

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

**SECOND INDUSTRY DRAFT REQUEST FOR PROPOSALS**  
**DESIGN-BUILD PROJECT**



**TIP R-2635D**

**March 4, 2015**



*VOID FOR BIDDING*

DATE AND TIME OF TECHNICAL AND PRICE PROPOSAL SUBMISSION: **April 28, 2015 BY 4:00 PM**

DATE AND TIME OF PRICE PROPOSAL OPENING: **May 19, 2015 AT 2:00 PM**

CONTRACT ID: C 203635

WBS ELEMENT NO. 35520.3.S5

COUNTY: Wake

ROUTE NO. Triangle Expressway (Toll NC 540)

MILES: 1.4

LOCATION: Triangle Expressway (Toll NC 540) / Old Holly Springs – Apex Road  
(SR 1153) Interchange

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. C203635  
IN WAKE 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. C203635; 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. C203635 in Wake County by no later than the dates(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.

**TO  
BE  
SEALED  
IN  
FINAL  
RFP**

*Administrator of the  
Technical Services Division*

**TO  
BE  
SEALED  
IN  
FINAL  
RFP**

*State Contract Officer*

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**PROPOSAL FORMS - ITEMIZED SHEET, ETC.**

- Itemized Proposal Sheet
- Fuel Usage Factor Chart and Estimate of Quantities
- Listing of MBE / WBE Subcontractors
- Execution of Bid, Non-Collusion Affidavit, Debarment Certification and Gift Ban Certification
- Signature Sheet

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

7-12-07

DB1 G04A

The date of availability for this contract is June 29, 2015, 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 July 15, 2018.

The observation periods required elsewhere in this RFP are not part of the work to be completed by the completion dates 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 **Two Thousand Dollars (\$ 2,000.00)** 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 **Five Hundred Dollars (\$ 500.00)** 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 shall 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 **Five Hundred Dollars (\$ 500.00)** 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.

**OTHER LIQUIDATED DAMAGES AND INCENTIVES**

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

DB1 G11

**Refer to the Transportation Management Scope of Work for more information on the following time restrictions and liquidated damages:**

Liquidated Damages for Intermediate Contract Time #1 for lane narrowing, lane closure, holiday and special event time restrictions for **Triangle Expressway (Toll NC 540), including all ramps and loops,** are \$500.00 per 15-minute period or any portion thereof.

Liquidated Damages for Intermediate Contract Time #2 for lane narrowing and lane closure time restrictions for Triangle Expressway (Toll NC 540) are \$500.00 per 15-minute period or any portion thereof.

Liquidated Damages for Intermediate Contract Time #3 for road closure time restrictions for Triangle Expressway (Toll NC 540) and Old Holly Springs – Apex Road (SR 1153), including all ramps and loops, are \$1000.00 per 15-minute period or any portion thereof.

Liquidated Damages for Intermediate Contract Time #4 for continuous lane closure time restrictions for Triangle Expressway (Toll NC 540) are \$1000.00 per calendar day or any portion thereof.

**Refer to the ITS Scope of Work for more information on the following liquidated damages:**

Liquidated Damages for Intermediate Contract Time #5 for failure to repair and / or maintain the ITS devices and restore communication within the timeframes specified in the ITS Scope of Work found elsewhere in this RFP are \$2,500.00 per occasion, per 24-hour period or any portion thereof, until corrected.

**All-Electronic Tolling Toll Zone Infrastructure and Conduit**

To ensure that adequate time is reserved for the Toll System Integrator to complete his / her work by the Substantial Completion Date proposed by the Design-Build Team in the Technical Proposal, liquidated damages apply to the completion dates of the All-Electronic Tolling Toll Zone Infrastructure, all ITS devices and the ITS communications infrastructure.

Liquidated damages for Intermediate Contract Date #1 for completion of the All-Electronic Tolling Toll Zone Infrastructure, all ITS devices and the ITS communications infrastructure for the entire project are Ten Thousand Dollars (\$10,000) per calendar day or any portion thereof. The portion of work required for this Intermediate Contract Date shall be all work necessary to design, fabricate, install and erect, on the entire project, the toll gantries, conduit, ITS devices, ITS communications infrastructure, and other items as required by the All-Electronic Toll Zone Facilities Infrastructure Scope of Work, the ITS Scope of Work and any other Scopes of Work sufficient to allow installation and testing of toll technology by the Toll System Integrator.

The Completion Date for Intermediate Contract Date #1 shall be 90 calendar days prior to the Substantial Completion Date proposed by the Design-Build Team in the Technical Proposal.

**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 the all updates to the Resident Engineer with a copy to the State Construction Engineer at 1 South Wilmington Street, 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**

5 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 50 percent of the lump sum amount calculated for Mobilization. The remaining 50 percent will be paid with the partial pay estimate following approval of all permits required in the Environmental Permits Scope of Work for this project.

### **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. All signs, including but not limited to all signs required for toll collection purposes, are complete and accepted, excluding signs on intersecting roadways that are not required for toll collection purposes.
4. All guardrails, drainage devices, ditches, excavation and embankment are complete.
5. The toll zone collection system, including but not limited to the All-Electronic Toll Zone Facilities Infrastructure, gantries and ITS devices, shall be fully operational.
6. 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.

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.

The Design-Build Team shall be responsible for the payment of all tolls incurred during construction of the project, including tolls incurred at the Triangle Expressway (Toll NC 540) / Old Holly Springs - Apex Road interchange ramps once toll collection begins. The Design-Build Team shall also be responsible for the cost of any transponders purchased, as well as all late fees and / or penalties.

#### **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 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 \$ [REDACTED] 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* 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 proposers' concerns and questions. The meeting may occur at any time after the first Question and Answer Session with the proposers and before two weeks prior to the date of Technical and Price Proposals submission. 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.

**\*\* NOTE \*\* Deleted *Partnering* Project Special Provision**

**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)Rev. (12-11-12)

DB1 G55B

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 responsible 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 Minority and Women's Business Enterprise (MB/WB) goals are established for this contract, the Proposer shall complete the form Listing of MB / WB Subcontractors contained elsewhere in this RFP in accordance with the Project Special Provision entitled *Minority Business Enterprise and Women Business Enterprise*.
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 three 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 one week 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 an 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 5 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 an order of court, 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 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 an 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 an 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 10 business days of submittal and provide written comments and 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; or (5) 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.

**VALUE ANALYSIS**

(9-1-11)

DB1 G57

Value Engineering Proposals, as specified in Article 104-12 of the 2012 *Standard Specifications for Roads and Structures* will be accepted. Only proposals, which alter the requirements of the RFP issued by the Department, will be considered as Value Engineering Proposals.

**SCHEDULE OF ESTIMATED COMPLETION PROGRESS**

(9-1-11) (Rev. 3/19/14)

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>
2016 (07/01/15 – 06/30/16)	14% of Total Amount Bid
2017 (07/01/16 – 06/30/17)	50% of Total Amount Bid
2018 (07/01/17 – 06/30/18)	36% 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.

**MINORITY BUSINESS ENTERPRISE AND WOMEN BUSINESS ENTERPRISE:**

(12/1/13)

DB1 G066

**Description**

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

**Definitions**

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

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

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

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

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

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

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

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

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

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

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

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

### **Forms and Websites Referenced in this Provision**

*Payment Tracking System* - On-line system in which the Design-Build Team enters the payments made to MBE and WBE subcontractors who have performed work on the project.

**<https://apps.dot.state.nc.us/Vendor/PaymentTracking/>**

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

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

SAF *Subcontract Approval Form* - Form required for approval to sublet the contract.

**<http://connect.ncdot.gov/projects/construction/Construction%20Forms/Subcontract%20Approval%20Form%20Rev.%202012.zip>**

JC-1 *Joint Check Notification Form* - Form and procedures for joint check notification. The form acts as a written joint check agreement among the parties providing full and prompt disclosure of the expected use of joint checks.

**<http://connect.ncdot.gov/projects/construction/Construction%20Forms/Joint%20Check%20Notification%20Form.pdf>**

*Letter of Intent* - Form signed by the Contractor and the MBE / WBE subcontractor, manufacturer or regular dealer that affirms that a portion of said contract is going to be performed by the signed MBE / WBE for the amount listed at the time of bid.

**<http://connect.ncdot.gov/letting/LetCentral/Letter%20of%20Intent%20to%20Perform%20as%20a%20Subcontractor.pdf>**

*Listing of MBE and WBE Subcontractors Form* - Form for entering MBE / WBE subcontractors on a project that will meet this MBE and WBE goals continued elsewhere in the RFP. This form is for paper bids only.

**[http://connect.ncdot.gov/municipalities/Bid%20Proposals%20for%20LGA%20Content/09%20MBE-WBE%20Subcontractors%20\(State\).docx](http://connect.ncdot.gov/municipalities/Bid%20Proposals%20for%20LGA%20Content/09%20MBE-WBE%20Subcontractors%20(State).docx)**

*Subcontractor Quote Comparison Sheet* - Spreadsheet for showing all subcontractor quotes in the work areas where MBEs and WBEs quoted on the project. This sheet is submitted with good faith effort packages.

**<http://connect.ncdot.gov/business/SmallBusiness/Documents/DBE%20Subcontractor%20Quote%20Comparison%20Example.xls>**

### **MBE and WBE Goal**

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

- (A) Minority Business Enterprises **6 %**
- (1) *If the MBE goal is more than zero*, the Design-Build Team shall exercise all necessary and reasonable steps to ensure that MBEs participate in at least the percent of the contract as set forth above as the MBE goal.
  - (2) *If the MBE goal is zero*, the Design-Build Team shall make an effort to recruit and use MBEs during the performance of the contract. Any MBE participation obtained shall be reported to the Department.
- (B) Women Business Enterprises **6 %**
- (1) *If the WBE goal is more than zero*, the Design-Build Team shall exercise all necessary and reasonable steps to ensure that WBEs participate in at least the percent of the contract as set forth above as the WBE goal.
  - (2) *If the WBE goal is zero*, the Design-Build Team shall make an effort to recruit and use WBEs during the performance of the contract. Any WBE participation obtained shall be reported to the Department.

This goal is to be met through utilization of highway construction contractors and / or right of way acquisition firms. Utilization of MBE / WBE 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 MBE and WBE certified shall be used to meet the MBE and WBE goals respectively. The Directory can be found at the following link.

**<https://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 MBE / WBE Subcontractors**

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

- (1) *If either the MBE or WBE goal is more than zero,*
  - (a) Proposers, at the time the Price Proposal is submitted, shall submit a listing of MBE / WBE participation, including the names and addresses on *Listing of MBE and WBE Subcontractors* contained elsewhere in the contract documents in order for the Price Proposal to be considered responsive. Proposers shall indicate the total dollar value of the MBE and WBE participation for the contract.
  - (b) If Proposers have no MBE or WBE participation, they shall indicate this on the *Listing of MBE and WBE Subcontractors* by entering the word "None" or the number "0." This form shall be completed in its entirety. **Blank forms will not be deemed to represent zero participation.** Price Proposals submitted that do not have MBE and WBE participation indicated on the appropriate form will not be read publicly during the opening of 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 MBE / WBE is certified at the time of bid by checking the Directory of Transportation Firms. If the firm is not certified at the time of the opening of the Price Proposals, that MBE's or WBE's participation will not count towards achieving the corresponding goal.
- (2) *If either the MBE or WBE goal is zero,* entries on the *Listing of MBE and WBE Subcontractors* are not required for the zero goal, however any MBE or WBE participation that is achieved during the project shall be reported in accordance with requirements contained elsewhere in this special provision.

**MBE or WBE Prime Contractor**

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

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

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

**Written Documentation – Letter of Intent**

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

The documentation shall be received in the office of the State Contractor Utilization Engineer or at DBE@ncdot.gov no later than 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 MBE and WBE to be used toward the MBE and WBE goals, or if the form is incomplete (i.e. both signatures are not present), the MBE / WBE participation will not count toward meeting the MBE / WBE goal. If the lack of this participation drops the commitment below either the MBE or WBE goal, the Design-Build Team shall submit evidence of good faith efforts for the goal not met, completed in its entirety, to the State Contractor Utilization Engineer or DBE@ncdot.gov no later than 12:00 noon on the eighth calendar day following opening of 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 either the MBE or the WBE goal, the Proposer with the apparent adjusted low price shall submit to the Department documentation of adequate good faith efforts made to reach that specific goal(s).

A hard copy and an electronic copy of this information shall be received in the office of the State Contractor Utilization Engineer or at DBE@ncdot.gov no later than 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 would be 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 9 copies of this information shall be received under the same time constraints above.

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

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

Adequate good faith efforts mean that the 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 MBE / WBE participation. Adequate good faith efforts also mean that the Proposer actively and aggressively sought MBE / WBE participation. Mere *pro forma* efforts are not considered good faith efforts.

The Department will consider the quality, quantity, and intensity of the different kinds of efforts a 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 goals and are not intended to be exclusive or exhaustive, nor is it intended to be a mandatory checklist.

- (A) Soliciting through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising, written notices, use of verifiable electronic means through the use of the NCDOT Directory of Transportation Firms) the interest of all certified MBEs / WBEs who have the capability to perform the work of the contract. The Proposer must solicit this interest within at least 10 days prior to the opening of the Price Proposals to allow the MBEs / WBEs to respond to the solicitation. Solicitation shall provide the opportunity to MBEs / WBEs within the Division and surrounding Divisions where the project is located. The Proposer must determine with certainty if the MBEs / WBEs are interested by taking appropriate steps to follow up initial solicitations.
- (B) Selecting portions of the work to be performed by MBEs / WBEs in order to increase the likelihood that the MBE and WBE goals will be achieved. Where appropriate, break out contract work items into economically feasible units to facilitate MBE / WBE participation, even when the prime contractor might otherwise prefer to perform



these work items with its own forces. Negotiate with subcontractors to assume part of the responsibility to meet the contract MBE / WBE goals when the work to be sublet includes potential for MBE / WBE participation (2<sup>nd</sup> and 3<sup>rd</sup> tier subcontractors).

- (C) Providing interested MBEs / WBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.
- (D)
  - (1) Negotiating in good faith with interested MBEs / WBEs. It is the Proposer's responsibility to make a portion of the work available to MBE / WBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available MBE / WBE subcontractors and suppliers, so as to facilitate MBE / WBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of MBEs / WBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for MBEs / WBEs to perform the work.
  - (2) A Proposer using good business judgment would consider a number of factors in negotiating with subcontractors, including MBE / WBE subcontractors, and would take a firm's price and capabilities as well as contract goals into consideration. However, the fact that there may be some additional costs involved in finding and using MBEs / WBEs is not in itself sufficient reason for a proposer's failure to meet the contract MBE or WBE goals, as long as such costs are reasonable. Also, the ability or desire of a prime contractor to perform the work of a contract with its own organization does not relieve the Proposer of the responsibility to make good faith efforts. Proposing Design-Build Teams are not, however, required to accept higher quotes from MBEs / WBEs if the price difference is excessive or unreasonable.
- (E) Not rejecting MBEs / WBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. The 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 Price Proposals in the Proposer's efforts to meet the project goal.
- (F) Making efforts to assist interested MBEs / WBEs in obtaining bonding, lines of credit, or insurance as required by the recipient or Proposer.
- (G) Making efforts to assist interested MBEs / WBEs in obtaining necessary equipment, supplies, materials, or related assistance or services.
- (H) Effectively using the services of available minority / women community organizations; minority/women contractors' groups; Federal, State, and local minority / women business

assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of MBEs / WBEs. Contact within 7 days from the 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 MBE or WBE quotes.

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

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

- (1) Whether the Proposer's documentation reflects a clear and realistic plan for achieving the MBE and WBE goals.
- (2) The Proposers' past performance in meeting the MBE and WBE goals.
- (3) The performance of other proposers in meeting the MBE and WBE goals. For example, when the Proposer with the apparent adjusted low price fails to meet the goals, 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 goals. If the Proposer with the apparent adjusted low price fails to meet the MBE and WBE goals, but meets or exceeds the average MBE and WBE 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 apparent 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 MBE and WBE goals can be met or that an adequate good faith effort has been made to meet the MBE and WBE goals.

### **Non-Good Faith Appeal**

The State Contractor Utilization 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 MBE / WBE Participation Toward Meeting MBE / WBE Goals****(A) Participation**

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

**(B) Joint Checks**

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

**(C) Subcontracts (Non-Trucking)**

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

**(D) Joint Venture**

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

**(E) Suppliers**

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

(F) **Manufacturers and Regular Dealers**

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

- (1) The fees or commissions charged by a MBE / WBE firm for providing a *bona fide* service, such as providing bonds or insurance specifically required for the performance of a DOT-assisted contract, provided the fees or commissions are determined to be reasonable and not excessive as compared with fees and commissions customarily allowed for similar services.
- (2) With respect to materials or supplies purchased from a MBE / WBE, which is neither a manufacturer nor a regular dealer, count the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on a job site (but not the cost of the materials and supplies themselves), provided the fees are determined to be reasonable and not excessive as compared with fees customarily allowed for similar services.

**Commercially Useful Function**

(A) **MBE / WBE Utilization**

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

(B) **MBE / WBE Utilization in Trucking**

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

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

- (2) The MBE / WBE shall itself own and operate at least one fully licensed, insured, and operational truck used on the contract.
- (3) The MBE / WBE receives credit for the total value of the transportation services it provides on the contract using trucks it owns, insures, and operates using drivers it employs.
- (4) The MBE may subcontract the work to another MBE firm, including an owner-operator who is certified as a MBE. The same holds true that a WBE may subcontract the work to another WBE firm, including an owner-operator who is certified as a WBE. When this occurs, the MBE or WBE who subcontracts work receives credit for the total value of the transportation services the subcontracted MBE or WBE provides on the contract. It should be noted that every effort shall be made by MBE and WBE contractors to subcontract to the same certification (i.e., MBEs to MBEs and WBEs to WBEs), in order to fulfill the goal requirement. This, however, may not always be possible due to the limitation of firms in the area. If the MBE or WBE firm shows a good faith effort has been made to reach out to similarly certified transportation service providers and there is no interest or availability, and they can get assistance from other certified providers, the Engineer will not hold the prime liable for meeting the goal.
- (5) The MBE / WBE may also subcontract the work to a non-MBE / WBE firm, including from an owner-operator. The MBE / WBE who subcontracts the work to a non-MBE / WBE is entitled to credit for the total value of transportation services provided by the non-MBE / WBE subcontractor not to exceed the value of transportation services provided by MBE / WBE-owned trucks on the contract. Additional participation by non-MBE / WBE subcontractors receives credit only for the fee or commission it receives as a result of the subcontract arrangement. The value of services performed under subcontract agreements between the MBE / WBE and the Design-Build Team will not count towards the MBE / WBE contract requirement.
- (6) A MBE / WBE may lease truck(s) from an established equipment leasing business open to the general public. The lease must indicate that the MBE / WBE has exclusive use of and control over the truck. This requirement does not preclude the leased truck from working for others during the term of the lease with the consent of the MBE / WBE, so long as the lease gives the MBE / WBE absolute priority for use of the leased truck. This type of lease may count toward the MBE / WBE's credit as long as the driver is under the MBE / WBE's payroll.
- (7) Subcontracted / leased trucks shall display clearly on the dashboard the name of the MBE / WBE that they are subcontracted / leased to and their own company name if it is not identified on the truck itself. Magnetic door signs are not permitted.

**Banking MBE / WBE Credit**

If the Price Proposal of the Proposer with the apparent adjusted low price exceeds \$500,000 and if the committed MBE / WBE participation submitted by Letter of Intent exceeds the algebraic sum of the MBE or WBE goal by \$1,000 or more, the excess will be placed on deposit by the Department for future use by the Proposer. Separate accounts will be maintained for MBE and WBE participation and these may accumulate for a period not to exceed 24 months.

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

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

**MBE / WBE Replacement**

When a Design-Build Team has relied on a commitment to a MBE or WBE firm (or an approved substitute MBE or WBE firm) to meet all or part of a contract goal requirement, the Design-Build Team shall not terminate the MBE / WBE 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 MBE / WBE subcontractor, a non-MBE / WBE subcontractor, or with the Design-Build Team's own forces or those of an affiliate. A MBE / WBE may only be terminated after receiving the Engineer's written approval based upon a finding of good cause for the termination.

All requests for replacement of a committed MBE / WBE firm shall be submitted to the Engineer for approval on Form RF-1 (*Replacement Request*). If the 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 6 months.

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

**(A) Performance Related Replacement**

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

additional MBEs / WBEs submitted at the time of bid to cover the same amount of work as the MBE / WBE that was terminated.

If a replacement MBE / WBE is not found that can perform at least the same amount of work as the terminated MBE / WBE, the 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 MBEs / WBEs that their interest is solicited in contracting the work defaulted by the previous MBE / WBE or in subcontracting other items of work in the contract.
  - (2) Efforts to negotiate with MBEs / WBEs for specific subbids including, at a minimum:
    - (a) The names, addresses, and telephone numbers of MBEs/ W BEs who were contacted.
    - (b) A description of the information provided to MBEs / WBEs regarding the plans and specifications for portions of the work to be performed.
  - (3) A list of reasons why MBE / WBE quotes were not accepted.
  - (4) Efforts made to assist the MBEs / WBEs contacted, if needed, in obtaining bonding or insurance required by the Design-Build Team.
- (B) Decertification Replacement
- (1) When a committed MBE / WBE is decertified by the Department after the SAF (*Subcontract Approval Form*) has been received by the Department, the Department will not require the Design-Build Team to solicit replacement MBE / WBE participation equal to the remaining work to be performed by the decertified firm. The participation equal to the remaining work performed by the decertified firm will count toward the contract goal requirement.
  - (2) When a committed MBE / WBE is decertified prior to the Department receiving the SAF (*Subcontract Approval Form*) for the named MBE / WBE firm, the Design-Build Team shall take all necessary and reasonable steps to replace the MBE / WBE subcontractor with another similarly certified MBE / WBE subcontractor to perform at least the same amount of work to meet the MBE / WBE goal requirement. If a MBE / WBE firm is not found to do the same amount of work, a good faith effort must be submitted to NCDOT (see A herein for required documentation).

**Changes in the Work**

When the Engineer makes changes that result in the reduction or elimination of work to be performed by a committed MBE / WBE, the 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 MBE / WBE based upon the Design-Build Team's commitment, the MBE / WBE shall participate in additional work to the same extent as the MBE / WBE participated in the original contract work.

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

When the Engineer makes changes that result in an alteration of plans or details of construction, and a portion or all of the work had been expected to be performed by a committed MBE / WBE, the Design-Build Team shall seek participation by MBEs / WBEs 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 MBE / WBE, the Design-Build Team shall seek additional participation by MBEs / WBEs equal to the reduced MBE / WBE participation caused by the changes.

**Reports and Documentation**

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

When using transportation services to meet the contract commitment, the 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 MBE / WBE 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 MBE / WBE credit.

**Reporting Minority and Women Business Enterprise Participation**

The Design-Build Team shall provide the Engineer with an accounting of payments made to all MBE and WBE firms, including material suppliers and contractors at all levels (prime, subcontractor, or second tier subcontractor). This accounting shall be furnished to the Engineer



for any given month by the end of the following month. Failure to submit this information accordingly may result in the following action:

- (A) Withholding of money due in the next partial pay estimate; or
- (B) Removal of an approved 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 MBEs / WBEs, it shall be the prime contractor's responsibility to report all monthly and final payment information in the correct reporting manner.

Failure on the part of the 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 and 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-MBE / WBE lessees shall evaluate the value of services provided during the month of the reporting period only.

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

The Design-Build Team shall report the accounting of payments through the Department's Payment Tracking System.

### **Failure to Meet Contract Requirements**

Failure to meet contract requirements in accordance with Subarticle 102- 15(J) of the 2012 *Standard Specifications for Roads and Structures* may be cause to disqualify the Prime Contractor or any other affiliated companies within the Design-Build Team from further bidding for a specified length of time.

### **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).

**RESOURCE CONSERVATION**

(3/27/13)

104-13

DB1 G118

In accordance with North Carolina Executive Order 156, NCGS 130A-309.14(2), and NCGS 136-28.8, it is the policy of the Department to aid in the reduction of materials that become a part of our solid waste stream, to divert materials from landfills, and to find ways to recycle and reuse materials for the benefit of the Citizens of North Carolina.

Initiate, develop and use products and construction methods that incorporate the use of recycled or solid waste products 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 on the Project Construction Reuse and Recycling Reporting Form.

A location-based tool for finding local recycling facilities and the Project Construction Reuse and Recycling Reporting Form are available at:

**<http://connect.ncdot.gov/resources/Environmental/Pages/North-Carolina-Recycling-Locations.aspx>**

**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.

**BID DOCUMENTATION**

(Rev. 07-31-12)

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.

*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 copy of the Escrow Agreement will be mailed to the Proposer with 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](mailto: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 by him. Bid documentation will be considered a certified copy if the Bidder includes a letter to the Department from a chief officer of the company stating that the enclosed documentation is an *EXACT* copy of the original documentation. The letter 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 letter.
- (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**

In addition to the bid documentation, an affidavit signed under oath by an individual authorized by the Proposer to execute the bid shall be included. The affidavit shall 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. 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 Price Proposal for this project, and that all such bid documentation has been included.

### **Verification**

Upon delivery of the bid documentation, the Department's Contract Officer and the Proposer's representative will verify the accuracy and completeness of the bid documentation compared to the affidavit. Should a discrepancy exist, the Proposer'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 Proposer'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 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 Contractor will be notified by certified letter from the escrow agent that the bid documentation will be released to the Contractor. The 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 Contractor does not receive the documents within 30 days of the receipt of the certified letter, the Department will contact the 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.

### **OUTSOURCING OUTSIDE THE USA**

(5-16-06)

DB1 G150

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

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

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

### **EROSION AND SEDIMENT CONTROL/STORMWATER CERTIFICATION**

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

105-16, 225-2, 16

DP1 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 two 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](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 Standard No. 200.03 of the 2012 *NCDOT Roadway Standard Drawings*. In areas with Permanent Utility Easements, clearing shall extend to the Right of Way limits.

**BURNING RESTRICTIONS**

(7-1-95)

DB2 R05

Open burning is not 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 Wake 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 R12B

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.

In the unlikely event that the Design-Build Team encounters unknown contaminated materials, these materials shall be handled in accordance with Article 107-25 of the 2012 *Standard Specifications for Roads and Structures*.

### **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.

**PIPE INSTALLATION**

09/28/12

300

DB3 R01

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

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

Provide foundation conditioning geotextile in accordance with Section 1056 for Type 4 geotextile.

**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 2 inches of final sub-grade elevation. The Design-Build Team shall sample the top 8 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**

<b><u>TEST</u></b>	<b><u>AASHTO DESIGNATION</u></b>
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**

<b><u>CRITERIA FOR SELECTING LIME OR CEMENT</u></b>		
<b>PROPERTY</b>	<b>A</b>	<b>B</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 2 specimens for each selected cement rate.
- Cure the specimens for 7 days in a moist room maintained at a temperature of 73°F ±2.7° and a humidity of 100%. At the end of the curing period, immerse the specimens in water for 4 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 2 days and a maximum of 4 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 \$ **PRICE TO BE INCLUDED IN THE FINAL RFP** per ton.

This base price index represents an average of F.O.B. selling prices of asphalt binder at supplier's terminals on **\_\_\_\_\_**.

**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 per theoretical ton. This price shall apply for all mix types.

**GEOTEXTILE FOR PAVEMENT STABILIZATION**

(05-07-14)

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:

<b>GEOTEXTILE FOR PAVEMENT STABILIZATION REQUIREMENTS</b>		
Property	Requirement (MARV <sup>A</sup> )	Test Method
Tensile Strength @ 5% Strain (MD & CD <sup>A</sup> )	1,900 lb/ft	ASTM D4595
Ultimate Tensile Strength (MD & CD <sup>A</sup> )	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 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**

3/26/13

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 Drawings* 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 Drawings* No. 1743.01.

## Materials

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

Item	Section
Conduit	1091-3
Grout, Nonshrink	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 or defective materials will 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 discretion of the Engineer. A list of approved polymer slurry products is available from:

**[connect.ncdot.gov/resources/Geological/Pages/Products.aspx](http://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, and
- (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 nominal 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 accepted 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



accepted 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 forms 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, Contractor and Drilled Pier Contractor Superintendent will attend this predrill meeting.

Do not excavate holes, install piles or allow equipment wheel loads or vibrations within 20 ft 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 accepted 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 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 should be installed against undisturbed material. Unless otherwise approved, do not leave temporary casings in place for mast arm poles and 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 2 ft of the bottom of holes. Take sample sets from excavations to test polymer slurry immediately after filling holes with slurry, at least every 4 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) except for the following:

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

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 will be considered defective in accordance with Subarticle 411-5(D) of the 2012 *Standard Specifications for Roads and Structures* and drilled pier acceptance is 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).

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 is required in accordance with Article 411-6 of the 2012 *Standard Specifications for Roads and Structures*. No 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.

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 and the following:

- (1) Protrusion of 3 to 5 anchor rod threads above top nuts after tightening and
- (2) 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 lubricants.
- (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 2 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:

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

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

- (11) Ensure nuts, washers and base plates 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 4 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:

<b>TORQUE REQUIREMENTS</b>	
<b>Anchor Rod Diameter, inch</b>	<b>Requirement, ft-lb</b>
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  $\pm 10$  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 is 1/2 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 Project Special Provision, 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 Project Special Provision 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  $M = P \times D_2$ .

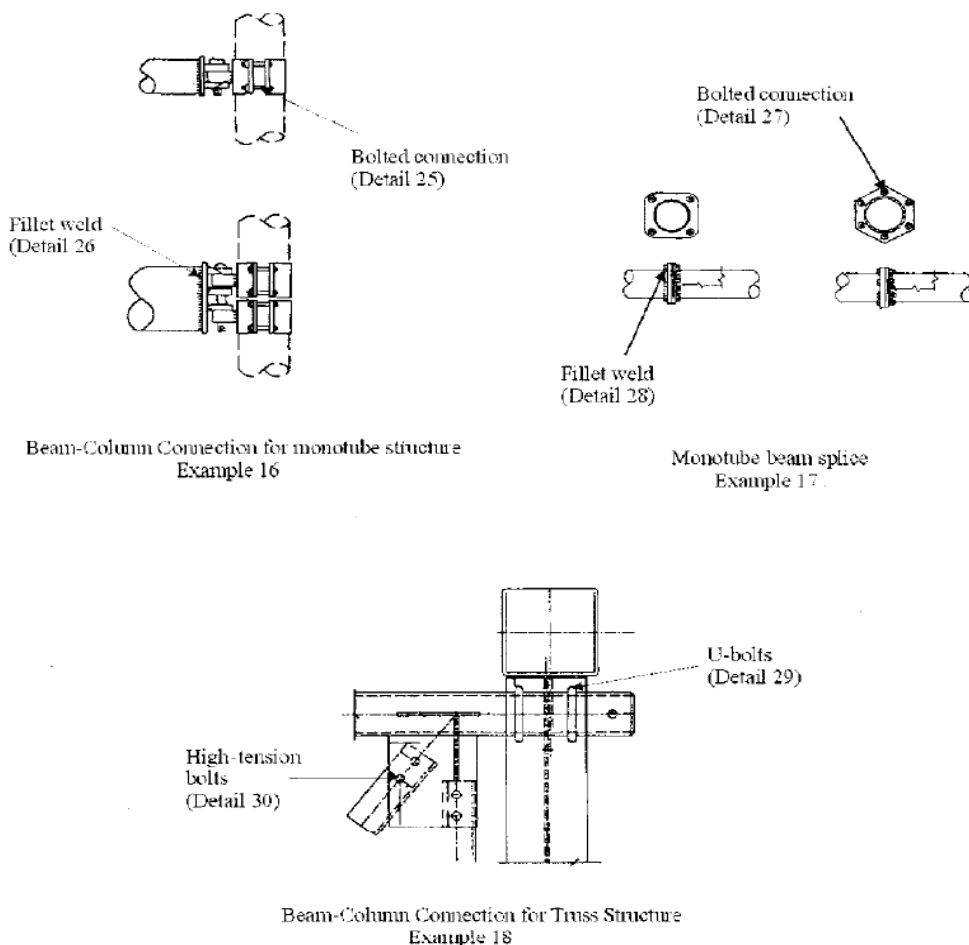
- M - bending moment at the critical section of the base plate induced by one anchor bolt
- P - anchoring force of each anchor bolt
- $D_1$  - horizontal distance between the center of the anchor bolt and the outer face of the upright, or the difference between the radius of the bolt circle and the outside radius of the upright
- $D_2$  - 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 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:

<b>Construction</b>	<b>Detail</b>	<b>Stress Category</b>	<b>Application</b>	<b>Example</b>
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 AASHTO 2009 *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5th Edition, with 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:

- (D) Unit weight = 120 lb/cf,
- (E) Friction angle = 30 degrees,
- (F) Cohesion = 0 lb/sf, and
- (G) Groundwater 7 feet below finished grade.

A subsurface investigation is 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 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 2 feet of finished grade before beginning drilling. Drill borings to 2 drilled pier diameters below anticipated pier tip elevations or refusal, whichever is higher.

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. 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 AASHTO 2009 *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5th Edition, with 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 5.0 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 AASHTO 2009 *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5th Edition, with 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 *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* provision.

### **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 Drawings* No. 1402.01 or the accepted submittals. Define “high mount standard foundation” as a drilled pier including the conduit and anchor rod assembly that meets 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 accepted plans developed by the Design-Build Team unless the following assumed site conditions are not applicable to high mount locations:

- (H) Soil with unit weight ( $\gamma$ )  $\geq$  120 lb/cf and friction angle ( $\phi$ )  $\geq$  30° ,
- (I) Groundwater at least 7 feet below finished grade, and
- (J) Slope of finished grade 6:1 (H:V) or flatter.

A subsurface investigation and high mount foundation design are 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 will 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. Rough grade high mount locations to within 2 feet of finished grade before beginning drilling. Drill borings to 2 drilled pier diameters below anticipated pier tip elevations or refusal, whichever is higher.

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. 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 accepted 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 4<sup>th</sup> Edition of the AASHTO 2009 *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5th Edition, with the 2010 and 2011 Interim Revisions.

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. 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 3 ft diameter level work area around high mount locations with cut and fill slopes as shown on 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.



**DIAMOND GRINDING CONCRETE PAVEMENT**

SPI 7-9

**Description**

Perform the work covered by this provision, including but not limited to diamond grinding and regrinding concrete pavement to meet final surface testing requirements, in accordance with Article 710-7 of the 2012 *NCDOT Standard Specifications for Roads and Structures*, evaluating existing concrete pavement and aggregate properties, selecting diamond tipped saw blades and configuration of cutting head; continual removal of residual slurry from pavement and disposal; furnishing all labor, materials, supplies, tools, equipment and incidentals as necessary.

**Equipment**

Use equipment with diamond tipped saw blades gang mounted on a power driven self-propelled machine with a minimum wheel base length of 15 feet that is specifically designed to smooth and texture Portland Cement Concrete pavement. Utilize equipment that does not cause ravel; aggregate fracture; spalls or disturbance to the longitudinal or transverse joints; or damage and/or strain to the underlying surface of the pavement. Should any of the above problems occur immediately suspend operations.

Provide a minimum three-foot wide grinding head with 50 to 60 evenly spaced grooves per foot. Prior to designing the grinding head, evaluate the aggregate hardness of the concrete pavement and select the appropriate diamond size, diamond concentration and bond hardness for the individual saw blades.

Provide vacuuming equipment to continuously remove slurry residue and excess water from the pavement as part of the grinding operation. Do not allow the slurry material to flow into a travel lane occupied by traffic or into any drainage facility.

**Method of Construction**

Grind the pavement surface to a uniform appearance with a high skid resistant longitudinal corduroy type texture. Provide grooves between 0.09 and 0.15 inches wide with the land area between the grooves between 0.06 and 0.13 inches wide. Ensure a ridge peak of approximately 0.0625 inches higher than the bottom of the grooves.

Begin and end diamond grinding at lines normal to the pavement centerline. Grind only in the longitudinal direction. All grooves and adjacent passes shall be parallel to each other with no variation. Completely lap adjacent passes with no unground surface remaining between passes and no overlap of more than 1½ inches. Adjacent passes shall be within 1/8 inch of the same height as measured with a three-foot straightedge. Maintain positive cross-slope drainage for the duration of the grinding operation.

Grind all concrete pavement with not less than 98 percent of the specified surface being textured by grinding. Grinding of the bridge decks and concrete shoulders will not be required. Remove a minimum 0.0625 inches at all locations except dips. Extra grinding to eliminate minor

depressions is not required. There shall be no ridge between lanes. In a separate operation, transition the grinding of any remaining ridges greater than 1/8 inch in height on the outside edge next to the shoulder or at a tie to an existing facility to the satisfaction of the Engineer.

### **Disposal of Residual Slurry**

Diamond grinding slurry disposal shall be in accordance with the Statewide Permit for Land Application of Diamond Grinding Slurry (DGS), Permit No. WQ0035749 dated April 24, 2013. Submit a slurry disposal plan to the Engineer detailing method of handling and disposing of slurry from the diamond grinding operation a minimum of 60 days prior to beginning the diamond grinding operation. Engineer shall review the slurry disposal plan. Plan must be accepted prior to beginning the diamond grinding operation. DSG may also be transported beyond the project limits to an approved permitted site. No additional payment will be made for transporting this slurry material for disposal.

**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 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 proposed improvements shall provide an interchange at Triangle Expressway (Toll NC 540) and Old Holly Springs - Apex Road (SR 1153). The approximately 1.4 mile project shall provide auxiliary lanes along Triangle Expressway (Toll NC 540) between the NC 55 Bypass and US 1 interchanges. The proposed improvements shall include the design and construction of All-Electronic Tolling (AET) toll zone facility infrastructures on the interchange ramps serving traffic to / from the north on Triangle Expressway (Toll NC 540). The North Carolina Turnpike Authority roadside toll collection system integrator will procure and install all roadside toll technology components (antennas, cameras, cables, etc.).

Project services shall include, but are not limited to:

- **Design Services** – completion of construction plans
- **Construction Services** – necessary to build and ensure workmanship of the designed facility
- **Intelligent Transportation System** – design and construction of ITS components, including conduit trunk line with fiber-optic communications, microwave detection devices, and relocation or reconstruction of other ITS elements
- **AET Toll Zone Facilities Infrastructure** - design and construction of AET sites, buildings and structures to support the toll collection system (toll technology components to be installed by others)
- **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**

NCDOT is currently developing the R-2635D State Combined Environmental Assessment (EA) / Finding of No Significant Impact (FONSI) which is anticipated to be completed in February 2015. 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 the project.

**Construction Engineering Inspection** will be provided by the NCDOT Division and NCTA 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 shall include all aspects to construct the Triangle Expressway (Toll NC 540) / Old Holly Springs – Apex Road (SR 1153) interchange and auxiliary lanes along the Triangle Expressway (Toll NC 540) between the NC 55 Bypass and US 1 interchanges. 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.

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 interchange and mainline widening. 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:

- Permit Application
- Hydraulic Design
- Roadway Design
- Structure Design
- Geotechnical
- Construction
- Erosion and Sedimentation Control Design and Implementation
- Lighting (Construction Only)
- Utility Construction
- R/W Utilities, Conflicts and / or Construction
- Transportation Management Plan Design and Implementation
- Pavement Marking Design
- Foundation Design for Structures and Roadway
- Sign Design
- Traffic Signal Design
- Design and Construction Management
- Construction Surveying
- Location and Surveys
- Right of Way Acquisition
- Public Information
- Project Management
- Subgrade Stabilization
- Aesthetics
- Intelligent Transportation Systems (ITS)
- All-Electronic Tolling (AET) Toll Zone Facilities Infrastructure

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 providing an interchange at Triangle Expressway (Toll NC 540) and Old Holly Springs – Apex Road (SR 1153) and auxiliary lanes along the Triangle Expressway (Toll NC 540) between the NC 55 Bypass and US 1 interchanges 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 "R-2635D Project" 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 that are assembled in a portfolio. 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); and
- 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, April 28, 2015**, 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**

Technical Proposals shall be submitted in a sealed package. The outer wrapping shall clearly indicate the following information:

Technical Proposal  
Submitted By: (Design-Build Team's Name)  
Design-Build Team Address  
Contract Number C 203635  
TIP Number R-2635D  
Wake County

Triangle Expressway (Toll NC 540) / Old Holly Springs – Apex Road (SR 1153) Interchange

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. C 203635".

**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

### **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 203635  
TIP Number R-2635D  
Wake County  
Triangle Expressway (Toll NC 540) / Old Holly Springs – Apex Road (SR 1153) Interchange

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. C 203635".

### **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 firm's understanding of the project, demonstrate the 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:

	<b>EVALUATION FACTORS</b>	<b>POINTS</b>
1.	Management	10
2.	Responsiveness to Request for Proposal	30
3.	Long Term Maintenance	5
4.	Schedule and Milestones	30
5.	Innovation	5
6.	Maintenance of Traffic and Safety Plan	15
7.	Oral Interview	5

## **TECHNICAL PROPOSAL EVALUATION CRITERIA**

### **1. Management – 10 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 Intelligent Transportation System (ITS), All-Electronic Tolling (AET) Toll Zone Facilities Infrastructure, Signing Plans, Traffic Signal Plans and Transportation Management Plans.

#### ***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 – 30 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 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 and streams.

- 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 Plan.

### ***Design Features***

- Show plan view of design concepts with key elements noted.
- Identify preliminary horizontal and vertical alignments of all roadway elements.
- Show mainline typical sections.
- Specify the pavement option chosen (ABC or asphalt) for all ramps and loops.
- Identify proposed deviations to the preliminary design provided by the Department.
- Identify drainage modifications and designs to be implemented.
- Throughout the project limits, identify all hydraulically deficient box culverts and pipes within the existing / proposed right of way and their proposed mitigation.
- If applicable, specify the extent of impacts to properties with contaminated soils, indicating the anticipated contamination excavation limits.
- Identify the appropriate design criteria for each feature, if not provided herein.
- 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 all aesthetic treatments 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 impacts meeting.
- Describe how the design will affect the Department's right of way costs.
- Identify types of any retaining walls, if applicable.

### **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.
- The schedule shall include the Design-Build Team's committed durations for continuous closure of the Triangle Expressway (Toll NC 540) eastbound and westbound outside lanes, as allowed by Intermediate Contract Time # 4.
- The schedule shall also include the Design-Build Team's final completion date and substantial completion date. **These dates shall be clearly indicated on the Project Schedule and labeled "Final Completion Date" and "Substantial Completion Date".**

#### 5. Innovation – 5 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 – 15 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 Completion 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 materials to and from the site and hauling of materials within NCDOT right of way.
- If a temporary portable barrier system will be utilized, provide the type and why it is needed.
- If temporary shoring will be required, provide the type and why it is required.
- Include all proposed road closures and / or offsite detour routes, duration and justification.
- Address where and how law enforcement officers will be used.
- Discuss the Design-Build Team's approach to provide the public with communication access to project personnel to inquire as to traffic impacts, including vehicular and pedestrian.
- Identify a Traffic Control Supervisor.

### ***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 traveling 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 Team's Technical Proposal, background, philosophies and project approach.
- Presentation, questions, and answers shall not exceed 90 minutes. No more than 10 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 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	10
Responsiveness to Request for Proposal	30
Long Term Maintenance	5
Schedule and Milestones	30
Innovation	5
Maintenance of Traffic and Safety Plan	15
Oral Interview	5
<b>Maximum Score</b>	<b>100</b>

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 **15%**. 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	15.00	84	7.00
99	14.50	83	6.50
98	14.00	82	6.00
97	13.50	81	5.50
96	13.00	80	5.00
95	12.50	79	4.50
94	12.00	78	4.00
93	11.50	77	3.50
92	11.00	76	3.00
91	10.50	75	2.50
90	10.00	74	2.00
89	9.50	73	1.50
88	9.00	72	1.00
87	8.50	71	0.50
86	8.00	70	0.00
85	7.50		

**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**

<b>Proposal</b>	<b>Technical Score</b>	<b>Quality Credit (%)</b>	<b>Price Proposal (\$)</b>	<b>Quality Value (\$)</b>	<b>Adjusted Price (\$)</b>
A	95	12.50	3,000,000	375,000	2,625,000
B	90	10.00	2,900,000	290,000	2,610,000
C *	90	10.00	2,800,000	280,000	2,520,000
D	80	5.00	2,700,000	135,000	2,565,000
E	70	0.00	2,600,000	0	2,600,000
* Successful Design-Build Team – Contract Cost \$2,520,000					

### **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 **\$25,000** 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** (2-23-15)

**\*\* NOTE \*\* The Design-Build Team shall design and construct horizontal and vertical alignments that accommodate the future improvements shown on the R-2635D Design Public Meeting Map – Ultimate Design, including but not limited to the appropriate cross slopes (superelevations), horizontal clearances, vertical clearances, etc.**

**Project Details**

- The Design-Build Team shall design and construct an interchange at Triangle Expressway (Toll NC 540) and Old Holly Springs - Apex Road (SR 1153). Between the NC 55 Bypass and US 1 interchanges, the Design-Build Team shall design and construct 12-foot auxiliary lanes along both sides of the Triangle Expressway (Toll NC 540). Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall design and construct the -L- Line providing the same or better access, widening, improvements and level of service included in the R-2635D Design Public Meeting Map - Interim Design 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 shall be designed and constructed to meet a 70 mph design speed for a rolling urban freeway designed to interstate standards. 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 14-foot outside shoulders (12-foot useable shoulder width plus two feet), 12-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).
- The Design-Build Team shall not reverse the mainline stationing from that shown on the Design-Public Meeting Map – Interim Design provided by the Department.
- Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall design and construct the -Y- Line, ramps and loops providing the same or better access, widening, improvements, and level of service included in the R-2635D Design Public Meeting Map - Interim Design provided by the Department. The -Y- Line shall be designed and constructed to meet a 50 mph design speed for a rolling rural major collector. Excluding the curb and gutter section, the Design-Build Team shall design and construct minimum 12-foot outside shoulders, four-foot of which shall be full depth paved shoulders, along the -Y- Line. The limits of the -Y- Line construction shall be of sufficient length to tie to existing based upon the current NCDOT guidelines and standards.
- The Design-Build Team shall design and construct the -Y- Line such that the through movement is not required to change lanes through the project limits.
- The Design-Build Team shall design and construct one-lane ramps that provide a minimum 16-foot lane width. The Design-Build Team shall design and construct two lane ramps that provide minimum 12-foot lanes. All ramps shall have 14-foot outside shoulders, four-foot of

which shall be full depth paved shoulders and 12-foot inside shoulders, four-foot of which shall be full depth paved shoulders.

- 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. Unless noted otherwise elsewhere in this RFP, all loops shall have 2'-6" curb and gutter along the inside edge of pavement, with a 14-foot berm. The minimum loop design shall be 30 mph with a minimum 230-foot radius.
- At all All-Electronic Tolling (AET) Toll Zone Facilities (with and without buildings), the Design-Build Team shall provide 14-foot shoulders, 12 feet of which shall be full depth paved shoulders for the minimum lengths noted below:
  - Upstream of all AET Toll Zone Facilities, the Design-Build Team shall provide the aforementioned shoulder widths a length equal to the distance required for a vehicle traveling at the adjacent roadway design speed to stop.
  - Downstream of all AET Toll Zone Facilities, the Design-Build Team shall provide the aforementioned shoulder widths a length equal to the distance required for a stopped vehicle to travel the adjacent roadway design speed.
  - The minimum lengths noted above shall be in accordance with the 2011 AASHTO *A Policy on Geometric Design of Highways and Streets* Tables 10-3, 10-4 and 10-5. For traffic entering the AET Toll Zone Facility, the minimum length shall be measured from the downstream end of the barrier protecting the facility. For traffic exiting the site, the minimum length shall be measured from the end of the taper shown on the NCTA AET Standard Drawings.
- To provide cross-over protection, the Design-Build Team shall design and construct double-face concrete barrier that separates ramp and loop traffic. Where warranted, the Design-Build Team shall also design and construct glare screens between the ramp and loop traffic. The aforementioned barrier and glare screens shall utilize details which aesthetically match the existing details within the Triangle Expressway (Toll NC 540) corridor and shall be in accordance with the NCTA Aesthetic Design Guidelines. (Reference the Aesthetic Design Scope of Work found elsewhere in this RFP)
- Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall design and construct at-grade intersections with the lane configurations noted in *Figure 3, 2016 Opening Year Interchange Interim Laneage and LOS*, of the March 2014 Traffic Capacity Analysis Technical Memorandum provided by the Department. 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 *Figure 3, 2016 Opening Year Interchange Interim Laneage and LOS*, of the March 2014 Traffic Capacity Analysis Technical Memorandum 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 Technical 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 Roadway Design Manual (Reference Section 9-1, Figure F-4C).
- For all intersection / interchange design modifications, the Design-Build Team shall provide a traffic analysis that adheres to the January 1, 2012 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" keyed-in concrete monolithic channelization islands.
- The Design-Build Team shall design the Triangle Expressway (Toll NC 540) / Old Holly Springs – Apex Road interchange as shown on the R-2635D Design Public Meeting Map – Ultimate Design. At this interchange, the Design-Build Team shall, at a minimum, adhere to the following requirements:
  - The Design-Build Team shall grade the additional ramps / loops shown on the R-2635D Design-Public Meeting Map – Ultimate Design to an elevation that extends the proposed constructed shoulder / berm and is graded to drain.
  - The Design-Build Team shall design and construct eastbound and westbound gore areas that adhere to the aforementioned Ultimate Design.
  - The Design-Build Team shall design and construct all required positive protection and cross pipes through the ramp / loop graded areas. (Reference the Hydraulics Scope of Work found elsewhere in this RFP)
  - The Design-Build Team shall make a determination of, and acquire, the additional right of way required for the aforementioned Ultimate Design. (Reference the Right of Way Scope found elsewhere in this RFP)

- The Design-Build Team shall relocate / coordinate the relocation of utilities in conflict with the future improvements. (Reference the Utilities Coordination Scope of Work found elsewhere in this RFP)
  - The Design-Build Team shall design and construct all elements of the toll zone collection system, including but not limited to the All-Electronic Toll Zone Facilities Infrastructure, gantries and ITS devices, such that they do not require relocation / modifications to accommodate the future improvements. (Reference the All-Electronic Toll Zone Facilities Infrastructure and ITS Scopes of Work found elsewhere in this RFP)
  - The Design-Build Team shall design and install all overhead sign structures such that they do not require relocation to accommodate the future improvements. (Reference the Signing Scope of Work found elsewhere in this RFP)
- At each end of the bridge on Old Holly Springs – Apex Road over the Triangle Expressway (Toll NC 540), the Design-Build Team shall design and construct paved stub outs that extend a minimum of 25 feet from the end of the bridge approach slabs and adhere to the Ultimate Design -Y- Line typical section. For a minimum distance of 100 feet beyond these paved stub outs, the Design-Build Team shall grade the Ultimate Design -Y- Line typical section to an elevation that extends the proposed constructed shoulder and is graded to drain.
  - The mainline 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 R-2635D Design Public Meeting Map - Ultimate Design provided by the Department. The proposed right of way and / or control of access may deviate in proximity to cultural, historic, or otherwise protected landmarks, including cemeteries, to eliminate / minimize impacts. Prior to negotiating right of way, easement and / or control of access with the property owners, the Department shall review and accept the Right of Way Plans developed by the Design-Build Team.
  - The Design-Build Team shall not further impact any cultural, historical or otherwise protected landmark or topographic feature beyond that shown on the Design Public Meeting Map – Ultimate Design provided by the Department, including but not limited to not increasing the impacts on the Highway 55 C & D Landfill property. The Design-Build Team shall not acquire right of way or easements from the aforementioned features unless shown on the Design Public Meeting Map – Ultimate Design provided by the Department.
  - 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:
    - With the exception of within subdivision limits, the Design-Build Team shall install woven wire fence.

- Within existing subdivision limits, the Design-Build Team shall install five-foot chain-link fence.
- Except as required otherwise above, the Design-Build Team shall replace, in kind, all control of access fence damaged during construction
- Except as required otherwise above, the Design-Build Team shall install all missing control of access fence, matching the adjacent fence type
- The Design-Build Team shall provide milled rumble strips along the mainline outside paved shoulders, including ramp and loop terminals, and acceleration, deceleration and auxiliary lanes, in accordance with the January 2012 Roadway Standard Drawings.
- For the bridge over the mainline, 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 the Department.
- The Design-Build Team shall design and construct a resurfacing grade for the -Y- Line. The resurfacing grade 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 throughout the limits of proposed construction.
  - The Design-Build Team shall resurface all lanes and shoulders to the limits of pavement marking obliterations / revisions.
- The Design-Build Team shall inform the Design-Build Unit, in writing, of all proposed design revisions, including but not limited to the following:
  - The Design-Build Team shall note in the Technical Proposal any proposed deviations to the preliminary design shown on the R-2635D Design Public Meeting Map - Interim Design provided by the Department. The Design-Build Team shall be responsible for all activities, as deemed necessary by the Department, resulting from changes to the NCDOT preliminary design, including but not limited to, public involvement, NEPA re-evaluation and / or coordination with other stakeholders, including but not limited to the Town of Apex. 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.
- Design exceptions will not be allowed for the -L- Line, including all ramps and loops. NCDOT prefers not to have design exceptions for the -Y- Line. 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. If conceptual approval is obtained, the Design-Build Team shall be responsible for the development and approval of all design exceptions.
- Within the project limits, the Design-Build Team shall locate and install concrete markers for all parcels. The aforementioned markers shall delineate all proposed right of way and permanent easements. The Design-Build Team shall replace all existing right of way and easement markers / monuments damaged and / or relocated during construction.
- The Design-Build Team shall positively protect the ends of the temporary barrier on the widened Old Holly Spring – Apex Road bridge over Triangle Expressway (Toll NC 540) with guardrail. (Reference the Structures Scope of Work found elsewhere in this RFP)
- The traffic pattern for the interim design will not be required to accommodate bicyclists.

## General

- The design shall be in accordance with the 2011 AASHTO *A Policy on Geometric Design of Highways and Streets*, 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*, 2012 *North Carolina Standard Specifications for Roads and Structures* and the 2011 AASHTO *Roadside Design Guide*, 4<sup>th</sup> Edition and 2012 Errata.
- If the NCDOT *Roadway Design Manual*, the 2011 AASHTO *A Policy on Geometric Design of Highways and Streets*, the 2012 *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 provide a maximum 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 otherwise noted 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.
- Excluding slopes in the interchange area, which shall adhere to the requirements set forth in the *Roadway Design Guidelines for Design-Build Projects* located on the Design-Build web site, the maximum allowable cut and fill slopes shall be in accordance with the Geotechnical Scope of Work requirements found elsewhere in this RFP.
- 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
- Unless noted otherwise elsewhere in this RFP, all guardrail 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 design shall be submitted for review with the Preliminary Plans submittal.
- 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.
- Along all -Y- Line and driveway intersection radii, the proposed sidewalk shall parallel the curb and gutter, terminating at the radius point.

- 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, General Statutes mandate the speed limit as 55 mph, resulting in a 60 mph design speed.
- Within the vehicle recovery area, the Design-Build Team shall design and construct single face concrete barrier in front of all retaining walls and all elements acting as retaining walls located on the outside shoulder in fill sections. 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.
- At all intersections impacted by the Design-Build Team's design and / or construction methods, excluding resurfacing, the following design vehicles shall be required for all turning movements:
  - WB-67 at all ramp / loop intersections with the -Y- Line (For side-by-side turning maneuvers, WB-67 for the outside movement only and SU-30 for inside movement)
  - WB-62 at all other intersections
- Excluding grades required to tie to existing, the minimum -Y- Line longitudinal grade shall be 0.50%.
- 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.
  - 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 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 3:1 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. 2:1 to 3:1) 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 State Combined Environmental Assessment (EA) / Finding of No Significant Impact (FONSI), 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 R-2635D Design Public Meeting Map - Interim Design and the R-2635D Design Public Meeting Map - Ultimate Design developed by the Department. The Design-Build Team is cautioned that the preliminary designs shown on these Maps 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 R-2635D electronic design files.
- The NCDOT will provide final pavement designs for R-2635D. 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 R-2635D. 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)

**STRUCTURES SCOPE OF WORK** (2-20-15)**Project Details**

The Design-Build Team shall be responsible for all structures necessary to complete the project. At a minimum, the Design-Build Team shall design and construct the structures noted below for the Ultimate Design shown on the Design Public Meeting Map provided by the Department:

- Widen Bridge on Old Holly Springs – Apex Road (SR 1153) over Triangle Expressway (Toll NC 540)
- Lengthen Existing Double 11' x 9' RCBC
- Lengthen Existing Single 10' x 9' RCBC
- All retaining walls as required by the Design-Build Team's design

The Design-Build Team shall design and construct 5'-6" sidewalk on both sides of the Old Holly Springs – Apex Road bridge over the Triangle Expressway (Toll NC 540). The Design-Build Team shall modify the existing bridge rail on the Old Holly Springs – Apex Road bridge to meet current AASHTO requirements. The proposed bridge rail on the aforementioned bridge shall be per Standard Drawing BMR3 and BMR4, as modified to match the existing bridge rail and to meet current AASHTO requirements. (Reference the Aesthetic Design Scope of Work found elsewhere in this RFP)

To maintain the interim traffic pattern, the temporary barrier on the Old Holly Springs – Apex Road bridge over the Triangle Expressway (Toll NC 540) shall be left in place.

As required by the Design-Build Team's design, the Design-Build Team shall be responsible for the removal and disposal of any portion of the existing bridge over the Triangle Expressway (Toll NC 540). All handling, removing, shipping, and disposing of these materials shall be in accordance with the 2012 NCDOT *Standard Specifications for Roads and Structures*.

The minimum vertical clearance for the Old Holly Springs – Apex Road bridge over the Triangle Expressway (Toll NC 540) shall be 17'-0".

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.

A live load rating chart for proposed girders shall be included with the highway 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 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:

- Cored slab, box beam, fracture critical, deck girder and cast-in-place deck slab bridges
- Precast barrier rails
- Steel girders
- Empirical method for deck design
- Interior pile bents at grade separations
- Monotube or cantilever DMS (if required on project) support structures
- Attachment of sign structures to bridges
- Bridge attachments (e.g. ITS conduit, waterlines) in the overhang of bridge structures
- Casting of conduit in the bridge deck or barrier rail for roadway bridges

### **Aesthetic Design**

In accordance with the Aesthetic Design Scope of Work found elsewhere in this RFP, all bridges, retaining walls, gantries, overhead sign structures and all-electronic toll zone facilities infrastructure shall have aesthetic treatments.

### **All-Electronic Tolling (AET) Infrastructure**

The Design-Build Team shall be responsible for the design and construction of the infrastructure required to support the toll collection system. (Reference the AET Tolling Zone Facilities Infrastructure Scope of Work found elsewhere in this RFP)

### **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.

The Design-Build Team shall design and construct all reinforced concrete box culverts 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) Precast reinforced concrete box culverts will not be allowed.

Construction and materials shall be in accordance with 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.



**PAVEMENT MANAGEMENT SCOPE OF WORK** (2-24-15)

**\*\* NOTE \*\* The Department will not consider Alternative Technical Concepts that provide an alternate pavement design.**

The pavement design for the widened mainline travel lanes shall consist of the following:

- 13.5” doweled jointed concrete
- 3.0” B25.0B
- 1.25” SF9.5A
- Subgrade Stabilization

The joints in the mainline travel lane widening shall match the adjacent travel lane joint spacing and location.

The pavement design for the mainline paved shoulders shall consist of the following:

- The mainline paved shoulders shall be a minimum thickness of 10.5” jointed concrete, without dowels.
- The mainline paved shoulder joints shall match the adjacent travel lane joint spacing and location.
- The mainline paved shoulders shall be anchored to the travel lane with tie bars.

Subgrade 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 Subgrade Soils* Project 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	ABC
-Y3- INT (SR 1153)	3.0” S9.5B	4.0” I19.0B	5.5” B25.0B	-----
-Y3RPA- and -Y3RPD-	3.0” S9.5B	2.5” I19.0B	-----	8.0”
-Y3LPA- and -Y3LPD-	3.0” S9.5B	4.0” I19.0B	-----	10.0”
AET Toll Zone Facilities driveway and parking areas	2.0” S9.5B	-----	5.0” B25.0B	-----

Warm mix asphalt will be allowed on -Y3- INT, but not on the -L- Line, ramps or loops.

For the ramps and loops noted in the table above, the Design-Build Team may substitute an asphalt base course layer for an ABC layer. If such an alternative is proposed, the Design-Build Team shall use B25.0B base course. The thickness of the asphalt base course, used as a substitute for the ABC layer, shall be equal to half of the proposed ABC thickness specified for the roadway. The Design-Build Team shall maintain the same pavement design throughout the ramp / loop construction limits. In the Technical Proposal, the Design-Build Team shall specify the base option

chosen (ABC or asphalt) for all ramps and loops. The Design-Build Team may substitute an asphalt base course layer for an ABC layer, as described above, for tie-ins and narrow widening.

The Design-Build Team shall resurface the existing -Y3- INT pavement with a minimum 3.0" S9.5B. (Reference the Roadway Scope of Work found elsewhere in this RFP)

On all ramps and loops, the adjacent through lane pavement design shall extend to the back of the gore (12-foot width).

Unless noted otherwise elsewhere in this RFP, the minimum narrow widened width shall be six feet. The minimum narrow 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.

To prevent a pavement joint transition across a travel lane, the Design-Build Team shall completely remove, dispose of and replace all existing concrete pavement through the limits of all concrete pavement tapers incorporated into a travel lane.

In areas where the existing 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 duration, 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 comments 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.

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 and 8.0" ABC. Unless otherwise noted above, the Design-Build Team shall adhere to the following for all driveway construction:

For existing gravel and soil driveways, use 8.0" ABC.

For existing asphalt driveways, use 1.5" S9.5B and 8.0" ABC with prime coat.

For existing concrete driveways, use 6.0" 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.

The Design-Build Team will not be required to install additional shoulder drains. However, the Design-Build Team shall be responsible for the maintenance of all existing shoulder drains. In the event that existing shoulder drains are found damaged, the Design-Build Team shall repair the existing shoulder drains to an acceptable level or replace the existing shoulder drains.

Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall pave from 1) the edge of all paved shoulder 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 located on the outside shoulder with 6.0" of ABC (or 4.0" B25.0B or B25.0C), a split seal and at least one lift 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.

When a resurfacing grade ties to an existing 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. The Design-Build Team shall not perform incidental milling more than 72 hours prior to placement of the asphalt surface layer.

**HYDRAULICS SCOPE OF WORK** (2-25-15)**Project Details**

- 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 referenced below:

**<https://connect.ncdot.gov/resources/hydro/pages/default.aspx>**

- 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 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.
- The Design-Build Team shall design and construct the drainage structures required for the ramps and the loops shown on the R-2635D Design Public Meeting Map – Ultimate Design.
- In accordance with the Hydraulic Guidelines noted above, the Design-Build Team shall provide Culvert Survey Reports for hydraulic structures for the Department's review and acceptance.
- For shoulder facilities, including those with expressway gutter and shoulder berm gutter, the hydraulic spread shall not encroach into a permanent travel lane or encroach more than two feet into an operational temporary travel lane.
- For curb and gutter facilities, the hydraulic spread shall not encroach more than three feet into the travel lane(s).
- Throughout the project limits, the Design-Build Team shall analyze all 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:
  - The Design-Build Team shall provide the appropriate hydraulic mitigation for all hydraulically deficient box culverts and / or pipes; and for all hydraulically and

structurally deficient box culverts and / or pipes, including but not limited to replacement. The Design-Build Team shall identify all hydraulically deficient box culverts and / or pipes and their proposed hydraulic mitigation in the Technical Proposal.

- 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*.
- In accordance with the Hydraulic Guidelines noted above, the Design-Build Team shall prepare Outfall Analyses for increases in discharge and take appropriate action to ensure that any increases are appropriately mitigated.
- 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 eliminates spread in a travel lane, including all future lanes for the Ultimate Design. 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 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 in the current NCDOT Stormwater Best Management Practices Toolbox.
- 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 is diverted away from surface waters
  - To the maximum extent practicable, on-site stormwater control measures, as identified in the NCDOT Stormwater Best Management Practices Toolbox effective on the Technical Proposal submittal date, shall be employed to minimize water quality impacts
- 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.
- The Design-Build Team shall provide permit drawings, calculations and impact sheets for the USACE 404 Permit and the NCDWR Section 401 Certification.

- 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 of the Merger 01 Process. (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 using ditches in wetlands.
- The Bicycle Safe Steel Grate and Frame Special Detail provided by the Department and the NCDOT Roadway Standard Drawing No. 840.29 are considered bicycle-safe drainage grates. In accordance with the January 1994 North Carolina Bicycle Facilities Planning and Design Guidelines, the Design-Build Team shall install bicycle-safe drainage grates throughout the Old Holly Springs – Apex Road (-Y3-) curb and gutter section construction limits.
- At a minimum, the Design-Build Team shall install traffic bearing drop inlets with steel frames and flat steel grates at the following locations:
  - Within a temporary and / or permanent travel lane
  - Within four feet of a temporary and / or permanent travel lane
- Raised median island cuts will not be allowed.
- The Design-Build Team shall drain all ponds that have the potential to intercept runoff from the project during and / or after construction prior to beginning the activity that will create the aforementioned runoff.

**GEOTECHNICAL ENGINEERING SCOPE OF WORK** (2-19-15)**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, building foundations, retaining wall foundations, overhead sign structure foundations, luminary foundations, overhead gantry 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 developed by the Design-Build Team. 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 two (2) standard penetration test (SPT) / rock core boring shall be required per bent for all bridges. All driven piles shall be located within 30 feet of an SPT / rock core boring. All drilled piers and other types of bridge foundations shall be located within 25 feet of an SPT / rock core boring. 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 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.

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. TRIASSIC ROCK**

This project is located within the Triassic Basin consisting of sandstone, siltstone, and mudstone. These sedimentary rocks have high slaking potential and degrade when exposed to air and / or water. Therefore the Design-Build Team and the prequalified geotechnical firm shall take into account the nature of these degradable materials and incorporate that into any design and construction recommendations. The Design-Build Team shall be aware that the slopes consisting of Triassic material, particularly those facing the south / southeast direction have had an increased potential for slope failure.

End bents supported on spread footings shall not be allowed in Triassic material. If the Design-Build Team elects to use spread footings for any structural foundations, the Design-Build Team shall submit an excavation plan to the Geotechnical Engineering Unit, via the Design-Build Unit, that outlines the construction sequence, extent of excavation, methods of protecting the Triassic rock from degradation, and the duration of any exposure of Triassic rock. The Design-Build Team shall remove all degraded materials prior to the spread footing construction.

If spread footing foundation excavations extend into material that deteriorates when exposed to the elements, the Design-Build Team shall check the field conditions for the required bearing capacity and place concrete within 24 hours after the excavation is completed. If concrete cannot be placed within 24 hours, the Design-Build Team shall place a lean concrete mud slab to help protect the bearing material. Water shall not be allowed to pool within the excavation.

### **A. Embankment Construction Using Degradable Rock**

Degradable rock shall be defined as rock material which exhibits high slaking characteristics when exposed to air and / or water. This type material is anticipated on this project and is comprised of Triassic mudstone and siltstone. The Design-Build Team shall place all excavated degradable rock and all mixtures of degradable rock and soil as specified herein.

The Design-Build Team shall place embankments constructed of degradable rock in accordance with Section 235 of the 2012 *Standard Specifications for Roads and Structures*. Limit maximum size of rock to 2 inch (50 mm) in diameter when



placed. Place each lift by blading and dozing in a manner to minimize voids, pockets and bridging. Compaction and density requirements shall be as specified in Section 235 of the 2012 *Standard Specifications for Roads and Structures*.

If the material is dry, add water to facilitate breakage of the rocks and compaction. Uniformly mix the added water for the entire depth of the lift by blading, disking or other approved methods. The amount of water added shall be sufficient to achieve optimum moisture of the particle size material.

Do not place degradable rock or degradable rock and soil mixture in the top 24 inches (600 mm) of embankment. Degradable rock or degradable rock and soil mixture shall be capped with a minimum 24 inches of suitable material meeting the requirements of borrow material in Section 1018 of the 2012 *Standard Specifications for Roads and Structures*.

Wasting of degradable rock will be permitted provided the provisions and conditions of Article 225-3 of the 2012 *Standard Specifications for Roads and Structures* are met.

### III. DESCRIPTION OF WORK

Unless otherwise noted herein, the Design-Build Team shall design foundations (except for sign foundations), embankments, slopes, and retaining 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

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. Design all end bent fill slopes to have a minimum factor of safety of 1.3 for global stability. Design all end bent cut slopes to have a minimum factor of safety of 1.5 for global stability. 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 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 L-Pile or FB-Pier. Design drilled piers and vertical piles with a sufficient embedment in soil and / or rock to achieve “fixity”.

In accordance with Section 450 of the 2012 *Standard Specifications for Roads and Structures*, drive all piles to bearing. If using drilled-in piles, drive piles to bearing within pile excavations prior to filling holes with concrete, grout, or non-excavatable flowable fill. All steel H-piles shall have pile points. All steel pipe piles shall have cutting shoes if open ended. All concrete piles shall have steel pile tips.

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 culvert length.

## **B. Roadway Foundations**

Unless noted otherwise herein, all unreinforced fill slopes, except bridge end bent slopes (Reference Section A - Structure Foundations), shall be 2:1 (H:V) or flatter. Design all roadway fill slopes to have a minimum factor of safety of 1.3 for global stability. Unless the slopes are designed with adequate reinforcement to provide the required stability, all cut slopes shall be 3:1 (H:V) or flatter. Design all roadway cut slopes to have a minimum factor of safety of 1.5 for global stability.

Use limit equilibrium methods, such as Modified Bishop, Simplified Janbu, Spencer, or any other generally accepted method for slope stability analysis. Submit detailed design calculations and slope stability analysis for all reinforced slopes and all unreinforced slopes higher than ten feet for review and acceptance by the Geotechnical Engineering Unit, via the Design-Build Unit, prior to construction. Provide design and construction recommendations for all cut slopes that will intersect groundwater. Provide subsurface drainage details for all cut slopes and grade points that intersect groundwater.

Any subsurface and / or slope drainage that is designed for either subgrade or slope stability shall be installed, regardless of site conditions at the time of construction.

Bridge approach embankments shall be defined as embankments within 250 feet of end bents. Design and construct bridge approach embankments such that no

more than one (1) inch of settlement will occur after the waiting period or monitoring ends or after embankment fill is constructed to subgrade elevation. Bridge approach embankment settlement monitoring shall be required when a waiting period of more than one month is recommended or more than four (4) inches of settlement is calculated 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 subgrade prior to monitoring. Use an appropriate method to monitor settlement across the length of the embankment (from toe to toe) such as settlement gauges, surveyed stakes or other methods. 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. Bridge approach embankment waiting periods shall not be ended until less than one (1) inch of the anticipated settlement remains and less than 0.10 inch of settlement is measured over a period of four weeks. Do not drive piles or construct end bent caps until after bridge approach embankment waiting periods are complete.

Design and construct roadway embankments such that no more than two (2) inches of settlement will occur following pavement construction. Embankment settlement monitoring shall be required for locations when a total settlement of more than six (6) inches is calculated in the roadway foundations design recommendation report developed by the Design-Build Team. Where computed settlement is greater than six (6) inches, monitor settlement across the width of the embankment at maximum spacing interval of 250 feet by settlement gauges or other approved methods. Submit documentation describing the method and procedures to the Geotechnical Engineering Unit, via the Design-Build Unit, for review and acceptance prior to construction of the embankment. Roadway embankment waiting periods shall not be ended until less than two (2) inches of settlement is anticipated following pavement construction and less than 0.10 inch of settlement is measured over a period of four weeks.

Soil improvement techniques to mitigate long term settlement problems or to transfer embankment load to a deeper bearing stratum are allowed at bridge approach and roadway embankments. 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*.

Material that does not meet the requirements of Table 1018-2 of the NCDOT 2012 *Standard Specifications for Roads and Structures* shall be considered unsuitable material. All earth materials within the entire embankment cross-section shall be compacted in accordance of Section 235 of the NCDOT 2012 *Standard Specifications for Roads and Structures* regardless of source of material. The Design-Build Team may propose an Alternative Technical Concept to chemically modify unsuitable unclassified excavation material for use.

Undercut all unsuitable or unstable soils to the extent that is required to improve the stability of embankments or subgrades. Undercut unsuitable or unstable soils to a minimum depth of 3 feet below subgrade.

Place Geotextile for Soil Stabilization, Type 4 in accordance with Section 270 of the NCDOT 2012 *Standard Specifications for Roads and Structures* on the base of all undercut sections.

Use Select Granular Material in accordance with Section 265 of the NCDOT 2012 *Standard Specifications for Roads and Structures* to backfill undercut areas except when employing shallow undercut which shall require the use of Select Material, Class IV.

Document and provide spring box or other subsurface drainage recommendations for all springs located under proposed fill sections.

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>**

Construct MSE walls using coarse aggregate if groundwater is above finished grade. Provide subsurface drainage at the back of the reinforced volume for all MSE retaining walls.

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](https://connect.ncdot.gov/resources/Geological/Pages/Geotech_Provisions_Notes.aspx)**

With the exception of cast-in-place gravity walls, submit a wall layout and design for each retaining wall. At a minimum the submittal shall include the following:

- Wall envelope with top of wall, bottom of wall, existing ground and finished grade elevations 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)

Cast-in-place gravity walls shall be designed and constructed in accordance with the NCDOT Structure Standard Drawings and the NCDOT 2012 *Standard Specifications for Roads and Structures*. Cast-in-place 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 NCDOT 2012 *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 cut slopes behind walls shall be 3:1 (H:V) or flatter. Any fill 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 shall not be permissible. Direct runoff above and below walls away from walls, if possible, or collect runoff at the walls and transmit it away. Curb and gutter or cast-in-place single faced barrier with paving up to the wall shall be required when runoff cannot be directed away from the back or front of the wall. A paved concrete ditch with a minimum depth of six 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 walls without a cast-in-place face with the exception of when a barrier is integrated into the top of the wall. Extend coping or cast-in-place face a minimum of six inches above where the finished or existing grade intersects the back of the wall. A fence shall be required on top of the facing, coping or barrier or immediately behind the wall, if there is no slope behind the wall.

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, (4) drilled piers, or (5) a double row of plumb piles. If fill is required around piles or drilled piers, install foundations before placing any fill. Wing walls independent of abutment retaining walls shall be required unless accepted otherwise by the NCDOT. Do not consider lateral support from any fill placed around drilled piers behind abutment retaining walls when analyzing end bent stability. Design abutment retaining walls to account for any additional pressures induced on the wall face due to calculated horizontal foundation movements. All pile foundations for end bents with abutment retaining walls shall penetrate minimum 10 feet into natural ground.

#### **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 NCDOT 2012 *Roadway Standard Drawing* Detail No. 1170.01.

#### **IV. CONSTRUCTION REQUIREMENTS**

All construction and materials shall be in accordance with the NCDOT 2012 *Standard Specifications for Roads and Structures* and current NCDOT *Project Special Provisions* unless otherwise stated in this scope of work. The Design-Build Team shall be responsible for investigating, proposing and incorporating remedial measures for any construction problems related to foundations, retaining walls, subgrades, embankment settlement, slope global-instability, slope surficial instability, and construction vibrations. Submit these proposals to the NCDOT Geotechnical Engineering Unit, via the Design-Build Group for review and acceptance.

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 NCDOT 2012 *Standard Specifications for Roads and Structures*), and

siltation or draining of ponds off the right of way. The Design-Build Team shall be responsible for deciding what, if any, pre and post-construction monitoring and inventories need to be conducted to satisfy their liability concerns. Any monitoring and inventory work shall be performed by a qualified private engineering firm experienced in the effects of construction on existing structures. At a minimum, the Design-Build Team shall perform pond preconstruction condition assessments as outlined in the NCDOT Geotechnical Engineering Unit *Guidelines and Procedures Manual for Subsurface Investigations*.

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 for review and acceptance 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.

Perform hammer approvals with GRLWEAP Version 2010 or later and in accordance with the NCDOT LRFD Driven Pile Foundation Design Policy. The foundation design firm shall develop pile driving inspection charts or tables, based upon PDA testing and CAPWAP analysis, if applicable, for acceptance by the NCDOT prior to pile installation.

Construct piles in accordance with Section 450 of the 2012 *Standard Specifications for Roads and Structures*. Perform Pile Driving Analyzer (PDA) testing using a NCDOT prequalified company to develop pile driving inspection charts or tables. 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 feet 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. Perform PDA tests in accordance with ASTM D 4945-89, Standard Test Method for High Strain Dynamic Testing of Piles and this scope of work.

Analyze data with the Case Pile Wave Analysis Program (CAPWAP), version 2006 or later. At a minimum, analysis shall be required for a hammer blow near the end of initial drive and for each restrike and re-drive. Additional CAPWAP analysis may be required as determined by the Engineer.

Meet the guidelines for NCDOT PDA reports from the Geotechnical Engineering Testing Contract for PDA test reports. To obtain a list of pre-approved Geotechnical Engineering

Testing Contract companies to perform PDA testing and guidelines for PDA test report, contact the Geotechnical Engineering Unit at 919-707-6850. PDA testing may be performed by a technician, but PDA testing shall be overseen and the reports sealed by a Professional Engineer registered in the State of North Carolina. Submit a complete PDA report sealed by the professional engineer who performed the test to the foundation design firm. The foundation design firm shall develop pile driving inspection charts or tables for acceptance by the NCDOT prior to pile installation.

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 2012 *Standard Specifications for Roads and Structures*. 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. The Design-Build Team shall notify Sam Lawhorn by e-mail ([sclawhorn@ncdot.gov](mailto: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. 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.

The prequalified geotechnical firm that prepared the original design shall perform any changes to the foundation designs. All changes shall be based upon additional information, subsurface investigation and / or testing. 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. 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.

Conduct proofrolling in accordance with Section 260 of the 2012 *Standard Specifications for Roads and Structures*. Proofroll areas again following the completion of corrections necessary to create a stable subgrade.



Send copies of all inspection forms related to foundations, settlement, or retaining walls to the NCDOT for review.

**TRANSPORTATION MANAGEMENT SCOPE OF WORK** (2-25-15)**I. Laws, Standards and Specifications**

The Design-Build Team shall design the Transportation Management Plan (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.

- Standard Specifications for Roads and Structures
- 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).

**WZTC Website: <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 (TCP), an Incident Management Plan (IMP) and a Traffic Operations Plan (TOP). In accordance with the Public Information Scope of Work found elsewhere in this RFP, the Design-Build Team shall assist the Department in the development of a Public Information Plan (PIP).

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 Completion Time(s) shall be established and shall become part of the contract.

### **General Requirements**

Unless permitted otherwise elsewhere in this RFP, maintain the existing number of travel lanes, travel lane widths and shoulder widths on the Triangle Expressway (Toll NC 540). Unless permitted otherwise elsewhere in this RFP, maintain a minimum of two 11-foot wide travel lanes and the existing shoulder widths on Old Holly Springs - Apex Road.

Traffic control devices shall be located a minimum 2-foot offset (shy distance) from the edge of an open travel lane.

Placement of temporary barrier systems shall be shown on the Transportation Management Staging Concept. Temporary barrier systems shall be designed in accordance with the following requirements:

- Determine the need for temporary barrier in accordance with the FHWA *Final 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 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 NCDOT 2012 *Standard Specifications for Roads and Structures*.

The design speed for temporary alignments of NC and US 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 2012 *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 crown 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 crown 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 toll zones, 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.

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.).

Obtain written approval from the Engineer of any road closure prior to incorporation.

Prior to incorporation, all offsite detour routes shall be approved in writing by the Engineer and adhere to the following requirements:

- Except as allowed in **ICT #1, ICT #2, ICT # 3 and ICT #4 Triangle Expressway (Toll NC 540) and Old Holly Springs – Apex Road, including all ramps and loops**, shall not be closed
- 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 provide improvements required to accommodate detoured traffic prior to utilizing detour routes.
- 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.)
- Use only state maintained roads for off-site detour routes.

On all roadways within the project limits, the Design-Build Team shall provide safe access for wide-loads and oversized permitted vehicles through the work zone. 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 clear widths as follows:

<b>Road</b>	<b>Minimum Clear Width</b>
Triangle Expressway (Toll NC 540) and Old Holly Springs - Apex Road (SR 1153), including all ramps and loops	18 feet
All other roadways	16 feet

The Design-Build Team shall coordinate with the Division Operation Engineer, Division Traffic Engineer and NCTA Regional Toll Road Manager 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.

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.

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 motorist 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 Traffic 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 Time #1 for Lane Narrowing, Lane Closure, Holiday and Special Event Restrictions.**

As a minimum, the Design-Build Team shall maintain the existing number of lanes and lane widths and shall not close or narrow a lane during the times below. When traffic is placed into the final pattern for any roadway, that shall become the minimal traffic pattern and the following time restrictions shall still apply.

Road	Day	Time Restrictions
Triangle Expressway (Toll NC 540), including all ramps and loops	Monday thru Friday	6:00 a.m. to 9:00 a.m. and 4:00 p.m. to 7:00 p.m.

The Design-Build Team shall not install, reset and / or remove any traffic control device during the times listed above.

In addition to the lane / shoulder narrowing and closure restrictions noted above, the Design-Build Team shall not close or narrow a lane, detain the traffic flow 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 31<sup>st</sup> to 7:00 p.m. January 2<sup>nd</sup>. If New Year's Day is on a Friday, Saturday, Sunday or Monday then from 7:00 p.m. the following Tuesday.
- (b) For Easter, between the hours of 6:00 a.m. Thursday and 7:00 p.m. Monday.
- (c) For Memorial Day, between the hours of 6:00 a.m. Friday and 7:00 p.m. Tuesday.
- (d) For Independence Day, between the hours of 6:00 a.m. July 3<sup>rd</sup> and 7:00 p.m. July 5<sup>th</sup>. 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 7:00 p.m. the Tuesday after Independence Day.
- (e) For Labor Day, between the hours of 6:00 a.m. Friday and 7:00 p.m. Tuesday.
- (f) For Thanksgiving Day, between the hours of 6:00 a.m. Tuesday and 7:00 p.m. Monday.
- (g) For Christmas, between the hours of 6:00 a.m. the Friday before the week of Christmas Day and 7:00 p.m. the following Tuesday after the week of Christmas Day.

**Liquidated Damages for Intermediate Contract Time #1 for the above lane narrowing, lane closure, holiday and special event time restrictions for Triangle Expressway (Toll NC 540), including all ramps and loops, are \$500.00 per 15-minute period or any portion thereof.**

## **2. Intermediate Contract Time #2 for Lane Narrowing and Lane Closure Time Restrictions.**

As a minimum, the Design-Build Team shall maintain a minimum of two 12-foot wide lanes in each direction and shall not close or narrow more than one lane in each direction during the times below. When traffic is placed in the final pattern for any roadway, that shall become the minimal traffic pattern and the following time restrictions shall still apply.

Road	Day	Time Restrictions
Triangle Expressway (Toll NC 540)	Monday thru Sunday	6:00 a.m. to 11:00 p.m.

The Design-Build Team shall not install, reset and / or remove any traffic control device during the times listed above.

**Liquidated Damages for Intermediate Contract Time #2 for the above lane narrowing and lane closure time restrictions for Triangle Expressway (Toll NC 540) are \$500.00 per 15-minute period or any portion thereof.**

**3. Intermediate Contract Time #3 for Road Closure Restrictions for Construction Operations.**

At a minimum, the Design-Build Team shall maintain the existing traffic pattern and follow the road closure restrictions 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.

The Design-Build Team shall not close any direction of travel on the following roads or any ramps / loops during the times noted below. Closure of these roads shall only be allowed for the operations listed in this intermediate contract time restriction.

Road	Day	Time Restrictions
Triangle Expressway (Toll NC 540) and Old Holly Springs - Apex Road (SR 1153), including all ramps and loops	Monday thru Sunday	5:00 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. With an approved offsite detour, the roadways listed above may be closed from 12:00 a.m. (Midnight) to 5:00 a.m. for the operations listed below.

- Traffic shifts to complete tie-in work and placement of pavement markings and markers
- Bridge demolition
- Girder installation and /or removal
- Installation / removal of temporary shoring
- Installation / removal of temporary traffic barrier systems
- Installation of overhead sign assemblies and / or work on existing overhead sign assemblies over travel lanes



Prior to incorporation in the Transportation Management Plans, the Design-Build Team shall obtain written approval from the Engineer for all road closures.

**Liquidated Damages for Intermediate Contract Time #3 for the above road closure time restrictions for Triangle Expressway (Toll NC 540) and Old Holly Springs - Apex Road (SR 1153), including all ramps and loops, are \$1000.00 per 15-minute period or any portion thereof.**

**4. Intermediate Contract Time #4 Continuous Lane Closure Time Restrictions for Triangle Expressway (Toll NC 540) to complete ramp / loop tie-in work.**

The Design-Build Team may continuously close the Triangle Expressway (Toll NC 540) outside lanes to traffic up to forty-five (45) consecutive calendar days after and including the date the Design-Build Team elects to close the outside lane to traffic. The aforementioned forty-five (45) consecutive calendar days shall apply per direction, allowing the Design-Build Team to concurrently or separately close the Triangle Expressway (Toll NC 540) eastbound and westbound outside lanes. The continuous lane closure shall only be allowed to complete the ramp / loop tie-in work. The Immediate Contract Time shall be the number of calendar days proposed by the Design-Build Team in the Technical Proposal for the eastbound and westbound outside lanes and such number of calendar days shall not be greater than forty-five (45) calendar days.

**Liquidated Damages for Intermediate Contract Time #4 for the above continuous lane closure time restrictions for Triangle Expressway (Toll NC 540) are \$1000.00 per calendar day or any portion thereof.**

**B. Hauling Restrictions**

The Design-Build Team shall adhere to the hauling restrictions noted in the NCDOT 2012 *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 Intermediate Contract Time #1, 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 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.

- Hauling access to the construction area shall only occur at the beginning and end of the project. Additional hauling access points shall be limited to one per direction, at a location chosen by the Design-Build Team and approved by the Department.
- Hauling entrances, exits and crossings shall be shown on the Transportation Management Plan.
- Hauling operations that perpendicularly cross a roadway shall require Traffic Control and shall be subject to the time restrictions, and holiday and special event time restrictions listed in ICT #1.

The Design-Build Team shall address how hauling will be conducted in the Technical Proposal, including but not limited to, hauling of any materials to and from the site and hauling material within the NCDOT right of way.

Single vehicle hauling shall not be allowed ingress and egress from any open travel lane during the following time restrictions:

Road	Day	Time Restrictions
Triangle Expressway (Toll NC 540), including all ramps and loops	Monday thru Friday	6:00 a.m. to 9:00 a.m. and 4:00 p.m. to 7:00 p.m.

Multi-vehicle hauling shall not be allowed ingress and egress from any open travel lane during the following time restrictions:

Road	Day	Time Restrictions
Triangle Expressway (Toll NC 540), including all ramps and loops	Monday thru Friday	6:00 a.m. to 9:00 a.m. and 4:00 p.m. to 7:00 p.m.

**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, measured from the beginning of the merge taper to the end of the lane closure. The Design-Build Team shall not install more than two simultaneous lane closures and shall provide a minimum of four (4) miles between lane closures, measured from the end of one closure to the first sign of the next lane closure.

On multi-lane facilities, the Design-Build Team shall not install more than two (2) miles of lane closure, measured from the beginning of the merge taper to the end of the lane closure. The Design-Build Team shall not install more than two simultaneous lane closures in any one direction and shall provide a minimum of four (4) miles between lane closures, measured from the end of one closure to the first sign of the next lane closure.

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 NCDOT 2012 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 NCDOT 2012 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 5 feet of an open travel lane, the Design-Build Team shall, at a minimum, close the nearest open travel lane using NCDOT 2012 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 10 feet of an open travel lane, the Design-Build Team shall, at a minimum, close the nearest open travel lane using NCDOT 2012 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 appropriate roadway standard drawing from the NCDOT 2012 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 opened travel lane that has an edge of pavement drop-off as follows:

- Elevation differences that exceed 2 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 3 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 2 inches in elevation between open lanes of traffic for nominal lifts of 1.5 inches. Install advance warning “UNEVEN LANES” signs (W8-11) 1000 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 be responsible for the installation and maintenance of 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 Plan or a Temporary Signing Plan to be approved by the Work Zone Traffic Control Section and / or the Signing and Delineation Unit.

#### **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 (except for water filled barrier) 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 (except for water filled barrier) 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:

<b>Posted Speed Limit (mph)</b>	<b>Minimum Offset (feet)</b>
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. 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 Approved Products List. The Approved Products List is shown on NCDOT's website at:

**<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 10 feet on-center in radii. Channelization devices shall be 3 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 NCDOT 2012 *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 shall 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

The Design-Build Team shall show temporary pavement markings on the Traffic Control Plans that meet the requirements of the RFP and the *Guidelines for Preparation of Traffic Control and Pavement Marking Plans for Design-Build Projects*.

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 approval from the Design-Build Unit prior to incorporation.

The Design-Build Team shall install pavement markings and markers in accordance with the NCDOT 2012 *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 marking on all roadways. 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:

<b>Road</b>	<b>Marking</b>	<b>Marker</b>
All Roads	Any Marking on the Approved Product List	Raised Temporary
All Structures	Cold Applied Plastic Type 4 - Removable Tape	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 on all roads (existing and temporary markings) at all times during construction, as follows:

White:	125 mcd / lux / m <sup>2</sup>
Yellow:	100 mcd / lux / m <sup>2</sup>

When using Cold Applied Plastic (Type IV) 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 2012 Roadway Standard Drawing No. 1250.01, Sheet 1 of 3.

Tie proposed pavement marking lines to existing pavement marking lines.

Remove / replace any conflicting / damaged pavement markings and markers by the end of each day's operation.

Trace existing and/or proposed monolithic island locations with the proper color pavement marking prior to removal and/or installation. Place drums to delineate and existing and/or proposed monolithic islands after removal and/or before installation.

The Design-Build Team shall not place temporary markings other than Cold Applied Plastic Type IV – Removable Tape on any final pavement surface unless the temporary markings are placed in the exact location of the final pavement markings.

Unless noted otherwise elsewhere in this RFP, removal of the temporary pavement markings on asphalt surfaces shall be accomplished by an NCDOT approved system to minimize damage to the road surface. Temporary pavement markings shall not be obliterated with any type of Black Pavement Markings (paint or other material). The

Design-Build Team shall remove all temporary pavement markings without removing more than 1/32 inch of the pavement surface.

#### **J. Temporary Traffic Signals**

Use the following notes if the Design-Build team recommends using temporary 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 developed by the Design-Build Team.

#### **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.

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 NCDOT Statewide Transportation Operations Center (STOC) personnel to ensure proper messages are displayed on the CMSs.
- (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 NCDOT 2012 *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.

The Design-Build Team shall design Transportation Management Plans for the posted speed limit; a speed reduction ordinance will not be allowed for this project.

The Design-Build Team shall coordinate with the Contractor and NCDOT Resident Engineer in charge of any project in proximity of this project for any work that may affect the construction, traffic operations, and / or placement of temporary traffic control devices (including advance warning signs) on all roads within the project limits and / or associated with this project.

The Design-Build Team shall be responsible for all required temporary shoring, including but not limited to 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 5 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 Traffic Control Staging 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 requirements 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 detail where temporary shoring will be used by providing station limits, offsets, the type of shoring and where temporary traffic barrier will be located if needed.

**SIGNING SCOPE OF WORK** (2-19-15)**Project Description**

The Design-Build Team shall prepare Signing Plans for the entire project limits, including but not limited to advance and other necessary signing outside of the roadway construction limits.

**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](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](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* (January 2012)
- NCDOT *Roadway Standard Drawings* (January 2012)

The Design-Build Team shall prepare Signing Plans in accordance with the R-2635D Signing Schematic dated October 2014 and the NCTA Toll Facility Signing Requirements dated January 22, 2015. The Design-Build Team shall use the Signing Schematic and NCTA Toll Facility Signing Requirements dated January 22, 2015, in conjunction with all applicable standards, to develop the Signing Plans. To minimize right of way, utility, drainage and / or jurisdictional impacts, or to install a sign behind existing guardrail, the Design-Build Team will be allowed to shift signs shown on the aforementioned Signing Schematic and NCTA Toll Facility Signing Requirements a maximum of 100 feet. To meet all applicable standards, the Design-Build Team shall replace / relocate all existing signs affected by the project, as well as provide all required additional signs, not shown on the aforementioned Signing Schematic and NCTA Toll Facility Signing Requirements, as necessary. The Design-Build Team shall update the aforementioned Signing Schematic and NCTA Toll Facility Signing Requirements such that the Signing Plans developed by the Design-Build Team shall be in accordance with the roadway design. Any changes to the R-2635D Signing Schematic and / or NCTA Toll Facility Signing Requirements dated January 22, 2015 shall be subject to the Department's review and acceptance.

### **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.

### **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**

Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall design, fabricate and install all Type A, B, D, E, F and reference mile marker signs and supports (including overhead sign structures) required through the construction limits of the mainline and all -Y- Lines. 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 and all -Y- Lines to ensure adequate advance signage and spacing is provided.

### **Sign Designs**

The Design-Build Team shall include all sign designs in the Signing Plans. 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 mainline, all -Y- Lines, all ramps and loops, 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 signs (route marker assemblies).

For areas where existing reference mile markers are affected, the Design-Build Team shall design, fabricate and install two enhanced reference mile markers mounted back to back at 2/10-mile intervals along both sides of the mainline. The Design-Build Team shall install each reference mile marker on one three-pound U-channel post. Reference mile markers shall be located at the outside shoulder point or a maximum of 15' from the edge of travel lane. The Design-Build Team shall install reference mile markers such that the bottom of the reference mile marker shall be four feet above the edge of travel lane (edgeline) elevation. The reference 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). The Department will provide reference mile marker numbers.

Enhanced ramp reference markers will not be required on ramps or loops.

At all interchange loops, the Design-Build Team shall fabricate and install advisory speed signing as shown in Figure 2C-3 of the MUTCD. At a minimum, the advisory speed signing shall include W13-6, W13-7 and W1-13R signs.

The Design-Build Team shall design, fabricate and install 30" x 36" Chevron Alignment signs (W1-8) along all interchange loops. 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.

### **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, and toll agency pictographs. The Design-Build Team shall design and fabricate all overhead signs with Grade A 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**

The posted speed limit for Triangle Expressway (Toll NC 540) shall be 70 mph and the posted speed limit for Old Holly Springs - Apex Road 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.

Unless depicted otherwise in the R-2635D Signing Schematic dated October 2014, the Design-Build Team shall provide a minimum of two advanced guide signs for all freeway / expressway interchange approaches.

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 and install all ground mounted sign supports.

The Design-Build Team shall design, fabricate and install ground mounted signs supports in accordance with the revised NCDOT Roadway Standard Drawing No. 903D10, Sheet 2 of 3, dated March 8, 2012. 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>**

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 edgeline 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 positive protection. The minimum lateral distance between the face of guardrail and the edge of the sign shall be six feet.

All toll agency signs, including but not limited to toll collection and interoperable signs, shall be on breakaway supports regardless of the existence of positive protection.

Unless noted otherwise elsewhere in this RFP, all Type D, E, F and reference mile marker 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, E and F signs and sign assemblies 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:

- An option lane at a freeway or expressway multi-lane exit or freeway / ramp split (use Arrow Per Lane signs)
- A freeway ends and “All Traffic Must Exit”
- A freeway lane ends (freeway lane drop)
- Three or more lanes on a freeway ramp

The Design-Build Team shall locate, design and install overhead sign structures that meet all Department requirements, including the calculation of wind load 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 as follows:

- All overhead structures with “Old Holly Springs - Apex Rd” signs shall be designed for a future sign panel with three lines of destinations and a minimum width of 264”.

The Design-Build Team shall locate, design and install overhead sign structures such that they are not in conflict with the future improvements shown on the Design-Public Meeting Map – Ultimate Design provided by the Department.

The wind speed for the overhead sign structures 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.

The minimum vertical clearance beneath all overhead sign assemblies shall be 17 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.

All overhead sign panels shall be bottom justified.

Sign structures identified in the R-2635D Signing Schematic dated October 2014 shall have aesthetic treatments. (Reference the Aesthetic Design Scope of Work found elsewhere in the RFP)

### **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

All pedestal mounted overhead signs shall be located on the right side of the roadway. All pedestal mounted overhead signs shall be located eighteen feet or less from the edge of the travel lane and 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 or modified overhead sign structure for the Department's review and acceptance. For shop drawing design and submittal requirements, see *Guidelines for Preparation of Signing Plans for Design-Build Projects*.

### **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 are retained to determine if the protection meets current requirements. If not, the Design-Build Team shall design and construct new positive protection that adheres to current requirements.



**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. At a minimum, the aforementioned verification shall include confirmation of the sign(s) positioning over lanes, span length, sign offsets, "s" 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 revised Structure Line Drawing with the shop drawing.

**Existing Overhead Signs and Structures**

Prior to modifying an existing overhead sign assembly to accommodate proposed signs, the Design-Build Team shall perform a structural analysis on the overhead sign structure in accordance with the 2009 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5<sup>th</sup> 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.

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. 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 wind load area.

**Removal and Disposal of Existing Signs**

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**

The Design-Build Team shall maintain all existing signs (including any temporary installations of signs that may be required by the Transportation Management Plans) during project construction to ensure the signs are in good condition, perform as intended, and visible to

motorists. All signs and supports remaining / existing at the completion of this project shall be plumb, oriented correctly and meet AASHTO requirements.

**Construction Revisions**

After submittal of RFC Signing Plans, all construction revisions shall be submitted to the Department for review and acceptance, prior to incorporation.

**TRAFFIC SIGNALS SCOPE OF WORK** (2-21-15)**I. GENERAL**

The Design-Build Team shall design and prepare plans for the temporary traffic signal installations, as required by the construction phasing and /or detour routes, and permanent traffic signal installations. This work shall include, but not be limited to, the preparation of Traffic Signal Plans, Electrical and Programming Details, and Project Special Provisions. These plans shall be prepared in accordance with the *Design-Build Submittal Guidelines* and the *Guidelines for Preparation of Traffic Signal & Intelligent Transportation System Plans on Design-Build Projects* available on the Design-Build website.

The Design-Build Team shall select a Private Engineering Firm (PEF) that has experience designing and sealing Traffic Signal Plans for NCDOT on comparable projects. The Technical Proposal shall list projects, including description and similarity to the subject project, for which the PEF has developed Traffic Signal Plans.

A pre-design meeting shall take place between the Design-Build Team, the NCDOT Intelligent Transportation Systems (ITS) & Signals Unit, the NCDOT Division 5 Traffic Engineer, the NCDOT Regional Traffic Engineer, and any other pertinent NCDOT personnel before signal designs begin. Traffic Signal plan submittals shall only be reviewed and accepted by the Department after this pre-design meeting. All Traffic Signal Plans shall be accepted by the NCDOT prior to the Design-Build Team beginning traffic signal construction or plan implementation.

The Design-Build Team shall coordinate and implement all traffic 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 5 Traffic Engineer, the Regional Traffic Engineer and the ITS & Signals Unit. The Design-Build Team shall not begin any construction activity related to the installation / modification of any traffic signal until the NCDOT has accepted the RFC Traffic Signal Plans. 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.

The Design-Build Team shall maintain, monitor and adjust the traffic signals as needed throughout the project. The Design-Build Team shall be responsible for the design and implementation of all temporary traffic signal designs, including but not limited to signal system timing plans, needed to maintain traffic during construction. Temporary traffic signal plans, if necessary, shall include, but not be limited to, new local controller signal timing, cables, poles, controllers, and / or signal heads. The extent of the temporary traffic signal design(s) shall be based on the Design-Build Team's construction phasing and / or detour routes.

The Design-Build Team shall design, implement and field evaluate / verify modifications to the coordinated signal system timing plans for the final traffic pattern, including but not limited to traffic responsive plans that are dependent on the traffic demands and / or projections. All signal system timing plans shall be reviewed and accepted by the Department prior to implementation. **Throughout the project construction, the Design-Build Team shall maintain full actuation, as well as system communications, for the traffic signals located within the project limits.**

To connect sidewalk networks, the Design-Build Team shall provide crosswalks and pedestrian heads for all approaches, as appropriate. Unless noted otherwise below, all new final signal installations shall utilize metal poles for signal supports.

Signal Inventory Numbers (SIN) will be assigned for each new signalized location by the NCDOT ITS & Signals Unit. Once all the traffic signal locations have been finalized and accepted by the Department, the Design-Build Team shall submit a written request for the SINS to the NCDOT ITS & Signals Unit. At a minimum, this request shall list each signal location that requires a SIN and include the following:

- County
- Nearest Municipality
- Names of all intersecting roads that will be under signal control, including state route numbers (Interstate, US, NC or SR) and common street names
- The dominant through movement

The Design-Build Team shall be responsible for a safe and economical design for the public. The Design-Build Team shall be responsible for ensuring that all plans and designs conform to the current design standards of the ITS & Signals Unit. Prior to installation, all plans and associated design material and specifications shall be reviewed and accepted by NCDOT. The Design-Build Team shall adhere to the requirements of the version of the documents noted below that are current on the Technical Proposal submittal date:

- NCDOT 2012 *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*
- *Guidelines for Preparation of Traffic Signal & Intelligent Transportation System Plans on Design-Build Projects*

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 design and install two new traffic signals. The Design-Build Team shall connect all traffic signals to a standalone Closed Loop Signal System. For the signals noted below, the Design-Build Team shall establish fiber optic communications. The required traffic signal work and signal communication requirements for each intersection are listed below. (Reference Section III for the signal communications requirements)

<b>Proposed Signals (2)</b>		
<b>Signal Inventory Number</b>	<b>Intersection Description</b>	<b>Work Requirements</b>
<b>TBD</b>	SR 1153 (Old Holly Springs - Apex Road) at Triangle Expressway (Toll NC 540) Northbound Ramps	<p>The Design-Build Team shall design and install a new, fully actuated traffic signal at these locations. They shall include a 2070 controller operating OASIS software, including base adapters / extenders, in a 170 cabinet.</p> <p><b>** NOTE ** Deleted bullet on accommodating the Ultimate Design shown on the Design Public Meeting Map provided by the Department.</b></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 NCDOT standard black powder coated metal poles with mast arms 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.</p>
<b>TBD</b>	SR 1153 (Old Holly Springs - Apex Road) at Triangle Expressway (Toll NC 540) Southbound Ramps	<p>The Design-Build Team shall provide pedestrian signal heads and corresponding hardware 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 5 Traffic Engineer, the Regional Traffic Engineer, and the ITS &amp; Signals Unit.</p> <p>Upon placing these signals in operation (includes temporary operation), the Design-Build Team shall install the required system communication equipment as described in Section III.</p>

**III. SIGNAL COMMUNICATIONS**

The Design-Build Team shall be design, install, and maintain a **Standalone fiber optic Closed Loop Signal System** along Old Holly Springs - Apex Road (SR 1153).

The communications networks shall utilize single mode fiber optic cable as the communications medium.

**Communications Cable & Conduit Routing Plans and Project Special Provisions**

Prior to construction, the Design-Build Team shall provide a detailed set of Communications 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 Plans and Project Special Provisions.

The Communications Plans and Project Special Provisions shall consist of the three major items listed below:

- Communications Cable & Conduit Routing Plans, including Splice Plans
- Project Special Provisions
- Catalog Cut Sheets

**Utility Make-Ready Plans**

In conjunction with the development of the Communications Cable and Conduit Routing Plans and Traffic Signal Plans, the Design-Build Team shall also develop a set of Utility Make-Ready Plans.

The Design-Build Team shall install all 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.

**ENVIRONMENTAL PERMITS SCOPE OF WORK** (2-23-15)**General**

The Design-Build Team shall be responsible for preparing all documents necessary for the Department to obtain the environmental permits for the construction of this project. Permit applications shall be required for the: US Army Corps of Engineers (USACE) Individual Section 404 Permit and NC Department of Natural Resources (DENR) 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 permits have 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. If a PCN is not required, the Design-Build Team may proceed with geotechnical investigations 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) the Department is notified in writing prior to these activities; (2) such activities are outside jurisdictional resources (3) a meeting is held with the NCDOT and permitting agencies prior to beginning work, if necessary; and (4) the Design-Build Team submits a Preconstruction Notification for the Department to forward to the permitting agencies, 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) - Environmental Coordination & Permitting Group or the Division's Environmental Officer (DEO) present. A representative from the Design-Build Unit shall be included on all correspondence.

Project R-2635D 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 decisions reached between the Department and 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 honor any requests for additional contract time or compensation associated with this additional coordination.

Unless stipulated otherwise in the Technical Proposal, the Department will schedule the interagency hydraulic design review meeting and interagency permit impacts meeting for October 2015 and January 2016, 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 noted otherwise elsewhere 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.

### **Individual 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 interagency permit impacts meetings
- Stormwater Management Plan (SWP)
- Permit drawings (with and without contours)



- Wetland Permit Impact Summary Sheets
- Half-size plans
- Completed forms (Section 404 ENG 4345, etc.) appropriate for impacts
- Ecosystem Enhancement Program (EEP) 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 303(d) impaired streams.

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 Department’s 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 (DEO), 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 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 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. The temporary impact descriptions (haul roads, utility relocations, work bridges, etc.) shall include restoration plans, schedules and disposal plans. Further, the Design-Build Team shall describe the construction methods for all structures. The aforementioned information, descriptions and details shall be presented during the interagency hydraulic design review meetings and interagency permit impacts meetings 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 11 months to accurately and adequately complete all designs necessary for the permit application, submit the application to the Department, and obtain approval for permits from the Environmental Agencies. Environmental Agency review time will be approximately 90 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 11-month period. With the exception of location and survey work, utility relocation work outside jurisdictional resources that adhere 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 11-month period or beyond the 11-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 11-month period has been exceeded. If time were granted it would be only for that time exceeding the 11-month period. This 11-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 approximate 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**

The Department will acquire the compensatory mitigation for unavoidable impacts to wetlands and surface waters due to the project construction from the Ecosystem Enhancement Program (EEP). This mitigation was based on impacts as identified in the planning stage.

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 resource 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 can 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 Ecosystem Enhancement Program 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 and from the United States Fish and Wildlife Service 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 11-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 discretion.

### **Commitments**

The NCDOT is committed to incorporating all reasonable and practicable design features to avoid and minimize stream and wetland impacts, and to provide full compensatory mitigation of all remaining impacts. Avoidance measures were taken during the planning and NEPA Process and minimization measures were incorporated as part of the preliminary design. The Design-Build Team shall incorporate these avoidance and minimization features, plus any minimization identified during the interagency hydraulic review meeting and 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 all 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.

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 State Combined Environmental Assessment (EA) / Finding of No Significant Impact (FONSI), all permits, the interagency meeting and site visits.

### **Archeological Sites**

If the Design-Build Team discovers any previously unknown historic or archeological resources while conducting the authorized work, they shall immediately notify in writing the NCDOT Archaeology Supervisor and the NCDOT Project Development Engineer, **in writing**, as listed below, who will initiate the 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 (919) 707-6089, or Ms. Jennifer Harris, PE, NCDOT Project Development (919) 707-6025.

**EROSION AND SEDIMENTATION CONTROL SCOPE OF WORK** (2-20-15)

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 *NC DENR - 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 Environment and Natural Resources, 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, as defined in the August 3, 2011 NCG-010000 General Construction Permit, 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-Built Plans that detail when and where permanent / temporary / repair seeding and 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. 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.
5. Take into account topography and show existing contour lines on Clearing & Grubbing Plans only.
6. 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).
7. 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 Permits.
8. Provide adequate silt storage for 3600 cubic feet per disturbed acre and sediment basins shall be sized with surface area equal to 435 square feet per cubic foot per second (cfs) of the peak inflow rate, Q25, using 25-year peak rainfall data (*NCDENR - Erosion and Sediment Control Planning and Design Manual* or NOAA's National Weather Service web site <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 (REU) upon request.
9. Skimmer Basins shall 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, Q25, using the 25-year peak rainfall data (*NCDENR - Erosion and Sediment Control Planning and Design Manual* or NOAA's National Weather Service web site <http://dipper.nws.noaa.gov/hdsc/pfds/> for partial duration (ARI) time series type). A Skimmer Basin Designer Spreadsheet will be provided by the NCDOT Roadside Environmental Unit (REU) upon request.
10. The minimum and maximum length to width ratio of all Sediment Basins shall be 2:1 and 6:1, respectively.
11. 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.
12. 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.
13. During construction, provide temporary sediment basins that dewater from the surface at all permanent stormwater devices.
  14. 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 Roadside Environmental Unit.
  15. Place a device utilizing PAM at all sediment basin inlets.
  16. Do not place erosion control devices that require excavation (i.e. sediment basins, silt ditches, etc.) in wetlands.
  17. Within the entire project limits, provide disturbed and undisturbed drainage areas in MicroStation Format.
  18. 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.
  19. All perimeter Sediment Basins shall be placed outside of fill slopes.
  20. At a maximum spacing of 200 feet, and as directed, utilize Special Sediment Control Fence drainage breaks in silt fence.

#### 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. Place Special Sediment Control Fence at toe of bridge approach fills along streams.
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 8 feet or higher and a fill slope grade of 3:1 or steeper, or where there are superelevations above 0.04 and fills are greater than 5 feet. Maximum slope drain spacing shall be 200 feet.
7. Utilize rock energy dissipater and / or silt basin at outlet of slope drain.
8. Devices at all drainage turnouts shall utilize infiltration, skimmer, or sediment control stone (TRSD-B, TRSC-A, etc.) and a spillway with an adequately designed base length to distribute outflow.
9. Provide adequate silt storage for 3600 cubic feet per disturbed acre and sediment basins shall be sized with surface area equal to 435 square feet per cubic foot per second (cfs) of the peak inflow rate, Q25, using 25-year peak rainfall data (*NC DENR - Erosion and Sediment Control Planning and Design Manual* or NOAA's National

- Weather Service web site <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 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, Q25, using the 25-year peak rainfall data (*NCDENR - Erosion and Sediment Control Planning and Design Manual* or NOAA's National Weather Service web site <http://dipper.nws.noaa.gov/hdsc/pfds/> for partial duration (ARI) time series type). A Skimmer Basin Designer Spreadsheet will be provided by the NCDOT Roadside Environmental Unit upon request.
  11. 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.
  12. 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.
  13. 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 15 feet.
  14. The minimum and maximum length to width ratio of all Sediment Basins shall be 2:1 and 6:1, respectively.
  15. 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.
  16. During construction, provide temporary sediment basins that dewater from the surface at all permanent stormwater devices.
  17. Utilize Coir 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 restriction, utility conflicts, or other construction limitations approved by the Roadside Environmental Unit.
  18. Place device utilizing PAM at all sediment basin inlets.
  19. Do not place erosion control devices that require excavation (i.e. 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. All perimeter Sediment Basins shall be placed on the outside of fill slopes.
23. At a maximum spacing of 200 feet, and as directed, utilize Special Sediment Control Fence drainage breaks in silt fence.

#### 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 such as 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 and / or streambank 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 IIIA certified individual responsible for designing and/or reviewing Erosion and Sedimentation Control Plans

## 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/](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 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 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. 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 Division of Solid Waste Management (NCDENR). 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 *Mining Act of 1971* or regulated by DSWM (DENR) 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)**

- G. 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.
- H. An accepted Erosion and Sedimentation Control Plan shall not exempt the Design-Build Team from making every effort to contain sediment onsite.
- I. Any Erosion Control Design revisions made during the construction of the project shall be submitted to NCDOT Roadside Environmental Unit by the 15<sup>th</sup> 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.
- J. The Design-Build Team shall comply with the *North Carolina Administrative Code Title 15 A Department of Environment and Natural Resources Chapter 4, Sediment Control*.
- K. A pre-design 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 Control Pre-Design Meeting. The Design-Build Team shall be required to submit a tentative Erosion and Sedimentation Control Plan submittal schedule at the pre-design meeting.

- L. At 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 Plan pre-design meeting.
- M. 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.
- N. 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.
- O. 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
- P. Erosion & Sediment Control / Stormwater Certification shall be required according to the Project Special Provision found elsewhere in this RFP.
- Q. 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/](http://www.ncdot.org/doh/operations/dp_chief_eng/roadside/fieldops/downloads/)**
- R. 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.
- S. 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)
- T. 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.
- U. Ground Cover Stabilization Requirements - NCG010000 (7 - 14 Days)

Ground cover stabilization shall comply with the timeframe guidelines specified by the North Carolina Department of Environment and Natural Resources 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.

#### V. 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.

##### **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:

###### **March 1 - August 31**

50# German or Browntop Millet  
500# Fertilizer  
4000# Limestone

###### **September 1 - February 28**

50# Rye Grain or Wheat  
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 approval from, the NCDOT Roadside Environmental Unit prior to eliminating limestone.

Upon obtaining 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.

In accordance with the requirements noted above, the Design-Build Team shall apply Mid-Term Stabilization to all exposed road beds that lime stabilization and asphalt tack coating is not applied.

**Long Term Stabilization - For areas that will remain inactive for more than 91 days**

Erodible areas shall be stabilized utilizing the following stabilization protocol:

**All Roadway Areas****March 1 - August 31**

10# Centipede \*  
 50# Tall Fescue Cultivars \*\*  
 25# Bermudagrass (hulled)  
 500# Fertilizer  
 4000# Limestone

**September 1 - February 28**

10# Centipede \*  
 50# Tall Fescue Cultivars \*\*  
 35# Bermudagrass (unhulled)  
 500# Fertilizer  
 4000# Limestone

\* On cut and fill slopes 2:1 or steeper, the Design-Build Team shall apply centipede, at a rate of five pounds per acre.

**Riparian and Wetland Locations****March 1 – August 31**

18# Creeping Red Fescue Cultivars \*\*\*  
 6# Indiangrass  
 8# Little Bluestem  
 4# Switchgrass  
 25# Browntop Millet  
 500# Fertilizer  
 4000# Limestone

**September 1 – February 28**

18# Creeping Red Fescue Cultivars \*\*\*  
 6# Indiangrass  
 8# Little Bluestem  
 4# Switchgrass  
 35# Rye Grain  
 500# Fertilizer  
 4000# Limestone

**Waste and Borrow Locations****March 1 – August 31**

75# Tall Fescue Cultivars \*\*  
 25# Bermudagrass (hulled)  
 500# Fertilizer  
 4000# Limestone

**September 1 - February 28**

75# Tall Fescue Cultivars \*\*  
 35# Bermudagrass (unhulled)  
 500# Fertilizer  
 4000# Limestone

**\*\* Approved Tall Fescue Cultivars**

06 Dust	Escalade	Justice	Serengeti
2 <sup>nd</sup> Millennium	Essential	Kalahari	Shelby
3 <sup>rd</sup> Millennium	Evergreen 2	Kitty Hawk 2000	Sheridan
Apache III	Faith	Legitimate	Signia
Avenger	Falcon IV	Lexington	Silver Hawk
Barlexas	Falcon NG	LSD	Silverstar
Barlexas II	Falcon V	Magellan	Shennandoah 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	Tahoe II
Blade Runner II	Five Point	Pedigree	Talladega
Bonsai	Focus	Picasso	Tanzania
Braveheart	Forte	Piedmont	Tarheel
Bravo	Garrison	Plantation	Terrano
Bullseye	Gazelle II	Proseeds 5301	Titan Ltd
Cannavaro	Gold Medallion	Prospect	Titanium LS
Catalyst	Grande 3	Pure Gold	Tracer
Cayenne	Greenbrooks	Quest	Traverse SRP
Cessane Rz	Greenkeeper	Raptor II	Trio
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	Umbrella
Darlington	Hot Rod	Rhambler 2 SRP	Van Gogh
Davinci	Hunter	Rembrandt	Venture
Desire	Inferno	Reunion	Watchdog
Dominion	Innovator	Riverside	Wolfpack II
Dynamic	Integrity	RNP	Xtremegreen
Dynasty	Jaguar 3	Rocket	
Endeavor	Jamboree	Scorpion	

**\*\*\* Approved Creeping Red Fescue Cultivars**

Aberdeen

Boreal

Epic

Cindy Lou

From January 1 – December 31, the Design-Build Team shall apply an additional 20# of *Sericea Lespedeza* and 15# Crown Vetch on cut and fill slopes 2:1 or steeper.

If applied with a hand seeder, the Crown Vetch Seed shall be double inoculated. If the Crown Vetch Seed is applied with a hydroseeder, four times the normal rate of inoculant shall be used. If a fertilizer-seed slurry is used, the required limestone shall also be included to prevent fertilizer acidity from killing the inoculant bacteria. To prevent harm to the bacteria, the inoculant shall be kept below 80° F. The rates and grades of fertilizer and limestone shall be the same as specified above.

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 1<sup>st</sup> through September 30<sup>th</sup>, 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*, with the exception that centipede seed shall not be allowed in the seed mix. 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 four inches.

## **EROSION CONTROL LIQUIDATED 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 2012 *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.

## **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 NCDOT Resident 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 NCDOT Resident Engineer may elect to change the construction meeting frequency or cancel a meeting.

**PAVEMENT MARKINGS SCOPE OF WORK** (1-23-15)**General**

The Design-Build Team shall prepare Final Pavement Marking Plans in accordance with the 2009 edition of the *Manual on Uniform Traffic Control Devices* (MUTCD), the 2012 NCDOT Roadway Standard Drawings, “*Guidelines for Preparation of Traffic Control and Pavement Marking Plans for Design-Build Projects*”, the “*Design-Build Submittal Guidelines*” 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 that 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).

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 the current ADA standards and with guidance from the 2012 NCDOT Roadway Standard Drawings. If the roadway geometry does not allow the use of the standard details, contact the Contract Standards and Development Unit for alternative approved curb ramp designs.

**Final Pavement Marking Project Limits**

The Final Pavement Marking Plans shall address any required modifications to existing pavement markings 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, including but not limited to a complete restriping of all Triangle Expressway (Toll NC 540) lanes throughout the project limits.

**Pavement Markings, Markers and Delineation**

The Design-Build Team shall submit a complete set of Final Pavement Marking Plans that include the -L- Line, all -Y- Lines, all ramps and loops for review and acceptance. The Design-Build Team shall not place any final pavement markings or markers until the 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 Signing and Delineation Unit prior to incorporation.

The Design-Build Team shall install pavement markings and markers in accordance with the NCDOT 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 surfaces as follows:

Road	Marking	Marker
Concrete Surfaces	Polyurea with Highly Reflective Elements	*Snowplowable (Raised Markers on -Y3- INT and Bridge Deck)
Asphalt Surfaces	Thermoplastic	

\* The Design-Build Team shall install snowplowable markers a minimum of 3” from longitudinal concrete joints and a minimum of one-foot from transverse concrete joints.

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) for stop bars, symbols, characters, crosswalks and diagonals.

Using water blasting (hydro blasting) or grinding, the Design-Build Team shall remove all residue and surface laitance on concrete surfaces prior to placing final pavement marking materials.

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 markings will be installed.

On all Full Control of Access interstate, toll facilities and US Routes the Design-Build Team shall install six-inch wide pavement markings, (i.e., lane line, edge line 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 water blasting (hydro blasting) or grinding. The Design-Build Team shall not remove pavement markings from asphalt surfaces by water blasting (hydro blasting).

**ALL-ELECTRONIC TOLLING (AET) TOLL ZONE FACILITIES INFRASTRUCTURE**  
**SCOPE OF WORK** (2-24-15)**General**

This AET Toll Zone Facilities Infrastructure Scope of Work includes design, engineering, fabrication, delivery and erection of gantries, AET Toll Zone Vaults, pavement, concrete pads, sidewalks, electrical work, heat, ventilation, air conditioning (HVAC) work, conduit duct banks and associated junction boxes necessary for the infrastructure of the AET tolling system.

The AET Toll Zones shall be designed and constructed in conformance with the NCTA AET Standard Drawings provided by the Department. The design and construction shall also conform to any applicable project aesthetic guidelines that may be provided by the Department.

The Department will enter into an agreement with a Toll Systems Integrator (TSI), to design, develop, install, test and operate the roadside toll AET equipment for the project.

The Design-Build Team shall coordinate with the Department in the final design and construction of the AET Toll Zone to readily accommodate the TSI's components without the need for modifications and to achieve the NCTA tolling performance requirements. Some information contained within this AET Toll Zone Facilities Infrastructure Scope of Work and the NCTA AET Standard Drawings is typical and may not be applicable for the specific tolling system provided by the TSI. The Design-Build Team shall consider all local conditions and proposed tolling equipment, and produce the best possible fully engineered design for conduits, boxes and pads to support the integration of the roadside toll AET equipment. However, based upon coordination with the TSI in the final design of the AET toll zone there may be a reduction, deletion or addition of items indicated within this scope of work, which if allowed and necessary, shall result in compensation adjustments in accordance with the 2012 *Standard Specifications for Roads and Structures*.

Accurate As-Built Plans shall be provided to the Department at the completion of work indicating all AET Toll Zone facilities infrastructure elements installed with accurate locations indicated.

Provide NCTA, via the Design-Build Group, four (4) sets of keys to all doors and cabinets.

Provide NCTA, via the Design-Build Group, a binder containing equipment installation / maintenance manuals, warranty information, etc. for all installed equipment. Provide electronic copies of this material on CD or DVD with the aforementioned binder.

Design, construction drawings, As-Built Plans, details, and specifications described within this Scope of Work shall be the responsibility of the Design-Build Team, unless noted otherwise. Provide all details and plans consistent with industry standards and professional requirements.

**AET Toll Zone Location**

Locate each AET Toll Zone at the general locations indicated on the R-2635D Design Public Meeting Map – Ultimate Design, provided by the Department. Coordinate the final site location

for the AET Toll Zones with the Department. The final location shall be approved by the Department prior to proceeding with final design drawings.

Locate AET Toll Zones away from sources of Electro Magnetic Interference (EMI) including electrical power supply transformers, motors, Magnetic Resonance Imaging (MRI) and X-ray equipment, radio transmitters, radar transmitters, and induction heating devices in order to minimize interference with future communications cabling. The Department has tested the EMI levels in proximity to the American Tower's telecommunication tower and determined that the levels are acceptable.

The Design-Build Team shall provide GPS coordinates of preliminary design toll zone locations to the Department for review and acceptance prior to developing the final design.

Locate all AET Toll Zones in roadway areas where lane changing and weaving would not be expected. Do not locate AET Toll Zones under structures or on structures.

Do not place drainage (or other) pipes under the area between the first and second gantries or within 25 feet of any conduit or junction box. The design and construction shall ensure that surface stormwater shall be directed away from all in-ground junction boxes and equipment pads. The AET Toll Zone design shall be closely coordinated with the roadway design. Shoulder gutter or curb may be needed to assure stormwater is directed away for the junction boxes and equipment pads.

Protect access drive and gantry columns with guardrail as shown in the NCTA AET Standard Drawings.

### **Toll Zone Location Geometric Design**

- Preferably, the AET Toll Zone should be located in a minimum 250-foot long horizontal tangent section with limits from at least 100 feet prior to the first AET gantry structure centerline to at least 100 feet beyond the second AET gantry structure centerline.
- In the event the AET Toll Zone cannot be located in a horizontal tangent section, it may be located in a horizontal curve section with a radius of 2,000 feet or greater.
- Provide AET Toll Zone pavement cross-slopes that shall be uniform through the AET Toll Zone travel lanes. The cross-slope shall not exceed 2 vertical feet over the width of the section at the tolling point; for the purpose of this requirement, the "width of the section" shall be defined as the distance between the centerlines of the left and right shoulder.
- For off-ramps, locate AET Toll Zones a minimum of 350 feet from pavement gore point, if possible. Pavement gore point shall be defined as the intersection of the right outside edge of mainline shoulder and the left outside edge of ramp shoulder. Locate AET Toll Zones no closer than 800' from ramp terminal (measured from the stop line or gore point).
- For on-ramps, locate AET Toll Zones a minimum of 350 feet from pavement gore point, if possible. Pavement gore point shall be defined as the intersection of the right outside edge of mainline shoulder and the left outside edge of ramp shoulder. Locate AET Toll Zones no closer than 400' from center of ramp terminal intersection or gore point. Note: For the functional design shown on the Design Public Meeting Maps – Interim and Ultimate

Designs, NCTA has approved an internal design exception to the requirement for the Loop A toll site. The site is approximately 275' from the center of ramp terminal intersection.

- Locate AET Toll Zones in roadway areas where uniform vehicle speeds above 35 mph are expected.
- Provide a minimum 1000 feet clear line of sight for drivers approaching AET Toll Zones located on exit-ramps.

The toll zone locations shall accommodate the shoulder acceleration and deceleration lengths required for access to / from the AET Toll Zones.

## **AET Toll Zone Vault**

### **(A) Location**

Do not locate the AET Toll Zone Vaults adjacent to areas that may be subject to the infiltration of water, steam, humidity, heat or other adverse atmospheric or environmental conditions. Avoid site locations that are below water level or near ponding water resulting from rainfall events. Grade the AET Toll Zone Site such that water flows away from the AET Toll Zone Vault.

Do not locate AET Toll Zone Vaults adjacent to sources of constant, excessive, low or high frequency noise, such as air-handling equipment, pumps, and the like.

Do not install equipment and utilities not specifically required for the AET Toll Zone Vaults, including utility pipes, wiring, cabling, ductwork or other electrical equipment within, through, or under the AET Toll Zone Vault.

Coordinate final positioning of the AET Toll Zone Vault at each site with the Department.

### **(B) General Configuration**

Design, engineer, fabricate and erect an AET Toll Zone Vault for each AET Toll Zone as shown in the NCTA AET Standard Drawings. The AET Toll Zone Vault shall house ITS equipment and roadside toll collection equipment (provided by the TSI).

Design AET Toll Zone Vaults to be typical in functionality and appearance throughout the project limits. Provide AET Toll Zone Vaults of steel, concrete or masonry construction that is aesthetically consistent with the applicable Aesthetic Design Guidelines and does not require painting and / or routine maintenance. Provide prefabricated, pre-cast or conventional masonry brick / block on-site construction. Wood construction will not be allowed. Provide durable, watertight, secure, AET Toll Zone Vaults requiring minimal maintenance. Provide a roofing system with a minimum 20-year warranty. Residential type shingles will not be allowed.

Size the AET Toll Zone Vault to meet constraints shown in the NCTA AET Standard Drawings. Design finish ceiling height to be not less than 9 feet as measured from the finished floor elevation. The vault shall have a minimum R-24 insulation.



Design AET Toll Zone Vaults for a two-hour fire rating, unless superseded by the North Carolina Fire Code standards. Provide a 10 pound Class ABC fire extinguisher rated for the size of the AET Toll Zone Vault mounted at the entrance wall.

The AET Toll Zone Vault shall be watertight and not allow water intrusion in extreme weather conditions. All conduit and utility penetrations shall be sealed watertight. The Design-Build Team shall test the AET Toll Zone Vault upon completion to verify the entire assembly is watertight.

**(C) Architectural Plans**

Prepare an architectural plans package for the AET Toll Zone Vaults, to include the Architectural, Structural, Electrical, HVAC and Mechanical Plans, finish schedule and other documents necessary for a complete turnkey construction of the AET Toll Zone Vaults. Submit design calculations including structural, foundations, HVAC and electrical calculations for all components of the AET Toll Zone Vault with plans. A professional engineer registered in the state of North Carolina shall seal all designs, plans and calculations. Design AET Toll Zone Vaults to meet all zoning and building code requirements. Prepare the AET Toll Zone Vault plans and designs in accordance with the North Carolina Building Code, latest edition. Provide facility plans that are accurate, legible, and complete in design, drawn to appropriate scales and furnished in reproducible form. Obtain all required permits to construct and occupy the AET Toll Zone Vaults.

**(D) HVAC**

Furnish AET Toll Zone Vaults with one HVAC unit. The Design-Build Team shall design the HVAC system in coordination with the TSI. Current heat load requirements provided by the TSI require a minimum of a 1½ ton HVAC unit. These load requirements are based upon anticipated toll collection and ITS equipment. Actual heat loads to be used in design of the HVAC system shall be confirmed with the TSI.

Provide a dual set point (heat and cool) thermostat and install heating and cooling ducts to minimize interference with wall surface area and conflicts with electrical and communication conduits, cable trays, and cabling.

Provide method of routing condensate away from base of building.

**(E) Doors**

Provide exterior access doors that swing outward following the NCTA AET Standard Drawings. Provide exterior doors constructed of steel with steel frames. Design and install exterior door, including hollow door jamb, to accommodate future access-control keypads and proximity card readers, which will be installed by the TSI. Provide keyed door locks for interim / back-up security. Provide a universal key that accesses all locks. Provide door construction to suitably protect, seal, and prevent the ingress of water, moisture, dust, gases and wind-driven rain into the AET Toll Zone Vaults.

Doors, frames and hardware shall be extra heavy duty, full flush as defined in SDI A250.8 and shall have a minimum two-hour fire rating in accordance with ANSI/UL 10C, "Positive Pressure Fire Tests of Door Assemblies", unless superseded by the North Carolina Fire Code Standards.

Additionally, the doors to the AET Toll Zone Vault shall be unobstructed such that a vehicle or portable lift could access the AET Toll Zone Vault.

**(F) Interior Finishes**

Provide interior walls and ceiling fully sealed and painted with a durable high quality paint. The interior finish color shall be high, bright white semi-gloss. Provide industrial anti-static non-slip tile or an epoxy flooring material.

**(G) Lighting**

Provide interior lighting consisting of T8 industrial fluorescent lighting fixtures with wall mounted occupancy sensor and manual on / off. Provide a minimum 50 foot-candles of illumination at a 30-inch work plane. Provide battery operated backup emergency packs with integral halogen heads at entrance / exit. Provide lighting point-by-point calculations for interior lighting as part of Architectural Plan submittal.

Provide motion sensor control, exterior lighting that provides an average maintained lighting level of 1.0 foot-candle with a uniformity ratio of 3:1 to 4:1 for the access to the AET Toll Zone Vault and the maintenance parking area. Provide full cut-off exterior lighting fixtures as defined by IESNA and that are International Dark-Sky Association (IDA) compliant. Provide lighting point-by-point calculations for exterior lighting as part of Architectural Plan submittal. Exterior lighting shall not illuminate the roadway in such a way that it would distract drivers. Exposed conduit on the exterior of the vault will not be allowed for the exterior lighting system

**AET Toll Zone Gantry Design Requirements**

Design, engineer, fabricate, transport and erect watertight gantry structures to which the TSI will attach the tolling equipment. Design gantries in compliance with the AASHTO 2009 *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 5<sup>th</sup> Edition, with the 2010 and 2011 Interim Revisions using a minimum wind speed of 90 miles per hour.

Provide two structural gantries at each AET Toll Zone, to be similar in appearance and scale. Design each gantry to span the facility width as indicated on the NCTA AET Standard Drawings. Design gantries to ensure that the line of sight for cameras, camera lights, and overhead profilers / separators are not obstructed by the structure.

Design and construct gantry structure including scale, materials, color and finish aesthetically consistent with the applicable Aesthetic Design Guidelines. The front façade or paneling of the gantry shall conceal all AET Toll Zone tolling equipment (to the extent possible without

impairing the tolling accuracy) and cabling from on-coming traffic and shall present a straight and clean visual appearance, which shall not be detracted from by tolling equipment.

Coordinate with the TSI and the Department for the final toll gantry loading and design. Include effect of any projected future roadway widening and additional tolling equipment in load analysis.

Provide vertical clearances in accordance with the NCTA AET Standard Drawings in order to maintain proper clearances for the toll collection equipment.

Design and construct an equipment-mounting frame and cantilevered overhead scanner (also known as an AVC [Automatic Vehicle Classifier] or as a profiler) frame as shown in the NCTA AET Standard Drawings to be used for the installation of the toll collection equipment. Design the gantry structure, equipment mounting frame, and overhead scanner frame to support the equipment shown in the NCTA AET Standard Drawings without vibration from wind forces or drafts from vehicles passing under the gantry.

A 12" (H) x 12" (W) divided enclosed NEMA 3R, 4, or 4X weather-tight cable tray shall be located on the top of the truss, concealed by the cladding face. A 24" x 24" x 12" enclosed NEMA 3R, 4, or 4X junction box shall be installed on the end of the cable tray to accommodate connection of the conduits extending up through the column. The extent of the cable tray is shown in the NCTA AET Standard Drawings. The cable tray shall accommodate connections where needed to facilitate the running of cables to equipment located at the lane / shoulder centers and lane / shoulder lines. Cable trays and boxes shall be grounded and bonded per NEC. The equipment mounting bar shall extend to cover all current and future lanes and paved shoulders.

All conduit, risers and cabling requirements shall be coordinated with the TSI and the Department.

Provide conduits terminating above the top of the gantry column and at the at-grade control / junction boxes at the base of the gantry as shown in the NCTA AET Standard Drawings.

Design communications conduit connections between the conduit at the top of the column and the cable tray junction box to accommodate a minimum 18" cable bend radius. Design power conduit connections between the conduit at the top of the column and the cable tray junction box to accommodate a minimum 6" cable bend radius.

Aesthetic end cap treatment shall be designed for the column-top conduit / cables to be accessible for preventive or emergency maintenance.

The aesthetic treatment shall conceal all conduit and cable trays from view of approaching traffic.

Locate hand-holes, stub-outs, junction boxes, or control boxes, for access to equipment cabling and electrical wiring out of view of approaching traffic.

**AET Toll Zone Driveway**

Design and provide an asphalt driveway / parking area as shown in the NCTA AET Standard Drawings. Provide a driveway to the right side of the direction of travel. (For additional requirements reference the Pavement Management Scope of Work found elsewhere in this RFP)

**Foundation / Sidewalk / Concrete Maintenance Pad**

As shown in the NCTA AET Standard Drawings, construct concrete pads that serve as the AET Toll Zone Vault foundation (will serve as maintenance pad, sidewalk, etc.) and equipment cabinet foundations. The AET Toll Zone Vaults and equipment cabinet foundations shall be 8-inches thick minimum. Design and grade site so water flows away from the AET Toll Zone Vault slab and equipment pads.

The sidewalk and pad areas shall have a brushed finish.

Locate the generator on the AET Toll Zone Vault foundation concrete pad as detailed in the NCTA AET Standard Drawings.

The AET Toll Zone Vault shall include a 6-inch high curb that separates the foundation from the adjacent parking surface. (Reference the NCTA AET Standard Drawings for additional requirements) Provide a ramp from the adjacent driveway centered on the door for loading / unloading.

**Screen Wall**

Design decorative screening / wall to visually shield the motorist from viewing the AET Toll Zone Vault and maintenance pad. Provide decorative screening / wall around two sides of the AET Toll Zone Vault, as shown in the NCTA AET Standard Drawings. When roadways are located on two sides of the AET Toll Zone Vault, provide a decorative screening / wall around three sides of the AET Toll Zone Vault, screening the traffic facing sides and the rear side of the AET Toll Zone Vault. Design decorative screening / wall consistent with the applicable Aesthetic Design Guidelines. Between the wall and the AET Toll Zone Vault, provide a washed stone (or similar) surface to facilitate drainage and maintenance of conduit entering the AET Toll Zone Vault.

**AET Toll Zone Conduit and Junction Boxes**

Design and construct required conduits and cabling infrastructure necessary to establish the communications path between fiber-optic trunk line, AET Toll Zone Vaults, gantries, cabinets, and junction boxes. Install the number and size of conduits, boxes and related equipment specified in the ITS Scope of Work found elsewhere in this RFP and the NCTA AET Standard Drawings.

Ensure junction boxes are provided such that the last set of junction boxes before a conduit route enters a vault are not placed higher in elevation than the vault slab itself. This will prevent water-filled boxes from draining into the vault.

Coordinate with the Department throughout the conduit and junction box design and installation.

Provide separation between power and communications conduit as specified in the NCTA AET Standard Drawings.

Provide underground concrete-encased conduit duct bank when crossing new roadways. Install conduit duct banks such that there is a minimum of 18 inches of cover from pavement subgrade to the top of the duct bank. For duct bank crossings of existing roads, bore or open-cut as site conditions dictate. Trenched conduit, directional bores or jack and bore shall be in accordance with the 2012 *Standard Specifications for Roads and Structures*.

Terminate conduit through the floor slab of AET Toll Zone Vaults above finished floor elevation.

Furnish conduits stubbed out at all concrete pads with plastic bushings (or comparable material) to prevent cables from being damaged when being pulled through conduits or shifting during use. Clearly label each end of the conduits and include conduit plugs, pull line in each conduit, and tracer wire (if needed) per Article 1091-3 of the 2012 *Standard Specifications for Roads and Structures*.

Provide galvanized metallic conduit in above ground installations.

## **Electrical**

Provide electrical service to the AET Toll Zone Vaults.

- Electrical service to the AET Toll Zone Vaults shall be 120/240V single-phase service.
- Provide an operating voltage of 120/240V, at a minimum, 100 amps, unless otherwise approved.
- Provide electrical power panel in a conventional NEMA 1 surface mount panel board enclosure, which supplies power to the electronic toll equipment.
- Provide, at a minimum, a 100 amp Main Breaker with a minimum of 24 circuits.
- Provide, at a minimum, one (1) two-pole breaker for UPS, coordinated with the TSI and 20% installed spare breakers at 20 amps rated, at a minimum, 18K AIC.
- Provide a main ground bus bar connected to the building grounding system
- If power is provided from a single point for multiple AET Toll Zone Vaults or locations, a Main Distribution Panel may be necessary.

Coordinate with the TSI and the Department in the design of the electrical loading, ampere capacity rating, circuit poles, etc. for the final power panel design.

Coordinate with the TSI and the Department to establish electrical power and communication / data service requirements for each toll gantry.

Provide building electrical power to lights, switches, receptacles, HVAC system and other infrastructure items for operating and managing the AET Toll Zone Vault.

Provide the AET Toll Zone Vaults with 125 volt rated duplex receptacles at approximately 10-foot centers at 18 inches above finished floor, as shown on the NCTA AET Standard Drawings. (Field-adjust, as needed, to accommodate the conduit risers)

Coordinate with the local utility company(ies), make application(s) in the name of NC Turnpike Authority, and pay all deposit fees to provide necessary electrical and communication services for the AET Toll Zones. The Design-Build Team shall be responsible for all application and connection fees. The Design-Build Team shall be responsible for any utility service installation from the power meter to the AET Toll Zone Vaults' power panels. The Design-Build Team will not be responsible for paying the monthly power bills.

Provide Type "C" equipment pads at AET Toll Zone locations.

### **Grounding**

Provide a master grounding system at all new and revised AET Toll Zone Vault electrical service points, unless otherwise specified. In addition to National Electrical Code (latest edition) requirements, test grounding electrode resistance at connection point to electrical service ground bus for a maximum of 20 ohms. Furnish and install additional ground rods to grounding electrode system as necessary to meet test requirements. Submit a completed Grounding Test Results form. Provide a length of marker tape 12-inches below finished grade directly over grounding electrodes and conductors.

### **Lightning Protection**

Design and install Lightning Protection System for the AET Toll Zone Vaults and Gantries in conformance with, and certified by, the Lightning Protection Institute (L.P.I.) Installation Code LPI-175. Products shall comply with Underwriters Laboratories, Inc. Master Label Code 96A and NFPA 780. The lightning protection system installer shall submit a UL Master Label or L.P.I. system certification upon completion of the work. Design Lightning Protection System taking into account all tolling equipment to be installed on gantry. Consider equipment installed on the Triangle Expressway's Salem Street interchange ramp toll sites as indicative of equipment to be installed at these sites. Coordinate with the TSI on actual equipment to be installed.

### **Standby Generator**

Provide standby generator to power each complete AET Toll Zone to include AET Toll Zone Vaults, toll and communications equipment, video tolling cameras and lights, sensors, DMS on gantries, lighting, electrical system, security system, monitoring and HVAC systems. Supply and install a 45kW standby generator. Provide a generator disconnect as per the NCTA AET Standard Drawings.

Where toll zone configurations differ from those shown in the NCTA AET Standard Drawings, alternate sizing shall be necessary and shall be coordinated with the Department.

Provide standby generator with an automatic transfer switch designed to run after 5 seconds of power outage. Evaluate and include a method for reducing the noise impact caused by the standby generators to residences near proposed AET Toll Zone Vault locations.

The standby generator shall be provided with an outdoor-rated housing and mounted on the concrete pad adjacent to the AET Toll Zone Vault with clearances as shown on the NCTA AET Standard Drawings, unless additional clearance is required by code or manufacturer's recommendation. Include a muffled exhaust system for the generator.

Provide a protective screen against rodents at the base of the generator.

### **Propane Tank**

Provide a single propane fuel tank with a dry level sensing device (hard-wired, 4-20mA, 0-5 VCD or 0-10 VDC typical Hall Effect Transmitter) that will interface with future AET Toll Zone Vault automation system provided by others. Supply a 500 gallon propane fuel tank. Install a transfer switch to interact and directly communicate via contact closures with building automation system for critical status indications. Provide TSI with Interface Control Documents (ICDs) as a part of construction submittals for generator, transfer switch, and propane tank to facilitate communications. Design propane fuel tank system compliant with all local, State, and Federal requirements and comply with NFPA 54, National Fuel Gas Code. The Design-Build Team shall take measures to ensure standing water does not accumulate in access hatch.

All wiring from the building interior to the generator and the propane shall be continuous and free of splices.

**INTELLIGENT TRANSPORTATION SYSTEM (ITS) SCOPE OF WORK** (2-16-15)**GENERAL REQUIREMENTS****(A) DESCRIPTION****1. Summary of Work**

This section of the RFP will provide the Department with intelligent transportation system (ITS) devices and communications infrastructure.

The ITS component shall include, but is not limited to:

- Removal and reinstallation of the closed circuit television (CCTV)-1A camera, pole, foundation, cabinet and ancillary equipment.
- Removal and reinstallation of the microwave vehicle detectors (MVD) #6A and #6B sensor, pole, foundation, cabinet and ancillary equipment.
- New microwave vehicle detection systems (MVDS), including sensor, pole, foundation and ancillary equipment.
- Approximately 2.0 miles of trunkline (replacement primary trunkline and new redundant trunkline), and
- Lateral and drop conduit for the toll collection and ITS communications network.

Before the commencement of significant earthwork in the vicinity of the existing trunkline, the Design-Build Team shall construct a “Redundant Trunkline” on the north side of the Triangle Expressway (Toll NC 540) connecting AET T33 toll zone (also known as AET (or ORT) 1.1) with the CCTV-2 site, as shown in the January 22, 2015 ITS Concept Plans. The Design-Build Team shall perform all splicing and testing required to re-establish all ITS and toll network communications along this Redundant Trunkline as shown in the “Redundant Trunkline Splicing Plan”, contained within the January 22, 2015 ITS Concept Plans. The Design-Build Team shall fully maintain this communication and full device functionality throughout project construction.

Before significant construction starts in proximity to the existing CCTV-1A, the Design-Build Team shall relocate the CCTV-1A camera, pole, cabinet and ancillary equipment to a new foundation in the approximate location shown on the January 22, 2015 ITS Concept Plans. The Design-Build Team shall construct a new fiber-optic drop cable from this site to a new splice enclosure at the west tie-in point. The Design-Build Team shall re-integrate this CCTV camera into the Triangle Expressway (Toll NC 540) camera system and maintain full operation of the camera throughout the remainder of construction.

When the detection devices, replacement conduit, and toll / ITS fiber in proximity of the interchange are ready to be integrated into the Triangle Expressway (Toll NC 540) fiber-optic network, the Design-Build Team shall perform all splicing and testing required to re-establish all ITS and toll network communications along this primary trunkline, as shown in the “Primary Trunkline Splicing Plan”, contained within the



January 22, 2015 ITS Concept Plans. The communications link along the Redundant Trunkline shall remain connected after final acceptance of the project.

As an alternate approach, the Design-Build Team may determine that all the current cable and conduit in the project limits can remain in place and fully functional throughout construction. The Design-Build Team shall still re-locate CCTV-1A as described above. If this alternative is pursued, the Design-Build Team shall build, connect, and test the redundant trunkline in order for it to be fully functional at the conclusion of the project, along with new ITS devices such as the new MVD units.

The Design-Build Team shall repair any damage to the existing ITS infrastructure and shall re-establish communications and full device functionality to damaged ITS infrastructure within 24 hours of the discovery of the damage by the Department.

The communications infrastructure, including the Primary and Redundant Trunklines, shall consist of an underground conduit system including conduit, tracer wire, junction boxes, heavy-duty junction boxes and custom junction boxes.

The Design-Build Team shall design and install the complete conduit system (as described in this Scope of Work) to service all ITS devices and toll facilities within the project limits.

Furnish and install fiber-optic cables as described elsewhere in this Scope of Work and as shown in the January 22, 2015 ITS Concept Plans.

Furnish and install fiber-optic splice / termination centers for both the tolls and ITS systems. Certain tolls equipment described in this Scope of Work will be installed by others.

All communications between proposed ITS field devices and the local hub shall be Ethernet over single-mode fiber-optic cable. Design-Build Team shall furnish and install Ethernet edge switches and related electronics.

The Design-Build Team shall determine the exact location of the ITS devices, junction boxes and conduit routing; and obtain the Engineer's approval of the locations, installing conduit, tracer wire, junction boxes, heavy-duty junction boxes, and developing and implementing test and coordination procedures for the conduit prior to incorporation. The basis of the design shall be the January 22, 2015 ITS Concept Plans provided by the Department.

Upon completion of the work, the Design-Build Team shall conduct field-testing using an approved test plan of the local communications system and the ITS devices, including but not limited to relocated ITS devices, and maintain the devices and communications system until final acceptance by the Department.

## 2. Standard Specifications

Conform to this Scope of Work and the 2012 *Standard Specifications for Roads and Structures*, the 2012 *Roadway Standard Drawings*, and the January 22, 2015 ITS Concept Plans (which also include the ITS Standard Details). Conform to NCTA *All-Electronic Tolling (AET) Standard Drawings* and All-Electronic Tolling (AET) Toll Zone Facilities Infrastructure Scope of Work. Conform to the regulations and codes described in Section 1700 of the 2012 *Standard Specifications for Roads and Structures*.

In the event of conflict between this Scope of Work and the 2012 *Standard Specifications for Roads and Structures*, this Scope of Work shall govern.

The 2012 *Standard Specifications for Roads and Structures* shall be revised as follows:

- **Subarticle 1098-1(H)** - In the second paragraph, add, “use 200 amp meter base for underground electrical service”.

Reference is made to the “Project Special Provisions for Signals and Intelligent Transportation Systems”. The document can be found at the following link:

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

This document is continually updated. The version that governs the Design-Build Team shall be [Version 12.4](#).

## 3. Other Codes and Standards

All communication conduit system materials shall conform to the latest version of the applicable standards of the National Electric Manufacturer's Association (NEMA), the Underwriters' Laboratories, Inc. (UL), the Electronic Industries Association (EIA), the National Electric Code (NEC), the International Municipal Signal Association (IMSA), and the National Electrical Safety Code (NESC). All materials and workmanship shall conform to the standards of the American Society for Testing and Materials (ASTM) and American National Standards Institute (ANSI).

## 4. Information Technology Requirements

Conform to the NCDOT and NC Statewide IT Policies and Standards as described at:

<https://www.scio.nc.gov/mission/itPoliciesStandards.aspx>.

The architecture of the IT modules shall be approved by NCDOT IT and the NC Office of Information Technology architecture groups.

**(B) MATERIALS****1. Qualified Products**

Furnish new equipment, materials, and hardware unless otherwise required. Inscribe manufacturer's name, model number, serial number, and any additional information needed for proper identification on each piece of equipment housed in a case or housing.

Certain categories of signal and communications equipment, material, and hardware shall be pre-approved on the latest version of the QPL by the date of installation. These categories are defined in this Scope of Work.

**2. Observation Period**

Under the payment and performance bond, warrant workmanship and Design-Build Team-furnished equipment for a 60-day observation period from date of acceptance.

**3. Wire and Cable**

Furnish wire and cable on reels. When requested by the Department, furnish samples of wire and cable to the Department at no additional cost.

**(C) CONSTRUCTION COORDINATION****1. Introduction**

This section addresses coordination issues that may affect this project.

**2. Toll System Integrator**

The Design-Build Team shall coordinate with the Toll System Integrator for design and construction issues and to schedule training of Toll System Integrator personnel. Training will only be required if the Design-Build Team furnishes ITS equipment not used on the Triangle Expressway (Toll NC 540) project.

**3. Regulations and Codes**

Furnish material and workmanship conforming to the *National Electric Code* (NEC), *National Electric Safety Code* (NESC), Underwriters Laboratories (UL), or other listing agencies approved by the North Carolina Department of Insurance, and all local safety codes in effect on the date of advertisement. Comply with Article 4, Chapter 87 of the *North Carolina General Statutes* (Licensing of Electrical Contractors). Comply with all previously referenced specifications, and all applicable local ordinances and regulations before and during all stages of the electrical work.

When required by the local ordinances and governmental agencies, upon completion of the work, have all systems inspected and approved in writing by the authorized

governmental electrical inspector for the area. Furnish written certification of the authorized inspector's approval to the Engineer. Inspection by the authorized governmental electrical inspector shall neither eliminate nor take the place of the inspections by the Engineer. Upon the Engineer's receipt of written certification and the Design-Build Team's written request for a final inspection of the installations, the Engineer will perform a final inspection.

Where required, conform to AASHTO and ASTM standards in effect on the Technical Proposal submittal date.

Notify the Engineer, local traffic enforcement agency, local utility company, and affected railroad companies seven business days before operational shutdowns to coordinate connection or disconnection to an existing utility or system.

Install meter bases and service disconnects as required by the NESC, NEC, local utility companies, and local ordinances. Install standoffs only when required and approved by the local utility companies. Where a standoff must be used, obtain the local utility company's approval prior to installing the standoff.

#### **4. Utility Services**

Coordinate all work to ensure electrical power of proper voltage, phase, frequency, and ampacity is available to complete the work. Use electrical services cables with THWN insulation.

The Design-Build Team shall provide electrical and telecommunication service as described in this Scope of Work, contact the utility company and make application to ensure all work can be completed. Obtain authorization for service in NCTA's name for NCTA-owned locations. Make application for service in NCTA's name for NCTA-owned locations.

The Design-Build Team shall be responsible for all expenses associated with utility installation costs, hookups, etc., from the power meter / electrical service tap to the facilities / device being provided power. Once installed, NCTA will be responsible for monthly utility company usage charges prior to final acceptance.

#### **5. Intermediate Contract Time #5 for Failure to Maintain and / or Repair ITS Devices and Restore Communication**

Ensure that an IMSA certified, or equivalent, Level II traffic qualified technician is standing by to provide emergency maintenance services whenever any electrical work is performed. Standby status shall be defined as being able to arrive, fully equipped, at the work site within two hours ready to provide maintenance services.

Furnish the Engineer with the name, office telephone number, cellular (mobile) telephone number, and pager number of the supervisory employee who will be responsible for maintenance and repair of equipment during all hours.

Maintain and repair all ITS devices and local communications related equipment installed by the contractor within the project construction limits from the time of installation until completion of the observation period and receipt of written notification of final acceptance of the project.

For all failures, malfunctions, or damages to equipment, begin necessary repairs within four hours of notification. Complete repairs within eight hours of notification. The inability to contact the supervisory employee or prearranged alternate will not extend repair time requirements.

Remove and replace all ITS devices and communications related equipment that fails.

Except for damages and malfunctions caused by the Design-Build Team's work activities, the Design-Build Team will not be held responsible for pre-existing conditions reported to the Engineer before starting any work at the specific location. The Design-Build Team shall assume responsibility for all maintenance and emergency services necessary once work has begun at an existing device location and for all damages and malfunctions caused either directly or indirectly by the Design-Build Team's work activities.

In the event the Design-Build Team fails to perform in accordance with the plans developed by the Design-Build Team and Scope of Work within the timeframe specified, the Department reserves the right to perform maintenance and emergency service necessary to ensure continuous operation. Further, all expenses incurred by the Department in implementing this option shall be deducted from payment due the Design-Build Team.

Maintain system equipment until the completion of the 60-day observation period and the receipt of written notification from the Engineer of final acceptance of the project.

**Liquidated Damages for Intermediate Contract Time #5 for failure to repair and / or maintain the ITS devices and restore communication within the timeframes specified herein are \$2,500 per occasion, per 24-hour period or any portion thereof, until corrected.**

## UNDERGROUND CONDUIT

### (A) DESCRIPTION

Furnish and install conduit for underground installation with tracer wire, miscellaneous fittings, all necessary hardware, marker tape, conduit plugs, sealing putty, pull lines, backfill, graded stone, paving materials, and seeding and mulching.

Provide conduit as needed to interconnect the ITS devices and toll facilities.

**(B) MATERIALS****1. General**

Material, equipment, and hardware furnished under this section shall be pre-approved on the Department's QPL, however, for HDPE and accessories, adhere to "Submittal Requirements" found elsewhere in this Scope of Work.

Comply with Article 1091-3 of the 2012 *Standard Specifications for Roads and Structures*, with additional requirements detailed below.

**2. Conduit Types**

Use moldable sealing putty in occupied conduit and conduit risers.

**3. Mechanical Couplings for HDPE Conduit**

Provide mechanical couplings that are both watertight and airtight for joining two segments of HDPE conduit of like diameter in trenched locations. Do not use mechanical couplings for directionally drilled installations. Provide couplings designed to accommodate pneumatic methods of cable installation. Provide couplings suitable for burial underground and that meet the following requirements:

- The coupling shall not fail by leakage when subjected to sustained internal pressure testing as noted in ASTM F 2176
- The coupling shall not fail by leakage when subjected to sustained external pressure testing as noted in ASTM F 2176
- The coupling assemblies tested shall be able to comply with the tensile loading requirements as specified in ASTM F 2176
- As specified in ASTM F 2176, the coupling shall not fail when conditioned at low temperature conditions of 10 degrees F and tested by an impact with a force of 20 ft-lb using Type "B" as described in Test Method ASTM D 2444

**(C) CONSTRUCTION METHODS****1. General**

Comply with Article 1715-3 of the 2012 *Standard Specifications for Roads and Structures*.

Install a minimum of two 2" conduits (**blue and orange**) for all underground routes that are designated to convey a pair of 24-fiber communications cables. This includes the "Redundant Trunkline" conduit. Install four 2" conduits (**blue, white, black and orange**) for all underground routes that are designated to convey a pair of 72-fiber communications cables. This includes the "Primary Trunkline". Install a minimum of one 2" conduit for underground routes that are designated to convey 6-fiber communications cable.

Install a minimum of two 2" conduits for conveying communication cables, exclusive of conduit needed for power service, for all directional drill installations beneath roadways, or streams.

Do not exceed **1,500** feet between junction boxes in any underground conduit route that conveys communications cable without the prior approval by the Department.

## **2. Maximum Length of Directional Drill**

The length of a directional drill shall not exceed **1,000** feet measured horizontally along the route of the directionally drilled conduit(s), unless otherwise approved by the Engineer. On or before the **1,000**-foot mark, transition from directional drill to trenching to continue the route up to the maximum spacing of **1,500** feet between junction boxes. Alternatively, continue the route by beginning a successive directional drill and installing an over-sized heavy-duty junction box where the two directionally drilled conduit runs meet.

## **3. Splicing and Coupling of HDPE Conduit**

Install a continuous HDPE conduit free from splices or couplings between junction boxes whenever possible. However, splicing or coupling of HDPE conduit may be permitted, subject to the prior approval by the Department, in the following situations:

- To complete an underground HDPE conduit run when the end of an HDPE reel is reached
- When transitioning from directional drill to trenching or from trenching to directional drill in an underground run while maintaining the same quantity and size of conduits in the run

Join the HDPE conduit ends by installing mechanical couplings in accordance with the manufacturer's instructions or by splicing the conduits using either a butt-fusion welder or an electro-fusion welder. Submit the proposed method of coupling or splicing the conduits to the Engineer for review and approval prior to joining any HDPE conduits.

Otherwise, install an oversized, heavy-duty junction box where the ends of the HDPE conduits meet in lieu of joining the ends through splicing and coupling. Install an oversized, heavy-duty junction box where the number of conduits in the underground run changes. For example, install an oversized, heavy-duty junction box where two directionally drilled conduits meet a single run of trenched conduit.

## **4. Bore and Jack**

Comply with Article 1715-3 of the 2012 *Standard Specifications for Roads and Structures*.

## **JUNCTION BOXES**

### **(A) DESCRIPTION**

Furnish and install junction boxes (pull boxes) with covers, graded stone, grounding systems, and all necessary hardware.

### **(B) MATERIALS**

#### **1. General**

Comply with Article 1411-2 of the 2012 *Standard Specifications for Roads and Structures*, except as follows:

- Provide junction box covers with standard NCTA logos, pull slots and stainless steel pins. For standard size junction boxes, provide covers with *NCTA Electrical* logo. Provide covers with *NCTA Fiber Optic* logo on all oversized and special-sized, heavy-duty junction boxes that house fiber-optic communications cable along the project.
- Do not provide sealant compound between junction boxes and covers.
- Material, equipment, and hardware furnished under this section must be pre-approved on the Department's QPL by the date of equipment installation; however, for special-sized heavy-duty junction boxes, loop and custom splice boxes, adhere to "Submittal Requirements" found elsewhere in this Scope of Work.
- Provide an 18" reinforced concrete collar on all junction boxes, unless boxes are on slopes of 3:1 or worse. Avoid placing junction on such slopes wherever possible.
- Provide box drains as shown in the NCTA AET Standard Drawings.

#### **2. Standard Sized Junction Boxes**

Provide standard sized junction boxes with minimum inside dimensions of 16"(l) x 10"(w) x 10"(d) that meet or exceed the Tier 15 requirements of ANSI/SCTE 77. Provide certification that testing methods are compliant with ANSI/SCTE 77. Vertical extensions of 6" to 12" shall be available from the junction box manufacturer.

#### **3. Oversized Heavy-Duty Junction Boxes**

Provide oversized heavy-duty junction boxes and covers with minimum inside dimensions of 30"(l) x 15"(w) x 24"(d) that meet or exceed the Tier 15 requirements of ANSI/SCTE 77. Provide certification that testing methods are compliant with ANSI/SCTE 77.

#### **4. Special-sized, Heavy-Duty Junction Boxes**

Provide special-sized heavy-duty junction boxes and covers with minimum inside dimensions of 36"(l) x 24"(w) x 24"(d) that meet or exceed the Tier 15 requirements of



ANSI/SCTE 77. Provide certification that testing methods are compliant with ANSI/SCTE 77.

### **5. Loop Splice Boxes**

Provide loop splice boxes and covers with minimum inside dimensions of 36"(l) x 17"(w) x 30"(d) that meet or exceed the Tier 15 requirements of ANSI/SCTE 77. Provide certification that testing methods are compliant with ANSI/SCTE 77.

### **6. Custom Splice Boxes**

Provide larger boxes for specialized use near AET Toll Zones that meet or exceed the Tier 15 requirements of ANSI/SCTE 77. Provide certification that testing methods are compliant with ANSI/SCTE 77.

## **(C) CONSTRUCTION METHODS**

Comply with Article 1411-3 of the 2012 *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 electrical cable is necessary and where transitioning from below ground to above ground installation or vice-versa.
- Install oversized heavy-duty junction boxes in underground fiber-optic communications cable runs at maximum intervals of 1500 feet for boxes containing fiber-optic cable except those with splice enclosures.
- Install special-sized, heavy-duty junction boxes at all underground fiber-optic splice enclosure locations.
- Install loop splice boxes in AET Toll Zones as shown in the NCTA AET Standard Drawings.
- Route the black and orange conduits into the ITS junction box. Route the white and blue conduit into the Tolls junction box.
- Mark the "Tolls" junction box with a blue plastic disc similarly in size and material to those used at other such boxes on the Triangle Expressway (Toll NC 540).

## **FIBER-OPTIC CABLE**

### **(A) DESCRIPTION**

Furnish and install single-mode fiber-optic (SMFO) communications cable and drop cable assemblies with grounding systems, communications cable identification markers, and all necessary hardware.

Provide two 24-strand single-mode fiber-optic cables in separate conduits, one for ITS and one for toll operations for the Redundant Trunkline cable.

Provide two 72-strand single-mode fiber-optic cables in separate conduits, one for ITS and one for toll operations for the replacement Primary Trunkline cable.

In lieu of providing the replacement Primary Trunkline, the Design-Build Team may elect to cut the existing cables at one tie-in point ONLY, pull the cable back thru the conduit system to the opposite tie-in point, and store the cable throughout the remainder of construction, until the new ITS devices and the new toll zone is ready to be connected to the network. The Design-Build Team shall maintain / protect the integrity of the cable while stored. Following re-connection, the cable shall meet the testing requirement described in this Scope of Work.

Provide one 24-strand single-mode fiber-optic drop cable for connection to AET T32.

Provide one 24-strand single-mode fiber-optic drop cable (in existing conduit) for connection to AET T17.

Provide 6-strand single-mode fiber-optic drop cables for ITS devices.

The exact location of conduit and junction boxes shall be determined by the Design-Build Team. Route the ITS and toll operations fiber-optic cables through AET Toll Zone Vault as indicated in the Splicing Details. The toll operations cable shall route only thru the AET Toll Zone Vault T32. The toll network connection between the AET Toll Zone Vault T32 and the AET Toll Zone Vault T31 will be installed by the Toll System Integrator. All fiber strands of the AET Toll Zone Vault T32 drop cable shall terminate on a patch panel provided by the Design-Build Team.

Conduct OTDR tests on both the ITS and toll operations fiber-optic cable and correct any defects revealed by the testing. Conform to Section 1730, and specifically, Subarticles 1731-3(A) and (G), of the 2012 *Standard Specifications for Roads and Structures*.

The Toll System Integrator will energize the Tolls designated cable and connect equipment to it after acceptance.

## **(B) MATERIALS**

### **1. SMFO Communications Cable**

Furnish single-mode fiber-optic communications cable that is pre-approved on the Department's QPL.

Comply with Article 1098-10 of the 2012 *Standard Specifications for Roads and Structures*.

## 2. Drop Cable Assembly

Furnish drop cable assemblies that provide communications links between splice enclosures and Ethernet edge switches mounted in cabinets. Provide an assembly that is factory pre-assembled and factory pre-tested with the necessary drop cable length. Furnish a drop a cable assembly comprised of the designated length of fiber-optic cable that has been factory pre-terminated on a factory pre-connectorized patch panel with six connectors matching the Ethernet edge and routing switches to form an integral pre-assembled unit. Furnish a drop-cable assembly that requires no field assembly, connectorization, or termination other than splicing the free end of the drop cable into the fiber-optic trunk cable in a splice enclosure external to the cabinet.

Provide a drop cable assembly with a patch panel in a compact, modular housing or a patch panel housed in low profile, rack-mountable interconnect center. The compact modular patch panel shall have a rugged, durable, non-metallic housing that can be surface-mounted vertically to the face of the 19-inch equipment rack rail inside a cabinet or mounted horizontally within the equipment rack occupying no more than one standard rack unit (1 RU) of space. The dimensions of the patch panel shall not exceed 1.75" (h) x 16.5"(w) x 13.5" (d). The low-profile interconnect center that houses the patch panel shall be a powder-coated aluminum enclosure designed for mounting horizontally in the 19-inch equipment rack inside a device cabinet and shall occupy no more than one standard rack unit (1 RU) of space.

Provide outdoor-rated, non-armored, riser-rated cable. Provide UV rated cable.

Use single-mode fiber-optic cable that does not exceed attenuation of 0.30 dB/km at 1550 nm and 0.40 dB/km at 1310 nm. Ensure attenuation loss for complete drop cable assembly does not exceed a mean value of 1.5 dB.

Provide metal connector housing, ceramic ferrules and coupler inserts. Provide a connector attenuation of 0.20 dB and a reflectance of  $\leq -55$  dB UPC. Use heat-cured epoxy material.

Provide length markings in sequential feet and within one percent of actual cable length. Ensure character height of markings is approximately 0.10".

Furnish SMFO jumpers that are a minimum of 3 feet in length with factory-assembled connectors matching the Ethernet edge and routing switches on each end for connecting Ethernet edge and routing switches to the fiber-optic patch panels on the drop cable assemblies. The Design-Build Team shall provide SMFO jumpers of sufficient length to not strain the fibers within when installed in the final position. The minimum length for all jumpers shall be 3 feet in field cabinets and 6 feet in the AET Toll Zone Vaults. Ensure SMFO jumpers meet the operating characteristics of the SMFO cable with which they are to be coupled.

### **3. Communications Cable Identification Markers**

Comply with Subarticle 1098-10(C) of the 2012 *Standard Specifications for Roads and Structures*, with the exception of replacing “NCDOT” on the cable marker with “NCTA”.

## **(C) CONSTRUCTION METHODS**

### **1. General**

Comply with Subarticle 1730-3(A) of the 2012 *Standard Specifications for Roads and Structures*.

### **2. Underground Installation**

Comply with Subarticle 1730-3(C) of the 2012 *Standard Specifications for Roads and Structures*.

Use a breakaway swivel so as not to exceed 80% of the maximum allowable pulling tension specified by the cable’s manufacturer if cable is pulled by mechanical means.

Store 50 feet of each fiber-optic cable in oversized heavy-duty junction boxes on all cable runs that are continuous without splices. Obtain approval for spare cable storage locations.

### **3. Installation of Drop Cable Assembly**

Determine length of drop cable needed, including slack, to reach from termination point to termination point.

At below ground splice enclosures, coil at least 50 feet of slack cable for each cable entering and exiting the splice enclosure in the junction box where enclosure is located. Coil and store any drop cable in excess of what is needed for storage in the manhole or junction box in the base of the equipment cabinet, however store no more than 100 feet of extra cable.

Mount the patch panel of the drop cable assembly vertically to the surface the rack frame or horizontally within 19-inch equipment rack using the screws, mounting brackets and hardware provided with the drop cable assembly. Mount the patch panel in a location convenient to the Ethernet switch and / or video encoder to facilitate installation of SMFO jumpers between them. Secure drop cable in cabinet using cable ties and cable management hardware.

Install SMFO jumpers between the appropriate connectors on the patch panel of the drop cable assembly and the Ethernet edge switch.

Label all connectors, pigtails and the connector panel.

Using an OTDR, test the end-to-end connectivity of the drop cable assembly from patch panel installed inside the ITS cabinet to its respective communications hub. Comply with the OTDR testing and reporting requirements of the “Testing and Acceptance” section of this Scope of Work when testing drop cable.

## **FIBER-OPTIC SPLICE CENTERS**

### **(A) DESCRIPTION**

Furnish and install fiber-optic interconnect centers, fiber-optic splice enclosures, and all necessary hardware.

### **(B) MATERIALS**

Material, equipment, and hardware furnished under this section shall be pre-approved on the Department’s QPL. Ensure patch panel connectors match connectors for associated switches.

#### **1. Interconnect Center**

Furnish compact, modular interconnect centers designed for rack mounting in AET Toll Zone Vaults. Design and size interconnect centers to accommodate all fibers (used and unused) entering the AET Toll Zone Vaults.

Comply with Subarticle 1098-11 (A) of the 2012 *Standard Specifications for Roads and Structures*.

#### **2. Splice Enclosure**

Comply with Subarticle 1098-11 (C) of the 2012 *Standard Specifications for Roads and Structures*.

### **(C) CONSTRUCTION METHODS**

#### **1. General**

Comply with Article 1731-3 of the 2012 *Standard Specifications for Roads and Structures*.

#### **2. Termination and Splicing within Interconnect Center**

Install one rack-mounted interconnect center for the cable entering AET Toll Zone Vault T32 in a 19-inch communications rack provided by the Toll System Integrator. Coordinate with the Toll System Integrator on the placement of the interconnect center.

Fiber strands shall be either expressed through an interconnect center or terminated on patch panels. For all fibers designated to pass through an interconnect center, neatly

coil and express the fibers without cutting. Neatly coil excess tubing inside interconnect center.

Install SMFO jumpers between the appropriate connectors on the interconnect center and the routing switch.

### **3. Splice Enclosure**

Comply with Subarticle 1731-3(E) of the 2012 *Standard Specifications for Roads and Structures*.

Develop a cable-splicing plan to maximize cable performance and minimize the quantity of cable.

Install underground enclosures with 50 feet of slack cable from each trunk cable entering the enclosure to allow enclosure to be taken out of the special sized heavy-duty junction boxes and extended into a splicing vehicle.

For underground, special-sized heavy duty and junction box facility installations, place the enclosure along with required spare cables in the facility in a neat and workmanship like manner. Neatly coil the spare cable in the special-sized heavy-duty junction boxes. In the AET Toll Zone Vaults, neatly coil the spare cable and secure with tie wraps to the communications rack or cable trays.

## **ELECTRICAL SERVICE**

### **(A) DESCRIPTION**

Install new electrical service to new ITS cabinets and devices. For MVD 6A, 6B, 68, 69, 70, and 71, utilize electrical service in the AET Toll Zone Vaults. Relocate the existing electrical service to the new CCTV-1A site (shown on the January 22, 2015 ITS Concept Plans) that will be operational during construction. When the electrical service for the AET Toll Zone Vault T32 site is ready, transfer the electrical feed to originate from this location and abandon the separate electrical service. All new electrical services within the NCDOT or NCTA rights of way shall be underground with pedestal-mounted assemblies, as shown in the ITS Standard Details.

### **(B) MATERIALS**

Material, equipment, and hardware furnished under this section shall be pre-approved on the Department's QPL by the date of equipment installation.

Provide UL-listed 1-inch Schedule 80 conduit for underground runs. If electrical conduit shares a trench with fiber-optic conduit, use conduit color other than black, orange, blue or white.

Provide all materials necessary to form a complete electrical service assembly as shown in 2012 *Roadway Standard Drawing* No. 1700.01, "Electrical Service Options".

Provide an external electrical service disconnect at each new ITS device cabinet location. Furnish external electrical service disconnects with a minimum of a double pole 50 ampere circuit breaker with a minimum of 10,000 RMS symmetrical amperes short circuit current rating in a lockable NEMA 3R enclosure. Ensure service disconnects are listed as meeting UL Standard UL-489 and marked as being suitable for use as service equipment. Fabricate enclosure from galvanized steel and electrostatically apply dry powder paint finish, light gray in color, to yield a minimum thickness of 2.4 mils. Provide ground bus and neutral bus with a minimum of four terminals with minimum wire capacity range of number 14 AWG through number 4 AWG.

Furnish NEMA Type 3R meter base rated 200-ampere minimum that meets the requirements of the local utility. Provide meter base with socket's ampere rating based on sockets being wired with minimum of 167 degrees F insulated wire. Furnish four-terminal, 600 volt, single-phase, three-wire meter bases that comply with the following:

- Line, load, and neutral terminals accept #8 to 2/0 AWG copper / aluminum wire
- With or without horn bypass
- Made of galvanized steel
- Listed as meeting UL Standard UL-414
- Underground service entrance

Ensure meter bases have electrostatically applied dry powder paint finish, light gray in color, with minimum thickness of 2.4 mils. Furnish 1" watertight hub for threaded rigid conduit with meter base. For all new ground-mounted electrical service assemblies for underground electrical service, provide a combination panel with pedestal extension. Ensure combination meter and disconnect mounted in a pedestal for underground service is listed as meeting UL Standard UL-231. Do not provide wood posts, steel U-channel posts, square tube sign posts (i.e., Telespar, etc.), Unistrut metal framing, or any method other than an underground service pedestal to mount meter bases and disconnects for new underground electrical service.

## **(C) CONSTRUCTION METHODS**

### **1. General**

All work involving electrical service shall be coordinated with the appropriate electric utility company. Coordinate with the utility company to ascertain the feasibility of installing electrical service at each location before performing any work. Obtain all required local permits before beginning work.

Run service conductors separately from all other conductors in a 1-inch rigid galvanized conduit above ground and Schedule 80 conduit underground. Do not allow service conductors to share conduits or junction boxes with any other conductors or cables, without permission from the Engineer. Do not route unfused electrical service conductors inside of metal poles.

## 2. New Electrical Service for ITS Devices

Install new electrical service for a device cabinet in accordance with the ITS Standard Details. Install a new electrical service comprised of an external service disconnect and a meter base housed in a combination panel. If more than one cabinet is fed from the same utility company service point, a common meter may be utilized with individual disconnects at each device cabinet. The cost of running electrical service to all cabinets shall include any transformers required.

Locate all secondary power service points outside the controlled access right of way. Locate combination panels as shown on the ITS Standard Details. After installation of the meter base, the local power company will install a new meter and make any necessary connections to the power lines.

Have the power company route the service drop underground to the service entrance equipment, even where source power lines are overhead; wood poles on NCTA / NDOT right of way for power service are generally not permissible with the exception of bringing power just inside the right of way.

Place durable vinyl identification number sticker (with 2" letters) on meter base. Utilize stickers that match the appearance of those used elsewhere on the Triangle Expressway (Toll NC 540). Submit proposed sticker to the Department for approval prior to incorporation.

## DEVICE CABINETS

### (A) GENERAL

Furnish and install ITS device cabinets to house communications hardware, fiber-optic patch panels, power supplies, cable terminations, and other equipment to support the installation of CCTV cameras, and MVDS. No new CCTV camera cabinets will be installed on the project, as the existing CCTV-1A cabinet will be re-used.

### (B) MATERIALS

#### 1. General

Provide device cabinets as follows to house equipment specific to the site where it is installed.

Cabinet Type Designation	Purpose
A	MVDS sites requiring fiber-optic communications
B	Optional "Slave" MVDS site

Type A cabinets shall be a minimum size of a Type 336 cabinet. Should such locations be on steep slopes (3:1 or steeper), mount cabinet on downstream side of pedestal



structure. For Type A cabinets, provide reinforced concrete maintenance pad as per the ITS Standard Details.

Provide cabinets with a serial number unique to the manufacturer. Engrave the entire identification code on a metallic plate that shall be epoxied to the cabinet on the upper right hand sidewall.

(a) Lighting

Provide 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.

(b) Convenience Outlets

Provide 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. Provide at least one surge protected 120V (+/-10%) GFCI duplex receptacle of the 3-wire grounding type in the cabinet.

(c) Circuit Protection

Protect the ITS device 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 and service ITS device equipment and cabinet utilities.

## 2. Type A

Furnish and install pole-mounted cabinets to house MVDS-related equipment described herein. Provide the cabinets with 19-inch communications rack for all equipment. The Design-Build Team shall appropriately size the cabinet to fit all the equipment installed within the cabinet at the particular location.

Furnish, at a minimum, Type 336 cabinets meeting the following minimum requirements as applicable to the specific installation:

- Pole mounting brackets
- Grounding bus bar
- 120 VAC power supply
- 120 VAC GFCI-protected duplex outlets for tools
- 120 VAC SPD-protected duplex outlets for equipment
- Lightning and surge protection on incoming and outgoing electrical lines (power and data)
- 19-inch rack system for mounting of all devices in the cabinet
- Pull-out shelf for laptop and maintenance use
- Fluorescent lighting

- Two ventilation fans with independent thermostat controls
- Power strip along vertical rail
- Termination of the composite cable to the camera
- Maintenance access points for data and video connections to observe camera images and program/monitor camera status

Provide cabinets complete with a prefabricated cabinet shell, and all internal components and equipment, back and side panels, front and back doors, terminal strips, cabling and harnesses, surge protection for power and communication circuits, power distribution blocks or assemblies, shelves, connectors and all mounting hardware necessary for installation of equipment.

Construct the cabinets using unpainted sheet aluminum with a minimum thickness of 0.125 inch.

Provide the rack assembly with a removable, standard 19-inch EIA compliant rack. Equip each cabinet with an aluminum storage compartment mounted in the rack assembly with the following dimensions ( $\pm 0.5$  inch): 16 inches wide, 14 inches long, and 1.75 inches deep. Provide the compartment with a ball bearing telescoping drawer guides to allow full extension from the rack assembly. The storage compartment shall open to provide a full-depth storage space for cabinet documentation and other miscellaneous items. The storage compartment shall be of adequate construction to support a weight of 20 pounds when extended without sagging. The top of the storage compartment shall be hinged aluminum. Provide at least one removable metal full-depth shelf with each cabinet.

Doorstops shall be included at 90 and 180-degree positions. Provide both the door and the doorstop mechanism of sufficient strength to withstand a simulated wind load of five pounds per square foot of door area applied to the both inside and outside surfaces without failure, permanent deformation, or compromising of door position and normal operation. Provide the cabinets without auxiliary police doors.

Ensure that cabinet doors include a gasket to provide a dust and weather-resistant seal when closed. Provide the gasket material with closed-cell neoprene and shall maintain its resiliency after exposure to the outdoor environment. The gasket shall show no sign of rolling or sagging, and shall ensure a uniform dust and weather-resistant seal around the entire door facing.

*Ventilation:* Provide all cabinets with a 100 CFM, minimum, cooling fan capacity. Provide dual fans with thermostats incorporated into the ventilation system.

Provide the cabinets with vent openings in the doors to allow convection cooling of electronic components. Locate the vent opening on the lower portion of the cabinet doors and shall be covered fully on the inside with a commercially available disposable three layer graded type filter.

## **Electrical**

Provide AC isolation within the cabinet. Configure all cabinets to accept 120 VAC from the utility company.

Provide UL listed circuit breakers with an interrupt capacity of 10,000 amperes and insulation resistance of 100 M $\Omega$  at 500 VDC. Provide power distributions blocks for use as power feed and junction points for two and three wire circuits. The line side of each shall be capable of handling up to 2/0 AWG conductors. Isolate the AC neutral and equipment ground wiring and terminal blocks from the line wiring by an insulation resistance of at least 10 M $\Omega$  when measured at the AC neutral.

### **3. Type B**

Furnish and install pole-mounted Type 5052-H32 aluminum NEMA 3R cabinets to house MVDS related equipment described herein. Type B cabinets may be used when the MVDS unit does not (or will not) contain a 120 VAC power service drop and fiber-optic drop cable. The Design Build Team shall appropriately size the cabinet to fit all the equipment installed within the cabinet at the particular location.

## **(C) CONSTRUCTION METHODS**

### **1. General**

Ground all cabinets in accordance with the requirements of this Scope of Work. Keep the ground wire from the cabinet ground bus bar to the ground rod assembly or array as short as possible. Ensure the ground wire is not in contact with any other part of the cabinet.

Tag and identify all cabinet wiring by the use of insulated pre-printed sleeves. The wire markers shall identify in plain words with sufficient details without abbreviations or codes.

Neatly arrange all wiring, firmly lace or bundle it, and mechanically secure the wiring without the use of adhesive fasteners. Route and secure all wiring and cabling to avoid sharp edges and to avoid conflicts with other equipment or cabling. Terminate all wiring on a terminal block, strip, bus bar, device clamp, lug; or connector, do not splice any wiring. Label all wiring, cables, terminal strips, and distribution blocks. Provide strain relief for all cabling with connectors, all cabling entering knockouts or ports at the equipment, and where appropriate.

Fasten all components of the cabinet assembly to be mounted on cabinet side panels with hex-head or Phillips-head machine screws. Install the screws into tapped and threaded holes in the panels. The components include, but are not limited to, terminal blocks; bus bars, panel, and socket mounted SPD, circuit breakers, accessory and equipment outlets, and DC power supply chassis.

Fasten all other cabinet components with hex-head or Phillips-head machine screws installed with nuts (with locking washer or insert) or into tapped and threaded holes. Fasten stud-mounted components to a mounting bracket providing complete access to the studs and mounting nuts. All fastener heads and nuts (when used) shall be fully accessible within a complete cabinet assembly, and any component shall be removable without requiring removal of other components, panels or mounting rails. Do not use self-tapping or self-threading fasteners.

Provide cabinets with all mounting plates, anchor bolts, and any other necessary mounting hardware in accordance with this Scope of Work and the project 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.

Ground the cabinet per Sections 1098 and 1700 of the 2012 *Standard Specifications for Roads and Structures*, the ITS Standard Details and this Scope of Work. Provide grounding circuits that are permanent and electrically continuous with a current carrying capacity high enough and an impedance low enough to limit the potential above ground to a safe level.

Run the power company neutral, conduit grounds, and all equipment grounds directly and independently off the ground bus. Use ground clamps, grounding and bonding bushings, lock nuts, and grounding electrodes that comply with UL Standard Electric Grounding and Bonding Equipment. Use ground rods of 5/8 inch minimum diameter, 10 feet long, and made of copper clad steel.

Make connections between ground electrodes and the ground wire using an exothermic welding process, cadweld or equivalent.

Ensure completed cabinet grounds have a resistance to ground of not more than 20 Ohms.

Each cabinet shall be ISO 9001 certified at the time of bid letting.

Equip the cabinets with SPD lightning and surge protection described separately in this Scope of Work.

Place durable vinyl identification number sticker (with 4" letters) on cabinets. Utilize stickers that match the appearance of those used elsewhere on the Triangle Expressway (Toll NC 540). Submit proposed sticker to the Department for approval prior to incorporation.

## 2. Type A

Mount the CCTV / MVDS cabinets on the metal pole using stainless steel bands as shown in the ITS Standard Details. Attach all risers to the base of pole-mounted cabinet as shown in the ITS Standard Details.

The CCTV camera cabinet shall be interconnected to CCTV camera assembly using a composite cable carrying the video, serial data and power. Terminal strips shall be provided to support 4-wire EIA 422 communications and the 24 VAC power as shall be required for power and data. The terminal strips shall be accessible such that it shall not be necessary to remove any other components to gain access. The terminal shall secure conductors by means of nickel or cadmium plated brass binder head screws.

Configure the cabinets with an interface panel to allow maintenance access for both video and data channels. This access shall provide a means to connect analog video and control data channels to a laptop computer. The connection of the laptop computer to video and data feeds shall not require disassembly or removal of any of the equipment or other components located inside the cabinet with the exception of patch cords for the data and video feeds.

Provide a video splitter to provide to the video encoder and the video monitor port simultaneously. The video cables shall interface with the CCTV camera cabinet test point connection and be fitted for interconnection to a BNC receptacle.

Provide a switch for selecting local camera PTZ control. Provide a communication cable for connection to a typical laptop and video monitor for future maintenance activities. The data cable shall consist of an integral USB to RS-232/422 converter as required to support the CCTV camera protocol and shall be compatible with the CCTV camera assembly. The data cable shall plug into the test point connector as provided in the cabinet and into a typical laptop USB data port. Two sets of cables shall be provided, two for data and two for video

Mount the digital video encoder in the 19" equipment rack inside the cabinet in accordance with the "Central Video Equipment" section of this Scope of Work.

## METAL CCTV CAMERA AND MVDS POLES

### (A) GENERAL

Furnish and install new MVDS poles, grounding systems, and all necessary hardware. Reinstall existing CCTV-1A pole. The work covered by this Scope of Work includes requirements for the design, fabrication, and installation of custom / site specifically designed CCTV and MVDS poles and associated foundations. The minimum CCTV camera mounting height shall be 45' above the adjacent roadway whether it is the mainline, ramp or crossing roadway, whichever is higher. The minimum mounting height and resultant pole length of the MVDS above the roadway edge of pavement shall be established by the manufacturer's recommended guidelines. For cases where the pole location is well above the grade of the roadway, a shorter pole will be allowed if the

Design-Build Team documents there will be no loss of functionality or intended field of view.

Remove the existing CCTV-1A pole foundation, and cut the existing conduits below grade.

The Design-Build Team may use NCDOT's standard strain poles and foundations for the CCTV camera and MVDS poles or they may custom design the poles and foundations using the design procedures described in this Scope of Work. Screw, auger or helix pole foundations shall not be used for CCTV camera poles.

Provide MVDS poles that contain no guy assemblies, struts, or stay braces. Provide designs of completed assemblies with hardware that equals or exceeds the requirements of the 5th Edition of the 2009 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals", including the latest interim specifications. Provide assemblies with a round cross-sectional design.

Ensure that materials and construction are in accordance with Section 10 of the "Project Special Provisions for Signals and Intelligent Transportation Systems". Ignore references to mast-arm poles and traffic signal related equipment. Replace references to "Contractor" with "Design-Build Team". Replace references to "signal poles" with "CCTV camera and MVDS poles".

## **(B) MATERIALS**

### **1. General**

Furnish poles and foundations that meet or exceed the following functional requirements with all CCTV camera and / or MVDS units, power meter, service disconnect, and all equipment cabinets attached and all risers, condulets, and weather head accessories in place:

- Maximum deflection at top of pole in 30 mph, non-gusting wind: one inch
- Ultimate load: 100 mph wind with a 30% gust factor

Furnish poles and foundations that sustain the dead load of all equipment attached to the pole with a safety factor of 1.65.

Furnish MVDS poles that when erected in foundation and completely installed are at a minimum height as recommended by the MVDS manufacturer.

### **2. Metal Pole**

Design poles according to the ITS Standard Details.

Furnish hot-dipped galvanized steel poles to mount CCTV cameras / MVDS units and equipment cabinets that meet or exceed the requirements of the 2012 *Standard Specifications for Roads and Structures*, unless otherwise noted in the ITS Standard Details or this Scope of Work.

Furnish CCTV camera poles with ½-inch diameter air terminal, with #4 AWG wire, routed down pole and cadwelded to a one of the ground rods installed for the cabinet equipment grounding system. Furnish an air terminal that extends high enough to provide a 45 degree cone of protection of the camera, as shown in the ITS Standard Details.

Provide materials in accordance with Section 10.2 of the “Project Special Provisions for Signals and Intelligent Transportation Systems”.

### **3. Foundation**

Prepare a design for the pole’s concrete foundation and submit to the Engineer for review. The top of the drilled shaft foundation shall be flush with finished grade. Unstable soil may require a deeper foundation. Concrete for the foundation shall be 3000 psi minimum. Foundation design shall meet all NCDOT requirements and be prepared and sealed by a North Carolina registered professional engineer. Prepare design, optional custom design and perform soil tests for each CCTV camera metal pole foundation location in accordance with Section 10.4.B of the “Project Special Provisions for Signals and Intelligent Transportation Systems”.

Conduit elbows in foundation shall have a minimum radius of 15 inches.

## **(C) CONSTRUCTION METHODS**

### **1. General**

Obtain approval from the Engineer for final field locations of the CCTV camera / MVDS metal poles before developing shop drawings or installing the poles. In order not to obstruct proper storm drainage, do not install poles in the center of ditch lines. Obtain shop drawings, signed and sealed by a North Carolina registered engineer, for each pole location (each combination of pole height and equipment mix) and submit to Engineer for approval. When approved, submit to pole manufacturer. Determine and provide to pole manufacturer the effective projected area of all items to be attached to each pole at each pole location. Construct drilled pier foundations, drilled pier wing-wall foundations, and erect pole in accordance with Section 10.4 of the “Project Special Provisions for Signals and Intelligent Transportation Systems”.

### **2. Electrical and Mechanical Requirements**

Ground all equipment as called for in the 2012 *Standard Specifications for Roads and Structures*, this Scope of Work and the ITS Standard Details.

Install surge protectors on all ungrounded conductors entering the CCTV camera enclosure as described below. House the protectors in the CCTV camera cabinet on the pole in a manner approved by the Engineer. The air terminal down conductor shall not pass through this cabinet.

### 3. CCTV Camera

Mount CCTV camera units at the height specified in this Scope of Work. Install CCTV assemblies at the locations shown on the January 22, 2015 ITS Concept Plans, unless otherwise approved by the Engineer.

Mount the CCTV camera on the side of pole nearest the intended field of view so that the mounting avoids occluding the view with the pole. Obtain approval of camera orientation from the Engineer prior to mounting.

Use the vendor-supplied software to configure the cameras.

### 4. Power Service

Provide 120 Volt power service. Comply with the “Electrical Service” section of this Scope of Work.

### 5. Surge Suppression

#### (a) Grounding

Connect all grounding points related to CCTV camera pole and its subsystems to a single point main grounding electrode, sometimes referred to as the ground window, which shall be driven a minimum of 12 inches from the CCTV camera pole. Each grounding electrode shall require an interfacing hemisphere, an imaginary cylinder with a diameter and depth equal to the length of the electrode. Therefore, a grounding electrode that is a minimum of 10 feet long shall be installed 10-20 feet away from any additional grounding electrodes and / or ground-mounted devices.

Install a minimum of one grounding radiant, plus additional radiants as required to achieve a resistance to ground of 20  $\Omega$  or less, at each CCTV camera pole. This grounding radiant shall consist of one main grounding rod that is a minimum of 10 feet long located at the structural base of the CCTV camera pole and attached to one additional 20-foot radiant grounding rod placed a minimum of 20 feet away from the main grounding rod. Attach the main grounding rod to the CCTV camera pole by a solid #4 ground cable that shall be exothermically welded. Attach the radiant grounding rod to the main grounding rod with a minimum #4 solid bare copper wire that is exothermically welded at both the main grounding rod and the radiant grounding rod.

#### (b) Load Side CCTV Camera Power

Install a transient voltage suppressor (SPD) at the CCTV camera power source on the load side. This device shall provide protection between line-to-neutral, line-to-ground, line-to-line, and neutral-to-ground.



(c) Line Side CCTV Camera Power

Install a SPD in the power line side ahead of all CCTV camera electronic equipment. This installation technique is designed to restrict earth current transients induced within the ground, or directly from the power source, from entering the ITS device through the incoming 120-volt power circuit. This device shall provide protection between line to neutral, line to ground, line-to-line and neutral to ground.

(d) Device Data/Video Line and Load Side

Install specialized SPDs at the line and line sides of all low voltage connections to the CCTV camera and its operating subsystems. These connections include, but are not limited to, Category 6 data cables, coaxial video cables, twisted pair video cables, and low voltage control cables that comply with EIA requirements as detailed in the EIA-232/422/485 standards.

## **MICROWAVE VEHICLE DETECTION SYSTEM**

### **(A) GENERAL**

Furnish and install a microwave vehicle detection system (MVDS) as shown in the January 22, 2015 ITS Concept Plans and as directed by the Engineer that is capable of traffic data collection meeting this section's requirements. Conform to the placement guidelines found in the Detector Location sheet of the ITS Standard Details. Ensure that the MVDS can be mounted on new MVDS poles, or CCTV camera poles for a side-fire configuration. The final locations and quantity to provide the minimum coverage shown in the January 22, 2015 ITS Concept Plans shall be the responsibility of the Design-Build Team. All interchange ramps shall be covered with a dedicated detector and not by derivation or calculation of other detectors. Detectors for different ramps may share the same pole if all other requirements are met. A single detector may cover both directions of a mainline location if all other requirements are met.

The detection units shall use Ethernet communications for monitoring and control from the NCDOT Statewide Transportation Operations Center (STOC).

### **(B) MATERIALS**

#### **1. General**

Provide an MVDS assembly for the project site that consists of microwave radar sensor(s) in enclosed housing(s) (i.e., the detectors), as shown in the ITS Standard Details and as directed by the Engineer. Provide an installation kit with mounting brackets; home run cable for the transmission and receipt of data and communications between the field detector and the communication system hardware; and all required power and data cables, as detailed in the ITS Standard Details.

## 2. Detector

Provide a (MVDS) that uses a Federal Communications Commission (FCC)-certified, low-power microwave radar beam to detect vehicle passage and generate volume, occupancy, length-based classification, and speed data. Ensure that the MVDS is a true-presence microwave radar that uses the frequency modulated continuous wave (FMCW) principle. Ensure that any non-background targets reflect the signal back to the microwave radar detector, where the targets are detected and their range measured.

Ensure that the MVDS provides speed-trap emulation and has the ability to detect automatically sensor settings, baud rates, loop spacing, and communication port settings to select an operational mode.

Ensure that the detector has the ability to self-tune and allow manual calibration via supplied vendor software. Ensure that the MVDS is capable of auto-calibration and auto-configuration, and that it does not transmit any signals outside its FCC-approved frequency. Provide a setup program that allows the operator to define detection zones within the detector's field of view. Ensure that the detector automatically configures zones, requiring minimal external tuning. Verify that the unit is not adversely affected by varied weather conditions, such as rain, fog, heat, or wind.

Ensure that the MVDS can compute, store, and provide all required traffic parameter measurements per detection zone in user-selected time intervals from 0 to 60 minutes, including, but not limited to, 10 seconds, 20 seconds, 30 seconds, 60 seconds, 5 minutes, 10 minutes, 15 minutes, 30 minutes, and 60 minutes. The MVDS shall log and store vehicle volume, occupancy, length-based classification and speed data for a minimum of seven days regardless of collection interval. Data storage within the MVDS shall utilize a first in / first out architecture such that the oldest stored data record is overwritten with the newest data record when the storage device is at full capacity.

### (a) Communications

Ensure that the MVDS generates and transmits traffic data in serial format using an Electronic Industries Alliance (EIA) standard EIA-232 communication port and an Internet Protocol (IP) interface. Ensure that the MVDS can generate contact closures emulating the output of a pair of 6-foot by 6-foot loops with leading edges placed 16 feet apart.

Verify that the MVDS is IP addressable. Ensure that all device communication addresses are user programmable.

Ensure that the MVDS supports Ethernet protocols. Ensure that the setup program assigns an IP address to the detection unit. Ensure that the MVDS responds to a polling request from the TMC for traffic data. Verify that the detection unit responds with the accumulated traffic parameter measurements from the period since the last request was issued.

Verify that the MVDS stores all system configuration and traffic parameter data within internal nonvolatile memory. Verify that traffic data can be locally and remotely transferred by issuing requests from a personal computer (PC) across the communication network connecting the detector and the NCTA operator workstation or other PC.

(b) Configuration and Management

Ensure that the MVDS software application provides a display of the detection zones and control of any vehicle detector connected to the network. Ensure that the MVDS setup program enables the operator to select whether data is output as contact closures emulating standard loop detector outputs, and / or as accumulated statistical data using detector serial ports.

Verify that the sensor holds a vehicle's presence in the specified detection zone until the vehicle is clear of the zone. Ensure that the sensor does not tune out stationary vehicles within a detection zone and thereby give a false clear status to the lane, even if a vehicle has stopped for a period exceeding 30 minutes. Provide a detector that is capable of resolving closely spaced vehicles.

Provide an assembly manufactured in such a way as to prevent reversed or improper installation. Ensure that the MVDS design provides high-voltage exposure protection to personnel during equipment operation, adjustments, and maintenance.

Provide software licenses.

Ensure that an operator using a locally connected laptop computer can conduct system setup, calibration, diagnosis, and data retrieval operations. Ensure that the MVDS is capable of having its configuration data saved to a laptop computer or TMC server, which can later transfer the data back to the MVDS for reloading.

Ensure that the MVDS operator can use a laptop computer or TMC server to edit previously defined detection configurations to permit adjustments to the detection zone's size, placement, and sensitivity, and to reprogram the detector's parameters.

Ensure that the laptop computer and the MVDS can communicate when connected directly by an EIA-232 cable. Provide preinstalled USB to RS-232 converter to facilitate laptop communications. Ensure that the laptop computer and MVDS can communicate across the ITS system's communication network using the NTCIP standards described in this Scope of Work. Ensure that the software allows communication between multiple users and multiple field devices concurrently across the same communication network.

Once programmed, ensure that no periodic adjustments are required to the detection zones unless physical roadway conditions change, such as lane shifts or closures.

(c) Electrical Requirements

Ensure that the MVDS field hardware meets the requirements in the FCC's 2005 Code of Federal Regulation (CFR), Title 47, Part 15. The detector shall not interfere with any known equipment.

Ensure the MVDS operates using a nominal input voltage at the field cabinet of 120 volts of alternating current ( $V_{AC}$ ). Ensure that the system's power supply will operate with an input voltage ranging from 89 to 135  $V_{AC}$ . For any device requiring a source input other than the standard 120  $V_{AC}$ , supply the appropriate means of conversion.

Provide an assembly manufactured in such a way as to prevent reversed or improper installation. Ensure that the MVDS design provides high-voltage exposure protection to personnel during equipment operation, adjustments, and maintenance.

Furnish all equipment with the appropriate power and communication cables. Install the power cable and the communication cables according to the manufacturer's recommendation. Ensure that the cables comply with NEC sizing requirements as presented in NEC Article 210-19(a), Fine Print Note (FPN) No. 4, and meet all other applicable standards, specifications and local code requirements.

Ensure that the power cable running between the MVDS and its electrical service is in a separate conduit. Do not install communication cables in the same conduit as power cables carrying voltage greater than 24  $V_{DC}/V_{AC}$  or current in excess of 1.5 amps. Do not install the power and communication cables in the same pull boxes.

Cut all wires to their proper length before assembly. Do not double back any wire to take up slack. Neatly lace wires into cables with nylon lacing or plastic straps. Secure cables with clamps and provide service loops at all connections.

In the event that power to the MVDS or a subcomponent thereof is interrupted, ensure that the equipment automatically recovers after power is restored. Ensure that all programmable system settings return to their previous configurations and the system resumes proper operation.

Ensure that the MVDS operator is able to select and use 12 to 24 volts of direct current ( $V_{DC}$ ) and 115  $V_{AC}$  at 60 Hz.

Ensure that the detector is FCC certified and that the FCC's identification number is displayed on an external label. Ensure that the detector transmits within a frequency band of 10.525 gigahertz,  $\pm 25$  megahertz, or another FCC approved spectral band.

(d) Environmental Requirements

Provide MVDS that meet all specifications during and after being subjected to an ambient operating temperature range of -29 degrees F to 165 degrees F with a maximum non-condensing relative humidity as defined in the environmental requirements section of the NEMA TS 2 standard.

Verify that the MVDS manufacturer certifies that its device has successfully completed environmental testing as defined in the NEMA TS 2 standard. Verify that vibration and shock resistance meet the requirements of Sections 2.1.9 and 2.1.10, respectively, of NEMA TS 2.

Ensure that no item, component, or subassembly emits a noise level exceeding the peak level of 55 decibels adjusted (dBa) when measured at a distance of 3.3 feet away from its surface.

Ensure that MVDS components comply with the environmental requirements detailed in the NEMA TS 2 standard.

(e) Detector Housing

Furnish and install an environmentally resistant and tamper-proof sensor enclosure for any detector assembly exposed to the elements. Ensure that the enclosure is environmentally sealed upon installation and that it is light in color.

(f) Wind Loads

Design MVDS poles in accordance with the 5th Edition 2009 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.

(g) Performance

Provide a MVDS capable of meeting the minimum total roadway segment accuracy levels of 95% for volume, 90% for occupancy, 90% for length based classification and 90% for speed for all lanes. This evaluation (by necessity) shall take place during the Observation Period. Provide detection for up to 12 traffic lanes. Provide a detection range of 0 to 250 feet.

To verify conformance with the accuracy requirements in this section, perform evaluations by comparing sample data collected from the vehicle detection system with ground truth data collected during the same time by human observation or by another method approved by the Engineer. Base the vehicle detection system's performance evaluation on sample data taken over several periods under a variety of traffic conditions. Develop and adhere to a methodology to collect data and calibrate and evaluate the performance of each device using speed, volume, and occupancy data.

### 3. Software

Ensure the MVD software can perform the following tasks:

- Device configuration and setup
- Diagnostic testing
- Device management
- Data retrieval, analysis, reporting and storage
- Data importing from NCDOT's MVDS database
- Data exporting to other systems, including but not limited to:
  - Toll collection system for congestion pricing
  - NCTA's Protronix "Metrics" data aggregation software
  - Protronix "Traffic Melder" software
  - NCDOT for posting on a speed map

Ensure software can collect data from each sensor as frequently as 20-second intervals.

The report function shall include user-definable queries in graphical, text and tabular formats.

Ensure software can perform database translations, data types and file formats to accomplish the above data exporting. The software shall utilize the following minimum file formats: XML, HTML, SQL, Excel, and PDF. Ensure software includes "on-demand" and scheduled data translation.

The Design-Build Team shall update the NCTA Protronix "Metrics" internal speed map by depicting / providing:

- Location of each MVD,
- Background map suitable in detail and for use on Internet website

The maps shall be expanded to display all of the interchange and the crossing route. Depict on the map local names, route numbers, and major landmarks. The Design-Build Team shall develop a verification plan, to be approved by the Engineer, to verify that speeds displayed on the map are accurate. This verification shall take place during the Observation Period.

Provide device drivers for detectors provided in this Scope of Work.

#### (C) CONSTRUCTION METHODS

Install, configure, and demonstrate a fully functional vehicle side-fire detection system. Connect all field hardware to the communication network, and provide all materials specified in this Scope of Work. Install all equipment according to the manufacturer's recommendations or as directed by the Engineer.

## 1. Electrical and Mechanical Requirements

Ground all equipment as called for in the 2012 *Standard Specifications for Roads and Structures*, this Scope of Work, and the ITS Standard Details.

Install surge protectors on all ungrounded conductors entering the MVDS enclosure as described below. House the surge protectors in the MVDS cabinet on the pole in a manner approved by the Engineer. The air terminal down conductor must not pass through this cabinet.

## 2. MVDS

Ensure that the MVDS can be mounted on new MVDS poles or CCTV camera poles, in a side-fire configuration. Mount each MVDS at height and setback corresponding to the manufacturer's recommendations for the number of lanes and the detection zone. For CCTV camera poles with lowering devices, provide a detector-mounting bracket to mount the detector on the side of the pole 90 degrees to traffic so the camera and lowering device do not strike the detector. For locations where the minimum setback cannot be met when mounting on front face of pole, provide a mounting bracket to mount on the side of the pole 90 degrees to traffic so the camera and lowering device do not strike the detector. Use this method only if that provides the minimum setback.

Mount the MVDS detector as detailed in the ITS Standard Details. In either configuration, mount the detector level with respect to the centerline of the roadway. Tilt the unit downward toward the roadway to ensure detection of all lanes.

Ensure that the MVDS sensor has a 250-foot range, and that the viewing angle is a minimum of 40 degrees vertical and a maximum of 15 degrees horizontal. Verify that all detection zones are contained within the specified elevation angle according to the manufacturer's recommendations and that the MVDS is capable of fully detecting all vehicles in a minimum of eight lanes or zones. Ensure that the configuration also provides accurate collection of all data types as detailed in this specification.

Provide a detector housing that can be pole-mounted, as indicated in the ITS Standard Details. Supply a universal mounting bracket that is adjustable on two axes for optimum alignment.

Attach the mounting bracket with approved stainless steel bands that are 0.75 inch wide and 0.025 inch thick, or mount to a concrete structure using two stainless steel expansion bolts of sufficient length and diameter to support 100 pounds.

When installing a detector near metal structures, such as buildings, bridges, or sign supports, mount the sensor and aim it so that the detection zone is not under and does not pass through any structure to avoid distortion and reflection.

Ensure that the detector is factory calibrated to comply with all applicable standards, specifications, and requirements.

Provide an interface to external equipment with a single connector. Ensure that the connector provides power to the unit and allows generation of contact closure output pairs. Ensure that the connector includes serial communication lines for programming, testing, and interfacing with the modem / switch at 9,600 to 115,000 bps baud rate and that it has at least 26 pins. Ensure that the serial port's data format is standard binary non-return to zero (NRZ) modulation with 8-bit data, 1-stop bit, and no parity.

Ensure that the homerun cable is a polyurethane-jacketed cable approved by the Engineer, with polyvinyl chloride (PVC) insulated conductors. The homerun cable shall have a 300-volt rating and a temperature rating of 200° F. Ensure that the cable is equipped with #20 or #22 American Wire Gauge (AWG) conductors.

Crimp or solder the detector connector pins to the cable conductors. Assemble and test the cable prior to onsite installation and pulling. Cut all wires to their proper length before installation. Do not double back wire to take up slack. Neatly lace wires into cable with nylon lacing or plastic straps, and secure cables with clamps. Provide service loops at all connections.

Perform continuity tests on the detector's stranded conductors using a meter having a minimum input resistance of  $20,000 \Omega$  per volt and show that each conductor has a resistance of not more than  $16 \Omega$  per 984.25 feet of conductor.

Measure the insulation resistance between isolated conductors and between each conductor, ground, and shield using a meter designed for measuring insulation resistance. The resistance shall be infinity. Perform all resistance testing after final termination and cable installation, but prior to the connection of any electronic or field devices.

### **3. Power Service**

Provide 120VAC power service. Comply with the "Electrical Service" section of this Scope of Work.

### **4. Surge Suppression**

#### **(a) Grounding**

Connect all grounding points related to the MVDS to a single point main grounding electrode as shown in the ITS Standard Details. A 10-foot grounding electrode shall be installed a minimum of 20 feet away from any additional grounding electrodes and / or ground mounted devices.

This grounding radiant shall consist of one main 10-foot grounding rod located at the structural base of the MVDS pole and attached to three additional 10-foot radiant grounding rod placed a minimum of 20 feet away from the main grounding rod. Attach the radiant grounding rod to the main grounding rod with a minimum #4 solid bare copper wire that shall be exothermically welded at both the main grounding rod and the radiant grounding rod.



(b) Load Side Detector Power

Install a transient voltage suppressor (SPD) at the MVDS power source on the supply side. This device shall provide protection between line-to-neutral, line-to-ground, line-to-line, and neutral-to-ground.

(c) Line Side Detector Power

Install a SPD in the power line side ahead of all MVDS electronic equipment. This installation technique is designed to restrict earth current transients induced within the ground, or directly from the power source, from entering the ITS device through the incoming 120/240-volt power circuit. This device shall provide protection between line-to-neutral, line-to-ground, line-to-line and neutral-to-ground.

(d) Load Side Detector Data

Install specialized SPD devices at the supply and line sides of all low voltage connections to the MVDS and its operating subsystems. These connections include, but are not limited to, Category 6 data cables, and low voltage control cables that comply with EIA requirements as detailed in the EIA-232/422/485 standards.

(e) Software

If software is required, install the software application(s) on the NCDOT Statewide Transportation Operations Center (STOC) virtual servers for access by all NCDOT Statewide Transportation Operations Center (STOC) operators. Configure data translation applications for those services described above.

## **COMMUNICATIONS HARDWARE**

### **(A) DESCRIPTION**

#### **1. General**

All communications between ITS devices and the local hub shall use Ethernet communications. The communications network along the corridor shall consist of local Ethernet edge switches at ITS devices, and existing Gigabit Ethernet routing switches as shown in the January 22, 2015 ITS Concept Plans.

Provide a minimum of a Fast Ethernet (100 Mbps) optical communications network between all proposed ITS field devices and Gigabit Ethernet routing switches located in the AET Toll Zone Vaults located at the toll zones.

## **2. Ethernet Edge Switches**

Furnish and install a hardened, device-level managed field Ethernet edge switch in each ITS field cabinet location. Ensure that the Ethernet edge switches provide fast Ethernet connectivity at minimum transmission rate of 100 Mbps from each ITS cabinet location to its respective Gigabit Ethernet routing switch. Provide Ethernet Switches capable of being managed with the existing Castle Rock network management software.

### **(B) MATERIALS**

#### **1. General**

Ensure that the Ethernet switches are fully compatible and interoperable with the trunk Ethernet network interface and that the Ethernet switches support half and full duplex Ethernet communications.

Furnish Ethernet switches that provide 99.999% error-free operation and that comply with the Electronic Industries Alliance (EIA) Ethernet data communication requirements using single-mode fiber-optic transmission medium and copper transmission medium. Ensure that the Ethernet switches have a minimum mean time between failures (MTBF) of 10 years, or 87,600 hours, as calculated using the Bellcore / Telcordia SR-332 standard for reliability prediction.

#### **2. Ethernet Edge Switches**

The Design-Build Team shall configure each Layer 2 edge switch with industry standard, non-proprietary protocols identified in the Design-Build Team-provided network documentation as outlined below. The protocols to be configured by the Design-Build Team shall include at a minimum:

- RSTP / MSTP
- SNMPv3 (Simple Network Management Protocol version 3)
- IGMP Snooping (Internet Group Management Protocol)
- SNTP (Simple Network Time Protocol)
- LLDP (Link Layer Discovery Protocol)

### **(C) CONSTRUCTION METHODS**

#### **1. General**

Ensure that all Ethernet switches are UL listed.

Verify that network / field / data patch cords meet all ANSI/EIA/TIA requirements for Category 6 4-pair unshielded twisted pair cabling with stranded conductors and RJ45 connectors.

Ensure that all project IP addresses are assigned as static addresses. Ensure As-Constructed Drawings include the identification of all IP addresses, subnets, gateways, VLANs, and associated hardware devices and device locations. Configure the Ethernet

network so the CCTV cameras shall be in separate VLAN(s) from other devices. All CCTV camera VLANs shall have IGMP snooping enabled.

After consulting with vendors of communication hardware, submit the following for review and approval by the Engineer prior to incorporation:

- Drawings and supporting documentation of the physical network topology as established and installed including physical connectivity at the device and port level
- Drawings and supporting documentation for a coherent and complete overall logical layers 2-3 network architecture and detailed design to include the following:
  - VLAN
  - STP domains (if applicable)
  - STP mode / role
  - STP ports
  - IP addressing / subnets / gateways
  - IP routing / trunking
  - Routing and routed protocols
  - Multicast addressing
- Drawings and supporting documentation identifying SNMP and RMON strategy and configurations including, probe information as applicable, management IP addressing, community strings, MIBS, traps, and respective active / passive alert thresholds.

## **2. Ethernet Edge Switches**

Ensure that the ITS network administrator will be able to manage each Ethernet edge switch individually or as a group / cluster for switch configuration, performance monitoring, and troubleshooting. Note that these requirements stipulate additional minimum management intelligence (i.e., Layer 2+) typical of most current industrial Ethernet deployments. Ensure that the Ethernet edge switches include Layer 2+ capability providing architecture standardization, open connectivity (i.e., interoperability), bandwidth management, rate limiting, security filtering, and general integration management of an advanced Ethernet switching architecture.

Ensure that all project IP addresses and VLAN IDs are statically assigned. Ensure As-Constructed Drawings include the identification of all IP addresses, VLANs, and associated hardware devices and device locations.

Mount the Ethernet edge switches securely inside each ITS device cabinet in the communications rack or on a vertical rail. Ensure that the Ethernet edge switches are resistant to all electromagnetic interference (EMI). Ensure that the Ethernet edge switches are fully accessible by field technicians without blocking access to other equipment. Verify that fiber-optic jumpers consist of a length of cable that is connectorized on both ends, primarily used for interconnecting termination or patching facilities and/or equipment. Use fiber-optic jumpers that are factory assembled and connectorized and are certified by the fiber-optic jumpers' manufacturer to meet the relevant performance standards required below. Verify that network / field / data

jumper cables meet all ANSI/EIA/TIA requirements for Category 6 4-pair unshielded twisted pair cabling with stranded conductors and RJ45 connectors.

## **SUBMITTAL DATA AND DOCUMENTATION**

### **(A) DESCRIPTION**

Provide project submittal data and documentation as described below:

### **(B) SUBMITTALS**

#### **1. General**

Comply with the Department's Design-Build Submittal Guidelines. All written documentation shall be either 11" x 17" or 8½" x 11" format. No documentation may be smaller or larger than these formats. Except for standard bound manuals, bind all 8½" x 11" documentation, including 11" x 17" drawings folded to 8½" x 11", in logical groupings in either 3-ring or plastic slide-ring loose-leaf binders. Permanently label each grouping of documentation.

All materials and equipment used on the project shall be submitted for review and approval prior to use on the project. Items on the Department's QPL will be approved by manufacturer and part number reference. Items not on the Department's QPL shall have catalog cut sheets submitted and approved that verify compliance with the 2012 *Standard Specifications for Roads and Structures*, *Standard Roadway Drawings*, ITS Standard Details and this Scope of Work. All submittals shall be reviewed and approved by the Department. Absence of comment will not grant approval.

#### **2. Qualified Products**

The Qualified Products List (QPL) is available on the Department's Website. Certain signal and communications equipment, material, and hardware shall be pre-approved on the QPL by the date of installation. Equipment, material, and hardware not pre-approved when required will not be allowed for use on the project. Consult the QPL Website to obtain pre-approval procedures.

#### **3. Submittal Requirements**

Provide certification to the Department that all Design-Build Team-furnished material is in accordance with the RFP. When requested by the Department, provide additional certifications from independent testing laboratories and sufficient data to verify item meets applicable specifications. Ensure additional certification states that the testing laboratory is independent of the material manufacturer and neither the laboratory nor the manufacturer has a vested interest in the other.

The intent of submittals is to show completely the materials meet the requirements of the January 22, 2015 ITS Concept Plans and this Scope of Work and how the Design-Build Team intends to construct or configure the materials. The Design-Build Team

shall clearly demonstrate in the submittals that the desired materials shall meet or exceed the requirements of the January 22, 2015 ITS Concept Plans and this Scope of Work. Each submittal shall be sufficiently complete and detailed for the Department to review and accept. For submittals with surge protection devices (SPDs), the submittal shall include a block diagram that clearly indicates the purpose of each SPD (data, power, comms, etc.) and the placement of the SPD in the path of data / power flow. If the Department deems that the submittal is insufficient in detail or completeness for review or acceptance, the submittal will be returned for corrections. Additional time and / or compensation shall not be granted for re-submittals.

Before material submittal data begins, provide to the Department for review and approval a list of all submittals with approximate dates of submission that the Design-Build Team intends to make. It is incumbent upon the Design-Build Team to schedule reviews in a timely manner that will not delay their schedule.

Certain groups of materials are related in function and operate as a subsystem together. To ensure individual and subsystem compliance with the project requirements materials shall be submitted as packages as follows:

<b>Submittal Package</b>	<b>Description</b>
Testing Plans	Detailed test plans, procedures and testing schedule
Electrical	UPS, meter bases, disconnects
Field Equipment Cabinets	Cabinet layout and wiring diagrams
Communications Hardware	Ethernet edge switches
Metal Poles	MVD pole shop drawings and foundation design, CCTV pole foundation design
Field Infrastructure	Fiber optic cable, conduit, risers, junction boxes, heavy-duty junction boxes/cabinets, misc. hardware
MVDS	Detector unit, vendor software, cabling

Submit cabinet layout and wiring diagrams for all cabinets.

Identify all proprietary parts in furnished material. The Department reserves the right to reject material that uses proprietary components not commercially available through electronic supply houses.

For furnished material listed on the QPL, furnish submittals in the format defined by the QPL.

For furnished material not on the QPL, furnish the equipment list including catalog cuts. Identify proposed material on catalog cuts by a reproducible means. Ensure material lists contain material description, brand name, manufacturer's address and telephone number, stock number, size, identifying trademark or symbol, and other appropriate ratings. For submittals showing a variety of models and parts available

from the manufacturer, clearly identify by circles, marking or other means the specific materials for which approval is requested.

Submittal acceptance will be granted only to specific materials; do not deviate from what is accepted without approval by the Department. Do not fabricate or order material until receipt of the Department's acceptance. All submittals will be returned as either "Accepted (AC)" (as submitted), "Accepted as Noted (AN)" or "Returned for Correction (RC)". The Design-Build Team may proceed with fabrication or ordering for items marked "Accepted". If an item is marked "Accepted as Noted" without any stipulation for re-submittal, then the Design-Build Team may proceed with fabrication or ordering. For any other notations, the Design-Build Team shall revise the submittal, address comments and resubmit for acceptance.

#### **4. Documentation**

In addition to the requirements in Section 109 of the 2012 *Standard Specifications for Roads and Structures*, furnish to the Department two copies of the following materials prior to acceptance: warranty materials, and serial and model numbers of all equipment furnished. All equipment and appurtenances shall be furnished and identified by name, model number, serial number, technical support, and warranty telephone numbers, and any other pertinent information required to facilitate equipment maintenance. Provide all configuration data for each device in electronic and printed form.

#### **5. As-Built Plans**

Provide coordinately correct electronic As-Built Plans, in MicroStation format, for all conduit system infrastructures, including but not limited to junction boxes. Provide a tabular list of all GPS coordinate data, in Microsoft Excel format, including but not limited to point data for each junction box and conduit run location points at a maximum ten-foot spacing.

### **TRAINING**

#### **(A) DESCRIPTION**

Provide training for the installation, operation, and maintenance of:

- MVDS
- Communications hardware

The Department will consider waiving certain sections of training if the equipment provided as a part of the project is identical or similar to equipment provided as a part of the Triangle Expressway (Toll NC 540) project.

**(B) MATERIALS****1. General**

Provide training in the installation, operation, maintenance, troubleshooting and repair of all equipment and software. Prepare training outline, agenda, training manuals, training exercises, instructor resumes and any other teaching aids for approval by the Department. For exercises requiring computers, furnish enough computers to have one computer per two students.

Provide draft training material to the Department for review and approval at least 60 days prior to the scheduled training. Provide adequate time for review and revision of the draft training materials. Furnish audio-visual equipment, demonstration equipment, and "hands-on" equipment in support of the envisioned training. Each training participant shall receive a copy of course materials including both comprehensive and presentation manuals. Assume there will be 12-15 students in the class. Provide two additional copies of these documents to the Department.

Utilize training personnel well versed in the subject matter and with extensive field experience dealing with real world problems. Utilize training personnel that have been certified by the respective manufacturers.

Video record the entire training on digital video disc (DVD) and provide the DVD(s) to the Department for later use.

The training shall be conducted locally after the completion of all system integration tests. The Department shall provide the training facility. Provide the Department with a 30-day notification to carry out the training so that arrangements can be made for attendance. Coordinate a mutually agreeable date, time, and location with the Department. The Engineer shall approve the training schedule time and location.

Develop the course content specifically for the products supplied for this project. The course shall include the following topics:

- Introductory-level briefing to familiarize attendees
- Terminology
- Theory of operation
- Installation
- Hardware and software configuration
- Operating procedures and capabilities
- Testing, diagnostics and troubleshooting
- Software applications
- Use of the system documentation to operate, diagnose, maintain, and expand the system
- "Hands-on" use of the system, laptop computer and software, system test equipment, and any other system equipment supplied

Provide course lengths and specific training described below:

## 2. MVDS

Provide two sessions in the basic theory and operation of the MVDS detectors, cabinets, and other related equipment. Include in this training lecture and hands-on exercise in the use of the MVDS software.

The training shall include the following sessions specific to the MVDS detectors:

Course	Type of Training	Length (Days)
Operations	Lecture	1
System overview / theory of operation	Lecture, Demonstration	
System software	Lecture, Demonstration	
Maintenance	Lecture	1
Routine maintenance, troubleshooting, testing and calibrating	Lecture, Demonstration and Hands-on	

## 3. Communications Hardware

Provide training for the Ethernet communications hardware as described below:

Course	Type of Training	Length (Days)
<b>Ethernet Switches</b>		1
Introduction	Lecture	
Configuration and programming	Lecture	
Review of Maintenance Manual	Lecture and Hands-on	
Review of Operations Manual	Lecture and Hands-on	
Maintenance	Lecture, Demonstration and Hands-on	
Routine, troubleshooting procedures, testing, system restart and recovery		
Question and answer session		

## TESTING AND ACCEPTANCE

### (A) GENERAL

Identify the test organization including the roles and responsibilities of the quality assurance organization. For each piece of equipment that requires testing, a test plan shall delineate the following:

- Test procedures with test values and desired outcomes
- Submittal schedule of test procedures
- Start time of each level of testing



- Test duration including any re-tests that are required or anticipated
- Submittal of the completed and signed off test report
- Revisions to the test plan shall be provided to the Department monthly

All testing shall be performed by the Design-Build Team and will be observed by the Engineer. The Engineer may perform additional testing at any time during the project.

Conduct and successfully complete the following progressive series of tests before acceptance: factory acceptance testing, field demonstration test prior to installation, installed standalone device tests, system test of the network hardware, management software and an observation period. Develop a comprehensive series of test plans for each device to determine the equipment was correctly installed and meets the requirements of materials, workmanship, performance, and functionality required in the plans developed by the Design-Build Team and this Scope of Work. The test plans shall describe the functions to be tested, purpose of test, setup requirements, procedures to be followed, any inputs and expected outputs for each test, criteria for pass / fail and any required tools or test equipment. Any software testers shall be pre-approved by the Department.

Develop as part of the test plan a traceability matrix of all the individual subsystem functional requirements to be used to cross-reference each planned test to a specific contract requirement to be verified. This Test Evaluation / Traceability Matrix shall be used by the Engineer to crosscheck the functional requirements and the results.

A key element of test plans, where appropriate, shall be the introduction of forced errors into the functional test. The test plan shall check the actual result of the forced error against the anticipated result. Tests shall be performed by the Design-Build Team and witnessed by the Department. No deviation from the approved test procedure shall be permitted without approval from the Engineer. Any changes to the approved test procedure to accommodate unforeseen events during the time of testing shall be documented in the master test procedure. Immediately following the conclusion of each test, the Department and the Design-Build Team shall meet to agree on the results observed and recorded during the testing. This shall form the basis for the conclusions reported in the test plan. All test results, notes, and observations shall be maintained in electronic form. Maintain complete records of all test results during all stages of testing.

## **(B) FACTORY ACCEPTANCE TESTING (FAT)**

Conduct a factory acceptance test in the presence of the Engineer to verify to the Department that all design, materials, and performance requirements for this project are satisfactorily met. Perform the factory acceptance tests at the equipment manufacturer's facility or at an independent testing laboratory.

## **(C) PRE-INSTALLATION FIELD DEMONSTRATION TESTING (FDT)**

### **1. General**

Conduct pre-installation tests on all devices at a Design-Build Team-provided facility within Wake County. Perform the tests on all components supplied to verify that no

damage was done to any unit during the shipment and delivery process. Notify the Engineer a minimum of 15 calendar days before the start of any tests. Conduct all tests according to the approved test procedures detailed in this section. Each device shall pass the individual tests detailed below prior to installation. Existing equipment that is being relocated shall be subject to pre-testing; after acceptance of the existing condition by the Engineer, the Design-Build Team shall maintain the equipment until the project is accepted.

(a) Product Examination Test

Examine each device carefully to verify that the materials, design, construction, markings and workmanship comply with all applicable standards, specifications and requirements. 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 Test Specifications

Check the wiring to determine conformance with the applicable standards, specifications and requirements.

(c) Operational Test Specifications

Operate each device long enough to permit equipment temperature stabilization, and to check and record an adequate number of performance characteristics to ensure compliance with applicable standards, specifications and requirements.

(d) Preinstallation Test Failure Consequence

If any unit fails to pass a FDT, the unit shall be corrected or another unit substituted in its place, and the test successfully repeated.

If a unit has been modified because of an FDT failure, prepare a report and deliver that report to the Engineer prior to the unit's shipment. The report shall describe the nature of the failure and the corrective action taken.

If a failure pattern develops (more than two failures), the Engineer will make a determination of the disposition of the failed equipment without additional cost to the Department or an extension of the contract period.

## 2. Microwave Vehicle Detectors

Subject the MVDS to field demonstration tests as follows:

- Use a laptop computer provided as part of the support equipment to configure the installation
- Install the MVDS sensor at the site for test setup
- Verify that configuration data is stored in nonvolatile memory
- Download previously stored configuration data
- Verify that vehicles traveling at the test site can be detected across multiple travel lanes to the accuracy specified herein
- Drive a test car of known length and speed through the detection zone. Compare the output from the vehicle detector to this known value to verify the accuracy of detection. Repeat this measurement at least 10 times
- Verify the volume counts and speed measurements for each MVDS using the test software running on the laptop computer connected locally to the detector's EIA-232/485 communication port. Verify the accuracy of traffic parameters specified herein by using permanent or temporary traffic detection devices of known accuracy

### (D) INSTALLED SITE TESTS

#### 1. General

Conduct an approved, installed standalone device installation test at the field site. Test all standalone functions of the field devices using equipment installed as detailed in the plans developed by the Design-Build Team, or as directed by the Engineer.

Complete approved test plan forms and turn them over to the Engineer for review as a basis for rejection or acceptance. Provide a minimum notice of 30 calendar days prior to all tests to permit the Engineer or his representative to observe each test.

If any unit fails to pass its stand-alone test, correct the unit or substitute another unit in its place, then repeat the test.

If a unit has been modified because of a standalone test failure, prepare a report describing the nature of the failure and the corrective action taken and deliver it to the Engineer prior to re-testing the unit. If a failure pattern develops, the Engineer may direct that design and construction modifications be made to all units without additional cost to the Department or an extension of the contract period.

Utilize vendor supplied device software to perform diagnostic tests of each device. The vendor supplied diagnostic software shall be provided to the Department before final acceptance. Test the following features of each competent as described below.

## **2. Conduit**

Prepare and submit written test procedures for conduit system tests to be performed. Provide test procedures for review and approval by the Engineer before any tests are conducted. The test procedures shall follow industry standards. The testing shall demonstrate the following:

- All conduit runs are open
- Run a mandrel through each conduit to demonstrate a fully functional and clear conduit
- Junction boxes and splice boxes are installed correctly with working lids and are free of debris

The conduit system shall be tested in accordance with the testing plan and procedures developed by the Design-Build Team and approved by the Engineer. Notify the Engineer of the proposed date, time and location of all testing a minimum of 10 calendar days in advance of the test being performed. All testing shall be performed by the Design-Build Team and shall be observed by the Engineer. The Engineer or assignee may perform additional testing at any time during the project.

## **3. CCTV Camera Field Equipment**

Develop an operational test plan that demonstrates all requirements of the equipment and software. Submit for approval before conducting tests.

Notify the Department at least 14 calendar days prior to the proposed date for the tests. The Department shall have the right to witness such tests, or to designate an individual or entity to witness such tests.

Perform the following installed site tests at the camera assembly field site in accordance with the test plans. A laptop computer shall provide camera control and positioning. After completing the installation of the camera assembly, including the camera hardware, power supply, and connecting cables:

- Furnish all equipment, appliances, and labor necessary to test the installed cable and to perform the following tests before any connections are made
- Verify that physical construction has been completed
- Inspect the quality and tightness of ground and surge protector connections
- Check the power supply voltages and outputs
- Connect devices to the power sources
- Verify installation of specified cables and connections between the camera, PTZ, camera control receiver and control cabinet
- Perform the CCTV camera assembly manufacturer's initial power-on test in accordance with the manufacturer's recommendation
- Set the camera control address
- Verify the presence and quality of the video image with a portable NTSC-approved monitor

- Exercise the pan, tilt, zoom, focus, iris opening, and manual iris control selections, and the operation, preset positioning, and power on / off functions
- Demonstrate the pan and tilt speeds and extent of movement to meet all applicable standards, specifications, and requirements
- Verify proper voltage of all power supplies

Repair or replace defective or failed equipment and retest.

#### **4. MVDS Detectors**

Inspect the MVDS field components to ensure proper installation and cable termination.

Adjust and verify the detector settings by comparing each sensor's recorded traffic volumes and speed with those actually observed. Remotely repeat this test from the TMC. Verify the accuracy of traffic parameters using permanent or temporary traffic detection methods or devices of known accuracy.

Conduct the installed field tests detailed below. The Design-Build Team shall furnish all equipment, appliances and labor necessary to test the installed MVDS and the network communication device, and to perform the following tests before any connections are made:

- Perform a continuity test on the detector cables to ensure that anomalies, such as openings, shorts, crimps or defects, are not present
- Perform continuity tests on the detector's stranded conductors using a meter having a minimum input resistance of 20,000  $\Omega$  per volt and show that each conductor has a resistance of not more than that specified by the wire/cable manufacturer
- Measure the insulation resistance between isolated conductors and between each conductor, ground, and shield using a meter designed for measuring insulation resistance. The resistance shall be greater than 100 M $\Omega$ . Perform all resistance testing after final termination and cable installation, but prior to the connection of any electronic or field devices
- Replace any cable that fails to meet these parameters, or if any testing reveals defects in the cable, and retest new cable as specified in this section.

Furnish and calibrate all test equipment. Demonstrate the following after installation of the MVDS, other hardware, power supplies and connecting cables:

- Verify that physical construction has been completed as specified in the plans developed by the Design-Build Team
- Inspect the quality and tightness of ground and surge protector connections
- Check power supply voltages and outputs
- Verify that device connections to power sources are as specified in the plans developed by the Design-Build Team
- Verify that the installation of specified cables and connections between all detectors and the field cabinet are as specified in the plans developed by the Design-Build Team

- Demonstrate that the remote system is fully operational and performing all specified types of detection, including data storage functions, with a laptop computer
- Verify detector accuracy by conducting sample ground counts using test intervals of 10 minutes and 100 vehicles as described in the field demonstration test

## **(E) OBSERVATION PERIOD**

### **1. General**

The Department shall observe all equipment and software operation according to the requirements of this Scope of Work for a single 60-day system observation period for all subsystems simultaneously. The observation period shall not begin until all subsystems are ready.

The observation period shall begin at project final acceptance. A successful 60-day observation period shall consist of continuous operation with no more than a total of two calendar days of non-operation due to mechanical, electrical, or other malfunctions of the CCTV camera and / or MVDS subsystems.

During the observation period, respond to failures of the Design-Build Team's equipment within two hours and make repairs within eight hours. For items that pose a traffic safety hazard, complete repairs within four hours. If any failures affect major components for more than 48 hours, the Department shall suspend the observation period beginning when the failure occurred. Resume the observation period with the approval of the Engineer after successful repair or replacement. If three or more major component failures of a like nature occur, the Department shall terminate the observation period. Begin a new 60-day observation period with the approval of the Engineer after the faulty equipment has been repaired or replaced.

**LIGHTING SCOPE OF WORK** (1-7-15)

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 2012 NCDOT *Standard Specifications for Roads and Structures*, and the *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.

The Design-Build Team shall include all costs required to construct the roadway lighting shown in the aforementioned Preliminary Lighting Plans provided by the Department in their lump sum price bid for the entire project. 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 Plans have been accepted by the Design-Build Unit, the Design-Build Team shall submit MicroStation files of the RFC Roadway 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.

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.

Reference the Transportation Management Scope of Work found elsewhere in this RFP for time restrictions and lane closure requirements.

**MAINTENANCE**

Throughout construction, the Design-Build Team shall assume responsible for routine maintenance of the newly installed lighting system(s) and relocated lighting components in accordance with Division 14 of the 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 re-lamp, repair and / or replace any newly installed non-functional luminaires within the project limits. All luminaires must be operational at project acceptance.

## **ROADWAY AND HIGH MAST LIGHT STANDARD LED LUMINAIRES**

The Design-Build Team shall provide light emitting diode (LED) luminaires on all new light standards installed as part of this project.

The Design-Build Team shall use Cooper GLEON-AE-10-LED-480-5WQ-AP-EA or Holophane HMLED2124KAHGAW high mast luminaires, or approved equal. High mount luminaire retrofit LED kits will not be an acceptable alternative.

The single arm / twin arm (roadway) luminaires shall be designed for vertical tenon mounting or short (<18”) horizontal arm mounting and shall be furnished 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.

Third party certified photometric files in IES format shall be submitted with the catalog cuts for proposed LED roadway luminaire or high mast LED luminaire submitted as approved equal. Photometric files must show that proposed luminaire meets or exceeds the design shown in the Final Lighting Plans provided by the Department.

### **LED LUMINAIRE REQUIREMENTS**

Any submitted roadway light standard LED luminaire, or high mast LED luminaire submitted as approved equal, shall adhere to the following minimum requirements.

Unless otherwise stated, the word ‘luminaire’ below refers to both roadway light standard LED luminaires and high mast LED luminaires.

#### **A. General Requirements**

- LM-79 photometric test reports shall be provided for all luminaires. LM-79 luminaire photometric reports shall be produced by an independent test laboratory and include the following:
  - Name of test laboratory. The test 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.
- Roadway light standard LED luminaires shall have a minimum L70 rating of 100,000 hours at 25°C. High mast LED luminaires shall have a minimum L70 rating of 60,000 hours at 25°C, 100,000 hours desirable. Provide a summary of reliability testing performed for LED driver.
- Roadway light standard LED luminaires shall have a maximum total power consumption of 370 watts (W) at 480VAC. High mast LED luminaires shall have a maximum total power consumption of 530W at 480VAC. 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 an appropriate IESNA distribution to meet spacing requirements shown on the Final Lighting Plans provided by the Department, maintaining an average of 0.8 footcandle (fc) at 4:1 average to minimum uniformity ratio.
- 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.
- 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 roadway LED luminaires and high mast LED luminaires shall not exceed 2.05 square feet and 60 pounds and 1.2 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.
- 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.
- Roadway 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**

- Drivers rated case temperature shall be suitable for operation in the luminaire operating in the ambient temperature range of -20°C to +40°C.
- Drivers shall be rated for 480VAC at 50/60 Hz, and shall operate normally for input voltage fluctuations of  $\pm 10\%$ .
- Drivers shall have a minimum Power Factor (PF) of 0.90 at full input power and across specified voltage range.
- Drivers shall have maximum 1050mA driver operating current.
- Drivers 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) 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. Latching and Hinging (Roadway Light Standard LED Luminaires only)**

- 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.

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.

Manufacturer or local sales representative shall provide installation and troubleshooting support via telephone and / or e-mail.

The Design-Build Team shall provide a documented minimum ten-year manufacturer 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. Warranty period shall begin after project acceptance by the Department. Supplier shall furnish documentation of warranty procedures to the Design-Build Team stating that the aforementioned ten-year warranty is for NCDOT.

The Design-Build Team shall level and secure each luminaire in all directions. The Design-Build Team shall adjust any luminaires, as directed by the Engineer, to provide optimal illumination distribution.

All LED packages on all luminaires must be operating normally when the project is accepted by the Department. Any luminaire displaying improper operating characteristics prior to the Department accepting the project shall be replaced by the Design-Build Team at no additional cost to the Department.

### **RELOCATE LIGHT STANDARDS**

The Design-Build Team shall provide all equipment, labor and materials necessary to move an existing light standard to a new foundation at locations shown on the Final Lighting Plans provided by the Department. At a minimum, this work shall include dismantling the existing pole and luminaire, storing materials to be reused, removing and disposing of the existing foundation, and constructing a new foundation.

The Design-Build Team shall not reuse materials that are damaged during relocation / construction. The Design-Build Team shall replace all materials damaged during relocation / construction with new materials, at no additional cost to the Department. Similarly, the Design-Build Team shall be responsible for the storage and protection of the materials to be reused against loss and / or damage. The Design-Build Team shall replace all materials lost or damaged during storage with new materials, at no additional cost to the Department.

The Design-Build Team shall only reuse the items referenced below that 1) are not damaged during relocation / construction and 2) are not lost or damaged during storage:

- The Design-Build Team may reuse existing materials, including the light standard & breakaway base. For light standards relocated to the All-Electronic Tolling (AET) toll zone facility, the Design-Build Team shall remove the existing luminaire, deliver the luminaire to the Engineer, and supply and install a new LED luminaire that meets the requirements noted above. The Design-Build Team may reuse shims and washers, but the Design-Build Team shall provide new connecting bolts.
- The Design-Build Team shall dismount and disassemble the light standard from the existing standard foundation. The Design-Build Team shall reassemble and reinstall light standards on a new foundation, and reuse the existing breakaway base. The Design-Build Team shall install new LED luminaire on standards relocated to the AET toll zone facility. The Design-Build Team shall replace the connecting bolts joining the standard to the breakaway base and attachment hardware for the standard-to-luminaire connection. The Design-Build Team shall use rope or web slings when hoisting or lifting the light standard, to prevent damage or marking. If the light standards are to be stored between dismounting and reinstalling, the Design-Build Team shall provide proper transportation and supports to prevent warping. The Design-Build Team shall protect materials to be reused against the elements.

The Design-Build Team shall abandon or remove and dispose of all existing concrete light foundations, including reinforcing steel and anchor bolts, no longer in use. (Reference the 2012 Standard Specifications for Roads and Structures Section 1400-10) The Design-Build Team shall backfill the foundation holes with suitable material and compact the material as required.

As required by construction, the Design-Build Team shall abandon or remove and dispose of the conductors and conduit. (Reference the 2012 Standard Specifications for Roads and Structures Section 1400-10) As shown on the Final Lighting Plans provided by the Department, the Design-Build Team shall install new feeder circuitry.

Prior to de-energizing circuitry for the relocation of light standards, the Design-Build Team shall consult with the Engineer.

### **RELOCATE JUNCTION BOX**

The Design-Build Team shall provide all equipment, labor and material necessary to move existing junction box(es) in conflict with construction.

The Design-Build Team shall remove existing junction box(es) identified on the Final Lighting Plans provided by the Department. The Design-Build Team shall intercept the existing conduit under the roadway and extend to a point such that the junction box(es) can be relocated without being in conflict with road widening or guardrail placement. The Design-Build Team shall install new conductors, as shown on the Final Lighting Plans provided by the Department.

**AET TOLL ZONE FACILITIES INFRASTRUCTURE LIGHTING**

As shown in the Final Lighting Plans provided by the Department, the Design-Build Team shall install a new lighting system for all parking / service areas in the AET toll zone facilities. All toll facility lighting shall be fed from a Light Control System that shall be connected to the building / vault power system instead of a separate utility service. At these locations, the AET toll zone vault generator shall be sized to handle all parking / service areas lighting loads connected to the Light Control System. The Design-Build Team shall locate the photocell for the parking / service area lighting on the wall of the AET toll zone vault.

**UTILITIES COORDINATION SCOPE OF WORK** (2-23-15)

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 Company, 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.

**Cost Responsibility**

The Design-Build Team shall be responsible for all costs associated with relocating water and sewer facilities.

The NCDOT will be responsible for all other non-betterment utility relocation cost when the utility company has prior rights of way / compensable interest. The utility company shall be responsible for the relocation costs if they can not furnish evidence of prior rights of way or a compensable interest in their facilities. The Design-Build Team shall be responsible for determining the cost responsibility 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.

**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 and / or in conflict with the future improvements shown on the Design Public Meeting Map – Ultimate Design provided by the Department. The following utilities are known to be located within the project construction limits:

<b>Utility Owner</b>	<b>Utility Type</b>	<b>Cost Responsibility</b>
Duke Energy	Power (Distribution)	NCDOT (normally)
AT&T	Telecommunications	AT&T (normally)
Time Warner Cable	Cablevision	Time Warner Cable
PSNC Energy	Gas (Distribution)	PSNC Energy (normally)
Dixie Pipeline	Gas (Transmission)	NCDOT (normally)
NCDOT	Communications Cable	NCDOT

## **Water and Sewer**

If the Design-Build Team's design, construction and / or functional design for the future improvements shown on the aforementioned Design Public Map - Ultimate Design requires the relocation of existing water or sewer facilities, designs shall be coordinated with the NCDOT Utilities Unit. All costs associated with the design and construction for relocation 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. The Design-Build Team shall be responsible for submitting five (5) sets of 11 x 17 utility construction drawings to the State Utility Agent, 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 Agent, the plans, with the appropriate agreement, will be sent to the utility owner for review and concurrence.

The relocation of all water and sewer facilities shall be done in accordance with the NCDOT policies and the utility owner's water and / or sewer design requirements / specifications. In the event of conflicting design parameters in the requirements noted above, the proposed design shall adhere to the most conservative values.

## **Telecommunication Tower**

Within the project limits, there is an American Tower's telecommunication tower located at approximately Station 89+00 -L- RT. It is the intent of this project NOT to impact or relocate this telecommunication tower. The Design-Build Team shall maintain a minimum 30-foot buffer of undisturbed area adjacent to the 38-foot wide anchor block faces closest to the telecommunication tower. The Design-Build Team shall maintain a minimum 15-foot buffer of undisturbed area along the perimeter all other anchor block faces. Should the Design-Build Team's design and / or construction methods impact and / or require the relocation of the telecommunication, including but not limited to encroaching onto the aforementioned buffers, all costs for these impacts, relocation and / or encroachment shall be borne by the Design-Build Team. The Department shall not honor any requests for additional contract time or compensation for the required activities resulting from encroaching onto the aforementioned buffers, impacting the telecommunication tower and / or relocating the telecommunication tower.

## **Shearon Harris Pole-Mounted Siren**

The Design-Build Team shall ensure that the power to the existing Shearon Harris Pole-Mounted Siren is not interrupted.



### **Utility Relocation Plans**

In the event of a utility conflict or utility conflict with the future improvements shown on the Design Public Meeting Map – Ultimate Design provided by the Department, the Design-Build Team shall request that the utility company 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 Utility Agent, via the Design-Build Unit, for review and acceptance 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 submit 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 company.

### **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 Governmental Agency or any other utility owner for proposed utility construction, in which the Agency / 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 Agency / Utility Owner agree on a plan and a lump sum estimated cost for the utility construction, the Design-Build Team shall be responsible for submitting five (5) sets of 11 x 17 utility construction drawings to the State Utility Agent, 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 Agency / 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 Agency / Utility Owner for reimbursement shall be a two party agreement between the NCDOT and the Agency / Utility Owner; and will be developed and executed by the Department.

If the Design-Build Team is requested, in writing, by a utility company 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 NCDOT Utilities Unit. The associated design and construction costs shall be negotiated and agreed upon between the Design-Build Team and the utility company. 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 the 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 expense.

The NCDOT will not permit CATV to place poles within the highway rights of way but will allow down guys for their facilities within the highway rights 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 rights of way then plans and encroachment agreements shall be required by the NCDOT.

### **Requirements for attachments to existing and / or proposed structures**

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. Attachments shall be prohibited under the following conditions:

- (A) Unless noted otherwise elsewhere in this RFP, 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) Unless noted otherwise elsewhere in this RFP, no attachments shall be allowed to cored-slab bridges.
- (C) Unless noted otherwise elsewhere in this RFP, no attachments shall be allowed to curved bridges.

Attachments to structures, if allowed, 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 Utility Agent, 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 Team's operations. In the event of interruption of any utilities by the project construction, the Design-Build Team shall promptly notify the proper authority (Utility Company) and cooperate with the authority 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 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) *NCDENR Public Water Supply* - Rules governing public water supply
- (G) *NCDENR Division of Water Quality* - Title 15A - Environment and Natural Resources

### **Agreements**

The NCDOT State Utility Agent 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 be required to 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 rights of way.
- (B) For **all** new utility installations within the existing or proposed highway rights 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.

**RIGHT OF WAY SCOPE OF WORK** (2-5-15)

**\*\* 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.**

As shown on the R-2635D Design Public Meeting Map - Ultimate Design provided by the Department, the NCDOT has acquired all right of way, easements and control of access for the parcels noted below. For all other parcels, the Design-Build Team shall acquire all right of way, easement and control of access required to construct the project, as well as required to construct the Ultimate Design shown on the aforementioned Design Public Meeting Map, in accordance with the provisions of this Scope of Work.

**The Department has acquired the right of way, easement and control of access for the following R-2635D parcels:**

Parcel Nos. 4, 5, 6A, 6B, 6C, and 6D

For the parcels noted above, the cost of the right of way, easement and control of access, as shown on the R-2635D Design Public Meeting Map - Ultimate Design provided by the Department, has been borne by the Department. The cost of both the acquisition services and the actual cost of any additional right of way, easement and / or control of access within those parcels required by the Design-Build Team's Interim Design, Ultimate Design and / or construction methods (including all erosion control measures), beyond that shown on the aforementioned Design Public Meeting Map, shall be the responsibility of the Design-Build Team. The following exception applies to this paragraph:

If the Design-Build Team demonstrates to the Department's satisfaction that the project cannot be constructed, the Ultimate Design cannot be constructed and / or utilities relocated / constructed, within the right of way, easements and / or control of access within the parcel noted below, as shown on the R-2635D Design Public Meeting Map - Ultimate Design provided by the Department, the Department will bear the cost for the portion of the additional right of way, easement and / or control of access that is satisfactorily demonstrated by the Design-Build Team as needed to construct the facility.

**For all additional right of way, easements and / or control of access required by the Design-Build Team's Interim and Ultimate Designs, including all design revisions required by this RFP, and / or construction methods, the Design-Build Team shall carry out the following responsibilities: (Reference the Roadway, Structures, Traffic Signals and Utilities Coordination Scopes of Work found elsewhere in this RFP)**

- The Design-Build Team shall employ qualified, competent personnel who are currently **approved by the NCDOT Right of Way Branch** 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 and future construction of the Ultimate Design 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 by the Department, the Design-Build Team should contact Mr. Neal Strickland, in the NCDOT Right of Way Branch, 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 all additional right of way, easements and control of access not acquired by the Department.

- Unless noted otherwise elsewhere in this RFP, 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 Department's Right of Way Manual.
- The Department will prepare all Condemnation Maps. The Design-Build Team shall prepare all Final Condemnation Reports. 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 Engineer 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 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 State Appraiser.
- The Design-Build Team shall provide two appraisals for all appraisals over \$1,000,000.00.
- 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 10 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. The NCDOT will sign as approving any and all appraisals to be used in acquisition.
- 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 Branch is the approving authority for the aforementioned calculations.
- ALL Claims for Payment involving relocation benefits must be submitted to the NCDOT Relocation Coordinator in the Right of Way Branch 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 State Property Agent, 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.

**AESTHETIC DESIGN SCOPE OF WORK** (10-2-14)**General**

The project shall include aesthetic treatments to roadway, bridge and other elements consistent with the existing details of the Triangle Expressway (Toll NC 540). The original details for the Triangle Expressway (Toll NC 540) project were developed from the NCTA Aesthetic Design Guidelines dated September 28, 2007 and portray the general theme for the Triangle Expressway (Toll NC 540) corridor. The NCTA consulted an architectural review committee of community representatives to assure that the theme was appropriate for the context in which the Triangle Expressway (Toll NC 540) is located. The style and detailing of the aesthetic theme was inspired by historic North Carolina civic buildings, particularly the State Capitol Building in Raleigh and Tryon Palace, and the seventeenth-century North Carolina Colonial Governor's mansion. Details and materials from these buildings were adapted in a style that is compatible with the contemporary Research Triangle Park and rapidly growing communities of Cary, Apex, Holly Springs and Wake County.

The Design-Build Team shall utilize details which aesthetically match the existing details within the Triangle Expressway (NC 540) corridor. The color scheme for the project shall be as illustrated in the April 12, 2013 Raleigh-Durham Roadbuilders letter to Mr. George Gibson provided by the Department. The Design-Build Team shall utilize the aforementioned NCTA Aesthetic Design Guidelines provided by the Department to develop the designs, plans and details necessary for aesthetic treatments of bridges, roadways, and other elements as outlined herein.

The NCTA Aesthetic Design Guidelines are guidelines; however, they shall serve as the basis for retaining aesthetic treatment uniformity throughout the Triangle Expressway (Toll NC 540) corridor. The structural member dimensions included in the NCTA Aesthetic Design Guidelines have not been engineered and therefore 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 NCTA Aesthetic Design Guidelines.

The Design-Build Team is cautioned that the NCTA Aesthetic Design Guidelines are not engineered drawings. The Design-Build Team shall ensure that the aesthetic details incorporated into the plans developed by the Design-Build Team meet the appropriate engineering standards and the RFP requirements.

The Design-Build Team shall consistent apply the design motif and replications of existing Triangle Expressway (Toll NC 540) aesthetic details throughout all of the proposed tolling areas, bridge abutments and bents, sign structures, ITS components and other roadway elements. At a minimum, the Design-Build Team shall adhere to the following:

- 1. MSE Retaining Walls at the Old Holly Springs-Apex Road Interchange Bridge:**  
Precast wall panels shall have a brick wall appearance using form liners and concrete stains with decorative pilasters, emblems, coping and any necessary pedestrian railings. Walls shall be turned back as per the original details for the existing bridge and set forth by the NCTA Aesthetic Design Guidelines.

2. **Embossed Street Identification on Bridge Abutments:** The back of barrier / MSE wall coping to be provided for the bridge widening shall contain the –Y- Line road name in the manner currently provided on the side to be maintained. A reverse mold casting or other means shall be made to accurately create the new identification.
3. **Columns:** Columns for bridge bents, sign structures and toll gantries shall be detailed with the same reveal patterns as the existing structures within the Triangle Expressway (Toll NC 540) corridor. For bent column details, reference the existing Structure Plans provided by the Department. The grooves and indentations in the proposed columns shall match the existing columns.
4. **Dogwood Emblems:** The proposed dogwood emblems at ends of interior bents and wingwalls shall match the existing emblems. The Design-Build Team shall replicate the emblem by reverse mold casting or other means to accurately create the new emblems. Emblems at interior bents shall be placed on the exterior faces where multiple substructure units are used for a single bent line. When widening an existing bridge, existing emblems which are now interior to the bent line shall be grouted flush or otherwise removed. In lieu of removal of an existing emblem, the Team may elect to add emblems to the ends of all substructure units on a bent line.
5. **Barrier Reveals:** The proposed two bar metal rail and edge of slab for the bridge widening shall match the reveal size and shape of the existing two bar metal rail and slab to remain. For reveal details, reference the existing Structure Plans provided by the Department. All rails seen by the traveling public shall be colored.
6. **Retaining Walls:** All retaining walls shall be consistent with the NCTA Aesthetic Design Guidelines and the details of the existing wall to be replaced.
7. **Screen Walls:** Decorative screen walls at toll system utility buildings shall be consistent with the existing facilities on Triangle Expressway (Toll NC 540) and the noise wall aesthetics illustrated in the NCTA Aesthetic Design Guidelines.

### **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, and the preliminary details for each design element within the project. The NCDOT will require 30 days to review this information to ensure that it is acceptable and complementary to the existing Triangle Expressway (Toll NC 540) 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, sign structure, gantry, 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 consistency of color and the facsimile to real brick, the Design-Build Team shall demonstrate to the NCDOT the long-term durability of any staining proposed and provide a minimum of three test panels, produced in different batches. Manufacturer stains previously approved and utilized on the Triangle Expressway (Toll NC 540) will not require the aforementioned test panel process.

Visible joints in the brick appearance or brick façade walls are of concern to the NCDOT. The Design-Build Team shall demonstrate in their aesthetics details package, to the NCDOT's satisfaction, how joints will be eliminated or otherwise masked from affecting the overall appearance and continuity of the wall.

Three test panels will be required for each type of colored concrete element on the project. 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.

The slopes required by this RFP govern the slopes identified in the NCTA Aesthetic Design Guidelines.

Pedestrian fence across the highway bridge will not be required.

**PUBLIC INFORMATION SCOPE OF WORK** (8-5-14)

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. 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

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 is directly based on the Design-Build Team's Transportation Management Plans and construction details. The Design-Build Team's responsibilities shall include:

- If a "Beginning of Construction" meeting for area businesses and residents is held, attending and / or speaking at this event
- 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

The Design-Build Team shall hold an initial project coordination meeting with NCDOT at least one month prior to start of construction to discuss project impacts to the public. This information will be used by the Department to create a Public Information Plan.

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, including, but 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 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 delivering time sensitive informational material provided by the NCDOT directly to portions of the target audience. 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 informational materials to the impacted target audiences.

The Department will be responsible for establishing, creating, maintaining and updating the project website for this project. However, throughout the project duration, the Design-Build Team shall coordinate with Danielle Bingham (dkbingham@ncdot.gov), the Web Content Coordinator in the NCDOT Communications Office, 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 the NCDOT Communications Office, 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.

**\*\*\* STANDARD SPECIAL PROVISIONS \*\*\*****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**

7-31-12)

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**

(12-19-14)

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.

### **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 Drawings* No. 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*.

<b>Item</b>	<b>Section</b>
Anchor Pins	1056-2
Geotextiles	1056
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 Roadway 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*.

**AGGREGATE BASE COURSE**

(10-02-14)

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 2 to 3 inches prior to placing the remaining aggregate thickness with a mechanical spreader.

**ASPHALT PAVEMENTS - SUPERPAVE**

(6-19-12) (Rev. 2-24-15)

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 601-1, with the following:

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

<b>TABLE 605-1 APPLICATION RATES FOR TACK COAT</b>	
<b>Existing Surface</b>	<b>Target Rate (gal/sy)</b>
	<b>Emulsified Asphalt</b>
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.

<b>TABLE 605-2 APPLICATION TEMPERATURE FOR TACK COAT</b>	
<b>Asphalt Material</b>	<b>Temperature Range</b>
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 6-21, Subarticle 610-3(C) Job Mix Formula (JMF)**, replace Table 610-1 with the following:

<b>TABLE 610-1 DESIGN MIXING TEMPERATURE AT THE ASPHALT PLANT<sup>A</sup></b>		
<b>Binder Grade</b>	<b>HMA JMF Temperature</b>	<b>WMA JMF Temperature Range</b>
PG 64-22	300°F	225 - 275°F
PG 70-22	315°F	240 - 290°F
PG 76-22	335°F	260 - 310°F

**A.** The mix temperature, when checked in the truck at the roadway, shall be within plus 15° and minus 25° of the temperature specified on the JMF.

**Page 6-21, Subarticle 610-3(C) Job Mix Formula (JMF)**, lines 4-6, delete first sentence of the second paragraph. Line 7, in the second sentence of the second paragraph, replace “275°F” with “275°F or greater.”

**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:

<b>Asphalt Concrete Mix Type</b>	<b>Minimum Surface and Air Temperature</b>
B25.0B, C	35°F
I19.0B, C, D	35°F
SF9.5A, S9.5B	40°F <sup>A</sup>
S9.5C, S12.5C	45°F <sup>A</sup>
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 6-26, 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”.

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

<b>Grading Requirements</b>	<b>Total Percent Passing</b>		
<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

**\*\* NOTE \*\* Deleted reference to Page 6-50, Table 660-1 MATERIAL APPLICATION RATES AND TEMPERATURES**

**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<sup>A</sup>, replace with the following:**

<b>TABLE 700-1</b>	
<b>TOLERANCE FOR DOWEL BAR ALIGNMENT<sup>A</sup></b>	
<b>Misalignment Category, inches</b>	<b>Weight</b>
$0 \leq d \leq 0.6$	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 2 lots approximately 4 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  $3/4 \pm 1/8$  inch center-to-center. The nominal depth of tined groove in the plastic concrete shall be  $1/8 \pm 1/32$  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 2-inch to 3-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 6-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”.

**ASPHALT BINDER CONTENT OF ASPHALT PLANT MIXES**

(6-7-12)

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.

**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 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.



**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.

**GUARDRAIL ANCHOR UNITS, TYPE 350**

(12-19-14)

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 may at their option, furnish any one of the guardrail anchor units or approved equal.

Guardrail anchor unit (X-Tension) as manufactured by:

Barrier Systems, Inc.  
c/o Transportation Equipment Services Inc.  
420 Boardwalk Dr.  
Youngsville, NC 27596  
Telephone: 877-499-8727

Guardrail anchor unit (ET-Plus) as manufactured by:

Trinity Industries, Inc.  
2525 N. Stemmons Freeway  
Dallas, Texas 75207  
Telephone: 800-644-7976

The guardrail anchor unit (SKT 350) as manufactured by:

Road Systems, Inc.  
3616 Old Howard County Airport  
Big Spring, Texas 79720  
Telephone: 915-263-2435

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 Section 106-2 of 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 Section 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**

Guardrail end delineation is required on all approach and trailing end sections for both temporary and permanent installations. Guardrail end delineation consists of yellow reflective sheeting applied to the entire end section of the guardrail in accordance with Section 1088-3 of the 2012 *Standard Specifications for Roads and Structures* and is incidental to the cost of the guardrail anchor unit.

### **IMPACT ATTENUATOR UNITS, TYPE 350**

(9-1-11)

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 may at their option, furnish any one of the impact attenuator units or approved equal:

#### **NON-GATING IMPACT ATTENUATOR UNITS:**

The impact attenuator unit (QUADGUARD) as manufactured by:

ENERGY ABSORPTION SYSTEMS, INC.  
ONE EAST WACKER DRIVE  
CHICAGO, ILLINOIS 60601-2076  
TELEPHONE: 312-467-6750

The impact attenuator unit (TRACC) as manufactured by:

TRINITY INDUSTRIES, INC.  
2525 N. STEMMONS FREEWAY  
DALLAS, TEXAS 75207  
TELEPHONE: 1-800-644-7976

GATING IMPACT ATTENUATOR UNITS:

The impact attenuator unit (BRAKEMASTER) as manufactured by:

ENERGY ABSORPTION SYSTEMS, INC.  
ONE EAST WACKER DRIVE  
CHICAGO, ILLINOIS 60601-2076  
TELEPHONE: 312-467-6750

The impact attenuator unit (CAT) as manufactured by:

TRINITY INDUSTRIES, INC.  
2525 N. STEMMONS FREEWAY  
DALLAS, TEXAS 75207  
TELEPHONE: 1-800-644-7976

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 Section 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 Section 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 one of the NON-GATING Impact Attenuator Units listed in the Materials Section herein.

If the median width is greater than 40 feet, the Design-Build Team may use any of the GATING or NON-GATING Impact Attenuator Units listed in the Materials Section herein.

**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**

(7-1-95)

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. (2-23-15))

1000, 1002, 1005, 1024, 1050, 1056, 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 10-5, Table 1000-1, REQUIREMENTS FOR CONCRETE, replace with the following:**

<b>TABLE 1000-1 REQUIREMENTS FOR CONCRETE</b>											
<b>Class of Concrete</b>	<b>Min. Comp. Strength at 28 days</b>	<b>Maximum Water-Cement Ratio</b>				<b>Consistency Max. Slump</b>		<b>Cement Content</b>			
		<b>Air-Entrained Concrete</b>		<b>Non Air-Entrained Concrete</b>		<b>Vibrated</b>	<b>Non-Vibrated</b>	<b>Vibrated</b>		<b>Non- Vibrated</b>	
		<b>Rounded Aggregate</b>	<b>Angular Aggregate</b>	<b>Rounded Aggregate</b>	<b>Angular Aggregate</b>			<b>Min.</b>	<b>Max.</b>	<b>Min.</b>	<b>Max.</b>
<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 10-1, 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:**

<b>Item</b>	<b>Section</b>
Type II 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 10-6, 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 10-23, Table 1005-1, AGGREGATE GRADATION-COARSE AGGREGATE, replace with the following:

**TABLE 1005-1  
AGGREGATE GRADATION - COARSE AGGREGATE**

Std. Size #	Percentage of Total by Weight Passing														Remarks
	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#40	#200			
4	100	90-100	20-55	0-15	-	0-5	-	-	-	-	-	A	Asphalt Plant Mix		
467M	100	95-100	-	35-70	-	0-30	0-5	-	-	-	-	A	Asphalt Plant Mix		
5	-	100	90-100	20-55	0-10	0-5	-	-	-	-	-	A	AST, Sediment Control Stone		
57	-	100	95-100	-	25-60	-	0-10	0-5	-	-	-	A	AST, 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, Str. Conc, Weep Hole Drains		
14M	-	-	-	-	-	100	35-70	5-20	-	0-8	-	A	Asphalt Plant Mix, AST, Weep Hole Drains, Str. Concrete		
9	-	-	-	-	-	100	85-100	10-40	-	0-10	-	A	AST		
ABC	-	100	75-97	-	55-80	-	35-55	-	25-45	-	14-30	4-12 <sup>B</sup>	Aggregate Base Course, Aggregate Stabilization		
ABC (M)	-	100	75-100	-	45-79	-	20-40	-	0-25	-	-	0-12 <sup>B</sup>	Maintenance Stabilization		
Light-C weight	-	-	-	-	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 10-46, Article 1024-1, PORTLAND CEMENT, line 33**, add the following as the ninth paragraph:

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

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

<b>TABLE 1024-1</b>	
<b>POZZOLANS FOR USE IN PORTLAND CEMENT CONCRETE</b>	
<b>Pozzolan</b>	<b>Rate</b>
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 10-73, Article 1056-1 DESCRIPTION, lines 7-8**, delete the first sentence of the second paragraph and replace with the following:

Use geotextile fabrics that are on the NCDOT Approved Products List.

**Page 10-73, Article 1056-2 HANDLING AND STORING, line 17**, replace “mechanically stabilized earth (MSE) wall faces” with “temporary wall faces”.

**Page 10-74, TABLE 1056-1 GEOTEXTILE REQUIREMENTS**, replace table with the following:

<b>TABLE 1056-1 GEOTEXTILE REQUIREMENTS</b>						
<b>Property</b>	<b>Requirement (MARV<sup>A</sup>)</b>					<b>Test Method</b>
	<b>Type 1</b>	<b>Type 2</b>	<b>Type 3<sup>B</sup></b>	<b>Type 4</b>	<b>Type 5<sup>C</sup></b>	
<i>Typical Application</i>	<i>Shoulder Drains</i>	<i>Under Rip Rap</i>	<i>Temporary Silt Fence</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 <sup>D</sup> , Class 3	Table 1 <sup>D</sup> , Class 1	100 lb	Table 1 <sup>D</sup> , Class 3	-	ASTM D4632
Tear Strength (MD & CD)			-		-	ASTM D4533
Puncture Strength			-		-	ASTM D6241
Ultimate Tensile Strength (MD & CD)	-	-	-	-	2,400 lb/ft (unless required otherwise in the contract)	ASTM D4595
Permittivity	Table 2 <sup>D</sup> , 15% to 50% <i>in Situ</i> Soil Passing No. 200 <sup>E</sup>		Table 7 <sup>D</sup>	Table 5 <sup>D</sup>	0.20 sec <sup>-1</sup>	ASTM D4491
Apparent Opening Size					No. 30 <sup>E</sup>	ASTM D4751
UV Stability (Retained Strength)					70%	ASTM D4355

- A. MARV does not apply to elongation
- B. Minimum roll width of 36" required
- C. Minimum roll width of 13 ft required
- D. AASHTO M 288
- E. US Sieve No. per AASHTO M 92

**Page 10-115, Subarticle 1074-7(B), Gray Iron Castings, lines 10-11**, replace with 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.

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

<b>TABLE 1078-1 REQUIREMENTS FOR CONCRETE</b>		
<b>Property</b>	<b>28 Day Design Compressive Strength 6,000 psi or less</b>	<b>28 Day Design Compressive Strength greater than 6,000 psi</b>
Maximum Water / Cementitious Material Ratio	0.45	0.40
Maximum Slump without HRWR	3.5"	3.5"
Maximum Slump with HRWR	8"	8"
Air Content (upon discharge into forms)	5 + 2%	5 + 2%

**Page 10-151, Article 1080-4 Inspection and Sampling, lines 18-22**, replace (B), (C) and (D) with the following:

- (B) At least 3 panels prepared as specified in 5.5.10 of AASHTO M 300, Bullet Hole Immersion Test.
- (C) At least 3 panels of 4"x6"x1/4" for the Elcometer Adhesion Pull Off Test, ASTM D4541.
- (D) A certified test report from an approved independent testing laboratory for the Salt Fog Resistance Test, Cyclic Weathering Resistance Test, and Bullet Hole Immersion Test as specified in AASHTO M 300.
- (E) A certified test report from an approved independent testing laboratory that the product has been tested for slip coefficient and meets AASHTO M253, Class B.

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

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

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

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

For epoxy resin systems used for embedding dowel bars, threaded rods, rebar, anchor bolts and other fixtures in hardened concrete, the manufacturer shall submit test results showing that the bonding system will obtain 125% of the specified required yield strength of the fixture. Furnish certification that, for the particular bolt grade, diameter and embedment depth required, the anchor system will not fail by adhesive failure and that there is no movement of the anchor bolt.

For certification and anchorage, use 3,000 psi as the minimum Portland cement concrete compressive strength used in this test. Use adhesives that meet Section 1081.

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

**Page 10-163, Table 1081-1 Properties of Mixed Epoxy Resin Systems**, replace table with the following:

<b>TABLE 1081-1 PROPERTIES OF MIXED EPOXY RESIN SYSTEMS</b>							
Property	Type 1	Type 2	Type 3	Type 3A	Type 4A	Type 4B	Type 5
Viscosity-Poises at 77°F ± 2°F	Gel	10-30	25-75	Gel	40-150	40-150	1-6
Spindle No.	-	3	4	--	4	4	2
Speed (RPM)	-	20	20	--	10	10	50
Pot Life (Minutes)	20-50	30-60	20-50	5-50	40-80	40-80	20-60
Minimum Tensile Strength at 7 days (psi)	1,500	2,000	4,000	4,000	1,500	1,500	4,000
Tensile Elongation at 7 days (%)	30 min.	30 min.	2-5	2-5	5-15	5-15	2-5
Min. Compressive Strength of 2" mortar cubes at 24 hours	3,000 (Neat)	4,000-	6,000-	6,000 (Neat)	3,000	3,000	6,000
Min. Compressive Strength of 2" mortar cubes at 7 days	5,000 (Neat)	-	-	-	-	5,000	-
Maximum Water Absorption (%)	1.5	1.0	1.0	1.5	1.0	1.0	1.0
Min. Bond Strength Slant Shear Test at 14 days (psi)	1,500	1,500	2,000	2,000	1,500	1,500	1,500

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

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

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

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

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

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

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

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

**Page 10-170, Article 1081-3 Hot Bitumen, line 9**, add the following at the end of Section 1081:

#### **1081-4 EPOXY RESIN ADHESIVE FOR BONDING TRAFFIC MARKINGS**

##### **(A) General**

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

##### **(B) Classification**

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

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

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

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

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

**(C) Requirements**

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

**(D) Prequalification**

Refer to Subarticle 1081-1(E).

**(E) Acceptance**

Refer to Subarticle 1081-1(F).

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

Steel sheet piles detailed for permanent applications shall be hot rolled and meet ASTM A572 or ASTM A690 unless otherwise required by the plans. Steel sheet piles shall be coated as required by the plans. Galvanized sheet piles shall be coated in accordance with Section 1076. Metallized sheet piles shall be metallized in accordance to the Project Special Provision “Thermal Sprayed Coatings (Metallization)” with an 8 mil, 99.9% aluminum alloy coating and a 0.5 mil seal coating. Any portion of the metallized sheet piling encased in concrete shall receive a barrier coat. The barrier coat shall be an approved waterborne coating with a low-viscosity which readily absorbs into the pores of the aluminum thermal sprayed coating. The waterborne coating shall be applied at a spreading rate that results in a theoretical 1.5 mil dry film thickness. The manufacturer shall issue a letter of certification that the resin chemistry of the waterborne coating is compatible with the 99.9% aluminum thermal sprayed alloy and suitable for tidal water applications.

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

The epoxy shall meet Article 1081-4.

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

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

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

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

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

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

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

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

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

**Page 10-204, Subarticle 1092-2(A) Performance and Test Requirements,** replace **Table 1092-3 Minimum Coefficient of Retroreflection for NC Grade A** with the following:

<b>TABLE 1092-3                      MINIMUM COEFFICIENT OF RETROREFLECTION FOR NC GRADE A                      (Candelas Per Lux Per Square Meter)</b>								
<b>Observation Angle, degrees</b>	<b>Entrance Angle, degrees</b>	<b>White</b>	<b>Yellow</b>	<b>Green</b>	<b>Red</b>	<b>Blue</b>	<b>Fluorescent Yellow Green</b>	<b>Fluorescent Yellow</b>
0.2	-4.0	525	395	52	95	30	420	315
0.2	30.0	215	162	22	43	10	170	130
0.5	-4.0	310	230	31	56	18	245	185
0.5	30.0	135	100	14	27	6	110	81
1.0	-4.0	120	60	8	16	3.6	64	48
1.0	30.0	45	34	4.5	9	2	36	27

**SELECT MATERIAL, CLASS III, TYPE 3**

12-2-11

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 is 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.

<b>TABLE 1019-1A</b>			
<b>ADDITIONAL LIMESTONE APPLICATION RATE TO RAISE pH</b>			
<b>pH TEST RESULT</b>	<b>Sandy Soils Additional Rate (lbs. / Acre)</b>	<b>Silt Loam Soils Additional Rate (lbs. / Acre)</b>	<b>Clay Loam Soils Additional Rate (lbs. / Acre)</b>
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**

(1-23-15)

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 3-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.

<b>Item</b>	<b>Section</b>
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.

<b>Gradation</b>		<b>Maximum Liquid Limit</b>	<b>Maximum Plasticity Index</b>
<b>Sieve Designation per AASHTO M 92</b>	<b>Percentage Passing (% by weight)</b>		
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	25	10
No. 200	10 – 30		

**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 shall not be permitted unless revised grout mix designs have been submitted to the Engineer and approved.

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

The Engineer will review the grout mix design for compliance with the contract and notify the 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:

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

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

<b>TABLE 1003-3 ELAPSED TIME FOR PLACING GROUT (with continuous agitation)</b>		
<b>Air or Grout Temperature, Whichever is Higher</b>	<b>Maximum Elapsed Time</b>	
	<b>No Retarding Admixture Used</b>	<b>Retarding Admixture Used</b>
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.

### **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 5 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 Standard Drawing No. 1170.01 of the 2012 *Roadway Standard Drawings*. Define “concrete barrier” as unanchored or anchored PCB or an approved equal. Define “temporary guardrail” as temporary steel beam guardrail that meets Standard Drawing No. 862.02 of the 2012 *Roadway Standard Drawings*.

## Materials

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

<b>Item</b>	<b>Section</b>
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 will 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 4 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](http://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 3-year design life in the MD based on material type. Define material type from the website above for shoring backfill as follows:

<b>Material Type</b>	<b>Shoring Backfill</b>
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 ( $\gamma$ ) = 120 lb/cf;

(b)	<b>Friction Angle (<math>\phi</math>)</b>	<b>Shoring Backfill</b>
	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 5 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 6 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 4 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 Standard Drawing No. 1170.01 of the 2012 *Roadway Standard Drawings*. Use temporary guardrail in accordance with Section 862 of the 2012 *Standard Specifications for Roads and Structures* and Standard Drawing Nos. 862.01, 862.02 and 862.03 of the 2012 *Roadway Standard Drawings*.

### (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 4 passes of an 8 ton to 10 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 5 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.

### **COORDINATION OF EXISTING LIGHTING WORK**

(6-24-12)

DB14 R002

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 shall 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.

### **ON-THE-JOB TRAINING**

(3-27-13) (Rev. 2-24-15)

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:

<b>Restricted Noxious Weed</b>	<b>Limitations per Lb. of Seed</b>	<b>Restricted Noxious Weed</b>	<b>Limitations per Lb. of Seed</b>
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  
Crownvetch  
Pensacola Bahiagrass  
Creeping Red Fescue

Japanese Millet  
Reed Canary Grass  
Zoysia

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**

(1-17-12) (Rev. 2-25-15)

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 “competion” with “completion”.

**Division 8**

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

**Division 10**

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

**Division 12**

**Page 12-7, Table 1205-3**, add “FOR THERMOPLASTIC” to the end of the title.

**Page 12-8, Subarticle 1205-5(B), line 13**, replace “Table 1205-2” with “Table 1205-4”.

**Page 12-8, Table 1205-4 and 1205-5**, replace “THERMOPLASTIC” in the title of these tables with “POLYUREA”.

**Page 12-9, Subarticle 1205-6(B), line 21**, replace “Table 1205-4” with “Table 1205-6”.

**Page 12-11, Subarticle 1205-8(C), line 25**, replace “Table 1205-5” with “Table 1205-7”.

**Division 15**

**Page 15-4, Subarticle 1505-3(F) Backfilling, line 26**, replace “Subarticle 235-4(C)” with “Subarticle 235-3(C)”.

**Page 15-6, Subarticle 1510-3(B), after line 21**, replace the allowable leakage formula with the following:  $W = LD\sqrt{P} \div 148,000$

**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”.

**MINIMUM WAGES**

(07-21-09)

Z-5

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

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

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

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

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

The determination of the intent of the application of these Acts to the project's contract shall be the Design-Build Team's responsibility.

The Design-Build Team shall have no claim against the Department of Transportation for any changes in the minimum wage laws, State or Federal. It is the responsibility of the Design-Build Team to be fully informed of all Federal and State Laws affecting the project's contract.

**\*\*\* 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 *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 *Standard Specifications* are deleted from Design-Build Contracts.

**Modifications:** The remainder of this Standard Special Provision includes modifications to Division One of the *Standard Specifications*.

## **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 *Standard Specifications*.

### **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, 4<sup>th</sup> 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 6<sup>th</sup> 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 1<sup>st</sup> 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 4<sup>th</sup> and 5<sup>th</sup> 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 1<sup>st</sup> and 2<sup>nd</sup> 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 3<sup>rd</sup> 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 2<sup>nd</sup> 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 2<sup>nd</sup> 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 1<sup>st</sup> 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 1<sup>st</sup> 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 : Wake

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
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**ROADWAY ITEMS**

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0001	0000900000-N	SP	GENERIC MISCELLANEOUS ITEM DESIGN & CONSTRUCTION	Lump Sum	L.S.	
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1559/Jan30/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			
Aggregate Base Course	Gal / Ton	0.55	_____ Tons
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			
<b>Portland Cement Concrete Pavement:</b>			
Thru Lanes and Shoulders (> 11")	Gal / SY	0.327	_____ SY
Thru Lanes and Shoulders (9" to 11")		0.272	_____ SY
Thru Lanes and Shoulders (< 9")		0.245	_____ SY
* 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 MBE & WBE SUBCONTRACTORS**

Sheet \_\_\_\_\_ of \_\_\_\_\_

FIRM NAME AND ADDRESS	MBE or WBE	ITEM NO.	ITEM DESCRIPTION	* AGREED UPON UNIT PRICE	** DOLLAR VOLUME OF ITEM

Contract No. \_\_\_\_\_ County \_\_\_\_\_ Firm \_\_\_\_\_

**This form must be completed in order for the Bid to be considered responsive and be publicly read.  
 Bidders with no MBE and / or WBE participation must so indicate this on the form by entering the word or number *zero*.**





**LISTING OF MBE & WBE SUBCONTRACTORS**

Sheet \_\_\_\_\_ of \_\_\_\_\_

FIRM NAME AND ADDRESS	MBE or WBE	ITEM NO.	ITEM DESCRIPTION	* AGREED UPON UNIT PRICE	** DOLLAR VOLUME OF ITEM

**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 MBE and / or WBE subcontractor, and these prices will be used to determine the percentage of the MBE and / or WBE participation in the contract.

\*\* Dollar Volume of MBE Subcontractor \$ \_\_\_\_\_  
 MBE Percentage of Total Construction Cost \_\_\_\_\_ %  
 (Including Right of Way Acquisition Costs)  
 \*\* Dollar Volume of WBE Subcontractor \$ \_\_\_\_\_  
 WBE Percentage of Total Construction Cost \_\_\_\_\_ %  
 (Including Right of Way Acquisition Services)

\*\* Must have entry even if figure to be entered is zero.

**This form must be completed in order for the Bid to be considered responsive and be publicly read.  
 Bidders with no MBE and / or WBE 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 \_\_\_\_\_  
\_\_\_\_\_ day of \_\_\_\_\_ 20\_\_.

**NOTARY SEAL**

\_\_\_\_\_  
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.:**    **C 203635**

**County:**            **Wake**

ACCEPTED BY THE  
DEPARTMENT OF TRANSPORTATION

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Contract Officer

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Date

Execution of Contract and Bonds  
Approved as to Form:

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Attorney General