

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

**THIRD INDUSTRY DRAFT REQUEST FOR PROPOSAL**



**DESIGN-BUILD PROJECT**

**TIP I-2513B & D**

**July 11, 2023**



*VOID FOR BIDDING*

DATE AND TIME OF TECHNICAL PROPOSAL SUBMISSION: **January 23, 2024 BY 4:00 PM**

DATE AND TIME OF PRICE PROPOSAL SUBMISSION: **February 12, 2024 BY 4:00 PM**

DATE AND TIME OF PRICE PROPOSAL OPENING: **February 20, 2024 AT 2:00 PM**

CONTRACT ID: C204870

WBS ELEMENT NO. 34165.3.GV2 and 34165.3.5

FEDERAL-AID NO. 0026020 and 0026021

COUNTY: Buncombe

ROUTE NO. I-26

MILES: 3.206

LOCATION: I-26 from South of US 19 Bus./US 23 Bus. (Haywood Road) to North of NC 251 (Broadway Street), Including the I-26 / I-240 Interchange and SR 1477 (Riverside Drive) from SR 1517 (Hill Street) to NC 251 (Broadway Street).

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

NOTICE:

ALL PROPOSERS SHALL COMPLY WITH ALL APPLICABLE LAWS REGULATING THE PRACTICE OF GENERAL CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA WHICH REQUIRES THE PROPOSER TO BE LICENSED BY THE N.C. LICENSING BOARD FOR CONTRACTORS WHEN BIDDING ON ANY NON-FEDERAL AID PROJECT WHERE THE BID IS \$30,000 OR MORE, EXCEPT FOR CERTAIN SPECIALTY WORK AS DETERMINED BY THE LICENSING BOARD. PROPOSERS SHALL ALSO COMPLY WITH ALL OTHER APPLICABLE LAWS REGULATING THE PRACTICES OF ELECTRICAL, PLUMBING, HEATING AND AIR CONDITIONING AND REFRIGERATION CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA. NOTWITHSTANDING 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. C204870**  
**IN BUNCOMBE 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. C204870; 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. C204870 in Buncombe 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 2018 *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 noted otherwise 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 2018 *Standard Specifications for Roads and Structures*.

Although the Department has furnished preliminary designs for this project, unless noted otherwise 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 2018, 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 shall 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 Price 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 fails 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 2018 *Standard Specifications for Roads and Structures*; otherwise said deposit will be returned to the Design-Build Team.

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

Itemized Proposal Sheet (TAN SHEET)

Fuel Usage Factor Chart and Estimate of Quantities

Listing of DBE Subcontractors

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

Signature Sheet

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

(7-12-7)(Rev. 5-16-23)

DB1 G06A

The date of availability for this contract is **April 1, 2024**, 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 **October 1, 2030**.

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

The liquidated damages for this contract are **Ten Thousand Dollars (\$ 10,000.00)** per calendar day. As an exception to this amount, where the contract has been determined to be substantially complete as defined by the *Substantial Completion* Project Special Provision found elsewhere in this RFP, the liquidated damages will be reduced to **Three Thousand Five Hundred Dollars (\$ 3,500.00)** 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 will become contract requirements.

Liquidated damages of **Ten Thousand Dollars (\$ 10,000.00)** per calendar day will be applicable to the early date for substantial completion proposed by the bidder. Liquidated damages of **Three Thousand Five Hundred Dollars (\$ 3,500.00)** 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.

**BUILD AMERICA, BUY AMERICA (BABA)**

(11-15-22)

106

DB 01 G04

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 1-53, Article 106-1 GENERAL REQUIREMENTS**, add the following after **Line 27**:

**(C) Build America, Buy America (BABA)**

All manufactured products and construction materials permanently incorporated into any project must meet requirements of the Build America, Buy America (BABA) Act of the Infrastructure



Investment and Jobs Act (IIJA). Before any material or product shown on the Department's Build America, Buy America (BABA) List is included for payment on a monthly estimate, the Design-Build Team shall furnish the Engineer with a notarized certification certifying that the items conform to the BABA Act. The Department's Build America Buy America (BABA) List can be found on the Department's website below:

**<https://connect.ncdot.gov/letting/LetCentral/NCDOT%20BABA%20Materials%20List.pdf>**

Each purchase order issued by the Design-Build Team, including but not limited to all subcontractors, for items on the BABA List to be permanently incorporated into any project shall contain in bold print a statement advising the supplier that the manufactured products and construction materials must be produced in the United States of America. The Design-Build Team, including but not limited to all affected subcontractors, shall maintain a separate file for BABA List items so that verification of the Design-Build Team's efforts to purchase items produced in the United States can readily be verified by an authorized representative of the Department or the Federal Highway Administration (FHWA).

#### **OTHER LIQUIDATED DAMAGES AND INCENTIVES**

(3-22-07) (Rev. 2-14-8)

DB1 G11

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

**Liquidated Damages for Intermediate Contract Time #1 for failure to repair a damaged NCDOT fiber optic communications cable and restore communications within 24 hours are \$500.00 per hour or any portion thereof.**

**Liquidated Damages for Intermediate Contract Time #2 for failure to reestablish NCDOT fiber optic communications within 24 hours after a disruption are \$2,500.00 per day or any portion thereof.**

**Liquidated Damages for Intermediate Contract Time #3 for failure to provide a plan that defines 1) an anticipated NCDOT fiber optic communications disruption timeframe, and 2) a plan of action for reestablishing NCDOT fiber optic communications a minimum of 21 calendar days prior to a proposed disruption in service are \$10,000.00 per failure.**

**Liquidated Damages for Intermediate Contract Time #4 for failure to restore communication to ITS devices or provide a replacement device within 24 hours are \$500.00 per hour or any portion thereof.**

**Liquidated Damages for Intermediate Contract Time #5 failure to reestablish DMS operation within seventy-two (72) hours are Two Thousand Five Hundred Dollars (\$ 2,500.00) per day, or any portion thereof.**

**Liquidated Damages for Intermediate Contract Time #6 failure to provide a plan that defines 1) an anticipated DMS disruption timeframe and 2) a plan of action for**

reestablishing DMS operation a minimum of twenty-one (21) calendar days prior to a proposed disruption in service are Ten Thousand Dollars (\$ 10,000.00) per failure.

Liquidated Damages for Intermediate Contract Time #7 failure to reestablish CCTV Operation within twenty-four (24) hours are Two Thousand Five Hundred Dollars (\$ 2,500.00) per day, or any portion thereof.

Liquidated Damages for Intermediate Contract Time #8 failure to provide a plan that defines 1) an anticipated CCTV disruption timeframe and 2) a plan of action for reestablishing CCTV Operation a minimum of twenty-one (21) calendar days prior to a proposed disruption in service are Ten Thousand Dollars (\$ 10,000.00) per failure.

Liquidated Damages for Intermediate Contract Time #9 for lane narrowing, lane closure, holiday and special event time restrictions for a single lane on I-26, I-240 and US 19 / 23 / 70 (existing I-26) including all ramps and loops are \$2,500.00 per 15-minute period or any portion thereof.

Liquidated Damages for Intermediate Contract Time #10 for lane narrowing, lane closure, holiday and special event time restrictions for all other roads are \$1,000.00 per hour or any portion thereof.

Liquidated Damages for Intermediate Contract Time #11 for road closure time restrictions for construction operations on I-26, I-240 and US 19 / 23 / 70 (existing I-26) including all ramps and loops, Patton Avenue and Haywood Road are \$2,500.00 per 15-minute period or any portion thereof.

Liquidated Damages for Intermediate Contract Time #12 for road closure time restrictions for construction operations for Riverside Drive and Broadway Street are \$250.00 per 15-minute period or any portion thereof.

Liquidated Damages for Intermediate Contract Time #13 for ramp reconstruction time restrictions for construction operations on the I-26 ramps and loops at Haywood Road and the I-26 ramps and loops at Broadway Street are \$2,000.00 per hour or any portion thereof.

Liquidated Damages for Intermediate Contract Time #14 for ramp reconstruction time restrictions for construction operations on the I-26 ramps and loops at I-240, the I-26 ramps and loops at Patton Avenue, the I-240 ramps and loops at US 19 / 23 / 70 and the I-240 ramps and loops at Patton Avenue are \$2000.00 per hour or any portion thereof.

Liquidated Damages for Intermediate Contract Time #15 failure to be ready for snow and ice removal operation and delivered to the pre-designated Department of Transportation Facility within three (3) hours of notification are Two Hundred Dollars (\$200.00) per hour per piece of equipment.

**\*\*NOTE\*\*** Deleted previously included Liquidated Damages for Intermediate Contract Time #9, #10, and #11, and renumbered Liquidated Damages for remaining Intermediate Contract Times

**Liquidated Damages for Erosion and Sedimentation Control efforts apply to this project.**

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

**REQUIRED PROVISION FOR USDOT DISCRETIONARY GRANTS**

The Contractor is hereby notified that this project will be partially financed with USDOT discretionary grant funds. The Contractor shall assure that all subcontracts, and other contracts for services for a USDOT discretionary funded project shall also have this Project Special Provision in their contracts. As such, the Department may require the Contractor to provide reports, and other information as evidence to document the progress and expenditures on the project on a monthly, quarterly and / or yearly basis. No direct payment will be made for providing any reports required by a USDOT Discretionary Grant.

**PAYOUT SCHEDULE**

(11-16-09)

DB1 G13

No later than 12:00 o'clock noon on the sixth day after the Price Proposal opening, 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 Anticipated Monthly Payout Schedule shall be submitted as a hard copy version and as an electronic version in Excel Spreadsheet. Both versions of the Anticipated Monthly Payout Schedule 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 Anticipated Monthly Payout Schedule shall include a monthly percentage breakdown (in terms of the total contract amount percentages) of the work anticipated to be completed. The Anticipated Monthly Payout Schedule shall begin with the Date of Availability and end with the Actual Completion Date proposed by the Design-Build Team. If the Anticipated Monthly 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.

As detailed above, the Design-Build Team shall submit electronic and hard copy updates of the Anticipated Monthly Payout Schedule on March 15<sup>th</sup>, June 15<sup>th</sup>, September 15<sup>th</sup>, and December 15<sup>th</sup> of each calendar year until project acceptance. The Design-Build Team shall submit all updates to the Resident Engineer, with copies to the State Construction Engineer at 1 South Wilmington Street, 1543 Mail Service Center, Raleigh, NC 27699-1543.

**MOBILIZATION**

(3-11-19)

DB1 G15B

Revise the 2018 *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**

Five 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. Excluding signs on intersecting roadways, all signs are complete and accepted.
4. All guardrails, drainage devices, ditches, excavation and embankment are complete.
5. Remaining work along the project consists of permanent pavement markings, permanent pavement markers or incidental construction that is away from the paved portion of the roadway.

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.

### **CONSTRUCTION MORATORIUM**

(12-2-15)

DB1 G18C

Reference the Project Commitments listed in the **I-2513 Record of Decision dated May 2023** for construction moratorium dates.

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

(9-19-22)

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 will be incorporating into the completed project and upon which the Price Proposal was based. The quantity breakdown shall include all items of work that appear in the *Fuel Usage Factor Chart and Estimate of Quantities* sheet. Only those items of work which are specifically noted in the *Fuel Usage Factor Chart and Estimate of Quantities* sheet will be subject to fuel price adjustments. The quantity estimate submitted shall be the final total quantity limit for which fuel price adjustments will be made for each item, regardless of Supplemental Agreements.

**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 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 \$            per gallon.

**(C) Opt Out of Fuel Price Adjustment**

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

**(D) Change Option**

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

**(E) Fuel Usage Factor for Asphalt Line Items**

If the Design-Build Team elects to pursue reimbursement for Fuel Price Adjustments, the Design-Build Team shall select either the 0.90 **or** 2.90 Fuel Usage Factor for each individual asphalt line item by marking the appropriate Factor on the *Fuel Usage Factor Chart*. If the Design-Build Team does not mark either Fuel Usage Factor or marks both Fuel Usage Factors for an asphalt line item, the 2.90 Fuel Usage Factor shall be used for that asphalt line item.

**(F) Failure to Submit**

Failure to submit the completed *Fuel Usage Factor Chart and Estimate of Quantities* sheet separately with the Technical Proposal 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.

**STEEL PRICE ADJUSTMENT**

(12-20-22)

DB1 G47

**Description and Purpose**

When the price of raw steel mill products utilized on the contract have fluctuated, steel price adjustments will be made to the payments due the Design-Build Team for selected eligible items, as defined herein, that are permanently incorporated into the work. The Department will adjust monthly progress payments up or down, as appropriate, for cost changes in steel according to this provision.

**Eligible Items**

The list of standard items the Department has determine are eligible for steel price adjustment can be found on the Departments website at the following address:

**<https://connect.ncdot.gov/letting/Pages/Central-Letting-Resources.aspx>**

Nuts, bolts, anchor bolts, rebar chairs, connecting bands and other miscellaneous hardware associated with these items shall not be included in the price adjustment.

Price adjustments shall only be made for fluctuations in the material cost of the steel used in the above products as specified in the Product Relationship Table below. The producing mill shall be defined as the source of steel product before any fabrication has occurred (e.g., coil, plate, rebar, hot rolled shapes, etc.). No adjustment will be made for changes in the cost of fabrication, coating, shipping, storage, etc.

A steel price adjustment shall not be made for any products manufactured from steel having an adjustment date, as defined by the Product Relationship Table below, prior to the Price Proposal Opening date.

### **Price Proposal Submittal Requirements**

The Design-Build Team shall provide Form SPA-1DB listing the steel material, (with corresponding Trns\*port Item Number, Item Description, and Category) for the steel products they wish to have a price adjustment calculated. Only the work items corresponding to the list of eligible item numbers for steel price adjustment may be entered on Form SPA-1DB. The Design-Build Team may choose to have steel price adjustment applied to any, all, or none of the eligible items. However, the Design-Build Team's selection of work items for steel price adjustment or non-selection (non-participation) shall not change once the Department has received Form SPA-1DB.

Work items the Design-Build Team chooses for steel price adjustment must be designated by writing the word "Yes" in the column titled "Option" by each Trns\*port Pay Item chosen for price adjustment. The Design-Build Team's designations on Form SPA-1DB shall be written in ink or typed. The completed SPA-1DB shall be signed and dated by an officer of the Design-Build Team to be considered complete. Items not properly designated, designated with "No", or left blank on the Design-Build Team's Form SPA-1DB shall automatically be removed from consideration for a price adjustment.

The Design-Build Team shall include the completed Form SPA-1DB in the sealed package containing the Price Proposal and deliver the completed Form SPA-1DB at the same time and location as the Price Proposal requirements found elsewhere in this RFP. If the Design-Build Team fails to return the completed Form SPA-1DB with the Price Proposal, no steel items will be eligible for price adjustments on this project.

Form SPA-1DB can be found on the Department's website below:

**<https://connect.ncdot.gov/letting/LetCentral/Form%20SPA-1.xlsm>**

### **Establishing the Base Price**

The Department will use a blend of monthly average prices as reported from the Fastmarkets platform to calculate the monthly adjustment indices (BI and MI). This data is typically available on the first day of the month for the preceding month. The Department will calculate the indices

for the different categories found on the Product Relationship Table below. For work item numbers that include multiple types of steel products, the category listed for that Trns\*port item number shall be used for adjusting each steel component.

### **CATEGORY STEEL ITEMS PRICE TO BE INCLUDED IN THE FINAL RFP**

The bidding index for Category 1 Steel items shall be \$ **[Dollars]** per hundredweight.  
 The bidding index for Category 2 Steel items shall be \$ **[Dollars]** per hundredweight.  
 The bidding index for Category 3 Steel items shall be \$ **[Dollars]** per hundredweight.  
 The bidding index for Category 4 Steel items shall be \$ **[Dollars]** per hundredweight.  
 The bidding index for Category 5 Steel items shall be \$ **[Dollars]** per hundredweight.  
 The bidding index for Category 6 Steel items shall be \$ **[Dollars]** per hundredweight.  
 The bidding index for Category 7 Steel items shall be \$ **[Dollars]** per hundredweight.

The bidding indices represent a selling price of steel based on Fastmarkets data for the month of **[Month]** \_\_\_\_ **[Year]** \_\_\_\_.

MI = Monthly Index - in Dollars (\$) per hundredweight (CWT). Use the adjustment indices from the month the steel was shipped from the producing mill, received on the project, or member cast as defined in the Product Relationship Table.

BI = Bidding Index - in Dollars (\$) per hundredweight (CWT). Use the adjustment indices as listed in the Final Request for Proposals, including all Addenda.

<b>Product Relationship Table</b>			
<b>Steel Product (Title)</b>	<b>BI, MI*</b>	<b>Adjustment Date for MI</b>	<b>Category</b>
Reinforcing Steel, Bridge Deck and SIP Forms	Based on one or more Fastmarkets indices	Delivery Date from Producing Mill	1
Structural Steel and Encasement Pipe	Based on one or more Fastmarkets indices	Delivery Date from Producing Mill	2
Steel H-Piles and Soldier Pile Walls	Based on one or more Fastmarkets indices	Delivery Date from Producing Mill	3
Guardrail Items and Pipe Piles	Based on one or more Fastmarkets indices	Material Received Date**	4
Fence Items	Based on one or more Fastmarkets indices	Material Received Date**	5
Overhead Sign Assembly, Signal Poles and High Mount Standards	Based on one or more Fastmarkets indices	Material Received Date**	6
Prestressed Concrete Members	Based on one or more Fastmarkets indices	Cast Date of Member	7
* BI and MI are in converted units of Dollars per Hundredweight (\$ / CWT)			
** Material Received Date shall be defined as the date the materials are received on the project site. If a material prepayment is made for a Category 4 - 6 item, the Adjustment Date to be used shall be the date of the prepayment request instead of the Materials Received Date.			



Submit documentation to the Engineer for all items listed in the contract for which the Design-Build Team is requesting a steel price adjustment.

### **Submittal Requirements**

Immediately upon arrival at the fabricator, the items in categories 1, 2 and 3, shall be specifically stored, labeled, or tagged, recognizable by color marking, and identifiable by Project for inspection and audit verification.

Furnish the following documentation for all steel products to be incorporated into the work and documented on Form SPA-2. Submit all documentation to the Engineer prior to incorporation of the steel into the completed work. The Department will withhold progress payments for the affected contract line item(s) if the documentation is not provided and, at the discretion of the Engineer, the work is allowed to proceed. Progress payments will be made upon receipt of the delinquent documentation.

Form SPA-2 can be found on the following website:

**[https://connect.ncdot.gov/projects/construction/Construction%20Forms/  
Form%20SPA-2.xlsx](https://connect.ncdot.gov/projects/construction/Construction%20Forms/Form%20SPA-2.xlsx)**

#### **Step 1 (Form SPA -2)**

Utilizing Form SPA-2, submit separate documentation packages for each work item from Form SPA-1DB for which the Design-Build Team opted for a steel price adjustment. For work items with multiple steel components, each component shall be listed separately. Label each SPA-2 documentation package with a unique number as described below:

- a. Documentation package number: (Insert the work item) - (Insert sequential package number beginning with "1")

Example: 412 - 1  
              412 - 2  
              424 - 1  
              424 - 2  
              424 - 3, etc.

- b. The steel product quantity in pounds

- i. The following sources shall be used, in declining order of precedence, to determine the weight of steel / iron, based on the Engineer's decision:

- 1. Approved Shop Drawings
    - 2. Verified Shipping Documents

3. Released for Construction (RFC) Plans
  4. Standard Drawing Sheets
  5. Industry Standards (e.g., AISC Manual of Steel Construction AWWA Standards, etc.)
  6. Manufacture's data
- ii. Any item requiring approved shop drawings shall have the weights of steel calculated and shown on the shop drawings or submitted and certified separately by the fabricator.
- c. The date the steel product, subject to price adjustment, was shipped from the producing mill (Categories 1 - 3), received on the project (Categories 4 - 6), or casting date (Category 7).

#### Step 2 (Monthly Calculator Spreadsheet)

For each month, upon the incorporation of the steel product into the work, provide the Engineer the following:

- 1) Completed NCDOT Steel Price Adjustment Calculator Spreadsheet, summarizing all the steel submittal packages (Form SPA-2) actually incorporated into the completed work in the given month.
  - a. Contract Number
  - b. Bidding Index Reference Month
  - c. Contract Completion Date or Revised Contract Completion Date
  - d. County, Route and Project TIP information
  - e. Work Item Number from Table of Quantities
  - f. Line-Item Description (corresponding Trns\*port pay item)
  - g. Submittal Number from Form SPA-2
  - h. Adjustment Date
  - i. Pounds of Steel
- 2) An affidavit signed by the Design-Build Team stating the documentation provided in the NCDOT Steel Price Adjustment Calculator Spreadsheet is true and accurate.

#### Price Adjustment Conditions

Download the Monthly Steel Adjustment Spreadsheet with the most current reference data from the Department's website each month. The Steel Price Adjustment Calculator Spreadsheet can be found on the following website:

**<https://connect.ncdot.gov/projects/construction/Pages/Construction-Resources.aspx>**

If the monthly Fastmarkets data is not available, the data for the most recent immediately preceding month shall be used as the basis for price adjustment.

### **Price Adjustment Calculations**

The price adjustment shall be determined by comparing the percentage of change in index value listed in the Final Request for Proposals, including all Addenda, (BI) to the monthly index value (MI) (Reference the examples below). Weights and date of shipment shall be documented as required herein. The final price adjustment dollar value will be determined by multiplying this percentage increase or decrease in the index by the represented quantity of steel incorporated into the work, and the established bidding index (BI) subject to the limitations herein.

#### **Price increase / decrease shall be computed as follows:**

$$\text{SPA} = ((\text{MI} / \text{BI}) - 1) * \text{BI} * (\text{Q} / 100)$$

Where:

SPA = Steel price adjustment in dollars

MI = Monthly Shipping Index - in Dollars (\$) per hundredweight (CWT). Use the adjustment indices from the month the steel was shipped from the producing mill, received on the project, or member cast as defined in the Product Relationship Table.

BI = Bidding Index - in Dollars (\$) per hundredweight (CWT). Use the adjustment indices as listed in the Final Request for Proposals, including all Addenda.

Q = Quantity of steel, product, pounds actually incorporated into the work as documented by the Design-Build Team and verified by the Engineer.

Calculations for price adjustment shall be shown separate from the monthly progress estimate and shall not be included in the total cost of work for determination of progress or for extension of contract time in accordance with Subarticle 108-10(B)(1) in Division One found elsewhere in this RFP.

Any apparent attempt to unbalance bids in favor of items subject to price adjustment, in the Department's sole discretion, may result in rejection of the Price Proposal.

Adjustments shall only be paid or charged to the Design-Build Team. Any Design-Build Team receiving a price adjustment under this provision shall distribute the proper proportional part of such adjustments to the subcontractor who performed the applicable work.

Delays to the work caused by steel shortages may be justification for a contract time extension, but will not constitute grounds for claims for standby equipment, extended office overhead, or other costs associated with such delays.

Price adjustments of eligible work items shall be adjusted up or down to a maximum of 50% from the Bid Index (BI) when compared to the Monthly Index (MI) of the steel product adjustment date.

If the decrease in the steel material exceeds 50% of the BI, the Design-Build Team may submit to the Department additional market index information specific to the work item in question to dispute the decrease. The Department will review this information and determine if the decrease is warranted.

When the steel product adjustment date, as defined in the Product Relationship Table, is after the approved contract completion date, the steel price adjustments shall be based on the lesser value of either the MI for the month of the approved contract completion date or the MI for the actual adjustment date.

If the price adjustment is based on estimated material quantities for that time, and a revision to the total material quantity is made in a subsequent or final estimate, an appropriate adjustment will shall be made to the price adjustment previously calculated. The adjustment shall be based on the same indices used to calculate the price adjustment which is being revised. If the adjustment date of the revised material quantity cannot be determined, the adjustment for the quantity in question, shall be based on the indices utilized to calculate the steel price adjustment for the last initial documentation package submission, for the steel product subject to price adjustment, that was incorporated into the particular work item, for which quantities are being finalized.

Example: Structural steel for a particular bridge was provided for in three different shipments with each having a different mill shipping date. The quantity of structural steel actually used for the bridge was calculated and a steel price adjustment was made in a progress payment. At the conclusion of the work an error was found in the plans of the final quantity of structural steel used for the bridge. The quantity to be adjusted cannot be directly related to any one of the three mill shipping dates. The steel price adjustment for the quantity in question shall be calculated using the indices that were utilized to calculate the steel price adjustment for the quantity of structural steel represented by the last initial structural steel documentation package submission. The package used shall be the one with the greatest sequential number.

### **Extra Work / Force Account**

When steel products, as specified herein, are added to the contract as extra work, in accordance with the provisions of Article 104-7 or 104-8, the Engineer will determine and specify in the supplemental agreement, the application of steel price adjustments on a case-by-case basis. A steel price adjustment shall not be made for any products manufactured from steel having an adjustment date prior to the supplemental agreement execution date. Price adjustments shall be made as provided herein, except the Bidding Index shall be based on the month in which the supplemental agreement pricing was executed.

For work performed on force account basis, reimbursement of actual material costs, along with the specified overhead and profit markup, shall be considered to include full compensation for the current cost of steel and steel price adjustments shall not be made.

**Example: Form SPA-2****Steel Price Adjustment Submission Form**Contract Number C203394 Bid Reference Month January 2019Submittal Date 8/31/2019Work Item from the Table of Quantities 237Work Item Description APPROX....LBS Structural SteelSequential Submittal  
Number 2


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Supplier	Description of material	Location information	Quantity in lbs.	Adjustment Date
XYZ mill	Structural Steel	Structure 3, Spans A - C	1,200,000	May 4, 2020
ABC distributing	Various channel and angle shapes	Structure 3 Spans A - C	35,000	July 14, 2020
		Total Pounds of Steel	1,235,000	

Note: Attach the following supporting documentation to this form:

- Bill of Lading to support the shipping date(s)
- Supporting information for weight documentation (e.g., Pay item reference, shop drawings, shipping documents, Standards Sheets, industry standards, or manufacturer's data)

By providing this data under my signature, I attest to the accuracy of and validity of the data on this form and certify that no deliberate misrepresentation in any manner has occurred.

Printed Name

Signature

\_\_\_\_\_

\_\_\_\_\_

**Example: Form SPA-2****Steel Price Adjustment Submission Form**Contract Number C203394 Bid Reference Month January 2019Submittal Date August 31, 2019Work Item from the Table of Quantities 158Work Item Description SUPPORT, OVRHD SIGN STR -DFEB- STA 36+00 -L-Sequential Submittal  
Number 2

Supplier	Description of material	Location information	Quantity in lbs.	Adjustment Date
XYZ mill	Tubular Steel (Vertical legs)	-DFEB- STA 36+00 -L-	12,000	December 11, 2021
PDQ Mill	4" Tubular steel (Horizontal legs)	-DFEB- STA 36+00 -L-	5,900	December 11, 2021
ABC distributing	Various channel and angle shapes (see quote)	-DFEB- STA 36+00 -L-	1,300	December 11, 2021
	Catwalk assembly	-DFEB- STA 36+00 -L-	2,000	December 11, 2021
Nucor	Flat plate	-DFEB- STA 36+00 -L-	650	December 11, 2021
		Total Pounds of Steel	21,850	

Note: Attach the following supporting documentation to this form.

- Bill of Lading to support the shipping date(s)
- Supporting information for weight documentation (e.g., Pay item reference, shop drawings, shipping documents, Standards Sheets, industry standards, or manufacturer's data)

By providing this data under my signature, I attest to the accuracy of and validity of the data on this form and certify that no deliberate misrepresentation in any manner has occurred.

Printed Name

Signature

**Example: Price Adjustment Calculation - Increase**

Price Proposal opened on September 17, 2019

Work Item 635 “Structural Steel” has a Released for Construction plan quantity of 2,717,000 pounds

Bidding Index for Structural Steel (Category 2) in the Final Request for Proposals, including all Addenda, was \$36.12 / CWT = BI

450,000 pounds of Structural Steel for Structure 2 at Station 44+08.60 -L- were shipped to fabricator from the producing mill in same month, May 2021.

Monthly Index for Structural Steel (Category 2) for May 2021 was \$64.89 / CWT = MI

The Steel Price Adjustment formula shall be as follows:

$$\text{SPA} = ((\text{MI} / \text{BI}) - 1) * \text{BI} * (\text{Q} / 100)$$

Where: SPA = Steel price adjustment in dollars

BI = Bidding Index - in dollars (\$) per hundredweight (CWT). Use the adjustment indices as listed in the Final Request for Proposals, including all Addenda.

MI = Mill Shipping Index - in dollars (\$) per hundredweight (CWT). Use the adjustment indices from the month the steel was shipped from the producing mill, received on the project, or member cast as defined in the Product Relationship Table.

Q = Quantity of steel product, in pounds (lbs.) actually incorporated into the work as documented by the Design-Build Team and verified by the Engineer.

$$\text{BI} = \$36.12 / \text{CWT}$$

$$\text{MI} = \$64.89 / \text{CWT}$$

$$\% \text{ change} = ((\text{MI} / \text{BI}) - 1) = (\$64.89 / \$36.12 - 1) = (1.79651 - 1) = 0.79651162791$$

$$\text{Q} = 450,000 \text{ pounds}$$

$$\text{SPA} = 0.79651162791 * \$36.12 \times (450,000 / 100)$$

$$\text{SPA} = 0.79651162791 * \$36.12 * 4,500$$

SPA = \$129,465 pay adjustment to the Design-Build Team for Structural Steel (Structure 2 at Station 44+08.60 -L-)

**Example: Price Adjustment Calculation - Decrease**

Price Proposal opened on December 18, 2018

Work Item 635 Structural Steel has a Released for Construction plan quantity of 2,717,000 pounds

Bidding Index for Structural Steel (Category 2) in the Final Request for Proposals, including all Addenda, was \$46.72 / CWT = BI

600,000 pounds of Structural Steel for Structure 1 at Station 22+57.68 -Y- were shipped to fabricator from the producing mill in same month, August 2020.

Monthly Index for Structural Steel (Category 2) for August 2020 was \$27.03 / CWT = MI

The Steel Price Adjustment formula shall be as follows:

$$\text{SPA} = ((\text{MI} / \text{BI}) - 1) * \text{BI} * (\text{Q} / 100)$$

Where: SPA = Steel price adjustment in dollars

BI = Bidding Index - in dollars (\$) per hundredweight (CWT). Use the adjustment indices as listed in the Final Request for Proposals, including all Addenda.

MI = Mill Shipping Index - in dollars (\$) per hundredweight (CWT). Use the adjustment indices from the month the steel was shipped from the producing mill, received on the project, or member cast as defined in the Product Relationship Table.

Q = Quantity of steel product, in pounds (lbs.) actually incorporated into the work as documented by the Design-Build Team and verified by the Engineer.

$$\text{BI} = \$46.72 / \text{CWT}$$

$$\text{MI} = \$27.03 / \text{CWT}$$

$$\% \text{ change} = ((\text{MI} / \text{BI}) - 1) = (\$27.03 / \$46.72 - 1) = (0.57855 - 1) = -0.421446917808$$

$$\text{Q} = 600,000 \text{ pounds}$$

$$\text{SPA} = -0.421446917808 * \$46.72 * (600,000 / 100)$$

$$\text{SPA} = -0.421446917808 * \$46.72 * 6,000$$

SPA = \$118,140.00 pay adjustment (credit) to the Department for Structural Steel (Structure 1 at Station 22+57.68 -Y-)



**Example - Price Adjustment Calculation - Increase**

Price Proposal opened on July 16, 2020

Work Item 614 Reinforced Concrete Deck Slab has a Released for Construction plan quantity of 24,1974 pounds.

Bidding Index Reference Month was May 2020. Bidding Index for Reinforced Concrete Deck Slab (Category 1) in the proposal was \$29.21 / CWT = BI

51,621 pounds of reinforcing steel and 52,311 pounds of epoxy coated reinforcing steel for Structure 2 at Station 107+45.55 -L- was shipped to fabricator from the producing mill in same month, May 2021.

Monthly Index for Reinforced Concrete Deck Slab (Category 1) for May 2021 was \$43.13 / CWT = MI

The Steel Price Adjustment formula shall be as follows:

$$\text{SPA} = ((\text{MI} / \text{BI}) - 1) * \text{BI} * (\text{Q} / 100)$$

BI = Bidding Index - in dollars (\$) per hundredweight (CWT). Use the adjustment indices as listed in the Final Request for Proposals, including all Addenda.

MI = Mill Shipping Index - in dollars (\$) per hundredweight (CWT). Use the adjustment indices from the month the steel was shipped from the producing mill, received on the project, or member cast as defined in the Product Relationship Table.

Q = Quantity of steel product, in pounds (lbs.) actually incorporated into the work as documented by the Design-Build Team and verified by the Engineer.

$$\text{BI} = \$29.21 / \text{CWT}$$

$$\text{MI} = \$43.13 / \text{CWT}$$

$$\% \text{ change} = ((\text{MI} / \text{BI}) - 1) = (\$43.13 / \$29.21 - 1) = (1.47655 - 1) = 0.47654912701$$

$$\text{Q} = 103,932 \text{ pounds}$$

$$\text{SPA} = 0.47654912701 * \$29.21 * (103,932 / 100)$$

$$\text{SPA} = 0.47654912701 * \$29.21 * 1,039.32$$

SPA = \$14,467.33 pay adjustment to the Design-Build Team for Reinforced Concrete Deck Slab (Category 1) at Station 107+45.55 -L-

**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.

After issuance of the First Industry Draft RFP, the Department will attempt to arrange a meeting between each individual proposer and the affected utility owners.

After issuance of the First Industry Draft RFP, the Department will attempt to arrange a meeting between each individual proposer and the Norfolk Southern and Blue Ridge Southern railways.

The Department will afford each proposer three additional meetings with the Department (maximum two-hour time limit per each meeting) to discuss project specifics and address the proposer's concerns and questions. These meetings may occur at any time after the first Question and Answer Session with the proposers and before two weeks prior to the Technical Proposal submittal date. The proposer shall request these meetings 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.

**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 the 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. 8-30-17)

DB1 G55A

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

1. The Proposer shall be prequalified with the Department prior to submitting a Price Proposal.
2. The Proposer shall deliver the Technical Proposal and the Price Proposal to the place indicated, and prior to the times indicated in this Request for Proposals.
3. The Price Proposal documents shall be signed by an authorized employee of the Proposer.
4. The Price Proposal shall be accompanied by Bid surety in the form of a Bid Bond or Bid Deposit, dated the day of the Price Proposal submission.
5. If Disadvantaged Business Enterprises (DBE) goals are established for this contract, the Proposer shall complete the form Listing of DBE Subcontractors contained elsewhere in this RFP in accordance with the *Disadvantaged Business Enterprises* Project Special Provision found elsewhere in this RFP.
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 2018 *Standard Specifications for Roads and Structures*, or Article 102-10 of the 2018 *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) (Rev. 1-27-22)

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 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 has 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 RFPs 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 issuance of the Final RFP, Confidential Questions may be submitted to the State Contract Officer via the Design-Build e-mail address (designbuild@ncdot.gov). After evaluation, the State Contract Officer will respond to the question in writing 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. Minor questions will not be acknowledged or answered.

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

### **Alternative Technical Concepts**

The Design-Build Team will be allowed to submit a maximum of twelve (12) Alternative Technical Concepts. The aforementioned maximum number of ATCs shall include both Preliminary and Formal ATCs. Excluding (1) Formal ATCs that are submitted in response to the Department's favorable review of a Preliminary ATC, (2) ATCs that are deemed to take advantage of an error or omission in the RFP, and (3) ATCs that contain multiple concepts, all ATCs submitted by the Design-Build Team shall count towards the maximum number of allowable ATCs, regardless of the Department's response. The Design-Build Team is cautioned that ATCs that receive responses that nullify the ATC shall count towards the maximum number of allowable ATCs. For example, at a minimum, the responses below shall count towards the maximum number of allowable ATCs:

- The ATC does not qualify as an ATC
- The RFP does not permit the concept proposed in the ATC to be submitted as an ATC, and the Department did not evaluate or consider the ATC
- 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 without further regard for confidentiality

- More than one ATC has been received on the same topic and the Department has elected to exercise its right to revise the RFP without further regard for confidentiality

Additionally, should the Design-Build Team resubmit an ATC that the Department did not approve, the original ATC, as well as all ATC resubmittals, shall count towards the maximum number of allowable ATCs, resulting in a minimum of two ATCs.

Once an ATC has been submitted to the Department, the Design-Build Team will **NOT** be allowed to rescind the ATC.

Should the Design-Build Team submit a single ATC with multiple concepts, the Department (1) will not evaluate the concepts proposed in the ATC, and (2) will return the ATC to the Proposer requiring a separate submittal for each individual concept. The single ATC with multiple concepts will not be considered received within the ATC submittal deadlines noted below.

Initial ATC submittals shall be submitted in accordance with the following deadlines:

- The Design-Build Team will be allowed to submit the maximum number of allowable ATCs prior to the Final RFP distribution.
- The Design-Build Team will be allowed to submit a maximum of seven (7) ATCs after the Final RFP distribution provided (1) the ATC submittal does not exceed the aforementioned maximum number of allowable ATCs, and (2) the ATC is received by the Department no later than seven weeks prior to the Technical Proposal submittal deadline.

The Design-Build Team may include an ATC in the Technical and Price Proposal only if the ATC was received by the Department in accordance with the requirements noted above and it has been approved by the Department (including conditionally approved ATCs, if all conditions are met).

The submittal deadlines above only apply to initial ATC submittals that contain one concept. Resubmittal of an ATC that (1) has been revised in response to the Department's requests for further information concerning a prior submittal, (2) is a Formal ATC for a Preliminary ATC that received a favorable response from the Department, or (3) requests approval of additional required variances to the RFP requirements that were omitted in the original ATC submittal shall be received by the Department no later than three weeks prior to the Technical Proposal submittal deadline.

The Design-Build Team shall be solely responsible for reviewing all versions of the RFP, including all Addenda, and determining variances required by a Formal ATC. The Design-Build Team is cautioned that the Department's approval in no way implies that the Design-Build Team has requested approval of all the required variances to the RFP requirements. Additionally, 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) no later than three weeks prior to the Technical Proposal submittal deadline unless the ATC deviates from revised requirements in an RFP Addendum that is distributed within three weeks prior to the Technical Proposal submittal deadline. If the ATC deviates from revised requirements in an RFP Addendum that is distributed within three weeks prior to the Technical Proposal submittal deadline, the Design-Build Team must submit a request for approval of all additional required variance(s) within five business days of the date of the Department's ATC response letter and / or the RFP Addendum distribution, as appropriate.

An ATC shall in no way take advantage of an error or omission in the RFP, or other documents incorporated into the contract by reference. If, at the sole discretion of the Department, an ATC is deemed to take advantage of an error or omission in the RFP, or other documents incorporated into the contract by reference, the RFP will be revised without regard for 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) the Department's comments resulting from review of the design details post-Award; (3) any obligation that may arise under applicable laws and regulations; and (4) any obligation mandated by the regulatory agencies as a permit condition.

### **ATC Submittals**

All ATCs shall be submitted in electronic .pdf format to the State Contract Officer, via the Design-Build e-mail address (designbuild@ncdot.gov). Excluding the ATC distribution letter, the ATC shall not include any reference to the submitter's identity.

### **Formal ATCs**

Each Formal ATC submittal shall include the following information:

- 1) **Description** - A detailed description and schematic drawings of the ATC configuration or other appropriate descriptive information (including, if appropriate, product details [e.g., specifications, construction tolerances, special provisions, etc.] 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 RFP requirements, 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 RFP requirements, or other documents incorporated into the contract by reference, should be allowed. **All intersection and interchange reconfigurations shall include corresponding electronic traffic analyses files and a signing concept.**
- 5) **Impacts** - Discussion of potential vehicular traffic impacts, environmental impacts, community impacts, 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
- 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 shall result in a disqualification of that ATC.

At any time, the Department may request additional information regarding a proposed ATC. 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 ten business days of receipt of all requested information.

In accordance with the *Individual Meetings with Proposers* Project Special Provision found elsewhere in this RFP, a Design-Build Team's ATC may be discussed during confidential one-on-one meeting(s). Under no circumstances will the Department be responsible or liable to the Design-Build Team or any other party as a result of disclosing any ATC materials, whether the disclosure is deemed required by law, by a court order, or occurs through inadvertence, mistake or negligence on the part of the Department or their respective officers, employees, contractors, or consultants.

In the event that the Department receives 1) ATCs from more than one Design-Build Team or 2) an ATC and a documented question outside of the ATC process that are deemed by the Department, in its sole discretion, to be similar in nature, the Department reserves the right to modify the RFP without further regard for confidentiality.

### **The Department Response to Formal ATCs**

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

- 1) The Formal ATC is approved.
- 2) The Formal ATC is not approved.
- 3) The Formal 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 Design-Build Proposal without an approved ATC (e.g., the concept complies with the baseline requirements of the RFP).
- 5) The Formal 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 Formal ATC will not be considered, and the RFP will be revised to correct the error or omission without further regard for confidentiality.
- 6) 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 without further regard for confidentiality.
- 7) More than one ATC has been received on the same topic and the Department has elected to exercise its right to revise the RFP without further regard for confidentiality. This response could also follow and supersede one of the other previously provided responses above.
- 8) The Formal ATC contains multiple concepts and has not been considered. Should the Design-Build Team wish to pursue one or more of the concepts presented in the Formal ATC, a submittal for each individual concept shall be required.

### **Formal ATC Inclusion in Technical Proposal**

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



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

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

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

### **Preliminary ATCs**

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

To the greatest extent possible, the Department will review Preliminary ATCs within ten business days of submittal and will respond to the Design-Build Team with one of the following determinations:

- 1) The Preliminary ATC would be considered as a Formal ATC if the Team so elects to pursue a Formal ATC submission.
- 2) The Preliminary ATC is denied.
- 3) An ATC is not required.
- 4) The Preliminary ATC takes advantage of an error or omission in the RFP or other documents incorporated into the contract by reference, in which case the Preliminary ATC will not be considered, and the RFP will be revised to correct the error or omission without further regard for confidentiality.
- 5) 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 without further regard for confidentiality.
- 6) More than one ATC has been received on the same topic and the Department has elected to exercise its right to revise the RFP without further regard for confidentiality. This

response could also follow and supersede one of the other previously supplied responses above.

- 7) The Preliminary ATC contains multiple concepts and has not been considered. Should the Design-Build Team wish to pursue one or more of the concepts presented in the Preliminary ATC, a submittal for each individual concept shall be required.

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 the Technical Proposal.

### **SCHEDULE OF ESTIMATED COMPLETION PROGRESS**

(7-15-08) (Rev. 6-20-23)

108-2

DB1 G58

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

<u>Fiscal Year</u>	<u>Progress (% of Dollar Value)</u>
2024 (07/01/23 - 06/30/24)	4% of Total Amount Bid
2025 (07/01/24 - 06/30/25)	5% of Total Amount Bid
2026 (07/01/25 - 06/30/26)	19% of Total Amount Bid
2027 (07/01/26 - 06/30/27)	23% of Total Amount Bid
2028 (07/01/27 - 06/30/28)	24% of Total Amount Bid
2029 (07/01/28 - 06/30/29)	13% of Total Amount Bid
2030 (07/01/29 - 06/30/30)	11% of Total Amount Bid
2031 (07/01/30 - 06/30/31)	1% of Total Amount Bid

In accordance with Article 108-2 of the 2018 *Standard Specifications for Roads and Structures*, the Design-Build Team shall also furnish its own progress schedule. Any acceleration of the progress as shown by the Design-Build Team's progress schedule over the progress as shown above shall be subject to the approval of the Engineer.

### **DISADVANTAGED BUSINESS ENTERPRISE**

(10-16-07) (Rev. 8-17-21)

102-15(J)

SP1 G61

DB1 G061

#### **Description**

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

**Definitions**

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

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

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

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

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

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

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

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

*Replacement / Substitution* - A full or partial reduction in the amount of work subcontracted to a committed (or an approved substitute) DBE firm.

*North Carolina Unified Certification Program (NCUCP)* - A program that provides comprehensive services and information to applicants for DBE certification, such that an applicant is required to apply only once for a DBE certification that will be honored by all recipients of USDOT funds in the state and not limited to the Department of Transportation only. The Certification Program is in accordance with 49 CFR Part 26.

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

**Forms and Websites Referenced in this Provision**

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

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

*DBE-IS Subcontractor Payment Information* - Form for reporting the payments made to all DBE firms working on the project.

**<https://connect.ncdot.gov/business/Turnpike/Documents/Form%20DBE-IS%20Subcontractor%20Payment%20Information.pdf>**

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

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

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

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

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

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

*Letter of Intent* - Form signed by the Contractor and the DBE subcontractor, manufacturer or regular dealer that affirms that a portion of said contract is going to be performed by the signed DBE for the estimated amount (based on quantities and unit prices) listed at the time the Price Proposal is submitted.

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

*Listing of DBE Subcontractors Form* - Form for entering DBE subcontractors on a project that will meet this DBE goal contained elsewhere in this RFP.

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

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

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

### **DBE Goal**

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

Disadvantaged Business Enterprises **5.0%**

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

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

### **Directory of Transportation Firms (Directory)**

Real-time information is available about firms doing business with the Department and firms that are certified through NCUCP in the Directory of Transportation Firms. Only firms identified in the Directory as DBE certified shall be used to meet the DBE goal. The Directory can be found at the following link.

**<https://www.ebs.nc.gov/VendorDirectory/default.html>**

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

### **Listing of DBE Subcontractors**

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

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

### **DBE Prime Contractor**

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

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

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

**Written Documentation - Letter of Intent**

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

The documentation shall be received in the office of the State Contractor Utilization Engineer or at DBE@ncdot.gov no later than 10:00 a.m. on 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 10:00 a.m. on the next official state business day.

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

**Submission of Good Faith Effort**

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

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

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

**Consideration of Good Faith Effort for Projects with DBE Goals More Than Zero**

Adequate good faith efforts mean that the Proposer took all necessary and reasonable steps to achieve the goal which, by their scope, intensity, and appropriateness, could reasonably be expected to obtain sufficient DBE participation. Adequate good faith efforts also mean that the

Proposer actively and aggressively sought DBE participation. Mere *pro forma* efforts are not considered good faith efforts.

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

- (A) Soliciting through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising, written notices, use of verifiable electronic means through the use of the NCDOT Directory of Transportation Firms) the interest of all certified DBEs who have the capability to perform the work of the contract. The Proposer must solicit this interest within at least ten days prior to the opening of the Price Proposals to allow the DBEs to respond to the solicitation. Solicitation shall provide the opportunity to DBEs within the Division and surrounding Divisions where the project is located. The Proposer must determine with certainty if the DBEs are interested by taking appropriate steps to follow up initial solicitations.
- (B) Selecting portions of the work to be performed by DBEs in order to increase the likelihood that the DBE goals will be achieved.
  - (1) Where appropriate, break out contract work items into economically feasible units to facilitate DBE participation, even when the Prime Contractor might otherwise prefer to perform these work items with its own forces.
  - (2) Negotiate with subcontractors to assume part of the responsibility to meet the contract DBE goal when the work to be sublet includes potential for DBE participation (2<sup>nd</sup> and 3<sup>rd</sup> tier subcontractors).
- (C) Providing interested DBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.
- (D)
  - (1) Negotiating in good faith with interested DBEs. It is the Proposer's responsibility to make a portion of the work available to DBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DBE subcontractors and suppliers, to facilitate DBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of DBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for DBEs to perform the work.
  - (2) A proposer using good business judgment would consider a number of factors in negotiating with subcontractors, including DBE subcontractors, and would take a firm's price and capabilities as well as contract goals into consideration. However, the fact that there may be some additional costs involved in finding and using DBEs is not in itself sufficient reason for a proposer's failure to meet the



contract DBE goal, as long as such costs are reasonable. Also, the ability or desire of a Prime Contractor to perform the work of a contract with its own organization does not relieve the Proposer of the responsibility to make good faith efforts. Proposing Design-Build Teams are not, however, required to accept higher quotes from DBEs if the price difference is excessive or unreasonable.

- (E) Not rejecting DBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. The Proposer's standing within its industry, membership in specific groups, organizations, or associates and political or social affiliations (for example, union vs. non-union employee status) are not legitimate causes for the rejection or non-solicitation of bids in the Proposer's efforts to meet the project goal.
- (F) Making efforts to assist interested DBEs in obtaining bonding, lines of credit, or insurance as required by the recipient or proposer.
- (G) Making efforts to assist interested DBEs in obtaining necessary equipment, supplies, materials, or related assistance or services.
- (H) Effectively using the services of available minority / women community organizations; minority / women contractors' groups; Federal, State, and local minority / women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of DBEs. Contact within seven days from the Price Proposals opening the Business Opportunity and Work Force Development Unit at BOWD@ncdot.gov to give notification of the Proposer's inability to get DBE quotes.
- (I) Any other evidence that the Proposer submits which shows that the Proposer has made reasonable good faith efforts to meet the DBE goal.

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

- (1) Whether the Proposer's documentation reflects a clear and realistic plan for achieving the DBE goal.
- (2) The Proposer's past performance in meeting the DBE goals.
- (3) The performance of other proposers in meeting the DBE goal. For example, when the Proposer with the apparent adjusted low price fails to meet the DBE goal, but others meet it, you may reasonably raise the question of whether, with additional reasonable efforts the Proposer with the apparent adjusted low price could have met the goal. If the Proposer with the apparent adjusted low price fails to meet the DBE goal, but meets or exceeds the average DBE participation obtained by other proposers, the Department may view this, in conjunction with other factors, as evidence of the Proposer with the apparent adjusted low price having made a good faith effort.

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

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

The State Prequalification 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 Prequalification Engineer or at DBE@ncdot.gov. The appeal shall be made within two business days of notification of the determination of non-good faith.

### **Counting DBE Participation Toward Meeting DBE Goal**

#### **(A) Participation**

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

#### **(B) Joint Checks**

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

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

A DBE may enter into subcontracts. Work that a DBE subcontracts to another DBE firm may be counted toward the contract goal requirement. Work that a DBE subcontracts to a non-DBE firm does not count toward the contract goal requirement. If a DBE contractor or subcontractor subcontracts a significantly greater portion of the work of the contract than would be expected on the basis of standard industry practices, it shall be presumed that the DBE is not performing a commercially useful function. The DBE may present evidence to rebut this presumption to the Department. The Department's decision on the rebuttal of this presumption is subject to review by the Federal Highway Administration but is not administratively appealable to USDOT.

#### **(D) Joint Venture**

When a DBE performs as a participant in a joint venture, the Design-Build Team may count toward its contract goal requirement a portion of the total value of participation

with the DBE in the joint venture, that portion of the total dollar value being a distinct clearly defined portion of work that the DBE performs with its forces.

(E) Suppliers

A Design-Build Team may count toward its DBE requirement 60.0 percent of its expenditures for materials and supplies required to complete the contract and obtained from a DBE regular dealer and 100.0 percent of such expenditures from a DBE manufacturer.

(F) Manufacturers and Regular Dealers

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

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

### **Commercially Useful Function**

(A) DBE Utilization

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

(B) DBE Utilization in Trucking

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

- (1) The DBE shall be responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract, and there shall not be a contrived arrangement for the purpose of meeting DBE goals.
- (2) The DBE shall itself own and operate at least one fully licensed, insured, and operational truck used on the contract.
- (3) The DBE receives credit for the total value of the transportation services it provides on the contract using trucks it owns, insures, and operates using drivers it employs.
- (4) The DBE may subcontract the work to another DBE firm, including an owner-operator who is certified as a DBE. The DBE who subcontracts work to another DBE receives credit for the total value of the transportation services the subcontracted DBE provides on the contract.
- (5) The DBE may also subcontract the work to a non-DBE firm, including from an owner-operator. The DBE who subcontracts the work to a non-DBE is entitled to credit for the total value of transportation services provided by the non-DBE subcontractor not to exceed the value of transportation services provided by DBE-owned trucks on the contract. Additional participation by non-DBE subcontractors receives credit only for the fee or commission it receives as a result of the subcontract arrangement. The value of services performed under subcontract agreements between the DBE and the Design-Build Team will not count towards the DBE contract requirement.
- (6) A DBE may lease truck(s) from an established equipment leasing business open to the general public. The lease must indicate that the DBE has exclusive use of and control over the truck. This requirement does not preclude the leased truck from working for others during the term of the lease with the consent of the DBE, so long as the lease gives the DBE absolute priority for use of the leased truck. This type of lease may count toward the DBE's credit as long as the driver is under the DBE's payroll.
- (7) Subcontracted / leased trucks shall clearly display on the dashboard the name of the DBE that they are subcontracted / leased to and their own company name if it is not identified on the truck itself. Magnetic door signs are not permitted.

**DBE Replacement**

When a Design-Build Team has relied on a commitment to a DBE subcontractor (or an approved substitute DBE subcontractor) to meet all or part of a contract goal requirement, the Design-Build Team shall not terminate the DBE for convenience. This includes, but is not limited to, instances in which the Design-Build Team seeks to perform the work of the terminated subcontractor with another DBE subcontractor, a non-DBE subcontractor, or with the Contractor's own forces or those of an affiliate.

The Design-Build Team must give notice in writing both by certified mail and e-mail to the DBE subcontractor, with a copy to the Engineer of its intent to request to terminate and / or substitute, and the reason for the request. The Design-Build Team must give the DBE subcontractor five (5) business days to respond to the Design-Build Team's notice of intent to request termination and / or substitution. If the DBE subcontractor objects to the intended termination / substitution, the DBE, within five (5) business days, must advise the Design-Build Team and the Department of the reasons why the action should not be approved. The five-day notice period shall begin on the next business day after written notice is provided to the DBE subcontractor.

A committed DBE subcontractor may only be terminated after receiving the Department's written approval based upon a finding of good cause for the proposed termination and / or substitution. For purposes of this section, good cause shall include the following circumstances:

- (a) The listed DBE subcontractor fails or refuses to execute a written contract.
- (b) The listed DBE subcontractor fails or refuses to perform the work of its subcontract in a way consistent with normal industry standards. Provided, however, that good cause does not exist if the failure or refusal of the DBE subcontractor to perform its work on the subcontract results from the bad faith or discriminatory action of the Prime Contractor.
- (c) The listed DBE subcontractor fails or refuses to meet the Prime Contractor's reasonable, nondiscriminatory bond requirements.
- (d) The listed DBE subcontractor becomes bankrupt, insolvent, or exhibits credit unworthiness.
- (e) The listed DBE subcontractor is ineligible to work on public works projects because of suspension and debarment proceedings pursuant to 2 CFR Parts 180, 215 and 1,200 or applicable state law.
- (f) The listed DBE subcontractor is not a responsible contractor.
- (g) The listed DBE voluntarily withdraws from the project and provides written notice of withdrawal.
- (h) The listed DBE is ineligible to receive DBE credit for the type of work required.

- (i) A DBE owner dies or becomes disabled with the result that the listed DBE contractor is unable to complete its work on the contract.
- (j) Other documented good cause that compels the termination of the DBE subcontractor. Provided, that good cause does not exist if the Prime Contractor seeks to terminate a DBE it relied upon to obtain the contract so that the Prime Contractor can self-perform the work for which the DBE contractor was engaged or so that the Prime Contractor can substitute another DBE or non-DBE contractor after contract award.

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

(A) Performance Related Replacement

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

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

- (1) Copies of written notification to DBEs that their interest is solicited in contracting the work defaulted by the previous DBE or in subcontracting other items of work in the contract.
- (2) Efforts to negotiate with DBEs for specific subbids including, at a minimum:
  - (a) The names, addresses, and telephone numbers of DBEs who were contacted.
  - (b) A description of the information provided to DBEs regarding the plans and specifications for portions of the work to be performed.
- (3) A list of reasons why DBE quotes were not accepted.
- (4) Efforts made to assist the DBEs contacted, if needed, in obtaining bonding or insurance required by the Design-Build Team.

(B) Decertification Replacement

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

- (2) When a committed DBE is decertified prior to the Department receiving the SAF (*Subcontract Approval Form*) for the named DBE firm, the Design-Build Team shall take all necessary and reasonable steps to replace the DBE subcontractor with another DBE subcontractor to perform at least the same amount of work to meet the DBE goal requirement. If a DBE firm is not found to do the same amount of work, a good faith effort must be submitted to NCDOT (See A herein for required documentation).
- (3) Exception: If the DBE's ineligibility is caused solely by its having exceeded the size standard during the performance of the contract, the Department will not require the Design-Build Team to solicit replacement DBE participation equal to the remaining work to be performed by the decertified firm. The participation equal to the remaining work performed by the decertified firm will count toward the contract goal requirement and Department's overall race-neutral goals.

All requests for replacement of a committed DBE firm shall be submitted to the Engineer for approval on Form RF-1 (DBE Replacement Request). If the Prime Contractor or any affiliated companies within the Design-Build Team fails to follow this procedure they may be disqualified from further bidding for a period of up to six months.

### **Changes in the Work**

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

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

When the Engineer makes changes that result in an alteration of plans or details of construction, and a portion or all of the work had been expected to be performed by a committed DBE, the Design-Build Team shall seek participation by DBEs unless otherwise approved by the Engineer.

When the Design-Build Team requests changes in the work that result in the reduction or elimination of work that the Design-Build Team committed to be performed by a DBE, the Design-Build Team shall seek additional participation by DBEs equal to the reduced DBE participation caused by the changes.

### **Reports and Documentation**

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

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

Within 30 calendar days of entering into an agreement with a DBE for materials, supplies or services, not otherwise documented by the SAF as specified above, the Design-Build Team shall furnish the Engineer a copy of the agreement. The documentation shall also indicate the percentage (60.0% or 100.0%) of expenditures claimed for DBE credit.

### **Reporting Disadvantaged Business Enterprise Participation**

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

- (A) Withholding of money due in the next partial pay estimate; or
- (B) Removal of an approved Prime Contractor or other affiliated companies within the Design-Build Team from the prequalified bidders' list or the removal of other entities from the approved subcontractors list.

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

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

Failure on the part of any subcontractor to submit the required information in the time frame specified may result in the disqualification of that Prime Contractor or any affiliate companies within the Design-Build Team from being approved for work on future NCDOT projects until the required information is submitted.

Design-Build Teams reporting transportation services provided by non-DBE lessees shall evaluate the value of services provided during the month of the reporting period only.

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

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



**Failure to Meet Contract Requirements**

Failure to meet contract requirements in accordance with Subarticle 102-15(J) of the 2018 *Standard Specifications for Roads and Structures* may be cause to disqualify the Prime Contractor or any affiliated companies within the Design-Build Team from further bidding for a specified length of time.

**SPECIAL NOTICE TO BIDDERS**

(3-8-23)

DB1 G71

Project I-2513 involves the construction of new overhead structures over NSR and BLU tracks. The North Carolina Department of Transportation (NCDOT) will be administering the project and the work will be constructed in accordance with the 2018 NCDOT *Standard Specifications for Roads and Structures*; NCDOT *Construction Manual*; Norfolk Southern Railway (NSR) *Public Projects Manual*, latest edition; *Manual on Uniform Traffic Control Devices*; latest edition, *AREMA Manual for Railway Engineering*, latest edition; Norfolk Southern Railway - *Standard Specifications for Materials and Construction*, latest edition; *Federal Aid Policy Guide 23 CFR 140I*; *Federal Aid Policy Guide 23 CFR 646*; and *North Carolina Administrative Code* Section T19A: 02B, 0150 through 0158.

The construction will be taking place in existing Railroad right of way owned by NSR with a separate location of right of way owned by BLU. BLU also operates and has trackage rights over a segment of track owned by NS. Safety in the right of way will be top priority and NSR's and BLU's safety and security policies shall be followed for all employees working within the right of way.

All work adjacent to live tracks shall be coordinated with NSR's Roadway Worker In Charge, as defined in the NSR Public Projects Manual as well as for BLU. As a result of safety requirements for passing trains, there will be intermittent delays requiring all labor and equipment within 25 feet of the operating tracks to stopwork until authorized to proceed by the operating Railroad. This will result in intermittent delays to the Design-Build Team's operations. The Design-Build Team needs to account for this in preparing their bid. The Design-Build Team shall have no claims whatsoever against NCDOT, NSR, or BLU for any additional cost incurred for delays caused by train operations or any changes to the information above.

**PROTECTION OF RAILROAD INTEREST - NSR AND BLU**

(3-8-23)

DB1 G73

**KEY STAKEHOLDERS AND ROLES FOR THE JOB**

The following defines the roles of key stakeholders and persons with authority on the project:

<b>TERMS</b>	<b>DEFINITIONS</b>
Operating Railroad, Railroad, Railway, Railway Company	Norfolk Southern Railway (NSR)
Owner's Engineer / Representative	NSR Engineers or their authorized representative for the project.
Operating Railroad, Railroad, Railway, Railway Company	Blue Ridge Southern Railroad (BLU)
Owner's Engineer Representative	BLU Engineers or their authorized representatives.
RWIC / Flagman	Roadway Worker In Charge. This is NSR's or BLU's onsite representative responsible for obtaining track time for work activities adjacent to the tracks and safety within the Railroad right of way / easement. The Roadway Worker In Charge may be in charge of multiple Railroad flagmen assigned to a project if more than one is required or may be the flagman for the project.
Standard Specifications, Specifications	NCDOT Standard Specifications for Road and Structures, January 2018.
NCDOT Rail, Rail Division	The North Carolina Department of Transportation, Rail Division. They are a branch of the Department of Transportation responsible for schedule review, reviewing change orders; assisting in answering requests for information (RFI), and working with the owners, operating rail and the Department, and the FRA for compliance and project closeout.
NSR Public Projects Manual	Norfolk Southern Railway Public Projects Manual, Latest Edition.

**AUTHORITY OF RAILROAD ENGINEER AND DEPARTMENT ENGINEER**

The authorized representative of the Operating Railroad Company, hereinafter referred to as Railroad Engineer, shall have final authority in all matters affecting the safe maintenance of Railroad traffic of the Operating Railroad Company including the adequacy of the foundations and structures supporting the Railroad tracks.

**TRACK CLEARANCES**

(A) Before undertaking any work within Railroad right of way / easement, or before placing any obstruction over any track, the Design-Build Team shall:

- (1) Notify the RWIC / Track Supervisor at least 72 hours in advance of the work.
- (2) Receive assurance from the Railroad Engineer that arrangements have been made for flagging service as may be necessary.
- (3) Receive permission from the RWIC / Track Supervisor to proceed with the work.

- (4) Ascertain that the Engineer has received copies of notice to the Railroad and of the Railroad's response thereto.
- (B) The minimum track clearances to be maintained by the Design-Build Team during construction are as follows:
  - (1) Horizontal clearance measured from centerline of track to falsework:  
13'-0" on tangent track  
14'-0" on curved track
  - (2) Vertical clearance from top of rail to falsework: 22'-0"

**CERTIFICATION FOR FEDERAL-AID CONTRACTS**

(3-21-90)

DB1 G85

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

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

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

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

**CONTRACTOR'S LICENSE REQUIREMENTS**

(7-1-95)

DB1 G88

If the Design-Build Team does not hold the proper license to perform any plumbing, heating, air conditioning, or electrical work in this contract, he shall 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).

#### **USE OF UNMANNED AIRCRAFT SYSTEM (UAS)**

(7-1-19)

DB1 G092

The Design-Build Team shall adhere to all Federal, State and Local regulations and guidelines for the use of Unmanned Aircraft Systems (UAS). This includes, but is not limited to, US 14 CFR Part 107 *Small UAS Rule*, NC GS 15A-300.2 *Regulation of launch and recovery sites*, NC GS 63-95 *Training required for the operation of unmanned aircraft systems*, NC GS 63-96 *Permit required for commercial operation of unmanned aircraft system*, and NCDOT UAS Policy. The required operator certifications include possessing a current Federal Aviation Administration (FAA) Remote Pilot Certificate, a NC UAS Operator Permit, as well as operating a UAS registered with the FAA.

Prior to beginning operations, the Design-Build Team shall complete the NCDOT UAS - Flight Operation Approval Form and submit it to the Engineer for approval. All UAS operations shall be approved by the Engineer, in writing, prior to beginning the operations.

All Design-Build team members operating UAS shall have UAS specific general liability insurance to cover all operations under this contract.

The use of UAS shall be at the Design-Build Team's discretion. Except as allowed otherwise below, no measurement or payment will be made for the use of UAS. In the event that the Department directs the Design-Build Team to utilize UAS, all costs associated with using UAS will be paid for as extra work, in accordance with Subarticle 104-8(A) of the *Standard Specifications for Roads and Structures*.

#### **U.S. DEPARTMENT OF TRANSPORTATION HOTLINE**

(8-18-22)

108-5

DB1 G100

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

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

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

**SUBSURFACE INFORMATION**

(10-2-20)

DB1 G112C

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.

**COOPERATION BETWEEN CONTRACTORS**

(9-1-11) (Rev. 9-7-17)

DB1 G133

The Design-Build Team's attention is directed to Article 105-7 of the 2018 *Standard Specifications for Roads and Structures*.

- Project I-2513AC is located south and adjacent to the Project I-2513B. Project I-2513AC has an anticipated February 2024 Let date
- Project EB-5822 is located adjacent and along I-2513B & I-2513D. Project EB-5822 has an anticipated non-DOT January 2025 Let date
- Project A-0010AA is located north and adjacent to the Project I-2513B & I-2513D. Project A-0010AA has an anticipated January 2040 Let date
- Project HL-0003 is located east, west and along the Project I-2513B & I-2513D on US 19-23 Bus (Haywood Road). Project HL-0003 has an anticipated November 2023 Let date

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

**BID DOCUMENTATION**

(7-31-12) (Rev. 8-3-15)

DB1 G142

**General**

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

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

**Terms**

*Bid Documentation* - Bid Documentation shall mean all written information, working papers, computer printouts, electronic media, charts, and all other data compilations which contain or reflect information, data, and calculations used by the Proposer in the preparation of the Price Proposal. The term *bid documentation* includes, but is not limited to, Design-Build Team equipment rates, Design-Build Team overhead rates, labor rates, efficiency or productivity factors, arithmetical calculations, and quotations from subcontractors and material suppliers to

the extent that such rates and quotations were used by the Proposer in formulating and determining the Price Proposal. The term *bid documentation* also includes any manuals, which are standard to the industry used by the Proposer in determining the Price Proposal. Such manuals may be included in the bid documentation by reference. Such reference shall include the name and date of the publication and the publisher. *Bid Documentation* does not include bid documents provided by the Department for use by the Proposer in bidding on this project. The Bid Documentation can be in the form of electronic submittal (e.g., thumb drive) or paper. If the Bidder elects to submit the Bid Documentation in electronic format, the Department requires a backup submittal (e.g., a second thumb drive) in case one is corrupted.

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

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

### **Escrow Agreement Information**

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

### **Failure to Provide Bid Documentation**

The Proposer's failure to provide the original, unaltered bid documentation or a certified copy of the original, unaltered bid documentation within ten 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 ten days after the notice of award is received.
- (C) Packaging - The container shall be no larger than 15.5 inches in length by 12 inches wide by 11 inches high and shall be water resistant. The container shall be clearly marked on the face and the back of the container with the following information: Bid

Documentation, Bidder's Name, Bidder's Address, Date of Escrow Submittal, Contract Number, TIP Number if applicable, and County.

**Affidavit**

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

**Verification**

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

**Confidentiality of Bid Documentation**

The bid documentation and affidavit in escrow are, and will remain, the property of the Proposer. The Department has no interest in, or right to, the bid documentation and affidavit other than to verify the contents and legibility of the bid documentation unless the Design-Build Team gives written notice of intent to file a claim, files a written claim, files a written and verified claim, or initiates litigation against the Department. In the event of such written notice of intent to file a claim, filing of a written claim, filing a written and verified claim, or initiation of litigation against the Department, or receipt of a letter from the Design-Build Team authorizing release, the bid documentation and affidavit may become the property of the Department for use in considering any claim or in litigation as the Department may deem appropriate.

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

**Duration and Use**

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

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

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

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

**Release of Bid Documentation to the Contractor**

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

The Prime Contractor will be notified by certified letter from the Escrow Agent that the bid documentation will be released to the Prime Contractor. The Prime Contractor or his representative shall retrieve the bid documentation from the Escrow Agent within 30 days of the receipt of the certified letter. If the Prime Contractor does not receive the documents within 30 days of the receipt of the certified letter, the Department will contact the Prime Contractor to determine final disposition 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 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 terms of the manufacturer's guarantee. NCDOT shall 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 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 (e.g., mowing grass, debris removal, ruts in earth shoulders, etc.) 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 shall be removed for a minimum of six months and will be reinstated only after all work has been corrected and the Design-Build Team requests reinstatement in writing.

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

#### **PERMANENT VEGETATION ESTABLISHMENT**

(6-11-15) (Rev. 8-30-17)

104

DB01 G160

Establish permanent vegetation stands of the Long Term Stabilization mixtures identified in the Erosion and Sedimentation Control Scope of Work found elsewhere in this RFP. During the period between initial vegetation planting and final project acceptance, perform all work necessary to establish 80% coverage of permanent vegetation within the project limits, as well as, in borrow and waste pits. This work shall include erosion control device maintenance and installation, repair seeding and mulching, supplemental seeding and mulching, mowing, and fertilizer topdressing, as directed. All work shall be performed in accordance with the Erosion and Sedimentation Control Scope of Work found elsewhere in this RFP and the applicable sections of the 2018 *Standard Specifications for Roads and Structures*.

Once the Engineer has determined that 80% coverage of permanent vegetation has been established, the Design-Build Team will be notified to remove the remaining erosion control devices that are no longer needed. The Design-Build Team shall be responsible for, and shall

correct, any areas disturbed by operations performed in permanent vegetation establishment and the removal of temporary erosion control measures, whether occurring prior to or after placing traffic on the project.

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

(1-16-07) (Rev. 10-26-20)

105-16, 225-2, 16

DB1 G180

#### **General**

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

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

- (A) *Certified Supervisor* - Provide a certified Erosion and Sediment Control / Stormwater (E & SC / SW) Supervisor to manage the Design-Build Team and subcontractor(s) operations, ensure compliance with Federal, State and Local ordinances and regulations, and 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 shall be 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. The Certified Supervisor shall 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 shall be, but are not limited to:
- (a) Control project site waste to prevent contamination of surface or ground waters of the state, e.g. 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 seven calendar days, and within 24 hours after a rainfall event equal to or greater than 1.0 inch that occurs within a 24-hour period. At the discretion of Division of Water Resources personnel, additional monitoring may be required if the receiving stream is 303(d) listed for turbidity and the project has had documented problems managing turbidity.
  - (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 NC Department of Environmental 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 Installer 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 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 ten calendar days after receiving notice of the proposed adverse action.

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

Failure to appeal within ten calendar days shall result in the proposed adverse action becoming effective on the date specified on the certified notice. Failure to appeal within the time specified shall 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 seven days of hearing the appeal. The decision of the Chief Engineer shall 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 Designers will be incidental to the project for which no direct compensation will be made.

### **TACK FOR MULCH FOR EROSION CONTROL**

(7-19-22) SP

### **Description**

This work consists of supplying and installing an approved material for binding mulch for erosion control in accordance with Section 1060-5, Section 1615 and Section 1660 of the 2018 *Standard Specifications for Roads and Structures*. This special provision defines acceptable materials and rates for tacking material for holding mulch in place.

### **Materials**

#### **(a) Emulsified Asphalt**

Asphalt emulsion tack shall conform to the requirements of AASHTO M 140, Specification for Emulsified Asphalt. The emulsified asphalt may be rapid setting, medium setting, or slow setting. Apply emulsified asphalt tackifier at a rate of 0.10 gallons per square yard (approximately 484 gallons per acre).

(b) Cellulose Hydromulch

Cellulose hydromulch products shall be non-toxic, weed-free, prepackaged cellulose fiber (pulp) material containing no more than 3% ash or other inert materials. Cellulose hydromulches may contain dyes or binders specifically formulated to enhance the adhesive qualities of the hydromulch. Apply cellulose hydromulches at a rate of 1000 pounds (dry weight) per acre.

Wood fiber or wood fiber blend hydromulches may be substituted for cellulose hydromulch at the same application rate.

(c) Other tackifiers

Other approved materials, specifically designed and manufactured for application as a straw mulch tacking agent, may be used at the manufacturer's recommended rate.

**Construction Methods**

Apply the Tack for Mulch for Erosion Control uniformly across straw mulch per Section 1615 and Section 1660 of the 2018 *Standard Specifications for Roads and Structures*.

**PROCEDURE FOR MONITORING BORROW PIT DISCHARGE**

(1-22-13) (Rev. 9-7-17)

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 2018 *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 shall 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:

**[https://connect.ncdot.gov/resources/roadside/FieldOperationsDocuments/  
TurbidityReductionOptionSheet.pdf](https://connect.ncdot.gov/resources/roadside/FieldOperationsDocuments/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)(Rev. 8-18-15)

DB2 R01

With the exception of areas with Permanent Utility Easements, perform clearing on this project to the limits established by Method "II" shown on Roadway Standard Drawing No. 200.02. Conventional clearing methods shall be used except where permit drawings or conditions have been included elsewhere in this RFP which require certain areas to be cleared by hand methods. In areas with Permanent Utility Easements, clearing shall extend to the right of way limits.

### **BURNING RESTRICTIONS**

(7-1-95)

DB2 R05

Open burning shall not be permitted on any portion of the right of way limits established for this project. The Design-Build Team shall not burn the clearing, grubbing or demolition debris designated for disposal and generated from the project at locations within the project limits, off the project limits or at any waste or borrow sites in Buncombe 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) (Rev. 9-7-17)

DB2 R12A

Unless otherwise as agreed upon by the Department, seal all wells and remove or demolish all buildings and appurtenances, in their entirety, that are located either partially or completely within the project's right of way limits or are located outside the project's right of way limits but within property purchased as an uneconomical remnant in accordance with Sections 205, 210 and 215 of the 2018 *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.

### **MANUFACTURED QUARRY FINES IN EMBANKMENTS**

(11-30-16) (Rev. 9-7-17)

235

DB02 R72

#### **Description**

This specification addresses the use of manufactured quarry fines that are not classified as select materials. The specification allows the Design-Build Team an option, with the approval of the Engineer, to use manufactured quarry fines (MQFs) in embankments as a substitute for conventional borrow material. Furnish and place geotextile for pavement stabilization in accordance with the *Geotextile for Pavement Stabilization* Project Special Provision found elsewhere in this RFP and the detail developed by the Design-Build Team. Geotextile for pavement stabilization shall be required to prevent pavement cracking and provide separation

between the subgrade and pavement section at embankment locations where manufactured quarry fines are utilized and as directed by the Engineer.

### **Manufactured Quarry Fines (MQF)**

Site specific approval of MQFs material shall be required prior to beginning construction as detailed in the preconstruction requirements of this provision.

The following MQFs are unacceptable:

- (A) Frozen material
- (B) Material with a maximum dry unit weight of less than 90 pounds per cubic foot when tested in accordance with AASHTO T-99 Method A or C
- (C) Material with greater than 80% by weight Passing the #200 sieve

Collect and transport MQFs in a manner that will prevent nuisances and hazards to public health and safety. Moisture condition the MQFs as needed and transport in covered trucks to prevent dusting. If MQFs are blended with natural earth material, follow Borrow Criteria in Section 1018 of the 2018 NCDOT *Standard Specifications for Roads and Structures*.

### **Geotextiles**

In embankment areas where MQFs are incorporated, Geotextile for Pavement Stabilization shall be used. The Geotextile for Pavement Stabilization shall adhere to all requirements of the *Geotextile for Pavement Stabilization* Project Special Provision found elsewhere in this RFP except the notification of subgrade elevation, sampling and waiting period required in the Construction Methods section.

### **Preconstruction Requirements**

When MQFs are to be used as a substitute for earth borrow material, request written approval from the Engineer at least ninety (90) days in advance of the intent to use MQFs and include the following details:

- (A) Description, purpose and location of project
- (B) Estimated start and completion dates of project
- (C) Estimated volume of MQFs to be used on project with specific locations and construction details of the placement
- (D) The names, addresses and contact information for the generator of the MQFs
- (E) Physical location of the site at which the MQFs were generated

The Engineer will forward this information to the State Materials Engineer for review and material approval prior to incorporation.

## **Construction Methods**

Place MQFs in the core of the embankment section with at least four feet of earth cover to the outside limits of the embankments or subgrade.

Construct embankments by placing MQFs in level uniform lifts with no more than a lift of ten inches and compacted to at least a density of 95 percent as determined by test methods in AASHTO T-99, Determination of Maximum Dry Density and Optimum Moisture Content, Method A or C depending upon particle size of the product. Provide a moisture content at the time of compaction of within 4.0 percent of optimum but not greater than one percent above optimum as determined by AASHTO T-99, Method A or C.

## **REINFORCED CONCRETE PIPE DESIGN**

(9-1-11) (Rev. 9-8-17)

DB3 R006

### **DESCRIPTION**

This work consists of the design and manufacture of reinforced concrete pipes which require fills greater than 40 feet and less than or equal to 80 feet.

### **Materials**

#### **(A) Design**

When the design of a reinforced concrete pipe is required on the plans developed by the Design-Build Team, design the reinforced concrete pipe in accordance with the current edition of the AASHTO LRFD Bridge Design Specifications. Provide the diameter of pipe as indicated on the plans developed by the Design-Build Team and manufacture the pipe in accordance with ASTM C 1417. Provide a reinforced concrete pipe that meets the requirements of Section 1032-6, Section 1077 and any other applicable parts of the 2018 *Standard Specifications for Roads and Structures*.

The design of the reinforced concrete pipe shall be the Design-Build Team's responsibility and shall be subject to review, comments and approval. Submit two sets of detailed plans for review and acceptance. Include all details in the plans, including the size and spacing of the required reinforcement necessary to fabricate the reinforced concrete pipe. Include checked design calculations for the reinforced concrete pipe. Have a North Carolina Registered Professional Engineer seal the plans and design calculations. After the plans are reviewed and, if necessary, all corrections made, submit one set of reproducible tracings on 22" x 34" sheets to become part of the plans developed by the Design-Build Team.

#### **(B) Reinforced Concrete Pipe Sections**

##### **(1) Class**

Reinforced concrete pipe sections manufactured in accordance with this Project Special Provision shall be designated by inside pipe diameter and design earth cover.

**(2) Design Criteria**

**The design of the reinforced concrete pipe shall be in accordance with Article 12.10.4.2 “Direct Design Method” of the current edition of the AASHTO LRFD Bridge Design Specifications. The following assumptions shall be used in the design calculations:**

<b>NCDOT Criteria for Direct Design Method</b>
Process and Material Factors
Radial Tension, $F_{rp}=1.0$
Shear Strength, $F_{vp}=1.0$
Design Concrete Strength - $f'_c$ 5,000 psi < $f'_c$ < 7,000 psi
Heger Pressure Distribution - Type 2 Installation
Vertical Arching Factor = 1.40
Horizontal Arching Factor = 0.40
Soil Unit Weight = 120 lb / ft <sup>3</sup>
Depth of Fluid = Inside Pipe Diameter
Minimum Concrete Cover = 1.00”
Crack Control = 0.90 (maximum)

**(C) Joints**

Produce the reinforced concrete pipe sections with spigot and bell ends. Design and form the ends of the pipe section so, when the sections are laid together, they make a continuous line of pipe with a smooth interior free of appreciable irregularities in the flow line, and compatible with the permissible variations given in the 2018 *Standard Specifications for Roads and Structures* and ASTM C 1417.

**(D) Manufacture**

In addition to the requirements of the 2018 *Standard Specifications for Roads and Structures* and ASTM C 1417, devices or holes are permitted in each pipe section for the purpose of handling and placement. Submit details of handling devices or holes for approval and do not cast any concrete until approval is granted. Remove all handling devices flush with concrete surfaces as directed. Fill holes in a neat and workmanlike manner with an approved non-metallic non-shrink grout, concrete or plug.

**DRAINAGE PIPE**

(9-1-11)

DB3 R36

**Description**

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

- All pipe types shall be subject to the maximum and minimum fill height requirements as found on Roadway Standard Drawing No. 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 Project 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.

**BRIDGE APPROACH FILLS - GEOTEXTILE**

(4-26-22)

DB4 R03

Place a single layer of Type 5 Geotextile one foot below the approach slab for the full width and length of the approach fill. Type 5 Geotextile shall meet the requirements of Section 1056 of the 2018 *Standard Specifications for Roads and Structures*. This revision applies to the 2018 Roadway Standard Drawing Nos. 422.01, 422.02, 422.03 and Detail in Lieu of Standard Drawing No. 422DO10.

**GEOTEXTILE FOR SUBGRADE STABILIZATION**

(5-7-14) (Rev. 3-21-23)

DB5 R9A

**Description**

Supply and install geotextile for subgrade stabilization in accordance with the Geotechnical Engineering Scope of Work found elsewhere in this RFP.

## Materials

Refer to Division 10 of the 2018 *Standard Specifications for Roads and Structures*.

Item	Section
Geotextile for Subgrade Stabilization, Type 5	1056

## Construction Methods

The Design-Build Team shall clearly show the proposed locations of geotextile for subgrade stabilization on the roadway typical sections within the Roadway Plans developed by the Design-Build Team.

The geotextile for subgrade stabilization minimum roll width shall be 13 feet. Install full width sections of geotextile for subgrade stabilization. Ripping / cutting geotextiles into smaller widths will not be allowed. Do not leave geotextiles exposed for more than seven days before covering geotextiles with ABC or soil.

Do not place asphalt directly on the geotextile. In areas without aggregate subgrade, place geotextile for subgrade stabilization immediately below ABC or 12"-18" below the bottom of asphalt base course (or asphalt separation layer for concrete pavements), as applicable. The geotextile shall extend one foot outside the limits of the pavement structure.

Install geotextile for subgrade stabilization either perpendicular or parallel to the roadway centerline as shown in the plans developed by the Design-Build Team. If installed parallel to the roadway centerline install the minimum roll width under roadway edges and shoulders adjacent to fill slopes. All geotextile joints shall overlap a minimum of 18 inches. Layer geotextile joints in the direction that ABC or soil will be placed to prevent lifting the edge of the top geotextile. Pull geotextiles taut so they are in tension and free of kinks, folds, wrinkles or creases. Hold geotextiles in place with wire staples or anchor pins as needed.

Do not damage geotextile for subgrade stabilization when placing ABC or soil. Place and compact ABC or soil in accordance with this project special provision and 2018 *Standard Specifications for Roads and Structures*. Excluding operations required to construct base courses or subgrade, do not operate heavy equipment on geotextiles. Replace any damaged geotextiles to the satisfaction of the Engineer.

## **CEMENT AND LIME STABILIZATION OF SUBGRADE SOILS**

(5-20-13) (Rev. 3-21-23)

DB5 R21

## General

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

1. Performing all laboratory tests in a laboratory certified by the AMRL / NCDOT Laboratory Proficiency Program
2. Sampling Sub-grade soils

3. Conducting Laboratory tests to determine:
  - a. Soil classifications
  - b. Moisture-density relationships
  - c. Quantity of lime or cement required to achieve specified strengths
4. Designating areas to be stabilized by either lime or cement and the required rates of application
5. Conducting field tests to determine unconfined compressive strength

### **Sampling**

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

### **Classification Tests**

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

**TABLE 1**

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

**Soil-Lime Mixtures**

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

- Allow the soil-water-lime mixture to mellow in an airtight, moisture proof container that does not contain aluminum or zinc for a minimum of 24 hours before compacting specimens.
- 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 airtight, moisture proof containers at a temperature of  $73^{\circ}\text{F} \pm 4^{\circ}$  for 7 days. The container for curing the specimen shall not contain aluminum or zinc. 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 NCDOT 2018 *Standard Specifications for Roads and Structures* with the following exceptions:

**Subsection 501-4 Equipment**

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

**Subsection 501-8 (A) General**

Paragraph #1 is not applicable to this project.

**Subsection 501-9 (B) Preliminary Curing**

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

**Subsection 501-10 Compacting, Shaping, and Finishing**

Last paragraph is not applicable.

**Subsection 501-11 Thickness**

Last two paragraphs are not applicable.

**Construction of Cement Treated Subgrade**

The Design-Build Team shall construct the soil cement sub-grade as specified in Section 542 of the 2018 *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.

### **CEMENT TREATED BASE COURSE**

(7-22-13) (Rev. 3-29-21)

DB5 R21A

### **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 Aggregate
3. Conducting Laboratory tests to determine:
  - a. Job Mix Formula
  - b. Quantity of cement required to achieve specified strengths
4. Designating areas to be stabilized by cement treated base course and the required rates of application
5. Conducting field tests to determine unconfined compressive strength

### **Sampling Aggregate**

Aggregate shall be sampled from the proposed aggregate pile at the quarry. An AASHTO classification test with unit weight and optimum moisture determination shall be completed on the sample. The aggregate shall meet the Acceptance Criteria in Column B of Table 1010-4 of the NCDOT Aggregate Sampling Manual.

### **Job Mix Formula**

A job mix formula shall be established for the accepted aggregate three weeks prior to proposed production. During production, the aggregate shall meet the tolerances specified in Table 540-1 of the 2018 *Standard Specifications for Roads and Structures*.

### **Determine Required Portland Cement Rate**

The quantity of Portland cement required shall be 3.0 - 4.0 percent by weight of the aggregate. Mix 3.5% and 4.0% Portland cement, aggregate and water at 1.5% over optimum and cure for seven days. Select rate of cement that provides a minimum and maximum unconfined compressive strength of 500 psi and 800 psi at seven days, respectively.

**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 and approval
- Submit a sketch in plan view showing areas of the project to be stabilized by Cement Treated Base Course and application rates
- Submit any other documentation that supports the Design-Build Team's recommendations

**Construction of Cement Treated Base Course**

The Design-Build Team shall construct the Cement Treated Base Course as specified in Section 540 of the North Carolina Department of Transportation 2018 *Standard Specifications for Roads and Structures* except that Articles 540-5, 540-7 and 540-13 do not apply.

**Unconfined Compressive Strength**

For Cement Treated Base Course, the Design-Build Team shall make field specimens, cure them for seven days and test them in the laboratory. The minimum and maximum acceptable unconfined compressive strength for Cement Treated Base Course shall be 450 psi and 850 psi, respectively. 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 test results for review and acceptance.

**PRICE ADJUSTMENTS FOR ASPHALT BINDER**

(9-1-11) (Rev. 8-23-18)

DB6 R25

Price adjustments for asphalt binder for plant mix will be made in accordance with Section 620 of the 2018 *Standard Specifications for Roads and Structures*.

The CEI firm is responsible for maintaining records in accordance with the procedures outlined in the Construction Manual for "Weight Tickets As A Basis Of Payment." And summarizing and submitting these records monthly for review and approval by the Resident Engineer.

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. 9-8-17)

DB6 R26

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 6-15, Article 609-11 and Page 6-31, Article 610-14**

Add the following paragraph before the first paragraph:

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

**HORIZONTAL DRAINS**

(11-7-19)

DB8 R17

**Description**

Construct horizontal drains for slopes, rock cuts and retaining walls in accordance with the contract and Geotechnical Engineering Unit Standard Detail No. 817.01. A horizontal drain typically consists of a slotted PVC pipe placed in a drilled hole inclined at an angle above horizontal, but in some holes, the pipe may be omitted. Horizontal drains shall be required to drain water from slopes and rock cuts, and from behind retaining walls at locations and elevations shown in the plans developed by the Design-Build Team and as directed by the Engineer.

**Materials**

Refer to Division 10 of the 2018 *Standard Specifications for Roads and Structures*.

Item	Section
PVC Pipe	1044-6

As shown in the plans developed by the Design-Build Team, use solid and slotted PVC Schedule 40 or Schedule 80 pipes for drain pipe. Provide slotted PVC pipe with 0.01-inch wide horizontal slots in the direction perpendicular to the pipe length and evenly spaced around and along the pipe so that the open area is at least one square inch per linear foot of pipe.

**Construction Methods**

The Engineer will determine the number, location, elevation, inclination and length of horizontal drains required. The approximate known drain locations, elevations, inclination and lengths shall be shown in the plans developed by the Design-Build Team. Drain pipe requirements including those drains without pipes will also be determined by the Engineer and known pipe information shall be shown in the plans developed by the Design-Build Team.

Use drill rigs of the sizes necessary to install horizontal drains and with sufficient capacity to drill through whatever materials are encountered. Drilling through boulders, cobbles and rock lenses may be required, but drilling in continuous intact weathered or hard rock, as determined

by the Engineer, will not be required unless the drain pipe is omitted. Drill straight and clean holes with the dimensions and orientations shown in the plans developed by the Design-Build Team or as directed by the Engineer. Drill holes within six inches of planned locations and elevations and 2° of required inclination.

For horizontal drains with drain pipes, do not insert PVC pipes into drill holes until hole locations, elevations, dimensions, inclination and cleanliness are approved by the Engineer. Insert drain pipes through hollow stem augers or into open clean drill holes. Do not vibrate, drive or otherwise force pipes into holes. If a drain pipe cannot be completely and easily inserted into a drill hole, remove the pipe and clean or re-drill the hole.

Extend solid PVC sections of drain pipes out past slope face far enough to connect to a drainage system or discharge water as directed by the Engineer. Seal all around drain pipe at collar of drill holes with a method acceptable to the Engineer. For each horizontal drain, record horizontal drain number, location, elevation, installation date, description of drilling conditions and completed drain pipe, if applicable, and drill hole diameter, length and inclination, and provide this information to the Engineer.

## **OBSERVATION PERIOD**

### **30-Day Observation Period**

The 30-Day Observation Period shall be considered part of work to be completed by the project completion date.

Upon successful completion of all project work the 30-day Observation Period may commence. Examples of project work includes but is not limited to:

- Installation of all project devices and communications infrastructure.
- Field Acceptance Testing of all devices.
- Central System Testing of all devices and network communications.
- Correction of all deficiencies and punch list items. (including minor construction items)

This observation consists of a 30-day period of normal, day-to-day operations of the field equipment in operation with new or existing central equipment without any failures. The purpose of this period is to ensure that all components of the system function in accordance with the Plans and these Project Special Provisions.

Respond to system or component failures (or reported failures) that occur during the 30-day Observation Period within twenty-four (24) hours. Correct any failures within forty-eight (48) hours (includes time of notification). Any failure that affects a major system component as defined below for more than forty-eight (48) hours will suspend the timing of the 30-day Observation Period beginning at the time when the Contractor is was notified that the failure occurred. After the cause of such failures has been corrected, timing of the 30-day Observation Period will resume. System or component failures that necessitate a redesign of any

component or a failure in any of the major system components exceeding a total of three (3) occurrences will terminate the 30-day Observation Period for that system. The 30-day Observation Period will be restarted from day zero when the redesigned components have been installed and/or the failures corrected. The major system components are:

- CCTV Cameras and Central Operations
- Dynamic Message Sign (DMS) and Central equipment/Operations
- Portable Changeable Message Sign (PCMS)
- Communications infrastructure (examples: Fiber, Radios, Ethernet Switches, Core Switches, etc.)
- Any other ITS Devices not named above (examples: DSRC radios, Radar and Out-of-Street Detection, etc.)

### **Final Acceptance**

Final system acceptance is defined as the time when all work and materials described in the Plans and these Project Special Provisions have been furnished and completely installed by the Contractor; all parts of the work have been approved and accepted by the Engineer; and successful completion of the 30-day observation period.

The completed System will be ready for final acceptance upon the satisfactory completion of all acceptance tests as detailed in their respective Section of the Project Special provisions; the rectification of all punch-list discrepancies; and the submittal of all project documentation including as-built plans.

### **FOUNDATIONS AND ANCHOR ROD ASSEMBLIES FOR METAL POLES**

(1-17-12) (Rev. 11-22-17)

9, 14, 17

DB9 R05

### **Description**

Foundations for metal poles include foundations for signals, cameras, overhead and dynamic message signs (DMS) and high mount and 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 foundations for signal pedestals; see Section 1743 of the 2018 *Standard Specifications for Roads and Structures* and 2018 Roadway Standard Drawing No. 1743.01.

## Materials

Refer to the 2018 *Standard Specifications for Roads and Structures*.

Item	Section / Article
Conduit	1091-3
Grout, Type 2	1003
Polymer Slurry	411-2(B)(2)
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 2018 *Standard Specifications for Roads and Structures* for conduit, rollers, chairs and anchor rod assemblies. Store steel materials on blocking at least 12 inches above the ground and protect it at all times from damage; and when placing in the work make sure it is free from dirt, dust, loose mill scale, loose rust, paint, oil or other foreign materials. Load, transport, unload and store foundation and anchor rod assembly materials so materials are kept clean and free of damage. Bent, damaged and / or defective materials shall be rejected.

Use conduit type in accordance with the contract. Use Class A concrete for footings and pedestals, Class Drilled Pier concrete for drilled piers and Class AA concrete for grade beams and wings including portions of drilled piers above bottom of wings elevations. Corrugated temporary casings may be accepted at the 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 thickness of at least ¼-inch. Galvanize anchor rods and exposed nuts and washers in

accordance with Article 1076-4 of the 2018 *Standard Specifications for Roads and Structures*. It is not necessary to galvanize nuts, plates and washers embedded in concrete.

### **Construction Methods**

Install the required size and number of conduits in foundations in accordance with the plans developed by the Design-Build Team and accepted submittals. Construct top of piers, footings, pedestals, grade beams and wings flat, level and within one-inch of the elevations shown in the plans developed by the Design-Build Team or approved by the Engineer. Provide an Ordinary Surface finish in accordance with Subarticle 825-6(B) of the 2018 *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, Design-Build Team and Drilled Pier Contractor Superintendent shall attend this predrill meeting.

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

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

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

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

Contain and dispose of drilling spoils and waste concrete as directed and in accordance with Section 802 of the 2018 *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 shall 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 the Department approves a casing installation method.

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 the required slurry properties at all times except for sand content.

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

Remove soft and loose material from bottom of holes using augers to the satisfaction of the Engineer. Assemble rebar cages and place cages and Drilled Pier concrete in accordance with Subarticle 411-4(E) of the 2018 *Standard Specifications for Roads and Structures*, except for the following:

- (1) Inspections for tip resistance and bottom cleanliness are not required,
- (2) Temporary casings may remain in place if approved, 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 the Department approves a concrete placement procedure. 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 the Department approves a procedure for placing anchor rod assemblies and conduit or constructing grade beams or wings.

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 2018 *Standard Specifications for Roads and Structures*. A drilled pier shall be considered defective in accordance with Subarticle 411-5(D) of the 2018 *Standard Specifications for Roads and Structures* and drilled pier acceptance shall be based in part on the criteria in Article 411-6 of the 2018 *Standard Specifications for Roads and Structures* except for the top of pier tolerances in Subarticle 411-6(C) of the 2018 *Standard Specifications for Roads and Structures*.

If a drilled pier is under further investigation, do not grout core holes, backfill around the pier or perform any work on the drilled pier until the Engineer accepts the pier. If the drilled pier is accepted, dewater and grout core holes and backfill around the pier with approved material to finished grade. If the Engineer determines a pier is unacceptable, remediation shall be required in accordance with Article 411-6 of the 2018 *Standard Specifications for Roads and Structures*. No additional compensation or extension of completion date or time will be allowed for remediation of unacceptable drilled piers or post repair testing.

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

(B) Footings, Pedestals, Grade Beams and Wings

Excavate as necessary for footings, grade beams and wings in accordance with the plans developed by the Design-Build Team, accepted submittals and Section 410 of the 2018 *Standard Specifications for Roads and Structures*. If unstable, caving or sloughing materials are anticipated or encountered, shore foundation excavations as needed with an approved method. Notify the Engineer when foundation excavation is complete. Do not place concrete or reinforcing steel until excavation dimensions and foundation material are approved by the Engineer.

Construct cast-in-place reinforced concrete footings, pedestals, grade beams and wings with the dimensions shown in the plans developed by the Design-Build Team and in accordance with Section 825 of the 2018 *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-inch horizontal width for pedestal and grade beam edges exposed above finished grade. Place concrete against undisturbed soil or backfill and fill in accordance with Article 410-8 of the 2018 *Standard Specifications for Roads and Structures*. Proper compaction around footings and wings shall be critical for foundations to resist uplift and torsion forces.

(C) Anchor Rod Assemblies

Size anchor rods for design and the required projection above top of foundations. Determine required anchor rod projections from nut, washer and base plate thicknesses,

the protrusion of three to five anchor rod threads above top nuts after tightening and the distance of one nut thickness between top of foundations and bottom of leveling nuts.

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

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

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

- (1) Turn leveling nuts onto anchor rods to a distance of one nut thickness between the top of foundation and bottom of leveling nuts. Place washers over anchor rods on top of leveling nuts.
- (2) Determine if nuts are level using a flat rigid template on top of washers. If necessary, lower leveling nuts to level the template in all directions or if applicable, lower nuts to tilt the template so the metal pole or upright truss will lean as shown in the plans developed by the Design-Build Team. If leveling nuts and washers are not in full contact with the template, replace washers with galvanized beveled washers.
- (3) Verify the distance between the foundation and leveling nuts is no more than one nut thickness.
- (4) Place base plate with metal pole or upright truss over anchor rods on top of washers. High mount luminaires may be attached before erecting metal poles but do not attach cables, mast arms or trusses to metal poles or upright trusses at this time.
- (5) Place washers over anchor rods on top of base plate. Lubricate top nut bearing surfaces and exposed anchor rod threads above washers with beeswax, paraffin or other approved lubricant.
- (6) Turn top nuts onto anchor rods. If nuts are not in full contact with washers or washers are not in full contact with the base plate, replace washers with galvanized beveled washers.

- (7) Tighten top nuts to snug-tight with the full effort of one workman using a 12-inch wrench. Do not tighten any nut all at once. Turn top nuts in increments. Follow a star pattern cycling through each nut at least twice.
- (8) Repeat (7) for leveling nuts.
- (9) Replace washers above and below the base plate with galvanized beveled washers if the slope of any base plate face exceeds 1:20 (5%), any washer is not in firm contact with the base plate or any nut is not in firm contact with a washer. If any washers are replaced, repeat (7) and (8).
- (10) With top and leveling nuts snug-tight, mark each top nut on a corner at the intersection of two flats and a corresponding reference mark on the base plate. Mark top nuts and base plate with ink or paint that is not water-soluble. Use the turn-of-nut method for pretensioning. Do not pretension any nut all at once. Turn top nuts in increments for a total turn that meets the following nut rotation requirements:

<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 top nut at least twice.

- (11) Ensure nuts, washers and base plate are in firm contact with each other for each anchor rod. Cables, mast arms and trusses may now be attached to metal poles and upright trusses.
- (12) Between four and 14 days after pretensioning top nuts, use a torque wrench calibrated within the last 12 months to check nuts in the presence of the Engineer. Completely erect mast arm poles and cantilever signs and attach any hardware before checking top nuts for these structures. Check that top nuts meet the following torque requirements:

<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 AND DYNAMIC MESSAGE SIGN FOUNDATIONS**

(9-11-17)

DB9 R07

### **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 2013 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 6<sup>th</sup> Edition, including the latest interim specifications and the latest 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.

### **Subsurface Conditions**

Assume the following soil parameters and groundwater elevation for sign foundations unless these subsurface conditions are not applicable to sign locations:

- A. Unit weight ( $\gamma$ ) = 120 pcf,
- B. Friction angle ( $\phi$ ) = 30°,
- C. Cohesion ( $c$ ) = 0 psf and
- D. Groundwater seven feet below finished grade.

A subsurface investigation shall be required if the Engineer determines these assumed subsurface conditions do not apply to a sign location and the sign cannot be moved. Subsurface conditions requiring a subsurface investigation shall include, but are not limited to, weathered or hard rock, boulders, very soft or loose soil, muck or shallow groundwater. No additional compensation or extension of completion date or time will be allowed for subsurface investigations.

### **Subsurface Investigations**

Use a prequalified geotechnical consultant to perform one standard penetration test (SPT) boring in accordance with ASTM D1586 at each sign location requiring a subsurface investigation. Rough grade sign locations to within two feet of finished grade before beginning drilling. Drill

borings to two drilled pier diameters below anticipated pier tip elevations or refusal, whichever is higher.

Use the computer software gINT version V8i or later manufactured by Bentley Systems, Inc. with the current NCDOT gINT library and data template to produce SPT boring logs. Provide boring logs sealed by a geologist or engineer licensed in the state of North Carolina.

### **Sign Foundation Designs**

Design sign foundations for the wind zone and 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 2013 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 6<sup>th</sup> Edition, including the latest interim specifications and the latest 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 psf 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 2016 or later manufactured by Ensoft, Inc. to analyze drilled piers. Provide drilled pier designs with a horizontal deflection of less than one inch 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 2013 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 6<sup>th</sup> Edition, including the latest interim specifications and the latest interim revisions.

Submit boring logs, if any, working drawings and design calculations for acceptance in accordance with Article 105-2 of the 2018 *Standard Specifications for Roads and Structures*. Submit working drawings showing plan views, required foundation dimensions and elevations and typical sections with reinforcement, conduit and anchor rod assembly details. Include all boring logs, design calculations and LPILE output for sign foundation design submittals. Have sign foundations designed, detailed and sealed by an engineer licensed in the state of North Carolina.



## Construction Methods

Construct footings, pedestals, drilled piers, grade beams and wings and install anchor rod assemblies for sign foundations in accordance with the *Foundations and Anchor Rod Assemblies for Metal Poles* Project Special Provision found elsewhere in this RFP. Submit boring logs, if any, working drawings and design calculations for acceptance in accordance with Article 105-2 of the 2018 NCDOT *Standard Specifications for Roads and Structures*. Submit working drawings showing plan views, required foundation dimensions and elevations and typical sections with reinforcement, conduit and anchor rod assembly details. Include all boring logs, design calculations and LPILE output for sign foundation design submittals. Have sign foundations designed, detailed and sealed by an engineer licensed in the state of North Carolina.

## ROADWAY LIGHTING FOUNDATIONS

(9-12-17)

DB9 R09

### Description

Roadway lighting foundations include foundations for high mount and light standards. High mount foundations for high mount standards and standard foundations for light standards consist of drilled piers or footings with pedestals, conduit and anchor rod assemblies. Construct roadway lighting foundations in accordance with the contract, 2018 Roadway Standard Drawings and accepted submittals. Define “high mount foundation” as a drilled pier including the conduit and anchor rod assembly that meets 2018 Roadway Standard Drawing No. 1402.01. Define “standard foundation” as a drilled pier or footing with pedestal including the conduit and anchor rod assembly that meets 2018 Roadway Standard Drawing No. 1405.01.

### Materials

Use roadway lighting foundation materials that meet the *Foundations and Anchor Rod Assemblies for Metal Poles* Project Special Provision found elsewhere in this RFP. Provide metal shrouds for median mounted light standards in accordance with Subarticle 1400-4(I) of the 2018 *Standard Specifications for Roads and Structures*.

### Roadway Lighting Foundations

#### (A) High Mount Foundations

Construct high mount foundations for the wind zone and high mount heights shown in the Final Lighting Plans provided by the Department, unless the following assumed site conditions are not applicable to high mount locations:

- 1) Soil with unit weight ( $\gamma$ )  $\geq$  120 pcf and friction angle ( $\phi$ )  $\geq$  30°,
- 2) Groundwater at least seven feet below finished grade and
- 3) Slope of finished grade 6:1 (H:V) or flatter.

A subsurface investigation and high mount foundation design shall be required if the Engineer determines these assumed site conditions do not apply to a high mount location and the high mount cannot be moved. Subsurface conditions requiring a high mount foundation design, include but are not limited to, weathered or hard rock, boulders, very soft or loose soil, muck or shallow groundwater. No extension of completion date or time will be allowed for subsurface investigations or high mount foundation designs.

**(B) Standard Foundations**

Construct standard foundation types for the light standard types shown in the Final Lighting Plans provided by the Department and the site conditions at each light standard location. When weathered or hard rock, boulders or obstructions conflict with standard foundations, submit an alternate standard foundation design for acceptance in accordance with Article 105-2 of the 2018 *Standard Specifications for Roads and Structures*. No extension of completion date or time will be allowed for alternate standard foundations.

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

Use the computer software gINT Version V8i or later manufactured by Bentley Systems, Inc. with the current NCDOT gINT library and data template to produce SPT boring logs. Provide boring logs sealed by a geologist or engineer licensed in the state of North Carolina.

**High Mount Foundation Designs**

Design high mount foundations for the wind zone and high mount heights shown in the Final Lighting Plans provided by the Department and the slope of finished grade and subsurface conditions at each high mount location. Design drilled piers, footings and pedestals in accordance with the 2013 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 6<sup>th</sup> Edition, including the latest interim specifications and the latest 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 2016 or later manufactured by Ensoft, Inc. to analyze drilled piers. Provide drilled pier designs with a horizontal deflection of less than 0.5-inch 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 psf for footings.

Submit boring logs, working drawings and design calculations for acceptance in accordance with Article 105-2 of the 2018 *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 around roadway lighting locations with cut and fill slopes as shown on 2018 Roadway Standard Drawing No. 1402.01 or No. 1405.01. Construct drilled piers, footings and pedestals and install anchor rod assemblies for roadway lighting foundations in accordance with the *Foundations and Anchor Rod Assemblies for Metal Poles* Project Special Provision found elsewhere in this RFP.

For median mounted light standards, place concrete for median barriers and underlying pedestals in the same pour. Construct concrete barriers in accordance with the contract and make concrete median barriers continuous through standard foundations. Coordinate construction of median mounted light standards with sign structures, concrete barriers, drainage structures, etc. to avoid conflicts.

### **LIGHTING**

(2-28-23)

DB14 R02-2

### **DESCRIPTION**

The work covered by this Section consists of furnishing, installing, connecting, and placing into satisfactory operating condition roadway lighting at locations shown on the Final Lighting Plans provided by the Department. Perform all work in accordance with these Special Provisions, the Final Lighting Plans provided by the Department, the National Electrical Code, and North Carolina Department of Transportation "Standard Specifications for Roads and Structures" (*2018 Standard Specifications*).

Perform all work in conformance with Division 14 of the *2018 Standard Specifications* except as modified or added to by these Special Provisions. Install all bore pits outside the clear zone, as defined in the AASHTO Roadside Design Guide or as directed by the Engineer.

In addition to the requirements of Division 1400, other specific Sections of the *2018 Standard Specifications* applicable to the work on this project are listed below.

Section 1401	High Mount Standard and Portable Drive Unit
Section 1404	Light Standards
Section 1407	Electric Service Pole and Lateral
Section 1408	Light Control System
Section 1409	Electrical Duct
Section 1410	Feeder Circuits
Section 1411	Electrical Junction Boxes
Section 1412	Underpass Lighting

## STANDARD AND NON-STANDARD LIGHT EMITTING DIODE (LED) LUMINAIRES FOR LIGHT STANDARDS

### DESCRIPTION

Furnish, install and place into satisfactory operation a standard or non-standard luminaire (as required), either on a bracket arm or directly mounted to the standard, complete with all light sources, drivers, wiring inside standard from circuit conductors to luminaire, in-line breakaway fuseholders and fuses and ground wiring at the pole on light standards less than 55 ft. in height.

Non-standard luminaires shall be used at all stream and river crossings as shown in the Final Lighting Plans provided by the Department. Standard luminaires shall be used at all other locations.

Any luminaire submitted for approval must meet the minimum requirements in the table and sections below.

Type	HPS Replacement Equivalent	Color Temp	Min. % of initial output at 70k hours	Min. Maintained Delivered Lumens
Non-Standard 195W LED	N/A	3000K	83%	11,400
Standard 200W LED	N/A	3000K	83%	13,450

Third party certified photometric files in IES format are required to be submitted with the catalog cuts for the proposed LED roadway luminaire. Photometric files must show that proposed luminaire will meet or exceed the design shown in the Final Lighting Plans provided by the Department.

The manufacturer shall state the Light Loss Factor (LLF) used in the photometric calculations for the proposed luminaire. LLF shall be calculated as follows:

$$\text{LLF} = \text{Lamp Lumen Depreciation (LLD)} \times \text{Luminaire Dirt Depreciation (LDD)}$$

- Lamp Lumen Depreciation (LLD) shall be the value calculated and reported by the manufacturer based on the LM-80 and TM-21 reports for the proposed fixture for 70,000 hours at 25° C.
- Luminaire Dirt Depreciation (LDD) = 0.90

### MATERIALS

#### LUMINAIRE REQUIREMENTS

##### A. General Requirements

- LM-79 photometric test reports shall be provided for all LED luminaires. LM-79 luminaire photometric reports shall be produced by an independent 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.
  - The luminaire shall have a 7 pin ANSI C136.41 compliant photocontrol receptacle for future expansion capabilities.
  - Provide a summary of reliability testing performed for LED driver.
  - Luminaires maximum total power consumption shall not exceed the values shown in the table above. Nominal luminaire input wattage shall account for nominal applied voltage and any reduction in driver efficiency due to sub-optimal driver loading.
  - Standard luminaires shall have a maximum Backlight, Uplight & Glare (BUG) rating of 3-0-3. Standard luminaires shall have an IESNA distribution of Type II or Type III as required to meet the spacing, the average maintained footcandle level and the average to minimum uniformity ratio requirements shown on the Final Lighting Plans provided by the Department. Non-standard luminaires shall have a distribution of Type II with spill control and shall be equipped with house side shields. The same BUG rating and distribution type shall be used for each respective luminaire throughout the project.
  - Non-standard luminaires shall have a maximum Backlight, Uplight & Glare (BUG) rating of 1-0-3, shall have an IESNA distribution of Type II with spill control and shall be equipped with house side shields. The same BUG rating and distribution type shall be used for each respective luminaire throughout the project.
  - Minimum Ingress Protection (IP) dust and moisture ratings for the luminaire electrical components (driver and surge protection) and luminaire optical components shall be IP65 and IP66, respectively, as specified in ANSI C136.25.
  - Luminaire shall have external and internal labels per ANSI C136.15 and ANSI C136.22, respectively. Internal label shall identify the manufacturer, year and month of manufacture and the manufacturer's part number.
  - Luminaire shall have an internal bubble level.
  - Luminaires shall start and operate in -20°C to +40°C ambient.
  - Luminaires shall be rated for continuous service at an ambient temperature of 40°C (104°F)
  - Electrically test fully assembled luminaires before shipment from factory.

- Effective Projected Area (EPA) and weight of the luminaires shall not exceed 1.4 square feet and 46 lbs.
- Luminaires shall be designed for ease of electrical component replacement.
- Luminaires shall be rated for minimum 2G vibration, minimum, per ANSI C136.31.
- LED light sources and drivers shall be RoHS compliant.
- The luminaire manufacturer shall have no less than five (5) years of experience in manufacturing LED-based lighting products and the manufacturing facility must be ISO 9001 certified.
- Luminaire shall have a 1.25" to 2.0" adjustable tenon mount for connection to luminaire bracket arm assembly.
- Pole hardware, nuts, bolts, and 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.

#### Driver

- Shall be 0V-10V dimmable.
- Rated case temperature shall be suitable for operation in the luminaire operating in the ambient temperature range of -20°C to +40°C.
- Shall be rated for 480VAC at 50/60 Hz, and shall operate normally for input voltage fluctuations of  $\pm 10\%$ .
- Shall have a minimum Power Factor (PF) of 0.90 at full input power and across specified voltage range.
- Shall provide UL Class II output.

#### 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).

#### 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.

#### Electrical safety testing

- Luminaires shall be listed for wet locations.
- Luminaires shall be UL listed and labeled.

#### Finish

- Luminaires shall be painted with a corrosion resistant polyester powdered paint with a minimum 2.0 mil thickness and finished green in color.
- 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.

#### Thermal management

- Mechanical design of protruding external surfaces (heat sink fins) on roadway luminaires shall facilitate hose-down cleaning and discourage debris accumulation.
- Liquids or moving parts will not be allowed for thermal management.

#### Color Quality

- Minimum Color Rendering Index (CRI) of 70 with a Correlated Color Temperature (CCT) of 3000K.

#### Optics

- Transmissive optical components shall be applied in accordance with OEM design guidelines to ensure suitability for the thermal/mechanical/chemical environment.

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 are prohibited inside the luminaire housing.

#### Latching and hinging

- Refractor and housing door holders and hinges shall be designed to maintain positive control of door to the luminaire body so as not to allow the accidental disengagement of either door.
- Drivers shall be mounted to a housing door designed to be opened from the bottom of the luminaire. Housing door shall allow easy removal for troubleshooting/repair on the ground.

Manufacturer or local sales representative shall provide installation and troubleshooting support via telephone and/or email.

Provide wiring inside the light standard, breakaway fuseholders and fuses meeting Article 1400-2 of the *2018 Standard Specifications*, respectively.

## WARRANTY

Provide a minimum ten-year warranty covering maintained integrity and functionality of the luminaire housing, wiring, and connections, LED light source(s) and LED driver. Negligible light output from more than 10 percent of the LED packages, color shifting, or flickering/strobing not related to incoming power issues all constitute luminaire failure.

Warranty period shall begin after project acceptance by the Department. Supplier shall furnish documentation of warranty procedures to the Design-Build Team stating that warranty is for NCDOT.

## CONSTRUCTION METHODS

Level and secure each luminaire in all directions. Adjust any luminaires, as directed by the Engineer, to provide optimal illumination distribution.

All LED packages on all luminaires must be operating normally at contract completion. Any luminaire displaying improper operating characteristics prior to contract completion will be replaced by the Design-Build Team at no additional cost to the Department.

## HIGH MAST LIGHT EMITTING DIODE (LED) LUMINAIRES

### DESCRIPTION

Furnish, install and place into satisfactory operation, LED luminaires on high mount standards as detailed in these Special Provisions.

Any high mast luminaire submitted for approval must meet the minimum requirements in the table and sections below.

Mounting Height	Max. LED Fixture Wattage	Number & HPS Replacement Equivalent	Color Temp	Min. % of initial output at 70k hours	Min. Maintained Delivered Lumens (per fixture)
120'	560W	8 x 750W	3000K	87%	54,000
100'	560W	6 x 750W	3000K	87%	54,000
80'	335W	8 x 400W	3000K	87%	27,000
60'	335W	4 x 400W	3000K	87%	27,000

The Design-Build Team shall supply the Department with current catalog cuts and 3<sup>rd</sup> party certified photometric data files in Illuminating Engineering Society (IES) format for any high mount luminaire submitted for approval. The Department will thoroughly evaluate all high mount luminaires to determine if the submitted high mount luminaire meets or exceeds design criteria and pole spacing shown on the Final Lighting Plans provided by the Department. High mount luminaires which do not meet or exceed the design criteria, or which do not produce enough light to meet the pole spacings shown on the Final Lighting Plans provided by the Department, will not be approved for use.



The manufacturer shall state the Light Loss Factor (LLF) used in the photometric calculations for the proposed luminaire. LLF shall be calculated as follows:

LLF = Lamp Lumen Depreciation (LLD) x Luminaire Dirt Depreciation (LDD)

- Lamp Lumen Depreciation (LLD) shall be the value calculated and reported by the manufacturer based on the LM-80 and TM-21 reports for the proposed fixture for 70,000 hours at 25° C.
- Luminaire Dirt Depreciation (LDD) = 0.90

High mount luminaire retrofit LED kits are not an acceptable alternative.

## MATERIALS

### LUMINAIRE REQUIREMENTS

#### General Requirements

- LM-79 photometric test reports shall be provided for all LED luminaires. LM-79 luminaire photometric reports shall be produced by an independent 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 aluminum. Each luminaire shall be finished gray in color unless otherwise noted.
- The luminaire shall have a 7 pin ANSI C136.41 compliant photocontrol receptacle for future expansion capabilities.
- Provide a summary of reliability testing performed for LED driver.
- Luminaires maximum total power consumption shall not exceed the values shown in the table above. Nominal luminaire input wattage shall account for nominal applied voltage and any reduction in driver efficiency due to sub-optimal driver loading.
- Luminaire shall have a maximum Backlight, Uplight & Glare (BUG) rating of 5-0-5 and an IESNA distribution of Type V as required to meet the spacing, the average maintained footcandle level and the average to minimum uniformity ratio

requirements shown on the Final Lighting Plans provided by the Department. The same BUG rating and distribution type shall be used throughout the project.

- Luminaire LED modules shall meet dust and moisture rating of IP-66, minimum.
- Luminaire shall have an external label per ANSI C136.15.
- Luminaires shall have an internal label per ANSI C136.22.
- Luminaires shall start and operate in -20°C to +40°C ambient.
- Electrically test fully assembled luminaires before shipment from factory.
- Effective Projected Area (EPA) and weight of the luminaires shall not exceed 1.3 square feet and 65 lbs.
- Luminaires shall be designed for ease of electrical component replacement.
- Luminaires shall be rated for minimum 2G vibration, minimum, per ANSI C136.31-2010
- LED light sources and drivers shall be RoHS compliant.
- The luminaire manufacturer shall have no less than five (5) years of experience in manufacturing LED-based lighting products and the manufacturing facility must be ISO 9001 certified.
- Pole hardware, nuts, bolts, and washers, etc. shall be made from 18-8 stainless steel, or steel conforming to ASTM A307 galvanized in accordance with ASTM A153.

#### Driver

- Shall be 0V-10V dimmable.
- Rated case temperature shall be suitable for operation in the luminaire operating in the ambient temperature range of -20°C to +40°C.
- Shall be rated for 480VAC at 50/60 Hz, and shall operate normally for input voltage fluctuations of  $\pm 10\%$ .
- Shall have a minimum Power Factor (PF) of 0.90 at full input power and across specified voltage range.

#### 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).

#### 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.

#### Electrical safety testing

- Luminaires shall be listed for wet locations.
- Luminaires shall be UL listed and labeled.

**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.

**Thermal management**

- Mechanical design of protruding external surfaces (heat sink fins) shall facilitate hose-down cleaning and discourage debris accumulation.

**Color Quality**

- Minimum Color Rendering Index (CRI) of 70 with a Correlated Color Temperature (CCT) of 3000K

**Optics**

- Transmissive optical components shall be applied in accordance with OEM design guidelines to ensure suitability for the thermal/mechanical/chemical environment.

The following shall be in accordance with corresponding sections of ANSI C136.37

- All internal components shall be assembled and pre-wired using modular electrical connections.
- Terminal blocks shall be used for incoming AC lines
- Latching and hinging

Manufacturer or local sales representative shall provide installation and troubleshooting support via telephone and/or email.

**WARRANTY**

Provide a minimum ten-year warranty covering maintained integrity and functionality of the luminaire housing, wiring, and connections, LED light source(s) and LED driver. Negligible light output from more than 10 percent of the LED packages, color shifting, or flickering/strobing not related to incoming power issues all constitute luminaire failure.

Warranty period shall begin after project acceptance by the Department.

**CONSTRUCTION METHODS**

Level and secure each luminaire in all directions. Securely terminate the wiring for each high mount luminaire and include an equipment grounding conductor to bond the housing to the supply cord grounding conductor.

Adjust any luminaires, as directed by the Engineer, to provide optimal illumination distribution.

All LED packages on all luminaires must be operating normally at contract completion. Any luminaire displaying improper operating characteristics prior to contract completion will be replaced by the Design-Build Team at no additional cost to the Department.

## **LIGHTING CONTROL SYSTEM**

### **DESCRIPTION**

The work covered under this section consists of furnishing and installing an entire control system, including enclosure, control panel, breakers, terminal blocks, wiring, conduits, lightning arrester, a concrete foundation, metal pole and galvanized slotted channel is also included.

The control system will be standard electrical components in a stainless steel enclosure mounted on a metal pole with a concrete foundation as shown in the contract.

### **4MATERIALS**

Refer to Division 10 of the *2018 Standard Specifications*.

<b>Item</b>	<b>Section</b>
Conduit	1091-3
Portland Cement Concrete, Class A	1000-4
Wire and Cable	1091-2, 1400-2

Provide concrete foundations and wire in accordance with the *2018 Standard Specifications*.

Use a piece of 4" rigid galvanized steel conduit (RGC), embedded in concrete as shown in the Final Lighting Plans provided by the Department, for mounting the control system.

Provide a NEMA type 3R stainless steel enclosure with external stainless mounting flanges, drip shield, back panel and continuous hinge door with a print pocket. Provide a door closing mechanism interlocked with a flange mounted operator handle to prevent the opening of the door with the service circuit breaker in the ON position, except by use of safety override devices.

Provide an enclosure approximately 36" (h) x 30" (w) x 10" (d) unless noted otherwise in the Final Lighting Plans provided by the Department. Provide only openings necessary for the entrance of conduits as shown in the Final Lighting Plans provided by the Department. Do not use knockouts. Ensure the enclosure conforms with NEC Article 312 and mount the devices so the NEC clearances will be provided, except use 1.5" where not specified or noted in the tables for minimum wire bending space.

Use minimum 1-5/8" x 1-5/8" galvanized slotted steel framing channel with straps and bolts for the mounting brackets and hardware for attaching the enclosure. Use galvanized finish on the brackets and hardware and coat all field cuts or scratches with organic zinc repair paint.

Provide a neutral bar, bonded to the panel, with sufficient box lug type terminals to accept the required number of wires.

Mount components to the back panel with manufacturer supplied mounting brackets or permanently attached screw studs.

Use a service circuit breaker providing a minimum interrupting rating of 22,000 A. Provide a thermal magnetic, molded case, permanent trip breaker. Provide multi-tap, solderless, load side box lugs or distribution terminal blocks of the appropriate size. Use insulating material approved for NEMA 3R applications. Provide a service barrier for the line side lugs as required by NEC Article 230-62(C). Provide a breaker with a voltage and amperage rating as indicated in the Final Lighting Plans provided by the Department.

Use feeder circuit breakers which are rated 14,000 A minimum interrupting capacity and have an open type molded case with a non-adjustable thermal magnetic trip setting as noted in the Final Lighting Plans provided by the Department.

Where Communication Gateways are required, provide a single pole, open type gateway circuit breaker rated at 240 VAC phase to ground with a minimum interrupting current capacity of 5,000 A and a high magnetic trip setting of 15 A.

Use a Type 1 surge protection device (SPD) meeting UL 1449 and UL 96A, designed to contain and arrest an arc of 40,000 A and with a short circuit current rating of 200,000 A. Install the SPD on the load side of the service breaker.

Use terminals and lugs rated for the connection of the appropriate size copper conductors. All conductors shall be made of copper and neatly wrapped in bundles or run in plastic raceways.

Perform all galvanizing in accordance with Section 1076.

Provide a drawing to scale showing the location, brand and catalog number of each component of the control system for approval. The completed light control system shall be marked "Suitable for Use as Service Equipment", in a prominent location in the enclosure, in accordance with NEC Article 409.110, and shall be marked with an arc flash hazard warning in accordance with NEC Article 110.16. If the control system is not made in a certified UL 508A Panel Shop, a third party, recognized by the Department of Insurance as having the authority, shall label the control systems.

## CONSTRUCTION METHODS

Construct the new control system foundation at the new location as shown in Standard Drawing 1408 of the Roadway Standard Drawings, with the top of the foundation 3 inches above finished grade.

Fasten the enclosure to the pole by means of a galvanized bracket assembly as shown in the Final Lighting Plans provided by the Department. Make all cuts square and remove all rough edges. Have mounting holes match existing mounting holes of the enclosure.

Arrange all conduits entering the enclosure in a neat symmetrical manner and extend directly downward into the foundation. Install six RGC feeder circuit conduits as shown in the Final Lighting Plans provided by the Department.

Install a Control System Junction Box as shown in the Final Lighting Plans provided by the Department. Stub all feeder circuit conduits and spare conduits from Control System in the Control System Junction Box. See Section 1412 of the *2018 Standard Specifications* for junction box construction methods. See Final Lighting Plans provided by the Department for conduit sizes. Place pull cord in any unused conduits and cap unused conduit in junction box.

To prevent the creation of electrically parallel paths, install a bonded conduit choke on the underground termination point of the system grounding conductor conduit in accordance with NEC Article 250.64(E). Do not terminate the system grounding conduit under the concrete foundation pad.

Install a grounding electrode system consisting of a minimum of two ground rods spaced not less than 6 feet apart at all new lighting control system panels. Connect ground rods with an appropriately sized bonding jumper.

Apply two coats of organic zinc repair paint to all field cut metal and conduit threads as specified in Article 1076-7 of the *2018 Standard Specifications*.

Install a 4" to 2" galvanized reducing bushing to the top of the 4" RGC the control system enclosure is mounted to. Install a 10' section of 2" RGC on the reducing bushing and install a cap on the top of the 2" RGC.

## **COMMUNICATION GATEWAY**

### **DESCRIPTION**

The Design-Build Team shall provide and install a communication gateway at the lighting control panels noted on the Final Lighting Plans provided by the Department. The communication gateway will be used to provide communication from the control nodes on the luminaires to a centralized monitoring software package. The communication gateway will be mounted on a piece of rigid galvanized conduit installed above the lighting control panel.

### **MATERIAL**

The communication gateway shall be a GE LightGrid gateway version 3.0 (or higher) rated for the voltage shown in the Final Lighting Plans provided by the Department.

Use conduit and conductors as specified in Article 1400-2 of the *2018 Standard Specifications*.

Provide stainless steel straps, galvanized conduit hangers, galvanized bolts, washers and nuts, and liquid-tight flexible metallic conduit (LFMC).

**CONSTRUCTION METHODS**

Mount the communication gateway to the 2" RGC pole, installed as part of the control system special provision, using the bands included with the gateway. Remove an existing cable gland in the bottom of the gateway enclosure and replace with a 1/2" RGC fitting. Install 1/2" RGC and appurtenances required to route conduit to bottom of lighting control panel enclosure. Transition RGC to LFMC to make the turn into the bottom of the enclosure. Secure LFMC to bottom of enclosure using a weatherproof fitting. Install a bonding bushing on the LFMC fitting inside the enclosure and attach to bonding jumper inside the enclosure.

Strap standoffs with rigid conduit hangers to the 2" RGC and secure 1/2" conduit to the conduit hanger. Install #12 THWN conductors inside the 1/2" RGC for power from the gateway circuit breaker in the control system enclosure to the gateway. Use a UV resistant cable tie to secure the magnetic GPS antenna to the frame.

Record the IMEI, model and serial numbers of each gateway and provide to the Engineer and the Lighting & Electrical Team Lead in the NCDOT Roadway Design Unit.

**CONTROL NODE****DESCRIPTION**

The Design-Build Team shall provide and install a communication node with each new LED luminaire on the project. The communication node will be used to interface with the Department's Statewide lighting control system. The communication node shall be provided with 10 years of service from the manufacturer.

**MATERIALS**

The communication node shall be a GE LightGrid version 3.0 (or higher) node rated for the same service voltage as the luminaire. No other materials are required for this section.

**CONSTRUCTION METHODS**

Install communication node on the seven-pin photocell receptacle of the luminaire. The communication node utilizes a twist-lock connection to ensure positive connection to the luminaire.

Record the IMEI, model and serial numbers of each control node and provide to the Engineer and the Lighting & Electrical Team Lead in the NCDOT Roadway Design Unit.

**UNDERPASS LIGHTING****DESCRIPTION**

Same as Article 1412-1 of the *2018 Standard Specifications*, except include a photocell receptacle.

## MATERIALS

Same as Article 1412-2 except as amended below:

- Include the following prior to the paragraph beginning on line 34 of page 14-22. Type WM luminaires shall be of similar aesthetics to the luminaires used in the McDowell Street Tunnel.
- Modify the last sentence of lines 1 and 2 of page 14-23 of the *2018 Standard Specifications* to read “Provide sealed, directional LED light engines covered by a glass refractor.”
- Modify the first sentence of line 13 to read “Use a 2-pole 15 A circuit breaker of the appropriate voltage with an interrupting capacity of at least 14,000A, installed in a NEAM 3R enclosure.”
- Add the following to the last paragraph of Article 1412-2 of the *2018 Standard Specifications*. “Provide a 7-pin photocontrol receptacle securely mounted to the enclosure.”

## CONSTRUCTION METHODS

Same as Article 1412-3 of the *2018 Standard Specifications*, except add the following:

Install the photocontrol receptacle either directly to the top of the enclosure, or use a standoff bracket. If a standoff bracket is used, the conductor from the photocontrol receptacle to the disconnect panel shall be enclosed and secured in liquidtight flexible metallic conduit.

Install a control node, as described in Section 6.00 of these Special Provisions, on the photocontrol receptacle.

## LIGHTING CONTROLS COORDINATION WITH THIRD PARTY

### DESCRIPTION

The existing lighting system installed throughout the project contains a smart lighting controls system which is being monitored and maintained by Brady/Trane Services (Brady) under a Statewide service agreement. The smart lighting control system (GE LightGrid) has been installed to monitor the power usage and status of the lighting system. The smart lighting control system consists of a wireless gateway installed at the control panel location and smart nodes installed on each luminaire.

The Design-Build Team shall notify Brady at 919-232-5764 or warranty.request@bradyservices.com at least two weeks prior to decommissioning the existing lighting systems.



## MATERIALS

No materials are required for this section.

## CONSTRUCTION METHODS

Carefully remove and store all gateways and control nodes. All gateways and nodes shall be removed and returned to the Department. The Design-Build Team shall coordinate the return of the removed equipment with Eric Frazier, Energy Management Engineer. Contact Eric at 919-707-4554 or [erfrazier@ncdot.gov](mailto:erfrazier@ncdot.gov) two weeks prior to delivery of the returned equipment.

The Design-Build Team is responsible for any equipment lost, stolen or damaged after removal and shall replace any equipment that is lost, stolen or damaged after removal with new equipment at no additional cost to the Department.

## PAINTED LIGHT STANDARDS

### DESCRIPTION

The Design-Build Team shall provide and install green-finished, powder-coated, single arm and twin arm light standards, luminaire bracket arms, exposed connecting hardware and impact attenuation devices at all locations shown on the Final Lighting Plans provided by the Department. Light standards and luminaire arm brackets shall be galvanized steel shall be powder coated at the factory after galvanizing. Field painting is not acceptable.

### MATERIALS

Same as Article 1404-2 of the *2018 Standard Specifications*, except the light standards shall be galvanized steel and shall be finished green in color using a thermoset powder-coated paint with a minimum 2.0 mil thickness. Any damage to light standards or finish during installation and/or construction shall be repaired or replaced in like-kind, at no additional cost to the Department.

Paint color shall be Federal Standard 595 #14115.

### CONSTRUCTION METHODS

Same as Article 1404-3 of the *2018 Standard Specifications*.

## REMOVE HIGH MOUNT STANDARDS

### DESCRIPTION

The work covered by this section consists of the removal of existing high mount standards on concrete foundations at locations shown on the Final Lighting Plans provided by the Department. The standards are attached to the foundations with anchor bolts.

Remove or abandon concrete foundations.

## MATERIALS

No materials are required for this work except such miscellaneous items as tape and terminal devices to dead-end circuits serving the standards.

## CONSTRUCTION METHODS

Maintain operation of the existing lighting system until such time that it becomes in conflict with the actual construction work, or it becomes a hazard to traffic as determined by the Engineer.

Coordinate work with the NCDOT Resident Engineer and Division Traffic Engineer to assure that circuits can be de-energized where and when necessary.

Carefully remove the luminaire with the control node from head frame carrier ring. The luminaire and control node shall be returned to the Department. The Design-Build Team shall coordinate the return of the removed equipment with Eric Frazier, Energy Management Engineer. Contact Eric at 919-707-4554 or [erfrazier@ncdot.gov](mailto:erfrazier@ncdot.gov) two weeks prior to delivery of the returned equipment.

The Design-Build Team is responsible for any equipment lost, stolen or damaged after removal and shall replace any equipment that is lost, stolen or damaged after removal with new equipment at no additional cost to the Department.

Dismount high mast pole and remove lowering device head frame and carrier ring. High mast pole and all components shall be disposed of by the Contractor.

Remove or abandon existing concrete high mast foundations as defined in Standard Specifications Section 1400-10. Dispose of the removed concrete, reinforcing steel and anchor bolts in a manner acceptable to the Engineer. Backfill the holes with approved material and compact backfill to 95% density in accordance with Section 235-3(C) of the *2018 Standard Specifications*.

Abandon or remove the conductors and the conduit for the removed high mast light standards as shown on the Final Lighting Plans provided by the Department. Refer to Standard Specifications Section 1400-10.

## REMOVE LIGHT STANDARDS

### DESCRIPTION

The work covered by this section consists of the removal of existing single arm metal light standards on breakaway bases and concrete foundations at locations shown on the Final Lighting Plans provided by the Department. The standards are less than 50' mounting height, and are attached to the foundations with anchor bolts.

Concrete foundations to be removed or abandoned may be located in areas where, due to knockdowns, there are no light standards to be removed.

## MATERIALS

No materials are required for this work except such miscellaneous items as tape and terminal devices to dead-end circuits serving the light standards.

## CONSTRUCTION METHODS

Maintain operation of the existing lighting system until such time that it becomes in conflict with the actual construction work, or it becomes a hazard to traffic as determined by the Engineer.

Coordinate work with the NCDOT Resident Engineer and Division Traffic Engineer to assure that circuits can be de-energized where and when necessary.

Carefully remove the luminaire with control node from pole-arm. The luminaire and control nodes shall be returned to the Department. The Design-Build Team shall coordinate the return of the removed equipment with Eric Frazier, Energy Management Engineer. Contact Eric at 919-707-4554 or [erfrazier@ncdot.gov](mailto:erfrazier@ncdot.gov) two weeks prior to delivery of the returned equipment.

The Design-Build Team is responsible for any equipment lost, stolen or damaged after removal and shall replace any equipment that is lost, stolen or damaged after removal with new equipment at no additional cost to the Department.

Remove light standard and arms, couplings, anchor nuts, washers, transformer bases with doors and connecting bolts and fuse holders. Dispose of all removed equipment from grassy shoulder areas in a manner acceptable to the Engineer. Coordinate removal of the existing light standards on the Jeff Bowen Bridges with Kevin Sexton, Deputy Division Traffic Engineer, at 828-250-3300. The Department will flag light standards on the bridges to be returned to the Department. All light standards which are not flagged shall be removed and disposed of.

Remove or abandon existing concrete light standard foundations as defined in Standard Specifications Section 1400-10. Dispose of the removed concrete, reinforcing steel and anchor bolts in a manner acceptable to the Engineer. Backfill the holes with approved material and compact backfill to 95% density in accordance with Section 235-3(C) of the *2018 Standard Specifications*.

Abandon or remove the conductors and the conduit for the removed light standards as shown on the Final Lighting Plans provided by the Department. Refer to Standard Specifications Section 1400-10.

## REMOVE CONTROL SYSTEM

### DESCRIPTION

The work covered by this section consists of providing all equipment, labor and materials necessary to remove an existing control system at the locations shown on the Final Lighting Plans provided by the Department.

## MATERIALS

No materials are required for this work except such miscellaneous items as tape and terminal devices to dead-end circuits at the control panel.

## CONSTRUCTION METHODS

Maintain operation of the existing lighting system until such time that it becomes in conflict with the actual construction work, or it becomes a hazard to traffic as determined by the Engineer.

Coordinate work with the NCDOT Resident Engineer and Division Traffic Engineer to assure that circuits can be de-energized where and when necessary.

Disconnect circuitry and remove control system enclosure from conduit and support structure, leaving all internal components intact. Abandon or remove underground circuitry, concrete pad and support structure.

All hoisting and lifting shall be with rope or web slings fastened in such a manner as to prevent damaging or marking any of the salvaged materials. The Contractor shall provide proper transportation, protection and supports so that rain, etc. will not damage equipment. The Contractor shall furnish labor, blocking materials and equipment to unload and properly store all salvaged materials.

Dispose of the removed concrete, reinforcing steel, support structure and conduit in a manner acceptable to the Engineer. Backfill the holes with approved material and compact backfill to 95% density in accordance with Section 235-3(C) of the *2018 Standard Specifications*.

Abandon or remove the conductors and conduit as required by construction. Refer to Standard Specifications Section 1400-10.

Deliver removed control systems to the NCDOT Division 13 Warehouse located at the address below. Contact Deputy Division Traffic Engineer Kevin Sexton by phone at 828-250-3300 two weeks prior to removal to coordinate delivery of the removed control systems.

NCDOT Division Traffic Services Office  
11 Old Charlotte Highway  
Asheville, NC 28803

## **ELECTRICAL CONDUIT SYSTEM ON BRIDGES FOR FUTURE AESTHETIC LIGHTING**

### DESCRIPTION:

The work covered by this section consists of furnishing and installing conduit systems embedded in the interior barrier rail of the Jeff Bowen Bridges and the exterior barrier rails of the Haywood Road and Hill Street bridges for future aesthetic lighting to be installed by Duke Energy Progress, on behalf of the City of Asheville, as shown in the Final Lighting Plans provided by

the Department. The conduit system in the barrier rail includes anchor bolts for light standard attachment by others.

## MATERIALS

Non-metallic conduit shall be rigid PVC (Polyvinyl chloride) heavy wall approved for above ground and for underground use by direct burial or encasement in concrete per UL 651 "Rigid Non-Metallic Conduit". Use terminations designed for PVC conduit to seal and stub out each PVC conduit, and to provide watertight protection. Provide UL listed PVC expansion fittings of the appropriate size at all parapet construction joints and bent expansion joints. Expansion fittings shall be weatherproof, designed for non-metallic conduit and provide 4" minimum of conduit movement.

Formed openings shall be included in lieu of junction boxes under each proposed light standard. The interior size of the formed openings shall be 30"x19"x9". The formed opening shall have double stainless steel covers as shown in the Final Lighting Plans provided by the Department with an overall outer size of 34"x22". The outer replaceable cover shall be checkered and include the Duke Energy Progress logo. The covers shall be a standardized design so that replacement can be done without disturbing the conduit system or feeder circuits.

Use mastic that is a permanent, non-hardening, water sealing compound that adheres to metal, plastic, and concrete.

Provide jute that is a burlap-like material used for filling voids and protecting components from waterproofing and adhesive compounds.

## CONSTRUCTION METHODS

Securely fasten all conduit and formed opening frames prior to placing any concrete. All work shall be inspected and approved by the Engineer and Duke Energy representative before concealment. Each conduit run between termination points should be as straight as possible. The total angular deflection of all bends in a conduit run should not exceed 180 degrees. Total deflection greater than 180 degrees requires advanced approval by the Engineer and Duke Energy Progress project engineer. After the conduit is encased in concrete, clean each conduit by snaking with a steel band that has an approved tube cleaner, equipped with a mandrel of a diameter not less than 1/2" of the nominal inside diameter of the conduit. Coordinate conduit cleaning with Duke Energy Progress personnel, and have Duke Energy Progress personnel on hand to witness cleaning.

Stub the conduit out in junction boxes in the grassy shoulder as shown in the Final Lighting Plans provided by the Department. Use threaded adapter and PVC bushing at all junction box to conduit connections. Install a pull line in each conduit for future use. Leave sufficient slack for attachment of a rope that will be used to install conductors. Coordinate electrical conduit system work with work by others.

Install anchor bolts according to pattern provided by Duke Energy Progress. Protect exposed threaded portion of anchor bolts, to guard against damage from concrete installation.

Seal and cap all conduits exposed in the light pedestals on the structure.

All work must be inspected and approved by the Engineer and Duke Energy Progress representative before concealment.

Installation of circuitry and light standards will be provided by others and are not part of this contract.

## **FOOT LIGHTING SYSTEM**

### **DESCRIPTION**

Furnish, install, and place into satisfactory operation a foot lighting system consisting of step light luminaires, control panel, conduit and conductors. The foot lighting system shall be installed in the outer barriers of the Jeff Bowen Bridges and will aid in illuminating the pedestrian ways on each structure.

The control system shall include the enclosure, photocell, switches, contactors, breakers, terminal blocks, wiring, concrete foundation, surge protector and junction box. The control system shall be standard electrical components in a weatherproof enclosure mounted on a metal pole with a concrete foundation as shown in the Final Lighting Plans provided by the Department.

### **MATERIALS**

#### **CONDUIT SYSTEM AND CONDUCTORS IN CONCRETE BARRIER RAIL**

Non-metallic conduit shall be rigid PVC (Polyvinyl chloride) Schedule 40 approved for above ground or underground use and concrete encasement per U.L. 651 "Rigid Non-Metallic Conduit". Use terminations designed for PVC conduit, to seal and stub out each PVC conduit, and to provide watertight protection. Transition conduit run from the end concrete barrier rail to an in-ground junction box.

Provide expansion fittings sized as shown in the Final Lighting Plans provided by the Department at all bridge expansion joints. Expansion fittings shall be weatherproof and provide 4" minimum of conduit movement.

Provide Type THWN stranded conductor of appropriate size and quantity as shown in the Final Lighting Plans provided by the Department.

Use watertight set screw type connectors rated for submersible installations meeting the requirements of Subarticle 1400-4(F) of the Standard Specifications for Roads and Structures for all conductor splicing.

Provide an antioxidant compound rated for use with copper conductors for all splices.

## STEP LIGHT LUMINAIRES

Provide and install LED step light luminaires, embedded in the vertical concrete barrier rail. The luminaire shall be an outdoor type rated for marine environments with a minimum ingress protection rating of IP66. The luminaire shall have 400 minimum initial lumens at a color temperature range of 3000K to 3500K, a maximum power input of 20 Watts and a minimum life of 50,000 hours. The luminaire shall have input voltage of 120 VAC.

Luminaires shall have a box embedded in the concrete rail sized appropriately to allow for splicing of phase, neutral and ground conductors. The embedded box shall be stainless steel or composite material.

## STEP LIGHTING CONTROL SYSTEM

Provide a 100 A meter base. The lighting control panel shall be a NEMA 3R rated enclosure and must include a main circuit breaker, a feeder circuit breaker, solid neutral bar, contactor, photocontrol, selector switch, fused control circuitry and a surge protector. Factory install as many components as practical.

The lighting control panel shall be labeled as suitable for use as service entrance equipment. If the control panel is not made in a certified UL 508A Panel Shop, a third party, recognized by the Department of Insurance as having the authority, shall label the lighting control panel.

The lighting control panel enclosure shall be equipped with a flange mounted operator handle that is lockable in the OFF position and is interlocked with the door and main circuit breaker, so that the door cannot be opened when the breaker is in the ON position. The enclosure shall have an internal removable back panel for mounting components and shall have external mounting brackets.

The lighting control panel shall be rated 120/240 VAC, single phase, two pole, three-wire, service entrance. The main circuit breaker shall have an interrupting capacity rating of not less than 10,000 amperes RMS symmetrical. The control relay shall be 120 Volts and shall have an amperage rating of 10 A. The electrically operated, mechanically held contactor shall be 4 pole, 240 Volts with a current rating of 60 A. Both the control relay and the electrically operated, mechanically held contactor shall have 120 VAC coils. The feeder circuit breakers for all circuits shall be 1 pole, 120 Volts and have an amperage rating for 15 A. The service circuit breaker shall be 2 pole, 240 Volts and have an amperage rating of 60 A. The control circuit breaker shall be 1 pole, 120 Volts and have an amperage rating of 15 A. The selector switch must be a heavy duty HAND-OFF-ON unit including contacts and handle mounted on the back panel of the enclosure.

Use a Type 1 surge protection device (SPD) meeting UL 1449 and UL96A, designed to contain and arrest an arc of 40,000 A. Install SPD on load side of service breaker.

The ground rod must be copper clad steel, with a irreversible clamp rated for direct burial.

Use a 4" Rigid Galvanized Steel Conduit with cap, embedded in concrete as shown in the Final Lighting Plans provided by the Department for mounting the lighting controller. Use galvanized

slotted steel framing channel with straps and bolts, for the mounting brackets and hardware for attaching the lighting controller to the pole.

Use mastic that is a permanent, non-hardening, water sealing compound that adheres to metal, plastic, and concrete.

Use zinc rich paint conforming to Article 1080-9 of the Standard Specifications.

## CONSTRUCTION METHODS

### CONDUIT SYSTEM AND CONDUCTORS IN CONCRETE BARRIER RAIL

Securely fasten all conduit and embedded luminaire boxes prior to pouring any concrete for the vertical barrier. Place concrete with care so as not to dent or disturb the proper alignment of the luminaire box.

After the conduit is encased in concrete, the Design-Build Team shall clean each conduit by snaking with a steel band with an approved tube cleaner equipped with a mandrel of a diameter not less than 85% of the nominal inside diameter of the conduit.

All conductor splicing shall be accomplished using watertight set screw connectors rated for submersible applications. Generously coat all conductor splices with an antioxidant compound.

The Engineer shall inspect and approve all work before encasement.

### STEP LIGHT LUMINAIRES

Install each step light luminaire over the embedded boxes following the manufacturer's directions. Adjust each luminaire to aim light towards the walking path as directed by the Engineer.

Any luminaire displaying improper operating characteristics shall be replaced with new at no cost to the Department.

### STEP LIGHTING CONTROL SYSTEM

Install feeder circuit conduits and spare conduit from the lighting control panel to in-ground junction box JB8. Spare conduit shall be capped in JB8.

Contact the local utility company and obtain the required electrical services, as stated in Article 1400-9 of the Standard Specifications.

Locate the lighting control panel as shown on the Final Lighting Plans provided by the Department. Install all non-factory installed components of the combination panel securely, with all conductors properly terminated and identified. Attach all components to the post with galvanized or stainless steel hardware. Provide and install a padlock for the controller, with eight keys all keyed alike as per Article 1400-8 of the Standard Specifications



Operate the lighting system without interruption or failure attributable to poor workmanship or defective material for 2 consecutive weeks, as stated in Article 1400-6 of the Standard Specifications. The Engineer will perform insulation resistance tests, as stated in Article 1400-5 of the Standard Specifications.

Repair any damage to the combination panel or external mounting hardware using zinc rich paint.

## **PEDESTRIAN BRIDGE LIGHTING**

### **DESCRIPTION**

Design, furnish, install, and place into satisfactory operation a pedestrian lighting system consisting of linear LED luminaires, control panel, conduit and conductors. The linear LED luminaires shall be installed on the overhead horizontal members of each structure to aid in illuminating the pedestrian way.

The control system shall include the enclosure, photocell, switches, contactors, breakers, terminal blocks, wiring, concrete foundation, surge protector and junction box. The control system will be standard electrical components in a weatherproof enclosure mounted on a metal pole with a concrete foundation.

### **MATERIALS**

#### **LINEAR LED LUMINAIRE**

##### **A. General Requirements**

- Luminaire driver shall accept a minimum input voltage range of 100 to 277VAC including fluctuations of  $\pm 10\%$ . The driver shall accept up to 480VAC if the roadway lighting system is used to power the pedestrian lighting system at the
- Luminaire shall have a color temperature of 3,000K.
- Nominal luminaire input wattage shall account for nominal applied voltage and any reduction in driver efficiency due to sub-optimal driver loading.
- Luminaire electrical components (driver and surge protection) shall meet the dust and moisture requirements of ingress protection (IP) rating of IP67, minimum.
- Luminaires shall start and operate in  $-20^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$  ambient.
- Luminaires shall be rated for continuous service at an ambient temperature of  $40^{\circ}\text{C}$  ( $104^{\circ}\text{F}$ )
- Electrically test fully assembled luminaires before shipment from factory.
- The luminaire manufacturer shall have no less than five (5) years of experience in manufacturing LED-based lighting products and the manufacturing facility must be ISO 9001 certified.
- Luminaire shall have multi-positional hinge mounting hardware.
- Luminaire shall be rated for 3G vibration in accordance with ANSI C136.31.
- Luminaire shall have integral male/female waterproof connectors. Provide waterproof and dustproof boots for any unused connectors.

- Luminaire shall have a L70 rating of 60,000 hours minimum at 25°C.
  - Include jumper cables between fixtures and leader cables to connect fixture to power source.
- B. 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.
- C. Electrical safety testing
- Luminaires shall be listed for wet locations.
  - Luminaires shall be UL listed and labeled.
- D. 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.
  - Luminaire housing shall be made of extruded anodized aluminum
- E. Color Quality
- Minimum Color Rendering Index (CRI) of 80 with a Correlated Color Temperature (CCT) of 3,000K.
- F. Optics
- Transmissive optical components shall be applied in accordance with OEM design guidelines to ensure suitability for the thermal/mechanical/chemical environment.
- G. Thermal management
- Mechanical design of protruding external surfaces (heat sink fins) shall facilitate cleaning via rain showers and discourage debris accumulation.
- H. Manufacturer or local sales representative shall provide installation and troubleshooting support via telephone and/or email.
- I. Warranty
- Provide a minimum five-year warranty covering maintained integrity and functionality of the luminaire housing, wiring, and connections, LED light source(s) and LED driver. Negligible light output from more than 10 percent of the LED packages, color shifting, or flickering/strobing not related to incoming power issues all constitute luminaire failure.

- Warranty period shall begin after project acceptance by the Department. Supplier shall furnish documentation of warranty procedures to the Contractor stating that warranty is for NCDOT.

## PEDESTRIAN BRIDGE LIGHTING CONTROL SYSTEM

Provide a 100 A meter base. The lighting control panel shall be a NEMA 3R rated enclosure and must include a main circuit breaker, a feeder circuit breaker, solid neutral bar, contactor, photocontrol, selector switch, fused control circuitry and a surge protector. Factory install as many components as practical.

The lighting control panel shall be labeled as suitable for use as service entrance equipment. If the control panel is not made in a certified UL 508A Panel Shop, a third party, recognized by the Department of Insurance as having the authority, shall label the lighting control panel.

The lighting control panel enclosure shall be equipped with a flange mounted operator handle that is lockable in the OFF position and is interlocked with the door and main circuit breaker, so that the door cannot be opened when the breaker is in the ON position. The enclosure shall have an internal removable back panel for mounting components and shall have external mounting brackets.

The lighting control panel shall be rated 120/240 VAC, single phase, two pole, three-wire, service entrance. The main circuit breaker shall have an interrupting capacity rating of not less than 10,000 amperes RMS symmetrical. The control relay shall be 120 Volts and shall have an amperage rating of 10 A. The electrically operated, mechanically held contactor shall be 4 pole, 240 Volts with a current rating of 60 A. Both the control relay and the electrically operated, mechanically held contactor shall have 120 VAC coils. The feeder circuit breakers for all circuits shall be 1 pole, 120 Volts and have an amperage rating for 15 A. The service circuit breaker shall be 2 pole, 240 Volts and have an amperage rating of 60 A. The control circuit breaker shall be 1 pole, 120 Volts and have an amperage rating of 15 A. The selector switch shall be a heavy duty HAND-OFF-ON unit including contacts and handle mounted on the back panel of the enclosure.

Use a Type 1 surge protection device (SPD) meeting UL 1449 and UL96A, designed to contain and arrest an arc of 40,000 A. Install SPD on load side of service breaker.

The ground rod shall be copper clad steel, with a clamp rated for direct burial.

Use a 4" Rigid Galvanized Steel Conduit with cap, embedded in concrete as shown in the Final Lighting Plans provided by the Department for mounting the lighting controller. Use galvanized slotted steel framing channel with straps and bolts, for the mounting brackets and hardware for attaching the lighting controller to the pole.

Use mastic that is a permanent, non-hardening, water sealing compound that adheres to metal, plastic, and concrete.

Use zinc rich paint conforming to Article 1080-9 of the Standard Specifications.

## CONSTRUCTION METHODS

### LINEAR LED LUMINAIRE

Install linear LED luminaires on the overhead horizontal beams parallel with the pedestrian walking path.

Wiring from the lighting control system to the first luminaire shall be in conduit. Attach conduit to the pedestrian bridge cross members. Wiring between luminaires shall be accomplished with jumper wires of the appropriate length. Jumper wires shall be type SOOW cord, or other manufacturer approved equal rated for exposure to sunlight, rain and moisture. To limit potential vandalism, luminaire to luminaire jumper wires shall be secured to the top of the horizontal beam and installed over the horizontal bracing tie points.

Aim luminaires towards the walking path. Take care to not aim luminaires in such a way that motorists below the pedestrian bridge experience disabling glare. Provide shielding as required to reduce or eliminate glare for motorists.

### PEDESTRIAN BRIDGE LIGHTING CONTROL SYSTEM

Install feeder circuit conduits and spare conduit from the lighting control panel to an in-ground junction box. Spare conduit shall be capped in the junction box.

Contact the local utility company and obtain the required electrical services. If required, electrical service for the Isaac Dickenson School Pedestrian Bridge shall be established in the Department's name in accordance with Article 1400-9 of the Standard Specifications. Electrical service for the Hill Street Pedestrian Bridge shall be established in the City of Asheville's name. Contact Mr. Ken Putman, City of Asheville Transportation Director, at 828-259-5943 for additional information for the Hill Street Pedestrian Bridge electrical service.

Locate the lighting control panel in an easily accessible area near the pedestrian bridge and near existing power facilities.

Install any non-factory installed components of the combination panel securely, with all conductors properly terminated and identified. Attach all components to the post with galvanized or stainless steel hardware. Provide and install a padlock for the controller, with eight keys all keyed alike as per Article 1400-8 of the Standard Specifications

Operate the lighting system without interruption or failure attributable to poor workmanship or defective material for 2 consecutive weeks, as stated in Article 1400-6 of the Standard Specifications. The Engineer will perform insulation resistance tests, as stated in Article 1400-5 of the Standard Specifications.

Repair any damage to the combination panel or external mounting hardware using zinc rich paint.

**PORTABLE CONSTRUCTION LIGHTING**

(3-22-22)

1413

DB14 R13

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 14-24, Article 1413-3 TOWER LIGHT, Lines 2 - 7,** delete and replace the first and second sentence in the first paragraph with the following:

Use tower lights which consist of mercury vapor, metal halide, high pressure sodium, low pressure sodium or light emitting diode (with correlated color temperature of 4000 Kelvin or less) fixtures mounted on a tower approximately 30 feet in height. Use tower light fixtures which are heavy duty flood, area, or roadway style with wide beam spread, have sufficient output to provide the minimum illumination for the Work Category, are weatherproof and supplied with attached waterproof power cord and plug.

**Page 14-24, Article 1413-3 TOWER LIGHT, Lines 11 - 12,** delete and replace the second paragraph with the following:

Provide tower lights of sufficient wattage or quantity to provide the minimum average maintained horizontal illuminance over the work area based on the Work Category as shown in Table 1413-1. For any work not covered in Table 1413-1, provide a minimum average maintained horizontal illuminance of 20.0 footcandles over the work area.

**TABLE 1413-1  
MINIMUM ILLUMINATION REQUIREMENTS FOR PORTABLE CONSTRUCTION  
LIGHTING**

<b>Work Category</b>	<b>Description of Construction and Maintenance Task</b>	<b>Minimum Average Maintained Horizontal Illuminance</b>
I	Excavation; Embankment, Fill and Compaction; Maintenance of Embankment; Asphalt Pavement Rolling; Subgrade, Stabilization and Construction; Base Course Rolling; Sweeping and Cleaning; Landscaping, Sod and Seeding; Reworking Shoulders.	5.0 footcandle
II	Barrier Wall and Traffic Separators; Milling, Removal of Pavement; Asphalt Paving and Resurfacing; Concrete Pavement; Base Course Grading and Shaping; Surface Treatment; Waterproofing and Sealing; Sidewalk Construction; Guardrails and Fencing; Striping and Pavement Marking; Highway Signs; Bridge Decks; Drainage Structures and Drainage Piping; Other Concrete Structures; Repair of Concrete Pavement; Pothole Filling; Repair of Guardrail and Fencing.	10.0 footcandle
III	Traffic Signals; Highway Lighting Systems; Crack Filling.	20.0 footcandle

**Page 14-24, Article 1413-4 MACHINE LIGHTS, Lines 18 - 21,** delete and replace the first and second sentence in the first paragraph with the following:

Use machine lights which have mercury vapor, metal halide, high pressure sodium, low pressure sodium or light emitting diode (with correlated color temperature of 4000 Kelvin or less) fixtures mounted on supports attached to the construction machine at a height of approximately 13 feet.

**Page 14-24, Article 1413-5 CONSTRUCTION METHODS, Lines 33 - 34,** delete and replace the third and fourth sentence in the first paragraph with the following:

Submit photometric calculations showing the minimum average maintained horizontal illuminance over the work area and the tower spacing to the Engineer for review and approval prior to installation.

### **DYNAMIC MESSAGE SIGN (DMS)**

#### **DESCRIPTION**

To ensure compatibility with the existing DMS Control Software deployed in the State, furnish NTCIP compliant DMS that are fully compatible with the current control software in use by the Department. (also referred to hereinafter as the “Control Software”). Contact the engineer to inquire about the current version being used.

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

Furnish, install, test, integrate and make fully operational the new DMS at locations shown in the plans developed by the Design-Build Team.

Furnish operating Dynamic Message Signs, not limited to, the following types. Dimensions represent DMS sizes commonly used by the Department, other size DMS may be specified in the plans developed by the Design-Build Team.

DMS Naming Convention	
Type	Color
Type 1 – Front Access	A – Amber – 66mm
Type 2 – Walk-in	C – Full Color – 20mm
Type 3 – Embedded	
Type 4 – Lane Control	

- **DMS Type 1A** – Front Access Amber 66mm – 27 pixels high by 60 pixels wide
  - 3 lines, 10 characters per line, using 18” high characters.
- **DMS Type 1C** – Front Access Full Color 20mm – 96 pixels high by 208 pixels wide
  - 3 lines, 11 characters per line, using 18” high characters.
- **DMS Type 2A** – Walk-in Amber 66mm – 27 pixels high by 90 pixels wide
  - 3 lines, 15 characters per line, using 18” high characters.

- **DMS Type 2C** – Walk-in Full Color 20mm – 96 pixels high by 288 pixels wide
  - 3 lines, 15 characters per line, using 18” high characters.
- **DMS Type 3A** – Embedded Front Access Tri-color 66mm – 7 pixels high by 35 pixels wide
  - 1 line, 7 characters per line, using 18” high characters.
- **DMS Type 3C** – Embedded Front Access Full Color 20mm – 24 pixels high by 160 pixels wide
  - 1 line, 8 characters per line, using 18” high characters.
- **DMS Type 4C** – Lane Control Sign Full Color 20mm – 48- or 64-pixels square
  - 48 pixels high by 48 pixels wide
    - 1 line, 2 characters per line using 18” high characters
  - 64 pixels high x 64 pixel wide
    - 2 lines, 3 characters per line using 18” high characters

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

**Use only approved DMS models listed on the NCDOT Qualified Products List (QPL) at the time of construction. NCDOT Qualified Products List can be accessed via official website at <https://apps.ncdot.gov/products/qpl/>**

## **MATERIALS**

### **Environmental and Operating Requirements**

Construct the DMS and DMS controller cabinet so the equipment within is protected against moisture, dust, corrosion, and vandalism. Design and construct the DMS unit for continuous usage of at least 20 years. Design the DMS system to comply with the requirements of Section 2.1 (Environmental and Operating Standards) of NEMA TS 4-2016.

### **Viewing Requirements for all DMS**

Each line of text should be clearly visible and legible to a person with 20/20 corrected vision from a distance of 900 feet in advance of the DMS at an eye height of 3.5 feet along the axis.

Any line must display equally spaced and equally sized alphanumeric individual characters. Each character must be at least 18 inches in height (unless otherwise noted in the plans) and composed from a luminous dot matrix.

### **Housing Requirements for all DMS**

Construct the external skin of the sign housing out of aluminum alloy 5052 H32 that is a minimum of 1/8 inches thick for all walk-in DMS and 0.090-inch-thick for all front access or embedded DMS. Ensure the interior structure is constructed of aluminum. Ensure that exterior

seams and joints, except the finish coated face pieces, are continuously welded using an inert gas welding method. Ensure that no internal frame connections or external skin attachments rely upon adhesive bonding. Ensure the sign housing meets the requirements of Section 3 of NEMA TS 4-2016.

Ensure that all drain holes and other openings in the sign housing are screened to prevent the entrance of insects. Ensure that the top of the housing includes multiple steel lifting eyebolts or equivalent hoisting points. Ensure hoist points are positioned such that the sign remains level when lifted. Ensure that the hoist points and sign frame allow the sign to be shipped, handled, and installed without damage. Ensure all external assembly and mounting hardware, including but not limited to; nuts, bolts, screws, and locking washers are corrosion resistant galvanized steel and are sealed against water intrusion. Ensure all exterior housing surfaces, excluding the sign face, and all interior housing surfaces are a natural aluminum mill finish. Ensure signs are fabricated, welded, and inspected in accordance with the requirements of the current ANSI/AWS Structural Welding Code-Aluminum. Do not place a manufacturer name, logo, or other information on the front face of the DMS or shield. Do not paint the stainless-steel bolts on the Z-bar assemblies used for mounting the enclosure.

### **Housing Requirements for Walk-in type DMS**

Ensure the sign housing meets the requirements of Section 3.2.8 of NEMA TS 4-2016. Stitch weld the exterior housing panel material to the internal structural members to form a unitized structure. Ensure that exterior mounting assemblies are fabricated from aluminum alloy 6061-T6 extrusions a minimum of 3/16 inches thick. Ensure housing access is provided through an access door at each end of the sign enclosure that meets the requirements of NEMA TS 4-2016, Section 3.2.8.1. Ensure the access doors include a keyed tumbler lock and a door handle with a hasp for a padlock. Ensure the doors include a closed-cell neoprene gasket and stainless-steel hinges. Install one appropriately sized fire extinguisher within 12 inches of each maintenance door. Ensure the sign housing meets the requirements of NEMA TS 4-2016, Section 3.2.8.3 for service lighting. All service lighting should be LED, incandescent and fluorescent lamps are not permitted. Ensure that the sign housing includes LED emergency lighting that automatically illuminates the interior when the door is open in the event of a power outage. Emergency lighting must be capable of operation without power for at least 90 minutes. Ensure the sign housing meets the requirements of NEMA TS 4-2016, Section 3.2.9 for convenience outlets.

### **Housing Requirements for Front Access DMS**

Comply with the requirements of Section 3.2.5 and 3.2.6 of NEMA TS 4-2016 as it applies to front access enclosures. The following requirements complement TS 4-2016. Ensure access door does not require specialized tools or excessive force to open. Provide multiple access doors that allow maintenance personnel access to 2 or 3 sign modules at a time. Vertically hinge the doors and design to swing out from the face to provide access to the enclosure interior. Extend each door the full height of the display matrix. Provide a retaining latch mechanism for each door to hold the door open at a 90-degree angle. Each door will form the face panel for a section of the sign. Mount the LED modules to the door such that they can be removed from the door when in the open position. Other sign components can be located inside the sign enclosure and be accessible through the door opening. Provide for each door a minimum of two (2) screw-type



captive latches to lock them in the closed position and pull the door tight and compress a gasket located around the perimeter of each door. Install the gasket around the doors to prevent water from entering the cabinet.

### **Housing Face Requirements for all DMS**

Ensure the sign face meets the requirements of NEMA TS 4-2016, Section 3.1.3. Protect the DMS face with contiguous, weather-tight, removable panels. The DMS front face shall be constructed with multiple rigid panels, each of which supports and protects a full-height section of the LED display matrix. The panels shall be fabricated using aluminum sheeting on the exterior and polycarbonate sheeting on the interior of the panel. These panels must be a polycarbonate material that is ultraviolet protected and have an antireflection coating. Prime and coat the front side of the aluminum mask, which faces the viewing motorists, with automotive-grade semi-gloss black acrylic enamel paint or an approved equivalent. Guarantee all painted surfaces provide a minimum outdoor service life of 20 years. Design the panels so they will not warp nor reduce the legibility of the characters. Differential expansion of the DMS housing and the front panel must not cause damage to any DMS component or allow openings for moisture or dust. Glare from sunlight, roadway lighting, commercial lighting, or vehicle headlights must not reduce the legibility or visibility of the DMS. Install the panels so that a maintenance person can easily remove or open them for cleaning.

### **Housing Face Requirements for Walk-in type DMS**

No exposed fasteners are allowed on the housing face. Ensure that display modules can be easily and rapidly removed from within the sign without disturbing adjacent display modules.

### **Housing Face Requirements for Front Access type DMS**

The DMS front face shall be constructed with multiple vertically hinged rigid door panels, each of which contains a full-height section of the LED display matrix.

Any exposed fasteners on the housing face must be the same color and finish as the housing face. Only captive fasteners may be used on the housing face.

### **Housing Face Requirements for Embedded Front Access type DMS**

The DMS front face shall be constructed with a single, horizontally hinged rigid face panel which contains a full-height section of the LED display matrix.

Any exposed fasteners on the housing face must be the same color and finish as the housing face. Only captive fasteners may be used on the housing face.

### **Sign Housing Ventilation System for all DMS**

Install a minimum of one (1) temperature sensor that is mounted near the top of the DMS interior. The sensor(s) will measure the temperature of the air in the enclosure over a minimum

range of -40°F to +176°F. Ensure the DMS controller will continuously monitor the internal temperature sensor output and report to the DMS control software upon request.

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

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

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

Design the ventilation fans and air filters to be removable and replaceable from inside the DMS housing. To ease serviceability, mount the ventilation fans no more than four (4) feet from the floor of the DMS enclosure. Position ventilation fans so they do not prevent removal of an LED pixel board or driver board.

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

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

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

Cover each air intake and exhaust port with an aluminum hood attached to the rear wall of the DMS. Thoroughly seal all intakes and exhaust hoods to prevent water from entering the DMS. Provide a thermostat near the top of the DMS interior to control the activation of the ventilation system.

The DMS shall automatically shut down the LED modules to prevent damaging the LEDs if the measured internal enclosure air temperature exceeds a maximum threshold temperature. The threshold temperature shall be configurable and shall have a default factory setting of 140°F. The DMS provide an output to the controller to notify the Control Software when the DMS shuts down due to high temperature.

### **Sign Housing Ventilation System for Walk-in DMS**

Ensure the sign includes a fail-safe ventilation subsystem that includes a snap disk thermostat that is independent of the sign controller. Preset the thermostat at 140°F. If the sign housing's interior reaches 140°F, the thermostat must override the normal ventilation system, bypassing the

sign controller and turning on all fans. The fans must remain on until the internal sign housing temperature falls below 115°F.

### **Sign Housing Photoelectric sensors**

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

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

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

### **Display Modules**

Manufacture each display module with a standard number of pixels which can be easily removed. Assemble the modules onto the DMS assemblies contiguously to form a continuous matrix to display the required number of lines, characters, and character height.

Design display modules that are interchangeable, self-addressable, and replaceable without using special tools. Provide plug-in type power and communication cables to connect to a display module. Ensure that the sign has a full matrix display area as defined in NEMA TS 4-2016, Section 1.6.

Design each module to display:

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

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

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

### **Discrete LEDs**

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

Provide LEDs that are untinted, non-diffused, high output solid state lamps utilizing AlInGaP technology for Red and InGaN technology for Green and Blue. No substitutions will be allowed. Provide LEDs that emit a full color.

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

Obtain the LEDs used in the display from a single LED manufacturer. Obtain them from batches sorted for luminous output, where the highest luminosity LED is not more than fifty percent more luminous than the lowest luminosity LED when the LEDs are driven at the same forward current. Do not use more than two successive and overlapping batches in the LED display.

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

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

Design the LED display operating range to be -20° F to +140° F at 95% relative humidity, non-condensing.

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

### **LED Power Supplies**

Power the LED Display by means of multiple regulated switching DC power supplies that operate from 120 volts AC input power and have an output of 24 volts DC or less. Wire the power supplies in a redundant parallel configuration that uses multiple power supplies per display. Provide the power supplies with current sharing capability that allows equal amounts of current to their portion of the LED display. Provide power supplies rated such that if one supply fails the remaining supplies will be able to operate their portion of the display under full load conditions (i.e. all pixels on at maximum brightness) and at a temperature of 140° F.

Provide power supplies to operate within a minimum input voltage range of +90 to +135 volts AC and within a temperature range of -22° F to 140° F. Power supply output at 140° F must not deteriorate to less than 65% of its specified output at 70° F. Provide power supplies that are overload protected by means of circuit breakers, that have an efficiency rating of at least 75%, a power factor rating of at least .95, and are UL listed. Provide all power supplies from the same manufacturer and with the same model number for each Type of DMS. Design the power driver circuitry to minimize power consumption.

Design the field controller to monitor the operational status (normal or failed) of each individual power supply and be able to display this information on the Client Computer screen graphically. Color code power supply status, red for failed and green for normal. Provide power supply

monitoring circuitry to detect power failure in the DMS and to automatically report this fault to the Control Software. This requirement is in addition to reporting power failure at the controller cabinet.

### **LED Pixels**

A pixel is defined as the smallest programmable portion of a display module that consists of a cluster of closely spaced discrete LEDs. Design each pixel with either 66mm or 20mm spacing depending on the type of DMS called for in the plans.

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

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

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

Power the LEDs in each pixel in strings. Use a redundant design so that the failure of an LED in one string does not affect the operation of any other string within the pixel and does not lower the luminous intensity of the pixel more than 25% of the 40Cd requirement. Provide the sign controller with the ability to detect the failure of any LED string and identify which LED string has failed.

### **DMS Mini Controller**

For Walk-In and Front Access DMS Types only, furnish and install a mini controller inside the DMS that is interconnected with the main controller using a fiber-optic cable. The mini controller will enable a technician to perform all functions available from the main controller. Provide the mini controller with a Display and keypad interface. Size the display screen to allow preview of an entire one-page message on one screen. Provide a 4 X 4 keypad.

### **DMS Enclosure Structure Mounting**

Mount the DMS enclosure and interconnect system securely to the supporting structures. Design the DMS enclosure supports and structure to allow full access to the DMS enclosure inspection door. Mount the DMS enclosure according to the manufacturer's recommendations.

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

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

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

Design the DMS structure to conform to the applicable requirements of Section 906 of the *2018 Standard Specifications for Roads and Structures* and the section titled “DMS Pedestal Structure” of these Project Special Provisions.

### **DMS / DMS Controller Interconnect**

Furnish and install all necessary cabling, conduit, and terminal blocks to connect the DMS and the DMS controller located in the equipment cabinet. Use approved manufacturer's specifications and the plans developed by the Design-Build Team for cable and conduit types and sizes. Use fiber-optic cable to interconnect sign and controller. Install fiber-optic interconnect centers in the sign enclosure and cabinet to securely install and terminate the fiber-optic cable. Submit material submittal cut sheets for the interconnect center.

### **DMS Controller and DMS Cabinet**

Furnish and install one DMS controller with accessories per DMS in a protective cabinet. Controlling multiple DMS with one controller is allowed when multiple DMS are mounted on the same structure. Mount the controller cabinet on the Sign support structure. Install cabinet so that the height from the ground to the middle of the cabinet is 4 feet. Ensure a minimum of 24" x 36" level concrete working surface under each cabinet that provides maintenance technicians with a safe working environment.

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

For DMS Type 4C installations provide a single controller that can control up to eight (8) signs simultaneously.

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

- Power supply and distribution assemblies,
- Power line filtering hybrid surge protectors,
- Radio Interference Suppressor,
- Communications surge protection devices,
- Industrial-Grade UPS system and local disconnect,
- Microprocessor based controller,
- Display driver and control system (unless integral to the DMS),
- RJ45 Ethernet interface port,

- Local user interface,
- Interior lighting and duplex receptacle,
- Adjustable shelves as required for components,
- Temperature control system,
- All interconnect harnesses, connectors, and terminal blocks,
- All necessary installation and mounting hardware.

Furnish the DMS controller and associated equipment completely housed in a Caltrans 336S cabinet made from 5052 H32 sheet aluminum at least 1/8" thick. Use natural aluminum cabinets. Perform all welding of aluminum and aluminum alloys in accordance with the latest edition of AWS D1.2, Structural Welding Code – Aluminum. Continuously weld the seams using Gas Metal Arc Welding (GMAW).

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

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

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

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

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

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

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

Provide a convenient location on the inside of the door to store the cabinet wiring diagrams and other related cabinet drawings. Provide a Corbin #2 main door lock made of non-ferrous or stainless-steel material. Key all locks on the project alike and provide 1 key per lock to the Engineer. In addition, design the handle to permit padlocking.

Provide the interior of the cabinet with ample space for housing the controller and all associated equipment and wiring. Provide ample space in the bottom of the cabinet for the entrance and exit of all power, communications, and grounding conductors and conduit.

Arrange the equipment to permit easy installation of the cabling through the conduit so that they will not interfere with the operation, inspection, or maintenance of the unit. Provide adjustable metal shelves, brackets, or other support for the controller unit and auxiliary equipment. Leave a 3-inch minimum clearance from the bottom of the cabinet to all equipment, terminals, and bus bars.

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

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

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

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

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

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

### **Wiring**

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

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

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



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

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

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

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

Label all equipment and equipment controls clearly.

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

### **Power Supply and Circuit Protection**

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

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

### **Circuit Breakers**

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

Provide a subpanel in the sign enclosure with a main and branch circuit breakers sized appropriately per NEC.

Provide a detailed plan for power distribution within the cabinet and the sign. Label all breaker and conductor with size and loads. Have the plans signed and sealed by a NC registered PE and submit the plans for review and approval.

## Surge Suppressor

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

Provide power line surge protector that meets the following requirements:

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

\*Capable of handling the continuous current to the equipment

## Transients and Emissions

DMS and DMS controller will be designed in such a way to meet the latest NEMA TS-4 for Transients and Emissions.

### Transient Protection

The RS232 and Ethernet communication ports in the DMS sign controller shall be protected with surge protection between each signal line and ground. This surge protection shall be integrated internally within the controller.

## Lightning Arrester

Protect the system with an UL approved lightning arrester installed at the main service disconnect that meets the following requirements:

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

### **Uninterruptible Power Supply (UPS)**

Furnish UPS with external temperature monitoring that will shut off when running on battery power and the maximum operating temperature for the ethernet switch is reached.

Install UPS with RJ-45 ethernet network monitoring ports that can be disabled via the UPS software/firmware.

The Design-Build Team is responsible for supplying a UPS and batteries that can adequately power the cabinet load plus an additional 20% for a **minimum** of 4 hours. The Design-Build Team shall request the power requirements for any department supplied equipment prior to submitting UPS for approval. Allow eight (8) weeks for the department to supply equipment power requirements. Provide to the Engineer for Approval, a submittal package with Engineering Calculations consisting of, as a minimum, schematic drawing, technical data sheets, and supporting documentation. Ensure the documentation demonstrates, in theory, that the battery(ies) will provide for continuous operation for a minimum of four (4) consecutive hours with no additional charging.

Furnish and install one rack mounted UPS in each new cabinet that meet the following **minimum** specifications:

#### **Output**

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

#### **Input**

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

#### **Battery Type**

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

Typical recharge time	2 hours
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**Communications & Management**

Interface Port(s)	DB-9 RS-232, USB,RJ-45 Ethernet
Control panel battery	LED status display with load and bar-graphs

**Surge Protection and Filtering**

Surge energy rating	480 Joules
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**Environmental**

Operating Environment	-32 - 165 °F
Operating Relative Humidity	0 - 95%

**Conformance**

Regulatory Approvals	FCC Part 15 Class A, UL 1778
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**Controller Communications Interface**

Provide the controller with the following interface ports:

- An EIA/TIA-232E port for remote communication using NTCIP,
- An 10/100 Ethernet port for remote communication using NTCIP,
- An EIA/TIA-232E port for onsite access using a laptop,
- An EIA/TIA-232E auxiliary port for communication with a field device such as a UPS,
- Fiber-optic ports for communication with the sign,

**Controller Local User Interface**

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

- On / Off Switch: controls power to the controller,
- Control Mode Switch: for setting the controller operation mode to either remote or local mode,
- Display and Keypad: Allow user to navigate through the controller menu for configuration (display, communications parameter, etc.) running diagnostics, viewing peripherals status, message creation, message preview, message activation, etc. Furnish a display with a minimum size of 240x64 dots with LED back light.

Protected access to the LUI with an alphanumeric and PIN passwords. Allow the user to select a preferred method of password protection. Default and hardcoded passwords are not allowed.

**Controller Address**

Assign each DMS controller a unique address. Preface all commands from the Control Software with a particular DMS controller address. The DMS controller compares its

address with the address transmitted; if the addresses match, then the controller processes the accompanying data.

### **Controller Functions**

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

Provide the DMS controller with a watchdog timer to detect controller failures and to reset the microprocessor, and with a battery backed up clock to maintain an accurate time and date reference. Set the clock through an external command from the Control Software or the Local User Interface.

### **DMS Controller Memory**

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

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

### **Equipment List**

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

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

### **Physical Description**

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

**Parts List**

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

**Character Set Submittal**

Submit an engineering drawing of the DMS character set including at a minimum, 26 upper case and lower case letters, 10 numerals, 9 punctuation marks (. , ! ? - ' " ; :) 12 special characters (# & \* + / ( ) [ ] < > @ ) and arrows at 0, 45, 90, 135, 180, 225, 270, and 315 degrees.

**Wiring Diagrams**

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

**Routine of Operation**

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

**Maintenance Procedures**

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

**Repair Procedures**

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

Describe accuracy, limits, and tolerances for all electrical, physical, or other applicable measurements. Include instructions for disassembly, overhaul, and reassembly, with shop specifications and performance requirements.

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

### **Warranty**

Ensure that the DMS system and equipment has a manufacturer's warranty covering all defects and failures for a minimum of five (5) years from the date of final acceptance by the Engineer. This warranty will cover all parts, labor, shipping, and any other costs associated with the repair of the DMS.

## **CONSTRUCTION METHODS**

### **Description**

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

Provide electrical equipment described in this specification that conforms to the standards of NEMA, UL, or Electronic Industries Association (EIA), wherever applicable. Provide connections between DMS equipment and DMS sign housing and electric utilities that conform to NEC standards.

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

### **Layout**

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

**Construction Submittal**

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

The "as built" plans will show: the DMS, controller, and service pole locations; DMS enclosure and controller cabinet wiring layouts; Wiring Diagrams, Parts list; coordinates of the DMS and devices; and wire and conduit routing. Show horizontal and vertical locations of all underground conduits and cables dimensioned from fixed objects.

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

**Conduit**

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

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

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

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

Flexible conduit will only be allowed when the conduits transition from the horizontal structure segment to the horizontal truss segment and from the horizontal truss segment to the rear entrance of the DMS when installing the DMS communications and feeder cables. The maximum length of flexible conduit allowed at each transition will be 5 feet.

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

**Wiring Methods (Power)**

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

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



Do not splice underground circuits unless specifically noted in the plans developed by the Design-Build Team.

### **Equipment and Cabinet Mounting**

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

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

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

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

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

Install a level concrete technician pad measuring a minimum 4 inches thick, 36 inches wide and 36 inches long at the front door of the DMS equipment cabinet as shown on the Typical Details sheet within the plans developed by the Design-Build Team.

### **Work Site Clean-Up**

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

### **General Test Procedure**

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

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

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

- A step-by-step outline of the test sequence that demonstrates the testing of every function of the equipment or system tested

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

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

Conform to these testing requirements and the requirements of these specifications. It is the Design-Build Team's responsibility to ensure the system functions properly even after the Engineer accepts the CCTV test results.

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

### **Compatibility Tests**

#### **DMS System**

Compatibility Tests are applicable to DMS that the Design-Build Team wishes to furnish but are of a different manufacturer or model series than the existing units installed in the Region. If required, the Compatibility Test shall be completed and accepted by the Engineer prior to approval of the material submittal.

The Compatibility Test shall be performed in a laboratory environment at a facility chosen by the Engineer based on the type of unit being tested. Provide notice to the Engineer with the material submitted that a Compatibility Test is requested. The notice shall include a detailed test plan that will show compatibility with existing equipment. The notice shall be given a minimum of 15 calendar days prior to the beginning of the Compatibility Test.

The Design-Build Team shall provide, install, and integrate a full-functioning unit to be tested. The Department will provide access to existing equipment to facilitate these testing procedures. The Engineer will determine if the Compatibility Test was acceptable for each proposed device. To prove compatibility the Design-Build Team is responsible for configuring the proposed equipment at the applicable Traffic Operations Center (TOC) with the accompaniment of an approved TOC employee.

#### ***Operational Field Test (On-Site Commissioning)***

#### **DMS System**

Final DMS locations must be field verified and approved by the Engineer. Perform the following local operational field tests at the DMS assembly field site in accordance with the test plans in the presence of the ITS Design Unit and a representative of the DMS manufacturer. The Design-Build Team is responsible for providing a laptop for camera control and positioning during the test. After completing the installation of the camera assemblies, including the camera hardware, power supply, and connecting cables, the Design-Build Team shall:

**Local Field Testing**

Furnish all equipment and labor necessary to test the installed camera and 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, check connection of devices to power source.
- Verify installation of specified cables and connection between the DMS and control cabinet,
- Make sure cabinet wiring is neat and labeled properly; check wiring for any wear and tear; check for exposed or loose wires.
- Perform the DMS assembly manufacturer's initial power-on test in accordance with the manufacturer's recommendation.
- Set the DMS control address.

**Central Operations Testing**

- Interconnect the DMS's communication interface device with one of the following methods as depicted on the plans:
  - communication network's assigned Ethernet switch and assigned fiber-optic trunk cable and verify a transmit/receive LED is functioning and that the DMS is fully operational at the TOC.

AND/OR

- to the DOT furnished cellular modem and verify a transmit/receive LED is functioning and that the DMS is fully operational at the TOC.
- Review DMS date and time and DMS controller information.
- Run DMS diagnostics and review results.
- Run DMS pixel test and review results.
- Run test message.
- Run test schedule.
- Program burn-in scenario.

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

**DIGITAL CCTV CAMERA ASSEMBLY****Description**

Furnish and install a Digital CCTV Camera Assembly as described in these Project Special Provisions. All new CCTV cameras shall be fully compatible with the video management software currently in use by the Region and the Statewide Traffic Operations Center (STOC). Provide a Pelco Spectra Enhanced low light 30X minimum zoom, Axis Dome Network Camera low light 30X minimum zoom or an approved equivalent that meets the requirements of these Project Special Provisions.

**Materials****General**

Furnish and install new CCTV camera assembly at the locations shown on the plans developed by the Design-Build Team and as approved by the Engineer. Each assembly consists of the following:

- One dome CCTV color digital signal processing camera unit with zoom lens, filter, control circuit, and accessories in a single enclosed unit
- A NEMA-rated enclosure constructed of aluminum with a clear acrylic dome or approved equal Camera Unit housing.
- Motorized pan, tilt, and zoom
- Built-in video encoder capable of H.264 / MPEG-4 compression for video-over IP transmission
- Pole-mount camera attachment assembly
- A lightning arrestor installed in-line between the CCTV camera and the equipment cabinet components.
- All necessary cable, connectors and incidental hardware to make a complete and operable system.

**A. Camera and Lens****Cameras**

Furnish a new CCTV camera that utilizes charged-coupled device (CCD) technology or Complementary Metal-Oxide-Semiconductor (CMOS) technology. The camera shall meet the following minimum requirements:

- Video Resolution: Minimum 1920x1080 (HDTV 1080p)
- Aspect Ratio: 16:9
- Overexposure protection: The camera shall have built-in circuitry or a protection device to prevent any damage to the camera when pointed at strong light sources, including the sun
- Low light condition imaging
- Wide Dynamic Range (WDR) operation
- Electronic Image Stabilization (EIS)
- Automatic focus with manual override

**Zoom Lens**

Furnish each camera with a motorized zoom lens that is a high-performance integrated dome system or approved equivalent with automatic iris control with manual override and neutral density spot filter. Furnish lenses that meet the following optical specifications:

- 30X minimum optical zoom, and 12X minimum digital zoom
- Preset positioning: minimum of 128 presets

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

**Communication Standards:**

The CCTV camera shall support the appropriate NTCIP 1205 communication protocol (version 1.08 or higher), ONVIF Profile G protocol, or approved equal.

**Networking Standards:**

- Network Connection: 10 / 100 Mbps auto-negotiate
- Frame Rate: 30 to 60 fps
- Data Rate: scalable
- Built-in Web Server
- Unicast & multicast support
- Two simultaneous video streams (Dual H.264 and MJPEG):
  - Video 1: H.264 (Main Profile, at minimum)
  - Video 2: H.264 or MJPEG
- Supported Protocols: DNS, IGMPv2, NTP, RTSP, RTP, TCP, UDP, DHCP, HTTP, IPv4, IP6
- 130 db Wide Dynamic Range (WDR)

The video camera shall allow for the simultaneous encoding and transmission of the two digital video streams, one in H.264 format (high-resolution) and one in H.264 or MJPEG format (low-resolution).

Initially use UDP / IP for video transport and TCP / IP for camera control transport unless otherwise approved by the Engineer.

The 10 / 100 BaseTX port shall support half-duplex or full-duplex and provide auto negotiation and shall be initially configured for full-duplex.

The camera unit shall be remotely manageable using standard network applications via web browser interface administration. Telnet or SNMP monitors shall be provided.

### **C. Camera Housing**

Furnish new dome style enclosure for the CCTV assembly. Equip each housing with mounting assembly for attachment to the CCTV camera pole. The enclosures shall be equipped with a sunshield and be fabricated from corrosion resistant aluminum and finished in a neutral color of weather resistant enamel. The enclosure shall meet or exceed NEMA 4X ratings. The viewing area of the enclosure shall be tempered glass. The pendant shall meet NEMA Type 4X, IP66 rating and use 1-1/2-inch NPT thread. The sustained operating temperature shall be -50 to 60C (-58 to 144F), condensing temperature 10 to 100% Relative Humidity (RH).

### **D. Pan and Tilt Unit**

Equip each new dome style assembly with a pan and tilt unit. The pan and tilt unit shall be integral to the high-performance integrated dome system. The pan and tilt unit shall be rated for outdoor operation, provide dynamic braking for instantaneous stopping, prevent drift, and have minimum backlash. The pan and tilt units shall meet or exceed the following specifications:

- Pan: continuous 360 Degrees rotation
- Tilt: up / down +2 to -90 degrees minimum
- Motors: Two-phase induction type, continuous duty, instantaneous reversing
- Preset Positioning: minimum of 128 presets
- Low latency for improved Pan and Tilt Control
- FCC, Class A; UL / cUL Listed

### **E. Video Ethernet Encoder**

Furnish cameras with a built-in digital video Ethernet encoder to allow video-over-IP transmission. The encoder units shall be built into the camera housing and require no additional equipment to transmit encoded video over IP networks.

Encoders shall have the following minimum features:

- Network Interface: Ethernet 10 / 100 Base-TX (RJ-45 connector)
- Protocols: IPv4, Ipv6, HTTP, UpnP, DNS, NTP, RTP, RTSP, TCP, UDP, IGMP, and DHCP
- Security: SSL, SSH, 802.1x, HTTPS encryption with password-controlled browser interface
- Video Streams: Minimum 2 simultaneous streams, user configurable
- Compression: H.264 (MPEG-4 Part 10 / AVC)
- Resolution Scalable: NTSC-compatible 320x176 to 1920x1080 (HDTV 1080p)
- Aspect Ratio: 16:9
- Frame Rate: 1-30 FPS programmable (full motion)
- Bandwidth: 30 kbps – 6 Mbps, configurable depending on resolution
- Edge Storage: SD / SDHC / SDXC slot supporting up to 64GB memory card

**F. Control Receiver / Driver**

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

- Zoom in / out
- Automatic focus with manual override
- Tilt up / down
- Automatic iris with manual override
- Pan right / left
- Minimum 128 preset positions for pan, tilt, and zoom, 16 Preset Tours, 256 Dome Presets
- Up to 32 Window Blanks.

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

**G. Electrical**

The camera assembly shall support Power-over-Ethernet (PoE) in compliance with IEEE 802.3. Provide any external power injector that is required for PoE with each CCTV assembly.

**H. CCTV Camera Attachment to Pole**

Furnish and install an attachment assembly for the CCTV camera unit. Use stainless steel banding approved by the Engineer.

Furnish CCTV attachments that allow for the removal and replacement of the CCTV enclosure as well as providing a weatherproof, weather tight, seal that does not allow moisture to enter the enclosure.

Furnish a CCTV Camera Attachment Assembly that can withstand wind loading at the maximum wind speed and gust factor called for in these Special Provisions and can support a minimum camera unit dead load of 45 pounds (20.4 kg).

**I. Riser**

Furnish material meeting the requirements of Section 1091-3 and 1098-4 of the 2018 *Standard Specifications for Roads and Structures*. Furnish a one-inch riser with weatherhead for instances where the riser is only carrying an Ethernet cable. For installations where fiber optic cable is

routed to the cabinet through a two-inch riser with heat shrink tubing the Design-Build Team may elect to install the Ethernet cable in the same riser with the fiber cable.

#### **J. Data line Surge Suppression**

Furnish data line surge protection devices (SPD) shall meet the following minimum requirements:

- UL497B
- Service Voltage: < 60 V
- Protection Modes: L-G (All), L-L (All)
- Response Time: < 5 nanoseconds
- Port Type: Shielded RJ-45 IN / Out
- Clamping Level: 75 V
- Surge Current Rating: 20 kA / Pair
- Power Handling: 144 Watts
- Data Rate: up to 10 GbE
- Operating Temperature: -40° F to + 158° F
- Standards Compliance: Cat-5e, EIA / TIA 568A and EIA / TIA 568B
- Warranty: Minimum of 5-year limited warranty

The data line surge protector shall be designed to operate with Power Over Ethernet (POE) devices. The SPD shall be designed such that when used with shielded cabling, a separate earth ground is not required. It shall be compatible with Cat-5e, Cat 6, and Cat-6A cablings.

Protect the electrical and Ethernet cables from the CCTV unit entering the equipment cabinet with surge protection. Provide an integrated unit that accepts unprotected electrical and Ethernet connections and outputs protected electrical and Ethernet connections.

#### **K. POE Injector**

Furnish POE Injectors meeting the following minimum performance requirements and that is compatible with the CCTV Camera and Ethernet Switch provided for the project.

- Working temp / humidity: 14° F to 131° F / maximum 90%, non-condensing
- Connectors: Shielded RJ-45, EIA 568A and EIA 568B
- Input Power: 100 to 240 VAC, 50 to 60 Hz
- Pass Through Data Rates: 10 / 100 / 1000 Mbps
- Regulatory: IEEE 802.3at (POE)
- Number of Ports: 1 In and 1 Out
- Safety Approvals: UL Listed

Ensure the POE Injector is designed for Plug-and-Play installation, requiring no configurations and supports automatic detection and protection of non-standard Ethernet Terminal configurations.



**Construction Methods****General**

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

Mount CCTV camera units at a height to adequately see traffic in all directions and as approved by the Engineer. The maximum attachment height is 45 feet above ground level unless specified elsewhere or directed by the Engineer.

Mount the CCTV camera units such that a minimum five feet of clearance is maintained between the camera and the top of the pole.

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

Install the data line surge protection device and POE Injector in accordance with the manufacturer's recommendations.

Install the riser in accordance with Section 1722-3 of the 2018 *Standard Specifications for Roads and Structures*. Install the Ethernet cable in the riser from the field cabinet to the CCTV camera.

**Electrical and Mechanical Requirements**

Install an "Air Terminal and Lightning Protections System" in accordance with the Air Terminal and Lightning Protection System Specification for the CCTV Camera Assembly. Ground all equipment as called for in the 2018 *Standard Specifications for Roads and Structures*, these Project Special Provisions, and the plans developed by the Design-Build Team.

Install surge protectors on all ungrounded conductors entering the CCTV enclosure.

**GENERAL TEST PROCEDURE**

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

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

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

- A step-by-step outline of the test sequence that demonstrates the testing of every function of the equipment or system tested
- A description of the expected nominal operation, output, and test results, and the pass / fail criteria
- An estimate of the test duration and a proposed test schedule

- A data form to record all data and quantitative results obtained during the test
- A description of any special equipment, setup, manpower, or conditions required by the test

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

Conform to these testing requirements and the requirements of these specifications. It shall be the Design-Build Team's responsibility to ensure the system functions properly even after the Engineer accepts the CCTV test results.

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

## **COMPATIBILITY TESTS**

### **A. CCTV System**

Compatibility Tests shall be applicable to CCTV cameras that the Design-Build Team wishes to furnish but are of a different manufacturer or model series than the existing units installed in the Region. If required, the Compatibility Test shall be completed and accepted by the Engineer prior to approval of the material submittal.

The Compatibility Test shall be performed in a laboratory environment at a facility chosen by the Engineer based on the type of unit being tested. Provide notice to the Engineer with the material submitted that a Compatibility Test is requested. The notice shall include a detailed test plan that will show compatibility with existing equipment. The notice shall be given a minimum of 15 calendar days prior to the beginning of the Compatibility Test.

The Design-Build Team shall provide, install, and integrate a full-functioning unit to be tested. The Department will provide access to existing equipment to facilitate these testing procedures. The Engineer will determine if the Compatibility Test was acceptable for each proposed device. To prove compatibility the Design-Build Team shall be responsible for configuring the proposed equipment at the applicable Traffic Operations Center (TOC) with the accompaniment of an approved TOC employee.

## **OPERATIONAL FIELD TEST (ON-SITE COMMISSIONING)**

### **B. CCTV System**

Final CCTV locations shall be field verified and approved by the Engineer. Perform the following local operational field tests at the camera assembly field site in accordance with the test plans. The Design-Build Team is responsible for providing a laptop for camera control and positioning during the test. After completing the installation of the camera assemblies, including the camera hardware, power supply, and connecting cables, the Design-Build Team shall:

**Local Field Testing**

Furnish all equipment and labor necessary to test the installed camera and 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, check connection of devices to power source.
- Verify installation of specified cables and connection between the camera, PTZ, camera control receiver, and control cabinet.
- Make sure cabinet wiring is neat and labeled properly; check wiring for any wear and tear; check for exposed or loose wires.
- Perform the CCTV assembly manufacturer's initial power-on test in accordance with the manufacturer's recommendation.
- Set the camera control address.
- Exercise the pan, tilt, zoom, and focus operations along with preset positioning, and power on / off functions.
- Demonstrate the pan, tilt and zoom speeds and movement operation meet all applicable standards, specifications, and requirements.
- Define, test and / or change presets.
- Ensure camera field of view is adjusted properly and there are no objects obstructing the view.
- Ensure camera lens is dust-free.
- Ensure risers are bonded and conduits entering cabinets are sealed properly.
- Lightning arrestor bonded correctly.

**Central Operations Testing**

- Interconnect the CCTV Camera's communication interface device with one of the following methods as depicted on the plans developed by the Design-Build Team:
  - communication network's assigned Ethernet switch and assigned fiber-optic trunk cable and verify a transmit / receive LED is functioning and that the CCTV camera is fully operational at the TOC.
- OR
- to the DOT furnished cellular modem and verify a transmit / receive LED is functioning and that the CCTV camera is fully operational at the TOC.

- Exercise the pan, tilt, zoom, and focus operations along with preset positioning, and power on / off functions.
- Demonstrate the pan, tilt and zoom speeds and movement operation meet all applicable standards, specifications, and requirements.
- Define, test and / or change presets.

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

### **CCTV FIELD EQUIPMENT CABINET**

#### **Description**

For standalone CCTV Camera installations, furnish pole mounted cabinets and all necessary hardware in accordance with the plans and specifications to house CCTV control and transmission equipment.

#### **Materials**

##### **CCTV Cabinet**

Furnish Type 336S style or equivalent pole-mounted cabinet meeting the following minimum requirements:

- Single doors on both front and rear of cabinet;
- Grounding bus bar;
- 19-inch rack system for mounting of all devices in the cabinet;
- Pull-out shelf drawer for laptop and maintenance use;
- Maintenance access connections;
- LED lighting;
- Ventilation fans;
- 120VAC power supply;
- 120VAC ground fault circuit interrupter (GFCI)-protected duplex outlets for tools;
- 120VAC surge-protected duplex outlets for equipment.
- Lightning and surge protection on incoming and outgoing electrical lines (power and data);
- UPS with sufficient capacity to hold hub's electrical load for 4 hours.
- Managed Ethernet Edge switch if called for in the plans (paid separately);
- Fiber-optic interconnect centers if called for in the plans (paid separately)

Furnish terminal blocks for power for cabinet CCTV and communications devices as needed to accommodate the number of devices in the cabinet.

Furnish all conduits, shelving, mounting adapters, and other equipment as necessary to route cabling, mount equipment and terminate conduit in the equipment cabinet.

### **Shelf Drawer**

Provide a pull out, hinged-top drawer, having sliding tracks, with lockout and quick disconnect feature, such as a Vent-Rak Retractable Writing Shelf, #D-4090-13 or equivalent in the equipment cabinet. Furnish a pullout drawer that extends a minimum of 14 inches that is capable of being lifted to gain access to the interior of the drawer. Minimum interior dimensions of the drawer are to be 1 inch high, 13 inches deep, and 16 inches wide. Provide drawers capable of supporting a 40-pound device or component when fully extended.

### **Cabinet Light**

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

### **Surge Protection for System Equipment**

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

#### **1. Main AC Power Input**

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

- Maximum AC line voltage: 140 VAC.
- Twenty pulses of peak current, each of which must rise in 8 microseconds and fall in 20 microseconds to  $\frac{1}{2}$  the peak: 20000 Amperes.
- The protector must be provided with the following terminals:
  - Main Line (AC Line first stage terminal).
  - Main Neutral (AC Neutral input terminal).
  - Equipment Line Out (AC line second state output terminal, 19 amps).
  - Equipment Neutral Out (Neutral terminal to protected equipment).
  - GND (Earth connection).
- The Main AC line in and the Equipment Line out terminals must be separated by a 200 Microhenry (minimum) inductor rated to handle 10 AMP AC Service.
- The first stage clamp must be between Main Line and Ground terminals.
- The second stage clamp must be between Equipment Line Out and Equipment Neutral.

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

## **2. Ground Bus**

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

## **3. Uninterruptible Power Supply (UPS)**

Furnish UPS with external temperature monitoring that will shut off when running on battery power and the maximum operating temperature for the ethernet switch is reached.

Install UPS with RJ-45 ethernet network monitoring ports that can be disabled via the UPS software/firmware.

The Design-Build Team is responsible for supplying a UPS and batteries that can adequately power the cabinet load plus an additional 20% for a **minimum** of 4 hours. The Design-Build Team shall request the power requirements for any department supplied equipment prior to submitting UPS for approval. Allow eight (8) weeks for the department to supply equipment power requirements. Provide to the Engineer for Approval, a submittal package with Engineering Calculations consisting of, as a minimum, schematic drawing, technical data sheets, and supporting documentation. Ensure the documentation demonstrates, in theory, that the battery(ies) will provide for continuous operation for a minimum of four (4) consecutive hours with no additional charging.

Furnish and install one rack mounted UPS in each new cabinet that meet the following **minimum** specifications:

### **Output**

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

### **Input**

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

### **Battery Type**

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

Typical recharge time	2 hours
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### **Communications & Management**

Interface Port(s)	DB-9 RS-232, USB,RJ-45 Ethernet
Control panel	LED status display with load and
battery	bar-graphs

### **Surge Protection and Filtering**

Surge energy rating	480 Joules
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### **Environmental**

Operating Environment	-32 - 165 °F
Operating Relative Humidity	0 - 95%

### **Conformance**

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

### **General**

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

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

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

### **CCTV WOOD POLE**

#### **Description**

Furnish and install wood poles, grounding systems and all necessary hardware for CCTV camera installations. Reference applicable Sections of Article 1720 of the 2018 *Standard Specifications for Roads and Structures* for Materials and Construction.

Furnish an air terminal and lightning protection system in accordance with the *Air Terminal & Lightning Protection System* Project Special Provision found elsewhere in this RFP.

Furnish and install wood poles with grounding systems and all necessary hardware in accordance with Section 1720 of the 2018 *Standard Specifications for Roads and Structures*.

#### **Materials**

Material, equipment, and hardware furnished under this section shall be pre-approved on the Department's QPL. For Wood poles refer to Sub articles 1082-3(F) Treated Timber and Lumber – Poles and 1082-4(A) – General; 1082-4 (B) – Timber Preservatives; 1082-4(G) – Poles; in the 2018 *Standard Specifications for Roads and Structures*.

#### **CCTV Wood Pole**

Unless otherwise specified in the plans developed by the Design-Build Team, furnish Class 3 or better wood poles that are a minimum of 60 feet long to permit the CCTV camera to be mounted approximately 45 feet above the ground and a minimum five feet from the top of the pole.

## **CONSTRUCTION METHODS**

Mark final pole locations and receive approval from the Engineer before installing poles. Comply with all requirements of Section 1720-3 of the 2018 *Standard Specifications for Roads and Structures*.



Install the required Air Terminal & Lightning Protection System as described in the *Air Terminal & Lighting Protection* Project Special Provision found elsewhere in this RFP and as referenced in the following Typical Details:

- CCTV Camera Installation for Wood Pole with Aerial Electrical Service
- CCTV Camera Installation for Wood Pole with Underground Electrical Service

### **PORTABLE CCTV CAMERA and TRAILER**

#### **Description**

The Design-Build Team shall furnish, install, operate, maintain, relocate and remove a Portable CCTV Camera, designed to be towed by a ½ ton and ¾ ton pickup truck and erected in work zones and on roadside right of ways for remote video monitoring and incident management. Ensure the CCTV Camera equipment is fully compatible with all features of the existing video management software (Protronix Video Pro) currently in use by NCDOT in this region and at the Statewide Traffic Operations Center (STOC).

Furnish, deploy, install, test, integrate and make fully operational the new Portable CCTV Camera assembly at the location described or shown in the plans developed by the Design-Build Team and / or as directed by the Engineer. Contact the Engineer to confirm the Portable CCTV Camera assembly location prior to deploying in the field.

Each unit shall be new, and of the latest design of a model in current production or an update of an existing model. Prototype equipment shall not be acceptable. Each unit shall be furnished with identical and interchangeable equipment, options and features. It shall be furnished completely assembled, fully serviced, and ready for immediate operation.

The Department will provide a cellular modem to establish the communications link between the Portable CCTV Camera and the State Traffic Operations Center (STOC).

#### **Trailer**

The trailer shall be specifically designed to support and secure the Portable CCTV assembly, photovoltaic power source and other systems both in a deployed and travel position. It shall be capable of being towed at 65 miles per hour over extensive distances. Provide trailers that comply with Federal Motor Safety Regulations 393.

#### **Trailer Construction**

The frame including the trailer tongue shall be designed, constructed, and rated for the full capacity of the trailer. The frame shall be constructed of 3" x 3" and 3" x 5" square steel tubing (ASTM A36) with a minimum of 3/16 inch wall thickness and welded in accordance with applicable American Welding Society (AWS) standards. If counterweights are required, they shall be incorporated as an integral part of the frame. Provide a mast support assembly that shall safely support the camera mount and CCTV Camera when they are not deployed, and the trailer is in travel mode and when the camera mount and CCTV Camera are deployed. Provide the

trailer with heavy-duty fenders capable of supporting a minimum of 200 pounds. Ensure the fenders are designed to minimize road surface water and debris from being thrown up on to the trailer equipment when being transported.

The towing tongue or drawbar shall be removable and shall include a two-inch ball hitch. The trailer shall tow level when attached to a two-inch ball mounted 18 inches high. Ensure the trailer tongue is removable and that no tools are required to remove or re-install the tongue. Provide an electrical connector for separation of the trailer safety lighting system where the trailer tongue connects to the trailer. Ensure the trailer tongue is rated for 6,000 lbs. Provide a tongue jack stand that shall be heavy-duty; swivel mount castor wheel type design with a 1,200 lb. capacity (minimum). Ensure the tongue jack stand can be swiveled up and out of the way and held in place by a locking mechanism for transporting the trailer.

Safety chains shall be provided, of adequate length, meeting SAE J-697 Standard, latest edition. Chain shall be a minimum of 5/16 inch, and meet the National Association of Chain Manufacturer's (NACM) welded chain standard rating of Grade 70 with a Working Load Limit of 4700 lbs.

The trailer, springs and axels shall be rated for 2,500 lbs. and supplied with 15 inches (minimum) radial tires. Total combined load rating of the tires and wheels shall exceed the GVWR of the unit. Load ratings shall be determined by reference to the current yearbook of the Tire and Rim Association, Inc., or the manufacturer's published load rating. Tire ratings shall be calculated at 65 mph.

Trailer GVWR shall not exceed 2,500 lbs. so a trailer braking system shall not be required. The trailer shall not require any special towing package, electric brakes or specialized heavy-duty truck to tow.

The trailer shall include a leveling system to allow for the trailer to be in a stable and level position when the jack legs are deployed. The trailer shall be equipped with four (4) crank style leveling jacks, one at each corner of the trailer that extend straight down with adequate lifting capacity and a large steel footpad to level and stabilize the trailer. Ensure the leveling jacks can be swiveled up and out of the way and held in place by a locking mechanism for transporting the trailer.

### **Lights / Reflectors and Safety Markings**

The trailer shall be equipped with lights and reflectors in compliance with applicable North Carolina motor vehicle laws and the Federal Motor Safety Carrier Regulations, including turn signals, dual taillights, and brake lights.

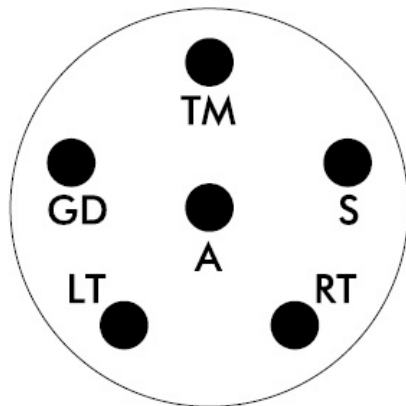
An illuminated license plate holder shall be mounted so that a license plate is protected and does not extend past sides of fenders.

The trailer sides and rear shall be marked with continuous red / white striped retroreflective tape in a pattern meeting applicable NHTSA (DOT) regulations using certified retroreflective

material meeting ASTM D4956. The tape shall be three inches wide and installed in a repeating pattern of 11 inches long (red) followed by seven inches long (white).

Provide a standard six-way plug and receptacle connector, equal to and interchangeable with a Velvac 055049 assembly, and a heavy-duty jacketed multi-conductor cable shall be furnished for connecting the truck and trailer wiring system. All wiring shall be properly protected and secured. The receptacle shall be furnished loose, while the cable and plug shall be attached to the trailer in sufficient length to reach a truck-mounted receptacle, additionally provide an intermediate electrical connector where the wiring harness leaves the removeable tongue and the trailer body. The plug shall be connected to the trailer wiring system in accordance with the following drawing:

### 6-Way Trailer Connection



Letter Code	Trailer Color Code
GD – Brake Wire Ground	WHITE
TM – Tail & Marker Lamp	BLACK
S – Stop Lamp	RED
RT – Right Turn Signal	GREEN
LT – Left Turn Signal	YELLOW
A – Live Brake Wire	BROWN

### Solar Power System

The CCTV Camera shall be powered by a photovoltaic system consisting of photovoltaic panels, deep-cycle batteries, solar charge controller and ancillary equipment and wiring. Under normal conditions, the power system should automatically recharge the battery system with no manual intervention. A motorized power supply requiring fossil fuels (e.g., gas, diesel generators, etc.) is not acceptable, however the system shall be designed and supplied with a NEMA L6-20 locking receptacle in an outdoor rated enclosure to allow for use of a stand-by generator or land-power (120V, single phase) when necessary. Land-Power can be used to charge the batteries when the units are in storage.

The unit shall satisfactorily operate in all weather conditions between -40 degrees F and +165 degrees F.

A bank of batteries forming a 12 VDC system shall power the unit during standard operations. The battery bank shall consist of six VDC deep cycle heavy duty lead / acid batteries wired in series / parallel as to form a 12 VDC system. Warranty service for the power source batteries shall be locally available on a nationwide basis.

The charging system for a trailer mounted device shall be solar, consisting of a photovoltaic array supplying electrical energy to the batteries through a solar regulator. The system shall

provide “on demand” charging consistent with battery condition and with the ambient solar luminance at the photovoltaic array. The trailer shall also be equipped with a standard 120 VAC receptacle as well as a temperature-stable 120 VAC battery trickle charger and ammeter. The 120 VAC charging system shall initiate charging automatically when 120 VAC service is connected and shall be capable of completely charging the battery pack within a 24 to 48 - hour time period. The actual charging time will vary depending upon conditions and state of charge / discharge of the batteries.

A Maximum Power Point Tracking (MPPT) solar charge controller shall be provided and solar charging circuitry shall include voltage regulators and automatic battery temperature compensation control circuitry components to prevent battery overcharging. Batteries shall be of the deep-cycle golf cart type / acid batteries (BCI Group GC-2) type. Ensure the battery capacity is adequate to operate the CCTV Camera continuously for at least 20 days with no external charging (no sunlight). Additionally, provide a trickle charger circuitry to allow for standby generator or Land-Power operation when necessary. The system shall have the ability to remotely disconnect the power to the camera load when the available operating power falls below a specified threshold voltage.

The photovoltaic panels shall be mounted to the trailer structure in a rigid steel frame. The photovoltaic panel assembly shall be designed with tilt and rotation capabilities. For travel, ensure that the photovoltaic panel assembly is mounted so as not to interfere with the mast and camera. The panels and panel assembly shall be attached using anti-theft fasteners. Panels shall have tempered glass faces and be sealed.

**The vendor, upon request, shall provide solar panel specifications including dimensions, voltage, wattage and the number of panels and cells to be used. Additionally, the vendor shall provide load calculations for the photovoltaic power system to operate the CCTV Camera and its supporting components in accordance with these specifications.**

Loads for NCDOT furnished equipment are shown below. The solar and load calculations shall be performed and certified by a certified NABCEP Solar PV Installation Professional. The Manufacturer shall specify the power requirements for each component of the system including the camera, digital cellular modem and any other electrical loads present during normal operation.

The trailer shall include a NEMA 4X hinged, lockable enclosure to contain the power system control components to operate the CCTV Camera system, unless these components are located in a separate compartment within the battery compartment. The battery enclosure shall be lockable to prevent unauthorized access to the battery(s) and control components. All locks shall be keyed to accept a Corbin #2 key.

Additionally, a separate 12 x 12 x 6 (minimum) NEMA 4X hinged, lockable enclosure shall be provided to install switches, cellular communications modules, and control equipment for the CCTV Camera assembly.

The power system including solar panels shall be mounted onto the trailer and shall not exceed the dimensions of the trailer or cause the trailer GVWR (2,500 lb.) to be exceeded.

**Equipment Variables (Typical) for Power Usage Calculations**

- 1) Sierra Wireless Modem (Typical) – Provided by NCDOT  
Transmit / Receive (Typical / Max) – 230 mA / 440mA @12 VDC  
Idle – 180 mA @ 12VDC

**Camera Mast**

The camera shall be mounted on a self-supporting mast allowing a camera to be raised to a height of 30 feet. The mast shall be made from galvanized steel and shall allow for telescoping action.

The unit shall satisfactorily operate in all weather conditions including up to a 100-mph wind load with the vertical post fully extended per the ASHTO Wind Load Standard. The mast may be raised and lowered by a single individual using a manual winch. In the raised position the camera mast shall be capable of being rotated 360 degrees. The mast shall mechanically lock in the raised position.

Once lowered, the mast may rotate down to be secured for transport. The mast shall mechanically lock in the lowered position for transport without removing the installed camera.

**The vendor shall provide a drawing that shows camera mounting provisions provided.** Camera wiring shall spiral around the mast to allow the mast to raise and lower. A two-inch diameter minimum (or acceptable equivalent) grommited entrance way shall be provided to feed wiring through mount into camera.

**Data Plaques and Serial Number**

Each unit shall be provided with data plaque containing the manufacturer's serial number, model number and other manufacturer's data unique to each unit, permanently attached and easily identified. The serial number shall be used by the Department and the manufacturer to identify units for recall, to aid in the recovery of stolen units, to establish ownership, and for other similar reasons. At a minimum, the serial number shall contain 17 characters and shall conform to Federal Vehicle Identification Numbering Standards (49 CFR 565).

A permanent data plaque shall be attached to each unit indicating serial number and model number using block lettering. Decals are not permitted.

**Safety Plaques or Details**

Product safety plaques or decals shall be furnished and affixed at the operator's station and at any hazardous area. The safety plaques or decals shall describe the nature of the hazard, level of hazard seriousness, how to avoid the hazard, and the consequence of human interaction with the hazard.

Permanent plaques mechanically attached are preferred to decals. Type, size and location of product safety plaques or decals shall be in accordance with current ANSI Z 535.4, or latest revision thereto.

**Color**

Each unit shall be thoroughly cleaned and prime coated with a rust preventative paint with a final coat that is either painted or powder coated meeting Federal Standard 595C Color Chip ID #12473 with a minimum paint thickness of 2.5 mils. Paint and primers used shall be leadfree. All data plaques and safety decals / plaques shall be protected from being painted over.

**CCTV Camera**

Furnish and install CCTV assemblies described in these Project Special Provisions. All new CCTV cameras shall be fully compatible with the video management software (Protronix Video Pro) currently in use by NCDOT at the STOC.

**Materials**

Furnish and install a new CCTV camera assembly per portable trailer. Each assembly consists of the following:

- One dome CCTV color digital signal processing camera unit with zoom lens, filter, control circuit, and accessories in a single enclosed unit
- A NEMA-rated enclosure constructed of aluminum with a clear acrylic dome or approved equal Camera Unit housing
- Motorized pan, tilt, and zoom
- Built-in video encoder capable of H.264 / MPEG-4 compression for video-over IP transmission
- Pole-mount camera attachment assembly
- A lightning arrestor installed in-line between the CCTV camera and the equipment cabinet components
- All necessary cable, connectors and incidental hardware to make a complete and operable system

**Camera**

Furnish new 1/3-inch charged-coupled device (CCD) color cameras. The sensors shall use Complementary Metal-Oxide-Semiconductor (CMOS) technology. The camera shall meet the following minimum requirements:

- Sensor size: 2 megapixels
- Video Resolution: 1920 x 1080 (HDTV 1080p)
- Aspect Ratio: 16:9
- Overexposure protection: The camera shall have built-in circuitry or a protection device to prevent any damage to the camera when pointed at strong light sources, including the sun
- Low light condition imaging
- Wide Dynamic Range (WDR) operation
- Electronic image stabilization
- Automatic focus with manual override
- Incoming session IP logging allows the monitoring of excess data usage.

**Lens**

Furnish each camera with a motorized zoom lens that is high performance integrated dome system or approved equivalent with automatic iris control with manual override and neutral density spot filter. Furnish lenses that meet the following optical specifications:

- 30X optical zoom, and 12X electronic zoom
- Preset positioning: 64 Presets

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

**Communications Standards**

The CCTV camera shall support the appropriate NTCIP 1205 communication protocol (version 1.08 or higher), ONVIF, or approved equal.

**Networking Standards**

- Network Connection: 10 / 100 Mbps auto-negotiate
- Frame Rate: 30 to 60 fps
- Data Rate: scalable
- Built-in Web Server
- Unicast & multicast support
- Two simultaneous video streams (Dual H.264 and MJPEG):
  - Video 1: H.264 (Main Profile, at minimum)
  - Video 2: H.264 or MJPEG
- Supported Protocols: DNS, IGMPv2, NTP, RTSP, RTP, TCP, UDP, DHCP, HTTP, IPv4

The video camera shall allow for the simultaneous encoding and transmission of the two digital video streams, one in H.264 format (high-resolution) and one in H.264 or MJPEG format (low-resolution).

Initially use UDP / IP for video transport and TCP / IP for camera control transport unless otherwise approved by the Engineer.

The 10 / 100 BaseTX port shall support half-duplex or full-duplex and provide auto negotiation and shall be initially configured for full-duplex.

The camera unit shall be remotely manageable using standard network applications via web browser interface administration. Telnet or SNMP monitors shall be provided.

**Camera Housing**

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

**Pan and Tilt Unit**

Equip each new dome style assembly with a pan and tilt unit. The pan and tilt unit shall be integral to the high-performance integrated dome system. The pan and tilt unit shall be rated for outdoor operation, provide dynamic braking for instantaneous stopping, prevent drift, and have minimum backlash. The pan and tilt units shall meet or exceed the following specifications:

- Pan: continuous 360 Degrees
- Tilt: up / down +2 to -90 degrees minimum
- Motors: Two-phase induction type, continuous duty, instantaneous reversing
- Preset Positioning: 64 PTZ presets per camera

**Video Ethernet Encoder**

Furnish cameras with a built-in digital video Ethernet encoder to allow video-over-IP transmission. The encoder units shall be built into the camera housing and require no additional equipment to transmit encoded video over IP Networks.

Encoders shall have the following minimum features:

- Network Interface: Ethernet 10 / 100 Base-T (RJ-45 connector)
- Protocols: IPv4, IPv6, HTTP, HTTPS, SSL, QoS, FTP, SMTP, UPnP, SNMP v2c/v3, DNS, NTP, RTSP, RTP, TCP, UDP, IGMP, and DHCP
- Security: SSL, SSH, 802.1x, HTTPS encryption with password-controlled browser interface
- Video Streams: Minimum 2 simultaneous streams, user configurable
- Compression: H.264 (MPEG-4 Part 10 / AVC)
- Resolution Scalable: NTSC-compatible 320x176 to 1920x1080 (HDTV 1080p, 16:9 aspect ratio)
- Frame Rate: 1-30 FPS programmable (full motion)
- Bandwidth: 30 kbps – 6 Mbps, configurable depending on resolution
- Edge Storage: SD/SDHC/SDXC slot supporting up to 64GB memory card

**Central Receiver / Driver**

Provide each new camera unit with a control receiver / driver that is integral to the CCTV dome assembly. The control receiver / driver shall receive serial asynchronous data initiated from a camera control unit, decode the command data, perform error checking, and drive the pan / tilt



unit, camera controls, and motorized lens. As a minimum, the control receiver / drivers shall provide the following functions:

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

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

### **Surge Protection**

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

Protect the electrical and Ethernet cables from the CCTV unit entering the equipment cabinet with surge protection. Provide an integrated unit that accepts unprotected electrical and Ethernet connections and outputs protected electrical and Ethernet connections. Ethernet connections shall be RJ45 with full gigabit Ethernet transmission speeds and electrical connections shall be #22-#14 AWG screw terminals. The surge protection unit shall comply with EIA / TIA568A and EIA / TIA568B standards for data transmission and automatically reset.

### **Wiring Diagrams**

Provide a wiring diagram for each Portable CCTV assembly detailing the power system, including but not limited to, Solar charge controller, photovoltaic panels, batteries, stand-by generator / land power hook up, trickle charger circuitry and cellular modem. Ensure the wiring diagram references connections for CCTV Camera and controller and all other supporting devices and systems that comprise the whole system.

### **Routine Operations**

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

### **Training**

A minimum one day of on-site training shall be conducted at the time of delivery or at a time as approved by the Engineer by representatives of the manufacturer’s technical service personnel or factory trained authorized representative.

**Training Materials**

In conjunction with the delivery of each unit, the Design-Build Team shall supply one complete set of video operator training materials (DVD format preferred). This material shall adequately cover the safe and correct operation of the equipment.

**CONSTRUCTION METHODS****Description**

This article establishes practices and procedures and gives minimum standards and requirements for the installation of Portable CCTV camera and trailers and auxiliary equipment. Provide electrical equipment described in this specification that conforms to the standards of NEMA, UL, or Electronic Industries Association (EIA), wherever applicable.

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

Mount the camera to the pole mount camera attachment assembly and secure to the assembly to the camera mast. Ensure camera wiring spirals around the mast to allow mast to raise and lower. A two-inch diameter minimum (or acceptable equivalent) grommeted entrance way shall be provided to feed wiring through mount into camera.

**Deployment**

The Department will establish the location of each Portable CCTV camera trailer assembly to be deployed on the Preliminary Incident Management Routes provided by the Department. The Department will approve the location of each Portable CCTV camera trailer assembly recommended to be deployed on the alternate Incident Management Route Plans developed by the Design-Build Team. It shall be the Design-Build Team's responsibility to ensure proper elevation, leveling, offset, and orientation of all Portable CCTV camera trailer assemblies. (Reference the Transportation Management Scope of Work found elsewhere in this RFP)

**Construction Submittal**

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

The As-Built Plans shall show each Portable CCTV camera trailer assembly location on a map with GPS coordinates and dimensioned from fixed objects or intersecting roadways.

**WARRANTY**

Units shall be warranted against defects in materials and workmanship for a period of not less than twelve (12) months. The warranty period start date shall begin on the date of deployment and acceptance by the Engineer.

The unit shall be furnished with a copy of the warranty statement and any necessary cards, booklets, or certificates needed to receive warranty repairs at a dealership. Provide a list of approved factory-authorized part, service and warranty facilities.

**AIR TERMINAL & LIGHTNING PROTECTION SYSTEM****Description**

Furnish an air terminal and lightning protection system that is comprised of items meeting UL 96 and UL 467 product standards for lightning protection and installed to be compliant with the National Fire Protection Association 780 Standards for Lightning Protection Systems. The lightning protection system shall consist of, as a minimum, an Air Terminal, vertical Air Terminal Base (wood pole) or Air Terminal Rod Clamps (metal pole), 28-Strand bare-copper lightning conductor, 4-point grounding systems (grounding electrodes), #4 AWG copper bonding conductors, marker tape and other miscellaneous hardware.

**Materials****General**

Reference the following Typical Details where applicable:

- CCTV Camera Installation for Metal Pole with Aerial Electrical Service
- CCTV Camera Installation for Metal Pole with Underground Electrical Service
- CCTV Camera Installation for Wood Pole with Aerial Electrical Service
- CCTV Camera Installation for Wood Pole with Underground Electrical Service

**Wood Pole**

Furnish a UL Listed Class II, copper clad minimum 48" long by ½" diameter air terminal. Ensure the air terminal has a tapered tip with a rounded point on one end and is threaded on the connection end with standard Unified Coarse (UNC) 13 threads per inch.

Furnish a copper vertical air terminal base that has internal threading to accept a ½" diameter air terminal with UNC 13 threads per inch. Provide a base that allows for a minimum ¼" mounting hole to secure the base to the vertical side of a wood pole. Ensure the air terminal base includes (2) 5/16" cap screws to secure the bare copper lightning conductor. Additionally, provide (2) ½" copper tube straps (conduit clamps) to secure the air terminal and bare copper lightning conductor to the pole.

**Metal Pole**

Furnish a UL Listed Class II, stainless steel minimum 48" long by ½" diameter air terminal with a tapered tip with a rounded point on one end. No threading is required on the opposing end.

Furnish an air terminal rod clamp manufactured out of 304 stainless steel. Ensure the air terminal rod clamp has two horizontal support arms that are 2" wide by 3/16" thick and design to offset the air terminal approximately 8" away from the metal pole. Ensure the support arms at the point where the air terminal is to be installed has an internal crease to secure the air terminal along with four (4) bolts to provide the clamping action between the two support arms. Provide two (2) stainless steel banding clamps to secure the air terminal rod clamp's base plate to the metal pole.

**Copper Lightning Conductor and Ground Rods**

Furnish a Class II rated copper lightning conductor which consists of 28 strands (minimum) of 15 AWG copper wires to form a rope-lay bare copper lightning conductor. Furnish 5/8" diameter, 10-foot-long copper-clad steel ground rods with a 10-mil thick copper cladding to serve as an integral part of the 4-point grounding system. Furnish irreversible mechanical clamps to secure the 28-strand lightning conductor, #4 AWG bare copper ground wires and grounding electrodes together to complete the grounding system.

**Construction Methods****Wood Pole**

Install the vertical air terminal base approximately 12" below the top of the wood pole and install the air terminal to the threaded connection on the base. Install a ½" copper tube strap (conduit clamp) over the air terminal, 6" from the top of the pole. Additionally, secure the copper lightning conductor under both 5/16" diameter cap screws located on the base. Install an additional ½" copper tube strap (conduit clamp) over the bare copper lightning conductor, 6" below the air terminal base. Locate the ¼" mounting hole on the vertical air terminal base and install a ¼" by 3" (minimum) long lag bolt through the base and into the wood pole to support the air terminal assembly.

Route the bare copper lightning conductor to maintain maximum horizontal separation from any risers that traverse up the pole. Secure the bare copper lightning conductor to the pole on 24" centers using copper cable clips. From the bottom of the pole (ground level) install a 2" by 10' long PVC U-Guard over the bare copper lightning conductor to protect the cable from vandalism.

**Metal Pole**

Install two (2) stainless steel air terminal rod clamps to the side of the metal pole structure starting at 6" below the top of the pole with the second air terminal clamp 12" from the top of the pole (approximately 6" of separation between the 2 clamps). Secure each air terminal rod clamp to the pole structure with two (2) stainless steel banding clamps. Install the air terminal between

the horizontal support arms on each air terminal rod clamp and tighten the bolts to provide a secure connection.

### **Copper Lightning Conductor and Ground Rods**

Install the 4-point grounding system by installing a central grounding electrode that is surrounded by a minimum of three (3) additional grounding electrodes spaced approximately 20 feet away from the central grounding electrode and approximately 120 degrees apart. Interconnect each grounding electrode using a #4 AWG bare copper conductor back to the central grounding electrode using irreversible mechanical crimps. Additionally, using an irreversible mechanical crimp, connect the bare copper lightning conductor to the central grounding electrode. Install each grounding electrode and its corresponding #4 AWG bare copper grounding wire and 28 strand copper lightning conductor such that the wires are 24" below grade. Install marker tape 12" below grade and above all grounding conductors.

In instances where right-of-way does not allow for ground rod spacing as required above, reference the 2018 Roadway Standard Drawings - Section 1700.02 "Electrical Service Grounding" for "Limited Shoulder" or "Restricted Space" installation alternatives.

Prior to connecting the lightning protection system to an electrical service, perform a grounding electrode test on the lightning protection system to obtain a maximum of 20 ohms or less. Install additional grounding electrodes as need to obtain the 20 ohms or less requirement. The grounding electrode resistance test shall be verified or witnessed by the Engineer or the Engineer's designated representative.

Follow test equipment's procedures for measuring grounding electrode resistance. When using clamp-type ground resistance meters, readings of less than one ohm typically indicate a ground loop. Rework bonding and grounding circuits as necessary to remove ground loop circuits and retest. If a ground loop cannot be identified and removed to allow the proper use of a clamp-type ground resistance meter, use the three-point test method. Submit a completed inductive Loop & Grounding

### **JUNCTION BOXES (LIMITED ACCESS FACILITIES)**

#### **Description**

The Design-Build Team shall furnish and install junction boxes with covers, graded stone, concrete collar, and all necessary hardware in accordance with the plans and specifications. Comply with the provisions contained in the details of this provision. Provide Electronic Marking Balls to aid in locating buried junction boxes.

#### **Materials**

##### **A. General**

Refer to Division 8 and 10 of the 2018 *Standard Specifications for Roads and Structures*.

<b>Item</b>	<b>Section</b>
Incidental Concrete Construction	825
#57 or #67 Washed Stone	1005
Portland Cement Concrete Production and Delivery	1000
Reinforcing Steel	1070

Furnish material, equipment, and hardware under this section that is pre-approved on the ITS and Signals QPL.

## **B. Junction Box**

Provide junction boxes with pull slots and at least two size 3/8-inch diameter stainless steel hex head cover bolts to match inserts in the box. Ensure junction boxes are provided with open bottoms.

Provide vertical extensions of six inches to 12 inches as required by project provisions. Provide the required logo on the cover. Provide pull slot(s) with stainless steel pin(s).

Provide third party certification that the junction boxes and covers meet ANSI/SCTE 77 2013 and Tier 22 loading. Provide certification that testing methods are compliant with ANSI/SCTE 77 2013.

Provide standard size junction boxes and covers with minimum outside dimensions of 18" (l) x 11" (w) x 12" (d) for feeder conductors only. Provide a cover embossed with the following wording "NCDOT Electrical".

Provide oversized junction boxes and covers with minimum outside dimensions of 30" (l) x 17" (w) x 24" (d) when installing fiber-optic cable where no splice enclosures are present.

Provide special oversized junction boxes and covers with minimum outside dimensions of 48" (l) x 30" (w) x 36" (d) where underground fiber-optic splice enclosures are to be installed or as directed by the plans developed by the Design-Build Team.

Provide additional special oversized junction boxes and covers as identified in the plans developed by the Design-Build Team where underground fiber-optic splice enclosures and conduit requirements require a junction box that is larger than what is listed above. Boxes of this nature can be supplied with a cover that is of a single or split cover design, but boxes with a split cover shall be supplied with a center brace to support the cover / lid.

For oversized and special oversized junction boxes, provide a cover embossed with the following wording "NCDOT Fiber Optic". Additionally, for junction boxes designated for fiber optic cable, furnish an access point / hatch on the lid to allow access to the tracer wire bonding / isolation test switch that is located inside the junction box (See "Tracer Wire Bonding / Isolation Test Switch" requirements below)

For oversized and any special oversized junction boxes, provide junction boxes with mouse holes or knock-outs fabricated in the sides to accommodate conduit entrances. Boxes fabricated without mouse holes or knock-outs shall be approved by the manufacturer for field drilling conduit entrance holes. Consult the manufacturer to identify the amount of surface area that can be removed for field drilling conduit entrance holes without violating the boxes structural integrity. Upon request, provide written approval from the manufacturer stating their recommendations.

### **C. Electronic Marker Ball**

Furnish an electronic marking ball, with a minimum life expectancy of 15 years and that is locatable when buried up to five feet deep to aid in locating buried junction boxes. Ensure the marking ball is designed to be self-leveling to provide precise horizontal positioning of the marker ball electronics (internal passive antenna) once installed in a junction box. Ensure the marker balls are compatible with a Metro Mark - Passive Marker Locator Model #760DX or approved equivalent and are tuned to the following frequencies:

- Orange Ball - 101.4 KHz - Fiber Installations
- Red Ball - 169.8 KHz – Power Cable Installations

### **D. Tracer Wire Bonding / Isolation Test Switch**

For all unburied junction boxes designated for “communications cable”, furnish as an integral part of the junction box assembly, a tracer wire access testing port via a retractable mechanism that allows easy access to the tracer wire system through a Bonding / Isolation switch. Ensure the Bonding / Isolation switch can be accessed through a small hatch located in the lid of the junction box. The hatch shall be designed into the lid and secured via a security bolt. The Bonding / Isolation switch must be retractable so it can be accessed without removing the lid of the junction box. The Bonding / Isolation switch shall include a minimum of five termination lugs for trace wires and one lug for grounding. Once the Bonding / Isolation switch is moved via the retractable mechanism, ensure the switch can be disengage effectively breaking the bond and allowing individual isolation of tracer wire circuits for locating. Ensure the Bonding / Isolation switch on the retractable mechanism is mounted in a location on the interior wall of the junction box which will not interfere with the installation or removal of the lid. When the Bonding / Isolation switch is pushed back down via the retractable mechanism, the Bonding / Isolation switch shall automatically return to a closed or bonded position.

Furnish a 5/8 inch by 10-foot, copper clad, ground rod to be driven inside the junction box.

For all buried junction boxes designated for “communications cable”, furnish as an integral part of the junction box assembly, a minimum of four (4) test lugs in the lid that allow for easy connection to the tracer wire system without removing the lid. Bond all tracer wires to the ground rod and the test lugs in accordance with the Communications Junction Box (Buried) detail drawing included in this provision.

## **Construction Methods**

### **(A) Junction Boxes**

Install standard size junction boxes as shown in the plans developed by the Design-Build Team. When lateral runs for electrical cables are greater than 300 feet, install additional junction boxes to ensure distances between junction boxes does not exceed 300 feet.

Install oversized junction boxes and any special oversized junction boxes at maximum intervals of 1500 feet unless otherwise approved by the Department.

Backfill beneath and around the boxes using #57 or #67 washed stone in conformance with Section 1005 of the 2018 *Standard Specifications for Roads and Structures*. Backfill beneath the box a minimum of 12 inches and around the exterior of the box a minimum of three inches.

Avoid placing junction boxes on slopes of 3:1 or greater.

### **(B) Concrete Collar**

Install an eight-inch thick reinforced concrete collar that extends 12 inches from the edges of the junction box and complies with Section 825 of the 2018 *Standard Specifications for Roads and Structures*. Ensure the reinforcing of the concrete collar consists of two rectangular hoops of #4 rebar tied in the corners. Provide minimum Class B concrete. Fill construction joints between the junction box and the concrete with an expansion joint filler. Ensure concrete collar is installed flush with grade.

### **(C) Junction Box Installation Requirements**

For all junction boxes designated to carry fiber optic communications cable or electrical services, install the junction box based on its location as listed below:

#### Communications

- Junction box located at the top of a ramp or located within six feet of an equipment cabinet:
  - Install the junction box flush with the surrounding grade with the required concrete collar.
  - NCDOT Junction boxes co-located with an OMC junction box do not require concrete collars.
- Junction box NOT located at the top of a ramp or NOT located within six feet of an equipment cabinet:
  - Install the junction box so that the top of the box falls six inches to no more than eight inches below the surrounding grade. These junction boxes do not require a concrete collar.



### Electrical Service

- Junction box located at the bottom of a service pole or within six feet of an equipment cabinet or service disconnect:
  - Install the junction box flush with the surrounding grade with the required concrete collar.
- Junction box located other than at the bottom of a service pole or within six feet of an equipment cabinet or service disconnect:
  - Install the junction box so that the top of the junction box falls six inches to no more than eight inches below the surrounding grade. These junction boxes do not require a concrete collar.

### **(D) Electronic Marker Ball**

Install the appropriate colored Marker Ball in each junction box upon completion of the junction box installation. Test to ensure that the Marker Ball is functioning properly with the approved electronic locator device. Record precise latitudinal and longitudinal coordinates for the location of each locate ball / junction box. See “GPS Coordinates” requirements below in this provision.

### **(E) Tracer Wire Bonding / Isolation Switch**

For all junction boxes designated for communications cable, install a ground rod (5/8 inches by ten-foot, copper clad) in the junction box and secure a minimum of five feet of #14 AWG THWN, green insulated, 19-strand copper tracer wire to the ground rod using an approved bonding clamp. Secure the opposing end of the tracer wire to the main bonding lug located on the Bonding / Isolation switch. Test ground rod resistance to obtain 20 ohms or less reading, install one additional ground rod if the 20 ohms or less reading is not achieved.

Secure all tracer wires that originate from the same side of the junction box together using a gel- filled wire nut along with a minimum of five feet slack Green, #14 AWG, THWN tracer wire to form a connection to one of the termination ports on the Bonding / Isolation switch. Provide a permanent nylon tag to the tracer wire jumper close to the tracer wire terminal port that identifies the direction of the tracer wire system as it leaves the junction box. Use a black indelible ink pen or other approved method, to label the nylon tag.

No splices of tracer wires are allowed outside of the interior portion of the junction box, unless approved by the Engineer. If external splices are necessary, use lockable connectors specifically manufactured for use in underground tracer wire systems. Connectors shall use a dielectric silicon filled compartment to seal out moisture and corrosion and shall be installed in a manner to prevent any uninsulated wire exposure. Gel-filled wire nuts are not acceptable for making splices outside of the junction box.

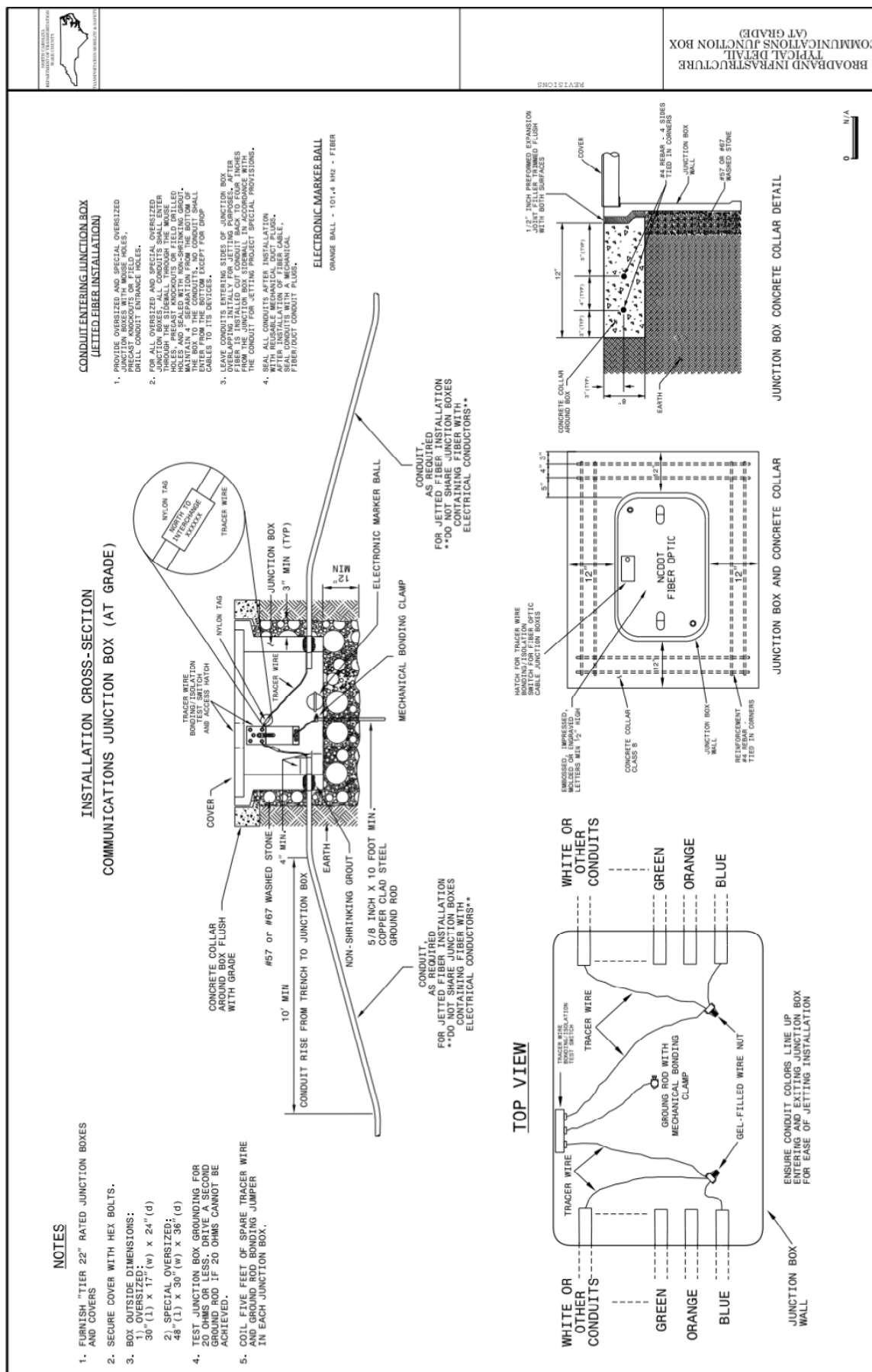
Upon completion and in the presence of the Engineer, test all legs of the tracer wire system using a tuned frequency transmitter and locator to ensure the tracer wire system forms a complete and operational system.

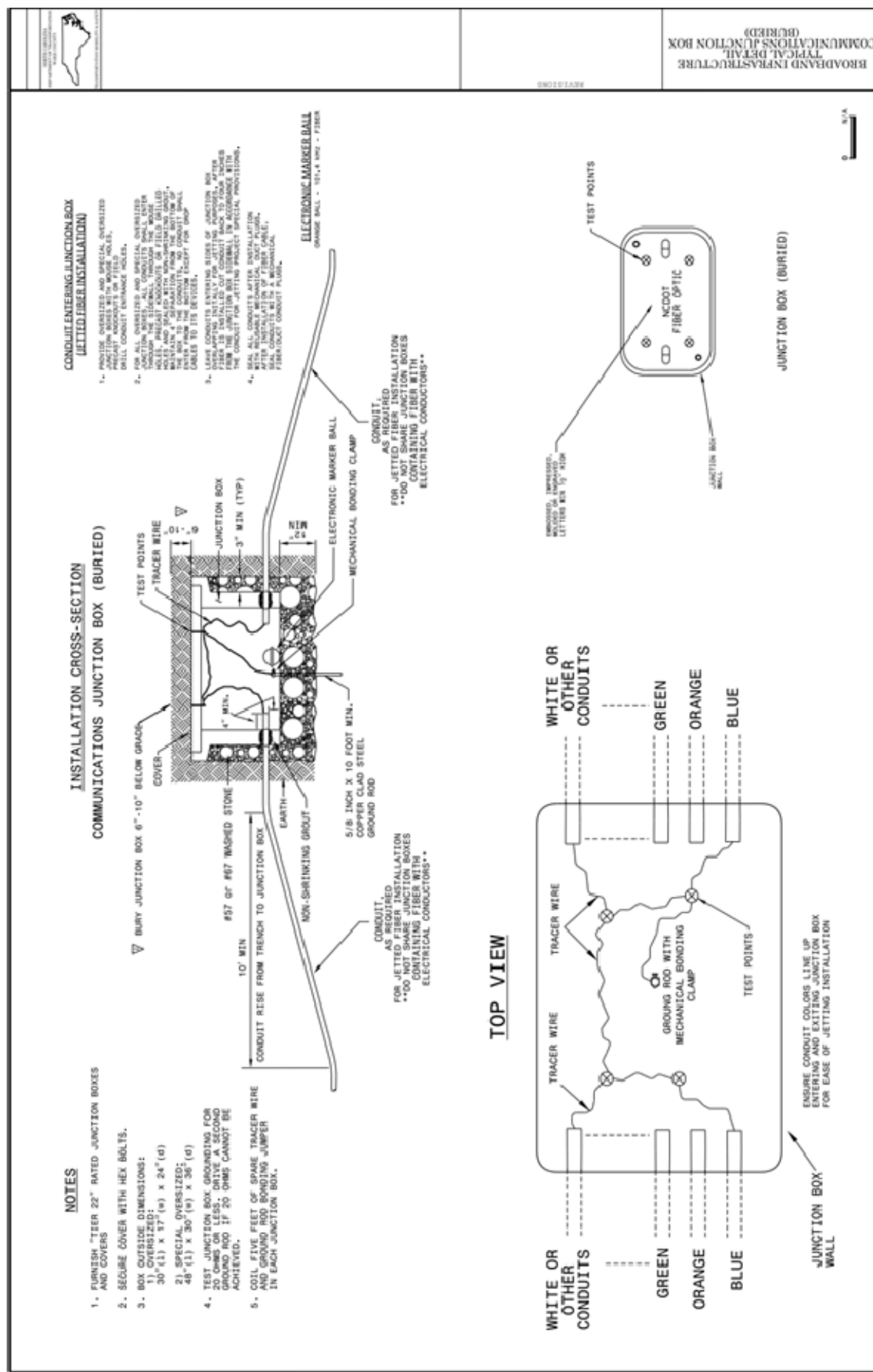
#### (F) GPS Coordinates

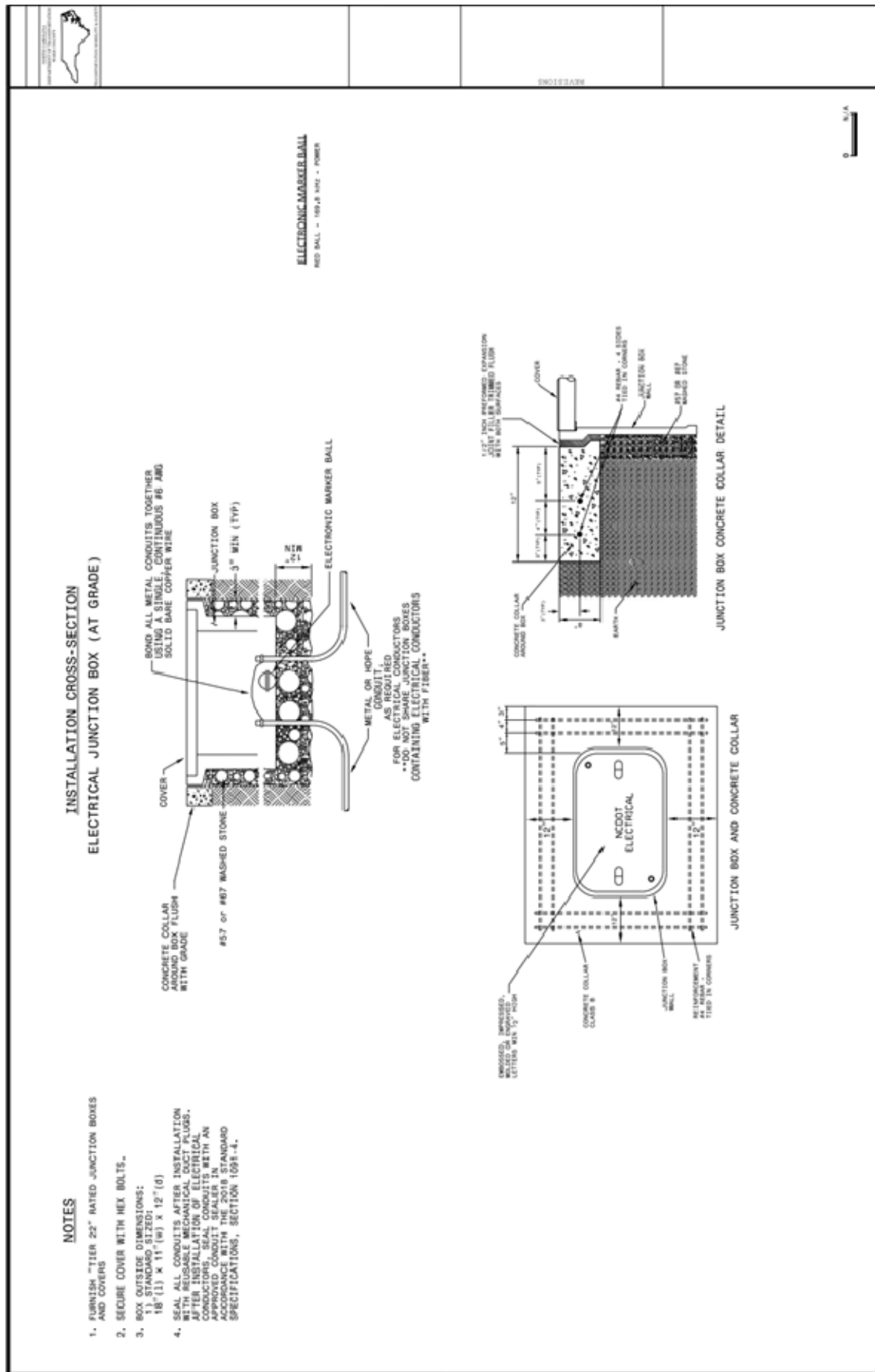
Provide real world coordinates for all junction boxes and equipment cabinets installed or used under this project. Provide the coordinates in feet units using the North Carolina State Plane coordinate system (1983 North American Datum also known as NAD '83). Furnish coordinates that do not deviate more than 1.7 feet in the horizontal plane and 3.3 feet in the vertical plane. Global positioning system (GPS) equipment able to obtain the coordinate data within these tolerances may be used. Submit cut sheets on the GPS unit proposed to collect the data for approval by the Engineer.

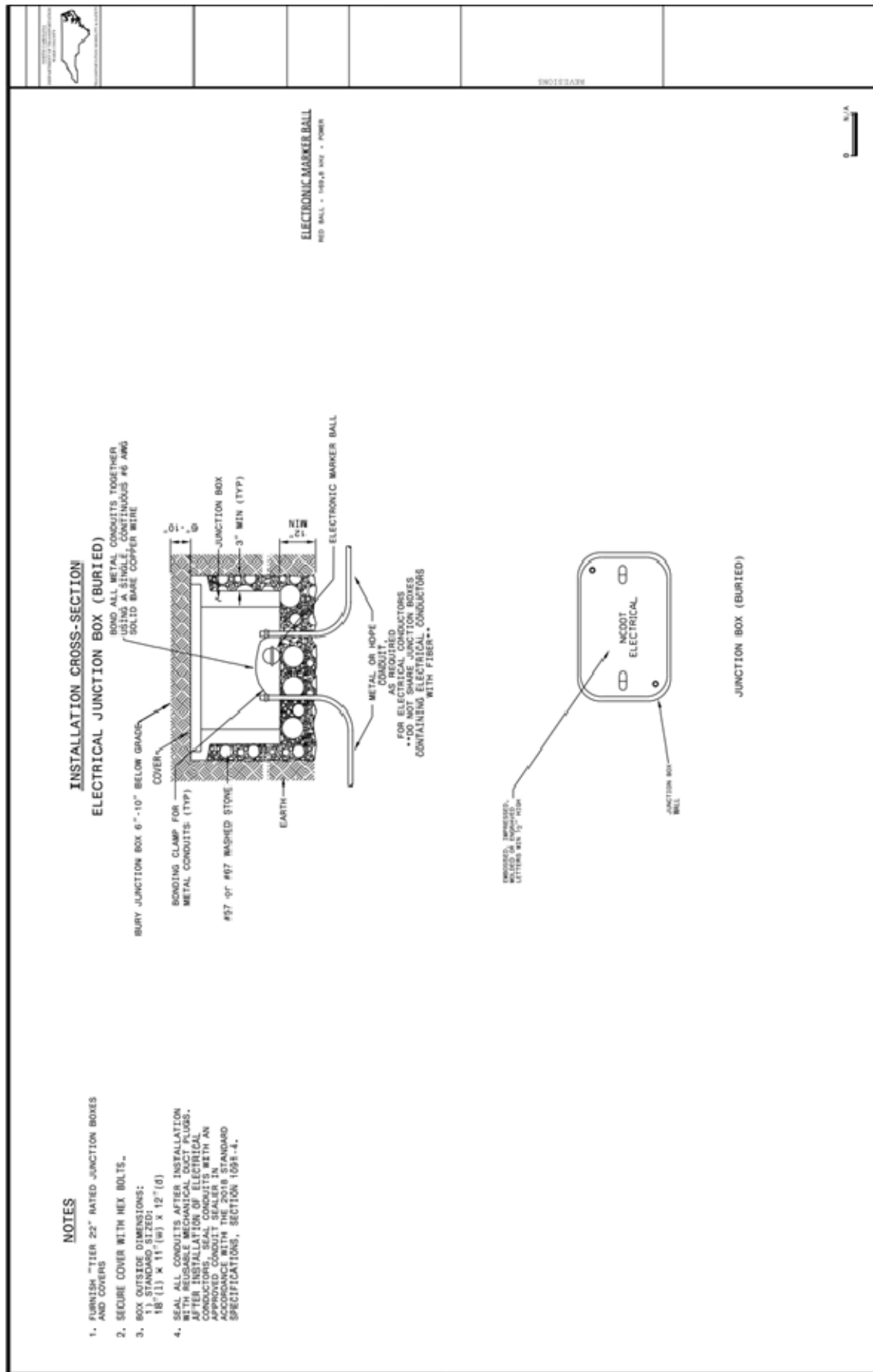
Provide a digital copy of all information regarding the location (including, but not limited to, manufacturer, model number, and NCDOT inventory number) in the Microsoft® spreadsheet shown by example below. Provide this information to the Engineer and the NCDOT ITS & Signals Management Section via the Design-Build Unit.

NCDOT Inv #	Name	Location	Latitude	Longitude	Manufacturer	Model #
05-0134	Equipment Cabinet	US 70 at Raynor Rd. / Auburn-Knightdale	-78.5500	35.6873	McCain	Type-332
05-0134	Junction Box # 1 (Phase 2 Side)	US 70 at Raynor Rd. / Auburn-Knightdale	-78.5516	35.6879	Quazite	PG1118BA12 (Box) PG118HA00 (Cover)
05-0134	Junction Box # 2 (Phase 2 Side)	US 70 at Raynor Rd. / Auburn-Knightdale	-78.5506	35.6876	Quazite	PG1118BA12 (Box) PG118HA00 (Cover)
05-0134	Junction Box # 3 (Near Cabinet)	US 70 at Raynor Rd. / Auburn-Knightdale	-78.5501	35.6873	Quazite	PG1118BA12 (Box) PG118HA00 (Cover)
05-0134	Junction Box # 4 (Phase 6 Side)	US 70 at Raynor Rd. / Auburn-Knightdale	-78.5486	35.6873	Quazite	PG1118BA12 (Box) PG118HA00 (Cover)
05-0134	Junction Box # 5 (Phase 6 Side)	US 70 at Raynor Rd. / Auburn-Knightdale	-78.5493	35.6876	Quazite	PG1118BA12 (Box) PG118HA00 (Cover)
05-0134	Junction Box # 6 (Phase 4 Side)	US 70 at Raynor Rd. / Auburn-Knightdale	-78.5503	35.6879	Quazite	PG1118BA12 (Box) PG118HA00 (Cover)









**ELECTRICAL SERVICE FOR ITS DEVICES****DESCRIPTION**

Install new electrical service equipment as shown in the plans developed by the Design-Build Team. Installation of all new electrical service pedestals, poles, and meter base/disconnect combination panels shall be the first item of work on this project to expedite the power service connections. Comply with the National Electrical Code (NEC), the National Electrical Safety Code (NESC), the Standard Specifications, the Project Special Provisions, and all local ordinances. All work involving electrical service shall be coordinated with the appropriate utility company and the Engineer.

Obtain the maximum available ground fault current from the utility company. Print this information on a durable label and adhere to the dead front of the disconnect.

**MATERIAL****Meter Base/Disconnect Combination Panel**

Furnish and install new meter base/disconnect combination panels as shown in the plans developed by the Design-Build Team. Provide meter base/disconnect combination panels that have a minimum 125A main service disconnect and a minimum of eight (8) additional spaces. Furnish a single pole 15A circuit breaker at CCTV locations. Furnish a double pole 50A circuit breakers at single DMS locations. Furnish a double pole 100A circuit breakers at dual DMS locations. Furnish each with a minimum of 10,000 RMS symmetrical amperes short circuit current rating in a lockable NEMA 3R enclosure. Ensure meter base/ disconnect combination panel is listed as meeting UL Standard UL-67 and marked as being suitable for use as service equipment. Ensure circuit breakers are listed as meeting UL-489. Place barriers so that no uninsulated, ungrounded service busbar or service terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing load terminations. 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. All exterior surfaces must be powder coated steel. Provide ground bus and neutral bus with a minimum of four terminals and a minimum wire capacity range of number 8 through number 3/0 AWG.

Furnish NEMA Type 3R combinational panels rated 100 Ampere minimum for overhead services and 200 Ampere minimum for underground services that meet the requirements of the local utility. Provide meter base with sockets' ampere rating based on sockets being wired with a minimum of 167 degrees F insulated wire. Furnish 4 terminal, 600 volt, single phase, 3-wire meter bases that comply with the following:

- Line, Load, and Neutral Terminals accept 4/0 AWG and smaller Copper/Aluminum wire
- With or without horn bypass
- Made of galvanized steel
- Listed as meeting UL Standard US-414
- Overhead or underground service entrance specified.

Furnish 1.5" watertight hub for threaded rigid conduit with meter base.

At the main service disconnect, furnish and install UL-approved lightning arrestors that meet the following requirements:

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

### **Equipment Cabinet Disconnect**

Provide new equipment cabinet disconnects at the locations shown in the plans developed by the Design-Build Team. Furnish a single pole 15A circuit breaker at CCTV locations. Furnish double pole 50A circuit breaker at single DMS locations. Furnish double pole 100A circuit breaker at dual DMS locations. Furnish panels that have a minimum of four (4) spaces in the disconnect. Furnish circuit breakers with a minimum of 10,000 RMS symmetrical amperes short circuit current rating in a lockable NEMA 3R enclosure. Ensure meter base/ disconnect combination panel is listed as meeting UL Standard UL-67 and marked as being suitable for use as service equipment. Ensure circuit breakers are listed as meeting UL-489. 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. All exterior surfaces must be powder coated steel. Provide ground bus and neutral bus with a minimum of four terminals and a minimum wire capacity range of number 8 through number 3/0 AWG.

### **10KVA Single Phase General Purpose Transformer**

As shown on the plans developed by the Design-Build Team, furnish and install a double-wound, dry type general purpose transformer to isolate the line side voltages from the load side voltages as shown in the plans developed by the Design-Build Team. Provide the transformer with the following specifications:

**Primary Volts: 120/240 with 83/41 Amps Max. 60Hz.**

**Secondary Volts: 120/240 with 83/41 Amps Max. 60Hz.**

**10 kVA power rating.**

**Electrostatic shielding between primary and secondary windings.**

**Epoxy-silica encapsulated core and coil.**

**Copper windings and copper lead wire terminations.**

**Multiple front and bottom knockout for conduit entry/exit.**

**Ground studs for conduit bonding.**

Provide the transformer in a NEMA 3R enclosure suitable for mounting to a metal or wood pole.



### **3-Wire Copper Service Entrance Conductors**

Furnish 3-wire stranded copper service entrance conductors with THWN rating. Provide conductors with black, red, and white insulation that are intended for power circuits at 600 Volts or less and comply with the following:

**Listed as meeting UL Standard UL-83**

**Meets ASTM B-3 and B-8 or B-787 standards.**

See the plans developed by the Design-Build Team for wire sizes and quantities.

### **3-Wire Copper Feeder Conductors**

Furnish 3-wire stranded copper feeder conductors with THWN rating for supplying power to ITS field equipment cabinets. Provide conductors with black or red, white, and green insulation that are intended for power circuits at 600 Volts or less and comply with the following:

- Listed as meeting UL Standard UL-83
- Meets ASTM B-3 and B-8 or B-787 standards.

See the plans developed by the Design-Build Team for wire sizes and quantities.

### **4-Wire Copper Feeder Conductors**

Furnish 4-wire stranded copper feeder conductors with THWN rating for supplying power to DMS field equipment cabinets. Provide conductors with black, red, white, and green insulation that are intended for power circuits at 600 Volts or less and comply with the following:

- Listed as meeting UL Standard UL-83
- Meets ASTM B-3 and B-8 or B-787 standards.

See the plans developed by the Design-Build Team for wire sizes and quantities.

### **Grounding System**

Furnish 5/8"x10' copper clad steel grounding electrodes (ground rods), #4 AWG solid bare copper conductors. Comply with the NEC, Standard Specifications, these Project Special Provisions, and the plans developed by the Design-Build Team.

## **CONSTRUCTION METHODS**

### **General**

Coordinate with the Engineer and the utility company to de-energize the existing service temporarily prior to starting any modifications.

Permanently label cables at all access points using nylon tags labeled with permanent ink. Ensure each cable has a unique identifier. Label cables immediately upon installation. Use component name and labeling scheme approved by the Engineer.

**Meter Base/Disconnect Combination Panel**

Install meter base/disconnect combination panels with lightning arrestors as called for in the plans developed by the Design-Build Team. At all new DMS locations, route the feeder conductors from the meter base/disconnect to the DMS equipment cabinet in conduit. At all new CCTV locations, route the feeder conductors from the meter base/disconnect to the CCTV equipment cabinet in conduit. Provide rigid galvanized conduit for above ground and PVC for below ground installations.

**Electrical Service Disconnect**

Install equipment cabinet disconnects and circuit breakers as called for in the plans developed by the Design-Build Team. Install THWN stranded copper feeder conductors as shown in plans developed by the Design-Build Team between the electrical service disconnect and the equipment cabinet disconnect. Route the conductors from the equipment cabinet disconnect to the equipment cabinet in rigid galvanized steel conduit. Bond the equipment cabinet disconnect in accordance with the NEC. Ensure that the grounding system complies with the grounding requirements of these Project Special Provisions, the Standard Specifications and the plans developed by the Design-Build Team.

**10KVA Single Phase General Purpose Transformer**

As shown on the plans developed by the Design-Build Team, furnish and install a single phase general purpose transformer in a NEMA 3R enclosure. Route the conductors from the transformer secondary to the DMS equipment cabinet or equipment cabinet disconnect in rigid galvanized conduit. Bond the equipment cabinet disconnect in accordance with the NEC. Provide all mounting hardware and other parts and labor necessary to successfully install the transformer.

**3-Wire Copper Service Entrance Conductors**

At locations shown in the plans developed by the Design-Build Team, furnish and install 3-wire THWN stranded copper service entrance conductors in 1.25 inch rigid galvanized risers as shown in the plans developed by the Design-Build Team. Install a waterproof hub on top of the electrical service disconnect for riser entrance/exit. Size the conductors as specified in the plans developed by the Design-Build Team. Comply with the Standard Specifications and Standard Drawings and all applicable electrical codes.

**4-Wire Copper Feeder Conductors**

At locations shown in the plans developed by the Design-Build Team, install 4-wire THWN stranded copper feeder conductors to supply 240/120 VAC to the DMS field equipment cabinets. Size the conductors as specified in the plans developed by the Design-Build Team. Comply with the Standard Specifications and Standard Drawings and all applicable electrical codes.

**3-Wire Copper Feeder Conductors**

At locations shown in the plans developed by the Design-Build Team, install 3-wire THWN stranded copper feeder conductors to supply 120 VAC to the CCTV field equipment cabinets. Size the conductors as specified in the plans developed by the Design-Build Team. Comply with the Standard Specifications and Standard Drawings and all applicable electrical codes.

### **Grounding System**

Install ground rods as indicated in the plans developed by the Design-Build Team. Connect the #4 AWG grounding conductor to ground rods using an irreversible mechanical crimping method. Test the system to ensure a ground resistance of 20-ohms or less is achieved. Drive additional ground rods as necessary or as directed by the Engineer to achieve the proper ground resistance.

### **ETHERNET CABLE**

#### **Description**

The Design-Build Team shall furnish and install Ethernet cable to serve as interconnect between Ethernet switches, PoE injectors, Signal Controllers and ITS devices.

#### **Materials**

Furnish CAT6 Ethernet cable or better that complies with ANSI / TIA Standards for Balanced Twisted-Pair Telecommunications Cabling and Components Standards. Furnish cable that is suitable for outdoor installation with UV stabilization and meets or exceeds the following:

- Meets ANSI / TIA 568C.2 Networking Standard
- Supports 10 / 100 /1,000 /10,000 Mbps
- 1,000 Mbps @ 300 Meter Cable Length
- 10,000 Mbps @ 50 Meter Cable Length
- 4 twisted pair cables
- 23 AWG (minimum) solid bare copper conductors (Copper clad aluminum is not allowed)
- 2+ twists per centimeter
- Nylon Spline to reduce cross talk
- Gel Filled High-density polyethylene insulation, PVC jacket
- Ascending / Descending Sequential Foot Markings
- Compliant with EIA / TIA standards
- UL / CSA listed
- UV Stabilized PE Jacket

Meets the following Minimum Electrical Operating Characteristics:

- Frequency Bandwidth: 1 – 250 MHz
- Attenuation (Insertion Loss): 19.8 dB
- Characteristic Impedance: 100 Ohms +/- 15
- Near-End Cross Talk - NEXT (Min.): 44.3 dB

- Power Sum Near-End Cross Talk PS-NEXT (Min.): 42.3 dB
- Equal-Level Far End Crosstalk (ELFEXT): 27.8 dB
- Power Sum Equal-Level Far End Crosstalk (PS-ELFEX): 24.8 dB
- Return Loss: 20.1 dB
- Delay Skew: 45 ns
- Connector Type: RJ45

The Ethernet cable shall be factory tested on reels for each pair's mutual capacitance, crosstalk loss, insulation resistance, and conductor resistance. Furnish the Engineer with a certified factory report for each reel showing compliance with these Project Special Provisions, the factory test results, and the manufactured date of the cable. The Design-Build Team shall not use Ethernet cable manufactured more than one year before the date of installation.

Provide RJ-45 connectors with gold conductors that are terminated according to EIA / TIA 568 standards. Provide connectors with eight contacts. Furnish connectors appropriately rated for the cable being installed.

Ethernet patch cables used to interconnect equipment inside of a cabinet or equipment rack shall be factory terminated. Ethernet cables which run outside of the cabinet may be field terminated. Ethernet cables installed inside of buildings to interconnect switching rack equipment shall bare the Low Smoke / Zero Halogen (LSZH) designation. Ethernet cables installed inside of buildings and passes from one equipment room to another may be field terminated. For Ethernet patch cables used to connect equipment inside an equipment rack cabinet provide factory pregerminated jumpers that minimize excessive slack that must be dressed inside the cabinet but provides sufficient slack to make neat runs.

### **Construction Methods**

Install Ethernet cable in conduits, cabinets, junction boxes, risers, and on aerial messenger cable at locations shown in the plans developed by the Design-Build Team. Allow a minimum of ten feet of cable slack in the cabinet.

Ethernet cables shall not be spliced. Ethernet cables should not exceed lengths of 100 meters or 328 feet. In cases where the Ethernet cables exceed lengths of 100 meters or 328 feet a signal regenerator or Ethernet extender shall be used. All Ethernet cables shall be labeled with waterproof, smear resistant labels. The labels shall denote the equipment cabinets or housing they are routed from and the device and device identifier they are connected to.

The Design-Build Team shall not exceed 80 percent of the manufacturer's maximum pulling tension when installing underground Ethernet cable. Use a clutch device (dynamometer) so as not to exceed the allowable pulling tension if the cable is pulled by mechanical means. Do not use a motorized vehicle to generate cable-pulling forces.

Keep tension on the cable reel and the pulling line at the start of each pull. Do not release the tension in the cable if the pulling operation is halted. Restart the pulling operation by gradually increasing the tension until the cable is in motion.

**CONDUIT FOR JETTING FIBER****Description**

For jetted fiber installations furnish and install conduit that has internal longitudinal ribbing and factory lubricated. Ensure the conduit is manufactured from High Density Polyethylene (HDPE) materials.

Furnish individual HDPE conduits (Traditional) and Grouped Microcell Conduits that are comprised of individual microducts manufactured into a multi-cell conduit configuration as required by the plans developed by the Design-Build Team. Furnish individual HDPE conduits (Traditional) with an embedded tracer wire. If there are more than one HDPE conduit in the same trench, provide tracer wire with only one of the conduits (see “Traditional - HDPE Conduit” section of this Project Special Provision). Furnish grouped microcell conduits with an internal tracer wire.

HDPE conduit shall be suitable for direct buried applications through standard trenching, plowing and / or directional drilling operations.

Ensure the conduit is coilable and can be furnished on reels.

For traditional conduits designated as spare, furnish polyester pull tape with an embedded tracer wire.

**Materials**

Furnish material, equipment, and hardware under this section that is pre-approved on the ITS and Signals QPL on the Technical Proposal submittal date.

**Solid Wall HDPE Conduit with Internal Ribbing (Traditional & Grouped Microcell)**

Use HDPE conduit that conforms to the material and dimensional requirements of UL Standard 651A. Provide conduit meeting Conduit trade Size and Standard Dimension Ratio (SDR) based on the fiber count as listed below or as required in the plans developed by the Design-Build Team s. Ensure the supplied conduits meet or exceed the minimum wall thickness ratios (SDR) corresponding to EPEC-40 (Schedule 40) or EPEC-B (SDR 13.5) as listed in UL Standard 651A,

<b>HDPE CONDUIT SIZE and FIBER COUNT</b>		
<b>Traditional Conduit Trade Size</b>	<b>Fiber Count (None Micro-Fiber)</b>	<b>Furnish</b>
1"	12 - 96	EPEC-40
1 ¼"	12 - 144	EPEC-40
1 ½"	72 - 288	EPEC-B (SDR 13.5)
2"	288 - larger	EPEC-B (SDR 13.5)
<b>Microduct Conduit Trade Sizes</b>	<b>Fiber Count (Micro-Fiber)</b>	<b>Furnish</b>
22 mm OD & 16 mm ID	12 - 864	EPEC-7.3 (SDR 7.3)

Ensure the PE resin compounds used in manufacturing the conduit meet or exceed the cell classification PE 334480C (black with 2% minimum carbon black) or PE 334480E (colored conduit with UV inhibitors) in ASTM D3350 and the table below.

<b>RESIN PROPERTIES</b>		
<b>Property</b>	<b>Requirement</b>	<b>Test Method</b>
Density	0.940 g/cm <sup>3</sup> min.	ASTM D1505 ASTM D792 ASTM D4883
Melt Index (condition 190/2.16 is acceptable)	< 0.4 grams/10 minutes	ASTM D1238
Flexural Modulus	80,000 psi, min.	ASTM D790
Tensile Strength	Tensile Strength 3,000 psi, min.	ASTM D638
Elongation	Elongation 400%, min.	ASTM D638
Slow Crack Growth Resistance	An ESCR as per condition B, 10% IGEPAL requirement of F <sub>10</sub> > 96 hrs is allowable	ASTM D1693
Hydrostatic Design Basis	"0" for Non-Pressure Rated Pipe	ASTM D2837
UV Resistance (Outdoor Conduit Only)	Stabilize with at least 2% by weight carbon black or colored with UV Inhibitor	ASTM D4218

Ensure the HDPE conduit is resistant to benzene, calcium chloride, ethyl alcohol, fuel oil, gasoline, lubricating oil, potassium chloride, sodium chloride, sodium nitrate and transformer oil and is protected against degradation due to oxidation and general corrosion.

Furnish all HDPE conduits with internal longitudinal ribbing and that is factory lubricated with a permanent coextruded internal layer to provide a low coefficient of friction of 0.20 or less in accordance with Telcordia GR-356.

Furnish coilable conduit that is supplied on reels in continuous lengths for transportation and storage outside. Ensure that the process of installing the coilable conduit on the reel does not alter the properties or performance of the conduit for its intended purpose.

**Conduit Color Schemes**

Ensure for traditional conduits and grouped microcell conduits that multiple conduit colors can be provided in accordance with the plan requirements developed by the Design-Build Team. For conduits manufactured with stripes, ensure that a minimum of three stripes are uniformly spaced around the conduit with 120 degrees of separation. Do not use “Solid Yellow” or “Black with Yellow Stripes” conduit, furnish conduits in the following minimum colors (Blue, Orange, Green, Brown, Slate or Grey, Black, Red, White).

Furnish grouped microcell conduit assemblies with an “Orange” outer sheath unless otherwise noted in the plans developed by the Design-Build Team or these project special provisions. An alternate grouped microcell conduit outer sheath color may be submitted for approval by the Engineer.

**Traditional - HDPE Conduit**

On traditional conduits, where multiple conduits are to be placed at the same time, furnish one HDPE locatable conduit manufactured with a minimum of a #14 AWG solid copper (soft drawn or annealed per ASTM B3) tracer wire attached to the outer shell of the conduit. Ensure the locatable conduit is manufactured to the material and dimensional specifications of NEMA TC-7 for the wall type to be certified by the manufacturer.

Ensure the non-locatable standard wall supplied HDPE conduit is printed in accordance with the requirements of UL Standard 651A and is listed by a Nationally Recognized Testing Laboratory (NRTL). Ensure all non-locatable standard wall HDPE conduits are marked at least with the following information at two-foot or less intervals per the examples below in a. - f. For locatable standard wall HDPE conduit ensure the conduit is marked with information a. – e. below at two-foot or less intervals.

- a. Material: HDPE
- b. Trade Size: i.e., two inches
- c. Conduit Type: SDR 13.5 or EPEC-B
- d. Manufacturer’s name or trademark
- e. Manufacturer’s production code to identify manufacturing date, facility, etc.
- f. National Recognized Testing Laboratory (NRTL) symbol or listing number for the non-locatable wall types and manufacturer certified for the locatable wall types

**Traditional – Mechanical Duct plugs, Mechanical Fiber / Conduit Duct Plugs**

Provide reusable mechanical duct plugs to seal traditional HDPE conduits that are designated as spare or unused at the time of installation. Ensure the mechanical duct plug is sized to slip inside

the conduit and can be tightened using compression to expand a seal creating a snug fit to ensure debris cannot enter the conduit system. Conduit plugs and / or caps that require special adhesive glues that permanently adhere the device to the conduit will not be accepted.

Provide mechanical fiber / conduit sealing split duct plugs designed to slip over the fiber cable and inside the HDPE conduit. Ensure mechanical fiber / conduit sealing split duct plugs through the use of compression have an expandable seal to ensure a snug fit around the fiber's outside diameter and the inside diameter of the conduit to ensure debris cannot enter the conduit system. The use of a duct and conduit sealer or mastic which is of a putty-like compound shall not be used.

Ensure any duct plug used to seal a conduit with or without a fiber cable is removable and reusable. Conduit plugs are not required to be listed electrical devices.

#### **Grouped Microcell Conduits**

Furnish individual microduct conduits that are bound together within and outer extruded 0.070 inch sheath of high-density polyethylene to form a grouped microcell conduit assembly. Ensure the individual 22/16 mm microducts that form the grouped microcell conduit assembly have a SDR number less than or equal to 7.3.

Furnish grouped microduct conduit assemblies with a minimum allowable flexural modulus of  $5,625 \text{ Kg/cm}^2$  (80,000 psi) and a minimum Pipe Stiffness of  $49.2 \text{ Kg/cm}^2$  (699 psi). Ensure the completed grouped microcell conduit assembly is furnished with a minimum of two (2) ripcords located along the outer sheath. The outer sheath of the grouped microcell conduit assembly shall not be adhered (glued) to the internal microcell conduits to allow for easy removal of outer sheath.

Furnish grouped microcell conduits assemblies with a preinstalled 14 AWG THWN solid copper soft drawn per ASTM B3 tracer wire located within the interior of the outer sheath. Grouped Microcell conduit assemblies with and internal tracer wire located inside an individual microduct conduit will not be accepted.

For overriding applications, where a new single microduct will be installed in an existing conduit system, furnish a microduct conduit with an SDR number less than or equal to 11 to serve as the new carrier pipe. For override applications provide a microduct conduit sized as specified in the plans developed by the Design-Build Team.

Ensure the individual microducts supplied by the manufacturer meet quality and verification testing in accordance with ASTM F2160 for materials and associated properties for cell classification PE 334480 C for black or E for color. Ensure the outer sheath of the group microcell conduit system is marked every two feet in accordance with ASTM F2160 standards to include the following a. – f. below:

- a. Material: HDPE
- b. Trade Sizes and # of microducts: i.e., 4-way 22/16 mm
- c. Conduit Type: SDR 7.3 or EPEC-7.3
- d. Manufacturer's name or trademark



- e. Manufacturer's production code to identify manufacturing date, facility, etc.
- f. Manufacturer certified meeting the material and dimensional microduct requirements.

### Microduct Couplers and End Caps

Furnish gasketed couplers and gasketed end caps recommended by the manufacturer of the furnished microduct conduits for joining and sealing off of the microduct conduit ends. Couplers and end caps shall be sized specifically for the microduct conduits and designed to be easily removed by hand and re-useable.

At a minimum, couplers shall meet the required safety margins testing as outlined under Bell Core GR-356-CORE. Additionally, the couplers shall be tested to illustrate that the couplers are 100% airtight (no air loss) due to failure of couplers when pressure is raised from the 125 psi (maximum Bell Core GR-356-CORE pressure tested) to 175 psi  $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$  ( $73^{\circ}\text{F} \pm 9^{\circ}\text{F}$ ) for five minutes.

### Pull Tape

Furnish pull tape manufactured out of ½-inch wide polyester material with a minimum of a #22 AWG solid PVC insulated tracer wire woven into the polyester material. Ensure the pull tape is pre-lubricated and has a minimum tensile strength of 1,250 lbs.

## CONSTRUCTION METHODS

### General

Install traditional HDPE conduits and grouped microcell conduit assemblies utilizing the method identified in the plans developed by the Design-Build Team (trench, micro-trench, plow, directional drill, etc.) Comply with the following Sections in Article 1715-3 "Construction Methods" of the 2018 *Standard Specifications for Roads and Structures*, where applicable:

- Section 1715-3 (B) – Trenching
- Section 1715-3 (C) – Plowing
- Section 1715-3 (D) – Directional Drilling

MINIMUM CLEARANCE REQUIREMENTS	
Man-made Structure or General Installations	Minimum Clearance Requirement (all distances are "averages")
Minimum / Maximum Conduit Depth Parallel to Interstate	42 inches / 48 inches
Minimum / Maximum Conduit Depth crossing the Interstate (Perpendicular)	15 feet below
Bridge Foundation	five feet horizontal and four feet vertical (clearances greater than minimum horizontal should continue to use the 4V:5H ratio, e.g., ten feet horizontal should be no deeper than eight feet)

Drainage Pipes 60 inches or Less	14 to 15 feet below
Drainage Pipes Greater than 60 inches	14 to 15 feet below
Box Culverts	14 to 15 feet below
Slope Protection (rip rap)	32 inches below
Slope Protection Foundation Footing	five feet below
Crossing Beneath Ditches	32 inches below bottom of ditch
Navigable Waters / Stream Crossings	six feet below

Follow industry accepted practices for installing the conduit(s) when trenching, plowing and / or directional drilling operations are required. Use pulling eyes or external conduit grips sized in accordance with the manufacture's recommendations for directional drilling operations. Where external grips are to be used the ends of the conduits should be sealed to prevent debris from entering as the conduit is being installed.

For any installation practices that require pulling of the conduits use a breakaway swivel rated to not exceed the manufactures recommended working tensile load. When a field bend or elevation change in the conduit is required to work around obstructions or obstacles do not violate the manufacturer's recommend safe working tensile load and minimum allowable bend radius.

Backfill and tamp trenches in six-inch lifts while removing any rocks or debris that could possibly damage the conduit system. Place non-detectable marker tape 12 inches below the final grade.

During installation of any conduit(s) temporarily install a mechanical duct plug (traditional) or end cap (microduct) on the exposed conduit ends to prevent any debris from entering the conduit. Install conduit(s) to enter and exit the junction boxes through the mouse holes, precast knockouts or field drilled conduit entrance holes. Sufficient slack conduit should be pulled into the junction box so the opposing ends overlap for joining. Adequate time should be given prior to joining to allow the conduit to relax and recover due to any elongation that may have occurred as it was being pulled into place. **Conduits installed for the purpose of jetting in fiber shall not enter or exit junction boxes through the bottom.**

Install quick setting, non-shrinking grout around the conduit openings to seal and hold the conduit in place as it enters and exits the junction boxes. Ensure the lowest conduit entering the junction box maintains a minimum of four-inch separation from the bottom layer of crushed stone located inside the junction box.

Ensure the orientation for conduits of the same color enter and exit the junction box positioned opposite each other so that when mating the conduit of the same color the ends will be in direct line with one another. During initial installations of the conduits ensure the opposing conduits are pulled into the junction box so the opposing ends overlap for joining and are properly sealed.

Install conduits in one continuous length between junction boxes. Joining conduits shall only be performed within junction boxes, unless otherwise approved by the Engineer (see “Conduit Integrity Testing” section of this Project Special Provision).

When temporarily joining conduits inside junction boxes to increase fiber jetting distances use removable split couplers designed to be airtight to temporarily join the opposing ends. Prior to joining two conduits with a removable split coupler use approved conduit shears to provide smooth, clean, square cuts on ends of the conduits. At the appropriate time during cable installation, the split couplers will need to be removed to allow for the specified slack loop length to be installed.

Final dressing of the conduits shall be done after the cable slack loops have been installed in each junction box. For the conduit sections where the cable has been installed, the conduit is to be slit and removed to four inches from the junction box wall. Consult the conduit manufacturer for the determining the appropriate tools to be used that will protect the installed cables. A split expandable seal is to be placed around the cable into the end of each conduit end, (see the “Jetting Operations” section of this Project Special Provision).

For the spare conduits the duct ends are to be left overlapped for future use. All ends should be sealed using an expandable duct plug which is to be removed when the conduit integrity testing. Once the conduit integrity testing has been completed, the ends are to be sealed as outlined in the “Duct Sealing” section of this Project Special Provision.

### **Conduit Integrity Testing**

Immediately upon completing the conduit installation or prior to installation of the fiber cable it will be the responsibility of the Design-Build Team to ensure usability of the conduit system. This will be done by conducting a mandatory “Conduit Integrity Tests” (CIT) on each individual conduit in the presence of the Engineer. The purpose of performing the CIT to identify there are no obstructions, leaks or other defects resulting from the conduits installation between access points (junction box locations). The CIT includes a series of three (3) individual steps to be completed, prior to acceptance of the conduit system.

#### **CIT Steps**

- 1) Air Pressure Test
- 2) Shuttle / Mandrel Test
- 3) Sponge Test / Cleaning

#### **Air Pressure Test**

Seal the downstream end of the conduit with a pressure rated temporary end cap or plug and attach an airtight fitting with a quick connect air coupling and pressure gauge to compressor end of the conduit. Connect the compressor hose to the fitting with an inline pressure gauge and fill the conduit with compressed air raising the pressure to 6 bars (87 psi). Once the pressure has reached the designated level wait to see if the pressure drops slightly and add additional air to reach the desired pressure level. Once the pressure level appears to have stabilized at the prescribed level wait five minutes to see if the pressure remains stable. If the pressure reading remains stable or does not drop significantly (Minimal reductions of one to two pounds is

acceptable) after a five minutes lapse of time, then there is no leakage in the duct and the section being tested has passed.

If the pressure reading shows a significant drop-in pressure, then determine where the leakage is occurring, and corrective actions shall be taken. Note the loss of pressure may be occurring at the coupler, if it has not been properly installed. If it is at the coupling in a handhole for example correct it and retest. If the problem is found to be in the conduit between access points notify the Engineer and make arrangements to replace or repair that section of conduit at no additional expense to the Department (see “Repair of Conduit Segments” section of this Project Special Provision).

### **Shuttle / Mandrel Test**

An obstruction or kink or some other defect in the installed conduit can be determined by a shuttle test. The test is conducted by using a shuttle that is 70-80% of conduits inner diameter that is either a sphere or a segment of fiber optic cable with a length of 3 times the diameter of the conduit being tested. The shuttle is to be inserted into the conduit and passed through the conduit by applying compressed air. The pulling option is to pull a segmented mandrel through the conduit, designed for proving duct runs.

Provided the shuttle or mandrel passes through from end to end of the conduit then the duct is considered to be acceptable for cable installation. If the shuttle mandrel fails to pass from end to end, then the conduit is either kinked or blocked. It will be the installers obligation to find the blockage or kinked location. For conduits that do not pass this test notify the Engineer and make arrangements to replace or repair that section of conduit at no additional expense to the Department (see “Repair of Conduit Segments” of this Project Special Provision).

### **Sponge Test / Cleaning**

Installation of a test sponge as recommended by the jetting equipment or conduit manufacturer is to be used for cleaning and / or lubricating the conduits inner diameter from end to end, prior to cable installation. Two sponges are to be used for this purpose using the steps listed below:

1. From the jetting end blow one or two sponges through the conduit to the destination handhole. Inspect the sponges and repeat this step until the sponges are clean of dirt and debris after passing through the conduit system, then move to step 2.
2. At the jetting end of the conduit insert one sponge pushing it into the end of the conduit several inches.
3. Leave enough room to then pour in the lubricant manufacturer’s suggested amount of lube for the diameter and distance the cable is to be jetted.
4. Lubricate and insert the second sponge into the end of the conduit.
5. Secure the conduit lead end to the jetting machine’s sealed air block and apply compressed air to blow the sponge and lubricant through the conduit.
6. The last step is to jet the fiber cable into the conduit.

### **Repair of Conduit Segments**

For HDPE Conduit segments (traditional and / or multicell), where the conduit has been discovered to have been damaged (failing to pass the Conduit Integrity Testing) notify the Engineer. The Engineer has the authority to require any of the following options regarding the damaged section of conduit:

- Replace the damaged section of conduit
- Allow the use of conduit couplers to replace the damaged section of the conduit
- Allow the damaged section to be repaired using the “HDPE pipe welding heat fusion” process.

### **Conduit Sealing**

Immediately upon completing the Conduit Integrity Testing install an approved mechanical duct plug or gasketed end coupler over the ends of all conduits to guard against debris or water entering the conduit.

### **Spare Conduits and Pull Tape**

For conduits designated to be used as spares, install a continuous section of Pull Tape through the conduit. Place the embedded tracer wire of the pull tape under the gel filled wire nut along with the other conduit’s internal tracer wire. (Reference the “Tracer Wire Bonding / Isolation Test Switch” Section of the *Junction Boxes (Limited Access Facilities)* Project Special Provision found elsewhere in this RFP)

## **JETTING FIBER**

### **General**

Furnish personnel trained in the operation of the fiber jetting machine and all safe operating procedures. Provide a fiber jetting machine complete with a head and feeder system with all necessary seals and nozzle attachments including a compressed air machine to facilitate installation of the fiber.

Provide couplers and split half couplers as necessary to make temporary joints of conduits to facilitate jetting of the fiber cable through midspan junction boxes. Ensure the couplers and split half couplers are designed to provide an airtight seal around the HDPE conduits and that they are reusable. Ensure split half couplers can be easily assembled and disassembled using standard wrenches and / or nut drivers and that couplers can easily be removed and reused.

Furnish a UL approved blowing lubricant recommended by the conduit manufacturer and approved by the fiber manufacturer that will not adversely affect the HDPE conduit nor the fiber optic cable both during and after the cable jetting installation process.

Ensure the lubricant is designed to meet or exceed all cable blowing requirements with respect to viscosity, cling, drag, wetting and designed for use in the temperature range indicative of the environmental temperature when the cable is installed. Ensure the lubricant is safe to use and is

non-toxic, non-corrosive, non-flammable and does not stain, alter or cause a smearing effect to the required markings found on the outer sheath of the fiber optic cable.

### **Jetting Operations**

Upon successful completion of the CIT procedures begin jetting operations to install the fiber. Ensure the fiber reel and jetting machine are synchronized to minimize unnecessary pulling and jerking on the fiber cable as it is being removed from the reel during the installation process. Apply cable pulling lubricant as recommend by manufacturers to minimize the Coefficient of Friction allowing the cable to slide effortlessly through the conduit system.

During the jetting process provide spare fiber at junction boxes and / or cabinets as required by the plans developed by the Design-Build Team. After the jetted fiber is installed ensure that all spare conduits are sealed off with a mechanical sealing plug or gasketed end cap. For conduits that contain a fiber cable install a mechanical fiber / conduit sealing split duct plug to seal the fiber and conduit from debris. Moldable Duct Seal shall not be acceptable for spare conduits or conduits containing fiber when those conduits are installed for the future installation of fiber using the “Fiber Jetting Process” and when the installation of the conduit system is along a “Limited Access” or “Controlled Access Facility”. Ensure any conduits designated as spare have a mechanical duct plug (Traditional) or gasketed end cap (Microcell) installed in the open ends to seal against debris entering the conduit system.

## **ITS HUB CABINET**

### **DESCRIPTION**

Furnish and install air-conditioned hub cabinets, hub cabinet base extenders, hub cabinet foundations and all necessary hardware as described herein. Size the cabinet appropriately to fit all the equipment and to allow for 25% free space available after all equipment is installed. Size the cabinet to ensure ease of access to equipment and provide proper ventilation in order to maintain an internal operating environment that does not exceed the environmental operating ranges for devices placed within the cabinet.

### **MATERIALS**

#### **Hub Cabinet**

#### **Standards**

Ensure that the hub cabinets comply with the following standards:

- ANSI;
- ASTM;
- IMSA ;
- ISO 9001;
- NEC;
- NEMA TS-2; and
- UL listed.

## Functional

Furnish Caltrans Type 332D base-mounted hub cabinets meeting the following minimum requirements:

- Side-by-side, double doors on both front and rear of cabinet;
- Fiber-optic interconnect centers (paid separately);
- Grounding bus bar;
- 19-inch rack system for mounting of all devices in the cabinet;
- Pull-out shelf for laptop and maintenance use;
- Maintenance access connections;
- LED lighting;
- Ventilation fans;
- 120VAC power supply;
- 120VAC ground fault circuit interrupter (GFCI)-protected duplex outlets for tools;
- 120VAC surge-protected duplex outlets for equipment;
- Sunshields constructed of light gauge aluminum that sit approximately one inch above the surface of the cabinet on all sides, including doors
- Lightning and surge protection on incoming and outgoing electrical lines (power and data);
- Managed Ethernet switch (paid separately);
- Door status sensors compatible with provided Managed Ethernet switches
- Power strip along vertical rail;
- HVAC system to maintain optimal temperature and humidity for the Ethernet hub switches and other powered electronics in the cabinet.
- UPS with sufficient capacity to hold hub's electrical load (minus the HVAC) for 4 hours. Cabinet AC system will not be connected to the UPS.

## Physical Features

Provide cabinets that are completely weatherproof to prevent the entry of water. Provide cabinet and door exterior seams that are continuously welded, and all exterior welds are smooth.

Provide cabinets with four full-size doors with full-length stainless steel piano hinges, with stainless steel pins spot-welded at the top. Provide hinges that utilize stainless steel hinge pins. Provide hinges that are mounted so that they cannot be removed from the door or cabinet without first opening the door. Provide door and hinges braced to withstand a 100-pound per vertical foot of door height load applied vertically to the outer edge of the door when standing open. Ensure that there is no permanent deformation or impairment of any part of the door or cabinet body when the load is removed. Provide cabinet door fitted with a #2 Corbin lock. Provide two keys for each cabinet. Provide cabinet doors that are also pad lockable. Provide door openings that are double flanged on all four sides.

Provide cabinets constructed of unpainted sheet aluminum alloy H5052-H32 with a minimum thickness of 0.125 inch.

Provide the hub cabinet with sunshields outside to deflect solar heat away from the cabinet. The sunshields must be offset a minimum of one inch from the exterior cabinet walls. Ensure that the sunshields are fabricated from 5052-H32 aluminum sheet that is 0.125 inch thick, and that sunshield corners are rounded and smoothed for safety. Mount the sunshields on standoffs on the top and on each side of the cabinet including the doors.

Provide doorstops at 90 and 180-degree positions. Ensure that both the door and the doorstop mechanism are 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. Do not provide auxiliary police doors.

Ensure that cabinet doors include a gasket to provide a dust and weather-resistant seal when closed. Ensure that the gasket material is closed-cell neoprene and maintains its resiliency after exposure to the outdoor environment. Ensure that the gasket shows no sign of rolling or sagging and provide a uniform dust and weather-resistant seal around the entire door facing.

Provide door alarms for all 4 doors that are compatible with the hub switches to be provided and installed by DIT. Door alarms should send a network alert to the switch when a hub cabinet door is opened or if the door alarm fails or is tampered with. Coordinate with the Engineer and DIT for hub switch model information.

Provide cabinets that include predrilled holes of standard diameter and bolt pattern with four (4) anchor bolts with each cabinet unit as part of the unit price bid. Provide a panel with each cabinet that matches the rest of the cabinet; and is held in place by four bolts provided with the panel. Drill or punch the panel to accommodate the bolts; the drill holes shall match the bolt pattern of the base cabinet of the cabinet. Provide a panel designed to be fitted in the interior of the cabinet and fabricated of the same material and thickness as the cabinet bottom.

Provide rails to create a cage to mount hardware, wiring panels and miscellaneous mounting brackets. Provide rails constructed of .1345-inch steel or .105-inch stainless steel. Provide rails with a keyhole design with slots 2 inches on center with a top opening of 5/8 inch in diameter to allow the insertion of a .625-inch by 1-inch carriage bolt. Ensure that the rails are 1.5 to 2 inches wide by .5 inches deep. Drill and tap the rails for 10-32 screws or rack screws with EIA universal spacing.

Provide rack assemblies that have a removable, standard 19-inch EIA compliant rack. The rack shall have a clearance between the rails of 17.5 inches.

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 compartment with ball-bearing telescoping drawer guides to allow full extension from the rack assembly. Ensure that when extended, the storage compartment opens to provide storage space for cabinet documentation and other miscellaneous items. Ensure that the storage compartment is of adequate construction to support a weight of 20 pounds when extended without sagging. Provide a top to the storage compartment that is hinged aluminum. Provide two (2) removable metal shelves with each cabinet.



Furnish a cabinet base extender with each hub cabinet that complies with the requirements of the “Cabinet Base Adapter and Base Extender” section of these Project Special Provisions.

Install an external generator connection port on the side of the cabinet opposite the air conditioning unit. Port should be designed and sized for the appropriate electrical requirements of the cabinet.

### **Lighting**

Provide the field cabinet with four LED lamps (one above each door) and clear shatterproof shield assemblies which are mounted on the inside front and rear top of the cabinet. Ensure that these lamps are unobstructed and able to cast light on the equipment. Equip the field cabinet with door-actuated switches so that the lamps automatically turn on when any cabinet door is opened and go off when all the doors are closed.

### **Electrical**

Provide a service panel assembly to function as the entry point for AC power to the cabinet and the location for power filtering, transient suppression, and equipment grounding. Provide AC isolation within the cabinet. Configure cabinet to accept 120 VAC from the utility company.

Provide circuit breakers that are UL listed and have an interrupt capacity of 5,000 amperes and insulation resistance of 100 MΩ at 500 VDC. Provide power distribution blocks that are suitable for use as power feed and as junction points for two and three wire circuits. Ensure that the line side of each block is capable of handling up to 2/0 AWG conductors. Ensure that the AC neutral and equipment ground wiring and terminal blocks are isolated from the line wiring by an insulation resistance of at least 10 MΩ when measured at the AC neutral.

Provide UL listed surge protection devices according to the UL 1449, 2nd edition standard that comply with the NEMA requirements as detailed in the NEMA LS 1 (1992) standard.

Provide branch circuits, surge protection devices, and grounding for the connected load served by the cabinet, including ventilation fans, internal lights, electrical receptacles, etc., as shown on the plans developed by the Design-Build Team. Terminate field wiring on terminal blocks with the voltage and current rating of the terminal block is greater than the voltage and current rating of the wire fastened to it.

Furnish a power distribution assembly that fits in the EIA 19-inch rack and provides for protection and distribution of 120VAC power.

Ensure that ground bus bars are fabricated from a copper alloy material compatible with copper wire. Use ground bus bars that have at least two positions where a #6 AWG stranded copper wire can be attached.

Mount the ground bus bar on the side of the cabinet wall adjacent to the service panel assembly for the connection of AC neutral wires and chassis ground wires. If more than one ground bus bar is used in a cabinet, use a minimum of a #10 AWG copper wire to interconnect them.

Terminate conductors on terminal blocks using insulated terminal lugs large enough to accommodate the conductor to be terminated. When two or more conductors are terminated on field wiring terminal block screws, use a terminal ring lug for termination of those conductors. Number all terminal block circuits and cover the blocks with a clear insulating material to prevent inadvertent contact.

### **Ventilation**

Ensure the cabinet assembly can maintain the temperature and humidity within the environmental requirements of the hub switches and other powered electronics in the cabinet.

Include two cooling fans with 100 CFM, minimum capacity. Provide thermostats to be incorporated into the ventilation system. Mount fans in the top of the cabinet.

Provide the cabinets with vent openings in the lower portion of the door to allow convection cooling of electronic components. Cover them fully on the inside with a commercially available disposable three layer graded type filter. All air entering the cabinet must pass through the air filter.

### **Air Conditioner**

Furnish each hub cabinet with a rack mounted air-cooled air conditioner that operates on 120VAC. The air conditioner shall be fit within a 19-inch EIA communications rack and shall not be external mounted on the cabinet. The air conditioner shall be mounted in the bottom of the cabinet to avoid damage to any communications equipment.

The air conditioners shall have a built-in condensate evaporator and condensate drain fitting and hose that is plumbed to the outside of the cabinet. The air conditioner shall be rated for a minimum of 3500 BTU. There shall be low temperature control to prevent overcooling.

Provide EMI/RFI transient spike protection. Equip the cabinet and air conditioner with remote monitoring of high temperature and low airflow conditions. Intake air shall enter through cabinet door vent and be exhausted through top cabinet vents. Air conditioners shall be CFC free or low ODP (R-22) refrigerant and shall use closed loop cooling. Insulate all cold components (coolant lines, compressor, evaporator, etc.) with high-performance insulation.

Blower motors shall be UL listed. Ensure the blower motors are equipped with automatic reset thermal overload protection. Provide double sealed and double shielded ball bearings.

The air conditioners shall have permanent corrugated aluminum or stainless steel air filters. The filters shall be removable and washable.

All grilles shall be stainless steel.

**Hub Cabinet Base Extender**

Fabricate hub cabinet base extenders from the same materials and with the same finish as the hub cabinet housing. Fabricate base extender in the same manner as hub cabinets, meeting all of the same applicable specifications called for in these project special provisions. Provide cabinet base extenders with a height of at least 12 inches.

**Hub Cabinet Foundation**

Furnish either poured concrete hub cabinet foundations or preformed hub cabinet foundations.

Obtain approval of foundation type from the engineer.

Comply with Section 1000-4 of the *2018 Standard Specifications for Road and Structures*.

Provide hub cabinet foundations with a minimum pad area that extend 24 inches from the front and back of the hub cabinet and 6 inches from the sides of the cabinet.

Furnish hub cabinet foundations with chamfered top edges. Provide minimum class B concrete.

On the same side as the cabinet generator hookup, cast a three inch inside width galvanized steel U-bolt into the cabinet foundation. A minimum of four inches of the U-bolt shall be cast into the concrete and a minimum of three inches of the U-bolt shall be exposed for securing a generator to the foundation.

Provide preformed hub cabinet foundations with 7" (L) x 18" (W) minimum opening for the entrance of conduits. For precast hub cabinet foundations, include steel reinforcement to ensure structural integrity during shipment and placing of item. Include four ¾ inch coil thread inserts for lifting. Comply with Article 1077-16 of the *2018 Standard Specifications for Road and Structures*.

**Hub Cabinet UPS**

Furnish UPS with external temperature monitoring that will shut off when running on battery power and the maximum operating temperature for the ethernet switch is reached.

Install UPS with RJ-45 ethernet network monitoring ports that can be disabled via the UPS software/firmware.

The Design-Build Team is responsible for supplying a UPS and batteries that can adequately power the cabinet load plus an additional 20% for a minimum of 4 hours. The Design-Build Team shall request the power requirements for any department supplied equipment prior to submitting UPS for approval. Allow eight (8) weeks for the department to supply equipment power requirements. Provide to the Engineer for Approval, a submittal package with Engineering Calculations consisting of, as a minimum, schematic drawing, technical data sheets, and supporting documentation. Ensure the documentation demonstrates, in theory, that the

battery(ies) will provide for continuous operation for a minimum of four (4) consecutive hours with no additional charging.

Furnish and install one rack mounted UPS in each new cabinet that meet the following minimum specifications:

#### **Output**

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

#### **Input**

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

#### **Battery Type**

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

Typical recharge time	2 hours
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#### **Communications & Management**

Interface Port(s)	DB-9 RS-232, USB,RJ-45 Ethernet
Control panel battery	LED status display with load and bar-graphs

#### **Surge Protection and Filtering**

Surge energy rating	480 Joules
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#### **Environmental**

Operating Environment	-32 - 165 °F
Operating Relative Humidity	0 - 95%

#### **Conformance**

Regulatory Approvals	FCC Part 15 Class A, UL 1778
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## **CONSTRUCTION METHODS**

## Hub Cabinet

Ensure all cabinet wiring is tagged and identified using insulated pre-printed sleeves and follows the project's cable identification scheme. Ensure that the wire markers identify usage in plain words with sufficient details without abbreviations or codes.

Use stranded copper for all conductors, including those in jacketed cables and solid copper for all grounding. 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 with permanent and waterproof tags. 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 TVSS, 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. Ensure that all fastener heads and nuts (when used) are fully accessible within a complete cabinet assembly, and any component is removable without requiring removal of other components, panels or mounting rails. Do not use self-tapping or self-threading fasteners.

Mount the air conditioner in the bottom of the cabinet and do not obstruct any cable entry into the cabinet. Install condensate drains to drain condensation water out of the cabinet. Ensure the cabinet has provisions to route conduit to the existing cabinet as shown in the drawings.

Furnish and install a 48" 120 VAC power strip vertically along one of the rear rails of the communications rack. Provide a power strip that has at least eight outlets along its length.

Provide a cabinet that is ISO 9001 certified at the time of bid letting.

Locate cabinets as close to the edge of the controlled access as possible and protect hub cabinets with guardrail unless instructed otherwise by the engineer.

Install base mounted cabinets as shown on the plans developed by the Design-Build Team and as approved by the Engineer. Refer to the "Hub Cabinet Foundation" section of these Project Special Provisions for installation requirements for the hub cabinet foundations. Install only the required number of conduits as shown on the plans developed by the Design-Build Team plus one additional spare stub out conduit. Position the ends of conduits approximately 2 inches above the finished surface of the concrete base.

Mount the hub cabinets on cabinet base extenders in accordance with the “Hub Cabinet Base Extender” section of these Project Special Provisions.

Mount surge protection devices in the cabinet for the field devices that will be connected to that cabinet.

Terminate power service wire, video, and data cabling on the appropriate terminal strips, surge protection devices or jacks in the cabinet with insulated terminal lugs or connectors. Use a calibrated ratchet-type crimping tool to install the insulated terminal lugs onto the field wires.

Label spare circuits of the data cables and connect them to the cabinet ground bus bar.

Neatly bundle and identify all field wiring cables in the cabinet with permanent waterproof tags.

Ground all hub cabinets in accordance with NEC requirements and the Hub Cabinet Grounding Detail included in these Project Special Provisions. 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.

### **Hub Cabinet Base Extender**

Install hub cabinet base extender at all hub cabinet locations.

Use permanent, flexible, waterproof sealing material to:

- (a) Seal between the hub cabinet base and hub cabinet base extender.
- (b) Seal 2-piece hub cabinet base extender seams.
- (c) Seal space between hub cabinet base extender and the hub cabinet foundation.

### **Hub Cabinet Foundation**

Comply with Section 825 of the *2018 Standard Specifications for Road and Structures*.

When using poured concrete foundations and preformed concrete foundations, use procedures, equipment and hardware as follows:

- (d) Locate new hub cabinets in locations as shown on the plans developed by the Design-Build Team and approved by the Engineer.
- (e) Do not install foundations over uncompacted fill or muck.
- (f) Do not install foundations in low areas or locations prone to standing water.
- (g) Hand tamp soil before placing concrete to ensure ground is level.
- (h) Use a minimum of four ½ inch diameter expanding type anchor bolts to secure cabinet to foundation.
- (i) Install minimum 4 inches above and 4 inches below finished grade.

- (j) Locate external stubbed out conduit at cabinet foundation so conduit is located on the side of the hub cabinet with the UPS, do not locate conduit under the air conditioning system. Install a minimum of 6 conduit stub-outs.
- (k) Give hub cabinet foundation a broom finish and chamfered edges.
- (l) Seal space between cabinet base and foundation with a permanent, flexible, waterproof sealing material.

### **Hub Cabinet UPS**

Install rack mounted UPS in each hub cabinet in accordance with the plans developed by the Design-Build Team and detail drawings.

### **Observation Period**

#### **30-Day Observation Period**

The 30-Day Observation Period shall be considered part of work to be completed by the project completion date.

Upon successful completion of all project work the 30-day Observation Period may commence. Examples of project work includes but is not limited to:

- Installation of all project devices and communications infrastructure.
- Field Acceptance Testing of all devices.
- Central System Testing of all devices and network communications.
- Correction of all deficiencies and punch list items. (including minor construction items)

This observation consists of a 30-day period of normal, day-to-day operations of the field equipment in operation with new or existing central equipment without any failures. The purpose of this period is to ensure that all components of the system function in accordance with the plans developed by the Design-Build Team developed by the Design-Build Team and these Project Special Provisions.

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

- CCTV Cameras and Central Operations
- Dynamic Message Sign (DMS) and Central equipment/Operations

- Portable Changeable Message Sign (PCMS)
- Communications infrastructure (examples: Fiber, Radios, Ethernet Switches, Core Switches, etc.)
- Any other ITS Devices not named above (examples: DSRC radios, Radar and Out-of-Street Detection, signals, etc.)

#### **FINAL ACCEPTANCE**

Final system acceptance is defined as the time when all work and materials described in the plans developed by the Design-Build Team developed by the Design-Build Team and these Project Special Provisions have been furnished and completely installed by the Design-Build Team; all parts of the work have been approved and accepted by the Engineer; and successful completion of the 30-day observation period.

The completed System will be ready for final acceptance upon the satisfactory completion of all acceptance tests as detailed in their respective Section of the Project Special provisions; the rectification of all punch-list discrepancies; and the submittal of all project documentation including As-Built Plans.

#### **BLACK EPOXY PAVEMENT MARKING MATERIAL**

(1-26-17)

##### **Description**

This work shall consist of applying black epoxy pavement marking material on concrete.

##### **Epoxy Pavement Marking Material**

###### **(A) Formulation**

Use epoxy pavement marking material consisting of 100% solid two-part system formulated and designed to provide a simple volumetric mixing ratio of the two components.

###### **(B) Epoxide Value:      ASTM D1652**

WPE of the epoxy resin shall be  $250 \pm 50$  for both white and yellow component A on a pigment free basis.

###### **(C) Amine Value          ASTM D2074**

The total amine value of the curing agent (component B) shall be  $450 \pm 50$

###### **(D) Requirements**

###### **(1) Color**

Black:

Shall meet ASTM standard



- |   |                      |
|---|----------------------|
| (2) Hardness:                           | ASTM D2240           |
| Minimum Shore D hardness:               | 80                   |
| (3) Abrasion Resistance:                | ASTM C-501           |
| Minimum wear index of catalyzed sample: | 80                   |
| (4) Adhesion to Concrete:               | ASTM D4541           |
| At 100% concrete failure:               | Greater than 325 psi |
| (5) Tensile Strength:                   | ASTM D638            |
| Minimum average tensile strength:       | 6000 psi             |
| (6) Compressive Strength:               | ASTM D695            |
| Minimum compressive strength:           | 12000 psi            |
| (7) Drying Time:                        | ASTM D711            |
| Maximum drying time at 75 ±2° F:        | Ten minutes          |
| (8) Gel Time:                           | ASTM D2471           |
| Maximum gel time:                       | Three minutes        |

(E) Material Certification: Type 3 Material Certification and Type 4 Material Certification

### **Construction Methods**

Epoxy Pavement Marking Material shall conform to the requirements of Section 1205 of the 2018 *Standard Specifications for Roads and Structures*.

#### **(A) Application Equipment**

Use epoxy application equipment, which is equipped with or capable of the following:

Precisely metering the two components in the ratio of proportion recommended by the manufacturer.

Producing the required amount of heat at the mixing head and gun tip.

Maintaining temperatures within the tolerances recommended.

Gauges for each proportioning pump so that any pressure difference can be easily monitored.

A minimum 24" long static mixer unit for proper mixing of the two components of the epoxy marking material.

Each component of the epoxy pavement marking shall be in a homogeneous state prior to mixing,

Have the capability to totally mix component A with component B immediately prior to the marking application.

Have the capability to spray pavement marking material and have the equipment mounted on a truck of sufficient size and stability with an adequate power source to produce uniform lines of the specified dimension.

A metering device to register the accumulated installed footage for each gun.

**(B) Weather Limitations**

Apply epoxy pavement marking only when the ambient air temperature and the pavement surface temperature is a minimum of 35° F and rising.

**(C) Application**

Produce epoxy pavement marking lines that have a minimum dry thickness of 15 mils when placed on concrete pavements and 20 mils when placed on asphalt pavements.

Use **Type I** epoxy material (fast dry) for epoxy pavement markings except when otherwise specified in the contract documents.

**Type II** epoxy material may be used with lane closures as approved by the Engineer to allow for curing time.

Do not place epoxy markings on fresh asphalt pavements until 15 days have elapsed after the last asphalt layer is placed.

Using the epoxy application equipment, apply the pavement marking materials simultaneously. Hot-spray the epoxy resin, mixed in accordance with the manufacturer's recommendations, onto the pavement surface within an application temperature range recommended by the manufacturer. Inject retroreflective glass beads into the molten (liquid) Epoxy Marking.

Individual Components: Before mixing, heat the individual components to within the temperature range of 100° F to 170° F. Do not exceed the upper limit of the manufacturer's recommended heating temperature at any time under any circumstances.

Mixed Material: After mixing, ensure that the application temperatures for the combined materials at the gun tip are within the temperature range recommended by the manufacturer for the particular product used.

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

**(D) Observation Period**

Epoxy pavement markings shall be subject to a 30-day observation period.

Maintain responsibility for the pavement markings for a 30-day observation period beginning upon the satisfactory completion of all work required in the plans developed by the Design-Build Team. Guarantee the markings under the payment and performance bond in accordance with Article 105-17 of the *Standard Specifications for Roads and Structures*.

Have traffic operating on the facility during the entire 30-day observation period unless otherwise directed.

Provide pavement marking material, which during the 30-day observation period, shows no signs of failure due to blistering, excessive cracking, chipping, bleeding, staining, discoloration, oil content of the pavement materials, smearing or spreading under heat, deterioration due to contact with grease deposits, oil, diesel fuel, or gasoline drippings, spilling, poor adhesion to the pavement materials, vehicular damage, debonding and normal wear.

Replace, at no additional expense to the Department, any pavement markings that do not perform satisfactorily under traffic during the 30-day observation period.

**SEQUENTIAL FLASHING WARNING LIGHTS**

(10/08/2016)

**Description**

In accordance with this RFP, the Design-Build Team shall furnish and install Sequential Flashing Warning Lights on drums used for merging tapers during nightly work activities on interstates and freeways with speed limits greater than 55 mph and or facilities that have significant traffic volumes, this includes the following facilities:

- US 19/23/70 (existing I-26) including ramps and loops
- I-240 including ramps and loops
- I-26 including ramps and loops
- Patton Avenue

The purpose of these lights is to assist the motorist in determining which direction to merge when approaching a lane closure. It's also designed to reduce the number of late merges resulting in devices being struck and having to be reset to maintain positive guidance at the merge point.

The successive flashing of the lights shall occur from the upstream end of the merging taper to the downstream end of the merging taper in order to identify the desired vehicle path.

### **Materials**

The Sequential Flashing Warning Lights shall meet all of the requirements for warning lights within the current edition of the Manual of Uniform Traffic Control Devices (MUTCD).

Each light unit shall be capable of operating fully and continuously for a minimum of 200 hours when equipped with a standard battery set.

Each light in the sequence shall be flashed at a rate of not less than 55 times per minute and not more than 75 times per minute. The flash rate and flash duration shall be consistent throughout the sequence.

Supply a Type 3 Certification (Independent Test Lab results) documenting all actual test results for the specified parameters contained in the Institute of Transportation Engineer's (ITE's) *Purchase Specification for Flashing and Steady Burn Warning Lights*. The laboratory shall also identify all manufacturer codes and part numbers for the incandescent lamp or LED clusters, lenses, battery, and circuitry, and the total width of the light with the battery in place. The complete assembly shall be certified as crashworthy when firmly affixed to the channelizing device.

All Sequential Flashing Warning Lights shall be on the NCDOT Work Zone Traffic Control Approved Products List.

### **Construction Methods**

Sequential Flashing Warning Lights are to be used for night time lane closures.

These lights shall flash sequentially beginning with the first light and continuing until the final light.

The Sequential Flashing Warning Lights shall automatically flash in sequence when placed on the drums that form the merging taper.

The number of lights used in the drum taper shall equal the number of drums used in the taper.

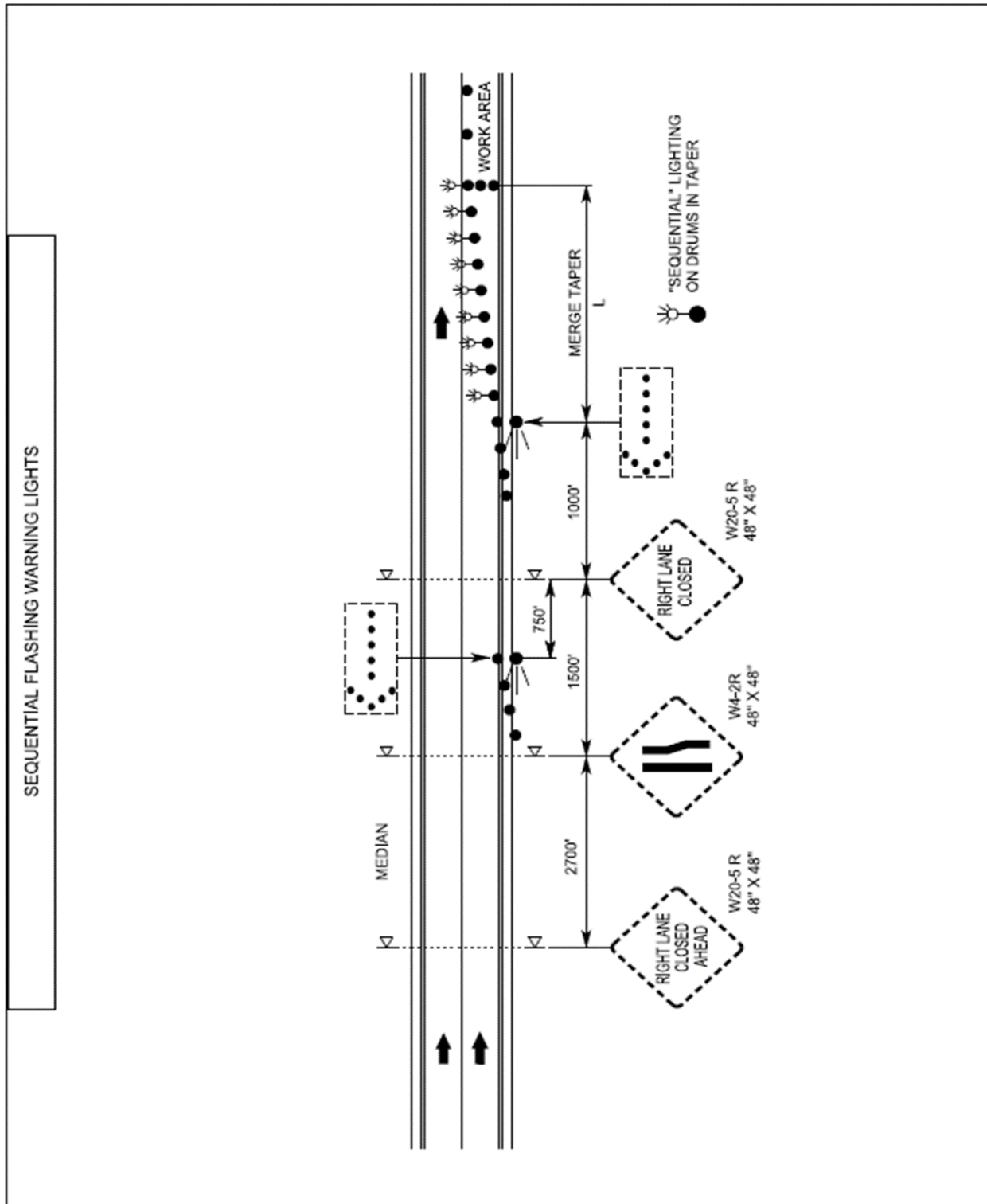
Drums are the only channelizing device allowed to mount sequential flashing warning lights.

The Sequential Flashing Warning Lights shall be weather independent and visual obstructions shall not interfere with the operation of the lights.

The Sequential Flashing Warning Lights shall automatically sequence when placed in line in an open area with a distance between lights of ten to 100 feet. A ten-foot stagger in the line of lights shall have no adverse effect on the operation of the lights.

If one light fails, the flashing sequence shall continue. If more than one light fails, all of the lights are to be automatically turned to the “off” mode. Non-sequential flashing is prohibited.

When lane closures are not in effect, the Sequential Flashing Warning Lights shall be deactivated.



**WORK ZONE DIGITAL SPEED LIMIT SIGNS**

(10/08/2016)

**Description**

In accordance with this RFP, The Design-Build Team shall furnish and install Work Zone Digital Speed Limit Signs on interstates and freeways with speed limits greater than 55 mph and or facilities that have significant traffic volumes and impacts. These signs are regulatory speed limit signs with LED displays for the speed limit numbers. The purpose of Work Zone Digital Speed Limit signs is to easily change work zone speed limits between activities that necessitate the need for a lower speed limit and the ones that do not.

**Materials**

Work Zone Digital Speed Limit Signs shall be a minimum 36" wide x 48" high. The speed limit sign (R2-1) shall be black on white with high intensity white prismatic sheeting.

The Work Zone Digital Speed Limit sign shall be mounted such that the bottom of the sign is seven feet above the roadway.

The LED panel shall be a minimum of 18" wide x 28" high. The display on the LED panel shall be amber or white.

The LED numbers shall have a minimum 5 wide by 7 high pixel array with a minimum height of 18".

The LED panel shall have auto brightness / dimming capability.

The black on orange "WORK ZONE" sign shall be mounted above the speed limit sign. It shall be 36" wide x 24" high with high intensity prismatic orange sheeting.

The black on white "\$250 FINE" sign shall be mounted below the speed limit sign. It shall be 36" wide x 24" high with high intensity prismatic white sheeting.

All digital speed limit systems shall have operational software and wireless communications that allow remote operation and data monitoring. It shall be configured to allow access by the Engineer or his designee to change each sign independently or change the speed limit on all signs at once from a PC, tablet or cellular phone application.

Work Zone Digital Speed Limit Signs may be trailer mounted or stationary mounted. The unit shall be solar powered and have the ability to operate continuously. It shall be supplemented with a battery backup system which includes a 110/120 VAC powered on-board charging system.

When fully charged, the batteries shall be capable of powering the display for 20 continuous days with no solar power. The unit shall be capable of being powered by a standard 110/120 VAC power source.

Store the battery bank and charging system in a lockable, weather and vandal resistant box.

**Optional Equipment / Capabilities**

Work Zone Digital Speed Limit systems may include speed data collection. If provided, this information shall be available in a spreadsheet format and accessed remotely from a secure cloud location.

The Work Zone Digital Speed Limit systems may have radar equipment to detect approaching speeds.

The Work Zone Digital Speed Limit systems may have flashing beacons. If used, the beacons shall be 12-inch diameter LED circular yellow. They may be mounted either above, beside or below the sign assemblies and shall be centered horizontally. If used, the beacons shall alternately flash at rates not less than 50 or more than 60 times per minute.

All Work Zone Digital Speed Limit equipment shall be on the NCDOT Work Zone Traffic Control Approved Products List.

**Construction Methods**

The speed limit shall be continuously displayed on the signs. The speed limits shall be the sole authority of the NCDOT. All speed limits shall be ordained by the State Traffic Engineer in order to have a lawfully enforceable speed limit.

The Regional Traffic Engineering Office and the Division Construction Engineer, in coordination with the Work Zone Traffic Control Section, will provide all work zone speed limit recommendations based on activities and conditions.

The Design-Build Team shall be responsible for coordinating with the Engineer when the work zone speed limits are to be changed and shall obtain approval by the Engineer or his designee before the speed limit is changed.

If the system has radar equipment and flashing beacons, the Work Zone Digital Speed Limit systems shall have beacons activated when the “55 MPH” speed limit is being displayed. At all other speed limit displays (60 MPH, 65 MPH, 70 MPH), the beacons shall not be automatically activated until approaching speeds are detected to be 7 mph or higher above the posted speed limit.

Whenever possible, each trailer mounted unit shall be placed on the paved shoulder and shall have the capability of being leveled.

**HIGH VISIBILITY DEVICES**

(2/10/2021)

**Description**

In accordance with this RFP, the Design-Build Team shall furnish and install high visibility devices for projects on interstates and freeways. High visibility devices include drums, skinny



drums, stationary work zone signs and portable work zone signs. All of these devices shall be new. Used devices shall not be acceptable.

The purpose of high visibility devices is to enhance the conspicuity of the devices in order to improve both safety and mobility through the interstate and freeway work zones. In addition, using new devices help to ensure they remain in compliance with required retroreflective properties for the full life of the project and to improve the overall appearance of significant work zones throughout the State.

## **Materials**

### **A) General**

Use materials in accordance with the manufacturer's recommendations that will retain both durability and retroreflectivity as described elsewhere in this project special provision for a period of at least 36 months.

The following are required high visibility devices to be used for Work Zone Performance applications.

- Drums
- Skinny Drums (daytime use only)
- Stationary Work Zone Signs
- Rigid Portable Work Zone Signs

All drums shall be new and meet the existing requirements of Section 1089-5 of the 2018 NCDOT *Standard Specifications for Roads and Structures* and shall have Grade B flexible fluorescent orange sheeting that meets the retroreflective requirements of Section 1092-2 of the 2018 NCDOT *Standard Specifications for Roads and Structures*.

All stationary work zone signs shall be new and meet the existing requirements of Section 1089-1 of the 2018 NCDOT *Standard Specifications for Roads and Structures*. Legend overlays shall be prohibited and shall not be accepted on the interstate / freeway or associated intersecting roadways. Vertical sign post reflector strips shall be added to all stationary sign supports. Use Grade B fluorescent orange for work zone sign supports and Grade B fluorescent yellow for exit sign supports. Install strips a minimum of six inches in length on sign supports with one sign mounted at a minimum of 4.5 feet in length for sign supports with two or more signs mounted vertically.

All portable work zone signs shall be new and have composite substrates as described in Section 1089-1 of the 2018 NCDOT *Standard Specifications for Roads and Structures*. Roll-up signs shall not meet the requirements of the project special provision. The remainder of the existing requirements of Section 1089-1 of the 2018 NCDOT *Standard Specifications for Roads and Structures* remain. Used sign stands will be acceptable.

**B) Material Qualifications / Certifications**

Only use materials as listed above that are on the NCDOT Approved Products List. In addition, provide a Type 3 Material Certification for all materials in accordance with Section 106-3 and Section 1087-4 of the 2018 NCDOT *Standard Specifications for Roads and Structures*.

**C) Performance**

Poor performance of any device or sign at any site, whether or not related to a specific contract may be grounds for removing the material from the NCDOT Approved Products List and / or removing from any project under contract.

**Construction Methods**

All requirements of Section 1110-3 and Section 1130-3 of the 2018 NCDOT *Standard Specifications for Roads and Structures* shall apply except roll-up signs shall not be permitted for use.

The use of skinny drums shall be prohibited for all nighttime lane closures on interstates and freeways.

**Maintenance**

Replace any sign or drum that prematurely fails due to any damage or defect that causes it to perform unsatisfactorily with an “in kind” device of similar quality and age according to the guidelines set forth in the American Traffic Safety Service Association’s (ATSSA) Quality Guidelines for Work Zone Traffic Control Devices. An “in kind” replacement sign or drum is not required to be new, however, it shall be less than one year old and have 100% of its original sheeting area and at least 85% of the retroreflective qualities of a new device, so that it is undetectable adjacent to the original devices and signs placed on the project.

**CONNECTED LANE CLOSURE DEVICES**

(10/29/18)

**Description**

The Design-Build Team shall furnish, install, operate, maintain, relocate, and remove connected lane closure devices for use on interstate and freeway lane closures. The connected lane closure devices shall transmit the location of the lane closure to navigational companies such as WAZE, Google Maps, Inrix, Here, TrafficCast, TomTom, Apple Maps, Panasonic, the Statewide Traffic Operations Center, (STOC), and any other navigational companies that requests it. A connected lane closure device shall be installed on the flashing arrow board identifying the beginning of a lane closure, and another connected lane closure device shall be installed on a crashworthy traffic control device (such as a drum) at the end of the same lane closure.

**Materials**

The connected lane closure devices shall be designed and built to transmit the location of the lane closure to the navigational companies as well as the STOC. The format of the information received by each of these shall be approved by each entity, and at minimum, consist of an XML file. The connected lane closure devices shall be capable of obtaining wireless communication by either cellular or satellite technology.

The initial connected device shall be designed and attached to the flashing arrow board in such a manner that it is only activated when either the left or right arrows are displayed, not when the flashing arrow board is operated in caution mode. When the lane closure is removed, and the flashing arrow board turned off or changed to caution mode, the connected device shall automatically turn off simultaneously.

The second connected device in a lane closure shall be installed on a crashworthy traffic control device. It shall have an easily accessible power switch and a small status indicator light mounted such that it is visible when passing by in a vehicle at operating speed. When switched to the ON position, the light shall indicate that device has established communication and is transmitting. The light may be either steady burn or flashing and shall not exceed one inch in diameter.

The devices shall have battery life sufficient to maintain operation for the duration of the lane closure, or have the ability to be recharged without deactivating the device.

**Construction Methods**

Connected lane closure devices shall be used on all lane closures on freeways and interstates throughout the project.

Two connected lane closure devices shall be installed per grouping of lane closures (single, double, or triple); one attached and wired into the flashing arrow board at the beginning of the first taper, and the other at the last traffic control device at the end of the lane closure(s). Supplemental flashing arrow boards in advance of the first lane closure taper or flashing arrow boards in subsequent lane closures (for double and triple lane closures) shall not have connected devices. Subsequent lane closures occurring downstream of where all lanes have been reopened and lane closures in the opposite direction of travel will require additional connected devices.

The second connected lane closure device shall be manually turned ON and OFF by crews installing and removing the lane closure, unless the device can be controlled by the initial connected device. The unit shall be turned on immediately upon installation of the lane closure and turned off immediately upon removal of the lane closure.

Once installed, the Design-Build Team shall verify that the connected lane closure devices are transmitting information prior to leaving the device unattended and re-verify transmission every 72 hours for as long as the device is in use.

## **Technical Requirements**

The connected devices shall run continuously during any active lane closures for the construction duration.

The GPS within the connected devices shall have a horizontal accuracy of 50 feet, 95% of the time.

The connected device information, including the location, transmission status, and battery status shall be transmitted within five (5) minutes of initiation and updated every fifteen (15) minutes. In addition to transmitting information to the Department, the Design-Build Team shall keep the retained device information for one (1) year after Final Acceptance of the project. Information shall include timestamps, device name, and GPS location. This information shall be made available to the Department upon request.

The battery voltage shall be collected at least once an hour. The information shall be stored and available for troubleshooting. The system shall transmit an alert if the battery voltage of a device is under a specified threshold.

The connected devices shall emit an audible alert if a device is not transmitting its position for a period of one hour.

The outputs from the connected device on the arrow board and the downstream connected device at the end of the lane closure shall be easily identifiable as a single pair, either by sequential device IDs, identical project names, or other method as approved by the Engineer. Additional pairs on the project shall have unique identifiable information such that it is not confused with another project pair.

## **WORK ZONE PERFORMANCE PAVEMENT MARKINGS**

(10-08-16) (Rev. 01-05-21)

### **Description**

The Design-Build Team shall furnish and install Work Zone Performance pavement markings that delineate the travel way for work zone traffic patterns on high speed (55 mph or higher) facilities and or facilities that have traffic volumes greater than 50,000 ADT. The purpose of Work Zone Performance pavement marking is to provide a more durable work zone pavement marking that shall last the full duration of a traffic pattern without requiring replacement or reapplication for a period of up to 12 months. The Work Zone Performance pavement markings shall also provide a higher retroreflectivity performance level, throughout the required 12-month duration, than standard traffic paints to improve nighttime work zone visibility.

## **Materials**

### **A) General**

Use materials in accordance with the manufacturer's recommendations that shall retain both durability and a minimum retroreflectivity, as described elsewhere in this RFP, for a period of at least 12 months.

The Work Zone Performance pavement markings shall be manufactured to bond successfully to both concrete and asphalt pavements. The pavement marking materials shall be applied in a single application. The following are approved materials to be used for Work Zone Performance pavement markings:

- Polyurea (for use on concrete pavement only)
- Thermoplastic (Extruded and Sprayed)
- Epoxy
- Polymer (Single System)
- Cold Applied Plastic (Type 4)

When using Cold Applied Plastic Type 4 pavement markings, place temporary raised markers half on and half off edge lines and centerlines to help secure the tape to the roadway. Markers shall be spaced the appropriate distance apart as described by the 2018 Roadway Standard Drawing No. 1250.01, Sheet 1 of 3.

### **B) Material Qualifications / Certifications**

The Design-Build Team shall only use Work Zone Performance pavement marking materials, as listed above, that are on the NCDOT Approved Products List at the time of installation. In accordance with Article 106-3, and Section 1087-4 of the 2018 NCDOT *Standard Specifications for Roads and Structures*, the Design-Build Team shall provide a Type 3 Material Certification for all materials, and a Type 3 and Type 4 certification for all reflective media.

### **C) Performance**

Poor performance of Work Zone Performance pavement marking materials at any site, whether or not related to a specific contract, may be grounds for removing the material from the NCDOT Approved Products List.

### **Construction Methods**

The Design-Build Team shall not use hand applied methods or any other non-truck mounted application equipment / device to install Work Zone Performance pavement markings for applications longer than 1000 feet.

All Work Zone Performance pavement markings shall be installed in a single application. Multiple passes shall not be allowed.

**A) Testing Procedures**

All Work Zone Performance pavement markings will be tested by the Department through an independent Mobile Retroreflective Contractor. The Work Zone Performance pavement markings will be scanned to ensure the retroreflectivity requirements in **Section C** below are met.

**B) Application Equipment**

Application equipment shall be in accordance with Section 1205 of the 2018 NCDOT *Standard Specifications for Roads and Structures*.

**C) Material Application**

The Work Zone Performance pavement marking material shall be applied at the following minimum thicknesses:

- Polyurea = 20 mils wet
- Epoxy = 20 mils wet
- Thermoplastic (Extruded or Sprayed) = 50 mils wet
- Polymer = 20 mils wet
- Cold Applied Plastic (IV) = Manufacturer's recommendation

The Work Zone Performance pavement marking line widths for interstates and freeways shall be as follows:

- Edge lines, Solid Lane Lines, Skip and Mini-Skip Lines = 6"
- Gorelines = 12"

The Work Zone Performance pavement marking line widths for all other facilities shall be four inches.

"No track" dry times for the liquid systems shall be ten minutes or shorter. Traffic shall not be placed on any material until it is sufficiently dry / cured to eliminate wheel tracking.

The minimum level of retroreflectivity for all Work Zone Performance pavement marking system selected shall be as follows:

**Reflectometer Requirements for Work Zone "Performance" Pavement Markings**

Color	Initial	6 Months	12 Months
White	375 mcd / lux / m2	275 mcd / lux / m2	150 mcd / lux / m2
Yellow	250 mcd / lux / m2	150 mcd / lux / m2	100 mcd / lux / m2

For the initial installation and the durations noted in the chart above, the Work Zone Performance pavement markings shall adhere to the corresponding retroreflectivity levels.

The Design-Build Team shall notify the Engineer, in writing, a minimum of seven - ten days prior to the installation of Work Zone Performance pavement markings. The Department will measure initial retroreflectivity levels with a mobile retroreflectometer within 30 days after placement to ensure compliance with the reflectivity levels in the chart above.

Work Zone Performance pavement markings shall maintain the retroreflectivity levels for the durations noted above. If the markings appear to be non-performing, in the Engineer's sole discretion, the Engineer may request additional retroreflectivity readings to be performed by the Department. If and when this becomes necessary, the same notification procedure as described above shall be used to have Work Zone Performance pavement markings measured by a Mobile Retroreflective Contractor.

If measured and found to be noncompliant, the Design-Build Team shall replace the Work Zone Performance pavement markings at no cost to the Department.

All Work Zone Performance pavement markings shall be durable enough to withstand a single snow event without showing excessive fatigue in either bonding or retroreflectivity. The Design-Build Team shall replace the Work Zone Performance pavement markings if a single snowplow event results in more than 25% of the pavement marking edgelines or skips being physically removed and / or the Work Zone Performance pavement markings do not meet the following minimum retroreflectivity values:

**Reflectometer Requirements for Work Zone Performance Pavement Markings after a Single Snowplowed Event**

<b>Color</b>	<b>Minimum</b>
White	150 mcd / lux / m <sup>2</sup>
Yellow	100 mcd / lux / m <sup>2</sup>

Unless the temporary traffic pattern is to be modified within 30 days, the Design-Build Team shall replace all non-compliant Work Zone Performance pavement markings within 30 days of determining they are non-compliant.

If the work zone experiences more than one snow event requiring snowplowing, the retroreflectivity values in the chart above will no longer apply. The Engineer will determine if the pavement markings are performing adequately and / or if replacement is necessary due to excessive damage caused solely by snowplow activities. If the Work Zone Performance pavement markings are found to be deficient, solely in the Engineer's discretion, they shall be replaced. In such case, the Work Zone Performance pavement markings will be paid for as extra work in accordance with Subarticle 104-8-(A) of the NCDOT *Standard Specifications for Roads and Structures* at the unit price of \$0.40 per linear foot. Unless the temporary traffic pattern is to be modified within 30 days, the Design-Build Team shall replace all Work Zone Performance pavement markings damaged due to multiple snowplow events within 30 days.

If the Work Zone Performance pavement markings need to remain in place longer than 12 months, the markings shall be scanned by a Mobile Retroreflective Contractor. If the Work

Zone Performance pavement markings meet or exceed the 12-month retroreflectivity requirements noted above, the markings can remain in place. If the Work Zone Performance pavement markings do not meet or exceed the 12-month retroreflectivity requirements noted above, the Design-Build Team shall replace the Work Zone Performance pavement markings within 15 days of the 12-month duration date at no cost to the Department. If and when this becomes necessary, the same notification procedure as described above shall be used to have Work Zone Performance pavement markings measured by a Mobile Retroreflective Contractor.

#### **D) Surface Preparation**

Prior to installation, all pavement surfaces to receive Work Zone Performance pavement markings shall be swept clean and prepared in accordance with the Manufacturer's recommendation.

#### **E) Temperature and Weather Limitations**

Work Zone Performance pavement markings shall only be applied when the ambient air temperature and the pavement temperature are 50° F or higher for thermoplastic and are 40° F or higher for all other materials. The Design-Build Team shall not install Work Zone Performance pavement markings unless the pavement surface is completely dry. The Design-Build Team shall not install Work Zone Performance pavement markings within four hours of a heavy rain event, (rainfall intensities equal to or greater than 1 inch / per hour).

In the event a traffic shift must occur when the air and / or pavement temperatures are below the aforementioned minimums and / or a rain event occurs four hours prior to or during a planned traffic shift, the Design-Build Team may install temporary pavement marking paint, at the Engineer's sole discretion. Temporary pavement marking paint shall be applied in one application and shall produce a four-inch wide line at 15 mils (wet). Beads that provide the following minimum retroreflectivity shall be applied to the temporary pavement marking paint:

White:	225 mcd / lux / m2
Yellow:	200 mcd / lux / m2

The temporary pavement marking paint with beads shall maintain the minimum retroreflectivity noted above until placement of the Work Zone Performance pavement markings.

The Design-Build Team shall replace / reapply temporary pavement marking paint with beads that does not adhere to the retroreflectivity requirements noted above at no cost to the Department. The Design-Build Team shall apply the Work Zone Performance pavement markings within 90 days of installing the temporary pavement marking paint with beads.

Excluding damage due solely to snowplow events, the Design-Build Team shall replace all Work Zone Performance pavement material that debonds and / or does not adhere to the retroreflectivity levels for the corresponding durations noted above at no cost to the Department.



**TYPICAL MEDIAN ACCESS AREAS**

(12-18-18)

**Description**

Perform the work covered by this section including, but not limited to, constructing, maintaining, and removing Typical Median Access Areas for construction vehicle ingress to and egress from the median to / from active travel lanes on US 70.

Typical Median Access Areas are not required when construction vehicle ingress and egress is conducted using lane closures as shown on 2018 Roadway Standard Drawing No. 1101.05, Sheet 2 of 2.

**Materials**

Refer to Divisions 6, 10, 11, 12, and 17 in the 2018 *Standard Specifications for Roads and Structures*.

Provide temporary traffic control devices listed on the NCDOT Approved Products List (APL).

Provide Work Zone Performance Pavement Markings (Reference the *Work Zone Performance Pavement Markings* Project Special Provision found elsewhere in this RFP)

Provide High Visibility Devices (Reference the *High Visibility Devices* Project Special Provision found elsewhere in this RFP)

**Flashing Beacon and Detection System****(A) General**

Provide flashing beacon and detection system components listed on the NCDOT ITS and Signals Qualified Products List (QPL).

Provide a trailer mounted flashing beacon and warning sign assembly that meets or exceeds the physical and operational requirements of the MUTCD, or other mounting method approved by the Department. The following specifications supplement those basic requirements.

- Provide a totally mobile complete unit capable of being located as traffic conditions demand.
- The warning sign height shall comply with 2018 Roadway Standard Drawing No. 1110.01, Sheet 1 of 3, when raised in the upright position.
- The flashing beacon housing assembly shall be of weather resistant construction.

**(B) Power System**

Provide a unit that is solar powered and supplemented with a battery backup system that includes a 110/120 VAC powered on-board charging system.

The unit shall also be capable of being powered by standard 110/120 VAC power source.

The batteries, when fully charged, shall be capable of powering the display for 20 continuous days with no solar power.

Store the battery bank and charging system in a lockable, weather, and vandal resistant box.

**(C) Controller**

Provide automatic brightness / dimming of the display and a manual override dimming switch.

The controller shall provide a battery-charge status indicator.

Mobile radio or any other radio transmissions shall not affect the controller.

Store the controller in a lockable, weather and vandal resistant box.

**(D) Trailer**

Finish all exterior metal surfaces with Federal orange enamel per Federal Standard 595a, color chip ID# 13538 or 12473 respectively. The trailer shall be able to support a 100 mph wind load with the display fully extended.

The trailer shall be equipped with leveling jacks capable of stabilizing the unit in a horizontal position when located on slopes 6:1 or flatter.

The trailer shall be properly equipped in compliance with North Carolina Law governing motor vehicles.

Provide a minimum four-inch wide strip of fluorescent orange retroreflective sheeting to the frame of the trailer. Apply the sheeting to all sides of the trailer. The retroreflective sheeting shall be Grade B that conforms to Article 1092-2 in the 2018 *Standard Specifications for Roads and Structures*. Drums may be supplemented around the unit in place of the sheeting.

**(E) Reliability**

Provide a sign unit, flashing beacons, and detection system with all components rated to operate at temperatures ranging from -30° F to 165° F.

## **Construction Methods**

See Typical Median Access Detail below.

### **Temporary Acceleration Lane**

Construct a temporary acceleration lane with a minimum length of 1720 feet and a minimum clear width of 12 feet from the face of the positive protection to the active travel lanes. At least 920 feet of parallel merge / diverge area shall be required adjacent to the active travel lanes, in addition to a 300-foot merging taper and a 500-foot channelized acceleration area that includes a 100-foot detection area. The channelized acceleration and detection areas shall have positive protection separating them from the active travel lanes and shall not overlap the 920 feet of parallel merge / diverge area.

For the proposed traffic volumes and durations in areas of temporary median access for construction traffic, the Design-Build Team shall 1) evaluate and upgrade the existing pavement structure, as needed, and 2) design all temporary pavement, in accordance with the Pavement Management Scope of Work found elsewhere in this RFP

Using Work Zone Performance Pavement Markings, install 12-inch yellow diagonal lines (2:1 slope) at 100-foot intervals throughout the upstream half of the parallel merge / diverge area, and at 55-foot intervals throughout the downstream half of the parallel merge / diverge area. Remove any conflicting markings in accordance with Section 1205 of the 2018 *Standard Specifications for Roads and Structures*.

### **Flashing Beacons and Detection System**

Provide High Visibility advance warning signage as shown in the details below. Provide a flashing beacon system with two (2) flashing lights per sign to alert motorists in the active travel lanes of work vehicles entering from the median.

Provide a non-intrusive detection system capable of detecting vehicles in the work area at least 400 feet in advance of the parallel merge / diverge area. The detection system shall be programmed such that passing public traffic in active travel lanes and vehicles in the work area not intending to use the parallel merge / diverge area are not detected.

Once detection occurs, the beacons on the advance warning sign(s) shall begin flashing immediately at a rate of not less than 50 or more than 60 times per minute. The beacons on the advance warning sign(s) shall flash continuously in an alternating pattern at all times that work vehicles are detected. The beacons shall continue flashing for thirty (30) seconds after detection ceases before turning off, and personnel on site shall have the ability to adjust this time based on field conditions. The flashing beacon system shall remain dark when idle.

Expedite repairs due to failure, malfunction or damage to the flashing beacons and / or detection system. Furnish another flashing beacon system or detection system approved by the Department during the repair time. Repair or replace flashing beacon system and / or detection systems

immediately; otherwise, suspend all construction activities requiring the use of the Median Access Area until the flashing beacon system and / or detection system is restored to operation.

Perform all maintenance operations recommended by the manufacturer of the flashing beacon system and detection system.

### **Location, Placement and Use**

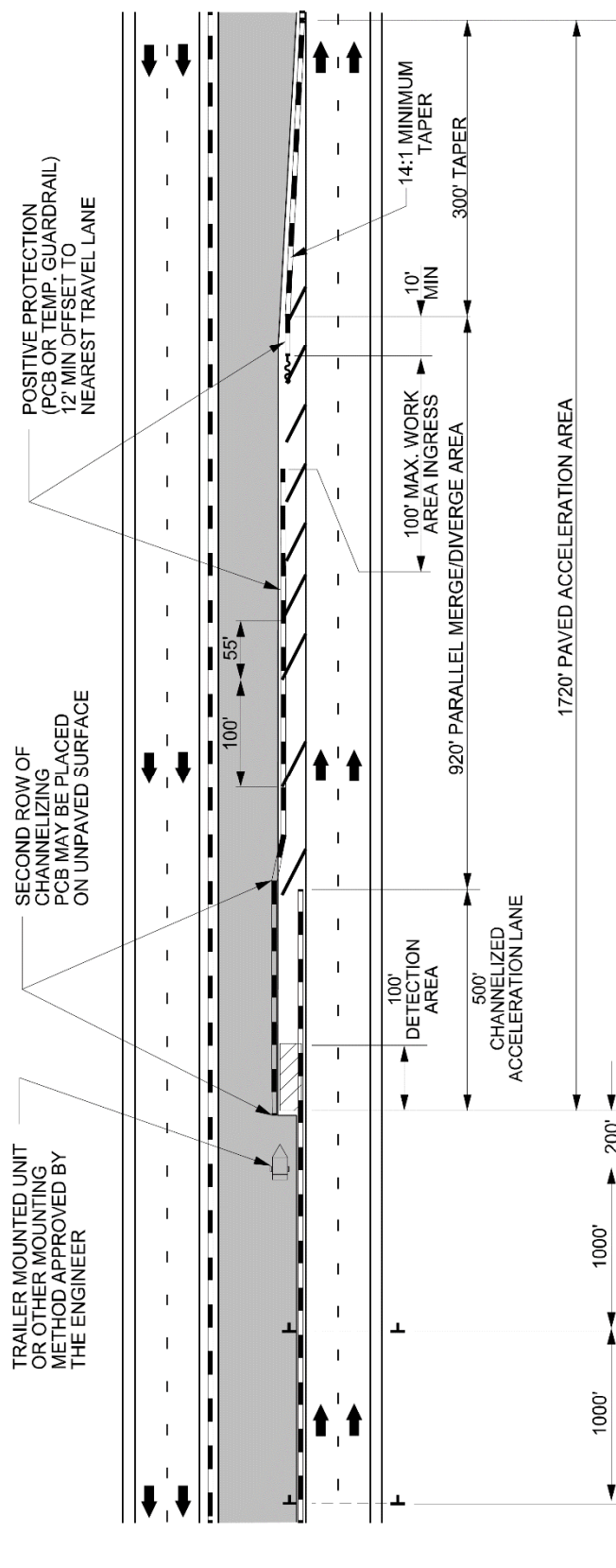
Typical Median Access Areas shall not be located within one-half (1/2) mile of any interchange acceleration or deceleration lanes, unless approved by the Department. All proposed locations for Typical Median Access Areas shall be reviewed and approved by the Department prior to installation.

Work vehicles using a particular Median Access Area shall not utilize any interchange ramp (on-ramp or off-ramp) within one (1) mile of the Median Access area.

Typical Median Access Areas installed in accordance with this section will not require the use of temporary lane closures for ingress / egress of work vehicles.

The Design-Build Team shall comply with multiple and single vehicle hauling restrictions as shown in the TMP when performing hauling of equipment or materials to or from the project while using Typical Median Access Areas.

## TYPICAL MEDIAN ACCESS DETAIL



## NOTES:

1. RELOCATE MEDIAN ACCESS POINTS, AS NEEDED, TO COMPLETE MEDIAN CONSTRUCTION AS APPROVED BY THE ENGINEER.
2. PLACE YELLOW DIAGONAL PAVEMENT MARKINGS THROUGHOUT ACCESS LANE, SPACING FOR UPSTREAM HALF OF LANE SHALL BE 100', AND 55' FOR DOWNSTREAM HALF OF LANE.
3. WHEN NOT IN USE FOR MORE THAN 72 HOURS, DRUMS SHALL BE USED ALONG THE SHOULDER TO CLOSE THE PARALLEL ACCELERATION/DECELERATION AREA.
4. ALL WORK VEHICLES ATTEMPTING TO RE-ENTER AN OPEN TRAVEL LANE SHALL PASS THROUGH THE DETECTION AREA. WORK VEHICLES SHALL NOT LEAVE THE WORK AREA USING THE INGRESS POINT AT ANY TIME.

[illegible]

[illegible]

SIGN NUMBER: WZTC		BACKG COLOR: Fluorescent Orange		CHECKED BY: J.Navarrete		Mar 14, 2018	
TYPE: STATIONARY		COPY COLOR: Black		LOCATION:		DIV: DIV	
QUANTITY: SEE PLANS				PROJECT ID: 15922			
SIGN WIDTH: 5'-6"							
HEIGHT: 5'-6"							
TOTAL AREA: 30.3 Sq.Ft.							
BORDER TYPE: INSET							
RECESS: 0"							
WIDTH: 0"							
RADII: 0"							
NO. Z BARS: 2							
LENGTH: 58.0							

USE NOTES: 1,2

1. Legend and border shall be direct applied black non-reflective sheeting.

2. Background shall be NC GRADE B fluorescent orange retroreflective sheeting.

DESIGN BY: J.Navarrete

PROJECT ID: 15922

CHECKED BY:

LOCATION:

FILENAME: 15922 Sign Designa

NORTH CAROLINA D.O.T. SIGN DETAIL



[illegible]

**SOUND BARRIER WALL**

(3-6-15) (Rev. 9-11-17)

**(A) DESCRIPTION**

This work consists of furnishing precast panels, structural steel, concrete columns, and all other materials; handling, transporting, fabricating, galvanizing, and storing materials; furnishing erection drawings, pile excavation, backfilling, erecting and installing the sound barrier wall members and all other materials as required by the plans developed by the Design-Build Team, the 2018 *Standard Specifications for Roads and Structures* and this Project Special Provision.

Unless otherwise approved by the Engineer, the Design-Build Team has a choice of ten or 15-foot pile spacing. Pile spacing greater than 15 feet will not be permitted. Provide consistent pile spacing the entire length of the wall. Use odd pile spacing, if necessary, only at the ends of the wall and at turning points, as approved by the Engineer.

A maximum one-foot drop or rise in top of wall elevation between wall sections will be permitted. Elevation changes greater than one foot, if necessary, will be allowed only at the end of the wall and in areas of steep topography. Top of wall elevation changes that result in a jagged appearance shall not be allowed. Unless otherwise approved by NCDOT, the wall shall adhere to the Design Noise Report developed by the Design-Build Team.

**(B) ALTERNATE PILE SPACING**

As an alternate, the Design-Build Team may submit plans for pile spacing greater than ten feet and less than 15 feet for review and approval. A submittal reducing the post spacing shall include the material and design specifications. The submittal shall also include an elevation view depicting the revised post spacing and proposed top of wall elevations. The proposed top of wall elevations shall be equal to or greater than the dimensions shown in the Design Noise Report developed by the Design-Build Team. The excavated hole diameter, excavation depth and reinforcing steel shall be equal to the amount required for 15-foot pile spacing. A variance in the reinforcing steel will be allowed for the length of horizontal and number of vertical reinforcement bars in the precast panel for the alternate pile spacing.

Submit two sets of detailed plans for review. Include all details in the plans developed by the Design-Build Team, including the size and spacing of required reinforcement necessary to fabricate the precast panels. Have a North Carolina Registered Professional Engineer check, seal and date the aforementioned plans.

**(C) ALTERNATE WALL TYPE**

Walls that have been assigned “Approved” or “Approved for Provisional Use” status by the Product Evaluation Program will be considered for substitution to the detailed Standard Sound Barrier Wall only when approved by the Department, in writing. Alternate walls shall meet all design and construction requirements of this RFP. Alternate wall structural stability and connection details shall conform to the current edition of the AASHTO LRFD Bridge Design Specifications.

Prior to submittal of Working Drawings, as described herein, submit a copy of the signed NCDOT Product Status Notification Letter and two sets of preliminary plans for review and acceptance. Include material specifications for all components. Once preliminary plans are accepted, submit Working Drawings in accordance with all applicable portions of the requirements herein, including details necessary to fabricate and construct the proposed alternate.

Have a North Carolina Registered Professional Engineer check, seal and date the plans developed by the Design-Build Team and, when requested, calculations.

## **MATERIALS AND FABRICATION**

Provide materials and fabricate members in accordance with the *Architectural Concrete Surface Treatment* Project Special Provision found elsewhere in this RFP, and the requirements of Division 10 of the 2018 *Standard Specifications for Roads and Structures*.

Excluding any sound barrier walls adjacent to the Montford Historic District and the sound barrier wall sections reserved for the Burton Street history mural, provide precast panels that are nominally four inches  $\pm$  ¼ inch thick with a simulated stone masonry textured surface on both faces. All texture shall extend outward from the nominal panel thickness. Furnish three 24" x 24" samples for approval which establish the acceptable variations in color, texture and uniformity. After the color, texture and uniformity of the furnished samples are approved, produce a full-scale panel unit meeting design requirements. This mock-up and the furnished samples establish the standard quality for determining approval of the panels. When producing the final installed panels, use fine and coarse aggregate, retarder, and cement from the same source as those used in the approved sample panels.

## **CONSTRUCTION METHODS**

Complete the final survey of existing ground profile after clearing the sound barrier wall area, but prior to submitting any Working Drawings. Submit the final groundline survey with the Working Drawings.

Excavate holes with the diameters shown on the plans developed by the Design-Build Team. Perform pile excavation to the depths shown on the aforementioned plans and install piles as shown on the plans developed by the Design-Build Team with a tolerance of ½-inch per foot from vertical. Backfill excavations with concrete after placing piles.

### **1. Pile Excavation**

Use equipment of adequate capacity and capable of drilling through soil and non-soil including rock, boulders, debris, man-made objects and any other materials encountered. Blasting shall not be permitted to advance the excavation. Blasting for core removal shall only be permitted when approved by the Engineer. Dispose of drilling spoils in accordance with Section 802 of the 2018 *Standard Specifications for Roads and Structures* and as directed by the Engineer. Drilling spoils shall consist of all excavated material, including but not limited to water removed from the excavation either by pumping or drilling tools.

If unstable, caving or sloughing soils are anticipated or encountered, stabilize excavations with either slurry or steel casing. When using slurry, submit slurry details including product information, manufacturer's recommendations for use, slurry equipment information and written approval from the slurry supplier that the mixing water is acceptable before beginning drilling. When using steel casing, use either the sectional type or one continuous corrugated or non-corrugated piece. Steel casings shall consist of clean watertight steel of ample strength to withstand handling and driving stresses and the pressures imposed by concrete, earth or backfill. Use steel casings with an outside diameter equal to the hole size and a minimum wall thickness of 1/4-inch.

## 2. Concrete Placement

Before placing concrete, center and support the pile in the excavation and check the water inflow rate in the excavation after any pumps have been removed. If the inflow rate is less than six inches per half hour, remove any water and free fall the concrete into the excavation. Ensure that concrete flows completely around the pile. If the water inflow rate is greater than six inches per half hour, propose a concrete placement procedure to the Engineer. The Engineer shall approve the concrete placement procedure before placing any concrete.

Fill the excavation with Class A concrete in accordance with Section 1000 of the 2018 *Standard Specifications for Roads and Structures*, except as modified herein. Provide concrete with a slump of six to eight inches. Use an approved high-range water reducer to achieve this slump. Place concrete in a continuous manner and remove all casings.

## WORKING DRAWINGS

In accordance with Article 1077-2 of the 2018 *Standard Specifications for Roads and Structures*, submit casting drawings for the precast face panels for approval prior to casting. Show the inserts, method of handling, and support details used for transportation on casting drawings. Submit metalwork fabrication drawings for approval prior to fabrication of steel wall components. Submit an erection plan and concrete face panel placing plan, including location of various heights of panels, for review and acceptance prior to fabrication of metalwork. Submit five sets of detail drawings for review and acceptance.

## **CONTINUOUS FLIGHT AUGER PILES FOR SOUND BARRIER WALLS**

SP

### GENERAL

Continuous flight auger (CFA) piles are constructed by drilling a borehole with a continuous flight hollow stem auger and filling the borehole by pumping grout through the auger as it is withdrawn. After completing grout placement, reinforcement is inserted into the column of fluid grout. At the Design-Build Team's option, construct CFA piles for sound barrier walls instead of pile excavation. Install CFA piles with the required depth in accordance with the contract and accepted submittals. Use a prequalified CFA Pile Subcontractor for CFA pile work. Define "pile" as a CFA pile and "reinforcement" as pile extending out of CFA pile.

**INSTALLATION PLAN SUBMITTAL**

Provide four copies and a PDF copy of the CFA pile installation plan developed by the Design-Build Team. Submit the installation plan at least 15 days before starting CFA pile construction. Do not begin pile construction until the CFA pile installation plan is accepted by the Department.

Provide detailed project specific information in the CFA pile installation plan that includes the following:

- List and sizes of proposed equipment including CFA drilling rigs, augers and other drilling tools and grouting equipment
- Step-by-step description of CFA pile installation and sequence of pile construction
- Methods for placing reinforcement with procedures for supporting and positioning the reinforcement
- Minimum grout volume factor
- Equipment and procedures for monitoring and recording grout volume
- Examples of construction records that meet the Construction Records Section of this project special provision
- Procedures for containment and disposal of drilling spoils and waste grout
- Approved packaged grout or grout mix design that meets Section 1003 of the 2018 NCDOT *Standard Specifications for Roads and Structures*
- Other information shown in the plans developed by the Design-Build Team or requested by the Engineer

If alternate installation procedures are proposed or necessary, a revised CFA pile installation plan submittal may be required. If the work deviates from the accepted submittal without prior approval, the Engineer may suspend CFA pile construction until a revised plan developed by the Design-Build Team is accepted by the Department.

**MATERIALS**

Use Type 2 grout that meets Section 1003 of the 2018 NCDOT *Standard Specifications for Roads and Structures*.

Use piles extending out of CFA piles that meet the *Sound Barrier Wall* Project Special Provision found elsewhere in this RFP.

**PRECONSTRUCTION MEETING**

Before starting CFA pile construction, hold a preconstruction meeting to discuss the installation and monitoring of the piles. Schedule this meeting after the CFA Pile Subcontractor mobilizes to the site. If this meeting occurs before all CFA pile submittals have been accepted, additional preconstruction meetings may be required before beginning construction of CFA piles without accepted submittals. The Resident or Bridge Maintenance Engineer, Bridge Construction Engineer, Geotechnical Operations Engineer, Design-Build Team and CFA Pile Subcontractor

Superintendent and Project Manager shall attend all preconstruction meetings.

## **CONSTRUCTION METHODS**

Use equipment and methods accepted in the CFA pile installation plan developed by the Design-Build Team or approved by the Engineer. Inform the Engineer of any deviations from the plan developed by the Design-Build Team and accepted by the Department.

Dispose of drilling spoils and waste grout as directed and in accordance with Section 802 of the 2018 NCDOT *Standard Specifications for Roads and Structures*. Drilling spoils consist of all excavated material and fluids removed from boreholes.

### **Drilling**

Use CFA piling rigs capable of drilling to the dimensions and depths shown in the plans developed by the Design-Build Team or required otherwise by the Engineer. Install CFA piles with tip elevations no higher than shown in the plans developed by the Design-Build Team or approved by the Engineer.

Use single helix hollow stem augers with uniform diameters and continuous flights from the top of the auger to the bottom tip of the cutting face. Provide augers with flights and teeth that cut the bottom of the borehole flat. Augers with outside diameters at least 97% of the pile design diameter shall be required. Augers capable of installing piles to a depth 20% greater than the depth shown on the plans developed by the Design-Build Team shall also be required.

Unless piles are installed with a hydraulic fixed mast installation platform and the stem to which the auger is fixed has an outside diameter 10" or greater, at least one guide connected to the leads of the CFA piling rig shall be required. Prevent the leads from rotating during drilling and grouting.

Seal the grout injection port to prevent entry during drilling. Keep the hollow stem of augers clean when drilling. Clearly mark augers or leads every foot along their length with markings visible to the unaided eye from the ground. Check for correct pile location and alignment before beginning drilling. Do not begin drilling until enough grout to complete the pile is on the project site.

Advance the auger into the ground at a continuous rate. Do not raise the auger until beginning grout placement. Control the auger rotation speed to prevent excess spoil from being transported to the ground surface and surrounding soil being drawn laterally into the borehole.

If muck, organics, soft soil or other unsuitable materials are encountered within five feet of the ground surface, contact the Engineer as these materials can cause problems with top of pile construction. If auger refusal is encountered before reaching the depth shown on the plans developed by the Design-Build Team, stop the auger rotation and inform the Engineer. Unless it is determined otherwise, define refusal as less than one foot of auger penetration per minute.

**Grouting**

Remove oil, rust inhibitors, residual drilling slurries and similar foreign materials from holding tanks / hoppers, stirring devices, pumps and lines and all other equipment in contact with grout before use.

Place a screen between the ready mix truck and the grout pump to remove large particles or cement balls using a mesh that has openings no larger than  $\frac{3}{4}$ ".

Use a positive displacement piston type pump with a known volume per stroke that can develop peak pressures at the pump of at least 350 psi. Size the pump to maintain a smooth continuous delivery of grout while limiting pressure variations (particularly pressure drops) due to pump strokes. At the beginning of construction, provide the grout volume delivered by each pump stroke and verify this value is within 3% of the actual volume. Recalibrate the grout volume per pump stroke during construction as necessary or directed.

Measure grout temperature and flow during grouting with at least the same frequency grout cubes are made for compressive strength. Perform flow field tests in the presence of the Engineer in accordance with ASTM C939 (Flow Cone).

Place grout in accordance with the contract and accepted submittals. Pump grout without difficulty to fill any soft or porous zones and with sufficient pressure to ensure a continuous monolithic pile with at least the cross section shown on the plans developed by the Design-Build Team from the maximum borehole depth to the top of the grout column. Provide grout free of segregation, intrusions, contamination, structural damage or inadequate consolidation (honeycombing).

Begin placing grout within five minutes after the auger has reached the depth shown on the plans developed by the Design-Build Team. At the beginning of grout placement, lift the auger 6" to 12" and remove the sealing device by applying grout pressure or with a steel bar. Do not lift the auger beyond this range in order to minimize soil movement. After initiating grout flow, reinsert the auger to the original depth.

Pump grout continuously while extracting the auger at a smooth steady rate. Maintain a positive grout pressure at the auger injection point at all times. If rotation occurs while removing the auger, rotate the auger in the same direction as during drilling. If grout placement is suspended for any reason, inform the Engineer and redrill the CFA pile.

Monitor the depth of the auger injection point while counting pump strokes during grouting. Record the grout volume and factor versus depth of the auger injection point in increments of five feet or less. The grout volume factor is the grout volume placed divided by the theoretical grout volume for each depth increment. A grout volume factor of at least 1.15 shall be required.

**Top of Pile Finishing and Protection**

After placing grout, remove all excess grout and spoil and place a temporary form within the top of the grout column. Use a form three feet to five feet long with a diameter equal

to or larger than the pile diameter. Place the form with equal lengths above and below the ground surface. Recheck the top of the grout and remove any foreign material. After the Engineer determines that grout reaches initial set, remove the form without disturbing the ground surface around the pile.

After inserting reinforcement, square the top of the CFA pile with the pile axis while grout is still fluid or by cutting off hardened grout. Construct the top of CFA pile to the elevation shown in the plans developed by the Design-Build Team.

### **Reinforcement**

Provide reinforcement for CFA piles consisting of piles shown in the plans developed by the Design-Build Team and accepted submittals. Insert reinforcement as a unit while the grout is still fluid. Lower or gently push reinforcement into the grout. Do not vibrate or drive the reinforcement. Support the reinforcement at the ground surface until the grout strength reaches 2,500 psi. Contact the Engineer if reinforcement cannot be properly inserted to the required depth.

### **CONSTRUCTION RECORDS**

Provide two copies of CFA pile construction records after completing each pile. Include the following in construction records:

- Names of CFA Pile Subcontractor, Superintendent, Drill Rig Operator and Project Manager
- Project description, county, Department's contract, TIP and WBS element number
- Wall station and number and pile location and identifier
- The grout volume and factor versus depth of the auger injection point in increments of five feet or less
- CFA pile diameter, length and tip elevation, top of pile and ground surface elevations
- Auger diameter and theoretical volume of the borehole
- Grout temperature and flow records
- Size, length, top elevation and grade of reinforcement
- Date and time drilling begins and ends, grout is mixed and arrives on-site, pumping grout begins and ends and reinforcement is placed
- Weather conditions including air temperature at time of grout placement
- All other pertinent details related to CFA pile construction

After completing CFA piles for each sound barrier wall, provide a PDF copy of all corresponding construction records.

### **CFA PILE ACCEPTANCE**

CFA pile acceptance shall be based in part on the following criteria:

- Grout volume factor is greater than the minimum required for any five-foot depth increment.



- Grout is properly placed and does not have any evidence of segregation, intrusions, contamination, structural damage or inadequate consolidation (honeycombing).
- CFA pile and reinforcement location, alignment and elevations are within tolerances for sound barrier walls for pile excavation and reinforcement is in accordance with the contract and accepted submittals.

If the Engineer determines a CFA pile is unacceptable, additional testing, remedial measures or replacement piles shall be required at no additional cost to the Department. Do not begin remediation work until remediation plans developed by the Design-Build Team are accepted by the Department.

## **ARCHITECTURAL CONCRETE SURFACE TREATMENT**

(I-28-15) (Rev. 11-16-17)

### **1.0 GENERAL**

The work covered by this Project Special Provision shall consist of constructing a stained, simulated stone masonry textured surface on both faces of pre-cast concrete panels used in sound barrier walls and exposed faces of retaining walls as indicated on the plans developed by the Design-Build Team and herein. The Design-Build Team shall furnish all materials, labor, equipment and incidentals necessary for the construction of architectural concrete surface treatment using simulated stone masonry form liners (molds) and a compatible concrete coloring system.

The Design-Build Team shall use the same source of form liner and color stains for all sound barrier wall panels and retaining walls. The architectural concrete surface treatment shall match the appearance (stone size, stone shape, stone texture, pattern and relief) of natural stone to resemble a stacked stone pattern with panel staining **on both sides** of pre-cast concrete panels used for sound barrier walls and exposed faces of retaining walls to match the Brown Palette Color #s found in the *Federal Standard 595B – Colors Used in Government Procurement*.

#### **Palette Color # and Percent Coverage Distribution per Wall Panel**

<b>Color FS #</b>	<b>Coverage Distribution</b>
33522	40%
30372	35%
20095	15%
24064	10%

All texture shall be in addition to the nominal thickness of the pre-cast sound barrier wall panel thickness and retaining wall face thickness,  $\pm \frac{1}{4}$  inch. Maximum relief of the textured surface shall be  $1\frac{1}{4}$  inch or less. The top 1'-0" of the top panel within each sound barrier wall segment shall have a smooth, non-textured and non-stained finish to resemble faux coping. Concrete columns shall remain unstained in their natural concrete color. There shall be an appreciable contrast between the colors of the unstained concrete

columns and the stained panels. For information purposes only, sources of form liners in the stacked stone pattern include, but are not limited to:

Scott System, Inc.  
10777 E. 45th Avenue  
Denver, Colorado 80239  
<http://www.scottsystem.com/>

Architectural Polymers, Inc.  
1220 Little Gap Road  
Palmerton, Pennsylvania 18071  
<http://www.architecturalpolymers.com/>

Fitzgerald Form Liners  
1500 East Chestnut Avenue  
Santa Ana, California 92701  
<http://formliners.com/>

The Design-Build Team has the option of supplying an alternative pattern of simulated stone form liner, as long as the pattern selected is approved, in writing, as an equal or approved alternative by the Engineer.

## 2.0 SUBMITTALS

**Shop Drawings** - The Design-Build Team shall submit for review and acceptance, plan and elevation views and details showing overall simulated stone pattern, joint locations, form tie locations, and end, edge or other special conditions. The drawings shall include typical cross sections of applicable surfaces, joints, corners, stone relief, stone size, pitch / working line, mortar joint and bed depths. If necessary, the Design-Build Team shall revise the shop drawings until the proposed form liner patterns and arrangement have been accepted by the Engineer. Shop drawings shall be of sufficient scale to show the detail of all stone and joint patterns. The size of the sheets used for the shop drawings shall be 22" x 34".

The form liner shall be patterned such that long continuous horizontal or vertical lines do not occur on the finished exposed surface. The line pattern shall be random in nature and shall conceal construction joint lines. Special attention shall be given to details for wrapping form liners around corners.

Shop drawings shall be reviewed and accepted prior to fabrication of any form liners.

**Sample Wall Panels** - After shop drawings have been reviewed and accepted by the Engineer, the Design-Build Team shall construct three 24" x 24" transportable sample panel(s) at the project site. The materials used in construction of the sample panel(s) shall comply with Section 420 of the 2018 *Standard Specifications for Roads and Structures*. The sample panel(s) shall be constructed using form liners approved by the Engineer.

Any sample panel that is not approved by the Engineer shall be removed from the project site and a new sample panel produced at no additional expense to the Department.

After the color, texture and uniformity of the furnished samples are approved by the Engineer, produce a full-scale unit meeting the design requirements. This mock-up and the furnished samples shall establish the standard quality for determining the panel approval.

Architectural surface treatments and patterns of the finished work shall achieve the same final effect as demonstrated on the approved sample panel(s). Upon approval by the Engineer, the sample panel(s) shall be used as the quality standard for the project. After the approval of the completed structure, the Design-Build Team shall dispose of the sample panels, as directed by the Engineer.

### 3.0 MATERIAL REQUIREMENTS

**Form Liner** - The form liner shall be a high quality, reusable product manufactured of high strength urethane rubber or other approved material which attaches easily to the form work system and shall not compress more than ¼-inch when concrete is poured at a rate of ten vertical feet per hour. The form liners shall be removable without causing deterioration of the surface or underlying concrete.

**Form Release Agent** - Form release agent shall be a non-staining petroleum distillate free from water, asphaltic, and other insoluble residue, or an equivalent product. Form release agents shall be compatible with the color system applied and any special surface finish.

**Form Ties** - Form ties shall be set back a minimum of two inches from the finished concrete surface. The ties shall be designed so that all material in the device to a depth of at least two inches back of the concrete face (bottom of simulated mortar groove) can be disengaged and removed without spalling or damaging the concrete. The Design-Build Team shall submit the type of form ties to the Engineer for approval.

**Concrete Color System / Stain** - Special surface color system shall be performed using approved coloring systems / stains suitable for the purpose intended and applied in a manner consistent with the design intent of the project. The approved sample panel shall be the basis for determining the appropriate color / stain application.

Color stains shall be a special penetrating stain mix as provided by the manufacturer and shall be light to medium tan / brown to achieve a full, natural color in the finished surface. The stain shall create a surface finish that is breathable (allowing water vapor transmission), and that resists deterioration from water, acid, alkali, fungi, sunlight, and / or weathering. Stain mix shall meet the requirements for mildew resistance of Federal Test Method Standard 144, Method 6271, and requirements for weathering resistance of 1,000 hours accelerated exposure measures by Weatherometer, in accordance with ASTM G 26. Color samples shall be submitted for approval by the Engineer. Final

coloring system and the Brown Palette Color # FS 33522 shall be subject to approval by the Engineer.

**Anti-Graffiti Coating** - The Design-Build Team shall apply anti-graffiti coating that is compatible with the concrete color system / stain. After application, the anti-graffiti coating shall be dry to the touch within one hour and shall achieve a final cure within three hours. The color of the anti-graffiti shall be clear after full cure. The Design-Build Team shall provide one gallon of graffiti remover, thinners, dryers and all necessary components recommended by the manufacturer to the North Carolina Department of Transportation Materials and Tests Unit, Chemical Testing Engineer.

**Quality Standards** - Manufacturer of simulated stone masonry form liners and custom coloring system shall have at least five years' experience making stone masonry molds and color stains to create formed concrete surfaces to match the natural stone shapes, surface textures and colors.

The Design-Build Team shall schedule a pre-installation conference with a manufacturer representative and the Engineer to assure understanding of simulated stone masonry form liner use, color application, requirements for construction of sample panel(s), and to coordinate the work. The Design-Build Team shall disclose their source of simulated stone masonry manufacturer and final coloration contractor at the Preconstruction Conference.

#### 4.0 CONSTRUCTION

**Form Liner Preparation** - Prior to each concrete pour, the form liners shall be clean and free of build-up. Each liner shall be visually inspected for blemishes and tears. Repairs shall be made in accordance with the manufacturer's recommendations. Repairs shall be approved by the Engineer before being used. Form liner panels that do not perform as intended or are no longer repairable shall be replaced.

**Form Liner Attachment** - Form liners shall be securely attached to forms in accordance with the manufacturer's recommendations, with less than a 1/4-inch seam. Blend form liner butt joints into the stone pattern and finish off the final concrete surface. Create no visible vertical or horizontal seams or conspicuous form liner butt joint marks. At locations where the form liners are joined, carefully blend to match the balance of the stone pattern. Form liners shall be installed to withstand anticipated concrete placement pressures without leakage and without causing physical or visual defects. Wall ties shall be coordinated with the form liner system. The Design-Build Team shall have a technical representative from the form liner manufacturer on site for technical supervision during the installation and removal of form liners. Unless allowed by the Engineer, installation and removal of form liners shall not be permitted if the aforementioned technical representative is not present.

**Form Release Agent** - Form release agent shall be applied in accordance with the manufacturer's recommendations. The material shall be compatible with the form liner

material and the concrete coloring system and in accordance with this Project Special Provision. Form release agent shall be worked into all areas, especially pattern recesses.

**Patching** - Using patching materials and procedures in accordance with the manufacturer's recommendations, all form tie holes and other defects in finished uncolored surface shall be filled or repaired within 48 hours of form removal.

**Surface Finish** - All surfaces that are to receive coloring agent application shall be free of all laitance, dirt, dust, grease, efflorescence, paint or any other foreign material prior to the application of coloring agent. Cleaning of surfaces shall be accomplished by pressure washing with water set at 3000 psi to remove laitance. The fan nozzle shall be held perpendicular to the surface at a distance of one to two feet. Sandblasting shall not be permitted.

Final surface shall be free of blemishes, discolorations, surface voids, and other irregularities. All patterns shall be continuous without visual disruption.

Reinforced concrete shall be finished in accordance with the 2018 *Standard Specifications for Roads and Structures*, except that curing of concrete shall be done to accommodate the application of coloring and surface finish treatment.

**Grout Pattern Joints** - Grout pattern joints shall be constructed to simulate the appearance of mortared joints produced in laid up masonry work. Grout pattern joints shall be produced in accordance with the form liner / concrete color system manufacturer.

**Color / Stain Application** - Finished concrete and patches shall stand in place 30 days after form liners are removed prior to application of coloring / staining agent. Maintain the concrete temperature between 40° F and 85° F during color / stain application and for 48 hours after color / stain application. Consult the manufacturer's recommendations for preparation, application, curing and storage of coloring agents / stains. The Design-Build Team shall provide a Color Application Artist who is trained in the special techniques to achieve realistic surface appearances, if requested by the Engineer. Treated surfaces located adjacent to exposed soil or pavement shall be temporarily covered to prevent dirt or soil splatter from rain.

**Anti-Graffiti Coating Application** - The Design-build Team shall apply anti-graffiti coating after full cure of the color coating. The anti-graffiti coating shall be applied by brush, roller or airless spray when the ambient temperature is between 45° F and 90° F, and the surface temperature is between 50° F and 100° F. Ensure the surface is clean and dry before applying the anti-graffiti coating. The minimum dry film thickness of the anti-graffiti coating shall be 2.0 mils.

Following the completion of all work, repairs of any damage made by other construction operations shall be made to the form lined and colored surfaces, as directed by the Engineer.

**Experience and Qualifications** - The Design-Build Team shall have a minimum of three consecutive years' experience in architectural concrete surface treatment construction on

similar types of projects. The Design-Build Team shall furnish to the Engineer five references who were responsible for supervision of similar projects and will testify to the successful completion of these projects. Include name, address, telephone number, and specific type of application.

## **APPLICATION OF BASE AND ANTI-GRAFFITI COATING**

(6-2-16)

SP

### **GENERAL**

This work consists of preparing and cleaning concrete and galvanized surfaces as well as furnishing and applying a colored base coating with a compatible anti-graffiti finish coating to the surfaces described herein. The base coating and anti-graffiti coating shall be applied to all surfaces indicated on the plans developed by the Design-Build Team and / or as directed by the Engineer and shall be applied only after the surface preparation specified herein has been completed, inspected and approved by the Engineer.

Alternate coating methods may be submitted for review and approval.

### **MATERIALS**

The base coating shall be compatible with the anti-graffiti finish coating and must be designed specifically for coating galvanized surfaces or damp, uncured concrete. The coating material shall be delivered to the job site in sealed containers bearing the manufacturer's original labels. The brand, color, and type shall be clearly marked on each container. A copy of the manufacturer's Materials Safety Data Sheet and a copy of the manufacturer's printed instructions shall be presented to the Engineer at the time of delivery.

The coating material shall be stored in airtight, upright containers. The containers shall be stored in a dry location where the temperature remains above 40° F and below 100° F.

The coating material shall have a shelf life of not less than 12 months. After application, the base coating shall be dry to the touch within 48 hours and shall achieve a final cure within two to three weeks. After application, the anti-graffiti coating shall be dry to the touch within one hour and shall achieve a final cure within three hours.

The color of the base coating and area of application shall be in accordance with the Federal Standard 595.

The color of the anti-graffiti coating shall be clear after full cure.

Prior to application, provide one gallon of graffiti remover, thinners, dryers and all necessary components recommended by the manufacturer to the NCDOT Materials and Tests Unit, Chemical Testing Engineer for review and acceptance.

### **MATERIAL TESTING AND CERTIFICATION**

Prior to applying coating material, a Type 2 certification shall be provided to the Engineer attesting that the product furnished is in accordance with the same formula as that previously

subjected to the tests specified below and approved. Copies of the current tests reports shall be attached to the certification. Reports for tests made more than four years prior to shipment to the project site will not be accepted.

All testing shall be performed by a qualified commercial testing laboratory that has been approved by the NCDOT Materials and Tests Unit.

Prior to application, the coating shall be subjected to, and shall satisfy, the requirements of the tests listed below:

### **Freeze-Thaw**

1. Three concrete specimens, not less than four inches by six inches by six inches, of the mix design for the structure shall be cast and cured. Fourteen days moist curing with a drying period at room temperature, 60° F to 80° F, for 24 hours shall be required before applying the coating material to the specimens. Caution shall be taken that there be no excessive oil on specimen forms. The coating shall be applied to the sides of specimens at a spreading rate of  $50 \pm 10$  square feet per gallon. Brush application will be permitted. Cementitious coatings shall be cured at room temperature and 30 percent relative humidity for 24 hours; at room temperature and 90 percent relative humidity for 48 hours; and at room temperature and 50 percent relative humidity for four days; for a total curing time of seven days.
2. The specimens shall be immersed in water at room temperature for three hours, then removed.
3. The specimens shall be placed in cold storage at -15° F for one hour and then removed.
4. The specimens shall be thawed at room temperature for one hour.
5. Steps 3 and 4 shall be repeated for a total of 250 cycles. At the end of 250 cycles, the specimens shall show no visible defects.

### **Accelerated Weathering**

Coating shall be subjected to a 7,500-hour exposure test in a Twin-Carbon-Arc-Weatherometer, ASTM G 23, Type D, at an opening temperature of 145° F. The test shall be made at 20-minute cycles consisting of 17 minutes of light; and three minutes of water spray plus light. At the end of the exposure test, the exposed samples shall show no chipping, flaking, or peeling. The panels for this test shall be prepared by applying the coating at a spreading rate of  $50 \pm 10$  square feet per gallon to both sides and edges of panels cut from asbestos cement shingles in accordance with Federal Specification S-S-346, Type I. Curing time shall be in accordance with Freeze-Thaw Test curing time.

### **Fungus Growth Resistance**

In accordance with Federal Specification TT-P-29g, coating shall pass a fungus resistance test. Fungus growth shall not be indicated after a minimum incubation period of 21 days.

**Abrasion Resistance**

In accordance with Method 6191 Abrasion Resistance-Falling Sand, Federal Test Method Standard 141a, ASTM D968-81, coating shall pass the 2,000 litre sand abrasion test. The specimens for this test shall be prepared by applying the coating to a cleaned steel panel at a spreading rate of  $50 \pm 10$  square feet per gallon. The specimens shall be cured at room temperature for 21 days.

**Impact Resistance**

Coating shall be applied to a concrete panel prepared in accordance with the Federal Test Method Standard 141a, Method 2051, at a spreading rate of  $50 \pm 10$  square feet per gallon, and allowed to cure for 21 days at room temperature. The test shall then be run using the Gardner Mandrel Impact Tester in accordance with ASTM D 2794, using a one-half inch indenter with an impact load of six inch-pounds. The coating shall show no chipping under this impact load.

**Salt-Spray Resistance**

A concrete specimen shall be coated at the rate of  $50 \pm 10$  square feet per gallon and cured for 21 days at room temperature. In accordance with ASTM B 117, the coated specimen shall be exposed to a five percent salt solution for 2,500 hours where the atmospheric temperature is maintained at  $90^{\circ} \pm 2^{\circ} \text{F}$ . At the end of the 2,500 hours of exposure, the coating shall show no ill effects, loss of adhesion, or deterioration.

**Flexibility**

A sheet metal specimen shall be coated at a rate of  $50 \pm 10$  square feet per gallon and allowed to cure for 48 hours at room temperature. The coated specimen shall be bent at 180 degrees over a one-inch round mandrel. After bending, the coating shall show no breaking.

In addition to the certification and test reports required above, a service record shall be supplied showing that the coating material has a satisfactory service record on concrete and, when applicable, galvanized surfaces for a period of not less than five years prior to the date of submission of the service record. The coating shall also have shown satisfactory service characteristics without peeling, chipping, flaking, and non-uniform change in texture or color. The structure for the specific product shall be named in the service record.



In addition to the above requirements, each batch delivered to the project shall be sampled and tested for color and the following product analysis data submitted:

- (a) Weight per gallon
- (b) Viscosity in Kneb units
- (c) Weight percent pigment
- (d) Weight percent vehicle solids
- (e) Infrared spectra of vehicle solution
- (f) Drying time

### **SURFACE PREPARATION**

Prepare concrete surfaces and galvanized surfaces in accordance with Section 420-17(B) and Section 442-13 of the 2018 *Standard Specifications for Roads and Structures*, respectively, or the manufacturer's recommendations, whichever is more restrictive. All surfaces to be coated shall be free of efflorescence, flaking coatings, dirt, oil, curing compounds, release agents and other deleterious substances prior to the application of the coating.

Concrete curing compounds and release agents shall be removed. Water blasting will be allowed; however, the blasting operation shall not remove or damage the concrete.

Prior to application of the coating, all concrete surfaces to be coated shall be sprayed with water. If the water soaks into the concrete surfaces, the coating may be applied once all surfaces dry. If the water beads up and is repelled, the surfaces require further cleaning before application of the coating.

### **APPLICATION**

The coating application, including equipment used, shall be in accordance with the manufacturer's recommendations. The coating shall be applied by qualified personnel with previous experience similar to the work outlined in the plans developed by the Design-Build Team.

The material shall be thoroughly mixed in its original container and shall not be thinned. Containers with coatings that have formed skins shall not be permitted for use.

The base coating may be applied over damp, but not wet concrete surfaces and shall be applied at a rate of  $50 \pm 10$  square feet per gallon. The application rate shall produce a uniform color texture. The base coating shall be applied only when the ambient temperature is between 40° F and rising, and 100° F. It shall not be applied over frozen surfaces or if rain is imminent. If a freshly applied surface is damaged by rain, re-coating may be necessary based solely on the Engineer's assessment of the damage.

Schedule the application of the base coating as one of the final finishing operations or when construction-generated dust will be minimal. To prevent lap marks, a wet edge shall be maintained at all times. Stopping and starting in mid-sections will not be allowed. Start or end at natural breaks in the surface (e.g. at panel edges, corners or joints). When applying the base

coating with a roller, the material shall be applied in vertical strokes initially, cross rolled for even film and appearance, and then finished with vertical strikes.

Apply the anti-graffiti coating by brush, roller or airless spray when the ambient temperature is between 45° F and 90° F, and the surface temperature is between 50° F and 100° F. Ensure the surface is clean and dry before applying the anti-graffiti coating.

## **FINISHED PRODUCT**

All coating material in the finished state shall be capable of accommodating the thermal and elastic expansion ranges of the concrete or, when applicable, galvanized surfaces without cracking.

The texture of the completed finish coat shall be similar to that of rubbed concrete. The completed finished coating shall be tightly bonded to the structure and present a uniform appearance and texture. Additional coats may be required by the Engineer in order to produce the desired surface texture and uniformity.

Coatings shall be entirely removed from the structure and reapplied if there is failure to positively adhere as evident by chipping, flaking, peeling, or the desired surface appearance is not achieved.

The average thickness of the completed finish coating shall not exceed 1/8 of an inch. The minimum dry film thickness of the anti-graffiti coating shall be 2.0 mils.

## **WEATHERING STEEL BEAM GUARDRAIL**

(12-18-09) (Rev. 11-19-21)

862

DBI 8-33

### **Description**

In accordance with Section 862 of the 2018 *Standard Specifications for Roads and Structures*, install weathering steel beam guardrail at locations shown on the plans developed by the Design-Build Team.

### **Materials**

In accordance with Subarticle 1046-3(B) of the 2018 *Standard Specifications for Roads and Structures*, guardrail posts shall be hot dipped galvanized. At the Design-Build Team's option, and at no additional expense to the Department, treated timber posts that adhere to Subarticle 1046-3(C) of the 2018 *Standard Specifications for Roads and Structures* will be allowed in lieu of hot dipped galvanized steel posts.

Material used in the weathering steel beam guardrail shall meet the corrosion requirements of unpainted structural steel found in ASTM A242. The rails and terminal sections shall meet the requirements of AASHTO M180 Type IV, Class B. The bolts and nuts for Type IV beams shall meet the requirements of an approved corrosion resistant material and conform to or exceed the requirements of AASHTO M180.

In accordance with Section 106-3 of the 2018 *Standard Specifications for Roads and Structures*, Submit Type 1 Certified Mill Test Report. The Engineer reserves the right to sample the materials.

All organic zinc repair paint shall be on the NCDOT Approved Products List before use.

### **Construction Methods**

Install weathering steel beam guardrail with a uniform color appearance on the outside surfaces on the roadway face of the guardrail. If weathering of the sections is not consistent after a period of time after erection, as determined by the Engineer, a brush-off blast cleaning or brushing in the field shall be required .

In accordance with Section 862 of the 2018 *Standard Specifications for Roads and Structures*, use delineators on curved rail elements.

At locations where the weathering steel beam guardrail is lapped, use inserts made of zinc foil with a nominal thickness of 20 mils, except as allowed otherwise below. Punch holes and shape inserts to conform to the dimensions as given in AASHTO M180, Figure 3 for standard W-Beam, and / or Figure 4 for Thrie-Beam guardrail. The zinc foil inserts shall be made to the minimum width of the W-Beam and / or Thrie-Beam guardrail and a minimum length of 12.5 inches. Zinc shall meet the requirements of ASTM B6, Standard Specification for Zinc and ASTM B69, Standard Specification for Rolled Zinc. The material shall be Special High Grade, with a minimum of 99.99% Zinc as shown in Table 1 of ASTM B6.

As an alternate to using zinc inserts, the ends of both sections to be lapped shall be coated with two coats of 3.0 - 5.0 mils dry film thickness (DFT) of an approved Department organic zinc repair paint.

The coated back on the end of one rail shall be placed over the end with a coated front on the adjacent rail. Only the side of the rail that is in contact with the adjacent rail shall be coated and each rail shall be coated for the entire length of the lap. Apply all coatings in accordance with Section 442 of the 2018 *Standard Specifications for Roads and Structures*, and the coating manufacturer's instructions. If the manufacturer's instructions and the 2018 *Standard Specifications for Roads and Structures* conflict, the more restrictive requirements shall apply.

### **NONWOVEN GEOTEXTILE INTERLAYER**

(1-13-14)

DBI 10-07

### **Description**

Furnish and install a nonwoven geotextile interlayer at locations shown in the plans prepared by the Design-Build Team.

## General

The Design-Build Team shall schedule a Pre-Pave Meeting at least three weeks prior to paving to discuss installation and construction procedures for the nonwoven geotextile interlayer with representatives from the Design-Build Team including Paving Superintendent, Subcontractor, Geotextile Manufacturer, Engineer, Roadway Inspector, Area Roadway Construction Engineer, Division Construction Engineer, and the State Pavement Construction Engineer.

## Materials

The geotextile interlayer shall be constructed of a non-woven needle-punched geotextile, with no thermal treatment (calendaring or IR). The material shall be resistant to chemicals, mildew, and rot and shall not have any tears or holes that will adversely affect the in-situ performance and physical properties of the installed material.

Furnish with each shipment a Type 3 Certification in accordance with Article 106-3 of the 2018 NCDOT *Standard Specifications for Roads and Structures* certifying that the paving mat is a non-woven needle-punched geotextile with no thermal treatment (calendaring or IR) meeting the requirements shown:

<b>Physical Properties of Non-Woven Geotextile Interlayer</b>			
<b>Property</b>	<b>Test Method</b>	<b>Units</b>	<b>Value</b>
Minimum Mass per unit area	ASTM D 5261	oz/yd <sup>2</sup>	15.0
Minimum thickness under load (a) at 2 kPa (0.29 psi) (b) at 20 kPa (2.9 psi) (c) at 200 kPa (29 psi)	ASTM D 5199	in	(a) 0.12 (b) 0.10 (c) 0.04
Minimum wide-width tensile strength	ASTM D 4595	lb/ft	685
Maximum wide-width elongation	ASTM D 4595	%	130
Minimum water permeability in normal direction under load (pressure) at 20 kPa (2.9 psi)	Mod. ASTM D 5493 or ASTM D 4491	ft/s	$3.3 \times 10^{-4}$
Minimum in-plane water permeability (transmissivity) under load (pressure) (a) at 20kPa (2.9 psi) (b) at 200kPa (29 psi)	Mod. ASTM D 6574 or ASTM D 4716	ft/s	(a) $1.6 \times 10^{-3}$ (b) $6.6 \times 10^{-4}$
Minimum weather resistance retained strength	ASTM D 4355 at 500 hrs. exposure	%	60
Alkali resistance, minimum polypropylene / polyethylene	Manufacturer certification of polymer	%	96

Note: Requirements must be met for 95 percent of samples.

## General Requirements

A trained and experienced installer, certified by the Geotextile Manufacturer, shall be present on-site during the installation of the geotextile and until the crew has a comfort level working with this material.

Ensure that any potential for keying of the two cementitious layers is minimized through proper repair techniques. Clean the underlying surface to remove loose debris before applying the interlayer. Roll the geotextile out on the underlying layer. The geotextile shall be tight and without excess wrinkles and folds. No more than 650 feet of geotextile shall be installed in advance of the paving operation at a given time. The interlayer shall be placed no more than three days before concrete placement.

Keep driving on the interlayer to a minimum. Tight radius turns and excessive acceleration and braking shall be avoided.

The geotextile shall be secured to the underlying layer with pins or nails punched through two-inch to 2.75-inch galvanized washers or disks every six feet or less. Additional fasteners shall be used as needed to ensure that the geotextile does not shift or fold before or during concrete placement. Edges of the geotextile shall overlap by eight inches +/- two inches. No more than three layers of geotextile shall overlap at any location. Transverse seams of adjacent rolls shall be staggered to prevent four layers from coinciding at any location. The free edge of the geotextile shall extend beyond the edge of the new concrete into a location that facilitates drainage.

## **CONTROL OF VIBRATION:**

**(SPECIAL)**

### **Description**

Conduct pre-construction surveys, monitor vibrations, and produce post-construction reports in accordance with the contract.

### **Project Requirements**

Conduct pre-construction surveys and post-construction reports for:

- *Each of the Riverside Cemetery key funerary monuments, as noted in the Key Funerary Monuments image provided by the Department.*
- Structures or subsurface utilities subject to the limits indicated in the Geotechnical Engineering Scope of Work.

Retain a Vibration & Noise Monitoring Subcontractor to conduct pre-construction surveys, post-construction reports, and monitor vibrations.

Provide pre-construction surveys and post-construction reports sealed by an engineer licensed in the state of North Carolina and approved as a Project Manager (key person) for the Vibration & Noise Monitoring Subcontractor.

Measure the existing vibration exposure for the key funerary monuments listed elsewhere in the contract. Additionally, continuously monitor vibrations throughout construction in the area of the listed funerary monuments and of all subsurface utilities and residential and commercial structures subject to the limits indicated in the Geotechnical Engineering Scope of Work.

The PPV at any Key Funerary Monument shall meet the following criteria:

Variable	Warning Level	Not-to-Exceed Limit
PPV (frequencies to be determined)	Per the Pre-Construction Survey	Per the Pre-Construction Survey

The PPV at any utility or structure shall meet the following criteria:

Variable	Warning Level	Not-to-Exceed Limit
PPV (frequency < 40 Hz)	0.40"/sec	0.50"/sec
PPV (frequency > 40 Hz)	0.75"/sec	1.0"/sec
Air Overpressure	120 dB (linear)	133 dB (linear)

If warning levels are exceeded, the Engineer may require additional monitoring.

## Construction Methods

### (A) Pre-Construction Surveys

Provide pre-construction surveys signed by the Project Manager. Provide pre-construction surveys that include at least the following:

- (a) Summary with the pre-construction survey date and time, comments about existing structure condition and name of individual conducting the survey;
- (b) Sketches of exterior walls and foundations with existing cracks and written descriptions of cracks including length, width, type and angle;
- (c) Digital color pictures documenting existing cracks and structure condition
- (d) Tabulation of vibration not-to-exceed thresholds at various frequencies

### (B) Post-Construction Reports

Provide post-construction condition reports for all monuments, structures, and utilities that received a pre-construction survey. Provide vibration monitoring results and seismograph records signed by the Project Manager.

## **PROPOSAL SCHEDULE**

(8-14-22) (Revised 10-26-22)

SP

The Technical Proposal submittal shall include a Proposal Schedule, in electronic and hard copy format, that depicts the proposed overall sequence of design and construction activities, and the times during which each major work task and deliverable required to complete the project will be accomplished. The Proposal Schedule shall be organized using a hierarchical Work Breakdown Structure (WBS) that shall be broken down by major project phases (e.g., project milestones, project management, design, public involvement, permits, right of way acquisition, utility coordination / relocation, railroad coordination, construction, etc.). The Proposal Schedule shall depict the anticipated project Critical Path (based on the longest path); summary level reviews of submittals, etc. by the Department, FHWA, and other regulatory agencies; and high-level work by suppliers, subcontractors, and other involved parties, as applicable. The final completion date and, if proposed, the substantial completion date, shall be clearly indicated on the Proposal Schedule and labeled “Final Completion Date” and “Substantial Completion Date”.

Unless approved otherwise by the Department, the Design-Build Team shall prepare the Proposal Schedule using software compatible with the most recent version of Primavera scheduling software system. Other software capable of providing the required information will be considered, but must be reviewed and approved by the Department prior to the Technical Proposal submittal date, via a confidential question. The Design-Build Team shall include a hard copy of the Proposal Schedule in the Technical Proposal. At the same time and location as the Technical Proposal submittal, the Design-Build Team shall submit an electronic version of the Proposal Schedule in Primavera compatible scheduling software or other software approved by the Department, and the Proposal Schedule's source document in "XER" file format in a separate sealed package with the outer wrapping clearly marked "Proposal Schedule". Failure to submit the Proposal Schedule separately in the aforementioned electronic formats and in the Technical Proposal will result in the Technical Proposal being considered irregular by the Department and the Design-Build Proposal may be rejected.

### **SNOW AND ICE REMOVAL:**

#### **DESCRIPTION**

Performance of snow and ice removal within the project limits.

#### **MATERIALS**

The Department of Transportation (Department) will provide all necessary deicing chemical materials and/or abrasives necessary for snow and ice control operations. The Design-Build Team's equipment shall be loaded with deicing materials, abrasives in the same manner, and at the same locations as the Department's equipment, as determined by the Engineer. The Design-Build Team shall return all unused materials to the Department.

#### **EQUIPMENT**

The Design-Build Team shall provide the following types of equipment:

A minimum of four multi-rear-axel dump trucks, with operators, equipped with 12.0-ft. snowplow, tire chains, and 10.0 cubic yard (minimum truck capacity) material spreader. *(spreaders with tanks that allow the application of liquid chemicals at the spinner are required)*

- A minimum of four trucks, as described above, will be assigned to I-26 / I-240 from Brevard Road to Elk Mountain Road and I-240 / Patton Avenue from Merrimon Avenue to New Leicester Highway as determined by the Buncombe County Maintenance Engineer.

All snowplows provided under this agreement shall be hydraulic powered, reversible, hydraulic angling, moldboard type plows, with a dual trip spring assembly, which shall automatically return the plow to the normal plowing position. The trip spring assembly is intended to reduce the potential for damage to the plowing equipment resulting from collision with roadway

structure, such as, but not limited to, manholes and valve boxes. The Department will not be responsible for damage to the Design-Build Team's equipment resulting from collisions with such structures. Also, the snowplow operating, heights will be determined by the NCDOT. In some cases, the Design-Build Team may be directed to have the snowplow in direct contact with the pavement surface.

All material spreaders provided under this agreement shall be truck engine driven, hydraulic pump powered, in-body style spreaders with a calibrated, adjustable, locking feed gate, which controls the amount of material being discharged.

A copy of the Department's specifications for snowplows and material spreaders will be made available to the Design-Build Team upon request.

All equipment provided by the Design-Build Team shall be equipped with warning lights visible from 360 degrees in accordance with NCDOT standards. All trucks shall have headlights mounted to provide forward lighting over the snowplow/blade. Lighting shall be installed and adjusted to minimize glare. Communication devices shall be available in each piece of equipment to accommodate continuous communication between operators and the Design-Build Team's designated supervisor. All equipment shall also be equipped with operable, audible back-up warning devices. Each vehicle shall be equipped with a set of tire chains for at least one drive axle.

The Design-Build Team shall be responsible for all cost or changes incurred in the operation and maintenance of the equipment during the term of the contract including but not limited to fuel, oil, snowplow blades, tire chains, equipment repairs, communication equipment, etc.

All equipment covered by this project special provision will remain the property of the Design-Build Team upon the completion of the project.

## CONSTRUCTION METHODS

### **Supervisor**

The Design-Build Team shall provide a designated supervisor that shall coordinate this work with the Buncombe County Maintenance Engineer and Department's snow and ice removal operations

### **Operators**

Operators of all trucks shall have a valid Commercial's Driver's License of the appropriate class. The Design-Build Team shall provide enough operators, per piece of equipment provided under this project special provision, to operate 24 hours per day during a storm event. Operators are limited to a maximum 12-hour shift within a 24-hour period.



**Training**

The Department shall provide training session(s) to familiarize all Design-Build Team personnel (both operators and supervisors) with snow removal and ice control methods, equipment, and assigned routes. Training sessions consist of classroom style instruction on snow removal and ice control method and materials, snowplow and spreader operation, calibration and safety issues. Training session(s) will be scheduled and completed as determined by the Engineer and the Design-Build Team will be given a minimum of 2 weeks' notice of scheduled training.

The Department of Transportation will conduct dry run(s) to familiarize all the Design-Build Team's personnel (both operators and supervisors) with snow removal and ice control methods, equipment, and assigned routes. Dry runs include the use of equipment. At a dry run, equipment is inspected; calibrated, and plowing routes are reviewed and driven for operators to note potential plowing patterns and changes. Dry run(s) will be scheduled and completed as determined by the Engineer, typically held during the months of October and November each year. The Department will provide the Design-Build Team with a minimum two (2) week notice of scheduled dry runs.

The snowplows and material spreaders will be inspected and approved by the Engineer during the scheduled dry run(s). The Engineer will also periodically inspect all equipment provided. If, at any time, the Engineer finds that the equipment is not satisfactory, or has not been maintained in operating condition, the Design-Build Team shall repair or replace the unsatisfactory equipment at the Design-Build Team's cost.

**Intermediate Contract Time #15 for failure to be ready for snow and ice removal operation and delivered to the pre-designated Department of Transportation Facility within three (3) hours of notification.**

The Engineer will notify the Design-Build Team when impending inclement weather is forecasted, and when and where, according to the forecast, to mobilize equipment in preparation for snow and ice removal. The Engineer will notify the Design-Build Team a minimum of three (3) hours before the equipment is needed to begin the work.

All equipment, including any specified appurtenances (plows, spreaders, etc.), shall be rigged fitted and ready for operation (loading, plowing, etc.) and delivered to the pre-designated Department Facilities within three (3) hours of notification.

**Liquidated Damages for Intermediate Contract Time #15 for failure to be ready for snow and ice removal operation and delivered to the pre-designated Department of Transportation Facility within three (3) hours of notification are Two Hundred Dollars (\$200.00) per hour per piece of equipment.**

**NEXT GRNERATION CONCRETE SURFACE (NGCS) GRINDING**

(05/09/2023)

**Description**

This standard specifies the procedures for project level construction of the Next Generation Concrete Surface (NGCS) Grinding on existing or newly constructed roadways using diamond grinding and grooving techniques. This standard does not apply to any other diamond grinding or grooving processes.

**Equipment**

Grinding shall be accomplished using diamond blades mounted on a self-propelled machine designed specifically for diamond grinding and texturing pavement. The equipment shall weigh a minimum of 35,000 pounds including the grinding head and be of a size that will grind a strip at least 4 feet wide in a single pass and can produce overlapping match lines out of the wheel path. The effective wheelbase of the machine shall be no less than 12 feet. The effective wheelbase is defined as the distance from the front wheel assembly transverse pivot point to the transverse pivot point of the profile / depth control / ground drive wheels.

Grinding equipment that causes raveling, aggregate fractures, spalls, or disturbance to the transverse or longitudinal joints shall not be permitted. The equipment shall have a positive means of vacuuming the grinding residue from the pavement surface leaving the surface in a clean, near-dry condition.

The equipment shall be maintained to ensure it is in proper working order, with attention paid to the “roundness” of the match and depth control wheels. Any wheels found to be out of round shall be replaced immediately.

**Method of Construction**

The construction operation shall be scheduled and proceed in a manner that produces a neat, uniform finished surface. Shoulder, auxiliary or ramp lane grinding shall transition from the edge of the mainline as required to provide drainage, leaving no more than a 3/16-inch ridge and an acceptable riding surface. When conditions require a feather pass into the shoulder, auxiliary or ramp lanes, conventional diamond grinding shall be used. Full- and partial-depth concrete repairs, slab stabilization and dowel bar retrofit shall be completed prior to any grinding. Joint sealing shall be completed subsequent to the diamond grinding operations and shall be installed in a recessed condition.

Grinding shall be accomplished in a manner that eliminates joint or crack faults so there is no more than a 1/16-inch differential between the adjacent sides of the joints and cracks. Grinding shall also substantially remove pavement conditions such as warp and curl to provide an acceptable ride. Lateral drainage shall be achieved by maintaining a constant cross slope between grinding extremities in each lane. The finished cross slope shall mirror the pre-grind cross slope and shall have no depressions or misalignment of slope greater than 1/8-inch in

12 feet when measured with a 12-foot straightedge placed perpendicular to the centerline. Straightedge requirements will not apply across longitudinal joints or outside the ground area. Grinding shall begin and end at lines normal to the pavement centerline at the project limits. Passes of the grinding head shall not overlap more than 1-2 inches. No unground surface area between passes will be permitted.

**Two-Pass NGCS Operation** – This construction operation will allow for two separate operations to construct the NGCS section. The first operation will create the flush ground surface. The flush grind blades shall be mounted on a minimum 4-foot grinding head, stacked with 0.125-inch-wide blades separated by 0.035 +/- 0.005-inch-wide spacers resulting in 92 to 100 blades per foot. The blades used to produce the flush ground surface shall be flat across their contact surface and in the same plane with other flush grind blades when mounted. The complete head, when stacked with all blades, shall be straight across its length without bowing when mounted on the diamond grinding machine. No unground surface area between passes will be permitted. The smoothness levels stated within this standard must be attained and measured to the satisfaction of the Engineer prior to constructing the second operation. The second operation will provide the longitudinal grooves. The longitudinal grooving blades shall be 0.095 +/- 0.05 inches wide and will produce grooves 1/8-inch to 3/16-inch in depth. The longitudinal grooves will be spaced on 1/2-inch to 5/8-inch centers. The grooves shall be constructed parallel to the centerline. The Design-Build Team shall use a guide to ensure proper alignment of the grooves to centerline.

### **Final Surface Finish**

The NGCS grinding process shall produce a pavement surface that is true to grade and uniform in appearance with a longitudinal grooved texture. The flush ground surface shall appear smooth and shall contain no ridges that exceed 1/32-inch. The longitudinal grooves shall be constructed parallel to the centerline. At a minimum, 98% of the pavement surface shall be textured utilizing the NGCS. Depressed pavement areas due to subsidence, edge slump or other localized causes will be excluded from this requirement when approved by the Engineer.

### **Smoothness Requirements**

Final surface testing is required on this project in accordance with Article 710-7 of the *2018 Standard Specifications*. All corrective actions must be approved by the Engineer.

### **Disposal of Residual Slurry**

Diamond grinding slurry management and disposal shall be in accordance with the latest Permit No. WQ0035749. The Design-Build Team shall dispose of the slurry at a permitted facility. No direct discharge or land application of diamond grinding slurry is permitted. 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. The Engineer shall review the slurry disposal plan. The plan must be accepted prior to beginning the diamond grinding operation.

To prevent the migration of any accidental discharge from the diamond grinding machine entering a drainage inlet or structure, the Design-Build Team shall install wattles and silt fence at the direction of the Engineer. Silt Fence shall be installed in accordance with Section 1605 of the NCDOT *2018 Standard Specifications*.

For more detailed information, see the Environmental Permits and Guidelines section under Environmental resources on the NC Connect website for the DG permit and guidelines at the following link. (NCID access required.)

**<https://connect.ncdot.gov/resources/Environmental/Environmental%20Permits%20and%20Guidelines/Forms/AllItems.aspx>**

**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 the Contract Standards and Development Unit within the Field Support 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. Unless stipulated otherwise in the Scope of Work, submittals will be reviewed within the timeframe the Design-Build Team indicates on the design submittal or ten working days (15 days for temporary structures, overhead sign assemblies, MSE walls, FEMA compliance documents, curved steel girder working drawings and temporary shoring), whichever is greater. All review timeframes, including but not limited to the

aforementioned ten-day and 15-day review timeframes, shall begin on the first working day after the Department receives the submittal, regardless of the time the submittal is received. 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 prioritize multiple submittals that are submitted concurrently. All submittals shall include pertinent Special Provisions. No work shall be performed prior to Department review and acceptance of the design submittals.

For all design disciplines, the Design-Build Team shall inform the Design-Build Unit, in writing, of all proposed changes / revisions to the NCDOT preliminary design, the Design-Build Team's Technical Proposal and / or previously reviewed / accepted submittals, including but not limited to changes / revisions to RFC Plans, and obtain approval prior to incorporation. Failure to provide the aforementioned written notification of changes with the appropriate design submittal could result in the Department 1) suspending the design submittal until documentation is provided and extending the contractual design submittal review timeframe by an amount of time equal to the time it takes for the Department to receive the required documentation, or 2) returning the unreviewed design submittal to the Design-Build Team and requiring a resubmittal. Unless noted otherwise elsewhere in this RFP, all proposed design changes / revisions shall be subject to the Department's review and acceptance, including but not limited to changes to RFC Plans.

## OVERVIEW

The I-2513B & D Design-Build Project widens I-26 from south of US 19-23 Bus (Haywood Road) to north NC 251/SR 1781 (Broadway Street) and improves SR 1477 (Riverside Drive) from SR 1517 (Hill Street) to NC 251 (Broadway Street) in Buncombe County. The approximately 3.2-mile project provides a six-lane divided facility, mostly on new location, with a new I-26 / I-240 interchange configuration.

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 CCTV cameras, fiber-optic communications cable and conduit, and ITS integration
- **Permit Preparation / Application** - development of all documents for required permits
- **Right of Way** - acquisition of right of way necessary to construct project
- **As-Built Plans**

**As-Constructed Drawings** will be developed by the NCDOT Division personnel or will be developed under a separate contract.

**Construction Engineering Inspection** will be provided by the NCDOT Division personnel or will be performed under a separate contract.

The following project planning documents have been completed:

- The I-2513 FEIS Reevaluation was approved May 23, 2023.
- The I-2513 Record of Decision was approved May 26, 2023.

**\*\*NOTE\*\*** Deleted paragraph about the development of the Record of Decision.

## GENERAL SCOPE

The scope of work for this project includes design, construction and management of the project. The design work includes all aspects to widen approximately 3.2 miles of I-26 to a six-lane divided facility, provide a new I-26 / I-240 interchange configuration, and improve SR 1477 (Riverside Drive) from SR 1517 (Hill Street) to NC 251 (Broadway Street). Unless allowed otherwise elsewhere in this RFP, the designs shall meet all appropriate latest versions of AASHTO *Policy on Geometric Design of Highways and Streets*, AASHTO *LRFD Bridge Design Specifications*, *Manual of Uniform Traffic Control Devices* and all NCDOT design policies that are current as of the Technical Proposal submittal date or the Best and Final Offer submittal date, whichever is later.

Unless noted otherwise elsewhere in this RFP, all documents referenced herein shall be the edition / version, including all interim revisions, effective on the Technical Proposal submittal date or the Best and Final Offer submittal date, whichever is later.

Construction shall include, but not be limited to, all necessary clearing, grading, roadway, drainage, structures, utility coordination and relocation, and erosion and sediment control work items for the proposed four-lane facility and installation of the control of access fence. Construction engineering and management shall be the responsibility of the Design-Build Team. Construction shall comply with 2018 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:

- Roadway Design
- Structure Design
- Permit Application
- Hydraulic Design
- Geotechnical Engineering
- GeoEnvironmental
- Subgrade Stabilization
- Railroad Coordination
- Foundation Design for Structures and Roadway
- Erosion and Sedimentation Control Design and Implementation
- Transportation Management Plan Design and Implementation
- Pavement Marking Design
- Intelligent Transportation Systems (ITS) Design
- Sign Design
- Traffic Signals and Signal Timing Plans

Construction  
Project Management  
Design and Construction Management  
Lighting  
Utility Construction  
R/W Utilities, Conflicts and / or Construction  
Construction Surveying  
Location and Surveys  
Right of Way Acquisition  
Public Involvement and Information  
Aesthetics

All designs shall be in Microstation format using Geopak software (current version used by the Department) or Bentley Open Roads Designer (ORD). If the Design-Build Team elects to use ORD, the Department will not honor any requests for additional contract time or compensation for any effort required to complete the designs using ORD.

#### **DESIGN AND CONSTRUCTION PERFORMED BY DESIGN-BUILD TEAM**

The design work consists of the preparation of all construction documents to widen approximately 3.2 miles of I-26 to a six-lane divided facility, provide a new I-26 / I-240 interchange configuration, and improve SR 1477 (Riverside Drive) from SR 1517 (Hill Street) to SR 1781 (Broadway Street), 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 Design-Build 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.



The Design-Build Team shall be solely responsible for all design and construction methods adhering to all requirements herein, as well as all applicable guidelines, standards and policies. If the applicable guidelines, standards and / 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 the event of conflicting design parameters in the requirements herein and / or the applicable guidelines, standards and policies, the proposed design shall adhere to the most conservative values. The Department's acceptance of plans, reports, calculations, analyses, etc. shall not relieve the Design-Build Team of any and all obligations to design and construct the project in accordance with the RFP requirements and all applicable guidelines, standards and policies.

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 Price Proposal submittal deadline. Subcontractors need only be prequalified prior to performing the work. Design firms should be prequalified prior to the Technical Proposal submittal deadline. If not prequalified at the time of the Technical 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.

## **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. Access to the web portal will be given to each short-listed prime contractor and lead design firm. No distribution of Provided Materials will be possible prior to the Department announcing the short-listed Design-Build Teams and establishing the access privileges.

Access privileges will only be given to the individuals listed in the prime contractor's and lead design firm's Active Directory Group. It shall be solely the prime contractor's and lead design firm's responsibility to maintain their Active Directory Group. Once access has been established,

individuals may enter the “Connect” site and login with their NCID account. Once logged in, the Teamsite “I-2513B & D” link will be apparent on the left side of the webpage.

Please note that all material provided, including the material provided through this portal, is provided for informational purposes only and is provided solely to assist the Design-Build Team in the development of the project design unless noted otherwise elsewhere in this RFP. By submitting a Technical Proposal and Price Proposal, the Design-Build Team acknowledges that they are fully and totally responsible for the project design, including the use of portions of the Department design, modification of such design, or other designs as may be submitted by the Design-Build Team, unless noted otherwise elsewhere in this RFP. The Design-Build Team further acknowledges that they are fully and totally responsible for the accuracy and completeness of all work performed, including the determination of the accuracy of the information provided through this portal, and to the extent that the Design-Build Team chooses to rely on such information.

### **ELECTRONIC PLAN SUBMITTALS AND E-SIGNATURES**

The Design-Build Team shall submit all Release for Construction Plans in accordance with the NCDOT e-Signature requirements, including but not limited to providing signed and sealed searchable .pdf files. Reference the website noted below for additional information:

**<https://connect.ncdot.gov/business/consultants/Pages/Guidelines-Forms.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 and their subcontractors shall restrict such person or persons from working on any Design-Build procurement / project in which the person or persons were “formerly involved” while employed by the State. The restriction period shall be for the duration of the Design-Build procurement / project with which the person was involved. *Former Involvement* shall be defined as active participation in any of the following activities:

- Developing the Request for Proposals / Design-Build contract, including any Supplemental Agreements
- Selecting or evaluating the Design-Build Team, including evaluating any document submitted by a Design-Build proposer

- Developing or negotiating the contract / Supplemental Agreement cost, including calculating manhours or fees
- Administering the Design-Build contract

An exception to these terms may be granted when recommended by the Secretary and approved by the Board of Transportation.

The Design-Build Team and their subconsultants / subcontractors shall restrict all personnel embedded within the Department, including but not limited to Design Units and Divisions, from working on any Design-Build procurement / project. Except as allowed otherwise below, the Design-Build Team shall provide a list of all embedded personnel to the Department and a signed Confidentiality Agreement for each embedded employee, as well as their employer and NCDOT Unit Manager. If the Design-Build Team has previously provided a signed Confidentiality Agreement for an embedded employee who's employer and / or NCDOT Unit Manager have not changed, the Design-Build Team shall 1) indicate on the aforementioned list when the original Confidentiality Agreement was provided to the Design-Build Unit (date and TIP Project), 2) provide a copy of the original signed Confidentiality Agreement, or 3) provide a new signed Confidentiality Agreement. The Design-Build Team shall submit the aforementioned list and Confidentiality Agreements to Mr. Ronald E. Davenport, Jr., P.E., State Contract Officer, within ten business days of the issuance of the Industry Draft RFP, and provide updated lists and Confidentiality Agreements, as appropriate, throughout the project procurement / duration.

Failure to comply with the terms stated above in this section may 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. The Department will only evaluate the maximum number of allowable pages noted below. Thus, the Department may 1) reject submissions that exceed the page limitations or 2) remove the page(s) that exceed the page limitations prior to evaluating the submission. The Department will notify the Proposer in writing of the reason(s) for the rejection or the details of the altered submission.**

### **TECHNICAL PROPOSAL**

Technical Proposals will be accepted until **4:00 p.m. Local Time on Tuesday, January 23, 2024**, at the office of the State Contract Officer:

Mr. Ronald E. Davenport, Jr., PE  
Contract Standards and Development  
1020 Birch Ridge Drive  
Century Center Complex - Building B  
Raleigh, NC 27610

**No Technical Proposals will be accepted after the time specified.**

**TECHNICAL PROPOSAL - Hard Copies**

Hard copies of the Technical Proposal shall be submitted in a sealed package. The outer wrapping shall clearly indicate the following information:

Technical Proposal - Hard Copies  
Submitted By: (Design-Build Team's Name)  
Design-Build Team Address  
Contract Number C204870  
TIP Number I-2513B & D  
Buncombe County

I-26 from South of US 19-23 Bus (Haywood Road) to North of NC 251 / SR 1781  
(Broadway Street), Including the I-26 / I-240 Interchange  
SR 1477 (Riverside Drive) from SR 1517 (Hill Street) to NC 251 (Broadway Street)

Hard copies of the Technical Proposals delivered in person shall be delivered to Door B3 of the Century Center Complex - Building B. The delivery person shall call Ms. Marsha Sample at (919) 707-6915 or Mr. Ken Kennedy, PE at (919) 707-6919 to accept delivery. If delivered by mail, the sealed package shall be placed in another sealed package that is addressed to the Contract Officer as stated in the Request for Proposals. The outer package shall also bear the statement "Technical Proposal for the Design-Build of State Highway Contract No. C204870". (Reference the *Submittal of Quantities, Fuel Base Index Price and Opt-Out Option* Project Special Provision found elsewhere in this RFP for additional requirements that are concurrent with the Technical Proposal submittal.)

**Technical Proposal Requirements**

12 Copies

8 ½-inch by 11-inch pages

No fold out sheets allowed - maximum 24-inch by 36-inch fold out sheets shall only be allowed to present interchange plans in the 11-inch by 17-inch plan sheets

Printed on one side only

Double-spaced

Font size 12 - Within embedded tables, charts, and graphics only, minimal font size 10 is permissible

Excluding the introductory letter to Mr. Ronald E. Davenport, Jr., P.E. (two-page maximum length), a copy of the Department's approval letter for each incorporated Formal ATC, and the 11-inch by 17-inch appropriate plan sheets, the maximum number of allowable pages shall be 50 pages.

The aforementioned introductory letter to Mr. Ronald E. Davenport, Jr., PE shall include a statement acknowledging that the NCDOT may destroy all Technical Proposals not retained by

the Department, **or** a statement 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. Ronald E. Davenport, Jr., PE, at the address below:

NCDOT- Contract Standards and Development  
Century Center Complex - Building B  
1020 Birch Ridge Drive  
Raleigh, NC 27610

**TECHNICAL PROPOSAL - Electronic Copy**

An electronic copy of the Technical Proposal shall be submitted in a sealed package. The electronic copy 1) shall be in a searchable .pdf format, 2) shall not contain any hyperlinks, 3) shall be scaled to reproduce to the appropriate page format, as defined above, and 4) shall be created by converting the original MicroStation / GeoPak files. The outer wrapping shall clearly indicate the following information:

Technical Proposal - Electronic Copy  
Submitted By: (Design-Build Team's Name)  
Design-Build Team Address  
Contract Number C204870  
TIP Number I-2513B & D  
Buncombe County  
I-26 from South of US 19-23 Bus (Haywood Road) to North of NC 251 / SR 1781  
(Broadway Street), Including the I-26 / I-240 Interchange  
SR 1477 (Riverside Drive) from SR 1517 (Hill Street) to NC 251 (Broadway Street)

Electronic copies of the Technical Proposals delivered in person shall be delivered to Door B3 of the Century Center Complex - Building B. The delivery person shall call Ms. Marsha Sample at (919) 707-6915 or Mr. Ken Kennedy, PE at (919) 707-6919 to accept delivery. If delivered by mail, the sealed package shall be placed in another sealed package that is addressed to the Contract Officer as stated in the Request for Proposals. The outer package shall also bear the statement "Technical Proposal for the Design-Build of State Highway Contract No. C204870".

**PRICE PROPOSAL**

Price Proposals will be accepted until **4:00 p.m. Local Time on Monday, February 12, 2024**, at the office of the State Contract Officer:

Mr. Ronald E. Davenport, Jr., PE  
Contract Standards and Development  
1020 Birch Ridge Drive  
Century Center Complex - Building B  
Raleigh, NC 27610

**No Price Proposals will be accepted after the time specified.**

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 C204870  
TIP Number I-2513B & D  
Buncombe County  
I-26 from South of US 19-23 Bus (Haywood Road) to North of NC 251 / SR 1781  
(Broadway Street), Including the I-26 / I-240 Interchange  
SR 1477 (Riverside Drive) from SR 1517 (Hill Street) to NC 251 (Broadway Street)

The Price Proposal shall be submitted by returning the Request for Proposals with the item sheets completed, and all required signatures and bonds. Failure to execute the required documents may render the Price Proposal non-responsive. (Reference the *Steel Price Adjustment* Project Special Provision found elsewhere in this RFP for additional requirements that are concurrent with the Price Proposal submittal)

Price Proposals delivered in person shall be delivered to Door B3 of the Century Center Complex - Building B. The delivery person shall call Ms. Marsha Sample at (919) 707-6915 or Mr. Ken Kennedy, PE at (919) 707-6919 to accept delivery. If delivered by mail, the sealed package shall be placed in another sealed package that is addressed to the Contract Officer as stated in the Request for Proposals. The outer package shall also bear the statement "Price Proposal for the Design-Build of State Highway Contract No. C204870".

**EVALUATIONS**

Decisions based on cost alone will not establish the design standards for the project. Technical Proposals shall address the technical elements of the design and construction of the project. The Technical Review Committee will consider the understanding of the project, the anticipated problems and the solutions to those problems, in addition to other evaluation criteria identified herein.

The Design-Build Team's Technical Proposal shall be developed using narratives, tables, charts, plots, drawings and sketches as appropriate. The purpose of the Technical Proposal is to document the Design-Build Team's understanding of the project, demonstrate the Design-Build Team's capabilities to complete the project, document their selection of appropriate design criteria and state their approach and schedule for completing all design and construction activities.

The review of design plans by the Department is not intended to reflect a reviewer's personal preferences, but rather to ensure that all contract requirements are met, sound engineering judgment is exercised by the Design-Build Team, and that the Design-Build Team adheres to all referenced documents, including but not limited to, design standards, codes, memos and manuals.

As such, the Award of the Design-Build contract does not in any way imply that the NCDOT accepts the details of the Technical Proposal submitted by the Design-Build Team.

The Technical Proposal will be evaluated in each of the following major categories:

EVALUATION FACTORS	POINTS
1. Design-Build Team	4
2. Responsiveness to Request for Proposal	30
3. Schedule and Milestones	20
4. Innovation / Added Value	12
5. Maintenance of Traffic and Safety Plan	30
6. Oral Interview	4

## TECHNICAL PROPOSAL EVALUATION CRITERIA

### 1. Design-Build Team - 4 points

Provide a comprehensive Organizational Chart that identifies the design, quality and construction team members, and the relationships with subconsultants / subcontractors. The Organizational Chart shall identify all firms and personnel changes (additions, substitutions, deletions) to the Design-Build Team since submittal of the Statement of Qualifications.

- Confirm that the key personnel identified in the Statement of Qualifications have not changed and identify all team member additions.
- If different firms and / or offices develop designs for the project, indicate how the designs will be integrated / consistent.
- Describe the work categories 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.
- Describe how the Design-Build Team will implement design and construction quality control for this project.
- Describe any significant design and / or construction quality control issues experienced on NCDOT projects in the last five years and how those issues will be addressed for this project
- 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.

### 2. Responsiveness to RFP - 30 points

#### *Natural Environmental Responsibility*

- Identify efforts to minimize impacts on wetlands, streams, riparian buffers and other environmentally sensitive areas. Describe any temporary impacts and associated minimization approaches.
- Describe the Design-Build Team's understanding of the overall approach to permitting.

- Identify methods of construction in wetlands, streams and riparian buffers.
- Describe the Design-Build Team's approach to Sedimentation and Erosion Control for the project.

### ***Design Features***

- Show plan view of design concepts with key elements noted.
- Identify preliminary horizontal and vertical alignments of all roadway elements.
- Identify the appropriate design criteria for each feature, if not provided herein.
- Identify proposed design exceptions and justify why the design exception is necessary.
- Identify proposed deviations to the preliminary design provided by the Department, not required herein.
- Show mainline typical sections.
- Provide conceptual designs and renderings for all aesthetic elements.
- Specify the pavement Alternate chosen for both I-26 and I-240. The pavement Alternate chosen for both I-26 and I-240 will not be a part of the Technical Proposal evaluation and the selection thereof will not impact the Technical Scores; although an alternate pavement design, as approved as an ATC, may be considered in the evaluation.
- Specify the pavement option chosen for I-26 and I-240 median and outside shoulders.
- The Design-Build Team shall specify the proposed I-26 and I-240 subgrade stabilization, or combination, with approximate limits of each type clearly noted
- Specify the base option chosen (ABC or asphalt) for all -Y- Lines, ramps, loops, service roads and roundabouts.
- If applicable, specify where all underlying longitudinal joints will be located and demonstrate how the underlying longitudinal joint location will minimize reflective cracking.
- For all incorporated ATC pavement designs, the Design-Build Team shall include in the Technical Proposal a minimum three-year extension of the 12-month guarantee.
- Indicate how longitudinal joints will be located on a lane line or lane midpoint.
- Identify drainage modifications and designs to be implemented.
- Provide a brief summary of the mainline hydroplaning risk assessment and proposed mitigation.
- Provide a *Deck Drain Analysis Table* that contains the deck drain analysis noted in the Hydraulics Scope of Work found elsewhere in this RFP.
- Provide a *Proposed Stormwater Control Measures Table* that contains the stormwater control measure attributes noted in the Hydraulics Scope of Work found elsewhere in this RFP.
- Provide a *Box Culverts and Cross Pipes Hydraulic Assessment Table* that contains the box culvert and cross pipe attributes noted in the Hydraulics Scope of Work found elsewhere in this RFP.
- Identify the months the Department should schedule the Concurrence Point 4B Meeting and the Concurrence Point 4C Meeting.
- For all major hydraulic crossings with a conveyance greater than the capacity of a single 72" diameter pipe, indicate the rise in the floodplain water elevation.



- Discuss the extent and limits of the rise in water elevation in the floodplain(s), identify potentially impacted insurable structures, specify areas anticipated to require additional surveys and estimate the anticipated additional right of way impacts outside the project construction limits.
- Indicate how the future NC 251/SR 1781 (Broadway Street) future widening can be accomplished without the need to 1) reconstruct any of the substructure elements of the I-26 bridge(s) over NC 251/SR 1781 (Broadway Street) or 2) obtain a future design exception.
- Identify all bridge types to be constructed, including any special design features or construction techniques needed.
- Describe how the Design-Build Team will minimize the use of bridge deck joints.
- Identify types of retaining walls and / or sound barrier walls, if applicable.
- 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 Engineering Scope of Work found elsewhere in this RFP.
- Identify the approximate location of new ITS devices and when they will be installed and operational in their permanent location.
- Identify any aesthetic considerations not required herein that will be part of the design.
- Describe how utility conflicts will be addressed and any special utility design considerations. Describe how the Design-Build Team's design and construction methods minimize the Department's utility relocation costs.
- Describe how the design will affect the Department's right of way costs.
- Provide a Preliminary Signing Concept Map that includes, at a minimum, all proposed overhead sign structure locations, all overhead signs, and all ground mounted Type A and B guide signs.
- Describe any proposed special materials, designs and / or construction methods that will reduce long term maintenance costs.

### 3. Schedule and Milestones - 20 points

Provide a Proposal Schedule that depicts the information noted in the *Proposal Schedule* PSP found elsewhere in this RFP. Also provide a Proposal Schedule Narrative that describes the Design-Build Team's proposed overall plan to accomplish the design and construction activities. At a minimum, the Proposal Schedule Narrative shall include, but not be limited to, the overall sequencing, a description and explanation of the Critical Path, proposed means and methods, resources, constraints and other key assumptions on which the Proposal Schedule is based. The Proposal Schedule and Proposal Schedule Narrative shall also include the following, as applicable:

- Indicate if, and how, the Design-Build Team intends to divide the project into work segments to enable optimum construction performance.
- Describe the Design-Build Team's plans and procedures to ensure timely deliveries of materials to achieve the project schedule.
- Provide a detailed schedule for the project including both design and construction activities. The schedule shall show the sequence and continuity of operations, as well as the month of delivery of usable segments of the project.
- Indicate the specific construction activities that will occur outside jurisdictional resources prior to obtaining the environmental permits and their anticipated start date.

- Indicate how the Design-Build Team will maintain the project schedule if the right of way acquisition process and / or utility relocations are delayed.
- Identify any self-imposed liquidated damages and associated Intermediate Contract Time(s), if applicable.
- Identify the month of delivery of usable segments of the project.
- The final completion date and, if proposed, the substantial completion date, clearly indicated and labeled **“Final Completion Date”** and **“Substantial Completion Date”**.

#### **4. Innovation / Added Value - 12 points**

- Identify any aspects of the design or construction elements that the Design-Build Team considers innovative.
- If applicable, describe design parameters / construction methods that provide added value to the Department.
- Provide a summary of all Alternative Technical Concepts (ATC) submitted, regardless of inclusion or approval status. At a minimum, include innovative and / or added value details associated with each ATC in the aforementioned summary. It is recommended, but not required, that this summary be provided as part of the 11-inch by 17-inch plan sheets.

#### **5. Maintenance of Traffic and Safety Plan - 30 points**

##### ***Maintenance of Traffic***

- Provide a Transportation Management Phasing Concept (TMPC).
- Identify the type of positive median cross-over protection proposed and replacement / resetting requirements.
- Describe any traffic control measures 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.
- Describe the Design-Build Team's approach to site access and material staging.
- Specifically describe how business, school and residential access will be maintained, if applicable.
- Identify the need for a Work Zone Speed Limit Reduction Ordinance and / or a \$250 Speeding Penalty Ordinance
- 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.
- Describe the Design-Build Team's approach to providing the public access to project personnel for inquiries on vehicular and pedestrian traffic impacts.
- If a temporary portable barrier system will be utilized, provide the type and why it is needed.
- If temporary shoring will be required to maintain traffic, provide the type and why it is required.
- Include all proposed road closures, detour routes, durations and justifications.
- Address where and how law enforcement officers will be used.

- Identify a Traffic Control Supervisor and briefly describe their qualifications for this role.

### ***Safety Plan***

- Describe the safety considerations specific to the project.
- Describe any proposed improvements that will be made prior to or during construction that will enhance the safety of the work force and / or travelling public both during and after the project construction.

## **6. Oral Interview - 4 points**

- The Design-Build Team's Project Management Team shall present a brief introduction of the project team and design / construction approach.
- Introductory comments shall be held to no more than 30 minutes.
- The Department will use this interview to ask specific questions about the Design-Build Team's Technical Proposal, background, philosophies and project approach.
- Presentation, questions, and answers shall not exceed 90 minutes. No more than ten people from the Design-Build Team may attend.

The Department will use the information presented in the oral interview to assist in the Technical Proposal evaluation, including but not limited to impacting the other evaluation criteria both positively and negatively.

## **Additional Warranty and / or Guarantee**

- **The Extra Credit for this project shall be a Maximum of 5 Points.**

A twelve-month guarantee, as outlined in the *Twelve-Month Guarantee* Project Special Provision found elsewhere in this RFP, is required for this project. However, the Design-Build Team may provide additional warranties and / or guarantees at their discretion. The Design-Build Team may be awarded additional points as "extra credit" to be added to the Technical Score.

The Design-Build Team may provide warranties and / or guarantees for major components of the project. Examples of major components are pavements, bridge components and sign structures. If additional warranties and / or guarantees are offered, the Design-Build Team shall indicate in the Technical Proposal the general terms of the warranties and / or guarantees, a list of the items covered, performance parameters, notification and response parameters for corrective action, and evaluation periods. The Department will be responsible for annual inspections of the components covered by all warranties and / or guarantees offered by the Design-Build Team that extend beyond the required twelve-month guarantee. The warranties and / or guarantees shall also define how disputes will be handled.

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 Technical Proposals are responsive to the Request for Proposals requirements. 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 shall 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 Score for each Design-Build Team to the State Contract Officer.

The State Contract Officer will use a table based on the maximum quality credit percentage to assign a Quality Credit Percentage to each Technical Proposal based on that proposal's overall consensus Technical Score. The maximum quality credit percentage for this project will be **35%**. 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	35.00	84	16.33
99	33.83	83	15.17
98	32.67	82	14.00
97	31.50	81	12.83
96	30.33	80	11.67
95	29.17	79	10.50
94	28.00	78	9.33
93	26.83	77	8.17
92	25.67	76	7.00
91	24.50	75	5.83
90	23.33	74	4.67
89	22.17	73	3.50
88	21.00	72	2.33
87	19.83	71	1.17
86	18.67	70	0.00
85	17.50		

**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 Technical Proposals are non-responsive or the Department elects to proceed with the Best and Final Offer process, the Department will recommend to the State Transportation Board that the Design-Build Team having the lowest adjusted price be awarded the contract. The cost of the Design-Build contract will be the amount received as the Price Proposal.

The following table shows an example of the calculations involved in this process.

### An Example of Calculating Quality Adjusted Price Ranking

Proposal	Technical Score	Quality Credit (%)	Price Proposal (\$)	Quality Value (\$)	Adjusted Price (\$)
A	95	16.67	3,000,000	500,100	2,499,900
B	90	13.33	2,900,000	386,570	2,513,430
C *	90	13.33	2,800,000	373,240	2,426,760
D	80	6.67	2,700,000	180,090	2,519,910
E	70	0.00	2,600,000	0	2,600,000
* Successful Design-Build Team - Contract Cost \$2,800,000					

### Opening of Price Proposals

Prior to opening the Price Proposals, the State Contract Officer will provide to each Design-Build Team their Technical Score in a sealed envelope. The sealed envelope will only contain that Design-Build Team's Technical Score.

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 Proposals, Technical Scores and Adjusted Prices 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 not to 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 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 the Technical Proposal details to adhere to the RFP modifications. 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 consensus Technical 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 **\$795,000.00** 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 contract award 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 Technical Proposal or Price Proposal submittal date current at the time of the suspension, no stipulated fee will be paid.

**ROADWAY SCOPE OF WORK** (7-6-23)

Throughout this RFP, references to the Preliminary Roadway Plans shall denote the I-2513B Preliminary Design Plans dated April 2023.

Throughout this RFP, references to the mainline and -L- Line shall denote I-26.

**Project Details**

- The Design-Build Team shall design and construct a six-lane divided freeway from the I-2513AC tie point located at approximately Station 10+00 -LB1-, south of US 19-23 Bus. (Haywood Road) to north of NC 251 / SR 1781 (Broadway Street). Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall design and construct the mainline, including all ramps and loops, providing the same or better access, widening, improvements and traffic measures of effectiveness, in the Department's sole discretion, included in the Preliminary Roadway Plans provided by the Department. The mainline, including all ramps and loops, construction limits 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 60 mph design speed for a rolling urban freeway designed to interstate standards. The mainline shall be designed and constructed in accordance with the 2018 AASHTO *A Policy on Geometric Design of Highways and Streets*, Table 3-10 ( $e_{\max} = 8\%$ ). The Design-Build Team shall provide all other design criteria in the Technical Proposal.
- The Design-Build Team shall design and construct the mainline and I-240 (-240\_Rev2-) shoulders as follows:
  - Unless noted otherwise elsewhere in this RFP, design and construct minimum 14-foot outside shoulders (twelve-foot useable shoulder width plus two feet), twelve-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).
  - Unless noted otherwise elsewhere in this RFP, design and construct minimum 12-foot median shoulders, twelve-foot of which shall be full depth paved shoulders.
  - Along the mainline, from approximately Station 10+00 -LB1- to Station 51+00 -LB-, as shown on the Preliminary Plans provided by the Department, the Design-Build Team shall design and construct a minimum 35-foot median with twelve-foot full depth median paved shoulders and two lines of single faced barrier. The area between the single-faced barriers shall serve as a future median planter.
  - Adjacent to retaining walls along I-240 (-240\_Rev2-) design and construct minimum 12-foot full depth paved outside shoulders.
- The Design-Build Team shall coordinate with Projects I-2513AC, A-0010AA, HL-0003, and EB-5822 design and construction to ensure accurate hydrology, capacity, and horizontal and vertical ties that adhere to the design criteria. The Design-Build Team shall not make any



design or construction revisions that impact the design or construction of Projects I-2513AC, A-0010AA, HL-0003, and EB-5822 without prior written approval from the Design-Build Unit. The aforementioned prior written approval shall occur 1) through the ATC Process prior to Award or 2) through coordination and / or submittals to the Design-Build Unit after Award. (Reference the *Alternative Technical Concepts and Confidential Questions and Cooperation Between Contractors* Project Special Provisions found elsewhere in this RFP)

- 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 3-27, *Design Widths of the Traveled Way for Turning Roadways* and Table 3-28, *Design Width Modifications for Edge Conditions of the Traveled Way for Turning Roadways*, shown in the 2018 AASHTO *A Policy on Geometric Design of Highways and Streets* - Case II / Condition C for one-lane loops; Case III / Condition C for two-lane loops. All loops shall have 12-foot outside shoulders, four-foot of which shall be full depth paved shoulders. All loops shall have 2'-6" curb and gutter along the inside edge of pavement, with a 14-foot berm. The minimum loop design shall be 30 mph with a minimum 230-foot radius.
- Unless noted otherwise elsewhere in this RFP, the maximum allowable cut and fill slopes shall be 2:1. (Reference the Geotechnical Engineering Scope of Work found elsewhere in this RFP) The slopes in the interchange area shall follow the requirements set forth in the *Roadway Design Guidelines for Design-Build Projects* located on the Design-Build website.
- Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall design and construct -Y- Lines, service roads, multi-use paths / greenways, and cul-de-sacs / turn-arounds providing the same or better access, widening, improvements and traffic measures of effectiveness, in the Department's sole discretion, -Y- Line and service road construction shall be of sufficient length to tie to existing based upon the current NCDOT guidelines and standards.
- Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall design and construct at-grade intersections with the lane configurations noted in the January 5, 2023, I-2513 *Traffic Operations Technical Report* 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 Recommended Treatment for Turn Lanes. These lengths shall be determined by adding 1) the storage length defined in the aforementioned Memorandum or Section 8.7.2.2 of the NCDOT *Roadway Design Manual*, if not provided in the aforementioned Memorandum, and 2) the desirable deceleration length, as defined in the NCDOT *Roadway Design Manual* Figure 8-10.

- Right turn lanes / tapers shall be provided in accordance with the NCDOT Right Turn Lane Warrants, as defined in the NCDOT *Roadway Design Manual* (Reference Section 8.7, Figure 8-8).
- Taper only right turn lanes shall be a minimum of 230-foot, 265-foot, and 300-foot for design speeds of 40 mph, 50 mph, and 60 mph respectively.
- There shall be no right turns with a yield sign at any interstate ramp or loop.
- For all interchange / intersection design modifications, the Design-Build Team shall provide a traffic analysis that adheres to the March 25, 2022, NCDOT *Congestion Management Capacity Analysis Guidelines* for the Department's review and acceptance.
- The Design-Build Team shall design and construct all -Y- Lines such that the through movement is not required to change lanes throughout the project limits.
- Unless noted otherwise elsewhere in this RFP, all roundabouts shall adhere to the design and operation parameters as detailed in NCHRP Report 672: *Roundabouts: An Informational Guide* - Second Edition. Prior to incorporating any roundabout not shown on the Preliminary Roadway Plans provided by the Department or any roundabout not required herein, the Design-Build Team shall provide a traffic analysis of the proposed roundabout(s), utilizing the I-2513 *Traffic Forecast Report* - 2045 Future Year - Build traffic volumes and SIDRA Intersection 8.1 or higher analysis software, for NCDOT review and acceptance. In addition to the requirements noted above all roundabouts shall adhere to the following:
  - The Design-Build Team shall design and construct all roundabouts to accommodate a WB-62FL design vehicle without the cab of the truck traversing over the center truck apron or the trailer traversing over the exterior 2'-6" curb and gutter.
  - The Department prefers a maximum 25 mph roundabout entry speed. Thus, justification, in the Department's sole discretion, shall be provided for all entry speeds that exceed 25 mph. The Design-Build Team shall perform a fastest path performance check and provide the results to the Department for review and acceptance.
  - The Department prefers that all roadway grades approaching a roundabout are 4.0% or less. Thus, justification, in the Department's sole discretion, shall be provided for all roadway approach grades that are steeper than 4.0%.
  - Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall design and construct all single-lane circular roundabouts with a minimum Inscribed Circle Diameter (ICD) of 130 feet.
  - The Design-Build Team shall design and construct the single-lane circular roundabout at the intersection of -Y25A-REV2- and -Y32A\_REV2- with a minimum Inscribed Circle Diameter (ICD) of 120 feet.

- The Design-Build Team shall design all roundabouts with an angle of intersection not less than 75 degrees for each leg.
- The Design-Build Team shall design and construct chicanes along the approach roadway when the approach roadway design speed is greater than 50 mph. The Design-Build Team will not be required to provide chicanes between roundabouts located at adjacent ramp terminals.
- The Design-Build Team shall design and construct splitter islands along the approach roadway when the approach roadway design speed is 50 mph or less. At a minimum, the splitter islands shall be 100 feet in length and extend beyond the end of the exit curve.
- The Design-Build Team shall design and construct all chicanes and splitters islands with a minimum six-foot width.
- The Design-Build Team shall design and construct five-inch keyed-in monolithic concrete islands for all roundabout approach / departure channelization islands, including the chicane and splitter islands.
- The roundabout center island shall be capped with four inches of concrete. All roundabout approach / departure channelization islands shall be designed and constructed with concrete. The Design-Build Team shall incorporate a red dye into the aforementioned center island and channelization island concrete prior to finishing and stamp the concrete with a brick pattern. The Design-Build Team shall submit the red dye and brick pattern to the Engineer for review and approval prior to constructing the islands. If the circulating roadway is constructed with concrete, then the center island truck apron shall also be constructed with red dye concrete and stamped with a brick pattern.
- When roundabouts are constructed at adjacent ramp terminals, the Design-Build Team shall design and construct a continuous minimum 16-foot wide concrete median island, with nine-inch offsets to each adjacent travel lane, between the roundabouts. The aforementioned median island shall be a five-inch keyed-in monolithic concrete island.
- Along the outside edge of the roundabout pavement, the Design-Build Team shall design and construct 2'-6" curb and gutter, with a minimum ten-foot berm. At a minimum, the 2'-6" curb and gutter shall extend along all approach / departing roadways to the approach / departing curve radius point.
- The Design-Build Team shall design and construct minimum 16-foot travel lanes inside the roundabout.
- The Design-Build Team shall design and construct 1'-6" mountable curb and gutter between the roundabout lane and the concrete truck apron. The slope of the 1'-6" curb and gutter shall match the travel lane pavement slope. The Design-Build Team shall

design and construct 9" x 18" concrete curb between the truck apron and the center island.

- 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 five-inch keyed-in concrete monolithic channelization islands, regardless of the island dimensions. (Reference Roadway Standard Drawing No. 852.01)
- The Design-Build Team shall design and construct minimum four-foot wide five-inch keyed-in concrete monolithic channelization islands, with nine-inch offsets to the adjacent lanes, that delineate and separate all dual left turn lanes from the opposing through lanes.
- In accordance with the NCDOT Right of Way Manual, the Design-Build Team shall develop Service Road Studies for all land-locked parcels and / or as required by variations to the Department's design. If the aforementioned Service Road Studies indicate that service roads are required that are not shown on the Preliminary Roadway Plans provided by the Department, the design and construction costs of the additional service roads shall be as follows:
  - If the Design-Build Team demonstrates, to the Department's sole satisfaction, that the additional service road(s) are required for the Department's preliminary design, the service road(s) design and construction, including all associated NEPA requirements, will be paid for as extra work in accordance with Subarticle 104-8-(A) of the NCDOT *Standard Specifications for Roads and Structures*.
  - If variations to the Department's proposed design and / or construction methods require additional service road(s), the service road(s) design and construction, as well as all associated NEPA requirements, shall be included in the Design-Build Team's lump sum bid for the entire project.
  - The Design-Build Team shall not eliminate any service roads shown on the Preliminary Roadway Plans provided by the Department without the Department's written approval. The aforementioned written approval shall occur 1) through the ATC Process prior to Award or 2) through coordination and / or submittals to the Design-Build Unit after Award. (Reference the *Alternative Technical Concepts and Confidential Questions* Project Special Provision found elsewhere in this RFP).
- The Design-Build Team shall design and construct all service roads in accordance with the following requirements:
  - Adhere to a minimum 50 mph design speed and the 2018 AASHTO *A Policy on Geometric Design of Highways and Streets*, Table 3-8 ( $e_{\max} = 4\%$ ).
  - Travel lane widths shall be the greater of 1) 11 feet, 2) the width required for the functional classification and design year traffic, 3) the width shown in the MicroStation .dsn file provided by the Department, or 4) the existing width.

- Paved shoulder widths shall be the greater of 1) five feet, 2) the width required for the functional classification and design year traffic, 3) the width shown in the MicroStation .dsn file provided by the Department, or 4) the existing width.
- Total shoulder widths (turf and paved) shall be the greater of 1) the width required for the functional classification and design year traffic, 2) the paved shoulder width plus two feet, or 3) the existing width.
- At a minimum, the limits of constructions shall encompass the “Proposed Roadway” limits shown on the Preliminary Roadway Plans provided by the Department, and all gaps between the Department’s Preliminary Roadway Plans and the I-2513AC Project construction limits.
- The Design-Build Team shall provide cul-de-sacs / turn-arounds on all roads that are dead-ended. All cul-de-sacs shall be designed and constructed with a minimum 30-foot radius.
- The mainline and I-240 crown point shall be located on the outside edge of the median lane such that the median lane in each direction of travel slopes towards the median and the remaining lanes slope towards the outside. The mainline median lane normal crown cross slope shall be 1) 0.02 or 2) the slope that achieves a 0.04 roll-over between the median lane and the existing adjacent travel lane cross slope, whichever is flatter.
- The Design-Build Team shall bring to the Design-Build Unit’s attention any deviations from the proposed control of access and / or right of way shown on the Preliminary Roadway Plans provided by the Department. The proposed control of access and / or right of way limits may deviate in proximity to cemeteries, cultural, historic, or otherwise protected landmarks, to eliminate / minimize impacts. Prior to negotiating right of way, easements and / or control of access with property owners, the Department shall accept the Right of Way Plans developed by the Design-Build Team.
- Throughout the project limits, the Design-Build Team shall remove and dispose of all existing control of access fence and install new control of access fence. Prior to installation, the Design-Build Team shall coordinate with, and obtain approval from, the NCDOT for the control of access fence placement. Prior to Final Project Acceptance, all control of access fence throughout the project limits shall be in good condition, requiring the Design-Build Team to replace any newly installed control of access fence damaged during construction, and / or install any missing control of access fence.
  - Except as required otherwise below, the Design-Build Team shall install woven wire fence with wooden posts, without barbed wire.
  - The Design-Build Team shall install black vinyl coated chain link control of access fence as required elsewhere in this RFP.

- The Design-Build Team shall install a black metal control of access fence adjacent to the limits of the Riverside Cemetery property in coordination with the City of Asheville Parks and Recreation, SHPO, and the Engineer.
- The Design-Build Team shall install an 8-foot black vinyl chain link fence with slats separating the West Asheville Greenway from the Aycock School property in coordination with the City of Asheville Schools, and the Engineer.
- The Design-Build Team shall replace all control of access fence damaged during construction.
- The Design-Build Team shall install all missing control of access fence.
- Except as required elsewhere in this RFP and / or to eliminate a design exception, the Design-Build Team shall not further impact any cultural, historical or otherwise protected landmark or topographic feature beyond that shown on the Preliminary Roadway Plans provided by the Department. Unless approved otherwise by the Department, in writing, the Design-Build Team shall not acquire right of way, easements and / or control of access from a parcel with the aforementioned features unless shown on the Preliminary Roadway Plans provided by the Department.
- The Design-Build Team shall design and construct all retaining walls a minimum of ten feet inside the right of way.
- In accordance with the NCDOT Roadway Standard Drawings, the Design-Build Team shall provide milled rumble strips along the mainline outside and median paved shoulders, including ramp and loop terminals, and acceleration, deceleration and auxiliary lanes.
- For all bridges over roadways, 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 the Department. 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.
- Throughout construction areas that consist solely of pavement marking obliterations / revisions, the Design-Build Team shall provide a uniform overlay or design and construct a resurfacing grade. Excluding construction areas that consist solely of pavement marking obliterations / revisions that are uniformly overlaid, the Design-Build Team shall design and construct resurfacing grades for all roadways impacted by construction. All uniform overlays and resurfacing grades shall 1) completely cover the entire pavement surface (travel lanes and paved shoulders) and 2) be extended on a one-way roadway of a divided facility, as required, to provide the same limits for both directions of travel.

All resurfacing grades shall adhere to the design criteria and standards, provide all required pavement wedging and adhere to the minimum requirements noted below. For purposes of determining the required resurfacing limits only, the term “construction” below will not apply to construction areas that consist solely of pavement marking obliterations / revisions. (Reference the Pavement Management Scope of Work found elsewhere in this RFP)

- The Design-Build Team shall resurface all lanes and shoulders of an undivided facility throughout the limits of proposed widening and construction.
- Unless noted otherwise elsewhere in this RFP, for both divided and undivided facilities, the Design-Build Team shall resurface all lanes and shoulders within the outermost construction limits of all proposed widening and construction, including **all** gaps along the facility where construction activities are not required.
- Excluding the modifications required herein, 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 Preliminary Roadway Plans provided by the Department. The Design-Build Team shall be responsible for all activities, as deemed necessary by the Department, or the FHWA, resulting from changes to the NCDOT preliminary design, including but not limited to, public involvement, NEPA re-evaluation and / or coordination with other stakeholders. The Department will 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, including but not limited to changes to RFC Plans.

The proposed design revisions noted above shall be subject to the Department’s review and acceptance.

- Excluding locations where horizontal curvature reduces the mainline stopping sight distance along the median paved shoulder, design exceptions will not be allowed for 1) the mainline, including all ramps and loops, or 2) service road vertical alignments over drainage pipes. The Department prefers not to have design exceptions for the -Y- Lines and other service road design parameters. If the Design-Build Team anticipates any allowable design exceptions, the Design-Build Team shall identify the design exception details, including but not limited to the associated justification, in the Technical Proposal. Prior to requesting / incorporating a

design exception into the Preliminary Plans developed by the Design-Build Team, the Design-Build Team shall inform the Design-Build Unit, in writing, and 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. A design exception will only be approved if the design exception request demonstrates, in the Department's sole discretion, that a design exception is warranted and that it cannot be reasonably and / or feasibly eliminated.

- Prior to recording the Right of Way Plans, the Design-Build Team shall locate and install iron pins and caps with fiberglass right of way markers that delineate the proposed right of way for all parcels within the project limits.

For all parcels, the Design-Build Team shall locate and install metal caps with fiberglass markers that delineate all proposed permanent easements within the project limits.

The Design-Build Team shall replace all existing right of way and permanent easement markers / monuments damaged and / or relocated during construction.

In accordance with NCDOT Policy, the Department will furnish the metal caps with fiberglass markers.

- The Department will provide an accepted I-2513 Traffic Noise Report (TNR) that is based on the Department's preliminary design. The Design-Build Team shall evaluate the I-2513B & D project and develop a Design Noise Report (DNR) based on the plans developed by the Design-Build Team, regardless of changes to the Department's preliminary design. The Design-Build Team shall complete TNM model validation, including but not limited to the collection of additional noise measurement data, regardless of what was included in the TNR. Unless noted otherwise in this RFP, the DNR shall be developed in accordance with the NCDOT 2021 Traffic Noise Policy and the NCDOT 2022 Traffic Noise Manual; and be reviewed and accepted by NCDOT. The DNR developed by the Design-Build Team must achieve a noise reduction design goal of at least 7dB(A) for as many impacted receptors as possible, while meeting all other feasibility and reasonableness criteria. If a 7 dB(A) noise reduction cannot be achieved for at least one impacted receptor, the sound barrier wall will not be considered reasonable. Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall include all design and construction costs for all sound barrier walls required by the accepted DNR, including but not limited to all costs associated with performing any additional geotechnical investigations necessary to design the foundations, any additional utility coordination / construction, and any supplemental surveys, in the lump sum price bid for the entire project. However, the Design-Build Team will not be required to include any designs associated with the proposed sound barrier walls in the Technical Proposal. Prequalification under Discipline Code 441 shall be required for the firm developing the DNR.

The Design-Build Team is cautioned that the TNR is provided to show the general location of potential walls. Thus, as with all information provided by the Department, the TNR is provided for informational purposes only; and the Department will not honor any requests for



additional contract time or compensation for any variations between the accepted TNR and the accepted DNR.

The Department will ballot all benefited receptors to determine which sound barrier walls recommended in the accepted DNR will be constructed. The Design-Build Team shall (1) develop and provide the information required by the Department to complete the balloting process, and (2) attend and / or speak at all balloting meetings and workshops. The Department will require four months to complete the balloting process. The Department will not honor any requests for additional contract time or compensation for the sound barrier wall construction unless the aforementioned four-month timeframe is exceeded. If time were granted, it would only be for that time exceeding the four-month period, which shall begin on the date the Department accepts the DNR developed by the Design-Build Team. The Design-Build Team shall not construct any sound barrier walls until the balloting process has been completed by the Department.

In accordance with Subarticle 104-8(A) of the 2018 *Standard Specifications for Roads and Structures*, if the accepted DNR and balloting process require more than 65,500 square feet of sound barrier wall on the shoulder, more than 111,700 square feet of sound barrier wall off the shoulder and / or more than 13,700 square feet of sound barrier wall on a bridge, the amount over 65,500 square feet, over 111,700 square feet and / or over 13,700 square feet will be paid for as extra work at the unit prices noted below:

- Sound barrier walls constructed on the shoulder - \$60.00 per square foot
- Sound barrier walls constructed off the shoulder - \$55.00 per square foot
- Sound barrier walls constructed on a bridge - \$60.00 per square foot
- All work tasks required to design and construct the additional sound barrier walls, including but not limited to traffic control, pavement, drainage, concrete barrier, geotechnical investigation, utility coordination / construction, supplemental surveys, and earthwork shall be considered inclusive in the aforementioned unit prices.

The amount of square footage to be paid for as extra work shall be determined by deducting all additional sound barrier wall square footage required as a result of horizontal and / or vertical alignment changes to the Preliminary Roadway Plans provided by the Department from the accepted DNR and balloting process sound barrier wall total square footage.

The Design-Build Team shall only credit the Department the construction cost of all sound barrier walls eliminated by the balloting process. The construction costs of all sound barrier walls eliminated solely by the balloting process shall be deducted from the lump sum amount bid for the entire project at the aforementioned unit prices.

Excluding sound barrier walls constructed in roadway cut / fill transition sections, proposed sound barrier walls constructed 1) off the shoulder in fill sections or 2) on the shoulder in cut sections shall be reviewed and approved by the Department, in writing, prior to incorporation into the DNR and Preliminary Plans developed by the Design-Build Team.

The Design-Build Team shall provide absorptive-faced sound barrier walls. at the following locations:

Where a sound barrier wall is located on the opposite side of the highway from impacted noise sensitive receptors that are not receiving a sound barrier wall and the receptors are located within ten times the proposed sound barrier wall height.

Where the parallel barrier analysis (PBA), including PBAs for a single wall configuration with a minimum six-foot high retaining wall on the opposite side of the highway, shows that the noise reduction degradation results in noise levels and / or insertion loss values cause the sound barrier wall to not be feasible and reasonable.

Where the PBA, including PBAs for a single wall configuration with a minimum six-foot high retaining wall on the opposite side of the highway, results in impacted receptors no longer being benefited.

At all sound barrier walls, the Design-Build Team shall provide 1) a four-foot berm between the wall and fill / cut slopes steeper than 6:1 and 2) a four-foot berm between the wall and a parallel concrete ditch at locations where the final grade slopes toward the wall.

The Design-Build Team shall design and construct all sound barrier walls a minimum of ten feet inside the right of way.

For all sound barrier walls, the Design-Build Team shall design and construct maintenance access points, as necessary and / or as directed by the Engineer.

To satisfy the FHWA's Abatement Measure Reporting requirements, the Design-Build Team shall prepare and concurrently submit a summary of the sound barrier walls to be constructed on the project with the final sound barrier wall working drawings submittal. The Design-Build Team shall submit the sound barrier wall summary directly to the NCDOT Traffic Noise and Air Quality Group and include the information noted in Title 23 Code of Federal Regulations Part 772 Section 772.13(f), including but not limited to overall cost and unit cost per square foot.

## General

- Unless noted otherwise elsewhere in this RFP, the design shall be in accordance with the 2018 AASHTO *A Policy on Geometric Design of Highways and Streets*, and 2019 Errata, NCDOT *Roadway Design Manual*, including all revisions effective on the Technical Proposal submittal date, January 2018 NCDOT *Roadway Standard Drawings*, or as superseded by detail sheets located at <https://connect.ncdot.gov/resources/Specifications/Pages/2018-Roadway-Standard-Drawings.aspx>, *Roadway Design Policy and Procedure Manual*, *Roadway Design Guidelines for Design-Build Projects*, 2018 NCDOT *Standard Specifications for Roads and Structures*, the Highway Capacity Manual, 6<sup>th</sup> Edition, and the 2011 AASHTO *Roadside Design Guide*, 4<sup>th</sup> Edition and 2015 Errata.
- If the NCDOT *Roadway Design Manual*, including all revisions, the 2018 AASHTO *A Policy on Geometric Design of Highways and Streets* and 2019 Errata, the 2018 NCDOT *Roadway Standard Drawings* and / or any other guidelines, standards or policies have desirable and / or minimum values, the Design-Build Team shall use the desirable values unless noted otherwise elsewhere in this RFP. Similarly, in case of conflicting design parameters, and / or ranges, in the various resources, the proposed design shall adhere to the most conservative values, unless noted otherwise elsewhere in this RFP.
- The Design-Build Team shall provide a Drainage Summary Sheet, Earthwork Summary Sheet, Guardrail Summary Sheet, (permanent and temporary) and Pavement Removal Summary Sheet in the Final Roadway Plans and RFC Roadway Plans.
- At all intersections, the Design-Build Team shall not exceed a 0.05 roll-over between the outside edge of travel lane of the primary roadway and the beginning of the proposed grade for the secondary roadway. For signalized intersections, the aforementioned roll-over shall be minimized to the maximum extent practicable.
- Unless noted otherwise elsewhere in this RFP, all bridge rail offsets shall be the greater of 1) the bridge rail offset as indicated in the NCDOT *Roadway Design Manual*, 2) the approach roadway paved shoulder width, or 3) the offset required to achieve stopping sight distance (maximum 12-foot). 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. Where retaining walls are located along the I-26 and I-240 outside shoulders approaching a bridge, the minimum outside bridge rail offset for bridges shall be 12 feet.
- Outside the project limits, the Design-Build Team will not be allowed to use the NCDOT right of way and / or property for borrow or waste sites. Within the project limits, the Design-Build Team shall adhere to the following:
  - Only clean waste material may be wasted within the NCDOT right of way or property.

- Excluding crushed concrete, debris shall not be buried within the NCDOT right of way or property.
- Normal grading operations shall occur, including but not limited to, grading to drain all existing embankments supporting removed roadway sections.
- Unless noted otherwise elsewhere in this RFP, all guardrail / guiderail placement shall be in accordance with the 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. Excluding construction areas that consist solely of pavement marking obliterations / revisions, the Design-Build Team shall upgrade all existing guardrail in the construction limits in accordance with the aforementioned requirements and the requirements noted below, regardless if the Design-Build Team's design and / or construction impacts the guardrail.
  - All guardrail shall be weathering steel beam guardrail. (Reference the *WEATHERING STEEL BEAM GUARDRAIL* Project Special Provision found elsewhere in this RFP)
  - For existing guardrail that extends 100 feet or less outside the construction limits, the Design-Build Team shall replace all the existing guardrail.
  - For existing guardrail that extends more than 100 feet outside the construction limits, the Design-Build Team shall tie the proposed guardrail to the existing guardrail outside the construction limits.
  - In areas that solely consist of resurfacing and guardrail replacement, the Design-Build Team will not be required to widen the existing shoulders. (Reference the Pavement Management Scope of Work found elsewhere in this RFP)

The guardrail / guiderail design shall be submitted for review with the Preliminary Roadway Plans submittal.

- The total outside shoulder width for all facilities with defined usable shoulders shall equal the usable shoulder plus two feet.
- The Design-Build Team shall provide continuous single face concrete barrier between two segments of single face concrete barrier when 1) the two segments are less than 300 feet apart, and 2) guardrail would be required between the two segments.
- At all locations where back-to-back single face concrete barrier is provided, including but not limited to bridge piers and sign supports, the Design-Build Team shall fill the area between the single face concrete barriers with gravel and cap with four inches of concrete when the area is ten feet wide or less.

- 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.
- 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 2018 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.
- The NCDOT shall review and accept the Design-Build Team's Design Criteria prior to the Preliminary Roadway Plans submittal.
- The Design-Build Team will not be required to submit separate Structure Recommendations as required by the Design-Build Submittal Guidelines. Instead, in accordance with NCDOT *Roadway Design Manual* Sections 5.3.1.1, 5.3.1.2, and 5.3.1.3, the Design-Build Team shall submit the roadway design information required to develop the Structure General Drawings with the Preliminary Roadway Plans submittal.
- Within the vehicle recovery area, the Design-Build Team shall design and construct single face concrete barrier in front of the traffic face of all shoulder piers, sound barrier walls, retaining walls, and all elements acting as a retaining wall. The Design-Build Team shall design and construct a concrete barrier with moment slab along the top of retaining walls. The aforementioned concrete barriers shall be located 1) beyond the typical section shoulder point and / or 2) a minimum of 12-foot behind the face of curb and gutter, requiring the Design-Build Team to widen the outside shoulder / berm beyond the typical section width. Between the single face concrete barrier and all shoulder piers, sound barrier walls, retaining walls, and all elements acting as a retaining wall, the Design-Build Team shall install minimum one-inch thick joint material. (Reference Section 1028-1 of the 2018 *Standard Specifications for Roads and Structures*)
- The Design-Build Team shall design and construct all depressed grass medians and raised medians in accordance with the following:
  - The minimum width of all depressed grass medians shall be eight feet. At all locations where a depressed grass median becomes narrower than eight feet, the Design-Build Team shall design and construct a five-inch keyed-in concrete monolithic island in lieu of the depressed grass median.
  - The Design-Build Team shall install a four-inch concrete cap on all raised medians that are eight feet wide or narrower, measured face to face from the surrounding mountable concrete curb and gutter.

- All grass covered raised medians shall be designed and constructed with topsoil and appropriate cross slope and median drain with pipe to prevent groundwater and surface water infiltration into the subgrade and / or pavement structure. Prior to construction of the grass covered raised median and / or median drain with pipe, the Design-Build Team shall submit to the Design-Build Unit, for review and acceptance, the proposed number of drains, drain locations within the typical section, topsoil specifications and construction details. Within all proposed grass covered raised median limits, the Design-Build Team shall completely remove and dispose of the existing pavement structure.
- Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall design and construct all lane drops from the outside travel way.
- A sag vertical curve low point will not be allowed on any proposed bridge or approach slab.
- At all -Y- Line / -Y- Line intersection radius points, including service roads, the minimum -Y- Line pavement width shall be 30 feet.
- Excluding grades required to tie to existing, the minimum longitudinal grade shall be 0.30%, unless noted otherwise elsewhere in this RFP. Along -Y- Lines with turf shoulders, a 0.00% grade will be allowed, provided all hydraulic requirements are met. (Reference the Hydraulics Scope of Work found elsewhere in this RFP).
- 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-62FL at all ramp / loop intersections with -Y- Lines, and all intersections on US and NC routes (For side-by-side turning maneuvers, WB-62FL for the outside movement only and SU-30 for inside movement)
  - WB-62 at all other intersections (For side-by-side turning maneuvers, WB-62 for the outside movement only and SU-30 for inside movement)
  - At all intersections, with existing / proposed pedestrian facilities, impacted by the Design-Build Team's design and / or construction methods, the Design-Build Team shall retrofit / upgrade all existing substandard curb ramps to current standards.
- Any variations in the Department's proposed design and / or construction methods that nullify any decisions reached between the Department and the environmental agencies; and / or require additional coordination with the environmental agencies shall be the sole responsibility of the Design-Build Team. The Department will not allow any contract time extensions or additional compensation associated with any coordination or approval process resulting from design and / or construction modifications. (Reference the Environmental Permits Scope of Work found elsewhere in this RFP)

- Excluding parcels restricted by Control of Access and all undeveloped parcels, the Design-Build Team shall design and construct a minimum of one driveway per parcel. The Design-Build Team shall design and construct all driveways to adhere to the NCDOT *Policy on Street and Driveway Access to North Carolina Highways* and the minimum requirements noted below. Excluding the maximum grade requirements, 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 tie to existing beyond the clear zone or the right of way limits of the connecting  
-Y- Line or service road.
  - Unless shown on the Preliminary Roadway Plans provided by the Department, driveways shall not be installed in roundabouts, right turn lanes, including their taper, or within the limits of splitter islands and chicanes.
  - Excluding grades required to tie to existing, the maximum driveway grade shall be 10.0%.
  - For commercial driveway entrances that generate more than 500 ADT, design and construct a paved driveway turnout in accordance with NCDOT Roadway Standard Drawing No. 848.04. Commercial driveway entrances shall be designed and constructed to accommodate the predominant design vehicle used at the commercial facility.
  - Unless noted otherwise elsewhere in this RPF, the minimum driveway turnout along shoulder facilities shall be 16'-0" and 24'-0" for residential and commercial properties, respectively, or the existing width, whichever is greater.
  - Unless noted otherwise elsewhere in this RPF, the minimum driveway turnout along curb and gutter facilities shall be 20'-0" and 28'-0" for residential and commercial properties, 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. Expressway gutter shall not be installed in fill

sections. Expressway gutter shall only be used to minimize impacts to 1) existing structures; 2) cemeteries; and / or 3) cultural, historical or otherwise protected landmarks.

- Excluding locations to minimize impacts to existing 1) natural gas regulator stations; 2) sanitary sewer lift / pump stations; 3) structures; 4) cemeteries; and / or 5) cultural, historical or otherwise protected landmarks, the front slope of all roadway ditches, including special drainage cut ditches, shall be in accordance with the front slopes for the facility classification shown in the NCDOT *Roadway Design Manual*, Section 4.4.6, Figure 4-4. The Design-Build Team shall design and construct all ditches adjacent to I-26 and I-240, including all ramps and loops, in accordance with the desirable Ditch Type “A” as shown in the NCDOT *Roadway Design Manual* Section 4.4.6, Figure 4-4. Excluding locations where the aforementioned desirable Ditch Type “A” shall be required, the Design-Build Team will be allowed to use the minimum ditch widths for the facility classification.
- At all locations with paved shoulders that extend beyond the typical width (e.g. to the face of single face barrier, 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)
- The minimum berm width along 2’-6” curb and gutter sections shall be ten feet.
- Shoulder berm gutter shall be installed in all fill sections with both guardrail and fill slopes steeper than 4:1, including but not limited to areas of guardrail replacement. Shoulder berm gutter shall not be installed in cut sections.
- Cut and fill slope transitions shall not exceed one increment (e.g. 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 a copy of the I-2513 Record of Decision, the latest list of environmental commitments, 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. All supplemental surveys shall adhere to the Location and Survey Unit’s September 28, 2018 *Proc 2018-4 - L&S*



*Implementation of SharePoint Site Guidelines and Proc 2018-6 - L&S Required PEF Attestations for Individually Developed Survey Products* Memorandums. 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 I-2513 Public Meeting Preferred Alternative Map, the I-2513 Preliminary Design Plans dated March 2023, and design files for each. The Design-Build Team is cautioned that the preliminary designs shown on the aforementioned Map, electronic design files, and plans 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 final pavement designs for I-2513B & D. 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 I-2513B & D. 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)

**AESTHETIC DESIGN SCOPE OF WORK** (7-3-23)**General**

The aesthetic design and construction of the project shall include aesthetic treatments to roadway, bridge and other elements in a cost and maintenance conscious manner.

The SECTIONS B AND D Aesthetic Vertical Betterment Recommendation and Funding Request to Asheville City Council SUBMITTED BY THE I-26 CONNECTOR AESTHETICS COMMITTEE DECEMBER 19, 2022 (Aesthetics Guide), portrays the general theme for the I-26 Connector. An aesthetics committee of community representatives was created to assist in developing themes that are appropriate for the context in which the I-26 Connector is located. The style and detailing of the aesthetic theme was inspired by the historic architecture and existing vistas found in the Asheville area. Special hardscape concepts have been developed for various features of the I-26 Connector. The purpose of the design of these features is to lend a look and feel to the roadway corridor that is reminiscent of the Region's architectural context. The Aesthetics Guide graphically depicts the appearance of the design. The means and methods of construction is not a part of the Aesthetics Guide.

The Design-Build Team shall utilize the Aesthetics Guide provided to develop the designs, plans and details necessary for aesthetic treatments of the bridges, roadway, and other elements as outlined herein. The Aesthetics Guide contains Aesthetics Guidelines only; however, they shall serve as the basis for retaining aesthetic treatment uniformity throughout the I-26 Connector. The Design-Build Team shall adapt the aesthetic treatments, materials, or construction techniques while preserving the general theme portrayed in the Aesthetics Guide. The structural member dimensions included in the Aesthetics Guide have not been engineered and shall be modified to suit the design. Dimensions for details such as grooves and indentations may be modified slightly but not to an extent that lessens their visual effect on the travelling public. The Design-Build Team is encouraged to consider aspect ratios in the modification of any dimension shown in the Aesthetics Guide.

The Design-Build Team is cautioned that the Aesthetics Guide does not contain engineered drawings. It is the responsibility of the Design-Build Team to ensure that the aesthetic details incorporated into the plans meet the requirements of the Contract Documents.

Consistent application of the design motif throughout all bridge abutments and bents, overhead sign structures, ITS components and other roadway elements is essential to the success of the design.

The Design-Build Team shall provide conceptual drawing and renderings in the Technical Proposal. The Proposer shall also address the attributes of their approach to aesthetics in their Oral Presentation with the Technical Review Committee.

## Bridge Aesthetics

Bridges shall have the historic architecture and existing vistas theme applied to locations visible to motorists and in accordance with the Aesthetics Guide. Bridge walls shall have base courses of a stacked stone texture. No aesthetic treatment is required for portions of the bridges concealed by barrier rail.

Bridge barrier rails shall meet all applicable AASHTO and NCDOT standards. Metal rail on parapets will be permissible to meet pedestrian and bicycle height requirements. If metal rail is utilized, it shall be treated to blend with the regional architectural theme.

## Sound and Retaining Walls

Sound walls shall be detailed and constructed to provide for an attractive and fluid elevation along the top of the wall. Sound and retaining walls shall have an appearance of a stacked stone, the layout of the colors and coursing shall all be as indicated in the Aesthetics Guide. (Reference the *Architectural Concrete Surface Treatment* Project Special Provision found elsewhere in this RFP)

## Preliminary Design

After contract award, the Design-Build Team shall clearly present, with appropriate visual aids, the design intent, their aesthetic theme, general plan, and preliminary details for each design element. The Design-Build Team shall allow 30 days for review of the aesthetic details.

## 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, etc.).

The Design-Build Team shall develop and submit for review any specifications, material requirements or construction processes needed to accomplish the aesthetic work along with the final design submittal for each element.

## Mandatory Aesthetic Treatments

The Design-Build Team shall include the following aesthetic treatments, as a minimum, in their plans and their lump sum price bid for the entire project.

**\*\*NOTE\*\*** Relocated bullet requiring yield conditions at interstate ramps and loops to the Roadway Scope of Work found elsewhere in this RFP

- Bowen Bridge:
  - Outer rail shall be anodized steel (paint colors to be determined) with double top and single bottom horizontal rails with vertical intermediary members separated by regularly spaced concrete pilasters.

- Inwardly facing inset LED lighting shall be incorporated into the railing system to provide additional pedestrian lighting.
  - Pedestrian surfaces shall be stamped and stained concrete while bike paths shall be distinguished from pedestrian paths by color (color and pattern to be provided).
  - A bi-directional, striped bike path, separate from the MUP shall be installed on the eastbound bridge span.
  - Both bridge spans shall be anchored on each end by a larger pilaster or monument, each with a prominent, lighted feature (to be provided).
- Haywood Road Bridge and Interchange:
  - An aesthetically enhanced pedestrian safety railing shall be installed above the bridge parapet.
  - Prominent signature concrete pillars shall be placed at each corner of the bridge, mounted on the bridge abutments (to be provided). Additionally smaller pillars shall be erected on the bridge parapet as shown on the bridge rendering.
  - Six decorative Falcon Ridge bridge lights with dual lanterns on a standard fluted metal pole shall be installed for pedestrian safety, three on each side of the bridge.
  - The bridge shall have stamped and stained concrete sidewalks (color and pattern to be provided).
  - There shall be smooth concrete spaces for six medallions, stained on sidewalks containing artistic designs, interspersed between the longer sections of stamped concrete (three on each side). These can be installed by the city later through an encroachment agreement with NCDOT and do not require a city commitment at this time.
  - Medians shall be heavily landscaped or stamped and stained concrete if landscaping is not possible (color and pattern to be provided).
  - The retaining wall approaching the bridge from both directions shall be tiered.
  - The pedestrian movements along Haywood Road shall include Rest in Walk signals.
- Hill Street
  - Safety railing with an arched theme shall be installed to reflect Asheville's mountain environment
  - Pedestrian lighting shall be provided using Falcon Ridge dual mast-arm lighting mounted on every other pilaster, staggered on opposite sides of the bridge roadway.
- I-240 Pedestrian Bridges
  - The pedestrian bridges shall have a truss-style.
  - The pedestrian bridges shall have weathering steel pedestrian safety railing.
  - Inward-facing LED security lighting shall be installed on the two pedestrian bridges attached to the horizontal cross-members of the truss railing at regular intervals.
- Patton Avenue East of Bowen Bridge:
  - Streetlights shall be Mitchell Top Hat style with black poles to match streetlights along Haywood Street and other areas of the downtown.
  - Traffic light poles shall be fluted and federal green to match traffic light poles along Haywood Street and other areas of the downtown.
  - Street trees with tree grates shall be installed according to city standards.
  - Where medians, etc., that are not landscaped, the concrete shall be stamped and stained (color and pattern to be provided).

- Patton Avenue West of Bowen Bridge:
  - A covered bus shelter (designed by a local artist) shall be provided on each side of the street.
  - Medians, etc. that cannot be planted shall have stamped and stained concrete matching the stamped and stained concrete currently existing between Florida Avenue and New Leicester Highway.
- Greenways (West Asheville, Smith Mill Creek):
  - That all greenways shall be lighted as recommended by the city's Greenway Committee.
  - All poles shall be placed 110 feet apart.
  - Greenways within Section B shall be lighted with Monticello style fixtures.
  - Dark green (34092) light poles along I-26 within Section B, consistent with City Council's acceptance of the AC's recommendation for this aesthetic treatment for Section A.
  - Identifying signage shall be placed at all greenway entrances. This would be done after construction is complete.
- Riverside Drive:
  - Large Sanibel style lights with angled brackets shall be placed along the MUP at 110-foot intervals to match those in the River Arts District.

### **Voluntary Aesthetic Treatments**

The Design-Build Team may elect to include other Voluntary Aesthetic Treatments in their Technical Proposal and / or design, such as the following, that will increase the quality of the visual appearance.

- Minimize the overall project footprint
- Minimize the height and footprint of structures
- Minimize Right of Way acquisitions
- Grade cut and fill slopes with naturally shaped contours and transitions
- Where possible guardrail should terminate into berms
- In compliance with Asheville's Dark Sky initiative overhead signage should be reflective and not artificially lighted
- Noise reducing materials should be used wherever possible
- Other such features included in the Aesthetics Guide but not specifically mentioned as Mandatory Aesthetic Treatments
- Where possible use permeable and textures surfaces for areas with minimal traffic
- Utilize linear filtration system design such as bioswales and stepped retention basins where possible
- Utilize media filters / bioslopes where possible, maintaining their surface as needed for maximum percolation
- Utilize filtration systems designed for first flush of stormwater to protect the French Broad River water quality
- Utilize unpaved rather than paved spreaders

- Reduce the use of grass stabilization when possible. Grading should be designed with the intention of a heavily wooded and swaled slope  
\*\*NOTE\*\* Deleted bullet regarding the utilization of hydrodynamic separators to protect the French Broad River from Stormwater

### **Materials, Construction, and Fabrication**

The Design-Build Team shall demonstrate the long-term durability of any color application (staining, anodizing, painting, etc.) on any feature proposed. Provide a minimum of three test panels, produced in different batches, of each product to demonstrate the consistency of color.

Proposers shall demonstrate in their aesthetic details how joints will be eliminated or otherwise masked from affecting the overall appearance and continuity of the walls, piers, pylons and arches.

Three full size mockup panels will be required for each type of colored concrete / stone element on the project. At their own risk, the Design-Build Team may elect to use production elements as the test panels.

Precast members may be used for structural supports or to hide structural members. Hollow sections may be used if the Design-Build Team can demonstrate to the Engineer's satisfaction that adequate access for maintenance and inspection is also provided.

**ENVIRONMENTAL PERMITS SCOPE OF WORK** (6-27-23)**General**

The Department is in the process of obtaining a phased US Army Corps of Engineers (USACE) Section 404 Individual Permit and Section 10 Permit and the NC Department of Environmental Quality Division of Water Resources (NCDWR) Section 401 Water Quality Certification for this project. The Design-Build Team shall prepare all designs and documents necessary for the Department to obtain the environmental permits for the project construction. Individual permit modification application(s) for Sections B & D shall be required for the US Army Corps of Engineers (USACE) Section 404 Permit and Section 10 Permit, the NC Department of Environmental Quality (DEQ) Division of Water Resources (NCDWR) Section 401 Water Quality Certification, herein referred to as the “environmental permits”.

Immediately after award the Department will arrange a meeting between USFWS and the selected Design-Build Team to provide and opportunity for USFWS to convey their concern about potential effects to protected species.

Excluding investigative borings covered under a Nationwide Permit No. 6, the Design-Build Team shall not begin ground-disturbing activities, including utility relocations, in jurisdictional areas until the environmental permits have been issued.

In accordance with the following, the Design-Build Team may perform geotechnical investigative borings covered under a Nationwide Permit No. 6:

- The Design-Build Team shall coordinate with the Design-Build Unit to determine if a Preconstruction Notification (PCN) is required for the Nationwide Permit No. 6.
- If a PCN is required, the Design-Build Team shall submit all necessary documents and forms to the Design-Build Unit for submittal to the appropriate agencies; and shall not perform any geotechnical investigative work within the jurisdictional resource(s) requiring a PCN prior to obtaining the required approval.
- If a PCN is not required, the Design-Build Team may proceed with geotechnical investigations inside and outside jurisdictional resources, provided all of the Nationwide Permit No. 6 General Conditions are followed.

The Design-Build Team may begin construction activities prior to obtaining the aforementioned environmental permits provided that (1) the Department has reviewed and accepted the appropriate design submittal(s); (2) the Department is notified in writing and provides written approval prior to beginning work; and (3) the Environmental Analysis Unit (EAU) and / or the Division’s Environmental Officer (DEO) concur that such activities are outside jurisdictional resources. The Design-Build Team is encouraged to advance as many construction activities as possible outside jurisdictional resources prior to issuance of the environmental permits. The Design-Build Team shall indicate the specific construction activities that will occur outside jurisdictional resources prior to obtaining the environmental permits and their anticipated start date in the Technical Proposal.

The Department will not allow any 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 Environmental Analysis Unit (EAU) - Environmental Coordination and Permitting Group (ECAP) or the Division's Environmental Officer (DEO) present. A representative from the Design-Build Unit shall be included on all correspondence.

The I-2513 Project is in the Merger Process used by the environmental agencies and the Department to obtain environmental permits. 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 in the *Section 404 / NEPA Merger Process Information* document on the website noted below:

**<https://connect.ncdot.gov/resources/Environmental/EPU/Merger/Pages/default.aspx>**

Unless stipulated otherwise in the Technical Proposal, the Department will schedule the interagency hydraulic design review meeting and the interagency permit impacts meeting for June 2024 and September 2024, respectively. The Design-Build Team shall clearly identify in the Technical Proposal what months they would like the Department to schedule these meetings. Failure on the part of the Design-Build Team to meet the dates shown in the Technical Proposal shall place all responsibility for delays resulting from missing these dates solely in the hands of the Design-Build Team.

Any variations in the Department's proposed design and / or construction methods that nullify any decisions reached between the Department and the environmental agencies; and / or require additional coordination with the environmental agencies shall be the sole responsibility of the Design-Build Team. The Department will not allow any contract time extensions or compensation associated with this additional coordination.

Unless 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.



**Permit Application Process and Timeframe for all Permits except the Nationwide Permit No. 6 for Geotechnical Investigations**

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 the 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 permit impact sheets (drawings) depicting the design and construction details to the Department as part of the permit application. The aforementioned permit impact sheets shall be reviewed and accepted by the Department prior to the permit application submittal. 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
- Completed forms (PCN, Section 404 ENG 4345, etc.) appropriate for impacts
- NCDOT Mitigation Site debit ledger and / or Division of Mitigation Acceptance Letter
- Minutes from the interagency hydraulic design review meeting and the interagency permit impacts meeting
- Stormwater Management Plan
- Permit drawings with and without contours, and, if necessary, utility drawings with and without contours.
- Wetland Permit Impact Summary Sheets and Buffer Impact Summary Sheets
- Half-size plans
- Mitigation Plan (if required by the Design-Build Team's design and / or construction methods)

The Department will re-verify and update, as needed, the required environmental data that expires prior to permit issuance. 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.

Excluding the Nationwide Permit No. 6 for geotechnical investigations, the Design-Build Team shall submit one permit application for the entire project. The Design-Build Team shall not submit multiple applications to develop a "staged permitting" process to expedite construction activities in a phased fashion.

Any temporary construction measures, including de-watering, construction access, etc. shall be addressed in the permit application. Impacts that result from so-called temporary measures may not be judged to be temporary impacts by the environmental agencies. These issues shall be addressed by the Design-Build Team and reviewed by EAU prior to the interagency hydraulic design review meeting and the interagency permit impacts meeting; and resolved with the environmental agencies during the aforementioned meetings.

The Design-Build Team shall clearly indicate the location and impacts of haul roads and utility relocations in jurisdictional areas. The Design-Build Team shall also identify all proposed borrow and waste sites. Further, the Design-Build Team shall describe the construction methods for all structures that impact jurisdictional resources. The temporary impact descriptions (haul roads, utility relocations, work bridges, etc.) shall include restoration plans, schedules and disposal plans. The aforementioned information, descriptions and details shall be presented during the interagency hydraulic design review meeting and the interagency permit impacts meeting and be included in the permit application.

The NCDOT hereby commits to ensuring, to the greatest extent practicable, that the footprint of the impacts in areas under the jurisdiction of the Federal Clean Water Act will not be increased during the Design-Build effort. In accordance with the Department of Water Resources' NCG 010000, all fill material shall be stabilized and maintained to prevent sediment from entering adjacent waters or wetlands. The Design-Build Team shall be responsible for ensuring that the design and construction of the project will not impair the movement of aquatic life.

Permit modification requests are strongly discouraged and shall only be allowed if the Engineer determines it to be in the best interest of the Department. The Design-Build Team shall not take an iterative approach to hydraulic design issues. Prior to submitting the permit application, the hydraulic design shall be complete and accepted by the Department.

Direct coordination between the Design-Build Team, the Design-Build Unit, Resident Engineer, DEO, Hydraulics Unit, and EAU shall be necessary to ensure proper permit application development. Upon completion of the draft permit application, the Design-Build Team shall concurrently forward the permit application to the Design-Build Unit, Resident Engineer, DEO, Hydraulics Unit and EAU for review and approval. After all revisions are complete, the Department will subsequently forward the "complete" permit application to the appropriate environmental agencies.

The Design-Build Team should expect it to take up to seven months to accurately and adequately complete all designs necessary for the permit application and develop the permit application. The Design-Build Team shall assume the environmental agencies will take up to 120 days to review the complete permit application and issue the permits and certifications. No requests for additional contract time or compensation will be allowed if the environmental agencies issue the permits and certifications within this 120-day period. The Department will only consider requests for contract time extensions for the environmental agencies' review if the 120-day period has been exceeded. If time were granted, it would be only for that time exceeding the 120-day period. The 120-day period is considered to begin on the date the Department submits a fully complete and 100% accurate permit application to the environmental agencies; and does not include the time required for commitment reconciliation or obtaining signatures after the permits and certifications are received from the environmental agencies.

### **Mitigation Responsibilities of the Design-Build Team**

As required by the NEPA Process and the USACE / EPA Section 404(b)(1) Guidelines, to offset potential wetland and stream impacts, the Department has reviewed the roadway project corridor for potential on-site mitigation opportunities. Since no on-site mitigation opportunities were identified, the Department will acquire compensatory mitigation for unavoidable impacts to wetlands, streams and riparian buffers due to the I-2513B and D project construction from the NC Division of Mitigation Services. The amount of mitigation acquired will be based on impacts, identified in the I-2513 Record of Decision.

Any changes proposed by the Design-Build Team to any design or construction details provided by the Department shall be approved by the Department prior to being submitted to the environmental agencies for their approval.

Should additional jurisdictional impacts result from design revisions that are not required elsewhere in this RFP and / or construction methods, suitable compensatory mitigation for wetlands, streams and / or riparian buffers 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. 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 all additional mitigation from the NC Division of Mitigation Services or an approved compensatory mitigation banking source.

The Design-Build Team shall analyze all new areas to be impacted that have not been analyzed during the NEPA Process, including but not limited to borrow sites, waste sites, haul roads and 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 NCDOT prequalified environmental consultant to conduct a full environmental investigation to include, but not be limited to, Federally Listed Threatened and Endangered Species, wetlands, streams, riparian buffers, avoidance and minimization in jurisdictional areas, compensatory mitigation, FEMA compliance, CAMA consideration, and historical, archaeological, and cultural resource surveys in these areas. The environmental consultant shall obtain concurrence, through EAU, from the U. S. 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 and fulfill all other requirements that the environmental agencies impose to obtain the permit. Any contract time extensions resulting from additional environmental assessments required by the Design-Build Team's design and / or construction methods impacting areas outside those previously analyzed through the NEPA Process shall be solely at the Department's discretion.

## **Commitments**

The NCDOT is committed to incorporating all reasonable and practicable design features to avoid and minimize wetland, stream and riparian buffer impacts; and to provide full compensatory mitigation of all remaining wetland, stream and riparian buffer impacts. Avoidance measures were taken during the planning and NEPA processes; and minimization measures were incorporated as part of the preliminary design provided by the Department. The Design-Build Team shall incorporate these avoidance and minimization features, plus any minimization identified during the interagency hydraulic design review meeting and the interagency permit impacts meeting, into the design and / or construction methods at no additional cost or contract time extension.

All work by the Design-Build Team must be accomplished in strict compliance with the plans submitted with the permit application and in compliance with all conditions of the permits and certifications issued by the environmental agencies. The Design-Build Team shall provide each of its contractors and / or agents associated with the construction or maintenance of this project with a copy of the permits and certifications.

Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall strictly adhere to these commitments, as well as others, including but not limited to, those included in the I-2513 Record of Decision, all permits, Biological Opinion, all interagency meetings, and all site visits.

## **Cultural Resources**

Based on the Department's preliminary design, FHWA, NCDOT and SHPO signed a Memorandum of Agreement under Section 106 of the National Historic Preservation Act for this Undertaking. (Reference the January 2021 I-2513 Memorandum of Agreement and the Historic Architectural Resources Survey Update Report dated March 2015 provided by the Department) If the Design-Build Team's design or construction activities 1) impact any property that has been determined eligible for the National Register of Historic Places (NRHP) beyond the impacts shown in the Department's Preliminary Roadway Plans, or 2) go outside the limits of the APEs, consultation with NCDOT, North Carolina State Historic Preservation Office (NC-HPO), and FHWA , as appropriate, must occur prior to any construction activities occurring in that area. If the consultation requires additional NRHP evaluation / surveys and / or Section 106 mitigation, the Design-Build Team shall engage the services of a NCDOT prequalified historic architecture and / or archaeology consultant to conduct further historic architecture and / or archaeology evaluation / surveys and / or determine potential mitigation. The Design-Build Team shall be responsible for all costs associated with the additional impacts, including but not limited to any additional design effort, additional construction, historic architecture and / or archaeology evaluations / surveys, coordination with NCDOT, NC-HPO and FHWA, and any required commitments and / or mitigation. The Department will not honor any requests for additional contract time or compensation for any efforts required for the aforementioned activities, including but not limited to public involvement, additional design effort, required evaluations / surveys, required commitments / mitigation, additional construction effort, and / or additional environmental agency coordination and approvals.

If the Design-Build Team discovers any undocumented historic or archaeological resources while conducting the authorized work, they shall immediately suspend activities in that area and notify, in writing, the Design-Build Unit, NCDOT Historic Architecture Team Leader, the NCDOT Archaeology Team Leader and the NCDOT Division Project Development Engineer, listed below. Upon receipt of notification, the Department will perform an initial assessment and initiate any required State / Federal coordination. Should the initial resource assessment and agency coordination completed by NCDOT determine that additional NRHP evaluation and / or Section 106 mitigation is necessary, the Design-Build Team shall engage the services of a NCDOT prequalified historic architecture and / or archaeology consultant to conduct further historic architecture and / or archaeology evaluation and / or mitigation.

The 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 Mary Pope Furr, NCDOT Historic Architecture Team Leader at (919) 707-6068, Matthew Wilkerson, NCDOT Archaeology Team Leader at (919) 707-6089, or Hon Yeung, PE, NCDOT Division 2 Project Development Engineer at (252) 439-2827.

**EROSION AND SEDIMENTATION CONTROL SCOPE OF WORK** (4-17-23)

The NCDOT Roadside Environmental Unit will review and accept all Erosion and Sedimentation Control Plans. Clearing & Grubbing and Final Grade Release for Construction (RFC) Erosion Control Plans shall be submitted, accepted and distributed 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 NCDOT *Erosion and Sediment Control Design and Construction Manual* and the NCDEQ - *Erosion and Sediment Control Planning and Design Manual* for erosion control design guidelines not addressed in this Scope of Work.

In addition to the NCDOT reviews required in this Scope of Work, the USFWS will review all Erosion and Sedimentation Control Plans beginning with 100% plans and including but not limited to all plan revisions. The Design-Build Team shall allow 15 working days for the USFWS to review the Erosion and Sedimentation Control Plans.

To ensure adherence with the NCG-010000 General Construction Permit, issued by the North Carolina Department of Environmental Quality, Division of Water Resources, the Design-Build Team shall formally submit a project-wide Vegetation Management Procedure for the Department's review and acceptance prior to any land disturbing activities. After this initial review, the Design-Build Team shall concurrently provide the Resident Engineer and Roadside Environmental Field Operations Engineer updated versions of the Vegetation Management Procedure on a monthly basis. These updated versions will not require formal submittal to the Design-Build Unit, but will be subject to review comments by the aforementioned field personnel. All versions of the Vegetation Management Procedure shall include, but not be limited to, 1) provisions for the early establishment of grasses / vegetation, 2) provisions for obtaining the required 80% permanent vegetation stand, as defined in the NCG-010000 General Construction Permit and in accordance with the *Permanent Vegetation Establishment* Project Special Provision found elsewhere in this RFP, by the project final completion date, and 3) procedure and schedule details for fertilizer topdressing, supplemental seeding, mowing and repair seeding. The Vegetation Management Procedure shall be closely coordinated with the grading and hauling operations.

From the beginning through the end of construction, the Design-Build Team shall maintain comprehensive "red-line" As-Constructed Drawings that detail when and where permanent / temporary / repair seeding and fertilizer topdressing have been performed.

Erosion and Sedimentation Control Plans shall at a minimum address the following:

## **I. Complete Set of Plans**

### **A. Clearing and Grubbing Phase**

1. Use correct NCDOT symbology.
2. Protect existing drainage structure inlets with Rock Inlet Sediment Trap Type 'A' (RIST-A), Rock Inlet Sediment Trap Type 'C' (RIST-C), Rock Pipe Inlet Sediment Trap Type 'A' (PIST-A), etc.
3. Utilize adequate perimeter controls (temporary silt ditches (TSD)), temporary silt fence (TSF), etc.).
4. Clean Water Diversions (CWD) shall not be used to divert offsite runoff through the project construction limits.
5. All jurisdictional streams within the project limits shall be identified as 'Environmentally Sensitive Areas' on the Clearing and Grubbing Plans.
6. 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.
7. Take into account topography and show existing contour lines on Clearing & Grubbing Plans only.
8. Utilize Temporary Rock Silt Checks Type 'B' (TRSC-B) or wattles to reduce velocity in existing ditches with spacing of 250 feet divided by percentage of ditch grade. Also utilize TRSC-Bs in proposed TSDs and temporary diversions (TD).
9. Protect existing streams; do not place erosion control devices in live streams unless permitted by the Division of Water Resources 401 Certification and the Army Corps of Engineers 404 Permit.
10. Sediment basins shall be sized to provide adequate silt storage for 3,600 cubic feet per disturbed acre 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 (NCDEQ - *Erosion and Sediment Control Planning and Design Manual* or NOAA's National Weather Service website <https://hdsc.nws.noaa.gov/hdsc/pfds/> for partial duration (ARI) time series type). A Sediment Basin Designer Spreadsheet will be provided by the NCDOT Roadside Environmental Unit upon request.
11. Skimmer Basins shall be sized to provide adequate silt storage for 1,800 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 (NCDEQ - *Erosion and Sediment Control Planning and Design Manual* or NOAA's National Weather Service website <https://hdsc.nws.noaa.gov/hdsc/pfds/> for partial duration (ARI) time series type). Skimmer Basins shall be designed to dewater in two to three days. A Skimmer Basin Designer Spreadsheet will be provided by the NCDOT Roadside Environmental Unit upon request.

12. Design Riser Basins to the following standards:

- Surface Area shall be determined by Equation A (sq. feet) =  $Q25 \text{ (cfs)} * 435$ .
  - Volume requirement shall be 1,800 cubic feet per disturbed acre draining to the riser basin.
  - Riser Pipe shall have a cross-sectional area 1.5 times that of the barrel pipe.
  - The riser pipe shall be non-perforated with a skimmer attached to the bottom of the pipe, one foot from the bottom of the basin.
  - See NCDEQ - *Erosion and Sediment Control Planning and Design Manual* for additional design criteria.
13. The minimum and maximum length to width ratio of all Sediment Basins shall be 2:1 and 6:1, respectively.
14. 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.
15. 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, in jurisdictional streams shall require a construction sequence. Prior to installation of pipes smaller than 48 inches in jurisdictional streams, 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*.
16. During construction, provide temporary sediment basins that dewater from the surface at all permanent stormwater devices.
17. In accordance with the NCDOT *Erosion and Sediment Control Design and Construction Manual*, utilize Excelsior / Coir Fiber Wattles with Polyacrylamide (PAM) and / or TRSC-As with Matting and PAM in temporary and permanent, existing and proposed ditches in areas where sediment basins are not feasible at drainage outlets, and in areas where sediment basins at drainage outlets with sediment traps (i.e. PIST-A, RIST-A, etc.) cannot be properly sized to surface area and / or sediment storage requirements due to safety concerns, right of way restrictions, utility conflicts, or other construction limitations approved by the NCDOT Roadside Environmental Unit.
18. Place devices utilizing PAM at all sediment basin inlets.
19. At a maximum spacing of 200 feet, at all sag points and as directed, utilize Special Sediment Control Fence or Coir Fiber Wattles as drainage breaks in silt fence.
20. Do not place erosion control devices that require excavation (e.g. sediment basins, silt ditches, etc.) in wetlands unless permitted by the Division of Water Resources 401 Certification and the Army Corps of Engineers 404 Permit.
21. Within the entire project limits, provide disturbed and undisturbed drainage area delineations in MicroStation Format.



22. 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.
23. Excluding Sediment Basins that will function only during Clearing and Grubbing operations, all perimeter Sediment Basins shall be placed outside of fill slopes.

#### B. Final Grade Phase

1. Use correct NCDOT symbology.
2. Protect existing and proposed drainage structure inlets with RIST-A, RIST-C, PIST-A, etc.
3. Utilize adequate perimeter controls (TSD, TSF, etc.).
4. Clean Water Diversions (CWD) shall not be used to divert offsite runoff through the project construction limits.
5. Utilize TRSC-Bs or wattles to reduce velocity in existing and proposed ditches with spacing of 250 feet divided by percentage of ditch grade. Also utilize TRSC-Bs in proposed TSDs and TDs.
6. Utilize temporary slope drains and earth berms at top of fill slopes five feet or higher and a fill slope steeper than 4:1, or where there are superelevations above 0.04 and fills are greater than three feet. Maximum slope drain spacing shall be 200 feet.
7. Utilize a rock energy dissipater at the outlet of all slope drains.
8. Devices at all drainage turnouts shall utilize skimmer or sediment control stone (TRSD-B, TRSC-A, etc.) and a spillway with an adequately designed base length to distribute outflow.
9. Sediment basins shall be sized to provide adequate silt storage for 3,600 cubic feet per disturbed acre 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 (NCDEQ - *Erosion and Sediment Control Planning and Design Manual* or NOAA's National Weather Service website <https://hdsc.nws.noaa.gov/hdsc/pfds/> for partial duration (ARI) time series type). A Sediment Basin Designer Spreadsheet will be provided by NCDOT Roadside Environmental Unit upon request.
10. Skimmer Basins shall be sized to provide adequate silt storage for 1,800 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 (NCDEQ - *Erosion and Sediment Control Planning and Design Manual* or NOAA's National Weather Service website <https://hdsc.nws.noaa.gov/hdsc/pfds/> for partial duration (ARI) time series type). Skimmer Basins shall be designed to dewater in two to three days. A Skimmer Basin Designer Spreadsheet will be provided by the NCDOT Roadside Environmental Unit upon request.
11. Design Riser Basins to the following standards:
  - Surface Area shall be determined by Equation A (sq. feet) = Q25 (cfs) \* 435.
  - Volume requirement shall be 1,800 cubic feet per disturbed acre draining to the riser basin.
  - Riser Pipe shall have a cross-sectional area 1.5 times that of the barrel pipe.

- The riser pipe shall be non-perforated with a skimmer attached to the bottom of the pipe, one foot from the bottom of the basin.
  - See NCDEQ - *Erosion and Sediment Control Planning and Design Manual* for additional design criteria.
12. In accordance with the requirements below, install erosion control in all ditch lines, including but not limited to temporary ditch lines (TDs) utilized to divert offsite runoff around construction areas:
- Install straw matting in all ditch lines where the velocity is greater than 2.0 feet / sec, and the shear stress is 1.25 psf or less.
  - Install excelsior matting in all ditch lines with a shear stress above 1.25 psf, but not greater than 2.55 psf.
  - Excluding locations where rip rap is not allowed (e.g. clear recovery zone, etc.), install Permanent Soil Reinforcement Mat or rip rap in all ditch lines with a sheer stress greater than 2.55 psf.
  - At locations where rip rap is not allowed, install Permanent Soil Reinforcement Mat in all ditch lines with a sheer stress greater than 2.55 psf.
13. Unless otherwise approved by the Roadside Environmental Field Operations Engineer, provide matting for erosion control on all slopes (cut and fill) that are steeper than 4:1 and a height of eight feet or greater.
14. Install matting for erosion control on all disturbed slopes adjacent to jurisdictional areas regardless of height and slope. Rolled erosion control products used within wetlands or riparian areas shall be non-poly mesh nettings.
15. Along all slopes (cut and fill) that are 30 feet or higher, place parallel rows of minimum nine-inch Excelsior Wattles at a spacing height of 20 feet.
16. The minimum and maximum length to width ratio of all Sediment Basins shall be 2:1 and 6:1, respectively.
17. 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.
18. During construction, provide temporary sediment basins that dewater from the surface at all permanent stormwater devices.
19. In accordance with the NCDOT *Erosion and Sediment Control Design and Construction Manual* Utilize Excelsior / Coir Fiber Wattles with Polyacrylamide (PAM) and / or TRSC-As with matting and PAM in temporary and permanent, existing and proposed ditches in areas where sediment basins are not feasible at drainage outlets, and in areas where sediment basins at drainage outlets with sediment traps (i.e. PIST-A, RIST-A, etc.) cannot be properly sized to surface area and / or sediment storage requirements due to safety concerns, right of way restrictions, utility

- conflicts, or other construction limitations approved by the NCDOT Roadside Environmental Unit.
20. Place devices utilizing PAM at all sediment basin inlets.
  21. At a maximum spacing of 200 feet, at all sag points, and as directed, Utilize Special Sediment Control Fence or Coir Fiber Wattles as drainage breaks in silt fence.
  22. Do not place erosion control devices that require excavation (i.e. sediment basins, silt ditches, etc.) in wetlands unless permitted by the Division of Water Resources 401 Certification and the Army Corps of Engineers 404 Permit.
  23. Within the entire project limits, provide disturbed and undisturbed drainage area delineations in MicroStation Format.
  24. 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.
  25. All perimeter Sediment Basins shall be placed outside of fill slopes.

### C. Intermediate Phase

Intermediate Erosion Control Plans shall 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, including but not limited to all detours where construction stormwater is not captured in the Erosion Control Plans. Intermediate Erosion Control Plans shall be submitted for review and shall be accepted prior to construction of any aspect impacted by the revised erosion control design. For any intermediate phase, comply with Section B, "Final Grade Phase" above.

## II. Detail Sheets and Notes

- A. Provide project specific special notes and details, including but not limited to, skimmer basin, coir fiber wattle with Polyacrylamide (PAM), etc.
- B. Provide matting summary sheet(s): matting for erosion control (straw and excelsior), permanent soil reinforcement mat, and coir fiber mat.
- C. Provide reforestation sheet(s): regular, wetland, streambank and / or buffer showing appropriate species.

## III. Title Sheet

- A. Show correct notes: NCG-01, HQW, ESA, clearing and grubbing, etc.
- B. Show correct standards for project
- C. List of standard NCDOT symbology
- D. Show name and certification number of Level III certified individual responsible for designing and / or reviewing Erosion and Sedimentation Control Plans

## IV. Special Provisions

- A. Erosion Control Special Provisions are available at the following website:

**<https://connect.ncdot.gov/resources/roadside/Pages/Soil-Water.aspx>**

- B. References in Erosion Control Special Provisions from the aforementioned website to Method of Measurement, Basis of Payment, or any other statement regarding direct payment for Erosion & Sediment Control measures shall be disregarded.
- C. *Erosion & Sediment Control / Stormwater Certification* Project Special Provision found elsewhere in this RFP.

## V. Miscellaneous

- A. Plan submittals shall include all pertinent design information required for review, such as design calculations, drainage areas, etc.
- B. The NCDOT Roadside Environmental Unit will provide a sample set of Erosion and Sedimentation Control Plans (including any special details or special provisions used by the NCDOT Roadside Environmental Unit) and MicroStation Erosion Control Workspace to the Design-Build Team for reference upon request.
- C. The Erosion and Sedimentation Control Plans shall address any environmental issues raised during the permitting process.
- D. The Design-Build Team shall allow sufficient time in the proposed schedule to address any comments to the Erosion and Sedimentation Control Plans, as deemed necessary by the NCDOT Roadside Environmental Unit.
- E. Temporary access and haul roads, other than public roads, constructed or used in connection with the project shall be considered a part of the project and addressed in the Erosion and Sedimentation Control Plans. Temporary access and haul roads located within the footprint and / or the right of way / easement corridor of the project shall be part of the highway Erosion and Sedimentation Control Plans. Temporary access and haul roads associated with borrow pits and staging areas shall be included in the Reclamation Plan.
- F. At a minimum, the Design-Build Team shall install Floating Turbidity Curtains at ponds, lakes, and other standing water bodies, both jurisdictional and non-jurisdictional, where 1) construction activities create surface fill impacts or 2) sufficient erosion and sediment control devices cannot be installed to contain sediment and / or turbidity impacts.
- G. To contain concrete waste water and associated concrete mix from washing out ready-mix trucks, drums, pumps, or other equipment, provide Concrete Washout Structures at egress points. Concrete Washout Structures must collect and retain all concrete waste water and solids so that this material does not migrate to surface waters or into the ground water. The Concrete Washout Structures are not intended for concrete waste not associated with washout operations. The Concrete Washout Structures may include devices above or below ground and / or commercially available devices designed specifically to capture concrete waste water. Concrete Washout Structure options may be found in the special provision, available at the website noted in Section IV above. For construction details of an above grade and below grade Concrete Washout Structure, reference the website noted below:

**[https://connect.ncdot.gov/resources/roadside/SoilWaterDocuments/  
ConcreteWashoutStructuredetail.pdf](https://connect.ncdot.gov/resources/roadside/SoilWaterDocuments/ConcreteWashoutStructuredetail.pdf)**

- H. Borrow or waste areas that are part of the project shall require a separate Reclamation Plan, unless the borrow or waste activity is regulated under the *Mining Act of 1971*, or is a landfill regulated by the NCDEQ - Division of Waste Management (DWM). For newly created borrow pit(s) that require dewatering, Borrow Pit(s) Dewatering Basins shall be required

and shall be in accordance with the applicable special provisions available at the website noted in Section IV above. The Design-Build Team shall submit the location and permit number for waste / borrow sites covered by the aforementioned Mining Act or regulated by the NCDEQ - DWM concurrently to the Design-Build Unit and the Resident Engineer. For Reclamation Procedures, see:

**<https://connect.ncdot.gov/resources/roadside/FieldOperationsDocuments/ContractedReclamationProcedures.pdf>**

- I. 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 to maintain environmental compliance. In accordance with Division One, found elsewhere in this RFP, all additional efforts to maintain environmental compliance shall be considered maintenance of the project and shall not be considered additional work.
- J. An accepted Erosion and Sedimentation Control Plan shall not exempt the Design-Build Team from making every effort to contain sediment onsite. As directed by the Engineer, sediment losses shall be recovered and associated damages repaired. In accordance with Division One, found elsewhere in this RFP, the work necessary to recover and repair areas affected by sediment losses shall be considered maintenance of the project and shall not be considered additional work.
- K. Any Erosion Control Design revisions made during construction of the project shall be submitted to the NCDOT Roadside Environmental Unit, via the Design Build Unit, for review and acceptance. 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.
- L. The Design-Build Team shall comply with the North Carolina Administrative Code *Title 15A Environmental Quality* Chapter 4, Sedimentation Control.
- M. A pre-submittal meeting shall take place between the NCDOT Roadside Environmental Unit Soil & Water Engineering Section, the Design-Build Team, and any other pertinent NCDOT personnel before any Erosion and Sedimentation Control Designs are submitted to the NCDOT Roadside Environmental Unit. Erosion and Sedimentation Control Plan submittals shall only be reviewed and accepted by the NCDOT Roadside Environmental Unit after the Erosion and Sedimentation Control Pre-Submittal Meeting. The Design-Build Team shall be required to submit a tentative Erosion and Sedimentation Control Plan submittal schedule at the pre-submittal meeting.
- N. At a minimum, the Design-Build Team shall bring one erosion control plan sheet with a clearing and grubbing erosion control design to the Erosion and Sedimentation Control Pre-Submittal Meeting.
- O. 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.
- P. 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 throughout the entire project limits. 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, 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, the Resident Engineer, as appropriate. 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. The Department will determine when the project conditions no longer warrant inspections by the erosion and sedimentation control designer.

Q. 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

R. Erosion & Sediment Control / Stormwater Certification shall be required according to the Project Special Provision found elsewhere in this RFP.

S. Prior to installation of any erosion control devices, the Design-Build Team shall verify boundaries of jurisdictional areas and ESA areas in the field, and delineate with Safety Fence or flagging. For guidance on Safety Fence and flagging in jurisdictional areas, see:

**<https://connect.ncdot.gov/resources/roadside/Pages/Field-Operations-Documents.aspx>**

T. 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, via the Design-Build 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 in the field by the Engineer for the entire project.

- U. 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)
- V. 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 and have less than one acre of total drainage area, surface dewatering outlets or stone outlets may be provided.
- W. In accordance with the requirements noted herein, the Design-Build Team shall be responsible for erosion control design, erosion control plans, erosion control plan implementation and maintenance of erosion control measures for all utility installation and relocation work performed by the Design-Build Team. To ensure that the Design-Build Team's erosion control designs, erosion control plan implementation and / or maintenance of erosion control measures do not conflict with the erosion control design, erosion control plan implementation and / or maintenance of erosion control measures for utility installation and / or relocation work performed by others, the Design-Build Team shall coordinate with the utility companies performing Utilities by Others (UBO) work.
- X. Structural controls installed to manage construction materials stored or used on site shall be shown on the Erosion and Sedimentation Control Plans in compliance with Section F, Materials Management of the NCG-010000 General Construction Permit.
- Y. The Design-Build Team shall conduct monthly litter pick-up and disposal of construction and non-construction waste within the project limits and as directed by the Engineer. Disposal of these waste materials shall be in accordance with local and state regulations.

On the pickup date, the Design-Build Team shall report the number of bags of litter and all recycling collected on the following NCDOT Litter Management website:

**<https://apps.ncdot.gov/LM>**

An access code ('Pickup Key') for the online reporting portal may be obtained via emailing the Roadside Environmental Unit Litter Management Section at **[ncdot.clr@ncdot.gov](mailto:ncdot.clr@ncdot.gov)**. Prior to starting initial litter collection operations, the Design-Build Team shall request access to the litter removal reporting website and obtain an access code.

**Z. Ground Cover Stabilization Requirements - NCG010000 (7 - 14 Days)**

Ground cover stabilization shall comply with the timeframe guidelines specified by the North Carolina Department of Environmental Quality, Division of Water Resources NCG-010000 General Construction Permit. 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 the NCG-010000 General Construction Permit.

#### AA. Additional Ground Cover Stabilization Requirements

Once the Design-Build Team identifies the area for stabilization due to inactivity, the Design-Build Team shall obtain concurrence from the Engineer and adhere to the following options based on the estimated amount of time the area will remain inactive. If the area stabilized exceeds the estimated timeframe, the Design-Build Team shall implement the next level of stabilization as directed by the Engineer.

All application rates noted below are in pounds per acre.

##### **Short Term Stabilization - For areas that will remain inactive for up to 21 days**

Erodible areas shall be stabilized utilizing non-vegetative cover. Non-vegetative cover options include straw mulch, hydraulic applied erosion control products or rolled erosion control products. If straw mulch is used, it shall provide 100% groundcover and be tacked sufficiently to hold the mulch in place for the duration of the inactive period. All other methods shall be installed according to the manufacturer's directions.

##### **Mid-Term Stabilization -For areas that will remain inactive for up to 90 days**

Erodible areas shall be stabilized utilizing the following stabilization protocol:

###### **August 1 - June 1   May 1 - September 1**

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

At the Engineer's sole discretion, the use of limestone may be eliminated for Mid-Term (temporary) seeding. The Design-Build Team shall consult with, and obtain written approval from, the NCDOT Roadside Environmental Unit prior to eliminating limestone.

Upon obtaining written approval from the Engineer, the Design-Build Team may use wood mulch and / or ground clearing and grubbing debris as an option for



Mid-Term Stabilization. If approved, the aforementioned mulch and / or debris shall be installed at a thickness that prevents erosion.

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

Erodible areas shall be stabilized utilizing the following stabilization protocol:

**All Roadway Areas**

**August 1 – June 1 May 1 – September 1**

20# Kentucky Bluegrass Cultivars *	20# Kentucky Bluegrass Cultivars *
75# Hard Fescue Cultivars **	75# Hard Fescue Cultivars **
35# Bermuda (unhulled)	25# Bermuda (hulled)
25# Rye Grain	10# German or Browntop Millet
500# Fertilizer	500# Fertilizer
4000# Limestone	4000# Limestone

**Riparian and Wetland Locations**

**August 1 – June 1 May 1 – September 1**

18# Creeping Red Fescue Cultivars ***	18# Creeping Red Fescue Cultivars ***
6# Indiangrass	6# Indiangrass
8# Big Bluestem	8# Big Bluestem
4# Switchgrass	4# Switchgrass
35# Rye Grain	25# German or Browntop Millet
500# Fertilizer	500# Fertilizer
4000# Limestone	4000# Limestone

**Areas Beyond the Mowing Pattern, Waste and Borrow Areas**

**August 1 – June 1 May 1 – September 1**

100# Tall Fescue Cultivars ****	100# Tall Fescue Cultivars ****
15# Kentucky Bluegrass Cultivars *	15# Kentucky Bluegrass Cultivars *
30# Hard Fescue Cultivars **	30# Hard Fescue Cultivars **
35# Bermuda (unhulled)	25# Bermuda (hulled)
25# Rye Grain	10# German or Browntop Millet
500# Fertilizer	500# Fertilizer
4000# Limestone	4000# Limestone

**\* Approved Kentucky Bluegrass Cultivars**

4-Season	Blue Velvet	Gladstone	Quantum Leap
Alexa II	Blueberry	Granite	Rambo
America	Boomerang	Hampton	Rhapsody

Apollo	Brilliant	Harmonie	Rhythm
Arcadia	Cabernet	Impact	Rita
Aries	Champagne	Jefferson	Royce
Armada	Champlain	Juliet	Rubicon
Arrow	Chicago II	Jump Start	Rugby II
Arrowhead	Corsair	Keeneland	Shiraz
Aura	Courtyard	Langara	Showcase
Avid	Delight	Liberator	Skye
Award	Diva	Madison	Solar Eclipse
Awesome	Dynamo	Mercury	Sonoma
Bandera	Eagleton	Midnight	Sorbonne
Barduke	Emblem	Midnight II	Starburst
Barnique	Empire	Moon Shadow	Sudden Impact
Baroness	Envicta	Moonlight SLT	Total Eclipse
Barrister	Everest	Mystere	Touche
Barvette HGT	Everglade	Nu Destiny	Tsunami
Bedazzled	Excursion	NuChicago	Unique
Belissimo	Freedom II	NuGlade	Valor
Bewitched	Freedom III	Odyssey	Voyager II
Beyond	Front Page	Perfection	Washington
Blacksburg II	Futurity	Pinot	Zinfandel
Blackstone	Gaelic	Princeton 105	
Blue Note	Ginney II	Prosperity	

### **\*\* Approved Hard Fescue Cultivars**

Aurora II	Eureka II	Oxford	Scaldis II
Aurora Gold	Firefly	Reliant II	Spartan II
Berkshire	Granite	Reliant IV	Stonehenge
Bighorn GT	Heron	Rescue 911	
Chariot	Nordic	Rhino	

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

Aberdeen	Boreal Epic	Cindy Lou
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**\*\*\*\* Approved Tall Fescue Cultivars**

06 Dust	Escalade	Justice	Serengeti
2 <sup>nd</sup> Millennium	Essential	Kalahari	Shelby
3 <sup>rd</sup> Millennium	Evergreen 2	Kitty Hawk 2000	Sheridan
Apache III	Falcon IV	Legitimate	Signia
Avenger	Falcon NG	Lexington	Silver Hawk
Barlexas	Falcon V	LSD	Sliverstar
Barlexas II	Faith	Magellan	Shenandoah Elite
Bar Fa	Fat Cat	Matador	Sidewinder
Barrera	Festnova	Millennium SRP	Skyline
Barrington	Fidelity	Monet	Solara
Barrobusto	Finelawn Elite	Mustang 4	Southern Choice II
Barvado	Finelawn Xpress	Ninja 2	Speedway
Biltmore	Finesse II	Ol' Glory	Spyder LS
Bingo	Firebird	Olympic Gold	Sunset Gold
Bizem	Firecracker LS	Padre	Taccoa
Blackwatch	Firenza	Patagonia	Tanzania
Blade Runner II	Five Point	Pedigree	Trio
Bonsai	Focus	Picasso	Tahoe II
Braveheart	Forte	Piedmont	Talladega
Bravo	Garrison	Plantation	Tarheel
Bullseye	Gazelle II	Proseeds 5301	Terrano
Cannavaro	Gold Medallion	Prospect	Titan Ltd
Catalyst	Grande 3	Pure Gold	Titanium LS
Cayenne	Greenbrooks	Quest	Tracer
Cessane Rz	Greenkeeper	Raptor II	Traverse SRP
Chipper	Gremlin	Rebel Exeda	Tulsa Time
Cochise IV	Greystone	Rebel Sentry	Turbo
Constitution	Guardian 21	Rebel IV	Turbo RZ
Corgi	Guardian 41	Regiment II	Tuxedo RZ
Corona	Hemi	Regenerate	Ultimate
Coyote	Honky Tonk	Rendition	Venture
Darlington	Hot Rod	Rhambler 2 SRP	Umbrella
Davinci	Hunter	Rembrandt	Van Gogh
Desire	Inferno	Reunion	Watchdog
Dominion	Innovator	Riverside	Wolfpack II
Dynamic	Integrity	RNP	Xtremegreen
Dynasty	Jaguar 3	Rocket	
Endeavor	Jamboree	Scorpion	

On cut and fill slopes 2:1 or steeper add 20# Sericea Lespedeza and 15# Crown Vetch  
January 1 - December 31.

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

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*. 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 Design-Build Team shall, at a minimum, mow areas not under active construction within the project limits within 14 calendar days prior to the Memorial Day, Independence Day, Labor Day, and Veterans Day holidays, and as directed by the Engineer.

Monthly litter management cleanups shall be timed to occur just prior to planned mowing activities. With prior written approval, mowing dates may be modified to occur with Division mowing cycles. The Design-Build Team shall conduct an additional project mowing prior to final acceptance, as directed by the Engineer.

The minimum mowing height shall be four inches.

**EROSION CONTROL COORDINATION MEETINGS****Preliminary Construction Meeting**

Prior to any land disturbing activity, the Engineer will schedule a meeting with Division construction personnel, Design-Build Team senior management, Design-Build Team project staff, NCDOT project staff, consultant engineering / inspection staff, NCDOT Construction Unit, NCDOT Roadside Environmental Unit, Land Quality, Department of Water Resources and any other party associated with activities that impact the overall effectiveness of the project's erosion control.

During this meeting, the attendees shall review the Design-Build Team's Traffic Control Plans and identify potential erosion control issues. All attendees will provide comments, recommendations and supportive information to help facilitate resolution to the aforementioned potential erosion control issues.

**Construction Meetings**

Once construction begins, the Engineer will schedule monthly meetings to review the erosion control status. All parties listed above for the Preliminary Construction Meeting shall participate in these monthly construction meetings.

During the construction meetings, the erosion control efforts / issues to date will be reviewed and discussed. Additionally, the upcoming construction phases will be reviewed to identify potential erosion control issues. After the construction meeting, a project review may occur to identify site specific issues and identify solutions. The Design-Build Team shall be responsible for all actions, corrections and / or resolutions resulting from the construction meetings and / or subsequent site visits.

The NCDOT senior management will discuss issues that are repeatedly identified on inspection reports and / or discussed during the construction meetings with the Design-Build Team's senior management.

If project activities do not change the erosion control status / conditions, the Engineer may elect to change the construction meeting frequency or cancel a meeting.

## **EROSION CONTROL DAMAGES**

The Design-Build Team shall observe and comply with Federal and State Laws, Local Laws, Ordinances, and Regulations; as well as Orders and Decrees of Bodies having any jurisdiction or authority in accordance with Section 107 of the 2018 NCDOT *Standard Specifications for Roads and Structures*.

The Design-Build Team shall take all reasonable precautions to comply with all regulations of all authorities having jurisdiction over public and private land governing the protection of erosion and sedimentation. Any fines, remediation required or charges levied against the Department for failing to comply with all rules and regulations concerning erosion and sediment control, due to the Design-Build Team's negligence, carelessness, or failure to implement the Erosion and Sedimentation Control Plans and Specifications; or failure to maintain an approved Storm Water Pollution Prevention Plan (SWPPP), regardless of absence of neglect, shall be deducted from monies due the Design-Build Team. In addition to said fines, remediation required, or charges levied, any associated engineering costs or actions taken by the Department in order for the Department to comply with rules and regulations, as a result of the Design-Build Team's negligence, carelessness, or failure to implement the Erosion and Sedimentation Control Plans and Specifications; and / or the SWPPP, regardless of absence of neglect, shall be deducted from the monies due to the Design-Build Team.

**GEOENVIRONMENTAL SCOPE OF WORK** (4-17-23)**I. DEFINITION**

For the purpose of this Scope of Work, contamination / contaminants are defined as any substance that when discharged in any quantity may present an imminent and substantial danger to the public health or welfare. Petroleum is defined as any petroleum-derived product of any kind and in any form, including, but not limited to, crude oil, diesel fuel, fuel oil, gasoline, lubrication oil, oil refuse, oil mixed with other waste, oil sludge, petroleum related products or by-products, and all other liquid hydrocarbons, regardless of specific gravity, whether occurring singly or in combination with other substances.

**II. DESCRIPTION OF WORK**

Sites of concern were identified in the September 3, 2014 I-2513 Revised Pre-Scoping Comments. After submittal of the Right of Way / 60% Roadway Plans developed by the Design-Build Team, the Design-Build Team shall hold a right of way consultation with the Department's GeoEnvironmental staff, Design-Build Unit, and key Design-Build Team members.

Sites of concern within the proposed right of way that are noted in the September 3, 2014 Revised Pre-Scoping Comments and any other sites identified during the right of way consultation with the Design-Build Team, will be investigated by the Department. The Department will require 90 days from the date of the aforementioned consultation to investigate and provide Right of Way Recommendations. The Right of Way Recommendations shall be completed prior to the Design Build Team making offers to purchase the right of way on these sites of concern.

Pre-regulatory solid waste landfill(s) have been identified along the Riverside Drive corridor as shown in the previously provided January 31, 2019, Preliminary Site Assessment (PSA) Report. To the maximum extent possible, the Design-Build team shall minimize excavations within the limits of the Riverside Drive corridor. Unavoidable excavation within the Riverside Drive corridor may be segregated as reusable material or waste material. Reusable material is defined as soil without trash and/or debris. Reusable material shall only be used on the landfill parcels investigated in the PSA. Any reusable material that cannot be placed on the parcels defined in the PSA shall be disposed of as waste at a municipal solid waste facility. The Design-Build Team shall dispose of excavated landfill waste material at a municipal solid waste facility. It is the responsibility of the Design-Build team to locate a facility to dispose of the waste material.

The Design-Build Team shall notify the Design-Build Unit, in writing, of any underground storage tanks (USTs) containing petroleum, chemicals, or heating oil tanks discovered during property appraisals. The Department will require 90 days from the date of written notification to investigate and provide Right of Way Recommendations. The Right of Way Recommendations shall be completed prior to the Design-Build Team making offers to purchase the right of way on sites containing USTs.

The Design-Build Team shall adhere to all Right of Way Unit procedures regarding the acquisition of contaminated property and all Right of Way Recommendations provided by the Department. (Reference the Right of Way Scope of Work found elsewhere in this RFP).

After the parcels with identified contamination and / or underground storage tanks (USTs) are acquired and cleared of all above ground structures, the Department will 1) remove from the right of way USTs identified in the I-2513B & D *Right of Way Recommendations* and discovered during the property appraisals, and 2) remove all associated contaminated soil anticipated to require excavation to complete the project. If any contaminated soil anticipated to require excavation to complete the project is located in an area only accessible after construction activities have occurred (e.g. beneath an existing operational interchange ramp to be relocated), the Department will remove the contaminated soil following completion of the necessary construction activities. The Department will remove the aforementioned USTs and contaminated soil within 60 days of written notification that the Design-Build Team has 1) removed all the above-ground structures or 2) completed the necessary construction activities. All contaminated soil not required for removal to complete the project shall be left in place and undisturbed.

If contaminated groundwater is encountered and dewatering is required in areas of known contamination, the Design-Build Team shall containerize the groundwater in vessels provided by the Department. The Department will be responsible for the sampling and disposal of the water.

It is important to note that petroleum contaminated soil may be encountered during any earthwork activity on this project.

### **III. INFORMATION PROVIDED BY NCDOT:**

- July 30, 1993 Eury Property Landfill PSA Report
- September 2, 2011 Pearson Bridge Dump Site Summary Report
- September 3, 2014 I-2513 Revised Pre-Scoping Comments
- I-2513\_GEO\_Env.dgn GeoEnvironmental Sites of concern reference file
- I-2513B January 31, 2019 PSA Report (Parcels 384,395,396,397) along Riverside Dr.

### **IV. UNKNOWN CONTAMINATED SITES:**

The Design-Build Team shall immediately notify the Department if the Design-Build Team's operations encounter or expose any abnormal condition that may indicate the presence of a hazardous, contaminated, and / or toxic material not previously identified. If the Engineer elects to have the Design-Build Team remove and dispose of contaminated material, the removal and disposal of this material shall be performed as extra work in accordance with Article 107-25 of the 2018 NCDOT *Standard Specifications for Roads and Structures*.



**GEOTECHNICAL ENGINEERING SCOPE OF WORK** (7-3-23)**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. A list of prequalified firms and the Discipline Code requirements can be found at the websites noted below:

**<https://www.ebs.nc.gov/VendorDirectory/search.html?s=pc&a=new>**

**<https://connect.ncdot.gov/resources/Geological/Pages/default.aspx>**

The prequalified geotechnical firm shall use the personnel and office location(s) that were submitted to the Department for their latest prequalification approval.

The prequalified geotechnical firm shall prepare foundation design recommendation reports for use in designing structure foundations, roadway foundations, retaining walls, sound barrier foundations, overhead sign structure foundations, and temporary structures.

The prequalified geotechnical firm shall utilize foundations and retaining wall types and systems in the submitted recommendations that have current NCDOT Geotechnical Engineering Unit Standard or Special Provisions, NCDOT 2018 *Standard Specifications for Roads and Structures*, and / or are included on the NCDOT Approved Products List with an “Approved” or “Approved for Provisional Use” product status.

The Engineer of Record who prepares the foundation design recommendation reports shall be a Professional Engineer registered in the State of North Carolina who has completed a minimum of three geotechnical design projects of scope and complexity similar to that anticipated for this project using the load and resistance factor design (LRFD) method and in accordance with the latest edition of the AASHTO *LRFD Bridge Design Specification*.

The prequalified geotechnical firm shall also determine if additional subsurface information, other than that required and noted elsewhere in this RFP, is required based upon the subsurface information provided by the NCDOT and the final roadway and structure designs. If a determination is made that additional subsurface information is required; the Design-Build Team shall use a prequalified geotechnical firm to perform all additional subsurface investigation and laboratory testing in accordance with the current NCDOT Geotechnical Engineering Unit *Guidelines and Procedures Manual for Subsurface Investigations*. Submit additional information collected by the Design-Build Team to the Geotechnical Engineering Unit, via the Design-Build Unit, for review and acceptance. The Design-Build Team shall provide the final Subsurface Investigation report in electronic and hardcopy format to the NCDOT for its records.

Unless noted otherwise herein, the Design-Build Team shall design foundations (except for sign foundations), embankments, slopes, retaining walls, and sound barrier walls in accordance with the current edition of the AASHTO *LRFD Bridge Design Specifications*, NCDOT *LRFD Driven Pile Foundation Design Policy*, all applicable NCDOT Geotechnical Engineering Unit Standard Provisions and Policies, 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 minimum of 2 standard penetration test (SPT) / rock core borings shall be required per bent for all bent lengths of 50 feet or less. Additional SPT / rock core borings shall be required across the roadway typical section for each bent more than 50 feet long and the borings shall be spaced no greater than 50 feet apart. All borings for pile-supported bents shall be located within 25 feet of the centerline of each bent location to be counted for these minimum requirements. All borings for bents with spread footing or drilled pier foundations shall be performed at opposite ends of each bent, but not greater than 50 feet apart along the bent line as required by bent length noted above, to be counted for these minimum requirements. For structure sites with multiple bridges, borings may be performed between bridges along the bent projection provided the distance between any two borings does not exceed 50 feet. The Design-Build Team shall extend all borings to a depth of 15 feet or four foundation element diameters, whichever is greater, below the foundation element to show a complete subsurface profile. The Design-Build Team shall be responsible for obtaining the borings noted above for all bents where subsurface information is not sufficient or is warranted by variability in the geology unless the prequalified geotechnical firm submits documented justification that the subsurface investigation provided by the NCDOT is adequate for design purposes and the justification is acceptable to the Department. Any deviations to the requirements noted above shall require acceptance from the NCDOT Geotechnical Engineering Unit prior to the foundation design submittal.

**\*\*NOTE\*\*** Deleted paragraph referencing SPT / boring requirements for bridges and replaced it with paragraph above.

The maximum spacing between borings for retaining walls and sound barrier walls shall be 100 feet and 200 feet respectively, 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 wall height. Boring depths for sound barrier walls shall be to a minimum depth below the bottom of the wall equal to the maximum wall height or to SPT refusal.

Bridge embankments shall be defined as those sections of embankment within 100 feet of a bridge end bent. Roadway embankments shall be defined as all other sections of existing or future embankment associated with the project.

## II. ADDITIONAL DESIGN REQUIREMENTS

### A. Structure Foundations

- Key in spread footings of structures crossing streams a minimum of full depth below the 100-year scour elevation and provide scour protection in accordance with the scour protection detail in the NCDOT *Structures Management Unit Manual*.

**\*\* NOTE \*\*** Deleted bullet pertaining to Spread footings / shallow foundations

- Permanent steel casings shall be required for drilled piers that are constructed in six inches or more of water.
- Analyze drilled pier and pile bent foundations using either LPile or FB-Pier. Design drilled piers and vertical piles in pile bents with a sufficient embedment in soil and / or rock to achieve “fixity”.
- In accordance with Section 7.3.6 of FHWA Publication No. FHWA-NHI-16-009 (Geotechnical Engineering Circular No. 12) dated July 2016, compute and mitigate downdrag loads on piles.
- When the weathered rock or rock elevation is below the 100-year hydraulic scour elevation, the 100-year and 500-year design scour elevations are equal to the 100-year and 500-year hydraulic scour elevations from the structure survey report developed by the Design-Build Team and accepted by the NCDOT Hydraulics Unit. When the weathered rock or rock elevation is above the 100-year hydraulic scour elevation, the 100-year design scour elevation may be considered equal to the top of the weathered rock or rock elevation, whichever is higher, and the 500-year design scour elevation may be set two feet below the 100-year design scour elevation.
- The horizontal and vertical limits of any proposed bridge abutment wall, including embedment, and any ground supporting the wall shall be located completely outside of the 500-year floodplain and at least 2 feet above the 500-year Water Surface Elevation (WSEL).
- End bent fill slopes up to 35 feet in height (defined as the difference between grade point elevation and finished grade at toe of slope) shall be 1.5:1 (H:V) or flatter. End bent fill slopes with heights greater than 35 feet shall be 2:1 or flatter. All end bent cut slopes shall be 2:1 or flatter. For 1.5:1 fill slopes, extend end bent slope protection from the toe of slope to berm and to 1.75:1 (H:V) slope or to the limits

of the superstructure. For end bent cut slopes and for 2:1 or flatter end bent fill slopes, extend end bent slope protection from the toe of slope to berm and to the limits of the superstructure.

- For box culverts, the Design-Build Team shall provide the following to the Geotechnical Unit, via the Design-Build Unit, for review and acceptance:
  - Details for undercut of unsuitable material or recommendations for use of more than one foot of conditioning material.
  - Total and differential settlement along the culvert and perpendicular to the culvert.
- Retaining walls or taller headwalls / end walls shall not be used to reduce the length of proposed box culverts.
- Calculate and report the estimated settlement and the rate of settlement for the full embankment height for bridge embankments. Add waiting periods, settlement monitoring, and soil improvement techniques to keep settlement equal to or less than ½ inch 15 years after reaching final grade. Soil improvement techniques to mitigate long term settlement problems or to transfer the embankment load to a deeper bearing stratum are acceptable means to accelerate construction.

## **B. Roadway Foundations**

- Mitigate all unsuitable soils to the extent required to improve the stability of the proposed embankment, walls, and subgrade. Unless noted otherwise elsewhere in this RFP, use any suitable material to backfill undercut areas. When employing shallow undercut, in accordance with Section 505 of the NCDOT 2018 *Standard Specifications for Roads and Structures* use Select Material, Class IV to backfill undercut areas. For undercut backfilling in water, use Select Material, Class III.
- Unless noted otherwise herein, all unreinforced proposed fill slopes, except bridge end bent slopes (Reference Section A – Structure Foundations), shall be 2:1 (H:V) or flatter. Unless the slopes are designed with adequate reinforcement to provide the required stability, all proposed soil cut slopes shall be 2:1 (H:V) or flatter. Except as allowed below, rock cuts shall be 1:1 (H:V) or flatter. Rock cuts steeper than 1:1 (H:V) and reinforced soil slopes shall only be used if detailed design calculations and a slope stability analysis are submitted to the NCDOT Geotechnical Engineering Unit, via the Design-Build Unit, for review and acceptance prior to construction.
- Reinforced soil slopes shall only be used to minimize impacts to existing structures, cemeteries, and / or cultural, historical or otherwise protected landmarks. All reinforced soil slopes shall meet the requirements of the NCDOT Geotechnical Standard Detail Nos. 1802.1 and / or 1802.2 unless detailed design calculations and

a slope stability analysis are submitted for review and accepted by the Department prior to construction.

- Subsurface / pipe underdrains and shoulder drains shall use coarse aggregate (No. 57 stone).
- All subsurface and / or slope drainage designed for either subgrade or slope stability shall be installed regardless of site conditions at the time of construction.
- Calculate and report the estimated settlement and the rate of settlement for embankment fill heights equal to roadway finished grade for roadway embankments. Add waiting periods, settlement monitoring, and soil improvement techniques that keep long term settlements equal to or less than one inch 15 years after reaching final grade.
- Document and provide spring boxes or other subsurface drainage features for all springs located under proposed fill sections.
- Conduct proofrolling in accordance with Section 260 of the 2018 *Standard Specifications for Roads and Structures*. A minimum load capacity of 35 tons shall be required.

### **C. Soil Improvement Methods**

- Soil improvement techniques to mitigate long term settlement problems or to transfer the embankment load to a deeper bearing stratum are acceptable means to accelerate construction. All soil improvement techniques shall follow the current industry standard practices and the guidelines of *Geotechnical Engineering Circular No. 13 Ground Modification Methods Reference Manual FHWA publication FHWA-NHI-16-027 and FHWA-NHI-16-028* or *Geosynthetic Design and Construction Guidelines FHWA-HI-95-038*.
- Geofoam design and construction shall be in accordance with the *Geofoam Applications in the Design and Construction of Highway Embankments, Prepared for National Cooperative Highway Research Program (NCHRP) Project 24-11, Transportation Research Board of the National Academies, July 2004* and *Guidelines and Recommended Standard for Geofoam Applications in Highway Embankments, NCHRP Report 529, Transportation Research Board of the National Academies, 2004*.
- Submit soil improvement design recommendations and calculations to the NCDOT Geotechnical Engineering Unit, via the Design-Build Unit, for review and acceptance a minimum of 30 days prior to beginning embankment construction. The Design-Build Team shall not begin any embankment construction activities until the Department has accepted the aforementioned recommendations and

calculations. Only the following soil improvement methods or combination of methods will be allowed to improve the foundation soil conditions:

- Excavation and replace with granular soils
- Wick drains and / or surcharge and / or waiting periods
- Lightweight fill – ultralightweight and lightweight aggregate
- Lightweight fill - foamed (cellular) lightweight concrete
- Lightweight fill - expanded polystyrene (EPS Geofoam Blocks)
- High strength geosynthetics
- Column Supported Embankments (CSE) with a Load Transfer Platform (LTP) - Columns shall consist of aggregate columns as defined in Chapter 5 of FHWA GEC 013, vibro concrete columns (VCC), controlled modulus columns (CMC), or stiff piles as defined in 3.1.1 (first three paragraphs) of Chapter 6 of FHWA GEC 013. Helical Screw Piles will not be allowed for columns. Aggregate columns shall consist of coarse aggregate. Refer to FHWA GEC 013 Chapter 6 for design of the LTP.

#### **D. Permanent Retaining Wall Structures**

- Roadway retaining walls will not be allowed at any location with more than five feet of scour without the aid of scour countermeasures calculated at the base of the wall.
- For design and construction of mechanically stabilized earth (MSE) retaining walls, refer to FHWA GEC 011 and 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>**

The Design Build Team may substitute lightweight aggregate or other lightweight material for the fine or coarse aggregate required in the reinforced zone of MSE retaining walls. All lightweight aggregate and other lightweight material shall adhere to the aggregate pH and aggregate electrochemical requirements for coarse aggregate noted in the NCDOT Geotechnical Engineering Unit's Standard MSE Wall Provision. Prior to incorporation, 1) the Design-Build Team shall provide documentation that supports the lightweight aggregate and other lightweight material parameter assumptions to the Department for review, and 2) the aforementioned parameter assumptions shall be accepted by the Department.

To accommodate wall settlement, the Design Build Team may stage construct MSE retaining walls.

- Walls shall include drainage methods / mediums to drain water behind the wall.
- With the exception of walls covered by a Geotechnical Engineering Unit Standard Detail, design and construct permanent retaining walls in accordance with the applicable NCDOT Geotechnical Engineering Unit Project Special Provisions, unless noted otherwise elsewhere in this RFP. The NCDOT Geotechnical Engineering Unit Project Special Provisions 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)**

- Submit a wall layout and design for each retaining wall. At a minimum, the wall layout submittal shall include the following:
  - Wall envelope with top of wall, bottom of wall, existing ground, 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.
  - Roadway plan sheets showing the wall (half size)
  - Roadway cross sections sheets showing the wall (half size)
  - Traffic Control Plans showing the wall (half size)
- For project retaining walls requiring a design not covered by a Geotechnical Engineering Unit Standard Detail, the wall layout submittal shall also include the following:
  - Calculations for sliding, settlement, overturning, bearing capacity, global stability, and settlement
  - Details of conflicts with utilities and drainage structures
- The NCDOT Geotechnical Unit Standard Detail No. 453.01 (Standard Cast in Place (CIP) Gravity Retaining Wall) does not consider traffic impact loads applied to the top of the wall and shall not be used along roadways where moment slabs and crash barriers are required at the top of the wall.
- Locate retaining walls at toes of slopes unless restricted by right of way limits or project commitments. The Design-Build Team shall submit global stability calculations for slopes at retaining walls and obtain acceptance from the NCDOT prior to construction. All fill slopes behind walls shall be 2:1 (H:V) or flatter.

- Cut wall (e.g., soil nail walls, soldier pile walls) anchors (where necessary) shall be located within the project right-of-way.
- Drainage over the top of retaining walls and sags in the top of walls shall not be allowed. 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. In accordance with the NCDOT *Roadway Design Manual* - Section 5.5.1.2, Figure 5-25, the Design-Build Team shall design and construct a paved concrete ditch, with a minimum 12-inch depth, at the top of all retaining walls with slopes draining towards the wall, and a four-foot bench between the wall and fill / cut slopes steeper than 6:1 (H:V).
- Cast-in-place or precast 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 12 inches above where the finished or existing grade intersects the back of the wall.
- The Design-Build Team shall provide a fall protection black vinyl coated chain-link fence immediately behind, or on top of the facing, coping or barrier of 1) all proposed and existing retaining walls where the delta in elevation of the finished grade and top of wall is 30.0 inches or more. If installed on top of the facing, on top of the coping or behind the aforementioned walls, the fence shall be six feet tall. If installed on top of the barrier, the fence shall extend six feet above the paved shoulder at the face of the barrier, measured from the highest finished grade. For all proposed abutment walls located at dual bridges, the Design-Build Team shall provide a four-foot black vinyl coated chain-link fence, as directed by the Engineer, on top of the facing, on top of the coping or immediately behind the abutment wall between the dual bridges.
- When using abutment retaining walls with deep foundations, the end bent deep foundation shall be designed and constructed with one of the following:
  - A single row of plumb piles with brace piles battered toward the wall
  - A single row of plumb piles with MSE reinforcement connected to the back of the cap
  - An 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
  - Drilled Piers
- The Design-Build Team shall drive, re-drive, and / or re-strike all bridge end bent piles within the concurrent construction stage/phase prior to beginning construction of an associated abutment wall or portion thereof.



- All deep foundations for end bents with abutment retaining walls shall extend a minimum of ten feet below the retaining wall foundation or leveling pad.
- A design friction angle greater than 40 degrees shall not be used for retaining walls, even if the measured friction angle of the material is greater than 40 degrees.
- The Design-Build Team shall use a cohesion value of zero pounds per square foot (psf) for retained materials.

#### **E. 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 2018 Roadway Standard Drawing No. 1170.01.

### **III. ADDITIONAL CONSTRUCTION REQUIREMENTS**

- Prior to incorporating recommended remedial measures into the project, the Design-Build Team shall investigate, propose, and submit proposed remedial measures to the NCDOT Geotechnical Engineering Unit for review and acceptance for any construction problems related to the features below. The recommended remedial measures shall be accepted by the NCDOT Geotechnical Engineering Unit prior to construction.
  - Foundations
  - Retaining walls
  - Sound barrier walls
  - Subgrades
  - Settlement
  - Slopes
  - Construction vibrations

- The prequalified geotechnical firm which prepares 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 them to the NCDOT for review and be accepted prior to beginning construction. Hammer approvals shall be submitted prior to performing any pile driving and shall be performed using GRLWEAP Version 2010 or later.
- The prequalified geotechnical firm which prepares the original foundation designs shall be responsible for any necessary changes to the foundation designs revising analysis, recommendations, and reports as needed. All changes shall be based upon additional information, subsurface investigation and / or testing. Send copies of revised designs, including additional subsurface information, calculations, and any other supporting documentation to the NCDOT for review and acceptance.
- Bridge embankment and roadway embankment settlement monitoring shall be required when the calculated settlement is greater than or equal to 2 inches. When embankment monitoring is required, construct the roadway embankment and/or bridge embankment to the proposed roadway finished grade prior to monitoring. A minimum of two embankment settlement gages shall be required at each end bent and one embankment settlement gage shall be required every 100' along the roadway embankment when a waiting period of more than one month is recommended in the foundation design recommendation reports developed by the Design-Build Team. Install settlement plates at least one foot below original grade and begin monitoring prior to placing first lift of the embankment. Survey the settlement gage elevations every 2 weeks. The prequalified geotechnical firm that prepares the foundation designs shall review the settlement monitoring data a minimum of every 2 weeks and issue a letter for review prior to releasing the embankment or approach fill from monitoring. Monitoring may not be ended until less than 0.10 inch of settlement is measured over a period of four weeks. The settlement monitoring data shall be submitted to the NCDOT Geotechnical Engineering Unit, via the Design-Build Unit, for review and acceptance prior to issuing the release letter.
- When bridge embankment and / or roadway embankment settlement monitoring is not required in accordance with the criterion above, bridge approach fill settlement monitoring shall be performed by the Design-Build Team. After constructing the entire embankment to proposed roadway finished grade within 100 feet of the bridge end bent and prior to construction of the approach slab, the Design-Build Team shall use an appropriate method to monitor settlement across the width of the embankment (from toe to toe) weekly, such as surveyed stakes on finished subgrade or other methods. Submit documentation describing the method and procedures used to the NCDOT Geotechnical Engineering Unit, via the Design-Build Unit, for review and acceptance prior to construction of the embankment. Monitoring shall not end until the change in elevation is less than 0.10 inch over a period of four

weeks. The prequalified geotechnical firm which prepared the foundation design recommendation reports shall review settlement monitoring data at least weekly and provide weekly updates to the NCDOT Geotechnical Engineering Unit, via the Design-Build Unit. This same firm shall issue a release letter ending the waiting period for an embankment fill once the settlement criteria listed elsewhere in this RFP is met. Settlement monitoring data and recommendations shall be submitted to the NCDOT Geotechnical Engineering Unit, via the Design-Build Unit, for review and be accepted prior to issuing a release letter.

- The Design-Build Team shall perform settlement monitoring at any bridge site where the foundation design recommendations include a waiting period prior to pile driving to mitigate downdrag loading. After constructing the entire embankment to the elevation stated in the foundation recommendations within 100 feet of the bridge end bent, the Design-Build Team shall use an appropriate method to monitor settlement across the width of the embankment (from toe to toe) weekly, such as surveyed stakes on finished subgrade or other methods. Submit documentation describing the method and procedures used to the NCDOT Geotechnical Engineering Unit, via the Design-Build Unit, for review and acceptance prior to construction of the embankment. Monitoring shall not end until the change in elevation is less than 0.10 inch over a period of four weeks. The prequalified geotechnical firm which prepared the foundation design recommendation reports shall review settlement monitoring data at least weekly and provide weekly updates to the NCDOT Geotechnical Engineering Unit, via the Design-Build Unit. This same firm shall issue a release letter ending the waiting period for an embankment fill once the settlement criteria listed elsewhere in this RFP is met. Settlement monitoring data and recommendations shall be submitted to the NCDOT Geotechnical Engineering Unit, via the Design-Build Unit, for review and be accepted prior to issuing a release letter.
- 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 2018 *Standard Specifications for Roads and Structures*). The Design-Build Team shall develop a preconstruction vibration monitoring plan to determine vibration thresholds for key funerary monuments, as noted in the *Key Funerary Monuments* image provided by the Department, within the Riverside Cemetery within the Montford Area Historic District upon project award. The plan shall include measurement of existing vibration exposure and vibration sensitivity assessment of the listed monuments. The Design-Build Team shall provide pre- and post-construction condition inventories for the listed monuments. In addition, the Design-Build Team shall provide continuous construction vibration monitoring in the area of the listed monuments, all subsurface utilities and residential and commercial structures located at a Scaled Distance of less than or equal to 55 feet pounds-0.5 for blasting operations. The vibration monitoring for subsurface utilities may be performed on the ground surface. The Design-Build Team shall perform pre- and post-construction condition inventories and construction vibration monitoring of all subsurface utilities and

residential and commercial structures within 200 feet of pile driving activities and other non-blasting construction activities that have the potential to induce peak particle velocities (PPV) exceeding 0.4 inch per second. When a reading exceeds any of the established thresholds, an alarm shall sound, and the Contractor shall immediately contact NCDOT's Division 13 Resident Engineer to assess the situation. The Design-Build Team shall be responsible for deciding what additional, if any, pre- and post-construction monitoring and inventories need to be conducted to satisfy their other liability concerns. The PPV at any utility or structure shall not exceed the "Alternative Blasting Level Criteria" from Appendix B of the U.S. Bureau of Mines Report of Investigations 8507. The maximum air-overpressure at any structure resulting from blasting shall not exceed 133 dB (linear). The vibration monitoring for subsurface utilities may be performed on the ground surface. Any monitoring and inventory work shall be performed by a prequalified private engineering firm experienced in the effects of construction on existing structures. Upon project award, the Design-Build Team shall provide a list of their Vibration Monitoring Consultant(s) and Rock Blasting Subcontractor(s) for review. The Design-Build team shall provide pre-construction inventories to the NCDOT Geotechnical Engineering Unit for review and acceptance at least five (5) working days prior to beginning construction within proximity of the subject structures or utilities. The Design-Build team shall provide vibration monitoring records to the Resident Engineer within 24 hours when the PPV exceeds 0.5 inch per second. Otherwise, provide vibration monitoring records to the Resident Engineer weekly.

- Prequalification of contractors is not required for pile excavation or drilled-in pile holes that are 30 inches in diameter or less. Class A concrete or grout shall be required to backfill holes for drilled-in piles.
- Continuous Flight Auger (CFA) piles will be allowed for sound barrier walls.
- Use Pile Driving Analyzer (PDA) testing on a minimum of one production pile for each pile size and type for each bridge with driven piles using the approved hammer driving system for the pile. When multiple PDA tests are required by design or during construction, the test piles shall not be located at the same bent, unless approved by the NCDOT Geotechnical Engineering Unit. Each PDA tested pile shall be driven to the maximum RDR for the end bent / bent(s) the PDA tested pile covers. The spacing between PDA tested piles shall not exceed 400 feet and at least one PDA tested pile shall be located at an end bent. Additional PDA testing shall be performed at other end bent / interior bents as needed to stay within the maximum spacing requirement. Changes in hammer driving systems and / or additional similar hammer driving systems shall require additional PDA testing. Additional PDA testing may be warranted based on AASHTO LFRD Bridge Design Specifications, variable subsurface conditions, etc. as determined by the NCDOT Geotechnical Engineering Unit. Dual bridges shall be considered as a single bridge when determining the amount and location of required PDA testing.

- A prequalified PDA consultant shall perform the required PDA testing, provide PDA reports, and develop pile driving criteria. All PDA consultants shall be prequalified a minimum of 30 days prior to performing any pile driving on the project. Geotechnical Contractor Prequalification requirements can be found at the NCDOT Geotechnical Engineering Unit's website at:

**[https://connect.ncdot.gov/resources/Geological/Documents/  
Contractor%20Prequalification%20Requirements.pdf](https://connect.ncdot.gov/resources/Geological/Documents/Contractor%20Prequalification%20Requirements.pdf)**

- PDA reports shall conform to the current NCDOT requirements and format and be signed and sealed by a Professional Engineer registered in the State of North Carolina who meets the experience requirements for the PDA Engineer in responsible charge of the PDA report. In addition, the recommendations within the PDA report shall address the cause of any Integrity Factor (BTA) values less than 100 and clarify the condition of the pile. PDA reports with driving criteria recommendations shall be reviewed and accepted by NCDOT prior to driving any production piles at the end bents / bents the PDA tested pile covers. PDA reports for miscellaneous piles tested to confirm factored resistance or acceptable pile integrity shall be reviewed and accepted by NCDOT prior to incorporating the pile into an end bent, bent or footing.
- For drilled piers the following shall apply.
  - 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 2018 NCDOT *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 and cannot be dewatered due to unstable soil or rock. The Design-Build Team shall notify Matt Hilderbran, PE by e-mail (mrhilderbran@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 Matt Hilderbran of all SID testing cancellations as soon as possible at the e-mail address noted above and at (919) 329-4015.
  - 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 and / or tomography as needed. The Department will determine which piers will be CSL tested. Submit CSL and tomography test information and results to the Geotechnical Engineering Unit, via the Design-Build Unit, for review and acceptance.

- Drilled pier tip elevations shall not be changed during construction unless the prequalified geotechnical firm which prepares 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.
- The geotechnical grade point shall be defined as the location where the proposed subgrade and natural ground intersect. At all geotechnical grade points, the Design-Build Team shall undercut the existing soils within two feet of the bottom of the proposed subgrade in accordance with the requirements below.
  - The undercut shall extend along the profile to a point where the elevation difference from the bottom of the proposed subgrade to natural ground is greater than two feet, or to 25 feet on each side of the geotechnical grade point, whichever is less.
  - The lateral extent of the undercut shall extend to a point where the elevation difference from the bottom of the proposed subgrade to natural ground is greater than two feet or to one foot outside of the paved shoulder / face of curb of the proposed roadway typical section, whichever is less.
  - The base of the undercut shall parallel the proposed subgrade.
- Send copies of any inspection forms related to foundations, settlement, sound barrier walls, or retaining wall to the NCDOT for review and acceptance.

**HYDRAULICS SCOPE OF WORK** (7-3-23)**Project Details**

- The Design-Build Team shall employ a private engineering firm(s) to perform hydraulic design for all work required under this contract. The private engineering firm must be prequalified for Tier II hydraulic design work under the Department's normal prequalification procedures prior to the Technical Proposal submittal date.
- The Design-Build Team shall hold a pre-design meeting with the Design-Build Unit and the NCDOT Hydraulics Review Engineer after acceptance of the Preliminary Roadway Plans developed by the Design-Build Team.

**Design Freeboard for Box Culverts and Pipes**

- For all existing and proposed box culverts and pipes (including all extensions) under routes functionally classified as Major Arterials (interstates and primary routes), including all ramps and loops, a minimum 1.5-foot freeboard shall be required below the shoulder point during the design storm. For all other facilities, including greenways and multi-use trails, the design year water surface elevation shall not exceed the lowest upstream shoulder point elevation of the roadway.
- The Design-Build Team shall not steepen slopes, reduce easements and / or reduce right of way solely to obtain the aforementioned freeboard requirement.

**Storm Drainage System Design**

- The Design-Build Team shall design all storm drainage systems using Geopak Drainage or Open Roads Drainage and Utilities, including but not limited to incorporating discharges from allowable routing programs.
- Raised median island cuts will not be allowed.
- Unless noted otherwise elsewhere in this RFP, slotted concrete median barrier will not be allowed for permanent installations.
- Slotted concrete barrier will be allowed separating vehicular travel lanes from non-vehicular areas, such as multi-use paths and sidewalks. Slotted barrier discharge shall not drain towards any vehicular travel lanes after passing through the barrier.
- All drainage system improvements shall be contained within the right of way. When tying directly to existing downstream systems located outside the right of way that are hydraulically deficient during the design storm, the Design-Build Team shall provide an Open Throat Catch Basin (OTCB) or 2GI within the right of way limits.

- Where a continuous, existing pipe or culvert section within the Department's right of way terminates more than 15 feet outside of the right of way and does not re-enter the right of way prior to the outlet of the pipe or culvert system, the Team shall replace the portion of the pipe within the Department's right of way. The Team will not be required to replace the portion of the pipe outside of the Department's right of way provided the following requirements are met:
  - The Team shall provide an Open Throat Catch Basin (OTCB) or 2GI within the right of way limits between the new pipe section and the remaining, existing pipe section.
  - In the Department's sole discretion, retention of the existing pipe section outside of the Department's right of way will not cause adverse effects, such as increased flooding or erosion problems, to the Department or any surrounding properties.
- The Design-Build Team shall use a minimum ditch grade of 0.3% and avoid constructing ditches in wetlands. Ditch grades less than 0.3% may be allowed post award if the Design-Build Team can demonstrate, in the Department's sole discretion, that a 0.3% grade cannot practically be achieved.
- At a minimum, the Design-Build Team shall install traffic bearing grated drop inlets with steel frames and flat steel grates at the following locations:
  - Within a temporary travel lane
  - Within four feet of a temporary and / or permanent travel lane
  - Within the median full depth paved shoulder of all interstates
- Proposed longitudinal pipe (trunkline) shall not be located beneath the proposed roadway travel lanes or beneath proposed barrier rails.
- At all pipe outlets with a ten-year partial flow velocity greater than 15 fps, the Design-Build Team shall provide additional outlet protection that mitigates erosive velocities to receiving downstream channels.
- All cross pipes installed within walled roadway sections, with a four-foot or taller retaining wall located on one or both sides of the roadway, shall be welded steel pipe.
- Excluding the exemption below, storm drainage systems (including outlet pipes located beneath the retaining wall) installed in a walled roadway section, with a four-foot or taller retaining wall located on one or both sides of the roadway, shall adhere to the following requirements:
  - Polypropylene Pipe (PP) with connectors conforming to ASTM D3212-20 shall be used for all storm drainage systems in medians and shoulders running parallel to the roadway and welded steel pipe shall be used for all other pipes



- Resilient Connectors that conform to ASTM C923 shall be used at all pipe connections to drainage structures
  - At all pipe connections to drainage structures, pipes shall extend a minimum of 6 inches beyond the internal wall of the drainage structure
- For walled section where a four foot or taller wall is only located on one side of the roadway, storm drainage system pipes and structures located in 1) the median, 2) the unwallled side of the roadway and / or 3) the walled side of the roadway with a retaining wall shorter than four feet are exempt from the walled roadway section requirements noted above

## Hydraulic Spread

- The hydraulic spread shall not encroach into any operational lane beyond the limits noted below:
  - For roadways with shoulders, including those with expressway gutter and shoulder berm gutter, the hydraulic spread shall not encroach into an operational permanent travel lane and shall not encroach more than two feet into an operational temporary travel lane.
  - For all other roadways, the hydraulic spread shall not exceed the values specified in Table 1 in Chapter 10 of the NCDOT *Guidelines for Drainage Studies and Hydraulics Design*.
  - For bridges, the hydraulic spread shall not encroach into an operational permanent through lane or an operational temporary through lane. The hydraulic spread shall not encroach more than a distance that equals half the lane width or six feet, whichever is less, into an operational permanent exclusive turn lane or an operational temporary exclusive turn lane.
  - For existing bridges, excluding interstate facilities, with no alteration to the travel lanes or shoulders (location and / or widths), hydraulic spread will be allowed to encroach into an operational travel lane to an extent equal to that present in the existing (pre-project) conditions.
- The Design-Build Team shall analyze spread for all bridges within the project limits and, as necessary, provide mitigation that adheres to the hydraulic spread requirement noted above. If required, the Design-Build Team shall adhere to the bridge drainage system requirements noted below:

The Design-Build Team shall design bridge drainage without the use of bridge scuppers (open grated inlets). If deck drains are used on the bridge(s) or modified on an existing bridge, they shall be vertical pipes at the flow line through the deck with no elbow and shall be consistent with that shown in the current NCDOT Stormwater Best Management Practices Toolbox.

- Unless noted otherwise elsewhere in this RFP, deck drains shall be a minimum of 6 inches in diameter.
- The Design-Build Team shall use four-inch deck drains adjacent to pedestrian facilities.
- The Design-Build Team shall provide bridge drainage features that prevent direct discharge into waterways or onto any existing / future greenway, railroad right of way, travel lane or paved shoulder.
- The maximum allowable deck drain spacing shall be 12-foot on center.
- The Design-Build Team shall design bridge drainage to avoid the use of closed / suspended drainage systems to the maximum extent practical. The Design-Build Team shall investigate and incorporate design adjustments as allowed by the RFP, such as, but not limited to; adjustments to superelevations; typical sections; and alignments to avoid and reduce the need for closed / suspended drainage systems. For the purpose of this Scope of Work, a closed / suspended drainage system is defined as a system having horizontal pipes that convey stormwater along the bridge(s). Closed / suspended drainage systems shall adhere to the following requirements:
  - The minimum longitudinal pipe diameter for a closed / suspended drainage system shall be 16 inches. Pipe diameters within a closed / suspended drainage system shall not decrease in the downstream direction.
  - Excluding the point at which the vertical deck drain enters the closed / suspended system, the maximum bend angle shall be 45 degrees for a closed / suspended drainage system.
  - The minimum slope for a closed / suspended drainage system shall be 2 percent or have a minimum flow velocity for a 4 inch/hour event of 2.5ft/s.
  - Where closed / suspended drainage systems are used, the plans developed by the Design-Build Team shall provide cleanouts at key points within the system to facilitate removal of obstructions. At a minimum, cleanouts shall be provided at the ends of all longitudinal segments, at all interior bents, and at all locations where the closed / suspended system has a bend exceeding 30 degrees. Additionally access or a cleanout shall be provided at the outlet of the closed / suspended system.
  - At all closed / suspended drainage system cleanouts the plans developed by the Design-Build Team shall provide a catwalk to access the cleanouts without the need for a lane closure.

- The Design Build Team shall include in the technical proposal a *Deck Drain Analysis Table* with the following information for each proposed bridge and each existing bridge that requires modifications to deck drains:
  - Alignment and Station
  - Minimum Shoulder Width Required (Without Drainage Considerations) (feet)
  - Max Spread Without Deck Drains (feet)
  - Deck Drains Required? (yes/no)
  - Max spread With Only Direct Discharge Deck Drains (no closed / suspended systems) (feet)
  - Closed / Suspended System Required to Meet Spread Requirements Without Bridge Widening? (yes/no)
  - Length of Closed / Suspended System (Not Over a Waterway) (feet)
  - Length of Closed / Suspended System (Over a Waterway) (feet)
  - Total Length of Closed / Suspended System (feet)
  - Max Spread Width with Closed / Suspended System (feet)
  - Bridge Widening Required to Meet Drainage Requirements (feet or N/A)
  - Linear Feet of Closed / Suspended System Required at Superelevation Rollovers (feet not over waterway/feet over waterway)
  - Additional Comments

The final row in the Deck Drain Analysis Table shall include the total length of closed / suspended systems required for the project. Each row of the table shall show an area of interest for the bridge rather than the entire bridge. For example, a bridge on a tangent section with normal crown would be shown as two rows, one for each side of the bridge, left and right.

Post award, the Design-Build Team shall coordinate with the Department to determine alternatives for bridge deck drainage where closed / suspended drainage systems are proposed in the Technical Proposal. Alternatives may include, but are not limited to, direct discharge to waterways, closed / suspended drainage systems, bridge widening and various combinations of these. The Design-Build Team shall provide the Department with bridge drainage analyses for the alternatives which shall include spread and bypass calculations, benefits and disadvantages of each alternative, and cost comparisons. The Design-Build Team shall follow guidance from the NCDOT *Stormwater Best Management Practices Toolbox*, the NCDOT *Post-Construction Stormwater Program*, the *NC-SELDM Catalog*, and other available NCDOT guidance to provide support and justification for the alternatives. Prior to the 4B Merger Meeting, the Design-Build Team shall coordinate with the Department to identify the preferred alternative for each bridge. The Design-Build Team shall present the preferred alternative and supporting information for each bridge during the 4B Merger Meeting for concurrence. Additionally, The Design Build Team shall present information and justification for direct discharge to waterways during the 4B Merger Meeting and shall request concurrence from the agencies for an exemption of the permit requirement that deck drains not discharge directly into waterways for any preferred alternatives that include such direct discharge into a waterway. The Design-Build Team shall be responsible for costs associated with any design revisions agreed to during the 4B Merger Meeting or that occur as the result of coordination with

the Merger Team. The Design-Build Team will be solely responsible for costs associated with any required closed / suspended bridge drainage systems. If the Department requests bridge widening, solely to avoid a closed / suspended drainage system on a bridge, the closed / suspended drainage system would otherwise have been allowed, and the bridge widening would not be otherwise required, the additional bridge widening will be paid for as extra work.

### Hydroplaning Analysis

- Excluding areas that the Design-Build Team will be uniformly overlaying the existing pavement structure, the Design-Build Team shall perform a hydroplaning risk assessment in accordance with the NCDOT *Guidelines for Drainage Studies and Hydraulic Designs*, including all addenda, memos and revisions and the requirements herein.
- The Design-Build Team shall provide mitigation that minimizes hydroplaning risk for all new and existing roadways within the construction limits, as necessary. (Reference the Roadway and Pavement Management Scopes of Work found elsewhere in this RFP)

The Design-Build Team shall include a brief summary of the mainline hydroplaning risk assessment in the Technical Proposal.

- The Design-Build Team shall use a 60 mph speed for the mainline hydroplaning analysis.
- The Design-Build Team shall give particular attention to areas with zero superelevation in a crest and / or sag vertical curve, and superelevation reversal points.
- The Design-Build Team shall develop a Final Hydroplaning Assessment that shall be included with the Preliminary Roadway Plans submittal for the Department's review and acceptance.
- In addition to Final Hydroplaning Assessment, the Design-Build Team shall develop a Construction Hydroplaning Risk Assessment and Mitigation Plan Report that shall be included with the Traffic Control Plans submittal for the Department's review and acceptance. The aforementioned Report shall identify a process that evaluates and avoids concentrated flow across travel lanes where speeds are in excess of 45 mph during construction phasing. (Reference the Transportation Management Scope of Work found elsewhere in this RFP)

### Stormwater Management

- In accordance with the NCDOT Post-Construction Stormwater Program, NCDOT's Stormwater Best Management Practices Toolbox, and NCDOT's *Guidelines for Drainage Studies and Hydraulics Design*, the Design-Build Team shall develop a Stormwater Management Plan that, at a minimum, demonstrates the following:
  - Compliance with the requirements described in the NCDOT Post-Construction Stormwater Program dated May 2022.

- To the maximum extent practicable, on-site stormwater control measures shall be employed to minimize water quality impacts.
- Underground detention will not be allowed.
- Unless noted otherwise elsewhere in this RFP, no additional right of way shall be acquired solely for stormwater management.
- In accordance with the NCDOT *Guidelines for Drainage Studies and Hydraulics Design*, including all addenda, memos and revisions, the Design-Build Team shall prepare Outlet Analyses using the Outlet Analysis Tool available on the Hydraulics Unit website for the increases in discharge due to the proposed project and take appropriate action to ensure that any increases are appropriately mitigated. Velocity mitigation shall be implemented in compliance with NC Administrative Code 15A NCAC 04B .0109 and associated *NCDOT Compliance Documentation Workflow for Rule 15A NCAC 04B .0109*. Such mitigation measures shall first consider long-term maintenance of the proposed mitigation. Except as otherwise noted, improvements to receiving channels shall be implemented before implementing any detention basin structures.
- The Design-Build Team shall follow the guidance and requirements outlined in the Memo from Stephen Morgan to Marissa Cox, dated June 20, 2019, with the “Subject: Biological Assessment for the STIP I-2513 Asheville I-26 Connector Project – Clarification of the NCDOT’s commitment to treat post-construction stormwater discharges to the French Broad River to protect endangered species.”
- In the Technical Proposal, Volume II, the Design-Build Team shall provide a *Proposed Stormwater Control Measures Table* that contains the attributes noted below:
  - Station
  - Proposed Stormwater Control Measure
  - Approximate Drainage Area Treated
  - Discharge Method Used
  - Approximate Inflow to Stormwater Control Measure
  - Approximate Outflow from Stormwater Control Measure
  - Receiving Water Body
  - Pollutants treated
  - Alternative Stormwater Control Measure(s) that will be evaluated if groundwater or other constraints precludes the use of the proposed measure
  - Comments
- The post-project 100-year frequency peak discharge rate to the railroad right of way shall not be higher than the pre-project 100-year frequency peak discharge rate to the railroad right of way. The Design-Build Team shall make every effort to mitigate for increases in discharge due to the proposed project within the existing / proposed right of way for the project. If, in the Department’s sole discretion, mitigation measures cannot be contained within the existing / proposed right of way for the project, the Department will allow acquisition of additional right

of way solely for stormwater management mitigation measures to avoid increased discharges to the railroad right of way.

- Direct connections from impervious surfaces to the receiving waters shall be minimized to the maximum extent practicable.

## Drainage Structures

Throughout this RFP, the term *drainage structures* shall include box culverts, cross pipes, drainage boxes and storm drainage systems.

- Revise the *Guidelines for Drainage Studies and Hydraulic Design* as follows:
  - Chapter 7 Table 1, Design Frequency
    - Along the mainline, replace the 50-year frequency for Bridges, Culverts and Cross Pipes with a 100-year frequency
    - Along the mainline, replace the 50-year frequency for Storm Drain Systems at Sags (without relief) with a 100-year frequency
    - Design frequency for Temporary / Detours, Storm Drain System on Grade shall be ten years.
    - Design frequency for Temporary / Detours, Storm Drain System at Sags (without relief) shall be 25 years.
  - Chapter 7 Table 2, Peak Discharge Method Selection
    - Delete the NCDOT Hwy. Hydrologic Charts column
  - Delete Section 7.4.4 NCDOT Highway Hydrologic Charts
  - Delete Section 7.7, Additional Documentation
  - Section 15.6 Temporary Encroachment in Regulatory Floodway
    - Section 15.6 is not applicable on this project. The Design-Build Team shall assume all liability for any flood damages resulting from temporary encroachment.
- Unless allowed otherwise elsewhere in this RFP, the Design-Build Team shall replace **all** existing pipes within the existing / proposed right of way of the mainline, and all -Y- Lines, service roads, ramps, loops, and interchange quadrants with the appropriate pipe type, in accordance with the *Drainage Pipe* Project Special Provision found elsewhere in this RFP.

- Unless otherwise required elsewhere in this RFP, greenways, multi-use trails, and other pedestrian facilities, separate from the vehicular roadway, shall be designed with a minimum 2-year design frequency.
- The RCBC portion of the Hill Street culvert system, as well as the dual CMAP at the culvert outlet will remain in place. The Design-Build Team will not be required to meet the HW/D or freeboard requirements specified elsewhere in this RFP for the RCBC portion of the Hill Street culvert system and dual CMAP at the culvert outlet provided there is no increase in the area draining to the culverts, no increase in water surface elevations outside of the culvert system or channel for a 100 year event, and no increase in water surface elevation on any structure. The Design-Build Team shall be required to demonstrate culvert outlet velocities are non-erosive or appropriate mitigation measures are provided to prevent erosion and scour at the culvert outlet.
- The Design-Build Team shall remove or fill with flowable fill all existing pipes not retained for drainage.
- Unless allowed otherwise elsewhere in this RFP, the Design-Build Team shall remove and replace **all** existing drainage boxes with the appropriately sized drainage box.
- A maximum HW/D = 1.2 shall not be exceeded for all existing and proposed box culverts and pipes during the design storm, unless allowed otherwise elsewhere in this RFP.
- The Design-Build Team will not be required to analyze or replace drainage structures within construction limits that consist solely of pavement marking obliterations and / or revisions.
- The Design-Build Team shall not install permanent elliptical pipe. Elliptical pipe will only be allowed in temporary conditions and all elliptical pipes shall be removed prior to final project acceptance.
- The Design-Build Team shall develop discharges for all drainage structures based upon the future build-out land use projections. At a minimum, the Design-Build Team shall use a level of future urbanization with a percent impervious area of no less than 20% throughout the project. The Design-Build Team shall not include the effects of storage when computing discharges for hydraulic design and analysis for areas less than 50% impervious. For drainage areas where impervious surfaces are greater than 50%, routing will be allowed. EPA SWMM, USACE HMS, Win TR-20, HydroCAD or equivalent are acceptable programs for routing. A storm drainage duration of 24 hours shall be used in developing the hydrograph.
- Revise the NCDOT *Pipe Material Selection Guide* as follows:
  - For the Open End Cross Pipes, delete the No. 5 superscript from “Interstate” and “Primary” and add a No. 5 superscript to “Open End Cross Pipes”.
  - Delete Note No. 5 and replace with the following:

- All open-end cross pipes on interstates and primary routes (US and NC routes), including all ramps, loops and interchange quadrants, shall be upsized by a minimum of six inches in diameter above that which would be hydraulically and / or jurisdictionally required. Upsizing shall be in addition to any upsizing required due to burial below the streambed.
- All open-end cross pipes on secondary routes that are beneath a fill height that is equal to or greater than fifteen (15) feet, as measured from the top of the pipe to the corresponding road surface above the pipe, shall be upsized by a minimum of six inches in diameter above that which would be hydraulically and / or jurisdictionally required. Upsizing shall be in addition to any upsizing required due to burial below the streambed.
- All storm drainage systems shall maintain a hydraulic grade line that is a minimum of 0.5 feet below the inlet rim elevation or top of junction box; and shall adhere to all other requirements as identified in Chapter 10 of the NCDOT *Guidelines for Drainage Studies and Hydraulic Design*.
- In the Technical Proposal, Volume II, the Design-Build Team shall provide a *Box Culverts and Cross Pipes Hydraulic Assessment Table* that contains the attributes noted below for all new box culverts and cross pipes 18 inches in diameter or greater:
  - Station
  - Proposed drainage structure details
  - Drainage Area
  - Percent Impervious or “C” value used
  - Discharge method used
  - Built-Out Discharges (Design Year and 100 Year)
  - Water Surface Elevation Natural Condition
  - Water Surface Elevation with Drainage Structure
  - HW/D for Build-out Discharges
  - Hydraulic Freeboard for Build-out Discharges
  - Comments
- Pipes within storm drainage systems that intercept and / or convey any offsite water from one side of a roadway to the other shall be considered a cross pipe if any of the following inlet conditions apply:
  - Open end
  - Berm Drainage Outlet (BDO)
  - Open Throat Catch Basin (OTCB)

The cross pipe designation shall apply to all pipes in the storm drainage system that convey the offsite water flow from the aforementioned inlet to the outlet.

- The minimum pipe size for a drainage pipe crossing a travel lane shall be 18 inches.



- For all proposed cross structures requiring a hydraulically effective waterway opening of thirty square feet or more, excluding any area that is buried below the streambed, a reinforced concrete box culvert shall be required. The minimum reinforced concrete box culvert barrel height (inside dimension) shall be six feet, with a minimum six-foot clear opening height above the streambed. The minimum reinforced concrete box culvert barrel width (inside dimension) shall be six feet.
- Cross drainage shall be conveyed with a single drainage structure (pipe or box culvert) or single drainage structures in series. More than one line of pipe and / or three (3) box culvert barrels serving the same watershed shall not be allowed.
- All proposed drainage boxes, including but not limited to catch basins, drop inlets and junction boxes, shall have a grate or manhole access.
- To ensure that all box culverts retained for drainage purposes are structurally sound, the Design-Build Team shall provide appropriate documentation, in the Department's sole discretion, for the Department's review and approval prior to any hydraulic design submittal. At a minimum, the documentation shall include a video inspection of each box culvert retained for drainage purposes, and a corresponding report. The video inspection shall be performed with a Closed Circuit Television Video (CCTV) steerable pipe crawler / rover that is tethered to a cable reel and capable of capturing 360° views from within the box culvert. The inspection report shall identify the elements noted below for each box culvert retained for drainage purposes:
  - Structural integrity of each joint, in its entirety, including but not limited to joint failure, joint separation and joint offsets
  - Longitudinal, transverse circumferential and multi-directional cracking
  - Spalling
  - Seepage and infiltration into the culvert
  - Culvert failures, including but not limited to differential settlement, material deformation and puncture holes

The Design-Build Team shall also provide the locations of each item noted above, as measured from the outlet of the culvert. If, for any reason, the video inspection or report is incomplete or inconclusive, the Design-Build Team shall perform another inspection and develop another report at no additional cost to the Department. Prior to performing any storm drain clean-out required for the video inspections, the Design-Build Team shall obtain approval from the Engineer. In accordance with Subarticle 104-8(A) of the 2018 *Standards and Specifications for Roads and Structures*, required storm drain clean-out will be paid for as extra work.

As directed by the Engineer, the Design-Build Team shall provide the appropriate structural mitigation for all structurally deficient box culverts. Structural mitigation, for deficiencies in box culverts, including but not limited to all design and repair costs, will be paid for as extra work in accordance with Subarticle 104-8(A) of the 2018 *Standards and Specifications for Roads and Structures*.

### Permit Coordination

- The Design-Build Team shall conduct an interagency hydraulic design review meeting and an interagency permit impacts meeting prior to the final submittal of the environmental permit applications. (Reference the Environmental Permits Scope of Work found elsewhere in this RFP) All work resulting from the interagency hydraulic design review meeting and the interagency permit impacts meeting shall be the Design-Build Team's responsibility. A minimum of five weeks prior to the appropriate interagency meeting, the Design-Build Team shall provide 1) hydraulic plans, 2) permit drawings, calculations, and impact sheets for the USACE 404 Permit and the NCDWR Section 401 Certification to the Design-Build Unit. The Design-Build Team shall take minutes of the interagency hydraulic design review meeting and the interagency permit impacts meeting and provide them to the Department within three business days of the aforementioned meetings.

### Roadway Plans Coordination

- To ensure that all NCDOT hydraulic comments have been addressed, the Design-Build Team shall concurrently submit to the Hydraulics Unit for review and acceptance 1) a copy of the revised 100% Hydraulics Design Plans with the Right of Way / 60% Roadway Plans submittal and 2) a copy of the RFC Hydraulics Design Plans with the 100% Roadway Plans submittal.

### FEMA Regulated Streams

- For all FEMA regulated streams impacted by the Design-Build Team's design and / or construction, the Design-Build Team shall adhere to the current *Guidelines for Drainage Studies* and *Hydraulics Design*, including all addenda, memos and revisions, and the following requirements:
  - The Design-Build Team shall prepare a CLOMR or MOA package for the Department's submittal to the North Carolina Floodplain Mapping Program (NCFMP). The Design-Build Team shall obtain NCFMP approval prior to performing any construction activity in a FEMA regulated floodplain.
  - Where a CLOMR is required, the structure shall be designed such that no more than 0.5 feet of rise occurs between the Corrected Effective and the Revised Conditions for the 100-year water surface elevation.
  - The Design-Build Team shall notify the Design-Build Unit, in writing, of all structures that may require purchase due to an increase in the 100-year water surface elevation. The Department will be responsible for all surveys to ascertain insurable structures within the impacted area of the floodplain(s). The Design-Build Team shall discuss the extent and limits of the rise in water elevation in the floodplain(s), identify potentially impacted insurable structures, specify areas anticipated to require additional surveys and estimate the anticipated additional right of way impacts outside the project construction limits in the Technical Proposal. (Reference the Right of Way Scope of Work found elsewhere in this RFP.)

- The Department will be responsible for all fees associated with the CLOMR(s) and / or MOA(s).
- The Design-Build Team shall ensure that construction and / or removal of all structures in FEMA regulated floodplains adheres to the approved CLOMR(s) and / or MOA(s). Within three months of completion of work in a FEMA-regulated floodplain, the Design-Build Team shall provide As-Built Plans of the site, and a completed As-Built Certification Review Form that verifies construction and / or removal adheres to the approved CLOMR(s) and / or MOA(s).
- The Design-Build Team shall prepare a new FEMA model and / or package and be responsible for all associated costs resulting from any construction variation from the approved CLOMR(s) and / or MOA(s).
- The Department will allow no direct contact between the Design-Build Team and the NCFMP representatives. No contact between the Design-Build Team, the NCFMP and / or personnel under contract with NCFMP shall be allowed by phone, e-mail, or in person, without Department representatives present. A representative from the Design-Build Unit shall be included on all correspondence.
- Temporary impacts due to construction and / or on-site detour traffic that 1) last longer than one year and / or 2) encroach into the floodway, shall be reviewed by the Design-Build Team for changes in the water surface elevations that could impact structures or have adverse impacts to the surrounding property. The results of the review shall be submitted to the Hydraulics Unit in a report format for the Department's coordination with NCFMP.

## General

- The Design-Build Team's design shall be in accordance with the information on the following website, the version of the following references effective on the Technical Proposal submittal date, and the contract requirements contained herein:
  - The North Carolina Division of Highways Hydraulics Unit website:  
  
**<https://connect.ncdot.gov/resources/hydro/pages/default.aspx>**
  - The NCDOT *Guidelines for Drainage Studies and Hydraulics Design*, including all addenda, memos and revisions, excepted as may be amended herein
  - The NCDOT *Best Management Practices for Construction and Maintenance Activities*
  - The NCDOT *Stormwater Best Management Practices Toolbox*
  - The NCDOT *Post-Construction Stormwater Program*

➤ The NCDOT *Design-Build Submittal Guidelines*

- In case of conflicting design parameters, and / or ranges, in the various resources, the proposed design shall adhere to the NCDOT *Guidelines for Drainage Studies and Hydraulics Design*, including all addenda, memos and revisions, unless noted otherwise elsewhere in this RFP.

**ITS SCOPE OF WORK** (7-3-23)**GENERAL**

A pre-design meeting shall take place between the NCDOT Transportation Systems Management & Operations Unit (TSMOU), the Work Zone Traffic Control Group, the Design-Build Team, the Design-Build Unit, the Division Traffic Engineer, the Regional Traffic Engineer, the Statewide Operations Center (STOC) Engineer, Maintenance and Commercialization (OMC) Contractor, and any other pertinent NCDOT personnel. The Department will not review ITS Plan submittals prior to the pre-design meeting.

The Design-Build Team shall coordinate with the Division Traffic Engineer, the Regional Traffic Engineer, the TSMOU, the STOC, the I-2513AC Design Team and the A-0010AA project management team throughout the project duration.

The Design-Build Team shall design, furnish, and install fiber-optic communications, Dynamic Message Signs (DMS), Closed-Circuit Television (CCTV) cameras, and HUB Cabinets within the project limits. The Design-Build Team shall integrate the new fiber, DMS, and CCTV cameras into the “Statewide ITS Network”. Major items of work include, but are not limited to, the following:

- Install fiber-optic cables in new conduit
- Relocate fiber optic communications infrastructure, as required to maintain connectivity
- Install two (2) DMS
- Install six (6) CCTV cameras
- Install one (1) HUB Cabinet
- Junction boxes (electrical and communications)
- Wood and Metal poles
- Electrical service equipment
- Portable CCTV camera assemblies, as identified herein

The Design- Build Team shall furnish and install guardrail and / or concrete barrier to protect temporary and permanent ITS devices and ITS Fiber Hub Cabinets, as required.

Determine the new location of each ITS device, obtain the Engineer’s approval of the location, install the devices and implement test procedures, then integrate the devices into the “Statewide ITS Network”.

Prior to any underground work, locate existing utilities, communications cable, power cable, and adjust work activities to protect these facilities. Immediately cease work and notify the Engineer and the affected owners if damage to existing utilities occurs. Repair damages to existing utilities, communications cable, and / or power cable at no cost to the Department.

Perform all work in accordance with the ITS Project Special Provisions found elsewhere in this RFP, the 2018 NCDOT *Standard Specifications for Roads and Structures*, the 2018 NCDOT *Roadway Standard Drawings*, and the ITS & Signals Project Special Provisions effective on the

Technical Proposal submittal date, found on the NCDOT ITS and Signals Unit Design Resources website below:

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

## **PROJECT OPERATION REQUIREMENTS**

It is the Department's desire to provide uninterrupted traffic incident management and traveler information operations throughout the life of the project. Thus, the Design-Build Team shall identify the approximate location of the new ITS devices and when they will be installed and operational in their permanent location in the Technical Proposal. ITS devices shall not be taken offline or removed unless construction activities require it.

The Design-Build Team shall provide a portable CCTV camera that is integrated with the "Statewide ITS Network" at the permanent CCTV camera locations until a permanent CCTV camera is installed and integrated with the "Statewide ITS Network". The portable CCTV cameras shall be installed and integrated with the "Statewide ITS Network" prior to beginning any activity that will impede the traffic on I-26 and / or I-240. All portable ITS devices shall communicate with the "Statewide ITS Network" by means of a Department supplied cell modem. Portable CCTV camera deployments shall comply with the requirements of the applicable project special provisions found elsewhere in this RFP.

For unplanned disconnections to permanent or temporary ITS devices, where communications cannot be restored within 24 hours, a replacement portable device capable of communicating with the "Statewide ITS Network" shall be provided at no additional cost to the Department. Portable CCTV cameras used at proposed locations shall be in addition to the portable CCTV cameras required for work zone traffic control and incident management during construction. (Reference the Transportation Management Scope of Work found elsewhere in this RFP)

The Design-Build Team shall remove and deliver all wireless radio equipment and cell modems used for portable ITS devices to the Division. Contact Chad Franklin, Regional ITS Engineer, at (828) 299-1494 two weeks in advance to coordinate the delivery of the aforementioned equipment.

The following ICTs apply to all NCDOT ITS and Signal Communications fiber-optic cable.

### **Intermediate Contract Time #1 for Failure to Repair a Damaged NCDOT Fiber Optic Communications Cable and Restore Communication**

The Design-Build Team shall repair all existing fiber optic communication cables damaged during construction. The Design-Build Team shall immediately report damages to the Engineer, NCDOT Division Traffic Engineer and the STOC. The Design-Build Team shall repair all damages within 24 hours at no cost to the Department. The Design-Build Team shall bring all affected NCDOT fiber optic communication cables back online within the same 24 hours. A "damaged" NCDOT fiber optic communications cable is any fiber optic communications cable that is determined damaged due to an accidental or unscheduled outage event.

**Liquidated Damages for Intermediate Contract Time #1 for failure to repair a damaged NCDOT fiber optic communications cable and restore communications within 24 hours are \$500.00 per hour or any portion thereof.**

**Intermediate Contract Times #2 and #3 for Failure to Reestablish NCDOT Fiber Optic Communications After a Disruption**

During construction, the Design-Build Team shall coordinate any disruption in NCDOT fiber optic communications with the Engineer, the NCDOT Division Traffic Engineer and STOC. The Design-Build Team shall notify the Engineer, the NCDOT Division Traffic Engineer and the STOC a minimum of seven days prior to all proposed disruptions in service. A minimum of 21 calendar days prior to any disruption in NCDOT fiber optic communications, the Design-Build Team shall develop and provide a plan for the Department's approval that defines 1) an anticipated disruption timeframe and 2) a plan of action for reestablishing NCDOT communications within 24 hours.

**Liquidated Damages for Intermediate Contract Time #2 for failure to reestablish NCDOT fiber optic communications within 24 hours after a disruption are \$2,500.00 per day or any portion thereof.**

**Liquidated Damages for Intermediate Contract Time #3 for failure to provide a plan that defines 1) an anticipated NCDOT fiber optic communications disruption timeframe and 2) a plan of action for reestablishing NCDOT fiber optic communications a minimum of 21 calendar days prior to a proposed disruption in service are \$10,000.00 per failure.**

**Intermediate Contract Time #4 for Failure to Restore Communication to ITS Devices**

The Design-Build Team shall maintain communications with all permanent and temporary ITS devices integrated with the "Statewide ITS Network". If communication is lost, the Design-Build Team shall restore communication within 24 hours or provide a replacement device at no cost to the Department. If a replacement device is provided, it shall be integrated with the "Statewide ITS Network" within 24 hours.

**Liquidated Damages for Intermediate Contract Time #4 for failure to restore communication to ITS devices or provide a replacement device within 24 hours are \$500.00 per hour or any portion thereof.**

**Intermediate Contract Time #5 and #6 for Failure to Reestablish Dynamic Message Sign Operation**

During construction, the Design-Build Team shall coordinate any disruption in service of an existing Dynamic Message Sign (DMS) with the Engineer, the Division Traffic Engineer, the OMC contractor, and the STOC Supervisor. The Design-Build Team shall notify parties listed above a minimum of seven (7) calendar days prior to all proposed disruptions in service. The Design-Build Team shall reestablish DMS Operation within seventy-two (72) hours, including

full access and control from the STOC and the Regional TMC via fiber optic cable or cellular modem.

A minimum of twenty-one (21) calendar days prior to any disruption in the service of a DMS, the Design-Build Team shall develop and provide a plan for the Department's approval that defines 1) an anticipated disruption timeframe, and 2) a plan of action for reestablishing DMS Operation, including full access and control from the STOC and the Regional TMC via fiber optic cable or cellular modem, within seventy-two (72) hours.

**Liquidated Damages for Intermediate Contract Time #5 failure to reestablish DMS operation within seventy-two (72) hours are Two Thousand Five Hundred Dollars (\$ 2,500.00) per day, or any portion thereof.**

**Liquidated Damages for Intermediate Contract Time #6 failure to provide a plan that defines 1) an anticipated DMS disruption timeframe and 2) a plan of action for reestablishing DMS operation a minimum of twenty-one (21) calendar days prior to a proposed disruption in service are Ten Thousand Dollars (\$ 10,000.00) per failure.**

#### **Intermediate Contract Time #7 and #8 for Failure to Reestablish CCTV Operation**

During construction, the Contractor shall coordinate any disruption in CCTV Operation with the Engineer, the Division Traffic Engineer, the OMC contractor, and the STOC Supervisor. The Design-Build Team shall notify the parties listed above a minimum of seven (7) calendar days prior to all proposed disruptions in service. The Design-Build Team shall reestablish CCTV Operation within twenty-four (24) hours, including full access and control from the STOC and the Regional TMC via fiber optic cable.

A minimum of twenty-one (21) calendar days prior to any disruption in CCTV Operation, the Design-Build Team shall develop and provide a plan for the Department's approval that defines 1) an anticipated disruption timeframe, and 2) a plan of action for reestablishing CCTV Operation, including full access and control from the STOC and the Regional TMC via fiber optic cable, within twenty-four (24) hours.

**Liquidated Damages for Intermediate Contract Time #7 failure to reestablish CCTV Operation within twenty-four (24) hours are Two Thousand Five Hundred Dollars (\$ 2,500.00) per day, or any portion thereof.**

**Liquidated Damages for Intermediate Contract Time #8 failure to provide a plan that defines 1) an anticipated CCTV disruption timeframe and 2) a plan of action for reestablishing CCTV Operation a minimum of twenty-one (21) calendar days prior to a proposed disruption in service are Ten Thousand Dollars (\$ 10,000.00) per failure.**

#### **DESIGN REQUIREMENTS**

The Design-Build Team shall furnish and install all new ITS field equipment for this project.



## Communications

### ➤ NCDOT 96-Fiber ITS Trunk Line

The Design-Build Team shall design, furnish, and install a 96-fiber trunk line along the full length of project along I-240 and I-26. The 96-fiber ITS trunk line shall run expressed between hub cabinets and the project limits and shall not be cut or spliced unless necessary for fiber installation purposes. The Design-Build Team shall label the 96-fiber ITS trunk line cable “NCDOT ITS TRUNK LINE” and store 50 feet of spare 96-fiber ITS trunk line cable in each junction box. Terminate 96-Fiber ITS trunk line in a splice enclosure in a junction box at the project limits.

ITS devices shall **NOT** be spliced into the 96-fiber ITS trunk line.

### ➤ NCDOT 144-Fiber ITS Device Line

The Design-Build team shall design, furnish, and install a 144-fiber ITS device line along the full length of the project along I-240 and I-26. All ITS device drop cables and Signal System connector drops shall be spliced into this device line. The Design-Build Team shall label the 144-fiber cable “NCDOT ITS DEVICE LINE” and store 50 feet of spare 144-fiber device line cable in each junction box. Terminate 144-Fiber ITS device line in a splice enclosure in a junction box at the project limits.

### ➤ NCDOT 12-Fiber Drop Cable

The Design-Build Team shall design, furnish and install 12-fiber drop cables from the 144-fiber ITS device line to each permanent ITS device and to signal system connection locations specified in this RFP. Drop cables shall be spliced into the 144-fiber ITS device line with a splice enclosure. The Design-Build Team shall terminate **ALL** fibers of each drop cable in an interconnect center in each ITS device cabinet.

In all junction boxes and device cabinets, the Design-Build Team shall label the 12-fiber drop cables and their interconnect centers “<DEVICE ID> DROP CABLE” and store 50 feet of spare drop cable.

## Ethernet Edge Switches

The Design-Build Team shall furnish and install Ethernet edge switches in each ITS device cabinet in accordance with the *Ethernet Edge Switch* Project Special Provision found on the NCDOT ITS and Signals Unit Design Resources website. HUB Switches for the HUB cabinet shall be provided, programmed and installed by NCDIT in coordination with the Design-Build Team. Allow eight (8) week lead time when requesting HUB switch installation from NCDIT.

## Cellular Modems

The Department will furnish all cellular modems to be used on the project. The Design-Build Team shall request the modems through the Engineer at least eight (8) weeks prior to scheduled installation.

## CCTV Cameras

The Design-Build Team shall strategically locate and install six (6) CCTV cameras on new 50-foot metal poles at locations that provide optimum viewing. All CCTV camera installations, including equipment cabinets, shall comply with the requirements of the *Metal Pole*, *CCTV Field Equipment Cabinet* and *Digital CCTV Camera Assembly* Project Special Provisions found on the NCDOT ITS and Signals Unit Design Resources website. At locations where CCTV cameras are being installed, all CCTV camera equipment installed shall be new, including but not limited to cabinets, poles and pole grounding systems.

Install one new CCTV camera on a new metal pole at each of the following locations:

- I-26 at NC 251 / SR 1781 (Broadway St.) Exit 25
- I-26 Eastbound at mile marker 26 West side of the curve
- I-26 at I-240 Exit 4 North of Hill St.
- I-240 at Patton Ave. Exit – Former Exit 4B
- I-26 at Patton Ave. – Former I-240 Exit 3A
- I-26 at US 19-23 BUS (Haywood Rd.) – Former I-240 Exit 2

Determine the exact location of each CCTV camera, obtain the Regional ITS Engineer's written approval of the locations, and install the cameras. Furnish site surveys, including but not limited to bucket truck or drone surveys, to ensure camera coverage areas are acceptable.

Install new electrical service equipment at all new CCTV camera locations unless power service is not available. Install solar power assembly equipment at any CCTV camera location where power service is not available. Obtain approval from the Engineer for any solar power location. Comply with the National Electrical Code (NEC), the National Electrical Safety Code (NESC), the 2018 NCDOT *Standard Specification for Roads and Structures*, the project special provisions, and all local ordinances. All work involving electrical service shall be coordinated with the appropriate utility company and the Engineer.

**\*\*NOTE\*\*** Deleted statement requiring design and installation of second 12-fiber drop cable

## Dynamic Message Signs

The Design-Build Team shall strategically locate, design, and install one (1) new and replace one (1) existing pedestal mount DMSs. DMSs shall not be located behind sound barrier walls. Furnish and install new DMS and associated equipment as defined in the Project Special Provisions found elsewhere in this RFP.

Install one DMS at each of the following locations:

- I-26 Westbound south of exit 25 (new)
- I-26 Eastbound former I-240 Westbound mile marker 3 (existing)

The DMSs installed under this project shall be full color DMS selected from the most current version of the NCDOT ITS & Signals Qualified Products List.

Determine the exact location of the DMSs by coordinating with the Engineer. Obtain the Engineer's written approval of the locations and install the DMSs.

Install new electrical service equipment at all new DMS locations. Comply with the National Electrical Code (NEC), the National Electrical Safety Code (NESC), the 2018 NCDOT *Standard Specifications for Roads and Structures*, the Project Special Provisions, and all local ordinances. All work involving electrical service shall be coordinated with the appropriate utility company and the Engineer.

## **HUB Cabinets**

The Design-Build Team shall strategically locate and install one (1) HUB Cabinet. Furnish and install new HUB Cabinet and associated equipment as defined in the Project Special Provisions found elsewhere in this RFP.

Install one HUB cabinet at the following locations.

- I-26 at Patton Ave. – Former I-240 Exit 3

All six (6) new ITS trunk lines listed below shall be terminated in interconnect centers in this HUB Cabinet. Terminate ALL fibers of each cable entering the HUB cabinet in an interconnect center.

- 96-fiber trunk and 144-fiber device lines running North on I-26
- 96-fiber trunk and 144-fiber device lines running East on I-240
- 96-fiber trunk and 144-Fiber device lines running South along I-26

Drop cables to ITS devices within 300 feet of the HUB cabinet can be terminated in the HUB cabinet instead of spliced into the 144-fiber device line cable.

The Design-Build Team shall design and install a 12-fiber drop cable from the new HUB Cabinet at I-26 and Patton Ave. to the nearby 60-fiber cable of the Asheville Signal System.

Determine the exact location of each HUB Cabinet, obtain the Engineer's written approval of the locations, and install the HUB Cabinets.

The Design-Build Team shall coordinate with NCDIT and the Engineer to allow NCDIT to supply and install the HUB Managed Ethernet Switch. The Design-Build Team shall allow for a twelve (12) week lead time when coordinating the installation of the Managed Ethernet Switch.

Install new electrical service equipment at all new HUB Cabinet locations. Comply with the National Electrical Code (NEC), the National Electrical Safety Code (NESC), the 2018 NCDOT *Standard Specification for Roads and Structures*, the project special provisions, and all local ordinances. All work involving electrical service shall be coordinated with the appropriate utility company and the Engineer.

## **MATERIALS & CONSTRUCTION**

Furnish and install new materials and hardware unless stated otherwise elsewhere in this RFP. Adhere to the requirements of the 2018 NCDOT *Standard Specifications for Roads and Structures* and the 2018 NCDOT *Roadway Standard Drawings* and the ITS & Signals Project Special Provisions effective on the Technical Proposal submittal date.

### **CCTV Cameras**

Install each stand-alone CCTV camera on a 50-foot metal pole. Install CCTV equipment in a 336S equipment cabinet mounted on the pole.

Perform all work in accordance with the applicable ITS Project Special Provisions found elsewhere in this RFP and on the NCDOT ITS and Signals Unit Design Resources website, and other standards listed elsewhere in this RFP.

### **Dynamic Message Signs (DMS)**

Install DMSs on a single metal pedestal type structure with ladders, ladder safety cages, platforms, CCTV extension poles (where applicable), and walkways leading to the DMS maintenance access door. The bottom of each DMSs should be 25 feet higher than the highest point of the roadway. Install DMS equipment in an approved equipment cabinet mounted on the structure.

Perform all work in accordance with the applicable ITS Project Special Provisions found elsewhere in this RFP, and other standards listed elsewhere in this RFP.

## Conduit

### ➤ Power Conduit

Furnish and install red conduit for power and all necessary hardware by trenching, plowing or directional drilling in accordance with Section 1715 of the 2018 NCDOT *Standard Specifications for Roads and Structures*. Conduit shall not be placed in the median or under the roadway, (travel lanes and shoulders), except for perpendicular crossings. (Reference the Electrical Service Section below)

## Communications Conduit

Furnish and install:

- Two (2) – 1.25-inch conduits for NCDOT communications lines
  - One blue conduit for the 144-fiber ITS Device Line
  - One orange conduit for the 96-fiber ITS Trunk Line
  - \*\*NOTE\*\* Deleted One orange conduit for spare
- Two (2) – 2-inch conduit for future commercialization
  - Two green conduit with pull tape
- Drop Cable Conduit – Furnish and Install
  - Two (2) 1.25-inch conduits for NCDOT drop cables passing under the roadway
  - One (1) 1.25-inch conduit for NCDOT drop cables not passing under the roadway
  - Drop cable conduits shall be white

Furnish and install conduit for fiber optic communication and all necessary hardware by trenching, plowing or directional drilling in accordance with the project special provisions found elsewhere in this RFP and on the ITS and Signals Unit Design Resources website. Conduit shall not be placed in the median or under the roadway (travel lanes and shoulders), except for perpendicular crossings. **Seal all conduits** as described in the project special provisions found elsewhere in this RFP and on the ITS and Signals Design Resources website.

At interchanges the Design-Build Team shall split the NCDOT conduits and commercialization conduit and place the NCDOT conduits and commercialization conduit in separate junction boxes on one side of the -Y- Line at the interchange ramp terminal. All conduits may share junction boxes between interchanges.

The Design-Build Team shall provide 811 services for newly constructed segments of infrastructure until NCDOT has accepted the infrastructure.

## **Junction Boxes**

### **➤ Electrical**

Furnish and install standard size junction boxes (pull boxes) for electrical services with all necessary hardware in accordance with the *Junction Boxes (Limited Access Facilities)* Project Special Provision found elsewhere in this RFP.

DO NOT bury junction boxes until all appropriate inspections have been conducted.

Provide junction box covers with standard “Electric” logo, pull slots and stainless-steel pins.

### **➤ Communications**

Furnish and install junction boxes (pull boxes) for communications cable with all necessary hardware in accordance with the *Junction Boxes (Limited Access Facilities)* Project Special Provision found elsewhere in this RFP. Provide junction boxes with “mouse holes” to accommodate horizontal conduit entrances into the junction box for fiber installations.

For communications junction boxes installed between interchanges and further than six feet from an ITS device, bury the junction box six inches to eight inches below grade in accordance with the project special provisions found elsewhere in this RFP. Install locate balls and delineator markers at all communications junction boxes in accordance with the project special provisions found elsewhere in this RFP.

DO NOT bury junction boxes until all appropriate inspections have been conducted.

Install communications junction boxes within six feet of the base of each ITS device pole / cabinet and at each hub cabinet.

Every junction box shall house 50 feet of spare cable for each NCDOT cable entering the junction box.

Every junction box with a splice enclosure shall house 50 feet of spare cable for each direction of cables being spliced. (e.g. 50 feet of spare trunk line in each direction and 50 feet of spare drop cable for each drop)

Communications cables and power cables shall NOT share junction boxes.

**Wood Poles**

In accordance with Section 1720 of the 2018 NCDOT *Standard Specifications for Roads and Structures*, furnish and install wood poles, with all necessary grounding systems and hardware necessary. Provide wood poles sized as necessary for the intended application.

- Use 40-foot Class 4 wood poles for approved applications.
- Use 6" x 6" x 8' treated wood posts for underground electrical service structures.

In accordance with Section 1720 of the 2018 NCDOT *Standard Specifications for Roads and Structures*, furnish and install related items of work, including but not limited to risers with weatherheads or heat shrink tubing and all necessary hardware.

**Electrical Service**

Furnish and install new electrical services rated 100 Amps for overhead service or 200 Amps for underground service, 240 / 120 VAC service drops for the each new ITS device. In accordance with Section 1700 of the 2018 NCDOT *Standard Specifications for Roads and Structures*, furnish and install related items of work, including, but not limited to service entrance equipment, service conductors, feeder conductors, disconnects, junction boxes, risers, guy assemblies and wood poles with all necessary hardware. (Reference the Utilities Coordination Scope of Work found elsewhere in the RFP for additional coordination / approval requirements and payment responsibilities)

Electrical Services and Service Disconnects with regards to voltage drop calculations shall be rated to accommodate the following breaker sizes:

- CCTV = 15 AMPS
  - DMS = 50 AMPS
- \*\*NOTE\*\* Deleted Dual DMS = 100 AMPS**

Calculations using actual equipment load amperage shall not be allowed.

**OTHER CODES AND STANDARDS**

All ITS materials shall conform to the latest version of the applicable standards of the National Electrical Code (NEC), National Electric Manufacturer's Association (NEMA), the Underwriters' Laboratories, Inc. (UL), the Electronic Industries Association (EIA), the International Municipal Signal Association (IMSA), and the National Electrical Safety Code (NESC). All materials and workmanship must conform to the requirements of the NESC, standards of the American Society for Testing and Materials (ASTM); American National Standards Institute (ANSI). Comply with all federal laws, state laws, and city codes in accordance with the 2018 NCDOT *Standard Specifications for Roads and Structures*.

## **QUALIFIED PRODUCTS LIST**

Submit a listing of items on the NCDOT 2018 Qualified Products List (QPL) to receive approval for use on the project. Catalog cuts will not be required for items on the QPL. The QPL website is:

**<https://connect.ncdot.gov/resources/safety/Pages/default.aspx>**

For any equipment not on the QPL, the Design-Build Team shall provide product specifications and special provisions, as necessary, for the Department's review and acceptance prior to incorporation.

## **ADDITIONAL REQUIREMENTS**

For all ITS devices and components located in the project limits, the Design-Build Team shall comply with the following requirements:

### **Maintenance and Repair**

The Design-Build Team shall maintain and repair all ITS components within the project limits, including but not limited to, ITS devices, ITS conduit system, and all related ITS components, from the beginning of construction until the final acceptance of the project by the NCDOT. After acceptance of the project, the Design-Build Team shall be responsible for repairing the system due to faulty materials or workmanship in accordance with the *Twelve-Month Guarantee* Project Special Provision found elsewhere in this RFP, or longer if the Design-Build Team extends the aforementioned warranty period.

### **Plan of Record Documentation**

Prepare and submit to the Department Plan of Record (POR) documentation that depicts the conduit and ITS device locations. Submit final POR documentation in electronic and hard copy format for Department approval. Provide electronic plans in MicroStation (latest release in use by the Department). Submit hard copy documentation on 22-inch x 34-inch plan sheets. POR documentation shall include the final location and depth of conduits, wiring external to the cabinets, locations of splice enclosures, junction box locations, and Single Mode Fiber Optics (SMFO) cable terminations. Include in the POR documentation real world coordinates for all ITS devices, splice enclosures, junction boxes, and equipment cabinets installed or utilized under this project. Provide the coordinates in feet units using the North Carolina State Plane coordinate system (1983 North American Datum also known as NAD '83). Furnish coordinates that do not deviate more than 1.7 feet in the horizontal plane and 3.3 feet in the vertical plane. Global positioning system (GPS) equipment able to obtain the coordinate data within these tolerances may be used. All POR documentation described above shall be provided to the Engineer and the NCDOT ITS & Signals Management Section, via the Design-Build Unit.



**Integration**

Upon completion of the ITS device installations, integrate the new devices with the “Statewide ITS Network” and verify command and control connectivity at the STOC. Ensure all existing and new ITS devices along the project corridor remain integrated with the “Statewide ITS Network”.

**Testing**

Develop unit and system test plans and procedures for each ITS device and all associated components and submit to the Engineer for review and approval.

Upon completion of the ITS device installations, conduct unit and system tests according to the approved test plan and procedures. Provide all necessary test equipment.

In case of failures and substandard performance, the Design-Build Team shall identify the cause, repair or replace the faulty parts and components, and repeat the test. If the problem persists, the entire unit causing the problem shall be replaced prior to retest, at no additional cost.

After successful completion of all unit and system tests, submit the test reports along with the record of repairs and part replacements to the Engineer.

**SUBMITTALS**

Submit a set of 60% preliminary plans, 90% unsealed set of project plans, including specifications for materials, catalog cuts, and installation and testing requirements for review. Upon acceptance by the Department, provide a 100% set of sealed plans and specifications to the Department. No construction of the ITS devices shall begin until the Department has accepted the 100% sealed plans and specifications.

**LIGHTING SCOPE OF WORK** (4-18-23)

**\*\* NOTE \*\*** Throughout this Scope of Work, references to the lighting design / plans provided by the Department only refer to roadway lighting, conduit systems and foot lighting systems. The Design-Build Team shall be responsible for all pedestrian lighting designs / plans for the Isaac Dickenson School and Hill Street Pedestrian Bridges.

**EXISTING LIGHTING SYSTEMS**

The Design-Build Team shall remove all existing lighting equipment installed throughout the corridor. Removed equipment shall be disposed of, or delivered to the Department as specified in the Lighting Special Provisions.

**NEW LIGHTING SYSTEMS**

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 2018 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 remove and properly dispose of the existing NCDOT owned lighting throughout the corridor and construct the new roadway lighting and conduit systems 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.

If any design revision, including but not limited to those incorporated at the Department's discretion, those incorporated at the Design-Build Team's discretion and / or those incorporated due to errors or omissions in the Department's preliminary lighting design, results in the removal and / or reduction of lighting equipment from the Preliminary Lighting Plans provided by the Department, all costs associated with the removal and / or reduction of lighting equipment shall be deducted from monies due the Design-Build Team.

After the RFC Roadway Plans have been accepted by the Department, 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 60 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.

Reference the Lighting Project Special Provisions found elsewhere in this RFP for additional requirements.

## **DECORATIVE LIGHTING SYSTEMS**

The Design-Build Team shall provide and install a complete conduit system, including light pole foundations and formed openings, integral to the interior barriers of the Jeff Bowen Bridges in accordance with the Final Lighting Plans provided by the Department. The light poles, fixtures and conductors will be installed by others at a later date.

The Design-Build Team shall provide and install a foot lighting system in the redesigned outer barriers of the Jeff Bowen Bridges in accordance with the Final Lighting Plans provided by the Department. The foot lighting system, in conjunction with the decorative lighting system, shall illuminate the pedestrian ways on each bridge.

Refer to the lighting plans for details. Reference the Structures Scope of Work and the Lighting Special Provisions found elsewhere in this RFP for additional requirements.

## **PEDESTRIAN BRIDGE LIGHTING**

The Design-Build Team shall design, provide and install a pedestrian lighting system on the Hill Street and Isaac Dickenson School Pedestrian Bridges. The pedestrian lighting system shall be integral to the pedestrian bridge structure, shall provide an average 1.0 footcandle calculated 5' above the walking surface with a 3:1 average to minimum uniformity ratio and shall not cause disabling glare to motorists on the interstates below.

Lighting for the Hill Street Pedestrian Bridge shall be owned and operated by the City of Asheville and will require separate electrical service from the roadway lighting systems owned and operated by the Department.

Lighting for the Isaac Dickenson School Pedestrian Bridge shall be owned and operated by the Department. If the load for the pedestrian lighting system designed by the Team does not exceed 6.0 amps (A) at 480 VAC, and the luminaires are rated to operate at 480 VAC, the pedestrian lighting system may be powered from the nearby roadway lighting system. Otherwise, the Design-Build Team shall provide and establish electrical service in the Department's name for the pedestrian lighting system.

## **MAINTENANCE**

Assume responsibility for routine maintenance of the newly installed lighting system(s) for the duration of the contract in accordance with Division 14 of the 2018 NCDOT *Standard Specifications for Roads and Structures*, except as amended below.

NCDOT will assume maintenance responsibility for the completed lighting systems after the project is accepted, and there is no chance of construction-related damage.

The Design-Build Team shall replace any newly installed non-functional lighting system components within the project limits. All luminaires must be fully operational at project acceptance.

**PAVEMENT MANAGEMENT SCOPE OF WORK** (07-7-23)**I-26 Pavement Designs West of the French Broad River**

I-2513B from the tie to the I-2513AC project limits (approximate Station 10+00 -LB1-) to the French Broad River (approximate station 75+00 -LB-) the Design-Build Team shall construct the I-26 travel lanes with the following pavement design:

Next Generation Concrete Surface Grinding  
12.0" doweled jointed concrete  
Nonwoven Geotextile Drainage Interlayer \*  
1.25" S9.5B  
Aggregate Subgrade Stabilization, Type 2

\* The Nonwoven Geotextile Drainage Layer shall be in accordance with the *Nonwoven Geotextile Interlayer* Project Special Provision found elsewhere in this RFP. The Nonwoven Geotextile Drainage Interlayer and the S9.5B layer shall extend to the shoulder drains.

For each direction of travel, the interstate concrete pavement structure width shall extend one-foot into the interstate outside paved shoulder. The transverse joints shall be uniformly spaced 15 feet apart.

In accordance with the *Next Generation Concrete Surface (CGCS) Grinding* Project Special Provision found elsewhere in this RFP, the Design-Build Team shall diamond grind the new concrete pavement.

**I-26 Full-Depth Median Shoulder and I-26 Full Depth  
Outside Shoulder Pavement Design**

The pavement design for the I-26 median paved shoulder and the I-26 outside paved shoulder shall consist of the following:

3.0" S9.5C  
4.0" I19.0C  
5.0" B25.0C  
Nonwoven Geotextile Drainage Layer \*  
1.25" S9.5B  
Aggregate Subgrade Stabilization, Type 2

The I-26 outside paved asphalt shoulder shall be 11 feet wide.

### **I-240EB and I-240WB Pavement Designs West of the French Broad River**

From the I-2513B project limits where I-240 diverges from I-26 to the French Broad River (approximate station 41+00 -240EB- and 34+00 -240WB-) the Design-Build Team shall construct I-240EB and I-240WB with the following pavement design.

Next Generation Concrete Surface Course Grinding

9.5" doweled jointed concrete

Nonwoven Geotextile Drainage Interlayer \*

1.25" S9.5B

Subgrade Stabilization

\* The Nonwoven Geotextile Drainage Layer shall be in accordance with the *Nonwoven Geotextile Interlayer* Project Special Provision found elsewhere in this RFP. The Nonwoven Geotextile Drainage Interlayer and the S9.5B layer shall extend to the shoulder drains.

For each direction of travel, the I-240EB and I-240WB concrete pavement structure width shall extend one-foot into the I-240EB and I-240WB outside paved shoulder. The transverse joints shall be uniformly spaced 15 feet apart.

In accordance with the *Next Generation Concrete Surface Course (NGCS) Grinding* Project Special Provision found elsewhere in this RFP, the Design-Build Team shall diamond grind the new concrete pavement.

### **I-240EB and I-240WB Full-Depth Median Shoulder and Full Depth Outside Shoulder Pavement Design**

The pavement design for the, I-240EB and I-240WB median paved shoulder and the I-240EB and I-240WB outside paved shoulder shall consist of the following:

3.0" S9.5C

2.5" I19.0C

4.0" B25.0C

Nonwoven Geotextile Drainage Layer \*

1.25" S9.5B

Subgrade Stabilization

The I-240EB and I-240WB outside paved asphalt shoulder shall be 11 feet wide.

### **I-26 Pavement Designs East of the French Broad River**

The pavement design for the I-26 travel lanes, the I-26 median shoulders and the I-26 outside shoulders shall consist of one of the following alternatives from the end of the bridge(s) over the

French Broad River (approximate Station 95+00 -LB-) to NC 251 / SR1781 (Broadway Street). The Design-Build Team shall specify the pavement alternate chosen in the Technical Proposal.

## **ALTERNATE 1 – CONCRETE PAVEMENT (ASPHALT SHOULDERS)**

### **I-26 Travel Lane Pavement Design**

The pavement design for the I-26 travel lanes shall consist of the following:

Next Generation Concrete Surface Grinding  
 11.0" doweled jointed concrete  
 Nonwoven Geotextile Drainage Interlayer \*  
 1.25" S9.5B  
 Subgrade Stabilization

\* The Nonwoven Geotextile Drainage Layer shall be in accordance with the *Nonwoven Geotextile Interlayer* Project Special Provision found elsewhere in this RFP. The Nonwoven Geotextile Drainage Interlayer and the S9.5B layer shall extend to the shoulder drains.

For each direction of travel, the I-26 concrete pavement structure width shall extend one-foot into the I-26 outside paved shoulder. The transverse joints shall be uniformly spaced 15 feet apart.

In accordance with the *Next Generation Concrete Surface (NGCS) Grinding* Project Special Provision found elsewhere in this RFP, the Design-Build Team shall diamond grind the new concrete pavement.

### **I-26 Full-Depth Median Shoulder and I-26 Full Depth Outside Shoulder Pavement Design**

The pavement design for the I-26 median paved shoulder and the I-26 outside paved shoulder shall consist of the following:

3.0" S9.5C  
 4.0" I19.0C  
 4" B25.0C  
 Nonwoven Geotextile Drainage Layer \*  
 1.25" S9.5B  
 Subgrade Stabilization

The I-26 outside paved asphalt shoulder shall be 11-feet wide.

## **ALTERNATE 2 – ASPHALT PAVEMENT (FULL-DEPTH ASPHALT)**

### **I-26 Travel Lane, Median Shoulder and Outside Shoulder Pavement Design**

The pavement designs for the I-26 travel lane, median and outside shoulders shall consist of the following:

**I-26 Travel Lane Pavement Design**

Ultra-Thin Bonded Wearing Course (UTBWC)

3.0" S9.5D

4.0" I19.0C

6.0" B25.0C

Subgrade Stabilization

The UTBWC shall extend 6.0" onto the median and outside shoulders.

**I-26 Median Shoulder and Outside Shoulder Pavement Design**

3.0" S9.5D

4.0" I19.0C

6.0" B25.0C

Subgrade Stabilization

**ALTERNATE 3 – ASPHALT PAVEMENT (AGGREGATE BASE COURSE)**

**I-26 Travel Lane, Median Shoulder and Outside Shoulder Pavement Design**

The pavement designs for the I-26 travel lane, median and outside shoulder shall consist of the following:

**I-26 Travel Lane Pavement Design**

UTBWC

3.0" S9.5D

4.0" I19.0C

3.0" B25.0C

8.0" ABC

Subgrade Stabilization

The UTBWC shall extend 6.0" onto the median and outside shoulders.



**I-26 Median Shoulder and Outside Shoulder Pavement Design**

3.0" S9.5D  
4.0" I19.0C  
3.0" B25.0C  
8.0" ABC  
Subgrade Stabilization

**ALTERNATE 4 – ASPHALT PAVEMENT (CEMENT TREATED AGGREGATE  
BASE COURSE)****I-26 Travel Lane, Median Shoulder and Outside Shoulder Pavement Design**

The pavement designs for the I-26 travel lane, median and outside shoulder shall consist of the following:

**I-26 Travel Lane Pavement Design**

UTBWC  
3.0" S9.5D  
4.0" I19.0C  
8.0" CTBC  
Subgrade Stabilization

The UTBWC shall extend 6.0" onto the median and outside shoulders.

**I-26 Median Shoulder and Outside Shoulder Pavement Designs**

3.0" S9.5D  
4.0" I19.0C  
8.0" CTBC  
Subgrade Stabilization

Cement treated base course shall be in accordance with the *Cement Treated Base Course Project Special Provision* found elsewhere in this RFP.

**I-240 Pavement Designs East of the French Broad River**

The pavement design for the I-240 travel lanes, the I-240 median shoulders and the I-240 outside shoulders shall consist of one of the following alternatives from the end of the Bridges (approximate station 10+00 -240 REV2-) to the end of the project (approximate station 45+00 -240 REV2-). The Design-Build Team shall specify the pavement alternate chosen in the Technical Proposal.

**ALTERNATE 1 – CONCRETE PAVEMENT (ASPHALT SHOULDERS)****I-240 Travel Lane Pavement Designs**

The pavement design for the I-240 travel lanes shall consist of the following:

Next Generation Concrete Surface Grinding  
9.5" doweled jointed concrete  
Nonwoven Geotextile Drainage Interlayer \*  
1.25" S9.5B  
Subgrade Stabilization

\* The Nonwoven Geotextile Drainage Layer shall be in accordance with the *Nonwoven Geotextile Interlayer* Project Special Provision found elsewhere in this RFP. The Nonwoven Geotextile Drainage Interlayer and the S9.5B layer shall extend to the shoulder drains.

For each direction of travel, the I-240 concrete pavement structure width shall extend one-foot into the I-240 outside paved shoulder. The transverse joints shall be uniformly spaced 15 feet apart.

In accordance with the *Next Generation Concrete Surface (NGCS) Grinding* Project Special Provision found elsewhere in this RFP, the Design-Build Team shall diamond grind the new concrete pavement.

**I-240 Full-Depth Median Shoulder and I-240 Full Depth Outside Shoulder Pavement Design**

The pavement design for the, I-240 median paved shoulder and the I-240 outside paved shoulder shall consist of the following:

3.0" S9.5C  
2.5" I19.0C  
4.0" B25.0C  
Nonwoven Geotextile Drainage Layer \*  
1.25" S9.5B Subgrade Stabilization

The I-240 outside paved asphalt shoulder shall be 11 feet wide.

**ALTERNATE 2 – ASPHALT PAVEMENT (FULL-DEPTH ASPHALT)****I-240 Travel Lane, Median Shoulder and Outside Pavement Shoulder Designs**

The pavement designs for the I-240 travel lane, median and outside pavement shoulders shall consist of the following:

**I-240 Travel Lane Pavement Design**

Ultra-Thin Bonded Wearing Course (UTBWC)

3.0" S9.5D

4.0" I19.0C

4.0" B25.0C

Subgrade Stabilization

The UTBWC shall extend 6.0" onto the median and outside shoulders.

**I-240 Median Shoulder and Outside Pavement Design**

3.0" S9.5D

4.0" I19.0C

4.0" B25.0C

Subgrade Stabilization

**ALTERNATE 3 – ASPHALT PAVEMENT (AGGREGATE BASE COURSE)****I-240 Travel Lane, Median Shoulder and Outside Shoulder Pavement Designs**

The pavement designs for the I-240 travel lane, median and outside shoulder shall consist of the following:

**I-240 Travel Lane Pavement Design**

UTBWC

3.0" S9.5D

4.0" I19.0C

8.0" ABC

Subgrade Stabilization

The UTBWC shall extend 6.0" onto the median and outside shoulders.

**I-240 Median Shoulder and Outside Shoulder Pavement Design**

3.0" S9.5D  
4.0" I19.0C  
8.0" ABC  
Subgrade Stabilization

**ALTERNATE 4 – ASPHALT PAVEMENT (CEMENT TREATED AGGREGATE  
BASE COURSE)****I-240 Travel Lane, Median Shoulder and Outside Shoulder Pavement Designs**

The pavement designs for the I-240 travel lane, median and outside shoulder shall consist of the following:

**I-240 Travel Lane Pavement Design**

UTBWC  
3.0" S9.5D  
4.0" I19.0C  
8.0" CTBC  
Subgrade Stabilization

The UTBWC shall extend 6.0" onto the median and outside shoulders.

**I-240 Median Shoulder and Outside Shoulder Pavement Design**

3.0" S9.5D  
4.0" I19.0C  
8.0" CTBC  
Subgrade Stabilization

Cement treated base course shall be in accordance with the *Cement Treated Base Course* Project Special Provision found elsewhere in this RFP.

**\*\*NOTE\*\*** Deleted section on I-26 Pavement Designs from the beginning of the project to the I-26 bridges north of Patton Avenue.

**OTHER REQUIREMENTS**

For concrete alternates, unless noted otherwise elsewhere in this RFP, all longitudinal joints shall be located on a lane line or lane midpoint. Solely to shift a longitudinal joint to one of the aforementioned locations, a maximum 840-foot transition, that locates the longitudinal joint elsewhere, will be allowed. The Design-Build Team shall indicate in the Technical Proposal how longitudinal joints will be located on a lane line or lane midpoint.

In accordance with the requirements noted below, the I-26, I-240 and Y-lines that require subgrade stabilization shall consist of chemical stabilization or Class IV stabilization. The Design-Build Team shall specify the proposed I-26 and I-240 subgrade stabilization, or combination, with approximate limits of each type clearly noted in the Technical Proposal. However, only one subgrade stabilization alternate shall be used across the full typical section width, in a given direction, and shall be used for a minimum 1000-foot length.

- Chemical stabilization shall be to a minimum depth of 8 inches for lime and 7 inches for cement. The type of subgrade stabilization and the amount of stabilizing agent shall be determined in accordance with the *Cement and Lime Stabilization of Sub-grade Soils* Project Special Provision found elsewhere in this RFP.
- Class IV stabilization shall be in accordance with the *Aggregate Subgrade in Lieu of Chemical Stabilization* Standard Special Provision found elsewhere in this RFP.

Other pavement designs for this project shall be as listed in the below:

### Ramps / Loops

LINE	Surface	Intermediate	Base	Stab
Y7RPA, Y7RPB, Y7RPC, 7RPD, Y7RPAA, Y7RPDD, Y16C, RP6A, RP6D, RP6B, Y23E, Y23F <b>**NOTE** Deleted US 19-23NB</b> <b>**NOTE** Deleted US 19-23SB</b>	3.0" S9.5C	4.0" I19.0C	3.0" B25.0C	Yes

### US 19-23 NB, US 19SB Travel Lanes and Shoulder Design Options

For US 19-23NB and US 19-23SB, the pavement design types (asphalt or concrete), for the travel lanes and shoulders, shall be chosen based on the design types chosen for I-26 and I-240. If both I-26 and I-240 are concrete, then US 19-23NB and US 19-23SB shall be concrete with the design shown in the table below. If either or both I-26 and I-240 are asphalt, then US 19-23NB and US 19-23SB shall be asphalt with the design shown in the table below.

Pavement Type	Travel Lanes and Median and Outside Shoulders
Asphalt with Asphalt Shoulders	UTBWC 3.0" S9.5C 4.0" I19.0C 3.0" B25.0C Subgrade Stabilization

The UTBWC shall extend 6.0" onto the median and outside shoulders.

<b>Pavement Type</b>	<b>Travel Lanes</b>	<b>Median and Outside Shoulders</b>
Concrete with Concrete Shoulders	Next Generation Concrete Surface Grinding 9.5" Dowelled Jointed Concrete Pavement Nonwoven Geotextile Interlayer * 1.25" S9.5B Subgrade Stabilization	9.5" Undowelled Jointed Concrete Pavement Nonwoven Geotextile Interlayer * 1.25" S9.5B Subgrade Stabilization

<b>Pavement Type</b>	<b>Travel Lanes</b>	<b>Median and Outside Shoulders</b>
Concrete with Asphalt Shoulders	Next Generation Concrete Surface Grinding 9.5" Jointed Concrete Pavement Nonwoven Geotextile Interlayer * 1.25" S9.5B Subgrade Stabilization	3.0" S9.5C 2.5" I19.0C 4.0" B25.0C Nonwoven Geotextile Interlayer * 1.25" S9.5B Subgrade Stabilization

\* The Nonwoven Geotextile Drainage Layer shall be in accordance with the *Nonwoven Geotextile Interlayer* Project Special Provision found elsewhere in this RFP. The Nonwoven Geotextile Drainage Interlayer and the S9.5B layer shall extend to the shoulder drains.

For the concrete with asphalt shoulder alternate, for each direction of travel, the US 19-23NB and US 19-23SB concrete pavement structure width shall extend one-foot into the US 19-23NB and US 19-23SB outside paved shoulder. The US 19-23NB and US 19-23SB outside paved asphalt shoulder shall be 11 feet wide.

The transverse joints shall be uniformly spaced 15 feet apart.

In accordance with the *Next Generation Concrete Surface (NGCS) Grinding* Project Special Provision found elsewhere in this RFP, the Design-Build Team shall diamond grind the new concrete pavement.

**Remaining Y Lines**

LINE	Surface	Intermediate	Base	Stab
Y7 (Patton Ave), Y7 EB (Patton Ave), Y7 WB (Patton Ave)	3.0" S9.5C	4.0" I19.0C	4.0" B25.0C	No
Y6 (Haywood Rd), Y24 (Resort Dr.), Y25 (Atkinson St.), Y28, Y28A, Y29 (Regent Park Blvd), Y30 (Hazel Mill Rd.), Y31 (Isaac Dickson Elementary School), Y32 (Hill St), Y36 (Riverside Dr)	3.0" S9.5B	4.0" I19.0C	4.0" B25.0C	No
Y34 (Greene St) Cul-de-Sacs	1.5" S9.5B	-	4.0" B25.0C	No
Aycock School Bus Turn-Around, Aycock School Drive Through and Parking Lot	3.0" S9.5B	-	4.0" B25.0C	No

LINE	
Aycock School Dumpster Pad	6.0" Concrete with welded wire mesh size 4x4 W3.5xW3.5 or 6x6 W5xW5 4.0" ABC

For the -Y- Lines, ramps, and loops pavement designs noted in the tables above, the Design-Build Team may substitute an ABC layer for the asphalt base course layer. If such an alternative is proposed, the thickness of the ABC layer, used as a substitute for the asphalt base course layer, shall be equal to twice the proposed asphalt base course thickness specified for the roadway. If an asphalt surface course is placed directly on an ABC layer, the Design-Build Team shall apply prime coat over the ABC layer.

The Design-Build Team shall maintain the same pavement design throughout the -Y- Line, ramp, and loop, construction limits. In the Technical Proposal, the Design-Build Team shall specify the base option chosen (ABC or asphalt) for all -Y- Lines, ramps, and loops.

For Y7, the Design-Build Team shall mill the existing asphalt 1.5" and replace with 1.5" S9.5C.

For Y7EB and Y7WB, the Design-Build Team shall mill the existing UTBWC then replace with UTBWC.

Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall resurface the existing pavement of all -Y- Lines and ramps with a minimum depth that equals the full thickness of the surface course as provided in the table above. (Reference the Roadway Scope of Work found elsewhere in this RFP).

Throughout the construction limits that consist solely of pavement marking obliterations and / or revisions, the Design-Build Team shall uniformly overlay the existing pavement with a pavement depth that equals half the full thickness of the surface course as provided in the tables above. For all roadway sections shown on the *I-2513 B&D, Emma, Clingman and Broadway Resurfacing Limits* map provided by the Department, the Design-Build Team shall uniformly mill 1.5" of the existing pavement and replace with 1.5" S9.5B.

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

For all greenways, the pavement design shall consist of 3.0" of S9.5B, 6.0" of ABC.

Longitudinal joints of all surface course layers shall not be located in the final traffic pattern wheel path. If applicable, the Design-Build Team shall indicate in the Technical Proposal where all underlying longitudinal joints will be located and demonstrate how the underlying longitudinal joint location will minimize reflective cracking.

Unless noted otherwise elsewhere in this RFP, the minimum widened width shall be six feet. The minimum widened width may be reduced to four feet only if the Design-Build Team demonstrates that their equipment properly compacts narrow widening and obtains prior Department written approval. Tapers that tie proposed pavement to existing pavement are excluded from the narrow widening requirements noted above.

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.



Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall pave from 1) the edge of all paved shoulders to the face of all single face barrier / guardrail, excluding median locations that the NCDOT Roadway Standard Drawings do not require paving to the face of guardrail 2) from the edge of all paved shoulders to the edge of all expressway / shoulder berm gutter and 3) from the edge of all paved shoulders to the face of proposed retaining walls and sound barrier walls located on the outside shoulder with 6" of ABC (or 4" B25.0C), a split seal and at least two lifts of surface course. If a split seal is not used, the ABC pavement design shall require prime coat at the normal application rate. In these areas, the Design-Build Team's installation of ABC or black base shall be consistent with the pavement type for the specific roadway. As an alternative to the above pavement design for paving the shoulders to the face of the aforementioned features, the Design-Build Team may use the adjacent travel lane pavement design.

The Design-Build Team shall place a minimum of 6" of ABC or 4" B25.0C under all single face barrier, expressway / shoulder berm gutter, curb and gutter, and concrete truck aprons.

All driveways, up to the radius point, shall be constructed with the full-depth pavement design of the intersecting roadway. The entire impacted length of all non-concrete driveways with a 10% grade shall be constructed with 1.5" S9.5B (or S9.5C) and 8" ABC with prime coat. Unless otherwise noted above, the Design-Build Team shall adhere to the following for all driveway construction:

- For existing gravel and soil driveways, use 8" ABC
- For existing asphalt driveways, use 1.5" S9.5B (or S9.5C) and 8" ABC with prime coat
- For existing concrete driveways, use 6" jointed concrete reinforced with woven wire mesh

The Design-Build Team shall be responsible for the design of all temporary pavements and for the evaluation of existing shoulders and roadways regarding their suitability for carrying traffic during construction, if necessary. In the event that the existing shoulders and / or roadways are found to be inadequate for the proposed temporary traffic volumes and durations, the Design-Build Team shall be responsible for upgrading the pavement to an acceptable level. Temporary pavements shall be designed in accordance with the NCDOT Pavement Design Procedure, AASHTO 1993 Method dated January 4, 2019. Temporary pavement designs and associated calculations shall be submitted for review and acceptance using the Design-Build submittal process prior to incorporation. The expected duration for traffic on temporary pavement must be included as part of the submittal.

The rate of application and the maximum and minimum thickness per application and layer shall be in accordance with the NCDOT Roadway Design Manual.

Excluding the high side of superelevated sections, the Design-Build Team shall design and construct continuous median and outside shoulder drains and outlets for the I-26 / I-240 and I-26 concrete pavement alternates.

Excluding the high side of superelevated sections, the Design-Build Team shall design and construct median and outside shoulder drains and outlets at the locations noted below for the I-26 / I-240 and I-26 asphalt pavement alternates:

- Throughout crest vertical curves located in cut sections
- Throughout all sag vertical curves
- Where the grade is less than 1%.

Where installed on the outside shoulder, outlets shall be provided approximately every 300 feet. Where installed on the median shoulder, outlet locations shall not exceed 500 feet, and all outlets shall be located at drainage structures. Shoulder drains shall be placed to drain the entire pavement structure. The shoulder drain design and outlet locations shall be submitted to the Design-Build Unit for review and acceptance.

When a resurfacing grade ties to an existing curb, bridge and / or pavement, the Design-Build Team shall perform incidental milling such that the new pavement ties flush with the existing feature(s). When tying to the aforementioned feature(s), the Design-Build Team shall not reduce the minimum required surface layer pavement thickness noted above. At existing pavement ties, the Design-Build Team shall perform incidental milling for a minimum distance of 25 feet at bridges and six feet at curb sections. The Design-Build Team shall not perform incidental milling more than 72 hours prior to placement of the asphalt surface layer.

### **ALTERNATIVE TECHNICAL CONCEPTS**

Alternative Technical Concepts (ATC) that provide an alternate pavement design will be considered subject to the following restrictions:

- ATCs on pavement design will be permitted on I-26 and I-240 travel lanes and shoulders only and shall not be submitted until after issuance of the Second Industry Draft Request for Proposals. ATC's on pavement design will not be permitted on the I-26/I-240 section.
- Unless noted otherwise elsewhere in this RFP, the pavement design in the ATC shall be determined using the method in the NCDOT Pavement Design Procedure, AASHTO 1993 Method dated January 4, 2019.
- The pavement design in the ATC shall be signed and sealed by a professional engineer registered in the State of North Carolina that has experience in pavement design. The ATC submittal shall include a brief resume or description of the designer's pavement design experience.
- For all incorporated ATC pavement designs, the Design-Build Team shall include in the Technical Proposal a minimum three-year extension of the 12-month guarantee. (Reference the *Twelve Month Guarantee* Project Special Provision found elsewhere in this RFP)

- The I-26 and I-240 pavement design in the ATC shall adhere to the design parameters noted below.

## 1. Asphalt Pavement

- In accordance with the requirements noted below, all asphalt pavement designs shall include subgrade stabilization that consists of chemical stabilization or Class IV stabilization as noted below:
  - Chemical stabilization shall be to a minimum depth of 8 inches for lime and 7 inches for cement. The type of subgrade stabilization and amount of stabilizing agent shall be determined in accordance with the *Cement and Lime Stabilization of Sub-grade Soils* Project Special Provision found elsewhere in this RFP.
  - Class IV stabilization shall be in accordance with the *Aggregate Subgrade in Lieu of Chemical Stabilization* Standard Special Provision found elsewhere in this RFP.
  - Only one subgrade stabilization alternate shall be used across the full typical section width, in a given direction, and shall be used for a minimum 1000-foot length.
- Full Depth Asphalt
  - I-26 - Minimum 13.0" thickness
  - I-240 - Minimum 11.0" thickness
- Asphalt on ABC
  - I-26 - Minimum 10.0" asphalt thickness
  - I-26 – Minimum 8.0" ABC thickness
  - I-240 – Minimum 7.0" Asphalt thickness
  - I-240 – Minimum 8.0" thickness
- Asphalt on CTBC I-26 and I-240
  - Minimum 7.0" asphalt thickness
  - 8" CTBC thickness – Cement treated base course shall be in accordance with the *Cement Treated Base Course* Project Special Provision found elsewhere in this RFP.

## 2. Concrete Pavement

- In accordance with the requirements noted below, all concrete pavement designs shall include subgrade stabilization that consist of chemical stabilization or Class IV stabilization:
  - Chemical stabilization shall be to a minimum depth of 8 inches for lime and 7 inches for cement. The type of subgrade stabilization and amount of stabilizing agent shall be determined in accordance with the *Cement and Lime Stabilization of Sub-grade Soils* Project Special Provision found elsewhere in this RFP.
  - Class IV stabilization shall be in accordance with the *Aggregate Subgrade in Lieu of Chemical Stabilization* Standard Special Provision found elsewhere in this RFP.
- Full Depth Concrete
  - I-26 - Minimum 11.0" concrete thickness
  - I-240 - Minimum 9.5" concrete thickness
  - Uniform 15-foot joint spacing
  - Base shall be non-erodible and shall include a permeable drainage layer and a separator layer below the drainage layer (must drain the pavement structure while protecting the subgrade from moisture)

ATCs complying with the above restrictions will be evaluated by a technical review panel in accordance with the usual ATC process with the exception that the NCDOT reserves the right to engage a recognized pavement design expert to assist with the ATC evaluations. (Reference the *Alternative Technical Concepts and Confidential Questions* Project Special Provision found elsewhere in this RFP)

**PAVEMENT MARKINGS SCOPE OF WORK** (4-18-23)**General**

The Design-Build Team shall prepare Pavement Marking 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>**

- Signing and Delineation Unit Procedures Manual

**<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)**

- *Guidelines for Preparation of Signing and Final Pavement Marking Plans for Design-Build Projects*

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

- *Design-Build Submittal Guidelines*

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

- NCDOT *Standard Specifications for Roads and Structures*

- NCDOT *Roadway Standard Drawings*

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.

**Final Pavement Marking Plan Requirements**

The Design-Build Team shall select a Private Engineering Firm (PEF) that has experience designing and sealing Pavement Marking Plans for NCDOT on comparable projects. The

Design-Build Team shall list projects in the Technical Proposal, including description and similarity to the subject project, for which the PEF developed Pavement Marking Plans.

The Design-Build Team shall develop Pavement Marking Plans that maintain all types of traffic (motorists, bicyclists, and pedestrians within the highway, including persons with disabilities, in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) as defined by the *Manual for Uniform Traffic Control Devices* (MUTCD).

If sidewalk is constructed, the Design-Build Team shall show and station all curb ramps in the Pavement Marking Plans for signalized intersections, non-signalized intersections and points of pedestrian crossings. Curb ramps shall be constructed per current ADA standards and with guidance from the 2018 NCDOT Roadway Standard Drawings. If the roadway geometry does not allow for the use of standard details, contact the Contract Standards and Development Unit for alternate approved curb ramp designs.

### **Final Pavement Marking Project Limits**

The Design-Build Team shall install all pavement markings and markers located within and outside the project limits, resulting from the project construction. The Final Pavement Marking Plans shall address all required modifications to existing pavement markings and markers located outside the project limits to ensure appropriate tie-ins. At a minimum, the Design-Build Team shall modify existing pavement markings and markers located outside the project limits to ensure that all lanes in each direction are open to traffic.

### **Pavement Markings, Markers and Delineation**

The Design-Build Team shall submit a complete set of Final Pavement Marking Plans that includes the -L- Line, and all -Y- Lines, ramps / loops, and service roads for review and acceptance. The Design-Build Team shall not place any final pavement markings or markers until the aforementioned Final Pavement Marking Plans are reviewed and accepted by the Department.

The Design-Build Team shall coordinate with the Transportation Management Plans for necessary traffic control devices that will remain at the completion of the project.

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 Products List shall require written approval from the NCDOT Signing and Delineation Unit prior to incorporation.

The Design-Build Team shall install pavement markings and markers in accordance with the 2018 NCDOT *Standard Specifications for Roads and Structures*, and in accordance with the manufacturer's procedures and specifications.

In accordance with the NCDOT Roadway Standard Drawing No. 1205.08, Sheet 1 of 8, and guidance found on the Signing and Delineation Unit's webpage, the Design-Build Team shall install wrong-way ramp arrow pavement markings and markers on all exit ramps / loops.

The Design-Build Team shall install longitudinal pavement markings and pavement markers on the final surface as follows:

Road	Marking	Marker
Asphalt Surfaces	Thermoplastic with Standard Glass Beads	<b>Roadways</b> <ul style="list-style-type: none"> <li>• Non-Cast Iron Snowplowable markers on mainline, ramps and loops</li> <li>• Match existing on all other roadways</li> </ul> <b>Bridge Decks</b> <ul style="list-style-type: none"> <li>• Raised markers on mainline, ramp and loop bridge decks</li> <li>• Match existing on -Y- Line bridge decks</li> </ul>
Concrete Surfaces	Polyurea with Standard Glass Beads	
Bridge Decks	Cold Applied Plastic or Polyurea with Standard Glass Beads	

Tubular Markers shall be installed along four-foot buffer area along I-26 EB between Patton Ave exit and I-240 EB exit.

The City of Asheville has been approved to use green colored pavement in marked bike lanes and bike lane extensions, citywide. The Design-Build Team shall coordinate with the City and the Department when determining the locations to install the green colored pavement. The green colored pavement shall be installed in accordance with the NCDOT Roadway Standard Drawing No. 1205.16, Sheets 1-9, found on the Signing and Delineation Unit's webpage.

In accordance with the Black - White Combination (10' White Skip Lines / 10' Black Skip Lines) Detail provided by the Department and the *Black Epoxy Pavement Marking Material* Project Special Provision found elsewhere in this RFP, the Design-Build Team shall place black epoxy contrast markings on concrete pavement.

On concrete surfaces, the Design-Build Team shall install Heated-in-Place Thermoplastic or Cold Applied Plastic (Type II or III) markings for stop bars, symbols, characters, crosswalks, and diagonals.

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.

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 where pavement markings will be installed.

On all Full Control of Access interstate facilities and US Routes the Design-Build Team shall install six-inch wide pavement markings, (i.e., lane 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.

Using approved methods, the Design-Build Team shall remove residue and surface laitance on concrete bridge decks prior to placing final pavement marking materials. In accordance with approved methods and the 2018 NCDOT *Standard Specifications for Road and Structures*, the Design-Build Team shall remove curing compound from all other concrete surfaces prior to placing final pavement marking materials.

The Design-Build Team shall only remove pavement markings from asphalt surfaces by grinding.

The Design-Build Team shall only remove pavement markings from concrete surfaces by hydroblasting.

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.



**PUBLIC INVOLVEMENT AND INFORMATION SCOPE OF WORK** (3-2-23)**General**

NCDOT will take the lead role on this project and be responsible for a portion of the public involvement and information efforts, through the Department's Public Involvement Group and Communications Office, respectively. At a minimum, the Design-Build Team shall designate a contact for public involvement and information inquiries / coordination.

The Design-Build Team shall hold an initial project coordination meeting with NCDOT at least six weeks prior to the start of construction to discuss project impacts to the public. This information will be used by the Department to create a Public Involvement and Information Plan.

The Design-Build Team shall prepare all required corridor and design public hearing maps in accordance with the Public Involvement Map Information Guide and the Corridor Public Hearing Map Checklist and / or Design Public Hearing Map Checklist located at the following website:

**<https://connect.ncdot.gov/projects/Roadway/Pages/Guidelines--Standards.aspx>**

The Department will develop, with assistance from 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 affected by the project
- County / City school systems
- Any other organization as deemed necessary by the Department.

The Department will be responsible for establishing, creating, maintaining and updating a project website. However, throughout the project duration, the Design-Build Team shall coordinate public involvement activities with the NCDOT Public Involvement Officer assigned to the project; and provide weekly updates, photos and other needed announcements to the Communications Office to ensure the accuracy of the aforementioned project website.

In the Technical Proposal, the Design-Build Team shall discuss their approach to providing the public access to project personnel for inquiries on vehicular and pedestrian traffic impacts.

The Design-Build Team shall include in their lump sum bid for the project, all costs associated with their involvement in the Public Involvement and Information Scope of Work.

**Public Involvement**

Unless noted otherwise elsewhere in this RFP, the NCDOT Public Involvement Group will be responsible for the activities noted below:

- Organizing public meetings, including venue selection, reservation and fee
- Excluding corridor and design public hearing maps, developing and producing informational print materials for all meetings and workshops
- Soliciting and administering advertisements, as deemed necessary
- Mailings to the identified target audiences, including postage
- If necessary, developing and producing informational print materials for Limited English Proficiency (LEP) outreach
- Web page updates related to public involvement efforts

To ensure that project information can be distributed to the public using standard methods, including but not limited to newspaper notices, the Design-Build Team shall coordinate with the Public Involvement Officer assigned to the project.

The Design-Build Team shall also coordinate with the Public Involvement Officer to promote public awareness for this project. The amount of public involvement required for this project shall be directly based on the Design-Build Team's Transportation Management Plans and construction details. The Design-Build Team's responsibilities shall include, but are not limited to, the following:

- Providing information requested by the Department to develop and produce informational printed materials for all meetings and workshops
- Developing and providing corridor and design public hearing maps for presentation at all public meetings / workshops
- Providing details surrounding the impacts to the public
- At a minimum, the Design-Build Team shall provide monthly operational updates to the Public Involvement officer for posting to the webpage and dissemination to subscriber lists by email; and to the Communication's Officer for dissemination to the project area residents via press release or social media as deemed appropriate, during construction to update stakeholders on the status of the project and upcoming construction activities.
- Providing advance notice to the Department of upcoming project impacts
- Assisting the Department in the development of the target audience area
- Attending and / or speaking at public meetings
- Hand delivery of time sensitive informational materials

The minimum public involvement requirements solely associated with the Transportation Management Plans shall include, but are not limited to the following:

- Public Meetings - If Beginning of Construction meeting for area businesses and residents is held, attending and / or speaking at this event.

- Distribution of Informational Materials - For beginning of construction and for all road closures with detour routes, the Design-Build Team shall be responsible for providing time sensitive informational material, provided by the Department, directly to the target audiences. If the Design-Build Team informs the Department of the aforementioned activities less than thirty (30) calendar days in advance, the Design-Build Team shall hand deliver the materials to the impacted target audiences.

### **Public Information**

Unless noted otherwise elsewhere in this RFP, the NCDOT Communications Office will be responsible for the activities noted below:

- Providing media announcements, including social media
- Scheduling interviews, as needed
- Website updates related to project progress

To ensure that project information can be distributed to the public using standard methods, including but not limited to notifying media outlets and updating the project website, the Design-Build Team shall inform the Department at least thirty (30) calendar days in advance of any construction activity that will significantly impact the public. These activities shall include, but are not limited to, the start of construction, major traffic shifts, road closures, ramp closures, detours, night work and project completion.

Throughout construction, the aforementioned Design-Build contact shall provide weekly updates to the NCDOT Communications Office, including, but not limited to, traffic control phasing, graphic illustrations, project pictures, etc.

**RAILROAD COORDINATION SCOPE OF WORK** (6-28-23)

The Design-Build Team shall be responsible for coordinating with Norfolk Southern Railway (NSR) and Blue Ridge Southern Railway (BLU) to secure the railroad agreements necessary for the construction of all highway bridges on I-26 and I-240 over the tracks operated and maintained by NSR and BLU. The Design-Build Team shall be responsible for any modification to these agreements that may be necessary based on their design and / or construction methods. The Design-Build Team shall be responsible for coordination of all design and construction details on NSR and BLU right of ways and shall secure any necessary agreements required by the NCDOT and / or NSR/BLU.

The Design-Build Team shall be responsible for all NSR and BLU costs associated with this project to include, but not be limited to, plan reviews, materials furnished by NSR and BLU, signals and communications work, track and related construction by NSR, BLU and / or their representative(s), any delays to train operations or maintenance crews, required insurances, railroad flagging, right of way acquisition, and construction engineering.

The Design-Build Team shall be responsible for all construction required. NSR and BLU will not incur any cost, and the Design Build Team shall not enter into or onto the NSR and BLU rail corridors until the Agreements are executed, insurance requirements are met, and NSR and BLU receive written authorization to proceed with the work provided in the Agreements.

**Preparation for Construction within the Existing NSR and BLU Right of Ways**

- I. The Design-Build Team shall comply with the following guidelines and any other guidelines as required by NSR and BLU, unless noted otherwise elsewhere in this RFP and / or a design exception is received from NSR, BLU, and NCDOT, via the NCDOT Design-Build Unit:
  - A. *AREMA Manual for Railway Engineering*, latest edition
  - B. *Norfolk Southern Railway - Standard Specifications for Materials and Construction*, latest edition
  - C. *Norfolk Southern Railway - Public Projects Manual*, latest edition
  - D. *Federal Aid Policy Guide 23 CFR 140I*
  - E. *Federal Aid Policy Guide 23 CFR 646*
  - F. NCDOT *Construction Manual* Section 105-8.
  - G. NCDOT *Construction Manual* Section 107-9.
  - H. 2018 NCDOT *Standard Specifications for Roads and Structures*, Section 107-9 (Excluding Paragraph 2)

- I. *North Carolina Administrative Code* Section T19A: 02B, 0150 through 0158
- II. The Design-Build Team shall verify the number of trains per day and the maximum speed allowed at the proposed overhead bridge location with NSR and BLU. Railroad traffic shall be maintained at all times. The Design-Build Team shall have no claims whatsoever against either NSR, BLU, or NCDOT for any delays and / or additional costs incurred based on changes to the following information:

NS S-line:

Number of trains per day	6-8
Type of trains per day	Freight
Maximum train speed	35 mph

NS Riverside Drive Spur Track:

Number of trains per day	1-2
Type of trains per day	Freight
Maximum train speed	10 mph

BLU T-line:

Number of trains per day	4-6
Type of trains per day	Freight
Maximum train speed	30 mph

Railroad inspection and maintenance requirements, in addition to normal train operations, will occur that may impact construction activities.

- III. This project has multiple sites with new structure crossings located on the NSR S-line between approximately NSR Milepost S 141.6 and S 143.7, rail impacts on NSR along their Spur Track parallel to Riverside Drive northward up to the Pearson Road at-grade crossing, and multiple sites with structure crossings located on the BLU T-line between approximately Murphy Junction (connection with NSR S-line) at Milepost T 0.0 and T 0.5. The NS S-line and BLU T-line rail corridors are both considered oriented east / west with mileposts increasing from east to west. The NS S-line corridor currently contains two tracks while the BLU T-line corridor contains one track. The railroad right of way width for both of these corridors is 200 feet wide, centered 100 feet on each side of the existing track centerline. The NS Spur Track corridor along Riverside Drive contains one track with

a right of way width of 20 feet, centered 10 feet each side the track centerline. BLU operates over the NS S-line by way of trackage rights from the BLU Murphy Junction (connection with NS S-line) at milepost T 0.0 southward to the NS Asheville rail yard located beyond NS milepost S 141.6.

- IV. The Design-Build Team shall design, replace and construct new bridge(s) over the NSR and BLU Corridors to span the existing track and any future track or maintenance road. Preliminary layouts shall be verified with NSR and BLU. The bridge(s) over the NSR S-line and BLU Corridors shall be long enough and high enough to accommodate future track(s), maintenance road, all required drainage, and all anticipated FEMA requirements. The bridge(s) over the NSR and BLU Corridors shall provide a minimum 23-foot vertical clearance above the highest rail (existing and future). The bridge(s) over the NSR and BLU Corridors shall provide a minimum horizontal clearance of no less than 25 feet from the centerline of the existing and future track to any 1) substructure element located above the top of rail elevation or 2) future maintenance road.

#### **Arrangements for Protection and Adjustments to Existing and Proposed Railroad Crossing Surface and Roadbeds**

- I. The Design-Build Team shall make the necessary arrangements with NSR and BLU for the installation of any temporary grade crossing surfaces, including but not limited to associated temporary drainage, crash gates with a NSR and BLU issued lock, removal of temporary construction crossings after completion of project, shoring plans, railroad force account estimates and agreements. The temporary grade crossing surface shall conform to NSR and BLU standards. All crossing surfaces, including but not limited to all grade crossing signals, gates, and any related train control signals / communications systems, shall be procured, installed and removed by NSR and BLU, or their representative, at the Design-Build Team's expense.

The Design-Build Team shall not commence any work on NSR or BLU right of way / easement until all agreements have been executed, insurance acquired and approved in accordance with NSR policies and procedures, and all construction plans have been approved by NCDOT, NSR, and BLU. The Design-Build Team shall make the necessary arrangements with NSR and BLU that are required to protect against property damage that may result in loss of service, expense, or loss of life. Removal of existing structures or portions of existing structures over NSR and BLU shall be performed in an approved manner so as not to damage or allow material / debris to fall on the track. The Design-Build Team shall be responsible for all damage to NSR and BLU property resulting from their operations and NSR and BLU may issue a stop order until all dangerous situations are remedied.

The Design-Build Team shall be responsible for providing Railroad Protective Liability Insurance for Bodily Injury Liability, Property Damage Liability, and Physical Damage to Property to NSR and BLU, identifying NSR and BLU as the insured parties, during the duration of the time work is being performed on or over the railroad right of way / easement.

The Design-Build Team shall be responsible for verifying and obtaining the appropriate insurance and coverage with NSR and BLU. Other insurance requirements, including those for all subcontractors, are detailed in the documents referenced herein. The Design-Build Team shall be responsible for any required Roadway Worker Protection training / certifications.

- II. Prior to any utility installation, removal or relocation across NSR right of way / easement, including but not limited to pipelines and / or electrical and communication cable routings over or under railroad-owned facilities, the Design-Build Team shall coordinate with NSR, BLU and private utility owners to obtain the necessary permits and secure the appropriate Encroachment Agreements. At a minimum, the Design-Build Team shall assist the private utility owners in obtaining their respective Encroachment Agreements in the private utility owner's name. In accordance with the requirements noted herein and NSR's and BLU's specifications, the private utility owner(s) will be responsible for all associated fees and provide the necessary insurance coverage.

All work associated with any utility installation across NSR's and BLU's right of way / easement shall adhere to the requirements noted herein and NSR's and BLU's specifications.

- III. After negotiations among the Department, the Design-Build Team, BLU, and NSR have been finalized, and approval obtained from the North Carolina Board of Transportation, the Design-Build Team shall submit executed agreements and plans to NCDOT's State Structures Engineer, via the project Sharepoint site, for plan approval and final agreement execution by NCDOT, prior to authorizing railroad work. After approval by NCDOT, one copy of the executed agreement will be returned to the Design-Build Team and one copy forwarded to the NCDOT's Resident Engineer, prior to any construction work by the Design-Build Team, NSR or BLU. This section particularly applies if a modification to an agreement is necessary.

### **Coordination with NSR and BLU**

The Design-Build Team shall coordinate with the primary owner of NSR through the NSR General Engineering Consultant (GEC), TGS Engineers. The Design-Build Team shall coordinate with Mr. Jeffrey Brittain at TGS Engineers, [jbrittain@tgsengineers.com](mailto:jbrittain@tgsengineers.com), 107-A Mica Avenue, Morganton, NC 28655, (828) 437-4681 Ext. 216 to obtain coordination procedures for plan approval and, if needed, a partially executed legal agreement with NSR and the NCDOT as the parties in the agreement for proposed roadway work. The Design-Build Team shall coordinate with Justin Mahr, WATCO, Director Real Estate – Contracts & Public Projects, (402) 651-8238, [justin.mahr@watco.com](mailto:justin.mahr@watco.com) to obtain coordination procedures for plan approval and, if needed, a partially executed legal agreement with BLU and the NCDOT as the parties in the agreement for proposed roadway work. The Department will review the agreements prior to submittal to the NSR and BLU. The Department will execute and distribute the Agreements within 14 calendar days of Board of Transportation approval. All agreements, and any modifications thereto, shall include necessary Force Account items, including but not limited to, preliminary engineering, construction

engineering, flagging, temporary construction crossing surfaces, track materials, track construction, signal and communication lines, and other work performed by NSR and BLU, as necessary. NSR and BLU have sole authority to determine the need for flagging required to protect its operations and property. (The Design-Build Team will not be responsible for the cost of flagmen required for NSR or BLU to perform routine maintenance programs.) The railroad agreements state that the Department will be responsible for payment of the NSR's and BLU's Force Account work and NSR and BLU expenses; however, the Design-Build Team shall reimburse the Department for these costs including all Force Account estimate overruns. This reimbursement shall be incidental to the lump sum price bid for the project. Upon request, the Department will provide copies of the NSR and BLU invoices to the Design-Build Team for review. The Design-Build Team shall have ten (10) days to provide comments to the Department, after which the Department will pay the invoice. The Design-Build Team shall be responsible for maintaining records to verify the invoice items.

The preliminary plan and final plan submittals to NSR and BLU shall include 1) roadway plans, the Railroad's "Overhead Bridge Crossing Data," appropriate roadway plan sheets showing impacts to the NSR and BLU right of way / easement, 2) erosion control plans, 3) drainage calculations for any drainage on or across the NSR's and BLU's right of way / easement and 4) bridge plans showing the vertical and horizontal alignments and preliminary general drawings. Electronic versions of the preliminary plans, final plans and data shall be submitted to TGS Engineers and BLU. If plan re-submittals, RFC Plans and / or any additional information are required, the Design-Build Team shall submit electronic versions to TGS Engineers and BLU. Working Drawings affecting NSR's and BLU's operations and / or right of way / easement shall follow submittal process as outlined in the 2018 NCDOT *Standard Specifications for Roads and Structures* or Special Provisions. The Design-Build Team shall allow 30 days for review of all railroad submittals.

#### **Coordination with NCDOT Rail Division**

All plans submitted to NSR and BLU, as required above, shall be accompanied by a .pdf copy for submission to the NCDOT Rail Division.



**RIGHT OF WAY SCOPE OF WORK** (6-27-23)

**\*\* 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.**

**Advanced Acquisition Parcels**

Through the Advance Acquisition Process, the Department is in the process of acquiring the parcels noted below; and anticipates completing the acquisition or having a right of entry to the parcels by March 1, 2024:

- Parcel No. 315 - Cole FE Asheville, NC, LLC (FedEx)
- Parcel No. 327 Jerry & Betty Owenby (Mr. Transmission)
- Parcel No. 326 York Real Estate Investment (Boost Mobile)
- Parcel No. 352 Thomas & Julia Jackson (Jackson's Western Store)
- Parcel No. 353 DJ3, LLC (Crowne Plaza)
- Parcel No. 353A DJ3 Delaware, LLC (Crowne Plaza)
- Parcel No. 354 Mark Walton & Carolyn Cooper (Crowne Plaza)
- Parcel No. 364 The Landing Strip, Inc. (Crowne Plaza)
- Parcel No. 384 Terri Eury (Salvage Station)
- Parcel No. 395 Bernard Coates
- Parcel No. 397 Riverside Partnership, LLC
- Parcel No. 904 Duyck Construction 610

If the Department completes the acquisition process or obtains a right of entry by March 1, 2024 for the parcels above, the Department will not honor any requests for additional contact time or compensation, including but not limited to idle equipment or mobilization / demobilization costs, for the Design-Build Team mobilizing men, materials (or ordering materials) or equipment. If time were granted, it would only be for that time exceeding March 1, 2024.

- The Design-Build Team shall employ qualified, competent personnel who are currently **approved by the NCDOT Right of Way Unit**, herein after referred to as the Department, to provide all services necessary to perform all appraisal (except appraisal reviews and updated appraisals required solely for condemned parcels), negotiation and relocation services required for all right of way, control of access and easements, including but not limited to utility easements, necessary for completion of the project in accordance with G.S. 136-28.1 of the General Statutes of North Carolina, as amended, and in accordance with the requirements set forth in the *Uniform Appraisal Standards and General Legal Principles for Highway Right of Way*, the *North Carolina Department of Transportation's Right of Way Manual*, the *North Carolina Department of Transportation's Rules and Regulations for the Use of Right of Way Consultants*, the *Code of Federal Regulations*, and Chapter 133 of the *General Statutes of North Carolina* from Section 133-5 through 133-18, hereby incorporated by reference, including the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. The Design-Build Team shall field stake all right of way, control of access and easements, including but not limited to utility easements, in accordance with the requirements noted above. For a list of firms currently approved, the Design-Build Team should contact Mr. Rodney Hatton, in the NCDOT Right of Way Unit, at 336-968-3855. The

Design-Build Team shall perform the services as set forth herein and furnish and deliver to the Department reports accompanied by all documents, including but not limited to all revisions and electronic design files, necessary for the settlement of claims and the recordation of deeds, or necessary for condemnation proceedings covering said properties. The Design-Build Team, acting as an agent on behalf of the State of North Carolina, shall provide right of way acquisition services for TIP I-2513B &D in Buncombe County.

Acquisition services required outside of the project construction limits due solely to an allowable rise in the floodplain water elevation on insurable structures will be considered extra work and paid for in accordance with Article 104-7 of the 2018 NCDOT *Standard Specifications for Roads and Structures*.

**The Design-Build Team shall carry out the responsibilities as follows:**

- With respect to the payments, costs and fees associated with the acquisition of right of way, easements and / or control of access, the Department will be responsible for only direct payments to property owners for negotiated settlements, recording fees, any relocation benefits, and deposits and fees involved in the filing of condemnation claims. The Department will assume responsibility for all costs associated with the litigation of condemned claims, including testimony by the appraiser(s). The Design-Build Team shall be responsible for all other acquisition services related to payments, costs and fees, including but not limited to attorney fees required for all non-condemnation acquisitions.
- A Department representative will be available to provide technical guidance on right of way acquisition procedures and to make timely decisions on approving relocation benefits and approving administrative adjustment settlements on behalf of the Department over and above the authority granted to the Department Right of Way Consultant Project Managers.
- The Design-Build Team shall verify / determine the prior rights and / or compensable interest for an existing utility prior to acquiring any corresponding utility easement. (Reference the Utilities Coordination Scope of Work found elsewhere in this RFP)
- The relocation and / or replacement of commercial and residential backflow preventers shall not be a Cost-to-Cure item and shall not be included in any appraisal. (Reference the *Utilities Scope of Work* found elsewhere in this RFP)
- The Department will provide a list indicating if existing billboards located within or adjacent to the project limits are conforming or non-conforming to the NCDOT *Regulations for The Control of Outdoor Advertising in North Carolina*, dated 2000. Prior to contacting any property owner(s) or billboard owner(s), the Design-Build Team shall meet with the appropriate Regional Outdoor Advertising Technician and the Division Right of Way Agent to determine the relocation eligibility and relocation benefits, and possible leasehold interest if the billboard is on leased property.
- The Design-Build Team shall submit a right of way project tracking report and right of way quality control plan to the Department. The Department standard forms and documents shall be used to the extent possible.

- The Design-Build Team shall provide a current title certificate for each parcel as of the date of closing or the date of filing of condemnation, unless required otherwise in the NCDOT *Right of Way Manual*, updated March 10, 2022.
- The Department will prepare all Condemnation Maps. The Design-Build Team shall prepare all Final Condemnation Reports and provide updated MicroStation CADD files, upon request, to the Department for preparation of the Condemnation Maps. Upon approval of the Final Condemnation Report, the Department will require a minimum of eight weeks to file the condemnation claim. 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, Location and Surveys Unit, and the Attorney General, in writing, that revisions have been made that impact a condemned parcel and provide updated plan sheets, revised MicroStation CADD files, and revised area takes.
  - The Design-Build Team shall consult with the Attorney General through the Area Negotiator, Area Appraiser and the Assistant State Negotiator to determine the status of the negotiations and appraisal(s).
  - If the Attorney General and / or the Department 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 and revised MicroStation CADD files. 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, including but not limited to, revised MicroStation CADD files.
  - The Department will be responsible for payment for the additional deposit to the Attorney General's Office and the Attorney General will prepare and file an Amendment to the Declaration of Taking.
- The following shall be required:
  - Unless otherwise approved by the NCDOT Assistant State Negotiator, in writing, the Design-Build Team shall provide right of way, control of access and easement descriptions in metes and bounds format (bearings and distances). The Design-Build Team shall provide exhibits, diagrams and / or other information required to verify the aforementioned descriptions.
  - In accordance with the NCDOT *Right of Way Manual*, updated March 10, 2022, 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.
- In accordance with the Location and Survey Unit’s September 28, 2018 *Proc 2018-3 - Creating NCDOT Right of Way Plan Sheets for LET Projects* and *Proc 2018-5 - Elimination of Need to Request Control Sheets and Property Ties and RW Series Development Timeline* Memorandums (references to timelines in the aforementioned Memos shall be disregarded), the Design-Build Team shall develop the following right of way items:
  - Right of Way series of plan sheets (“R/W” series of plan sheets) that delineate the existing property information, property ties, proposed centerline data, existing and proposed right of way, existing and proposed easements, and existing and proposed control of access. The “R/W” series of plan sheets shall be signed and sealed by a Professional Land Surveyor registered in the State of North Carolina. The Professional Land Surveyor’s signature and seal shall attest that the right of way monuments were placed under their responsible charge.
  - A table of control points for the proposed centerline alignments (“D” series of plan sheets).
  - A table of proposed right of way and permanent easement control points (“E” series of plan sheets) that shall be signed and sealed by a Professional Land Surveyor registered in the State of North Carolina.
- 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(s) be added to the approved state certified appraiser list, subject to approval by the Department’s Area Appraiser and State Appraiser.

- The Department will develop or contract with a private firm to develop and provide a second appraisal for parcels as noted below:
  - All parcels with an initial appraisal, with just compensation, equal to or greater than one million dollars (\$1,000,000.00).
  - All parcels where the initial appraisal indicates damages to the remaining property equal to or greater than two hundred fifty thousand dollars (\$250,000.00), where damages to the remaining property are defined as a loss in value to the remaining land, and / or improvements and / or a cost to cure.
- The 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 fifteen business days from the date of receipt, all appraisals and / or appraisal corrections 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 acquisitions.
- The NCDOT will provide relocation reviews and approvals for all Replacement Housing Payment calculations and all Rent Supplement Payment calculations prior to the Design-Build Team making any offers to the displacees. Within five business days of the receipt of the Replacement Housing Payment or Rent Supplement Payment calculation documentation, which shall include all documentation required for an Evaluation Package, the Department will approve the calculation, and the signed FRM15-D will be returned to the Design-Build Team, or a request for an updated calculation or documentation will be presented to the Design-Build Team for further handling. At this time, the Relocation Coordinator in the NCDOT Right of Way Unit is the approving authority for the aforementioned calculations.
- The Design-Build Team shall coordinate with the Health Department to determine if septic systems can be relocated / modified to remain operational. To assist with the aforementioned determinations, the Design-Build Team may utilize a third-party consultant to perform the septic system inspections only if the Health Department approves the third-party consultant, in writing, prior to the inspections beginning. The Department will only be responsible for the Health Department fees and / or third-party fees associated with these determinations. The Design-Build Team shall determine the relocation / modification design and construction costs required for the septic systems to remain operational and include these costs in the property right of way appraisals. (Reference the Utilities Coordination Scope of Work found elsewhere in this RFP)
- All Claims for Payment involving relocation benefits must be submitted to the NCDOT Relocation Coordinator in the Right of Way Unit for approval and processing.

- At the conclusion of the right of way acquisition process, the Design-Build Team shall provide a right of way certification to the Division Right of Way Agent.
- The Design-Build Team shall prepare Right of Way Claim Reports, Transmittal Summaries and / or Narrative Appraisals for all right of way, control of access and easement acquisitions.
- 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 Western Assistant State Negotiator, Mr. Rodney Hatton. 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

**SIGNING SCOPE OF WORK** (6-26-23)**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>**

- Signing and Delineation Unit Procedures Manual

**<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)**

- *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 and Final Pavement Marking Plans for Design-Build Projects*

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

- *Design-Build Submittal Guidelines*

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

- *NCDOT Standard Specifications for Roads and Structures*
- *NCDOT Roadway Standard Drawings*
- I-2513 IAR Signing Schematic (Conceptual use only)
- I-2513 IAR I-26 Signing Schematic (Conceptual use only)

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.

### **Signing Requirements for Technical Proposal**

The Design-Build Team shall select a Private Engineering Firm (PEF) that has experience in the preparation, design, and sealing of Signing Plans for NCDOT on comparable projects. The Technical Proposal shall list projects, where the Signing Plans were developed by the PEF, including description and similarity to the subject project.

The Design-Build Team shall include a Preliminary Signing Concept Map in the Technical Proposal. At a minimum, the aforementioned Concept Map shall include all anticipated DMS locations, all proposed overhead sign structure locations, all overhead signs, and all ground mounted Type A and B guide signs.

### **Signing Plans Submittal Requirements**

The Design-Build Team shall concurrently submit the 25% Preliminary Signing Plans to the recipients in the Design-Build Submittal Guidelines and the ITS Unit for review of the DMS locations.

Prior to submitting the 50% Preliminary Signing Plans, the Design-Build Team, the Division Traffic Engineer, the Regional Traffic Engineer, the Signing and Delineation Regional Engineer and the Design-Build Unit shall meet to discuss and review the Design-Build Team's 25% Preliminary Signing Plans.

The Design-Build Team shall provide 25% Pavement Markings Plans that have been reviewed and accepted by the Department and the latest Roadway Plans with the 50% Preliminary Signing Plans submittal.

### **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 and F signs and supports (including overhead sign structures) required through the construction limits of the mainline, as well as all -Y- Lines, all service roads, all turn-arounds / cul-de-sacs, all roundabouts, all ramps and all loops. 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, all -Y- Lines, all service roads, all turn-arounds / cul-de-sacs, all roundabouts, all ramps and all loops to ensure adequate advance signage and spacing is provided. The Design-Build Team shall coordinate with all current and future projects (if plans are available) to assure proper signing has been addressed for current and future installations.

## I-240 Signing

The Design-Build Team shall milepost I-240 from proposed I-26 toward I-40 east of Asheville.

- Remove and dispose of all exit gore signs, exit panels and mile markers.
- In accordance with the milepost numbers provided by the Department, design, fabricate and install all exit gore signs, exit panels and mile markers for the aforementioned re-mileposted area. Provide overlays for all supplemental and logo signs affected by the new milepost of I-240. Mileposting information will be provided to the Design-Build Team upon submittal of the accepted Right-of-Way plans and design files.

The Design-Build Team shall design, fabricate and install enhance guide signs at the following multi-lane conventional roads approaching the interchanges along I-26 and I-240.

- US 19-23 (Patton Ave) / I-26
- US 19-23 (Patton Ave) / I-240
- Haywood Road

## 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, all loops, all service roads, all roundabouts, and all turn-arounds / cul-de-sacs, including Type A and 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).

The Design-Build Team shall design, fabricate and install mile markers for I-26 & I-240 at **1/2-mile** intervals along both sides of the mainline. The Design-Build Team shall install each mile marker on one three-pound U-channel post. Mile markers shall be located at the outside shoulder

point or a maximum of 15 feet from the edge of travel lane. The Design-Build Team shall install mile markers such that the bottom of the mile marker shall be four feet above the edge of travel lane (edgeline) elevation. Excluding whole mile locations, mile marker designs shall be in accordance with the Intermediate Reference Location Signs (D10-2a) referenced in the Standard Highway Signs (2004 Edition and the 2012 Supplement to the 2004 Edition). At whole mile locations, mile marker designs shall be in accordance with the Reference Location Signs (D10-2) referenced in the Standard Highway Signs (2004 Edition and the 2012 Supplement to the 2004 Edition).

The Design-Build Team shall design, fabricate and install mile markers and exit numbers in accordance with the mile numbers provided by the Department.

At all interchange exit loops and / or as required by the MUTCD Table 2C-5, the Design-Build Team shall fabricate and install advisory speed signing as shown in Figure 2C-3 of the MUTCD. In addition to signing shown in Table 2C-5 of the MUTCD, the advisory speed signing shall include W1-8, W13-6, W13-7, W1-13R, and E13-1P signs.

Prior to submittal of RFC Signing Plans, the Design-Build Team shall coordinate with the Signing and Delineation Unit and the Design-Build Unit on destination cities and / or street names on guide signs.

### **Logo Signs (Blue Service Signs with Specific Business Panels)**

The Design-Build Team will not be responsible for designing, locating or installing any additional Logo Signs not located within the project limits on the Technical Proposal submittal date. The Division Traffic Engineer shall be notified when a LOGO or TODS (Service Signs) are removed during construction and not immediately relocated.

Prior to project completion, the Design-Build Team shall relocate, reinstall and / or replace all existing Logo Signs located within the project limits on the Technical Proposal submittal date that are impacted by the Design-Build Team's design and / or construction methods.

If damage occurs to the Logo Signs and / or the business panels during construction, the Design-Build Team shall immediately notify the Division Logo Coordinator. The Design-Build Team shall replace all Logo Signs and / or business panels that are damaged during construction. If the Logo Signs are replaced, the Design-Build Team shall remove the business panels and deliver them to the Division Logo Coordinator. During project construction, the Design-Build Team shall maintain the Logo Signs order of preference in accordance with the MUTCD Section 2J.01.

### **Sign Sheeting Requirements for Overhead Signs**

The Design-Build Team shall design and fabricate all overhead signs with Grade A retro-reflective sheeting for sign legends (text), borders, and all Interstate, US and NC route shields and arrows. The Design-Build Team shall design and fabricate all overhead signs with Grade C retro-reflective sheeting for the background.

Black non-reflective sheeting shall be used for all black arrows, legends (text), and borders on overhead signs.

### **Speed Limit**

The posted speed limit for the mainline (I-26) shall be 55 mph. (Reference the Roadway Scope of Work found elsewhere in this RFP)

### **Interstate, US and NC Route Designation**

The Design-Build Team shall coordinate all interstate, US and NC highway routing with the Transportation Mobility and Safety Division of NCDOT. Prior to designing any signs that display new or revised Interstate, US or NC routes, the Design-Build Team shall confirm all highway routes with the Department. Concurrent with the Release for Construction (RFC) Signing Plans submittal, the Design-Build Team shall notify the State Signing and Delineation Engineer, in writing, of all new or revised Interstate, US or NC routes.

### **Sign Locations**

The Design-Build Team shall determine the station location of all signs and sign structures.

The Design-Build Team shall provide a minimum of two advanced guide signs for 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 design, fabricate and install ground mounted signs supports in accordance with the NCDOT Roadway Standard Drawings. 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>**

Prior to installation, the Design-Build Team shall 1) field verify all Type A and B ground mounted sign supports, 2) recalculate the field verified S-Dimensions, using the latest edition of the design software on the website noted above, and 3) revise the beam sections, where applicable. The Design-Build Team shall use the most recent version of the ground mounted sign support selection workbook tool, in accordance with the submittal schedule outlined in the “Instructions” tab of the tool.

Unless otherwise approved by the Department, the vertical mounting height for ground mounted Type D, E and F signs shall be a minimum of seven feet and maximum of eight feet from the edge of the travel lane to the bottom of the sign.

On freeways and expressways, the minimum lateral offset for Type A and B ground mounted signs on breakaway supports shall be 30 feet, unless approved otherwise by the Department. The lateral offset shall be measured from the edge of the travel lane closest to the shoulder to the closest sign edge.

On freeways and expressways, all Type A and B ground mounted signs on simple (non-breakaway) supports shall be protected by guardrail, barrier or another form of approved positive protection. The minimum lateral distance between the face of guardrail and the closest sign edge shall be six feet.

Unless noted otherwise elsewhere in this RFP, all Type D, E and F signs shall be installed on U-channel posts in accordance with the NCDOT Roadway Standard Drawings. Type D signs shall not exceed eight feet in width and / or 24 square feet. Unless positively protected, all Type D signs shall be installed on a maximum of two U-channel posts.

### **Proposed Bridge Mounted Signs and Overhead Sign Structures**

The Design-Build Team shall consider the proposed roadway geometry, number of lanes, and all advisory signing needs when selecting the type of overhead signing for a given location. At a minimum, the Design-Build Team shall provide overhead signing at the locations identified in the MUTCD, Section 2E.24 - Signing for Interchange Lane Drops, Section 2A.17 - Overhead Sign Installations, Items A - M, and the following locations, unless allowed otherwise elsewhere in this RFP:

- An option lane at a freeway / expressway multi-lane exit or freeway / ramp split (use Arrow Per Lane signs)
- A minimum of two (2) overhead structures for freeway lane ends (freeway lane drop)
- Three or more lanes on a freeway
- Arrow Per Lane (APL) signs along I-26 EB @ I-240 EB exit (EXIT 26).
- Arrow Per Lane (APL) signs along I-26 WB @ I-240 EB exit (EXIT 26).
- Arrow Per Lane (APL) along I-240 WB @ I-26 EB and WB split.

The Design-Build Team shall locate, design and install the required supports / structures for the proposed signs to be installed on bridges over the French Broad River. At a minimum, the supports / structures / proposed signs on the proposed bridge along I-26 and I-240 shall include all Type A, B, D and E signs, milemarkers,

The wind speed for the overhead sign structure and foundation designs for this project shall be 90 mph.

The Design-Build Team shall design, fabricate and install overhead sign supports and foundations in accordance with Section 906 of the NCDOT *Standard Specifications for Roads and Structures*, the *Foundations and Anchor Rod Assemblies for Metal Poles*, and *Overhead and Dynamic Message Sign Foundations* Project Special Provisions found elsewhere in this RFP.

The vertical clearance beneath all proposed overhead sign assemblies shall be no less than 17 feet and no greater than 18 feet. For all proposed overhead sign assemblies, the Design-Build Team shall submit documentation that verifies the actual vertical clearance at all critical points.

For all overhead sign assemblies mounted on concrete median barrier, the Design-Build Team shall design, fabricate and install median barrier footing and median transitional barrier in accordance with the 2018 Roadway Standard Drawing No. 854.05.

The maximum span length for cantilever overhead sign structures shall be 52 feet.

Lighting and walkways will not be required on any overhead sign assembly.

Overhead sign panels shall not be attached to existing or proposed bridges.

Excluding Interchange Sequence Signs on median barrier, pedestal mounted overhead signs will not be allowed.

### Archiving of Overhead Sign Structures

The Design-Build Team shall provide information related to the design of each overhead sign structure (full-span, cantilever, pedestal mount) to the Signing and Delineation Unit and shall be archived electronically (PDF format) within the Design-Build Submittals folder on NCDOT Connect. The design elements to be archived by the Design-Build Team are:

- Overhead Sign Structure line drawings (RFC Signing Plans)
- Overhead Sign Designs
- Plan Sheets that include Overhead Sign Assemblies

The Design-Build Team shall submit to the Department an excel spreadsheet that includes all proposed overhead sign locations with the overhead structure line drawings as required in the *Design-Build Submittal Guidelines* dated May 2009. This spreadsheet shall also include the type of structure (cantilever, full span, pedestal) as well as geographic coordinate information as shown below.

Structure Number	Sign Structure	Type	Station	Latitude (Degrees)	Longitude (Degrees)
	A	Cantilever	Outside Project Limits on NB US 29	35.929633	-80.002204
	B	Full Span	-L- Sta. 12+50	35.932891	-79.995279
	C	Cantilever	-L- Sta. 35+50	35.936724	-79.988283
	D	Pedestal	Outside Project Limits on SB US 29	35.949003	-79.967006

Coordinates should be taken near the center of the structure and reference its approximate Latitude and Longitude.

The Department will use the aforementioned spreadsheet as well as the overhead structure line drawings to request all overhead sign structures be assigned a corresponding Structure Inventory Number from Structures Management Unit. Once the overhead sign structure inventory numbers are assigned, the Department will provide these structure inventory numbers to the Design-Build Team to be included on each structure line drawing in the RFC Signing Plans. The geographic

coordinate information of the proposed overhead sign structure locations shall not be included in the structure line drawings in the RFC Plans.

Further guidance can be found in the Signing and Delineation Unit Procedure Manual at:

<https://connect.ncdot.gov/resources/safety/Pages/Signing-and-Delineation.aspx>

The Design-Build Team shall be responsible for providing revised overhead structure line drawings, sign designs and plan sheets pertaining to any construction revisions after submittal of RFC Signing Plans.

### **Proposed Overhead Wind Load Area**

Overhead sign structures shall be designed for proposed and future signs. The Design-Build Team shall determine wind load areas and include the wind load areas on the overhead sign structure drawings. The wind load area for the sign structures shall be determined according to the following:

- **Case A, Identified Future Signs:** For sign structures that have an identified need for larger future signs, the future signs shall be designed and shown on the overhead sign structure drawings. Future sign messages, sizes, and positions shall be shown on the elevation drawings. The largest potential wind load area shall be used for the design of the overhead structure.
- **Case B, General Future Wind Load Area:** For overhead signs without identified future signs, the structure shall be designed for a larger wind load area to accommodate future signs that are not identified at the time of the structure design. General future wind load area sizes and positions shall be shown on the elevation drawings. The general future wind load area shall be computed as follows:
  - The wind load area shall be rectangular for each primary sign including secondary and supplemental signs.
  - The wind load area width shall extend two feet outside the proposed primary sign on each side of the sign. In cases where the wind load areas of two signs intersect, the taller area shall take priority. For cantilever structures, the wind load area shall be flush with the edge of the primary sign at the cantilevered end, such that the future four-foot wind load area does not extend past the end of a cantilever sign structure.
  - The wind load area height shall extend two feet below the bottom of each sign and two feet above the top of each sign, including secondary and supplemental signs as well as the spacing between signs according to Roadway Standard Drawing No. 904.20, and excluding temporary “all traffic exit” signs. The minimum vertical clearance shall be measured from the bottom of the lowest wind load area.

- **Case C, Exceptions from Case B:** The following are exempted from Case B, general future wind load areas:
  - Arrow Per Lane Signs
  - Interchange Sequence Signs on median barrier

### **Existing Overhead Structures**

Prior to modifying an existing overhead sign assembly to accommodate proposed signs that exceed the original wind load area, the Design-Build Team shall perform a structural analysis of the overhead sign structure. The Design-Build Team shall obtain Department acceptance of the structural analysis prior to construction. The Design-Build Team shall replace all existing overhead sign assemblies determined to be structurally inadequate for the proposed modifications, in the Department's sole discretion. The Design-Build Team may modify an existing overhead sign assembly to accommodate proposed signs that do not exceed the original wind load area without performing the aforementioned structural analysis.

When the aforementioned structural analysis determines that an existing overhead sign structure is structurally adequate to be retained or the proposed wind load area does not require a structural analysis, 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 wind load area, and 8) confirmation that the proposed wind load area does not exceed the original wind load area.

If the Department can't provide existing overhead structure line drawings or shop drawings of the existing overhead sign structure, the Design-Build Team shall design and install new overhead sign structures.

The minimum vertical clearance beneath all existing overhead sign assemblies that are retained shall be 17 feet. For all existing overhead sign assemblies retained, the Design-Build Team shall submit documentation that verifies the actual vertical clearance at all critical points.

### **Shop Drawings for Overhead Sign Structures**

The Design-Build Team shall prepare a shop drawing for each proposed and 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* and the *NCDOT Standard Specifications for Roads and Structures*.

**Guardrail or other Positive Protection for Overhead Sign Supports**

Except as allowed otherwise 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, at the Department's sole discretion. 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. 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 existing positive protection meets current requirements. If the positive protection does not meet current requirements, the Design-Build Team shall design and construct new positive protection that adheres to the current requirements.

Cable-guide rail shall not be used as positive protection for overhead sign supports.

**Verification of Theoretical Information shown on Structure Line Drawings**

The Design-Build Team shall verify the information on the Structure Line Drawings prior to submittal of shop drawings for the Department's review and acceptance. At a minimum, the aforementioned verification shall include confirmation of the sign(s) positioning over lanes, span length, sign offsets, "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.

**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**

During project construction, the Design-Build Team shall maintain all existing signs within the project limits (including all Logo Signs and temporary sign installations that may be required by the Transportation Management Plans) to ensure the signs are in good condition, perform as intended, and are visible to motorists. (Reference Articles 901-4 and 1092-2 of the NCDOT *Standard Specifications for Roads and Structures*) All signs and supports remaining / existing at



the completion of this project shall be plumb, oriented correctly and adhere to AASHTO requirements.

Unless approved by the Division Logo Coordinator, in writing, all Logo and TOD signs shall be immediately relocated to a temporary or permanent location. If a temporary removal is granted, the Design-Build Team shall notify the Division Logo Coordinator in writing at least seven days prior to removal and deliver the business panels to the Division Logo Coordinator once removed.

### **CADD Files**

After acceptance of RFC Signing Plans, the Design-Build Team shall provide the final Signing Plans to the Department in .pdf and MicroStation format.

### **Construction Revisions**

After submittal of RFC Signing Plans, the Design-Build Team shall submit all construction revisions to the Department for review and acceptance prior to incorporation.

### **As-Built Plans**

After project completion, the Design-Build Team shall provide final electronic Signing Plans to the Department. At a minimum, these Signing Plans shall include all revisions that occurred during construction, as well as field verifications for ground mounted sign supports and overhead structures. These Signing Plans shall be provided in .pdf and MicroStation format.

**STRUCTURES SCOPE OF WORK** (7-6-23)**Project Details**

The Design-Build Team shall design and construct all structures necessary to complete the project, including but not limited to, the following:

- Replace Bridge No. 100279 on Atkinson Street with New Pedestrian Bridge
- Replace Pedestrian Bridge No. 100357
- Bridge(s) on US 19-23 Bus. (Haywood Road) over I-26 / I-240
- Bridge(s) on US 19-23 (Patton Avenue) over I-26 / I-240
- Bridge(s) on I-26 over the French Broad River
- Bridge on Resort Drive over Smith Mill Creek
- Bridge on Ramp -Y7RPD- over Smith Mill Creek
- Bridge on I-240 EB on-ramp over Smith Mill Creek
- Bridge on Ramp -Y7RPA- over Smith Mill Creek
- Bridge on I-240 EB over French Broad River
- Bridge on I-240 WB over French Broad River
- Bridge on I-240 WB off-ramp over Blue Ridge Southern Railway
- Bridge on Ramp -Y7RPAA- over Blue Ridge Southern Railway
- Bridge on I-240 WB ramp onto I-26 NB
- Bridge on Hill Street south over I-240
- Bridge on I-240 WB on-ramp onto I-240
- Bridge(s) on I-26 over NC 251 / SR 1781 (Broadway Street)
- Extend Box Culvert C100774 crossing SR 1477 (Riverside Drive) at approximately Sta 87+00 (-Y36\_Rev2-) accommodating the future A-0010AA project
- Modify Bridge Nos. 100322 & 100323 on I-240 (Patton Ave) over French Broad River as per provided materials
- All retaining walls required by the Design-Build Team's design
- All sound barrier walls required by the Design-Build Team's design (Reference the Roadway Scope of Work found elsewhere in this RFP)
- All reinforced concrete box culverts / reinforced concrete box culvert extensions, including but not limited to reinforced concrete box culvert replacements, required by the Design-Build Team's design

**\*\*NOTE\*\*** Deleted sentence restricting Alternative Technical Concepts for bridge locations.

All bridges shall meet the geometric criteria shown in the accepted Preliminary Roadway Plans developed by the Design-Build Team.

The minimum vertical clearance for bridges constructed over I-26 and I-240 shall be 17'-0". The minimum vertical clearance for bridges constructed over all local roads and collector roads, shall be 15'-6". The minimum vertical clearance for straddle bents shall be 18'-0".

The proposed bridge(s) on I-26 over NC 251 /SR 1781 (Broadway Street) shall be long enough and high enough to accommodate the future widening on NC 251 / SR 1781 (Broadway Street), without the need to:

1. Reconstruct any of the substructure elements, including but not limited to retaining walls located at the end bents or,
2. obtain a future design exception, including but not limited to all minimum vertical clearance requirements noted elsewhere in this RFP.

The Design-Build Team shall indicate in the Technical Proposal how the aforementioned future construction can be accomplished without the need to reconstruct any of the substructure elements or obtain a future design exception.

Railing for the following bridges shall meet the Aesthetic Guidelines – Section B and D:

- Bridge Nos. 100322 and 100323 (Patton Avenue over French Broad River)
- Bridge(s) on US 19-23 Bus. (Haywood Road) over I-26 / I-240
- 
- Bridge on Hill Street over I-240
- Pedestrian bridges

Railing for bridges not listed in the Aesthetic Guidelines – Section B and D and adjacent to sidewalk and / or multi-use paths, shall be per Standard Drawings BMR3 & BMR4.

All other bridge railing shall be per Standard Drawing CBR1.

The Design-Build Team shall construct outriggers to accommodate lighting pedestals on bridges where required by the lighting plans. The pedestal anchor bolt pattern for the bridges at Haywood Road and Hill Street shall be per Duke Energy plans.

The Design-Build Team shall diamond grind the portion of deck under the remaining two traffic lanes of Bridge Nos. 100322 and 100323.

The minimum horizontal setbacks from the closest edge of travel lane to face of barrier in front of walls shall be 12'-0".

End bents shall be integral if the criteria listed in the NCDOT *Structures Management Unit Manual* is met. The criteria in Section 6.2.3.2 of the NCDOT *Structures Management Unit Manual* shall apply to all roadways, including Secondary Routes that meet the criteria for North Carolina Routes.

**\*\*NOTE\*\*** Deleted statement requiring vertical abutments on all bridges.

Link slabs may be used for bridges, provided the girders in adjacent spans are the same depth.

Unless noted otherwise elsewhere in this RFP, the following will not be allowed on the project:

- Cored slab, box beam, nonredundant steel tension member, deck girder and cast-in-place deck slab bridges
- Precast bridge barrier rails
- Metal plate arch culverts
- Interior pile bents at roadway grade separations
- Attachment of sign structures to bridges (excluding signs for roadway carried by the bridge)
- Bridge attachments (excluding ITS) in the overhang of roadway grade separation structures
- Casting of conduit in the bridge deck or barrier rail for roadway bridges (excluding lighting conduit where required by lighting plans)
- Modular expansion joints
- Monotube or cantilever DMS (if required on project) support structures
- Shallow foundations behind MSE abutment walls
- Bridges with less than four girder lines

**\*\*Note\*\*** Deleted bullets referencing Multiple girder depths on an individual bridge and Sound barrier walls constructed on top of retaining walls

### Structure Removal

In accordance with the 2018 *Standard Specifications for Roads and Structures*, the Design-Build Team shall remove and dispose of the following existing structure:

- Pedestrian Bridge No. 100340 over US 19-23-74A (Patton Avenue)

Upon removal from Bridge No. 100036, the tubular rail and rail posts shall be salvaged and remain property of the Department. The Design-Build Team shall deliver the salvaged material to Buncombe Bridge Maintenance Unit, 11 Old Charlotte Highway, Asheville, NC 28803. Prior to delivery, the Design-Build Team shall give three days' notice to Justin Rice, PE at 828-250-3360.

In addition to the NCDOT reviews required in this Scope of Work, the Design-Build Team shall provide regulatory agency representatives with all structure demolition plans including but not limited to all plan revisions. The Design-Build Team shall allow 15 working days for the regulatory agency representatives to review the structure demolition plans. All agencies will be notified prior to the start of demolition, so they may have a representative on site.

### Box Culverts

As required by the Design-Build Team's design, the Design-Build Team shall design and construct all proposed reinforced concrete box culverts. Reinforced concrete box culvert designs shall be in accordance 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 the RFP)

## Sound Barrier Walls and Retaining Walls

Excluding the side of the sound barrier wall facing the Burton Street neighborhood, all proposed sound barrier wall and retaining wall surfaces shall have equivalent surface treatment-

Unless noted otherwise elsewhere in this RFP, all ground mounted sound barrier walls shall be detailed in accordance with Structure Standard Drawings that utilize concrete piles. (Reference the *Sound Barrier Wall* and *Architectural Concrete Surface Treatment* Project Special Provisions, the Geotechnical Engineering Scope of Work, and the Roadway Scope of Work found elsewhere in this RFP)

The Design-Build Team shall apply non-sacrificial anti-graffiti coating on all exposed surfaces of sound barrier walls and all retaining walls, including MSE walls.

## 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.

The Design-Build Team shall obtain Structure numbers from NCDOT for all new bridges and include the Structure numbers on applicable plan sheets and correspondence.

Unless allowed or directed otherwise in this RFP, designs shall be in accordance with the latest editions of the *AASHTO LRFD Bridge Design Specifications* (with exceptions noted in the *NCDOT Structures Management Unit Manual*), *AASHTO LRFD Guide Specifications for the Design of Pedestrian Bridges*, *NCDOT LRFD Driven Pile Foundation Design Policy*, *NCDOT Structures Management Unit Manual* (including Policy Memos), Chapter 5 of the *NCDOT Roadway Design Manual*, and *NCDOT 2021 Traffic Noise Policy*.

Use of Florida Department of Transportation Prestressed Florida I-Beams (FIB), the Prestressed Concrete Committee for Economic Fabrication (PCEF) prestressed concrete girders, and Modified Bulb Tee girders will be allowed. However, the structural details associated with the aforementioned items, including but not limited to mild reinforcing and reinforcing cover, shall be subject to Department review and acceptance post-award.

Unless allowed or directed otherwise in this RFP, all construction and materials shall be in accordance with 2018 *NCDOT Standard Specifications for Roads and Structures*, *NCDOT Structures Management Unit Project Special Provisions* and *NCDOT Structures Management Unit Standard Drawings*. Reference the Structures Management Unit website noted below:

**<https://connect.ncdot.gov/resources/Structures/Pages/default.aspx>**

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.

**TRANSPORTATION MANAGEMENT SCOPE OF WORK** (7-10-23)**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 effective on the Technical Proposal submittal date.

- NCDOT *Standard Specifications for Roads and Structures*
- NCDOT *Roadway Standard Drawings*
- FHWA *Manual on Uniform Traffic Control Devices* (MUTCD)
- NCDOT *Supplement to the Manual on Uniform Traffic Control Devices* (NCSMUTCD)
- AASHTO *A Policy on Geometric Design of Highways and Streets*
- NCDOT *Roadway Design Manual*
- AASHTO *Roadside Design Guide*
- Americans with Disabilities Act of 1990 (ADA)
- FHWA *Standard Highway Signs*
- NCDOT *Design-Build Submittal Guidelines*
- FHWA *Rule on Work Zone Safety and Mobility* (23 CFR 630 Subpart J and K)
- Transportation Research Board *Highway Capacity Manual*
- NCDOT *Transportation Management Plans Design Manual*

**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 Plan (TMP).

**<https://connect.ncdot.gov/projects/WZTC/>**

**Prequalification**

The Design-Build Team shall select a Private Engineering Firm (PEF) that has experience developing TMPs on comparable projects for the North Carolina Department of Transportation (NCDOT) and maintains prequalification code 00541 (Traffic Management Plan - Level 1 and 2).

**TRANSPORTATION MANAGEMENT PLANS**

A pre-design meeting shall take place between the NCDOT Transportation Systems Management & Operations Unit (TSMOU), the Work Zone Traffic Control Group, the Design-Build Team, the Design-Build Unit, the Division Traffic Engineer, the Regional Traffic Engineer, Statewide Transportation Operations Center (STOC), local municipalities (if applicable), and any other pertinent NCDOT personnel. TMP submittals shall only be reviewed and accepted by the Department after this pre-design meeting.

The Design-Build Team shall prepare TMPs that include Temporary Traffic Control Plans (TTCP), an Incident Management Plan (IMP), and a Traffic Operations Plan (TOP). In accordance

with the Public Involvement and 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 TMPs for each phase of work that impacts road users. The TMPs 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 typical sections, alignment, striping layout, drop off conditions, and temporary drainage. The Design-Build Team shall develop TMPs that include procedures to communicate TMP information to the public about road and travel conditions within the work zone and affected roadway network.

### **Transportation Management Phasing Concept**

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. 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.

### **Incident Management Plan**

The Design-Build Team shall be an active partner in developing an Incident Management Plan (IMP) in and around the work zone.

The Design-Build Team shall develop an IMP that documents 1) the roles and responsibilities of each response agency that may participate in traffic incident management activities, and 2) the procedural and coordination aspects of managing unplanned incidents on I-26 and I-240 that impact the flow of traffic. These incidents shall include, but are not limited to, environmental events, stalled vehicles, multi-vehicle crashes, and hazardous materials incidents that impact the shoulder, travel lane, or close the entire roadway. The objective of the IMP is to reduce the severity of the capacity reduction, incident duration, and / or traffic demand around the incident scene. The IMP shall be reviewed, revised, and updated as necessary throughout construction of the project.

The IMP shall be developed in coordination with the Division Traffic Engineer, State Traffic Operations Engineer, and response agencies; and shall be reviewed and accepted by the Department and the STOC. During development of the IMP, a minimum of two coordination meetings shall take place between the Design-Build Team and all relevant NCDOT incident management personnel and response agencies. Once accepted by the Department and the STOC, the Design-Build Team shall share the IMP with all response agencies to ensure they have a clear understanding of the procedures and available resources for responding to, processing of, and clearing unplanned incidents.

The Design-Build Team shall not begin any construction activity that disrupts traffic operations on I-26 and I-240, in the Department's sole discretion, until 1) the Department and the STOC have accepted the IMP, 2) the Design-Build Team has installed all portable ITS devices for incident management and they are communicating with the Mountain Region Transportation Management Center (TMC) and the STOC, and 3) the Design-Build Team has installed all temporary stationary signing for all Incident Management Routes.

The Design-Build Team shall use the references in the "Materials Provided" on the Design-Build Project Page.

At a minimum, the IMP shall include the following components:

#### IMP - Incident Levels and Associated Actions

Incident levels define the extent and duration of the impact anticipated on the roadway. For consistency across NCDOT, the STOC, Regional TMCs, and NCDOT administered towing contracts, the Design-Build Team shall utilize the following incident levels and document the actions that shall occur for each incident level:

- **Minor:** Minor traffic incidents are typically disabled vehicles and minor crashes with minimal disruption to the flow of traffic. On-scene responders are typically law enforcement, towing companies, and occasionally Incident Management Assistance Patrol (IMAP). Impacts to the traveled roadway are estimated to be less than 30 minutes with no lane blockage.
- **Intermediate:** Intermediate traffic incidents typically affect travel lanes for a time period. Full roadway closures might be needed for short periods during traffic incident clearance to allow traffic incident responders to accomplish their tasks. Impacts to the traveled roadway are estimated to be greater than 30 minutes, but less than two hours with lane blockages, but not necessarily a full closure of the roadway.
- **Major:** Major traffic incidents typically involve hazardous materials, fatal traffic crashes, and other natural or man-made disasters. These traffic incidents typically involve closing all or part of a roadway facility. Congestive impact to traveled roadway is estimated to be greater than two hours or the roadway is fully closed in a single direction.

#### IMP List of Response Agencies

The Design Build Team shall develop a list of response agencies for NCDOT review and acceptance. This list may include, but is not limited to the following:

- NCDOT
- City of Asheville
- Law enforcement
- Fire / Rescue
- 911 dispatch



- Towing and recovery
- Emergency Medical Service (EMS)
- Hazardous materials
- Media
- Coroner and Medical Examiner
- Emergency Management

During construction, the Design-Build Team shall hold monthly meetings with incident management personnel and response agencies. These meetings may be incorporated into regular Maintenance of Traffic (MOT) or Traffic Task Force Meetings. Additionally, the Design-Build Team shall hold After Action Review meetings with incident management personnel, response agencies, and all other relevant parties following fatal and major traffic incidents.

#### IMP Contact Information

The Design-Build Team shall develop a contact matrix of local emergency response agencies and Design-Build Team points of contact for traffic incidents.

The Design-Build Team shall hold regular meetings with incident management personnel and emergency responders. These meetings may be incorporated into regular Maintenance of Traffic (MOT) or Traffic Task Force Meetings. Additionally, the Design-Build Team shall hold After Action Review meetings with incident management personnel, emergency responders, and all other relevant parties following fatal and major traffic incidents.

#### IMP Incident Management Routes

Preliminary Incident Management Routes with portable incident management ITS device locations will be provided by the Department. The Design-Build shall provide, install and maintain one changeable trailblazer sign and one static trailblazer sign along the Department's Preliminary Incident Management Routes.

If the Design-Build Team's design or construction methods impact the Preliminary Incident Management Routes provided by the Department, the Design-Build Team shall develop alternate routes and alternate Incident Management Route Plans, as necessary, to mitigate impacts to the Department's Preliminary Incident Management Routes. Prior to incorporation, the alternate Incident Management Route Plans shall be reviewed and accepted by STOC and NCDOT. At a minimum, the alternate Incident Management Route Plans shall include:

- All incident management routes
- Changeable and / or static trailblazer sign locations
- The location of ITS devices for incident management (portable changeable message signs (PCMS) and portable CCTV cameras)
- Existing stationary and temporary alternate route signing locations (reference *NCUTCD Item No. 18A-GMI-01*)

- Police traffic control during incident response plan activation (e.g. at stop-controlled intersections)
- Signal locations
- Median access locations available for emergency response vehicles on I-26 and I-240
- Route identification using NCDOT naming convention (e.g. I-26W MM 25-19)

Prior to routing traffic on an Incident Management Route, 1) the Design-Build Team shall install all portable incident management ITS devices and signs, including but not limited to trailblazing signs, 2) the Design-Build Team shall modify traffic signals, if necessary, and 3) all ITS devices shall be communicating with the NCDOT Mountain Region TMC and STOC. (Reference the Traffic Signal Commutations Scope of Work found elsewhere in this RFP).

## **LANE AND ROAD CLOSURE NOTIFICATION**

### **Lane Closure Notice (LCN)**

The Design-Build Team shall issue a Lane Closure Notice (LCN) to NCDOT and affected government entities a minimum of thirty (30) 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 an LCN utilizing a non-NCDOT controlled facility, the Design-Build Team shall secure concurrence in writing from the controlling government entity.

An 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, an 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 TMP and shall adhere to the following requirements:

- Unless allowed otherwise elsewhere in this Scope of Work, all roads, including but not limited to all proposed ramps and loops once opened to traffic, shall remain open.
- The Design-Build Team shall not concurrently close -Y- Lines with overlapping detours.

Unless required otherwise by this RFP, the Design-Build Team shall issue a Road Closure Notice (RCN) to NCDOT and affected government entities a minimum of thirty (30) 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 an RCN utilizing a non-NCDOT controlled facility, the Design-Build Team shall secure concurrence in writing from the controlling government entity.

An 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, an 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.

## **STOC Coordination**

### Lane Closures

In addition to the aforementioned minimum thirty (30) calendar day notice for a LCN, the Design-Build Team shall notify the STOC when the process of closing a lane, ramp or paved shoulder begins.

### Lane Opening

The Design-Build Team shall notify the STOC when the process of re-opening a lane, ramp or paved shoulder begins, and again when the lane, ramp or paved shoulder is completely open.

## **GENERAL DESIGN AND CONSTRUCTION REQUIREMENTS**

### **Maintenance of Access**

Maintain access to all businesses, schools, residences, bus stops, mass transit facilities, park and ride lots, and emergency services at all times. Prior to incorporation, obtain written approval from the Engineer on the method to maintain access.

In accordance with the Department's Policy on Evaluating Temporary Accommodations for Pedestrians during Construction, found on the website noted below, the Design-Build Team shall maintain pedestrian accommodations in all areas as follows:

<b>Roadway</b>	<b>Minimum Level of Pedestrian Accommodation</b>
Haywood Rd	Full
Patton Ave	Full
Riverside Dr	Basic
Hill St	Moderate
Atkinson Street	Moderate

**<https://connect.ncdot.gov/projects/WZTC/Pages/PedSafety.aspx>**

\*Pedestrian counts have not been conducted. The DB Team shall provide level of accommodations as listed above and/or what pedestrian volumes indicate and require. The DB Team can obtain pedestrian volumes from the Engineer, should they have that information. Should the pedestrian counts yield a level different from what is listed above; the DB Team can have the level of accommodations listed above adjusted.

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 include, but not be 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 of proposed overhead structures, and providing the minimum horizontal clear widths as follows:

<b>Roadway</b>	<b>Minimum Clear Width</b>
Interstates, US routes, NC Routes, and all ramps and loops	20 feet
All other roadways	18 feet

For temporary alignments, the Design-Build Team shall provide the wider of the width in the Table above or the required design criteria found elsewhere in this Scope of Work.

### **Traffic Control Supervisor**

The Design-Build Team shall furnish a Traffic Control Supervisor for the project who is knowledgeable of TMP 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 ensure all employees working inside NCDOT right of way have received the proper training appropriate to the job decisions each individual is required to make.

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:

- A minimum 24 months of On-the-Job Training in supervision and work zone set up and implementation on similar projects.
- Be certified by an approved NCDOT training provider. If the Design-Build Contractor or their traffic control subcontractor is approved by NCDOT to train their own staff, a notarized certification letter shall be furnished to the Engineer at the preconstruction meeting. The letter shall state certification and re-certification dates. It shall also state the Traffic Control Supervisor has the knowledge and experience as well as the authority to ensure traffic is maintained in accordance with the contract documents.

The Traffic Control Supervisor for the project shall perform the following:

- During construction, be available or on call 24 hours per day, 7 days per week to address mobility and / or safety concerns within the work zone and direct / make any necessary changes in the traffic control operations in a timely and safe manner. The Design-Build Team shall provide NCDOT the name of the Traffic Control Supervisor and support personnel, and the phone number(s) where they can be reached 24 hours per day, seven days per week.
- 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.
- Coordinate and cooperate with the NCDOT Division Incident Management staff and Resident Engineer.
- Coordinate and cooperate with the NCDOT Mountain Region TMC and Statewide Transportation Operations Center (STOC) to ensure proper messages are displayed on the DMSs and any PCMS(IM)s that are required to communicate with the NCDOT Mountain Region TMC and STOC.
- Coordinate with Hospitals, Emergency Medical Services (EMS), Fire Departments, and Law Enforcement throughout construction to alert these entities to traffic control impacts that may affect their services.
- Provide traffic control setup that ensures safe traffic operations and workers' safety throughout the construction area.
- Attend all scheduled traffic control coordination meetings, as required by the Engineer.
- Monitor traffic delays and backups within the work zone

- Ensure all employees working inside NCDOT right of way have received the proper training appropriate to the job decisions each individual is required to make

### **Traffic Control Devices**

The Design-Build Team shall use traffic control devices that conform to all NCDOT requirements and are listed on the NCDOT Approved Products List. The Approved Products List may be referenced on the website noted below:

**<https://apps.ncdot.gov/vendor/approvedproducts/>**

The use of any devices that are not shown on the NCDOT Approved Products List shall require written approval from the Design-Build Unit prior to incorporation.

Excluding areas within 1,000 feet of a signalized intersection, channelizing device spacing shall not exceed a distance in feet equal to twice the posted speed limit. When channelizing devices are installed within 1,000 feet of a signalized intersection, their spacing shall not exceed a distance in feet equal to the posted speed limit. Channelizing devices shall be spaced ten feet on-center in radii. Channelizing devices shall be two feet off the edge of an open travelway when lane closures are not in effect. Skinny drums shall only be allowed as defined in Section 1180 of the 2018 NCDOT *Standard Specifications for Roads and Structures*.

Place Type III barricades, with "ROAD CLOSED" signs (R11-2) attached, of sufficient length to close entire roadway. Stagger or overlap barricades as needed to allow for ingress or egress.

Portable changeable message signs (PCMS) should be placed off the shoulder of the roadway and behind a traffic barrier, if practical. PCMSs used solely by the Design-Build Team for daily traffic control operations do not need to meet the requirements of PCMS(IM)s found in the Incident Management subsections of this scope and shall not be controllable by the STOC. Where placement of a traffic barrier is not practical to shield the PCMS, the PCMS should be placed off the shoulder and outside of the clear zone. If a PCMS must be placed on the roadway shoulder or within the clear zone, it shall be delineated with retroreflective temporary traffic control (TTC) devices. When PCMSs are not being used to display TTC messages, they shall be relocated such that they are outside of the clear zone or shielded behind a traffic barrier and turned away from traffic.

If any trailer mounted traffic control device must be placed on the roadway shoulder or within the clear zone, it shall be delineated with retroreflective temporary traffic control (TTC) devices.

All traffic control devices, including but not limited to, temporary or permanent barrier systems, shall be placed / located a minimum two-foot offset (shy distance) from the edge of an open travel lane.

Temporary Portable ITS Devices

In addition to the PCMSs required by the NCDOT Roadway Standard Drawings and portable devices required in the ITS Scope of Work found elsewhere in this RFP, the Design-Build Team shall provide a minimum of seven (7) temporary PCMSs and three (3) portable CCTV cameras to be used solely for incident management. The Design-Build Team shall provide additional temporary PCMSs and portable CCTV cameras for incident management, as necessary, along alternate Incident Management Routes developed by the Design-Build Team. (Reference the IMP Incident Management Routes Section of this Scope of Work) The Design-Build Team will be allowed to relocate temporary PCMSs and portable CCTV cameras from an inactive Incident Management Route to an active Incident Management Route.

The PCMSs for incident management shall be used to display alternate route information ahead of detour points for incidents in the project area. The Design-Build Team shall coordinate with the STOC when alternate route information needs to be displayed. In the event of an incident, the STOC will control the applicable PCMSs to provide incident management information to motorists.

The temporary portable ITS devices for incident management shall be installed, relocated as necessary, operated, and maintained from the initiation of project construction to project completion or completion of their usefulness as determined by the Engineer.

A preliminary location plan for the incident management ITS devices will be provide by the Department. Final locations and positioning of these devices shall be coordinated with the STOC and NCDOT and included in the IMP for STOC and NCDOT for review and acceptance prior to installation. Once the location of the ITS devices for incident management have been accepted by the STOC and NCDOT, the locations shall not be changed without STOC and NCDOT approval.

Unless noted otherwise elsewhere in this Scope of Work, all portable ITS devices shall be capable of communicating with the existing software utilized by the NCDOT Mountain Region TMC and STOC and have the functionality to be operated locally in the field and controlled remotely from the NCDOT Mountain Region TMC and STOC. All portable ITS devices provided must be fully National Transportation Communications for ITS Protocol (NTCIP) compliant and on the NCDOT ITS and Signals QPL as of the Technical Proposal submittal date. No vendor specific or third-party software will be allowed. PCMSs used solely by the Design-Build Team for daily traffic control operations do not need to communicate with the NCDOT Mountain Region TMC or STOC.

The Department will provide cellular modems to establish the communications link between the portable ITS devices for incident management and the NCDOT Mountain Region TMC and STOC. The portable ITS devices shall have a fully configurable, standard ethernet port for connection to the cellular modem. Devices with built-in or onboard modems shall have an available ethernet port to allow communications with the Department-furnished modem. Devices designed specifically for serial communications and devices without an available ethernet port will not be accepted. All modems provided by the NCDOT shall be returned to the NCDOT once the project is complete or the Engineer determines the device is no longer needed. (Reference the ITS Scope of Work found elsewhere in this RFP)

## Temporary Barrier Systems

Placement of temporary barrier systems shall be shown on the TMPC and shall be designed in accordance with the requirements below.

At a minimum, the Design-Build Team shall maintain all existing positive median cross-over protection for the entire project limits. The Design-Build Team shall indicate in the Technical Proposal the type of positive protection proposed and replacement / resetting requirements.

Determine the need for temporary barrier in accordance with the FHWA *Rule on Temporary Traffic Control Devices* (23 CFR 630 Subpart K). Reference the NCDOT Work Zone Traffic Control website noted below for examples and *Guidelines for the Use of Positive Protection in Work Zones*.

**<https://connect.ncdot.gov/projects/WZTC/Pages/Design-Resources.aspx>**

The Design-Build Team shall adhere to the AASHTO Roadside Design Guide in determining the length of need, flare rate, and clear zone. The Design-Build Team shall adhere to the maximum deflections from crash testing of the proposed temporary barrier system in accordance with NCHRP-350 *Recommended Procedures for the Safety Performance Evaluation of Highway Features* and 2016 AASHTO *Manual for Assessing Safety Hardware* (MASH). Providing less than the minimum deflection distance shall require the use of anchored temporary barrier systems in accordance with the NCDOT 2018 *Standard Specifications for Roads and Structures*.

The Design-Build Team shall only use an NCDOT approved temporary traffic barrier system.

The temporary traffic barrier system shall not be installed more than two weeks prior to beginning work in any location. Once the temporary traffic barrier system is installed at any location, the Design-Build Team shall proceed in a continuous manner to complete the proposed work in that location.

Excluding water filled barrier, protect the approach end of temporary traffic barrier systems from oncoming traffic at all times with a truck mounted impact attenuator (maximum 72-hour duration) or an approved end unit such as a temporary crash cushion unless the approach end of the temporary traffic barrier system is offset from oncoming traffic as follows:

Posted speed limit (mph)	Minimum offset (feet)
40 or less	15
45 - 50	20
55	25
60 mph or higher	30

Crash cushions shall be installed according to the manufacturer's recommendations, including offsets from fixed objects.



The Design-Build Team shall provide the proper connection between the existing guardrail or bridge rail and the temporary traffic barrier system. Connection details shall be included in the TTCP.

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.

All temporary barrier systems utilized for traffic control shall be placed on a paved surface. A minimum two-foot width of 1) paved surface, 2) standard sloped turf shoulder, or 3) a combination of paved surface and standard sloped turf shoulder shall extend behind all unanchored barrier, unless permitted otherwise by the Department, in writing. The aforementioned standard sloped turf shoulder shall adhere to Roadway Standard Drawing Nos. 560.01 and 560.02.

When temporary barrier is used continuously on one or both sides of a direction of mainline travel for a distance greater than one mile, the Design-Build Team shall provide a paved motorist breakdown area on the right side of the mainline travel way every mile, unless the outside paved shoulder width (clear distance between edge of travel lane and face of barrier) is ten feet or greater. All breakdown areas shall be a minimum of one thousand feet long and fourteen feet wide, ten feet of which shall be pavement. The breakdown areas shall be identified on the project by use of Changeable Message Signs or Stationary Signs placed in advance of each breakdown area, as approved by the Department. Prior to incorporation, the Design-Build Team shall submit a temporary pavement design for the breakdown areas. (Reference the Pavement Management Scope of Work found elsewhere in this RFP)

The Design-Build Team shall use a minimum six-foot offset to temporary barrier along any shifting or merging taper, including but not limited to, existing, temporary, and / or proposed shifting or merging tapers. At the start of a taper, temporary traffic barrier shall continue along the tangent to achieve this six-foot offset. For all ramp / loop merge tapers, temporary traffic barrier shall continue parallel to the travel lanes a minimum of 200 feet beyond the start of the merge taper before flaring back towards the travel lanes in accordance with Roadway Standard Drawing No. 1101.11, Sheet 3 of 4.

When temporary traffic barrier is placed on a roadway shoulder, the Design-Build Team shall install shoulder closure signs and devices in advance of the barrier in accordance with the NCDOT Roadway Standard Drawings.

The Design-Build Team shall not place temporary barrier in any paved gore area. If the work cannot be safely performed without placing temporary barrier in the paved gore area, the Design-Build Team shall temporarily close the ramp or loop in accordance with the ICTs.

Temporary traffic barrier used for traffic control shall not act as a retaining wall.

### **Temporary Alignments and Traffic Shifts**

The Design-Build Team shall notify the Engineer in writing at least thirty (30) calendar days prior to any traffic pattern alteration (Reference the Public Involvement and Information Scope of Work found elsewhere in this RFP).

Unless noted otherwise elsewhere in this RFP, the design speed for temporary alignments, including crossovers, of Interstates, US, and NC routes shall not be lower than the current posted speed limit. The minimum allowable design speed for temporary alignments on secondary roads shall be the higher of 10 mph below the posted speed limit or 35 mph.

If, at the Department's sole discretion, the Design-Build Team can justify a temporary alignment cannot be designed to adhere to the current posted speed limit requirement, a lower design speed may be used.

All on-site detours shall meet the minimum number of existing lanes per direction and shall adhere to all temporary alignment requirements noted elsewhere in the RFP. All interstate movements, including interstate-to-interstate loops and ramps, shall not be signalized. All pavement transitions, including but not limited to cross slopes and superelevation, at on-site detour tie-ins shall adhere to the on-site detour speed limit.

The Design-Build Team shall provide a smooth pavement surface for traffic at all times. The Design-Build Team shall not place traffic on lanes containing rumble strips unless the Design-Build Team mills the rumble strips and installs a uniform overlay on the lane prior to placing traffic on the lane (Reference the Pavement Management Scope of Work found elsewhere in this RFP).

For temporary traffic patterns that will remain in place for a period longer than three days, including but not limited to traffic shifts, merges, and temporary alignments, breaks in the superelevation and / or breaks in a normal crown section will not be allowed within the shifting taper. Excluding the aforementioned temporary traffic patterns, breaks in the superelevation and / or breaks in a normal crown section shall only occur on a lane line or lane midpoint, and shall not exceed 0.04.

The Design-Build Team shall provide proper drainage for all temporary alignments and / or traffic shifts.

The NCDOT Roadway Standard Drawing No. 1101.11 shall be used to calculate the length of temporary merges for lane closures and temporary traffic shifts. All straight-line traffic shifts on Interstate and US routes shall be designed for the full L distance ( $L = \text{width of traffic shift times speed limit in mph}$ ).

Straight line traffic shifts of six feet or greater shall have the appropriate lane shift warning signs and solid white line pavement markings that separate the travel lanes. For straight line traffic shifts less than six feet, the need for signing and solid line pavement markings shall be determined by the Design-Build Team.

Temporary traffic shifts that are not covered by a standard or require vertical grades shall be considered a temporary alignment. All temporary alignments shall adhere to the NCDOT *Roadway Design Manual*, including all revisions, 2011 AASHTO *A Policy on Geometric Design of Highways and Streets* and the most current Transportation Research Board *Highway Capacity Manual*.

### **Lane and Shoulder Requirements**

Unless permitted otherwise elsewhere in this RFP, maintain the existing number of travel lanes on all roads. The Design-Build Team shall adhere to the minimum lane width requirements noted below. Maintaining these requirements will not be considered lane narrowing:

- Existing travel lanes that are equal to or greater than 11-foot wide, maintain minimum 11-foot travel lanes.
- Existing travel lanes that are narrower than 11 feet, maintain the existing travel lane widths.

Maintain a minimum inside and outside paved shoulder width of four feet in each direction of I-26, I-240 and US 19 / 23 / 70 (existing I-26) unless temporary barrier is placed on the paved shoulder. This requirement may be reduced to two-foot paved shoulders under structures and one-foot paved shoulders along ramps. If temporary traffic barrier is placed on the shoulder, refer to the Traffic Control Devices and Temporary Barrier Systems subsections for shy distance and placement requirements.

On two-lane, two-way facilities, the Design-Build Team shall not install more than one (1) mile of lane closure in any one direction on any roadway within the project limits or in conjunction with this project, measured from the beginning of the merge taper to the end of the lane closure.

On multi-lane facilities, the Design-Build Team shall not install more than two (2) miles of lane closure in any one direction, measured from the beginning of the merge taper to the end of the lane closure.

For simultaneous lane closures in any one direction on any road, a minimum of three (3) miles shall be provided between lane closures including those occurring in neighboring projects. The distance between lane closures shall be measured from the end of one closure to the beginning of the taper of the next lane closure.

Through traffic traveling in the same direction shall not be split, including separation by any type of barrier, bridge piers, existing or proposed median, or any other device.

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.

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.

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 the NCDOT Roadway Standard Drawings, unless the work area is protected by an approved temporary traffic barrier or guardrail.

When personnel and / or equipment are working on the shoulder adjacent to an undivided facility and within five feet of an open travel lane, the Design-Build Team shall, at a minimum, close the nearest open travel lane using the NCDOT Roadway Standard Drawings, unless the work area is protected by an approved temporary traffic barrier or guardrail.

When personnel and / or equipment are working on the shoulder adjacent to a divided facility and within ten feet of an open travel lane, the Design-Build Team shall, at a minimum, close the nearest open travel lane using the NCDOT Roadway Standard Drawings, unless the work area is protected by an approved temporary traffic barrier or guardrail.

When personnel and / or equipment are working within a lane of travel of an undivided or divided facility, the Design-Build Team shall, at a minimum, close the lane using the NCDOT Roadway Standard Drawings. The Design-Build Team shall conduct the work so that all personnel and / or equipment remain within the closed travel lane.

The Design-Build Team shall not perform work involving heavy equipment within 15 feet of the edge of travelway when work is being performed behind a lane closure on the opposite side of the travelway.

The Design-Build Team shall provide paved motorist pull-offs along any full control of access freeway facilities in accordance with the Motorist Pull-Off Area found on the NCDOT Work Zone Traffic Control's webpage below. The Design-Build Team shall only install the pull-offs on the right side of the roadway. The Design-Build Team shall submit a temporary pavement design for the pull off areas. (Reference the Pavement Management Scope of Work found elsewhere in this RFP).

**<https://connect.ncdot.gov/projects/WZTC/Pages/Design-Resources.aspx>**

### **Off-site Detours**

Prior to incorporation, obtain written approval from the Engineer for all road and / or access point closures. Access point closures will only be allowed for locations that have multiple access points and all access point closures shall be coordinated with the property owner and the Engineer.

Excluding any ICM detour that may be provided by the Department, all offsite detour routes shall receive Department written approval prior to incorporation. All roads and lanes along the detour route shall remain open to traffic while the detour is in effect. Submit detour routes and all associated sign designs for review and acceptance prior to incorporation.

Excluding ICM detours provided by the Department, the Design-Build Team shall investigate all proposed detour routes. At a minimum, this investigation shall include analyzing the detour route capacity and geometry / characteristics to ensure the additional volume can be supported, investigating impacts to emergency services (access and response times) and schools, and

investigating the structural integrity of the bridges and pavement along the detour route, including the existing shoulders. The Design-Build Team shall submit recommendations resulting from the aforementioned investigations / analyses for the Department's review and acceptance. The recommendations shall include mitigation for any impacts to emergency services (access and response times).

As determined by the Engineer, the Design-Build Team shall provide all 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.

Unless approved otherwise by the controlling government entity, in writing, use only state-maintained roads for off-site detour routes.

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 require Department approval.)

### **Impacts to Other Network Roadways**

The Design-Build Team shall coordinate with the Division Maintenance Engineer, Resident Engineer, Division Traffic Engineer, Rail Division, and Statewide Transportation Operations Center (STOC) 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 limited to, providing notification of planned lane or road closures, traffic detours, public information, traffic management, access management, and incidents.

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 TMP. Additionally, the Design-Build Team shall readjust the markings, markers, and / or signing located outside the project limits to the existing / proposed pattern when the temporary changes are no longer needed.

The Design-Build Team shall take steps to minimize disruptions to existing roadway facilities during construction and shall demonstrate in the TMPC how the traffic control phasing minimizes inconvenience to motorists on all roads.

### **Pavement Edge Drop-off Requirements**

The Design-Build Team shall mitigate longitudinal pavement edge or terrain drop-off conditions created by construction operations in accordance with the *NCDOT Transportation Management Plans Design Manual*.

**\*\*NOTE\*\*** Deleted Edge of pavement drop off requirements and included reference above

## Signing

The Design-Build Team shall install advance work zone warning signs when work is within 40 feet from the edge of travel lane. The advance work zone warning signs shall be installed no more than three days prior to the beginning of construction.

When no work is being conducted for a period longer than one week, the Design-Build Team shall remove or cover all advance work zone warning signs, as directed by the Engineer. Stationary work zone warning signs shall be covered with an opaque material that prevents reading of the sign at night by a driver traveling in either direction.

When portable work zone signs are not in use for periods longer than 30 minutes, the Design-Build Team shall lay the portable work zone sign flat on the ground and collapse the sign stand and lay it flat on the ground.

The Design-Build Team shall install and maintain all detour signing and devices required for road closures. The Design-Build Team shall cover or remove all detour signs and devices required for road closures within and outside of the project limits when a detour is not in operation.

The Design-Build Team shall ensure proper signing is in place at all times during construction as required by the MUTCD. Guide signs shall be maintained or modified as required by the TMP throughout the entire project construction duration. All temporary signing shall be shown on the TTCP and /or Temporary Signing Plans to be reviewed and approved by the Work Zone Traffic Control Section, the Signing and Delineation Unit prior to incorporation.

## Temporary Pavement Markings, Markers, and Delineation

The Design-Build Team shall install pavement markings and markers in accordance with the NCDOT *Standard Specifications for Roads and Structures*, and in accordance with the manufacturer's procedures and specifications.

The Design-Build Team shall install temporary pavement markings and markers for temporary traffic patterns as follows.

Road	Marking	Marker
US 19/23/70 (existing I-26), including all ramps and loops; I-26, including all ramps and loops; I-240, including all ramps and loops; and Patton Avenue	Work Zone Performance Pavement Markings (Reference the <i>Work Zone Performance Pavement Markings</i> Project Special Provision found elsewhere in this RFP)	Raised Temporary
All other roads	Any Marking on the Approved Product List	Raised Temporary

Prior to shifting traffic to a new pattern, the Design-Build Team shall 1) remove all conflicting markers and snowplowable marker castings, and patch all casting holes, and 2) remove or conceal all conflicting markings in accordance with the following requirements: (Reference the *Pavement Management* Scope of Work found elsewhere in this RFP).

- Pavement markings on concrete surfaces shall only be removed by hydroblasting.
- Conflicting pavement markings on asphalt surfaces of I-26, I-240 and US 19 / 23 / 70 (existing I-26) including all ramps and loops, shall be either milled and filled or concealed by applying a uniform overlay. At a minimum, the mill and fill or uniform overlay shall cover the entire width of any shifted lane(s) containing the conflicting markings and extend to the outside edge of any conflicting markers on the shoulder.
- Conflicting pavement markings on all other asphalt surfaces shall be removed as noted below, milled and filled or concealed by applying a uniform overlay.

The Design-Build Team shall plan and perform their operations to minimize damage to existing and proposed pavement resulting from the removal of pavement markings.

Removal of the temporary pavement markings on asphalt surfaces shall be accomplished by an NCDOT approved system to minimize damage to the road surface. Pavement markings shall not be obscured 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.

By the end of each day's operation, and in accordance with the requirements above, the Design-Build Team shall remove or conceal, as appropriate, all conflicting markings, replace all damaged markings, and remove / replace all conflicting / damaged markers.

Excluding pavement markings and markers not visible to traffic, conflicting pavement markings and markers shall be defined as any pavement marking or marker not being used for the current traffic pattern which is within six feet of any pavement marking required for the current traffic pattern.

The Design-Build Team shall tie proposed pavement marking lines to existing pavement marking lines.

The Design-Build Team shall show temporary pavement markings on the TMP that meet the requirements of the RFP and NCDOT *Transportation Management Plans Design Manual*.

The Design-Build Team shall only use pavement marking and marker products that conform to all NCDOT requirements and are listed on the NCDOT Approved Products List. The use of any devices that are not shown on the NCDOT Approved Products List shall require written approval from the Design-Build Unit prior to incorporation.

The Design-Build Team shall install temporary pavement markings that are the same width as existing pavement markings. For roadways that do not have existing pavement markings, the Design-Build Team shall install temporary pavement markings that are the same width required for the final pavement markings in the Pavement Markings Scope of Work found elsewhere in this RFP.

For Work Zone Performance Pavement Markings, the Design-Build Team shall maintain a minimum retroreflectivity in accordance with the *Work Zone Performance Pavement Markings* Project Special Provision found elsewhere in this RFP. For all other pavement markings, the Design-Build Team shall maintain a minimum retroreflectivity for existing and temporary pavement 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 4 pavement markings, place temporary raised markers half on and half off edge lines and centerlines to help secure the tape to the roadway. Markers shall be spaced an appropriate distance apart as described by the NCDOT *Roadway Standard Drawing* No. 1250.01, Sheet 1 of 3.

The Design-Build Team shall trace existing and / or proposed monolithic island locations with the proper color pavement marking prior to removal and / or installation. The Design-Build Team shall place drums to delineate existing and / or proposed monolithic islands after the removal and / or before installation.

The Design-Build Team shall not place temporary markings other than Cold Applied Plastic Type 4 - 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. Pavement markings shall not be obscured 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.

### **Temporary Traffic Signals**

Multi-lane turn lanes at intersections shall be 15 feet in width at the midpoint of the turn.

If the Design-Build Team proposes temporary traffic signals for maintenance of traffic, include the following as part of the TMP General Notes:

- 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.



## Lighting

The Design-Build Team shall provide portable temporary construction and equipment lighting to conduct night work in accordance with the NCDOT *Standard Specifications for Road and Structures*.

For nighttime lane closures along I-26, I-240 and US 19 / 23 / 70 (existing I-26), furnish and install Work Zone Presence Lighting and Sequential Flashing Warning Lights. (Reference the *Work Zone Presence Lighting* and *Sequential Flashing Warning Lights* Project Special Provision found elsewhere in this RFP).

## Temporary Shoring for Maintenance of Traffic

Temporary shoring for the maintenance of traffic shall be defined as shoring necessary to provide lateral support to the side of an excavation or embankment parallel to an open travelway when a theoretical 2:1 (H:V) slope from the bottom of the excavation or embankment intersects the existing ground line closer than five feet from the edge of pavement of the open travelway.

The Design-Build Team shall be responsible for all required temporary shoring including designing, furnishing, installing, maintaining, and removing the shoring.

The Design-Build Team shall identify where temporary shoring will be used for maintenance of traffic on the TMPC and include cut sections showing offsets to the travelway.

The Design-Build Team shall install temporary traffic barrier as shown on the “PCB at Temporary Shoring Locations” detail available on the Work Zone Traffic Control website noted below. This detail provides design information on the temporary traffic barrier location in relation to the temporary shoring and traffic location. Notes related to Temporary Shoring are not required in the General Notes sheet for the TMP.

The NCDOT Geotechnical Engineering Unit and Work Zone Traffic Control websites contain more information on the design and use of temporary shoring. The Design-Build Team shall adhere to any additional requirements for temporary shoring located on the websites below:

**<https://connect.ncdot.gov/resources/Geological/Pages/default.aspx>**

**<https://connect.ncdot.gov/projects/WZTC/Pages/default.aspx>**

## Law Enforcement

Law enforcement officers shall be used during any rolling roadblock operation and to direct traffic when installing / removing / shifting traffic signal heads at intersections. Law enforcement officers may be used to maintain traffic through the work area and / or intersections. The use of law enforcement officers shall adhere to the following requirements:

- 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 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.

### **Work Zone Speed Limit Reduction and \$250 Speeding Penalty**

All speed limits shall be ordinance by the State Traffic Engineer in order to have a lawfully enforceable speed limit. No speed limit messages / signs shall be installed prior to receiving a signed ordinance. NCDOT has sole authority of the speed limits displayed within the work zone.

If, at the Department's sole discretion, the Design-Build Team can justify that the TMPs cannot be designed to adhere to the existing I-26, I-240 and US 19 / 23 / 70 (existing I-26) posted speed limit requirements, the Design-Build Team shall submit a formal Work Zone Speed Limit Reduction Ordinance request to the Design-Build Unit for approval. The request shall state the type of ordinance requested, why the ordinance is needed, and why the TMPs cannot be designed to avoid the need. The request shall also include an Engineering Study that justifies the need for a Work Zone Speed Limit Reduction Ordinance. (Reference the criteria listed in the NCDOT Work Zone Traffic Control Guidelines) Upon receipt of the formal request, the Design-Build Team shall allow four weeks for the Work Zone Speed Limit Reduction Ordinance to be approved.

A Work Zone Variable Speed Reduction is intended to temporarily reduce the speed within the work zone based on specific traffic control strategies needed during construction. When a variable speed limit reduction is in effect, all existing speed limit signs located within the active work area shall be removed or covered. The speed limit shall only be displayed using Digital Speed Limit Signs. Reference *Digital Speed Limit Signs* Project Special Provision found elsewhere in this RFP.

During construction activities along I-26, I-240 and US 19 / 23 / 70 (existing I-26), the Design-Build Team may request a \$250 Speeding Penalty Ordinance. If granted, supplemental signing will be required to alert motorists of the increased fines along the corridor.

The Design-Build Team shall identify the need for a Work Zone Speed Limit Reduction Ordinance and / or a \$250 Speeding Penalty Ordinance in the Technical Proposal. Additionally, the Design-Build Team shall include all relevant details required of the Work Zone Speed Limit Reduction Ordinance and / or a \$250 Speeding Penalty Ordinance in the TMP.

### **PROJECT REQUIREMENTS AND TIME RESTRICTIONS**

All time restrictions and notes shall be included in the TMP General Notes, unless noted otherwise elsewhere in this RFP.

In the event any self-imposed liquidated damages are included in the Technical Proposal, an Intermediate Contract Time(s) shall be established and shall become part of the contract.

### **Intermediate Contract Times for Lane Narrowing, Lane Closure, Holiday and Special Event Restrictions**

Except as allowed otherwise elsewhere in this RFP, the Design-Build Team shall maintain the existing traffic pattern and shall not close or narrow a single lane of traffic during the times listed below. Construction operations requiring a lane closure on a ramp / loop section with a single lane shall be defined as a road closure and shall be subject to the intermediate contract times for road closures noted in the ICTs found elsewhere in this Scope of Work.

<b>Intermediate Contract Time</b>	<b>Facility</b>	<b>Days</b>	<b>Time Restrictions</b>
9	I-26, I-240 and US 19 / 23 / 70 (existing I-26) including all ramps and loops, Patton Avenue, Haywood Road	Monday through Friday  Saturday and Sunday	6:00 a.m. to 9:00 p.m.  9:00 a.m. to 9:00 p.m.
10	All Other Roads	Monday through Friday	6:00 a.m. to 9:00 a.m. and 4:00 p.m. to 7:00 p.m.

The Design-Build Team shall not close or narrow a lane of traffic on all roads, detain, and / or alter the traffic flow on or during holidays, holiday weekends, special events, or any other time when traffic is unusually heavy. At a minimum, these requirements / restrictions shall apply to the following schedules:

1. For unexpected occurrence that creates unusually high traffic volumes, as directed by the Engineer.
2. For Christmas and New Year's Day, between the hours of 6:00 AM December 18th and 9:00 PM the third weekday following New Year's Day.
3. For Easter, between the hours of 6:00 AM Thursday and 9:00 PM Monday.
4. For Memorial Day, between the hours of 6:00 AM Friday and 9:00 PM Tuesday.
5. For Independence Day, between the hours of 6:00 AM the day before Independence Day and 9:00 PM the day after Independence Day.

If Independence Day is on a Friday, Saturday, Sunday, or Monday, then between the hours of 6:00 AM the Thursday before Independence Day and 9:00 PM the Tuesday after Independence Day.

6. For Labor Day, between the hours of 6:00 AM Friday and 9:00 PM Tuesday.
7. For Thanksgiving, between the hours of 6:00 AM Tuesday and 9:00 PM Monday.
9. For Asheville Half Marathon, RAD Half Marathon and 10K, Gran Fondo Asheville Cycling Event, Oktoberfest Half Marathon and 5K, occurring on NC 251 (Riverside Drive) and SR 1781 (Broadway Street) between 2 hours before the start and 2 hours after the end of the Asheville Half Marathon, RAD Half Marathon and 10K, Gran Fondo Asheville Cycling Event, Oktoberfest Half Marathon and 5K.
10. For Any Events at Harrah's Cherokee Center/Thomas Wolfe Auditorium, between three (3) hours before the start of the event and three (3) hours after the end of the event.
11. NC Mountain State Fair (Typically held for 10 days) Starting 6:00 AM the Friday following Labor Day to 9:00 PM the following Monday that the Fair concludes.

Unless allowed otherwise elsewhere in this RFP, at a minimum, the Design-Build Team shall maintain the existing traffic pattern and follow the road closure restrictions for all roadways.

**Liquidated Damages for Intermediate Contract Time #9 for the above lane narrowing, lane closure, holiday and special event time restrictions for a single lane on I-26, I-240 and US 19 / 23 / 70 (existing I-26) including all ramps and loops are \$2,500.00 per 15-minute period or any portion thereof.**

**Liquidated Damages for Intermediate Contract Time #10 for the above lane narrowing, lane closure, holiday and special event time restrictions for all other roads are \$1,000.00 per hour or any portion thereof.**

### **Intermediate Contract Times for Road Closure Restrictions for Construction Operations**

Unless allowed otherwise elsewhere in this RFP, at a minimum, the Design-Build Team shall maintain the existing traffic pattern and follow the road closure restrictions for all roadways listed below. When a road closure is used, the Design-Build Team shall reopen the travel lanes by the end of the road closure duration to allow the traffic queue to deplete before re-closing the roadway.

Unless allowed otherwise elsewhere in this RFP, the Design-Build Team shall not close any direction of travel on the following roads or any ramps / loops during the times noted below; and only close the following roads or any ramps / loops for the operations listed in this intermediate contract time. Using a median crossover, exclusively for the operations listed below, shall be defined as a closure of a direction of travel.

<b>Intermediate Contract Time</b>	<b>Facility</b>	<b>Days</b>	<b>Time Restrictions</b>
11	I-26, I-240 and US 19 / 23 / 70 (existing I-26) including all ramps and loops, Patton Avenue, Haywood Road	Monday through Sunday	6:00 a.m. to 9:00 p.m.
12	Riverside Drive, Broadway Street	Monday through Sunday	6:00 a.m. to 9:00 p.m.

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 may be closed according to the time restrictions listed in the appropriate Road Closure ICT for the operations listed below:

- Bridge demolition
- Girder, overhang, and falsework installation and / or removal
- Installation overhead sign assemblies and/or work on existing sign assemblies over travel lanes
- Signal installation
- Tie-in work to implement or remove an on-site detour

Proposed road closures for any road within the project limits shall be approved by the Engineer, in writing, prior to incorporation in the TMP.

**Liquidated Damages for Intermediate Contract Time #11 for the above road closure time restrictions for construction operations on I-26, I-240 and US 19 / 23 / 70 (existing I-26) including all ramps and loops, Patton Avenue and Haywood Road are \$2,500.00 per 15-minute period or any portion thereof.**

**Liquidated Damages for Intermediate Contract Time #12 for the above road closure time restrictions for construction operations for Riverside Drive and Broadway Street are \$250.00 per 15-minute period or any portion thereof.**

#### **Intermediate Contract Times for Ramp Reconstruction**

One road closure, with an approved offsite detour, will be permitted for the reconstruction of each ramp / loop at the following interchanges for the maximum durations listed below. The Design-Build Team shall not concurrently close both on ramps / loops and / or both off-ramps / loops at the same interchange. The Design-Build Team shall not concurrently close any ramps or loops at

adjacent interchanges. The Design-Build Team shall not concurrently close any ramp or loop, and associated -L- or -Y-.

**ICTs #13 and #14 are as listed in the table below:**

<b>Intermediate Contract Time #</b>	<b>Interchange</b>	<b>Day</b>	<b>Duration (Per ramp or loop)</b>	<b>Liquidated Damages (per hour or any portion thereof)</b>
#13	I-26 at Haywood Rd, I-26 at Broadway St	From Friday at 9:00 p.m. until 5:00 a.m. Monday	56 consecutive hours	\$2,000.00
#14	I-26 at ALT US 74 (Patton Ave); I-26 at I-240; I-240 at US 19/23/70 and Patton Ave	From Saturday 9:00 p.m. Until 5:00 a.m. Monday	32 consecutive hours	\$2,000.00

The date of availability shall be the date the Design-Build Team elects to close the ramp / loop. The Design-Build Team shall provide the Engineer a minimum of 30 days written notice prior to the date of availability. The date of completion shall be the number of consecutive hours proposed by the Design-Build Team in the Technical proposal, and such number of consecutive hours proposed shall not be greater than the hours noted above.

**Liquidated Damages for Intermediate Contract Time #13 for the above ramp reconstruction time restrictions for construction operations on the I-26 ramps and loops at Haywood Road and the I-26 ramps and loops at Broadway Street are \$2,000.00 per hour or any portion thereof.**

**Liquidated Damages for Intermediate Contract Time #14 for the above ramp reconstruction time restrictions for construction operations on the I-26 ramps and loops at I-240 the I-26 ramps and loops at Patton Avenue, the I-240 ramps and loops at US 19 / 23 / 70 and the I-240 ramps and loops at Patton Avenue are \$2000.00 per hour or any portion thereof.**

#### **Other Intermediate Contract Times**

In the event any self-imposed liquidated damages are included in the Technical Proposal, an Intermediate Contract Time(s) shall be established and shall become part of the contract.

## Hauling Restrictions

The Design-Build Team shall adhere to the hauling restrictions noted in the 2018 NCDOT *Standard Specifications for Roads and Structures*.

The Design-Build Team shall not conduct any hauling operations as follows:

- The Design-Build Team shall not conduct any hauling operations against the flow of traffic of an open travelway unless an approved temporary traffic barrier or guardrail separates the traffic from the hauling operation.
- The Design-Build Team shall not haul during the holiday and special events time restrictions listed in ICT #9 and ICT #10 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 be shown on the TMP and be in accordance with the NCDOT Roadway Standard Drawings and the *Typical Median Access Areas* Project Special Provision found elsewhere in this RFP.
- Haul vehicles shall not enter and / or exit an open travel lane at speeds more than 10 mph below the posted speed limit. Haul vehicle acceleration to within 10 mph of the posted speed limit shall only occur on a paved surface.
- Signs with activated Beacons or LED flashers shall be installed and used when hauling from the median. These signs shall be activated once haul vehicles are detected to warn motorists of vehicles entering the highway from the median. Reference the *Typical Median Access Areas* Project Special Provision found elsewhere in this RFP.
- Hauling operations that perpendicularly cross a roadway shall require Transportation Management Plans and shall be subject to the lane narrowing / lane closure time restrictions, and holiday and special event time restrictions.

Excluding hauling operations that are conducted entirely behind a temporary traffic barrier or guardrail, single vehicle hauling shall not be allowed ingress and egress from any open travel lane during the following time restrictions:

### Single Vehicle Hauling

Facility	Days	Time Restrictions
All Roads	Monday through Friday	6:00 a.m. to 9:00 a.m. and 4:00 p.m. to 7:00 p.m.

Excluding hauling operations that are conducted entirely behind a temporary traffic barrier or guardrail, multi-vehicle hauling shall not be allowed ingress or egress from any open travel lane during the following time restrictions:

### Multi-Vehicle Hauling

Facility	Days	Time Restrictions
I-26, I-240 and US 19 / 23 / 70 (existing I-26), including all ramps and loops, Patton Avenue	Monday through Friday	6:00 a.m. to 9:00 p.m.
	Saturday and Sunday	9:00 a.m. to 9:00p.m.

The Design-Build Team shall address how hauling will be conducted in the Technical Proposal, including hauling of any materials to and from the site and hauling material within the NCDOT right of way.

In the event any self-imposed hauling restrictions are included in the Technical Proposal, an Intermediate Contract Time(s) shall be established and shall become part of the contract.

### Alternative TMP Design Performance Criteria

After award of the contract, NCDOT is willing to consider long term lane closures, road closures, and / or modifications to sections Project Requirements and Time Restrictions, and Hauling Restrictions above in order to accommodate a proposal by the Design-Build Team which utilizes an unconventional construction method to reduce construction time or project cost. Any proposal by the Design-Build Team under this section shall include a macroscopic traffic analysis that verifies the proposed modifications will maintain acceptable travel times through (or around) the work zone as provided in the table below. The traffic analysis shall be submitted to NCDOT for review and acceptance prior to incorporating any long term lane closures, road closures, and / or modifications to sections Project Requirements and Time Restrictions, and Hauling Restrictions in the TMP.



<b>Direction &amp; Start Location</b>	<b>Direction &amp; End Location</b>	<b>Peak Maximum Travel Time (Minutes)</b>	<b>Off-Peak Maximum Travel Time (Minutes)</b>
I-240 EB / Haywood Rd	I-26 WB / SR 1684 (Elk Mountain Rd)	9:15	6:30
	I -240 EB / US 25 (Merrimon Ave)	5:45	4:00
US 19-23 (Patton Ave) / Florida Ave	US 19-23 (Patton Ave) / SR 3548 (Clingman Ave)	5:00	3:00
US 19-23 (Patton Ave) / SR 3548 (Clingman Ave)	US 19-23 (Patton Ave) / Florida Ave	5:30	3:00
I-240 WB / US 25 (Merrimon Ave)	I-240 WB / US 19-23 BUS (Haywood Rd)	7:00	4:45
I-26 EB / SR 1684 (Elk Mountain Rd)	I-240 WB / US 19-23 BUS (Haywood Rd)	10:30	7:15

Peak Maximum Travel Times will be allowable from 6:30 a.m. to 8:30 a.m. and 4:00 p.m. to 6:30p.m. Monday through Friday, and during all times listed in the Holiday and Special Event schedule listed in Intermediate Contract Times #9 and #10. Off-Peak Maximum Travel Times shall be utilized during all other times.

If NCDOT approves modifications to the Time Restrictions and / or Hauling Restrictions, the associated Intermediate Contract Times will be adjusted as appropriate to match the modified time restrictions. Liquidated Damages will be assessed on the adjusted Intermediate Contract Times.

For routes and travel times not defined in the table above, travel time thresholds for proposed modifications will be set as follows:

- Peak Maximum Travel Time will represent a 100% increase over the pre-construction Peak (i.e. M-F 6:30 a.m. to 8:30 a.m. and 4:00 p.m. to 6:30 p.m) travel times.
- Off-Peak Maximum Travel Time will represent a 50% increase over the pre-construction Off-Peak travel times.

Travel times through (or around) the work zone will be measured and monitored by the INRIX and / or iPEMS systems. Violations of maximum travel times will be reported to the Design-Build Team weekly, and modifications to traffic control strategies shall be made to minimize future violations at no cost to the Department.

NCDOT shall have sole authority to revoke modifications to the Time Restrictions or Hauling Restrictions and reinstate the original restrictions and Intermediate Contract Times set forth in Sections Project Requirements and Time Restrictions, and Hauling Restrictions above due to excessive queueing, frequent violations of travel time thresholds, major traffic disruptions to routes or intersections outside the project limits, or any other reason deemed appropriate by the Engineer. Individual incidents that cause travel times to exceed the chart above and are beyond the Design-Build Team's control (such as crashes, motorist breakdowns, etc.) will not be considered violations of this section; however, a significant increase in the frequency of these incidents (as determined by the Engineer) may result in revocation of the modified Time and Hauling

**TRAFFIC SIGNALS AND SIGNAL COMMUNICATIONS SCOPE OF WORK** (4-19-23)**I. GENERAL**

The Design-Build Team shall design and prepare plans for the temporary traffic signal installations required by the construction phasing and / or detour routes, permanent traffic signal installations, traffic signal revisions, and signal communication plans for connection to the Asheville Signal System. This work shall include, but not be limited to, the preparation of Traffic Signal Plans, Metal Pole Loading Diagrams, Electrical and Programming Details, Utility Make-Ready Plans, Signal Communication Fiber Optic Communication and Splicing Plans, Wireless Communication Plans, and Project Special Provisions. These plans shall be prepared in accordance with the *Design-Build Submittal Guidelines* and the *Guidelines for the Preparation of ITS & Signal Plans by Private Engineering Firms* available on the Design-Build Unit's website located at:

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

The Design-Build Team shall select a Private Engineering Firm (PEF) that has experience designing and sealing Traffic Signal, Electrical Detail, and Signal Communications Plans for NCDOT on comparable projects. The Private Engineering Firm selected shall also have experience preparing Utility Make Ready plans. The Technical Proposal shall list projects, including description and similarity to the subject project, for which the PEF has developed Traffic Signal, Electrical Detail, and Signal Communications Plans.

A pre-design meeting shall take place between the NCDOT Transportation Systems Management & Operations Unit (TSMO), the Work Zone Traffic Control Group, the Design-Build Team, the Design-Build Unit, the Division Traffic Engineer, the Regional Traffic Engineer, Statewide Operations Center (STOC), the Mountain Regional Traffic Management Center (MRTMC), and any other pertinent NCDOT personnel before signal submittals begin. Traffic Signal, Electrical Detail, and Signal Communications Plan submittals shall only be reviewed and accepted by the Department after this pre-design meeting. All Traffic Signal and Signal Communications Plans shall be reviewed by the TSMO Unit. Final approval on all Traffic Signal Plans and Signal Communications Plans submittals will be the responsibility of the NCDOT TSMO Unit. All Traffic Signal Plans and Signal Communication Plans shall be accepted by the TSMO Unit prior to beginning traffic signal construction or plan implementation.

The Design-Build Team shall coordinate and implement all signal designs at the appropriate time as directed by the Engineer. Prior to final design and installation, the Design-Build Team shall coordinate all signal phasing recommendations with the Division Traffic Engineer, the Regional Traffic Engineer, and the TSMO Unit. Prior to placing traffic in a new pattern, all traffic signals shall be installed and operational, including but not limited to, signal system timing plans and interconnection to the Signal System, if required below.

Except as noted otherwise elsewhere in this RFP, the Design-Build Team shall maintain, monitor, and adjust the traffic signals, both vehicle and pedestrian, as needed throughout the project construction. The Design-Build Team shall be responsible for the design and implementation of all temporary signal designs, including but not limited to signal system timing plans, needed to maintain vehicular and pedestrian traffic during construction, and all final traffic signal timing plans for the final traffic configurations. If necessary, temporary traffic signal designs and

implementation, shall include, but not be limited to, new local controller, signal timing, inductive loops / vehicle detection, cables, poles, signal span, controllers, cabinets, and / or signal heads. Prior to implementation, all signal timing plans shall be reviewed and accepted by the TSMO Unit.

Where construction activities necessitate a detour, the Design-Build Team shall evaluate the effects of that detour on all traffic signals along the detour route. The Design-Build Team shall make operational changes as necessary and as directed by the Engineer.

**Throughout the project construction, the Design-Build Team shall maintain full actuation of the traffic signals located within the project limits, unless allowed otherwise by the Engineer in writing.**

The Design-Build Team shall maintain or incorporate all traffic signals on this project into the Asheville Signal System, as detailed below. To connect sidewalk networks, the Design-Build Team shall provide crosswalks and pedestrian signal heads for all approaches, as appropriate, based on field conditions. Crosswalks and pedestrian signal heads will not be required where there is no sidewalk on a quadrant.

All final signal installations shall black metal poles with straight mast arms. All temporary signal installations may utilize wood poles for signal supports. All plans and associated design material and specifications shall be reviewed and accepted by NCDOT before installation. See Section II below for final traffic signal support requirements.

The Design-Build Team shall deliver all existing cabinets and their contents, including but not limited to fiber and cellular modems, that are not reinstalled on this project to the Division Traffic Services Office located at 11 Old Charlotte Highway, Asheville, NC 28803. The Design-Build Team shall dispose of and / or retain ownership of all other traffic signal equipment.

Signal Inventory Numbers (SIN) will be assigned for each new signalized location by the NCDOT Signal Design Section. 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 Signal Design Section, via the Design-Build 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
- Latitude and Longitude coordinates to the middle of the intersection

The Design-Build Team shall be responsible for providing a safe and economical design for the public. The Design-Build Team shall prepare all plans and designs in accordance with the current NCDOT TSMO Unit design standards, including but not limited to, the version of the following documents effective on the Technical Proposal submittal date:

- NCDOT *Standard Specifications for Roads and Structures*
- NCDOT *Standard Roadway Drawings*

- Signals and ITS Project Special Provisions
- ITS and Signals Design Manual
- *Manual on Uniform Traffic Control Devices (MUTCD)*
- *North Carolina Supplement to the Manual on Uniform Traffic Control Devices (NCMUTCD)*
- *Guidelines for the Preparation of ITS & Signal Plans by Private Engineering Firms*
- *NCDOT Signal System Timing Philosophy Manual*

Links to additional TSMOU design standards and aides are available on website noted below:

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

## **II. TRAFFIC SIGNALS**

Unless allowed otherwise elsewhere in this RFP, the Design-Build Team shall install eight (8) new traffic signals, modify six (6) existing traffic signals, and remove one (1) existing traffic signal within the project limits. All these signals shall be interconnected into the Asheville Signal System. The traffic signal detection for the final traffic patterns shall be inductive loop detection unless 1) the required location of the inductive loop is within a bridge deck, and / or 2) the Department provides written approval otherwise. The Design-Build Team shall only provide out of street detection for 1) temporary traffic patterns during construction and 2) final traffic patterns at locations where inductive loops would be located within a bridge deck. The out of street detection shall be approved by the Department, in writing, prior to incorporation, and appear on the NCDOT Qualified Products List. Unless allowed otherwise elsewhere in this RFP, the required traffic signal work and signal communications for the intersections are listed below:

<b>NCDOT - Existing Signals in the Asheville Signal System to be Modified (6)</b>		
<b>Signal Inventory Number</b>	<b>Intersection Description</b>	<b>Work Requirements</b>
13-0218	US 19-23 Bus/SR 3548 (Haywood Rd) at I-240 Ramps/Hanover St	The Design-Build Team shall modify these existing traffic signals as needed to match all temporary construction phasing and the proposed final traffic pattern. This may require, but not be limited to, additional lanes, signal phasing changes, signal head changes, system detectors, and / or system interconnections equipment.
13-0293	US 19-23-74A (Patton Avenue) at Florida Ave / Shopping Center	
13-0920	US 19-23-74 (Patton Ave) at I-240 Ramp and Regent Park Blvd. / Shopping Center	The Design-Build Team shall install new <b>black metal poles with straight mast arms</b> at these locations.
13-1294	SR 1477 (Riverside Dr.) at SR 1348 (Pearson Bridge Rd.)	The Design-Build Team shall design and install new fully actuated traffic signals with 2070LX controllers operating MAXTIME local controller software in a 170 cabinet with an auxiliary output file, including base extenders. <i>(The Asheville Signal System is scheduled to be upgraded to 2070LX controllers running MAXTIME in 2024.)</i>
13-0278	US 19-23-70 Ramp and SR 1477 (Riverside Drive) at NC 251 and SR 1781 (Broadway)	The Design-Build Team shall provide Flashing Yellow Arrow signal heads at all protected / permissive and permissive left turns and U-Turn movements, including time of day phasing options, as appropriate.
13-0263	Patton Avenue at SR 3548 (Clingman Avenue)	The Design-Build Team shall provide crosswalks and pedestrian signal heads at each approach with existing or proposed sidewalk.
		The Design-Build Team shall provide Up Green Arrow signal heads with respective lane control signs for through lanes at locations where movement restrictions exist.
		The Design-Build Team shall maintain and / or provide the required system communication equipment as described in Section III.

<b>NCDOT - New Signals to be installed into the Asheville Signal System (8)</b>		
<b>Signal Inventory Number</b>	<b>Intersection Description</b>	<b>Work Requirements</b>
13-1329	US 19-23 Bus/SR 3548 (Haywood Rd) at I-240 WB Ramp	The Design-Build Team shall install new traffic signals to match all temporary construction phasing and the proposed final traffic pattern. This may require, but not be limited to, additional lanes, signal phasing changes, signal head changes, system detectors, and / or system interconnection equipment.
13-1330	US 19-23-74A (Patton Avenue) at U-Turn just West of Regent Park Blvd	
13-1331	US 19-23-74A (Patton Avenue) at I-26 WB Ramp	The Design-Build Team shall install new <b>black metal poles with straight mast arms</b> at these locations.
13-1332	US 19-23-74A (Patton Avenue) at I-26 EB Ramp	The Design-Build Team shall design and install new fully actuated traffic signals with 2070LX controllers operating MAXTIME local controller software in a 170 cabinet with an auxiliary output file, including base extenders. <i>(The Asheville Signal System is scheduled to be upgraded to 2070LX controllers running MAXTIME in 2024.)</i>
13-1333	SR 1477 (Riverside Dr) at SR 1517 (Hill St)	The Design-Build Team shall provide Flashing Yellow Arrow signal heads at all protected / permissive and permissive left turns and U-Turn movements, including time of day phasing options, as appropriate.
13-1334	US 19-23-74A (Patton Avenue) at STA 65+00	The Design-Build Team shall provide crosswalks and pedestrian signal heads at each approach with existing or proposed sidewalk.
13-1335	US 19-23-74A (Patton Avenue) at STA 74+00	The Design-Build Team shall provide Up Green Arrow signal heads with respective lane control signs for through lanes at locations where movement restrictions exist.
13-1336	-Y25A- at STA 24+00 (HAWK Ped Signal)	
		The Design-Build Team shall maintain and / or provide the required system communication equipment as described in Section III.

<b>Existing Signal to be Removed (1)</b>		
<b>Signal Inventory Number</b>	<b>Intersection Description</b>	<b>Work Requirements</b>
13-1029	I-240 WB Ramp at US 19-23 EB Ramp and Patton Avenue	<p>The Design-Build Team shall, upon completion of the final interchange configuration, and at a time agreed upon with the Engineer, remove this existing traffic signal. The Design-Build Team shall coordinate the removal of the traffic signal with the Division Traffic Engineer.</p> <p>The Design-Build Team shall return the traffic signal controllers, cabinets, and signal heads to the Division 13 Traffic Services Office, unless otherwise directed. The Design-Build Team shall dispose of and / or retain ownership of all other equipment.</p>

### **III. SIGNAL COMMUNICATION PLANS**

The Design-Build Team shall coordinate all proposed downtime and / or disruptions in service in accordance with the Project Operations Requirements Section of this Scope of Work. Unless allowed otherwise elsewhere in this RFP, the Design-Build Team shall maintain the existing communications infrastructure and communication integrity of the signals located within the project boundaries, including but not limited to the fiber optic, wireless, and cellular modem infrastructure and equipment.

#### **A. SIGNAL COMMUNICATIONS**

The Design-Build Team shall design, install, and maintain / upgrade the following communications networks as noted below:

- a) Existing NCDOT Maintained City of Asheville Signal System - Signal communications fiber, ASC/3 software with Ethernet communications

All existing main trunk line fibers shall remain the same size or larger upon completion of the project.



<b>US 19-23 Bus/SR 3548 (Haywood Rd) at I-240 Ramps</b>	
<b>Signal Inventory Number and Intersection Description</b>	<b>Description of Work</b>
<p>13-0218 US 19-23 Bus/SR 3548 (Haywood Rd) at I-240 Ramps/Hanover St</p> <p>13-NEW 1 US 19-23 Bus/SR 3548 (Haywood Rd) at I-240 WB Ramp</p>	<p>The Design Build Team shall replace the existing 60-fiber trunk line with a new 60-fiber trunk line along SR 3548 (Haywood Rd.) from the eastern end of the construction limits to the western end of the construction limits.</p> <p>The Design Build Team shall install aerial or underground fiber optic splice enclosures outside of the eastern and western ends of the construction limits to splice the new 60-fiber trunk line to the existing 60-fiber trunk line.</p> <p>The Design Build Team shall install aerial or underground fiber optic splice enclosures at or near each traffic signal and install a new 12-fiber drop cable to each traffic signal cabinet.</p> <p>The Design Build Team shall install a new Ethernet switch in each new and existing signal cabinet.</p> <p>The Design Build Team shall install new fiber optic interconnect centers, fiber optic pigtails, and fiber optic jumpers in each new and existing traffic signal cabinet.</p>

<b>Patton Ave. (West of the French Broad River)</b>	
<b>Signal Inventory Number and Intersection Description</b>	<b>Description of Work</b>
<p>13-0293 US 19-23-74A (Patton Avenue) at Florida Ave / Shopping Center</p> <p>13-0920 US 19-23-74 (Patton Ave) at I-240 Ramp and Regent Park Blvd. / Shopping Center</p> <p>13-NEW 2 US 19-23-74A (Patton Avenue) at U-Turn just West of Regent Park Blvd</p> <p>13-NEW 3 US 19-23-74A (Patton Avenue) at I-26 WB Ramp</p> <p>13-NEW 4 US 19-23-74A (Patton Avenue) at I-26 EB Ramp</p>	<p>The Design Build Team shall replace the existing 24-fiber trunk line with a new 24-fiber trunk line along US 19-23-74A (Patton Ave.) from Florida Ave. the New Signal at US 19-23-74A (Patton Avenue) at I-26 EB Ramp.</p> <p>The Design Build Team shall install aerial or underground fiber optic splice enclosures at or near each traffic signal and install a new 12-fiber drop cable to each traffic signal cabinet.</p> <p>The Design Build Team shall install a new Ethernet switch in each new and existing signal cabinet.</p> <p>The Design Build Team shall install new fiber optic interconnect centers, fiber optic pigtails, and fiber optic jumpers in each new and existing traffic signal cabinet.</p>

<b>Patton Ave. (East of the French Broad River)</b>	
<b>Signal Inventory Number and Intersection Description</b>	<b>Description of Work</b>
<p>13-0263 Patton Avenue at SR 3548 (Clingman Avenue)</p> <p>13-NEW 6 US 19-23-74A (Patton Avenue) at STA 65+00</p> <p>13-NEW 7 US 19-23-74A (Patton Avenue) at STA 74+00</p> <p>13-NEW 8 -Y25A- at STA 24+00 (HAWK Ped Signal)</p> <p>13-1029 I-240 WB Ramp at US 19-23 EB Ramp and Patton Avenue</p>	<p>The Design Build Team shall install a new 24-fiber trunk line along US 19-23-74 (Patton Ave) from SR 3548 (Clingman Ave.) to new signal 13-NEW 6 at STA 65+00 and north along Y25A from new signal 6 at STA 65+00 to new signal 13-NEW 7.</p> <p>The Design Build Team shall replace the existing 60-fiber trunk line with a new 60-fiber trunk line along the existing I-240 Off Ramp 19-23-74 (Patton Ave) from the western end of the Construction limits to the east of SR 3548 Clingman Ave.</p> <p>The Design Build Team shall replace the existing 24-fiber trunk line with a new 24-fiber trunk line along SR 3548 (Clingman Ave.) SR 3548 (Haywood Rd.) from US 19-23-74 (Patton Ave) to the northern end of the construction limits.</p> <p>The Design Build Team shall replace the existing 60-fiber trunk line with a new 60-fiber trunk line along SR 3548 (Clingman Ave.) from US 19-23-74 (Patton Ave) to Hilliard Ave.</p> <p>The Design Build Team shall install aerial or underground fiber optic splice enclosures at or near each traffic signal and install a new 12-fiber drop cable to each traffic signal cabinet.</p> <p>The Design Build Team shall install a new Ethernet switch in each new and existing signal cabinet.</p> <p>The Design Build Team shall install new fiber optic interconnect centers, fiber optic pigtails,</p>

	<p>and fiber optic jumpers in each new and existing traffic signal cabinet.</p> <p>The Design Build Team shall replace the existing 900MHZ radio connection along US 19-23-74 (Patton Ave) between SR 3548 (Clingman Ave.) and Haywood St. (Existing Signal COA-113)</p> <p>The Design Build Team shall maintain the existing fiber communications at signal 13-1029 - I-240 WB Ramp at US 19-23 EB Ramp and Patton Avenue</p>
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<b>Riverside Dr.</b>	
<b>Signal Inventory Number and Intersection Description</b>	<b>Description of Work</b>
<p>13-0278 US 19-23-70 Ramp and SR 1477 (Riverside Drive) at NC 251 and SR 1781 (Broadway St.)</p> <p>13-1294 SR 1477 (Riverside Dr.) at SR 1348 (Pearson Bridge Rd.)</p> <p>13-NEW 5 SR 1477 (Riverside Dr) at SR 1517 (Hill St)</p>	<p>The Design Build Team shall replace the existing 24-fiber trunk line with a new 24-fiber trunk line at 13-0278 - US 19-23-70 Ramp and SR 1477 (Riverside Dr.) at NC 251 and SR 1781 (Broadway St.) wherever impacted by construction of the I-2513D project. The Design Build Team may back pull the existing 24-fiber trunk line from the existing splice enclosure and reroute to the new splice enclosure if possible.</p> <p>The Design Build Team shall install a new 24-fiber trunk line along SR 1477 (Riverside Dr.) from US 19-23-70 Ramp and SR 1477 (Riverside Dr.) at NC 251 and SR 1781 (Broadway) to SR 1517 (Hill St.)</p> <p>The Design Build Team shall install aerial or underground fiber optic splice enclosures at or near each traffic signal and install a new 12-fiber drop cable to each traffic signal cabinet.</p>

	<p>The Design Build Team shall install a new Ethernet switch in each new and existing signal cabinet.</p> <p>The Design Build Team shall install new fiber optic interconnect centers, fiber optic pigtails, and fiber optic jumpers in each new and existing traffic signal cabinet.</p>
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## B. PLANS AND SUBMITTALS

The Signal Communications Plans shall consist of the three major items listed below:

- Signal Communications Plans, including Splice Plans
- Project Special Provisions
- Catalog Cut Sheets

The Design-Build Team shall install all traffic signal equipment, communications cables and conduit systems in such a manner that avoids conflicts with other utilities. All aerial communications cable installations shall be installed in accordance with the National Electrical Safety Code. The Design-Build Team shall be responsible for coordinating all Utility Make-Ready Work with the proper utility representatives.

Prior to construction, the Design-Build Team shall provide a detailed set of Signal Communications Plans, Project Special Provisions and Catalog Cut Sheets as required above for the Department's review and acceptance. No construction related to the installation of the communications system shall begin until NCDOT has accepted the RFC Signal Communications Plans, Project Special Provisions and Catalog Cut Sheets.

### Utility Make-Ready Plans

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

The Design-Build Team shall coordinate with all affected utilities to make necessary utility adjustments and / or pole change outs for all new fiber optic cable to be installed aerially. The Design-Build Team shall schedule coordination meetings with each affected utility owner and pertinent NCDOT personnel.

### Junction Boxes

For all underground splice enclosure locations, the Design-Build Team shall furnish and install new *Special Oversized Heavy-Duty Junction Boxes* that meet the requirements of Sections 1098-5 and 1716 of the 2018 NCDOT *Standard Specifications for Roads and Structures* and have minimum inside dimensions of 36" (l) x 24" (w) x 24" (d).

For all other locations, the Design-Build Team shall furnish and install new *Oversized Heavy-Duty Junction Boxes* that meet the requirements of Sections 1098-5 and 1716 of the 2018 NCDOT *Standard Specifications for Roads and Structures* and have minimum inside dimensions of 30" (l) x 15" (w) x 24" (d).

Store 50 feet of spare cable, for each cable, in all junction boxes; and 20 feet of spare cable in all signal cabinets.

Furnish junction box lids with "NCDOT Fiber Optic" logo for NCDOT fiber optic cable.

### **C. MATERIALS**

When existing equipment (signal cabinets, hub cabinets, Ethernet equipment, electronic equipment, fiber, conduit, messenger cable, etc.) is replaced, the Design-Build Team shall replace existing equipment with new equipment. All material, equipment and work shall adhere to the 2018 NCDOT *Standard Specifications for Roads and Structures* requirements. Materials, where applicable, shall be pre-approved on the Department's Qualified Products List (QPL). The QPL web site is:

**<https://connect.ncdot.gov/resources/safety/Pages/default.aspx>**

Prior to incorporation, the Design-Build Team shall provide detailed specifications for all material, equipment and / or work that is not covered in the 2018 NCDOT *Standard Specifications for Roads and Structures* for Department approval. The Design-Build Team shall provide specifications and plans that address the material requirements and construction methods. No equipment or material shall be installed until it has been approved by the Department, in writing. Catalog cuts will not be required for items on the QPL. Items not listed on the QPL will require Department written approval prior to incorporation.

Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall return all existing electronic equipment to the Department. A minimum of one week prior to removal of electronic equipment, the Design-Build Team shall contact Division 13 Traffic Engineer, during normal business hours at 828-250-3000 to coordinate a specific day and time for the Design-Build Team to deliver the salvaged material to the Department. Prior to delivery to the Department, the Design-Build Team shall stockpile all salvaged material to prevent damage.

### **D. MAINTENANCE AND REPAIR REQUIREMENTS**

From the beginning of construction until the final project acceptance, the Design-Build Team shall maintain and repair all system components within the project scope, including but not limited to, signal cabinets, loops, signal heads, conduit systems, communications lines, hub cabinets, etc. After project acceptance, the Design-Build Team shall perform all system repairs resulting from faulty materials and / or workmanship, in accordance with the *Twelve Month Guarantee* Project Special Provision found elsewhere in this RFP, or longer if the Design-Build Team extends the aforementioned warranty period.

### **E. PLAN OF RECORD DOCUMENTATION**

The Design-Build Team shall prepare and submit to the Department Plan of Record (POR) documentation that depicts the conduit and equipment device locations. The Design-Build

Team shall submit final POR documentation in electronic and hard copy format for acceptance by the Department. At a minimum, the POR documentation shall include, but not be limited to, the following:

- Electronic plans in MicroStation (latest release in use by the Department) format on CD
- Hard copy documentation on 22 x 34 inch plan sheets
- Final location and depth of conduits, wiring external to the cabinets, locations of splice closures, junction box locations, and single mode fiber optic (SMFO) cable terminations
- Real world coordinates for all devices, splice enclosures, junction boxes, and equipment cabinets installed or utilized under this project
- Coordinates in English units using the North Carolina State Plane coordinate system (1983 North American Datum also known as NAD '83)
- Coordinates that do not deviate more than 1.7 feet in the horizontal plane and 3.3 feet in the vertical plane. Global positioning system (GPS) equipment able to obtain the coordinate data within these tolerances may be used.

#### **F. LOCAL AREA NETWORK**

For all Ethernet based systems, the Design-Build Team shall furnish and install media access control (MAC) addresses for all equipment utilized as part of this project. MAC address labels shall be affixed to each device utilized. IP addresses shall be furnished for all equipment utilized as part of this project. When replacing existing equipment or installing new equipment, IP address information shall be obtained from the equipment operator to ensure proper operations within their respective systems. Final IP address labels shall be affixed to each device utilized. LAN equipment shall be fully integrated, providing local device failover and fault tolerance, virus protection, user authentication, and security functions to prevent unauthorized user and data from entering the LAN.

The Design-Build Team shall ensure that all plans and designs conform to the NCDOT and NC Statewide IT Policies and Standards as described at:

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

The Design-Build Team shall submit all architecture of the IT modules for review and approval by NCDOT IT and the NC Office of Information Technology architecture groups.

#### **G. INTEGRATION & TESTING**

The Design-Build Team shall integrate each system signal or device and work with the signal system operator to ensure that each device is functioning properly within the system.

The Design-Build Team shall develop unit and system test plans and procedures for each device and component and submit to the Engineer for review and approval. This includes, but is not limited to, signal equipment, fiber optic communications cable, local and central equipment. Upon completion of the system installation and integration, the Design-Build Team shall conduct unit and system tests according to the approved test plans and procedures. The Design-Build Team shall be responsible for providing all necessary test equipment.

In case of failures and substandard performance, the Design-Build Team shall identify the cause of failure and / or substandard performance, repair or replace the faulty parts and components and repeat the test. If the problem persists, the Design-Build Team shall replace the entire unit causing the problem prior to repeating the test at no additional cost.

After successful completion of all units and system test, the Design-Build Team shall submit the test reports, along with the record of repairs and part replacements, to the Engineer.

**\*\*NOTE\*\*** Deleted Liquidated Damages for Intermediate Contract Time #9, #10, and #11

#### IV. SIGNAL SYSTEM TIMING PLANS

The Design-Build Team shall develop and implement all temporary and final coordinated timing plans for the closed loop signal system along US 19-23-74A (Patton Avenue) and US 19-23 (Haywood Rd). This work shall include the design, implementation and fine-tuning of signal timing plans, and evaluation of the final operational benefits associated with work performed on the project. The signal timing plans shall be designed to address all possible traffic needs within the project construction limits, including but not limited to:

- Roadway capacity modifications due to construction, including but not limited to, through / turn lane additions / removals, signal phasing changes, and traffic pattern changes
- Weekday peak / non-peak traffic periods (e.g. a.m., p.m., noon, off-peak, etc.)
- School / Universities start / end and / or class change peak traffic periods
- Seasonal traffic patterns
- Pre-scheduled holiday(s) traffic patterns
- Incident management traffic patterns (e.g. detour routes, hurricane evacuations, etc.)
- Other special events traffic patterns

The Design-Build Team shall select a Private Engineering Firm (PEF) that is prequalified by NCDOT in *Discipline Code 210 - Signal System Timing Development and Implementation* and under the direct charge of a North Carolina certified Professional Engineer.

The Design Build Team shall coordinate the number of timing plans with the Division, the Signal System Timing and Operations (SSTO) Section, and the Division 13 Traffic Engineer, as appropriate. The Design Build Team shall submit a set of preliminary signal system timing plans, with supporting *Tru-Traffic*, *SYNCHRO* 10.0, and *Translink32* database files, to the SSTO Section, Division, and the City of Asheville, as appropriate. All Signal System Timing Plans shall be reviewed and accepted by the SSTO Section, Division, and the City of Asheville, as appropriate, prior to implementation. The Design-Build Team shall coordinate the development and implementation of all signal system timing plans at the appropriate times, as directed by the Engineer.

The Design Build Team shall field implement signal system timing plans in accordance with the SSTO Section, Division, and the City of Asheville's requirements. In the event of conflicting design parameters in the requirements noted above, the proposed design shall adhere to the most conservative values. The Design-Build Team shall:



- Ensure all signal system timing plans are operational in the Central Control Center, Master and local controller(s), as appropriate.
- Observe new traffic operations at the intersections and along the corridor and collect trip logs for each signal system timing plan implemented, by riding the system with Tru-Traffic synched with the plan in operation at the time
- Fine-tune signal system timing plans, as necessary, for optimal system performance.

Prior to Final Project Acceptance, the Design-Build Team shall submit a final report, including final implemented signal timing plans and all supporting documents in *SYNCHRO* 10.0, *Tru-Traffic* Reports and data, *Translink32* database files to the SSTO Section, Division, and the City of Asheville, as appropriate.

**UTILITIES COORDINATION SCOPE OF WORK** (6-21-23)

**\*\* NOTE \*\* Within 45 days of contract execution, the Design-Build Team shall meet with representatives of all the utility companies, and the appropriate NCDOT Utility and Design-Build personnel.**

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 aforementioned PSF shall coordinate all utility relocations, removals and / or adjustments, including but not limited to construction revisions, where the Design-Build Team and utility owner, with concurrence from the Department, determine that such work is essential for highway safety and performance of the required highway construction. Coordination shall be for all utilities, whether or not they are specifically identified in this Scope of Work, and shall include any necessary utility agreements when applicable. NCDOT will be the approving authority for all utility agreements and approval of plans.

During the procurement phase and throughout the project duration, the Design-Build Team 1) will only be allowed direct contact with the utility owners when the aforementioned PSF is present, and 2) shall include the aforementioned PSF on all correspondence with the utility owners. The Design-Build Team shall not contact any utility owner until after the first Question and Answer Sessions with the Design-Build Teams have been conducted. (Reference the *Individual Meetings with Proposers* Project Special Provision found elsewhere in this RFP)

In accordance with the requirements herein, the Design-Build Team shall relocate / coordinate the relocation of all existing facilities that are 1) parallel to a roadway in full control of access, 2) in physical conflict with the construction, 3) within the existing or proposed right of way and structurally inadequate, and / or 4) within the existing or proposed right of way, consist of unacceptable material, and the project will change the grade over the facilities and / or heavy equipment is likely to be operated over the facilities. (Reference the NCDOT *Utilities Accommodation Manual*) Proposed / relocated underground facilities that are located beneath the pavement structure shall only be allowed to cross the roadway as close to perpendicular as possible.

The Department has initiated utility relocation coordination efforts on this project with Duke Energy Transmission and the City of Asheville - Water Resources Department (CoA – Water).

The Duke Energy Transmission efforts are for the transmission line crossing the Crowne Plaza Resort and the line along the west side of Riverside Drive and crossing I-26 near the Riverside Cemetery. Preliminary plans with vertical clearances have been uploaded to the Materials Provide folder.

The City of Asheville - Water is currently having CDM Smith design an upgrade on their 16” waterline to a 24” waterline. The location of the line is along Patton Ave., crosses I-26/I-240 and continues along Hazel Mill Rd. The installation of the new 24” waterline shall be the responsibility of the Design-Build Team. CDM Smith anticipates providing 50% plans by July 1st, 2023. Those plans will be provided upon receipt.

**Project Details**

The Design-Build Team shall be responsible for verifying the utility locations, type of facilities, and identifying the utility owners in order to coordinate the relocation of any utilities, known and unknown, in conflict with the project. The following utilities are known to be located within the project construction limits:

<b>Utility Owner List</b>		
<b>Utility Owner</b>	<b>Utility Type</b>	<b>Cost Responsibility</b>
AT&T	Telecommunications - Distribution	Utility Company or NCDOT (w/ approved Prior Rights)
Charter	CATV	Utility Company or NCDOT (w/ approved Prior Rights)
City of Asheville	Public Utilities	Design-Build Team
City of Asheville	Traffic & Fiber Optics	Utility Company or NCDOT (w/ approved Prior Rights)
Dominion Energy	Gas (HP)	Utility Company or NCDOT (w/ approved Prior Rights)
Dominion Energy	Gas (Distribution)	Utility Company or NCDOT (w/ approved Prior Rights)
Duke Energy	Transmission	Utility Company or NCDOT (w/ approved Prior Rights)
Duke Energy	Distribution	Utility Company or NCDOT (w/ approved Prior Rights)
Education & Research Consortium	Communications	Utility Company or NCDOT (w/ approved Prior Rights)
Metropolitan Sewerage	Public Utilities	Design-Build Team
RST Fiber	Telecom Internet Services	Utility Company or NCDOT (w/ approved Prior Rights)
SEGRA	Telecommunications	Utility Company or NCDOT (w/ approved Prior Rights)
Spirit	Telecommunications	Utility Company or NCDOT (w/ approved Prior Rights)
Verizon - MCI Metro	Telecommunications	Utility Company or NCDOT (w/ approved Prior Rights)
<b>Reference the NCDOT Utilities Accommodation Manual for additional cost responsibility information</b>		

## Water and Sewer

After the Department accepts the Preliminary Roadway Plans developed by the Design-Build Team, a pre-design meeting shall take place between the utility owners and / or their representatives, the Design-Build Team, and appropriate NCDOT Utilities Unit and Design-Build Unit representatives. The Department will only review and accept water and sewer design submittals after the aforementioned pre-design meeting has been held and the 100% Hydraulic Design provided by the Design-Build Team has been accepted by the Department.

The Design-Build Team shall develop water and sewer designs; prepare all water and sewer plans required for 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.

The Design-Build Team shall provide water and sewer designs for all water and sewer facilities impacted by the project, including but not limited to all haul roads and temporary conditions resulting from the Design-Build Team's methods of operation and / or sequence of work. **All** water and sewer designs, including all temporary relocations and / or protection of existing water and sewer facilities, shall be coordinated with the NCDOT Utilities Unit and the utility owners or their representatives.

The relocation and / or protection of all water and sewer facilities shall be done in accordance with the NCDOT policies and standards, as well as the latest water and sewer design requirements / specifications for each individual utility company that are current on the Technical Proposal submittal date or the Best and Final Offer submittal date, whichever is later. In the event of conflicting design parameters in the requirements noted above, the proposed design shall adhere to the most conservative values. The water and sewer facility locations, materials and appurtenances proposed by the Design-Build Team shall require approval by both NCDOT and the appropriate utility owner prior to installation.

The Design-Build Team shall design and construct water / sewer facility extensions to all parcels with access to existing water and / or sewer facilities, including parcels subdivided by the project. The aforementioned water facility extensions shall be installed completely within the right of way. The aforementioned sewer facility extensions shall be installed completely within the right of way or a recorded easement.

\*\*\* MSD of Buncombe County has confirmed that a 30ft vertical clearance (above existing ground) above their 60" Sewer line located along Riverside Drive and the French Board River is required for maintenance.

Excluding water and / or sewer extensions due to encroachment into wells and / or septic systems, all costs associated with the design and construction for relocation, extension, and / or protection of 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 entire project. Protection of water and sewer facilities shall include, but not be limited to encasement, lining and bridging. (Reference the General Section below for requirements associated with encroachment into wells and / or septic systems)

The Design-Build Team shall relocate / replace all commercial and residential backflow preventers impacted by the project in accordance with the local authority's design Policies and Regulations (i.e., Town, City, County, etc.). The City of Asheville Water Department has indicated that there are backflow devices located within the limits of the project. The locations of these devices are in a spreadsheet (*I-2513 CoAVL Water System Backflow Prevention Devices within Project Vicinity*), provided by the Department, in the materials provided folder. Please confirm size and location with utility owner and parcel owner.

The Design-Build Team shall concurrently submit all water and sewer design submittals to the NCDOT State Utilities Manager, via the Design-Build Unit, and the appropriate utility owner for review and acceptance. All water and sewer design submittals shall include a title sheet, plan sheets, profile sheets and special provisions, if required. All water and sewer design submittals shall include all the aforementioned information in a full-size .pdf. Excluding the Release for Construction Water and / or Sewer Plans, the Design-Build Team shall allow the utility owners 30 days to review each water and / or sewer design submittal. At a minimum, the water and / or sewer design submittals shall consist of the following:

- (A) Preliminary Water and / or Sewer Plans shall be submitted after the Department accepts the 100% Hydraulic Plans.
- (B) Final Water and / or Sewer Plans shall be submitted after the Department accepts the Right of Way / 60% Roadway Plans.
- (C) Release for Construction Water and / or Sewer Plans shall be submitted after the Department accepts the Final Water and / or Sewer Plans.

The Design-Build Team shall provide a set of Agreement Plans that will be used in a Utility Agreement (UCA or U&O) to be prepared by NCDOT and executed with the utility owners. The Agreement Plans shall include Release for Construction Plans, special provisions, and a construction estimate with unit quantities. The Department will send the appropriate agreement, with the Agreement Plans, to the utility owner for their review and concurrence.

Upon completion of the water and sewer relocations and protective measures, the Design-Build Team shall concurrently provide 1) lump sum construction costs for the relocations and protective measures that are separated by individual utility owner to the Department; and 2) electronic As-Built Plans to the Department and the utility owner. At a minimum, the As-Built Plans shall include all revisions that occurred during construction, as well as all field adjustments. The As-Built Plans shall be in accordance with NCDOT requirements or the utility owner's requirements, whichever is more conservative. The As-Built Plans shall be provided in .pdf format and MicroStation format to the Department and in the CADD format required by the utility owner.

### **Utility Relocation Plans**

Excluding water and sewer conflicts, if the Design-Build Team's design and / or construction creates a utility conflict, the Design-Build Team shall request that the utility owner submit relocation plans (Highway Construction Plans to be provided by the Design-Build Team to utility owners) that show existing utilities and proposed utility relocations for approval by the NCDOT.

In .pdf format, the Design-Build Team shall electronically submit one half-size set and one full size set of the Utility Relocation Plans to the NCDOT State Utilities Manager, via the Design-Build Unit, for review and approval. The Design-Build Team shall include a cover letter with the Utility Relocation Plans verifying that the proposed utility relocations are not in conflict with the Design-Build Team's proposed design or construction activities. The Department shall approve the Utility Relocation Plans prior to any utility 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 Section found elsewhere in this Scope of Work). After the review process is complete, the NCDOT Utilities Unit will submit an electronic copy of the authorization letter to the Design-Build Team. The NCDOT Utilities Unit will also submit an electronic copy of the approved Utility Relocation Plans, estimate and agreement to the Department's Resident Engineer. If the Utility Relocation Plans are approved subject to changes, it shall be the Design-Build Team's responsibility to coordinate these changes with the appropriate utility owner.

### **Prior Rights and Compensable Interest**

The Design-Build Team shall verify / determine the prior rights and compensable interest for all utility relocations. Typically, affidavits, recorded easements or NCDOT agreements can serve as evidence of prior rights. The Design-Build Team shall provide documentation that verifies / determines the prior rights and / or compensable interest. If the verification process is not complete prior to right of way acquisition, the Design-Build Team shall provide documentation of all Utility Easement costs. A compensable interest shall be identified as follows:

- (A) Existing or prior easement rights within the project limits, either by recorded right of way or adverse possession.
- (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 easement rights within the project limits.

### **Work Performed by Design-Build Team for Utility Owners**

If the Design-Build Team elects to make arrangements with a utility owner for proposed utility construction not required herein, in which the utility owner shall be responsible for the costs of work to be performed by the Design-Build Team, the Design-Build Team shall be responsible for negotiating all costs associated with the proposed construction. Once the Design-Build Team and the utility owner agree on a plan and a lump sum cost for the utility construction, the Design-Build Team shall electronically submit one half-size set and one full size set of the utility construction drawings, in .pdf format, to the NCDOT State Utilities Manager, via the Design-Build Unit, for further handling. Each set shall include a title sheet, plan sheets, profiles, and special provisions, if required. This submittal shall also include 1) a letter from the utility owner agreeing to the plans and lump sum cost, and 2) a letter from the Design-Build Team verifying the proposed utility construction is not in conflict with the Design-Build Team's proposed design or construction

activities. The NCDOT will reimburse the Design-Build Team the lump sum cost under a Supplemental Agreement. The necessary Utility Construction Agreement (UCA) to the utility owner for reimbursement shall be a two-party agreement between the NCDOT and the utility owner; and will be developed and executed by the Department.

If the Design-Build Team is requested, in writing, by a utility owner to relocate facilities not impacted by the project's construction, upgrade existing facilities and / 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 owner. The Design-Build Team shall develop designs; prepare all plans for needed agreements and permits; submit permits directly to the agencies and obtain approval from the agencies. The Design-Build Team shall be responsible for all permit fees.

### **Cable TV**

The cost in relocating CATV due to highway construction shall be the responsibility of the CATV Company; however, 1) if the CATV Company can validate a recorded easement for facilities outside the maintained NCDOT right of way, the Department will bear the relocation expense; and 2) if the adjustment is needed on existing utility poles to accommodate a proposed NCDOT Traffic Management System Fiber Optic Communication Cable Project, the Design-Build Team shall be responsible for the relocation cost.

The NCDOT will not permit CATV to place poles within the highway right of way but will allow down guys for their facilities within the highway right of way. Under most circumstances, the CATV Company will continue a joint-use attachment with the local power and telephone company. If the CATV proposed relocation places buried facilities within the highway right of way, then plans and encroachment agreements shall be required by the NCDOT.

### **Communication Cables / Electrical Services for ITS**

Prior to establishing the location for new meter poles, the Design-Build Team shall coordinate with the local power distribution company concerning accessibility of E/C service and safety in maintenance of the meter.

Prior to installation, the Design-Build Team shall provide plans for review and approval for all service taps that require a parallel installation within the control of access (C/A).

Parallel service installation within a C/A shall be buried and located as close to the right of way line as practical. Only due to unusual circumstances will parallel aerial service installations within the C/A be allowed. The Design-Build Team shall justify the allowance of parallel aerial service installation and obtain NCDOT written approval prior to installation.

The Design-Build Team shall be responsible for all coordination activities, including deposit fees, required for the utility company to provide service taps. Prior to the Design-Build Team developing the associated design and / or instructing the utility company to proceed with providing



the service taps, the Design-Build Team shall obtain written approval of the service tap locations from the NCDOT Resident Engineer.

The Design-Build Team shall be responsible for all costs associated with providing communication cables / electrical service from the service tap to the ITS devices.

### **Adjusting Existing Utilities due to Proposed Traffic Management Systems Fiber Optic Communications Cables**

The Design-Build Team shall be responsible for all costs for coordinating and adjusting any existing utilities that are in conflict with any proposed communication cables to be installed as part of the project.

### **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, in the Department's sole discretion. All utility related attachments must be evaluated and approved by the NCDOT State Utilities Manager, including any existing attachments to any structure(s) that require modification or replacement. Attachments shall be prohibited under the following conditions:

- (A) No attachments shall be allowed to a bridge located parallel within the C/A carrying the freeway over streams, other roadways or railroads. (No parallel utility installations within the C/A)
- (B) No attachments shall be allowed to cored-slab bridges.
- (C) No attachments shall be allowed to curved bridges.

Attachments to structures, if approved by the NCDOT State Utilities Manager, shall meet the following criteria:

- (A) No attachments shall be allowed below the bottom of the beams and / or girders.
- (B) Drilling of, or attachments to, beams and / or girders shall not be allowed. Attachments shall only be allowed to the bottom of the bridge deck.
- (C) For water and sewer force mains, only restrained joint ductile iron pipe shall be allowed.
- (D) A minimum of 18 inches of clearance to beams and / or girders shall be maintained, if possible.

Documentation of adverse conditions or cost estimates of all feasible alternatives shall be submitted to the NCDOT State Utilities Manager, via the Design-Build Unit, when seeking

approval of a structure attachment. Cost estimates shall consider all costs involved with each alternative and impacts to the utility and the highway project as a whole.

## **General**

The Design-Build Team shall not commence work at points where the highway construction operations are adjacent to utility facilities, until making arrangements with the utility owner to protect against damage that might result in expense, loss, disruption of service or other undue inconvenience to the public or utility owner. The Design-Build Team shall be responsible for damage to the existing or relocated utilities resulting from the Design-Build Team's operations. In the event of interruption of any utilities by the project construction, the Design-Build Team shall promptly notify the utility owner and cooperate with the utility owner in the prompt restoration of service.

The Design-Build Team shall accommodate utility adjustments, reconstruction, new installation and routine maintenance work that may be underway or take place during the progress of the contract.

If total property acquisition is unavoidable due to encroachment into wells and / or septic systems, the Design-Build Team shall investigate and determine if extending water and / or sewer lines to the affected property is cost effective. If the Department concurs with the determination that a utility extension is cost effective, the costs associated with the utility design and construction shall be paid for as extra work in accordance with Article 104-7 of the 2018 NCDOT *Standard Specifications for Roads and Structures*.

Unless noted otherwise elsewhere in this RFP, the Design-Build Team shall be required to use the guidelines as set forth in the following:

- (A) NCDOT *Utilities Accommodation Manual* posted on the following website:

**<https://connect.ncdot.gov/municipalities/Utilities/Pages/UtilitiesManuals.aspx>**

- (B) *Federal Aid Policy Guide* - Subchapter G, Part 645, Subparts A & B
- (C) *Federal Highway Administration's Program Guide, Utility Adjustments & Accommodations on Federal Aid Highway Projects*
- (D) NCDOT *Construction Manual* - Section 105-8
- (E) NCDOT *Right of Way Manual* - Chapter 16 Utility Relocations
- (F) NCDEQ *Public Water Supply* - Rules governing public water supply
- (G) NCDEQ *Division of Water Resources* - Title 15A - Environment and Natural Resources

## Agreements

If a utility company can provide evidence of prior rights of way or a compensable interest in their facilities, the Design-Build Team shall coordinate the non-betterment utility relocation costs with the utility company and develop the Utility Relocation Agreement (URA).

The NCDOT State Utilities Manager must execute approved agreements on Design-Build projects. The URAs and Encroachment Agreements are available from the NCDOT Utilities Unit. Reference the *NCDOT Utilities Accommodation Manual* for the different types of Encroachment Agreements available for use.

In accordance with the NCDOT *Project Delivery Network*, the Design-Build Team shall develop a preliminary Utility Risk Analysis and Inventory (URAI) to identify potential utility conflicts, determine preliminary alignments and schedules for the relocation of each utility, and identify any anticipated Permanent Utility Easements (PUE) and Aerial Utility Easements (AUE). The aforementioned URAI shall be submitted to the NCDOT Utility Unit, via the Design-Build Unit, for review a minimum of ten days before the Right of Way Plans submittal.

The Design-Build Team shall submit all utility agreements, and all supporting documents to the NCDOT State Utilities Manager, via the Design-Build Unit, in electronic format. Prior to submittal, all agreements shall be signed electronically by an authorized representative of the utility owner. These electronic agreement packets will be reviewed, approved and signed electronically by the NCDOT State Utilities Manager, or designated representative, before being distributed to the field.

The Design-Build Team shall utilize the NCDOT Standard Utility Encroachment Agreements, as necessary, in relocating utilities. The Encroachment Agreements shall be used under the following conditions:

- (A) If a utility company is not occupying a valid right of way / compensable interest and the proposed relocation will place the relocated utilities within the existing or proposed highway right of way.
- (B) For **all** new utility installations, not covered under a Utility Construction Agreement and within the existing or proposed highway right of way. This includes all water, sewer and gas lines owned by entities covered under General Statute 136-27.1 and 136-27.2.

**\*\*\* STANDARD SPECIAL PROVISIONS \*\*\*****RAILROAD GRADE CROSSING**

(7-1-95) (Rev. 9-9-20)

107-9

DB1 G17R

When the use of slow moving or stopped equipment is required over at-grade railroad crossings, the Design-Build Team shall contact the appropriate track owner to gain Right of Entry. The Design-Build Team shall be responsible for ascertaining and contacting the railroad track owner.

All questions regarding the Right of Entry shall be addressed to Ms. Meredith McLamb, NCDOT Surfaces and Encroachment Manager with the NCDOT Rail Division, at (919) 707-4132.

**RESTRICTIONS ON ITS EQUIPMENT AND SERVICES**

(10-2-20)

DB01 G090

All telecommunications, video or other ITS equipment or services installed or utilized on this project must be in conformance with UNIFORM ADMINISTRATIVE REQUIREMENTS, COST PRINCIPLES, AND AUDIT REQUIREMENTS FOR FEDERAL AWARDS **2 CFR, § 200.216 Prohibition on certain telecommunications and video surveillance services or equipment.**

**EQUIPMENT IDLING GUIDELINES**

(12-29-20)

107

DB1 R096

Exercise reduced fuel consumption and reduced equipment emissions during the construction of all work associated with this contract. Except as allowed otherwise elsewhere in this project special provision, employees engaged in the construction of this project should turn off vehicles when stopped for more than thirty (30) consecutive minutes and off-highway equipment (equipment) should idle no longer than fifteen (15) consecutive minutes.

These guidelines for turning off vehicles and equipment when idling do not apply to:

1. Idling when queuing.
2. Idling to verify the vehicle / equipment is in safe operating condition.
3. Idling for testing, servicing, repairing or diagnostic purposes.
4. Idling necessary to accomplish work for which the vehicle / equipment was designed (such as operating a crane, mixing concrete, etc.).
5. Idling required to bring the machine system to operating temperature.
6. Emergency vehicles, utility company, construction, and maintenance vehicles where the engines must run to perform needed work.
7. Idling to ensure safe operation of the vehicle / equipment.
8. Idling when the propulsion engine is providing auxiliary power for other than heating or air conditioning, except as allowed below, such as hydraulic systems for pavers.
9. When specific traffic, safety, or emergency situations arise.
10. Limited idling, no longer than 30 minutes, to provide for the safety of occupants (e.g. to run the heater) when the ambient temperature is less than 32 degrees Fahrenheit.

11. Limited idling, no longer than 30 minutes, to provide for the safety of occupants (e.g. to run the air conditioning) when the ambient temperature is greater than 90 degrees Fahrenheit.
12. Diesel powered vehicles / equipment may idle for up to 30 minutes to minimize restart problems.

Any vehicle or equipment in which the primary source of fuel is natural gas or electricity is exempt from the idling limitations set forth in this project special provision.

### **PLANT AND PEST QUARANTINES**

**(Imported Fire Ant, Gypsy Moth, Witchweed, Emerald Ash Borer, Guave Root Knot Nematode and Other Noxious Weeds)**

(8-31-13)(Rev. 4-1-19)

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 <https://www.ncagr.gov/plantindustry/Plant/quaran/table2.htm> to determine those specific project sites located in the quarantined area or for any regulated article used on this project originating in a quarantined county.

#### **Regulated Articles Include**

1. Soil, sand, gravel, compost, peat, humus, muck, and decomposed manure, separately or with other articles. This includes movement of articles listed above that may be associated with cut / waste, ditch pulling, and shoulder cutting.
2. Plants with roots including grass sod
3. Plant crowns and roots
4. Bulbs, corms, rhizomes, and tubers of ornamental plants
5. Hay, straw, fodder, and plant litter of any kind
6. Clearing and grubbing debris

7. Used agricultural cultivating and harvesting equipment
8. Used earth-moving equipment
9. Any other products, articles, or means of conveyance, of any character, if determined by an inspector to present a hazard of spreading imported fire ant, gypsy moth, witchweed, emerald ash borer, guave root knot nematode or other noxious weeds.

### **COAL COMBUSTION PRODUCTS IN EMBANKMENTS**

(Rev. 4-10-15) (Rev.10-26-20)

235

DB2 R70

#### **Description**

This specification allows the Design-Build Team an option, with the written approval of the Engineer, to use coal combustion products (CCPs) in embankments as a substitute for conventional borrow material. The amount of CCPs allowed to be used for this project shall be less than 80,000 tons total and less than 8,000 tons per acre.

#### **Materials**

Supply coal combustion products from the Department list of potential suppliers maintained by the Materials and Tests Unit. Site specific approval of CCP material shall be required prior to beginning construction.

The following CCPs shall be unacceptable:

- (A) Frozen material
- (B) Ash from boilers fired with both coal and petroleum coke
- (C) Material with a maximum dry unit weight of less than 65 pounds per cubic foot when tested in accordance with AASHTO T-99 Method A or C

Collect and transport CCPs in a manner that will prevent nuisances and hazards to public health and safety. Moisture condition the CCPs as needed and transport in covered trucks to prevent dusting.

#### **Preconstruction Requirements**

When CCPs are to be used as a substitute for earth borrow material, request written approval from the Engineer at least ninety (90) days in advance of the intent to use CCPs and include the following details using the NCDOT Form CCP-2015-V1 in accordance with NCGS § 130A-309.219(b)(1):

- (A) Description, purpose and location of project
- (B) Estimated start and completion dates of project
- (C) Estimated volume of CCPs to be used on project with specific locations and construction details of the placement
- (D) Toxicity Characteristic Leaching Procedure analysis from a representative sample of each different CCP source to be used in the project for, at minimum, all of the following constituents: arsenic, barium, cadmium, lead, chromium, mercury, selenium, and silver

- (E) The names, address, and contact information for the generator of the CCPs
- (F) Physical location of the project at which the CCPs were generated

Submit the form to the Engineer and the Resource Conservation Program (RCP) Engineer at **ResourceConservation@ncdot.gov** for review. The Engineer and the RCP Engineer will coordinate the requirements of NCGS § 130A-309.219(a)(1) and notify the Design-Build Team that all the necessary requirements have been met before the placement of structural fill using coal combustion products will be allowed.

### **Construction Methods**

In accordance with the details in the plans developed by the Design-Build Team, place CCPs in the core of the embankment section with at least four feet of earth cover to the outside limits of the embankments or subgrade and at least five feet above the seasonal high ground-water table. CCPs used in embankments shall not be placed as follows:

- (A) Within 50 feet of any property boundary
- (B) Within 300 horizontal feet of a private dwelling or well
- (C) Within 50 horizontal feet of the top of the bank of a perennial stream or other surface water body
- (D) Within a 100-year floodplain except as authorized under NCGS § 143-215.54A(b). A site located in a floodplain shall not restrict the flow of the 100-year floodplain or result in washout of solid waste so as to pose a hazard to human life, wildlife or land and water resources
- (E) Within 50 horizontal feet of a wetland, unless, after consideration of the chemical and physical impact on the wetland, the United States Army Corps of Engineers issues a permit or waiver for the fill.

Construct embankments by placing CCPs in level uniform lifts with no more than a lift of ten inches and compacted to at least a density of 95 percent as determined by test methods in AASHTO T-99, Determination of Maximum Dry Density and Optimum Moisture Content, Method A or C depending upon particle size of the product. Provide a moisture content at the time of compaction of within four percent of optimum but not greater than one percent above optimum as determined by AASHTO T-99, Method A or C.

Divert surface waters resulting from precipitation from the CCPs placement area during filling and construction activities. Construct embankments such that rainfall will not run directly off of the CCPs. Provide dust control to minimize airborne emissions. Construct fill in a manner that prevents water from accumulating and ponding and do not pump nor discharge waters from CCP's filling and construction areas.

**ROCK AND BROKEN PAVEMENT FILLS**

(12-29-15) (Rev. 8-31-17)

235

DB2 R85

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 2-23, Article 235-2 MATERIALS, add the following after Line 15:**

Item	Section
Geotextile for Rock and Broken Pavement Fills, Type 2	1056

Provide Type 2 geotextile for filtration geotextiles. Use rip rap and No. 57 stone from either a quarry or onsite material to fill voids in rock and broken pavement fills. Provide small and large size rip rap with stone sizes that meet Class A and B in accordance with Table 1042-1 and No. 57 stone with a gradation that meets Table 1005-1 or use similar size onsite material approved by the Engineer.

**Page 2-24, Subarticle 235-3(B) Embankment Formation, Lines 18 - 19,** delete the third sentence in the seventh paragraph.

**Page 2-24, Subarticle 235-3(B) Embankment Formation, Lines 21 - 23,** replace the eighth paragraph with the following:

Before placing embankment fill material or filtration geotextiles over rock and broken pavement, fill voids in the top of rock and broken pavement fill with rip rap and No. 57 stone. Place and compact larger rip rap first followed by smaller rip rap. Then, fill any remaining voids with No. 57 stone so geotextiles are not torn, ripped or otherwise damaged when installed and covered. Compact rip rap and No. 57 stone with tracked equipment or other approved methods. Install filtration geotextiles on top of rock, broken pavement, rip rap and No. 57 stone in accordance with Article 270-3 before placing remaining embankment fill material.

Remove any rocks, debris or pavement pieces from the roadbed larger than two inches within 12" of the subgrade or finished grade, whichever is lower.

**CORRUGATED ALUMINUM ALLOY CULVERT PIPE**

(9-21-21)

305, 310

DB3 R34

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 3-5, Article 305-2, MATERIALS, add the following after Line 16:**

Item	Section
Waterborne Paint	1080-9
Hot Bitumen	1081-3

**Page 3-5, Article 305-3, CONSTRUCTION METHODS, add the following after Line 24:**



Coating must be applied to the aluminum when in contact with concrete. Immediately prior to coating, aluminum surfaces to be coated shall be cleaned by a method that will remove all dirt, oil, grease, chips, and other foreign substances. Aluminum to be coated shall be given one coat of suitable quality coating such as:

Approved waterborne paint (Section 1080-9)  
Approved Hot Bitumen (Section 1081-3)

Other coating materials may be submitted to the Engineer for approval.

### **CULVERT PIPE**

(7-1-19)(Rev. 4-26-22)

305, 310

DB3 R35

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 3-5, Article 305-1 DESCRIPTION, Lines 12 - 14**, replace with the following:

Where shown in the plans developed by the Design-Build Team, the Design-Build Team may use reinforced concrete pipe, aluminum alloy pipe, aluminized corrugated steel pipe, galvanized corrugated steel pipe, HDPE pipe, polypropylene pipe, or PVC pipe in accordance with the following requirements.

**Page 3-5, Article 305-2 MATERIALS**, add the following after **Line 16**:

Item	Section
Polypropylene Pipe	1032-9
Galvanized Corrugated Steel Pipe	1032-3

**Page 3-6, Article 310-2 MATERIALS**, add the following after **Line 9**:

Item	Section
Polypropylene Pipe	1032-9
Galvanized Corrugated Steel Pipe	1032-3

**Page 3-6, Article 310-4 SIDE DRAIN PIPE, Lines 24 - 25**, replace the first sentence of the second paragraph with the following:

Where shown in the plans developed by the Design-Build Team, side drain pipe may be Class II reinforced concrete pipe, aluminized corrugated steel pipe, galvanized corrugated steel pipe, corrugated aluminum alloy pipe, polypropylene pipe, HDPE pipe or PVC pipe.

**Page 3-7, Article 310-5 PIPE END SECTIONS, Lines 2 - 4**, replace the second sentence with the following:

Both corrugated steel and concrete pipe end sections will work on concrete pipe, corrugated steel pipe, polypropylene pipe, and HDPE smooth lined corrugated plastic pipe.

**Page 10-60, add Article 1032-9:****(A) General**

Use polypropylene pipe from sources participating in the Department's Polypropylene Pipe QA / QC Program. A list of participating sources is available from the Materials and Tests Unit. The Department will remove a manufacturer of polypropylene pipe from this program if the monitoring efforts indicated that non-specification material is being provided or test procedures are not being followed.

Use polypropylene pipe that meets AASHTO M 330 for Type S or Type D, or ASTM F2881 or ASTM F2764 Double or Triple wall; and has been evaluated by NTPEP.

**(B) End Treatments, Pipe Tees and Elbows**

End treatments, pipe tees and elbows shall meet AASHTO M 330, Section 7.7, or ASTM F2764, Section 6.6.

**(C) Marking**

Clearly mark each section of pipe, end section, tee and elbow and other accessories according to the Department's Polypropylene Pipe QA / QC Program:

- (1) AASHTO or ASTM designation
- (2) The date of manufacture
- (3) Name or trademark of the manufacturer

When polypropylene pipe, end sections, tees and elbows have been inspected and accepted a sticker shall be applied to the inside of the pipe. Do not use pipe sections, flared end sections, tees or elbows that do not have this seal of approval.

**BRIDGE APPROACH FILLS**

(10-19-10) (Rev. 11-22-17)

422

DB4 R02A

**Description**

Bridge approach fills consist of backfilling behind bridge end bents with select material or aggregate to support all or portions of bridge approach slabs. Install drains to drain water from bridge approach fills and geotextiles to separate approach fills from embankment fills, ABC and natural ground as required. For bridge approach fills behind end bents with mechanically stabilized earth (MSE) abutment walls, reinforce bridge approach fills with MSE wall reinforcement connected to end bent caps. Construct bridge approach fills in accordance with the contract, accepted submittals and Roadway Standard Drawing No. 422.01, Roadway Standard Drawing No. 422.02 or Roadway Detail Drawing No. 422D10.

Define bridge approach fill types as follows:

*Approach Fills* - Bridge approach fills in accordance with Roadway Standard Drawing No. 422.01, Roadway Standard Drawing No. 422.02 or Roadway Detail Drawing No. 422D10

*Standard Approach Fill* - Type I Standard Bridge Approach Fill in accordance with Roadway Standard Drawing No. 422.01

*Modified Approach Fill* - Type II Modified Bridge Approach Fill in accordance with Roadway Standard Drawing No. 422.02

*Reinforced Approach Fill* - Type III Reinforced Bridge Approach Fill in accordance with Roadway Detail Drawing No. 422D10

## Materials

Refer to Division 10 of the 2018 *Standard Specifications for Roads and Structures*.

Item	Section
Geotextiles, Type 1	1056
Portland Cement Concrete	1000
Select Materials	1016
Subsurface Drainage Materials	1044

Provide Type 1 geotextile for separation geotextiles and Class B concrete for outlet pads. Use Class V or Class VI select material for standard and modified approach fills. For an approach fill behind a bridge end bent with an MSE abutment wall, backfill the reinforced approach fill with the same aggregate type approved for the reinforced zone in the accepted MSE wall submittal. For MSE wall aggregate, reinforcement and connector materials, reference the *Mechanically Stabilized Earth Retaining Walls* provision found on the website below:

<https://connect.ncdot.gov/resources/Geological/Pages/default.aspx>

Provide PVC pipes, fittings and outlet pipes for subsurface drainage materials. For PVC drain pipes, use pipes with perforations that meet AASHTO M 278.

## Construction Methods

Excavate as necessary for approach fills in accordance with the contract. Notify the Engineer when foundation excavation is complete. Do not place separation geotextiles or aggregate until approach fill dimensions and foundation material are approved.

For reinforced approach fills, cast MSE wall reinforcement or connectors into end bent cap backwalls within three inches of locations shown in the accepted MSE wall submittals. Install MSE wall reinforcement with the orientation, dimensions and number of layers shown in the accepted MSE wall submittals. If a reinforced approach fill is designed with geogrid reinforcement embedded in an end bent cap, cut geogrids to the required lengths and after

securing ends of geogrids in place, reroll and rewrap portions of geogrids not embedded in the cap to protect geogrids from damage. Before placing aggregate, pull geosynthetic reinforcement taut so that it is in tension and free of kinks, folds, wrinkles or creases.

Attach separation geotextiles to end bent cap backwalls and wing walls with adhesives, tapes or other approved methods. Overlap adjacent separation 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 separation geotextiles or MSE wall reinforcement.

Install continuous perforated PVC drain pipes with perforations pointing down in accordance with Roadway Standard Drawing No. 422.01 or Roadway Standard Drawing No. 422.02. Connect drain pipes to outlet pipes just beyond wing walls. Connect PVC pipes, fittings and outlet pipes with solvent cement in accordance with Article 815-3 of the 2018 *Standard Specifications for Roads and Structures* and place outlet pads in accordance with Roadway Standard Drawing No. 815.03.

Install drain pipes so water drains towards outlets. If the groundwater elevation is above drain pipe elevations, raise drains up to maintain positive drainage towards outlets. Place pipe sleeves in or under wing walls so water drains towards outlets. Use sleeves that can withstand wing wall loads.

Place select material or aggregate in eight-inch to ten-inch thick lifts. Compact fine aggregate for reinforced approach fills in accordance with Subarticle 235-3(C) of the 2018 *Standard Specifications for Roads and Structures* except compact fine aggregate to a density of at least 98%. Compact select material for standard or modified approach fills and coarse aggregate for reinforced approach fills with a vibratory compactor to the satisfaction of the Engineer. Do not displace or damage geosynthetics, MSE wall reinforcement or drains when placing and compacting select material or aggregate. End dumping directly on geosynthetics is not permitted. Do not operate heavy equipment on geosynthetics or drain pipes until they are covered with at least eight inches of select material or aggregate. Replace any damaged geosynthetics or drains to the satisfaction of the Engineer. When approach fills extend beyond bridge approach slabs, wrap separation geotextiles over select material or aggregate as shown in Roadway Standard Drawing No. 422.01 or Roadway Detail Drawing No. 422D10.

For temporary walls, use welded wire reinforcement for welded wire facing and Type 5 geotextile for reinforcement geotextiles. Use Type 5 geotextile with lengths and an ultimate tensile strength as shown in Roadway Standard Drawing No. 422.03. Provide Type 1 geotextile for separation geotextiles and Class B concrete for outlet pads. Use Class V or Class VI select material for alternate approach fills and temporary walls. Provide PVC pipes, fittings and outlet pipes for subsurface drainage materials. For PVC drain pipes, use pipes with perforations that meet AASHTO M 278.

**ALTERNATE BRIDGE APPROACH FILLS FOR INTEGRAL ABUTMENTS**

(11-21-17)

422

DB4 R02B

**Description**

At the Design-Build Team's option, use Type A Alternate Bridge Approach Fills instead of Type I or II Bridge Approach Fills to support bridge approach slabs for integral bridge abutments. An alternate bridge approach fill shall consist of constructing an approach fill with a temporary geotextile wall before placing all or a portion of the concrete for the backwall and wing walls of the integral end bent cap. The temporary geotextile wall shall be designed for a crane surcharge, shall remain in place and shall be aligned so the wall face functions as a form for the end bent cap backwall and wing walls. Install drains, welded wire facing and geotextiles and backfill approach fills and temporary walls with select material as required. Define "geotextiles" as separation or reinforcement geotextiles, "temporary wall" as a temporary geotextile wall and "alternate approach fill" as a Type A Alternate Bridge Approach Fill in accordance with Roadway Standard Drawing No. 422.03.

**Materials**

Refer to Division 10 of the 2018 *Standard Specifications for Roads and Structures*.

<b>Item</b>	<b>Section</b>
Geotextiles	1056
Portland Cement Concrete	1000
Select Materials	1016
Subsurface Drainage Materials	1044
Welded Wire Reinforcement	1070-3

For temporary walls, use welded wire reinforcement for welded wire facing and Type 5 geotextile for reinforcement geotextiles. Use Type 5 geotextile with lengths and an ultimate tensile strength as shown in Roadway Standard Drawing No. 422.03. Provide Type 1 geotextile for separation geotextiles and Class B concrete for outlet pads. Use Class V or Class VI select material for alternate approach fills and temporary walls. Provide PVC pipes, fittings and outlet pipes for subsurface drainage materials. For PVC drain pipes, use pipes with perforations that meet AASHTO M 278.

**Construction Methods**

Excavate as necessary for alternate approach fills and temporary walls in accordance with the contract. Notify the Engineer when foundation excavation is complete. Do not place geotextiles until approach fill dimensions and foundation material are approved.

Install geotextiles as shown in Roadway Standard Drawing No. 422.03. Attach separation geotextiles to end bent cap backwalls and wing walls as needed with adhesives, tapes or other approved methods. 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 geotextiles.

Install continuous perforated PVC drain pipes with perforations pointing down in accordance with Roadway Standard Drawing No. 422.03. Connect drain pipes to outlet pipes just beyond wing walls. Connect PVC pipes, fittings and outlet pipes with solvent cement in accordance with Article 815-3 of the 2018 *Standard Specifications for Roads and Structures* and place outlet pads in accordance with Roadway Standard Drawing No. 815.03.

Install drain pipes so water drains towards outlets. If the groundwater elevation is above drain pipe elevations, raise drains up to maintain positive drainage towards outlets. Place pipe sleeves in or under wing walls so water drains towards outlets. Use sleeves that can withstand wing wall loads.

At the Design-Build Team's option, construct bottom portion of integral end bents before temporary walls as shown in Roadway Standard Drawing No. 422.03. Erect and set welded wire facing so facing functions as a form for the end bent cap backwall. Place welded wire facing adjacent to each other in the horizontal and vertical directions to completely cover the temporary wall face. Stagger welded wire facing to create a running bond by centering facing over joints in the row below.

Wrap reinforcement geotextiles at the temporary wall face in accordance with Roadway Standard Drawing No. 422.03 and cover geotextiles with at least three inches of select material. Place layers of reinforcement geotextiles within three inches of locations shown in Roadway Standard Drawing No. 422.03. Before placing select material, pull reinforcement geotextiles taut so they are in tension and free of kinks, folds, wrinkles or creases. Install reinforcement geotextiles with the direction shown in Roadway Standard Drawing No. 422.03. Do not splice or overlap reinforcement geotextiles so seams are parallel to the temporary wall face.

Place select material in eight-inch to ten-inch thick lifts and compact select material with a vibratory compactor to the satisfaction of the Engineer. Do not displace or damage geotextiles or drains when placing and compacting select material. End dumping directly on geotextiles is not permitted. Do not operate heavy equipment on geotextiles or drain pipes until they are covered with at least eight inches of select material. Replace any damaged geotextiles or drains to the satisfaction of the Engineer. When alternate approach fills extend beyond bridge approach slabs, wrap separation geotextiles over select material as shown in Roadway Standard Drawing No. 422.03.

Temporary walls shall be designed for a surcharge pressure in accordance with Roadway Standard Drawing No. 422.03. If the crane surcharge will exceed the wall design, contact the Engineer before positioning the crane over reinforcement geotextiles.

## **PILES**

(10-19-21)(Rev. 12-20-22)

450

DB4 R05

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 4-65, Article 450-1 DESCRIPTION, Lines 8 - 9**, replace the fourth sentence of the first paragraph with the following:

Galvanize, metallize, restrike, redrive, splice, cut off and build up piles and perform predrilling, spudding and pile driving analyzer testing, as necessary or required.

**Page 4-65, Article 450-1 DESCRIPTION, Lines 14 - 16**, replace the third paragraph with the following:

The estimated pile lengths shown in the plans developed by the Design-Build Team are sufficient for the minimum required pile embedment and penetration and are estimates of the pile lengths needed for required driving resistance. For prestressed concrete piles, use estimated pile lengths for pile order lengths or provide pile order lengths based on testing prestressed concrete piles with the pile driving analyzer (PDA). For bridges with staged construction and pile order lengths based on testing prestressed concrete piles with the PDA, order lengths for latter stages shall not be provided until pile driving for previous stage of construction is complete.

**Page 4-66, Article 450-3(C) Pile Accessories, Line 14**, insert the following as the second, third and fourth sentence of the first paragraph:

Steel pile points for steel pipe piles include pipe pile cutting shoes and conical points. Use "inside fit" pipe pile cutting shoes, e.g., cutting shoes with an outside diameter equal to the pipe pile diameter. Use pipe pile plates with a diameter equal to the pipe pile diameter.

**Page 4-66, Article 450-3(D) Driven Piles, Lines 37 - 39**, replace the fourth paragraph with the following:

Redrive piles raised or moved laterally due to driving adjacent piles. For initial drive of prestressed concrete piles below a depth of ten feet or 20 percent of pile length, whichever is greater, drive each pile continuously except to pause driving for one hour or less to change pile cushions and remove templates. Design and construct templates so prestressed concrete piles can be driven to pile cut-off without exceeding the one-hour time limit. When a prestressed concrete pile attains the required resistance and pile penetration, do not drive the pile any further to avoid cutting off the pile. Stop driving the pile if a prestressed concrete pile does not have the minimum required driving resistance when the pile head is one foot above pile cut-off.

**Page 4-68, Article 450-3(D)(3) Required Driving Resistance, Lines 10 - 11**, replace the second paragraph with the following:

Stop driving piles if "refusal" is reached. Refusal occurs at 240 blows per foot (20 blows per inch) or any equivalent set (maximum set of 1/2 inch in ten blows) with the required stroke as per the pile driving criteria.

**Page 4-68, Article 450-3(D)(4) Restriking and Redriving Piles, Lines 13 - 15**, replace the first sentence of the first paragraph with the following:

If piles do not attain the required resistance with the estimated or order lengths, the Engineer may require the Design-Build Team to stop driving piles, wait and restrike or redrive piles to attain the required resistance if piles do not attain the required resistance with the estimated or order lengths.

**Page 4-69, Article 450-3(F) Pile Driving Analyzer, Lines 16 - 18**, replace the first and second sentences of the second paragraph with the following:

Test piles in accordance with the plans developed by the Design-Build Team or as directed by the Engineer. Provide piles for PDA testing with lengths shown in the plans developed by the Design-Build Team.

**Page 4-69, Article 450-3(F)(1) PDA Testing, Line 33 and 34**, replace the fifth sentence of the second paragraph with the following:

The prequalified PDA consultant performing the PDA testing and / or the Engineer may require modified pile installation procedures during driving, including but not limited to driving piles deeper or to a higher driving resistance than stated in the plans developed by the Design-Build Team.

#### **AUTOMATED FINE GRADING**

(9-1-11) (Rev. 9-13-17)

DB5 R05

On mainline portions and ramps / loops of this project, prepare the subgrade and base beneath the pavement structure in accordance with the applicable sections of the 2018 *Standard Specifications for Roads and Structures* except use an automatically controlled fine grading machine utilizing string lines, laser controls, or other approved methods to produce final subgrade and base surfaces meeting the lines, grades, and cross sections required by the plans developed by the Design-Build Team or established by the Engineer.

#### **AGGREGATE SUBGRADE**

(5-15-18)(Rev 4-18-23)

505

DB5 R8

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 5-8, Section 505 AGGREGATE SUBGRADE, lines 3-32**, replace the section with the following:

##### **505-1 DESCRIPTION**

Construct aggregate subgrades in accordance with the contract. Install geotextile for subgrade stabilization and place Class IV subgrade stabilization at locations shown in the plans developed by the Design-Build Team and as directed by the Engineer.

Undercut natural soil materials if necessary to construct aggregate subgrades. Define “subsoil” as the portion of the roadbed below the Class IV subgrade stabilization. For Type 2 aggregate subgrades, undercut subsoil as needed. The types of aggregate subgrade with thickness and



compaction requirements for each are as shown below.

**Type 1** - A six-inch to 24-inch thick aggregate subgrade with Class IV subgrade stabilization compacted to 92% of AASHTO T 180 as modified by the Department or to the highest density that can be reasonably obtained.

**Type 2** – An eight-inch thick aggregate subgrade on a proof rolled subsoil with Class IV subgrade stabilization compacted to 97% of AASHTO T 180 as modified by the Department.

## **505-2 MATERIALS**

Refer to Division 10.

<b>Item</b>	<b>Section</b>
Geotextile for Subgrade Stabilization, Type 5	1056
Select Material, Class IV	1016

Use Class IV select material for Class IV subgrade stabilization.

## **505-3 CONSTRUCTION METHODS**

When shallow undercut is required to construct aggregate subgrades, undercut six inches to 24 inches as shown in the plans developed by the Design-Build Team or as directed by the Engineer. For Type 2 aggregate subgrades, proof roll subsoil in accordance with Section 260 before installing geotextile for subgrade stabilization. Perform undercut excavation in accordance with Section 225.

Do not leave geotextiles exposed for more than seven days before covering geotextiles with Class IV subgrade stabilization (standard size no. ABC). Install geotextile for subgrade stabilization on subsoil with the long dimension, i.e., machine direction (MD), of the roll parallel to the roadway centerline and completely cover subsoil with geotextiles. For fill sections, the minimum roll width is required under roadway edges and shoulders nearest to fill slopes as shown in the plans developed by the Design-Build Team. Overlap adjacent geotextiles at least 18 inches in the direction that ABC will be placed to prevent lifting the edge of the top geotextile. Pull geotextiles taut so they are in tension and free of kinks, folds, wrinkles or creases. Hold geotextiles in place as needed with wire staples or anchor pins.

Place Class IV subgrade stabilization by end dumping ABC on geotextiles. Do not operate heavy equipment on geotextiles until geotextiles are covered with Class IV subgrade stabilization. Compact ABC as required for the type of aggregate subgrade constructed.

Maintain Class IV subgrade stabilization in an acceptable condition and minimize the use of heavy equipment on ABC in order to avoid damaging aggregate subgrades. Provide and maintain drainage ditches and drains as required to prevent entrapping water in aggregate subgrades.

**AGGREGATE SUBGRADE IN LIEU OF CHEMICAL STABILIZATION**

(6-16-15) (Rev. 3-21-23)

501, 505, 542

DB5 R17

**Description**

In lieu of chemical stabilization, replace eight inches of subgrade with Type 2 aggregate subgrade. This substitution shall be allowed in full typical section width and shall not result in chemically stabilized sections less than 1,000 feet in length, unless otherwise approved by the Engineer. This substitution shall not be allowed for chemically stabilized sections with geotextile for subgrade stabilization. Notify the Engineer at least 30 days in advance of starting aggregate subgrade in lieu of chemical stabilization. Define “subsoil” as the portion of the roadbed below the Class IV subgrade stabilization.

**Materials**

Refer to Division 10 of the 2018 *Standard Specifications for Roads and Structures* as follows.

<b>Item</b>	<b>Section</b>
Geotextile for Subgrade Stabilization, Type 5	1056

**Construction Methods**

Proof roll subsoil, install geotextile for subgrade stabilization and place, compact and maintain Class IV subgrade stabilization in accordance with Article 505-3 of the 2018 *Standard Specifications for Roads and Structures* for a Type 2 aggregate subgrade.

**FINAL SURFACE TESTING**

(4-26-16) (Rev. 9-13-17)

DB6 R45

On all mainline travel lanes, including but not limited to all auxiliary lanes, and all -Y- Line travel lanes with 1) two or more layers of asphalt, 2) one mile or greater in length, and 3) a posted speed limit of 45 mph or greater, perform smoothness acceptance testing of the longitudinal profile of the finished pavement surface using an Inertial Profiler in accordance with Sections 610 and 710 of the 2018 *Standard Specifications for Roads and Structures*. The North Carolina Hearne Straightedge will not be permitted.

**MILLING ASPHALT PAVEMENT**

(12-17-18)

607

DB6 R59

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 6-5, Article 607-2, EQUIPMENT, Lines 14 - 16**, delete the seventh sentence of this Article and replace with the following:

Use either a non-contacting laser or sonar type ski system with a minimum of three referencing stations mounted on the milling machine at a length of at least 24 feet.

**ULTRA-THIN BONDED WEARING COURSE**

(1-15-19)

661

DB6 R64

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 6-49, Article 661-4, CONSTRUCTION METHODS, Lines 25 - 28,** delete the third sentence of this Article and replace with the following:

Use a mobile grade reference system capable of averaging the existing grade or pavement profile over at least a 30-foot distance; or by non-contacting laser or sonar type ski with at least three referencing stations mounted on the paver at a minimum length of 24 feet.

**Page 6-50, Article 661-4, CONSTRUCTION METHODS, Line 9,** delete the word “four” and replace with “three”.

**ASPHALT CONCRETE PLANT MIX PAVEMENTS**

(12-12-18) (Rev. 6-20-23)

610, 1012

DB6 R65

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 6-14, Table 609-3, LIMITS OF PRECISION FOR TEST RESULTS,** replace with the following:

<b>TABLE 609-3 LIMITS OF PRECISION FOR TEST RESULTS</b>	
<b>Mix Property</b>	<b>Limits of Precision</b>
25.0 mm sieve (Base Mix)	± 10.0%
19.0 mm sieve (Base Mix)	± 10.0%
12.5 mm sieve (Intermediate & Type P-57)	± 6.0%
9.5 mm sieve (Surface Mix)	± 5.0%
4.75 mm sieve (Surface Mix)	± 5.0%
2.36 mm sieve (All Mixes, except S4.75A)	± 5.0%
1.18 mm sieve (S4.75A)	± 5.0%
0.075 mm sieve (All Mixes)	± 2.0%
Asphalt Binder Content	± 0.5%
Maximum Specific Gravity ( $G_{mm}$ )	± 0.020
Bulk Specific Gravity ( $G_{mb}$ )	± 0.030
TSR	± 15.0%
QA retest of prepared QC Gyratory Compacted Volumetric Specimens	± 0.015
Retest of QC Core Sample	± 1.2% (% Compaction)
Comparison QA Core Sample	± 2.0% (% Compaction)
QA Verification Core Sample	± 2.0% (% Compaction)
Density Gauge Comparison of QC Test	± 2.0% (% Compaction)
QA Density Gauge Verification Test	± 2.0% (% Compaction)

**Page 6-17, Table 610-1, MIXING TEMPERATURE AT THE ASPHALT PLANT**, replace with the following:

<b>TABLE 610-1 MIXING TEMPERATURE AT THE ASPHALT PLANT</b>	
<b>Binder Grade</b>	<b>JMF Temperature</b>
PG 58-28; PG 64-22	250 - 290° F
PG 76-22	300 - 325° F

**Page 6-17, Subarticle 610-3(C), Job Mix Formula (JMF), Lines 38 - 39**, delete the fourth paragraph.

**Page 6-18, Subarticle 610-3(C), Job Mix Formula (JMF), Line 12**, replace “SF9.5A” with “S9.5B”.

**Page 6-18, Table 610-3, MIX DESIGN CRITERIA**, replace with the following:

TABLE 610-3 MIX DESIGN CRITERIA									
Mix Type	Design ESALs millions <sup>A</sup>	Binder PG Grade	Compaction Levels		Max. Rut Depth (mm)	Volumetric Properties <sup>B</sup>			
			Gmm @			VMA	VTM	VFA	%Gmm
			Nini	Ndes		% Min.	%	Min.-Max.	@ Nini
S4.75A	< 1	64 - 22	6	50	11.5	16.0	4.0 - 6.0	65 - 80	≤ 91.5
S9.5B	0 - 3	64 - 22	6	50	9.5	16.0	3.0 - 5.0	70 - 80	≤ 91.5
S9.5C	3 - 30	64 - 22	7	65	6.5	15.5	3.0 - 5.0	65 - 78	≤ 90.5
S9.5D	> 30	76 - 22	8	100	4.5	15.5	3.0 - 5.0	65 - 78	≤ 90.0
I19.0C	ALL	64 - 22	7	65	-	13.5	3.0 - 5.0	65 - 78	≤ 90.5
B25.0C	ALL	64 - 22	7	65	-	12.5	3.0 - 5.0	65 - 78	≤ 90.5
	Design Parameter					Design Criteria			
All Mix Types	Dust to Binder Ratio (P <sub>0.075</sub> / P <sub>be</sub> )					0.6 - 1.4 <sup>C</sup>			
	Tensile Strength Ratio (TSR) <sup>D</sup>					85% Min. <sup>E</sup>			
A. Based on 20-year design traffic.									
B. Volumetric Properties based on specimens compacted to N <sub>des</sub> as modified by the Department.									
C. Dust to Binder Ratio (P <sub>0.075</sub> / P <sub>be</sub> ) for Type S4.75A is 1.0 - 2.0.									
D. NCDOT-T-283 (No Freeze-Thaw cycle required).									
E. TSR for Type S4.75A & B25.0C mixes is 80% minimum.									

**Page 6-19, Table 610-5, BINDER GRADE REQUIREMENTS (BASED ON RBR%),** replace with the following:

<b>TABLE 610-5 BINDER GRADE REQUIREMENTS (BASED ON RBR%)</b>			
<b>Mix Type</b>	<b>%RBR ≤ 20%</b>	<b>21% ≤ %RBR ≤ 30%</b>	<b>%RBR &gt; 30%</b>
S4.75A, S9.5B, S9.5C, I19.0C, B25.0C	PG 64-22	PG 64-22 <sup>A</sup>	PG 58-28
S9.5D, OGFC	PG 76-22 <sup>B</sup>	n/a	n/a

- A.** If the mix contains any amount of RAS, the virgin binder shall be PG 58-28.  
**B.** Maximum Recycled Binder Replacement (%RBR) is 18% for mixes using PG 76-22 binder.

**age 6-20, Table 610-6, PLACEMENT TEMPERATURES FOR ASPHALT**, replace with the following:

<b>TABLE 610-6 PLACEMENT TEMPERATURES FOR ASPHALT</b>	
<b>Asphalt Concrete Mix Type</b>	<b>Minimum Surface and Air Temperature</b>
B25.0C	35° F
I19.0C	35° F
S4.75A, S9.5B, S9.5C	40° F <sup>A</sup>
S9.5D	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 6-21, Article 610-8, SPREADING AND FINISHING, Lines 34 - 35**, delete the second sentence and replace with the following:

Use an MTV for all surface mix regardless of binder grade on Interstates, US Routes, and NC Routes (primary routes) that have four or more lanes and are median divided.

**Page 6-21, Article 610-8, SPREADING AND FINISHING, Lines 36 - 38**, delete the fourth sentence and replace with the following:

Use MTV for all ramps, loops and -Y- Lines, that have four or more lanes and are median divided; and all full width acceleration lanes, full width deceleration lanes, and full width turn lanes that are greater than 1000 feet in length.

**Page 6-23, Table 610-7, DENSITY REQUIREMENTS**, replace with the following:

<b>TABLE 610-7 DENSITY REQUIREMENTS</b>	
<b>Mix Type</b>	<b>Minimum % G<sub>mm</sub> (Maximum Specific Gravity)</b>
S4.75A	85.0 <sup>A</sup>
S9.5B	90.0
S9.5C, S9.5D, I19.0C, B25.0C	92.0

- A. Compaction to the above specified density shall be required when the S4.75A mix is applied at a rate of 100 lbs/sy or higher.

**Page 6-24, Article 610-13, FINAL SURFACE TESTING, Lines 35 - 36,** delete the second sentence and replace with the following:

Final surface testing will not be required on ramps, loops or turn lanes.

**Page 6-26, Subarticle 610-13(A)(1), Acceptance for New Construction, Lines 29 - 30,** delete the second sentence and replace with the following:

Areas excluded from testing by the profiler may be tested using a ten-foot straightedge in accordance with Article 610-12.

**Page 6-27, Subarticle 610-13(B), Option 2 - North Carolina Hearne Straightedge, Lines 41 - 46,** delete the eighth and ninth sentence of this paragraph and replace with the following:

Take profiles over the entire length of the final surface travel lane pavement, exclusive of structures, approach slabs, paved shoulders, tapers, and other irregular shaped areas of pavement, unless otherwise approved by the Engineer. In accordance with this provision, test all mainline travel lanes, full width acceleration lanes, full width deceleration lanes and collector lanes.

**Page 6-28, Subarticle 610-13(B), Option 2 - North Carolina Hearne Straightedge, Lines 1 - 2,** delete these two lines.

**Page 10-30, Table 1012-1, AGGREGATE CONSENSUS PROPERTIES,** replace with the following:

<b>TABLE 1012-1 AGGREGATE CONSENSUS PROPERTIES<sup>A</sup></b>				
<b>Mix Type</b>	<b>Coarse Aggregate Angularity<sup>B</sup></b>	<b>Fine Aggregate Angularity % Minimum</b>	<b>Sand Equivalent % Minimum</b>	<b>Flat and Elongated 5 : 1 Ratio % Maximum</b>
<i>Test Method</i>	<i>ASTM D5821</i>	<i>AASHTO T 304</i>	<i>AASHTO T 176</i>	<i>ASTM D4791</i>
S4.75A; S9.5B	75 / -	40	40	-
S9.5C; I19.0C; B25.0C	95 / 90	45	45	10
S9.5D	100 / 100	45	50	10
OGFC	100 / 100	45	45	10
UBWC	100 / 85	45	45	10

**A.** Requirements apply to the design aggregate blend.

**B.** 95 / 90 denotes that 95% of the coarse aggregate has one fractured face and 90% has two or more fractured faces.

**Page 10-30, Subarticle 1012-1(B)(6), Toughness (Resistance to Abrasion), line 12, replace “OGAFC” with “OGFC”.**

### **SUBSURFACE DRAINAGE**

(9-1-11) (Rev. 9-14-17)

DB8 R05

Revise the 2018 *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 END UNITS & TEMPORARY GUARDRAIL END UNITS, TYPE TL-2**

(10-21-08) (Rev. 5-16-23)

862

DB8 R64

### **Description**

Furnish and install guardrail end units in accordance with the details in the plans developed by the Design-Build Team, the applicable requirements of Section 862 of the 2018 *Standard Specifications for Roads and Structures*, and at locations shown in the plans developed by the Design-Build Team.



## Materials

The Design-Build Team shall furnish guardrail end units listed on the NCDOT Approved Products List at <https://apps.dot.state.nc.us/vendor/approvedproducts/>. Units shall not be modified by the manufacturer and installer once approved and on the NCDOT Approved Products List.

Prior to installation, the Design-Build Team shall submit to the Engineer certified working drawings and assembling instructions from the manufacturer for each guardrail end unit in accordance with Article 105-2 of the 2018 *Standard Specifications for Roads and Structures*.

Perform installation in accordance with the details in the plans developed by the Design-Build Team, and details and assembling instructions furnished by the manufacturer.

## Construction Methods

Guardrail end delineation shall be required on all approach and trailing end sections for both temporary and permanent installations. Guardrail end delineation shall consist of yellow reflective sheeting applied to the entire end section of the guardrail in accordance with Article 1088-3 of the 2018 *Standard Specifications for Roads and Structures*.

### **GUARDRAIL END UNITS & TEMPORARY GUARDRAIL END UNITS, TYPE TL-3**

(4-20-04) (Rev.5-16-23)

862

DB8 R65

## Description

Furnish and install guardrail end units in accordance with the details in the plans developed by the Design-Build Team, the applicable requirements of Section 862 of the 2018 *Standard Specifications for Roads and Structures*, and at locations shown in the plans developed by the Design-Build Team.

## Materials

The Design-Build Team shall furnish guardrail end units listed on the NCDOT Approved Products List at <https://apps.dot.state.nc.us/vendor/approvedproducts/>. Units shall not be modified by the manufacturer and installer once approved and on the NCDOT Approved Products List.

Prior to installation, the Design-Build Team shall submit to the Engineer certified working drawings and assembling instructions from the manufacturer for each guardrail end unit in accordance with Article 105-2 of the 2018 *Standard Specifications for Roads and Structures*.

Perform installation in accordance with the details in the plans developed by the Design-Build Team, and details and assembling instructions furnished by the manufacturer.

## Construction Methods

Guardrail end delineation shall be required on all approach and trailing end sections for both temporary and permanent installations. Guardrail end delineation shall consist of yellow reflective sheeting applied to the entire end section of the guardrail in accordance with Article 1088-3 of the 2018 *Standard Specifications for Roads and Structures*.

### **GUARDRAIL ANCHOR UNITS AND TEMPORARY GUARDRAIL ANCHOR UNITS**

(11-22-17)

862

DB8 R70

Guardrail anchor units shall be in accordance with the details in the plans developed by the Design-Build Team and the applicable requirements of Section 862 of the 2018 *Standard Specifications for Roads and Structures*.

### **IMPACT ATTENUATOR UNIT, TYPE TL-3**

(4-20-04) (Rev. 12-12-18)

DB8 R75

## Description

The Design-Build Team shall furnish and install impact attenuator units and any components necessary to connect the impact attenuator units in accordance with the manufacturer's requirement, the details in the plans developed by the Design-Build Team, and at locations shown in the plans developed by the Design-Build Team.

## Materials

The Design-Build Team shall furnish impact attenuator units listed on the NCDOT Approved Products List at <https://apps.dot.state.nc.us/vendor/approvedproducts/> or approved equal.

Prior to installation, the Design-Build Team shall submit to the Engineer:

1. FHWA acceptance letter for each impact attenuator unit certifying it meets the requirements of the Manual for Assessing Safety Hardware (MASH-16), Test Level 3, in accordance with Article 106-2 of the 2018 *Standard Specifications for Roads and Structures*.
2. Certified working drawings and assembling instructions from the manufacturer for each impact attenuator unit in accordance with Article 105-2 of the 2018 *Standard Specifications for Roads and Structures*.

No modifications shall be made to the impact attenuator unit without the express written permission from the manufacturer. Perform installation in accordance with the details in the plans developed by the Design-Build Team, and details and assembling instructions furnished by the manufacturer.

## Construction Methods

If the median width is 40 feet or less, the Design-Build Team shall supply NON-GATING Impact Attenuator Units.

If the median width is greater than 40 feet, the Design-Build Team may use GATING or NON-GATING Impact Attenuator Units.

## **PORTLAND CEMENT CONCRETE PRODUCTION AND DELIVERY**

(7-27-20)

1000, 1014, 1024

DB10 R01

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 10-6, Table 1000-1, REQUIREMENTS FOR CONCRETE**, replace with the following:

TABLE 1000-1 REQUIREMENTS FOR CONCRETE											
Class of Concrete	Min. Compressive Strength at 28 days	Maximum Water-Cement Ratio				Consistency Maximum Slump		Cement Content			
		Air-Entrained Concrete		Non-Air-Entrained Concrete		Vibrated	Non-Vibrated	Vibrated		Non-Vibrated	
		Rounded Aggregate	Angular Aggregate	Rounded Aggregate	Angular Aggregate			Min.	Max.	Min.	Max.
Units	psi					inch	inch	lb/cy	lb/cy	lb/cy	lb/cy
AA	4500	0.381	0.426	---	---	3.5 <sup>A</sup>	---	639	715	---	---
AA Slip Form	4500	0.381	0.426	---	---	1.5	---	639	715	---	---
Drilled Pier	4500	---	---	0.450	0.450	---	5 – 7 dry 7 – 9 wet	---	---	640	800
A	3000	0.488	0.532	0.550	0.594	3.5 <sup>A</sup>	4.0	564	---	602	---
B	2500	0.488	0.567	0.559	0.630	1.5 machine placed 2.5 <sup>A</sup> hand placed	4.0	508	---	545	---
Sand Light-weight	4500	---	0.420	---	---	4.0 <sup>A</sup>	---	715	---	---	---
Latex Modified	3000 (at 7 days)	0.400	0.400	---	---	6.0	---	658	---	---	---
Flowable Fill excavatable	150 max. (at 56 days)	as needed	as needed	as needed	as needed	---	Flowable	---	---	40	100

Flowable Fill non-excavatable	125	as needed	as needed	as needed	as needed	---	Flowable	---	---	100	as needed
Pavement	4500 Design, field 650 flexural, design only	0.559	0.559	---	---	1.5 slip form 3.0 hand placed	---	526	---	---	---
Precast	See Table 1077-1	as needed	as needed	---	---	6.0	as needed	as needed	as needed	as needed	as needed
Prestressed	per contract	See Table 1078-1	See Table 1078-1	---	---	8.0	---	564	as needed	---	---

- A. The slump may be increased to six inches, provided the increase in slump is achieved by adding a chemical admixture conforming to Section 1024-3. In no case shall the water-cement ratio on the approved design be exceeded. Concrete exhibiting segregation and / or excessive bleeding will be rejected. Utilizing an admixture to modify slump does not relinquish the Design-Build Team's responsibility to ensure the final product quality and overall configuration meets design specifications. Caution should be taken when placing these modified mixes on steep grades to prevent unintended changes to the set slope.

### **THERMOPLASTIC INTERMIXED BEAD TESTING**

7-19-22

1087

DB10 R04

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 10-183, Subarticle 1087-7(B) Thermoplastic Pavement Marking Material Composition, delete Lines 34 and 35.**

**Page 10-184, Article 1087-8 MATERIAL CERTIFICATION, after Line 34, delete and replace with the following:**

Drop-on Glass Beads	Type 3 Material Certification and Type 4 Material Certification
Intermix Glass Beads	Type 2 Material Certification and Type 3 Material Certification
Paint	Type 3 Material Certification
Removable Tape	Type 3 Material Certification
Thermoplastic	Type 3 Material Certification and Type 4 Material Certification
Cold Applied Plastic	Type 2 Material Certification and Type 3 Material Certification
Polyurea	Type 2 Material Certification and Type 3 Material Certification

### **NON-CAST IRON SNOWPLOWABLE PAVEMENT MARKERS**

10-19-21 (Rev. 10-19-21)

1086, 1250, 1253

DB10 R08

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Pages 10-177 and 10-178, Article 1086-3 SNOWPLOWABLE PAVEMENT MARKERS,** delete items (A), (B) and (C)(1) and replace with the following:

**(A) General**

Use non-cast iron snowplowable pavement markers evaluated by NTPEP. The non-cast iron snowplowable pavement markers shall consist of a housing with one or more glass or plastic face lens type reflective lenses to provide the required color designation. The marker shall be designed or installed in a manner that minimizes damage from snowplow blades. Plastic lens faces shall use an abrasion resistant coating.

**(B) Housings**

**(1) Dimensions**

The dimension, slope and minimum area of reflecting surface shall conform to dimensions as shown in the plans developed by the Design-Build Team. The minimum area of each reflecting surface shall be 1.44 square inch.

**(2) Materials**

Use non-cast iron snowplowable pavement markers that are on the NCDOT Approved Products List.

**(3) Surface**

The housing surface shall be free of scale, dirt, rust, oil, grease or any other contaminant which might reduce its bond to the epoxy adhesive.

**(4) Identification**

Mark the housing with the manufacturer's name and marker model number.

**(C) Reflectors**

**(1) General**

Laminate the reflector to an elastomeric pad and attach with adhesive to the housing. The thickness of the elastomeric pad shall be 0.04 inch.

**Pages 12-14, Subarticle 1250-3(C) Removal of Existing Pavement Markers, Lines 19 - 29,** delete and replace with the following:

Remove the existing raised pavement markers or the snowplowable pavement markers, including the housings, before overlaying an existing roadway with pavement. Repair the pavement by filling holes, as directed by the Engineer.

When traffic patterns are changed in work zones due to construction or reconstruction, remove all raised pavement markers or snowplowable markers, including housings, that conflict with the new traffic pattern before switching traffic to the new traffic pattern. Lens removal in lieu of total housing removal shall not be an acceptable practice for snowplowable markers.

Properly dispose of the removed pavement markers.

**Pages 12-16, Article 1253-1 DESCRIPTION, Lines 4 - 5,** delete and replace with the following:

Furnish, install and maintain non-cast iron snowplowable pavement markers in accordance with the contract.

**Pages 12-16 and 12-17, Article 1253-3 CONSTRUCTION METHODS,** delete items (A), (B) and (C) and replace with the following:

**(A) General**

Bond marker housings to the pavement with epoxy adhesive. Mechanically mix and dispense epoxy adhesives as required by the manufacturer's specifications. Place the markers immediately after the adhesive has been mixed and dispensed.

If saw cutting, milling, or grooving operations are used, promptly remove all resulting debris from the pavement surface. Install the marker housings within seven calendar days after saw cutting, milling or grooving the pavement. Remove and dispose of loose material from the slots by brushing, blow cleaning or vacuuming. Dry the slots before applying the epoxy adhesive. Install non-cast iron snowplowable pavement markers according to the manufacturer's recommendations.

Protect the non-cast iron snowplowable pavement markers until the epoxy has initially cured and is track free.

**(B) Reflector Replacement**

In the event that a reflector is damaged, replace the damaged reflector by using adhesives and methods recommended by the marker manufacturer and approved by the Engineer.

Missing housings shall be replaced. Broken housings shall be removed and replaced. In both cases the slot for the housings shall be properly prepared prior to installing the new housing; patch the existing marker slots as directed by the Engineer and install the new marker approximately one foot before or after the patch.

**Pages 12-17, Article 1253-4 MAINTENANCE, Line 5,** delete and replace with the following:

Maintain all installed non-cast iron snowplowable pavement markers until final project acceptance.

## **MATERIALS FOR PORTLAND CEMENT CONCRETE**

(8-4-20)

1000, 1024

DB10 R24

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 10-52, Article 1024-4, WATER, Lines 3 - 6,** delete and replace with the following:

Test water from wells at all locations. Test public water supplies from all out of state locations and in the following counties: Beaufort, Bertie, Brunswick, Camden, Carteret, Chowan, Craven, Currituck, Dare, Gates, Hyde, New Hanover, Onslow, Pamlico, Pasquotank, Pender, Perquimans, Tyrell and Washington unless the Engineer waives the testing requirements.

**Page 10-52, Table 1024-2, PHYSICAL PROPERTIES OF WATER,** replace with the following:

<b>TABLE 1024-2 PHYSICAL PROPERTIES OF WATER</b>		
<b>Property</b>	<b>Requirement</b>	<b>Test Method</b>
Compression Strength, minimum percent of control at three and seven days	90%	ASTM C1602
Time of set, deviation from control	From 1:00 hour earlier to 1:30 hour later	ASTM C1602
pH	4.5 to 8.5	ASTM D1293 *
Chloride Ion Content, Max.	250 ppm	ASTM D512 *
Total Solids Content (Residue), Max.	1,000 ppm	SM 2540B *
Resistivity, Min.	0.500 kohm-cm	ASTM D1125 *

\* Denotes an alternate method is acceptable. Test method used shall be referenced in the test report.

## **GEOSYNTHETICS**

(03-21-23)

1056

DB10 R56

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 10-77, Article 1056-1 DESCRIPTION, Lines 13-16,** delete and replace the second sentence in the second paragraph with the following:

Steel shall have anchor pins with a diameter of at least 3/16 inch, a length of at least 18 inches, a point at one end and a head at the other end that will retain a steel washer with an outside diameter of at least 1.5 inches.

**Page 10-77, Article 1056-2 HANDLING AND STORING, Lines 20-21**, delete and replace the third sentence in the first paragraph with the following:

Geosynthetics with defects, flaws, deterioration or damage will be rejected by the Engineer.

**Page 10-77, Article 1056-3 CERTIFICATIONS AND IDENTIFICATION, Lines 25-27**, delete and replace the first sentence in the first paragraph with the following:

Provide Type 1, Type 2 or Type 4 material certifications in accordance with Article 106-3 for geosynthetics except certifications are not required for Type 1 through Type 5 geotextiles.

**Page 10-77, Article 1056-3 CERTIFICATIONS AND IDENTIFICATION, Lines 32-35**, delete the second paragraph.

**Page 10-77, Article 1056-3 CERTIFICATIONS AND IDENTIFICATION, Lines 36-41**, delete and replace the third paragraph with the following:

Allow the Engineer to visually identify geosynthetic products before installation. Open packaged geosynthetics just before use in the presence of the Engineer to verify the correct product. Geosynthetics that are missing original packaging or product labels or that have been unwrapped or previously opened will be rejected unless otherwise approved by the Engineer.

**Page 10-77, Article 1056-4 GEOTEXTILES, Lines 43-45**, delete the first paragraph.

**Page 10-78, Article 1056-4 GEOTEXTILES, before Line 1 and Lines 1-5**, delete Table 1056-1, Lines 1-5 and replace with the following:



**TABLE 1056-1  
GEOTEXTILE REQUIREMENTS**

<b>Property<sup>A</sup></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>Silt Fence Fabric</i>	<i>Soil Stabilization</i>	<i>Subgrade Stabilization</i>	
Elongation (MD & CD)	≥ 50%	≥ 50%	≤ 25%	< 50%	< 50%	ASTM D4632
Grab Strength (MD & CD) <sup>A</sup>	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) <sup>A</sup>			—			ASTM D4533
Puncture Strength			—			ASTM D6241
Ultimate Tensile Strength (MD & CD) <sup>A</sup>	—	—	—	—	Table 12 <sup>D</sup> , Class 4A	ASTM D4595
Permittivity	Table 2 <sup>D</sup> , 15% to 50% in <i>Situ</i> Soil Passing 0.075 mm	Table 6 <sup>D</sup> , 15% to 50% in <i>Situ</i> Soil Passing 0.075 mm	Table 7 <sup>D</sup>	Table 5 <sup>D</sup>	Table 12 <sup>D</sup> , Class 4A	ASTM D4491
Apparent Opening Size						ASTM D4751
UV Stability (Retained Strength)						ASTM D4355

**A.** MD, CD and MARV per Article 1056-3.

**B.** Minimum roll width of 36 inches required.

**C.** Minimum roll width of 13 feet required unless otherwise approved by the Engineer for the application.

**D.** Per AASHTO M 288.

**Page 10-78, Article 1056-5 GEOCOMPOSITE DRAINS, before Line 9 and Lines 9-10, delete Table 1056-2, Lines 9-10 and replace with the following:**

**TABLE 1056-2  
GEOCOMPOSITE DRAIN REQUIREMENTS**

Property	Requirement			Test Method
	Sheet Drain	Strip Drain	Wick Drain	
Width	≥ 12"	12" ±1/4"	4" ±1/4"	N/A
In-Plane Flow Rate <sup>A</sup> (with gradient of 1.0 and 24-hour seating period)	6 gpm/ft @ applied normal compressive stress of 10 psi	15 gpm/ft @ applied normal compressive stress of 7.26 psi	1.5 gpm <sup>B</sup> @ applied normal compressive stress of 1.45 psi	ASTM D4716

**A.** MARV per Article 1056-3.

**B.** Per foot of width tested.

**Page 10-79, Article 1056-5 GEOCOMPOSITE DRAINS, before Line 3, delete Table 1056-3, lines 6-7 and replace with the following:**

**TABLE 1056-3  
DRAINAGE CORE REQUIREMENTS**

Property	Requirement		Test Method
	Sheet Drain	Strip Drain	
Thickness	1/4"	1"	ASTM D1777 or D5199
Compressive Strength <sup>A</sup>	40 psi	30 psi	ASTM D6364

**A.** MARV per Article 1056-3.

**Page 10-79, Article 1056-5 GEOCOMPOSITE DRAINS, before Line 6 and Lines 6-11, delete Table 1056-4 and the last paragraph and replace with the following:**

**TABLE 1056-4  
WICK DRAIN GEOTEXTILE REQUIREMENTS**

Property	Requirement	Test Method
Elongation	≥ 50%	ASTM D4632
Grab Strength	Table 1 <sup>A</sup> , Class 3	ASTM D4632
Tear Strength		ASTM D4533
Puncture Strength		ASTM D6241
Permittivity <sup>B</sup>	0.7 sec <sup>-1</sup>	ASTM D4491
Apparent Opening Size (AOS)	Table 2 <sup>A</sup> , > 50% <i>in Situ</i> Soil Passing 0.075 mm	ASTM D4751
UV Stability (Retained Strength)		ASTM D4355

**A.** Per AASHTO M 288.

**B.** MARV per Article 1056-3.

For wick drains with a geotextile fused to both faces of a corrugated drainage core along the peaks of the corrugations, use wick drains with an ultimate tensile strength of at least 1,650 lbs. per 4 inch width in accordance with ASTM D4595 and geotextiles with a permittivity, AOS and UV stability that meet Table 1056-4.

**Page 10-80, Article 1056-6 GEOCELLS, before Line 1 and Lines 1-4, delete Table 1056-5, lines 1-4 and replace with the following:**

<b>TABLE 1056-5 GEOCELL REQUIREMENTS</b>		
<b>Property</b>	<b>Requirement</b>	<b>Test Method</b>
Cell Depth	4"	N/A
Fully Expanded Cell Area	100 sq.in. max	N/A
Sheet Thickness	50 mil -5%, +10%	ASTM D5199
Density	58.4 pcf min	ASTM D1505
Carbon Black Content	1.5% min	ASTM D1603 or D4218
ESCR <sup>A</sup>	5000 hr min	ASTM D1693
Coefficient of Direct Sliding (with material that meets AASHTO M 145 for soil classification A-2)	0.85 min	ASTM D5321
Short-Term Seam (Peel) Strength (for 4" seam)	320 lb min	USACE <sup>C</sup> Technical Report GL-86-19, Appendix A
Long-Term Seam (Hang) Strength <sup>B</sup> (for 4" seam)	160 lb min	

**A.** Environmental Stress Crack Resistance.

**B.** Minimum test period of 168 hours with a temperature change from 74°F to 130°F in 1-hour cycles.

**C.** US Army Corps of Engineers (USACE).

## **TEMPORARY SHORING**

(2-20-07) (Rev. 9-7-21)

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 contract, the plans developed by the Design-Build Team and accepted submittals. Construct temporary shoring at locations shown in the plans developed by the Design-Build Team and as directed. Temporary shoring shall be required to maintain traffic when a 2:1 (H:V) slope from the top of an embankment or bottom of an excavation will intersect the existing ground line less than five feet from the edge of pavement of an open travelway. This

standard special provision does not apply to pipe, inlet or utility installations 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 and “Temporary Wall Vendor” as the vendor supplying the temporary MSE wall. Define “reinforcement” as geotextile, geogrid, geostrip, welded wire grid or metallic strip reinforcement.

Temporary geosynthetic walls consist of geotextile or geogrid reinforcement wrapped behind welded wire facing or geostrip reinforcement connected to welded wire facing. Define “temporary geotextile wall” as a temporary geosynthetic wall with geotextile reinforcement, “temporary geogrid wall” as a temporary geosynthetic wall with geogrid reinforcement and “temporary geostrip wall” as a temporary geosynthetic wall with geostrip 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 embedment below the grade at the wall face.

**(E) Positive Protection**

Define “unanchored or anchored portable concrete barrier” as portable concrete barrier (PCB) that meets 2018 Roadway Standard Drawing No. 1170.01. Define “concrete barrier” as unanchored or anchored PCB or an approved equal. Define “temporary guardrail” as temporary steel beam guardrail that meets 2018 Roadway Standard Drawing No. 862.02.

**Materials**

Refer to the 2018 *Standard Specifications for Roads and Structures*.

<b>Item</b>	<b>Section</b>
Concrete Barrier Materials	1170-2
Flowable Fill, Excavatable	1000-6
Geosynthetics	1056
Grout, Type 1	1003
Portland Cement	1024-1
Portland Cement Concrete	1000
Select Materials	1016
Steel Beam Guardrail Materials	862-2
Steel Plates	1072-2
Steel Sheet Piles and H-Piles	1084
Untreated Timber	1082-2
Water	1024-4
Welded Wire Reinforcement	1070-3

Provide Type 6 material certifications for shoring materials in accordance with Article 106-3 of the 2018 *Standard Specifications for Roads and Structures*. Use Class IV select material for temporary guardrail. Use Class A concrete that meets Article 450-2 of the 2018 *Standard Specifications for Roads and Structures* or Type 1 grout for drilled-in piles. Provide untreated timber with a thickness of at least three inches and a bending stress of at least 1,000 pounds per square inch 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 inches above the ground and protect it at all times from damage; and when placing in the work make sure it is free from dirt, dust, loose mill scale, loose rust, paint, oil or other foreign materials. Load, transport, unload and store anchor materials so materials are kept clean and free of damage. Bent, damaged or defective materials shall be rejected.

(1) Ground Anchors

Use high-strength deformed steel bars that meet AASHTO M 275 or seven-wire strands that meet ASTM A886 or Article 1070-5 of the 2018 *Standard Specifications for Roads and Structures*. Splice bars in accordance with Article 1070-9 of the 2018 *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*.

Use neat cement grout that only contains cement and water with a water cement ratio of 0.4 to 0.5 which is approximately 5.5 gallons of water per 94 pounds of Portland cement. Provide grout with a compressive strength at three and 28 days of at least 1,500 and 4,000 psi, respectively.

(2) Helical Anchors

Use helical anchors with an ICC Evaluation Service, Inc. (ICC-ES) report. 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 and Geostrip Reinforcement

Use geogrids with a roll width of at least four feet. Use geogrids for geogrid reinforcement and geostrips for geostrip reinforcement with an “approved” status code in accordance with the NCDOT Geosynthetic Reinforcement Evaluation Program. The list of approved geogrids and geostrips is available from:

**[connect.ncdot.gov/resources/Geological/Pages/Products.aspx](http://connect.ncdot.gov/resources/Geological/Pages/Products.aspx)**

Provide geogrids and geostrips with design strengths in accordance with the accepted submittals. Geogrids and geostrips are approved for short-term design strengths (three-year design life) in the machine direction (MD) and cross-machine direction (CD) 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 2018 *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 shall be 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 four 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 .pdf files of working drawings and design calculations for temporary shoring designs in accordance with Article 105-2 of the 2018 *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.

Provide temporary wall designs sealed by a Design Engineer licensed in the state of North Carolina and employed or contracted by the Temporary Wall Vendor. 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 or flood elevations shown in the plans developed by the Design-Build Team. Assume the following soil parameters for shoring backfill:

- (a) Unit weight ( $\gamma$ ) = 120 pcf;



(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 psf.

(2) Traffic Surcharge

Design temporary shoring for a traffic surcharge of 250 pounds per square foot 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. Design temporary shoring for a traffic (live load) surcharge in accordance with Article 11.5.6 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 Type 1 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 pounds per foot applied 18 inches above top of shoring if concrete barrier is above and next to shoring or temporary guardrail is above and attached to shoring. Extend cantilever, braced and anchored shoring at least 32 inches above top of shoring if shoring is designed for traffic impact. Otherwise, extend shoring at least six inches above top of shoring.

Design cantilever, braced and anchored shoring for a maximum deflection of three inches if the horizontal distance to the closest edge of pavement or structure is less than H. Otherwise, design shoring for a maximum deflection of six inches. Design cantilever and braced shoring in accordance with the plans developed by the Design-Build Team and AASHTO *Guide Design Specifications for Bridge Temporary Works*.

Design anchored shoring in accordance with the plans developed by the Design-Build Team and Article 11.9 of the AASHTO *LRFD Bridge Design Specifications*. Use a resistance factor of 0.80 for tensile resistance of anchors with bars, strands or shafts. Extend the unbonded length for ground anchors and the shallowest helix for helical anchors at least five feet behind the critical failure surface. Do not extend anchors beyond right of way or easement limits. If existing or future obstructions such as foundations, guardrail posts, pavements, pipes,

inlets or utilities will interfere with anchors, maintain a clearance of at least six inches between obstructions and anchors.

(4) Temporary Wall Designs

Use shoring backfill in the reinforced zone of temporary walls. Separation geotextiles shall be 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 shall also be 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 inches except for walls on structures or rock as determined by the Engineer. Use a uniform reinforcement length throughout the wall height of at least 0.7H or six feet, whichever is longer. Extend the reinforced zone at least six inches 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 and geostrip reinforcement, use approved geosynthetic reinforcement properties available from the website shown elsewhere in this provision. Use geosynthetic properties for the direction reinforcement will be installed, a three-year design life and shoring backfill to be used in the reinforced zone.

Do not use more than four different reinforcement strengths for each temporary geosynthetic wall. Design temporary geotextile walls for a reinforcement coverage ratio ( $R_c$ ) of 1.0. For temporary geogrid walls 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-inch to 24-inch long legs. Locate geosynthetic 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. Attach geostrip reinforcement to welded wire facing with a connection approved by the Department.

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, geostrip 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, Area 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 2018 *Standard Specifications for Roads and Structures* and 2018 Roadway Standard Drawing No. 1170.01. Use temporary guardrail in accordance with Section 862 of the 2018 *Standard Specifications for Roads and Structures* and 2018 Roadway Standard Drawing Nos. 862.01, 862.02 and 862.03.

(A) Tolerances

Construct shoring with the following tolerances:

- (1) Horizontal wires of welded wire facing are level in all directions,
- (2) Shoring location is within six inches of horizontal and vertical alignment shown in the accepted submittals, and
- (3) Shoring plumbness (batter) is not negative and within two degrees 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 2018 *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 Type 1 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 three inches 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) Mix and place neat cement grout in accordance with Subarticles 1003-5, 1003-6 and 1003-7 of the *2018 Standard Specifications for Roads and Structures*. 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 three 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 shall be based in part on the following criteria.

- (i) For ground and helical anchors, total movement is less than 0.04 inch between the one and ten minute readings or less than 0.08 inch between the six 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 .pdf files 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.

Attach geostrip reinforcement to welded wire facing and wrap geotextile reinforcement and retention geotextiles behind welded wire facing as shown in the plans developed by the Design-Build Team and accepted submittals. Cover geotextiles with at least three inches of shoring backfill. Overlap adjacent geotextile reinforcement and retention and separation geotextiles at least 18 inches with seams oriented perpendicular to the wall face. Hold geotextiles in place with wire staples or anchor pins as needed.

Place reinforcement within three inches of locations shown in the plans developed by the Design-Build Team and accepted submittals. Before placing shoring backfill, pull geosynthetic reinforcement taut so it is in tension and free of kinks, folds, wrinkles and 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 eight-inch to ten-inch 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 2018 *Standard Specifications for Roads and Structures*. Use only hand operated compaction equipment to compact backfill within three feet of welded wire facing. At a distance greater than three feet, compact shoring backfill with at least four passes of an eight-ton to ten-ton vibratory roller in a direction parallel to the wall face. Smooth wheeled or rubber tired rollers are also acceptable for compacting backfill. Do not use sheepsfoot, grid rollers or other types of compaction equipment with feet. Do not displace or damage reinforcement when placing and compacting shoring backfill. End dumping directly on geosynthetic reinforcement shall not be permitted. Do

not operate heavy equipment on reinforcement until it is covered with at least eight inches 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 2018 *Standard Specifications for Roads and Structures*. Bench temporary walls into the sides of excavations where applicable. For temporary geosynthetic walls with top of wall within five feet of finished grade, remove top facing and incorporate top reinforcement layer into fill when placing fill in front of wall. Temporary walls remain in place permanently unless otherwise required.

### **MATERIAL AND EQUIPMENT STORAGE & PARKING OF PERSONAL VEHICLES**

(10-19-21)(Rev. 8-16-22)

1101

DB11 R03

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 11-2, Article 1101-8 MATERIAL AND EQUIPMENT STORAGE, Lines 35 - 38,** delete and replace with the following:

Except as allowed otherwise below, when work is not in progress, keep all personnel, equipment, machinery, tools, construction debris, materials and supplies away from active travel lanes in accordance with Table 1101-1.

<b>TABLE 1101-1 MATERIAL AND EQUIPMENT STORAGE FROM ACTIVE TRAVEL LANES</b>	
<b>Posted Speed Limit (mph)</b>	<b>Distance (ft)</b>
40 or less	≥ 18
45 - 50	≥ 28
55	≥ 32
60 or higher	≥ 40

When vehicles, equipment and / or materials are protected by concrete barrier or guardrail, they shall be offset at least five feet from the barrier or guardrail.

**Page 11-2, Article 1101-9 PARKING OF PERSONAL VEHICLES, Lines 40 - 41,** delete and replace with the following:

In accordance with Article 1101-8, or as directed by the Engineer, provide staging areas for personal vehicle parking before use.

### **WORK ZONE INSTALLER**

(7-20-21) (Rev. 8-16-22)

1101, 1150

DB11 R04

The Design-Build Team shall provide the service of at least one qualified work zone installer during the setup, installation, and removal of temporary traffic control devices within any highway right of way. The qualified work zone installer shall serve as crew leader and shall be on site and directing the installation and removal of temporary traffic control devices. If multiple

temporary traffic control installations and / or removals are occurring simultaneously, then each crew leader shall be a qualified work zone installer.

The work zone installer shall be qualified by an NCDOT approved training agency or other NCDOT approved training provider in the safe and competent set up of temporary traffic control devices. For a complete listing of approved training agencies, reference the Work Zone Safety Training webpage noted below:

**<https://connect.ncdot.gov/projects/WZTC/Pages/Training.aspx>**

In accordance with Article 1101-13 of the 2018 *Standard Specifications for Roads and Structures*, a work zone supervisor may fulfill the role of the work zone installer during the setup, installation and removal of temporary traffic control devices within any highway right of way, provided they are on site and directing the installation and removal of temporary traffic control devices.

At a minimum, all other individuals participating in the setup, installation, and removal of temporary traffic control devices within any highway right of way shall be certified as a qualified flagger in accordance with Article 1150-3 of the 2018 *Standard Specifications for Roads and Structures*, even if flagging is not being performed as part of the traffic control operation.

Prior to or at the preconstruction conference, the Design-Build Team shall provide the name and contact information of all qualified work zone installers to the Engineer. Additionally, the Design-Build Team shall provide a qualification statement that all other individuals participating in the setup, installation and removal of temporary traffic control devices are qualified flaggers that have been properly trained through an NCDOT approved training agency or other NCDOT approved training provider.

Prior to the qualified work zone installer or flagger performing any traffic control duties on the project, all certification records for qualified work zone installers and flaggers shall be uploaded by the NCDOT approved training agency or other NCDOT approved training provider to the Department's Work Zone Education Verification App (WZ-EVA). For more information about WZ-EVA, reference the Work Zone Safety Training webpage noted above.

### **PORTABLE CHANGEABLE MESSAGE SIGNS**

(9-20-22)(Rev. 11-15-22)

1089, 1120

DB11 R10

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 10-197, Subarticle 1089-7(D) Controller, Line 16**, add the following after the third sentence of the first paragraph:

Change the controller password from the factory default and periodically change the controller password to deter unauthorized programming of the controller.

**Page 10-197, Subarticle 1089-7(D) Controller, Lines 16 - 19**, replace the fourth sentence of the first paragraph with the following:



The password system is recommended to include at least two levels of security such that operators at one level may only change message sequences displayed using preprogrammed sequences and operators at a higher level may create and store messages or message sequences.

**Page 10-197, Subarticle 1089-7(D) Controller, Line 24** replace the sentence with the following:

The controller shall be stored in a locked, weather and vandal resistant box when not in use and after changes to the messages are made.

**Page 11-8, Article 1120-3 CONSTRUCTION METHODS, Lines 26 - 32,** replace the second paragraph with the following:

During periods of operation, provide an experienced operator for the portable changeable message sign to ensure that the messages displayed on the sign panel are in accordance with the plans developed by the Design-Build Team and Subarticle 1089-7(D). Change the controller password from the factory default and periodically change the controller password to deter unauthorized programming of the controller. Using two levels of password security is recommended such that operators at one level may only change message sequences displayed using preprogrammed sequences and operators at a higher level may create and store messages or message sequences. The controller shall be stored in a locked, weather and vandal resistant box when not in use and after changes to the messages are made.

## **LAW ENFORCEMENT**

(6-21-22)(Rev. 11-15-22)

1190

DB11 R30

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 11-19, Article 1190-1 DESCRIPTION, Lines 4 - 5,** replace the paragraph with the following:

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

**Page 11-19, Article 1190-2 CONSTRUCTION METHODS, Lines 7 - 10,** replace the first and second paragraph with the following:

Use off-duty uniformed Law Enforcement Officers and official Law Enforcement vehicles equipped with blue lights to direct or control traffic as required by the plans developed by the Design-Build Team or as required by the Engineer.

Law Enforcement vehicles shall not be parked within the buffer space on any roadway. Law Enforcement vehicles shall not be used to close or block an active travel lane on multi-lane roadways with a posted speed limit of 45 mph or higher, except as allowed during rolling roadblock operations as shown in the 2018 *Roadway Standard Drawings* or while responding to an emergency.

**EXTRUDED THERMOPLASTIC PAVEMENT MARKING THICKNESS**

(3-19-19)(Rev. 4-26-22)

DB12 R005

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 12-6, Subarticle 1205-4(A)(1) General, Lines 5 - 8,** delete the second sentence and replace with the following:

Use application equipment that provides multiple width settings ranging from four inches to 12 inches and multiple thickness settings to achieve the required thickness above the surface of the pavement as shown in Table 1205-3.

**Page 12-7, Table 1205-3, THICKNESS REQUIREMENTS FOR THERMOPLASTIC,** replace with the following:

<b>TABLE 1205-3 MINIMUM THICKNESS REQUIREMENTS FOR THERMOPLASTIC</b>	
<b>Thickness</b>	<b>Location</b>
240 mils	In-lane and shoulder-transverse pavement markings (rumble strips). May be placed in two passes
90 mils	Center lines, skip lines, transverse bands, mini-skip lines, characters, bike lane symbols, crosswalk lines, edge lines, gore lines, diagonals, and arrow symbols

**POLYUREA PAVEMENT MARKING MATERIAL - TYPE 2 TYPICAL CERTIFIED MILL TEST REPORT**

(1-16-19)

SP

Amend the 2018 *Standard Specifications for Roads and Structures* as follows:

**Page 10-184, Article 1087-8 Material Certification,** in accordance with Article 106-3 provide a Type 2 Typical Certified Mill Test Report and a Type 3 Manufacturer's Certification for Polyurea pavement marking material.

When tested, the material shall meet the physical and chemical characteristics provided by the manufacturer. NCDOT reserves the right to compare these test results to baseline test results gathered by the NCDOT Materials and Test Unit.

**POLYUREA PAVEMENT MARKING MEDIA AND THICKNESS**

(8-27-20)

SP

Revise the 2018 NCDOT *Standard Specifications for Roads and Structure* as follows:

**Page 12-8, Subarticle 1205-5(B), Lines 14-16,** replace with the following:

Produce polyurea pavement marking lines that have a minimum dry thickness of 20 mils above the pavement surface when placed on concrete and asphalt pavements. Produce polyurea

pavement marking lines that have a minimum dry thickness of 30 mils above the pavement surface on textured surfaces such as OGFC and on surfaces where the polyurea will be placed over a previously removed pavement marking.

**Page 12-9**, replace **Table 1205-4 Minimum Reflectometer Requirement for Polyurea** with the following:

<b>TABLE 1205-4 MINIMUM REFLECTOMETER REQUIREMENTS FOR POLYUREA</b>		
<b>Item</b>	<b>Color</b>	<b>Reflectivity</b>
Standard Glass Beads	White	375 mcd/lux/m <sup>2</sup>
	Yellow	250 mcd/lux/m <sup>2</sup>

The installer may choose to use an AASHTO Type 4 / Type 1 or AASHTO Type 3 / Type 1 double drop system and these systems will be incidental to the polyurea pavement marking.

#### **THERMOPLASTIC PAVEMENT MARKING MATERIAL – COLOR TESTING**

(1-16-19)

SP

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Pages 10-183 and 10-184, Subarticle 1087-7(D)(1)(b) Yellow, Lines 9 - 11**, delete and replace with the following:

Obtain Color Values Y, x, y per ASTM E1349 using C/2° illuminant / observer.

Results shall be  $Y \geq 45\%$ , and x, y shall fall within PR#1 chart chromaticity limits.

#### **ON-THE-JOB TRAINING**

(2-24-15) (Rev. 7-20-17)

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 one 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 subcontractor. 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 Subarticle 108-13(D), of the North Carolina Department of Transportation *Standard Specifications for Roads and Structures*, dated January 2018 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	Japanese Millet
Crownvetch	Reed Canary Grass
Pensacola Bahiagrass	Zoysia
Creeping Red Fescue	

Minimum 70% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 5% inert matter; maximum 144 restricted noxious weed seed per pound.

Barnyard Grass  
Big Bluestem  
Little Bluestem  
Bristly Locust  
Birdsfoot Trefoil  
Indiangrass  
Orchardgrass  
Switchgrass  
Yellow Blossom Sweet Clover

**STANDARD SPECIAL PROVISION****ERRATA**

(10-16-18) (Rev. 6-20-23)

Z-4

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

**Division 1**

**Page 1-1, Article 101-2 Abbreviations, Line 13**, replace " American National Standards Institute, Inc." with "American National Standards Institute".

**Page 1-1, Article 101-2 Abbreviations, Line 32**, replace "Equivalent Single Axis Load" with "Equivalent Single Axle Load".

**Page 1-16, Subarticle 102-9(A) General, Line 26**, replace "10 U.S.C. 2304(g)" with "10 U.S.C. 3205".

**Page 1-43, Article 104-13 RECYCLED PRODUCTS OR SOLID WASTE MATERIALS, Line 4**, replace "104-13(B)(2)" with "104-13(B)".

**Page 1-52, Article 106-1 RECYCLED PRODUCTS OR SOLID WASTE MATERIALS, Line 25**, replace "13 NCAC 7CF.0101(a)(99)" with "29 CFR 1910.1200".

**Division 2**

**Page 2-5, Article 210-2 CONSTRUCTION METHODS, Line 21**, replace "NCGS §§ 130A-444 to -452" with "NCGS §§ 130A-444 to -453".

**Page 2-13, Article 225-2 EROSION CONTROL REQUIREMENTS, Line 17**, replace "the Sedimentation and Pollution Control Act" with "Article 107-12".

**Page 2-20, Subarticle 230-4(B)(3) Reclamation Plan, Line 12**, replace " Department's borrow and waste site reclamation procedures for contracted projects" with "Department's *Borrow Waste and Staging Site Reclamation Procedures for Contract Projects*".

**Page 2-25, Subarticle 235-3(E) Surcharges and Waiting Periods, Line 21 and Line 27**, delete "Department's Materials and Tests Unit.".

**Division 4**

**Page 4-18, Subarticle 411-5(C)(3) Coring, Line 11**, replace "in accordance with ASTM D5079" with "with methods acceptable to the Engineer".

**Page 4-50, Article 430-2 MATERIALS, prior to Line 15**, replace Section "1080-9" with "1080-7".

**Page 4-53, Article 440-2 MATERIALS, prior to Line 6**, replace Section "1080-9" with "1080-7".

**Page 4-58, Article 442-2 MATERIALS, prior to Line 15, replace Section “1080-6” with “1080-12”.**

**Page 4-59, Subarticle 442-7(A) Blast Cleaning, Line 36, replace Article “1080-6” with “1080-12”.**

**Page 4-76, Article 454-2 MATERIALS, prior to Line 24, replace Section “815-2” with “1044”.**

**Page 4-79, Article 455-2 MATERIALS, prior to Line 21, replace Section “815” with “1044”.**

**Page 4-80, Subarticle 455-3(B) Precast Gravity Wall Designs, Line 23 and Lines 25 - 26, replace “AASHTO LRFD specifications” with “*AASHTO LRFD Bridge Design Specifications*”.**

### **Division 6**

**Page 6-7, Article 609-1 DESCRIPTION, Line 29, replace Article Number “609-10” with “609-9”.**

**Page 6-10, Subarticle 609-6(C) Control Charts, Line 17, replace Section Number “7021” with “7.20.1”.**

**Page 6-13, Article 609-9 QUALITY ASSURANCE, Line 31, replace Section Number “7.60” with “7.6”.**

**Page 6-26, Subarticle 610-13(A)(1) Acceptance for New Construction, Line 31, replace Table number “610-7” with “610-8”.**

**Page 6-29, Subarticle 610-13(B) North Carolina Hearne Straightedge, Line 32, replace Table number “610-8” with “610-9”.**

**Page 6-31, Article 610-14 DENSITY ACCEPTANCE, Specified Density prior to Line 30 and Line 32, replace Table number “610-6” with “610-7”.**

**Page 6-37, Article 650-5 CONSTRUCTION METHODS, Line 10, replace Section Number “9.5(E)” with “9.5.1(E)”.**

**Page 6-44, Subarticle 660-8(B) Asphalt Mat and Seal, Line 40, replace Subarticle Number “660-8(A)” with “660-8(C)”.**

**Page 6-44, Subarticle 660-8(B) Asphalt Mat and Seal, Line 42, replace Subarticle Number “660-8(C)” with “660-8(A)”.**

**Division 7**

**Page 7-11, Subarticle 700-15(E) Compressive Strength, Line 5,** replace “AASHTO T 23” with “AASHTO R 100”.

**Page 7-24, Article 723-4 Very High Early Strength Concrete for Concrete Pavement Repair, Line 4,** replace “AASHTO T126” with “AASHTO R 39”.

**Division 8**

**Page 8-11, Article 815-1 MATERIALS, after Line 35,** replace “1080-12” with “1080-10”.

**Page 8-13, Article 816-1 MATERIALS, after Line 28,** replace “1080-12” with “1080-10”.

**Page 8-17, Article 825-1 Description, Line 5,** delete “853” and “855”.

**Division 10**

**Page 10-2, Subarticle 1000-3(B) Air Entrainment, Line 33,** replace “Chase” with “Chace”.

**Page 10-4, Subarticle 1000-4(A) Composition and Design, after Line 17,** replace “T23” with “R100”.

**Page 10-4, Subarticle 1000-4(B) Air Entrainment, Lines 31 and 33,** replace “Chase” with “Chace”.

**Page 10-4, Subarticle 1000-4(C) Strength of Concrete, Lines 39 and 41,** replace “T 23” with “R 100”.

**Page 10-15, Subarticle 1000-11(B) Mixing Time for Central Mixed Concrete, after Line 35,** replace “T 23” with “R 100”.

**Page 10-22, Article 1003-3 COMPOSITION AND DESIGN, Line 9,** replace “Engineer” with “engineer”.

**Page 10-23, Article 1003-4 GROUT REQUIREMENTS, Lines 16 and 18,** replace “T 23” with “R 100”.

**Page 10-26, Article 1005-4 TESTING, after Line 26,** replace “1014-2€(6)” with “1014-2€(6)” in C. of Table 1005-1 footnote and replace “Lightweight<sup>B</sup>” with “Lightweight<sup>C</sup>”.

**Page 10-29, Subarticle 1012-1(B)(4) Flat and Elongated Pieces, Line 44,** delete “SF9.5A”

**Page 10-36, Subarticle 1012-2(E) Toughness (Resistance to Abrasion), Line 31,** replace “course” with “coarse”.

**Page 10-37, Article 1012-4, LIGHTWEIGHT AGGREGATE, Line 4,** replace Table number “1012-8” with “1012-5”.

**Page 10-48, Subarticle 1020-10(A) Mineral Fibers, Line 27,** replace “Table 1012-5” with “Table 1020-2”.

**Page 10-52, Article 1024-5 FLY ASH, Line 12,** replace “Table 2” with “Table 3”.

**Page 10-60, Subarticle 1032-6(F) Joint Materials, Line 15,** replace “AASHTO M 198” with “ASTM C990” and delete “Type B”.

**Page 10-61, Article 1034-3 CONCRETE SEWER PIPE, Line 33,** replace “AASHTO M 198” with “ASTM C990” and delete “Type A or B”.

**Page 10-64, Article 1040-1 BRICK, Line 12,** replace “ASTM C62” with “ASTM C62 or ASTM C216”.

**Page 10-67, Article 1044-7 CORRUGATED PLASTIC PIPE AND FITTINGS, Line 24,** replace “AASHTO M 294 for heavy duty tubing” with “Article 1032-7 and AASHTO M 252”.

**Page 10-68, Subarticle 1046-3(D) Offset Blocks, Lines 30-32,** delete “Before beginning the installation of recycled offset block, submit the FHWA acceptance letter for each type of block to the Engineer for approval.”

**Page 10-69, Subarticle 1046-3(D) Offset Blocks, before Line 1,** replace “WIRE DIAMETER” with “COMPOSITE OFFSET BLOCKS” as the title of Table 1046-1, delete “Testing” property and associated requirement from Table 1046-1, and replace “Approval” requirement of “Approved for use by the FHWA” with “Approved for use on the NCDOT APL” in Table 1046-1.

**Page 10-80, Article 1060-2 FERTILIZER, Line 18,** replace “North Carolina Fertilizer Law” with “North Carolina Commercial Fertilizer Law”.

**Page 10-83, Article 1060-9 WATER, Line 9,** replace “15 NCAC 2B.0200” with “15A NCAC 02B.0200”.

**Page 10-86, Article 1070-3 COLD DRAWN STEEL WIRE AND WIRE REINFORCEMENT, Line 23 and 25,** replace “M 32” and “M 55” with “M 336”.

**Page 10-87, Article 1070-6 DOWELS AND TIE BARS FOR PORTLAND CEMENT CONCRETE PAVEMENT, Line 17,** replace “AASHTO M 32” with “AASHTO M 336”.

**Page 10-88, Subarticle 1070-7(D) Handling, Storage and Transportation, Line 40,** replace “Section” with “Subarticle”.

**Page 10-89, Article 1070-8 SPIRAL COLUMN REINFORCING STEEL, Line 21,** replace “AASHTO M 32” with “AASHTO M 336”.

**Page 10-91, Article 1072-3 BEARING PLATE ASSEMBLIES, Line 44,** replace “Article 1080-9” with “Article 1080-7”.

**Page 10-92, Subarticle 1072-5(A) General, after Line Page 30,** replace “SAMPLING REQUIREMENTS FOR HIGH STRENGTH BOLTS, NUTS AND WASHERS” with “SAMPLING REQUIREMENTS FOR HIGH STRENGTH BOLTS, NUTS AND WASHERS TO INCLUDE DIRECT TENSION INDICATORS” as the title of Table 1072-1.

**Page 10-95, Subarticle 1072-5(D)(7)(a) Mill Test Report(s), Line 18,** replace title with “Mill Test Report(s) (MTR)”.

**Page 10-95, Subarticle 1072-5(D)(7)(b) Manufacturer Certified Test Report(s), Line 24,** replace title with “Manufacturer Certified Test Report(s) (MCTR)”.

**Page 10-96, Subarticle 1072-5(D)(7)(c) Distributor Certified Test Report(s), Line 1,** replace title with “Distributor Certified Test Report(s) (DCTR)”.

**Page 10-98, Subarticle 1072-5(F) Galvanized High Strength Bolts, Nuts and Washers, Line 11,** replace “Article 1080-9” with “Article 1080-7”.

**Page 10-98, Subarticle 1072-5(F) Galvanized High Strength Bolts, Nuts and Washers, Line 11,** replace “Article 1080-9” with “Article 1080-7”.

**Page 10-111, Subarticle 1072-18(B) General, Line 24,** replace “Structural Welding Code-Reinforcing Steel” with “Structural Welding Code-Steel Reinforcing Bars”.

**Page 10-117, Article 1074-1 WELDING, Lines 21-22,** replace “Structural Welding Code-Reinforcing Steel” with “Structural Welding Code-Steel Reinforcing Bars”.

**Page 10-119, Article 1074-7(B) Gray Iron Castings, Line 16,** replace “M306” with “AASHTO M 306”.

**Page 10-121, Article 1076-7, REPAIR OF GALVANIZING, Line 8,** replace Article Number “1080-9” with “1080-7”.

**Page 10-125, Subarticle 1077-5(B) Testing, Line 31,** replace “T 23” with “R 100”.

**Page 10-135, Subarticle 1078-4(J)(2) Mixing Time for Central Mixed Concrete, line 46,** replace “Table 1078-2” with “Table 1078-3”

**Page 10-136, Subarticle 1078-4(J)(2) Mixing Time for Central Mixed Concrete, after Line 17,** replace “T23” with “R100”.

**Page 10-131, Subarticle 1078-4(A) Composition and Design, after Line 23, in Table 1078-2** replace “T 23” with “R 100”.

**Page 10-153, Subarticle 1079-1 PREFORMED BEARING PADS, Line 8,** replace “MIL-C882-D” with “MIL-C-882-E”.

**Page 10-154, Subarticle 1079-2(A) General, Line 6,** delete “and 1079-2(E)”.

**Page 10-156, Article 1080-5 SELF-CURING INORGANIC ZINC PAINT, Line 8,** replace “AASHTO M 252” with “AASHTO M 300”.

**Page 10-156, Article 1080-5 SELF-CURING INORGANIC ZINC PAINT, Line 20,** replace “AASHTO M 253” with “AASHTO M 300”.

**Page 10-156, Subarticle 1080-9(A) Composition, Line 40,** replace “Tables 1080-7 through 1080-14” with “Tables 1080-1 through 1080-3”.

**Page 10-157, Subarticle 1080-9(B) Properties, Line 5,** replace “Tables 1080-7 through 1080-14” with “Tables 1080-1 through 1080-3”.

**Page 10-157, Subarticle 1080-9(B) Properties, Line 35,** replace “Materials and Tests Standards CLS-P-1.0” with “*Structural Steel Shop Coatings Program*”.

**Page 10-159, Subarticle 1080-9(E) Color Variation, Table 1080-1,** replace “ASTM D1159” with “ASTM D1199”.

**Page 10-159, Subarticle 1080-9(E) Color Variation, Table 1080-1,** replace “NCDOT M&T P-10” with “ASTM D6280”.

**Page 10-161, Subarticle 1080-9(E) Color Variation, Table 1080-3,** replace “ASTM D13278” and “ASTM D3278”.

**Page 10-161, Subarticle 1080-9(E) Color Variation, Table 1080-3,** replace “NCDOT M&T P-10” and “Structural Steel Shop Coatings Program”.

**Page 10-161, Subarticle 1080-9(E) Color Variation, Table 1080-3,** add Test Method “ASTM D4400” for the Leneta Sag Test property in Table 1080-3.

**Page 10-161, Subarticle 1080-9(E) Color Variation, Table 1080-3,** add Test Method “ASTM D523” for the Gloss, Specular property in Table 1080-3.

**Page 10-161, Subarticle 1080-9(E) Color Variation, Table 1080-3,** replace Test Method “ASTM” with “ASTM E70” for the pH property in Table 1080-3.

**Page 10-162, Article 1080-50 PAINT FOR VERTICAL MARKERS, Line 1,** replace Article Number “1080-50” with “1080-10”.



**Page 10-162, Article 1080-61 EPOXY RESIN FOR REINFORCING STEEL, Line 5,** replace Article Number “1080-61” with “1080-11”.

**Page 10-162, Article 1080-72 ABRASIVE MATERIALS FOR BLAST CLEANING STEEL, Line 22,** replace Article Number “1080-72” with “1080-12”.

**Page 10-163, Article 1080-83 FIELD PERFORMANCE AND SERVICES, Line 25,** replace Article Number “1080-83” with “1080-13”.

**Page 10-166, Subarticle 1081-1(E) Prequalification, Line 24,** replace “Value Management Unit” with “Product Evaluation Program”.

**Page 10-168, Subarticle 1081-3(A) Physical Requirements, after Line 9,** replace “Subarticle 1081-4(B)” with “Subarticle 1081-3(B)” in Table 1081-2.

**Page 10-168, Subarticle 1087-2(A) Paint Composition, Lines 19-20,** replace “Federal Specification TTP 1952F” with “Federal Specification TT-P-1952”.

**Page 10-200, Subarticle 1090-1(C) Anchor Bolts, Line 38,** replace ASTM number “A325” with “F3125”.

**Page 10-202, Subarticle 1091-3(F) Solid Wall HDPE Conduit, Line 5,** replace “, Table 1091-1, 1091-2 and 1091-3” with “and Table 1091-1”.

**Page 10-208, Subarticle 1094-1(A) Breakaway or Simple Steel Beam Sign Supports, Line 19,** replace ASTM number “A325” with “F3125”.

**Page 10-209, Subarticle 1094-1(D) Steel Square Tube Posts, Line 10,** replace ASTM number “A123” with “A653”.

**Page 10-209, Subarticle 1094-1(E) Wood Supports, Line 17,** replace “Article 1082-2 and 1082-3” with “Section 1082”.

**Page 10-212, Subarticle 1098-1(H) Electrical Service, Line 21,** replace “NEMA Type 3R” with “NEMA 3R”.

**Page 10-212, Subarticle 1098-1(H) Electrical Service, Line 36,** replace “UL Standard 231” with “UL Standard UL-231”.

**Page 10-212, Subarticle 1098-1(H) Electrical Service, Line 37,** replace “UL Standard 67” with “UL Standard UL-67”.

**Page 10-224, Subarticle 1098-14(H)(1) Type I – Pedestrian Pushbutton Post, Line 3,** replace ASTM number “325” with “F3125”.

**Page 10-224, Article 1098-16 CABINET BASE ADAPTER/EXTENDER, Line 33,** replace Section Number “6.7” with “6.8”.

#### **Division 14**

**Page 14-11, Subarticle 1401-2(B) Lowering Device, Line 36,** replace Military Specification “MIL-W-83420E” with “MIL-DTL-83420”.

**Page 14-22, Article 1412-2 MATERIALS, Line 29,** replace UL Standard “1572” with “1598”.

#### **Division 15**

**Page 15-6, Subarticle 1510-3(B) Testing and Sterilization, Line 40,** replace Section Number “4.4.3” with “4.4”.

**Page 15-14, Article 1525-2 MATERIALS, Line 9,** replace “AASHTO M 198” with “ASTM C990”.

**Page 15-14, Article 1525-2 MATERIALS, Lines 17-18,** delete “in the Grout Production and Delivery provision”.

**Page 15-19, Article 1550-2 MATERIALS, Line 16,** replace “*AASHTO LRFD Bridge Design Specifications*” with “*AASHTO LRFD Bridge Construction Specifications*”.

#### **Division 17**

**Page 17-15, Subarticle 1715-3(E) Bore and Jack, Line 5,** replace Article Number “1540-4” with “1550-4”.

**Page 17-15, Subarticle 1715-3(E) Bore and Jack, Lines 10 & 11,** replace “*NCDOT Policies and Procedures for Accommodating Utilities on Highway Rights of Way*” with “*NCDOT Utilities Accommodations Manual*”.

**\*\*\* STANDARD SPECIAL PROVISIONS \*\*\*****TITLE VI AND NONDISCRIMINATION**

(6-28-77) (Rev 5-2-18)

Z-6

Revise the 2018 *Standard Specifications for Roads and Structures* as follows:

Replace Subarticle 103-4(B) with the following:

The North Carolina Department of Transportation is committed to carrying out the U.S. Department of Transportation's policy of ensuring nondiscrimination in the award and administration of contracts.

The provisions of this section related to United States Department of Transportation (US DOT) Order 1050.2A, Title 49 Code of Federal Regulations (CFR) part 21, 23 United States Code (U.S.C.) 140 and 23 CFR part 200 (or 49 CFR 303, 49 U.S.C. 5332 or 49 U.S.C. 47123) are applicable to all North Carolina Department of Transportation (NCDOT) contracts and to all related subcontracts, material supply, engineering, architectural and other service contracts, regardless of dollar amount. Any Federal provision that is specifically required not specifically set forth is hereby incorporated by reference.

**(1) Title VI Assurances (USDOT Order 1050.2A, Appendix A)**

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

**(a) Compliance with Regulations**

The contractor (hereinafter includes consultants) shall comply with the Acts and the Regulations relative to Nondiscrimination in Federally-assisted programs of the U.S. Department of Transportation, Federal Highway Administration (FHWA), as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

**(b) Nondiscrimination**

The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor shall not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.

**(c) Solicitations for Subcontractors, Including Procurements of Materials and Equipment**

In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Nondiscrimination on the grounds of race, color, or national origin.

(d) Information and Reports

The contractor shall provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the FHWA to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor shall so certify to the Recipient or the FHWA, as appropriate, and shall set forth what efforts it has made to obtain the information.

(e) Sanctions for Noncompliance:

In the event of a contractor's noncompliance with the Nondiscrimination provisions of this contract, the Recipient will impose such contract sanctions as it and / or the FHWA may determine to be appropriate, including, but not limited to:

- (i) Withholding payments to the contractor under the contract until the contractor complies; and / or
- (ii) Cancelling, terminating, or suspending a contract, in whole or in part.

(f) Incorporation of Provisions

The contractor shall include the provisions of paragraphs (a) through (f) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor shall take action with respect to any subcontract or procurement as the Recipient or the FHWA may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

**(2) Title VI Nondiscrimination Program (23 CFR 200.5(p))**

The North Carolina Department of Transportation (NCDOT) has assured the USDOT that, as a condition to receiving federal financial assistance, NCDOT will comply with Title VI of the Civil Rights Act of 1964 and all requirements imposed by Title 49 CFR Part 21 and related nondiscrimination authorities to ensure that no person shall, on the ground of race, color, national origin, limited English proficiency, sex, age, or disability (including religion / creed or income-level, where applicable), be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any programs, activities, or services conducted or funded by NCDOT. Contractors and other organizations under contract or agreement with NCDOT must also comply with Title VI and related authorities, therefore:

- (a) During the performance of this contract or agreement, contractors (e.g. subcontractors, consultants, vendors, prime contractors) shall be responsible for

complying with NCDOT's Title VI Program. Contractors are not required to prepare or submit Title VI Programs. To comply with this section, the prime contractor shall:

1. Post NCDOT's Notice of Nondiscrimination and the Contractor's own Equal Employment Opportunity (EEO) Policy in conspicuous locations accessible to all employees, applicants and subcontractors on the jobsite.
2. Physically incorporate the required Title VI clauses into all subcontracts on federally-assisted and state-funded NCDOT projects, and ensure inclusion by subcontractors into all lower-tier subcontracts.
3. Required Solicitation Language. The Contractor shall include the following notification in all solicitations for bids and requests for work or material, regardless of funding source:

“The North Carolina Department of Transportation, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award. In accordance with other related nondiscrimination authorities, bidders and contractors will also not be discriminated against on the grounds of sex, age, disability, low-income level, creed / religion, or limited English proficiency in consideration for an award.”

4. Physically incorporate the FHWA-1273, in its entirety, into all subcontracts and subsequent lower tier subcontracts on Federal-aid highway construction contracts only.
  5. Provide language assistance services (i.e., written translation and oral interpretation), free of charge, to LEP employees and applicants. Contact NCDOT OCR for further assistance, if needed.
  6. For assistance with these Title VI requirements, contact the NCDOT Title VI Nondiscrimination Program at 1-800-522-0453.
- (b) Subrecipients (e.g. cities, counties, LGAs, planning organizations) may be required to prepare and submit a Title VI Plan to NCDOT, including Title VI Assurances and / or agreements. Subrecipients must also ensure compliance by their contractors and subrecipients with Title VI. (23 CFR 200.9(b)(7))
- (c) If reviewed or investigated by NCDOT, the contractor or subrecipient agrees to take affirmative action to correct any deficiencies found within a reasonable time period, not to exceed 90 calendar days, unless additional time is granted by NCDOT. (23 CFR 200.9(b)(15))

- (d) The Contractor shall be responsible for notifying subcontractors of NCDOT's External Discrimination Complaints Process.

1. Applicability

Title VI and related laws protect participants and beneficiaries (e.g., members of the public and contractors) from discrimination by NCDOT employees, subrecipients and contractors, regardless of funding source.

2. Eligibility

Any person, or class of persons, who believes he / she has been subjected to discrimination based on race, color, national origin, Limited English Proficiency (LEP), sex, age, or disability (and religion in the context of employment, aviation, or transit) may file a written complaint. The law also prohibits intimidation or retaliation of any sort.

3. Time Limits and Filing Options

Complaints may be filed by the affected individual(s) or a representative and must be filed no later than 180 calendar days after the following:

- (i) The date of the alleged act of discrimination; or
- (ii) The date when the person(s) became aware of the alleged discrimination; or
- (iii) Where there has been a continuing course of conduct, the date on which that conduct was discontinued or the latest instance of the conduct.

Title VI and related discrimination complaints may be submitted to the following entities:

- North Carolina Department of Transportation, Office of Civil Rights, Title VI Program, 1511 Mail Service Center, Raleigh, NC 27699-1511; toll free 1-800-522-0453
- Federal Highway Administration, North Carolina Division Office, 310 New Bern Avenue, Suite 410, Raleigh, NC 27601; 919-747-7010
- US Department of Transportation, Departmental Office of Civil Rights, External Civil Rights Programs Division, 1200 New Jersey Avenue, SE, Washington, DC 20590; 202-366-4070

4. Format for Complaints

Complaints must be in writing and signed by the complainant(s) or a representative, and include the complainant's name, address, and telephone number. Complaints received by fax or e-mail will be acknowledged and processed. Allegations received by telephone will be reduced to writing and provided to the complainant for confirmation or revision before processing. Complaints will be accepted in other languages, including Braille.

5. Discrimination Complaint Form

Contact NCDOT Civil Rights to receive a full copy of the Discrimination Complaint Form and procedures.

6. Complaint Basis

Allegations must be based on issues involving race, color, national origin (LEP), sex, age, disability, or religion (in the context of employment, aviation or transit). “Basis” refers to the complainant’s membership in a protected group category.

**TABLE 103-1**  
**COMPLAINT BASIS**

Protected Categories	Definition	Examples	Applicable Nondiscrimination Authorities
Race and Ethnicity	An individual belonging to one of the accepted racial groups; or the perception, based usually on physical characteristics that a person is a member of a racial group	Black / African American, Hispanic / Latino, Asian, American Indian / Alaska Native, Native Hawaiian / Pacific Islander, White	Title VI of the Civil Rights Act of 1964; 49 CFR Part 21; 23 CFR 200; 49 U.S.C. 5332(b); 49 U.S.C. 47123. (Executive Order 13166)
Color	Color of skin, including shade of skin within a racial group	Black, White, Brown, Yellow, etc.	
National Origin ( <i>Limited English Proficiency</i> )	Place of birth. Citizenship is not a factor. ( <i>Discrimination based on language or a person's accent is also covered</i> )	Mexican, Cuban, Japanese, Vietnamese, Chinese	
Sex	Gender. The sex of an individual. <i>Note:</i> Sex under this program does not include sexual orientation.	Women and Men	1973 Federal-Aid Highway Act; 49 U.S.C. 5332(b); 49 U.S.C. 47123.
Age	Persons of any age	21-year-old person	Age Discrimination Act of 1975 49 U.S.C. 5332(b); 49 U.S.C. 47123.
Disability	Physical or mental impairment, permanent or temporary, or perceived.	Blind, alcoholic, para-amputee, epileptic, diabetic, arthritic	Section 504 of the Rehabilitation Act of 1973; Americans with Disabilities Act of 1990
Religion (in the context of employment) ( <i>Religion / Creed in all aspects of any aviation or transit-related construction</i> )	An individual belonging to a religious group; or the perception, based on distinguishable characteristics that a person is a member of a religious group. In practice, actions taken as a result of the moral and ethical beliefs as to what is right and wrong, which are sincerely held with the strength of traditional religious views. <i>Note:</i> Does not have to be associated with a recognized religious group or church; if an individual sincerely holds to the belief, it is a protected religious practice.	Muslim, Christian, Sikh, Hindu, etc.	Title VII of the Civil Rights Act of 1964; 23 CFR 230; FHWA-1273 Required Contract Provisions. (49 U.S.C. 5332(b); 49 U.S.C. 47123)



**(3) Pertinent Nondiscrimination Authorities**

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

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects)
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), (prohibits discrimination on the basis of sex)
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability) and 49 CFR Part 27
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age)
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex)
- (g) The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not)
- (h) Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38
- (i) The Federal Aviation Administration's Nondiscrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex)
- (j) Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures Nondiscrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations

- (k) Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of Limited English Proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100)
- (l) Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq)
- (m) Title VII of the Civil Rights Act of 1964 (42 U.S.C. § 2000e et seq., Pub. L. 88-352), (prohibits employment discrimination on the basis of race, color, religion, sex, or national origin).

**(4) Additional Title VI Assurances**

*\*\*The following Title VI Assurances (Appendices B, C and D) shall apply, as applicable*

**(a) Clauses for Deeds Transferring United States Property (1050.2A, Appendix B)**

The following clauses shall be included in deeds effecting or recording the transfer of real property, structures, or improvements thereon, or granting interest therein from the United States pursuant to the provisions of Assurance 4.

NOW, THEREFORE, the U.S. Department of Transportation as authorized by law and upon the condition that the North Carolina Department of Transportation (NCDOT) will accept title to the lands and maintain the project constructed thereon in accordance with the North Carolina General Assembly, the Regulations for the Administration of the Federal-Aid Highway Program, and the policies and procedures prescribed by the Federal Highway Administration of the U.S. Department of Transportation in accordance and in compliance with all requirements imposed by Title 49, Code of Federal Regulations, U.S. Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination in Federally-assisted programs of the U.S Department of Transportation pertaining to and effectuating the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252; 42 U.S.C. § 2000d to 2000d-4), does hereby remise, release, quitclaim and convey unto the NCDOT all the right, title and interest of the U.S. Department of Transportation in and to said lands described in Exhibit A attached hereto and made a part hereof.

**(HABENDUM CLAUSE)**

TO HAVE AND TO HOLD said lands and interests therein unto the North Carolina Department of Transportation (NCDOT) and its successors forever, subject, however, to the covenants, conditions, restrictions and reservations herein contained as follows, which will remain in effect for the period during which the real property or structures are used for a purpose for which Federal financial assistance is extended or for another purpose involving the provision of similar services or benefits and will be binding on the NCDOT, its successors and assigns.

The NCDOT, in consideration of the conveyance of said lands and interests in lands, does hereby covenant and agree as a covenant running with the land for itself, its successors and assigns, that (1) no person will on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination with regard to any facility located wholly or in part on, over, or under such lands hereby conveyed [,] [and]\* (2) that the NCDOT will use the lands and interests in lands and interests in lands so conveyed, in compliance with all requirements imposed by or pursuant to Title 49, Code of Federal Regulations, U.S. Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, Effectuation of Title VI of the Civil Rights Act of 1964, and as said Regulations and Acts may be amended [, and (3) that in the event of breach of any of the above-mentioned nondiscrimination conditions, the Department will have a right to enter or re-enter said lands and facilities on said land, and that above described land and facilities will thereon revert to and vest in and become the absolute property of the U.S. Department of Transportation and its assigns as such interest existed prior to this instruction].\*

(\*Reverter clause and related language to be used only when it is determined that such a clause is necessary in order to make clear the purpose of Title VI.)

(b) Clauses for Transfer of Real Property Acquired or Improved Under the Activity, Facility, or Program (1050.2A, Appendix C)

The following clauses shall be included in deeds, licenses, leases, permits, or similar instruments entered into by the North Carolina Department of Transportation (NCDOT) pursuant to the provisions of Assurance 7(a):

1. The (grantee, lessee, permittee, etc. as appropriate) for himself / herself, his / her heirs, personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree [in the case of deeds and leases add "as a covenant running with the land"] that:
  - (i.) In the event facilities are constructed, maintained, or otherwise operated on the property described in this (deed, license, lease, permit, etc.) for a purpose for which a U.S. Department of Transportation activity, facility, or program is extended or for another purpose involving the provision of similar services or benefits, the (grantee, licensee, lessee, permittee, etc.) will maintain and operate such facilities and services in compliance with all requirements imposed by the Acts and Regulations (as may be amended) such that no person on the grounds of race, color, or national origin, will be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities.

2. With respect to licenses, leases, permits, etc., in the event of breach of any of the above Nondiscrimination covenants, the NCDOT will have the right to terminate the (lease, license, permit, etc.) and to enter, re-enter, and repossess said lands and facilities thereon, and hold the same as if the (lease, license, permit, etc.) had never been made or issued. \*
3. With respect to a deed, in the event of breach of any of the above Nondiscrimination covenants, the NCDOT will have the right to enter or re-enter the lands and facilities thereon, and the above described lands and facilities will there upon revert to and vest in and become the absolute property of the NCDOT and its assigns. \*

(\*Reverter clause and related language to be used only when it is determined that such a clause is necessary to make clear the purpose of Title VI.)

(c) Clauses for Construction / Use / Access to Real Property Acquired Under the Activity, Facility or Program (1050.2A, Appendix D)

The following clauses shall be included in deeds, licenses, permits, or similar instruments / agreements entered into by the North Carolina Department of Transportation (NCDOT) pursuant to the provisions of Assurance 7(b):

1. The (grantee, licensee, permittee, etc., as appropriate) for himself / herself, his / her heirs, personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree (in the case of deeds and leases add, "as a covenant running with the land") that (1) no person on the grounds of race, color, or national origin, will be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities, (2) that in the construction of any improvements on, over, or under such land, and the furnishing of services thereon, no person on the ground of race, color, or national origin, will be excluded from participation in, denied the benefits of, or otherwise be subjected to discrimination, (3) that the (grantee, licensee, lessee, permittee, etc.) will use the premises in compliance with all other requirements imposed by or pursuant to the Acts and Regulations, as amended, set forth in this Assurance.
2. With respect to (licenses, leases, permits, etc.), in the event of breach of any of the above Nondiscrimination covenants, the NCDOT will have the right to terminate the (license, permit, etc., as appropriate) and to enter or re-enter and repossess said land and the facilities thereon, and hold the same as if said (license, permit, etc., as appropriate) had never been made or issued. \*
3. With respect to deeds, in the event of breach of any of the above Nondiscrimination covenants, the NCDOT will there upon revert to and vest in and become the absolute property of the NCDOT and its assigns. \*

(\*Reverter clause and related language to be used only when it is determined that such a clause is necessary to make clear the purpose of Title VI.)

**\*\*\* STANDARD SPECIAL PROVISIONS \*\*\*****MINORITY AND FEMALE EMPLOYMENT REQUIREMENTS**

(12-18-07)

Z-7

**NOTICE OF REQUIREMENTS FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (*EXECUTIVE NUMBER 11246*)**

1. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, see as shown on the attached sheet entitled "Employment Goals for Minority and Female Participation".

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and nonfederally involved construction.

The Contractor's compliance with the Executive Order and the regulations in *41 CFR Part 60-4* shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in *41 CFR 60-4.3(a)*, and its effort to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project or the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the executive Order and the regulations in *41 CFR Part 60-4*. Compliance with the goals will be measured against the total work hours performed.

2. As used in this Notice and in the contract resulting from this solicitation, the "covered area" is the county or counties shown on the cover sheet of the proposal form and contract.

**EMPLOYMENT GOALS FOR MINORITY  
AND FEMALE PARTICIPATION**

**Economic Areas**

**Area 023 29.7%**

Bertie County  
Camden County  
Chowan County  
Gates County  
Hertford County  
Pasquotank County  
Perquimans County

**Area 024 31.7%**

Beaufort County  
Carteret County  
Craven County  
Dare County  
Edgecombe County  
Green County  
Halifax County  
Hyde County  
Jones County  
Lenoir County  
Martin County  
Nash County  
Northampton County  
Pamlico County  
Pitt County  
Tyrrell County  
Washington County  
Wayne County  
Wilson County

**Area 025 23.5%**

Columbus County  
Duplin County  
Onslow County  
Pender County

**Area 026 33.5%**

Bladen County  
Hoke County  
Richmond County  
Robeson County  
Sampson County  
Scotland County

**Area 027 24.7%**

Chatham County  
Franklin County  
Granville County  
Harnett County  
Johnston County  
Lee County  
Person County  
Vance County  
Warren County

**Area 028 15.5%**

Alleghany County  
Ashe County  
Caswell County  
Davie County  
Montgomery County  
Moore County  
Rockingham County  
Surry County  
Watauga County  
Wilkes County

**Area 029 15.7%**

Alexander County  
Anson County  
Burke County  
Cabarrus County  
Caldwell County  
Catawba County  
Cleveland County  
Iredell County  
Lincoln County  
Polk County  
Rowan County  
Rutherford County  
Stanly County

**Area 0480 8.5%**

Buncombe County  
Madison County

**Area 030 6.3%**

Avery County  
Cherokee County  
Clay County  
Graham County  
Haywood County  
Henderson County  
Jackson County  
McDowell County  
Macon County  
Mitchell County  
Swain County  
Transylvania County  
Yancey County

**SMSA Areas****Area 5720 26.6%**

Currituck County

**Area 9200 20.7%**

Brunswick County

New Hanover County

**Area 2560 24.2%**

Cumberland County

**Area 6640 22.8%**

Durham County

Orange County

Wake County

**Area 1300 16.2%**

Alamance County

**Area 3120 16.4%**

Davidson County

Forsyth County

Guilford County

Randolph County

Stokes County

Yadkin County

**Area 1520 18.3%**

Gaston County

Mecklenburg County

Union County

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**Goals for Female****Participation in Each Trade**

(Statewide) 6.9%

## **STANDARD SPECIAL PROVISION**

### **REQUIRED CONTRACT PROVISIONS FEDERAL - AID CONSTRUCTION CONTRACTS**

FHWA - 1273 - Revised July 5, 2022

Z-8

- I. General
- II. Nondiscrimination
- III. Non-segregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion
- XI. Certification Regarding Use of Contract Funds for Lobbying
- XII. Use of United States-Flag Vessels

#### **ATTACHMENTS**

- A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

#### **I. GENERAL**

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23, United States Code, as required in 23 CFR 633.102(b) (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services). 23 CFR 633.102(e).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider. 23 CFR 633.102(e).

Form FHWA-1273 must be included in all Federal-aid Design-Build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services) in accordance with 23 CFR 633.102. The Design-Builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in solicitation-for-bids or Request for Proposals documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract). 23 CFR 633.102(b).

2. Subject to the applicability criteria noted in the following Sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract. 23 CFR 633.102(d).
3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.
4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. 23 U.S.C. 114(b). The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors. 23 U.S.C. 101(a).

#### **II. NONDISCRIMINATION (23 CFR 230.107(a); 23 CFR Part 230, Subpart A, Appendix A; EO 11246)**

The provisions of this Section related to 23 CFR Part 230, Subpart A, Appendix A, are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR Part 60, 29 CFR Parts 1625-1627, 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230 and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.



Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR Part 60, and 29 CFR Parts 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230 and 633.

The following provision is adopted from 23 CFR Part 230, Subpart A, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

#### 1. **Equal Employment Opportunity**

Equal Employment Opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (see 28 CFR Part 35, 29 CFR Part 1630, 29 CFR Parts 1625-1627, 41 CFR Part 60 and 49 CFR Part 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140, shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR Part 35 and 29 CFR Part 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

- a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract. 23 CFR 230.409 (g)(4) & (5).

- b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, sexual orientation, gender identity, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and / or on-the-job training."

#### 2. **EEO Officer**

The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

#### 3. **Dissemination of Policy**

All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

- a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer or other knowledgeable company official.
- b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.
- c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.
- d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.
- e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

#### 4. **Recruitment**

When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

- a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.
- b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where

implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

- c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

#### 5. Personnel Actions

Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age or disability. The following procedures shall be followed:

- a. The contractor will conduct periodic inspections of project sites to ensure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.
- b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.
- c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.
- d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

#### 6. Training and Promotion

- a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.
- b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs (e.g., apprenticeship, and on-the-job training programs for the geographical area of contract performance). In the event a special provision for training is provided under this contract, this paragraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).
- c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.
- d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

#### 7. Unions

If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. 23 CFR 230.409. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

- a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.
- b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, sexual orientation, gender identity, national origin, age or disability.
- c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.
- d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability; making full efforts to obtain qualified and / or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

**8. Reasonable Accommodation for Applicants / Employees with Disabilities**

The contractor must be familiar with the requirements for, and comply with, the Americans with Disabilities Act and all rules and regulations established thereunder. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

**9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment**

The contractor shall not discriminate on the grounds of race, color, religion, sex, sexual orientation, gender identity, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

- a. The contractor shall notify all potential subcontractors, suppliers and lessors of their EEO obligations under this contract.
- b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

**10. Assurances Required**

- a. The requirements of 49 CFR Part 26 and the State DOT's FHWA-approved Disadvantaged Business Enterprise (DBE) program are incorporated by reference.
- b. The contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:
  - (1) Withholding monthly progress payments;
  - (2) Assessing sanctions;
  - (3) Liquidated damages; and / or
  - (4) Disqualifying the contractor from future bidding as non-responsible.
- c. The Title VI and nondiscrimination provisions of U.S. DOT Order 1050.2A at Appendixes A and E are incorporated by reference. 49 CFR Part 21.

**11. Records and Reports**

The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

- a. The records kept by the contractor shall document the following:
  - (1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;
  - (2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and
  - (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women.
- b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

**III. NONSEGREGATED FACILITIES**

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of more than \$10,000. 41 CFR 60-1.5.

As prescribed by 41 CFR 60-1.8, the contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

**IV. DAVIS-BACON AND RELATED ACT PROVISIONS**

This Section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size), in accordance with 29 CFR 5.5. The requirements apply to all projects located within the right-of-way of a roadway

that is functionally classified as Federal-aid highway. 23 U.S.C. 113. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. 23 U.S.C. 101.

Where applicable law requires that projects be treated as a project on a Federal-aid highway, the provisions of this subpart will apply regardless of the location of the project. Examples include: Surface Transportation Block Grant Program projects funded under 23 U.S.C. 133 [excluding recreational trails projects], the Nationally Significant Freight and Highway Projects funded under 23 U.S.C. 117, and National Highway Freight Program projects funded under 23 U.S.C. 167.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

**1. Minimum wages (29 CFR 5.5)**

- a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this Section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this Section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

- b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification, wage rate and fringe benefits, therefore, only when the following criteria have been met:
- (i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
  - (ii) The classification is utilized in the area by the construction industry; and
  - (iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
- (2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits, where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
- (3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
- (4) The wage rate (including fringe benefits, where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this Section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.
- c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
- d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

**2. Withholding (29 CFR 5.5)**

The contracting agency shall upon its own action or upon written request of an authorized representative of the U.S. Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

**3. Payrolls and basic records (29 CFR 5.5)**

- a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

- b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead, the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the U.S. Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this Section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency.

- (2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
  - (i) That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5 (a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5 (a)(3)(i), and that such information is correct and complete;
  - (ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3; and
  - (iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
- (3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this Section.
- (4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 231.

- c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this Section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the U.S. Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

**4. Apprentices and trainees (29 CFR 5.5)**

- a. Apprentices (programs of the USDOL)

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training

Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination.

Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL)

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

d. Apprentices and Trainees (programs of the U.S. DOT)

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. 23 CFR 230.111(e)(2). The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. **Compliance with Copeland Act requirements**

The contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract as provided in 29 CFR 5.5.

6. **Subcontracts**

The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

**7. Contract termination**

Debarment - A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor, as provided in 29 CFR 5.12.

**8. Compliance with Davis-Bacon and Related Act requirements**

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3 and 5 are herein incorporated by reference in this contract, as provided in 29 CFR 5.5.

**9. Disputes concerning labor standards**

As provided in 29 CFR 5.5 disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the U. S. Department of Labor set forth in 29 CFR Parts 5, 6 and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

**10. Certification of eligibility (29 CFR 5.5)**

- a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3.(a). of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

**V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT**

Pursuant to 29 CFR 5.5(b), the following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

**1. Overtime requirements**

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek. 29 CFR 5.5.

**2. Violation; liability for unpaid wages; liquidated damages**

In the event of any violation of the clause set forth in paragraph 1 of this Section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph 1. of this Section, in the sum currently provided in 29 CFR 5.5(b)(2)\* for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 1. of this Section. 29 CFR 5.5.

\* \$27 as of January 23, 2019 (See 84 FR 213-01, 218) as may be adjusted annually by the U.S. Department of Labor; pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990).

**3. Withholding for unpaid wages and liquidated damages**

The FHWA or the contracting agency shall upon its own action or upon written request of an authorized representative of the U.S. Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages, as provided in the clause set forth in paragraph 2. of this Section. 29 CFR 5.5.

**4. Subcontracts**

The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs 1. through 4. of this Section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1. through 4. of this Section. 29 CFR 5.5.

**VI. SUBLETTING OR ASSIGNING THE CONTRACT**

This provision is applicable to all Federal-aid construction contracts on the National Highway System pursuant to 23 CFR 635.116.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).
  - a. The term "perform work with its own organization" in paragraph 1. of Section VI refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions: (based on longstanding interpretation)
    - (1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
    - (2) the prime contractor remains responsible for the quality of the work of the leased employees;
    - (3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
    - (4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.
  - b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract. 23 CFR 635.102.
2. Pursuant to 23 CFR 635.116(a), the contract amount upon which the requirements set forth in paragraph 1. of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.
3. Pursuant to 23 CFR 635.116(c), the contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.
4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract (based on longstanding interpretation of 23 CFR 635.116).
5. The 30 percent self-performance requirement of paragraph 1. is not applicable to Design-Build contracts; however, contracting agencies may establish their own self-performance requirements. 23 CFR 635.116(d).

**VII. SAFETY: ACCIDENT PREVENTION**

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR Part 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract. 23 CFR 635.108.
2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his / her health or safety, as determined under construction safety and health standards (29 CFR Part 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704). 29 CFR 1926.10.
3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

**VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS**

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR Part 635) in one or more places where it is readily available to all persons concerned with the project:



18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 11, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

**IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT (42 U.S.C. 7606; 2 CFR 200.88; EO 11738)**

This provision is applicable to all Federal-aid construction contracts in excess of \$150,000 and to all related subcontracts. 48 CFR 2.101; 2 CFR 200.326.

By submission of this bid / proposal or the execution of this contract or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, subcontractor, supplier, or vendor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal Highway Administration and the Regional Office of the Environmental Protection Agency. 2 CFR Part 200, Appendix II.

The contractor agrees to include or cause to be included the requirements of this Section in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements. 2 CFR 200.326.

**X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION**

This provision is applicable to all Federal-aid construction contracts, Design-Build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more, as defined in 2 CFR Parts 180 and 1200. 2 CFR 180.220 and 1200.220.

**1. Instructions for Certification - First Tier Participants**

- a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.
- b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the Department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction. 2 CFR 180.320.
- c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default. 2 CFR 180.325.
- d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances. 2 CFR 180.345 and 180.350.
- e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900-180.1020, and 1200. "First Tier Covered Transactions" refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).
- f. The prospective first tier participant agrees, by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the Department or agency entering into this transaction. 2 CFR 180.330.

- g. The prospective first tier participant further agrees, by submitting this proposal, that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the Department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold. 2 CFR 180.200 and 180.300.
- h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. 2 CFR 180.300, 180.320, and 180.325. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. 2 CFR 180.335. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (<https://www.sam.gov/>). 2 CFR 180.300, 180.320, and 180.325.
- i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- j. Except for transactions authorized under paragraph f. of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the Department or agency may terminate this transaction for cause or default. 2 CFR 180.325.

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## 2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - First Tier Participants

- a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:
  - (1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.335;
  - (2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property, 2 CFR 180.800;
  - (3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph a.(2) of this certification, 2 CFR 180.700 and 180.800; and
  - (4) Have not within a three-year period preceding this application / proposal had one or more public transactions (Federal, State or local) terminated for cause or default. 2 CFR 180.335(d).
  - (5) Are not a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and
  - (6) Are not a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability (USDOT Order 4200.6 implementing appropriations act requirements).
- b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal. 2 CFR 180.335 and 180.340.

## 3. Instructions for Certification - Lower Tier Participants

(Applicable to all subcontracts, purchase orders, and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200). 2 CFR 180.220 and 1200.220.

- a. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.
- b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the Department, or agency with which this transaction originated may pursue available remedies, including suspension and / or debarment.
- c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances. 2 CFR 180.365.
- d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900 - 180.1020, and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers

to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers to any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

- e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the Department or agency with which this transaction originated. 2 CFR 1200.220 and 1200.332.
- f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold. 2 CFR 180.220 and 1200.220.
- g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (<https://www.sam.gov/>), which is compiled by the General Services Administration. 2 CFR 180.300, 180.320, 180.330 and 180.335.
- h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- i. Except for transactions authorized under paragraph e. of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the Department or agency with which this transaction originated may pursue available remedies, including suspension and / or debarment. 2 CFR 180.325.

\* \* \* \* \*

#### **Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Participants**

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals:
  - (a) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.355;
  - (b) is a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and
  - (c) is a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability. (USDOT Order 4200.6 implementing appropriations act requirements).
2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

\* \* \* \* \*

#### **XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING**

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000. 49 CFR Part 20, App. A.

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:
  - a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
  - b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000, and not more than \$100,000, for each such failure.
3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts which exceed \$100,000, and that all such recipients shall certify and disclose accordingly.

## XII. USE OF UNITED STATES - FLAG VESSELS

This provision is applicable to all Federal-aid construction contracts, Design-Build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, or any other covered transaction. 46 CFR Part 381.

This requirement applies to material or equipment that is acquired for a specific Federal-aid highway project. 46 CFR 381.7. It is not applicable to goods or materials that come into inventories independent of an FHWA funded-contract.

When oceanic shipments (or shipments across the Great Lakes) are necessary for materials or equipment acquired for a specific Federal-aid construction project, the bidder, proposer, contractor, subcontractor, or vendor agrees:

1. To utilize privately owned United States - flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States - flag commercial vessels. 46 CFR 381.7.
2. To furnish within 20 days following the date of loading for shipments originating within the United States, or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, 'on-board' commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph 1. of this Section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Office of Cargo and Commercial Sealift (MAR-620), Maritime Administration, Washington, DC 20590. (MARAD requires copies of the ocean carrier's (master) bills of lading, certified onboard, dated, with rates and charges. These bills of lading may contain business sensitive information and therefore may be submitted directly to MARAD by the Ocean Transportation Intermediary on behalf of the contractor). 46 CFR 381.7.

## ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS (23 CFR 633, Subpart B, Appendix B)

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:
  - a. To the extent that qualified persons regularly residing in the area are not available.
  - b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.
  - c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this paragraph 1.c. shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in paragraph 4. below.
2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.
3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.
4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of paragraph 1.c. above.
5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.
6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

**STANDARD SPECIAL PROVISION**  
**MINIMUM WAGES**  
**GENERAL DECISION NC20230087 01/06/2023 NC87**

Z-087

Date: January 6, 2023

General Decision Number: NC20230087 01/06/2023 NC87

Superseded General Decision Numbers: NC20220087

State: North Carolina

Construction Type: HIGHWAY

**COUNTIES**

Alexander	Caldwell	Henderson
Buncombe	Catawba	Madison
Burke	Haywood	

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	Executive Order 14026 generally applies to the contract.  The Design-Build Team must pay all covered workers at least \$16.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2023.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	Executive Order 13658 generally applies to the contract.  The Design-Build Team must pay all covered workers at least \$12.15 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2023.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the Design-Build Team must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

**Modification Number**

0

**Publication Date**

01/06/2023

SUNC2014-002 11/13/2014

	<b>Rates</b>	<b>Fringes</b>
<b>BLASTER</b>	20.93	
<b>CARPENTER</b>	13.48 **	
<b>CEMENT MASON / CONCRETE FINISHER</b>	14.40 **	
<b>ELECTRICIAN</b>		
Electrician	18.79	2.62
Telecommunications Technician	14.67 **	1.67
<b>IRONWORKER</b>	12.48 **	
<b>LABORER</b>		
Asphalt Raker and Spreader	11.76 **	
Asphalt Screed / Jackman	15.38 **	.08
Carpenter Tender	10.50 **	
Cement Mason / Concrete Finisher Tender	11.04 **	
Common or General	11.90 **	
Guardrail / Fence Installer	13.09 **	
Pipelayer	12.87 **	
Traffic Signal / Lighting Installer	15.33 **	.22
<b>PAINTER</b>		
Bridge	20.67	
<b>POWER EQUIPMENT OPERATORS</b>		
Asphalt Broom Tractor	10.00 **	
Bulldozer Fine	16.28	
Bulldozer Rough	14.51 **	
Concrete Grinder / Groover	19.20	
Crane Boom Trucks	18.19	
Crane Other	18.69	
Crane Rough / All-Terrain	19.19	
Drill Operator Rock	15.00 **	
Drill Operator Structure	21.07	
Excavator Fine	16.02 **	
Excavator Rough	14.67 **	
Grader / Blade Fine	19.86	
Grader / Blade Rough	15.12 **	
Loader 2 Cubic Yards or Less	12.38 **	
Loader Greater Than 2 Cubic Yards	17.91	
Material Transfer Vehicle (Shuttle Buggy)	15.44 **	
Mechanic	17.86	
Milling Machine	15.08 **	
Off-Road Hauler / Water Tanker	11.95 **	

	<b>Rates</b>	<b>Fringes</b>
Oiler / Greaser	15.05 **	
Pavement Marking Equipment	11.99 **	
Paver Asphalt	17.84	.08
Paver Concrete	18.20	
Roller Asphalt Breakdown	15.00 **	.08
Roller Asphalt Finish	16.08 **	.07
Roller Other	12.51 **	.03
Scraper Finish	12.86 **	
Scraper Rough	13.83 **	
Slip Form Machine	20.38	
Tack Truck / Distributor Operator	14.81 **	.02
<b>TRUCK DRIVER</b>		
GVWR of 26,000 Pounds or Less	12.48 **	
GVWR of 26,001 Pounds or Greater	13.65 **	

**Welders** - Receive rate prescribed for craft performing operation to which welding is incidental.

\*\* Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$16.20) or 13658 (\$12.15). Please see the Note at the top of the wage determination for more information.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

### Union Rate Identifiers

A four-letter classification abbreviation identifier enclosed in dotted lines beginning with

characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

### **Survey Rate Identifiers**

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

### **Union Average Rate Identifiers**

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated / CBA rate of the union locals from which the rate is based.

### **WAGE DETERMINATION APPEALS PROCESS**

- 1.) Has there been an initial decision in the matter? This can be:



- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the David-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
Wage and Hour Division  
U. S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, D.C. 20210

- 2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, D.C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

- 3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, D.C. 20210

- 4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

**\*\*\* STANDARD SPECIAL PROVISIONS \*\*\***

(10-23-17) (Rev. 10-8-22)

**DIVISION ONE OF STANDARD SPECIFICATIONS**

**Division One of the 2018 NCDOT *Standard Specifications for Roads and Structures (Standard Specifications)* shall apply except as follows:**

**Definitions:** Throughout Division One of the 2018 *Standard Specifications for Roads and Structures*, the term “Contractor” is replaced with “Design-Build Team”, the term “Bidder” is replaced with “Proposer,” the term “Bid” is replaced with “Price Proposal,” and the phrase “lowest Responsible Bidder” is replaced with “responsible Proposer with the lowest adjusted price.” Throughout Article 102-2, the term “State Contractual Services Engineer” is replaced with “State Prequalifications Engineer”. 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 / Subarticles 102-3(B), 102-4, 102-8(B), 102-9(C)(2), 103-2(B), and 103-4(C) of the 2018 *Standard Specifications for Roads and Structures* are deleted from Design-Build Contracts.

**Modifications:** The remainder of this Standard Special Provision includes modifications to Division One of the 2018 *Standard Specifications for Roads and Structures*.

## **SECTION 101 DEFINITION OF TERMS**

**Page 1-3, Article 101-3, replace and add certain definitions as follows:**

### **ADDITIONAL WORK**

Additional work is that which results from a change or alteration to the contract and for which there are contract unit prices in the original contract or an executed supplemental agreement.

### **ADVERTISEMENT**

The public advertisement inviting Statements of Qualifications for the design and construction of specific projects.

### **AWARD**

The decision of the Department of Transportation to accept the Technical and Price Proposals 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 2018 *Standard Specifications for Roads and Structures*.

**CONTRACT**

The executed agreement between the Department and the successful Proposer, covering the performance of, and compensation for, the work. The term contract is all inclusive with reference to all written agreements affecting a contractual relationship and all documents referred to therein. The contract shall include, but not be limited to, the Request for Proposals, the Technical Proposal, the Price Proposal, the printed contract form and attachments, contract bonds, plans and associated special provisions prepared by the Design-Build Team, standard specifications and supplemental specifications, standard special provisions and project special provisions contained in the Request for Proposals or as developed by the Design-Build Team and accepted by the Department, and all executed supplemental agreements. The contract shall constitute one instrument.

**DATE OF AVAILABILITY**

That date, established as 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 the 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 noted otherwise 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:

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.

## **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.

**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.

**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 the Request for Proposals requirements, 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 Design-Build Proposals will be received for the design and 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 Price Proposal 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 dates and times 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 to the Request for Proposals 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:**

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 Request for Proposals. 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 Request for Proposals 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 Request for Proposals.
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 Price Proposal 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.
  - 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.
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 package and shall have been delivered to, and received by, the Department prior to the time specified in the Request for Proposals.

**Page 1-17, Article 102-10, 3<sup>rd</sup> 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 written 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 1-18, 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 Proposal and / or Price Proposal 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 short-listed Proposers will be opened and read publicly on the date and time indicated in the Request for Proposals. The Technical 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 items in the Request for Proposals shall be considered irregular and may be rejected.

**Page 1-29, Subarticle 103-4(C), first paragraph, replace the first sentence with the following:**

A Proposer who desires to submit a Price Proposal on more than one project on which Price Proposals are to be opened in the same letting and who desires to avoid receiving an award of more projects than he is equipped to handle, may submit a Price Proposal on any number of projects but may limit the total amount of work awarded to him on selected projects by completing the form Award Limits on Multiple Projects for each project subject to the award limit.

**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 Technical 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 Price Proposal, 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 Price 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 the line items.

**Page 1-23, Subarticle 103-4(A), first paragraph, replace the 3<sup>rd</sup> and 4<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 1-29, 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 1-30, 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 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 1-30, Article 104-3, replace “plans or details of construction” with “contract” in all instances within this Article.**

**Page 1-39, delete Article 104-10 and replace 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. 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.

All existing and constructed guardrail / guiderail within the project limits shall be included in this maintenance. The Design-Build Team shall perform weekly inspections of all 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 seven consecutive calendar days of such inspection report.

The Design-Build Team shall maintain all existing drainage facilities, except where the work consists of resurfacing only, such that they are in the same condition upon acceptance of the project as they were when the project was made available to the Design-Build Team. In the event that the Design-Build Team's work is suspended for any reason, the Design-Build Team shall maintain the work covered by the contract, as provided herein. When a portion of the project is accepted as provided in Article 105-17, immediately after such acceptance, the Design-Build Team will not be required to maintain the accepted portion. Should latent defects be discovered or become evident in an accepted portion of the project, the Design-Build Team shall repair or replace the defective work at no cost to the Department.

Where an observation period(s) is required that extends beyond the final acceptance date, the Design-Build Team shall perform any work required by the observation period until satisfactory completion of the observation period.

With the exception of the maintenance of existing and constructed guardrail / guiderail, the Design-Build Team will not be directly compensated for any maintenance operations. The Design-Build Team will not be compensated for the performance of weekly inspections of

guardrail / guiderail, and the damage reports required as described above. Authorized maintenance activities for existing and constructed guardrail / guiderail within the project limits will be paid for as extra work in accordance with Articles 104-7 and 104-8 of the NCDOT *Standard Specifications for Roads and Structures*.

## **SECTION 105 CONTROL OF WORK**

**Pages 1-44, 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 1-45, 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 1-45, 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 1-48, 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. The Design-Build Team shall be responsible for the accuracy of lines, slopes, grades and other engineering work which the Design-Build Team provides under this contract.

### **SECTION 106 CONTROL OF MATERIAL**

**Page 1-53, 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.

A Certified Table of Quantities shall be submitted with each pay request. All Certified Tables of Quantities shall indicate that the information accurately represents the materials used for the work performed for which payment is requested, and be notarized by a Design-Build Team representative.

**Page 1-55, 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 1-64, replace the first sentence with the following:**

The Design-Build Team shall at its sole cost and expense obtain and furnish to the Department an original standard Association for Cooperative Operations Research and Development (ACORD) certificate of liability insurance evidencing commercial general liability with a limit for bodily injury and property damage in the amount of \$5,000,000 per occurrence and \$5,000,000 general aggregate, covering the Design-Build Team from claims or damages for bodily injury, personal injury, or for property damages that may arise from operating under the contract by the employees and agents of the Design-Build Team.

**Page 1-65, 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 1-68, delete Article 108-2 and replace with the following:**

#### **108-2 COST-LOADED CRITICAL PATH METHOD PROJECT SCHEDULE**

##### **(A) General Requirements**

The Design-Build Team shall create a Cost-Loaded Critical Path Method Project Schedule (CPM Schedule). The Design-Build Team shall include the work of subcontractors, vendors, suppliers, utilities, railroads, permitting agencies, NCDOT, and all other parties associated with the project in the CPM Schedule. Failure by the Design-Build Team to include any element of its work or the work of others required for project completion shall not excuse the Design-Build Team from completing the project by the Contract Completion Date(s). The Design-Build Team shall assign a dollar value to each activity in the CPM Schedule. In accordance with Article 109-4(A) of this Standard Special Provision, the Design-Build Team shall use the CPM Schedule to prepare its payment applications. The Design-Build Team shall provide adequate time in the CPM Schedule for all parties involved with the project to complete their work, including inspections, procurement activities and testing. The Design-Build Team's plan, as presented in the CPM Schedule, shall adhere to all contract requirements.

The Engineer's acceptance of any CPM Schedule shall not relieve the Design-Build Team of responsibility for the accuracy or feasibility of the CPM Schedule, shall not modify the contract requirements, shall not be construed as an endorsement or validation of the Design-Build Team's plan, and shall not guarantee that the project can be performed or completed as scheduled. The Engineer's acceptance of the Design-Build Team's CPM Schedules in no way attests to the validity of the assumptions, logic constraints, dependency, relationships, resource allocations, resource availability, manpower and equipment, or any other aspect of the means and methods of performing the work. The Design-Build Team is and shall remain solely responsible for the scheduling, planning, and execution of the work in order to meet the Project Milestones, the Intermediate Contract Times, and the Contract Completion Date(s).

The Design-Build Team shall not submit a resource leveled CPM Schedule for the purposes of payment, determining expected start and finish dates, or the longest path of the CPM Schedule. Rather, the longest path and expected start and finish dates shall be determined by logic, durations, and calendars.

**Materials** - Unless approved otherwise by the Department, in writing, the Design-Build Team shall produce every schedule referenced in this Article and / or submitted to the Engineer on a computer using software and files that are compatible with the most recent version of Primavera. Other software capable of providing the required information will be considered, but must be reviewed and approved by the Department prior to submitting a schedule produced with the alternate software.

**Definitions** - The following definitions apply solely to the terms used in this Article. The following definitions do not modify in any way the definitions provided elsewhere in the contract documents.

**Activity** - A discrete, identifiable task or event that takes time, has definable start and stop dates, furthers the work's progress, and can be used to plan, schedule, and monitor a project.

**Activity Calendar** - A set of days assigned to an activity on which work associated with the activity may be scheduled.

**Activity Code** - Additional information assigned to an activity for purposes of grouping or filtering related activities. Common codes include phase, area, responsibility, subcontractor, type of work, and sub phase.

**Activity ID** - A unique, alphanumeric, identification code assigned to an activity.

**Actual Dates** - Actual Starts and Actual Finishes of activities in the schedule.

**Actual Finish** - The date when the work represented by a specific activity in the schedule was actually finished.

**Actual Start** - The date when the work represented by a specific activity in the schedule was actually started.

**Activity Network Diagram** - A graphic representation of a CPM Schedule that shows the relationships among activities.

**Availability Date** - The contract Date of Availability provided in the *Contract Time and Liquidated Damages* Project Special Provisions found elsewhere in this FRP.

**Bar Chart** - A graphic representation of a schedule without relationships. A timescale appears along the horizontal axis.

**Baseline Schedule** - The first accepted CPM Schedule showing the accepted plan to complete the entire project.

**CPM of Record** - The most recent CPM Schedule accepted by the Engineer.

**Calendar Day** - A day shown on the calendar beginning and ending at midnight.

**Constraint** - A restriction imposed in a schedule, which fixes a value that would otherwise be calculated within the schedule. Examples of values that can be fixed by a constraint include float, start date, end date, and completion date.

**Contract Time** - The number of calendar days inclusive between the Availability Date and the Contract Completion Date(s).

**Contract Value** - The Design-Build Team's lump sum bid for the entire project and any additional dollar value added through Supplemental Agreement(s).

**Controlling Activity** - The first incomplete activity on the Critical Path. This term shall be considered synonymous with "Controlling Operation."

**Critical Delay** - A delay to an activity on the critical path that extends the Scheduled Completion Date(s).



**Critical Path** - The longest path of activities that determines the scheduled project completion date(s). Activities on the critical path are critical activities.

**Data Date** - The earliest possible date identified in a schedule from which remaining activities can proceed.

**Early Finish** - The earliest date an activity can finish based on its duration and its predecessors.

**Early Start** - The earliest date an activity can start based on its predecessors.

**Final Schedule** - The last monthly updated CPM Schedule containing actual start and finish dates for every activity.

**Free Float** - The amount of time an activity can be delayed without delaying the early state date of any successor activity.

**Lag** - An offset of time from the predecessor to the successor. Lag shall be a numerical value that is not assigned a description or activity number.

**Late Finish** - The latest date an activity can finish based on its successors without causing a delay to the Scheduled Completion Date(s) of the project.

**Late Start** - The latest date an activity can start based on its successors and duration without causing a delay to the Scheduled Completion Date(s) of the project.

**Logic** - Plural or singular reference to the predecessor and successor relationships between activities in the schedule.

**Milestone** - An activity with no duration that is typically used to represent the beginning or end of the project or an interim phase. Includes, but is not limited to, Intermediate Completion Dates and the Contract Completion Date(s).

**Open End** - The condition that exists when an activity has either no predecessor or no successor, or when an activity's only predecessor relationship is a finish-to-finish or only successor relationship is a start-to-start.

**Original Duration** - The original estimate of time, expressed in workdays, required to perform an activity.

**Preceding Work** - Work that must be performed prior to work being performed on the same project by other contractors or Design-Build Teams and under separate contract with the NCDOT.

**Predecessor** - An activity that is defined by schedule logic to precede another activity.

**Progress Schedule** - A CPM Schedule produced by incorporating the project's actual progress into the CPM of Record for purposes of reviewing payment applications prior to any major schedule revisions.

**Punch Work** - Minor corrective work typically performed at the end of construction that is necessary to bring the project into full compliance with the contract requirements.

**Relationship** - Interdependence between two activities. Relationships link an activity to predecessors and successors.

**Remaining Duration** - The estimated time, expressed in workdays, required to complete an activity.

**Revised Schedule** - A Progress Schedule with Schedule Revisions.

**Scheduled Completion Date(s)** - The completion date(s) forecast by the CPM Schedule. The CPM Schedule may also forecast Intermediate Completion Dates for Milestones, Phases, or other portions of the project.

**Schedule Revision(s)** - A change in calendars, along with adding / deleting activities, the method of calculation, relationships, sequence, or original duration of activities in the schedule; or a change in the remaining duration of a work activity that is not caused by the actual progress of the activity. Revisions can be considered either Major or Minor as noted in Section F below.

**Successor** - An activity that is defined by schedule logic to succeed another activity.

**Total Float** - The amount of time an activity can be delayed without affecting the project's completion date(s) or an intermediate deadline (constraint); it is the difference between the late finish date and the early finish date.

#### **(B) Design-Build Team's Schedule Representative**

The Design-Build Team shall propose to the Engineer a person to serve as the Schedule Representative responsible for developing, updating, and revising the Design-Build Team's CPM Schedule. The Design-Build Team shall propose a Schedule Representative with scheduling experience on projects of similar size, scope and complexity. The Schedule Representative shall have a thorough understanding of project phasing and milestones, as well as the project's budget / invoicing. The Schedule Representative may also serve as the project manager, so long as all the requirements of this Article can still be met. The proposed Schedule Representative's qualifications shall be submitted with the Technical Proposals for evaluation. The Engineer may reject a Schedule Representative that does not meet the minimum requirements of this Article. In such case, the Design-Team must designate another individual meeting the minimum requirements for a Schedule Representative prior to the acceptance of the first CPM Schedule.

The Design-Build Team shall use the same Schedule Representative for the duration of the project unless submitted and approved by the Department in writing. If the accepted Schedule Representative is no longer assigned to the project, the Design-Build Team shall submit a new Schedule Representative for the Engineer's review within 14 days of receiving notice of the Schedule Representative's departure.

**(C) Interim Schedule**

The Design-Build Team may submit electronically to the Engineer an Interim Cost-Loaded Critical Path Method Project Schedule (Interim Schedule). The Interim Schedule shall be submitted electronically within 14 days of contract execution. The Interim Schedule shall be used to monitor the project progress and process the Design-Build Team's payment applications for up to 120 days. The use of an Interim Schedule is optional.

The Interim Schedule shall meet the following requirements:

- (1) The Interim Schedule shall start with an activity identified as "Availability Date."
- (2) The last activity in the Interim Schedule shall be identified as "Project Completion." The Design-Build Team shall plan the other activities in the schedule so that the late finish date of "Project Completion" is calculated to occur on the Contract Completion Date.
- (3) The Design-Build Team shall identify all major work components in the Interim Schedule as activities. For the Interim Schedule, the Design-Build Team may present large work components, such as "construction of the project," as a single activity in the schedule, so long as the Interim Schedule meets the other requirements of this Article.

The Design-Build Team shall identify the following for each activity in the Interim Schedule.

- (a) A unique alphanumeric activity ID
- (b) A description of the work associated with each activity ID
- (c) A duration
  - (i) The Design-Build Team shall limit activities expected to start in the first 120 days to a maximum duration of 20 workdays. The Design-Build Team shall subdivide activities expected to take longer than 20 days so as to provide more detail and to meet this requirement. Any duration provided by the Department, utilities, or other government agencies will be exempt from this requirement.
  - (ii) The Design-Build Team may assign any realistic durations for activities expected to start more than 120 days after the Availability Date.
- (d) Predecessors
- (e) Successors
- (f) Value of the Work
  - (i) The Design-Build Team shall assign an accurate dollar value to each activity expected to start within 120 days of the Availability Date based on estimated costs plus associated profit and overhead. The profit and overhead assigned by the Design-Build Team to the individual activities starting in the first 120 days shall be equal to or less than the mark-up applied to the work when establishing the Design-Build Team's lump sum bid for the entire project.
  - (ii) The Design-Build Team shall limit the value of an activity to \$500,000 for activities expected to start in the first 120 days. The Design-Build Team shall

subdivide activities starting in the first 120 days and with anticipated values over \$500,000 into two or more activities to meet this requirement. Mobilization, design activities and material procurement activities are except from this \$500,000 requirement.

- (iii) The Design-Build Team shall assign a dollar value to each activity in the Interim Schedule.
  - (iv) Activities may be assigned a value of zero dollars, as appropriate.
  - (v) The total value of all activities in the Interim Schedule shall be equal to the Design-Build Team's lump sum bid for the entire project.
  - (vi) Any activities that are incidental shall have a value of zero dollars.
- (4) The Design-Build Team shall assign each activity in the Interim Schedule at least one predecessor and one successor, except the first activity and the last activity in the schedule.
- (5) The Design-Build Team shall use scheduling software that adheres to the requirements found elsewhere in this Article to calculate the following data for each activity in the Interim Schedule:
- (a) Early Start
  - (b) Early Finish
  - (c) Late Start
  - (d) Late Finish
  - (e) Total Float
- (6) The Design-Build Team shall submit a brief written narrative with the Interim Schedule that explains the planned sequence of work, the critical path, proposed project phasing, and any other scheduling assumptions made by the Design-Build Team.

The Engineer may choose to reject the Interim Schedule if it does not conform to the requirements of this Article. If the Engineer rejects the Interim Schedule, the project shall be administered as if no Interim Schedule has been submitted.

#### **(D) Baseline Cost-Loaded Critical Path Method Schedule**

Within 60 days of contract execution, the Design-Build Team shall submit electronically to the Engineer a Baseline Cost-Loaded Critical Path Method Project Schedule (Baseline Schedule) meeting the requirements of this Article and using industry-accepted CPM scheduling practices as identified in the AGC's Construction Planning and Scheduling book, Second Edition. Within 21 days of receipt of the Design-Build Team's Baseline Schedule, the Engineer will complete the review. If the Engineer decides it is warranted, the Engineer will convene a joint review conference at which the Engineer and the Design-Build Team shall make any necessary corrections or adjustments to the Baseline Schedule. If a revision is necessary either from the Engineer's Review or the joint review conference, the Design-Build Team shall submit a revised Baseline Schedule electronically within seven days of such joint review conference and the Engineer will review the revised Baseline Schedule within seven days of re-submittal. The Design-Build Team and the Engineer shall repeat this process until an acceptable Baseline Schedule is established.

Once accepted, the Baseline Schedule becomes the first CPM of Record for the project. If an Interim Schedule was submitted and accepted by the Engineer, the accepted Baseline Schedule replaces the Interim Schedule for all purposes, including payment.

The Design-Build Team shall submit a Baseline Schedule that meets the following requirements.

- (1) The first activity in the schedule shall be the "Availability Date." The Design-Build Team shall constrain this activity to start on the contract Date of Availability identified elsewhere in this RFP. Except as indicated otherwise elsewhere in this Article or agreed in writing by the Engineer, the Design-Build Team shall not use constraints.
- (2) If the Design-Build Team proposes a Substantial Completion Date in the Technical Proposal, the schedule shall include an activity identified as Substantial Completion.
- (3) The Last Activity in the Schedule shall be identified as "Project Completion." The Design-Build Team shall plan the other activities in the schedule so that the expected finish of "Project Completion" is calculated to occur on the Contract Completion Date.
- (4) The Design-Build Team shall plan its work to meet all time-related contract requirements. This includes but is not limited to submittal review times, Milestones, Intermediate Contract Times, phasing requirements, and the date of Substantial Completion, as appropriate.
- (5) The Design-Build Team shall identify all the components of the work and the work of others on the project as activities in the Baseline Schedule. If the Engineer cannot identify a work item as an activity or as part of an activity in the schedule, then that work item shall be considered incidental.
- (6) The Design-Build Team shall designate the following for each activity in the Baseline Schedule, including:
  - (a) A unique alpha numeric activity ID
  - (b) A description of the work associated with each activity ID
  - (c) A duration
    - (i) Unless approved otherwise by the Engineer, the Design-Build Team shall limit construction activities to a maximum duration of 20 workdays. The Design-Build Team shall subdivide activities expected to take longer than 20 days so as to provide more detail and to meet this requirement. If for any reason the maximum 20-day duration cannot be achieved, the Design-Build Team shall provide a written request to the Engineer, explaining the reason for a duration over 20 workdays. Any duration provided by the Department, utilities, or other government agencies shall be exempt from this requirement. Waiting times for plant growth cure times, material procurement, and other activities assigned a zero-dollar value and no assignment of responsibility are also exempt from this requirement.

- (ii) The Design-Build Team shall limit design activities to the required design submittal intervals or a maximum of 90 days, whichever is shorter. The Design-Build Team shall subdivide activities expected to take longer so as to provide more detail.
- (iii) All activities with a dollar value greater than zero shall have a duration assigned to it, even if the duration is equal to zero.
- (d) Predecessors - Each activity except for “Availability Date” shall have at least one predecessor.
- (e) Successors - Each activity except for “Final Completion” shall have at least one successor.
- (f) Activity Calendar - The Activity Calendar shall clearly identify the days when work could be performed on the activity and the days when work cannot be performed on the activity, in addition to the number of hours per day for a given work week. Weather days shall be included as non-workdays in specific work type calendars. Weather calendars shall be agreed to by the Engineer. Weather shall not be accounted for in activity durations.
- (g) Activity Code - Each activity in the schedule shall be assigned an activity code for the following categories:
  - (i) Area of the Project
  - (ii) Structure within the Area of the Project
  - (iii) Phase of the Project
  - (iv) Work Type
  - (v) Responsibility for the Work
    - The Design-Build Team shall identify the entity responsible to perform each activity in the Baseline Schedule. Examples might include a particular subcontractor, the Department, the Design-Build Team, a design consultant, a utility company, etc.
    - If more than one entity is performing a particular activity, then the activity code shall identify both entities.
    - When the Baseline Schedule is submitted, the Design-Build Team shall provide a list to the Engineer of each activity code that assigns responsibility to entities that are not under the control of the Design-Build Team.
  - (vi) Categories and Groupings
    - The Design-Build Team shall assign different categories for items in separate Divisions within the 2018 NCDOT *Standard Specifications for Roads and Structures* and at least one type of work shall be classified as punch work.
    - The Design-Build Team shall choose a method of identifying the type of work that shall clearly communicate to the Engineer the nature of the work being performed.

## (h) Value of the Work

- (i) The Design-Build Team shall assign an accurate dollar value to each activity based on a reasonable assignment of the value of that work when compared to the overall work being performed on the project.
- (ii) The Design-Build Team shall not assign a dollar value to an activity less than the estimated cost to perform that work.
- (iii) The Design-Build Team shall not assign a dollar value to the work being performed by the Department or other third parties.
- (iv) Activities scheduled to occur early in the project shall be assigned the same or lesser value than similar activities scheduled to occur later in the project, unless otherwise approved by the Department, in writing.
- (v) The Design-Build Team shall limit the value of an activity to \$500,000. The Design-Build Team shall subdivide activities with anticipated values over \$500,000 into two or more activities to meet this requirement. Mobilization, some design activities, and materials procurement activities are exempt from this \$500,000 requirement.
- (vi) The Design-Build Team shall assign activities in the schedule representing tasks incidental to the performance of the work a value of zero dollars.
- (vii) Activities may be assigned a value of zero dollars when appropriate. Examples include the work of others, or tasks performed by subcontractors for which the contractor has no cost.
- (viii) Each Activity in the Baseline Schedule shall be cost loaded so that the sum of the budgeted total costs for each activity equals to the Contract Value. The budgeted total costs for each activity shall not change once the Baseline Schedule is approved as the first CPM of Record, unless authorized in writing by the Engineer.
- (ix) Any work performed that is not identified in the schedule shall have a value of zero dollars.
- (x) Any activities that are incidental shall have a value of zero dollars.
- (xi) The Design-Build Team shall be limited to the total percentage and distribution percentages defined in the *Mobilization* Project Special Provision found elsewhere in this RFP for mobilization. The Design-Build Team shall assign costs that correspond to the aforementioned percentages to “Mobilization, Pre-Permit” and “Mobilization, Post-Permit” activities.
- (xii) The Design-Build Team shall assign activities to both erosion and sedimentation control device installation and device maintenance. The activity for erosion and sedimentation control device maintenance shall span the duration of the project construction and shall be cost-loaded in a linear manner.
- (xiii) The Design-Build Team shall assign at least one-half of one percent of the lump sum bid for the entire project to the activity or activities representing punch work.
- (xiv) All costs assigned to activities shall be evaluated on a linear basis with regard to payment unless a payment curve is provided and approved. Such curves shall be agreed to in the Baseline Schedule and shall not change unless authorized in writing by the Engineer.

- (7) The Design-Build Team shall assign each activity in the Baseline Schedule at least one predecessor and one successor, except the first activity, "Availability Date," and the last activity, "Project Completion."
- (8) The Design-Build Team shall not use start-to-finish relationships to connect predecessor and successor activities.
- (9) The Design-Build Team shall limit the use of start-to-start and finish-to-finish relationships to connect predecessor and successor activities. The Schedule Representative shall explain to the Engineer why a start-to-start or finish-to-finish relationship was used upon the Engineer's request.
- (10) The Design-Build Team shall produce a Baseline Schedule that does not contain open-ended activities, except for the first and last activity in the schedule.
- (11) The Design-Build Team shall not use negative lags in the Baseline Schedule. The Design-Build Team shall limit the use of lags in the Baseline Schedule, and shall not use a lag greater than ten days unless approved otherwise by the Engineer. If for any reason the maximum ten-day lag cannot be achieved, the Design-Build Team shall provide a written request to the Engineer, explaining the reason for a duration over ten days. The Schedule Representative shall explain why a lag was used in the narrative.
- (12) The Design-Build Team shall use scheduling software that adheres to the requirements found elsewhere in this Article to calculate the following data for each activity in the Baseline Schedule:
  - (a) Early Start
  - (b) Early Finish
  - (c) Late Start
  - (d) Late Finish
  - (e) Total Float
  - (f) Free Float
- (13) The longest path shall be dictated by schedule logic and durations, not by the leveling of resources or cost information.
- (14) The Design-Build Team shall submit a written narrative with the Baseline Schedule that explains the planned work sequence, the critical path, proposed project phasing, the activity calendars, maintenance of traffic, milestone dates, and the estimated payouts by month and by phase. In addition, the Design-Build Team shall explain in its written narrative how it has provided for procurement of materials, weather, permitting requirements, environmental requirements, coordination with other contractors, coordination with local municipalities, work to be performed in whole or in part by Department or other government agencies, work to be performed by the utility companies, and any other scheduling assumptions made by the Design-Build Team.



The Engineer will review the Baseline Schedule submitted by the Design-Build Team for compliance with the contract requirements. The Engineer may reject the Baseline Schedule if it does not adhere to the contract requirements or if it makes unreasonable demands on the Department or third parties on the project without their written acknowledgement or agreement to such demands or requirements. Examples of unreasonable demands might include, but is not limited to, the simultaneous review of numerous submittals, short durations for utilities to perform work, shutting down adjacent roadways, or limiting access to private land owners. The Engineer may reject a schedule that over-utilizes start-to-start and finish-to-finish relationships to connect predecessor and successor activities if, in the opinion of the Engineer, the use of these logic relationships obscures the relationships between activities. The Engineer may reject a schedule that over-utilizes lags, if in the opinion of the Engineer, lags are being used to replace necessary activities or obscuring how one activity relates to the next.

The Engineer will also review the values assigned to the activities for balance. The Engineer may reject the Baseline Schedule if, in the opinion of the Engineer, the values assigned to activities expected to be completed early in the project exceed the value assigned to the same or similar activities expected to finish late in the project, without explanation.

The Design-Build Team shall be responsible for the timely preparation of a Baseline Schedule that fully complies with the requirements of this Article and the contract. The Engineer may take action under Articles 108-7 of the 2018 NCDOT *Standard Specifications for Roads and Structures* if the Design-Build Team has not prepared an acceptable Baseline Schedule within 180 days from the Availability Date.

#### **(E) Schedule Updates**

As the basis of its payment application request and as a requirement of this Article, the Design-Build Team shall submit electronically to the Engineer a regular Schedule Update to the CPM of Record using accepted scheduling practices. The Engineer will determine the frequency and date of the Schedule Updates - not to exceed two updates per month and to occur at least once within any 35-day period. The Design-Build Team shall continue to provide the Engineer Schedule Updates until the final schedule is approved with 100% completion of all activities and all the project work. The Design-Build Team shall submit a Schedule Update within seven calendar days of its data date. The Engineer shall review the payment application and provide a response to the Design-Build Team within seven calendar days of the submission. Upon the Engineer's acceptance, the Schedule Update shall become the new CPM of Record, replacing the previous CPM of Record, and shall be considered used from its data date until the data date of the next schedule accepted by the Engineer.

The Design-Build Team shall incorporate the following information into the previous CPM of Record and submit this as its Schedule Update:

- (1) An updated data date
- (2) The actual start of any activity that started prior to the data date of the Schedule Update

- (3) The actual finish of any activity that finished prior to the data date of the Schedule Update
- (4) The new remaining duration of any activity that began, but did not finish prior to the data date of the Schedule Update
- (5) The percent complete for every activity in the CPM Schedule. The Design-Build Team shall use both activity percent complete and resource percent complete for activities representing the purchase of materials, and shall identify the resource percent complete of activities representing the purchase of materials for undelivered; delivered or fabricated; or installed material as 0%, 95% or 100% complete, respectively.
- (6) The Design-Build Team shall use scheduling software that adheres to the requirements found elsewhere in this Article to calculate the following data for each of the remaining activities in the Schedule Update:
  - (a) Early Start
  - (b) Early Finish
  - (c) Late Start
  - (d) Late Finish
  - (e) Total Float
  - (f) Free Float

The Design-Build Team shall provide a narrative as part of the Schedule Update, in addition to any of the other requirements identified in Article 109-4(A) of this Standard Special Provision for partial payment requests. The Design-Build Team shall include in the Schedule Update narrative a description of the work performed during the update period; the status of any outstanding permits; the current critical path; any delays or disruptions experienced during the update period to Intermediate Contract Dates, Substantial Completion Date, and / or Final Completion Date; any foreseeable delays or disruptions; and any "Minor Revisions" made during the update period that have previously been accepted by the Engineer. A discussion of delays in the Schedule Update's narrative shall not constitute a written request for additional time or notice of intent to file a claim as required by the contract.

The Design-Build Team shall not incorporate any revisions into a Schedule Update unless the revisions are minor and have been previously accepted by the Engineer. The Schedule Update narrative shall include documentation of any revisions previously verbally approved by the Engineer.

If the Design-Build Team chooses to revise the CPM of Record, the revised schedule shall be submitted separately from and within seven calendar days of the Schedule Update. The revised CPM of Record shall have the same data date as the most recent CPM of Record and reflect the progress achieved up to that point in time.

The Engineer may reject a Schedule Update that 1) incorporates "Major Revisions" that were not previously accepted by the Engineer, 2) includes actual dates on or after the data date, and / or 3) records incomplete or incorrect information on the work progress.

**(F) Revisions to the CPM of Record**

In accordance with the requirements in this Article, the Design-Build Team shall revise the CPM of Record. With prior approval from the Engineer, the Design-Build Team may revise the CPM of Record for other circumstances.

A minor revision shall be defined as a revision that does not affect the critical path of the work on the project, does not affect work activities that may soon become critical, does not significantly affect third parties, does not significantly affect the Department, and / or does not increase or lower the dollar values assigned to the activities in the schedule. For minor revisions, the Schedule Representative shall contact the Engineer and explain the revision. If the Engineer determines that the revision is minor, the Engineer will verbally approve the revision. The Design-Build Team shall incorporate revisions verbally approved by the Engineer into the next Schedule Update, and include a summary of the changes, the approver's name and the approval date in the narrative. The Engineer's determination as to whether a revision is minor or major shall be final.

All revisions that are not minor revisions shall be defined as major revisions. For major revisions, the Design-Build Team shall submit to the Engineer a revised CPM Schedule that meets all the requirements of the Baseline Schedule and is updated to reflect current progress. The Design-Build Team shall submit all revised CPM Schedules within seven days of its data date unless otherwise agreed by the Engineer, in writing. The Design-Build Team shall include a narrative with the revised CPM Schedule describing each revision and the reason for each revision. Every revision that was made to the revised CPM Schedule shall be listed in the narrative. The Design-Build Team shall also include in the narrative any foreseeable problems that may need to be overcome when implementing the CPM Schedule revision. A discussion of delays and potential delays in the revised CPM Schedule narrative shall not constitute a written request for additional time or satisfy any requirement for written notice to file a claim as required by the contract.

If the Design-Build Team is re-allocating the dollar values assigned to activities, it shall include for the Engineer's review and approval a list of the activities affected by the revision, a list of any new activities added or deleted, and the difference in dollar value assigned to each activity. For changed work where the dollar value is disputed, the Design-Build Team shall assign dollar values to its work activities as directed by the Engineer, but shall include the designation "D-C" at the beginning of the activity's description for each activity affected by the change. For changes settled through a Supplemental Agreement, the Design-Build Team shall assign the agreed dollar amount among the new or existing activities, and shall include the designation SA# (where # represents the number of the Supplemental Agreement) at the beginning of the activity's description for each activity affected by the change.

Within seven calendar days of submittal, the Engineer shall accept or reject proposed CPM Schedule revision(s). Upon the Engineer's acceptance, the revised CPM Schedule shall become the CPM of Record, and shall be used from its data date until the data date of the next CPM Schedule revision accepted by the Engineer.

The Department will not pay additional costs for any revisions to the CPM Schedule regardless of what condition or change prompted the revision(s). The cost to create, revise, and update the CPM Schedule shall be an administrative requirement included as part of the Design-Build Team's lump sum bid for the entire project. The Design-Build Team shall allocate sufficient resources to timely administer the CPM Schedule, including but not limited to all revisions, as required.

The Engineer will accept CPM Schedule revisions that appear to accurately reflect the Design-Build Team's current plan for completing the work on the project. The Engineer may accept a revised CPM Schedule that indicates the project is currently expected to finish earlier or later than required by the contract. However, the Engineer's acceptance of the Design-Build Teams' schedules does not relieve the Design-Build Team from its obligations to perform under the contract terms including but not limited to completion of the work within the contract time; or as granting, rejecting, or in any way acting on the Design-Build Team's requests for adjustment to the date(s) for completion of the work.

The Engineer may reject any CPM Schedule revision that 1) does not, in the opinion of the Engineer, accurately reflect the Design-Build Team's current plan of construction; 2) requires additional and / or revised actions on the part of third parties or the Department; 3) changes the dollar value assigned to an activity, unless the Design-Build Team has correctly allocated this amount into new activities for additional detail; 4) materially alters the projected payout of the project; and / or 5) submitted more than seven calendar days after its data date, unless the Engineer had previously agreed to waive this requirement.

#### **(G) Use of the CPM of Record to Assess Project Delays**

If the Design-Build Team submits a written request for an extension to the contract time in accordance with Article 108-10 of this Standard Special Provision, the Engineer will rely upon the CPM of Record in effect at the time the delay is recognized or occurs, whichever is sooner, to assess the effects of changes and revisions or other potential causes of delay to the Scheduled Completion Date(s).

For purposes of calculating and withholding anticipated liquidated damages, as identified in the 2018 NCDOT *Standard Specifications for Roads and Structures*, and as may be amended by this Standard Special Provision, the Engineer will rely on the Scheduled Completion Date(s) identified in the CPM of Record.

**Page 1-69, 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 all proposed subcontractors associated with the project design.

A preconstruction conference shall be held at least ten 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 written notice before the Design-Build Team 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, the Design-Build Team shall be responsible for coordinating with the Engineer in scheduling the utility owners attendance and for notifying the utility owners. 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 or WBE / MBE requirement, the Design-Build Team shall submit copies of completed and signed DBE or WBE / MBE subcontracts, purchase orders, or invoices to the Department.

In accordance with Article 1101-1 and the Request for Proposals, the Design-Build Team shall submit Transportation Management Plans, including but not limited to Temporary Traffic Control Plans. The Design-Build Team shall designate an employee who is competent and experienced in transportation management to implement and monitor the Transportation Management Plans. 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 the 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, Temporary Traffic Control Plans and a Safety Plan 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 Transportation Management Plans, including but not limited to the Temporary 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 Temporary Traffic Control Plans and the Safety Plan. The Design-Build Team shall not designate its superintendent as the responsible person for either the Temporary Traffic Control Plans or the Safety Plan, unless approved by the Engineer.

If the project requires the 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 that will be used 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 1-69, 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 1-70, Article 108-6, replace “40%” with “30%” in the 1<sup>st</sup> paragraph.**

**Page 1-71, Article 108-6, replace “35%” with “25%” in the 2<sup>nd</sup> paragraph.**

**Pages 1-72, 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 Subarticle 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 1-75, Subarticle 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 1-75, delete Subarticle 108-10(B)(1) in its entirety.**

**Page 1-78, delete Subarticle 108-13(D)(2) in its entirety.**

## **SECTION 109 MEASUREMENT AND PAYMENT**

**Page 1-80, 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 1-85, delete Subarticle 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 1-86, Subarticle 109-5(D), delete the 4<sup>th</sup> and 5<sup>th</sup> 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 1-88, Article 109-10, add the following as bullets (E), (F) and (G) under the 1<sup>st</sup> paragraph.**

- (E)** As-Built Plans
- (F)** All documents required elsewhere in this RFP
- (G)** Documents or guarantees to support any warranty provided by the Design Build Team

County: BUNCOMBE

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
CONTRACT ITEMS						
0001	0000996000-N	SP	DESIGN AND CONSTRUCTION	Lump Sum	L.S.	

0919/Mar06/Q1/D996000/E1

Total Amount Of Bid For Entire Project :

**FUEL USAGE FACTOR CHART AND ESTIMATE OF QUANTITIES**

Description of Work	Units	Fuel Usage Factor Diesel #2	Estimate of Quantities
Unclassified Excavation	Gal / CY	0.29	CY
Borrow Excavation	Gal / CY	0.29	CY
Class IV Subgrade Stabilization	Gal / Ton	0.55	Tons
Aggregate Base Course	Gal / Ton	0.55	Tons
Sub-Ballast	Gal / Ton	0.55	Tons
Erosion Control Stone	Gal / Ton	0.55	Tons
Rip Rap	Gal / Ton	0.55	Tons
Aggregate for Cement Treated Base Course	Gal / Ton	0.55	Tons
Portland Cement for Cement Treated Base Course	Gal / Ton	0.55	Tons
* Asphalt Concrete Base Course	Gal / Ton	_____ 0.90 _____ 2.90	Tons
* Asphalt Concrete Intermediate Course	Gal / Ton	_____ 0.90 _____ 2.90	Tons
* Asphalt Concrete Surface Course	Gal / Ton	_____ 0.90 _____ 2.90	Tons
* Open-Graded Asphalt Friction Course	Gal / Ton	_____ 0.90 _____ 2.90	Tons
* Permeable Asphalt Drainage Course	Gal / Ton	_____ 0.90 _____ 2.90	Tons
* Sand Asphalt Surface Course, Type SA-1	Gal / Ton	_____ 0.90 _____ 2.90	Tons
* Ultra-Thin Bonded Wearing Course	Gal / Ton	_____ 0.90 _____ 2.90	Tons
<b>Portland Cement Concrete Pavement</b>			
Through Lanes and Shoulders (> 11")	Gal / SY	0.327	SY
Through Lanes and Shoulders (9" to 11")		0.272	SY
Through Lanes and Shoulders (<9")		0.245	SY
** Structural Concrete (Cast-in-Place Only)	Gal / CY	0.98	CY

\* Select 0.90 **OR** 2.90\*\* 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 2018 *Standard Specifications for Roads and Structures*.
☐ The above quantities represent the estimate of total quantities for each item, as pertaining to Fuel Price Adjustments, for 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 Proposal submittal.)***

<b>LISTING OF DBE SUBCONTRACTORS</b>					
Firm Name and Address		Item No.	Item Description	* Agreed upon Unit Price	** Dollar Volume of Item
Name  Address					
Name  Address					
Name  Address					
Name  Address					
Name  Address					
Name  Address					
Name  Address					

**This form must be completed in order for the Bid to be considered responsive and be publicly read.  
Bidders with no DBE participation must so indicate this on the form by entering the word or number *zero*.**

<b>LISTING OF DBE SUBCONTRACTORS</b>					
Firm Name and Address		Item No.	Item Description	* Agreed upon Unit Price	** Dollar Volume of Item
Name  Address					
Name  Address					
Name  Address					
Name  Address					
Name  Address					
Name  Address					
Name  Address					

**This form must be completed in order for the Bid to be considered responsive and be publicly read.  
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Firm Name and Address		Item No.	Item Description	* Agreed upon Unit Price	** Dollar Volume of Item
Name  Address					
Name  Address					
Name  Address					
Name  Address					
Name  Address					
Name  Address					
Name  Address					

**This form must be completed in order for the Bid to be considered responsive and be publicly read.  
Bidders with no DBE participation must so indicate this on the form by entering the word or number *zero*.**

<b>LISTING OF DBE SUBCONTRACTORS</b>				
Firm Name and Address		Item No.	Item Description	* Agreed upon Unit Price
<b>Name</b>				
Address				
<b>Name</b>				
Address				
<b>Name</b>				
Address				
<b>Name</b>				
Address				

**COST OF CONSTRUCTION WORK ONLY**

\$ \_\_\_\_\_

\*The Dollar Volume shown in this column shall be the Actual Price Agreed Upon by the Prime Contractor and the DBE subcontractor, and these prices will be used to determine the percentage of the DBE participation in the contract.

\*\* Dollar Volume of DBE Subcontractor \$ \_\_\_\_\_

Percentage of Total Construction Cost \_\_\_\_\_ %

(Including Right of Way Acquisition Services)

\*\* - Must have entry even if figure to be entered is zero.

\*\* - *If firm is a Material Supplier Only, show Dollar Volume as 60% of Agreed Upon Amount from Letter of Intent.  
If firm is a Manufacturer, show Dollar Volume as 100% of Agreed Upon Amount from Letter of Intent.*

**This form must be completed in order for the Bid to be considered responsive and be publicly read.  
Bidders with no DBE participation must so indicate this on the form by entering the word or number *zero*.**

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

**CORPORATION**

The person executing the bid, on behalf of the Bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee of the Bidder has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the Bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the Bidder intends to do the work with its own bonafide employees or subcontractors and is not bidding for the benefit of another contractor.

In addition, execution of this bid in the proper manner also constitutes the Bidder's certification of status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

*N.C.G.S. § 133-32* and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

**SIGNATURE OF CONTRACTOR**

---

Full name of Corporation

---

Address as prequalified

Attest

---

Secretary / Assistant Secretary  
*Select appropriate title*

By

---

President / Vice President / Assistant Vice President  
*Select appropriate title*

---

Print or type Signer's name

---

Print or type Signer's name

**CORPORATE SEAL**



**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

---

Signature of Witness

By

---

Signature of Partner

---

Print or type Signer's name

---

Print or type Signer's name

**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

**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
	Print or type Signer's name	Signature of Contractor
	Print or type Signer's name	Print or type Signer's name
	<i>If Corporation, affix Corporate Seal</i>	and
(3)		
	Name of Contractor	
	Address as prequalified	
	Signature of Witness or Attest	By
	Print or type Signer's name	Signature of Contractor
	Print or type Signer's name	Print or type Signer's name
	<i>If Corporation, affix Corporate Seal</i>	and
(4)		
	Name of Contractor <i>(for 3 Joint Venture only)</i>	
	Address as prequalified	
	Signature of Witness or Attest	By
	Print or type Signer's name	Signature of Contractor
	Print or type Signer's name	Print or type Signer's name
	<i>If Corporation, affix Corporate Seal</i>	

**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

**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

**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.:**     **C204870**

**County:**           **Buncombe County**

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

Signature Sheet (Bid - Acceptance by Department)