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

FINAL REQUEST FOR PROPOSALS

DESIGN-BUILD PROJECT
NCDOT MULTIMODAL CONNECTED VEHICLE PILOT

HO-0001AA

January 10, 2023
Includes
Addendum No. 1 January 18, 2023
Addendum No. 2 Dated February 3, 2023

DATE AND TIME OF TECHNICAL PROPOSAL SUBMISSION: **FEBRUARY 21, 2023 BY 4:00 PM**

DATE AND TIME OF PRICE PROPOSAL SUBMISSION: **FEBRUARY 28, 2023 BY 4:00 PM**

DATE AND TIME OF PRICE PROPOSAL OPENING: **MARCH 21, 2023 AT 2:00 PM**

CONTRACT ID: TBD

WBS ELEMENT NO.: 49368.3.5

FEDERAL-AID NO.: 00SS124

COUNTY: Wake

ROUTE NO. Various

LOCATION: 31 Intersections around NCSU Campus

TYPE OF WORK: UPGRADING EXISTING INFRASTRUCTURE, SUPPLYING APPLICATIONS, AND INSTALLING NECESSARY BACKBONE TO COLLECT DATA TO SUPPORT CONNECTED VEHICLE TECHNOLOGY

NOTICE:

ALL PROPOSERS SHALL COMPLY WITH ALL APPLICABLE LAWS REGULATING THE PRACTICE OF GENERAL CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA WHICH REQUIRES THE PROPOSER TO BE LICENSED BY THE N.C. LICENSING BOARD FOR CONTRACTORS WHEN BIDDING ON ANY NON-FEDERAL AID PROJECT WHERE THE BID IS $30,000 OR MORE, EXCEPT FOR CERTAIN SPECIALTY WORK AS DETERMINED BY THE LICENSING BOARD. PROPOSERS SHALL ALSO COMPLY WITH ALL OTHER APPLICABLE LAWS REGULATING THE PRACTICES OF ELECTRICAL, PLUMBING, HEATING AND AIR CONDITIONING AND REFRIGERATION CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA. NOT WITHSTANDING THESE LIMITATIONS ON BIDDING, THE PROPOSER WHO IS AWARDED ANY PROJECT SHALL COMPLY WITH CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA FOR LICENSING REQUIREMENTS WITHIN 60 CALENDAR DAYS OF PREFERRED PROCUREMENT TRACK AND PREFERRED PROPOSER ANNOUNCEMENT, REGARDLESS OF FUNDING SOURCES.

_____
5% BID BOND OR BID DEPOSIT REQUIRED

PROPOSAL FORM FOR THE CONSTRUCTION OF CONTRACT HO-0001AA

IN WAKE COUNTY, NORTH CAROLINA

Date_____ 20_____

DEPARTMENT OF TRANSPORTATION,

RALEIGH, NORTH CAROLINA

The Design-Build Team herein acknowledges that it has carefully examined the location of the proposed work to be known as Contract HO-0001AA; 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 HO-0001AA in Wake County by no later than the dates(s) specified in the Final RFP or Technical Proposal, whichever is earlier, and in accordance with the requirements of the Engineer, the Final RFP and Addenda thereto, the 2018 *Standard Specifications for Roads and Structures*, specifications prepared by the Department, the Technical Proposal prepared by the Design-Build Team, at the 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 documents 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 Design-Build Proposal shall be a bid bond secured by a corporate surety, or certified check payable to the order of the Department of Transportation, for five percent of the total bid price, which deposit is to be forfeited as liquidated damages in case this bid is accepted and the Design-Build Team shall fail to provide the required payment and performance bonds with the Department of Transportation, under the condition of this proposal, within 14 calendar days after the written notice of award is received by them, as provided in the 2018 *Standard Specifications for Roads and Structures*; otherwise said deposit will be returned to the Design-Build Team.

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*** PROJECT SPECIAL PROVISIONS ***

CONTRACT TIME AND LIQUIDATED DAMAGES

(7-12-7) DB1 G04A

The date of availability for this contract is **May 1, 2023**, except that the Design-Build Team shall only begin ground disturbing activities as allowed by this Request for Proposals (RFP).

The completion date for this contract is **May 1, 2026**.

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 **One Thousand One Hundred Dollars ($ 1,100.00)** per calendar day.

OTHER LIQUIDATED DAMAGES

Reference the Transportation Management Scope of Work for more information regarding the following ICT and associated liquidated damages:

Liquidated Damages for Intermediate Contract Time #1 for the above lane narrowing, lane closure, holiday and special event time restrictions on All Roads, are $250.00 per hour or any portion thereof.

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

(7-1-21) DB1 G43

(A) Submittal of Quantities

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

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

Submittal - The submittal shall be signed and dated by an officer of the Design-Build Team. The information shall be copied and submitted in a separate sealed package with the outer wrapping clearly marked “Fuel Price Adjustment” and shall be delivered at the

same time and location as the Technical and Price Proposal. The original shall be submitted in the Price Proposal.

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

(B) Base Index Price

The Design-Build Team's Estimate of Quantities will be used on the various partial payment estimates to determine fuel price adjustments. The Design-Build Team shall submit a payment request for quantities of work completed based on the work completed for that estimate period. The quantities requested for partial payment shall be reflective of the work actually accomplished for the specified period. The Design-Build Team shall certify that the quantities are reasonable for the specified period. The base index price for DIESEL #2 FUEL is **$ 3.4755** per gallon.

(C) Opt Out of Fuel Price Adjustment

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

(D) Change Option

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

(E) 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 in a separate sealed package 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.

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 Design-Build Proposal.

2. The Proposer shall deliver the Design-Build Proposal to the place indicated, and prior to the time indicated in this Request for Proposals.

3. The Design-Build Proposal documents shall be signed by an authorized employee of the Proposer.

4. The Design-Build Proposal shall be accompanied by Bid surety in the form of a Bid Bond or Bid Deposit, dated the day of 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.

CONFIDENTIAL QUESTIONS

(1-5-07) DB1 G56B

The Design-Build Team will be permitted to ask confidential questions of the Department, which neither the question nor answer will be shared with other proposing Design-Build Teams. For the purpose of this provision, "confidential question" shall be defined as a private inquiry containing information whose disclosure could alert others to certain details of doing business in a particular manner. The Department will determine if the question is considered a confidential question.

I. Confidential questions arising prior to issuance of the Final Request for Proposals 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 meeting, if possible. If not answered verbally during the meeting, the Department will answer the confidential question by subtle changes in the Final Request for Proposals, which will clarify the scope by either allowing or disallowing the request. The revision will be made in such a manner as to not disclose the confidential question.

II. After issuance of the Final Request for Proposals, confidential questions may be asked by requesting a meeting with the State Contract Officer via the Design-Build e-mail address (designbuild@ncdot.gov). The request shall be in writing and provide sufficient detail to evaluate the magnitude of the request. Questions shall be of such magnitude as to warrant a special meeting. Minor questions will not be acknowledged or answered.

   After evaluation, the State Contract Officer will respond to the question in writing to the Design-Build Team only 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 extend possible, the revision will be made in such a manner as to not disclose the confidential question. Other Design-Build Teams will not be notified of the question or answer.

If the Design-Build Team includes work based on the confidential questions and answers, the work shall be included and discussed in the Technical Proposal. The Technical Proposal evaluations will be based solely on the evaluation criteria defined elsewhere in this RFP, regardless of the inclusion or absence of work based on the confidential questions and answers.

SCHEDULE OF ESTIMATED COMPLETION PROGRESS

(9-1-11) (Rev. 7-19-22) 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:

Fiscal Year	Progress (% of Dollar Value)
2023 (07/01/22 - 06/30/23)	9% of Total Amount Bid
2024 (07/01/23 - 06/30/24)	38% of Total Amount Bid
2025 (07/01/24 - 06/30/25)	35% of Total Amount Bid
2026 (07/01/25 – 06/30/26)	18% 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.

https://connect.ncdot.gov/projects/construction/Construction%20Forms/DBE%20MBE%20WBE%20Replacement%20Form%20and%20Instructions.pdf

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

https://connect.ncdot.gov/projects/construction/Construction%20Forms/SAF%20Form%20-%20Subcontract%20Approval%20Form%20Revised%2004-19.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

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 **0.0%**

(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/search.html?s=fn&a=new

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^{nd} and 3^{rd} 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, 2nd tier subcontractor) is responsible for accurate accounting of payments to DBEs, it shall be the Prime Contractor's responsibility to report all monthly and final payment information in the correct reporting manner.

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

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

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*.

CONSTRUCTION EQUIPMENT EMISSIONS

(1-3-22) DB1 G94

Reporting Requirements

During construction, within 60 days after the end of each calendar year, the Design-Build Team shall submit to the Department a list of non-road diesel-powered construction equipment that was used for construction work for more than 40 hours during that calendar year. Such list shall be submitted each year through the final acceptance of the project. The list shall be submitted on a form supplied by the Department and shall include the following information for each applicable piece of non-road construction equipment:

- Equipment type and manufacturer
- Engine manufacturer and model
- Engine model number
- Engine family name and model year
- Engine horsepower or kilowatts
- Engine serial number
- Engine EPA Tier number

The submittal shall include the Tier (0, 1, 2, 3 or 4) Non-road Exhaust Emission Standard that the equipment's engine currently satisfies in accordance with EPA current standards. In accordance with the requirements above, the Design-Build Team shall update and submit this list annually.

Failure to provide the equipment list by the timeframe provided above may result in the Department withholding money from the Design-Build Team due for work performed by that entity in the next partial payment until the necessary assurances are made consistent with this project special provision.

Minimum Tier Requirements

A minimum of fifty percent (50.0%) of the reported construction equipment used on the project must meet Tier 4 or Tier 4i requirements.

Incentive

The Department will pay a Fifty Thousand and 0/100 Dollars ($50,000.00) incentive to the Design-Build Team if, at the conclusion of the project, each calendar year's report reflects that both items below were accomplished:

(1) More than seventy-five percent (75.0%) of the total number of pieces of applicable construction equipment used on the project met Tier 4 Final requirements, and
(2) Less than twenty-five percent (25.0%) of the total number of pieces of applicable construction equipment used on the project was categorized as Tier 0 or 1.

Exclusions

A piece of applicable construction equipment operated by DBE firms (federally funded projects) or MBE / WBE firms (state funded projects) may be excluded from the Reporting Requirements and Minimum Tier Requirements Sections of this project special provision, provided the applicable piece of equipment meets at least the Tier 1 requirements. However, to be eligible for the incentive, the Design-Build Team must include all of these firms' applicable construction equipment in the percentage calculations provided in the Incentive Section of this project special provision.

Regardless of Tier level, cranes shall be subject to the Reporting Requirements Section of this project special provision. However, any crane may be excluded from the calculations provided under the Minimum Tier Requirements and Incentive Sections of this project special provision, provided that crane meets Tier 1 or higher requirements.

U.S. DEPARTMENT OF TRANSPORTATION HOTLINE

(11-22-94) 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 is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

CARGO PREFERENCE ACT

(2-16-16) DB1 G100

Privately owned United States-flag commercial vessels transporting cargoes are subject to the Cargo Preference Act (CPA) of 1954 requirements and regulations found in 46 CFR 381.7. Contractors are directed to clause (b) of 46 CFR 381.7 as follows:

(b) Contractor and Subcontractor Clauses. "Use of United States-flag vessels: The contractor agrees-

"(1) To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels.

(2) To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States a legible copy of a rated, 'on-board' commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b) (1) of this section to both the Contracting Officer (through the Prime Contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590.

(3) To insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract."

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.

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 Wake County. The Design-Build Team shall dispose of the clearing, grubbing and demolition debris by means other than burning and in accordance with state and local rules and regulations.

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.

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 Design-Build Project HO-0001AA aims to create and test a connected environment to measure the safety impact of Connected Vehicle (CV) technology for pedestrians, cyclists, transit drivers and passengers, motorists, and other road users as well as improve the efficiency and mobility of the North Carolina State University (NCSU) Wolfline bus system.

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, dynamic message signs (DMS), fiber-optic communications cable and conduit, and ITS integration
- **As-Constructed Drawings**
- **As-Built Plans**

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 HO-0001AA Categorical Exclusion (CE) was approved on October 26, 2022.

GENERAL SCOPE

The scope of work for this project includes design, construction and management of the project. The design work includes all aspects to deploy the CV technology on the roadside and in the

Wolfline bus fleet, which includes installing of new infrastructure, utilizing existing infrastructure and software. Unless allowed otherwise elsewhere in this RFP, the designs shall meet all appropriate latest versions of AASHTO *Policy on Geometric Design of Highways and Streets*, AASHTO *LRFD Bridge Design Specifications, Manual of Uniform Traffic Control Devices* and all NCDOT design policies that are current as of the Technical and Price Proposal 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 Design-Build submittal date.

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:

Transportation Management Plan Design and Implementation
Intelligent Transportation Systems (ITS) Design
Sign Design
Traffic Signals and Signal Communications
Construction
Project Management
Design and Construction Management
Utility Construction
R/W Utilities, Conflicts and / or Construction
Construction Surveying

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 deploy the Connected Vehicle technology 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 polices. 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 polices, 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 "HO-0001AA Project Submittals" 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 of the 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. 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.

GENERAL

Technical Proposals will be accepted until **February 21, 2023, at 4:00 PM Local Time** at the office of the State Contract Officer shown below. Sealed Price Proposals for all Proposers will be accepted until **February 28, 2023, at 4:00 PM** at the office of the State Contract Officer as shown below:

Mr. Ronald E. Davenport, Jr., PE
Contract Standards and Development
1020 Birch Ridge Drive
Century Center Complex - Building B
Raleigh, NC 27610

No Proposals will be accepted after the time specified.

Proposals shall be submitted in separate, sealed parcels. Proposals shall be delivered to Door B3 of the Century Center Complex—Building B. The courier shall call either Ms. Marsha Sample at (919) 707-6915 or Mr. Ken Kennedy, PE at (919) 707-6919 at accept delivery at Door B3.

TECHNICAL PROPOSAL SUBMITTAL INSTRUCTIONS

An electronic copy of the Technical Proposal, on a thumb drive, 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 electronic copy shall be scaled to reproduce to the appropriate page format, as defined below. The outer wrapping shall clearly indicate the following information:

Technical Proposal - Electronic Copy
Submitted By: (Design-Build Team's Name)
Design-Build Team Address
TIP Number HO-0001AA
Wake County
NCDOT Multimodal Connected Vehicle Pilot

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 HO-0001AA". (Reference the *Submittal of Quantities, Fuel Base Index Price and Opt-Out Option* Project Special Provisions found elsewhere in this RFP for additional requirements that are concurrent with the Technical Proposal submittal.)

Technical Proposal Requirements

8 ½ inch by 11-inch pages
No fold out sheets allowed

Printed on one side only

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), **the maximum number of allowable pages shall be 100 pages**. CVs / resumes will not be included in the page count.

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

PRICE PROPOSAL

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

Price Proposal
Submitted by (Design-Build Team's Name)
Design-Build Team Address
TIP Number HO-0001AA
Wake County
NCDOT Multimodal Connected Vehicle Pilot

The Price Proposal shall be submitted by returning the Request for Proposals with the item sheets it render the Price Proposal non-responsive.

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 HO-0001AA".

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	2
2.	Responsiveness to Request for Proposal	12
3.	Schedule and Milestones	7
4.	Innovation /Added Value	3
5.	Outreach and Evaluation Support	5
6.	Oral Interview	1

TECHNICAL PROPOSAL EVALUATION CRITERIA

1. Design-Build Team - 2 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 will 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 ten 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 - 12 points

Design Features

- Show plan view of design concepts with key elements noted.
- 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.
- 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.
- Describe any proposed special materials, designs and / or construction methods, not referenced elsewhere in this RFP, that will reduce long term maintenance costs.
- Describe the Design-Build Team's proposed plan to achieve the required intersection upgrades. This includes traffic signal controller upgrades, traffic signal cabinet replacement, detection upgrades, roadside unit installation, and cellular modem installation.
- Describe the Design-Build Team's proposed plan to ensure updated Signal Plans are provided for each location.
- Describe the Design-Build Team's proposed plan to install a pedestrian detection system at two locations.
- Describe the Design-Build Team's approach and plan to implement the connected vehicle Safety Applications. These include the SPaT application, Pedestrian in Signalized Crosswalk Warning application, Mobile Accessible Pedestrian Signal System application, Red Light Violation Warning application, Speed Warning application, and Work Zone Warning application.
- Describe the Design-Build Team's approach and plan to implement the Transit Signal Priority Application.
- Describe the Design-Build Team's approach and plan to implement the Intelligent Traffic Signal System (I-Sig) use case.
- Describe the Design-Build Team's approach and plan to implement High Resolution Data collection and Automated Traffic Signal Performance Measures (ATSPM).
- Describe the Design-Build Team's approach and plan to implement the Connected Eco-Driving (CED) use case.

- Describe the Design-Build Team's approach and plan to address the security requirements for this project. The description shall include at least the following:

  - Describe the Design-Build Team's plans and procedures to ensure a Security Credential Management System (SCMS) is in place to ensure the authenticity, integrity, and security of all messages and data involved in the pilot.
  - Describe the Design-Build Team's plans and procedures to address information management. This includes personally identifiable information (PII), data collection, data storage, and data retention.

- Describe how the Design-Build Team intends to approach the operational and maintenance requirements of this project.
- Describe how the Design-Build Team will approach project management for this project.
- Describe how the Design-Build Team will approach the integration, testing, and documentation of the equipment and systems installed as part of this project. Include details on how the Design-Build Team intends to integrate with the City of Raleigh's existing signal system.
- Describe the Design-Build Team's proposed plan for providing training.
- Describe the Design-Build Team's proposed plan for ensuring warranty, maintenance, and support is provided for the duration of the project.

3. Schedule and Milestones - 7 points

- Provide a brief narrative description of the Design-Build Team's proposed plan for performing construction on the project. The description shall include at least the following:

  - 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.
- Identify any self-imposed liquidated damages and associated Intermediate Contract Time(s), if applicable.
- The schedule shall also include the Design-Build Team's final completion date and, if proposed, their substantial completion date. **These dates shall be clearly indicated on the Project Schedule and labeled "Final Completion Date" and "Substantial Completion Date"**.

4. Innovation / Added Value - 3 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.

5. Outreach and Evaluation Support Plan - 5 points

Outreach

- Describe how the Design-Build Team intends to approach the public outreach needs of the project to ensure participation in the pilot and measurement of a successful pilot. The description shall include at least the following:

  - Describe how the Design-Build Team plans to encourage end users to participate in the pilot.
  - Describe how the Design-Build Team plans to get participant feedback about the pilot from end users.

Evaluation Support Plan

- Describe the Design-Build Team's plans and procedures to ensure evaluation support is provided to key partners.
- Describe the Design-Build Team's plans to prepare and collect survey data from participants of the pilot where other methods of performance evaluation is not possible.

6. Oral Interview - 1 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. Meetings will be held in-person, via Teams or a combination of both, whichever works best for the Design-Build Team.

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.

PROPOSER SELECTION

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.

Qualified Proposals will be evaluated according to the Proposer's Technical and Price Proposal an assigned a total score out of 100 points. The highest score will determine the Best Proposal (as defined below).

The Proposer's Technical Proposal will be evaluated out of the 30 points according to the evaluation criteria above in order to determine the Proposer's Technical Proposal Score.

The Proposer's Price Proposal will be evaluated out of 70 points relative to other qualified Price Proposals, according to the formula below, in order to determine the Proposer's Price Proposal Score:

a. If the Price Proposal is the lowest price out of all qualified Proposals:
   Price Proposal Score = 70 Points
b. If the Price Proposal is not the lowers price out of all qualified Proposals:
   Price Proposal Score = (Lowest Price) / (Price Proposal) x 70 points

The Proposer's Technical Proposal Score (out of 30 points) and the Proposer's Price Proposal Score (out of 70 points) will then be combined to calculate the Proposer's Score. The Proposer with the highest Proposer Score will be the "Best Proposal".

The State Contract Officer will provide each Proposer with its Technical Proposal Score, Price Proposal Score, and Proposal Score when the Department makes a Preferred Proposer announcement.

TRANSPORTATION MANAGEMENT SCOPE OF WORK

I. TRANSPORTATION MANAGEMENT PLANS:

A. DESIGN PARAMETERS

a. All elements of traffic control shall comply with NCDOT Standard Specifications for Roads and Structures as well as the most current NCDOT Roadway Standard Drawings.

b. The Contractor 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/

c. 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.

d. The NCDOT's Work Zone Traffic Control Website should be utilized when developing the Transportation Management Plan. The NCDOT's Work Zone Traffic Control Website is updated and provides key information necessary in preparing the Transportation Management Plan. The Work Zone Traffic Control Website Address is:

https://connect.ncdot.gov/projects/WZTC/Pages/default.aspx

B. PROJECT OPERATION REQUIRMENTS

All time restrictions and notes shall be included in the TMP General Notes, unless noted otherwise 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 #1 for Lane Narrowing, Lane Closure, Holiday and Special Event restrictions.

Except as allowed otherwise elsewhere in this RFP, the Design-Build Team shall maintain the existing traffic pattern and shall not close or narrow a lane of traffic during the times listed below.

Intermediate Contract Time	Facility	Days	Time Restrictions
1	All 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:

- For any unexpected occurrence that creates unusually high traffic volumes, as directed by the Engineer.
- For New Year's between the hours of 6:00 a.m. December 31st and 6:00 p.m. January 2nd. If New Year's Day is on a Friday, Saturday, Sunday or Monday then between the hours of 6:00 a.m. December 31st and 6:00 p.m. the following Tuesday.
- For Easter, between the hours of 6:00 a.m. Thursday and 6:00 p.m. Monday.
- For Memorial Day, between the hours of 6:00 a.m. Friday and 6:00 p.m. Tuesday.
- For Independence Day, between the hours of 6:00 a.m. July 3rd and 6:00 p.m. July 5th. If Independence Day is on a Friday, Saturday, Sunday or Monday, then between the hours of 6:00 a.m. the Thursday before Independence Day and 6:00 p.m. the Tuesday after Independence Day.
- For Labor Day, between the hours of 6:00 a.m. Friday and 6:00 p.m. Tuesday.
- For Thanksgiving Day, between the hours of 6:00 a.m. Tuesday and 6:00 p.m. Monday.
- For Christmas, between the hours of 6:00 a.m. the Friday before the week of Christmas Day and 6:00 p.m. the following Tuesday after the week of Christmas Day.

Liquidated Damages for Intermediate Contract Time #1 for the above lane narrowing, lane closure, holiday and special event time restrictions on All Roads, are $250.00 per hour or any portion thereof.

Maintenance of Access

Maintain access to all businesses, schools, residences, 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.

ITS Scope of Work

See Appendix A for ITS Scope of Work.

Appendices B, C and D are for information purposes only.

***** STANDARD SPECIAL PROVISIONS *****

VALUE ENGINEERING PROPOSALS

(4-6-15) 104 DB01 G116

Value Engineering Proposals (VEP), as specified in Article 104-12 of the 2018 *Standard Specifications for Roads and Structures* will be accepted. Only proposals, which alter the Technical Proposal submitted by the Design-Build Team and / or the requirements of the RFP issued by the Department, will be considered as Value Engineering Proposals.

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

Page 1-40, Subarticle 104-12(B), Evaluation of Proposals, lines 42-44, replace the fourth sentence of the second paragraph with the following:

Pending execution of a formal supplemental agreement implementing an approved VEP and transferal of final plans (hard copy and electronic), sealed by an engineer licensed in the State of North Carolina, incorporating an approved VEP to the State Value Management Engineer, the Resident Engineer and the Design-Build Unit, the Design-Build Team shall remain obligated to perform the work in accordance with the terms of the existing contract with no additional contract time or compensation.

Page 1-41, Subarticle 104-12(D), Preliminary Review, lines 9-12, replace the first sentence of the first paragraph with the following:

Should the Design-Build Team desire a preliminary review of a possible VEP, prior to expending considerable time and expense in full development, a copy of the Preliminary VEP shall be concurrently submitted to the State Value Management Engineer at **ValueManagementUnit@ncdot.gov**, the Resident Engineer and the Design-Build Unit.

Page 1-41, Subarticle 104-12(E), Final Proposal, lines 22-23, replace the first sentence of the first paragraph with the following:

The Design-Build Team shall concurrently submit a copy of the Final VEP to the State Value Management Engineer at **ValueManagementUnit@ncdot.gov,** the Resident Engineer and the Design-Build Unit.

Page 1-42, Subarticle 104-12(F), Modifications, lines 2-10, replace the first paragraph with the following:

The preparation of new design drawings by the Design-Build Team shall be coordinated with the appropriate Department personnel through the State Value Management Engineer. The Design-Build Team shall provide, at no charge to the Department, one set of reproducible drawings of the approved design needed to implement the VEP. Drawings (hard copy and electronic) which are sealed by an engineer licensed in the State of North Carolina shall be concurrently submitted to the State Value Management Engineer, the Resident Engineer and the Design-Build Unit no later than ten (10) business days after acceptance of a VEP, unless otherwise permitted in writing.

Page 1-43, Subarticle 104-12(F), Modifications, lines 1-5, replace the eighth paragraph with the following:

Unless and until a supplemental agreement is executed and issued by the Department; and final plans (hard copy and electronic) sealed by an engineer licensed in the State of North Carolina incorporating an approved VEP have been concurrently provided to the State Value Management Engineer, the Resident Engineer and the Design-Build Unit, the Design-Build Team shall remain obligated to perform the work in accordance with the terms of the existing contract with no additional contract time or compensation.

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 And Other Noxious Weeds)

08/31/2013(Rev. 12-20-16) DB1 G130

Within Quarantined Area

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

Originating in a Quarantined County

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

Contact

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

Regulated Articles Include

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

GIFTS FROM VENDORS AND CONTRACTORS

(12-15-09) DB1 G152

By Executive Order 24, issued by Governor Perdue, and *N.C. G.S.§ 133-32,* it is unlawful for any vendor or contractor (i.e. architect, bidder, contractor, construction manager, design professional, engineer, landlord, offeror, seller, subcontractor, supplier, or vendor), to make gifts or to give favors to any State employee of the Governor's Cabinet Agencies (i.e. Administration, Commerce,

Correction, Crime Control and Public Safety, Cultural Resources, Environment and Natural Resources, Health and Human Services, Juvenile Justice and Delinquency Prevention, Revenue, Transportation, and the Office of the Governor). This prohibition covers those vendors and contractors who:

(1) have a contract with a governmental agency; or
(2) have performed under such a contract within the past year; or
(3) anticipate bidding on such a contract in the future.

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

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

MATERIAL AND EQUIPMENT STORAGE & PARKING OF PERSONAL VEHICLES

(10-19-21) 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.

TABLE 1101-1
MATERIAL AND EQUIPMENT STORAGE FROM ACTIVE TRAVEL LANES

Posted Speed Limit (mph)	Distance (ft)
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 Section 1101-8, or as directed by the Engineer, provide staging areas for personal vehicle parking before use.

WORK ZONE INSTALLER

(7-20-21) 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 in the safe and competent set up of temporary traffic control. 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.

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 1 to 15 per contractor per calendar year. The Contractor shall sign an agreement to fulfill their annual goal for the year.

Training Classifications

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

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

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

Department will review and recommend for acceptance to FHWA the new classifications proposed by contractors, if applicable. New classifications shall meet the following requirements:

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

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

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

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

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

Records and Reports

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

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

Trainee Interviews

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

Trainee Wages

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

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

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

Achieving or Failing to Meet Training Goals

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

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

Measurement and Payment

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

STANDARD SPECIAL PROVISION

AVAILABILITY OF FUNDS – TERMINATION OF CONTRACTS

(9-1-11) Z-2

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

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

Payment will be made on any contract terminated pursuant to the special provision in accordance with Article 108-13(E), of the *North Carolina Department of Transportation Standard Specifications for Roads and Structures*, dated January 2018 and as amended by the Standard Special Provision, Division One found elsewhere in this RFP.

STANDARD SPECIAL PROVISION

ERRATA

(10-16-18) (Rev. 7-19-22) Z-4

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

Division 6

Page 6-7, Article 609-1 DESCRIPTION, Line 29, replace article number "609-10" with "609-9".

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) Option 2 - 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".

Division 10

Page 10-37, Article 1012-4 LIGHTWEIGHT AGGREGATE, Line 4, replace Table number "1012-8" with "1012-5".

Page 10-78, Article 1056-4 GEOTEXTILES, TABLE 1056-1, Permittivity, Type 2, replace "Table 6[D]" with "Table 7[D]" and **Permittivity, Type 3[B],** replace "Table 7[D]" with "Table 8[D]".

Page 10-121, Article 1076-7, REPAIR OF GALVANIZING, Line 8, replace article number "1080-9" with "1080-7".

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".

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 *****

AWARD OF CONTRACT
(6-28-77)(Rev. 1-8-16) Z-6

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

TITLE VI AND NONDISCRIMINATION

I. Title VI Assurance

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

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

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

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

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

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

(a) Withholding of payments to the contractor under the contract until the contractor complies, and / or
(b) Cancellation, termination or suspension of the contract, in whole or in part.

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

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

II. Title VI Nondiscrimination Program

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

Nondiscrimination Assurance

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

Obligation

During the performance of this contract, the Contractor and its subcontractors are responsible for complying with NCDOT's Title VI Program. The Contractor must ensure that NCDOT's Notice of

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

FILING OF COMPLAINTS

1. **Applicability** – These complaint procedures apply to the beneficiaries of the NCDOT's programs, activities, and services, including, but not limited to, members of the public, contractors, subcontractors, consultants, and other sub-recipients of federal and state funds.

2. **Eligibility** – Any person or class of persons who believes he/she has been subjected to discrimination or retaliation prohibited by any of the Civil Rights authorities, based upon race, color, sex, age, national origin, or disability, may file a written complaint with NCDOT's Civil Rights office. The law prohibits intimidation or retaliation of any sort. The complaint may be filed by the affected individual or a representative, and must be in writing.

3. **Time Limits and Filing Options** – A complaint must be filed no later than 180 calendar days after the following:

   - The date of the alleged act of discrimination; or
   - The date when the person(s) became aware of the alleged discrimination; or
   - Where there has been a continuing course of conduct, the date on which that conduct was discontinued or the latest instance of the conduct.

   Title VI and other discrimination complaints may be submitted to the following entities:

   - **North Carolina Department of Transportation**, Office of Equal Opportunity & Workforce Services (EOWS), External Civil Rights Section, 1511 Mail Service Center, Raleigh, NC 27699-1511; 919-508-1808 or toll free 800-522-0453

   - **US Department of Transportation**, Departmental Office of Civil Rights, External Civil Rights Programs Division, 1200 New Jersey Avenue, SE, Washington, DC 20590; 202-366-4070

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

Federal Highway Administration, Office of Civil Rights, 1200 New Jersey Avenue, SE, 8th Floor, E81-314, Washington, DC 20590, 202-366-0693; 202-366-0752
Federal Transit Administration, Office of Civil Rights, ATTN: Title VI Program Coordinator, East Bldg. 5th Floor – TCR, 1200 New Jersey Avenue, SE, Washington, DC 20590

Federal Aviation Administration, Office of Civil Rights, 800 Independence Avenue, SW, Washington, DC 20591, 202-267-3258

- **US Department of Justice**, Special Litigation Section, Civil Rights Division, 950 Pennsylvania Avenue, NW, Washington, DC 20530, 202-514-6255 or toll free 877-218-5228

4. **Format for Complaints –** Complaints must be in **writing** and **signed** by the complainant(s) or a representative and include the complainant's name, address, and telephone number. Complaints received by fax or e-mail will be acknowledged and processed. Allegations received by telephone will be reduced to writing and provided to the complainant for confirmation or revision before processing. Complaints will be accepted in other languages including Braille.

5. **Discrimination Complaint Form –** Contact NCDOT EOWS at the phone number above to receive a full copy of the Discrimination Complaint Form and procedures.

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

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

III. Pertinent Nondiscrimination Authorities

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

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

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

***** STANDARD SPECIAL PROVISIONS *****

MINORITY AND FEMALE EMPLOYMENT REQUIREMENTS
(12-18-07) Z-7

NOTICE OF REQUIREMENTS FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (*EXECUTIVE NUMBER 11246*)

1. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, see as shown on the attached sheet entitled "Employment Goals for Minority and Female Participation".

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and nonfederally involved construction.

The Contractor's compliance with the Executive Order and the regulations in *41 CFR Part 60-4* shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in *41 CFR 60-4.3(a)*, and its effort to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project or the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the executive Order and the regulations *in 41 CFR Part 60-4*. Compliance with the goals will be measured against the total work hours performed.

2. As used in this Notice and in the contract resulting from this solicitation, the "covered area" is the county or counties shown on the cover sheet of the proposal form and contract.

EMPLOYMENT GOALS FOR MINORITY AND FEMALE PARTICIPATION

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

Goals for Female

Participation in Each Trade

(Statewide) 6.9%

STANDARD SPECIAL PROVISION

REQUIRED CONTRACT PROVISIONS FEDERAL - AID CONSTRUCTION CONTRACTS

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ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

   The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

   Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

   Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).
2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.
3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.
4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. **Equal Employment Opportunity:** Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.
b. The contractor will accept as its operating policy the following statement:
"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. **EEO Officer:** The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.
3. **Dissemination of Policy:** All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:
   a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.
   b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.
   c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.
   d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.
   e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.
4. **Recruitment:** When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.
   a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.
   b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.
   c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.
5. **Personnel Actions:** Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:
   a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.
   b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.
   c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.
   d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.
6. **Training and Promotion:**
   a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.
   b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).
   c The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.
   d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.
7. **Unions:** If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:
   a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.
c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.
d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. **Reasonable Accommodation for Applicants / Employees with Disabilities:** The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.
9. **Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.
   a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.
   b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.
10. **Assurance Required by 49 CFR 26.13(b):**
   a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.
   b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.
11. **Records and Reports:** The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.
   a. The records kept by the contractor shall document the following:
      (1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;
      (2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and
      (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;
   b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. **Minimum wages**
   a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

      Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs

which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH–1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:
   (i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
   (ii) The classification is utilized in the area by the construction industry; and
   (iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

   (2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

   (3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

   (4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. **Withholding.** The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. **Payrolls and basic records**

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g. the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/ wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a

subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency.

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. **Apprentices and trainees**

a. Apprentices (programs of the USDOL). Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL). Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT). Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. **Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. **Subcontracts.** The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.
7. **Contract termination:** debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.
8. **Compliance with Davis-Bacon and Related Act requirements.** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.
9. **Disputes concerning labor standards.** Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.
10. **Certification of eligibility.**
    a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
    b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
    c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. **Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
2. **Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.
3. **Withholding for unpaid wages and liquidated damages.** The FHWA or the contacting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.
4. **Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).
    a. The term “perform work with its own organization” refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:
        (1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
        (2) the prime contractor remains responsible for the quality of the work of the leased employees;
        (3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
        (4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.
    b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.
2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.
3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and

(b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.
5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.
2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).
3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1. **Instructions for Certification – First Tier Participants:**
   a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.
   b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.
d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).
f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.
g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.
h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website **(https://www.epls.gov/)**, which is compiled by the General Services Administration.
i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

2. **Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:**
   a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:
      (1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;
      (2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
      (3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and
      (4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
   b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.
2. **Instructions for Certification - Lower Tier Participants:**
   (Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200)
   a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.
   b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.
   c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.
   d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.
f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.
g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.
h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

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Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.
2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:
   a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
   b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.
3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

STANDARD SPECIAL PROVISION
MINIMUM WAGES
GENERAL DECISION NC20220090 02/25/2022 NC90

Z-090

Date: February 25, 2022

General Decision Number: NC20220090 02/25/2022 NC90

Superseded General Decision Numbers: NC20210090

State: North Carolina

Construction Type: HIGHWAY

COUNTIES

Brunswick	Greene	Onslow
Cumberland	Hoke	Pender
Currituck	Johnston	Pitt
Edgecombe	Nash	Wake
Franklin	New Hanover	Wayne

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 $15.00 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 2022.
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 $11.25 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 2022.

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 **https://www.dol.gov/agencies/whd/government-contracts**.

Modification Number	Publication Date
0	01/07/2022
1	02/25/2022

SUNC2014-005 11/17/2014

	Rates	Fringes
BLASTER	21.04	
CARPENTER	13.72 **	
CEMENT MASON / CONCRETE FINISHER	14.48 **	
ELECTRICIAN		
Electrician	17.97	
Telecommunications Technician	16.79	.63
IRONWORKER	16.02	
LABORER		
Asphalt Raker and Spreader	12.46 **	
Asphalt Screed / Jackman	14.33 **	
Carpenter Tender	12.88 **	
Cement Mason / Concrete Finisher Tender	12.54 **	
Common or General	10.20 **	
Guardrail / Fence Installer	12.87 **	
Pipelayer	12.17 **	
Traffic Signal / Lighting Installer	14.89 **	
PAINTER		
Bridge	24.57	
POWER EQUIPMENT OPERATORS		
Asphalt Broom Tractor	11.85 **	
Bulldozer Fine	17.04	
Bulldozer Rough	14.34 **	
Concrete Grinder / Groover	20.34	2.30
Crane Boom Trucks	20.54	
Crane Other	20.08	
Crane Rough / All-Terrain	20.67	
Drill Operator Rock	14.38 **	
Drill Operator Structure	21.14	
Excavator Fine	16.60	
Excavator Rough	14.00 **	
Grader / Blade Fine	18.47	
Grader / Blade Rough	14.62 **	
Loader 2 Cubic Yards or Less	13.76 **	
Loader Greater Than 2 Cubic Yards	14.14 **	
Material Transfer Vehicle (Shuttle Buggy)	15.18	

	Rates	Fringes
Mechanic	17.55	
Milling Machine	15.36	
Off-Road Hauler / Water Tanker	11.36 **	
Oiler / Greaser	13.55 **	
Pavement Marking Equipment	12.11 **	
Paver Asphalt	15.59	
Paver Concrete	18.20	
Roller Asphalt Breakdown	12.45 **	
Roller Asphalt Finish	13.85 **	
Roller Other	11.36 **	
Scraper Finish	12.71 **	
Scraper Rough	11.35 **	
Slip Form Machine	16.50	
Tack Truck / Distributor Operator	14.52 **	
TRUCK DRIVER		
GVWR of 26,000 Pounds or Less	11.12 **	
GVWR of 26,001 Pounds or Greater	12.37 **	

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 ($15.00) or 13658 ($11.25). 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

MINIMUM WAGES
(07-21-09) Z-5

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

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

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

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

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

The determination of the intent of the application of these Acts to the project's contract shall be the Design-Build Team's responsibility.

The Design-Build Team shall have no claim against the Department of Transportation for any changes in the minimum wage laws, State or Federal. It is the responsibility of the Design-Build Team to be fully informed of all Federal and State Laws affecting the project's contract.

***** STANDARD SPECIAL PROVISIONS *****

(10-23-17) (Rev. 3-22-22)

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." The replacement of "Contractor" with "Design-Build Team" does not apply to Article 102-2. The replacement of the above terms also does not apply when the terms are part of a phrase (e.g. bid bond, prime contractor, total amount bid, etc.)

Deletions: Articles 102-3(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 date and time Technical and Price Proposals are to be submitted and when the Price Proposals will be opened. The Request for Proposals will also include special provisions or requirements that vary from or are not contained in any preliminary design information or standard specifications.

The Request for Proposals will also include the printed contract forms and signature sheets for execution by both parties to the contract. In the event the Proposer is awarded the contract, execution of the Request for Proposals by the Proposer is considered the same as execution of the contract.

Standard specifications, sealed plans specifically identified as the Department's responsibility and other documents designated in the Request for Proposals shall be considered a part of the Request for Proposals whether or not they are attached thereto. All papers bound 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, 4th 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 or digitally signed, comparable to Docusign.

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, 3rd paragraph, delete the fifth sentence and replace with the following:

The condition of the bid bond or bid deposit is: the Principal shall not withdraw its bid within 75 days after the submittal of the same, and if the Department shall award a contract to the Principal, the Principal shall, within 14 calendar days after the 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 6th 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, Article 102-14, replace the 1st paragraph with the following:

102-14 REJECTION OF BIDS

Any Price Proposal submitted which fails to comply with any of the requirements of Articles 102-8, 102-9 or 102-10, or with the requirements of the project scope and specifications shall be considered irregular and may be rejected. A Price Proposal that does not contain costs for all 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, 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 opening 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 3rd and 4th 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 1st and 2nd paragraphs and replace with the following:

Checks that have been furnished as a bid deposit will be retained until after the contract bonds have been furnished by the successful Proposer, at which time the checks that were furnished as a bid deposit will be returned.

SECTION 104
SCOPE OF WORK

Page 1-30, 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.

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 3rd paragraph:

The Design-Build Team shall bear all the costs of providing the burden of proof that the nonconforming work is reasonable and adequately addresses the design purpose. The Design-Build Team shall bear all risk for continuing with nonconforming work in question until it is accepted.

The Engineer may impose conditions for acceptance of the nonconforming work. The Design-Build Team shall bear all costs for fulfilling the conditions.

The decisions whether the product satisfies the design purpose, whether the nonconforming work is reasonably acceptable and the conditions for acceptance are at the sole discretion of the Engineer.

Pages 1-45, 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 1-55, 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 108
PROSECUTION AND PROGRESS

Page 1-68, Article 108-2, replace the 2nd paragraph with the following:

The Design-Build Team shall submit a Progress Schedule for review within thirty (30) calendar days of receiving Notice of Award. The Department will review the Progress Schedule within twenty-one (21) calendar days of receipt. The Design-Build Team shall make any necessary corrections and adjustments to the Progress Schedule as necessitated by the Department's review within seven (7) calendar days. The Department will review the revised Progress Schedule within seven (7) calendar days of receipt.

Page 1-68, Subarticle 108-2(A)(1), add the following:

(k) Utility relocation and construction

Page 1-69, Subarticle 108-2(A)(2), add the following:

(h) Critical design submittal dates

(i) Critical permitting dates

(j) Completion of right of way acquisition

(k) Completion of utility relocation and construction

Page 1-69, Article 108-2, add the following:

(D) The Design-Build Team shall provide a written narrative each month detailing the work and percentage of work completed, anticipated sequence of upcoming work (two-month forecast), controlling operation(s), intermediate completion dates, and milestones. If any milestones are exceeded or will not be achieved, the Design-Build Team shall provide in the written narrative details of the delay; controlling operation affected, impacts to other operations, revisions to future intermediate completion dates and milestones, and remedial action necessary to get the project back to the original completion date.

Page 1-69, 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 1st paragraph.

Page 1-71, Article 108-6, replace "35%" with "25%" in the 2nd 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 1st paragraph and replace with the following:

Payment to the Design-Build Team will be made only for the work completed, certified and accepted in accordance with the terms of the contract.

Pages 1-85, 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 4th and 5th paragraphs and replace with the following:

Partial payments will not be made on seed or any living or perishable plant materials.

Partial payment requests shall not be submitted by the Design-Build Team until those items requested have corresponding signed and sealed RFC Plans accepted by the Department.

Pages 1-88, Article 109-10, add the following as bullets (E), (F), (G) and (H) under the 1st paragraph.

(E) As-Constructed Drawings

(F) As-Built Plans

(G) All documents required elsewhere in this RFP

(H) Documents or guarantees to support any warranty provided by the Design Build Team

NCDOT MULTIMODAL CONNECTED VEHICLE PILOT					*HO-0001AA*
Line Item	**Description**	**Qty**	**Unit**	**Unit Bid Price**	**Amount Bid**
1	Furnish and install 2070LX controller unit	30	EA		
2	Local controller software license	30	EA		
3	Update signal plans and electrical details	30	EA		
4	Furnish and install video detection system	31	EA		
5	Furnish and install roadside unit (cellular and DSRC/C-V2X hybrid unit)	31	EA		
6	Furnish spare roadside unit (cellular and DSRC/C-V2X hybrid unit)	1	EA		
7	Obtain FCC licenses for RSU	31	EA		
8	Provide Safety related applications including the following applications: - SPaT application - Pedestrian in Signalized Crosswalk Warning application - Mobile Accessible Pedestrian Signal System application - Red Light Violation Warning application. - Speed Warning application - Work Zone Warning application	1	LS		
9	Provide TSP application including integration into existing system	1	LS		
10	Furnish and install onboard unit or human machine interface (such as a tablet running an application) in the transit vehicle	35	EA		
11	Furnish spare onboard unit or human machine interface	1	EA		
12	Furnish and install pedestrian detection system	2	EA		
13	Provide and integrate an Intelligent Traffic Signal System (I-SIG)	1	LS		
14	Furnish and install a High Resolution Data solution	1	LS		
15	Provide Automated Traffic Signal Performance Measures (ATSPM) solution	1	LS		
16	Furnish and install a connected Eco-Driving system	1	LS		
17	Install and integrate cellular modem	2	EA		

NCDOT MULTIMODAL CONNECTED VEHICLE PILOT					*HO-0001AA*
Line Item	**Description**	**Qty**	**Unit**	**Unit Bid Price**	**Amount Bid**
18	Project management	1	LS		
19	Integration, testing, and documentation	1	LS		
20	Public outreach	1	LS		
21	Project evaluation support	1	LS		
22	Training	1	LS		
23	Security Credential Management System	1	LS		
24	Cabinet replacement	1	EA		
25	Warranty and support	1	LS		
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 Aggregate Base Course Sub-Ballast 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
Portland Cement Concrete Pavement Through Lanes and Shoulders (> 11") Through Lanes and Shoulders (9" to 11") Through Lanes and Shoulders (< 9")	Gal / SY	 0.327 0.272 0.245	 _____ SY _____ SY _____ 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 a reasonable estimate of the total quantities anticipated, for each item, as pertaining to fuel price adjustments, and is representative of the design proposed in the Technical Proposal submitted under separate cover.

Or

☐ The Design-Build Team elects not to pursue reimbursement for Fuel Price Adjustments on this project.

The information submitted on this sheet is claimed as a "Trade Secret" in accordance with the requirements of G.S. 66-152(3) until such time as the Price Proposal is opened.

_____ _____

Signature, Title Dated

_____

Print Name, Title

(Submit a copy of this sheet in a separate sealed package with the outer wrapping clearly marked "Fuel Price Adjustment" and deliver with the Technical and Price Proposal.)

LISTING OF DBE SUBCONTRACTORS			Sheet _____ of _____	
Firm Name and Address	Item No.	Item Description	* Agreed upon Unit Price	** Dollar Volume of Item
Name Address				
Name Address				
Name Address				
Name Address				
Name Address				
Name Address				
Name Address				

This form must be completed in order for the Bid to be considered responsive and be publicly read.
Bidders with no DBE participation must so indicate this on the form by entering the word or number *zero*.

LISTING OF DBE SUBCONTRACTORS			Sheet _____ of _____	
Firm Name and Address	Item No.	Item Description	* Agreed upon Unit Price	** Dollar Volume of Item
Name Address				
Name Address				
Name Address				
Name Address				
Name Address				
Name Address				
Name Address				

This form must be completed in order for the Bid to be considered responsive and be publicly read.
Bidders with no DBE participation must so indicate this on the form by entering the word or number *zero*.

LISTING OF DBE SUBCONTRACTORS

Sheet _____ of _____

Firm Name and Address	Item No.	Item Description	* Agreed upon Unit Price	** Dollar Volume of Item
Name Address				
Name Address				
Name Address				
Name Address				
Name Address				
Name Address				
Name Address				

This form must be completed in order for the Bid to be considered responsive and be publicly read.
Bidders with no DBE participation must so indicate this on the form by entering the word or number *zero*.

LISTING OF DBE SUBCONTRACTORS

Sheet _____ of _____

Firm Name and Address	Item No.	Item Description	* Agreed upon Unit Price	** Dollar Volume of Item
Name Address				
Name Address				
Name Address				
Name Address				

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 _____ By _____

Secretary / Assistant Secretary
Select appropriate title

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

_____ By _____
Signature of Witness 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

_____ By _____
Signature of Witness or Attest — Signature of Contractor

_____ _____
Print or type Signer's name — Print or type Signer's name

If Corporation, affix Corporate Seal and

(3) _____
Name of Contractor

_____
Address as prequalified

_____ By _____
Signature of Witness or Attest — Signature of Contractor

_____ _____
Print or type Signer's name — Print or type Signer's name

If Corporation, affix Corporate Seal and

(4) _____
Name of Contractor *(for 3 Joint Venture only)*

_____
Address as prequalified

_____ By _____
Signature of Witness or Attest — Signature of Contractor

_____ _____
Print or type Signer's name — Print or type Signer's name

If Corporation, affix Corporate Seal

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.

TIP No.: **HO-0001AA**

WBS No.: **49368.3.5**

County: **Wake County**

ACCEPTED BY THE
DEPARTMENT OF TRANSPORTATION

_____
Contract Officer

_____
Date

Execution of Contract and Bonds
Approved as to Form:

_____
Attorney General

Signature Sheet (Bid - Acceptance by Department)

Appendix Part A – Bidding Documentation

NCDOT Multimodal Connected Vehicle Pilot

TIP Number: HO-0001AA

Bidding Document

February 3, 2023 to Include Addendum No. 2

Table of Contents

List of Tables

Acronym/Abbreviation	Definition
ATMS	Advanced Traffic Management System
ATSPM	Automated Traffic Signal Performance Measures
ConOps	Concept of Operations
CV	Connected Vehicle
DSRC	Dedicated Short Range Communication
CED	Connected Eco Driving
GMS	Governor Morehead School
GPS	Global Positioning System
HRD	High Resolution Data
IEEE	Institute of Electrical and Electronics Engineers
ITRE	Institution for Transportation Research and Education
I-SIG	Intelligent Signal System
MMCVP	Multimodal Connected Vehicle Pilot
MUTCD	Manual on Uniform Traffic Control Devices
NCDOT	North Carolina Department of Transportation
NCSU	North Carolina State University
OBU	On-Board Unit
PID	Personal Information Device
PSCW	Pedestrian in Signalized Crosswalk Warning
PED-SIG	Mobile Accessible Pedestrian Signal System
RLVW	Red Light Violation Warning
RSE	Roadside Equipment
RSU	Roadside Unit
ROI	Return on Investment
SAE	Society of Automotive Engineers
SCMS	Security Credential Management System
SOP	Standard Operating Procedure
SPaT	Signal Phase and Timing
SRM	Signal Request Message
SSM	Signal Status Message
SW	Speed Warning
THEA	Tampa Hillsborough Expressway Authority
TIM	Traveler Information Message
TMC	Traffic Management Center
TOC	Traffic Operations Center
TSMO	Transportation Systems Management and Operations
TSP	Transit Signal Priority
USDOT	United States Department of Transportation
V2I	Vehicle-to-Infrastructure
V2V	Vehicle-to-Vehicle
WZW	Work Zone Warning

1 BACKGROUND

In 2019, the North Carolina Department of Transportation (NCDOT) was awarded an Advanced Transportation and Congestion Management Technologies Deployment grant to support a connected vehicle pilot project. The project will develop, deploy, and evaluate the impacts of several Connected Vehicle (CV) applications and the necessary supporting infrastructure.

1.1 PROJECT OVERVIEW

The NCDOT MMCVP aims to create and test a connected environment to measure the safety impact of CV technology for pedestrians, cyclists, motorists, and other road users as well as improve the efficiency and mobility of the Wolfline bus system. The pilot will deploy CV technology on the roadside and in the Wolfline bus fleet. Where possible, existing infrastructure will be utilized, including existing traffic signal cabinets and communication backbone fibers. To support the new system, new traffic signal controller units will be deployed along with upgrades to the local controller software and central software. Pedestrian assist applications will be deployed on portable personal information devices (e.g., smartphones). Motorists will be able to use the same applications to receive alerts, notifications, and warnings about pedestrians in the crosswalk, traveler information messages, speed violations, red light violations, work zones, and eco-driving opportunities. Vehicles equipped with a capable onboard unit will be able to receive signal timing information through DSRC broadcast messages. Security will be implemented to ensure the integrity and authenticity of the messages while maintaining privacy. The system will also collect high resolution data and implement signal performance measures to help optimize system performance while also evaluating the effects of pedestrian and transit priority.

1.2 PROJECT VISION AND GOALS

It is envisioned that this pilot will improve safety, increase mobility, and help reduce environmental impacts. The valuable data this pilot project provides will help the NCDOT to further deploy CV technology within the state, enhancing safety and mobility for all citizens while simultaneously protecting the environment.

Table 1 lists the goals and objectives for the MMCVP project.

Table 1 - Project Goals and Objectives

Goal: Improve mobility within the pilot area for motorists
• Improve travel times • Improve travel speeds • Reduce travel delay
Goal: Improve mobility within the pilot area for transit
• Increase schedule adherence for transit buses • Increase arrival on green • Increase transit ridership rates • Improve rider experience • Improve transit vehicle operator experience
Goal: Improve safety for all users of the pilot area
• Reduce the number of crashes • Reduce the crash severity in the study area

- Reduce the number of red-light violations
- Reduce the number of crashes involving cyclist and pedestrians
- Improve the road users' safety impression of the pilot area
- Improve the experience of vision impaired pedestrians in the pilot area

Goal: Reduce environmental impacts in the pilot area

- Reduce transportation-related emissions
- Reduce idle times and therefore fuel use

Goal: Reduce costs/Improve ROI

- Demonstrate the benefits outweigh the costs
- Provide cost savings to transportation agencies
- Reduce resources needed from first responders
- Reduce resources needed for data collection

1.3 CURRENT SYSTEM

The current location for the system is in an urban environment between NCSU's Central and South campuses. The corridors for the pilot project will include thirty-one intersections around campus, strategically placed in areas with multimodal urban use including pedestrian, cyclist, transit, and motorist traffic. This dense location will allow the pilot to test a multitude of applications with various users to evaluate the impact of CV technology. Along this route, NCSU operates its Wolfline bus system to serve students, faculty, and visitors.

The current software for the traffic signal controllers is Siemens SEPAC. All but three locations are part of the Raleigh signal system which utilizes Siemens Tactics ATMS software without smart corridor technology. Existing infrastructure will be utilized for the pilot where possible.

The project area is shown in Figure 1.

Figure 1 – Project Area

1.4 LOCATIONS

Table 2 lists the intersections that are a part of this pilot. All locations are currently connected to the Raleigh Signal System through an existing fiber connection, except for Cates Avenue at Morrill Drive and Dan Allen Drive at Thurman Drive and Yarbrough Drive.

Table 2 - Pilot Intersection Locations

#	Sig Inv. No.	Location	Software	Cabinet
1	05-0023	Hillsborough St at Meredith College Dr	SE-PAC	332
2	05-0028	Hillsborough St at Gardner St	SE-PAC	332
3	05-0029	Hillsborough St at Horne St	SE-PAC	332
4	05-0047	Western Blvd at Dan Allen Dr	SE-PAC	332
5	05-0048	Western Blvd at Avent Ferry Rd/Morrill Dr	SE-PAC	332 w/Aux
6	05-0186	Western Blvd at Gorman St	SE-PAC	332

7	05-0442	Hillsborough St at Enterprise St	SE-PAC	332
8	05-0804	Hillsborough St Pogue St	SE-PAC	332
9	05-0913	Avent Ferry Rd at Gorman St	SE-PAC	332
10	05-0258	Hillsborough St at Faircloth St/Gorman St	SE-PAC	332
11	05-1050	Hillsborough St at Logan Ct	SE-PAC	332
12	05-1098	Hillsborough St at Beryl Rd	SE-PAC	332
13	05-1521	Avent Ferry Rd at Varsity Dr	SE-PAC	332 w/Aux
14	05-1586	Hillsborough St at I-440 WB/US 1 SB Ramps	SE-PAC	332
15	05-1603	Hillsborough St at I-440 EB/US 1 NB Ramps	SE-PAC	332
16	05-1657	Avent Ferry Rd at Centennial Pkwy/Champion Ct	SE-PAC	332
17	05-2007	Centennial Pkwy at Oval Dr/Bilyeu St	SE-PAC	332
18	05-2146	Avent Ferry Rd at Trailwood Dr	SE-PAC	332 w/Aux
19	05-2199	Western Blvd at Varsity Dr	SE-PAC	332 w/Aux
20	05-2329	Hillsborough St at Chamberlain St	SE-PAC	332
21	R-????	Cates Ave at Morrill Dr	SE-PAC	NEMA TS-1
22	R-369	Gorman St at Ligon St/Sullivan Dr	SE-PAC	336
23	R-????	Dan Allen Dr at Thurman Dr and Yarbrough Dr	SE-PAC	336
24	R-227	Pullen Rd at Cates Ave	SE-PAC	332
25	R-597	Gorman St at Kaplan Dr	SE-PAC	332
26	05-0032	Hillsborough at Oberlin	SE-PAC	332
27	05-0033	Hillsborough at Woodburn/Cox	SE-PAC	336
28	05-2127	Western at Canton	SE-PAC	332 w/Aux
29	05-0046	Western at Kent/Method	SE-PAC	332
30	05-2128	Western at Pullen	SE-PAC	332

1.5 USERS

The primary users of the system are identified below.

1.5.1 INFRASTRUCTURE OWNERS/OPERATORS

Users who own and are responsible for operating and maintaining different parts of the system:

- NCDOT – the primary manager of the project
- City of Raleigh – the owner/operator of the signal system
- NCSU – the owners of the transit system

1.5.2 ROADWAY USERS

A broad group of users who will utilize the system on a regular basis:

- Wolfline Bus Drivers – transit bus operators employed by Transdev
- Wolfline Passengers – any riders of Wolfline buses
- NCSU Students, Faculty, Visitors – as drivers, pedestrians, cyclists, or transit riders
- Governor Morehead Students, Faculty, Visitors – as drivers, pedestrians, cyclists, or transit riders
- Meredith College Students, Faculty, Visitors – as drivers, pedestrians, cyclists, or transit riders
- Motorists – any driver/operator of a motor vehicle in the project area

- Non-Motorized Vehicle Users – those riding scooters, skateboards, or other non-motorized modes of transportation
- Pedestrians – any pedestrian or individual using a wheelchair in the project area
- Cyclists – any person riding a cycle regardless of the number of wheels

1.5.3 Data Users

Users who will provide guidance, oversight, and monitor the data for performance measurements.

- NCDOT – use data to evaluate the system for real time and project level success
- ITRE – assist with the data collection, surveying, and analysis
- City of Raleigh – use data to guide decision making for signal system

2 PROJECT SCOPE

NCDOT is requesting a complete turnkey solution that utilizes existing infrastructure to achieve the goals of the MMCVP. While existing infrastructure will be utilized where possible, certain upgrades will be required to achieve the goals of this project. All proposed solutions and upgrades should integrate easily with the existing Signal System to minimize the overall impact of this pilot on the rest of the Signal System.

2.1 GENERAL

Conform to these Project Special Provisions, Project Plans, the Signals and ITS Project Special Provisions (current version 18.6), and the 2018 Standard Specifications for Roads and Structures (also referred to hereinafter as the "Standard Specifications"). The current edition of these specifications and publications in effect on the date of advertisement will apply.

In the event of a conflict between these Project Special Provisions and the Standard Specifications or the Signals and ITS Project Special Provisions, these Project Special Provisions govern.

In the event of a conflict between the Signals and ITS Project Special Provisions and the Standard Specifications, the Signals and ITS Project Special Provisions govern.

2.2 LICENSING

The contractor will be expected to obtain any required FCC licensing for this pilot on behalf of the Department. Site licenses for the DSRC communication portion of this pilot are expected at a minimum. The contractor will be responsible for filling out any necessary applications and ensuring the licensing are received prior to turning on the system. The contractor will be provided access to the Department's FCC Universal Licensing System for the purpose of applying for and managing site licenses.

2.3 INTERSECTION UPGRADES

2.3.1 Traffic Signal Controllers

Traffic signal controller units at 30 pilot locations will be upgraded under this contract to 2070LX controller units running the latest version of SEPAC software. The contractor will be expected to furnish, program, test, and install new 2070LX controller units as part of this contract.

2.3.2 Traffic Signal Cabinet

The traffic signal cabinet located at the intersection of Cates Ave at Morrill Dr shall be replaced and changed to a type 332 cabinet with an auxiliary output file.

2.3.3 Signal Plans

New traffic signal plans will be necessary to document any equipment upgrades, detection upgrades, and potential TSP programming. The contractor will be responsible for ensuring new signal plans are prepared and provided as part of this project.

2.3.4 Upgraded Detection

Any existing detection will remain at all 30 locations and continued to be used for operation of the intersection. Each location should have an additional detection system installed to facilitate high resolution data collection as well as any additional detection zones required by the use cases listed in these specifications. Additional detection zones should be provided to ensure the ATSPM signal metrics that are provided with this project can be achieved. The additional detection system should be a video-based detection system, or other NCDOT approved detection system.

2.3.5 Roadside Units

Roadside units shall be provided for all 30 locations under this contract to facilitate both cellular and DSRC/C-V2X communications. While DSRC communications is required under this pilot, a 'hybrid' unit that is capable of C-V2X communications as well as DSRC shall be provided.

2.3.6 Communications

Cellular modem communications will be necessary for the following three locations: Cates Avenue at Morrill Drive, Dan Allen Drive at Yarbrough Drive, and Dan Allen Drive at Thurman Drive. NCDOT will provide the contractor three approved cellular modems and the contractor will be responsible for installing and integrating the modems into the traffic signal cabinets through an Ethernet connection as well as into the Raleigh Signal System to facilitate communications to these locations from the central ATMS software. The contractor will need to coordinate with the State ITS & Signals Management Engineer to obtain these cellular modems. Monthly charges for the cellular modems will be the responsibility of NCDOT.

2.4 USE CASES

The following use cases will be provided and tested as part of this project. Each subsection describes the application and its use in the scope of the MMCVP. The User Needs describe the underlying reasons for the applications based on the potential users of each system. The Use Case-Specific System Requirements describes the system requirements derived from the user needs and the system concept. Each use case's system requirements are mapped back to the user needs to which it applies. The vendor is expected to provide and meet all the requirements for each use case under this contract.

The nomenclature for the user needs and system requirement ID (xxx-yy-zzz) is defined in Table 3.

Table 3 – Requirement Nomenclature

ID Position	Definition
xxx	A distinct abbreviation for the subsystem or application to which the system requirement refers

yy	SR = Identifies that the ID is a System Requirement UN = Identifies that the ID is a User Need
zzz	Sequential number starting at 001 and is incremented by one for the next requirement. The numbering resets to 001 for each new requirement type.

2.4.1 Signal Phase and Timing (SPaT)

Signal Phase and Timing (SPaT) broadcasts will enable the development of numerous applications in this pilot. This subsystem broadcasts the current phase and residual time in that phase for each approach and movement in a signalized intersection. It can be used for Transit Signal Priority, Red Light Violation Warning, Pedestrian Signal Application, and other applications being tested in this pilot.

2.4.1.1 User Needs

Identification	Application	User Need
SPAT-UN-001	SPaT	Users need to be able to receive information concerning the signal status of the intersection and how long this status will persist for each approach and lane that is active.
SPAT-UN-002	SPaT	Users need to be able to receive information concerning the geographical layout of the intersection through MAP broadcasts as well as receive GPS correction data.
SPAT-UN-003	SPaT	NCDOT needs to be able to test and deploy emerging CV technology and applications through supporting infrastructure.

2.4.1.2 Use Case-Specific System Requirements

ID	Requirement	User Need
SPAT-SR-001	The traffic signal controller shall provide data to the Connected Vehicle Roadside Equipment.	SPAT-UN-01
SPAT-SR-002	The roadside equipment shall communicate with users to provide current signal phase and timing information for all lanes and approaches at a signalized intersection.	SPAT-UN-01
SPAT-SR-003	The roadside equipment shall communicate with users to provide information concerning the geographical layout of the intersection through MAP broadcasts as well as receive GPS correction data.	SPAT-UN-02
SPAT-SR-004	The roadside equipment shall send status information to the traffic operations center.	SPAT-UN-03
SPAT-SR-005	The roadside equipment shall collect current signal phase and timing data from the traffic signal controller.	SPAT-UN-03
SPAT-SR-006	The roadside equipment shall provide real time signal phase and timing information for all lanes at a signalized intersection to a user.	SPAT-UN-03
SPAT-SR-007	The system shall interface with the traffic signal controller.	SPAT-UN-01
SPAT-SR-008	The Wolfline OBU shall have the ability to receive SPaT data.	SPAT-UN-01

2.4.1.3 Additional Requirements

This application should be accessible to end users utilizing a mobile communication device, including smart phones. In addition, SPaT and MAP messages shall be broadcast locally at each location via DSRC

communications. The contractor shall configure MAP messages for each location and ensure any roadside equipment is configured properly.

2.4.2 Transit Signal Priority (TSP)

The Wolfline bus system serves the student population of NCSU as well as the general public. Riders need to be able to rely on the bus system to arrive and depart on time. Traffic conditions and traffic signal inefficiencies can delay buses, causing a ripple effect throughout the day, resulting in unreliable schedules. Buses stuck idle at an intersection with a red light uses more fuel and release additional emissions. There is a need to ensure buses arrive and depart on time to promote use, improve safety, and reduce their impact to the environment.

2.4.2.1 User Needs

Identification	Application	User Need
TSP-UN-001	Transit Signal Priority	Transit drivers need to be able to maintain published arrival and departure times according to the transit schedule.
TSP-UN-002	Transit Signal Priority	Transit drivers need to receive a notification when they are given priority at a signalized intersection.
TSP-UN-003	Transit Signal Priority	Transit drivers need to receive a notification when they do not have priority or priority has been revoked due to a higher priority request.
TSP-UN-004	Transit Signal Priority	Transit riders need to be able to rely on consistent travel, departure, and arrival times.
TSP-UN-005	Transit Signal Priority	The system needs to be secure to ensure the authenticity and integrity of the data as well as maintain the privacy of the users.

2.4.2.2 Use Case-Specific System Requirements

ID	Requirement	User Need
TSP-SR-001	The system shall receive requests for transit signal priority.	TSP-UN-01
TSP-SR-002	The system shall notify transit drivers of the priority request status.	TSP-UN-02 TSP-UN-03
TSP-SR-003	The roadside unit shall receive transit signal priority requests from transit vehicles and send that request to the signal system.	TSP-UN-01
TSP-SR-004	The roadside unit shall determine whether requests for priority are from authorized vehicles based on digital credentials.	TSP-UN-05
TSP-SR-005	The TOC shall adjust signal timing in response to signal prioritization requests and defined rules.	TSP-UN-01
TSP-SR-006	The transit vehicle shall determine schedule deviation and estimated time of arrival at the transit stops.	TSP-UN-01
TSP-SR-007	The transit vehicle shall send priority requests to the roadside unit along the route.	TSP-UN-01
TSP-SR-008	The transit vehicle shall send schedule deviation data and status of priority requests to the transit vehicle operator.	TSP-UN-01
TSP-SR-009	The transit vehicle shall only request priority when it is behind schedule.	TSP-UN-01
TSP-SR-010	The system shall respond to requests from transit management centers for signal priority at one or more intersections along a transit route.	TSP-UN-01

ID	Requirement	User Need
TSP-SR-011	The roadside unit shall collect current SPaT data from the traffic signal controller.	TSP-UN-01
TSP-SR-012	The transit vehicle shall be equipped with Automatic Vehicle Location for GPS tracking.	TSP-UN-01
TSP-SR-013	The system shall provide extended green time or shorten the red time to expedite the movement of transit vehicles on the identified approach when priority request is granted.	TSP-UN-01
TSP-SR-014	The system shall include rules to negotiate competing calls for priority.	TSP-UN-01
TSP-SR-015	The system shall revert to normal traffic signal operation through pre-determined signal phase sequencing and timing.	TSP-UN-01
TSP-SR-016	The system shall collect ridership data through an automatic passenger counter. The buses are currently equipped with an Urban Transportation Associates (UTA) Smartsensor automatic passenger counter.	TSP-UN-04

2.4.2.3 Additional Requirements

The potential contractor should provide additional details on how they propose to achieve this use case. The Raleigh Signal System currently uses Siemens TACTICS ATMS software. The offered solution should ideally interface with existing infrastructure, including the ATMS software, without the need for complex integration. Coordination with the City of Raleigh will be required for these upgrades. Additionally, coordination with NCSU Transit Department as well as the owners of the transit vehicles will be required for any upgrades or integration of the Wolfline bus fleet. There are currently 35 buses in operation that will need to be integrated in with this pilot.

The buses in operation are currently equipped with the following equipment and/or software:

- Automatic Vehicle Location (AVL) system: TransLoc Inc.
- GPS: TransLoc Inc.
- Automatic passenger counting device: Urban Transportation Associates (UTA) Smartsensor via RS-232 protocol
- Audio Visual Announcements (AVA): Passio Technologies – Radio Engineering Industries (REI) 2-Channel PA Amplified
- Passio Rugged Advanced Incromaxx touch-screen MDT (Android 5.1, 4G Verizon)
- Interior LED display: TranSign – TranSign LED Destinator EnCompass LD896

Installation of the onboard units into the bus fleet must be coordinated with NCSU Transit Department. It is anticipated that the installations will occur at the Wolfline Base of Operations located at 6514 Chapel Hill Road, Raleigh, NC, 27607. Installation should occur during the summer or off-times between semesters. If installation can't be coordinated outside of semester hours, installation shall be limited to off peak service hours and the number of vehicles available per day for installation will be limited (Note: Peak service time is 7am through 7pm during semesters).

The Automatic Vehicle Location (AVL) system is scheduled for replacement in 2023. No additional details can be provided, but the intent is to have installation of the new AVL system occur during the summer of 2023. Installation of any equipment under this project must avoid the installation timeline

for the AVL system or coordinate/partner with the installation of the AVL system to have both performed at the same time.

2.4.3 Pedestrian in Signalized Crosswalk Warning (PSCW)

Centering around NCSU, an urban college campus, the corridors that comprise this system experience heavy volumes of pedestrian traffic. Distracted pedestrians or those hurrying to class may not pay full attention to vehicles or buses in the area. Furthermore, visitors to campus may be unfamiliar with the area causing a complex dynamic resulting in safety concerns for vulnerable road users including distracted and vision impaired pedestrians.

2.4.3.1 User Needs

Identification	Application	User Need
PSCW-UN-001	Pedestrian in Signalized Crosswalk Warning	Drivers need to receive warnings about pedestrians in the crosswalk.
PSCW-UN-002	Pedestrian in Signalized Crosswalk Warning	Drivers need to receive alerts about pedestrians approaching the crosswalk.
PSCW-UN-003	Pedestrian in Signalized Crosswalk Warning	The system needs to detect pedestrians in marked crossing areas. The system needs to detect pedestrians that are crossing at a location with a marked crossing area but the pedestrian is not within the marked crossing area at specific locations designated by NCDOT.
PSCW-UN-004	Pedestrian in Signalized Crosswalk Warning	The system needs the ability to detect vehicles encroaching on pedestrians.

2.4.3.2 Use Case-Specific System Requirements

ID	Requirement	User Need
PSCW-SR-001	The personal device application shall provide current location of non-motorized travelers.	PSCW-UN-03
PSCW-SR-002	The system shall collect images or sensor data for pedestrians.	PSCW-UN-04
PSCW-SR-003	The system shall provide warnings to pedestrians or cyclists when vehicles are infringing on a crosswalk.	PSCW-UN-04
PSCW-SR-004	Vehicles equipped with the application shall provide data describing the vehicle's location, heading, speed, acceleration, braking status, and size.	PSCW-UN-04
PSCW-SR-005	The roadway equipment shall alert drivers of stop signs, red lights, and crossing conflicts or violations of a non-motorized user.	PSCW-UN-01
PSCW-SR-006	The vehicle or application shall be capable of providing warnings to the driver based on information received.	PSCW-UN-02

2.4.3.3 Additional Requirements

This application should be accessible to end users using a mobile communication device, including smart phones. Two locations within this pilot will be identified as key intersections for this use case. As such,

a pedestrian detection system will be installed at these locations under this contract. The pedestrian detection systems should be able to detect pedestrians accurately and reliably in and near the crosswalk to achieve the goals of this use case as well as the goals for the mobile accessible pedestrian signal system application. The two primary locations identified for this use case are Western Blvd. at Avent Ferry Rd/Morrill Dr. (05-0048) and Avent Ferry Rd at Varsity Dr. (05-1521). Alternate locations for consideration are Western Blvd. at Gorman St. (05-0186), Hillsborough St. at Faircloth St/Gorman St. (05-0258), and Hillsborough St. at Enterprise St. (05-0442).

2.4.4 Mobile Accessible Pedestrian Signal System (PED-SIG)

With the heavy volume of pedestrian traffic within the study area, clarity on pedestrian priority for crossing is essential. Without receiving confirmations that it is safe to cross, it can be dangerous for visually impaired pedestrians to attempt to cross the street. Because the pilot project is inclusive of several signals near Governor Morehead School, the flagship school in North Carolina for students who are visually impaired, there is an opportunity to improve the safety of these students as they cross at signalized intersections.

2.4.4.1 User Needs

Identification	Application	User Need
PEDSIG-UN-001	PED-SIG	Pedestrians approaching the crosswalk need to receive a status notification concerning their request for service.
PEDSIG-UN-002	PED-SIG	Pedestrians in the crosswalk need to receive notification if they have travelled outside the designated crosswalk area.
PEDSIG-UN-003	PED-SIG	Pedestrians in the crosswalk need to receive warnings about vehicles encroaching on the crosswalk.
PEDSIG-UN-004	PED-SIG	Pedestrians approaching the crosswalk need to receive alerts about vehicles encroaching on the crosswalk.
PEDSIG-UN-005	PED-SIG	Pedestrians crossing in non-crosswalk areas need to receive a warning about vehicles in the vicinity of where the pedestrian is crossing.
PEDSIG-UN-006	PED-SIG	The system needs to detect pedestrians in marked crossing areas.
PEDSIG-UN-007	PED-SIG	The system needs to detect pedestrians that are crossing at a location with a marked crossing area but the pedestrian is not within the marked crossing area at specific locations designated by NCDOT.
PEDSIG-UN-008	PED-SIG	The system needs to detect vehicles encroaching on pedestrians.

2.4.4.2 Use Case-Specific System Requirements

ID	Requirement	User Need
PEDSIG-SR-001	The system shall alert pedestrians who are visually impaired via their personnel device concerning the status of their request for service.	PEDSIG-UN-01
PEDSIG-SR-002	The system shall alert pedestrians who are visually impaired if they travel outside of the crosswalk.	PEDSIG-UN-02
PEDSIG-SR-003	The system shall detect vehicles encroaching on the crosswalk.	PEDSIG-UN-08
PEDSIG-SR-004	The system shall alert pedestrians who are visually impaired of vehicles encroaching on the crosswalk.	PEDSIG-UN-03, PEDSIG-UN-04
PEDSIG-SR-005	The system shall alert pedestrians not in marked crossing areas of vehicles in the vicinity of where the pedestrian is crossing.	PEDSIG-UN-05
PEDSIG-SR-006	The system shall detect pedestrians in marked crossing areas.	PEDSIG-UN-06

PEDSIG-SR-007	The system shall detect pedestrians that are crossing at a location with a marked crossing area but the pedestrian is not within the marked crossing area.	PEDSIG-UN-07

2.4.4.3 Additional Requirements

The selected contractor will be expected to coordinate with a representative from the Governor Morehead School to ensure this use case is implemented to meet the needs of the visually impaired.

2.4.5 Intelligent Traffic Signal System (I-SIG)

The pilot corridors present the typical challenges associated with moving vehicles, buses, cyclists, and pedestrians safely and efficiently. This complete Intelligent Signal System will capture and monitor data and optimize system performance while accommodating transit priority, preemption, and pedestrian movements.

2.4.5.1 User Needs

Identification	Application	User Need
ISIG-UN-001	I-SIG	The system needs to log and analyze transit priority requests and their effect on the overall system.
ISIG-UN-002	I-SIG	The system needs to log and analyze pedestrian requests and their effect on the overall system.
ISIG-UN-003	I-SIG	The system needs to optimize performance under changing circumstances.
ISIG-UN-004	I-SIG	Drivers, transit, cyclists, and pedestrians need to have access to an optimized system corridor.
ISIG-UN-005	I-SIG	Transit drivers and riders need to be able to rely on consistent travel, departure, and arrival times.

2.4.5.2 Use Case-Specific System Requirements

ID	Requirement	User Need
ISIG-SR-001	The system shall log and analyze transit priority requests and their effect on the overall system.	ISIG-UN-01
ISIG-SR-002	The system shall log and analyze pedestrian crossing requests and their effect on the overall system.	ISIG-UN-02
ISIG-SR-003	The system shall optimize performance under changing circumstances.	ISIG-UN-03, ISIG-UN-04, ISIG-UN-05
ISIG-SR-004	The signal system shall collect, process, digitize, and send traffic sensor data to the Raleigh traffic operations center for further analysis and storage.	ISIG-UN-03
ISIG-SR-005	The signal system shall collect, process, and send traffic images to the Raleigh traffic operations center for analysis and distribution.	ISIG-UN-03
ISIG-SR-006	The system shall collect traffic data including speed, heading, starts and stops, and speed changes.	ISIG-UN-03
ISIG-SR-007	The RSU shall communicate with OBU or personal device on passing vehicles to collect current vehicle position, speed, and heading and a record of previous events (e.g., starts and stops,	ISIG-UN-03

ID	Requirement	User Need
	link travel times) that can be used to determine current traffic conditions.	
ISIG-SR-008	The traffic operations center shall monitor, analyze, and store traffic sensor data (speed, volume, occupancy) collected from field elements under remote control of the center.	ISIG-UN-03
ISIG-SR-009	The traffic operations center shall monitor, analyze, and distribute traffic images from CCTV systems under remote access by the TOC.	ISIG-UN-03
ISIG-SR-010	The traffic operations center shall remotely control detection devices to detect traffic.	ISIG-UN-03
ISIG-SR-011	The traffic operations center shall remotely control traffic signal controllers.	ISIG-UN-03
ISIG-SR-012	The traffic operations center shall implement control plans to coordinate signalized intersections based on data from sensors and connected vehicles.	ISIG-UN-03, ISIG-UN-04, ISIG-UN-05
ISIG-SR-013	The vehicle OBU or personal device shall provide its location with lane-level accuracy to on-board applications.	ISIG-UN-03
ISIG-SR-014	The vehicle OBU or personal device shall exchange location and motion information with roadside equipment and nearby vehicles.	ISIG-UN-03
ISIG-SR-015	The vehicle OBU or personal device shall provide data describing the vehicle's location in three dimensions, heading, speed, acceleration, braking status, and size.	ISIG-UN-03
ISIG-SR-016	The field element shall notify the TOC of pedestrian calls and pedestrian accommodations.	ISIG-UN-03
ISIG-SR-017	The field element shall respond to pedestrian crossing requests.	ISIG-UN-03
ISIG-SR-018	The field element shall return the status of the sensor and CCTV system to the controlling traffic operations center.	ISIG-UN-03
ISIG-SR-019	The field element shall accept configuration information from the traffic operations center.	ISIG-UN-03
ISIG-SR-020	The field element shall pass data provided by the traffic operations center to local field devices and report data from the field devices back to the center.	ISIG-UN-03
ISIG-SR-021	The field element shall report the current signal control information to the traffic operations center.	HRD-UN-06 HRD-UN-07
ISIG-SR-022	The field element shall return system fault data of the sensor and CCTV to the controlling traffic operations center.	ISIG-UN-03
ISIG-SR-023	The field element shall return operational status of the traffic signal controller to the traffic operations center.	ISIG-UN-03
ISIG-SR-024	The field element shall return traffic signal controller fault data to the traffic operations center.	ISIG-UN-03
ISIG-SR-025	The traffic operations center shall collect environmental sensor operational status.	ISIG-UN-03
ISIG-SR-026	The traffic operations center shall collect traffic signal controller fault data from the field element.	ISIG-UN-03

ID	Requirement	User Need
ISIG-SR-027	The signal controller shall send high resolution data every tenth of a second.	HRD-UN-01
ISIG-SR-028	The system shall collect and store high resolution data to control and monitor signals.	HRD-UN-02
ISIG-SR-029	The local controller software shall be compatible with high resolution data system.	HRD-UN-03
ISIG-SR-030	The system shall store and manage high resolution data in a secure way that ensures integrity and authenticity of the data.	HRD-UN-04
ISIG-SR-031	The system shall notify motorists regarding driving efficiency, recommended driving speeds, optimal acceleration and deceleration.	CED-UN-02
ISIG-SR-032	The vehicle shall receive notifications through the on board unit or application.	CED-UN-01

2.4.5.3 Additional Requirements

The potential contractor should provide additional details on how they propose to achieve this use case.

2.4.6 Red Light Violation Warning (RLVW)

Drivers will run red lights for various reasons which is a safety hazard for pedestrians and other motorists. The Red Light Violation Warning will calculate the vehicle's speed and trajectory relative to the signal system status, to alert the driver of a risk to run the red light.

2.4.6.1 User Needs

Identification	Application	User Need
RLVW-UN-001	RLVW	Drivers need to receive warnings when they are likely to violate a red light.
RLVW-UN-002	RLVW	Drivers need to receive an alert when they are violating a red light.
RLVW-UN-003	RLVW	Pedestrians need to receive warnings if a red light violation is occurring while they are in or near the crosswalk.

2.4.6.2 Use Case-Specific System Requirements

ID	Requirement	User Need
RLVW-SR-001	The system shall alert drivers that they are likely to violate a red light based on speed and SPaT data.	RLVW-UN-01
RLVW-SR-002	The system shall alert drivers when they violate a red light.	RLVW-UN-02
RLVW-SR-003	The system shall alert pedestrians if a vehicle is on a trajectory to violate a red light at their location.	RLVW-UN-03
RLVW-SR-004	The application shall receive the following information: enforceable speed limit, SPaT, and latitude/longitude.	RLVW-UN-01
RLVW-SR-005	The application shall receive vehicle information including GPS location, heading, speed, and acceleration.	RLVW-UN-01
RLVW-SR-006	The application shall generate an audial and/or haptic notification within 1 second of being triggered by the application.	RLVW-UN-01

2.4.6.3 Additional Requirements

This application should be accessible to end users utilizing a mobile communication device, including smart phones.

2.4.7 Speed Warning (SW)

The pilot corridors are often heavily congested with vehicles, buses, pedestrians, and cyclists. Drivers speeding through these corridors present a safety hazard to all users of the corridor. There is a need to alert drivers when their speed exceeds a defined threshold so that they will reduce their speeds, improving the safety of the road users.

2.4.7.1 User Needs

Identification	Application	User Need
SW-UN-001	Speed Warning	Drivers need to receive alerts when their speed exceeds a threshold.
SW-UN-002	Speed Warning	The system needs to issue alerts when the detected speed of a vehicle is exceeding a threshold.
SW-UN-003	Speed Warning	The system needs to be able to identify a necessary change to the speed threshold that triggers a violation alert.

2.4.7.2 Use Case-Specific System Requirements

ID	Requirement	User Need
SW-SR-001	The system shall alert drivers if their speed exceeds the speed threshold.	SW-UN-02
SW-SR-002	The system shall identify changes to the vehicle speeds that trigger the violation alert.	SW-UN-03
SW-SR-003	The application shall receive the following information: enforceable speed limit and latitude/longitude.	SW-UN-02
SW-SR-004	Warnings received shall not contradict or conflict with roadside signage on the corridor.	SW-UN-01
SW-SR-005	The application shall receive vehicle information including GPS position, heading, speed, and acceleration.	SW-UN-03
SW-SR-006	The application shall generate an audial and/or haptic notification within 1 second of being triggered by the application.	SW-UN-01

2.4.7.3 Additional Requirements

This application should be accessible to end users utilizing a mobile communication device, including smart phones.

2.4.8 High Resolution Data (HRD)

High resolution data is data provided every one tenth of a second. This granularity is vital to ensure the system stays optimized. High resolution data will be used to evaluate the effectiveness of various applications, methods, and technologies within the pilot project.

2.4.8.1 User Needs

Identification	Application	User Need
HRD-UN-001	High Resolution Data	The system needs for the signal controller to provide high resolution data every one tenth of a second.

Identification	Application	User Need
HRD-UN-002	High Resolution Data	The system needs to collect and store high resolution data to control and monitor signals within the pilot corridors.
HRD-UN-003	High Resolution Data	The system needs for traffic signal controller software to support high resolution data, NTCIP communications, and connected vehicle applications.
HRD-UN-004	High Resolution Data	The system needs to securely store and manage high resolution data in a way that ensures the integrity and authenticity of the data.
HRD-UN-005	High Resolution Data	Users need the ability to analyze this data to quantify the effectiveness of the system.
HRD-UN-006	High Resolution Data	Transportation engineers need the ability to analyze this data to optimize the performance of the system.

2.4.8.2 Use Case-Specific System Requirements

ID	Requirement	User Need
HRD-SR-001	The system shall provide high resolution data every tenth of a second.	HRD-UN-01
HRD-SR-002	The system shall collect and store data for control and monitoring signals.	HRD-UN-02
HRD-SR-003	The system shall support high resolution data, NTCIP communications, and CV applications.	HRD-UN-03
HRD-SR-004	The system shall provide a way for users to access and analyze authentic data.	HRD-UN-04, HRD-UN-05, HRD-UN-06

2.4.8.3 Additional Requirements

The contractor will be expected to perform upgrades that allows the high resolution data collection use case to be achieved. The contractor will be expected to upgrade existing traffic signal controller units to 2070LX controller units under this contract. These controller units should also be upgraded to the latest version of Siemens SEPAC software approved by the City of Raleigh and properly integrated with the signal system to allow high resolution data to be collected. Additionally, central infrastructure upgrades may be necessary to enable the collection of high resolution data. Any integration, or configuration, of the infrastructure shall be performed by the contractor. This includes configuring all locations included in this pilot within the offered HRD solution software. The Department prefers a cloud-based solution for high resolution data collection and storage instead of an on-premises server infrastructure. High resolution data shall be stored for 6 months, and aggregate data shall be stored for 2 years. High resolution data should conform to *'Indiana Traffic Signal Hi Resolution Data Logger Enumerations'*. The potential contractor shall provide additional details on how they propose to achieve this use case, including infrastructure upgrades and potential software solutions to be used.

2.4.9 Automated Traffic Signal Performance Measures (ATSPM)

Automated Traffic Signal Performance Measures (ATSPM) is an objective-based solution to gather data on the actual performance of signal systems. This automated process reduces the level of effort for the agency, provides cost savings, and allows signal retiming efforts to be based on actual data. Different techniques and applications can be used to monitor the overall effect on different aspects of the system. These signal performance measures are needed to ensure the system is optimized.

2.4.9.1 User Needs

Identification	Application	User Need
ATSPM-UN-001	ATSPM	The system needs to display charts and graphs that highlight specific measures of performance to be defined by NCDOT.
ATSPM-UN-002	ATSPM	Users need the ability to analyze data to quantify the effectiveness of the system.
ATSPM-UN-003	ATSPM	Transportation engineers need the ability to analyze this data to optimize the performance of the system.

2.4.9.2 Use Case-Specific System Requirements

ID	Requirement	User Need
ATSPM-SR-001	The detection devices shall report detected vehicles to the traffic signal controller.	ATSPM-UN-03
ATSPM-SR-002	The detection devices shall report vehicle speeds to the terminal server.	ATSPM-UN-03
ATSPM-SR-003	The controller shall collect and record high resolution data and communicate it to the server.	ATSPM-UN-03
ATSPM-SR-004	The system shall produce charts and graphics that highlight performance measures to be defined by NCDOT.	ATSPM-UN-01
ATSPM-SR-005	The system shall provide data for analysis by users.	ATSPM-UN-02

2.4.9.3 Additional Requirements

The contractor will be expected to provide a way to generate ATSPM reports based on high resolution data collected. The potential contractor should provide additional details on how they propose to achieve this use case, including infrastructure upgrades and potential software solutions to be used. The contractor should provide additional details about the proposed solution's reports capabilities. Any offered solution should adhere to the '*NCDOT Automated Traffic Signal Performance Measures ATSPM Implementation Plan'*, where applicable.

The Department prefers the following signal metrics be provided, at a minimum:

- Purdue Phase Termination
- Split Monitor
- Pedestrian Delay
- Preemption Details
- Purdue Coordination Diagram
- Purdue Link Pivot
- Turning Movement Counts
- Purdue Split Failure
- Approach Volume
- Approach Delay
- Arrivals on Red
- Yellow and Red Actuations

2.4.10 Work Zone Warning (WZW)

Reduced speed limits, lane closures, and information on delays associated with work zones can be communicated to drivers, pedestrians, and cyclists. With this information, the user can alter their route or take the appropriate steps necessary to ensure they continue to travel safely through the system. The increased awareness by the users will also result in increased safety for workers in the work zone.

2.4.10.1 User Needs

Identification	Application	User Need
WZW-UN-001	Work Zone Warning	Drivers need to get alerts when their speed exceeds a threshold in a work zone.
WZW-UN-002	Work Zone Warning	The system needs to issue alerts and notifications associated with a work zone.
WZW-UN-003	Work Zone Warning	The system needs to change and customize the alerts and notifications broadcast for a work zone.

2.4.10.2 Use Case-Specific System Requirements

ID	Requirement	User Need
WZW-SR-001	The system shall alert drivers of their speed when it exceeds a threshold in a work zone.	WZW-UN-01
WZW-SR-002	The system shall alert drivers of lane shifts and lane reductions within the work zone.	WZW-UN-02
WZW-SR-003	The system shall issue alerts and notifications in a work zone.	WZW-UN-02
WZW-SR-004	The system shall change and customize alerts and notifications in a work zone.	WZW-UN-03

2.4.10.3 Additional Requirements

This application should be accessible to end users utilizing a mobile communication device, including smart phones. In addition, this should be broadcast locally at each location via DSRC communications.

2.4.11 Connected Eco-Driving (CED)

This application will use the on-board mobile app to collect and process vehicle data. Through real-time information and feedback on driving behavior, optimal driving speeds, optimal acceleration, and optimal deceleration profiles, users can reduce their fuel usage and emissions.

2.4.11.1 User Needs

Identification	Application	User Need
CED-UN-001	Connected Eco-Driving	Motorists need to receive notifications and feedback regarding driving efficiency including recommended driving speeds, optimal acceleration, and optimal deceleration.
CED-UN-002	Connected Eco-Driving	The system needs to issue notifications and feedback regarding driving efficiency including recommended driving speeds, optimal acceleration, and optimal deceleration.

2.4.11.2 Use Case-specific System Requirements

ID	Requirement	User Need

CED-SR-001	Motorists need to receive notifications and feedback regarding driving efficiency including recommended driving speeds, optimal acceleration, and optimal deceleration.	CED-UN-01
CED-SR-002	The system needs to issue notifications and feedback regarding driving efficiency including recommended driving speeds, optimal acceleration, and optimal deceleration.	CED-UN-02

2.4.11.3 Additional Requirements

The potential contractor should provide additional details on how they propose to achieve this use case.

2.5 SYSTEM CONDITIONS AND REQUIREMENTS

The following sections include system conditions for safety and performance that will be used to validate the system is improving safety and support the efficacy of the system. The tables below contain the Safety Requirements and the Performance Measure Requirements.

2.5.1 SAFETY REQUIREMENTS

ID	Requirement
SAF-SR-001	Equipment, software, processes, and interfaces shall comply with IEEE and SAE standards as prescribed by one of the USDOT approved certification entities.
SAF-SR-002	Equipment, software, processes, and interfaces shall be tested for interoperability before deployment to ensure they meet those standards for interoperability.
SAF-SR-003	The contractor shall perform checks on the equipment, software, interfaces, and processes on a six month basis at a minimum.
SAF-SR-004	The contractor shall maintain the RSUs installed along the roadside for the duration of the project.
SAF-SR-005	OBU/Application failure shall not affect the normal operation of the vehicle.
SAF-SR-006	RSU/Application failure shall not affect the safe operation of the signal controller.
SAF-SR-007	RSUs shall be installed such that they receive GPS and DSRC signals.
SAF-SR-008	RSUs shall be installed near signal cabinets such that the RSU and signal controller can be connected.
SAF-SR-009	The in-vehicle applications shall present information to drivers using a device that drivers are familiar with and that minimizes interaction.
SAF-SR-010	CV device suppliers shall provide and follow an approved quality management process in designing, constructing, and producing their devices.
SAF-SR-011	The proposed user interface(s) shall be reviewed and approved by NCDOT and core team members.
SAF-SR-012	Safety checks for OBU's and RSU's shall include the equipment reset functions upon power loss and restoration.
SAF-SR-013	Safety checks for OBU's and RSU's shall include the redundancy actions upon power loss and restoration.
SAF-SR-014	Safety checks for OBU's and RSU's shall include the security actions upon power loss and restoration.
SAF-SR-015	Device installers shall be approved by NCDOT and NCSU - Transit to install devices in buses.
SAF-SR-016	Device installers shall be approved by NCDOT and the City of Raleigh to install devices in signal cabinets and along the roadside.

ID	Requirement
SAF-SR-017	Devices installed for the pilot shall have a failsafe mode.
SAF-SR-018	All basic safety messages shall include longitude, latitude, vertical position, and yaw.
SAF-SR-019	All basic safety messages shall conform to the latest published versions of SAE J2735 and SAE J2495/1 standards.
SAF-SR-020	All basic safety messages generated by the global navigation satellite system shall include orientation, speed, and heading.

2.5.2 Performance Measures System Requirements

ID	Requirement
PFM-SR-001	The Primary Server shall collect historical or "before CV treatment" performance metrics for each CV App used in each Use Case if available.
PFM-SR-002	The Primary Server shall store historical or "before CV treatment" performance metrics for each CV App used in each Use Case if available.
PFM-SR-003	The Primary Server shall collect performance metrics for each CV App used during each Use Case.
PFM-SR-004	The Primary Server shall store performance metrics for each CV App used during each Use Case.
PFM-SR-005	The Primary Server shall enable the analysis or compare historical or "before CV treatment" performance metrics for each CV App used in each Use Case to "after CV treatment" performance metrics for each CV App used in each Use Case.
PFM-SR-006	The Primary Server shall automate routine performance reports.
PFM-SR-007	The Primary Server shall automate on demand performance reports.
PFM-SR-008	The Primary Server shall automate daily performance reports.
PFM-SR-009	The Primary Server shall automate weekly performance reports.
PFM-SR-010	The Primary Server shall automate monthly performance reports.
PFM-SR-011	The system shall collect and store: • delay time • queue length • travel time reliability indices • travel times • percent arrival on green • percent red light running/violation • number of time red light running/violation warning issued • bus travel time through the deployment region • bus percent arrival on schedule • bus percent arrival on green • bus percent red light violation/running • number of times priority is requested and granted • number of time priority is requested and denied • number of times priority is requested, granted, and then denied due to a higher priority

2.6 SYSTEM CAPABILITIES AND CONDITIONS REQUIREMENTS

The system capabilities and conditions in this chapter are system requirements that are not directly tied to a specific user need but must be maintained to keep the system operational.

2.6.1 PHYSICAL REQUIREMENTS

The physical systems requirements for construction, mechanical, electrical, durability, scalability, and environmental are listed in the following subsections.

ID	Requirement
PHY-SR-001	DSRC Antenna shall be mounted in a location with a clear path to the directions from which it is anticipated CV communications will take place.
PHY-SR-002	GPS Antenna shall be installed with a clear view of the sky.
PHY-SR-003	RSUs shall be installed with the proper environmental protection from rain, flooding, freezing, or high winds.
PHY-SR-004	Equipment wiring diagrams and any other documentation shall be provided to the Department prior to installation of the equipment.
PHY-SR-005	All CV devices shall meet USDOT requirements as determined by USDOT certification entities for durability including withstanding wear and tear, operating time, and damage.
PHY-SR-006	The system shall be adaptable to scale up or down in terms of geography and the quantities of RSUs, OBUs, and PIDs.

2.6.2 PERFORMANCE CHARACTERISTICS

The system performance requirements are needed to ensure the system is meeting expectations and is functioning as needed.

ID	Requirement
SPC-SR-001	The system shall have redundancy.
SPC-SR-002	The system shall be in real-time.
SPC-SR-003	The RSUs shall return to operational state within five minutes of losing power.

2.6.3 SECURITY REQUIREMENTS

System security is of the utmost importance from both a personally identifiable information perspective as well as a system intrusion perspective. Security requirements for the pilot are listed in the table below.

ID	Requirement
SEC-SR-001	All systems shall be compatible with Security Credential Management System (SCMS) to ensure authenticity and privacy.
SEC-SR-002	All roadside equipment shall support remote authenticated access.
SEC-SR-003	An RSU shall verify received messages per IEEE 1609.2 and per the relevant security profiles before using them for operations in any application.
SEC-SR-004	An RSU shall require that 1609.2 signed messages are signed by a certificate that is protected from modification by, or chains back to a certificate that is protected from modification by, the secure boot process.

ID	Requirement
SEC-SR-005	An RSU shall provide tamper evidence to detect tampering of the device (e.g. opening of the case).
SEC-SR-006	An RSU shall implement a firewall blocking all IP access from devices to any IP address other than those approved for specific applications.
SEC-SR-007	An RSU shall comply with IEEE 1609.2: Standard for WAVE Security Services for Applications and Management Messages.
SEC-SR-008	An RSU shall delete old certificates if it has been moved to another intersection.
SEC-SR-009	An OBU shall verify received messages per IEEE 1609.2 and per the relevant security profiles before using them for operations in any application.
SEC-SR-010	An OBU shall verify a DSRC message when other potential threat situations such as red-light violations, and other safety applications are active.

2.6.4 Information Management Requirements

The pilot will include some personal data and system generated data which must be managed and protected according to the Personal Data Information Management Requirements and the System Generated Data Requirements below.

ID	Requirement
PDI-SR-001	Data shall not include personally identifiable information (PII) or it shall be removed prior to public release.
PDI-SR-002	The system shall protect personal information including name, address, and vehicle make/model meeting standards for security of PII.
PDI-SR-003	There shall be an established list of personnel that have access to participant data but shall not have access to CV data generated by the participants.
PDI-SR-004	The participant's location information shall not be provided unless it is part of an application and no correlation to the participant's personal information.
PDI-SR-005	For broadcast and transactional unicast transmissions by OBUs, temporary and one-time identifiers shall be used to protect against inadvertently providing PII.
PDI-SR-006	Personal data access shall require a login with password protection.

ID	Requirement
SGD-SR-001	Data collected shall be property of NCDOT.
SGD-SR-002	Data delivered by vendor systems, software, or applications will be considered property of NCDOT and free of IP limitations.
SGD-SR-003	The system shall, in all ways, comply with the policies of the data management plan.
SGD-SR-004	The data shall be collected and stored in standard, non-proprietary formats.
SGD-SR-005	The data shall be described in type, scale, collection method, and format.
SGD-SR-006	Any proprietary data collected shall require rationale, format, standards, and a data dictionary.
SGD-SR-007	Metadata standards shall be required in accordance with the Project Open Metadata Schema.
SGD-SR-008	Data and metadata shall be transmitted to primary servers through a secure communications connection.

ID	Requirement
SGD-SR-009	Data shall be securely backed up on a regular schedule to protect against a single point of failure.
SGD-SR-010	Data shall be in accordance with the data retention schedule determined by NCDOT.
SGD-SR-011	When local data is required to be transmitted to the Primary server, messages transmitted and received by RSUs shall be stored on a storage device connected locally to the RSU until transmitted to the primary server.
SGD-SR-012	When local data is required to be transmitted to the Primary server, the frequency at which data locally stored on RSUs is transmitted to the primary server shall be determined based on the RSUs' storage capacity.

2.7 OPERATIONAL REQUIREMENTS

The following subsections include requirements as they pertain to systems operations for maintainability and reliability.

2.7.1 MAINTAINABILITY REQUIREMENTS

ID	Requirement
MAI-SR-001	RSU communication failures shall be responded to within one business day in accordance with the City of Raleigh response time for signal controllers.
MAI-SR-002	RSU communication failures shall be restored in accordance with the City of Raleigh response time for signal controllers.
MAI-SR-003	RSU hardware failures shall be addressed in accordance with the City of Raleigh response time for signal controllers.
MAI-SR-004	RSU application issues shall be responded to in accordance with the City of Raleigh response time for signal controllers.
MAI-SR-005	Planned maintenance shall be performed during off peak hours of the pilot's operation and be coordinated in advance with the City of Raleigh.
MAI-SR-006	Support staff shall be trained to troubleshoot and diagnose the system including RSUs, OBUs, and portable personal information device issues.
MAI-SR-007	A set of support, diagnostic, and troubleshooting procedures shall be developed to guide the support staff.
MAI-SR-008	The contractor shall maintain the RSUs installed in the signal cabinets as part of this pilot.

2.7.2 RELIABILITY REQUIREMENTS

ID	Requirement
REL-SR-001	RSUs shall meet *CTI (Connected Transportation Interoperability) 4001 v01.01 - Roadside Unit (RSU) Standard Amendment*, as a minimum.
REL-SR-002	When local data is required to be transmitted to the Primary server, RSUs shall store their data and not delete or rollover the data until it has confirmed the data has been successfully transmitted to the Primary server and properly stored.

2.8 POLICY AND REGULATION

All systems must follow federal, state, and local law as it pertains to the project including obtaining proper licensing for DSRC through the FCC.

ID	Requirement
PAR-SR-001	Proper licensing to broadcast using DSRC shall be obtained.
PAR-SR-002	The system shall comply with all local, state, and federal laws.
PAR-SR-003	All OBUs shall meet license requirements of FCC rules.

3 PROJECT MANAGEMENT

3.1 INSTALLATION AND INTEGRATION

The selected contractor will be responsible for the installation of any hardware and software required under this pilot. They will also be responsible for any integration with the existing system or infrastructure that may be needed. The contractor shall provide a Systems Design Document that provides high-level design that meets the requirements of the project.

3.2 COORDINATION

The selected contractor will be expected to coordinate efforts with a wide range of interested parties. This is a NCDOT contract, so NCDOT will be the primary point of contact for coordination. The signals included in this pilot are part of the Raleigh Signal System, so any work to be performed on site will need to be coordinated with the City of Raleigh staff as well. Any integration in with the Raleigh Signal System will need to be coordinated with the City of Raleigh staff including their IT. Coordination with NCSU Transit and the bus owners will be required, especially for the Transit Signal Priority portion of this pilot. Also, coordination with NCSU ITRE staff will be required to ensure they have proper access to the system to effectively evaluate the use cases.

3.3 TESTING AND CONFIGURATION

The contractor will be expected to configure and test installed components for proper operation. These efforts should be documented, with the testing procedures approved by the NCDOT in advance. Documentation shall include a System Verification Plan and System Validation Plan.

3.4 SCHEDULED MEETINGS

As part of this pilot, the contractor will be expected to conduct status meeting to keep everyone updated on the progress of the project. These meetings are expected to be weekly initially, but may transition into a monthly interval as the project progresses, installations are complete, and the project moves into the operations phase. Status update meetings are intended to discuss current progress and issues, status of items, any issues that may be impacting the project, and ensuring the project stays on schedule.

3.5 DOCUMENTATION

The contractor shall provide any and all documentation related to the offered solution as part of this project. This includes user manuals, wiring diagrams, configuration instructions, testing procedures, and operational manuals. Wiring of equipment should be documented, and submitted for approval in advance of installation. Documentation shall include the following systems engineering documents, as a minimum:

- Systems Design Document
- System Verification Plan
- System Validation Plan

3.6 CONTRACT LENGTH

This pilot will last three years, from the date of an executed agreement with a contractor. The contractor shall be responsible for maintenance and any issues that may arise during this time. At the conclusion of this pilot, all installed infrastructure including hardware and software will remain property of the Department. Maintenance and operations after the conclusion of the pilot will become the responsibility of the Department.

3.7 SCHEDULE

Milestones for the pilot are shown below. Initial work on the pilot will focus on necessary infrastructure upgrades as well as safety applications. The transit signal priority application implementation will occur approximately three months after the infrastructure upgrades and safety applications deployment is complete to allow for a brief period of system normalization. The eco driving application implementation will occur approximately six months after the transit signal application deployment. This also will allow for a period of before study to measure the effectiveness of the eco driving application on the pilot corridors. Any proposed changes to the schedule will need to be coordinated with the Department.

MMCVP Project Milestones			
Milestone	**Description**	**Planned Start Date**	**End Date**
Kick-Off Meeting	Conduct a kick-off meeting with DOT within four (4) weeks.	5/1/2023	5/31/2023
Order Equipment	Should be accomplished within 120 days of selection.	5/1/2023	8/31/2023
Signal Plan Design	Signal plan design can begin	5/1/2023	7/31/2023
Survey Site	Site surveys should be done soon after meeting with contractor and prior to ordering equipment.	5/1/2023	7/31/2023
FCC Site License	FCC licensing process should begin shortly after site surveys.	5/1/2023	8/31/2023
Develop Multimodal (Safety) Application	Development of safety applications (SPaT, pedestrian, red light warning, speed warning, and work zone warning) should begin after meeting with contractor.	5/1/2023	8/31/2023
MAP Creation	Development of MAP files can begin after site surveys are completed.	5/1/2023	6/30/2023
Equipment Delivery	Anticipate equipment delivery 60-90 days after order.	11/1/2023	12/31/2023
Installation	Installation of equipment can begin after delivery.	12/1/2023	1/31/2024
System Integration	Integration of the system can begin once equipment installation begins and is expected to be completed within 30 days after equipment installation.	1/1/2024	2/29/2024

Develop TSP Application	Development of Transit Signal Priority application should begin approximately three months after the infrastructure upgrades and safety applications deployment.	11/1/2023	2/29/2024
System Verification	Verification of the system can begin once system installation and integration is complete.	3/1/2024	4/30/2024
System Testing	Testing of the system can begin after verification of the system is complete or alongside verification of the system.	3/1/2024	4/30/2024
Develop Eco Driving Application	Development of the Eco Driving Application is to begin approximately six (6) months after the transit signal application deployment.	8/1/2024	12/31/2024
Outreach and Education	Outreach and education is expected to be a continuous process. Stronger efforts will be required at different times for different users as new stages of the project become operational.	5/1/2023	4/30/2026
System Operations and Maintenance	Operations and maintenance support is expected to begin once the system has been tested and is operational and will continue for the duration of the contract.	5/1/2024	4/30/2026

3.8 PUBLIC OUTREACH

The contractor will be responsible for conducting public outreach as part of this pilot. This public outreach will include reaching out to end users such as students of NCSU and Governor Morehead School. Participation in the pilot and receiving feedback from participants is key to the success of this pilot. The contractor will develop a program that actively seeks to achieve this goal to ensure participation in the pilot and measurement of a successful pilot is able to be achieved.

3.9 PROJECT EVALUATION SUPPORT

The contractor will be expected to support the evaluation of this pilot by ensuring the appropriate parties can access the necessary data and reports. A key component of this pilot is to measure the effectiveness of the deployed use cases and applications. As such, evaluation of these components will take place at certain intervals of this pilot. Further information on this evaluation process can be found in the Project Evaluation Plan. The contractor will be expected to assist others, such as staff from ITRE, in accessing and gathering data as needed to evaluate this pilot. The contractor will be expected to prepare and ensure survey data is collected from participants of the pilot where other methods of performance evaluation is not possible. These surveys will be prepared for performance measures identified in the Project Evaluation Plan and used to evaluate the effectiveness of the deployed applications and use cases.

3.10 DATA MANAGEMENT

The contractor will be expected to adhere to the Data Management Plan for this pilot, as well as any other established NCDIT policies. The Data Management Plan details expectations concerning PII, data storage, data access, data retention, as well as data preservation.

3.11 SECURITY

The contractor shall ensure a security credential management system (SCMS) is in place to ensure the authenticity, integrity, and security of all messages and data involved in this pilot. If a SCMS is not available, the contractor should provide additional details on how their proposed solutions will address these requirements.

4 TRAINING

The contractor will provide training on the different system components deployed under this pilot. At a minimum, the contractor is to provide two and a half (2 ½) days of training.

Training will include, at a minimum:

- Installation and maintenance
- Equipment configuration
- Equipment testing
- MAP configuration
- Message conversion and uploading, if any (including traveler information messages (TIM))
- Message security validation configuration (interface to SCMS)
- Applications Training
- Transit signal priority

The contractor is expected to supply a training agenda and resume(s) for the instructor(s) at least thirty (30) days in advance for approval by the Department. The instructor(s) shall be knowledgeable on the subject matter to be covered.

Contractor will be responsible for the following:

- Providing all training material, handouts, and documentation to support the training sessions up to 25 individuals.
- Covering all costs associated with instructor(s) and vendor personnel for the training including wages, travel, and other expenses incurred by these personnel.
- Recording training sessions and making the recordings available to the Department within thirty (30) days of the training.

The training will be provided for up to 25 individuals in person, unless otherwise agreed upon by both the Contractor and the Department in writing. The training shall include enough training material and documentation for all 25 individuals. Any presentations, handouts, and all other training material shall be submitted electronically to the Department within thirty (30) days after the training has been completed so it can be used for future internal training needs.

The Department will provide the location for the training. In addition, the Department will provide any necessary hardware, power cords, and audio/visual equipment requested by the Contractor at least two (2) weeks in advance of the training date.

At the request of the Department, or if agreed upon by the Department, this training may be held remotely in a virtual environment. The Department may request, or may agree to, the training being conducted in a hybrid format with training available in a remote virtual environment simultaneously with the in-person training. If training is held remotely, the vendor shall ensure that all handouts, training materials, and anything else necessary for an effective training class is provided to the attendees at least forty-eight (48) hours in advance of the training. If any additional software will need to be loaded onto Department computers for the training, this software will be provided to the Department at least thirty (30) days in advance for approval and installation. Virtual training sessions shall be recorded by the contractor, with the recording provided to the Department within thirty (30) days of completing of the training.

5 WARRANTY AND SUPPORT

Contractor shall provide on-going support and warranties for all items installed under this pilot. The contractor is expected to provide maintenance support for all items for the duration of the pilot.

Provide manufacturer's warranties on equipment for material and workmanship by the equipment manufacturer and ensure warranty period of at least three years in length from the date of delivery. Include unconditional coverage for all parts and labor necessary or incidental to the repair of defective equipment or workmanship and malfunctions that arise during the warranty period. All warranties and guarantees that are customarily issued by the equipment manufacturer that exceed this requirement shall be acceptable.

6 MEASUREMENT AND PAYMENT

Bidder shall provide their total turnkey price along with itemized unit prices included in that total turnkey bid price.

6.1 MEASUREMENT AND PAYMENT DETAILS

1. ***Furnish and install 2070LX controller unit*** will be measured and paid as the actual number furnished, configured, installed, tested, and accepted.
2. ***Local controller software license*** will be measured and paid as the actual number furnished, configured, installed, tested, and accepted.
3. ***Update signal plans and electrical details*** will be measured and paid as the actual number furnished and accepted.
4. ***Furnish and install video detection system*** will be measured and paid as the actual number furnished, configured, tested, and accepted.
5. ***Furnish and install roadside unit (cellular and DSRC/C-V2X hybrid unit)*** will be measured and paid as the actual number furnished, configured, installed, tested, and accepted. All antennae, wiring, cabling, mounting, grounding, conduits, PoE surge protectors, cable termination, software configuration, MAP file generation, and any other work to provide and install a fully operational RSU will be considered incidental.
6. ***Furnish spare roadside unit (cellular and DSRC/C-V2X hybrid unit)*** will be measured and paid as the actual number furnished and accepted.

7. ***Obtain FCC licenses for RSU*** will be measured and paid as the actual number accepted by the FCC.
8. ***Provide Safety related applications including the following applications:***
    - ***SPaT application***
    - ***Pedestrian in Signalized Crosswalk Warning application***
    - ***Mobile Accessible Pedestrian Signal System application***
    - ***Red Light Violation Warning application.***
    - ***Speed Warning application***
    - ***Work Zone Warning application***

    This line item will be measured and paid at the bid lump sum price.

9. ***Provide TSP application including integration into existing system*** will be measured and paid at the bid lump sum price. All antennae, wiring, cabling, mounting, grounding, conduits, cable terminations, software configuration, and any other work to provide and install a fully operational TSP system will be considered incidental.
10. ***Furnish and install onboard unit or human machine interface (such as a tablet running an application) in the transit vehicle*** will be measured and paid as the actual number furnished and accepted. All antennae, wiring, cabling, mounting, grounding, conduits, PoE surge protectors, cable termination, software configuration, and any other work to provide and install a fully operational OBU will be considered incidental.
11. ***Furnish spare onboard unit or human machine interface*** will be measured and paid as the actual number furnished and accepted.
12. ***Furnish and install pedestrian detection system*** will be measured and paid as the actual number furnished, installed, tested, and accepted. All wiring, cabling, mounting, grounding, conduits, surge protectors, cable termination, software configuration, and any other work to provide and install a fully operational pedestrian detection system will be considered incidental.
13. ***Provide and integrate an Intelligent Traffic Signal System (I-SIG)*** will be measured and paid at the bid lump sum price.
14. ***Furnish and install a High Resolution Data solution*** will be measured and paid at the bid lump sum price. All wiring, cabling, mounting, grounding, conduits, surge protectors, cable termination, licenses, software configuration, integration, and any other work to provide and install a fully operational high resolution data solution will be considered incidental.
15. ***Provide Automated Traffic Signal Performance Measures (ATSPM) solution*** will be measured and paid at the bid lump sum price. All licenses, software configuration, integration, and any other work to provide an ATSPM solution will be considered incidental.
16. ***Furnish and install a connected Eco-Driving system*** will be measured and paid at the bid lump sum price. All wiring, cabling, mounting, grounding, conduits, surge protectors, cable termination, software configuration, integration, and any other work to provide and install a fully operational eco-driving system will be considered incidental.
17. ***Install and integrate cellular modem*** will be measured and paid as the actual number installed, integrated, and accepted. All wiring, cabling, mounting, grounding, conduits, surge protectors, cable termination, configuration, and any other work to install and integrate a fully operational cellular modem will be considered incidental.
18. ***Project management*** will be measured and paid at the bid lump sum price.

19. ***Integration, testing, and documentation*** will be measured and paid at the bid lump sum price. Documentation shall include the following systems engineering documents: Systems Design Document, System Verification Plan, and System Validation Plan.
20. ***Public outreach*** will be measured and paid at the bid lump sum price.
21. ***Project evaluation support*** will be measured and paid at the bid lump sum price.
22. ***Training*** will be measured and paid at the bid lump sum price.
23. ***Security Credential Management System*** will be measured and paid at the bid lump sum price. All wiring, cabling, mounting, grounding, conduits, surge protectors, cable termination, licenses, software configuration, integration, and any other work to provide and install a fully operational security credential management system will be considered incidental.
24. ***Cabinet replacement*** will be measured and paid as the actual number furnished, configured, installed, tested, and accepted.
25. ***Warranty and support*** will be measured and paid at the bid lump sum price.

6.2 MILESTONE PAYMENT SCHEDULE

Line Item	Payment Schedule Task	Terms of Payment
1	Furnish and install 2070LX controller unit	100% paid after successful installation, integration, testing, and acceptance
2	Local controller software license	100% paid upon equipment receipt
3	Update signal plans and electrical details	100% paid upon updated plan receipt
4	Furnish and install video detection system	100% paid after successful installation, integration, testing, and acceptance
5	Furnish and install roadside unit (cellular and DSRC/C-V2X hybrid unit)	100% paid after successful installation, integration, testing, and acceptance
6	Furnish spare roadside unit (cellular and DSRC/C-V2X hybrid unit)	100% paid upon equipment receipt
7	Obtain FCC licenses for RSU	100% paid upon receipt
8	Provide Safety related applications including the following applications: - SPaT application - Mobile Accessible Pedestrian Signal System application - Red Light Violation Warning application. - Speed Warning application - Work Zone Warning application	100% paid after 100% successful system operation
9	Provide TSP application including integration into existing system	100% paid after 100% successful system operation

10	Furnish and install onboard unit or human machine interface (such as a tablet running an application) in the transit vehicle	100% paid after successful installation, integration, testing, and acceptance
11	Furnish spare onboard unit or human machine interface	100% paid upon equipment receipt
12	Furnish and install pedestrian detection system	100% paid after successful installation, integration, testing, and acceptance
13	Provide and integrate an Intelligent Traffic Signal System (I-SIG)	100% paid after 100% successful system operation
14	Furnish and install a High Resolution Data solution	100% paid after successful implementation and system operation
15	Provide Automated Traffic Signal Performance Measures (ATSPM) solution	100% paid after successful implementation
16	Furnish and install a connected Eco-Driving system	100% paid after successful implementation and system operation
17	Install and integrate cellular modem	100% paid after 100% successful implementation
18	Project management	50% paid after successfully meeting project milestones at the end of year 1 of the project 30% paid after successfully meeting project milestones at the end of year 2 of the project 20% paid after successful project completion
19	Integration, testing, and documentation	100% paid after 100% successful system operation and documentation delivery
20	Public outreach	50% paid after successful public outreach support at the end of year 1 of the project 30% paid after successful public outreach support at the end of year 2 of the project 20% paid after successful project completion
21	Project evaluation support	30% paid after successful project evaluation support at the end of year 1 of the project 50% paid after successful project evaluation support at the end of year 2 of the project 20% paid after successful project completion
22	Training	100% paid after 100% training complete
23	Security Credential Management System	100% paid after successful implementation and system operation
24	Cabinet replacement	100% paid after successful installation, integration, testing, and acceptance
25	Warranty and support	100% paid after 100% successful project completion

6.3 ITEMIZED AND TURNKEY PRICE

Line Item	Description	Qty	Unit	Unit Price ($)	Extended Price ($)
1	Furnish and install 2070LX controller unit	30	EA		
2	Local controller software license	30	EA		
3	Update signal plans and electrical details	30	EA		
4	Furnish and install video detection system	31	EA		
5	Furnish and install roadside unit (cellular and DSRC/C-V2X hybrid unit)	31	EA		
6	Furnish spare roadside unit (cellular and DSRC/C-V2X hybrid unit)	1	EA		
7	Obtain FCC licenses for RSU	31	EA		
8	Provide Safety related applications including the following applications: - SPaT application - Pedestrian in Signalized Crosswalk Warning application - Mobile Accessible Pedestrian Signal System application - Red Light Violation Warning application. - Speed Warning application - Work Zone Warning application	1	LS		
9	Provide TSP application including integration into existing system	1	LS		
10	Furnish and install onboard unit or human machine interface (such as a tablet running an application) in the transit vehicle	35	EA		
11	Furnish spare onboard unit or human machine interface	1	EA		
12	Furnish and install pedestrian detection system	2	EA		
13	Provide and integrate an Intelligent Traffic Signal System (I-SIG)	1	LS		
14	Furnish and install a High Resolution Data solution	1	LS		
15	Provide Automated Traffic Signal Performance Measures (ATSPM) solution	1	LS		
16	Furnish and install a connected Eco-Driving system	1	LS		
17	Install and integrate cellular modem	2	EA		
18	Project management	1	LS		
19	Integration, testing, and documentation	1	LS		
20	Public outreach	1	LS		

21	Project evaluation support	1	LS		
22	Training	1	LS		
23	Security Credential Management System	1	LS		
24	Cabinet replacement	1	EA		
25	Warranty and support	1	LS		
	Total turnkey bid price				

7 GLOSSARY OF TERMS

Term	Definition
Application	One or more pieces of software designed to perform some specific function.
Basic Safety Message (BSM)	Data broadcasted from vehicles through V2V and V2I at a frequency of 10 Hz. The core contents of a BSM are data elements that describe a vehicle's position and motion.
Concept of Operations (ConOps)	A user-oriented document that describes a system's operational characteristics from the end user's viewpoint.
Connected Vehicle (CV)	A vehicle (car, truck, bus, etc.) that is equipped with a wireless communication device. A CV uses any of the available wireless communication technologies to communicate with other cars on the road (vehicle-to-vehicle [V2V]), roadside infrastructure (vehicle-to-infrastructure [V2I]), and other travelers and the cloud (V2X).
Dedicated Short Range Communication (DSRC)	A communications protocol developed to address the safety critical issues associated with sending and receiving data among vehicles and between moving vehicles and fixed roadside access points.
Dilemma Zone	An area where drivers approaching a signalized intersection must decide, when facing a yellow indication, to either proceed through the intersection or decelerate and come to a stop
Intelligent Traffic Signal System (I-SIG)	A traffic signal system that uses data collected from vehicles through V2V and V2I communications as well as pedestrian and non-motorized travelers to control signals and maximize flows in real time. The I-SIG application also plays the role of an overarching system optimization application, accommodating transit or freight signal priority, preemption, and pedestrian movements to maximize overall network performance.
Interoperability	The ability of a system to communicate with other systems to provide the same service in different physical locations. It is also the ability of one system (or component) to replace another without degrading the service being provided.
Mobile Accessible Pedestrian Signal System (PED-SIG)	An application that allows for an automated call from a smart phone to the traffic signal, as well as cues to safely navigate the crosswalk.

Term	Definition
On-board Equipment (OBE)	A piece of ITS related hardware that is located in a vehicle to collect data from the vehicle and/or provide an interface through which ITS services can be provided, e.g. tolls, navigation, trip planning, travel information.
On-board Unit (OBU)	A piece of equipment located in a vehicle to receive and transmit data to and from other CV devices (such as a RSU or another OBU).
Pedestrian in Signalized Crosswalk Warning (Transit)	An application that warns drivers when pedestrians, within the crosswalk, are in the intended path of the vehicle.
Portable Personal Information Device	A portable device that allows the user to receive data wirelessly. For example, a smartphone.
Signal Phase and Timing (SPaT)	The signal state of the intersection and how long this state will persist for each approach and lane that is active, according to the SPaT Benefits Report. The SPaT message sends the current state of each phase, with all-red intervals not transmitted. Movements are given to specific lanes and approaches by use of the lane numbers present in the message.
Signal Request Message (SRM)	Broadcast by vehicles to request priority.
Signal Status Message (SSM)	Broadcast by roadside units (RSU) to announce pending priority requests.
Transit Signal Priority (TSP)	An application that provides signal priority to transit at intersections.
Vehicle to Infrastructure (V2I)	A communication that promotes the exchange of information between the vehicles and the infrastructure.
Vehicle to Vehicle (V2V)	A communication that promotes the exchange of information between vehicles.
Vehicle to Many (V2X)	Pronounced “vehicle to many,” a communication that promotes the exchange of information between the vehicles and various counterparts including other means of transport, the infrastructure, traffic management centers and various Internet applications.

8 ATTACHMENTS

Attachment 1: Project Evaluation Plan
Attachment 2: Data Management Plan
Attachment 3: NCDOT Automated Traffic Signal Performance Measures ATSPM Implementation Plan (Provided for reference only.)

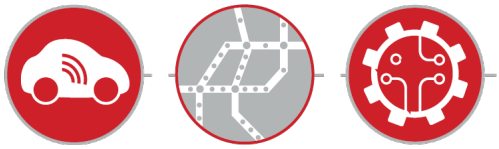
Appendix Part B – Project Evaluation Plan

NCDOT Multimodal Connected Vehicle Pilot

Project Evaluation Plan

Version 2.2

February 3, 2023



Contents

List of Tables

Version History

Version	Date	Summary of Changes
1.0	1/14/21	Initial Version
2.0	10/5/21	Updated per ITRE Review
2.1	1/6/23	Updated quantities and schedule
2.2	2/3/23	Updated schedule

Project Evaluation Plan

INTRODUCTION

PURPOSE OF THE DOCUMENT

Evaluation of the Multimodal Connected Vehicle Pilot will allow the partner agencies to demonstrate the effectiveness of the pilot to address transportation goals and objectives. An evaluation plan defines what the program will evaluate, how evaluation will be done, and the thresholds for determine system success. The results of the evaluation are intended to assist DOT in determining which elements of the pilot project can be applied in in other geographic areas that demonstrate the same needs and similar characteristics.

EVALUATION PROCESS

The following process was developed for the evaluation of the Multimodal Connected Vehicle Pilot. After defining goals and objectives, an evaluation question was written for each of the defined project objectives. These evaluation questions guided the remaining steps of the process, shown in Figure 1.

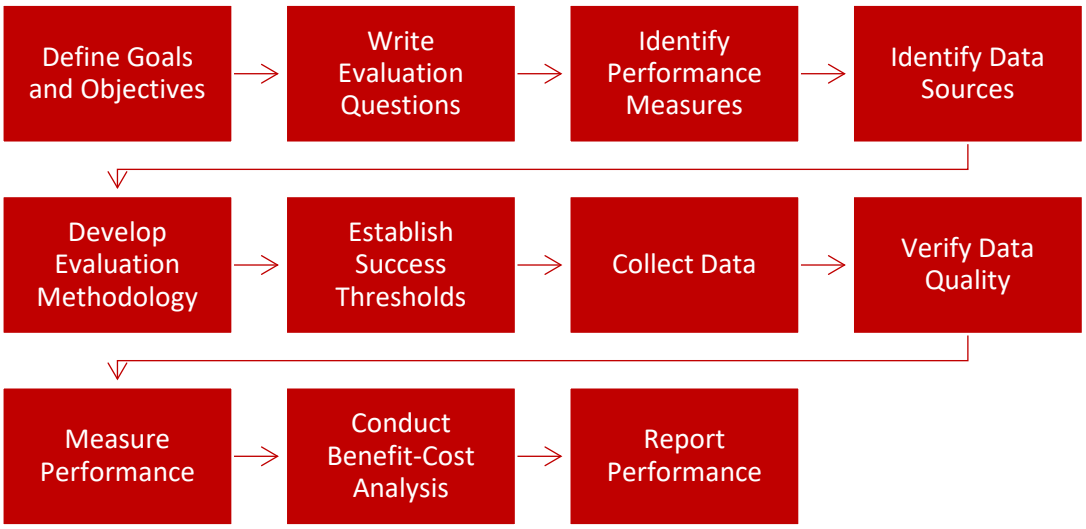
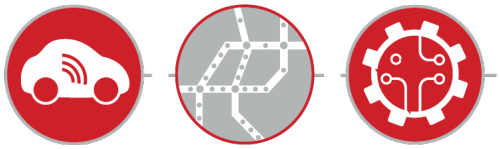


Figure 1. Project Evaluation Process



PROJECT OVERVIEW

The NCDOT MMCVP explores technologies to improve the day-to-day transportation experience for pedestrians, cyclists, motorists, and transit drivers and passengers. To properly evaluate the integration of these technologies, a small geographic area inclusive of the NCSU campus was identified as an ideal location for testing. Using the data gathered in the pilot, NCDOT hopes to expand the successful technologies to additional geographic areas in the region and across the state.

A key component of the experience for students, faculty, and visitors on the NCSU campus is the free bus system, Wolfline. The Wolfline buses have on-board Wi-Fi which will be used to support TSP and mobile safety notifications. This technology will be deployed on 35 buses operating on 11 routes and covering a network encompassing 30 signalized intersections. Because Wolfline buses are available for public use, the pilot benefits extend beyond the student population to the entire geographic area served by the system.

TECHNOLOGY HIGHLIGHTS

SIGNAL & INTERSECTION IMPROVEMENTS

- **Signal Phase and Timing (SPaT)** – broadcast the current phase and residual time for each lane in the intersection; broadcast periodically by intersection
- **Transit Signal Priority (TSP)** – Optimizes signal timing for improved schedule adherence and travel time reliability at signalized intersections for transit buses that are behind schedule
- **Intelligent Traffic Signal System (I-SIG)** – Uses vehicle location and movement information from connected vehicles to traffic signal
- **High-Resolution Data** – Optimize traffic signal performance through near real time, lane-by-lane data
- **DSRC/Cellular Hybrid Communications** – Low latency data share of infrastructure and vehicle data for connected vehicle applications

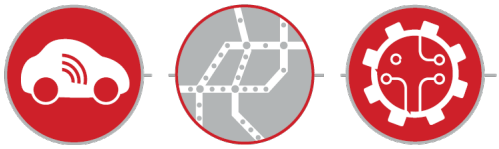
MOBILE APPLICATIONS

- **Pedestrian in Crosswalk Warning** – uses pedestrian detection to alert transit drivers or other motorists that there is a pedestrian in the crosswalk
- **Mobile Accessible Pedestrian Signal System** – uses GPS to help those with limited or no sight to safely cross signalized intersections
- **Red Light Violation Warning** – uses vehicle speed, acceleration, signal timing and geometry to alert a motorist if their vehicle will enter the intersection on red
- **Speed Threshold Warning** – uses vehicle speed to alert a motorist if the vehicle is exceeding the speed limit
- **Work Zone Warning** – Uses cellular communications to alert a motorist if there is a work zone ahead and speed limit will be reduced
- **Connected Eco-Driving** – Uses vehicle speed, acceleration, deceleration, and traffic conditions data to advise motorists to reduce fuel use and decrease emissions

PROJECT STAKEHOLDERS

The following stakeholders and their roles have been identified for the MMCVP.

- **North Carolina DOT** – oversee the project deployment and coordination with members of the partnership;



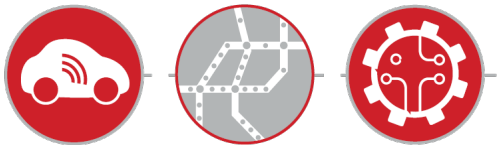
- **City of Raleigh** – participate in the project management team and guide the project development in line with upcoming initiatives such as the BRT implementation on Western Boulevard. In addition, the City will maintain equipment at the signalized intersections, provide necessary central equipment to support the signal system operations and data collection, and provide NCDOT access to the collected data.
- **North Carolina State University (NCSU)** – provide support for deployment of CV technology, specifically the TSP application
- **NCSU Students and Faculty** – Transit riders and pedestrians in the project area
- **Governor Morehead Students and Faculty** – Pedestrians users of the application
- **General Public** – beneficiaries through traffic smoothing and improved safety in the project area
- **Federal Highway Administration** – provide technical assistance and guidance throughout the project.

END-OF-PROJECT SUCCESS

The project will be deemed successful if it meets or exceeds X of the X objectives/goals. The thresholds will be established after the initial data is collected. The "before data" will provide a baseline for ground truth comparison.

PROJECT MILESTONE SCHEDULE

MMCVP Project Milestones			
Milestone	**Description**	**Planned Start Date**	**End Date**
Kick-Off Meeting	Conduct a kick-off meeting with DOT within four (4) weeks.	5/1/2023	5/31/2023
Order Equipment	Should be accomplished within 120 days of selection.	5/1/2023	8/31/2023
Signal Plan Design	Signal plan design can begin	5/1/2023	7/31/2023
Survey Site	Site surveys should be done soon after meeting with contractor and prior to ordering equipment.	5/1/2023	7/31/2023
FCC Site License	FCC licensing process should begin shortly after site surveys.	5/1/2023	8/31/2023
Develop Multimodal (Safety) Application	Development of safety applications (SPaT, pedestrian, red light warning, speed warning, and work zone warning) should begin after meeting with contractor.	5/1/2023	8/31/2023
MAP Creation	Development of MAP files can begin after site surveys are completed.	5/1/2023	6/30/2023
Equipment Delivery	Anticipate equipment delivery 60-90 days after order.	11/1/2023	12/31/2023
Installation	Installation of equipment can begin after delivery.	12/1/2023	1/31/2024
System Integration	Integration of the system can begin once equipment installation begins and is expected to be completed within 30 days after equipment installation.	1/1/2024	2/29/2024
Develop TSP Application	Development of Transit Signal Priority application should begin approximately three months after the infrastructure upgrades and safety applications deployment.	11/1/2023	2/29/2024



System Verification	Verification of the system can begin once system installation and integration is complete.	3/1/2024	4/30/2024
System Testing	Testing of the system can begin after verification of the system is complete or alongside verification of the system.	3/1/2024	4/30/2024
Develop Eco Driving Application	Development of the Eco Driving Application is to begin approximately six (6) months after the transit signal application deployment.	8/1/2024	12/31/2024
Outreach and Education	Outreach and education is expected to be a continuous process. Stronger efforts will be required at different times for different users as new stages of the project become operational.	5/1/2023	4/30/2026
System Operations and Maintenance	Operations and maintenance support is expected to begin once the system has been tested and is operational and will continue for the duration of the contract.	5/1/2024	4/30/2026

PROJECT GOALS AND OBJECTIVES

Table 1 outlines the project objectives based on each of the project's goals. These objectives will allow the project team to apply a more granular level of analysis that can be easily traced back to each goal.

Table 1. Project Goals and Objectives

Goal: Improve mobility within the pilot area for motorists

- Improve travel times
- Improve travel speeds
- Reduce travel delay

Goal: Improve mobility within the pilot area for transit

- Increase schedule adherence for transit buses
- Increase arrival on green
- Increase transit ridership rates
- Improve rider experience
- Improve transit vehicle operator experience

Goal: Improve safety for all users of the pilot area

- Reduce the number of crashes
- Reduce the crash severity in the study area
- Reduce the number of red-light violations
- Reduce the number of crashes involving cyclist and pedestrians
- Improve the road users' safety impression of the pilot area
- Improve the experience of vision impaired pedestrians in the pilot area

Goal: Reduce environmental impacts in the pilot area

- Reduce transportation-related emissions
- Reduce idle times and therefore fuel use

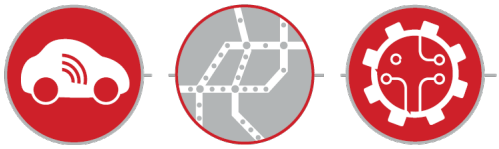
Goal: Reduce costs /Improve ROI

- Demonstrate the benefits outweigh the costs
- Provide cost savings to transportation agencies
- Reduce resources needed from first responders
- Reduce resources needed for data collection

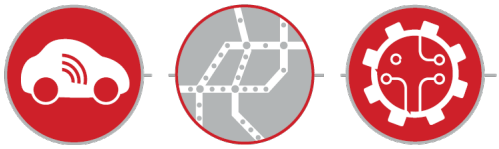
Table 2 depicts the goal alignment with each of the applications planned for deployment during the Multimodal Connected Vehicle Pilot. Each application proposed should contribute to at least one of the goals of the pilot. While evaluation of individual applications may be challenging to isolate, this table shows which applications are contributing to each goal. The overall outcomes of the project can be assumed to be related to one or more of the associated applications deployed during the project.

Table 2. Application and Goal Alignment

Goal / Application	Improve Mobility within the pilot area for motorists	Improve mobility for transit buses in the project area	Improve safety within the pilot area for road users	Reduce environmental impact in the corridor area	Provide cost savings for improved ROI
Signal Phasing and Timing	X	X	X	X	



Goal / Application	Improve Mobility within the pilot area for motorists	Improve mobility for transit buses in the project area	Improve safety within the pilot area for road users	Reduce environmental impact in the corridor area	Provide cost savings for improved ROI
Transit Signal Priority	X	X		X	
Intelligent Traffic Signal System	X	X	X	X	X
High-Resolution Data					X
DSRC/Cellular Hybrid Comms	X	X	X		
Advanced Traffic Signal Performance Measures (ATSPM)					X
Pedestrian in Crosswalk Warning			X		
Mobile Accessible Pedestrian Signal System			X		
Red Light Violation Warning			X		
Speed Threshold Warning			X		
Work Zone Warning			X		
Connected Eco Driving				X	



EVALUATION CRITERIA

The evaluation process is based on the defined goals and objectives. The ability to evaluate each of the objectives is dependent upon the identification of the correct performance measures. The data collected for each performance measure can be either quantitative or qualitative. Quantitative data is numerical and allows for the comparison of progress or regress of a specific data point. The data should be verifiable, and the results should be repeatable. Qualitative data is generally linked to perception and satisfaction levels and is complementary to quantitative-data-based conclusions. For example, there can be a measurable decrease in travel time that is not noticeable to motorists. In this case, the analysis team might decide that the lack of satisfaction by the motorists (a qualitative assessment) outweighs the importance of a small decrease in travel time reflected by the quantitative data analysis.

PERFORMANCE MEASURES

The following performance measures will be used to evaluate the efficacy of the pilot and potential impacts. For each objective under a broader goal, an evaluation question was written. These questions define the performance measures used to validate the pilot project. In some cases, performance measures utilize a surrogate of the primary outcome if collection of the primary data is prohibitively expensive or technically infeasible.

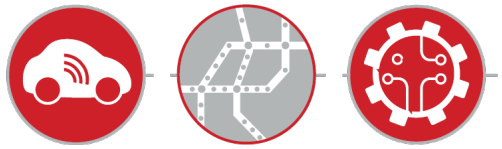
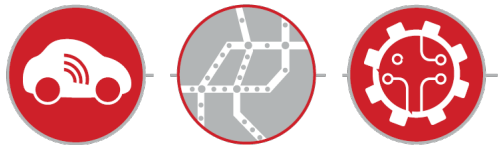


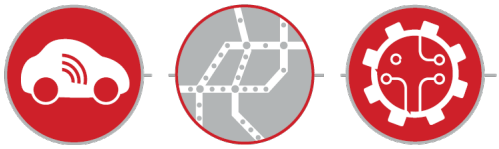
Table 3. Development of Evaluation Questions and Performance Measures

Objective	Objective Evaluation Question	Performance Measure	Evaluation Success Threshold*
Goal: Improve mobility within the pilot area for motorists			
Improve travel times	What effect did the pilot have on travel times in the project area?	Travel Time (vehicle hours traveled per vehicle miles traveled)	
Improve travel speeds	What effect did the pilot have on average speeds in the project area?	Average speed	
Reduce travel delay	What effect did the pilot have on travel delay in the project area?	Delay per trip	
Goal: Improve mobility within the pilot area for transit			
Increase schedule adherence for transit buses	What effect did the pilot have on the transit schedule adherence?	Percent of trips completed on schedule	
Increase arrival on green	What effect did TSP have on buses?	% arrival on green; % arrival on red	
Increase transit ridership rates	What effect did the pilot have on ridership?	Transit ridership rates	
Improve rider experience	What effect did the pilot have on rider experience?	% of riders who report their transit experience has improved	
Improve transit vehicle operator experience	What effect did the pilot have on transit operator experience?	% of transit vehicle operators reporting an improved experience on their route	
Goal: Improve safety for all users of the pilot area			
Reduce the number of crashes	To what extent has the system reduced traffic crashes in the study area?	Crash rate	
Improve the road users safety impression of the pilot area	To what extent does the system improve the safety impression on road users?	Percent of survey respondents who feel safety was improved on the corridor	
Reduce the crash severity in the study area	To what extent has the system reduced crash severity in the study area?	Crash severity	
Reduce the number of red light violations	To what extent does the red light violation warning reduce the number of red light violations?	Red light violation frequency	
Improve safety for cyclist and pedestrians in the pilot area	To what extent has the system improved bike/ped safety in the study area	Bike/Ped conflict rate	
Improve the experience of vision impaired pedestrians in the pilot area	Has the pedestrian accessible app improved the experience of the vision impaired users of the system?	Percent of survey respondents who feel their safety was improved on the corridor	
Goal: Reduce environmental impacts in the pilot area			



Objective	Objective Evaluation Question	Performance Measure	Evaluation Success Threshold*
Reduce transportation related emissions	To what extent has the system reduced emissions in the study area	Net emissions in kilograms per day	
Reduce idle times and therefore fuel use	To what extent has the system reduced fuel use in the study area	Reduced idle time (Energy Reduction in gallons of fuel saved (gallons))	
Goal: Reduce costs/ Improve ROI			
Demonstrate the benefits outweigh the costs	To what extent has the system provided a return on investment	Benefit Cost Ratio	
Provide cost savings to transportation agencies	To what extent were the operational costs reduced for the agency?	Decreased staff time for retiming efforts, frequency of retiming efforts, and therefore cost	
Reduce resources needed from first responders	To what extent has the system reduced resources needed from police and first responders	Reduced crash rates	
Reduce resources needed for data collection	To what extent has the system reduced costs of collecting data	Time spent in data collection and analysis	

*The Evaluation Success Threshold column will be completed following the Before Study data collection period

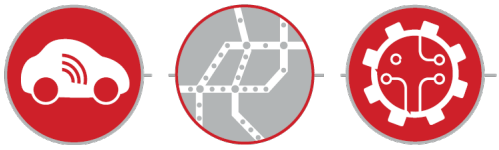


DATA COLLECTION PROCEDURES

To ensure that each of the performance measures can be properly evaluated, the Table 4 outlines the data source, evaluation method, and any limitations or constraints related to the identified data. Some of the evaluation methods, including Before and After Studies, Public Outreach, High-Resolution Data, and Benefit Cost Analysis will provide the data for several performance measures.

Table 4. Performance Measure Sources and Evaluation Methods

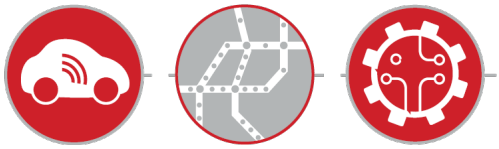
Evaluation Question	Performance Measure	Source	Evaluation Method	Limitation/Constraints
What effect did the pilot have on travel times in the project area?	Travel time	ClearGuide, Bluetooth	Before/After, Bluetooth on Limited Corridors	COVID has changed traffic patterns and travel times in addition to technology
What effect did the pilot have on average speeds in the project area?	Average speed	ClearGuide, Bluetooth	Before/After, Bluetooth on Limited Corridors	COVID has changed traffic patterns and travel speed in addition to technology
What effect did the pilot have on travel delay in the project area?	Delay per trip	ClearGuide	Total VHD/VMT	COVID has changed traffic patterns and travel delay in addition to technology
What effect did the pilot have on the transit schedule adherence?	Percent of trips completed on schedule	Wolfline Transloc	Trajectory and Schedule	Trajectory not stored historically; data only available during grant period
What effect did TSP have on buses?	Percent change in schedule adherence	Wolfline Transloc	Trajectory and Schedule	Trajectory not stored historically; data only available during grant period
What effect did the pilot have on ridership?	Transit ridership rates	Transloc's admin website	Pre/Post comparison of ridership	Service has changed over time due to COVID
What effect did the pilot have on rider experience?	% of riders who report their transit experience has improved	Survey	Survey response in post-deployment survey	Riders should have experience from 2019-2020 and after
What effect did the pilot have on transit driver experience?	% of transit vehicle operators reporting an improved experience on their route	Survey	Survey response in post-deployment survey	Drivers should have experience from 2019/2020 and after
To what extent has the system reduced traffic crashes in the study area?	Crash rate	Crash reports	Pre/Post comparison of crash reports	Limited after timeframe for crash rate analysis
To what extent does the system improve the safety impression on road users?	Percent of survey respondents who feel safety was improved on the corridor	Survey	Survey response in post-deployment survey	Low response rates to surveys
To what extent has the system reduced crash severity in the study area?	Crash severity	Crash reports	Pre/Post comparison of crash reports	Limited after timeframe for crash rate analysis, may need surrogate measures



Evaluation Question	Performance Measure	Source	Evaluation Method	Limitation/Constraints
To what extent does the red light violation warning reduce the number of red light violations?	Red light violation frequency	Video records	Pre/Post comparison of red light violations	
To what extent has the system improved bike/ped safety in the study area	Bike/Ped conflicts with traffic	Video records	Pre/Post comparison of conflict counts	
To what extent has the system reduced crashes in work zones?	Work Zone crash frequency	Crash reports	Pre/Post comparison of crash reports	Limited after timeframe for crash rate analysis
Has the pedestrian accessible app improved the experience of the vision impaired users of the system?	Percent of survey respondents who feel their experience was improved on the corridor	Survey	Survey response in post-deployment survey	App dev usage data?
To what extent has the system reduced emissions in the study area	Net emissions in kilograms per day	Travel Time	CMAQ Emissions Calculator Toolkit (Traffic Signal Synchronization Module)	Estimates only not actual measurable data
To what extent has the system reduced fuel use in the study area	Reduced idle time	Delay	NCDOT RP 2013-09	Estimates only not actual measurable data
To what extent has the system provided a return on investment	Benefit Cost Ratio	Benefit Cost Analysis	Monetized estimates of project impacts (dollars)	Incomplete data; Some impacts are difficult to quantify
What were the operational cost savings to the agency?	Decreased operating costs. (Decreased staff time for retiming efforts)	Benefit Cost Analysis	Change in operating costs (dollars)	Limited after timeframe for analysis
To what extent has the system reduced resources needed from police and first responders	Reduced crash rates	Crash reports	Pre/Post comparison of crash reports	Limited after timeframe for crash rate analysis
To what extent has the system reduced costs of collecting data	Time spent in data collection and analysis	Benefit Cost Analysis	Change in operating costs (dollars) related to data collection and analysis	ATSPM has high value Transit data? CV Data from App Ped Detection

OUTLINE OF EVALUATION REPORT

The Evaluation Report, included with the annual report to the secretary, will be based on the following outline. The Evaluation Report will also include Table 5, to document the pre-deployment and post-deployment data. This table will also summarize each of the challenges faced and milestones achieved during the pilot project.



I. Introduction
   a. Project Scope
   b. Purpose of Evaluation Report
   c. Summary of Findings
II. Performance Measurements
III. Pre-Deployment Data
   a. Collection
      i. Quantitative
      ii. Qualitative
   b. Analysis
IV. Post-Deployment Data
   a. Collection
      i. Quantitative
      ii. Qualitative
   b. Analysis
V. Lessons Learned
   a. Effectiveness of measuring and improving transportation system performance
VI. Conclusions

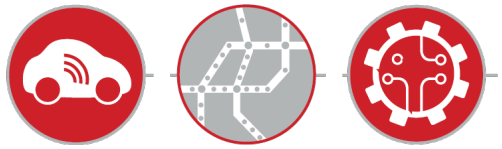
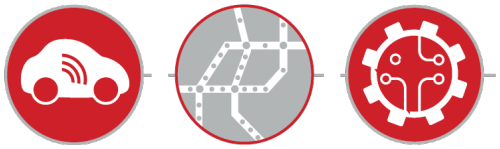
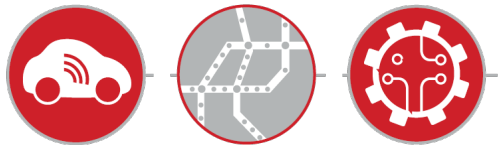


Table 5. Evaluation Report Table

Goal Area	Evaluation Question	Baseline Data	Performance Measure Delta	Challenges	Milestones Achieved
Improve mobility within the pilot area for motorists	What effect did the intelligent signal system have on travel times in the pilot area?				
	What effect did the intelligent signal system have on average speeds in the pilot area?				
	What effect did the intelligent signal system have on delay in the pilot area?				
Improve mobility for transit buses in the pilot area	What effect did the pilot have on the transit schedule adherence?				
	What effect did TSP have on Wolfline buses?				
	What effect did the pilot have on ridership?				
	What effect did the pilot have on rider experience?				
	What effect did the pilot have on transit driver experience?				



Goal Area	Evaluation Question	Baseline Data	Performance Measure Delta	Challenges	Milestones Achieved
Improve safety within the pilot area for road users	To what extent has the system reduced traffic crashes in the study area?				
	To what extent does the system improve the safety impression on road users?				
	To what extent has the system reduced crash severity in the study area?				
	To what extent does the red-light violation warning reduce the number of red light violations caused by a vehicle entering an intersection on a red light?				
	To what extent has the system improved bike/ped safety in the study area				
	To what extent has the system reduced crashes in work zones?				
	Has the pedestrian accessible app improved the experience of the vision impaired users of the system?				
Reduce environmental impact in the corridor area	To what extent has the system reduced emissions in the study area				
	To what extent has the system reduced fuel use in the study area				
Provide cost savings for improved ROI	To what extent has the system reduced response times for crashes/incidents				
	To what extent has the system provided a return on investment				
	To what extent has the system reduced resources needed from police and first responders				
	To what extent has the system reduced costs of collecting data				



Appendix Part C – Data Management Plan

NCDOT Multimodal Connected Vehicle Pilot

Preliminary Data Management Plan

February 17, 2021

INTRODUCTION

The North Carolina Department of Transportation (NCDOT) Multimodal Connected Vehicle Pilot (MMCVP) will deploy various technologies to improve the day-to-day transportation experience for pedestrians, cyclists, motorists, transit drivers, and transit riders. This pilot study will take place over a period of three years. The data collected in before-and-after studies, as well as observation studies within the pilot area, will be used to evaluate the success of the pilot. This document, in harmony with the Project Evaluation Plan, discusses the data collected and the management of the datasets.

PURPOSE OF THE PLAN

The Data Management Plan (DMP) describes the data that will be collected, stored, and accessed for the period of time before, during, and after the pilot project. The preliminary data management plan below includes the research data that will be produced during the project, the data access policies, and the approach to storage and retention. Future updates to the document will expand upon the standards used for formatting and content, policies for accessing and sharing as well as preserving privacy and other rights, policies for re-use, re-distribution, and production of derivatives, and plans for archiving final research data. The DMP is a living document and will evolve and grow as the project progresses.

ORGANIZATION OF THE PLAN

The DMP is organized into the following major sections:

- Introduction - Provides the purpose of the DMP as well as an overview of the MMCVP system.
- Data Description - Addresses the nature, scope, and scale of the data that will be collected. Defines data elements within a detailed data dictionary.
- Access Policies - Describes any access restrictions that may apply to the data.
- Archiving and Preservation Plans - Describes where the data will be stored. Also describes how long the data will be retained in these systems.
- Data Rights - Describes who will hold the intellectual property rights for the data, and any other legal requirements that need to be addressed.
- Resources - Lists the documents used as reference in this document.

SYSTEM OVERVIEW

The NCDOT MMCVP explores technologies to improve the day-to-day transportation experience for pedestrians, cyclists, motorists, and transit drivers and passengers. To properly evaluate the integration of these technologies, a small geographic area inclusive of the NCSU campus was identified as an ideal location for testing. Using the data gathered in the pilot, NCDOT hopes to expand the successful technologies to additional geographic areas in the region and across the state.

A key component of the experience for students, faculty, and visitors on the NCSU campus is the free bus system, Wolfline. The Wolfline buses have on-board Wi-Fi which will be used to support TSP and mobile safety notifications. This technology will be deployed on 45 buses operating on 11 routes and covering a network encompassing 29 signalized intersections. Because Wolfline buses are available for public use, the pilot benefits extend beyond the student population to the entire geographic area served by the system.

Technology Highlights

Signal & Intersection Improvements

- **Signal Phase and Timing (SPaT)** – broadcast the current phase and residual time for each lane in the intersection; broadcast periodically by intersection

- **Transit Signal Priority (TSP)** – Optimizes signal timing for improved schedule adherence and travel time reliability at signalized intersections for transit buses that are behind schedule
- **Intelligent Traffic Signal System (I-SIG)** – Uses vehicle location and movement information from connected vehicles to traffic signal
- **High-Resolution Data** – Optimize traffic signal performance through near real time, lane-by-lane data
- **DSRC/Cellular Hybrid Communications** – Low latency data share of infrastructure and vehicle data for connected vehicle applications

Mobile Applications

- **Pedestrian in Crosswalk Warning** – uses pedestrian detection to alert transit drivers or other motorists that there is a pedestrian in the crosswalk
- **Mobile Accessible Pedestrian Signal System** – uses GPS to help those with limited or no sight to safely cross signalized intersections
- **Red Light Violation Warning** – uses vehicle speed, acceleration, signal timing and geometry to alert a motorist if their vehicle will enter the intersection on red
- **Speed Threshold Warning** – uses vehicle speed to alert a motorist if the vehicle is exceeding the speed limit
- **Work Zone Warning** – Uses cellular communications to alert a motorist if there is a work zone ahead and speed limit will be reduced
- **Connected Eco-Driving** – Uses vehicle speed, acceleration, deceleration, and traffic conditions data to advise motorists to reduce fuel use and decrease emissions

The System Concept is depicted in Figure 1.

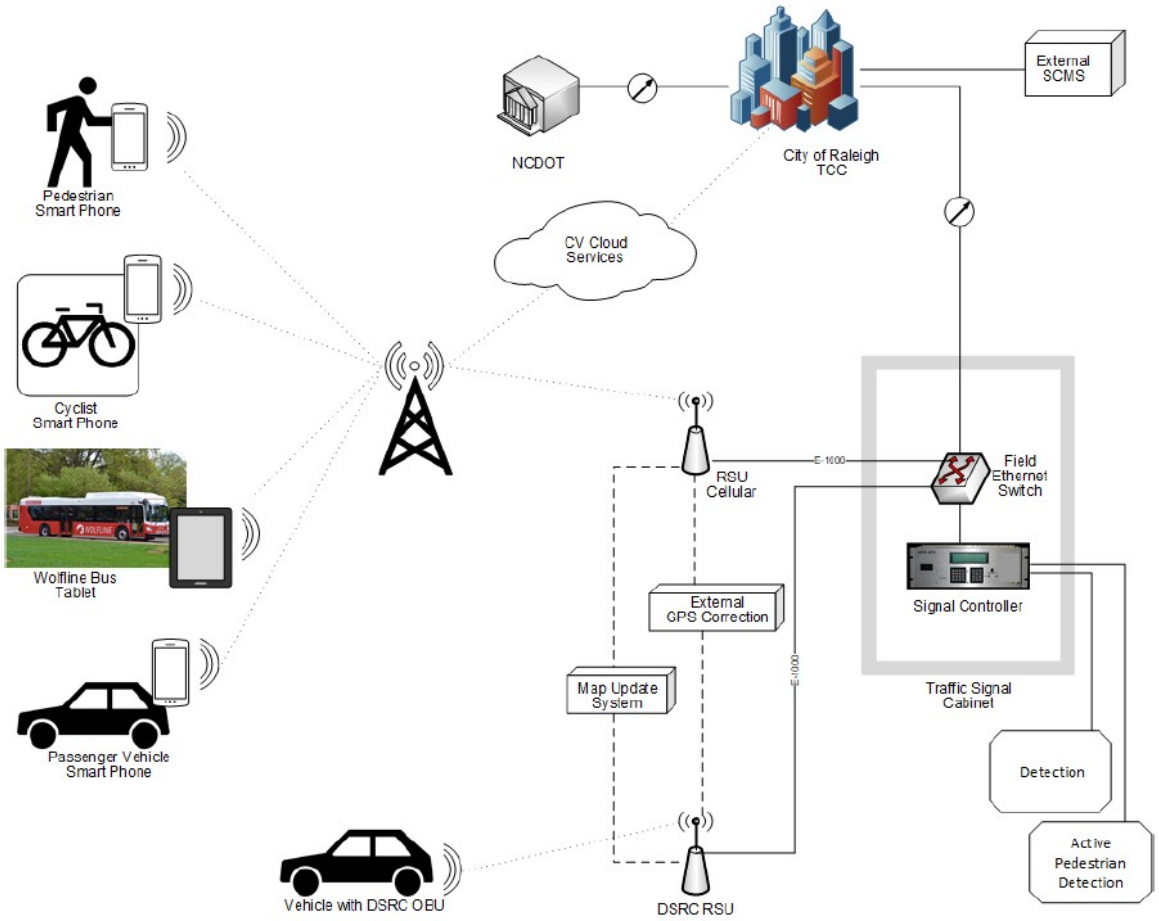


Figure 1 System Concept

DATA DESCRIPTION

The MMCVP will collect data through mobile applications, connected vehicles, surveys, and Advanced Traffic Signal Performance Measures (ATSPM). This data collection process will be documented throughout the course of the project in technical documents. Data sets generated are shown in Table 1.

Table 1 Data Types and Sources

Data Type	Data Sources
Signal System Data	Data collected from the intelligent signal system and ATSPM
Connected Vehicle System Data	Data collected from vehicle systems and Connected Vehicle applications
Participant Data	Data collected from electronic surveys, in-person or phone interviews, and observations on site
Operations Data	Observations from analysis team including video, Bluetooth detection, drone, and vehicle counters

SIGNAL SYSTEM DATA

The following data will be collected as a result of the signal system enhancements:

- Signal Phase and Timing Data (SPaT)/MAP Data

- Advanced Traffic Signal Performance Measures (ATSPM) Data
- Pedestrian Detection Data
- PED-SIG Application Data

SPaT/MAP Data

Signal Phase and Timing applications will include two devices, the signal roadside units (RSUs) and the vehicle onboard units (OBUs). This data will be used in support of the various Vehicle to Infrastructure (V2I) applications in this project. The data flow is a one way flow with the RSU sending SPaT data and MAP data to the vehicle OBU.

Advanced Traffic Signal Performance Measures Data

ATSPM requires a high-resolution data capable traffic signal controller, a server, and detection devices to report on the signal, corridor, and system performance. Data flows of this system are as follows:

- The detection device reports detected vehicles to the traffic signal controller
- The detection device reports vehicle speeds to the terminal server
- The controller collects and records high-resolution data and communicates it to the server through the communication network

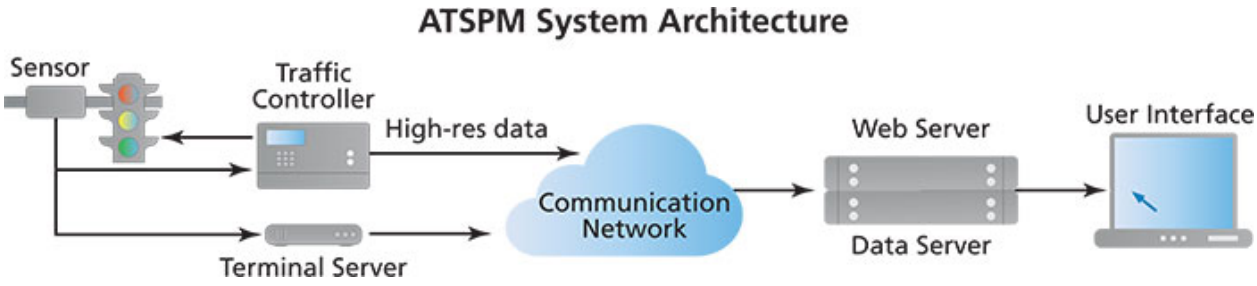


Figure 2 ATSPM System Architecture (Source: Utah Department of Transportation)

Pedestrian Detection Data

The Pedestrian Detection Application has four components: LIDAR, RSU, Pedestrian Application, and the Vehicle Application. The data flows between these components are as follows:

- LIDAR to send pedestrian detection with time stamp to RSU
- The RSU will send a timestamped personal safety message to the pedestrian application
- The RSU will send a timestamped BSM to the vehicle application

PED-SIG Application Data

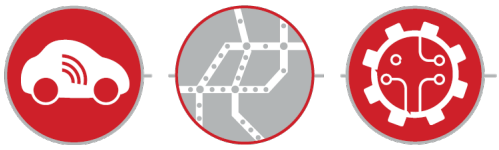
The Pedestrian Signal Application will include two components: the PED-SIG Application and the RSU.

- The PED-SIG Application will send a timestamped pedestrian call request with the direction requested to cross, and an extension request where necessary.
- The RSU will grant requests and send time to cross and extension time as needed to the PED-SIG application.

CONNECTED VEHICLE (CV) SYSTEM DATA

In addition to the consumption of the SPaT and MAP messages, the Connected Vehicle (CV) System also relies on:

- Basic Safety Messages (BSMs)



- Work Zone Data
- Transit Vehicle Data

Basic Safety Messages (BSM)

Basic Safety Messages (BSM) generated by the OBUs include longitude, latitude, vertical position, yaw. BSMs generated by the Global Navigation Satellite System (GNSS) include orientation, speed, and heading. All CV BSMs are required to conform to SAE J2735 and SAE J2945/1 standards.

Work Zone Data

Work Zone Data will include the latitude and longitudes of the extents of the work zone and the dates in which the work zone is active. This data will be collected and logged manually. The RSU will broadcast Traveler Information Messages (TIM) that contain information related to active work zones.

Transit Signal Priority (TSP) Data

The Transit Signal Priority system includes RSUs, Transit Vehicles, Transit Centers, and Traffic Signals. The Transit Signal Priority system will also use SPaT and MAP messages. The data flows of the system are as follows:

- The transit vehicle broadcasts its location and heading to the RSU
- The RSU broadcasts the priority request status and signal controller information to the transit vehicle, and sends a priority request to the Priority Request Server (PRS)
- The transit server communicates on-time/late information about the transit vehicle to the PRS
- The PRS will use the on-time/late information as well as the priority request to determine whether to grant or deny the priority request. The PRS will send the priority request, if granted, to the traffic management system.
- The PRS will also send the priority request status (denied, granted) to the RSU
- The traffic management system will receive a priority request from the TSP app and issue the appropriate commands to the local traffic signal controller

PARTICIPANT DATA

The before-and-after study will necessitate some additional participant data to evaluate perception of the stakeholder including:

- User Satisfaction
  - % of survey respondents who feel safety was improved on the corridor
- Transit Operator Satisfaction
  - % of transit vehicle operators reporting that an improved experience on their route
- Survey Responses
- Interview Responses

OBSERVED OPERATIONS DATA

The before-and-after study will also necessitate operations data including:

- Travel Time Data, generated by ClearGuide and Bluetooth Devices
- Average Speed Data, generated by ClearGuide and Bluetooth Devices
- Intersection Approach Delay, generated by ClearGuide

- Crash Frequency and Severity Data, generated by police reports
- Transit Schedule Adherence, generated by Wolfline and Transloc

DATA COLLECTION

Data will be collected from March 2021 through December 2023. Existing data for the before-and-after study will be used to compare the pilot deployment period to the existing conditions.

DATA DICTIONARY

A data dictionary will be provided in machine-readable form, such as .CSV.

STANDARDS USED

Data can be collected in various formats. One of the objectives of this program is generating and sharing data that can be used for further research or replication. It is expected that the data used in this program be publicly available. As such, the data will be made available in the original format for maximum use, where possible. Examples of industry standard formats include MS Word, MS Excel, PDFs, .csv, and others. The format and frequency of each dataset will be developed as the project progresses.

Data from vendors and project participants not yet selected or established will follow the following process for all data collected:

1. Use standard file formats, non-proprietary whenever possible
2. Describe the data, type and scale, collection method, and file formats
3. If proprietary data is necessary, explain rationale, format, and standards, and data dictionary
4. Identify metadata standards used to describe the data (Refer to Project Open Metadata Schema for further direction to develop metadata)

Table 2 shows an example of the standards table that will be completed during the project.

Table 2 Dataset Standards

Dataset Title	Description	Type/Scale	Collection Method	Data File Format(s)	Metadata
Basic Safety Message (BSM)	This data consists of Basic Safety Messages (BSMs) generated by participant vehicles onboard units (OBU) and transmitted to road-side units (RSU) located throughout the Project Study areas.	Numerical, positional (latitude/longitude)	Observed, automatic from RSUs to OBUs	JSON	Metadata will be provided at the field and asset level using Project Open Data Metadata Schema

ACCESS POLICIES

With the exception of Personally Identifiable Information (PII), data will be made publicly accessible. Storage and access policies are the responsibility of NCDOT. These storage and access policies will be developed as the project advances.

The MMCVP will include a Security Credential Management System (SCMS) which ensures authenticity and privacy, and eases interoperability between vendors. This message security system uses a Public

Key Infrastructure (PKI) approach to encrypt and certify messages. The datasets from users should not obtain any personally identifiable information to protect the privacy of users of the system.

DATA USERS

The data will be used by NCDOT, City of Raleigh, and NCSU to make decisions for the future of the project and to evaluate the success of the pilot. The data will be publicly available, with the exception of proprietary data or personally identifiable information. Public access of the data will allow the stakeholders to evaluate the project success and to see the benefits of the project in their communities.

ACCESS RESTRICTIONS

Personally Identifiable Information (PII) will be protected through anonymization and data scrubbing. PII data will not be archived and will be categorized as restricted. Consent will be acquired through the survey process which will inform participants of the data being collected and stored.

PII collected in the MMCVP may include:

1. Survey Participant Background Data
    a. Name (First, Last)
    b. Socioeconomic Data
2. Vehicle Information
    a. Location
    b. Heading
    c. Velocity
3. Transit Driver Information
    a. Name (First, Last)

MEANS OF CONTROL

Additional means of control may include, encryption, identification authorization, system monitoring, anti-virus software, and internal or independent audits.

ARCHIVING AND PRESERVATION PLANS

CLOUD SERVER

The MMCVP project, being a pilot, does not call for high-cost on-premises server infrastructure. Therefore, NCDOT will host the data in a cloud server for the short term duration of the pilot. If the pilot is successful, NCDOT can invest in the on-prem server infrastructure moving forward. The benefits of cloud storage include affordability in the short term and flexibility in access management.

CITY OF RALEIGH/NCDOT MASTER SERVER

Data and metadata received by RSUs as well as high-resolution data will be transmitted to master servers.

BACKUP SCHEDULE

The backup schedule will vary based on the data collected. Daily, Weekly, Monthly, Ad-Hoc, Annual, schedules will be determined and will include who is responsible for the backup, where and how long it is stored, and whether it is automatic or manual. It will also discuss where redundant copies will be kept.

DATA ARCHIVE

The archive will support the capture and provision of the Project Open Data Metadata Schema as required by this project and will follow the Guidelines for Evaluation Repositories for Conformance with the DOT Public Access Plan.

If accepted, the data will be archived through the USDOT Secure Data Commons. The data can be uploaded in near real time, has strong user management controls, and validates incoming datasets. If not approved by the USDOT SDC, the data will be archived through DRYAD.

RETENTION SCHEDULE

A retention schedule will be developed for the various data collected. These schedules will conform to existing NCDOT and/or City of Raleigh policies and retention procedures.

DATA RIGHTS

Data collected as part of this project will be property of the NCDOT. The data will be openly available to MMCVP partners at NCSU, City of Raleigh, and USDOT.

INTELLECTUAL PROPERTY

Intellectual Property (IP) for the software and applications created will be negotiated with the vendors. Additionally, IP claims will be minimal and pertain to methods of collection, algorithms utilized for analysis and products or processes which are existing or patent pending. Data delivered by vendor systems, software, or applications will be considered property of NCDOT and free of IP.

RESOURCES

https://www.its.dot.gov/resources/scms.htm

https://www.its.dot.gov/factsheets/pdf/ITS_ResearchData.pdf

https://itsdatahub.boozallencsn.com/#/resources/data-management/additional-resources

https://resources.data.gov/resources/dcat-us/#USG-note

https://www.bts.gov/ntl/public-access/creating-data-management-plans

https://ntl.bts.gov/public-access/guidelines-evaluating-repositories

https://ntl.bts.gov/public-access/creating-data-management-plans-extramural-research

https://www.its.dot.gov/about.htm

https://ops.fhwa.dot.gov/publications/fhwahop20002/ch2.htm

https://ops.fhwa.dot.gov/publications/fhwahop18048/index.htm

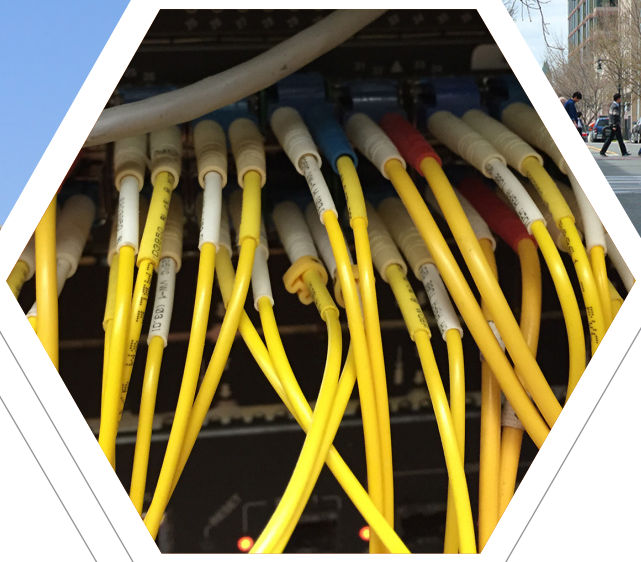
Appendix Part D – NCDOT STSPM Implementation Plan

NCDOT

AUTOMATED TRAFFIC SIGNAL PERFORMANCE MEASURES

A T S P M

IMPLEMENTATION PLAN



PREPARED FOR:

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

PREPARED BY:

Kimley»Horn

AUGUST 2019

I. Decision Process

1. Decision to Pursue ATSPM

Automated Traffic Signal Performance Measures (ATSPM) utilize high-resolution controller data to create detailed performance measure reports for signals and signal systems. These performance measures give traffic engineers a complete picture of signal system operations and allow for finely calibrated signal timing, real-time improvements, and enhanced system awareness.

NCDOT began assessing the need for ATSPM in 2018**.** The *NCDOT Guide on ATSPM* was completed in April 2019 and summarizes the costs, benefits, and operational requirements of ATSPM. Based on this information, program metrics were identified to evaluate the benefits of implementing ATPSM in North Carolina.

Program Benefits Metrics

Signal Level

METRIC Implement more effective signal timing plans using high-resolution data.

MEASURE Signal timing improvements as measured by a reduction in congestion, minimized cycle failures and split failures, improved safety, improved progression, minimized delays, or reduced citizen complaints.

Project Level

METRIC Implement more effective project prioritization and resource allocation.

MEASURE Use performance data to more easily identify and re-optimize under-performing signals and signal systems.

MEASURE Use performance data to more easily identify and upgrade under-performing signals and signal systems.

MEASURE Use performance data to more easily identify and allocate maintenance for identified equipment failure.

Program Level

METRIC Use performance measures to assess the Return on Investment for statewide signal timing funds.

MEASURE Use data-driven decision making to optimize resources, resulting in a higher return on investment for funding of signal timing.

Challenges

During the research process, the following challenges of implementing ATSPM were identified:

- Server requirements
- Personnel buy-in
- Utilizing data effectively
- Hardware/software upgrades (i.e. funding)

After evaluating the potential benefits and challenges of deploying ATSPM in North Carolina, NCDOT decided to develop an implementation plan for ATSPM with a long-term goal of upgrading all NCDOT signal systems to ATSPM. This document will lay out the necessary requirements and methods for implementing ATSPM.

2. ATSPM Software Decision Process

During the evaluation of ATSPM deployment, a variety of ATSPM software options were researched and evaluated. A software evaluation matrix was created to compare the costs and benefits of the software options and a webinar was held on March 20, 2019 with peer agencies currently utilizing the Open Source ATSPM Software developed by the Utah Department of Transportation.

Software Evaluation Matrix

- Research was conducted on a range of ATSPM software options.
- Proprietary options evaluated were Centracs MOE, Centracs SPM, Trafficware, and Miovison. The Open Source ATSPM Software was also evaluated.
- ATSPM Software options were evaluated based on reports produced, operational objectives, lifecycle costs, software/hardware costs, implementation effort, and other user features.
- The software evaluation matrix is included in Appendix 1.

Peer Agency Webinar (March 20, 2019)

- April Wire from Maricopa County, AZ and Justin Effinger from Lake County, IL presented on each of their agency's use of the Open Source ATSPM Software.
- Maricopa County evaluated several vendor solutions before choosing the Open Source ATSPM Software. While the vendor solutions output more polished graphs than the Open Source ATSPM Software, both proprietary and non-proprietary software options use the same data.
- Justin Effinger (Lake County) was able to configure the Open Source ATSPM Software by himself in a matter of weeks. The largest effort was configuring each traffic signal in the software (10-15 minutes each).
- Maricopa County hired a consultant to configure the Open Source ATSPM Software.
- Both agencies concluded that the vendor software is too expensive for the limited benefits it provides. In addition, there are hidden costs associated with the vendors.
- Additional features can be added to the Open Source ATSPM Software to tailor it to an agency's needs. Agencies using the Open Source Software share their customizations on GitHub for anyone to use and NCDOT also can contribute customizations developed during their implementation.
- A vendor software option also can be implemented in the future since it uses the same data as the Open Source ATSPM Software.

Core Team Follow-Up Meeting (March 25, 2019)

- The team's main concern with the Open Source ATSPM Software was that a significant effort would be required to roll out the software. Justin Effinger addressed this concern in the webinar, indicating that a single person with sufficient experience could set up the software and configure the signals in a matter of weeks. Secondly, April Wire discussed her process of using outside resources for the configuration. Both referenced the effort needed for the set-up, but that it was manageable, and they were able to see results very quickly as they continued to integrate signals and systems.
- The team also considered the following factors:
    - The Open Source software offers significantly more reports (See the Operational Objectives chart in Appendix 1).
    - Multiple peer agencies already have large-scale implementations and can offer knowledge and experience as NCDOT begins to deploy.
    - Only the Open Source software offers the Link Pivot report, which reduces the need for traffic simulation to determine offsets.
    - NCDOT houses and controls all data.
    - The Open Source software is completely software, hardware, and vendor agnostic, thus future-proofing the ATSPM platform against changes in software and hardware contracts.
    - Centracs SPM was not chosen because it is limited to the Econolite hardware and software.
    - Miovision was not chosen due to its excessive costs.
- The team decided to move forward using the Open Source ATSPM Software.

II. Hardware and Software Requirements

1. Baseline Conditions

Baseline conditions for signal system hardware and software were defined to establish the incremental costs and benefits of ATSPM. Not all signal systems currently meet the defined baseline conditions. A portion of the implementation plan will address the phased upgrade of systems to the baseline, regardless of the ATSPM solution that is identified for the corridor. For the purposes of this implementation plan, the baseline configuration for a signal system is defined with the following hardware and software.

Note: Econolite's Centracs is currently the central software but is subject to change.

a. Hardware

i. Central hardware is the Centracs server.
ii. Field hardware is the NCDOT standard 2070E controller.

b. Software

i. Central software is Centracs. All new signal systems will have Centracs and existing systems are in the process of upgrading.
ii. Field software is either Oasis, ASC/3, or EOS.

c. Communications

i. For systems on Centracs, Field-to-Central communications are cellular modems or ITS fiber.
ii. Signal-to-signal communications are either fiber optic cable or ethernet radios.

d. NCDOT Standard Detection Scheme

The standard NCDOT detection scheme is deployed on a majority of NCDOT signal systems and will be considered the baseline detection configuration.

The standard cross-section assumption is:

- Major Street Approaches: Two through lanes with dedicated left turn and right turn lanes
- Minor Street Approaches: One through lane with dedicated left turn and right turn lanes

The standard detection is:

- Major Street: Lane-by-lane through lane advanced detection, left turn lane presence detection
- Minor Street: Lane-by-lane presence detection

Figure 2 shows the NCDOT standard detection configuration and the available ATSPM reports based on that detection scheme. More robust detection schemes provide additional reports and those are detailed in Section V.

2. ATSPM Deployment Conditions

Additional technical requirements must be met to collect and process ATSPM data.

a. ATSPM Software

The ATSPM software will be the Open Source ATSPM Software.

b. High Resolution Controllers

High resolution controllers are required to support ATSPM data collection. 2070LX controllers are compatible with ATSPM.

c. High Resolution Software

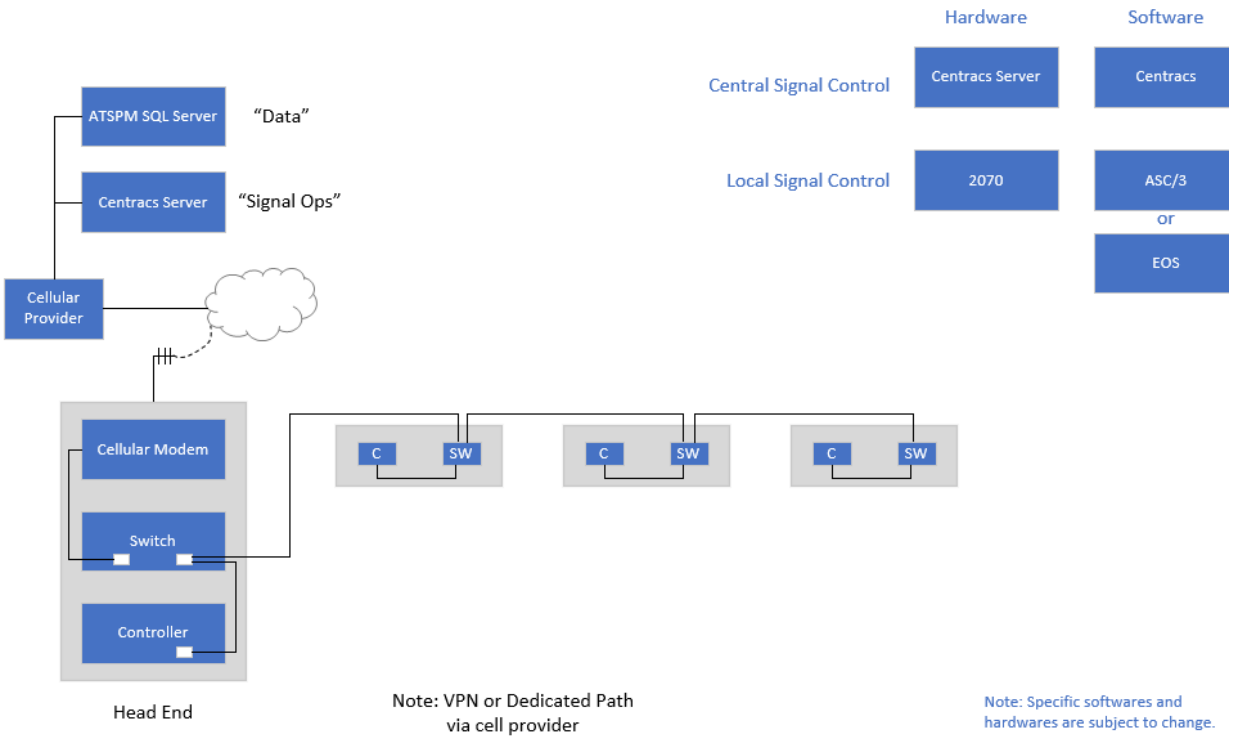
High resolution controller software is required to support ATSPM data collection. ASC/3 and EOS are compatible with ATSPM.

III. System and Design Requirements for Open Source ATSPM Software

1. Network Configuration

The baseline conditions for the signal systems will include interconnect with the head end controller and communication to both the Centracs central server and the ATSPM central server. **Figure 1** shows the communication architecture for the baseline condition.

Figure 1: ATSPM Network Configuration



2. Server Needs

The ATSPM central server will require data storage that can accommodate continuous data collection from every intersection. The COST group initiated conversations in April 2019 with IT to discuss server requirements that can support the space needs estimated for ATSPM data. UDOT estimates approximately 19 MB of storage space for each signal controller per day. The volume of data collected at each intersection is directly related to the amount of detection deployed at an intersection so a conservative estimate of 20 MB/day was used to calculate data storage with an assumed length of storage time of 3 years. Based on these assumptions, the anticipated server needs were estimated to be:

- By end of 2019: 2TB (100 signals)
- By end of 2020: 10TB (500 signals)
- By end of 2021: 30TB (1,500 signals)

- By end of 2022: 80TB (4,000 signals)
- By end of 2023: 100TB (5,000 signals)

It is projected that 5,000 traffic signals statewide could potentially benefit from ATSPM implementation. Coordination with IT regarding additional technical requirements will continue as implementation moves forward.

3. Utah Software Configuration

An experienced user can set-up the software and configure the traffic signals. The process is estimated to take a few weeks and is dependent on the number of intersections that will be initially configured. Once the initial software is installed and ready, each intersection will require approximately 10-15 minutes to configure.

Georgia Department of Transportation provides an ATSPM Software Installation Manual that guides the user through server requirements, installation procedures, and database configuration. In addition, UDOT provides manuals regarding the use of the website interface to access data (ATSPM Component Details) and the application of individual reports (ATSPM Reporting Details).

IV. Corridor Prioritization Methodology

1. Implementation Tiers

ATSPM implementation can vary based on the needs of the corridor. Five implementation tiers were established to define potential levels of ATSPM implementation.

Table 1: Implementation Matrix

	Tier V	Tier IV	Tier III	Tier II	Tier I
Central Signal Control	None	Yes	Yes	Yes	Yes
Field Hardware	No High-Resolution Data Controller Installed	No High-Resolution Data Controller Installed	High-Resolution Data Controller Installed (2070LX)	High-Resolution Data Controller Installed (2070LX)	High-Resolution Data Controller Installed (2070LX)
ATSPM Software	No configuration with ATSPM central software	No configuration with ATSPM central software	Configuration with ATSPM central software	Configuration with ATSPM central software	Configuration with ATSPM central software
Detection	No detection upgrades	No detection upgrades	No detection upgrades	Detection upgrades at critical approaches to critical intersections	Full detection upgrades on most or all approaches at the majority of intersections
Result	No ATSPM data available	No ATSPM data available	Some ATSPM data available	ATSPM data available at critical intersections.	ATSPM Data available on all approaches at all intersections
Notes		Tier IV is considered the baseline.	Tier III is the lowest level of ATSPM implementation and generates some performance measures.	Tier II is the middle level ATSPM implementation and generates a moderate number of performance measures.	Tier I is the most complete ATSPM implementation and generates the most performance measures.

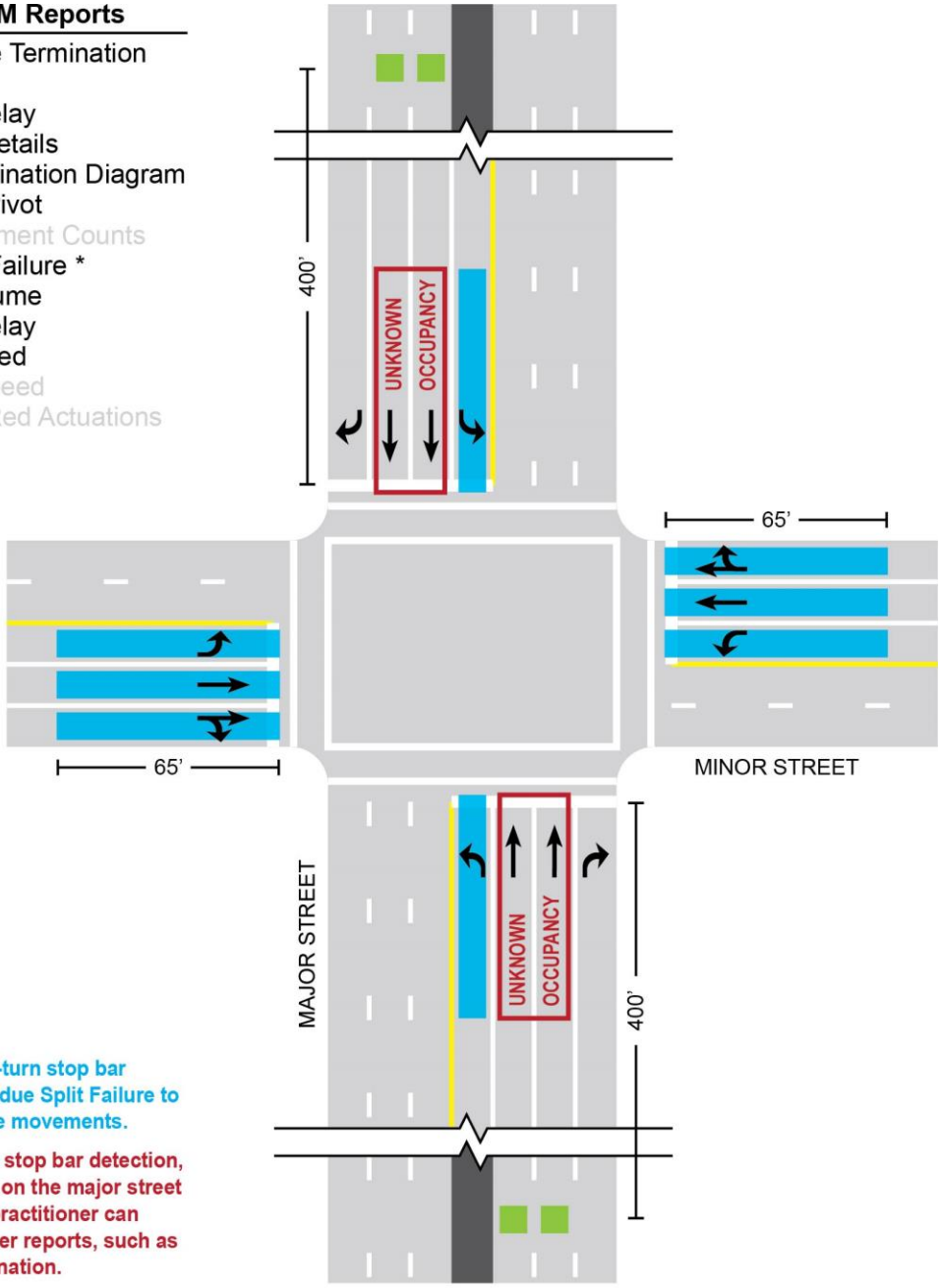
a. Central Signal Control: The signals are connected to the central control software for signal systems. Currently, the software is Centracs. The baseline for ATSPM includes Centracs, so Tier IV represents the baseline conditions for the purposes of this implementation plan. Signal systems in Tier V are not on Centracs and are not currently planned to be upgraded. Should funding become available to upgrade these systems to Centracs, they should be reevaluated to assess the implementation tier based on the needs of the corridor.
b. Field Hardware: High resolution controllers are necessary for high resolution data to be collected and pushed to the ATSPM server.

c. ATSPM Software: Indicates whether a signal system is configured with the ATSPM software, which is anticipated to be the Open Source ATSPM Software. Only Tiers I, II, and III will be configured with the ATSPM software and have ATSPM reports available.
d. Detection: The detection configuration determines the level of information collected for a corridor and the number and types reports available. Tier III assumes the standard NCDOT detection configuration. Tier II includes detection upgrades as necessary at critical intersections. Tier I includes upgrading to the full detection scheme at all intersections on the corridor. **Figure 2** and **Figure 3** depict the detection configuration for Tier III and Tier I, respectively.

Figure 2: NCDOT Standard Detection Configuration

Available ATSPM Reports

1. Purdue Phase Termination
2. Split Monitor
3. Pedestrian Delay
4. Preemption Details
5. Purdue Coordination Diagram
6. Purdue Link Pivot
7. Turning Movement Counts
8. Purdue Split Failure *
9. Approach Volume
10. Approach Delay
11. Arrivals on Red
12. Approach Speed
13. Yellow and Red Actuations



*** NOTE**

Minor street and left-turn stop bar detection allows Purdue Split Failure to be reported for those movements.

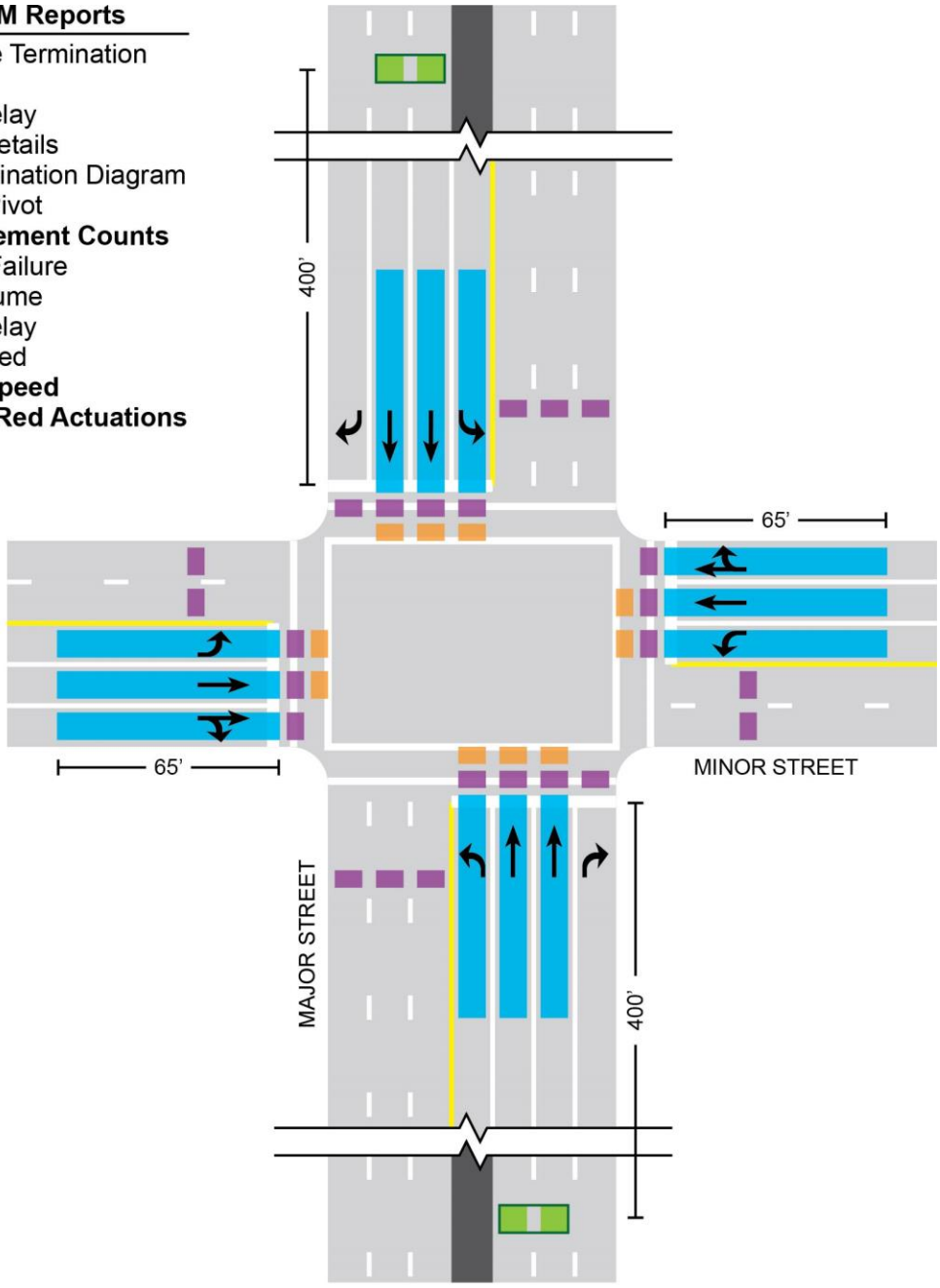
Without major street stop bar detection, available green time on the major street will be unknown. A practitioner can supplement with other reports, such as Purdue Phase Termination.

Legend	Detection Requirements	Recommendations/Notes
Presence	Lane-by-Lane or Lane Group	Lane-by-Lane will provide more accurate occupancies.
Advanced Count	Lane-by-Lane or Lane Group	Lane-by-Lane will provide more accurate activations.
Advanced Speed	Wavetronix Radar Only	
Stop Bar Count	Lane-by-Lane	
Yellow & Red Actuation	Lane-by-Lane or Lane Group	Lane-by-lane will provide more accurate activations. Speed filter recommended for <15mph.

Figure 3: Tier I Full Detection

Available ATSPM Reports

1. Purdue Phase Termination
2. Split Monitor
3. Pedestrian Delay
4. Preemption Details
5. Purdue Coordination Diagram
6. Purdue Link Pivot
7. **Turning Movement Counts**
8. Purdue Split Failure
9. Approach Volume
10. Approach Delay
11. Arrivals on Red
12. **Approach Speed**
13. **Yellow and Red Actuations**



Legend	Detection Requirements	Recommendations/Notes
Presence	Lane-by-Lane or Lane Group	Lane-by-Lane will provide more accurate occupancies.
Advanced Count	Lane-by-Lane or Lane Group	Lane-by-Lane will provide more accurate activations.
Advanced Speed	Wavetronix Radar Only	
Stop Bar Count	Lane-by-Lane	
Yellow & Red Actuation	Lane-by-Lane or Lane Group	Lane-by-lane will provide more accurate activations. Speed filter recommended for <15mph.

2. Implementation Tool for Divisions

A spreadsheet tool was created to identify an initial recommendation for the implementation tier for each signal system (See Appendix 2). The tool is designed to allow Division Traffic Engineers to qualitatively evaluate the signal systems in their Division. The tool assesses which ATSPM implementation tier a signal system warrants based on the current signal system configuration and the current corridor performance. The tool identifies the Current Tier and proposes a Goal Tier based on that assessment. Additionally, it will serve as an inventory of signal systems for all Divisions. The questions included in the tool are:

Background Information

- Length of Corridor (miles)
- Number of Signals
- Annual VMT (millions)
- Is this system CMAQ eligible?

Current Signal System Configuration

- Controller
- Communications
- Is this system currently using Centracs?
- Is the system planned to be upgraded to Centracs in the next 5 years?
- Does this signal system have high resolution data controllers?

Current Corridor Performance

- Is this corridor over capacity?
- Does this corridor have atypical travel patterns (i.e. not AM/PM commuter travel)?
- Are additional performance measures needed to understand the corridor (beyond travel time runs)?
- Does this corridor have an unusually high number of maintenance calls?
- Does this corridor receive an unusually high number of complaints from the public?
- Does this corridor have safety issues? (Combined Safety Score > 80)
- Is this corridor retimed frequently? (on average, every 3 years)
- Is the corridor more than 60 minutes from the central maintenance facility?

Future Corridor Conditions

- Is the corridor anticipated to change rapidly in the future? (i.e. development, new connections, TIP Projects)

Based on answers to these questions, the tool assigns a Current Tier and a Goal Tier to the signal system. The rules for assigning the Current Tier and Goal Tier are described below. In addition, the tool confirms configuration and performance data that can be used in the project prioritization process.

Current Tier

- Tier IV: The system is currently using Centracs OR is planned to be upgraded to Centracs.

- Tier V: The system does not have Centracs AND is not planned to be upgraded to Centracs.

Goal Tier

The goal tier is calculated on the number of "yes" answers to questions in Current Corridor Performance and Future Corridor Conditions.

- Tier I: Answer "yes" to 8 or more questions.
- Tier II: Answer "yes" to 6 or more questions.
- Tier III: Answer "yes" to 4 or more questions.
- Tier IV: Answer "yes" to 2 or more questions.
- Tier V: Answer "yes" to 1 or fewer questions.

Note: A "yes" answer to "Is the corridor more than 60 minutes from the central maintenance facility" only counts towards the total if "yes" is answered for either "Does this corridor have an unusually high number of maintenance calls" OR "Does this corridor receive an unusually high number of complaints from the public."

V. Costs and Benefits

1. ATSPM Costs

a. Software

The Open Source ATSPM Software has no costs associated with procuring (downloading), installing, or configuring for use. NCDOT expects to utilize internal resources for software installation and configuration.

b. Field Hardware

The following costs are associated with upgrading controllers:

- 2070 LX Controller: $2,500 each ($1,500 under state contract)

The most common communication architecture for closed systems uses either fiber or 900 MHz radios to connect individual signals back to the head end. A 4G cellular modem at the head end then can communicate to any central servers. The bandwidth of the 4G cellular modem is sufficient for daily data transfers to the central servers. NCDOT is planning to test a corridor to evaluate the reliability of the 900 MHz radios to transmit the high resolution data from the individual intersections to the head end. If necessary, radios may require an upgrade to 2.4 GHz or 5.8 GHz to provide reliability in data collection.

- 2.4 GHz of 5.8 GHz radio upgrades: $2,500 each (1 per signalized intersection)

c. Detection

Implementation Tiers I and II require detection upgrades from the NCDOT standard detection configuration. **Figure 3** shows a Tier I detection configuration. Unit costs for detection upgrades are listed below.

- Loops: $1,500 each
- Radar: $5,000 each
- Cameras: $10,000 per intersection

In **Table 2,** the first two columns show the detection deployment costs at a new intersection for a Tier III (Standard Configuration) and Tier I (Full Deployment). The third column shows the cost to upgrade from a Tier III to a Tier I. There are two options for a Tier I implementation: loop-based and camera-based. **Figure 2** and **Figure 3** show the loop configuration requirements regardless of the technology selected. The camera-based option will require radar and advance loops to capture advanced speed and advanced count.

Tier II implementation costs fall between Tier I and Tier III and depend on the level of detection needed for each intersection.

Table 2: Detection Costs

	Tier III (Standard Configuration)		Tier I (Full Deployment)				Upgrade from Tier III to Tier I			
	Loop-Based		Loop-Based		Camera-Based		Loop-Based		Camera-Based	
	Count	Cost	Count	Cost	Count	Cost	Count	Cost	Count	Cost
Loops	12	$18,000	50*	$75,000	4	$6,000	38*	$57,000	-	-
Cameras	-	-	-	-	-	$10,000	-	-	-	$10,000
Radar	-	-	2	$10,000	2	$10,000	2	$10,000	2	$10,000
		$18,000		$85,000		$26,000		$67,000		$20,000

**NCDOT utilizes 332/336 signal cabinets which only have 28 inputs. Additional detector racks can't be added to the cabinet due to space constraints. Therefore, a loop-based Tier I deployment is not feasible.*

For a camera-based Tier I deployment, four loops (two for each major approach) are required for advanced detection beyond the reach of the camera. In addition, one radar is necessary for each major approach for advanced speed detection. These needs may vary depending on the camera vendor.

There are multiple camera-based detection systems already in use by municipalities in North Carolina. The City of Greensboro is using GridSmart, which costs approximately $10,000 per intersection and does not have a subscription fee. A single fish-eye camera can capture stop bar and advance detection for most intersections on 35 mph roadways and they offer a supplemental traditional camera for advance loops where needed. The City of Wilmington is utilizing ITS Plus, which costs approximately $9,000 per intersection, has no subscription fees, and utilizes one camera per approach.

Camera-based detection systems have advantages over loop-based systems. Camera maintenance is less invasive than loops, camera technology is more flexible to adapt to new software improvements, detection zones can easily be modified for changes in intersection geometry, and cameras can also provide additional video surveillance of an intersection (bandwidth must be taken into consideration for streaming video).

2. ATSPM Benefits

There are a variety of benefits associated with implementing ATSPM, including maintenance efficiencies, timing optimization, and safety. The benefits of ATSPM vary based on the number of performance reports available, which in turn is based on the level of detection. More robust detection schemes associated with higher implementation tiers will provide greater operational benefits.

a. Data and Reports

Different sets of reports are available based on the detection configuration. **Figure 2** shows the reports available for the NCDOT standard detection configuration (Tier III) and **Figure 3** shows the reports available a full detection configuration (Tier I).

b. Maintenance

ATSPM maintenance benefits include:

- Time savings for maintenance technicians through remote verification of issues
- Maintenance priorities based on performance
- More timely identification of potential technical issues

c. Signal Timing Optimization

ATSPM will completely overhaul the signal retiming and optimization process. Rather than a 3-5 year retiming cycle, signal systems can be identified for retiming and optimization based on performance data. Signal timing optimization benefits include:

- Proactive and automated notification of declining operational performance
- Ability to quickly and easily identify and address declining operational performance
- Reduced time spent traveling to and from the field
- Reduced time spent diagnosing and correcting operational deficiencies
- Ability to quickly and easily give a snapshot report of signal and system performance
- Ability to assess and implement incremental signal adjustments to address citizen complaints
- Prioritize signal retiming projects based on most urgent needs
- Eliminate the need for travel time runs
- Eliminate the need for manually-collected turning movement counts (Tier I only)

d. Safety

ATSPM safety benefits include:

- More granular data regarding red light running (Tier I only)
- Support timing plan adjustments based on red light running data
- Indirect benefit of fewer crashes due to less corridor congestion

VI. Short Term Implementation Plan

1. CMAQ Corridors

The Congestion Mitigation and Air Quality (CMAQ) Program provides funding to support surface transportation projects and other related efforts that contribute to air quality improvements and provide congestion relief in areas that fail to meet the National Ambient Air Quality Standards.

There are currently 21 counties in North Carolina classified as non-attainment counties and are therefore eligible for CMAQ funding (See Appendix 3). NCDOT currently has approximately $1.8 million in CMAQ funds to begin ATSPM implementation. The signal systems in this initial implementation must be in non-attainment counties and should include a variety of implementation tiers, corridor locations, and corridor characteristics. These implementations will provide additional insight into how North Carolina can benefit from ATSPM data and further guide long term implementation decisions.

2. Initial Implementation Cost/Benefit

CMAQ funding will be utilized to implement ATSPM on several initial corridors throughout the state. In order to justify funding for additional ATSPM implementations, the costs and benefits of each of these CMAQ corridor implementations should be tracked. In addition to tracking the total project cost, suggested benefits metrics are listed below.

- Reduced congestion
- Minimized cycle failure
- Improved progression
- Minimized delay
- Reduced maintenance visits
- Fewer citizen complaints
- Utilizing performance alarms to quickly address issues
- Reduced time needed to fix timing problems

VII. Long Term Implementation Plan

1. Applying Implementation Tiers and Priority List

The Implementation Tool assigns a Current Tier and a Goal Tier for signal systems but does not assign priority. A signal system with Goal Tier I does not always imply the highest project benefits or the highest priority for implementation.

To prioritize the signal systems for implementation, the Implementation Tier will be cross-referenced with the signal retiming prioritization process. The retiming process considers the overall corridor performance of each signal system. Maximum ATSPM value would come from a system high on the retiming priority list with a low implementation cost, which can be estimated based on the implementation tier. For example, a system with Current Tier V and Goal Tier I would have a higher implementation cost than a system with Current Tier IV and Goal Tier II.

This prioritization process can be used to allocate funding as it becomes available.

2. Funding Sources

There are a variety of funding sources that can be utilized for ATSPM implementation. See Appendix 4 for details on the following long-term funding opportunities:

- Congestion Mitigation and Air Quality Improvement Program (CMAQ)
- SPOT Mobility
- SPOT Safety (Highway Safety Improvement Program)
- State Transportation Improvement Program

VIII. Moving Forward

1. Next Steps

As of completion of this document, these are the next steps required to move ATSPM Implementation forward:

- Identify CMAQ Corridors
  - Based on Division responses to the Implementation Tool, corridors with a variety of Goal Tiers, locations, and current conditions should be chosen.
- Define Before/After Study of CMAQ Corridors
  - In order to measure the effectiveness of implementing varying levels of ATSPM on different types of corridors, a before/after study should be devised. For example, ATSPM could be installed on a corridor to gather existing conditions data for a period of time before any timing changes are made.
  - This information will be useful in applying for further ATSPM funds and to fine-tune the level of implementation necessary for different corridor types.
- Guiding Divisions Forward
  - After completing the ATSPM tool, Divisions can begin identifying corridors for ATSPM upgrade as funds become available. For example, Divisions should incorporate ATSPM implementation into TIP scopes for other projects.

2. Operational Considerations

The scope of this document is the implementation of ATSPM and does not cover best practices for utilizing ATSPM in operations. During the research process, the following topics were identified as best practices for and challenges to successful ATSPM implementation.

- Incorporating ATSPM into the signal retiming process
- Roles and responsibilities for use
- Alarm parameters and response
- Asset management of closed loop systems
  - Quickly identify and repair malfunctioning loops and track maintenance
- Management of ATSPM data, including public access and archived data retention schedule

The Signal Timing Philosophy Manual should be updated to address these topics, along with other operational procedures for the effective utilization of ATSPM.

Appendix

1. Software Evaluation Matrix

	Evaluation Point	Centracs MOE	Trafficware	Open Source	Centracs SPM	Miovision
Costs	Software installation cost (per 25 intersections)	$ -	$ 8,000	$ -	$ 22,000	$ 36,000
	Hardware cost (assume existing controllers are Econolite Oasis or ASC/3 2070)	$ -	$ -	$ -	$ -	$ 100,000
	Annual subscription cost (per 25 intersections)		$ 8,000	$ -	$ 11,000	$ 30,000
	Life Cycle Cost (over 10 years)	$ -	$ 88,000	$ -	$ 132,000	$ 436,000
	Controller upgrades required (assume existing controllers are Econolite Oasis or ASC/3 2070)	None	Upgrade to Trafficware Linux-based controller	Upgrade to any Linux-based controller	Upgrade to Econolite Linux-based controller	Upgrade to any Linux-based controller or install SmartLink widget
Features	Level of implementation effort	Low	Medium	High	Low	Medium
	Ability to process data from different vendors	Econolite only	Trafficware only	Yes	Econolite only	Yes
	Location of data storage	On-site		On-site		
	Dashboard metrics for multiple intersections	Not available	Not available	KHA custom dashboard available	Available	Available
	ATSPM summary tables	Not available	Not available	Available	Available	Available
	How to identify problems?	Scheduled reports identify possible maintenance concerns but not performance concerns	Click each intersection and generate each report	KHA dashboard shows changes in performance over time	Dashboard provides list of signals with possible performance concerns	Dashboard shows changes in performance over time
	Level of effort needed to identify problems	Medium	High	Medium	Low	Low
	Highlight hot spots	Not available	Not available	Not available	Available	Available
	Customization of queries by time frame	Available in 24-hour periods	Can customize one time frame at a time	Can customize one time frame at a time	Able to compare metrics between two date ranges	Able to query multiple days and intersections on single chart
	Customization of alerts (ease, versatility)	Not available for ATSPM	No alerting capabilities	Configurable daily email alerts	Available	Available

2. Implementation Tier Tool

A screenshot of the implementation spreadsheet is included. The spreadsheet itself is attached.

About: This is a tool to classify signal systems into ATSPM implementation tiers based on certain hardware, software, and performance characteristics. See the definition of each implementation tier on the next tab. **Instructions**: Enter "yes" or "no" for each question for each signal system. If a pre-populated value is incorrect, please correct the value and highlight the cell so the database can be updated.	MA# 11016, NC 51 (Pineville- Mathews Rd) - SR 4982 (Polk St), Division 10, Mecklenburg, Pineville	MA# 11017, SR 1430 (Kannapolis Pkwy) North, Division 10, Cabarrus, Kannapolis	MA# 11018, SR 2697 (W Catawba Ave) DDI, Division 10, Mecklenburg, Cornelius	MA# 11019, NC 218 (Fairview Rd), Division 10, Mecklenburg, Mint Hill
Background Information				
Length of Corridor (miles)*	11.37	5.18	4.4	2.7
Number of Signals*	16	8	7	2
Annual VMT (Millions)*	44.51	33.27	21.05	5.43
Is this system CMAQ eligible?*	yes			
Current Signal System Conditions				
Controller*	2070	2070	2070	2070
Communications*	Wireless	Wireless	Wireless	Wireless
Is this system currently using Centracs?	yes	yes	yes	yes
Is the system planned to be upgraded to Centracs in the next 5 years?	yes	yes	yes	yes
Does this signal system have high resolution controllers?	no	no	no	no
Current Corridor Conditions				
Is this corridor over capacity?	yes	yes	yes	no
Does this corridor have atypical travel patterns (i.e. not AM/PM commuter travel)?	yes	yes	yes	yes
Are additional peformance measures needed to understand the corridor (beyond travel time runs)?	yes	no	yes	yes
Does this corridor have an unusually high number of maintenance calls?	no	no	yes	no
Does this corridor recive an unusually high number of complaints from the public?	yes	no	yes	no
Does this corridor have safety issues? (Combined Safety Score > 80)*	yes	no	no	no
Is this corridor retimed frequently? (on average, every 3 years)	no	no	yes	no
Future Corridor Conditions				
Is the corridor anticipated to change rapidly in the future? (i.e. development, new connections, TIP Projects)	yes	yes	yes	no
Current Tier	Tier IV	Tier IV	Tier IV	Tier IV
Goal Tier	Tier II	Tier III	Tier I	Tier IV

Summary	
Tier I	2
Tier II	10
Tier III	11
Tier IV	40
Tier V	1

3. CMAQ Eligible Counties

The following counties were in non-attainment as of 2011 and are eligible for CMAQ funding.

- Cabarrus
- Catawba
- Chatham*
- Davidson
- Davie
- Durham
- Edgecombe
- Forsyth
- Franklin
- Gaston
- Granville
- Guilford
- Haywood*
- Iredell*
- Johnston
- Lincoln
- Mecklenburg
- Nash
- Orange
- Person
- Rowan
- Swain*
- Union
- Wake

*Counties are only partially designated non-attainment. CMAQ projects within these counties must be within the non-attainment portion.

4. Funding Sources Matrix

Appendix 4: Long Term Funding Sources

Funding Documentation					
Name of Funds	**Web Resource**	**Funding Agency**	**Timeframe**	**Size of Project/Award**	**Notes**
Congestion Mitigation and Air Quality Improvement Program (CMAQ)	https://www.fhwa.dot.gov/fastact/factsheets/cmaqfs.cfm	USDOT FHWA	Awarded yearly; apply in February	Varies. Total available: $2.449B	Funds may be used for a transportation project or program that is likely to contribute to the attainment or maintenance of a national ambient air quality standard, with a high level of effectiveness in reducing air pollution, and that is included in the metropolitan planning organization's (MPO's) current transportation plan and transportation improvement program (TIP) or the current state transportation improvement program (STIP) in areas without an MPO. Infrastructure projects seeking funds through the statewide process must be a minimum of $500,000 in total costs. Non-infrastructure projects do not have a minimum required amount.
SPOT Safety	https://connect.ncdot.gov/resources/safety/Pages/NC-Highway-Safety-Program-and-Projects.aspx	NCDOT	Yearly	$400,000/project; $9 million total/year	The Spot Safety Program is used to develop smaller improvement projects to address safety, potential safety, and operational issues. The program is funded with state funds and currently receives approximately $9 million per state fiscal year. Other monetary sources (such as Small Construction or Contingency funds) can assist in funding Spot Safety projects, however, the maximum allowable contribution of Spot Safety funds per project is $400,000. A Safety Oversight Committee (SOC) reviews and recommends Spot Safety projects to the Board of Transportation (BOT) for approval and funding. Criteria used by the SOC to select projects for recommendation to the BOT include, but are not limited to, the frequency of correctable crashes, severity of crashes, delay, congestion, number of signal warrants met, effect on pedestrians and schools, division and region priorities, and public interest.
SPOT Mobility	NCDOT	Mobility and Safety		$40M	This is a fund managed by the State Traffic Engineer, Kevin Lacy, and administers funds for smaller mobility focused projects.
State Transportation Improvement Program (STIP)	https://www.ncdot.gov/initiatives-policies/Transportation/stip/Pages/default.aspx	NCDOT	Updated every two years. New cycle begins in July-Sept 2019	Amount varies. Funding breakdown: 40% State Mobility, 30% Regional Impact, 30% Division Needs	Through the process, called Prioritization, potential transportation improvement projects are submitted to NCDOT to be scored and ranked through the Strategic Mobility Formula at the statewide, regional and division levels, based on approved criteria such as safety, congestion, benefit-cost and local priorities. These scores and other factors are used to determine whether a project receives funding. Project prioritization occurs every two years. The current round of Prioritization is referred to as P5.0, because it is the fifth iteration of this process.