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

C205037

CONTRACT AND

CONTRACT BONDS

FOR CONTRACT NO. C205037

WBS 67015.3.1 STATE FUNDED

T.I.P NO. BR-0015

COUNTY OF DAVIDSON
THIS IS THE ROADWAY & STRUCTURE CONTRACT
ROUTE NUMBER LENGTH 0.710 MILES
LOCATION BRIDGE #280067 AND #280068 OVER SR-1192 ON US-29/US-70.

CONTRACTOR SMITH-ROWE, LLC
ADDRESS 639 OLD US 52 SOUTH
MOUNT AIRY, NC 27030

BIDS OPENED JUNE 17, 2025
CONTRACT EXECUTION 07/02/2025

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

PROPOSAL

DATE AND TIME OF BID OPENING: **Jun 17, 2025 AT 02:00 PM**

CONTRACT ID	C205037
WBS	67015.3.1

FEDERAL-AID NO.	STATE FUNDED
COUNTY	DAVIDSON
T.I.P NO.	BR-0015
MILES	0.710
ROUTE NO.	
LOCATION	BRIDGE #280067 AND #280068 OVER SR-1192 ON US-29/US-70.
TYPE OF WORK	GRADING, DRAINAGE, PAVING, SIGNALS, AND STRUCTURES.

NOTICE:

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

BIDS WILL BE RECEIVED AS SHOWN BELOW:

THIS IS A ROADWAY & STRUCTURE PROPOSAL

5% BID BOND OR BID DEPOSIT REQUIRED

PROPOSAL FOR THE CONSTRUCTION OF

CONTRACT No. C205037 IN DAVIDSON COUNTY, NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION,

RALEIGH, NORTH CAROLINA

The Bidder has carefully examined the location of the proposed work to be known as Contract No. **C205037** has carefully examined the plans and specifications, which are acknowledged to be part of the proposal, the special provisions, the proposal, the form of contract, and the forms of contract payment bond and contract performance bond; and thoroughly understands the stipulations, requirements and provisions. The undersigned bidder agrees to bound upon his execution of the bid and subsequent award to him by the Board of Transportation in accordance with this proposal to provide the necessary contract payment bond and contract performance bond within fourteen days after the written notice of award is received by him. The undersigned Bidder further agrees to provide all necessary machinery, tools, labor, and other means of construction; and to do all the work and to furnish all materials, except as otherwise noted, necessary to perform and complete the said contract in accordance with the *2024 Standard Specifications for Roads and Structures* by the dates(s) specified in the Project Special Provisions and in accordance with the requirements of the Engineer, and at the unit or lump sum prices, as the case may be, for the various items given on the sheets contained herein.

The Bidder shall provide and furnish all the materials, machinery, implements, appliances and tools, and perform the work and required labor to construct and complete Contract No. **C205037** in **Davidson County**, for the unit or lump sum prices, as the case may be, bid by the Bidder in his bid and according to the proposal, plans, and specifications prepared by said Department, which proposal, plans, and specifications show the details covering this project, and hereby become a part of this contract.

The published volume entitled *North Carolina Department of Transportation, Raleigh, Standard Specifications for Roads and Structures, January 2024* with all amendments and supplements thereto, is by reference incorporated into and made a part of this contract; that, except as herein modified, all the construction and work included in this contract is to be done in accordance with the specifications contained in said volume, and amendments and supplements thereto, under the direction of the Engineer.

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

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

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

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

State Contract Officer

Signed by:
Ronald Elton Davenport, Jr. 05/14/2025
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UNIT PROJECT SPECIAL PROVISIONS

PROPOSAL ITEM SHEET

PROJECT SPECIAL PROVISIONS

GENERAL

HAUL ROADS:
(7-16-24) 105 SP1 G04

Revise the *Standard Specifications* as follows:

Page 1-45, Article 105-15 RESTRICTION OF LOAD LIMITS, line 31, add the following after second sentence of the second paragraph:

At least 30 days prior to use, the Contractor shall notify the Engineer of any public road proposed for use as a haul road for the project.

CONTRACT TIME AND LIQUIDATED DAMAGES:
(8-15-00) (Rev. 5-16-23) 108 SP1 G08 A

The date of availability for this contract is **October 27, 2025**, except that work in jurisdictional waters and wetlands shall not begin until a meeting between the DOT, Regulatory Agencies, and the Contractor is held as stipulated in the permits contained elsewhere in this proposal. This delay in availability has been considered in determining the contract time for this project.

The completion date for this contract is **March 30, 2029**.

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

The liquidated damages for this contract are **Two Hundred Dollars ($ 200.00)** per calendar day. These liquidated damages will not be cumulative with any liquidated damages which may become chargeable under Intermediate Contract Time Number 1.

INTERMEDIATE CONTRACT TIME NUMBER 1 AND LIQUIDATED DAMAGES:
(7-1-95) (Rev. 2-21-12) 108 SP1 G13 A

Except for that work required under the Project Special Provisions entitled *Planting, Reforestation* and/or *Permanent Vegetation Establishment*, included elsewhere in this proposal, the Contractor will be required to complete all work included in this contract and shall place and maintain traffic on same.

The date of availability for this intermediate contract time is **October 27, 2025**.

The completion date for this intermediate contract time is **October 1, 2028**.

The liquidated damages for this intermediate contract time are **Two Thousand Four Hundred Dollars ($ 2,400.00)** per calendar day.

Upon apparent completion of all the work required to be completed by this intermediate date, a final inspection will be held in accordance with Article 105-17 and upon acceptance, the Department will assume responsibility for the maintenance of all work except *Planting*, *Reforestation* and/or *Permanent Vegetation Establishment*. The Contractor will be responsible for and shall make corrections of all damages to the completed roadway caused by his planting operations, whether occurring prior to or after placing traffic through the project.

INTERMEDIATE CONTRACT TIME NUMBER 2 AND LIQUIDATED DAMAGES:
(2-20-07) 108 SP1 G14 A

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

DAY AND TIME RESTRICTIONS

Monday thru Friday, 7:00 A.M. to 9:00 A.M. and 4:00 P.M. to 7:00 P.M.

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

HOLIDAY AND HOLIDAY WEEKEND LANE CLOSURE RESTRICTIONS

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

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

3. For **Easter**, between the hours of **7:00 A.M.** Thursday and **7:00 P.M.** Monday.

4. For **Memorial Day**, between the hours of **7:00 A.M.** Friday and **7:00 P.M.** Tuesday.

5. For **Independence Day**, between the hours of **7:00 A.M.** the day before Independence Day and **7:00 P.M.** the day after Independence Day.

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

6. For **Labor Day**, between the hours of **7:00 A.M.** Friday and **7:00 P.M.** Tuesday.

7. For **Thanksgiving Day**, between the hours of **7:00 A.M.** Tuesday and **7:00 P.M.** Monday.

8. For **Christmas**, between the hours of **7:00 A.M.** the Friday before the week of Christmas Day and **7:00 P.M.** the following Tuesday after the week of Christmas Day.

9. For **Lexington Barbecue Festival**, between the hours of **7:00 A.M.** the Friday before the week of **Lexington Barbecue Festival** and **7:00 P.M.** the following Monday after the week of **Lexington Barbecue Festival**.

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

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

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

The liquidated damages are **Two Hundred Fifty Dollars ($ 250.00)** per hour.

INTERMEDIATE CONTRACT TIME NUMBER 3 AND LIQUIDATED DAMAGES:
(2-20-07) 108 SP1 G14 D

The Contractor shall complete the required work of installing, maintaining and removing the traffic control devices for road closures and restoring traffic to the existing traffic pattern. The Contractor shall not close **-Y1- (Old Hwy 64 / West 5th Avenue) or SR 1277 (Central Avenue)** during the following time restrictions:

DAY AND TIME RESTRICTIONS

Monday thru Sunday, 6:00 A.M. to 10:00 P.M.

This intermediate contract time shall apply to the bridge demolition and the girder erection operations required over -Y1-, as well as the water line operations required along SR 1277.

The time of availability for this intermediate contract time will be the time the Contractor begins to install traffic control devices required for road closures according to the time restrictions stated herein.

The completion time for this intermediate contract time will be the time the Contractor is required to complete the removal of traffic control devices required for the road closures according to the time restrictions stated herein and restore traffic to the existing traffic pattern.

The liquidated damages are **Five Hundred Dollars ($ 500.00)** per hour.

INTERMEDIATE CONTRACT TIME NUMBER 4 AND LIQUIDATED DAMAGES:
(2-20-07) (Rev. 6-18-13) 108 SP1 G14 F

The Contractor shall complete the work required of **installing proposed sewer line -SS1- across -Y1- (Old HWY 64)** as shown on Sheet **TMP-1E** and shall place and maintain traffic on same.

The time of availability for this intermediate contract time is the **Friday** at **10:00 P.M.** that the Contractor elects to begin the work.

The completion time for this intermediate contract time is the following **Monday** at **6:00 A.M.** after the time of availability.

The liquidated damages are **Five Hundred Dollars ($ 500.00)** per hour. **The Liquidated Damages for Day and Time Restrictions associated with Intermediate Contract Time #2 shall not apply to the work required of this intermediate contract time; however, the Liquidated Damages for Holiday and Holiday Weekend Lane Closure Restrictions associated with Intermediate Contract Time #2 shall apply to the work required of this intermediate contract time**.

INTERMEDIATE CONTRACT TIME NUMBER 5 AND LIQUIDATED DAMAGES:
(2-20-07) (Rev. 6-18-13) 108 SP1 G14 F

The Contractor shall complete the work required of **installing proposed water line -WL4- along -Y3- (National Boulevard)** as shown on Sheet **TMP-1E** and shall place and maintain traffic on same.

The time of availability for this intermediate contract time is the **Friday** at **10:00 P.M.** that the Contractor elects to begin the work.

The completion time for this intermediate contract time is the following **Monday** at **6:00 A.M.** after the time of availability.

The liquidated damages are **Five Hundred Dollars ($ 500.00)** per hour. **The Liquidated Damages for Day and Time Restrictions associated with Intermediate Contract Time #2 shall not apply to the work required of this intermediate contract time; however, the Liquidated Damages for Holiday and Holiday Weekend Lane Closure Restrictions associated with Intermediate Contract Time #2 shall apply to the work required of this intermediate contract time**.

INTERMEDIATE CONTRACT TIME NUMBER 6 AND LIQUIDATED DAMAGES:
(2-20-07) (Rev. 6-18-13) 108 SP1 G14 F

The Contractor shall complete the work required of **installing proposed water line -WL5- along -Y3- (National Boulevard)** as shown on Sheet **TMP-1E** and shall place and maintain traffic on same.

The time of availability for this intermediate contract time is the **Friday** at **10:00 P.M.** that the Contractor elects to begin the work.

The completion time for this intermediate contract time is the following **Monday** at **6:00 A.M.** after the time of availability.

The liquidated damages are **Five Hundred Dollars ($ 500.00)** per hour. **The Liquidated Damages for Day and Time Restrictions associated with Intermediate Contract Time #2 shall not apply to the work required of this intermediate contract time; however, the Liquidated Damages for Holiday and Holiday Weekend Lane Closure Restrictions associated with Intermediate Contract Time #2 shall apply to the work required of this intermediate contract time**.

INTERMEDIATE CONTRACT TIME NUMBER 7 AND LIQUIDATED DAMAGES:
(2-20-07) (Rev. 6-18-13) 108 SP1 G14 H

The Contractor shall complete the work required of **Phase IV, Step #7** as shown on Sheet **TMP-1E** and shall place and maintain traffic on same.

The date of availability for this intermediate contract time is the date the Contractor elects to begin the work.

The completion date for this intermediate contract time is the date which is **thirty (30)** consecutive calendar days after and including the date the Contractor begins this work.

The liquidated damages are **One Thousand Dollars ($ 1,000.00)** per calendar day. **The Liquidated Damages associated with Intermediate Contract Time #2 shall not apply to the work required of this intermediate contract time**.

PERMANENT VEGETATION ESTABLISHMENT:
(2-16-12)(Rev. 1-16-24) 104 SP1 G16

Establish a permanent stand of the vegetation mixture shown in the contract. During the period between initial vegetation planting and final project acceptance, perform all work necessary to establish permanent vegetation on all erodible areas within the project limits, as well as, in borrow and waste pits. This work shall include erosion control device maintenance and installation, repair seeding and mulching, supplemental seeding and mulching, mowing, and fertilizer topdressing, as directed. All work shall be performed in accordance with the applicable section of the *Standard Specifications*. All work required for initial vegetation planting shall be performed as a part of the work necessary for the completion and acceptance of the Intermediate Contract Time (ICT). Between the time of ICT and Final Project acceptance, or otherwise referred to as the vegetation establishment period, the Department will be responsible for preparing the required National Pollutant Discharge Elimination System (NPDES) inspection records.

Once the Engineer has determined that the permanent vegetation establishment requirement has been achieved at an 80% vegetation density (the amount of established vegetation per given area to stabilize the soil) and no erodible areas exist within the project limits, the Contractor will be notified to remove the remaining erosion control devices that are no longer needed. The Contractor will be responsible for, and shall correct any areas disturbed by operations performed in permanent vegetation establishment and the removal of temporary erosion control measures, whether occurring prior to or after placing traffic on the project.

Payment for *Response for Erosion Control, Seeding and Mulching, Repair Seeding, Supplemental Seeding, Mowing, Fertilizer Topdressing, Silt Excavation,* and *Stone for Erosion Control* will be made at contract unit prices for the affected items. Work required that is not represented by contract line items will be paid in accordance with Articles 104-7 or 104-3 of the *Standard Specifications*. No additional compensation will be made for maintenance and removal of temporary erosion control items.

CONSTRUCTION MORATORIUM:

(1-19-16) SP1 G18C

No tree cutting will be allowed from **April 1st** through **July 15th** of any year.

DELAY IN RIGHT OF ENTRY:

(7-1-95) (Rev. 7-15-14) 108 SP1 G22

The Contractor will not be allowed right of entry to the following parcel(s) prior to the listed date(s) unless otherwise permitted by the Engineer.

Parcel No.	Property Owner	Date
9A	Gerald Lomax Smith	6-17-2025

MAJOR CONTRACT ITEMS:

(2-19-02)(Rev. 1-16-24) 104 SP1 G28

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

Line #	Description
256	MSE Retaining Wall No 1

SPECIALTY ITEMS:
(7-1-95)(Rev. 1-16-24) 108-6 SP1 G37

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

Line #	**Description**
78-91, 95	Guardrail
92-94	Fencing
99-119	Signing
138-142, 148-151, 157	Long-Life Pavement Markings
158-159	Permanent Pavement Markers
161-184	Utility Construction
185-220	Erosion Control
221-255	Signals/ITS System

FUEL PRICE ADJUSTMENT:
(11-15-05)(Rev. 1-16-24) 109-8 SP1 G43

Page 1-82, Article 109-8, FUEL PRICE ADJUSTMENTS, add the following:

The base index price for DIESEL #2 FUEL is **$ 2.2231** per gallon. Where any of the following are included as pay items in the contract, they will be eligible for fuel price adjustment.

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

Description	**Units**	**Fuel Usage Factor Diesel**
Unclassified Excavation	Gal/CY	0.29
Borrow Excavation	Gal/CY	0.29
Class IV Subgrade Stabilization	Gal/Ton	0.55
Aggregate Base Course	Gal/Ton	0.55
Sub-Ballast	Gal/Ton	0.55
Erosion Control Stone	Gal/Ton	0.55
Rip Rap, Class _____	Gal/Ton	0.55
Asphalt Concrete Base Course, Type ____	Gal/Ton	0.90 or 2.90
Asphalt Concrete Intermediate Course, Type ____	Gal/Ton	0.90 or 2.90
Asphalt Concrete Surface Course, Type ____	Gal/Ton	0.90 or 2.90
Open-Graded Asphalt Friction Course	Gal/Ton	0.90 or 2.90
Permeable Asphalt Drainage Course, Type ____	Gal/Ton	0.90 or 2.90
Sand Asphalt Surface Course, Type ____	Gal/Ton	0.90 or 2.90
Ultra-thin Bonded Wearing Course	Gal/Ton	0.90 or 2.90
Aggregate for Cement Treated Base Course	Gal/Ton	0.55
Portland Cement for Cement Treated Base Course	Gal/Ton	0.55
> 11" Portland Cement Concrete Pavement	Gal/SY	0.327
Concrete Shoulders Adjacent to > 11” Pavement	Gal/SY	0.327
9” to 11" Portland Cement Concrete Pavement	Gal/SY	0.272
Concrete Shoulders Adjacent to 9” to 11” Pavement	Gal/SY	0.272
< 9” Portland Cement Concrete Pavement	Gal/SY	0.245
Concrete Shoulders Adjacent to < 9” Pavement	Gal/SY	0.245

For the asphalt items noted in the chart as eligible for fuel adjustments, the bidder may include the *Fuel Usage Factor Adjustment Form* with their bid submission if they elect to use the fuel usage factor. The *Fuel Usage Factor Adjustment Form* is found at the following link:

https://connect.ncdot.gov/letting/LetCentral/Fuel%20Usage%20Factor%20Adjustment%20Form%20-%20%20Starting%20Nov%202022%20Lettings.pdf

Select either 2.90 Gal/Ton fuel factor or 0.90 Gal/Ton fuel factor for each asphalt line item on the *Fuel Usage Factor Adjustment Form*. The selected fuel factor for each asphalt item will remain in effect for the duration of the contract.

Failure to complete the *Fuel Usage Factor Adjustment Form* will result in using 2.90 gallons per ton as the Fuel Usage Factor for Diesel for the asphalt items noted above. The contractor will not be permitted to change the Fuel Usage Factor after the bids are submitted.

STEEL PRICE ADJUSTMENT:
(4-19-22)(Rev. 12-20-22) SP1 G47

Description and Purpose

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

Eligible Items

The list of eligible bid items for steel price adjustment can be found on the Departments website at the following address:

https://connect.ncdot.gov/letting/LetCentral/Eligible%20Bid%20Items%20for%20Steel%20Price%20Adjustment.xlsx

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

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

No steel price adjustments will be made for any products manufactured from steel having an adjustment date, as defined by the Product Relationship Table below, prior to the letting date.

Bid Submittal Requirements

The successful bidder, within 14 calendar days after the notice of award is received by him, shall provide the completed Form SPA-1 to the Department (State Contract Officer or Division Contract Engineer) along with the payment bonds, performance bonds and contract execution signature sheets in a single submittal. If Form SPA-1 is not included in the same submittal as the payment bonds, performance bonds and contract execution signature sheets, the Contractor will not be eligible for any steel price adjustment for any item in the contract for the life of the contract. Form SPA-1 can be found on the Department's website at the following address:

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

The Contractor shall provide Form SPA-1 listing the Contract Line Number, (with corresponding Item Number, Item Description, and Category) for the steel products they wish to have an adjustment calculated. Only the contract items corresponding to the list of eligible item numbers for steel price adjustment may be entered on Form SPA-1. The Contractor may choose to have steel price adjustment applied to any, all, or none of the eligible items. However, the Contractor's selection of items for steel price adjustment or non-selection (non-participation)

may not be changed once Form SPA-1 has been received by the Department. Items the Bidder chooses for steel price adjustment must be designated by writing the word "Yes" in the column titled "Option" by each Pay Item chosen for adjustment. Should the bidder elect an eligible steel price item, the entire quantity of the line item will be subject to the price adjustment for the duration of the Contract. The Bidder's designations on Form SPA-1 must be written in ink or typed and signed by the Bidder (Prime Contractor) to be considered complete. Items not properly designated, designated with "No", or left blank on the Bidder's Form SPA-1 will automatically be removed from consideration for adjustment. No steel items will be eligible for steel price adjustment on this Project if the Bidder fails to return Form SPA-1 in accordance with this provision.

Establishing the Base Price

The Department will use a blend of monthly average prices as reported from the Fastmarkets platform to calculate the monthly adjustment indices (BI and MI). This data is typically available on the first day of the month for the preceding month. The indices will be calculated by the Department for the different categories found on the Product Relationship Table below. For item numbers that include multiple types of steel products, the category listed for that item number will be used for adjusting each steel component.

The bidding index for Category 1 Steel items is **$ 39.00** per hundredweight.
The bidding index for Category 2 Steel items is **$ 56.85** per hundredweight.
The bidding index for Category 3 Steel items is **$ 63.53** per hundredweight.
The bidding index for Category 4 Steel items is **$ 48.26** per hundredweight.
The bidding index for Category 5 Steel items is **$ 52.81** per hundredweight.
The bidding index for Category 6 Steel items is **$ 63.84** per hundredweight.
The bidding index for Category 7 Steel items is **$ 42.30** per hundredweight.

The bidding index represents a selling price of steel based on Fastmarkets data for the month of **April 2025**.

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

BI = Bidding Index. - in Dollars ($) per hundredweight (CWT). Use the adjustment indices as listed in the proposal.

Product Relationship Table

Steel Product (Title)	BI, MI*	Adjustment Date for MI	Category
Reinforcing Steel, Bridge Deck, and SIP Forms	Based on one or more Fastmarkets indices	Delivery Date from Producing Mill	1
Structural Steel and Encasement Pipe	Based on one or more Fastmarkets indices	Delivery Date from Producing Mill	2
Steel H-Piles, Soldier Pile Walls	Based on one or more Fastmarkets indices	Delivery Date from Producing Mill	3
Guardrail Items and Pipe	Based on one or more	Material Received Date**	4

Piles	Fastmarkets indices		
Fence Items	Based on one or more Fastmarkets indices	Material Received Date**	5
Overhead Sign Assembly, Signal Poles, High Mount Standards	Based on one or more Fastmarkets indices	Material Received Date**	6
Prestressed Concrete Members	Based on one or more Fastmarkets indices	Cast Date of Member	7
* BI and MI are in converted units of Dollars per Hundredweight ($/CWT)			
** Material Received Date is defined as the date the materials are received on the project site. If a material prepayment is made for a Category 4-6 item, the Adjustment Date to be used will be the date of the prepayment request instead of the Materials Received Date.			

Submit documentation to the Engineer for all items listed in the Contract for which the Contractor is requesting a steel price adjustment.

Submittal Requirements

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

Furnish the following documentation for all steel products to be incorporated into the work and documented on Form SPA-2, found on the Departments website at the following address:

https://connect.ncdot.gov/projects/construction/Construction%20Forms/Form%20SPA-2.xlsx

Submit all documentation to the Engineer prior to incorporation of the steel into the completed work. The Department will withhold progress payments for the affected contract line item if the documentation is not provided and at the discretion of the Engineer the work is allowed to proceed. Progress payments will be made upon receipt of the delinquent documentation.

Step 1 (Form SPA -2)

Utilizing Form SPA-2, submit separate documentation packages for each line item from Form SPA-1 for which the Contractor opted for a steel price adjustment. For line items with multiple components of steel, each component should be listed separately. Label each SPA-2 documentation package with a unique number as described below.

a. Documentation package number: (Insert the contract line-item) - (Insert sequential package number beginning with “1”).
   Example: 412 - 1,
   412 - 2,
   424 – 1,
   424 – 2,
   424 – 3, etc.
b. The steel product quantity in pounds

i. The following sources should be used, in declining order of precedence, to determine the weight of steel/iron, based on the Engineers decision:
   1. Department established weights of steel/iron by contract pay item per pay unit;
   2. Approved Shop Drawings;
   3. Verified Shipping Documents;
   4. Contract Plans;
   5. Standard Drawing Sheets;
   6. Industry Standards (i.e., AISC Manual of Steel Construction, AWWA Standards, etc.); and
   7. Manufacture's data.

ii. Any item requiring approved shop drawings shall have the weights of steel calculated and shown on the shop drawings or submitted and certified separately by the fabricator.

c. The date the steel product, subject to adjustment, was shipped from the producing mill (Categories 1-3), received on the project (Categories 4-6), or casting date (Category 7).

Step 2 (Monthly Calculator Spreadsheet)

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

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

Price Adjustment Conditions

Download the Monthly Steel Adjustment Spreadsheet with the most current reference data from the Department's website each month at the following address:

https://connect.ncdot.gov/projects/construction/Construction%20Forms/Form%20SPA-3%20NCDOT%20Steel%20Price%20Adjustment%20Calculator.xlsx

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

Price Adjustment Calculations

The price adjustment will be determined by comparing the percentage of change in index value listed in the proposal (BI) to the monthly index value (MI). (See included sample examples). Weights and date of shipment must be documented as required herein. The final price adjustment dollar value will be determined by multiplying this percentage increase or decrease in the index by the represented quantity of steel incorporated into the work, and the established bidding index (BI) subject to the limitations herein.

Price increase/decrease will be computed as follows:

SPA = ((MI/ BI) -1) * BI *(Q/100)

Where;

SPA = Steel price adjustment in dollars

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

BI = Bidding Index. - in Dollars ($) per hundredweight (CWT). Use the adjustment indices as listed in the proposal.

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

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

Any apparent attempt to unbalance bids in favor of items subject to price adjustment may result in rejection of the bid proposal.

Adjustments will be paid or charged to the Contractor only. Any Contractor receiving an adjustment under this provision shall distribute the proper proportional part of such adjustments to the subcontractor who performed the applicable work.

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

If an increase in the steel material price is anticipated to exceed 50% of the original quoted price, the contractor must notify the Department within 7 days prior to purchasing the material. Upon receipt of such notification, the Department will direct the Contractor to either (1) proceed with the work or (2) suspend the work and explore the use of alternate options.

If the decrease in the steel material exceeds 50% of the original quoted price, the contractor may submit to the Department additional market index information specific to the item in question to dispute the decrease. The Department will review this information and determine if the decrease is warranted.

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

If the price adjustment is based on estimated material quantities for that time, and a revision to the total material quantity is made in a subsequent or final estimate, an appropriate adjustment will be made to the price adjustment previously calculated. The adjustment will be based on the same indices used to calculate the price adjustment which is being revised. If the adjustment date of the revised material quantity cannot be determined, the adjustment for the quantity in question, will be based on the indices utilized to calculate the steel price adjustment for the last initial documentation package submission, for the steel product subject to adjustment, that was incorporated into the particular item of work, for which quantities are being finalized. Example: Structural steel for a particular bridge was provided for in three different shipments with each having a different mill shipping date. The quantity of structural steel actually used for the bridge was calculated and a steel price adjustment was made in a progress payment. At the conclusion of the work an error was found in the plans of the final quantity of structural steel used for the bridge. The quantity to be adjusted cannot be directly related to any one of the three mill shipping dates. The steel price adjustment for the quantity in question would be calculated using the indices that were utilized to calculate the steel price adjustment for the quantity of structural steel represented by the last initial structural steel documentation package submission. The package used will be the one with the greatest sequential number.

Extra Work/Force Account:

When steel products, as specified herein, are added to the contract as extra work, in accordance with the provisions of Article 104-7 or 104-3, the Engineer will determine and specify in the supplemental agreement, the need for application of steel price adjustments on a case-by-case basis. No steel price adjustments will be made for any products manufactured from steel having an adjustment date prior to the supplemental agreement execution date. Price adjustments will be made as provided herein, except the Bidding Index will be based on the month in which the supplemental agreement pricing was executed.

For work performed on force account basis, reimbursement of actual material costs, along with the specified overhead and profit markup, will be considered to include full compensation for the current cost of steel and no steel price adjustments will be made.

Examples **Form SPA-2**

Steel Price Adjustment Submission Form

Contract Number __C203394_____ Bid Reference Month __January 2019__

Submittal Date ___8/31/2019_____

Contract Line Item _____237_____

Line Item Description __APPROX….LBS Structural Steel_____

Sequential Submittal Number _____2_____

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

Note: Attach the following supporting documentation to this form.

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

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

Printed Name _____ Signature _____

Examples **Form SPA-2**

Steel Price Adjustment Submission Form

Contract Number C203394 Bid Reference Month January 2019

Submittal Date August 31, 2019

Contract Line Item 237

Line Item Description SUPPORT, OVRHD SIGN STR -DFEB – STA 36+00

Sequential Submittal Number 2

Supplier	Description of material	Location information	Quantity in lbs.	Adjustment Date
XYZ mill	Tubular Steel (Vertical legs)	-DFEB – STA 36+00	12000	December 11, 2021
PDQ Mill	4" Tubular steel (Horizontal legs)	-DFEB – STA 36+00	5900	December 11, 2021
ABC distributing	Various channel & angle shapes (see quote)	-DFEB – STA 36+00	1300	December 11, 2021
	Catwalk assembly	-DFEB – STA 36+00	2000	December 11, 2021
Nucor	Flat plate	-DFEB – STA 36+00	650	December 11, 2021
		Total Pounds of Steel	21,850	

Note: Attach the following supporting documentation to this form.

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

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

Printed Name _____ Signature _____

Price Adjustment Sample Calculation (increase)

Project bid on September 17, 2019

Line Item 635 “Structural Steel” has a plan quantity of 2,717,000 lbs.

Bidding Index for Structural Steel (Category 2) in the proposal was $36.12/CWT = BI

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

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

The Steel Price Adjustment formula is as follows:

SPA = ((MI/ BI) -1) * BI *(Q/100)

Where;

SPA = Steel price adjustment in dollars

BI = Bidding Index – in dollars ($) per hundredweight (CWT). Use the adjustment indices as listed in the proposal.

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

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

BI = $36.12/ CWT

MI = $64.89 / CWT

% change = ((MI/ BI)-1) = ($64.89 / $36.12 – 1) = (1.79651 – 1) = 0.79651162791

Q = 450,000 lbs.

SPA = 0.79651162791x $36.12 x (450,000/100)

SPA = 0.79651162791* $36.12 *4,500

SPA = $129,465 pay adjustment to Contractor for Structural Steel (Structure 2 at Station 44+08.60)

Price Adjustment Sample Calculation (decrease)

Project bid on December 18, 2018

Line Item 635 Structural Steel has a plan quantity of 2,717,000 lbs.

Bidding Index for Structural Steel (Category 2) in the proposal was $46.72/CWT = BI

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

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

The Steel Price Adjustment formula is as follows:

SPA = ((MI/ BI) -1) * BI *(Q/100)

Where;

SPA = Steel price adjustment in dollars

BI = Bidding Index – in dollars ($) per hundredweight (CWT). Use the adjustment indices as listed in the proposal.

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

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

BI = $46.72/ CWT

MI = $27.03 / CWT

% change = ((MI/ BI)-1) = ($27.03/ $46.72–1) = (0.57855–1) = -0.421446917808

Q = 600,000 lbs.

SPA = -0.421446917808 * $46.72 * (600,000/100)

SPA = -0.421446917808 * $46.72 *6,000

SPA = $ 118,140.00 Credit to the Department for Structural Steel (Structure 1 at Station 22+57.68)

Price Adjustment Sample Calculation (increase)

Project bid on July 16, 2020

Line Item 614 Reinforced Concrete Deck Slab has a plan quantity of 241974 lbs.

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

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

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

The Steel Price Adjustment formula is as follows:

SPA = ((MI/ BI) -1) * BI *(Q/100)

Where; SPA = Steel price adjustment in dollars

BI = Bidding Index – in dollars ($) per hundredweight (CWT). Use the adjustment indices as listed in the proposal.

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

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

BI = $29.21/ CWT

MI = $43.13 / CWT

% change = ((MI/ BI)-1) = ($43.13 / $29.21 – 1) = (1.47655 – 1) = 0.47654912701

Q = 103932 lbs.

SPA = 0. 47654912701 * $29.21 * (103,932/100)

SPA = 0. 47654912701 * $29.21 *1,039.32

SPA = $14,467.33 Pay Adjustment to Contractor for Reinforced Concrete Deck Slab (Category 1) at Station 107+45.55 -L-

SCHEDULE OF ESTIMATED COMPLETION PROGRESS:

(7-15-08)(Rev. 6-17-25) 108-2 SP1 G58

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

	Fiscal Year	Progress (% of Dollar Value)
2026	(7/01/25 - 6/30/26)	**31**% of Total Amount Bid
2027	(7/01/26 - 6/30/27)	**40**% of Total Amount Bid
2028	(7/01/27 - 6/30/28)	**25**% of Total Amount Bid
2029	(7/01/28 - 6/30/29)	**4**% of Total Amount Bid

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

MINORITY BUSINESS ENTERPRISE AND WOMEN BUSINESS ENTERPRISE:

(10-16-07)(Rev. 5-9-24) 102-15(J) SP1 G66

Description

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

Definitions

Additional MBE/WBE Subcontractors - Any MBE/WBE submitted at the time of bid that will not be used to meet the Combined MBE /WBE Goal. No submittal of a Letter of Intent is required.

Combined MBE/WBE Goal: A portion of the total contract, expressed as a percentage that is to be performed by committed MBE/WBE subcontractors.

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

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

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

Manufacturer - A firm that owns (or leases) and operates or maintains a factory or establishment that produces on the premises, the materials or supplies obtained by the Contractor. A firm that makes minor modifications to the materials, supplies, articles, or equipment is not a manufacturer.

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

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

Regular Dealer - A firm that owns (or leases), and operates a store, warehouse, or other establishment in which the materials or supplies required for the performance of the contract are bought, kept in sufficient quantities, 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, concrete or concrete products, gravel, stone, asphalt and petroleum products need not keep such products in stock, if it owns and operates distribution equipment for the products. Any supplement of regular dealers' own distribution equipment shall be by a long-term operating lease and not on an ad hoc or contract-by-contract basis.

Distributor – A firm that engages in the regular sale or lease of the items specified by the contract. A distributor assumes responsibility for the items it purchases once they leave the point of origin (e.g., a manufacturer's facility), making it liable for any loss or damage not covered by the carrier's insurance.

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

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

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

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

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

Forms and Websites Referenced in this Provision

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

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

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

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

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

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

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

DBE Regular Dealer/Distributor Affirmation Form – Form is used to make a preliminary counting determination for each DBE listed as a regular dealer or distributor to assess its eligibility for 60 or 40 percent credit, respectively of the cost of materials or supplies based on its demonstrated capacity and intent to perform as a regular dealer or distributor, as defined in section 49 CFR 26.55 under the contract at issue. A Contractor will submit the completed form with the Letter of Intent.
https://connect.ncdot.gov/projects/construction/Construction%20Forms/DBE%20Regular%20Dealer-Distributor%20Affirmation%20Form%20-%20USDOT%202024.pdf

Combined MBE/WBE Goal

The Combined MBE/WBE Goal for this project is **4.0 %**

The Combined Goal was established utilizing the following anticipated participation for Minority Business Enterprises and Women Business Enterprises:

(A) Minority Business Enterprises **2.0 %**

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

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

(B) Women Business Enterprises **2.0 %**

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

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

The Bidder is required to submit only participation to meet the Combined MBE/WBE Goal. The Combined Goal may be met by submitting all MBE participation, all WBE participation, or a combination of MBE and WBE participation.

Directory of Transportation Firms (Directory)

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

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

Listing of MBE/WBE Subcontractors

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

(A) Electronic Bids

Bidders shall submit a listing of MBE and WBE participation in the appropriate section of the electronic submittal file.

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

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

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

(B) Paper Bids

(1) *If the Combined MBE/WBE Goal is more than zero,*

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

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

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

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

MBE or WBE Prime Contractor

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

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

Written Documentation – Letter of Intent

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

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

If the bidder fails to submit the Letter of Intent from each committed MBE and WBE to be used toward the Combined MBE/WBE Goal, or if the form is incomplete (i.e. both signatures are not

present), the MBE/WBE participation will not count toward meeting the Combined MBE/WBE Goal. If the lack of this participation drops the commitment below the Combined MBE/WBE Goal, the Contractor shall submit evidence of good faith efforts for the goal, completed in its entirety, to the State Contractor Utilization Engineer or DBE@ncdot.gov no later than 10:00 a.m. on the eighth calendar day following opening of bids, unless the eighth day falls on an official state holiday. In that situation, it is due in the office of the State Contractor Utilization Engineer no later than 10:00 a.m. on the next official state business day.

Banking MBE/WBE Credit

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

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

Submission of Good Faith Effort

If the bidder fails to meet or exceed the Combined MBE/WBE Goal, the apparent lowest responsive bidder shall submit to the Department documentation of adequate good faith efforts made to reach that specific 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 bids unless the sixth day falls on an official state holiday. In that situation, it would be due in the office of the State Contractor Utilization Engineer no later than 10:00 a.m. on the next official state business day. If the Contractor cannot send the information electronically, then one complete set and 5 copies of this information shall be received under the same time constraints above.

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

Consideration of Good Faith Effort for Projects with a Combined MBE/WBE Goal More Than Zero

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

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

(A) Soliciting through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising, written notices, use of verifiable electronic means through the use of the NCDOT Directory of Transportation Firms) the interest of all certified MBEs/WBEs that are also prequalified subcontractors. The bidder must solicit this interest within at least 10 days prior to bid opening to allow the MBEs/WBEs to respond to the solicitation. Solicitation shall provide the opportunity to MBEs/WBEs within the Division and surrounding Divisions where the project is located. The bidder must determine with certainty if the MBEs/WBEs are interested by taking appropriate steps to follow up initial solicitations.

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

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

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

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

(D) (1) Negotiating in good faith with interested MBEs/WBEs. It is the bidder's responsibility to make a portion of the work available to MBE/WBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available MBE/WBE subcontractors and suppliers, so as to facilitate MBE/WBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of MBEs/WBEs that were considered; a description of the information provided regarding the plans and specifications

for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for MBEs/WBEs to perform the work.

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

(E) Not rejecting MBEs/WBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. The bidder's standing within its industry, membership in specific groups, organizations, or associates and political or social affiliations (for example, union vs. non-union employee status) are not legitimate causes for the rejection or non-solicitation of bids in the bidder's efforts to meet the project goal.

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

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

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

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

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

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

(2) The bidders' past performance in meeting the contract goal.

(3) The performance of other bidders in meeting the advertised goal. For example, when the apparent successful bidder fails to meet the goal, but others meet it, you may reasonably raise the question of whether, with additional reasonable efforts

the apparent successful bidder could have met the goal. If the apparent successful bidder fails to meet the advertised goal, but meets or exceeds the average MBE and WBE participation obtained by other bidders, the Department may view this, in conjunction with other factors, as evidence of the apparent successful bidder having made a good faith effort.

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

Non-Good Faith Appeal

The State Prequalification Engineer will notify the Contractor verbally and in writing of non-good faith. A Contractor may appeal a determination of non-good faith made by the Goal Compliance Committee. If a Contractor wishes to appeal the determination made by the Committee, they shall provide written notification to the State Prequalification Engineer. The appeal shall be made within 2 business days of notification of the determination of non-good faith.

Counting MBE/WBE Participation Toward Meeting the Combined MBE/WBE Goal

(A) Participation

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

(B) Joint Checks

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

(C) Subcontracts (Non-Trucking)

A MBE/WBE may enter into subcontracts. Work that a MBE subcontracts to another MBE firm may be counted toward the anticipated MBE participation. The same holds true for work that a WBE subcontracts to another WBE firm. Work that a MBE/WBE subcontracts to a non-MBE/WBE firm does <u>not</u> count toward the contract goal requirement. It should be noted that every effort shall be made by MBE and WBE contractors to subcontract to the same certification (i.e., MBEs to MBEs and WBEs to WBEs), in order to fulfill the MBE or WBE participation breakdown. This, however, may not always be possible due to the limitation of firms in the area. If the MBE or WBE firm shows a good faith effort has been made to reach out to similarly certified

firms and there is no interest or availability, and they can get assistance from other certified firms, the Engineer will not hold the prime responsible for meeting the individual MBE or WBE breakdown. If a MBE or WBE contractor or subcontractor subcontracts a significantly greater portion of the work of the contract than would be expected on the basis of standard industry practices, it shall be presumed that the MBE or WBE is not performing a commercially useful function.

(D) Joint Venture

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

(F) Manufacturer, Regular Dealer, Distributor

A Contractor may count toward its MBE/WBE requirement 40 percent of its expenditures for materials or supplies (including transportation costs) from a MBE/WBE distributor, 60 percent of its expenditures for materials or supplies (including transportation costs) from a MBE/WBE regular dealer and 100 percent of such expenditures obtained from a MBE/WBE manufacturer.

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

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

(2) With respect to materials or supplies purchased from a MBE/WBE, which is neither a manufacturer, regular dealer, nor a distributor count the entire amount of fees or commissions charged that the Department deems to be reasonable, including transportation charges for the delivery of materials or supplies. Do not count any portion of the cost of the materials and supplies themselves.

A Contractor will submit a completed *DBE Regular Dealer/Distributor Affirmation Form* with the Letter of Intent to the State Contractor Utilization Engineer or DBE@ncdot.gov. The State Contractor Utilization Engineer will make a preliminary assessment as to whether a MBE/WBE supplier has the demonstrated capacity to perform a commercially useful function (CUF) on a contract-by-contract basis *prior* to its participation.

Commercially Useful Function

(A) MBE/WBE Utilization

The Contractor may count toward its contract goal requirement only expenditures to MBEs and WBEs that perform a commercially useful function in the work of a contract. A MBE/WBE performs a commercially useful function when it is responsible for execution of the work of the contract and is carrying out its responsibilities by performing, managing, and supervising the work involved. To perform a commercially useful function, the MBE/WBE shall also be responsible with respect to materials and supplies used on the contract, for negotiating price, determining quality and quantity, ordering the material and installing (where applicable) and paying for the material itself. To determine whether a MBE/WBE is performing a commercially useful function, the Department will evaluate the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the contract is commensurate with the work it is performing and the MBE/WBE credit claimed for its performance of the work, and any other relevant factors. If it is determined that a MBE or WBE is not performing a Commercially Useful Function, the contractor may present evidence to rebut this presumption to the Department.

(B) MBE/WBE Utilization in Trucking

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

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

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

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

(4) The MBE may subcontract the work to another MBE firm, including an owner-operator who is certified as a MBE. The same holds true that a WBE may subcontract the work to another WBE firm, including an owner-operator who is certified as a WBE. When this occurs, the MBE or WBE who subcontracts work receives credit for the total value of the transportation services the subcontracted MBE or WBE provides on the contract. It should be noted that every effort shall be made by MBE and WBE contractors to subcontract to the same certification (i.e., MBEs to MBEs and WBEs to WBEs), in order to fulfill the participation breakdown. This, however, may not always be possible due to the limitation of firms in the area. If the MBE or WBE firm shows a good faith

effort has been made to reach out to similarly certified transportation service providers and there is no interest or availability, and they can get assistance from other certified providers, the Engineer will not hold the prime responsible for meeting the individual MBE or WBE participation breakdown.

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

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

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

MBE/WBE Replacement

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

The Contractor must give notice in writing both by certified mail and email to the MBE/WBE subcontractor, with a copy to the Engineer of its intent to request to terminate a MBE/WBE subcontractor or any portion of its work, and the reason for the request. The Contractor must give the MBE/WBE subcontractor five (5) business days to respond to the Contractor's Notice of Intent to Request Termination and/or Substitution. If the MBE/WBE subcontractor objects to the intended termination/substitution, the MBE/WBE, within five (5) business days must advise the Contractor 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 MBE/WBE subcontractor.

A committed MBE/WBE subcontractor may only be terminated or any portion of its work after receiving the Department's written approval based upon a finding of good cause for the proposed termination and/or substitution. Good cause does not exist if the Contractor seeks to terminate a MBE/WBE or any portion of its work that it relied upon to obtain the contract so that the Contractor can self-perform the work for which the MBE/WBE was engaged, or so that the Contractor can substitute another MBE/WBE or non- MBE/WBE contractor after contract award. For purposes of this section, good cause shall include the following circumstances:

(a) The listed MBE/WBE subcontractor fails or refuses to execute a written contract;
(b) The listed MBE/WBE 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 MBE/WBE subcontractor to perform its work on the subcontract results from the bad faith or discriminatory action of the prime contractor;
(c) The listed MBE/WBE subcontractor fails or refuses to meet the prime contractor's reasonable, nondiscriminatory bond requirements;
(d) The listed MBE/WBE subcontractor becomes bankrupt, insolvent, or exhibits credit unworthiness;
(e) The listed MBE/WBE subcontractor is ineligible to work on public works projects because of suspension and debarment proceedings pursuant to 2 CFR parts 180, 215 and 1200 or applicable State law;
(f) The listed MBE/WBE subcontractor is not a responsible contractor;
(g) The listed MBE/WBE voluntarily withdraws from the project and provides written notice of withdrawal;
(h) The listed MBE/WBE is ineligible to receive MBE/WBE credit for the type of work required;
(i) A MBE/WBE owner dies or becomes disabled with the result that the listed MBE/WBE contractor is unable to complete its work on the contract; and
(j) Other documented good cause that compels the termination of the MBE/WBE subcontractor.

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

(A) Performance Related Replacement

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

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

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

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

(a) The names, addresses, and telephone numbers of MBE/WBEs who were contacted.
(b) A description of the information provided to MBE/WBEs regarding the plans and specifications for portions of the work to be performed.

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

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

(B) Decertification Replacement

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

(i) If the MBE/WBE's ineligibility is caused solely by its having exceeded the size standard during the performance of the contract. The Department may continue to count participation equal to the remaining work performed by the decertified firm which will count toward the contract goal requirement and overall goal.

(ii) If the MBE/WBE's ineligibility is caused solely by its acquisition by or merger with a non- MBE/WBE during the performance of the contract. The Department may not continue to count the portion of the decertified firm's performance on the contract remaining toward either the contract goal or the overall goal, even if the Contractor has executed a subcontract with the firm or the Department has executed a prime contract with the MBE/WBE that was later decertified.

(2) When a committed MBE/WBE is decertified prior to the Department receiving the SAF (*Subcontract Approval Form*) for the named MBE/WBE firm, the

Contractor shall take all necessary and reasonable steps to replace the MBE/WBE subcontractor with another MBE/WBE subcontractor to perform at least the same amount of work to meet the Combined MBE/WBE goal requirement. If a MBE/WBE firm is not found to do the same amount of work, a good faith effort must be submitted to NCDOT (see A herein for required documentation).

All requests for replacement of a committed MBE/WBE firm shall be submitted to the Engineer for approval on Form RF-1 *(DBE Replacement Request).* If the Contractor fails to follow this procedure, the Contractor may be disqualified from further bidding for a period of up to 6 months.

Changes in the Work

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

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

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

When the Contractor requests changes in the work that result in the reduction or elimination of work that the Contractor committed to be performed by a MBE/WBE, the Contractor shall seek additional participation by MBEs/WBEs equal to the reduced MBE/WBE participation caused by the changes.

Reports and Documentation

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

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

Within 30 calendar days of entering into an agreement with a MBE/WBE for materials, supplies or services, not otherwise documented by the SAF as specified above, the Contractor shall

furnish the Engineer a copy of the agreement. The documentation shall also indicate the percentage (60% or 100%) of expenditures claimed for MBE/WBE credit.

Reporting Minority and Women Business Enterprise Participation

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

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

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

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

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

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

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

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

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

Failure to Meet Contract Requirements

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

RESTRICTIONS ON ITS EQUIPMENT AND SERVICES:
(11-17-20) SP01 G090

All telecommunications, video or other ITS equipment or services installed or utilized on this project must be in conformance with UNIFORM ADMINISTRATIVE REQUIREMENTS, COST PRINCIPLES, AND AUDIT REQUIREMENTS FOR FEDERAL AWARDS **2 CFR, § 200.216 Prohibition on certain telecommunications and video surveillance services or equipment.**

USE OF UNMANNED AIRCRAFT SYSTEM (UAS):
(8-20-19) SP1 G092

The Contractor 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 Contractor 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 prior to beginning the operations.

All contractors or subcontractors operating UAS shall have UAS specific general liability insurance to cover all operations under this contract.

The use of UAS is at the Contractor's discretion. No measurement or payment will be made for the use of UAS. In the event that the Department directs the Contractor to utilize UAS, payment will be in accordance with Article 104-7 Extra Work.

EQUIPMENT IDLING GUIDELINES:
(1-19-21) 107 SP1 G096

Exercise reduced fuel consumption and reduced equipment emissions during the construction of all work associated with this contract. Employees engaged in the construction of this project should turn off vehicles when stopped for more than thirty (30) minutes and off-highway 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 is in safe operating condition.
3. Idling for testing, servicing, repairing or diagnostic purposes.
4. Idling necessary to accomplish work for which the vehicle 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.
8. Idling when the propulsion engine is providing auxiliary power for other than heating or air conditioning. (such as hydraulic systems for pavers)
9. When specific traffic, safety, or emergency situations arise.
10. If the ambient temperature is less than 32 degrees Fahrenheit. Limited idling to provide for the safety of vehicle occupants (e.g. to run the heater).
11. If the ambient temperature is greater than 90 degrees Fahrenheit. Limited idling to provide for the safety of vehicle occupants of off-highway equipment (e.g. to run the air conditioning) no more than 30 minutes.
12. Diesel powered vehicles may idle for up to 30 minutes to minimize restart problems.

Any vehicle, truck, or equipment in which the primary source of fuel is natural gas or electricity is exempt from the idling limitations set forth in this special provision.

SUBSURFACE INFORMATION:
(7-1-95) 450 SP1 G112 C

Subsurface information is available on the roadway and structure portions of this project.

PORTABLE CONCRETE BARRIER - (Partial Payments for Materials):
(7-1-95)(Rev. 1-16-24) 1170-4 SP1 G121

When so authorized by the Engineer, partial materials payments will be made up to 95 percent of the delivered cost of portable concrete barrier, provided that these materials have been delivered on the project and stored in an acceptable manner, and further provided the documents listed in Subarticle 109-5(C) of the *Standard Specifications* have been furnished to the Engineer.

The provisions of Subarticle 109-5(B) of the *Standard Specifications* will apply to the portable concrete barrier.

REMOVABLE PAVEMENT MARKINGS - (Partial Payments for Materials):
(7-1-95)(Rev. 1-16-24) 1205-10 SP1 G124

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

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

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

MAINTENANCE OF THE PROJECT:
(11-20-07)(Rev. 1-16-24) 104-10 SP1 G125

Revise the *Standard Specifications* as follows:

Page 1-35, Article 104-10 Maintenance of the Project, line 3, add the following after the first sentence of the first paragraph:

All guardrail/guiderail within the project limits shall be included in this maintenance.

Page 1-35, Article 104-10 MAINTENANCE OF THE PROJECT, line 8, add the following as the last sentence of the first paragraph:

The Contractor shall perform weekly inspections of guardrail and guiderail and shall report damages to the Engineer on the same day of the weekly inspection. *Where damaged guardrail or guiderail is repaired or replaced as a result of maintaining the project in* accordance with this article, such repair or replacement shall be performed within 7 consecutive calendar days of such inspection report.

Page 1-35, Article 104-10 MAINTENANCE OF THE PROJECT, lines 20-22, replace the last sentence of the last paragraph with the following:

The Contractor will not be directly compensated for any maintenance operations necessary, except for maintenance of guardrail/guiderail, as this work will be considered incidental to the work covered by the various contract items. The provisions of Article 104-7, Extra Work, and Article 104-8, Compensation and Record Keeping will apply to authorized maintenance of guardrail/guiderail. Performance of weekly inspections of guardrail/guiderail, and the damage reports required as described above, will be considered to be an incidental part of the work being paid for by the various contract items.

COOPERATION BETWEEN CONTRACTORS:
(7-1-95)(Rev. 1-16-24) 105-7 SP1 G133

The Contractor's attention is directed to Article 105-7 of the *Standard Specifications*.

HI-0005 is located along I-285 / US 52, within the vicinity of this project, such that the off-site detour for Central Avenue's traffic will pass through the HI-0005 project. HI-0005 is anticipated for September 16, 2025 Letting.

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

TWELVE MONTH GUARANTEE:
(7-15-03) 108 SP1 G145

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

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

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

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

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

OUTSOURCING OUTSIDE THE USA:
(9-21-04) (Rev. 5-16-06) SP1 G150

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

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

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

EROSION AND SEDIMENT CONTROL/STORMWATER CERTIFICATION:

(1-16-07) (Rev. 10-15-24) 105-16, 225-2, 16 SP1 G180

General

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

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

(A) *Certified Supervisor* - Provide a certified Erosion and Sediment Control/Stormwater Supervisor to manage the Contractor and subcontractor operations, insure compliance with Federal, State and Local ordinances and regulations, and manage the Quality Control Program.

(B) *Certified Foreman* - Provide a certified, trained foreman for each construction operation that increases the potential for soil erosion or the possible sedimentation and turbidity of surface waters.

(C) *Certified Installer* - Provide a certified installer to install or direct the installation for erosion or sediment/stormwater control practices.

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

Roles and Responsibilities

(A) *Certified Erosion and Sediment Control/Stormwater Supervisor* - The Certified Supervisor shall be Level II and responsible for ensuring the erosion and sediment control/stormwater plan is adequately implemented and maintained on the project and for conducting the quality control program. The Certified Supervisor shall be on the project within 24 hours notice from initial exposure of an erodible surface to the project's final acceptance. Perform the following duties:

(1) Manage Operations - Coordinate and schedule the work of subcontractors so that erosion and sediment control/stormwater measures are fully executed for each operation and in a timely manner over the duration of the contract.

(a) Oversee the work of subcontractors so that appropriate erosion and sediment control/stormwater preventive measures are conformed to at each stage of the work.

(b) Prepare the required National Pollutant Discharge Elimination System (NPDES) Inspection Record and submit to the Engineer.

(c) Attend all weekly or monthly construction meetings to discuss the findings of the NPDES inspection and other related issues.

(d) Implement the erosion and sediment control/stormwater site plans requested.

(e) Provide any needed erosion and sediment control/stormwater practices for the Contractor's temporary work not shown on the plans, such as, but not limited to work platforms, temporary construction, pumping operations, plant and storage yards, and cofferdams.

(f) Acquire applicable permits and comply with requirements for borrow pits, dewatering, and any temporary work conducted by the Contractor in jurisdictional areas.

(g) Conduct all erosion and sediment control/stormwater work in a timely and workmanlike manner.

(h) Fully perform and install erosion and sediment control/stormwater work prior to any suspension of the work.

(i) Coordinate with Department, Federal, State and Local Regulatory agencies on resolution of erosion and sediment control/stormwater issues due to the Contractor's operations.

(j) Ensure that proper cleanup occurs from vehicle tracking on paved surfaces or any location where sediment leaves the Right-of-Way.

(k) Have available a set of erosion and sediment control/stormwater plans that are initialed and include the installation date of Best Management Practices. These practices shall include temporary and permanent groundcover and be properly updated to reflect necessary plan and field changes for use and review by Department personnel as well as regulatory agencies.

(2) Requirements set forth under the NPDES Permit - The Department's NPDES Stormwater permit (NCS000250) outlines certain objectives and management measures pertaining to construction activities. The permit references *NCG010000, General Permit to Discharge Stormwater* under the NPDES, and states that the Department shall incorporate the applicable requirements into its delegated Erosion and Sediment Control Program for construction activities disturbing one or more acres of land. The Department further incorporates these requirements on all contracted bridge and culvert work at jurisdictional waters, regardless of size. Some of the requirements are, but are not limited to:

(a) Control project site waste to prevent contamination of surface or ground waters of the state, i.e. from equipment operation/maintenance, construction materials, concrete washout, chemicals, litter, fuels, lubricants, coolants, hydraulic fluids, any other petroleum products, and sanitary waste.

(b) Inspect erosion and sediment control/stormwater devices and stormwater discharge outfalls at least once every 7 calendar days and within 24 hours after a rainfall event equal to or greater than 1.0 inch that occurs within a 24 hour period. Additional monitoring may be required at the discretion of Division of Water Resources personnel if the receiving stream is 303(d)

listed for turbidity and the project has had documented problems managing turbidity.

(c) Maintain an onsite rain gauge or use the Department's Multi-Sensor Precipitation Estimate website to maintain a daily record of rainfall amounts and dates.

(d) Maintain erosion and sediment control/stormwater inspection records for review by Department and Regulatory personnel upon request.

(e) Implement approved reclamation plans on all borrow pits, waste sites and staging areas.

(f) Maintain a log of turbidity test results as outlined in the Department's Procedure for Monitoring Borrow Pit Discharge.

(g) Provide secondary containment for bulk storage of liquid materials.

(h) Provide training for employees concerning general erosion and sediment control/stormwater awareness, the Department's NPDES Stormwater Permit NCS000250 requirements, and the applicable requirements of the *General Permit, NCG010000*.

(i) Report violations of the NPDES permit to the Engineer immediately who will notify the Division of Water Quality Regional Office within 24 hours of becoming aware of the violation.

(3) Quality Control Program - Maintain a quality control program to control erosion, prevent sedimentation and follow provisions/conditions of permits. The quality control program shall:

(a) Follow permit requirements related to the Contractor and subcontractors' construction activities.

(b) Ensure that all operators and subcontractors on site have the proper erosion and sediment control/stormwater certification.

(c) Notify the Engineer when the required certified erosion and sediment control/stormwater personnel are not available on the job site when needed.

(d) Conduct the inspections required by the NPDES permit.

(e) Take corrective actions in the proper timeframe as required by the NPDES permit for problem areas identified during the NPDES inspections.

(f) Incorporate erosion control into the work in a timely manner and stabilize disturbed areas with mulch/seed or vegetative cover on a section-by-section basis.

(g) Use flocculants approved by state regulatory authorities where appropriate and where required for turbidity and sedimentation reduction.

(h) Ensure proper installation and maintenance of temporary erosion and sediment control devices.

(i) Remove temporary erosion or sediment control devices when they are no longer necessary as agreed upon by the Engineer.

(j) The Contractor's quality control and inspection procedures shall be subject to review by the Engineer. Maintain NPDES inspection records and make records available at all times for verification by the Engineer.

(B) *Certified Foreman* - At least one Certified Foreman shall be onsite for each type of work listed herein during the respective construction activities to control erosion, prevent sedimentation and follow permit provisions:

(1) Foreman in charge of grading activities
(2) Foreman in charge of bridge or culvert construction over jurisdictional areas
(3) Foreman in charge of utility activities

The Contractor may request to use the same person as the Level II Supervisor and Level II Foreman. This person shall be onsite whenever construction activities as described above are taking place. This request shall be approved by the Engineer prior to work beginning.

The Contractor may request to name a single Level II Foreman to oversee multiple construction activities on small bridge or culvert replacement projects. This request shall be approved by the Engineer prior to work beginning.

(C) *Certified Installers* - Provide at least one onsite, Level I Certified Installer for each of the following erosion and sediment control/stormwater crew:

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

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

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

Preconstruction Meeting

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

Ethical Responsibility

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

Revocation or Suspension of Certification

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

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

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

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

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

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

Failure to appeal within 10 calendar days will result in the proposed adverse action becoming effective on the date specified on the certified notice. Failure to appeal within the time specified

will result in a waiver of all future appeal rights regarding the adverse action taken. The certificant will not be allowed to perform duties associated with the certification during the appeal process.

The Chief Engineer will hear the appeal and make a decision within 7 days of hearing the appeal. Decision of the Chief Engineer will be final and will be made in writing to the certificant.

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

Measurement and Payment

All work described within this provision and the role of Certified Erosion and Sediment Control/Stormwater Supervisor, Certified Foremen, Certified Installers and Certified Designer will be incidental to the project for which no direct compensation will be made.

PROCEDURE FOR MONITORING BORROW PIT DISCHARGE:

(2-20-07) (Rev. 1-16-24) 105-16, 230, 801 SP1 G181

Water discharge from borrow pit sites shall not cause surface waters to exceed 50 NTUs (nephelometric turbidity unit) in streams not designated as trout waters and 10 NTUs in streams, lakes or reservoirs designated as trout waters. For lakes and reservoirs not designated as trout waters, the turbidity shall not exceed 25 NTUs. If the turbidity exceeds these levels due to natural background conditions, the existing turbidity level shall not be increased.

If during any operating day, the downstream water quality exceeds the standard, the Contractor shall do all of the following:

(A) Either cease discharge or modify the discharge volume or turbidity levels to bring the downstream turbidity levels into compliance, or

(B) Evaluate the upstream conditions to determine if the exceedance of the standard is due to natural background conditions. If the background turbidity measurements exceed the standard, operation of the pit and discharge can continue as long as the stream turbidity levels are not increased due to the discharge.

(C) Measure and record the turbidity test results (time, date and sampler) at all defined sampling locations 30 minutes after startup and at a minimum, one additional sampling of all sampling locations during that 24-hour period in which the borrow pit is discharging.

(D) Notify DWQ within 24 hours of any stream turbidity standard exceedances that are not brought into compliance.

During the Environmental Assessment required by Article 230-4 of the *Standard Specifications*, the Contractor shall define the point at which the discharge enters into the State's surface waters and the appropriate sampling locations. Sampling locations shall include points upstream and downstream from the point at which the discharge enters these waters. Upstream sampling location shall be located so that it is not influenced by backwater conditions and represents

natural background conditions. Downstream sampling location shall be located at the point where complete mixing of the discharge and receiving water has occurred.

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

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

The Contractor shall use the *NCDOT Turbidity Reduction Options for Borrow Pits Matrix,* available at https://connect.ncdot.gov/resources/roadside/FieldOperationsDocuments/TurbidityReductionOptionSheet.pdf to plan, design, construct, and maintain BMPs to address water quality standards. Tier I Methods include stilling basins which are standard compensatory BMPs. Other Tier I methods are noncompensatory and shall be used when needed to meet the stream turbidity standards. Tier II Methods are also noncompensatory and are options that may be needed for protection of rare or unique resources or where special environmental conditions exist at the site which have led to additional requirements being placed in the DWQ's 401 Certifications and approval letters, Isolated Wetland Permits, Riparian Buffer Authorization or a DOT Reclamation Plan's Environmental Assessment for the specific site. Should the Contractor exhaust all Tier I Methods on a site exclusive of rare or unique resources or special environmental conditions, Tier II Methods may be required by regulators on a case by case basis per supplemental agreement.

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

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

NOTE TO CONTRACTOR:

*Any lighting needed for night work shall be directed toward the active work area and shall be turned off when not in use.

(*-Per Green Sheet Commitments)

PROJECT SPECIAL PROVISIONS

ROADWAY

CLEARING AND GRUBBING - METHOD III:

(4-6-06)(Rev. 3-19-24) 200 SP2 R02B

Perform clearing on this project to the limits established by Method - III shown on Standard Drawing No. 200.03 of the *Roadway Standard Drawings*. Conventional clearing methods may be used except where permit drawings or conditions have been included in the proposal which require certain areas to be cleared by hand methods.

BURNING RESTRICTIONS:

(7-1-95) 200, 210, 215 SP2 R05

Open burning is not permitted on any portion of the right-of-way limits established for this project. Do 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 this county. Dispose of the clearing, grubbing and demolition debris by means other than burning, according to state or local rules and regulations.

LUMP SUM GRADING:

(8-17-10)(Rev. 1-16-24) 226 SP2 R16

Lump sum grading shall be performed in accordance with Section 226 Comprehensive Grading of the *Standard Specifications* except as follows:

Delete all references to **Section 225 Unclassified Excavation (Item 0022)**.

TEMPORARY DETOURS:

(2-18-14) 1101 SP2 R30C

Construct temporary detours required on this project in accordance with the typical sections in the plans or as directed.

After the detours have served their purpose, remove the portions deemed unsuitable for use as a permanent part of the project as directed by the Engineer. Salvage and stockpile the aggregate base course removed from the detours at locations within the right of way, as directed by the Engineer, for removal by State Forces. Place pavement and earth material removed from the detour in embankments or dispose of in waste areas furnished by the Contractor.

Aggregate base course and earth material that is removed will be measured and will be paid at the contract unit price per cubic yard for *Unclassified Excavation*. No direct payment will be made for removing asphalt pavement as the cost of same shall be included in the lump sum price bid for *Grading*. Pipe culverts removed from the detours remain the property of the Contractor. Pipe culverts that are removed will be measured and will be paid at the contract unit price per linear foot for *Pipe Removal*. Payment for the construction of the detours will be made at the contract unit prices for the various items involved.

Such prices and payments will be full compensation for constructing the detours and for the work of removing, salvaging, and stockpiling aggregate base course; removing pipe culverts; and for placing earth material and pavement in embankments or disposing of earth material and pavement in waste areas.

SHOULDER AND FILL SLOPE MATERIAL:

(5-21-02)(Rev. 1-16-24) 235, 560 SP2 R45 A

Description

Perform the required shoulder and slope construction for this project in accordance with the applicable requirements of Section 560 and Section 235 of the *Standard Specifications*.

Measurement and Payment

Where the material has been obtained from an authorized stockpile or from a borrow source and *Borrow Excavation* is not included in the contract, no direct payment will be made for this work, as the cost of this work will be part of the work being paid at the contract lump sum price for *Grading.* If *Borrow Excavation* is included in this contract and the material has been obtained from an authorized stockpile or from a borrow source, measurement and payment will be as provided in Section 230 of the *Standard Specifications* for *Borrow Excavation*.

MANUFACTURED QUARRY FINES IN EMBANKMENTS:

(01-17-17)(Rev. 4-16-24) 235 SP02 R72

Description

This specification addresses the use of manufactured quarry fines that are not classified as select materials. The specification allows the Contractor an option, with the approval of the Engineer, to use manufactured quarry fines (MQFs) in embankments as a substitute for conventional borrow material. Furnish and place geotextile for subgrade stabilization in accordance with the contract. Geotextile for subgrade stabilization is required to prevent pavement cracking and provide separation between the subgrade and pavement section at embankment locations where manufactured quarry fines are utilized and as directed by the Engineer.

Materials

Manufactured Quarry Fines.

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

The following MQFs are unacceptable:

(A) Frozen material,

(B) Material with a maximum dry unit weight of less than 90 pounds per cubic foot when tested in accordance with AASHTO T 99 Method A or C.

(C) Material with greater than 80% by weight Passing the #200 sieve

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

Preconstruction Requirements

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

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

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

Construction Methods

Place MQFs in the core of the embankment section with at least 4 feet of earth cover to the outside limits of the embankments or subgrade.

Construct embankments by placing MQFs in level uniform lifts with no more than a lift of 10 inches and compacted to at least a density of 95 percent as determined by test methods in AASHTO T 99, Determination of Maximum Dry Density and Optimum Moisture Content, Method A or C depending upon particle size of the product. Provide a moisture content at the time of compaction of within 4 percent of optimum but not greater than one percent above optimum as determined by AASHTO T 99, Method A or C.

In embankments where MQFs are incorporated, geotextile for subgrade stabilization shall be used. Refer to Article 505-2 of the *Standard Specifications* for geotextile type and Article 505-3 of the *Standard Specifications* for the geotextile construction methods.

Measurement and Payment

Borrow Excavation will be measured by truck volume and paid in cubic yards in accordance with Article 230-5 of the *Standard Specifications*. As an alternate weigh tickets can be provided and payment made by converting weight to cubic yards based on the verifiable unit weight. Where the pay item for *Borrow Excavation* is not included in the original contract then no separate payment will be made for this item and payment will be included in the lump sum price bid for *Grading*.

Geotextile for Subgrade Stabilization will be measured and paid in accordance with Article 505-4 of the *Standard Specifications*. When the pay item for *Geotextile for Subgrade Stabilization* is

not included in the original contract then no payment will be made for this item and will be considered incidental to the use of MQFs in embankment.

CORRUGATED ALUMINUM ALLOY CULVERT PIPE:

(9-21-21)(Rev. 1-16-24) 305, 310 SP3 R34

Revise the *Standard Specifications* as follows:

Page 3-5, Article 305-2, MATERIALS, add the following after line 16:

Item	**Section**
Waterborne Paint	1080-9
Hot Bitumen	1081-3

Page 3-5, Article 305-3, CONSTRUCTION METHODS, add the following after line 26:

Coating must be applied to the aluminum when in contact with concrete. Immediately prior to coating, aluminum surfaces to be coated shall be cleaned by a method that will remove all dirt, oil, grease, chips, and other foreign substances. Aluminum to be coated shall be given one coat of suitable quality coating such as:

Approved waterborne paint (Section 1080-9)
Approved Hot Bitumen (Section 1081-3)

Other coating materials may be submitted to the Engineer for approval.

Page 3-7, Article 310-6, MEASUREMENT AND PAYMENT, lines 10-11, delete the fourth sentence and replace with the following:

Select bedding and backfill material and coating will be included in the cost of the installed pipe.

BRIDGE APPROACH FILLS:

(10-19-10)(Rev. 1-16-24) 422 SP4 R02

Description

Bridge approach fills consist of backfilling behind bridge end bents with select material or aggregate to support all or part of bridge approach slabs. Install outlets and grade bridge approach fills to drain water through and away from approach fills. Install geotextiles to allow for possible future slab jacking and separate approach fills from embankment fills, natural ground and pavement sections as required. For bridge approach fills behind end bents with mechanically stabilized earth (MSE) abutment walls, reinforce bridge approach fills with MSE wall reinforcement connected to end bent caps as required. Construct bridge approach fills in accordance with the contract, accepted submittals and bridge approach fill *Roadway Standard Drawings*.

Define bridge approach fill types as follows:

Type 1 Approach Fill – Approach fill for bridge abutment in accordance with *Roadway Standard*

Drawing No. 423.01;

Type 1A Approach Fill – Alternate approach fill for integral bridge abutment in accordance with *Roadway Standard Drawing* No. 423.02;

Type 2 Approach Fill – Approach fill for bridge abutment with MSE wall in accordance with *Roadway Standard Drawing* No. 423.03 and

Type 2A Approach Fill – Alternate approach fill for integral bridge abutment with MSE wall in accordance with *Roadway Standard Drawing* No. 423.04.

At the Contractors option, use Type 1A or 2A approach fills instead of Type 1 or 2 approach fills, respectively, for integral bridge abutments. Type 1A and 2A approach fills consists of constructing an approach fill with a temporary geotextile wall before placing all or a portion of the concrete for the backwall and wing walls of the integral end bent cap. The temporary geotextile wall is designed for a construction surcharge, remains in place and is aligned so the wall face functions as a form for the integral end bent cap backwall and wing walls.

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	**Section**
Geotextiles	1056
Portland Cement Concrete	1000
Select Materials	1016
Subsurface Drainage Materials	1044
Welded Wire Reinforcement	1070-3

Provide Type 1 geotextile for separation geotextiles, Type 4a geotextile for under bridge approach slabs and Class B concrete for outlet pads. Use Class V or Class VI select material for Type 1 and 1A approach fills and the same aggregate type approved for the reinforced zone in the accepted MSE wall submittal for Type 2 and 2A approach fills. For MSE wall aggregate, reinforcement and connector materials, see the *Mechanically Stabilized Earth Retaining Walls* provision. Provide outlet pipes and fittings for subsurface drainage materials. Provide 1/4" hardware cloth with 1/4 inch openings constructed from 24 gauge wire.

For temporary geotextile walls, use welded wire reinforcement for welded wire facing and Type 5a geotextile for reinforcement geotextiles. Use Type 5a geotextile with lengths as shown in *Roadway Standard Drawing* No. 423.02 or 423.04.

Construction Methods

Excavate as necessary for approach fills and, if applicable, temporary geotextile walls in accordance with the contract. Ensure limits of approach fills are graded to drain as shown in the bridge approach fill *Roadway Standard Drawings*. For Type 1 and 1A approach fills in embankment fills, place and compact a temporary 1.5:1 (H:V) fill slope in accordance with *Roadway Standard Drawing* No. 423.01 or 423.02 and in accordance with Subarticle 235-3(B) and 235-3(C) of the *Standard Specifications*. Density testing is required within the temporary fill slope and additional more frequent density testing is also required for bridge approach embankments. Wait 3 days before cutting the slope back to complete the approach fill excavation. Use excavated material elsewhere on the project to form embankments, subgrades, or shoulders. If a slope for an approach fill is excavated to flatter than what is required for access or any other reason, that same slope is required for the entire approach fill excavation. Do not backfill overexcavations that extend outside the approach fill limits shown on the *Roadway Standard Drawings* with embankment soils. Instead, expand approach fill limits to include overexcavations.

Notify the Engineer when embankment fill placement and approach fill excavation is complete. Do not place separation geotextiles or aggregate until approach fill dimensions and embankment materials below and outside approach fills are approved.

For Type 2 approach fills, cast MSE wall reinforcement or connectors into end bent cap backwalls within 3 inches of locations shown in the accepted MSE wall submittals. Install MSE wall reinforcement with the orientation, dimensions and number of layers shown in the accepted MSE wall submittals. If a Type 2 approach fill is designed with geogrid reinforcement embedded in an end bent cap, cut geogrids to the required lengths and after securing ends of geogrids in place, reroll and rewrap portions of geogrids not embedded in the cap to protect geogrids from damage. Before placing aggregate over any MSE wall geosynthetic reinforcement, pull reinforcement taut so that it is in tension and free of kinks, folds, wrinkles or creases.

For Type 1 and 1A approach fills, place pipe sleeves in wing walls so water drains towards outlets. Use sleeves that can withstand wing wall loads. Insert outlet pipes into pipe sleeves to direct water towards outlets. Attach hardware cloth in front of the outlet pipe at the wing. Connect outlet pipes and fittings with solvent cement in accordance with Article 815-3 of the *Standard Specifications* and place outlet pads in accordance with Roadway Standard Drawing No. 815.03.

Attach separation geotextiles to end bent cap backwalls and wing walls with adhesives, tapes or other approved methods. Overlap adjacent geotextiles of the same type at least 18 inches. Cover select material or aggregate with Type 4a geotextile at an elevation 6 inches below the bridge approach slab. Hold geotextiles in place with wire staples or anchor pins as needed. Contact the Engineer when existing or future obstructions such as foundations, pavements, pipes, inlets or utilities will interfere with geotextiles or MSE wall reinforcement.

For Type 1A and 2A approach fills, install temporary geotextile walls as shown in *Roadway Standard Drawing* No. 423.02 or 423.04. At the Contractor's option, construct the bottom portion of integral end bents before temporary geotextile walls as shown in the plans. Erect and

set welded wire facing for temporary geotextile walls so facing functions as a form for the integral end bent cap backwall. Place welded wire facing adjacent to each other in the horizontal and vertical directions to completely cover the temporary geotextile wall face. Stagger welded wire facing to create a running bond by centering facing over joints in the row below. Wrap reinforcement geotextiles at the wall face in accordance with *Roadway Standard Drawing* No. 423.02 or 423.04 and cover geotextiles with at least 3 inches of select material or aggregate. Place layers of reinforcement geotextiles within 3 inches of locations shown in *Roadway Standard Drawing* No. 423.02 or 423.04. Install reinforcement geotextiles with the direction shown in *Roadway Standard Drawing* No. 423.02 or 423.04. Orient overlapping seams in reinforcement geotextiles perpendicular to the integral end bent cap backwall. Do not overlap reinforcement geotextiles so seams are parallel to the wall face. Before placing select material or aggregate over reinforcement geotextiles, pull geotextiles taut so they are in tension and free of kinks, folds, wrinkles or creases. Temporary geotextile walls are designed for a surcharge pressure in accordance with *Roadway Standard Drawing* No. 423.02 or 423.04. If loads from construction equipment will be more than what the wall is designed for, contact the Engineer before positioning equipment on top of temporary geotextile walls.

Place select material or aggregate in 6 inch to 8 inch thick lifts. Compact fine aggregate for Type 2 and 2A approach fills in accordance with Subarticle 235-3(C) of the *Standard Specifications* except compact fine aggregate to a density of at least 98%. Compact select material for Type 1 and 1A approach fills and coarse aggregate for Type 2 and 2A approach fills with at least 4 passes of a trench roller in a direction parallel to the end bent cap backwall. Do not displace or damage geosynthetics or MSE wall reinforcement when placing and compacting select material or aggregate. End dumping directly on geosynthetics is not permitted. Do not operate heavy equipment on geosynthetics until they are covered with at least 8 inches of select material or aggregate. Replace any damaged geosynthetics to the satisfaction of the Engineer. When approach fills extend beyond bridge approach slabs, wrap Type 4a geotextiles over select material or aggregate and back under approach slabs as shown in *Roadway Standard Drawing* No. 423.03 or 423.04.

Measurement and Payment

Type 1 and 1A approach fills will be paid for at the contract lump sum price for *Type 1 Bridge Approach Fill, Station* _____ and Type 2 and 2A approach fills will be paid for at the contract lump sum price for *Type 2 Bridge Approach Fill, Station* _____. The lump sum price for each approach fill will be full compensation for providing labor, tools, equipment and approach fill materials, excavating, backfilling, hauling and removing excavated materials, installing wall facing, geotextiles and outlets, compacting backfill and supplying select material, aggregate, geotextiles, pipe sleeves, outlet pipes and pads and any incidentals necessary to construct approach fills behind bridge end bents.

Compensation for the material placed within the temporary 1.5:1 (H:V) fill slopes will be made in accordance with Section 225, 226, or 230 of the *Standard Specifications*. The cost of removal, including excavating, hauling, placement, and compaction of the material elsewhere on or off the project will be included in the contract lump sum price for *Type 1 Bridge Approach Fill, Station* _____.

The contract lump sum price for *Type 2 Bridge Approach Fill, Station* _____ will also be full

compensation for supplying and connecting MSE wall reinforcement to end bent caps but not designing MSE wall reinforcement and connectors. The cost of designing reinforcement and connectors for Type 2 approach fills behind bridge end bents with MSE abutment walls will be incidental to the contract unit price for *MSE Retaining Wall No. _____*.

Payment will be made under:

Pay Item	**Pay Unit**
Type 1 Bridge Approach Fill, Station _____	Lump Sum
Type 2 Bridge Approach Fill, Station _____	Lump Sum

PRICE ADJUSTMENT - ASPHALT BINDER FOR PLANT MIX:
(11-21-00)(Rev. 1-16-24) 620 SP6 R25

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

The base price index for asphalt binder for plant mix is **$ 563.75** per ton.

This base price index represents an average of F.O.B. selling prices of asphalt binder at supplier's terminals on **May 1, 2025**.

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

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

CONVERT EXISTING DROP INLET TO TRAFFIC BEARING JUNCTION BOX:
(1-1-02)(Rev. 1-16-23) 840, 859 SP8 R50

At the proper phase of construction, convert the existing Drop Inlet at locations indicated in the plans or where directed, to Traffic Bearing Junction Box in accordance with the details in the plans and the applicable requirements of Sections 840 and 859 of the *Standard Specifications*.

Convert Existing Drop Inlet to Traffic Bearing Junction Box will be measured and paid as each, completed and accepted. Such price and payment is considered full compensation for all equipment, materials, labor, tools, and incidentals necessary to complete each conversion satisfactorily.

Payment will be made under:

Pay Item	**Pay Unit**
Convert Existing Drop Inlet to Traffic Bearing Junction Box	Each

CONVERT EXISTING DROP INLET TO TB2GI:

(1-1-02)(Rev. 1-16-24) 840, 859 SP8 R50

At the proper phase of construction, convert the existing Drop Inlet at locations indicated in the plans or where directed, to TB2GI in accordance with the details in the plans and the applicable requirements of Sections 840 and 859 of the *Standard Specifications*.

Convert Existing Drop Inlet to TB2GI will be measured and paid as each, completed and accepted. Such price and payment is considered full compensation for all equipment, materials, labor, tools, and incidentals necessary to complete each conversion satisfactorily.

Payment will be made under:

Pay Item	**Pay Unit**
Convert Existing Drop Inlet to TB2GI	Each

FOUNDATIONS AND ANCHOR ROD ASSEMBLIES FOR METAL POLES:

(1-17-12)(Rev. 1-16-24) 9, 14, 17 SP9 R05

Description

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

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

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

Materials

Refer to the *Standard Specifications*.

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

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

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

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

(A) Straight anchor rods,

(B) Heavy hex top and leveling nuts and flat washers on exposed ends of rods, and

(C) Nuts and either flat plates or washers on the other ends of anchor rods embedded in foundations.

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

Construction Methods

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

(A) Drilled Piers

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

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

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

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

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

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

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

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

Use polymer slurry and additives to stabilize holes in accordance with the slurry manufacturer's recommendations. Provide mixing water and equipment suitable for polymer slurry. Maintain the required slurry properties at all times except for sand content.

Define a "sample set" as slurry samples collected from mid-height and within 2 ft of the bottom of holes. Take sample sets from excavations to test polymer slurry immediately after filling holes with slurry, at least every 4 hours thereafter and immediately before placing concrete. Do not place Drilled Pier concrete until both slurry samples from an excavation meet the required polymer slurry properties. If any slurry test results do not meet the requirements, the Engineer may suspend drilling until both samples from a sample set meet the required polymer slurry properties.

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

(1) Inspections for tip resistance and bottom cleanliness are not required,
(2) Temporary casings may remain in place if approved, and
(3) Concrete placement may be paused near the top of pier elevations for anchor rod assembly installation and conduit placement or
(4) If applicable, concrete placement may be stopped at bottom of grade beam or wings elevations for grade beam or wing construction.

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

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

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

If a drilled pier is under further investigation, do not grout core holes, backfill around the pier or perform any work on the drilled pier until the Engineer accepts the pier. If the drilled pier is accepted, dewater and grout core holes and backfill around the pier with approved material to finished grade. If the Engineer determines a pier is unacceptable,

remediation is required in accordance with Article 411-6 of the *Standard Specifications*. No extension of completion date or time will be allowed for remediation of unacceptable drilled piers or post repair testing.

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

(B) Footings, Pedestals, Grade Beams and Wings

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

Construct cast-in-place reinforced concrete footings, pedestals, grade beams and wings with the dimensions shown in the plans and in accordance with Section 825 of the *Standard Specifications*. Use forms to construct portions of pedestals and grade beams protruding above finished grade. Provide a chamfer with a 3/4" horizontal width for pedestal and grade beam edges exposed above finished grade. Place concrete against undisturbed soil or backfill and fill in accordance with Article 410-8 of the *Standard Specifications*. Proper compaction around footings and wings is critical for foundations to resist uplift and torsion forces.

(C) Anchor Rod Assemblies

Size anchor rods for design and the required projection above top of foundations. Determine required anchor rod projections from nut, washer and base plate thicknesses, the protrusion of 3 to 5 anchor rod threads above top nuts after tightening and the distance of one nut thickness between top of foundations and bottom of leveling nuts.

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

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

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

(1) Turn leveling nuts onto anchor rods to a distance of one nut thickness between the top of foundation and bottom of leveling nuts. Place washers over anchor rods on top of leveling nuts.

(2) Determine if nuts are level using a flat rigid template on top of washers. If necessary, lower leveling nuts to level the template in all directions or if applicable, lower nuts to tilt the template so the metal pole or upright truss will lean as shown in the plans. If leveling nuts and washers are not in full contact with the template, replace washers with galvanized beveled washers.

(3) Verify the distance between the foundation and leveling nuts is no more than one nut thickness.

(4) Place base plate with metal pole or upright truss over anchor rods on top of washers. High mount luminaires may be attached before erecting metal poles but do not attach cables, mast arms or trusses to metal poles or upright trusses at this time.

(5) Place washers over anchor rods on top of base plate. Lubricate top nut bearing surfaces and exposed anchor rod threads above washers with beeswax, paraffin or other approved lubricant.

(6) Turn top nuts onto anchor rods. If nuts are not in full contact with washers or washers are not in full contact with the base plate, replace washers with galvanized beveled washers.

(7) Tighten top nuts to snug-tight with the full effort of one workman using a 12" wrench. Do not tighten any nut all at once. Turn top nuts in increments. Follow a star pattern cycling through each nut at least twice.

(8) Repeat (7) for leveling nuts.

(9) Replace washers above and below the base plate with galvanized beveled washers if the slope of any base plate face exceeds 1:20 (5%), any washer is not in firm contact with the base plate or any nut is not in firm contact with a washer. If any washers are replaced, repeat (7) and (8).

(10) With top and leveling nuts snug-tight, mark each top nut on a corner at the intersection of 2 flats and a corresponding reference mark on the base plate. Mark top nuts and base plate with ink or paint that is not water-soluble. Use the turn-of-nut method for pretensioning. Do not pretension any nut all at once. Turn top nuts in increments for a total turn that meets the following nut rotation requirements:

NUT ROTATION REQUIREMENTS (Turn-of-Nut Pretensioning Method)	
Anchor Rod Diameter, inch	**Requirement**
≤ 1 1/2	1/3 turn (2 flats)
> 1 1/2	1/6 turn (1 flat)

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

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

(12) Between 4 and 14 days after pretensioning top nuts, use a torque wrench

calibrated within the last 12 months to check nuts in the presence of the Engineer. Completely erect mast arm poles and cantilever signs and attach any hardware before checking top nuts for these structures. Check that top nuts meet the following torque requirements:

TORQUE REQUIREMENTS	
Anchor Rod Diameter, inch	**Requirement, ft-lb**
7/8	180
1	270
1 1/8	380
1 1/4	420
≥ 1 1/2	600

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

(13) Do not grout under base plate.

Measurement and Payment

Foundations and anchor rod assemblies for metal poles and upright trusses will be measured and paid for elsewhere in the contract.

No payment will be made for temporary casings that remain in drilled pier excavations. No payment will be made for PIT. No payment will be made for further investigation of defective piers. Further investigation of piers that are not defective will be paid as extra work in accordance with Article 104-7 of the *Standard Specifications*. No payment will be made for remediation of unacceptable drilled piers or post repair testing.

OVERHEAD AND DYNAMIC MESSAGE SIGN FOUNDATIONS:

(1-16-18)(Rev. 1-16-24) SP9 R07

Description

Sign foundations include foundations for overhead and dynamic message signs (DMS) supported by metal poles or upright trusses. Sign foundations consist of footings with pedestals or drilled piers with or without grade beams or wings, conduit and anchor rod assemblies. Construct sign foundations in accordance with the contract and accepted submittals. Define "cantilever sign" as an overhead cantilever sign support in accordance with Figure 1-1 of the *AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*.

Materials

Use sign foundation materials that meet the *Foundations and Anchor Rod Assemblies for Metal Poles* provision.

Subsurface Conditions

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

(A) Unit weight (γ) = 120 pcf,
(B) Friction angle (ϕ) = 30°,
(C) Cohesion (c) = 0 psf and
(D) Groundwater 7 feet below finished grade.

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

Subsurface Investigations

Use a prequalified geotechnical consultant to perform one standard penetration test (SPT) boring in accordance with ASTM D1586 at each sign location requiring a subsurface investigation. Rough grade sign locations to within 2 feet of finished grade before beginning drilling. Drill borings to 2 drilled pier diameters below anticipated pier tip elevations or refusal, whichever is higher.
Use the computer software gINT version V8i or later manufactured by Bentley Systems, Inc. with the current NCDOT gINT library and data template to produce SPT boring logs. Provide boring logs sealed by a geologist or engineer licensed in the state of North Carolina.

Sign Foundation Designs

Design sign foundations for the wind zone and clearances shown in the plans and the slope of finished grade at each sign location. Use the assumed soil parameters and groundwater elevation above for sign foundation designs unless a subsurface investigation is required. For sign locations requiring a subsurface investigation, design sign foundations for the subsurface conditions at each sign location. Design footings, pedestals, drilled piers, grade beams and wings in accordance with the *AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*. In some instances, conflicts with drainage structures may dictate sign foundation types.

Design footings in accordance with Section 4.4 of the *AASHTO Standard Specifications for Highway Bridges*. Do not use an allowable bearing pressure of more than 3,000 psf for footings. Design drilled piers for side resistance only in accordance with Section 4.6 of the *AASHTO Standard Specifications for Highway Bridges* except reduce ultimate side resistance by 25% for uplift. Use the computer software LPILE version 2016 or later manufactured by Ensoft, Inc. to analyze drilled piers. Provide drilled pier designs with a horizontal deflection of less than 1" at top of piers. For cantilever signs with single drilled pier foundations supporting metal poles, use wings to resist torsion forces. Provide drilled pier designs with a factor of safety of at least 2.0 for torsion.

For drilled pier sign foundations supporting upright trusses, use dual drilled piers connected with a grade beam having a moment of inertia approximately equal to that of either pier. The Broms' method is acceptable to analyze drilled piers with grade beams instead of LPILE. Use a safety factor of at least 3.5 for the Broms' design method in accordance with C13.6.1.1 of the *AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*.

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

Construction Methods

Construct footings, pedestals, drilled piers, grade beams and wings and install anchor rod assemblies for sign foundations in accordance with the *Foundations and Anchor Rod Assemblies for Metal Poles* provision.

Measurement and Payment

Overhead Footing will be measured and paid in cubic yards. Sign foundations will be measured as the cubic yards of foundation concrete for footings, pedestals, drilled piers, grade beams and wings shown in the accepted submittals. The contract unit price for *Overhead Footings* will be full compensation for providing labor, tools, equipment and foundation materials, stabilizing or shoring excavations, supplying and placing concrete, reinforcing steel, conduit, anchor rod assemblies and any incidentals necessary to construct sign foundations. Subsurface investigations required by the Engineer will be paid as extra work in accordance with Article 104-7 of the *Standard Specifications*.

Payment will be made under:

Pay Item	**Pay Unit**
Overhead Footing	Cubic Yard

HIGH STRENGTH CONCRETE FOR DRIVEWAYS:

(11-21-00)(Rev. 1-16-24) 848 SP10 R02

Use high early strength concrete for all driveways shown in the plans and as directed by the Engineer. Provide high early strength concrete that meets the requirements of Article 1000-6 of the *Standard Specifications*.

Measurement and payment will be in accordance with Section 848 of the *Standard Specifications*.

ELECTRONIC TICKETING SYSTEM:

(7-16-24)(Rev. 12-17-24) 1020 SP10 R20

Description

At the contractor's option, the use of an electronic ticketing system for reporting individual and cumulative asphalt material deliveries may be utilized on this project. At the preconstruction conference, the contractor shall notify the Engineer if they intend to utilize an electronic ticketing system for reporting individual and cumulative asphalt material deliveries to the project.

Electronic Ticketing Requirements

a. The electronic ticketing system must be fully integrated with the load read-out system at the plant. The system shall be designed so data inputs from scales cannot be altered by either the Contractor or the Department.

b. Material supplier must test to confirm that ticketing data can be shared from the originating system no less than 30 days prior to project start.

c. After each truck is loaded, ticket data must be electronically captured, and ticket information uploaded via Application Programming Interface (API) to the Department.

d. Obtain security token from NCDOT for access to E-Ticketing portal (to send tickets). To request a Security Key, fill out the below E-Ticketing Security Request Form: https://forms.office.com/g/XnT7QeRtgt

e. Obtain API from NCDOT containing the required e-ticketing data fields and format. Download the API from the NCDOT E-ticketing Webpage: https://connect.ncdot.gov/projects/construction/E-Ticketing/Pages/default.aspx

f. Provide all ticket information in real time and daily summaries to the Department's designated web portal. If the project contains locations with limited cellular service, an alternative course of action must be agreed upon.

g. Electronic ticketing submissions must be sent between the Material Supplier and the Department.

h. The electronic ticket shall contain the following information:

Date
Contract Number
Supplier Name
Contractor Name
Material
JMF
Gross Weight
Tare Weight

Net Weight
Load Number
Cumulative Weight
Truck Number
Weighmaster Certification
Weighmaster Expiration
Weighmaster Name
Facility Name
Plant Certification Number
Ticket Number
Hauling Firm (optional)
Voided Ticket Number (if necessary)
Original Ticket Number (if necessary)
Supplier Revision (If necessary)

The Contractor/supplier can use the electronic ticketing system of their choice to meet the requirements of this provision.

Measurement and Payment

No measurement or payment will be made for utilizing an electronic ticketing system as the cost of such shall be included in the contract price bid for the material being provided.

GLASS BEAD GRADATION FOR PAVEMENT MARKINGS:

(9-17-24) 1087 SP10 R87

Revise the *Standard Specifications* as follows:

Page 10-187, Subarticle 1087-4(C), Gradation & Roundness, after line 6, delete and replace Table 1087-2 with the following:

TABLE 1087-2
GLASS BEAD GRADATION REQUIREMENTS

Sieve Size	Gradation Requirements	
	Minimum	**Maximum**
Passing #20	100%	--
Retained on #30	5%	15%
Retained on #50	40%	80%
Retained on #80	15%	40%
Passing #80	0%	10%
Retained on #200	0%	5%

TEMPORARY SHORING:

(2-20-07)(Rev. 1-16-24) SP11 R02

Description

Temporary shoring includes cantilever, braced and anchored shoring and temporary mechanically stabilized earth (MSE) walls. Temporary shoring does not include trench boxes. At the Contractor's option, use any type of temporary shoring unless noted otherwise in the plans or as directed. Design and construct temporary shoring based on actual elevations and shoring dimensions in accordance with the contract and accepted submittals. Construct temporary shoring at locations shown in the plans and as directed. Temporary shoring is required to maintain traffic when a 2:1 (H:V) slope from the top of an embankment or bottom of an excavation will intersect the existing ground line less than 5 feet from the edge of pavement of an open travelway. This provision does not apply to pipe, inlet or utility installation unless noted otherwise in the plans.

Positive protection includes concrete barrier and temporary guardrail. Provide positive protection for temporary shoring at locations shown in the plans and as directed. Positive protection is required if temporary shoring is located in the clear zone in accordance with the *AASHTO Roadside Design Guide*.

(A) Cantilever and Braced Shoring

Cantilever shoring consists of steel sheet piles or H-piles with timber lagging. Braced shoring consists of sheet piles or H-piles with timber lagging and bracing such as beams, plates, walers, struts, rakers, etc. Define "piles" as sheet piles or H-piles.

(B) Anchored Shoring

Anchored shoring consists of sheet piles with walers or H-piles with timber lagging anchored with ground or helical anchors. Driven anchors may be accepted at the discretion of the Engineer. A ground anchor consists of a grouted steel bar or multi-strand tendon with an anchorage. A helical anchor consists of a lead section with a central steel shaft and at least one helix steel plate followed by extensions with only central shafts (no helixes) and an anchorage. Anchorages consist of steel bearing plates with washers and hex nuts for bars or steel wedge plates and wedges for strands. Use a prequalified Anchored Wall Contractor to install ground anchors. Define "anchors" as ground, helical or driven anchors.

(C) Temporary MSE Walls

Temporary MSE walls include temporary geosynthetic and wire walls. Define "temporary wall" as a temporary MSE wall and "Temporary Wall Vendor" as the vendor supplying the temporary MSE wall. Define "reinforcement" as geotextile, geogrid, geostrip, welded wire grid or metallic strip reinforcement.

Temporary geosynthetic walls consist of geotextiles or geogrids wrapped behind welded wire facing or geostrips connected to welded wire facing. Define "temporary geotextile wall" as a temporary geosynthetic wall with geotextile reinforcement, "temporary

geogrid wall" as a temporary geosynthetic wall with geogrid reinforcement and "temporary geostrip wall" as a temporary geosynthetic wall with geostrip reinforcement.

Temporary wire walls consist of welded wire grid or metallic strip reinforcement connected to welded wire facing. Define "Wire Wall Vendor" as the vendor supplying the temporary wire wall.

(D) Embedment

Define "embedment" for cantilever, braced and anchored shoring as the pile depth below the grade in front of shoring. Define "embedment" for temporary walls as the wall embedment below the grade at the wall face.

(E) Positive Protection

Define "unanchored or anchored portable concrete barrier" as portable concrete barrier (PCB) that meets *Roadway Standard Drawing* No. 1170.01. Define "concrete barrier" as unanchored or anchored PCB or an approved equal. Define "temporary guardrail" as temporary steel beam guardrail that meets *Roadway Standard Drawing* No. 862.02.

Materials

Refer to the *Standard Specifications*.

Item	**Section**
Concrete Barrier Materials	1170-2
Flowable Fill, Excavatable	1000-7
Geosynthetics	1056
Grout, Type 1	1003
Portland Cement	1024-1
Portland Cement Concrete	1000
Select Materials	1016
Steel Beam Guardrail Materials	862-2
Steel Plates	1072-2
Steel Sheet Piles and H-Piles	1084
Untreated Timber	1082-2
Water	1024-4
Welded Wire Reinforcement	1070-3

Provide Type 6 material certifications for shoring materials in accordance with Article 106-3 of the *Standard Specifications*. Use Class IV select material for temporary guardrail and Class A concrete that meets Article 450-2 of the *Standard Specifications* or Type 1 grout for drilled-in piles. Provide untreated timber with a thickness of at least 3 inches and a bending stress of at least 1,000 pounds per square inch for timber lagging. Provide steel bracing that meets ASTM A36.

(A) Shoring Backfill

Use Class II, Type 1, Class III, Class V or Class VI select material or material that meets AASHTO M 145 for soil classification A-2-4 with a maximum PI of 6 for shoring backfill except do not use A-2-4 soil for backfill around culverts.

(B) Anchors

Store anchor materials on blocking a minimum of 12 inches above the ground and protect it at all times from damage; and when placing in the work make sure it is free from dirt, dust, loose mill scale, loose rust, paint, oil or other foreign materials. Load, transport, unload and store anchor materials so materials are kept clean and free of damage. Bent, damaged or defective materials will be rejected.

(1) Ground Anchors

Use high-strength deformed steel bars that meet AASHTO M 275 or seven-wire strands that meet ASTM A886 or Article 1070-5 of the *Standard Specifications*. Splice bars in accordance with Article 1070-9 of the *Standard Specifications*. Do not splice strands. Use bondbreakers, spacers and centralizers that meet Article 6.3.5 of the *AASHTO LRFD Bridge Construction Specifications*.

Use neat cement grout that only contains cement and water with a water cement ratio of 0.4 to 0.5 which is approximately 5.5 gallons of water per 94 pounds of Portland cement. Provide grout with a compressive strength at 3 and 28 days of at least 1,500 and 4,000 psi, respectively.

(2) Helical Anchors

Use helical anchors with an ICC Evaluation Service, Inc. (ICC-ES) report. Provide couplers, thread bar adapters and bolts recommended by the Anchor Manufacturer to connect helical anchors together and to piles.

(3) Anchorages

Provide steel plates for bearing plates and steel washers, hex nuts, wedge plates and wedges recommended by the Anchor Manufacturer.

(C) Temporary Walls

(1) Welded Wire Facing

Use welded wire reinforcement for welded wire facing, struts and wires. For temporary wire walls, provide welded wire facing supplied by the Wire Wall Vendor or a manufacturer approved or licensed by the vendor. For temporary wire walls with separate reinforcement and facing components, provide connectors (e.g., bars, clamps, plates, etc.) and fasteners (e.g., bolts, nuts, washers, etc.) required by the Wire Wall Vendor.

(2) Geotextiles

Provide Type 2 geotextile for separation and retention geotextiles. Provide Type 5 geotextile for geotextile reinforcement with ultimate tensile strengths in accordance with the accepted submittals.

(3) Geogrid and Geostrip Reinforcement

Use geogrids with a roll width of at least 4 feet. Use geogrids for geogrid reinforcement and geostrips for geostrip reinforcement with an "approved" status code in accordance with the NCDOT Geosynthetic Reinforcement Evaluation Program. The list of approved geogrids and geostrips is available from: connect.ncdot.gov/resources/Geological/Pages/Products.aspx

Provide geogrids and geostrips with design strengths in accordance with the accepted submittals. Geogrids and geostrips are approved for short-term design strengths (3-year design life) in the machine direction (MD) and cross-machine direction (CD) based on material type. Define material type from the website above for shoring backfill as follows:

Material Type	Shoring Backfill
Borrow	A-2-4 Soil
Fine Aggregate	Class II, Type 1 or Class III Select Material
Coarse Aggregate	Class V or VI Select Material

(4) Welded Wire Grid and Metallic Strip Reinforcement

Provide welded wire grid and metallic strip reinforcement supplied by the Wire Wall Vendor or a manufacturer approved or licensed by the vendor. Use welded wire grid reinforcement ("mesh", "mats" and "ladders") that meet Article 1070-3 of the *Standard Specifications* and metallic strip reinforcement ("straps") that meet ASTM A572 or A1011.

Preconstruction Requirements

(A) Concrete Barrier

Define "clear distance" behind concrete barrier as the horizontal distance between the barrier and edge of pavement. The minimum required clear distance for concrete barrier is shown in the plans. At the Contractor's option or if the minimum required clear distance is not available, set concrete barrier next to and up against traffic side of temporary shoring except for barrier above temporary walls. Concrete barrier with the minimum required clear distance is required above temporary walls.

(B) Temporary Guardrail

Define "clear distance" behind temporary guardrail as the horizontal distance between guardrail posts and temporary shoring. At the Contractor's option or if clear distance for cantilever, braced and anchored shoring is less than 4 feet, attach guardrail to traffic side

of shoring as shown in the plans. Place ABC in clear distance and around guardrail posts instead of pavement. Do not use temporary guardrail above temporary walls.

(C) Temporary Shoring Designs

Before beginning temporary shoring design, survey existing ground elevations in the vicinity of shoring locations to determine actual design heights (H). Submit PDF files of working drawings and design calculations for temporary shoring designs in accordance with Article 105-2 of the *Standard Specifications*. Submit working drawings showing plan views, shoring profiles, typical sections and details of temporary shoring design and construction sequence. Do not begin shoring construction until a design submittal is accepted.

Have cantilever and braced shoring designed, detailed and sealed by an engineer licensed in the state of North Carolina. Use a prequalified Anchored Wall Design Consultant to design anchored shoring. Provide anchored shoring designs sealed by a Design Engineer approved as a Geotechnical Engineer (key person) for an Anchored Wall Design Consultant. Include details in anchored shoring working drawings of anchor locations and lock-off loads, unit grout/ground bond strengths for ground anchors or minimum installation torque and torsional strength rating for helical anchors and if necessary, obstructions extending through shoring or interfering with anchors. Include details in the anchored shoring construction sequence of pile and anchor installation, excavation and anchor testing.

Provide temporary wall designs sealed by a Design Engineer licensed in the state of North Carolina and employed or contracted by the Temporary Wall Vendor. Include details in temporary wall working drawings of geotextile and reinforcement types, locations and directions and obstructions extending through walls or interfering with reinforcement.

(1) Soil Parameters

Design temporary shoring for the assumed soil parameters and groundwater or flood elevations shown in the plans. Assume the following soil parameters for shoring backfill:

(a) Unit weight (γ) = 120 pcf,

(b)

Friction Angle (ϕ)	**Shoring Backfill**
30°	A-2-4 Soil
34°	Class II, Type 1 or Class III Select Material
38°	Class V or VI Select Material

(c) Cohesion (c) = 0 psf.

(2) Traffic Surcharge

Design temporary shoring for a traffic surcharge of 250 pounds per square foot if

supplied by the Contractor shall conform to the following requirements and be provided in contract submittals for review and approval:

(1) List host pipe diameter ranges for which the product is applicable;
(2) Indicate corrosion potential/acid reaction potential;
(3) Liner must be closed profile; i.e. no definable bell and spigot that protrudes from the outer wall of the pipe;
(4) Certification on manufacturer's letterhead indicating that the Contractor is approved by the manufacturer to perform installation work;
(5) Material safety data sheets for all hazardous chemicals that will be used on the job site. Identify the proposed use for each hazardous chemical and where it will be used in the work;
(6) Calculated minimum thickness of liner;
(7) Maximum allowable pulling and/or pushing force;
(8) Grouting mix design and manufacturer recommendations;
(9) Installation procedures and recommendations;
(10) Provide inside diameter and outside diameter of pipe;
(11) Provide and comply with specification for installation, and in accordance with Article 106-3 of the *Standard Specifications* provide Type 1 or Type 4 material certification of compliance with material specifications as applicable to the below, or equivalent as approved by the Engineer;
  (a) ASTM D1784 defines PVC cell class referenced below
  (b) ASTM D3350 defines PE cell class referenced below
  (c) ASTM F714 for solid wall polyethylene min cell classification 345464 and 2–4% carbon black
  (d) AASHTO M326 for solid wall polyethylene
  (e) ASTM D3034 for solid wall PVC, min. cell classification 12454
  (f) ASTM F679 for solid wall PVC, large diameter, min. cell classification 12454
  (g) ASTM D2241 for solid wall PVC, min. cell classification 12454
  (h) ASTM F585 for polyethylene slip-line
  (i) ASTM F2620 for polyethylene heat fusion joining
(12) Submit to the Engineer Type 2 or Type 5 material certifications in accordance with Article 106-3 of the *Standard Specifications* by vendors or subcontractors for proof of long-term modulus of elasticity, 50-year sustained loading value, if the following values are not used in design calculations: 22,000 psi shall be used for HDPE, PE, PP; and 140,000 psi shall be used for PVC; in accordance with *AASHTO LRFD Bridge Design Specifications*, Table 12.12.3.3-1, Mechanical Properties of Thermoplastic Pipe.

(D) Category D HDPE, PVC, PP corrugated, profile wall, steel reinforced, or spiral wound slip liners

When HDPE, PVC, PP corrugated, profile wall, steel reinforced, or spiral wound slip liners are specified, the liner system supplied by the Contractor shall conform to the following requirements and be provided in contract submittals for review and approval:

(1) List host pipe diameter ranges for which the product is applicable;
(2) Indicate corrosion potential/acid reaction potential;

(3) Certification on manufacturer's letterhead indicating that the Contractor is approved by the manufacturer to perform installation work;
(4) Material safety data sheets for all hazardous chemicals that will be used on the job site. Identify the proposed use for each hazardous chemical and where it will be used in the work;
(5) Calculated minimum thickness of liner;
(6) Maximum allowable pulling and/or pushing force;
(7) Grouting mix design and manufacturer recommendations;
(8) Installation procedures and recommendations;
(9) Provide and comply with specification for installation, and in accordance with Article 106-3 of the *Standard Specifications* provide Type 1 or Type 4 material certification of compliance with material specifications as applicable to the below, or equivalent as determined by the Engineer;
  (a) ASTM D1784 defines PVC cell class referenced below
  (b) AASHTO M294 for polyethylene profile wall (See Article 1032-7 of the *Standard Specifications*)
  (c) ASTM F894 for profile polyethylene
  (d) ASTM F2562 or F2435 for steel reinforced polyethylene min. cell classification 334452 and 2-4% carbon black
  (e) AASHTO M304 for profile PVC (see Article 1032-8 of the *Standard Specifications*)
  (f) ASTM F1803 for closed profile PVC
  (g) ASTM F949 and F794 for corrugated PVC min cell classification 12454
  (h) AASHTO M330 for corrugated polypropylene
  (i) AASHTO MP20-13 for steel reinforced polyethylene ribbed
  (j) ASTM F1735 PVC for profile strip / spiral wound, min. cell classification 12454. When steel reinforced, resin shall conform to ASTM D3350, min. cell classification 335420 and 2-4% carbon black. Steel fully encapsulated.
  (k) ASTM F1697 PVC for profile strip / machine spiral wound, min. cell classification 13354 (for Type A) or 12344 (for Type B) or higher, as defined in Specification D1784. When steel reinforced, resin shall conform to ASTM D3350, min. cell classification 335420 and 2-4% carbon black. Steel fully encapsulated.
  (l) ASTM F585 for polyethylene slip-line
  (m) ASTM F1698 for PVC spiral wound
  (n) ASTM F1741 for PVC machine spiral wound
(10) Submit to the Engineer Type 2 or Type 5 material certifications in accordance with Article 106-3 of the *Standard Specifications* by vendors or subcontractors for proof of long-term modulus of elasticity, 50-year sustained loading value, if the following values are not used in design calculations: 22,000 psi shall be used for HDPE, PE, PP; and 140,000 psi shall be used for PVC; in accordance with *AASHTO LRFD Bridge Design Specifications*, Table 12.12.3.3-1, Mechanical Properties of Thermoplastic Pipe.

(E) Category E - Spray-on liners

Spray-on liners consist of conduit lining with spray applied, factory blended cementitious, geopolymer, or other material. The liner system supplied by the Contractor shall conform to the following requirements and be provided in contract submittals for review and approval:

(1) List host pipe diameter ranges for which the product is applicable;
(2) Indicate corrosion potential/acid reaction potential;
(3) List liner material type;
(4) List typical, minimum, maximum application thicknesses;
(5) Include documentation of specification or standard practice for installation;
(6) Minimum thickness of liner from design calculations;
(7) Manufacturer moisture limitations (e.g. installation in the dry, humidity restrictions, etc.);
(8) Certification on manufacturer's letterhead indicating that the Contractor is approved by manufacturer to perform installation work;
(9) Material safety data sheets for all hazardous chemicals that will be used on the job site. Identify the proposed use for each hazardous chemical and where it will be used in the work;
(10) Site specific cure time;
(11) Provide volume (cubic yards or cubic feet) of liner material planned for use in each host pipe. For example, cubic yards of dry, unmixed cementitious liner material. This must match the value provided by design calculations;
(12) Ambient temperature range during installation;
(13) Other submittals as appropriate for the type of spray-on liner, as determined by the Engineer;
(14) Minimum thickness for cementitious or geopolymer liner material is 1 inch (clear of corrugations);
(15) Cementitious and geopolymer liner material must fill the corrugations of the host pipe (if corrugated);
(16) All liner thickness is measured above the corrugation crests, whether corrugations are filled or not;
(17) For cementitious or geopolymer liners, submit to the Engineer Type 2 or Type 5 material certifications in accordance with Article 106-3 of the *Standard Specifications* for the categories below, and a letter of certification from the manufacturer that states the material to be used conforms to manufacturer specifications. Actual properties must meet or exceed the values used in structural calculations when field tested. The psi values in the following table shall be provided in the contract submittals for review and approval;

Property	Test Method	Duration	Provide Value
Compressive Strength	ASTM C 109	3 Day 28 Days	psi psi
Flexural Strength	ASTM C 78	7 Days 28 Days	psi psi
Modulus of Elasticity	ASTM C 469	28 Days	psi
Tensile Strength	ASTM C 496	28 Days	psi

(18) For onsite or offsite Ready Mix or Project Produced cementitious or geopolymer liners (i.e. not “bag mixes” produced by a manufacturer), submit a mix design to the Engineer for review and approval;
(19) Liners which exhibit Rigid Pipe behavior, such as Cementitious or geopolymer liners, require the following submittals. (Rigid Pipe behavior is characterized by

cracking when subjected to 2% or greater deflection.);

(a) Provide Type 2 or Type 5 material certifications in accordance with Article 106-3 of the *Standard Specifications* for the compressive strength, flexural strength, modulus of elasticity, and tensile strength in accordance with the table above.

(b) Provide liner structural designs for each pipe in Excel format to the Engineer using the cementitious tabs of the NCDOT-provided spreadsheet: *2021 03 25 SAPL Design Worksheet Final Version 135417* where the *NCDOT Pipe Liner Manual* provides guidance on spreadsheet input values.

(c) Provide written justification to the Engineer for all user-input values contained in the spreadsheet described above. If default values are accepted as provided in the spreadsheet, it is acceptable to indicate for each value: *Default value verified and adopted.*

(20) Liners which exhibit Flexible Pipe behavior (can withstand greater than 2% deflection without structural damage) shall be treated as Thermoplastic Pipe as described in the *NCDOT Pipe Liner Manual*. Cementitious and geopolymer liners are not eligible for this method. The following submittals are required:

(a) Provide liner structural designs for each pipe in Excel format using the polymer tabs of the NCDOT-provided spreadsheet: *2021 03 25 SAPL Design Worksheet Final Version 135417.*

(b) Provide written justification to the Engineer for all user-input values contained in the spreadsheet described above. If default values are accepted as provided in the spreadsheet, it is acceptable to indicate for each value: *Default value verified and adopted* where the *NCDOT Pipe Liner Manual* provides guidance on spreadsheet input values.

(c) Provide $E_{SAPL,}$ Short-Term Circumferential Flexural Modulus of Liner Material. Vendor or subcontractor must provide value used in calculations. It shall be provided from test ASTM D790. Provide Type 2 or Type 5 material certifications in accordance with Article 106-3 of the *Standard Specifications* for value used in calculations.

(d) Provide E_{SAPL}, Long-Term Circumferential Flexural Modulus of Liner Material. Vendor or subcontractor must provide value used in calculations. It shall be provided from test ASTM D2990, using 50-year sustained loading value. In the absence of the ASTM D2990 standard tests, it is acceptable to use 50% of the short term flexural modulus described immediately above (provided by ASTM D790) as a value for the long term flexural modulus. Provide Type 2 or Type 5 material certifications in accordance with Article 106-3 of the *Standard Specifications* for value used in calculations. This value does not apply to, and is not required for arch host pipes.

(e) Provide S_b, Long-Term Ring-Bending Strain. Vendor or subcontractor must provide value used in calculations. It shall be provided from test. ASTM D5365. Provide Type 2 or Type 5 material certifications in accordance with Article 106-3 of the *Standard Specifications* for value used in calculations. This value does not apply to, and is not required for arch host pipes.

(f) Provide σR Compressive Strength (Stress Strength of Material Corresponding to 95% Lower Confidence Limit). Vendor or subcontractor must provide value used in calculations which shall be provided from test ASTM D695. Provide Type 2 or Type 5 material certifications in accordance with Article 106-3 of the *Standard Specifications* for value used in calculations. This value applies only to arch host pipes, and is not required for round host pipes.

(F) Category F - Smooth-wall steel pipe liner

Smooth-wall steel pipe liner rehabilitation materials shall conform to Article 1032-5 of the *Standard Specifications*, except as altered herein.

Grade B pipe shall be used with minimum wall thicknesses as listed in the *NCDOT Pipe Liner Manual*.

The Contractor shall submit the following items to the Engineer:

(1) Material safety data sheets for all hazardous chemicals that will be used on the job site. Identify the proposed use for each hazardous chemical and where it will be used in the work.
(2) Grouting mix design and manufacturer recommendations.

Construction Methods

For all categories the Contractor shall perform pre-installation inspection, pipe cleanout, grout host pipe, inlet and outlet sealing, dewatering, and submit a disposal plan as follows:

(A) Pre-Installation Inspection

Perform a pre-installation video inspection of pipe using NASSCO certified personnel. Place the camera that is mounted on a rubber tired or tracked pipe rover that allows for a 360-degree inspection at the centerline of the pipe. Inspection equipment shall be capable of measuring protrusions and obstructions of 1/2 inch or greater. Provide a pipe profile, on which deflections that may affect the installation of the liner are located and noted. The inspection shall be performed in the presence of the Engineer, unless waived by the Engineer. Dewater the host pipe to the satisfaction of the Engineer, and in accordance with *NCDOT's Best Management Practices for Construction and Maintenance Activities*. A thorough culvert inspection is required to determine the number of existing "pipe to pipe" connections and the extent, if any, of obstruction removal and voids. Perform inspection by experienced personnel trained in locating breaks, obstacles, voids and service connections. Video inspections shall be clearly labeled on the media with the time, date, and location of the pipe inspected. Furnish a copy of the video inspection to the Engineer at least 10 days prior to the start of rehabilitative construction. In the event the Contractor's inspection shows the method of rehabilitation the Contractor has selected is no longer viable at that location as verified by the Engineer, select another allowable method, if specified, from those designated in the Designated Locations and Allowable Methods table found earlier in this special provision or as found elsewhere in the contract.

(B) Pipe Clean-out

Clear the existing pipe(s) designated for rehabilitation of any debris, sediment, protrusions greater than 1/2 inch in height, and any other potential obstructions prior to the start of rehabilitation efforts. Thoroughly clean and prepare the host pipe prior to the liner installation. Conform to the cleaning recommendations of the liner manufacturer, and any

additional requirements of this special provision of which the more stringent shall apply. In the absence of manufacturer recommendations, submit the proposed method for cleaning and preparing the host pipe for the Engineer's review and acceptance at least 10 working days prior to beginning the work at that location.

(C) Grouting Host Pipe

Perform grouting work described in the contract, prior to pipe liner installation to fill voids in the soil around the existing host pipe. Grouting to fill voids in the soil around the host pipe is not included in the scope of pipe lining described by this special provision and will be paid for as found elsewhere in this contract.

Grouting the annular space between the liner and the host pipe when the liner does not fit snugly against the host pipe is incidental to the *Pipe Rehabilitation* pay item.

(D) Inlet & Outlet Sealing

All pipe liner installations shall be sealed to the host pipe at the terminal ends of the liner to prevent flow between the liner and host pipe.

(E) De-Watering

Install all pipe liners and grout in dry conditions. De-water by diverting, pumping, or bypassing any water flow through an existing pipe or drainage system prior to and during the lining process. The method of de-watering is to be determined by the Contractor but must be approved by the Engineer prior to implementing.

(F) Disposal Plan

Submit a disposal plan to the Engineer a minimum of 10 days prior to installation. The disposal plan shall indicate how by-products and waste are to be contained, captured, transported offsite, and disposed of in accordance with project permits and local, state and federal regulations. It shall be the Contractor's responsibility to report and take appropriate corrective actions to remediate any water quality alteration resulting from lining operations in accordance with project permits and applicable local, state or federal regulations. The cost for such remediation shall be at the Contractor's expense.

Category A – Cured-In-Place Pipe Liner Construction Methods

Fabricate and install the cured-in-place pipe liner system in such a manner as to result in a maintained full contact tight fit to the internal circumference of the host pipe for its entire length. The installation shall adhere to the cure times and temperatures stipulated in the manufacturer's recommended installation and cure specifications and the finished product shall be free of de-lamination, bubbling, rippling or other signs of installation failure.

Install per specification or standard practice for installation in accordance with (ASTM F1216 for inverted CIPP, or ASTM F1743 for pulled-in-place CIPP, or ASTM F2019 for pulled-in-

place GRP CIPP, or ASTM F2599 for sectional inverted CIPP, or ASTM F3541 for sectional CIPP pushed or pulled in place unless otherwise approved by the Engineer).

Pulled-in-place liner installation must be accomplished without significant liner twisting, or stretching the liner greater than 1% of its original length during installation. At no time shall the pulling force, as measured by a Contractor-provided dynamometer or load cell, exceed that established by the liner manufacturer. For liner lengths greater than 100 feet, protect the pipe liner end using a device that uniformly distributes the applied load around the perimeter of the liner.

Curing for styrene-based, epoxy-based, and vinyl ester-based CIPP may be accomplished by water, steam or ultraviolet light and shall be in accordance with the liner manufacturer's recommendations.

Installation and curing requirements of pipe sections shall be in accordance with the manufacturer's recommendations for the specific product, as applicable. Furnish installation and curing requirements for the various flexible liners including individual components of the system, tube type (reinforced or non-reinforced), manufacturer name and type of resin including catalyst, volume of resin required to achieve proper impregnation and curing. All components of the systems shall be in accordance with manufacturer's recommendations for the specific system used, and all components shall include lot numbers and expiration dates.

Place an impermeable barrier immediately upstream and downstream of the host pipe, prior to liner insertion, to capture any possible raw resin spillage during installation and dispose of any materials in accordance with the submitted and approved disposal plan.

Where the pulled-in-place method of installation is used, install a semi-rigid plastic slip sheet over any interior portions of the host pipe that could tear the outer film or over any significant voids in the host pipe.

Reconnect the existing storm drain lateral connections immediately after the liner has been cured in place. Use robotic cutting devices to re-establish tie-ins in non-man accessible pipes.

Monitor temperature via a minimum of three thermocouples on the outer surface (interface between the host pipe and liner) of the liner (one each at the upstream and downstream ends and one approximately mid-length of the host pipe). Monitor pressure during inversion and curing, and maintain pressure between minimum and maximum allowable pressures as provided by the manufacturer. Log cure time-temperature and time-pressure data at 5-minute intervals and provide such information in a format acceptable to the Engineer for review and approval within 48 hours after completing the resin-curing process.

Thoroughly rinse the cured lined pipe with clean water prior to re-introducing flow.

Capture all cure water and/or steam condensate and rinse water and dispose of, in accordance with the submitted and approved disposal plan.

Within 21 days of completing the resin curing at a given culvert location, submit the test results from an ISO 17025 lab approved by the Engineer. The report must be signed by a representative of the independent testing lab. The report must include:

(1) Thickness measurements as well as flexural strength and flexural modulus test results for field samples.
(2) Description of the defects in the tested samples in terms of the effect on CIPP performance.

Make cured samples from the identical materials (tube, resin and catalyst) to be used for the CIPP. Identify each sample by date, contract number, drainage system number of the corresponding culvert, thickness, name of resin, and name of catalyst. The samples must be 6 by 16 inches in size, so that the testing lab can cut the sample into five pieces for testing. Comply with the following sampling procedures unless UV cured:

(1) One sample will be made for each setup of the lining apparatus and tested for thickness and flexural properties. A setup is defined as the lining equipment being used to line one run of storm sewer with one continuous liner bag that undergoes one heating/curing/cooling cycle, which may contain multiple pipes and drainage structures in series.
(2) Place one aluminum-plate clamped mold containing a flat plate sample, inside the downtube when heated circulated water is used, and in the silencer when steam is used during the resin curing period.
(3) Seal each flat plate sample in a heavy-duty plastic envelope inside the mold.
(4) Remove the cured flat plate sample after draining all of the moisture from the cured CIPP.

If UV cured, comply with field sampling procedures under ASTM F2019, Section 7: Recommended Inspection Practices.

Test the samples for flexural properties under ASTM D790, ASTM D5813, ASTM F1216, ASTM F1743, ASTM F2019, or ASTM F3541 as applicable unless otherwise approved by the Engineer. Verify that physical properties of the field samples comply with the minimum values under:

(1) ASTM F1216, Table 1 (modified values), for heat cured polyester, vinyl ester, and epoxy resins. The flexural strength must be at least 5,000 psi. The flexural modulus must be at least 300,000 psi.
(2) ASTM F2019, Table 1, for UV cured CIPP. The flexural strength must be at least 6,500 psi. The flexural modulus must be at least 725,000 psi. Comply with sampling and testing procedures under ASTM F2019, Section 7: Recommended Inspection Practices.

Test the samples for thickness. If heat cured, remove the film from the inner lining or preliner. If UV cured, remove the film from the inner and outer foil.

Measure the thickness of the liner at 3 spots on each deburred sample. Calculate the thickness as an average of the measurements.

If UV cured, comply with sampling and testing procedures under ASTM F2019, Section 7:

Recommended Inspection Practices. If the culvert material is corrugated metal, measure the thickness at 3 spots that are along a line corresponding to the corrugation crests. Calculate the thickness as an average of at least 6 measurements.

CIPP may be rejected by the Engineer if any of the following occur:

(1) Actual temperature and curing time and schedule do not comply with those shown in the authorized work plan;
(2) Pressure deviates more than 1 psi from the required pressure;
(3) At any time during installation the manufacturer's required minimum cool-down time or maximum cool-down rate is violated;
(4) There are defects including;
    (a) Concentrated ridges, including folds and wrinkles exceeding 8 percent of the CIPP diameter
    (b) Dry spots
    (c) Lifts
    (d) Holes
    (e) Tears
    (f) Soft spots
    (g) Blisters or bubbles however this does not include superficial bubbles in the inner plastic liner that do not penetrate into the felt
    (h) Delaminations
    (i) Gaps in the length of the CIPP
    (j) Gaps or a loose fit between the exterior of the CIPP and the culvert
(5) Test results indicate one of the following:
    (a) If heat cured, the average of the test results for one prepared sample cut into pieces for testing does not have the specified modulus of elasticity, the specified flexural strength, nor either the specified modulus of elasticity or the specified flexural strength
    (b) If UV cured, the average of the test results for one prepared sample cut into pieces for testing does not have the specified modulus of elasticity, the specified flexural strength, nor either the specified modulus of elasticity or the specified flexural strength
(6) The liner thickness is less than the greater of either one of the following:
    (a) Specified thickness
    (b) Calculated minimum thickness shown in your authorized work plan
(7) Materials and installation methods are not those shown in your authorized installation plan;
(8) Defects are excessive or unrepairable;
(9) CIPP is not continuous or does not fit tightly for the full length of the culvert;
(10) If UV cured, and post installation inspections reveal signs of incomplete curing (dripping resin, etc.), trim liner obscuring uncured liner, re-wet, and re-cure with UV.

Category B - Fold and Form Flexible Liners Construction Methods

Install per specification or standard practice for installation (ASTM F1606 deformed polyethylene, ASTM F1867 folded/formed PVC Type A, or ASTM F1947 folded PVC unless

otherwise approved by the Engineer).

Fabricate and install the liner system in such a manner as to result in a maintained full contact tight fit to the internal circumference of the host pipe for its entire length. The installation shall adhere to the reforming pressures and temperatures stipulated in the manufacturer's recommended installation specifications and the finished product shall be free of bubbling, rippling or other signs of installation failure.

Installation and reforming requirements of pipe sections shall be in accordance with the manufacturer's recommendations for the specific product. All components of the systems shall be as recommended by the manufacturer for the specific system used, and all components shall include lot numbers. Submit documentation from the manufacturer to verify compliance with the requirements of this paragraph as well as installation recommendations to the Engineer for review and approval.

Reconnect the existing storm drain lateral connections immediately after the liner has been installed in place. Use robotic cutting devices to reestablish tie-ins in non-man accessible pipes.

Monitor temperature via a minimum of two thermocouples (one each at the upstream and downstream ends of the host pipe). The Contractor shall automatically log cure time-temperature and time-pressure data at 30 second intervals with a data logger and provide such information in a format acceptable to the Engineer.

Submit the tape and log of recorded temperatures to the Engineer within 48 hours after completing the lining process. Submit the recorded pressure to the Engineer within 48 hours after completing the lining process.

Liner may be rejected by the Engineer if any of the following occur:

(1) Actual temperature and curing time and schedule do not comply with those shown in the authorized work plan;
(2) There are defects including:
    (a) Concentrated ridges, including folds and wrinkles exceeding 8 percent of the liner diameter
    (b) Lifts
    (c) Holes
    (d) Tears
    (e) Soft spots
    (f) Blisters or bubbles
    (g) Gaps in the length of the liner
    (h) Gaps or a loose fit between the exterior of the liner and the culvert
(3) The liner thickness is less than the greater of either one of the following:
    (a) Specified thickness
    (b) Calculated minimum thickness shown in your authorized work plan
(4) Materials and installation methods are not those shown in installation plan;
(5) Defects are excessive or unrepairable;
(6) Liner is not continuous or does not fit tightly for the full length of the culvert.

Category C – HDPE, PE, PVC, or PP Solid Wall Slip Liner Construction Methods

Installed per specification or standard practice for installation (ASTM F585 polyethylene slip-line, ASTM F2620 polyethylene heat fusion joining unless otherwise approved by the Engineer).

Installation requirements of pipe sections shall be in accordance with the manufacturer's recommendations for the specific product. All components of the systems shall be as recommended by the manufacturer for the specific system used, and all components shall include lot numbers.

Before lining, pull or push a mandrel through the existing pipe or perform laser survey to verify liner clearance. The liner must be positioned and secured to facilitate its complete encapsulation by grout. Follow the manufacturer's recommendations for handling and assembling the pipe, and all provisions included in the design calculations. Reconnect the existing storm drain lateral connections immediately after the liner has been installed in place. Use robotic cutting devices to reestablish tie-ins in non-man accessible pipes. Prior to filling the annular space, connect and seal all laterals between the new liner pipe and the existing lateral.

Grout the entire annular space with non-shrink grout or an expansive admixture approved by the manufacturer for use with the liner system. In the absence of manufacturer's recommendations for grout, refer to Section 1003 of the *Standard Specifications*. Provide a minimum annular space of 1 inch for grouting between the new and existing pipes. Provide details on how to hold the liner pipe to line and grade until the grout has set. Ensure the maximum pressure developed by the grout does not exceed the manufacturer's recommendation for the maximum allowable external pressure for the liner pipe. If the volume of the grout used is less than the anticipated (calculated) volume, or an inspection of the relined culvert indicates that there are voids in the annular space, provide the Engineer with a plan to rehabilitate all identified voids. Depending on the location and size of the voids, additional grouting may be required in these areas. This may be accomplished by re-grouting in those areas from within the culvert. The voids must be filled to the satisfaction of the Engineer at no additional cost. Grouting is included with the cost of pipe liner installation.

Lining with HDPE or PP: Field cuts will be permitted only at the terminal ends. No pipe sections less than 3 feet long will be allowed in any lining projects. Perform all butt fusion, welding and extrusion welding of pipe in accordance with the manufacturer's recommendations. Based on existence of alignment breaks or pinch points in the host pipe, all joints shall be butt fusion welded, or extrusion welded unless alternate joining methods are approved by the Engineer, in which case limit joint separations to less than 1/2 inch between adjoining sections.

Lining with Polyvinyl Chloride Pipe: Reline with a PVC Pipe with integral bell and spigot joints. Field cuts will be permitted only at the terminal ends. No pipe sections less than 3 feet long will be allowed in any lining projects. The submittals to the Engineer must address the following PVC specific issues: Will the PVC liner will be pulled or pushed through the culvert, along with the type of pushing or pulling ring/plate to be used? Will a nose cone or different

device be used in the process? How will the jacking, pulling or pushing loads on the liner be monitored to conform to manufacturer's specifications and guidelines?

Category D - HDPE, PVC, or PP Corrugated, Profile, or Spiral Wound Slip Liner Construction Methods

Installed per specification or standard practice for installation (ASTM F585 polyethylene slip-line, ASTM F1698 PVC spiral wound, ASTM F1741 PVC machine spiral wound unless otherwise approved by the Engineer).

Installation requirements of pipe sections shall be in accordance with the manufacturer's recommendations for the specific product. All components of the systems shall be as recommended by the manufacturer for the specific system used, and all components shall include lot numbers.

Before lining, pull or push a mandrel through the existing pipe to verify liner clearance. The liner must be positioned and secured to facilitate its complete encapsulation by grout. Follow the manufacturer's recommendations for handling and assembling the pipe, and all provisions included in the design calculations. Immediately reconnect the existing storm drain lateral connections after the liner has been installed in place. Use robotic cutting devices to reestablish tie-ins in non-man accessible pipes. Prior to filling the annular space, connect and seal all laterals between the new liner pipe and the existing lateral.

Grout the entire annular space with non-shrink grout approved by the manufacturer for use with the liner system. In the absence of manufacturer's recommendations for grout, refer to Section 1003 of the *Standard Specifications*. Provide a minimum annular space of 1 inch around the circumference for grouting between the new and existing pipes. (Spiral Wound liner that is designed to fit tightly to the interior wall of the host pipe is not subject to the 1 inch annular space and grouting.) Provide details on how to hold the liner pipe to line and grade until the grout has set. Ensure the maximum pressure developed by the grout does not exceed the manufacturer's recommendation for the maximum allowable external pressure for the liner pipe. If the volume of the grout used is less than the anticipated (calculated) volume, or an inspection of the relined culvert indicates that there are voids in the annular space, provide the Engineer with a plan to rehabilitate all identified voids. Depending on the location and size of the voids, additional grouting may be required in these areas. This may be accomplished by re-grouting in those areas from within the culvert. The voids must be filled to the satisfaction of the Engineer at no additional cost. Grouting is included with the cost of pipe liner installation.

<u>Lining with HDPE or PP (does not apply to spiral-wound):</u> Field cuts will be permitted only at the terminal ends. No pipe sections less than 3 feet long will be allowed in any lining projects. Perform all butt fusion, welding and extrusion welding of pipe in accordance with the manufacturer's recommendation. Based on existence of alignment breaks or pinch points in the host pipe, all joints shall be butt fusion welded, or extrusion welded unless alternate joining methods are approved by the Engineer, in which case limit joint separations to less than 1/2 inch between adjoining sections.

Lining with Polyvinyl Chloride Pipe (does not apply to spiral-wound): Reline with a PVC Pipe with integral bell and spigot joints. Field cuts will be permitted only at the terminal ends. No pipe sections less than 3 feet long will be allowed in any lining projects. The submittals for this item provided for Engineer review and approval shall also address the following PVC specific issues prior to any work approval is granted: Will the PVC liner will be pulled or pushed through the culvert, along with the type of pushing or pulling ring/plate to be used? Will a nose cone or different device be used in the process? How will the jacking, pulling or pushing loads on the liner be monitored to conform to manufacturer's specifications and guidelines?

Category E - Spray-On Cementitious, Geopolymer, or Other Materials Construction Methods

Install in accordance with the liner material manufacturer's recommendations. For spray-on cementitious, geopolymer, or other liner systems, the following requirements shall apply:

Control the temperature and humidity in the host pipe according to the manufacturer's recommendation, including stopping air drafts through the pipe. Measure and record the temperature and humidity. The Contractor shall automatically log cure time-humidity and time-temperature data at 30 minute intervals with a data logger and provide such information in a format acceptable to the Engineer.

Patch and fill voids, holes, and gaps in the host pipe with an approved hydraulic cement or the same cementitious or geopolymer based material to be used for the liner to provide a solid continuous surface on which to spray. Stop water infiltration into the host pipe by applying dry hydraulic cement, or other methods approved by the Engineer. Prepare lateral connections to the host pipe according to the manufacturer's recommendations. Record the batch or lot number from the containers used each day.

To achieve bonding to the host pipe: Before placing liner, remove all loose or flaking coatings, loose or flaking corrosion, and other material until the original host pipe material is exposed; by water jetting, mechanically scraping, or other effective methods consistent with manufacturer's recommendations. Corrosion and coatings soundly attached to the host pipe walls may remain. Ensure cleaning methods will not affect chemical properties of liner, or adhesion of liner.

Application of liner material must be uninterrupted and continuous. Use a machine approved by the manufacturer, and capable of projecting liner material against the culvert wall without rebound and at a velocity sufficient to cause liner material to pack densely and adhere in place. Obtain authorization from the Engineer for placing liner material by hand to fill gaps left by dewatering pipe after application and prior to being fully cured, while material may be added.

The machine operator must continuously monitor the application of cementitious material.

The travel of the projecting machine and the discharge rate of liner material must be entirely mechanically controlled and must produce a uniform thickness of liner material without segregation around the perimeter and along the culvert length. The pipe liner must be free of sand pockets or visible lack of homogeneity.

Submit an installation plan to the Engineer which details the number of passes, sled travel speed, and installation parameters relevant to the work.

Remove splatter and the accumulation of other undesirable substances along the culvert invert.

Obtain authorization from the Engineer for placing liner material by hand methods at sharp bends and special locations where machine placement is impracticable.

Provide a smooth finished surface texture.

After placement, the lining must be the greater of 1 inch thick (cementitious or geopolymer), or calculated thickness. For corrugated pipe, the thickness must be measured over the top of the corrugation crests. The tolerance for the pipe liner's thickness is plus 0.12 inch with no minus tolerance.

Depth gauges shall be installed in the soffit (12 o'clock position) of the host pipe every 10 feet along the length to allow determination of liner thickness. Depth gauges shall protrude from the host pipe wall a distance equivalent to the final surface of the liner, and shall remain in place permanently. Depth gauges shall be metal screws or rods with the shaft not greater than 3/16 inch diameter.

After application and before being fully cured, while material may be added, verify the applied thickness at least once every 10 feet to the satisfaction of the Engineer. Apply additional material to any areas found to be less than the design thickness.

Ensure the liner is continuous over the entire length of the host pipe and free from defects such as foreign inclusions, holes and cracks no larger than 0.01 inches wide. Ensure the renewed conduit is impervious to infiltration and exfiltration.

Protect walls, surfaces, streambed and plants at the entrance and exit of the host pipe from overspray. Install a temporary curtain at the outlet and inlet to prevent overspray during installation.

Thoroughly rinse the cured pipe with clean water and dispose of it in accordance with the disposal plan.

Reinstate water flow no sooner than recommended by manufacturer or 24 hours following installation, whichever is greater.

For cementitious or geopolymer spray-on liners, prevent the escape of any rinse water from the lined pipe or otherwise capture it until he can either

(1) dispose of it in accordance with the submitted disposal plan; or

(2) continuously monitor the pH of the rinse water until the pH is less than 9 whereupon it may be released.

For other liner types, the Contractor shall capture and dispose of the rinse water in accordance with the submitted disposal plan, prior to reinstating flow.

For quality control for geopolymer or cementitious liner submit Type 1 or Type 4 material certifications in accordance with 106-3 of the *Standard Specifications* for each lined pipe in accordance with required cementitious liner properties table in the materials section of this special provision. The Engineer, at his option, may collect concrete mix samples for testing. If the material does not achieve the specified properties listed in the materials section of this special provision, the pipe liner may be rejected by the Engineer. Submit a new work plan to the Engineer for the placement of material before replacing the rejected pipe liner. Take core samples of the liner under direction and in the presence of the Engineer. Core sample diameter shall be at least twice the liner thickness. Repair cored area with liner material. Transport core samples to a Materials and Tests Regional Laboratory for testing.

Inspect the pipe liner for defects. If defects are visible:

(1) Submit a work plan to the Engineer for repairing the defects.

(2) Measure the length of the defect along the centerline of the culvert.

(a) If the length of the defect is 60 inches long or less, patch defects using the same cementitious material used in the work. Hand methods may be used.

(b) If the length of the defect is greater than 60 inches long, replace the defective length of the pipe liner for the full diameter of the pipe liner. Replace the defective length using machine methods.

Quality control for other liner material will be determined per manufacturer recommendations and the Engineer.

Category F – Smooth Wall Steel Pipe Liner Construction Methods

Rehabilitation methods shall be in accordance with Section 330 of the *Standard Specifications*, except as altered herein. The work shall be rehabilitation by the insertion of a smooth wall steel pipe into a host pipe. Where field welding is required, pipe shall be joined by butt welds in accordance with AWWA C-206. Field welded butt joints shall be complete joint penetration (CJP) and the adjoining members shall be assembled so that the seams in the adjacent pipe sections are offset from each other by at least five (5) times the thickness of the thinner member.

Welding procedures employed for welding shall be qualified by testing or prequalified in accordance with AWS D1.1

Personnel performing field welding operations shall have been tested and qualified by the Department.

Provide a Certified Welding Inspector (CWI) on site during all welding and inspection operations to perform the necessary quality control examinations. Non-destructive testing/examination for testing to include visual outlined in the AWWA C-206 shall be provided at the contractor’s expense.

Personnel performing these functions shall be qualified in accordance with AWS QC1 and/or the

recommendations of the current edition of ASNT SNT-TC-1A. Radiographic and Hydrostatic testing is not required.

Before lining, pull or push a mandrel through the existing pipe to verify liner clearance. The liner must be positioned and secured to facilitate its complete encapsulation by grout. Follow the manufacturer's recommendations for handling and assembling the pipe, and all provisions included in the design calculations. Reconnect the existing storm drain lateral connections after the liner has been installed in place. Use robotic cutting devices to re-establish tie-ins in non-man accessible pipes. Prior to filling the annular space, connect and seal all laterals between the new liner pipe and the existing lateral.

Grout the entire annular space with non-shrink grout approved by the manufacturer for use with the liner system. In the absence of manufacturer's recommendations for grout, refer to Section 1003 of *Standard Specifications*. Provide a minimum annular space of 1 inch for grouting between the new and existing pipes. Provide details on how to hold the liner pipe to line and grade until the grout has set. Ensure the maximum pressure developed by the grout does not exceed the manufacturer's recommendation for the maximum allowable external pressure for the liner pipe. If the volume of the grout used is less than the anticipated (calculated) volume, or an inspection of the relined culvert indicates that there are voids in the annular space, provide the Engineer with a plan to rehabilitate all identified voids. Depending on the location and size of the voids, additional grouting may be required in these areas. This may be accomplished by re-grouting in those areas from within the culvert. The voids must be filled to the satisfaction of the Engineer at no additional cost. Grouting is included with the cost of pipe liner installation.

Post Installation Inspection – In addition to the inspection performed by the Department, the Contractor shall perform two post-installation video inspections using NASSCO certified personnel. The first inspection shall take place between 90 and 100 calendar days after completion of installation for each culvert or system to a single outfall. The second inspection shall take place 30 calendar days prior to the end of the liner warranty period (5 years, secured by construction bond). The camera shall be situated at the centerline of the pipe, and shall be mounted on a rubber tired or tracked pipe rover that allows for a 360-degree inspection. Inspection equipment shall be capable of measuring protrusions and obstructions of 1/2 inch or greater. The inspection shall be performed in the presence of the Engineer. Dewater the host pipe to the satisfaction of the Engineer. Video inspections shall be clearly labeled on the media with the time, date, and location of the pipe inspected. A copy of the video inspection shall be furnished to the Engineer for review and approval prior to acceptance of the work.

The finished liner may be rejected if not continuous over its entire length and free from visual defects such as foreign inclusions, joint separation, cracks, insufficient liner thickness, material loss, roughness, deformation, dry spots, pinholes, insufficient bonding to host pipe, delamination, or other material or installation deficiencies as described herein.

Remedies for rejection of liner - In the event the first post inspection of the installation reveals defects in localized areas of the liner pipe (comprising less than 20 percent of the pipe length) the localized defects shall be repaired as specified by the manufacturer. Where defects occur on 20 percent or more of the pipe length the defects shall be repaired, however, the Contractor will not

be allowed to continue with his methodology of installation and/or the liner system used until he can demonstrate to the Engineer that he has remedied his operations to a sufficient level of quality as determined by the Engineer. All such remedial efforts shall be at the Contractor's expense. Further failure(s) to perform a proper installation may result in the disallowance of the use of that liner system and an adjustment in the cost or non-payment of the failed installations depending on the severity of the failure.

In the event the first post installation inspection is not conducted until all or most of the locations in the contract permitting this methodology have been performed, and the inspection reveals defects on 20 percent or more of the host pipe's length, then an adjustment in the cost or non-payment of the failed installations may be made by the Engineer depending on the severity of the failure.

In the event the second post inspection of the installation reveals defects, the Department may execute the option to call the construction bond to reimburse the Department for repairs or corrections, or to act as an adjustment in the cost, or both.

Measurement and Payment

Pre Installation Inspection will be measured and paid for as the actual number of linear feet of pipe inspected, including mobilization of equipment, and production of records incorporated into the completed and accepted work. Linear footage is not increased for multiple passes of inspection equipment through a length of pipe.

Pipe Rehabilitation will be measured and paid for as the actual number of linear feet of pipe for the size, and method that has been incorporated into the completed and accepted work. Note: At locations shown in the Contract where multiple methods are permitted, the Contractor may select any of the methods specified, however, if only one method is specified, this will be the only method permitted at that location. This price shall include post installation inspection, cleaning and preparation of the host pipe, furnishing and installing the liner, lateral reconnection, coupling and expansion devices, annular cement grout, design (if necessary) and shop drawing preparation, furnishing and installing liner and all components of the liner system, capturing any discharges or releases during installation or curing operations, furnishing any documentation or fees required for effluent or condensate disposal, all testing and sampling including furnishing reports and pre and post installation video inspections, waste disposal costs, excavation, sheeting, shoring, disposing of surplus and unsuitable material; backfilling and backfill material; compaction, restoring existing surfaces, and clearing debris and obstructions.

De-Watering will be measured and paid in units of each as the actual number of water diversions or bypasses required to complete pipe rehabilitation work. Each instance of *De-Watering* paid includes de-watering for pre-inspection, installation, post inspections, and remediation (if necessary). All materials, equipment, labor, or other resources required to de-watering a site shall be incidental to the unit cost for *De-Watering*.

Grouting the annular space between the liner and the host pipe is incidental to the *Pipe Rehabilitation* pay item when the liner is a type that does not fit snugly against the host pipe. Otherwise grouting the voids in the soil around the host pipe is not included in the scope of pipe

lining described in this special provision and will be paid for as found elsewhere in this contract.

Payment will be made under:

Pay Item	**Pay Unit**
Pre Installation Inspection	Linear Foot
(Size) Pipe Rehabilitation CIPP Liner	Linear Foot
(Size) Pipe Rehabilitation Fold & Form Liner	Linear Foot
(Size) Pipe Rehabilitation Solid Wall Thermoplastic Slip Liner	Linear Foot
(Size) Pipe Rehabilitation Corrugated Thermoplastic Slip Liner	Linear Foot
(Size) Pipe Rehabilitation Spiral Wound Liner	Linear Foot
(Size) Pipe Rehabilitation Cementitious / Geopolymer Spray Liner	Linear Foot
(Size) Pipe Rehabilitation Spray Liner – Other	Linear Foot
(Size) Pipe Rehabilitation Smooth Wall Steel Slip Liner	Linear Foot
De-Watering	Each

Project Special Provisions
Erosion Control

STABILIZATION REQUIREMENTS:
(1-21-2025)

Stabilization for this project shall comply with the time frame guidelines as specified by the NCG-010000 general construction permit issued by the North Carolina Department of Environmental Quality Division of Energy, Mineral and Land Resources. Temporary or permanent ground cover stabilization shall occur within the following time frames from the last land-disturbing activity:

- Perimeter dikes, swales, ditches, and perimeter slopes shall be stabilized within 7 calendar days.
- High Quality Water (HQW) Zones shall be stabilized within 7 calendar days.
- Slopes steeper than 3:1 shall be stabilized within 7 calendar days.
    - If slopes are 10 ft. or less in length and are not steeper than 2:1, 14 days are allowed.
- Slopes 3:1 to 4:1 shall be stabilized within 14 calendar days.
    - 7 days for slopes greater than 50 ft. in length and with slopes steeper than 4:1.
    - 7 days for perimeter dikes, swales, ditches, perimeter slopes, and HQW Zones.
- Areas with slopes flatter than 4:1 shall be stabilized within 14 calendar days.
    - 7 days for perimeter dikes, swales, ditches, perimeter slopes, and HQW Zones.

The stabilization timeframe for High Quality Water (HQW) Zones shall be 7 calendar days with no exceptions for slope grades or lengths. High Quality Water Zones (HQW) Zones are defined by North Carolina Administrative Code 15A NCAC 04A.0105 (25). Temporary and permanent ground cover stabilization shall be achieved in accordance with the provisions in this contract and as directed.

SEEDING AND MULCHING: **(West)**

The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below. During periods of overlapping dates, the kind of seed to be used shall be determined. All rates are in pounds per acre.

Shoulder and Median Areas

August 1 - June 1		**May 1 - September 1**	
20#	Kentucky Bluegrass	20#	Kentucky Bluegrass
75#	Hard Fescue	75#	Hard Fescue
25#	Rye Grain	10#	German or Browntop Millet
500#	Fertilizer	500#	Fertilizer
4000#	Limestone	4000#	Limestone

Areas Beyond the Mowing Pattern, Waste and Borrow Areas:

August 1 - June 1	**May 1 - September 1**

100#	Tall Fescue	100#	Tall Fescue
15#	Kentucky Bluegrass	15#	Kentucky Bluegrass
30#	Hard Fescue	30#	Hard Fescue
25#	Rye Grain	10#	German or Browntop Millet
500#	Fertilizer	500#	Fertilizer
4000#	Limestone	4000#	Limestone

Approved Tall Fescue Cultivars

06 Dust	Escalade	Kalahari	Serengeti
2nd Millennium	Essential	Kitty Hawk 2000	Shelby
3rd Millennium	Evergreen 2	Legitimate	Shenandoah III
Avenger	Faith	Lexington	Shenandoah Elite
Bar Fa	Falcon IV	LifeGuard	Sheridan
Barlexas	Falson NG	LSD	Sidewinder
Barlexas II	Falcon V	Magellan	Signia
Barrera	Fat Cat	Masterpiece	Silver Hawk
Barrington	Fesnova	Millennium SRP	Skyline
Barrobusto	Fidelity	Monet	Solara
Barvado	Finelawn Elite	Mustang 4	Southern Choice II
Biltmore	Finelawn Xpress	Naturally Green	Speedway
Bingo	Finesse II	Ninja 2	Spyder LS
Bizem	Firebird	Ol' Glory	Sunset Gold
Black Tail	Firecracker LS	Padre	Taccoa
Blackwatch	Firenza	Patagonia	Tahoe II
Blade Runner II	Five Point	Pedigree	Talladega
Bonsai	Focus	Picasso	Tanzania
Braveheart	Forte	Piedmont	Temple
Bravo	Garrison	Plantation	Terrano
Bullseye	Gazelle II	Proseeds 5301	Thor
Cannavaro	GLX Aced	Prospect	Thunderstruck
Catalyst	Gold Medallion	Quest	Titanium LS
Cayenne	Grande 3	RainDance	Titan LTD
Cezanne RZ	Greenbrooks	Raptor II	Tracer
Chipper	Greenkeeper	Rebel IV	Traverse SRP
Cochise IV	Gremlin	Rebel Exeda	Trio
Constitution	Greystone	Rebel Sentry	Tulsa Time
Corgi	Guardian 21	Regenerate	Turbo
Corona	Guardian 41	Regiment II	Turbo RZ
Coyote	Hemi	Rembrandt	Tuxedo
Cumberland	Honky Tonk	Rendition	Ultimate
Darlington	Hot Rod	Reunion	Umbrella
DaVinci	Hunter	Rhambler 2 SRP	Van Gogh
Desire	Inferno	Riverside	Venture
Diablo	Integrity	RNP	Watchdog
Dominion	Jaguar 3	Rocket	Wolfpack II

Dynamic	Jamboree	Saltillo	Xtremegreen
Dynasty	Justice	Scorpion	

Approved Kentucky Bluegrass Cultivars:

4-Season	Blue Coat	Granite	Prosperity
Alexa II	Blue Note	Hampton	Quantum Leap
America	Blue Velvet	Harmonie	Rambo
Apollo	Boomerang	Impact	Rhapsody
Aramintha	Cabernet	Jackrabbit	Rhythm
Arcadia	Champagne	Jefferson	Royce
Aries	Champlain	Juliet	Rubicon
Armada	Chicago II	Keeneland	Rugby II
Arrow	Corsair	Langara	Rush
Arrowhead	Courtyard	Legend	Shariz
Aura	Dauntless	Liberator	Showcase
Avid	Delight	Lunar	Skye
Award	Diva	Madison	Solar Eclipse
Awesome	Dynamo	Mazama	Sonoma
Bandera	Eagleton	Mercury	Sorbonne
Barduke	Emblem	Merlot	Starburst
Barnique	Empire	Midnight	Sudden Impact
Baron	Envicta	Midnight II	Thermal Blue
Baroness	Everest	Moon Shadow	Total Eclipse
Barrister	Everglade	Mystere	Touche
Barvette HGT	Excursion	Nu Destiny	Tsunami
Bedazzled	Freedom II	NuChicago	Valor
Belissimo	Freedon III	NuGlade	Washington
Bewitched	Front Page	Oasis	Zedor
Beyond	Futurity	Odyssey	Zinfandel
Blackjack	Gaelic	Perfection	
Bluebank	Ginney II	Pinot	
Blueberry	Gladstone	Princeton 105	

Approved Hard Fescue Cultivars:

Aurora Gold	Firefly	Nordic	Rhino
Azay Blue	Gladiator	Oxford	Scaldis II
Beacon	Granite	Predator	Spartan II
Berkshire	Heron	Quatro	Stonehenge
Beudin	Jetty	Reliant II	Sword
Blueray	Minimus	Reliant IV	Warwick
Chariot	Miser	Rescue 911	
Eureka II	Nancock	Resolute	

On cut and fill slopes 2:1 or steeper add 20# Sericea Lespedeza January 1 - December 31.

Fertilizer shall be 10-20-20 analysis. A different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis and as directed.

Native Grass Seeding And Mulching (West)

Native Grass Seeding and Mulching shall be performed on the disturbed areas of wetlands and riparian areas, and adjacent to Stream Relocation and/or trout stream construction within a 50 foot zone on both sides of the stream or depression, measured from top of stream bank or center of depression. The stream bank of the stream relocation shall be seeded by a method that does not alter the typical cross section of the stream bank. Native Grass Seeding and Mulching shall also be performed in the permanent soil reinforcement mat section of preformed scour holes, and in other areas as directed.

The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below. During periods of overlapping dates, the kind of seed to be used shall be determined. All rates are in pounds per acre.

August 1 - June 1		**May 1 – September 1**	
18#	Creeping Red Fescue	18#	Creeping Red Fescue
8#	Big Bluestem	8#	Big Bluestem
6#	Indiangrass	6#	Indiangrass
4#	Switchgrass	4#	Switchgrass
35#	Rye Grain	25#	German or Browntop Millet
500#	Fertilizer	500#	Fertilizer
4000#	Limestone	4000#	Limestone

Approved Creeping Red Fescue Cultivars:

Aberdeen Boreal Epic Cindy Lou

Fertilizer shall be 10-20-20 analysis. A different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis and as directed.

Native Grass Seeding and Mulching shall be performed in accordance with Section 1660 of the *Standard Specifications* and vegetative cover sufficient to restrain erosion shall be installed immediately following grade establishment.

Measurement and Payment

Native Grass *Seeding and Mulching* will be measured and paid for in accordance with Article 1660-8 of the *Standard Specifications*.

TEMPORARY SEEDING:

Fertilizer shall be the same analysis as specified for *Seeding and Mulching* and applied at the rate of 400 pounds and seeded at the rate of 50 pounds per acre. German Millet, or Browntop Millet shall be used in summer months and rye grain during the remainder of the year. The Engineer will determine the exact dates for using each kind of seed.

FERTILIZER TOPDRESSING:

Fertilizer used for topdressing shall be 16-8-8 grade and shall be applied at the rate of 500 pounds per acre. A different analysis of fertilizer may be used provided the 2-1-1 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as 16-8-8 analysis and as directed.

SUPPLEMENTAL SEEDING:

The kinds of seed and proportions shall be the same as specified for *Seeding and Mulching*, and the rate of application may vary from 25# to 75# per acre. The actual rate per acre will be determined prior to the time of topdressing and the Contractor will be notified in writing of the rate per acre, total quantity needed, and areas on which to apply the supplemental seed. Minimum tillage equipment, consisting of a sod seeder shall be used for incorporating seed into the soil as to prevent disturbance of existing vegetation. A clodbuster (ball and chain) may be used where degree of slope prevents the use of a sod seeder.

MOWING:

The minimum mowing height on this project shall be six inches.

MINIMIZE REMOVAL OF VEGETATION:

The Contractor shall minimize removal of vegetation within project limits to the maximum extent practicable. Vegetation along stream banks and adjacent to other jurisdictional resources outside the construction limits shall only be removed upon approval of Engineer. No additional payment will be made for this minimization work.

CONSTRUCTION MATERIALS MANAGEMENT
(3-19-19) (rev. 04-27-20)

Description

The requirements set forth shall be adhered to in order to meet the applicable materials handling requirements of the NCG010000 permit. Structural controls installed to manage construction materials stored or used on site shall be shown on the E&SC Plan. Requirements for handling materials on construction sites shall be as follows:

Polyacrylamides (PAMS) and Flocculants

Polyacrylamides (PAMS) and flocculants shall be stored in leak-proof containers that are kept under storm-resistant cover or surrounded by secondary containment structures designed to protect adjacent surface waters. PAMS or other flocculants used shall be selected from the NC DWR List of Approved PAMS/Flocculants The concentration of PAMS and other flocculants used shall not exceed those specified in the NC DWR List of Approved PAMS/Flocculants and in accordance with the manufacturer's instructions. The NC DWR List of Approved PAMS/Flocculants is available at:

https://files.nc.gov/ncdeq/Water+Quality/Environmental+Sciences/ATU/PAM8_30_18.pdf

Equipment Fluids

Fuels, lubricants, coolants, and hydraulic fluids, and other petroleum products shall be handled and disposed of in a manner so as not to enter surface or ground waters and in accordance with applicable state and federal regulations. Equipment used on the site must be operated and maintained properly to prevent discharge of fluids. Equipment, vehicle, and other wash waters shall not be discharged into E&SC basins or other E&SC devices. Alternative controls should be provided such that there is no discharge of soaps, solvents, or detergents.

Waste Materials

Construction materials and land clearing waste shall be disposed of in accordance with North Carolina General Statutes, Chapter 130A, Article 9 - Solid Waste Management, and rules governing the disposal of solid waste (15A NCAC 13B). Areas dedicated for managing construction material and land clearing waste shall be at least 50 feet away from storm drain inlets and surface waters unless it can be shown that no other alternatives are reasonably available. Paint and other liquid construction material waste shall not be dumped into storm drains. Paint and other liquid construction waste washouts should be located at least 50 feet away from storm drain inlets unless there is no alternative. Other options are to install lined washouts or use portable, removable bags or bins. Hazardous or toxic waste shall be managed in accordance with the federal Resource Conservation and Recovery Act (RCRA) and NC Hazardous Waste Rules at 15A NCAC, Subchapter 13A. Litter and sanitary waste shall be managed in a manner to prevent it from entering jurisdictional waters and shall be disposed of offsite.

Herbicide, Pesticide, and Rodenticides

Herbicide, pesticide, and rodenticides shall be stored and applied in accordance with the Federal Insecticide, Fungicide, and Rodenticide Act, North Carolina Pesticide Law of 1971 and labeling restrictions.

Concrete Materials

Concrete materials onsite, including excess concrete, must be controlled and managed to avoid contact with surface waters, wetlands or buffers. No concrete or cement slurry shall be discharged from the site. (Note that discharges from onsite concrete plants require coverage under a separate

NPDES permit – NCG140000.) Concrete wash water shall be managed in accordance with the *Concrete Washout Structure* provision. Concrete slurry shall be managed and disposed of in accordance with *NCDOT DGS and HOS DCAR Distribution of Class A Residuals Statewide* (Permit No. WQ0035749). Any hardened concrete residue will be disposed of, or recycled on site, in accordance with state solid waste regulations.

Earthen Material Stock Piles

Earthen material stock piles shall be located at least 50 feet away from storm drain inlets and surface waters unless it can be shown that no other alternatives are reasonably available.

Measurement and Payment

Conditions set within the *Construction Materials Management* provision are incidental to the project for which no direct compensation will be made.

WASTE AND BORROW SOURCES:
(2-16-11) (Rev. 3-17-22)

Payment for temporary erosion control measures, except those made necessary by the Contractor's own negligence or for his own convenience, will be paid for at the appropriate contract unit price for the devices or measures utilized in borrow sources and waste areas.

No additional payment will be made for erosion control devices or permanent seeding and mulching in any commercial borrow or waste pit. All erosion and sediment control practices that may be required on a commercial borrow or waste site will be done at the Contractor's expense.

All offsite Staging Areas, Borrow and Waste sites shall be in accordance with "Borrow and Waste Site Reclamation Procedures for Contracted Projects" located at:

https://connect.ncdot.gov/resources/roadside/FieldOperationsDocuments/Contract%20Reclamation%20Procedures.pdf

All forms and documents referenced in the "Borrow and Waste Site Reclamation Procedures for Contracted Projects" shall be included with the reclamation plans for offsite staging areas, and borrow and waste sites.

TEMPORARY DIVERSION:

This work consists of installation, maintenance, and cleanout of *Temporary Diversions* in accordance with Section 1630 of the *Standard Specifications*. The quantity of excavation for installation and cleanout will be measured and paid for as *Silt Excavation* in accordance with Article 1630-3 of the *Standard Specifications*.

SAFETY FENCE AND JURISDICTIONAL FLAGGING:

Description

Safety Fence shall consist of furnishing materials, installing and maintaining polyethylene or polypropylene fence along the outside riparian buffer, wetland, or water boundary, or other boundaries located within the construction corridor to mark the areas that have been approved to infringe within the buffer, wetland, endangered vegetation, culturally sensitive areas or water. The fence shall be installed prior to any land disturbing activities.

Interior boundaries for jurisdictional areas noted above shall be delineated by stakes and highly visible flagging.

Jurisdictional boundaries at staging areas, waste sites, or borrow pits, whether considered outside or interior boundaries shall be delineated by stakes and highly visible flagging.

Materials

(A) Safety Fencing

Polyethylene or polypropylene fence shall be a highly visible preconstructed safety fence approved by the Engineer. The fence material shall have an ultraviolet coating.

Either wood posts or steel posts may be used. Wood posts shall be hardwood with a wedge or pencil tip at one end, and shall be at least 5 ft. in length with a minimum nominal 2" x 2" cross section. Steel posts shall be at least 5 ft. in length, and have a minimum weight of 0.85 lb/ft of length.

(B) Boundary Flagging

Wooden stakes shall be 4 feet in length with a minimum nominal 3/4" x 1-3/4" cross section. The flagging shall be at least 1" in width. The flagging material shall be vinyl and shall be orange in color and highly visible.

Construction Methods

No additional clearing and grubbing is anticipated for the installation of this fence. The fence shall be erected to conform to the general contour of the ground.

(A) Safety Fencing

Posts shall be set at a maximum spacing of 10 ft., maintained in a vertical position and hand set or set with a post driver. Posts shall be installed a minimum of 2 ft. into the ground. If hand set, all backfill material shall be thoroughly tamped. Wood posts may be sharpened to a dull point if power driven. Posts damaged by power driving shall be removed and replaced prior to final

acceptance. The tops of all wood posts shall be cut at a 30-degree angle. The wood posts may, at the option of the Contractor, be cut at this angle either before or after the posts are erected.

The fence geotextile shall be attached to the wood posts with one 2" galvanized wire staple across each cable or to the steel posts with wire or other acceptable means.

Place construction stakes to establish the location of the safety fence in accordance with Article 105-9 or Article 801-1 of the *Standard Specifications.* No direct pay will be made for the staking of the safety fence. All stakeouts for safety fence shall be considered incidental to the work being paid for as "Construction Surveying", except that where there is no pay item for construction surveying, all safety fence stakeout will be performed by state forces.

The Contractor shall be required to maintain the safety fence in a satisfactory condition for the duration of the project as determined by the Engineer.

(B) Boundary Flagging

Boundary flagging delineation of interior boundaries shall consist of wooden stakes on 25 feet maximum intervals with highly visible orange flagging attached. Stakes shall be installed a minimum of 6" into the ground. Interior boundaries may be staked on a tangent that runs parallel to buffer but must not encroach on the buffer at any location. Interior boundaries of hand clearing shall be identified with a different colored flagging to distinguish it from mechanized clearing.

Boundary flagging delineation of interior boundaries will be placed in accordance with Article 105-9 or Article 801-1 of the *Standard Specifications*. No direct pay will be made for delineation of the interior boundaries. This delineation will be considered incidental to the work being paid for as *Construction Surveying,* except that where there is no pay item or construction surveying the cost of boundary flagging delineation shall be included in the unit prices bid for the various items in the contract. Installation for delineation of all jurisdictional boundaries at staging areas, waste sites, or borrow pits shall consist of wooden stakes on 25 feet maximum intervals with highly visible orange flagging attached. Stakes shall be installed a minimum of 6" into the ground. Additional flagging may be placed on overhanging vegetation to enhance visibility but does not substitute for installation of stakes.

Installation of boundary flagging for delineation of all jurisdictional boundaries at staging areas, waste sites, or borrow pits shall be performed in accordance with Subarticle 230-4(B)(5) or Subarticle 802-2(F) of the *Standard Specifications*. No direct pay will be made for this delineation, as the cost of same shall be included in the unit prices bid for the various items in the contract.

The Contractor shall be required to maintain alternative stakes and highly visible flagging in a satisfactory condition for the duration of the project as determined by the Engineer.

Measurement and Payment

Safety Fence will be measured and paid as the actual number of linear feet of polyethylene or polypropylene fence installed in place and accepted. Such payment will be full compensation

including but not limited to furnishing and installing fence geotextile with necessary posts and post bracing, staples, tie wires, tools, equipment and incidentals necessary to complete this work.

Payment will be made under:

Pay Item	**Pay Unit**
Safety Fence	Linear Foot

PERMANENT SOIL REINFORCEMENT MAT:
9-1-2011 (Rev. 8-16-24)

Description

This work consists of furnishing and placing permanent soil reinforcement mat (PSRM), of the type specified, over previously prepared areas at locations shown on the plans and as directed by the Engineer.

Materials

The product shall be a permanent soil reinforcement mat constructed of synthetic stabilized, non-biodegradable synthetic fibers processed to form a rigid permanent three-dimensional structure to promote soil stability in combination with vegetation under hydraulic stresses. Organic biodegradable fibers (such as straw, coir, excelsior or blends thereof) may also incorporated into the PSRM, evenly distributed throughout the mat. PSRMs utilizing organic fibers shall have a bottom and top UV stabilized netting stitched together with UV stabilized thread to retain the organic fibers. All PSRMs shall meet the following minimum physical properties:

Property	**Test Method**	**Value**	**Unit**
Thickness	ASTM D6525	$\geq$0.25	in
Tensile Strength (MD)	ASTM D6818	225	lbs/ft
Tensile Strength (TD)	ASTM D6818	175	lbs/ft
Vegetation Establishment (Min)	ASTM D7322	250	%
UV Stability[1]	ASTM D4355	$\geq$80	%

[1]ASTM D4355 Tensile Strength and % strength retention of material after 1,000 hours of exposure.

PSRM shall also meet the minimum performance values by type as shown in the table below:

Property	**Test Method**	**Type 1**	**Type 2**	**Type 3**	**Type 4**	**Type 5**	**Unit**
Maximum Permissible Shear Stress (Unvegetated)	ASTM 6460	2.25	2.5	3.0	3.25	N/A	lb/ft^2
Maximum Permissible Shear Stress (Vegetated)	ASTM 6460	6.0	8.0	10.0	12.0	16.0	lb/ft^2

Maximum Allowable Velocity (Vegetated)	ASTM 6460	8.0	12	16.0	20.0	24.0	ft/s

Staples shall be used as anchors. Provide staples to meet Article 1060-8 of the *Standard Specifications*.

Construction Methods

All areas to be protected with the PSRM shall be brought to final grade and prepared in accordance with Section 1660 of the *Standard Specifications*. The surface of the soil shall be smooth, firm, stable and free of rocks, clods, roots or other obstructions that would prevent the mat from lying in direct contact with the soil surface. Preserve the required line, grade and cross section of the area covered. Unroll the PSRM in the direction of the flow of water and apply without stretching so that it will lie smoothly but loosely on the soil surface. Bury the up-channel or top of slope end of each piece of PSRM in a narrow trench at least 6 inches deep and tamp firmly. Where one roll of matting ends and a second-roll begins, overlap the end of the upper roll over the beginning of the second roll so there is a 6 inch overlap. Install staple checks 4 inches on center and every 30 feet longitudinally in the matting or as directed by the Engineer. Fold over and bury matting to the full depth of the trench, close and tamp firmly. Overlap matting at least 4 inches where 2 or more widths of matting are laid side by side.

Place staples across matting at ends, junctions and check trenches approximately 10 inches apart. Place staples along the outer edges and down the center of each strip of matting 3 feet apart. Place staples along all lapped edges 10 inches apart. Install product with netting and biodegradable fibers on the top side if present. Trenching and stapling shall fit individual cut or fill slope conditions and conform to manufacturer's installation recommendations for the type specified. Any conflict between the manufacturer's installation recommendations and this special provision will be resolved by the more stringent measures being required.

Apply all soil amendments and one-half of the seed in accordance with Section 1660 of the Standard Specifications of the types at the rates specified in the contract prior to installation of the PSRM. For PSRMs that do not contain biodegradable fibers, apply 3/4 inch to 1 inch loose, friable topsoil uniformly over the PSRM and gently work to incorporate into the structure of the PSRM completely filling the voids until the level of soil is at the top of the PSRM. Apply the remainder of the seed and gently work into the surface of the topsoil in-fill and mulch. For all other PSRMs, apply 3/4 inch to 1 inch of loose, friable topsoil uniformly over the PSRM and gently work to create a suitable seed bed. Apply the remainder of the seed and gently work into the surface of the topsoil. At the sole discretion of the Engineer, topsoil may be omitted for PSRMs containing biodegradable fibers. All seed should be applied prior to installation of PSRM if topsoil is omitted and will not need to be mulched.

Measurement and Payment

Permanent Soil Reinforcement Mat, Type __ will be measured and paid for as the actual number of square yards measured along the surface of the ground over which permanent soil reinforcement mat of the specified type is installed and accepted. Overlaps will not be included in the

measurement and will be considered as incidental to the work. Such price and payment shall be full compensation for all work covered by this provision, including, but not limited to, furnishing all materials, labor, equipment and incidentals necessary to apply topsoil and install the PSRM.

Payment will be made under:

Pay Item	Pay Unit
Permanent Soil Reinforcement Mat, Type __	Square Yard

IMPERVIOUS DIKE:
(9-9-11)(Rev. 11-15-22)

Description

This work consists of furnishing, installing, maintaining, pumping and removing an *Impervious Dike* for the purpose of diverting normal stream flow around the construction site. The Contractor shall construct an impervious dike in such a manner approved by the Engineer. The impervious dike shall not permit seepage of water into the construction site or contribute to siltation of the stream. The impervious dike shall be constructed of an acceptable material in the locations noted on the plans or as directed by the Engineer.

Materials

Acceptable materials shall include but not be limited to sheet piles, sandbags, and/or the placement of an acceptable size stone lined with polypropylene or other impervious geotextile.

Earth material shall not be used to construct an impervious dike when it is in direct contact with the stream unless vegetation can be established before contact with the stream takes place.

Construction Methods

Where impervious dikes are shown on the plans and used to dewater or lower the water elevation, construct in accordance with Article 410-4 and 410-5.

Measurement and Payment

Impervious Dike will be measured and paid as the actual number of linear feet of impervious dike(s) constructed, measured in place from end to end of each separate installation that has been completed and accepted by the Engineer. Such price and payment will be full compensation for all work including but not limited to furnishing materials, construction, maintenance, pumping and removal of the impervious dike.

Payment will be made under:

Pay Item	Pay Unit
Impervious Dike	Linear Foot

FLOATING TURBIDITY CURTAIN:

Description

This work consists of furnishing a *Floating Turbidity Curtain* to deter silt suspension and movement of silt particles during construction. The floating turbidity curtain shall be constructed at locations as directed.

Materials

The curtain material shall be made of a tightly woven nylon, plastic or other non-deteriorating material meeting the following specifications:

Property	Value
Grab tensile strength	*md-370 lbs *cd-250 lbs
Mullen burst stength	480 psi
Trapezoid tear strength	*md-100 lbs *cd-60 lbs
Apparent opening size	70 US standard sieve
Percent open area	4% permittivity 0.28 sec-1

*md - machine direction
*cd - cross machine direction

In the event that more than one width of fabric is required, a 6" overlap of the material shall also be required.

The curtain material shall be supported by a flotation material having over 29 lbs/ft buoyancy. The floating curtain shall have a 5/16" galvanized chain as ballast and dual 5/16" galvanized wire ropes with a heavy vinyl coating as load lines.

Construction Methods

The Contractor shall maintain the *Floating Turbidity Curtain* in a satisfactory condition until its removal is requested by the Engineer. The curtain shall extend to the bottom of the jurisdictional resource. Anchor the curtain according to manufacturer recommendations.

Measurement and Payment

Floating Turbidity Curtain will be measured and paid for as the actual number of square yards of curtain furnished as specified and accepted. Such price and payment will be full compensation for the work as described in this section including but not limited to furnishing all materials, tools, equipment, and all incidentals necessary to complete the work.

Payment will be made under:

Pay Item	**Pay Unit**
Floating Turbidity Curtain	Square Yard

CONCRETE WASHOUT:
(10-22-15)(Rev. 4-15-25)

Description

Concrete washouts are impermeable enclosures, above or below grade, to contain concrete wastewater and associated concrete mix from cleaning of ready-mix trucks, drums, pumps, tools or other equipment. Concrete washouts must collect and retain all the concrete washout water and solids, so that this material does not migrate to surface waters or into the ground water. These enclosures are not intended for concrete waste not associated with washout operations.

Acceptable concrete washouts may include constructed earthen structures, above or below ground, or commercially available devices designed specifically to capture concrete wash water.

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	**Section**
Temporary Silt Fence	1605

Safety Fence shall meet the specifications as provided elsewhere in this contract.

Geomembrane basin liner shall consist of a minimum 10 mil thick polypropylene or polyethylene geomembrane.

Construction Methods

Build an enclosed earthen berm or excavate to form an enclosure in accordance with the details and as directed by the Engineer near the project entrance(s) or at location(s) of concrete operations. Structures shall be constructed a minimum of 50 feet from drainage conveyances or jurisdictional streams or wetlands. Alternate structure designs or plans for management of concrete washout may be submitted for review and approval by the Engineer. Include in the alternate plan the method used to retain, treat and dispose of the concrete washout wastewater generated within the project limits and in accordance with the minimum setback requirements.

Install temporary silt fence around the perimeter of the structure enclosure in accordance with the details and as directed by the Engineer if the structure is not located in an area where existing erosion and sedimentation control devices are capable of containing stormwater runoff.

Post a sign with the words “Concrete Washout” in close proximity of the concrete washout area, so it is clearly visible to site personnel. Install safety fence as directed by the Engineer for visibility to construction traffic.

Install prefabricated concrete washouts, designed specifically to capture concrete wash water, at locations of additional concrete pouring operations. Acceptable systems may include geotextile lined containers, vinyl or plastic containers or roll-off containers, with or without filter bags with a minimum functional holding capacity of 36 cubic feet (1.33 cubic yards). Submit prefabricated concrete washout system for approval by the Engineer prior to installation. Place prefabricated concrete washout devices to a minimum 50 foot setback from drainage conveyances and jurisdictional streams and wetlands. If the minimum setback cannot be achieved, provide secondary containment to prevent accidental release of wastewater from reaching drainage conveyances or streams.

Prefabricated concrete washouts must be clearly and visibly labeled as such, either by the manufacturer on the product itself, or by a sign with the words "Concrete Washout" in close proximity of the concrete washout area so it is clearly visible to site personnel.

Maintenance and Removal

Maintain the concrete washout structure(s) to provide adequate holding capacity plus a minimum freeboard of 12 inches. Remove and dispose of hardened concrete and return the structure to a functional condition after reaching 75% capacity. Inspect concrete washout structures for damage to liner or structure to maintain functionality.

Maintain prefabricated concrete washout systems per manufacturer's recommendations. Inspect concrete washout structures for damage to linings or structure and repair or replace as necessary.

Remove the concrete washout structures and sign upon project completion. Grade the area to match the existing topography and permanently seed and mulch area. Dispose of prefabricated concrete washout structures according to state or local waste regulations.

Measurement and Payment

Concrete Washout Structure will be measured and paid per each enclosure installed in accordance with the details in the plans. If alternate plans or details are approved, those structures will also be paid for per each approved and installed structure. Such price and payment will be full compensation for all work including, but not limited to, furnishing all materials, labor, equipment, signage, slurry solidification and incidentals necessary to construct, maintain and remove *Concrete Washout Structure* and dispose of residual concrete washout wastewater and concrete solids.

Prefabricated Concrete Washout will be measured and paid per each system installed in accordance with the manufacturer's recommendations. Such price and payment will be full compensation for all work including, but not limited to, furnishing all materials, labor, equipment, signage, slurry solidification and incidentals necessary to install, maintain and remove *Prefabricated Concrete Washout*, and dispose of residual concrete washout wastewater and concrete solids.

Temporary Silt Fence will be measured and paid for in accordance with Article 1605-5 of the *Standard Specifications*.

Temporary Silt Fence will be measured and paid for in accordance with Article 1605-5 of the *Standard Specifications*.

Safety Fence shall be measured and paid for as provided elsewhere in this contract.

No measurement will be made for over excavation or stockpiling or other items necessary to complete this work.

Payment will be made under:

Pay Item	Pay Unit
Concrete Washout Structure	Each
Prefabricated Concrete Washout	Each

LITTER REMOVAL (MOWING AREAS ONLY):
(07-19-22)

Description

This work consists of the pickup, removal, and disposal of litter from roadsides within the construction project prior to mowing operations.

Construction Methods

Provide labor, equipment and materials necessary for the pickup and removal of litter from non-construction sources and the disposal of same into state approved landfills. The Contractor shall abide by all ordinances, laws and regulations regarding disposal of litter and recycling of eligible materials. Wastes generated from construction activities shall be managed as provided elsewhere in the contract. Litter items may consist of any item not considered normal to the right-of-way, including but not limited to, varied sizes of bottles, cans, paper, tires, tire pieces, lumber, vehicle parts, building supplies, metals, household furnishings, cardboard, plastics, ladders, brush and other items not considered normal to the right of way. Litter removal shall be performed in designated areas within five days prior to any mowing operations and as directed. Designated areas shall include vegetated medians and shoulders within the project limits including all interchange ramps and other areas to be mown. Designated areas may be omitted for litter removal by the Engineer due to safety concerns.

The Contractor shall provide adequate personnel and materials to collect and remove litter. The Contractor shall be responsible for locating and utilizing approved local landfills and recycling facilities. Refer to Section 105-27 of the *Standard Specifications* for potential hazardous materials. All collected litter shall be containerized immediately and kept off the traveled portions of the roadway, shoulders, and rights-of-way (including paved shoulders). All collected litter that is small enough to be placed in a bag shall be bagged immediately. All collected litter that is too

large for a bag shall be placed into a vehicle. Extended storage or stockpiling of collected litter and recyclables will not be permitted.

The Contractor's personnel shall dispose of any litter in a landfill approved by North Carolina Division of Waste Management. The Contractor will not be allowed to use NCDOT accounts at the landfills/recycling centers nor be allowed to dispose of the litter in NCDOT trash containers on any NCDOT property.

The Contractor shall report online the number of bags of litter and any recycling on the NCDOT Litter Management Website on the date of the pickup at the following website:

https://apps.ncdot.gov/LM

An access code ('Pickup Key') for the online reporting portal may be obtained via emailing the Roadside Environmental Unit Litter Management Section at ncdot.clr@ncdot.gov. The Contractor shall request access to the litter removal reporting website prior to starting initial litter collection operations.

Measurement and Payment

The quantity of litter removal to be performed will be affected by the actual conditions that occur during construction of the project. The quantity of litter removal may be increased, decreased, or eliminated entirely as directed. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

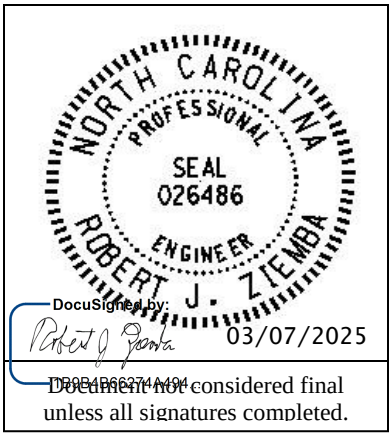
Manual Litter Removal will be measured and paid as the actual number of man hours each worker spends picking up litter. Such price and payment will be full compensation for all litter removal work covered by *Litter Removal*, including, but not limited to, furnishing all materials, labor, equipment, transport, reporting, and incidentals necessary to accomplish the work.

Litter Disposal will be measured and paid for by the actual number of tons of litter collected and properly disposed of at a state approved landfill. Such price and payment will be full compensation for all fees, labor, transport, and incidentals necessary to dispose of collected litter associated with *Litter Removal*.

All traffic control necessary to provide a safe work area for *Litter Removal* shall be paid for as specified elsewhere in the contract.

Payment will be made under:

Pay Item	Pay Unit
Manual Litter Removal	MHR
Litter Disposal	TON



BR-0015

Project Special Provisions
(Version 24.1)

Prepared By: IOU
7-Mar-25

Contents

1. 2024 STANDARD SPECIFICATIONS FOR ROADS & STRUCTURES

The 2024 Standard Specifications are revised as follows:

1.1. ELECTRICAL JUNCTION BOXES (1091-5)

Page 10-209, revise paragraphs beginning on line 26 to read "Provide electrical junction boxes with covers of the type and size indicated by the contract or plans for the termination of conduits. Boxes and covers shall meet all requirements and specifications of ANSI/SCTE 77 2017. Structural load tests shall meet the Tier 15 application type."

Page 10-209, line 28, revise title of section 1091-5(B) from “Polymer Concrete (PC) Junction Boxes” to “Polymer Concrete (PC), Composite, and Thermoplastic Junction Boxes”.

Page 10-209, revise paragraphs beginning on line 29 through line 41 to read “For PC junction boxes, use polymer concrete material made of an aggregate consisting of sand and gravel bound together with a polymer and reinforced with glass strands to fabricate box and cover components.
Provide junction boxes which have bolted covers and open bottoms. Provide vertical extensions of 6 inches to 12 inches as required by project provisions.
Provide the required logo on the cover. Provide at least two size 3/8 inch diameter hex head stainless steel cover bolts to match inserts in the box. Provide pull slot(s) with stainless steel pin(s). Bodies of junction boxes shall be a single piece.
Polymer concrete, composite, and thermoplastic junction boxes are not required to be listed electrical devices.”

1.2. TRAFFIC SIGNAL ACTIVATION (1700-4)

Page 17-4, revise paragraph beginning on line 42 through line 46 to read “Prior to placing signal in the steady (stop-and-go) mode, the signal should be placed in yellow-red flashing mode for up to 7 days or as directed by the Engineer. Yellow-red flashing mode differs from the red-red flashing mode shown in the signal plan. Yellow-red flash mode includes flashing the yellow signal indications on all main street through movements while flashing the red signal indications on all side street signal heads and any left turn heads on the main street. The signal should not be placed in the steady (stop-and-go) mode on a Saturday or Sunday without prior approval from the Engineer. Do not place the signal in steady (stop-and-go) mode until inspected and without prior approval of the Engineer.”

2. SIGNAL HEADS

2.1. MATERIALS

A. General:

Fabricate vehicle signal head housings and end caps from die-cast aluminum. Provide visor mounting screws, door latches, and hinge pins fabricated from stainless steel. Provide interior screws, fasteners, and metal parts fabricated from stainless steel.

Fabricate tunnel and traditional visors from sheet aluminum.

Paint all surfaces inside and outside of signal housings and doors. Paint outside surfaces of tunnel and traditional visors, wire outlet bodies, wire entrance fitting brackets and end caps when supplied as components of messenger cable mounting assemblies, pole and pedestal mounting assemblies, and pedestrian pushbutton housings. Have electrostatically-applied, fused-polyester

paint in highway yellow (Federal Standard 595C, Color Chip Number 13538) a minimum of 2.5 to 3.5 mils thick. Do not apply paint to the latching hardware, rigid vehicle signal head mounting brackets for mast-arm attachments, messenger cable hanger components or balance adjuster components.

Have the interior surfaces of tunnel and traditional visors painted an alkyd urea black synthetic baking enamel with a minimum gloss reflectance and meeting the requirements of MIL-E-10169, "Enamel Heat Resisting, Instrument Black."

Where required, provide polycarbonate signal heads and visors that comply with the provisions pertaining to the aluminum signal heads listed on the QPL with the following exceptions:

Fabricate signal head housings, end caps, and visors from virgin polycarbonate material. Provide UV stabilized polycarbonate plastic with a minimum thickness of 0.1 ± 0.01 inches that is highway yellow (Federal Standard 595C, Color Chip 13538). Ensure the color is incorporated into the plastic material before molding the signal head housings and end caps. Ensure the plastic formulation provides the following physical properties in the assembly (tests may be performed on separately molded specimens):

Test	**Required**	**Method**
Specific Gravity	1.17 minimum	ASTM D 792
Flammability	Self-extinguishing	ASTM D 635
Tensile Strength, yield, PSI	8500 minimum	ASTM D 638
Izod impact strength, ft-lb/in [notched, 1/8 inch]	12 minimum	ASTM D 256

For pole mounting, provide side of pole mounting assemblies with framework and all other hardware necessary to make complete, watertight connections of the signal heads to the poles and pedestals. Fabricate the mounting assemblies and frames from aluminum with all necessary hardware, screws, washers, etc. to be stainless steel. Provide mounting fittings that match the positive locking device on the signal head with the serrations integrally cast into the brackets. Provide upper and lower pole plates that have a 1 ¼-inch vertical conduit entrance hubs with the hubs capped on the lower plate and 1 ½-inch horizontal hubs. Ensure that the assemblies provide rigid attachments to poles and pedestals so as to allow no twisting or swaying of the signal heads. Ensure that all raceways are free of sharp edges and protrusions, and can accommodate a minimum of ten Number 14 AWG conductors.

For pedestal mounting, provide a post-top slipfitter mounting assembly that matches the positive locking device on the signal head with serrations integrally cast into the slipfitter. Provide stainless steel hardware, screws, washers, etc. Provide a minimum of six 3/8 X 3/4-inch long square head bolts for attachment to pedestal. Provide a center post for multi-way slipfitters.

For light emitting diode (LED) traffic signal modules, provide the following requirements for inclusion on the Department's Qualified Products List for traffic signal equipment.

1. Sample submittal,
2. Third-party independent laboratory testing results for each submitted module with evidence of testing and conformance with all of the Design Qualification Testing specified in section 6.4 of each of the following Institute of Transportation Engineers (ITE) specifications:
    - Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Circular Signal Supplement

- Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement

(Note: The Department currently recognizes two approved independent testing laboratories. They are Intertek ETL Semko and Light Metrics, Incorporated with Garwood Laboratories. Independent laboratory tests from other laboratories may be considered as part of the QPL submittal at the discretion of the Department,

3. Evidence of conformance with the requirements of these specifications,
4. A manufacturer's warranty statement in accordance with the required warranty, and
5. Submittal of manufacturer's design and production documentation for the model, including but not limited to, electrical schematics, electronic component values, proprietary part numbers, bill of materials, and production electrical and photometric test parameters.
6. Evidence of approval of the product to bear the Intertek ETL Verified product label for LED traffic signal modules.

Ensure LED traffic signal modules meet the performance requirements for the minimum period of 15 years, provide a written warranty against defects in materials and workmanship for the modules for a period of 15 years after installation of the modules. During the warranty period, the manufacturer must provide new replacement modules within 45 days of receipt of modules that have failed at no cost to the State. Repaired or refurbished modules may not be used to fulfill the manufacturer's warranty obligations. Provide manufacturer's warranty documentation to the Department during evaluation of product for inclusion on Qualified Products List (QPL).

B. Vehicle Signal Heads:

Comply with the ITE standard "Vehicle Traffic Control Signal Heads". Provide housings with provisions for attaching backplates.

Provide visors that are 10 inches in length for 12-inch vehicle signal heads.

Provide a termination block with one empty terminal for field wiring for each indication plus one empty terminal for the neutral conductor. Have all signal sections wired to the termination block. Provide barriers between the terminals that have terminal screws with a minimum Number 8 thread size and that will accommodate and secure spade lugs sized for a Number 10 terminal screw.

Mount termination blocks in the yellow signal head sections on all in-line vehicle signal heads. Mount the termination block in the red section on five-section vehicle signal heads.

Furnish vehicle signal head interconnecting brackets. Provide one-piece aluminum brackets less than 4.5 inches in height and with no threaded pipe connections. Provide hand holes on the bottom of the brackets to aid in installing wires to the signal heads. Lower brackets that carry no wires and are used only for connecting the bottom signal sections together may be flat in construction.

For messenger cable mounting, provide messenger cable hangers, wire outlet bodies, balance adjusters, bottom caps, wire entrance fitting brackets, and all other hardware necessary to make complete, watertight connections of the vehicle signal heads to the messenger cable. Fabricate messenger cable hanger components, wire outlet bodies and balance adjuster components from stainless steel or malleable iron galvanized in accordance with ASTM A153 (Class A) or ASTM A123. Provide serrated rings made of aluminum. Provide messenger cable hangers with U-bolt clamps. Fabricate washers, screws, hex-head bolts and associated nuts, clevis pins, cotter pins, U-bolt clamps and nuts from stainless steel.

For mast-arm mounting, provide rigid vehicle signal head mounting brackets and all other hardware necessary to make complete, watertight connections of the vehicle signal heads to the mast

arms and to provide a means for vertically adjusting the vehicle signal heads to proper alignment. Fabricate the mounting assemblies from aluminum, and provide serrated rings made of aluminum. Provide stainless steel cable attachment assemblies to secure the brackets to the mast arms. Ensure all fastening hardware and fasteners are fabricated from stainless steel.

Provide LED vehicular traffic signal modules (hereafter referred to as modules) that consist of an assembly that uses LEDs as the light source in lieu of an incandescent lamp for use in traffic signal sections. Use LEDs that are aluminum indium gallium phosphorus (AlInGaP) technology for red and yellow indications and indium gallium nitride (InGaN) for green indications. Install the ultra bright type LEDs that are rated for 100,000 hours of continuous operation from -40°F to +165°F. Design modules to have a minimum useful life of 15 years and to meet all parameters of this specification during this period of useful life.

For the modules, provide spade terminals crimped to the lead wires and sized for a #10 screw connection to the existing terminal block in a standard signal head. Do not provide other types of crimped terminals with a spade adapter.

Ensure the power supply is integral to the module assembly. On the back of the module, permanently mark the date of manufacture (month & year) or some other method of identifying date of manufacture.

Tint the red, yellow and green lenses to correspond with the wavelength (chromaticity) of the LED. Transparent tinting films are unacceptable. Provide a lens that is integral to the unit with a smooth outer surface.

1. LED Circular Signal Modules:

Provide modules in the following configurations: 12-inch circular sections. All makes and models of LED modules purchased for use on the State Highway System shall appear on the current NCDOT Traffic Signal Qualified Products List (QPL).

Provide the manufacturer's model number and the product number (assigned by the Department) for each module that appears on the 2024 or most recent Qualified Products List. In addition, provide manufacturer's certification in accordance with Article 106-3 of the *Standard Specifications,* that each module meets or exceeds the ITE "Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Circular Signal Supplement" dated June 27, 2005 (hereafter referred to as VTCSH Circular Supplement) and other requirements stated in this specification.

Provide modules that meet the following requirements when tested under the procedures outlined in the VTCSH Circular Supplement:

Module Type	Max. Wattage at 165° F	Nominal Wattage at 77° F
12-inch red circular	17	11
12-inch green circular	15	15

For yellow circular signal modules, provide modules tested under the procedures outlined in the VTCSH Circular Supplement to insure power required at 77° F is 22 Watts or less for the 12-inch circular module.

Note: Use a wattmeter having an accuracy of ±1% to measure the nominal wattage and maximum wattage of a circular traffic signal module. Power may also be derived from voltage, current and power factor measurements.

2. LED Arrow Signal Modules

Provide 12-inch omnidirectional arrow signal modules. All makes and models of LED modules purchased for use on the State Highway System shall appear on the current NCDOT Traffic Signal Qualified Products List (QPL).

Provide the manufacturer's model number and the product number (assigned by the Department) for each module that appears on the 2024 or most recent Qualified Products List. In addition, provide manufacturer's certification in accordance with Article 106-3 of the *Standard Specifications,* that each module meets or exceeds the requirements for 12-inch omnidirectional modules specified in the ITE "Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement" dated July 1, 2007 (hereafter referred to as VTCSH Arrow Supplement) and other requirements stated in this specification.

Provide modules that meet the following requirements when tested under the procedures outlined in the VTCSH Arrow Supplement:

Module Type	Max. Wattage at 165° F	Nominal Wattage at 77° F
12-inch red arrow	12	9
12-inch green arrow	11	11

For yellow arrow signal modules, provide modules tested under the procedures outlined in the VTCSH Arrow Supplement to insure power required at 77° F is 12 Watts or less.

Note: Use a wattmeter having an accuracy of ±1% to measure the nominal wattage and maximum wattage of an arrow traffic signal module. Power may also be derived from voltage, current and power factor measurements.

C. Louvers:

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

Provide louvers made from sheet aluminum. Paint the louvers alkyd urea black synthetic baked enamel with a minimum gloss reflectance and meeting the requirements of MIL-E-10169, "Enamel Heat Resisting, Instrument Black."

Ensure that the louvers have a 0-degree horizontal viewing angle. Provide a minimum of 5 vanes.

Provide geometrically programmed louvers that are made from aluminum with stainless steel hardware and designed to fit inside a 12" signal visor. Ensure geometrically programmed louvers are field adjustable to provide horizontal or vertical viewing control with a minimum of 6 different viewing angles. Provide a .050" aluminum full circle tunnel visor if the geometrically programmed louver is supplied with a visor.

3. CONTROLLERS WITH CABINETS

3.1. MATERIALS – TYPE 2070LX CONTROLLERS

Furnish model 2070LX controller units that conform to CALTRANS *Transportation Electrical Equipment Specifications* (TEES) (dated March 12, 2009, plus Errata 1 dated January 21, 2010 and Errata 2 dated December 5, 2014) except as required herein.

The Department will provide software at the beginning of the burning-in period. Contractor shall give 5 working days notice before needing software. Program software provided by the Department.

Provide model 2070LX controllers with Linux kernel 2.6.18 or higher and device drivers, composed of the unit chassis and at a minimum the following modules and assemblies:

- MODEL 2070-1C, CPU Module, Single Board, with 8Mb Datakey (blue in color)
- MODEL 2070-2E+, Field I/O Module (FI/O)
  - Note: Configure the Field I/O Module to disable both the External WDT Shunt/Toggle Switch and SP3 (SP3 active indicator is "off")
- MODEL 2070-3B, Front Panel Module (FP), Display B (8x40)
- MODEL 2070-4A, Power Supply Module, 10 AMP

Provide a Board Support Package (BSP) to the state and to any specified applications software manufacturer when requested by the state to facilitate the porting of application software.

3.2. MATERIALS – GENERAL CABINETS

Provide a moisture resistant coating on all circuit boards.

Provide one 20 mm diameter radial lead UL-recognized metal oxide varistor (MOV) between each load switch field terminal and equipment ground. Electrical performance is outlined below.

PROPERTIES OF MOV SURGE PROTECTOR	
Maximum Continuous Applied Voltage at 185° F	150 VAC (RMS) 200 VDC
Maximum Peak 8x20µs Current at 185° F	6500 A
Maximum Energy Rating at 185° F	80 J
Voltage Range 1 mA DC Test at 77° F	212-268 V
Max. Clamping Voltage 8x20µs, 100A at 77° F	395 V
Typical Capacitance (1 MHz) at 77° F	1600 pF

Provide a power line surge protector that is a two-stage device that will allow connection of the radio frequency interference filter between the stages of the device. Ensure that a maximum continuous current is at least 10A at 120V. Ensure that the device can withstand a minimum of 20 peak surge current occurrences at 20,000A for an 8x20 microsecond waveform. Provide a maximum clamp voltage of 395V at 20,000A with a nominal series inductance of 200µh. Ensure that the voltage does not exceed 395V. Provide devices that comply with the following:

Frequency (Hz)	Minimum Insertion Loss (dB)
60	0
10,000	30
50,000	55
100,000	50
500,000	50
2,000,000	60
5,000,000	40
10,000,000	20
20,000,000	25

3.3. MATERIALS – TYPE 170E CABINETS

A. Type 170 E Cabinets General:

Conform to the city of Los Angeles' Specification No. 54-053-08, *Traffic Signal Cabinet Assembly Specification* (dated July 2008), except as required herein.

Furnish model 332 base mounted cabinets configured for 8 vehicle phases, 4 pedestrian phases, and 6 overlaps. When overlaps are required, provide auxiliary output files for the overlaps. Do not reassign load switches to accommodate overlaps unless shown on electrical details.

Provide model 200 load switches, model 222 loop detector sensors, model 252 AC isolators, and model 242 DC isolators according to the electrical details. As a minimum, provide one (1) model 2018 conflict monitor, one (1) model 206L power supply unit, two (2) model 204 flashers, one (1) DC isolator (located in slot I14), and four (4) model 430 flash transfer relays (provide seven (7) model 430 flash transfer relays if auxiliary output file is installed) with each cabinet.

B. Type 170 E Cabinet Electrical Requirements:

Provide a cabinet assembly designed to ensure that upon leaving any cabinet switch or conflict monitor initiated flashing operation, the controller starts up in the programmed start up phases and start up interval.

Furnish two sets of non-fading cabinet wiring diagrams and schematics in a paper envelope or container and placed in the cabinet drawer.

All AC+ power is subject to radio frequency signal suppression.

Provide surge suppression in the cabinet for each type of cabinet device. Provide surge protection for the full capacity of the cabinet input file. Provide surge suppression devices that operate properly over a temperature range of -40º F to +185º F. Ensure the surge suppression devices provide both common and differential modes of protection.

Provide a pluggable power line surge protector that is installed on the back of the PDA (power distribution assembly) chassis to filter and absorb power line noise and switching transients. Ensure the device incorporates LEDs for failure indication and provides a dry relay contact closure for the purpose of remote sensing. Ensure the device meets the following specifications:

- Peak Surge Current (Single pulse, 8x20µs)……..20,000A
- Occurrences (8x20µs waveform)……..10 minimum @ 20,000A

- Maximum Clamp Voltage…….395VAC
- Operating Current……..15 amps
- Response Time……..< 5 nanoseconds

Provide a loop surge suppressor for each set of loop terminals in the cabinet. Ensure the device meets the following specifications:

- Peak Surge Current (6 times, 8x20µs)
  - (Differential Mode)…….400A
  - (Common Mode)……1,000A
- Occurrences (8x20µs waveform)……..500 min @ 200A
- Maximum Clamp Voltage
  - (Differential Mode @400A)……35V
  - (Common Mode @1,000A)…….35V
- Response Time……..< 5 nanoseconds
- Maximum Capacitance……..35 pF

Provide a data communications surge suppressor for each communications line entering or leaving the cabinet. Ensure the device meets the following specifications:

- Peak Surge Current (Single pulse, 8x20µs)……..10,000A
- Occurrences (8x20µs waveform)……..100 min @ 2,000A
- Maximum Clamp Voltage…….Rated for equipment protected
- Response Time……..< 1 nanosecond
- Maximum Capacitance…….1,500 pF
- Maximum Series Resistance…….15Ω

Provide a DC signal surge suppressor for each DC input channel in the cabinet. Ensure the device meets the following specifications:

- Peak Surge Current (Single pulse, 8x20µs)……..10,000A
- Occurrences (8x20µs waveform)……..100 @ 2,000A
- Maximum Clamp Voltage…….30V
- Response Time……..< 1 nanosecond

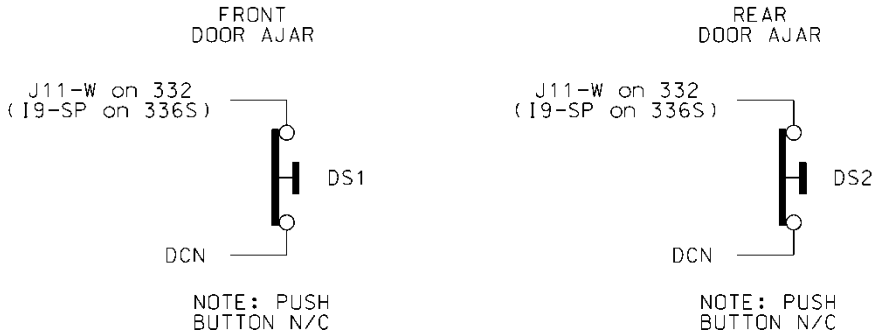
Provide a 120 VAC signal surge suppressor for each AC+ interconnect signal input. Ensure the device meets the following specifications:

- Peak Surge Current (Single pulse, 8x20µs)……..20,000A
- Maximum Clamp Voltage……350VAC
- Response Time……..< 200 nanoseconds
- Discharge Voltage……<200 Volts @ 1,000A
- Insulation Resistance…….≥100 MΩ

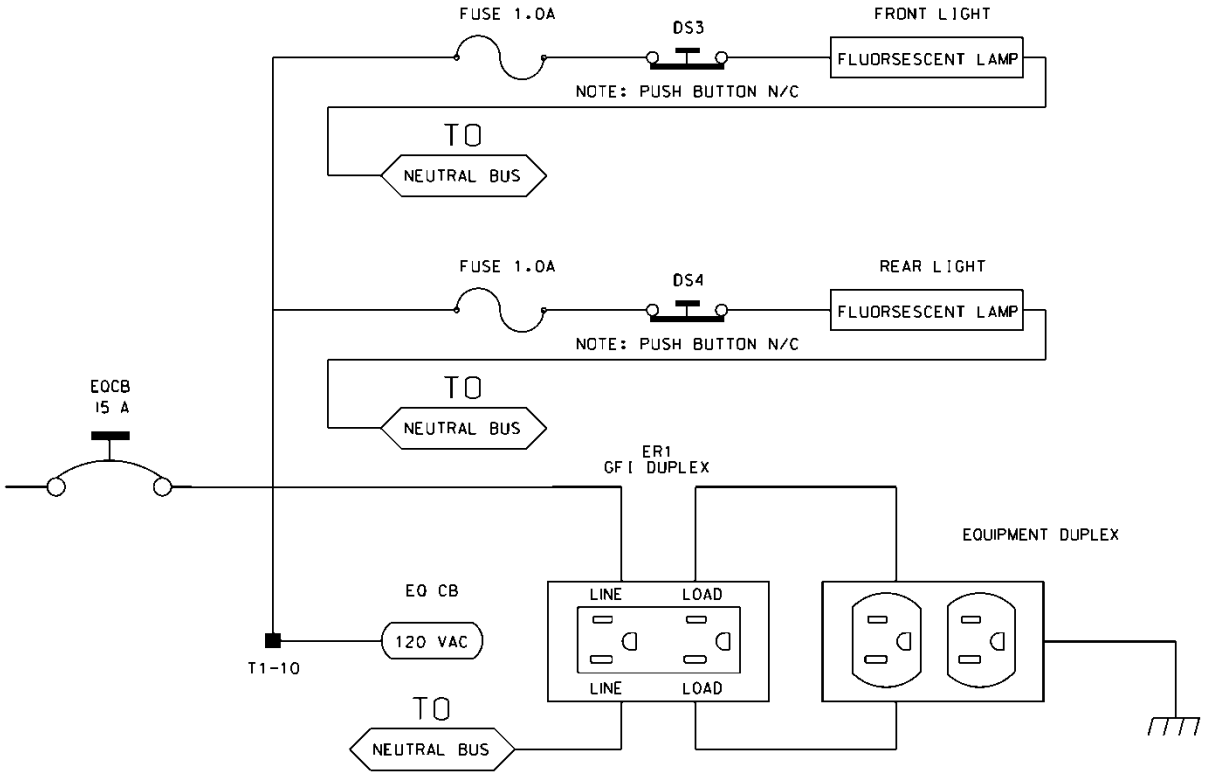
Provide conductors for surge protection wiring that are of sufficient size (ampacity) to withstand maximum overcurrents which could occur before protective device thresholds are attained and current flow is interrupted.

If additional surge protected power outlets are needed to accommodate fiber transceivers, modems, etc., install a UL listed, industrial, heavy-duty type power outlet strip with a minimum rating of 15 A / 125 VAC, 60 Hz. Provide a strip that has a minimum of 3 grounded outlets. Ensure the power outlet strip plugs into one of the controller unit receptacles located on the rear of the PDA. Ensure power outlet strip is mounted securely; provide strain relief if necessary.

Provide a door switch in the front and a door switch in the rear of the cabinet that will provide the controller unit with a Door Ajar alarm when either the front or the rear door is open. Ensure the door switches apply DC ground to the Input File when either the front door or the rear door is open.



Furnish a fluorescent fixture in the rear across the top of the cabinet and another fluorescent fixture in the front across the top of the cabinet at a minimum. Ensure that the fixtures provide sufficient light to illuminate all terminals, labels, switches, and devices in the cabinet. Conveniently locate the fixtures so as not to interfere with a technician's ability to perform work on any devices or terminals in the cabinet. Provide a protective diffuser to cover exposed bulbs. Install 16 watt T-4 lamps in the fluorescent fixtures. Provide a door switch to provide power to each fixture when the respective door is open. Wire the fluorescent fixtures to the 15 amp ECB (equipment circuit breaker).



Furnish a police panel with a police panel door. Ensure that the police panel door permits access to the police panel when the main door is closed. Ensure that no rainwater can enter the cabinet even with the police panel door open. Provide a police panel door hinged on the right side as viewed from the front. Provide a police panel door lock that is keyed to a standard police/fire call box key. In addition to the requirements of LA Specification No. 54-053-08, provide the police panel with a toggle switch connected to switch the intersection operation between normal stop-and-go operation (AUTO) and manual operation (MANUAL). Ensure that manual control can be implemented using inputs and software such that the controller provides full programmed clearance times for the yellow clearance and red clearance for each phase while under manual control.

Provide a 1/4-inch locking phone jack in the police panel for a hand control to manually control the intersection. Provide sufficient room in the police panel for storage of a hand control and cord.

For model 332 base mounted cabinets, ensure terminals J14-E and J14-K are wired together on the rear of the Input File. Connect TB9-12 (J14 Common) on the Input Panel to T1-2 (AC-) on the rear of the PDA.

Provide detector test switches mounted at the top of the cabinet rack or other convenient location which may be used to place a call on each of eight phases based on the chart below. Provide three positions for each switch: On (place call), Off (normal detector operation), and Momentary On (place momentary call and return to normal detector operation after switch is released). Ensure that the switches are located such that the technician can read the controller display and observe the intersection.

Connect detector test switches for cabinets as follows:

332 Cabinet	
Detector Call Switches	**Terminals**
Phase 1	I1-W
Phase 2	I4-W
Phase 3	I5-W
Phase 4	I8-W
Phase 5	J1-W
Phase 6	J4-W
Phase 7	J5-W
Phase 8	J8-W

Provide the PCB 28/56 connector for the conflict monitor unit (CMU) with 28 independent contacts per side, dual-sided with 0.156 inch contact centers. Provide the PCB 28/56 connector contacts with solder eyelet terminations. Ensure all connections to the PCB 28/56 connector are soldered to the solder eyelet terminations.

Ensure that all cabinets have the CMU connector wired according to the 332 cabinet connector pin assignments (include all wires for auxiliary output file connection). Wire pins 13, 16, R, and U of the CMU connector to a separate 4 pin plug, P1, as shown below. Provide a second plug, P2, which will mate with P1 and is wired to the auxiliary output file as shown below. Provide an additional plug, P3, which will mate with P1 and is wired to the pedestrian yellow circuits as shown below. When no auxiliary output file is installed in the cabinet, provide wires for the green and yellow inputs for channels 11, 12, 17, and 18, the red inputs for channels 17 and 18, and the wires for the P2 plug. Terminate the two-foot wires with ring type lugs, insulated, and bundled for optional use.

	P1		P2		P3	
PIN	**FUNCTION**	**CONN TO**	**FUNCTION**	**CONN TO**	**FUNCTION**	**CONN TO**
1	CH-9G	CMU-13	OLA-GRN	A123	2P-YEL	114
2	CH-9Y	CMU-16	OLA-YEL	A122	4P-YEL	105
3	CH-10G	CMU-R	OLB-GRN	A126	6P-YEL	120
4	CH-10Y	CMU-U	OLB-YEL	A125	8P-YEL	111

Do not provide the P20 terminal assembly (red monitor board) or red interface ribbon cable as specified in LA Specification No. 54-053-08.

Provide a P20 connector that mates with and is compatible with the red interface connector mounted on the front of the conflict monitor. Ensure that the P20 connector and the red interface connector on the conflict monitor are center polarized to ensure proper connection. Ensure that removal of the P20 connector will cause the conflict monitor to recognize a latching fault condition and place the cabinet into flashing operation.

Wire the P20 connector to the output file and auxiliary output file using 22 AWG stranded wires. Ensure the length of these wires is a minimum of 42 inches in length. Provide a durable braided sleeve around the wires to organize and protect the wires.

Wire the P20 connector to the traffic signal red displays to provide inputs to the conflict monitor as shown below. Ensure the pedestrian Don't Walk circuits are wired to channels 13 through 16 of the P20 connector. When no auxiliary output file is installed in the cabinet, provide wires for channels 9 through 12 reds. Provide a wire for special function 1. Terminate the unused wires with ring type lugs, insulated, and bundled for optional use.

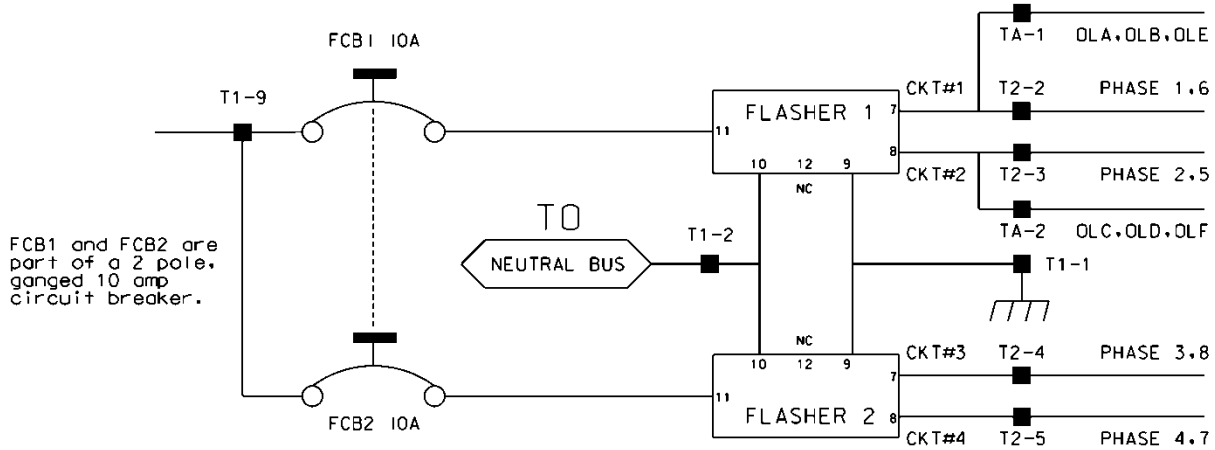
	P20 Connector				
PIN	**FUNCTION**	**CONN TO**	**PIN**	**FUNCTION**	**CONN TO**
1	Channel 15 Red	119	2	Channel 16 Red	110
3	Channel 14 Red	104	4	Chassis GND	01-9
5	Channel 13 Red	113	6	N/C	
7	Channel 12 Red	AUX 101	8	Spec Function 1	
9	Channel 10 Red	AUX 124	10	Channel 11 Red	AUX 114
11	Channel 9 Red	AUX 121	12	Channel 8 Red	107
13	Channel 7 Red	122	14	Channel 6 Red	134
15	Channel 5 Red	131	16	Channel 4 Red	101
17	Channel 3 Red	116	18	Channel 2 Red	128
19	Channel 1 Red	125	20	Red Enable	01-14

Ensure the controller unit outputs to the auxiliary output file are pre-wired to the C5 connector. When no auxiliary output file is installed in the cabinet, connect the C5 connector to a storage socket located on the Input Panel or on the rear of the PDA.

Do not wire pin 12 of the load switch sockets.

In addition to the requirements of LA Specification No. 54-053-08, ensure relay K1 on the Power Distribution Assembly (PDA) is a four pole relay and K2 on the PDA is a two pole relay.

Provide a two pole, ganged circuit breaker for the flash bus circuit. Ensure the flash bus circuit breaker is an inverse time circuit breaker rated for 10 amps at 120 VAC with a minimum of 10,000 RMS symmetrical amperes short circuit current rating. Do not provide the auxiliary switch feature on the flash bus circuit breaker. Ensure the ganged flash bus circuit breaker is certified by the circuit breaker manufacturer to provide gang tripping operation.



Ensure auxiliary output files are wired as follows:

AUXILIARY OUTPUT FILE TERMINAL BLOCK TA ASSIGNMENTS	
POSITION	**FUNCTION**
1	Flasher Unit #1, Circuit 1/FTR1 (OLA, OLB)/FTR3 (OLE)
2	Flasher Unit #1, Circuit 2/FTR2 (OLC, OLD)/FTR3 (OLF)
3	Flash Transfer Relay Coils
4	AC -
5	Power Circuit 5
6	Power Circuit 5
7	Equipment Ground Bus
8	NC

Provide four spare load resistors mounted in each cabinet. Ensure each load resistor is rated as shown in the table below. Wire one side of each load resistor to AC-. Connect the other side of each resistor to a separate terminal on a four (4) position terminal block. Mount the load resistors and terminal block either inside the back of Output File No. 1 or on the upper area of the Service Panel.

ACCEPTABLE LOAD RESISTOR VALUES	
VALUE (ohms)	**WATTAGE**
1.5K – 1.9 K	25W (min)
2.0K – 3.0K	10W (min)

Provide Model 200 load switches, Model 204 flashers, Model 242 DC isolators, Model 252 AC isolators, and Model 206L power supply units that conform to CALTRANS' "*Transportation Electrical Equipment Specifications*" dated March 12, 2009 with Erratum 1.

C. Type 170 E Cabinet Physical Requirements:

Do not mold, cast, or scribe the name "City of Los Angeles" on the outside of the cabinet door as specified in LA Specification No. 54-053-08. Do not provide a Communications Terminal Panel as specified in LA Specification No. 54-053-08. Do not provide terminal block TBB on the Service Panel. Do not provide Cabinet Verification Test Program software or associated test jigs as specified in LA Specification No. 54-053-08.

Furnish unpainted, natural, aluminum cabinet shells. Ensure that all non-aluminum hardware on the cabinet is stainless steel or a Department approved non-corrosive alternate.

Ensure the lifting eyes, gasket channels, police panel, and all supports welded to the enclosure and doors are fabricated from 0.125 inch minimum thickness aluminum sheet and meet the same standards as the cabinet and doors.

Provide front and rear doors with latching handles that allow padlocking in the closed position. Furnish 0.75 inch minimum diameter stainless steel handles with a minimum 0.5 inch shank. Place the padlocking attachment at 4.0 inches from the handle shank center to clear the lock and key. Provide an additional 4.0 inches minimum gripping length.

Provide Corbin #2 locks on the front and rear doors. Provide one (1) Corbin #2 and one (1) police master key with each cabinet. Ensure main door locks allow removal of keys in the locked position only.

Provide a surge protection panel with 16 loop surge protection devices and designed to allow sufficient free space for wire connection/disconnection and surge protection device replacement. For model 332 cabinets, provide an additional 20 loop surge protection devices. Provide an additional two AC+ interconnect surge devices to protect one slot and eight DC surge protection devices to protect four slots. Provide no protection devices on slot I14.

For base mounted cabinets, mount surge protection panels on the left side of the cabinet as viewed from the rear. Attach each panel to the cabinet rack assembly using bolts and make it easily removable. Mount the surge protection devices in vertical rows on each panel and connect the devices to one side of 12 position, double row terminal blocks with #8 screws. For each surge protection panel, terminate all grounds from the surge protection devices on a copper equipment ground bus attached to the surge protection panel. Wire the terminals to the rear of a standard input file using spade lugs for input file protection.

Provide permanent labels that indicate the slot and the pins connected to each terminal that may be viewed from the rear cabinet door. Label and orient terminals so that each pair of inputs is next to each other. Indicate on the labeling the input file (I or J), the slot number (1-14) and the terminal pins of the input slots (either D & E for upper or J & K for lower).

Provide a minimum 14 x 16 inch pull out, hinged top shelf located immediately below controller mounting section of the cabinet. Ensure the shelf is designed to fully expose the table surface outside the controller at a height approximately even with the bottom of the controller. Ensure the shelf has a storage bin interior which is a minimum of 1 inch deep and approximately the same dimensions as the shelf. Provide an access to the storage area by lifting the hinged top of the shelf. Fabricate the shelf and slide from aluminum or stainless steel and ensure the assembly can support the 2070L controller plus 15 pounds of additional weight. Ensure shelf has a locking mechanism to secure it in the fully extended position and does not inhibit the removal of the 2070L controller or removal of cards inside the controller when fully extended. Provide a locking mechanism that is easily released when the shelf is to be returned to its non-use position directly under the controller.

D. Model 2018 Enhanced Conflict Monitor:

Furnish Model 2018 Enhanced Conflict Monitors that provide monitoring of 18 channels. Ensure each channel consists of a green, yellow, and red field signal input. Ensure that the conflict monitor meets or exceeds CALTRANS' Transportation Electrical Equipment Specifications dated March 12, 2009, with Erratum 1 (hereafter referred to as CALTRANS' 2009 TEES) for a model 210 monitor unit and other requirements stated in this specification.

Ensure the conflict monitor is provided with an 18 channel conflict programming card. Pin EE and Pin T of the conflict programming card shall be connected together. Pin 16 of the conflict programming card shall be floating. Ensure that the absence of the conflict programming card will cause the conflict monitor to trigger (enter into fault mode), and remain in the triggered state until the programming card is properly inserted and the conflict monitor is reset.

Provide a conflict monitor that incorporates LED indicators into the front panel to dynamically display the status of the monitor under normal conditions and to provide a comprehensive review of field inputs with monitor status under fault conditions. Ensure that the monitor indicates the channels that were active during a conflict condition and the channels that experienced a failure for all other per channel fault conditions detected. Ensure that these indications and the status of each channel are retained until the Conflict Monitor is reset. Furnish LED indicators for the following:

- AC Power (Green LED indicator)
- VDC Failed (Red LED indicator)
- WDT Error (Red LED indicator)
- Conflict (Red LED indicator)
- Red Fail (Red LED indicator)
- Dual Indication (Red LED indicator)
- Yellow/Clearance Failure (Red LED indicator)
- PCA/PC Ajar (Red LED indicator)
- Monitor Fail/Diagnostic Failure (Red LED indicator)
- 54 Channel Status Indicators (1 Red, 1 Yellow, and 1 Green LED indicator for each of the 18 channels)

Provide a switch to set the Red Fail fault timing. Ensure that when the switch is in the ON position the Red Fail fault timing value is set to 1350 +/- 150 ms (2018 mode). Ensure that when the switch is in the OFF position the Red Fail fault timing value is set to 850 +/- 150 ms (210 mode).

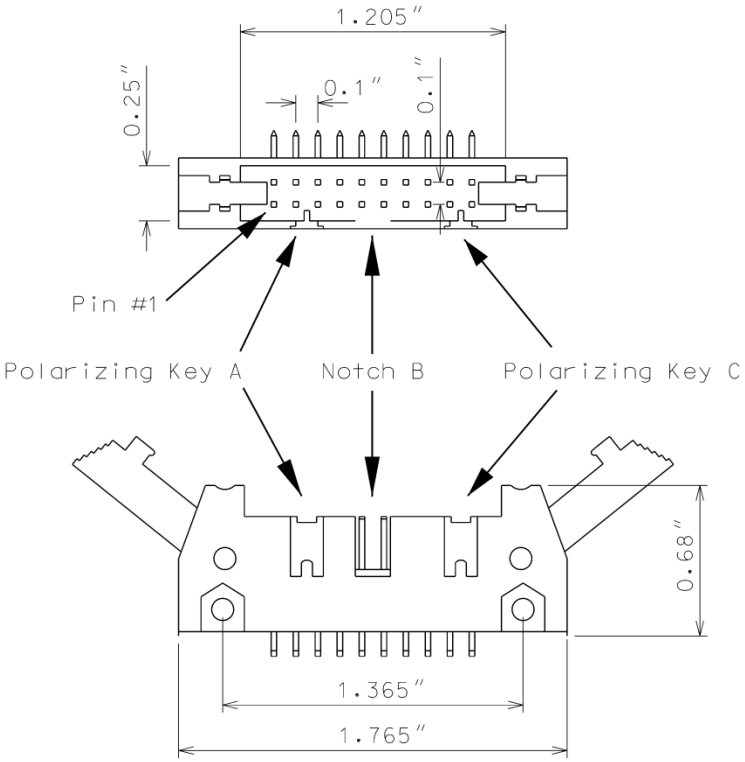
Provide a switch to set the Watchdog fault timing. Ensure that when the switch is in the ON position the Watchdog fault timing value is set to 1.0 +/- 0.1 s (2018 mode). Ensure that when the switch is in the OFF position the Watchdog fault timing value is set to 1.5 +/- 0.1 s (210 mode).

Provide a jumper or switch to set the AC line brown-out levels. Ensure that when the jumper is present or the switch is in the ON position the AC line dropout voltage threshold is 98 +/- 2 Vrms, the AC line restore voltage threshold is 103 +/- 2 Vrms, and the AC line brown-out timing value is set to 400 +/- 50ms (2018 mode). Ensure that when the jumper is not present or the switch is in the OFF position the AC line dropout voltage threshold is 92 +/- 2 Vrms, the AC line restore voltage threshold is 98 +/- 2 Vrms, and the AC line brown-out timing value is set to 80 +/- 17 ms (210 mode).

Provide a jumper or switch that will enable and disable the Watchdog Latch function. Ensure that when the jumper is not present or the switch is in the OFF position the Watchdog Latch function is disabled. In this mode of operation, a Watchdog fault will be reset following a power loss, brownout, or power interruption. Ensure that when the jumper is present or the switch is in the ON position the Watchdog Latch function is enabled. In this mode of operation, a Watchdog fault will be retained until a Reset command is issued.

Provide a jumper that will reverse the active polarity for pin #EE (output relay common). Ensure that when the jumper is not present pin #EE (output relay common) will be considered ‘Active’ at a voltage greater than 70 Vrms and ‘Not Active’ at a voltage less than 50 Vrms (Caltrans mode). Ensure that when the jumper is present pin #EE (output relay common) will be considered ‘Active’ at a voltage less than 50 Vrms and ‘Not Active’ at a voltage greater than 70 Vrms (Failsafe mode).

In addition to the connectors required by CALTRANS' 2009 TEES, provide the conflict monitor with a red interface connector mounted on the front of the monitor. Ensure the connector is a 20 pin, right angle, center polarized, male connector with latching clip locks and polarizing keys. Ensure the right angle solder tails are designed for a 0.062" thick printed circuit board. Keying of the connector shall be between pins 3 and 5, and between 17 and 19. Ensure the connector has two rows of pins with the odd numbered pins on one row and the even pins on the other row. Ensure the connector pin row spacing is 0.10" and pitch is 0.10". Ensure the mating length of the connector pins is 0.24". Ensure the pins are finished with gold plating 30µ" thick.



Ensure the red interface connector pins on the monitor have the following functions:

Pin #	Function	Pin #	Function
1	Channel 15 Red	2	Channel 16 Red
3	Channel 14 Red	4	Chassis Ground
5	Channel 13 Red	6	Special Function 2
7	Channel 12 Red	8	Special Function 1
9	Channel 10 Red	10	Channel 11 Red
11	Channel 9 Red	12	Channel 8 Red
13	Channel 7 Red	14	Channel 6 Red
15	Channel 5 Red	16	Channel 4 Red
17	Channel 3 Red	18	Channel 2 Red
19	Channel 1 Red	20	Red Enable

Ensure that removal of the P20 cable connector will cause the conflict monitor to recognize a latching fault condition and place the cabinet into flashing operation.

Provide Special Function 1 and Special Function 2 inputs to the unit which shall disable only Red Fail Monitoring when either input is sensed active. A Special Function input shall be sensed active when the input voltage exceeds 70 Vrms with a minimum duration of 550 ms. A Special Function input shall be sensed not active when the input voltage is less than 50 Vrms or the duration is less than 250 ms. A Special Function input is undefined by these specifications and may or may not be sensed active when the input voltage is between 50 Vrms and 70 Vrms or the duration is between 250 ms and 550 ms.

Ensure the conflict monitor recognizes field signal inputs for each channel that meet the following requirements:

- consider a Red input greater than 70 Vrms and with a duration of at least 500 ms as an “on” condition;
- consider a Red input less than 50 Vrms or with a duration of less than 200 ms as an “off” condition (no valid signal);
- consider a Red input between 50 Vrms and 70 Vrms or with a duration between 200 ms and 500 ms to be undefined by these specifications;
- consider a Green or Yellow input greater than 25 Vrms and with a duration of at least 500 ms as an “on” condition;
- consider a Green or Yellow input less than 15 Vrms or with a duration of less than 200 ms as an “off” condition; and
- consider a Green or Yellow input between 15 Vrms and 25 Vrms or with a duration between 200 ms and 500 ms to be undefined by these specifications.

Provide a conflict monitor that recognizes the faults specified by CALTRANS’ 2009 TEES and the following additional faults. Ensure the conflict monitor will trigger upon detection of a fault and will remain in the triggered (in fault mode) state until the unit is reset at the front panel or through the external remote reset input for the following failures:

1. **Red Monitoring or Absence of Any Indication (Red Failure):** A condition in which no “on” voltage signal is detected on any of the green, yellow, or red inputs to a given monitor channel. If a signal is not detected on at least one input (R, Y, or G) of a conflict monitor

channel for a period greater than 1000 ms when used with a 170 controller and 1500 ms when used with a 2070 controller, ensure monitor will trigger and put the intersection into flash. If the absence of any indication condition lasts less than 700 ms when used with a 170 controller and 1200 ms when used with a 2070 controller, ensure conflict monitor will not trigger. Red fail monitoring shall be enabled on a per channel basis by the use of switches located on the conflict monitor. Have red monitoring occur when all of the following input conditions are in effect:

a) Red Enable input to monitor is active (Red Enable voltages are "on" at greater than 70 Vrms, off at less than 50 Vrms, undefined between 50 and 70 Vrms), and

b) Neither Special Function 1 nor Special Function 2 inputs are active.

c) Pin #EE (output relay common) is not active

2. **Short/Missing Yellow Indication Fault (Clearance Error):** Yellow indication following a green is missing or shorter than 2.7 seconds (with ± 0.1-second accuracy). If a channel fails to detect an "on" signal at the Yellow input for a minimum of 2.7 seconds (± 0.1 second) following the detection of an "on" signal at a Green input for that channel, ensure that the monitor triggers and generates a clearance/short yellow error fault indication. Short/missing yellow (clearance) monitoring shall be enabled on a per channel basis by the use of switches located on the conflict monitor. This fault shall not occur when the channel is programmed for Yellow Inhibit, when the Red Enable signal is inactive or pin #EE (output relay common) is active.
3. **Dual Indications on the Same Channel:** In this condition, more than one indication (R,Y,G) is detected as "on" at the same time on the same channel. If dual indications are detected for a period greater than 500 ms, ensure that the conflict monitor triggers and displays the proper failure indication (Dual Ind fault). If this condition is detected for less than 200 ms, ensure that the monitor does not trigger. G-Y-R dual indication monitoring shall be enabled on a per channel basis by the use of switches located on the conflict monitor. G-Y dual indication monitoring shall be enabled for all channels by use of a switch located on the conflict monitor. This fault shall not occur when the Red Enable signal is inactive or pin #EE (output relay common) is active.
4. **Configuration Settings Change:** The configuration settings are comprised of (as a minimum) the permissive diode matrix, dual indication switches, yellow disable jumpers, any option switches, any option jumpers, and the Watchdog Enable switch. Ensure the conflict monitor compares the current configuration settings with the previous stored configuration settings on power-up, on reset, and periodically during operation. If any of the configuration settings are changed, ensure that the conflict monitor triggers and causes the program card indicator to flash. Ensure that configuration change faults are only reset by depressing and holding the front panel reset button for a minimum of three seconds. Ensure the external remote reset input does not reset configuration change faults.

Ensure the conflict monitor will trigger and the AC Power indicator will flash at a rate of 2 Hz ± 20% with a 50% duty cycle when the AC Line voltage falls below the "drop-out" level. Ensure the conflict monitor will resume normal operation when the AC Line voltage returns above the "restore" level. Ensure the AC Power indicator will remain illuminated when the AC voltage returns above the "restore" level. Should an AC Line power interruption occur while the monitor is in the fault mode, then upon restoration of AC Line power, the monitor will remain in the fault mode and the correct fault and channel indicators will be displayed.

Provide a flash interval of at least 6 seconds and at most 16 seconds in duration following a power-up, an AC Line interruption, or a brownout restore. Ensure the conflict monitor will suspend all fault monitoring functions, close the Output relay contacts, and flash the AC indicator at a rate of 4 Hz ± 20% with a 50% duty cycle during this interval. Ensure the termination of the flash interval after at least 6 seconds if the Watchdog input has made 5 transitions between the True and False state and the AC Line voltage is greater than the "restore" level. If the watchdog input has not made 5 transitions between the True and False state within 10 ± 0.5 seconds, the monitor shall enter a WDT error fault condition.

Ensure the conflict monitor will monitor an intersection with a minimum of four approaches using the four-section Flashing Yellow Arrow (FYA) vehicle traffic signal as outlined by the NCHRP 3-54 research project for protected-permissive left turn signal displays. Ensure the conflict monitor will operate in the FYA mode and FYAc (Compact) mode as specified below to monitor each channel pair for the following fault conditions: Conflict, Flash Rate Detection, Red Fail, Dual Indication, and Clearance. Provide a switch to select between the FYA mode and FYAc mode. Provide a switch to select each FYA phase movement for monitoring.

FYA mode

FYA Signal Head	Phase 1	Phase 3	Phase 5	Phase 7
Red Arrow	Channel 9 Red	Channel 10 Red	Channel 11 Red	Channel 12 Red
Yellow Arrow	Channel 9 Yellow	Channel 10 Yellow	Channel 11 Yellow	Channel 12 Yellow
Flashing Yellow Arrow	Channel 9 Green	Channel 10 Green	Channel 11 Green	Channel 12 Green
Green Arrow	Channel 1 Green	Channel 3 Green	Channel 5 Green	Channel 7 Green

If a FYA channel pair is enabled for FYA operation, the conflict monitor will monitor the FYA logical channel pair for the additional following conditions:

1. **Conflict:** Channel conflicts are detected based on the permissive programming jumpers on the program card. This operation remains unchanged from normal operation except for the solid Yellow arrow (FYA clearance) signal.
2. **Yellow Change Interval Conflict:** During the Yellow change interval of the Permissive Turn channel (flashing Yellow arrow) the conflict monitor shall verify that no conflicting channels to the solid Yellow arrow channel (clearance) are active. These conflicting channels shall be determined by the program card compatibility programming of the Permissive Turn channel (flashing Yellow arrow). During the Yellow change interval of the Protected Turn channel (solid Green arrow) the conflict monitor shall verify that no conflicting channels to the solid Yellow arrow channel (clearance) are active as determined by the program card compatibility programming of the Protected Turn channel (solid Green arrow).
3. **Flash Rate Detection:** The conflict monitor unit shall monitor for the absence of a valid flash rate for the Permissive turn channel (flashing Yellow arrow). If the Permissive turn

channel (flashing Yellow arrow) is active for a period greater than 1600 milliseconds, ensure the conflict monitor triggers and puts the intersection into flash. If the Permissive turn channel (flashing Yellow arrow) is active for a period less than 1400 milliseconds, ensure the conflict monitor does not trigger. Ensure the conflict monitor will remain in the triggered (in fault mode) state until the unit is reset at the front panel or through the external remote reset input. Provide a jumper or switch that will enable and disable the Flash Rate Detection function. Ensure that when the jumper is not present or the switch is in the OFF position the Flash Rate Detection function is enabled. Ensure that when the jumper is present or the switch is in the ON position the Flash Rate Detection function is disabled.

4. **Red Monitoring or Absence of Any Indication (Red Failure):** The conflict monitor unit shall detect a red failure if there is an absence of voltage on all four of the inputs of a FYA channel pair (RA, YA, FYA, GA).
5. **Dual Indications on the Same Channel:** The conflict monitor unit shall detect a dual indication if two or more inputs of a FYA channel pair (RA, YA, FYA, GA) are "on" at the same time.
6. **Short/Missing Yellow Indication Fault (Clearance Error):** The conflict monitor unit shall monitor the solid Yellow arrow for a clearance fault when terminating both the Protected Turn channel (solid Green arrow) interval and the Permissive Turn channel (flashing Yellow arrow) interval.

Ensure that the conflict monitor will log at least nine of the most recent events detected by the monitor in non-volatile EEPROM memory (or equivalent). For each event, record at a minimum the time, date, type of event, status of each field signal indication with RMS voltage, and specific channels involved with the event. Ensure the conflict monitor will log the following events: monitor reset, configuration, previous fault, and AC line. Furnish the signal sequence log that shows all channel states (Greens, Yellows, and Reds) and the Red Enable State for a minimum of 2 seconds prior to the current fault trigger point. Ensure the display resolution of the inputs for the signal sequence log is not greater than 50 ms.

For conflict monitors used within an Ethernet communications system, provide a conflict monitor with an Ethernet 10/100 Mbps, RJ-45 port for data communication access to the monitor by a local notebook computer and remotely via a workstation or notebook computer device connected to the signal system local area network. The Ethernet port shall be electrically isolated from the conflict monitor's electronics and shall provide a minimum of 1500 Vrms isolation. Integrate monitor with Ethernet network in cabinet. Provide software to retrieve the time and date from a network server in order to synchronize the on-board times between the conflict monitor and the controller. Furnish and install the following Windows based, graphic user interface software on workstations and notebook computers where the signal system client software is installed: 1) software to view and retrieve all event log information, 2) software that will search and display a list of conflict monitor IP addresses and IDs on the network, and 3) software to change the conflict monitor's network parameters such as IP address and subnet mask.

For non-Ethernet connected monitors, provide a RS-232C/D compliant port (DB-9 female connector) on the front panel of the conflict monitor in order to provide communications from the conflict monitor to the 170/2070 controller or to a Department-furnished laptop computer. Electrically isolate the port interface electronics from all monitor electronics, excluding Chassis Ground. Ensure that the controller can receive all event log information through a controller Asynchronous Communications Interface Adapter (Type 170E) or Async Serial Comm Module (2070). Furnish and connect a serial cable from the conflict monitor's DB-9 connector to Comm

Port 1 of the 2070 controller. Ensure conflict monitor communicates with the controller. Provide a Windows based graphic user interface software to communicate directly through the same monitor RS-232C/D compliant port to retrieve and view all event log information to a Department-furnished laptop computer. The RS-232C/D compliant port on the monitor shall allow the monitor to function as a DCE device with pin connections as follows:

Conflict Monitor RS-232C/D (DB-9 Female) Pinout		
Pin Number	**Function**	**I/O**
1	DCD	O
2	TX Data	O
3	RX Data	I
4	DTR	I
5	Ground	-
6	DSR	O
7	CTS	I
8	RTS	O
9	NC	-

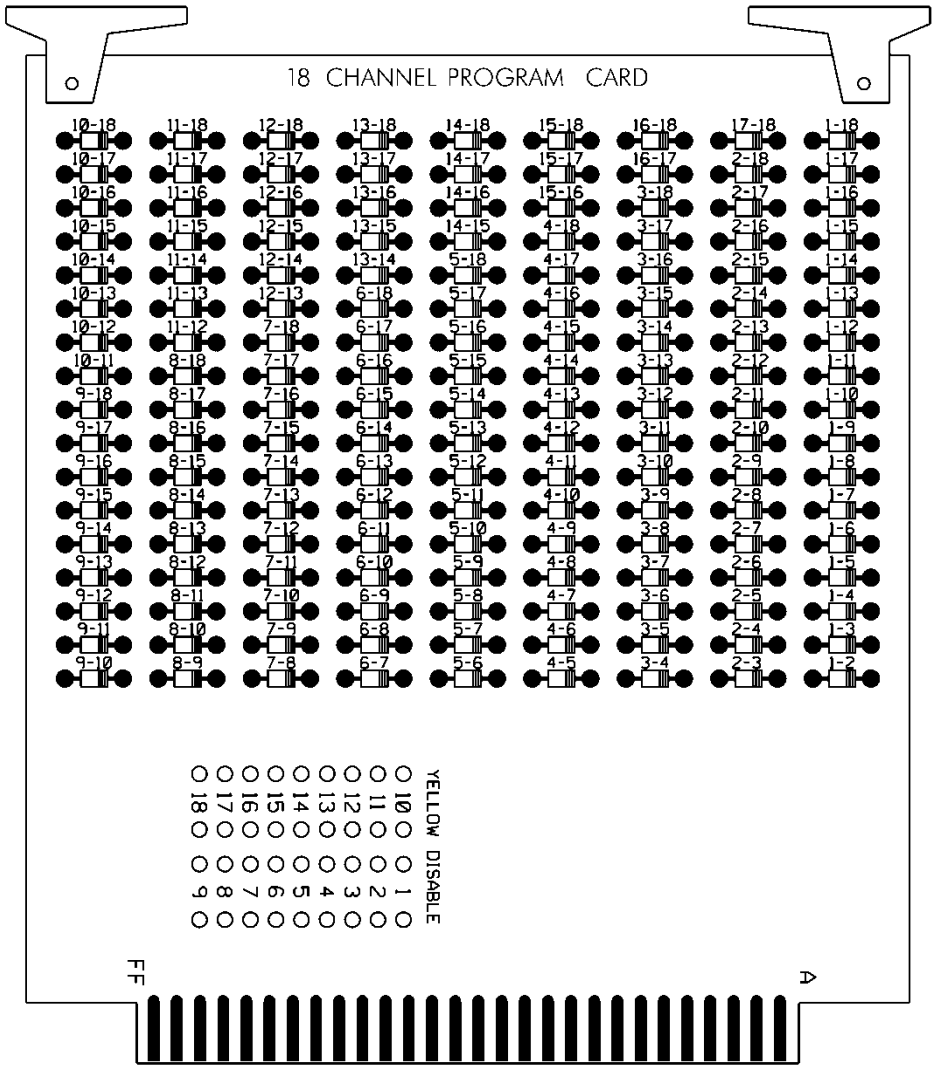
MONITOR BOARD EDGE CONNECTOR			
Pin #	**Function (Back Side)**	**Pin #**	**Function (Component Side)**
1	Channel 2 Green	A	Channel 2 Yellow
2	Channel 13 Green	B	Channel 6 Green
3	Channel 6 Yellow	C	Channel 15 Green
4	Channel 4 Green	D	Channel 4 Yellow
5	Channel 14 Green	E	Channel 8 Green
6	Channel 8 Yellow	F	Channel 16 Green
7	Channel 5 Green	H	Channel 5 Yellow
8	Channel 13 Yellow	J	Channel 1 Green
9	Channel 1 Yellow	K	Channel 15 Yellow
10	Channel 7 Green	L	Channel 7 Yellow
11	Channel 14 Yellow	M	Channel 3 Green
12	Channel 3 Yellow	N	Channel 16 Yellow
13	Channel 9 Green	P	Channel 17 Yellow
14	Channel 17 Green	R	Channel 10 Green
15	Channel 11 Yellow	S	Channel 11 Green
16	Channel 9 Yellow	T	Channel 18 Yellow
17	Channel 18 Green	U	Channel 10 Yellow
--		--	
18	Channel 12 Yellow	V	Channel 12 Green
19	Channel 17 Red	W	Channel 18 Red
20	Chassis Ground	X	Not Assigned
21	AC-	Y	DC Common
22	Watchdog Timer	Z	External Test Reset
23	+24VDC	AA	+24VDC
24	Tied to Pin 25	BB	Stop Time (Output)
25	Tied to Pin 24	CC	Not Assigned
26	Not Assigned	DD	Not Assigned
27	Relay Output, Side #3, N.O.	EE	Relay Output,Side #2,Common
28	Relay Output, Side #1, N.C.	FF	AC+

-- Slotted for keying between Pins 17/U and 18/V

CONFLICT PROGRAM CARD PIN ASSIGNMENTS

Pin #	Function (Back Side)	Pin #	Function (Component Side)
1	Channel 2 Green	A	Channel 1 Green
2	Channel 3 Green	B	Channel 2 Green
3	Channel 4 Green	C	Channel 3 Green
4	Channel 5 Green	D	Channel 4 Green
5	Channel 6 Green	E	Channel 5 Green
6	Channel 7 Green	F	Channel 6 Green
7	Channel 8 Green	H	Channel 7 Green
8	Channel 9 Green	J	Channel 8 Green
9	Channel 10 Green	K	Channel 9 Green
10	Channel 11 Green	L	Channel 10 Green
11	Channel 12 Green	M	Channel 11 Green
12	Channel 13 Green	N	Channel 12 Green
13	Channel 14 Green	P	Channel 13 Green
14	Channel 15 Green	R	Channel 14 Green
15	Channel 16 Green	S	Channel 15 Green
16	N/C	T	PC AJAR
17	Channel 1 Yellow	U	Channel 9 Yellow
18	Channel 2 Yellow	V	Channel 10 Yellow
19	Channel 3 Yellow	W	Channel 11 Yellow
20	Channel 4 Yellow	X	Channel 12 Yellow
21	Channel 5 Yellow	Y	Channel 13 Yellow
22	Channel 6 Yellow	Z	Channel 14 Yellow
23	Channel 7 Yellow	AA	Channel 15 Yellow
24	Channel 8 Yellow	BB	Channel 16 Yellow
--		--	
25	Channel 17 Green	CC	Channel 17 Yellow
26	Channel 18 Green	DD	Channel 18 Yellow
27	Channel 16 Green	EE	PC AJAR (Program Card)
28	Yellow Inhibit Common	FF	Channel 17 Green

-- Slotted for keying between Pins 24/BB and 25/CC



3.4. MATERIALS – TYPE 170 DETECTOR SENSOR UNITS

Furnish detector sensor units that comply with Chapter 5 Section 1, "General Requirements," and Chapter 5 Section 2, "Model 222 & 224 Loop Detector Sensor Unit Requirements," of the CALTRANS "Transportation Electrical Equipment Specifications" dated March 12, 2009 with Erratum 1.

4. VIDEO IMAGING LOOP EMULATOR DETECTOR SYSTEMS FOR TEMPORARY INSTALLATION

4.1. DESCRIPTION

Design, furnish, provide training, and install video imaging loop emulator detection systems with all necessary hardware for temporary traffic signals in accordance with the plans and specifications.

Unless otherwise specified in the contract, all loop emulator detection equipment will remain the property of the contractor.

4.2. MATERIALS

A. General:

Material and equipment furnished under this section must be pre-approved on the Department's QPL by the date of installation except miscellaneous hardware such as cables and mounting hardware do not need to be pre-approved.

Used equipment will be acceptable provided the following conditions have been met:

- Equipment is listed on the current QPL.
- Equipment is in good working condition.
- Equipment is to remain the property of the contractor.

Ensure that software is licensed for use by the Department and by any other agency responsible for maintaining or operating the loop emulation system. Provide the Department with a license to duplicate and distribute the software as necessary for design and maintenance support.

Design and furnish video imaging loop emulator detection systems that detect vehicles at signalized intersections by processing video images and providing detection outputs to the signal controller in real time (within 112 milliseconds of vehicle arrival).

Furnish all required camera sensor units, loop emulator processor units, hardware and software packages, cabling, poles, mast arms, harnesses, camera mounting assemblies, surge protection panels, grounding systems, messenger cable and all necessary hardware. Furnish systems that allow the display of detection zones superimposed on an image of the roadway on a Department-furnished monitor or laptop computer screen. Ensure detection zones can be defined and data entered using a simple keyboard or mouse and monitor, or using a laptop PC with software.

Provide design drawings showing design details and camera sensor unit locations for review and acceptance before installation. Provide mounting height and location requirements for camera sensor units on the design based on site survey. Design video imaging loop emulator detection systems with all necessary hardware. Indicate all necessary poles, spans, mast arms, luminaire arms, cables, camera mounting assemblies and hardware to achieve the required detection zones where Department owned poles are not adequate to locate the camera sensor units. Do not design for the installation of poles in medians.

Obtain the Engineer's approval before furnishing video imaging loop emulator detection systems. The contractor is responsible for the final design of video imaging loop emulator detection systems. Review and acceptance of the designs by the Department does not relieve the contractor from the responsibility to provide fully functional systems and to ensure that the required detection zones can be provided.

Provide the ability to program each detection call (input to the controller) with the following functions:

- Full Time Delay – Delay timer is active continuously,
- Normal Delay – Delay timer is inhibited when assigned phase is green (except when used with TS 2 and 170/2070 controllers),
- Extend – Call is extended for this amount of time after vehicle leaves detection area,
- Delay Call/Extend Call – This feature uses a combination of full time delay and extend time on the same detection call. Ensure operation is as follows: Vehicle calls are received after the delay timer times out. When a call is detected, it is held until the detection area is empty and the programmed extend time expires. If another vehicle enters the detection area before the

extend timer times out, the call is held and the extend time is reset. When the extend timer times out, the delay timer has to expire before another vehicle call can be received.

Provide the ability to program each detection zone as one of the following functions:

- Presence detector,
- Directional presence detector,
- Pulse detector,
- Directional pulse detector.

Ensure previously defined detector zones and configurations can be edited.

Provide each individual system with all the necessary equipment to focus and zoom the camera lenses without the need to enter the camera enclosure.

Provide systems that allow for the placement of at least 8 detection zones within the combined field of view of a single camera sensor unit. Provide a minimum of 8 detection outputs per camera.

Provide detection zones that can be overlapped. Ensure systems reliably detect vehicles when the horizontal distance from the camera sensor unit to the detection zone area is less than ten times the mounting height of the sensor. Ensure systems detect vehicles in multiple travel lanes.

Ensure systems can detect vehicle presence within a 98 to 102 percent accuracy (up to 2 percent of the vehicles missed and up to 2 percent of false detection) for clear, dry, daylight conditions, a 96 to 105 percent accuracy (up to 4 percent of the vehicles missed and up to 5 percent false detection) for dawn and dusk conditions, and a 96 percent accuracy (up to 4 percent of the vehicles missed) for night and adverse conditions (fog, snow, rain, etc.) using standard sensor optics and in the absence of occlusion.

Repair and replace all failed components within 72 hours.

The Department may conduct field-testing to ensure the accuracy of completed video imaging loop emulator detection systems.

B. Loop Emulator System:

Furnish loop emulator systems that receive and simultaneously process information from camera sensor units, and provides detector outputs to signal controllers.

Ensure systems provide the following:

- Operate in a typical roadside environment and meet the environmental specifications and are fully compatible with NEMA TS 1, NEMA TS 2, or Type 170/2070 controllers and cabinets,
- provide a “fail-safe” mode whereby failure of one or more of the camera sensor units or power failure of the loop emulator system will cause constant calls to be placed on the affected vehicle detection outputs to the signal controller,
- provide compensation for minor camera movement of up to 2 percent of the field of view at 400 feet without falsely detecting vehicles,
- process the video at a minimum rate of 30 times per second,
- provide separate wired connectors inside the controller cabinet for video recording each camera,
- provide remote video monitoring with a minimum refresh rate at 1 frame per second over a standard dial-up telephone line,
- provide remote video detection monitoring.

Furnish camera sensor units that comply with the following:

- have an output signal conforming to EIA RS-170 standard,
- have a nominal output impedance of 75 ohms,
- be immune to bright light sources, or have built in circuitry or protective devices to prevent damage to the sensor when pointed directly at strong light sources,
- be housed in a light colored environmental enclosure that is water proof and dust tight, and that conforms to NEMA-4 specifications or better,
- simultaneously monitor at least five travel lanes when placed at the proper mounting location with a zoom lens,
- have a sunshield attached to the environmental enclosure to minimize solar heating,
- meet FCC class B requirements for electromagnetic interference emissions,
- have a heater attached to the viewing window of the environmental enclosure to prevent ice and condensation in cold weather.

Where coaxial video cables and other cables are required between the camera sensor and other components located in the controller cabinet, furnish surge protection in the controller cabinet.

If furnishing coaxial communications cable comply with the following, as recommended by the approved loop emulator manufacturer:

- Number 20 AWG, solid bare copper conductor terminated with crimped-on BNC connectors (do not use BNC adapters) from the camera sensor to the signal controller cabinet.
- Number 22 AWG, stranded bare copper conductor terminated with crimped-on BNC connectors (do not use BNC adapters) from the camera sensor unit to the junction box, and within the signal controller cabinet.

Furnish power cable appropriately sized to meet the power requirements of the sensors. At a minimum, provide three conductor 120 VAC field power cable.

As determined during the site survey, furnish sensor junction boxes with nominal 6 x 10 x 6 inches dimensions at each sensor location. Provide terminal blocks and tie points for coaxial cable.

C. Video Imaging Loop Emulator System Support:

Furnish video imaging loop emulator systems with either a simple keyboard or a mouse with monitor and appropriate software, or with system software for use on department-owned laptop PCs. Ensure the system is Windows 2000 and Windows XP compatible.

Provide Windows 2000 and Windows XP compatible personal computer software, if needed, to provide remote video and video detection monitoring.

Ensure systems allow the user to edit previously defined detector configurations. When a vehicle is within a detection zone, provide for a change in color or intensity of the detection zone perimeter or other appropriate display changes on the Department-furnished monitor or laptop computer screen.

Provide cabling and interconnection hardware with 6-foot minimum length interconnection cable to interface with the system.

Provide all associated equipment manuals and documentation.

4.3. CONSTRUCTION METHODS

Arrange and conduct site surveys with the system manufacturer’s representative and Department personnel to determine proper camera sensor unit selection and placement. Provide the Department

at least 3 working days notice before conducting site surveys. Upon completion of the site surveys the Department will provide revised plans reflecting the findings of the site survey.

Before beginning work at locations requiring video imaging loop emulator detection systems, furnish system software. Upon activation of detection zones, provide detector configuration files. Ensure that up-to-date detection configuration files are furnished for various detection zone configurations that may be required for construction phasing.

Place into operation loop emulator detection systems. Configure loop emulator detection systems to achieve required detection in designated zones. Have a certified manufacturer's representative on site to supervise and assist with installation, set up, and testing of the system.

Install the necessary processing and communications equipment in the signal controller cabinet. Make all necessary modifications to install equipment, cabling harnesses, and camera sensor interface panels with surge suppression.

Perform modifications to camera sensor unit gain, sensitivity, and iris limits necessary to complete the installation.

Do not install camera sensor units on signal poles unless approved by the Engineer.

Install the necessary cables from each sensor to the signal controller cabinet along signal cabling routes. Install surge protection and terminate all cable conductors.

Reconfigure detection zones as necessary according to the plans for construction phases.

Provide at least 8 hours of training on the set up, operation, troubleshooting, and maintenance of the loop emulator detection system to a maximum of ten Department personnel. Arrange for training to be conducted by the manufacturer's representative at an approved site within the Division responsible for administration of the project. Thirty days before conducting training submit a detailed course curriculum, draft manuals and materials, and resumes. Obtain approval of the submittal before conducting the training. At least one week before beginning training, provide three sets of complete documentation necessary to maintain and operate the system. Do not perform training until installation of loop emulator detection systems is complete.

4.4. MEASUREMENT AND PAYMENT

Actual number of site surveys, arranged, conducted, and accepted.

Actual number of cameras without internal loop emulator processing units furnished, installed, and accepted.

Actual number of external loop emulator processing units furnished, installed, and accepted.

No measurement will be made of video imaging loop emulator system support or training, power and video cables, and trenching as these items will be considered incidental to furnishing and installing video imaging loop emulator detection systems.

Payment will be made under:

Site Survey ..... Each

Camera without Internal Loop Emulator Processing Unit ..... Each

External Loop Emulator Processing Unit ..... Each

5. METAL POLE SUPPORTS

5.1. METAL POLES

A. General:

Furnish and install metal poles, grounding systems, and all necessary hardware. Work covered under this special provision includes requirements for design, fabrication, and installation of standard and custom/site-specific designed metal pole supports and associated foundations.

Comply with applicable sections of the *2024 STANDARD SPECIFICATIONS FOR ROADS & STRUCTURES*, hereinafter referred to as the *Standard Specifications*. Provide designs of completed assemblies with hardware equaling or exceeding AASHTO *LRFD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals* 1st Edition, 2015 (hereinafter called 1st Edition AASHTO), including the latest interim specifications. Provide assemblies with a round or near-round (18 sides or more) cross-section, or a multi-sided cross section with no less than six sides. The sides may be straight, convex, or concave.

For bid purposes, pole heights shown on plans are estimated from available data. Prior to furnishing metal poles, use field measurements and adjusted cross-sections to determine whether pole heights will meet required clearances. If pole heights do not meet required clearances, the Contractor should immediately notify the Engineer of the required revised pole heights.

Standard Drawings for Metal Poles are available that supplement these project special provisions. The drawings are located on the Department's website:

https://connect.ncdot.gov/resources/safety/pages/ITS-Design-Resources.aspx

Comply with article 1098-1(B) of the *Standard Specifications* for submittal requirements. Furnish shop drawings for approval. Provide copies of detailed shop drawings for each type of structure as summarized below. Ensure shop drawings include material specifications for each component. Ensure shop drawings identify welds by type and size on the detail drawing only, not in table format. **Do not release structures for fabrication until shop drawings have been approved by NCDOT**. Ensure shop drawings contain an itemized bill of materials for all structural components and associated connecting hardware.

Comply with article 1098-1(A) of the *Standard Specifications* for Qualified Products List (QPL) submittals. All shop drawings must include project location description, signal or asset inventory number(s) and project number or work order number.

Summary of information required for metal pole review submittal:

Item	Electronic Submittal	Comments / Special Instructions
Sealed, Approved Signal or ITS Plan/Loading Diagram	1 set	All structure design information needs to reflect the latest approved Signal or ITS plans
Custom Pole Shop Drawings	1 set	Submit drawings on 11" x 17" format media. Show NCDOT signal or asset inventory number(s), Contractor's name and relevant revision number in the title block. All drawings must have a unique drawing number for each project.

Standard Strain Pole Shop Drawings (from the QPL)	1 set	Submit drawings on 11" x 17" format media. Show NCDOT signal inventory number(s), Contractor's name and relevant revision number in the title block. All drawings must have a unique drawing number for each project.
Structure Calculations	1 set	Not required for Standard QPL Poles
Standard Strain Pole Foundation Drawings	1 set	Submit drawings on 11" x 17" format media. Submit a completed Standard Foundation Selection form for each pole using foundation table on Metal Pole Drawing M8.
Custom Foundation Drawings	1 set	Submit drawings on 11" x 17" format media. Show NCDOT signal or asset inventory number(s), Contractor's name and relevant revision number in the title block. All drawings must have a unique drawing number for each project. If QPL Poles are used, include the corresponding QPL pole shop drawings with this submittal.
Foundation Calculations	1 set	**Submit copies of LPILE input, output, and pile tip deflection graph per Section titled Drilled Pier Foundations for Metal Poles of this specification for each foundation.** Not required for Standard Strain Poles (from the QPL)
Soil Boring Logs and Report	1 set	Report shall include a location plan and a soil classification report including soil capacity, water level, hammer efficiency, soil bearing pressure, soil density, etc. for each pole.

NOTE – All shop drawings and custom foundation design drawings must be sealed by a Professional Engineer licensed in the state of North Carolina. All geotechnical information must be sealed by either a Professional Engineer or Geologist licensed in the state of North Carolina. Include a title block and revision block on the shop drawings and foundation drawings showing the NCDOT signal or asset inventory number(s).

Shop drawings and foundation drawings may be submitted together or separately for approval. However, shop drawings must be approved before foundations can be reviewed. Foundation designs will be returned without review if the associated shop drawing has not been approved. Boring reports shall include the following: Engineer's summary, boring location maps, soil classification per AASHTO Classification System, hammer efficiency, and Metal Pole Standard Foundation Selection Form. Incomplete submittals will be returned without review. The Reviewer has the right to request additional analysis and copies of the calculations to expedite the approval process.

B. Materials:

Fabricate metal pole from coil or plate steel that meet the requirements of ASTM A 572 Gr 55 or ASTM A 595 Grade A tubes. For structural steel shapes, plates, and bars use, as a minimum, ASTM A572 Gr 50, AASHTO M270 Gr 50, ASTM A709 Gr 50, or an approved equivalent. Provide pole shafts of round or near round (18 sides or more) cross-section, or multi-sided tubular cross-section

with no less than six sides, having a uniform linear taper of 0.14 in/ft. Construct shafts from one piece of single-ply plate or coil. For anchor base fabrication, conform to the applicable bolt pattern and orientation as shown on Metal Pole Standard Drawing Sheet M2.

Use the submerged arc process, or other NCDOT previously approved process suitable for shafts, to continuously weld pole shafts along their entire length. Finish the longitudinal seam weld flush with the outside contour of the base metal. Ensure shaft has no circumferential welds except at the lower end joining the shaft to the pole base. Use full penetration groove welds with backing ring for all tube-to-transverse-plate connections in accordance with 1st Edition AASHTO. Provide welding that conforms to Article 1072-18 of the *Standard Specifications.* No field welding on any part of the pole will be permitted unless approved by a qualified Engineer.

After fabrication, hot-dip galvanize steel poles and all assembly components in accordance with section 1076-3 of the *Standard Specifications*. Design structural assemblies with weep holes large enough and properly located to drain molten zinc during the galvanization process. Galvanize hardware in accordance with section 1076-4 of the *Standard Specifications*. Ensure threaded material is brushed and retapped as necessary after galvanizing. Perform repair of damaged galvanizing in accordance with section 1076-7 of the Standard *Specifications. Ensure* all hardware is galvanized steel or stainless steel. The Contractor is responsible for ensuring the Designer/Fabricator specifies connecting hardware and/or materials that prevent a dissimilar metal corrosive reaction.

Ensure each anchor rod is 2-inch minimum diameter and 60-inch length. Provide 10-inch minimum thread projection at the top of the rod, and 8-inch minimum at the bottom of the rod. Use anchor rod assembly and drilled pier foundation materials complying with SP09_R005, hereinafter referred to as *Foundations and Anchor Rod Assemblies for Metal Poles*.

Ensure anchor bolt hole diameters are ¼-inch larger than the anchor bolt diameters in the base plate.

Provide a circular anchor bolt lock plate securing the anchor bolts at the embedded end with two (2) washers and two (2) nuts. Provide a base plate template matching the bolt circle diameter of the anchor bolt lock plate. Construct plates and templates from ¼-inch minimum thick steel with a minimum width of 4 inches. Hot-dip galvanizing is not required for both plates.

Provide four (4) heavy hex nuts and four (4) flat washers for each anchor bolt. For nuts, use AASHTO M291 grade 2H, DH, or DH3 or equivalent material. For flat washers, use AASHTO M293 or equivalent material. Ensure anchor bolts have required diameters, lengths, and positions, and will develop strengths comparable to their respective poles.

For each pole, provide a grounding lug with a ½-inch minimum thread diameter, coarse thread stud and nut that will accommodate #4 AWG ground wire. Ensure the lug is electrically bonded to the pole and is conveniently located inside the pole at the hand hole.

Provide a removable pole cap with stainless steel attachment screws for the top of each pole. Ensure cap is cast aluminum conforming to Aluminum Association Alloy 356.0F. Furnish cap attached to the pole with a sturdy stainless-steel chain that is long enough to permit cap to hang clear of the pole-top opening when cap is removed.

Where required by the plans, furnish couplings 42 inches above bottom of the pole base for mounting of pedestrian pushbuttons. Provide mounting points consisting of 1½-inch internally threaded half-couplings complying with the NEC, mounted within the poles. Ensure that couplings are essentially flush with the outside surfaces of the poles and are installed before any required hot-dip galvanizing. Provide a threaded plug in each mounting point. Ensure the surface of the plug is

essentially flush with the outer end of the mounting point when installed and has a recessed slot that will accommodate a ½ "drive standard socket wrench.

Metal poles may be erected and fully loaded after concrete has attained a minimum allowable compressive strength of 3,000 psi.

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

When field drilling is necessary for wire or cable entrances into the pole, comply with the following requirements:

- Do not drill holes within 2 inches of any welds.
- Do not drill any holes larger than 3 inches in diameter without checking with the ITS & Signals Structure Engineers.
- Avoid drilling multiple holes along the same cross section of tube shafts.
- Install rubber grommets in all field drilled holes that wire, or cable will directly enter unless holes are drilled for installation of weather heads or couplings.
- Treat the inside of the drilled holes and repair all galvanized surfaces in accordance with Section 1076-7 of the latest edition of the *Standard Specification prior to installing grommets, caps, or plugs.*
- Cap or plug any existing field drilled holes that are no longer used with rubber, aluminum, or stainless-steel hole plugs.

When street lighting is installed on metal signal structures, isolate the conductors feeding the luminaires inside the pole shaft using liquid tight flexible metal conduit (Type LFMC), liquid tight flexible nonmetallic conduit (Type LFNC), high density polyethylene conduit (Type HDPE), or approved equivalent. All conductors supplying power for luminaires must run through an external disconnect prior to entrance into the structure. In accordance with the National Electrical Code (NEC) Article 230.2(E), provide identification of the electrical source provider for the luminaire feeder circuit with contact information on a permanent label located in the pole hand hole near the feeder circuit raceway.

Install a ¼-inch thick plate for a concrete foundation tag to include the following information: concrete grade, depth, diameter, and reinforcement sizes of the installed foundation. Install galvanized wire mesh to cover gap between the base plate and top of foundation for debris and pest control. Refer to standard drawing M7 for further details.

Immediately notify the Engineer of any structural deficiency that becomes apparent in any assembly, or member of any assembly, because of the design requirements imposed by these specifications, the plans, or the typical drawings.

C. Design:

Unless otherwise specified, design all metal pole support structures using the following 1st Edition AASHTO specifications:

- Use 700-Year MRI and 10-Year MRI wind pressure maps developed from 3-second gust speeds, as provided in Section 3.8.
- Ensure metal pole support structures include natural wind gust loading and truck-induced gust loading for fatigue design, as provided in Sections 11.7.1.2 and 11.7.1.3, respectively. Designs need not consider periodic galloping forces.

- Assume 11.2 mph natural wind gust speed in North Carolina. For natural wind fatigue stress calculations, utilize a drag coefficient (C_d) based on the yearly mean wind velocity of 11.2 mph.
- When selecting Fatigue Importance Factors, utilize Fatigue Importance Category II, as provided for in Table 11.6-1, unless otherwise specified.
- Calculate all forces using applicable equations from Section 5. The Maximum allowable force ratio for all metal pole support designs is 0.9.
- Conform to Sections 10.4.2 and 11.8 for deflection requirements. For CCTV and MVD support structures, ensure maximum deflection at top of pole does not exceed 2.0 percent of pole height.
- Assume the combined minimum weight of a messenger cable bundle (including messenger cable, signal cable and detector lead-in cables) is 1.3 lbs/ft. Assume the combined minimum diameter of the cable bundle is 1.3 inches.

Unless otherwise specified by special loading criteria, the following computed surface area for ice load on signal heads shall be used:

- 3-section, 12-inch, Surface area: 26.0 ft^2
- 4-section, 12-inch, Surface area: 32.0 ft^2
- 5-section, 12-inch, Surface area: 42.0 ft^2

Design a base plate for each pole. The minimum base plate thickness for all poles is determined by the following criteria:

Case 1 Circular or rectangular solid base plate with the upright pole welded to the top surface of base plate with full penetration butt weld, where no stiffeners are provided. A base plate with a small center hole, which is less than 1/3 of the upright diameter, and located concentrically with the upright pole, may be considered as a solid base plate.

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

M = bending moment at the critical section of the base plate induced by one (1) anchor bolt

P = anchoring force of each anchor bolt

D_1 = horizontal distance between the anchor bolt center and the outer face of the upright, or the difference between the bolt circle radius and the outside radius of the upright

Locate the critical section at the face of the anchor bolt and perpendicular to the bolt circle radius. The overlapped part of two (2) adjacent critical sections is considered ineffective.

Case 2 Circular or rectangular base plate with the upright pole socketed into and attached to the base plate with two (2) lines of fillet weld, and where no stiffeners are provided, or any base plate with a center hole that is larger in diameter than 1/3 of the upright diameter.

The magnitude of bending moment induced by the anchoring force of each anchor bolt is $M = P \times D_2$,

where P = anchoring force of each anchor bolt

D_2 = horizontal distance between the face of the upright and the face of the anchor bolt nut

Locate the critical section at the face of the anchor bolt top nut and perpendicular to the radius of the bolt circle. The overlapped part of two (2) adjacent critical sections is considered ineffective.

If the base plate thickness calculated for Case 2 is less than Case 1, use the thickness calculated for Case 1.

The following additional requirements apply concerning pole base plates.

- Ensure that whichever case governs as defined above, the anchor bolt diameter is set to match the base plate thickness. If the minimum diameter required for the anchor bolt exceeds the thickness required for the base plate, set the base plate thickness equal to the required bolt diameter.
- For all metal poles, use a full penetration groove weld with a backing ring to connect the pole upright component to the base. Refer to Metal Pole Standard Drawing Sheet M3 or M4.

The Professional Engineer is wholly responsible for the design of all poles. Review and acceptance of these designs by the Department does not relieve the said Professional Engineer of his or her responsibility.

D. Strain Poles:

Refer to Metal Pole Standard Drawing Sheets M2 and M3 for fabrication details.

Provide two (2) messenger cable (span wire) clamps and associated hardware for attachment of messenger cable. Ensure diameter of the clamp is appropriate to its location on the pole and is appropriately designed for adjustment from 1'-6" below the top, down to 6'-6" below the top of the pole. Do not attach more than one (1) support cable to a messenger cable clamp.

Provide a minimum of three (3) 2-inch holes equipped with an associated coupling and weatherhead on the messenger cable load side of the pole to accommodate passage of signal cables from inside the pole. Provide galvanized threaded plugs for all unused couplings at pole entrance points. Refer to Metal Pole Standard Drawing Sheet M3 for fabrication details.

Provide designs with a 6" x 12" hand hole with reinforcing frame for each pole.

Provide a terminal compartment with cover and screws in each pole encompassing the hand hole and containing a 12-terminal barrier type terminal block. Provide two (2) terminal screws with a removable shorting bar between them for each termination. Furnish terminal compartment covers attached to the pole by a sturdy chain or cable approved by the Engineer. Ensure chain or cable is long enough to permit cover to hang clear of the compartment opening when cover is removed and is strong enough to prevent vandalism. Ensure chain or cable will not interfere with service to cables in the pole base.

Have poles permanently stamped above the hand holes with the identification tag details as shown on Metal Pole Standard Drawing Sheets M2 and M3.

Provide grounding lug(s) in the approximate vicinity of the messenger cable clamp for bonding and grounding messenger cable. Lugs must accept #4 AWG wire to bond messenger cables to the pole in order to provide an effective ground fault circuit path. Refer to Metal Pole Standard Drawing Sheet M6 for construction details.

Install metal poles, hardware, and fittings as shown on the manufacturer's installation drawings. Ensure the installed pole, when fully loaded, is within 1 degree 40 minutes (1°40') of vertical. Install poles with the manufacturer's recommended "rake." Where required, use threaded leveling nuts to establish rake.

E. Mast Arm Poles:

Refer to Metal Pole Standard Drawing Sheets M2 through M5 for fabrication details.

Fabricate metal arm shaft from coil or plate steel that meet the requirements of ASTM A 595 Grade A tubes. Provide arm shafts of round or near round (18 sides or more) cross-section, or multi-sided tubular cross-section with no less than six sides, having a uniform linear taper of 0.14 in/ft. Construct shafts from one piece of single-ply plate or coil, eliminating circumferential weld splices.

Use the submerged arc process, or other NCDOT previously approved process suitable for arm shafts, to continuously weld arm shafts along their entire length. The longitudinal seam weld shall be finished flush to the outside contour of the base metal. Ensure arm shaft has no circumferential welds except at the lower end joining the shaft to the arm flange plate. Use full penetration groove welds with backing ring for all tube-to-transverse-plate connections in accordance with 1st Edition AASHTO. Provide welding that conforms to Article 1072-18 of the *Standard Specifications*, except no field welding on any part of the arm shaft will be permitted unless approved by a qualified Engineer.

After fabrication, hot-dip galvanize steel arm shafts and all assembly components per section 1076 of the *Standard Specifications*. Design arm shafts with weep holes large enough and properly located to drain molten zinc during the galvanization process. Provide hot-dip galvanizing on steel arm shafts that meets or exceeds ASTM Standard A-123, AASHTO M111, or an approved equivalent. Perform repair of damaged galvanizing that complies with the following *Standard Specifications* article:

Repair of Galvanizing.....Article 1076-7

Ensure metal arm shafts permit cables to be installed inside arm shafts. For holes in arm shafts used to accommodate cables, provide full-circumference grommets. Wire access holes for arm flange plates should be deburred, non-grommeted, and oversized to fit around 4-inch diameter grommeted wire access holes for shaft flange plates.

Provide a minimum of four (4) 1-1/2” diameter high strength bolts for connection between arm plate and pole plate. Increase number of bolts to a minimum of six (6) 1-1/2” diameter high strength bolts when arm lengths are greater than 50’-0” long.

Provide designs with a 6” x 12” hand hole with reinforcing frame for each pole.

Provide a terminal compartment with cover and screws in each pole encompassing the hand hole and containing a 12-terminal barrier type terminal block. Provide two (2) terminal screws with a removable shorting bar between them for each termination. Furnish terminal compartment covers attached to the pole by a sturdy chain or cable approved by the Engineer. Ensure chain or cable is long enough to permit cover to hang clear of the compartment opening when cover is removed and is strong enough to prevent vandalism. Ensure chain or cable will not interfere with service to cables in the pole base.

Have poles permanently stamped above the hand holes with the identification tag details as shown on Metal Pole Standard Drawing Sheets M2 and M4.

Provide a removable end cap with stainless steel attachment screws for the end of each mast arm. Ensure cap is cast aluminum conforming to Aluminum Association Alloy 356.0F. Furnish cap attached to arm with a sturdy chain or cable approved by the Engineer. Ensure chain or cable is long enough to permit cap to hang clear of arm end opening when cap is removed.

Provide pole flange plates and associated gussets and fittings for attachment of required mast arms. As part of each mast arm attachment, provide a cable passage hole in pole to allow passage of cables

from pole to arm. Provide a grommeted 4-inch diameter cable passage hole on the shaft side of the connection to allow passage of cables from pole to arm.

Furnish all arm plates and necessary attachment hardware, including bolts and brackets.

Provide two (2) extra bolts for each arm.

Provide arms with weatherproof connections for attaching to the pole shaft.

Provide hardware that is galvanized steel, stainless steel, or corrosive-resistant aluminum.

Install metal poles, hardware, and fittings as shown on the manufacturer's installation drawings. Ensure the installed pole, when fully loaded, is within 1 degree 40 minutes (1°40') of vertical. Install poles with the manufacturer's recommended "rake." Where required, use threaded leveling nuts to establish rake.

Install horizontal-type arms with a manufactured rise preventing arm from deflecting below arm attachment height.

Ensure maximum angular rotation of the top of mast arm pole does not exceed 1 degree 40 minutes (1°40'). Ensure allowable mast arm deflection does not exceed that allowed per 1st Edition AASHTO. For all load combination limit states specified under Section 3 of 1st Edition AASHTO, restrict tip of fully loaded arm from going below arm attachment point with the pole.

5.2. DRILLED PIER FOUNDATIONS FOR METAL POLES

Analysis procedures and formulas shall be based on AASHTO 1st Edition, latest ACI-318 code and the *Drilled Shafts: Construction Procedures and Design Methods* FHWA-NHI-10-016 manual. Design methods based on engineering publications or research papers must have prior approval from NCDOT. The Department reserves the right to accept or reject any method used for the analysis.

Ensure deflection at top of foundation does not exceed 1 inch for worst-case (Service Limit State) lateral load.

Use LPILE Plus V6.0 or later for lateral analysis. Submit inputs, results and corresponding graphs with the design calculations.

Calculate skin friction using the α-method for cohesive soils and the β-method for cohesion-less soils (**Broms method will not be accepted**). Detailed descriptions of the "α" and "β" methods can be found in *FHWA-NHI-10-016*.

Omit first 2.5 feet for cohesive soils when calculating skin friction.

Assume a hammer efficiency of 0.70 unless value is provided.

Design custom foundations to carry maximum capacity of each metal pole. For standard case strain poles with custom design, use actual shear, axial and moment reactions from the Standard Strain Pole Foundation Selection Table shown on Standard Drawing No. M8.

When poor soil conditions are encountered, which could create an excessively large foundation design, consideration may be given to allow an exemption to the maximum capacity design. The Contractor must gain approval from the Engineer before reducing a foundation's capacity. On projects where poor soil is known to be present, the Contractor should have foundation designs approved before releasing poles for fabrication.

Have the Contractor notify the Engineer if the proposed foundation is to be installed on a slope other than 8H: 1V or flatter.

A. Description:

Furnish and install foundations for NCDOT metal poles with all necessary hardware in accordance with the plans and specifications.

Metal Pole Standards have been developed and implemented by NCDOT for use at signalized intersections in North Carolina. If the plans call for a standard strain pole, then a standard foundation may be selected from the plans. However, the Contractor is not required to use a standard foundation. If the Contractor chooses to design a non-standard site-specific foundation for a standard strain pole or if the plans call for a non-standard site-specific pole, design the foundation to conform to the applicable provisions in the NCDOT Metal Pole Standard Drawings and Section B4 (Non-Standard Foundation Design) below. If non-standard site-specific foundations are designed for standard QPL approved strain poles, the foundation designer must use the design moment specified by load case on Metal Pole Standard Drawing Sheet M8. Failure to conform to this requirement will be grounds for rejection of the design.

If the Contractor chooses to design a non-standard foundation for a standard strain pole and the soil test results indicate a standard foundation is feasible for the site, the Contractor will be paid the cost of the standard foundation. Any additional cost associated with a non-standard site-specific foundation including additional materials, labor and equipment will be considered incidental to the cost of the standard foundation. All costs for the non-standard foundation design will be considered incidental to the cost of the standard foundation.

B. Soil Test and Foundation Determination:

1. General:

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

2. Soil Test:

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

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

- A total of 100 blows have been applied in any two consecutive 6-inch intervals.
- A total of 50 blows have been applied with < 3-inch penetration.

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

If the pole location is located between intersections, provide a coordinate location and offset, or milepost number and offset. Pole numbers should be made available to the Drill Contractor. Include pole numbers in the boring label if they are available. If they are not available, ensure the boring labels can be cross-referenced to corresponding pole numbers. For each boring, submit a legible (hand-written or typed) boring log signed and sealed by a licensed Geologist or Professional Engineer registered in North Carolina. Include on each boring the SPT blow counts and N-values at each depth, depth of the boring, hammer efficiency, depth of water table and a general description of the soil types encountered using the AASHTO Classification System.

Borings that cannot be easily correlated to their specific pole location will be returned to the Contractor for clarification; or if approved by the Engineer, the foundation may be designed using the worst-case soil condition obtained as part of this project.

3. Standard Foundation Determination:

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

$$N_{AVG} = \frac{N_{@1'} + N_{@2.5'} + \cdots + N_{@Deepest\ Boring\ Depth}}{Total\ Number\ of\ N\ values}$$

$$Y = (N_{@1'})^2 + (N_{@2.5'})^2 + \cdots + (N_{@Deepest\ Boring\ Depth})^2$$

$$Z = N_{@1'} + N_{@2.5'} + \cdots + N_{@Deeepest\ Boring\ Depth}$$

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

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

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

OR

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

Note: If less than four (4) N-values are obtained because of criteria listed in Section 2 above, use average of N-values collected for second condition. Do not include the N-value at the deepest boring depth for above calculations if the boring is discontinued at or before the required boring depth because of criteria listed in Section 2 above. Use N-value of zero (0) for weight of hammer or weight of rod. If N-value is greater than fifty (50), reduce N-value to fifty (50) for calculations.

If standard NCDOT strain poles are shown on the plans and the Contractor chooses to use standard foundations, determine a drilled pier length, "L," for each signal pole from the Standard Strain Pole Foundations Chart (sheet M8) based on the Design N-value and the predominant soil type. For each standard pole location, submit a completed "Metal Pole Standard Foundation Selection Form" signed by the Contractor's representative. Signature on form is for verification purposes only. Include the Design N-value calculation and resulting drilled pier length, "L," on each form.

If non-standard site-specific poles are shown on the plans, submit completed boring logs collected in accordance with Section 2 (Soil Test) along with pole loading diagrams from the plans to the Contractor-selected pole Fabricator to assist in the pole and foundation design.

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

- The Design N-value is less than four (4).

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

In the case where a standard foundation cannot be used, the Department will be responsible for the additional cost of the non-standard foundation.

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

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

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

If assistance is needed, contact the Engineer.

4. Non-Standard Foundation Design:

Design non-standard foundations based upon site-specific soil test information collected in accordance with Section 2 (Soil Test). Design drilled piers for side resistance in accordance with Section 10.8 of the *2014 AASHTO LRFD Bridge Design Specifications, 7th Edition*. Use computer software LPILE version 6.0 or later manufactured by Ensoft, Inc. to analyze drilled piers. Use computer software gINT V8i or later manufactured by Bentley Systems, Inc. with the current NCDOT gINT library and data template to produce SPT boring logs. Provide a drilled pier foundation for each pole with a length and diameter resulting in horizontal lateral movement less than 1 inch at top of the pier, and horizontal rotational movement less than 1 inch at the edge of pier. Contact the Engineer for pole loading diagrams of standard poles used for non-standard foundation designs. Submit non-standard foundation designs including drawings, calculations, and soil boring logs to the Engineer for review and approval before construction.

C. Drilled Pier Construction:

Construct drilled pier foundation and Install anchor rod assemblies in accordance with the *Foundations and Anchor Rod Assemblies for Metal Poles* Standard Special Provision SP09-R005 located at:

https://connect.ncdot.gov/resources/Specifications/Pages/2024-Specifications-and-Special-Provisions.aspx

5.3. POLE NUMBERING SYSTEM

Attach an identification tag to each pole shaft section as shown on Metal Pole Standard Sheet M2 "Typical Fabrication Details for All Metal Poles."

5.4. MEASUREMENT AND PAYMENT

Actual number of metal strain signal poles (without regard to height or load capacity) furnished, installed and accepted.

Actual number of metal poles with single mast arms furnished, installed, and accepted.

Actual number of metal poles with dual mast arms furnished, installed, and accepted.

Actual number of designs for mast arms with metal poles furnished and accepted.

Actual number of soil tests with SPT borings drilled furnished and accepted.

Actual volume of concrete poured in cubic yards of drilled pier foundation furnished, installed and accepted.

No measurement will be made for foundation designs prepared with metal pole designs, as these will be considered incidental to designing Traffic Signal , CCTV or MVD support structures.

Payment will be made under:

Metal Strain Signal Pole .....Each
Metal Pole with Single Mast Arm .....Each
Metal Pole with Dual Mast Arm.....Each
Mast Arm with Metal Pole Design .....Each
Soil Test .....Each
Drilled Pier Foundation..... Cubic Yard

6. ETHERNET EDGE SWITCH

Furnish and install a managed Ethernet edge switch as specified below that is fully compatible, interoperable, and completely interchangeable and functional within the existing City, Division, or Statewide traffic signal system communications network.

6.1. DESCRIPTION

A. Ethernet Edge Switch:

Furnish and install a hardened, field Ethernet edge switch (hereafter "edge switch") for the traffic signal controller or ITS device as specified below. Ensure that the edge switch provides wire-speed, fast Ethernet connectivity at transmission rates of 1000 megabits per second from each remote traffic signal controller or ITS device location to the routing switches.

Contact the City or NCDIT to arrange for the programming of the new Field Ethernet Switches with the necessary network configuration data, including but not limited to, the IP Address, Default Gateway, Subnet Mask and VLAN ID information. Provide a minimum ten (10) working days notice to allow the City or NCDIT to program the new devices.

B. Network Management:

Ensure that the edge switch is fully compatible with the existing City, Division, or Statewide Network Management Software.

6.2. MATERIALS

A. General:

Ensure that the edge switch is fully compatible and interoperable with the trunk Ethernet network interface and that the edge switch supports half and full duplex Ethernet communications.

Furnish an edge switch that provide 99.999% error-free operation, and that complies with the Electronic Industries Alliance (EIA) Ethernet data communication requirements using single-mode fiber-optic transmission medium and copper transmission medium. Ensure that the edge switch has a minimum mean time between failures (MTBF) of 10 years, or 87,600 hours, as calculated using the Bellcore/Telcordia SR-332 standard for reliability prediction.

B. Compatibility Acceptance

The Engineer has the authority to require the Contractor to submit a sample Field Ethernet Switch and SFP along with all supporting documentation, software and testing procedures to allow a compatibility acceptance test be performed prior to approving the proposed Field Ethernet Switch and Field Ethernet Transceiver for deployment**. The Compatibility Acceptance testing will ensure that the proposed device is 100% compatible and interoperable with the existing City, Division, or Statewide Signal System network, monitoring software and Traffic Operations**

Center network hardware. Allow fifteen (15) working days for the Compatibility Acceptance Testing to be performed

C. Standards:

Ensure that the edge switch complies with all applicable IEEE networking standards for Ethernet communications, including but not limited to:

- IEEE 802.1D standard for media access control (MAC) bridges used with the Spanning Tree Protocol (STP);
- IEEE 802.1Q standard for port-based virtual local area networks (VLANs);
- IEEE 802.1P standard for Quality of Service (QoS);
- IEEE 802.1w standard for MAC bridges used with the Rapid Spanning Tree Protocol (RSTP);
- IEEE 802.1s standard for MAC bridges used with the Multiple Spanning Tree Protocol;
- IEEE 802.1x standard for port based network access control, including RADIUS;
- IEEE 802.3 standard for local area network (LAN) and metropolitan area network (MAN) access and physical layer specifications;
- IEEE 802.3u supplement standard regarding 100 Base TX/100 Base FX;
- IEEE 802.3x standard regarding flow control with full duplex operation; and
- IFC 2236 regarding IGMP v2 compliance.
- IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
- IEEE 802.3ad Ethernet Link Aggregation
- IEEE 802.3i for 10BASE-T (10 Mbit/s over Fiber-Optic)
- IEEE 802.3ab for 1000BASE-T (1Gbit/s over Ethernet)
- IEEE 802.3z for 1000BASE-X (1 Gbit/s Ethernet over Fiber-Optic)

D. Functional:

Ensure that the edge switch supports all Layer 2 management features and certain Layer 3 features related to multicast data transmission and routing. These features shall include, but not be limited to:

- An STP healing/convergence rate that meets or exceeds specifications published in the IEEE 802.1D standard.
- An RSTP healing/convergence rate that meets or exceeds specifications published in the IEEE 802.1w standard.
- An Ethernet edge switch that is a port-based VLAN and supports VLAN tagging that meets or exceeds specifications as published in the IEEE 802.1Q standard, and has a minimum 4-kilobit VLAN address table (254 simultaneous).
- A forwarding/filtering rate that is a minimum of 14,880 packets per second for 10 megabits per second and 148,800 packets per second for 100 megabits per second.
- A minimum 4-kilobit MAC address table.
- Support of Traffic Class Expediting and Dynamic Multicast Filtering.
- Support of, at a minimum, snooping of Version 2 & 3 of the Internet Group Management Protocol (IGMP).
- Support of remote and local setup and management via telnet or secure Web-based GUI and command line interfaces.

- Support of the Simple Network Management Protocol version 3 (SNMPv3). Verify that the Ethernet edge switch can be accessed using the resident EIA-232 management port, a telecommunication network, or the Trivial File Transfer Protocol (TFTP).
- Port security through controlling access by the users. Ensure that the Ethernet edge switch has the capability to generate an alarm and shut down ports when an unauthorized user accesses the network.
- Support of remote monitoring (RMON-1 & RMON-2) of the Ethernet agent.
- Support of the TFTP and SNTP. Ensure that the Ethernet edge switch supports port mirroring for troubleshooting purposes when combined with a network analyzer.

E. Physical Features:

Ports: Provide 10/100/1000 Mbps auto-negotiating ports (RJ-45) copper Fast Ethernet ports for all edge switches. Provide auto-negotiation circuitry that will automatically negotiate the highest possible data rate and duplex operation possible with attached devices supporting the IEEE 802.3 Clause 28 auto-negotiation standard.

Optical Ports: Ensure that all fiber-optic link ports operate at 1310 or 1550 nanometers in single mode. Provide Type LC connectors for the optical ports, as specified in the Plans or by the Engineer. Do not use mechanical transfer registered jack (MTRJ) type connectors.

Provide an edge switch having a minimum of two optical 100/1000 Base X ports capable of transmitting data at 100/1000 megabits per second. Ensure that each optical port consists of a pair of fibers; one fiber will transmit (TX) data and one fiber will receive (RX) data. Ensure that the optical ports have an optical power budget of at least 15 dB. Provide small form-factor pluggable modules (SFPs) with a maximum range that meets or exceeds the distance requirement as indicated on the Plans.

Copper Ports: Provide an edge switch that includes a minimum of four copper ports. Provide Type RJ-45 copper ports and that auto-negotiate speed (i.e., 10/100/1000 Base) and duplex (i.e., full or half). Ensure that all 10/100/1000 Base TX ports meet the specifications detailed in this section and are compliant with the IEEE 802.3 standard pinouts. Ensure that all Category 6 unshielded twisted pair/shielded twisted pair network cables are compliant with the EIA/TIA-568-B standard.

*Port Security***:** Ensure that the edge switch supports/complies with the following (remotely) minimum requirements:

- Ability to configure static MAC addresses access;
- Ability to disable automatic address learning per ports; know hereafter as Secure Port. Secure Ports only forward; and
- Trap and alarm upon any unauthorized MAC address and shutdown for programmable duration. Port shutdown requires administrator to manually reset the port before communications are allowed.

F. Management Capabilities:

Ensure that the edge switch supports all Layer 2 management features and certain Layer 3 features related to multicast data transmission and routing. These features shall include, but not be limited to:

- An STP healing/convergence rate that meets or exceeds specifications published in the IEEE 802.1 D standards;

- An RSTP healing/convergence rate that meets or exceeds specifications published in the IEEE 802.1w standard;
- An Ethernet edge switch that is a port-based VLAN and supports VLAN tagging that meets or exceeds specifications as published in the IEEE 802.1Q standard, and has a minimum 4-kilobit VLAN address table (254 simultaneous);
- A forwarding/filtering rate that is a minimum of 14,880 packets per second for 10 megabits per second, 148,800 packets per second for 100 megabits per second and 1,488,000 packets per second for 1000 megabits per second;
- A minimum 4-kilobit MAC address table;
- Support of Traffic Class Expediting and Dynamic Multicast Filtering.
- Support of, at a minimum, snooping of Version 2 & 3 of the Internet Group Management Protocol (IGMP);
- Support of remote and local setup and management via telnet or secure Web-based GUI and command line interfaces; and
- Support of the Simple Network Management Protocol (SNMP). Verify that the Ethernet edge switch can be accessed using the resident EIA-232 management port, a telecommunication network, or the Trivial File Transfer Protocol (TFTP).

*Network Capabilities***:** Provide an edge switch that supports/complies with the following minimum requirements:

- Provide full implementation of IGMPv2 snooping (RFC 2236);
- Provide full implementation of SNMPv1, SNMPv2c, and/or SNMPv3;
- Provide support for the following RMON–I groups, at a minimum:
  - Part 1: Statistics
  - Part 2: History
  - Part 3: Alarm
  - Part 9: Event
- Provide support for the following RMON–2 groups, at a minimum:
  - Part 13: Address Map
  - Part 16: Layer Host
  - Part 17:Layer Matrix
  - Part 18:User History
- Capable of mirroring any port to any other port within the switch;
- Meet the IEEE 802.1Q (VLAN) standard per port for up to four VLANs;
- Meet the IEEE 802.3ad (Port Trunking) standard for a minimum of two groups of four ports;
- Password manageable;
- Telnet/CLI;
- HTTP (Embedded Web Server) with Secure Sockets Layer (SSL); and
- Full implementation of RFC 783 (TFTP) to allow remote firmware upgrades.

*Network Security***:** Provide an edge switch that supports/complies with the following (remotely) minimum network security requirements:

- Multi-level user passwords;
- RADIUS centralized password management (IEEE 802.1X);
- SNMPv3 encrypted authentication and access security;
- Port security through controlling access by the users: ensure that the Ethernet edge switch has the capability to generate an alarm and shut down ports when an unauthorized user accesses the network;

- Support of remote monitoring (RMON-1&2) of the Ethernet agent; and
- Support of the TFTP and SNTP. Ensure that the Ethernet edge switch supports port mirroring for troubleshooting purposes when combined with a network analyzer.

G. Electrical Specifications:

Ensure that the edge switch operates and power is supplied with 115 volts of alternating current (VAC). Ensure that the edge switch has a minimum operating input of 110 VAC and a maximum operating input of 130 VAC. Ensure that if the device requires operating voltages other than 120 VAC, supply the required voltage converter. Ensure that the maximum power consumption does not exceed 50 watts. Ensure that the edge switch has diagnostic light emitting diodes (LEDs), including link, TX, RX, speed (for Category 6 ports only), and power LEDs.

H. Environmental Specifications:

Ensure that the edge switch performs all of the required functions during and after being subjected to an ambient operating temperature range of -30 degrees to 165 degrees Fahrenheit as defined in the environmental requirements section of the NEMA TS 2 standard, with a noncondensing humidity of 0 to 95%.

Provide certification that the device has successfully completed environmental testing as defined in the environmental requirements section of the NEMA TS 2 standard. Provide certification that the device meets the vibration and shock resistance requirements of Sections 2.1.9 and 2.1.10, respectively, of the NEMA TS 2 standard. Ensure that the edge switch is protected from rain, dust, corrosive elements, and typical conditions found in a roadside environment.

The edge switch shall meet or exceed the following environmental standards:

- IEEE 1613 (electric utility substations)
- IEC 61850-3 (electric utility substations)
- IEEE 61800-3 (variable speed drive systems)
- IEC 61000-6-2 (generic industrial)
- EMF – FCC Part 15 CISPR (EN5502) Class A

I. Ethernet Patch Cable:

Furnish a factory pre-terminated/pre-connectorized Ethernet patch cable with each edge switch. Furnish Ethernet patch cables meeting the following physical requirements:

- Five (5)-foot length
- Category 6 or better
- Factory-installed RJ-45 connectors on both ends
- Molded anti-snag hoods over connectors
- Gold plated connectors
- Copper-clad aluminum is **NOT** allowed.

Furnish Fast Ethernet patch cords meeting the following minimum performance requirements:

- TIA/EIA-568-B-5, Additional Transmission Performance Specifications for 4-pair 100 Ω Enhanced Category 6 Cabling
- Frequency Range: 1-100 MHz
- Near-End Crosstalk (NEXT): 30.1 dB
- Power-sum NEXT: 27.1 dB

- Attenuation to Crosstalk Ratio (ACR): 6.1 dB
- Power-sum ACR: 3.1 dB
- Return Loss: 10dB
- Propagation Delay: 548 nsec

6.3. CONSTRUCTION METHODS

A. General:

Ensure that the edge switch is UL listed.

Verify that network/field/data patch cords meet all ANSI/EIA/TIA requirements for Category 6 four-pair unshielded twisted pair cabling with stranded conductors and RJ45 connectors.

Contact the City, Division, or NCDIT a minimum of 10 working days prior to installation to allow for the programming of the edge switch.

B. Edge Switch:

Mount the edge switch inside each field cabinet by securely fastening the edge switch to the upper end of the right rear vertical rail of the equipment rack using manufacturer-recommended or Engineer-approved attachment methods, attachment hardware and fasteners.

Ensure that the edge switch is mounted securely in the cabinet and is fully accessible by field technicians without blocking access to other equipment. Verify that fiber-optic jumpers consist of a length of cable that has connectors on both ends, primarily used for interconnecting termination or patching facilities and/or equipment.

6.4. MEASURMENT AND PAYMENT

Ethernet edge switch will be measured and paid as the actual number of Ethernet edge switches furnished, installed, and accepted.

No separate measurement will be made for Ethernet patch cable, small form factor pluggable modules (SFPs), power cord, mounting hardware, nuts, bolts, brackets, or edge switch programming as these will be considered incidental to furnishing and installing the edge switch.

Payment will be made under:

Ethernet Edge Switch.....Each

PROJECT SPECIAL PROVISIONS

Structures

SUBMITTAL OF WORKING DRAWINGS (1-31-25)

GENERAL

Submit working drawings in accordance with Article 105-2 of the *Standard Specifications* and this Special Provision. For this Special Provision, "submittals" refers to only those listed in this Special Provision. The list of submittals contained herein does not represent a list of required submittals for the project. Submittals are only necessary for those items as required by the contract. Make submittals that are not specifically noted in this provision directly to the Engineer. Either the Structures Management Unit or the Geotechnical Engineering Unit or both units will jointly review submittals.

If a submittal contains variations from plan details or specifications or significantly affects project cost, field construction or operations, discuss the submittal with and submit all copies to the Engineer. State the reason for the proposed variation in the submittal. To minimize review time, make sure all submittals are complete when initially submitted. Provide a contact name and information with each submittal. Direct any questions regarding submittal requirements to the Engineer, Structures Management Unit contacts or the Geotechnical Engineering Unit contacts noted below.

To facilitate in-plant inspection by NCDOT and approval of working drawings, provide the name, address and telephone number of the facility where fabrication will actually be done if different than shown on the title block of the submitted working drawings. This includes, but is not limited to, precast concrete items, prestressed concrete items and fabricated steel or aluminum items.

ADDRESSES AND CONTACTS

For submittals to the Structures Management Unit, use the following addresses:

Via Email: SMU-wdr@ncdot.gov (do not cc SMU Working Drawings staff)

Via US mail:

Mr. D. N. Snoke, P. E.
State Structures Engineer
North Carolina Department
of Transportation
Structures Management Unit
1581 Mail Service Center
Raleigh, NC 27699-1581

Attention: Mr. J. L. Bolden, P. E.

Via other delivery service:

Mr. D. N. Snoke, P. E.
State Structures Engineer
North Carolina Department
of Transportation
Structures Management Unit
1000 Birch Ridge Drive
Raleigh, NC 27610

Attention: Mr. J. L. Bolden, P. E.

For submittals to the Geotechnical Engineering Unit, use the following addresses:

For projects in Divisions 1-7 (Eastern Regional Office):

Via Email: EastGeotechnicalSubmittal@ncdot.gov

Via US mail:

Via other delivery service:

Mr. Thomas Santee, P. E.
Assistant State Geotechnical
Engineer – Eastern Region
North Carolina Department
of Transportation
Geotechnical Engineering Unit
Eastern Regional Office
1570 Mail Service Center
Raleigh, NC 27699-1570

Mr. Thomas Santee, P. E.
Assistant State Geotechnical
Engineer – Eastern Region
North Carolina Department
of Transportation
Geotechnical Engineering Unit
Eastern Regional Office
3301 Jones Sausage Road, Suite 100
Garner, NC 27529

For projects in Divisions 8-14 (Western Regional Office):

Via Email: WestGeotechnicalSubmittal@ncdot.gov

Via US mail or other delivery service:

Mr. Eric Williams, P. E.
Assistant State Geotechnical
Engineer – Western Region
North Carolina Department
of Transportation
Geotechnical Engineering Unit
Western Regional Office
5253 Z Max Boulevard
Harrisburg, NC 28075

The status of the review of structure-related submittals sent to the Structures Management Unit can be viewed from the Unit's website, via the "Drawing Submittal Status" link.

The status of the review of geotechnical-related submittals sent to the Geotechnical Engineering Unit can be viewed from the Unit's website, via the "Geotechnical Construction Submittals" link.

Direct any questions concerning submittal review status, review comments or drawing markups to the following contacts:

Primary Structures Contact: James Bolden (919) 707 – 6408
jlbolden@ncdot.gov

Secondary Structures Contacts: Madonna Rorie (919) 707 – 6508
mlrorie@ncdot.gov

Eastern Regional Geotechnical Contact (Divisions 1-7):
Thomas Santee (984) 920-8901
EastGeotechnicalSubmittal@ncdot.gov

Western Regional Geotechnical Contact (Divisions 8-14):
Eric Williams (980)258-6400

WestGeotechnicalSubmittal@ncdot.gov

SUBMITTAL COPIES

Furnish one complete copy of each submittal, including all attachments, to the Engineer. At the same time, submit a copy of the same complete submittal directly to the Structures Management Unit and/or the Geotechnical Engineering Unit as specified in the tables below.

The first table below covers "Structure Submittals." The Engineer will receive review comments and drawing markups for these submittals from the Structures Management Unit. The second table in this section covers "Geotechnical Submittals." The Engineer will receive review comments and drawing markups for these submittals from the Geotechnical Engineering Unit.

Unless otherwise required, submit one set of supporting calculations to either the Structures Management Unit or the Geotechnical Engineering Unit unless both units require submittal copies in which case submit a set of supporting calculations to each unit. Provide additional copies of any submittal as directed.

STRUCTURE SUBMITTALS

Submittal	Submittal Required by Structures Management Unit?	Submittal Required by Geotechnical Engineering Unit?	Contract Reference Requiring Submittal [1]
Arch Culvert Falsework	Y	N	Plan Note, SN Sheet & "Falsework and Formwork"
Box Culvert Falsework [7]	Y	N	Plan Note, SN Sheet & "Falsework and Formwork"
Cofferdams	Y	Y	Article 410-4
Foam Joint Seals [6]	Y	N	"Foam Joint Seals"
Expansion Joint Seals (hold down plate type with base angle)	Y	N	"Expansion Joint Seals"
Expansion Joint Seals (modular)	Y	N	"Modular Expansion Joint Seals"
Expansion Joint Seals (strip seals)	Y	N	"Strip Seal Expansion Joints"
Falsework & Forms [2] (substructure)	Y	N	Article 420-3 & "Falsework and Formwork"
Falsework & Forms (superstructure)	Y	N	Article 420-3 & "Falsework and Formwork"

Girder Erection over Railroad	Y	N	Railroad Provisions
Maintenance and Protection of Traffic Beneath Proposed Structure	Y	N	"Maintenance and Protection of Traffic Beneath Proposed Structure at Station ___"
Metal Bridge Railing	Y	N	Plan Note
Metal Stay-in-Place Forms	Y	N	Article 420-3
Metalwork for Elastomeric Bearings [4,5]	Y	N	Article 1072-8
Miscellaneous Metalwork [4,5]	Y	N	Article 1072-8
Disc Bearings [4]	Y	N	"Disc Bearings"
Overhead and Digital Message Signs (DMS) (metalwork and foundations)	Y	N	Applicable Provisions
Placement of Equipment on Structures (cranes, etc.)	Y	N	Article 420-20
Prestressed Concrete Box Beam (detensioning sequences) [3]	Y	N	Article 1078-11
Precast Concrete Box Culverts	Y	N	"Optional Precast Reinforced Concrete Box Culvert at Station ___"
Prestressed Concrete Cored Slab (detensioning sequences) [3]	Y	N	Article 1078-11
Prestressed Concrete Deck Panels	Y	N	Article 420-3
Prestressed Concrete Girder (strand elongation and detensioning sequences)	Y	N	Articles 1078-8 and 1078-11
Removal of Existing Structure over Railroad	Y	N	Railroad Provisions
Revised Bridge Deck Plans (adaptation to prestressed deck panels)	Y	N	Article 420-3
Revised Bridge Deck Plans (adaptation to modular expansion joint seals)	Y	N	"Modular Expansion Joint Seals"
Sound Barrier Wall (precast items)	Y	N	Article 1077-2 & "Sound Barrier Wall"

Sound Barrier Wall Steel Fabrication Plans [5]	Y	N	Article 1072-8 & "Sound Barrier Wall"
Structural Steel [4]	Y	N	Article 1072-8
Temporary Detour Structures	Y	Y	Article 400-3 & "Construction, Maintenance and Removal of Temporary Structure at Station ____"
TFE Expansion Bearings [4]	Y	N	Article 1072-8

FOOTNOTES

1. References are provided to help locate the part of the contract where the submittals are required. References in quotes refer to the provision by that name. Articles refer to the *Standard Specifications*.
2. Submittals for these items are necessary only when required by a note on plans.
3. Submittals for these items may not be required. A list of pre-approved sequences is available from the producer or the Materials & Tests Unit.
4. The fabricator may submit these items directly to the Structures Management Unit.
5. The two sets of preliminary submittals required by Article 1072-8 of the *Standard Specifications* are not required for these items.
6. Submittals for Fabrication Drawings are not required. Submittals for Catalogue Cuts of Proposed Material are required. See Section 5.A of the referenced provision.
7. Submittals are necessary only when the top slab thickness is 18" or greater.

GEOTECHNICAL SUBMITTALS

Submittal	Submittals Required by Geotechnical Engineering Unit	Submittals Required by Structures Management Unit	Contract Reference Requiring Submittal [1]
Drilled Pier Construction Plans [2]	Y	N	Subarticle 411-3(A)
Crosshole Sonic Logging (CSL) Reports [2]	Y	N	Subarticle 411-5(A)(2)

Pile Driving Equipment Data Forms [2,3]	Y	N	Subarticle 450-3(D)(2)
Pile Driving Analyzer (PDA) Reports [2]	Y	N	Subarticle 450-3(F)(3)
Retaining Walls [4]	Y; drawings and calculations	Y; drawings	Applicable Provisions
Temporary Shoring [4]	Y; drawings and calculations	Y; drawings	"Temporary Shoring" & "Temporary Soil Nail Walls"

FOOTNOTES

1. References are provided to help locate the part of the contract where the submittals are required. References in quotes refer to the provision by that name. Subarticles refer to the *Standard Specifications*.

2. Submit one hard copy of submittal to the Engineer. Submit a second copy of submittal electronically (PDF via email), US mail or other delivery service to the appropriate Geotechnical Engineering Unit regional office. Electronic submission is preferred.

3. The Pile Driving Equipment Data Form is available from:
   https://connect.ncdot.gov/projects/construction/ConstManRefDocs/PILE%20DRIVING%20EQUIPMENT%20DATA%20FORM.pdf
   See second page of form for submittal instructions.

4. Electronic copy of submittal is required. See referenced provision.

FALSEWORK AND FORMWORK (11-30-23)

GENERAL

Use this Special Provision as a guide to develop temporary works submittals required by the *Standard Specifications* or other provisions; no additional submittals are required herein. Such temporary works include, but are not limited to, falsework and formwork.

Falsework is any temporary construction used to support the permanent structure until it becomes self-supporting. Formwork is the temporary structure or mold used to retain plastic or fluid concrete in its designated shape until it hardens. Access scaffolding is a temporary structure that functions as a work platform that supports construction personnel, materials, and tools, but is not intended to support the structure. Scaffolding systems that are used to temporarily support permanent structures (as opposed to functioning as work platforms) are considered to be falsework under the definitions given. Shoring is a component of falsework such as horizontal, vertical, or

inclined support members. Where the term "temporary works" is used, it includes all of the temporary facilities used in bridge construction that do not become part of the permanent structure.

Design and construct safe and adequate temporary works that will support all loads imposed and provide the necessary rigidity to achieve the lines and grades shown on the plans in the final structure.

MATERIALS

Select materials suitable for temporary works; however, select materials that also ensure the safety and quality required by the design assumptions. The Engineer has authority to reject material on the basis of its condition, inappropriate use, safety, or nonconformance with the plans. Clearly identify allowable loads or stresses for all materials or manufactured devices on the plans. Revise the plan and notify the Engineer if any change to materials or material strengths is required.

DESIGN REQUIREMENTS

(A) Working Drawings

Provide working drawings for items as specified in the contract, or as required by the Engineer, with design calculations and supporting data in sufficient detail to permit a structural and safety review of the proposed design of the temporary work.

On the drawings, show all information necessary to allow the design of any component to be checked independently as determined by the Engineer.

When concrete placement is involved, include data such as the drawings of proposed sequence, rate of placement, direction of placement, and location of all construction joints.

When required, have the drawings and calculations prepared under the guidance of, and sealed by, a North Carolina Registered Professional Engineer who is knowledgeable in temporary works design.

If requested by the Engineer, submit with the working drawings manufacturer's catalog data listing the weight of all construction equipment that will be supported on the temporary work. Show anticipated total settlements and/or deflections of falsework and forms on the working drawings. Include falsework footing settlements, joint take-up, and deflection of beams or girders.

As an option for the Contractor, overhang falsework hangers may be uniformly spaced, at a maximum of 36 inches, provided the following conditions are met:

Member Type (PCG)	Member Depth, (inches)	Max. Overhang Width, (inches)	Max. Slab Edge Thickness, (inches)	Max. Screed Wheel Weight, (lbs.)	Bracket Min. Vertical Leg Extension, (inches)
II	36	39	14	2000	26
III	45	42	14	2000	35
IV	54	45	14	2000	44
MBT	63	51	12	2000	50

MBT	72	55	12	1700	48

Overhang width is measured from the centerline of the girder to the edge of the deck slab. For Type II, III & IV prestressed concrete girders (PCG), 45-degree cast-in-place half hangers and rods must have a minimum safe working load of 6,000 lbs.

For MBT prestressed concrete girders, 45-degree angle holes for falsework hanger rods shall be cast through the girder top flange and located, measuring along the top of the member, 1'-2 ½" from the edge of the top flange. Hanger hardware and rods must have a minimum safe working load of 6,000 lbs.

For link slabs, the top of girders directly beneath the link slab shall be free of overhang falsework attachments or other hardware. Submit calculations and working drawings for overhang falsework in the link slab region.

The overhang bracket provided for the diagonal leg shall have a minimum safe working load of 3,750 lbs. The vertical leg of the bracket shall extend to the point that the heel bears on the girder bottom flange, no closer than 4 inches from the bottom of the member. However, for 72-inch members, the heel of the bracket shall bear on the web, near the bottom flange transition.

Provide adequate overhang falsework and determine the appropriate adjustments for deck geometry, equipment, casting procedures and casting conditions.

If the optional overhang falsework spacing is used, indicate this on the falsework submittal and advise the girder producer of the proposed details. Failure to notify the Engineer of hanger type and hanger spacing on prestressed concrete girder casting drawings may delay the approval of those drawings.

Falsework hangers that support concentrated loads and are installed at the edge of thin top flange concrete girders (such as bulb tee girders) shall be spaced so as not to exceed 75% of the manufacturer's stated safe working load. Use of dual leg hangers (such as Meadow Burke HF-42 and HF-43) are not allowed on concrete girders with thin top flanges. Design the falsework and forms supporting deck slabs and overhangs on girder bridges so that there will be no differential settlement between the girders and the deck forms during placement of deck concrete.

When staged construction of the bridge deck is required, detail falsework and forms for screed and fluid concrete loads to be independent of any previous deck pour components when the mid-span girder deflection due to deck weight is greater than ¾".

Note on the working drawings any anchorages, connectors, inserts, steel sleeves or other such devices used as part of the falsework or formwork that remains in the permanent structure. If the plan notes indicate that the structure contains the necessary corrosion protection required for a Corrosive Site, epoxy coat, galvanize or metalize these devices. Electroplating will not be allowed. Any coating required by the Engineer will be considered incidental to the various pay items requiring temporary works.

Design falsework and formwork requiring submittals in accordance with the current edition of AASHTO *Guide Design Specifications for Bridge Temporary Works* except as noted herein.

(1) Wind Loads

Table 2.2 of Article 2.2.5.1 is modified to include wind velocities up to 110 mph. In addition, Table 2.2A is included to provide the maximum wind speeds by county in North Carolina.

Table 2.2 - Wind Pressure Values

Height Zone feet above ground	Pressure, lb/ft^2 for Indicated Wind Velocity, mph				
	70	80	90	100	110
0 to 30	15	20	25	30	35
30 to 50	20	25	30	35	40
50 to 100	25	30	35	40	45
over 100	30	35	40	45	50

(2) Time of Removal

The following requirements replace those of Article 3.4.8.2.

Do not remove forms until the concrete has attained strengths required in Article 420-16 of the *Standard Specifications* and these Special Provisions.

Do not remove forms until the concrete has sufficient strength to prevent surface damage.

Table 2.2A - Steady State Maximum Wind Speeds by Counties in North Carolina

COUNTY	25 YR (mph)	COUNTY	25 YR (mph)	COUNTY	25 YR (mph)
Alamance	70	Franklin	70	Pamlico	100
Alexander	70	Gaston	70	Pasquotank	100
Alleghany	70	Gates	90	Pender	100
Anson	70	Graham	80	Perquimans	100
Ashe	70	Granville	70	Person	70
Avery	70	Greene	80	Pitt	90
Beaufort	100	Guilford	70	Polk	80
Bertie	90	Halifax	80	Randolph	70
Bladen	90	Harnett	70	Richmond	70
Brunswick	100	Haywood	80	Robeson	80
Buncombe	80	Henderson	80	Rockingham	70
Burke	70	Hertford	90	Rowan	70
Cabarrus	70	Hoke	70	Rutherford	70
Caldwell	70	Hyde	110	Sampson	90
Camden	100	Iredell	70	Scotland	70
Carteret	110	Jackson	80	Stanley	70
Caswell	70	Johnston	80	Stokes	70
Catawba	70	Jones	100	Surry	70
Cherokee	80	Lee	70	Swain	80
Chatham	70	Lenoir	90	Transylvania	80
Chowan	90	Lincoln	70	Tyrell	100
Clay	80	Macon	80	Union	70
Cleveland	70	Madison	80	Vance	70
Columbus	90	Martin	90	Wake	70
Craven	100	McDowell	70	Warren	70
Cumberland	80	Mecklenburg	70	Washington	100
Currituck	100	Mitchell	70	Watauga	70
Dare	110	Montgomery	70	Wayne	80
Davidson	70	Moore	70	Wilkes	70
Davie	70	Nash	80	Wilson	80
Duplin	90	New Hanover	100	Yadkin	70
Durham	70	Northampton	80	Yancey	70
Edgecombe	80	Onslow	100		
Forsyth	70	Orange	70		

(B) Review and Approval

The Engineer is responsible for the review and approval of temporary works' drawings.

Submit the working drawings sufficiently in advance of proposed use to allow for their review, revision (if needed), and approval without delay to the work.

The time period for review of the working drawings does not begin until complete drawings and design calculations, when required, are received by the Engineer.

Do not start construction of any temporary work for which working drawings are required until the drawings have been approved. Such approval does not relieve the Contractor of the responsibility for the accuracy and adequacy of the working drawings.

CONSTRUCTION REQUIREMENTS

All requirements of Section 420 of the *Standard Specifications* apply.

Construct temporary works in conformance with the approved working drawings. Ensure that the quality of materials and workmanship employed is consistent with that assumed in the design of the temporary works. Do not weld falsework members to any portion of the permanent structure unless approved. Show any welding to the permanent structure on the approved construction drawings.

Provide tell-tales attached to the forms and extending to the ground, or other means, for accurate measurement of falsework settlement. Make sure that the anticipated compressive settlement and/or deflection of falsework does not exceed 1 inch. For cast-in-place concrete structures, make sure that the calculated deflection of falsework flexural members does not exceed 1/240 of their span regardless of whether or not the deflection is compensated by camber strips.

(A) Maintenance and Inspection

Inspect and maintain the temporary work in an acceptable condition throughout the period of its use. Certify that the manufactured devices have been maintained in a condition to allow them to safely carry their rated loads. Clearly mark each piece so that its capacity can be readily determined at the job site.

Perform an in-depth inspection of an applicable portion(s) of the temporary works, in the presence of the Engineer, not more than 24 hours prior to the beginning of each concrete placement. Inspect other temporary works at least once a month to ensure that they are functioning properly. Have a North Carolina Registered Professional Engineer inspect the cofferdams, shoring, sheathing, support of excavation structures, and support systems for load tests prior to loading.

(B) Foundations

Determine the safe bearing capacity of the foundation material on which the supports for temporary works rest. If required by the Engineer, conduct load tests to verify proposed bearing capacity values that are marginal or in other high-risk situations.

The use of the foundation support values shown on the contract plans of the permanent structure is permitted if the foundations are on the same level and on the same soil as those of the permanent structure.

Allow for adequate site drainage or soil protection to prevent soil saturation and washout of the soil supporting the temporary works supports.

If piles are used, the estimation of capacities and later confirmation during construction using standard procedures based on the driving characteristics of the pile is permitted. If preferred, use load tests to confirm the estimated capacities; or, if required by the Engineer conduct load tests to verify bearing capacity values that are marginal or in other high risk situations.

The Engineer reviews and approves the proposed pile and soil bearing capacities.

REMOVAL

Unless otherwise permitted, remove and keep all temporary works upon completion of the work. Do not disturb or otherwise damage the finished work.

Remove temporary works in conformance with the contract documents. Remove them in such a manner as to permit the structure to uniformly and gradually take the stresses due to its own weight.

MEASUREMENT AND PAYMENT

Unless otherwise specified, *Falsework and Formwork* will not be directly measured.

Payment at the contract unit prices for the various pay items requiring temporary works will be full compensation for the above falsework and formwork.

CRANE SAFETY (6-20-19)

GENERAL

Comply with the manufacturer specifications and limitations applicable to the operation of any and all cranes and derricks. Prime contractors, sub-contractors, and fully operated rental companies shall comply with the current Occupational Safety and Health Administration (OSHA) regulations.

Submit all items listed below to the Engineer prior to beginning crane operations. Changes in personnel or equipment must be reported to the Engineer and all applicable items listed below must be updated and submitted prior to continuing with crane operations.

CRANE SAFETY SUBMITTAL LIST

(A) Competent Person: Provide the name and qualifications of the "Competent Person" responsible for crane safety and lifting operations. The named competent person will have the responsibility and authority to stop any work activity due to safety concerns.

(B) Riggers: Provide the qualifications and experience of the persons responsible for rigging operations. Qualifications and experience should include, but not be limited to, weight

calculations, center of gravity determinations, selection and inspection of sling and rigging equipment, and safe rigging practices.

(C) Crane Inspections: Inspection records for all cranes shall be current and readily accessible for review upon request.

(D) Certifications: Crane operators shall be certified by the National Commission for the Certification of Crane Operators (NCCCO) or the National Center for Construction Education and Research (NCCER). Other approved nationally accredited programs will be considered upon request. In addition, crane operators shall have a current CDL medical card. Submit a list of crane operator(s) and include current certification for each type of crane operated (small hydraulic, large hydraulic, small lattice, large lattice) and medical evaluations for each operator.

MEASUREMENT AND PAYMENT

No direct payment will be made for *Crane Safety*. All costs shall be considered incidental to items for which direct payment is made.

GROUT FOR STRUCTURES (12-1-17)

GENERAL

This Special Provision addresses grout for use in pile blockouts, grout pockets, shear keys, dowel holes and recesses for structures. This Special Provision does not apply to grout placed in post-tensioning ducts for bridge beams, girders, decks, end bent caps, or bent caps. Mix and place grout in accordance with the manufacturer's recommendations, the applicable sections of the *Standard Specifications* and this Special Provision.

MATERIAL REQUIREMENT

Unless otherwise noted on the plans, use a Type 3 Grout in accordance with Section 1003 of the *Standard Specifications*.

Initial setting time shall not be less than 10 minutes when tested in accordance with ASTM C266.

Construction loading and traffic loading shall not be allowed until the 3-day compressive strength is achieved.

SAMPLING AND PLACEMENT

Place and maintain components in final position until grout placement is complete and accepted. Concrete surfaces to receive grout shall be free of defective concrete, laitance, oil, grease, and other foreign matter. Saturate concrete surfaces with clean water and remove excess water prior to placing grout.

MEASUREMENT AND PAYMENT

No separate payment will be made for *Grout for Structures*. The cost of the material, equipment, labor, placement, and any incidentals necessary to complete the work shall be considered incidental to the structure item requiring grout.

ASBESTOS ASSESSMENT (11-30-23)

INSPECTION FOR ASBESTOS CONTAINING MATERIAL

Prior to conducting bridge demolition or renovation activities, the Contractor shall thoroughly inspect the bridge or affected components for the presence of asbestos containing material (ACM) using a firm prequalified by NCDOT to perform asbestos surveys. The inspection must be performed by a N.C. accredited asbestos inspector with experience inspecting bridges or other industrial structures. The N.C. accredited asbestos inspector must conduct a thorough inspection, identifying all asbestos-containing material as required by the Environmental Protection Agency National Emission Standards for Hazardous Air Pollutants (NESHAP) Code of Federal Regulations (CFR) 40 CFR, Part 61, Subpart M.

The Contractor shall submit an inspection report to the Engineer, which at a minimum must include information required in 40 CFR 763.85 (a)(4) vi)(A)-(E), as well as a project location map, photos of existing structure, the date of inspection and the name, N.C. accreditation number, and signature of the N.C. accredited asbestos inspector who performed the inspection and completed the report. The cover sheet of the report shall include project identification information. Place the following notes on the cover sheet of the report and check the appropriate box:

___ ACM was found
___ ACM was not found

REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIAL

If ACM is found, notify the Engineer. Compensation for removal and disposal of ACM is considered extra work in accordance with Article 104-7 of the *Standard Specifications*.

An Asbestos Removal Permit must be obtained from the Health Hazards Control Unit (HHCU) of the N.C. Department of Health & Human Services, Division of Public Health, if more than 35 cubic feet, 160 square feet, or 260 linear feet of regulated ACM (RACM) is to be removed from a structure and this work must be completed by a contractor prequalified by NCDOT to perform asbestos abatement. RACM is defined in 40 CFR, Part 61, Subpart M. Note: 40 CFR 763.85 (a)(4) vi)(D) defines ACM as surfacing, TSI and Miscellaneous which does not meet the NESHAP RACM.

DEMOLITION NOTIFICATION

Even if no ACM is found (or if quantities are less than those required for a permit), a Demolition Notification (DHHS-3768) must be submitted to the HHCU. Notifications and Asbestos Permit applications require an original signature and must be submitted to the HHCU 10 working days prior to beginning demolition activities. The 10 working day period starts based on the post-marked date or date of hand delivery. Demolition that does not begin as originally notified requires

submission of a separate revision form HHCU 3768-R to HHCU. Reference the North Carolina Administrative Code, Chapter 10A, Subchapter 41C, Article .0605 for directives on revision submissions.

Contact Information
Health Hazards Control Unit (HHCU)
N.C. Department of Health and Human Services
1912 Mail Service Center
Raleigh, NC 27699-1912
Telephone: (919) 707-5950
Fax: (919) 870-4808

SPECIAL CONSIDERATIONS

Buncombe, Forsyth, and Mecklenburg counties also have asbestos permitting and NESHAP requirements must be followed. For projects involving permitted RACM removals, both the applicable county and the state (HHCU) must be notified.

For demolitions with no RACM, only the local environmental agencies must be notified. Contact information is as follows:

Buncombe County
WNC Regional Air Pollution Control Agency
49 Mt. Carmel Road
Asheville, NC 28806
(828) 250-6777

Forsyth County
Environmental Affairs Department
537 N. Spruce Street
Winston-Salem, NC 27101
(336) 703-2440

Mecklenburg County
Land Use and Environmental Services Agency
Mecklenburg Air Quality
700 N. Tryon Street
Charlotte, NC 28202
(704) 336-5430

ADDITIONAL INFORMATION

Additional information may be found on N.C. asbestos rules, regulations, procedures, and N.C. accredited inspectors, as well as associated forms for demolition notifications and asbestos permit applications at the N.C. Asbestos Hazard Management Program website:

https://epi.dph.ncdhhs.gov/asbestos/ahmp.html

MEASUREMENT AND PAYMENT

Asbestos Assessment Payment will be paid at the lump sum contract unit price and will be full compensation for all asbestos inspections, reports, permitting and notifications.
Payment will be made under:

Pay Item	Pay Unit
Asbestos Assessment	Lump Sum

THERMAL SPRAYED COATINGS (METALLIZATION) (12-1-2017)

DESCRIPTION

Apply a thermal sprayed coating (TSC) and sealer to metal surfaces in accordance with the *Thermal Sprayed Coatings (Metallization) Program* and as specified herein when called for on the plans or by other Special Provisions. Use only Arc Sprayed application methods to apply TSC. The Engineer must approve other methods of application.

The *Thermal Sprayed Coatings (Metallization) Program* is available on the Materials and Tests Unit website.

QUALIFICATIONS

Only use NCDOT approved TSC Contractors meeting the requirements outlined in the *Thermal Sprayed Coatings (Metallization) Program*.

MATERIALS

Use only materials meeting the requirements of Section 7 of the *Thermal Sprayed Coatings (Metallization) Program.*

SURFACE PREPARATION AND TSC APPLICATION

Surface preparation of TSC surfaces shall meet the requirements of Section 8 of the *Thermal Sprayed Coatings (Metallization) Program*. Apply TSC with the alloy to the thickness specified on the plans or as required by *Thermal Sprayed Coatings (Metallization) Program*.

INSPECTION AND TESTING

The TSC Contractor must conduct inspections and tests listed in the *Thermal Sprayed Coatings (Metallization) Program.*

REPAIRS

Perform all shop repairs in accordance with the procedures outlined in the *Thermal Sprayed Coatings (Metallization) Program*.

Repairs associated with field welding shall be made by removing the existing metallizing by blast or power tool cleaning. Affected areas shall be addressed as follows:

- For Marine Environments, incorporate a minimum surface preparation in accordance with SSPC SP-11 (Power Tool Cleaning to Bare Metal) and require an approved epoxy mastic coating applied in accordance with the manufacturer's recommendation. Apply a minimum of two (2) coats at a rate of 5-7 (WFT) per coat to the affected area.

- For Non-Marine Environments, incorporate a minimum surface preparation in accordance with SSPC SP-11 (Power Tool Cleaning to Bare Metal) and require an approved organic zinc-rich coating applied in accordance with the manufacturer's recommendation. Apply a minimum of two (2) coats at a rate of 5-7 (WFT) per coat to the affected area.

    (1) Minor localized areas less than or equal to 0.1 ft^2 with exposed substrate shall be repaired as outlined above for marine and non-marine environments.

    (2) Large localized areas greater than 0.1 ft^2 with exposed substrate shall require the Contractor to submit a detailed repair procedure to the Engineer for review and approval.

    (3) Repair methods for areas where the substrate has not been exposed shall be mutually agreed upon between the Contractor and TSC Contractor as approved by the Engineer.

TWELVE MONTH OBSERVATION PERIOD

All TSC materials applied under the *Thermal Sprayed Coatings (Metallization) Program* shall be evaluated twelve (12) months after project acceptance for defective materials and workmanship.

MEASUREMENT AND PAYMENT

The contract price bid for the metal component to which the TSC is applied will be full compensation for the thermal sprayed coating.

REMOVAL OF EXISTING STRUCTURE AT STATION 29+45.91 -L- (SPECIAL)

The existing bridge shall be removed in accordance with the Standard Specifications with the following exceptions.

All steel beams, all steel diaphragms, guardrail and structural attachments, and the existing concrete barrier rail shall be removed and salvaged for the Division of Highways as directed by the Engineer. The remaining portions of the structure shall be removed in accordance with the plans and Standard Specifications.

The Contractor shall not use any of the items, either temporarily or permanently, which have been removed and are to be salvaged. All concrete shall be removed from the beams with no

damage from the demolition activities. The diaphragms shall be removed at the bolts and not cut.

The Contractor shall notify B. Scott Cornatzer or Charles R. White of the Salisbury Bridge Maintenance Yard at (704) 630-3260, five days prior to removal of the salvaged material. The Contractor shall deliver the salvaged material to 515 Camp Road in Salisbury, NC 28147. NCDOT maintenance forces will unload the salvaged material provided it is packed such that it can be removed with a frontend loader. If the material can be moved to a closer location, this will be discussed at the preconstruction meeting.

No separate measurement will be made for this work and the entire cost of this work shall be included in the lump sum contract price bid for:

"Removal of Existing Structure at Station 29+45.91 -L- . . . . . Lump Sum"

MAINTENANCE AND PROTECTION OF TRAFFIC BENEATH PROPOSED STRUCTURE AT STATION 29+45.91 -L- (08-13-04)

GENERAL

Maintain traffic on W. 5th Avenue (SR 1192) as shown in Traffic Control Plans and as directed by the Engineer.

Provide a minimum temporary vertical clearance of 16'-10" at all times during construction.

Submit plans and calculations for review and approval for protecting traffic and bracing girders, as described herein, at the above station before beginning work at this location. Have the drawings and design calculations prepared, signed, and sealed by a North Carolina Registered Professional Engineer. The approval of the Engineer will not relieve the Contractor of the responsibility for the safety of the method or equipment.

PROTECTION OF TRAFFIC

Protect traffic from any operation that affords the opportunity for construction materials, equipment, tools, etc. to be dropped into the path of traffic beneath the structure. Based on Contractor means and methods determine and clearly define all dead and live loads for this system, which, at a minimum, shall be installed between beams or girders over any travelway or shoulder area where traffic is maintained. Install the protective system before beginning any construction operations over traffic. In addition, for these same areas, keep the overhang falsework in place until after the rails have been poured.

BRACING GIRDERS

Brace girders to resist wind forces, weight of forms and other temporary loads, especially those eccentric to the vertical axis of the member during all stages of erection and construction. Before casting of intermediate diaphragms, decks, or connecting steel diaphragms do not allow the horizontal movement of girders to exceed ½ inch.

MEASUREMENT AND PAYMENT

Payment at the contract unit prices for the various pay items will be full compensation for the above work.

ELASTOMERIC CONCRETE (2-11-19)

General

Elastomeric concrete is a mixture of a two-part polymer consisting of polyurethane and/or epoxy and kiln-dried aggregate. Provide an elastomeric concrete and binder system that is preapproved.

Use the concrete in the blocked out areas on both sides of the bridge deck joints as indicated on the plans.

Materials

Provide materials that comply with the following minimum requirements at 14 days (or at the end of the specified curing time).

ELASTOMERIC CONCRETE PROPERTIES	TEST METHOD	MINIMUM REQUIREMENT
Compressive Strength, psi	ASTM D695	2,000
5% Deflection Resilience	ASTM D695	95
Splitting Tensile Strength, psi	ASTM D3967	625
Bond Strength to Concrete, psi	ASTM C882 (C882M)	450
Durometer Hardness	ASTM D2240	50

BINDER PROPERTIES (without aggregate)	TEST METHOD	MINIMUM REQUIREMENT
Tensile Strength, psi	ASTM D638	1000
Ultimate Elongation	ASTM D638	150%
Tear Resistance, lb/in	ASTM D624	200

In addition to the requirements above, the elastomeric concrete must be resistant to water, chemical, UV and ozone exposure and withstand temperature extremes. Elastomeric concrete systems requiring preheated aggregates are not allowed.

Prequalification

Manufacturers of elastomeric concrete materials shall submit samples (including aggregate, primer and binder materials) and a Type 3 certification in accordance with Article 106-3 of the *Standard Specifications* for prequalification to:

North Carolina Department of Transportation

Materials and Tests Unit

1801 Blue Ridge Road

Raleigh, NC 27607

Prequalification will be determined for the system. Individual components will not be evaluated, nor will individual components of previously evaluated systems be deemed prequalified for use.

The submitted binder (a minimum volume of 1 gallon) and corresponding aggregate samples will be evaluated for compliance with the Materials requirements specified above. Systems satisfying

all of the Materials requirements will be prequalified for a one year period. Before the end of this period new product samples shall be resubmitted for prequalification evaluation.

If, at any time, any formulation or component modifications are made to a prequalified system that system will no longer be approved for use.

Installation

The elastomeric concrete shall not be placed until the reinforced concrete deck slab has cured for seven (7) full days and reached a minimum strength of 3,000 psi.

Provide a manufacturer's representative at the bridge site during the installation of the elastomeric concrete to ensure that all steps being performed comply with all manufacturer installation requirements including, but not limited to weather conditions (ambient temperature, relative humidity, precipitation, wind, etc.), concrete deck surface preparation, binder and aggregate mixing, primer application, elastomeric concrete placement, curing conditions and minimum curing time before joint exposure to traffic. Do not place elastomeric concrete if the ambient air or surface temperature is below 45°F.

Prepare the concrete surface within 48 hours prior to placing the elastomeric concrete. Before placing the elastomeric concrete, all concrete surfaces shall be thoroughly cleaned and dry. Sandblast the concrete surface in the blockout and clear the surface of all loose debris. Do not place the elastomeric concrete until the surface preparation is completed and approved.

Prepare and apply a primer, as per manufacturer's recommendations, to all concrete faces to be in contact with elastomeric concrete, and to areas specified by the manufacturer.

Prepare, batch, and place the elastomeric concrete in accordance with the manufacturer's instructions. Place the elastomeric concrete in the areas specified on the plans while the primer is still tacky and within two (2) hours after applying the primer. Trowel the elastomeric concrete to a smooth finish.

The joint opening in the elastomeric concrete shall match the formed opening in the concrete deck prior to sawing the joint.

Field Sampling

Provide additional production material to allow freshly mixed elastomeric concrete to be sampled for acceptance. A minimum of six (6) 2-inch cube molds and three (3) 3-inch diameter x 6-inch cylinders will be taken by the Department for each day's production. Compression, splitting tensile, and durometer hardness testing will be performed by the Department to

determine acceptance. Materials failing to meet the requirements listed above are subject to removal and replacement at no cost to the Department.

Measurement and Payment

No separate payment will be made for *Elastomeric Concrete*. The lump sum contract price bid for *Foam Joint Seals* or *Preformed Silicone Expansion Joint Seal* will be full compensation for furnishing and placing the *Elastomeric Concrete*.

FOAM JOINT SEALS (9-27-12)

SEALS

Use preformed seals compatible with concrete and resistant to abrasion, oxidation, oils, gasoline, salt, and other materials that are spilled on or applied to the surface. Use a resilient, UV stable, preformed, impermeable, flexible, expansion joint seal. The joint seal shall consist of low-density, closed cell, cross-linked polyethylene non-extrudable, foam. The joint seal shall contain no EVA (Ethylene Vinyl Acetate). Cell generation shall be achieved by being physically blown using nitrogen. No chemical blowing agents shall be used in the cell generation process.

Use seals manufactured with grooves ⅛"± wide by ⅛"± deep and spaced between ¼" and ½" apart along the bond surface running the length of the joint. Use seals with a depth that meets the manufacturer's recommendation but is not less than 70% of the uncompressed width. Provide a seal designed so that, when compressed, the center portion of the top does not extend upward above the original height of the seal by more than ¼". Provide a seal that has a working range of 30% tension and 60% compression and meets the requirements given below.

TEST	TEST METHOD	REQUIREMENT
Tensile strength	ASTM D3575-08, Suffix T	110 – 130 psi
Compression Set	ASTM D1056 Suffix B, 2 hr recovery	10% - 16%
Water Absorption	ASTM D3575	< 0.03 lb/ft^2
Elongation at Break	ASTM D3575	180% - 210%
Tear Strength	ASTM D624 (D3575-08, Suffix G)	14 – 20 pli
Density	ASTM D3575-08, Suffix W, Method A	1.8 – 2.2 lb/ft^3
Toxicity	ISO-10993.5	Pass (not cytotoxic)

Have the top of the joint seal clearly shop marked. Inspect the joint seals upon receipt to ensure that the marks are clearly visible before installation.

BONDING ADHESIVE

Use a two component, 100% solid, modified epoxy adhesive supplied by the joint seal manufacturer that meets the requirements given below.

TEST	TEST METHOD	REQUIREMENT
Tensile strength	ASTM D638	3000 psi (min.)
Compressive strength	ASTM D695	7000 psi (min.)
Hardness	Shore D Scale	75-85 psi
Water Absorption	ASTM D570	0.25% by weight max.
Elongation to Break	ASTM D638	5% (max.)
Bond Strength	ASTM C882	2000 psi (min.)

Use an adhesive that is workable to 40°F. When installing in ambient air or surface temperatures below 40°F or for application on moist, difficult to dry concrete surfaces, use an adhesive specified by the manufacturer of the joint seal.

SAWING THE JOINT

The joint opening shall be initially formed to the width shown on the plans including the blockout for the elastomeric concrete.

The elastomeric concrete shall have sufficient time to cure such that no damage can occur to the elastomeric concrete prior to sawing to the final width and depth as specified in the plans.

When sawing the joint to receive the foam seal, always use a rigid guide to control the saw in the desired direction. To control the saw and to produce a straight line as indicated on the plans, anchor and positively connect a template or a track to the bridge deck. Do not saw the joint by visual means such as a chalk line. Fill the holes used for holding the template or track to the deck with an approved, flowable non-shrink, non-metallic grout.

Saw cut to the desired width and depth in one or two passes of the saw by placing and spacing two metal blades on the saw shaft to the desired width for the joint opening.

The desired depth is the depth of the seal plus ¼" above the top of the seal plus approximately 1" below the bottom of the seal. An irregular bottom of a sawed joint is permitted as indicated on the plans. Grind exposed corners on saw cut edges to a ¼" chamfer.

Saw cut a straight joint, centered over the formed opening and to the desired width specified in the plans. Prevent any chipping or damage to the sawed edges of the joint.

Remove any staining or deposited material resulting from sawing with a wet blade to the satisfaction of the Engineer.

PREPARATION OF SAWED JOINT FOR SEAL INSTALLATION

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

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

Clean the joints by sandblasting with clean dry sand immediately before placing the bonding agent. Sandblast the joint opening to provide a firm, clean joint surface free of curing compound, loose material, and any foreign matter. Sandblast the joint opening without causing pitting or uneven surfaces. The aggregate in the elastomeric concrete may be exposed after sandblasting.

After blasting, either brush the surface with clean brushes made of hair, bristle or fiber, blow the surface with compressed air, or vacuum the surface until all traces of blast products and abrasives are removed from the surface, pockets, and corners.

If nozzle blasting is used to clean the joint opening, use compressed air that does not contain detrimental amounts of water or oil.

Examine the blast cleaned surface and remove any traces of oil, grease or smudge deposited in the cleaning operations.

Bond the seal to the blast cleaned surface on the same day the surface is blast cleaned.

SEAL INSTALLATION

Install the joint seal according to the manufacturer's procedures and recommendations and as recommended below. Do not install the joint seal if the ambient air or surface temperature is below 45°F. Have a manufacturer's certified trained factory representative present during the installation of the first seal of the project.

Before installing the joint seal, check the uninstalled seal length to ensure the seal is the same length as the deck opening. When the joint seal requires splicing, use the heat welding method by placing the joint material ends against a teflon heating iron of 425-475°F for 7 - 10 seconds, then pressing the ends together tightly. Do not test the welding until the material has completely cooled.

Begin installation by protecting the top edges of the concrete deck adjacent to the vertical walls of the joint as a means to minimize clean up. After opening both cans of the bonding agent, stir each can using separate stirring rods for each component to prevent premature curing of the bonding agent. Pour the two components, at the specified mixing ratio, into a clean mixing bucket. Mix the components with a low speed drill (400 rpm max.) until a uniform gray color is achieved without visible marbling. Apply bonding agent to both sides of the elastomeric concrete as well as both sides of the joint seal, making certain to completely fill the grooves with epoxy. With gloved hands, compress the joint seal and with the help of a blunt probe, push the seal into the joint opening until the seal is recessed approximately ¼" below the surface. When pushing down on the joint seal, apply pressure only in a downward direction. Do not push the joint seal into the joint opening at an angle that would stretch the material. Seals that are stretched during installation shall be removed and rejected. Once work on placing a seal begins, do not stop until it is completed.

Clean the excess epoxy from the top of the joint seal immediately with a trowel. Do not use solvents or any cleaners to remove the excess epoxy from the top of the seal. Remove the protective cover at the joint edges and check for any excess epoxy on the surface. Remove excess epoxy with a trowel, the use of solvents or any cleaners will not be allowed.

The installed system shall be watertight and will be monitored until final inspection and approval. Do not place pavement markings on top of foam joint seals.

MEASUREMENT AND PAYMENT

Foam Joint Seals will be paid for at the lump sum contract price bid. Payment will be full compensation for furnishing all material, including elastomeric concrete, labor, tools, and equipment necessary for installing these units in place and accepted.

Payment will be made under:

Pay Item	**Pay Unit**
Foam Joint Seals	Lump Sum

PROJECT SPECIAL PROVISION

(10-18-95) (Rev. 10-15-24) Z-1

PERMITS

The Contractor's attention is directed to the following permits, which have been issued to the Department of Transportation by the authority granting the permit.

PERMIT	AUTHORITY GRANTING THE PERMIT
Dredge and Fill and/or Work in Navigable Waters (404)	U. S. Army Corps of Engineers
Water Quality (401)	Division of Water Resources, DEQ State of North Carolina

The Contractor shall comply with all applicable permit conditions during construction of this project.

Agents of the permitting authority will periodically inspect the project for adherence to the permits.

The Contractor's attention is also directed to Articles 107-10 and 107-13 of the *Standard Specifications* and the following:

Should the Contractor propose to utilize construction methods (such as temporary structures or fill in waters and/or wetlands for haul roads, work platforms, cofferdams, etc.) not specifically identified in the permit (individual, general, or nationwide) authorizing the project it shall be the Contractor's responsibility to coordinate with the Engineer to determine what, if any, additional permit action is required. The Contractor shall also be responsible for initiating the request for the authorization of such construction method by the permitting agency. The request shall be submitted through the Engineer. The Contractor shall not utilize the construction method until it is approved by the permitting agency. The request normally takes approximately 60 days to process; however, no extensions of time or additional compensation will be granted for delays resulting from the Contractor's request for approval of construction methods not specifically identified in the permit.

Where construction moratoriums are contained in a permit condition which restricts the Contractor's activities to certain times of the year, those moratoriums will apply only to the portions of the work taking place in the restricted waters, wetlands or buffer zones, provided that activities outside those areas is done in such a manner as to not affect the restricted waters, wetlands or buffer zones.

P-2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

JOSH STEIN
GOVERNOR

J.R. "JOEY" HOPKINS
SECRETARY

February 21, 2025

MEMORANDUM TO: Division Environmental and Construction Units

FROM: Michael A. Turchy, ECAP Group Leader
Environmental Analysis Unit

SUBJECT: Environmental Permits for the Replacement of Bridges 67 & 68 on US 29/US 70 over SR 1192 in Davidson County, Division 9, **TIP: BR-0015.**

Please find enclosed the following permits for this project:

Agency	Permit Type	Permit Expiration
US Army Corps of Engineers Section 404 Clean Water Act Permit	Nationwide Permit 14	March 14, 2026
NC Division of Water Resources Section 401 Water Quality Certification	Individual Certification No. 007437	March 14, 2026

Work is authorized by the above referenced permit provided it is accomplished in strict accordance with the permitted plans. The Environmental Coordination and Permitting Group or the Division Environmental Office must be consulted if any deviation from the permit(s) is required.

The General Conditions and Certifications for Nationwide and Regional Permits can be referenced at: https://xfer.services.ncdot.gov/pdea/PermIssued/_General_Conditions_and_Certifications/

The Project Commitments "Greensheet" is located on the Preconstruction SharePoint Dashboard at: https://connect.ncdot.gov/site/preconstruction

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL ANALYSIS UNIT
1598 MAIL SERVICE CENTER
RALEIGH NC 27699-1598

Telephone: (919) 707-6000
Customer Service: 1-877-368-4968
Website: www.ncdot.gov

Location:
1000 BIRCH RIDGE DRIVE
RALEIGH NC 27610

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, WILMINGTON DISTRICT
WILMINGTON REGULATORY OFFICE
69 DARLINGTON AVENUE
WILMINGTON NORTH CAROLINA 28403

February 20, 2025

Regulatory Division
SAW-2016-01267

Sent Via email: ekcheely@ncdot.gov

Erin Cheely, Western Team Lead
Environmental Coordination & Permitting
NCDOT Environmental Analysis Unit
1598 Mail Service Center
Raleigh, NC 27699

Dear Ms. Cheely:

This letter is in response to the Pre-Construction Notification (PCN) you submitted to the Wilmington District, WRDA / Transportation Branch on December 16, 2024, for a Department of the Army Nationwide permit (NWP) verification. This project has been assigned the file number SAW-2016-01267 and is known as NCDOT BR-0015, Bridge # 67 & # 68 Replacements on US 29/US 70 over SR 1192 . This file number should be referenced in all correspondence concerning this project.

A review of the information provided indicates that the proposed work would include the replacement of the existing US 29/US 70 Bridges (#67 & # 68) and to construct a single bridge carrying both northbound and south bound lanes on US 29/US 70 across SR 1192 (West 5th Avenue). This project will include permanent placement of 15 linear feet (lf) of fill, placement of a total of 123 lf of permanent bank stabilization and temporary placement of dewatering structures in 33 lf of a tributary of Michaels Branch. In addition, this project will include the placement of 47 lf of permanent bank stabilization and 35 lf of temporary dewatering structures in Michaels Branch. The project area for this determination includes approximately 29 acres area which is illustrated on the enclosed site plans/maps. The project/review area is located in Michaels Branch and a tributary to Michaels Branch; at a location adjacent to the intersection/interchange of US 29/US 70 and SR 1192 (West 5th Avenue), at Latitude 35.825760 and Longitude -80.275690; in Lexington, Davidson County, North Carolina.

We have determined that the proposed work is authorized by Nationwide Permit 14 (NWP-14) pursuant to authorities under Section 404 of the Clean Water Act (33 U.S.C § 1344). The proposed work must be accomplished in strict accordance with the general permit conditions, any regional conditions, the special conditions listed in this letter, the application materials, and the enclosed plans. If the extent of the project area and/or nature of the authorized impacts to waters are modified, a revised PCN must be

submitted to this office for written approval before work is initiated. Any violation of permit conditions or deviation from your submitted plans may subject the permittee to enforcement action.

This verification is valid until March 14, 2026, unless prior to this date the subject NWP(s) is suspended, revoked, or is modified such that the activity no longer complies with the terms and conditions of this NWP. If you commence or are under contract to commence this activity before the date that the relevant NWP is modified or revoked, you will have 12 months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this NWP.

Project Specific Special Conditions:

1. All work must be performed in strict compliance with (a) the description of work in the PCN and (b) the Wetlands and Surface Water Impact Permit Drawing(s) (Permit Plans) in the application dated December 16, 2024. Any modification to the description of work and/or the permit plans must be approved by the USACE prior to implementation.

2. The permittee shall require its contractors and/or agents to comply with the terms and conditions of this authorization letter in the construction and maintenance of this project and shall provide each of its contractors and/or agents associated with the construction or maintenance of this project with a copy of this authorization letter, all conditions, and any authorized modifications. A copy of this authorization letter, all conditions, and any authorized modifications, shall be available at the project site during construction and maintenance of this project.

3. Since suitable habitat for tricolored bat (Perimyotis subflavus) may be present in the BR-0015 project area, the permittee agrees to implement the follow conservation measures for the NCDOT BR-0015, Bridge # 67 & # 68 Replacements on US 29/US 70 over SR 1192 :

    a. Tree clearing will occur outside of the tricolored bat summer activity season (April 1 - July 15) for the year-round active Zone 1.
    b. Permanent lighting will be replaced in the action area and will reduce backlight and glare from previous conditions.
    c. Any lighting needed for night work will be directed toward the active work area and will be turned off when not in use.

4. In order to compensate for impacts associated with this permit, mitigation shall be provided in accordance with the provisions outlined on the most recent version of the attached Compensatory Mitigation Responsibility Transfer Forms. The requirements of these forms, including any special conditions listed on these forms, are hereby incorporated as special conditions of this permit authorization

This NWP verification does not preclude the necessity to obtain any other Federal, State, or local permits, licenses, and/or certifications, which may be required.

If you have any questions related to this verification or have issues accessing documents referenced in this letter, please contact Stephen Brumagin, WRDA Project Manager of the Charlotte Field Office at (704) 798-6471, by mail at the above address, or by email at stephen.a.brumagin@usace.army.mil. Please take a moment to complete our customer satisfaction survey located at https://regulatory.ops.usace.army.mil/customer-service-survey/.

Sincerely,

M. Scott Jones, PWS
WRDA / Transportation Branch Chief
USACE - Wilmington District

Enclosures

Project Plans
401 WQC
NWP-14

cc (w/enclosures)

William Barrett, NCDOT Raleigh (via wabarrett@ncdot.gov)
Amy Euliss, NC DOT Div 9 (via aeuliss@ncdot.gov)

Compliance Certification Form

File Number: SAW-2016-01267 **County: Davidson**

Permittee: NCDOT Environmental Analysis Unit, Erin Cheely

Project Name: NCDOT BR-0015, Bridge # 67 & # 68 Replacements on US 29/US 70 over SR 1192

Date Verification Issued: 2/20/2025

Project Manager: Stephen Brumagin

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

US ARMY CORPS OF ENGINEERS
Wilmington District
Attn: Stephen Brumagin
Charlotte Field Office
8430 University Executive Park Drive Suite 615
Charlotte, NC 28262
or
stephen.a.brumagin@usace.army.mil

Please note that your permitted activity is subject to a compliance inspection by a U. S. Army Corps of Engineers representative. Failure to comply with any terms or conditions of this authorization may result in the Corps suspending, modifying or revoking the authorization and/or issuing a Class I administrative penalty, or initiating other appropriate legal action.

I hereby certify that the work, and mitigation (if applicable), authorized by the above referenced permit has been completed in accordance with the terms and conditions of the said permit including any general or specific conditions.

Date Authorized Work Started: _____ **Completed: _____**

Describe any deviations from permit (attach drawing(s) depicting the deviations):

_____

_____

***Note: The description of any deviations on this form does not constitute approval by the Corps.**

_____ _____

Signature of Permittee **Date**

P-7

From: Youngman, Holland J
To: Barrett, William A
Cc: Euliss, Amy; Boules, George M; Stanton, Tyler P; NCDOT_Service_Account_ECAP
Subject: Re: [EXTERNAL] RE: BR-0015 Concurrence Request
Date: Thursday, February 13, 2025 5:12:15 PM
Attachments: image001.png

Hi Bill,

Apologies for the delay. A response is provided below. Note that I've included standard notification language regarding the federal proposal status of monarch butterfly. At this time, we do not recommend voluntary conference on the species as we have not yet received internal conferencing guidance. If the project timeline is prolonged and NCDOT becomes concerned about a potential monarch listing overlapping with project work, we will work with NCDOT if/when that time comes on conferencing procedures for the species. Please let me know if anything additional is needed for this project.

Informal Conference for Tricolored Bat (*Perimyotis subflavus*) Relating to the Subject Project - **FWS Log # 18-429**

We have reviewed the information you submitted, along with a prior scoping letter issued from this office on February 9, 2023, and the following is provided in accordance with the provisions of the National Environmental Policy Act (42 U.S.C.§ 4321 et seq.); the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661 - 667e); and section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 - 1543) (ESA).

NCDOT proposes to replace Bridge No. 67 (NB) and Bridge No. 68 (SB) on US 29/US 70/I-85 Business over SR 1192 (W. Fifth Avenue), Davidson County. Work will involve percussive actions such as jack hammering and pile-driving, tree clearing, and some night work. The bridge and adjacent culvert structures were inspected for bats and signs of bats on July 29, 2024 and results were negative. NCDOT has committed to implementing the following conservation measures:

1. Tree clearing will occur outside of the tricolored bat summer activity season (April 1 - July 15) for the year-round active Zone 1.
2. Permanent lighting will be replaced in the action area and will reduce backlight and glare from previous conditions.
3. Any lighting needed for night work will be directed toward the active work area and will be turned off when not in use.

The information provided indicates that a “No Effect” (NE) determination has been made for Schweinitz's sunflower (*Helianthus schweinitzii*). In instances of suitable habitat being absent from the action area, we would agree that NE determinations are appropriate. In instances where suitable habitat is present and botanical surveys conducted during the optimal survey window and within the past 1 or 2 years (depending on the species) have negative results, we would concur with a biological

determination of "may affect, not likely to adversely affect" (NLAA). This information is provided for the sake of the administrative record.

On September 14, 2022, the U.S. Fish and Wildlife Service published a proposal in the Federal Register to list the tricolored bat as endangered under the ESA. As a result, NCDOT has requested a conference for the tricolored bat as the project may be on-going after the effective date of any final listing rule, if one is published. Based on the information provided, the analysis above, and the commitments to minimize project impacts, we have determined that the proposed project will not jeopardize the continued existence of the tricolored bat. Additionally, we would concur with the NCDOT's determination that the project is NLAA the tricolored bat should it become listed.

On December 12, 2024, monarch butterfly (*Danaus plexippus*) was proposed for listing as threatened under the ESA. Species proposed for listing are not afforded protection under the ESA; however, as soon as a listing becomes effective, the prohibitions against jeopardizing its continued existence and "take" will apply. Therefore, if the project may affect monarch butterflies after the potential new listing goes into effect, we recommend analyzing possible effects of the project on the species and their habitat to determine whether consultation under section 7 of the ESA is necessary on behalf of monarch butterfly.

Conservation Recommendations: Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

-Seasonal Tree Clearing: Avoid clearing trees during the winter torpor period of December 15 – February 15. These dates are for the year-round active zone 1, as explained in Appendix L of the Service's Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines: https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines. This guidance includes tricolored bat.

-Noise Considerations for Bats: If suitable roost trees are present near high-decibel activity (81 – 162 dBA) and would experience noise above background levels (41 – 70 dBA), avoid conducting those high-decibel activities during the bat summer occupancy season (April 1 – September 30). Alternatively, activity could avoid the pup season (May 15 - July 31). To minimize noise levels, incorporate sound-dampening devices such as noise shrouds for pile driving.

-Pre-construction Surveys for Bats: While the July 29, 2024 structure surveys did not reveal presence or signs of roosting bats, conducting pre-construction surveys within 30 days or, ideally, 14 days of work would increase the assurance that no bats are present.

-Riparian Replanting: Because the removal of forested riparian habitat can affect the quality and suitability of foraging and commuting habitat for bats, we recommend replanting the riparian zone with native, fast-growing trees and shrubs that would serve to block light pollution and improve the quality of the terrestrial and aquatic habitat.

We believe the requirements under section 7 of the ESA are fulfilled for the federally listed species discussed above. However, obligations under section 7 must be reconsidered if: (1) new information

reveals impacts of this proposed action may affect listed species or critical habitat in a manner not previously considered, (2) this proposed action is subsequently modified in a manner that was not considered in this review, or (3) a new species is listed, or critical habitat is determined that may be affected by the proposed action.

We appreciate the opportunity to provide these comments. In any future correspondence on this project, please reference **FWS Log # 18-429**.

Sincerely,

Holland Youngman
(she/her)
Wildlife Biologist
U.S. Fish and Wildlife Service
Asheville Ecological Services Field Office
160 Zillicoa Street, Asheville, North Carolina, 28801
Cell: 828-575-3920

From: Barrett, William A <wabarrett@ncdot.gov>
Sent: Thursday, February 13, 2025 8:36 AM
To: Youngman, Holland J <holland_youngman@fws.gov>
Cc: Euliss, Amy <aeuliss@ncdot.gov>; Boules, George M <gmboules@ncdot.gov>; Stanton, Tyler P <tpstanton@ncdot.gov>; NCDOT_Service_Account_ECAP <ECAP@ncdot.gov>
Subject: [EXTERNAL] RE: BR-0015 Concurrence Request

Good morning Holland,

We are coming up on the Let Review date of February 25th for BR-0015, so I want to check the status of the Concurrence Request (see email below, dated Nov. 25, 2024). The 404 is ready to be issued but USACE is awaiting receipt of the Concurrence Letter before issuance.

Thanks,
Bill

William A. Barrett
ECAP Environmental Coordinator
Environmental Analysis Unit
North Carolina Department of Transportation

919 707 6103 office

919 302 1908 mobile
wabarrett@ncdot.gov

1598 Mail Service Center (Mail)
Raleigh, NC 27699-1598

1000 Birch Ridge Drive (Delivery)
Raleigh, NC 27610

From: Barrett, William A
Sent: Monday, November 25, 2024 3:57 PM
To: holland_youngman@fws.gov
Cc: Euliss, Amy <aeuliss@ncdot.gov>; Boules, George M <gmboules@ncdot.gov>; Stanton, Tyler P <tpstanton@ncdot.gov>; NCDOT_Service_Account_ECAP <ECAP@ncdot.gov>
Subject: BR-0015 Concurrence Request

Hi Holland,

Attached please find the Informal Concurrence Request for BR-0015. Please let me know if there is anything else needed.

Thanks,
Bill

William A. Barrett
ECAP Environmental Coordinator
Environmental Analysis Unit
North Carolina Department of Transportation

919 707 6103 office
919 302 1908 mobile
wabarrett@ncdot.gov

1598 Mail Service Center (Mail)
Raleigh, NC 27699-1598

1000 Birch Ridge Drive (Delivery)
Raleigh, NC 27610

JOSH STEIN
Governor
D. REID WILSON
Secretary
RICHARD E. ROGERS, JR.
Director

NORTH CAROLINA
Environmental Quality

January 22, 2025

Mr. William A. Barrett
ECAP Environmental Coordinator
Environmental Analysis Unit
North Carolina Department of Transportation
1598 Mail Service Center
Raleigh, North Carolina 27699

Subject: 401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act with ADDITIONAL CONDITIONS for the Proposed Replacement of Bridge No. 67 (NB) and Bridge No. 68 (SB) on US 29/US 70/I-85 Business over SR 1192 (W. Fifth Ave.) in Davidson County; TIP BR-0015; NCDWR Project No. 20241681.

Dear Mr. Barrett:

Attached hereto is a copy of Certification No. 007437 (this is the Individual Certification No.) issued to The North Carolina Department of Transportation (NCDOT) dated January 22, 2025.

This approval is for the purpose and design described in your application. The plans and specifications for this project are incorporated by reference as part of this Water Quality Certification. If you change your project, you must notify the Division and you may be required to submit a new application package with the appropriate fee. If the property is sold, the new owner must be given a copy of this Certification and is responsible for complying with all conditions. [15A NCAC 02H .0507(d)(2)]. This Certification does not relieve the permittee of the responsibility to obtain all other required Federal, State, or Local approvals before proceeding with the project, including those required by, but not limited to, Sediment and Erosion Control, Non-Discharge, Water Supply Watershed, and Trout Buffer regulations.

If we can be of further assistance, do not hesitate to contact us.

Sincerely,

Signed by:
Susan Locklear
375CAF2B0BF542C...

Richard E. Rogers, Jr., Director
Division of Water Resources

Attachments

cc: Steve Brumagin, USACE Charlotte Regulatory Field Office
Holland Youngman, US Fish and Wildlife Service
Dave McHenry, NC Wildlife Resources Commission
Erin Cheely, North Carolina Department of Transportation
File Copy

401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act with ADDITIONAL CONDITIONS

THIS CERTIFICATION is issued in conformity with the requirements of Section 401 Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Division of Water Resources (NCDWR) Regulations in 15 NCAC 2H .0500 and 15A NCAC 2B. This certification authorizes the NCDOT to impact 253 linear feet of jurisdictional streams in Davidson County. The project shall be constructed pursuant to the application dated and received December 16, 2024. The authorized impacts are as described below:

Stream Impacts in the Yadkin-Pee Dee River Basin

Site	Permanent Fill in Perennial Stream (linear ft)	Temporary Fill in Perennial Stream (linear ft)	Total Stream Impact (linear ft)	Stream Impacts Requiring Mitigation (linear ft)
S1	-	33	33	-
S2	6	-	6	-
S3	15	-	15	-
S4	117	-	117	-
S5	47	-	47	-
S6	-	35	35	-
Totals	**185**	**68**	**253**	**-**

Total Stream Impact for Project: 253 linear feet

The application provides adequate assurance that the discharge of fill material into the waters of the Yadkin-Pee Dee River Basin in conjunction with the proposed development will not result in a violation of applicable Water Quality Standards and discharge guidelines. Therefore, the State of North Carolina certifies that this activity will not violate the applicable portions of Sections 301, 302, 303, 306, 307 of PL 92-500 and PL 95-217 if conducted in accordance with the application and conditions hereinafter set forth.

This approval is only valid for the purpose and design that you submitted in your application dated and received December 16, 2024. Should your project change, you are required to notify the NCDWR and submit a new application. If the property is sold, the new owner must be given a copy of this Certification and approval letter and is thereby responsible for complying with all the conditions. If any additional wetland impacts, or stream impacts, for this project (now or in the future) exceed 0.10 acre or 300 linear feet, respectively, additional compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h) (6) and (7).

For this approval to remain valid, you are required to comply with all the conditions listed below. In addition, you should obtain all other federal, state or local permits before proceeding with your project including (but not limited to) Sediment and Erosion control, Coastal Stormwater, Non-discharge and Water Supply watershed regulations. This Certification shall expire on the same day as the expiration date of the corresponding Corps of Engineers Permit.

This Water Quality Certification neither grants nor affirms any property right, license, or privilege in any lands or waters, or any right of use in any waters. This Water Quality Certification does not authorize any person to interfere with the riparian rights, littoral rights, or water use rights of any other person and does not create any prescriptive right or any right of priority regarding any usage of water. This Water Quality Certification shall not be interposed as a defense in any action respecting the determination of riparian or littoral rights or other rights to water

use. No consumptive user is deemed by virtue of this Water Quality Certification to possess any prescriptive or other right of priority with respect to any other consumptive user regardless of the quantity of the withdrawal or the date on which the withdrawal was initiated or expanded. Upon the presentation of proper credentials, the Division may inspect the property.

Condition(s) of Certification:

1. NCDWQ will not require the burial of the culverts in the streambed at Impact S3. However, design and placement of the culvert and other structures shall be installed in such a manner that the original stream profiles are not altered (i.e., the depth of the channel must not be reduced by a widening of the streambed). Existing stream dimensions (including pattern and profile) are to be maintained above and below locations of each culvert. The structure shall be designed and installed to allow for fish and other wildlife movement as well as prevent headcutting of the stream. The applicant may be required to provide evidence that the equilibrium has been maintained if requested in writing by the NCDWR. [15A NCAC 02H.0506(b)(2)]

2. If concrete is used during construction, a dry work area shall be maintained to prevent direct contact between curing concrete and stream water. Water that inadvertently contacts uncured concrete shall not be discharged to surface waters due to the potential for elevated pH and possible aquatic life and fish kills. [15A NCAC 02B.0200]

3. For all streams being impacted due to site dewatering activities, the site shall be graded to its preconstruction contours and revegetated with appropriate native species. [15A NCAC 02H.0506(b)(2)]

4. During the construction of the project, no staging of equipment of any kind is permitted in waters of the U.S. or protected riparian buffers. [15A NCAC 02H.0506(b)(2)]

5. The dimension, pattern and profile of the stream above and below the crossing shall not be modified. Disturbed floodplains and streams shall be restored to natural geomorphic conditions. [15A NCAC 02H.0506(b)(2)]

6. The use of riprap above the Normal High Water Mark shall be minimized. Any riprap placed for stream stabilization shall be placed in stream channels in such a manner that it does not impede aquatic life passage. [15A NCAC 02H.0506(b)(2)]

7. The Permittee shall ensure that the final design drawings adhere to the permit and to the permit drawings submitted for approval. [15A NCAC 02H .0507 (c) and 15A NCAC 02H .0506 (b)(2) and (c)(2)]

8. All work in or adjacent to stream waters shall be conducted in a dry work area. Approved BMP measures from the most current version of NCDOT Construction and Maintenance Activities manual such as sandbags, rock berms, cofferdams and other diversion structures shall be used to prevent excavation in flowing water. [15A NCAC 02H.0506(b)(3) and (c)(3)]

9. Heavy equipment shall be operated from the banks rather than in the stream channel in order to minimize sedimentation and reduce the introduction of other pollutants into the stream. [15A NCAC 02H.0506(b)(3)]

10. All mechanized equipment operated near surface waters must be regularly inspected and maintained to prevent contamination of stream waters from fuels, lubricants, hydraulic fluids, or other toxic materials. [15A NCAC 02H.0506(b)(3)]

11. No rock, sand or other materials shall be dredged from the stream channel except where authorized by this certification. [15A NCAC 02H.0506(b)(3)]

12. Discharging hydroseed mixtures and washing out hydroseeders and other equipment in or adjacent to surface waters is prohibited. [15A NCAC 02H.0506(b)(3)]

13. The permittee and its authorized agents shall conduct its activities in a manner consistent with State water quality standards (including any requirements resulting from compliance with §303(d) of the Clean Water Act) and any other appropriate requirements of State and Federal law. If the NCDWR determines that such standards or laws are not being met (including the failure to sustain a designated or achieved use) or that State or federal law is being violated, or that further conditions are necessary to assure compliance, the NCDWR may reevaluate and modify this certification. [15A NCAC 02B.0200]

14. A copy of this Water Quality Certification shall be maintained on the construction site at all times. In addition, the Water Quality Certification and all subsequent modifications, if any, shall be maintained with the Division Engineer and the on-site project manager. [15A NCAC 02H .0507(c) and 15A NCAC 02H .0506 (b)(2) and (c)(2)]

15. The outside buffer, wetland or water boundary located within the construction corridor approved by this authorization, including all non-commercial borrow and waste sites associated with the project, shall be clearly marked by highly visible fencing prior to any land disturbing activities. Impacts to areas within the fencing are prohibited unless otherwise authorized by this certification. [15A NCAC 02H.0501 and .0502]

16. The issuance of this certification does not exempt the Permittee from complying with any and all statutes, rules, regulations, or ordinances that may be imposed by other government agencies (i.e. local, state, and federal) having jurisdiction, including but not limited to applicable buffer rules, stormwater management rules, soil erosion and sedimentation control requirements, etc.

17. The Permittee shall report any violations of this certification to the Division of Water Resources within 24 hours of discovery. [15A NCAC 02B.0506(b)(2)]

18. Upon completion of the project (including any impacts at associated borrow or waste sites), the NCDOT Division Engineer shall complete and return the "Certification of Completion Form" to notify the NCDWR when all work included in the 401 Certification has been completed. [15A NCAC 02H.0507]

19. Native riparian vegetation (i.e., herbaceous, trees, and shrubs native to your geographic region) must be reestablished in the riparian areas within the construction limits of the project by the end of the growing season following completion of construction. [15A NCAC 02B.0506(b)(2)]

20. There shall be no excavation from, or waste disposal into, jurisdictional wetlands or waters associated with this permit without appropriate modification. Should waste or borrow sites, or access roads to waste or borrow sites, be located in wetlands or streams, compensatory mitigation will be required since that is a direct impact from road construction activities. [15A NCAC 02H.0506(b)(3) and (c)(3)]

21. Erosion control matting that incorporates plastic mesh and/or plastic twine shall not be used along streambanks or within jurisdictional wetlands. [15A NCAC 2H.0506; 15A NCAC 2H.0507]

22. Erosion and sediment control practices must be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices in order to protect surface waters standards [15A NCAC 02H.0506(b)(3) and (c)(3)]:

    a. The erosion and sediment control measures for the project must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Sediment and Erosion Control Planning and Design Manual*.
    b. The design, installation, operation, and maintenance of the sediment and erosion control measures must be such that they equal, or exceed, the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual*. The devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) projects, including contractor-owned or leased borrow pits associated with the project.
    c. For borrow pit sites, the erosion and sediment control measures must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual*.

d. The reclamation measures and implementation must comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act.

23. Sediment and erosion control measures shall not be installed in wetlands or waters except within the footprint of temporary or permanent impacts authorized by this Certification. If placed within authorized impact areas, then placement of such measures shall not be conducted in a manner that results in dis-equilibrium of any wetlands, streambeds, or streambanks. Any silt fence installed within wetlands shall be removed from wetlands and the natural grade restored and revegetated within two months of project completion. [15A NCAC 2H.0506(b); 15 A NCAC 2H.0507(c)]

24. When applicable, all construction activities shall be performed and maintained in full compliance with G.S. Chapter 113A Article 4 (Sediment and Pollution Control Act of 1973). Regardless of applicability of the Sediment and Pollution Control Act, all projects shall incorporate appropriate Best Management Practices for the control of sediment and erosion so that no violations of state water quality standards, statutes, or rules occur. [15A NCAC 02H .0506{b)(3) and (c)(3) and 15A NCAC 02B .0200]

25. Design, installation, operation, and maintenance of all sediment and erosion control measures shall be equal to or exceed the requirements specified in the most recent version of the North Carolina Sediment and Erosion Control Manual, or for linear transportation projects, the NCDOT Sediment and Erosion Control Manual.

26. All devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) sites, including contractor-owned or leased borrow pits associated with the project. Sufficient materials required for stabilization and/or repair of erosion control measures and stormwater routing and treatment shall be on site at all times.

27. For borrow pit sites, the erosion and sediment control measures shall be designed, installed, operated, and maintained in accordance with the most recent version of the North Carolina Surface Mining Manual. Reclamation measures and implementation shall comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act and the Mining Act of 1971.

28. DWR approves the stormwater drainage design as shown in the 401 application under the assumption that it meets the requirements of the NCDOT NPDES permit #NCS000250. These plans are enforceable by DWR. Changes to the approved plans are prohibited without prior approval from DWR. If sediment or other pollutants are found to be discharged from the stormwater outfalls, DWR may take enforcement action. NCDOT and DWR shall assess the damage to water quality standards and implement an appropriate action plan to address the impacts. The action plan shall provide an appropriate timeline for implementation as agreed upon by both DWR and NCDOT. This may require NCDOT to obtain a modification to its current 401 and 404 permits.

This Certification shall become null and void unless the above conditions are made conditions of the Federal 404 and/or Coastal Area Management Act Permit. This Certification shall expire upon the expiration of the 404 or CAMA permit. Please be aware that impacting waters without first applying for and securing the issuance of a 401 Water Quality Certification violates Title 15A of the North Carolina Administrative Code (NCAC) 2H .0500. Title 15A NCAC 2H .0500 requires certifications pursuant to Section 401 of the Clean Water Act whenever construction or operation of facilities will result in a discharge into navigable waters, including wetlands, as described in 33 Code of Federal Regulations (CFR) Part 323. It also states any person desiring issuance of the State certification or coverage under a general certification required by Section 401 of the Federal Water Pollution Control Act shall file with the Director of the North Carolina Division of Water Quality. Violations of any condition herein set forth may result in revocation of this Certification and may result in criminal and/or civil penalties. Pursuant to G.S. 143-215.6A, these violations and any future violations are subject to a civil penalty assessment of up to a maximum of $25,000.00 per day for each violation.

This approval and its conditions are final and binding unless contested [G.S. 143-215.5]. Please be aware that impacting waters without first applying for and securing the issuance of a 401 Water Quality Certification violates Title 15A of the North Carolina Administrative Code (NCAC) 2H .0500. Title 15A NCAC 2H .0500 requires certifications pursuant to Section 401 of the Clean Water Act whenever construction or operation of facilities will

result in a discharge into navigable waters, including wetlands, as described in 33 Code of Federal Regulations (CFR) Part 323. It also states any person desiring issuance of the State certification or coverage under a general certification required by Section 401 of the Federal Water Pollution Control Act shall file with the Director of the North Carolina Division of Water Quality. Pursuant to G.S. 143-215.6A, these violations and any future violations are subject to a civil penalty assessment of up to a maximum of $25,000.00 per day for each violation.

This Certification can be contested as provided in Chapter 150B of the North Carolina General Statutes by filing a Petition for a Contested Case Hearing (Petition) with the North Carolina Office of Administrative Hearings (OAH) within sixty (60) calendar days. Requirements for filing a Petition are set forth in Chapter 150B of the North Carolina General Statutes and Title 26 of the North Carolina Administrative Code. Additional information regarding requirements for filing a Petition and Petition forms may be accessed at http://www.ncoah.com/ or by calling the OAH Clerk's Office at (919) 431-3000.

A party filing a Petition must serve a copy of the Petition on:

William F. Lane, General Counsel
Department of Environmental Quality
1601 Mail Service Center
Raleigh, NC 27699-1601

If the party filing the Petition is not the permittee, then the party must also serve the recipient of the Certification in accordance with N.C.G.S 150B-23(a).

This the 22nd day of January 2025

DIVISION OF WATER RESOURCES

Signed by:
Susan Locklear
375CAE2BB9F540C...

Richard E. Rogers, Jr., Director

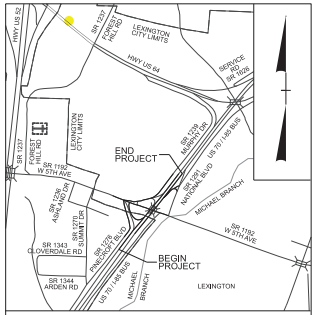
WQC No. 007437

09/08/99

PROJECT: BR-0015

CONTRACT: TBD

See Sheet 1A For Index of Sheets



VICINITY MAP (NTS)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

DAVIDSON COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0015	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
67015.1.1		PE
67015.2.1		R/W, UTIL
67015.3.1		CONST.

PERMIT DRAWING SHEET 3 OF 11

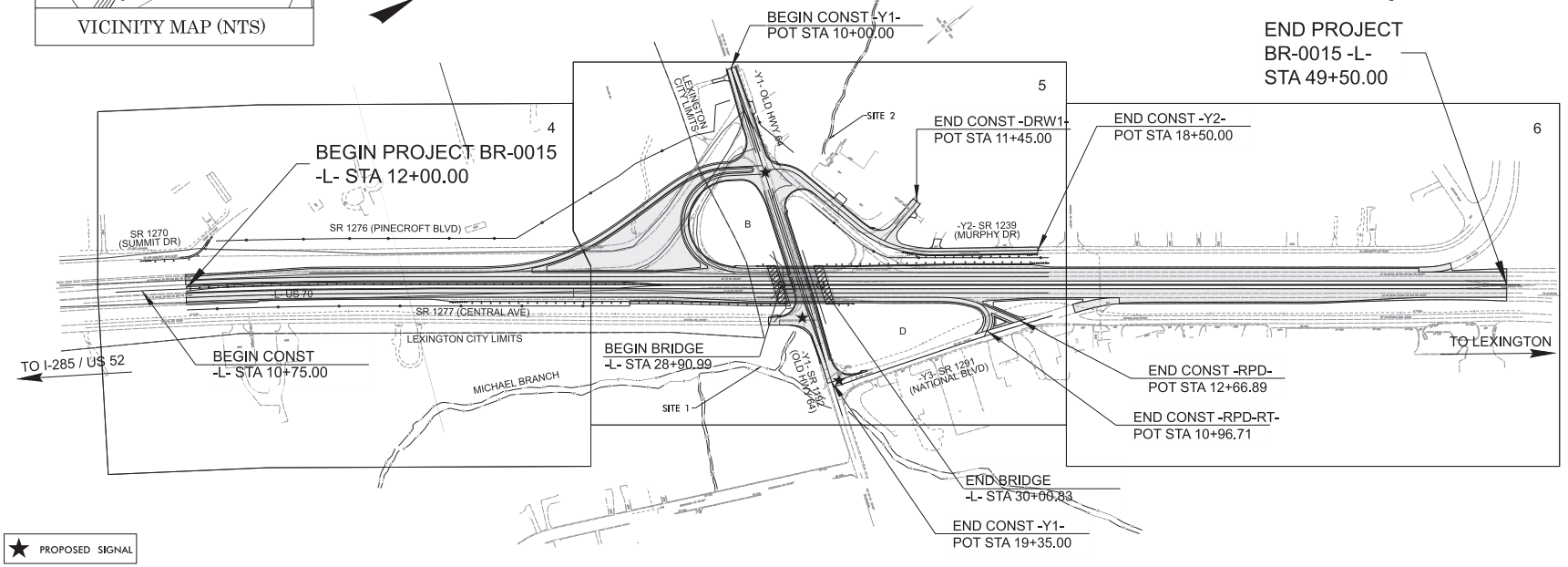
LOCATION: *BRIDGE 280067 AND 280068 REPLACEMENTS ON US 29/US 70. NB & SB OVER SR 1192 (W. 5TH AVE.)*

TYPE OF WORK: *GRADING, DRAINAGE, PAVING, WIDENING, SIGNALS, AND STRUCTURES*

WETLAND & STREAM IMPACTS

Plans Developed with OpenRoads

NAD 83/2011



★ PROPOSED SIGNAL

THIS IS A CONTROL OF ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

PLANS: 50 25 0 50 100

PROFILE (HORIZONTAL): 50 25 0 50 100

PROFILE (VERTICAL): 10 5 0 10 20

DESIGN DATA

ADT 2025 = 15150
ADT 2045 = 18700
K = 8 %
D = 55 %
T = 9 % *
V = 60 MPH
* TTST =5% DUAL 4%
FUNC CLASS = PRINCIPAL ARTERIAL STATEWIDE TIER

PROJECT LENGTH

PROJECT LENGTHS FOR PROJECT BR-0015:

LENGTH ROADWAY PROJECT BR-0015	=	0.689 MILES
LENGTH STRUCTURES PROJECT BR-0015	=	0.021 MILES
TOTAL LENGTH PROJECT BR-0015	=	0.710 MILES

NCDOT Contact: JENNIFER HERNANDEZ, P.E.

Prepared In the Office of: KCA KERNGER CAMPO & ASSOCIATES — NC FIRM LICENSE No# C-1506, 301 Fayetteville St., Suite 1100, Raleigh, NC 27601, (919)882-7039

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: 04/17/2024

LETTING DATE: 06/17/2025

ANDREA B. GORDON, P.E.
PROJECT ENGINEER

GERALD P. SYKES, E.I.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

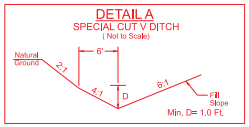
STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION ·

P-17

5/26/20

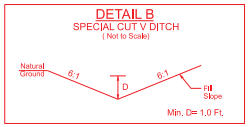
PERMIT DRAWING
SHEET 4 OF 11

DETAIL A
SPECIAL CUT V DITCH
(Not to Scale)



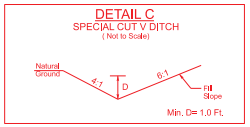
FROM STA. TO STA.
-L- 12+00 TO 19+87 LT.
-RPB- 10+00 TO 18+58 LT.

DETAIL B
SPECIAL CUT V DITCH
(Not to Scale)



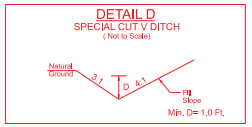
FROM STA. TO STA.
-L- 31+00 TO 32+49 LT.

DETAIL C
SPECIAL CUT V DITCH
(Not to Scale)



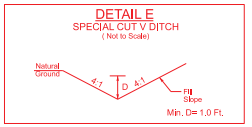
FROM STA. TO STA.
-RPB- 13+50 TO 16+45 RT.
-LPB- 12+07 TO 13+35 LT.

DETAIL D
SPECIAL CUT V DITCH
(Not to Scale)



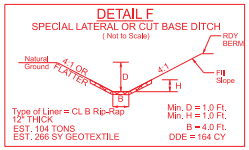
FROM STA. TO STA.
-Y1- 10+00 TO 11+00 RT.
-Y1- 17+71 TO 18+75 RT.

DETAIL E
SPECIAL CUT V DITCH
(Not to Scale)



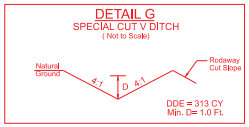
FROM STA. TO STA.
-Y1- 11+00 TO 12+20 RT.
-Y2- 13+05 TO 13+80 LT.

DETAIL F
SPECIAL LATERAL OR CUT BASE DITCH
(Not to Scale)



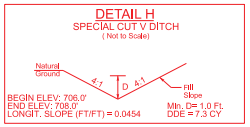
FROM STA. TO STA.
-Y1- 13+75 TO 15+11 RT.

DETAIL G
SPECIAL CUT V DITCH
(Not to Scale)



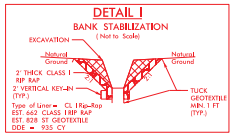
FROM STA. TO STA.
-Y1- 17+69 TO 19+00 LT.

DETAIL H
SPECIAL CUT V DITCH
(Not to Scale)



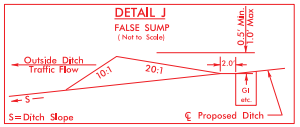
FROM STA. TO STA.
-Y3- 10+47 TO 10+91 LT.

DETAIL I
BANK STABILIZATION
(Not to Scale)

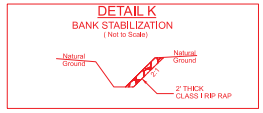


STA.
-Y1- 17+47 TO 18+65 RT.

DETAIL J
FALSE SUMP
(Not to Scale)



DETAIL K
BANK STABILIZATION
(Not to Scale)



STA.
-Y1- 17+47 TO 18+65 RT.

PERMIT

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DAVIDSON COUNTY

HIGHWAY DIVISION 9

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

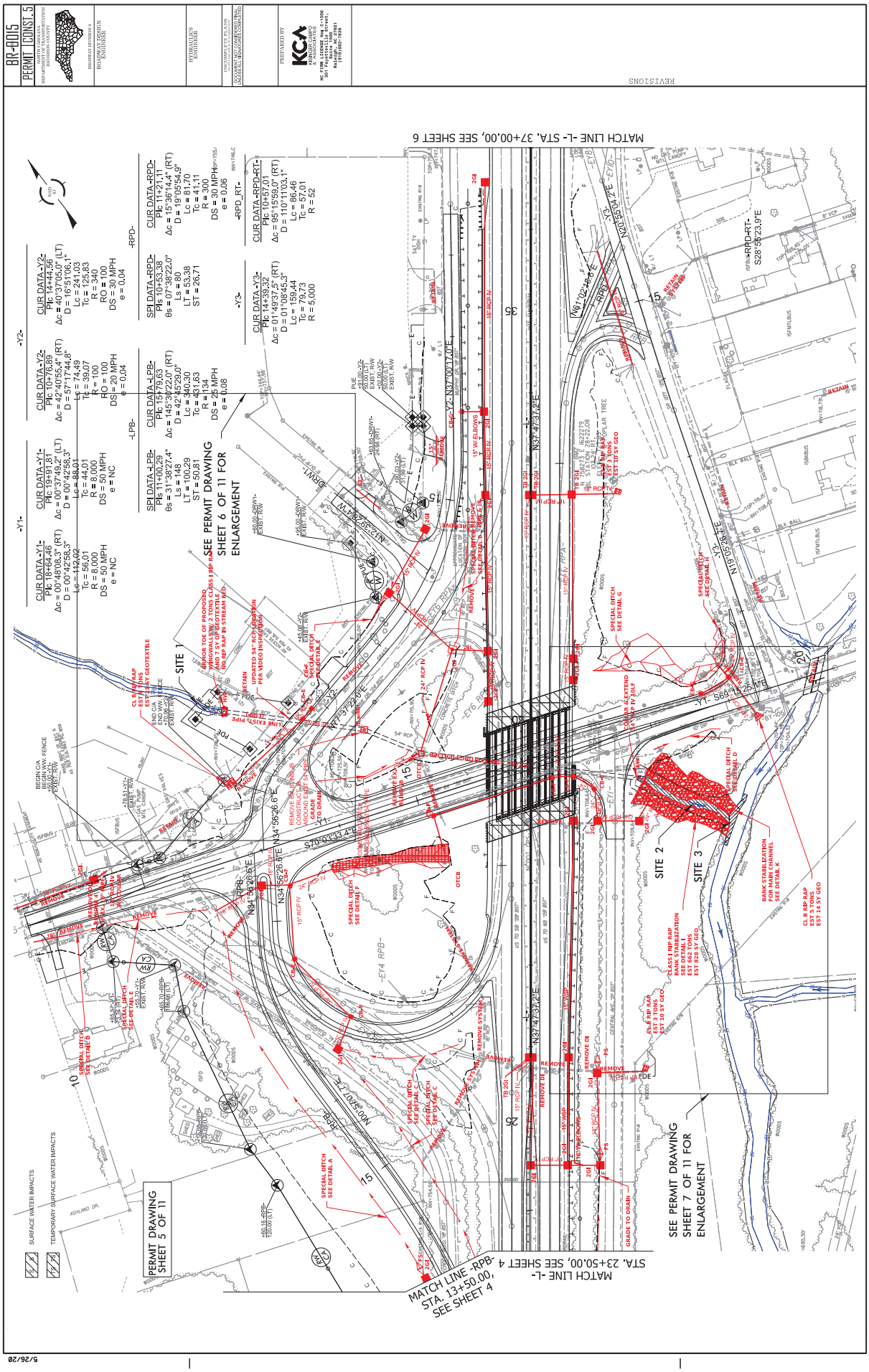
INCOMPLETE PLANS
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

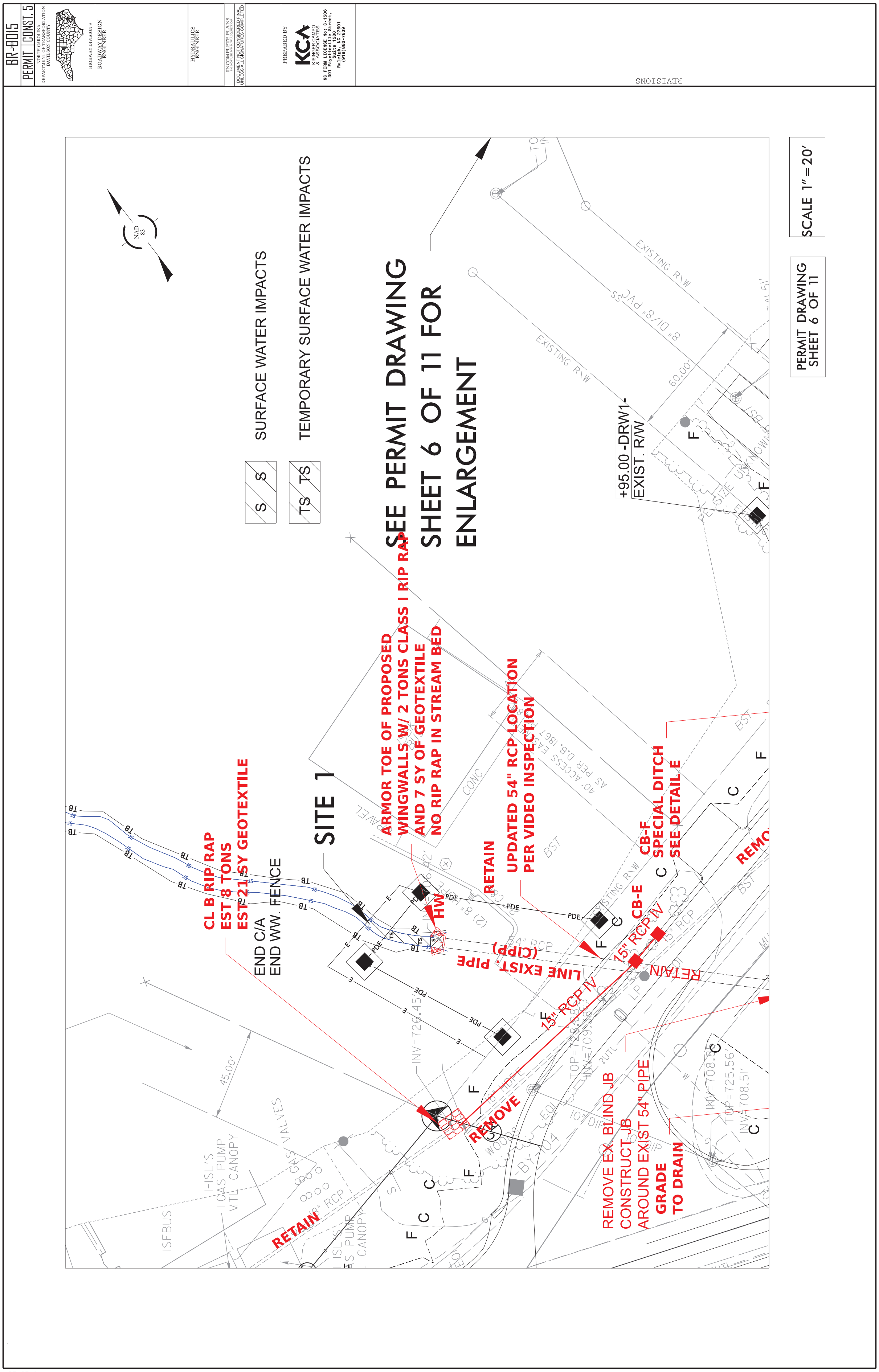
PREPARED BY

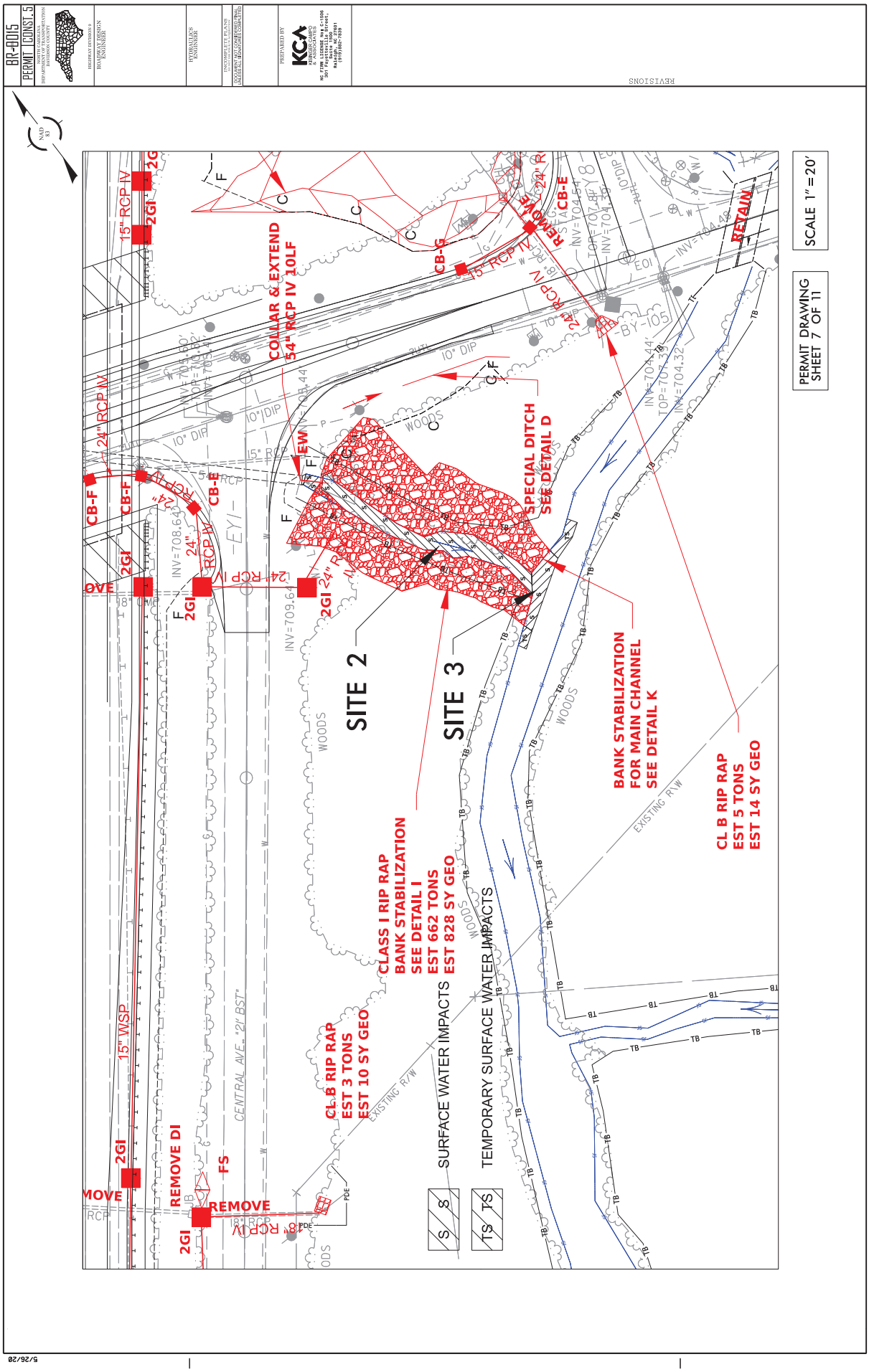
KCA
KBIMGER CAMPO & ASSOCIATES
NC FIRM LICENSE No# C-1506
301 Fayetteville Street,
Suite 1900
Raleigh, NC 27601
(919)882-7830

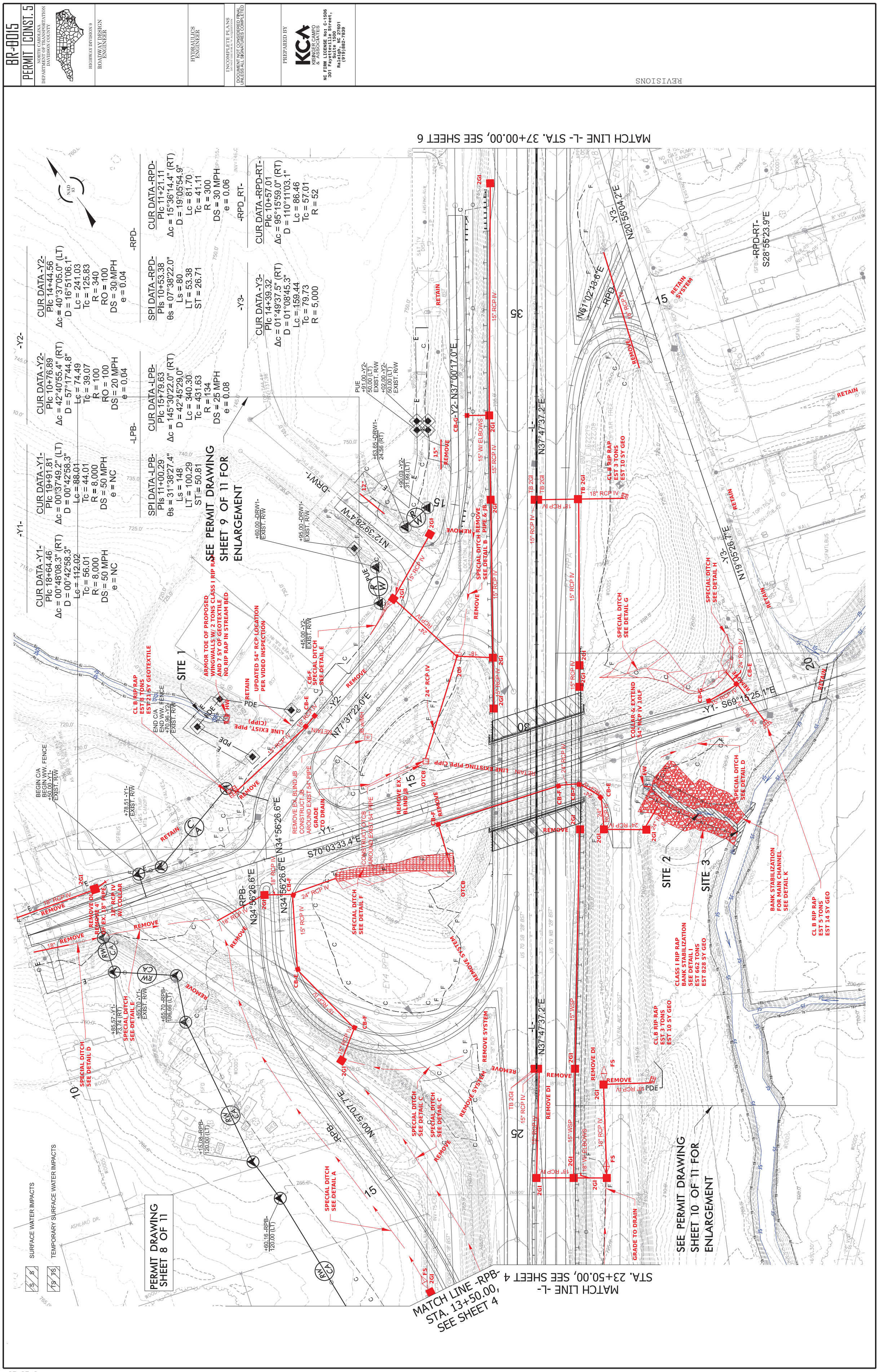
REVISIONS

P-18


BR-0015
PERMIT CONSTR.5
REVISIONS
PREPARED BY
KCA
KIMLEY-HORN & ASSOCIATES
SEE PERMIT DRAWING SHEET 6 OF 11 FOR ENLARGEMENT
MATCH LINE -L- STA. 37+00.00, SEE SHEET 6
SEE PERMIT DRAWING SHEET 7 OF 11 FOR ENLARGEMENT
MATCH LINE -L- STA. 23+50.00, SEE SHEET 4
MATCH LINE -RPB- STA. 13+50.00, SEE SHEET 4
PERMIT DRAWING SHEET 5 OF 11
SITE 1
SITE 2
SITE 3
SURFACE WATER IMPACTS
TEMPORARY SURFACE WATER IMPACTS
5/26/20


BR-0015
PERMIT CONST. 5
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DAVIDSON COUNTY
HIGHWAY DIVISION 9
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
PREPARED BY
KCA
REVISIONS
NAD 83
SURFACE WATER IMPACTS
TEMPORARY SURFACE WATER IMPACTS
SEE PERMIT DRAWING SHEET 6 OF 11 FOR ENLARGEMENT
PERMIT DRAWING SHEET 6 OF 11
SCALE 1" = 20'
SITE 1
EXISTING R/W
8" DI/8" PVC SS
+95.00 -DRW1-
EXIST. R/W
CL B RIP RAP
EST 8 TONS
EST 21 SY GEOTEXTILE
END C/A
END WW. FENCE
ARMOR TOE OF PROPOSED WINGWALLS W/ 2 TONS CLASS I RIP RAP AND 7 SY OF GEOTEXTILE
NO RIP RAP IN STREAM BED
HW
RETAIN
UPDATED 54" RCP LOCATION PER VIDEO INSPECTION
LINE EXIST. PIPE (CIPP)
CB-F
SPECIAL DITCH
SEE DETAIL E
CB-E
15" RCP IV
RETAIN
REMOVE
REMOVE EX. BLIND JB
CONSTRUCT JB
AROUND EXIST 54" PIPE
GRADE TO DRAIN
RETAIN
45.00'
60.00'
ISFBUS
GAS VALVES
5/26/20


BR-0015
PERMIT CONST. 5
REVISIONS
PREPARED BY
KCA ENGINEERING & ASSOCIATES
SCALE 1" = 20'
PERMIT DRAWING SHEET 7 OF 11
SITE 2
SITE 3
COLLAR & EXTEND 54" RCP IV 10LF
SPECIAL DITCH SEE DETAIL D
BANK STABILIZATION FOR MAIN CHANNEL SEE DETAIL K
CLASS I RIP RAP BANK STABILIZATION SEE DETAIL I EST 662 TONS EST 828 SY GEO
CL B RIP RAP EST 3 TONS EST 10 SY GEO
CL B RIP RAP EST 5 TONS EST 14 SY GEO
SURFACE WATER IMPACTS
TEMPORARY SURFACE WATER IMPACTS
EXISTING R/W
CENTRAL AVE. "2I" BST"
REMOVE
REMOVE DI
RETAIN
CB-F
CB-E
CB-G
15" RCP IV
24" RCP IV
15" WSP
10" DIP
WOODS


BR-0015
PERMIT CONST. 5
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DAVIDSON COUNTY
HIGHWAY DIVISION 9
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
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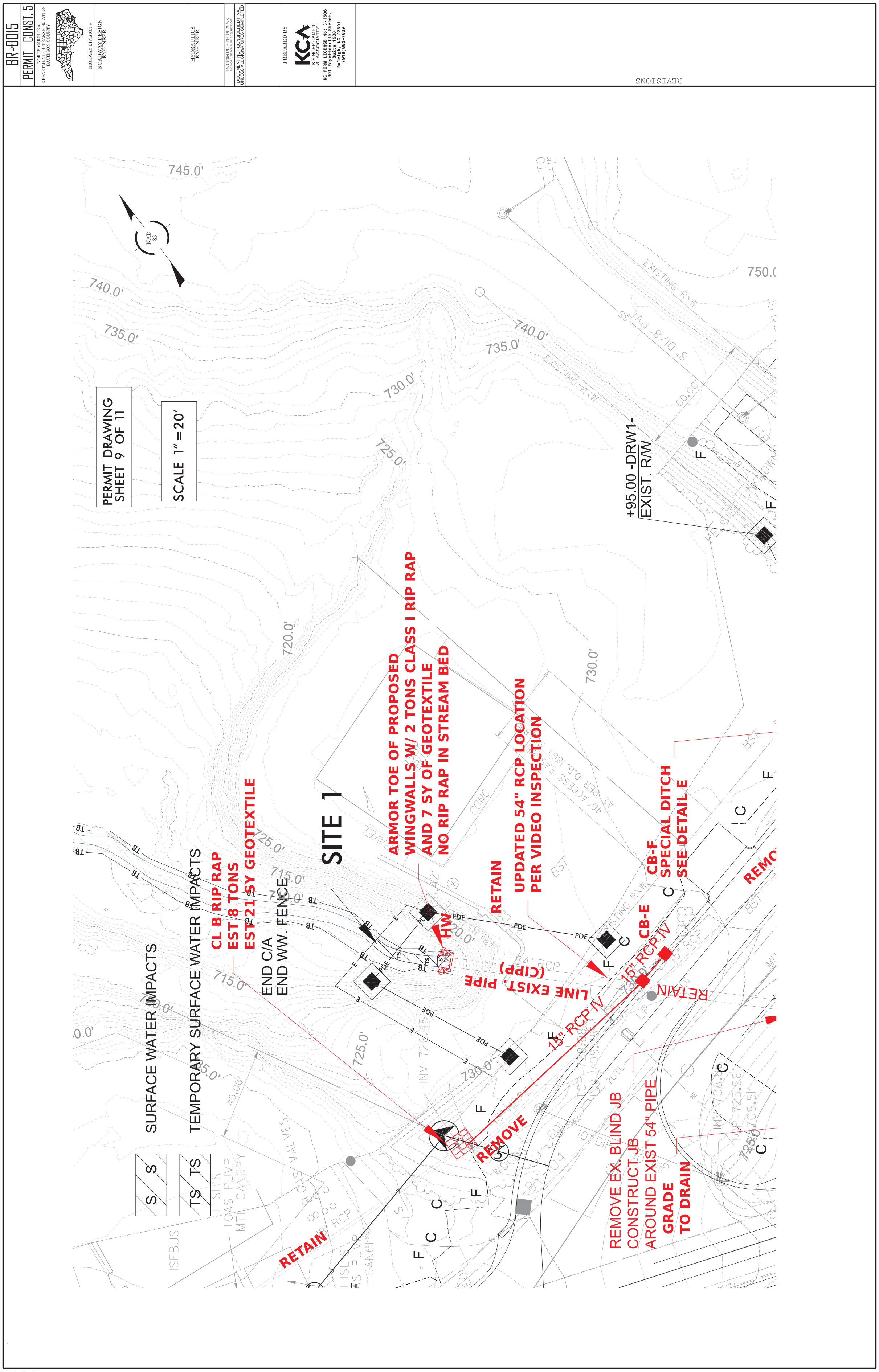
KCA
REVISIONS
MATCH LINE -L- STA. 37+00.00, SEE SHEET 6
SEE PERMIT DRAWING SHEET 9 OF 11 FOR ENLARGEMENT
SEE PERMIT DRAWING SHEET 10 OF 11 FOR ENLARGEMENT
PERMIT DRAWING SHEET 8 OF 11
MATCH LINE -RPB- STA. 13+50.00, SEE SHEET 4
MATCH LINE -L- STA. 23+50.00, SEE SHEET 4
SITE 1
SITE 2
SITE 3
SURFACE WATER IMPACTS
TEMPORARY SURFACE WATER IMPACTS
5/26/20


BR-0015
PERMIT
CONST. 5
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DAVIDSON COUNTY
HIGHWAY DIVISION 9
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
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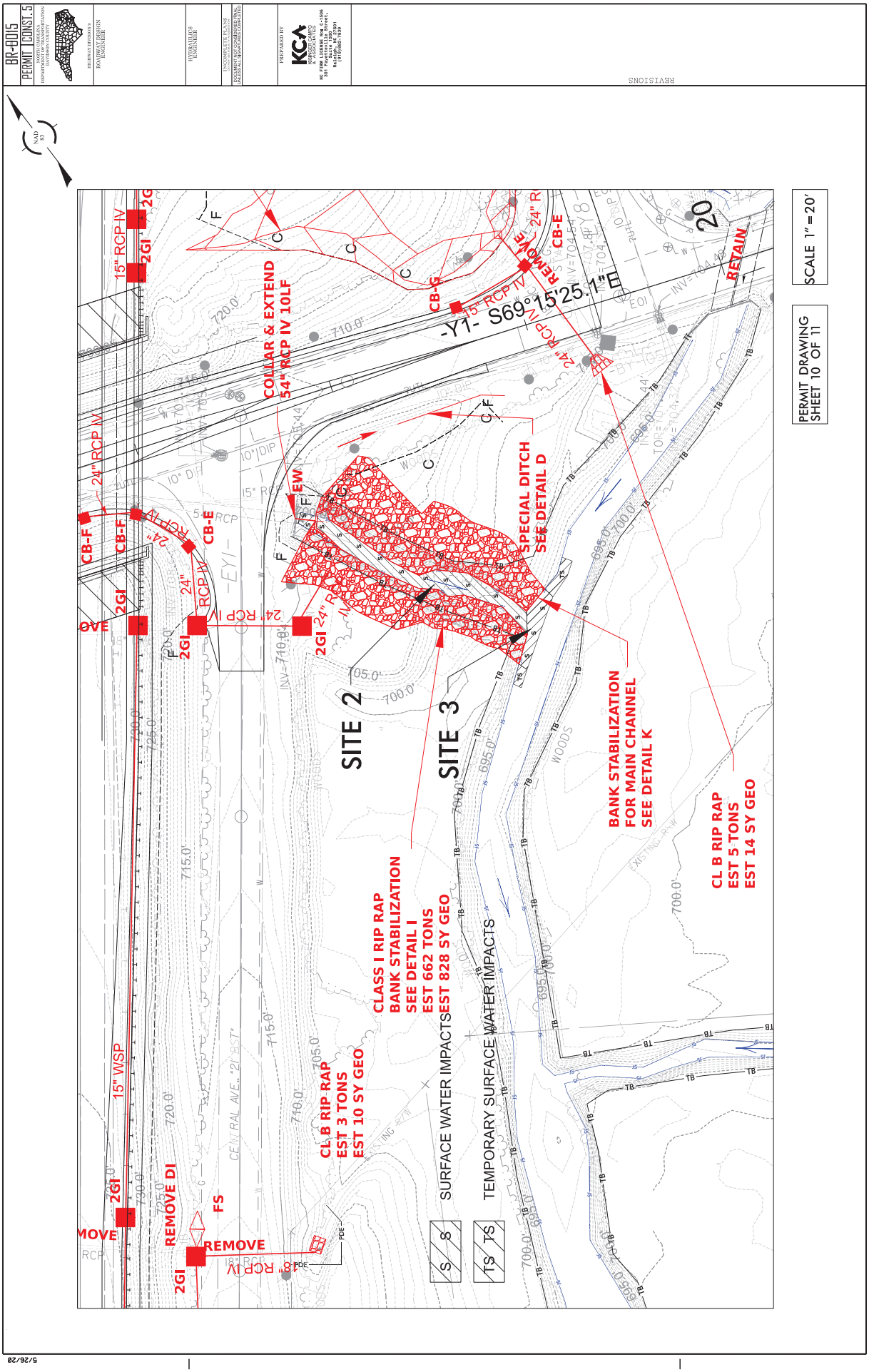
KCA
KISINGER CAMPO & ASSOCIATES
REVISIONS
PERMIT DRAWING
SHEET 9 OF 11
SCALE 1" = 20'
NAD 83
SITE 1
SURFACE WATER IMPACTS
TEMPORARY SURFACE WATER IMPACTS
CL B RIP RAP
EST 8 TONS
EST 21 SY GEOTEXTILE
END C/A
END WW. FENCE
ARMOR TOE OF PROPOSED
WINGWALLS W/ 2 TONS CLASS I RIP RAP
AND 7 SY OF GEOTEXTILE
NO RIP RAP IN STREAM BED
RETAIN
UPDATED 54" RCP LOCATION
PER VIDEO INSPECTION
LINE EXIST. PIPE
(CIPP)
HW
CB-F
SPECIAL DITCH
SEE DETAIL E
CB-E
15" RCP IV
REMOVE
RETAIN
REMOVE EX. BLIND JB
CONSTRUCT JB
AROUND EXIST 54" PIPE
GRADE
TO DRAIN
+95.00 -DRW1-
EXIST. R/W
EXISTING R/W
60.00'
745.0'
740.0'
735.0'
730.0'
725.0'
720.0'
715.0'
750.0'
5/26/20


BR-0015
PERMIT CONST. 5
NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DAVIDSON COUNTY
HIGHWAY DIVISION 8
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
PREPARED BY
KCA
REVISIONS
NAD 83
SCALE 1" = 20'
PERMIT DRAWING
SHEET 10 OF 11
SITE 2
SITE 3
-Y1- S69°15'25.1"E
SPECIAL DITCH
SEE DETAIL D
BANK STABILIZATION
FOR MAIN CHANNEL
SEE DETAIL K
CLASS I RIP RAP
BANK STABILIZATION
SEE DETAIL I
EST 662 TONS
EST 828 SY GEO
CL B RIP RAP
EST 3 TONS
EST 10 SY GEO
CL B RIP RAP
EST 5 TONS
EST 14 SY GEO
SURFACE WATER IMPACTS
TEMPORARY SURFACE WATER IMPACTS
COLLAR & EXTEND
54" RCP IV 10LF
REMOVE
RETAIN
REMOVE DI
CB-E
CB-F
CB-S
FS
EW
2GI
15" RCP IV
24" RCP IV
18" RCP IV
15" WSP
CENTRAL AVE. "21" RCP"
EXISTING R/W
WOODS
5/26/20

WETLAND AND SURACE WATER IMPACTS SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	-Y2-11+14 / 11+21 LT	CIPP Liner Installation (Dewatering)							< 0.01		33	
1	-Y2-11+14 / 11+21 LT	Bank Stabilization						< 0.01		6		
2	-Y1- 17+64 / 17+80 RT	Ex. Pipe Extension / Endwall Construction						< 0.01		15	0	
2	-Y1- 17+72 / 18+58 RT	Bank Stabilization						0.02		117		
3	-Y1- 18+58 / 18+71 RT	Bank Stabilization						< 0.01	< 0.01	47	35	
TOTALS*:								0.03	< 0.01	185	68	0

*Rounded totals are sum of actual impacts

NOTES:

Site 1 Permanent Surface Water Impacts:	39.2 sq. ft.
Site 1 Temporary Surface Water Impacts	148.1 sq. ft.
Site 2 Permanent Surface Water Impacts:	1036.7 sq. ft.
Site 3 Permanent Surface Water Impacts:	252.6 sq. ft.
Site 3 Temporary Surface Water Impacts	139.4 sq. ft.

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
12/12/2024
DAVIDSON
BR-0015

County: DAVIDSON

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
			ROADWAY ITEMS			
0001	0000100000-N	800	MOBILIZATION	Lump Sum	L.S.	
0002	0000400000-N	801	CONSTRUCTION SURVEYING	Lump Sum	L.S.	
0003	0022000000-E	225	UNCLASSIFIED EXCAVATION	71,100 CY		
0004	0036000000-E	225	UNDERCUT EXCAVATION	3,475 CY		
0005	0050000000-E	226	SUPPLEMENTARY CLEARING & GRUBBING	1 ACR		
0006	0063000000-N	SP	GRADING	Lump Sum	L.S.	
0007	0134000000-E	240	DRAINAGE DITCH EXCAVATION	1,420 CY		
0008	0195000000-E	265	SELECT GRANULAR MATERIAL	3,175 CY		
0009	0196000000-E	270	GEOTEXTILE FOR SOIL STABILIZATION	3,375 SY		
0010	0199000000-E	SP	TEMPORARY SHORING	6,889 SF		
0011	0248000000-N	SP	GENERIC GRADING ITEM TYPE 1 BRIDGE APPROACH FILL, STATION 29+45.91 -L-	Lump Sum	L.S.	
0012	0248000000-N	SP	GENERIC GRADING ITEM TYPE 2 BRIDGE APPROACH FILL, STATION 29+45.91 -L-	Lump Sum	L.S.	
0013	0318000000-E	300	FOUNDATION CONDITIONING MATERIAL, MINOR STRUCTURES	560 TON		
0014	0321000000-E	300	FOUNDATION CONDITIONING GEOTEXTILE	1,740 SY		
0015	0342000000-E	310	**" SIDE DRAIN PIPE (12")	40 LF		
0016	0343000000-E	310	15" SIDE DRAIN PIPE	64 LF		
0017	0344000000-E	310	18" SIDE DRAIN PIPE	168 LF		

County: DAVIDSON

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0018	0348000000-E	310	**" SIDE DRAIN PIPE ELBOWS (15")	2 EA		
0019	0348000000-E	310	**" SIDE DRAIN PIPE ELBOWS (18")	6 EA		
0020	0448000000-E	310	****" RC PIPE CULVERTS, CLASS IV (54")	12 LF		
0021	0448200000-E	310	15" RC PIPE CULVERTS, CLASS IV	1,992 LF		
0022	0448300000-E	310	18" RC PIPE CULVERTS, CLASS IV	1,222 LF		
0023	0448400000-E	310	24" RC PIPE CULVERTS, CLASS IV	912 LF		
0024	0448500000-E	310	30" RC PIPE CULVERTS, CLASS IV	376 LF		
0025	0986000000-E	SP	GENERIC PIPE ITEM 15" WELDED STEEL PIPE	424 LF		
0026	0986000000-E	SP	GENERIC PIPE ITEM 54" PIPE REHABILITATION CIPP LINER	520 LF		
0027	0986000000-E	SP	GENERIC PIPE ITEM PRE-INSTALLATION INSPECTION	520 LF		
0028	0992000000-E	SP	GENERIC PIPE ITEM DE-WATERING	3 EA		
0029	0995000000-E	340	PIPE REMOVAL	1,481 LF		
0030	1099500000-E	505	SHALLOW UNDERCUT	5,600 CY		
0031	1099700000-E	505	CLASS IV SUBGRADE STABILIZATION	11,425 TON		
0032	1110000000-E	510	STABILIZER AGGREGATE	500 TON		
0033	1112000000-E	505	GEOTEXTILE FOR SUBGRADE STABILIZATION	22,500 SY		
0034	1121000000-E	520	AGGREGATE BASE COURSE	3,300 TON		

County: DAVIDSON

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0035	1220000000-E	545	INCIDENTAL STONE BASE	100 TON		
0036	1297000000-E	607	MILLING ASPHALT PAVEMENT, ***" DEPTH (1-1/2")	24,300 SY		
0037	1330000000-E	607	INCIDENTAL MILLING	4,500 SY		
0038	1491000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0C	7,800 TON		
0039	1503000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C	7,000 TON		
0040	1519000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5B	1,180 TON		
0041	1523000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5C	10,600 TON		
0042	1575000000-E	620	ASPHALT BINDER FOR PLANT MIX	1,390 TON		
0043	1693000000-E	654	ASPHALT PLANT MIX, PAVEMENT REPAIR	500 TON		
0044	2020000000-N	806	CONTROL-OF-ACCESS MARKERS	7 EA		
0045	2022000000-E	815	SUBDRAIN EXCAVATION	190.4 CY		
0046	2026000000-E	815	GEOTEXTILE FOR SUBSURFACE DRAINS	850 SY		
0047	2036000000-E	815	SUBDRAIN COARSE AGGREGATE	142.8 CY		
0048	2044000000-E	815	6" PERFORATED SUBDRAIN PIPE	850 LF		
0049	2070000000-N	815	SUBDRAIN PIPE OUTLET	2 EA		
0050	2077000000-E	815	6" OUTLET PIPE	12 LF		
0051	2190000000-N	828	TEMPORARY STEEL PLATE COVERS FOR MASONRY DRAINAGE STRUCTURE	5 EA		

County: DAVIDSON

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0052	2220000000-E	838	REINFORCED ENDWALLS	10.4 CY		
0053	2253000000-E	840	PIPE COLLARS	7.916 CY		
0054	2286000000-N	840	MASONRY DRAINAGE STRUCTURES	65 EA		
0055	2297000000-E	840	MASONRY DRAINAGE STRUCTURES	18.643 CY		
0056	2308000000-E	840	MASONRY DRAINAGE STRUCTURES	20.78 LF		
0057	2364200000-N	840	FRAME WITH TWO GRATES, STD 840.20	10 EA		
0058	2365000000-N	840	FRAME WITH TWO GRATES, STD 840.22	17 EA		
0059	2366000000-N	840	FRAME WITH TWO GRATES, STD 840.24	6 EA		
0060	2367000000-N	840	FRAME WITH TWO GRATES, STD 840.29	2 EA		
0061	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (E)	4 EA		
0062	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (F)	7 EA		
0063	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (G)	2 EA		
0064	2396000000-N	840	FRAME WITH COVER, STD 840.54	3 EA		
0065	2407000000-N	840	STEEL FRAME WITH TWO GRATES, STD 840.37	16 EA		
0066	2451000000-N	852	CONCRETE TRANSITIONAL SECTION FOR DROP INLET	1 EA		
0067	2472000000-N	840	GENERIC DRAINAGE ITEM FRAME WITH COVER, STD 840.55	2 EA		
0068	2549000000-E	846	2'-6" CONCRETE CURB & GUTTER	2,260 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0069	2556000000-E	846	SHOULDER BERM GUTTER	660 LF		
0070	2577000000-E	846	CONCRETE EXPRESSWAY GUTTER	350 LF		
0071	2612000000-E	848	6" CONCRETE DRIVEWAY	20 SY		
0072	2647000000-E	852	5" MONOLITHIC CONCRETE ISLANDS (SURFACE MOUNTED)	220 SY		
0073	2703000000-E	854	CONCRETE BARRIER, TYPE ******* (IV)	2,380 LF		
0074	2830000000-N	858	ADJUSTMENT OF MANHOLES	2 EA		
0075	2950000000-N	859	CONVERT EXISTING JUNCTION BOX TO DROP INLET	1 EA		
0076	2995000000-N	SP	GENERIC DRAINAGE ITEM CONVERT EXISTING DROP INLET TO TB2GI	1 EA		
0077	2995000000-N	SP	GENERIC DRAINAGE ITEM CONVERT EXISTING DROP INLET TO TRAFFIC BEARING JUNCTION BOX	5 EA		
0078	3030000000-E	862	STEEL BEAM GUARDRAIL	3,487.5 LF		
0079	3045000000-E	862	STEEL BEAM GUARDRAIL, SHOP CURVED	75 LF		
0080	3060000000-E	862	STEEL BEAM GUARDRAIL, DOUBLE FACED	1,225 LF		
0081	3150000000-N	862	ADDITIONAL GUARDRAIL POSTS	10 EA		
0082	3210000000-N	862	GUARDRAIL END UNITS, TYPE CAT-1	2 EA		
0083	3287000000-N	862	GUARDRAIL END UNITS, TYPE TL-3	2 EA		
0084	3288000000-N	862	GUARDRAIL END UNITS, TYPE TL-2	4 EA		
0085	3317000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE B-77	6 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0086	3360000000-E	863	REMOVE EXISTING GUARDRAIL	11,434.5 LF		
0087	3380000000-E	862	TEMPORARY STEEL BEAM GUARDRAIL	250 LF		
0088	3387000000-N	862	TEMPORARY GUARDRAIL ANCHOR UNITS, TYPE ********* (B-77)	3 EA		
0089	3387000000-N	862	TEMPORARY GUARDRAIL ANCHOR UNITS, TYPE ********* (III)	1 EA		
0090	3389150000-N	862	TEMPORARY GUARDRAIL END UNITS, TYPE ***** (TL-3)	5 EA		
0091	3389160000-N	862	TEMPORARY ADDITIONAL GUARDRAIL POSTS	5 EA		
0092	3503000000-E	866	WOVEN WIRE FENCE, 47" FABRIC	3,820 LF		
0093	3509000000-E	866	4" TIMBER FENCE POSTS, 7'-6" LONG	230 EA		
0094	3515000000-E	866	5" TIMBER FENCE POSTS, 8'-0" LONG	76 EA		
0095	3595000000-E	869	RELAPPING GUARDRAIL	2,000 LF		
0096	3628000000-E	876	RIP RAP, CLASS I	449 TON		
0097	3649000000-E	876	RIP RAP, CLASS B	129 TON		
0098	3656000000-E	876	GEOTEXTILE FOR DRAINAGE	2,429 SY		
0099	4025000000-E	901	CONTRACTOR FURNISHED, TYPE *** SIGN (A)	828 SF		
0100	4025000000-E	901	CONTRACTOR FURNISHED, TYPE *** SIGN (B)	24 SF		
0101	4025000000-E	901	CONTRACTOR FURNISHED, TYPE *** SIGN (D)	30 SF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0102	4025000000-E	901	CONTRACTOR FURNISHED, TYPE *** SIGN (E)	317 SF		
0103	4025000000-E	901	CONTRACTOR FURNISHED, TYPE *** SIGN (F)	213 SF		
0104	4048000000-E	902	REINFORCED CONCRETE SIGN FOUNDATIONS	4 CY		
0105	4054000000-E	902	PLAIN CONCRETE SIGN FOUNDATIONS	1 CY		
0106	4057000000-E	SP	OVERHEAD FOOTING	9 CY		
0107	4060000000-E	903	SUPPORTS, BREAKAWAY STEEL BEAM	3,506 LB		
0108	4066000000-E	903	SUPPORTS, SIMPLE STEEL BEAM	889 LB		
0109	4072000000-E	903	SUPPORTS, 3-LB STEEL U-CHANNEL	1,035.4 LF		
0110	4082000000-E	903	SUPPORTS, WOOD	500 LF		
0111	4096000000-N	904	SIGN ERECTION, TYPE D	2 EA		
0112	4102000000-N	904	SIGN ERECTION, TYPE E	39 EA		
0113	4108000000-N	904	SIGN ERECTION, TYPE F	11 EA		
0114	4109000000-N	904	SIGN ERECTION, TYPE *** (OVERHEAD) (A)	1 EA		
0115	4110000000-N	904	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (A)	7 EA		
0116	4110000000-N	904	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (B)	2 EA		
0117	4130000000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (28+25 -L-)	Lump Sum	L.S.	

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0118	4155000000-N	907	DISPOSAL OF SIGN SYSTEM, U-CHANNEL	66 EA		
0119	4158000000-N	907	DISPOSAL OF SIGN SYSTEM, WOOD	7 EA		
0120	4400000000-E	1110	WORK ZONE SIGNS (STATIONARY)	5,816 SF		
0121	4405000000-E	1110	WORK ZONE SIGNS (PORTABLE)	192 SF		
0122	4410000000-E	1110	WORK ZONE SIGNS (BARRICADE MOUNTED)	1,080 SF		
0123	4415000000-N	1115	FLASHING ARROW BOARD	5 EA		
0124	4420000000-N	1120	PORTABLE CHANGEABLE MESSAGE SIGN	4 EA		
0125	4430000000-N	1130	DRUMS	450 EA		
0126	4445000000-E	1145	BARRICADES (TYPE III)	680 LF		
0127	4455000000-N	1150	FLAGGER	150 DAY		
0128	4465000000-N	1160	TEMPORARY CRASH CUSHIONS	7 EA		
0129	4470000000-N	1160	REMOVE & RESET TEMPORARY CRASH CUSHION	7 EA		
0130	4480000000-N	1165	TMA	3 EA		
0131	4485000000-E	1170	PORTABLE CONCRETE BARRIER	9,100 LF		
0132	4490000000-E	1170	PORTABLE CONCRETE BARRIER (ANCHORED)	2,238 LF		
0133	4500000000-E	1170	REMOVE AND RESET PORTABLE CONCRETE BARRIER	17,359 LF		
0134	4505000000-E	1170	REMOVE & RESET PORTABLE CONCRETE BARRIER (ANCHORED)	613 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0135	4510000000-N	1190	LAW ENFORCEMENT	240 HR		
0136	4520000000-N	1266	TUBULAR MARKERS (FIXED)	766 EA		
0137	4650000000-N	1251	TEMPORARY RAISED PAVEMENT MARKERS	6,373 EA		
0138	4685000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (4", 90 MILS)	7,800 LF		
0139	4695000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (8", 90 MILS)	400 LF		
0140	4709000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (24", 90 MILS)	300 LF		
0141	4720000000-E	1205	THERMOPLASTIC PAVEMENT MARKING CHARACTER (90 MILS)	12 EA		
0142	4725000000-E	1205	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)	18 EA		
0143	4810000000-E	1205	PAINT PAVEMENT MARKING LINES (4")	11,908 LF		
0144	4820000000-E	1205	PAINT PAVEMENT MARKING LINES (8")	107 LF		
0145	4835000000-E	1205	PAINT PAVEMENT MARKING LINES (24")	214 LF		
0146	4840000000-N	1205	PAINT PAVEMENT MARKING CHARACTER	19 EA		
0147	4845000000-N	1205	PAINT PAVEMENT MARKING SYMBOL	46 EA		
0148	4846000000-E	1205	POLYUREA PAVEMENT MARKING LINES (**", *** MILS) (12", 30 MILS)	2,900 LF		
0149	4846000000-E	1205	POLYUREA PAVEMENT MARKING LINES (**", *** MILS) (6", 30 MILS)	33,300 LF		
0150	4847500000-E	SP	WORK ZONE PERFORMANCE PAVEMENT MARKING LINES, 6"	48,044 LF		
0151	4847600000-E	SP	WORK ZONE PERFORMANCE PAVEMENT MARKING LINES, 12"	5,022 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0152	4850000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (4")	1,216 LF		
0153	4855000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (6")	23,765 LF		
0154	4865000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (12")	1,431 LF		
0155	4870000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (24")	377 LF		
0156	4875000000-N	1205	REMOVAL OF PAVEMENT MARKING SYMBOLS & CHARACTERS	65 EA		
0157	4890000000-E	SP	GENERIC PAVEMENT MARKING ITEM YIELD LINE THERMOPLASTIC PAVEMENT MARKING, (24", 90 MILS)	20 LF		
0158	4895000000-N	SP	GENERIC PAVEMENT MARKING ITEM POLYCARBONATE H-SHAPED MARKERS	560 EA		
0159	4900000000-N	1251	PERMANENT RAISED PAVEMENT MARKERS	40 EA		
0160	5255000000-N	1413	PORTABLE LIGHTING	Lump Sum	L.S.	
0161	5325000000-E	1510	**" WATER LINE (1")	73 LF		
0162	5325200000-E	1510	2" WATER LINE	5 LF		
0163	5325600000-E	1510	6" WATER LINE	263 LF		
0164	5325800000-E	1510	8" WATER LINE	1,160 LF		
0165	5326200000-E	1510	12" WATER LINE	280 LF		
0166	5329000000-E	1510	DUCTILE IRON WATER PIPE FITTINGS	8,135 LB		
0167	5534000000-E	1515	**" VALVE (1")	1 EA		
0168	5540000000-E	1515	6" VALVE	2 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0169	5546000000-E	1515	8" VALVE	6 EA		
0170	5558000000-E	1515	12" VALVE	2 EA		
0171	5606000000-E	1515	2" BLOW OFF	1 EA		
0172	5648000000-N	1515	RELOCATE WATER METER	4 EA		
0173	5649000000-N	1515	RECONNECT WATER METER	2 EA		
0174	5686500000-E	1515	WATER SERVICE LINE	148 LF		
0175	5691300000-E	1520	8" SANITARY GRAVITY SEWER	627 LF		
0176	5775000000-E	1525	4' DIA UTILITY MANHOLE	6 EA		
0177	5781000000-E	1525	UTILITY MANHOLE WALL 4' DIA	22.4 LF		
0178	5800000000-E	1530	ABANDON 6" UTILITY PIPE	319 LF		
0179	5801000000-E	1530	ABANDON 8" UTILITY PIPE	1,472 LF		
0180	5804000000-E	1530	ABANDON 12" UTILITY PIPE	255 LF		
0181	5816000000-N	1530	ABANDON UTILITY MANHOLE	5 EA		
0182	5828000000-N	1530	REMOVE UTILITY MANHOLE	2 EA		
0183	5835700000-E	1540	16" ENCASEMENT PIPE	472 LF		
0184	5872500000-E	1550	BORE AND JACK OF **" (16")	420 LF		
0185	6000000000-E	1605	TEMPORARY SILT FENCE	9,970 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0186	6006000000-E	1610	STONE FOR EROSION CONTROL, CLASS A	2,100 TON		
0187	6009000000-E	1610	STONE FOR EROSION CONTROL, CLASS B	1,485 TON		
0188	6012000000-E	1610	SEDIMENT CONTROL STONE	2,395 TON		
0189	6015000000-E	1615	TEMPORARY MULCHING	59 ACR		
0190	6018000000-E	1620	SEED FOR TEMPORARY SEEDING	3,400 LB		
0191	6021000000-E	1620	FERTILIZER FOR TEMPORARY SEEDING	18.5 TON		
0192	6024000000-E	1622	TEMPORARY SLOPE DRAINS	585 LF		
0193	6029000000-E	SP	SAFETY FENCE	14,160 LF		
0194	6030000000-E	1630	SILT EXCAVATION	9,640 CY		
0195	6036000000-E	1631	MATTING FOR EROSION CONTROL	21,345 SY		
0196	6037000000-E	1629	COIR FIBER MAT	100 SY		
0197	6042000000-E	1632	1/4" HARDWARE CLOTH	2,730 LF		
0198	6043000000-E	1644	LOW PERMEABILITY GEOTEXTILE	200 SY		
0199	6048000000-E	SP	FLOATING TURBIDITY CURTAIN	115 SY		
0200	6070000000-N	1639	SPECIAL STILLING BASINS	2 EA		
0201	6071002000-E	1642	FLOCCULANT	2,665 LB		
0202	6071012000-E	1642	COIR FIBER WATTLE	3,180 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0203	6071030000-E	1640	COIR FIBER BAFFLE	375 LF		
0204	6071050000-E	1644	**" SKIMMER (1-1/2")	4 EA		
0205	6071050000-E	1644	**" SKIMMER (2")	1 EA		
0206	6071050000-E	1644	**" SKIMMER (2-1/2")	1 EA		
0207	6084000000-E	1660	SEEDING & MULCHING	59 ACR		
0208	6087000000-E	1660	MOWING	30 ACR		
0209	6090000000-E	1661	SEED FOR REPAIR SEEDING	900 LB		
0210	6093000000-E	1661	FERTILIZER FOR REPAIR SEEDING	2.5 TON		
0211	6096000000-E	1662	SEED FOR SUPPLEMENTAL SEEDING	1,225 LB		
0212	6108000000-E	1665	FERTILIZER TOPDRESSING	36.75 TON		
0213	6111000000-E	SP	IMPERVIOUS DIKE	103 LF		
0214	6114500000-N	1667	SPECIALIZED HAND MOWING	10 MHR		
0215	6114800000-N	SP	MANUAL LITTER REMOVAL	17 MHR		
0216	6114900000-E	SP	LITTER DISPOSAL	2 TON		
0217	6117000000-N	1675	RESPONSE FOR EROSION CONTROL	150 EA		
0218	6117500000-N	SP	CONCRETE WASHOUT STRUCTURE	2 EA		
0219	6132000000-N	SP	GENERIC EROSION CONTROL ITEM PREFABRICATED CONCRETE WASHOUT	9 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0220	6141000000-E	SP	GENERIC EROSION CONTROL ITEM PERMANENT SOIL REINFORCEMENT MAT, TYPE 4	165 SY		
0221	7060000000-E	1705	SIGNAL CABLE	5,000 LF		
0222	7120000000-E	1705	VEHICLE SIGNAL HEAD (12", 3 SECTION)	34 EA		
0223	7132000000-E	1705	VEHICLE SIGNAL HEAD (12", 4 SECTION)	1 EA		
0224	7144000000-E	1705	VEHICLE SIGNAL HEAD (12", 5 SECTION)	5 EA		
0225	7204000000-N	1705	LOUVER	6 EA		
0226	7264000000-E	1710	MESSENGER CABLE (3/8")	1,050 LF		
0227	7288000000-E	1715	PAVED TRENCHING (**********) (2, 2")	25 LF		
0228	7300000000-E	1715	UNPAVED TRENCHING (**********) (1, 2")	160 LF		
0229	7300000000-E	1715	UNPAVED TRENCHING (**********) (2, 2")	100 LF		
0230	7300100000-E	1715	UNPAVED TRENCHING FOR TEMPORARY LEAD-IN	120 LF		
0231	7301000000-E	1715	DIRECTIONAL DRILL (**********) (2, 2")	200 LF		
0232	7324000000-N	1716	JUNCTION BOX (STANDARD SIZE)	16 EA		
0233	7360000000-N	1720	WOOD POLE	8 EA		
0234	7372000000-N	1721	GUY ASSEMBLY	14 EA		
0235	7408000000-E	1722	1" RISER WITH WEATHERHEAD	2 EA		
0236	7420000000-E	1722	2" RISER WITH WEATHERHEAD	6 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0237	7444000000-E	1725	INDUCTIVE LOOP SAWCUT	950 LF		
0238	7456100000-E	1726	LEAD-IN CABLE (14-2)	1,400 LF		
0239	7481000000-N	SP	SITE SURVEY	1 EA		
0240	7481240000-N	SP	CAMERA WITHOUT INTERNAL LOOP EMULATOR PROCESSING UNIT	6 EA		
0241	7481260000-N	SP	EXTERNAL LOOP EMULATOR PROCESSING UNIT	1 EA		
0242	7575142010-N	1736	900MHZ SERIAL/ETHERNET SPREAD SPECTRUM RADIO	2 EA		
0243	7576000000-N	SP	METAL STRAIN SIGNAL POLE	4 EA		
0244	7588000000-N	SP	METAL POLE WITH SINGLE MAST ARM	1 EA		
0245	7590000000-N	SP	METAL POLE WITH DUAL MAST ARM	1 EA		
0246	7613000000-N	SP	SOIL TEST	6 EA		
0247	7614100000-E	SP	DRILLED PIER FOUNDATION	36 CY		
0248	7631000000-N	SP	MAST ARM WITH METAL POLE DESIGN	2 EA		
0249	7636000000-N	1745	SIGN FOR SIGNALS	2 EA		
0250	7642200000-N	1743	TYPE II PEDESTAL WITH FOUNDATION	3 EA		
0251	7684000000-N	1750	SIGNAL CABINET FOUNDATION	2 EA		
0252	7696000000-N	1751	CONTROLLERS WITH CABINET (**********) (TYPE 2070LX BASE MOUNTED)	2 EA		
0253	7744000000-N	1751	DETECTOR CARD (TYPE 170)	8 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0254	7901000000-N	1753	CABINET BASE EXTENDER	2 EA		
0255	7980000000-N	SP	GENERIC SIGNAL ITEM ETHERNET EDGE SWITCH	2 EA		
			WALL ITEMS			
0256	8801000000-E	SP	MSE RETAINING WALL NO **** (1)	10,595 SF		
0257	8801000000-E	SP	MSE RETAINING WALL NO **** (2)	1,950 SF		
			STRUCTURE ITEMS			
0258	8042000000-N	402	REMOVAL OF EXISTING STRUCTURES AT STATION ********** (29+45.91 -L-)	Lump Sum	L.S.	
0259	8065000000-N	SP	ASBESTOS ASSESSMENT	Lump Sum	L.S.	
0260	8147000000-E	420	REINFORCED CONCRETE DECK SLAB	11,760 SF		
0261	8161000000-E	420	GROOVING BRIDGE FLOORS	15,082 SF		
0262	8182000000-E	420	CLASS A CONCRETE (BRIDGE)	189.1 CY		
0263	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (29+45.91 -L-)	Lump Sum	L.S.	
0264	8217000000-E	425	REINFORCING STEEL (BRIDGE)	25,238 LB		
0265	8265000000-E	430	54" PRESTRESSED CONCRETE GIRDERS	1,488.89 LF		
0266	8328200000-E	450	PILE DRIVING EQUIPMENT SETUP FOR *** STEEL PILES (HP 14 X 73)	34 EA		
0267	8384000000-E	450	HP 14 X 73 STEEL PILES	1,870 LF		
0268	8503000000-E	460	CONCRETE BARRIER RAIL	215.3 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0269	8510000000-E	460	CONCRETE MEDIAN BARRIER	157.6 LF		
0270	8531000000-E	462	4" SLOPE PROTECTION	310 SY		
0271	8657000000-N	430	ELASTOMERIC BEARINGS	Lump Sum	L.S.	
0272	8692000000-N	SP	FOAM JOINT SEALS	Lump Sum	L.S.	

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supplied by the Contractor shall conform to the following requirements and be provided in contract submittals for review and approval:

(1) List host pipe diameter ranges for which the product is applicable;
(2) Indicate corrosion potential/acid reaction potential;
(3) Liner must be closed profile; i.e. no definable bell and spigot that protrudes from the outer wall of the pipe;
(4) Certification on manufacturer's letterhead indicating that the Contractor is approved by the manufacturer to perform installation work;
(5) Material safety data sheets for all hazardous chemicals that will be used on the job site. Identify the proposed use for each hazardous chemical and where it will be used in the work;
(6) Calculated minimum thickness of liner;
(7) Maximum allowable pulling and/or pushing force;
(8) Grouting mix design and manufacturer recommendations;
(9) Installation procedures and recommendations;
(10) Provide inside diameter and outside diameter of pipe;
(11) Provide and comply with specification for installation, and in accordance with Article 106-3 of the *Standard Specifications* provide Type 1 or Type 4 material certification of compliance with material specifications as applicable to the below, or equivalent as approved by the Engineer;
  (a) ASTM D1784 defines PVC cell class referenced below
  (b) ASTM D3350 defines PE cell class referenced below
  (c) ASTM F714 for solid wall polyethylene min cell classification 345464 and 2–4% carbon black
  (d) AASHTO M326 for solid wall polyethylene
  (e) ASTM D3034 for solid wall PVC, min. cell classification 12454
  (f) ASTM F679 for solid wall PVC, large diameter, min. cell classification 12454
  (g) ASTM D2241 for solid wall PVC, min. cell classification 12454
  (h) ASTM F585 for polyethylene slip-line
  (i) ASTM F2620 for polyethylene heat fusion joining
(12) Submit to the Engineer Type 2 or Type 5 material certifications in accordance with Article 106-3 of the *Standard Specifications* by vendors or subcontractors for proof of long-term modulus of elasticity, 50-year sustained loading value, if the following values are not used in design calculations: 22,000 psi shall be used for HDPE, PE, PP; and 140,000 psi shall be used for PVC; in accordance with *AASHTO LRFD Bridge Design Specifications*, Table 12.12.3.3-1, Mechanical Properties of Thermoplastic Pipe.

(D) Category D HDPE, PVC, PP corrugated, profile wall, steel reinforced, or spiral wound slip liners

When HDPE, PVC, PP corrugated, profile wall, steel reinforced, or spiral wound slip liners are specified, the liner system supplied by the Contractor shall conform to the following requirements and be provided in contract submittals for review and approval:

(1) List host pipe diameter ranges for which the product is applicable;
(2) Indicate corrosion potential/acid reaction potential;

(3) Certification on manufacturer's letterhead indicating that the Contractor is approved by the manufacturer to perform installation work;
(4) Material safety data sheets for all hazardous chemicals that will be used on the job site. Identify the proposed use for each hazardous chemical and where it will be used in the work;
(5) Calculated minimum thickness of liner;
(6) Maximum allowable pulling and/or pushing force;
(7) Grouting mix design and manufacturer recommendations;
(8) Installation procedures and recommendations;
(9) Provide and comply with specification for installation, and in accordance with Article 106-3 of the *Standard Specifications* provide Type 1 or Type 4 material certification of compliance with material specifications as applicable to the below, or equivalent as determined by the Engineer;
  (a) ASTM D1784 defines PVC cell class referenced below
  (b) AASHTO M294 for polyethylene profile wall (See Article 1032-7 of the *Standard Specifications*)
  (c) ASTM F894 for profile polyethylene
  (d) ASTM F2562 or F2435 for steel reinforced polyethylene min. cell classification 334452 and 2-4% carbon black
  (e) AASHTO M304 for profile PVC (see Article 1032-8 of the *Standard Specifications*)
  (f) ASTM F1803 for closed profile PVC
  (g) ASTM F949 and F794 for corrugated PVC min cell classification 12454
  (h) AASHTO M330 for corrugated polypropylene
  (i) AASHTO MP20-13 for steel reinforced polyethylene ribbed
  (j) ASTM F1735 PVC for profile strip / spiral wound, min. cell classification 12454. When steel reinforced, resin shall conform to ASTM D3350, min. cell classification 335420 and 2-4% carbon black. Steel fully encapsulated.
  (k) ASTM F1697 PVC for profile strip / machine spiral wound, min. cell classification 13354 (for Type A) or 12344 (for Type B) or higher, as defined in Specification D1784. When steel reinforced, resin shall conform to ASTM D3350, min. cell classification 335420 and 2-4% carbon black. Steel fully encapsulated.
  (l) ASTM F585 for polyethylene slip-line
  (m) ASTM F1698 for PVC spiral wound
  (n) ASTM F1741 for PVC machine spiral wound
(10) Submit to the Engineer Type 2 or Type 5 material certifications in accordance with Article 106-3 of the *Standard Specifications* by vendors or subcontractors for proof of long-term modulus of elasticity, 50-year sustained loading value, if the following values are not used in design calculations: 22,000 psi shall be used for HDPE, PE, PP; and 140,000 psi shall be used for PVC; in accordance with *AASHTO LRFD Bridge Design Specifications*, Table 12.12.3.3-1, Mechanical Properties of Thermoplastic Pipe.

(E) Category E - Spray-on liners

Spray-on liners consist of conduit lining with spray applied, factory blended cementitious, geopolymer, or other material. The liner system supplied by the Contractor shall conform to the following requirements and be provided in contract submittals for review and approval:

(1) List host pipe diameter ranges for which the product is applicable;
(2) Indicate corrosion potential/acid reaction potential;
(3) List liner material type;
(4) List typical, minimum, maximum application thicknesses;
(5) Include documentation of specification or standard practice for installation;
(6) Minimum thickness of liner from design calculations;
(7) Manufacturer moisture limitations (e.g. installation in the dry, humidity restrictions, etc.);
(8) Certification on manufacturer's letterhead indicating that the Contractor is approved by manufacturer to perform installation work;
(9) Material safety data sheets for all hazardous chemicals that will be used on the job site. Identify the proposed use for each hazardous chemical and where it will be used in the work;
(10) Site specific cure time;
(11) Provide volume (cubic yards or cubic feet) of liner material planned for use in each host pipe. For example, cubic yards of dry, unmixed cementitious liner material. This must match the value provided by design calculations;
(12) Ambient temperature range during installation;
(13) Other submittals as appropriate for the type of spray-on liner, as determined by the Engineer;
(14) Minimum thickness for cementitious or geopolymer liner material is 1 inch (clear of corrugations);
(15) Cementitious and geopolymer liner material must fill the corrugations of the host pipe (if corrugated);
(16) All liner thickness is measured above the corrugation crests, whether corrugations are filled or not;
(17) For cementitious or geopolymer liners, submit to the Engineer Type 2 or Type 5 material certifications in accordance with Article 106-3 of the *Standard Specifications* for the categories below, and a letter of certification from the manufacturer that states the material to be used conforms to manufacturer specifications. Actual properties must meet or exceed the values used in structural calculations when field tested. The psi values in the following table shall be provided in the contract submittals for review and approval;

Property	Test Method	Duration	Provide Value
Compressive Strength	ASTM C 109	3 Day 28 Days	psi psi
Flexural Strength	ASTM C 78	7 Days 28 Days	psi psi
Modulus of Elasticity	ASTM C 469	28 Days	psi
Tensile Strength	ASTM C 496	28 Days	psi

(18) For onsite or offsite Ready Mix or Project Produced cementitious or geopolymer liners (i.e. not “bag mixes” produced by a manufacturer), submit a mix design to the Engineer for review and approval;
(19) Liners which exhibit Rigid Pipe behavior, such as Cementitious or geopolymer liners, require the following submittals. (Rigid Pipe behavior is characterized by

cracking when subjected to 2% or greater deflection.);

(a) Provide Type 2 or Type 5 material certifications in accordance with Article 106-3 of the *Standard Specifications* for the compressive strength, flexural strength, modulus of elasticity, and tensile strength in accordance with the table above.

(b) Provide liner structural designs for each pipe in Excel format to the Engineer using the cementitious tabs of the NCDOT-provided spreadsheet: *2021 03 25 SAPL Design Worksheet Final Version 135417* where the *NCDOT Pipe Liner Manual* provides guidance on spreadsheet input values.

(c) Provide written justification to the Engineer for all user-input values contained in the spreadsheet described above. If default values are accepted as provided in the spreadsheet, it is acceptable to indicate for each value: *Default value verified and adopted.*

(20) Liners which exhibit Flexible Pipe behavior (can withstand greater than 2% deflection without structural damage) shall be treated as Thermoplastic Pipe as described in the *NCDOT Pipe Liner Manual*. Cementitious and geopolymer liners are not eligible for this method. The following submittals are required:

(a) Provide liner structural designs for each pipe in Excel format using the polymer tabs of the NCDOT-provided spreadsheet: *2021 03 25 SAPL Design Worksheet Final Version 135417.*

(b) Provide written justification to the Engineer for all user-input values contained in the spreadsheet described above. If default values are accepted as provided in the spreadsheet, it is acceptable to indicate for each value: *Default value verified and adopted* where the *NCDOT Pipe Liner Manual* provides guidance on spreadsheet input values.

(c) Provide $E_{SAPL,}$ Short-Term Circumferential Flexural Modulus of Liner Material. Vendor or subcontractor must provide value used in calculations. It shall be provided from test ASTM D790. Provide Type 2 or Type 5 material certifications in accordance with Article 106-3 of the *Standard Specifications* for value used in calculations.

(d) Provide E_{SAPL}, Long-Term Circumferential Flexural Modulus of Liner Material. Vendor or subcontractor must provide value used in calculations. It shall be provided from test ASTM D2990, using 50-year sustained loading value. In the absence of the ASTM D2990 standard tests, it is acceptable to use 50% of the short term flexural modulus described immediately above (provided by ASTM D790) as a value for the long term flexural modulus. Provide Type 2 or Type 5 material certifications in accordance with Article 106-3 of the *Standard Specifications* for value used in calculations. This value does not apply to, and is not required for arch host pipes.

(e) Provide S_b, Long-Term Ring-Bending Strain. Vendor or subcontractor must provide value used in calculations. It shall be provided from test. ASTM D5365. Provide Type 2 or Type 5 material certifications in accordance with Article 106-3 of the *Standard Specifications* for value used in calculations. This value does not apply to, and is not required for arch host pipes.

(f) Provide σR Compressive Strength (Stress Strength of Material Corresponding to 95% Lower Confidence Limit). Vendor or subcontractor must provide value used in calculations which shall be provided from test ASTM D695. Provide Type 2 or Type 5 material certifications in accordance with Article 106-3 of the *Standard Specifications* for value used in calculations. This value applies only to arch host pipes, and is not required for round host pipes.

(F) Category F - Smooth-wall steel pipe liner

Smooth-wall steel pipe liner rehabilitation materials shall conform to Article 1032-5 of the *Standard Specifications*, except as altered herein.

Grade B pipe shall be used with minimum wall thicknesses as listed in the *NCDOT Pipe Liner Manual*.

The Contractor shall submit the following items to the Engineer:

(1) Material safety data sheets for all hazardous chemicals that will be used on the job site. Identify the proposed use for each hazardous chemical and where it will be used in the work.
(2) Grouting mix design and manufacturer recommendations.

Construction Methods

For all categories the Contractor shall perform pre-installation inspection, pipe cleanout, grout host pipe, inlet and outlet sealing, dewatering, and submit a disposal plan as follows:

(A) Pre-Installation Inspection

Perform a pre-installation video inspection of pipe using NASSCO certified personnel. Place the camera that is mounted on a rubber tired or tracked pipe rover that allows for a 360-degree inspection at the centerline of the pipe. Inspection equipment shall be capable of measuring protrusions and obstructions of 1/2 inch or greater. Provide a pipe profile, on which deflections that may affect the installation of the liner are located and noted. The inspection shall be performed in the presence of the Engineer, unless waived by the Engineer. Dewater the host pipe to the satisfaction of the Engineer, and in accordance with *NCDOT's Best Management Practices for Construction and Maintenance Activities*. A thorough culvert inspection is required to determine the number of existing "pipe to pipe" connections and the extent, if any, of obstruction removal and voids. Perform inspection by experienced personnel trained in locating breaks, obstacles, voids and service connections. Video inspections shall be clearly labeled on the media with the time, date, and location of the pipe inspected. Furnish a copy of the video inspection to the Engineer at least 10 days prior to the start of rehabilitative construction. In the event the Contractor's inspection shows the method of rehabilitation the Contractor has selected is no longer viable at that location as verified by the Engineer, select another allowable method, if specified, from those designated in the Designated Locations and Allowable Methods table found earlier in this special provision or as found elsewhere in the contract.

(B) Pipe Clean-out

Clear the existing pipe(s) designated for rehabilitation of any debris, sediment, protrusions greater than 1/2 inch in height, and any other potential obstructions prior to the start of rehabilitation efforts. Thoroughly clean and prepare the host pipe prior to the liner installation. Conform to the cleaning recommendations of the liner manufacturer, and any

additional requirements of this special provision of which the more stringent shall apply. In the absence of manufacturer recommendations, submit the proposed method for cleaning and preparing the host pipe for the Engineer's review and acceptance at least 10 working days prior to beginning the work at that location.

(C) Grouting Host Pipe

Perform grouting work described in the contract, prior to pipe liner installation to fill voids in the soil around the existing host pipe. Grouting to fill voids in the soil around the host pipe is not included in the scope of pipe lining described by this special provision and will be paid for as found elsewhere in this contract.

Grouting the annular space between the liner and the host pipe when the liner does not fit snugly against the host pipe is incidental to the *Pipe Rehabilitation* pay item.

(D) Inlet & Outlet Sealing

All pipe liner installations shall be sealed to the host pipe at the terminal ends of the liner to prevent flow between the liner and host pipe.

(E) De-Watering

Install all pipe liners and grout in dry conditions. De-water by diverting, pumping, or bypassing any water flow through an existing pipe or drainage system prior to and during the lining process. The method of de-watering is to be determined by the Contractor but must be approved by the Engineer prior to implementing.

(F) Disposal Plan

Submit a disposal plan to the Engineer a minimum of 10 days prior to installation. The disposal plan shall indicate how by-products and waste are to be contained, captured, transported offsite, and disposed of in accordance with project permits and local, state and federal regulations. It shall be the Contractor's responsibility to report and take appropriate corrective actions to remediate any water quality alteration resulting from lining operations in accordance with project permits and applicable local, state or federal regulations. The cost for such remediation shall be at the Contractor's expense.

Category A – Cured-In-Place Pipe Liner Construction Methods

Fabricate and install the cured-in-place pipe liner system in such a manner as to result in a maintained full contact tight fit to the internal circumference of the host pipe for its entire length. The installation shall adhere to the cure times and temperatures stipulated in the manufacturer's recommended installation and cure specifications and the finished product shall be free of de-lamination, bubbling, rippling or other signs of installation failure.

Install per specification or standard practice for installation in accordance with (ASTM F1216 for inverted CIPP, or ASTM F1743 for pulled-in-place CIPP, or ASTM F2019 for pulled-in-

place GRP CIPP, or ASTM F2599 for sectional inverted CIPP, or ASTM F3541 for sectional CIPP pushed or pulled in place unless otherwise approved by the Engineer).

Pulled-in-place liner installation must be accomplished without significant liner twisting, or stretching the liner greater than 1% of its original length during installation. At no time shall the pulling force, as measured by a Contractor-provided dynamometer or load cell, exceed that established by the liner manufacturer. For liner lengths greater than 100 feet, protect the pipe liner end using a device that uniformly distributes the applied load around the perimeter of the liner.

Curing for styrene-based, epoxy-based, and vinyl ester-based CIPP may be accomplished by water, steam or ultraviolet light and shall be in accordance with the liner manufacturer's recommendations.

Installation and curing requirements of pipe sections shall be in accordance with the manufacturer's recommendations for the specific product, as applicable. Furnish installation and curing requirements for the various flexible liners including individual components of the system, tube type (reinforced or non-reinforced), manufacturer name and type of resin including catalyst, volume of resin required to achieve proper impregnation and curing. All components of the systems shall be in accordance with manufacturer's recommendations for the specific system used, and all components shall include lot numbers and expiration dates.

Place an impermeable barrier immediately upstream and downstream of the host pipe, prior to liner insertion, to capture any possible raw resin spillage during installation and dispose of any materials in accordance with the submitted and approved disposal plan.

Where the pulled-in-place method of installation is used, install a semi-rigid plastic slip sheet over any interior portions of the host pipe that could tear the outer film or over any significant voids in the host pipe.

Reconnect the existing storm drain lateral connections immediately after the liner has been cured in place. Use robotic cutting devices to re-establish tie-ins in non-man accessible pipes.

Monitor temperature via a minimum of three thermocouples on the outer surface (interface between the host pipe and liner) of the liner (one each at the upstream and downstream ends and one approximately mid-length of the host pipe). Monitor pressure during inversion and curing, and maintain pressure between minimum and maximum allowable pressures as provided by the manufacturer. Log cure time-temperature and time-pressure data at 5-minute intervals and provide such information in a format acceptable to the Engineer for review and approval within 48 hours after completing the resin-curing process.

Thoroughly rinse the cured lined pipe with clean water prior to re-introducing flow.

Capture all cure water and/or steam condensate and rinse water and dispose of, in accordance with the submitted and approved disposal plan.

Within 21 days of completing the resin curing at a given culvert location, submit the test results from an ISO 17025 lab approved by the Engineer. The report must be signed by a representative of the independent testing lab. The report must include:

(1) Thickness measurements as well as flexural strength and flexural modulus test results for field samples.
(2) Description of the defects in the tested samples in terms of the effect on CIPP performance.

Make cured samples from the identical materials (tube, resin and catalyst) to be used for the CIPP. Identify each sample by date, contract number, drainage system number of the corresponding culvert, thickness, name of resin, and name of catalyst. The samples must be 6 by 16 inches in size, so that the testing lab can cut the sample into five pieces for testing. Comply with the following sampling procedures unless UV cured:

(1) One sample will be made for each setup of the lining apparatus and tested for thickness and flexural properties. A setup is defined as the lining equipment being used to line one run of storm sewer with one continuous liner bag that undergoes one heating/curing/cooling cycle, which may contain multiple pipes and drainage structures in series.
(2) Place one aluminum-plate clamped mold containing a flat plate sample, inside the downtube when heated circulated water is used, and in the silencer when steam is used during the resin curing period.
(3) Seal each flat plate sample in a heavy-duty plastic envelope inside the mold.
(4) Remove the cured flat plate sample after draining all of the moisture from the cured CIPP.

If UV cured, comply with field sampling procedures under ASTM F2019, Section 7: Recommended Inspection Practices.

Test the samples for flexural properties under ASTM D790, ASTM D5813, ASTM F1216, ASTM F1743, ASTM F2019, or ASTM F3541 as applicable unless otherwise approved by the Engineer. Verify that physical properties of the field samples comply with the minimum values under:

(1) ASTM F1216, Table 1 (modified values), for heat cured polyester, vinyl ester, and epoxy resins. The flexural strength must be at least 5,000 psi. The flexural modulus must be at least 300,000 psi.
(2) ASTM F2019, Table 1, for UV cured CIPP. The flexural strength must be at least 6,500 psi. The flexural modulus must be at least 725,000 psi. Comply with sampling and testing procedures under ASTM F2019, Section 7: Recommended Inspection Practices.

Test the samples for thickness. If heat cured, remove the film from the inner lining or preliner. If UV cured, remove the film from the inner and outer foil.

Measure the thickness of the liner at 3 spots on each deburred sample. Calculate the thickness as an average of the measurements.

If UV cured, comply with sampling and testing procedures under ASTM F2019, Section 7:

Recommended Inspection Practices. If the culvert material is corrugated metal, measure the thickness at 3 spots that are along a line corresponding to the corrugation crests. Calculate the thickness as an average of at least 6 measurements.

CIPP may be rejected by the Engineer if any of the following occur:

(1) Actual temperature and curing time and schedule do not comply with those shown in the authorized work plan;
(2) Pressure deviates more than 1 psi from the required pressure;
(3) At any time during installation the manufacturer's required minimum cool-down time or maximum cool-down rate is violated;
(4) There are defects including;
    (a) Concentrated ridges, including folds and wrinkles exceeding 8 percent of the CIPP diameter
    (b) Dry spots
    (c) Lifts
    (d) Holes
    (e) Tears
    (f) Soft spots
    (g) Blisters or bubbles however this does not include superficial bubbles in the inner plastic liner that do not penetrate into the felt
    (h) Delaminations
    (i) Gaps in the length of the CIPP
    (j) Gaps or a loose fit between the exterior of the CIPP and the culvert
(5) Test results indicate one of the following:
    (a) If heat cured, the average of the test results for one prepared sample cut into pieces for testing does not have the specified modulus of elasticity, the specified flexural strength, nor either the specified modulus of elasticity or the specified flexural strength
    (b) If UV cured, the average of the test results for one prepared sample cut into pieces for testing does not have the specified modulus of elasticity, the specified flexural strength, nor either the specified modulus of elasticity or the specified flexural strength
(6) The liner thickness is less than the greater of either one of the following:
    (a) Specified thickness
    (b) Calculated minimum thickness shown in your authorized work plan
(7) Materials and installation methods are not those shown in your authorized installation plan;
(8) Defects are excessive or unrepairable;
(9) CIPP is not continuous or does not fit tightly for the full length of the culvert;
(10) If UV cured, and post installation inspections reveal signs of incomplete curing (dripping resin, etc.), trim liner obscuring uncured liner, re-wet, and re-cure with UV.

Category B - Fold and Form Flexible Liners Construction Methods

Install per specification or standard practice for installation (ASTM F1606 deformed polyethylene, ASTM F1867 folded/formed PVC Type A, or ASTM F1947 folded PVC unless

otherwise approved by the Engineer).

Fabricate and install the liner system in such a manner as to result in a maintained full contact tight fit to the internal circumference of the host pipe for its entire length. The installation shall adhere to the reforming pressures and temperatures stipulated in the manufacturer's recommended installation specifications and the finished product shall be free of bubbling, rippling or other signs of installation failure.

Installation and reforming requirements of pipe sections shall be in accordance with the manufacturer's recommendations for the specific product. All components of the systems shall be as recommended by the manufacturer for the specific system used, and all components shall include lot numbers. Submit documentation from the manufacturer to verify compliance with the requirements of this paragraph as well as installation recommendations to the Engineer for review and approval.

Reconnect the existing storm drain lateral connections immediately after the liner has been installed in place. Use robotic cutting devices to reestablish tie-ins in non-man accessible pipes.

Monitor temperature via a minimum of two thermocouples (one each at the upstream and downstream ends of the host pipe). The Contractor shall automatically log cure time-temperature and time-pressure data at 30 second intervals with a data logger and provide such information in a format acceptable to the Engineer.

Submit the tape and log of recorded temperatures to the Engineer within 48 hours after completing the lining process. Submit the recorded pressure to the Engineer within 48 hours after completing the lining process.

Liner may be rejected by the Engineer if any of the following occur:

(1) Actual temperature and curing time and schedule do not comply with those shown in the authorized work plan;
(2) There are defects including:
    (a) Concentrated ridges, including folds and wrinkles exceeding 8 percent of the liner diameter
    (b) Lifts
    (c) Holes
    (d) Tears
    (e) Soft spots
    (f) Blisters or bubbles
    (g) Gaps in the length of the liner
    (h) Gaps or a loose fit between the exterior of the liner and the culvert
(3) The liner thickness is less than the greater of either one of the following:
    (a) Specified thickness
    (b) Calculated minimum thickness shown in your authorized work plan
(4) Materials and installation methods are not those shown in installation plan;
(5) Defects are excessive or unrepairable;
(6) Liner is not continuous or does not fit tightly for the full length of the culvert.

Category C – HDPE, PE, PVC, or PP Solid Wall Slip Liner Construction Methods

Installed per specification or standard practice for installation (ASTM F585 polyethylene slip-line, ASTM F2620 polyethylene heat fusion joining unless otherwise approved by the Engineer).

Installation requirements of pipe sections shall be in accordance with the manufacturer's recommendations for the specific product. All components of the systems shall be as recommended by the manufacturer for the specific system used, and all components shall include lot numbers.

Before lining, pull or push a mandrel through the existing pipe or perform laser survey to verify liner clearance. The liner must be positioned and secured to facilitate its complete encapsulation by grout. Follow the manufacturer's recommendations for handling and assembling the pipe, and all provisions included in the design calculations. Reconnect the existing storm drain lateral connections immediately after the liner has been installed in place. Use robotic cutting devices to reestablish tie-ins in non-man accessible pipes. Prior to filling the annular space, connect and seal all laterals between the new liner pipe and the existing lateral.

Grout the entire annular space with non-shrink grout or an expansive admixture approved by the manufacturer for use with the liner system. In the absence of manufacturer's recommendations for grout, refer to Section 1003 of the *Standard Specifications*. Provide a minimum annular space of 1 inch for grouting between the new and existing pipes. Provide details on how to hold the liner pipe to line and grade until the grout has set. Ensure the maximum pressure developed by the grout does not exceed the manufacturer's recommendation for the maximum allowable external pressure for the liner pipe. If the volume of the grout used is less than the anticipated (calculated) volume, or an inspection of the relined culvert indicates that there are voids in the annular space, provide the Engineer with a plan to rehabilitate all identified voids. Depending on the location and size of the voids, additional grouting may be required in these areas. This may be accomplished by re-grouting in those areas from within the culvert. The voids must be filled to the satisfaction of the Engineer at no additional cost. Grouting is included with the cost of pipe liner installation.

Lining with HDPE or PP: Field cuts will be permitted only at the terminal ends. No pipe sections less than 3 feet long will be allowed in any lining projects. Perform all butt fusion, welding and extrusion welding of pipe in accordance with the manufacturer's recommendations. Based on existence of alignment breaks or pinch points in the host pipe, all joints shall be butt fusion welded, or extrusion welded unless alternate joining methods are approved by the Engineer, in which case limit joint separations to less than 1/2 inch between adjoining sections.

Lining with Polyvinyl Chloride Pipe: Reline with a PVC Pipe with integral bell and spigot joints. Field cuts will be permitted only at the terminal ends. No pipe sections less than 3 feet long will be allowed in any lining projects. The submittals to the Engineer must address the following PVC specific issues: Will the PVC liner will be pulled or pushed through the culvert, along with the type of pushing or pulling ring/plate to be used? Will a nose cone or different

device be used in the process? How will the jacking, pulling or pushing loads on the liner be monitored to conform to manufacturer's specifications and guidelines?

Category D - HDPE, PVC, or PP Corrugated, Profile, or Spiral Wound Slip Liner Construction Methods

Installed per specification or standard practice for installation (ASTM F585 polyethylene slip-line, ASTM F1698 PVC spiral wound, ASTM F1741 PVC machine spiral wound unless otherwise approved by the Engineer).

Installation requirements of pipe sections shall be in accordance with the manufacturer's recommendations for the specific product. All components of the systems shall be as recommended by the manufacturer for the specific system used, and all components shall include lot numbers.

Before lining, pull or push a mandrel through the existing pipe to verify liner clearance. The liner must be positioned and secured to facilitate its complete encapsulation by grout. Follow the manufacturer's recommendations for handling and assembling the pipe, and all provisions included in the design calculations. Immediately reconnect the existing storm drain lateral connections after the liner has been installed in place. Use robotic cutting devices to reestablish tie-ins in non-man accessible pipes. Prior to filling the annular space, connect and seal all laterals between the new liner pipe and the existing lateral.

Grout the entire annular space with non-shrink grout approved by the manufacturer for use with the liner system. In the absence of manufacturer's recommendations for grout, refer to Section 1003 of the *Standard Specifications*. Provide a minimum annular space of 1 inch around the circumference for grouting between the new and existing pipes. (Spiral Wound liner that is designed to fit tightly to the interior wall of the host pipe is not subject to the 1 inch annular space and grouting.) Provide details on how to hold the liner pipe to line and grade until the grout has set. Ensure the maximum pressure developed by the grout does not exceed the manufacturer's recommendation for the maximum allowable external pressure for the liner pipe. If the volume of the grout used is less than the anticipated (calculated) volume, or an inspection of the relined culvert indicates that there are voids in the annular space, provide the Engineer with a plan to rehabilitate all identified voids. Depending on the location and size of the voids, additional grouting may be required in these areas. This may be accomplished by re-grouting in those areas from within the culvert. The voids must be filled to the satisfaction of the Engineer at no additional cost. Grouting is included with the cost of pipe liner installation.

<u>Lining with HDPE or PP (does not apply to spiral-wound):</u> Field cuts will be permitted only at the terminal ends. No pipe sections less than 3 feet long will be allowed in any lining projects. Perform all butt fusion, welding and extrusion welding of pipe in accordance with the manufacturer's recommendation. Based on existence of alignment breaks or pinch points in the host pipe, all joints shall be butt fusion welded, or extrusion welded unless alternate joining methods are approved by the Engineer, in which case limit joint separations to less than 1/2 inch between adjoining sections.

Lining with Polyvinyl Chloride Pipe (does not apply to spiral-wound): Reline with a PVC Pipe with integral bell and spigot joints. Field cuts will be permitted only at the terminal ends. No pipe sections less than 3 feet long will be allowed in any lining projects. The submittals for this item provided for Engineer review and approval shall also address the following PVC specific issues prior to any work approval is granted: Will the PVC liner will be pulled or pushed through the culvert, along with the type of pushing or pulling ring/plate to be used? Will a nose cone or different device be used in the process? How will the jacking, pulling or pushing loads on the liner be monitored to conform to manufacturer's specifications and guidelines?

Category E - Spray-On Cementitious, Geopolymer, or Other Materials Construction Methods

Install in accordance with the liner material manufacturer's recommendations. For spray-on cementitious, geopolymer, or other liner systems, the following requirements shall apply:

Control the temperature and humidity in the host pipe according to the manufacturer's recommendation, including stopping air drafts through the pipe. Measure and record the temperature and humidity. The Contractor shall automatically log cure time-humidity and time-temperature data at 30 minute intervals with a data logger and provide such information in a format acceptable to the Engineer.

Patch and fill voids, holes, and gaps in the host pipe with an approved hydraulic cement or the same cementitious or geopolymer based material to be used for the liner to provide a solid continuous surface on which to spray. Stop water infiltration into the host pipe by applying dry hydraulic cement, or other methods approved by the Engineer. Prepare lateral connections to the host pipe according to the manufacturer's recommendations. Record the batch or lot number from the containers used each day.

To achieve bonding to the host pipe: Before placing liner, remove all loose or flaking coatings, loose or flaking corrosion, and other material until the original host pipe material is exposed; by water jetting, mechanically scraping, or other effective methods consistent with manufacturer's recommendations. Corrosion and coatings soundly attached to the host pipe walls may remain. Ensure cleaning methods will not affect chemical properties of liner, or adhesion of liner.

Application of liner material must be uninterrupted and continuous. Use a machine approved by the manufacturer, and capable of projecting liner material against the culvert wall without rebound and at a velocity sufficient to cause liner material to pack densely and adhere in place. Obtain authorization from the Engineer for placing liner material by hand to fill gaps left by dewatering pipe after application and prior to being fully cured, while material may be added.

The machine operator must continuously monitor the application of cementitious material.

The travel of the projecting machine and the discharge rate of liner material must be entirely mechanically controlled and must produce a uniform thickness of liner material without segregation around the perimeter and along the culvert length. The pipe liner must be free of sand pockets or visible lack of homogeneity.

Submit an installation plan to the Engineer which details the number of passes, sled travel speed, and installation parameters relevant to the work.

Remove splatter and the accumulation of other undesirable substances along the culvert invert.

Obtain authorization from the Engineer for placing liner material by hand methods at sharp bends and special locations where machine placement is impracticable.

Provide a smooth finished surface texture.

After placement, the lining must be the greater of 1 inch thick (cementitious or geopolymer), or calculated thickness. For corrugated pipe, the thickness must be measured over the top of the corrugation crests. The tolerance for the pipe liner's thickness is plus 0.12 inch with no minus tolerance.

Depth gauges shall be installed in the soffit (12 o'clock position) of the host pipe every 10 feet along the length to allow determination of liner thickness. Depth gauges shall protrude from the host pipe wall a distance equivalent to the final surface of the liner, and shall remain in place permanently. Depth gauges shall be metal screws or rods with the shaft not greater than 3/16 inch diameter.

After application and before being fully cured, while material may be added, verify the applied thickness at least once every 10 feet to the satisfaction of the Engineer. Apply additional material to any areas found to be less than the design thickness.

Ensure the liner is continuous over the entire length of the host pipe and free from defects such as foreign inclusions, holes and cracks no larger than 0.01 inches wide. Ensure the renewed conduit is impervious to infiltration and exfiltration.

Protect walls, surfaces, streambed and plants at the entrance and exit of the host pipe from overspray. Install a temporary curtain at the outlet and inlet to prevent overspray during installation.

Thoroughly rinse the cured pipe with clean water and dispose of it in accordance with the disposal plan.

Reinstate water flow no sooner than recommended by manufacturer or 24 hours following installation, whichever is greater.

For cementitious or geopolymer spray-on liners, prevent the escape of any rinse water from the lined pipe or otherwise capture it until he can either

(1) dispose of it in accordance with the submitted disposal plan; or

(2) continuously monitor the pH of the rinse water until the pH is less than 9 whereupon it may be released.

For other liner types, the Contractor shall capture and dispose of the rinse water in accordance with the submitted disposal plan, prior to reinstating flow.

For quality control for geopolymer or cementitious liner submit Type 1 or Type 4 material certifications in accordance with 106-3 of the *Standard Specifications* for each lined pipe in accordance with required cementitious liner properties table in the materials section of this special provision. The Engineer, at his option, may collect concrete mix samples for testing. If the material does not achieve the specified properties listed in the materials section of this special provision, the pipe liner may be rejected by the Engineer. Submit a new work plan to the Engineer for the placement of material before replacing the rejected pipe liner. Take core samples of the liner under direction and in the presence of the Engineer. Core sample diameter shall be at least twice the liner thickness. Repair cored area with liner material. Transport core samples to a Materials and Tests Regional Laboratory for testing.

Inspect the pipe liner for defects. If defects are visible:

(1) Submit a work plan to the Engineer for repairing the defects.

(2) Measure the length of the defect along the centerline of the culvert.

(a) If the length of the defect is 60 inches long or less, patch defects using the same cementitious material used in the work. Hand methods may be used.

(b) If the length of the defect is greater than 60 inches long, replace the defective length of the pipe liner for the full diameter of the pipe liner. Replace the defective length using machine methods.

Quality control for other liner material will be determined per manufacturer recommendations and the Engineer.

Category F – Smooth Wall Steel Pipe Liner Construction Methods

Rehabilitation methods shall be in accordance with Section 330 of the *Standard Specifications*, except as altered herein. The work shall be rehabilitation by the insertion of a smooth wall steel pipe into a host pipe. Where field welding is required, pipe shall be joined by butt welds in accordance with AWWA C-206. Field welded butt joints shall be complete joint penetration (CJP) and the adjoining members shall be assembled so that the seams in the adjacent pipe sections are offset from each other by at least five (5) times the thickness of the thinner member.

Welding procedures employed for welding shall be qualified by testing or prequalified in accordance with AWS D1.1

Personnel performing field welding operations shall have been tested and qualified by the Department.

Provide a Certified Welding Inspector (CWI) on site during all welding and inspection operations to perform the necessary quality control examinations. Non-destructive testing/examination for testing to include visual outlined in the AWWA C-206 shall be provided at the contractor’s expense.

Personnel performing these functions shall be qualified in accordance with AWS QC1 and/or the

recommendations of the current edition of ASNT SNT-TC-1A. Radiographic and Hydrostatic testing is not required.

Before lining, pull or push a mandrel through the existing pipe to verify liner clearance. The liner must be positioned and secured to facilitate its complete encapsulation by grout. Follow the manufacturer's recommendations for handling and assembling the pipe, and all provisions included in the design calculations. Reconnect the existing storm drain lateral connections after the liner has been installed in place. Use robotic cutting devices to re-establish tie-ins in non-man accessible pipes. Prior to filling the annular space, connect and seal all laterals between the new liner pipe and the existing lateral.

Grout the entire annular space with non-shrink grout approved by the manufacturer for use with the liner system. In the absence of manufacturer's recommendations for grout, refer to Section 1003 of *Standard Specifications*. Provide a minimum annular space of 1 inch for grouting between the new and existing pipes. Provide details on how to hold the liner pipe to line and grade until the grout has set. Ensure the maximum pressure developed by the grout does not exceed the manufacturer's recommendation for the maximum allowable external pressure for the liner pipe. If the volume of the grout used is less than the anticipated (calculated) volume, or an inspection of the relined culvert indicates that there are voids in the annular space, provide the Engineer with a plan to rehabilitate all identified voids. Depending on the location and size of the voids, additional grouting may be required in these areas. This may be accomplished by re-grouting in those areas from within the culvert. The voids must be filled to the satisfaction of the Engineer at no additional cost. Grouting is included with the cost of pipe liner installation.

Post Installation Inspection – In addition to the inspection performed by the Department, the Contractor shall perform two post-installation video inspections using NASSCO certified personnel. The first inspection shall take place between 90 and 100 calendar days after completion of installation for each culvert or system to a single outfall. The second inspection shall take place 30 calendar days prior to the end of the liner warranty period (5 years, secured by construction bond). The camera shall be situated at the centerline of the pipe, and shall be mounted on a rubber tired or tracked pipe rover that allows for a 360-degree inspection. Inspection equipment shall be capable of measuring protrusions and obstructions of 1/2 inch or greater. The inspection shall be performed in the presence of the Engineer. Dewater the host pipe to the satisfaction of the Engineer. Video inspections shall be clearly labeled on the media with the time, date, and location of the pipe inspected. A copy of the video inspection shall be furnished to the Engineer for review and approval prior to acceptance of the work.

The finished liner may be rejected if not continuous over its entire length and free from visual defects such as foreign inclusions, joint separation, cracks, insufficient liner thickness, material loss, roughness, deformation, dry spots, pinholes, insufficient bonding to host pipe, delamination, or other material or installation deficiencies as described herein.

Remedies for rejection of liner - In the event the first post inspection of the installation reveals defects in localized areas of the liner pipe (comprising less than 20 percent of the pipe length) the localized defects shall be repaired as specified by the manufacturer. Where defects occur on 20 percent or more of the pipe length the defects shall be repaired, however, the Contractor will not

be allowed to continue with his methodology of installation and/or the liner system used until he can demonstrate to the Engineer that he has remedied his operations to a sufficient level of quality as determined by the Engineer. All such remedial efforts shall be at the Contractor's expense. Further failure(s) to perform a proper installation may result in the disallowance of the use of that liner system and an adjustment in the cost or non-payment of the failed installations depending on the severity of the failure.

In the event the first post installation inspection is not conducted until all or most of the locations in the contract permitting this methodology have been performed, and the inspection reveals defects on 20 percent or more of the host pipe's length, then an adjustment in the cost or non-payment of the failed installations may be made by the Engineer depending on the severity of the failure.

In the event the second post inspection of the installation reveals defects, the Department may execute the option to call the construction bond to reimburse the Department for repairs or corrections, or to act as an adjustment in the cost, or both.

Measurement and Payment

Pre Installation Inspection will be measured and paid for as the actual number of linear feet of pipe inspected, including mobilization of equipment, and production of records incorporated into the completed and accepted work. Linear footage is not increased for multiple passes of inspection equipment through a length of pipe.

Pipe Rehabilitation will be measured and paid for as the actual number of linear feet of pipe for the size, and method that has been incorporated into the completed and accepted work. Note: At locations shown in the Contract where multiple methods are permitted, the Contractor may select any of the methods specified, however, if only one method is specified, this will be the only method permitted at that location. This price shall include post installation inspection, cleaning and preparation of the host pipe, furnishing and installing the liner, lateral reconnection, coupling and expansion devices, annular cement grout, design (if necessary) and shop drawing preparation, furnishing and installing liner and all components of the liner system, capturing any discharges or releases during installation or curing operations, furnishing any documentation or fees required for effluent or condensate disposal, all testing and sampling including furnishing reports and pre and post installation video inspections, waste disposal costs, excavation, sheeting, shoring, disposing of surplus and unsuitable material; backfilling and backfill material; compaction, restoring existing surfaces, and clearing debris and obstructions.

De-Watering will be measured and paid in units of each as the actual number of water diversions or bypasses required to complete pipe rehabilitation work. Each instance of *De-Watering* paid includes de-watering for pre-inspection, installation, post inspections, and remediation (if necessary). All materials, equipment, labor, or other resources required to de-watering a site shall be incidental to the unit cost for *De-Watering*.

Grouting the annular space between the liner and the host pipe is incidental to the *Pipe Rehabilitation* pay item when the liner is a type that does not fit snugly against the host pipe. Otherwise grouting the voids in the soil around the host pipe is not included in the scope of pipe

lining described in this special provision and will be paid for as found elsewhere in this contract.

Payment will be made under:

Pay Item	**Pay Unit**
Pre Installation Inspection	Linear Foot
(Size) Pipe Rehabilitation CIPP Liner	Linear Foot
(Size) Pipe Rehabilitation Fold & Form Liner	Linear Foot
(Size) Pipe Rehabilitation Solid Wall Thermoplastic Slip Liner	Linear Foot
(Size) Pipe Rehabilitation Corrugated Thermoplastic Slip Liner	Linear Foot
(Size) Pipe Rehabilitation Spiral Wound Liner	Linear Foot
(Size) Pipe Rehabilitation Cementitious / Geopolymer Spray Liner	Linear Foot
(Size) Pipe Rehabilitation Spray Liner – Other	Linear Foot
(Size) Pipe Rehabilitation Smooth Wall Steel Slip Liner	Linear Foot
De-Watering	Each

Project Special Provisions
Erosion Control

STABILIZATION REQUIREMENTS:
(1-21-2025)

Stabilization for this project shall comply with the time frame guidelines as specified by the NCG-010000 general construction permit issued by the North Carolina Department of Environmental Quality Division of Energy, Mineral and Land Resources. Temporary or permanent ground cover stabilization shall occur within the following time frames from the last land-disturbing activity:

- Perimeter dikes, swales, ditches, and perimeter slopes shall be stabilized within 7 calendar days.
- High Quality Water (HQW) Zones shall be stabilized within 7 calendar days.
- Slopes steeper than 3:1 shall be stabilized within 7 calendar days.
    - If slopes are 10 ft. or less in length and are not steeper than 2:1, 14 days are allowed.
- Slopes 3:1 to 4:1 shall be stabilized within 14 calendar days.
    - 7 days for slopes greater than 50 ft. in length and with slopes steeper than 4:1.
    - 7 days for perimeter dikes, swales, ditches, perimeter slopes, and HQW Zones.
- Areas with slopes flatter than 4:1 shall be stabilized within 14 calendar days.
    - 7 days for perimeter dikes, swales, ditches, perimeter slopes, and HQW Zones.

The stabilization timeframe for High Quality Water (HQW) Zones shall be 7 calendar days with no exceptions for slope grades or lengths. High Quality Water Zones (HQW) Zones are defined by North Carolina Administrative Code 15A NCAC 04A.0105 (25). Temporary and permanent ground cover stabilization shall be achieved in accordance with the provisions in this contract and as directed.

SEEDING AND MULCHING: **(West)**

The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below. During periods of overlapping dates, the kind of seed to be used shall be determined. All rates are in pounds per acre.

Shoulder and Median Areas

August 1 - June 1		**May 1 - September 1**	
20#	Kentucky Bluegrass	20#	Kentucky Bluegrass
75#	Hard Fescue	75#	Hard Fescue
25#	Rye Grain	10#	German or Browntop Millet
500#	Fertilizer	500#	Fertilizer
4000#	Limestone	4000#	Limestone

Areas Beyond the Mowing Pattern, Waste and Borrow Areas:

August 1 - June 1	**May 1 - September 1**

100#	Tall Fescue	100#	Tall Fescue
15#	Kentucky Bluegrass	15#	Kentucky Bluegrass
30#	Hard Fescue	30#	Hard Fescue
25#	Rye Grain	10#	German or Browntop Millet
500#	Fertilizer	500#	Fertilizer
4000#	Limestone	4000#	Limestone

Approved Tall Fescue Cultivars

06 Dust	Escalade	Kalahari	Serengeti
2nd Millennium	Essential	Kitty Hawk 2000	Shelby
3rd Millennium	Evergreen 2	Legitimate	Shenandoah III
Avenger	Faith	Lexington	Shenandoah Elite
Bar Fa	Falcon IV	LifeGuard	Sheridan
Barlexas	Falson NG	LSD	Sidewinder
Barlexas II	Falcon V	Magellan	Signia
Barrera	Fat Cat	Masterpiece	Silver Hawk
Barrington	Fesnova	Millennium SRP	Skyline
Barrobusto	Fidelity	Monet	Solara
Barvado	Finelawn Elite	Mustang 4	Southern Choice II
Biltmore	Finelawn Xpress	Naturally Green	Speedway
Bingo	Finesse II	Ninja 2	Spyder LS
Bizem	Firebird	Ol' Glory	Sunset Gold
Black Tail	Firecracker LS	Padre	Taccoa
Blackwatch	Firenza	Patagonia	Tahoe II
Blade Runner II	Five Point	Pedigree	Talladega
Bonsai	Focus	Picasso	Tanzania
Braveheart	Forte	Piedmont	Temple
Bravo	Garrison	Plantation	Terrano
Bullseye	Gazelle II	Proseeds 5301	Thor
Cannavaro	GLX Aced	Prospect	Thunderstruck
Catalyst	Gold Medallion	Quest	Titanium LS
Cayenne	Grande 3	RainDance	Titan LTD
Cezanne RZ	Greenbrooks	Raptor II	Tracer
Chipper	Greenkeeper	Rebel IV	Traverse SRP
Cochise IV	Gremlin	Rebel Exeda	Trio
Constitution	Greystone	Rebel Sentry	Tulsa Time
Corgi	Guardian 21	Regenerate	Turbo
Corona	Guardian 41	Regiment II	Turbo RZ
Coyote	Hemi	Rembrandt	Tuxedo
Cumberland	Honky Tonk	Rendition	Ultimate
Darlington	Hot Rod	Reunion	Umbrella
DaVinci	Hunter	Rhambler 2 SRP	Van Gogh
Desire	Inferno	Riverside	Venture
Diablo	Integrity	RNP	Watchdog
Dominion	Jaguar 3	Rocket	Wolfpack II

Dynamic	Jamboree	Saltillo	Xtremegreen
Dynasty	Justice	Scorpion	

Approved Kentucky Bluegrass Cultivars:

4-Season	Blue Coat	Granite	Prosperity
Alexa II	Blue Note	Hampton	Quantum Leap
America	Blue Velvet	Harmonie	Rambo
Apollo	Boomerang	Impact	Rhapsody
Aramintha	Cabernet	Jackrabbit	Rhythm
Arcadia	Champagne	Jefferson	Royce
Aries	Champlain	Juliet	Rubicon
Armada	Chicago II	Keeneland	Rugby II
Arrow	Corsair	Langara	Rush
Arrowhead	Courtyard	Legend	Shariz
Aura	Dauntless	Liberator	Showcase
Avid	Delight	Lunar	Skye
Award	Diva	Madison	Solar Eclipse
Awesome	Dynamo	Mazama	Sonoma
Bandera	Eagleton	Mercury	Sorbonne
Barduke	Emblem	Merlot	Starburst
Barnique	Empire	Midnight	Sudden Impact
Baron	Envicta	Midnight II	Thermal Blue
Baroness	Everest	Moon Shadow	Total Eclipse
Barrister	Everglade	Mystere	Touche
Barvette HGT	Excursion	Nu Destiny	Tsunami
Bedazzled	Freedom II	NuChicago	Valor
Belissimo	Freedon III	NuGlade	Washington
Bewitched	Front Page	Oasis	Zedor
Beyond	Futurity	Odyssey	Zinfandel
Blackjack	Gaelic	Perfection	
Bluebank	Ginney II	Pinot	
Blueberry	Gladstone	Princeton 105	

Approved Hard Fescue Cultivars:

Aurora Gold	Firefly	Nordic	Rhino
Azay Blue	Gladiator	Oxford	Scaldis II
Beacon	Granite	Predator	Spartan II
Berkshire	Heron	Quatro	Stonehenge
Beudin	Jetty	Reliant II	Sword
Blueray	Minimus	Reliant IV	Warwick
Chariot	Miser	Rescue 911	
Eureka II	Nancock	Resolute	

On cut and fill slopes 2:1 or steeper add 20# Sericea Lespedeza January 1 - December 31.

Fertilizer shall be 10-20-20 analysis. A different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis and as directed.

Native Grass Seeding And Mulching (West)

Native Grass Seeding and Mulching shall be performed on the disturbed areas of wetlands and riparian areas, and adjacent to Stream Relocation and/or trout stream construction within a 50 foot zone on both sides of the stream or depression, measured from top of stream bank or center of depression. The stream bank of the stream relocation shall be seeded by a method that does not alter the typical cross section of the stream bank. Native Grass Seeding and Mulching shall also be performed in the permanent soil reinforcement mat section of preformed scour holes, and in other areas as directed.

The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below. During periods of overlapping dates, the kind of seed to be used shall be determined. All rates are in pounds per acre.

August 1 - June 1		**May 1 – September 1**	
18#	Creeping Red Fescue	18#	Creeping Red Fescue
8#	Big Bluestem	8#	Big Bluestem
6#	Indiangrass	6#	Indiangrass
4#	Switchgrass	4#	Switchgrass
35#	Rye Grain	25#	German or Browntop Millet
500#	Fertilizer	500#	Fertilizer
4000#	Limestone	4000#	Limestone

Approved Creeping Red Fescue Cultivars:

Aberdeen Boreal Epic Cindy Lou

Fertilizer shall be 10-20-20 analysis. A different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis and as directed.

Native Grass Seeding and Mulching shall be performed in accordance with Section 1660 of the *Standard Specifications* and vegetative cover sufficient to restrain erosion shall be installed immediately following grade establishment.

Measurement and Payment

Native Grass *Seeding and Mulching* will be measured and paid for in accordance with Article 1660-8 of the *Standard Specifications*.

TEMPORARY SEEDING:

Fertilizer shall be the same analysis as specified for *Seeding and Mulching* and applied at the rate of 400 pounds and seeded at the rate of 50 pounds per acre. German Millet, or Browntop Millet shall be used in summer months and rye grain during the remainder of the year. The Engineer will determine the exact dates for using each kind of seed.

FERTILIZER TOPDRESSING:

Fertilizer used for topdressing shall be 16-8-8 grade and shall be applied at the rate of 500 pounds per acre. A different analysis of fertilizer may be used provided the 2-1-1 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as 16-8-8 analysis and as directed.

SUPPLEMENTAL SEEDING:

The kinds of seed and proportions shall be the same as specified for *Seeding and Mulching*, and the rate of application may vary from 25# to 75# per acre. The actual rate per acre will be determined prior to the time of topdressing and the Contractor will be notified in writing of the rate per acre, total quantity needed, and areas on which to apply the supplemental seed. Minimum tillage equipment, consisting of a sod seeder shall be used for incorporating seed into the soil as to prevent disturbance of existing vegetation. A clodbuster (ball and chain) may be used where degree of slope prevents the use of a sod seeder.

MOWING:

The minimum mowing height on this project shall be six inches.

MINIMIZE REMOVAL OF VEGETATION:

The Contractor shall minimize removal of vegetation within project limits to the maximum extent practicable. Vegetation along stream banks and adjacent to other jurisdictional resources outside the construction limits shall only be removed upon approval of Engineer. No additional payment will be made for this minimization work.

CONSTRUCTION MATERIALS MANAGEMENT
(3-19-19) (rev. 04-27-20)

Description

The requirements set forth shall be adhered to in order to meet the applicable materials handling requirements of the NCG010000 permit. Structural controls installed to manage construction materials stored or used on site shall be shown on the E&SC Plan. Requirements for handling materials on construction sites shall be as follows:

Polyacrylamides (PAMS) and Flocculants

Polyacrylamides (PAMS) and flocculants shall be stored in leak-proof containers that are kept under storm-resistant cover or surrounded by secondary containment structures designed to protect adjacent surface waters. PAMS or other flocculants used shall be selected from the NC DWR List of Approved PAMS/Flocculants The concentration of PAMS and other flocculants used shall not exceed those specified in the NC DWR List of Approved PAMS/Flocculants and in accordance with the manufacturer's instructions. The NC DWR List of Approved PAMS/Flocculants is available at:

https://files.nc.gov/ncdeq/Water+Quality/Environmental+Sciences/ATU/PAM8_30_18.pdf

Equipment Fluids

Fuels, lubricants, coolants, and hydraulic fluids, and other petroleum products shall be handled and disposed of in a manner so as not to enter surface or ground waters and in accordance with applicable state and federal regulations. Equipment used on the site must be operated and maintained properly to prevent discharge of fluids. Equipment, vehicle, and other wash waters shall not be discharged into E&SC basins or other E&SC devices. Alternative controls should be provided such that there is no discharge of soaps, solvents, or detergents.

Waste Materials

Construction materials and land clearing waste shall be disposed of in accordance with North Carolina General Statutes, Chapter 130A, Article 9 - Solid Waste Management, and rules governing the disposal of solid waste (15A NCAC 13B). Areas dedicated for managing construction material and land clearing waste shall be at least 50 feet away from storm drain inlets and surface waters unless it can be shown that no other alternatives are reasonably available. Paint and other liquid construction material waste shall not be dumped into storm drains. Paint and other liquid construction waste washouts should be located at least 50 feet away from storm drain inlets unless there is no alternative. Other options are to install lined washouts or use portable, removable bags or bins. Hazardous or toxic waste shall be managed in accordance with the federal Resource Conservation and Recovery Act (RCRA) and NC Hazardous Waste Rules at 15A NCAC, Subchapter 13A. Litter and sanitary waste shall be managed in a manner to prevent it from entering jurisdictional waters and shall be disposed of offsite.

Herbicide, Pesticide, and Rodenticides

Herbicide, pesticide, and rodenticides shall be stored and applied in accordance with the Federal Insecticide, Fungicide, and Rodenticide Act, North Carolina Pesticide Law of 1971 and labeling restrictions.

Concrete Materials

Concrete materials onsite, including excess concrete, must be controlled and managed to avoid contact with surface waters, wetlands or buffers. No concrete or cement slurry shall be discharged from the site. (Note that discharges from onsite concrete plants require coverage under a separate

NPDES permit – NCG140000.) Concrete wash water shall be managed in accordance with the *Concrete Washout Structure* provision. Concrete slurry shall be managed and disposed of in accordance with *NCDOT DGS and HOS DCAR Distribution of Class A Residuals Statewide* (Permit No. WQ0035749). Any hardened concrete residue will be disposed of, or recycled on site, in accordance with state solid waste regulations.

Earthen Material Stock Piles

Earthen material stock piles shall be located at least 50 feet away from storm drain inlets and surface waters unless it can be shown that no other alternatives are reasonably available.

Measurement and Payment

Conditions set within the *Construction Materials Management* provision are incidental to the project for which no direct compensation will be made.

WASTE AND BORROW SOURCES:
(2-16-11) (Rev. 3-17-22)

Payment for temporary erosion control measures, except those made necessary by the Contractor's own negligence or for his own convenience, will be paid for at the appropriate contract unit price for the devices or measures utilized in borrow sources and waste areas.

No additional payment will be made for erosion control devices or permanent seeding and mulching in any commercial borrow or waste pit. All erosion and sediment control practices that may be required on a commercial borrow or waste site will be done at the Contractor's expense.

All offsite Staging Areas, Borrow and Waste sites shall be in accordance with "Borrow and Waste Site Reclamation Procedures for Contracted Projects" located at:

https://connect.ncdot.gov/resources/roadside/FieldOperationsDocuments/Contract%20Reclamation%20Procedures.pdf

All forms and documents referenced in the "Borrow and Waste Site Reclamation Procedures for Contracted Projects" shall be included with the reclamation plans for offsite staging areas, and borrow and waste sites.

TEMPORARY DIVERSION:

This work consists of installation, maintenance, and cleanout of *Temporary Diversions* in accordance with Section 1630 of the *Standard Specifications*. The quantity of excavation for installation and cleanout will be measured and paid for as *Silt Excavation* in accordance with Article 1630-3 of the *Standard Specifications*.

SAFETY FENCE AND JURISDICTIONAL FLAGGING:

Description

Safety Fence shall consist of furnishing materials, installing and maintaining polyethylene or polypropylene fence along the outside riparian buffer, wetland, or water boundary, or other boundaries located within the construction corridor to mark the areas that have been approved to infringe within the buffer, wetland, endangered vegetation, culturally sensitive areas or water. The fence shall be installed prior to any land disturbing activities.

Interior boundaries for jurisdictional areas noted above shall be delineated by stakes and highly visible flagging.

Jurisdictional boundaries at staging areas, waste sites, or borrow pits, whether considered outside or interior boundaries shall be delineated by stakes and highly visible flagging.

Materials

(A) Safety Fencing

Polyethylene or polypropylene fence shall be a highly visible preconstructed safety fence approved by the Engineer. The fence material shall have an ultraviolet coating.

Either wood posts or steel posts may be used. Wood posts shall be hardwood with a wedge or pencil tip at one end, and shall be at least 5 ft. in length with a minimum nominal 2" x 2" cross section. Steel posts shall be at least 5 ft. in length, and have a minimum weight of 0.85 lb/ft of length.

(B) Boundary Flagging

Wooden stakes shall be 4 feet in length with a minimum nominal 3/4" x 1-3/4" cross section. The flagging shall be at least 1" in width. The flagging material shall be vinyl and shall be orange in color and highly visible.

Construction Methods

No additional clearing and grubbing is anticipated for the installation of this fence. The fence shall be erected to conform to the general contour of the ground.

(A) Safety Fencing

Posts shall be set at a maximum spacing of 10 ft., maintained in a vertical position and hand set or set with a post driver. Posts shall be installed a minimum of 2 ft. into the ground. If hand set, all backfill material shall be thoroughly tamped. Wood posts may be sharpened to a dull point if power driven. Posts damaged by power driving shall be removed and replaced prior to final

acceptance. The tops of all wood posts shall be cut at a 30-degree angle. The wood posts may, at the option of the Contractor, be cut at this angle either before or after the posts are erected.

The fence geotextile shall be attached to the wood posts with one 2" galvanized wire staple across each cable or to the steel posts with wire or other acceptable means.

Place construction stakes to establish the location of the safety fence in accordance with Article 105-9 or Article 801-1 of the *Standard Specifications.* No direct pay will be made for the staking of the safety fence. All stakeouts for safety fence shall be considered incidental to the work being paid for as "Construction Surveying", except that where there is no pay item for construction surveying, all safety fence stakeout will be performed by state forces.

The Contractor shall be required to maintain the safety fence in a satisfactory condition for the duration of the project as determined by the Engineer.

(B) Boundary Flagging

Boundary flagging delineation of interior boundaries shall consist of wooden stakes on 25 feet maximum intervals with highly visible orange flagging attached. Stakes shall be installed a minimum of 6" into the ground. Interior boundaries may be staked on a tangent that runs parallel to buffer but must not encroach on the buffer at any location. Interior boundaries of hand clearing shall be identified with a different colored flagging to distinguish it from mechanized clearing.

Boundary flagging delineation of interior boundaries will be placed in accordance with Article 105-9 or Article 801-1 of the *Standard Specifications*. No direct pay will be made for delineation of the interior boundaries. This delineation will be considered incidental to the work being paid for as *Construction Surveying,* except that where there is no pay item or construction surveying the cost of boundary flagging delineation shall be included in the unit prices bid for the various items in the contract. Installation for delineation of all jurisdictional boundaries at staging areas, waste sites, or borrow pits shall consist of wooden stakes on 25 feet maximum intervals with highly visible orange flagging attached. Stakes shall be installed a minimum of 6" into the ground. Additional flagging may be placed on overhanging vegetation to enhance visibility but does not substitute for installation of stakes.

Installation of boundary flagging for delineation of all jurisdictional boundaries at staging areas, waste sites, or borrow pits shall be performed in accordance with Subarticle 230-4(B)(5) or Subarticle 802-2(F) of the *Standard Specifications*. No direct pay will be made for this delineation, as the cost of same shall be included in the unit prices bid for the various items in the contract.

The Contractor shall be required to maintain alternative stakes and highly visible flagging in a satisfactory condition for the duration of the project as determined by the Engineer.

Measurement and Payment

Safety Fence will be measured and paid as the actual number of linear feet of polyethylene or polypropylene fence installed in place and accepted. Such payment will be full compensation

including but not limited to furnishing and installing fence geotextile with necessary posts and post bracing, staples, tie wires, tools, equipment and incidentals necessary to complete this work.

Payment will be made under:

Pay Item	**Pay Unit**
Safety Fence	Linear Foot

PERMANENT SOIL REINFORCEMENT MAT:
9-1-2011 (Rev. 8-16-24)

Description

This work consists of furnishing and placing permanent soil reinforcement mat (PSRM), of the type specified, over previously prepared areas at locations shown on the plans and as directed by the Engineer.

Materials

The product shall be a permanent soil reinforcement mat constructed of synthetic stabilized, non-biodegradable synthetic fibers processed to form a rigid permanent three-dimensional structure to promote soil stability in combination with vegetation under hydraulic stresses. Organic biodegradable fibers (such as straw, coir, excelsior or blends thereof) may also incorporated into the PSRM, evenly distributed throughout the mat. PSRMs utilizing organic fibers shall have a bottom and top UV stabilized netting stitched together with UV stabilized thread to retain the organic fibers. All PSRMs shall meet the following minimum physical properties:

Property	**Test Method**	**Value**	**Unit**
Thickness	ASTM D6525	$\geq$0.25	in
Tensile Strength (MD)	ASTM D6818	225	lbs/ft
Tensile Strength (TD)	ASTM D6818	175	lbs/ft
Vegetation Establishment (Min)	ASTM D7322	250	%
UV Stability[1]	ASTM D4355	$\geq$80	%

[1]ASTM D4355 Tensile Strength and % strength retention of material after 1,000 hours of exposure.

PSRM shall also meet the minimum performance values by type as shown in the table below:

Property	**Test Method**	**Type 1**	**Type 2**	**Type 3**	**Type 4**	**Type 5**	**Unit**
Maximum Permissible Shear Stress (Unvegetated)	ASTM 6460	2.25	2.5	3.0	3.25	N/A	lb/ft^2
Maximum Permissible Shear Stress (Vegetated)	ASTM 6460	6.0	8.0	10.0	12.0	16.0	lb/ft^2

Maximum Allowable Velocity (Vegetated)	ASTM 6460	8.0	12	16.0	20.0	24.0	ft/s

Staples shall be used as anchors. Provide staples to meet Article 1060-8 of the *Standard Specifications*.

Construction Methods

All areas to be protected with the PSRM shall be brought to final grade and prepared in accordance with Section 1660 of the *Standard Specifications*. The surface of the soil shall be smooth, firm, stable and free of rocks, clods, roots or other obstructions that would prevent the mat from lying in direct contact with the soil surface. Preserve the required line, grade and cross section of the area covered. Unroll the PSRM in the direction of the flow of water and apply without stretching so that it will lie smoothly but loosely on the soil surface. Bury the up-channel or top of slope end of each piece of PSRM in a narrow trench at least 6 inches deep and tamp firmly. Where one roll of matting ends and a second-roll begins, overlap the end of the upper roll over the beginning of the second roll so there is a 6 inch overlap. Install staple checks 4 inches on center and every 30 feet longitudinally in the matting or as directed by the Engineer. Fold over and bury matting to the full depth of the trench, close and tamp firmly. Overlap matting at least 4 inches where 2 or more widths of matting are laid side by side.

Place staples across matting at ends, junctions and check trenches approximately 10 inches apart. Place staples along the outer edges and down the center of each strip of matting 3 feet apart. Place staples along all lapped edges 10 inches apart. Install product with netting and biodegradable fibers on the top side if present. Trenching and stapling shall fit individual cut or fill slope conditions and conform to manufacturer's installation recommendations for the type specified. Any conflict between the manufacturer's installation recommendations and this special provision will be resolved by the more stringent measures being required.

Apply all soil amendments and one-half of the seed in accordance with Section 1660 of the Standard Specifications of the types at the rates specified in the contract prior to installation of the PSRM. For PSRMs that do not contain biodegradable fibers, apply 3/4 inch to 1 inch loose, friable topsoil uniformly over the PSRM and gently work to incorporate into the structure of the PSRM completely filling the voids until the level of soil is at the top of the PSRM. Apply the remainder of the seed and gently work into the surface of the topsoil in-fill and mulch. For all other PSRMs, apply 3/4 inch to 1 inch of loose, friable topsoil uniformly over the PSRM and gently work to create a suitable seed bed. Apply the remainder of the seed and gently work into the surface of the topsoil. At the sole discretion of the Engineer, topsoil may be omitted for PSRMs containing biodegradable fibers. All seed should be applied prior to installation of PSRM if topsoil is omitted and will not need to be mulched.

Measurement and Payment

Permanent Soil Reinforcement Mat, Type __ will be measured and paid for as the actual number of square yards measured along the surface of the ground over which permanent soil reinforcement mat of the specified type is installed and accepted. Overlaps will not be included in the

measurement and will be considered as incidental to the work. Such price and payment shall be full compensation for all work covered by this provision, including, but not limited to, furnishing all materials, labor, equipment and incidentals necessary to apply topsoil and install the PSRM.

Payment will be made under:

Pay Item	Pay Unit
Permanent Soil Reinforcement Mat, Type __	Square Yard

IMPERVIOUS DIKE:
(9-9-11)(Rev. 11-15-22)

Description

This work consists of furnishing, installing, maintaining, pumping and removing an *Impervious Dike* for the purpose of diverting normal stream flow around the construction site. The Contractor shall construct an impervious dike in such a manner approved by the Engineer. The impervious dike shall not permit seepage of water into the construction site or contribute to siltation of the stream. The impervious dike shall be constructed of an acceptable material in the locations noted on the plans or as directed by the Engineer.

Materials

Acceptable materials shall include but not be limited to sheet piles, sandbags, and/or the placement of an acceptable size stone lined with polypropylene or other impervious geotextile.

Earth material shall not be used to construct an impervious dike when it is in direct contact with the stream unless vegetation can be established before contact with the stream takes place.

Construction Methods

Where impervious dikes are shown on the plans and used to dewater or lower the water elevation, construct in accordance with Article 410-4 and 410-5.

Measurement and Payment

Impervious Dike will be measured and paid as the actual number of linear feet of impervious dike(s) constructed, measured in place from end to end of each separate installation that has been completed and accepted by the Engineer. Such price and payment will be full compensation for all work including but not limited to furnishing materials, construction, maintenance, pumping and removal of the impervious dike.

Payment will be made under:

Pay Item	Pay Unit
Impervious Dike	Linear Foot

FLOATING TURBIDITY CURTAIN:

Description

This work consists of furnishing a *Floating Turbidity Curtain* to deter silt suspension and movement of silt particles during construction. The floating turbidity curtain shall be constructed at locations as directed.

Materials

The curtain material shall be made of a tightly woven nylon, plastic or other non-deteriorating material meeting the following specifications:

Property	Value
Grab tensile strength	*md-370 lbs *cd-250 lbs
Mullen burst stength	480 psi
Trapezoid tear strength	*md-100 lbs *cd-60 lbs
Apparent opening size	70 US standard sieve
Percent open area	4% permittivity 0.28 sec-1

*md - machine direction
*cd - cross machine direction

In the event that more than one width of fabric is required, a 6" overlap of the material shall also be required.

The curtain material shall be supported by a flotation material having over 29 lbs/ft buoyancy. The floating curtain shall have a 5/16" galvanized chain as ballast and dual 5/16" galvanized wire ropes with a heavy vinyl coating as load lines.

Construction Methods

The Contractor shall maintain the *Floating Turbidity Curtain* in a satisfactory condition until its removal is requested by the Engineer. The curtain shall extend to the bottom of the jurisdictional resource. Anchor the curtain according to manufacturer recommendations.

Measurement and Payment

Floating Turbidity Curtain will be measured and paid for as the actual number of square yards of curtain furnished as specified and accepted. Such price and payment will be full compensation for the work as described in this section including but not limited to furnishing all materials, tools, equipment, and all incidentals necessary to complete the work.

Payment will be made under:

Pay Item	**Pay Unit**
Floating Turbidity Curtain	Square Yard

CONCRETE WASHOUT:
(10-22-15)(Rev. 4-15-25)

Description

Concrete washouts are impermeable enclosures, above or below grade, to contain concrete wastewater and associated concrete mix from cleaning of ready-mix trucks, drums, pumps, tools or other equipment. Concrete washouts must collect and retain all the concrete washout water and solids, so that this material does not migrate to surface waters or into the ground water. These enclosures are not intended for concrete waste not associated with washout operations.

Acceptable concrete washouts may include constructed earthen structures, above or below ground, or commercially available devices designed specifically to capture concrete wash water.

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	**Section**
Temporary Silt Fence	1605

Safety Fence shall meet the specifications as provided elsewhere in this contract.

Geomembrane basin liner shall consist of a minimum 10 mil thick polypropylene or polyethylene geomembrane.

Construction Methods

Build an enclosed earthen berm or excavate to form an enclosure in accordance with the details and as directed by the Engineer near the project entrance(s) or at location(s) of concrete operations. Structures shall be constructed a minimum of 50 feet from drainage conveyances or jurisdictional streams or wetlands. Alternate structure designs or plans for management of concrete washout may be submitted for review and approval by the Engineer. Include in the alternate plan the method used to retain, treat and dispose of the concrete washout wastewater generated within the project limits and in accordance with the minimum setback requirements.

Install temporary silt fence around the perimeter of the structure enclosure in accordance with the details and as directed by the Engineer if the structure is not located in an area where existing erosion and sedimentation control devices are capable of containing stormwater runoff.

Post a sign with the words “Concrete Washout” in close proximity of the concrete washout area, so it is clearly visible to site personnel. Install safety fence as directed by the Engineer for visibility to construction traffic.

Install prefabricated concrete washouts, designed specifically to capture concrete wash water, at locations of additional concrete pouring operations. Acceptable systems may include geotextile lined containers, vinyl or plastic containers or roll-off containers, with or without filter bags with a minimum functional holding capacity of 36 cubic feet (1.33 cubic yards). Submit prefabricated concrete washout system for approval by the Engineer prior to installation. Place prefabricated concrete washout devices to a minimum 50 foot setback from drainage conveyances and jurisdictional streams and wetlands. If the minimum setback cannot be achieved, provide secondary containment to prevent accidental release of wastewater from reaching drainage conveyances or streams.

Prefabricated concrete washouts must be clearly and visibly labeled as such, either by the manufacturer on the product itself, or by a sign with the words "Concrete Washout" in close proximity of the concrete washout area so it is clearly visible to site personnel.

Maintenance and Removal

Maintain the concrete washout structure(s) to provide adequate holding capacity plus a minimum freeboard of 12 inches. Remove and dispose of hardened concrete and return the structure to a functional condition after reaching 75% capacity. Inspect concrete washout structures for damage to liner or structure to maintain functionality.

Maintain prefabricated concrete washout systems per manufacturer's recommendations. Inspect concrete washout structures for damage to linings or structure and repair or replace as necessary.

Remove the concrete washout structures and sign upon project completion. Grade the area to match the existing topography and permanently seed and mulch area. Dispose of prefabricated concrete washout structures according to state or local waste regulations.

Measurement and Payment

Concrete Washout Structure will be measured and paid per each enclosure installed in accordance with the details in the plans. If alternate plans or details are approved, those structures will also be paid for per each approved and installed structure. Such price and payment will be full compensation for all work including, but not limited to, furnishing all materials, labor, equipment, signage, slurry solidification and incidentals necessary to construct, maintain and remove *Concrete Washout Structure* and dispose of residual concrete washout wastewater and concrete solids.

Prefabricated Concrete Washout will be measured and paid per each system installed in accordance with the manufacturer's recommendations. Such price and payment will be full compensation for all work including, but not limited to, furnishing all materials, labor, equipment, signage, slurry solidification and incidentals necessary to install, maintain and remove *Prefabricated Concrete Washout*, and dispose of residual concrete washout wastewater and concrete solids.

Temporary Silt Fence will be measured and paid for in accordance with Article 1605-5 of the *Standard Specifications*.

Temporary Silt Fence will be measured and paid for in accordance with Article 1605-5 of the *Standard Specifications*.

Safety Fence shall be measured and paid for as provided elsewhere in this contract.

No measurement will be made for over excavation or stockpiling or other items necessary to complete this work.

Payment will be made under:

Pay Item	Pay Unit
Concrete Washout Structure	Each
Prefabricated Concrete Washout	Each

LITTER REMOVAL (MOWING AREAS ONLY):
(07-19-22)

Description

This work consists of the pickup, removal, and disposal of litter from roadsides within the construction project prior to mowing operations.

Construction Methods

Provide labor, equipment and materials necessary for the pickup and removal of litter from non-construction sources and the disposal of same into state approved landfills. The Contractor shall abide by all ordinances, laws and regulations regarding disposal of litter and recycling of eligible materials. Wastes generated from construction activities shall be managed as provided elsewhere in the contract. Litter items may consist of any item not considered normal to the right-of-way, including but not limited to, varied sizes of bottles, cans, paper, tires, tire pieces, lumber, vehicle parts, building supplies, metals, household furnishings, cardboard, plastics, ladders, brush and other items not considered normal to the right of way. Litter removal shall be performed in designated areas within five days prior to any mowing operations and as directed. Designated areas shall include vegetated medians and shoulders within the project limits including all interchange ramps and other areas to be mown. Designated areas may be omitted for litter removal by the Engineer due to safety concerns.

The Contractor shall provide adequate personnel and materials to collect and remove litter. The Contractor shall be responsible for locating and utilizing approved local landfills and recycling facilities. Refer to Section 105-27 of the *Standard Specifications* for potential hazardous materials. All collected litter shall be containerized immediately and kept off the traveled portions of the roadway, shoulders, and rights-of-way (including paved shoulders). All collected litter that is small enough to be placed in a bag shall be bagged immediately. All collected litter that is too

large for a bag shall be placed into a vehicle. Extended storage or stockpiling of collected litter and recyclables will not be permitted.

The Contractor's personnel shall dispose of any litter in a landfill approved by North Carolina Division of Waste Management. The Contractor will not be allowed to use NCDOT accounts at the landfills/recycling centers nor be allowed to dispose of the litter in NCDOT trash containers on any NCDOT property.

The Contractor shall report online the number of bags of litter and any recycling on the NCDOT Litter Management Website on the date of the pickup at the following website:

https://apps.ncdot.gov/LM

An access code ('Pickup Key') for the online reporting portal may be obtained via emailing the Roadside Environmental Unit Litter Management Section at ncdot.clr@ncdot.gov. The Contractor shall request access to the litter removal reporting website prior to starting initial litter collection operations.

Measurement and Payment

The quantity of litter removal to be performed will be affected by the actual conditions that occur during construction of the project. The quantity of litter removal may be increased, decreased, or eliminated entirely as directed. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

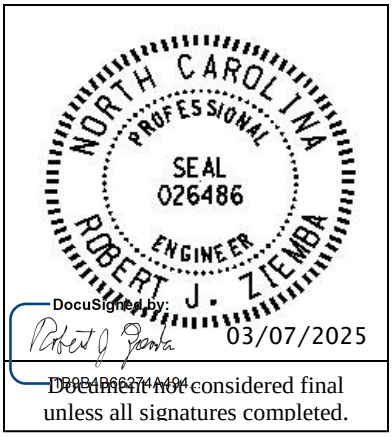
Manual Litter Removal will be measured and paid as the actual number of man hours each worker spends picking up litter. Such price and payment will be full compensation for all litter removal work covered by *Litter Removal*, including, but not limited to, furnishing all materials, labor, equipment, transport, reporting, and incidentals necessary to accomplish the work.

Litter Disposal will be measured and paid for by the actual number of tons of litter collected and properly disposed of at a state approved landfill. Such price and payment will be full compensation for all fees, labor, transport, and incidentals necessary to dispose of collected litter associated with *Litter Removal*.

All traffic control necessary to provide a safe work area for *Litter Removal* shall be paid for as specified elsewhere in the contract.

Payment will be made under:

Pay Item	Pay Unit
Manual Litter Removal	MHR
Litter Disposal	TON



BR-0015

Project Special Provisions
(Version 24.1)

Prepared By: IOU
7-Mar-25

Contents

1. 2024 STANDARD SPECIFICATIONS FOR ROADS & STRUCTURES

The 2024 Standard Specifications are revised as follows:

1.1. ELECTRICAL JUNCTION BOXES (1091-5)

Page 10-209, revise paragraphs beginning on line 26 to read "Provide electrical junction boxes with covers of the type and size indicated by the contract or plans for the termination of conduits. Boxes and covers shall meet all requirements and specifications of ANSI/SCTE 77 2017. Structural load tests shall meet the Tier 15 application type."

Page 10-209, line 28, revise title of section 1091-5(B) from “Polymer Concrete (PC) Junction Boxes” to “Polymer Concrete (PC), Composite, and Thermoplastic Junction Boxes”.

Page 10-209, revise paragraphs beginning on line 29 through line 41 to read “For PC junction boxes, use polymer concrete material made of an aggregate consisting of sand and gravel bound together with a polymer and reinforced with glass strands to fabricate box and cover components.
Provide junction boxes which have bolted covers and open bottoms. Provide vertical extensions of 6 inches to 12 inches as required by project provisions.
Provide the required logo on the cover. Provide at least two size 3/8 inch diameter hex head stainless steel cover bolts to match inserts in the box. Provide pull slot(s) with stainless steel pin(s). Bodies of junction boxes shall be a single piece.
Polymer concrete, composite, and thermoplastic junction boxes are not required to be listed electrical devices.”

1.2. TRAFFIC SIGNAL ACTIVATION (1700-4)

Page 17-4, revise paragraph beginning on line 42 through line 46 to read “Prior to placing signal in the steady (stop-and-go) mode, the signal should be placed in yellow-red flashing mode for up to 7 days or as directed by the Engineer. Yellow-red flashing mode differs from the red-red flashing mode shown in the signal plan. Yellow-red flash mode includes flashing the yellow signal indications on all main street through movements while flashing the red signal indications on all side street signal heads and any left turn heads on the main street. The signal should not be placed in the steady (stop-and-go) mode on a Saturday or Sunday without prior approval from the Engineer. Do not place the signal in steady (stop-and-go) mode until inspected and without prior approval of the Engineer.”

2. SIGNAL HEADS

2.1. MATERIALS

A. General:

Fabricate vehicle signal head housings and end caps from die-cast aluminum. Provide visor mounting screws, door latches, and hinge pins fabricated from stainless steel. Provide interior screws, fasteners, and metal parts fabricated from stainless steel.

Fabricate tunnel and traditional visors from sheet aluminum.

Paint all surfaces inside and outside of signal housings and doors. Paint outside surfaces of tunnel and traditional visors, wire outlet bodies, wire entrance fitting brackets and end caps when supplied as components of messenger cable mounting assemblies, pole and pedestal mounting assemblies, and pedestrian pushbutton housings. Have electrostatically-applied, fused-polyester

paint in highway yellow (Federal Standard 595C, Color Chip Number 13538) a minimum of 2.5 to 3.5 mils thick. Do not apply paint to the latching hardware, rigid vehicle signal head mounting brackets for mast-arm attachments, messenger cable hanger components or balance adjuster components.

Have the interior surfaces of tunnel and traditional visors painted an alkyd urea black synthetic baking enamel with a minimum gloss reflectance and meeting the requirements of MIL-E-10169, "Enamel Heat Resisting, Instrument Black."

Where required, provide polycarbonate signal heads and visors that comply with the provisions pertaining to the aluminum signal heads listed on the QPL with the following exceptions:

Fabricate signal head housings, end caps, and visors from virgin polycarbonate material. Provide UV stabilized polycarbonate plastic with a minimum thickness of 0.1 ± 0.01 inches that is highway yellow (Federal Standard 595C, Color Chip 13538). Ensure the color is incorporated into the plastic material before molding the signal head housings and end caps. Ensure the plastic formulation provides the following physical properties in the assembly (tests may be performed on separately molded specimens):

Test	**Required**	**Method**
Specific Gravity	1.17 minimum	ASTM D 792
Flammability	Self-extinguishing	ASTM D 635
Tensile Strength, yield, PSI	8500 minimum	ASTM D 638
Izod impact strength, ft-lb/in [notched, 1/8 inch]	12 minimum	ASTM D 256

For pole mounting, provide side of pole mounting assemblies with framework and all other hardware necessary to make complete, watertight connections of the signal heads to the poles and pedestals. Fabricate the mounting assemblies and frames from aluminum with all necessary hardware, screws, washers, etc. to be stainless steel. Provide mounting fittings that match the positive locking device on the signal head with the serrations integrally cast into the brackets. Provide upper and lower pole plates that have a 1 ¼-inch vertical conduit entrance hubs with the hubs capped on the lower plate and 1 ½-inch horizontal hubs. Ensure that the assemblies provide rigid attachments to poles and pedestals so as to allow no twisting or swaying of the signal heads. Ensure that all raceways are free of sharp edges and protrusions, and can accommodate a minimum of ten Number 14 AWG conductors.

For pedestal mounting, provide a post-top slipfitter mounting assembly that matches the positive locking device on the signal head with serrations integrally cast into the slipfitter. Provide stainless steel hardware, screws, washers, etc. Provide a minimum of six 3/8 X 3/4-inch long square head bolts for attachment to pedestal. Provide a center post for multi-way slipfitters.

For light emitting diode (LED) traffic signal modules, provide the following requirements for inclusion on the Department's Qualified Products List for traffic signal equipment.

1. Sample submittal,
2. Third-party independent laboratory testing results for each submitted module with evidence of testing and conformance with all of the Design Qualification Testing specified in section 6.4 of each of the following Institute of Transportation Engineers (ITE) specifications:
    - Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Circular Signal Supplement

- Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement

(Note: The Department currently recognizes two approved independent testing laboratories. They are Intertek ETL Semko and Light Metrics, Incorporated with Garwood Laboratories. Independent laboratory tests from other laboratories may be considered as part of the QPL submittal at the discretion of the Department,

3. Evidence of conformance with the requirements of these specifications,
4. A manufacturer's warranty statement in accordance with the required warranty, and
5. Submittal of manufacturer's design and production documentation for the model, including but not limited to, electrical schematics, electronic component values, proprietary part numbers, bill of materials, and production electrical and photometric test parameters.
6. Evidence of approval of the product to bear the Intertek ETL Verified product label for LED traffic signal modules.

Ensure LED traffic signal modules meet the performance requirements for the minimum period of 15 years, provide a written warranty against defects in materials and workmanship for the modules for a period of 15 years after installation of the modules. During the warranty period, the manufacturer must provide new replacement modules within 45 days of receipt of modules that have failed at no cost to the State. Repaired or refurbished modules may not be used to fulfill the manufacturer's warranty obligations. Provide manufacturer's warranty documentation to the Department during evaluation of product for inclusion on Qualified Products List (QPL).

B. Vehicle Signal Heads:

Comply with the ITE standard "Vehicle Traffic Control Signal Heads". Provide housings with provisions for attaching backplates.

Provide visors that are 10 inches in length for 12-inch vehicle signal heads.

Provide a termination block with one empty terminal for field wiring for each indication plus one empty terminal for the neutral conductor. Have all signal sections wired to the termination block. Provide barriers between the terminals that have terminal screws with a minimum Number 8 thread size and that will accommodate and secure spade lugs sized for a Number 10 terminal screw.

Mount termination blocks in the yellow signal head sections on all in-line vehicle signal heads. Mount the termination block in the red section on five-section vehicle signal heads.

Furnish vehicle signal head interconnecting brackets. Provide one-piece aluminum brackets less than 4.5 inches in height and with no threaded pipe connections. Provide hand holes on the bottom of the brackets to aid in installing wires to the signal heads. Lower brackets that carry no wires and are used only for connecting the bottom signal sections together may be flat in construction.

For messenger cable mounting, provide messenger cable hangers, wire outlet bodies, balance adjusters, bottom caps, wire entrance fitting brackets, and all other hardware necessary to make complete, watertight connections of the vehicle signal heads to the messenger cable. Fabricate messenger cable hanger components, wire outlet bodies and balance adjuster components from stainless steel or malleable iron galvanized in accordance with ASTM A153 (Class A) or ASTM A123. Provide serrated rings made of aluminum. Provide messenger cable hangers with U-bolt clamps. Fabricate washers, screws, hex-head bolts and associated nuts, clevis pins, cotter pins, U-bolt clamps and nuts from stainless steel.

For mast-arm mounting, provide rigid vehicle signal head mounting brackets and all other hardware necessary to make complete, watertight connections of the vehicle signal heads to the mast

arms and to provide a means for vertically adjusting the vehicle signal heads to proper alignment. Fabricate the mounting assemblies from aluminum, and provide serrated rings made of aluminum. Provide stainless steel cable attachment assemblies to secure the brackets to the mast arms. Ensure all fastening hardware and fasteners are fabricated from stainless steel.

Provide LED vehicular traffic signal modules (hereafter referred to as modules) that consist of an assembly that uses LEDs as the light source in lieu of an incandescent lamp for use in traffic signal sections. Use LEDs that are aluminum indium gallium phosphorus (AlInGaP) technology for red and yellow indications and indium gallium nitride (InGaN) for green indications. Install the ultra bright type LEDs that are rated for 100,000 hours of continuous operation from -40°F to +165°F. Design modules to have a minimum useful life of 15 years and to meet all parameters of this specification during this period of useful life.

For the modules, provide spade terminals crimped to the lead wires and sized for a #10 screw connection to the existing terminal block in a standard signal head. Do not provide other types of crimped terminals with a spade adapter.

Ensure the power supply is integral to the module assembly. On the back of the module, permanently mark the date of manufacture (month & year) or some other method of identifying date of manufacture.

Tint the red, yellow and green lenses to correspond with the wavelength (chromaticity) of the LED. Transparent tinting films are unacceptable. Provide a lens that is integral to the unit with a smooth outer surface.

1. LED Circular Signal Modules:

Provide modules in the following configurations: 12-inch circular sections. All makes and models of LED modules purchased for use on the State Highway System shall appear on the current NCDOT Traffic Signal Qualified Products List (QPL).

Provide the manufacturer's model number and the product number (assigned by the Department) for each module that appears on the 2024 or most recent Qualified Products List. In addition, provide manufacturer's certification in accordance with Article 106-3 of the *Standard Specifications,* that each module meets or exceeds the ITE "Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Circular Signal Supplement" dated June 27, 2005 (hereafter referred to as VTCSH Circular Supplement) and other requirements stated in this specification.

Provide modules that meet the following requirements when tested under the procedures outlined in the VTCSH Circular Supplement:

Module Type	Max. Wattage at 165° F	Nominal Wattage at 77° F
12-inch red circular	17	11
12-inch green circular	15	15

For yellow circular signal modules, provide modules tested under the procedures outlined in the VTCSH Circular Supplement to insure power required at 77° F is 22 Watts or less for the 12-inch circular module.

Note: Use a wattmeter having an accuracy of ±1% to measure the nominal wattage and maximum wattage of a circular traffic signal module. Power may also be derived from voltage, current and power factor measurements.

2. LED Arrow Signal Modules

Provide 12-inch omnidirectional arrow signal modules. All makes and models of LED modules purchased for use on the State Highway System shall appear on the current NCDOT Traffic Signal Qualified Products List (QPL).

Provide the manufacturer's model number and the product number (assigned by the Department) for each module that appears on the 2024 or most recent Qualified Products List. In addition, provide manufacturer's certification in accordance with Article 106-3 of the *Standard Specifications,* that each module meets or exceeds the requirements for 12-inch omnidirectional modules specified in the ITE "Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement" dated July 1, 2007 (hereafter referred to as VTCSH Arrow Supplement) and other requirements stated in this specification.

Provide modules that meet the following requirements when tested under the procedures outlined in the VTCSH Arrow Supplement:

Module Type	Max. Wattage at 165° F	Nominal Wattage at 77° F
12-inch red arrow	12	9
12-inch green arrow	11	11

For yellow arrow signal modules, provide modules tested under the procedures outlined in the VTCSH Arrow Supplement to insure power required at 77° F is 12 Watts or less.

Note: Use a wattmeter having an accuracy of ±1% to measure the nominal wattage and maximum wattage of an arrow traffic signal module. Power may also be derived from voltage, current and power factor measurements.

C. Louvers:

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

Provide louvers made from sheet aluminum. Paint the louvers alkyd urea black synthetic baked enamel with a minimum gloss reflectance and meeting the requirements of MIL-E-10169, "Enamel Heat Resisting, Instrument Black."

Ensure that the louvers have a 0-degree horizontal viewing angle. Provide a minimum of 5 vanes.

Provide geometrically programmed louvers that are made from aluminum with stainless steel hardware and designed to fit inside a 12" signal visor. Ensure geometrically programmed louvers are field adjustable to provide horizontal or vertical viewing control with a minimum of 6 different viewing angles. Provide a .050" aluminum full circle tunnel visor if the geometrically programmed louver is supplied with a visor.

3. CONTROLLERS WITH CABINETS

3.1. MATERIALS – TYPE 2070LX CONTROLLERS

Furnish model 2070LX controller units that conform to CALTRANS *Transportation Electrical Equipment Specifications* (TEES) (dated March 12, 2009, plus Errata 1 dated January 21, 2010 and Errata 2 dated December 5, 2014) except as required herein.

The Department will provide software at the beginning of the burning-in period. Contractor shall give 5 working days notice before needing software. Program software provided by the Department.

Provide model 2070LX controllers with Linux kernel 2.6.18 or higher and device drivers, composed of the unit chassis and at a minimum the following modules and assemblies:

- MODEL 2070-1C, CPU Module, Single Board, with 8Mb Datakey (blue in color)
- MODEL 2070-2E+, Field I/O Module (FI/O)
  - Note: Configure the Field I/O Module to disable both the External WDT Shunt/Toggle Switch and SP3 (SP3 active indicator is "off")
- MODEL 2070-3B, Front Panel Module (FP), Display B (8x40)
- MODEL 2070-4A, Power Supply Module, 10 AMP

Provide a Board Support Package (BSP) to the state and to any specified applications software manufacturer when requested by the state to facilitate the porting of application software.

3.2. MATERIALS – GENERAL CABINETS

Provide a moisture resistant coating on all circuit boards.

Provide one 20 mm diameter radial lead UL-recognized metal oxide varistor (MOV) between each load switch field terminal and equipment ground. Electrical performance is outlined below.

PROPERTIES OF MOV SURGE PROTECTOR	
Maximum Continuous Applied Voltage at 185° F	150 VAC (RMS) 200 VDC
Maximum Peak 8x20µs Current at 185° F	6500 A
Maximum Energy Rating at 185° F	80 J
Voltage Range 1 mA DC Test at 77° F	212-268 V
Max. Clamping Voltage 8x20µs, 100A at 77° F	395 V
Typical Capacitance (1 MHz) at 77° F	1600 pF

Provide a power line surge protector that is a two-stage device that will allow connection of the radio frequency interference filter between the stages of the device. Ensure that a maximum continuous current is at least 10A at 120V. Ensure that the device can withstand a minimum of 20 peak surge current occurrences at 20,000A for an 8x20 microsecond waveform. Provide a maximum clamp voltage of 395V at 20,000A with a nominal series inductance of 200µh. Ensure that the voltage does not exceed 395V. Provide devices that comply with the following:

Frequency (Hz)	Minimum Insertion Loss (dB)
60	0
10,000	30
50,000	55
100,000	50
500,000	50
2,000,000	60
5,000,000	40
10,000,000	20
20,000,000	25

3.3. MATERIALS – TYPE 170E CABINETS

A. Type 170 E Cabinets General:

Conform to the city of Los Angeles' Specification No. 54-053-08, *Traffic Signal Cabinet Assembly Specification* (dated July 2008), except as required herein.

Furnish model 332 base mounted cabinets configured for 8 vehicle phases, 4 pedestrian phases, and 6 overlaps. When overlaps are required, provide auxiliary output files for the overlaps. Do not reassign load switches to accommodate overlaps unless shown on electrical details.

Provide model 200 load switches, model 222 loop detector sensors, model 252 AC isolators, and model 242 DC isolators according to the electrical details. As a minimum, provide one (1) model 2018 conflict monitor, one (1) model 206L power supply unit, two (2) model 204 flashers, one (1) DC isolator (located in slot I14), and four (4) model 430 flash transfer relays (provide seven (7) model 430 flash transfer relays if auxiliary output file is installed) with each cabinet.

B. Type 170 E Cabinet Electrical Requirements:

Provide a cabinet assembly designed to ensure that upon leaving any cabinet switch or conflict monitor initiated flashing operation, the controller starts up in the programmed start up phases and start up interval.

Furnish two sets of non-fading cabinet wiring diagrams and schematics in a paper envelope or container and placed in the cabinet drawer.

All AC+ power is subject to radio frequency signal suppression.

Provide surge suppression in the cabinet for each type of cabinet device. Provide surge protection for the full capacity of the cabinet input file. Provide surge suppression devices that operate properly over a temperature range of -40º F to +185º F. Ensure the surge suppression devices provide both common and differential modes of protection.

Provide a pluggable power line surge protector that is installed on the back of the PDA (power distribution assembly) chassis to filter and absorb power line noise and switching transients. Ensure the device incorporates LEDs for failure indication and provides a dry relay contact closure for the purpose of remote sensing. Ensure the device meets the following specifications:

- Peak Surge Current (Single pulse, 8x20µs)……..20,000A
- Occurrences (8x20µs waveform)……..10 minimum @ 20,000A

- Maximum Clamp Voltage…….395VAC
- Operating Current……..15 amps
- Response Time……..< 5 nanoseconds

Provide a loop surge suppressor for each set of loop terminals in the cabinet. Ensure the device meets the following specifications:

- Peak Surge Current (6 times, 8x20µs)
  - (Differential Mode)…….400A
  - (Common Mode)……1,000A
- Occurrences (8x20µs waveform)……..500 min @ 200A
- Maximum Clamp Voltage
  - (Differential Mode @400A)……35V
  - (Common Mode @1,000A)…….35V
- Response Time……..< 5 nanoseconds
- Maximum Capacitance……..35 pF

Provide a data communications surge suppressor for each communications line entering or leaving the cabinet. Ensure the device meets the following specifications:

- Peak Surge Current (Single pulse, 8x20µs)……..10,000A
- Occurrences (8x20µs waveform)……..100 min @ 2,000A
- Maximum Clamp Voltage…….Rated for equipment protected
- Response Time……..< 1 nanosecond
- Maximum Capacitance…….1,500 pF
- Maximum Series Resistance…….15Ω

Provide a DC signal surge suppressor for each DC input channel in the cabinet. Ensure the device meets the following specifications:

- Peak Surge Current (Single pulse, 8x20µs)……..10,000A
- Occurrences (8x20µs waveform)……..100 @ 2,000A
- Maximum Clamp Voltage…….30V
- Response Time……..< 1 nanosecond

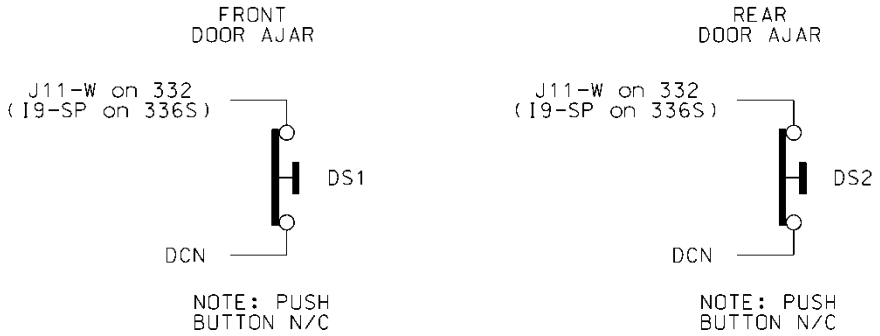
Provide a 120 VAC signal surge suppressor for each AC+ interconnect signal input. Ensure the device meets the following specifications:

- Peak Surge Current (Single pulse, 8x20µs)……..20,000A
- Maximum Clamp Voltage……350VAC
- Response Time……..< 200 nanoseconds
- Discharge Voltage……<200 Volts @ 1,000A
- Insulation Resistance…….≥100 MΩ

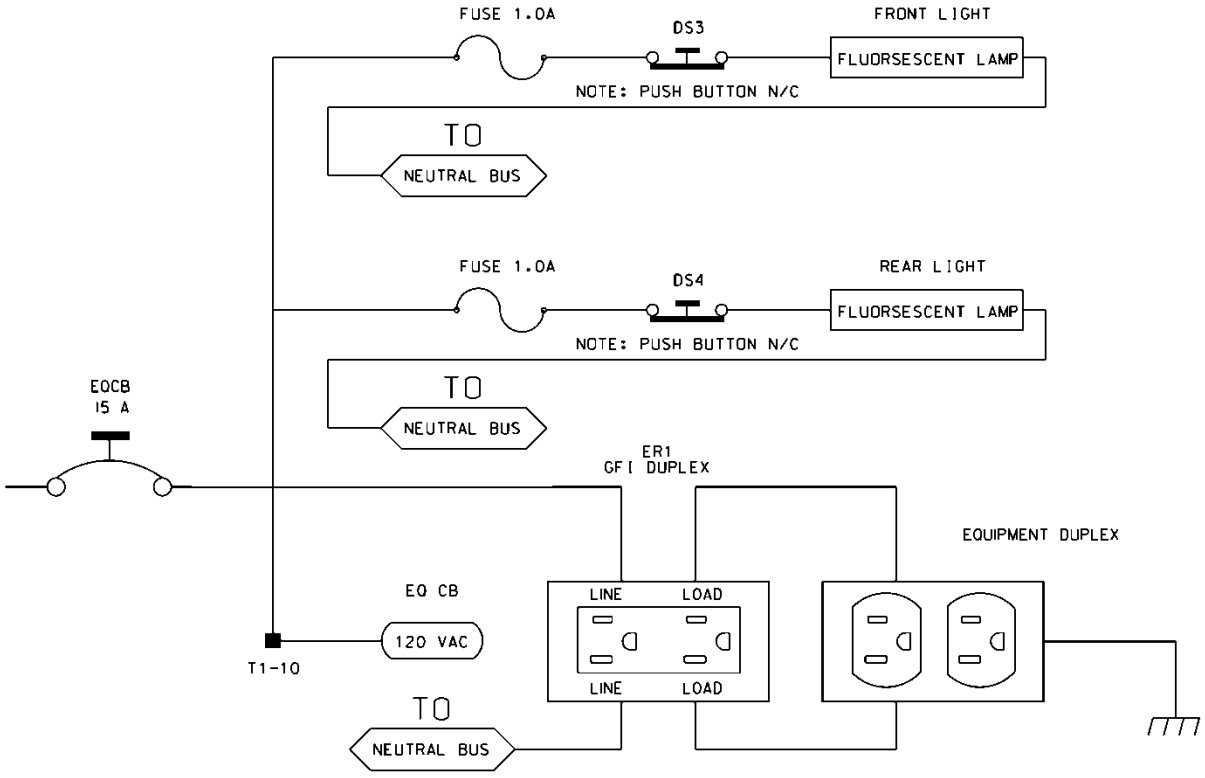
Provide conductors for surge protection wiring that are of sufficient size (ampacity) to withstand maximum overcurrents which could occur before protective device thresholds are attained and current flow is interrupted.

If additional surge protected power outlets are needed to accommodate fiber transceivers, modems, etc., install a UL listed, industrial, heavy-duty type power outlet strip with a minimum rating of 15 A / 125 VAC, 60 Hz. Provide a strip that has a minimum of 3 grounded outlets. Ensure the power outlet strip plugs into one of the controller unit receptacles located on the rear of the PDA. Ensure power outlet strip is mounted securely; provide strain relief if necessary.

Provide a door switch in the front and a door switch in the rear of the cabinet that will provide the controller unit with a Door Ajar alarm when either the front or the rear door is open. Ensure the door switches apply DC ground to the Input File when either the front door or the rear door is open.



Furnish a fluorescent fixture in the rear across the top of the cabinet and another fluorescent fixture in the front across the top of the cabinet at a minimum. Ensure that the fixtures provide sufficient light to illuminate all terminals, labels, switches, and devices in the cabinet. Conveniently locate the fixtures so as not to interfere with a technician's ability to perform work on any devices or terminals in the cabinet. Provide a protective diffuser to cover exposed bulbs. Install 16 watt T-4 lamps in the fluorescent fixtures. Provide a door switch to provide power to each fixture when the respective door is open. Wire the fluorescent fixtures to the 15 amp ECB (equipment circuit breaker).



Furnish a police panel with a police panel door. Ensure that the police panel door permits access to the police panel when the main door is closed. Ensure that no rainwater can enter the cabinet even with the police panel door open. Provide a police panel door hinged on the right side as viewed from the front. Provide a police panel door lock that is keyed to a standard police/fire call box key. In addition to the requirements of LA Specification No. 54-053-08, provide the police panel with a toggle switch connected to switch the intersection operation between normal stop-and-go operation (AUTO) and manual operation (MANUAL). Ensure that manual control can be implemented using inputs and software such that the controller provides full programmed clearance times for the yellow clearance and red clearance for each phase while under manual control.

Provide a 1/4-inch locking phone jack in the police panel for a hand control to manually control the intersection. Provide sufficient room in the police panel for storage of a hand control and cord.

For model 332 base mounted cabinets, ensure terminals J14-E and J14-K are wired together on the rear of the Input File. Connect TB9-12 (J14 Common) on the Input Panel to T1-2 (AC-) on the rear of the PDA.

Provide detector test switches mounted at the top of the cabinet rack or other convenient location which may be used to place a call on each of eight phases based on the chart below. Provide three positions for each switch: On (place call), Off (normal detector operation), and Momentary On (place momentary call and return to normal detector operation after switch is released). Ensure that the switches are located such that the technician can read the controller display and observe the intersection.

Connect detector test switches for cabinets as follows:

332 Cabinet	
Detector Call Switches	**Terminals**
Phase 1	I1-W
Phase 2	I4-W
Phase 3	I5-W
Phase 4	I8-W
Phase 5	J1-W
Phase 6	J4-W
Phase 7	J5-W
Phase 8	J8-W

Provide the PCB 28/56 connector for the conflict monitor unit (CMU) with 28 independent contacts per side, dual-sided with 0.156 inch contact centers. Provide the PCB 28/56 connector contacts with solder eyelet terminations. Ensure all connections to the PCB 28/56 connector are soldered to the solder eyelet terminations.

Ensure that all cabinets have the CMU connector wired according to the 332 cabinet connector pin assignments (include all wires for auxiliary output file connection). Wire pins 13, 16, R, and U of the CMU connector to a separate 4 pin plug, P1, as shown below. Provide a second plug, P2, which will mate with P1 and is wired to the auxiliary output file as shown below. Provide an additional plug, P3, which will mate with P1 and is wired to the pedestrian yellow circuits as shown below. When no auxiliary output file is installed in the cabinet, provide wires for the green and yellow inputs for channels 11, 12, 17, and 18, the red inputs for channels 17 and 18, and the wires for the P2 plug. Terminate the two-foot wires with ring type lugs, insulated, and bundled for optional use.

	P1		P2		P3	
PIN	**FUNCTION**	**CONN TO**	**FUNCTION**	**CONN TO**	**FUNCTION**	**CONN TO**
1	CH-9G	CMU-13	OLA-GRN	A123	2P-YEL	114
2	CH-9Y	CMU-16	OLA-YEL	A122	4P-YEL	105
3	CH-10G	CMU-R	OLB-GRN	A126	6P-YEL	120
4	CH-10Y	CMU-U	OLB-YEL	A125	8P-YEL	111

Do not provide the P20 terminal assembly (red monitor board) or red interface ribbon cable as specified in LA Specification No. 54-053-08.

Provide a P20 connector that mates with and is compatible with the red interface connector mounted on the front of the conflict monitor. Ensure that the P20 connector and the red interface connector on the conflict monitor are center polarized to ensure proper connection. Ensure that removal of the P20 connector will cause the conflict monitor to recognize a latching fault condition and place the cabinet into flashing operation.

Wire the P20 connector to the output file and auxiliary output file using 22 AWG stranded wires. Ensure the length of these wires is a minimum of 42 inches in length. Provide a durable braided sleeve around the wires to organize and protect the wires.

Wire the P20 connector to the traffic signal red displays to provide inputs to the conflict monitor as shown below. Ensure the pedestrian Don't Walk circuits are wired to channels 13 through 16 of the P20 connector. When no auxiliary output file is installed in the cabinet, provide wires for channels 9 through 12 reds. Provide a wire for special function 1. Terminate the unused wires with ring type lugs, insulated, and bundled for optional use.

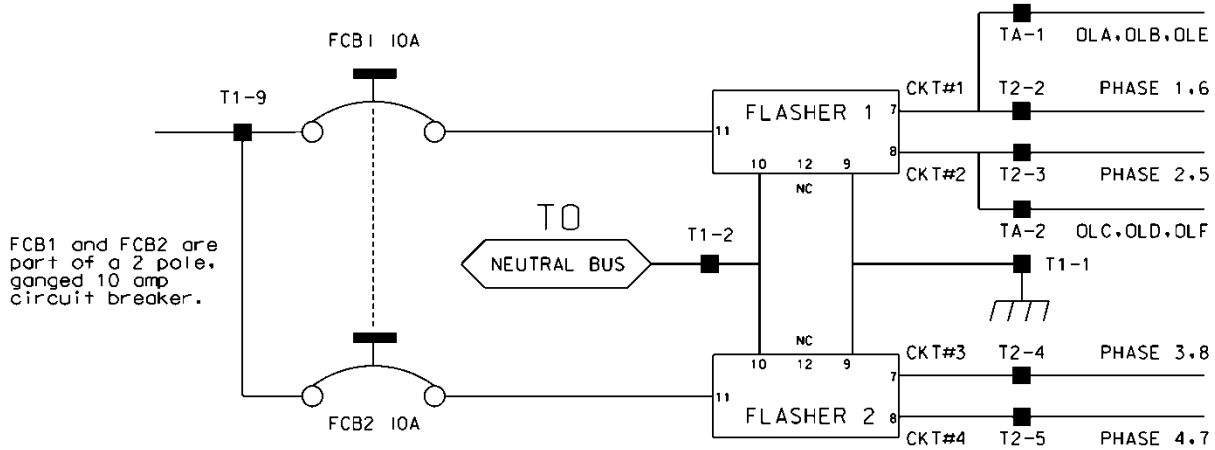
	P20 Connector				
PIN	**FUNCTION**	**CONN TO**	**PIN**	**FUNCTION**	**CONN TO**
1	Channel 15 Red	119	2	Channel 16 Red	110
3	Channel 14 Red	104	4	Chassis GND	01-9
5	Channel 13 Red	113	6	N/C	
7	Channel 12 Red	AUX 101	8	Spec Function 1	
9	Channel 10 Red	AUX 124	10	Channel 11 Red	AUX 114
11	Channel 9 Red	AUX 121	12	Channel 8 Red	107
13	Channel 7 Red	122	14	Channel 6 Red	134
15	Channel 5 Red	131	16	Channel 4 Red	101
17	Channel 3 Red	116	18	Channel 2 Red	128
19	Channel 1 Red	125	20	Red Enable	01-14

Ensure the controller unit outputs to the auxiliary output file are pre-wired to the C5 connector. When no auxiliary output file is installed in the cabinet, connect the C5 connector to a storage socket located on the Input Panel or on the rear of the PDA.

Do not wire pin 12 of the load switch sockets.

In addition to the requirements of LA Specification No. 54-053-08, ensure relay K1 on the Power Distribution Assembly (PDA) is a four pole relay and K2 on the PDA is a two pole relay.

Provide a two pole, ganged circuit breaker for the flash bus circuit. Ensure the flash bus circuit breaker is an inverse time circuit breaker rated for 10 amps at 120 VAC with a minimum of 10,000 RMS symmetrical amperes short circuit current rating. Do not provide the auxiliary switch feature on the flash bus circuit breaker. Ensure the ganged flash bus circuit breaker is certified by the circuit breaker manufacturer to provide gang tripping operation.



Ensure auxiliary output files are wired as follows:

AUXILIARY OUTPUT FILE TERMINAL BLOCK TA ASSIGNMENTS	
POSITION	**FUNCTION**
1	Flasher Unit #1, Circuit 1/FTR1 (OLA, OLB)/FTR3 (OLE)
2	Flasher Unit #1, Circuit 2/FTR2 (OLC, OLD)/FTR3 (OLF)
3	Flash Transfer Relay Coils
4	AC -
5	Power Circuit 5
6	Power Circuit 5
7	Equipment Ground Bus
8	NC

Provide four spare load resistors mounted in each cabinet. Ensure each load resistor is rated as shown in the table below. Wire one side of each load resistor to AC-. Connect the other side of each resistor to a separate terminal on a four (4) position terminal block. Mount the load resistors and terminal block either inside the back of Output File No. 1 or on the upper area of the Service Panel.

ACCEPTABLE LOAD RESISTOR VALUES	
VALUE (ohms)	**WATTAGE**
1.5K – 1.9 K	25W (min)
2.0K – 3.0K	10W (min)

Provide Model 200 load switches, Model 204 flashers, Model 242 DC isolators, Model 252 AC isolators, and Model 206L power supply units that conform to CALTRANS' "*Transportation Electrical Equipment Specifications*" dated March 12, 2009 with Erratum 1.

C. Type 170 E Cabinet Physical Requirements:

Do not mold, cast, or scribe the name "City of Los Angeles" on the outside of the cabinet door as specified in LA Specification No. 54-053-08. Do not provide a Communications Terminal Panel as specified in LA Specification No. 54-053-08. Do not provide terminal block TBB on the Service Panel. Do not provide Cabinet Verification Test Program software or associated test jigs as specified in LA Specification No. 54-053-08.

Furnish unpainted, natural, aluminum cabinet shells. Ensure that all non-aluminum hardware on the cabinet is stainless steel or a Department approved non-corrosive alternate.

Ensure the lifting eyes, gasket channels, police panel, and all supports welded to the enclosure and doors are fabricated from 0.125 inch minimum thickness aluminum sheet and meet the same standards as the cabinet and doors.

Provide front and rear doors with latching handles that allow padlocking in the closed position. Furnish 0.75 inch minimum diameter stainless steel handles with a minimum 0.5 inch shank. Place the padlocking attachment at 4.0 inches from the handle shank center to clear the lock and key. Provide an additional 4.0 inches minimum gripping length.

Provide Corbin #2 locks on the front and rear doors. Provide one (1) Corbin #2 and one (1) police master key with each cabinet. Ensure main door locks allow removal of keys in the locked position only.

Provide a surge protection panel with 16 loop surge protection devices and designed to allow sufficient free space for wire connection/disconnection and surge protection device replacement. For model 332 cabinets, provide an additional 20 loop surge protection devices. Provide an additional two AC+ interconnect surge devices to protect one slot and eight DC surge protection devices to protect four slots. Provide no protection devices on slot I14.

For base mounted cabinets, mount surge protection panels on the left side of the cabinet as viewed from the rear. Attach each panel to the cabinet rack assembly using bolts and make it easily removable. Mount the surge protection devices in vertical rows on each panel and connect the devices to one side of 12 position, double row terminal blocks with #8 screws. For each surge protection panel, terminate all grounds from the surge protection devices on a copper equipment ground bus attached to the surge protection panel. Wire the terminals to the rear of a standard input file using spade lugs for input file protection.

Provide permanent labels that indicate the slot and the pins connected to each terminal that may be viewed from the rear cabinet door. Label and orient terminals so that each pair of inputs is next to each other. Indicate on the labeling the input file (I or J), the slot number (1-14) and the terminal pins of the input slots (either D & E for upper or J & K for lower).

Provide a minimum 14 x 16 inch pull out, hinged top shelf located immediately below controller mounting section of the cabinet. Ensure the shelf is designed to fully expose the table surface outside the controller at a height approximately even with the bottom of the controller. Ensure the shelf has a storage bin interior which is a minimum of 1 inch deep and approximately the same dimensions as the shelf. Provide an access to the storage area by lifting the hinged top of the shelf. Fabricate the shelf and slide from aluminum or stainless steel and ensure the assembly can support the 2070L controller plus 15 pounds of additional weight. Ensure shelf has a locking mechanism to secure it in the fully extended position and does not inhibit the removal of the 2070L controller or removal of cards inside the controller when fully extended. Provide a locking mechanism that is easily released when the shelf is to be returned to its non-use position directly under the controller.

D. Model 2018 Enhanced Conflict Monitor:

Furnish Model 2018 Enhanced Conflict Monitors that provide monitoring of 18 channels. Ensure each channel consists of a green, yellow, and red field signal input. Ensure that the conflict monitor meets or exceeds CALTRANS' Transportation Electrical Equipment Specifications dated March 12, 2009, with Erratum 1 (hereafter referred to as CALTRANS' 2009 TEES) for a model 210 monitor unit and other requirements stated in this specification.

Ensure the conflict monitor is provided with an 18 channel conflict programming card. Pin EE and Pin T of the conflict programming card shall be connected together. Pin 16 of the conflict programming card shall be floating. Ensure that the absence of the conflict programming card will cause the conflict monitor to trigger (enter into fault mode), and remain in the triggered state until the programming card is properly inserted and the conflict monitor is reset.

Provide a conflict monitor that incorporates LED indicators into the front panel to dynamically display the status of the monitor under normal conditions and to provide a comprehensive review of field inputs with monitor status under fault conditions. Ensure that the monitor indicates the channels that were active during a conflict condition and the channels that experienced a failure for all other per channel fault conditions detected. Ensure that these indications and the status of each channel are retained until the Conflict Monitor is reset. Furnish LED indicators for the following:

- AC Power (Green LED indicator)
- VDC Failed (Red LED indicator)
- WDT Error (Red LED indicator)
- Conflict (Red LED indicator)
- Red Fail (Red LED indicator)
- Dual Indication (Red LED indicator)
- Yellow/Clearance Failure (Red LED indicator)
- PCA/PC Ajar (Red LED indicator)
- Monitor Fail/Diagnostic Failure (Red LED indicator)
- 54 Channel Status Indicators (1 Red, 1 Yellow, and 1 Green LED indicator for each of the 18 channels)

Provide a switch to set the Red Fail fault timing. Ensure that when the switch is in the ON position the Red Fail fault timing value is set to 1350 +/- 150 ms (2018 mode). Ensure that when the switch is in the OFF position the Red Fail fault timing value is set to 850 +/- 150 ms (210 mode).

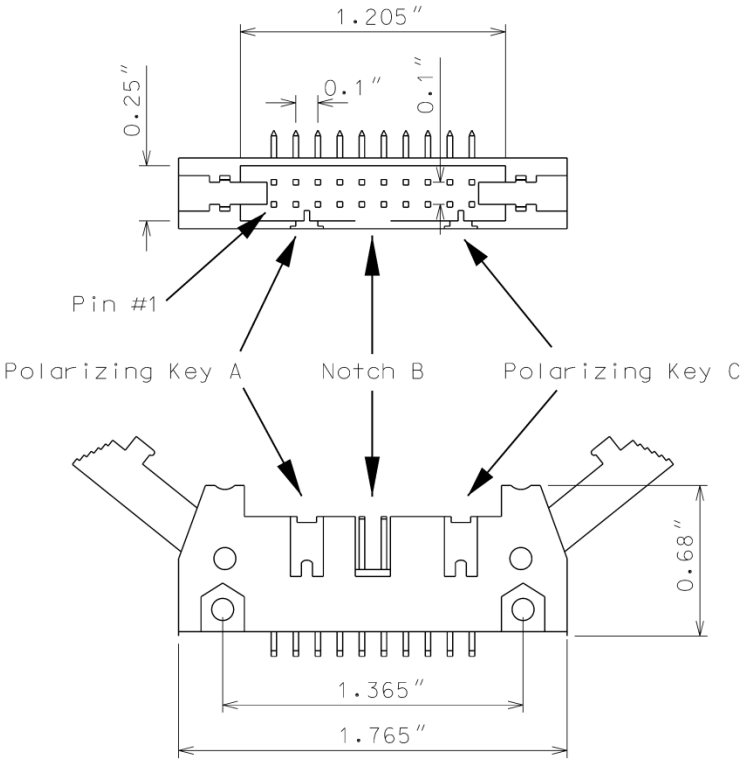
Provide a switch to set the Watchdog fault timing. Ensure that when the switch is in the ON position the Watchdog fault timing value is set to 1.0 +/- 0.1 s (2018 mode). Ensure that when the switch is in the OFF position the Watchdog fault timing value is set to 1.5 +/- 0.1 s (210 mode).

Provide a jumper or switch to set the AC line brown-out levels. Ensure that when the jumper is present or the switch is in the ON position the AC line dropout voltage threshold is 98 +/- 2 Vrms, the AC line restore voltage threshold is 103 +/- 2 Vrms, and the AC line brown-out timing value is set to 400 +/- 50ms (2018 mode). Ensure that when the jumper is not present or the switch is in the OFF position the AC line dropout voltage threshold is 92 +/- 2 Vrms, the AC line restore voltage threshold is 98 +/- 2 Vrms, and the AC line brown-out timing value is set to 80 +/- 17 ms (210 mode).

Provide a jumper or switch that will enable and disable the Watchdog Latch function. Ensure that when the jumper is not present or the switch is in the OFF position the Watchdog Latch function is disabled. In this mode of operation, a Watchdog fault will be reset following a power loss, brownout, or power interruption. Ensure that when the jumper is present or the switch is in the ON position the Watchdog Latch function is enabled. In this mode of operation, a Watchdog fault will be retained until a Reset command is issued.

Provide a jumper that will reverse the active polarity for pin #EE (output relay common). Ensure that when the jumper is not present pin #EE (output relay common) will be considered ‘Active’ at a voltage greater than 70 Vrms and ‘Not Active’ at a voltage less than 50 Vrms (Caltrans mode). Ensure that when the jumper is present pin #EE (output relay common) will be considered ‘Active’ at a voltage less than 50 Vrms and ‘Not Active’ at a voltage greater than 70 Vrms (Failsafe mode).

In addition to the connectors required by CALTRANS' 2009 TEES, provide the conflict monitor with a red interface connector mounted on the front of the monitor. Ensure the connector is a 20 pin, right angle, center polarized, male connector with latching clip locks and polarizing keys. Ensure the right angle solder tails are designed for a 0.062" thick printed circuit board. Keying of the connector shall be between pins 3 and 5, and between 17 and 19. Ensure the connector has two rows of pins with the odd numbered pins on one row and the even pins on the other row. Ensure the connector pin row spacing is 0.10" and pitch is 0.10". Ensure the mating length of the connector pins is 0.24". Ensure the pins are finished with gold plating 30µ" thick.



Ensure the red interface connector pins on the monitor have the following functions:

Pin #	Function	Pin #	Function
1	Channel 15 Red	2	Channel 16 Red
3	Channel 14 Red	4	Chassis Ground
5	Channel 13 Red	6	Special Function 2
7	Channel 12 Red	8	Special Function 1
9	Channel 10 Red	10	Channel 11 Red
11	Channel 9 Red	12	Channel 8 Red
13	Channel 7 Red	14	Channel 6 Red
15	Channel 5 Red	16	Channel 4 Red
17	Channel 3 Red	18	Channel 2 Red
19	Channel 1 Red	20	Red Enable

Ensure that removal of the P20 cable connector will cause the conflict monitor to recognize a latching fault condition and place the cabinet into flashing operation.

Provide Special Function 1 and Special Function 2 inputs to the unit which shall disable only Red Fail Monitoring when either input is sensed active. A Special Function input shall be sensed active when the input voltage exceeds 70 Vrms with a minimum duration of 550 ms. A Special Function input shall be sensed not active when the input voltage is less than 50 Vrms or the duration is less than 250 ms. A Special Function input is undefined by these specifications and may or may not be sensed active when the input voltage is between 50 Vrms and 70 Vrms or the duration is between 250 ms and 550 ms.

Ensure the conflict monitor recognizes field signal inputs for each channel that meet the following requirements:

- consider a Red input greater than 70 Vrms and with a duration of at least 500 ms as an “on” condition;
- consider a Red input less than 50 Vrms or with a duration of less than 200 ms as an “off” condition (no valid signal);
- consider a Red input between 50 Vrms and 70 Vrms or with a duration between 200 ms and 500 ms to be undefined by these specifications;
- consider a Green or Yellow input greater than 25 Vrms and with a duration of at least 500 ms as an “on” condition;
- consider a Green or Yellow input less than 15 Vrms or with a duration of less than 200 ms as an “off” condition; and
- consider a Green or Yellow input between 15 Vrms and 25 Vrms or with a duration between 200 ms and 500 ms to be undefined by these specifications.

Provide a conflict monitor that recognizes the faults specified by CALTRANS’ 2009 TEES and the following additional faults. Ensure the conflict monitor will trigger upon detection of a fault and will remain in the triggered (in fault mode) state until the unit is reset at the front panel or through the external remote reset input for the following failures:

1. **Red Monitoring or Absence of Any Indication (Red Failure):** A condition in which no “on” voltage signal is detected on any of the green, yellow, or red inputs to a given monitor channel. If a signal is not detected on at least one input (R, Y, or G) of a conflict monitor

channel for a period greater than 1000 ms when used with a 170 controller and 1500 ms when used with a 2070 controller, ensure monitor will trigger and put the intersection into flash. If the absence of any indication condition lasts less than 700 ms when used with a 170 controller and 1200 ms when used with a 2070 controller, ensure conflict monitor will not trigger. Red fail monitoring shall be enabled on a per channel basis by the use of switches located on the conflict monitor. Have red monitoring occur when all of the following input conditions are in effect:

a) Red Enable input to monitor is active (Red Enable voltages are "on" at greater than 70 Vrms, off at less than 50 Vrms, undefined between 50 and 70 Vrms), and

b) Neither Special Function 1 nor Special Function 2 inputs are active.

c) Pin #EE (output relay common) is not active

2. **Short/Missing Yellow Indication Fault (Clearance Error):** Yellow indication following a green is missing or shorter than 2.7 seconds (with ± 0.1-second accuracy). If a channel fails to detect an "on" signal at the Yellow input for a minimum of 2.7 seconds (± 0.1 second) following the detection of an "on" signal at a Green input for that channel, ensure that the monitor triggers and generates a clearance/short yellow error fault indication. Short/missing yellow (clearance) monitoring shall be enabled on a per channel basis by the use of switches located on the conflict monitor. This fault shall not occur when the channel is programmed for Yellow Inhibit, when the Red Enable signal is inactive or pin #EE (output relay common) is active.
3. **Dual Indications on the Same Channel:** In this condition, more than one indication (R,Y,G) is detected as "on" at the same time on the same channel. If dual indications are detected for a period greater than 500 ms, ensure that the conflict monitor triggers and displays the proper failure indication (Dual Ind fault). If this condition is detected for less than 200 ms, ensure that the monitor does not trigger. G-Y-R dual indication monitoring shall be enabled on a per channel basis by the use of switches located on the conflict monitor. G-Y dual indication monitoring shall be enabled for all channels by use of a switch located on the conflict monitor. This fault shall not occur when the Red Enable signal is inactive or pin #EE (output relay common) is active.
4. **Configuration Settings Change:** The configuration settings are comprised of (as a minimum) the permissive diode matrix, dual indication switches, yellow disable jumpers, any option switches, any option jumpers, and the Watchdog Enable switch. Ensure the conflict monitor compares the current configuration settings with the previous stored configuration settings on power-up, on reset, and periodically during operation. If any of the configuration settings are changed, ensure that the conflict monitor triggers and causes the program card indicator to flash. Ensure that configuration change faults are only reset by depressing and holding the front panel reset button for a minimum of three seconds. Ensure the external remote reset input does not reset configuration change faults.

Ensure the conflict monitor will trigger and the AC Power indicator will flash at a rate of 2 Hz ± 20% with a 50% duty cycle when the AC Line voltage falls below the "drop-out" level. Ensure the conflict monitor will resume normal operation when the AC Line voltage returns above the "restore" level. Ensure the AC Power indicator will remain illuminated when the AC voltage returns above the "restore" level. Should an AC Line power interruption occur while the monitor is in the fault mode, then upon restoration of AC Line power, the monitor will remain in the fault mode and the correct fault and channel indicators will be displayed.

Provide a flash interval of at least 6 seconds and at most 16 seconds in duration following a power-up, an AC Line interruption, or a brownout restore. Ensure the conflict monitor will suspend all fault monitoring functions, close the Output relay contacts, and flash the AC indicator at a rate of 4 Hz ± 20% with a 50% duty cycle during this interval. Ensure the termination of the flash interval after at least 6 seconds if the Watchdog input has made 5 transitions between the True and False state and the AC Line voltage is greater than the "restore" level. If the watchdog input has not made 5 transitions between the True and False state within 10 ± 0.5 seconds, the monitor shall enter a WDT error fault condition.

Ensure the conflict monitor will monitor an intersection with a minimum of four approaches using the four-section Flashing Yellow Arrow (FYA) vehicle traffic signal as outlined by the NCHRP 3-54 research project for protected-permissive left turn signal displays. Ensure the conflict monitor will operate in the FYA mode and FYAc (Compact) mode as specified below to monitor each channel pair for the following fault conditions: Conflict, Flash Rate Detection, Red Fail, Dual Indication, and Clearance. Provide a switch to select between the FYA mode and FYAc mode. Provide a switch to select each FYA phase movement for monitoring.

FYA mode

FYA Signal Head	Phase 1	Phase 3	Phase 5	Phase 7
Red Arrow	Channel 9 Red	Channel 10 Red	Channel 11 Red	Channel 12 Red
Yellow Arrow	Channel 9 Yellow	Channel 10 Yellow	Channel 11 Yellow	Channel 12 Yellow
Flashing Yellow Arrow	Channel 9 Green	Channel 10 Green	Channel 11 Green	Channel 12 Green
Green Arrow	Channel 1 Green	Channel 3 Green	Channel 5 Green	Channel 7 Green

If a FYA channel pair is enabled for FYA operation, the conflict monitor will monitor the FYA logical channel pair for the additional following conditions:

1. **Conflict:** Channel conflicts are detected based on the permissive programming jumpers on the program card. This operation remains unchanged from normal operation except for the solid Yellow arrow (FYA clearance) signal.
2. **Yellow Change Interval Conflict:** During the Yellow change interval of the Permissive Turn channel (flashing Yellow arrow) the conflict monitor shall verify that no conflicting channels to the solid Yellow arrow channel (clearance) are active. These conflicting channels shall be determined by the program card compatibility programming of the Permissive Turn channel (flashing Yellow arrow). During the Yellow change interval of the Protected Turn channel (solid Green arrow) the conflict monitor shall verify that no conflicting channels to the solid Yellow arrow channel (clearance) are active as determined by the program card compatibility programming of the Protected Turn channel (solid Green arrow).
3. **Flash Rate Detection:** The conflict monitor unit shall monitor for the absence of a valid flash rate for the Permissive turn channel (flashing Yellow arrow). If the Permissive turn

channel (flashing Yellow arrow) is active for a period greater than 1600 milliseconds, ensure the conflict monitor triggers and puts the intersection into flash. If the Permissive turn channel (flashing Yellow arrow) is active for a period less than 1400 milliseconds, ensure the conflict monitor does not trigger. Ensure the conflict monitor will remain in the triggered (in fault mode) state until the unit is reset at the front panel or through the external remote reset input. Provide a jumper or switch that will enable and disable the Flash Rate Detection function. Ensure that when the jumper is not present or the switch is in the OFF position the Flash Rate Detection function is enabled. Ensure that when the jumper is present or the switch is in the ON position the Flash Rate Detection function is disabled.

4. **Red Monitoring or Absence of Any Indication (Red Failure):** The conflict monitor unit shall detect a red failure if there is an absence of voltage on all four of the inputs of a FYA channel pair (RA, YA, FYA, GA).
5. **Dual Indications on the Same Channel:** The conflict monitor unit shall detect a dual indication if two or more inputs of a FYA channel pair (RA, YA, FYA, GA) are "on" at the same time.
6. **Short/Missing Yellow Indication Fault (Clearance Error):** The conflict monitor unit shall monitor the solid Yellow arrow for a clearance fault when terminating both the Protected Turn channel (solid Green arrow) interval and the Permissive Turn channel (flashing Yellow arrow) interval.

Ensure that the conflict monitor will log at least nine of the most recent events detected by the monitor in non-volatile EEPROM memory (or equivalent). For each event, record at a minimum the time, date, type of event, status of each field signal indication with RMS voltage, and specific channels involved with the event. Ensure the conflict monitor will log the following events: monitor reset, configuration, previous fault, and AC line. Furnish the signal sequence log that shows all channel states (Greens, Yellows, and Reds) and the Red Enable State for a minimum of 2 seconds prior to the current fault trigger point. Ensure the display resolution of the inputs for the signal sequence log is not greater than 50 ms.

For conflict monitors used within an Ethernet communications system, provide a conflict monitor with an Ethernet 10/100 Mbps, RJ-45 port for data communication access to the monitor by a local notebook computer and remotely via a workstation or notebook computer device connected to the signal system local area network. The Ethernet port shall be electrically isolated from the conflict monitor's electronics and shall provide a minimum of 1500 Vrms isolation. Integrate monitor with Ethernet network in cabinet. Provide software to retrieve the time and date from a network server in order to synchronize the on-board times between the conflict monitor and the controller. Furnish and install the following Windows based, graphic user interface software on workstations and notebook computers where the signal system client software is installed: 1) software to view and retrieve all event log information, 2) software that will search and display a list of conflict monitor IP addresses and IDs on the network, and 3) software to change the conflict monitor's network parameters such as IP address and subnet mask.

For non-Ethernet connected monitors, provide a RS-232C/D compliant port (DB-9 female connector) on the front panel of the conflict monitor in order to provide communications from the conflict monitor to the 170/2070 controller or to a Department-furnished laptop computer. Electrically isolate the port interface electronics from all monitor electronics, excluding Chassis Ground. Ensure that the controller can receive all event log information through a controller Asynchronous Communications Interface Adapter (Type 170E) or Async Serial Comm Module (2070). Furnish and connect a serial cable from the conflict monitor's DB-9 connector to Comm

Port 1 of the 2070 controller. Ensure conflict monitor communicates with the controller. Provide a Windows based graphic user interface software to communicate directly through the same monitor RS-232C/D compliant port to retrieve and view all event log information to a Department-furnished laptop computer. The RS-232C/D compliant port on the monitor shall allow the monitor to function as a DCE device with pin connections as follows:

Conflict Monitor RS-232C/D (DB-9 Female) Pinout		
Pin Number	**Function**	**I/O**
1	DCD	O
2	TX Data	O
3	RX Data	I
4	DTR	I
5	Ground	-
6	DSR	O
7	CTS	I
8	RTS	O
9	NC	-

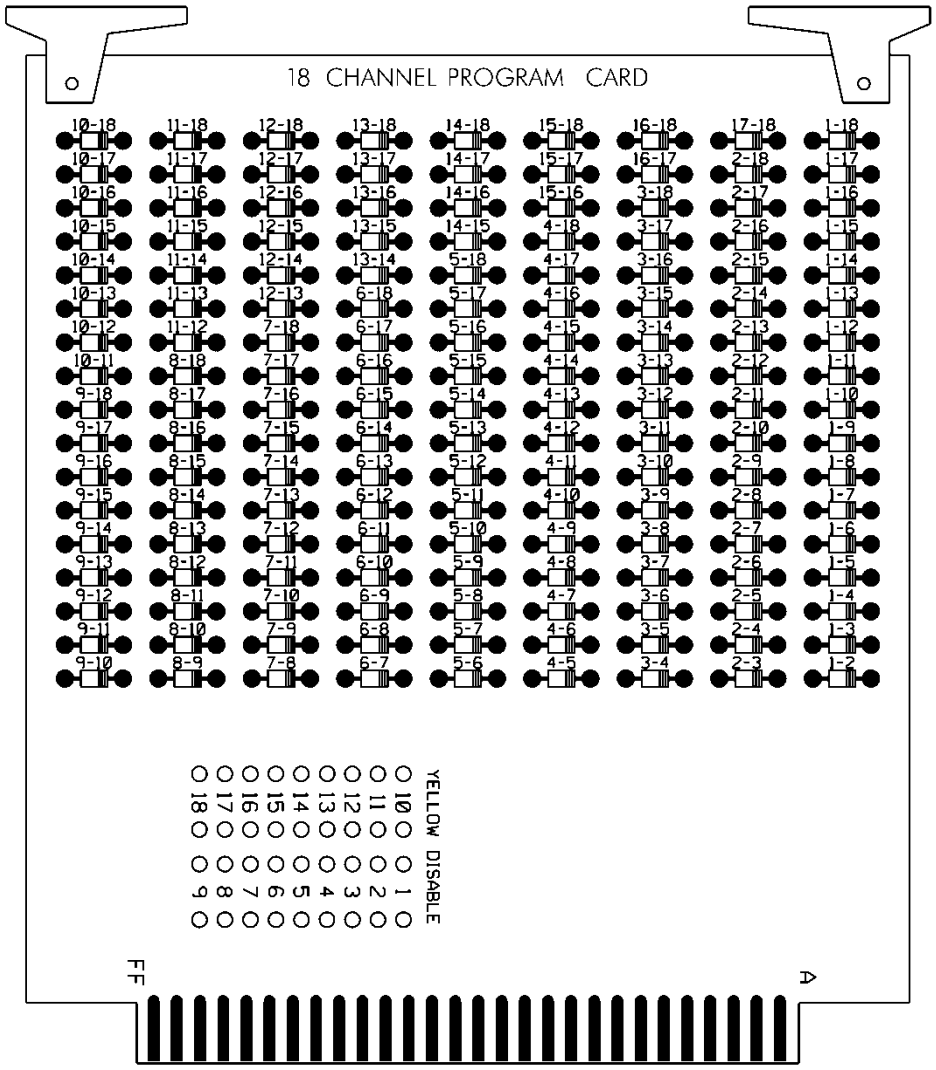
MONITOR BOARD EDGE CONNECTOR			
Pin #	**Function (Back Side)**	**Pin #**	**Function (Component Side)**
1	Channel 2 Green	A	Channel 2 Yellow
2	Channel 13 Green	B	Channel 6 Green
3	Channel 6 Yellow	C	Channel 15 Green
4	Channel 4 Green	D	Channel 4 Yellow
5	Channel 14 Green	E	Channel 8 Green
6	Channel 8 Yellow	F	Channel 16 Green
7	Channel 5 Green	H	Channel 5 Yellow
8	Channel 13 Yellow	J	Channel 1 Green
9	Channel 1 Yellow	K	Channel 15 Yellow
10	Channel 7 Green	L	Channel 7 Yellow
11	Channel 14 Yellow	M	Channel 3 Green
12	Channel 3 Yellow	N	Channel 16 Yellow
13	Channel 9 Green	P	Channel 17 Yellow
14	Channel 17 Green	R	Channel 10 Green
15	Channel 11 Yellow	S	Channel 11 Green
16	Channel 9 Yellow	T	Channel 18 Yellow
17	Channel 18 Green	U	Channel 10 Yellow
--		--	
18	Channel 12 Yellow	V	Channel 12 Green
19	Channel 17 Red	W	Channel 18 Red
20	Chassis Ground	X	Not Assigned
21	AC-	Y	DC Common
22	Watchdog Timer	Z	External Test Reset
23	+24VDC	AA	+24VDC
24	Tied to Pin 25	BB	Stop Time (Output)
25	Tied to Pin 24	CC	Not Assigned
26	Not Assigned	DD	Not Assigned
27	Relay Output, Side #3, N.O.	EE	Relay Output,Side #2,Common
28	Relay Output, Side #1, N.C.	FF	AC+

-- Slotted for keying between Pins 17/U and 18/V

CONFLICT PROGRAM CARD PIN ASSIGNMENTS

Pin #	Function (Back Side)	Pin #	Function (Component Side)
1	Channel 2 Green	A	Channel 1 Green
2	Channel 3 Green	B	Channel 2 Green
3	Channel 4 Green	C	Channel 3 Green
4	Channel 5 Green	D	Channel 4 Green
5	Channel 6 Green	E	Channel 5 Green
6	Channel 7 Green	F	Channel 6 Green
7	Channel 8 Green	H	Channel 7 Green
8	Channel 9 Green	J	Channel 8 Green
9	Channel 10 Green	K	Channel 9 Green
10	Channel 11 Green	L	Channel 10 Green
11	Channel 12 Green	M	Channel 11 Green
12	Channel 13 Green	N	Channel 12 Green
13	Channel 14 Green	P	Channel 13 Green
14	Channel 15 Green	R	Channel 14 Green
15	Channel 16 Green	S	Channel 15 Green
16	N/C	T	PC AJAR
17	Channel 1 Yellow	U	Channel 9 Yellow
18	Channel 2 Yellow	V	Channel 10 Yellow
19	Channel 3 Yellow	W	Channel 11 Yellow
20	Channel 4 Yellow	X	Channel 12 Yellow
21	Channel 5 Yellow	Y	Channel 13 Yellow
22	Channel 6 Yellow	Z	Channel 14 Yellow
23	Channel 7 Yellow	AA	Channel 15 Yellow
24	Channel 8 Yellow	BB	Channel 16 Yellow
--		--	
25	Channel 17 Green	CC	Channel 17 Yellow
26	Channel 18 Green	DD	Channel 18 Yellow
27	Channel 16 Green	EE	PC AJAR (Program Card)
28	Yellow Inhibit Common	FF	Channel 17 Green

-- Slotted for keying between Pins 24/BB and 25/CC



3.4. MATERIALS – TYPE 170 DETECTOR SENSOR UNITS

Furnish detector sensor units that comply with Chapter 5 Section 1, "General Requirements," and Chapter 5 Section 2, "Model 222 & 224 Loop Detector Sensor Unit Requirements," of the CALTRANS "Transportation Electrical Equipment Specifications" dated March 12, 2009 with Erratum 1.

4. VIDEO IMAGING LOOP EMULATOR DETECTOR SYSTEMS FOR TEMPORARY INSTALLATION

4.1. DESCRIPTION

Design, furnish, provide training, and install video imaging loop emulator detection systems with all necessary hardware for temporary traffic signals in accordance with the plans and specifications.

Unless otherwise specified in the contract, all loop emulator detection equipment will remain the property of the contractor.

4.2. MATERIALS

A. General:

Material and equipment furnished under this section must be pre-approved on the Department's QPL by the date of installation except miscellaneous hardware such as cables and mounting hardware do not need to be pre-approved.

Used equipment will be acceptable provided the following conditions have been met:

- Equipment is listed on the current QPL.
- Equipment is in good working condition.
- Equipment is to remain the property of the contractor.

Ensure that software is licensed for use by the Department and by any other agency responsible for maintaining or operating the loop emulation system. Provide the Department with a license to duplicate and distribute the software as necessary for design and maintenance support.

Design and furnish video imaging loop emulator detection systems that detect vehicles at signalized intersections by processing video images and providing detection outputs to the signal controller in real time (within 112 milliseconds of vehicle arrival).

Furnish all required camera sensor units, loop emulator processor units, hardware and software packages, cabling, poles, mast arms, harnesses, camera mounting assemblies, surge protection panels, grounding systems, messenger cable and all necessary hardware. Furnish systems that allow the display of detection zones superimposed on an image of the roadway on a Department-furnished monitor or laptop computer screen. Ensure detection zones can be defined and data entered using a simple keyboard or mouse and monitor, or using a laptop PC with software.

Provide design drawings showing design details and camera sensor unit locations for review and acceptance before installation. Provide mounting height and location requirements for camera sensor units on the design based on site survey. Design video imaging loop emulator detection systems with all necessary hardware. Indicate all necessary poles, spans, mast arms, luminaire arms, cables, camera mounting assemblies and hardware to achieve the required detection zones where Department owned poles are not adequate to locate the camera sensor units. Do not design for the installation of poles in medians.

Obtain the Engineer's approval before furnishing video imaging loop emulator detection systems. The contractor is responsible for the final design of video imaging loop emulator detection systems. Review and acceptance of the designs by the Department does not relieve the contractor from the responsibility to provide fully functional systems and to ensure that the required detection zones can be provided.

Provide the ability to program each detection call (input to the controller) with the following functions:

- Full Time Delay – Delay timer is active continuously,
- Normal Delay – Delay timer is inhibited when assigned phase is green (except when used with TS 2 and 170/2070 controllers),
- Extend – Call is extended for this amount of time after vehicle leaves detection area,
- Delay Call/Extend Call – This feature uses a combination of full time delay and extend time on the same detection call. Ensure operation is as follows: Vehicle calls are received after the delay timer times out. When a call is detected, it is held until the detection area is empty and the programmed extend time expires. If another vehicle enters the detection area before the

extend timer times out, the call is held and the extend time is reset. When the extend timer times out, the delay timer has to expire before another vehicle call can be received.

Provide the ability to program each detection zone as one of the following functions:

- Presence detector,
- Directional presence detector,
- Pulse detector,
- Directional pulse detector.

Ensure previously defined detector zones and configurations can be edited.

Provide each individual system with all the necessary equipment to focus and zoom the camera lenses without the need to enter the camera enclosure.

Provide systems that allow for the placement of at least 8 detection zones within the combined field of view of a single camera sensor unit. Provide a minimum of 8 detection outputs per camera.

Provide detection zones that can be overlapped. Ensure systems reliably detect vehicles when the horizontal distance from the camera sensor unit to the detection zone area is less than ten times the mounting height of the sensor. Ensure systems detect vehicles in multiple travel lanes.

Ensure systems can detect vehicle presence within a 98 to 102 percent accuracy (up to 2 percent of the vehicles missed and up to 2 percent of false detection) for clear, dry, daylight conditions, a 96 to 105 percent accuracy (up to 4 percent of the vehicles missed and up to 5 percent false detection) for dawn and dusk conditions, and a 96 percent accuracy (up to 4 percent of the vehicles missed) for night and adverse conditions (fog, snow, rain, etc.) using standard sensor optics and in the absence of occlusion.

Repair and replace all failed components within 72 hours.

The Department may conduct field-testing to ensure the accuracy of completed video imaging loop emulator detection systems.

B. Loop Emulator System:

Furnish loop emulator systems that receive and simultaneously process information from camera sensor units, and provides detector outputs to signal controllers.

Ensure systems provide the following:

- Operate in a typical roadside environment and meet the environmental specifications and are fully compatible with NEMA TS 1, NEMA TS 2, or Type 170/2070 controllers and cabinets,
- provide a “fail-safe” mode whereby failure of one or more of the camera sensor units or power failure of the loop emulator system will cause constant calls to be placed on the affected vehicle detection outputs to the signal controller,
- provide compensation for minor camera movement of up to 2 percent of the field of view at 400 feet without falsely detecting vehicles,
- process the video at a minimum rate of 30 times per second,
- provide separate wired connectors inside the controller cabinet for video recording each camera,
- provide remote video monitoring with a minimum refresh rate at 1 frame per second over a standard dial-up telephone line,
- provide remote video detection monitoring.

Furnish camera sensor units that comply with the following:

- have an output signal conforming to EIA RS-170 standard,
- have a nominal output impedance of 75 ohms,
- be immune to bright light sources, or have built in circuitry or protective devices to prevent damage to the sensor when pointed directly at strong light sources,
- be housed in a light colored environmental enclosure that is water proof and dust tight, and that conforms to NEMA-4 specifications or better,
- simultaneously monitor at least five travel lanes when placed at the proper mounting location with a zoom lens,
- have a sunshield attached to the environmental enclosure to minimize solar heating,
- meet FCC class B requirements for electromagnetic interference emissions,
- have a heater attached to the viewing window of the environmental enclosure to prevent ice and condensation in cold weather.

Where coaxial video cables and other cables are required between the camera sensor and other components located in the controller cabinet, furnish surge protection in the controller cabinet.

If furnishing coaxial communications cable comply with the following, as recommended by the approved loop emulator manufacturer:

- Number 20 AWG, solid bare copper conductor terminated with crimped-on BNC connectors (do not use BNC adapters) from the camera sensor to the signal controller cabinet.
- Number 22 AWG, stranded bare copper conductor terminated with crimped-on BNC connectors (do not use BNC adapters) from the camera sensor unit to the junction box, and within the signal controller cabinet.

Furnish power cable appropriately sized to meet the power requirements of the sensors. At a minimum, provide three conductor 120 VAC field power cable.

As determined during the site survey, furnish sensor junction boxes with nominal 6 x 10 x 6 inches dimensions at each sensor location. Provide terminal blocks and tie points for coaxial cable.

C. Video Imaging Loop Emulator System Support:

Furnish video imaging loop emulator systems with either a simple keyboard or a mouse with monitor and appropriate software, or with system software for use on department-owned laptop PCs. Ensure the system is Windows 2000 and Windows XP compatible.

Provide Windows 2000 and Windows XP compatible personal computer software, if needed, to provide remote video and video detection monitoring.

Ensure systems allow the user to edit previously defined detector configurations. When a vehicle is within a detection zone, provide for a change in color or intensity of the detection zone perimeter or other appropriate display changes on the Department-furnished monitor or laptop computer screen.

Provide cabling and interconnection hardware with 6-foot minimum length interconnection cable to interface with the system.

Provide all associated equipment manuals and documentation.

4.3. CONSTRUCTION METHODS

Arrange and conduct site surveys with the system manufacturer’s representative and Department personnel to determine proper camera sensor unit selection and placement. Provide the Department

at least 3 working days notice before conducting site surveys. Upon completion of the site surveys the Department will provide revised plans reflecting the findings of the site survey.

Before beginning work at locations requiring video imaging loop emulator detection systems, furnish system software. Upon activation of detection zones, provide detector configuration files. Ensure that up-to-date detection configuration files are furnished for various detection zone configurations that may be required for construction phasing.

Place into operation loop emulator detection systems. Configure loop emulator detection systems to achieve required detection in designated zones. Have a certified manufacturer's representative on site to supervise and assist with installation, set up, and testing of the system.

Install the necessary processing and communications equipment in the signal controller cabinet. Make all necessary modifications to install equipment, cabling harnesses, and camera sensor interface panels with surge suppression.

Perform modifications to camera sensor unit gain, sensitivity, and iris limits necessary to complete the installation.

Do not install camera sensor units on signal poles unless approved by the Engineer.

Install the necessary cables from each sensor to the signal controller cabinet along signal cabling routes. Install surge protection and terminate all cable conductors.

Reconfigure detection zones as necessary according to the plans for construction phases.

Provide at least 8 hours of training on the set up, operation, troubleshooting, and maintenance of the loop emulator detection system to a maximum of ten Department personnel. Arrange for training to be conducted by the manufacturer's representative at an approved site within the Division responsible for administration of the project. Thirty days before conducting training submit a detailed course curriculum, draft manuals and materials, and resumes. Obtain approval of the submittal before conducting the training. At least one week before beginning training, provide three sets of complete documentation necessary to maintain and operate the system. Do not perform training until installation of loop emulator detection systems is complete.

4.4. MEASUREMENT AND PAYMENT

Actual number of site surveys, arranged, conducted, and accepted.

Actual number of cameras without internal loop emulator processing units furnished, installed, and accepted.

Actual number of external loop emulator processing units furnished, installed, and accepted.

No measurement will be made of video imaging loop emulator system support or training, power and video cables, and trenching as these items will be considered incidental to furnishing and installing video imaging loop emulator detection systems.

Payment will be made under:

Site Survey ..... Each

Camera without Internal Loop Emulator Processing Unit ..... Each

External Loop Emulator Processing Unit ..... Each

5. METAL POLE SUPPORTS

5.1. METAL POLES

A. General:

Furnish and install metal poles, grounding systems, and all necessary hardware. Work covered under this special provision includes requirements for design, fabrication, and installation of standard and custom/site-specific designed metal pole supports and associated foundations.

Comply with applicable sections of the *2024 STANDARD SPECIFICATIONS FOR ROADS & STRUCTURES*, hereinafter referred to as the *Standard Specifications*. Provide designs of completed assemblies with hardware equaling or exceeding AASHTO *LRFD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals* 1st Edition, 2015 (hereinafter called 1st Edition AASHTO), including the latest interim specifications. Provide assemblies with a round or near-round (18 sides or more) cross-section, or a multi-sided cross section with no less than six sides. The sides may be straight, convex, or concave.

For bid purposes, pole heights shown on plans are estimated from available data. Prior to furnishing metal poles, use field measurements and adjusted cross-sections to determine whether pole heights will meet required clearances. If pole heights do not meet required clearances, the Contractor should immediately notify the Engineer of the required revised pole heights.

Standard Drawings for Metal Poles are available that supplement these project special provisions. The drawings are located on the Department's website:

https://connect.ncdot.gov/resources/safety/pages/ITS-Design-Resources.aspx

Comply with article 1098-1(B) of the *Standard Specifications* for submittal requirements. Furnish shop drawings for approval. Provide copies of detailed shop drawings for each type of structure as summarized below. Ensure shop drawings include material specifications for each component. Ensure shop drawings identify welds by type and size on the detail drawing only, not in table format. **Do not release structures for fabrication until shop drawings have been approved by NCDOT**. Ensure shop drawings contain an itemized bill of materials for all structural components and associated connecting hardware.

Comply with article 1098-1(A) of the *Standard Specifications* for Qualified Products List (QPL) submittals. All shop drawings must include project location description, signal or asset inventory number(s) and project number or work order number.

Summary of information required for metal pole review submittal:

Item	Electronic Submittal	Comments / Special Instructions
Sealed, Approved Signal or ITS Plan/Loading Diagram	1 set	All structure design information needs to reflect the latest approved Signal or ITS plans
Custom Pole Shop Drawings	1 set	Submit drawings on 11" x 17" format media. Show NCDOT signal or asset inventory number(s), Contractor's name and relevant revision number in the title block. All drawings must have a unique drawing number for each project.

Standard Strain Pole Shop Drawings (from the QPL)	1 set	Submit drawings on 11" x 17" format media. Show NCDOT signal inventory number(s), Contractor's name and relevant revision number in the title block. All drawings must have a unique drawing number for each project.
Structure Calculations	1 set	Not required for Standard QPL Poles
Standard Strain Pole Foundation Drawings	1 set	Submit drawings on 11" x 17" format media. Submit a completed Standard Foundation Selection form for each pole using foundation table on Metal Pole Drawing M8.
Custom Foundation Drawings	1 set	Submit drawings on 11" x 17" format media. Show NCDOT signal or asset inventory number(s), Contractor's name and relevant revision number in the title block. All drawings must have a unique drawing number for each project. If QPL Poles are used, include the corresponding QPL pole shop drawings with this submittal.
Foundation Calculations	1 set	**Submit copies of LPILE input, output, and pile tip deflection graph per Section titled Drilled Pier Foundations for Metal Poles of this specification for each foundation.** Not required for Standard Strain Poles (from the QPL)
Soil Boring Logs and Report	1 set	Report shall include a location plan and a soil classification report including soil capacity, water level, hammer efficiency, soil bearing pressure, soil density, etc. for each pole.

NOTE – All shop drawings and custom foundation design drawings must be sealed by a Professional Engineer licensed in the state of North Carolina. All geotechnical information must be sealed by either a Professional Engineer or Geologist licensed in the state of North Carolina. Include a title block and revision block on the shop drawings and foundation drawings showing the NCDOT signal or asset inventory number(s).

Shop drawings and foundation drawings may be submitted together or separately for approval. However, shop drawings must be approved before foundations can be reviewed. Foundation designs will be returned without review if the associated shop drawing has not been approved. Boring reports shall include the following: Engineer's summary, boring location maps, soil classification per AASHTO Classification System, hammer efficiency, and Metal Pole Standard Foundation Selection Form. Incomplete submittals will be returned without review. The Reviewer has the right to request additional analysis and copies of the calculations to expedite the approval process.

B. Materials:

Fabricate metal pole from coil or plate steel that meet the requirements of ASTM A 572 Gr 55 or ASTM A 595 Grade A tubes. For structural steel shapes, plates, and bars use, as a minimum, ASTM A572 Gr 50, AASHTO M270 Gr 50, ASTM A709 Gr 50, or an approved equivalent. Provide pole shafts of round or near round (18 sides or more) cross-section, or multi-sided tubular cross-section

with no less than six sides, having a uniform linear taper of 0.14 in/ft. Construct shafts from one piece of single-ply plate or coil. For anchor base fabrication, conform to the applicable bolt pattern and orientation as shown on Metal Pole Standard Drawing Sheet M2.

Use the submerged arc process, or other NCDOT previously approved process suitable for shafts, to continuously weld pole shafts along their entire length. Finish the longitudinal seam weld flush with the outside contour of the base metal. Ensure shaft has no circumferential welds except at the lower end joining the shaft to the pole base. Use full penetration groove welds with backing ring for all tube-to-transverse-plate connections in accordance with 1st Edition AASHTO. Provide welding that conforms to Article 1072-18 of the *Standard Specifications.* No field welding on any part of the pole will be permitted unless approved by a qualified Engineer.

After fabrication, hot-dip galvanize steel poles and all assembly components in accordance with section 1076-3 of the *Standard Specifications*. Design structural assemblies with weep holes large enough and properly located to drain molten zinc during the galvanization process. Galvanize hardware in accordance with section 1076-4 of the *Standard Specifications*. Ensure threaded material is brushed and retapped as necessary after galvanizing. Perform repair of damaged galvanizing in accordance with section 1076-7 of the Standard *Specifications. Ensure* all hardware is galvanized steel or stainless steel. The Contractor is responsible for ensuring the Designer/Fabricator specifies connecting hardware and/or materials that prevent a dissimilar metal corrosive reaction.

Ensure each anchor rod is 2-inch minimum diameter and 60-inch length. Provide 10-inch minimum thread projection at the top of the rod, and 8-inch minimum at the bottom of the rod. Use anchor rod assembly and drilled pier foundation materials complying with SP09_R005, hereinafter referred to as *Foundations and Anchor Rod Assemblies for Metal Poles*.

Ensure anchor bolt hole diameters are ¼-inch larger than the anchor bolt diameters in the base plate.

Provide a circular anchor bolt lock plate securing the anchor bolts at the embedded end with two (2) washers and two (2) nuts. Provide a base plate template matching the bolt circle diameter of the anchor bolt lock plate. Construct plates and templates from ¼-inch minimum thick steel with a minimum width of 4 inches. Hot-dip galvanizing is not required for both plates.

Provide four (4) heavy hex nuts and four (4) flat washers for each anchor bolt. For nuts, use AASHTO M291 grade 2H, DH, or DH3 or equivalent material. For flat washers, use AASHTO M293 or equivalent material. Ensure anchor bolts have required diameters, lengths, and positions, and will develop strengths comparable to their respective poles.

For each pole, provide a grounding lug with a ½-inch minimum thread diameter, coarse thread stud and nut that will accommodate #4 AWG ground wire. Ensure the lug is electrically bonded to the pole and is conveniently located inside the pole at the hand hole.

Provide a removable pole cap with stainless steel attachment screws for the top of each pole. Ensure cap is cast aluminum conforming to Aluminum Association Alloy 356.0F. Furnish cap attached to the pole with a sturdy stainless-steel chain that is long enough to permit cap to hang clear of the pole-top opening when cap is removed.

Where required by the plans, furnish couplings 42 inches above bottom of the pole base for mounting of pedestrian pushbuttons. Provide mounting points consisting of 1½-inch internally threaded half-couplings complying with the NEC, mounted within the poles. Ensure that couplings are essentially flush with the outside surfaces of the poles and are installed before any required hot-dip galvanizing. Provide a threaded plug in each mounting point. Ensure the surface of the plug is

essentially flush with the outer end of the mounting point when installed and has a recessed slot that will accommodate a ½ "drive standard socket wrench.

Metal poles may be erected and fully loaded after concrete has attained a minimum allowable compressive strength of 3,000 psi.

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

When field drilling is necessary for wire or cable entrances into the pole, comply with the following requirements:

- Do not drill holes within 2 inches of any welds.
- Do not drill any holes larger than 3 inches in diameter without checking with the ITS & Signals Structure Engineers.
- Avoid drilling multiple holes along the same cross section of tube shafts.
- Install rubber grommets in all field drilled holes that wire, or cable will directly enter unless holes are drilled for installation of weather heads or couplings.
- Treat the inside of the drilled holes and repair all galvanized surfaces in accordance with Section 1076-7 of the latest edition of the *Standard Specification prior to installing grommets, caps, or plugs.*
- Cap or plug any existing field drilled holes that are no longer used with rubber, aluminum, or stainless-steel hole plugs.

When street lighting is installed on metal signal structures, isolate the conductors feeding the luminaires inside the pole shaft using liquid tight flexible metal conduit (Type LFMC), liquid tight flexible nonmetallic conduit (Type LFNC), high density polyethylene conduit (Type HDPE), or approved equivalent. All conductors supplying power for luminaires must run through an external disconnect prior to entrance into the structure. In accordance with the National Electrical Code (NEC) Article 230.2(E), provide identification of the electrical source provider for the luminaire feeder circuit with contact information on a permanent label located in the pole hand hole near the feeder circuit raceway.

Install a ¼-inch thick plate for a concrete foundation tag to include the following information: concrete grade, depth, diameter, and reinforcement sizes of the installed foundation. Install galvanized wire mesh to cover gap between the base plate and top of foundation for debris and pest control. Refer to standard drawing M7 for further details.

Immediately notify the Engineer of any structural deficiency that becomes apparent in any assembly, or member of any assembly, because of the design requirements imposed by these specifications, the plans, or the typical drawings.

C. Design:

Unless otherwise specified, design all metal pole support structures using the following 1st Edition AASHTO specifications:

- Use 700-Year MRI and 10-Year MRI wind pressure maps developed from 3-second gust speeds, as provided in Section 3.8.
- Ensure metal pole support structures include natural wind gust loading and truck-induced gust loading for fatigue design, as provided in Sections 11.7.1.2 and 11.7.1.3, respectively. Designs need not consider periodic galloping forces.

- Assume 11.2 mph natural wind gust speed in North Carolina. For natural wind fatigue stress calculations, utilize a drag coefficient (C_d) based on the yearly mean wind velocity of 11.2 mph.
- When selecting Fatigue Importance Factors, utilize Fatigue Importance Category II, as provided for in Table 11.6-1, unless otherwise specified.
- Calculate all forces using applicable equations from Section 5. The Maximum allowable force ratio for all metal pole support designs is 0.9.
- Conform to Sections 10.4.2 and 11.8 for deflection requirements. For CCTV and MVD support structures, ensure maximum deflection at top of pole does not exceed 2.0 percent of pole height.
- Assume the combined minimum weight of a messenger cable bundle (including messenger cable, signal cable and detector lead-in cables) is 1.3 lbs/ft. Assume the combined minimum diameter of the cable bundle is 1.3 inches.

Unless otherwise specified by special loading criteria, the following computed surface area for ice load on signal heads shall be used:

- 3-section, 12-inch, Surface area: 26.0 ft^2
- 4-section, 12-inch, Surface area: 32.0 ft^2
- 5-section, 12-inch, Surface area: 42.0 ft^2

Design a base plate for each pole. The minimum base plate thickness for all poles is determined by the following criteria:

Case 1 Circular or rectangular solid base plate with the upright pole welded to the top surface of base plate with full penetration butt weld, where no stiffeners are provided. A base plate with a small center hole, which is less than 1/3 of the upright diameter, and located concentrically with the upright pole, may be considered as a solid base plate.

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

M = bending moment at the critical section of the base plate induced by one (1) anchor bolt

P = anchoring force of each anchor bolt

D_1 = horizontal distance between the anchor bolt center and the outer face of the upright, or the difference between the bolt circle radius and the outside radius of the upright

Locate the critical section at the face of the anchor bolt and perpendicular to the bolt circle radius. The overlapped part of two (2) adjacent critical sections is considered ineffective.

Case 2 Circular or rectangular base plate with the upright pole socketed into and attached to the base plate with two (2) lines of fillet weld, and where no stiffeners are provided, or any base plate with a center hole that is larger in diameter than 1/3 of the upright diameter.

The magnitude of bending moment induced by the anchoring force of each anchor bolt is $M = P \times D_2$,

where P = anchoring force of each anchor bolt

D_2 = horizontal distance between the face of the upright and the face of the anchor bolt nut

Locate the critical section at the face of the anchor bolt top nut and perpendicular to the radius of the bolt circle. The overlapped part of two (2) adjacent critical sections is considered ineffective.

If the base plate thickness calculated for Case 2 is less than Case 1, use the thickness calculated for Case 1.

The following additional requirements apply concerning pole base plates.

- Ensure that whichever case governs as defined above, the anchor bolt diameter is set to match the base plate thickness. If the minimum diameter required for the anchor bolt exceeds the thickness required for the base plate, set the base plate thickness equal to the required bolt diameter.
- For all metal poles, use a full penetration groove weld with a backing ring to connect the pole upright component to the base. Refer to Metal Pole Standard Drawing Sheet M3 or M4.

The Professional Engineer is wholly responsible for the design of all poles. Review and acceptance of these designs by the Department does not relieve the said Professional Engineer of his or her responsibility.

D. Strain Poles:

Refer to Metal Pole Standard Drawing Sheets M2 and M3 for fabrication details.

Provide two (2) messenger cable (span wire) clamps and associated hardware for attachment of messenger cable. Ensure diameter of the clamp is appropriate to its location on the pole and is appropriately designed for adjustment from 1'-6" below the top, down to 6'-6" below the top of the pole. Do not attach more than one (1) support cable to a messenger cable clamp.

Provide a minimum of three (3) 2-inch holes equipped with an associated coupling and weatherhead on the messenger cable load side of the pole to accommodate passage of signal cables from inside the pole. Provide galvanized threaded plugs for all unused couplings at pole entrance points. Refer to Metal Pole Standard Drawing Sheet M3 for fabrication details.

Provide designs with a 6" x 12" hand hole with reinforcing frame for each pole.

Provide a terminal compartment with cover and screws in each pole encompassing the hand hole and containing a 12-terminal barrier type terminal block. Provide two (2) terminal screws with a removable shorting bar between them for each termination. Furnish terminal compartment covers attached to the pole by a sturdy chain or cable approved by the Engineer. Ensure chain or cable is long enough to permit cover to hang clear of the compartment opening when cover is removed and is strong enough to prevent vandalism. Ensure chain or cable will not interfere with service to cables in the pole base.

Have poles permanently stamped above the hand holes with the identification tag details as shown on Metal Pole Standard Drawing Sheets M2 and M3.

Provide grounding lug(s) in the approximate vicinity of the messenger cable clamp for bonding and grounding messenger cable. Lugs must accept #4 AWG wire to bond messenger cables to the pole in order to provide an effective ground fault circuit path. Refer to Metal Pole Standard Drawing Sheet M6 for construction details.

Install metal poles, hardware, and fittings as shown on the manufacturer's installation drawings. Ensure the installed pole, when fully loaded, is within 1 degree 40 minutes (1°40') of vertical. Install poles with the manufacturer's recommended "rake." Where required, use threaded leveling nuts to establish rake.

E. Mast Arm Poles:

Refer to Metal Pole Standard Drawing Sheets M2 through M5 for fabrication details.

Fabricate metal arm shaft from coil or plate steel that meet the requirements of ASTM A 595 Grade A tubes. Provide arm shafts of round or near round (18 sides or more) cross-section, or multi-sided tubular cross-section with no less than six sides, having a uniform linear taper of 0.14 in/ft. Construct shafts from one piece of single-ply plate or coil, eliminating circumferential weld splices.

Use the submerged arc process, or other NCDOT previously approved process suitable for arm shafts, to continuously weld arm shafts along their entire length. The longitudinal seam weld shall be finished flush to the outside contour of the base metal. Ensure arm shaft has no circumferential welds except at the lower end joining the shaft to the arm flange plate. Use full penetration groove welds with backing ring for all tube-to-transverse-plate connections in accordance with 1st Edition AASHTO. Provide welding that conforms to Article 1072-18 of the *Standard Specifications*, except no field welding on any part of the arm shaft will be permitted unless approved by a qualified Engineer.

After fabrication, hot-dip galvanize steel arm shafts and all assembly components per section 1076 of the *Standard Specifications*. Design arm shafts with weep holes large enough and properly located to drain molten zinc during the galvanization process. Provide hot-dip galvanizing on steel arm shafts that meets or exceeds ASTM Standard A-123, AASHTO M111, or an approved equivalent. Perform repair of damaged galvanizing that complies with the following *Standard Specifications* article:

Repair of Galvanizing.....Article 1076-7

Ensure metal arm shafts permit cables to be installed inside arm shafts. For holes in arm shafts used to accommodate cables, provide full-circumference grommets. Wire access holes for arm flange plates should be deburred, non-grommeted, and oversized to fit around 4-inch diameter grommeted wire access holes for shaft flange plates.

Provide a minimum of four (4) 1-1/2” diameter high strength bolts for connection between arm plate and pole plate. Increase number of bolts to a minimum of six (6) 1-1/2” diameter high strength bolts when arm lengths are greater than 50’-0” long.

Provide designs with a 6” x 12” hand hole with reinforcing frame for each pole.

Provide a terminal compartment with cover and screws in each pole encompassing the hand hole and containing a 12-terminal barrier type terminal block. Provide two (2) terminal screws with a removable shorting bar between them for each termination. Furnish terminal compartment covers attached to the pole by a sturdy chain or cable approved by the Engineer. Ensure chain or cable is long enough to permit cover to hang clear of the compartment opening when cover is removed and is strong enough to prevent vandalism. Ensure chain or cable will not interfere with service to cables in the pole base.

Have poles permanently stamped above the hand holes with the identification tag details as shown on Metal Pole Standard Drawing Sheets M2 and M4.

Provide a removable end cap with stainless steel attachment screws for the end of each mast arm. Ensure cap is cast aluminum conforming to Aluminum Association Alloy 356.0F. Furnish cap attached to arm with a sturdy chain or cable approved by the Engineer. Ensure chain or cable is long enough to permit cap to hang clear of arm end opening when cap is removed.

Provide pole flange plates and associated gussets and fittings for attachment of required mast arms. As part of each mast arm attachment, provide a cable passage hole in pole to allow passage of cables

from pole to arm. Provide a grommeted 4-inch diameter cable passage hole on the shaft side of the connection to allow passage of cables from pole to arm.

Furnish all arm plates and necessary attachment hardware, including bolts and brackets.

Provide two (2) extra bolts for each arm.

Provide arms with weatherproof connections for attaching to the pole shaft.

Provide hardware that is galvanized steel, stainless steel, or corrosive-resistant aluminum.

Install metal poles, hardware, and fittings as shown on the manufacturer's installation drawings. Ensure the installed pole, when fully loaded, is within 1 degree 40 minutes (1°40') of vertical. Install poles with the manufacturer's recommended "rake." Where required, use threaded leveling nuts to establish rake.

Install horizontal-type arms with a manufactured rise preventing arm from deflecting below arm attachment height.

Ensure maximum angular rotation of the top of mast arm pole does not exceed 1 degree 40 minutes (1°40'). Ensure allowable mast arm deflection does not exceed that allowed per 1st Edition AASHTO. For all load combination limit states specified under Section 3 of 1st Edition AASHTO, restrict tip of fully loaded arm from going below arm attachment point with the pole.

5.2. DRILLED PIER FOUNDATIONS FOR METAL POLES

Analysis procedures and formulas shall be based on AASHTO 1st Edition, latest ACI-318 code and the *Drilled Shafts: Construction Procedures and Design Methods* FHWA-NHI-10-016 manual. Design methods based on engineering publications or research papers must have prior approval from NCDOT. The Department reserves the right to accept or reject any method used for the analysis.

Ensure deflection at top of foundation does not exceed 1 inch for worst-case (Service Limit State) lateral load.

Use LPILE Plus V6.0 or later for lateral analysis. Submit inputs, results and corresponding graphs with the design calculations.

Calculate skin friction using the α-method for cohesive soils and the β-method for cohesion-less soils (**Broms method will not be accepted**). Detailed descriptions of the "α" and "β" methods can be found in *FHWA-NHI-10-016*.

Omit first 2.5 feet for cohesive soils when calculating skin friction.

Assume a hammer efficiency of 0.70 unless value is provided.

Design custom foundations to carry maximum capacity of each metal pole. For standard case strain poles with custom design, use actual shear, axial and moment reactions from the Standard Strain Pole Foundation Selection Table shown on Standard Drawing No. M8.

When poor soil conditions are encountered, which could create an excessively large foundation design, consideration may be given to allow an exemption to the maximum capacity design. The Contractor must gain approval from the Engineer before reducing a foundation's capacity. On projects where poor soil is known to be present, the Contractor should have foundation designs approved before releasing poles for fabrication.

Have the Contractor notify the Engineer if the proposed foundation is to be installed on a slope other than 8H: 1V or flatter.

A. Description:

Furnish and install foundations for NCDOT metal poles with all necessary hardware in accordance with the plans and specifications.

Metal Pole Standards have been developed and implemented by NCDOT for use at signalized intersections in North Carolina. If the plans call for a standard strain pole, then a standard foundation may be selected from the plans. However, the Contractor is not required to use a standard foundation. If the Contractor chooses to design a non-standard site-specific foundation for a standard strain pole or if the plans call for a non-standard site-specific pole, design the foundation to conform to the applicable provisions in the NCDOT Metal Pole Standard Drawings and Section B4 (Non-Standard Foundation Design) below. If non-standard site-specific foundations are designed for standard QPL approved strain poles, the foundation designer must use the design moment specified by load case on Metal Pole Standard Drawing Sheet M8. Failure to conform to this requirement will be grounds for rejection of the design.

If the Contractor chooses to design a non-standard foundation for a standard strain pole and the soil test results indicate a standard foundation is feasible for the site, the Contractor will be paid the cost of the standard foundation. Any additional cost associated with a non-standard site-specific foundation including additional materials, labor and equipment will be considered incidental to the cost of the standard foundation. All costs for the non-standard foundation design will be considered incidental to the cost of the standard foundation.

B. Soil Test and Foundation Determination:

1. General:

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

2. Soil Test:

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

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

- A total of 100 blows have been applied in any two consecutive 6-inch intervals.
- A total of 50 blows have been applied with < 3-inch penetration.

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

If the pole location is located between intersections, provide a coordinate location and offset, or milepost number and offset. Pole numbers should be made available to the Drill Contractor. Include pole numbers in the boring label if they are available. If they are not available, ensure the boring labels can be cross-referenced to corresponding pole numbers. For each boring, submit a legible (hand-written or typed) boring log signed and sealed by a licensed Geologist or Professional Engineer registered in North Carolina. Include on each boring the SPT blow counts and N-values at each depth, depth of the boring, hammer efficiency, depth of water table and a general description of the soil types encountered using the AASHTO Classification System.

Borings that cannot be easily correlated to their specific pole location will be returned to the Contractor for clarification; or if approved by the Engineer, the foundation may be designed using the worst-case soil condition obtained as part of this project.

3. Standard Foundation Determination:

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

$$N_{AVG} = \frac{N_{@1'} + N_{@2.5'} + \cdots + N_{@Deepest\ Boring\ Depth}}{Total\ Number\ of\ N\ values}$$

$$Y = (N_{@1'})^2 + (N_{@2.5'})^2 + \cdots + (N_{@Deepest\ Boring\ Depth})^2$$

$$Z = N_{@1'} + N_{@2.5'} + \cdots + N_{@Deeepest\ Boring\ Depth}$$

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

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

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

OR

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

Note: If less than four (4) N-values are obtained because of criteria listed in Section 2 above, use average of N-values collected for second condition. Do not include the N-value at the deepest boring depth for above calculations if the boring is discontinued at or before the required boring depth because of criteria listed in Section 2 above. Use N-value of zero (0) for weight of hammer or weight of rod. If N-value is greater than fifty (50), reduce N-value to fifty (50) for calculations.

If standard NCDOT strain poles are shown on the plans and the Contractor chooses to use standard foundations, determine a drilled pier length, "L," for each signal pole from the Standard Strain Pole Foundations Chart (sheet M8) based on the Design N-value and the predominant soil type. For each standard pole location, submit a completed "Metal Pole Standard Foundation Selection Form" signed by the Contractor's representative. Signature on form is for verification purposes only. Include the Design N-value calculation and resulting drilled pier length, "L," on each form.

If non-standard site-specific poles are shown on the plans, submit completed boring logs collected in accordance with Section 2 (Soil Test) along with pole loading diagrams from the plans to the Contractor-selected pole Fabricator to assist in the pole and foundation design.

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

- The Design N-value is less than four (4).

Vendor 1 of 5: SMITH-ROWE, LLC (9965)
Call Order 009 (Proposal: C205037)

Bid Information

Proposal County: DAVIDSON
Vendor Address: 639 OLD US 52 SOUTH
MOUNT AIRY , NC , 27030
Signature Check: William Franklin Fulp Jr.
Time Bid Received: June 17, 2025 01:58 PM
Amendment Count: 0

Bid Checksum: 3A242C554A
Bid Total: $21,685,504.70
Items Total: $21,685,504.70
Time Total: $0.00

Bidding Errors:
None.

DBE Goal Set 4%
DBE Goal OBT 4.64%

Vendor 1 of 5: SMITH-ROWE, LLC (9965)
Call Order 009 (Proposal: C205037)

Bid Bond Information

Projects:		**Bond Maximum:**	
Counties:		**State of Incorporation:**	CT
Bond ID:	C85D-A032-22ED-BB39	**Agency Execution Date:**	2025-06-17T00:00:00
Paid by Check:	No	**Surety Name:**	Tinubu Surety
Bond Percent:	5%	**Bond Agency Name:**	Travelers Casualty and Surety Company of America

DBE Load Information

Letting ID: L250617
Letting Date: 06/17/2025
Call Order: 009
Contract ID: C205037
Project: STATE FUNDEDSTATE FUNDEDSTATE FUNDEDSTATE FUNDED
Bid Total: $21,685,504.70
DBE Goal: 4.00% ($867,420.19)

DBE Goal Set 4%
DBE Goal OBT 4.64%

Vendor ID: 9965
Vendor Name: Smith-Rowe, LLC
DBE Entered: 4.64% ($1,005,174.95)

Vendor ID	DBE Name	Is Supplier?	City/State	Goods/Service	Amount
4761	TRAFFIC CONTROL SAFETY SERVICES INC	False	P.O. Box 24511 WINSTON SALEM, NC 27114	SubContractor Committed	358,361.50
12802	NICKELSTON INDUSTRIES INC	False	P.O. Box 133 LAWSONVILLE, NC 27022	SubContractor Committed	192,176.00
3230	HIATT & MASON ENTERPRISES INC	False	P.O. Box 1378 MOUNT AIRY, NC 27030	SubContractor Committed	53,272.80
4388	FOOTHILLS CONSTRUCTION SERVICES INC	False	6081 PEA RIDGE PASS HAMPTONVILLE, NC 27020	SubContractor Committed	251,684.65
11883	JC CONCRETE CONSTRUCTION LLC	False	P.O. Box 613 PINNACLE, NC 27043	SubContractor Committed	149,680.00

BondID: C85D-A032-22ED-BB39
Surety Registry Agency: Tinubu Surety
Verified?: 1
Surety Agency: Travelers Casualty and Surety Company of America
Bond Execution Date: 2025-06-17T00:00:00

Line Number	Item Number	Quantity	Unit	Unit Price	Extension Price
Section 0001 ROADWAY ITEMS					
0001	0000100000-N MOBILIZATION	1.000	LS	$1,089,250.0000	$1,089,250.00
0002	0000400000-N CONSTRUCTION SURVEYING	1.000	LS	$215,000.0000	$215,000.00
0003	0022000000-E UNCLASSIFIED EXCAVATION	71100.000	CY	$14.9000	$1,059,390.00
0004	0036000000-E UNDERCUT EXCAVATION	3475.000	CY	$21.8000	$75,755.00
0005	0050000000-E SUPPLEMENTARY CLEARING & GRUBBING	1.000	ACR	$1.0000	$1.00
0006	0063000000-N GRADING	1.000	LS	$2,308,032.8200	$2,308,032.82
0007	0134000000-E DRAINAGE DITCH EXCAVATION	1420.000	CY	$15.8200	$22,464.40
0008	0195000000-E SELECT GRANULAR MATERIAL	3175.000	CY	$0.0100	$31.75
0009	0196000000-E GEOTEXTILE FOR SOIL STABILIZATION	3375.000	SY	$5.0600	$17,077.50
0010	0199000000-E TEMPORARY SHORING	6889.000	SF	$72.7200	$500,968.08
0011	0248000000-N GENERIC GRADING ITEM TYPE 1 BRIDGE APPROACH FILL, STATION 29+45.91 -L-	1.000	LS	$57,000.0000	$57,000.00
0012	0248000000-N GENERIC GRADING ITEM TYPE 2 BRIDGE APPROACH FILL, STATION 29+45.91 -L-	1.000	LS	$138,100.0000	$138,100.00
0013	0318000000-E FOUNDATION CONDITIONING MATERIAL, MINOR STRUCTURES	560.000	TON	$62.6600	$35,089.60
0014	0321000000-E FOUNDATION CONDITIONING GEOTEXTILE	1740.000	SY	$6.0500	$10,527.00
0015	0342000000-E **" SIDE DRAIN PIPE (12")	40.000	LF	$83.8000	$3,352.00
0016	0343000000-E 15" SIDE DRAIN PIPE	64.000	LF	$100.9600	$6,461.44
0017	0344000000-E 18" SIDE DRAIN PIPE	168.000	LF	$90.6000	$15,220.80
0018	0348000000-E **" SIDE DRAIN PIPE ELBOWS (15")	2.000	EA	$582.6200	$1,165.24
0019	0348000000-E **" SIDE DRAIN PIPE ELBOWS (18")	6.000	EA	$682.3100	$4,093.86
0020	0448000000-E ****" RC PIPE CULVERTS, CLASS IV (54")	12.000	LF	$904.0000	$10,848.00
0021	0448200000-E 15" RC PIPE CULVERTS, CLASS IV	1992.000	LF	$107.4800	$214,100.16
0022	0448300000-E 18" RC PIPE CULVERTS, CLASS IV	1222.000	LF	$154.2000	$188,432.40
0023	0448400000-E 24" RC PIPE CULVERTS, CLASS IV	912.000	LF	$189.3200	$172,659.84

0024	0448500000-E	376.000	LF	$327.8200	$123,260.32
	30" RC PIPE CULVERTS, CLASS IV				
0025	0986000000-E	424.000	LF	$187.9100	$79,673.84
	GENERIC PIPE ITEM 15" WELDED STEEL PIPE				
0026	0986000000-E	520.000	LF	$765.5600	$398,091.20
	GENERIC PIPE ITEM 54" PIPE REHABILITATION CIPP LINER				
0027	0986000000-E	520.000	LF	$66.7800	$34,725.60
	GENERIC PIPE ITEM PRE-INSTALLATION INSPECTION				
0028	0992000000-E	3.000	EA	$4,048.7300	$12,146.19
	GENERIC PIPE ITEM DE-WATERING				
0029	0995000000-E	1481.000	LF	$46.0100	$68,140.81
	PIPE REMOVAL				
0030	1099500000-E	5600.000	CY	$21.0600	$117,936.00
	SHALLOW UNDERCUT				
0031	1099700000-E	11425.000	TON	$46.8000	$534,690.00
	CLASS IV SUBGRADE STABILIZATION				
0032	1110000000-E	500.000	TON	$47.2800	$23,640.00
	STABILIZER AGGREGATE				
0033	1112000000-E	22500.000	SY	$5.9000	$132,750.00
	GEOTEXTILE FOR SUBGRADE STABILIZATION				
0034	1121000000-E	3300.000	TON	$48.7500	$160,875.00
	AGGREGATE BASE COURSE				
0035	1220000000-E	100.000	TON	$72.5000	$7,250.00
	INCIDENTAL STONE BASE				
0036	1297000000-E	24300.000	SY	$4.3000	$104,490.00
	MILLING ASPHALT PAVEMENT, ***" DEPTH (1-1/2")				
0037	1330000000-E	4500.000	SY	$13.1500	$59,175.00
	INCIDENTAL MILLING				
0038	1491000000-E	7800.000	TON	$85.0000	$663,000.00
	ASPHALT CONC BASE COURSE, TYPE B25.0C				
0039	1503000000-E	7000.000	TON	$85.0000	$595,000.00
	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C				
0040	1519000000-E	1180.000	TON	$90.0000	$106,200.00
	ASPHALT CONC SURFACE COURSE, TYPE S9.5B				
0041	1523000000-E	10600.000	TON	$80.0000	$848,000.00
	ASPHALT CONC SURFACE COURSE, TYPE S9.5C				
0042	1575000000-E	1390.000	TON	$620.0000	$861,800.00
	ASPHALT BINDER FOR PLANT MIX				
0043	1693000000-E	500.000	TON	$277.5000	$138,750.00
	ASPHALT PLANT MIX, PAVEMENT REPAIR				
0044	2020000000-N	7.000	EA	$300.0000	$2,100.00
	CONTROL-OF-ACCESS MARKERS				
0045	2022000000-E	190.400	CY	$20.0000	$3,808.00
	SUBDRAIN EXCAVATION				
0046	2026000000-E	850.000	SY	$6.3500	$5,397.50
	GEOTEXTILE FOR SUBSURFACE DRAINS				
0047	2036000000-E	142.800	CY	$112.0500	$16,000.74
	SUBDRAIN COARSE AGGREGATE				
0048	2044000000-E	850.000	LF	$9.3600	$7,956.00

		6" PERFORATED SUBDRAIN PIPE			
0049	2070000000-N	2.000	EA	$545.4000	$1,090.80
	SUBDRAIN PIPE OUTLET				
0050	2077000000-E	12.000	LF	$35.3500	$424.20
	6" OUTLET PIPE				
0051	2190000000-N	5.000	EA	$2,406.1400	$12,030.70
	TEMPORARY STEEL PLATE COVERS FOR MASONRY DRAINAGE STRUCTURE				
0052	2220000000-E	10.400	CY	$2,591.3100	$26,949.62
	REINFORCED ENDWALLS				
0053	2253000000-E	7.916	CY	$3,984.8000	$31,543.68
	PIPE COLLARS				
0054	2286000000-N	65.000	EA	$4,615.8000	$300,027.00
	MASONRY DRAINAGE STRUCTURES				
0055	2297000000-E	18.643	CY	$7,159.2000	$133,468.97
	MASONRY DRAINAGE STRUCTURES				
0056	2308000000-E	20.780	LF	$1,050.8600	$21,836.87
	MASONRY DRAINAGE STRUCTURES				
0057	2364200000-N	10.000	EA	$1,465.9200	$14,659.20
	FRAME WITH TWO GRATES, STD 840.20				
0058	2365000000-N	17.000	EA	$2,630.3900	$44,716.63
	FRAME WITH TWO GRATES, STD 840.22				
0059	2366000000-N	6.000	EA	$2,721.7800	$16,330.68
	FRAME WITH TWO GRATES, STD 840.24				
0060	2367000000-N	2.000	EA	$2,651.8600	$5,303.72
	FRAME WITH TWO GRATES, STD 840.29				
0061	2374000000-N	4.000	EA	$1,328.6800	$5,314.72
	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (E)				
0062	2374000000-N	7.000	EA	$1,328.6800	$9,300.76
	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (F)				
0063	2374000000-N	2.000	EA	$1,328.6800	$2,657.36
	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (G)				
0064	2396000000-N	3.000	EA	$997.2400	$2,991.72
	FRAME WITH COVER, STD 840.54				
0065	2407000000-N	16.000	EA	$3,114.0700	$49,825.12
	STEEL FRAME WITH TWO GRATES, STD 840.37				
0066	2451000000-N	1.000	EA	$1,400.0000	$1,400.00
	CONCRETE TRANSITIONAL SECTION FOR DROP INLET				
0067	2472000000-N	2.000	EA	$932.5000	$1,865.00
	GENERIC DRAINAGE ITEM FRAME WITH COVER, STD 840.55				
0068	2549000000-E	2260.000	LF	$31.0000	$70,060.00
	2'-6" CONCRETE CURB & GUTTER				
0069	2556000000-E	660.000	LF	$37.0000	$24,420.00
	SHOULDER BERM GUTTER				
0070	2577000000-E	350.000	LF	$80.0000	$28,000.00
	CONCRETE EXPRESSWAY GUTTER				
0071	2612000000-E	20.000	SY	$181.0000	$3,620.00
	6" CONCRETE DRIVEWAY				
0072	2647000000-E	220.000	SY	$110.0000	$24,200.00
	5" MONOLITHIC CONCRETE ISLANDS (SURFACE MOUNTED)				

0073	2703000000-E CONCRETE BARRIER, TYPE ******* (IV)	2380.000 LF	$147.4400	$350,907.20
0074	2830000000-N ADJUSTMENT OF MANHOLES	2.000 EA	$2,620.9200	$5,241.84
0075	2950000000-N CONVERT EXISTING JUNCTION BOX TO DROP INLET	1.000 EA	$3,074.0600	$3,074.06
0076	2995000000-N GENERIC DRAINAGE ITEM CONVERT EXISTING DROP INLET TO TB2GI	1.000 EA	$3,074.0600	$3,074.06
0077	2995000000-N GENERIC DRAINAGE ITEM CONVERT EXISTING DROP INLET TO TRAFFIC BEARING JUNCTION BOX	5.000 EA	$3,528.1600	$17,640.80
0078	3030000000-E STEEL BEAM GUARDRAIL	3487.500 LF	$23.5000	$81,956.25
0079	3045000000-E STEEL BEAM GUARDRAIL, SHOP CURVED	75.000 LF	$26.5000	$1,987.50
0080	3060000000-E STEEL BEAM GUARDRAIL, DOUBLE FACED	1225.000 LF	$32.0000	$39,200.00
0081	3150000000-N ADDITIONAL GUARDRAIL POSTS	10.000 EA	$1.0000	$10.00
0082	3210000000-N GUARDRAIL END UNITS, TYPE CAT-1	2.000 EA	$950.0000	$1,900.00
0083	3287000000-N GUARDRAIL END UNITS, TYPE TL-3	2.000 EA	$3,200.0000	$6,400.00
0084	3288000000-N GUARDRAIL END UNITS, TYPE TL-2	4.000 EA	$3,100.0000	$12,400.00
0085	3317000000-N GUARDRAIL ANCHOR UNITS, TYPE B-77	6.000 EA	$2,600.0000	$15,600.00
0086	3360000000-E REMOVE EXISTING GUARDRAIL	11434.500 LF	$0.5000	$5,717.25
0087	3380000000-E TEMPORARY STEEL BEAM GUARDRAIL	250.000 LF	$12.0000	$3,000.00
0088	3387000000-N TEMPORARY GUARDRAIL ANCHOR UNITS, TYPE ********* (B-77)	3.000 EA	$2,000.0000	$6,000.00
0089	3387000000-N TEMPORARY GUARDRAIL ANCHOR UNITS, TYPE ********* (III)	1.000 EA	$2,000.0000	$2,000.00
0090	3389150000-N TEMPORARY GUARDRAIL END UNITS, TYPE ***** (TL-3)	5.000 EA	$2,000.0000	$10,000.00
0091	3389160000-N TEMPORARY ADDITIONAL GUARDRAIL POSTS	5.000 EA	$1.0000	$5.00
0092	3503000000-E WOVEN WIRE FENCE, 47" FABRIC	3820.000 LF	$8.0000	$30,560.00
0093	3509000000-E 4" TIMBER FENCE POSTS, 7'-6" LONG	230.000 EA	$42.0000	$9,660.00
0094	3515000000-E 5" TIMBER FENCE POSTS, 8'-0" LONG	76.000 EA	$48.0000	$3,648.00
0095	3595000000-E RELAPPING GUARDRAIL	2000.000 LF	$3.0000	$6,000.00
0096	3628000000-E RIP RAP, CLASS I	449.000 TON	$85.8800	$38,560.12

0097	3649000000-E	129.000	TON	$83.7000	$10,797.30
	RIP RAP, CLASS B				
0098	3656000000-E	2429.000	SY	$4.3500	$10,566.15
	GEOTEXTILE FOR DRAINAGE				
0099	4025000000-E	828.000	SF	$35.0000	$28,980.00
	CONTRACTOR FURNISHED, TYPE *** SIGN (A)				
0100	4025000000-E	24.000	SF	$35.0000	$840.00
	CONTRACTOR FURNISHED, TYPE *** SIGN (B)				
0101	4025000000-E	30.000	SF	$25.0000	$750.00
	CONTRACTOR FURNISHED, TYPE *** SIGN (D)				
0102	4025000000-E	317.000	SF	$25.0000	$7,925.00
	CONTRACTOR FURNISHED, TYPE *** SIGN (E)				
0103	4025000000-E	213.000	SF	$25.0000	$5,325.00
	CONTRACTOR FURNISHED, TYPE *** SIGN (F)				
0104	4048000000-E	4.000	CY	$800.0000	$3,200.00
	REINFORCED CONCRETE SIGN FOUNDATIONS				
0105	4054000000-E	1.000	CY	$5.0000	$5.00
	PLAIN CONCRETE SIGN FOUNDATIONS				
0106	4057000000-E	9.000	CY	$3,000.0000	$27,000.00
	OVERHEAD FOOTING				
0107	4060000000-E	3506.000	LB	$8.5000	$29,801.00
	SUPPORTS, BREAKAWAY STEEL BEAM				
0108	4066000000-E	889.000	LB	$8.5000	$7,556.50
	SUPPORTS, SIMPLE STEEL BEAM				
0109	4072000000-E	1035.400	LF	$10.0000	$10,354.00
	SUPPORTS, 3-LB STEEL U-CHANNEL				
0110	4082000000-E	500.000	LF	$25.0000	$12,500.00
	SUPPORTS, WOOD				
0111	4096000000-N	2.000	EA	$150.0000	$300.00
	SIGN ERECTION, TYPE D				
0112	4102000000-N	39.000	EA	$65.0000	$2,535.00
	SIGN ERECTION, TYPE E				
0113	4108000000-N	11.000	EA	$150.0000	$1,650.00
	SIGN ERECTION, TYPE F				
0114	4109000000-N	1.000	EA	$5.0000	$5.00
	SIGN ERECTION, TYPE *** (OVERHEAD) (A)				
0115	4110000000-N	7.000	EA	$750.0000	$5,250.00
	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (A)				
0116	4110000000-N	2.000	EA	$750.0000	$1,500.00
	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (B)				
0117	4130000000-N	1.000	LS	$69,500.0000	$69,500.00
	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (28+25 -L-)				
0118	4155000000-N	66.000	EA	$1.0000	$66.00
	DISPOSAL OF SIGN SYSTEM, U-CHANNEL				
0119	4158000000-N	7.000	EA	$1.0000	$7.00
	DISPOSAL OF SIGN SYSTEM, WOOD				
0120	4400000000-E	5816.000	SF	$22.0000	$127,952.00
	WORK ZONE SIGNS (STATIONARY)				
0121	4405000000-E	192.000	SF	$38.9500	$7,478.40

		WORK ZONE SIGNS (PORTABLE)			
0122	4410000000-E	1080.000	SF	$7.0000	$7,560.00
	WORK ZONE SIGNS (BARRICADE MOUNTED)				
0123	4415000000-N	5.000	EA	$2,978.4000	$14,892.00
	FLASHING ARROW BOARD				
0124	4420000000-N	4.000	EA	$12,617.4500	$50,469.80
	PORTABLE CHANGEABLE MESSAGE SIGN				
0125	4430000000-N	450.000	EA	$69.7500	$31,387.50
	DRUMS				
0126	4445000000-E	680.000	LF	$10.0000	$6,800.00
	BARRICADES (TYPE III)				
0127	4455000000-N	150.000	DAY	$603.7800	$90,567.00
	FLAGGER				
0128	4465000000-N	7.000	EA	$9,275.0000	$64,925.00
	TEMPORARY CRASH CUSHIONS				
0129	4470000000-N	7.000	EA	$2,650.0000	$18,550.00
	REMOVE & RESET TEMPORARY CRASH CUSHION				
0130	4480000000-N	3.000	EA	$9,738.0000	$29,214.00
	TMA				
0131	4485000000-E	9100.000	LF	$43.0500	$391,755.00
	PORTABLE CONCRETE BARRIER				
0132	4490000000-E	2238.000	LF	$63.5600	$142,247.28
	PORTABLE CONCRETE BARRIER (ANCHORED)				
0133	4500000000-E	17359.000	LF	$11.5000	$199,628.50
	REMOVE AND RESET PORTABLE CONCRETE BARRIER				
0134	4505000000-E	613.000	LF	$25.4500	$15,600.85
	REMOVE & RESET PORTABLE CONCRETE BARRIER (ANCHORED)				
0135	4510000000-N	240.000	HR	$69.0000	$16,560.00
	LAW ENFORCEMENT				
0136	4520000000-N	766.000	EA	$95.0000	$72,770.00
	TUBULAR MARKERS (FIXED)				
0137	4650000000-N	6373.000	EA	$10.5000	$66,916.50
	TEMPORARY RAISED PAVEMENT MARKERS				
0138	4685000000-E	7800.000	LF	$0.8500	$6,630.00
	THERMOPLASTIC PAVEMENT MARKING LINES (4", 90 MILS)				
0139	4695000000-E	400.000	LF	$4.4500	$1,780.00
	THERMOPLASTIC PAVEMENT MARKING LINES (8", 90 MILS)				
0140	4709000000-E	300.000	LF	$13.2500	$3,975.00
	THERMOPLASTIC PAVEMENT MARKING LINES (24", 90 MILS)				
0141	4720000000-E	12.000	EA	$185.0000	$2,220.00
	THERMOPLASTIC PAVEMENT MARKING CHARACTER (90 MILS)				
0142	4725000000-E	18.000	EA	$418.0000	$7,524.00
	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)				
0143	4810000000-E	11908.000	LF	$1.5000	$17,862.00
	PAINT PAVEMENT MARKING LINES (4")				
0144	4820000000-E	107.000	LF	$2.3000	$246.10
	PAINT PAVEMENT MARKING LINES (8")				
0145	4835000000-E	214.000	LF	$4.8000	$1,027.20
	PAINT PAVEMENT MARKING LINES (24")				

0146	4840000000-N PAINT PAVEMENT MARKING CHARACTER	19.000 EA	$86.0000	$1,634.00
0147	4845000000-N PAINT PAVEMENT MARKING SYMBOL	46.000 EA	$111.0000	$5,106.00
0148	4846000000-E POLYUREA PAVEMENT MARKING LINES (**", *** MILS) (12", 30 MILS)	2900.000 LF	$3.6500	$10,585.00
0149	4846000000-E POLYUREA PAVEMENT MARKING LINES (**", *** MILS) (6", 30 MILS)	33300.000 LF	$1.5500	$51,615.00
0150	4847500000-E WORK ZONE PERFORMANCE PAVEMENT MARKING LINES, 6"	48044.000 LF	$1.6000	$76,870.40
0151	4847600000-E WORK ZONE PERFORMANCE PAVEMENT MARKING LINES, 12"	5022.000 LF	$4.7000	$23,603.40
0152	4850000000-E REMOVAL OF PAVEMENT MARKING LINES (4")	1216.000 LF	$2.9500	$3,587.20
0153	4855000000-E REMOVAL OF PAVEMENT MARKING LINES (6")	23765.000 LF	$0.3500	$8,317.75
0154	4865000000-E REMOVAL OF PAVEMENT MARKING LINES (12")	1431.000 LF	$1.4500	$2,074.95
0155	4870000000-E REMOVAL OF PAVEMENT MARKING LINES (24")	377.000 LF	$6.6500	$2,507.05
0156	4875000000-N REMOVAL OF PAVEMENT MARKING SYMBOLS & CHARACTERS	65.000 EA	$84.0000	$5,460.00
0157	4890000000-E GENERIC PAVEMENT MARKING ITEM YIELD LINE THERMOPLASTIC PAVEMENT MARKING, (24", 90 MILS)	20.000 LF	$71.0000	$1,420.00
0158	4895000000-N GENERIC PAVEMENT MARKING ITEM POLYCARBONATE H-SHAPED MARKERS	560.000 EA	$75.0000	$42,000.00
0159	4900000000-N PERMANENT RAISED PAVEMENT MARKERS	40.000 EA	$22.0000	$880.00
0160	5255000000-N PORTABLE LIGHTING	1.000 LS	$27,000.0000	$27,000.00
0161	5325000000-E **" WATER LINE (1")	73.000 LF	$287.2900	$20,972.17
0162	5325200000-E 2" WATER LINE	5.000 LF	$510.1800	$2,550.90
0163	5325600000-E 6" WATER LINE	263.000 LF	$273.3000	$71,877.90
0164	5325800000-E 8" WATER LINE	1160.000 LF	$159.3800	$184,880.80
0165	5326200000-E 12" WATER LINE	280.000 LF	$258.6700	$72,427.60
0166	5329000000-E DUCTILE IRON WATER PIPE FITTINGS	8135.000 LB	$11.6800	$95,016.80
0167	5534000000-E **" VALVE (1")	1.000 EA	$1,681.6000	$1,681.60
0168	5540000000-E 6" VALVE	2.000 EA	$3,803.7500	$7,607.50
0169	5546000000-E 8" VALVE	6.000 EA	$4,699.6600	$28,197.96

0170	5558000000-E 12" VALVE	2.000	EA	$7,610.0000	$15,220.00
0171	5606000000-E 2" BLOW OFF	1.000	EA	$3,409.1500	$3,409.15
0172	5648000000-N RELOCATE WATER METER	4.000	EA	$2,180.9200	$8,723.68
0173	5649000000-N RECONNECT WATER METER	2.000	EA	$2,269.5200	$4,539.04
0174	5686500000-E WATER SERVICE LINE	148.000	LF	$48.1700	$7,129.16
0175	5691300000-E 8" SANITARY GRAVITY SEWER	627.000	LF	$207.7800	$130,278.06
0176	5775000000-E 4' DIA UTILITY MANHOLE	6.000	EA	$18,680.5800	$112,083.48
0177	5781000000-E UTILITY MANHOLE WALL 4' DIA	22.400	LF	$731.3400	$16,382.02
0178	5800000000-E ABANDON 6" UTILITY PIPE	319.000	LF	$24.4900	$7,812.31
0179	5801000000-E ABANDON 8" UTILITY PIPE	1472.000	LF	$29.5600	$43,512.32
0180	5804000000-E ABANDON 12" UTILITY PIPE	255.000	LF	$44.9200	$11,454.60
0181	5816000000-N ABANDON UTILITY MANHOLE	5.000	EA	$3,850.8800	$19,254.40
0182	5828000000-N REMOVE UTILITY MANHOLE	2.000	EA	$4,662.2500	$9,324.50
0183	5835700000-E 16" ENCASEMENT PIPE	472.000	LF	$265.9800	$125,542.56
0184	5872500000-E BORE AND JACK OF **" (16")	420.000	LF	$1,658.7100	$696,658.20
0185	6000000000-E TEMPORARY SILT FENCE	9970.000	LF	$2.1300	$21,236.10
0186	6006000000-E STONE FOR EROSION CONTROL, CLASS A	2100.000	TON	$0.0100	$21.00
0187	6009000000-E STONE FOR EROSION CONTROL, CLASS B	1485.000	TON	$0.0100	$14.85
0188	6012000000-E SEDIMENT CONTROL STONE	2395.000	TON	$0.0100	$23.95
0189	6015000000-E TEMPORARY MULCHING	59.000	ACR	$1.0000	$59.00
0190	6018000000-E SEED FOR TEMPORARY SEEDING	3400.000	LB	$1.0000	$3,400.00
0191	6021000000-E FERTILIZER FOR TEMPORARY SEEDING	18.500	TON	$975.0000	$18,037.50
0192	6024000000-E TEMPORARY SLOPE DRAINS	585.000	LF	$27.3500	$15,999.75
0193	6029000000-E SAFETY FENCE	14160.000	LF	$1.9900	$28,178.40
0194	6030000000-E	9640.000	CY	$0.0100	$96.40

	SILT EXCAVATION				
0195	6036000000-E MATTING FOR EROSION CONTROL	21345.000	SY	$1.4500	$30,950.25
0196	6037000000-E COIR FIBER MAT	100.000	SY	$18.0000	$1,800.00
0197	6042000000-E 1/4" HARDWARE CLOTH	2730.000	LF	$3.2500	$8,872.50
0198	6043000000-E LOW PERMEABILITY GEOTEXTILE	200.000	SY	$5.1000	$1,020.00
0199	6048000000-E FLOATING TURBIDITY CURTAIN	115.000	SY	$1.0000	$115.00
0200	6070000000-N SPECIAL STILLING BASINS	2.000	EA	$912.9500	$1,825.90
0201	6071002000-E FLOCCULANT	2665.000	LB	$0.5000	$1,332.50
0202	6071012000-E COIR FIBER WATTLE	3180.000	LF	$8.9500	$28,461.00
0203	6071030000-E COIR FIBER BAFFLE	375.000	LF	$10.0000	$3,750.00
0204	6071050000-E **" SKIMMER (1-1/2")	4.000	EA	$1,636.9000	$6,547.60
0205	6071050000-E **" SKIMMER (2")	1.000	EA	$2,077.5000	$2,077.50
0206	6071050000-E **" SKIMMER (2-1/2")	1.000	EA	$2,340.1000	$2,340.10
0207	6084000000-E SEEDING & MULCHING	59.000	ACR	$1,000.0000	$59,000.00
0208	6087000000-E MOWING	30.000	ACR	$100.0000	$3,000.00
0209	6090000000-E SEED FOR REPAIR SEEDING	900.000	LB	$4.0000	$3,600.00
0210	6093000000-E FERTILIZER FOR REPAIR SEEDING	2.500	TON	$800.0000	$2,000.00
0211	6096000000-E SEED FOR SUPPLEMENTAL SEEDING	1225.000	LB	$2.9500	$3,613.75
0212	6108000000-E FERTILIZER TOPDRESSING	36.750	TON	$925.0000	$33,993.75
0213	6111000000-E IMPERVIOUS DIKE	103.000	LF	$105.9500	$10,912.85
0214	6114500000-N SPECIALIZED HAND MOWING	10.000	MHR	$150.0000	$1,500.00
0215	6114800000-N MANUAL LITTER REMOVAL	17.000	MHR	$136.7500	$2,324.75
0216	6114900000-E LITTER DISPOSAL	2.000	TON	$775.0000	$1,550.00
0217	6117000000-N RESPONSE FOR EROSION CONTROL	150.000	EA	$0.0100	$1.50
0218	6117500000-N CONCRETE WASHOUT STRUCTURE	2.000	EA	$1,060.0000	$2,120.00

0219	6132000000-N	9.000	EA	$790.0000	$7,110.00
	GENERIC EROSION CONTROL ITEM PREFABRICATED CONCRETE WASHOUT				
0220	6141000000-E	165.000	SY	$10.0000	$1,650.00
	GENERIC EROSION CONTROL ITEM PERMANENT SOIL REINFORCEMENT MAT, TYPE 4				
0221	7060000000-E	5000.000	LF	$4.0000	$20,000.00
	SIGNAL CABLE				
0222	7120000000-E	34.000	EA	$1,400.0000	$47,600.00
	VEHICLE SIGNAL HEAD (12", 3 SECTION)				
0223	7132000000-E	1.000	EA	$1,700.0000	$1,700.00
	VEHICLE SIGNAL HEAD (12", 4 SECTION)				
0224	7144000000-E	5.000	EA	$2,200.0000	$11,000.00
	VEHICLE SIGNAL HEAD (12", 5 SECTION)				
0225	7204000000-N	6.000	EA	$250.0000	$1,500.00
	LOUVER				
0226	7264000000-E	1050.000	LF	$11.0000	$11,550.00
	MESSENGER CABLE (3/8")				
0227	7288000000-E	25.000	LF	$81.0000	$2,025.00
	PAVED TRENCHING (**********) (2, 2")				
0228	7300000000-E	160.000	LF	$15.0000	$2,400.00
	UNPAVED TRENCHING (**********) (1, 2")				
0229	7300000000-E	100.000	LF	$22.0000	$2,200.00
	UNPAVED TRENCHING (**********) (2, 2")				
0230	7300100000-E	120.000	LF	$9.0000	$1,080.00
	UNPAVED TRENCHING FOR TEMPORARY LEAD-IN				
0231	7301000000-E	200.000	LF	$32.0000	$6,400.00
	DIRECTIONAL DRILL (**********) (2, 2")				
0232	7324000000-N	16.000	EA	$800.0000	$12,800.00
	JUNCTION BOX (STANDARD SIZE)				
0233	7360000000-N	8.000	EA	$2,290.0000	$18,320.00
	WOOD POLE				
0234	7372000000-N	14.000	EA	$950.0000	$13,300.00
	GUY ASSEMBLY				
0235	7408000000-E	2.000	EA	$585.0000	$1,170.00
	1" RISER WITH WEATHERHEAD				
0236	7420000000-E	6.000	EA	$1,060.0000	$6,360.00
	2" RISER WITH WEATHERHEAD				
0237	7444000000-E	950.000	LF	$20.0000	$19,000.00
	INDUCTIVE LOOP SAWCUT				
0238	7456100000-E	1400.000	LF	$3.0000	$4,200.00
	LEAD-IN CABLE (14-2)				
0239	7481000000-N	1.000	EA	$1,500.0000	$1,500.00
	SITE SURVEY				
0240	7481240000-N	6.000	EA	$3,490.0000	$20,940.00
	CAMERA WITHOUT INTERNAL LOOP EMULATOR PROCESSING UNIT				
0241	7481260000-N	1.000	EA	$15,350.0000	$15,350.00
	EXTERNAL LOOP EMULATOR PROCESSING UNIT				
0242	7575142010-N	2.000	EA	$3,570.0000	$7,140.00
	900MHZ SERIAL/ETHERNET SPREAD SPECTRUM RADIO				
0243	7576000000-N	4.000	EA	$21,200.0000	$84,800.00

	METAL STRAIN SIGNAL POLE			
0244	7588000000-N	1.000 EA	$46,240.0000	$46,240.00
	METAL POLE WITH SINGLE MAST ARM			
0245	7590000000-N	1.000 EA	$37,650.0000	$37,650.00
	METAL POLE WITH DUAL MAST ARM			
0246	7613000000-N	6.000 EA	$1,900.0000	$11,400.00
	SOIL TEST			
0247	7614100000-E	36.000 CY	$1,840.0000	$66,240.00
	DRILLED PIER FOUNDATION			
0248	7631000000-N	2.000 EA	$110.0000	$220.00
	MAST ARM WITH METAL POLE DESIGN			
0249	7636000000-N	2.000 EA	$650.0000	$1,300.00
	SIGN FOR SIGNALS			
0250	7642200000-N	3.000 EA	$3,600.0000	$10,800.00
	TYPE II PEDESTAL WITH FOUNDATION			
0251	7684000000-N	2.000 EA	$3,220.0000	$6,440.00
	SIGNAL CABINET FOUNDATION			
0252	7696000000-N	2.000 EA	$27,000.0000	$54,000.00
	CONTROLLERS WITH CABINET (**********) (TYPE 2070LX BASE MOUNTED)			
0253	7744000000-N	8.000 EA	$365.0000	$2,920.00
	DETECTOR CARD (TYPE 170)			
0254	7901000000-N	2.000 EA	$690.0000	$1,380.00
	CABINET BASE EXTENDER			
0255	7980000000-N	2.000 EA	$2,590.0000	$5,180.00
	GENERIC SIGNAL ITEM ETHERNET EDGE SWITCH			
Section 0001 Total				$17,193,245.36

Section 0003
WALL ITEMS

0256	8801000000-E	10595.000 SF	$128.1600	$1,357,855.20
	MSE RETAINING WALL NO **** (1)			
0257	8801000000-E	1950.000 SF	$142.5900	$278,050.50
	MSE RETAINING WALL NO **** (2)			
Section 0003 Total				$1,635,905.70

Section 0004
STRUCTURE ITEMS

0258	8042000000-N	1.000 LS	$777,544.7800	$777,544.78
	REMOVAL OF EXISTING STRUCTURES AT STATION ********** (29+45.91 -L-)			
0259	8065000000-N	1.000 LS	$3,196.5400	$3,196.54
	ASBESTOS ASSESSMENT			
0260	8147000000-E	11760.000 SF	$54.5300	$641,272.80
	REINFORCED CONCRETE DECK SLAB			
0261	8161000000-E	15082.000 SF	$1.4100	$21,265.62
	GROOVING BRIDGE FLOORS			
0262	8182000000-E	189.100 CY	$1,154.2700	$218,272.46

		CLASS A CONCRETE (BRIDGE)			
0263	8210000000-N	1.000	LS	$178,275.0000	$178,275.00
	BRIDGE APPROACH SLABS, STATION ********** (29+45.91 -L-)				
0264	8217000000-E	25238.000	LB	$1.7300	$43,661.74
	REINFORCING STEEL (BRIDGE)				
0265	8265000000-E	1488.890	LF	$376.5200	$560,596.86
	54" PRESTRESSED CONCRETE GIRDERS				
0266	8328200000-E	34.000	EA	$2,130.8700	$72,449.58
	PILE DRIVING EQUIPMENT SETUP FOR *** STEEL PILES (HP 14 X 73)				
0267	8384000000-E	1870.000	LF	$60.1500	$112,480.50
	HP 14 X 73 STEEL PILES				
0268	8503000000-E	215.300	LF	$256.9300	$55,317.03
	CONCRETE BARRIER RAIL				
0269	8510000000-E	157.600	LF	$253.2800	$39,916.93
	CONCRETE MEDIAN BARRIER				
0270	8531000000-E	310.000	SY	$198.4800	$61,528.80
	4" SLOPE PROTECTION				
0271	8657000000-N	1.000	LS	$7,625.0000	$7,625.00
	ELASTOMERIC BEARINGS				
0272	8692000000-N	1.000	LS	$62,950.0000	$62,950.00
	FOAM JOINT SEALS				
Section 0004 Total					$2,856,353.64
Item Total					$21,685,504.70

ELECTRONIC BID SUBMISSION

By submitting this bid electronically, I hereby acknowledge that all requirements included in the hard copy proposal, addendum, amendments, plans, standard specifications, supplemental specifications and special provisions are part of the bid and contract. Further, I acknowledge that I have read, understand, accept, acknowledge and agree to comply with all statements in this electronic bid.

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NON-COLLUSION, DEBARMENT AND GIFT BAN CERTIFICATION

The prequalified bidder declares (or certifies, verifies, or states) under penalty of perjury under the laws of the United States that neither he, nor any official, agent or employee 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 prequalified bidder has not been convicted of violating N.C.G.S. §133-24 within the last three years, and that the prequalified bidder intends to do the work with his own bonafide employees or subcontractors and will not bid for the benefit of another contractor.

By submitting this non-collusion, debarment and gift ban certification, the Contractor is attesting his 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.

DEBARMENT CERTIFICATION OF PREQUALIFIED BIDDER

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 and debarment certification will result in the prequalified bidder’s bid being considered non-responsive.

EXPLANATION:

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Award Limits on Multiple Projects

By answering YES to this statement, the bidder acknowleges that they are using the award limits on multiple projects? **Yes** ○ **No** ◉

A bidder who desires to bid on more than one project on which bids are to be opened on the same date, and who also desires to avoid receiving an award of more projects than he is equipped to handle, may bid on any number of projects but may limit the total amount of work awarded to him on selected projects by completing the AWARD LIMITS ON MULTIPLE PROJECTS.

The Award Limits on Multiple Projects must be filled in on each project bid for which the Bidder desires protection.

It is the desire of the Bidder to be awarded contracts, the value of which

will not exceed a total of for those

projects indicated herein, for which bids will be opened on (MM/DD/YY)

The Award Limits shall apply to the following projects:

Contract Number
County

Contract Number
County

Contract Number
County

Contract Number
County

Contract Number
County

Contract Number
County

It is agreed that if I am (we are) the low Bidder(s) on indicated projects, the total value of which is more than the above stipulated award limits, the Board of Transportation will award me (us) projects from among those indicated

that have a total value not to exceed the award limit and will result in the lowest total bids to the Department of Transportation.

DBE List Summary

Project: STATE FUNDED
Bid Total: 21,685,504.70
Goal: 4.00% (867,420.19)
Total Entered: 4.64% (1,005,174.95)

Bidder ID: 9965
Business Name: Smith-Rowe, LLC

ID	Name	Supp?/Dist?	Item Count	Amount	Is Complete?
4761	TRAFFIC CONTROL SAFETY SERVICES INC	No	25	358,361.50	True
12802	NICKELSTON INDUSTRIES INC	No	15	192,176.00	True
3230	HIATT & MASON ENTERPRISES INC	No	1	53,272.80	True
4388	FOOTHILLS CONSTRUCTION SERVICES INC	No	19	251,684.65	True
11883	JC CONCRETE CONSTRUCTION LLC	No	5	149,680.00	True

Name: TRAFFIC CONTROL SAFETY SERVICES INC ID: 4761

Address: P.O. Box 24511 WINSTON SALEM, NC 27114

Used As: SubContractor DBE Items Total:$358,361.50

Items for TRAFFIC CONTROL SAFETY SERVICES INC

0001 ROADWAY ITEMS					
0001	0000100000-N MOBILIZATION	1.000	LS	$10,000.0000	$10,000.00
0099	4025000000-E CONTRACTOR FURNISHED, TYPE *** SIGN (A)	828.000	SF	$35.0000	$28,980.00
0100	4025000000-E CONTRACTOR FURNISHED, TYPE *** SIGN (B)	24.000	SF	$35.0000	$840.00
0101	4025000000-E CONTRACTOR FURNISHED, TYPE *** SIGN (D)	30.000	SF	$25.0000	$750.00
0102	4025000000-E CONTRACTOR FURNISHED, TYPE *** SIGN (E)	317.000	SF	$25.0000	$7,925.00
0103	4025000000-E CONTRACTOR FURNISHED, TYPE *** SIGN (F)	213.000	SF	$25.0000	$5,325.00
0104	4048000000-E REINFORCED CONCRETE SIGN FOUNDATIONS	4.000	CY	$800.0000	$3,200.00
0105	4054000000-E PLAIN CONCRETE SIGN FOUNDATIONS	1.000	CY	$5.0000	$5.00
0106	4057000000-E OVERHEAD FOOTING	9.000	CY	$2,000.0000	$18,000.00
0107	4060000000-E SUPPORTS, BREAKAWAY STEEL BEAM	3506.000	LB	$8.5000	$29,801.00
0108	4066000000-E SUPPORTS, SIMPLE STEEL BEAM	889.000	LB	$8.5000	$7,556.50
0109	4072000000-E SUPPORTS, 3-LB STEEL U-CHANNEL	1035.400	LF	$10.0000	$10,354.00
0110	4082000000-E SUPPORTS, WOOD	500.000	LF	$25.0000	$12,500.00
0111	4096000000-N SIGN ERECTION, TYPE D	2.000	EA	$150.0000	$300.00
0112	4102000000-N SIGN ERECTION, TYPE E	39.000	EA	$65.0000	$2,535.00
0113	4108000000-N SIGN ERECTION, TYPE F	11.000	EA	$150.0000	$1,650.00
0114	4109000000-N SIGN ERECTION, TYPE *** (OVERHEAD) (A)	1.000	EA	$5.0000	$5.00
0115	4110000000-N SIGN ERECTION, TYPE *** (GROUND MOUNTED) (A)	7.000	EA	$750.0000	$5,250.00

0116	4110000000-N	2.000	EA	$750.0000	$1,500.00
	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (B)				
0117	4130000000-N	1.000	LS	$69,500.0000	$69,500.00
	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (28+25 -L-)				
0118	4155000000-N	66.000	EA	$1.0000	$66.00
	DISPOSAL OF SIGN SYSTEM, U-CHANNEL				
0119	4158000000-N	7.000	EA	$1.0000	$7.00
	DISPOSAL OF SIGN SYSTEM, WOOD				
0120	4400000000-E	5816.000	SF	$22.0000	$127,952.00
	WORK ZONE SIGNS (STATIONARY)				
0122	4410000000-E	1080.000	SF	$7.0000	$7,560.00
	WORK ZONE SIGNS (BARRICADE MOUNTED)				
0126	4445000000-E	680.000	LF	$10.0000	$6,800.00
	BARRICADES (TYPE III)				
Section 0001 Total					$358,361.50
Item Total					$358,361.50

Name: NICKELSTON INDUSTRIES INC ID: 12802

Address: P.O. Box 133 LAWSONVILLE, NC 27022

Used As: SubContractor DBE Items Total:$192,176.00

Items for NICKELSTON INDUSTRIES INC

0001 ROADWAY ITEMS				
0078	3030000000-E STEEL BEAM GUARDRAIL	3487.500 LF	$23.5000	$81,956.25
0079	3045000000-E STEEL BEAM GUARDRAIL, SHOP CURVED	75.000 LF	$26.5000	$1,987.50
0080	3060000000-E STEEL BEAM GUARDRAIL, DOUBLE FACED	1225.000 LF	$32.0000	$39,200.00
0081	3150000000-N ADDITIONAL GUARDRAIL POSTS	10.000 EA	$1.0000	$10.00
0082	3210000000-N GUARDRAIL END UNITS, TYPE CAT-1	2.000 EA	$950.0000	$1,900.00
0083	3287000000-N GUARDRAIL END UNITS, TYPE TL-3	2.000 EA	$3,200.0000	$6,400.00
0084	3288000000-N GUARDRAIL END UNITS, TYPE TL-2	4.000 EA	$3,100.0000	$12,400.00
0085	3317000000-N GUARDRAIL ANCHOR UNITS, TYPE B-77	6.000 EA	$2,600.0000	$15,600.00
0086	3360000000-E REMOVE EXISTING GUARDRAIL	11434.500 LF	$0.5000	$5,717.25
0087	3380000000-E TEMPORARY STEEL BEAM GUARDRAIL	250.000 LF	$12.0000	$3,000.00
0088	3387000000-N TEMPORARY GUARDRAIL ANCHOR UNITS, TYPE ********* (B-77)	3.000 EA	$2,000.0000	$6,000.00
0089	3387000000-N TEMPORARY GUARDRAIL ANCHOR UNITS, TYPE ********* (III)	1.000 EA	$2,000.0000	$2,000.00
0090	3389150000-N TEMPORARY GUARDRAIL END UNITS, TYPE ***** (TL-3)	5.000 EA	$2,000.0000	$10,000.00
0091	3389160000-N TEMPORARY ADDITIONAL GUARDRAIL POSTS	5.000 EA	$1.0000	$5.00
0095	3595000000-E RELAPPING GUARDRAIL	2000.000 LF	$3.0000	$6,000.00
Section 0001 Total				$192,176.00
Item Total				$192,176.00

Name: HIATT & MASON ENTERPRISES INC ID: 3230

Address: P.O. Box 1378 MOUNT AIRY, NC 27030

Used As: SubContractor DBE Items Total:$53,272.80

Items for HIATT & MASON ENTERPRISES INC

0004 STRUCTURE ITEMS				
0260	8147000000-E	11760.000 SF	$4.5300	$53,272.80
	REINFORCED CONCRETE DECK SLAB			
Section 0004 Total				$53,272.80
Item Total				$53,272.80

Name: FOOTHILLS CONSTRUCTION SERVICES INC ID: 4388

Address: 6081 PEA RIDGE PASS HAMPTONVILLE, NC 27020

Used As: SubContractor DBE Items Total:$251,684.65

Items for FOOTHILLS CONSTRUCTION SERVICES INC

0001 ROADWAY ITEMS					
0044	2020000000-N CONTROL-OF-ACCESS MARKERS	7.000	EA	$300.0000	$2,100.00
0185	6000000000-E TEMPORARY SILT FENCE	9500.000	LF	$2.1300	$20,235.00
0190	6018000000-E SEED FOR TEMPORARY SEEDING	3400.000	LB	$1.0000	$3,400.00
0191	6021000000-E FERTILIZER FOR TEMPORARY SEEDING	18.500	TON	$975.0000	$18,037.50
0193	6029000000-E SAFETY FENCE	13160.000	LF	$1.9900	$26,188.40
0195	6036000000-E MATTING FOR EROSION CONTROL	21345.000	SY	$1.4500	$30,950.25
0196	6037000000-E COIR FIBER MAT	100.000	SY	$18.0000	$1,800.00
0197	6042000000-E 1/4" HARDWARE CLOTH	2330.000	LF	$3.2500	$7,572.50
0201	6071002000-E FLOCCULANT	2665.000	LB	$0.5000	$1,332.50
0202	6071012000-E COIR FIBER WATTLE	3180.000	LF	$8.9500	$28,461.00
0203	6071030000-E COIR FIBER BAFFLE	375.000	LF	$10.0000	$3,750.00
0207	6084000000-E SEEDING & MULCHING	59.000	ACR	$1,000.0000	$59,000.00
0208	6087000000-E MOWING	30.000	ACR	$100.0000	$3,000.00
0209	6090000000-E SEED FOR REPAIR SEEDING	900.000	LB	$4.0000	$3,600.00
0210	6093000000-E FERTILIZER FOR REPAIR SEEDING	2.500	TON	$800.0000	$2,000.00
0211	6096000000-E SEED FOR SUPPLEMENTAL SEEDING	1225.000	LB	$2.9500	$3,613.75
0212	6108000000-E FERTILIZER TOPDRESSING	36.750	TON	$925.0000	$33,993.75
0214	6114500000-N SPECIALIZED HAND MOWING	10.000	MHR	$100.0000	$1,000.00

0220	6141000000-E	165.000 SY	$10.0000	$1,650.00
	GENERIC EROSION CONTROL ITEM PERMANENT SOIL REINFORCEMENT MAT, TYPE 4			

Section 0001 Total $251,684.65

Item Total $251,684.65

Name: JC CONCRETE CONSTRUCTION LLC ID: 11883

Address: P.O. Box 613 PINNACLE, NC 27043

Used As: SubContractor DBE Items Total:$149,680.00

Items for JC CONCRETE CONSTRUCTION LLC

0001 ROADWAY ITEMS					
0068	2549000000-E	2260.000	LF	$31.0000	$70,060.00
	2'-6" CONCRETE CURB & GUTTER				
0069	2556000000-E	660.000	LF	$37.0000	$24,420.00
	SHOULDER BERM GUTTER				
0070	2577000000-E	350.000	LF	$80.0000	$28,000.00
	CONCRETE EXPRESSWAY GUTTER				
0071	2612000000-E	20.000	SY	$150.0000	$3,000.00
	6" CONCRETE DRIVEWAY				
0072	2647000000-E	220.000	SY	$110.0000	$24,200.00
	5" MONOLITHIC CONCRETE ISLANDS (SURFACE MOUNTED)				
Section 0001 Total					$149,680.00
Item Total					$149,680.00

THIS PROPOSAL CONTAINS THE FOLLOWING ERRORS/WARNINGS (IF ANY)

This Bid contains 0 amendment files

Electronic Bid Submission

By submitting this bid electronically, I hereby acknowledge that all requirements included in the hard copy proposal, addendum, amendments, plans, standard specifications, supplemental specifications and special provisions are part of the bid and contract. Further, I acknowledge that I have read, understand, accept, acknowledge and agree to comply with all statements in this electronic bid.

I hereby certify that I have the authority to submit this bid.

Signature _____

Agency _____

Date _____

Signature _____

Agency _____

Date _____

Signature _____

Agency _____

Date _____

Attachments

Failure to complete and attach the Fuel Usage Factor Adjustment Form will result in using 2.90 gallons per ton as the Fuel Usage Factor for Diesel for the asphalt items included on the form. The contractor will not be permitted to change the option after the bids are submitted.

NOTE: The maximum upload limit is 5 MB.Fuel Usage Factor Adjustment Davidson C205037 - 625.pdf ☑ Verify

Contract Item Sheets For C205037

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
			ROADWAY ITEMS			
0001	0000100000-N	800	MOBILIZATION	LUMP SUM	1,089,250.00	1,089,250.00
0002	0000400000-N	801	CONSTRUCTION SURVEYING	LUMP SUM	215,000.00	215,000.00
0003	0022000000-E	225	UNCLASSIFIED EXCAVATION	71,100 CY	14.90	1,059,390.00
0004	0036000000-E	225	UNDERCUT EXCAVATION	3,475 CY	21.80	75,755.00
0005	0050000000-E	226	SUPPLEMENTARY CLEARING & GRUBBING	1 ACR	1.00	1.00
0006	0063000000-N	SP	GRADING	LUMP SUM	2,308,032.82	2,308,032.82
0007	0134000000-E	240	DRAINAGE DITCH EXCAVATION	1,420 CY	15.82	22,464.40
0008	0195000000-E	265	SELECT GRANULAR MATERIAL	3,175 CY	0.01	31.75
0009	0196000000-E	270	GEOTEXTILE FOR SOIL STABILIZATION	3,375 SY	5.06	17,077.50
0010	0199000000-E	SP	TEMPORARY SHORING	6,889 SF	72.72	500,968.08
0011	0248000000-N	SP	GENERIC GRADING ITEM TYPE 1 BRIDGE APPROACH FILL, STATION 29+45.91 -L-	LUMP SUM	57,000.00	57,000.00
0012	0248000000-N	SP	GENERIC GRADING ITEM TYPE 2 BRIDGE APPROACH FILL, STATION 29+45.91 -L-	LUMP SUM	138,100.00	138,100.00
0013	0318000000-E	300	FOUNDATION CONDITIONING MATERIAL, MINOR STRUCTURES	560 TON	62.66	35,089.60
0014	0321000000-E	300	FOUNDATION CONDITIONING GEOTEXTILE	1,740 SY	6.05	10,527.00
0015	0342000000-E	310	**" SIDE DRAIN PIPE (12")	40 LF	83.80	3,352.00
0016	0343000000-E	310	15" SIDE DRAIN PIPE	64 LF	100.96	6,461.44
0017	0344000000-E	310	18" SIDE DRAIN PIPE	168 LF	90.60	15,220.80
0018	0348000000-E	310	**" SIDE DRAIN PIPE ELBOWS (15")	2 EA	582.62	1,165.24
0019	0348000000-E	310	**" SIDE DRAIN PIPE ELBOWS (18")	6 EA	682.31	4,093.86
0020	0448000000-E	310	****" RC PIPE CULVERTS, CLASS IV (54")	12 LF	904.00	10,848.00
0021	0448200000-E	310	15" RC PIPE CULVERTS, CLASS IV	1,992 LF	107.48	214,100.16

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
			ROADWAY ITEMS			
0022	0448300000-E	310	18" RC PIPE CULVERTS, CLASS IV	1,222 LF	154.20	188,432.40
0023	0448400000-E	310	24" RC PIPE CULVERTS, CLASS IV	912 LF	189.32	172,659.84
0024	0448500000-E	310	30" RC PIPE CULVERTS, CLASS IV	376 LF	327.82	123,260.32
0025	0986000000-E	SP	GENERIC PIPE ITEM 15" WELDED STEEL PIPE	424 LF	187.91	79,673.84
0026	0986000000-E	SP	GENERIC PIPE ITEM 54" PIPE REHABILITATION CIPP LINER	520 LF	765.56	398,091.20
0027	0986000000-E	SP	GENERIC PIPE ITEM PRE-INSTALLATION INSPECTION	520 LF	66.78	34,725.60
0028	0992000000-E	SP	GENERIC PIPE ITEM DE-WATERING	3 EA	4,048.73	12,146.19
0029	0995000000-E	340	PIPE REMOVAL	1,481 LF	46.01	68,140.81
0030	1099500000-E	505	SHALLOW UNDERCUT	5,600 CY	21.06	117,936.00
0031	1099700000-E	505	CLASS IV SUBGRADE STABILIZATION	11,425 TON	46.80	534,690.00
0032	1110000000-E	510	STABILIZER AGGREGATE	500 TON	47.28	23,640.00
0033	1112000000-E	505	GEOTEXTILE FOR SUBGRADE STABILIZATION	22,500 SY	5.90	132,750.00
0034	1121000000-E	520	AGGREGATE BASE COURSE	3,300 TON	48.75	160,875.00
0035	1220000000-E	545	INCIDENTAL STONE BASE	100 TON	72.50	7,250.00
0036	1297000000-E	607	MILLING ASPHALT PAVEMENT, ***" DEPTH (1-1/2")	24,300 SY	4.30	104,490.00
0037	1330000000-E	607	INCIDENTAL MILLING	4,500 SY	13.15	59,175.00
0038	1491000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0C	7,800 TON	85.00	663,000.00
0039	1503000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C	7,000 TON	85.00	595,000.00
0040	1519000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5B	1,180 TON	90.00	106,200.00
0041	1523000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5C	10,600 TON	80.00	848,000.00
0042	1575000000-E	620	ASPHALT BINDER FOR PLANT MIX	1,390 TON	620.00	861,800.00
0043	1693000000-E	654	ASPHALT PLANT MIX, PAVEMENT REPAIR	500 TON	277.50	138,750.00

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
			ROADWAY ITEMS			
0044	2020000000-N	806	CONTROL-OF-ACCESS MARKERS	7 EA	300.00	2,100.00
0045	2022000000-E	815	SUBDRAIN EXCAVATION	190.4 CY	20.00	3,808.00
0046	2026000000-E	815	GEOTEXTILE FOR SUBSURFACE DRAINS	850 SY	6.35	5,397.50
0047	2036000000-E	815	SUBDRAIN COARSE AGGREGATE	142.8 CY	112.05	16,000.74
0048	2044000000-E	815	6" PERFORATED SUBDRAIN PIPE	850 LF	9.36	7,956.00
0049	2070000000-N	815	SUBDRAIN PIPE OUTLET	2 EA	545.40	1,090.80
0050	2077000000-E	815	6" OUTLET PIPE	12 LF	35.35	424.20
0051	2190000000-N	828	TEMPORARY STEEL PLATE COVERS FOR MASONRY DRAINAGE STRUCTURE	5 EA	2,406.14	12,030.70
0052	2220000000-E	838	REINFORCED ENDWALLS	10.4 CY	2,591.31	26,949.62
0053	2253000000-E	840	PIPE COLLARS	7.92 CY	3,984.80	31,543.68
0054	2286000000-N	840	MASONRY DRAINAGE STRUCTURES	65 EA	4,615.80	300,027.00
0055	2297000000-E	840	MASONRY DRAINAGE STRUCTURES	18.64 CY	7,159.20	133,468.97
0056	2308000000-E	840	MASONRY DRAINAGE STRUCTURES	20.78 LF	1,050.86	21,836.87
0057	2364200000-N	840	FRAME WITH TWO GRATES, STD 840.20	10 EA	1,465.92	14,659.20
0058	2365000000-N	840	FRAME WITH TWO GRATES, STD 840.22	17 EA	2,630.39	44,716.63
0059	2366000000-N	840	FRAME WITH TWO GRATES, STD 840.24	6 EA	2,721.78	16,330.68
0060	2367000000-N	840	FRAME WITH TWO GRATES, STD 840.29	2 EA	2,651.86	5,303.72
0061	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (E)	4 EA	1,328.68	5,314.72
0062	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (F)	7 EA	1,328.68	9,300.76
0063	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (G)	2 EA	1,328.68	2,657.36

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
			ROADWAY ITEMS			
0064	2396000000-N	840	FRAME WITH COVER, STD 840.54	3 EA	997.24	2,991.72
0065	2407000000-N	840	STEEL FRAME WITH TWO GRATES, STD 840.37	16 EA	3,114.07	49,825.12
0066	2451000000-N	852	CONCRETE TRANSITIONAL SECTION FOR DROP INLET	1 EA	1,400.00	1,400.00
0067	2472000000-N	840	GENERIC DRAINAGE ITEM FRAME WITH COVER, STD 840.55	2 EA	932.50	1,865.00
0068	2549000000-E	846	2'-6" CONCRETE CURB & GUTTER	2,260 LF	31.00	70,060.00
0069	2556000000-E	846	SHOULDER BERM GUTTER	660 LF	37.00	24,420.00
0070	2577000000-E	846	CONCRETE EXPRESSWAY GUTTER	350 LF	80.00	28,000.00
0071	2612000000-E	848	6" CONCRETE DRIVEWAY	20 SY	181.00	3,620.00
0072	2647000000-E	852	5" MONOLITHIC CONCRETE ISLANDS (SURFACE MOUNTED)	220 SY	110.00	24,200.00
0073	2703000000-E	854	CONCRETE BARRIER, TYPE ******* (IV)	2,380 LF	147.44	350,907.20
0074	2830000000-N	858	ADJUSTMENT OF MANHOLES	2 EA	2,620.92	5,241.84
0075	2950000000-N	859	CONVERT EXISTING JUNCTION BOX TO DROP INLET	1 EA	3,074.06	3,074.06
0076	2995000000-N	SP	GENERIC DRAINAGE ITEM CONVERT EXISTING DROP INLET TO TB2GI	1 EA	3,074.06	3,074.06
0077	2995000000-N	SP	GENERIC DRAINAGE ITEM CONVERT EXISTING DROP INLET TO TRAFFIC BEARING JUNCTION BOX	5 EA	3,528.16	17,640.80
0078	3030000000-E	862	STEEL BEAM GUARDRAIL	3,487.5 LF	23.50	81,956.25
0079	3045000000-E	862	STEEL BEAM GUARDRAIL, SHOP CURVED	75 LF	26.50	1,987.50
0080	3060000000-E	862	STEEL BEAM GUARDRAIL, DOUBLE FACED	1,225 LF	32.00	39,200.00
0081	3150000000-N	862	ADDITIONAL GUARDRAIL POSTS	10 EA	1.00	10.00
0082	3210000000-N	862	GUARDRAIL END UNITS, TYPE CAT-1	2 EA	950.00	1,900.00
0083	3287000000-N	862	GUARDRAIL END UNITS, TYPE TL-3	2 EA	3,200.00	6,400.00
0084	3288000000-N	862	GUARDRAIL END UNITS, TYPE TL-2	4 EA	3,100.00	12,400.00

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
			ROADWAY ITEMS			
0085	3317000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE B-77	6 EA	2,600.00	15,600.00
0086	3360000000-E	863	REMOVE EXISTING GUARDRAIL	11,434.5 LF	0.50	5,717.25
0087	3380000000-E	862	TEMPORARY STEEL BEAM GUARDRAIL	250 LF	12.00	3,000.00
0088	3387000000-N	862	TEMPORARY GUARDRAIL ANCHOR UNITS, TYPE ********* (B-77)	3 EA	2,000.00	6,000.00
0089	3387000000-N	862	TEMPORARY GUARDRAIL ANCHOR UNITS, TYPE ********* (III)	1 EA	2,000.00	2,000.00
0090	3389150000-N	862	TEMPORARY GUARDRAIL END UNITS, TYPE ***** (TL-3)	5 EA	2,000.00	10,000.00
0091	3389160000-N	862	TEMPORARY ADDITIONAL GUARDRAIL POSTS	5 EA	1.00	5.00
0092	3503000000-E	866	WOVEN WIRE FENCE, 47" FABRIC	3,820 LF	8.00	30,560.00
0093	3509000000-E	866	4" TIMBER FENCE POSTS, 7'-6" LONG	230 EA	42.00	9,660.00
0094	3515000000-E	866	5" TIMBER FENCE POSTS, 8'-0" LONG	76 EA	48.00	3,648.00
0095	3595000000-E	869	RELAPPING GUARDRAIL	2,000 LF	3.00	6,000.00
0096	3628000000-E	876	RIP RAP, CLASS I	449 TON	85.88	38,560.12
0097	3649000000-E	876	RIP RAP, CLASS B	129 TON	83.70	10,797.30
0098	3656000000-E	876	GEOTEXTILE FOR DRAINAGE	2,429 SY	4.35	10,566.15
0099	4025000000-E	901	CONTRACTOR FURNISHED, TYPE *** SIGN (A)	828 SF	35.00	28,980.00
0100	4025000000-E	901	CONTRACTOR FURNISHED, TYPE *** SIGN (B)	24 SF	35.00	840.00
0101	4025000000-E	901	CONTRACTOR FURNISHED, TYPE *** SIGN (D)	30 SF	25.00	750.00
0102	4025000000-E	901	CONTRACTOR FURNISHED, TYPE *** SIGN (E)	317 SF	25.00	7,925.00

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
			ROADWAY ITEMS			
0103	4025000000-E	901	CONTRACTOR FURNISHED, TYPE *** SIGN (F)	213 SF	25.00	5,325.00
0104	4048000000-E	902	REINFORCED CONCRETE SIGN FOUNDATIONS	4 CY	800.00	3,200.00
0105	4054000000-E	902	PLAIN CONCRETE SIGN FOUNDATIONS	1 CY	5.00	5.00
0106	4057000000-E	SP	OVERHEAD FOOTING	9 CY	3,000.00	27,000.00
0107	4060000000-E	903	SUPPORTS, BREAKAWAY STEEL BEAM	3,506 LB	8.50	29,801.00
0108	4066000000-E	903	SUPPORTS, SIMPLE STEEL BEAM	889 LB	8.50	7,556.50
0109	4072000000-E	903	SUPPORTS, 3-LB STEEL U-CHANNEL	1,035.4 LF	10.00	10,354.00
0110	4082000000-E	903	SUPPORTS, WOOD	500 LF	25.00	12,500.00
0111	4096000000-N	904	SIGN ERECTION, TYPE D	2 EA	150.00	300.00
0112	4102000000-N	904	SIGN ERECTION, TYPE E	39 EA	65.00	2,535.00
0113	4108000000-N	904	SIGN ERECTION, TYPE F	11 EA	150.00	1,650.00
0114	4109000000-N	904	SIGN ERECTION, TYPE *** (OVERHEAD) (A)	1 EA	5.00	5.00
0115	4110000000-N	904	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (A)	7 EA	750.00	5,250.00
0116	4110000000-N	904	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (B)	2 EA	750.00	1,500.00
0117	4130000000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (28+25 -L-)	LUMP SUM	69,500.00	69,500.00
0118	4155000000-N	907	DISPOSAL OF SIGN SYSTEM, U-CHANNEL	66 EA	1.00	66.00
0119	4158000000-N	907	DISPOSAL OF SIGN SYSTEM, WOOD	7 EA	1.00	7.00
0120	4400000000-E	1110	WORK ZONE SIGNS (STATIONARY)	5,816 SF	22.00	127,952.00
0121	4405000000-E	1110	WORK ZONE SIGNS (PORTABLE)	192 SF	38.95	7,478.40
0122	4410000000-E	1110	WORK ZONE SIGNS (BARRICADE MOUNTED)	1,080 SF	7.00	7,560.00

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
			ROADWAY ITEMS			
0123	4415000000-N	1115	FLASHING ARROW BOARD	5 EA	2,978.40	14,892.00
0124	4420000000-N	1120	PORTABLE CHANGEABLE MESSAGE SIGN	4 EA	12,617.45	50,469.80
0125	4430000000-N	1130	DRUMS	450 EA	69.75	31,387.50
0126	4445000000-E	1145	BARRICADES (TYPE III)	680 LF	10.00	6,800.00
0127	4455000000-N	1150	FLAGGER	150 DAY	603.78	90,567.00
0128	4465000000-N	1160	TEMPORARY CRASH CUSHIONS	7 EA	9,275.00	64,925.00
0129	4470000000-N	1160	REMOVE & RESET TEMPORARY CRASH CUSHION	7 EA	2,650.00	18,550.00
0130	4480000000-N	1165	TMA	3 EA	9,738.00	29,214.00
0131	4485000000-E	1170	PORTABLE CONCRETE BARRIER	9,100 LF	43.05	391,755.00
0132	4490000000-E	1170	PORTABLE CONCRETE BARRIER (ANCHORED)	2,238 LF	63.56	142,247.28
0133	4500000000-E	1170	REMOVE AND RESET PORTABLE CONCRETE BARRIER	17,359 LF	11.50	199,628.50
0134	4505000000-E	1170	REMOVE & RESET PORTABLE CONCRETE BARRIER (ANCHORED)	613 LF	25.45	15,600.85
0135	4510000000-N	1190	LAW ENFORCEMENT	240 HR	69.00	16,560.00
0136	4520000000-N	1266	TUBULAR MARKERS (FIXED)	766 EA	95.00	72,770.00
0137	4650000000-N	1251	TEMPORARY RAISED PAVEMENT MARKERS	6,373 EA	10.50	66,916.50
0138	4685000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (4", 90 MILS)	7,800 LF	0.85	6,630.00
0139	4695000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (8", 90 MILS)	400 LF	4.45	1,780.00
0140	4709000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (24", 90 MILS)	300 LF	13.25	3,975.00
0141	4720000000-E	1205	THERMOPLASTIC PAVEMENT MARKING CHARACTER (90 MILS)	12 EA	185.00	2,220.00
0142	4725000000-E	1205	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)	18 EA	418.00	7,524.00
0143	4810000000-E	1205	PAINT PAVEMENT MARKING LINES (4")	11,908 LF	1.50	17,862.00
0144	4820000000-E	1205	PAINT PAVEMENT MARKING LINES (8")	107 LF	2.30	246.10

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
			ROADWAY ITEMS			
0145	4835000000-E	1205	PAINT PAVEMENT MARKING LINES (24")	214 LF	4.80	1,027.20
0146	4840000000-N	1205	PAINT PAVEMENT MARKING CHARACTER	19 EA	86.00	1,634.00
0147	4845000000-N	1205	PAINT PAVEMENT MARKING SYMBOL	46 EA	111.00	5,106.00
0148	4846000000-E	1205	POLYUREA PAVEMENT MARKING LINES (**", *** MILS) (12", 30 MILS)	2,900 LF	3.65	10,585.00
0149	4846000000-E	1205	POLYUREA PAVEMENT MARKING LINES (**", *** MILS) (6", 30 MILS)	33,300 LF	1.55	51,615.00
0150	4847500000-E	SP	WORK ZONE PERFORMANCE PAVEMENT MARKING LINES, 6"	48,044 LF	1.60	76,870.40
0151	4847600000-E	SP	WORK ZONE PERFORMANCE PAVEMENT MARKING LINES, 12"	5,022 LF	4.70	23,603.40
0152	4850000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (4")	1,216 LF	2.95	3,587.20
0153	4855000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (6")	23,765 LF	0.35	8,317.75
0154	4865000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (12")	1,431 LF	1.45	2,074.95
0155	4870000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (24")	377 LF	6.65	2,507.05
0156	4875000000-N	1205	REMOVAL OF PAVEMENT MARKING SYMBOLS & CHARACTERS	65 EA	84.00	5,460.00
0157	4890000000-E	SP	GENERIC PAVEMENT MARKING ITEM YIELD LINE THERMOPLASTIC PAVEMENT MARKING, (24", 90 MILS)	20 LF	71.00	1,420.00
0158	4895000000-N	SP	GENERIC PAVEMENT MARKING ITEM POLYCARBONATE H-SHAPED MARKERS	560 EA	75.00	42,000.00
0159	4900000000-N	1251	PERMANENT RAISED PAVEMENT MARKERS	40 EA	22.00	880.00
0160	5255000000-N	1413	PORTABLE LIGHTING	LUMP SUM	27,000.00	27,000.00
0161	5325000000-E	1510	**" WATER LINE (1")	73 LF	287.29	20,972.17
0162	5325200000-E	1510	2" WATER LINE	5 LF	510.18	2,550.90
0163	5325600000-E	1510	6" WATER LINE	263 LF	273.30	71,877.90
0164	5325800000-E	1510	8" WATER LINE	1,160 LF	159.38	184,880.80

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
			ROADWAY ITEMS			
0165	5326200000-E	1510	12" WATER LINE	280 LF	258.67	72,427.60
0166	5329000000-E	1510	DUCTILE IRON WATER PIPE FITTINGS	8,135 LB	11.68	95,016.80
0167	5534000000-E	1515	**" VALVE (1")	1 EA	1,681.60	1,681.60
0168	5540000000-E	1515	6" VALVE	2 EA	3,803.75	7,607.50
0169	5546000000-E	1515	8" VALVE	6 EA	4,699.66	28,197.96
0170	5558000000-E	1515	12" VALVE	2 EA	7,610.00	15,220.00
0171	5606000000-E	1515	2" BLOW OFF	1 EA	3,409.15	3,409.15
0172	5648000000-N	1515	RELOCATE WATER METER	4 EA	2,180.92	8,723.68
0173	5649000000-N	1515	RECONNECT WATER METER	2 EA	2,269.52	4,539.04
0174	5686500000-E	1515	WATER SERVICE LINE	148 LF	48.17	7,129.16
0175	5691300000-E	1520	8" SANITARY GRAVITY SEWER	627 LF	207.78	130,278.06
0176	5775000000-E	1525	4' DIA UTILITY MANHOLE	6 EA	18,680.58	112,083.48
0177	5781000000-E	1525	UTILITY MANHOLE WALL 4' DIA	22.4 LF	731.34	16,382.02
0178	5800000000-E	1530	ABANDON 6" UTILITY PIPE	319 LF	24.49	7,812.31
0179	5801000000-E	1530	ABANDON 8" UTILITY PIPE	1,472 LF	29.56	43,512.32
0180	5804000000-E	1530	ABANDON 12" UTILITY PIPE	255 LF	44.92	11,454.60
0181	5816000000-N	1530	ABANDON UTILITY MANHOLE	5 EA	3,850.88	19,254.40
0182	5828000000-N	1530	REMOVE UTILITY MANHOLE	2 EA	4,662.25	9,324.50
0183	5835700000-E	1540	16" ENCASEMENT PIPE	472 LF	265.98	125,542.56
0184	5872500000-E	1550	BORE AND JACK OF **" (16")	420 LF	1,658.71	696,658.20
0185	6000000000-E	1605	TEMPORARY SILT FENCE	9,970 LF	2.13	21,236.10
0186	6006000000-E	1610	STONE FOR EROSION CONTROL, CLASS A	2,100 TON	0.01	21.00

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
			ROADWAY ITEMS			
0187	6009000000-E	1610	STONE FOR EROSION CONTROL, CLASS B	1,485 TON	0.01	14.85
0188	6012000000-E	1610	SEDIMENT CONTROL STONE	2,395 TON	0.01	23.95
0189	6015000000-E	1615	TEMPORARY MULCHING	59 ACR	1.00	59.00
0190	6018000000-E	1620	SEED FOR TEMPORARY SEEDING	3,400 LB	1.00	3,400.00
0191	6021000000-E	1620	FERTILIZER FOR TEMPORARY SEEDING	18.5 TON	975.00	18,037.50
0192	6024000000-E	1622	TEMPORARY SLOPE DRAINS	585 LF	27.35	15,999.75
0193	6029000000-E	SP	SAFETY FENCE	14,160 LF	1.99	28,178.40
0194	6030000000-E	1630	SILT EXCAVATION	9,640 CY	0.01	96.40
0195	6036000000-E	1631	MATTING FOR EROSION CONTROL	21,345 SY	1.45	30,950.25
0196	6037000000-E	1629	COIR FIBER MAT	100 SY	18.00	1,800.00
0197	6042000000-E	1632	1/4" HARDWARE CLOTH	2,730 LF	3.25	8,872.50
0198	6043000000-E	1644	LOW PERMEABILITY GEOTEXTILE	200 SY	5.10	1,020.00
0199	6048000000-E	SP	FLOATING TURBIDITY CURTAIN	115 SY	1.00	115.00
0200	6070000000-N	1639	SPECIAL STILLING BASINS	2 EA	912.95	1,825.90
0201	6071002000-E	1642	FLOCCULANT	2,665 LB	0.50	1,332.50
0202	6071012000-E	1642	COIR FIBER WATTLE	3,180 LF	8.95	28,461.00
0203	6071030000-E	1640	COIR FIBER BAFFLE	375 LF	10.00	3,750.00
0204	6071050000-E	1644	**" SKIMMER (1-1/2")	4 EA	1,636.90	6,547.60
0205	6071050000-E	1644	**" SKIMMER (2")	1 EA	2,077.50	2,077.50
0206	6071050000-E	1644	**" SKIMMER (2-1/2")	1 EA	2,340.10	2,340.10
0207	6084000000-E	1660	SEEDING & MULCHING	59 ACR	1,000.00	59,000.00
0208	6087000000-E	1660	MOWING	30 ACR	100.00	3,000.00

Contract Item Sheets For C205037

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
			ROADWAY ITEMS			
0209	6090000000-E	1661	SEED FOR REPAIR SEEDING	900 LB	4.00	3,600.00
0210	6093000000-E	1661	FERTILIZER FOR REPAIR SEEDING	2.5 TON	800.00	2,000.00
0211	6096000000-E	1662	SEED FOR SUPPLEMENTAL SEEDING	1,225 LB	2.95	3,613.75
0212	6108000000-E	1665	FERTILIZER TOPDRESSING	36.75 TON	925.00	33,993.75
0213	6111000000-E	SP	IMPERVIOUS DIKE	103 LF	105.95	10,912.85
0214	6114500000-N	1667	SPECIALIZED HAND MOWING	10 MHR	150.00	1,500.00
0215	6114800000-N	SP	MANUAL LITTER REMOVAL	17 MHR	136.75	2,324.75
0216	6114900000-E	SP	LITTER DISPOSAL	2 TON	775.00	1,550.00
0217	6117000000-N	1675	RESPONSE FOR EROSION CONTROL	150 EA	0.01	1.50
0218	6117500000-N	SP	CONCRETE WASHOUT STRUCTURE	2 EA	1,060.00	2,120.00
0219	6132000000-N	SP	GENERIC EROSION CONTROL ITEM PREFABRICATED CONCRETE WASHOUT	9 EA	790.00	7,110.00
0220	6141000000-E	SP	GENERIC EROSION CONTROL ITEM PERMANENT SOIL REINFORCEMENT MAT, TYPE 4	165 SY	10.00	1,650.00
0221	7060000000-E	1705	SIGNAL CABLE	5,000 LF	4.00	20,000.00
0222	7120000000-E	1705	VEHICLE SIGNAL HEAD (12", 3 SECTION)	34 EA	1,400.00	47,600.00
0223	7132000000-E	1705	VEHICLE SIGNAL HEAD (12", 4 SECTION)	1 EA	1,700.00	1,700.00
0224	7144000000-E	1705	VEHICLE SIGNAL HEAD (12", 5 SECTION)	5 EA	2,200.00	11,000.00
0225	7204000000-N	1705	LOUVER	6 EA	250.00	1,500.00
0226	7264000000-E	1710	MESSENGER CABLE (3/8")	1,050 LF	11.00	11,550.00
0227	7288000000-E	1715	PAVED TRENCHING (**********) (2, 2")	25 LF	81.00	2,025.00
0228	7300000000-E	1715	UNPAVED TRENCHING (**********) (1, 2")	160 LF	15.00	2,400.00
0229	7300000000-E	1715	UNPAVED TRENCHING (**********) (2, 2")	100 LF	22.00	2,200.00

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
			ROADWAY ITEMS			
0230	7300100000-E	1715	UNPAVED TRENCHING FOR TEMPORARY LEAD-IN	120 LF	9.00	1,080.00
0231	7301000000-E	1715	DIRECTIONAL DRILL (**********) (2, 2")	200 LF	32.00	6,400.00
0232	7324000000-N	1716	JUNCTION BOX (STANDARD SIZE)	16 EA	800.00	12,800.00
0233	7360000000-N	1720	WOOD POLE	8 EA	2,290.00	18,320.00
0234	7372000000-N	1721	GUY ASSEMBLY	14 EA	950.00	13,300.00
0235	7408000000-E	1722	1" RISER WITH WEATHERHEAD	2 EA	585.00	1,170.00
0236	7420000000-E	1722	2" RISER WITH WEATHERHEAD	6 EA	1,060.00	6,360.00
0237	7444000000-E	1725	INDUCTIVE LOOP SAWCUT	950 LF	20.00	19,000.00
0238	7456100000-E	1726	LEAD-IN CABLE (14-2)	1,400 LF	3.00	4,200.00
0239	7481000000-N	SP	SITE SURVEY	1 EA	1,500.00	1,500.00
0240	7481240000-N	SP	CAMERA WITHOUT INTERNAL LOOP EMULATOR PROCESSING UNIT	6 EA	3,490.00	20,940.00
0241	7481260000-N	SP	EXTERNAL LOOP EMULATOR PROCESSING UNIT	1 EA	15,350.00	15,350.00
0242	7575142010-N	1736	900MHZ SERIAL/ETHERNET SPREAD SPECTRUM RADIO	2 EA	3,570.00	7,140.00
0243	7576000000-N	SP	METAL STRAIN SIGNAL POLE	4 EA	21,200.00	84,800.00
0244	7588000000-N	SP	METAL POLE WITH SINGLE MAST ARM	1 EA	46,240.00	46,240.00
0245	7590000000-N	SP	METAL POLE WITH DUAL MAST ARM	1 EA	37,650.00	37,650.00
0246	7613000000-N	SP	SOIL TEST	6 EA	1,900.00	11,400.00
0247	7614100000-E	SP	DRILLED PIER FOUNDATION	36 CY	1,840.00	66,240.00
0248	7631000000-N	SP	MAST ARM WITH METAL POLE DESIGN	2 EA	110.00	220.00
0249	7636000000-N	1745	SIGN FOR SIGNALS	2 EA	650.00	1,300.00
0250	7642200000-N	1743	TYPE II PEDESTAL WITH FOUNDATION	3 EA	3,600.00	10,800.00
0251	7684000000-N	1750	SIGNAL CABINET FOUNDATION	2 EA	3,220.00	6,440.00

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
			ROADWAY ITEMS			
0252	7696000000-N	1751	CONTROLLERS WITH CABINET (**********) (TYPE 2070LX BASE MOUNTED)	2 EA	27,000.00	54,000.00
0253	7744000000-N	1751	DETECTOR CARD (TYPE 170)	8 EA	365.00	2,920.00
0254	7901000000-N	1753	CABINET BASE EXTENDER	2 EA	690.00	1,380.00
0255	7980000000-N	SP	GENERIC SIGNAL ITEM ETHERNET EDGE SWITCH	2 EA	2,590.00	5,180.00

Contract Item Sheets For C205037

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
			WALL ITEMS			
0256	8801000000-E	SP	MSE RETAINING WALL NO **** (1)	10,595 SF	128.16	1,357,855.20
0257	8801000000-E	SP	MSE RETAINING WALL NO **** (2)	1,950 SF	142.59	278,050.50

Contract Item Sheets For C205037

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
			STRUCTURE ITEMS			
0258	8042000000-N	402	REMOVAL OF EXISTING STRUCTURES AT STATION ********** (29+45.91 -L-)	LUMP SUM	777,544.78	777,544.78
0259	8065000000-N	SP	ASBESTOS ASSESSMENT	LUMP SUM	3,196.54	3,196.54
0260	8147000000-E	420	REINFORCED CONCRETE DECK SLAB	11,760 SF	54.53	641,272.80
0261	8161000000-E	420	GROOVING BRIDGE FLOORS	15,082 SF	1.41	21,265.62
0262	8182000000-E	420	CLASS A CONCRETE (BRIDGE)	189.1 CY	1,154.27	218,272.46
0263	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (29+45.91 -L-)	LUMP SUM	178,275.00	178,275.00
0264	8217000000-E	425	REINFORCING STEEL (BRIDGE)	25,238 LB	1.73	43,661.74
0265	8265000000-E	430	54" PRESTRESSED CONCRETE GIRDERS	1,488.89 LF	376.52	560,596.86
0266	8328200000-E	450	PILE DRIVING EQUIPMENT SETUP FOR *** STEEL PILES (HP 14 X 73)	34 EA	2,130.87	72,449.58
0267	8384000000-E	450	HP 14 X 73 STEEL PILES	1,870 LF	60.15	112,480.50
0268	8503000000-E	460	CONCRETE BARRIER RAIL	215.3 LF	256.93	55,317.03
0269	8510000000-E	460	CONCRETE MEDIAN BARRIER	157.6 LF	253.28	39,916.93
0270	8531000000-E	462	4" SLOPE PROTECTION	310 SY	198.48	61,528.80
0271	8657000000-N	430	ELASTOMERIC BEARINGS	LUMP SUM	7,625.00	7,625.00
0272	8692000000-N	SP	FOAM JOINT SEALS	LUMP SUM	62,950.00	62,950.00
				TOTAL AMOUNT OF BID FOR ENTIRE PROJECT		$21,685,504.70

Fuel Usage Factor Adjustment Form

Contract Number	C205037
County	Davidson
Contractor Name	Smith-Rowe, LLC
HiCAMS Vendor Number	9965

Select a Fuel Usage Factor for each of the Asphalt Material Descriptions to be used on the project. Within the Selected Fuel Usage Factor column, choose either 0.90 or 2.90 Gallons per Ton for the corresponding asphalt material description.

The Selected Fuel Usage Factor chosen will be used for the entire contract duration.

Description	**Unit**	**Selected Fuel Usage Factor**	
		0.90	**2.90**
Asphalt Concrete Base Course, Type B25.0C	Gal/Ton	▪	
Asphalt Concrete Intermediate Course, Type I19.0C	Gal/Ton	▪	
Asphalt Concrete Surface Course, Type SA-1	Gal/Ton	▪	
Asphalt Concrete Surface Course, Type SA-1 (Leveling Course)	Gal/Ton	▪	
Asphalt Concrete Surface Course, Type S4.75	Gal/Ton	▪	
Asphalt Concrete Surface Course, Type S4.75 (Leveling Course)	Gal/Ton	▪	
Asphalt Concrete Surface Course, Type S9.5B	Gal/Ton	▪	
Asphalt Concrete Surface Course, Type S9.5B (Leveling Course)	Gal/Ton	▪	
Asphalt Concrete Surface Course, Type S9.5C	Gal/Ton	▪	
Asphalt Concrete Surface Course, Type S9.5C (Leveling Course)	Gal/Ton	▪	
Asphalt Concrete Surface Course, Type S9.5D	Gal/Ton	▪	
Asphalt Concrete Surface Course, Type S9.5D (Leveling Course)	Gal/Ton	▪	
Open-Graded Asphalt Friction Course	Gal/Ton	▪	
Ultra-thin Bonded Wearing Course	Gal/Ton	▪	
Permeable Asphalt Drainage Course, Type ____	Gal/Ton	▪	
Sand Asphalt Surface Course, Type ____	Gal/Ton	▪	

If the Contractor does not mark either Fuel Usage Factor or marks both Fuel Usage Factors for an asphalt item description, the 2.90 Fuel Usage Factor shall be used for that asphalt line item.

Revised 11-15-2022

Contract No. C205037

County Davidson

Rev. 10-31-24

EXECUTION OF CONTRACT
NON-COLLUSION, DEBARMENT AND GIFT BAN CERTIFICATION

LIMITED LIABILITY COMPANY

The Contractor declares (or certifies, verifies, or states) under penalty of perjury under the laws of the United States that neither he, nor any official, agent or employee 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 this Contract, that the Contractor has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the Contractor intends to do the work with its own bona fide employees or subcontractors and did not bid for the benefit of another contractor.

By submitting this Execution of Contract, non-collusion, debarment and gift ban certification, the Contractor is certifying his 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

Smith-Rowe, LLC

Full Name of Firm

639 Old US 52 South, Mount Airy, NC 27030

Address as prequalified

Signature of Witness

Signature of Member, Manager, Authorized Agent

Select appropriate title

William F. Fulp

Print or type Signer's name

David L. Rowe

Print or type Signer's Name

Contract No. C205037
County Davidson

Rev. 10-31-24

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 filed 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.

Contract No. C205037
County Davidson

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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 and debarment certification will result in the prequalified bidder's bid being considered non-responsive.

☐ Check here if an explanation is attached to this certification.

Contract No. **C205037**

County (ies): **Davidson**

ACCEPTED BY THE
DEPARTMENT OF TRANSPORTATION

Signed by:
Ronald E. Davenport, Jr.
52C46046381F443...
Contract Officer

07/02/2025
Date

Execution of Contract and Bonds
Approved as to Form:

Signed by:
Thomas H. Magee
C0EA8F599F64429...
Attorney General

07/02/2025
Date

Contract No. C205037
County Davidson

Rev. 10-31-24

CONTRACT PAYMENT BOND

Date of Payment Bond Execution	June 26, 2025
Name of Principal Contractor	Smith-Rowe, LLC
Name of Surety:	Travelers Casualty and Surety Company of America
Name of Contracting Body:	**North Carolina Department of Transportation**
	Raleigh, North Carolina
Amount of Bond:	$21,685,504.70
Contract ID No.:	C205037
County Name:	Davidson

KNOW ALL MEN BY THESE PRESENTS, That we, the PRINCIPAL CONTRACTOR (hereafter, PRINCIPAL) and SURETY above named, are held and firmly bound unto the above named Contracting Body, hereinafter called the Contracting Body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the Contracting Body, numbered as shown above and hereto attached:

NOW THEREFORE, if the principal shall promptly make payment to all persons supplying labor and material in the prosecution of the work provided for in said contract, and any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Contract No. C205037
County Davidson

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CONTRACT PAYMENT BOND

Affix Seal of Surety Company

Travelers Casualty and Surety Company of America
Print or type Surety Company Name NAIC #

By Donna K. Ashley
Print, stamp or type name of Attorney-in-Fact

Donna K. Ashley
Signature of Attorney-in-Fact

Jennifer B. Gullett
Signature of Witness

Jennifer B. Gullett
Print or type Signer's name

227 W. Trade St., Suite 1930, Charlotte, NC 28202
Address of Attorney-in-Fact

Contract No. C205037
County Davidson

Rev. 10-31-24

CONTRACT PAYMENT BOND

LIMITED LIABILITY COMPANY

SIGNATURE OF CONTRACTOR (Principal)

Name of Contractor Smith-Rowe, LLC
Full name of Firm

639 Old US 52 South, Mount Airy, NC 27030
Address as prequalified

By: _____
Signature of Member/Manager/Authorized Agent
Select appropriate title

David L. Rowe Manager
Print or type Signer's name

Contract No. C205037
County Davidson

Rev. 10-31-24

Bond No.: 108244195

CONTRACT PERFORMANCE BOND

Date of Performance Bond Execution:	June 26, 2025
Name of Principal Contractor:	Smith-Rowe, LLC
Name of Surety:	Travelers Casualty and Surety Company of America
Name of Contracting Body:	**North Carolina Department of Transportation**
	Raleigh, North Carolina
Amount of Bond:	$21,685,504.70
Contract ID No.:	C205037
County Name:	Davidson

KNOW ALL MEN BY THESE PRESENTS, That we, the PRINCIPAL CONTRACTOR (hereafter, PRINCIPAL) and SURETY above named, are held and firmly bound unto the above named Contracting Body, hereinafter called the Contracting Body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the Contracting Body, numbered as shown above and hereto attached:

NOW THEREFORE, if the principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the Contracting Body, with or without notice to the Surety, and during the life of any guaranty required under the contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Contract No. C205037
County Davidson

Rev. 10-31-24

CONTRACT PERFORMANCE BOND

Affix Seal of Surety Company

Travelers Casualty and Surety Company of America
Print or type Surety Company Name NAIC #

By Donna K. Ashley
Print, stamp or type name of Attorney-in-Fact

Donna K. Ashley
Signature of Attorney-in-Fact

Jennifer B. Gullett
Signature of Witness

Jennifer B. Gullett
Print or type Signer's name

227 W. Trade St., Suite 1930, Charlotte, NC 28202
Address of Attorney-in-Fact

Contract No. C205037
County Davidson

Rev. 10-31-24

CONTRACT PERFORMANCE BOND

LIMITED LIABILITY COMPANY

SIGNATURE OF CONTRACTOR (Principal)

Name of Contractor Smith-Rowe, LLC
Full name of Firm

639 Old US 52 South, Mount Airy, NC 27030
Address as prequalified

By: _____
Signature of Member, Manager, Authorized Agent
Select appropriate title

David L. Rowe Manager
Print or type Signer's name

TRAVELERS

Travelers Casualty and Surety Company of America
Travelers Casualty and Surety Company
St. Paul Fire and Marine Insurance Company
Farmington Casualty Company

POWER OF ATTORNEY

Travelers Casualty and Surety Company of America, Travelers Casualty and Surety Company, St. Paul Fire and Marine Insurance Company, and Farmington Casualty Company are corporations duly organized under the laws of the State of Connecticut (herein collectively called the "Companies"), and the Companies do hereby make, constitute and appoint Donna K. Ashley of Charlotte, NC , their true and lawful Attorney(s)-in-Fact to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed, and their corporate seals to be hereto affixed, this **4th** day of **March, 2024.**

State of Connecticut

City of Hartford ss.

By: _____
Bryce Grissom, Senior Vice President

On this the **4th** day of **March, 2024**, before me personally appeared **Bryce Grissom**, who acknowledged himself to be the Senior Vice President of each of the Companies, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of said Companies by himself as a duly authorized officer.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

My Commission expires the **30th** day of **June, 2026**

_____
Anna P. Nowik, Notary Public

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of each of the Companies, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, **Kevin E. Hughes**, the undersigned, Assistant Secretary of each of the Companies, do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which remains in full force and effect.

Dated this June 26, 2025

_____
Kevin E. Hughes, Assistant Secretary

To verify the authenticity of this Power of Attorney, please call us at 1-800-421-3880.
Please refer to the above-named Attorney(s)-in-Fact and the details of the bond to which this Power of Attorney is attached.