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

PROPOSAL

INCLUDES ADDENDUM No. 3 DATED 10-08-2024

DATE AND TIME OF BID OPENING: **Oct 15, 2024 AT 02:00 PM**

CONTRACT ID	C204348
WBS	37944.3.4

FEDERAL-AID NO.	STP-0150(036)
COUNTY	IREDELL, CATAWBA
T.I.P NO.	R-2307B
MILES	6.943
ROUTE NO.	NC-150
LOCATION	NC-150 FROM SR-1840 (GREENWOOD ROAD) IN CATAWBA COUNTY TO US-21 IN IREDELL COUNTY.

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. C204348 IN CATAWBA AND IREDELL COUNTIES, 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. **C204348** 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. **C204348** in **Catawba and Iredell Counties**, 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.
52C46046381F443...
10/08/2024

TABLE OF CONTENTS

COVER SHEET
PROPOSAL SHEET

PROJECT SPECIAL PROVISIONS

HAUL ROADS: G-1
BUILD AMERICA, BUY AMERICA (BABA): G-1
CONTRACT TIME AND LIQUIDATED DAMAGES: G-2
INTERMEDIATE CONTRACT TIME NUMBER 1 AND LIQUIDATED DAMAGES: G-2
INTERMEDIATE CONTRACT TIME NUMBER 2 AND LIQUIDATED DAMAGES: G-3
INTERMEDIATE CONTRACT TIME NUMBER 3 AND LIQUIDATED DAMAGES: G-5
INTERMEDIATE CONTRACT TIME NUMBER 4 AND LIQUIDATED DAMAGES: G-7
INTERMEDIATE CONTRACT TIME NUMBER 5 AND LIQUIDATED DAMAGES: G-7
INTERMEDIATE CONTRACT TIME NUMBER 6 AND LIQUIDATED DAMAGES: G-8
INTERMEDIATE CONTRACT TIME NUMBER 7 AND LIQUIDATED DAMAGES: G-8
INTERMEDIATE CONTRACT TIME NUMBER 8 AND LIQUIDATED DAMAGES: G-8
INTERMEDIATE CONTRACT TIME NUMBER 9 AND LIQUIDATED DAMAGES: G-9
INTERMEDIATE CONTRACT TIME NUMBER 10 AND LIQUIDATED DAMAGES: G-9
INTERMEDIATE CONTRACT TIME NUMBER 11 AND LIQUIDATED DAMAGES: G-9
INTERMEDIATE CONTRACT TIME NUMBER 12 AND LIQUIDATED DAMAGES: ... G-10
INTERMEDIATE CONTRACT TIME NUMBER 13 AND LIQUIDATED DAMAGES: ... G-10
INTERMEDIATE CONTRACT TIME NUMBER 14 AND LIQUIDATED DAMAGES: ... G-10
PERMANENT VEGETATION ESTABLISHMENT: G-11
CONSTRUCTION MORATORIUM: G-11
DELAY IN RIGHT OF ENTRY: G-12
MAJOR CONTRACT ITEMS: G-12
SPECIALTY ITEMS: G-13
FUEL PRICE ADJUSTMENT: G-13
STEEL PRICE ADJUSTMENT: G-15
PAYOUT SCHEDULE: G-26
SCHEDULE OF ESTIMATED COMPLETION PROGRESS: G-26
DISADVANTAGED BUSINESS ENTERPRISE: G-26
CERTIFICATION FOR FEDERAL-AID CONTRACTS: G-41
RESTRICTIONS ON ITS EQUIPMENT AND SERVICES: G-42
USE OF UNMANNED AIRCRAFT SYSTEM (UAS): G-42
EQUIPMENT IDLING GUIDELINES: G-43
U.S. DEPARTMENT OF TRANSPORTATION HOTLINE: G-43
SUBSURFACE INFORMATION: G-44
PORTABLE CONCRETE BARRIER - (Partial Payments for Materials): G-44
REMOVABLE PAVEMENT MARKINGS - (Partial Payments for Materials): G-44
MAINTENANCE OF THE PROJECT: G-44
COOPERATION BETWEEN CONTRACTORS: G-45
TWELVE MONTH GUARANTEE: G-45
EROSION AND SEDIMENT CONTROL/STORMWATER CERTIFICATION: G-46
PROCEDURE FOR MONITORING BORROW PIT DISCHARGE: G-51

NOTES TO CONTRACTOR: G-53
PUBLIC INVOLVEMENT TECHNICIAN / BUSINESS SUPPORT LIAISON: G-53

ROADWAY R-1

STANDARD SPECIAL PROVISIONS

AVAILABILITY OF FUNDS – TERMINATION OF CONTRACTS SSP-1
NCDOT GENERAL SEED SPECIFICATION FOR SEED QUALITY SSP-2
ERRATA SSP-5
PLANT AND PEST QUARANTINES SSP-6
TITLE VI AND NONDISCRIMINATION: SSP-7
MINORITY AND FEMALE EMPLOYMENT REQUIREMENTS SSP-16
REQUIRED CONTRACT PROVISIONS FEDERAL-AID CONSTR CONTRACTS SSP-19
ON-THE-JOB TRAINING SSP-33
MINIMUM WAGES SSP-36
MINIMUM WAGES SSP-41

UNIT PROJECT SPECIAL PROVISIONS

GEOTECHNICAL GT-1
GEOENVIRONMENTAL GV-1
PAVEMENT MARKINGS PM-1
TRAFFIC CONTROL TC-1
LIGHTING LT-1
UTILITY CONSTRUCTION UC-1
UTILITY BY OTHERS UBO-1
MISCELLANEOUS ROADWAY MR-1
EROSION CONTROL EC-1
TRAFFIC SIGNALS TS-1
STRUCTURE/CULVERTS ST-1

PERMITS P-1

PROPOSAL ITEM SHEET

ITEM SHEET(S)

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.

BUILD AMERICA, BUY AMERICA (BABA):
(11-15-22)(Rev. 7-16-24) 106 SP1 G05

Revise the *Standard Specifications* as follows:

Page 1-48, Article 106-1 GENERAL REQUIREMENTS, add the following after line 49:

(C) Build America, Buy America (BABA)

All manufactured products and construction materials permanently incorporated into any project must meet requirements of the Build America, Buy America (BABA) Act of the Infrastructure Investment and Jobs Act (IIJA). Before any material or product shown on the Department's Build America, Buy America (BABA) List is included for payment on a monthly estimate, the Contractor shall furnish the Engineer with a notarized certification certifying that the items conform to the BABA Act. The Department's Build America Buy America (BABA) List can be found on the Department's website below.

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

Each purchase order issued by the Contractor or a subcontractor for items on the BABA List to be permanently incorporated into any project shall contain in bold print a statement advising the supplier that the manufactured products and construction materials must be produced in the United States of America. The Contractor and all affected subcontractors shall maintain a separate file for BABA List items so that verification of the Contractor's efforts to purchase items produced in the United States can readily be verified by an authorized representative of the Department or the Federal Highway Administration (FHWA).

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

The date of availability for this contract is **January 2, 2025 from -L- Sta. 700+50 (+/-) to the end of the project (including associated -Y- Lines), except December 20, 2025 from -L- Sta. 595+00 (+/-) to -L- Sta. 700+50 (+/-) (including associated -Y- Lines), except December 1, 2026 from the beginning of the project to -L- Sta. 595+00 (+/-) (including associated -Y- Lines)**, 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 **May 14, 2030**.

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 **January 2, 2025 from -L- Sta. 700+50 (+/-) to the end of the project (including associated -Y- Lines), except December 20, 2025 from -L- Sta. 595+00 (+/-) to -L- Sta. 700+50 (+/-) (including associated -Y- Lines), except December 1, 2026 from the beginning of the project to -L- Sta. 595+00 (+/-) (including associated -Y- Lines)**.

The completion date for this intermediate contract time is **November 15, 2029**.

The liquidated damages for this intermediate contract time are **Ten Thousand Dollars ($ 10,000.00)** 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 **-L- (NC 150 – Multilane Sections), -Y31- (I-77), and/or Any Ramp associated with -Y31-** during the following time restrictions:

DAY AND TIME RESTRICTIONS

Monday thru Sunday, 6:00 AM to 8:00 PM

In addition, the Contractor shall not close or narrow a lane of traffic on **-L- (NC 150 – Multilane Sections), -Y31- (I-77), and/or Any Ramp associated with -Y31-**, 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 **6:00 AM** December 31st and **8:00 PM** January 2nd. If New Year's Day is on a Friday, Saturday, Sunday or Monday, then until **8:00 PM** the following Tuesday.

3. For **Easter**, between the hours of **6:00 AM** Thursday and **8:00 PM** Monday.

4. For **Memorial Day**, between the hours of **6:00 AM** Friday and **8:00 PM** Tuesday.

5. For **Independence Day**, between the hours of **6:00 AM** the day before Independence Day and **8:00 PM** the day after Independence Day.

   If **Independence Day** is on a Friday, Saturday, Sunday or Monday, then between the hours of **6:00 AM** the Thursday before Independence Day and **8:00 PM** the Tuesday after Independence Day.

6. For **Labor Day**, between the hours of **6:00 AM** Friday and **8:00 PM** Tuesday.

7. For **Thanksgiving**, between the hours of **6:00 AM** Tuesday and **8:00 PM** Monday.

8. For **Christmas**, between the hours of **6:00 AM** the Friday before the week of Christmas Day and **8:00 PM** the following Tuesday after the week of Christmas Day.

9. For any races or events at **Charlotte Motor Speedway** that create unusually high traffic volumes, as directed by the Engineer.

10. For **North Carolina Race Week**, between the hours of **6:00 AM** the **Saturday** before **North Carolina Race Week** and **8:00 PM** the following **Sunday** after **North Carolina Race Week**.

11. For any events at **Lake Norman High School** that create unusually high traffic volumes, as directed by the Engineer.

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 **One Thousand Two Hundred Fifty Dollars ($ 1,250.00)** per fifteen **(15)** minute time period.

INTERMEDIATE CONTRACT TIME NUMBER 3 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 **the following roads** during the following time restrictions:

DAY AND TIME RESTRICTIONS

-L- (NC 150 – Two-Lane, Two-Way Sections), -Y16- (Perth Road), -Y17- (Doolie Road), -Y21- (Ervin Road), -Y22- (Morrison Plantation Parkway), -Y26- (Bluefield / Williamson Road), -Y29- (Regency Center Drive), -Y30- (Rolling Hills Road), and/or -Y39- & -Y40- (Talbert Road)

Monday thru Sunday, 6:00 AM to 8:00 PM

-Y1- (Mariner Point Lane), -Y2- (Pinnacle Lane), -Y3- (High Hills Drive), -Y4- (Pinnacle Shores Drive), -Y5- (Long Cove Lane), -Y6- (Indigo Lane), -Y7- (Paradise Peninsula Road), -Y8- (Hermance Lane), -Y9- (Waddell Road), -Y10- (Quiet Cove Road), -Y11- (Boaters Drive), -Y12- (Robinson Road), -Y13- (McCrary Road), -Y14- (River Park Road), -Y15- (SR 3162), -Y18- (Byers Village Avenue), -Y19- (Water Oaks Drive), -Y20- (Antiquity Lane), -Y24- (Leisurewood Drive), -Y25- (Target Entrance), -Y27- (Spirits Drive), -Y28- (Spirits Drive), -Y32- (Consumer SQ. Drive), -Y33- (Straightaway Drive), -Y34- (Festival Shopping Center), -Y35- (Norman Station Boulevard), -Y36- (Consumer SQ. Entrance), -Y37- (Portestown Way), -Y38- (Corporate Center Drive), -Y41- & -Y42- (Macleod Drive), -Y43- (Commons Drive), and/or -Y44- (US 21 Ramp)

Monday thru Friday, 6:00 AM to 8:00 AM and 4:00 PM to 6:00 PM

In addition, the Contractor shall not close or narrow a lane of traffic on **Any Road not included in Intermediate Contract Time Number 2**, 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 **6:00 AM** December 31st and **8:00 PM** January 2nd. If New Year's Day is on a Friday, Saturday, Sunday or Monday, then until **8:00 PM** the following Tuesday.

3. For **Easter**, between the hours of **6:00 AM** Thursday and **8:00 PM** Monday.

4. For **Memorial Day**, between the hours of **6:00 AM** Friday and **8:00 PM** Tuesday.

5. For **Independence Day**, between the hours of **6:00 AM** the day before Independence Day and **8:00 PM** the day after Independence Day.

   If **Independence Day** is on a Friday, Saturday, Sunday or Monday, then between the hours of **6:00 AM** the Thursday before Independence Day and **8:00 PM** the Tuesday after Independence Day.

6. For **Labor Day**, between the hours of **6:00 AM** Friday and **8:00 PM** Tuesday.

7. For **Thanksgiving**, between the hours of **6:00 AM** Tuesday and **8:00 PM** Monday.

8. For **Christmas**, between the hours of **6:00 AM** the Friday before the week of Christmas Day and **8:00 PM** the following Tuesday after the week of Christmas Day.

9. For any races or events at **Charlotte Motor Speedway** that create unusually high traffic volumes, as directed by the Engineer.

10. For **North Carolina Race Week**, between the hours of **6:00 AM** the **Saturday** before **North Carolina Race Week** and **8:00 PM** the following **Sunday** after **North Carolina Race Week**.

11. For any events at **Lake Norman High School** that create unusually high traffic volumes, as directed by the Engineer.

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 4 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 **-Y31- (I-77), -Y31RPA-, -Y31RPB-, -Y31RPC-, and/or -Y31RPD-** during the following time restrictions:

DAY AND TIME RESTRICTIONS

Monday thru Sunday, 5:00 AM to 12:00AM (Midnight)

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 Thousand Dollars ($ 5,000.00)** per fifteen **(15)** minute time period.

INTERMEDIATE CONTRACT TIME NUMBER 5 AND LIQUIDATED DAMAGES:
(2-20-07) (Rev. 10-15-13) 108 SP1 G14 E

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 **-L- (NC 150)** during the following time restrictions:

DAY AND TIME RESTRICTIONS

Monday thru Sunday, 6:00 AM to 8:00PM

The maximum allowable time for **Overhead Sign Erection** is **fifteen (15)** minutes for **-L- (NC 150)**. The Contractor shall reopen the travel lanes to traffic until any resulting traffic queue is depleted.

The time of availability for this intermediate contract time will be the time the Contractor begins to install traffic control devices required for the 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 Thousand Dollars ($ 5,000.00)** per fifteen **(15)** minute time period.

INTERMEDIATE CONTRACT TIME NUMBER 6 AND LIQUIDATED DAMAGES:
(2-20-07) (Rev. 10-15-13) 108 SP1 G14 E

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 **-L- (NC 150), -Y8- (Hermance Lane) and/or -Y9- (Waddell Road)** during the following time restrictions:

DAY AND TIME RESTRICTIONS

Monday thru Sunday, from 3:00 P.M. to 10:00 A.M. (the following day)

The maximum allowable time for **Blasting Operations** is **twenty (20)** minutes for **-L- (NC 150), -Y8- (Hermance Lane) and/or -Y9- (Waddell Road)**. The Contractor shall reopen the travel lanes to traffic until any resulting traffic queue is depleted.

The time of availability for this intermediate contract time will be the time the Contractor begins to install traffic control devices required for the 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 Thousand Dollars ($ 5,000.00)** per fifteen **(15)** minute time period.

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

The Contractor shall complete the work required of **Phase I, Steps #1C1 and #1C2** as shown on Sheet **TMP-3** and shall place and maintain traffic on same.

The time of availability for this intermediate contract time is the **Friday** at **6:00 PM** that the Contractor elects to begin the work.

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

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

INTERMEDIATE CONTRACT TIME NUMBER 8 AND LIQUIDATED DAMAGES:
(2-20-07) (Rev. 6-18-13) 108 SP1 G14 H

The Contractor shall complete the work required of **Phase I, Steps #1D1 and #1D2** as shown on Sheet **TMP-3** 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 **seven (7)** consecutive calendar days after and including the date the Contractor begins this work.

The liquidated damages are **One Thousand Five Hundred Dollars ($ 1,500.00)** per calendar day.

INTERMEDIATE CONTRACT TIME NUMBER 9 AND LIQUIDATED DAMAGES:
(2-20-07) (Rev. 6-18-13) 108 SP1 G14 H

The Contractor shall complete the work required of **Phase I, Steps #1E1 and #1E2** as shown on Sheet **TMP-3** 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 **seven (7)** consecutive calendar days after and including the date the Contractor begins this work.

The liquidated damages are **One Thousand Five Hundred Dollars ($ 1,500.00)** per calendar day.

INTERMEDIATE CONTRACT TIME NUMBER 10 AND LIQUIDATED DAMAGES:
(2-20-07) (Rev. 6-18-13) 108 SP1 G14 F

The Contractor shall complete the work required of **Phase III, Steps #5A thru #5C** as shown on Sheet **TMP-3B** and shall place and maintain traffic on same.

The time of availability for this intermediate contract time is the day at **8:00 PM** that the Contractor elects to begin the work.

The completion time for this intermediate contract time is the following **morning** at **6:00 AM** after the time of availability.

The liquidated damages are **Two Thousand Five Hundred Dollars ($ 2,500.00)** per fifteen **(15)** minute time period.

INTERMEDIATE CONTRACT TIME NUMBER 11 AND LIQUIDATED DAMAGES:
(2-20-07) (Rev. 6-18-13) 108 SP1 G14 F

The Contractor shall complete the work required of **Phase III, Steps #6A thru #6B** as shown on Sheet **TMP-3B** and shall place and maintain traffic on same.

The time of availability for this intermediate contract time is the **Friday** at **9:00 PM** that the Contractor elects to begin the work.

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

The Day & Time Restrictions associated with Intermediate Contract Time #4 shall not apply to the work required of this intermediate contract time.

The liquidated damages are **Five Thousand Dollars ($ 5,000.00)** per fifteen **(15)** minute time period.

INTERMEDIATE CONTRACT TIME NUMBER 12 AND LIQUIDATED DAMAGES:
(2-20-07) (Rev. 6-18-13) 108 SP1 G14 F

The Contractor shall complete the work required of **Phase III, Steps #6C thru #6D** as shown on Sheet **TMP-3B** and shall place and maintain traffic on same.

The time of availability for this intermediate contract time is the **Friday** at **9:00 PM** that the Contractor elects to begin the work.

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

The Day & Time Restrictions associated with Intermediate Contract Time #4 shall not apply to the work required of this intermediate contract time.

The liquidated damages are **Five Thousand Dollars ($ 5,000.00)** per fifteen **(15)** minute time period.

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

The Contractor shall complete the work required of **Phase III, Steps #6E thru #6F** as shown on Sheet **TMP-3B** and shall place and maintain traffic on same.

The time of availability for this intermediate contract time is the **Friday** at **9:00 PM** that the Contractor elects to begin the work.

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

The Day & Time Restrictions associated with Intermediate Contract Time #4 shall not apply to the work required of this intermediate contract time.

The liquidated damages are **Five Thousand Dollars ($ 5,000.00)** per fifteen **(15)** minute time period.

INTERMEDIATE CONTRACT TIME NUMBER 14 AND LIQUIDATED DAMAGES:
(2-20-07) (Rev. 6-18-13) 108 SP1 G14 F

The Contractor shall complete the work required of **Phase III, Steps #6G thru #6H** as shown on Sheet **TMP-3B** and shall place and maintain traffic on same.

The time of availability for this intermediate contract time is the **Friday** at **9:00 PM** that the Contractor elects to begin the work.

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

The Day & Time Restrictions associated with Intermediate Contract Time #4 shall not apply to the work required of this intermediate contract time.

The liquidated damages are **Five Thousand Dollars ($ 5,000.00)** per fifteen **(15)** minute time period.

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 **October 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
7	Lake Norman Duke Energy Carolinas LLC	07/31/2025
10	Duke Energy Carolinas LLC	07/31/2025
22	Duke Energy Carolinas LLC	07/31/2025

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
9	Borrow Excavation
28	Select Material, Class VII
80	Asphalt Conc Base Course, Type B25.0C
516	Reinforced Concrete Deck Slab (Sand Lightweight Concrete)

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**
144-156	Guardrail
157-173	Fencing
179-212	Signing
237-244, 255-259, 265	Long-Life Pavement Markings
245-248	Removable Tape
266, 463 or 464 or 465 or 466 or 467	Permanent Pavement Markers
267-289, 291-295	Lighting
296-366, 536	Utility Construction
367-406, 408-410	Erosion Control
407	Reforestation
411-462	Signals/ITS System
509-514	Drilled Piers

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 **$ 2.3222** 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 **$ 37.5** per hundredweight.
The bidding index for Category 2 Steel items is **$ 49.34** per hundredweight.
The bidding index for Category 3 Steel items is **$ 60.68** per hundredweight.
The bidding index for Category 4 Steel items is **$ 37.06** per hundredweight.
The bidding index for Category 5 Steel items is **$ 52.19** per hundredweight.
The bidding index for Category 6 Steel items is **$ 49.77** per hundredweight.
The bidding index for Category 7 Steel items is **$ 39.6** per hundredweight.

The bidding index represents a selling price of steel based on Fastmarkets data for the month of **August 2024**.

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-

PAYOUT SCHEDULE:

(1-19-10) (Rev. 1-17-12) 108 SP1 G57

Submit an Anticipated Monthly Payout Schedule prior to beginning construction. The Anticipated Monthly Payout Schedule will be used by the Department to monitor funding levels for this project. Include a monthly percentage breakdown (in terms of the total contract amount) of the work anticipated to be completed. The schedule should begin with the date the Contractor plans to begin construction and end with the anticipated completion date. Submit updates of the Anticipated Monthly Payout Schedule on March 15, June 15, September 15, and December 15 of each calendar year until project acceptance. Submit the original Anticipated Monthly Payout Schedule and all subsequent updates to the Resident Engineer with a copy to the State Construction Engineer at 1 South Wilmington Street, 1543 Mail Service Center, Raleigh, NC 27699-1543.

SCHEDULE OF ESTIMATED COMPLETION PROGRESS:

(7-15-08)(Rev. 7-16-24) 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)**
2025	(7/01/24 - 6/30/25)	**15**% of Total Amount Bid
2026	(7/01/25 - 6/30/26)	**24**% of Total Amount Bid
2027	(7/01/26 - 6/30/27)	**23**% of Total Amount Bid
2028	(7/01/27 - 6/30/28)	**20**% of Total Amount Bid
2029	(7/01/28 - 6/30/29)	**15**% of Total Amount Bid
2030	(7/01/29 - 6/30/30)	**3**% 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.

DISADVANTAGED BUSINESS ENTERPRISE:

(10-16-07)(Rev. 5-9-24) 102-15(J) SP1 G61

Description

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

Definitions

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

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

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

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

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

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

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) DBE firm.

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

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

Forms and Websites Referenced in this Provision

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

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

RF-1 *DBE Replacement Request Form* - Form for replacing a committed DBE. https://connect.ncdot.gov/projects/construction/Construction%20Forms/DBE%20MBE%20WBE%20Replacement%20Form%20and%20Instructions.pdf

SAF *Subcontract Approval Form* - Form required for approval to sublet the contract. https://connect.ncdot.gov/projects/construction/Construction%20Forms/SAF%20Form%20-%20Subcontract%20Approval%20Form%20Revised%2004-19.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. https://connect.ncdot.gov/projects/construction/Construction%20Forms/Joint%20Check%20Notification%20Form.pdf

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

Listing of DBE Subcontractors Form - Form for entering DBE subcontractors on a project that will meet this DBE goal. This form is for paper bids only. http://connect.ncdot.gov/municipalities/Bid%20Proposals%20for%20LGA%20Content/08%20DBE%20Subcontractors%20(Federal).docx

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

DBE 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

DBE Goal

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

Disadvantaged Business Enterprises **4.0** %

(A) *If the DBE goal is more than zero*, the Contractor shall exercise all necessary and reasonable steps to ensure that DBEs participate in at least the percent of the contract as set forth above as the DBE goal.

(B) *If the DBE goal is zero*, the Contractor shall make an effort to recruit and use DBEs during the performance of the contract. Any DBE participation obtained shall be reported to the Department.

Directory of Transportation Firms (Directory)

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

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

Listing of DBE Subcontractors

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

(A) Electronic Bids

Bidders shall submit a listing of DBE participation in the appropriate section of the electronic submittal file.

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

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

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

(B) Paper Bids

(1) *If the DBE goal is more than zero,*

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

(b) If bidders have no DBE participation, they shall indicate this on the *Listing of DBE Subcontractors* by entering the word "None" or the number "0." This form shall be completed in its entirety. **Blank forms will not be deemed to represent zero participation**. Bids submitted that do not have DBE 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 DBE is certified at the time of bid by checking the Directory of Transportation Firms. If the firm is not certified at the time of the bid-letting, that DBE's participation will not count towards achieving the corresponding goal.

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

DBE Prime Contractor

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

For example, if the DBE goal is 45% and the DBE bidder will only perform 40% of the contract work, the prime will list itself at 40%, and the additional 5% shall be obtained through additional DBE participation with DBE subcontractors or documented through a good faith effort.

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

Written Documentation – Letter of Intent

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

The documentation shall be received in the office of the State Contractor Utilization Engineer or at DBE@ncdot.gov no later than 10:00 a.m. 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 DBE to be used toward the DBE goal, or if the form is incomplete (i.e. both signatures are not present), the DBE participation will not count toward meeting the DBE goal. If the lack of this participation drops the commitment below the DBE goal, the Contractor shall submit evidence of good faith efforts, completed in its entirety, to the State Contractor Utilization Engineer or DBE@ncdot.gov no later than 10:00 a.m. on the eighth calendar day following opening of 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.

Submission of Good Faith Effort

If the bidder fails to meet or exceed the DBE goal, the apparent lowest responsive bidder shall submit to the Department documentation of adequate good faith efforts made to reach the DBE goal.

A hard copy and an electronic copy of this information shall be received in the office of the State Contractor Utilization Engineer or at DBE@ncdot.gov no later than 10:00 a.m. on the sixth calendar day following opening of 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 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 DBE quotations shall be a part of the good faith effort submittal. This documentation may include written subcontractor quotations, telephone log notations of verbal quotations, or other types of quotation documentation.

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

Adequate good faith efforts mean that the 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 DBE participation. Adequate good faith efforts also mean that the bidder actively and aggressively sought DBE participation. Mere *pro forma* efforts are not considered good faith efforts.

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

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

(B) Selecting portions of the work to be performed by DBEs in order to increase the likelihood that the DBE goals will be achieved.

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

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

(C) Providing interested DBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.

(D) (1) Negotiating in good faith with interested DBEs. It is the bidder's responsibility to make a portion of the work available to DBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DBE subcontractors and suppliers, to facilitate DBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of DBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for DBEs to perform the work.

(2) A bidder using good business judgment would consider a number of factors in negotiating with subcontractors, including DBE subcontractors, and would take a firm's price and capabilities as well as contract goals into consideration. However, the fact that there may be some additional costs involved in finding and using DBEs is not in itself sufficient reason for a bidder's failure to meet the contract DBE goal, as long as such costs are reasonable. Also, the ability or desire of a prime contractor to perform the work of a contract with its own organization does not relieve the bidder of the responsibility to make good faith efforts. Bidding contractors are not, however, required to accept higher quotes from DBEs if the price difference is excessive or unreasonable.

(E) Not rejecting DBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. The 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 DBEs in obtaining bonding, lines of credit, or insurance as required by the recipient or bidder.

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

(H) Effectively using the services of available minority/women community organizations; minority/women contractors' groups; Federal, State, and local minority/women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of DBEs. Contact within 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 DBE quotes.

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

(2) The bidders' past performance in meeting the DBE goals.

(3) The performance of other bidders in meeting the DBE goal. For example, when the apparent successful bidder fails to meet the DBE 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 DBE goal, but meets or exceeds the average DBE 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 DBE goal can be met or that an adequate good faith effort has been made to meet the DBE goal.

Non-Good Faith Appeal

The State Prequalification Engineer will notify the 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 DBE Participation Toward Meeting DBE Goal

(A) Participation

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

(B) Joint Checks

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

(C) Subcontracts (Non-Trucking)

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

(D) Joint Venture

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

(E) Manufacturer, Regular Dealer, Distributor

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

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

(1) The fees or commissions charged by a DBE firm for providing a *bona fide* service, such as professional, technical, consultant, or managerial services, or for providing bonds or insurance specifically required for the performance of

a DOT-assisted contract, provided the fees or commissions are determined to be reasonable and not excessive as compared with fees and commissions customarily allowed for similar services.

(2) With respect to materials or supplies purchased from a DBE, which is neither a manufacturer, 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 DBE 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) DBE Utilization

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

(B) DBE Utilization in Trucking

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

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

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

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

(4) The DBE may subcontract the work to another DBE firm, including an owner-operator who is certified as a DBE. The DBE who subcontracts work to another DBE receives credit for the total value of the transportation services the subcontracted DBE provides on the contract.

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

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

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

DBE Replacement

When a Contractor has relied on a commitment to a DBE subcontractor (or an approved substitute DBE subcontractor) to meet all or part of a contract goal requirement, the contractor shall not terminate the DBE 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 DBE subcontractor, a non-DBE 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 DBE subcontractor, with a copy to the Engineer of its intent to request to terminate a DBE subcontractor or any portion of its work, and the reason for the request. The Contractor must give the DBE subcontractor five (5) business days to respond to the Contractor's Notice of Intent to Request Termination and/or Substitution. If the DBE subcontractor objects to the intended termination/substitution, the DBE, within five (5) business days must advise the 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 DBE subcontractor.

A committed DBE 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 DBE 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 DBE was engaged, or so that the Contractor can substitute another DBE or non-DBE contractor after contract award. For purposes of this section, good cause shall include the following circumstances:

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

The Contractor shall comply with the following for replacement of a committed DBE:

(A) Performance Related Replacement

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

If a replacement DBE is not found that can perform at least the same amount of work as the terminated DBE, the 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 DBEs that their interest is solicited in contracting the work defaulted by the previous DBE or in subcontracting other items of work in the contract.

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

(a) The names, addresses, and telephone numbers of DBEs who were contacted.

(b) A description of the information provided to DBEs regarding the plans and specifications for portions of the work to be performed.

(3) A list of reasons why DBE quotes were not accepted.

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

(B) Decertification Replacement

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

(i) If the DBE'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 DBE's ineligibility is caused solely by its acquisition by or merger with a non-DBE 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 DBE that was later decertified.

(2) When a committed DBE is decertified prior to the Department receiving the SAF (*Subcontract Approval Form*) for the named DBE firm, the Contractor shall take all necessary and reasonable steps to replace the DBE subcontractor with another DBE subcontractor to perform at least the same amount of work to meet the DBE goal requirement. If a DBE firm is not found to do the same amount of work, a good faith effort must be submitted to NCDOT (see A herein for required documentation).

All requests for replacement of a committed DBE firm shall be submitted to the Engineer for approval on Form RF-1 *(DBE Replacement Request).* If the 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 DBE, 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 DBE based upon the Contractor's commitment, the DBE shall participate in additional work to the same extent as the DBE participated in the original contract work.

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

When the Engineer makes changes that result in an alteration of plans or details of construction, and a portion or all of the work had been expected to be performed by a committed DBE, the Contractor shall seek participation by DBEs 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 DBE, the Contractor shall seek additional participation by DBEs equal to the reduced DBE participation caused by the changes.

Reports and Documentation

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

When using transportation services to meet the contract commitment, the 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 DBE 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 DBE credit.

Reporting Disadvantaged Business Enterprise Participation

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

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

(B) Removal of an approved 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 DBEs, it shall be the prime contractor's responsibility to report all monthly and final payment information in the correct reporting manner.

Failure on the part of the 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-DBE lessees shall evaluate the value of services provided during the month of the reporting period only.

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

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

Failure to Meet Contract Requirements

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

CERTIFICATION FOR FEDERAL-AID CONTRACTS:

(3-21-90) SP1 G85

The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

(A) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(B) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, *Disclosure Form to Report Lobbying*, in accordance with its instructions.

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

The prospective participant also agrees by submitting his or her bid or proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such subrecipients shall certify and disclose accordingly.

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.

U.S. DEPARTMENT OF TRANSPORTATION HOTLINE:
(11-22-94) 108-5 SP1 G100

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

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

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

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*.

I-5918 (C204948 - Iredell County) is an interstate rehabilitation project located in the vicinity of this project. I-5918 is currently under construction and not anticipated to be completed prior to the letting of this project.

I-6065 (Mecklenburg and Iredell Counties) is an I-77 widening project, located adjacent to this project. I-6065 is anticipated for a June 15, 2027 letting.

R-2307A (Catawba County) is a NC 150 widening project, located adjacent to this project. R-2307A is anticipated for an October 16, 2029 letting.

R-5100B (Iredell County) is a SR 1109 (Williamson Road) widening project, located adjacent to this project. R-5100B is anticipated for a September 15, 2026 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.

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.

NOTES TO CONTRACTOR:

The existing bridge and culverts greater or equal to 3 feet in manufactured diameter within the action area will be surveyed during the summer of 2024. Additionally, structures will be surveyed within 30 days of letting. The U.S. Fish and Wildlife Service (Service) Asheville Field Office will be contacted immediately if bats are observed.

Temporary lighting for night work shall be aimed at the direction of work to minimize lighting the surrounding landscape and shall be turned off when not needed for project work.

The replacement of permanent lighting shall be downcast and shall not be in excess of what currently exists within the action area.

Should blasting occur, it shall take place after tree clearing within the action area has been completed.

PUBLIC INVOLVEMENT TECHNICIAN / BUSINESS SUPPORT LIAISON SCOPE OF WORK FOR R-2307B:

Description
The Contractor shall provide a Public Involvement Technician / Business Support Liaison ("PI Technician") for the R-2307B NC-150 Widening project (hereinafter "the project"). The PI Technician shall be responsible for gathering and providing information and promotional material regarding the project, including construction schedules, traffic impacts, and business impacts, to the public, businesses, local municipalities, counties, planning organizations, and community groups.

The following scope of work outlines tasks to be performed by the PI Technician for the project. The purpose of these tasks is to develop strategies to disseminate information that will inform and educate businesses and the public about this project during construction efforts.

Tasks Include
- The PI Technician will maintain the stakeholder list and public database using NCDOT's subscription to PublicInput.com.
- The PI Technician will use NCDOT's subscription to PublicInput.com to distribute e-blasts, track public inquiries via phone and email, and when responding to citizen inquiries.
- The PI Technician shall develop and produce materials for all meetings (as requested).
- NCDOT will maintain and post content to the project website.
- NCDOT Division 12 Communications Officer (Communications Officer) and NCDOT Public Involvement Officer (PIO) will be responsible for review and approval of all materials and content produced by the PI Technician.

- The Communications Officer will be responsible for posting content to social media and responding to media inquiries and notifications.
- NCDOT's Public Involvement, Community Studies and Visualization Group (PICSViz) will review and translate informational print materials for Limited English Proficiency (LEP) outreach.

1. Task Coordination

The PI Technician will participate in all public involvement and information meetings with Department staff and / or the selected contractor for the duration of the project. This sub-task includes weekly calls, as needed, with the Resident Engineer, the Contractor, Communications Officer, and PIO to provide updates about activities and progress.

2. Develop a Public Involvement and Information Plan

The PI Technician will develop a Public Involvement Plan (PIP) to detail the goals for public communications and engagement, as well as tools and techniques to effectively communicate with and inform the public and impacted stakeholders. The PI Technician will host a call to review the PIP with NCDOT Division 12 (Division), the Communications Officer, and PICSViz. The PI Technician will provide revisions based on comments before finalizing the PIP.

3. Business Stakeholder / Public Outreach Methods

Business Stakeholder and public outreach will ensure that impacted businesses and the general public will be informed of project progress and updates. This outreach will include direct communication between business stakeholders, the public and the Department. The PI Technician will document communication between business stakeholders and the public via an Excel spreadsheet and summary reports to be provided to the Division, the Communications Officer, and the PIO monthly, throughout the life of the project. The following methods will be used to support this task.

3.1 Business Stakeholder Distribution List: To ensure impacted businesses are properly informed of project information, NCDOT will provide the PI Technician with a list of businesses and other important stakeholders with whom NCDOT has communicated in previous project phases. The PI Technician will maintain and update this list as new contacts are identified using NCDOT's subscription to PublicInput.com, which can be found at the following link:

https://publicinput.com/nc150-widening-improvements

This list will be utilized to assist businesses during construction and in understanding the construction phases and impacts of construction. The PI Technician will coordinate with the Local Chamber of Commerce on updates to the list as well as assistance in distributing information.

3.2 Public Mailing List: There will be two types of mailing lists to ensure interested members of the public are properly informed of project information. The first will be an electronic mailing list using NCDOT's subscription to PublincInput.com to provide a link to sign-up for project updates on the project webpage. This will allow the public to enter their email address or phone number to be included in communications about project updates. The second will be a mail distribution list for mail through the United States Postal Service.

NCDOT PIO will provide a distribution list for USPS mailing. Mailers will be distributed to inform the public about the project, contact information, project website, etc. as needed. This list will be maintained in an Excel spreadsheet using the NCDOT PublicInput platform.

3.3 Comment Management: Business stakeholders and members of the public will be able to make comments and ask questions through the NCDOT subscription to PublicInput.com. The PI Technician shall be responsible for tracking these comments via an Excel spreadsheet (provided through Publicinput.com). The PI Technician shall be responsible for responding to inquiries and questions. The PI Technician shall develop a document of standard responses to inquiries, to be approved by the Division, the Communications Officer, and PICSViz for use in responding to public inquiries.

3.4 Toll Free Call-in Number: The call-in number 984-205-6615 with code 7128 to leave messages, will be used for business stakeholders and the public to receive updated project information, make inquiries, and ask questions by phone using NCDOT's subscription through PublicInput.com. The PI Technician shall develop project information talking points to include general project information, the schedule and construction updates. These talking points shall be approved by the Division and the Communications Officer. The toll-free number will allow users to leave a message and provide a call back number. Those messages will be automatically transcribed in the database. The PI Technician shall respond to the call using the developed talking points or will coordinate with the appropriate person to respond, as needed. The PI Technician shall monitor all phone calls using an Excel spreadsheet provided by the NCDOT PublicInput platform. The Contractor shall be responsible for providing content to inform the public about the project updates. The 984-205-6615 (7128) number shall be listed on the NCDOT project website and shall be on all public project materials.

3.5 Project Email: A project email (NC150-Widening-Improvements@publicinput.com) will be used for business stakeholders and the public to make inquiries and ask questions by email using NCDOT's subscription through PublicInput.com. The PI Technician shall use the approved standard responses to reply to email messages received. The PI Technician shall document emails using an Excel spreadsheet. The email address shall be listed on the project's NCDOT website and shall be on all public project materials.

3.6 Project Updates: The project email will also be used in coordination with the social media posts to update subscribers who signed up on the NCDOT PublicInput.com project webpage. Construction updates will be coordinated with the project manager and PIO.

3.7 Social Media Post: Social media can target specific populations based on location, demographic and/or profile information. The Contractor acknowledges that it is NCDOT's policy to manage all social media outreach. The NCDOT Facebook, Instagram, NextDoor, and X (formerly Twitter) accounts shall be utilized to share project information, progress, and updates. The PI Technician shall provide images and content to be approved by the Division and the Communications Officer as needed or at a minimum monthly. The Communications Officer will work with the Social Media Coordinator to post the content. The PI Technician shall coordinate with the Communications Officer about construction impacts and/or changes, as needed outside of the monthly content updates.

To further increase social media reach, the PI Technician shall develop a list of related organizations to request their participation in sharing NCDOT social media posts. These organizations may include, but are not limited to, local municipalities, counties, planning organizations, community groups and other local stakeholders. The PI Technician, in collaboration with the Communications Officer, shall identify this list of willing related organizations and provide them with a monthly schedule of social media posts to be shared from the NCDOT accounts.

3.8 Media Outreach: The Communications Officer will develop media releases to promote project updates at key milestones and to announce the availability of public materials. Project materials will be available when requested and will be accessible online for media use. The Communications Officer will manage all media inquiries. The PI Technician shall participate in media interviews, as requested.

4. Project Public Information Content

The following deliverables will be used to share project updates and information. These deliverables shall be designed to match NCDOT branding and project standards. NCDOT will provide the PI Technician with branding guidelines and materials.

4.1 Project Branding: The PI Technician shall use the logo provided by NCDOT when developing project materials. Text, colors, and graphics shall be developed using NCDOT standard guidelines and shall be reviewed by the Communications Officer.

4.2 E-blast Messages: The PI Technician shall draft weekly e-blasts once project construction begins, to be sent to the business stakeholders and public lists. The PI Technician shall develop additional e-blasts as-needed to communicate any necessary information outside of the weekly e-blast notification cycle, including announcing updates to the website and public meeting schedules. The Division and the Communications Officer will review any e-blasts prior to distribution. The PI Technician shall be responsible for distributing the weekly e-blast and any additional e-blasts using PublicInput.com.

4.3 Project Webpage: The PI Technician shall develop content for the NCDOT project webpage including information about the project, schedule, public meetings, and frequently asked questions. Content shall be revised as needed and approved by the Division and the Communications Officer. The PI Technician shall update content regularly to inform the public about project milestones and impacts to traffic. The Communications Officer will be responsible for posting content on the webpage. Updates to Publicinput.com pages will be made by the PI Technician or PIO as needed to coordinate with updates to the NCDOT webpage.

4.4 Mailers: The PI Technician shall develop either a newsletter or postcard, as directed by the Division, Communications Office, and PICSViz, which will be prepared as the initial point of contact to business stakeholders and the public along the project area and to inform them of project information, the project website, and contact information. The PIO will provide the mailing list. The PI Technician shall develop mailers as needed, to be approved by the Division, the Communications Officer, and Public Involvement Team. NCDOT will be responsible for printing and distributing mailers.

4.5 Project Videos: The PI Technician shall develop content for a series of short videos as needed to provide project updates. These videos shall be designed to last 1-2 minutes and to be shared via the project website and social media. The Division and the Communications Officer will review video content. The PI Technician and NCDOT will work together to produce the videos. The Communications Officer will be responsible for posting the videos on the webpage and social media.

4.6 Collateral Materials: The PI Technician shall use information provided by the Contractor to develop collateral materials for public consumption. These may include, but are not limited to, project fact sheetsdoor hangers, PSAs, yard signs, and materials to be distributed at community events.. The Division, the Communications Officer, and the Public Involvement Team will review all developed materials. The PI Technician shall revise materials up to two times before finalizing. The PI Technician shall coordinate with the Communications Officer to post materials to the project webpage.

5. Project Public Meetings

The PI Technician shall schedule and participate in in-person and/or virtual public meetings when requested to do so by NCDOT. The PI Technician shall coordinate with the Contractor regarding participation in any meetings. The PIO is responsible for locating and arranging the facilities for the meetings. In the case of a virtual public meeting, the Public Involvement Team will coordinate with the Contractor regarding the set- up and hosting of the online meeting.

6. Business Stakeholder Meetings

The PI Technician shall attend meetings with impacted business owners as requested by NCDOT on an as needed basis with approval from the Division.
These meetings will be used to provide project information and address any concerns that the businesses may have about the project. The PI Technician shall be responsible for arranging the meetings. These meetings may be held virtually. The PI Technician shall be responsible for tracking these meetings via an Excel spreadsheet.

7. Progress Reports

The PI Technician shall be responsible for providing monthly progress reports to NCDOT throughout the life of the project. These reports shall include updates on changes to the Business Stakeholder list, changes to the Public Mailing List, comments received through PublicInput.com, e-blasts sent through PublicInput.com, social media accounts, and phone calls received through the 1-800 call-in number. (984-205-6615 code 7128)

Measurement and Payment:
The work of this provision will be paid for at the contract lump sum price for "Public Involvement Technician." Partial payments will be made on each partial pay estimate based upon the percentage of work completed. The Contractor shall submit a certified statement each month indicating the percentage of work completed. The Resident Engineer will determine if the amount indicated is reasonably correct and the Resident Engineer will pay accordingly on the next partial pay estimate.

Pay Item	**Pay Unit**
Public Involvement Technician	Lump Sum

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.

FIELD OFFICE (Month):

(6-1-07)(Rev. 2-15-22) SPI 8-02

Description

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

Procedures

The field office and equipment will remain the property of the Contractor upon completion of the contract. The field office shall be separated from buildings and trailers used by the Contractor and be erected and functional as an initial operation. Failure to have the field office functional when work first begins on the project and maintained, as determined by the Engineer, throughout the life of the project will result in withholding payment of the Contractor's monthly progress estimate. Maintain the field office in an operational state throughout the duration of the project. Remove the field office when directed by the Engineer.

Provide a field office that is weatherproof, tightly floored and roofed, constructed with an air space above the ceiling for ventilation, supported above the ground, has a width of at least 20 feet, and the floor-to-ceiling height that is at least 7 feet 6 inches. Provide inside walls and a ceiling that are constructed of plywood, fiber board, gypsum board, or other suitable materials. Have the exterior walls, ceiling, and floor insulated.

Provide a field office with a minimum floor space of 1,800 square feet and that is equipped with the following:

Item

Telephone service.
Internet Connection Service with modem for Wi-Fi with 2 Data ports in all rooms (with exception of kitchenette and bathrooms).

Number	Item
4	Double-pedestal desk (approximately 60 by 34 inches, at least 2,000 square inches).
1	Plan and drafting table (approximately 30 by 96 inches) with adjustable stool.
1	Computer table at least 48 by 30 by 29 inches.
1	Plan rack for 24 by 36 inch drawings with 6 plan clamps.
4	4-drawer fire protection file, 15 inch drawer width, minimum UL rating of Class 350.
2	Conference tables at least 36 by 96 inches each.
12	Chairs with wheels for conference table.
6	Adjustable five-leg base rolling office chairs.
1	Wastebasket per room.
1	Telephone.
1	Print/Copy/Scan/Fax machine (11 inch x 17 inch copies).
1	Standard Refrigerator/Freezer Combination.
1	Standard Microwave Oven.

Windows and Doors

Provide a field office with at least three windows with blinds, each having an area of at least 540 square inches, capable of being opened and secured from the inside and having at least two exterior passage doors. Provide doors at least 30 inches in width and 78 inches in height. Provide screens for windows and doors. Equip exterior passage doors with locks and furnish at least two keys to the Engineer. Provide accessibility in compliance with the current ADA Design and Accessibility Standards, and the State Building Code and maintain them free from obstructions.

Kitchenette

Provide a field office with a kitchenette that includes a sink with hot and cold water. Kitchenette shall include cabinet and counter space.

Steps

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

Storage Facility for Nuclear Gauge

Provide an outside storage facility for the Department's nuclear gauge. Provide a facility that has at least 190 square feet of floor space, is weatherproof, tightly floored and roofed, and has a tamper resistant key operated lock. The storage facility shall not be located within 10 feet of any other structure including the field office. Furnish at least two keys to the Engineer.

Lighting, Heating, and Air Conditioning

The field office shall have satisfactory lighting, electrical outlets, heating equipment, an exhaust fan, and an air conditioner connected to an operational power source. Provide at least one lighting fixture in each room and at least one fluorescent light fixture over the plan and drafting table. Furnish electrical current and fuel for heating equipment.

Fire Extinguishers

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

Toilets

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

Utilities

Except for telephone service, make necessary utility and internet connections, maintain utilities and internet, pay internet and utility service fees and bills, and handle the final disconnection of internet and utilities. Furnish a telephone in each field office and permit the work necessary to install it.

Storage Facility for Test Equipment

Provide a storage facility, separate from the office for storage of test equipment, other than the nuclear gauge. Provide a facility that has at least 64 square feet of floor space, is weatherproof, tightly floored and roofed, and has a tamper resistant key operated lock. Furnish at least two keys to the Engineer.

Miscellaneous Items

The field office shall also include the following:

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

Measurement and Payment

Measurement for use of the *Field Office* will be based on the time it is used, expressed in calendar months. The unit bid price shall include furnishing, erecting, equipping, maintaining, and removing the field office. Payment will not be made for any month during which the office is furnished for less than 15 calendar days or for any time in excess of the time limit established in the Contract as extended in accordance with the requirements of Section 108-10 of the *Standard Specifications.*

Installation and service fees for the telephone will be paid for by the Department.

Payment will be made under:

Pay Item	**Pay Unit**
Field Office	Month

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.

TEMPORARY DETOURS:

(7-1-95) (Rev. 11-19-13) 1101 SP2 R30B

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*. Pavement that is removed will be measured and will be paid at the contract unit price per square yard for *Removal of Existing _____ Pavement*. 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 B

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

When the Contractor elects to obtain material from an area located beneath a proposed fill sections which does not require excavation for any reason other than to generate acceptable shoulder and fill slope material, the work of performing the excavation will be considered incidental to the item of *Borrow Excavation* or *Shoulder Borrow*. If there is no pay item for *Borrow* or *Shoulder Borrow* in the contract, this work will be considered incidental to *Unclassified Excavation*. Stockpile the excavated material in a manner to facilitate measurement by the Engineer. Fill the void created by the excavation of the shoulder and fill slope material with suitable material. Payment for material used from the stockpile will be made at the contract unit price for *Borrow Excavation* or *Shoulder Borrow*. If there is no pay item for *Borrow Excavation* or *Shoulder Borrow*, then the material will be paid for at the contract unit price for *Unclassified Excavation*. The material used to fill the void created by the excavation of the shoulder and fill slope material will be made at the contract unit price for *Unclassified Excavation*, *Borrow Excavation*, or *Shoulder Borrow*, depending on the source of the material.

Material generated from undercut excavation, unclassified excavation or clearing and grubbing operations that is placed directly on shoulders or slope areas, will not be measured separately for payment, as payment for the work requiring the excavation will be considered adequate compensation for depositing and grading the material on the shoulders or slopes.

When undercut excavation is performed at the direction of the Engineer and the material excavated is found to be suitable for use as shoulder and fill slope material, and there is no area on the project currently prepared to receive the material generated by the undercut operation, the Contractor may construct a stockpile for use as borrow at a later date. Payment for the material used from the stockpile will be made at the contract unit price for *Borrow Excavation* or *Shoulder Borrow*.

When shoulder material is obtained from borrow sources or from stockpiled material, payment for the work of shoulder construction will be made at the contract unit price per cubic yard for *Borrow Excavation* or *Shoulder Borrow* in accordance with the applicable provisions of Section 230 or Section 560 of the *Standard Specifications*.

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.

FLOWABLE FILL:

(9-17-02) (Rev. 1-16-24) 300, 340, 1000, 1530, 1540, 1550 SP3 R30

Description

This work consists of all work necessary to place flowable fill in accordance with these provisions, the plans, and as directed.

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	Section
Flowable Fill	1000-7

Construction Methods

Discharge flowable fill material directly from the truck into the space to be filled, or by other approved methods. The mix may be placed full depth or in lifts as site conditions dictate. The Contractor shall provide a method to plug the ends of the existing pipe in order to contain the flowable fill.

Measurement and Payment

At locations where flowable fill is called for on the plans and a pay item for flowable fill is included in the contract, *Flowable Fill* will be measured in cubic yards and paid as the actual number of cubic yards that have been satisfactorily placed and accepted. Such price and payment will be full compensation for all work covered by this provision including, but not limited to, the mix design, furnishing, hauling, placing and containing the flowable fill.

Payment will be made under:

Pay Item	**Pay Unit**
Flowable Fill	Cubic Yard

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

GEOTEXTILE FOR SUBGRADE STABILIZATION:

(5-15-18)(Rev. 4-16-24) 505, 1056 SP5 R9

Description

Provide geotextile for subgrade stabilization in accordance with the contract. Geotextile for subgrade stabilization is required for subgrades to prevent pavement cracking at locations shown in the plans and as directed by the Engineer.

Materials

Refer to Article 505-2 of the *Standard Specifications*.

Construction Methods

Refer to Article 505-3 of the *Standard Specifications*.

Measurement and Payment

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

AGGREGATE SUBGRADE IN LIEU OF CHEMICAL STABILIZATION:

(6-16-15)(Rev. 1-16-24) 501, 505, 542 SP5 R17

Description

At the Contractor's option and in lieu of chemical stabilization, replace 8 inches of subgrade with Type 2 aggregate subgrade. This substitution is allowed in full typical section width and cannot result in chemically stabilized sections less than 1,000 feet in length, unless otherwise approved by the Engineer. This substitution is not allowed for chemically stabilized sections with geotextile for subgrade stabilization. Notify the Engineer at least 30 days before starting aggregate subgrade in lieu of chemical stabilization. Define "subsoil" as the portion of the roadbed below the Class IV subgrade stabilization.

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	Section
Geotextile for Subgrade Stabilization, Type 5a	1056

Construction Methods

Proof roll subsoil, install geotextile for subgrade stabilization and place, compact and maintain Class IV subgrade stabilization in accordance with Article 505-3 of the *Standard Specifications* for a Type 2 aggregate subgrade.

Measurement and Payment

Aggregate Subgrade in Lieu of Chemical Stabilization will be paid at the prices established in the contract that relate to the chemical stabilization type that is being replaced (lime or cement). No direct payment will be made for additional excavation required to accommodate this alternate.

The total amount paid for this subgrade stabilization alternative will be limited to the contract amounts per square yard for replacement for Portland cement or lime, theoretical tons of Portland cement or lime replaced, mixing of cement or lime, and theoretical gallons of asphalt curing seal replaced at the rate of 0.15 gallons per square yard.

A supplement agreement will be executed prior to starting the work to create a square yard price for the *Aggregate Subgrade in Lieu of Chemical Stabilization* and deleting the quantities associated with the work being replaced.

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 **$ 591.63** per ton.

This base price index represents an average of F.O.B. selling prices of asphalt binder at supplier's terminals on **September 1, 2024**.

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*.

FRAME WITH GRATE (Driveway Drop Inlet):
(3-21-00)(Rev. 1-16-24) SPI 8-35(Rev)

Description

Provide grates for driveway drop inlets that are fabricated steel or cast iron. Provide grates that are of a design and weight that is recommended by the manufacturer as being adequate for HS-20 loadings. Furnish a manufacturer's certification stating that the grates and frame furnished on the project have been designed and manufactured to be adequate for an HS-20 loading. Provide grates with a minimum clear waterway opening of 50 in^2 per 1'-0" length of grate.

If the frame and grate is made from fabricated steel, the requirements of Article 1074-9 of the *Standard Specifications* will be applicable. If the grate and frame is made from iron castings, the requirements of Article 1074-7 of the *Standard Specifications* will be applicable.

Measurement and Payment

Frame with Grates, Driveway Drop Inlet will be measured and paid for as the actual number of linear feet that have been incorporated into the completed and accepted work. Such price and payment will be full compensation for furnishing the grates and frame, and all labor and incidentals necessary to complete the work.

Payment will be made under:

Pay Item	**Pay Unit**
Frame with Grates, Driveway Drop Inlet	Linear Foot

IMPACT ATTENUATOR UNITS, TYPE TL- :
(4-20-04)(Rev. 8-20-24) SP8 R75

Description

Furnish and install impact attenuator units and any components necessary to connect the impact attenuator units in accordance with the manufacturer's requirement, the details in the plans and at locations shown in the plans.

Materials

Furnish attenuator units listed on the NCDOT APL. Units shall not be modified by the manufacturer and installer once approved and on the NCDOT APL.

Prior to installation the Contractor shall submit to the Engineer certified working drawings and assembling instructions from the manufacturer for each impact attenuator unit in accordance with Article 105-2 of the *Standard Specifications*.

Construction Methods

Perform installation in accordance with the plans and details and assembling instructions furnished by the manufacturer.

Measurement and Payment

*Impact Attenuator Unit, Type TL-*___ will be measured and paid at the contract unit price per each. Such prices and payment will be full compensation for all work covered by this provision including, but not limited to, furnishing, installing and all incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
Impact Attenuator Units, Type TL-___	Each

PEDESTRIAN SAFETY RAIL:

(8-28-09)(Rev. 7-18-23) SPI 8-51

Furnish and install steel pipe handrail at locations as shown in the plans, in accordance with the detail in the plans and as directed by the Engineer.

Measurement and Payment

Pedestrian Safety Rail will be measured and paid as the actual number of linear feet of steel pipe handrail measured along the top of the handrail to the nearest 0.1 of a foot. Such price and payment shall be full compensation for fabricating, furnishing, installing, painting, anchoring and all incidentals necessary to satisfactorily install the handrail.

Payment will be made under:

Pay Item	**Pay Unit**
Pedestrian Safety Rail	Linear Foot

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 Footings 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 Footings	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) 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
Time
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 Type
Plant Number
Ticket Number
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%

ELECTRICAL JUNCTION BOXES:

(6-18-24) 1091 SP10 R91

Revise the *Standard Specifications* as follows:

Page 10-209, Subarticle 1091-5(A) General, add the following after line 27:

Boxes and covers shall meet all requirements and specifications of ANSI/SCTE 77. Structural load tests shall meet the Tier 15 application type.

Page 10-209, Subarticle 1091-5(B) Polymer Concrete (PC) Junction Boxes, lines 28, delete and replace the subarticle title with the following:

(B) Polymer Concrete (PC), Composite and Thermoplastic Junction Boxes

Page 10-209, Subarticle 1091-5(B) Polymer Concrete (PC) Junction Boxes, add the following after line 28:

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.

Page 10-209, Subarticle 1091-5(B) Polymer Concrete (PC) Junction Boxes, line 29 replace "polymer concrete (PC) boxes" with "junction boxes".

Page 10-209, Subarticle 1091-5(B) Polymer Concrete (PC) Junction Boxes, lines 31-37, delete the second and third paragraph.

Page 10-209, Subarticle 1091-5(B) Polymer Concrete (PC) Junction Boxes, lines 40-41, delete the fourth sentence of the fourth paragraph and replace with the following:

Bodies of junction boxes shall be a single piece.

Polymer concrete, composite and thermoplastic junction boxes are not required to be listed electrical devices.

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 traffic will be above and within H of shoring. This traffic surcharge does not apply to construction traffic. Design temporary shoring for any construction surcharge if construction traffic will be above and within H of shoring. Design temporary shoring for a traffic (live load) surcharge in accordance with Article 11.5.6 of the *AASHTO LRFD Bridge Design Specifications*.

(3) Cantilever, Braced and Anchored Shoring Designs

Use shoring backfill for fill sections and voids between cantilever, braced and anchored shoring and the critical failure surface. Use concrete or Type 1 grout for embedded portions of drilled-in H-piles. Do not use drilled-in sheet piles.

Define “top of shoring” for cantilever, braced and anchored shoring as where the grade intersects the back of sheet piles or H-piles and timber lagging. Design cantilever, braced and anchored shoring for a traffic impact load of 2,000 pounds per foot applied 18 inches above top of shoring if concrete barrier is above and next to shoring or temporary guardrail is above and attached to shoring. Extend cantilever, braced and anchored shoring at least 32 inches above top of shoring if shoring is designed for traffic impact. Otherwise, extend shoring at least 6 inches

above top of shoring.

Design cantilever, braced and anchored shoring for a maximum deflection of 3 inches if the horizontal distance to the closest edge of pavement or structure is less than H. Otherwise, design shoring for a maximum deflection of 6 inches. Design cantilever and braced shoring in accordance with the plans and *AASHTO Guide Design Specifications for Bridge Temporary Works*.

Design anchored shoring in accordance with the plans and Article 11.9 of the *AASHTO LRFD Bridge Design Specifications*. Use a resistance factor of 0.80 for tensile resistance of anchors with bars, strands or shafts. Extend the unbonded length for ground anchors and the shallowest helix for helical anchors at least 5 feet behind the critical failure surface. Do not extend anchors beyond right-of-way or easement limits. If existing or future obstructions such as foundations, guardrail posts, pavements, pipes, inlets or utilities will interfere with anchors, maintain a clearance of at least 6 inches between obstructions and anchors.

(4) Temporary Wall Designs

Use shoring backfill in the reinforced zone of temporary walls. Separation geotextiles are required between shoring backfill and backfill, natural ground or culverts along the sides of the reinforced zone perpendicular to the wall face. For Class V or VI select material in the reinforced zone, separation geotextiles are also required between shoring backfill and backfill or natural ground on top of and at the back of the reinforced zone.

Design temporary walls in accordance with the plans and Article 11.10 of the *AASHTO LRFD Bridge Design Specifications*. Embed temporary walls at least 18 inches except for walls on structures or rock as determined by the Engineer. Use a uniform reinforcement length throughout the wall height of at least 0.7H or 6 feet, whichever is longer. Extend the reinforced zone at least 6 inches beyond end of reinforcement. Do not locate the reinforced zone outside right-of-way or easement limits.

Use the simplified method for determining maximum reinforcement loads in accordance with the AASHTO LRFD specifications. For geotextile reinforcement, use geotextile properties approved by the Department or default values in accordance with the AASHTO LRFD specifications. For geogrid and geostrip reinforcement, use approved geosynthetic reinforcement properties available from the website shown elsewhere in this provision. Use geosynthetic properties for the direction reinforcement will be installed, a 3-year design life and shoring backfill to be used in the reinforced zone.

Do not use more than 4 different reinforcement strengths for each temporary geosynthetic wall. Design temporary geotextile walls for a reinforcement coverage ratio (R_c) of 1.0. For temporary geogrid walls with an R_c of less than 1.0, use a maximum horizontal clearance between geogrids of 3 feet and stagger reinforcement so geogrids are centered over gaps in the reinforcement layer

below.

For temporary geosynthetic walls, use "L" shaped welded wire facing with 18 to 24 inch long legs. Locate geosynthetic reinforcement so reinforcement layers are at the same level as the horizontal legs of welded wire facing. Use vertical reinforcement spacing equal to facing height. Wrap geotextile or geogrid reinforcement behind welded wire facing and extend reinforcement at least 3 feet back behind facing into shoring backfill. Attach geostrip reinforcement to welded wire facing with a connection approved by the Department.

For temporary wire walls with separate reinforcement and facing components, attach welded wire grid or metallic strip reinforcement to welded wire facing with a connection approved by the Department. For temporary geogrid, geostrip and wire walls, retain shoring backfill at welded wire facing with retention geotextiles and extend geotextiles at least 3 feet back behind facing into backfill.

(D) Preconstruction Meeting

The Engineer may require a shoring preconstruction meeting to discuss the construction, inspection and testing of the temporary shoring. If required and if this meeting occurs before all shoring submittals have been accepted, additional preconstruction meetings may be required before beginning construction of temporary shoring without accepted submittals. The Resident, District or Bridge Maintenance Engineer, Area Construction Engineer, Geotechnical Operations Engineer, Contractor and Shoring Contractor Superintendent will attend preconstruction meetings.

Construction Methods

Control drainage during construction in the vicinity of shoring. Direct run off away from shoring and shoring backfill. Contain and maintain backfill and protect material from erosion.

Install positive protection in accordance with the contract and accepted submittals. Use PCB in accordance with Section 1170 of the *Standard Specifications* and *Roadway Standard Drawing* No. 1170.01. Use temporary guardrail in accordance with Section 862 of the *Standard Specifications* and *Roadway Standard Drawing* Nos. 862.01, 862.02 and 862.03.

(A) Tolerances

Construct shoring with the following tolerances:

(1) Horizontal wires of welded wire facing are level in all directions,

(2) Shoring location is within 6 inches of horizontal and vertical alignment shown in the accepted submittals, and

(3) Shoring plumbness (batter) is not negative and within 2 degrees of vertical.

(B) Cantilever, Braced and Anchored Shoring Installation

If overexcavation behind cantilever, braced or anchored shoring is shown in the accepted submittals, excavate before installing piles. Otherwise, install piles before excavating for shoring. Install cantilever, braced or anchored shoring in accordance with the construction sequence shown in the accepted submittals. Remove piles and if applicable, timber lagging when shoring is no longer needed.

(1) Pile Installation

Install piles with the minimum required embedment and extension in accordance with Subarticles 450-3(D) and 450-3(E) of the *Standard Specifications* except that a pile driving equipment data form is not required. Piles may be installed with a vibratory hammer as approved by the Engineer.

Do not splice sheet piles. Use pile excavation to install drilled-in H-piles. After filling holes with concrete or Type 1 grout to the elevations shown in the accepted submittals, remove any fluids and fill remaining portions of holes with flowable fill. Cure concrete or grout at least 7 days before excavating.

Notify the Engineer if refusal is reached before pile excavation or driven piles attain the minimum required embedment. When this occurs, a revised design submittal may be required.

(2) Excavation

Excavate in front of piles from the top down in accordance with the accepted submittals. For H-piles with timber lagging and braced and anchored shoring, excavate in staged horizontal lifts with a maximum height of 5 feet. Remove flowable fill and material in between H-piles as needed to install timber lagging. Position lagging with at least 3 inches of contact in the horizontal direction between the lagging and pile flanges. Do not excavate the next lift until timber lagging for the current lift is installed and if applicable, bracing and anchors for the current lift are accepted. Backfill behind cantilever, braced or anchored shoring with shoring backfill.

(3) Anchor Installation

If applicable, install foundations located behind anchored shoring before installing anchors. Fabricate and install ground anchors in accordance with the accepted submittals, Articles 6.4 and 6.5 of the *AASHTO LRFD Bridge Construction Specifications* and the following unless otherwise approved:

(a) Materials in accordance with this provision are required instead of materials conforming to Articles 6.4 and 6.5.3 of the AASHTO LRFD Specifications,

(b) Encapsulation-protected ground anchors in accordance with Article 6.4.1.2 of the AASHTO LRFD specifications are not required, and

(c) Corrosion protection for unbonded lengths of ground anchors and anchorage covers are not required.

(d) Mix and place neat cement grout in accordance with Subarticles 1003-5, 1003-6 and 1003-7 of the *Standard Specifications*. Measure grout temperature, density and flow during grouting with at least the same frequency grout cubes are made for compressive strength. Perform density and flow field tests in the presence of the Engineer in accordance with American National Standards Institute/American Petroleum Institute Recommended Practice 13B-1 (Section 4, Mud Balance) and ASTM C939 (Flow Cone), respectively.

Install helical anchors in accordance with the accepted submittals and Anchor Manufacturer's instructions. Measure torque during installation and do not exceed the torsional strength rating of the helical anchor. Attain the minimum required installation torque and penetration before terminating anchor installation. When replacing a helical anchor, embed last helix of the replacement anchor at least 3 helix plate diameters past the location of the first helix of the previous anchor.

(4) Anchor Testing

Proof test and lock-off anchors in accordance with the accepted submittals and Article 6.5.5 of the *AASHTO LRFD Bridge Construction Specifications* except for the acceptance criteria in Article 6.5.5.5. For the AASHTO LRFD specifications, "ground anchor" refers to a ground or helical anchor and "tendon" refers to a bar, strand or shaft.

(a) Anchor Acceptance

Anchor acceptance is based in part on the following criteria.

(i) For ground and helical anchors, total movement is less than 0.04 inches between the 1 and 10 minute readings or less than 0.08 inches between the 6 and 60 minute readings.
(ii) For ground anchors, total movement at maximum test load exceeds 80% of the theoretical elastic elongation of the unbonded length.

(b) Anchor Test Results

Submit PDF files of anchor test records including movement versus load plots for each load increment within 24 hours of completing each row of anchors. The Engineer will review the test records to determine if the anchors are acceptable.

If the Engineer determines an anchor is unacceptable, revise the anchor design or installation methods. Submit a revised anchored shoring design

for acceptance and provide an acceptable anchor with the revised design or installation methods. If required, replace the anchor or provide additional anchors with the revised design or installation methods.

(C) Temporary Wall Installation

Excavate as necessary for temporary walls in accordance with the plans and accepted submittals. If applicable, install foundations located in the reinforced zone before placing shoring backfill or reinforcement unless otherwise approved. Notify the Engineer when foundation excavation is complete. Do not place shoring backfill or reinforcement until excavation dimensions and foundation material are approved.

Erect welded wire facing so the wall position is as shown in the plans and accepted submittals. Set welded wire facing adjacent to each other in the horizontal and vertical direction to completely cover the wall face with facing. Stagger welded wire facing to create a running bond by centering facing over joints in the row below.

Attach geostrip reinforcement to welded wire facing and wrap geotextile reinforcement and retention geotextiles behind welded wire facing as shown in the plans and accepted submittals. Cover geotextiles with at least 3" of shoring backfill. Overlap adjacent geotextile reinforcement and retention and separation geotextiles at least 18 inches with seams oriented perpendicular to the wall face. Hold geotextiles in place with wire staples or anchor pins as needed.

Place reinforcement within 3 inches of locations shown in the plans and accepted submittals. Before placing shoring backfill, pull geosynthetic reinforcement taut so it is in tension and free of kinks, folds, wrinkles or creases. Install reinforcement with the direction shown in the plans and accepted submittals. For temporary wire walls with separate reinforcement and facing components, attach welded wire grid or metallic strip reinforcement to welded wire facing as shown in the accepted submittals. Do not splice or overlap reinforcement so seams are parallel to the wall face. Contact the Engineer when unanticipated existing or future obstructions such as foundations, pavements, pipes, inlets or utilities will interfere with reinforcement.

Place shoring backfill in the reinforced zone in 8 to 10 inch thick lifts. Compact A-2-4 soil and Class II, Type 1 and Class III select material in accordance with Subarticle 235-3(C) of the *Standard Specifications*. Use only hand operated compaction equipment to compact backfill within 3 feet of welded wire facing. At a distance greater than 3 feet, compact shoring backfill with at least 4 passes of an 8 to 10 ton vibratory roller in a direction parallel to the wall face. Smooth wheeled or rubber tired rollers are also acceptable for compacting backfill. Do not use sheepsfoot, grid rollers or other types of compaction equipment with feet. Do not displace or damage reinforcement when placing and compacting shoring backfill. End dumping directly on geosynthetics is not permitted. Do not operate heavy equipment on reinforcement until it is covered with at least 8 inches of shoring backfill. Replace any damaged reinforcement to the satisfaction of the Engineer.

Backfill for temporary walls outside the reinforced zone in accordance with Article 410-8

of the *Standard Specifications*. Bench temporary walls into the sides of excavations where applicable. For temporary geosynthetic walls with top of wall within 5 feet of finished grade, remove top facing and incorporate top reinforcement layer into fill when placing fill in front of wall. Temporary walls remain in place permanently unless otherwise required.

Measurement and Payment

Temporary Shoring will be measured and paid in square feet. Temporary walls will be measured as the square feet of exposed wall face area. Cantilever, braced or anchored shoring will be measured as the square feet of exposed shoring face area with the shoring height equal to the difference between the top and bottom of shoring elevations. Define "top of shoring" as where the grade intersects the back of sheet piles or H-piles and timber lagging. Define "bottom of shoring" as where the grade intersects front of sheet piles or H-piles and timber lagging. No measurement will be made for any embedment, shoring extension above top of shoring or pavement thickness above temporary walls.

The contract unit price for *Temporary Shoring* will be full compensation for providing shoring designs, submittals and materials, excavating, backfilling, hauling and removing excavated materials and supplying all labor, tools, equipment and incidentals necessary to construct temporary shoring.

No payment will be made for temporary shoring not shown in the plans or required by the Engineer including shoring for OSHA reasons or the Contractor's convenience. No value engineering proposals will be accepted based solely on revising or eliminating shoring locations shown in the plans or estimated quantities shown in the bid item sheets as a result of actual field measurements or site conditions.

PCB will be measured and paid in accordance with Article 1170-4 of the *Standard Specifications*. No additional payment will be made for anchoring PCB for temporary shoring. Costs for anchoring PCB will be incidental to temporary shoring.

Temporary guardrail will be measured and paid for in accordance with Article 862-6 of the *Standard Specifications*.

Payment will be made under:

Pay Item	**Pay Unit**
Temporary Shoring	Square Foot

CONES:

(3-19-24) 1135 SP11 R35

Revise the *Standard Specifications* as follows:

Page 11-11, Article 1135-3 CONSTRUCTION METHODS, lines 19-20, delete the third sentence of the first paragraph, "Do not use cones in the upstream taper of lane or shoulder closures for multi-lane roadways.".

SNOWPLOWABLE DELINEATION:
(10-15-24) 1253 SP12 R53

Description

Furnish, install and maintain snowplowable delineation.

There are five snowplowable delineation alternate options approved for use in North Carolina. They include the following markers and markings options:

(1) Polycarbonate H-shaped Markers
(2) Inlaid Raised Pavement Markers
(3) 10' Rumble Skips
(4) Inlaid Cradle Markers
(5) 10' Inlaid Pavement Markings

Only one type of snowplowable delineation will be allowed on a single project.

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	**Section**
Epoxy	1081
Pavement Markings	1087
Snowplowable Pavement Markers	1086-3

Any snowplowable pavement delineation shall conform to the applicable requirements of Sections 1086, 1087, and 1081 of the *Standards and Specifications.* Use snowplowable delineation markers and markings listed on the NCDOT APL. Any treatment that requires pavement cutting or milling shall be installed within 7 calendar days of the pavement cutting or milling operation.

Construction Methods

(A) General

For any snowplowable delineation, prior to installation, by brushing, blow cleaning, vacuuming or other suitable means, ensure that all materials and the pavement surface are free of dirt, grease, dust, oil, moisture, mud, grass, or any other material that would prevent adhesion to the pavement by brushing blow cleaning, or vacuuming. If required, apply a primer per manufactures recommendations to pavement surfaces before applying pavement marking material.

Install snowplowable delineation per manufacturers specifications every 80 feet. Make sure pavement markers are oriented to traffic correctly and pavement markings are applied in a uniform thickness. Do not apply markings over longitudinal joints. Protect the pavement markings until they are tack free. Apply applicable Sections 1205 and 1250 of the *Standards Specifications*.

If damage occurs during installation the effected treatments shall be corrected or replaced. This work shall be considered incidental to the installation of the marking or marker.

(B) Polycarbonate H-shaped Markers and Inlaid Cradle Markers

Bond marker housings to the pavement with epoxy adhesive. Mechanically mix and dispense epoxy adhesives as required by the manufacturer's specifications. Place the markers immediately after the adhesive has been mixed and dispensed.

Install polycarbonate H-shaped markers and inlaid cradle markers castings into slots sawcut into the pavement. Make slots in the pavement to exactly duplicate the shape of the casting of the polycarbonate H-shaped markers and inlaid cradle markers.

If saw cutting, milling, or grooving operations are used, promptly remove all resulting debris from the pavement surface. Install the marker housings within 7 calendar days after saw cutting , milling, or grooving the pavement. Remove and dispose of loose material from the slots by brushing, blow cleaning or vacuuming. Dry the slots before applying the epoxy adhesive. Install polycarbonate H-shaped markers and inlaid cradle markers according to the manufacturer's recommendations.

Protect the polycarbonate H-shaped markers or inlaid cradle markers until the epoxy has initially cured and is track free.

Construct inlaid cradle markers in accordance with the details in the plans and as directed by the Engineer.

(C) Reflector Replacement

The following requirements only apply to polycarbonate H-shaped markers and inlaid cradle markers.

In the event that a reflector is damaged, replace the damaged reflector by using adhesives and methods recommended by the manufacturer of the markers and approved by the Engineer. This work is considered incidental if damage occurs during the initial installation of the marker housings and maintenance of initial polycarbonate H-shaped markers or inlaid cradle markers specified in this section.

If during reflector replacement it is discovered that the housing is missing or broken this will be paid as *Polycarbonate H-shaped Markers* or *Inlaid Cradle Markers*. Missing housings shall be replaced. Broken housings shall be removed and replaced. In both cases the slot for the housings shall be properly prepared prior to installing the new housing; patch the existing marker slots as directed by the Engineer and install the new marker approximately one foot before or after the patch. Removal of broken housings and preparation of slots will be considered incidental to the work of replacing housings.

(D) Inlaid Raised Pavement Markers

Cut groove in accordance with the details in the plans and as directed by the Engineer.

Use adhesive recommended by the manufacturer to install markers into the groove in accordance with Section 1251. The raised pavement markers are incidental to inlaid raised pavement markers.

(E) 10' Rumble Skips

Construct 10' rumble skips on asphalt concrete in accordance with Section 665 for all centerline and shoulder rumble skips, details in the plans and as directed by the Engineer. Construct 10' rumble skips on Portland cement concrete in accordance with Section 730 for all centerline and shoulder rumble skips, details in the plans and as directed by the Engineer. The milled rumble strips are incidental to the rumble skips. Using polyurea or extruded 90 mil thermoplastic construct pavement markings in accordance with Section 1205.

(F) 10' Inlaid Pavement Markings

The groove in which the marking is to be placed shall be one inch wider than the marking to be placed and 10 mils deeper than the thickness of the marking.

When using this method, use enhanced reflective media. The following retroreflectivity values shall be met.

MINIMUM INITIAL REFLECTOMETER READINGS		
Item	**Color**	**Reflectivity**
Enhanced Reflectivity Media	White	450 mcd/lux/m^2
	Yellow	350 mcd/lux/m^2

Using polyurea, extruded 90 mil thermoplastic or cold applied plastic construct pavement markings in accordance with Section 1205.

Maintenance

Maintain all installed snowplowable delineation before acceptance by the Engineer.

Measurement and Payment

Polycarbonate H-shaped Markers will be measured and paid as the actual number of polycarbonate H-shaped markers satisfactorily placed and accepted by the Engineer.

Inlaid Raised Pavement Markers will be measured and paid as the actual number of inlaid raised pavement markers satisfactorily placed and accepted by the Engineer.

10' Rumble Skips will be measured and paid as the actual number of rumble skips satisfactorily placed and accepted by the Engineer.

Inlaid Cradle Markers will be measured and paid as the actual number of pavement markers satisfactorily placed and accepted by the Engineer.

10' Inlaid Pavement Markings will be measured and paid as the actual number of 10' inlaid pavement markings satisfactorily placed and accepted by the Engineer.

Replace Snowplowable Pavement Marker Reflector will be measured and paid in accordance with Article 1253-5.

Payment will be made under:

Pay Item	**Pay Unit**
Polycarbonate H-shaped Markers	Each
Inlaid Raised Pavement Markers	Each
10' Rumble Skips	Each
Inlaid Cradle Markers	Each
10' Inlaid Pavement Markings	Each

ROADWAY LIGHTING FOUNDATIONS:

(1-16-18)(Rev. 1-16-24) SP14 R04

Description

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

Materials

Use roadway lighting foundation materials that meet the *Foundations and Anchor Rod Assemblies for Metal Poles* provision. Provide metal shrouds for median mounted light standards in accordance with Subarticle 1400-4(I) of the *Standard Specifications*.

Roadway Lighting Foundations

(A) High Mount Foundations

Construct high mount foundations for the wind zone and high mount heights shown in the plans unless the following assumed site conditions are not applicable to high mount locations:

(E) Soil with unit weight (γ) $\geq$ 120 pcf and friction angle (ϕ) $\geq$ 30°,
(F) Groundwater at least 7 feet below finished grade and
(G) Slope of finished grade 6:1 (H:V) or flatter.

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

(B) Standard Foundations

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

Subsurface Investigations

Use a prequalified geotechnical consultant to perform one standard penetration test (SPT) boring in accordance with ASTM D1586 at each high mount location requiring a subsurface investigation. Rough grade high mount locations to within 2 ft 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.

High Mount Foundation Designs

Design high mount foundations for the wind zone and high mount heights shown in the plans and the slope of finished grade and subsurface conditions at each high mount location. Design drilled piers, footings and pedestals in accordance with the *AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*.

Design drilled piers for side resistance only in accordance with Section 4.6 of the *AASHTO Standard Specifications for Highway Bridges*. Use the computer software LPILE version 2016 or later manufactured by Ensoft, Inc. to analyze drilled piers. Provide drilled pier designs with a horizontal deflection of less than 0.5" at top of piers.

Design footings in accordance with Section 4.4 of the *AASHTO Standard Specifications for Highway Bridges.* Do not use an allowable bearing pressure of more than 3,000 psf for footings. Submit boring logs, working drawings and design calculations for acceptance in accordance with Article 105-2 of the *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 high mount foundation design submittals. Have high mount foundations designed, detailed and sealed by an engineer licensed in the state of North Carolina.

Construction Methods

Grade around roadway lighting locations with cut and fill slopes as shown on *Roadway Standard Drawing* No. 1402.01 or 1405.01. Construct drilled piers, footings and pedestals and install anchor rod assemblies for roadway lighting foundations in accordance with the *Foundations and Anchor Rod Assemblies for Metal Poles* provision.

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

Measurement and Payment

High Mount Foundations will be measured and paid in cubic yards. High mount foundations will be measured as the cubic yards of concrete shown on *Roadway Standard Drawing* No. 1402.01 for the high mount height and wind zone shown in the plans. All other high mount foundations will be measured as the cubic yards of foundation concrete for drilled piers, footings and pedestals shown in the accepted submittals. Subsurface investigations and high mount foundation designs required by the Engineer will be paid as extra work in accordance with Article 104-7 of the *Standard Specifications*.

Standard Foundation ____ will be measured and paid in units of each. Standard foundations will be measured as the number of each standard foundation type. Alternate standard foundations will be measured as 1.5 times the number of each standard foundation type replaced.

The contract unit prices for *High Mount Foundations* and *Standard Foundation* ____ 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 roadway lighting foundations.

Payment will be made under:

Pay Item	**Pay Unit**
High Mount Foundations	Cubic Yard
Standard Foundation ____	Each

WATTLE DEVICES:

(1-1-24) 1642 SP16 R01

Page 16-23, Subarticle 1642-2(B) Wattle, lines 10-12, delete and replace with the following:

(B) Wattle and Wattle Barrier

Wattles shall meet Table 1642-1.

TABLE 1642-1 100% CURLED WOOD (EXCELSIOR) FIBERS - WATTLE	
Property	**Property Value**
Minimum Diameter	12 inches
Minimum Density	2.5 pcf +/- 10%
Net Material	Synthetic
Net Openings	1 inch x 1 inch
Net Configuration	Totally Encased
Minimum Weight	20 lb +/- 10% per 10 foot length

Coir Fiber Wattles shall meet Table 1642-2.

TABLE 1642-2 100% COIR (COCONUT) FIBERS WATTLE	
Property	**Property Value**
Minimum Diameter	12 inches
Minimum Density	3.5 pcf +/- 10%
Net Material	Coir Fiber
Net Openings	2 inch x 2 inch
Net Strength	90 lb
Minimum Weight	2.6 pcf +/- 10%

Wattle Barriers shall meet Table 1642-3.

TABLE 1642-3 100% CURLED WOOD (EXCELSIOR) FIBERS – WATTLE BARRIER	
Property	**Property Value**
Minimum Diameter	18 inches
Minimum Density	2.9 pcf +/- 10%
Net Material	Synthetic
Net Openings	1 inch x 1 inch
Net Configuration	Totally Encased
Minimum Weight	5 pcf +/- 10%

Coir Fiber Wattle Barriers shall meet Table 1642-4.

TABLE 1642-4 100% COIR (COCONUT) FIBERS WATTLE BARRIER	
Property	**Property Value**
Minimum Diameter	18 inches
Minimum Density	5 pcf +/- 10%
Net Material	Coir Fiber
Net Openings	2 inch x 2 inch
Net Strength	90 lb
Minimum Weight	10 pcf +/- 10%

Pages 16-24 & 16-25, Article 1642-5 MEASUREMENT AND PAYMENT, lines 42-47 & lines 1-2, delete and replace with the following:

Wattle will be measured and paid for by the actual number of linear feet of wattles which are installed and accepted. Such price and payment will be full compensation for all work covered by this section, including, but not limited to, furnishing all materials, labor, equipment and incidentals necessary to install the *Wattle*.

Coir Fiber Wattles will be measured and paid for by the actual number of linear feet of coir fiber wattles which are installed and accepted. Such price and payment will be full compensation for all work covered by this section, including, but not limited to, furnishing all materials, labor, equipment and incidentals necessary to install the *Coir Fiber Wattles*.

Wattle Barrier will be measured and paid as the actual number of linear feet of wattle barrier installed and accepted. Such price and payment will be full compensation for all work covered by this provision, including, but not limited to, furnishing all materials, labor, equipment and incidentals necessary to install the *Wattle Barrier*.

Coir Fiber Wattle Barrier will be measured and paid as the actual number of linear feet of coir fiber wattle barrier installed and accepted. Such price and payment will be full compensation for all work covered by this provision, including, but not limited to, furnishing all materials, labor, equipment and incidentals necessary to install the *Coir Fiber Wattle Barrier*.

Page 16-25, Article 1642-5 MEASUREMENT AND PAYMENT, after line 9, delete and replace "___ Wattle Check" with "Wattle".

Page 16-25, Article 1642-5 MEASUREMENT AND PAYMENT, after line 9, delete and replace "___ Wattle Barrier" with "Wattle Barrier".

Page 16-25, Article 1642-5 MEASUREMENT AND PAYMENT, after line 9, add the following:

Pay Item	**Pay Unit**
Coir Fiber Wattle	Linear Foot
Coir Fiber Wattle Barrier	Linear Foot

PERMANENT SEEDING AND MULCHING:

(7-1-95)(Rev. 1-16-24) 1660 SP16 R02

The Department desires that permanent seeding and mulching be established on this project as soon as practical after slopes or portions of slopes have been graded. As an incentive to obtain an early stand of vegetation on this project, the Contractor's attention is called to the following:

For all permanent seeding and mulching that is satisfactorily completed in accordance with the requirements of Section 1660 in the *Standard Specifications* and within the following percentages of elapsed contract times, an additional payment will be made to the Contractor as an incentive additive. The incentive additive will be determined by multiplying the number of

acres of seeding and mulching satisfactorily completed times the contract unit bid price per acre for Seeding and Mulching times the appropriate percentage additive.

Percentage of Elapsed Contract Time	Percentage Additive
0% - 30%	30%
30.01% - 50%	15%

Percentage of elapsed contract time is defined as the number of calendar days from the date of availability of the contract to the date the permanent seeding and mulching is acceptably completed divided by the total original contract time.

STANDARD SPECIAL PROVISION
AVAILABILITY OF FUNDS – TERMINATION OF CONTRACTS

(5-20-08)(Rev. 1-16-24) Z-2

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

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

Payment will be made on any contract terminated pursuant to the special provision in accordance with Subarticle 108-13(D) of the *Standard Specifications*.

STANDARD SPECIAL PROVISION
NCDOT GENERAL SEED SPECIFICATION FOR SEED QUALITY

(5-17-11) Z-3

Seed shall be sampled and tested by the North Carolina Department of Agriculture and Consumer Services, Seed Testing Laboratory. When said samples are collected, the vendor shall supply an independent laboratory report for each lot to be tested. Results from seed so sampled shall be final. Seed not meeting the specifications shall be rejected by the Department of Transportation and shall not be delivered to North Carolina Department of Transportation warehouses. If seed has been delivered it shall be available for pickup and replacement at the supplier's expense.

Any re-labeling required by the North Carolina Department of Agriculture and Consumer Services, Seed Testing Laboratory, that would cause the label to reflect as otherwise specified herein shall be rejected by the North Carolina Department of Transportation.

Seed shall be free from seeds of the noxious weeds Johnsongrass, Balloonvine, Jimsonweed, Witchweed, Itchgrass, Serrated Tussock, Showy Crotalaria, Smooth Crotalaria, Sicklepod, Sandbur, Wild Onion, and Wild Garlic. Seed shall not be labeled with the above weed species on the seed analysis label. Tolerances as applied by the Association of Official Seed Analysts will NOT be allowed for the above noxious weeds except for Wild Onion and Wild Garlic.

Tolerances established by the Association of Official Seed Analysts will generally be recognized. However, for the purpose of figuring pure live seed, the found pure seed and found germination percentages as reported by the North Carolina Department of Agriculture and Consumer Services, Seed Testing Laboratory will be used. Allowances, as established by the NCDOT, will be recognized for minimum pure live seed as listed on the following pages.

The specifications for restricted noxious weed seed refers to the number per pound as follows:

Restricted Noxious **Weed**	Limitations per Lb. Of Seed	Restricted Noxious **Weed**	Limitations per Lb. of Seed
Blessed Thistle	4 seeds	Cornflower (Ragged Robin)	27 seeds
Cocklebur	4 seeds	Texas Panicum	27 seeds
Spurred Anoda	4 seeds	Bracted Plantain	54 seeds
Velvetleaf	4 seeds	Buckhorn Plantain	54 seeds
Morning-glory	8 seeds	Broadleaf Dock	54 seeds
Corn Cockle	10 seeds	Curly Dock	54 seeds
Wild Radish	12 seeds	Dodder	54 seeds
Purple Nutsedge	27 seeds	Giant Foxtail	54 seeds
Yellow Nutsedge	27 seeds	Horsenettle	54 seeds
Canada Thistle	27 seeds	Quackgrass	54 seeds
Field Bindweed	27 seeds	Wild Mustard	54 seeds
Hedge Bindweed	27 seeds		

Seed of Pensacola Bahiagrass shall not contain more than 7% inert matter, Kentucky Bluegrass, Centipede and Fine or Hard Fescue shall not contain more than 5% inert matter whereas a maximum of 2% inert matter will be allowed on all other kinds of seed. In addition, all seed

shall not contain more than 2% other crop seed nor more than 1% total weed seed. The germination rate as tested by the North Carolina Department of Agriculture shall not fall below 70%, which includes both dormant and hard seed. Seed shall be labeled with not more than 7%, 5% or 2% inert matter (according to above specifications), 2% other crop seed and 1% total weed seed.

Exceptions may be made for minimum pure live seed allowances when cases of seed variety shortages are verified. Pure live seed percentages will be applied in a verified shortage situation. Those purchase orders of deficient seed lots will be credited with the percentage that the seed is deficient.

FURTHER SPECIFICATIONS FOR EACH SEED GROUP ARE GIVEN BELOW:

Minimum 85% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 restricted noxious weed seed per pound. Seed less than 83% pure live seed will not be approved.

Sericea Lespedeza
Oats (seeds)

Minimum 80% pure live seed; maximum 1% total weed seed; maximum 2% total other crop; maximum 144 restricted noxious weed seed per pound. Seed less than 78% pure live seed will not be approved.

Tall Fescue (all approved varieties)
Kobe Lespedeza
Korean Lespedeza
Weeping Lovegrass
Carpetgrass
Bermudagrass
Browntop Millet
German Millet – Strain R
Clover – Red/White/Crimson

Minimum 78% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 restricted noxious weed seed per pound. Seed less than 76% pure live seed will not be approved.

Common or Sweet Sundangrass

Minimum 76% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 restricted noxious weed seed per pound. Seed less than 74% pure live seed will not be approved.

Rye (grain; all varieties)
Kentucky Bluegrass (all approved varieties)
Hard Fescue (all approved varieties)
Shrub (bicolor) Lespedeza

Minimum 70% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 noxious weed seed per pound. Seed less than 70% pure live seed will not be approved.

Centipedegrass
Crownvetch
Pensacola Bahiagrass
Japanese Millet
Reed Canary Grass
Zoysia

Creeping Red Fescue

Minimum 70% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 5% inert matter; maximum 144 restricted noxious weed seed per pound.

Barnyard Grass
Big Bluestem
Little Bluestem
Bristly Locust
Birdsfoot Trefoil
Indiangrass
Orchardgrass
Switchgrass
Yellow Blossom Sweet Clover

STANDARD SPECIAL PROVISION
ERRATA

(1-16-24) Z-4

Revise the *2024 Standard Specifications* as follows:

Division 3

Page 3-5, Article 305-2 MATERIALS, after line 16, replace " 1032-3(A)(7)" with "1032-3" and add the item "Galvanized Corrugated Steel Pipe" with Section "1032-3".

Page 3-6, Article 310-2 MATERIALS, after line 9, add the item "Galvanized Corrugated Steel Pipe" with Section "1032-3".

Division 9

Page 9-17, Article 904-4 MEASUREMENT AND PAYMENT, prior to line 1, replace " Sign Erection, Relocate Type (Ground Mounted)" with "Sign Erection, Relocate Type ___ (Ground Mounted)".

Division 10

Page 10-51, Article 1024-4 WATER, prior to line 1, delete the "unpopulated blank row" in Table 1024-2 between "Time of set, deviation from control" and "Chloride Ion Content, Max.".

Page 10-170, Subarticle 1081-1(C) Requirements, line 4, replace "maximum" with "minimum".

Division 11

Page 11-15, Article 1160-4 MEASUREMENT AND PAYMENT, line 24, replace "Where barrier units are moved more than one" with "Where barrier units are moved more than once".

Division 15

Page 15-10, Article 1515-4 MEASUREMENT AND PAYMENT, lines 11, replace " All piping" with "All labor, the manhole, other materials, excavation, backfilling, piping".

Division 16

Page 16-14, Article 1633-5 MEASUREMENT AND PAYMENT, line 20-24 and prior to line 25, delete and replace with the following " *Flocculant* will be measured and paid in accordance with Article 1642-5 applied to the temporary rock silt checks."

Page 16-3, Article 1609-2 MATERIALS, after line 26, replace "Type 4" with "Type 4a".

Page 16-25, Article 1644-2 MATERIALS, after line 22, replace "Type 4" with "Type 4a".

STANDARD SPECIAL PROVISION

PLANT AND PEST QUARANTINES
(Imported Fire Ant, Gypsy Moth, Witchweed, Emerald Ash Borer, Guava Root Knot Nematode, And Other Noxious Weeds)

(3-18-03) (Rev. 5-21-19) Z-04a

Within Quarantined Area

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

Originating in a Quarantined County

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

Contact

Contact the N.C. Department of Agriculture/United States Department of Agriculture at 1-800-206-9333, 919-707-3730, or *https://www.ncagr.gov/plantindustry/Plant/quaran/table2.htm* to determine those specific project sites located in the quarantined area or for any regulated article used on this project originating in a quarantined county.

Regulated Articles Include

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

STANDARD SPECIAL PROVISION

TITLE VI AND NONDISCRIMINATION:

(6-28-77)(Rev 1/16/2024) Z-6

The North Carolina Department of Transportation is committed to carrying out the U.S. Department of Transportation's policy of ensuring nondiscrimination in the award and administration of contracts.

The provisions of this section related to United States Department of Transportation (US DOT) Order 1050.2A, Title 49 Code of Federal Regulations (CFR) part 21, 23 United States Code (U.S.C.) 140 and 23 CFR part 200 (or 49 CFR 303, 49 U.S.C. 5332 or 49 U.S.C. 47123) are applicable to all North Carolina Department of Transportation (NCDOT) contracts and to all related subcontracts, material supply, engineering, architectural and other service contracts, regardless of dollar amount. Any Federal provision that is specifically required not specifically set forth is hereby incorporated by reference.

(1) **Title VI Assurances (USDOT Order 1050.2A, Appendix A)**

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

(a) Compliance with Regulations

The contractor (hereinafter includes consultants) shall comply with the Acts and the Regulations relative to Nondiscrimination in Federally-assisted programs of the U.S. Department of Transportation, Federal Highway Administration (FHWA), as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

(b) Nondiscrimination

The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor shall not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.

(c) Solicitations for Subcontractors, Including Procurements of Materials and Equipment

In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Nondiscrimination on the grounds of race, color, or national origin.

(d) Information and Reports

The contractor shall provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be

determined by the Recipient or the FHWA to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor shall so certify to the Recipient or the FHWA, as appropriate, and shall set forth what efforts it has made to obtain the information.

(e) Sanctions for Noncompliance:

In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it and/or the FHWA may determine to be appropriate, including, but not limited to:

(i) Withholding payments to the contractor under the contract until the contractor complies; and/or

(ii) Cancelling, terminating, or suspending a contract, in whole or in part.

(f) Incorporation of Provisions

The contractor shall include the provisions of paragraphs (a) through (f) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor shall take action with respect to any subcontract or procurement as the Recipient or the FHWA may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

(2) **Title VI Nondiscrimination Program (23 CFR 200.5(p))**

The North Carolina Department of Transportation (NCDOT) has assured the USDOT that, as a condition to receiving federal financial assistance, NCDOT will comply with Title VI of the Civil Rights Act of 1964 and all requirements imposed by Title 49 CFR part 21 and related nondiscrimination authorities to ensure that no person shall, on the ground of race, color, national origin, limited English proficiency, sex, age, or disability (including religion/creed or income-level, where applicable), be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any programs, activities, or services conducted or funded by NCDOT. Contractors and other organizations under contract or agreement with NCDOT must also comply with Title VI and related authorities, therefore:

(a) During the performance of this contract or agreement, contractors (e.g., subcontractors, consultants, vendors, prime contractors) are responsible for complying with NCDOT's Title VI Program. Contractors are not required to prepare or submit Title VI Programs. To comply with this section, the prime contractor shall:

1. Post NCDOT's Notice of Nondiscrimination and the Contractor's own Equal Employment Opportunity (EEO) Policy in conspicuous locations accessible to all employees, applicants and subcontractors on the jobsite.

2. Physically incorporate the required Title VI clauses into all subcontracts on federally-assisted and state-funded NCDOT projects, and ensure inclusion by subcontractors into all lower-tier subcontracts.

3. Required Solicitation Language. The Contractor shall include the following notification in all solicitations for bids and requests for work or material, regardless of funding source:

   "The North Carolina Department of Transportation, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 US.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award. In accordance with other related nondiscrimination authorities, bidders and contractors will also not be discriminated against on the grounds of sex, age, disability, low-income level, creed/religion, or limited English proficiency in consideration for an award."

4. Physically incorporate the FHWA-1273, in its entirety, into all subcontracts and subsequent lower tier subcontracts on Federal-aid highway construction contracts only.

5. Provide language assistance services (i.e., written translation and oral interpretation), free of charge, to LEP employees and applicants. Contact NCDOT OCR for further assistance, if needed.

6. For assistance with these Title VI requirements, contact the NCDOT Title VI Nondiscrimination Program at 1-800-522-0453.

(b) Subrecipients (e.g. cities, counties, LGAs, planning organizations) may be required to prepare and submit a Title VI Plan to NCDOT, including Title VI Assurances and/or agreements. Subrecipients must also ensure compliance by their contractors and subrecipients with Title VI. (23 CFR 200.9(b)(7))

(c) If reviewed or investigated by NCDOT, the contractor or subrecipient agrees to take affirmative action to correct any deficiencies found within a reasonable time period, not to exceed 90 calendar days, unless additional time is granted by NCDOT. (23 CFR 200.9(b)(15))

(d) The Contractor is responsible for notifying subcontractors of NCDOT's External Discrimination Complaints Process.

1. Applicability

   Title VI and related laws protect participants and beneficiaries (e.g., members of the public and contractors) from discrimination by NCDOT employees, subrecipients and contractors, regardless of funding source.

2. Eligibility

   Any person—or class of persons—who believes he/she has been subjected to discrimination based on race, color, national origin, Limited English Proficiency (LEP), sex, age, or disability (and religion in the context of employment, aviation, or transit) may file a written complaint. The law also prohibits intimidation or retaliation of any sort.

3. Time Limits and Filing Options

   Complaints may be filed by the affected individual(s) or a representative and must be filed no later than 180 calendar days after the following:

   (i) The date of the alleged act of discrimination; or

   (ii) The date when the person(s) became aware of the alleged discrimination; or

   (iii) Where there has been a continuing course of conduct, the date on which that conduct was discontinued or the latest instance of the conduct.

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

   - North Carolina Department of Transportation, Office of Civil Rights, Title VI Program, 1511 Mail Service Center, Raleigh, NC 27699-1511; toll free 1-800-522-0453
   - Federal Highway Administration, North Carolina Division Office, 310 New Bern Avenue, Suite 410, Raleigh, NC 27601, 919-747-7010
   - US Department of Transportation, Departmental Office of Civil Rights, External Civil Rights Programs Division, 1200 New Jersey Avenue, SE, Washington, DC 20590; 202-366-4070

4. Format for Complaints

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

5. Discrimination Complaint Form

   Contact NCDOT Civil Rights to receive a full copy of the Discrimination Complaint Form and procedures.

6. Complaint Basis

   Allegations must be based on issues involving race, color, national origin (LEP), sex, age, disability, or religion (in the context of employment, aviation or transit). "Basis" refers to the complainant's membership in a protected group category.

TABLE 103-1
COMPLAINT BASIS

Protected Categories	Definition	Examples	Applicable Nondiscrimination Authorities
Race and Ethnicity	An individual belonging to one of the accepted racial groups; or the perception, based usually on physical characteristics that a person is a member of a racial group	Black/African American, Hispanic/Latino, Asian, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, White	Title VI of the Civil Rights Act of 1964; 49 CFR Part 21; 23 CFR 200; 49 U.S.C. 5332(b); 49 U.S.C. 47123. *(Executive Order 13166)*
Color	Color of skin, including shade of skin within a racial group	Black, White, brown, yellow, etc.	
National Origin *(Limited English Proficiency)*	Place of birth. Citizenship is not a factor. (*Discrimination based on language or a person's accent is also covered)*	Mexican, Cuban, Japanese, Vietnamese, Chinese	
Sex	Gender. The sex of an individual. *Note:* Sex under this program does not include sexual orientation.	Women and Men	1973 Federal-Aid Highway Act; 49 U.S.C. 5332(b); 49 U.S.C. 47123.
Age	Persons of any age	21-year-old person	Age Discrimination Act of 1975 49 U.S.C. 5332(b); 49 U.S.C. 47123.
Disability	Physical or mental impairment, permanent or temporary, or perceived.	Blind, alcoholic, para-amputee, epileptic, diabetic, arthritic	Section 504 of the Rehabilitation Act of 1973; Americans with Disabilities Act of 1990
Religion (in the context of employment) *(Religion/ Creed in all aspects of any aviation or transit-related construction)*	An individual belonging to a religious group; or the perception, based on distinguishable characteristics that a person is a member of a religious group. In practice, actions taken as a result of the moral and ethical beliefs as to what is right and wrong, which are sincerely held with the strength of traditional religious views. ***Note:*** Does not have to be associated with a recognized religious group or church; if an individual sincerely holds to the belief, it is a protected religious practice.	Muslim, Christian, Sikh, Hindu, etc.	Title VII of the Civil Rights Act of 1964; 23 CFR 230; FHWA-1273 Required Contract Provisions. *(49 U.S.C. 5332(b);* *49 U.S.C. 47123)*

(3) **Pertinent Nondiscrimination Authorities**

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

(a) Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21.

(b) The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);

(c) Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), (prohibits discrimination on the basis of sex);

(d) Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability) and 49 CFR Part 27;

(e) The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);

(f) Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);

(g) The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);

(h) Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;

(i) The Federal Aviation Administration's Nondiscrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);

(j) Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures Nondiscrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;

(k) Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of Limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);

(l) Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

(m) Title VII of the Civil Rights Act of 1964 (42 U.S.C. § 2000e et seq., Pub. L. 88-352), (prohibits employment discrimination on the basis of race, color, religion, sex, or national origin).

(4) **Additional Title VI Assurances**

***The following Title VI Assurances (Appendices B, C and D) shall apply, as applicable*

(a) Clauses for Deeds Transferring United States Property (1050.2A, Appendix B)

The following clauses will be included in deeds effecting or recording the transfer of real property, structures, or improvements thereon, or granting interest therein from the United States pursuant to the provisions of Assurance 4.

NOW, THEREFORE, the U.S. Department of Transportation as authorized by law and upon the condition that the North Carolina Department of Transportation (NCDOT) will accept title to the lands and maintain the project constructed thereon in accordance with the North Carolina General Assembly, the Regulations for the Administration of the Federal-Aid Highway Program, and the policies and procedures prescribed by the Federal Highway Administration of the U.S. Department of Transportation in accordance and in compliance with all requirements imposed by Title 49, Code of Federal Regulations, U.S. Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination in Federally-assisted programs of the U.S Department of Transportation pertaining to and effectuating the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252; 42 U.S.C. § 2000d to 2000d-4), does hereby remise, release, quitclaim and convey unto the NCDOT all the right, title and interest of the U.S. Department of Transportation in and to said lands described in Exhibit A attached hereto and made a part hereof.

(HABENDUM CLAUSE)

TO HAVE AND TO HOLD said lands and interests therein unto the North Carolina Department of Transportation (NCDOT) and its successors forever, subject, however, to the covenants, conditions, restrictions and reservations herein contained as follows, which will remain in effect for the period during which the real property or structures are used for a purpose for which Federal financial assistance is extended or for another purpose involving the provision of similar services or benefits and will be binding on the NCDOT, its successors and assigns.

The NCDOT, in consideration of the conveyance of said lands and interests in lands, does hereby covenant and agree as a covenant running with the land for itself, its successors and assigns, that (1) no person will on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination with regard to any facility located wholly or in part on, over, or under such lands hereby conveyed [,] [and]* (2) that the NCDOT will use the lands and interests in lands and interests in lands so conveyed, in compliance with all requirements imposed by or pursuant to Title 49, Code of Federal Regulations, U.S. Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, Effectuation of Title VI of the Civil Rights Act of 1964, and as said Regulations and Acts may be amended [, and (3) that in the event of breach of any of the above-mentioned nondiscrimination conditions, the Department will have a right to enter or re-enter said lands and facilities on said land, and that above described land and facilities will thereon revert to and vest in and become the absolute property of the U.S. Department of Transportation and its assigns as such interest existed prior to this instruction].*

(*Reverter clause and related language to be used only when it is determined that such a clause is necessary in order to make clear the purpose of Title VI.)

(b) Clauses for Transfer of Real Property Acquired or Improved Under the Activity, Facility, or Program (1050.2A, Appendix C)

The following clauses will be included in deeds, licenses, leases, permits, or similar instruments entered into by the North Carolina Department of Transportation (NCDOT) pursuant to the provisions of Assurance 7(a):

1. The (grantee, lessee, permittee, etc. as appropriate) for himself/herself, his/her heirs, personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree [in the case of deeds and leases add "as a covenant running with the land"] that:

   (i.) In the event facilities are constructed, maintained, or otherwise operated on the property described in this (deed, license, lease, permit, etc.) for a purpose for which a U.S. Department of Transportation activity, facility, or program is extended or for another purpose involving the provision of similar services or benefits, the (grantee, licensee, lessee, permittee, etc.) will maintain and operate such facilities and services in compliance with all requirements imposed by the Acts and Regulations (as may be amended) such that no person on the grounds of race, color, or national origin, will be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities.

2. With respect to licenses, leases, permits, etc., in the event of breach of any of the above Nondiscrimination covenants, the NCDOT will have the right to terminate the (lease, license, permit, etc.) and to enter, re-enter, and repossess said lands and facilities thereon, and hold the same as if the (lease, license, permit, etc.) had never been made or issued. *

3. With respect to a deed, in the event of breach of any of the above Nondiscrimination covenants, the NCDOT will have the right to enter or re-enter the lands and facilities thereon, and the above described lands and facilities will there upon revert to and vest in and become the absolute property of the NCDOT and its assigns. *

(*Reverter clause and related language to be used only when it is determined that such a clause is necessary to make clear the purpose of Title VI.)

(c) Clauses for Construction/Use/Access to Real Property Acquired Under the Activity, Facility or Program (1050.2A, Appendix D)

The following clauses will be included in deeds, licenses, permits, or similar instruments/ agreements entered into by the North Carolina Department of Transportation (NCDOT) pursuant to the provisions of Assurance 7(b):

1. The (grantee, licensee, permittee, etc., as appropriate) for himself/herself, his/her heirs, personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree (in the case of deeds and leases add, "as a covenant running with the land") that (1) no person on the ground of race, color, or national origin, will be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities, (2) that in the construction of any improvements on, over, or under such land, and the furnishing of services thereon, no person on the ground of race, color, or national origin, will be excluded from participation in, denied the benefits of, or otherwise be subjected to discrimination, (3) that the (grantee, licensee, lessee, permittee, etc.) will use the premises in compliance with all other requirements imposed by or pursuant to the Acts and Regulations, as amended, set forth in this Assurance.
2. With respect to (licenses, leases, permits, etc.), in the event of breach of any of the above Non¬ discrimination covenants, the NCDOT will have the right to terminate the (license, permit, etc., as appropriate) and to enter or re-enter and repossess said land and the facilities thereon, and hold the same as if said (license, permit, etc., as appropriate) had never been made or issued. *
3. With respect to deeds, in the event of breach of any of the above Nondiscrimination covenants, the NCDOT will there upon revert to and vest in and become the absolute property of the NCDOT and its assigns. *

(*Reverter clause and related language to be used only when it is determined that such a clause is necessary to make clear the purpose of Title VI.)

STANDARD SPECIAL PROVISION

MINORITY AND FEMALE EMPLOYMENT REQUIREMENTS

Z-7

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

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

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

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

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

EMPLOYMENT GOALS FOR MINORITY AND FEMALE PARTICIPATION

Economic Areas

Area 023 29.7%
Bertie County
Camden County
Chowan County
Gates County
Hertford County
Pasquotank County
Perquimans County

Area 024 31.7%
Beaufort County
Carteret County
Craven County
Dare County
Edgecombe County
Green County
Halifax County
Hyde County
Jones County
Lenoir County
Martin County
Nash County
Northampton County
Pamlico County
Pitt County
Tyrrell County
Washington County
Wayne County
Wilson County

Area 025 23.5%
Columbus County
Duplin County
Onslow County
Pender County

Area 026 33.5%
Bladen County
Hoke County
Richmond County
Robeson County
Sampson County
Scotland County

Area 027 24.7%
Chatham County
Franklin County
Granville County
Harnett County
Johnston County
Lee County
Person County
Vance County
Warren County

Area 028 15.5%
Alleghany County
Ashe County
Caswell County
Davie County
Montgomery County
Moore County
Rockingham County
Surry County
Watauga County
Wilkes County

Area 029 15.7%
Alexander County
Anson County
Burke County
Cabarrus County
Caldwell County
Catawba County
Cleveland County
Iredell County
Lincoln County
Polk County
Rowan County
Rutherford County
Stanly County

Area 0480 8.5%
Buncombe County
Madison County

Area 030 6.3%
Avery County
Cherokee County
Clay County
Graham County
Haywood County
Henderson County
Jackson County
McDowell County
Macon County
Mitchell County
Swain County
Transylvania County
Yancey County

_

SMSA Areas

Area 5720 26.6%
Currituck County

Area 9200 20.7%
Brunswick County
New Hanover County

Area 2560 24.2%
Cumberland County

Area 6640 22.8%
Durham County
Orange County
Wake County

Area 1300 16.2%
Alamance County

Area 3120 16.4%
Davidson County
Forsyth County
Guilford County
Randolph County
Stokes County
Yadkin County

Area 1520 18.3%
Gaston County
Mecklenburg County
Union County

_

Goals for Female

Participation in Each Trade

(Statewide) 6.9%

FHWA-1273 -- Revised October 23, 2023

REQUIRED CONTRACT PROVISIONS FEDERAL-AID CONSTRUCTION CONTRACTS

I. General
II. Nondiscrimination
III. Non-segregated Facilities
IV. Davis-Bacon and Related Act Provisions
V. Contract Work Hours and Safety Standards Act Provisions
VI. Subletting or Assigning the Contract
VII. Safety: Accident Prevention
VIII. False Statements Concerning Highway Projects
IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
X. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion
XI. Certification Regarding Use of Contract Funds for Lobbying
XII. Use of United States-Flag Vessels:

ATTACHMENTS

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

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under title 23, United States Code, as required in 23 CFR 633.102(b) (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services). 23 CFR 633.102(e).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider. 23 CFR 633.102(e).

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services) in accordance with 23 CFR 633.102. The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in solicitation-for-bids or request-for-proposals documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract). 23 CFR 633.102(b).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract. 23 CFR 633.102(d).

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. 23 U.S.C. 114(b). The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors. 23 U.S.C. 101(a).

II. NONDISCRIMINATION (23 CFR 230.107(a); 23 CFR Part 230, Subpart A, Appendix A; EO 11246)

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

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR Part 60, 29 CFR Parts 1625-1627, 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

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

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR Part 60, and 29 CFR Parts 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

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

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

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract. 23 CFR 230.409 (g)(4) & (5).

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, sexual orientation, gender identity, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action or are substantially involved in such action, will be made fully cognizant of and will implement the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer or other knowledgeable company official.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to ensure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action

within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs (i.e., apprenticeship and on-the-job training programs for the geographical area of contract performance). In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. 23 CFR 230.409. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established thereunder. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors, suppliers, and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurances Required:

a. The requirements of 49 CFR Part 26 and the State DOT's FHWA-approved Disadvantaged Business Enterprise (DBE) program are incorporated by reference.

b. The contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:
(1) Withholding monthly progress payments;
(2) Assessing sanctions;
(3) Liquidated damages; and/or
(4) Disqualifying the contractor from future bidding as non-responsible.

c. The Title VI and nondiscrimination provisions of U.S. DOT Order 1050.2A at Appendixes A and E are incorporated by reference. 49 CFR Part 21.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women.

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of more than $10,000. 41 CFR 60-1.5.

As prescribed by 41 CFR 60-1.8, the contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location under the contractor's control where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size), in accordance with 29 CFR 5.5. The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. 23 U.S.C. 113. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. 23 U.S.C. 101. Where applicable law requires that projects be treated as a project on a Federal-aid highway, the provisions of this subpart will apply regardless of the location of the project. Examples include: Surface Transportation Block Grant Program projects funded under 23 U.S.C. 133 [excluding recreational trails projects], the Nationally Significant Freight and Highway Projects funded under 23 U.S.C. 117, and National Highway Freight Program projects funded under 23 U.S.C. 167.

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

1. Minimum wages (29 CFR 5.5)

a. *Wage rates and fringe benefits.* All laborers and mechanics employed or working upon the site of the work (or otherwise working in construction or development of the project under a development statute), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of basic hourly wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. As provided in paragraphs (d) and (e) of 29 CFR 5.5, the appropriate wage determinations are effective by operation of law even if they have not been attached to the contract. Contributions made or costs reasonably anticipated for bona fide fringe benefits under the Davis-Bacon Act (40 U.S.C. 3141(2)(B)) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.e. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics must be paid the appropriate wage rate and fringe benefits on the wage determination for the classification(s) of work actually performed, without regard to skill, except as provided in paragraph 4. of this section. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided,* That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph 1.c. of this section) and the Davis-Bacon poster (WH–1321) must be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. *Frequently recurring classifications.* (1) In addition to wage and fringe benefit rates that have been determined to be prevailing under the procedures set forth in 29 CFR part 1, a wage determination may contain, pursuant to § 1.3(f), wage and fringe benefit rates for classifications of laborers and mechanics for which conformance requests are regularly submitted pursuant to paragraph 1.c. of this section, provided that:

(i) The work performed by the classification is not performed by a classification in the wage determination for which a prevailing wage rate has been determined;

(ii) The classification is used in the area by the construction industry; and

(iii) The wage rate for the classification bears a reasonable relationship to the prevailing wage rates contained in the wage determination.

(2) The Administrator will establish wage rates for such classifications in accordance with paragraph 1.c.(1)(iii) of this section. Work performed in such a classification must be paid at no less than the wage and fringe benefit rate listed on the wage determination for such classification.

c. *Conformance.* (1) The contracting officer must require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract be classified in conformance with the wage determination. Conformance of an additional classification and wage rate and fringe benefits is appropriate only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is used in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) The conformance process may not be used to split, subdivide, or otherwise avoid application of classifications listed in the wage determination.

(3) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken will be sent by the contracting officer by email to *DBAconformance@dol.gov*. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30–day period that additional time is necessary.

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

(5) The contracting officer must promptly notify the contractor of the action taken by the Wage and Hour Division under paragraphs 1.c.(3) and (4) of this section. The contractor must furnish a written copy of such determination to each affected worker or it must be posted as a part of the wage determination. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 1.c.(3) or (4) of this section must be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

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

e. *Unfunded plans.* If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided,* That the Secretary of Labor has found, upon the written request of the contractor, in accordance with the criteria set forth in § 5.28, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

f. *Interest.* In the event of a failure to pay all or part of the wages required by the contract, the contractor will be required to pay interest on any underpayment of wages.

2. Withholding (29 CFR 5.5)

a. *Withholding requirements.* The contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for the full amount of wages and monetary relief, including interest, required by the clauses set forth in this section for violations of this contract, or to satisfy any such liabilities required by any other Federal contract, or federally assisted contract subject to Davis-Bacon labor standards, that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to Davis-Bacon labor standards requirements and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld. In the event of a contractor's failure to pay any laborer or mechanic, including any apprentice or helper working on the site of the work all or part of the wages required by the contract, or upon the contractor's failure to submit the required records as discussed in paragraph 3.d. of this section, the contracting agency may on its own initiative and after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with paragraph

2.a. of this section or Section V, paragraph 3.a., or both, over claims to those funds by:

(1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(2) A contracting agency for its reprocurement costs;

(3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(4) A contractor's assignee(s);

(5) A contractor's successor(s); or

(6) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901–3907.

3. Records and certified payrolls (29 CFR 5.5)

a. *Basic record requirements* (1) *Length of record retention.* All regular payrolls and other basic records must be maintained by the contractor and any subcontractor during the course of the work and preserved for all laborers and mechanics working at the site of the work (or otherwise working in construction or development of the project under a development statute) for a period of at least 3 years after all the work on the prime contract is completed.

(2) *Information required.* Such records must contain the name; Social Security number; last known address, telephone number, and email address of each such worker; each worker's correct classification(s) of work actually performed; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act); daily and weekly number of hours actually worked in total and on each covered contract; deductions made; and actual wages paid.

(3) *Additional records relating to fringe benefits.* Whenever the Secretary of Labor has found under paragraph 1.e. of this section that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act, the contractor must maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

(4) *Additional records relating to apprenticeship.* Contractors with apprentices working under approved programs must maintain written evidence of the registration of apprenticeship programs, the registration of the apprentices, and the ratios and wage rates prescribed in the applicable programs.

b. *Certified payroll requirements* (1) *Frequency and method of submission.* The contractor or subcontractor must submit weekly, for each week in which any DBA- or Related Acts-covered work is performed, certified payrolls to the contracting agency. The prime contractor is responsible for the submission of all certified payrolls by all subcontractors. A contracting agency or prime contractor may permit or require contractors to submit certified payrolls through an electronic system, as long as the electronic system requires a legally valid electronic signature; the system allows the contractor, the contracting agency, and the Department of Labor to access the certified payrolls upon request for at least 3 years after the work on the prime contract has been completed; and the contracting agency or prime contractor permits other methods of submission in situations where the contractor is unable or limited in its ability to use or access the electronic system.

(2) *Information required.* The certified payrolls submitted must set out accurately and completely all of the information required to be maintained under paragraph 3.a.(2) of this section, except that full Social Security numbers and last known addresses, telephone numbers, and email addresses must not be included on weekly transmittals. Instead, the certified payrolls need only include an individually identifying number for each worker (*e.g.,* the last four digits of the worker's Social Security number). The required weekly certified payroll information may be submitted using Optional Form WH–347 or in any other format desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division website at *https://www.dol.gov/sites/dolgov/files/WHD/legacy/files/wh347/.pdf* or its successor website. It is not a violation of this section for a prime contractor to require a subcontractor to provide full Social Security numbers and last known addresses, telephone numbers, and email addresses to the prime contractor for its own records, without weekly submission by the subcontractor to the contracting agency.

(3) *Statement of Compliance.* Each certified payroll submitted must be accompanied by a “Statement of Compliance,” signed by the contractor or subcontractor, or the contractor's or subcontractor's agent who pays or supervises the payment of the persons working on the contract, and must certify the following:

(i) That the certified payroll for the payroll period contains the information required to be provided under paragraph 3.b. of this section, the appropriate information and basic records are being maintained under paragraph 3.a. of this section, and such information and records are correct and complete;

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

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

(4) *Use of Optional Form WH–347.* The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 will satisfy the requirement for submission of the “Statement of Compliance” required by paragraph 3.b.(3) of this section.

(5) *Signature.* The signature by the contractor, subcontractor, or the contractor's or subcontractor's agent must be an original handwritten signature or a legally valid electronic signature.

(6) *Falsification.* The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 3729.

(7) *Length of certified payroll retention.* The contractor or subcontractor must preserve all certified payrolls during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

c. *Contracts, subcontracts, and related documents.* The contractor or subcontractor must maintain this contract or subcontract and related documents including, without limitation, bids, proposals, amendments, modifications, and extensions. The contractor or subcontractor must preserve these contracts, subcontracts, and related documents during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

d. *Required disclosures and access* (1) *Required record disclosures and access to workers.* The contractor or subcontractor must make the records required under paragraphs 3.a. through 3.c. of this section, and any other documents that the contracting agency, the State DOT, the FHWA, or the Department of Labor deems necessary to determine compliance with the labor standards provisions of any of the applicable statutes referenced by § 5.1, available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and must permit such representatives to interview workers during working hours on the job.

(2) *Sanctions for non-compliance with records and worker access requirements.* If the contractor or subcontractor fails to submit the required records or to make them available, or refuses to permit worker interviews during working hours on the job, the Federal agency may, after written notice to the contractor, sponsor, applicant, owner, or other entity, as the case may be, that maintains such records or that employs such workers, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available, or to permit worker interviews during working hours on the job, may be grounds for debarment action pursuant to § 5.12. In addition, any contractor or other person that fails to submit the required records or make those records available to WHD within the time WHD requests that the records be produced will be precluded from introducing as evidence in an administrative proceeding under 29 CFR part 6 any of the required records that were not provided or made available to WHD. WHD will take into consideration a reasonable request from the contractor or person for an extension of the time for submission of records. WHD will determine the reasonableness of the request and may consider, among other things, the location of the records and the volume of production.

(3) *Required information disclosures.* Contractors and subcontractors must maintain the full Social Security number and last known address, telephone number, and email address of each covered worker, and must provide them upon request to the contracting agency, the State DOT, the FHWA, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or other compliance action.

4. Apprentices and equal employment opportunity (29 CFR 5.5)

a. *Apprentices* (1) *Rate of pay.* Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship (OA), or with a State Apprenticeship Agency recognized by the OA. A person who is not individually registered in the program, but who has been certified by the OA or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice, will be permitted to work at less than the predetermined rate for the work they perform in the first 90 days of probationary employment as an apprentice in such a program. In the event the OA or a State Apprenticeship Agency recognized by the OA withdraws approval of an apprenticeship program, the contractor will no longer be permitted to use apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(2) *Fringe benefits.* Apprentices must be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits must be paid in accordance with that determination.

(3) *Apprenticeship ratio.* The allowable ratio of apprentices to journeyworkers on the job site in any craft classification must not be greater than the ratio permitted to the contractor as to the entire work force under the registered program or the ratio applicable to the locality of the project pursuant to paragraph 4.a.(4) of this section. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in paragraph 4.a.(1) of this section, must be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under this section must be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(4) *Reciprocity of ratios and wage rates.* Where a contractor is performing construction on a project in a locality other than the locality in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyworker's hourly rate) applicable within the locality in which the construction is being performed must be observed. If there is no applicable ratio or wage rate for the locality of the project, the ratio and wage rate specified in the contractor's registered program must be observed.

b. *Equal employment opportunity.* The use of apprentices and journeyworkers under this part must be in conformity with

the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

c. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. 23 CFR 230.111(e)(2). The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeyworkers shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract as provided in 29 CFR 5.5.

6. Subcontracts. The contractor or subcontractor must insert FHWA-1273 in any subcontracts, along with the applicable wage determination(s) and such other clauses or contract modifications as the contracting agency may by appropriate instructions require, and a clause requiring the subcontractors to include these clauses and wage determination(s) in any lower tier subcontracts. The prime contractor is responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this section. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and may be subject to debarment, as appropriate. 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract as provided in 29 CFR 5.5.

9. Disputes concerning labor standards. As provided in 29 CFR 5.5, disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility. a. By entering into this contract, the contractor certifies that neither it nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

c. The penalty for making false statements is prescribed in the U.S. Code, Title 18 Crimes and Criminal Procedure, 18 U.S.C. 1001.

11. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under the DBA, Related Acts, this part, or 29 CFR part 1 or 3; or

d. Informing any other person about their rights under the DBA, Related Acts, this part, or 29 CFR part 1 or 3.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

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

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek. 29 CFR 5.5.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph 1. of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages and interest from the date of the underpayment. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or

mechanic, including watchpersons and guards, employed in violation of the clause set forth in paragraph 1. of this section, in the sum currently provided in 29 CFR 5.5(b)(2)* for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 1. of this section.

* $31 as of January 15, 2023 (See 88 FR 88 FR 2210) as may be adjusted annually by the Department of Labor, pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990.

3. Withholding for unpaid wages and liquidated damages

a. *Withholding process.* The FHWA or the contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for any unpaid wages; monetary relief, including interest; and liquidated damages required by the clauses set forth in this section on this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to the Contract Work Hours and Safety Standards Act and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with Section IV paragraph 2.a. or paragraph 3.a. of this section, or both, over claims to those funds by:

(1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(2) A contracting agency for its reprocurement costs;

(3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(4) A contractor's assignee(s);

(5) A contractor's successor(s); or

(6) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901–3907.

4. Subcontracts. The contractor or subcontractor must insert in any subcontracts the clauses set forth in paragraphs 1. through 5. of this section and a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor is responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1. through 5. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and associated liquidated damages and may be subject to debarment, as appropriate.

5. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the Contract Work Hours and Safety Standards Act (CWHSSA) or its implementing regulations in this part;

b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under CWHSSA or this part;

c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under CWHSSA or this part; or

d. Informing any other person about their rights under CWHSSA or this part.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System pursuant to 23 CFR 635.116.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term “perform work with its own organization” in paragraph 1 of Section VI refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions: (based on longstanding interpretation)

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;

(2) the prime contractor remains responsible for the quality of the work of the leased employees;

(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and

(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract. 23 CFR 635.102.

2. Pursuant to 23 CFR 635.116(a), the contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. Pursuant to 23 CFR 635.116(c), the contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract. (based on long-standing interpretation of 23 CFR 635.116).

5. The 30-percent self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements. 23 CFR 635.116(d).

VII. SAFETY: ACCIDENT PREVENTION

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

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR Part 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract. 23 CFR 635.108.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR Part 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704). 29 CFR 1926.10.

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

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

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

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

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

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

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 11, 1916, (39 Stat. 355), as amended and supplemented;

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

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT (42 U.S.C. 7606; 2 CFR 200.88; EO 11738)

This provision is applicable to all Federal-aid construction contracts in excess of $150,000 and to all related subcontracts. 48 CFR 2.101; 2 CFR 200.327.

By submission of this bid/proposal or the execution of this contract or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, subcontractor, supplier, or vendor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal Highway Administration and the Regional Office of the Environmental Protection Agency. 2 CFR Part 200, Appendix II.

The contractor agrees to include or cause to be included the requirements of this Section in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements. 2 CFR 200.327.

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

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200. 2 CFR 180.220 and 1200.220.

1. Instructions for Certification – First Tier Participants:

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction. 2 CFR 180.320.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default. 2 CFR 180.325.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances. 2 CFR 180.345 and 180.350.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900-180.1020, and 1200. “First Tier Covered Transactions” refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction. 2 CFR 180.330.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold. 2 CFR 180.220 and 180.300.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. 2 CFR 180.300; 180.320, and 180.325. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. 2 CFR 180.335. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (https://www.sam.gov/). 2 CFR 180.300, 180.320, and 180.325.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default. 2 CFR 180.325.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.335;.

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property, 2 CFR 180.800;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification, 2 CFR 180.700 and 180.800; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default. 2 CFR 180.335(d).

(5) Are not a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(6) Are not a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability (USDOT Order 4200.6 implementing appropriations act requirements).

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal. 2 CFR 180.335 and 180.340.

* * * * *

3. **Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders, and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200). 2 CFR 180.220 and 1200.220.

a. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances. 2 CFR 180.365.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900 – 180.1020, and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated. 2 CFR 1200.220 and 1200.332.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold. 2 CFR 180.220 and 1200.220.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (https://www.sam.gov/), which is compiled by the General Services Administration. 2 CFR 180.300, 180.320, 180.330, and 180.335.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily

excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment. 2 CFR 180.325.

* * * * *

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

a. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals:

(1) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.355;

(2) is a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(3) is a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability. (USDOT Order 4200.6 implementing appropriations act requirements)

b. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

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

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

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

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

XII. USE OF UNITED STATES-FLAG VESSELS:

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, or any other covered transaction. 46 CFR Part 381.

This requirement applies to material or equipment that is acquired for a specific Federal-aid highway project. 46 CFR 381.7. It is not applicable to goods or materials that come into inventories independent of an FHWA funded-contract.

When oceanic shipments (or shipments across the Great Lakes) are necessary for materials or equipment acquired for a specific Federal-aid construction project, the bidder, proposer, contractor, subcontractor, or vendor agrees:

1. To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels. 46 CFR 381.7.

2. To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, ‘on-board’ commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b)(1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Office of Cargo and Commercial Sealift (MAR-620), Maritime Administration, Washington, DC 20590. (MARAD requires copies of the ocean carrier's (master) bills of lading, certified onboard, dated, with rates and charges. These bills of lading may contain business sensitive information and therefore may be submitted directly to MARAD by the Ocean Transportation Intermediary on behalf of the contractor). 46 CFR 381.7.

ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS (23 CFR 633, Subpart B, Appendix B) This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

STANDARD SPECIAL PROVISION

ON-THE-JOB TRAINING

(10-16-07) (Rev. 4-21-15) Z-10

Description

The North Carolina Department of Transportation will administer a custom version of the Federal On-the-Job Training (OJT) Program, commonly referred to as the Alternate OJT Program. All contractors (existing and newcomers) will be automatically placed in the Alternate Program. Standard OJT requirements typically associated with individual projects will no longer be applied at the project level. Instead, these requirements will be applicable on an annual basis for each contractor administered by the OJT Program Manager.

On the Job Training shall meet the requirements of 23 CFR 230.107 (b), 23 USC – Section 140, this provision and the On-the-Job Training Program Manual.

The Alternate OJT Program will allow a contractor to train employees on Federal, State and privately funded projects located in North Carolina. However, priority shall be given to training employees on NCDOT Federal-Aid funded projects.

Minorities and Women

Developing, training and upgrading of minorities and women toward journeyman level status is a primary objective of this special training provision. Accordingly, the Contractor shall make every effort to enroll minority and women as trainees to the extent that such persons are available within a reasonable area of recruitment. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

Assigning Training Goals

The Department, through the OJT Program Manager, will assign training goals for a calendar year based on the contractors' past three years' activity and the contractors' anticipated upcoming year's activity with the Department. At the beginning of each year, all contractors eligible will be contacted by the Department to determine the number of trainees that will be assigned for the upcoming calendar year. At that time the Contractor shall enter into an agreement with the Department to provide a self-imposed on-the-job training program for the calendar year. This agreement will include a specific number of annual training goals agreed to by both parties. The number of training assignments may range from 1 to 15 per contractor per calendar year. The Contractor shall sign an agreement to fulfill their annual goal for the year.\

Training Classifications

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

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

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

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

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

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

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

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

Records and Reports

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

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

Trainee Interviews

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

Trainee Wages

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

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

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

Achieving or Failing to Meet Training Goals

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

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

Measurement and Payment

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

STANDARD SPECIAL PROVISION
MINIMUM WAGES
GENERAL DECISION NC20240087 01/05/2024 NC87

Z-087

Date: January 5, 2024

General Decision Number: NC20240087 01/05/2024 NC87

Superseded General Decision Numbers: NC20230087

State: North Carolina

Construction Type: HIGHWAY

COUNTIES:

Alexander	Caldwell	Henderson
Buncombe	Catawba	Madison
Burke	Haywood	

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	Executive Order 14026 generally applies to the contract. The contractor must pay all covered workers at least $17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	Executive Order 13658 generally applies to the contract. The contractor must pay all covered workers at least $12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number
0

Publication Date
01/05/2024

SUNC2014-002 11/13/2014

	Rates	Fringes
BLASTER	20.93	
CARPENTER	13.48 **	
CEMENT MASON/CONCRETE FINISHER	14.40 **	
ELECTRICIAN		
Electrician	18.79	2.62
Telecommunications Technician	14.67 **	1.67
IRONWORKER	12.48 **	
LABORER		
Asphalt Raker and Spreader	11.76 **	
Asphalt Screed/Jackman	15.38 **	.08
Carpenter Tender	10.50 **	
Cement Mason/Concrete Finisher Tender	11.04 **	
Common or General	11.90 **	
Guardrail/Fence Installer	13.09 **	
Pipelayer	12.87 **	
Traffic Signal/Lighting Installer	15.33 **	.22
PAINTER		
Bridge	20.67	
POWER EQUIPMENT OPERATORS		
Asphalt Broom Tractor	10.00 **	
Bulldozer Fine	16.28 **	
Bulldozer Rough	14.51 **	
Concrete Grinder/Groover	19.20	
Crane Boom Trucks	18.19	
Crane Other	18.69	
Crane Rough/All-Terrain	19.19	
Drill Operator Rock	15.00 **	
Drill Operator Structure	21.07	
Excavator Fine	16.02 **	
Excavator Rough	14.67 **	
Grader/Blade Fine	19.86	
Grader/Blade Rough	15.12 **	
Loader 2 Cubic Yards or Less	12.38 **	
Loader Greater Than 2 Cubic Yards	17.91	
Material Transfer Vehicle (Shuttle Buggy)	15.44 **	
Mechanic	17.86	
Milling Machine	15.08 **	
Off-Road Hauler/Water Tanker	11.95 **	
Oiler/Greaser	15.05 **	
Pavement Marking Equipment	11.99 **	
Paver Asphalt	17.84	.08
Paver Concrete	18.20	
Roller Asphalt Breakdown	15.00 **	.08
Roller Asphalt Finish	16.08 **	.07
Roller Other	12.51 **	.03
Scraper Finish	12.86 **	
Scraper Rough	13.83 **	

	Rates	Fringes
Slip Form Machine	20.38	
Tack Truck/Distributor Operator	14.81 **	.02
TRUCK DRIVER		
GVWR of 26,001 Lbs or Greater	13.65 **	
GVWR of 26,000 Lbs or Less	12.48 **	

Welders – Receive rate prescribed for craft performing operation to which welding is incidental.

** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 ($17.20) or 13658 ($12.90). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the David-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U. S. Department of Labor
200 Constitution Avenue, N.W.
Washington, D.C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, D.C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, D.C. 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

STANDARD SPECIAL PROVISION
MINIMUM WAGES
GENERAL DECISION NC20240089 01/05/2024 NC89

Z-089

Date: January 5, 2024

General Decision Number: NC20240089 01/05/2024 NC89

Superseded General Decision Numbers: NC20230089

State: North Carolina

Construction Type: HIGHWAY

COUNTIES:

Caswell	Lee	Richmond
Davidson	Montgomery	Rowan
Iredell	Moore	Stanly

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	Executive Order 14026 generally applies to the contract. The contractor must pay all covered workers at least $17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	Executive Order 13658 generally applies to the contract. The contractor must pay all covered workers at least $12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number
0

Publication Date
01/05/2024

SUNC2014-004 11/17/2014

	Rates	Fringes
BLASTER	21.85	
CARPENTER	13.98 **	
CEMENT MASON/CONCRETE FINISHER	13.67 **	
ELECTRICIAN		
Electrician	19.19	2.39
Telecommunications Technician	14.96 **	1.07
IRONWORKER	14.53 **	
LABORER		
Asphalt Raker and Spreader	11.75 **	
Asphalt Screed/Jackman	14.03 **	
Carpenter Tender	10.21 **	
Cement Mason/Concrete Finisher Tender	12.26 **	
Common or General	10.45 **	.13
Guardrail/Fence Installer	13.43 **	
Pipelayer	13.36 **	.43
Traffic Signal/Lighting Installer	16.29	
PAINTER		
Bridge	19.62	
POWER EQUIPMENT OPERATORS		
Asphalt Broom Tractor	12.14 **	
Bulldozer Fine	16.92 **	
Bulldozer Rough	15.58 **	
Concrete Grinder/Groover	25.00	
Crane Boom Trucks	14.83 **	
Crane Other	21.05	
Crane Rough/All-Terrain	21.25	
Drill Operator Rock	15.43 **	1.61
Drill Operator Structure	19.24	
Excavator Fine	16.09 **	1.52
Excavator Rough	14.07 **	.74
Grader/Blade Fine	19.40	
Grader/Blade Rough	15.48 **	
Loader 2 Cubic Yards or Less	12.67 **	1.52
Loader Greater Than 2 Cubic Yards	14.48 **	
Material Transfer Vehicle (Shuttle Buggy)	17.39	
Mechanic	18.86	
Milling Machine	16.26	
Off-Road Hauler/Water Tanker	12.90 **	
Oiler/Greaser	16.36	
Pavement Marking Equipment	11.63 **	
Paver Asphalt	15.07 **	
Roller Asphalt Breakdown	12.91 **	
Roller Asphalt Finish	13.67 **	
Roller Other	13.48 **	
Scraper Finish	13.59 **	
Scraper Rough	11.53 **	
Slip Form Machine	19.99	

	Rates	Fringes
Tack Truck/Distributor Operator	15.60 **	
TRUCK DRIVER		
GVWR of 26,000 Lbs or Less	10.58 **	
GVWR of 26,001 Lbs or Greater	13.50 **	.15

Welders – Receive rate prescribed for craft performing operation to which welding is incidental.

** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 ($17.20) or 13658 ($12.90). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the David-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U. S. Department of Labor
200 Constitution Avenue, N.W.
Washington, D.C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, D.C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, D.C. 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

PROJECT SPECIAL PROVISIONS

GEOTECHNICAL

GEOTEXTILE FOR EMBANKMENT STABILIZATION (SPECIAL)	GT-1.1	- GT-1.3
THERMAL INTEGRITY PROFILER (SPECIAL)	GT-2.1	- GT-2.2
ROCK EMBANKMENT (SPECIAL)	GT-3.1	- GT-3.2
TEMPORARY SOIL NAIL WALLS - (01/16/2024)	GT-4.1	- GT-4.9
SOLDIER PILE RETAINING WALLS (LRFD) - (01/16/2024)	GT-5.1	- GT-5.8
MSE RETAINING WALLS - (01/16/2024)	GT-6.1	- GT-6.12

DocuSigned by:
Geotechnical Engineering Unit
E06538624A11498...
09/03/2024

GEOTEXTILE FOR EMBANKMENT STABILIZATION
(SPECIAL)

DESCRIPTION:

This work consists of furnishing and installing synthetic geotextile for stabilizing embankment in accordance with this provision or as directed by the Engineer. The work shall include maintaining the geotextile in the required configuration until completion and acceptance of overlying work items. The geotextile shall be placed at the locations shown in the plans or as directed by the Engineer.

MATERIAL:

The geotextile for embankment stabilization shall be made of high-tenacity polyester in the machine direction with a plain or straight-warp weave pattern and polyester or polypropylene in the cross machine direction or approved equal. The geotextile shall be composed of strong rot-proof synthetic fibers formed into a fabric of the woven type. The geotextile shall be free of any treatment or coating which might significantly alter its physical properties after installation.

The geotextile shall contain stabilizers and/or inhibitors to make the filaments resistant to deterioration resulting from ultraviolet or heat exposure. The geotextile shall be a pervious sheet of synthetic fibers oriented into a stable network so that the fibers retain their relative positions with respect to each other. The edges of the geotextile shall be finished to prevent the outer yarn from pulling away from the geotextile. The geotextile shall be free of defects or flaws which significantly affect its physical and/or filtering properties. Sheets of geotextile shall be sewn together with a seam that furnishes the required minimum strengths. The seam thread shall be made of synthetic geotextile which are resistant to deterioration, as are the geotextile fibers. Lamination of geotextile sheets to produce the physical requirements of a geotextile layer will not be accepted.

During all periods of shipment and storage, the geotextile shall be wrapped in a heavy duty protective covering to protect the geotextile from direct sunlight ultraviolet rays, mud, dust, dirt, and debris. The geotextile shall not be exposed to temperatures greater than 140°F. After the protective wrapping has been removed, the geotextile shall not be left uncovered under any circumstances for longer than one (1) week.

The geotextile shall meet the following physical requirements:

All values represent minimum average roll values (any roll in a lot should meet or exceed the minimum values in this table).

EMBANKMENT STABILIZATION GEOTEXTILE

Geotextile Property	Test Method	Requirements
AOS, US STD Sieve	ASTM D-4751	30
Seams, Strength Cross Machine Direction Only	ASTM D-4884	Equal to geotextile strength
Ultraviolet (UV) % Strength Retained	ASTM D-4355	70%
Permittivity	ASTM D-4491	0.20/sec.
Tensile Strength at 5% Strain	ASTM D-4595 (Wide Strip Test)	Machine Direction 2400 lbs/ft
Ultimate Tensile Strength	ASTM D-4595 (Wide Strip Test)	Machine Direction 2400 lbs/ft

The Contractor shall furnish certified test reports by an approved independent testing laboratory with each shipment of material attesting that the geotextile meets the requirements of this provision; however, the material shall be subject to inspection, test, or rejection by the Engineer at any time. The Contractor shall furnish the Engineer certified test reports by an approved independent testing laboratory attesting that the sewn seam provides the required strength.

The Contractor shall furnish and place over the embankment stabilization geotextile as shown in the plan or directed by the engineer.

CONSTRUCTION METHODS:

The geotextile for embankment stabilization shall be placed at locations shown in the plans or as directed by the Engineer. The locations should be cleared and free of obstructions, debris and pockets. Stumps shall be cut smooth at the ground elevation with the root system left intact. At the time of installation, the geotextile shall be rejected if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation, or storage.

The geotextile for embankment stabilization shall be placed with the machine directions as shown on the plans or as directed by the engineer. Geotextile shall be laid smooth and free from tension, stress fold, wrinkles or creases. All joints in the machine direction must be sewn by an approved method to develop the required seam strength. All sewn seams must be placed upward to allow for inspection. All geotextile which is damaged as a result of installation will be required to be replaced or repaired at the discretion of the Engineer with no additional cost to the Department. Compaction equipment must be operated such that it will not damage the geotextile.

Any geotextile which is damaged as a result of installation or which is left uncovered for longer than one week after placement shall be replaced at no additional cost to the Department.

METHOD OF MEASUREMENT

The quantity of geotextile to be paid for will be the number of square yards of "Geotextile for Embankment Stabilization" measured along the surface of the ground which has been acceptably placed. No separate measurement will be made of overlapping geotextile.

BASIS OF PAYMENT:

The quantity of geotextile, measured as provided above, will be paid for at the contract unit price per square yard for "Geotextile for Embankment Stabilization". Such price and payment will be full compensation for furnishing, hauling, placing, seaming, compaction, and all incidentals necessary to complete the work.

Pay Item	**Pay Unit**
Geotextile for Embankment Stabilization	Square Yard

07/25/2024

THERMAL INTERGRITY PROFILER (SPECIAL)

1.0 GENERAL

Perform the nondestructive testing (NDT) method termed Thermal Integrity Profiler (TIP) testing by obtaining records of the heat generated by curing cement (hydration energy) to assess the quality of drilled piers. TIP measurements that are colder than normal indicate necks, inclusions, or poor quality concrete, while warmer than normal measurements are indicative of bulges. Variations of temperatures between tubes reveal cage eccentricity. Furnish all materials, equipment, and labor necessary to conduct TIP testing on production and demonstration drilled piers. The TIP testing will meet the requirements of ASTM D 7949, except as noted below.

2.0 EQUIPMENT

Supply all materials and equipment required to perform TIP tests. Equipment to perform the test shall have the following minimum requirements:

A. (Probe or wire option) A computer based TIP data acquisition system for (a) display of signals during data acquisition (probe option only), or (b) to monitor temperature versus time after casting (wire option only).

B. (Probe option only) Thermal probe infrared sensors equally spaced around the perimeter that read temperatures of the tube wall to within 1°F accuracy. The probes shall be less than 1.25 inches in diameter and shall freely descend through the full depth of properly installed access tubes in the drilled piers; One depth encoder sensor to determine probe depths; Ability to collect data at user specified depth increment; Thermal Probe access points will correspond to CSL tube locations.

C. (Wire option only) Ability to collect data at user defined time intervals (typically 15 to 60 minutes). If embedded sensors are used, install the same number of sensor strings as the number of CSL tubes.

3.0 TESTING PROCEDURE. Conform to testing procedures in ASTM D 7949 specification.

4.0 RESULT REPORTING

Submit a written report within (5) working days of completion of testing. The report shall present results of TIP tests by including:

A. Graphical displays of all temperature measurements (probes or wires) versus depth

B. Indication of unusual temperatures, particularly significantly cooler local deviations of the average at any depth from the overall average over the entire length, in either probe or thermal wire measurements

C. The overall average temperature. This temperature is proportional to the average radius computed from the actual total concrete volume installed (assuming a consistent concrete mix throughout). Radius at any point can then be determined from the temperature at that point compared to the overall average temperature.

D. Variations in temperature between tubes (at each depth) which in turn correspond to variations in cage alignment. Where concrete volume is known, the cage alignment or offset from center should be noted.

E. Where pier specific construction information is available (e.g. elevations of the top of pier, bottom of casing, bottom of pier, etc.), these values should be noted on all pertinent graphical displays.

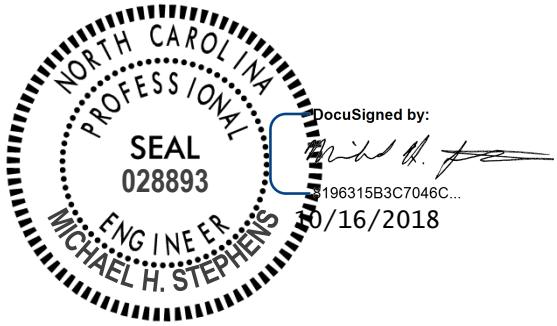
5.0 MEASUREMENT AND PAYMENT

TIP testing will be measured by each successful test that is approved by the Engineer. Quantities of TIP testing will be shown on the plans.

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for each "Thermal Integrity Profiler (TIP) Testing of Drilled Pier" of size and type specified. This price is full compensation for material, equipment, labor, work, tools, and incidentals.

Payment will be made under:

Pay Item	**Pay Unit**
Thermal Integrity Profiler	Each



ROCK EMBANKMENT: **(SPECIAL)**

Description

Construct rock embankments in accordance with the contract and Section 235 of the Standard Specifications

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	Section
Geotextile for Rock Embankments, Type 2	1056
Select Material, Class VI	1016
Select Material, Class VII	1016
Rip Rap, Class A/B	1042

Use Class VII Select Material and Class A/B Riprap for rock embankments. Class VII Select Material must be mechanically sorted to Specification and placed with Class A/B rip rap for rock embankment construction as described below. Use Class VI select material (No. 57 stone) to cap top of embankment to fill remaining voids in rock embankments.

Provide Type 2 geotextile for filtration geotextiles.

Construction Methods

Provide an embankment that is uniform in construction and free of debris and groups of large rocks that could cause voids in embankments.

Construct rock embankments in accordance with the slopes, dimensions and elevations shown in the plans and Section 235 of the *Standard Specifications*. Place stable rock embankments as shown in plans beginning with Class VII Select Material along the centerline of the proposed roadway and continue placing the materials until the proposed roadway width has been established. Cap the Class VII layer by placing a 3 foot layer of mixed Class B Rip Rap rocks so sizes are evenly distributed. Prior to placing fine grained materials on top of a rock layer, place and compact 2" to 8" rocks along the top of the fill layer to fill any large voids. Finish rock layer by placing and compacting a 1 ft layer of No. 57 stone (Select Material, Class VI) stone filler material over rock fill to fill remaining voids and protect filtration geotextiles against damage.

Install filtration geotextiles on top of filler material in accordance with Article 270-3 of the *Standard Specifications* before placing embankment fill material.

Measurement and Payment

Payment will not be made for Rock Embankment Construction. See Section 235 of the Standard Specifications.

Select Material, Class VII and *Select Material, Class IV* will be measured and paid for in tons. Select material will be measured by weighing material in trucks in accordance with Article 106-7 of the *Standard Specifications*. The contract unit prices for *Select Material, Class VII* and *Select Material, Class IV* will be full compensation for providing, hauling, handling, placing, compacting and maintaining select material.

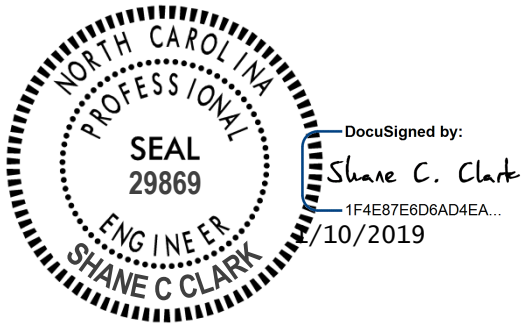
Rip Rap, Class A/B will be measured and paid for in tons. Rip Rap materials will be measured by weighing material in trucks in accordance with Article 106-7 of the *Standard Specifications*. The contract unit prices for *Rip Rap, Class A/B* will be full compensation for providing, hauling, handling, placing, compacting and maintaining select material.

Class VI Select Material will be measured by weighing material in trucks in accordance with Article 106-7 of the *Standard Specifications*. The contract unit price for *Class VI Select Material* will be full compensation for providing, hauling, handling, placing, compacting and maintaining select material and rip rap.

Geotextile for Rock Embankments will be measured and paid in square yards. Geotextiles will be measured along the top of rock embankments as the square yards of exposed geotextiles before placing embankment fill material. No measurement will be made for overlapping geotextiles. The contract unit price for *Geotextile for Rock Embankments* will be full compensation for providing, transporting and installing geotextiles.

Payment will be made under:

Pay Item	**Pay Unit**
Select Material, Class VII	Ton
Rip Rap, Class A	Ton
Rip Rap, Class B	Ton
Select Material, Class VI	Ton
Geotextile for Rock Embankments	Square Yard



TEMPORARY SOIL NAIL WALLS: **(1-16-24)**

Description

Construct temporary soil nail walls consisting of soil nails spaced at a regular pattern and connected to a reinforced shotcrete face. A soil nail consists of a solid or hollow steel bar grouted in a drilled hole inclined at an angle below horizontal. At the Contractor's option, use temporary soil nail walls instead of temporary shoring for full cut sections. Design and construct temporary soil nail walls based on actual elevations and wall dimensions in accordance with the contract and accepted submittals. Use a prequalified Anchored Wall Contractor to construct temporary soil nail walls. Define "soil nail wall" as a temporary soil nail wall and "Soil Nail Wall Contractor" as the Anchored Wall Contractor installing soil nails and applying shotcrete. Define "nail" as a soil nail.

Provide positive protection for soil nail walls at locations shown in the plans and as directed. See *Temporary Shoring* provision for positive protection types and definitions.

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	**Section**
Geocomposites	1056
Portland Cement	1024-1
Reinforcing Steel	1070
Shotcrete	1002
Select Material, Class IV	1016
Steel Plates	1072-2
Water	1024-4

Use Type 5 grout for soil nails.

Use Class IV select material for temporary guardrail. Provide soil nails consisting of grouted steel bars and nail head assemblies. Use deformed solid steel bars that meet AASHTO M 275 or M 31, Grade 60, 75 or 80. Splice solid bars in accordance with Article 1070-9 of the *Standard Specifications*. Use hollow steel bars manufactured by DYWIDAG-Systems International USA Inc., Nucor Skyline, Williams Form Engineering Corp. or an approved equal.

Use centralizers that meet Article 34.3.4 of the *AASHTO LRFD Bridge Construction Specifications*. Provide nail head assemblies consisting of nuts, washers and bearing plates. Use steel plates for bearing plates and steel washers and hex nuts recommended by the Soil Nail Manufacturer.

Provide Type 6 material certifications for soil nail materials in accordance with Article 106-3 of the *Standard Specifications*. 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 soil nail wall materials so materials are kept clean and free of damage. Bent, damaged or defective materials will be rejected.

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 soil nail walls except for barrier above walls. Concrete barrier with the minimum required clear distance is required above soil nail walls.

(B) Temporary Guardrail

Define "clear distance" behind temporary guardrail as the horizontal distance between guardrail posts and soil nail walls. At the Contractor's option or if clear distance for soil nail walls is less than 4 ft, use temporary guardrail with 8 ft posts and a clear distance of at least 2.5 ft. Place ABC in clear distance and around guardrail posts instead of pavement.

(C) Soil Nail Wall Designs

Before beginning soil nail wall design, survey existing ground elevations in the vicinity of wall locations to determine actual design heights (H). Use a prequalified Anchored Wall Design Consultant to design soil nail walls. Provide designs sealed by a Design Engineer approved as a Geotechnical Engineer (key person) for the Anchored Wall Design Consultant.

Design soil nail walls in accordance with the plans and the *AASHTO LRFD Bridge Design Specifications* unless otherwise required. Design soil nails that meet the following unless otherwise approved:

(1) Horizontal and vertical spacing of at least 3 ft,

(2) Inclination of at least 12° below horizontal and

(3) Diameter of 4" to 10".

Do not extend nails beyond right-of-way or easement limits. If existing or future obstructions such as foundations, pavements, pipes, inlets or utilities will interfere with nails, maintain a clearance of at least 6" between obstructions and nails.

Design soil nail walls for a traffic surcharge of 250 psf if traffic will be above and within H of walls. This traffic surcharge does not apply to construction traffic. Design soil nail walls for any construction surcharge if construction traffic will be above and within H of walls. For temporary guardrail with 8 ft posts above soil nail walls, analyze shotcrete and top row of nails for a nominal horizontal load of 300 lb/ft of wall with a load factor of 1.0.

Place geocomposite sheet drains with a horizontal spacing of no more than 10 ft and center drains between adjacent nails. Attach sheet drains to excavation faces. Design shotcrete in accordance with Article 11.12.6.2 of the *AASHTO LRFD Bridge Design Specifications*.

Submit PDF files of working drawings and design calculations for soil nail wall designs

in accordance with Article 105-2 of the *Standard Specifications*. Submit working drawings showing plan views, wall profiles, typical sections and details of soil nail wall design and construction sequence. Include details in working drawings of soil nail locations, unit grout/ground bond strengths, shotcrete reinforcement and if necessary, obstructions extending through walls or interfering with nails. Include details in construction sequence of excavation, grouting, installing reinforcement, nail testing and shotcreting with mix designs and shotcrete nozzleman certifications. Do not begin soil nail wall construction until a design submittal is accepted.

Submit design calculations for each wall section with different surcharge loads, geometry or material parameters. Include analysis of temporary conditions during construction in design calculations. At least one analysis is required for each wall section with different nail lengths. Analyze internal and compound stability with a computer software program that uses limit equilibrium methods and submit all PDF output files from the program with the design calculations. See Article C11.12.2 of the AASHTO LRFD specifications for determining the maximum soil nail force, T_{maxsn}. Once T_{maxsn} and pullout length behind slip surface, $L_{P,}$ are determined from limit equilibrium methods at the target soil failure resistance factor (1 over factor of safety output from computer software), use these values for soil nail (pullout and tensile resistance) and wall facing (flexure, punching shear and headed-stud tensile resistance) design in accordance with Articles 11.12.5.2, 11.12.6.1 and 11.12.6.2 of the AASHTO LRFD specifications.

(1) When designing soil nail walls with computer software Snail manufactured by the California Department of Transportation (CALTRANS), use Snail version 2.2.0 or later, to calculate factors of safety and T_{maxsn} and L_P values in accordance with the following:Allowable Stress Design for Analysis Method with no load factors applied except those applied to factored surcharge loads from structures or traffic,

(2) Perform Below Toe Search option selected when any soil layer has a friction angle less than 30° and

(3) Default value of 0.33 for Interface Friction Reduction Factor.

When designing soil nail walls with computer software other than Snail, use bi-linear (or tri-linear, as applicable) search surfaces intended to reproduce Snail results. Factors of safety and T_{maxsn} and L_P values are acceptable if they are within 5% of the factors of safety and T_{maxsn} and L_P values calculated by the Engineer using the computer software Slide2 manufactured by Rocscience, Inc.

(D) Preconstruction Meeting

Before starting soil nail wall construction, hold a preconstruction meeting to discuss the construction, inspection and testing of the soil nail walls. If this meeting occurs before all soil nail wall submittals have been accepted, additional preconstruction meetings may be required before beginning construction of soil nail walls without accepted submittals. The Resident, District or Bridge Maintenance Engineer, Area Construction Engineer, Geotechnical Operations Engineer, Contractor and Soil Nail Wall Contractor Superintendent will attend preconstruction meetings.

Construction Methods

Control drainage during construction in the vicinity of soil nail walls. Direct run off away from soil nail walls and areas above and behind walls.

Install foundations located behind soil nail walls before beginning wall construction. Do not excavate behind soil nail walls. If overexcavation occurs, repair walls with an approved method and a revised soil nail wall design may be required.

Install positive protection in accordance with the contract and accepted submittals. Use PCB in accordance with Section 1170 of the *Standard Specifications* and Roadway Standard Drawing No. 1170.01. Use temporary guardrail in accordance with Section 862 of the *Standard Specifications* and Roadway Standard Drawing No. 862.01, 862.02 and 862.03.

(A) Excavation

Excavate for soil nail walls from the top down in accordance with the accepted submittals. Excavate in staged horizontal lifts with no negative batter (excavation face leaning forward). Excavate lifts in accordance with the following:

(1) Heights not to exceed vertical nail spacing,

(2) Bottom of lifts no more than 3 ft below nail locations for current lift and

(3) Horizontal and vertical alignment within 6" of location shown in the accepted submittals.

Remove any cobbles, boulders, rubble or debris that will protrude more than 2" into the required shotcrete thickness. Rocky ground such as colluvium, boulder fills and weathered rock may be difficult to excavate without leaving voids.

Apply shotcrete to excavation faces within 24 hours of excavating each lift unless otherwise approved. Shotcreting may be delayed if it can be demonstrated that delays will not adversely affect excavation stability. If excavation faces will be exposed for more than 24 hours, use polyethylene sheets anchored at top and bottom of lifts to protect excavation faces from changes in moisture content.

If an excavation becomes unstable at any time, suspend soil nail wall construction and temporarily stabilize the excavation by immediately placing an earth berm up against the unstable excavation face. When this occurs, repair walls with an approved method and a revised soil nail wall design may be required.

Do not excavate the next lift until nail installations and testing and shotcrete application for the current lift are accepted and grout and shotcrete for the current lift have cured at least 3 days and 1 day, respectively.

(B) Soil Nails

Drill and grout nails the same day and do not leave drill holes open overnight. Control drilling and grouting to prevent excessive ground movements, damaging structures and pavements or fracturing rock and soil formations. If ground heave or subsidence occurs, suspend soil nail wall construction and take corrective action to minimize movement. If property damage occurs, make repairs with an approved method and a revised soil nail wall design may be required.

The drilling, steel bar and grouting requirements below are for solid bar nails and may not apply to hollow bar nails. Hollow bar nails are typically installed by simultaneously drilling and grouting as a sacrificial drill bit is advanced and grout is pumped through the bar. For hollow bar nails, submit drilling and grouting procedures for approval before installing soil nails.

(1) Drilling

Use drill rigs of the sizes necessary to install soil nails and with sufficient capacity to drill through whatever materials are encountered. Drill straight and clean holes with the dimensions and inclination shown in the accepted submittals. Drill holes within 6" of locations and 2° of inclination shown in the accepted submittals unless otherwise approved.

Stabilize drill holes with temporary casings if unstable, caving or sloughing material is anticipated or encountered. Do not use drilling fluids to stabilize drill holes or remove cuttings.

(2) Steel Bars

Center solid steel bars in drill holes with centralizers. Securely attach centralizers along bars at no more than 8 ft centers. Attach uppermost and lowermost centralizers 18" from excavation faces and ends of holes.

Do not insert solid steel bars into drill holes until hole locations, dimensions, inclination and cleanliness are approved. Do not vibrate, drive or otherwise force bars into holes. If a steel bar cannot be completely and easily inserted into a drill hole, remove the bar and clean or redrill the hole.

(3) Grouting

Mix and place grout in accordance with Subarticles 1003-5, 1003-6 and 1003-7 of the *Standard Specifications*. Remove oil, rust inhibitors, residual drilling fluids and similar foreign materials from holding tanks/hoppers, stirring devices, pumps, lines, tremie pipes and any other equipment in contact with grout before use. Measure grout temperature, density and flow during grouting with at least the same frequency grout cubes are made for compressive strength. Perform density and flow field tests in the presence of the Engineer in accordance with American National Standards Institute/American Petroleum Institute Recommended Practice 13B-1 (Section 4, Mud Balance) and ASTM C939 (Flow Cone), respectively.

Inject grout at the lowest point of drill holes through tremies, e.g., grout tubes, casings, hollow-stem augers or drill rods, in one continuous operation. Fill drill holes progressively from ends of holes to excavation faces and withdraw tremies at a slow even rate as holes are filled to prevent voids in grout. Extend tremies into grout at least 5 ft at all times except when grout is initially placed in holes.

Provide grout free of segregation, intrusions, contamination, structural damage or inadequate consolidation (honeycombing). Cold joints in grout are not allowed except for test nails. Remove any temporary casings as grout is placed and record grout volume for each drill hole.

(4) Nail Heads

Install nail head assemblies after shotcreting. Before shotcrete reaches initial set, seat bearing plates and tighten nuts so plates contact shotcrete uniformly. If uniform contact is not possible, install nail head assemblies on mortar pads so nail heads are evenly loaded.

(C) Sheet Drains

Install geocomposite sheet drains as shown in the accepted submittals. Before installing shotcrete reinforcement, place sheet drains with the geotextile side against excavation faces. For highly irregular faces and at the discretion of the Engineer, sheet drains may be placed after shotcreting over weep holes through the shotcrete. Hold sheet drains in place with anchor pins so drains are in continuous contact with surfaces to which they are attached and allow for full flow the entire height of soil nail walls. Discontinuous sheet drains are not allowed. If splices are needed, overlap sheet drains at least 12" so flow is not impeded. Cut off excess sheet drain length and expose drain ends below shotcrete when soil nail wall construction is complete.

(D) Shotcrete

Clean ungrouted zones of drill holes and excavation faces of loose materials, mud, rebound and other foreign material. Moisten surfaces to receive shotcrete. Install shotcrete reinforcement in accordance with the contract and accepted submittals. Secure reinforcing steel so shooting does not displace or vibrate reinforcement. Install approved thickness gauges on 5 ft centers in the horizontal and vertical directions to measure shotcrete thickness.

Apply shotcrete in accordance with the contract, accepted submittals and Subarticle 1002-3(F) of the *Standard Specifications*. Use approved shotcrete nozzlemen who made satisfactory preconstruction test panels to apply shotcrete. Direct shotcrete at right angles to excavation faces except when shooting around reinforcing steel. Rotate nozzle steadily in small circular patterns and apply shotcrete from bottom of lifts up.

Make shotcrete surfaces uniform and free of sloughing or sagging. Completely fill ungrouted zones of drill holes and any other voids with shotcrete. Taper construction joints to a thin edge over a horizontal distance of at least the shotcrete thickness. Wet joint surfaces before shooting adjacent sections.

Repair surface defects as soon as possible after shooting. Remove any shotcrete which lacks uniformity, exhibits segregation, honeycombing or lamination or contains any voids or sand pockets and replace with fresh shotcrete to the satisfaction of the Engineer. Protect shotcrete from freezing and rain until shotcrete reaches initial set.

(E) Construction Records

Provide 2 copies of soil nail wall construction records within 24 hours of completing each lift. Include the following in construction records:

(1) Names of Soil Nail Wall Contractor, Superintendent, Nozzleman, Drill Rig Operator, Project Manager and Design Engineer;

(2) Wall description, county, Department’s contract, TIP and WBS element number;

(3) Wall station and number and lift location, dimensions, elevations and description;

(4) Nail locations, dimensions and inclinations, bar types, sizes and grades and temporary casing information;

(5) Date and time drilling begins and ends, steel bars are inserted into drill holes, grout and shotcrete are mixed and arrives on-site and grout placement and shotcrete application begins and ends;

(6) Grout volume, temperature, flow and density records;

(7) Ground and surface water conditions and elevations if applicable;

(8) Weather conditions including air temperature at time of grout placement and shotcrete application; and

(9) All other pertinent details related to soil nail wall construction.

After completing each soil nail wall or stage of a wall, provide a PDF file of all corresponding construction records.

Nail Testing

"Proof tests" are performed on nails incorporated into walls, i.e., production nails. Define "test nail" as a nail tested with a proof test. Proof tests are typically required for at least one nail per nail row per soil nail wall or at least 5% of production nails, whichever is greater. More or less test nails may be required depending on subsurface conditions encountered. The Engineer will determine the number and locations of proof tests required. Do not test nails until grout and shotcrete attain the required 3-day compressive strength.

(A) Test Equipment

Use the following equipment to test nails:

(1) Two dial gauges with rigid supports,

(2) Hydraulic jack and pressure gauge and

(3) Jacking block or reaction frame.

Provide dial gauges with enough range and precision to measure the maximum test nail movement to 0.001". Use pressure gauges graduated in 100 psi increments or less. Submit identification numbers and calibration records for load cells, jacks and pressure gauges with the soil nail wall design. Calibrate each jack and pressure gauge as a unit.

Align test equipment to uniformly and evenly load test nails. Use a jacking block or reaction frame that does not damage or contact shotcrete within 3 ft of nail heads. Place dial gauges opposite each other on either side of test nails and align gauges within 5° of bar inclinations. Set up test equipment so resetting or repositioning equipment during nail testing is not needed.

(B) Test Nails

Test nails include both unbonded and bond lengths. Grout only bond lengths before nail testing. Provide unbonded and bond lengths of at least 3 ft and 10 ft, respectively.

Steel bars for production nails may be overstressed under higher test nail loads. If

necessary, use larger size or higher grade bars with more capacity for test nails instead of shortening bond lengths to less than the minimum required.

(C) Proof Tests

Test proof test nails in accordance with the accepted submittals and Article 34.5.5.3, respectively of the *AASHTO LRFD Bridge Construction Specifications*.

(D) Test Nail Acceptance

Submit 2 copies of test nail records including load versus movement and time versus creep movement plots within 24 hours of completing each proof test. The Engineer will review the test nail records to determine if test nails are acceptable. Test nail acceptance is based in part on the acceptance criteria in Article 34.5.5.4 of the *AASHTO LRFD Bridge Construction Specifications*.

Maintain stability of unbonded lengths for subsequent grouting. If a test nail is accepted but the unbonded length cannot be satisfactorily grouted, do not incorporate the test nail into the soil nail wall and add another production nail to replace the test nail.

If the Engineer determines a test nail is unacceptable, either perform additional proof tests on adjacent production nails or revise the soil nail design or installation methods for the production nails represented by the unacceptable test nail as determined by the Engineer. Submit a revised soil nail wall design for acceptance, provide an acceptable test nail with the revised design or installation methods and install additional production nails for the nails represented by the unacceptable test nail.

After completing nail testing for each soil nail wall or stage of a wall, provide a PDF file of all corresponding test nail records.

Measurement and Payment

Temporary soil nail walls will be measured and paid in square feet. Temporary soil nail walls will be paid for at the contract unit price for *Temporary Shoring*. Temporary soil nail walls will be measured as the square feet of exposed wall face area. No measurement will be made for any embedment or pavement thickness above soil nail walls.

The contract unit price for *Temporary Shoring* will be full compensation for providing soil nail wall designs, submittals, labor, tools, equipment and soil nail wall materials, excavating, hauling and removing excavated materials, installing and testing soil nails, grouting, shotcreting and supplying sheet drains and any incidentals necessary to construct soil nail walls. No additional payment will be made and no extension of completion date or time will be allowed for repairing property damage, overexcavations or unstable excavations, unacceptable test nails or thicker shotcrete.

No payment will be made for temporary shoring not shown in the plans or required by the Engineer including shoring for OSHA reasons or the Contractor's convenience. No value engineering proposals will be accepted based solely on revising or eliminating shoring locations shown in the plans or estimated quantities shown in the bid item sheets as a result of actual field measurements or site conditions.

PCB will be measured and paid in accordance with Section 1170 of the *Standard Specifications*. No additional payment will be made for anchoring PCB for soil nail walls. Costs for anchoring

PCB will be incidental to soil nail walls.

Temporary guardrail will be measured and paid for in accordance with Section 862 of the *Standard Specifications*.

DocuSigned by:
Scott A. Hidden
F760CAEB96EC4D3...
07/18/2024

SOLDIER PILE RETAINING WALLS (1-16-24)

1.0 GENERAL

Construct soldier pile retaining walls consisting of driven or drilled-in steel H-piles with either precast concrete panels in between piles or a CIP reinforced concrete face attached to front of piles unless required otherwise in the plans. Timber lagging is typically used for temporary support of excavations during construction. Provide CIP reinforced concrete coping as required. Design and construct soldier pile retaining walls based on actual elevations and wall dimensions in accordance with the contract and accepted submittals. Use a prequalified Cantilever Wall Contractor to construct soldier pile retaining walls. Define "soldier pile wall" as a soldier pile retaining wall. Define "panel" as a precast concrete panel and "concrete facing" as a CIP reinforced concrete face. Define "pile" as a steel H-pile and "coping" as CIP concrete coping.

2.0 MATERIALS

Refer to the *Standard Specifications*.

Item	Section
Asphalt Concrete Base Course, Type B25.0C	620
Flowable Fill, Excavatable	1000-7
Geosynthetics	1056
Grout, Type 1	1003
Joint Materials	1028
Masonry	1040
Portland Cement Concrete	1000
Reinforcing Steel	1070
Retaining Wall Panels	1077
Select Materials	1016
Shoulder Drain Materials	816-2
Steel H-Piles	1084-1
Untreated Timber	1082-2
Welded Stud Shear Connectors	1072-6

Provide Type 2 geotextile for separation geotextiles and Class VI select material (standard size No. 57 stone) for leveling pads and backfilling. Use Class A concrete for concrete facing and coping and Class A concrete that meets Article 450-2 of the *Standard Specifications* or grout for drilled-in piles. Use untreated timber with a thickness of at least 3" and a bending stress of at least 1,000 psi for timber lagging.

Unless required otherwise in the contract, produce panels with a smooth flat final finish that meets Article 1077-11 of the *Standard Specifications*. When noted in the plans, produce panels with an exposed aggregate finish that meets Article 1077-12 of the *Standard Specifications*. Produce panels within 1/4" of the panel dimensions shown in the accepted submittals. Damaged panels with excessive discoloration, chips or cracks as determined by the Engineer will be rejected.

For soldier pile walls with panels, galvanize piles in accordance with Section 1076 of the *Standard Specifications*. When noted in the plans, paint galvanized piles in accordance with Article 442-13 of the *Standard Specifications*. Apply the following system to paint galvanized piles gray with waterborne paints that meet Article 1080-9 of the *Standard Specifications*. For painting galvanized piles other colors, contact the Materials and Tests (M&T) Unit for an appropriate paint system.

GRAY PAINT SYSTEM FOR GALVANIZED PILES			
Coat	**Color**	**Dry/Wet Film Thickness (Mils)**	
		Min.	**Max.**
Intermediate	Brown	3.0 DFT	5.0 DFT
Stripe	White	4.0 WFT	7.0 WFT
Topcoat	Gray	2.0 DFT	4.0 DFT
Total		**5.0 DFT**	**9.0 DFT**

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 soldier pile wall materials so materials are kept clean and free of damage. Bent, damaged or defective materials will be rejected.

3.0 PRECONSTRUCTION REQUIREMENTS

A. Soldier Pile Wall Surveys

The Retaining Wall Plans show a plan view, typical sections, details, notes and an elevation or profile view (wall envelope) for each soldier pile wall. Before beginning soldier pile wall design, survey existing ground elevations shown in the plans and other elevations in the vicinity of soldier pile wall locations as needed. For proposed slopes above or below soldier pile walls, survey existing ground elevations to at least 10 ft beyond slope stake points. Based on these elevations, finished grades and actual soldier pile wall dimensions and details, submit revised wall envelopes for acceptance. Use accepted wall envelopes for design.

B. Soldier Pile Wall Designs

For soldier pile wall designs, submit PDF files of working drawings and design calculations at least 30 days before the preconstruction meeting. Do not begin soldier pile wall construction until a design submittal is accepted.

Use a prequalified Cantilever Wall Design Consultant to design soldier pile walls. Provide designs sealed by a Design Engineer approved as a Geotechnical Engineer (key person) for the Cantilever Wall Design Consultant.

Design soldier pile walls in accordance with the plans and Article 11.8 of the *AASHTO LRFD Bridge Design Specifications* unless otherwise required. Design soldier pile walls

for a maximum deflection of 2" or 1.5% of H, whichever is less, with H as shown in the plans.

When noted in the plans, design soldier pile walls for a live load (traffic) surcharge of 250 psf in accordance with Article 11.5.6 of the AASHTO LRFD specifications. For steel beam guardrail with 8 ft posts above soldier pile walls, analyze walls for a nominal horizontal load (P_{H1}) of 300 lb/ft of wall in accordance with Figure 3.11.6.3-2(a) of the AASHTO LRFD specifications. For concrete barrier rail above soldier pile walls, analyze walls for a nominal P_{H1} of 500 lb/ft of wall in accordance with Figure 3.11.6.3-2(a).

When a rock mass shear strength (S_m) is noted in the plans, analyze piles using the equation shown in Figure 3.11.5.6-2 of the AASHTO LRFD specifications to calculate the passive resistance of the rock ($\overline{P_p}$). Use a maximum H-pile spacing of 10 ft. At the Contractor's option, use driven or drilled-in piles for soldier pile walls with concrete facing unless otherwise required. For soldier pile walls with panels, use drilled-in piles unless noted otherwise in the plans. Use concrete or grout for embedded portions of drilled-in piles. Install drilled-in piles by excavating holes with diameters that will result in at least 3" of clearance all around piles.

Provide temporary support of excavations for excavations more than 4 ft deep and timber lagging in accordance with the *AASHTO Guide Design Specifications for Bridge Temporary Works*. At the Contractor's option and when noted in the plans, provide temporary slopes instead of temporary support of excavations. Do not extend temporary slopes outside right-of-way or easement limits. Except for fill sections or when using temporary slopes, backfill voids behind panels, lagging and piles with No. 57 stone. Separation geotextiles are required between No. 57 stone and overlying fill sections. When placing pavement sections directly on No. 57 stone, cap stone with 4" of asphalt concrete base course.

At the Contractor's option, use panels or concrete facing unless required otherwise in the plans. Design panels and concrete facing in accordance with the plans and Section 5 of the *AASHTO LRFD Bridge Design Specifications*. Provide reinforcing steel of sufficient density to satisfy Article 5.7.3.4 of the AASHTO LRFD specifications. Use panels or concrete facing with the dimensions shown in the plans and attach facing to front of H-piles with welded stud shear connectors.

Use No. 57 stone for aggregate leveling pads. Use 6" thick leveling pads beneath panels and concrete facing. Unless required otherwise in the plans, embed top of leveling pads at least 12" below bottom of walls shown in the plans.

Provide wall drainage systems consisting of geocomposite sheet drains, an aggregate shoulder drain and outlet components. Place sheet drains with a horizontal spacing of no more than 10 ft and center drains between adjacent piles. Attach sheet drains to front of timber lagging or back of panels or concrete facing and connect drains to aggregate leveling pads. Locate a continuous aggregate shoulder drain along the base of panels or concrete facing in front of piles and leveling pads. Provide aggregate shoulder drains

and outlet components in accordance with Roadway Standard Drawing No. 816.02.

Unless required otherwise in the plans, use CIP reinforced concrete coping at top of soldier pile walls with panels. Use coping dimensions shown in the plans and at the Contractor's option, connect coping to panels with dowels or extend coping down back of panels. When concrete barrier rail is required above soldier pile walls, use concrete barrier rail with moment slab as shown in the plans.

Submit working drawings and design calculations for acceptance in accordance with Article 105-2 of the *Standard Specifications*. Submit working drawings showing plan views, wall profiles with pile locations, typical sections and details of piles, drainage, temporary support, leveling pads, panels and concrete facing. If necessary, include details on working drawings for coping, concrete barrier rail with moment slab and obstructions extending through walls or interfering with piles, barriers or moment slabs. Submit design calculations including deflection calculations for each wall section with different surcharge loads, geometry or material parameters. Include analysis of temporary conditions in design calculations. When designing soldier pile walls with computer software, a hand calculation is required for the tallest wall section.

C. Soldier Pile Wall Construction Plan

Submit a PDF file of a soldier pile wall construction plan at least 30 days before the preconstruction meeting. Do not begin soldier pile wall construction until the construction plan submittal is accepted. Provide project specific information in the soldier pile wall construction plan including a detailed construction sequence. For driven piles, submit proposed pile driving methods and equipment in accordance with Subarticle 450-3(D)(2) of the *Standard Specifications*. For drilled-in piles, submit installation details including drilling equipment and methods for stabilizing and filling holes. Provide details in the construction plan of excavations including temporary support and any other information shown in the plans or requested by the Engineer.

If alternate construction procedures are proposed or necessary, a revised soldier pile wall construction plan submittal may be required. If the work deviates from the accepted submittal without prior approval, the Engineer may suspend soldier pile wall construction until a revised plan is accepted.

D. Preconstruction Meeting

Before starting soldier pile wall construction, hold a preconstruction meeting to discuss the construction and inspection of the soldier pile walls. If this meeting occurs before all soldier pile wall submittals have been accepted, additional preconstruction meetings may be required before beginning construction of soldier pile walls without accepted submittals. The Resident or Bridge Maintenance Engineer, Area Construction Engineer, Geotechnical Operations Engineer, Contractor and Cantilever Wall Contractor Superintendent will attend preconstruction meetings.

4.0 CONSTRUCTION METHODS

Control drainage during construction in the vicinity of soldier pile walls. Direct run off away from soldier pile walls and areas above and behind walls. Contain and maintain No. 57 stone and backfill and protect material from erosion.

Notify the Engineer before blasting in the vicinity of soldier pile walls. Perform blasting in accordance with the contract. Unless required otherwise in the plans, install foundations located behind soldier pile walls before beginning wall construction if the horizontal distance to the closest foundation is less than the height of the tallest wall section.

Install soldier pile walls in accordance with the accepted submittals and as directed. Do not excavate behind soldier pile walls unless a temporary slope is shown in the accepted submittals. If overexcavation occurs and is not approved, repair walls with an approved method and a revised soldier pile wall design or construction plan may be required.

A. Piles

If a temporary slope is shown in the accepted submittals, excavate the slope before installing piles. Otherwise, install piles before excavating for soldier pile walls. Weld stud shear connectors to piles in accordance with Article 1072-6 of the *Standard Specifications*.

Install piles within 1" of horizontal and vertical alignment shown in the accepted submittals and with no negative batter (piles leaning forward). Minimize alignment variations between piles for soldier pile walls with concrete facing since variations can result in thicker concrete facing in some locations in order to provide the minimum required facing thickness elsewhere. Locate piles so the minimum required concrete facing thickness, if applicable, and roadway clearances are maintained for variable pile alignments.

Install piles to the required elevations in accordance with Subarticles 450-3(D) and 450-3(E) of the *Standard Specifications*. Piles may be installed with a vibratory hammer as approved by the Engineer. Do not splice piles. If necessary, cut off piles at elevations shown in the accepted submittals along a plane normal to the pile axis.

Use pile excavation to install drilled-in piles. If overexcavation occurs, fill to required elevations with No. 57 stone before setting piles. After filling holes with concrete or grout to the elevations shown in the accepted submittals, remove any fluids and fill remaining portions of holes with flowable fill. Cure concrete or grout at least 7 days before excavating.

Notify the Engineer if refusal is reached before pile excavation or driven piles attain the required penetration. When this occurs, a revised soldier pile wall design or construction plan submittal may be required. When a minimum pile penetration into rock is noted in the plans, rock is as determined by the Engineer.

B. Excavation

If a temporary slope is shown in the accepted submittals, excavate the slope as shown.

Otherwise, excavate in front of piles from the top down in accordance with the accepted submittals. Excavate in staged horizontal lifts with a maximum height of 5 ft. Use timber lagging or an alternate approved method for temporary support of excavations in accordance with the accepted submittals.

Install temporary support within 24 hours of excavating each lift unless otherwise approved. The installation may be delayed if it can be demonstrated that delays will not adversely affect excavation stability. If excavation faces will be exposed for more than 24 hours, use polyethylene sheets anchored at top and bottom of lifts to protect excavation faces from changes in moisture content.

If an excavation becomes unstable at any time, suspend soldier pile wall construction and temporarily stabilize the excavation by immediately placing an earth berm up against the unstable excavation face. When this occurs, repair walls with an approved method and a revised soldier pile wall design or construction plan may be required.

Remove flowable fill and material in between piles as necessary to install timber lagging. Position lagging with at least 3" of contact in the horizontal direction between the lagging and pile flanges. Do not excavate the next lift until temporary support for the current lift is accepted.

C. Wall Drainage Systems

Install wall drainage systems as shown in the accepted submittals and in accordance with Section 816 of the *Standard Specifications*. Place geocomposite sheet drains with the geotextile side facing away from wall faces. Secure sheet drains so drains are in continuous contact with surfaces to which they are attached and allow for full flow the entire height of soldier pile walls. Discontinuous sheet drains are not allowed. If splices are needed, overlap sheet drains at least 12" so flow is not impeded. Connect sheet drains to aggregate leveling pads by embedding drain ends at least 4" into No. 57 stone.

D. Leveling Pads, Panels, Coping and Concrete Facing

Construct aggregate leveling pads at elevations and with dimensions shown in the accepted submittals. Compact leveling pads with a vibratory compactor to the satisfaction of the Engineer.

Set panels against pile flanges as shown in the accepted submittals. Position panels with at least 2" of contact in the horizontal direction between the panels and pile flanges. If contact cannot be maintained, remove panels, fill gaps with joint filler and reset panels. Securely support panels until enough No. 57 stone or backfill is placed to hold panels in place.

Construct coping as shown in the accepted submittals and Subarticle 452-4(B) of the *Standard Specifications*. When single faced precast concrete barrier is required in front of and against soldier pile walls, stop coping just above barrier so coping does not interfere with placing barrier up against wall faces. If the gap between a single faced barrier and wall face is wider than 2", fill gap with Class V select material (standard size

No. 78M stone). Otherwise, fill gap with backer rod and seal joint between barrier and soldier pile wall with silicone sealant.

Construct concrete facing in accordance with the accepted submittals and Section 420 of the *Standard Specifications*. Do not remove forms until concrete attains a compressive strength of at least 2,400 psi. Unless required otherwise in the plans, provide a Class 2 surface finish for concrete facing that meets Subarticle 420-17(F) of the *Standard Specifications*. Construct concrete facing joints at a spacing of 10 ft to 12 ft unless required otherwise in the plans. Make 1/2" thick expansion joints that meet Article 420-10 of the *Standard Specifications* for every third joint and 1/2" deep grooved contraction or sawed joints that meet Subarticle 825-10(B) or 825-10(E) respectively for the remaining joints. Stop reinforcing steel for concrete facing 2" on either side of expansion joints.

If a brick veneer is required, construct brick masonry in accordance with Section 830 of the *Standard Specifications*. Anchor brick veneers to soldier pile walls in accordance with Subarticle 453-4 of the *Standard Specifications*. Seal joints above and behind soldier pile walls between coping or concrete facing and concrete slope protection with silicone sealant.

E. Backfill

For fill sections or if a temporary slope is shown in the accepted submittals, backfill behind piles, panels and concrete facing in accordance with Article 410-8 of the *Standard Specifications*. Backfill voids behind panels, lagging and piles with No. 57 stone as shown in the accepted submittals. Ensure all voids between panels and lagging and between piles, lagging and excavation faces are filled with No. 57 stone. Compact stone to the satisfaction of the Engineer. When separation geotextiles are required, overlap adjacent geotextiles at least 18" and hold separation geotextiles in place with wire staples or anchor pins as needed.

F. Pile Coatings

For soldier pile walls with panels, clean exposed galvanized or painted surfaces of piles with a 2,500 psi pressure washer after wall construction is complete. Repair galvanized surfaces that are exposed and damaged in accordance with Article 1076-7 of the *Standard Specifications*. Repair painted surfaces that are exposed and damaged by applying 4.0 to 7.0 mils wet film thickness of a topcoat to damaged areas with brushes or rollers. Use the same paint for damaged areas that was used for the topcoat when painting piles initially. Feather or taper topcoats in damaged areas to be level with surrounding areas.

5.0 MEASUREMENT AND PAYMENT

Soldier Pile Retaining Walls will be measured and paid in square feet. Soldier pile walls will be measured as the square feet of wall face area with the pay height equal to the difference between top of wall and top of leveling pad elevations. Define “top of wall” as top of coping or top of panels or concrete facing for soldier pile walls without coping.

The contract unit price for *Soldier Pile Retaining Walls* will be full compensation for providing designs, submittals, labor, tools, equipment and soldier pile wall materials, installing piles, excavating, hauling and removing excavated materials, placing and compacting No. 57 stone and backfill material and supplying temporary support of excavations, wall drainage systems, leveling pads, panels, concrete facing, No. 57 stone, geotextiles, aggregate concrete base course and any incidentals necessary to construct soldier pile walls. The contract unit price for *Soldier Pile Retaining Walls* will also be full compensation for coping, pile coatings, backer rod and silicone sealant, No. 78M stone and brick veneers, if required. No additional payment will be made and no extension of completion date or time will be allowed for repairing overexcavations or unstable excavations or thicker concrete facing.

The contract unit price for *Soldier Pile Retaining Walls* does not include the cost for ditches, fences, handrails, barrier or guardrail associated with soldier pile walls as these items will be paid for elsewhere in the contract.

Where it is necessary to provide backfill material behind soldier pile walls from sources other than excavated areas or borrow sources used in connection with other work in the contract, payment for furnishing and hauling such backfill material will be paid as extra work in accordance with Article 104-7 of the *Standard Specifications*. Placing and compacting such backfill material is not considered extra work but is incidental to the work being performed.

Payment will be made under:

Pay Item	**Pay Unit**
Soldier Pile Retaining Walls	Square Foot

DocuSigned by:
Scott A. Hidden
F760CAEB96FC4D3...
09/03/2024

MECHANICALLY STABILIZED EARTH RETAINING WALLS (1-16-24)

1.0 GENERAL

Construct mechanically stabilized earth (MSE) retaining walls consisting of steel or geosynthetic reinforcement in the reinforced zone connected to vertical facing elements. Use precast concrete panels for vertical facing elements and coarse aggregate in the reinforced zone unless noted otherwise in the plans. Provide reinforced concrete coping and pile sleeves as required. Design and construct MSE retaining walls based on actual elevations and wall dimensions in accordance with the contract and accepted submittals. Use a prequalified MSE Wall Installer to construct MSE retaining walls.

Define MSE wall terms as follows:
Geosynthetic Reinforcement – Polyester Type (PET), HDPE or Polypropylene (PP) geosynthetic grids, i.e., geogrid reinforcement or polymer straps, i.e., geostrip reinforcement,
Geogrid – PET, HDPE or PP geogrid,
Reinforcement – Steel or geosynthetic reinforcement,
Aggregate – Coarse or fine aggregate,
Panel – Precast concrete panel,
Coping – Precast or CIP concrete coping,
Design Height (H) – Wall height + wall embedment as shown in the plans,
MSE Wall – Mechanically stabilized earth retaining wall,
MSE Wall Vendor – Vendor supplying the chosen MSE wall system,
MSE Panel Wall – MSE wall with panels,
MSE Segmental Wall – MSE wall with segmental retaining wall (SRW) units and
Abutment Wall – MSE wall with bridge foundations in any portion of the reinforced zone or an MSE wall connected to an abutment wall (even if bridge foundations only penetrate a small part of the reinforced zone, the entire MSE wall is considered an abutment wall).

For bridge approach fills behind end bents with MSE abutment walls, design reinforcement connected to end bent caps in accordance with the plans and this provision.

Use an approved MSE wall system in accordance with the plans and any NCDOT restrictions or exceptions for the chosen system. Value engineering proposals for other MSE wall systems will not be considered. Do not use MSE wall systems with an "approved for provisional use" status for MSE walls with design heights greater than 35 ft or walls supporting or adjacent to railroads or interstate highways. The list of approved MSE wall systems with approval status is available from:
connect.ncdot.gov/resources/Geological/Pages/Products.aspx

2.0 MATERIALS

Refer to the *Standard Specifications*.

Item	Section
Aggregate	1014
Asphalt Concrete Base Course, Type B25.0C	620
Corrugated Steel Pipe	1032-3

Epoxy, Type 3A	1081
Geosynthetics	1056
Grout, Type 3	1003
Joint Materials	1028
Portland Cement Concrete, Class A	1000
Precast Retaining Wall Coping	1077
Reinforcing Steel	1070
Retaining Wall Panels	1077
Segmental Retaining Wall Units	1040-4
Select Material, Class V	1016
Shoulder Drain Materials	816-2
Steel Pipe	1036-4(A)

Use galvanized corrugated steel pipe with a zinc coating weight of 2 oz/sf (G200) for pile sleeves. Provide Type 2 geotextile for filtration and separation geotextiles. Use Class A concrete for CIP coping, leveling concrete and pads. Use galvanized steel pipe, threaded rods and nuts for the PET geogrid reinforcement vertical obstruction detail. Provide galvanized Grade 36 anchor rods and Grade A hex nuts that meet AASHTO M 314 for threaded rods and nuts.

Use panels and SRW units from producers approved by the Department and licensed by the MSE Wall Vendor. Provide steel strip connectors embedded in panels fabricated from structural steel that meets the requirements for steel strip reinforcement. Unless required otherwise in the contract, produce panels with a smooth flat final finish that meets Article 1077-11 of the *Standard Specifications*. Accurately locate and secure reinforcement connectors in panels and maintain required concrete cover. Produce panels within 1/4" of the panel dimensions shown in the accepted submittals.

Damaged panels or SRW units with excessive discoloration, chips or cracks as determined by the Engineer will be rejected. Do not damage reinforcement connection devices or mechanisms in handling or storing panels and SRW units.

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. Handle and store geosynthetics in accordance with Article 1056-2 of the *Standard Specifications*. Load, transport, unload and store MSE wall materials so materials are kept clean and free of damage. Bent, damaged or defective materials will be rejected.

A. Aggregate

Use standard size No. 57, 57M, 67 or 78M that meets Table 1005-1 of the *Standard Specifications* for coarse aggregate and the following for fine aggregate:

1. Standard size No. 1S, 2S, 2MS or 4S that meets Table 1005-2 of the *Standard Specifications* or
2. Gradation that meets Class III, Type 3 select material in accordance with Article

1016-3 of the *Standard Specifications*.

Fine aggregate is exempt from mortar strength in Subarticle 1014-1(E) of the *Standard Specifications*. Use fine aggregate with a maximum organic content of 1.0%. Provide aggregate with chemical properties that meet the following requirements:

AGGREGATE pH REQUIREMENTS		
Aggregate Type (in reinforced zone)	**Reinforcement or Connector Material**	**pH**
Coarse or Fine	Steel	5 – 10
Coarse or Fine	Geosynthetic	4.5 – 9

AGGREGATE ELECTROCHEMICAL REQUIREMENTS (Steel Reinforcement/Connector Materials Only)			
Aggregate Type (in reinforced zone)	**Resistivity**	**Chlorides**	**Sulfates**
Coarse	≥ 5,000 Ω · cm	≤ 100 ppm	≤ 200 ppm
Fine	≥ 3,000 Ω · cm		

Use aggregate from sources participating in the Department's Aggregate QC/QA Program as described in Section 1006 of the *Standard Specifications*. Sample and test aggregate in accordance with the *Mechanically Stabilized Earth Wall Aggregate Sampling and Testing Procedures*.

B. Reinforcement

Provide steel or geosynthetic reinforcement supplied by the MSE Wall Vendor or a manufacturer approved or licensed by the vendor. Use reinforcement approved for the chosen MSE wall system. The list of approved reinforcement for each MSE wall system is available from the website shown elsewhere in this provision.

1. Steel Reinforcement

Provide Type 1 material certifications in accordance with Article 106-3 of the *Standard Specifications* for steel reinforcement. Use welded wire grid reinforcement ("mesh", "mats" and "ladders") that meet Article 1070-3 of the *Standard Specifications* and steel strip reinforcement ("straps") that meet ASTM A572, A1011 or A463. Use 10 gauge or heavier structural steel Grade 50 or higher for steel strip reinforcement. Galvanize steel reinforcement in accordance with Section 1076 of the *Standard Specifications* or provide aluminized steel strip reinforcement that meet ASTM A463, Type 2-100.

2. Geosynthetic Reinforcement

Provide Type 1 material certifications and identify geosynthetic reinforcement in accordance with Article 1056-3 of the *Standard Specifications*. Define machine

direction (MD) and cross-machine direction (CD) for geogrids per Article 1056-3 of the *Standard Specifications*.

Use HDPE or PP geogrid for geogrid reinforcement cast into backwalls of end bent caps. Use PET or HDPE geogrid for geogrid reinforcement connected directly to SRW units and only HDPE geogrid for geogrid reinforcement cast into panels.

Provide extruded geogrids produced in the United States and manufactured from punched and drawn polypropylene sheets for PP geogrids that meet the following:

PP GEOGRID REQUIREMENTS		
Property	**Requirement[1]**	**Test Method**
Aperture Dimensions[2]	1" x 1.2"	N/A
Minimum Rib Thickness[2]	0.07" x 0.07"	N/A
Tensile Strength @ 2% Strain[2]	580 lb/ft x 690 lb/ft	ASTM D6637, Method B
Tensile Strength @ 5% Strain[2]	1,200 lb/ft x 1,370 lb/ft	
Ultimate Tensile Strength[2]	1,850 lb/ft x 2,050 lb/ft	
Junction Efficiency[3] (MD)	93%	ASTM D7737
Flexural Rigidity[4]	2,000,000 mg–cm	ASTM D7748
Aperture Stability Modulus[5]	0.55 lb–ft/degrees	ASTM D7864
UV Stability (Retained Strength)	100% (after 500 hr of exposure)	ASTM D4355

1. MARV per Article 1056-3 of the *Standard Specifications* except dimensions and thickness are nominal.
2. Requirement for MD x CD.
3. Junction Efficiency (%) = (Average Junction Strength (Xj_{ave}) / Ultimate Tensile Strength in the MD from ASTM D6637, Method A) × 100.
4. Test specimens two ribs wide, with transverse ribs cut flush with exterior edges of longitudinal ribs, and sufficiently long to enable measurement of the overhang dimension.
5. Applied moment of 17.7 lb–inch (torque increment).

C. Bearing Pads

For MSE panel walls, use preformed ethylene propylene diene monomer rubber bearing pads that meet ASTM D2000 Grade 2, Type A, Class A with a durometer hardness of 60 or 80 ± 5. Provide bearing pads with thicknesses that meet the following:

BEARING PAD THICKNESS	
Facing Area per Panel (A)	**Minimum Pad Thickness After Compression (based on 2 times panel weight above pads)**
$A \leq 30$ sf	1/2"
30 sf $< A \leq 75$ sf	3/4"

D. Miscellaneous Components

Miscellaneous components may include connectors (e.g., anchors, bars, clamps, pins,

plates, ties, etc.), fasteners (e.g., bolts, nuts, washers, etc.) and any other MSE wall components not included above. Use 10 gauge or heavier structural steel Grade 50 or higher for steel strip panel anchors and connectors. Galvanize steel components in accordance with Section 1076 of the *Standard Specifications*. Provide miscellaneous components approved for the chosen MSE wall system. The list of approved miscellaneous components for each MSE wall system is available from the website shown elsewhere in this provision.

3.0 PRECONSTRUCTION REQUIREMENTS

A. MSE Wall Surveys

The Retaining Wall Plans show a plan view, typical sections, details, notes and an elevation or profile view (wall envelope) for each MSE wall. Before beginning MSE wall design, survey existing ground elevations shown in the plans and other elevations in the vicinity of MSE wall locations as needed. For proposed slopes above or below MSE walls, survey existing ground elevations to at least 10 ft beyond slope stake points. Based on these elevations, finished grades and actual MSE wall dimensions and details, submit revised wall envelopes for acceptance. Use accepted wall envelopes for design.

B. MSE Wall Designs

For MSE wall designs, submit PDF files of working drawings and design calculations at least 30 days before the preconstruction meeting. Note name and NCDOT ID number of the panel or SRW unit production facility on working drawings. Do not begin MSE wall construction until a design submittal is accepted.

Use a prequalified MSE Segmental Wall Design Consultant to design MSE segmental walls. Provide MSE segmental wall designs sealed by a Design Engineer approved as a Geotechnical Engineer (key person) for the MSE Segmental Wall Design Consultant. Provide MSE panel wall designs sealed by a Design Engineer licensed in the state of North Carolina and employed or contracted by the MSE Wall Vendor.

Design MSE walls in accordance with the plans, *AASHTO LRFD Bridge Design Specifications* and any NCDOT restrictions for the chosen MSE wall system unless otherwise required. For abutment walls only, design MSE walls for seismic if wall sites meet either or both of the following:

- Wall site is in seismic zone 2 based on Figure 2-1 of the *Structure Design Manual*,
- Wall site is classified as AASHTO Site Class E, as noted in the plans, and is in or west of Pender, Duplin, Wayne, Johnston, Wake, Durham or Person County.

Connect reinforcement to panels or SRW units with methods or devices approved for the chosen system. Use a uniform reinforcement length throughout the height of the wall of at least 0.7H or 6 ft, whichever is longer, unless noted otherwise in the plans. Extend the reinforced zone at least 6" beyond end of reinforcement. Do not locate drains, the reinforced zone or leveling pads outside right-of-way or easement limits.

Use the simplified method for determining maximum reinforcement loads and design parameters approved for the chosen MSE wall system or default values in accordance with the AASHTO LRFD specifications. Design steel components including reinforcement and connectors for the design life noted in the plans and aggregate type in the reinforced zone. If an MSE wall system with geosynthetic reinforcement includes any steel parts for obstructions, bin walls, connections or other components, design steel exposed to aggregate for the design life noted in the plans and aggregate type in the reinforced zone. Use "loss of galvanizing" metal loss rates for nonaggressive backfill in accordance with the AASHTO LRFD specifications for galvanized and aluminized steel and metal loss rates for carbon steel in accordance with the following:

CARBON STEEL CORROSION RATES	
Aggregate Type (in reinforced zone)	**Carbon Steel Loss Rate (after coating depletion)**
Coarse	0.47 mil/year
Fine (except abutment walls)	0.58 mil/year
Fine (abutment walls)	0.70 mil/year

For PET or HDPE geogrid and geostrip reinforcement and geosynthetic connectors, use approved geosynthetic properties for the design life noted in the plans and aggregate type in the reinforced zone. For geogrid reinforcement connected to end bent caps, embed reinforcement or connectors in caps as shown in the plans. For PP geogrid reinforcement connected to end bent caps, use the following design parameters for the aggregate type in the reinforced approach fill.

PP GEOGRID REINFORCEMENT DESIGN PARAMETERS				
Aggregate Type (in reinforced zone)	**T_{al} (MD)**	**F***	**α**	**ρ**
Coarse	400 lb/ft	0.70	0.8	32.0°
Fine	428 lb/ft	0.54	0.8	28.35°

Where,

T_{al} = long-term design strength (LTDS),
F* = pullout resistance factor,
α = scale effect correction factor and
ρ = soil-geogrid friction angle.

When noted in the plans, design MSE walls for a live load (traffic) surcharge of 250 psf in accordance with Figure C11.5.6-3(b) of the AASHTO LRFD specifications. For steel beam guardrail with 8 ft posts or concrete barrier rail above MSE walls, analyze top 2 reinforcement layers for traffic impact loads in accordance with Section 7.2 of *FHWA Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes – Volume I* (Publication No. FHWA-NHI-10-024) except use the following for geosynthetic reinforcement rupture:

$$\phi\, T_{al}\, R_c \geq T_{max} + (T_I / RF_{CR})$$

Where,

ϕ = resistance factor for tensile resistance in accordance with Section 7.2.1 of the FHWA MSE wall manual,

T_{al} = long-term geosynthetic design strength approved for chosen MSE wall system,

R_c = reinforcement coverage ratio = 1 for continuous geosynthetic reinforcement,

T_{max} = factored static load in accordance with Section 7.2 of the FHWA MSE wall manual,

T_I = factored impact load in accordance with Section 7.2 of the FHWA MSE wall manual and

RF_{CR} = creep reduction factor approved for chosen MSE wall system.

When shown in the plans for abutment walls, use pile sleeves to segregate piles from aggregate in the reinforced zone. If existing or future obstructions such as foundations, guardrail, fence or handrail posts, moment slabs, pavements, pipes, inlets or utilities will interfere with reinforcement, maintain a clearance of at least 3" between obstructions and reinforcement unless otherwise approved. Design reinforcement for obstructions and locate reinforcement layers so all of reinforcement length is within 3" of corresponding connection elevations. Modify PET geogrid reinforcement for obstructions as shown in the plans.

Use 6" thick CIP unreinforced concrete leveling pads beneath panels and SRW units that are continuous at steps and extend at least 6" in front of and behind bottom row of panels or SRW units. Unless required otherwise in the plans, embed top of leveling pads in accordance with the following requirements:

WALL EMBEDMENT REQUIREMENTS		
Front Slope[1] (H:V)	**Minimum Embedment Depth[2] (whichever is greater)**	
6:1 or flatter (except abutment walls)	H/20	1 ft for H ≤ 10 ft 2 ft for H > 10 ft
6:1 or flatter (abutment walls)	H/10	2 ft
> 6:1 to < 3:1	H/10	2 ft
3:1 to 2:1	H/7	2 ft

1. Front slope is as shown in the plans.
2. H is the maximum design height per wall.

When noted in the plans, locate a continuous aggregate shoulder drain along the base of the reinforced zone behind the aggregate. Provide wall drainage systems consisting of drains and outlet components in accordance with Roadway Standard Drawing No. 816.02.

For MSE panel walls, cover joints at back of panels with filtration geotextiles at least 12" wide. If the approval of the chosen MSE wall system does not require a minimum number of bearing pads, provide the number of pads in accordance with the following:

NUMBER OF BEARING PADS

Facing Area per Panel (A)	Maximum Height of Wall Above Horizontal Panel Joint	Minimum Number of Pads per Horizontal Panel Joint
A ≤ 30 sf	25 ft	2
	35 ft[1]	3
30 sf < A ≤ 75 sf	25 ft	3
	35 ft[1]	4

1. Additional bearing pads per horizontal panel joint may be required for wall heights above joints greater than 35 ft.

For MSE segmental walls, coarse aggregate is required in any SRW unit core spaces and between and behind SRW units for a horizontal distance of at least 18".

Separation geotextiles are required between the aggregate and overlying fill sections. When noted in the plans, separation geotextiles are also required at the back of the reinforced zone between the aggregate and backfill or natural ground. When placing pavement sections directly on the reinforced zone, cap aggregate with 4" of asphalt concrete base course. Unless required otherwise in the plans, use reinforced concrete coping at top of walls that meets the following requirements:

1. Coping dimensions as shown in the plans,
2. At the Contractor's option, coping that is precast or CIP concrete for MSE panel walls unless CIP coping is required as shown in the plans,
3. CIP concrete coping for MSE segmental walls and
4. At the Contractor's option and when shown in the plans, CIP concrete coping that extends down back of panels or SRW units or connects to panels or SRW units with dowels.

For MSE segmental walls with dowels, attach dowels to top courses of SRW units in accordance with the following:

1. Set dowels in core spaces of SRW units filled with grout instead of coarse aggregate or
2. Embed adhesively anchored dowels in holes of solid SRW units with epoxy.

For MSE panel walls with coping, connect CIP concrete coping or leveling concrete for precast concrete coping to top row of panels with dowels cast into panels. When concrete barrier rail is required above MSE walls, use concrete barrier rail with moment slab as shown in the plans.

Submit working drawings and design calculations for acceptance in accordance with Article 105-2 of the *Standard Specifications*. Submit working drawings showing plan views, wall profiles with foundation pressures, typical sections with reinforcement and connection details, aggregate locations and types, geotextile locations and details of leveling pads, panels or SRW units, coping, bin walls, slip joints, pile sleeves, etc. If

necessary, include details on working drawings for concrete barrier rail with moment slab, reinforcement splices if allowed for the chosen MSE wall system, reinforcement connected to end bent caps, curved MSE walls with tight (short) radii and obstructions extending through walls or interfering with reinforcement, leveling pads, barriers or moment slabs. Submit design calculations for each wall section with different surcharge loads, geometry or material parameters. At least one analysis is required for each wall section with different reinforcement lengths. When designing MSE walls with computer software other than MSEW, use MSEW manufactured by ADAMA Engineering, Inc. to verify the design. At least one MSEW analysis is required per 100 ft of wall length with at least one analysis for the wall section with the longest reinforcement. Submit electronic MSEW input files and PDF output files with design calculations.

C. Preconstruction Meeting

Before starting MSE wall construction, hold a preconstruction meeting to discuss the construction and inspection of the MSE walls. If this meeting occurs before all MSE wall submittals have been accepted, additional preconstruction meetings may be required before beginning construction of MSE walls without accepted submittals. The Resident or Bridge Maintenance Engineer, Area Construction Engineer, Geotechnical Operations Engineer, Contractor and MSE Wall Installer Superintendent will attend preconstruction meetings.

4.0 CORROSION MONITORING

Corrosion monitoring is required for MSE walls with steel reinforcement. The Engineer will determine the number of monitoring locations and where to install the instrumentation. Contact M&T before beginning wall construction. M&T will provide the corrosion monitoring instrumentation kits and if necessary, assistance with installation.

5.0 SITE ASSISTANCE

Unless otherwise approved, an MSE Wall Vendor representative is required to assist and guide the MSE Wall Installer on-site for at least 8 hours when the first panels or SRW units and reinforcement layer are placed. If problems are encountered during construction, the Engineer may require the vendor representative to return to the site for a time period determined by the Engineer.

6.0 CONSTRUCTION METHODS

Control drainage during construction in the vicinity of MSE walls. Direct run off away from MSE walls, aggregate and backfill. Contain and maintain aggregate and backfill and protect material from erosion.

Excavate as necessary for MSE walls in accordance with the accepted submittals. If applicable and at the Contractor's option, use temporary shoring for wall construction instead of temporary slopes to construct MSE walls. Define "temporary shoring for wall construction" as temporary shoring not shown in the plans or required by the Engineer including shoring for OSHA reasons or the Contractor's convenience.

Unless required otherwise in the plans, install foundations and if required, pile sleeves located in the reinforced zone before placing aggregate or reinforcement. Brace piles in the reinforced zone to maintain alignment when placing and compacting aggregate. Secure piles together with steel members near top of piles. Clamp members to piles instead of welding if bracing is at or below pile cut-off elevations.

Notify the Engineer when foundation excavation is complete. Do not place leveling pad concrete, aggregate or reinforcement until excavation dimensions and foundation material are approved.

Construct CIP concrete leveling pads at elevations and with dimensions shown in the accepted submittals and in accordance with Section 420 of the *Standard Specifications*. Cure leveling pads at least 24 hours before placing panels or SRW units.

Erect and support panels and stack SRW units so the final wall position is as shown in the accepted submittals. Stagger SRW units to create a running bond by centering SRW units over joints in the row below as shown in the accepted submittals. Space bearing pads in horizontal panel joints as shown in the accepted submittals and cover all panel joints with filtration geotextiles as shown in the accepted submittals. Attach filtration geotextiles to back of panels with adhesives, tapes or other approved methods.

Construct MSE walls with the following tolerances:

A. SRW units are level from front to back and between units when checked with a 4 ft long level,

B. Vertical joint widths are 1/4" maximum for SRW units and 3/4", ±1/4" for panels,

C. Final wall face is within 3/4" of horizontal and vertical alignment shown in the accepted submittals when measured along a 10 ft straightedge and

D. Final wall plumbness (batter) is not negative (wall face leaning forward) and within 0.5° of vertical unless otherwise approved.

Place reinforcement at locations and elevations shown in the accepted submittals and within 3" of corresponding connection elevations. Install reinforcement with the direction shown in the accepted submittals. Before placing aggregate, pull geosynthetic reinforcement taut so it is in tension and free of kinks, folds, wrinkles or creases. Reinforcement may be spliced once per reinforcement length if shown in the accepted submittals. Use reinforcement pieces at least 6 ft long. Contact the Engineer when unanticipated existing or future obstructions such as foundations, guardrail, fence or handrail posts, pavements, pipes, inlets or utilities will interfere with reinforcement. To avoid obstructions, deflect, skew or modify reinforcement as shown in the accepted submittals.

Place aggregate in the reinforced zone in 8" to 10" thick lifts. Compact fine aggregate in accordance with Subarticle 235-3(C) of the *Standard Specifications*. Use only hand operated compaction equipment to compact aggregate within 3 ft of panels or SRW units. At a distance greater than 3 ft, compact aggregate with at least 4 passes of an 8 ton to 10 ton vibratory roller in a direction parallel to the wall face. Smooth wheeled or rubber tired rollers are also acceptable for compacting aggregate. Do not use sheepsfoot, grid rollers or other

types of compaction equipment with feet. Do not displace or damage reinforcement when placing and compacting aggregate. End dumping directly on geosynthetics is not permitted. Do not operate heavy equipment on reinforcement until it is covered with at least 8" of aggregate. Replace any damaged reinforcement to the satisfaction of the Engineer.

Backfill for MSE walls outside the reinforced zone in accordance with Article 410-8 of the *Standard Specifications*. If a drain is required, install wall drainage systems as shown in the accepted submittals and in accordance with Section 816 of the *Standard Specifications*. If pile sleeves are required, fill sleeves with loose uncompacted sand before constructing end bent caps.

Install dowels as necessary for SRW units and place and construct coping and leveling concrete as shown in the accepted submittals. Construct leveling concrete in accordance with Section 420 of the *Standard Specifications*. Construct CIP concrete coping in accordance with Subarticle 452-4(B) of the *Standard Specifications*. When single faced precast concrete barrier is required in front of and against MSE walls, stop coping just above barrier so coping does not interfere with placing barrier up against wall faces. If the gap between a single faced barrier and wall face is wider than 2", fill gap with Class V select material (standard size No. 78M stone). Otherwise, fill gap with backer rod and seal joint between barrier and MSE wall with silicone sealant.

When separation geotextiles are required, overlap adjacent geotextiles at least 18" and hold geotextiles in place with wire staples or anchor pins as needed. Seal joints above and behind MSE walls between coping and concrete slope protection with silicone sealant.

7.0 MEASUREMENT AND PAYMENT

MSE Retaining Wall No. __ will be measured and paid in square feet. MSE walls will be measured as the square feet of wall face area with the pay height equal to the difference between top of wall and top of leveling pad elevations. Define "top of wall" as top of coping or top of panels or SRW units for MSE walls without coping.

The contract unit price for *MSE Retaining Wall No. __* will be full compensation for providing designs, submittals, labor, tools, equipment and MSE wall materials, excavating, hauling and removing excavated materials, placing and compacting aggregate and backfill material and supplying site assistance, leveling pads, panels, SRW units, reinforcement, aggregate, wall drainage systems, geotextiles, aggregate concrete base course, bearing pads, coping, miscellaneous components and any incidentals necessary to construct MSE walls. The contract unit price for *MSE Retaining Wall No. __* will also be full compensation for reinforcement and connector design for reinforcement connected to end bent caps, wall modifications for obstructions, pile sleeves filled with sand, joints sealed with silicone sealant and gaps between barriers and MSE walls filled with backer rod or No. 78M stone, if required.

No separate payment will be made for temporary shoring for wall construction. Temporary shoring for wall construction will be incidental to the contract unit price for *MSE Retaining Wall No. __*.

The contract unit price for *MSE Retaining Wall No. __* does not include the cost for ditches, fences, handrails, barrier or guardrail associated with MSE walls as these items will be paid for elsewhere in the contract. The contract unit price for *MSE Retaining Wall No. __* also does not include the cost for constructing bridge approach fills behind end bents with MSE abutment walls. See *Bridge Approach Fills* provision for measurement and payment of Type 2 Bridge Approach Fills.

Where it is necessary to provide backfill material behind the reinforced zone from sources other than excavated areas or borrow sources used in connection with other work in the contract, payment for furnishing and hauling such backfill material will be paid as extra work in accordance with Article 104-7 of the *Standard Specifications*. Placing and compacting such backfill material is not considered extra work but is incidental to the work being performed.

Payment will be made under:

Pay Item	**Pay Unit**
MSE Retaining Wall No. __	Square Foot

DocuSigned by:
Scott A. Hidden
F760CAEB96FC4D3...
09/03/2024

PROJECT SPECIAL PROVISIONS
GEOENVIRONMENTAL

CONTAMINATED SOIL / CONTAMINATED MATERIAL (6/3/2024)

The Contractor's attention is directed to the fact that soil contaminated with petroleum hydrocarbon compounds and coal combustion by-products (coal ash) exists within the project area. The known areas of contamination are indicated on corresponding plans sheets. Information relating to these contaminated areas, sample locations, and investigation reports will be available at the following web address by navigating to the correct letting year and month then selecting, "Plans and Proposals", "R-2307B", "Individual Sheets/520 GeoEnvironmental":

http://dotw-xfer01.dot.state.nc.us/dsplan/

Petroleum Contaminated Soil

Petroleum contaminated soil may be encountered during any earthwork activities on the project. The Contractor shall only excavate those soils that the Engineer designates necessary to complete a particular task. The Engineer shall determine if soil is contaminated based on areas shown on the plans, petroleum odors, and unusual soil staining. Contaminated soil not required to be excavated is to remain in place and undisturbed. Undisturbed soil shall remain in place, whether contaminated or not. The Contractor shall transport all petroleum contaminated soil excavated from the project to a facility licensed to accept petroleum contaminated soil.

In the event that a stockpile is needed, the stockpile shall be created within the property boundaries of the source material and in accordance with the Diagram for Temporary Containment and Treatment of Petroleum-Contaminated Soil per North Carolina Department of Environmental Quality's (NCDEQ) Division of Waste Management UST Section GUIDELINES FOR EX SITU PETROLEUM CONTAMINATED SOIL REMEDIATION. If the volume of contaminated material exceeds available space on site, the Contractor shall obtain a permit from the NCDEQ UST Section's Regional Office for off-site temporary storage. The Contractor shall provide copies of disposal manifests completed per the disposal facilities requirements and weigh tickets to the Engineer.

Coal Combustion By-Product (Coal Ash) Contaminated Material

Coal ash contaminated material may be encountered during earthwork activities. Parcels 087, 170, 191, 262 and 269 are known to contain coal ash; other unknown parcels may also contain coal ash. The Contractor shall only excavate those materials that the Engineer designates necessary to complete a particular task. Coal ash contaminated material not required to be excavated is to remain in place and undisturbed. Undisturbed soil shall remain in place, whether contaminated or not. Coal ash contaminated material removed during construction shall be transported to a waste treatment and disposal facility that is fully approved and permitted by all applicable environmental regulatory agencies to receive, treat and/or dispose of the material. It shall be the Contractor's responsibility to locate such a facility. All material shall be contained appropriately during transport to the disposal facility. Departmental approval of the specific facility identified for use by the Contractor shall occur prior to removal of any material from the project limits.

The Contractor shall provide the Department with all transportation manifests and certificates of acceptance from the receiving disposal facility weekly. The Department will be the regulatory

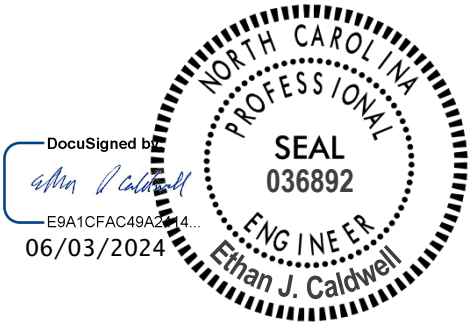
generator of all waste excavated and removed from within its right of way. The Contractor, with the approval of the Engineer, is authorized to sign all waste transportation and disposal manifests on behalf of the Department.

Measurement and Payment:
The quantity of contaminated soil/contaminated material hauled and disposed of shall be the actual number of tons of material, which has been acceptably transported and weighed with certified scales as documented by disposal manifests and weigh tickets. The quantity of petroleum contaminated soil, measured as provided above, shall be paid for at the contract unit price per ton for "Hauling and Disposal of Petroleum Contaminated Soil". The quantity of coal ash contaminated material, measured as provided above, shall be paid for at the contract unit price per ton for "Hauling and Disposal of Coal Ash Contaminated Material."

The above price and payment shall be full compensation for all work covered by this section, including, but not limited to stockpiling, loading, transportation, weighing, laboratory testing, disposal, equipment, decontamination of equipment, labor, and personal protective equipment.

Payment shall be made under:

Pay Item	**Pay Unit**
Hauling and Disposal of Petroleum Contaminated Soil	Ton
Hauling and Disposal of Coal Ash Contaminated Material	Ton



DocuSigned by:
Renee B. Roach, PE
3EB4360BD316431...
9-17-24

YIELD LINES PAVEMENT MARKING:

(1-15-24)(Rev. 9-17-24)

Description

Install yield lines in accordance with this special provision, Section 1205 of the *Standard Specifications* and as directed by the Engineer.

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	Section
Pavement Markings	1087

The material for yield line pavement markings shall be thermoplastic, polyurea, type III cold applied plastic, or heated-in-place thermoplastic. Paint may be used for temporary yield line pavement markings.

Application

Refer to Section 1205 of the *Standard Specifications* and refer to Division 12 of the *Roadway Standard Drawings* on application of products used for yield lines. Yield lines shall be a row of solid white isosceles triangles with 3 to 12 inches between each one, 12 to 24 inches in width, with a height 1.5 times the width. Yield lines shall point towards traffic, and they shall be placed at least 4 feet before the nearest controlled crosswalk. For unsignalized midblock crosswalks, yield lines shall be placed with the Yield Here to Pedestrians sign located 20 to 50 feet in advance of the crosswalk. Yield lines are not symbols or characters.

Measurement and Payment

Yield Line _____ Pavement Marking, __", __mils (for thermoplastic, polyurea and heated-in-place thermoplastic material), *Yield Line Pavement Marking, Type III (__")* (for Type 3 cold applied plastic material), or *Yield Line Pavement Marking, __"* (for paint material) will be measured and paid as the actual number of linear feet of pavement marking lines satisfactorily

placed and accepted by the Engineer. The quantity of lines will be the summation of the linear feet of solid line measured end-to-end of the line.

Payment will be made under:

Pay Item	**Pay Unit**
Yield Line _____ Pavement Marking, __", __mils	Linear Feet
Yield Line Cold Applied Plastic Pavement Marking, Type III (__")	Linear Feet
Yield Line Paint Pavement Marking, __"	Linear Feet

Docusign Envelope ID: A77C2A84-A509-4D54-A6A2-CA12DE040A14

R-2307B Catawba and Iredell Counties

WORK ZONE TRAFFIC CONTROL

Project Special Provisions
Table of Contents

Special Provision	Page
ADA Compliant Pedestrian Traffic Control Devices	TC-2
Connected Lane Closure System	TC-3
High Visibility Devices	TC-6

Signed by:
J.W. Woolard, Jr.
BBC02F49E95C4EC...

NORTH CAROLINA PROFESSIONAL SEAL 19862 ENGINEER J. W. WOOLARD, JR.

8/23/2024

Docusign Envelope ID: A77C2A84-A509-4D54-A6A2-CA12DE040A14

TC-2

ADA COMPLIANT PEDESTRIAN TRAFFIC CONTROL DEVICES:
(10/31/2017) (Rev. 6/3/2022)

Description

Furnish, install, and maintain all ADA compliant pedestrian traffic control devices for existing pedestrian facilities that are disrupted, closed, or relocated by planned work activities.

The ADA compliant pedestrian traffic control devices used to either close, redirect, divert or detour pedestrian traffic are Pedestrian Channelizing Devices, Audible Warning Devices and Temporary Curb Ramps.

Construction Methods

The ADA compliant pedestrian traffic control devices involved in the closing or redirecting of pedestrians as designated on the Transportation Management Plan (TMP) shall be manufactured and assembled in accordance with the requirements of the Americans with Disabilities Act (ADA) and be on the NCDOT approved products list.

Pedestrian Channelizing Devices shall be manufactured and assembled to be connected as to eliminate any gaps that allow pedestrians to stray from the channelizing path. Any Pedestrian Channelizing Devices used to close or block a pedestrian facility shall have a “SIDEWALK CLOSED” sign affixed to it and any audible warning devices, if designated on the TMP.

Audible Warning Devices shall be manufactured to include a locator tone activated by a motion sensor and have the ability to program a message for a duration of at least 1 minute. The motion sensor shall have the ability to detect pedestrians a minimum of 10’ away. The voice module may be automatic or it may be push button activated. If push button activated, it shall be mounted at a height of approximately 3.5 feet, but no more than 4 feet, above the pedestrian facility.

Temporary Curb Ramps shall be manufactured and assembled to meet all of the requirements for persons with walking disabilities, including wheelchair confinement, according to the ADA regulations. All detectable warning features are to be included with these installations.

Measurement and Payment

Pedestrian Channelizing Devices will be measured and paid as the maximum number of linear feet of *Pedestrian Channelizing Devices* furnished, acceptably placed, and in use at any one time during the life of the project.

No direct payment will be made for any sign affixed to a pedestrian channelizing device. Signs mounted to pedestrian channelizing devices will be considered incidental to the device.

Docusign Envelope ID: A77C2A84-A509-4D54-A6A2-CA12DE040A14

Audible Warning Devices will be measured and paid as the maximum number of *Audible Warning Devices* furnished, acceptably installed, and in use at any one time during the life of the project.

Relocation, replacement, repair, maintenance, or disposal of *Pedestrian Channelizing Devices* and *Audible Warning Devices* will be incidental to the pay item.

Temporary Curb Ramps will be measured and paid as the actual number of *Temporary Curb Ramps* furnished, acceptably installed, and in use. *Temporary Curb Ramps* will be paid for each time a curb ramp is moved from one location on the project to another location on the project.

Payment will be made under:

Pay Item	**Pay Unit**
Pedestrian Channelizing Devices	Linear Foot
Audible Warning Devices	Each
Temporary Curb Ramps	Each

CONNECTED LANE CLOSURE SYSTEM:
(10/29/2018) (Rev. 2/7/2023)

Description

Furnish, install, operate, maintain, relocate, and remove connected lane closure devices for use on Interstate and Freeway lane closures. The purpose of a Connected Lane Closure System (CLCS) is to transmit real-time information of active lane closures on Interstate and Freeways for use by the State Transportation Operations Center (STOC), Regional Transportation Management Centers (TMCs), and 511 systems; and for third party vendors (Mapping, Navigation, Connected Vehicles, etc.) to identify and provide advanced notification of active lane closures to approaching motorists.

Materials

The CLCS shall be designed and built to transmit the location of the real-time lane closure from the START to the END such that the full length of the lane closure is known. The information transmitted shall be approved by each entity, conform to the current version of the USDOT's Work Zone Data Exchange (WZDx) specification and be publicly available to NCDOT approved

Docusign Envelope ID: A77C2A84-A509-4D54-A6A2-CA12DE040A14

consumers of this data. More information about the WZDx specification can be found at (https://www.transportation.gov/av/data/wzdx).

The connected lane closure devices shall be capable of wireless communication.

The initial connected device representing the START location shall be designed and attached to the flashing arrow board in such a manner that it is only activated when either the left or right arrows are displayed, not when the flashing arrow board is operated in caution mode. When the lane closure is removed, and the flashing arrow board is turned off or changed to caution mode, the connected device shall automatically turn off simultaneously and its location shall no longer be transmitted. The device shall also have a visual indicator (e.g. an illuminated light either steady burn or flash) to allow clear, visual proof the device is powered on, has established communication and is transmitting. The visual indicator shall not be located such that it potentially creates confusion to the motorists.

A second connected device representing the END location shall be installed on a crashworthy (e.g. NCHRP 350 or MASH-16) traffic control device. It shall have an easily accessible power switch and a small status indicator light mounted such that it is visible when passing by in a vehicle at operating speed. When switched to the ON position, the light shall indicate the device has established communication and is transmitting. The light may be either steady burn or flashing and shall not exceed one (1) inch in diameter. This second connected device representing the END location may be created virtually by a connected flashing arrow board.

The devices shall have battery life sufficient to maintain operation for the duration of the lane closure or have the ability to be recharged without deactivating the device or impacting the location of the lane closure information transmitted to the external parties. All costs associated with charging are incidental and shall be included in the cost of the system.

Construction Methods

Connected lane closure devices shall be used on all lane closures on freeways and interstates throughout the project.

A START and END location shall be established by the installed system per grouping of lane closures (single, double, or triple); one attached and wired into the flashing arrow board at the beginning of the first taper. The other at the last traffic control device at the end of the lane closure(s) if the END location cannot be created virtually. Supplemental flashing arrow boards in advance of the first lane closure taper or flashing arrow boards in subsequent lane closures (for double and triple lane closures) shall not be transmitting if equipped with connected devices. Subsequent lane closures occurring downstream of where all lanes have been reopened and lane closures in the opposite direction of travel will require additional connected devices.

Docusign Envelope ID: A77C2A84-A509-4D54-A6A2-CA12DE040A14

The second connected lane closure device shall be manually turned ON and OFF by crews installing and removing the lane closure unless the device can be controlled or virtually created by the initial connected device. The unit shall be turned on immediately upon installation of the lane closure and turned off immediately upon removal of the lane closure.

Once installed, the Contractor shall verify that the connected lane closure devices are transmitting information prior to leaving the device unattended and re-verify transmission every 72 hours for long-term installations.

Technical Requirements

The connected devices shall run continuously during any active lane closures for the length of the contract.

The GPS within the connected devices shall have a horizontal accuracy of 10 feet, 95% of the time.

The system shall send real-time alerts to designated NCDOT personnel when the flashing arrow mode or direction is changed. The alert shall be within 5 minutes of the actual change.

The connected device information, including the location, transmission status, and battery status shall be transmitted within five (5) minutes of initiation and updated every thirty (30) minutes to the central server.

The contractor shall provide multiple logins to a secured server (e.g. vendor dashboard) that provides real-time and historic status. The status must be exportable, within 24 hours, in .csv or .xls format and include data for date, display direction, time on, time off, and GPS coordinates. The historic logged information shall be available to CLCS users 24/7/365 during the length of the entire construction phase. All logged information from the project shall be retained by the Contractor and be available to the NCDOT for at least one (1) year after the contract ends. Information shall include timestamps, device name, flashing arrow mode, communication status, battery voltage and GPS location.

The battery voltage shall be collected at least once an hour. The information shall be stored and available for troubleshooting. To prevent communication loss, the system shall transmit an alert via E-mail or SMS to designated personnel if the battery voltage of a device is under a specified threshold.

The CLCS shall provide an immediate electronic alert (e.g. via E-mail or SMS) to the Traffic Control Supervisor or other designated individual if a device is not transmitting its position for a period of 30 minutes or more.

Docusign Envelope ID: A77C2A84-A509-4D54-A6A2-CA12DE040A14

The outputs from the connected device on the arrow board and the downstream connected (or virtual) device at the end of the lane closure shall be easily identifiable as a single system, either by sequential device IDs, identical project names, or other method as approved by the Engineer. Additional pairs on the project shall have unique identifiable information such that it is not confused with another project system.

Measurement and Payment

Connected Lane Closure System will be measured and paid as the maximum number of connected systems acceptably placed and in use at any one time during the life of the project. Each lane closure system may be satisfied by one of the following:

- Two (2) connected lane closure devices; one connected to the flashing arrow board and the other on a crashworthy device at the downstream end of the lane closure.

- One (1) connected lane closure device connected to the flashing arrow board that can generate a virtual END location with 50’ accuracy.

All devices for each system must be functioning properly to receive payment for the system. No payment will be made for a system until all devices are satisfactorily installed and operational at the device and on the vendors dashboard. A copy of the device status reporting should be provided by the contractor every 2 weeks.

The price for each connected lane closure system will cover all material, labor, maintenance, relocation, removal, and communication costs required for the duration of the project.

Flashing Arrow Boards will be measured and paid in accordance with Section 1115-4 of the *Standard Specifications*.

Crashworthy devices (such as drums) used to mount the downstream connected lane closure device shall be considered incidental.

Pay Item	**Pay Unit**
Connected Lane Closure System	Each

Docusign Envelope ID: A77C2A84-A509-4D54-A6A2-CA12DE040A14

TC-7

R-2307B Catawba and Iredell Counties

HIGH VISIBILITY DEVICES
(10/25/2019) (Rev. 11/15/2022)

Description

Furnish and install High Visibility Devices for projects on interstates and freeways. High Visibility Devices include drums, skinny drums, stationary work zone signs and rigid portable work zone signs. All of these devices shall be new. Used devices are not acceptable.

Materials

A) General

Use materials in accordance with the Manufacturer's recommendations that will retain both durability and retroreflectivity as described elsewhere in this specification for a period of at least 36 months.

The following are required High Visibility Devices to be used for work zone performance applications.

- Drums
- Skinny Drums (Daytime use only)
- Stationary Work Zone Signs
- Rigid Portable Work Zone Signs

All drums and skinny drums shall be new and meet the existing requirements of Section 1089-5 of the NCDOT Standard Specifications for Roads and Structures and shall have Grade B flexible, fluorescent orange sheeting that meets the retroreflective requirements of Section 1092-2 of the NCDOT Standard Specifications for Roads and Structures.

All stationary work zone signs shall be new and meet the existing requirements of Section 1089-1 of the NCDOT Standard Specifications for Roads and Structures. Legend overlays are prohibited and shall not be accepted on the interstate/freeway or associated intersecting roadways. Vertical sign post reflector strips shall be added to all stationary sign supports. Use Grade B fluorescent orange for work zone sign supports and Grade B fluorescent yellow for exit sign supports. Install strips a minimum of 2" wide, a minimum of 6' in length on sign supports with one sign mounted and a minimum of 4.5' in length for sign supports with two or more signs mounted vertically.

All portable work zone signs shall be new and have composite substrates as described in Section 1089-1 of the NCDOT Standard Specifications for Roads and Structures. Roll-up signs do not meet the requirements of this provision. The remainder of the existing requirements of Section 1089-1 of the NCDOT Standard Specifications for Roads and Structures remain. Used sign stands are acceptable.

B) Material Qualifications/Certifications

Docusign Envelope ID: A77C2A84-A509-4D54-A6A2-CA12DE040A14

Only use materials as listed above that are on the NCDOT Approved Products List. In addition, provide a Type 3 Material Certification for all materials in accordance with Section 106-3 and Section 1087-4.

(C) Performance

Poor performance of any device or sign at any site, whether or not related to a specific contract may be grounds for removing the material from the NCDOT Approved Products List and/or removing from any project under contract.

Construction Methods

All requirements of Section 1110-3 and Section 1130-3 of the NCDOT Standard Specifications for Roads and Structures shall apply except roll up signs are not permitted for use.

The use of skinny drums is prohibited for any nighttime lane closures on interstates/freeways.

Maintenance

Replace any sign or drum that prematurely fails due to any damage or defect that causes it to perform unsatisfactorily with an “in kind” device of similar quality and age according to the guidelines set forth in the American Traffic Safety Service Association’s (ATSSA) Quality Guidelines for Work Zone Traffic Control Devices. An “in kind” replacement sign or drum is not required to be new, however, it shall be less than 1 year old and have 100% of its original sheeting area and at least 85% of the retroreflective qualities of a new device, so that it is undetectable adjacent to the original devices and signs placed on the project.

Measurement and Payment

High Visibility Drums will be measured and paid as the maximum number of drums placed and in use at any one time during the life of the project.

High Visibility Skinny Drums will be measured and paid as the maximum number of skinny drums placed and in use at any one time during the life of the project.

High Visibility Stationary Signs will be measured as the actual number of square feet satisfactorily installed at each location and accepted by the Engineer. Where a particular sign is used at more than one location, measurement will be made at each location.

High Visibility Portable Signs will be measured and paid as the actual number of square feet satisfactorily installed and accepted by the Engineer. Payment will be made for the initial installation only. Relocation of signs will be incidental to the measurement of the quantity of High Visibility Portable Signs.

Docusign Envelope ID: A77C2A84-A509-4D54-A6A2-CA12DE040A14

TC-9

No direct payment will be made for stationary work zone sign supports or portable work zone sign stands. All stationary work zone sign support or portable work zone sign stands will be incidental to the work of providing work zone signs.

Payment will be made under:

Pay Item:	**Pay Unit**
High Visibility Drums	Each
High Visibility Portable Signs	Square Foot

PROJECT SPECIAL PROVISIONS
LIGHTING

1.00 DESCRIPTION

The work covered by this Section consists of furnishing, installing, connecting, and placing into satisfactory operating condition roadway lighting at locations shown on the plans. Perform all work in accordance with these Special Provisions, the Plans, the National Electrical Code, and North Carolina Department of Transportation "Standard Specifications for Roads and Structures" (*2024 Standard Specifications*).

Perform all work in conformance with Division 14 of the *2024 Standard Specifications* except as modified or added to by these Special Provisions. Install all bore pits outside the clear zone, as defined in the AASHTO Roadside Design Guide or as directed by the Engineer.

In addition to the requirements of Division 1400, other specific Sections of the *2024 Standard Specifications* applicable to the work on this project are listed below.

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

1.10 FINAL INSPECTION

The electrical subcontractor foreman onsite during project construction shall also be onsite during the final inspection by NCDOT Lighting & Electrical personnel. In instances where the same foreman cannot be present, the final inspection shall be canceled and rescheduled. As-built plans are required to be submitted prior to the final inspection.

2.00 LIGHT STANDARD LIGHT EMITTING DIODE (LED) LUMINAIRES

2.10 DESCRIPTION

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

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

Type	HPS Replacement Equivalent	Color Temp	Min. % of initial output at 70k hours	Min. Maintained Delivered Lumens
185W LED	250W	3500K ±500K	83%	15,500
285W LED	400W	3500K ±500K	83%	19,150

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

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

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

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

2.20 MATERIALS

2.21 LUMINAIRE REQUIREMENTS

A. General Requirements

- LM-79 photometric test reports shall be provided for all LED luminaires. LM-79 luminaire photometric reports shall be produced by an independent test laboratory and include the following:
  - Name of test laboratory. The test laboratory must hold National Voluntary Laboratory Accreditation Program (NVLAP) accreditation for the IES LM-79 test procedure or must be qualified, verified, and recognized through the U.S. Department of Energy's CALiPER program.
  - Report number
  - Date
  - Complete luminaire catalog number. Catalog number tested must match the catalog number of the luminaire submitted, except for variations which do not affect performance.
  - Description of luminaire, LED light source(s), and LED driver(s)
  - Goniophotometry
  - Colorimetry

- LM-80 lumen maintenance test report shall be provided for each respective LED light source.
- Luminaire shall be constructed of a single piece die cast aluminum housing. Each luminaire shall be finished gray in color unless otherwise noted.
- The luminaire shall have a 7 pin ANSI C136.41 compliant photocontrol receptacle for future expansion capabilities.
- Provide a summary of reliability testing performed for LED driver.

- Luminaires maximum total power consumption shall not exceed the values shown in the table above. Nominal luminaire input wattage shall account for nominal applied voltage and any reduction in driver efficiency due to sub-optimal driver loading.
- Luminaire shall have a maximum Backlight, Uplight & Glare (BUG) rating of 3-0-3 and an IESNA distribution of Type II or Type III as required to meet the spacing, the average maintained footcandle level and the average to minimum uniformity ratio requirements shown on the plans. The same BUG rating and distribution type shall be used throughout the project.
- Minimum Ingress Protection (IP) dust and moisture ratings for the luminaire electrical components (driver and surge protection) and luminaire optical components shall be IP65 and IP66, respectively, as specified in ANSI C136.25.
- Luminaire shall have external and internal labels per ANSI C136.15 and ANSI C136.22, respectively. Internal label shall identify the manufacturer, year and month of manufacture and the manufacturer's part number.
- Luminaire shall have an internal bubble level.
- Luminaires shall start and operate in -20°C to +40°C ambient.
- Luminaires shall be rated for continuous service at an ambient temperature of 40°C (104°F)
- Electrically test fully assembled luminaires before shipment from factory.
- Effective Projected Area (EPA) and weight of the luminaires shall not exceed 1.4 square feet and 46 lbs.
- Luminaires shall be designed for ease of electrical component replacement.
- Luminaires shall be rated for minimum 2G vibration, minimum, per ANSI C136.31.
- LED light sources and drivers shall be RoHS compliant.
- The luminaire manufacturer shall have no less than five (5) years of experience in manufacturing LED-based lighting products and the manufacturing facility must be ISO 9001 certified.
- Luminaire shall have a 1.25" to 2.0" adjustable tenon mount for connection to luminaire bracket arm assembly.
- Pole hardware, nuts, bolts, and washers, etc. shall be made from 18-8 stainless steel, or steel conforming to ASTM A307 galvanized in accordance with ASTM A153.
- Grommets shall be installed in cable entry holes. Cable entry holes shall be free from sharp edges which might cut conductors or an ungloved hand.
- All conductors inside the luminaire shall be neatly secured with tie-wraps as needed to prevent pinch points and assist in trouble shooting.

B. Driver

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

- Shall provide UL Class II output.

C. Surge Suppression
- Integral surge protection shall meet ANSI/IEEE C62.45 procedures based on ANSI/IEEE C62.41.2 definitions for standard and optional waveforms for location category C-High 10kV/10kA test, IEC 61000-4-2 (Electrostatic Discharge) 8kV Air/4kV Contact test and IEC 61000-4-4 (Fast Transients).

D. Electromagnetic interference
- Luminaires shall have a maximum Total Harmonic Distortion (THD) of 20% at full input power and across specified voltage range.
- Luminaires shall comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.

E. Electrical safety testing
- Luminaires shall be listed for wet locations.
- Luminaires shall be UL listed and labeled.

F. Finish
- Luminaires shall be painted with a corrosion resistant polyester powdered paint with a minimum 2.0 mil thickness.
- Luminaires shall exceed a rating of six per ASTM D1654 after 1000 hours of salt spray fog testing per ASTM B117.
- The coating shall exhibit no greater than 30% reduction of gloss per ASTM D523, after 500 hours of QUV testing at ASTM G154 Cycle 6.
- Exterior surfaces shall be smooth and free of burrs.

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

H. Color Quality
- Minimum Color Rendering Index (CRI) of 70 with a Correlated Color Temperature (CCT) of 3000K to 4000K

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

J. The following shall be in accordance with corresponding sections of ANSI C136.37
- All internal components shall be assembled and pre-wired using modular electrical connections.
- Terminal blocks shall be used for incoming AC lines. Terminal blocks shall be easily accessible to installers or repair personnel. Wire nuts are prohibited inside the luminaire housing.

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

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

Include a shorting cap for each luminaire provided.

Provide wiring inside the light standard, breakaway fuseholders and fuses meeting Article 1400-2 of the *2024 Standard Specifications*, respectively.

2.30 WARRANTY

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

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

2.40 CONSTRUCTION METHODS

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

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

2.50 MEASUREMENT AND PAYMENT

The light standard luminaires measured as provided above will be paid for at the contract unit price per each "Light Standard Luminaires, Type _____". Such price and payment will be considered full compensation for providing and installing the LED light standard luminaire on the bracket arm, wiring inside the standard from the circuit conductors to the LED light standard luminaire, in-line breakaway fuseholders with fuses, ground wiring at the pole of the light standard and a shorting cap.

Payment will be made under:

Light Standard Luminaires, Type _____…… Each

3.00 HIGH MAST LIGHT EMITTING DIODE (LED) LUMINAIRES

3.10 DESCRIPTION

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

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

Mounting Height	Max. LED Fixture Wattage	Number & HPS Replacement Equivalent	Color Temp	Min. % of initial output at 70k hours	Min. Maintained Delivered Lumens (per fixture)
120’	560W	8 x 750W	3500K ±500K	87%	54,000
100’	560W	6 x 750W	3500K ±500K	87%	54,000
80’	335W	8 x 400W	3500K ±500K	87%	27,000
60’	335W	4 x 400W	3500K ±500K	87%	27,000

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

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

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

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

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

3.20 MATERIALS

3.21 LUMINAIRE REQUIREMENTS

A. General Requirements

- LM-79 photometric test reports shall be provided for all LED luminaires. LM-79 luminaire photometric reports shall be produced by an independent test laboratory and include the following:
  - Name of test laboratory. The test laboratory must hold National Voluntary Laboratory Accreditation Program (NVLAP) accreditation for the IES

LM-79 test procedure or must be qualified, verified, and recognized through the U.S. Department of Energy's CALiPER program.

- Report number
- Date
- Complete luminaire catalog number. Catalog number tested must match the catalog number of the luminaire submitted, except for variations which do not affect performance.
- Description of luminaire, LED light source(s), and LED driver(s)
- Goniophotometry
- Colorimetry

- LM-80 lumen maintenance test report shall be provided for each respective LED light source.
- Luminaire shall be constructed of aluminum. Each luminaire shall be finished gray in color unless otherwise noted.
- The luminaire shall have a 7 pin ANSI C136.41 compliant photocontrol receptacle for future expansion capabilities.
- Provide a summary of reliability testing performed for LED driver.
- Luminaires maximum total power consumption shall not exceed the values shown in the table above. Nominal luminaire input wattage shall account for nominal applied voltage and any reduction in driver efficiency due to sub-optimal driver loading.
- Luminaire shall have a maximum Backlight, Uplight & Glare (BUG) rating of 5-0-5 and an IESNA distribution of Type V as required to meet the spacing, the average maintained footcandle level and the average to minimum uniformity ratio requirements shown on the plans. The same BUG rating and distribution type shall be used throughout the project.
- Luminaire LED modules shall meet dust and moisture rating of IP-66, minimum.
- Luminaire shall have an external label per ANSI C136.15.
- Luminaires shall have an internal label per ANSI C136.22.
- Luminaires shall start and operate in -20°C to +40°C ambient.
- Electrically test fully assembled luminaires before shipment from factory.
- Effective Projected Area (EPA) and weight of the luminaires shall not exceed 1.3 square feet and 65 lbs.
- Luminaires shall be designed for ease of electrical component replacement.
- Luminaires shall be rated for minimum 2G vibration, minimum, per ANSI C136.31-2010
- LED light sources and drivers shall be RoHS compliant.
- The luminaire manufacturer shall have no less than five (5) years of experience in manufacturing LED-based lighting products and the manufacturing facility must be ISO 9001 certified.
- Pole hardware, nuts, bolts, and washers, etc. shall be made from 18-8 stainless steel, or steel conforming to ASTM A307 galvanized in accordance with ASTM A153.

B. Driver
- Shall be 0V-10V dimmable.

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

C. Surge Suppression
- Integral surge protection shall meet ANSI/IEEE C62.45 procedures based on ANSI/IEEE C62.41.2 definitions for standard and optional waveforms for location category C-High 10kV/10kA test, IEC 61000-4-2 (Electrostatic Discharge) 8kV Air/4kV Contact test and IEC 61000-4-4 (Fast Transients).

D. Electromagnetic interference
- Luminaires shall have a maximum Total Harmonic Distortion (THD) of 20% at full input power and across specified voltage range.
- Luminaires shall comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.

E. Electrical safety testing
- Luminaires shall be listed for wet locations.
- Luminaires shall be UL listed and labeled.

F. Finish
- Luminaires shall be painted with a corrosion resistant polyester powdered paint with a minimum 2.0 mil thickness.
- Luminaires shall exceed a rating of six per ASTM D1654 after 1000 hours of salt spray fog testing per ASTM B117.
- The coating shall exhibit no greater than 30% reduction of gloss per ASTM D523, after 500 hours of QUV testing at ASTM G154 Cycle 6.

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

H. Color Quality
- Minimum Color Rendering Index (CRI) of 70 with a Correlated Color Temperature (CCT) of 3000K to 4000K

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

J. The following shall be in accordance with corresponding sections of ANSI C136.37
- All internal components shall be assembled and pre-wired using modular electrical connections.

- Terminal blocks shall be used for incoming AC lines
- Latching and hinging

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

Include a shorting cap for each luminaire provided.

3.30 WARRANTY

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

Warranty period shall begin after project acceptance by the Department.

3.40 CONSTRUCTION METHODS

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

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

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

3.50 MEASUREMENT AND PAYMENT

The high mount luminaires measured as provided above will be paid for at the contract unit price per each "High Mount Luminaires _____". Such price and payment will be considered full compensation for providing and installing the LED high mount luminaire with a shorting cap on the carrier ring tenon arm and connecting the LED high mount luminaire to the supply cord on the carrier ring.

Payment will be made under:

High Mount Luminaires _____ ..... Each

4.00 REMOVE AND DISPOSE OFF CONTROL SYSTEM "E"

4.10 DESCRIPTION

The work covered by this section consists of providing all equipment, labor and materials necessary to remove an existing control system at the location shown on the plans.

4.20 MATERIALS

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

4.30 CONSTRUCTION METHODS

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

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

Disconnect circuitry and remove control system enclosure from conduit and support structure. Abandon or remove underground circuitry, concrete pad and support structure.

Dispose of the removed control panel, concrete, reinforcing steel, support structure and conduit in a manner acceptable to the Engineer.

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

4.40 MEASUREMENT AND PAYMENT

The removal of Control Systems “E” measured as provided above will be paid for at the contract unit price per each "Remove Control System - Dispose". Such price and payment will be considered full compensation for disconnecting circuitry, disassembly, removal of existing foundation and support structure, disposing of control panel, concrete, backfilling, compaction, and all incidentals necessary to complete the work.

Payment will be made under:

Remove Control System - Dispose.....Each

5.00 REMOVE SINGLE ARM LIGHT STANDARDS

5.10 DESCRIPTION

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

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

5.20 MATERIALS

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

5.30 CONSTRUCTION METHODS

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

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

Remove light standard and arms, couplings, anchor nuts, washers, transformer bases with doors and connecting bolts and fuse holders.

Remove or abandon existing concrete light standard foundations as defined in Standard Specifications Section 1400-10. Dispose of the removed concrete, reinforcing steel and anchor bolts in a manner acceptable to the Engineer. Backfill the holes with suitable material and compact backfill as required.

Abandon or remove the conductors and the conduit for the removed single arm light standards as shown on the plans. Refer to Standard Specifications Section 1400-10.

5.40 MEASUREMENT AND PAYMENT

The quantity of removed single arm light standards to be paid for will be the actual number which have been dismounted from existing foundations and disposed of in a manner acceptable to the Engineer.

The quantity of removed foundations to be paid for will be the actual number which have been removed or abandoned and accepted.

The disposed of single arm light standards will be paid for at the contract unit price per each "Remove Single Arm Light Standard – Dispose". Such price and payment will be considered full compensation for disassembly and disposal of the shaft, arm, fuseholders, transformer base and hardware.

The removed foundations will be paid for at the contract unit price per each "Remove Light Standard Foundation". Such price and payment will be considered full compensation for removing or abandoning foundation concrete, reinforcing steel and anchor bolts. It also includes backfilling the holes with suitable material and compacting the backfill material as required.
Payment will be made under:

Remove Single Arm Light Standard - Dispose……..……..……Each
Remove Light Standard Foundation…….……...…….……Each

6.00 REMOVE 100' HIGH MOUNT STANDARDS

6.10 DESCRIPTION

The work covered by this section consists of the removal of existing 100' High Mount Standards on concrete foundations at locations shown on the plans. The standards are attached to the foundations with anchor bolts.

Remove or abandon concrete foundations.

6.20 MATERIALS

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

6.30 CONSTRUCTION METHODS

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

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

Remove the luminaires from carrier ring and dispose.

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

Remove or abandon existing concrete high mast foundations as defined in Standard Specifications Section 1400-10. Dispose of the removed concrete, reinforcing steel and anchor bolts in a manner acceptable to the Engineer. Backfill the holes with suitable material and compact backfill as required.

Abandon or remove the conductors and the conduit for the removed high mast light standards as shown on the plans. Refer to Standard Specifications Section 1400-10.

6.40 MEASUREMENT AND PAYMENT

The quantity of removed high mast standards to be paid for will be the actual number which have been dismounted from existing foundations and properly disposed of in a manner acceptable to the Engineer.

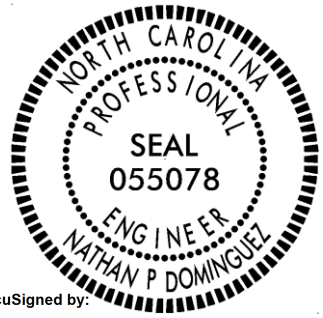
The quantity of removed foundations to be paid for will be the actual number which have been removed or abandoned and accepted.

The removed high mast light standards measured as provided above will be paid for at the contract unit price per each "Remove 100' High Mast Standard". Such price and payment will be considered full compensation for disassembly and disposal of the high mast pole and all components.

The removed foundations measured as provided above will be paid for at the contract unit price per each "Remove 100' High Mast Standard Foundation". Such price and payment will be considered full compensation for removing or abandoning foundation concrete, reinforcing steel, transformer bases and anchor bolts. It also includes backfilling the holes with suitable material and compacting the backfill material as required.

Payment will be made under:

Remove (height) High Mast Standard……Each
Remove (height) High Mast Standard Foundation……Each



DocuSigned by:
Nathan Dominguez
4C60B9594A58434...

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

06/18/2024

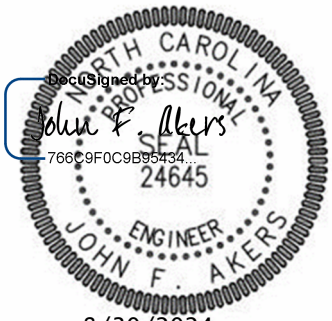
Docusign Envelope ID: CCAD71B6-20B7-4998-85ED-408F36D1E4D5

PROJECT SPECIAL PROVISIONS
Utility Construction- Aqua North Carolina Inc.

Dewberry

Dewberry Engineers Inc.
2610 Wycliff Road, Suite 410
Raleigh, NC 27607

919.881.9939
919.881.9923 fax
www.dewberry.com



Where brand names and model numbers are specified in these Special Provisions or in the plans, the cited examples are used only to denote the quality standard of product desired and do not restrict bidders to a specific brand, make, or manufacturer. They are provided to set forth the general style, type, character, and quality of the product desired. Equivalent products will be acceptable.

The utility owner is the Aqua North Carolina. The contact person is Kyle McKay, and he can be reached by phone at 919-653-6973.

The provisions contained within these Utilities Construction Project Special Provisions modify the *Standard Specifications* only for materials used and work performed constructing water or sewer facilities owned by Aqua North Carolina, Inc.

SUBMITTALS AND RECORDS

Revise the 2024 *Standard Specifications* as follows:

Page 15-2, Article 1500-7 SUBMITTALS AND RECORDS, lines 29-30, replace the last sentence of the third paragraph with the following:

Provide an electronic file in “dwg” format, AutoCAD Release 14 minimum, 2000, or 2000i showing longitude and latitude of each valve. Provide one copy and one pdf copy of the ENGINEER’s signed and sealed Record Drawings for the project. Provide an ENGINEER’s Letter of Certification of Completion for the project. The original shall be provided to NCDEQ.

Docusign Envelope ID: CCAD71B6-20B7-4998-85ED-408F36D1E4D5

PVC GRAVITY FLOW SEWER

Materials:

PVC Gravity Sewer Pipe (4" - 15"), ASTM D3034, SDR 35. Uniform minimum "pipe stiffness" at five (5) percent deflection shall be 46 psi. The joints shall be integral bell electrometric gasket joints manufactured in accordance with ASTM D3212 and ASTM F477. Applicable UNI-Bell Plastic Pipe Association standard is UNI-B-4.

PVC Gravity Sewer Pipe (18" - 27"), ASTM F679, SDR 35. Uniform minimum "pipe stiffness" at five (5) percent deflection shall be 46 psi. The joints shall be integral bell electrometric gasket joints manufactured in accordance with ASTM D3212 and ASTM F477. Applicable UNI-Bell Plastic Pipe Association standard is UNI-B-7.

All PVC pipe shall bear the NSF-DWV seal. The minimum standard length of pipe shall be thirteen (13) feet.

PVC fittings shall not be allowed. Use ductile iron fitting with "push-on" or mechanical joints conforming to ANSI A21.11 and sub-article 1034-4 (A).

PVC FORCE MAIN SEWER PIPE

Materials:

All PVC pipe of nominal diameter three through twelve inches shall be manufactured in accordance with AWWA Standard C900, latest edition. The PVC pipe shall have a minimum working pressure rating of 235 psi and shall have a minimum DR of 18. Pipe shall be the same O.D. as ductile iron pipe. PVC pipe smaller than three inches shall be SDR 21 Class 200.

PVC pipe shall have integral bell push-on type joints conforming to ASTM D3139.

All PVC Force Main Sewer Pipe shall be green in color.

Fittings, to be used with three inches and larger C900 PVC pipe shall be restrained mechanical joint ductile iron conforming to ANSI/AWWA A21.10/C110, 350 psi minimum pressure rating. Ductile iron fittings shall have exterior asphaltic coating with a minimum thickness of 1.0 mils and an interior protective lining of ceramic epoxy with a minimum dry thickness of 40 mils applied by the pipe manufacturer. Ceramic epoxy lining shall be equivalent to Protecto 401. PVC fittings are not allowed on PVC force mains larger than three inches.

Fittings used with three inch and smaller PVC pipe shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a Cell Class of 12454 as identified in ASTM D 1784. All fitting shall be joining via solvent weld.

Docusign Envelope ID: CCAD71B6-20B7-4998-85ED-408F36D1E4D5

Construction Methods:

Clay pipe, DIP pipe, PE pipe and concrete pipe shall not be used for sewer pipe unless approved in writing by Aqua. All sewer pipes shall be PVC with ductile iron fittings as specified herein unless otherwise indicated on the drawings.

Joints between pipes of different materials shall be made with a flexible mechanical compression coupling with No. 304 stainless steel bands.

Each test section shall not exceed 400 feet in length and shall be tested between adjacent manholes.

Perform a video internal inspection of all installed gravity sewer pipe within 30 days after Substantial Completion after the road base is in place and the manhole rings and covers are to grade. If the video inspection reveals cracked, broken, or defective pipe, or pipe misalignment resulting in vertical sags in excess of 1-1/2" and in the case of PVC pipe a ring deflection in excess of 5%, repair or replace the pipe.

Prior to repair or replacement of failed sewer pipe, the method of repair or replacement shall be submitted to Aqua for approval. Pressure grouting of pipe shall not be considered as an acceptable method of repair.

Wastewater force mains shall be equipped with automatic air release valves located at all high points and as shown on the plans. Valves shall be located in an enclosure as detailed in the air release valve detail on the plans.

The tests shall be made on sections not to exceed 2,000 feet. Perform testing in accordance with AWWA C600 and C605.

Use the following leakage formula:

$$W=LD\sqrt{P}\div 148{,}000$$

where: P=Average test pressure during leakage test,in lb/sq.in.

Prior to final inspection and acceptance of the force main by Aqua, flush and clean all of the system. Flushing and cleaning shall remove all accumulated construction debris, rocks, gravel, sand, silt, and other foreign material from the sewer system at or near the downstream end. This water used for flushing will not be allowed to drain to the wastewater plant, so proper procedures must be in place to remove the water used to flush.

Upon Aqua's final inspection of the pressure pipe systems, if any foreign matter is still present in the system, clean the sections and portions of the lines as required.

Docusign Envelope ID: CCAD71B6-20B7-4998-85ED-408F36D1E4D5

DUCTILE IRON FORCE MAIN SEWER PIPE

Materials:

Ductile Iron Pipe: All ductile iron pipe of nominal diameter four through fifty-four inches shall conform to ANSI/AWWA A21.51/C151. A minimum of Class 52 pipe shall be supplied for all sizes of pipe unless a higher-class pipe is specifically called out in the plans or required by Aqua.

Fittings: All fittings shall be mechanical joint ductile iron conforming to ANSI/AWWA A21.10/C110, 350 psi minimum pressure rating, or ductile iron compact fittings four through twenty-four inches in accordance with ANSI/AWWA A21.53/C153.

Joints: Joints for ductile iron pipe and fittings shall be push-on or mechanical joints conforming to ANSI/AWWA A21.11/C111, unless otherwise called for on the plans. Where called for on the plans, restrained or flanged joints shall be provided. Flanged joints shall conform to ANSI Standard B16.1-125 LB. Restrained joints shall conform to Section 5.3.

Coatings and Linings: Where ductile iron pipe and fittings are installed below grade or installed in a casing pipe, the coating shall be a minimum 1.0 mil thick in accordance with ANSI/AWWA A21.51/C151. Where ductile iron pipe and fittings are installed above grade, pipe, fittings and valves shall be thoroughly cleaned and given one field coat (minimum 1.5 mils dry thickness) of rust inhibitor primer. Intermediate and finished field coats of Alkyd shall also be applied (minimum 1.5 mils dry thickness each coat). Primer and field coats shall be compatible and shall be applied in accordance with the manufacturer's recommendations. Final field coat color shall be gray for raw wastewater, light brown for scum and dark brown for sludge.

All ductile iron pipe and fittings shall have an interior protective lining of ceramic epoxy with a minimum dry thickness of 40 mils applied by the pipe manufacturer. Ceramic epoxy lining shall be equivalent to Protecto 401.

PVC POTABLE WATER PIPE

Materials:

All PVC pipe of nominal diameter three through twelve inches shall be manufactured in accordance with AWWA Standard C900, latest edition. The PVC pipe shall have a minimum working pressure rating of 235 psi and shall have a minimum DR of 18. Pipe shall be the same O.D. as ductile iron pipe. PVC pipe smaller than three inches shall be SDR 21 Class 200.

PVC pipe shall have integral bell push-on type joints conforming to ASTM D3139.

All PVC Water Main Pipe shall be blue in color.

Fittings used with C900 PVC pipe shall be mechanical joint ductile iron or gray iron conforming to ANSI/AWWA A21.10/C110, 250 psi minimum pressure rating, or ductile iron compact fittings three through twenty-four inches in accordance with ANSI/AWWA A21.53/C153.

Docusign Envelope ID: CCAD71B6-20B7-4998-85ED-408F36D1E4D5

Fittings used with three inch and smaller PVC pipe shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a Cell Class of 12454 as identified in ASTM D 1784. All fitting shall be joining via solvent weld.

POLYETHYLENE (PE) PIPE

Materials:

All service lines shall be 3/4”, 1", 1-1/2" or 2" blue polyethylene tubing conforming to specifications in AWWA C800 and AWWA C901.

DUCTILE IRON PIPE FITTINGS

Materials:

Fittings shall have a 250-psi minimum pressure rating.

Where called for in the plans, restrained or flanged joints shall be provided. Flanged joints shall conform to ANSI Standard B 16.1-125 LB.

GATE VALVES

Materials:

All gate valves twenty-four (24) inches and smaller shall be resilient seat gate valves. Such valves shall be resilient seated, manufactured to meet or exceed the requirements of AWWA C509, latest revision. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the pipe.

The valve body, bonnet, and bonnet cover shall be cast iron ASTM A126, Class B. All ferrous surfaces inside and outside shall have a fusion-bonded epoxy coating. A 2" wrench nut shall be provided for operating the valve in a buried installation. All valves shall be tested in strict accordance with AWWA C509. All valves are to open counterclockwise.
The valves shall be non-rising stem with the stem made of cast, forged, or rolled bronze as specified in AWWA C509. Two stem seals shall be provided and shall be of the o-ring type. The stem nut must be independent of the gate.

The resilient sealing mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction.

CHECK VALVES (3” AND LARGER)

Materials:

Check valves shall be manufactured from gray iron meeting or exceeding ASTM A126 Grade B. Check valves are to comply with ANSI/AWWA C508, latest revision for use in water works service, and at a rated working pressure of 200 psig. Test pressure shall be at 400 psig. Check

Docusign Envelope ID: CCAD71B6-20B7-4998-85ED-408F36D1E4D5

valves shall be UL Listing, in applicable configurations, at a rated working pressure is 175 psig Check valves shall be Certified to NSF/ANSI 61 and NSF/ANSI 372. The disc on check valves 3 in. -12 in. shall be constructed of high-strength bronze. Valve body shall exhibit a bronze seat ring threaded into the body. The clapper arm shall be made of high-strength bronze. The check valve disc and clapper arm assembly shall use corrosion-resistant bearings, bushings, and washers to help reduce wear and increase operating life. Clapper arm shaft shall be made of 316 stainless steel.

Disc and clapper arm assembly shall be removable from the check valve body without having to remove the check valve from the pipeline. Disc shall be equipped with an O-ring seal and shall open to provide a full waterway design as defined by ANSI/AWWA C508 and a Type II full waterway, composition-to-metal seat, as defined by MSS SP-71.

Check valves are available with an interior and exterior fusion-bond epoxy coating, in accordance with ANSI/AWWA C550.

Valve to be designed for use in water and wastewater applications. Check valves equipped with lever and weight, or lever and spring, that can be used in a horizontal pipeline or in a vertical pipeline only when flow is in an upward direction. The orientation of the lever shall be field adjustable and must be positioned correctly for the installation.

Measurement and Payment:

Pay Item	**Pay Unit**
__ "Check Valve	Each

TAPPPING SLEEVES

Materials:

All pressure connections to asbestos cement pipe and all "size on size" taps shall utilize mechanical joint sleeves. Gaskets shall be vulcanized natural or synthetic rubber.
Mechanical Joint Sleeves: Sleeves shall be cast of gray-iron or ductile-iron and have an outlet flange with the dimensions of the Class 125 flanges shown in ANSI B16.1, properly recessed for tapping valve. Glands shall be gray-iron or ductile iron. Bolts and nuts shall comply with ANSI/AWWA Cl11/A21.11.

Type 304 Stainless Steel Tapping Sleeves: Sleeves shall be fabricated of minimum 3/8" carbon steel meeting ASTM A285 Grade C. Outlet flange shall meet AWWA C-207, Class "D" ANSI 150 lb. drilling and be properly recessed for the tapping valve. Bolts and nuts shall be high strength low alloy steel to AWWA C111 (ANSI A21.11). Sleeve shall have manufacturer-applied fusion bonded epoxy coating, minimum 12 mil thickness.

Docusign Envelope ID: CCAD71B6-20B7-4998-85ED-408F36D1E4D5

NOTIFICATION AND CONNECTION TO EXISTING WATER AND SEWER MAINS

Revise the 2024 *Standard Specifications* as follows:

Page 15-2, Sub-article 1500-9 Placing Pipelines into Service, paragraph 2
Add the following sentences:

All connections to existing mains shall be made by only after the connection procedure and work scheduling has been reviewed and approved by Aqua. Submit a written request to Aqua a minimum of one week prior to scheduling said connections. In request, outline the following:

1. Points of connection, fittings to be used, and method.

2. Estimated construction time for said connections.

Aqua shall review the submittal within one week after receiving it and approve or deny the request. If the request is rejected by Aqua, resubmit the request modifying it in a manner acceptable to Aqua.

All connections shall only be made on the agreed upon date and time. If the connection work is not initiated and completed in the agreed upon manner, reschedule the said connection by following the procedure outlined above.

PIPE HANDLING, STORAGE AND TRANSPORTATION

Revise the 2024 *Standard Specifications* as follows:

Page 15-3, Sub-article 1505-2 Materials
Add the following sentences:

All types of pipe shall be handled in such manner as will prevent damage to the pipe or coating. Accidental damage to pipe or coating shall be repaired to the satisfaction of Aqua or be removed from the job. When not being handled, the pipe shall be supported on timber cradles or on properly prepared ground, graded to eliminate all rock points and to provide uniform support along the full length. When being transported, the pipe shall be supported at all times in a manner which will not permit distortion or damage to the lining or coating. Any unit of pipe that, in the opinion of Aqua, is damaged beyond repair it shall be removed from the site of the work and replaced with another unit.

Joint gaskets shall be stored in clean, dark, dry location until before use.

Dirt or other foreign material shall be prevented from entering the pipe or pipe joint during handling or laying operations and any pipe or fitting that has been installed with dirt or foreign material in it shall be removed, cleaned and reinstalled. At times when pipe installation is not in progress, the open ends of the pipe shall be closed by a watertight plug or by other means approved by Aqua to ensure absolute cleanliness inside the pipe.

Docusign Envelope ID: CCAD71B6-20B7-4998-85ED-408F36D1E4D5

THRUST RESTRAINT

Revise the 2024 *Standard Specifications* as follows:

Page 15-4, Sub-article 1505-3 (E) Thrust Restraint paragraph 3
Replace with the following:

Provide thrust restraint for pressurized pipelines and appurtenances. When shown in the plans, construct as specified with modifications to match the actual field conditions. Use concrete reaction backing and thrust collars where joint restraint is impractical. Where any section of a main is provided with concrete thrust restraint for fittings, controls or hydrants, perform the hydrostatic pressure test after the concrete reaches appropriate strength.

Provide thrust restraint on the existing piping system as necessary.

Sections of piping requiring restrained joints shall be constructed using pipe and fittings with restrained "Locked-type" joints manufactured by the pipe and fitting manufacturer and the joints shall be capable of holding against withdrawal for line pressures of a minimum 200 psi. Mechanical joint ductile iron pipe retainer glands shall not be permitted. Any restrained joints that allow for elongation upon pressurization will not be allowed in those locations where the pipe comes out of the ground.

Restrained pipe joints that achieve restraint by incorporating cut out sections in the wall of the pipe shall have a minimum wall thickness at the point of cut out that corresponds with the minimum specified wall thickness for the remainder of the pipe.

The minimum number of restrained joints required for resisting forces at fittings and changes in direction of pipe shall be determined from the length of restrained pipe on each side of fittings and changes in direction necessary to develop adequate resisting friction with the soil.

The required lengths of restrained joint ductile iron pipe and PVC pipe shall be as shown on the plans and in the Restrained Joint Detail on the plans.

Wherever 2-45° bends are used in place of a 90° bend and the minimum length of restrained pipe required from one 45° bend extends beyond the other 45° bend, the 2-45° bends will be considered as though a 90° bend were located midway between the 2-45° bends.

Mechanical Restraining: Devices as specified herein may be substituted for the restrained "Locked-Type" joints. The length of pipe to be restrained shall be based on the "Restrained Joint Detail" in the plans.

Joint Restraint Device: Mechanical joint restraint shall be incorporated in the design of the follower gland and shall include a restraining mechanism which, when actuated, imparts multiple wedging action against the pipe, increasing its resistance as the pressure increases. Flexibility of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron conforming to ASTM A536. Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 BHN. Dimensions of the gland shall be such that it can be used with the standardized

Docusign Envelope ID: CCAD71B6-20B7-4998-85ED-408F36D1E4D5

mechanical joint bell and tee-head bolts conforming to ANSI A11.11 and ANSI/AWWA C153/A21.53. Twist-off nuts shall be used to insure proper actuating of the restraining devices.

TESTING AND STERILIZATION

Revise the 2024 *Standard Specifications* as follows:

Page 15-6, Sub-article 1510-3 (B) Testing and Sterilization, paragraph 1
Add the following sentences:

Length of test section shall not exceed 2,000 feet.

Page 15-6, Sub-article 1510-3 (B) Testing and Sterilization, paragraph 2
Add the following sentences:

Each section of pipe to be tested, as determined by Aqua, shall be slowly filled with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a satisfactory manner. Before applying the specified test pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made, and appropriate valves installed to ensure bleeding of all air from the main.

Page 15-6, Sub-article 1510-3 (B) Testing and Sterilization, paragraph 5
Add the following sentences:

If no hydrant is installed at the end of the main, then a blow-off valve shall be provided large enough to develop a velocity of at least 2.5 feet per second in the main. All taps required for chlorination or flushing purpose or for temporary or permanent release of air shall be provided as a part of the construction of water mains. After the disinfection, all such taps shall be sealed to the satisfaction of Aqua.

UTILITY MANHOLES

Revise the 2024 *Standard Specifications* as follows:

Page 15-14, Sub-article 1525-2 Materials
Add the following sentences:

The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on each pre-cast section.

Sections shall be cured by an approved method for at least 28 days prior to painting and shall not be shipped until at least 2 days after having been painted.

Pre-cast concrete top slabs shall be used where cone sections cannot be used. Lift rings or non-penetrating lift holes shall be provided for handling pre-cast manhole sections. Non-penetrating lift holes shall be filled with non-shrink grout after installation of the manhole sections.

Docusign Envelope ID: CCAD71B6-20B7-4998-85ED-408F36D1E4D5

Concrete surfaces shall have form oil, curing compounds, dust, dirt and other interfering materials removed by brush sand blasting and shall be fully cured prior to the application of any coatings.

Interior surfaces of manholes shall have a protective bituminous coating with a minimum of 2 coats with a dry film thickness of 24 mils or approved equal. Exterior surfaces shall have a protective coal tar epoxy coating with a minimum dry film thickness of 16 mils. Coatings shall be applied in two applications by the manhole manufacturer in strict accordance with the paint manufacturer's recommendations.

Manholes that receive force main flow shall be lined with a 2 mm polyethylene liner and shall follow the construction called out in the details on the plans.

At all manholes, use an inflow protection device such as "Sewer Guard" as manufactured by Methods Engineering Corporation, or approved equal.

Page 15-14, Sub-article 1525-3 Construction Methods, paragraph 3
Add the following sentences:

For inverts between 0.5' to 2.0' use a chute.

Page 15-15, Sub-article 1525-3 (B) Installation of Precast Units
Add the following sentences:

Cast-in-place bases shall be used only when specifically approved by Aqua.

The completed manhole shall be rigid, true to dimensions, and watertight.

The pre-cast sections shall be jointed together with a pre-formed flexible joint sealant compound meeting all requirements of Federal Specification SS-S-00210 (GSA-FSS), "Sealing Compound, Pre-formed Plastic for Pipe Joints." Type 1, Rope Form. On the outside of manholes, a sealant-strip shall be wrapped over the joints.

Page 15-15, Sub-article 1525-3 (C) Fittings and Connections
Add the following sentence:

Special care shall be taken to see that the openings through which pipes enter the structure are provided with watertight connections. For ductile iron and PVC pipe, connections shall conform to ASTM C923, "Standard Specifications for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes."

Page 15-16, Sub-article 1525-3 (D) Testing
Replace with the following:

Prior to testing, all lifting holes shall be plugged with non-shrink grout and all manhole tops shall be bolted to the cone section using concrete expansion anchors and sealed down with asphaltic cement or "ram-neck". In doing the vacuum test, all pipes entering the manhole shall be plugged and secured from being drawn into the sewer line. Inflate the compressor band to affect a seal between the vacuum base and the manhole cone section. Connect the vacuum pump to the outlet

Docusign Envelope ID: CCAD71B6-20B7-4998-85ED-408F36D1E4D5

port with the valve open. A vacuum of ten inches of mercury shall be drawn and the vacuum shot off. With the valves closed, the time for the vacuum to drop to nine inches of mercury shall not be less than the following table:

Manhole Depth	48” dia.	60” dia.	72” dia.
0’-10’	60 sec.	75 sec.	90 sec.
10’-15’	75 sec.	90 sec.	105 sec.
15’ or Greater	90 sec.	105 sec.	120 sec.

If the manhole fails, repairs will be made, and a retest performed. Provide all labor, equipment, and any appurtenances to perform the vacuum test. All equipment shall be approved for vacuum testing.

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

PROJECT SPECIAL PROVISIONS
Utility Construction – Catawba County/City of Hickory

Dewberry

Dewberry Engineers Inc.
2610 Wycliff Road, Suite 410
Raleigh, NC 27607
919.881.9939
919.881.9923 fax
www.dewberry.com

Signed by:
John Akers
766C9F0C...
9/3/2024

NORTH CAROLINA PROFESSIONAL SEAL 24645 ENGINEER JOHN F. AKERS

Where brand names and model numbers are specified in these Special Provisions or in the plans, the cited examples are used only to denote the quality standard of product desired and do not restrict bidders to a specific brand, make, or manufacturer. They are provided to set forth the general style, type, character, and quality of the product desired. Equivalent products will be acceptable.

The utility owner is the Catawba County. The contact person is Andrew Foy, and he can be reached by phone at 828-323-7427.

The provisions contained within these Utilities Construction Project Special Provisions modify the *Standard Specifications* only for materials used and work performed constructing water or sewer facilities owned by Catawba County.

STEEL ENCASEMENT PIPE

Materials:

Encasement: The encasement pipe shall be of the size as shown on the contract drawings. All encasement pipe shall be smooth wall welded steel conforming to ASTM Designation A139, Grade B. The outside of the pipe shall be coated in accordance with AWWA Standard C203. Minimum pipe wall thickness shall be as follows:

Pipe-Nominal Diameter Inches	Wall Thickness Inches
16	.250
20	.250
24	.250
30	.312
36	.500

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

DUCTILE IRON PIPE AND FITTINGS

Materials:

Ductile Iron Pipe: All materials shall be true to theoretical form throughout, first quality with smooth interior and exterior and free from imperfections. All materials shall be available for inspection by the Engineer/Owner at any point from production to installation for the purpose of rejecting defective materials or altering to meet intended specification. All rejected material shall be immediately removed from the project site upon written notice from the Engineer.

All cited or referenced specifications or standards shall be the latest revisions under that identification or in the case of abandoned standards any such superseding standard. This shall be true for all specifications or standards except such requirements that clearly are not applicable.

Ductile iron pipe shall be manufactured in accordance with AWWA Standard C 151. All Ductile iron pipe shall be class 350 psi unless specified differently on the plans and shall contain a cement mortar lining, unless specified differently on the plans, not less than 1/16" thick as specified in AWWA Standard C 104. Wall thickness for all ductile iron pipes shall be in conformance with AWWA Standard C 150. Standard laying conditions shall be assumed to be type 2 unless specified differently on the plans. The exterior of pipe shall be coated to a thickness of not less than 5 mils, as specified in AWWA Standards C 110 & C 115, with an asphaltic material

Flanged Joints: Flanged pipe shall have flanges with long hubs, shop fitted on the threaded end of pipe, shall be 125 lb. rated and accurately faced at right angles to the pipe axis so a complete fit is readily obtained. When required, flanges shall be tapped for stud bolts. The face of all flanges shall be drilled smooth and true and completely coated with coal tar finish, varnish or other approved anti-corrosion agent. Immediately prior to installation, flange faces shall be cleaned with a wire brush until the face is significantly consistent of bare metal.

Ductile iron flanged joint pipe shall conform to AWWA Standards C 110 & C 115 and shall have a minimum thickness of Class 53. Flanged end pipe shall be accurately measured and ordered so that not field cutting of pipe is necessary unless specifically approved by the Engineer. Unless approved no field alteration of flanged pipe will the allowed. Attempts to field cut pipe shall result in immediate rejection of all material affected. All flanged joints shall be properly aligned with no external force applied to the pipe or flange to achieve alignment. All bolts and gaskets shall be furnished by the Contractor installing the pipe for all joints, including such joints as the Contractor may be connecting to equipment or appurtenances which they did not supply or install.

Flanged joints shall be jointed with properly sized and type bolts as recommended by the manufacturer. Stud or tap bolts shall be used only as indicated on the plans. Steel or tap bolts shall be cadmium plated with true and sound fitting threads. Cadmium plating shall be by an approved process with a thickness of 3 to 5/ 10,000 of an inch. The Contractor upon request shall supply written confirmation of plating to the Engineer.

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

Mechanical Joints: All mechanical joint pipe shall be manufactured in accordance with AWWA Standard C 111, C 151 and C150 as applicable with a rating of class 350 psi.

All bolts shall be finish tightened by means of a torque wrench to the specified torque as recommended by the manufacturer in such a manner as the pipe is sealed evenly around to the joint. If effective sealing is not obtained by following the above procedures then the joint shall be disassembled, cleaned and reassembled following the above procedures.

Bolts shall be high-grade steel, low alloy type with tee head and American Standard threads. Mechanical joint gland shall be cast iron and gasket shall be plain rubber.

Slip Joints: Slip joint pipe shall be manufactured in accordance with AWWA Standards C 151 & C 150 as applicable with a rating of class 350 psi.

Bells of pipe shall be contoured to receive a bulb shaped circular rubber gasket and spigot end shall have sufficient taper to facilitate installation. Jointing shall be achieved by lubricating joint with approved lubricant, guiding spigot end of pipe into bell end of adjacent pipe until contact is made with gasket and exerting enough compressive force to drive the spigot forward into the bell until they achieve full contact. No joint shall exceed the maximum deflection allowed by the manufacturer, normally 8” in an 18’ joint.

Restrained Joint: Restrained joints shall consist of standard ductile iron slip bell with gaskets containing metal wedges. Wedges shall be manufactured of stainless steel and the gasket rubber shall be manufactured in accordance with ANSI/AWWA C 111/A21.11. Bells shall be manufactured in accordance with ANSI/AWWA C 153/A21.53.

The joints shall be designed for a working pressure of 200 psi. Restrained joints shall be American “Fast Grip”, U.S. Pipe “Field- Lok”, or approved equal.

Ball and Socket Joints: When specified ductile iron ball and socket joint pipe shall conform to AWWA Standards C 150 & C 151 as applicable and shall have a minimum thickness class of 55. The spherical socket shall be manufactured with applicable material requirements of ASTM A 536 and threaded onto the ductile iron pipe barrel with threads conforming to ANSI B2.1 adapted to standard ductile iron pipe. The ball end of joint shall be integrally cast with the pipe barrel and accurately machined to fit into the adjoining pipe socket and provide constant compression of the gasket through deflection of up to 15 degrees of the assembled joint and shall maintain a watertight joint in all directions. The inside surface of the ball shall be shaped so that the waterway shall not be significantly impacted at any degree of deflection. A substantial external locking ductile iron gland shall prevent longitudinal separation.

Ball and Socket joints shall be American “Flex-Lok”, U.S. Pipe “USIFLEX”, or approved equal.
Fittings: All ductile iron fittings shall by in conformance with AWWA Standards C 110 & C 111 for underground piping as applicable and shall be mechanical joint type unless otherwise specified on the plan. If flanged pipe is specified, then it shall be in conformance with AWWA Standard C 110 for exposed piping.

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

All fittings shall be manufactured in conformance with AWWA Standards C 111 & C 104 as applicable and shall be cement mortar lined unless otherwise specified on the plans. All fittings shall have rated working pressure of 250 psi unless otherwise specified on the plans.

GATE VALVES

Materials:

Gate Valves: All Gate Valves shall as a minimum reflect a rating of 200 psi, contain clearway equal to the full nominal diameter of the adjoining pipe, be open left operation (counterclockwise), reflect the name and date of manufacture, be of non-rising stem type, contain a directional arrow for operation cast into the body, have a 2" operating nut for control and contain Mechanical Joint connections. All requirements shall be meet unless specified on the plans or directed by the Engineer in writing.

All materials shall withstand a hydraulic test pressure of equal to twice the rated pressure and Contractor shall provide written proof of test from manufacturer upon request.

Resilient Seated Wedge Valve: Gate Valves 2" through 36" diameter shall be of cast iron or ductile iron body, resilient seated wedge type valves conforming to the requirements of AWWA Standard C 509 and/or AWWA Standard C 500. Unless specifically approved in writing by the Engineer all valves shall be from one manufacturer and all parts interchangeable.

Gate valves shall conform to ASTM A-536 as it relates to cast iron or ductile iron manufacturer of the body, bonnet and gate. Shell thickness of components shall conform to the thickness in Table 2, Sect. 4.4 of AWWA Standard C 509 or AWWA Standard C 500 as appropriate. Valve body and bonnet coating shall conform to AWWA Standard C 550 and include fusion bonded epoxy coating for the interior and exterior surfaces of the valve.

The gate shall be completely covered with a rubber coating securely fixed to all ferrous surfaces. The gate and rubber coating shall conform to ASTM D429.

Valve stems shall be of cast bronze construction. Valves shall contain a stuffing box, which located above the thrust collar, which will contain O- rings for sealing. The valve shall be of type construction that allows replacement of the ring seals while the valve is fully open and under pressure.

Valves 16" and larger in diameter shall be designed and constructed in such a manner as to include beveled reduction gears to reduce the number of turns and torque required to operate valves.

Double Disc Valves: Gate valves larger than 36" diameter shall be ductile iron body, double disc parallel seat conforming to AWWA Standard C 500. All valves shall be from one manufacturer with interchangeable parts.

Gate valves shall conform with ASTM A 536 as it relates to manufacturer of body, bonnet and gate constructed of ductile iron. Entire valve body and bonnet shall be coated on interior and exterior surfaces.

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

Gates shall be constructed of cast iron smooth and continuous without pockets on either face. Cam surfaces shall be open to the bottom. Gate ring seals shall be inserted into a dovetail groove under pressure and make up a single insertable finish.

Gate valves shall operate as a bottom wedging design with a two-part wedge contact. Wedge and Hook shall be separate castings.

Valve stems shall be of cast bronze construction. Valves shall contain a stuffing box, which located above the thrust collar, which will contain O- rings for sealing. The valve shall be of type construction that allows replacement of the ring seals while the valve is fully open and under pressure.

Valves 16" and larger in diameter shall be designed and constructed in such a manner as to include beveled reduction gears to reduce the number of turns and torque required to operate valves. All rollers, tracks and scrapers shall be of bronze casting.

Bypasses shall be supplied and installed as a part of all valves. Bypass shall be a minimum of 3" diameter and operating mechanism shall be of resilient seated wedge type.

Valve Boxes: All valve boxes shall be adjustable screw type with a base sized to fit over the valve yoke and a lid with "water" cast integral. All valve boxes shall be constructed of domestic or foreign cast iron that complies with the requirements of ASTM A 48. Valve boxes shall be the appropriate range of adjustment for the site and Contractor should minimize the use of extensions.

AUTO FLUSH VALVE

Materials:

General Description:

1. The equipment furnished under this Section shall be automatic water distribution flushing equipment designed to be permanently or semi-permanently installed on water distribution lines.
2. The primary purpose of this equipment shall be to automatically flush the desired amounts of water from water distribution systems for the purpose of improving and/or maintaining water quality.

Performance:

1. This equipment shall be connected to a water distribution line as required by the plans or standard installation detail. The self-contained device is designed for automatic flushing of the water distribution line through the opening of a control valve that is an integral part of the device.
2. This equipment shall be capable of being programmed to activate up to 24 times daily on the days desired at a minimum of one (1) minute to six (6) hour increments (on a continually rotating 7-day cycle or on an interval between every 1 to 30 days).
3. All programming shall be accomplished by means of an integrated programmer module that is powered by a single 9-volt battery and a Bluetooth equipped smart phone.

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

4. The Bluetooth controlled programmer must be capable of receiving management data transmissions from up to 25 feet, line of sight. a. The Bluetooth controller must be capable of being programmed up to 24 times per day and offer flush durations of one minute to 24 hours per event. b. The Bluetooth controller must be capable of providing up to 5,000 separate on/off functions over the life of a single 9-volt Alkaline battery. c. The Bluetooth controller must be capable of being programmed by a standard Android or iOS smart phone and the K-Rain and password protected App.

Manufacturers:

1. Automatic water distribution flushing equipment shall be Hydro-Guard® as manufactured by the Mueller Company or an approved equal.
2. The automatic water distribution flushing system is comprised of the self-contained automatic flushing device with a dechlorination system, sampling quick connect, and freeze protection upgradeability.

Controller/Programming

1. Programming for the device shall be managed by a KR-BL Bluetooth controller with a single 9-volt battery and an iOS or Android App-based management system.

Automatic Flushing Device – shall be a single device consisting of the major components described below:

Integral Piping and Control Valve – The piping and control valve components shall include the following:

1. Device must be certified by Underwriters Laboratories (UL) as meeting or exceeding the criteria of NSF-372.
2. The device’s internal control valve shall be capable of being activated by a single 9-volt battery-controlled programming interface that is managed by a Bluetooth equipped smart phone (Android or iOS).
3. The control valve shall be a globe valve type design capable of passing sand and other debris up to 5/8” in diameter without obstructing the valve’s throat.
4. The device’s standard internal piping shall be schedule 80 PVC with the option to upgrade the material to low lead brass.
5. The device’s internal piping and control valve shall have an operational rating of 200 psi.
6. Internal piping and control valve shall be capable of being removed from the housing by means of a quick-disconnect cam-lock release system that is comprised of easy-access handles located near the top section of the flushing device that engage and disengage a quick disconnect at the service line entry point located in the bottom of the flushing device; a minimum of two centering stars/guides that allow for ease of alignment during installation and removal of the flushing device’s internal components; an insulation pad constructed from medium density foam for the protection of the flushing device’s critical water management components; and stainless-steel rods and fasteners. The use of multiple O-ring push-in connections to the service line will not be permitted.

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

7. The control valve shall be constructed of a non-corrosive glass-reinforced nylon, or equal, and shall be fitted with stainless-steel hardware. The valve shall be of the type that can be easily rebuilt.
8. The valve shall include a single piece EPDM diaphragm.
9. The valve must be actuated by a 9-volt latching solenoid. Solenoid must be pressure rated between 0-10 bar (0 to 145.037738 psi). Wetted parts must be stainless-steel 400 or Polyamide. Leads must be 0.32 mm^2 x 80 cm^2.
10. The device shall be supplied with a standard 2-inch male NPT water supply connection.

Housing:

1. The components shall be designed to dissipate the energy and distribute the flow of pressurized water leaving the water distribution system in a circular pattern inside of the device's protective exterior, above-grade, housing and discharging to atmosphere. The discharged water must be capable of passing through an energy dissipating vented shield at the top of the exterior of the device's above-ground protective housing. The energy dissipating shield shall be slotted and capable of discouraging intrusion by reptiles. The shield shall be constructed of a UV resistant Geon, injection molded, plastic material.
2. The discharged water shall be directed downward, through the energy dissipating shield, onto a ground-level splash pad directing the flow of water horizontally onto the surrounding area in a manner that does not promote erosion in adequately prepared areas.
3. The self-contained device shall be supplied with a below-grade bottom-vented protective base that shall protect the internals of the flushing device; provide stability; and provide antibuoyancy capabilities. The protective base shall be constructed of Schedule 40 PVC (ASTM D2241, grade 1120) with a minimum diameter of 15-inches. The below-grade base shall feature a full debris shield that is affixed to the bottom of the base; a drain with filter fabric must be included with the debris shield to allow water to exit the base while preventing debris from entering the base; and the debris shield must include a male cam-lock quick connect to allow for the internals of the flushing device to easily connect to the utility service line.
4. The device's above-grade components shall be constructed of a non-corrosive maintenance free material and shall be permanently colored light green to blend with typical residential and commercial environments. The material shall be specifically designed for direct exposure to the sun and weather and have a minimum life expectancy of 15 years.
5. All mounting brackets and hardware shall be stainless-steel, 5052 aluminum or anodized aluminum.

System Sampling:

1. The device must be equipped with a fully functional sampling system that shall draw water quality samples from ahead of the 2-inch control valve and the sample collection point must be easily accessible from the top of the device. The sampling system shall include the following features:
2. The sampling system shall be constructed of polyethylene or other material with equal or greater resistance to bacterial regrowth and be connected with low lead brass or stainless-steel fittings.

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

3. The sampling system shall be designed in such a way to reduce the potential for contamination of the sampling system by allowing access and inspection of the internal piping compartment and components without disassembly or depressurization of the sampling system.
4. The sampling system shall draw water for water quality sampling from the inlet side of the two-inch (2") adjustable control valve and be tapped into the service piping of the device no more than eighteen inches (18") from the utility's service connection to the device. This positioning is essential in order to allow for a sample to be an accurate representation of the utility's water quality at the point of entry into the flushing device.
5. Connection to the device's sampling system shall be by means of a stainless-steel quick connect that can be mated with a portable sample valve assembly which can be utilized to obtain samples from an unlimited number of such flushing devices. The sampling tip of the portable sample valve shall be constructed from medical grade polyethylene tubing, stainless steel or low lead brass. The device's sampling connection shall be housed in a secure weather-tight area to minimize contamination of the sampling connection. The sampling connection itself shall be provided with a protective sanitary cover.

Electrical/Electronic System - The Electrical/Electronic System shall include the following features and capabilities:

1. All programming shall be accomplished by means of an integrated programmer module that is powered by a single 9-volt battery and a Bluetooth equipped smart phone.
2. The Bluetooth-equipped device must be powered by a single 9-volt Alkaline battery that can power up to 5,000 on/off events over the life of the battery.
3. The Bluetooth-equipped device must allow for up to 24 flush events daily with durations of one minute to 24 hours.
4. The Bluetooth controller interface shall be capable of being managed from a maximum distance of 25 feet (line of sight/no obstructions) by way of a standard Android or iOS smart phone.
5. The Bluetooth controller interface module must be password protected to prevent unauthorized operation.
6. Offer 24 flushing program events per day.
7. Be leap-year compatible, automatically accounting for February 29th every four years.
8. Incorporate LCD readout of clock and programming functions on a removable handheld programmer.
9. No onsite programming functions shall be possible without the utilization of a handheld programmer, or a smart phone, thus providing an added level security against unauthorized program changes.
10. Offer manual on and off functions
11. Be secured and water-resistant.
12. Offer a percentage increase/decrease option that will allow the operator to make monthly adjustments by increasing or decreasing the flush durations by a percentage without the need to reset flush duration times.
13. Have heavy-duty power cable with an inferred connection that shall correspond with an inferred antenna on a programming module that shall be integrated into the flushing device.
14. Use an integrated 9-volt or greater latching solenoid to operate the control valve.

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

15. The solenoid must be able to be threaded directly into the two-inch (2") adjustable control valve without the use of secondary adaptors.

Winterization (Required)

1. As per the local ordinance, the device shall be constructed either with a self-draining double check valve freeze protection assembly designed to evacuate water remaining within the device's standpipe subsequent to, but not during, the flushing process.
2. The self-draining double check valve freeze protection assembly must be located no less than 2-inches above the solenoid actuated control valve and must be constructed of low lead brass or stainless-steel.
3. The self-draining double check valve freeze protection assembly must be capable of preventing the intrusion of ground water in the event ground water were to submerge the self-draining double check valve freeze protection assembly.

OEM Installed Dechlorination System (Required)

1. A tablet feed Dechlorination System shall be designed to accommodate 2 5/8th-inch sodium sulfite or ascorbic acid tablets and it shall be installed inside of the device upon delivery. A portion of the water being flushed shall be directed through the tablet feeder in the creation of a concentrated solution of the dechlorinating agent. The directly treated, concentrated solution shall be introduced to the non-directly treated discharge on the device's splash plate resulting in a homogenous mixture effectively treating the entire discharge.

Maintenance and Security of Device

1. Disassembly and reassembly of the devices must be accomplished by way of unique security wrenches. The security wrenches must be capable of removing the security screws used to secure the ground splash plate to the below-grade base and the cap that protects the device's programming module and sampling port.

Construction Methods:

1. Prior to the installation, the drainage patterns for the intended installation location shall be viewed to ensure that any discharged water will not create hazardous conditions for pedestrian or vehicular traffic. The selected location's drainage pattern shall also permit discharged water to flow away from the automatic flushing device or be absorbed by the surrounding soil to prevent pooling.
2. Remove debris that might create uneven pressure on the device from the bottom of the hole. Compact the bottom of the hole to minimalize settling after installation.
3. Install a four-inch (4") lift of non-compacted sand or similar bedding material into the bottom of the hole.
4. Backfill the hole around the automatic flushing valve with clean fill, #57 stone and/or a combination of other appropriate materials. Backfilling shall be accomplished in 6" lifts. Ensure the device is level after each lift.
5. The area thirty-six inches (36") around the automatic flushing valve shall be prepared in order to prevent erosion.

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

6. The automatic flushing valve shall be disinfected in accordance with ADH and AWWA standards.

Measurement and Payment:

Payment for flush valve shall be per each flush valve and paid for under the contract price for "Flush Valve". Such price and payments will be full compensation for all labor, materials, excavation, backfilling and any incidentals necessary to complete the work, as required.

Pay Item ……...Pay Unit

Flush Valve ……...EA

SLEEVES, COUPLINGS AND MISCELLANEOUS

Materials:

All sleeves shall have flanged outlet of appropriate size and strength to accommodate the tapping valve. Tapping valve shall be resilient seat wedge gate valve design with each flange capable of accepting the sleeve, tap machine face, or mechanical joint connection to adjacent pipe.
Tapping sleeves up to 12" shall be Stainless Steel Wrap Around type. Tapping sleeves 12" and larger shall be Ductile Iron Full Body type. All tapping sleeve and valves shall be of the size and type detailed on the plans.

Stainless steel tapping sleeves shall be constructed of two-piece stainless steel jointed by grade 18-8 stainless steel bolts. The gasket shall be girded virgin SBR compound rated for water service per ASTM D2000, and the gasket shall provide full range pipe coverage. Outlet pipe shall be constructed of grade 18-8 stainless steel and be schedule 5. All sleeves shall contain a ¾"test outlet with brass plug for the purpose of air testing the sleeve.
All connections to the existing system shall be coordinated with the Water Purveyor having jurisdiction.

PIPE INSULATION

Materials:

Summary

This section includes insulation for thermal control as well as energy conservation applications on piping and equipment.

References

ASTM C755 – Standard Practice for Selection of Vapor Retarders for Thermal Insulation
ATSM C1136 – Standard Specification for Flexible, Low-Permeance Vapor Retarders for Thermal Insulation
ASTM E84 – Standard Test Method for Surface-Burning Characteristics of Building Materials
ASTM C578-10a Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

UL 723 – Test for Surface-Burning Characteristics of Building Materials sources with no adverse effects. Products must have sufficient field history and accelerated laboratory testing to substantiate product viability for these exposures.

System Description

A complete insulation system consists of insulation, vapor barrier, protective jacket, and associated sealants and tapes, which will maintain temperatures within requisite boundaries, prevent condensation on the outer surface of the insulation system, and/or provide the desired level of energy conservation.

Submittals

Product Data: The owner/engineer shall confirm and/or identify the required insulation type (and density) as specified in this document as well as the required insulation thickness and other relevant insulation dimensions (pipe or equipment size). The owner/engineer shall also identify additional system components such as vapor-barrier sheeting (factory or field applied), vapor-barrier tape, mastics, sealants, jackets, banding, and pipe hangar-related design.

Quality Assurance

Installer Qualifications: The insulation contractor installing this insulation system must be experienced with similar types of systems and products.

Delivery, Storage, And Handling

Packaging: All insulation materials shall be delivered to project site in original, unbroken factory packaging labeled with product designation and thickness.

Shipment: Shipment of materials from the manufacturer to the project location shall be in weather-tight transportation.

Storage: Insulation materials delivered to the jobsite shall be stored so as to protect the materials from moisture and weather during storage and installation. The insulation material shall be protected from long exposure to UV light from the sun.

Project Conditions

All testing of piping systems shall be completed prior to the installation of the insulation system.

All pipes shall be clean, dry and free of foreign substances prior to the application of the insulation system.

Resistance to the Environment

The breadth of environmental conditions includes temperature, frequency and degree of temperature cycling, solar intensity, humidity, wind speed, physical abuse, ultraviolet exposure, chemical exposure, wash-down frequency and maintenance requirements, among others. Thus, it is inappropriate to address each condition in the document; the owner should consult an engineer, and have them work closely with the fabricator, the contractor and PermaTherm to help ensure a properly designed, installed, and long-lasting insulation system.

Corrosion of metal pipes, vessels, and equipment under insulation, while not typically caused by the insulation, is still a significant issue that must be considered during the design of any mechanical insulation system. The propensity for corrosion is dependent on many factors including the ambient environment and the operating temperature of the metal.

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

Ultraviolet protection may be required for outdoor installations and should be considered, which may require aluminum or stainless-steel jacketing.

Pipe Insulation

Products:

PermaTherm 407 (1lb/ft3) rigid expanded polystyrene pipe insulation

Manufacturers: PermaTherm, Inc., or approved equal

Insulation shall meet the requirements of ASTM C578 for Type I and as follows:

Physical Properties		ASTM TEST
Density 1.0 lbs./cu.ft. min dry weight		0.90
Thermal Conductivity	20°F	0.23
K Factor	55°F	0.25
	75°F	0.26
Thermal Resistance	20°F	4.4
R-value	55°F	4.0
	75°F	3.8
Compressive 10% Deformation		15.13
Flexural		40.1
Tensile		16-20
Shea		
Shear Modulus		18-22
Modulus of Elasticity		280-320
Water Vapor Permeance Perm. Inch maximum		2.11
Water Absorption Percentage		1.53
Maximum Service Temperature Long Term Exposure		167
Intermittent Exposure 180 Oxygen 24.0		

Insulation products shall have a flame spread/smoke generation as required per local code and performance tested via method ASTM E84 or equivalent.

Vapor Barriers and Roof Penetration Products

For pipe service temperatures below ambient, a vapor barrier is required and shall be used based on the Manufacturer’s recommendations.

Manufacturers

The vapor-barrier sheet shall be PermaTherm’s PMZ vapor barrier or approved equal. The vapor-barrier sheet is formed by laminating a 1-mil thickness of aluminum between two thicknesses of an extraordinarily strong polyester film.

The vapor-barrier tape shall be PermaTherm’s PMZ Vapor-Barrier tape (PMZ), or approved equal. The PMZ Vapor-Barrier Tape shall be a three-ply laminate made with a 1-mil aluminum foil with 0.5 mil polyester film on both sides and coated with a special cold-weather, acrylic pressure sensitive adhesive system.

The vapor-barrier sealant shall be Boss 368 Butyl Rubber Sealant.

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

Product Properties:

PermaTherm PMZ Vapor-Barrier Sheet
- Aluminum foil: 1 mil
- Film: 1 mil
- Adhesive: flame retardant
- Permeance (MTVR) per ASTM E-96: 0000 perms
- Service Temp. Range: -100 °F to +300 °F
- Tensile Strength: 20,000 psi
- Bursting Strength: 95 psi
- UL File Number: R20722
- Flame Spread (White) per ASTM E-84 &UL 723: 10 FSI
- Smoke Generation (White) per ASTM E-84 & UL 723: 25 SDI

PermaTherm's PMZ Vapor-Barrier Tape
- Adhesive Thickness: 1.5 mils (0.0015") 0.0381 mm
- Substrate Thickness: 2.5 mils (0.0025") 0.063
- Adhesion: Peel (PSTC-1) 60 oz/inch width 17 N/2.5cm
- Shear: (PSTC-7) Indefinite @ 2.2psi 15.2 kPa
- Tensile: (PSTC-31) 15 lbs./inch width 68N/2.5cm
- Elongation: 50% 50%
- Maximum Continuous Use Temperature: 300°F
- Glass Transition Temperature (T2): -40°F (40'C)
- Release Liner: 55 lb. 90 GSM

PermaCast Fitting Seal (Factory Applied)
- Water Vapor Transmission: E-96 .02
- Tensile Strength (psi): 1,900 2.4.3.3 Elongation (%)31
- Flexural Modulus (psi): 81,864 (@-20 °F); 58,736 (@72°F); 4,475 (@158°F)
- Tear Strength: Graves (pli) 223
- Notched Izod Impact (ft. -lbs./in.): 1.23
- Coef. Lin. Thermal Exp (x10 (-6)): 113
- Heat Distortion (°F @66 psi): 160
- Hardness (Short 'D"): 67
- Density (lb./ft3): 50
- Taber Wt. Loss, mg Loss: 518 [1000 cycles, 18 wheels]
- NBS Abrasion: cycle 200
- NBS inches abraded to .1 inch

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

FSI-96 Butyl Rubber Sealant
Specific Gravity: 1.62 g/cc
Weight per gallon: 12-15 lbs.
Shrinkage: 10% Max.
Flexibility: No cracking, separation or loss of adhesion of a 3/8" – diameter bead on galvanized steel when bent at -60°F over ¼" mandrel after being subjected to three cycles of 16 hours at 158°F; 8 hours at 0°F, and after first conditioning for 2 days at 77'F.
Slump: ASTM-D-2202 0.5" at 158°F

Construction Methods:

Allowable Installation Temperatures

Vapor-Barrier sheeting, tape, sleeves and all other associated insulation productions shall only be installed within temperature ranges recommended by the Manufacturer.

Manufacturer's Installation Instructions

Comply with manufacturer's installation guidelines for each insulation system component.

Examination

Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
Proceed with the installation only after any unsatisfactory conditions have been corrected.

Preparation

Prepare the mechanical system in accordance with Part I sections 7 and 8 of this specification.

Installation

All insulation shall be tightly butted and free of voids and gaps. Vapor barriers must be continuous. All fasteners and bands shall be neatly aligned, and overall work must be of high quality in appearance and workmanship.
In below ambient systems, staples, rivets, screws and other fasteners capable of penetrating the vapor barriers shall not be used.
Install prefabricated insulation fittings on elbows, tees, and valves. Insulation at fittings shall be of the same type and thickness as on straight pipe selections.
The lap joint of vapor barrier has to be sealed using a self-sealing tape or a liquid adhesive. The vapor-barrier butt joints shall be covered with the PermaTherm PMZ vapor-barrier tape.
When it is not feasible to wrap elbows and fittings with PMZ vapor-barrier tape sheeting, they shall be wrapped with PMZ vapor-barrier tape in a spiral, overlapping fashion.

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

Underground Installations

Trench is to be constructed with stone bedding. It should be sand backfilled as well.
PermaTherm EPS rigid foam insulation should be wrapped with a tough, puncture-resistant vapor barrier and covered in appropriate jacketing.
Promulgate design data for input from manufacturers.

EXPANSION/CONTRACTION JOINT

Materials:

Expansion joints shall be installed in the locations indicated on the drawings and shall be manufactured of ductile iron conforming to the material properties of ANSI/AWWA C153/A21.53. All expansion joints shall be capable of expanding or contracting to the amounts shown on the drawings, or indicated in the specifications, but in no case shall there be less than 4" total axial movement. Separation beyond the maximum extension of the expansion joint shall be prevented without the use of external tie rods. Each expansion joint shall be pressure tested against its own restraint to a minimum of 350 psi (250 psi 24 inch and greater). MEGALUG joint restraint shall be provided with each mechanical joint connection. All pressure containing parts shall be lined with a minimum of 15 mils of fusion bonded epoxy, conforming to the applicable requirements of ANSI/AWWA C213, and shall be tested with a 1500-volt spark test conforming to stated specification. All expansion joints shall be EX-TEND 200, as manufactured by EBAA Iron, Inc., or approved equal.

HANGERS AND SUPPORTS

Materials:

Definitions:

MSS: manufacturers standardization society of the valve and fittings industry inc.

Submittals:

1. Product data: for each type of product indicated.
2. Shop drawings: shall be signed and sealed by a registered North Carolina Professional Engineer. Show fabrication and installation details and include calculations for the following: include product data for components:
    a. Roller pipe hangers.
3. Detail fabrication and assembly of roller hangers.
4. Design calculations: calculate requirements for designing roller hangers.
5. Welding certificates.

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

Quality assurance:

1. Structural steel welding qualifications: qualify procedures and personnel according to AWS d1.1/d1.1m, "structural welding code - steel."
2. Pipe welding qualifications: qualify procedures and operators according to ASME boiler and pressure vessel code.

Products:

1. Metal pipe hangers and supports:
    a. Carbon-steel pipe hangers and supports:
        i. Description: mss sp-58, types 1 through 58, factory-fabricated components.
        ii. Galvanized metallic coatings: pregalvanized or hot dipped.
        iii. Nonmetallic coatings: plastic coating, jacket, or liner.
        iv. Padded hangers: hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
        v. Hanger rods: continuous-thread rod, nuts, and washer made of carbon steel.
    b. Fastener systems:
        i. Mechanical-expansion anchors: insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
2. Miscellaneous materials:
    a. Structural steel: ASTM a 36/a 36m, carbon-steel plates, shapes, and bars; black and galvanized.
    b. Grout: ASTM c 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
        i. Properties: nonstaining, noncorrosive, and nongaseous.
        ii. Design mix: 5000-psi, 28-day compressive strength.

Construction Methods:

Hanger and support installation:

1. Metal pipe-hanger installation: comply with MSS sp-69 and MSS sp-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
2. Fastener system installation:
    a. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
    b. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
    c. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

d. Install lateral bracing with pipe hangers and supports to prevent swaying.

3. Load distribution: install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
4. Pipe slopes: install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME b31.9 for building services piping.

Metal Fabrications:

1. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
2. Field welding: comply with aws d1.1/d1.1m procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
3. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
4. Obtain fusion without undercut or overlap.
5. Remove welding flux immediately.
6. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

Adjusting:

1. Hanger adjustments: adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
2. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

Painting:

1. Touchup: clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-pa 1 requirements for touching up field-painted surfaces.
    a. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
2. Touchup: cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal in accordance with ncdot standard specifications.
3. Galvanized surfaces: clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

HANGERS AND SUPPORTS FOR UTILITY PIPING AND EQUIPMENT

The contractor shall construct the hangers, supports, expansion joints, and pipe insulation in accordance with the Structural Utility Plans

Measurement and Payment:

Payment for hangers and supports for utility piping and equipment shall be lump sum. Pipe insulation, expansion/contraction joints, and hangers and supports will be incidental to this item.

Pay Item	**Pay Unit**
16" Water Line Pipe and Suspension System	Lump Sum

SERVICE LINE VALVES AND FITTINGS

Materials:

1. Copper Setter (Meter Setter) shall be of copper and brass, domestic manufacture and of the proper size for the service on which they are installed. The setters shall be equipped with a double check valve outlet and padlock wings on the key valve. ¾"– 1" copper setters shall be Mueller H1404-2A or approved equal. 1-1/2" - 2" copper setters shall be Mueller H1423-2A or approved equal.
2. Corporation Stops shall be of brass, domestic manufacture and of the proper size for the service on which they are installed. Where dictated by the tapping angle, eighth or quarter bend couplings shall be provided. Suitable brass adapters for coupling to service pipe shall be provided. Corporation stops shall be Mueller 300 B-25008 or approved equal.
3. Tapping Saddles shall be of ductile iron saddles with double high tension, low alloy steel straps. Tapping saddles shall be Romac style 202, Smith-Blair style 313, or approved equal.
4. All meters shall be Neptune Compound meters or approved equal compatible with meter reading equipment and software of the responsible entity.
5. Meter Boxes shall be 18" deep Fastec MBX-1 cast iron, or approved equal, for ¾" and one-inch meters. Meter Boxes for 1-1/2" and 2" meters shall be Fastec MBX-5 cast iron or approved equal. Lid of meter box shall clearly be marked "Water".

AIR VALVES (WATER)

Materials:

All air valves shall operate as both an air/vacuum valve and air release valve simultaneously in one unit. The air/vacuum portion of the appurtenance shall operate such that during the filling operation, or when necessary, it will allow large amounts of air to be expelled from the line to avoid substantially compressing air in the line and also operate to effectively allow air to reenter the line in the case that internal pressures would approach negative values, such as happens with

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

line breaks or separations. The air release portion of the valve shall operate such that it automatically releases minute amounts of air as necessary while in service.

All air valves shall contain a rating of 150 psi with a test rating of 300 psi.

Body and cover shall be manufactured of cast iron conforming to ASTM A126, Class B. The float shall be stainless steel with stainless steel guide and rated to withstand ultimate system surge pressure successfully. Valves 4" and larger shall have floats of stainless steel with dual stainless-steel guides and rated to withstand ultimate system surge pressure successfully. The body and cover shall be constructed of cast iron and be concentrically located. All internal parts shall be stainless steel or Buna-N rubber.

Construction Methods:

TRENCHLESS METHODS

Page 15-20, Sub-article 1550-4 (A) Trenchless Methods

Add the following sentences:
Encasements shall be installed by boring and jacking unless field conditions require otherwise. It shall be the Contractor's responsibility to notify the Engineer immediately if conditions do not permit a jack and bore installation.

Installation of encasement pipe shall include all related work and services such as mobilization of equipment, construction and maintaining working pits, right-of-way maintenance and restoration, traffic maintenance, mining, excavations, dewatering, sheeting, shoring and bracing for embankments, operating pits, and as elsewhere required shall be placed and maintained in order that work may proceed safely and expeditiously.

The encasement pipe shall be of the diameter indicated for the carrier pipe as shown on the drawings.

Boring Machine Alignment: The boring machine shall be accurately aligned before the boring is commenced and the Contractor shall take such necessary steps as are required to accurately place the encasement with respect to line and grade. Payment will not be made for a bore and encasement that is not accurate as to line and grade as determined by the Engineer.

Extension of Encasement Pipe: As the boring operation progresses, each new section of the encasement pipe shall be butt welded to the section previously jacked into place. The boring auger shall not be of a greater diameter than the outside diameter of encasement. The leading edge of the steel casing shall be kept as close to the auger head as possible and shall be advanced at the same rate of speed as the earth auger in order to minimize any unsupported holes in the earth. Any voids that occur are to be filled with 3:1 ratio sand to cement grout at 50 psi pressure, sand or pea gravel, as directed by the Engineer to ensure that there will be no settlement. The Engineer will direct that this space be filled if the space is large enough to cause any earth settling. There will be no payment for grout work.

Docusign Envelope ID: 7A62B7D2-E5B0-4BB7-919A-FFC0CEAFC893

Before the pipe is installed in the casing, bolt-on meter skids painted with bitumastic paint shall be rigidly fastened to the barrel of the pipe. After completion of the casing, the Contractor shall insert the pipeline in the pre-jointed segments. No contact will be permitted between the casing and the carrier pipeline.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

PROJECT SPECIAL PROVISIONS
Utility Construction – Town of Mooresville

Dewberry

Dewberry Engineers Inc.
2610 Wycliff Road, Suite 410
Raleigh, NC 27607

919.881.9939
919.881.9923 fax
www.dewberry.com

Signed by:
John Akers
766C9F0C...
9/3/2024

NORTH CAROLINA PROFESSIONAL SEAL 24645 ENGINEER JOHN F. AKERS

Where brand names and model numbers are specified in these Special Provisions or in the plans, the cited examples are used only to denote the quality standard of product desired and do not restrict bidders to a specific brand, make, or manufacturer. They are provided to set forth the general style, type, character, and quality of the product desired. Equivalent products will be acceptable.

The utility owner is The Town of Mooresville. The contact person is Allison Kraft, and he can be reached by phone at 704-799-4066.

The provisions contained within these Utilities Construction Project Special Provisions modify the *Standard Specifications* only for materials used and work performed constructing water or sewer facilities owned by The Town of Mooresville.

PVC GRAVITY FLOW SEWER PIPE

Materials:

Sewer pipe 8-inches through 15-inches in diameter may be Poly Vinyl Chloride (PVC) sewer pipe and fittings with a minimum Standard Dimension Ratio (SDR) of 26 and shall meet all requirements of ASTM Specification D3034. Sewer pipe 18-inches through 27-inches in diameter may be Polyvinyl Chloride Pipe (PVC) large diameter sewer pipe with a minimum pipe stiffness of 46 PSI in accordance with ASTM Specification F679. Pipe joining shall be push-on elastomeric joints only, and joints with integral bells and with gaskets that are permanently installed at the factory, in accordance with ASTM Specification D3212. The pipe shall be furnished in nominal lengths of 13 feet. At the discretion of the town, PVC pipe shall be covered with an opaque material while permitting adequate air circulation around the pipe.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

AWWA C900 pipe (normally for pressure applications) with a DR 18 or less is also acceptable for gravity sewer applications.

PVC pipe shall contain the markings required by ASTM D-3034, ASTM F-679, or AWWA C900 as applicable. The manufacture shall submit certifications that the pipe has been found to meet all requirements. Test samples shall be as selected by the manufacture or testing laboratory unless otherwise stipulated.

Fittings shall be in accordance with ASTM D_3034, F-679, AWWA C900 and /or D-3212 as applicable, with stiffness and wall thickness equal to or greater than the pipe. Adapters shall be provided to join different materials.

DUCTILE IRON GRAVITY FLOW SEWER PIPE

Materials:

The exterior of ductile iron pipe shall be coated with a bituminous coating. Ductile iron pipe up to 12-inch diameter must be thickness pressure Class 350. Pipe diameters 16 inch and larger must have a minimum thickness pressure Class 250.

All ductile iron pipe and fittings used for all gravity and pressure applications shall be lined with 40 mils of Protecto 401™ Ceramic Epoxy or approved equal. All bells and spigots for pipes which require Protecto 401™ must be coated with a minimum of 8 mils of Protecto 401™ Joint Compound. Ductile iron sewer pipe must be easily recognized by the brownish red bells and spigots, as well as stenciling of the words showing “For Sewer Only”.

All restrained joint pipe shall have flexible push-on joints designed to deflect a minimum of 3 deg. per joint. Field welding will not be allowed. Factory supplied field cut kits shall be used as directed by the pipe manufacture. Approved restrained retainer glands shall be used to connect pipe to mechanical joint fittings. Restrained joint pipe is subject to approval by the Director of Engineering, whose acceptance or rejection shall be final. The Director of Engineering reserves the right to specify the type of restrained pipe to be used on specific projects and specific field applications. Restrained pipe shall be lined per the requirements for push-on joint DIP for sewer.

COPPER PIPE

Materials:

Copper Pipe and Fittings

All copper pipes shall conform to ASTM B88, and shall by Type K, soft copper. All joints shall be compression fittings.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

PVC PIPE

Materials:

All PVC pipe 4" and larger shall be manufactured in conformance with AWWA Standard C 900, ASTM 2241 and shall conform to the requirements of DR 14 class 200 psi. The exterior of all PVC shall bear a continuous stamp indicating the AWWA certification, DR ratio, size and manufacturer. Two strands of 12-gauge copper tracer wire shall be installed with all PVC pipe (see tracer wire paragraph).

All PVC shall have a bell with integral rubber gasket and be slip joint manufactured in accordance with AWWA C 151.

Bells of pipe shall be contoured to receive a bulb shaped circular rubber gasket and spigot end shall have sufficient taper to facilitate installation. Jointing shall be achieved by lubricating joint with approved lubricant, guiding spigot end of pipe into bell end of adjacent pipe until contact is made with gasket and exerting enough compressive force to drive the spigot forward into the bell until they achieve full contact. No joint shall exceed the maximum deflection allowed by the manufacturer, normally 11" in a 20' joint. Fittings for PVC pipe 4 inches through 16 inches shall be mechanical joint ductile iron with a minimum pressure rating of 250 psi as conforming to ANSI/AWWA Standard C110/A21.10 and A21.4.

PVC pipe shall be blue for potable water and green for sewer force main applications.

Restrained joints for PVC pipe shall be Uni-Flange Series 1350 for PVC-PVC joints and Uni-Flange Series 1300 or EBBA PV2000 fittings for PVC-DIP joints, or equal.

Restrained joint development length calculations shall be performed using the EBBA Iron

Restrained Length Calculator computer program which can be found at http://rcp.ebaa.com/. The output shall be submitted to the Town for review and approval.

2-inch PVC pipe shall be SDR 13.5 and manufactured in accordance with ASTM D2241.

Pipe shall be slip joint with integral bell and gasket meeting ASTM F477. 12-gauge copper tracer wire shall be installed with all PVC pipe (see tracer wire paragraph).

All PVC pipe shall have two strands of 12 gauge insulated copper tracer wire securely installed on top of the pipe at the 12 o'clock position. The wire shall be held in place with nylon cable ties (or equal means of attachment) at each end and on 48-inch centers along the pipe sections. The ire shall be of sufficient length to be extendable to the surface at each valve box, allowing a current to be induced through the wire to detect the location of the pipeline. The wire shall be brought to the surface inside valve boxes and terminated with a tinned wire connector.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

STEEL ENCASMENT PIPE

Materials:

Steel encasement pipe shall be smooth wall pipe with welded joints. All section joints of steel casing pipe shall be full penetration welded with a continuous circumferential weld. The encasement pipe must be capable of withstanding highway loadings and must have an inside diameter which will allow the carrier pipe to be removed subsequently without disturbing the encasement pipe. Encasement pipe and joints shall be of leak proof construction. The inside diameter of the encasement pipe shall be at least 2 inches greater than the largest outside diameter of the carrier pipe, joints, or couplings, for carrier pipe less than 6 inches in diameter; and at least 4 inches greater for carrier pipe 6 inches and larger in diameter. In general, to determine the casing size you should double the size of the carrier pipe, i.e., a 8” carrier pipe requires a 16” casing pipe. The Engineer shall verify the clearance is sufficient to allow the carrier pipe to be removed without disturbing the casing pipe.

DUCTILE IRON PIPE AND FITTINGS

Materials:

Ductile iron pipe up to 12-inch diameter must be thickness pressure Class 350. Pipe diameters 16 inch and lager must have a minimum thickness pressure Class 250. Any deviations in pressure class must be approved by the Director of Engineering.

Ductile iron fittings shall be compact fittings conforming to ANSI/AWWA C153/A21.53, and will be of the mechanical joint type in accordance to ANSI/AWWA C111/A21.11. All glands shall be ductile iron, not gray iron. The interior of fittings will be cement-mortar lining of standard thickness in accordance with ANSI/AWWA C104/A21.4. The exterior of all fittings shall be coated with bituminous coating. Fittings coated on the interior and exterior with 8 mils of fusion-bonded epoxy in accordance with ANSI/AWWA C116/A21.16 are acceptable.

FIRE HYDRANTS

Materials:

Hydrants shall be designed for a minimum working pressure of 200 psi. Each hydrant shall be assembled at the factory with one 5” steamer nozzle with the 5” Storz connection and cap.

Hydrants accepted by the Town of Mooresville are as follows:

(1) Super Centurion 250, A-423 5-1/4” manufactured by Mueller Company
(2) 5-1/4” American Darling B-84-B, manufactured by American Flow Control
(3) K-81A 5-1/4” Guardian, manufactured by Kennedy Valve Company
(4) Medallion Hydrant 5-1/4”, manufactured by Clow Valve Company

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

GATE VALVES

Materials:

The valve body, bonnet and seal plate shall be coated on all exterior and interior surfaces with a minimum of 8-10 mils of fusion bonded epoxy in accordance with ANSI/AWWA C550. The valve shall incorporate a guide system with guide lugs on the wedge or on the body. The wedge shall be gray or ductile iron, fully encapsulated with rubber (including guide lugs and stem nut holder). Non-rising stem valves shall have two O-ring seals above the stem thrust collar that can be replaced with the valve under pressure. Non-rising stem valves shall also have a thrust washer on the stem thrust collar.

The word "OPEN" and an arrow to indicate the direction of opening the valve shall be cast on the flanged base of the operating nut. Above ground valves, unless otherwise specified, will have an outside screw and yoke rising stem or a non-rising stem, flanged end connections, and a hand wheel to operate the valve. The word "OPEN" and an arrow to indicate the direction of opening the valve shall be cast on the rim of the hand wheel. All valves will open by turning the nut or hand wheel counterclockwise. Valves installed in manholes will normally be considered to be buried service valves and valves installed in vaults will normally be considered to be above ground valves.

Each valve shall be seat tested at the rated working pressure and shell tested at twice the rated working pressure in accordance with ANSI/AWWA C509 - Section 5 or ANSI/AWWA C515 - Section 5. All valves shall be warranted for l0 years from date of purchase against defective materials and workmanship.

TAPPING SLEEVES

Materials:

Tapping sleeves and valves shall be used for “wet” taps into existing water mains. The tapping valve shall meet all specifications for “gate valves”. Flange by Mechanical Joint tapping valve shall have an inlet flange (with centering ring) for connection to the flanged sleeve outlet of the flanged tapping sleeve, conforming to AWWA C207, Class D, ANSI 150 lb. drilling. Tapping valves shall be supplied with stainless steel bolts, and heavy hexagon nuts conforming to ANSI/AWWA C111/A21.11. Tapping valve seal plates and bonnets shall have 316 stainless steel bolts and nuts.

All tapping sleeves and valves shall be water tested before the tap is made. All tapping sleeves and valves shall be installed level. Valve shall be supported so sleeve does not shift during tap. Setup shall be inspected by the Town prior to beginning tap.

Stainless steel tapping sleeves shall be manufactured from type 304 stainless steel. The outlet shall be mechanical joint outlet to be used with a standard mechanical joint valve. The mechanical joint outlet shall be stainless steel. The sleeve shall include a test plug for pressure testing the installed sleeve prior to making the tap. All welds shall be passivated for corrosion

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

resistance. Stainless steel tapping sleeves shall be Smith-Blair 665 or JCM 439, 459 or approved equal.

All connections shall only be made on the agreed upon date and time. If the connection work is not initiated and completed in the agreed upon manner, reschedule the said connection by following the procedure outlined above.

Each valve shall be seat tested at the rated working pressure and shell tested at twice the rated working pressure in accordance with ANSI/AWWA C509 - Section 5 or ANSI/AWWA C515 - Section 5. All valves shall be warranted for l0 years from date of purchase against defective materials and workmanship.

SERVICE LINE VALVES AND FITTINGS

Materials:

Pipes for water meter service connections greater than 2" shall be restrained joint DIP, pressure class 350. Three-inch diameter DIP shall not be used for service connections. Service connection 2-inch and smaller shall be copper only.

PRECAST CONCRETE UTILITY VAULTS

Materials:

References

A. Materials and operations shall comply with the latest revision of the Codes and Standards listed within this specification. The use of ASTM, AWWA, NFPA, etc. standard specification references without a year designation implies the most current applicable specification or standard.

B. ASTM International:

1. ASTM A48 - Standard Specification for Gray Iron Castings.
2. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
3. ASTM A536 - Standard Specification for Ductile Iron Castings.
4. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
5. ASTM C150 - Standard Specification for Portland Cement.
6. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
7. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
8. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
9. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

10. ASTM C890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
11. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
12. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joints Sealants.
13. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).
14. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3).
15. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
16. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

Design Requirements

A. Design Criteria:

1. Mixes: Design concrete mix to produce required concrete strength, air-entrainment (where applicable), watertight properties, and loading requirements.
2. Watertight precast reinforced air-entrained concrete structures designed to ASTM C890 Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures and manufactured to conform to ASTM C913 Standard Specification for Precast Concrete Water and Wastewater Structures.
3. Loading:
   a. Vault top and bottom to be designed for 150 psf pedestrian traffic load or AASHTO HS20 - 16-kip wheel, as applicable, for location and conditions.
   b. Walls shall also account for a surcharge load due to pedestrian traffic or wheel load as applicable.
   c. Stress from installation shall also be taken into consideration during vault/box design.
   d. Lateral groundwater loads on walls shall be taken into consideration in design. Unless otherwise approved by Water Management, designer to assume groundwater depth equals bottom of top slab.
4. Provide uplift resistance provisions (anti-flotation) in design of vaults or boxes where flotation is a potential threat (i.e. extended base, extra wall, top or bottom thicknesses, etc.). Indicate on shop drawings that this provision has been addressed.
5. Concrete Performance: Concrete used in the construction of the precast concrete structures shall have a minimum 28-day compressive strength of 5000-psi conforming to ASTM C33 Standard Specification for Concrete Aggregates and ASTM C94 Standard Specification for Ready-Mixed Concrete. Honeycombed or retempered concrete is not permitted. Air entrainment (with 4 to 6 percent air) shall be added when vault is exposed to weather.
6. Step Provisions: For large boxes where access hatch or manhole aligns with the wall, provide manhole steps cast into structure.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

B. Design shall be signed and sealed by a Licensed NC Professional Engineer.

Submittals

A. Shop Drawings: Shop drawings shall show the following, all in conformance with the design drawings:

1. Vault interior and exterior dimensions,
2. Vault wall, top and bottom (if applicable) thicknesses,
3. Joint details,
4. Wall penetrations (locations, sizes, and dimensions to pipe entry), cast-in-place pipe sleeves,
5. Cast-in-place hatches or manholes and their respective manufacturers name and model number, opening locations.
6. Indicate locations of all diagonal extra reinforcement at all openings.
7. Provide ground rod openings,
8. Floor drain openings and/or sumps, vent openings, and
9. Floor slope.
10. Design Assumptions (code or guidelines design is based upon [ASCE7, NCSBC, etc], live load and/or surcharge live load, groundwater depth, anti-flotation measures, assumed subgrade bearing pressure, concrete strength, backfill [type, density and assumed Φ], assumed earth pressure coefficient [active or at rest], surface slope, safety factors, etc.).
11. Calculations and drawings with seal and signature of a Licensed NC Professional Engineer and date.

B. Manufacturer’s Certificates: Submit Statement of Compliance, supporting data, from materials suppliers attesting that precast concrete valve vaults and meter boxes provided meet or exceed ASTM Standards and specification requirements.

C. Manufacturer’s Installation Instructions: Submit special procedures for precast concrete valve vaults installation.

Delivery, Storage and Handling

A. Inspect castings before unloading for signs of damage, cracks, or other obvious deficiencies. Reject if damaged.

B. Observe manufacturer's directions for handling, delivery, and storage of materials and accessories.

C. Contractor to provide a crane, hoist, or other means of unloading heavy precast structure segments safely along with experienced technicians.

D. Handle precast concrete units with equipment designed to protect units from damage.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

E. Schedule delivery to coincide with installation in final location.

F. Do not place concrete units in position to cause overstress, warp or twist.

Products

A. Product Description:
   1. Precast vault designed in accordance with ASTM C858 Standard Specification for Underground Precast Concrete Utility Structures, comprising modular, interlocking sections complete with accessories.

B. Materials:
   1. Portland Cement: ASTM C150 Standard Specification for Portland Cement, Type II.
   2. Coarse Aggregates: ASTM C33 Standard Specification for Concrete Aggregates; Graded 1 inch to No. 4 Sieve.
   3. Sand: ASTM C33; 2.35 fineness modulus.
   4. Water: Potable; clean and free of injurious amounts of acids, alkalis, salts, organic materials, and substances incompatible with concrete or steel.
   5. Air-Entraining Admixtures: ASTM C260 Standard Specification for Air-Entraining Admixtures for Concrete.
   6. Reinforcing Steel:
      a. Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed billet steel bars, unfinished.
   7. Reinforcing Wire:
      a. Plain Wire: ASTM A82; unfinished
      b. Deformed Wire: ASTM A496 unfinished.
   8. Welded Steel Wire Fabric:
      a. Plain Wire: ASTM A185.
      b. Deformed Wire: ASTM A496 unfinished.
   9. Joint Sealant: Preformed plastic gaskets shall meet Federal Specification SS-S210-A Sealing Compound, Preformed Plastic, for Expansion Joints and Pipe Joints, Type 1, Rope Form or Type 2, Flat Type. Sag or flow resistance and chemical resistance shall meet ASTM C990 Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants. Preformed butyl gaskets shall be used with structures meeting ASTM C478 and ASTM C990. Minimum rope diameter to be 3/4-inch or as required for the size structure.

C. Vault Manway Hatches:
   1. Cover: Aluminum welded construction; minimum ¼” thick diamond plate aluminum doors (single or double leaf as applicable); leaves reinforced with structural stiffeners to support required loads for either pedestrian rated (150 psf minimum) or traffic rated (H20), as applicable.
   2. Frame: Aluminum extruded frames (angles, channel or gutter as applicable to model) with integral seat to support cover stiffeners; steel anchor straps around frame perimeter; frames designed to drain.
   3. Hinges: Heavy forged type 316 stainless hinges.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

4. Latch Mechanism: Type 316 stainless steel slam lock with fixed interior handle and removable square key stainless steel exterior turn/lift handle (lift handle does not protrude above cover), automatic hold-open bar with grip handle release.
5. Finish: Aluminum lacquer factory finish.
6. See Standard Details 516.04.

D. Access Steps: Steel reinforced copolymer polypropylene plastic step meeting ASTM D4101 Standard Specification for Polypropylene Injection and Extrusion Materials with embedded ½-inch diameter ASTM A-615 Grade 60 steel reinforcement. Unless otherwise shown on the approved plans, cast steps at 12 inches on center directly below manhole or access hatch opening.

Bedding Materials

A. Aggregate Bedding Material: NCDOT No. 57 clean stone.

B. Fabrication and Manufacture
1. Fabricate precast reinforced concrete structures in accordance with ASTM C913 Standard Specification for Precast Concrete Water and Wastewater Structures, to dimensions indicated on Drawings, and to specified design criteria.

Construction Methods:

Examination

A. Administrative Requirements: Verification of existing conditions before starting work.

B. Verify piping connection, size, location, and inverts match plans. Adjust grades as required to ensure finished grade will match the approved plans.

Preparation

A. Cut pipe ends square, ream pipe and tube end to full pipe diameter, remove burrs.

B. Remove scale and dirt from components before assembly.

C. Establish invert elevations for each component in system.

D. Excavate pit to subgrade elevation, maintaining pit in a dry condition, dewatering as necessary.
E. Hand grade subgrade to provide adequate uniform subgrade to required elevation for valve vault(s) and meter box(es). Remove stones, roots, or other obstructions.
F. Excavate and place drain piping to daylight or into a storm drain structure as shown on the approved drawings and NCDOT Standard Details. Install drain line. Protect ends from dirt and debris until connected.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

Bedding

A. Place #57 clean stone bedding material level and in one continuous layer not less than 4 inches thick. Stone may be placed in a single lift, up to 12 inches thickness. Consolidate/compact stone. See NCDOT Standard Details.

Setting Vaults

A. Install vaults and meter boxes and related components on bedding; connect drain.

B. Seal vault joints watertight with preformed plastic joint sealant compound. Apply waterproofing to exterior walls.

C. Connecting Piping

D. Connect piping.

E. Seal annular space between pipe and wall sleeves with Link-Seal® or an approved equal.

F. If not prefabricated into vault top by vault manufacturer, install vault covers and frames; adjust to finished grade elevation.

Backfill

A. Backfill pit in accordance with NCDOT Standard Specifications.

B. Backfill around sides of vaults and meter boxes, tamped in place, and compacted to 95 percent of the Standard Proctor maximum dry density with light vibratory tamps.

C. Backfill evenly along the full perimeter of box to avoid and prevent uneven pressures or movement of structure.

D. Do not allow compacting heavy equipment within 10 feet of the structure until the structure has been completely backfilled and compacted.

E. A City representative must inspect all service connections prior to backfilling.

Measurement and Payment:

Pay Item ……..	Pay Unit
Utility Vault	Each

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

CURED-IN-PLACE PIPE (CIPP)

Materials:

A. Description
   1. Work covered by this specification includes providing all labor, materials, equipment, and incidentals required to clean/prepare pipe, install, and test Cured-In-Place Pipe (CIPP) lining and appurtenances complete as shown on the Drawings and specified herein. CIPP lining is specified as a resin-impregnated flexible tube, which fits against the original pipe. The CIPP will be continuous and tight fitting.

B. Standards:
   1. ASTM F1216 (Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube).
   2. ASTM F1743 (Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured in Place Thermosetting Resin Pipe (CIPP)).
   3. ASTM D5813 (Cured-in-Place Thermosetting Resin Sewer Pipe).
   4. ASTM D543 (Standard and Practice for Evaluating the Resistance of Plastics to Chemical Reagents).
   5. ASTM C790 (Test Methods for Flexural Properties of Un-Reinforced and Reinforced Plastics and Electrical Insulating Materials).
   6. ASTM D2990 (Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics).
   7. ASTM D2412 (Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading).
   8. ASTM C581 (Standard Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass Fiber Reinforced Structures, Intended for Liquid Service).
   9. ASTM F2019 (Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP)).

C. Lining Materials:
   1. The liner shall consist of one or more layers of absorbent, flexible, non-woven polyester with or without additives such as woven fiberglass or other fibers. The felt tubing shall be impregnated with a thermosetting polyester resin and catalyst, vinyl ester and catalyst or epoxy resin and hardener. The liner material and resin shall be completely compatible. The outside layer of the tube shall be coated with an impermeable material compatible with the resin and fabric. The tube shall be marked for distance at regular intervals along its entire length, not to exceed 5 feet. Such marking shall include the Manufacturer's name or identifying symbol.
   2. The liner shall be capable of fitting into irregularly shaped pipe sections and through bends and dips within the pipeline.
   3. The liner shall be able to cure in the presence of water at a temperature of 180 degrees F or less.
   4. The wall color of the interior pipe surface of CIPP after installation shall be a relatively light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

5. The liner shall be chemically resistant to chemicals found in stormwater runoff, such as but not limited to gasoline, oil products, grass clippings, and fertilizers. It is required that CIPP samples with and without plastic coating meet these chemical testing requirements.
6. When cured the liner shall form a continuous, tight fitting, hard, watertight, and impermeable liner. The liner shall be fabricated to a size that will tightly fit the storm drain being rehabilitated after being installed and cured. Allowance for longitudinal and circumferential expansion shall be taken into account when sizing and installing the liner. Field measurements shall be used to ensure maximum closure between the new liner and the existing storm drainpipe.
7. The application of the resin to the felt tubing (wet-out) shall be conducted under factory conditions and the materials shall be fully protected against UV light, excessive heat, and contamination at all times.
8. The existing pipe conditions shall be reflected in the design of the liner thickness. In particular, the ovality of the existing pipe and, thus, the liner pipe shall be accurately estimated and reflected in the design calculations.
9. The thickness to be used for the liner shall be the largest thickness as determined by calculations for deflection, bending, buckling, and minimum stiffness.

D. Qualifications
   1. The Contractor performing the CIPP lining work shall be fully qualified, experienced and equipped to complete this work expeditiously and in a satisfactory manner and shall be certified and/or licensed as an installer by the CIPP manufacturer.
      (a) The Contractor shall have successfully installed a minimum of 75,000 linear feet of CIPP liner, 25,000 linear feet of liner greater than 18” in diameter and at least one project of proposed liner equal to or greater than 36” in diameter, as documented by verifiable references and documented in the CIPP Material and References Document.
      b. The Superintendent shall have successfully installed a minimum total of 100,000 linear feet of CIPP liners of any diameter and over 5,000 linear feet of liner greater than 18”.
      c. Provide name of the CIPP manufacturer and list of prior work for the CIPP lining manufacturer and supplier.
      d. Provide certified statement from the manufacturer that contractor is certified and / or licensed for the proposed CIPP lining system.
      e. Provide list of municipal clients for whom the Contractor has performed this type of work. Include reference contact information and a description of work that includes diameter of pipe and linear footage installed.

E. Submittals
   1. The Contractor shall submit for review and approval by the Engineer the following information, fifteen (15) days prior to beginning work on the site:
      a. Shop drawings of all CIPP materials including resin, felt, coatings, and catalysts. Shop drawings shall be prepared by a North Carolina Registered Professional Engineer. The following supplemental information shall also be included: product MSDS sheets and manufacturers shipping, handling, and storage recommendations.
      b. A CIPP lining production schedule with location manufactured, lengths, and sizes.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

c. Certified test report from a Testing Laboratory or Manufacturer, that the CIPP was manufactured and tested in accordance with all ASTM standards specified and referenced herein.

d. Detailed description of wet-out, storage, shipping, and installation procedures. The application of resin to the tubing (wet-out) shall be conducted under factory conditions and the materials shall be fully protected against UV light, excessive heat, and contamination at all times.

e. Engineering calculations specifying the design and required thickness for each CIPP installation, which are signed and sealed by a North Carolina Registered Professional Engineer. The CIPP liner shall be designed to the following minimum criteria:
   (i) All sections of pipe shall be considered fully deteriorated.
   (ii) All pipes shall be subjected to soil loads of 120 pounds per cubic foot.
   (iii) The soil modulus shall be no more than 1,000 psi.
   (iv) All pipes located shall be assumed to carry AASHTO HS20-44 live loads.
   (v) The existing pipe shall be assumed to have an ovality of 2%.
   (vi) The contractor shall assume a factor of safety of 2.0.
   (vii) Ground water is assumed 3 feet below surface elevation unless site-specific data is available.
   (viii) The depth of cover is as shown on the plans.
   (ix) The design flexural modulus shall be 300,000 psi.
   (x) CIPP design life shall be 50 years or greater.
   (xi) Hydraulic Capacity – Overall, the hydraulic cross-section shall be maintained as large as possible. The CIPP shall have a Manning's "n" value of 0.010 or less after installation.

f. Health and Safety Plan, including confined space safety plan.

g. Emergency Response Plan. The Contractor shall include a plan to address reported backups or other problems resulting from the work, including personnel contact, equipment, disposal, etc. The minimum response time to address any issues shall be two hours unless otherwise directed by the Engineer.

h. Maintenance of Base Flows plan. The plan shall include but not be limited to pump sizes, capacity, power requirements, pump selection and other calculations, pump curves, and piping sizes and locations. Bypass pumping systems shall include as a minimum one or more pumps capable of handling the base flow and storm events without the stored water level exceeding the crown of the pipe and one standby pump equal to the largest pump used.

i. Odor Control Plan. The Contractor shall develop and submit to the Engineer a protocol for addressing odor complaints during the CIPP installation process (primarily styrene odor complaints). The protocol shall include steps to be taken by on-site personnel when the complaint is received, including discussing the odor with the property owners and Engineer to address their concerns and alleviating the odor from the home or business using fans or other means as necessary. The Contractor shall also maintain a calibrated portable styrene test unit to immediately document the atmospheric concentrations of the styrene on the site and in the house/business when a complaint is received. The styrene concentrations must be tested prior to exhausting the odors from the housed/business. The Contractor shall also utilize blowers (vacuum blowers) during the CIPP installation to exhaust odors from the

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

pipes and into the atmosphere during the installation. The blowers shall be strategically placed to exhaust the concentrated odors in an isolated location.

j. Identification of water source(s) that will be used during CIPP installation. Contractor is responsible for securing and providing the necessary water for curing the CIPP. Contractor shall coordinate with the Town of Mooresville if proposed water is obtained from fire hydrants. The Contractor is responsible for obtaining permits from Town of Mooresville for water and sewer usage.

k. Identification of staging area(s) necessary for CIPP installation.

l. Comply with the most current Town of Mooresville Traffic Control standards.

m. Contingency plan for equipment malfunctions or equipment that becomes immovable.

n. Contractor shall provide a hard copy summary of all inspections performed, defining all pipe sections inspected, measured lengths to features (pipe penetrations, structures, damage, etc.), and inspection date. An electronic copy of the inspection report, inspection still images, the pipe inspection video files, and inspection database provided on a CD, DVD, or other approved digital media device, shall also be provided. Pre-installation video inspections shall be submitted a minimum of two weeks prior to installation of the liner.

Construction Methods:

A. Site Preparation

1. The Contractor shall verify site conditions prior to commencing any construction activities. Site conditions include, but are not limited to, inlet and access port accessibility, accessibility to remote locations and encroachment onto private or publicly owned property. Selection of inspection equipment shall be based on the conditions of the storm drainage piping, structures, and inlets at the time the work commences. All dimensions shall be field verified by the Contractor.
2. The Contractor shall conduct a PACP compliant color digital television inspection of each length of pipe prior to ordering liner. The purpose of this inspection is to confirm that existing conditions are suitable for the installation of the proposed lining process, to document the location of all service lateral connections and to confirm point repair locations. Digital recordings on either CD's or DVD's shall be prepared and retained by the Contractor and submitted with the post-lining inspection recordings prior to request for payment. Where this television inspection reveals conditions that are not suitable for lining, the digital recordings shall be immediately provided to the Engineer for review.
3. The Contractor shall protect the storm drainage system and adjacent properties from damage that might result from construction. Any damage caused by the Contractor's operations shall be repaired to the complete satisfaction of the Engineer at no additional cost.
4. Protruding lateral connections, if encountered, shall be cut or ground with a robotic cutter flush with the pipe to be lined prior to CIPP liner installation. All lateral connections for reconnection after CIPP liner installation shall be documented. The cutting operation shall be monitored by CCTV equipment to verify proper execution of work. Cutter shall be capable of cutting the following materials: vitrified clay pipe, polyvinyl chloride pipe, ductile iron pipe, high-density polyethylene pipe, or reinforced concrete pipe. Equipment

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

specifically designed for cutting roots from storm drainage pipes (such as a chain cutter) shall not be allowed for this purpose.

5. If, in the opinion of the CIPP liner manufacturer, the rate of infiltration in the storm drainage pipe presents washout risk of the resin, then the Contractor shall perform measures as required to minimize infiltration prior to lining. Any infiltration gusher identified shall be brought to the attention of the Engineer. The Contractor shall submit for approval to the Engineer the measures to prevent any adverse issues to the installation of the final product. The submittals shall be reviewed and approved prior to installation.

B. Delivery, Handling, and Installation

1. Care shall be taken in shipping, handling, and storage to avoid damaging the liner. Any liner damaged in shipment shall be replaced as directed by the Engineer. Any liner showing a split or tear, or which has received a blow that may have caused damage, even if the damage may not be visible, shall be marked as rejected and removed at once from the job site. The liner shall be maintained at a proper temperature in refrigerated facilities to prevent premature curing at all times prior to installation. The liner shall be protected from UV light prior to installation. Any liner showing evidence of premature curing will be rejected for use and will be removed from the site immediately.
2. The bypass pump(s) shall be setup and ready for immediate operation. Pumps shall be automatically controlled. The Contractor shall properly maintain the bypass pumping system. A responsible operator shall be on site at all times during bypass pumping operations. Drainage flows from existing storm drainage pipes shall not be allowed to enter the rehabilitated facilities until those facilities have been cleaned and CIPP completely installed including curing.
3. Pipe inversion using hydrostatic head shall be performed in compliance with this specification and the requirements of the CIPP manufacturer. Care shall be taken not to overstress the tube at the elevated curing temperatures, which may cause damage or failure prior to cure. The Contractor may submit a proposal for a product that uses a pull-in method as defined in ASTM F1743, for review and approval by the Town. If pulled into place, a power winch or equivalent should be utilized, and care should be exercised not to damage the tube as a result of pull-in friction. The Contractor shall use a slip sheet or preliner or method recommended by the manufacturer to reduce the friction.
4. Contractor shall supply a suitable heat and water source to uniformly raise the water temperature above the temperature required to affect a cure of the resin. The heat source shall be fitted with suitable monitors to gauge temperatures of the incoming and outgoing water supply. Another gauge shall be placed between the layers of the impregnated tube in the upstream, downstream, and intermediate inlets to determine the temperature during curing. Water temperature in the line during curing shall be per the manufacturer's recommendations. Initial cure may be considered complete when the remote sensing device indicates the temperatures to be adequate, as recommended by the resin/catalyst system manufacturer. The Contractor shall maintain a log of the temperatures at each sensor during the entire curing process.
5. The Contractor shall cool the hardened CIPP to a temperature below 100 degrees F or temperature specified by the manufacturer, whichever is less, before relieving the water column. Cool water may be added to the water column while draining hot water from the CIPP, thus maintaining a constant water column. Careful attention should be taken not to

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

cool too quickly to eliminate the possibility of thermo-shock. Careful attention should be taken in the release of the static head so that a vacuum will not be developed that could damage the newly installed liner.

6. The CIPP shall meet the chemical resistance requirements of ASTM 1216, Appendix X2. CIPP samples for testing shall be of tube and resin system. The CIPP samples with and without plastic coating must meet these chemical-testing requirements.
7. All cutting and sealing of the liner at drainage structures shall provide a watertight pipe and inlet seal using quick set cement grout or approved equal.
8. Contractor shall reopen all existing lateral connections in each length of pipe following liner installation. Lateral connections shall be determined from the pre-installation CCTV inspection. The lateral connections shall be reopened from inside the pipe by means of a television camera-controlled cutting device appropriate for the liner material and the pipe. All pipe connections shall be completely opened, clean and neatly cut, shall be flush with the lateral pipe and the cut shall be wire polished. The bottom of the opening shall be flush with the bottom of the lateral pipe so that there is not a lip. All liner penetrations shall be watertight. The Contractor shall be fully responsible for all backups and damage caused by unopened or not fully opening lateral connections, including paying all costs associated with repairing damage as required by the Engineer, Owner and/or property owner.
9. Contractor shall, with approval from Town of Mooresville, discharge all water used for cooling, heating, and curing to the existing sanitary sewer system. Contractor may utilize a vacuum truck to remove the water from the site and discharge directly to a wastewater treatment plant. No water used for the installation of the CIPP lining shall be discharged into the downstream storm drainage system.

C. Post-Installation Inspection and Testing Requirements

1. After all liner installation and lateral connection work has been completed, the contractor shall inspect via CCTV all new CIPP liners within 3 weeks of installation. Inspection of pipelines shall be performed by PACP certified, experienced personnel, trained in locating breaks, obstacles, and service connections using CCTV inspection techniques. For every segment of CIPP installed, the Contractor shall generate a report that documents the installation including date, time, temperature, curing temperature, curing time, resin type and volume. The reports shall be submitted along with the post-installation CCTV inspection to the Engineer prior to acceptance of work and submittal of payment request.
2. There shall be no dry spots, lifts, ridges, splits, cracks, uncured resin, delaminations or other defects in the CIPP lining. There shall be no visible infiltration through the liner or from behind the liner at manholes and service connections. Wrinkles in the finished liner that cause backwater, reduce the pipe's hydraulic capacity or structural stability or that create voids between the liner and pipe wall will be unacceptable. Defective lining will be removed, and the pipe re-lined at no additional cost.
3. The Contractor shall remove two specimens from each pipe diameter or two per 25,000 linear feet of CIPP installed, of at least 18 inches in length for testing of liner thickness and flexural properties. The Contractor shall provide a constrained pipe sample for pipe diameters less than 18 inches and a constrained plate sample for pipe diameters greater than 18 inches. The Contractor shall create two specimens by cutting out a section of uncured saturated tube and curing the sample in the same water and at the same time, the mainline pipe is cured. Additional tests may be required by the Engineer at no additional

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

cost if any of the first specimens fail to meet the requirements of this specification. The Contractor shall send specimens to an independent laboratory for testing. Specimens shall be clearly marked to indicate the installed liner location, date of installation, pipe diameter, and resin used. Results of the test for each liner shall be submitted within 30 days after the liner is installed.

4. Installed CIPP lining that does not meet the specified strength and / or thickness requirements, regardless of the deviation from these specified requirements, shall be corrected by the Contractor in a manner approved by the Engineer. Options for correcting deficient CIPP liner installations that will be considered by the Engineer include removal of the existing CIPP liner and re-lining the pipe or complete replacement of the storm drainage pipe. Installation of a second lining shall not be considered.

Measurement and Payment:

The quantity of Cured-in-Place Pipe Lining to be paid for will be the actual number of linear feet of pipe liner, which has been installed and accepted. Measurement will be made horizontally along the centerline of the installed liner defined as the distance between the upstream and downstream structures using applicable structure inside walls as the beginning and ending point. Measurement from center of structure to center of structure will not be permitted. Measurement will not be made across precast bends or other sanitary sewer structures.

The quantity of Cured-in-Place Pipe Lining, measured as provided above, will be paid for at the contract unit price per linear foot for "Cured-in-Place Pipe Lining." Such payment will be full compensation for all work covered by this special provision including but not limited to: engineering and design costs, permitting costs, submittals, pipe cleaning/preparation, CCTV inspections, installation, materials, labor, equipment, odor control, bypass pumping, materials testing and laboratory services.

Pay Item …… **Pay Unit**
CIPP Lining ..... LF

AIR RELEASE VALVES (WATER)

Materials:

All interior iron surfaces of the air valve shall be coated with a minimum of 8 mils of fusion bonded epoxy or liquid epoxy in accordance with ANSI/AWWA C550. All internal working parts shall be stainless steel. All valves shall be furnished with back flushing attachments. The bronze ball valve curb stops shall have a minimum working pressure of 300 psi.

AIR RELEASE VALVES (SEWER)

Materials:

All air release valves shall be of the combination air vacuum type.

All internal working parts shall be stainless steel. Nipples shall be stainless steel or brass.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

Valve shall be furnished with back flushing attachments. The bronze ball valve curb stops shall have a minimum working pressure of 300 psi.
All combination air vacuum valves shall be installed with Wager 3100 VWS odor control valves.

UTILITY MANHOLES

Materials:

Manholes will be furnished with the following clear inside diameters according to depth and the sewer main diameter:

1. 8" to 18" pipe 4' Manhole (< 12’ deep)
2. 8" to 18" pipe 5' Manhole (≥ 12’ deep)
3. 2l" to 36" pipe 5' Manhole
4. 39" to 54" pipe 6' Manhole
5. 54" and larger 8' Manhole

Manhole Rings and Covers

Standard manhole rings and covers will be made of cast iron and will conform to ASTM A48, Class 35B. Metal riser rings shall not be used. In addition, all manhole rings and covers shall be designed to support an H-20-wheel load. All castings will conform to the shape and dimensions shown on the Town of Mooresville detail drawing (Detail S-2) and will be free from holes, cracks or any other defects. Rings and covers will have machined seats so that the cover will not rattle. Rings will weigh a minimum of 190 pounds and covers a minimum of 120 pounds. The name of the foundry and the part number shall be cast permanently on the ring and the cover. Castings that do not meet specifications shall be rejected.

Sealed Ring and Cover

Sealed (watertight) rings and covers shall be installed wherever the manhole will be flush with grade, or where the top of the manhole is not above the 100-year flood elevation. Vented covers may be used at high points in the line to allow for safe escape of sewer gas. Locations shall be as coordinated with the Town but not less than every 1,000 feet. Secured rings and covers shall meet all specifications for Secured Rings and Covers and shall conform to the Town of Mooresville detail drawing for Sealed Rings and Covers (Detail S-4). Sealed covers shall have no vent holes.

Flat Top Manhole Sealed Ring and **Cover**

Flat top manhole sealed covers shall meet all specifications for Standard rings and covers, except that rings will weigh a minimum of 136 pounds and covers a minimum of 120 pounds. All rings and covers shall conform to the Town of Mooresville detail drawing for Type 3. Covers shall not have vent holes. Flat-top manholes shall have flat top sealed covers cast into the top.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

PROTECTIVE COATINGS

Materials:

GENERAL

Scope

A. This section covers coating, lining for the ductile iron piping and precast manholes and manhole joint sealing for the items in Section 3.3, complete. This specification supersedes any and all coating and lining specified in the Town of Mooresville Sewer Specification and Details Manual.

Quality Assurance

A. All paints used on the site shall be clearly labeled showing manufacturer's name, product name and number, color and batch number.

B. Ceramic Epoxy Liner Manufacturer Qualifications:

   1. Manufacturer’s Qualifications: Provide products from a company specializing in manufacture of high-performance epoxy coatings with a minimum 10 years of experience.

      a. Materials shall be products of a single manufacturer or items standard with manufacture of specified coating materials.

      b. Submit manufacturer's certification that coatings comply with specified requirements and are suitable for intended application.

C. Concrete Lining Applicator Qualifications:

   1. Contractor shall be a qualified Applicator by the corrosion protection lining manufacturer prior to bid date. Submit proof of acceptability of Applicator by manufacturer to Engineer.

   2. Installation equipment shall be acceptable to the protective lining manufacturer.

   3. Applicator to establish quality control procedures and practices to monitor phases of surface preparation, storage, mixing, application, and inspection throughout the duration of the project. Contractor to provide a fulltime, on-site person whose dedicated responsibilities will include quality control of the corrosion protection linings.

   4. Applicator’s quality control procedures and practices must include the following items:

      a. Training of personnel in the proper surface preparation requirements.
      b. Training of personnel in the proper storing, mixing, and application and quality control testing of the linings.

D. Performance Criteria: The surfaces to receive the protective lining shall be capable of withstanding under constant exposure to raw wastewater, permeation from hydrogen sulfide and other sewer gases, and attack from organic acids generated by microbial sources with no adverse effects. Products must have sufficient field history and accelerated laboratory testing to substantiate product viability for these exposures.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

E. Source Quality Control: Provide each component of protective lining produced by a single manufacturer, including recommended repair mortar, repair overlay (resurfacer), base coat and topcoat materials.

F. Field Quality Control shall consist of the following:

1. Request review of first finished item or area.
2. Use the first acceptable item or area as the project standard for the rest of the work.
3. Each item or area used as a project standard shall be no smaller than 100 sq. ft. in surface area.
4. Manufacturer's representative shall be available to advise applicator on proper application techniques and procedures.

Reference Standards

a. Butyl Rubber Sealant

(1) Federal Specification SS-S-210 (210-A),
(2) AASHTO M-198B
(3) ASTM C-990-91.

b. Exterior Joint Wrap

(1) ASTM E-1745,
(2) ASTM C-877,
(3) ASTM C-990
(4) AASHTO M198 Type B

c. Modified Polyamine Ceramic Epoxy Lining

(1) ASTM International, (ASTM)

(a) ASTM B 117-99(2007) – Standard Practice for Operating Salt Spray (Fog) Apparatus

(b) ASTM C 413-01(2006) – Standard Test Method for Absorption of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes

(c) ASTM C 868-02(2008) – Standard Test Method for Chemical Resistance of Protective Linings

(d) ASTM D 149-09 – Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies

(e) ASTM D 870-09 – Standard Practice for Testing Water Resistance of Coatings Using Water Immersion

(f) ASTM D 1653-03(2008) – Standard Test Methods for Water Vapor Transmission of Organic Coating Films

(g) ASTM D 2370-98(2002) – Standard Test Method for Tensile Properties of Organic Coatings

(h) ASTM D 2240-05 – Standard Test Method for Rubber Property—Durometer Hardness

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

(i) ASTM D2583-07 – Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor

(j) ASTM D 2794-93(2004) – Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)

(k) ASTM D 4400-99(2007) – Standard Test Method for Sag Resistance of Paints Using a Multinotch Applicator

(l) ASTM D 4060-07 – Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser

(m) ASTM D 4541-09 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers

(n) ASTM G 8-96(2003) e1 – Standard Test Methods for Cathodic Disbonding of Pipeline Coatings

(2) British Standard, (BS)

(a) BS EN 598:2007+A1:2009 – Ductile Iron Pipes, Fittings, Accessories and Their Joints for Sewerage Applications – Requirements and Test Methods

(3) NACE International, (NACE)

(a) NACE SP0188-2006 – Standard Practice for Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates

(b) NACE TM0174-2002 – Laboratory Methods for the Evaluation of Protective Coatings and Lining Materials in Immersion Service

(4) SSPC: The Society for Protective Coatings, (SSPC)

(a) SSPC-PA2 – Paint Application Specification No. 2: Measurement of Dry Coating Thickness with Magnetic Gages.

(5) Standard Practice for the Rapid Evaluation of Coatings and Linings by Severe Wastewater Analysis Test, (S.W.A.T.)

d. Aggregate-Reinforced Epoxy Lining:

(1) American Concrete Institute, (ACI)

(a) ACI 224.1R – Causes, Evaluation and Repair of Cracks in Concrete Structures
(b) ACI 301 – Specifications for Structural Concrete
(c) ACI 308R – Guide to Curing Concrete
(d) ACI 350 – Code Requirements for Environmental Engineering Concrete Structures and Commentary
(e) ACI 515 – A Guide to the use of Waterproofing, Dampproofing, Protective, and Decorative Barrier Systems for Concrete
(f) ACI 546.R – Concrete Repair Guide
(g) ACI 546.3R – Guide for the Selection of Materials for the Repair of Concrete

(2) ASTM International, (ASTM)

(a) ASTM C 868 – Standard Test Method for Chemical Resistance of Protective Linings
(b) ASTM C 1583/1583M – Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

(c) ASTM D 2794 – Standard Test Method for Resistance of Organic Linings to the Effects of Rapid Deformation (Impact)
(d) ASTM D 4060 – Standard Test Method for Abrasion Resistance of Organic Linings by the Taber Abraser
(e) ASTM D 4285 – Standard Test Method for Indicating Water or Oil in Compressed Air
(f) ASTM D 4263 – Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
(g) ASTM D 4414 – Standard Practice for Measurement of Wet Film Thickness by Notch Gages
(h) ASTM D 6944 Standard Test Method for Measuring Humidity with a Physchrometer
(i) ASTM D 7682 – Standard Test Method for Replication and Measurement of Concrete Surface Profiles Using Replica Putty
(j) ASTM F 1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
(k) ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
(l) ASTM F 2414 – Standard Practice for Sealing Sewer Manholes Using Chemical Grouting

(3) International Concrete Repair Institute, (ICRI)
(a) Guideline No. 310.1R – Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion
(b) Guideline No. 310.2 – Selecting and Specifying Concrete Surface Preparation for Sealer, Linings, and Polymer Overlays

(4) NACE International, (NACE)
(a) NACE Publication 6D-173 – A Manual for Painter Safety
(b) NACE SP0188 – Standard Practice for Discontinuity (Holiday) Testing of Protective Linings
(c) NACE SP0892 – Standard Practice for Coatings and Linings over Concrete for Chemical Immersion and Containment Service
(d) NACE No. 6/SSPC-SP13 – Surface Preparation of Concrete

(5) Occupational Safety and health Administration, (OSHA)
(a) Safety and health Standards (29 CFR 1910/1926)

(6) SSPC: The Society for Protective Linings, (SSPC)
(a) SSPC-SP13/NACE No. 6 – Surface Preparation of Concrete
(b) SSPC-Guide 12 – Guide for Illumination of Industrial Painting Projects

(7) Standard Practice for the Rapid Evaluation of Coatings and Linings by Severe Wastewater Analysis Test, (S.W.A.T.)
(a) Corrosion Testing Laboratories, Inc., Newark, DE, USA. (www.corrosionlab.com)**.** Contact: Brad Krantz 302-454-8200.
(b) RAE Engineering and Inspection, LTD., Edmonton, Alberta, CANADA. (www.raeengineering.ca) Contact: Linda Gray 780-440-9391.

Submittals

A. The Contractor shall submit the following items for approval prior to painting:
1. Coating materials giving the manufacturer's name, product name & product line number for each material.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

2. Two copies of the manufacturer's technical data sheet for each coating, giving descriptive data, curing time, mixing, thinning and application instructions. Also provide a color selection chart.
3. Color Samples:
    a. Two samples of each color selected by the Owner for the project. One sample will be forwarded to the LCSA for approval.
    b. Prepare samples of clear and stained finished on the same type and grade of substrate specified for the project.
    c. Make color sample at least 5" X 7" in size.
4. Certificates: Manufacturer's certified test reports confirming compliance with specified performance requirements.

Delivery, Storage and Handling

A. Delivery of Materials:
    1. Deliver material in manufacturer's original, unopened, and undamaged packages.
    2. Clearly identify manufacturer's, brand name, contents, color, batch number, and any personal safety hazards associated with the use of or exposure to the materials on each package.
    3. Packages showing indications of damage that may affect condition of contents are not acceptable.
B. Storage of Materials:
    1. Materials shall be stored in accordance with manufacturer's recommendations in enclosed structures and shall be protected from weather and adverse temperature conditions. Flammable materials shall be stored in accordance with state and local codes. Materials exceeding storage life as defined by the manufacturer shall be removed promptly from the site. Store all materials only in area or areas designated by the Engineer solely for this purpose.
    2. Store in original packaging under protective cover and protect from damage.
    3. Stack containers in accordance with manufacturer's recommendations.
C. Handling of Materials: Handle materials in such a manner as to prevent damage to products or finishes.

Application Conditions:

A. Environmental Requirements:
    1. Proceed with corrosion protection lining Work only when temperature and moisture conditions of substrates, air temperature, relative humidity, dew point and other conditions comply with the corrosion protection lining manufacturer's written recommendations and when no damaging environmental conditions are forecasted for the time when the material will be vulnerable to such environmental damage. Record all such conditions and include in final Site Quality Control Report.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

2. Maintain substrate temperature and ambient temperature before, during and after installation above 50°F (10°C) and rising in accordance with protective lining material manufacturer's instructions.
3. Provide adequate ventilation during instillation and full curing periods of the protective lining.
4. Protective Lining shall not be applied when ambient air temperature is within 5°F (3°C) of the dew point and falling.
5. Protective Lining shall not be applied when relative humidity is outside of material manufacturer's recommendations. Do not prepare surfaces or apply materials in rain, snow, fog, mist, or otherwise inclement weather as per material manufacturer's instructions.

B. Dust and Contaminants: Protect work and adjacent areas from excessive dust and airborne contaminates during protective lining application and curing. Schedule Work to avoid excessive dust and airborne contaminants.

Safety

A. The Contractor shall submit to the Owner/Engineer current manufacturer's product data sheets as well as Material Safety Data Sheets and shall have these documents available to his employees at the job site.
B. The Contractor shall ensure that his employees are aware of any hazards peculiar to the job site, as well as location of first aid stations, emergency phone numbers and evacuation routes.
C. The Contractor shall be responsible to report any condition which may pose a threat to the health and welfare of his employees to the Owner/Engineer.
D. The Contractor shall keep his working area clean and safe and shall obey all job site rules and regulations.

Warranty

A. Protective Lining Manufacturer shall warranty its products as free from material defects for a minimum period of three (3) years. Provide associated Warranty Certificate.
B. Contractor shall warranty the installed protective lining system as free from workmanship defects for a minimum period of three (3) years.

PRODUCTS

Manufacturers

A. Coating and Lining: Products specified herein are manufactured by Tnemec Company, Inc., North Kansas City, Missouri, and are specified as a standard of quality. Ceramapure PL90 Ceramic Epoxy as manufactured by Induron Coatings Inc., Birmingham, Alabama is an approved acceptable alternative.
B. Joint seal and exterior wrap for precast concrete structures specified herein are manufactured by ConSeal Concrete Sealants, Inc, Tipp City, Ohio and are specified as standard of quality. Equivalent materials of other manufacturers may be substituted only by approval of the

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

Engineer/Owner. Contractor shall submit alternative materials according to Specification Section 01300 Submittals.

C. Products for each specified function and system shall be of a single manufacturer.

Materials

A. Conseal CS-102 Butyl Rubber Sealant
B. Conseal CS-212 Polyolefin Backed Exterior Joint Wrap or equal.
C. Tnemec Series 431 Perma-Shield PL modified polyamine ceramic epoxy lining
   1. Generic Type: Polyamine Ceramic Epoxy
   2. Properties:
      a. Solids by Volume: 100 percent
      b. Hazardous Air Pollutants: Zero
      c. Ceramic Hollow Microspheres: 20 percent by volume (no silica fume, fly ash, or alumina dust)
      d. Pigment Volume Concentration: Less than 22 percent.
      e. Coal-Tar Content: Zero
      f. Dry Film Thickness:
      (a) 40 mils minimum
      (b) 60 mils maximum
   3. Performance Criteria:
      a. Abrasion: (ASTM D4060-07, CS-17 wheel, 1,000 grams) – 76 mg loss. (BS EN 598:2007+A1:2009, 50,000 cycles) – 0.6 mils loss
      b. Adhesion: (ASTM D 4541) – Not less than 1,860 psi.
      c. Severe Wastewater Analysis Test: (150°F, 500 ppm H2S, 4000 ppm NaCl, 10% H2S04, EIS Permeation Analysis) – Initial impedance of 11.2 (log-z). No blistering, cracking, checking or loss of adhesion. Reduction in electrical impedance of 0.5 after 28 days exposure.
      d. Cathodic Disbondment: ASTM G 8 (1.5 V) Classification Group A. No more than 0.000 inch (0.00 mm) disbonded equivalent circle diameter.
      e. Chemical Resistance: (ASTM C 868-02, 25 percent sulfuric acid, 100 degrees F, 100 days – (NACE TM0174-2002, 6 months continuous immersion, 50 percent sulfuric acid, 13 percent sodium hypochlorite, 5 percent sodium hydroxide, 75 degrees F – No effect.
      f. Dielectric Strength: (ASTM D 149-09) – greater than 600 volts per mil
      g. Hardness: (ASTM D 2240): Shore D hardness of 79. (ASTM D 3363).
      h. Immersion: 140°F (60°C) De-ionized Water Immersion. No blistering, cracking or delamination of film after 5,000 hours continuous immersion.
      i. Impact: (ASTM D 2794-04) – No visible cracking or delamination after 160 inch-pounds (18.0 J) direct impact.
      j. Salt Spray (ASTM B 117-09): No blistering, cracking, rusting or delamination of film after 10,000 hrs.
      k. Water Absorption (ASTM C413-01(2006) – 0.0 percent water absorption
      l. Water Vapor Transmission (ASTM D 1653-03(2008) Method B, Wet Cup, Condition C) – 1.25 g/m2 per 24 h water vapor transmission and 0.09 perms water vapor permeance.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

D. Tnemec Series 434 Perma-Shield FR Epoxy Lining, Aggregate-Reinforced Epoxy Lining:

1. Properties:

a. Application Time at 75°F:	30 min
b. Color:	Beige
c. Maximum Dry Film Thickness (DFT):	125 mils
d. Severe Wastewater Analysis Test (S.W.A.T.)	
Initial EIS Impedance (Log $Z_{0.01\ Hz}$ Ω cm^2):	10.7
Final EIS Impedance (Log $Z_{0.01\ Hz}$ Ω cm^2):	9.1
S.W.A.T. Results with Epoxy Glaze Topcoat	
Initial EIS Impedance (Log $Z_{0.01\ Hz}$ Ω cm^2):	11.3
Final EIS Impedance (Log $Z_{0.01\ Hz}$ Ω cm^2):	10.8
e. Bond Strength (ASTM D 7234)	
Bare Concrete/Series 434:	Concrete Failure
Bare Concrete/Series 218/Series 434:	Concrete Failure
f. Chemical Resistance (ASTM C 686)	
25% H_2SO_4, 100 days, 100°F:	No effect
g. Compressive Strength (ASTM D 695):	12,331 psi
h. Flexural (ASTM C 580)	
Strength:	3,200 psi
Modulus of Elasticity:	1.1 x 10^6 psi
i. Impact (ASTM D 2794)	160 in.-lbs.
j. Shrinkage (ASTM C 531):	-0.013%
k. Tensile Strength (ASTM D 307):	2,030 psi
l. Thermal Expansion	
Linear Coefficient (ASTM C 531):	6.3 x 10^{-5} in/in/°F
m. Water Absorption (ASTM C 413):	0.15%
n. Water Vapor Transmission	
(ASTM E 96, Procedure D):	0.27 perms

2. Epoxy Lining shall be 100% solids, aggregate-reinforced, trowel-applied epoxy polymer protective barrier material specifically designed to protect concrete and steel surfaces in severe wastewater environments, including associated abrasive physical attack and chemical attack from sewer gases and organic acids generated by microbial sources.
3. Epoxy Lining shall be capable of achieving the specified thickness in a single coat application.

Construction Methods:

EXECUTION

Tnemec Series 431 Perma-Shield PL

A. Surface Preparation

1. All ductile iron pipe and fittings shall be delivered to the application facility without asphalt, cement lining, or any other lining on the interior surface. All oils, small deposits of asphalt paint, grease, and soluble deposits shall be removed in accordance with NAPF 500-03-01 Solvent Cleaning prior to abrasive blasting.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

2. Ductile Iron Pipe: Uniformly rotary-abrasive blast the entire interior surface using angular abrasive to an NAPF 500-03-04: "Internal Pipe Surface Condition, with full removal of annealing oxide layer". When viewed without magnification, the interior surfaces shall be free of all visible dirt, dust, annealing oxide, rust, mold coating and other foreign matter. Any area where rust reappears before application shall be re-blasted. The surface shall contain a minimum angular anchor profile of 3.0 mils (76.2 microns) (Reference NACE RP0287 or ASTM D 4417, Method C).
3. Ductile Iron Fittings: Uniformly abrasive blast to a NAPF 500-03-05: "Fitting Blast Clean #1 Condition, No Staining". When viewed without magnification, the interior surfaces of cast iron fittings shall be free of all visible dirt, dust, annealing oxide, rust, mold coating and other foreign mater. The surface shall contain a minimum angular anchor profile of 3.0 mils (76.2 microns).
4. Surface shall be coated within eight hours of surface preparation.

B. Application
1. The lining shall be applied by an approved applicator with successful history of applying ceramic epoxy linings to the interior of ductile iron pipe and fittings.
2. Within 8 hours of surface preparation, the interior shall be coated with the following dry film thicknesses (DFT).
   a. Pipe Interior: 40 mils.
   b. Fittings Interior: 40 mils.
   c. Push-on Joints: 6-10 mils.
   d. Mechanical Joints: Extend lining from spigot end to edge of gauging ring.

C. Cutting Pipe
1. Cutting shall be done in a neat manner, without damage to the pipe or the lining. Use wheel cutters when practicable. Cuts shall be smooth, straight, and at right angles to the pipe axis. After cutting, the ends of the pipe shall be dressed with a power grinder to remove all sharp edges. The cut ends of push on joint pipe shall be suitably beveled.

D. Handling
1. Series 431 Perma-Shield PL lined pipe and fittings must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, cables, or other devices shall be placed inside the pie and fittings for lifting, positioning, or laying. The pipe shall not be dropped or unloaded by rolling. Care should be taken not to let the pipe strike sharp objects while swinging or being off loaded. Ductile iron pipe should never be placed on grade by use of hydraulic pressure from an excavator bucket or by banging with heavy hammers. Only nylon straps or similar lifting devices are to be used.

E. Inspection
1. Inspection
   a. All ceramic epoxy lined pipe and fittings visual examined for film defects, including any runs, sags, and debris in the film. Repairs shall be made in accordance with the manufacturer's instructions.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

b. All ductile iron pipe and fitting linings shall be checked for thickness using a magnetic dry film thickness gauge. The thickness testing shall be in according with SSPC-PA2 film thickness rating.
c. The interior lining of all pipe and fittings shall be tested for holidays, pinholes, and discontinuities in accordance with ASTM D5162 with voltage setting 100-125 volts per mil thickness. All holidays shall be properly repaired in accordance with the manufacturer's instructions and retested at no additional cost to the Owner.
d. Each pipe joint and fitting shall be marked with the date of application of the ceramic epoxy lining system and with its numerical sequence of application on that date.

2. Certification: The pipe or fitting manufacturer shall supply a certificate attesting to the fact that the applicator met the requirements of this Specification, and that the material was applied as required by the Specification.

F. Coating Repair
1. Repairs and touch-up shall be performed in accordance with the manufacturer's recommended repair and touch-up procedures.
2. All field cut ends shall be repaired and sealed prior to the installation.

Tnemec Series 434 Perma-Shield FR

A. General
1. Contractor shall provide, erect, and maintain all required hoists, scaffolding, staging and planking, and perform all access related hoisting work required to complete the Work of this Section as specified.
2. Contractor shall cover or otherwise protect finish work or other surfaces not being coated within the scope of this Section. Contractor shall erect and maintain protective tarps, enclosures and/or masking to contain debris, including dust or other airborne particles from surface preparation or application activities. This may include the use of dust or debris collection apparatus as required at no additional cost to Owner.

B. Inspection
1. Contractor shall examine the areas and conditions under which the protective coating Work is to be performed in accordance with NACE SP0892, Table 1 and SSPC-SP13/NACE No. 6, and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work.
2. Contractor shall confirm the presence of a positive side waterproofing on the exterior of the concrete structure.
3. Commencement of the Work of this Section shall indicate that the substrate and other conditions of installation are acceptable to the Contractor and his Applicator and will produce a finished product meeting the requirements of the Specifications. All defects resulting from accepted conditions shall be corrected by Contractor at his own expense.
4. Stopping Active Leaks: After surface cleaning, any visible leaks or other water ingress shall be reported to the Engineer. Any water infiltration through minor leaks must be stopped using a polyurethane grout manufactured by Avanti International, Webster, TX (281-486-5600), or approved equal, or other approved method in accordance with ACI 221.1R. Surface and grouting material may require additional surface preparation prior to application of protective coating.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

C. Preparation
1. Concrete surfaces to receive protective coating shall be cast with a Smooth Form Finish in accordance with ACI 301. Surfaces shall not be rubbed, sacked, troweled, or otherwise finished in any manner that will obscure or cover the parent concrete surface with materials other than materials as specified in this Section.
2. Allow cast-in-place concrete to cure for a minimum of 28 days at 75°F (24°C) and with adequate air movement before installing the corrosion protection lining system.
3. All surface washing, abrasive blasting, water jetting, grinding, patching, filling, and preparation shall be completed by the Applicator in accordance with the Protective Coating Manufacturer's recommendations.
4. Substrate: Concrete surfaces to be coated shall be free of curing compounds and form release agents, laitance and foreign particles that my inhibit bonding. Prior to start of protective coating systems application, pre-clean as required, and inspect the substrate in accordance with SSPC-SP13/NACE No. 6, Severe Service. Surface preparation procedures shall be in accordance with NACE SP0892, SSPC-SP13/NACE No. 6 and ICRI Guideline No. 310.2. Surface preparation shall expose aggregate and obtain a uniform surface texture resembling the minimum recommended concrete surface ICRI-CSP profile.
5. Level or grind concrete substrates to produce a uniform and smooth surface, including removal of all sharp edges, ridges, form fins, and other concrete protrusions.
6. New Concrete Application: All voids, bugholes, and other surface depressions shall be filled with the specified epoxy-modified resurfacer, re-establishing plan finished grades and concrete planes. The thin overlay shall be applied as a continuous parge coat at a minimum 1/16-inch (1.6 mm) thickness to the entire concrete surface.
7. Metal Application: Remove all visible contaminants per SSPC-SP1. Prepare the surfaces in accordance with SSPC/NACE surface preparation standards per the Manufacturer's instructions.

D. Application
1. Protective coating systems shall be installed when ambient air and surface temperature is above 50°F. The substrate temperature shall be at least 5°F (3°C) above the dew point. Condition the material between 70-80°F (21-27°C) for 24 hours prior to use. Application when temperatures outside of this range will require written instruction from the Manufacturer and approval of the Engineer.
2. Application in direct sunlight and/or with rising surface temperatures is not allowed, as this may result in blistering of the materials due to expansion of entrapped air or moisture in the concrete. In such cases, it will be necessary to postpone the application until later in the day when the temperature of the substrate is falling. Concrete surfaces that have been in direct sunlight should be shaded for at least 24 hours prior to application. Consult the Manufacturer for application schedule guidelines specific to temperature conditions and possible sealer application recommendations to reduce outgassing.
3. Epoxy Lining: Epoxy lining protective coating shall be trowel applied and cured in accordance with Manufacturer's written instructions as outlined in the product data sheet and application guide.
    a. Thickness – Epoxy lining shall be applied to a thickness of 125 mils (1/8" inch) dry film thickness to the entire surface.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

E. Field Quality Control, Inspection and Testing
   1. Contractor to perform the quality control procedures listed below in conjunction with the requirements of this Section.
   2. Inspect all materials upon receipt to ensure that all are supplied by the approved Manufacturer.
   3. Surface pH Testing: The pH of the concrete substrate will be measured using pH indicating papers. The pH testing is to be performed once every 50 square feet (5 square meters). Acceptable pH values shall be a minimum 9.0 as measured using color indicating pH paper with readable color calibrations and a scale at whole numbers (minimum). Use Hydrion Insta-Check Jumbo 1-12, or equal. The paper shall be touched to the surface once using moderate gloved finger pressure. The surface shall not be wiped or moved laterally to disturb the surface during pH testing. Following the one touch, lift the paper vertically to not "wipe" the surface. Compare the color indicated with the scale provided and record the pH. Spot check any questionable areas with a 1% phenolphthalein solution. The phenolphthalein solution shall turn bright pink on concrete.
   4. Surface Profile: Inspect and record substrate profile (anchor pattern). Surfaces shall be profiled, at a minimum, equal to the CSP roughness as recommended by the coating manufacturer in accordance with ICRI Guideline 310.2 and SSPC-SP13/NACE No. 6.
      a. Perform replication of the concrete surface profile every 500 square feet (46 square meters) using replica putty in accordance with ASTM D7682. Submit replications to the Engineer as part of the Jobsite Reports.
   5. Measure and record ambient air temperature once every two hours of each work shift using a thermometer and measure and record substrate temperature once every two hours using an infrared or other surface thermometer.
   6. Measure and record relative humidity and dew point temperature every two hours of each work shift using a sling psychrometer in accordance with ASTM E 337.
   7. Provide verification of correct mixing of coating materials in accordance with the Manufacturer’s instructions.
   8. Inspect and record that the "pot life" of coating materials is not exceeded during installation.
   9. Verify curing of the coating materials in accordance with the Manufacturer's instructions.
   10. Dry-Film Thickness:
      a. Wet-Film Thickness shall be taken every 100 square feet (9 square meters) in accordance with ASTM D 4414 and recorded.
      b. The Dry-Film Thickness can be determined using a surface area calculation for material consumption.
   11. High-Voltage Holiday (Spark) Testing: Upon full cure, the installed lining system shall be checked by high voltage spark detection in accordance with NACE SP0188 and the Manufacturer’s printed application guide to verify a pinhole-free surface. Areas which do not pass the spark detection test shall be corrected at no cost to the Owner.
   12. Contractor is responsible for keeping the Engineer informed of all progress so that Engineer may provide additional quality control at his discretion.
   13. Inspection by the Engineer or others does not absolve the Contractor from his responsibilities for quality control inspection and testing as specified herein or as required by the Manufacturer's instructions.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

F. Acceptance Criteria
   1. All surfaces shall be prepared, applied, and tested in accordance with the specification and referenced standards herein.

G. Adjustments And Cleaning
   1. At the completion of the Work, Contractor shall remove all materials and debris associated with the Work of this Section.
   2. Clean all surfaces not designated to receive protective coating. Restore all other work in a manner acceptable to Engineer.
   3. All finished protective coating shall be protected from damage until Final Acceptance of the Work. Protective coating damaged in any manner shall be repaired or replaced at the discretion of Engineer, at no additional cost to Owner.

Coating Schedule

A. The surfaces to be painted under these specifications shall be coated in accordance with the following schedule:

   1. Mill Coated Ductile Iron Pipe – Gravity Sewer and Forcemain:
      a. Interior: Tnemec Series 431 Perma-Shield PL or approved equal
      b. Exterior Buried: Bituminous Epoxy – 1mm DFT (min)
      c. Exterior Exposed: See Specification Section 09900 Painting and Protective Coating
   2. Concrete:
      a. Interior of New Utility Manholes:
         1) Tnemec Series 434 Perma-Shield FR or approved equal.
      b. All Buried Exterior Concrete Structure Joints:
         1) Conseal CS-102 Butyl Rubber Sealant
         2) Conseal CS-212 Exterior Joint Wrap

Measurement and Payment

Protective coatings shall be incidental to the __" *Sanitary Gravity Sewer* and __" *Force Main Sewer*.

Protective coatings shall be incidental to the __" Dia Utility Manhole.

STRUCTURE REHABILITATION

Materials:

GENERAL

Description

A. This section specifies rehabilitation of the existing concrete structures included in the scope utilizing a resurfacing compound as manufactured by the coating system manufacturer (CSM) as detailed herein. All repairs will be top coated with a high-performance epoxy surface coating as detailed herein.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

B. Demolition of existing coating and deteriorated concrete surfaces shall be in general conformance with Section (D). Anticipated depths of concrete demolition shall be determined in the field based on CSM's recommendations.

Quality Assurance

A. This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

B. Per Section (D), a pre-coating meeting is required before structural rehabilitation can begin.

C. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
ASTM A 185-85	Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM C 1583	Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method)
ASTM D 7234	Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers

D. Quality Control Requirements:

1. The Contractor is responsible for the workmanship and quality of the installation. Inspections by the Engineer or the Coating System Manufacturer's Technical Representative(s) (CTR) will not relieve or limit the Contractor's responsibilities.
2. Application methods shall conform to requirements of this specification and the standards referenced in this Section (D). Changes in the coating system installation requirements will be allowed only with the written acceptance of the Engineer before work commences.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

3. Only personnel who are trained by the CTR specifically for this contract or who are approved by the CSM specifically for this contract shall be allowed to perform the rehabilitation.
4. Contaminated, outdated, diluted materials, and/or materials from previously opened containers shall not be used.
5. For repairs, provide the same products, or products recommended by the CSM, as used for the original coating.
6. Identify the points of access for inspection by the Owner or the Engineer. Provide ventilation, ingress and egress, and other means necessary for the Engineer's personnel to access safely the work areas.
7. Conduct the work so that the system is installed as specified and self-inspect the work continually to ensure that the system is installed as specified. Work that does not conform to the specifications or is otherwise not acceptable shall be corrected.
8. Follow the sequential steps required for proper system installation as specified and as listed in the Structural Rehabilitation Inspection Checklist. For each portion of the work, install the system and complete sign-offs as specified prior to proceeding with the next step. After completing each step as indicated on the Inspection Checklist, sign the checklist indicating that the work has been installed and inspected as specified.
9. Provide written daily reports that present, in summary form, test data, work progress, surfaces covered, ambient conditions, quality control inspection test findings, and other information pertinent to the system installation.

E. Inspection at Hold Points

1. Conduct inspections at Hold Points during the structural rehabilitation and coating system installation and record the results from those inspections. The Contractor shall coordinate such Hold Points with the Engineer such that the Engineer may observe Contractor's inspections on a scheduled basis. Provide the Engineer a minimum of two (2) hours of notice prior to conducting Hold Point Inspections.
2. Onsite Recertification Training. Prior to commencing with any work, CTR shall provide onsite training of CSA. Reference Section (D).
3. The Structural Rehabilitation Checklist Hold Points, when applicable, are as indicated on Form 03900-A.

F. Delivery and Storage

1. Materials shall be delivered to the job site in their original, unopened containers. Each container shall be properly labeled. Materials shall be handled and stored to prevent damage to or loss of label.
2. Labels on material containers shall show the following information:
   a. Name or title of product.
   b. CSM's batch number.
   c. CSM's name.
   d. Generic type of material.
   e. Application and mixing instructions.
   f. Hazardous material identification label.
   g. Shelf-life expiration date.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

3. Materials shall be stored in enclosed structures and shall be protected from weather and excessive heat or cold in accordance with the CSM's recommendations. Flammable materials shall be stored in accordance with state and local requirements.
4. Containers shall be clearly marked indicating personnel safety hazards associated with the use of or exposure to the materials.
5. Material Safety Data Sheets (MSDS) for each material shall be provided to the Engineer.
6. Store and dispose of hazardous waste according to federal, state and local requirements. This requirement specifically addresses waste solvents and coatings.

Submittals

A. Submit manufacturer's product data to verify conformance with this section.

B. Chemical grout used to seal structure from infiltration.

C. Submit written approval of products by the CSM.

D. Pull test results.

E. Red-lined drawings indicating limits of rebar replacement, wire fabric replacement and thickness of resurfacer.

PRODUCTS

Resurfacing Compound

A. Resurfacing Compound shall be selected based on the coating system selected, see Section (D) for applicable coating systems.

1. Resurfacing Compound for Raven Coating System
   a. Resurfacing compound shall be Series 755 as manufactured by Raven.
2. Resurfacing Compound for Sauereisen Coating System
   a. Resurfacing compound shall be Restokrete Underlayment No. F-120 or F-121 as manufactured by Sauereisen.
3. Resurfacing Compound for Warren Coating System
   a. Resurfacing compound shall be M-301 Epoxy Trowel-On Mastic System as manufacturer by Warren Environmental Inc.

B. Requests for consideration of products from CSMs other than those specified in this Section shall demonstrate that the proposed CSM's coating system is equal to the specified coating systems in Section (D). Alternate resurfacing compounds shall be a part of a designed system and manufactured by the CSM of the specified coating system.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

Reinforcing Steel

A. ASTM A-615, Grade 60.

Welded Wire Reinforcement

A. Wire reinforcement, where required by CSM or where shown on the Contract Drawings, shall be Type 304 stainless steel, 2 inch x 2 inch spacing, and 12 gauge.

Reinforcement Coating

A. Rust inhibitive reinforcing coating shall be by the same manufacturer as the resurfacing compound, suitable for application.

Bar Supports

A. Bar supports coming into contact with forms shall be CRSI Class 1 plastic protected or Class 2 stainless steel protected and shall be located in accordance with CRSI MSP-1 and placed in accordance with CRSI PRB. Precast concrete block supports shall be dense, smooth concrete and provided for slabs cast on grade (concrete masonry units are not acceptable). Stainless steel or plastic protected plain steel supports shall be provided for other work.

Construction Methods:

EXECUTION

Surface Preparation

A. Concrete Structures
   1. Mechanically remove contaminated and unsound concrete to the anticipated limits indicated on the Contract Drawings and in accordance with Section 09900. In order to determine when suitable concrete is found pH measurements on the surface of the concrete shall be taken until a pH of 9 is obtained. Additionally, ensure the following removal.
      a. Damaged concrete.
      b. Existing coatings/liners.
      c. Laitance.
      d. Any other bond-inhibiting materials.
   2. Utilize one of the following means to successfully remove the contaminated and unsound concrete from the structures.
      a. Abrasive blasting
      b. Chipping hammer or bush hammer (maximum size shall be 15 lb. to minimize micro cracks just below the prepared surface).
   3. Remove all existing coatings/T-lock and a minimum of ¼ inch of existing concrete facing and continue removal as required to expose suitable concrete. Concrete shall be prepared

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

in accordance with SSPC-SP13/NACE No. 6 Surface Preparation of Concrete with a minimum surface profile equivalent to the ICRI-CSP6 amplitude.

4. Saw-cut perimeter of the area to be repaired to a minimum depth of 1/4 inch for shallow repairs and 1” for deep repairs or local patches. Do not cut existing steel reinforcement. The saw cut area shall generally be square or rectangular in shape.
5. Apply a protective coating to exposed existing reinforcing. Coating shall be made by the same manufacturer as the resurfacer, suitable for application and recommended by the manufacturer. Prevent spillage or application of the reinforcing protective coating to the parent concrete.
6. Where reinforcing steel with active corrosion is encountered, comply with the following.
   a. Abrasive blast reinforcing steel to remove rust, scale and contaminants to achieve a white metal finish.
   b. If half or greater of the diameter of the reinforcing steel is exposed, chip out behind the reinforcing to a 3/4 in. minimum depth in accordance with ICRI Guideline No. 310.1R.
   c. Splice new reinforcing steel to existing steel where corrosion has depleted the cross-section area by 25%, as directed by the Engineer.
7. Abrade the roughened surface and exposed reinforcement to remove bond-inhibiting materials such as: rust, dirt, loose chips, and dust. Maintain substrate in a saturated, surface dry condition.
8. Active or potential hydrostatic leaks shall be stopped or prevented utilizing a suitable urethane grout as recommended by the resurfacer compound manufacturer. All excess grout shall be removed from outside of crack.

Welded Wire Reinforcement

A. Provide a stainless-steel mesh that is anchored to the prepared substrate.

B. Using spacers and concrete anchors, locate a distance from the finished surface as indicated on the Drawings.

Resurfacing Compound

A. Mix resurfacing compound in accordance with manufacturer’s recommendations.

Application

A. Maintain substrate in a saturated, surface-dry condition.

B. Follow the manufacturer’s requirements regarding temperature and humidity.

C. Apply a bond coat of the resurfacing compound.

D. Apply resurfacing compound mortar (prior to the bond coat drying) by low pressure wet spraying or hand troweling. Follow manufacturer recommendations regarding multiple lifts.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

E. Level surface by striking off with a straight edge and closing with a steel trowel. Wooden or plastic floats or rubber sponges may also be used to level and close the resurfacer

F. External curing is required and shall be conducted in accordance with ACI recommendation.

Testing

A. Perform pull tests on the resurfacer in accordance with ASTM C 1583 for cementitious resurfacers or ASTM D 7234 for epoxy based resurfacers. The minimum acceptable failure strength shall be 300 psi and the failure plain must be 90% within the existing concrete.

B. One pull test shall be done per 100 square feet of surface area within the existing structure. In manholes, a minimum of 2 pull tests per manhole is required. In siphons, a minimum of 4 pull tests per structure is required. Locations shall be selected at random based on recommendations of the Engineer or Resident Project Representative.

C. A failure of any pull test within a structure constitutes a failure that requires repair in accordance with the CSM's requirements.

Warranty

A. Warrant structural rehabilitation work against defects in the materials and workmanship for a period of five (5) years from the date of final acceptance of the project. Contractor shall, within a reasonable time after receipt of written notice thereof, repair defects in materials or workmanship which may develop during the five (5) year warranty period, and damage to other work caused by such defects or the repairing of same, at his own expense and without additional cost to Owner. Defects identified during the warranty period shall be repaired in accordance with the performance guarantee at no additional cost to Owner. This may require bypassing structure flows depending on the nature of the repair. Additional costs for work associated with making the repairs such as bypassing flows, shall be borne by the Contractor.

Measurement and Payment:

Structural Rehabilitation shall be incidental to the Epoxy Coating System

EPOXY COATING SYSTEMS

General

A. This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail
.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

B. References to documents shall mean the documents in effect at the time of Advertisement for Bids. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued, or replaced.

ANSI/ASC 29.4 Exhaust Systems	Abrasive Blasting Operations – Ventilation and Safe Practice
ANSI/NSF 61	Drinking Water System Components Health Effects
ANSI B74.18	Grading of Certain Abrasive Grain on Coated Abrasive Material
ASTM D16	Standard Terminology for Paint, Related Coatings, Materials, and Applications
ASTM D2200 (SSPC-VIS1)	Pictorial Surface Preparation Standards for Painting Steel Surfaces
ASTM D3960	Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
ASTM D4262	Standard Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces
ASTM D4263	Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D4414	Standard Practice for Measurement of Wet Film Thickness by Notch Gages
ASTM D4417	Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
ASTM D4541	Standard Test Methods for Pull-Off Strength of Coatings On Metal Substrates Using Portable Adhesion Testers
ASTM D4787	Standard Practice for Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates
ASTM D5162	Standard Practice for Discontinuity (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates
ASTM D7234	Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Adhesion Testers.
ASTM E337	Standard Test Method for Measuring Humidity With a Psychrometer
ASTM F1869	Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
FS 595b	Federal Standard Colors
ICRI 03732	Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays
NACE Publication 6D-163	A Manual for Painter Safety
NACE Publication 6F-163	Surface Preparation of Steel or Concrete Tank/Interiors

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

NACE Publication 6G-164 A	Surface Preparation Abrasives for Industrial Maintenance Painting
NACE Standards	January 1988 Edition of the National Association of Corrosion Engineers, TPC.
NACE Standard RP0188	Standard Recommended Practice – Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates
NACE Standard RP0288	Standard Recommended Practice, Inspection of Linings on Steel and Concrete
NACE Standard RP0892	Standard Recommended Practice, Linings Over Concrete in Immersion Service
NACE Publication TPC2	Coatings and Linings for Immersion Service
NAPF 500-03	Surface Preparation Standard for Ductile Iron Pipe and Fittings in Exposed Locations Receiving Special External Coatings and/or Special Internal Linings
NAPF 500-03-04	Abrasive Blast Cleaning for Ductile Iron Pipe
NAPF 500-03-05	Abrasive Blast Cleaning for Cast Ductile Iron Fittings
OSHA 1910.144	Safety Color Code for Marking Physical Hazards
OSHA 1915.35	Standards – 29CFR - Painting
SSPC	Paint Application Specification No. 1.
SSPC-AB 1	Mineral and Slag Abrasives
SSPC-PA 1	Shop, Field, and Maintenance Painting of Steel
SSPC-PA 2	Measurement of Dry Coating Thickness with Magnetic Gages
SSPC-PA 9	Measurement of Dry Coating Thickness on Cementitious Substrates Using Ultrasonic Gages
SSPC-PA Guide 1	Guide for Illumination of Industrial Painting Project
SSPC-PA Guide 3	A Guide to Safety in Paint Application
SSPC-PA Guide 6	Guide for Containing Debris Generated During Paint Removal Operations
SSPC-PA Guide 11	Guide for Coating Concrete
SSPC SP1	Solvent Cleaning
SSPC SP2	Hand Tool Cleaning
SSPC SP3	Power Tool Cleaning
SSPC SP5	White Metal Blast Cleaning
SSPC SP6	Commercial Blast Cleaning
SSPC SP7	Brush-Off Blast Cleaning
SSPC SP10	Near-White Blast Cleaning
SSPC SP11	Power Tool Cleaning to Bare Metal
SSPC SP12	Surface Preparation and Cleaning of Steel and Other Hard Materials by High and Ultra- High Pressure Water Jetting Prior to Recoating
SSPC SP13	Surface Preparation of Concrete
SSPC-TR2	Wet Abrasive Blast Cleaning
SSPC-TU-3	Overcoating

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

SSPC-TU-4	Field Methods for Retrieval and Analysis of Soluble Salts on Substrates.
SSPC V2	Systems and Specifications: Steel Structures Painting Manual, Volume 2
SSPC-VIS 1	Visual Standard for Abrasive Blast Cleaned Steel
SSPC-VIS 3	Visual Standard for Power and Hand – Tool Cleaned Steel
SSPC-VIS 4	Visual Standards (Water jetting)
SSPC-VIS 5	Visual Standards (Wet Abrasive Blast Cleaning)
WPCF Manual of Practice No. 17	Paints and Protective Coatings for Wastewater Treatment Facilities. Guide and Paint Application Specifications.

Definitions

A. Specific coating terminology used in this Section (D) is in accordance with definitions contained in ASTM D16, ASTM D3960, and the following definitions.
   1. Abrasive: Material used for blast cleaning, such as sand, grit or shot.
   2. Abrasive Blast Cleaning: Cleaning/surface preparation by abrasive propelled at high speed
   3. Anchor Pattern: Profile or texture of prepared surface(s).
   4. ANSI: American National Standards Institute.
   5. Bug Holes: Small cavities, usually not exceeding 15 mm in diameter, resulting from entrapment of air bubbles in the surface of formed concrete during placement and compaction.
   6. Coating/Paint/Lining Thickness: The total thickness of primer, intermediate and/or finish coats.
   7. Coating System Applicator (CSA): A generic reference to the specialty subcontractor or subcontractors retained by the Contractor to install the coating systems specified in this Section (D).
   8. Coating System Manufacturer (CSM): Refers to the acceptable coating system manufacturer, abbreviated as the CSM.
   9. Coating System Manufacturer's Technical Representative(s) (CTR): Refers to the technical representative(s) of the acceptable Coating System Manufacturer and is abbreviated as CTR.
   10. Concrete Surface Profile (CSP) - is the measure of the average distance from the peaks of the surface to the valleys as seen through a cross-sectional view of the concrete.
   11. Dew point: Temperature of a given air/water vapor mixture at which condensation starts.
   12. Dry Film Thickness (DFT): Depth of cured film, usually expressed in mils (0.001 inch). Use this definition as opposed to existing definition.
   13. Drying Time: Time interval between application and curing of material.
   14. Dry to Recoat: Time interval between application of material and ability to receive next coat.
   15. Dry to Touch: Time interval between application of material and ability to touch lightly without damage.
   16. Field Coat: The application or the completion of application of the coating system after installation of the surface at the site of the work.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

17. Hold Point: A defined point, specified in this Section (D), at which work shall be halted for inspection.
18. Holiday: a discontinuity, skip, or void in coating or coating system film that exposes the substrate.
19. Honeycomb: Segregated condition of hardened concrete due to non-consolidation.
20. ICRI: International Concrete Repair Institute.
21. Incompatibility: Inability of a coating to perform well over another coating because of bleeding, poor bonding, or lifting of old coating; inability of a coating to perform well on a substrate.
22. Laitance: A layer of weak, non-durable concrete containing cement fines that is brought to the surface through bleed water because of concrete finishing and/or over-finishing.
23. Mil: 0.001 inch.
24. NACE: National Association of Corrosion Engineers.
25. Overspray: Dry spray, particularly such paint that failed to strike the intended surface.
26. Pinhole: A small diameter discontinuity in a coating or coating system film that is typically created by outgassing of air from a void in a concrete substrate resulting in exposure of the substrate or a void between coats.
27. Pot Life: Time interval after mixing of components during which the coating can be satisfactorily applied.
28. Resurfacer/Resurfacing Material: A layer of cementitious and/or resin-base material used to fill or otherwise restore surface continuity to worn or damaged concrete surfaces.
29. Shelf Life: Maximum storage time for which a material may be stored without losing its usefulness.
30. Shop Coat: One or more coats applied in a shop or plant prior to shipment to the site of the work, where the field or finishing coat is applied.
31. Spreading Rate: Area covered by a unit volume of paint at a specific thickness.
32. SSPC: The Society for Protective Coatings.
33. Stripe Coat: A separate coat of paint applied to all weld seems, pits, nuts/bolts/washers, and edges by brush. This coat shall not be applied until any previous coat(s) have cured and once applied, shall be allowed to cure prior to the application of the subsequent coat(s).
34. Surface Saturated Dry (SSD): Refers to concrete surface condition where the surface is saturated (damp) without the presence of standing water.
35. Volatile Organic Compound (VOC) Content: The portion of the coating that is a compound of carbon, is photochemically reactive, and evaporates during drying or curing, expressed in grams per liter (g/l) or pounds per gallon (lb./gal).
36. Immersion: Refers to a service condition in which the substrate is below the waterline or submerged in water or wastewater at least intermittently if not constantly.
37. Wet Film Thickness (WFT): The primer or coating film's thickness immediately following application. Wet film thickness is measured in mils or thousandths of an inch (0.001 inch) and is abbreviated WFT.

Quality Assurance

A. Quality Control Requirements:

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

1. The Contractor is responsible for the workmanship and quality of the coating system installation. Inspections by the Engineer or the CTR will not relieve or limit the Contractor's responsibilities.
2. Application methods shall conform to requirements of this specification and the standards referenced in this Section (D). Changes in the coating system installation requirements will be allowed only with the written acceptance of the Engineer before work commences.
3. Only personnel who are trained and approved by the CSM specifically for this contract shall be allowed to perform the coating system installation specified in this Section (D).
4. Contaminated, outdated, diluted materials, and/or materials from previously opened containers shall not be used.
5. For repairs, provide the same products, or products recommended by the CSM, as used for the original coating.
6. Conduct the work so that the coating system is installed as specified and self-inspect the work continually to ensure that the coating system is installed as specified. Coating system work that does not conform to the specifications or is otherwise not acceptable shall be corrected.
7. Follow the sequential steps required for proper coating system installation as specified and as listed in the Coating System Inspection Checklist. For each portion of the work, install the coating system and complete signoffs as specified prior to proceeding with the next step. After completing each step as indicated on the Coating System Inspection Checklist, sign the checklist indicating that the work has been installed and inspected as specified.
8. Provide written daily reports that present, in summary form, test data, work progress, surfaces covered, ambient conditions, quality control inspection test findings, and other information pertinent to the coating system installation.

B. Inspection at Hold Points
   1. Conduct inspections at Hold Points during the coating system installation and record the results from those inspections. The Contractor shall coordinate such Hold Points with the Engineer such that the Engineer may observe Contractor's inspections on a scheduled basis. Provide the Engineer a minimum of two (2) hours of notice prior to conducting Hold Point Inspections.
   2. The Coating System Inspection Checklist Hold Points shall be as follows:
      a. Environmental and Site Conditions. Prior to commencing an activity associated with coating system installation, measure, record, and confirm acceptability of ambient air temperature and humidity as well as other conditions such as proper protective measures for surfaces not to be coated and safety requirements for personnel. The acceptability of the weather and/or environmental conditions within the structure shall be determined by the requirements specified by the CSM of the coating system being used.
      b. Surface Preparation. Prior to commencing surface preparation, observe, record, and confirm that oil, grease, and/or soluble salts have been eliminated from the surface after cleaning and abrasive blasting. Confirm degree of cleanliness, surface profile, and surface pH testing. In addition, the compressed air used for surface preparation or blow down cleaning shall be checked to confirm it is free from oil and moisture.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

c. Post Application Inspection – Identify defects in application work including pinholes, holidays, excessive runs or sags, inadequate or excessive film thickness and other problems as may be observed.
d. Post Cure Evaluation – Measure and inspect the overall dry film thickness. Conduct a DFT survey, as well as perform adhesion testing, holiday detection, or cure testing as required based on the type of project and the specific requirements in this Section (D) and/or in the CSM's written instructions.
e. Completion of Localized Repairs. Perform necessary repairs to comply with the requirements of Section (D).
f. Final Acceptance. Measure and reinspect corrective coating work performed to repair defects identified at prior Hold Points. This activity also includes final visual inspection along with follow-up tests such as holiday detection, adhesion tests, and DFT surveys.

C. Delivery and Storage
1. Materials shall be delivered to the job site in their original, unopened containers. Each container shall be properly labeled. Materials shall be handled and stored to prevent damage to or loss of label.
2. Labels on material containers shall show the following information:
   a. Name or title of product.
   b. CSM's batch number.
   c. CSM's name.
   d. Generic type of material.
   e. Application and mixing instructions.
   f. Hazardous material identification label.
   g. Shelf-life expiration date.
3. Materials shall be stored in enclosed structures and shall be protected from weather and excessive heat or cold in accordance with the CSM's recommendations. Flammable materials shall be stored in accordance with state and local requirements.
4. Containers shall be clearly marked indicating personnel safety hazards associated with the use of or exposure to the materials.
5. Material Safety Data Sheets (MSDS) for each material shall be provided to the Engineer.
6. Store and dispose of hazardous waste according to federal, state and local requirements. This requirement specifically addresses waste solvents and coatings.

Action Submittals

A. Submit manufacturer's product data to verify conformance with this section.

B. CSM's current printed recommendations and product data sheets for coating systems including:
1. Volatile organic compound (VOC) data.
2. Surface preparation recommendations.
3. Primer type, where required.
4. Maximum dry and wet-mil thickness per coat.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

5. Minimum and maximum curing time between coats, including atmospheric conditions for each.
6. Curing time before submergence in liquid.
7. Minimum atmospheric conditions during which the coating shall be applied.
8. Allowable application methods.
9. Maximum allowable moisture content.
10. Maximum shelf life.

C. Storage requirements including temperature, humidity, and ventilation for Coating System Materials as recommended by the CSMs.

D. CSM standard details.
   1. Coating termination details
   2. Transition details (e.g.: vertical; vertical to horizontal corners, pipe penetrations, metal embedment)

Information Submittals

A. Affidavits signed and sealed by an officer of the CSM's corporation, attesting to full compliance of each coating system component with current and promulgated federal, state, and local air pollution control regulations and requirements.
B. Material Safety Data Sheets (MSDS) for materials to be delivered to the job site, including coating system materials, solvents, and abrasive blast media.
C. Provide a detailed work plan identifying the procedure that will be followed when performing restoration work.
D. Submit letter(s) from the CTR identifying that the application personnel for this project have satisfactorily completed training.
E. Acceptance test results/reports.

Responsibilities of the CTR

A. The CTR shall routinely inspect and verify in writing that the application personnel have successfully performed surface preparation, filler/surface application, coating system application, and Quality Control Inspection in accordance with this Section (D) and to warrantable level of quality. This must include checking the required degree of cleanliness, surface pH for concrete substrates, surface profile of substrates, proper mixing of coating materials, application (including checking the wet and dry film thickness of the coating systems), proper cure of the coating systems, and proper treatment of coating systems at terminations, transitions, and joints and cracks in substrates. This inspection is in addition to the inspection performed by the Contractor in accordance with this Section (D).
   1. Coating System Inspection
      a. While on site to routinely inspect and verify, the CTR shall perform the following activities to confirm acceptability and conformance with the specifications:
         1) Inspect ambient conditions during various coating system installation at hold points for conformance with the specified requirements.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

2) Inspect the surface preparation of the substrates where the coating system will terminate or will be applied for conformance to the specified application criteria.
3) Inspect preparation and application of coating detail treatment (for example, terminations at joints, metal embedments in concrete, etc.
4) Inspect application of the filler/resurfacer materials for concrete and masonry substrates.
5) Inspect application of the primers and finish coats including wet and dry film thickness of the coatings.
6) Inspect coating systems for cure.
7) Review adhesion testing of the cured coating systems for conformance to specified criteria.
8) Review coating system continuity testing for conformance to specified criteria.
9) Inspect and record representative localized repairs made to discontinuities identified via continuity testing.
10) Conduct a final review of completed coating system installation for conformance to the specifications.
11) Prepare and submit a site visit report following each site visit that documents the acceptability of the coating work in accordance with the CSM's recommendations.

2. Final Report
   a. Upon completion of coating work for the project, the CTR shall prepare a final report. That report shall summarize:
      1) daily test data
      2) observations
      3) daily drawings that indicating where each batch of CSM's product was applied to structure in a diagram format.
      4) photographs
      5) substrate conditions
      6) ambient conditions
      7) application procedures observed during the CTR's site visits.
   b. The report shall be submitted in accordance with paragraph (D) -2.2. Include a statement that the completed work was performed in accordance with the requirements of this Section (D) and the CSM's recommendations.

PRODUCTS

EA-4 Epoxy Coating System

A. Coating system shall be 100% solids, ultra-high build epoxy coating system with zero shrinkage. The epoxy shall be suitable for application on vertical and overhead surfaces. The system shall be a two-part system: resin and curing agent.

B. Minimum physical properties
   1. Tensile strength per ASTM D 638: 7,600 psi

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

2. Tensile Elongation per ASTM D 638: 1.5%
3. Compressive strength per ASTM D 695: 16,000 psi
4. Flexural strength per ASTM D 790: 13,000 psi
5. Hardness, Shore D per ASTM D2240: 88
6. Adhesion, concrete per ASTM D 7234: Substrate Failure
7. VOCs: zero pounds per gallon

C. Manufacturer shall be:
   1. Raven Series 405
   2. Or Equal

EC-1 Urethane Coating System

A. Corrosion resistant aromatic flexible urethane resin coating from the manhole cone, across any leveling rings and to the frame at a point just below where the cover rests.

B. Material shall have a minimum elongation of 800% and Durameter Hardness of 75. Minimum tensile and adhesion strengths of 1150 psi and 175 lb./in, respectively.

C. If the manhole has been EA-4 coated prior to the seal installation the seal shall cover a minimum of 12 vertical inches or a minimum of 1 kit material applied.

D. Manufactures:
   1. Flex-Seal by Sealing Systems, Inc.
   2. Or Equal

Construction Methods:

EXECUTION

Coatings

A. General:
   1. Coating products shall not be used until the Engineer has received the affidavits, the Engineer has observed materials onsite match the approved submittals, and the evidence that the applicator has received training for surface preparation, mixing and application of each coating system.

B. Shop and Field Coats:
   1. Shop Applied Prime Coat: Except as otherwise specified, prime coats may be shop-applied or field-applied. Shop-applied primer shall be compatible with the specified coating system and shall be applied at the minimum dry film thickness recommended by the CSM. Data sheets identifying the shop primer used shall be provided to the on-site coating application personnel. Adhesion tests shall be performed on the shop primer. Damaged, deteriorated and poorly applied shop coatings that do not meet the requirements of this Section (D) shall be removed and the surfaces recoated. If the shop

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

primer coat meets the requirements of this Section (D), the field coating may consist of touching up the shop prime coat and then applying the finish coats to achieve the specified film thickness and continuity.

2. Field Coats: Field coats shall consist of one or more prime coats and one or more finish coats to build up the coating to the specified dry film thickness. Unless otherwise specified, finish coats shall not be applied until other work in the area is complete and until previous coats have been inspected. Adhesion tests shall be performed on the shop primer.
3. Adhesion Confirmation: The Contractor shall perform an adhesion test after proper cure in accordance with ASTM D3359 to demonstrate that (1) the shop applied prime coat adheres to the substrate, and (2) the specified field coatings adhere to the shop coat. Test results showing an adhesion rating of 5A on immersed surfaces and 4A or better on other surfaces shall be considered acceptable for coatings 5 mils or more in thickness (Method A). Test results showing an adhesion rating of 5B on immersed surfaces and 4B or better on other surfaces shall be considered acceptable for coating thicknesses less than 5 mils.

Preparation

A. General:
   1. Surface preparations for each type of surface shall be in accordance with the specific requirements of each coating specification sheet (COATSPEC) and the following. In the event of a conflict, the COATSPEC sheets shall take precedence.
   2. Surfaces to be coated shall be clean and dry. Before applying coating or surface treatments, oil, grease, dirt, rust, loose mill scale, old, weathered coatings, and other foreign substances shall be removed. Oil and grease shall be removed before mechanical cleaning is started. Where mechanical cleaning is accomplished by blast cleaning, the abrasive used shall be washed, graded and free from contaminants that might interfere with the adhesion of the coatings. The air used for blast cleaning shall be sufficiently free of oil and moisture so as not to cause detrimental contamination of the surfaces to be coated.
   3. Where deemed necessary by the Engineer, a NACE International certified coatings inspector, provided by the Owner, will inspect and approve surfaces to be coated before application of a coating. Surface defects identified by the inspector shall be corrected by the Contractor at no additional cost to the Owner.

B. Blast Cleaning:
   1. The compressed air used for blast cleaning shall be filtered and shall contain no condensed water and no oil.
   2. Oil separators shall be installed just downstream of compressor discharge valves and at the discharge of the blast pot discharges.
   3. An air dryer or desiccant filter drying unit shall be installed which dries the compressed air prior to blast pot connections. This dryer shall be used and maintained for the duration of surface preparation work.
   4. The abrasive blast nozzles used shall be of the venturi or other high velocity type supplied with a minimum of 100 psig air pressure and sufficient volume to obtain the blast cleaning production rates and cleanliness/specified.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

5. The Contractor shall provide ventilation for airborne particulate evacuation (meeting pertinent safety standards) to optimize visibility for both blast cleaning and inspection of the substrate during surface preparation work.
6. If, between final surface preparation work and coating system application, contamination of prepared and cleaned metallic substrates occurs, or if the prepared substrates' appearance darkens or changes color, recleaning by water blasting, reblasting and abrasive blast cleaning shall be required until the specified degree of cleanliness is reclaimed.

C. Solvent Cleaning:
1. Any solvent wash, solvent wipe, or cleaner usedshall not contain phosphates, is biodegradable, removes no zinc, and is compatible with the specified primer.
2. Clean white cloths and clean fluids shall be used in solvent cleaning.

D. Metallic Surfaces
1. Metallic surfaces shall be prepared in accordance with applicable portions of surface preparation specifications of the Society for Protective Coatings (SSPC) specified for each coating system. The profile depth of the surface to be coated shall be in accordance with the COATSPEC requirements in this Section measured by Method C of ASTM D4417.
2. Preparation of metallic surfaces shall be based upon comparison with SSPC-VIS1-89 (ASTM D2200), and as described in the COATSPEC for each coating system.

E. Concrete Surfaces:
1. Inspection of concrete surfaces prior to surface preparation and surface preparation of concrete surfaces shall be performed in accordance with SSPC-SP13 (also called NACE 6).
2. Prepare substrate cracks, areas requiring resurfacing and perform detail treatment including but not limited to, terminating edges, per CSM recommendations. This shall precede surface preparation for degree of cleanliness and profile.
3. The surface profile for prepared concrete surfaces to be coated shall be evaluated by comparing the profile of the prepared concrete with the profile of graded abrasive paper, as described in ANSI B74.18 or by comparing the profile with the ICRI 03732 (surface profile replicas). Surface profile requirements shall be in accordance with the COATSPEC requirements and the CSM’s recommendations.
4. Surface cleanliness of prepared concrete substrates shall be inspected after cleaning, preparation, and/or drying, but prior to making repairs or applying a coat in the coating system. If concrete surfaces are repaired, they shall be reinspected for surface cleanliness prior to application of the coating system.
5. Surface preparation of concrete substrates shall be accomplished using methods such as dry abrasive blast cleaning, high, or ultra high-pressure water blast cleaning in accordance with SSPC-SP-13. The selected cleaning method shall produce the requirements set forth below.
    a. A clean substrate that is free of calcium sulfate, loose coarse or fine aggregate, laitance, loose hydrated cement paste, and otherwise deleterious substances shall be achieved. Blast cleaning and other means necessary shall be used to open up air voids

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

or bugholes to expose their complete perimeter. Leaving shelled over, hidden air voids beneath the exposed concrete surface is not acceptable. Concrete substrate must be dry prior to the application of filler/surface or coating system materials.

b. Acceptable surface preparation must produce a concrete surface with a minimum pH of 10.0 to be confirmed by surface pH testing. If after surface preparation, the surface pH remains below 10.0, perform additional water blasting, cleaning, or abrasive blast cleaning until additional pH testing indicates an acceptable pH level.
c. Following inspection by the Contractor of the concrete surface preparation, thoroughly vacuum clean concrete surfaces to be coated to remove loose dirt and spent abrasive (if dry blast cleaning is used) leaving a dust free, sound concrete substrate. Debris produced by blast cleaning shall be removed from the structures to be coated and disposed of legally off site by the Contractor.

6. Should abrasive blast cleaning or high or ultrahigh pressure water blasting not remove degraded concrete, chipping or other abrading tools shall be used to remove the deteriorated concrete until a sound, clean substrate is achieved which is free of calcium sulfate, loose coarse or fine aggregate, laitance, loose hydrated cement paste, and otherwise deleterious substances. Concrete substrates must be dry prior to the application of filler/surfacers or coating system materials.
7. Surface cleanliness of prepared concrete substrates shall be inspected after cleaning, preparation, and/or drying, but prior to application of coating materials. If concrete surfaces are repaired, they shall be reinspected for surface cleanliness and required surface profile prior to application of the coating system.
8. Moisture content of concrete to be coated shall be tested in accordance with ASTM D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method and ASTM F 1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride. The ASTM D4263 plastic sheet test shall be conducted at least once for every 500 sq. ft. of surface area to be coated. The presence of any moisture on plastic sheet following test period constitutes a non-acceptable test.

F. Existing Facilities:
1. Abrasive blasting shall be used to clean wall surfaces of existing structures to be coated. Surfaces to be coated, or recoated, shall be repaired, cleaned, and finished to the standards as specified herein.
2. Existing equipment and metalwork shall be coated in accordance with the appropriate coating system specified for new work in the COATSPEC.

Application

A. Workmanship:
1. Coated surfaces shall be free from runs, drips, ridges, waves, laps, and brush marks. Coats shall be applied to produce an even film of uniform thickness completely coating corners and crevices.
2. The equipment shall be designed for application of the materials specified. Compressors shall have suitable traps and filters to remove water and oils from the air. A paper blotter test shall be performed by the Contractor when requested by the Engineer to determine if

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

the air is sufficiently free of oil and moisture so as not to produce deteriorating effects on the coating system. The amount of oil and moisture in spray air shall be less than the amount recommended by the CSM. Spray equipment shall be equipped with mechanical agitators, pressure gages, and pressure regulators, and spray nozzles of the proper sizes.

3. Each coat of coating material shall be applied evenly and sharply cut to line. Care shall be exercised to avoid overspraying or spattering paint on surfaces not to be coated. Glass, hardware, floors, roofs, and other adjacent areas and installations shall be protected by taping, drop cloths, or other suitable measures.
4. Allow each coat to cure or dry thoroughly, according to CSM's printed instructions, prior to recoating.
5. Vary color for each successive coat for coating systems when possible.

B. Coating Properties and Mixing:
   1. Coatings, when applied, shall provide a satisfactory film and smooth even surface. Glossy undercoats shall be lightly sanded to provide a surface suitable for the proper application and adhesion of subsequent coats. Coating materials shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Coatings consisting of two or more components shall be mixed in accordance with the CSM's instructions.

C. Atmospheric Conditions:
   1. Coatings shall be applied only to surfaces that are dry, and only under conditions of evaporation rather than condensation. Coatings systems shall not be applied during rainy, misty weather, or to surfaces upon which there is frost or moisture condensation. During damp weather, when the temperature of the surface to be coated is within 10 degrees F of the dew point, forced dehumidification equipment may be used to maintain a temperature of minimum 40 degrees F and 10 degrees F above the dew point for the surfaces to be coated, the coated surface, and the atmosphere in contact with the surface. These conditions shall be maintained for a period of at least 8 hours or as recommended by the CSM. Where conditions causing condensation are severe, dehumidification equipment, fans, and/or heaters shall be used inside enclosed areas to maintain the required atmospheric and surface temperature requirements for proper coating application and cure.

D. Concrete Substrate Temperatures and Detail Treatment:
   1. When the surface temperatures of the concrete substrates to be coated are rising or when these substrates are in direct sunlight, outgassing of air from the concrete may result in bubbling, pinhole formations, and/or blistering in the coating system. The application of the filler/surface and the coating system will only be allowed during periods of falling temperature. This will require that application of the filler/surface and coating system shall only occur during the cooler evening hours. Contractor shall include any cost for working outside of normal hours in the bid.
   2. Should bubbles, pinholes, or discontinuities form in the applied coating system material, they shall be repaired as recommended by the CSM. Should pinholes develop in the filler/surfacer material or in the first coat of the coating material, the pinholes shall be repaired in accordance with the CSM's recommendations prior to application of the next

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

coat of material. Whenever pinholes occur, the air void behind or beneath the pinhole shall be opened up completely and then completely filled with the specified filler/surfacer material. Next, the coated area around the pinhole repair shall be abraded and the coating reapplied over that area.

3. Perform application detail work per CSM's current written recommendations and/or drawings.

E. Protection of Coated Surfaces:
   1. Items that have been coated shall not be handled, worked on, or otherwise disturbed, until the coating is completely dry and hard.

F. Method of Coating Application

   1. Where two or more coats are required, alternate coats shall contain sufficient compatible color additive to act as indicator of coverage, or the alternate coats shall be of contrasting colors. Color additives shall not contain lead, or lead compounds, which may be destroyed or affected by hydrogen sulfide or other corrosive gas, and/or chromium.
   2. Coatings shall not be applied to a surface until it has been prepared as specified. After the prime coat is dry, pinholes and holidays shall be marked, repaired in accordance with CSM's recommendations and retested before succeeding coats are applied.
   3. Coating applications method shall be conventional or airless spray, brush or roller, or trowel as recommended by CSM.

G. Film Thickness and Continuity:
   1. Wet Film Thickness of the first coat of the coating system and subsequent coats shall be verified by the Contractor, following application of each coat.
   2. The surface area covered per gallon of coating for various types of surfaces shall not exceed those recommended by the CSM. The minimum thickness at any point shall not deviate more than 25 percent from the required average.
   3. Unless otherwise specified, no less than two coats shall be applied.
   4. In testing for continuity of coating about welds, projections (such as bolts and nuts), and crevices, the Engineer shall determine the minimum conductivity for smooth areas of like coating where the dry-mil thickness has been accepted. This conductivity shall be the minimum required for these rough or irregular areas. Pinholes and holidays shall be recoated to the required coverage.
   5. For concrete substrates, the Contractor shall apply a complete skim coat of the specified filler/surfacer material over the entire substrate prior to application of the coating system. This material shall be applied such that all open-air voids and bugholes in the concrete substrate are completely filled prior to coating application.

Cleanup

A. Upon completion of coating, the Contractor shall remove surplus materials, protective coverings, and accumulated rubbish, and thoroughly clean surfaces and repair overspray or other coating-related damage.

Coating System Specification Sheets (Coatspec)

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

A. Coating systems for different types of surfaces and general service conditions for which these systems are normally applied are specified on the following COATSPEC sheets. Surfaces shall be coated in accordance with the COATSPEC to the system thickness specified. Coating systems shall be as specified, Coating System Schedule. In case of conflict between the schedule and the COATSPECS, the requirements of the schedule shall prevail.
B. Coating Specification Sheets included.

Coating Specification Sheets

Coating System ID	**Coating Material**	**Surface**	**Service Condition**
EA-4	Blended Amine Cured Epoxy – For Very Corrosive Conditions	Concrete	Non-immersed or immersed, very corrosive environment. Very high H_2S conditions.
EC-1	Eurethane	Steel, concrete, or epoxy where frame and cover and leveling rings are located atop the manhole corbel section	Service Condition: Interior, exposed to direct sunlight or not, corrosive (immersion pH 4.0 or lower and/or headspace pH 4.0 or lower and/or gaseous H_2S concentrations between 10 and 150 ppm typically.)

Coating System Specification Sheets (Coatspec)

Coating System Identification:	EA-4
Coating Material:	Blended Amine Cured Epoxy
Surface:	Concrete or masonry
Service Condition:	Immersed, nonpotable; non-immersed, very corrosive environment, color not required, new or existing construction, especially for headspace environments that are very corrosive due to biogenic sulfide corrosion.
Surface Preparation:	All coating termination and transition details shall be prepared in accordance with the CSM's standard detail drawings. This includes coating termination details, coating transitions at vertical and vertical to horizontal corners, coating terminations at joints, concrete crack treatment, pipe penetration treatment, coating terminations at metal embedments in the concrete substrate, and other details. The CSM's standard detail drawings shall be submitted for all such coating applications. If standard details are not available for a given detail treatment, the CSM shall be required to produce one at no additional cost to the Owner, the Engineer, or any other party. If wet abrasive or water blasting surface preparation methods were used, the concrete substrate shall be allowed to dry under warm conditions (minimum of 75 degrees F) for at least 5 days prior to coating application. Following surface preparation work and dry-out, all surfaces to be coated shall be vacuum cleaned to remove all loose dirt, dust, or other loose materials.
Concrete:	Concrete surfaces shall be allowed to age for at least 28 days and allowed to dry to the moisture content recommended by the CSM. Moisture content may be tested by the Engineer with a Delmhorst Instrument Company moisture detector, or equal. Loose concrete, form oils, surface hardeners, curing compounds, and laitance shall be removed from surfaces by abrasive blasting, and voids and cracks shall be repaired as specified in Section 03900. Concrete shall be abraded also to achieve a uniform concrete surface profile of CSP 5 minimum. If the parge coat (filler/surfacer material) is non-polymer modified, it shall be brush blasted following adequate cure

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

	per the CSM's instructions to produce a uniform concrete surface profile of CSP-4 in accordance with ICRI 03732 prior to coating application. After cleaning, air voids or bugholes in the concrete shall be filled with a surfacer or block filler. The filler/surfacer material shall be applied as a complete parge coat of the substrate. For existing concrete that has been degraded, apply a skim coat of resurfacer or filler material to restore the substrate to a coatable condition. Be certain the filler surfacer material is compatible with the coating system.
Application:	Field Resurfaer or filler shall be applied and dry per CSM's recommendations prior to application of coating. Drying time between filler/resurfacer and coating system shall be as specified by the CSM for the site conditions. If the maximum recoat time is exceeded, surface preparation shall require solvent washing, light abrasive blasting, or other procedures per CSM's instructions. The parge coat shall completely fill all bugholes and voids in the substrate and it will also completely cover the substrate unless specified otherwise above such filled voids by 1/8 inch of thickness
System Thickness:	Minimum 125 mils dry film in addition to the parge coat.
Primer:	Self-priming
Testing:	Holiday detection shall be performed over 100% of the coated surface area to identify any holidays or pinholes that could compromise coating system performance. Holiday detection shall be performed after application and adequate cure of the spray applied epoxy coating material. Holiday detection shall be performed in accordance with NACE RP0188. Pull testing shall be performed to a minimum of 300 psi. A maximum of 4 pull tests in each manhole at locations designated by Resident Project Representative. A maximum of 10 pull tests in each siphon chamber at locations designated by Resident Project Representative. All pull tests must pass. Failures require repair in accordance with CSM requirements and retesting in the repaired area. Repair pull test locations in accordance with CSM requirements.
Pinhole and Holiday Repair Procedure:	Pinholes and holidays identified by Holiday Detection shall be repaired as follows: • Using a grinder or other suitable power tool, remove the coating system at all pinholes or holidays in an area at least 2 inches in diameter or in both dimensions around the defect back to the concrete substrate. • Chip out and remove the concrete to expose the full dimensions in all three directions of the air void responsible for the defect. • Aggressively abrade or sand the intact coating system surface at least 3-inches beyond the removal area in all directions to produce a uniform 6- to 8-mil profile in the intact coating system. • Vacuum clean the prepared area to remove all dust, dirt, etc. leaving clean sound surfaces. • Tape to mask the periphery of the prepared intact coating area to prevent coating repair application onto the prepared area. • Using a putty knife or other suitable tool, fill the opened void with the approved filler/surfacer material completely and strike-off. Allow to cure per CSM's recommendations. • Apply the coating system in the number of coats necessary to achieve the specified 60 mils DFT over the defect and coating removal area and feather the coating onto the abraded coated surfaces around the removal area to avoid a lip and to achieve a neat repair outline. Allow to cure properly.

Coating System Identification:	EC-1
Coating Material:	Eurethane
Surface:	Concrete and epoxy coating

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

Service Condition:	Interior exposed to direct sunlight or not, corrosive (immersion pH 4.0 or lower and/or headspace pH 4.0 or lower and/or gaseous H2S concentrations between 10 and 150 ppm typically).
Surface Preparation:	All coating termination and transition details shall be prepared in accordance with the CSM's standard detail drawings. The CSM's standard detail drawings shall be submitted for all such coating applications. If standard details are not available for a given detail treatment, the CSM shall be required to produce one at no additional cost to the owner, the engineer, or any other party. If wet abrasive or water blasting surface preparation methods were used, the concrete substrate shall be allowed to dry under warm conditions (minimum of 75 degrees F) for at least 5 days prior to coating application. Following surface preparation work and dry-out, all surfaces to be coated shall be vacuum cleaned to remove all loose dirt, dust, or other loose materials. Sandblast concrete and steel surfaces to CSM requirements. Air blast surface after cleaning.
Concrete:	Concrete surfaces shall be allowed to cure for at least 28 days and allowed to dry to the moisture content recommended by the CSM. Moisture content may be tested by the Engineer with a Delmhorst Instrument Company moisture detector, or equal. Except as otherwise specified, loose concrete, form oils, surface hardeners, curing compounds, and laitance shall be removed from surfaces by abrasive blasting and chipping, and voids and cracks shall be repaired as specified in Section 03900. Surface Preparation must open up all shelled over air voids or bugholes to expose fully the void's depth, width, and length. Concrete shall be abraded to achieve a uniform concrete surface profile of CSP-5 in accordance with ICRI 03732. Clean with a sandblaster.
Steel:	Clean with a sandblaster.
Epoxy:	Clean with a sandblaster. The surface must be coated with NHNS prep material manufactured by the CSM.
Eurethane:	Clean with a sandblaster. The surface must be coated with NHNS prep material manufactured by the CSM.
Application:	Field Apply acetone cleaning to cleaned surfaces. Apply primer and cure to CSM requirements and then immediately apply coating system.
System Thickness:	Minimum 170 mils dry film
Testing:	Holiday detection shall be performed over 100% of the coated surface area to identify any holidays or pinholes that must be repaired.
Pinhole and Holiday	Pinholes or holidays identified by Holiday Detection shall be repaired by applying additional coating.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

Coating System Schedule (Final Schedule)

A. Specific coating systems for items that are to be coated are specified in the following coating system schedule. Unless otherwise specified in the coating system schedule, the word "interior" shall mean the inside of a building or structure, and the word "exterior" shall mean outside exposure to weather elements.

Location Description	**Surface**	**Coating System Identification**	**Standard Color**
Existing Manholes New Manholes New Wet Wells	1. All Interior Surfaces including floor, channel, bench, walls, ceiling, riser sections	EA-4	N/A
	2. Interior surface of the frame starting below the ledge upon which the cover sits then across leveling rings and down to at least 2” of the corbel section	EC-1	N/A

Final Inspection

A. Contractor shall conduct a final inspection to determine whether coating system work meets the requirements of the specifications.
B. Engineer will subsequently conduct a final inspection with the Contractor to determine the work is in conformance with requirements of the contract documents.
C. Any rework required shall be marked. Such areas shall be recleaned and repaired as specified at no additional cost to the Owner.

Warranty

A. Warrant coating work against defects in the materials and workmanship for a period of five (5) years from the date of final acceptance of the project. Within a reasonable time after receipt of written notice thereof, repair defects in materials or workmanship which may develop during the five (5) year warranty period, and any damage to other work caused by such defects or the repairing of same, without additional cost to Owner.

SIPHON CHAMBER

General

A. The items listed below refer to and are the same pay items listed in the Bid Form. They constitute all of the pay items for the completion of the Work.

B. The unit bid prices will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

C. Refer to the General Conditions for provisions for Payments to Contractor and Changes in Contract Price.
   1. Measurement:
      a. Measurement for payment for each siphon chamber rehabilitation on a lump sum basis for each chamber.
      b. Chemical Grout Injection – per gallon of chemical pumped to seal the structure. Either the Owner or Owner's representative shall verify volume of material used.
   2. Payment under this item shall include, but not be limited to:
      a. Temporary removal and restoration/relocation or temporary support of existing utilities.
      b. Cutting and removal of existing paved surfaces including curb and sidewalk.
      c. Excavation, shoring and bracing installation and removal where required, excess material disposal, loading, hauling and stockpiling material, subgrade preparation, dewatering and/or well pointing as required
      d. Providing backfill, compaction and trench maintenance.
      e. Temporary support and protection of existing underground facilities.
      f. Repair to damaged new and existing utilities.
      g. Replacing gutters, storm sewers, and inlets (that are not indicated to be replaced either on the Drawings or in the Specifications) and utilities removed as part of construction. Storm sewers, inlets and utilities damaged through fault of the Contractor or removed at the convenience of the Contractor shall be replaced at the Contractor's expense.
      h. Chemical Grout Injection to prevent infiltration during the rehabilitation process.
      i. Materials, equipment and labor to rehabilitate the structure, preparation, abrasive blasting, removal of steps and lifting beam, cutting, surface repairs within the structure, root removal, chamber cleaning, sealing of all surfaces including walls, chimney, inverts and benches prior to coating application (if necessary), demolition, concrete, reinforcing steel, welded wire reinforcement, coating, supports, anchors, chimneys, leveling rings, access openings, preparing structure in accordance with Resurfacing Compound and Epoxy Coating System EA-4 manufacturer's written instructions, monitoring and managing environmental conditions, record keeping, , coating system application, sediment removal, cleanup, and testing.
   3. Payment will be made after passing acceptance testing and written confirmation from the EA-4 coating system manufacturer that the structure is ready for sanitary sewer service.

Siphon Chamber Chimney Seal

A. Measurement: Measurement for payment for sealing the joint from corbel section across the leveling rings to the frame shall be made for each manhole.

B. Payment under this item shall include, but not be limited to, materials, equipment and labor for preparing surfaces in accordance with flexible eurethane coating system, EC-1 manufacturer's written instructions and providing the seal.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

Coating System Inspection Checklist
PROJECT NAME:
PROJECT #:

Owner		Coating System Manufacturer Technical Representative (CTR)	
General Contractor (GC)		Coating System Applicator (CSA)	
Area or Structure		Location within Structure	
Coating System		Coating Type	

Hold Point	Description	Approved By	Name	Signature	Date
1	Onsite CSA Recertification for rehabilitation methods in Specification 03900 and 09900[1]	GC QC			
		CTR QC			
		CSA QC			
		Owner QC			
2	Existing pipe openings abandoned in accordance with the Contract Drawings	GC QC			
		CSA QC			
		Owner QC			
3	Contaminated and unsound concrete and rebar removed per Specification 03900 and the Contract Drawings	GC QC			
		CSA QC			
		Owner QC			
4	Active or potential hydrostatic leaks sealed per Specification 03900	GC QC			
		CSA QC			
		Owner QC			
5	Surface pH test and SSPC profile within acceptable limits per Specification 03900	GC QC			
		CSA QC			
		Owner QC			

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

Hold Point	Description		Name	Signature	Date
6	Anchoring systems (rebar and mesh) replaced / added and coated per Specification 03900 and the Contract Drawings	GC QC			
		CSA QC			
		Owner QC			
7	Resurfacing compound applied and leveled per Specification 03900 and the Contract Drawings	GC QC			
		CSA QC			
		Owner QC			
8	Pull tests on the resurfacer meets or exceeds requirements per Specification 03900	GC QC			
		CSA QC			
		Owner QC			
9	Repair(s) for any failed pull test completed per Specification 03900	GC QC			
		CSA QC			
		Owner QC			

Notes:
The CTR is required only at the 1st manhole to be rehabilitated and the 1st siphon structure to be rehabilitated.

Coating System Post Installation Certification/Warranty

(Submit prior to Substantial Completion with Coating System Inspection Checklist)

Project Name	
Owner	
Contractor	
Agreement No.	

Applicator:		**I certify that the coating system identified below was installed in conformance with the manufacturer's recommendations at**
Company Name:		

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

Address:		**the conditions listed below.**
Telephone:		_____

This applicator is certified by _____, Coatings Manufacturer, located at

_____
(address)
and approved in the proper application of the specified coating system. The materials and workmanship for the coatings systems are warranted for a period of one (1) year from the date of Substantial Completion of the project.

_____ _____
Coating Manufacturer Authorized Representative/Title Date

Coating System: _____

(Use Separate Form for Each Coating System Applied)

Date Applied	Location	Actual Substrate Conditions			Ambient Air Conditions		Min/Max Recoat	Dry Film	
		CSP Rating	Temp. (F)	Moisture (Yes/No)	Temp. (F)	Humidity (%)	(Hrs/Hrs)	(Avg)	(Min)

Measurement and Payment:

The quantity of Epoxy coating to be paid for will be the actual number manholes lined, which has been installed and accepted. Structural rehabilitation shall be incidental to the *CIPP Lining Existing Utility Manhole*.

The quantity of Epoxy coated manholes, measured as provided above, will be paid for at the contract unit price each for "CIPP Lining Existing Utility Manhole." Such payment will be full compensation for all work covered by this special provision including but not limited to: engineering and design costs, permitting costs, submittals, pipe cleaning/preparation, CCTV

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

inspections, installation, materials, labor, equipment, odor control, bypass pumping, and materials testing and laboratory services.

Pay Item	Pay Unit
CIPP Lining Existing Utility Manhole	EA

BACKFLOW PREVENTOR ASSEMBLY

Measurement and Payment:

Installation of Backflow Preventor Assemblies including all labor and materials shall be paid for as each. Abandon Backflow Preventer Assemblies shall include all labor and materials necessary to completely remove and dispose of or return the assembly to the owner.

Pay Item	Pay Unit
6” FP Backflow Preventor Assembly	EA

Pay Item	Pay Unit
8” RPDA Backflow Prevention Assembly	EA

Pay Item	Pay Unit
Abandon Backflow Preventor	EA

THRUST RESTRAINT

Page 15-4, Sub-article 1505-3 (E) Thrust Restraint paragraph 3

Replace with the following:

Provide thrust restraint for pressurized pipelines and appurtenances. When shown in the plans, construct as specified with modifications to match the actual field conditions. Use concrete reaction backing and thrust collars where joint restraint is impractical. Where any section of a main is provided with concrete thrust restraint for fittings, controls or hydrants, perform the hydrostatic pressure test after the concrete reaches appropriate strength.

Provide thrust restraint on the existing piping system as necessary.

Sections of piping requiring restrained joints shall be constructed using pipe and fittings with restrained "Locked-type" joints manufactured by the pipe and fitting manufacturer and the joints shall be capable of holding against withdrawal for line pressures of a minimum 200 psi. Mechanical joint ductile iron pipe retainer glands shall not be permitted. Any restrained joints that allow for elongation upon pressurization will not be allowed in those locations where the pipe comes out of the ground.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

Restrained pipe joints that achieve restraint by incorporating cut out sections in the wall of the pipe shall have a minimum wall thickness at the point of cut out that corresponds with the minimum specified wall thickness for the remainder of the pipe.

The minimum number of restrained joints required for resisting forces at fittings and changes in direction of pipe shall be determined from the length of restrained pipe on each side of fittings and changes in direction necessary to develop adequate resisting friction with the soil.

The required lengths of restrained joint ductile iron pipe and PVC pipe shall be as shown on the plans and in the Restrained Joint Detail on the plans.
Wherever 2-45° bends are used in place of a 90° bend and the minimum length of restrained pipe required from one 45° bend extends beyond the other 45° bend, the 2-45° bends will be considered as though a 90° bend were located midway between the 2-45° bends.

FITTINGS FOR PVC PIPE

Page 15-5, Sub-article 1510-2 Materials

Add the following sentences:

Fittings for PVC pipe 4 inches through 16 inches shall be mechanical joint ductile iron with a minimum pressure rating of 250 psi as conforming to ANSI/AWWA Standard C110/A21.10 and A21.4.

PVC pipe shall be blue for potable water and green for sewer force main applications.
All PVC pipe shall have two strands of 12 gauge insulated copper tracer wire securely installed on top of the pipe at the 12 o'clock position. The wire shall be held in place with nylon cable ties (or equal means of attachment) at each end and on 48-inch centers along the pipe sections. The wire shall be of sufficient length to be extendable to the surface at each valve box, allowing a current to be induced through the wire to detect the location of the pipeline. The wire shall be brought to the surface inside valve boxes and terminated with a tinned wire connector.

TESTING AND STERILIZATION

Page 15-7, Sub-article 1510-3 Construction Methods (B) Testing and Steriliation

Add the following sentences:

The chlorine solution shall remain in contact with interior surfaces of the water system for a period of 24 hours. Then the water system shall be flushed with fresh water from an approved water source until the chlorine solution is dispelled to a maximum of 2.0 milligrams per liter (or ppm) free chlorine.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

GRAVITY SANITARY SEWER

Page 15-11, Sub-article 1520-3 Construction Methods (A) Gravity Sanitary Sewer
Add the following sentences:
Pipes designed at minimum slopes shall be avoided. Minimum slopes are difficult to maintain during installation and limits the ability to make necessary field changes. Pipe designed to be constructed at minimum slopes must have a letter submitted with necessary documentation showing all alternatives, substantiating the design, and must be approved by the Director of Engineering. Minimum slope is 1 percent, for dead-end lines. Otherwise, minimum slopes must conform to the following Table:

PIPE DIA. (in)	MIN. DESIGN SLOPE	MAX. DESIGN SLOPE
8	0.6%	18%
10	0.3%	16%
12	0.3%	13%
15	0.2%	9%
18	0.2%	7%
24	0.1%	5%
30+	0.1%	4%

Maximum design slope may be exceeded in certain situations where topography warrants it unavoidable. This must be approved by the Director of Engineering.

Tapping saddle connections are not allowed in new sewer design/construction.
Minimum diameter pipe for gravity sanitary sewer applications shall be 8 inches, with a minimum of 4 inches for sanitary service laterals.

Laterals 6” or larger must connect to manholes.

Sewer laterals and gravity lines less than 3 feet or over 12 feet deep must be ductile iron pipe. Sewer laterals located in the right-of-way of major roads, or as directed by the Director of Engineering, will also be ductile iron pipe. Otherwise, Schedule 40 PVC pipe can be used for sewer laterals.

EXFILTRATION

Page 15-12, Sub-article 1520-3 Construction Methods (A)(2)(b) Exfiltration

Add the following sentences:

Gravity sewer pipe shall be tested for leaks using a low-pressure air test method. Pressure loss shall not exceed 0.5 psi when pressurized to 3 psi for the required testing time. Testing time in minutes shall conform to ASTM F1417, latest revision, for PVC and DIP. Testing time for VCP shall conform to C828, latest revision. The contractor shall furnish supplies for exfiltration testing. Maximum allowable air loss is 0.5 psi when the section is pressurized to 3 psi for 5 minutes.

Docusign Envelope ID: 1F589039-59C2-4E97-AF64-CD8B95EE4C12

TRENCHLESS METHODS

Page 15-20, Sub-article 1550-4 (A) Trenchless Methods

Add the following sentences:

Steel encasement pipe shall be smooth wall pipe with welded joints. All section joints of steel casing pipe shall be full penetration welded with a continuous circumferential weld. The pipe shall have minimum yield strength of 35,000 psi in accordance with ASTM A139 and A283. The encasement pipe must be capable of withstanding highway loadings and must have an inside diameter which will allow the carrier pipe to be removed subsequently without disturbing the encasement pipe. Encasement pipe and joints shall be of leak proof construction. The inside diameter of the encasement pipe shall be at least 2 inches greater than the largest outside diameter of the carrier pipe, joints or couplings, for carrier pipe less than 6 inches in diameter; and at least 4 inches greater for carrier pipe 6 inches and larger in diameter. In general, to determine the casing size you should double the size of the carrier pipe, i.e., a 8" carrier pipe requires a 16" casing pipe. The Engineer shall verify the clearance is sufficient to allow the carrier pipe to be removed without disturbing the casing pipe.
Minimum steel casing pipe size and wall thickness shall be as indicated as follows:

Carrier Pipe (inches)	Casing Pipe (inches)	Thickness (inches) NCDOT	Railroad
6	16	.250	.281
8	20	.250	.344
12	24	.250	.375
16	30	.312	.469
18	30	.312	.469
24	36	.375	.562
30	48	.500	.750

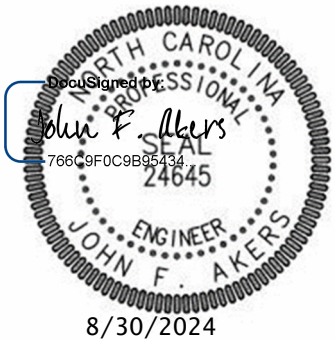
Docusign Envelope ID: 1D03BF1A-A09F-4628-A5DD-DB6BF642DB62

PROJECT SPECIAL PROVISIONS
Utility Construction – Utilities Inc.

Dewberry

Dewberry Engineers Inc.
2610 Wycliff Road, Suite 410
Raleigh, NC 27607

919.881.9939
919.881.9923 fax
www.dewberry.com



8/30/2024

Where brand names and model numbers are specified in these Special Provisions or in the plans, the cited examples are used only to denote the quality standard of product desired and do not restrict bidders to a specific brand, make, or manufacturer. They are provided to set forth the general style, type, character, and quality of the product desired. Equivalent products will be acceptable.

The utility owner is Utilities Inc (Carolina Water Service, Inc of NC). The contact person is Travis Dupree, and he can be reached by phone at 864-395-3571

The provisions contained within these Utilities Construction Project Special Provisions modify the Standard Specifications only for materials used and work performed constructing water or sewer facilities owned by is Utilities Inc (Carolina Water Service, Inc of NC).

DUCTILE IRON PIPE AND FITTINGS

Materials:

Ductile Iron Pipe shall be designed as per ANSI A21.50 for a working pressure of 200 psi, laying condition B. Pipe shall be minimum Class 50, and manufactured as per AWWA C141 in 18 ft. lengths. Pipe joints shall be of the push-on type as per AWWA C151, Paragraph 51-2.6. Pipe lining shall be cement mortar with a seal coat of bituminous material, all in accordance with AWWA C104. D.I.P. shall only be used where noted on the plans.

Water Pipe Fittings: Pipe fittings shall be compact or ductile iron mechanical joint fittings designed and manufactured as per AWWA C153 and rated at a working pressure of 350 psi.

Docusign Envelope ID: 1D03BF1A-A09F-4628-A5DD-DB6BF642DB62

Fitting shall be lined with cement mortar with a seal coat of bituminous materials, all in accordance with AWWA C104.

Reaction Blocking for all fittings of components subject to hydrostatic thrust shall be securely anchored by the use of concrete blocks poured in place. Refer to standard drawings for details. Wrap fittings in 6 mil plastic before pouring blocking concrete. Material for reaction blocking shall be 3000 psi concrete.

WATER VALVES

Materials:

Gate Valves: Gate valves greater than 2 inches shall meet all requirements of AWWA C500 (latest revision), for a working pressure of 200 psi. All shall be mechanical joint (except for use on blow-off assemblies or backflow preventers) with iron body, bronze mounting double disc parallel seat type with a non-rising stem with a double “O” ring seal, 2" square operating nut, and open-left as furnished by Mueller, American Valve and Hydrant or Clow.

Valves shall be properly located, operable and at the correct elevation. The valve box shall be centered over the wrench nut and seated on a solid concrete block without touching the valve assembly. Tracer wire to be pulled up and “looped” inside valve box. Valve locations shall be marked with a “V” in the concrete curbing.

All valve boxes shall be cast iron of the screw or telescopic type, with a 5-inch opening with “water” cast in the cover. Refer to standard detail W-5.

Blow-Off Assemblies: The assembly shall be constructed as shown on Standard Drawing W-4 for Blow-off Assemblies. The gate valves shall meet all requirements of AWWA C500 and shall have a non-rising stem, “O”-ring seals and screwed ends, 2” operating nut, and open-left as furnished by Mueller or American Valve and Hydrant. Tracer wire to be pulled up and “looped” inside valve box.

SERVICE LINE VALVES AND FITTINGS

Materials:

Refer to standard drawings W-1 and W-3 for all details regarding services.

Automatic flushing device shall have a 2” Stainless Steel MIP inlet, that will lead vertically to the bottom into a 2” automatic flushing valve. The flushing valve shall control the flow of water through the hydrant and its diaphragm with the extension and retraction of a DC latching solenoid and have a 220 PSI rating. Each unit shall be furnished with a stand-alone valve controller. Valve controller will not require a second hand-held device for programming. Controller must have minimum of 12 possible flushing cycles per day. Shall be submersible to 12 feet, operate with a 9-volt battery and have resin-seated electrical components. Solenoid shall have no loose parts when removed from valve. Removal of 2” solenoid valve shall be possible via an O-ring connector located under the valve after removal of stainless-steel access plate.

Docusign Envelope ID: 1D03BF1A-A09F-4628-A5DD-DB6BF642DB62

Valve assembly shall be contained within a UV-resistant locking cover. Install in accordance with manufacturer's instructions.

TESTING AND STERILIZATION

Page 15-6, Sub-article 1510-3 (B) Testing and Sterilization, paragraph 1
Add the following sentences:

No valve in the existing water system shall be operated without giving a minimum of 48 hours' notice to Utilities, Inc. Water mains shall be subjected to pressure and leakage tests in accordance with AWWA Standard C600 (latest revision). Hydrostatic tests for a section of line to be tested shall be slowly filled with water at a rate which will allow complete evacuation of air from the line.

The line shall be tested to a pressure of 200 psi, or 1-1/2 times the normal working pressure as measured at the lowest elevation of the line, whichever is greater, for a minimum duration of 2 hours. Test pressure is to be maintained within ±5 psi of the "start" test-pressure. The pressure gauge used in the hydrostatic test shall be calibrated in increments of 10 psi or less. At the end of the test period, the leakage shall be measured with an accurate water meter.

PROJECT SPECIAL PROVISIONS
Utilities by Others

RK&K
8601 Six Forks Rd., Forum 1 Suite 700 | Raleigh, NC 27615 | P 919.878.9560 | T 888.521.4455 | www.rkk.com

General:

The following utility companies have facilities that will be in conflict with the construction of this project:

A) Duke Energy – Power (Trans)
B) Duke Energy – Power (Dist)
C) Energy United – Power (Dist)
D) Dominion Energy (PSNC) – Natural Gas
E) Windstream Telecommunications – Telecommunications
F) BrightSpeed Telecommunications – Telecommunications
G) AT&T Communications – Telecommunications
H) TDS – Communications
I) MCI/Verizon Communications – Communications
J) SEGRA Communications – Telecommunications
K) Lumen (Level 3) Communications – Communications
L) Conterra Ultra Broadband – Communications
M) Spectrum - CATV
N) North Carolina Department of Transportation – Traffic Communications

The conflicting facilities of these concerns will be adjusted prior to the date of availability, unless otherwise noted and are therefore listed in these special provisions for the benefit of the Contractor. All utility work listed herein will be done by the utility owners. All utilities are shown on the plans from the best available information.

The Contractor's attention is directed to Article 105-8 of the *Standard Specifications*.

The project is broken down into three (3) Utility Phases as listed below:

Utility Phase I -L- Stations 425+23.31 to 595+00

Utility Phase II -L- Stations 595+00 to 700+50

Utility Phase III -L- Stations 700+50 to 799+10.00

PROJECT SPECIAL PROVISIONS
Utilities by Others

Utilities Requiring Adjustment:

Utility relocations are shown on the Utilities by Others Plans.

A) Duke Energy – Power (Trans)

1) Duke Energy (Trans) has an aerial 230KV transmission crossing at -L- 555+00 that does not meet Duke Transmission's current standard specifications for a roadway crossing within their easement. The relocation work is not in conflict with the R-2307B project. However, it will be relocated when the Department has transferred the easement they purchased for Duke Transmission back to Duke Transmission. Relocation time frame is unknown at this time.
2) Contact person for Duke Energy (Trans) is George Tambe at george.tambe@duke-energy.com and (619) 251-3419.

B) Duke Energy – Power (Dist)

1) Duke Energy (Dist) Has aerial and underground facilities throughout the project limits. They have relocated the power in Utility PH III. The power will be relocated in Utility PH II by December 2024. Utility PH I will be relocated by November of 2026.
2) Contact person for Duke Energy (Dist) is Steve Ferrell at Steve.Ferrell2@duke-energy.com and (704) 519-5235.

C) Energy United – Power

1) Energy united has aerial power in Utility PH I. They are joint use with Duke and will be relocated by November of 2026.
2) Contact person for Energy United is Nathan Teeter at nathan.teeter@energyunited.com and (704) 896-5408.

D) Dominion Energy – Natural Gas

1) Dominion Energy Natural Gas has underground distribution throughout the project limits. They will be relocated in Utility PH III by May 2025. Dominion Energy will be relocated in Utility PH I by November 2026. Dominion Energy will be relocated in Utility PH II by December 2025.
2) Contact person for Dominion Energy Natural Gas is Joe Lauffenburger at joseph.lauffenburger@dominionenergy.com and (612) 254-5324.

PROJECT SPECIAL PROVISIONS
Utilities by Others

E) Windstream Telecommunications – Telecommunications

1) Windstream Telecommunications has aerial and buried facilities throughout the project limits. Windstream will be relocated in Utility PH III by the date of availability. They will be relocated within Utility PH I by November 2026. They will be relocated within Utility PH II by December 2025.
2) Contact person for Windstream Telecommunications is Mitchell Belk at Mitchell.Belk@windstream.com and (704) 687-4978.

F) BrightSpeed Telecommunications – Telecommunications

1) BrightSpeed Telecommunications has aerial and buried facilities throughout the project limits. Keeping intact an existing bore crossing Lake Norman. They will have their facilities relocated within Utility PH III by the date of availability. Utility PH I will be relocated by November 2026. They will be relocated within Utility PH II by December 2025.
2) Contact person for CenturyLink Telecommunications is Jarvis Jones at Jarvis.jones@brightspeed.com and (828) 323-2539.

G) AT&T Telecommunications – Telecommunications

1) AT&T Communications – Telecommunications has aerial and buried facilities throughout the project limits. They will be relocated in Utility PH III by the date of availability. They will be relocated within Utility PH I by November 2026. They will be relocated within Utility PH II by December 2025.
2) Contact person for AT&T Communications is Kevin Hogsed at kh3217@att.com and (336) 584-8942.

H) TDS – Communications

1) TDS Communications has aerial and buried facilities throughout the project limits. They will have all facilities relocated by the date of availability within the project limits.
2) Contact person for TDS Communications is James (Jimbo) Melton at Jimbo.Melton@tdstelecom.com and (704) 560-8295.

I) MCI/Verizon Communications – Communications

1) MCI/Verizon Communications has buried facilities throughout the project limits. They will have their relocation work completed in Utility PH III by the date of availability. They will be relocated within utility PH I by November 2026. They will be relocated within Utility PH II by December 2025.
2) Contact person for MCI/Verizon Communications is Steven Ruiz at steven.ruiz@verizon.com and (704) 692-3142

PROJECT SPECIAL PROVISIONS
Utilities by Others

J) SEGRA (Spirit) Communications – Telecommunications

1) Spirit Communications has aerial facilities in Utility PH III. They will be relocated by the date of availability.
2) Contact person for Spirit Communications is Robert Robinson at Robert.Robinson@SEGRA.com and (803) 230-0515.

K) Lumen (Level 3) Communications – Telecommunications

1) Level 3 Communications has aerial and buried facilities within Utility PH III. They will be relocated by the date of availability.
2) Contact person for Level 3 Communications is Wanita Brenes at Wanita.Brenes@lumen.com and (910) 551-8838.

L) Conterra Ultra Broadband – Communications

1) Conterra Ultra Broadband has facilities in utility PH II they have been relocated. The are relocated for the date of availability.
2) Contact person for Conterra Ultra Broadband is Kim Brown at kbrown@conterra.com and (704) 778-5685.

M) Spectrum – CATV

1) Spectrum CATV has aerial and buried facilities throughout the project limits. They will be relocated in Utility PH III by the date of availability. They will be relocated within Utility PH I by November 2026. They will be relocated within Utility PH II by December 2025.
2) Contact Person for Spectrum CATV is Eric Brotzman at Eric.Brotzman@charter.com and (704) 914-6551.

N) NCDOT - Traffic Fiber

1) NCDOT -Traffic Fiber has aerial and buried facilities within utility PH II and III. They will be relocated under construction.
2) Contact Person for NCDOT Traffic Fiber is Nick Zinser at rnzinsder@ncdot.gov and (919) 814-4926.

Docusign Envelope ID: C3CD6692-8D4B-4A66-B5B6-EBDE3355C61F

FILTRATION BASIN MEDIA:

Description

Furnish and place Filtration Basin Media (FBM) with no organic material, clay, loam, dust and similar adherent materials as shown in the plans and as directed.

Materials

Filtration basin media shall consist of the following blend:

Recycled Expanded Slate Fines	80%
Approved Compost Organic Component	20%

The slate aggregate fines and organic component consist of the following:

Recycled Expanded Slate Fines

The recycled expanded slate aggregate fines shall conform to the following screening operation:

Sieve Size	% Retained
#4	4-8%
#8	28-38%
#16	46-58%
#30	63-75%
#50	74-84%
#100	82-90%
Fine Material	2.79-3.53% passing #100

Organic Component

The compost or organic component shall conform to the following specifications:

1. Humus material shall have an ash content of no less than 8 percent and no more than 40 percent.
2. The pH of the organic matter shall be between 5.5 and 8.5.
3. The salt content shall be less than 10 millimho/cm at 25 degrees C, (Ec_e<10 dS/m) on a saturated paste extract.
4. Types of acceptable composted products can be derived from yard wastes, low in salts, low in phosphorus (P205 below 1% wet weight basis), free from weed seeds, free of pathogens and other deleterious materials.
5. Composted pine bark products are conditionally acceptable (stable humus must be present).
6. Sludge-based materials are not acceptable including municipal sewage sludge bio-solids.
7. The organic amendment must have a Carbon/Nitrogen ratio of <25:1.
8. The compost shall be aerobic without malodorous presence of decomposition products.

Docusign Envelope ID: C3CD6692-8D4B-4A66-B5B6-EBDE3355C61F

9. From 75 to 100 percent organic amendment particles shall pass the 4.0 mm sieve size.
10. From 45 to 65 percent moisture measured via wet-weight basis.
11. Free of stones, debris, plant material.
12. Organic content must be above 50% on a dry weight basis.
13. Metals and contaminants must meet or exceed US EPA Standard 40.

Mixing

The FBM components shall be thoroughly mechanically mixed at 1 part compost with 4 parts of expanded slate fines until a uniform distribution of the components is achieved. The process for mixing shall be submitted in writing to the Engineer prior to mixing. An on-site inspection of the mixing procedure may be required prior to approval of the mixing process. No samples shall be prepared prior to receiving approval of the mixing process.

Testing

The Contractor will be responsible for ensuring that the FBM meets the material requirements presented herein. Prior to placement of the FBM, the Contractor will submit a report demonstrating that the FBM meets the material requirements. Random samples may be taken by the Engineer in order to test for mix uniformity and to verify that it remains within the specified ranges for the physical properties. The FBM shall not be placed until approved by the Engineer.

Stockpiling

If the FBM is to be stockpiled, the location chosen for stockpiling shall be reasonably free of weed seed, vegetation, toxic substances, or any other material which would be harmful to plant growth. Prior to stockpiling, the Engineer shall approve the stockpile location.

Construction Methods

The filtration facility shall not be constructed until all contributing drainage areas are stabilized as shown on the plans and to the satisfaction of the Engineer. No heavy equipment shall operate within the perimeter of a filtration facility during excavation, underdrain placement, backfilling, planting, or mulching of the facility.

Excavation

The filtration facility shall be excavated to the dimensions, side slopes, and elevations shown on the plans. The method of excavation shall minimize the compaction of the bottom of the filtration facility (the ‘rake’ method of working the bucket should be used). Prior to placing the underdrain and the FBM, the bottom of the excavation shall be tilled to a minimum depth of 12 inches to alleviate any compaction of the facility bottom.

Docusign Envelope ID: C3CD6692-8D4B-4A66-B5B6-EBDE3355C61F

Placement and Compaction of the Engineered Soil Media

The FBM shall be placed and graded using low ground-contact pressure equipment or by excavators and/or backhoes operating on the ground adjacent to the filtration facility. The FBM shall be placed in horizontal layers not to exceed 12 inches for the entire area of the filtration facility. The FBM shall be compacted by saturating the entire area of the filtration facility after each lift of FBM is placed until water flows from the underdrain. Water for saturation shall be applied by spraying or sprinkling. Saturation of each lift shall be performed in the presence of the Engineer. An appropriate sediment control device shall be used to treat any sediment-laden water discharged from the underdrain. If the FBM becomes contaminated during the construction of the facility, the contaminated material shall be removed and replaced with uncontaminated material. Final grading of the FBM shall be performed after a 24-hour settling period. Final elevation shall be within 1 inch of the elevation shown on the plans.

Measurement and Payment

Filtration Basin Media will be measured and paid for as the actual number of cubic yards of FBM that has been installed and accepted. Such prices and payments will be full compensation for furnishing, placing, amending, all labor, equipment, herbicide treatments and all incidentals necessary to complete the work satisfactorily.

Payment will be made under:

Pay Item	**Pay Unit**
Filtration Basin Media	Cubic Yard

PERFORATED HDPE PIPE:

Description

Furnish and install perforated HDPE pipe per the drawings. All elbows, tees, wyes, caps, water tight gaskets, couplers, or other fittings and filter sock are incidental to the installation of the pipe.

Materials

Refer to Division 10.

Perforations shall conform to the following requirements unless otherwise specified by an approved manufacturer:

Docusign Envelope ID: C3CD6692-8D4B-4A66-B5B6-EBDE3355C61F

Circular perforations shall be 1/4 ± 1/16-inch diameter holes arranged in rows parallel to the axis of the pipe. Perforations shall be evenly spaced along each row such that the center-to-center distance between perforations is not less than eight times the perforation diameter. Perforations may appear at the ends of short and random lengths. The minimum perforation opening per foot of pipe shall be as shown in the table below.

Nominal Pipe Size (in)	Minimum Number of Rows	Minimum Opening/Foot (sq. in.)
4	2	0.22
6	4	0.44
8	4	0.44
10	4	0.44
12	6	0.66

Rows shall be arranged in two equal groups at equal distance from the bottom on each side of the vertical centerline of the pipe. The lowermost rows of perforations shall be separated by an arc of not less than 60 degrees or more than 125 degrees. The uppermost rows of perforations shall be separated by an arc not to exceed 166 degrees. The spacing of rows between these limits shall be uniform. The minimum number of rows shall be as shown in the above table.

On both the inside and outside of the pipe, perforations shall be free of cuttings or frayed edges and of any material that would reduce the effective opening.

Installation

Installation shall be in accordance with ASTM D2321 (or approved manufacturer) published installation guidelines with the exception that minimum cover in trafficked areas for 4- through 48-inch diameters shall be one foot and for 60-inch diameters shall be 2 ft in single run applications.

Measurement and Payment

Perforated HDPE Pipe will be measured and paid for as the actual number of linear feet of pipe that has been incorporated into the completed and accepted work. Payment will be full compensation for all materials, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
Perforated HDPE Pipe	Linear Foot

Docusign Envelope ID: C3CD6692-8D4B-4A66-B5B6-EBDE3355C61F

POLYPROPYLENE NONWOVEN GEOTEXTILE FABRIC:

Description

This work consists of furnishing and placing polypropylene nonwoven geotextile fabric of the type specified, over previously prepared areas as directed.

Materials

The product shall be a nonwoven polypropylene geotextile and will meet the following Minimum Average Roll Values (MARV) when tested in accordance with the methods listed below. The mat shall have the following physical properties:

Property	Test Method	Value	Unit
Tensile Strength (Grab)	ASTM D4632	120	lbs
Elongation	ASTM D4632	≥50	%
CBR Puncture	ASTM D6241	300	lbs
Trapezoidal Tear	ASTM D4533	40	lbs
UV Resistance	ASTM D4355	50	%
Apparent Opening Size (AOS)	ASTM D4751	60	US Std. Sieve
Permittivity	ASTM D4491	1.10	sec^{-1}
Water Flow Rate	ASTM D4491	110	gpm/ft^2

Provide Type 1, Type 2 or Type 4 material certification in accordance with Article 106-3 for geosythetics.

Construction Methods

(A) Preparation

Prepare surfaces on which polypropylene nonwoven geotextile fabric is to be placed to smooth condition as indicated or as directed by the Engineer. Remove debris, depressions, and obstructions that could damage the polypropylene nonwoven geotextile fabric.

(B) Installation

Polypropylene nonwoven geotextile fabric shall be installed at the proper elevation and alignment as shown on the Drawings or as directed by the Engineer.

Successive sheets of polypropylene nonwoven geotextile fabric shall be overlapped a minimum of 12 inches, with the upstream sheet overlapping the downstream sheet. All seams shall be subject to the approval of the Engineer. Should the polypropylene nonwoven geotextile fabric be damaged during installation or engineered soil placement, a geotextile patch shall be placed over the damaged area extending beyond the damaged

Docusign Envelope ID: C3CD6692-8D4B-4A66-B5B6-EBDE3355C61F

area a minimum distance of 12 inches, or the specified seam overlap, whichever is greater.

Placement of engineered soil, as applicable, should proceed immediately following placement of the polypropylene nonwoven geotextile fabric. The polypropylene nonwoven geotextile fabric should be covered with a minimum of 12 inches of loosely placed engineered soil. Select construction equipment that will prevent excess rutting.

On side slopes, anchor polypropylene nonwoven geotextile fabric at top, then unroll. Keep polypropylene nonwoven geotextile fabric free of wrinkles and folds.

Cut polypropylene nonwoven geotextile fabric using upward cutting hook blade.

Use sandbags or other weights to prevent wind displacement.

(C) Protection

Atmospheric exposure of the polypropylene nonwoven geotextile fabric to the elements following lay down shall be limited to 14 days to prevent damage.

Vehicles and construction equipment shall not be operated directly over installed polypropylene nonwoven geotextile fabric without approval of the Engineer.

Measurement and Payment

Polypropylene Nonwoven Geotextile Fabric will be measured and paid in square yards. Geotextiles will be measured along the ground surface as the square yards of exposed geotextiles before placing backfill material. No measurement will be made for overlapping geotextiles or sewing seams. The contract unit price for *Polypropylene Nonwoven Geotextile Fabric* will be full compensation for providing, transporting and placing geotextiles, wire staples and anchor pins, overlaps and sewing geotextiles, and for all required maintenance.

Payment will be made under:

Pay Item	Pay Unit
Polypropylene Nonwoven Geotextile Fabric	Square Yard

Signed by:
David B. Petty
400EFF4863B6465...
8/28/2024 | 1:43 PM PDT

Docusign Envelope ID: 39B26DE1-3488-44CE-A42E-4B4093710ED4

CONCRETE FILL IN RISER:

Description

Provide concrete fill in outlet control (riser) structure in accordance with the details in the plans. Use materials meeting the requirements of Section 1000 of the *2024 Standard Specifications*.

Measurement and Payment

Work completed and accepted will be paid at the contract price for *Concrete Fill in Riser*. Such price and payment will be full compensation for all materials, labor, equipment, tools, and any other incidentals necessary to complete the work satisfactorily.

Payment will be made under:

Pay Item	Pay Unit
Concrete Fill in Riser	CY

WASHED NO. 57 STONE:

Description

Furnish and place washed no. 57 stone as shown in the plans and as directed. Stone shall be thoroughly washed with clear water and permitted to dry prior to placement. The washed stone shall be free of clay, loam, dust, similar adherent materials nor organic materials unless otherwise permitted by the Engineer in writing.

Materials

Refer to Division 10

Item	Section
Washed course aggregate (Std. Size No. 57) as indicated on the plans	1005 & 1014-2

Measurement and Payment

Washed No. 57 Stone will be measured and paid in tons of stone that has been incorporated into the completed and accepted work. Work includes but is not limited to furnishing, hauling, placing and all incidentals necessary to satisfactorily complete the work.

Docusign Envelope ID: 39B26DE1-3488-44CE-A42E-4B4093710ED4

Project: R-2307B

MR-8

Counties: Catawba/Iredell

Payment will be made under:

Pay Item	**Pay Unit**
Washed No. 57 Stone	Tons

8/29/2024

Project Special Provisions
Erosion Control

STABILIZATION REQUIREMENTS:

(4-30-2019)

Stabilization for this project shall comply with the time frame guidelines as specified by the NCG-010000 general construction permit effective April 1, 2024 issued by the North Carolina Department of Environmental Quality Division of Water Resources. Temporary or permanent ground cover stabilization shall occur within 7 calendar days from the last land-disturbing activity, with the following exceptions in which temporary or permanent ground cover shall be provided in 14 calendar days from the last land-disturbing activity:

- Slopes between 2:1 and 3:1, with a slope length of 10 ft. or less
- Slopes 3:1 or flatter, with a slope of length of 50 ft. or less
- Slopes 4:1 or flatter

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	Justice	Serengeti
2nd Millennium	Essential	Kalahari	Shelby
3rd Millennium	Evergreen 2	Kitty Hawk 2000	Sheridan
Apache III	Falcon IV	Legitimate	Signia
Avenger	Falcon NG	Lexington	Silver Hawk
Barlexas	Falcon V	LSD	Sliverstar
Barlexas II	Faith	Magellan	Shenandoah Elite
Bar Fa	Fat Cat	Matador	Sidewinder
Barrera	Festnova	Millennium SRP	Skyline
Barrington	Fidelity	Monet	Solara
Barrobusto	Finelawn Elite	Mustang 4	Southern Choice II
Barvado	Finelawn Xpress	Ninja 2	Speedway
Biltmore	Finesse II	Ol' Glory	Spyder LS
Bingo	Firebird	Olympic Gold	Sunset Gold
Bizem	Firecracker LS	Padre	Taccoa
Blackwatch	Firenza	Patagonia	Tanzania
Blade Runner II	Five Point	Pedigree	Trio
Bonsai	Focus	Picasso	Tahoe II
Braveheart	Forte	Piedmont	Talladega
Bravo	Garrison	Plantation	Tarheel
Bullseye	Gazelle II	Proseeds 5301	Terrano
Cannavaro	Gold Medallion	Prospect	Titan ltd
Catalyst	Grande 3	Pure Gold	Titanium LS
Cayenne	Greenbrooks	Quest	Tracer
Cessane Rz	Greenkeeper	Raptor II	Traverse SRP
Chipper	Gremlin	Rebel Exeda	Tulsa Time
Cochise IV	Greystone	Rebel Sentry	Turbo
Constitution	Guardian 21	Rebel IV	Turbo RZ
Corgi	Guardian 41	Regiment II	Tuxedo RZ
Corona	Hemi	Regenerate	Ultimate
Coyote	Honky Tonk	Rendition	Venture
Darlington	Hot Rod	Rhambler 2 SRP	Umbrella
Davinci	Hunter	Rembrandt	Van Gogh
Desire	Inferno	Reunion	Watchdog
Dominion	Innovator	Riverside	Wolfpack II
Dynamic	Integrity	RNP	Xtremegreen
Dynasty	Jaguar 3	Rocket	
Endeavor	Jamboree	Scorpion	

Approved Kentucky Bluegrass Cultivars:

4-Season	Blue Velvet	Gladstone	Quantum Leap
Alexa II	Blueberry	Granite	Rambo
America	Boomerang	Hampton	Rhapsody
Apollo	Brilliant	Harmonie	Rhythm

Arcadia	Cabernet	Impact	Rita
Aries	Champagne	Jefferson	Royce
Armada	Champlain	Juliet	Rubicon
Arrow	Chicago II	Jump Start	Rugby II
Arrowhead	Corsair	Keeneland	Shiraz
Aura	Courtyard	Langara	Showcase
Avid	Delight	Liberator	Skye
Award	Diva	Madison	Solar Eclipse
Awesome	Dynamo	Mercury	Sonoma
Bandera	Eagleton	Midnight	Sorbonne
Barduke	Emblem	Midnight II	Starburst
Barnique	Empire	Moon Shadow	Sudden Impact
Baroness	Envicta	Moonlight SLT	Total Eclipse
Barrister	Everest	Mystere	Touche
Barvette HGT	Everglade	Nu Destiny	Tsunami
Bedazzled	Excursion	NuChicago	Unique
Belissimo	Freedom II	NuGlade	Valor
Bewitched	Freedom III	Odyssey	Voyager II
Beyond	Front Page	Perfection	Washington
Blacksburg II	Futurity	Pinot	Zinfandel
Blackstone	Gaelic	Princeton 105	
Blue Note	Ginney II	Prosperity	

Approved Hard Fescue Cultivars:

Aurora II	Eureka II	Oxford	Scaldis II
Aurora Gold	Firefly	Reliant II	Spartan II
Berkshire	Granite	Reliant IV	Stonehenge
Bighorn GT	Heron	Rescue 911	
Chariot	Nordic	Rhino	

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.

LAWN TYPE APPEARANCE:

All areas adjacent to lawns must be hand finished as directed to give a lawn type appearance. Remove all trash, debris, and stones ¾" and larger in diameter or other obstructions that could interfere with providing a smooth lawn type appearance. These areas shall be reseeded to match their original vegetative conditions, unless directed otherwise by the Field Operations Engineer.

REFORESTATION:

Description

Reforestation will be planted within interchanges and along the outside borders of the road, and in other areas as directed. *Reforestation* is not shown on the plan sheets. See the Reforestation Detail Sheet.

All non-maintained riparian buffers impacted by the placement of temporary fill or clearing activities shall be restored to the preconstruction contours and revegetated with native woody species.

The entire *Reforestation* operation shall comply with the requirements of Section 1670 of the *Standard Specifications*.

Materials

Reforestation shall be bare root seedlings 12"-18" tall.

Construction Methods

Reforestation shall be planted as soon as practical following permanent S*eeding and Mulching*. The seedlings shall be planted in a 16-foot wide swath adjacent to mowing pattern line, or as directed.

Root dip: The roots of reforestation seedlings shall be coated with a slurry of water, and either a fine clay (kaolin) or a superabsorbent that is designated as a bare root dip. The type, mixture ratio, method of application, and the time of application shall be submitted to the Engineer for approval.

With the approval of the Engineer, seedlings may be coated before delivery to the job or at the time of planting, but at no time shall the roots of the seedlings be allowed to dry out. The roots shall be moistened immediately prior to planting.

Seasonal Limitations: *Reforestation* shall be planted from November 15 through March 15.

Measurement and Payment

Reforestation will be measured and paid for in accordance with Article 1670-17 of the *Standard Specifications*.

303(d) IMPAIRED WATERS LIST:

The Catawba River which has been identified on the 303(d) list of impaired waters as impaired for sedimentation and/or turbidity, is within one mile of the project and receives drainage from the project. The Contractor shall adhere to all conditions and/or regulations required for impacts to these waters.

HIGH QUALITY WATERS:

Description

The Catawba River has been identified as high quality waters. This designation requires special procedures to be used for clearing and grubbing, temporary stream crossings, and grading operations within the High Quality Water Zone and as designated by the Engineer. The High Quality Water Zones are identified on the plans as Environmentally Sensitive Areas. This also requires special procedures to be used for seeding and mulching and staged seeding.

The High Quality Water Zone/Environmentally Sensitive Area shall be defined as a 50- foot buffer zone on both sides of the stream measured from top of streambank.

Construction Methods

Clearing and Grubbing

In areas identified as High Quality Water Zones/Environmentally Sensitive Areas, the Contractor may perform clearing operations, but not grubbing operations until immediately prior to beginning grading operations as described in Article 200-1 of the *Standard Specifications*. Only clearing operations (not grubbing) shall be allowed in this buffer zone until immediately prior to beginning grading operations. Erosion control devices shall be installed immediately following the clearing operation.

Grading

Once grading operations begin in identified High Quality Water Zones/ Environmentally Sensitive Areas, work shall progress in a continuous manner until complete. All construction within these areas shall progress in a continuous manner such that each phase is complete and areas are permanently stabilized prior to beginning of next phase. Failure on the part of the Contractor to complete any phase of construction in a continuous manner in High Quality Water Zones/ Environmentally Sensitive Areas will be just cause for the Engineer to direct the suspension of work in accordance with Article 108-7 of the *Standard Specifications*.

Temporary Stream Crossings

Any crossing of streams within the limits of this project shall be accomplished in accordance with the requirements of Subarticle 107-13(B) of the *Standard Specifications*.

Seeding and Mulching

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.

Seeding and mulching shall be performed on the areas disturbed by construction immediately following final grade establishment. No appreciable time shall lapse into the contract time without stabilization of slopes, ditches and other areas within the High Quality Water Zones/Environmentally Sensitive Areas.

Stage Seeding

The work covered by this section shall consist of the establishment of a vegetative cover on cut and fill slopes as grading progresses. Seeding and mulching shall be done in stages on cut and fill slopes that are greater than 20 feet in height measured along the slope, or greater than 2 acres in area. Each stage shall not exceed the limits stated above.

Additional payments will not be made for the requirements of this section, as the cost for this work shall be included in the contract unit prices for the work involved.

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 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

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.

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.

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. 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.

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	≥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	≥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

STORMWATER BASIN EROSION CONTROL:
(8-16-23)

Description

Provide a skimmer to remove sediment from construction site runoff in permanent stormwater basins at locations shown in the erosion control plans. Work includes constructing basin, installation of coir fiber baffles, furnishing, installation and cleanout of skimmer, providing and placing stone pad on bottom of basin underneath skimmer device, stabilizing side slopes of basin with matting and seed, disposing of excess materials, removing coir fiber baffles, and skimmer device.

Materials

Item	Section
Seeding and Mulching	1060-4
Matting for Erosion Control	1060-8
Staples	1060-8
Coir Fiber Baffle	1640

Provide appropriately sized and approved skimmer device.

Provide Schedule 40 PVC pipe with a length of 6 ft. to attach to the skimmer and the coupling connection to serve as the arm pipe. For skimmer sizes of 2.5 in. and smaller, the arm pipe diameter shall be 1.5 inches. For skimmer sizes of 3 in. and larger, refer to manufacturer recommendation.

Provide 4" diameter Schedule 40 PVC pipe to attach to coupling connection of skimmer to serve as the barrel pipe through the earthen dam.

Construction Methods

Construct permanent stormwater basin according to the plans with basin surface free of obstructions, debris, and pockets of low-density material. Construct the coir fiber baffles according to *Roadway Standard Drawings* No. 1640.01 and Section 1640 of the *Standard Specifications*.

Install skimmer device according to manufacturer recommendations. Install the coupling connection provided with the skimmer 1 ft. from the bottom of the basin and attach to permanent stormwater drainage structure. Attach the 6 ft. arm pipe to the coupling connection and skimmer according to manufacturer recommendations. The coupling shall be rigid and non-buoyant and not exceed a diameter of 4" and 12" in length. Attach the rope included with the skimmer to the tee between the vent socket and the tube inlet, and the other end to a wooden stake or metal post. Clean out skimmer device when it becomes clogged with sediment and/or debris and is unable to float at the top of water in basin. Take appropriate measures to avoid ice accumulation in the skimmer device. Construct a stone pad of Class B stone directly underneath the skimmer device at bottom of basin. The pad shall be a minimum of 12" in height, and shall have a minimum cross sectional area of 4 ft. by 4 ft.

All bare side slope sections of the stormwater basin shall be seeded with a permanent seed mix as directed and in accordance with Articles 1660-4, 1660-5 and 1660-7 of the *Standard Specifications*. Straw or excelsior matting shall be installed on all bare side slope sections immediately upon the completion of seeding and in accordance with Article 1631-3 of the *Standard Specifications*.

Measurement and Payment

Silt Excavation will be measured and paid for in accordance with Article 1630-4 of the *Standard Specifications*, as calculated from the typical section throughout the length of the basin as shown on the final approved plans.

Coir Fiber Baffles will be measured and paid for in Accordance with Article 1640-4 of the *Standard Specifications*.

__" *Skimmer* will be measured and paid for in Accordance with Article 1644-5 of the *Standard Specifications*.

Stone for Erosion Control, Class __ will be measured and paid for in accordance with Article 1610-4 of the *Standard Specifications*.

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

Matting for Erosion Control will be measured and paid for in accordance with Article 1631-4 of the *Standard Specifications*.

No measurement will be made for other items or for over excavation or stockpiling.

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

PUMP AROUND OPERATION:

Description

The work covered by this section consists of furnishing, installing, maintaining and removing any and

all pump around systems used on this project. The Contractor shall install a pump around system in locations as shown in the plans and in other locations approved by the Engineer. The pump around system shall provide a passageway for the stream flow around the work site.

The quantity of pump around systems 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. See NCDOT *Best Management Practices for Construction and Maintenance Activities* manual for example pump around operation.

Materials

Item	**Section**
Special Stilling Basin	1639

Impervious Dike shall meet the specifications as provided elsewhere in this contract.

Pumps shall be of sufficient size to divert the stream flow around the work area, as approved by the Engineer.

Construction Methods

Install *impervious dike(s)* as shown on the plans or as directed. Pump water around the work site. If the water is turbid or exposed to bare soil, pump through a *special stilling basin*. Once the work is complete in an area remove the *impervious dike(s)* and pump system and stabilize the area.

Measurement and Payment

Impervious Dike will be measured and paid for as provided elsewhere in this contract.

Special Stilling Basin will be measured and paid for in accordance with Article 1639-4 of the *Standard Specifications*.

Payment for pumping operations shall be considered incidental to the work of installing pipes and culverts. The pumping operations shall include but not be limited to, diverting the stream flow around the work area and pumping runoff from the work area into a stilling basin, special stilling basin or other sediment control device. No additional payment will be made for furnishing materials or maintenance of the pumping operations for the installation of pipes and culverts.

The above prices and payments will be full compensation for all work covered by this section including, but not limited to furnishing all of the necessary materials, construction, maintenance and removal of the impervious dike and pump around system.

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 strength	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 STRUCTURE:
(8-17-23)

Description

Concrete washout structures are enclosures above or below grade to contain concrete waste water and associated concrete mix from washing out ready-mix trucks, drums, pumps, 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 wash out operations.

The concrete washout structure may include constructed devices above or below ground and or commercially available devices designed specifically to capture concrete wash water.

Materials

Item	Section
Temporary Silt Fence	1605

Safety Fence shall meet the specifications as provided elsewhere in this contract.

Geomembrane basin liner shall meet the following minimum physical properties for low permeability; it shall consist of a polypropylene or polyethylene 10 mil think geomembrane. If the minimum setback dimensions can be achieved the liner is not required. (5 feet above groundwater, 50 feet from top of bank of perennial stream, other surface water body, or wetland.)

Construction Methods

Build an enclosed earthen berm or excavate to form an enclosure in accordance with the details and as directed.

Install temporary silt fence around the perimeter of the enclosure in accordance with the details and as directed if structure is not located in an area where existing erosion and sedimentation control devices are capable to containing any loss of sediment.

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 for visibility to construction traffic.

Alternate details for accommodating concrete washout may be submitted for review and approval.

The alternate details shall include the method used to retain and dispose of the concrete waste water within the project limits and in accordance with the minimum setback requirements. (5 feet above groundwater, 50 feet from top of bank of perennial stream, other surface water body, or wetland.)

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 and maintain for effectiveness.

Remove the concrete washout structures and sign upon project completion. Grade the earth material to match the existing contours and permanently seed and mulch area.

Measurement and Payment

Concrete Washout Structure will be paid for per each enclosure installed in accordance with the details. If alternate details or commercially available devices are approved, then those devices will also be paid for per each approved and installed device.

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 other items or for over excavation or stockpiling.

Payment will be made under:

Pay Item	Pay Unit
Concrete Washout Structure	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 by the Engineer. 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 by the Engineer. 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

FABRIC INSERT INLET PROTECTION

(1-1-24)

Description

Install, maintain, and remove Fabric Insert Inlet Protection, of the type specified, in inlet structures (catch basins, drop inlets, etc.) in areas where asphalt or concrete may prevent the proper installation of a Rock Inlet Sediment Traps Type C, or as directed by the Engineer.

Materials

Provide a fabric inlet protection device composed of a fitted woven polypropylene geotextile double sewn with nylon thread suspended sack. The Fabric Insert Inlet Protection shall be manufactured to fit the opening of the catch basin or drop inlet or shall have a deflector to direct runoff from the curb opening into the fabric sack. The Fabric Insert Inlet Protection shall have a rigid frame or support system to support the loaded weight of the product. The product shall have lifting loops for removing the device from the basin and will have dump straps attached at the bottom to facilitate the emptying of the device. The Fabric Insert Inlet Protection shall have an overflow system to allow stormwater to enter the inlet structure and avoid ponding on the roadway when the device reaches capacity.

The fitted filter assembly shall have the following physical properties:

Type 1 (High Flow):

Physical	Test Method	English
Grab Tensile	ASTM D-4632	255 x 275 lbs
Minimum Puncture Strength	ASTM D-4833	125 lbs
Mullen Burst	ASTM D-3786	420 PSI
Minimum UV Resistance	ASTM D-4355	70 %.
Flow Rate	ASTM D-4491	200 gal/min/ft^2
Apparent Opening	ASTM D-4751	20 US Sieve
Permittivity	ASTM D-4491	1.5 sec^{-1}

Type 2 (Low Flow):

Physical	Test Method	English
Grab Tensile	ASTM D-4632	315 x 300 lbs
Grab Elongation	ASTM D-4632	15 x 15 %
Minimum Puncture Strength	ASTM D-4833	125 lbs
Mullen Burst	ASTM D-3786	650 PSI
Minimum UV Resistance	ASTM D-4355	70 %.
Flow Rate	ASTM D-4491	40 gal/min/ft^2
Apparent Opening	ASTM D-4751	40 US Sieve
Permittivity	ASTM D-4491	0.55 sec^{-1}

Construction Methods

Strictly adhere to the manufacturer's installation instructions and recommendations. Maintenance shall include regular daily inspections and after each qualifying rain event. The Fabric Insert Inlet Protection shall be emptied, cleaned and placed back into the basin when it reaches 50% capacity or as directed by the Engineer.

Measurement and Payment

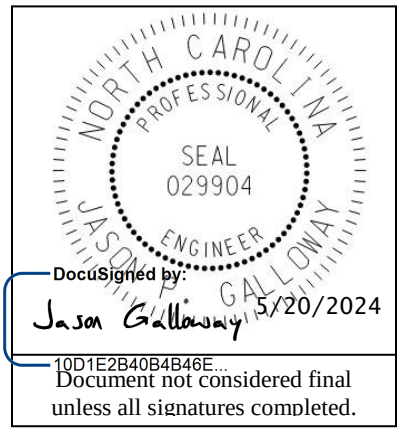
Fabric Insert Inlet Protection, Type __ will be measured and paid in units of each of the type specified, complete in place and accepted. Such payment shall be full compensation for furnishing and installing the *Fabric Insert Inlet Protection, Type* __ in accordance with this specification and for all required maintenance.

Fabric Insert Inlet Protection Cleanout will be measured and paid in units of each for the maintenance of the device, cleanout and disposal of accumulated sediments.

Payment will be made under:

Pay Item	Pay Unit
Fabric Insert Inlet Protection, Type __	Each
Fabric Insert Inlet Protection Cleanout	Each

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A



Signals and Intelligent Transportation Systems
Project Special Provisions
(Version 24.1)

Prepared By: JPG
20-May-24

Contents

1. 2024 STANDARD SPECIFICATIONS FOR ROADS & STRUCTURES 4
1.1. ELECTRICAL JUNCTION BOXES (1091-5) 4
1.2. TRAFFIC SIGNAL ACTIVATION (1700-4) 4
2. SIGNAL HEADS 4
2.1. MATERIALS 4
A. General: 4
B. Vehicle Signal Heads: 6
C. Pedestrian Signal Heads: 9
D. Louvers: 11
3. CONTROLLERS WITH CABINETS 11
3.1. MATERIALS – TYPE 2070LX CONTROLLERS 11
3.2. MATERIALS – GENERAL CABINETS 12
3.3. MATERIALS – TYPE 170E CABINETS 12
A. Type 170 E Cabinets General: 12
B. Type 170 E Cabinet Electrical Requirements: 13
C. Type 170 E Cabinet Physical Requirements: 19
D. Model 2018 Enhanced Conflict Monitor: 22
E. Preemption and Sign Control Box 32
3.4. MATERIALS – TYPE 170 DETECTOR SENSOR UNITS 35
4. VIDEO IMAGING LOOP EMULATOR DETECTOR SYSTEMS FOR TEMP. INSTALLATION 35
4.1. DESCRIPTION 35
4.2. MATERIALS 35
A. General: 35
B. Loop Emulator System: 36
C. Video Imaging Loop Emulator System Support: 38
4.3. CONSTRUCTION METHODS 38
4.4. MEASUREMENT AND PAYMENT 39
5. MICROWAVE VEHICLE DETECTION SYSTEM - MULTIPLE DETECTION ZONES 39
5.1. DESCRIPTION 39
5.2. MATERIALS 39
5.3. CONSTRUCTION METHODS 40
5.4. MEASUREMENT AND PAYMENT 40
6. METAL POLE SUPPORTS 41
6.1. METAL POLES 41
A. General: 41
B. Materials: 42
C. Design: 44
D. Strain Poles: 46

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

E. Mast Arm Poles: 47
6.2. DRILLED PIER FOUNDATIONS FOR METAL POLES 48
A. Description: 49
B. Soil Test and Foundation Determination: 49
C. Drilled Pier Construction: 51
6.3. POLE NUMBERING SYSTEM 51
A. New Poles 51
6.4. MEASUREMENT AND PAYMENT 51

7. ETHERNET EDGE SWITCH 52

7.1. DESCRIPTION 52
A. Ethernet Edge Switch: 52
B. Network Management: 52
7.2. MATERIALS 52
A. General: 52
B. Compatibility Acceptance 53
C. Standards: 53
D. Functional: 53
E. Physical Features: 54
F. Management Capabilities: 55
G. Electrical Specifications: 56
H. Environmental Specifications: 56
I. Ethernet Patch Cable: 56
7.3. CONSTRUCTION METHODS 57
A. General: 57
B. Edge Switch: 57
7.4. MEASURMENT AND PAYMENT 57

8. DIGITAL CCTV CAMERA ASSEMBLY 58

8.1. DESCRIPTION 58
8.2. MATERIALS 58
A. General 58
B. Camera and Lens 58
C. Camera Housing 59
D. Pan and Tilt Unit 60
E. Video Ethernet Encoder 60
F. Control Receiver/Driver 60
G. Electrical 61
H. CCTV Camera Attachment to Pole 61
I. Riser 61
J. Data line Surge Suppression 61
K. POE Injector 62
8.3. CONSTRUCTION METHODS 62
A. General 62
B. Electrical and Mechanical Requirements 63
C. General Test Procedure 63
A. Compatibility Tests 63
B. Operational Field Test (On-Site Commissioning) 64
C. Local Field Testing 64
D. Central Operations Testing 65
8.4. MEASUREMENT AND PAYMENT 65

9. OBSERVATION PERIOD FOR ITS DEVICES 65

9.1. 30-DAY OBSERVATION PERIOD 65
9.2. FINAL ACCEPTANCE 66
9.3. MEASUREMENT AND PAYMENT 66

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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. Fabricate 12-inch and 16-inch pedestrian signal head housings and end caps from die-cast aluminum. Fabricate 9-inch pedestrian signal head housings, end caps, and visors from virgin polycarbonate material. 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.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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,

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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
   - Pedestrian Traffic Control Signal Indications –Light Emitting Diode (LED) Signal Modules.

   (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 8 inches in length for 8-inch vehicle signal head sections. 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.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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, and 8-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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

8-inch red circular	13	8
12-inch green circular	15	15
8-inch green circular	12	12

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 and 13 Watts or less for the 8-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.

3. LED U-Turn Arrow Signal Modules:

Provide modules in the following configurations: 12-inch left u-turn arrow signal modules and 12-inch right u-turn arrow signal modules.

Modules are not required to be listed on the ITS and Signals Qualified Products List. 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 have minimum maintained luminous intensity values that are not less than 16% of the values calculated using the method described in section 4.1 of the VTCSH Circular Supplement.

Provide modules that meet the following requirements when tested under the procedures outlined in the VTCSH Circular Supplement:

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

Module Type	Max. Wattage at 165° F	Nominal Wattage at 77° F
12-inch red u-turn arrow	17	11
12-inch green u-turn arrow	15	15

For yellow u-turn arrow signal modules, provide modules tested under the procedures outlined in the VTCSH Circular Supplement to ensure power required at 77° F is 22 Watts or less.

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.

4. LED Bi-Modal Green-Yellow Arrow Signal Modules

Provide 12-inch omnidirectional bi-modal arrow signal modules. Ensure both green and yellow arrow indications are in each module with a clear lens that is integral to the unit. Ensure both indications display an incandescent style look.

Modules are not required to be listed on the ITS and Signals Qualified Products List. Ensure that both indications along with the module meet or exceed the requirements in sections 1, 2, 3, 4 and 5 of the 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:

Arrow Type	Nominal Wattage at 77° F
12-inch yellow arrow	12
12-inch green arrow	11

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.

C. Pedestrian Signal Heads:

Provide pedestrian signal heads with international symbols that meet the MUTCD. Do not provide letter indications.

Comply with the ITE standard for “Pedestrian Traffic Control Signal Indications” and the following sections of the ITE standard for “Vehicle Traffic Control Signal Heads” in effect on the date of advertisement:

- Section 3.00 - “Physical and Mechanical Requirements”
- Section 4.01 - “Housing, Door, and Visor: General”
- Section 4.04 - “Housing, Door, and Visor: Materials and Fabrication”
- Section 7.00 - “Exterior Finish”

Provide a double-row termination block with three empty terminals and number 10 screws for field wiring. Provide barriers between the terminals that accommodate a spade lug sized for number 10 terminal screws. Mount the termination block in the hand section. Wire all signal sections to the terminal block.

Where required by the plans, provide 16-inch pedestrian signal heads with traditional three-sided, rectangular visors, 6 inches long. Where required by the plans, provide 12-inch pedestrian signal heads with traditional three-sided, rectangular visors, 8 inches long.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

Provide 2-inch diameter pedestrian push-buttons with weather-tight housings fabricated from die-cast aluminum and threading in compliance with the NEC for rigid metal conduit. Provide a weep hole in the housing bottom and ensure that the unit is vandal resistant.

Provide push-button housings that are suitable for mounting on flat or curved surfaces and that will accept 1/2-inch conduit installed in the top. Provide units that have a heavy duty push-button assembly with a sturdy, momentary, normally-open switch. Have contacts that are electrically insulated from the housing and push-button. Ensure that the push-buttons are rated for a minimum of 5 mA at 24 volts DC and 250 mA at 12 volts AC.

Provide standard R10-3 signs with mounting hardware that comply with the MUTCD in effect on the date of advertisement. Provide R10-3E signs for countdown pedestrian heads and R10-3B for non-countdown pedestrian heads.

Design the LED pedestrian traffic signal modules (hereafter referred to as modules) for installation into standard pedestrian traffic signal sections that do not contain the incandescent signal section reflector, lens, eggcrate visor, gasket, or socket. Provide modules that consist of an assembly that uses LEDs as the light source in lieu of an incandescent lamp. Use LEDs that are of the latest aluminum indium gallium phosphorus (AlInGaP) technology for the Portland Orange hand and countdown displays. Use LEDs that are of the latest indium gallium nitride (InGaN) technology for the Lunar White walking man displays. 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 60 months and to meet all parameters of this specification during this period of useful life.

Design all modules to operate using a standard 3 - wire field installation. Provide spade terminals crimped to the lead wires and sized for a #10 screw connection to the existing terminal block in a standard pedestrian signal housing. 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.

Provide modules in the following configuration: 16-inch displays which have the solid hand/walking man overlay on the left and the countdown on the right, and 12-inch displays which have the solid hand/walking man module as an overlay. 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 "Pedestrian Traffic Control Signal Indicators - Light Emitting Diode (LED) Signal Modules" dated August 04, 2010 (hereafter referred to as PTCSI Pedestrian Standard) and other requirements stated in this specification.

Provide modules that meet the following requirements when tested under the procedures outlined in the PTCSI Pedestrian Standard:

Module Type	Max. Wattage at 165° F	Nominal Wattage at 77° F
Hand Indication	16	13
Walking Man Indication	12	9
Countdown Indication	16	13

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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.

Provide module lens that is hard coated or otherwise made to comply with the material exposure and weathering effects requirements of the Society of Automotive Engineers (SAE) J576. Ensure all exposed components of the module are suitable for prolonged exposure to the environment, without appreciable degradation that would interfere with function or appearance.

Ensure the countdown display continuously monitors the traffic controller to automatically learn the pedestrian phase time and update for subsequent changes to the pedestrian phase time.

Ensure the countdown display begins normal operation upon the completion of the preemption sequence and no more than one pedestrian clearance cycle.

D. 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.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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 336S pole mounted cabinets configured for 8 vehicle phases, 4 pedestrian phases, and 6 overlaps. Do not reassign load switches to accommodate overlaps unless shown on electrical

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

details. Provide 336S pole mounted cabinets that are 46" high with 40" high internal rack assemblies.

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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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:

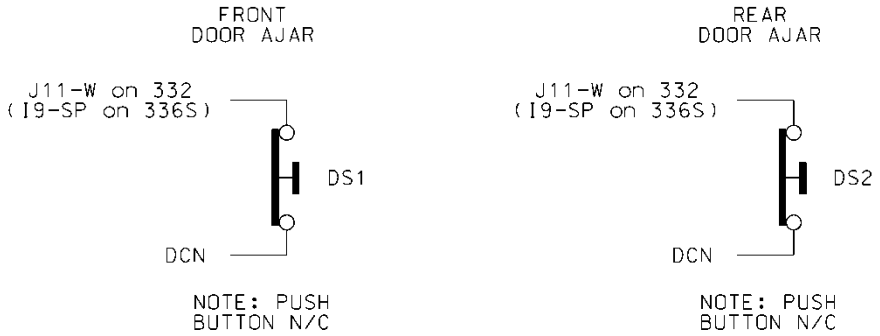
Peak Surge Current (Single pulse, 8x20µs)……..20,000A
Maximum Clamp Voltage…….350VAC
Response Time……..< 200 nanoseconds
Discharge Voltage……<200 Volts @ 1,000A
Insulation Resistance……≥100 MΩ

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.

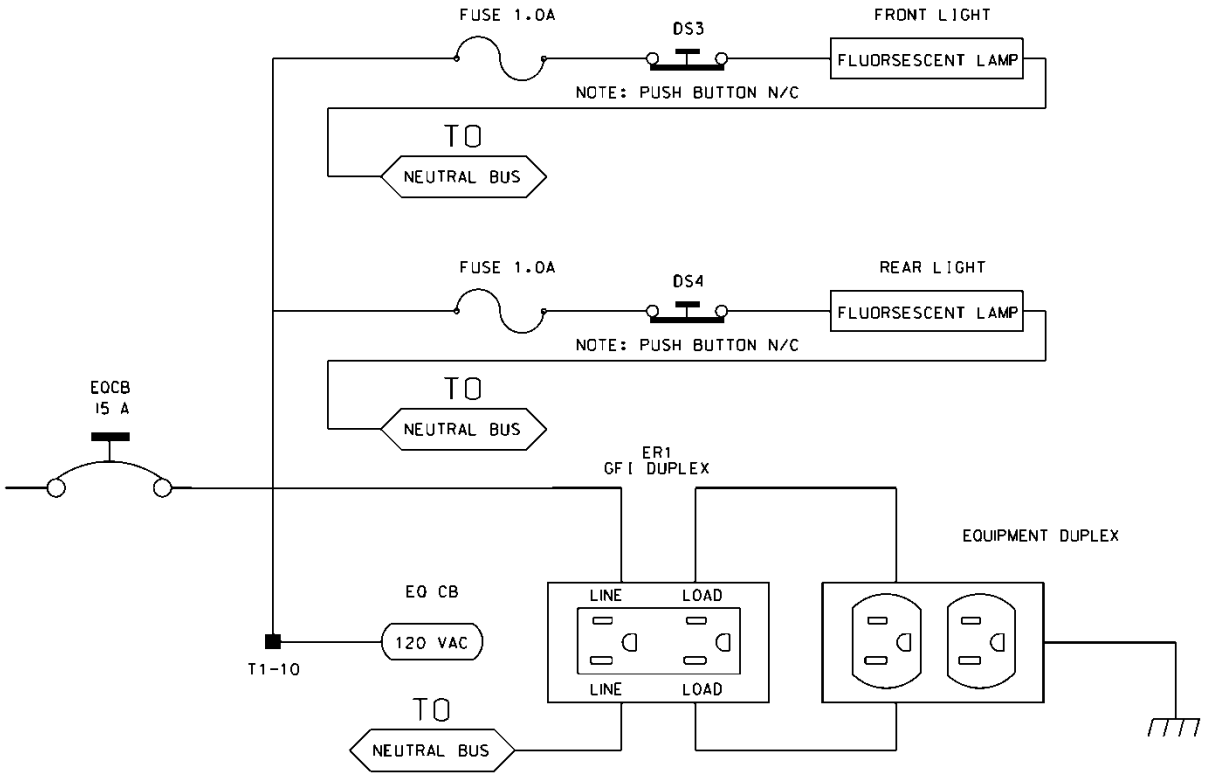
If additional surge protected power outlets are needed to accommodate fiber transceivers, modems, etc., install a UL listed, industrial, heavy-duty type power outlet strip with a minimum rating of 15 A / 125 VAC, 60 Hz. Provide a strip that has a minimum of 3 grounded outlets. Ensure the power outlet 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.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A



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. For model 336S cabinets, mount the police panel on the rear 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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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.

Ensure the 336S cabinet Input File is wired as follows:

336S Cabinet
Port-Bit/C-1 Pin Assignment

Slot #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
C-1 (Spares)	59	60	61	62	63	64	65	66	75	76	77	78	79	80
Port	3-2	1-1	3-4	1-3	3-1	1-2	3-3	1-4	2-5	5-5	5-6	5-1	5-2	6-7
C-1	56	39	58	41	55	40	57	42	51	71	72	67	68	81
Port	2-1	1-5	2-3	1-7	2-2	1-6	2-4	1-8	2-6	5-7	5-8	5-3	5-4	6-8
C-1	47	43	49	45	48	44	50	46	52	73	74	69	70	82

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:

336S Cabinet		**332 Cabinet**	
Detector Call Switches	**Terminals**	**Detector Call Switches**	**Terminals**
Phase 1	I1-F	Phase 1	I1-W
Phase 2	I2-F	Phase 2	I4-W
Phase 3	I3-F	Phase 3	I5-W
Phase 4	I4-F	Phase 4	I8-W
Phase 5	I5-F	Phase 5	J1-W
Phase 6	I6-F	Phase 6	J4-W
Phase 7	I7-F	Phase 7	J5-W
Phase 8	I8-F	Phase 8	J8-W

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

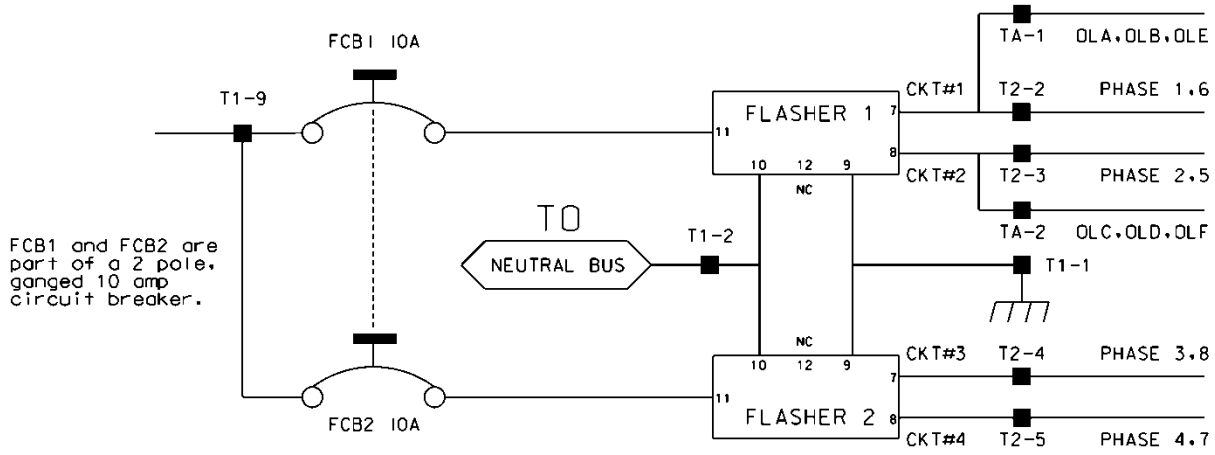
5	Channel 13 Red	113	6	N/C	
7	Channel 12 Red	AUX 101	8	Spec Function 1	
9	Channel 10 Red	AUX 124	10	Channel 11 Red	AUX 114
11	Channel 9 Red	AUX 121	12	Channel 8 Red	107
13	Channel 7 Red	122	14	Channel 6 Red	134
15	Channel 5 Red	131	16	Channel 4 Red	101
17	Channel 3 Red	116	18	Channel 2 Red	128
19	Channel 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:

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

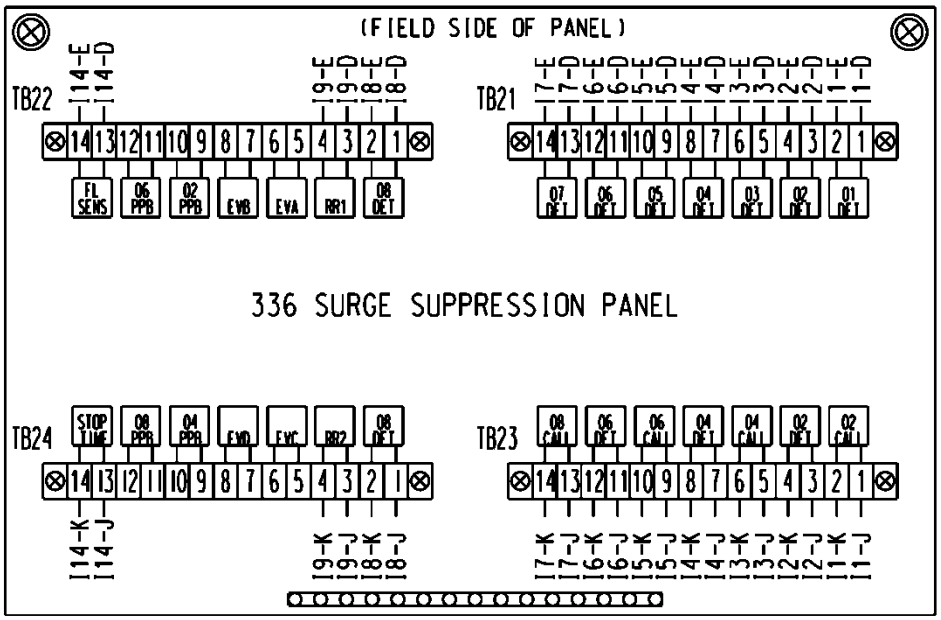
the padlocking attachment at 4.0 inches from the handle shank center to clear the lock and key. Provide an additional 4.0 inches minimum gripping length.

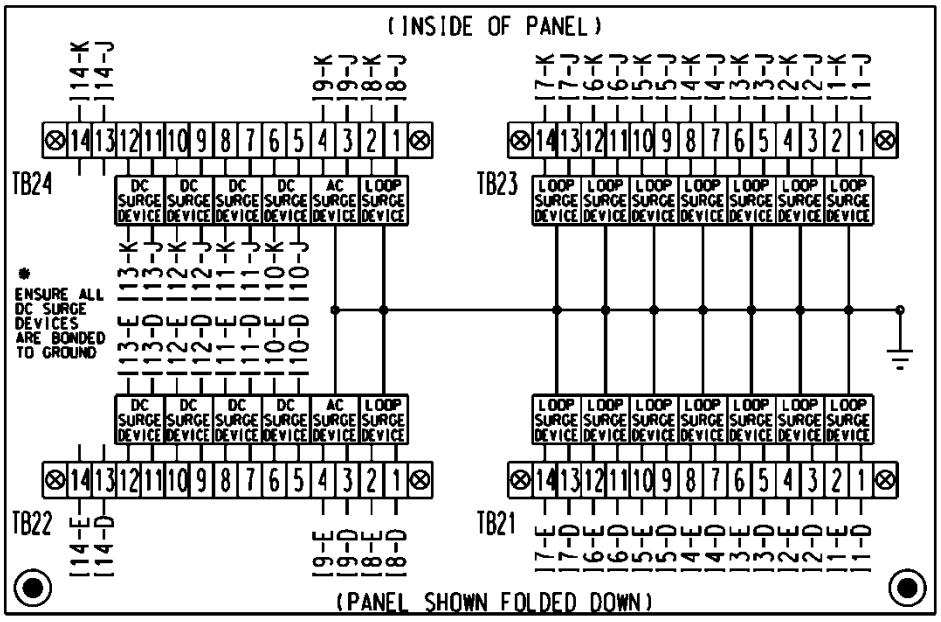
Provide Corbin #2 locks on the front and rear doors. Provide one (1) Corbin #2 and one (1) police master key with each cabinet. Ensure main door locks allow removal of keys in the locked position only.

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 pole mounted cabinets, mount surge protection devices for the AC+ interconnect inputs, inductive loop detector inputs, and low voltage DC inputs on a swing down panel assembly fabricated from sturdy aluminum. Attach the swing down panel to the bottom rear cabinet rack assembly using thumb screws. Ensure the swing down panel allows for easy removal of the input file without removing the surge protection panel assembly or its parts. Have the surge protection devices mounted horizontally on the panel and soldered to the feed through terminals of four 14 position terminal blocks with #8 screws mounted on the other side. Ensure the top row of terminals is connected to the upper slots and the bottom row of terminals is connected to the bottom slots. Provide a 15 position copper equipment ground bus attached to the field terminal side (outside) of the swing down panel for termination of loop lead-in shield grounds. Ensure that a Number 4 AWG green wire connects the surge protection panel assembly ground bus to the main cabinet equipment ground.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A





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.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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)

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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).

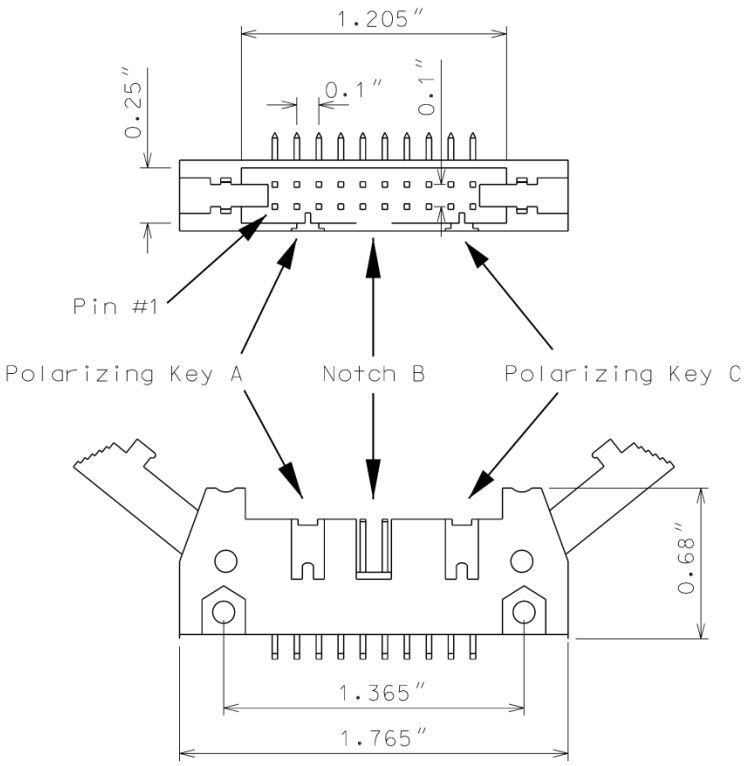
Provide a jumper or switch to set the AC line brown-out levels. Ensure that when the jumper is present or the switch is in the ON position the AC line dropout voltage threshold is 98 +/- 2 Vrms, the AC line restore voltage threshold is 103 +/- 2 Vrms, and the AC line brown-out timing value is set to 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.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A



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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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

FYAc mode

FYA Signal Head	Phase 1	Phase 3	Phase 5	Phase 7
Red Arrow	Channel 1 Red	Channel 3 Red	Channel 5 Red	Channel 7 Red
Yellow Arrow	Channel 1 Yellow	Channel 3 Yellow	Channel 5 Yellow	Channel 7 Yellow
Flashing Yellow Arrow	Channel 1 Green	Channel 3 Green	Channel 5 Green	Channel 7 Green
Green Arrow	Channel 9 Green	Channel 9 Yellow	Channel 10 Green	Channel 10 Yellow

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).

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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	-

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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

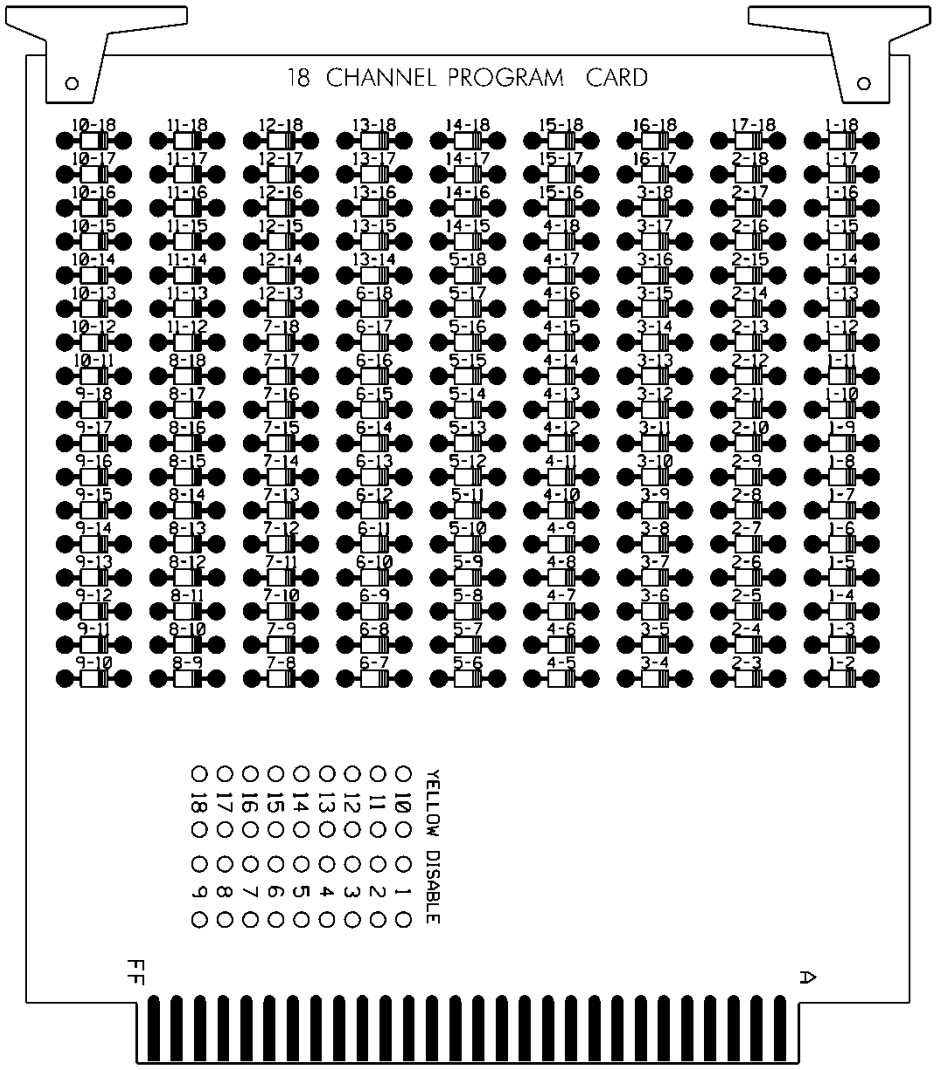
DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A



E. Preemption and Sign Control Box

Provide preemption and sign control box to operate in a Model 332 and Model 336S cabinet. Provide hardware to mount the box to the cage of the cabinet to ensure the front side is facing the opposite side of the cabinet. Furnish the material of the box from a durable finished metallic or thermoplastic case. Ensure the size of the box is not greater than 7(l) x 5(w) x 5(d) inches. Ensure that no modification is necessary to mount the box on the cabinet cage.

Provide the following components in the preemption and sign control box: relays, fuses, terminal blocks, MOVs, resistor, RC network, lamp, and push button switch.

Provide UL Listed or Recognized relay K1 as a DPDT enclosed relay (120 VAC, 60 Hz coil) with an 8-pin octal-style plug and associated octal base. Provide contact material made of AgCdO with a 10 amp, 240 VAC rating. Ensure the relay has a specified pickup voltage of 102 VAC.

Provide relay SSR1 as a Triac SPST normally open solid state relay that is rated for 120 VAC input and zero-crossing (resistive load) 25 amp @ 120 VAC output. Ensure the relay turns on at 90 Vrms within 10 ms and turns off at 10 Vrms within 40 ms. Ensure the relay has physical

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

characteristics as shown in the wiring detail in Figure 1. Provide 4 terminal screws with saddle clamps.

Provide fuses F1 and F2 as a UL Listed ¼″ x 1-1/4″ glass tube rated at 250 volts with a 10kA interrupting rating. Ensure F1 non-delay (fast-acting) and F2 slow-blow (time-delay) fuses have a maximum opening times of 60 minutes and 120 seconds for currents of 135 and 200 percent of the ampere rating, respectively. Ensure F2 slow-blow (time-delay) fuses have a minimum opening times of 12 seconds at 200 percent of the ampere rating. Provide fuse holders that are UL Recognized panel-mounted holders rated 250V, 15 ampere minimum with bayonet-type knobs which accept ¼″ x 1-1/4″ glass tube fuses.

Provide terminal blocks that are rated for 300V and are made of electrical grade thermoplastic or thermosetting plastic. Ensure each terminal block is of closed back design and has recessed-screw terminals with molded barriers between terminals. Ensure each terminal block is labeled with a block designation. Ensure each terminal is labeled with the function and a number.

Provide 3/4-inch diameter radial lead UL-recognized metal oxide varistors (MOVs) that have electrical performance as 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 resistor R1 as a 2K ohm, 12 watt, wirewound resistor with tinned terminals and attaching leads. Ensure the resistor is spaced apart from surrounding wires.

Provide a LED or incandescent lamp that has a voltage rating of 120 VAC with a minimum life rating at 50,000 hours.

Wire the preemption and sign control box as shown in Figure 1.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

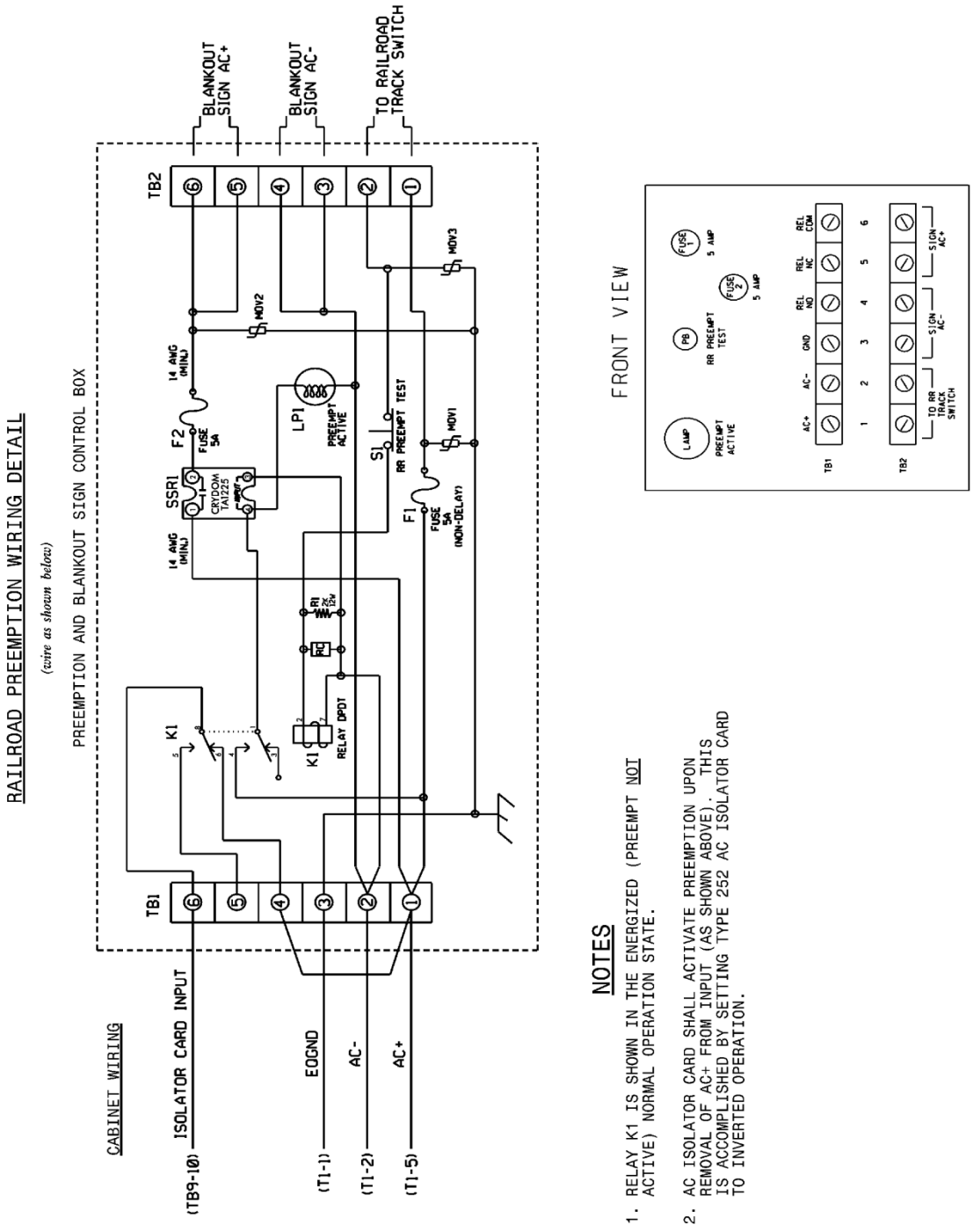


Figure 1

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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 TEMP. 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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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 170/2070L 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:

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

- Operate in a typical roadside environment and meet the environmental specifications and are fully compatible with NEMA TS 1, NEMA TS 2, or Type 170/2070L 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.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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.

Relocate camera sensor units and 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.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

4.4. MEASUREMENT AND PAYMENT

Actual number of site surveys, arranged, conducted, and accepted.

Actual number of luminaire arms for temporary video systems furnished, installed, 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.

Actual number of temporary camera sensor units relocated with detection zones reconfigured 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

Luminaire Arm for Temporary Video System ..... Each

Camera without Internal Loop Emulator Processing Unit ..... Each

External Loop Emulator Processing Unit ..... Each

Relocate Temporary Camera Sensor Unit ..... Each

5. MICROWAVE VEHICLE DETECTION SYSTEM - MULTIPLE DETECTION ZONES

5.1. DESCRIPTION

Design, furnish and install a microwave vehicle detection system with the manufacturer recommended cables and hardware in accordance to the plans and specifications. Ensure the detection system provides multiple detection zones.

5.2. MATERIALS

Provide design drawings showing design details and microwave sensor locations for review and acceptance before installation. Provide mounting height and location requirements for microwave sensor units on the design based on a site survey. Design microwave vehicle detection system with all necessary hardware. Indicate all necessary poles, spans, mast arms, luminaire arms, cables, microwave sensor mounting assemblies and hardware to achieve the required detection zones where Department owned poles are not adequate to locate the microwave sensor units. Do not design for the installation of poles in medians.

Obtain the Engineer's approval before furnishing microwave vehicle detection system. The contractor is responsible for the final design of microwave vehicle detection system. 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. With the exception of contractor-furnished poles, mast arms, and luminaire arms, furnish material, equipment, and hardware under this section that is pre-approved on the ITS and Signals QPL. Submit and obtain Engineer's approval of shop drawings for any poles, mast arms, and luminaire arms provided by the contractor prior to ordering from manufacturer.

Provide a detector for either side-fire or forward-fire configuration. Ensure the detector will detect vehicles in sunny, cloudy, rainy, snowy, and foggy weather conditions. Ensure the detector can operate from the voltage supplied by a NEMA TS-1/TS-2 or Type 332 or 336 traffic signal cabinet. Ensure the detector can provide detection calls to the traffic signal controller within a NEMA TS-1/TS-2 or Type 332 or 336 cabinet. Ensure the detection system provides a constant call

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

in the event of a component failure or loss of power. Ensure the detector has an operating temperature range of -30 to 165 degrees F and operates within the frequency range of 10 to 25 GHz. Ensure the detector is provided with a water-tight housing offering NEMA 4X protection and operates properly in up to 95% relative humidity, non-condensing.

Provide each detector unit to allow the placement of at least 8 detection zones with a minimum of 8 detection channel outputs. When the microwave vehicle detection system requires an integrated card rack interface(s), provide only enough interface cards to implement the vehicle detection shown on the signal plans. Provide a means acceptable to the Engineer to configure traffic lanes and detection zones. Provide each channel output with a programmable means to delay the output call upon activation of a detection zone that is adjustable in one second increments (maximum) over the range of 0 to 25 seconds. Provide each channel output with a programmable means to extend the output call that is adjustable in one second increments (maximum) over the range of 0 to 25 seconds. Ensure both delay and extend timing can be set for the same channel output.

For advance detection system, ensure the detector senses vehicles in motion at a range of 50 to 400 feet from the detector unit for forward-fire configuration and a range of 50 to 200 feet from the detector unit for side-fire configuration with an accuracy of 95% for both configurations. Ensure the advance detection system provides each channel output call of at least 100 ms in duration.

For stop bar presence detection system, ensure the detector outputs a constant call while a vehicle is in the detection zone and removes the call after all vehicles exit the detection zone. Ensure the presence detector unit can cover a detection zone as shown on the plans and has an effective range of 10 to 120 feet from the detector unit.

For units without an integrated card rack interface, provide Form C output relay contacts rated a minimum of 3A, 24VDC.

If a laptop is used to adjust detector settings, ensure that software is licensed for use by the Department and by any other agency responsible for maintaining or operating the microwave detection system. Provide the Department with a license to duplicate and distribute the software as necessary for design and maintenance support.

After initial detector configuration and installation, ensure routine adjustments or calibration are not needed to maintain acceptable performance.

5.3. CONSTRUCTION METHODS

Install the microwave vehicle detection system in accordance with the manufacturer's recommendations.

Monitor and maintain each detector unit during construction to ensure microwave vehicle detection system is functioning properly and aimed for the detection zone shown in the plans. Refer to Subarticle 1700-3 (D) Maintenance and Repair of Materials of the *Standard Specifications* for failure to maintain the microwave detection system.

5.4. MEASUREMENT AND PAYMENT

Actual number of microwave vehicle detection systems – multiple zones furnished, installed, and accepted.

No measurement will be made of cables or hardware, as these will be considered incidental to furnishing and installing microwave vehicle detection systems.

Payment will be made under:

Microwave Vehicle Detection System – Multiple Zones ..... Each

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

6. METAL POLE SUPPORTS

6.1. 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),

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

		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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

- 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.

- All CCTV and MVD poles shall meet the compact section limits per section 5.7.2 along with Table 5.7.2-1. Minimum thickness of CCTV and MVD pole shafts shall be ¼-inch.
- All CCTV and MVD poles shall use full-penetration groove weld tube-to-transverse plate connection with backing ring. Refer to Metal Pole Standard Drawing Sheet M9 for details. Fillet-welded tube-to-transverse-plate connections are not permitted.

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:

<u>*Case 1*</u> 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.

<u>*Case 2*</u> 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.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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.

6.2. 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.

All CCTV and MVD pole drilled shafts shall be a minimum of 4'-0" diameter. Refer to Standard Drawing Nos. M7 and M8.

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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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

6.3. POLE NUMBERING SYSTEM

A. New Poles

Attach an identification tag to each pole shaft section as shown on Metal Pole Standard Sheet M2 "Typical Fabrication Details for All Metal Poles."

6.4. MEASUREMENT AND PAYMENT

Actual number of metal strain signal poles (without regard to height or load capacity) furnished, installed and accepted.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

Actual number of designs for metal strain poles furnished 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 Strain Pole Design .....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

7. 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.

7.1. 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.

7.2. 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.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

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.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

- 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;

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

- 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;

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

- 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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

- 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

7.3. 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.

7.4. 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

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

8. DIGITAL CCTV CAMERA ASSEMBLY

8.1. DESCRIPTION

Furnish and install a Digital CCTV Camera Assembly as described in these Project Special Provisions. All new CCTV cameras shall be fully compatible with the video management software currently in use by the Region and the Statewide Traffic Operations Center (STOC). Provide a Pelco Spectra Enhanced low light 30X minimum zoom, Axis Dome Network Camera low light 30X minimum zoom or an approved equivalent that meets the requirements of these Project Special Provisions.

8.2. MATERIALS

A. General

Furnish and install new CCTV camera assembly at the locations shown on the Plans and as approved by the Engineer. Each assembly consists of the following:

- One dome CCTV color digital signal processing camera unit with zoom lens, filter, control circuit, and accessories in a single enclosed unit
- A NEMA-rated enclosure constructed of aluminum with a clear acrylic dome or approved equal Camera Unit housing.
- Motorized pan, tilt, and zoom
- Built-in video encoder capable of H.264/MPEG-4 compression for video-over IP transmission
- Pole-mount camera attachment assembly
- A lightning arrestor installed in-line between the CCTV camera and the equipment cabinet components.
- All necessary cable, connectors and incidental hardware to make a complete and operable system.

B. Camera and Lens

1. Cameras

Furnish a new CCTV camera that utilizes charged-coupled device (CCD) technology or Complementary Metal-Oxide-Semiconductor (CMOS) technology. The camera must meet the following minimum requirements:

- Video Resolution: Minimum 1920x1080 (HDTV 1080p)
- Aspect Ratio: 16:9
- Overexposure protection: The camera shall have built-in circuitry or a protection device to prevent any damage to the camera when pointed at strong light sources, including the sun
- Low light condition imaging
- Wide Dynamic Range (WDR) operation
- Electronic Image Stabilization (EIS)
- Automatic focus with manual override

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

2. Zoom Lens

Furnish each camera with a motorized zoom lens that is a high-performance integrated dome system or approved equivalent with automatic iris control with manual override and neutral density spot filter. Furnish lenses that meet the following optical specifications:

- 30X minimum optical zoom, and 12X minimum digital zoom
- Preset positioning: minimum of 128 presets

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

3. Communication Standards:

The CCTV camera shall support the appropriate NTCIP 1205 communication protocol (version 1.08 or higher), ONVIF Profile G protocol, or approved equal.

4. Networking Standards:

- Network Connection: Minimum 10/100 Mbps auto-negotiate
- Frame Rate: 30 to 60 fps
- Data Rate: scalable
- Built-in Web Server
- Unicast & multicast support
- Two simultaneous video streams (Dual H.264 and MJPEG):
    - Video 1: H.264 (Main Profile, at minimum)
    - Video 2: H.264 or MJPEG
- Supported Protocols: DNS, IGMPv2, NTP, RTSP, RTP, TCP, UDP, DHCP, HTTP, IPv4, IP6
- 130 db Wide Dynamic Range (WDR)

The video camera shall allow for the simultaneous encoding and transmission of the two digital video streams, one in H.264 format (high-resolution) and one in H.264 or MJPEG format (low- resolution).

Initially use UDP/IP for video transport and TCP/IP for camera control transport unless otherwise approved by the Engineer.

The 10/100BaseTX port shall support half-duplex or full-duplex and provide auto negotiation and shall be initially configured for full-duplex.

The camera unit shall be remotely manageable using standard network applications via web browser interface administration. Telnet or SNMP monitors shall be provided.

C. Camera Housing

Furnish new dome style enclosure for the CCTV assembly. Equip each housing with mounting assembly for attachment to the CCTV camera pole. The enclosures must be equipped with a sunshield and be fabricated from corrosion resistant aluminum and finished in a neutral color of weather resistant enamel. The enclosure must meet or exceed NEMA 4X ratings. The viewing area

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

of the enclosure must be tempered glass. The pendant must meet NEMA Type 4X, IP66 rating and use 1-1/2-inch NPT thread. The sustained operating temperature must be -50 to 60C (-58 to 144F), condensing temperature 10 to 100% Relative Humidity (RH).

D. Pan and Tilt Unit

Equip each new dome style assembly with a pan and tilt unit. The pan and tilt unit must be integral to the high-performance integrated dome system. The pan and tilt unit must be rated for outdoor operation, provide dynamic braking for instantaneous stopping, prevent drift, and have minimum backlash. The pan and tilt units must meet or exceed the following specifications:

- Pan: continuous 360 Degrees rotation
- Tilt: up/down +2 to -90 degrees minimum
- Motors: Two-phase induction type, continuous duty, instantaneous reversing
- Preset Positioning: minimum of 128 presets
- Low latency for improved Pan and Tilt Control
- FCC, Class A; UL/cUL Listed

E. Video Ethernet Encoder

Furnish cameras with a built-in digital video Ethernet encoder to allow video-over-IP transmission. The encoder units must be built into the camera housing and require no additional equipment to transmit encoded video over IP networks.

Encoders must have the following minimum features:

- Network Interface: Ethernet 10/100Base-TX (RJ-45 connector)
- Protocols: IPv4, Ipv6, HTTP, UpnP, DNS, NTP, RTP, RTSP, TCP, UDP, IGMP, and DHCP
- Security: SSL, SSH, 802.1x, HTTPS encryption with password-controlled browser interface
- Video Streams: Minimum 2 simultaneous streams, user configurable
- Compression: H.264 (MPEG-4 Part 10/AVC)
- Resolution Scalable: NTSC-compatible 320x176 to 1920x1080 (HDTV 1080p
- Aspect Ratio: 16:9
- Frame Rate: 1-30 FPS programmable (full motion)
- Bandwidth: 30 kbps – 6 Mbps, configurable depending on resolution
- Edge Storage: SD/SDHC/SDXC slot supporting up to 64GB memory card

F. Control Receiver/Driver

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

- Zoom in/out
- Automatic focus with manual override
- Tilt up/down
- Automatic iris with manual override

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

- Pan right/left
- Minimum 128 preset positions for pan, tilt, and zoom, 16 Preset Tours, 256 Dome Presets
- Up to 32 Window Blanks.

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

G. Electrical

The camera assembly shall support Power-over-Ethernet (PoE) in compliance with IEEE 802.3. Provide any external power injector that is required for PoE with each CCTV assembly.

H. CCTV Camera Attachment to Pole

Furnish and install an attachment assembly for the CCTV camera unit. Use stainless steel banding approved by the Engineer.

Furnish CCTV attachments that allow for the removal and replacement of the CCTV enclosure as well as providing a weatherproof, weather tight, seal that does not allow moisture to enter the enclosure.

Furnish a CCTV Camera Attachment Assembly that can withstand wind loading at the maximum wind speed and gust factor called for in these Special Provisions and can support a minimum camera unit dead load of 45 pounds (20.4 kg).

I. Riser

Furnish material meeting the requirements of Section 1091-3 and 1098-5 of the 2024 Standard Specifications for Roads and Structures. Furnish a 1" riser with weatherhead for instances where the riser is only carrying an Ethernet cable. For installations where fiber optic cable is routed to the cabinet through a 2" riser with heat shrink tubing the Contractor may elect to install the Ethernet cable in the same riser with the fiber cable.

J. Data line Surge Suppression

Furnish data line surge protection devices (SPD) shall meet the following minimum requirements:

- UL497B
- Service Voltage: < 60 V
- Protection Modes: L-G (All), L-L (All)
- Response Time: <5 nanoseconds
- Port Type: Shielded RJ-45 IN/Out
- Clamping Level: 75 V
- Surge Current Rating: 20 kA/Pair
- Power Handling: 144 Watts
- Data Rate: up to 10 GbE
- Operating Temperature: -40º F to + 158º F

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

- Standards Compliance: Cat-5e, EIA/TIA 568A and EIA/TIA 568B
- Warranty: Minimum of 5-year limited warranty

The data line surge protector shall be designed to operate with Power Over Ethernet (POE) devices. The SPD shall be designed such that when used with shielded cabling, a separate earth ground is not required. It shall be compatible with Cat-5e, Cat 6, and Cat-6A cablings.

Protect the electrical and Ethernet cables from the CCTV unit entering the equipment cabinet with surge protection. Provide an integrated unit that accepts unprotected electrical and Ethernet connections and outputs protected electrical and Ethernet connections.

K. POE Injector

Furnish POE Injectors meeting the following minimum performance requirements and that is compatible with the CCTV Camera and Ethernet Switch provided for the project.

- Working temp/humidity: 14º F to 131º F/maximum 90%, non-condensing
- Connectors: Shielded RJ-45, EIA 568A and EIA 568B
- Input Power: 100 to 240 VAC, 50 to 60 Hz
- Pass Through Data Rates: 10/100/1000 Mbps
- Regulatory: IEEE 802.3at (POE)
- Number of Ports: 1 In and 1 Out
- Safety Approvals: UL Listed

Ensure the POE Injector is designed for Plug-and-Play installation, requiring no configurations and supports automatic detection and protection of non-standard Ethernet Terminal configurations.

8.3. CONSTRUCTION METHODS

A. General

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

Mount CCTV camera units at a height to adequately see traffic in all directions and as approved by the Engineer. The maximum attachment height is 45 feet above ground level unless specified elsewhere or directed by the Engineer.

Mount the CCTV camera units such that a minimum 5 feet of clearance is maintained between the camera and the top of the pole to ensure adequate lightning protection is provided by the air terminal.

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

Install the data line surge protection device and POE Injector in accordance with the manufacturer’s recommendations.

Install the riser in accordance with Section 1722 of the 2024 Standard Specifications for Roads and Structures. Install the Ethernet cable in the riser from the field cabinet to the CCTV camera.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

B. Electrical and Mechanical Requirements

Install an "Air Terminal and Lightning Protections System" in accordance with the Air Terminal and Lightning Protection System Project Special Provisions for the CCTV Camera Assembly. Ground all equipment as called for in the Standard Specifications, these Special Provisions, and the Plans. **Do not install lightning protection when installing a CCTV camera assembly on a signal pole.**

Install surge protectors on all ungrounded conductors entering the CCTV enclosure.

C. General Test Procedure

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

Provide 4 copies of all test procedures and requirements to the Engineer for review and approval at least 30 days prior to the testing start date.

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

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

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

Conform to these testing requirements and the requirements of these specifications. It is the Contractor's responsibility to ensure the system functions properly even after the Engineer accepts the CCTV test results.

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

A. Compatibility Tests

1. CCTV System

Compatibility Tests are applicable to CCTV cameras that the Contractor wishes to furnish but are of a different manufacturer or model series than the existing units installed in the Region. If required, the Compatibility Test shall be completed and accepted by the Engineer prior to approval of the material submittal.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

The Compatibility Test shall be performed in a laboratory environment at a facility chosen by the Engineer based on the type of unit being tested. Provide notice to the Engineer with the material submitted that a Compatibility Test is requested. The notice shall include a detailed test plan that will show compatibility with existing equipment. The notice shall be given a minimum of 15 calendar days prior to the beginning of the Compatibility Test.

The Contractor shall provide, install, and integrate a full-functioning unit to be tested. The Department will provide access to existing equipment to facilitate these testing procedures. The Engineer will determine if the Compatibility Test was acceptable for each proposed device. To prove compatibility the Contractor is responsible for configuring the proposed equipment at the applicable Traffic Operations Center (TOC) with the accompaniment of an approved TOC employee.

B. Operational Field Test (On-Site Commissioning)

1. CCTV System

Final CCTV locations must be field verified and approved by the Engineer. Perform the following local operational field tests at the camera assembly field site in accordance with the test plans and in the presence of the Engineer. The Contractor is responsible for providing a laptop for camera control and positioning during the test. After completing the installation of the camera assemblies, including the camera hardware, power supply, and connecting cables, the contractor shall:

C. Local Field Testing

Furnish all equipment and labor necessary to test the installed camera and perform the following tests before any connections are made.

- Verify that physical construction has been completed.
- Inspect the quality and tightness of ground and surge protector connections.
- Check the power supply voltages and outputs, check connection of devices to power source.
- Verify installation of specified cables and connection between the camera, PTZ, camera control receiver, and control cabinet.
- Make sure cabinet wiring is neat and labeled properly; check wiring for any wear and tear; check for exposed or loose wires.
- Perform the CCTV assembly manufacturer’s initial power-on test in accordance with the manufacturer’s recommendation.
- Set the camera control address.
- Exercise the pan, tilt, zoom, and focus operations along with preset positioning, and power on/off functions.
- Demonstrate the pan, tilt and zoom speeds and movement operation meet all applicable standards, specifications, and requirements.
- Define, test and/or change presets.
- Ensure camera field of view is adjusted properly and there are no objects obstructing the view.
- Ensure camera lens is dust-free.
- Ensure risers are bonded and conduits entering cabinets are sealed properly.
- Lightning arrestor bonded correctly.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

D. Central Operations Testing

- Interconnect the CCTV Camera's communication interface device with one of the following methods as depicted on the plans:
    - communication network's assigned Ethernet switch and assigned fiber-optic trunk cable and verify a transmit/receive LED is functioning and that the CCTV camera is fully operational at the TOC.

    OR

    - to the DOT furnished cellular modem and verify a transmit/receive LED is functioning and that the CCTV camera is fully operational at the TOC.
- Exercise the pan, tilt, zoom, and focus operations along with preset positioning, and power on/off functions.
- Demonstrate the pan, tilt and zoom speeds and movement operation meet all applicable standards, specifications, and requirements.
- Define, test and/or change presets.

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

8.4. MEASUREMENT AND PAYMENT

Digital CCTV Camera Assembly will be measured and paid as the actual number of digital CCTV assemblies furnished, installed, integrated, and accepted. No separate measurement will be made for electrical cabling, connectors, CCTV camera attachment assemblies, conduit, condulets, risers, grounding equipment, surge protectors, PoE Injectors, PoE Cable, Air Terminal and Lightning Protection System, compatibility testing, operational testing or any other equipment or labor required to install the digital CCTV assembly.

Payment will be made under:

Digital CCTV Camera Assembly .....Each

9. OBSERVATION PERIOD FOR ITS DEVICES

9.1. 30-DAY OBSERVATION PERIOD

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

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

- Installation of all project devices and communications infrastructure.
- Field Acceptance Testing of all devices.
- Central System Testing of all devices and network communications.

DocuSign Envelope ID: CE8ABAA4-1D9D-49FC-9F0A-559BF8EB1E4A

- Correction of all deficiencies and punch list items. (including minor construction items)

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

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

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

9.2. FINAL ACCEPTANCE

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

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

9.3. MEASUREMENT AND PAYMENT

There will be no payment for this item of work as it is incidental to the project as a whole and to the item of work in which it is associated.

DocuSign

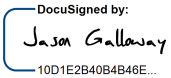
Certificate Of Completion

Envelope Id: CE8ABAA41D9D49FC9F0A559BF8EB1E4A
Status: Completed
Subject: Complete with DocuSign: R-2307B_PSP_24.1 PSP.docx
Source Envelope:
Document Pages: 66
Signatures: 1
Certificate Pages: 1
Initials: 0
AutoNav: Enabled
EnvelopeId Stamping: Enabled
Time Zone: (UTC-05:00) Eastern Time (US & Canada)

Envelope Originator:
Regina M. Muncey
801 Jones Franklin Rd, Ste 300
Raleigh, NC 27606
regina.muncey@stantec.com
IP Address: 173.42.0.66

Record Tracking

Status: Original
5/20/2024 10:07:49 AM
Holder: Regina M. Muncey
regina.muncey@stantec.com
Location: DocuSign

Signer Events	Signature	Timestamp
Jason Galloway jason.galloway@stantec.com Security Level: Email, Account Authentication (None)	DocuSigned by:  10D1E2B40B4B46E... Signature Adoption: Pre-selected Style Using IP Address: 173.42.0.66	Sent: 5/20/2024 10:08:39 AM Viewed: 5/20/2024 10:09:06 AM Signed: 5/20/2024 10:09:50 AM Freeform Signing

Electronic Record and Signature Disclosure:
Not Offered via DocuSign

In Person Signer Events	Signature	Timestamp

Editor Delivery Events	Status	Timestamp

Agent Delivery Events	Status	Timestamp

Intermediary Delivery Events	Status	Timestamp

Certified Delivery Events	Status	Timestamp

Carbon Copy Events	Status	Timestamp

Witness Events	Signature	Timestamp

Notary Events	Signature	Timestamp

Envelope Summary Events	Status	Timestamps
Envelope Sent	Hashed/Encrypted	5/20/2024 10:08:39 AM
Certified Delivered	Security Checked	5/20/2024 10:09:06 AM
Signing Complete	Security Checked	5/20/2024 10:09:50 AM
Completed	Security Checked	5/20/2024 10:09:50 AM

Payment Events	Status	Timestamps

Project Special Provisions
Structures and Culverts

Table of Contents

	Page #
Maintenance & Protection of Traffic Beneath Proposed Structure at Sta. 733+32.53 -L- (8-13-04)	ST-2
Construction, Maintenance & Removal of Temporary Access at Sta. 471+85.00 -L- (2-21-23)	ST-3
Thermal Sprayed Coatings (Metallization) (12-1-17)	ST-5
Sand Lightweight Concrete (9-30-11)	ST-7
Expansion Joint Seals (9-30-11)	ST-9
Optional Precast Reinforced Concrete Box Culvert at Sta. 783+89.30 -L- (11-30-23)	ST-13
Mass Concrete (6-20-19)	ST-21
Asbestos Assessment (11-30-23)	ST-23
Falsework and Formwork (11-30-23)	ST-26
Submittal of Working Drawings (11-30-23)	ST-32
Crane Safety (6-20-19)	ST-38
Grout for Structures (12-1-17)	ST-39
Securing of Vessels (10-12-01)	ST-40
Removal of Existing Structure at Sta. 733+32.53 -L- (SPECIAL)	ST-41
Modified 74" Prestressed Concrete Girder (SPECIAL)	ST-42
Work In, Over or Adjacent to Navigable Waters (SPECIAL)	ST-43
Boater Safety Plan (SPECIAL)	ST-44

For Thermal Intergrity Profiler, See Geotechnical Special Provisions.
For 16" Water Line Pipe & Suspension System, See Utility Special Provisions.

DocuSigned by:
A4A2999A8BC64F2...
10/04/2024

MAINTENANCE AND PROTECTION OF TRAFFIC (08-13-04)
BENEATH PROPOSED STRUCTURE AT STA. 733+32.53 -L-

GENERAL

Maintain traffic on I-77 as shown in Traffic Control Plans and as directed by the Engineer.

Provide a minimum temporary vertical clearance of 17'-6" 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.

CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS AT STA. 471+85.00 -L- (02-21-23)

GENERAL

Construct, maintain, and remove the temporary access required to provide the working area necessary for construction of the new bridge, construction of the temporary detour structure, or for the removal of an existing bridge, as applicable. Temporary access may involve the use of a rock causeway [workpad], a work bridge, or other methods; however, all types of temporary access are required to meet the requirements of all permits, the plans, the *Standard Specifications*, and this Special Provision.

TEMPORARY ROCK CAUSEWAY [WORKPAD]

At the contractor's option, construction of a temporary rock causeway [workpad] within the limits shown on the plans is acceptable, provided the causeway [workpad] impacts are in compliance with all permits. Build the causeway [workpad] with Class II riprap topped by a layer of Class B riprap or as otherwise designated on the plans or approved by the Engineer. If desired, recycle the Class II riprap used in the causeway [workpad] for placement in the final riprap slope protection as directed by the Engineer. No payment will be made for recycled riprap as this material is considered incidental to the causeway [workpad] placement and removal. If this option is exercised, no adjustment in contract bid price will be allowed due to an underrun in the quantity of "Rip Rap Class II (2'-0" Thick)".

Completely remove all causeway [workpad] material including pipes and return the entire causeway [workpad] footprint to the original contours and elevations within 90 days of the completion of the deck slab or as otherwise required by permits.

For sites affected by moratoriums or restrictions on in-stream work: Do not construct or remove causeway [workpad] during the moratorium period shown on the permit. If the completion of the deck slab falls within the prohibitive dates for causeway [workpad] construction or removal, begin causeway [workpad] removal immediately following the prohibitive dates.

TEMPORARY WORK BRIDGE

At the contractor's option, construction of a temporary work bridge in lieu of the causeway(s) [workpad] is acceptable, provided the temporary work bridge satisfies all permits. Submit details of the temporary work bridge to the Engineer prior to constructing the work bridge to ensure conformance with the plans and all permits. Completely remove the temporary bridge prior to final acceptance or as otherwise required by the permits.

MEASUREMENT AND PAYMENT

Construction, Maintenance and Removal of Temporary Access at Sta. 471+85.00 -L- will be paid under the lump sum price bid for the above work, or other methods of access, including all material, pipes, work bridge components, equipment, tools, labor, disposal, and incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
Construction, Maintenance and Removal of Temporary Access at Sta. 471+85.00 -L-	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:

(A) 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.

(B) 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.

SAND LIGHTWEIGHT CONCRETE (9-30-11)

GENERAL

Use sand lightweight concrete, as noted on the plans, that meets the requirements of this Special Provision.

Sand lightweight concrete is composed of portland cement, fine aggregate, lightweight coarse aggregate, water, and admixtures. Provide sand lightweight concrete that complies with the applicable requirements of Sections 420, 1000, and 1024 of the *Standard Specifications* and the additional requirements herein.

Submit a mix design from a testing laboratory approved by the NC Division of Highways for approval at least 35 days prior to the proposed use. Provide a mix meeting Table 1000-1 of the *Standard Specifications* and the following design criteria:

TEST	TEST METHOD	REQUIREMENT
Max. Unit Weight, plastic, lbs/ft^3	AASHTO T121	120
Max. Unit Weight, dry, lbs/ft^3	ASTM C567 using equilibrium air dried unit weight	115
Min. Relative Dynamic Modulus, (percent)	AASHTO T161 Procedure A	80

When submitting the mix design, include the source of the aggregates, cement, and admixtures and the gradation, specific gravity, and fineness modulus (fine aggregate only) of the aggregates. Submit test results showing the mix design conforms to the criteria, including the 28 day compressive strength of a minimum of six cylinders. Provide a mix design that produces an average compressive strength sufficient to ensure that a minimum strength of 4,500 psi is achieved in the field.

Produce an additional mix in accordance with AASHTO M195 to determine the drying shrinkage. The maximum drying shrinkage for this mix is 0.07%.

For lightweight aggregate, use expanded shale or slate that meets the requirements of AASHTO M195. Grade the lightweight aggregate in accordance with 1014-2(E)(6) of the *Standard Specifications.*

Determine the soundness in accordance with AASHTO T104. Loss of more than 10% of the lightweight aggregate in five (5) cycles of the accelerated soundness test using sodium sulfate is not permitted.

Ensure the lightweight aggregate is in a saturated surface-dry condition when it is proportioned and incorporated into the mix.

MEASUREMENT AND PAYMENT

No separate payment will be made for *Sand Lightweight Concrete*. Furnishing sand lightweight concrete shall be incidental to applicable pay items.

EXPANSION JOINT SEALS (9-30-11)

GENERAL

The work covered by this Special Provision consists of furnishing and installing the expansion joint seals as shown on the contract drawings. All materials, labor, equipment and incidentals necessary for the proper installation of the expansion joint seals are included.

MATERIAL

Provide expansion joint seals capable of accommodating a total movement measured parallel to the centerline of the roadway as shown on plans.

Provide an elastomeric component for each expansion joint seal that is a continuous unit for the entire length of the joint. Do not field splice the elastomeric component. Only vulcanized shop splicing of the elastomeric component is permitted. The minimum length of an elastomeric component before shop splicing is 20 feet. However, one piece shorter than 20 feet is permitted. Provide an elastomeric component that is clearly shop marked to indicate the top side and joint location of the elastomeric component. On skewed bridges, or under unsymmetrical conditions, clearly mark the left side of the elastomeric component. Left is defined as being on the left when facing in the direction of increasing station. Inspect the seals upon receipt to ensure that the marks are clearly visible upon installation.

Make sure the convolution of the gland does not project above the top of the hold-down plates when the joint opening is in the most compressed condition. Use either elastic polychloroprene (neoprene) or ethyl propylene diene monomer (EPDM) for the elastomer that meets the following minimum properties:

	ASTM TEST METHOD	REQUIREMENTS
Hardness, Durometer - Shore A	D2240	60 ± 5, Neoprene (upward corrugated shape - fabric reinforced) 75 ± 5, EPDM and Neoprene (upward non-corrugated shape) 80 ± 5, EPDM (upward corrugated shape-fabric reinforced)
Tensile Strength	D412	2000 psi (min.)
Elongation at Break	D412	250% (min.)
Width of Gland in Relaxed Condition	N/A	10" ± 0.25"

Thickness of Upturned portion of gland	N/A	0.25" non-corrugated shape, -0.032" to +0.032"
Thickness of Upturned portion of gland	N/A	0.1875" corrugated shape, -0.032" to +0.032"
Thickness of Flat portion of gland	N/A	0.1563", -0.032" to +0.032"

For fabric reinforced glands, submit one unreinforced sample per lot number, up to 500 feet of Expansion Joint Seal, to the Engineer for testing.

Only field splice hold-down plates at crown points, at abrupt changes in the deck slab cross slope, and on lane lines. Splicing within travel lanes is not permitted and splicing on edge lines is not required. Field splice hold-down plates between the edge line and gutter upturn and where necessary for proper installation and alignment is permitted. Show all splice locations on the working drawings for approval. For the location of lane markings at the expansion joint seal, see the Structure plans. At the splice locations, locate the hold-down bolts three (3) inches from the end of the hold-down plate. At splice locations where changes in deck slab cross slope occur, cut the ends of hold-down plates parallel to the bridge centerline for skews less than 80° and greater than 100°.

Do not use welded shop splices in hold-down plates.

SHOP DRAWINGS

Submit nine (9) sets of working drawings to the Engineer for review, comments and acceptance. Show complete details drawn to scale and include:

(A) The proposed template details including the makeup of the template

(B) The proposed method of holding the base angle assembly in place while concrete is cast around it

(C) The proposed procedure to correct for the effects of beam movement and rotation when setting width of joint opening

(D) The proposed chronology of installation including the sequence and direction of the concrete casting

(E) The details of cross connectors between base angles, such as steel bars with slots bolted to angles, to maintain evenness between the adjacent base angles while accommodating movement that occurs when concrete is cast. Indicate when bolts are loosened to allow movement.

(F) The proposed method for removing the hold-down plate

(G) A section detail through the joint showing horizontal offset dimensions of the base angles from the centerline joint. This detail is required when the vertical face of the joint opening is not perpendicular to the roadway surface (e.g. when the roadway grade is significant).

Have someone other than the one who prepares the drawing check all detailed drawings and include the signatures of both the drafter and checker on each sheet of the drawings. The Engineer returns unchecked drawings to the Contractor. Provide all completed drawings well in advance of the scheduled installation time for the expansion joint seal.

INSTALLATION

Provide supports for the base angle assembly at a maximum spacing of 9 feet. Place supports near field splices of base angles to ensure that field splices are straight and even. Provide base angles with ½" diameter weep holes at 12 inch centers to allow bleeding of trapped air and/or water. Do not obstruct the weep holes with falsework. Make the bottom of the trough parallel to grade and the sides parallel to the sides of the expansion joint seal.

For damaged areas, depressions, spalls, cracks, or irregularities of curbs or decks adjacent to the expansion joint, submit a proposed method of repair and repair material specifications for approval.

If the Engineer deems any aspects of the expansion joint seals unacceptable, make necessary corrections.

INSPECTION

When concrete is cast, use a non-aluminum, 10 foot, true to line straight edge to check and grade the top of the slab on each side of the joint to ensure smooth transition between spans.

(A) Watertight Integrity Test

(1) Upon completion of an expansion joint seal, perform a water test on the top surface to detect any leakage. Cover the roadway section of the joint from curb to curb, or barrier rail to barrier rail, with water, either ponded or flowing, not less than 1 inch above the roadway surface at all points. Block sidewalk sections and secure an unnozzled water hose delivering approximately 1 gallon of water per minute to the inside face of the bridge railing, trained in a downward position about 6 inches above the sidewalks, such that there is continuous flow of water across the sidewalk and down the curb face of the joint.

(2) Maintain the ponding or flowing of water on the roadway and continuous flow across sidewalks and curbs for a period of 5 hours. At the conclusion of the test, the underside of the joint is closely examined for leakage. The expansion joint seal is considered watertight if no obvious wetness is visible on the Engineer’s finger after touching a number of underdeck areas. Damp concrete that does not impart wetness to the finger is not a sign of leakage.

(3) If the joint system leaks, locate the place(s) of leakage and take any repair measures necessary to stop the leakage at no additional cost to the Department. Use repair measures recommended by the manufacturer and approved by the Engineer prior to beginning corrective work.

(4) If measures to eliminate leakage are taken, perform a subsequent water integrity test subject to the same conditions as the original test. Subsequent tests carry the same responsibility as the original test and are performed at no extra cost to the Department.

MEASUREMENT AND PAYMENT

Expansion Joint Seals will be paid for at the lump sum contract price. Payment will be full compensation for furnishing all material, including any steel accessory plates for sidewalks, medians and rails, labor, tools, and incidentals necessary for installing the expansion joint seal in place and including all materials, labor, tools and incidentals for performing the original watertight integrity test.

Payment will be made under:

Pay Item	Pay Unit
Expansion Joint Seals	Lump Sum

OPTIONAL PRECAST REINFORCED CONCRETE BOX CULVERT AT STATION **(11-30-23)**

GENERAL

This Special Provision covers the design, fabrication and construction of precast reinforced concrete box culverts intended for the conveyance of storm water.

If the option is indicated on the plans, the submittal for a precast reinforced box culvert in lieu of a cast-in-place culvert is permitted. Design the precast culvert sections in accordance with ASTM C1577 or the current edition of the *AASHTO LRFD Bridge Design Specifications*. Rate all sizes of precast reinforced concrete box culverts in accordance with the current edition of the *AASHTO Manual for Bridge Evaluation*. Ensure the culvert rates for the AASHTO design loads, North Carolina's legal loads (see section North Carolina's Legal Loads), and Fixing America's Surface Transportation (FAST) Act's emergency vehicles (EV). Provide the size and number of barrels as indicated on the plans. Detail the culvert with cast-in-place wings walls and footings. Precast wing walls and footings will not be allowed. Provide a precast box culvert that meets the requirements of Section 1077 and any other applicable parts of the *Standard Specifications.*

The design and rating of the precast and cast-in-place members is the responsibility of the Contractor and is subject to review, comments, and approval. Submit two (2) sets of detailed plans and rating sheets for review. Include all details in the plans, including the size and spacing of the required reinforcement necessary to build the precast box and cast-in-place members. Have a North Carolina Registered Professional Engineer check and seal the plans, rating sheets and design calculations. After the plans, rating sheets and design calculations are reviewed and, if necessary, the corrections made, submit one set of plans and rating sheets on 22" x 34" sheets to become part of the contract plans.

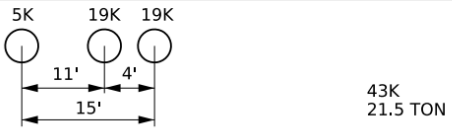
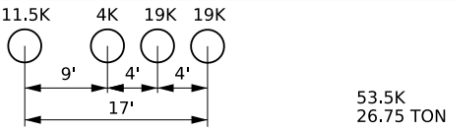
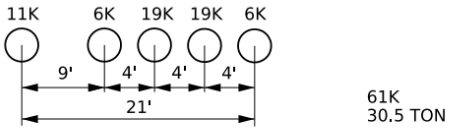
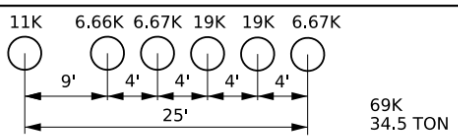
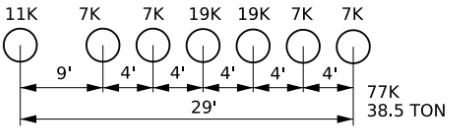
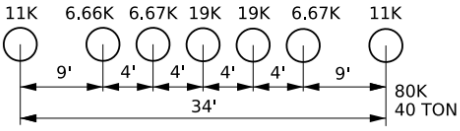
If the span, rise and design earth cover for the precast reinforced concrete box culvert are identical to a previously approved submittal, the Contractor may request the previously approved design calculations and plans be considered as the submittal for review and approval. However, a set of plans and rating sheets will need to be submitted to become part of the contract plans.

NORTH CAROLINA'S LEGAL LOADS

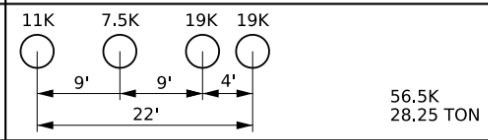
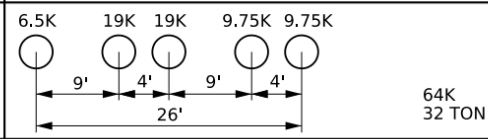
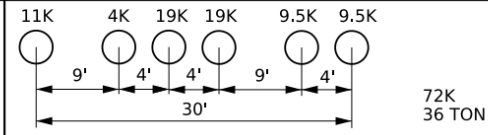
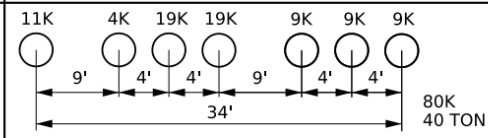
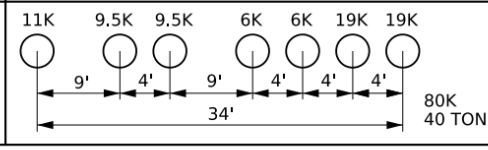
Apply the following legal loads to all structures carrying interstate traffic:

NORTH CAROLINA LEGAL LOADS

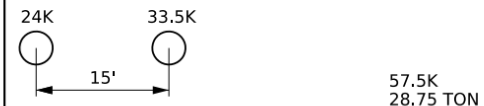
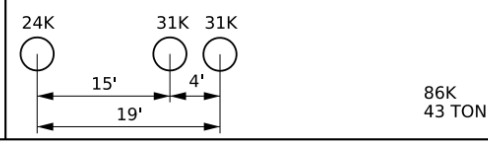
SINGLE VEHICLE (SV)

*REF.#	SCHEMATIC
SH (I01)	
S3C (I02)	
S3A (I03)	
S4A (I04)	
S5A (I05)	
S6A (I06)	
S7B (I07)	
S7A (I08)	

TRUCK TRACTOR SEMI-TRAILER (TTST)

*REF.#	SCHEMATIC
T4A (I09)	
T5B (I10)	
T6A (I11)	
T7A (I12)	
T7B (I13)	

FAST ACT EMERGENCY VEHICLES

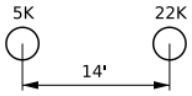
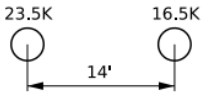
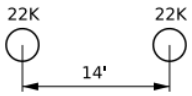
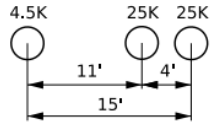
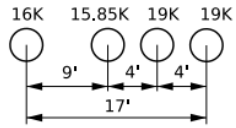
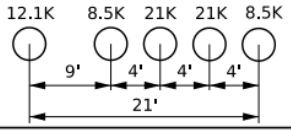
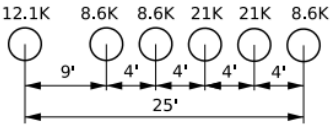
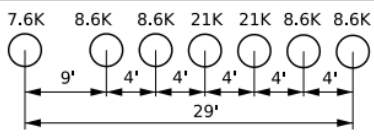
REF.#	SCHEMATIC
EV2	
EV3	

*( ) = NC LEGAL LOAD CODE FOR THE SPECIFICATIONS FOR THE NATIONAL BRIDGE INVENTORY (SNBI) ITEM ID B.EP.01

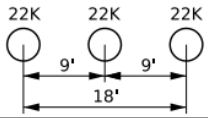
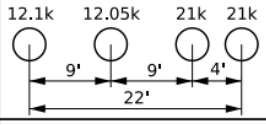
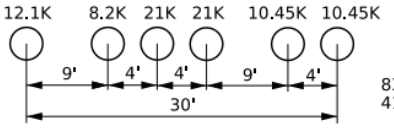
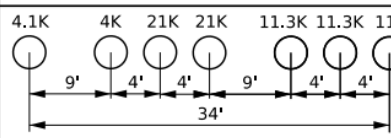
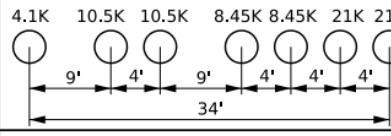
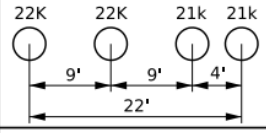
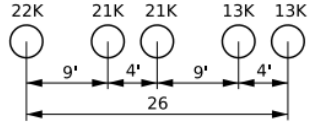
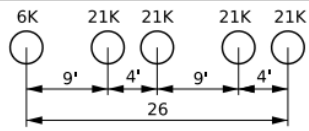
Apply the following legal loads to all structures carrying non-interstate traffic:

NORTH CAROLINA LEGAL LOADS

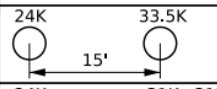
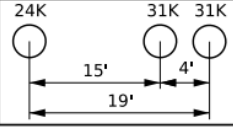
SINGLE VEHICLE (SV)

*REF.#	SCHEMATIC
SNSH (N01)	 27K 13.5 TON
SNGARBS2 (N02)	 40K 20 TON
SNAGRIS2 (N03)	 44K 22 TON
SNCOTTS3 (N04)	 54.5K 27.25 TON
SNAGGRS4 (N05)	 69.85K 34.925 TON
SNS5A (N06)	 71.1K 35.55 TON
SNS6A (N07)	 79.9K 39.95 TON
SNS7B (N08)	 84K 42 TON

TRUCK TRACTOR SEMI-TRAILER (TTST)

*REF.#	SCHEMATIC
TNAGRIT3 (N09)	 66K 33 TON
TNT4A (N10)	 66.15K 33.075 TON
TNT6A (N11)	 83.2K 41.6 TON
TNT7A (N12)	 84K 42 TON
TNT7B (N13)	 84K 42 TON
TNAGRIT4 (N14)	 86K 43 TON
TNAGT5A (N15)	 90K 45 TON
TNAGT5B (N16)	 90K 45 TON

FAST ACT EMERGENCY VEHICLES

REF.#	SCHEMATIC
EV2	 57.5K 28.75 TON
EV3	 86K 43 TON

*( ) = NC LEGAL LOAD CODE FOR THE SPECIFICATIONS FOR THE NATIONAL BRIDGE INVENTORY (SNBI) ITEM ID B.EP.01

PRECAST REINFORCED CONCRETE BOX SECTIONS

The precast reinforced concrete box culvert sections shall match the size and hydraulic opening indicated in the contract plans.

(A) Design

(1) Design Fill – The design earth cover is reported on the plans as the elevation difference between the point of maximum fill and the bottom of the top slab.

(2) Placement of Reinforcement – Provide a 1 inch concrete cover over the reinforcement subject to the provisions of Section E. Extend the inside reinforcement into the tongue portion of the joint and the outside reinforcement into the groove portion of the joint. Detail the clear distance of the end wires so it is not less than ½ inch or more than two (2) inches from the ends of the box section. Assemble reinforcement per the requirements of ASTM C1577 or the approved design. The exposure of the ends of the wires used to position the reinforcement is not a cause for rejection.

(3) Laps and Spacing – Use lap splices for the transverse reinforcement. Detail the transverse wires so that the center to center spacing is not less than two (2) inches or more than four (4) inches. Do not detail the longitudinal wires with a center to center spacing of more than 8 inches.

(B) Joints

(1) Produce the precast reinforced concrete box section with tongue and groove ends. Design and form these ends of the box section so, when the sections are laid together, they make a continuous line of box sections with a smooth interior free of appreciable irregularities in the flowline, all compatible with the permissible variations given in Section F. The internal joint formed at the tongue and groove ends of the precast units shall be sealed with either bitumen/butyl sealant or closed-cell neoprene material. The internal joint material shall be installed in accordance with the manufacturer's recommendations. The material shall be shown on the shop drawings when they are submitted for review.

(2) Seal the external joint with an outside sealer wrap conforming to ASTM C877 that is at least 12 inches wide and covers the joint on both the sides and the top of the box section. Use ConWrap CS-212 from Concrete Sealants, Inc., EZ-Wrap from Press-Seal Gasket Corporation, Seal Wrap from Mar-Mac Manufacturing Co., Inc., Cadilloc External Pipe Joint from Cadilloc, or an approved equal for the outside sealer wrap. If the outside sealer wrap is not applied in a continuous strip along the entire joint, a 12 inch minimum lap of the outside sealer wrap is permitted. Before placing the outside sealer wrap, clean and prime the area receiving the outside sealer wrap in accordance with the sealer wrap manufacturer recommendations. The joint wrap manufacturer installation recommendations shall be included with shop drawings submitted for review. The external joint wrap shall be installed in pieces, as indicated on Figure 1 below:

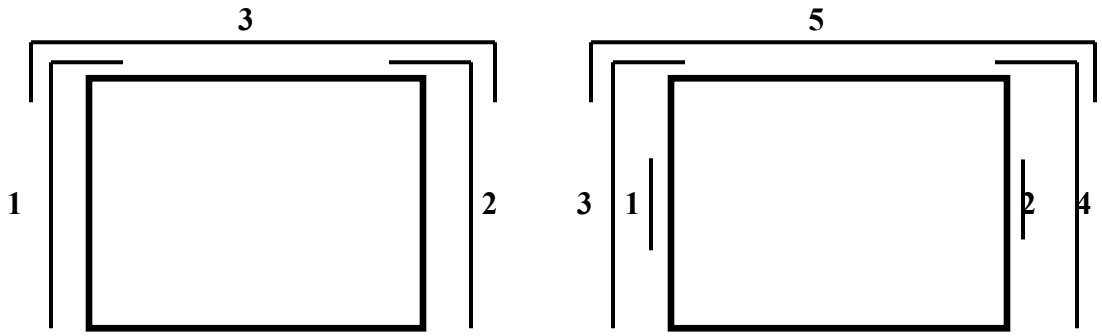


Figure 1

Cover the external joint sealer with a 3 foot strip of filter fabric conforming to Type 4 requirements in Section 1056 of the *Standard Specifications*.

Place multiple lines of a precast reinforced concrete box culvert such that the longitudinal joint between the sections has a minimum width of three (3) inches. Fill the joint between multiple lines of precast box sections with Class A concrete. Use Class A concrete that meets the requirements listed in the *Standard Specifications* except that Field Compressive Strength Specimens are not required.

(C) Manufacture

Manufacture precast reinforced concrete box culvert sections by either the wet cast method or dry cast method.

(1) Mixture – In addition to the requirements of Section 1077 of the *Standard Specifications*, do not proportion the mix with less than 564 lb/yd^3 of Portland cement. When a flowable concrete consistency is required, refer to Section 1077-5(B) of the *Standard Specifications* for the use of Self-Consolidating Concrete (SCC) and Intermediate Flow Concrete.

(2) Strength – Concrete shall develop a minimum 28-day compressive strength of 5,000 psi. Movement of the precast sections should be minimized during the initial curing period. Any damage caused by moving or handling during the initial curing phase will be grounds for rejection of that precast section.

(3) Air Entrainment – Air entrain the concrete in accordance with Section 1077 – 5(A) of the *Standard Specifications*. For dry cast manufacturing, air entrainment is not required.

(4) Testing – Test the concrete in accordance with the requirements of Section 1077 – 5(C) of the *Standard Specifications*.

(5) Handling – Handling devices or holes are permitted in each box section for the purpose of handling and placing. Submit details of handling devices or holes for approval and do not cast any concrete until approval is granted. Remove all handling devices flush with

concrete surfaces as directed. Fill holes in a neat and workmanlike manner with an approved non-metallic non-shrink grout, concrete, or hole plug.

(D) Physical Requirements

Acceptability of precast culvert sections is based on concrete cylinders made and tested in accordance with ASTM C31 and ASTM C39.

(E) Permissible Variations

(1) Flatness – All external surfaces shall be flat, true, and plumb. Irregularities, depressions, or high spots on all external surfaces shall not exceed ½ inch in 8 feet.

(2) Internal Dimensions – Produce sections so that the internal and haunch dimensions do not vary more than ¼ inch from the plan dimensions.

(3) Adjacent Sections - Internal, external, and haunch dimensions for connecting sections shall not vary more than ½ inch.

(4) Length of Tongue and Groove – The minimum length of the tongue shall be four (4) inches. The minimum length of the groove shall be four (4) inches. The dimensions of the tongue and groove shall not vary more than ¼ inch from the plan dimensions.

(5) Slab and Wall Thickness – Produce sections so that the slab and wall thickness are not less than that shown on the plans by more than 5% or $^{3}/_{16}$ inch, whichever is greater. A thickness more than that required on the plans is not a cause for rejection.

(6) Length of Opposite Surfaces – Produce sections so that variations in laying lengths of two (2) opposite surfaces of the box section meet the requirements of ASTM C1577, Section 11.3.

(7) Length of Section – Produce sections so that the underrun in length of a section is not more than ½ inch in any box section.

(8) Position of Reinforcement – Produce sections so that the maximum variation in the position of the reinforcement is ± ⅜ inch for slab and wall thicknesses of five (5) inches or less and ± ½ inch for slab and wall thicknesses greater than five (5) inches. Produce sections so that the concrete cover is never less than ⅝ inch as measured to the internal surface or the external surface. The preceding minimum cover limitations do not apply at the mating surfaces of the joint.

(9) Area of Reinforcement – Use the design steel shown on the plans for the steel reinforcement. Steel areas greater than those required are not cause for rejection. The permissible variation in diameter of any wire in finished fabric is prescribed for the wire before fabrication by either AASHTO M32 or M225.

(F) Marking

(1) Each section shall be match-marked in order of intended installation as indicated on the approved shop drawings. Ensure that pieces fit together neatly and in a workmanlike manner. In order to ensure a good, neat field fit, the Department will verify assembly of the first five (5) adjacent sections or 20% of the total culvert length, whichever is greater, at the producer's facility and match-mark the pieces. This will require that a minimum of three (3) adjacent sections of the culvert be fitted at the production yard at a time and then match-marked. Once three (3) sections have been match-marked, the first section may be removed for shipment and a fourth section set for marking. Continue in a progressive manner until all sections have been properly match-marked. The producer shall document the GO-NO-GO dimensional measurements of each box culvert section produced through the post-pour inspection process.

(2) Clearly mark each section of the box culvert in accordance with ASTM C1577, Section 15. The information requirements of Section 15.1 shall be clearly marked on the inner surface of each section.

(G) Construction

(1) Pre-installation Meeting – A pre-installation meeting is required prior to installation. Representatives from the Contractor, the precast box manufacturer, and the Department should attend this meeting. The precast box manufacturer’s representative shall be on site during installation.

(2) Foundation – Foundation for precast box culvert shall meet the requirements of Section 414 of the *Standard Specifications*. In addition, Type VI foundation material shall be encapsulated in filter fabric conforming to Type 4 requirements in Section 1056 of the *Standard Specifications*. The filter fabric shall be placed perpendicular to the culvert barrel. Provide sufficient overhang beyond the excavation to allow a minimum lap of three (3) feet when the foundation material is placed, and fabric wrapped on top. Perpendicular sections of fabric shall be continuous. A minimum lap of two (2) feet shall be provided between sections of fabric.

(3) Installation – Sections shall be placed at the beginning of the outlet end of the culvert with the groove end being laid upgrade. Tongue sections shall be laid into the groove sections. Positive means shall be provided to pull each section firmly into the previously placed section so that the joints are tightly homed. Use a "come-along" box pullers or other approved methods to create a positive means of joining box sections. Construction equipment shall not have direct contact with the box section. The load of the box shall be suspended by lifting device during joining procedure.

(4) Backfill – Complete backfill in accordance with Section 414 of the *Standard Specifications*.

BASIS OF PAYMENT

Any additional cost of redesigning will be paid for by the Contractor if Precast Reinforced Concrete Culvert is used in lieu of the cast-in-place culvert shown on the plans. Except for Foundation Conditioning Material and Culvert Excavation, payment for the Precast Box Culvert will be a lump sum amount equal to the payment that would be allowed for construction of a Cast-in-Place Box Culvert. Plan quantities and unit bid prices will be used to compute the lump sum amount. Such price and payment will be full compensation for all work covered by this Special Provision, the plans and applicable parts of the Standard Specifications and will include, but not be limited to, furnishing all labor, materials (including all filter fabric), equipment and other incidentals necessary to complete this work. Such price and payment will also be full compensation for concrete, reinforcing steel, labor, equipment and all other related materials necessary for the completion of the barrel section, and the construction of the headwalls, leveling pad, end curtain walls, wings and wing footings.

MASS CONCRETE (6-20-19)

GENERAL

This Special Provision applies to substructure components (footings, columns, or caps) where the smallest dimension of that component is greater than or equal to six feet and less than or equal to eight feet.

The mass concrete temperature after placement shall not exceed 158°F and the temperature difference between the core and exterior surfaces shall not exceed 35°F. Mass concrete should remain covered and monitored until the difference between the core temperature and the average daily ambient temperature is below 35°F. All mass concrete pours shall remain covered and protected a minimum of 7 days unless otherwise directed by the Engineer.

Submit an analysis, for review and approval, of the anticipated thermal developments in the mass concrete based on the proposed mix design, materials, and casting procedures. At a minimum the analysis shall provide: an anticipated range of peak temperatures, temperature gradients, time to peak temperature and recommended cure time. The submittal shall also describe the measures and procedures that will be taken to limit the temperature differential to 35°F or less between the core and exterior surfaces.

Methods for reducing thermal differential may involve but are not limited to a combination of the following:

(A) Selecting materials that minimize the heat generated by hydration of the cement.

(B) Cooling materials to reduce the temperature of the concrete in its plastic state.

(C) Controlling the rate of concrete placement.

(D) Insulating the concrete surface to prevent heat loss.

(E) Providing supplemental heat at the concrete surface to prevent heat loss.

(F) Other acceptable methods which may be developed by the Contractor.

The temperature of mass concrete at the time of placement shall not be less than 40°F nor more than 75°F.

Mass concrete shall contain an approved set-retarding, water-reducing admixture, and flyash or ground granulated blast furnace slag in the amount of 25% by weight of the total cementitious material (portland cement plus flyash). Fly ash or ground granulated blast furnace slag used in the mass concrete mix shall meet the requirements of Articles 1024-5 and 1024-6 of the *Standard Specifications*. Portland Cement shall meet the requirements of AASHTO M85 for Type II. The total cementitious material shall not exceed 600 lbs. per cubic yard of concrete. The Contractor shall test and submit results for the compressive strength of his proposed mix design for review and approval. The strength must be taken as the average of at least three (3)

cylinders made in the laboratory and meet the minimum 28 day strength requirements noted in the contract plans.

The Contractor shall provide and install a minimum of six (6) temperature sensing devices in each mass concrete pour to monitor temperature differentials between the core and exterior surfaces. These devices shall have an accuracy of ±2°F within the temperature range of 40°F to 180°F. One temperature sensing probe shall be placed near the core of the pour, and the remaining temperature sensing probes shall be placed at approximately two (2) inches clear from the surface of the concrete furthest from the core. The Engineer shall approve the locations of the temperature sensing probes.

Readings from the temperature sensing devices shall be recorded at one-hour intervals, from the time casting is complete until the maximum temperature is established. After the maximum temperature is established, record readings from temperature sensing devices at two-hour intervals until consecutive readings indicated the temperature difference between the core and all exterior surfaces is less than 35°F. At the option of the Contractor, the temperature may be recorded by an approved strip-chart recorder furnished by the Contractor.

If monitoring indicates the 35°F differential has been exceeded, the Contractor shall take immediate action to reduce the temperature differential to less than 35°F and revise the thermal plan to ensure future mass concrete pours meet the temperature limits. All revisions to the approved plan must be approved by the Engineer prior to implementation.

At the discretion of the Engineer, all temperature monitoring requirements may be waived provided the Contractor has proven to the satisfaction of the Engineer that the temperature after placement will not exceed 158°F and the temperature difference between the core and all exterior surfaces will not exceed 35°F.

Placement of mass concrete shall be continuous resulting in a footing, column or cap that is monolithic and homogeneous.

MEASUREMENT AND PAYMENT

The entire cost of this work shall be included in the unit contract price bid for the class of concrete associated with *Mass Concrete*.

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

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.

SUBMITTAL OF WORKING DRAWINGS (11-30-23)

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. B. C. Hanks, 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. B. C. Hanks, 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, use the following Eastern Regional Office addresses:

Via Email: EastGeotechnicalSubmittal@ncdot.gov

Via US mail:

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

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
3301 Jones Sausage Road, Suite 100
Garner, NC 27529

For projects in Divisions 8-14, use the following Western Regional Office addresses:

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: Emmanuel Omile (919) 707 – 6451
eomile@ncdot.gov

Madonna Rorie (919) 707 – 6508
mrorie@ncdot.gov

Eastern Regional Geotechnical Contact (Divisions 1-7):
Thomas Santee (919) 920-8901
tgsantee@ncdot.gov

Western Regional Geotechnical Contact (Divisions 8-14):
Eric Williams (704) 455 – 8902
ewilliams3@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.

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.

SECURING OF VESSELS (10-12-01)

GENERAL

Secure vessels in accordance with Section 107 of the *Standard Specifications* and the following provision.

When utilizing barges, tugboats or other vessels, take all necessary precautions to ensure that such vessels are securely anchored or moored when not in active operation. Take all necessary measures to ensure that the vessels are operated in a manner that avoids damage to or unnecessary contact with bridges and other highway structures and attachments. If severe weather conditions are anticipated or should be anticipated through reasonable monitoring of weather forecasts, take additional measures to protect bridges and other highway structures and attachments from extreme conditions. The Contractor is strictly liable for damages to any bridge or other highway structures or attachments caused by a vessel owned or controlled by the Contractor. The Contractor is also liable to third parties for property damages and loss of revenue caused by vessels under the Contractor's control.

MEASUREMENT AND PAYMENT

No separate payment will be made for *Securing of Vessels*.

REMOVAL OF EXISTING STRUCTURE AT STA. 733+32.53 -L- (SPECIAL)

The existing structure shall be removed in accordance with the Standard Specifications except as noted below:

Upon removal, the aluminum posts and rails shall be salvaged from the structure and remain as the property of the North Carolina Department of Transportation. The Contractor shall deliver the salvaged material to Bridge Maintenance facilities located at 190 Prison Camp Road, Statesville, NC 28625. The Contractor shall contact Maintenance Supervisor, Eric Schenz at 704-876-1485 at least one week prior to delivery. Bridge Maintenance Unit shall provide the manpower and equipment to unload the salvaged material.

All salvaged material shall be removed carefully without damage.

No separate measurement will be made for this work and the entire cost of this work shall be included in the lump sum price bid for Removal of Existing Structure at Sta. 733+32.53 -L-.

MODIFIED 74" PRESTRESSED CONCERTE GIRDERS (SPECIAL)

Modified 74" Prestressed Concrete Girders shall be in accordance with the contract plans and the Standard Specifications. Measurement and Payment will be for the actual number of linear feet of prestressed concrete girders.

Payment will be made under:

Modified 74" Prestressed Concrete Girders ……Lin. Ft.

WORK IN, OVER OR ADJACENT TO NAVIGABLE WATERS (SPECIAL)

GENERAL

All work in, over, or adjacent to navigable waters shall be in accordance with Article 107-10 of the *Standard Specifications*, the Special Provisions and conditions contained in the permits obtained by the Department from the U.S. Coast Guard, U.S. Army Corps of Engineers, or other authority having jurisdiction. The work shall have no adverse effect on navigation of the waterway including traffic flow, navigational depths, and horizontal and vertical clearances without approval from the authorities granting the permits.

The Contractor shall prepare drawings necessary to obtain any permits which may be required for his operations which are not included in the Department's permit including but not limited to excavation and dumping, constructing wharves, piers, ramps, and other structures connecting to bank or shore, and drawings for constructing falsework, cofferdams, sheeting, temporary bridges, and any other construction within the waterway. Submittals shall show locations of such work with respect to the navigational opening. The Contractor shall coordinate the submittal of drawings with the Engineer.

All construction shall progress and be maintained in a safe and timely manner. Temporary construction facilities shall be removed completely and promptly upon discontinuation of their useful purpose. Navigational lights, signals, or facilities shall be provided and maintained by the Contractor on temporary or permanent construction or vessels until such facilities are no longer needed as determined by the Engineer or permitting agency. **See Boater Safety Plan for additional requirements.**

The Contractor shall immediately notify the appropriate authorities and take corrective measures as needed when any situation occurs that imposes a threat to the public. The Contractor shall also immediately correct any acts or occurrences that contradict or violate any requirements in the plans, special provisions, or permits when corrective measures can be performed in a safe manner. The Contractor shall notify the appropriate authorities when such corrective measures cannot be performed in a safe manner.

All costs incurred by the Contractor in complying with the above requirements shall be included in the prices bid for the various pay items and no additional payment will be made.

Lake Facility Safety Plan: NC 150 Parallel Bridge Construction, Lake Norman

Introduction

There is an existing steel bridge built in 1961 located on NC 150 over Lake Norman on the Catawba County / Iredell County line near Mooresville. The bridge has an overall length of about 1,100 feet and consists of 10 spans. A new bridge having an overall length of 1,220 feet and consisting of 9 spans will be built parallel to the existing bridge creating dual bridges with one-way traffic on each.

No Wake Zone – there are at least three 'No Wake' buoys located no less than 150 feet from the existing bridge. There is one buoy south of the bridge and two buoys to the north of the bridge. All are located between 150 feet and 250 feet of the edges of the existing bridge. For this reason, the engagement of law enforcement officials during the deployment of the boater safety system or the performance of the work is not anticipated.

Perform all work under this plan in accordance with the standard specifications[1] and all other governing federal, state or local regulations.

Scope of Construction Activities

The scope of Construction Activities on the new bridge that are related to boater safety include:

Stage 1 – West End

- Install floating barrier and lighted buoys on western half of bridge crossing to isolate work area
- Install causeway on west end of the new bridge approach
- Construct bents 1 through 5.
- Install girders for spans A through E.
- Install girder bracing components (diaphragms) for spans A through E.
- Install lightweight concrete deck for spans A through E.

Stage 2 – East End

- Move floating barrier and lighted buoys to eastern half of bridge crossing to isolate work area
- Install causeway on east end of the new bridge approach
- Construct bents 6 through 8.
- Install girders for spans F through I.
- Install girder bracing components (diaphragms) for spans F through I.
- Install lightweight concrete deck for spans F through I.

Access

Access to the bridge for construction workers and equipment will be by barges situated on Lake Norman or from the new bridge. All barge activity will be reviewed by NCDOT and must be approved prior to beginning construction. Access to Lake Norman by construction crews and equipment will be onto a

barge via a public or private boat launch. The barge will be approximately 40 feet by 40 feet in size. Work skiffs will shuttle construction workers as needed.

No impact to shorelines is expected. Additionally, there will be no impacts or access restrictions to the existing skimmer facility on the west side of the lake in the proximity of proposed bridge.

Bridge Construction Items

- All debris generated by construction will be contained and at no time will it be dropped into the lake water. Construction areas will be closed off from boating access for duration of construction activities.
- The Contractor will protect all utility lines or mains which may be supported on, under or adjacent to bridge work sites from damage. There is a water main attached to the north side of the existing NC 150 bridge.

Operational Safety Methods

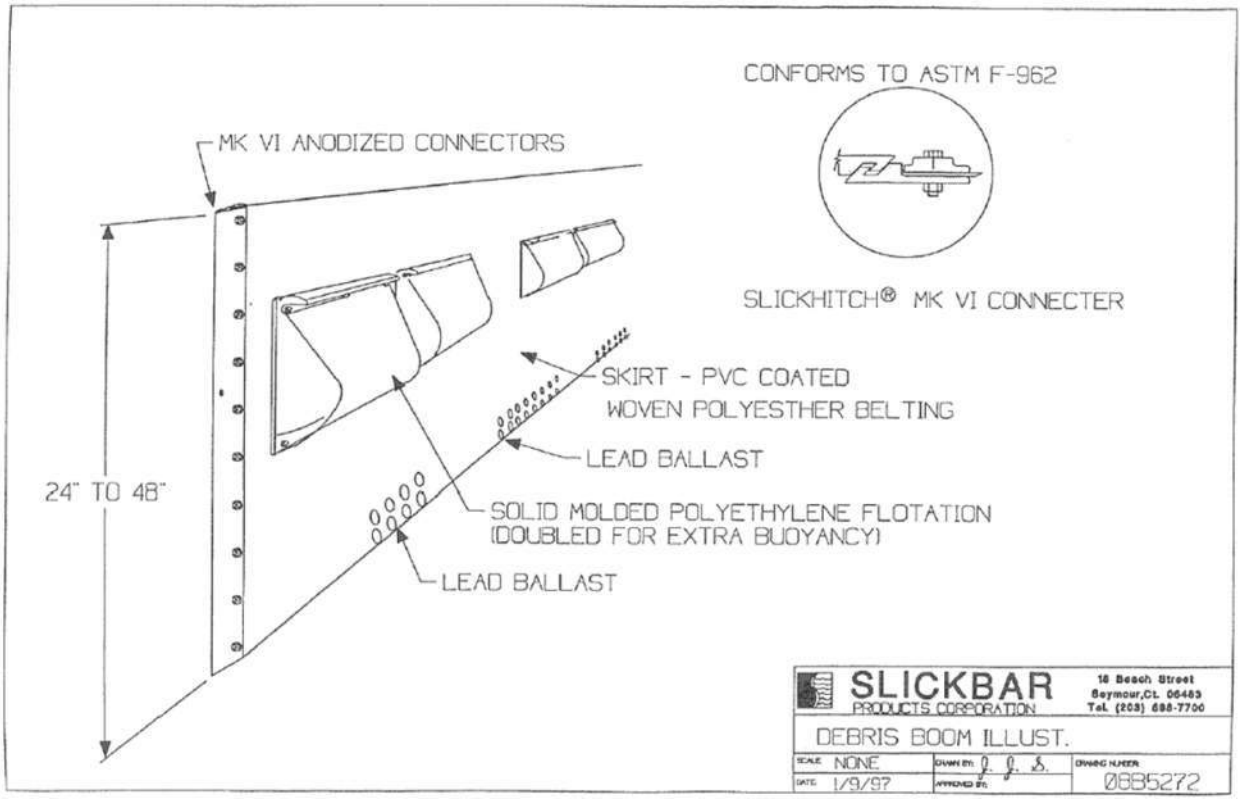
- All parts of the existing bridge, and the traveling public including boaters, will be protected from new bridge construction activities.
- Work Plan – No work will begin until the Contractor furnishes the NCDOT Resident Engineer with a work plan for construction and the Engineer has accepted the plan.
- All activities will follow OSHA requirements[2].

Boater Safety System

The active construction areas will be restricted, and advisory information provided to the Lake Norman Marine Commission for distribution to all of its members. Each boat launch will also have placards displayed at the loading areas informing boaters of the restrictions to the waterway access under the bridge. The placards will be displayed a minimum of two weeks prior to the installation of the floating barricade system and the associated work to be performed on the structure. The information and placards will provide contact numbers for various entities – the contractor, NCDOT and the US Fish and Wildlife Service so that the public can make inquiries or report damage, vandalism or operational problems with the system.

All work areas proposed for the project will be protected by a floating barrier marked with flashing warning lights as described below.

- Debris Shield Curtain – a bright orange-colored debris shield will be deployed to protect the work areas. The proposed work areas and plans depicting the sequencing are attached. Below is a section of the product to be utilized for the barricade.



- Lighting – solar powered LED marine safety lights will be placed atop the barricade buoys (see image to the right) and will be spaced no more than 50 feet apart along the top of the barricade which will enclose the proposed maintenance activity. The lights will be placed a minimum of 2 feet above the water line to provide a visual barrier both day and night. These solar marine lights help protect boaters during the early morning and late afternoon/early evening hours or when cloud cover reduces visibility for boaters. The marine safety lights provide visibility in flashing mode up to one nautical mile, according to the distributor. They can be set for 'steady on' or 'in flash' mode at a rate of one flash per second. They can be seen no matter the boaters position or if not mounted perfectly level or if the buoy is bobbing or swaying. All routine maintenance activity for the barricade system is restricted to occur only between 6:00 am and 7:00 pm. Emergency repairs to the boater safety system will be made as needed, anytime 24 hours per day / any day of the week.

- Mooring requirements - When utilizing barges, tugboats or other vessels, the Contractor will take all necessary precautions to ensure that such vessels are securely anchored or moored when not in active operation and to contain the vessels within the encapsulated work area. The contractor will also take all necessary measures to ensure that the vessels are operated in a manner that avoids damage to or unnecessary contact with bridges, boaters and other highway structures and attachments within the containment area. If severe weather conditions are anticipated, or should be anticipated through reasonable monitoring of weather forecasts, the contractor shall take additional measures to adequately moor the vessel within the containment area during the extreme conditions. Vessel will be secured per Section 107 of the NCDOT Standard Specifications[1].

Deployment of the Boater Safety System – the debris shield and lighted buoys will be put into place prior to the commencement of any work on the structure and moved periodically, as needed, to protect boaters from the construction activities. Deployment and redeployment will occur during daylight hours. The operation will occur from a barge and or a work skiff.

All deployment will be staged to prevent boater entrapment. The staging will progress such that work will start on the deployment and will continue each successive day until such time as the work area is protected. All construction activities on the staged work will be halted until such time as the containment barricade is in place and all work activities are adequately contained. All barricade lights will be operational as soon as the barricade is deployed in the water. The lights will be inspected daily and repaired immediately.

Staging Plan

Figure 1 shows the first stage of activity. Stage 1 will occur on the west end of the bridge, entirely within Catawba County. The red line on Figure 1, which is entirely in the water, shows an outline of the debris shield. Boaters will pass under the east end of the existing bridge.

Figure 2 shows the new bridge area of the second stage of activity. Stage 2 will occur on the east end of the bridge in Catawba and Iredell Counties. The red line on Figure 2, which is entirely in the water, shows an outline of the debris shield. Boaters will pass under the west end of the bridge. De-mobilization to remove all equipment and material will occur at the end of this period.

Figure 3 shows the road construction area of the second stage of activity. A new roadway section will be built in Iredell County that leads to the new bridge. The red line on Figure 3, which is entirely in the water, shows an outline of the debris shield. De-mobilization to remove all equipment and material will occur at the end of this period.

Schedule - (tentative)

A phased-approach is described below, dates to be determined:

Stage	Likely Start Date	Anticipated End Date	Activity
0			Procure materials
1			Stage 1(See Figure 1)
2			Stage 2 (See Figure 2 and 3)

Notes:

- Time restrictions (boaters or construction):
  - Under the bridge deck: none (operations can occur 24 hours per day / 7 days per week)
  - Boater Safety System – operational throughout the project
  - Repairs – as needed, anytime 24 hours per day / 7 days per week
  - All routine maintenance of boater safety system to occur between 6:00 AM and 7:00 PM

Other Considerations:

- Staging area for contractors' equipment / materials – will be located on Duke Energy property along Harvell Road. Harvell Road is approximately 0.5 miles west along NC 150 from end of bridge.

Standards

[1] NCDOT Standard Specifications for Roads and Structures, January 2024.
[2] Occupational Safety and Health Act (OSHA 29-CFR 1910-1926)

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	1

LAKE NORMAN

NAD 83

CATAWBA COUNTY
IREDELL COUNTY

MOVE /RELOCATE EXISTING NO WAKE BUOY 250' FROM PROPOSED BRIDGE

MOVE /RELOCATE EXISTING NO WAKE BUOY 250' FROM PROPOSED BRIDGE

840' +/-
WORK / STORAGE AREA
EB1 TO B5

415' +/-
BOAT PASSAGE – EX. B5 TO EX. B9

DEBRIS SHIELD WITH WHITE SOLAR WARNING LIGHTS AT 50' +/- INTERVALS

EXISTING NO WAKE BUOY

EXISTING NO WAKE BUOY

100' +/-

150' +/-

160' +/-

TO TERRELL

EB1 B1 B2 B3 B4 B5

SPAN A | SPAN B | SPAN C | SPAN D | SPAN E

100' 100' 150' 150' 150' 40'

TYPE M350

EX. B1 EX. B2 EX. B3 EX. B4 EX. B5 EX. B6 EX. B7 EX. B8 EX. B9

TO MOORESVILLE

250' +/-

150' +/-

660' +/-

EXISTING NO WAKE BUOY

LAKE NORMAN

STAGE 1

INSTALL /RELOCATE NO WAKE BUOY 250' FROM EXISTING BRIDGE (IN LINE WITH EX. B7)

FIGURE 1

GRAPHIC SCALE
50 25 0 50 100
PLANS

10/4/2024
R:\R-2307B\Structures\Boater Safety Plan\R-2307B_RDY_BOAT_SHT1 - Copy.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	2

LAKE NORMAN

NAD 83

CATAWBA COUNTY
IREDELL COUNTY

DEBRIS SHIELD WITH WHITE SOLAR WARNING LIGHTS AT 50' +/- INTERVALS

MOVE /RELOCATE EXISTING NO WAKE BUOY 250' FROM PROPOSED BRIDGE

MOVE /RELOCATE EXISTING NO WAKE BUOY 250' FROM PROPOSED BRIDGE

515' +/-
BOAT PASSAGE – B1 TO B4

660' +/-
WORK / STORAGE AREA – B5 TO EB2

EXISTING NO WAKE BUOY

EXISTING NO WAKE BUOY

100' +/-

150' +/-

58' +/-

TO TERRELL

EB1 B1 B2 B3 B4 B5 B6 B7 B8 EB2

SPAN A SPAN B SPAN C SPAN D SPAN E SPAN F SPAN G SPAN H SPAN I

100' 100' 150' 150' 150' 150' 150' 150' 120'

TYPE M350

TYPE B-77

EX. B1 EX. B2 EX. B3 EX. B4 EX. B5 EX. B6 EX. B7 EX. B8 EX. B9

TO MOORESVILLE

40' +/-

150' +/-

250' +/-

585' +/-

EXISTING NO WAKE BUOY

INSTALL /RELOCATE NO WAKE BUOY 250' FROM EXISTING BRIDGE (IN LINE WITH EX. B7)

LAKE NORMAN

STAGE 2

FIGURE 2

GRAPHIC SCALE
50 25 0 50 100
PLANS

MATCHLINE –L– STA 478+50
SEE SHEET 3

10/4/2024
R:\R-2307B\Structures\Booster Safety Plan\R-2307B_RDY_BOAT_SHT2 - Copy.dgn
kbaldwin

PROJECT REFERENCE NO.	SHEET NO.
R-2307B	3

NAD 83

915' +/-
WORK / STORAGE AREA

DEBRIS SHIELD WITH
WHITE SOLAR WARNING LIGHTS
AT 50' +/- INTERVALS

305' +/-
310' +/-
260' +/-

479+00
482+00
485+00
487+50

150' +/-
120' +/-
90' +/-
60'

MATCHLINE -L- STA 478+50
SEE SHEET 2

TYPE M350

CAT-7

STAGE 2

FIGURE 3

GRAPHIC SCALE
50 25 0 50 100
PLANS

10/4/2024
R:\R-2307B\Structures\Boater Safety Plan\R-2307B_RDY_BOAT_SHT3 - Copy.dgn
kbailey

PROJECT SPECIAL PROVISION

(10-18-95) (Rev. 9-19-23) 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 Environmental Management, DEQ State of North Carolina
Buffer Certification	Division of Environmental Management, DEQ State of North Carolina
FERC*	Federal Energy Regulatory Commission

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.

***FERC Permit is forthcoming.**

P-2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J.R. "JOEY" HOPKINS
SECRETARY

August 25, 2024

MEMORANDUM TO: Division Environmental and Construction Units

FROM: Michael A. Turchy, ECAP Group Leader
Environmental Analysis Unit

SUBJECT: Environmental Permits for the Improvements to NC 150 in Catawba and Iredell Counties Division 12, **TIP: R-2307.**

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	Individual Permit, dated 9/3/2020, Modification & Renewal 8/20/2024	Dec. 31, 2034
NC Division of Water Resources Section 401 Water Quality Certification	Individual Certification, dated 4/17/2019 Modification & Renewal 8/1/2024	Dec. 31, 2034
NC Division of Water Resources Catawba Riparian Buffer Authorization	Authorization, dated 4/17/2019 Modification & Renewal 8/1/2024	Dec. 31, 2034

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) or accompanying drawings is required.

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

P-3

Site 10: The previous design proposed a 9’ diameter precast manhole connecting an existing RCBC to a proposed 78” RCP at the downstream culvert extension at 784+50 RT (Permit Site 10). NCDOT determined that attaching a precast manhole to the existing RCBC is not feasible and would require a cast in place connection. To avoid this situation, the existing 5’W x 6’H RCBC will be extended. This will result in the outlet of the RCBC shifting 3’ west of the previous 78” RCP outlet. However, the inverts, lengths, and channel layout will remain the same. There are no changes to stream impacts.

Site 12: Permanent impact decreased from 28 to 27 linear feet due to a corrected measurement (The change is only reflected on the Impact Summary Sheet, no change to the plan view).

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, WILMINGTON DISTRICT
WILMINGTON REGULATORY OFFICE
69 DARLINGTON AVENUE
WILMINGTON NORTH CAROLINA 28403

August 20, 2024

Regulatory Program

Sent Via Email: jlwyatt@ncdot.gov

NC Department of Transportation
Natural Environment Section
Mr. Jeffrey Wyatt
Division Environmental Officer
P.O. Box 47
Shelby, NC 28151

Dear Mr. Wyatt:

Please reference the Department of the Army (DA) permit issued on September 3, 2020, for the NC 150 (R-2307 and I-5717) Improvement Project located along NC 150 between the intersection of NC 150 with the NC 16 Bypass in Catawba County and the NC 150 intersection with US 21 in Mooresville, Iredell County, North Carolina. Please additionally reference your June 4, 2024, letter requesting the extension of the expiration date of the project to December 31, 2034, the re-evaluation of the project with consideration of the project's effects on the proposed endangered species, the Tricolor Bat and minor changes to impacts to waters of the US. After review of the file and the modification request, we have determined that the proposed project revisions are minor, and a supplemental public notice is not necessary to authorize the modification. Accordingly, your permit is hereby modified to extend the expiration date of the permit to December 31, 2034, and to include the additional conditions and changes to project impacts as listed below.

Revised Wetland & Stream Impacts:

1. Site 3: Permanent Surface Water Impacts decreased from 3.11 acres to 3.079 acres due to minor slope stake changes at Lake Norman.
2. Site 3: Three temporary Surface Water Impacts were added down to elevation 750 ft on Permit Drawing Sheets 2-5. Temporary Surface Water Impacts increased from 0 to 0.070 acre.
3. Due to concerns from Duke Energy regarding boater safety and the alignment of bridge piers with the existing structure, the proposed bridge span arrangement was modified to better match the existing bridge. Permit Drawing Sheets 4-6 and associated footnote on the Impact Summary Sheet were updated.
4. Site 4: Permanent Surface Water Impacts decreased from 3.91 acres to 3.859 acres due to minor slope changes at Lake Norman.

5. Site 4: Two temporary Surface Water Impacts were added down to elevation 750 ft on Permit Drawing Sheets 7-8. Temporary Surface Water Impacts increased from 0 to 0.162 acre.
6. Site 10: The previous design proposed a 9’ diameter precast manhole connecting an existing RCBC to a proposed 78” RCP at the downstream culvert extension at 784+50 RT (Permit Site 10). NCDOT determined that attaching a precast manhole to the existing RCBC is not feasible and would require a cast in place connection. To avoid this situation, the existing 5’W x 6’H RCBC will be extended. This will result in the outlet of the RCBC shifting 3’ west of the previous 78” RCP outlet. However, the inverts, lengths, and channel layout will remain the same. There are no changes to stream impacts.
7. Site 12: Permanent impact decreased from 28 to 27 linear feet due to a corrected measurement (The change is only reflected on the Impact Summary Sheet, no change to the plan view).
8. Impact Summary Sheet: Impacts on the previous version were shown to nearest 0.01 acre and now show the nearest 0.001 acre.

2024 Modification SC.1

Endangered Species: In order to avoid and minimize effects to the tricolor bat, NCDOT will comply with the following measures:

1. Tree clearing will take place from October 16 to March 31, outside of the bat active season.
2. Tree clearing from December 15 – February 15 (the winter torpor season for tricolored bat in the year-round active zone 1) will be avoided and minimized to the maximum extent practical.
3. The existing bridge and culverts ≥ 3 feet in manufactured diameter within the action area will be surveyed during the summer of 2024. Additionally, structures will be surveyed within 30 days of letting. The U.S. Fish and Wildlife Service (Service) Asheville Field Office will be contacted immediately if bats are observed.
4. Temporary lighting for night work will be aimed at the direction of work to minimize lighting the surrounding landscape and will be turned off when not needed for project work.
5. The replacement of permanent lighting will be downcast and will not be in excess of what currently exists within the action area.
6. Should blasting occur, it will take place after tree clearing within the action area has been completed.

It is understood that all other conditions of the original permit remain applicable.

If you have any questions concerning this correspondence, please contact Crystal Amschler, WRDA Project Manager of the WRDA Transportation Branch at 828-526-6013, by mail at the above address, or by email at crystal.c.amschler@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,

Monte Matthews
Chief, Transportation Branch
Wilmington District, Regulatory

Enclosures

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
69 DARLINGTON AVENUE
WILMINGTON, NORTH CAROLINA 28403-1343

September 3, 2020

Regulatory Division

Action ID: SAW-2018-02343

Project Development and Environmental Analysis Unit,
Attn: Mr. Philip Harris, P.E.,
1548 Mail Service Center
Raleigh, NC 27699-1598

Dear Mr. Harris:

Enclosed is a Department of the Army permit for the NC 150 (R-2307 and I-5717) Improvement Project which involves the improvement of approximately 15 miles of existing NC 150 to a median-divided 'superstreet' facility which includes road widening (widened to a four or six-lane divided facility including curb and gutter and a multi-use path), replacing several bridges, and access management measures. Specifically, impacts will involve 1,634 linear feet of stream channel, 0.84 acres of wetlands and 13.18 acres of open water (based on final design for Section B and preliminary design for Section A and not including temporary impacts for Section A). The project is located along existing NC 150 and begins at the intersection of NC 150 with the NC 16 Bypass in Catawba County and extends approximately 15 miles northeast along NC 150 through Catawba County into Iredell County to terminate just west of the NC 150 intersection with US 21 in Mooresville, Iredell County, North Carolina. The project has been divided into two phases: Section A extends from NC 16 Bypass to SR 1902 (Harvel Road). Section B extends from Harvel Road to just west of the US 21/NC 150 Interchange and includes the I-5717 component, the I-77 interchange. This permit authorization includes final design and final impact numbers for Section B and preliminary designs and impacts for Section A. Approval for final design plans and impacts for Segment A will be completed through a permit modification. The Corps is issuing this permit in response to your written request of December 21, 2018 and the ensuing administrative record.

Any deviation in the authorized work will likely require modification of this permit. If a change in the authorized work is necessary, you should promptly submit revised plans to the Corps showing the proposed changes. You may not undertake the proposed changes until the Corps notifies you that your permit has been modified.

Carefully read your permit. The general and special conditions are important. Your failure to comply with these conditions could result in a violation of Federal law. Certain significant conditions require that:

a. You must complete construction before December 31, 2025

b. You must notify this office in advance as to when you intend to commence and complete work.

c. You must allow representatives from this office to make periodic visits to your worksite as deemed necessary to assure compliance with permit plans and conditions.

d. In order to compensate for impacts associated with this permit, mitigation shall be provided in accordance with the provisions outlined in the U.S. Army Corps of Engineers, Wilmington District, Compensatory Mitigation Responsibility Transfer Form. The requirements of this form, including any special conditions listed on this form, are hereby incorporated as special conditions of this permit authorization.

You should address all questions regarding this authorization to Crystal Amschler at the Asheville Regulatory Field Office, telephone (828) 271-7980 extension 4231.

FOR THE DISTRICT ENGINEER

Monte Matthews Date: 2020.09.03 08:00:29 -04'00'

Monte Matthews
Lead Project Manager

Enclosures

Project Development and Environmental Analysis Unit,
Attn: Mr. Michael Turchy.,
1548 Mail Service Center
Raleigh, NC 27699-1598

Mr. Todd Bowers
Wetlands Protection Section – Region IV
Water Management Division
U.S. Environmental Protection Agency
61 Forsyth Street, SW
Atlanta, Georgia 30303

Ms. Amy S. Chapman
Transportation Permitting Unit
NC Division of Water Quality
1617 Mail Service Center
Raleigh, NC 27699-1617

Ms. Marla Chambers
Western Region Highway Project Coordinator
NCWRC
12275 Swift Road
Oakboro, NC 28129

US Fish and Wildlife Service
Asheville Ecological Services Field Office
Attn: Byron Hamstead
160 Zillicoa Street
Asheville, NC 28801-1082

Ms. Renee Gledhill-Early
Environmental Review Coordinator
NC State Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 27699-4617

BCC (without enclosures) (via Email):

CESAW-RG-A/Crystal Amschler
CESAW-RG-R/Matthews
CESAW-RG/McLendon
CESAW-OC/Pruitt

P-10

DEPARTMENT OF THE ARMY PERMIT

Permittee **NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**
ATTN: MR. PHILIP S. HARRIS III, P.E., C.P.M.

Permit No. **SAW-2018-02343**

Issuing Office **CESAW-RG-A**

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: **The NC 150 (R-2307 and I-5717) Improvement Project involves the improvement of approximately 15 miles of existing NC 150 to a median-divided 'superstreet' facility which includes road widening (widened to a four or six-lane divided facility including curb and gutter and a multi-use path), replacing several bridges, and access management measures. Specifically, impacts will involve 1,634 linear feet of stream channel, 0.84 acres of wetlands and 13.18 acres of open water (based on final design for Section B and preliminary design for Section A and not including temporary impacts for Section A). The project is located along existing NC 150 and begins at the intersection of NC 150 with the NC 16 Bypass in Catawba County and extends approximately 15 miles northeast along NC 150 through Catawba County into Iredell County to terminate just west of the NC 150 intersection with US 21 in Mooresville, Iredell County, North Carolina. The project has been divided into two phases: Section A extends from NC 16 Bypass to SR 1902 (Harvel Road). Section B extends from Harvel Road to just west of the US 21/NC 150 Interchange and includes the I-5717 component, the I-77 interchange. This permit authorization includes final design and final impact numbers for Section B and preliminary designs and impacts for Section A. Approval for final design plans and impacts for Segment A will be completed through a permit modification.**

Project Location: **The project is located along existing NC 150 and begins at the intersection of NC 150 with the NC 16 Bypass in Catawba County and extends approximately 15 miles northeast along NC 150 through Catawba County into Iredell County to terminate just west of the NC 150 intersection with US 21 in Mooresville, Iredell County, North Carolina.**

Permit Conditions:

General Conditions:

P-11

1. The time limit for completing the work authorized ends on **December 31, 2025.** If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit,

Special Conditions:

SEE ATTACHED SPECIAL CONDITIONS

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

( ) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

*U.S. GOVERNMENT PRINTING OFFICE: 1986 - 717-425

2. Limits of this authorization.

   a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

   b. This permit does not grant any property rights or exclusive privileges.

   c. This permit does not authorize any injury to the property or rights of others.

   d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

   a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

   b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

   c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

   d. Design or construction deficiencies associated with the permitted work.

   e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

   a. You fail to comply with the terms and conditions of this permit.

   b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

   c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures

*U.S. GOVERNMENT PRINTING OFFICE: 1986 - 717-425

provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit, Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

Carla Dagnino September 2, 2020

For/ for

(PERMITTEE) **NORTH CAROLINA DEPARTMENT OF TRANSPORTATION** *(DATE)*
MR. PHILIP S. HARRIS III, P.E., C.P.M.

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

FOR THE DISTRICT ENGINEER

FOR - Monte Matthews Date: 2020.09.03 08:03:54 -04'00'

(DISTRICT COMMANDER) **BENJAMIN A. BENNETT, COLONEL** *(DATE)*

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(TRANSFEREE) *(DATE)*

*U.S. GOVERNMENT PRINTING OFFICE: 1986 - 717-425

SPECIAL CONDITIONS
Action ID: SAW-2018-02343
R-2307 and I-5717

1. **Phased Permit:** This permit only authorizes work on Segment B of the NC 150 R2307 Improvement Project. Construction on Segment A shall not commence until: (a) final design has been completed for those sections and submitted to the U.S. Army Corps of Engineers (Corps); (b) the Permittee has minimized impacts to waters and wetlands to the maximum extent practicable and the Corps concurs with this assessment through standard Merger 4B and 4C meetings; (c) any modification to the plans have been approved by the Corps in writing; and (d) a final compensatory mitigation plan has been submitted by the Permittee and approved by the Corps.

2. **Work Limits:** All work authorized by this permit shall be performed in strict compliance with the attached permit plans dated 7/11/2018, which are a part of this permit. The Permittee shall ensure that the construction design plans for this project do not deviate from the permit plans attached to this authorization. Any modification to the attached permit plans must be approved by the US Army Corps of Engineers prior to any active construction in waters or wetlands.

3. **Unauthorized Dredge or Fill:** Except as authorized by this permit or any U.S. Army Corps of Engineers approved modification to this permit, no excavation, fill, or mechanized land-clearing activities shall take place at any time in the construction or maintenance of this project, within waters or wetlands, or shall any activities take place that cause the degradation of waters or wetlands. There shall be no excavation from, waste disposal into, or degradation of, jurisdictional wetlands or waters associated with this permit without appropriate modification of this permit, including appropriate compensatory mitigation. This prohibition applies to all borrow and waste activities connected with this project. In addition, except as specified in the plans attached to this permit, no excavation, fill or mechanized land-clearing activities shall take place at any time in the construction or maintenance of this project, in such a manner as to impair normal flows and circulation patterns within, into, or out of waters or wetlands or to reduce the reach of waters or wetlands

4. **Permit Distribution:** The Permittee shall require its contractors and/or agents to comply with the terms and conditions of this permit 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 permit. A copy of this permit, including all conditions, drawings and attachments shall be available at the project site during the construction and maintenance of this project.

5. **Pre-Construction Meeting:** The Permittee shall schedule and attend a preconstruction meeting between its representatives, the contractors representatives, and the U.S. Army Corps of Engineers, Asheville Field Office, NCDOT Regulatory Project Manager, prior to any work within jurisdictional waters and wetlands to ensure that there is a mutual understanding of all the terms and conditions contained with this

SPECIAL CONDITIONS
Action ID: SAW-2018-02343
R-2307 and I-5717

Department of Army Permit. The Permittee shall provide the Corps, Asheville Field Office, NCDOT Project Manager, with a copy of the final permit plans at least two weeks prior to the preconstruction meeting along with a description of any changes that have been made to the project's design, construction methodology or construction timeframe. The Permittee shall schedule the preconstruction meeting for a time frame when the Corps, NCDCM, and NCDWQ Project Managers can attend. The Permittee shall invite the Corps, NCDCM, and NCDWQ Project Managers a minimum of thirty (30) days in advance of the scheduled meeting in order to provide those individuals with ample opportunity to schedule and participate in the required meeting. The thirty (30) day requirement can be waived with the concurrence of the Corps.

6. **Notification of Construction Commencement and Completion:** The Permittee shall notify the U.S. Army Corps of Engineers in writing prior to beginning the work authorized by this permit and again upon completion of the work authorized by this permit.

7. **Reporting Address:** All reports, documentation, and correspondence required by the conditions of this permit shall be submitted to the following: U.S. Army Corps of Engineers, Wilmington District Asheville Regulatory Field Office, Attn: Crystal Amschler 151 Patton Avenue, Room 208 or Crystal.C.Amschler@usace.army.mil. The Permittee shall reference the following permit number, SAW-2018-02343, on all submittals.

8. **Permit Revocation:** The Permittee, upon receipt of a notice of revocation of this permit or upon its expiration before completion of the work will, without expense to the United States and in such time and manner as the Secretary of the Army or his authorized representative may direct, restore the water or wetland to its pre-project condition.

9. **Reporting Violations:** Violation of these permit conditions or violation of Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act shall be reported to the Corps in writing and by telephone at: 828-271-7980 within 24 hours of the Permittee's discovery of the violation.

10. **Clean Fill:** The Permittee shall use only clean fill material for this project. The fill material shall be free from items such as trash, construction debris, metal and plastic products, and concrete block with exposed reinforcement bars. Soils used for fill shall not be contaminated with any toxic substance in concentrations governed by Section 307 of the Clean Water Act. Unless otherwise authorized by this permit, all fill material placed in waters or wetlands shall be generated from an upland source.

11. **Endangered Species Act:** The Permittee shall implement all necessary measures to ensure the authorized activity does not kill, injure, capture, harass, or otherwise harm any federally-listed threatened or endangered species. While accomplishing the authorized work, if the Permittee discovers or observes an injured or dead threatened or endangered species, the U.S. Army Corps of Engineers, Wilmington District Asheville

SPECIAL CONDITIONS
Action ID: SAW-2018-02343
R-2307 and I-5717

Regulatory Field Office, Attn: Crystal Amschler, 151 Patton Avenue, Room 208 or Crystal.C.Amschler@usace.army.mil will be immediately notified to initiate the required Federal coordination.

A. Habitat is present within the project corridor for the Dwarf-flowered heartleaf (*Hexastylis naniflora*) (Iredell and Catawba) and the Schweinitz's sunflower *(Helianthus schweinitzii)* (Catawba). Surveys were conducted for these species on October 24, 2018 and no species were found. The survey for the Dwarf-flowered heartleaf is good for 5 years and the survey for the Schweinitz's sunflower is good for 2 years. As such, new surveys will need to be conducted for these species within permit areas for Segment A and will also need to be conducted for Segment B if construction is not complete prior to survey expiration.
B. Habitat is present within the project corridor for the Northern long- eared bat (NLEB) (*Myotis septentrionalis)*. In order to avoid impacts to potential roosting NLEB, NCDOT will do the following:
    a. Inspect existing bridges prior to demolition or other work that may affect the NLEB, for the presence of federally listed bats and contact the Corps and FWS if any bats are observed

12. **Culverts:**

1) Unless otherwise requested in the application and depicted on the approved permit plans, culverts greater than 48 inches in diameter shall be buried at least one foot below the bed of the stream or, if prior approval given, set at the current stream bed elevation. Culverts 48 inches in diameter and less shall be buried or placed on the stream bed as practicable and appropriate to maintain aquatic passage, and every effort shall be made to maintain existing channel slope. Culverts shall be designed and constructed in a manner that minimizes destabilization and head cutting.

2) Measures shall be included in the construction/installation that will promote the safe passage of fish and other aquatic organisms. The dimension, pattern, and profile of the stream above and below a pipe or culvert shall not be modified by widening the stream channel or by reducing the depth of the stream in connection with the construction activity. The width, height, and gradient of a proposed opening shall be such as to pass the average historical low flow and spring flow without adversely altering flow velocity. Spring flow should be determined from gauge data, if available. In the absence of such data, bankfull flow can be used as a comparable level.

3) The Permittee shall implement all reasonable and practicable measures to ensure that equipment, structures, fill pads, work, and operations associated with this project do not adversely affect upstream and/or downstream reaches. Adverse effects include, but are not limited to, channel instability, flooding, and/or stream bank erosion. The Permittee shall routinely monitor for these effects, cease all work when detected, take initial corrective measures to correct actively eroding areas, and notify this office immediately. Permanent corrective measures may require additional authorization by the U.S. Army Corps of Engineers.

SPECIAL CONDITIONS
Action ID: SAW-2018-02343
R-2307 and I-5717

4) Culverts placed within wetlands must be installed in a manner that does not restrict the flows and circulation patterns of waters of the United States. Culverts placed across wetland fills purely for the purposes of equalizing surface water shall not be buried, but the culverts must be of adequate size and/or number to ensure unrestricted transmission of water.

13. **Sediment and Erosion Control:**

1) During the clearing phase of the project, heavy equipment shall not be operated in surface waters or stream channels. Temporary stream crossings will be used to access the opposite sides of stream channels. All temporary diversion channels and stream crossings will be constructed of non-erodible materials. Grubbing of riparian vegetation will not occur until immediately before construction begins on a given segment of stream channel.

2) No fill or excavation impacts for the purposes of sedimentation and erosion control shall occur within jurisdictional waters, including wetlands, unless the impacts are included on the plan drawings and specifically authorized by this permit. This includes, but is not limited to, sediment control fences and other barriers intended to catch sediment losses.

3) The Permittee shall remove all sediment and erosion control measures placed in waters and/or wetlands, and shall restore natural grades on those areas, prior to project completion.

4) The Permittee shall use appropriate sediment and erosion control practices which equal or exceed those outlined in the most recent version of the “North Carolina Sediment and Erosion Control Planning and Design Manual” to ensure compliance with the appropriate turbidity water quality standard. Erosion and sediment control practices shall be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices in order to ensure compliance with the appropriate turbidity water quality standards. This shall include, but is not limited to, the immediate installation of silt fencing or similar appropriate devices around all areas subject to soil disturbance or the movement of earthen fill, and the immediate stabilization of all disturbed areas. Additionally, the project shall remain in full compliance with all aspects of the Sedimentation Pollution Control Act of 1973 (North Carolina General Statutes Chapter 113A, Article 4). Adequate sedimentation and erosion control measures shall be implemented prior to any ground disturbing activities to minimize impacts to downstream aquatic resources. These measures shall be inspected and maintained regularly, especially following rainfall events. All fill material shall be adequately stabilized at the earliest practicable date to prevent sediment from entering into adjacent waters or wetlands.

14. **Temporary Fills:** Within thirty (30) days of the date of completing the authorized work, the Permittee shall remove all temporary fills in waters of the United States and

restore the affected areas to pre-construction contours and elevations. The affected areas shall be re-vegetated with native, non-invasive vegetation as necessary to minimize erosion and ensure site stability.

15. **Borrow and Waste:** To ensure that all borrow and waste activities occur on high ground and do not result in the degradation of adjacent waters and wetlands, except as authorized by this permit, the Permittee shall require its contractors and/or agents to identify all areas to be used as borrow and/or waste sites associated with this project. The Permittee shall provide the U.S. Army Corps of Engineers with appropriate maps indicating the locations of proposed borrow and/or waste sites as soon as such information is available. The Permittee shall submit to the Corps site-specific information needed to ensure that borrow and/or waste sites comply with all applicable Federal requirements, to include compliance with the Endangered Species Act and the National Historic Preservation Act, such as surveys or correspondence with agencies (e.g., the USFWS, the NC-HPO, etc.). The required information shall also include the location of all aquatic features, if any, out to a distance of 400 feet beyond the nearest boundary of the site. The Permittee shall not approve any borrow and/or waste sites before receiving written confirmation from the Corps that the proposed site meets all Federal requirements, whether or not waters of the U.S. , including wetlands, are located in the proposed borrow and/or waste site. All delineations of aquatic sites on borrow and/or waste sites shall be verified by the U.S. Army Corps of Engineers and shown on the approved reclamation plans. The Permittee shall ensure that all borrow and/or waste sites comply with Special Condition 3 of this permit. Additionally, the Permittee shall produce and maintain documentation of all borrow and waste sites associated with this project. This documentation will include data regarding soils, vegetation, hydrology, any delineation(s) of aquatic sites, and any jurisdictional determinations made by the Corps to clearly demonstrate compliance with Special Condition 3. All information will be available to the U.S. Army Corps of Engineers upon request. The Permittee shall require its contractors to complete and execute reclamation plans for each borrow and/or waste site and provide written documentation that the reclamation plans have been implemented and all work is completed. This documentation will be provided to the U.S. Army Corps of Engineers within 30 days of the completion of the reclamation work.

16. **Compensatory Mitigation:** 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 Form. The requirements of this form, including any special conditions listed on this form, are hereby incorporated as special conditions of this permit.

17. **Compliance Inspection:** A representative of the Corps of Engineers will periodically and randomly inspect the work for compliance with these conditions. Deviations from these procedures may result in an administrative financial penalty and/or directive to cease work until the problem is resolved to the satisfaction of the Corps.

SPECIAL CONDITIONS
Action ID: SAW-2018-02343
R-2307 and I-5717

18. **NCDWR 401 Cert**: In accordance with 33 U.S.C. 1341(d), all conditions of the North Carolina Division of Water Resources 401 Water Quality Certification No. 3845 dated April 17, 2019 are hereby incorporated as special conditions of this permit

19. **Prohibitions on Concrete:** The permittee shall take measures to prevent live or fresh concrete, including bags of uncured concrete, from coming into contact with any water in or entering into waters of the United States. Water inside coffer dams or casings that has been in contact with concrete shall only be returned to waters of the United States when it no longer poses a threat to aquatic organisms (concrete is set and cured).

20. **Discovery of Previously Unknown Remains and Artifacts:** If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

21. **Segment A, Affects to Navigation Evaluation:** Once final plans are completed for Segment A, information regarding potential effects to navigation for the two bridge replacements over Lake Norman on NC 150 in Segment A should be included with the permit modification request. Information should include temporary and permanent impacts to lake users, the boater's safety plan and verification that the bridge replacements will be designed in accordance with the Lake Norman Management Plan.

Docusign Envelope ID: 1AAE3601-3816-4E61-9073-997EDBFB498C

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
RICHARD E. ROGERS, JR.
Director

NORTH CAROLINA
Environmental Quality

August 1, 2024
Catawba and Iredell Counties
NCDWR Project No 20181732 V 2
TIP# R-2307AB and I-5717
WBS# 37944.1.FR5
STP# 150(19)

APPROVAL of 401 WATER QUALITY CERTIFICATION and CATAWBA BUFFER APPROVAL with ADDITIONAL CONDITIONS

Mr. Michael Turchy
NCDOT, Environmental Analysis Unit
1598 Mail Service Center
Raleigh, NC 27699-1598
MATurchy@NCDOT.gov

Subject: Modification/Revision **to** 401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act and Catawba Riparian Buffer Impacts with ADDITIONAL CONDITIONS for Proposed improvement to Highway 150 from the intersection with the Highway 16 bypass in Lincoln County to intersection with Highway 21 in Iredell County, including the I-77/Highway 150 interchange, improvements for the whole project are in Lincoln, Catawba, and Iredell Counties, Federal Aid Project No. STP-150(19), State Project No. R-2307AB, I-5717, NCDWR Project No. 20181732 V 2

Dear Mr. Turchy:

Attached hereto is a copy of Water Quality Certification No. 004181 issued to the NCDOT dated August 1, 2024.

This approval is for the purpose and design described in your application dated December 21, 2018, and modification application dated June 3, 2024. This modification/revision approval replaces the one issued April 17, 2019. Please be advised that this project is being constructed under a phased permit. As of the date of its issuance, only impacts for R-2307B and I-5717 are permitted. Before construction can begin on R-2307A, an individual permit must be issued with final design impact numbers on streams, wetlands, and Catawba buffers, as applicable, as well as an updated letter from Division of Mitigation Services.

Additionally, this project has known, and unknown areas of coal ash fill along the entirety of the project. Those areas, whether known or discovered during construction, are subject to the Coal Ash Management Act, North Carolina General Statute 130A-309. Ground disturbance of those properties is subject to the Act.

This letter completes the review of the Division under section 401 of the Clean Water Act, 15A NCAC 02H .0500, and the Catawba Riparian Buffer Rules as described in 15A NCAC 02B.0614. Please contact Mary Plummer at 704-235-2193 or Mary.Plummer@deq.nc.gov if you have any questions or concerns.

Sincerely,
DocuSigned by:
Susan Locklear
04351F033762414...
Richard E. Rogers Jr., Director
Division of Water Resources

Docusign Envelope ID: 1AAE3601-3816-4E61-9073-997EDBFB498C

Electronic copy only distribution:
Crystal Amschler, US Army Corps of Engineers, Asheville Field Office
Rebekah Reid, US Fish and Wildlife Service
David McHenry, NC Wildlife Resources Commission
Jeff Wyatt, NC Department of Transportation, Division 12
Amanetta Somerville, US Environmental Protection Agency
Beth Harmon, Division of Mitigation Services
File Copy

401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act and CATAWBA BUFFER RULES 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 .0243. This certification authorizes the NCDOT to impact 522 linear feet of streams, .061 acres of jurisdictional wetlands, 7.946 acres of open water, and 35,072 square feet in the Catawba River Buffer in Catawba and Iredell Counties. The project shall be constructed pursuant to your application dated and received December 21, 2018, and the modification/revision dated June 3, 2024. The authorized impacts are as described below:

Stream Impacts (Linear Feet) in the Catawba River Basin.

Site	Permanent Fill in Perennial Stream	Permanent Fill in Intermittent Stream	Temporary Fill in Perennial Stream	Total Stream Impacts	Stream Impacts Requiring Mitigation
	Culvert				
7 L 554+25/554+82 LT	-	117	-	**117**	**117**
8 L 755+17/755+36 LT	39	-	-	**39**	**39**
9 L 755+24/755+53 RT	68	-	17	**85**	**68**
10 L 784+30/784+87 RT	97	-	20	**117**	**97**
11 L 792+60/793+23 RT	98	-	19	**117**	**98**
12 L 793+40/793+49 LT	27	-	20	**47**	**27**
Totals	**329**	**117**	**76**	**522**	**446**
	446				

Total Stream Impacts for Project: 522 Linear Feet.

Catawba Riparian Buffer Impacts (Square Feet).

Site	Zone 1	Minus Wetlands in Zone 1	=Zone 1 Buffer (Not Wetlands)	Zone 1 Buffer Mitigation Required (1:1 Ratio)	Zone 2	Minus Wetlands in Zone 2	=Zone 2 Buffers (Not Wetlands)	Zone 2 Biffer Mitigation Required (1:1Ratio)	Total Buffer Mitigation
Lake Norman	20,142	-	20,142	20,142	14,930	-	14,930	14,930	35,072
Totals	**20,142**	**-**	**20,142**	**20,142**	**14,930**	**-**	**14,930**	**14,930**	**35,072**

Total Riparian Buffer Impacts for Project: 35,072 Square Feet.

Docusign Envelope ID: 1AAE3601-3816-4E61-9073-997EDBFB498C

Wetland Impacts (Acres) in the Catawba River Basin (Riverine).

Site	Permanent Fill		Total Wetland Impacts	Wetland Impacts Requiring Mitigation
	Pipe & Roadway	Mechanized Clearing		
7 L 554+25/554+82 LT	.051	.01	**.061**	**.061**
Totals	**.051**	**.01**		
	.061			

Total Wetland Impacts for Project: 0.061 Acres.

Open Water (Lake/River) Impacts in the Catawba River Basin.

Site	Permanent Fill		Temporary Fill		Totals
	Pipe w/Rip Rap	Causeway	Pipe w/Rip Rap	Causeway	
1 L 453+21/453+40 LT	.001	-	.006	-	**.007**
2 L 458+40/458+74 LT	.006	-	.016	-	**.022**
3 L 458+21/467+07 LT	-	3.079	-	.70	**3.779**
4 L 476+33/488+33 LT	-	3.859	-	.162	**4.021**
5 L 487+17/488+00 LT	.014	-	.019	-	**.033**
6 L 519+88/520+50 RT	.02	-	.064	-	**.084**
Totals	**.041**	**6.938**	**.105**	**.862**	**7.946**
	6.979		**.967**		

Total Open Water Impacts for Project: 7.946 Acres.

This application provides adequate assurance that the discharge of fill material into waters of the Catawba 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 Section 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 valid solely for the purpose and design described in your application dated and received December 21, 2018, and modification/revision dated June 3, 2024. Should your project change, you must 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 one acre or 300 linear feet, respectively, additional compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h)(6) and (7). Additional buffer impacts may require compensatory mitigation as described in 15A NCAC 2B .0243. 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 date as the expiration date of the corresponding Corps

If you are unable to comply with any of the conditions below, you must notify the DWR Transportation Permitting Branch within 24 hours (or the next business day if a weekend or holiday) from the time the permittee becomes aware of the circumstances. The permittee shall report to the NC Division of Water Resources any noncompliance with the conditions of this Authorization Certificate and/or any violation of state regulated Catawba riparian buffer rules .0614. Information shall be provided orally within 24 hours (or the next business day if a weekend or holiday) from the time the applicant became aware of the circumstances.

Docusign Envelope ID: 1AAE3601-3816-4E61-9073-997EDBFB498C

Condition(s) of Approval and Certification:

1. All riparian buffers impacted by the placement of temporary fill or clearing activities shall be restored to the preconstruction contours and revegetated. Maintained buffers shall be permanently revegetated with non-woody species by the end of the growing season following completion of construction. For the purpose of this condition, maintained buffer areas are defined as areas within the transportation corridor that will be subject to regular NCDOT maintenance activities including mowing. The area with non-maintained buffers shall be permanently revegetated with native woody species before the next growing season following completion of construction. [15A NCAC 02B.0614]

2. Pursuant to 15A NCAC 2B.0614. sediment and erosion control devices shall not be placed in Zone 1 of any Catawba Buffer without prior approval by the NCDWR. At this time, the NCDWR has approved no sediment and erosion control devices in Zone 1, outside of the approved project impacts, anywhere on this project. Moreover, sediment and erosion control devices shall be allowed in Zone 2 of the buffers provided that Zone 1 is not compromised, and that discharge is released as diffuse flow.

3. All stormwater runoffs shall be directed as sheetflow through stream buffers at non-erosive velocities, unless otherwise approved by this certification. Sheetflow requirements are waived per request with low velocities achieved per submitted plans and email. [15A NCAC 02B.0614]

4. Native riparian vegetation (i.e., 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.0614] & [15A NCAC 02B.0506(b)(2)]

Project Specific Conditions

1. This project has known, and potentially unknown, coal ash fill areas. Additional requirements will be needed to ensure compliance with the Coal Ash Management Act of North Carolina. Please see the sited NCGS for additional requirements. NCGS 130A-309

2. The NCDOT Division Environmental Officer or Environmental Assistant will conduct a pre-construction meeting with all appropriate staff to ensure that the project supervisor and essential staff understand the potential issues with stream and pipe alignment at the permitted sites. NCDWR staff shall be invited to the pre-construction meeting. [15A NCAC 02H.0506 (b)(2) and (b)(3)]

3. The NCDOT shall be in compliance with the NCS00250 issued to the NCDOT, including the applicable requirements of the NCG01000. Please note the extra protections for the sensitive watersheds.

4. The post-construction removal of any temporary bridge structures must return the project site to its preconstruction contours and elevations. The impacted areas shall be revegetated with appropriate native species. [15A NCAC 02H .0506(b)(2)

5. All portions of the proposed project draining to 303(d) listed watersheds that are impaired due to turbidity shall be designed, constructed, and operated with sediment and erosion control measures that meet Design Standards in Sensitive Watersheds (15A NCAC 4B .0124). However, due to the size of the project, NCDOT shall not be required to meet 15A NCAC 4B .0124(a) regarding the maximum amount of uncovered acres.

6. All portions of the proposed project draining to 303(d) listed watersheds that are impaired due to biological criteria exceedances shall not discharge stormwater directly to surface waters. Storm water shall be treated using appropriate best management practices (e.g., vegetated conveyances, constructed wetlands, detention ponds, etc.) prior to discharging to surface waters.

7. The NCDOT shall design, construct, and operate and maintain hazardous spill catch basins (HSCBs) at lake crossings within the WS CA watershed. The HSCBs shall be located at Station numbers L Sta 456+00 and 487+00. [15A NCAC 02B.0200]

Docusign Envelope ID: 1AAE3601-3816-4E61-9073-997EDBFB498C

8. As a condition of this 401 Water Quality Certification, the bridge demolition and construction must be accomplished in strict compliance with the most recent version of NCDOT's Best Management Practices for Construction and Maintenance Activities. [15A NCAC 02H .0507(d)(2) and 15A NCAC 02H .0506(b)(5)]

9. Bridge deck drains shall not discharge directly into the stream. Stormwater shall be directed across the bridge and pre-treated through site-appropriate means (grassed swales, pre-formed scour holes, vegetated buffers, etc.) before entering the stream. To meet the requirements of NCDOT's NPDES permit, please refer to the most recent version of the *North Carolina Department of Transportation Stormwater Best Management Practices Toolbox* for approved measures. [15A NCAC 02H .0507(d)(2) and 15A NCAC 02H .0506(b)(5)]

10. Bridge piles and bents shall be constructed using driven piles (hammer or vibratory) or drilled shaft construction methods. More specifically, jetting or other methods of pile driving are prohibited without prior written approval from the NCDWR first. [15A NCAC 02H.0506(b)(2)]

11. No drill slurry or water that has been in contact with uncured concrete shall be allowed to enter surface waters. This water shall be captured, treated, and disposed of properly. [15A NCAC 02H .0506(b)(3)

12. A turbidity curtain will be installed in the stream if driving or drilling activities occur within the stream channel, on the stream bank, or within 5 feet of the top of bank, or during the removal of bents from an old bridge. This condition can be waived with prior approval from the NCDWR. [15A NCAC 02H .0506(b)(3)

13. All bridge construction shall be performed from the existing bridge, temporary work bridges, temporary causeways, or floating or sunken barges. If work conditions require barges, they shall be floated into position and then sunk. The barges shall not be sunk and then dragged into position. Under no circumstances should barges be dragged along the bottom of the surface water. [15A NCAC 02H .0506(b)(3)

14. Existing stream dimensions (including pattern and profile) are to be maintained above and below locations of each culvert. The structures 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)]

15. Unless otherwise approved in this certification, placement of culverts and other structures in open waters and streams, shall be placed below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20 percent of the culvert diameter for culverts having a diameter less than 48 inches, to allow low flow passage of water and aquatic life. Design and placement of culverts and other structures including temporary erosion control measures shall not be conducted in a manner that may result in dis-equilibrium of wetlands or streambeds or banks, adjacent to or upstream and downstream of the above structures. The applicant is required to provide evidence that the equilibrium is being maintained if requested in writing by the NCDWR. If this condition is unable to be met due to bedrock or other limiting features encountered during construction, please contact the NCDWR for guidance on how to proceed and to determine whether or not a permit modification will be required. [15A NCAC 02H.0506(b)(2)]

16. If multiple pipes or barrels are required, they shall be designed to mimic natural stream cross sections as closely as possible including pipes or barrels at flood plain elevation and/or sills where appropriate. Widening the stream channel should be avoided. Stream channel widening at the inlet or outlet end of structures typically decreases water velocity causing sediment deposition that requires increased maintenance and disrupts aquatic life passage. [15A NCAC 02H.0506(b)(2)]

17. Riprap shall not be placed in the active thalweg channel or placed in the streambed in a manner that precludes aquatic life passage. Bioengineering boulders or structures should be properly designed, sized and installed. [15A NCAC 02H.0506(b)(2)]

18. The stream channel shall be excavated no deeper than the natural bed material of the stream, to the maximum extent practicable. Efforts must be made to minimize impacts to the stream banks, as well as to vegetation

Docusign Envelope ID: 1AAE3601-3816-4E61-9073-997EDBFB498C

responsible for maintaining the stream bank stability. Any applicable riparian buffer impact for access to stream channel shall be temporary and be revegetated with native riparian species. [15A NCAC 02H.0506(b)(2)]

19. Pipes and culverts used exclusively to maintain equilibrium in wetlands, where aquatic life passage is not a concern, shall not be buried. These pipes shall be installed at natural ground elevation.

20. Wetland areas impacted by temporary clearing shall be stabilized and reseeded with native wetland seed. [15A NCAC 02H.0506(b)]

21. Due to the possibility that compaction and/or other site alterations might prevent the temporary wetland impact area from re-attaining jurisdictional wetland status; the permittee shall provide an update on the wetland areas temporarily impacted. This update shall be conducted two growing seasons after completion of the work and shall consist of photographs and a brief report on the progress of the areas in re-attaining wetland jurisdictional status. Upon submission of this update to the NCDWR, the permittee shall schedule an agency field meeting with the NCDWR to determine if the wetland areas temporarily impacted by this project have re-attained jurisdictional wetland status. If the wetland areas temporarily impacted by this project have not re-attained jurisdictional wetland status, the NCDWR shall determine if additional compensatory wetland mitigation is to be required.

22. Compensatory mitigation for 446 linear feet of impacts to streams is required. We understand that you have chosen to perform compensatory mitigation for impacts to streams through the North Carolina Division of Mitigation Service (DMS) (formerly NCEEP), and that the DMS has agreed to implement the mitigation for the project. The DMS has indicated in a letter dated December 19, 2018, that they will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for the above-referenced project, in accordance with the DMS Mitigation Banking Instrument signed July 28, 2010.

23. Compensatory mitigation for impacts to 20,142 square feet of protected riparian buffers in Zone 1 and 14,930 square feet of protected riparian buffers in Zone 2 shall be required. We understand that you have chosen to perform compensatory mitigation for impacts to protected buffers through use of the North Carolina Division of Mitigation Services (DMS) (formerly NCEEP). Mitigation for unavoidable impacts to Catawba Riparian Buffers shall be provided in the Catawba River Basin and done in accordance with 15A NCAC .02B .0295**.** The DMS has indicated in a letter dated December 19, 2018, that they will assume responsibility for satisfying the compensatory mitigation requirements for the above-referenced project, in accordance with DMS's Mitigation Banking Instrument signed June 14, 2016.

24. Compensatory mitigation for impacts to .061 acres of riverine wetlands is required. We understand that you have chosen to perform compensatory mitigation for impacts to wetlands through the North Carolina Division of Mitigation Services (DMS) (formerly NCEEP), and that the DMS has agreed to implement the mitigation for the project. DMS has indicated in a letter dated December 19, 2018, that they will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for the above-referenced project, in accordance with DMS's Mitigation Banking Instrument signed July 28, 2010.

General Conditions

1. 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)]

2. 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)]

Docusign Envelope ID: 1AAE3601-3816-4E61-9073-997EDBFB498C

3. 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)]

4. All work in or adjacent to stream waters shall be conducted per approved BMP measures from the most current version of NCDOTs Construction and Maintenance Activities manual. [15A NCAC 02H.0506(b)(3) and (c)(3)]

5. 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)]

6. Stormwater shall be directed to vegetated buffer areas, grass-lined ditches or other means appropriate to the site for the purpose of pre-treating storm water runoff prior to discharging directly into streams. (15A NCAC 02B.0224 and .0225)

7. 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]

8. 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)]

9. The dimensions, 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)]

10. The use of rip-rap above the Normal High-Water Mark shall be minimized. Any rip-rap 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)]

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. All fill slopes located in jurisdictional wetlands shall be placed at slopes no flatter than 3:1, unless otherwise authorized by this certification. [15A NCAC 02H.0506(b)(2)]

15. 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)]

16. The outside buffer, wetland or water boundary located within the construction corridor approved by this authorization 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]

Docusign Envelope ID: 1AAE3601-3816-4E61-9073-997EDBFB498C

17. 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.

18. 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)]

19. Upon completion of the project (including any impacts at associated borrow or waste sites), an appointee shall complete and return the enclosed "Certification of Completion Form" to notify the NCDWR when all work included in the 401 Certification has been completed. [15A NCAC 02H.0502(f)]

20. Native riparian vegetation 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 02H.0506(b)(3) and (c)(3)]

21. 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)]

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 water 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. Where placement of sediment and erosion control devices in wetlands and/or waters is unavoidable, they shall be removed, and the natural grade restored upon completion of the project. [15A NCAC 02H.0506(b)(3) and (c)(3)]

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 *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.

Docusign Envelope ID: 1AAE3601-3816-4E61-9073-997EDBFB498C

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. 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.

29. If the project occurs in water or watersheds classified as Primary Nursery Areas (PNAs), SA, WS-1, WS-II, High Quality Waters (HQW), or Outstanding Resource Waters (ORW), then the sedimentation and erosion control designs shall comply with the requirements set forth in 15A NCAC 04B .0124, *Design Standards in Sensitive Watersheds* [15A NCAC 02H.0506(b)(3) and (c)(3); GC 4135]

30. Sediment and erosion control measures shall not be placed in wetlands or surface waters, or within 5 feet of the top of the bank, without prior approval from DWR. [15A NCAC 02H.0506(b)(3) and (c)(3)]

Violations of any condition herein set forth may result in revocation of this Certification and may result in criminal and/or civil penalties. 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.

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 Authorization shall expire five (5) years from the date of this letter.
This letter completes the review of the Division under the Catawba Riparian Buffer Rules as described in 15A NCAC 02B.0614. Please contact Mary Plummer at Mary.Plummer@deq.nc.gov or 704-235-2193 if you have any questions or concerns.

Docusign Envelope ID: 1AAE3601-3816-4E61-9073-997EDBFB498C

This the 1st of August 2024

DIVISION OF WATER RESOURCES

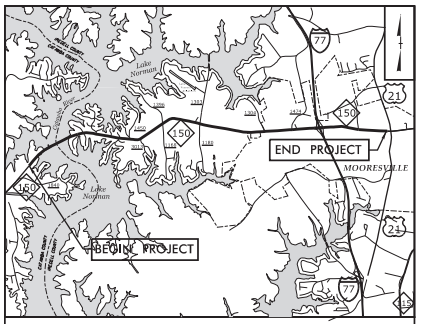
DocuSigned by:
Susan Locklear
04351F033762414...

Richard E. Rogers Jr., Director

WQC No. 004181

CONTRACT: TIP PROJECTS: R–2307B & I–5717

See Sheet 1-A For Index of Sheets



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CATAWBA & IREDELL COUNTIES

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R–2307B, I–5717	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
37944.1.FR5	STP–0150(36)	PE (R–2307B)
50134.1.FS1	NHPP–077–1(221)37	PE (I–5717)
37944.2.4	STP–0150(036)	R/W (R–2307B)
37944.2.5	STP–0150(036)	UTILITIES (R–2307B)
50134.2.1	NHPP–077–1(221)37	R/W, UTILITIES (I–5717)

LOCATION: NC 150 FROM SR 1840 (GREENWOOD RD) IN CATAWBA COUNTY TO US 21 IN IREDELL COUNTY

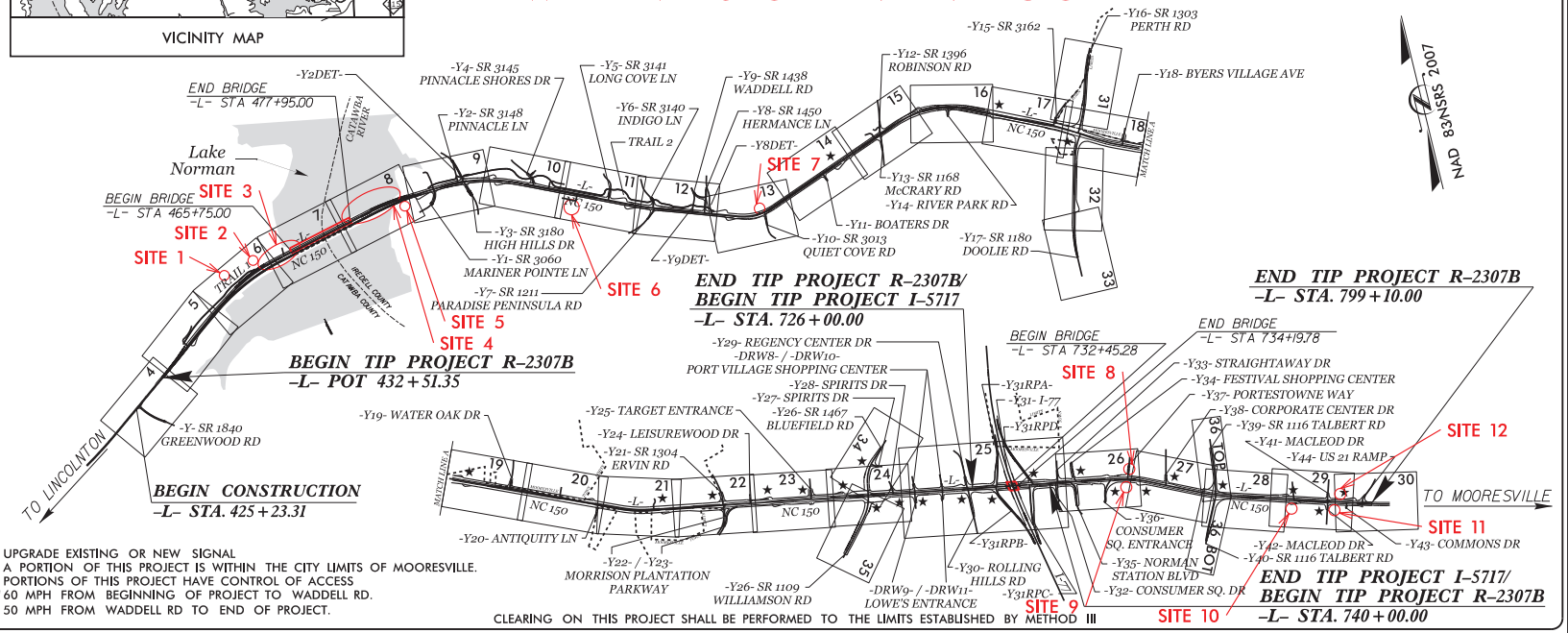
PERMIT DRAWING SHEET 1 OF 22

TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURES, AND SIGNALS

WETLAND & STREAM IMPACTS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83 NSRS 2007



★ UPGRADE EXISTING OR NEW SIGNAL
A PORTION OF THIS PROJECT IS WITHIN THE CITY LIMITS OF MOORESVILLE.
PORTIONS OF THIS PROJECT HAVE CONTROL OF ACCESS
** 60 MPH FROM BEGINNING OF PROJECT TO WADDELL RD.
50 MPH FROM WADDELL RD TO END OF PROJECT.

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III

GRAPHIC SCALES

50 25 0 50 100
PLANS

DESIGN DATA

ADT 2019 = 47,900
ADT 2039 = 58,860
K = 8%
D = 55%
T = 6%*
V = **
* TTST 2%+ DUAL 4%
FUNC CLASS =
PRINCIPAL ARTERIAL
STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R–2307B	=	6.447 mile
LENGTH STRUCTURES TIP PROJECT R–2307B	=	0.231 mile
TOTAL LENGTH TIP PROJECT R–2307B	=	6.678 mile
LENGTH ROADWAY TIP PROJECT I–5717	=	0.232 mile
LENGTH STRUCTURES TIP PROJECT I–5717	=	0.033 mile
TOTAL LENGTH TIP PROJECT I–5717	=	0.265 mile
TOTAL LENGTH TIP PROJECT R–2307B / I–5717	=	6.943 mile

Prepared For:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610
By:
TGS ENGINEERS
706 HILLSBOROUGH ST
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: AUGUST 31, 2017

LETTING DATE: JUNE 17, 2025

BURKE EVANS, PE
PROJECT ENGINEER

NATHAN ADIMA, PE
NCDOT CONTACT

HYDRAULICS ENGINEER
SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER
SIGNATURE: P.E.

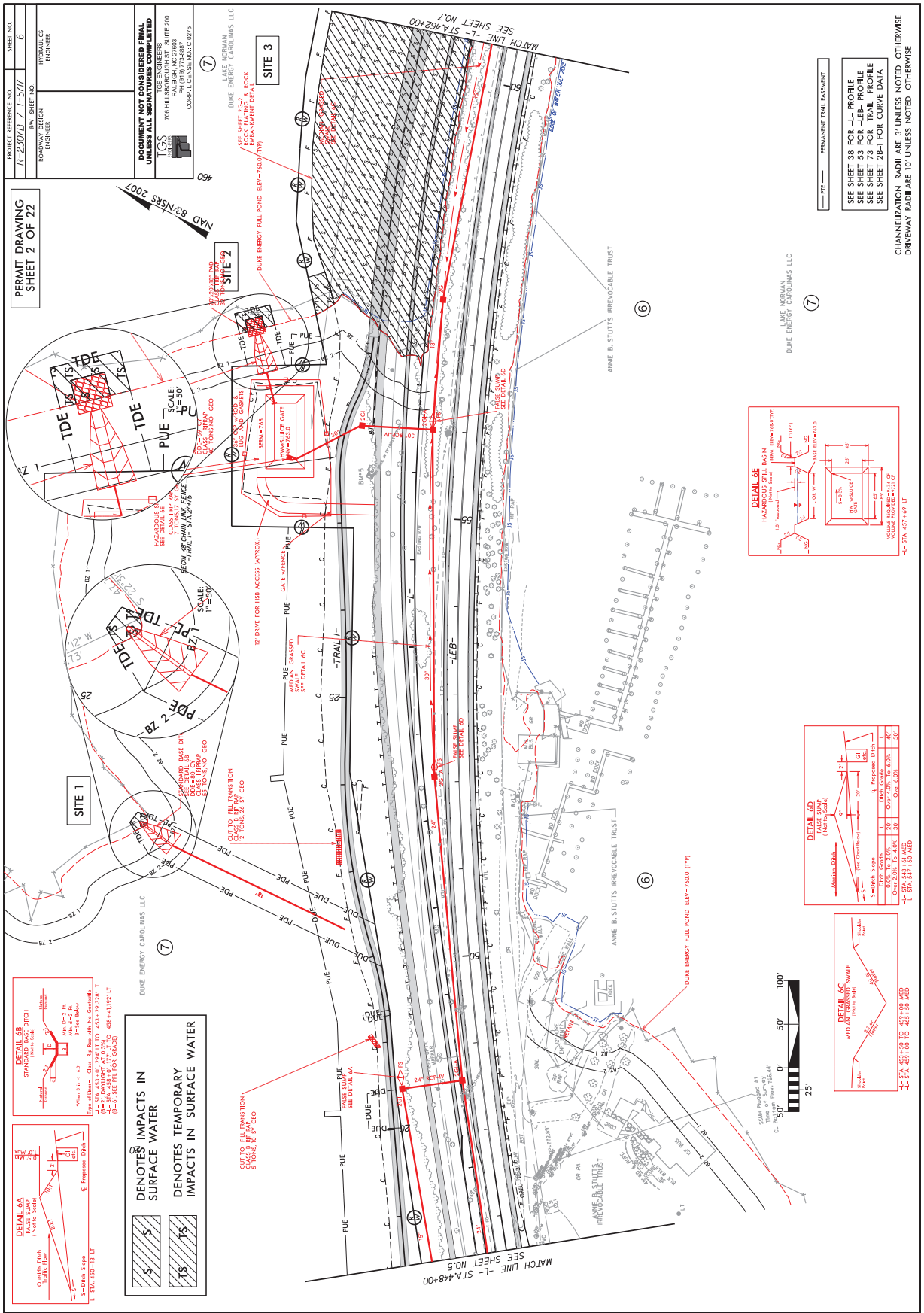
STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION

P-30

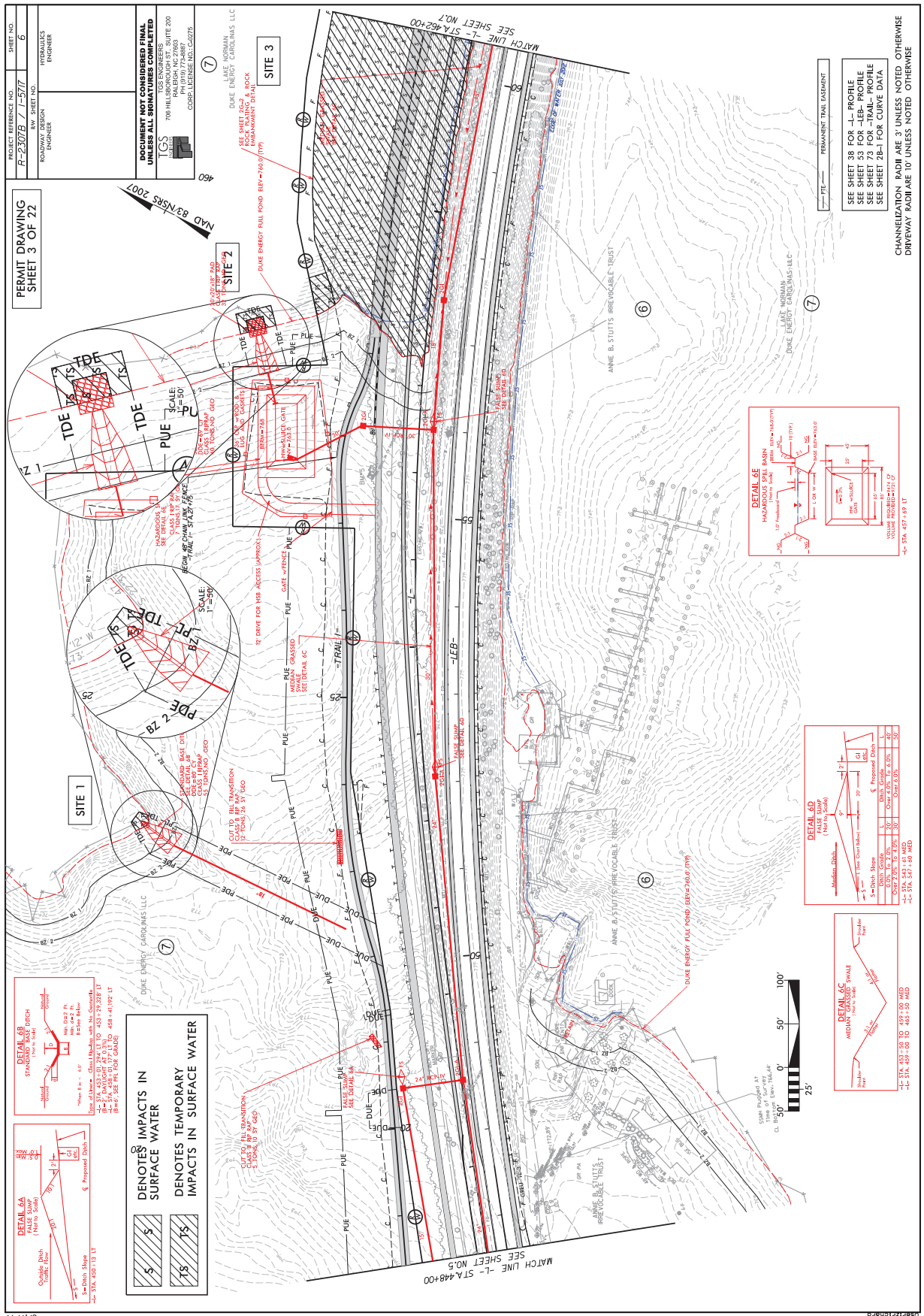
09/08/99

V:\26\2024\...\R-2307B\Hydraulics\PERMITS_Environmental\Drawings\R-2307B_RDY_TSH.dgn
User:zrichard

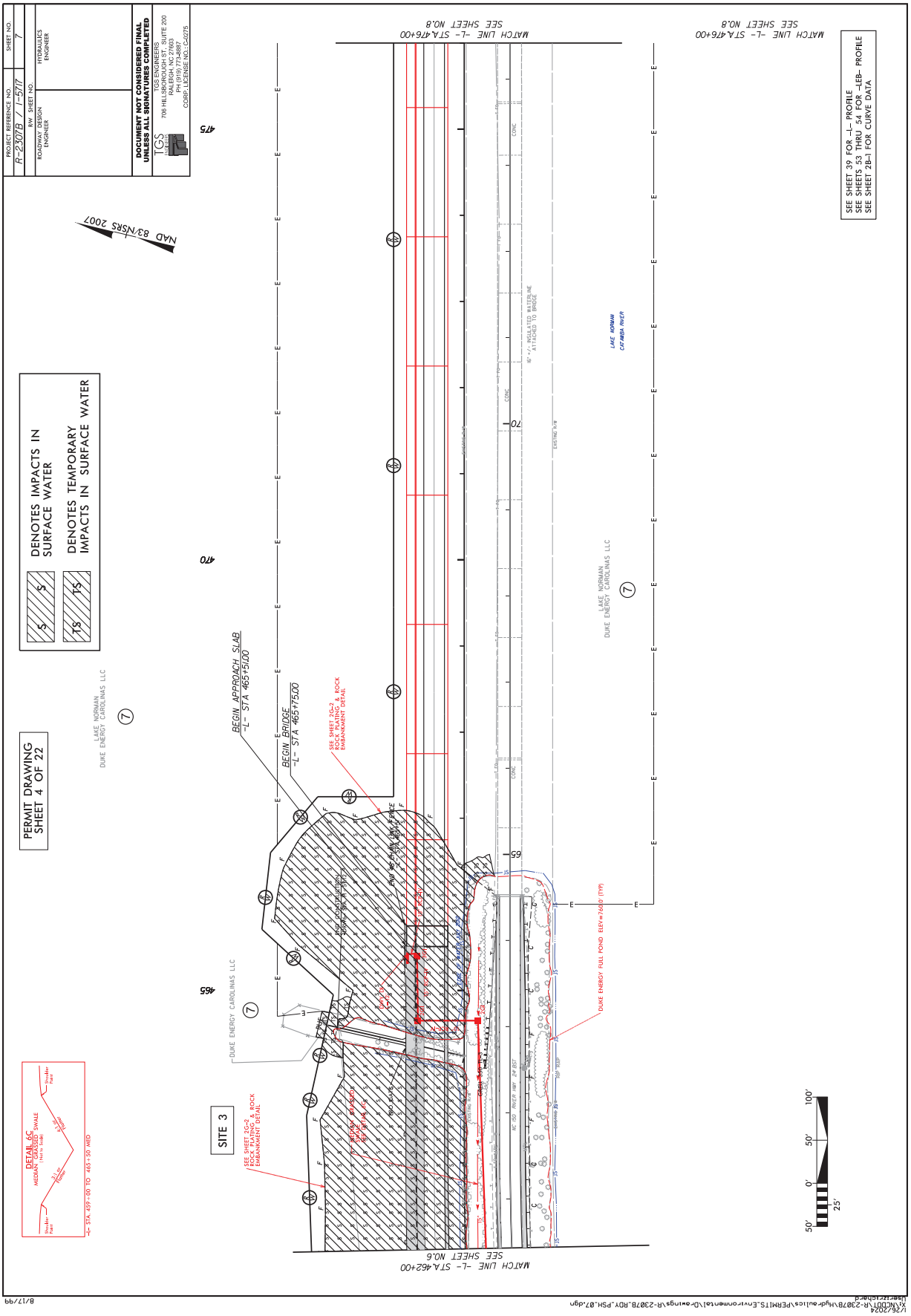
TGS


PROJECT REFERENCE NO. R-2307B
SHEET NO. 6
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH ST., SUITE 200
RALEIGH, NC 27603
PH: (919) 773-4887
CORP. LICENSE NO.: C-0775
PERMIT DRAWING SHEET 2 OF 22
NAD 83/NSRS 2007
SITE 1
SITE 2
SITE 3
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
PERMANENT TRAIL EASEMENT
SEE SHEET 38 FOR -L- PROFILE
SEE SHEET 53 FOR -LEB- PROFILE
SEE SHEET 73 FOR -TRAIL- PROFILE
SEE SHEET 28-I FOR CURVE DATA
CHANNELIZATION RADII ARE 3' UNLESS NOTED OTHERWISE
DRIVEWAY RADII ARE 10' UNLESS NOTED OTHERWISE
DUKE ENERGY FULL POND ELEV.=760.0' (TYP)
ANNIE B. STUTTS IRREVOCABLE TRUST
LAKE NORMAN
DUKE ENERGY CAROLINAS LLC
MATCH LINE -L- STA 462+00 SEE SHEET NO.7
MATCH LINE -L- STA 448+00 SEE SHEET NO.5
DETAIL 6A
DETAIL 6B
DETAIL 6C
DETAIL 6D
DETAIL 6E
DETAIL 6F
DETAIL 6G
DETAIL 6H
DETAIL 6I
DETAIL 6J
DETAIL 6K
DETAIL 6L
DETAIL 6M
DETAIL 6N
DETAIL 6O
DETAIL 6P
DETAIL 6Q
DETAIL 6R
DETAIL 6S
DETAIL 6T
DETAIL 6U
DETAIL 6V
DETAIL 6W
DETAIL 6X
DETAIL 6Y
DETAIL 6Z
DETAIL 6AA
DETAIL 6BB
DETAIL 6CC
DETAIL 6DD
DETAIL 6EE
DETAIL 6FF
DETAIL 6GG
DETAIL 6HH
DETAIL 6II
DETAIL 6JJ
DETAIL 6KK
DETAIL 6LL
DETAIL 6MM
DETAIL 6NN
DETAIL 6OO
DETAIL 6PP
DETAIL 6QQ
DETAIL 6RR
DETAIL 6SS
DETAIL 6TT
DETAIL 6UU
DETAIL 6VV
DETAIL 6WW
DETAIL 6XX
DETAIL 6YY
DETAIL 6ZZ
DETAIL 6AAA
DETAIL 6BBB
DETAIL 6CCC
DETAIL 6DDD
DETAIL 6EEE
DETAIL 6FFF
DETAIL 6GGG
DETAIL 6HHH
DETAIL 6III
DETAIL 6JJJ
DETAIL 6KKK
DETAIL 6LLL
DETAIL 6MMM
DETAIL 6NNN
DETAIL 6OOO
DETAIL 6PPP
DETAIL 6QQQ
DETAIL 6RRR
DETAIL 6SSS
DETAIL 6TTT
DETAIL 6UUU
DETAIL 6VVV
DETAIL 6WWW
DETAIL 6XXX
DETAIL 6YYY
DETAIL 6ZZZ
DETAIL 6AAAA
DETAIL 6BBBB
DETAIL 6CCCC
DETAIL 6DDDD
DETAIL 6EEEE
DETAIL 6FFFF
DETAIL 6GGGG
DETAIL 6HHHH
DETAIL 6IIII
DETAIL 6JJJJ
DETAIL 6KKKK
DETAIL 6LLLL
DETAIL 6MMMM
DETAIL 6NNNN
DETAIL 6OOOO
DETAIL 6PPPP
DETAIL 6QQQQ
DETAIL 6RRRR
DETAIL 6SSSS
DETAIL 6TTTT
DETAIL 6UUUU
DETAIL 6VVVV
DETAIL 6WWWW
DETAIL 6XXXX
DETAIL 6YYYY
DETAIL 6ZZZZ
DETAIL 6AAAAA
DETAIL 6BBBBB
DETAIL 6CCCCC
DETAIL 6DDDDD
DETAIL 6EEEEE
DETAIL 6FFFFF
DETAIL 6GGGGG
DETAIL 6HHHHH
DETAIL 6IIIII
DETAIL 6JJJJJ
DETAIL 6KKKKK
DETAIL 6LLLLL
DETAIL 6MMMMM
DETAIL 6NNNNN
DETAIL 6OOOOO
DETAIL 6PPPPP
DETAIL 6QQQQQ
DETAIL 6RRRRR
DETAIL 6SSSSS
DETAIL 6TTTTT
DETAIL 6UUUUU
DETAIL 6VVVVV
DETAIL 6WWWWW
DETAIL 6XXXXX
DETAIL 6YYYYY
DETAIL 6ZZZZZ
DETAIL 6AAAAAA
DETAIL 6BBBBBB
DETAIL 6CCCCCC
DETAIL 6DDDDDD
DETAIL 6EEEEEE
DETAIL 6FFFFFF
DETAIL 6GGGGGG
DETAIL 6HHHHHH
DETAIL 6IIIIII
DETAIL 6JJJJJJ
DETAIL 6KKKKKK
DETAIL 6LLLLLL
DETAIL 6MMMMMM
DETAIL 6NNNNNN
DETAIL 6OOOOOO
DETAIL 6PPPPPP
DETAIL 6QQQQQQ
DETAIL 6RRRRRR
DETAIL 6SSSSSS
DETAIL 6TTTTTT
DETAIL 6UUUUUU
DETAIL 6VVVVVV
DETAIL 6WWWWWW
DETAIL 6XXXXXX
DETAIL 6YYYYYY
DETAIL 6ZZZZZZ
DETAIL 6AAAAAAA
DETAIL 6BBBBBBB
DETAIL 6CCCCCCC
DETAIL 6DDDDDDD
DETAIL 6EEEEEEE
DETAIL 6FFFFFFF
DETAIL 6GGGGGGG
DETAIL 6HHHHHHH
DETAIL 6IIIIIII
DETAIL 6JJJJJJJ
DETAIL 6KKKKKKK
DETAIL 6LLLLLLL
DETAIL 6MMMMMMM
DETAIL 6NNNNNNN
DETAIL 6OOOOOOO
DETAIL 6PPPPPPP
DETAIL 6QQQQQQQ
DETAIL 6RRRRRRR
DETAIL 6SSSSSSS
DETAIL 6TTTTTTT
DETAIL 6UUUUUUU
DETAIL 6VVVVVVV
DETAIL 6WWWWWWW
DETAIL 6XXXXXXX
DETAIL 6YYYYYYY
DETAIL 6ZZZZZZZ
DETAIL 6AAAAAAAA
DETAIL 6BBBBBBBB
DETAIL 6CCCCCCCC
DETAIL 6DDDDDDDD
DETAIL 6EEEEEEEE
DETAIL 6FFFFFFFF
DETAIL 6GGGGGGGG
DETAIL 6HHHHHHHH
DETAIL 6IIIIIIII
DETAIL 6JJJJJJJJ
DETAIL 6KKKKKKKK
DETAIL 6LLLLLLLL
DETAIL 6MMMMMMMM
DETAIL 6NNNNNNNN
DETAIL 6OOOOOOOO
DETAIL 6PPPPPPPP
DETAIL 6QQQQQQQQ
DETAIL 6RRRRRRRR
DETAIL 6SSSSSSSS
DETAIL 6TTTTTTTT
DETAIL 6UUUUUUUU
DETAIL 6VVVVVVVV
DETAIL 6WWWWWWWW
DETAIL 6XXXXXXXX
DETAIL 6YYYYYYYY
DETAIL 6ZZZZZZZZ
DETAIL 6AAAAAAAAA
DETAIL 6BBBBBBBBB
DETAIL 6CCCCCCCCC
DETAIL 6DDDDDDDDD
DETAIL 6EEEEEEEEE
DETAIL 6FFFFFFFFF
DETAIL 6GGGGGGGGG
DETAIL 6HHHHHHHHH
DETAIL 6IIIIIIIII
DETAIL 6JJJJJJJJJ
DETAIL 6KKKKKKKKK
DETAIL 6LLLLLLLLL
DETAIL 6MMMMMMMMM
DETAIL 6NNNNNNNNN
DETAIL 6OOOOOOOOO
DETAIL 6PPPPPPPPP
DETAIL 6QQQQQQQQQ
DETAIL 6RRRRRRRRR
DETAIL 6SSSSSSSSS
DETAIL 6TTTTTTTTT
DETAIL 6UUUUUUUUU
DETAIL 6VVVVVVVVV
DETAIL 6WWWWWWWWW
DETAIL 6XXXXXXXXX
DETAIL 6YYYYYYYYY
DETAIL 6ZZZZZZZZZ
DETAIL 6AAAAAAAAAA
DETAIL 6BBBBBBBBBB
DETAIL 6CCCCCCCCCC
DETAIL 6DDDDDDDDDD
DETAIL 6EEEEEEEEEE
DETAIL 6FFFFFFFFFF
DETAIL 6GGGGGGGGGG
DETAIL 6HHHHHHHHHH
DETAIL 6IIIIIIIIII
DETAIL 6JJJJJJJJJJ
DETAIL 6KKKKKKKKKK
DETAIL 6LLLLLLLLLL
DETAIL 6MMMMMMMMMM
DETAIL 6NNNNNNNNNN
DETAIL 6OOOOOOOOOO
DETAIL 6PPPPPPPPPP
DETAIL 6QQQQQQQQQQ
DETAIL 6RRRRRRRRRR
DETAIL 6SSSSSSSSSS
DETAIL 6TTTTTTTTTT
DETAIL 6UUUUUUUUUU
DETAIL 6VVVVVVVVVV
DETAIL 6WWWWWWWWWW
DETAIL 6XXXXXXXXXX
DETAIL 6YYYYYYYYYY
DETAIL 6ZZZZZZZZZZ
DETAIL 6AAAAAAAAAAA
DETAIL 6BBBBBBBBBBB
DETAIL 6CCCCCCCCCCC
DETAIL 6DDDDDDDDDDD
DETAIL 6EEEEEEEEEEE
DETAIL 6FFFFFFFFFFF
DETAIL 6GGGGGGGGGGG
DETAIL 6HHHHHHHHHHH
DETAIL 6IIIIIIIIIII
DETAIL 6JJJJJJJJJJJ
DETAIL 6KKKKKKKKKKK
DETAIL 6LLLLLLLLLLL
DETAIL 6MMMMMMMMMMM
DETAIL 6NNNNNNNNNNN
DETAIL 6OOOOOOOOOOO
DETAIL 6PPPPPPPPPPP
DETAIL 6QQQQQQQQQQQ
DETAIL 6RRRRRRRRRRR
DETAIL 6SSSSSSSSSSS
DETAIL 6TTTTTTTTTTT
DETAIL 6UUUUUUUUUUU
DETAIL 6VVVVVVVVVVV
DETAIL 6WWWWWWWWWWW
DETAIL 6XXXXXXXXXXX
DETAIL 6YYYYYYYYYYY
DETAIL 6ZZZZZZZZZZZ
DETAIL 6AAAAAAAAAAAA
DETAIL 6BBBBBBBBBBBB
DETAIL 6CCCCCCCCCCCC
DETAIL 6DDDDDDDDDDDD
DETAIL 6EEEEEEEEEEEE
DETAIL 6FFFFFFFFFFFF
DETAIL 6GGGGGGGGGGGG
DETAIL 6HHHHHHHHHHHH
DETAIL 6IIIIIIIIIIII
DETAIL 6JJJJJJJJJJJJ
DETAIL 6KKKKKKKKKKKK
DETAIL 6LLLLLLLLLLLL
DETAIL 6MMMMMMMMMMMM
DETAIL 6NNNNNNNNNNNN
DETAIL 6OOOOOOOOOOOO
DETAIL 6PPPPPPPPPPPP
DETAIL 6QQQQQQQQQQQQ
DETAIL 6RRRRRRRRRRRR
DETAIL 6SSSSSSSSSSSS
DETAIL 6TTTTTTTTTTTT
DETAIL 6UUUUUUUUUUUU
DETAIL 6VVVVVVVVVVVV
DETAIL 6WWWWWWWWWWWW
DETAIL 6XXXXXXXXXXXX
DETAIL 6YYYYYYYYYYYY
DETAIL 6ZZZZZZZZZZZZ
DETAIL 6AAAAAAAAAAAAA
DETAIL 6BBBBBBBBBBBBB
DETAIL 6CCCCCCCCCCCCC
DETAIL 6DDDDDDDDDDDDD
DETAIL 6EEEEEEEEEEEEE
DETAIL 6FFFFFFFFFFFFF
DETAIL 6GGGGGGGGGGGGG
DETAIL 6HHHHHHHHHHHHH
DETAIL 6IIIIIIIIIIIII
DETAIL 6JJJJJJJJJJJJJ
DETAIL 6KKKKKKKKKKKKK
DETAIL 6LLLLLLLLLLLLL
DETAIL 6MMMMMMMMMMMMM
DETAIL 6NNNNNNNNNNNNN
DETAIL 6OOOOOOOOOOOOO
DETAIL 6PPPPPPPPPPPPP
DETAIL 6QQQQQQQQQQQQQ
DETAIL 6RRRRRRRRRRRRR
DETAIL 6SSSSSSSSSSSSS
DETAIL 6TTTTTTTTTTTTT
DETAIL 6UUUUUUUUUUUUU
DETAIL 6VVVVVVVVVVVVV
DETAIL 6WWWWWWWWWWWWW
DETAIL 6XXXXXXXXXXXXX
DETAIL 6YYYYYYYYYYYYY
DETAIL 6ZZZZZZZZZZZZZ
DETAIL 6AAAAAAAAAAAAAA
DETAIL 6BBBBBBBBBBBBBB
DETAIL 6CCCCCCCCCCCCCC
DETAIL 6DDDDDDDDDDDDDD
DETAIL 6EEEEEEEEEEEEEE
DETAIL 6FFFFFFFFFFFFFF
DETAIL 6GGGGGGGGGGGGGG
DETAIL 6HHHHHHHHHHHHHH
DETAIL 6IIIIIIIIIIIIII
DETAIL 6JJJJJJJJJJJJJJ
DETAIL 6KKKKKKKKKKKKKK
DETAIL 6LLLLLLLLLLLLLL
DETAIL 6MMMMMMMMMMMMMM
DETAIL 6NNNNNNNNNNNNNN
DETAIL 6OOOOOOOOOOOOOO
DETAIL 6PPPPPPPPPPPPPP
DETAIL 6QQQQQQQQQQQQQQ
DETAIL 6RRRRRRRRRRRRRR
DETAIL 6SSSSSSSSSSSSSS
DETAIL 6TTTTTTTTTTTTTT
DETAIL 6UUUUUUUUUUUUUU
DETAIL 6VVVVVVVVVVVVVV
DETAIL 6WWWWWWWWWWWWWW
DETAIL 6XXXXXXXXXXXXXX
DETAIL 6YYYYYYYYYYYYYY
DETAIL 6ZZZZZZZZZZZZZZ
DETAIL 6AAAAAAAAAAAAAAA
DETAIL 6BBBBBBBBBBBBBBB
DETAIL 6CCCCCCCCCCCCCCC
DETAIL 6DDDDDDDDDDDDDDD
DETAIL 6EEEEEEEEEEEEEEE
DETAIL 6FFFFFFFFFFFFFFF
DETAIL 6GGGGGGGGGGGGGGG
DETAIL 6HHHHHHHHHHHHHHH
DETAIL 6IIIIIIIIIIIIIII
DETAIL 6JJJJJJJJJJJJJJJ
DETAIL 6KKKKKKKKKKKKKKK
DETAIL 6LLLLLLLLLLLLLLL
DETAIL 6MMMMMMMMMMMMMMM
DETAIL 6NNNNNNNNNNNNNNN
DETAIL 6OOOOOOOOOOOOOOO
DETAIL 6PPPPPPPPPPPPPPP
DETAIL 6QQQQQQQQQQQQQQQ
DETAIL 6RRRRRRRRRRRRRRR
DETAIL 6SSSSSSSSSSSSSSS
DETAIL 6TTTTTTTTTTTTTTT
DETAIL 6UUUUUUUUUUUUUUU
DETAIL 6VVVVVVVVVVVVVVV
DETAIL 6WWWWWWWWWWWWWWW
DETAIL 6XXXXXXXXXXXXXXX
DETAIL 6YYYYYYYYYYYYYYY
DETAIL 6ZZZZZZZZZZZZZZZ
DETAIL 6AAAAAAAAAAAAAAAA
DETAIL 6BBBBBBBBBBBBBBBB
DETAIL 6CCCCCCCCCCCCCCCC
DETAIL 6DDDDDDDDDDDDDDDD
DETAIL 6EEEEEEEEEEEEEEEE
DETAIL 6FFFFFFFFFFFFFFFF
DETAIL 6GGGGGGGGGGGGGGGG
DETAIL 6HHHHHHHHHHHHHHHH
DETAIL 6IIIIIIIIIIIIIIII
DETAIL 6JJJJJJJJJJJJJJJJ
DETAIL 6KKKKKKKKKKKKKKKK
DETAIL 6LLLLLLLLLLLLLLLL
DETAIL 6MMMMMMMMMMMMMMMM
DETAIL 6NNNNNNNNNNNNNNNN
DETAIL 6OOOOOOOOOOOOOOOO
DETAIL 6PPPPPPPPPPPPPPPP
DETAIL 6QQQQQQQQQQQQQQQQ
DETAIL 6RRRRRRRRRRRRRRRR
DETAIL 6SSSSSSSSSSSSSSSS
DETAIL 6TTTTTTTTTTTTTTTT
DETAIL 6UUUUUUUUUUUUUUUU
DETAIL 6VVVVVVVVVVVVVVVV
DETAIL 6WWWWWWWWWWWWWWWW
DETAIL 6XXXXXXXXXXXXXXXX
DETAIL 6YYYYYYYYYYYYYYYY
DETAIL 6ZZZZZZZZZZZZZZZZ
DETAIL 6AAAAAAAAAAAAAAAAA
DETAIL 6BBBBBBBBBBBBBBBBB
DETAIL 6CCCCCCCCCCCCCCCCC
DETAIL 6DDDDDDDDDDDDDDDDD
DETAIL 6EEEEEEEEEEEEEEEEE
DETAIL 6FFFFFFFFFFFFFFFFF
DETAIL 6GGGGGGGGGGGGGGGGG
DETAIL 6HHHHHHHHHHHHHHHHH
DETAIL 6IIIIIIIIIIIIIIIII
DETAIL 6JJJJJJJJJJJJJJJJJ
DETAIL 6KKKKKKKKKKKKKKKKK
DETAIL 6LLLLLLLLLLLLLLLLL
DETAIL 6MMMMMMMMMMMMMMMMM
DETAIL 6NNNNNNNNNNNNNNNNN
DETAIL 6OOOOOOOOOOOOOOOOO
DETAIL 6PPPPPPPPPPPPPPPPP
DETAIL 6QQQQQQQQQQQQQQQQQ
DETAIL 6RRRRRRRRRRRRRRRRR
DETAIL 6SSSSSSSSSSSSSSSSS
DETAIL 6TTTTTTTTTTTTTTTTT
DETAIL 6UUUUUUUUUUUUUUUUU
DETAIL 6VVVVVVVVVVVVVVVVV
DETAIL 6WWWWWWWWWWWWWWWWW
DETAIL 6XXXXXXXXXXXXXXXXX
DETAIL 6YYYYYYYYYYYYYYYYY
DETAIL 6ZZZZZZZZZZZZZZZZZ
DETAIL 6AAAAAAAAAAAAAAAAAA
DETAIL 6BBBBBBBBBBBBBBBBBB
DETAIL 6CCCCCCCCCCCCCCCCCC
DETAIL 6DDDDDDDDDDDDDDDDDD
DETAIL 6EEEEEEEEEEEEEEEEEE
DETAIL 6FFFFFFFFFFFFFFFFFF
DETAIL 6GGGGGGGGGGGGGGGGGG
DETAIL 6HHHHHHHHHHHHHHHHHH
DETAIL 6IIIIIIIIIIIIIIIIII
DETAIL 6JJJJJJJJJJJJJJJJJJ
DETAIL 6KKKKKKKKKKKKKKKKKK
DETAIL 6LLLLLLLLLLLLLLLLLL
DETAIL 6MMMMMMMMMMMMMMMMMM
DETAIL 6NNNNNNNNNNNNNNNNNN
DETAIL 6OOOOOOOOOOOOOOOOOO
DETAIL 6PPPPPPPPPPPPPPPPPP
DETAIL 6QQQQQQQQQQQQQQQQQQ
DETAIL 6RRRRRRRRRRRRRRRRRR
DETAIL 6SSSSSSSSSSSSSSSSSS
DETAIL 6TTTTTTTTTTTTTTTTTT
DETAIL 6UUUUUUUUUUUUUUUUUU
DETAIL 6VVVVVVVVVVVVVVVVVV
DETAIL 6WWWWWWWWWWWWWWWWWW
DETAIL 6XXXXXXXXXXXXXXXXXX
DETAIL 6YYYYYYYYYYYYYYYYYY
DETAIL 6ZZZZZZZZZZZZZZZZZZ
DETAIL 6AAAAAAAAAAAAAAAAAAA
DETAIL 6BBBBBBBBBBBBBBBBBBB
DETAIL 6CCCCCCCCCCCCCCCCCCC
DETAIL 6DDDDDDDDDDDDDDDDDDD
DETAIL 6EEEEEEEEEEEEEEEEEEE
DETAIL 6FFFFFFFFFFFFFFFFFFF
DETAIL 6GGGGGGGGGGGGGGGGGGG
DETAIL 6HHHHHHHHHHHHHHHHHHH
DETAIL 6IIIIIIIIIIIIIIIIIII
DETAIL 6JJJJJJJJJJJJJJJJJJJ
DETAIL 6KKKKKKKKKKKKKKKKKKK
DETAIL 6LLLLLLLLLLLLLLLLLLL
DETAIL 6MMMMMMMMMMMMMMMMMMM
DETAIL 6NNNNNNNNNNNNNNNNNNN
DETAIL 6OOOOOOOOOOOOOOOOOOO
DETAIL 6PPPPPPPPPPPPPPPPPPP
DETAIL 6QQQQQQQQQQQQQQQQQQQ
DETAIL 6RRRRRRRRRRRRRRRRRRR
DETAIL 6SSSSSSSSSSSSSSSSSSS
DETAIL 6TTTTTTTTTTTTTTTTTTT
DETAIL 6UUUUUUUUUUUUUUUUUUU
DETAIL 6VVVVVVVVVVVVVVVVVVV
DETAIL 6WWWWWWWWWWWWWWWWWWW
DETAIL 6XXXXXXXXXXXXXXXXXXX
DETAIL 6YYYYYYYYYYYYYYYYYYY
DETAIL 6ZZZZZZZZZZZZZZZZZZZ
DETAIL 6AAAAAAAAAAAAAAAAAAAA
DETAIL 6BBBBBBBBBBBBBBBBBBBB
DETAIL 6CCCCCCCCCCCCCCCCCCCC
DETAIL 6DDDDDDDDDDDDDDDDDDDD
DETAIL 6EEEEEEEEEEEEEEEEEEEE
DETAIL 6FFFFFFFFFFFFFFFFFFFF
DETAIL 6GGGGGGGGGGGGGGGGGGGG
DETAIL 6HHHHHHHHHHHHHHHHHHHH
DETAIL 6IIIIIIIIIIIIIIIIIIII
DETAIL 6JJJJJJJJJJJJJJJJJJJJ
DETAIL 6KKKKKKKKKKKKKKKKKKKK
DETAIL 6LLLLLLLLLLLLLLLLLLLL
DETAIL 6MMMMMMMMMMMMMMMMMMMM
DETAIL 6NNNNNNNNNNNNNNNNNNNN
DETAIL 6OOOOOOOOOOOOOOOOOOOO
DETAIL 6PPPPPPPPPPPPPPPPPPPP
DETAIL 6QQQQQQQQQQQQQQQQQQQQ
DETAIL 6RRRRRRRRRRRRRRRRRRRR
DETAIL 6SSSSSSSSSSSSSSSSSSSS
DETAIL 6TTTTTTTTTTTTTTTTTTTT
DETAIL 6UUUUUUUUUUUUUUUUUUUU
DETAIL 6VVVVVVVVVVVVVVVVVVVV
DETAIL 6WWWWWWWWWWWWWWWWWWWW
DETAIL 6XXXXXXXXXXXXXXXXXXXX
DETAIL 6YYYYYYYYYYYYYYYYYYYY
DETAIL 6ZZZZZZZZZZZZZZZZZZZZ
DETAIL 6AAAAAAAAAAAAAAAAAAAAA
DETAIL 6BBBBBBBBBBBBBBBBBBBBB
DETAIL 6CCCCCCCCCCCCCCCCCCCCC
DETAIL 6DDDDDDDDDDDDDDDDDDDDD
DETAIL 6EEEEEEEEEEEEEEEEEEEEE
DETAIL 6FFFFFFFFFFFFFFFFFFFFF
DETAIL 6GGGGGGGGGGGGGGGGGGGGG
DETAIL 6HHHHHHHHHHHHHHHHHHHHH
DETAIL 6IIIIIIIIIIIIIIIIIIIII
DETAIL 6JJJJJJJJJJJJJJJJJJJJJ
DETAIL 6KKKKKKKKKKKKKKKKKKKKK
DETAIL 6LLLLLLLLLLLLLLLLLLLLL
DETAIL 6MMMMMMMMMMMMMMMMMMMMM
DETAIL 6NNNNNNNNNNNNNNNNNNNNN
DETAIL 6OOOOOOOOOOOOOOOOOOOOO
DETAIL 6PPPPPPPPPPPPPPPPPPPPP
DETAIL 6QQQQQQQQQQQQQQQQQQQQQ
DETAIL 6RRRRRRRRRRRRRRRRRRRRR
DETAIL 6SSSSSSSSSSSSSSSSSSSSS
DETAIL 6TTTTTTTTTTTTTTTTTTTTT
DETAIL 6UUUUUUUUUUUUUUUUUUUUU
DETAIL 6VVVVVVVVVVVVVVVVVVVVV
DETAIL 6WWWWWWWWWWWWWWWWWWWWW
DETAIL 6XXXXXXXXXXXXXXXXXXXXX
DETAIL 6YYYYYYYYYYYYYYYYYYYYY
DETAIL 6Z

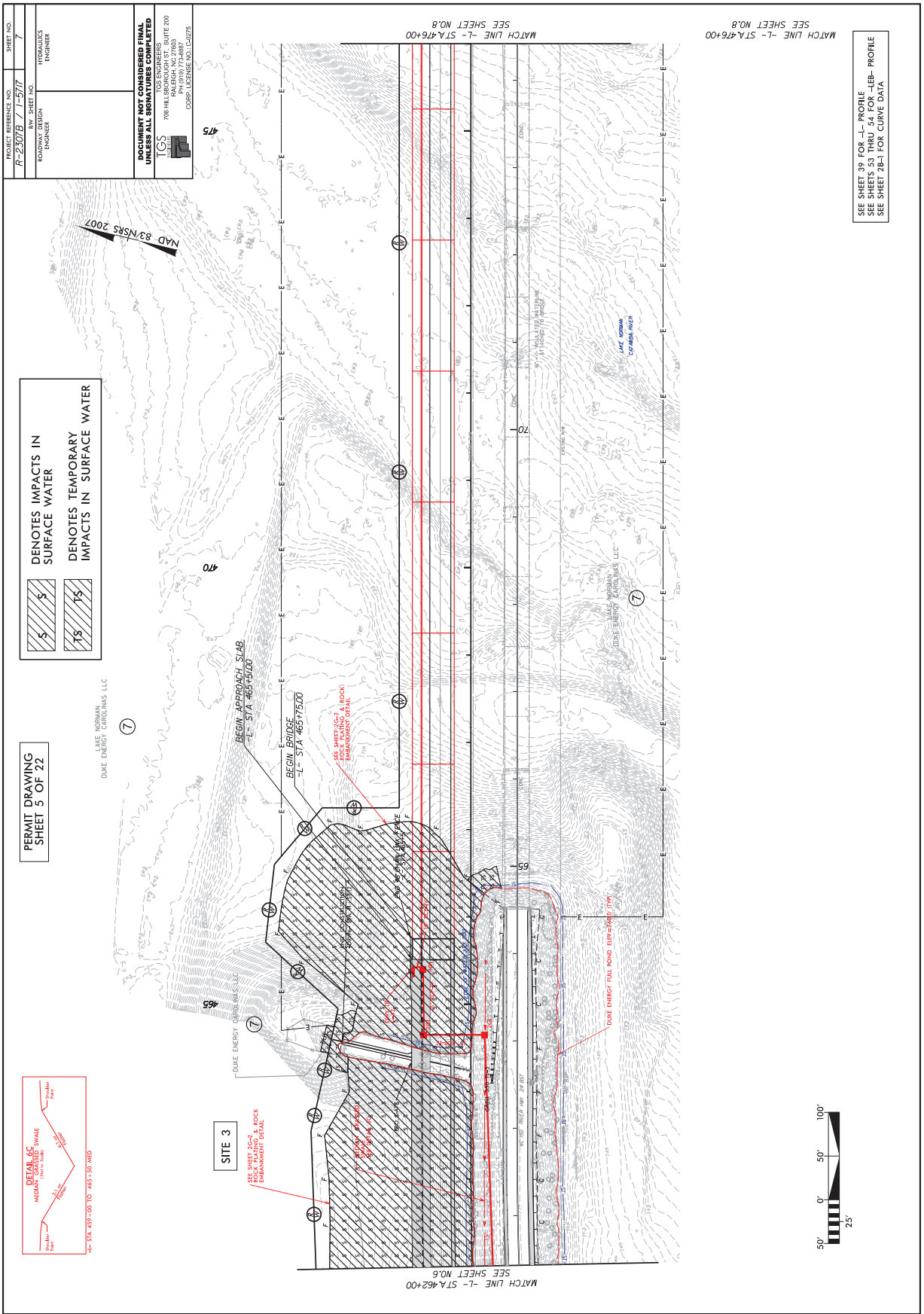
P-32


PROJECT REFERENCE NO. R-2307B
SHEET NO. 6
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH ST., SUITE 200
RALEIGH, NC 27603
PH: (919) 773-4887
CORP. LICENSE NO.: C-4075
PERMIT DRAWING SHEET 3 OF 22
SITE 1
SITE 2
SITE 3
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
CHANNELIZATION RADII ARE 3' UNLESS NOTED OTHERWISE
DRIVEWAY RADII ARE 10' UNLESS NOTED OTHERWISE
SEE SHEET 38 FOR -L- PROFILE
SEE SHEET 53 FOR -LEB- PROFILE
SEE SHEET 73 FOR -TRAIL- PROFILE
SEE SHEET 28-I FOR CURVE DATA
PERMANENT TRAIL EASEMENT
NAD 83/NSRS 2007
MATCH LINE -L- STA 448+00 SEE SHEET NO.5
MATCH LINE -L- STA 462+00 SEE SHEET NO.7
DUKE ENERGY CAROLINAS LLC
ANNIE B. STUTTS IRREVOCABLE TRUST
LAKE NORMAN
DETAIL 6A
DETAIL 6B
DETAIL 6C
DETAIL 6D
DETAIL 6E
DUKE ENERGY FULL POND ELEV.=760.0' (TYP)

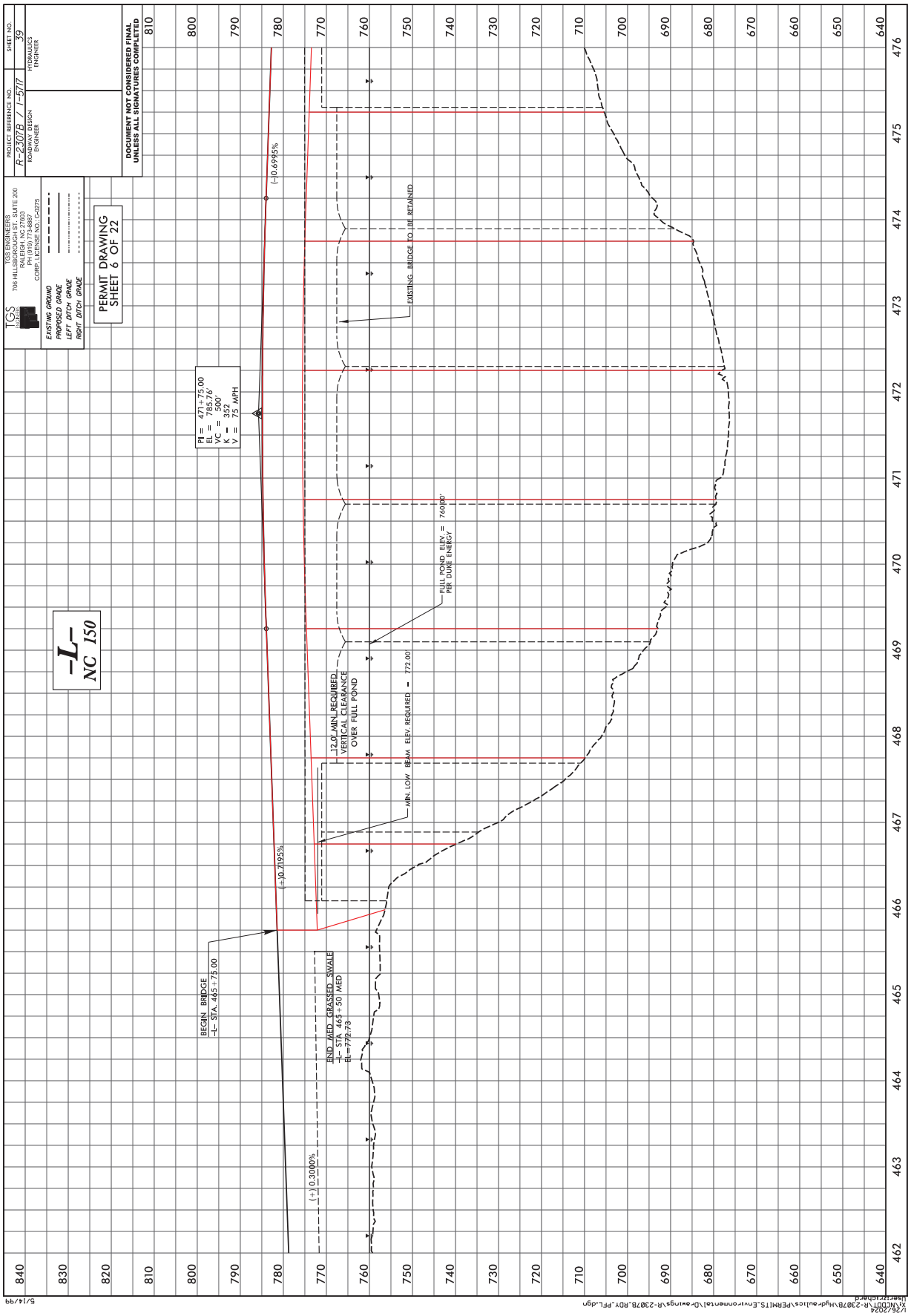
P-33

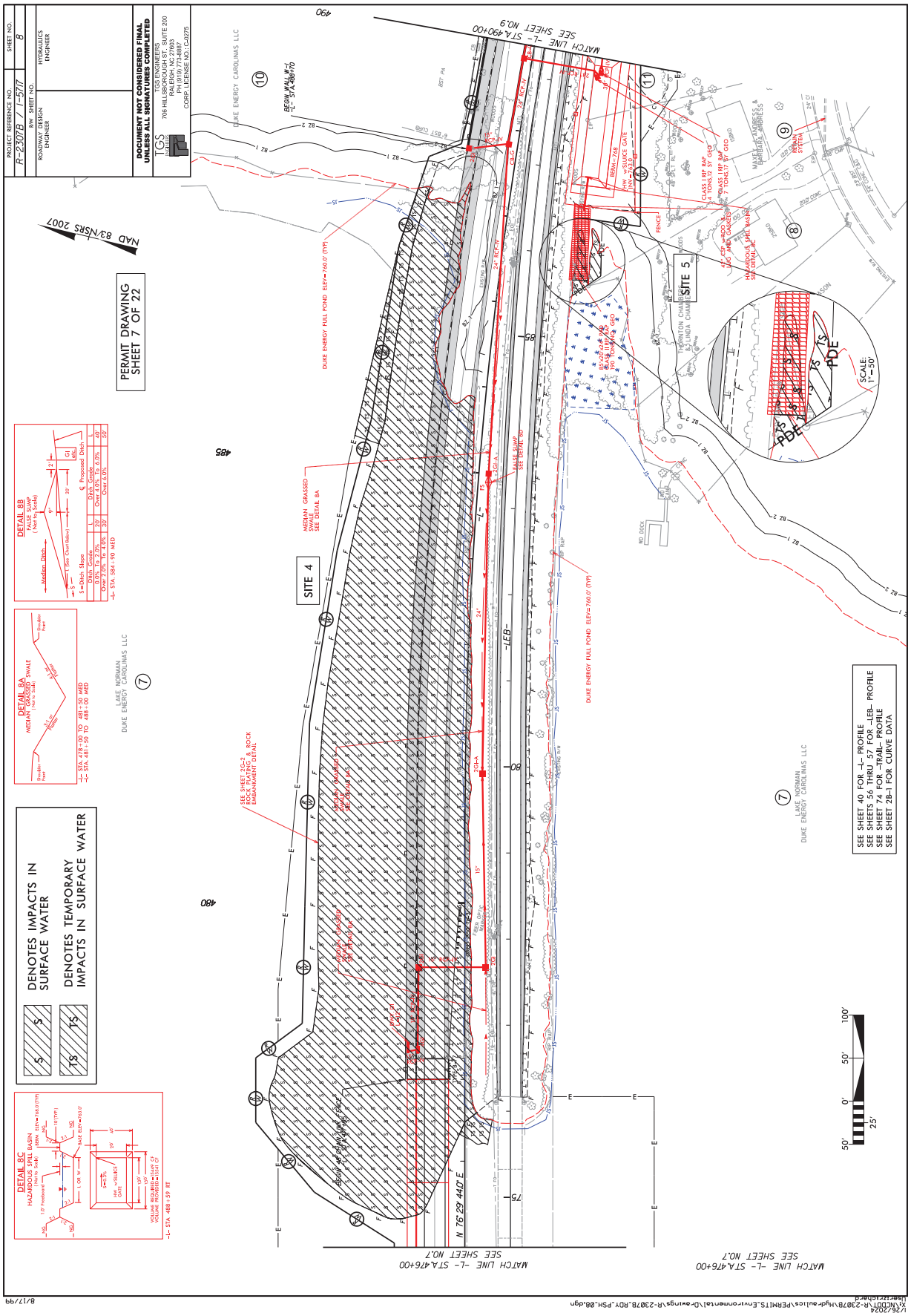


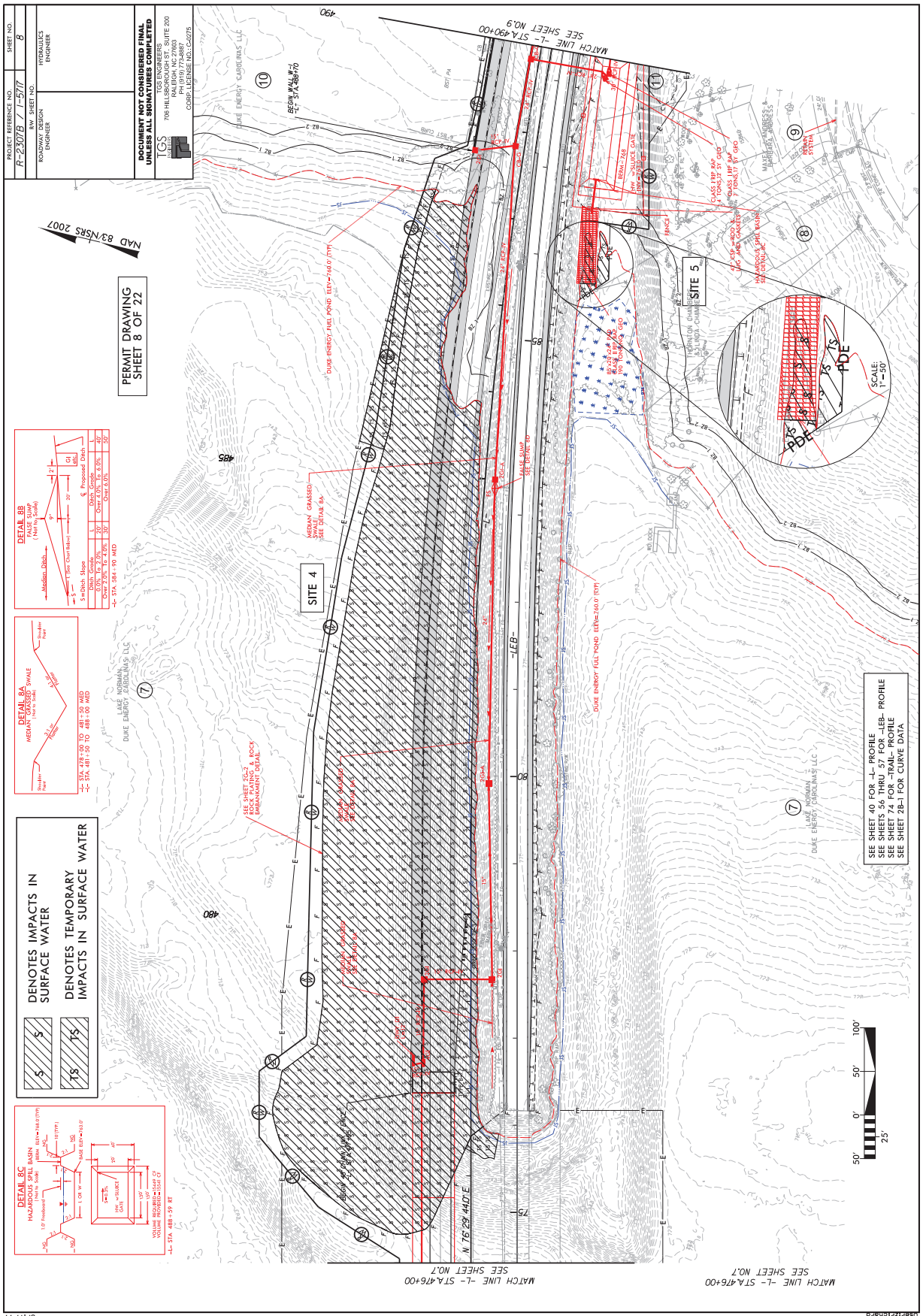
8/17/99
I:\76\2024\NCDOT\R-2307B\Hydraulics\PERMITS_Environmental\Drawings\R-2307B_RDY_PSH_07.dgn
1/26/2024 3:54:38 PM
User:tlashley



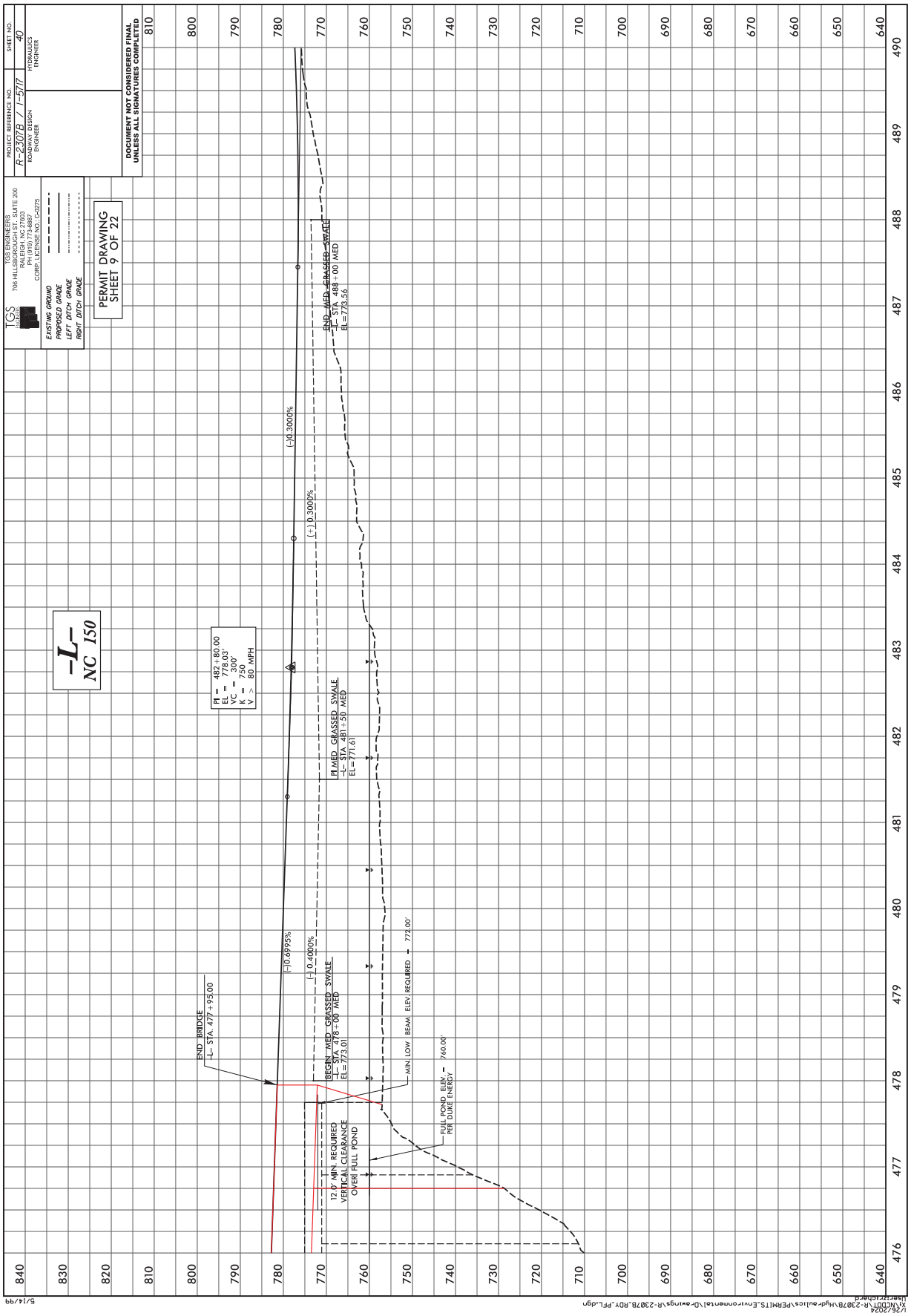
I:\26\2024\R-2307B\Hydraulics\PERMITS_Environmental\Drawings\R-2307B_RDY_PSH_07.dgn
General Standard


TGS ENGINEERS
708 HILLSBOROUGH ST. SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO. C-0275
EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE
PERMIT DRAWING
SHEET 6 OF 22
PROJECT REFERENCE NO.
R-2307B / I-5717
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
SHEET NO.
39
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
-L-
NC 150
PI = 471+75.00
EL = 785.76'
VC = 500'
K = 352
V = 75 MPH
(-)0.6995%
(+)0.7195%
(+)0.3000%
BEGIN BRIDGE
-L- STA. 465+75.00
END MED. GRASSED SWALE
-L- STA. 463+50 MED
EL=772.73
12.0' MIN. REQUIRED VERTICAL CLEARANCE OVER FULL POND
MIN. LOW BEAM ELEV REQUIRED = 772.00'
FULL POND ELEV. = 760.00'
PER DUKE ENERGY
EXISTING BRIDGE TO BE RETAINED

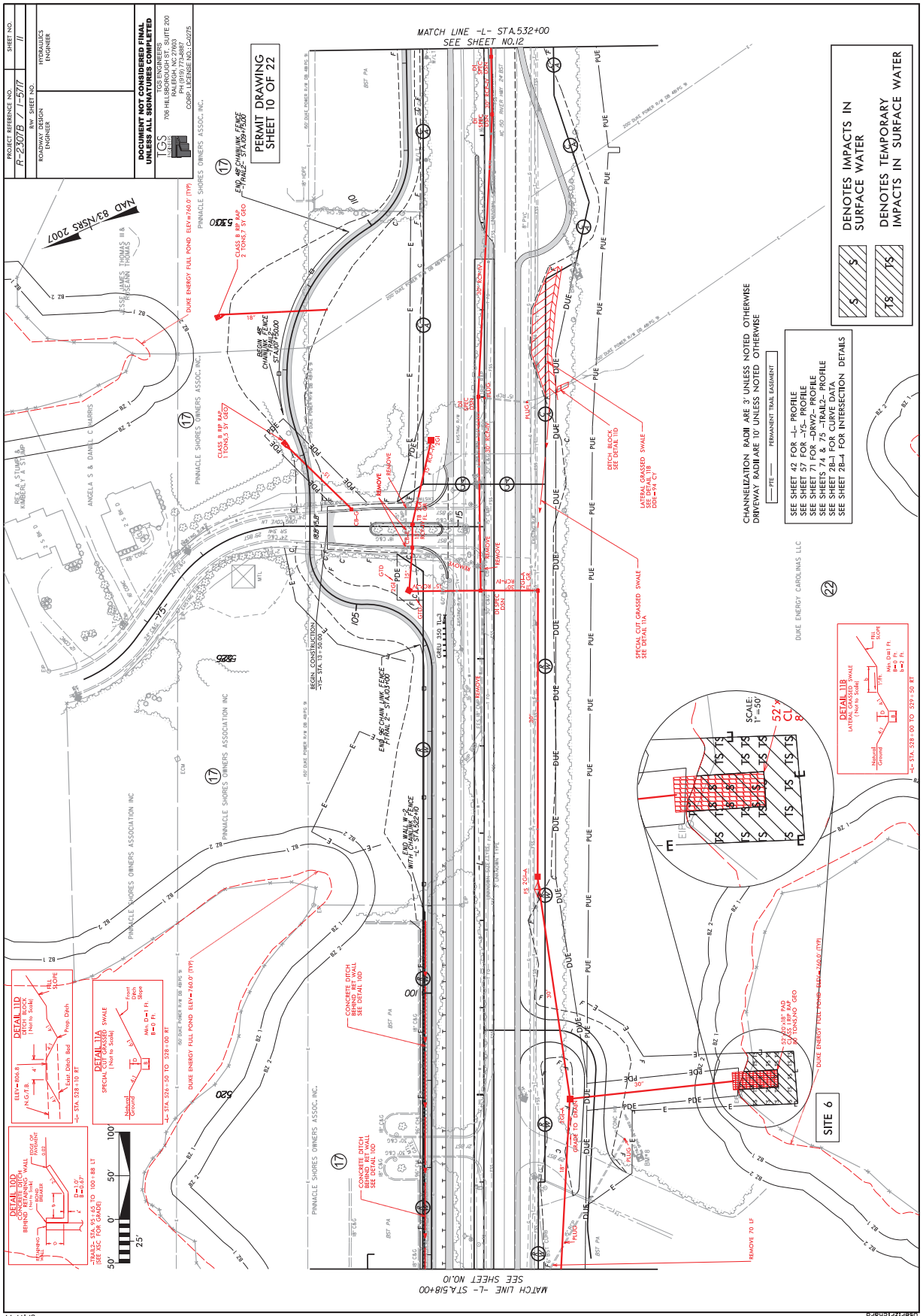

PROJECT REFERENCE NO.
R-2307B / I-5717
SHEET NO.
8
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH ST., SUITE 200
RALEIGH, NC 27603
PH: (919) 773-4887
CORP. LICENSE NO.: C-0775
NAD 83/NSRS 2007
PERMIT DRAWING
SHEET 7 OF 22
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
S
TS
DETAIL 8B
FALSE SUMP
(NOT TO SCALE)
DETAIL 8A
MEDIAN GRASSED SWALE
(NOT TO SCALE)
DETAIL 8C
HAZARDOUS SPILL BASIN
(NOT TO SCALE)
SITE 4
SITE 5
DUKE ENERGY FULL POND ELEV=760.0' (TYP)
LAKE NORMAN
DUKE ENERGY CAROLINAS LLC
MATCH LINE -L- STA 490+00
SEE SHEET NO.9
MATCH LINE -L- STA 476+00
SEE SHEET NO.7
SEE SHEET 40 FOR -L- PROFILE
SEE SHEETS 56 THRU 57 FOR -LEB- PROFILE
SEE SHEET 74 FOR -TRAIL- PROFILE
SEE SHEET 28-1 FOR CURVE DATA
SCALE:
1"=50'
8/17/99



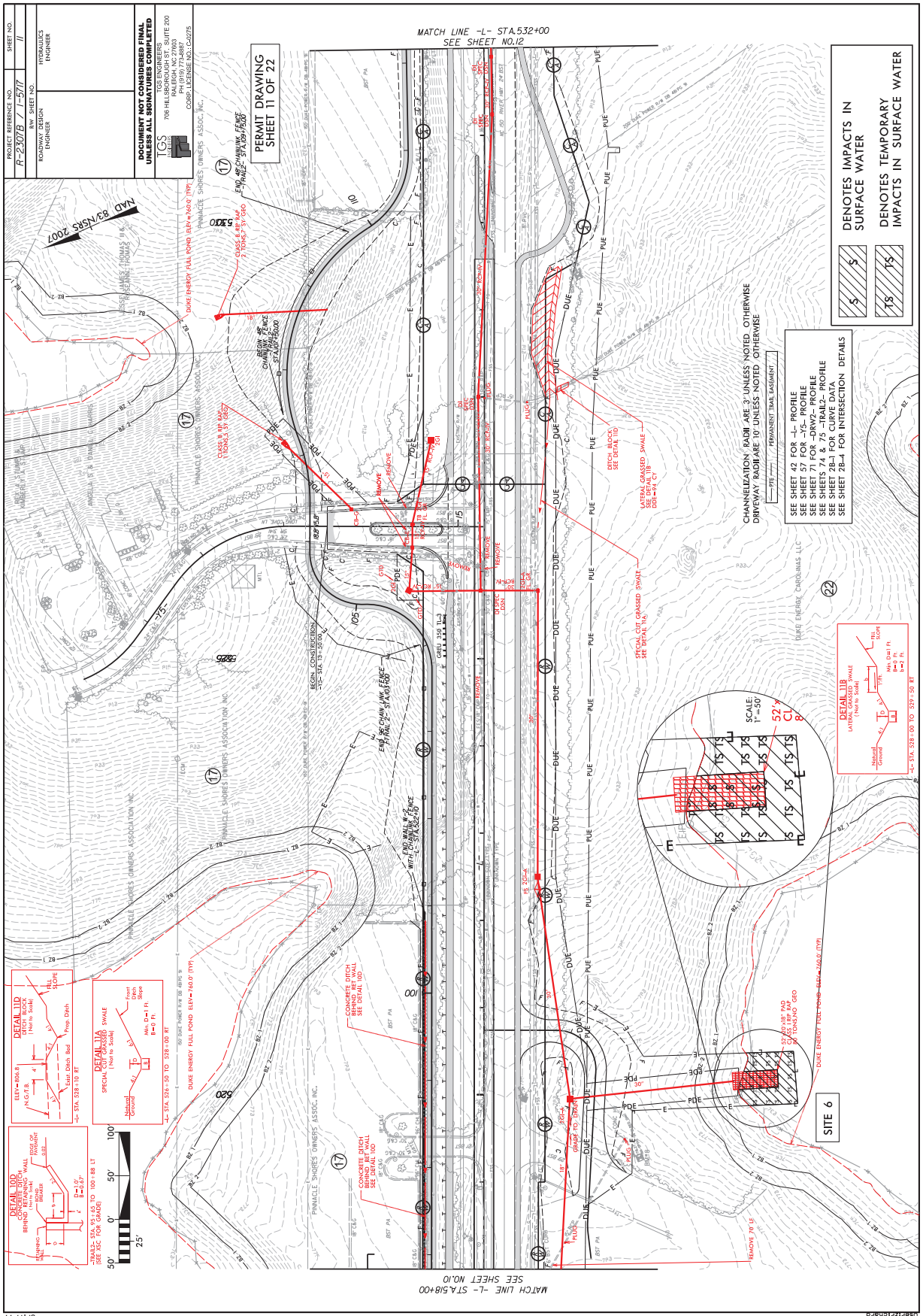
I:\26\2024
X:\NCDOT\R-2307B\Hydr-pulls\PERMITS_Environmental\Drawings\R-2307B_RDY_PSH_08.dgn
tlarrisa
8/17/99

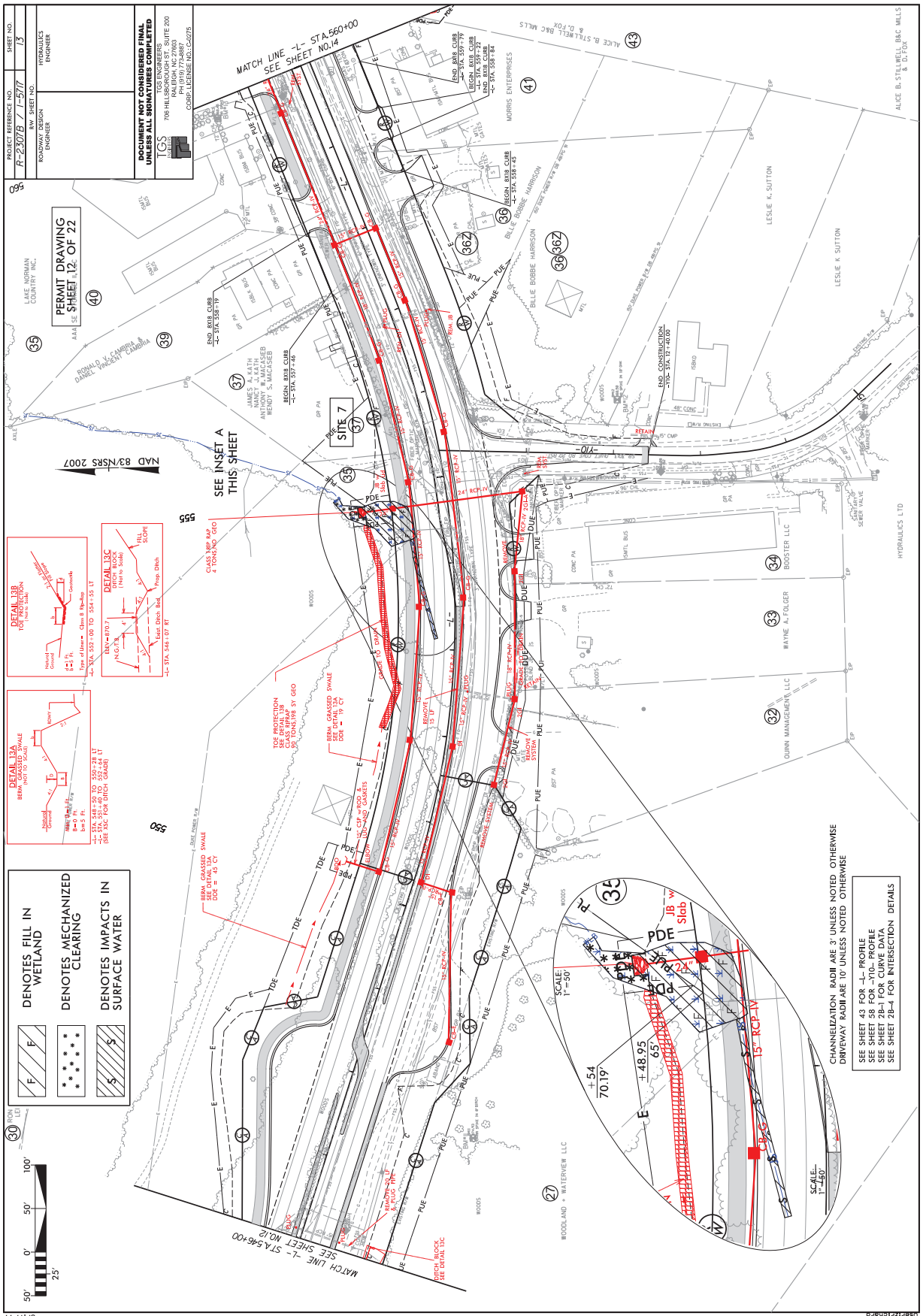


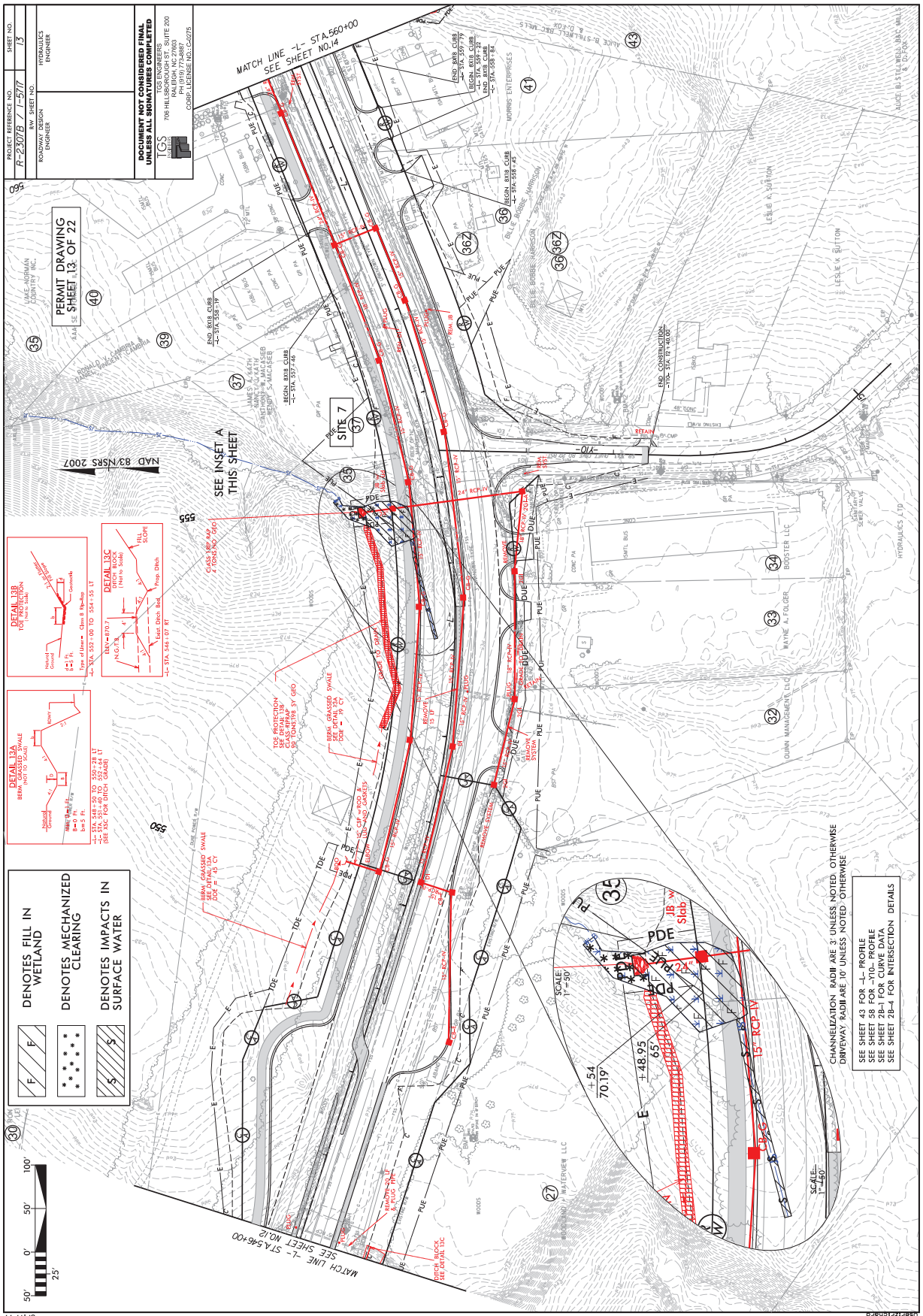
1/26/2024
X:\NCDOT\R-2307B\Hydr-aulics\PERMITS-Environmental\Drawings\R-2307B_RDY_PFL.dgn
jlancaster

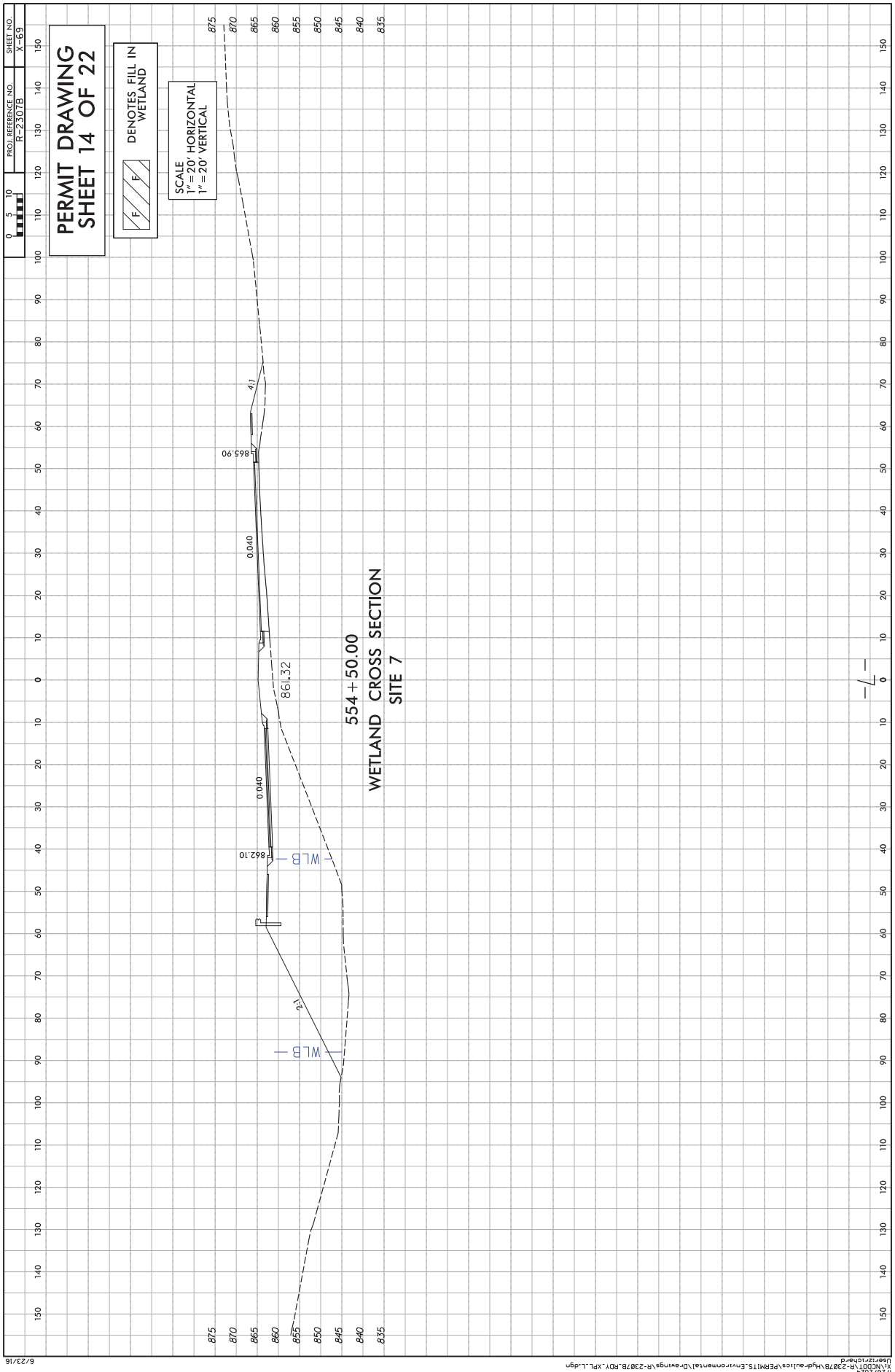

PROJECT REFERENCE NO.
R-2307B / I-5717
SHEET NO.
11
ROADWAY DESIGN ENGINEER
RW SHEET NO.
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH ST., SUITE 200
RALEIGH, NC 27603
PH (919) 773-4887
CORP. LICENSE NO.: C-0775
PERMIT DRAWING
SHEET 10 OF 22
MATCH LINE -L- STA.532+00
SEE SHEET NO.12
MATCH LINE -L- STA.518+00
SEE SHEET NO.10
NAD 83/NSRS 2007
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
CHANNELIZATION RADII ARE 3' UNLESS NOTED OTHERWISE
DRIVEWAY RADII ARE 10' UNLESS NOTED OTHERWISE
PTE PERMANENT TRAIL EASEMENT
SEE SHEET 42 FOR -L- PROFILE
SEE SHEET 57 FOR -Y5- PROFILE
SEE SHEET 71 FOR -DRW2- PROFILE
SEE SHEETS 74 & 75 -TRAIL2- PROFILE
SEE SHEET 2B-1 FOR CURVE DATA
SEE SHEET 2B-4 FOR INTERSECTION DETAILS
SITE 6
DETAIL 11D
CONCRETE DITCH BEHIND RET. WALL
DITCH BLOCK
DETAIL 11A
SPECIAL CUT GRASSED SWALE
DETAIL 11B
LATERAL GRASSED SWALE
CONCRETE DITCH BEHIND RET. WALL SEE DETAIL 10D
DITCH BLOCK SEE DETAIL 10D
SPECIAL CUT GRASSED SWALE SEE DETAIL 11A
LATERAL GRASSED SWALE SEE DETAIL 11B
DUKE ENERGY CAROLINAS LLC
PINNACLE SHORES OWNERS ASSOC. INC.
PINNACLE SHORES OWNERS ASSOCIATION INC
DUKE ENERGY FULL POND ELEV=760.0' (TYP)
BEGIN CONSTRUCTION -L- STA. 518+00
END 48' CHAIN LINK FENCE FL RAIL 2' STA.03+00
END 48' CHAIN LINK FENCE FL RAIL 2' STA.09+50
BEGIN 48' FENCE CHAIN LINK FENCE STA.09+50
END WALL #2 with -L- STA.532+00
CLASS B RIP RAP 1 TONS, 3' DEP.
CLASS B RIP RAP 2 TONS, 3' DEP.
CLASS B RIP RAP 3 TONS, 3' DEP.
REMOVE
REMOVE 70 LF
DUKE ENERGY FULL POND ELEV=760.0' (TYP)
SCALE: 1"=50'
0' 50' 100'
25' 50'

P-40

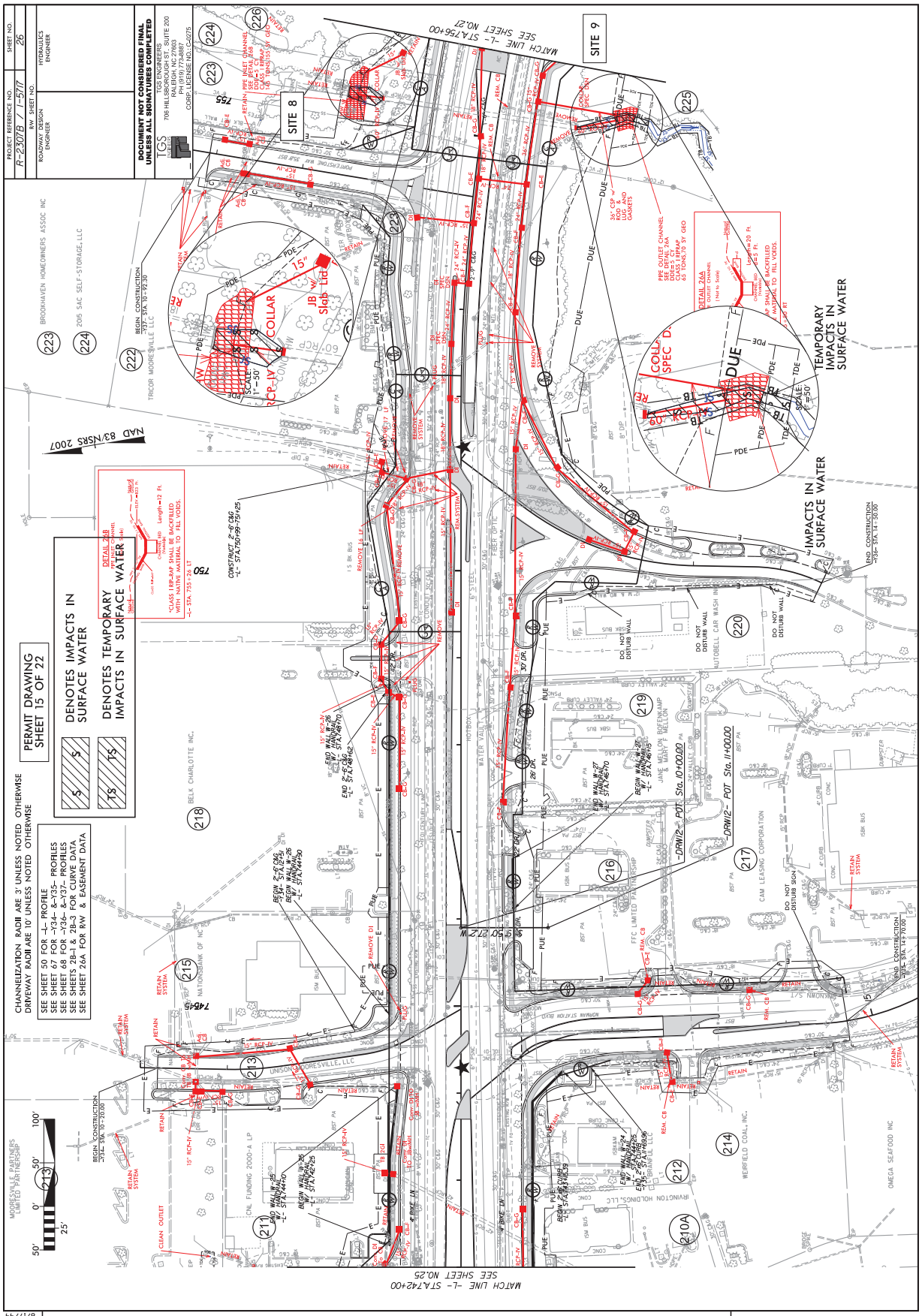

PROJECT REFERENCE NO. R-2307B / I-5717
SHEET NO. 11
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH ST., SUITE 200
RALEIGH, NC 27603
PH (919) 773-4887
CORP. LICENSE NO.: C-0275
PERMIT DRAWING SHEET 11 OF 22
MATCH LINE -L- STA.532+00 SEE SHEET NO.12
MATCH LINE -L- STA.518+00 SEE SHEET NO.10
NAD 83/NSRS 2007
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
CHANNELIZATION RADII ARE 3' UNLESS NOTED OTHERWISE
DRIVEWAY RADII ARE 10' UNLESS NOTED OTHERWISE
PERMANENT TRAIL EASEMENT
SEE SHEET 42 FOR -L- PROFILE
SEE SHEET 57 FOR -Y5- PROFILE
SEE SHEET 71 FOR -DRW2- PROFILE
SEE SHEETS 74 & 75 -TRAIL2- PROFILE
SEE SHEET 2B-1 FOR CURVE DATA
SEE SHEET 2B-4 FOR INTERSECTION DETAILS
SITE 6
SCALE: 1"=50'
DETAIL 10D CONCRETE DITCH BEHIND RET. WALL
DETAIL 11D DITCH BLOCK
DETAIL 11A SPECIAL CUT GRASSED SWALE
DETAIL 11B LATERAL GRASSED SWALE
PINNACLE SHORES OWNERS ASSOC. INC.
DUKE ENERGY CAROLINAS LLC
DUKE ENERGY FULL POND ELEV=760.0' (TYP.)
REMOVE 70' LF
REMOVE 75' LF
REMOVE 80' LF
REMOVE 85' LF
REMOVE 90' LF
REMOVE 95' LF
REMOVE 100' LF
REMOVE 105' LF
REMOVE 110' LF
REMOVE 115' LF
REMOVE 120' LF
REMOVE 125' LF
REMOVE 130' LF
REMOVE 135' LF
REMOVE 140' LF
REMOVE 145' LF
REMOVE 150' LF
REMOVE 155' LF
REMOVE 160' LF
REMOVE 165' LF
REMOVE 170' LF
REMOVE 175' LF
REMOVE 180' LF
REMOVE 185' LF
REMOVE 190' LF
REMOVE 195' LF
REMOVE 200' LF
REMOVE 205' LF
REMOVE 210' LF
REMOVE 215' LF
REMOVE 220' LF
REMOVE 225' LF
REMOVE 230' LF
REMOVE 235' LF
REMOVE 240' LF
REMOVE 245' LF
REMOVE 250' LF
REMOVE 255' LF
REMOVE 260' LF
REMOVE 265' LF
REMOVE 270' LF
REMOVE 275' LF
REMOVE 280' LF
REMOVE 285' LF
REMOVE 290' LF
REMOVE 295' LF
REMOVE 300' LF
REMOVE 305' LF
REMOVE 310' LF
REMOVE 315' LF
REMOVE 320' LF
REMOVE 325' LF
REMOVE 330' LF
REMOVE 335' LF
REMOVE 340' LF
REMOVE 345' LF
REMOVE 350' LF
REMOVE 355' LF
REMOVE 360' LF
REMOVE 365' LF
REMOVE 370' LF
REMOVE 375' LF
REMOVE 380' LF
REMOVE 385' LF
REMOVE 390' LF
REMOVE 395' LF
REMOVE 400' LF
REMOVE 405' LF
REMOVE 410' LF
REMOVE 415' LF
REMOVE 420' LF
REMOVE 425' LF
REMOVE 430' LF
REMOVE 435' LF
REMOVE 440' LF
REMOVE 445' LF
REMOVE 450' LF
REMOVE 455' LF
REMOVE 460' LF
REMOVE 465' LF
REMOVE 470' LF
REMOVE 475' LF
REMOVE 480' LF
REMOVE 485' LF
REMOVE 490' LF
REMOVE 495' LF
REMOVE 500' LF
REMOVE 505' LF
REMOVE 510' LF
REMOVE 515' LF
REMOVE 520' LF
REMOVE 525' LF
REMOVE 530' LF
REMOVE 535' LF
REMOVE 540' LF
REMOVE 545' LF
REMOVE 550' LF
REMOVE 555' LF
REMOVE 560' LF
REMOVE 565' LF
REMOVE 570' LF
REMOVE 575' LF
REMOVE 580' LF
REMOVE 585' LF
REMOVE 590' LF
REMOVE 595' LF
REMOVE 600' LF
REMOVE 605' LF
REMOVE 610' LF
REMOVE 615' LF
REMOVE 620' LF
REMOVE 625' LF
REMOVE 630' LF
REMOVE 635' LF
REMOVE 640' LF
REMOVE 645' LF
REMOVE 650' LF
REMOVE 655' LF
REMOVE 660' LF
REMOVE 665' LF
REMOVE 670' LF
REMOVE 675' LF
REMOVE 680' LF
REMOVE 685' LF
REMOVE 690' LF
REMOVE 695' LF
REMOVE 700' LF
REMOVE 705' LF
REMOVE 710' LF
REMOVE 715' LF
REMOVE 720' LF
REMOVE 725' LF
REMOVE 730' LF
REMOVE 735' LF
REMOVE 740' LF
REMOVE 745' LF
REMOVE 750' LF
REMOVE 755' LF
REMOVE 760' LF
REMOVE 765' LF
REMOVE 770' LF
REMOVE 775' LF
REMOVE 780' LF
REMOVE 785' LF
REMOVE 790' LF
REMOVE 795' LF
REMOVE 800' LF
REMOVE 805' LF
REMOVE 810' LF
REMOVE 815' LF
REMOVE 820' LF
REMOVE 825' LF
REMOVE 830' LF
REMOVE 835' LF
REMOVE 840' LF
REMOVE 845' LF
REMOVE 850' LF
REMOVE 855' LF
REMOVE 860' LF
REMOVE 865' LF
REMOVE 870' LF
REMOVE 875' LF
REMOVE 880' LF
REMOVE 885' LF
REMOVE 890' LF
REMOVE 895' LF
REMOVE 900' LF
REMOVE 905' LF
REMOVE 910' LF
REMOVE 915' LF
REMOVE 920' LF
REMOVE 925' LF
REMOVE 930' LF
REMOVE 935' LF
REMOVE 940' LF
REMOVE 945' LF
REMOVE 950' LF
REMOVE 955' LF
REMOVE 960' LF
REMOVE 965' LF
REMOVE 970' LF
REMOVE 975' LF
REMOVE 980' LF
REMOVE 985' LF
REMOVE 990' LF
REMOVE 995' LF
REMOVE 1000' LF


PROJECT REFERENCE NO. R-2307B / 7-5717
SHEET NO. 13
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH ST., SUITE 200
RALEIGH, NC 27603
PH (919) 773-4887
CORP. LICENSE NO.: C-0775
PERMIT DRAWING SHEET 12 OF 22
SEE INSET A THIS SHEET
SITE 7
MATCH LINE -L- STA.560+00 SEE SHEET NO.14
MATCH LINE -L- STA.546+00 SEE SHEET NO.12
NAD 83/NSRS 2007
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES IMPACTS IN SURFACE WATER
DETAIL 13A BERM GRASSED SWALE (NOT TO SCALE)
DETAIL 13B TOE PROTECTION (NOT TO SCALE)
DETAIL 13C DITCH BLOCK (NOT TO SCALE)
CHANNELIZATION RADII ARE 3' UNLESS NOTED OTHERWISE
DRIVEWAY RADII ARE 10' UNLESS NOTED OTHERWISE
SEE SHEET 43 FOR -L- PROFILE
SEE SHEET 58 FOR -Y10- PROFILE
SEE SHEET 2B-1 FOR CURVE DATA
SEE SHEET 2B-4 FOR INTERSECTION DETAILS
SCALE 1"=50'
SCALE 1"=40'
50' 0' 50' 100'
25'
LAKE NORMAN COUNTRY INC.
RONALD K CAMPBELL & DANIEL VINCENT CAMPBELL
JAMES A. KATH & MARY ANN MACASEB ANTHONY W. MACASEB WENDY S. MACASEB
MORRIS ENTERPRISES
BILLIE BOBBIE HARRISON
LESLIE K. SUTTON
ALICE B. STILLWELL B&C MILLS & D. FOX
BOOSTER LLC
WAYNE A. FOLGER
QUINN MANAGEMENT, LLC
WOODLAND - WATERVIEW LLC
HYDRAULICS LTD
BEGIN RTE CURB -L- STA 557+46
END RTE CURB -L- STA 558+19
BEGIN RTE CURB -L- STA 558+45
END RTE CURB -L- STA 558+84
BEGIN RTE CURB -L- STA 559+79
END RTE CURB -L- STA 560+22
END CONSTRUCTION -L- STA 12+40.00
CLASS I NP RAP 4 TON W/ GEO
TOE PROTECTION SEE DETAIL 13B CLASS I NP RAP 99 TONS,198 SY GEO
BERM GRASSED SWALE SEE DETAIL 13A DIKE = 19" CY
BERM GRASSED SWALE SEE DETAIL 13A DIKE = 48" CY
DITCH BLOCK SEE DETAIL 13C
REMOVE EXISTING SYSTEM
REMOVE ASPHALT
REMOVE INLET
RETAIN
JB w/ Slab
PDE
TDE
PLE
PLC
15" RCP IV
+54 70.19'
+48.95 65'
-L- STA 548+30 TO 550+28 LT -Y10- STA 10+00 TO 10+44 LT (SEE XSC FOR DITCH GRADE)
-L- STA 546+07 RT
-L- STA 547+00 TO 547+55 LT
-L- STA 557+00 TO 557+28 LT
-L- STA 559+00 TO 559+44 LT
-L- STA 560+00 TO 560+44 LT

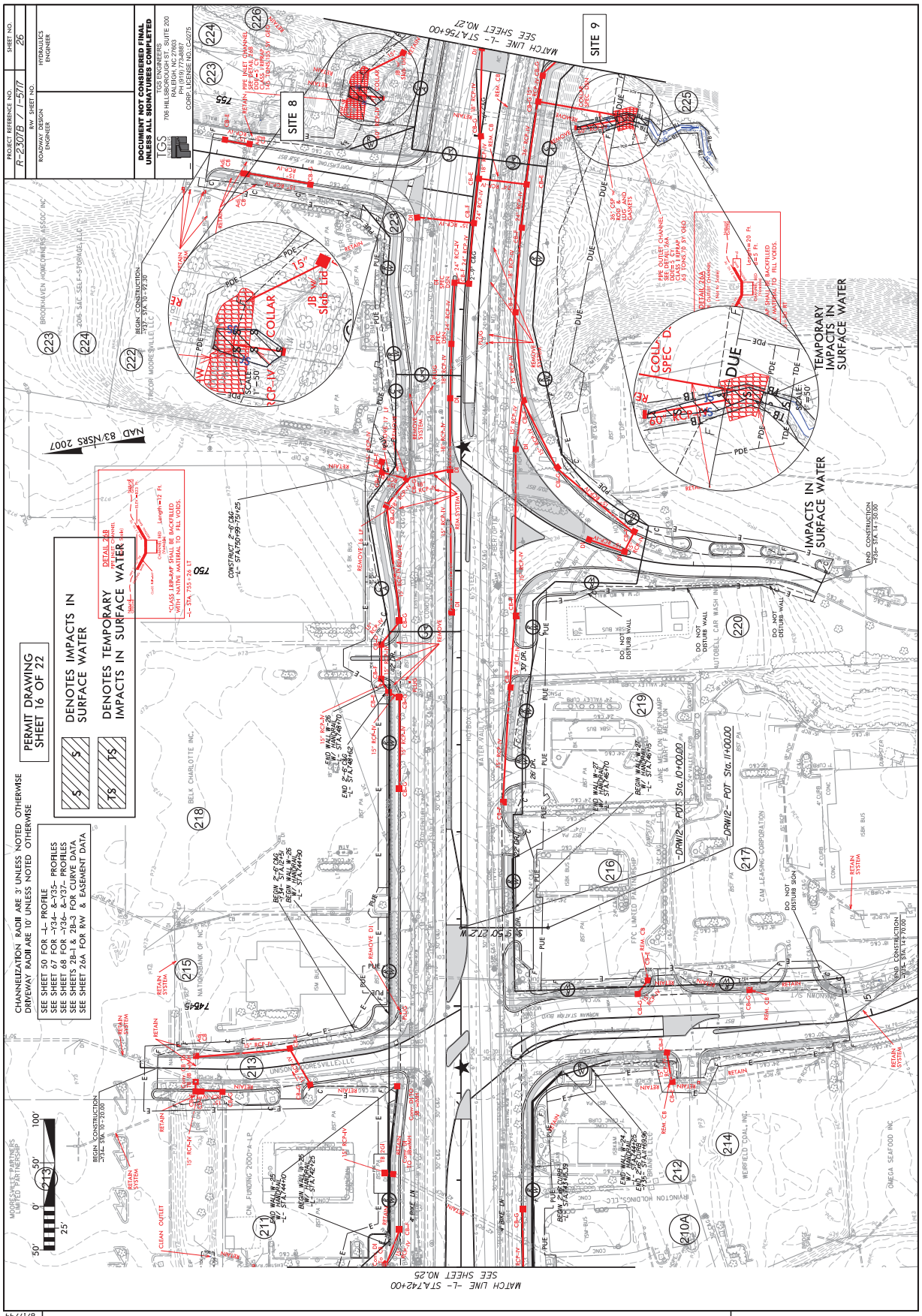

PROJECT REFERENCE NO. R-2307B / 7-5717
SHEET NO. 13
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH ST., SUITE 200
RALEIGH, NC 27603
PH (919) 773-4887
CORP. LICENSE NO.: C-0775
PERMIT DRAWING SHEET 13 OF 22
SEE INSET A THIS SHEET
NAD 83/NSRS 2007
MATCH LINE -L- STA 560+00 SEE SHEET NO.14
MATCH LINE -L- STA 546+00 SEE SHEET NO.12
SITE 7
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES IMPACTS IN SURFACE WATER
DETAIL 13A BERM GRASSED SWALE (NOT TO SCALE)
DETAIL 13B TOE PROTECTION (NOT TO SCALE)
DETAIL 13C DITCH BLOCK (NOT TO SCALE)
CHANNELIZATION RADII ARE 3' UNLESS NOTED OTHERWISE
DRIVEWAY RADII ARE 10' UNLESS NOTED OTHERWISE
SEE SHEET 43 FOR -L- PROFILE
SEE SHEET 58 FOR -Y10- PROFILE
SEE SHEET 2B-1 FOR CURVE DATA
SEE SHEET 2B-4 FOR INTERSECTION DETAILS
SCALE: 1"=50'
SCALE: 1"=50'
50' 0' 50' 100'
25'
8/17/99
I:\26\2024\R-2307B\Hydraulics\PERMITS_Environmental\Drawings\R-2307B_RDY_PSH_13.dgn
General Standard

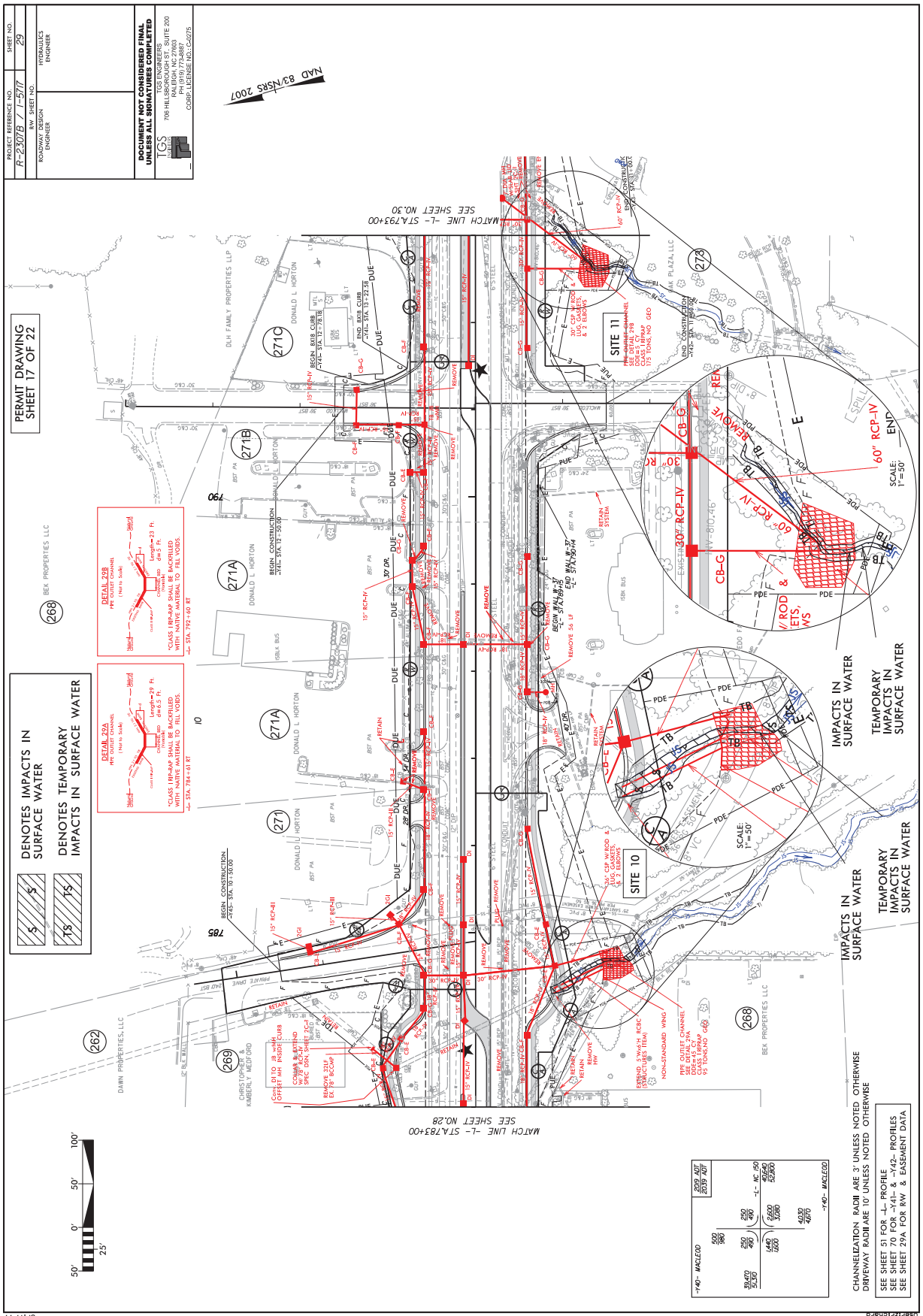

PERMIT DRAWING
SHEET 14 OF 22
PROJ. REFERENCE NO.
R-2307B
SHEET NO.
X-69
0 5 10
DENOTES FILL IN WETLAND
F
SCALE
1"= 20' HORIZONTAL
1"= 20' VERTICAL
554+50.00
WETLAND CROSS SECTION
SITE 7
WLB
WLB
865.90
862.10
861.32
0.040
0.040
4:1
2:1
6/23/16
I/26/2024
X:\NCDOT\R-2307B\Hydraulics\PERMITS_Environmental\Drawings\R-2307B_RDY_XPL_L.dgn
User:rrichard

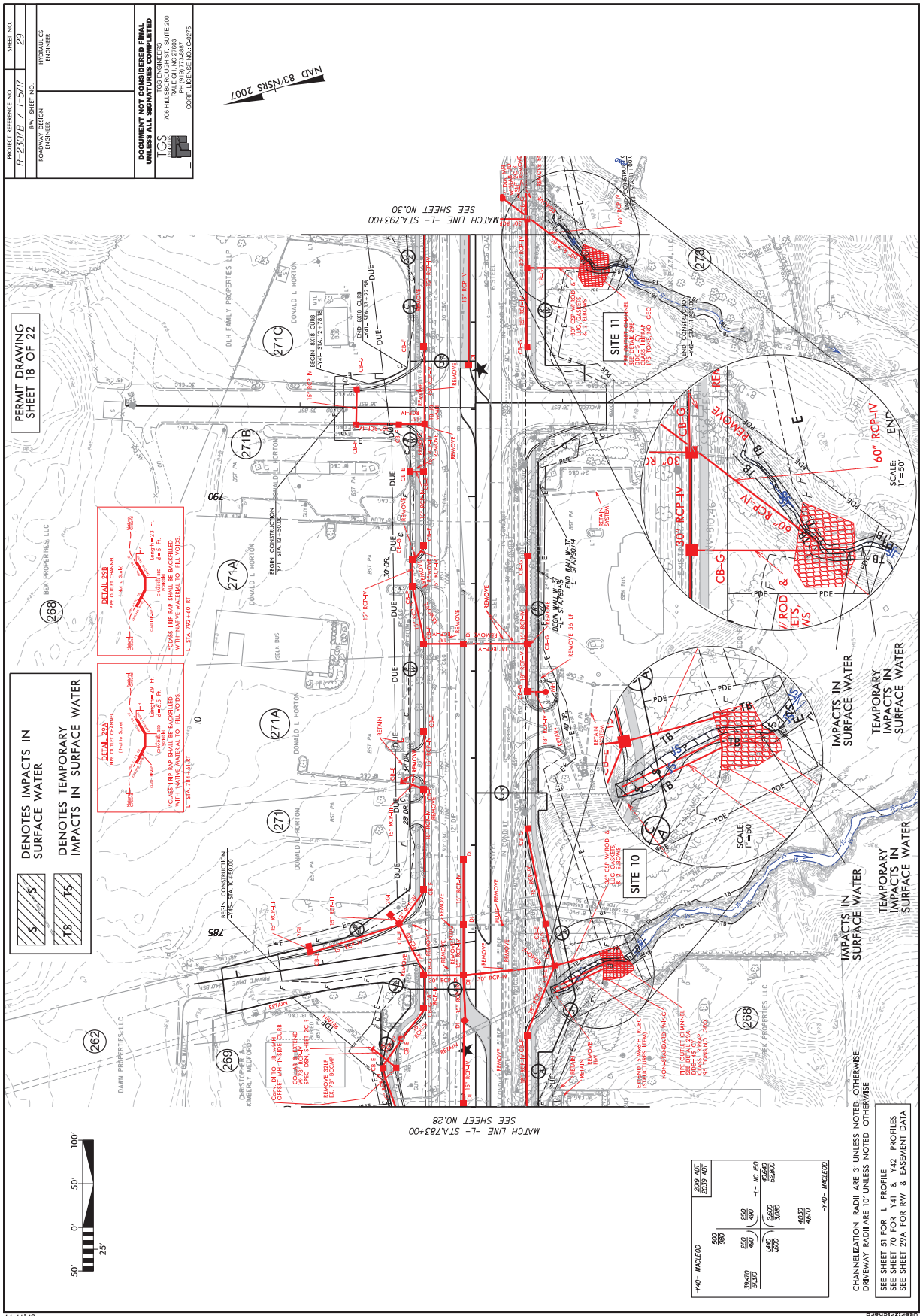
P-44

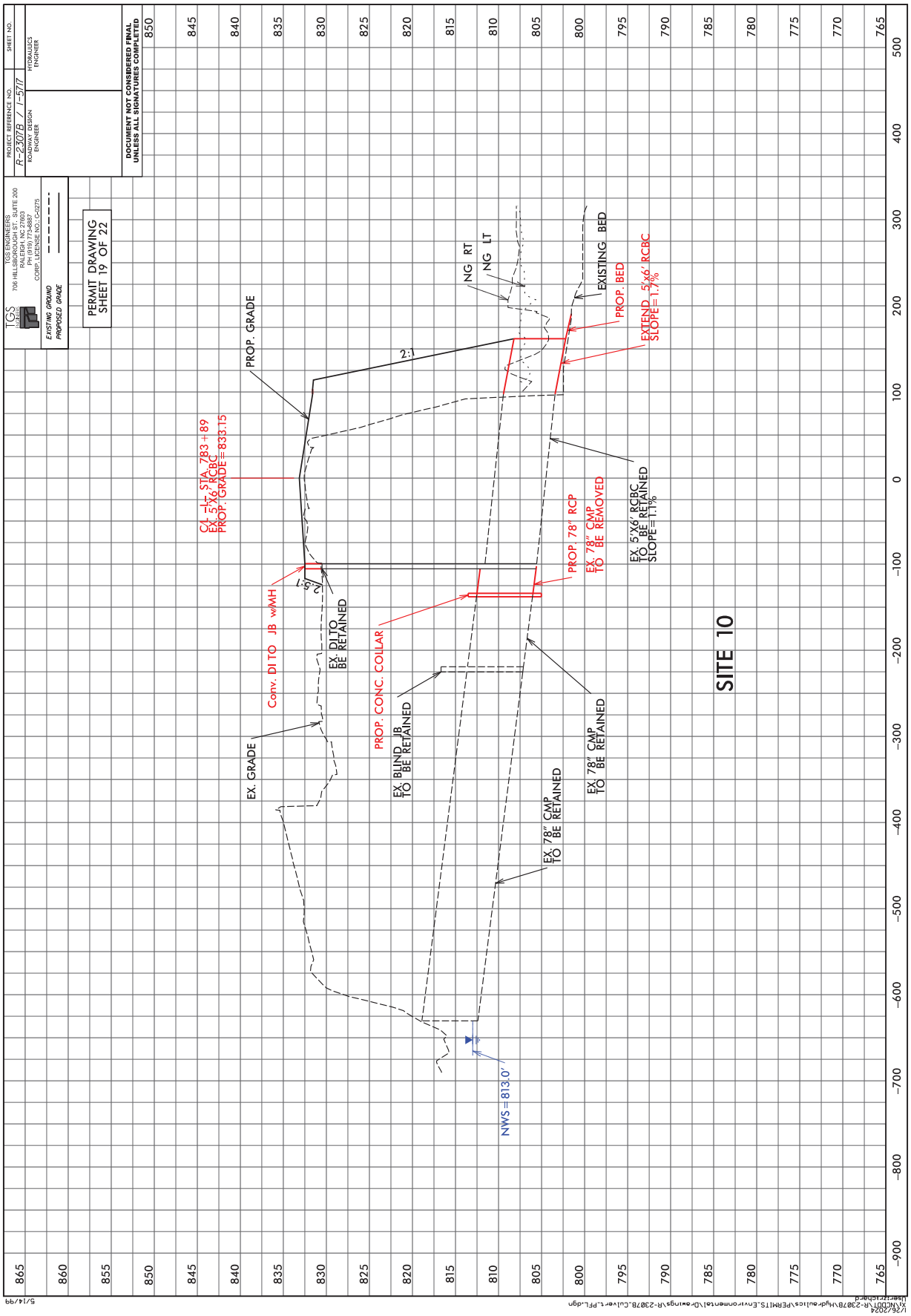

PROJECT REFERENCE NO.
R-2307B / I-5717
SHEET NO.
26
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH ST., SUITE 200
RALEIGH, NC 27603
PH (919) 773-4887
CORP. LICENSE NO.: C-0975
PERMIT DRAWING
SHEET 15 OF 22
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
CHANNELIZATION RADII ARE 3' UNLESS NOTED OTHERWISE
DRIVEWAY RADII ARE 10' UNLESS NOTED OTHERWISE
SEE SHEET 50 FOR -L- PROFILE
SEE SHEET 67 FOR -Y34- &-Y35- PROFILES
SEE SHEET 68 FOR -Y36- &-Y37- PROFILES
SEE SHEETS 2B-1 & 2B-3 FOR CURVE DATA
SEE SHEET 26A FOR RW & EASEMENT DATA
MATCH LINE -L- STA 742+00
SEE SHEET NO.25
MATCH LINE -L- STA 756+00
SEE SHEET NO.27
SITE 8
SITE 9
NAD 83/NSRS 2007
TEMPORARY IMPACTS IN SURFACE WATER
IMPACTS IN SURFACE WATER
DRW12 - POT Sta. 10+00.00
DRW12 - POT Sta. 11+00.00
BEGIN CONSTRUCTION -L- STA. 10+92.30
BEGIN CONSTRUCTION -L- STA. 10+20.00
END CONSTRUCTION -L- STA. 14+50.00
END CONSTRUCTION -L- STA. 14+70.00
CONSTRUCT 2-6 CMG -L- STA 750+99+19.25
DETAIL 26B
DETAIL 26A
RCP-IV COLLAR
JB Slab Lid
PIPE OUTLET CHANNEL
SPEC DETAIL
DD-5 CY
63 TONS
63 TONS/70 SY GEO
BROOKHAVEN HOMEOWNERS ASSOC INC
TRICOR MOORESVILLE LLC
205 SAC SELF STORAGE, LLC
BELK CHARLOTTE INC.
NATIONSBANK OF NC
MOORESVILLE PARTNERS LIMITED PARTNERSHIP
CNL FUNDING 2000-A LP
UNISON MOORESVILLE, LLC
CAM LEASING CORPORATION
FFC LIMITED PARTNERSHIP
JANE MELLON REVOCABLE TRUST
AUTOBELL CAR WASH INC
BRANFILE LLC
IRVINGTON HOLDINGS LLC
WERFIELD COAL, INC.
OMEGA SEAFOOD INC
DO NOT DISTURB WALL
DO NOT DISTURB SIGN
REVISIONS
10-5-20IT REVISED EASEMENTS ON PARCELS 218,219 & 222
8/17/99

P-45

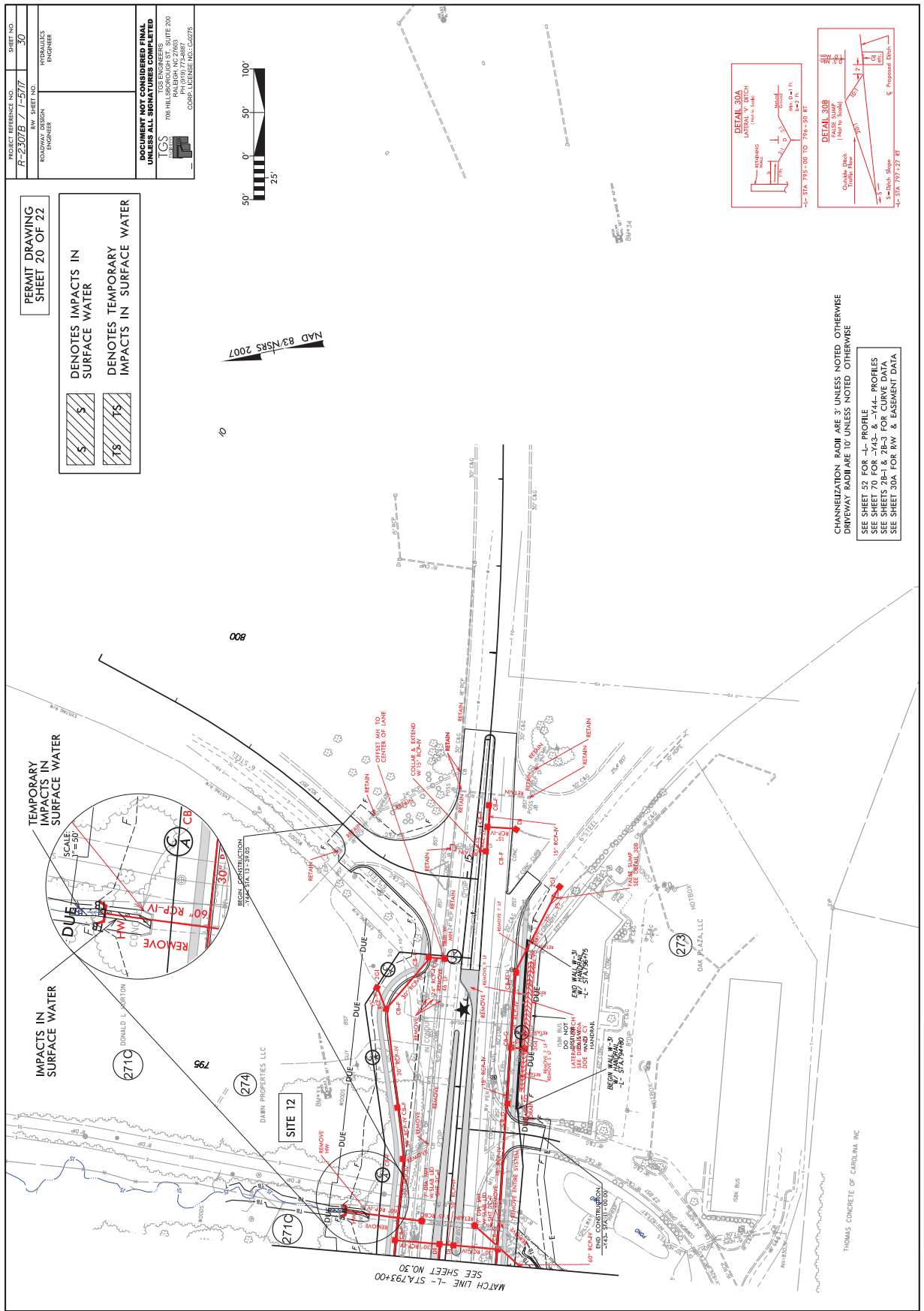

PROJECT REFERENCE NO.
R-2307B / I-5717
SHEET NO.
26
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH ST., SUITE 200
RALEIGH, NC 27603
PH (919) 773-4887
CORP. LICENSE NO.: C-0975
PERMIT DRAWING
SHEET 16 OF 22
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
CHANNELIZATION RADII ARE 3' UNLESS NOTED OTHERWISE
DRIVEWAY RADII ARE 10' UNLESS NOTED OTHERWISE
SEE SHEET 50 FOR -L- PROFILE
SEE SHEET 67 FOR -Y34- &-Y35- PROFILES
SEE SHEET 68 FOR -Y36- &-Y37- PROFILES
SEE SHEETS 28-1 & 28-3 FOR CURVE DATA
SEE SHEET 26A FOR R/W & EASEMENT DATA
MATCH LINE -L- STA.756+00
SEE SHEET NO.27
MATCH LINE -L- STA.742+00
SEE SHEET NO.25
SITE 8
SITE 9
NAD 83/NSRS 2007
IMPACTS IN SURFACE WATER
TEMPORARY IMPACTS IN SURFACE WATER
DRWI2 - PDT Sta. 10+00.00
DRWI2 - PDT Sta. 11+00.00
DETAIL 26B
DETAIL 26S
REVISIONS
10-5-20IT REVISED EASEMENTS ON PARCELS 218,219 & 222
8/17/99

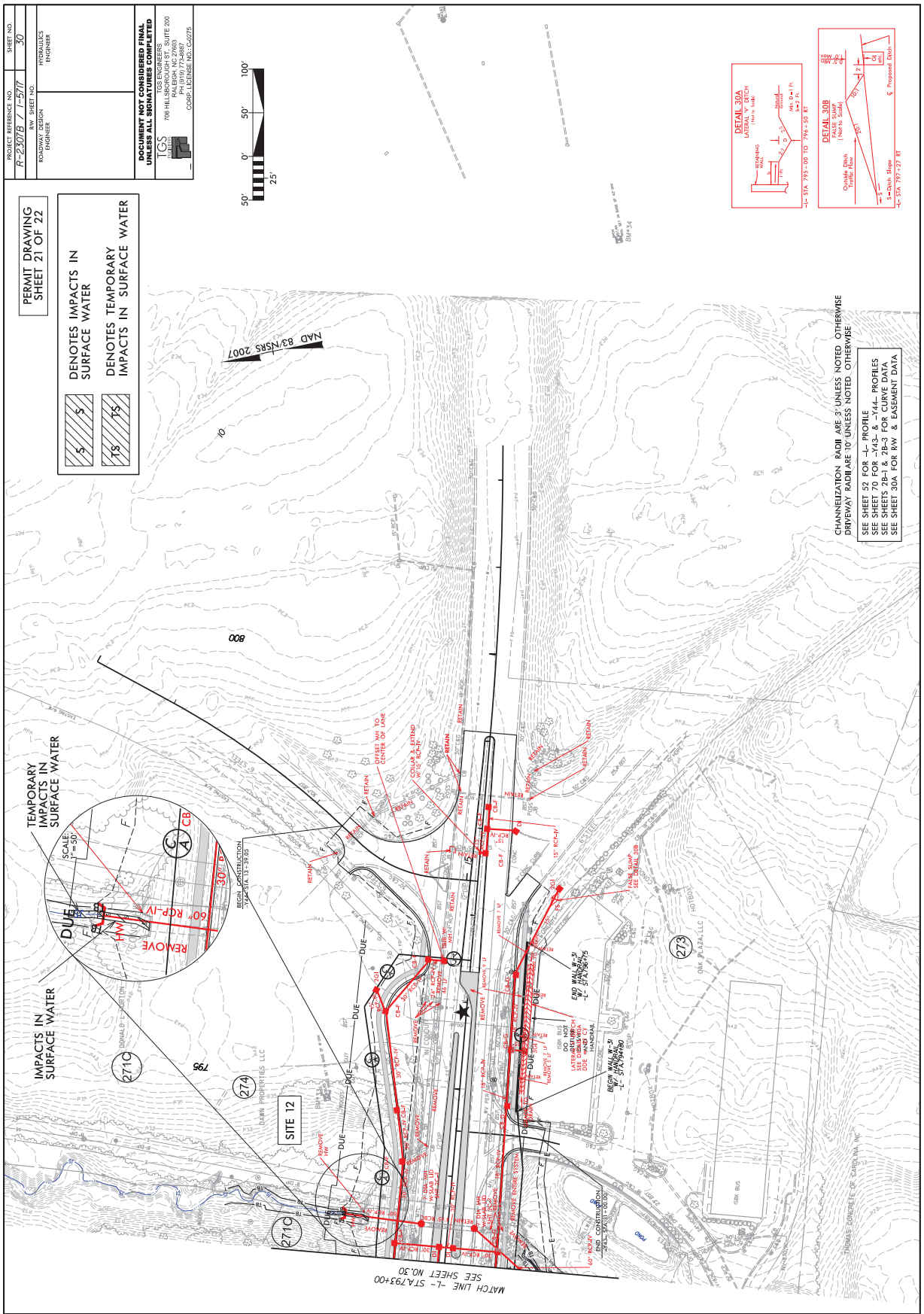

PROJECT REFERENCE NO. R-2307B / 1-5/7
SHEET NO. 29
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH ST., SUITE 200
RALEIGH, NC 27603
PH (919) 773-4887
CORP. LICENSE NO.: C-0775
NAD 83/NSRS 2007
PERMIT DRAWING SHEET 17 OF 22
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DETAIL 29B
DETAIL 29A
SITE 10
SITE 11
IMPACTS IN SURFACE WATER
TEMPORARY IMPACTS IN SURFACE WATER
MATCH LINE -L- STA 783+00 SEE SHEET NO.28
MATCH LINE -L- STA 793+00 SEE SHEET NO.30
CHANNELIZATION RADII ARE 3' UNLESS NOTED OTHERWISE
DRIVEWAY RADII ARE 10' UNLESS NOTED OTHERWISE
SEE SHEET 51 FOR -L- PROFILE
SEE SHEET 70 FOR -Y41- & -Y42- PROFILES
SEE SHEET 29A FOR R/W & EASEMENT DATA
8/17/99


PROJECT REFERENCE NO.
R-2307B / 1-5717
SHEET NO.
29
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH ST., SUITE 200
RALEIGH, NC 27603
PH (919) 773-4887
CORP. LICENSE NO.: C-0775
NAD 83/NSRS 2007
PERMIT DRAWING
SHEET 18 OF 22
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
MATCH LINE -L- STA 793+00
SEE SHEET NO.30
MATCH LINE -L- STA 783+00
SEE SHEET NO.28
SITE 10
SITE 11
IMPACTS IN SURFACE WATER
TEMPORARY IMPACTS IN SURFACE WATER
SCALE: 1" = 50'
60" RCP-IV
30" RCP-IV
CB-G
REMOVE
RETAIN
DUE
PDE
TB
CHANNELIZATION RADII ARE 3' UNLESS NOTED OTHERWISE
DRIVEWAY RADII ARE 10' UNLESS NOTED OTHERWISE
SEE SHEET 51 FOR -L- PROFILE
SEE SHEET 70 FOR -Y41- & -Y42- PROFILES
SEE SHEET 29A FOR R/W & EASEMENT DATA
-Y40- MACLEOD
-L- MC 950
-Y42- MACLEOD
2059 ADT
2539 ADT
500
980
250
490
2500
3080
1440
1820
4030
4870
39,470
50,360
25,000
31,850
50'
0'
50'
100'
25'



I:\24CD01\R-2307B\Hydr\plots\PERMITS_Environmental\Drawings\R-2307B_Culvert_PPL.dgn
1/26/2024
jherrickshard


PERMIT DRAWING
SHEET 20 OF 22
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
PROJECT REFERENCE NO. R-2307B / I-5717
SHEET NO. 30
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH ST., SUITE 200
RALEIGH, NC 27603
PH: (919) 773-4887
CORP. LICENSE NO.: C-0775
NAD 83/NSRS 2007
SCALE 1" = 50'
TEMPORARY IMPACTS IN SURFACE WATER
IMPACTS IN SURFACE WATER
SITE 12
DETAIL 30A
LATERAL 'V' DITCH
DETAIL 30B
FALSE SUMP
CHANNELIZATION RADII ARE 3' UNLESS NOTED OTHERWISE
DRIVEWAY RADII ARE 10' UNLESS NOTED OTHERWISE
SEE SHEET 52 FOR -L- PROFILE
SEE SHEET 70 FOR -Y43- & -Y44- PROFILES
SEE SHEETS 2B-1 & 2B-3 FOR CURVE DATA
SEE SHEET 30A FOR R/W & EASEMENT DATA
MATCH LINE -L- STA 793+00
SEE SHEET NO. 30
10-5-2017 REVISED DUES ON PARCELS 271 & 274.
I:\26\2024\ACTIVE\R-2307B\Hydraulics\PERMITS-Environmental\Drawings\R-2307B_ROD_PSH_30.dgn
8/17/2018
USER-12-10hard


PROJECT REFERENCE NO.
R-2307B / I-5717
SHEET NO.
30
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH ST., SUITE 200
RALEIGH, NC 27603
PH: (919) 773-4887
CORP. LICENSE NO.: C-0775
PERMIT DRAWING
SHEET 21 OF 22
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
NAD 83/NSRS 2007
50' 0' 50' 100'
25'
DETAIL 30A
LATERAL 'V' DITCH
DETAIL 30B
FALSE SUMP
TEMPORARY IMPACTS IN SURFACE WATER
IMPACTS IN SURFACE WATER
SCALE: 1" = 50'
CHANNELIZATION RADII ARE 3' UNLESS NOTED OTHERWISE
DRIVEWAY RADII ARE 10' UNLESS NOTED OTHERWISE
SEE SHEET 52 FOR -L- PROFILE
SEE SHEET 70 FOR -Y43- & -Y44- PROFILES
SEE SHEETS 2B-1 & 2B-3 FOR CURVE DATA
SEE SHEET 30A FOR R/W & EASEMENT DATA
SITE 12
MATCH LINE -L- STA 793+00
SEE SHEET NO. 30
10-5-2017 REVISED DUES ON PARCELS 271 & 274.
I:\26\2024\R-2307B\Hydraulics\ENVIRONMENTAL\Drawings\R-2307B_ROD_PSH_30.dgn
USER-12-10hrd
8/17/2017

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	-L- 453+21/453+40 LT	18" PIPE						0.001	0.006			
2	-L- 458+40/458+74 LT	36" CSP						0.006	0.016			
3	-L- 458+21/467+07 LT	ROCK CAUSEWAY						3.079	0.070			
4	-L- 476+33/488+33 LT	ROCK CAUSEWAY						3.859	0.162			
5	-L- 487+17/488+00 LT	42" PIPE						0.014	0.019			
6	-L- 519+88/520+50 RT	30" PIPE						0.020	0.064			
7**	-L- 554+25/554+82 LT	24" PIPE	0.051			0.010		0.011		117		
8	-L- 755+17/755+36 LT	60" RCP						0.013		39		
9	-L- 755+24/755+53 RT	60" RCP						0.010	0.002	68	17	
10	-L- 784+30/784+87 RT	5'x'6 RCBC EXTENSION						0.013	0.003	97	20	
11	-L- 792+60/793+23 RT	60" RCP						0.004	0.001	98	19	
12	-L- 793+40/793+49 LT	60" RCP						0.003	0.002	27	20	
TOTALS*:			0.051			0.010		7.033	0.345	446	76	

*Rounded totals are sum of actual impacts

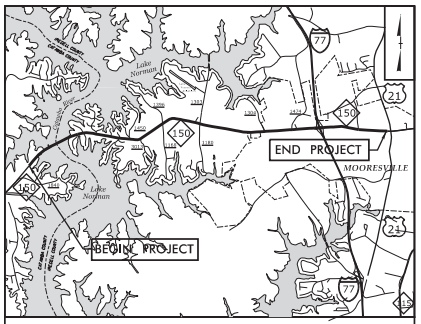
NOTES:
0.02 acres of Permanent SW impacts for bridge interior bents at 466+75, 467+75, 469+25, 470+75, 472+25, 473+75, 475+25 and 476+75.
** - Site 7 wetland is accounted for as a total take per 4C meeting minutes.

Revised 2016 09 09

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
1/29/2024
CATAWBA/IREDELL COUNTIES
R-2307B / I-5717
37944.1.FR5 / 50134.1.FS1
SHEET 22 OF 22

CONTRACT: TIP PROJECTS: R–2307B & I–5717

See Sheet 1-A For Index of Sheets



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CATAWBA & IREDELL COUNTIES

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R–2307B, I–5717	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
37944.1.FR5	STP–0150(36)	PE (R–2307B)
50134.1.FS1	NHPP–077–1(221)37	PE (I–5717)
37944.2.4	STP–0150(036)	R/W (R–2307B)
37944.2.5	STP–0150(036)	UTILITIES (R–2307B)
50134.2.1	NHPP–077–1(221)37	R/W, UTILITIES (I–5717)

LOCATION: *NC 150 FROM SR 1840 (GREENWOOD RD) IN CATAWBA COUNTY TO US 21 IN IREDELL COUNTY*

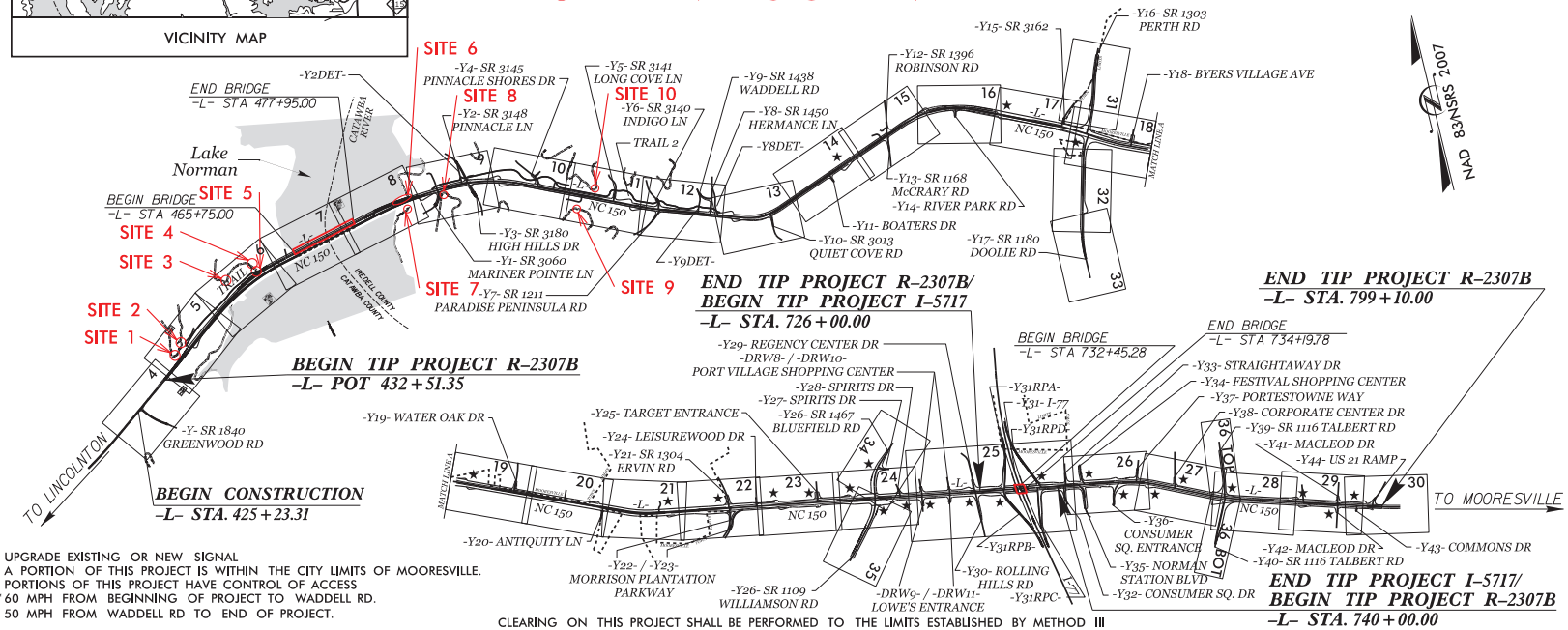
BUFFER DRAWING SHEET 1 OF 7

TYPE OF WORK: *GRADING, DRAINAGE, PAVING, STRUCTURES, AND SIGNALS*

BUFFER IMPACTS PERMIT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 1983 2007



★ UPGRADE EXISTING OR NEW SIGNAL
A PORTION OF THIS PROJECT IS WITHIN THE CITY LIMITS OF MOORESVILLE.
PORTIONS OF THIS PROJECT HAVE CONTROL OF ACCESS
** 60 MPH FROM BEGINNING OF PROJECT TO WADDELL RD.
50 MPH FROM WADDELL RD TO END OF PROJECT.

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III

GRAPHIC SCALES

50 25 0 50 100
PLANS

DESIGN DATA

ADT 2019 = 47,900
ADT 2039 = 58,860
K = 8%
D = 55%
T = 6%*
V = **
* TTST 2%+ DUAL 4%
FUNC CLASS = PRINCIPAL ARTERIAL STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R–2307B	=	*6.447 mile*
LENGTH STRUCTURES TIP PROJECT R–2307B	=	*0.231 mile*
TOTAL LENGTH TIP PROJECT R–2307B	=	*6.678 mile*
LENGTH ROADWAY TIP PROJECT I–5717	=	*0.232 mile*
LENGTH STRUCTURES TIP PROJECT I–5717	=	*0.033 mile*
TOTAL LENGTH TIP PROJECT I–5717	=	*0.265 mile*
TOTAL LENGTH TIP PROJECT R–2307B / I–5717	=	*6.943 mile*

Prepared For:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610
By:
TGS ENGINEERS
706 HILLSBOROUGH ST
SUITE 200
RALEIGH, NC 27603
PH (919) 773-8887
CORP. LICENSE NO.: C-0275

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: AUGUST 31, 2017

LETTING DATE: JUNE 17, 2025

BURKE EVANS, PE
PROJECT ENGINEER

NATHAN ADIMA, PE
NCDOT CONTACT

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

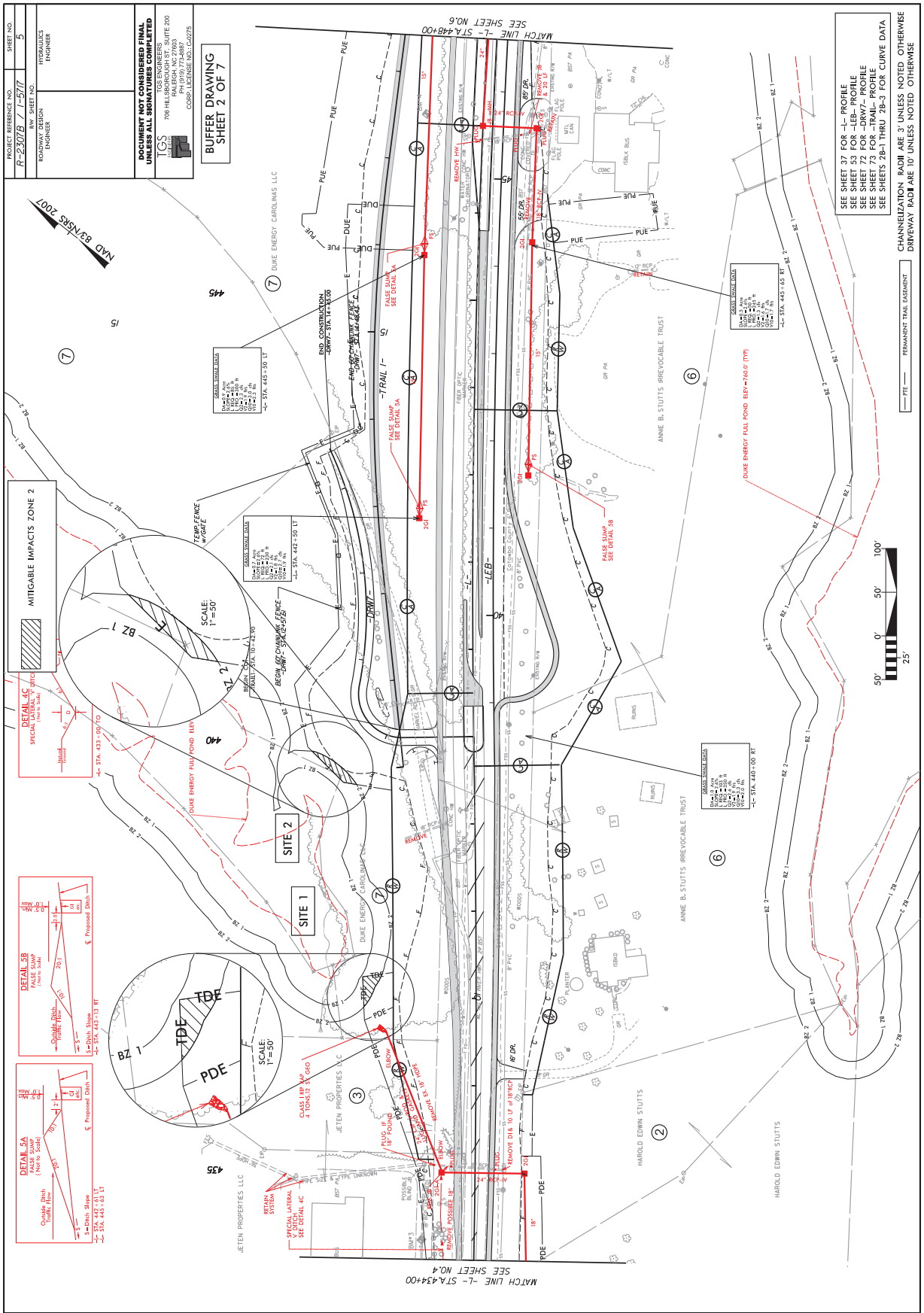
STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION

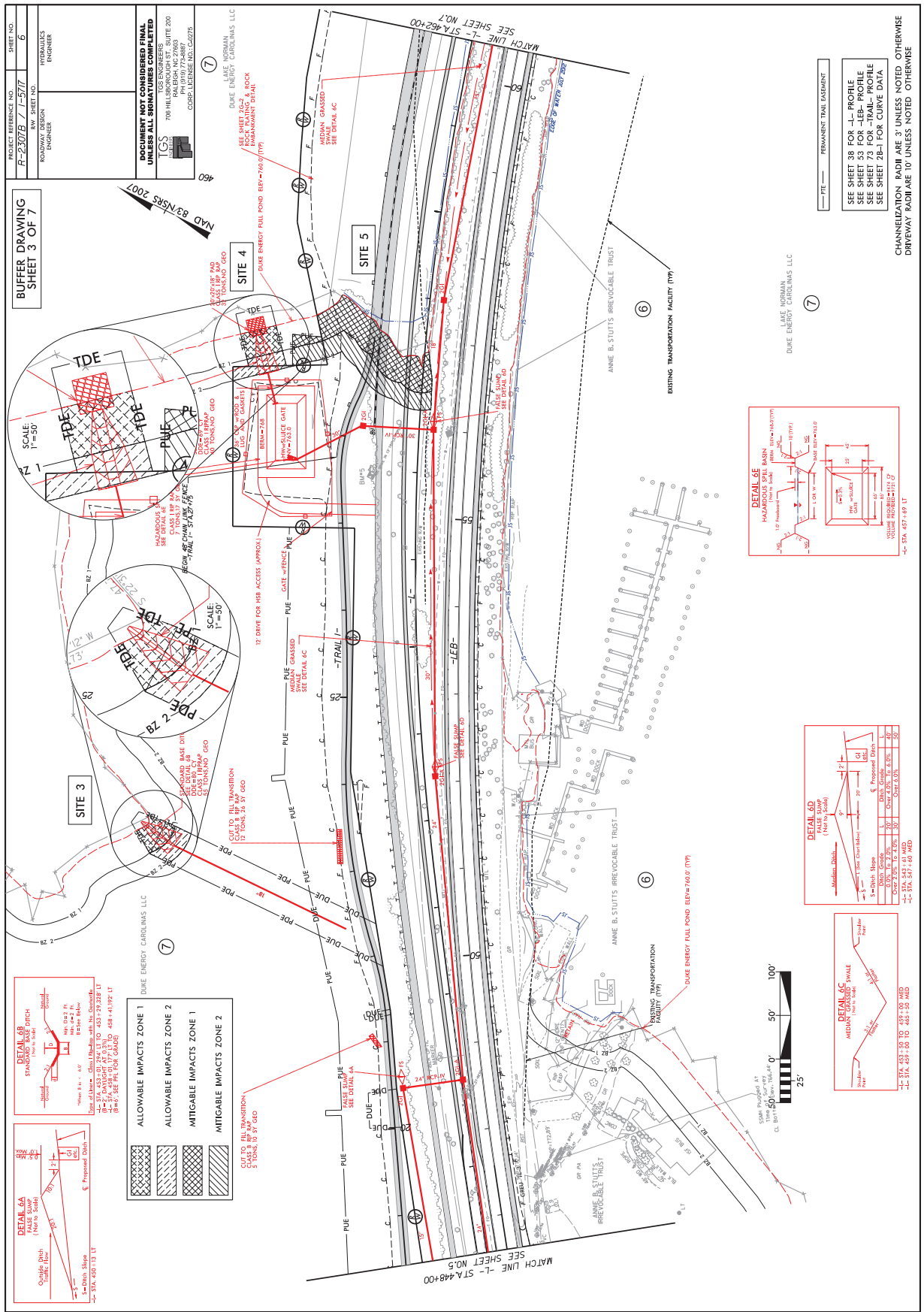
P-52

09/08/99

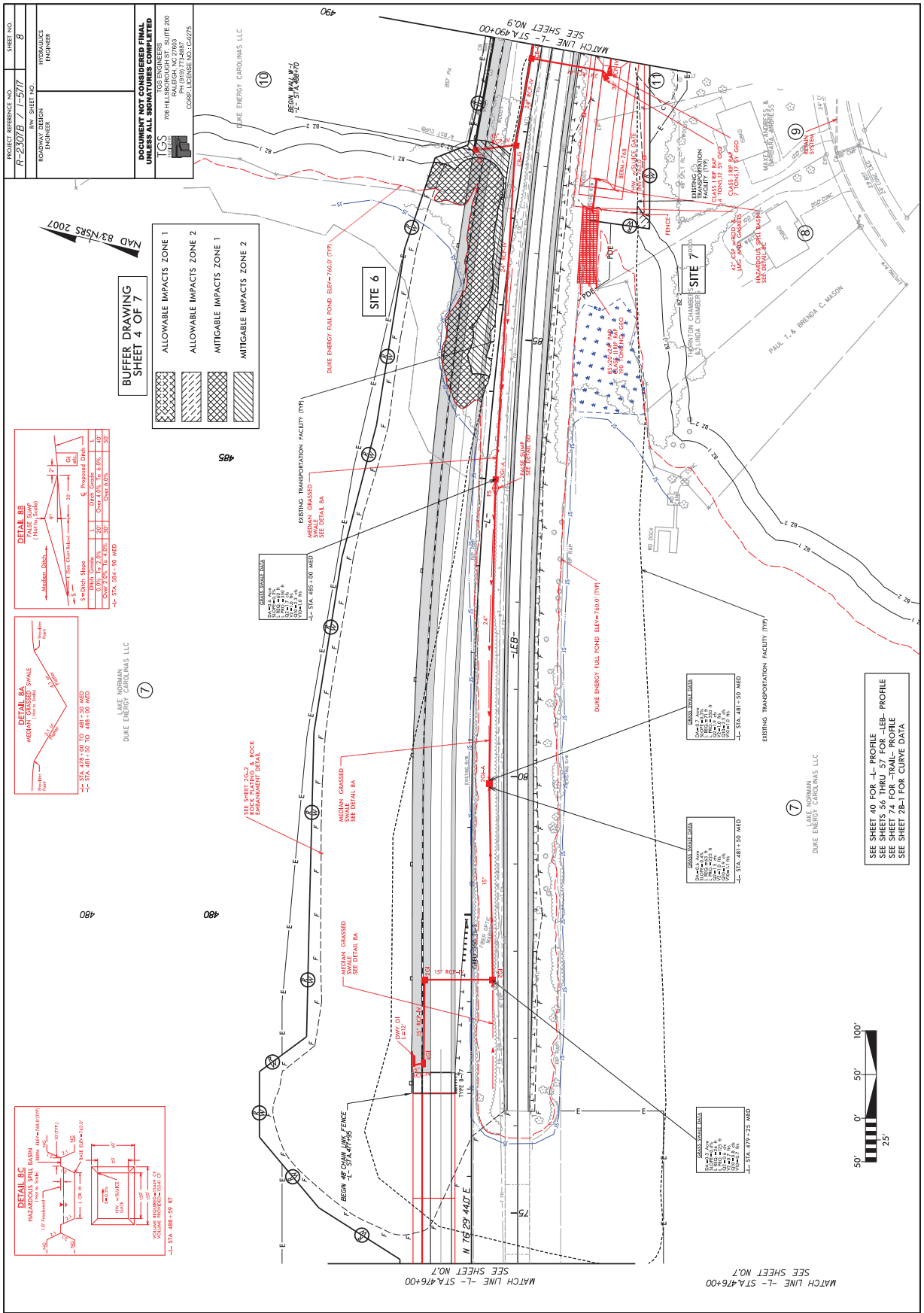
V:26/2024
M:\NCDOT_R-2307B\Hydraulics\PERMITS_Environmental\Drawings\Buffer Plansheets\R-2307B_RDY_TSH.dgn
User:zrichard

TGS

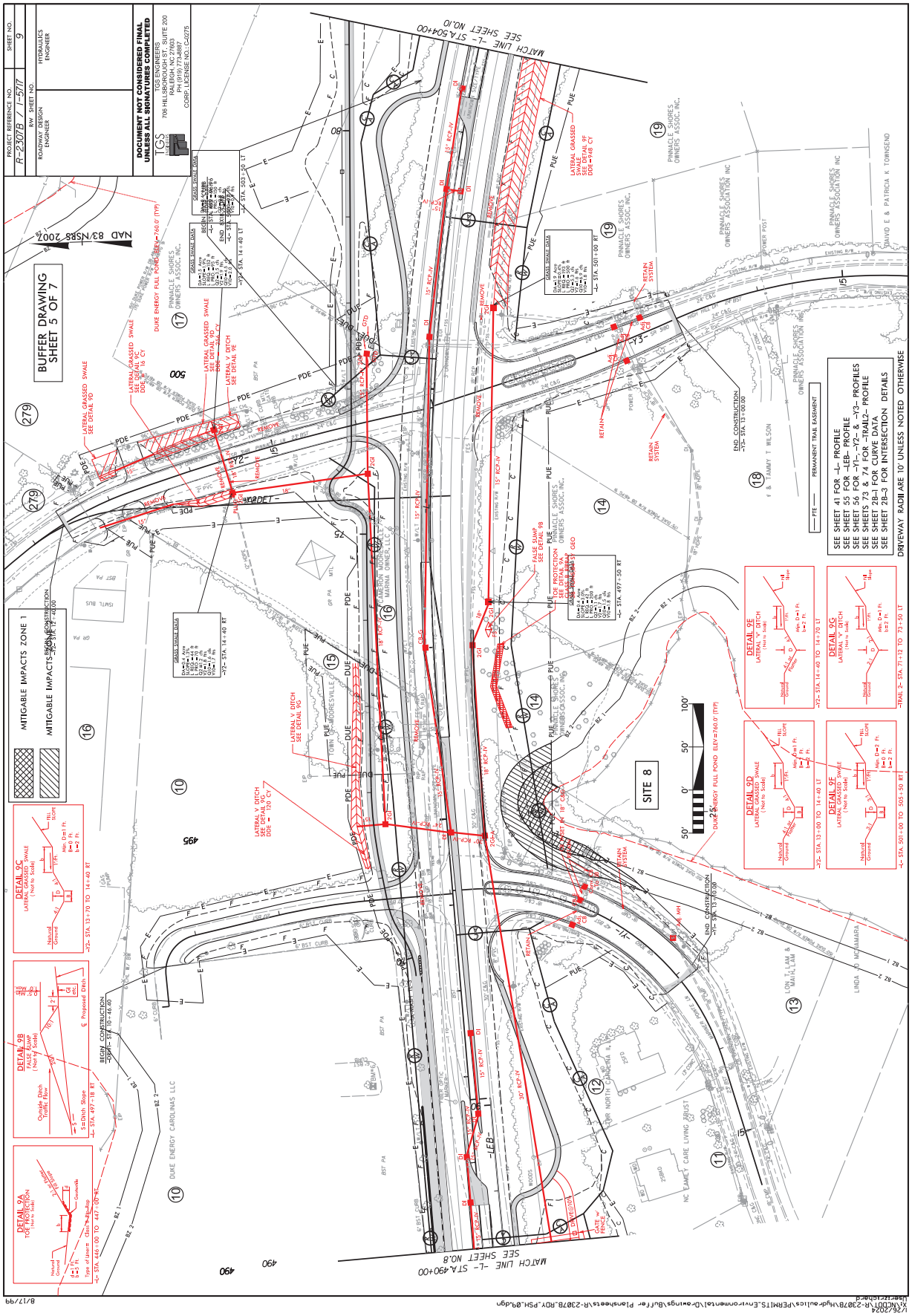

BUFFER DRAWING
SHEET 2 OF 7
PROJECT REFERENCE NO. R-2307B / I-5717
SHEET NO. 5
ROADWAY DESIGN ENGINEER
R/W SHEET NO.
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH ST., SUITE 200
RALEIGH, NC 27603
PH: (919) 773-4887
CORP. LICENSE NO.: C-0775
MATCH LINE -L- STA 448+00
SEE SHEET NO.6
MATCH LINE -L- STA 434+00
SEE SHEET NO.4
NAD 83/NSRS 2007
SEE SHEET 37 FOR -L- PROFILE
SEE SHEET 53 FOR -LEB- PROFILE
SEE SHEET 72 FOR -DRW7- PROFILE
SEE SHEET 73 FOR -TRAIL- PROFILE
SEE SHEETS 28-1 THRU 28-3 FOR CURVE DATA
CHANNELIZATION RADII ARE 3' UNLESS NOTED OTHERWISE
DRIVEWAY RADII ARE 10' UNLESS NOTED OTHERWISE
PTE PERMANENT TRAIL EASEMENT
MITIGABLE IMPACTS ZONE 2
SITE 1
SITE 2
DUKE ENERGY CAROLINAS LLC
DUKE ENERGY FULL POND ELEV.=760.0' (TYP.)
ANNE B. STUTTS IRREVOCABLE TRUST
HAROLD EDWIN STUTTS
JETEN PROPERTIES LLC
-TRAIL-
-LEB-
-DRW7-
DETAIL 4C
SPECIAL LATERAL V DITCH
DETAIL 5B
FALSE SUMP
DETAIL 5A
FALSE SUMP
SCALE: 1"=50'
TEMP. FENCE W/GATE
TEMP. SILT FENCE
REMOVE EXIST. CULVERT
REMOVE EXIST. HW
REMOVE EXIST. RCP
REMOVE EXIST. RIP-RAP
REMOVE EXIST. CONC. HW
REMOVE EXIST. METAL PIPE
REMOVE EXIST. CONC. PIPE
REMOVE EXIST. BUILDING
REMOVE EXIST. SHED
REMOVE EXIST. GAZEBO
REMOVE EXIST. PLANTER
REMOVE EXIST. RUINS
REMOVE EXIST. WOODS
REMOVE EXIST. CONC. PAD
REMOVE EXIST. CONC. WALK
REMOVE EXIST. BRICK WALK
REMOVE EXIST. CONC. CURB
REMOVE EXIST. ASPHALT
REMOVE EXIST. GRAVEL
REMOVE EXIST. GUARDRAIL
REMOVE EXIST. CHAIN LINK FENCE
REMOVE EXIST. WOOD FENCE
REMOVE EXIST. WIRE FENCE
REMOVE EXIST. POST
REMOVE EXIST. SIGN
REMOVE EXIST. MAILBOX
REMOVE EXIST. UTILITY POLE
REMOVE EXIST. GUY WIRE
REMOVE EXIST. GUY ANCHOR
REMOVE EXIST. TRANSFORMER
REMOVE EXIST. METER
REMOVE EXIST. VALVE
REMOVE EXIST. FIRE HYDRANT
REMOVE EXIST. WATER MANHOLE
REMOVE EXIST. SEWER MANHOLE
REMOVE EXIST. DRAINAGE MANHOLE
REMOVE EXIST. TELEPHONE MANHOLE
REMOVE EXIST. ELECTRIC MANHOLE
REMOVE EXIST. CATCH BASIN
REMOVE EXIST. DROP INLET
REMOVE EXIST. CURB INLET
REMOVE EXIST. YARD INLET
REMOVE EXIST. FLUME
REMOVE EXIST. DITCH
REMOVE EXIST. SWALE
REMOVE EXIST. BERM
REMOVE EXIST. RETAINING WALL
REMOVE EXIST. ROCK
REMOVE EXIST. TREE
REMOVE EXIST. SHRUB
REMOVE EXIST. STUMP
REMOVE EXIST. BRUSH
REMOVE EXIST. GRASS
REMOVE EXIST. SOIL
REMOVE EXIST. CONCRETE

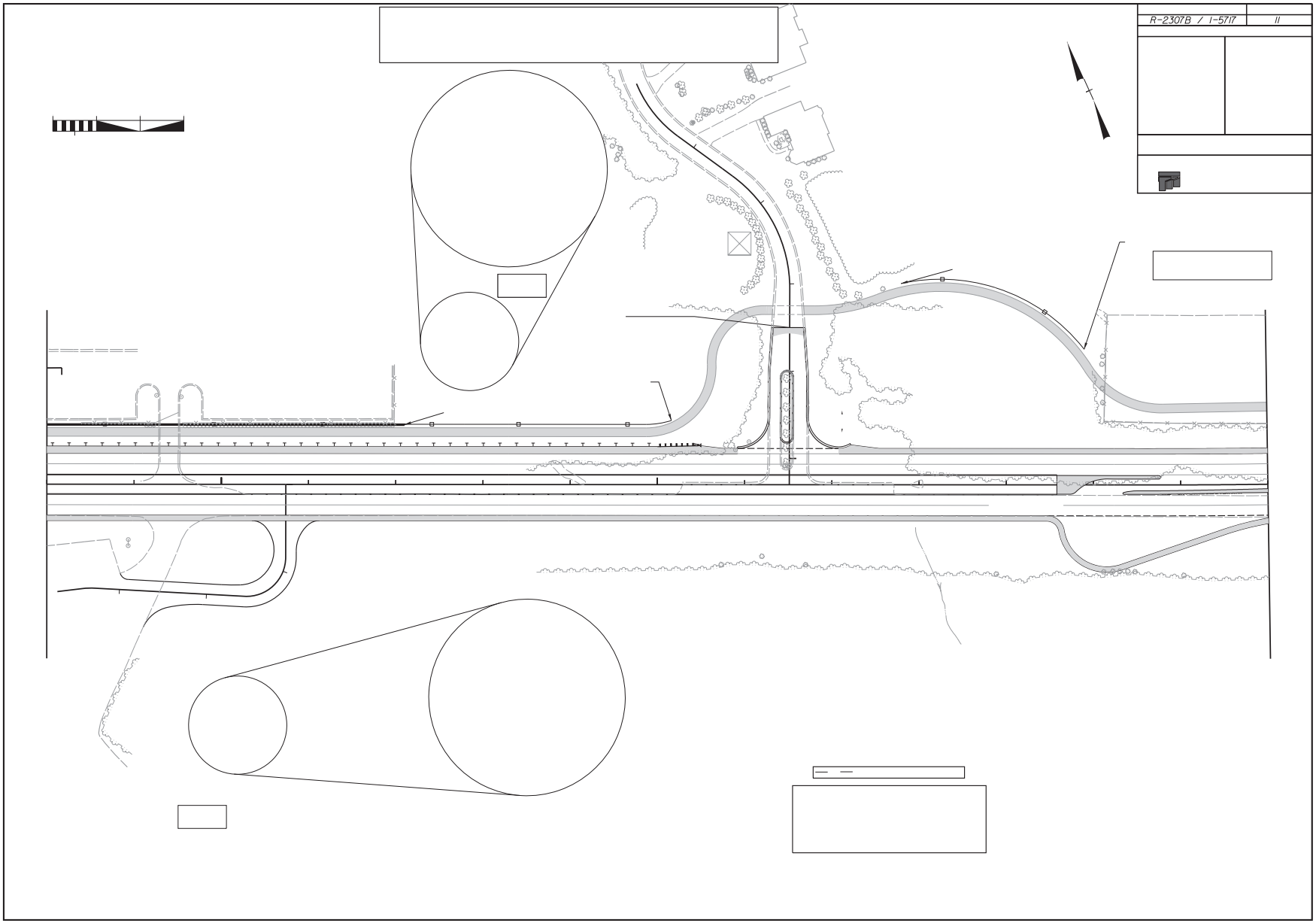

BUFFER DRAWING
SHEET 3 OF 7
PROJECT REFERENCE NO. R-2307B / 1-5717
SHEET NO. 6
ROADWAY DESIGN ENGINEER
RW SHEET NO.
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH ST., SUITE 200
RALEIGH, NC 27603
PH: (919) 773-4887
CORP. LICENSE NO.: C-0775
NAD 83/NSRS 2007
SCALE: 1"=50'
SITE 3
SITE 4
SITE 5
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2
MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
DETAIL 6A
DETAIL 6B
DETAIL 6C
DETAIL 6D
DETAIL 6E
DUKE ENERGY CAROLINAS LLC
LAKE NORMAN
ANNIE B. STUTTS IRREVOCABLE TRUST
EXISTING TRANSPORTATION FACILITY (TYP)
DUKE ENERGY FULL POND ELEV=760.0' (TYP)
MATCH LINE -L- STA 462+00 SEE SHEET NO.7
MATCH LINE -L- STA 448+00 SEE SHEET NO.5
SEE SHEET 38 FOR -L- PROFILE
SEE SHEET 53 FOR -LEB- PROFILE
SEE SHEET 73 FOR -TRAIL- PROFILE
SEE SHEET 28-I FOR CURVE DATA
CHANNELIZATION RADII ARE 3' UNLESS NOTED OTHERWISE
DRIVEWAY RADII ARE 10' UNLESS NOTED OTHERWISE
PTE PERMANENT TRAIL EASEMENT

P-55


PROJECT REFERENCE NO.
R-2307B / I-5717
SHEET NO.
8
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH ST., SUITE 200
RALEIGH, NC 27603
PH: (919) 773-4887
CORP. LICENSE NO.: C-0775
BUFFER DRAWING
SHEET 4 OF 7
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2
MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
NAD 83/NSRS 2007
SITE 6
SITE 7
DUKE ENERGY CAROLINAS LLC
LAKE NORMAN
PAUL T. & BRENDA C. MASON
EXISTING TRANSPORTATION FACILITY (TYP)
DUKE ENERGY FULL POND ELEV.=760.0' (TYP)
MEDIAN GRASSED SWALE SEE DETAIL 8A
DETAIL 8A
DETAIL 8B
DETAIL 8C
SEE SHEET 40 FOR -L- PROFILE
SEE SHEETS 56 THRU 57 FOR -LEB- PROFILE
SEE SHEET 74 FOR -TRAIL- PROFILE
SEE SHEET 28-1 FOR CURVE DATA
MATCH LINE -L- STA 490+00
SEE SHEET NO.9
MATCH LINE -L- STA 476+00
SEE SHEET NO.7
MATCH LINE -L- STA 476+00
SEE SHEET NO.7
N 76° 29' 44.0" E
BEGIN 4F CHAIN LINK FENCE
-L- STA. 479+95
BEGIN WALL #1
-L- STA. 488+70
SEE SHEET 2G-2 ROCK PLATING & ROCK EMBANKMENT DETAIL
STA. 481+50 TO 488+00 MED
STA. 484+90 MED
STA. 485+00 MED
STA. 481+50 MED
STA. 479+25 MED
STA. 488+59 RT
50' 0' 50' 100'
25'

P-56


PROJECT REFERENCE NO.
R-2307B / 1-5/7
SHEET NO.
9
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
TGS ENGINEERS
706 HILLSBOROUGH ST., SUITE 200
RALEIGH, NC 27603
PH (919) 773-4887
CORP. LICENSE NO.: C-0775
BUFFER DRAWING
SHEET 5 OF 7
NAD 83/NSRS 2007
MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
SITE 8
DUKE ENERGY FULL POND ELEV.=760.0' (TYP)
MATCH LINE -L- STA 504+00
SEE SHEET NO.10
MATCH LINE -L- STA 490+00
SEE SHEET NO.8
PINNACLE SHORES OWNERS ASSOC., INC.
PINNACLE SHORES OWNERS ASSOCIATION INC
DUKE ENERGY CAROLINAS LLC
NC FAMILY CARE LIVING ADJUST
LINDA JO MCNAMARA
DAVID E & PATRICIA K TOWNSEND
Y & TAMMY T WILSON
LON T LAM & MAI L LAM
MARINA OWNER LLC
TOWN OF MOORESVILLE
DETAIL 9A
TOP OF DIVERSION
DETAIL 9B
FALSE SUMP
DETAIL 9C
LATERAL GRASSED SWALE
DETAIL 9D
LATERAL GRASSED SWALE
DETAIL 9E
LATERAL V DITCH
DETAIL 9F
LATERAL GRASSED SWALE
DETAIL 9G
LATERAL V DITCH
SEE SHEET 41 FOR -L- PROFILE
SEE SHEET 55 FOR -LEB- PROFILE
SEE SHEET 56 FOR -Y1-, -Y2- & -Y3- PROFILES
SEE SHEETS 73 & 74 FOR -TRAIL2- PROFILE
SEE SHEET 28B-1 FOR CURVE DATA
SEE SHEET 28B-3 FOR INTERSECTION DETAILS
DRIVEWAY RADII ARE 10' UNLESS NOTED OTHERWISE
PTE PERMANENT TRAIL EASEMENT
BEGIN CONSTRUCTION -L- STA 13+70.00
END CONSTRUCTION -L- STA 15+70.00
BEGIN CONSTRUCTION -TRAIL 2- STA 13+70.00
END CONSTRUCTION -TRAIL 2- STA 14+40.00
BEGIN CONSTRUCTION -L- STA 14+40.00
END CONSTRUCTION -L


R-2307B / I-5717
11

RIPARIAN BUFFER IMPACTS SUMMARY

			IMPACT									BUFFER REPLACEMENT	
			TYPE			ALLOWABLE			MITIGABLE				
SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
1	Roadway	-L- 436+90/437+28 LT			X					415	415		
2	Roadway	-L- 439+50/439+85 LT			X					474	474		
3	Ditch	-L- 452+83/453+36 LT			X	1,072	882	1,954					
4	Ditch	-L- 457+90/458+53 LT	X			1,254	1,125	2,379					
5	Roadway	-L- 457+71/458+93 LT	X						5,565	3,820	9,385		
6	Roadway	-L- 485+78/488+83 LT	X						11,213	4,284	15,497		
7	Shoreline Protection	-L- 488+18/488+35 RT	X				225	225					
8	Roadway	-L- 493+96/495+76 RT			X				3,364	5,171	8,535		
9	Ditch	-L- 519+85/520+46 RT			X	1,962	1,262	3,224					
10	Temp. S&EC	-L- 522+76/523+07 LT			X					766			
TOTAL:						4,288	3,494	7,782	20,142	14,929	34,306	0.0	0.0

Notes:
There are no wetland impacts within buffer impacts on this project.

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
R-2307B / I-5717
CATAWBA/ IREDELL COUNTIES
PROJECT: 37944.1.FR5 / 50134.1.FS1

DATE 1/29/2024
SHEET 7 OF 7

Rev. SEP 2016

Rev. May 2006

County: IREDELL, CATAWBA

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.	
0004	0001000000-E	200	CLEARING & GRUBBING .. ACRE(S)	Lump Sum	L.S.	
0005	0008000000-E	200	SUPPLEMENTARY CLEARING & GRUBBING	3 ACR		
0006	0015000000-N	205	SEALING ABANDONED WELLS	1 EA		
0007	0022000000-E	225	UNCLASSIFIED EXCAVATION	205,000 CY		
0008	0036000000-E	225	UNDERCUT EXCAVATION	31,000 CY		
0009	0106000000-E	230	BORROW EXCAVATION	380,000 CY		
0010	0134000000-E	240	DRAINAGE DITCH EXCAVATION	2,840 CY		
0011	0141000000-E	240	BERM DITCH CONSTRUCTION	140 LF		
0012	0156000000-E	250	REMOVAL OF EXISTING ASPHALT PAVEMENT	62,300 SY		
0013	0177000000-E	250	BREAKING OF EXISTING ASPHALT PAVEMENT	7,450 SY		
0014	0192000000-N	260	PROOF ROLLING	50 HR		
0015	0195000000-E	265	SELECT GRANULAR MATERIAL	18,900 CY		
0016	0196000000-E	270	GEOTEXTILE FOR SOIL STABILIZATION	15,300 SY		
0017	0199000000-E	SP	TEMPORARY SHORING	24,800 SF		
0018	0222000000-E	SP	GEOTEXTILE FOR ROCK EMBANKMENTS	19,800 SY		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0019	0223000000-E	275	ROCK PLATING	4,300 SY		
0020	0234000000-E	SP	GENERIC GRADING ITEM FILTRATION BASIN MEDIA	857 CY		
0021	0241000000-E	SP	GENERIC GRADING ITEM GEOTEXTILE FOR EMBANKMENT STABILIZATION	3,200 SY		
0022	0248000000-N	SP	GENERIC GRADING ITEM TYPE 1 BRIDGE APPROACH FILL, STA 471+85.00 -L-	Lump Sum	L.S.	
0023	0248000000-N	SP	GENERIC GRADING ITEM TYPE 2 BRIDGE APPROACH FILL, STA 733+32.53 -L-	Lump Sum	L.S.	
0024	0255000000-E	SP	GENERIC GRADING ITEM HAULING AND DISPOSAL OF COAL ASH CONTAMINATED MATERIAL	250 TON		
0025	0255000000-E	SP	GENERIC GRADING ITEM HAULING AND DISPOSAL OF PETROLEUM CONTAMINATED SOIL	150 TON		
0026	0255000000-E	SP	GENERIC GRADING ITEM WASHED #57 STONE	242 TON		
0027	0314000000-E	SP	SELECT MATERIAL, CLASS ***** (VI)	17,750 TON		
0028	0314000000-E	SP	SELECT MATERIAL, CLASS ***** (VII)	207,200 TON		
0029	0318000000-E	300	FOUNDATION CONDITIONING MATERIAL, MINOR STRUCTURES	8,310 TON		
0030	0321000000-E	300	FOUNDATION CONDITIONING GEOTEXTILE	26,110 SY		
0031	0342000000-E	310	**" SIDE DRAIN PIPE (12")	96 LF		
0032	0342000000-E	310	**" SIDE DRAIN PIPE (30")	1,400 LF		
0033	0342000000-E	310	**" SIDE DRAIN PIPE (36")	56 LF		
0034	0342000000-E	310	**" SIDE DRAIN PIPE (42")	76 LF		

County: **IREDELL, CATAWBA**

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0035	0342000000-E	310	**" SIDE DRAIN PIPE (48")	52 LF		
0036	0343000000-E	310	15" SIDE DRAIN PIPE	3,912 LF		
0037	0344000000-E	310	18" SIDE DRAIN PIPE	1,820 LF		
0038	0345000000-E	310	24" SIDE DRAIN PIPE	1,288 LF		
0039	0366000000-E	310	15" RC PIPE CULVERTS, CLASS III	564 LF		
0040	0378000000-E	310	24" RC PIPE CULVERTS, CLASS III	236 LF		
0041	0384000000-E	310	30" RC PIPE CULVERTS, CLASS III	148 LF		
0042	0390000000-E	310	36" RC PIPE CULVERTS, CLASS III	324 LF		
0043	0402000000-E	310	48" RC PIPE CULVERTS, CLASS III	144 LF		
0044	0448000000-E	310	****" RC PIPE CULVERTS, CLASS IV (60")	292 LF		
0045	0448000000-E	310	****" RC PIPE CULVERTS, CLASS IV (78")	36 LF		
0046	0448200000-E	310	15" RC PIPE CULVERTS, CLASS IV	42,860 LF		
0047	0448300000-E	310	18" RC PIPE CULVERTS, CLASS IV	11,704 LF		
0048	0448400000-E	310	24" RC PIPE CULVERTS, CLASS IV	7,640 LF		
0049	0448500000-E	310	30" RC PIPE CULVERTS, CLASS IV	3,728 LF		
0050	0448600000-E	310	36" RC PIPE CULVERTS, CLASS IV	988 LF		
0051	0536000000-E	310	***" HDPE PIPE CULVERTS (6")	108 LF		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0052	0576000000-E	310	**" CS PIPE CULVERTS, *****" THICK (36", 0.079")	252 LF		
0053	0576000000-E	310	**" CS PIPE CULVERTS, *****" THICK (42", 0.109")	40 LF		
0054	0582000000-E	310	15" CS PIPE CULVERTS, 0.064" THICK	316 LF		
0055	0588000000-E	310	18" CS PIPE CULVERTS, 0.064" THICK	88 LF		
0056	0594000000-E	310	24" CS PIPE CULVERTS, 0.064" THICK	172 LF		
0057	0600000000-E	310	30" CS PIPE CULVERTS, 0.079" THICK	116 LF		
0058	0636000000-E	310	**" CS PIPE ELBOWS, *****" THICK (15", 0.064")	2 EA		
0059	0636000000-E	310	**" CS PIPE ELBOWS, *****" THICK (18", 0.064")	1 EA		
0060	0636000000-E	310	**" CS PIPE ELBOWS, *****" THICK (24", 0.064")	2 EA		
0061	0636000000-E	310	**" CS PIPE ELBOWS, *****" THICK (30", 0.079")	2 EA		
0062	0636000000-E	310	**" CS PIPE ELBOWS, *****" THICK (36", 0.079")	2 EA		
0063	0986000000-E	SP	GENERIC PIPE ITEM PERFORATED HDPE PIPE	498 LF		
0064	0995000000-E	340	PIPE REMOVAL	23,817 LF		
0065	1011000000-N	500	FINE GRADING	Lump Sum	L.S.	
0066	1044000000-E	501	LIME TREATED SOIL (SLURRY METHOD)	66,570 SY		
0067	1066000000-E	501	LIME FOR LIME TREATED SOIL	800 TON		
0068	1099500000-E	505	SHALLOW UNDERCUT	2,500 CY		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0069	1099700000-E	505	CLASS IV SUBGRADE STABILIZATION	50,700 TON		
0070	1110000000-E	510	STABILIZER AGGREGATE	500 TON		
0071	1112000000-E	505	GEOTEXTILE FOR SUBGRADE STABILIZATION	128,000 SY		
0072	1121000000-E	520	AGGREGATE BASE COURSE	11,050 TON		
0073	1176000000-E	542	SOIL CEMENT BASE	66,570 SY		
0074	1187000000-E	542	PORTLAND CEMENT FOR SOIL CEMENT BASE	1,865 TON		
0075	1209000000-E	543	ASPHALT CURING SEAL	19,980 GAL		
0076	1220000000-E	545	INCIDENTAL STONE BASE	6,000 TON		
0077	1297000000-E	607	MILLING ASPHALT PAVEMENT, ***" DEPTH (2-1/2")	44,570 SY		
0078	1297000000-E	607	MILLING ASPHALT PAVEMENT, ***" DEPTH (3")	7,200 SY		
0079	1330000000-E	607	INCIDENTAL MILLING	8,360 SY		
0080	1491000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0C	121,630 TON		
0081	1503000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C	76,940 TON		
0082	1519000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5B	7,330 TON		
0083	1523000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5C	53,830 TON		
0084	1524200000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5D	390 TON		
0085	1575000000-E	620	ASPHALT BINDER FOR PLANT MIX	12,820 TON		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0086	1577000000-E	620	POLYMER MODIFIED ASPHALT BINDER FOR PLANT MIX	25 TON		
0087	1693000000-E	654	ASPHALT PLANT MIX, PAVEMENT REPAIR	12,154 TON		
0088	1840000000-E	665	MILLED RUMBLE STRIPS (ASPHALT CONCRETE)	1,620 LF		
0089	2022000000-E	815	SUBDRAIN EXCAVATION	336 CY		
0090	2026000000-E	815	GEOTEXTILE FOR SUBSURFACE DRAINS	1,000 SY		
0091	2036000000-E	815	SUBDRAIN COARSE AGGREGATE	168 CY		
0092	2044000000-E	815	6" PERFORATED SUBDRAIN PIPE	1,000 LF		
0093	2070000000-N	815	SUBDRAIN PIPE OUTLET	2 EA		
0094	2077000000-E	815	6" OUTLET PIPE	12 LF		
0095	2143000000-E	818	BLOTTING SAND	35 TON		
0096	2209000000-E	838	ENDWALLS	11.3 CY		
0097	2220000000-E	838	REINFORCED ENDWALLS	11.2 CY		
0098	2253000000-E	840	PIPE COLLARS	16.307 CY		
0099	2264000000-E	840	PIPE PLUGS	5.112 CY		
0100	2275000000-E	SP	FLOWABLE FILL	52 CY		
0101	2286000000-N	840	MASONRY DRAINAGE STRUCTURES	899 EA		
0102	2297000000-E	840	MASONRY DRAINAGE STRUCTURES	14.3 CY		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0103	2308000000-E	840	MASONRY DRAINAGE STRUCTURES	521.1 LF		
0104	2352000000-N	840	FRAME WITH GRATE, STD 840.**** (840.20)	1 EA		
0105	2354200000-N	840	FRAME WITH GRATE, STD 840.24	1 EA		
0106	2364000000-N	840	FRAME WITH TWO GRATES, STD 840.16	173 EA		
0107	2364200000-N	840	FRAME WITH TWO GRATES, STD 840.20	23 EA		
0108	2365000000-N	840	FRAME WITH TWO GRATES, STD 840.22	9 EA		
0109	2366000000-N	840	FRAME WITH TWO GRATES, STD 840.24	83 EA		
0110	2367000000-N	840	FRAME WITH TWO GRATES, STD 840.29	21 EA		
0111	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (E)	85 EA		
0112	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (F)	232 EA		
0113	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (G)	238 EA		
0114	2396000000-N	840	FRAME WITH COVER, STD 840.54	24 EA		
0115	2418000000-E	SP	FRAME WITH GRATES, DRIVEWAY DROP INLET	144 LF		
0116	2440000000-N	852	CONCRETE TRANSITIONAL SECTION FOR CATCH BASIN	6 EA		
0117	2451000000-N	852	CONCRETE TRANSITIONAL SECTION FOR DROP INLET	172 EA		
0118	2462000000-E	836	**" SLUICE GATE (36")	1 EA		
0119	2462000000-E	836	**" SLUICE GATE (42")	1 EA		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0120	2489000000-E	SP	GENERIC DRAINAGE ITEM POLYPROPYLENE NONWOVEN GEOTEXTILE FABRIC	1,678 SY		
0121	2495000000-E	SP	GENERIC DRAINAGE ITEM CONCRETE FILL IN RISER	5.7 CY		
0122	2535000000-E	846	**" X **" CONCRETE CURB (8" X 18")	2,690 LF		
0123	2538000000-E	846	**'-**" CONCRETE CURB & GUTTER (2'-0")	1,240 LF		
0124	2538000000-E	846	**'-**" CONCRETE CURB & GUTTER (2'-9")	3,270 LF		
0125	2542000000-E	846	1'-6" CONCRETE CURB & GUTTER	32,730 LF		
0126	2549000000-E	846	2'-6" CONCRETE CURB & GUTTER	74,600 LF		
0127	2556000000-E	846	SHOULDER BERM GUTTER	555 LF		
0128	2577000000-E	846	CONCRETE EXPRESSWAY GUTTER	380 LF		
0129	2591000000-E	848	4" CONCRETE SIDEWALK	21,270 SY		
0130	2605000000-N	848	CONCRETE CURB RAMPS	300 EA		
0131	2612000000-E	848	6" CONCRETE DRIVEWAY	1,050 SY		
0132	2619000000-E	850	4" CONCRETE PAVED DITCH	330 SY		
0133	2627000000-E	852	4" CONCRETE ISLAND COVER	92 SY		
0134	2655000000-E	852	5" MONOLITHIC CONCRETE ISLANDS (KEYED IN)	20,270 SY		
0135	2710000000-N	854	CONCRETE BARRIER TRANSITION SECTION	4 EA		
0136	2717000000-E	854	VARIABLE HEIGHT CONCRETE BARRIER, TYPE ********** (III)	2,200 LF		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0137	2717200000-E	854	MEDIAN HAZARD PROTECTION	170 LF		
0138	2724000000-E	857	PRECAST REINFORCED CONCRETE BARRIER, SINGLE FACED	580 LF		
0139	2800000000-N	858	ADJUSTMENT OF CATCH BASINS	10 EA		
0140	2830000000-N	858	ADJUSTMENT OF MANHOLES	3 EA		
0141	2860000000-N	859	CONVERT EXISTING CATCH BASIN TO JUNCTION BOX	3 EA		
0142	2905000000-N	859	CONVERT EXISTING DROP INLET TO JUNCTION BOX	7 EA		
0143	2920000000-N	859	CONVERT EXISTING DROP INLET TO CATCH BASIN	1 EA		
0144	3001000000-N	SP	IMPACT ATTENUATOR UNITS, TYPE TL-3	3 EA		
0145	3030000000-E	862	STEEL BEAM GUARDRAIL	14,225 LF		
0146	3045000000-E	862	STEEL BEAM GUARDRAIL, SHOP CURVED	675 LF		
0147	3105000000-N	862	STEEL BEAM GUARDRAIL TERMINAL SECTIONS	6 EA		
0148	3145000000-E	862	EXTRA LENGTH GUARDRAIL POST (**' STEEL) (8')	105 EA		
0149	3150000000-N	862	ADDITIONAL GUARDRAIL POSTS	30 EA		
0150	3195000000-N	862	GUARDRAIL END UNITS, TYPE AT-1	5 EA		
0151	3210000000-N	862	GUARDRAIL END UNITS, TYPE CAT-1	41 EA		
0152	3215000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE III	4 EA		
0153	3287000000-N	862	GUARDRAIL END UNITS, TYPE TL-3	44 EA		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0154	3317000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE B-77	3 EA		
0155	3345000000-E	864	REMOVE & RESET EXISTING GUARDRAIL	400 LF		
0156	3360000000-E	863	REMOVE EXISTING GUARDRAIL	8,900 LF		
0157	3503000000-E	866	WOVEN WIRE FENCE, 47" FABRIC	2,820 LF		
0158	3509000000-E	866	4" TIMBER FENCE POSTS, 7'-6" LONG	165 EA		
0159	3515000000-E	866	5" TIMBER FENCE POSTS, 8'-0" LONG	67 EA		
0160	3533000000-E	866	CHAIN LINK FENCE, **" FABRIC (60")	300 LF		
0161	3533000000-E	866	CHAIN LINK FENCE, **" FABRIC (96")	900 LF		
0162	3536000000-E	866	CHAIN LINK FENCE, 48" FABRIC	6,500 LF		
0163	3539000000-E	866	METAL LINE POSTS FOR **" CHAIN LINK FENCE (60")	30 EA		
0164	3539000000-E	866	METAL LINE POSTS FOR **" CHAIN LINK FENCE (96")	80 EA		
0165	3542000000-E	866	METAL LINE POSTS FOR 48" CHAIN LINK FENCE	560 EA		
0166	3545000000-E	866	METAL TERMINAL POSTS FOR **" CHAIN LINK FENCE (60")	4 EA		
0167	3545000000-E	866	METAL TERMINAL POSTS FOR **" CHAIN LINK FENCE (96")	2 EA		
0168	3548000000-E	866	METAL TERMINAL POSTS FOR 48" CHAIN LINK FENCE	40 EA		
0169	3554000000-E	866	METAL GATE POSTS FOR **" CHAIN LINK FENCE, DOUBLE GATE (48")	14 EA		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0170	3554000000-E	866	METAL GATE POSTS FOR **" CHAIN LINK FENCE, DOUBLE GATE (60")	2 EA		
0171	3565000000-E	866	DOUBLE GATES, **" HIGH, **' WIDE, **' OPENING (48", 6', 12')	7 EA		
0172	3565000000-E	866	DOUBLE GATES, **" HIGH, **' WIDE, **' OPENING (60", 6', 12')	1 EA		
0173	3575000000-E	SP	GENERIC FENCING ITEM PEDESTRIAN SAFETY RAIL	5,275 LF		
0174	3628000000-E	876	RIP RAP, CLASS I	1,640 TON		
0175	3635000000-E	876	RIP RAP, CLASS II	200 TON		
0176	3642000000-E	876	RIP RAP, CLASS A	6,450 TON		
0177	3649000000-E	876	RIP RAP, CLASS B	13,600 TON		
0178	3656000000-E	876	GEOTEXTILE FOR DRAINAGE	15,370 SY		
0179	4048000000-E	902	REINFORCED CONCRETE SIGN FOUNDATIONS	6 CY		
0180	4057000000-E	SP	OVERHEAD FOOTING	333 CY		
0181	4060000000-E	903	SUPPORTS, BREAKAWAY STEEL BEAM	5,513 LB		
0182	4072000000-E	903	SUPPORTS, 3-LB STEEL U-CHANNEL	11,250 LF		
0183	4096000000-N	904	SIGN ERECTION, TYPE D	8 EA		
0184	4102000000-N	904	SIGN ERECTION, TYPE E	716 EA		
0185	4108000000-N	904	SIGN ERECTION, TYPE F	65 EA		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0186	4110000000-N	904	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (A)	4 EA		
0187	4114000000-N	904	SIGN ERECTION, MILEMARKERS	2 EA		
0188	4116100000-N	904	SIGN ERECTION, RELOCATE TYPE **** (GROUND MOUNTED) (A)	8 EA		
0189	4116100000-N	904	SIGN ERECTION, RELOCATE TYPE **** (GROUND MOUNTED) (B)	4 EA		
0190	4116100000-N	904	SIGN ERECTION, RELOCATE TYPE **** (GROUND MOUNTED) (D)	3 EA		
0191	4116100000-N	904	SIGN ERECTION, RELOCATE TYPE **** (GROUND MOUNTED) (E)	21 EA		
0192	4116100000-N	904	SIGN ERECTION, RELOCATE TYPE **** (GROUND MOUNTED) (F)	2 EA		
0193	4116100000-N	904	SIGN ERECTION, RELOCATE TYPE **** (GROUND MOUNTED) (LOGO TRAILBLAZER)	7 EA		
0194	4130000000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (13+00 -Y23-)	Lump Sum	L.S.	
0195	4130000000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (14+32 -Y40-)	Lump Sum	L.S.	
0196	4130000000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (14+97 -Y17-)	Lump Sum	L.S.	
0197	4130000000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (16+55 -Y31RPC-)	Lump Sum	L.S.	
0198	4130000000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (17+03 -Y31RPA-)	Lump Sum	L.S.	
0199	4130000000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (22+88 -Y16-)	Lump Sum	L.S.	

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0200	4130000000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (609+50 -L-)	Lump Sum	L.S.	
0201	4130000000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (698+45 -L-)	Lump Sum	L.S.	
0202	4130000000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (712+77 -L-)	Lump Sum	L.S.	
0203	4130000000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (728+23 -L-)	Lump Sum	L.S.	
0204	4130000000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (731+90 -L-)	Lump Sum	L.S.	
0205	4130000000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (734+85 -L-)	Lump Sum	L.S.	
0206	4130000000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (739+32 -L-)	Lump Sum	L.S.	
0207	4130000000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (786+50 -L-)	Lump Sum	L.S.	
0208	4130000000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE ***** (796+89 -L-)	Lump Sum	L.S.	
0209	4138000000-N	907	DISPOSAL OF SUPPORT, STEEL BEAM	16 EA		
0210	4155000000-N	907	DISPOSAL OF SIGN SYSTEM, U-CHANNEL	251 EA		
0211	4192000000-N	907	DISPOSAL OF SUPPORT, U-CHANNEL	30 EA		
0212	4237000000-N	907	STOCKPILE SIGN, D, E OR F	13 EA		
0213	4400000000-E	1110	WORK ZONE SIGNS (STATIONARY)	2,208 SF		
0214	4405000000-E	1110	WORK ZONE SIGNS (PORTABLE)	624 SF		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0215	4410000000-E	1110	WORK ZONE SIGNS (BARRICADE MOUNTED)	300 SF		
0216	4415000000-N	1115	FLASHING ARROW BOARD	4 EA		
0217	4420000000-N	1120	PORTABLE CHANGEABLE MESSAGE SIGN	6 EA		
0218	4430000000-N	1130	DRUMS	1,100 EA		
0219	4434000000-N	1140	SEQUENTIAL FLASHING WARNING LIGHTS	50 EA		
0220	4435000000-N	1135	CONES	150 EA		
0221	4445000000-E	1145	BARRICADES (TYPE III)	720 LF		
0222	4455000000-N	1150	FLAGGER	1,380 DAY		
0223	4465000000-N	1160	TEMPORARY CRASH CUSHIONS	13 EA		
0224	4470000000-N	1160	REMOVE & RESET TEMPORARY CRASH CUSHION	10 EA		
0225	4485000000-E	1170	PORTABLE CONCRETE BARRIER	3,800 LF		
0226	4490000000-E	1170	PORTABLE CONCRETE BARRIER (ANCHORED)	2,500 LF		
0227	4500000000-E	1170	REMOVE AND RESET PORTABLE CONCRETE BARRIER	2,500 LF		
0228	4505000000-E	1170	REMOVE & RESET PORTABLE CONCRETE BARRIER (ANCHORED)	3,800 LF		
0229	4510000000-N	1190	LAW ENFORCEMENT	1,080 HR		
0230	4590000000-E	SP	GENERIC TRAFFIC CONTROL ITEM PEDESTRIAN CHANNELIZING DEVICES	80 LF		
0231	4595000000-E	SP	GENERIC TRAFFIC CONTROL ITEM HIGH VISIBILITY PORTABLE SIGNS	256 SF		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0232	4600000000-N	SP	GENERIC TRAFFIC CONTROL ITEM AUDIBLE WARNING DEVICES	8 EA		
0233	4600000000-N	SP	GENERIC TRAFFIC CONTROL ITEM CONNECTED LANE CLOSURE SYSTEM	2 EA		
0234	4600000000-N	SP	GENERIC TRAFFIC CONTROL ITEM HIGH VISIBILITY DRUMS	150 EA		
0235	4600000000-N	SP	GENERIC TRAFFIC CONTROL ITEM TEMPORARY CURB RAMPS	2 EA		
0236	4650000000-N	1251	TEMPORARY RAISED PAVEMENT MARKERS	4,243 EA		
0237	4685000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (4", 90 MILS)	250 LF		
0238	4695000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (8", 90 MILS)	7,500 LF		
0239	4700000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (12", 90 MILS)	4,300 LF		
0240	4709000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (24", 90 MILS)	6,025 LF		
0241	4720000000-E	1205	THERMOPLASTIC PAVEMENT MARKING CHARACTER (90 MILS)	193 EA		
0242	4725000000-E	1205	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)	693 EA		
0243	4726100000-E	1205	HEATED-IN-PLACE THERMOPLASTIC PAVEMENT MARKING CHARACTER (120 MILS)	22 EA		
0244	4726110000-E	1205	HEATED-IN-PLACE THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)	152 EA		
0245	4770000000-E	1205	COLD APPLIED PLASTIC PAVEMENT MARKING LINES, TYPE ** (4") (IV)	6,800 LF		
0246	4780000000-E	1205	COLD APPLIED PLASTIC PAVEMENT MARKING LINES, TYPE ** (8") (IV)	400 LF		
0247	4800000000-N	1205	COLD APPLIED PLASTIC PAVEMENT MARKING CHARACTER, TYPE ** (IV)	8 EA		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0248	4805000000-N	1205	COLD APPLIED PLASTIC PAVEMENT MARKING SYMBOL, TYPE ** (IV)	24 EA		
0249	4810000000-E	1205	PAINT PAVEMENT MARKING LINES (4")	374,538 LF		
0250	4815000000-E	1205	PAINT PAVEMENT MARKING LINES (6")	9,600 LF		
0251	4820000000-E	1205	PAINT PAVEMENT MARKING LINES (8")	14,905 LF		
0252	4835000000-E	1205	PAINT PAVEMENT MARKING LINES (24")	9,006 LF		
0253	4840000000-N	1205	PAINT PAVEMENT MARKING CHARACTER	102 EA		
0254	4845000000-N	1205	PAINT PAVEMENT MARKING SYMBOL	592 EA		
0255	4846000000-E	1205	POLYUREA PAVEMENT MARKING LINES (**", *** MILS) (12", 30 MILS)	265 LF		
0256	4846000000-E	1205	POLYUREA PAVEMENT MARKING LINES (**", *** MILS) (4", 30 MILS)	208,000 LF		
0257	4846000000-E	1205	POLYUREA PAVEMENT MARKING LINES (**", *** MILS) (6", 30 MILS)	6,000 LF		
0258	4846000000-E	1205	POLYUREA PAVEMENT MARKING LINES (**", *** MILS) (8", 30 MILS)	28,500 LF		
0259	4847300000-N	1205	IN LANE ROUTE SHIELDS	8 EA		
0260	4850000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (4")	11,550 LF		
0261	4855000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (6")	50 LF		
0262	4860000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (8")	795 LF		
0263	4870000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (24")	125 LF		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0264	4875000000-N	1205	REMOVAL OF PAVEMENT MARKING SYMBOLS & CHARACTERS	22 EA		
0265	4890000000-E	SP	GENERIC PAVEMENT MARKING ITEM YIELD LINE THERMOPLASTIC PAVEMENT MARKING (24", 90 MILS)	60 LF		
0266	4900000000-N	1251	PERMANENT RAISED PAVEMENT MARKERS	30 EA		
0267	5010000000-E	1401	100' HIGH MOUNT STANDARD	4 EA		
0268	5020000000-N	1401	PORTABLE DRIVE UNIT	1 EA		
0269	5025000000-E	SP	HIGH MOUNT FOUNDATIONS	25 CY		
0270	5030000000-N	SP	HIGH MOUNT LUMINAIRES ******** (560W LED)	24 EA		
0271	5050000000-N	1404	LIGHT STANDARDS, TYPE MTLT ********** (45' SA, 15' ARM)	12 EA		
0272	5070000000-N	SP	STANDARD FOUNDATION ********* (TYPE R1)	10 EA		
0273	5070000000-N	SP	STANDARD FOUNDATION ********* (TYPE R2)	2 EA		
0274	5080000000-N	SP	LIGHT STANDARD LUMINAIRES, TYPE ********** (RDW, 285W LED)	12 EA		
0275	5120000000-N	1407	ELECTRIC SERVICE POLE ********** (30' CLASS 4)	1 EA		
0276	5125000000-E	1407	ELECTRIC SERVICE LATERAL ********** (3 #1/0 USE)	25 LF		
0277	5145000000-N	1408	LIGHT CONTROL EQUIPMENT, TYPE RW ********** (240/480 V)	1 EA		
0278	5150000000-E	1409	ELECTRICAL DUCT, TYPE **, SIZE ***** (TL, 3")	595 LF		
0279	5150000000-E	1409	ELECTRICAL DUCT, TYPE **, SIZE ***** (TL, 4")	160 LF		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0280	5155000000-E	1409	ELECTRICAL DUCT, TYPE BD, SIZE ***** (2")	190 LF		
0281	5170000000-E	1410	** #8 W/G FEEDER CIRCUIT (2)	20 LF		
0282	5180000000-E	1410	** #4 W/G FEEDER CIRCUIT (2)	200 LF		
0283	5205000000-E	1410	** #8 W/G FEEDER CIRCUIT IN *****" CONDUIT (2, 1-1/2")	4,943 LF		
0284	5215000000-E	1410	** #4 W/G FEEDER CIRCUIT IN *****" CONDUIT (2, 1-1/2")	2,025 LF		
0285	5240000000-N	1411	ELECTRICAL JUNCTION BOXES ********** (CS36)	1 EA		
0286	5240000000-N	1411	ELECTRICAL JUNCTION BOXES ********** (HM18)	4 EA		
0287	5240000000-N	1411	ELECTRICAL JUNCTION BOXES ********** (IG18)	9 EA		
0288	5240000000-N	1411	ELECTRICAL JUNCTION BOXES ********** (IG36)	2 EA		
0289	5240000000-N	1411	ELECTRICAL JUNCTION BOXES ********** (LS18)	12 EA		
0290	5255000000-N	1413	PORTABLE LIGHTING	Lump Sum	L.S.	
0291	5270000000-N	SP	GENERIC LIGHTING ITEM REMOVE 100' HIGH MAST STANDARD	4 EA		
0292	5270000000-N	SP	GENERIC LIGHTING ITEM REMOVE 100' HIGH MAST STANDARD FOUNDATION	4 EA		
0293	5270000000-N	SP	GENERIC LIGHTING ITEM REMOVE CONTROL SYSTEM - DISPOSE	1 EA		
0294	5270000000-N	SP	GENERIC LIGHTING ITEM REMOVE LIGHT STANDARD FOUNDATION	12 EA		

County: **IREDELL, CATAWBA**

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0295	5270000000-N	SP	GENERIC LIGHTING ITEM REMOVE SINGLE ARM LIGHT STANDARD - DISPOSE	12 EA		
0296	5325600000-E	1510	6" WATER LINE	1,872 LF		
0297	5325800000-E	1510	8" WATER LINE	7,382 LF		
0298	5326200000-E	1510	12" WATER LINE	4,670 LF		
0299	5326600000-E	1510	16" WATER LINE	10,212 LF		
0300	5329000000-E	1510	DUCTILE IRON WATER PIPE FITTINGS	88,000 LB		
0301	5540000000-E	1515	6" VALVE	20 EA		
0302	5546000000-E	1515	8" VALVE	10 EA		
0303	5558000000-E	1515	12" VALVE	2 EA		
0304	5558600000-E	1515	16" VALVE	5 EA		
0305	5563000000-E	1515	**" PLUG VALVE (3")	5 EA		
0306	5563000000-E	1515	**" PLUG VALVE (4")	4 EA		
0307	5563000000-E	1515	**" PLUG VALVE (6")	4 EA		
0308	5563000000-E	1515	**" PLUG VALVE (8")	4 EA		
0309	5571600000-E	1515	6" TAPPING SLEEVE & VALVE	2 EA		
0310	5571800000-E	1515	8" TAPPING SLEEVE & VALVE	10 EA		
0311	5572200000-E	1515	12" TAPPING SLEEVE & VALVE	23 EA		

County: **IREDELL, CATAWBA**

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0312	5572600000-E	1515	16" TAPPING SLEEVE & VALVE	13 EA		
0313	5589200000-E	1515	2" AIR RELEASE VALVE	6 EA		
0314	5606000000-E	1515	2" BLOW OFF	3 EA		
0315	5643100000-E	1515	3/4" WATER METER	1 EA		
0316	5643800000-E	1515	8" WATER METER	1 EA		
0317	5648000000-N	1515	RELOCATE WATER METER	123 EA		
0318	5653000000-E	1515	**" DCV BACKFLOW PREVENTION ASSEMBLY (1")	1 EA		
0319	5653200000-E	1515	2" DCV BACKFLOW PREVENTION ASSEMBLY	1 EA		
0320	5653400000-E	1515	4" DCV BACKFLOW PREVENTION ASSEMBLY	1 EA		
0321	5656000000-E	1515	**" RPZ BACKFLOW PREVENTION ASSEMBLY (1")	24 EA		
0322	5656000000-E	1515	**" RPZ BACKFLOW PREVENTION ASSEMBLY (1-1/2")	9 EA		
0323	5656000000-E	1515	**" RPZ BACKFLOW PREVENTION ASSEMBLY (3/4")	21 EA		
0324	5656200000-E	1515	2" RPZ BACKFLOW PREVENTION ASSEMBLY	6 EA		
0325	5656800000-E	1515	8" RPZ BACKFLOW PREVENTION ASSEMBLY	2 EA		
0326	5666000000-N	1515	FIRE HYDRANT	13 EA		
0327	5672000000-N	1515	RELOCATE FIRE HYDRANT	40 EA		

County: **IREDELL, CATAWBA**

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0328	5673000000-E	1515	FIRE HYDRANT LEG	205 LF		
0329	5686000000-E	1515	**" WATER SERVICE LINE (2")	139 LF		
0330	5686000000-E	1515	**" WATER SERVICE LINE (8")	30 LF		
0331	5686500000-E	1515	WATER SERVICE LINE	673 LF		
0332	5691300000-E	1520	8" SANITARY GRAVITY SEWER	898 LF		
0333	5709000000-E	1520	**" FORCE MAIN SEWER (3")	5,878 LF		
0334	5709200000-E	1520	4" FORCE MAIN SEWER	5,299 LF		
0335	5709300000-E	1520	6" FORCE MAIN SEWER	3,088 LF		
0336	5709400000-E	1520	8" FORCE MAIN SEWER	165 LF		
0337	5768500000-E	1520	SEWER SERVICE LINE	298 LF		
0338	5769000000-E	1520	DUCTILE IRON SEWER PIPE FITTINGS	6,900 LB		
0339	5773000000-N	SP	UTILITY VAULT	1 EA		
0340	5776000000-E	1525	5' DIA UTILITY MANHOLE	7 EA		
0341	5781000000-E	1525	UTILITY MANHOLE WALL 4' DIA	101.64 LF		
0342	5801000000-E	1530	ABANDON 8" UTILITY PIPE	9,180 LF		
0343	5804000000-E	1530	ABANDON 12" UTILITY PIPE	3,535 LF		
0344	5810000000-E	1530	ABANDON 16" UTILITY PIPE	8,404 LF		

County: **IREDELL, CATAWBA**

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0345	5815000000-N	1530	REMOVE WATER METER	1 EA		
0346	5815500000-N	1530	REMOVE FIRE HYDRANT	12 EA		
0347	5816000000-N	1530	ABANDON UTILITY MANHOLE	2 EA		
0348	5835000000-E	1540	**" ENCASEMENT PIPE (10")	350 LF		
0349	5835600000-E	1540	12" ENCASEMENT PIPE	140 LF		
0350	5835700000-E	1540	16" ENCASEMENT PIPE	650 LF		
0351	5835900000-E	1540	20" ENCASEMENT PIPE	337 LF		
0352	5836000000-E	1540	24" ENCASEMENT PIPE	100 LF		
0353	5836200000-E	1540	30" ENCASEMENT PIPE	100 LF		
0354	5872500000-E	1550	BORE AND JACK OF **" (10")	350 LF		
0355	5872500000-E	1550	BORE AND JACK OF **" (12")	140 LF		
0356	5872500000-E	1550	BORE AND JACK OF **" (16")	650 LF		
0357	5872500000-E	1550	BORE AND JACK OF **" (20")	337 LF		
0358	5872500000-E	1550	BORE AND JACK OF **" (24")	100 LF		
0359	5872500000-E	1550	BORE AND JACK OF **" (30")	100 LF		
0360	5882000000-N	SP	GENERIC UTILITY ITEM 3" CHECK VALVE	1 EA		
0361	5882000000-N	SP	GENERIC UTILITY ITEM 6" FP BACKFLOW PREVENTOR ASSEMBLY	1 EA		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0362	5882000000-N	SP	GENERIC UTILITY ITEM 8" RPDA BACKFLOW PREVENTION ASSEMBLY	1 EA		
0363	5882000000-N	SP	GENERIC UTILITY ITEM ABANDON BACKFLOW PREVENTOR	1 EA		
0364	5882000000-N	SP	GENERIC UTILITY ITEM CIPP LINING EXISTING UTILITY MANHOLE	33 EA		
0365	5882000000-N	SP	GENERIC UTILITY ITEM FLUSH VALVE	1 EA		
0366	5888000000-E	SP	GENERIC UTILITY ITEM CIPP LINING	8,439 LF		
0367	6000000000-E	1605	TEMPORARY SILT FENCE	82,220 LF		
0368	6006000000-E	1610	STONE FOR EROSION CONTROL, CLASS A	8,170 TON		
0369	6009000000-E	1610	STONE FOR EROSION CONTROL, CLASS B	20,680 TON		
0370	6012000000-E	1610	SEDIMENT CONTROL STONE	21,235 TON		
0371	6015000000-E	1615	TEMPORARY MULCHING	130 ACR		
0372	6018000000-E	1620	SEED FOR TEMPORARY SEEDING	7,500 LB		
0373	6021000000-E	1620	FERTILIZER FOR TEMPORARY SEEDING	39.5 TON		
0374	6024000000-E	1622	TEMPORARY SLOPE DRAINS	4,795 LF		
0375	6029000000-E	SP	SAFETY FENCE	12,900 LF		
0376	6030000000-E	1630	SILT EXCAVATION	74,740 CY		
0377	6036000000-E	1631	MATTING FOR EROSION CONTROL	376,345 SY		
0378	6037000000-E	1629	COIR FIBER MAT	345 SY		

County: **IREDELL, CATAWBA**

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0379	6042000000-E	1632	1/4" HARDWARE CLOTH	48,585 LF		
0380	6043000000-E	1644	LOW PERMEABILITY GEOTEXTILE	2,300 SY		
0381	6046000000-E	1636	TEMPORARY PIPE FOR STREAM CROSSING	50 LF		
0382	6048000000-E	SP	FLOATING TURBIDITY CURTAIN	5,685 SY		
0383	6070000000-N	1639	SPECIAL STILLING BASINS	42 EA		
0384	6071002000-E	1642	FLOCCULANT	5,210 LB		
0385	6071012000-E	1642	COIR FIBER WATTLE	600 LF		
0386	6071014000-E	1642	COIR FIBER WATTLE BARRIER	320 LF		
0387	6071030000-E	1640	COIR FIBER BAFFLE	6,445 LF		
0388	6071050000-E	1644	**" SKIMMER (1-1/2")	18 EA		
0389	6071050000-E	1644	**" SKIMMER (2")	5 EA		
0390	6071050000-E	1644	**" SKIMMER (2-1/2")	4 EA		
0391	6071050000-E	1644	**" SKIMMER (3")	2 EA		
0392	6071050000-E	1644	**" SKIMMER (4")	2 EA		
0393	6084000000-E	1660	SEEDING & MULCHING	130 ACR		
0394	6087000000-E	1660	MOWING	65 ACR		
0395	6090000000-E	1661	SEED FOR REPAIR SEEDING	1,600 LB		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0396	6093000000-E	1661	FERTILIZER FOR REPAIR SEEDING	4.75 TON		
0397	6096000000-E	1662	SEED FOR SUPPLEMENTAL SEEDING	2,950 LB		
0398	6102000000-E	1664	SODDING	840 SY		
0399	6105000000-E	1664	WATER	30 M/G		
0400	6108000000-E	1665	FERTILIZER TOPDRESSING	88.25 TON		
0401	6111000000-E	SP	IMPERVIOUS DIKE	87 LF		
0402	6114500000-N	1667	SPECIALIZED HAND MOWING	60 MHR		
0403	6114800000-N	SP	MANUAL LITTER REMOVAL	62 MHR		
0404	6114900000-E	SP	LITTER DISPOSAL	10 TON		
0405	6117000000-N	1675	RESPONSE FOR EROSION CONTROL	100 EA		
0406	6117500000-N	SP	CONCRETE WASHOUT STRUCTURE	55 EA		
0407	6123000000-E	1670	REFORESTATION	1.5 ACR		
0408	6132000000-N	SP	GENERIC EROSION CONTROL ITEM FABRIC INSERT INLET PROTECTION CLEANOUT	1,584 EA		
0410	6141000000-E	SP	GENERIC EROSION CONTROL ITEM PERMANENT SOIL REINFORCEMENT MAT, TYPE 2	475 SY		
0411	7048500000-E	1705	PEDESTRIAN SIGNAL HEAD (16", 1 SECTION W/COUNTDOWN)	96 EA		
0412	7060000000-E	1705	SIGNAL CABLE	90,430 LF		
0413	7120000000-E	1705	VEHICLE SIGNAL HEAD (12", 3 SECTION)	509 EA		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0414	7132000000-E	1705	VEHICLE SIGNAL HEAD (12", 4 SECTION)	52 EA		
0415	7144000000-E	1705	VEHICLE SIGNAL HEAD (12", 5 SECTION)	18 EA		
0416	7204000000-N	1705	LOUVER	24 EA		
0417	7252000000-E	1710	MESSENGER CABLE (1/4")	24,180 LF		
0418	7264000000-E	1710	MESSENGER CABLE (3/8")	16,030 LF		
0419	7279000000-E	1715	TRACER WIRE	4,780 LF		
0420	7288000000-E	1715	PAVED TRENCHING (**********) (2, 2")	200 LF		
0421	7300000000-E	1715	UNPAVED TRENCHING (**********) (1, 2")	17,140 LF		
0422	7300000000-E	1715	UNPAVED TRENCHING (**********) (2, 2")	4,170 LF		
0423	7300100000-E	1715	UNPAVED TRENCHING FOR TEMPORARY LEAD-IN	350 LF		
0424	7301000000-E	1715	DIRECTIONAL DRILL (**********) (2, 2")	8,450 LF		
0425	7301000000-E	1715	DIRECTIONAL DRILL (**********) (3, 2")	1,950 LF		
0426	7301000000-E	1715	DIRECTIONAL DRILL (**********) (4, 2")	100 LF		
0427	7324000000-N	1716	JUNCTION BOX (STANDARD SIZE)	287 EA		
0428	7348000000-N	1716	JUNCTION BOX (OVER-SIZED, HEAVY DUTY)	110 EA		
0429	7360000000-N	1720	WOOD POLE	81 EA		
0430	7372000000-N	1721	GUY ASSEMBLY	190 EA		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0431	7408000000-E	1722	1" RISER WITH WEATHERHEAD	35 EA		
0432	7420000000-E	1722	2" RISER WITH WEATHERHEAD	35 EA		
0433	7432000000-E	1722	2" RISER WITH HEAT SHRINK TUBING	34 EA		
0434	7444000000-E	1725	INDUCTIVE LOOP SAWCUT	24,330 LF		
0435	7456100000-E	1726	LEAD-IN CABLE (14-2)	89,980 LF		
0436	7481000000-N	SP	SITE SURVEY	39 EA		
0437	7481240000-N	SP	CAMERA WITHOUT INTERNAL LOOP EMULATOR PROCESSING UNIT	97 EA		
0438	7481260000-N	SP	EXTERNAL LOOP EMULATOR PROCESSING UNIT	37 EA		
0439	7516000000-E	1730	COMMUNICATIONS CABLE (** FIBER) (48)	27,420 LF		
0440	7528000000-E	1730	DROP CABLE	13,950 LF		
0441	7540000000-N	1731	SPLICE ENCLOSURE	22 EA		
0442	7552000000-N	1731	INTERCONNECT CENTER	35 EA		
0443	7566000000-N	1733	DELINEATOR MARKER	59 EA		
0444	7576000000-N	SP	METAL STRAIN SIGNAL POLE	16 EA		
0445	7588000000-N	SP	METAL POLE WITH SINGLE MAST ARM	36 EA		
0446	7590000000-N	SP	METAL POLE WITH DUAL MAST ARM	7 EA		
0447	7613000000-N	SP	SOIL TEST	59 EA		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0448	7614100000-E	SP	DRILLED PIER FOUNDATION	354 CY		
0449	7630000000-N	SP	METAL STRAIN POLE DESIGN	3 EA		
0450	7631000000-N	SP	MAST ARM WITH METAL POLE DESIGN	43 EA		
0451	7636000000-N	1745	SIGN FOR SIGNALS	220 EA		
0452	7642100000-N	1743	TYPE I POST WITH FOUNDATION	13 EA		
0453	7642200000-N	1743	TYPE II PEDESTAL WITH FOUNDATION	107 EA		
0454	7684000000-N	1750	SIGNAL CABINET FOUNDATION	35 EA		
0455	7696000000-N	1751	CONTROLLERS WITH CABINET (**********) (2070LX, BASE MOUNTED)	35 EA		
0456	7744000000-N	1751	DETECTOR CARD (TYPE 170)	181 EA		
0457	7901000000-N	1753	CABINET BASE EXTENDER	35 EA		
0458	7980000000-N	SP	GENERIC SIGNAL ITEM DIGITAL CCTV CAMERA ASSEMBLY	11 EA		
0459	7980000000-N	SP	GENERIC SIGNAL ITEM ETHERNET EDGE SWITCH	35 EA		
0460	7980000000-N	SP	GENERIC SIGNAL ITEM LUMINAIRE ARM FOR TEMPORARY VIDEO SYSTEM	100 EA		
0461	7980000000-N	SP	GENERIC SIGNAL ITEM MICROWAVE VEHICLE DETECTION SYSTEM - MULTIPLE ZONES	2 EA		
0462	7980000000-N	SP	GENERIC SIGNAL ITEM RELOCATE TEMPORARY CAMERA SENSOR UNIT	67 EA		
0539	0000720000-N	SP	FIELD OFFICE	60 MO		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0540	6132000000-N	SP	GENERIC EROSION CONTROL ITEM FABRIC INSERT INLET PROTECTION, TYPE 1	528 EA		
0541	0000900000-N	SP	GENERIC MISCELLANEOUS ITEM PUBLIC INVOLVEMENT TECHNICIAN	Lump Sum	L.S.	
			********* BEGIN SCHEDULE AA ****** ******* (5 ALTERNATES) *********			
0463 AA1	4894900000-E	SP	GENERIC PAVEMENT MARKING ITEM 10' INLAID PAVEMENT MARKINGS	4,350 EA		
			***** OR *****			
0464 AA2	4894900000-E	SP	GENERIC PAVEMENT MARKING ITEM 10' RUMBLE SKIPS	4,350 EA		
			***** OR *****			
0465 AA3	4895000000-N	SP	GENERIC PAVEMENT MARKING ITEM INLAID CRADLE MARKERS	4,350 EA		
			***** OR *****			
0466 AA4	4895000000-N	SP	GENERIC PAVEMENT MARKING ITEM INLAID RAISED PAVEMENT MARKERS	4,350 EA		
			***** OR *****			
0467 AA5	4895000000-N	SP	GENERIC PAVEMENT MARKING ITEM POLYCARBONATE H-SHAPED MARKERS	4,350 EA		
			******* END SCHEDULE AA *******			
			CULVERT ITEMS			
0468	8130000000-N	414	BOX CULVERT EXCAVATION, STA ******** (783+89.30 -L-)	Lump Sum	L.S.	
0469	8133000000-E	414	FOUNDATION CONDITIONING MATERIAL, BOX CULVERT	48 TON		
0470	8196000000-E	420	CLASS A CONCRETE (CULVERT)	53.9 CY		
0471	8245000000-E	425	REINFORCING STEEL (CULVERT)	5,945 LB		
			WALL ITEMS			
0472	8801000000-E	SP	MSE RETAINING WALL NO **** (24)	2,103 SF		
0473	8801000000-E	SP	MSE RETAINING WALL NO **** (25)	1,358 SF		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0474	8801000000-E	SP	MSE RETAINING WALL NO **** (W1)	2,165 SF		
0475	8801000000-E	SP	MSE RETAINING WALL NO **** (W13)	905 SF		
0476	8801000000-E	SP	MSE RETAINING WALL NO **** (W14)	1,269 SF		
0477	8801000000-E	SP	MSE RETAINING WALL NO **** (W15)	716 SF		
0478	8801000000-E	SP	MSE RETAINING WALL NO **** (W17)	1,197 SF		
0479	8801000000-E	SP	MSE RETAINING WALL NO **** (W19)	950 SF		
0480	8801000000-E	SP	MSE RETAINING WALL NO **** (W2)	3,298 SF		
0481	8801000000-E	SP	MSE RETAINING WALL NO **** (W20)	678 SF		
0482	8801000000-E	SP	MSE RETAINING WALL NO **** (W21)	873 SF		
0483	8801000000-E	SP	MSE RETAINING WALL NO **** (W22)	214 SF		
0484	8801000000-E	SP	MSE RETAINING WALL NO **** (W26)	2,286 SF		
0485	8801000000-E	SP	MSE RETAINING WALL NO **** (W27)	132 SF		
0486	8801000000-E	SP	MSE RETAINING WALL NO **** (W29)	687 SF		
0487	8801000000-E	SP	MSE RETAINING WALL NO **** (W3)	2,599 SF		
0488	8801000000-E	SP	MSE RETAINING WALL NO **** (W30)	487 SF		
0489	8801000000-E	SP	MSE RETAINING WALL NO **** (W31)	1,095 SF		
0490	8801000000-E	SP	MSE RETAINING WALL NO **** (W32)	206 SF		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0491	8801000000-E	SP	MSE RETAINING WALL NO **** (W33)	1,452 SF		
0492	8801000000-E	SP	MSE RETAINING WALL NO **** (W35)	4,805 SF		
0493	8801000000-E	SP	MSE RETAINING WALL NO **** (W36)	5,850 SF		
0494	8801000000-E	SP	MSE RETAINING WALL NO **** (W37)	366 SF		
0495	8801000000-E	SP	MSE RETAINING WALL NO **** (W39)	564 SF		
0496	8801000000-E	SP	MSE RETAINING WALL NO **** (W4)	759 SF		
0497	8801000000-E	SP	MSE RETAINING WALL NO **** (W40)	988 SF		
0498	8801000000-E	SP	MSE RETAINING WALL NO **** (W41)	1,078 SF		
0499	8801000000-E	SP	MSE RETAINING WALL NO **** (W42)	2,863 SF		
0500	8801000000-E	SP	MSE RETAINING WALL NO **** (W45)	419 SF		
0501	8801000000-E	SP	MSE RETAINING WALL NO **** (W46)	667 SF		
0502	8801000000-E	SP	MSE RETAINING WALL NO **** (W5)	2,937 SF		
0503	8802014000-E	SP	SOLDIER PILE RETAINING WALLS	6,631 SF		
0504	8802031000-E	455	PRECAST GRAVITY RETAINING WALLS	3,402 SF		
			STRUCTURE ITEMS			
0505	8017000000-N	SP	CONSTRUCTION, MAINTENANCE, & REMOVAL OF TEMP ACCESS AT STA ********** (471+85.00 -L-)	Lump Sum	L.S.	
0506	8035000000-N	402	REMOVAL OF EXISTING STRUCTURE AT STATION ********** (733+32.53 -L-)	Lump Sum	L.S.	

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0507	8065000000-N	SP	ASBESTOS ASSESSMENT	Lump Sum	L.S.	
0508	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT NO ** AT STATION ********* (1, 733+32.53 -L-)	Lump Sum	L.S.	
0509	8108000000-E	411	**'-**" DIA DRILLED PIERS (3'-6")	800 LF		
0510	8108000000-E	411	**'-**" DIA DRILLED PIERS (8'-0")	1,743.6 LF		
0511	8111000000-E	411	PERMANENT STEEL CASING FOR **'-**" DIA DRILLED PIER (8'-0")	1,417.5 LF		
0512	8111400000-E	411	PERMANENT STEEL CASING FOR 3'-6" DIA DRILLED PIER	465.6 LF		
0513	8113000000-N	411	SID INSPECTIONS	24 EA		
0514	8115000000-N	411	CSL TESTING	24 EA		
0515	8147000000-E	420	REINFORCED CONCRETE DECK SLAB	27,886 SF		
0516	8154000000-E	420	REINFORCED CONCRETE DECK SLAB (SAND LIGHTWEIGHT CONCRETE)	62,008 SF		
0517	8161000000-E	420	GROOVING BRIDGE FLOORS	74,297 SF		
0518	8182000000-E	420	CLASS A CONCRETE (BRIDGE)	1,502.6 CY		
0519	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (471+85.00 -L-)	Lump Sum	L.S.	
0520	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (733+32.53 -L-)	Lump Sum	L.S.	
0521	8217000000-E	425	REINFORCING STEEL (BRIDGE)	904,717 LB		
0522	8238000000-E	425	SPIRAL COLUMN REINFORCING STEEL (BRIDGE)	121,502 LB		

County: IREDELL, CATAWBA

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0523	8265000000-E	430	54" PRESTRESSED CONCRETE GIRDERS	3,106.5 LF		
0524	8328200000-E	450	PILE DRIVING EQUIPMENT SETUP FOR *** STEEL PILES (HP 12 X 53)	94 EA		
0525	8364000000-E	450	HP 12 X 53 STEEL PILES	8,040 LF		
0526	8475000000-E	460	TWO BAR METAL RAIL	1,592.78 LF		
0527	8503000000-E	460	CONCRETE BARRIER RAIL	1,237.75 LF		
0528	8505000000-E	460	VERTICAL CONCRETE BARRIER RAIL	1,268.75 LF		
0529	8517000000-E	460	1'-**" X *****" CONCRETE PARAPET (1'-2" X 2'-6")	1,267.75 LF		
0530	8517000000-E	460	1'-**" X *****" CONCRETE PARAPET (1'-2" X 3'-3")	347.96 LF		
0531	8531000000-E	462	4" SLOPE PROTECTION	140.6 SY		
0532	8608000000-E	876	RIP RAP CLASS II (2'-0" THICK)	1,171 TON		
0533	8622000000-E	876	GEOTEXTILE FOR DRAINAGE	1,300 SY		
0534	8657000000-N	430	ELASTOMERIC BEARINGS	Lump Sum	L.S.	
0535	8706000000-N	SP	EXPANSION JOINT SEALS	Lump Sum	L.S.	
0536	8860000000-N	SP	GENERIC STRUCTURE ITEM 16" WATER LINE PIPE & SUSPENSION SYSTEM	Lump Sum	L.S.	
0537	8867000000-E	SP	GENERIC STRUCTURE ITEM MODIFIED 74" PRESTRESSED CONCRETE GIRDERS	8,502.08 LF		
0538	8897000000-N	SP	GENERIC STRUCTURE ITEM THERMAL INTEGRITY PROFILER	24 EA		