

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

C203484

CONTRACT AND
CONTRACT BONDS

FOR CONTRACT NO. C203484

WBS 34839.3.GVS4 NHF-0918(93)

T.I.P NO. U-2579B

COUNTY OF FORSYTH
THIS IS THE ROADWAY & STRUCTURE CONTRACT
ROUTE NUMBER _____ LENGTH 4.057 MILES
LOCATION WINSTON-SALEM NORTHERN BELTWAY (EASTERN SECTION) FROM
US-158 TO I-40 BUS/US-421.

CONTRACTOR DRAGADOS USA INC
ADDRESS 810 7TH AVENUE
9TH FLOOR
NEW YORK, NY 10019

BIDS OPENED OCTOBER 21, 2014
CONTRACT EXECUTION 11/18/2014

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

PROPOSAL

**INCLUDES ADDENDUM No.1 DATED 9-30-14
AND ADDENDUM No. 2 DATED 10-10-14**

DATE AND TIME OF BID OPENING: **OCTOBER 21, 2014 AT 2:00 PM**

CONTRACT ID C203484
WBS 34839.3.GVS4

FEDERAL-AID NO. NHF-0918(93)

COUNTY FORSYTH

T.I.P. NO. U-2579B

MILES 4.057

ROUTE NO.

LOCATION WINSTON-SALEM NORTHERN BELTWAY (EASTERN SECTION) FROM
US-158 TO I-40 BUS/US-421.

TYPE OF WORK GRADING, DRAINAGE, PAVING, SIGNING, SIGNALS, ITS, AND STRS.

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. C203484 IN FORSYTH COUNTY, NORTH CAROLINA**

Date _____ 20 _____

**DEPARTMENT OF TRANSPORTATION,
RALEIGH, NORTH CAROLINA**

The Bidder has carefully examined the location of the proposed work to be known as Contract No. C203484; 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 2012 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 State Highway Contract No. C203484 in Forsyth County, for the unit or lump sum prices, as the case may be, bid by the Bidder in his bid and according to the proposal, plans, and specifications prepared by said Department, which proposal, plans, and specifications show the details covering this project, and hereby become a part of this contract.

The published volume entitled *North Carolina Department of Transportation, Raleigh, Standard Specifications for Roads and Structures, January 2012* 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

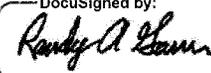
DocuSigned by:

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(8-15-00) (Rev. 12-18-07)

108

SPI G07 A

The date of availability for this contract is **December 1, 2014**, 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 **April 30, 2019**.

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

SPI 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 **December 1, 2014**.

The completion date for this intermediate contract time is **November 1, 2018**.

The liquidated damages for this intermediate contract time are **Five Thousand Dollars (\$5,000.00)** 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

SPI 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 **BUS I-40/US 421 (-Y4-)** during the following time restrictions:

DAY AND TIME RESTRICTIONS

**Monday through Friday
from 6:00 AM to 8:00 PM
and
Saturday and Sunday
from 11:00 AM to 8:00 PM**

In addition, the Contractor shall not close or narrow a lane of traffic on **BUS I-40/US 421 (-Y4-)**, 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 Day**, 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 **NCAA Tournament occurring at the Greensboro Coliseum Complex**, between the hours of **6:00 AM** the day before the start of the Tournament and **8:00 PM** the following day after the end of the Tournament.
10. For **ACC Tournament occurring at the Greensboro Coliseum Complex**, between the hours of **6:00 AM** the day before the start of the Tournament and **8:00 PM** the following day after the end of the Tournament.
11. For **the Dixie Classic Fair in Winston-Salem**, between the hours of **6:00 AM** the day before the start of the Dixie Classic Fair and **8:00 PM** the following day after the end of the Dixie Classic Fair.
12. For **the Furniture Markets**, between the hours of **6:00 AM** the day before the start of the Furniture Markets and **8:00 PM** the following day after the end of the Furniture Markets.

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 Dollars (\$1,000.00)** per fifteen (15)-minute time period.

INTERMEDIATE CONTRACT TIME NUMBER 3 AND LIQUIDATED DAMAGES:

(2-20-07)

108

SPI G14 C

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 **US 158 (-Y1-)** during the following time restrictions:

DAY AND TIME RESTRICTIONS

**Monday through Friday
from 8:00 AM to 7:00 PM**

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

The liquidated damages are **Five Hundred Dollars (\$500.00)** per fifteen (15)-minute time period.

INTERMEDIATE CONTRACT TIME NUMBER 4 AND LIQUIDATED DAMAGES:

(2-20-07)

108

SPI G14 C

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 **West Mountain Road (-Y3-) and Hastings Hill Road (-Y5-)** during the following time restrictions:

DAY AND TIME RESTRICTIONS

**Monday through Friday
from 7:00 AM to 9:00 AM
and
from 4:00 PM to 6:00 PM**

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

The liquidated damages are **Two Hundred and Fifty Dollars (\$250.00)** per fifteen (15)-minute time period.

INTERMEDIATE CONTRACT TIME NUMBER 5 AND LIQUIDATED DAMAGES:

(2-20-07) (Rev. 10-15-13)

108

SPI 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 **West Mountain Road (-Y3-)** during the following time restrictions:

DAY AND TIME RESTRICTIONS

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

The maximum allowable time for **girder installation** is **30** minutes for **West Mountain Road (-Y3-)**. 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 Hundred Dollars (\$500.00)** per fifteen (15) minute time period.

INTERMEDIATE CONTRACT TIME NUMBER 6 AND LIQUIDATED DAMAGES:

(2-20-07) (Rev. 10-15-13)

108

SPI 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 **BUS I-40/US 421 (-Y4-)** during the following time restrictions:

DAY AND TIME RESTRICTIONS

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

The maximum allowable time for **girder installation** is **five (5) hours** for **BUS I-40/US 421 (-Y4-), using an offsite detour.** The Contractor shall reopen the travel lanes to traffic when road closure is no longer needed, up to five hours maximum.

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 **Two Thousand Dollars (\$2,000.00)** per fifteen (15) minute time period.

INTERMEDIATE CONTRACT TIME NUMBER 7 AND LIQUIDATED DAMAGES:

(2-20-07) (Rev. 10-15-13)

108

SPI 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 **Pisgah Church Road (-Y2A-)** during the following time restrictions:

DAY AND TIME RESTRICTIONS

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

The maximum allowable time for **girder installation** is **five hours** for **Pisgah Church Road (-Y2A-), using an offsite detour**. The Contractor shall reopen the travel lanes to traffic when road closure is no longer needed, up to five hours maximum.

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 Hundred Dollars (\$500.00)** per fifteen (15) minute time period.

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 **Area 2, Phase I, Step 3** 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 **two hundred forty (240)** consecutive calendar days after and including the date the Contractor begins this work.

The liquidated damages are **Three Thousand Five Hundred Dollars (\$ 3,500.00)** per calendar day.

INTERMEDIATE CONTRACT TIME NUMBER 9 AND LIQUIDATED DAMAGES:

(2-20-07)

108

SP1 G14 C

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. **In addition to other day and time restrictions herein, the Contractor shall not close or narrow a lane of traffic on the work areas involved for Intermediate Contract Time Numbers 10 and 11 during the following time restrictions:**

DAY AND TIME RESTRICTIONS

From Monday at 6:00 AM until Friday at 8:00 PM

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

The liquidated damages are **One Thousand Dollars (\$1,000.00)** per fifteen (15) minute time period.

INTERMEDIATE CONTRACT TIME NUMBER 10 AND LIQUIDATED DAMAGES:

(2-20-07) (Rev. 6-18-13)

108

SP1 G14 G

The Contractor shall complete the work required of **Area 3, Phase I, Step 3** as shown on Sheet **TMP- 3** and shall place and maintain traffic on same.

The work shall be performed during an Eight (8) consecutive weekend periods of the Contractor's choice, beginning at **8:00 PM** on a Friday and ending at **6:00 AM** the following Monday on each weekend.

The time of availability for this intermediate contract time is Friday at **8:00 PM**, the Contractor begins the work.

The completion time for this intermediate contract time is Monday at **6:00 AM**, of the eighth weekend the Contractor performs work on this intermediate contract time.

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

INTERMEDIATE CONTRACT TIME NUMBER 11 AND LIQUIDATED DAMAGES:

(2-20-07) (Rev. 6-18-13)

108

SP1 G14 G

The Contractor shall complete the work required of **Area 3, Phase I, Step 4** as shown on Sheet **TMP- 3** and shall place and maintain traffic on same.

The work shall be performed during an eight (8) consecutive weekend periods of the Contractor's choice, beginning at **8:00 PM** on a Friday and ending at **6:00 AM** the following Monday on each weekend.

The time of availability for this intermediate contract time is Friday at **8:00 PM**, the Contractor begins the work.

The completion time for this intermediate contract time is Monday at **6:00 AM**, of the eighth weekend the Contractor performs work on this intermediate contract time.

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

INTERMEDIATE CONTRACT TIME NUMBER 12 AND LIQUIDATED DAMAGES:

(2-20-07) (Rev. 6-18-13)

108

SP1 G14 H

The Contractor shall complete the work required of **Area 3, Phase II, Step 3** as shown on Sheet **TMP-3A** 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 **one hundred eighty (180)** consecutive calendar days after and including the date the Contractor begins this work.

The liquidated damages are **One Thousand Dollars (\$1,000.00)** per calendar day.

INTERMEDIATE CONTRACT TIME NUMBER 13 AND LIQUIDATED DAMAGES:

(2-20-07) (Rev. 6-18-13)

108

SP1 G14 H

The Contractor shall complete the work required of **Area 3, Phase III, Step 3** as shown on Sheet **TMP-3A** 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 **ninety (90)** consecutive calendar days after and including the date the Contractor begins this work.

The liquidated damages are **One Thousand Dollars (\$1,000.00)** per calendar day.

PERMANENT VEGETATION ESTABLISHMENT:

(2-16-12) (Rev. 10-15-13)

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 *2012 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 *2012 Standard Specifications*. No additional compensation will be made for maintenance and removal of temporary erosion control items.

CONSTRUCTION MORATORIUM:

(5-23-14)

Division 9

No tree removal (not including grubbing) for this project shall be completed between April 15 and October 15, of any year, so that habitat for the Northern long-eared bat is not disturbed during the roosting season.

MAJOR CONTRACT ITEMS:

(2-19-02)

104

SP1 G28

The following listed items are the major contract items for this contract (see Article 104-5 of the *2012 Standard Specifications*):

Line #	Description
8	Unclassified Excavation
28	Borrow Excavation
127	12.5" Portland Cement Concrete Pavement, Through Lanes (With Dowels)

SPECIALTY ITEMS:

(7-1-95)(Rev. 1-17-12)

108-6

SP1 G37

Items listed below will be the specialty items for this contract (see Article 108-6 of the *2012 Standard Specifications*).

Line #	Description
177 thru 187	Guardrail
188 thru 191	Fencing
199 thru 231	Signing
251 thru 253 & 259 thru 261	Long-Life Pavement Markings
263 thru 264	Permanent Pavement Markers
272 thru 311	Utility Construction
312 thru 345	Erosion Control
346 thru 347	Reforestation
348 thru 422	Signals/ITS System
461 thru 475	Drilled Piers

FUEL PRICE ADJUSTMENT:

(11-15-05) (Rev. 2-18-14)

109-8

SP1 G43

Revise the *2012 Standard Specifications* as follows:

Page 1-83, Article 109-8, Fuel Price Adjustments, add the following:

The base index price for DIESEL #2 FUEL is \$ **2.9777** 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
Asphalt Concrete Base Course, Type _____	Gal/Ton	2.90
Asphalt Concrete Intermediate Course, Type _____	Gal/Ton	2.90
Asphalt Concrete Surface Course, Type _____	Gal/Ton	2.90
Open-Graded Asphalt Friction Course	Gal/Ton	2.90
Permeable Asphalt Drainage Course, Type _____	Gal/Ton	2.90
Sand Asphalt Surface Course, Type _____	Gal/Ton	2.90
Aggregate for Cement Treated Base Course	Gal/Ton	0.55
Portland Cement for Cement Treated Base Course	Gal/Ton	0.55
___ " Portland Cement Concrete Pavement	Gal/SY	0.245
Concrete Shoulders Adjacent to ___ " Pavement	Gal/SY	0.245

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. 5-20-14)

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:

2015	(7/01/14 - 6/30/15)	22 % of Total Amount Bid
2016	(7/01/15- 6/30/16)	33 % of Total Amount Bid
2017	(7/01/16 - 6/30/17)	24 % of Total Amount Bid
2018	(7/01/17 - 6/30/18)	17 % of Total Amount Bid
2019	(7/01/17 - 6/30/19)	4 % of Total Amount Bid

The Contractor shall also furnish his own progress schedule in accordance with Article 108-2 of the *2012 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. 12-17-13)

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 operates or maintains a factory or establishment that produces on the premises, the materials or supplies obtained by the Contractor.

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

North Carolina Unified Certification Program (NCUCP) - A program that provides comprehensive services and information to applicants for 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.
<http://www.ncdot.org/doh/forms/files/DBE-IS.xls>

RF-1 DBE Replacement Request Form - Form for replacing a committed DBE.
<http://connect.ncdot.gov/projects/construction/Construction%20Forms/DBE%20MBE%20WBE%20Replacement%20Request%20Form.pdf>

SAF Subcontract Approval Form - Form required for approval to sublet the contract.
<http://connect.ncdot.gov/projects/construction/Construction%20Forms/Subcontract%20Approval%20Form%20Rev.%202012.zip>

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

Letter of Intent - Form signed by the Contractor and the DBE subcontractor, manufacturer or regular dealer that affirms that a portion of said contract is going to be performed by the signed DBE for the amount 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\(Federal\).doc](http://connect.ncdot.gov/municipalities/Bid%20Proposals%20for%20LGA%20Content/08%20DBE%20Subcontractors%20(Federal).doc)

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

DBE Goal

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

Disadvantaged Business Enterprises **14.0 %**

- (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://partner.ncdot.gov/VendorDirectory/default.html>

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

Listing of 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 Expedite, the bidding software of Bid Express[®].

- (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 Expedite, 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 12:00 noon 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 12:00 noon 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 12:00 noon 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 12:00 noon 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 12:00 noon 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 the next official state business day. If the contractor cannot send the information electronically, then one complete set and 9 copies of this information shall be received under the same time constraints above.

Note: Where the information submitted includes repetitious solicitation letters, it will be acceptable to submit a representative letter along with a distribution list of the firms that were solicited. Documentation of 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 (2nd and 3rd 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, so as 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 Development Manager in the Business Opportunity and Work Force Development Unit 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 Contractor Utilization 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 Contractual Services Engineer or at DBE@ncdot.gov. 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 actually 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) Suppliers

A contractor may count toward its DBE requirement 60 percent of its expenditures for materials and supplies required to complete the contract and obtained from a DBE regular dealer and 100 percent of such expenditures from a DBE manufacturer.

(F) Manufacturers and Regular Dealers

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

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

Commercially Useful Function

(A) DBE Utilization

The 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 actually performing, managing, and supervising the work involved. To perform a commercially useful function, the DBE shall also be responsible with respect to materials and supplies used on the contract, for negotiating price, determining quality and quantity, ordering the material and installing (where applicable) and paying for the material itself. To determine whether a DBE is performing a commercially useful function, the Department will evaluate the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the contract is commensurate with the work it is actually performing and the DBE credit claimed for its performance of the work, and any other relevant factors.

(B) DBE Utilization in Trucking

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

- (1) The DBE shall be responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract, and there shall not be a contrived arrangement for the purpose of meeting DBE goals.
- (2) The DBE shall itself own and operate at least one fully licensed, insured, and operational truck used on the contract.
- (3) The DBE receives credit for the total value of the transportation services it provides on the contract using trucks it owns, insures, and operates using drivers it employs.
- (4) The DBE may subcontract the work to another DBE firm, including an owner-operator who is certified as a DBE. The DBE who subcontracts work to another DBE receives credit for the total value of the transportation services the subcontracted DBE provides on the contract.
- (5) The DBE may also subcontract the work to a non-DBE firm, including from an owner-operator. The DBE who subcontracts the work to a non-DBE is entitled to credit for the total value of transportation services provided by the non-DBE subcontractor not to exceed the value of transportation services provided by DBE-owned trucks on the contract. Additional participation by non-DBE subcontractors receives credit only for the fee or commission it receives as a result of the subcontract arrangement. The value of services performed under subcontract agreements between the DBE and the 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 firm (or an approved substitute DBE firm) to meet all or part of a contract goal requirement, the contractor shall not terminate the DBE 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. A DBE may only be terminated after receiving the Engineer's written approval based upon a finding of good cause for the termination.

All requests for replacement of a committed 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.

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.

- (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).

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.

- (A) Electronic Bids Reporting

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

- (B) Paper Bids Reporting

The Contractor shall report the accounting of payments on the Department's DBE-IS (*Subcontractor Payment Information*) with each invoice. Invoices will not be processed for payment until the DBE-IS is received.

Failure to Meet Contract Requirements

Failure to meet contract requirements in accordance with Subarticle 102-15(J) of the *2012 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.

CONTRACTOR'S LICENSE REQUIREMENTS:

(7-1-95)

102-14

SP1 G88

If the successful bidder does not hold the proper license to perform any plumbing, heating, air conditioning, or electrical work in this contract, he will be required to sublet such work to a contractor properly licensed in accordance with *Article 2 of Chapter 87 of the General Statutes* (licensing of heating, plumbing, and air conditioning contractors) and *Article 4 of Chapter 87 of the General Statutes* (licensing of electrical contractors).

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

SPI G112 D

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

LOCATING EXISTING UNDERGROUND UTILITIES:

(3-20-12)

105

SPI G115

Revise the *2012 Standard Specifications* as follows:

Page 1-43, Article 105-8, line 28, after the first sentence, add the following:

Identify excavation locations by means of pre-marking with white paint, flags, or stakes or provide a specific written description of the location in the locate request.

RESOURCE CONSERVATION:

(5-21-13)

104-13

SPI G118

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

Initiate, develop and use products and construction methods that incorporate the use of recycled or solid waste products in accordance with Article 104-13 of the *2012 Standard Specifications*. Report the quantities of reused or recycled materials either incorporated in the project or diverted from landfills on the Project Construction Reuse and Recycling Reporting Form.

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

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

DOMESTIC STEEL:

(4-16-13)

106

SPI G120

Revise the *2012 Standard Specifications* as follows:

Page 1-49, Subarticle 106-1(B) Domestic Steel, lines 2-7, replace the first paragraph with the following:

All steel and iron products that are permanently incorporated into this project shall be produced in the United States except minimal amounts of foreign steel and iron products may be used provided the combined material cost of the items involved does not exceed 0.1% of the total amount bid for the entire project or \$2,500, whichever is greater. If invoices showing the cost of

the material are not provided, the amount of the bid item involving the foreign material will be used for calculations. This minimal amount of foreign produced steel and iron products permitted for use is not applicable to high strength fasteners. Domestically produced high strength fasteners are required.

PORTABLE CONCRETE BARRIER - (Partial Payments for Materials):

(7-1-95) (Rev. 8-16-11)

1170-4

SPI 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 *2012 Standard Specifications* have been furnished to the Engineer.

The provisions of Subarticle 109-5(B) of the *2012 Standard Specifications* will apply to the portable concrete barrier.

MAINTENANCE OF THE PROJECT:

(11-20-07) (Rev. 1-17-12)

104-10

SPI G125

Revise the *2012 Standard Specifications* as follows:

Page 1-35, Article 104-10 Maintenance of the Project, line 25, 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 30, 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 42-44, 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)

105-7

SPI G133

The Contractor's attention is directed to Article 105-7 of the *2012 Standard Specifications*.

B-4511, Forsyth County (Bridge over a Tributary of Salem Creek on SR 2667) located in the vicinity of this project is scheduled to be let during the construction of U-2579B.

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.

BID DOCUMENTATION:

(1-1-02) (Rev. 9-18-12)

103

SPI G142

General

The successful Bidder (Contractor) shall submit the original, unaltered bid documentation or a certified copy of the original, unaltered bid documentation used to prepare the bid for this contract to the Department within 10 days after receipt of notice of award of contract. Such documentation shall be placed in escrow with a banking institution or other bonded document storage facility selected by the Department.

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

Terms

Bid Documentation - Bid Documentation shall mean all written information, working papers, computer printouts, electronic media, charts, and all other data compilations which contain or reflect information, data, and calculations used by the Bidder in the preparation of the bid. The term *bid documentation* includes, but is not limited to, contractor equipment rates, contractor overhead rates, labor rates, efficiency or productivity factors, arithmetical calculations, and quotations from subcontractors and material suppliers to the extent that such rates and quotations were used by the Bidder in formulating and determining the bid. The term *bid documentation* also includes any manuals, which are standard to the industry used by the Bidder in determining the bid. Such manuals may be included in the bid documentation by reference. Such reference shall include the name and date of the publication and the publisher. *Bid Documentation* does not include bid documents provided by the Department for use by the Bidder in bidding on this project.

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

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

Escrow Agreement Information

A copy of the Escrow Agreement will be mailed to the Bidder with the notice of award for informational purposes. The Bidder and Department will sign the actual Escrow Agreement at the time the bid documentation is delivered to the escrow agent.

Failure to Provide Bid Documentation

The Bidder's failure to provide the original, unaltered bid documentation or a certified copy of the original, unaltered bid documentation within 10 days after the notice of award is received by him may be just cause for rescinding the award of the contract and may result in the removal of the Bidder from the Department's list of qualified bidders for a period of up to 180 days. Award may then be made to the next lowest responsible bidder or the work may be readvertised and constructed under the contract or otherwise, as the Department may decide.

Submittal of Bid Documentation

- (A) Appointment – Email specs@ncdot.gov or call 919.707.6900 to schedule an appointment.
- (B) Delivery - A representative of the Bidder shall deliver the original, unaltered bid documentation or a certified copy of the original, unaltered bid documentation to the Department, in a container suitable for sealing, within 10 days after the notice of award is received by him. Bid documentation will be considered a certified copy if the Bidder includes a letter to the Department from a chief officer of the company stating that the enclosed documentation is an *EXACT* copy of the original documentation. The letter shall be signed by a chief officer of the company, have the person's name and title typed below the signature, and the signature shall be notarized at the bottom of the letter.
- (C) Packaging – The container shall be no larger than 15.5 inches in length by 12 inches wide by 11 inches high and shall be water resistant. The container shall be clearly marked on the face and the back of the container with the following information: Bid Documentation, Bidder's Name, Bidder's Address, Date of Escrow Submittal, Contract Number, TIP Number if applicable, and County.

Affidavit

In addition to the bid documentation, an affidavit signed under oath by an individual authorized by the Bidder to execute the bid shall be included. The affidavit shall list each bid document with sufficient specificity so a comparison may be made between the list and the bid documentation to ensure that all of the bid documentation listed in the affidavit has been enclosed. The affidavit shall attest that the affiant has personally examined the bid documentation, that the affidavit lists all of the documents used by the Bidder to determine the bid for this project, and that all such bid documentation has been included.

Verification

Upon delivery of the bid documentation, the Department's Contract Officer and the Bidder's representative will verify the accuracy and completeness of the bid documentation compared to

the affidavit. Should a discrepancy exist, the Bidder's representative shall immediately furnish the Department's Contract Officer with any other needed bid documentation. The Department's Contract Officer upon determining that the bid documentation is complete will, in the presence of the Bidder's representative, immediately place the complete bid documentation and affidavit in the container and seal it. Both parties will deliver the sealed container to the escrow agent for placement in a safety deposit box, vault, or other secure accommodation.

Confidentiality of Bid Documentation

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

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

Duration and Use

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

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

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

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

Release of Bid Documentation to the Contractor

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

The Contractor will be notified by certified letter from the escrow agent that the bid documentation will be released to the Contractor. The Contractor or his representative shall retrieve the bid documentation from the escrow agent within 30 days of the receipt of the certified letter. If the Contractor does not receive the documents within 30 days of the receipt of the certified letter, the Department will contact the Contractor to determine final dispersion of the bid documentation.

Payment

The cost of the escrow will be borne by the Department. There will be no separate payment for all costs of compilation of the data, container, or verification of the bid documentation. Payment at the various contract unit or lump sum prices in the contract will be full compensation for all such costs.

TWELVE MONTH GUARANTEE:

(7-15-03)

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.

GIFTS FROM VENDORS AND CONTRACTORS:

(12-15-09)

107-1

SPI G152

By Executive Order 24, issued by Governor Perdue, and *N.C.G.S. § 133-32*, it is unlawful for any vendor or contractor (i.e. architect, bidder, contractor, construction manager, design professional, engineer, landlord, offeror, seller, subcontractor, supplier, or vendor), to make gifts or to give favors to any State employee of the Governor's Cabinet Agencies (i.e. Administration, Commerce, Correction, Crime Control and Public Safety, Cultural Resources, Environment and Natural Resources, Health and Human Services, Juvenile Justice and Delinquency Prevention, Revenue, Transportation, and the Office of the Governor). This prohibition covers those vendors and contractors who:

- (A) Have a contract with a governmental agency; or
- (B) Have performed under such a contract within the past year; or
- (C) Anticipate bidding on such a contract in the future.

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

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

LIABILITY INSURANCE:

(5-20-14)

SPI G160

Revise the *2012 Standard Specifications* as follows:

Page 1-60, Article 107-15 LIABILITY INSURANCE, line 16, add the following as the second sentence of the third paragraph:

Prior to beginning services, all contractors shall provide proof of coverage issued by a workers' compensation insurance carrier, or a certificate of compliance issued by the Department of Insurance for self-insured subcontractors, irrespective of whether having regularly in service fewer than three employees.

EROSION AND SEDIMENT CONTROL/STORMWATER CERTIFICATION:

(1-16-07) (Rev 9-18-12)

105-16, 225-2, 16

SPI 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, twice weekly for construction related *Federal Clean Water Act, Section 303(d)* impaired streams with turbidity violations, and within 24 hours after a significant rainfall event of 0.5 inch that occurs within a 24 hour period.
 - (c) Maintain an onsite rain gauge or use the Department's Multi-Sensor Precipitation Estimate website to maintain a daily record of rainfall amounts and dates.
 - (d) Maintain erosion and sediment control/stormwater inspection records for review by Department and Regulatory personnel upon request.
 - (e) Implement approved reclamation plans on all borrow pits, waste sites and staging areas.
 - (f) Maintain a log of turbidity test results as outlined in the Department's Procedure for Monitoring Borrow Pit Discharge.

- (g) Provide secondary containment for bulk storage of liquid materials.
 - (h) Provide training for employees concerning general erosion and sediment control/stormwater awareness, the Department's NPDES Stormwater Permit NCS000250 requirements, and the applicable requirements of the *General Permit, NCG010000*.
 - (i) Report violations of the NPDES permit to the Engineer immediately who will notify the Division of Water Quality Regional Office within 24 hours of becoming aware of the violation.
- (3) Quality Control Program - Maintain a quality control program to control erosion, prevent sedimentation and follow provisions/conditions of permits. The quality control program shall:
- (a) Follow permit requirements related to the 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-B Certified Designer on the erosion and sediment control/stormwater component of all reclamation plans and if applicable, the certification number of the Level III-A 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 *Cease and Desist Order* for erosion and sediment control/stormwater related issues.

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

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

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

A certificant has the right to appeal any adverse action which results in suspension or permanent revocation of certification by responding, in writing, to the Chief Engineer within 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

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. 3-19-13)

105-16, 230, 801

SPI 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 *2012 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 http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/fieldops/downloads/Files/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.

EMPLOYMENT:

(11-15-11) (Rev. 1-17-12)

108, 102

SPI G184

Revise the *2012 Standard Specifications* as follows:

Page 1-20, Subarticle 102-15(O), delete and replace with the following:

(O) Failure to restrict a former Department employee as prohibited by Article 108-5.

Page 1-65, Article 108-5 Character of Workmen, Methods, and Equipment, line 32, delete all of line 32, the first sentence of the second paragraph and the first word of the second sentence of the second paragraph.

STATE HIGHWAY ADMINISTRATOR TITLE CHANGE:

(9-18-12)

SPI G185

Revise the *2012 Standard Specifications* as follows:

Replace all references to "State Highway Administrator" with "Chief Engineer".

E-VERIFY COMPLIANCE:

(2-18-14)

SPI G200

Contractors and subcontractors shall comply with the E-Verify requirements of N.C.G.S. Chapter 64, Article 2. Contractors are directed to review the foregoing laws. By signing this bid, any awarded Contractor certifies its compliance with the E-Verify requirements and will do so on a periodic basis thereafter as may be required by the Department.

NOTE TO CONTRACTOR:

All streams temporarily impacted by this project shall be restored to existing flow lines.

SUBLETTING OF CONTRACT:

(11-18-2014)

108-6

SPI G186

Revise the *2012 Standard Specifications* as follows:

Page 1-66, Article 108-6 Subletting of Contract, line 37, add the following as the second sentence of the first paragraph:

All requests to sublet work shall be submitted within 30 days of the date of availability or prior to expiration of 20% of the contract time, whichever date is later, unless otherwise approved by the Engineer.

Page 1-67, Article 108-6 Subletting of Contract, line 7, add the following as the second sentence of the fourth paragraph:

Purchasing materials for subcontractors is not included in the percentage of work required to be performed by the Contractor. If the Contractor sublets items of work but elects to purchase material for the subcontractor, the value of the material purchased will be included in the total dollar amount considered to have been sublet.

PROJECT SPECIAL PROVISIONS**ROADWAY****CLEARING AND GRUBBING - METHOD III:**

(4-6-06) (Rev. 1-17-12)

200

SP2 R02B

Perform clearing on this project to the limits established by Method "III" shown on Standard Drawing No. 200.03 of the *2012 Roadway Standard Drawings*.

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)

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 *2012 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 *2012 Standard Specifications*.

SURCHARGES AND WAITING PERIODS:

(2-17-04) (Rev. 2-19-13)

235

SP2 R65

Revise the *2012 Standard Specifications* as follows:

Page 2-22, Article 235-1 DESCRIPTION, add the following:

Surcharges and waiting periods may be required for embankments and retaining walls to minimize and control the effects of settlement on structures, approach slabs, pavements, pipes, utilities, etc.

Page 2-24, Article 235-3 CONSTRUCTION METHODS, add the following:

(E) Surcharges and Waiting Periods

Place surcharges at locations shown in the plans. Unless required otherwise in the contract, surcharge embankments after embankments are constructed to the grade and cross section shown in the plans. Construct surcharges with side slopes as directed, 2:1 (H:V) end slopes outside of surcharge limits and surcharge heights shown in the plans. Place and compact surcharge material in accordance with Subarticles 235-3(B) and 235-3(C). Construct and maintain adequate drainage of surface runoff to prevent erosion of surcharge material.

Waiting period durations are in accordance with the contract and as directed. Surcharge waiting periods apply to surcharge locations shown in the plans and begin after surcharges are constructed to the height shown in the plans.

Unless required otherwise in the contract, bridge waiting periods are required in accordance with the following:

- (1) Apply to bridge embankments and retaining walls within 100 ft of end bent and bent locations shown in the plans and
- (2) Begin after bridge embankments and retaining walls are constructed to the elevations noted in the plans.

Unless required otherwise in the contract, embankment waiting periods are required in accordance with the following:

- (1) Apply to embankment locations shown in the plans and retaining walls for embankments with waiting periods and
- (2) Begin after embankments and retaining walls are constructed to the elevations, grade and cross section shown in the plans.

Except for maintaining embankments, do not perform any work on embankments or structures with waiting periods until waiting periods end unless otherwise approved. Place and compact additional material in accordance with Subarticles 235-3(B) and 235-3(C) to maintain embankment grade elevations during waiting periods. Remove surcharges to the grade and cross section shown in the plans after surcharge waiting periods end.

Page 2-24, Article 235-5 MEASUREMENT AND PAYMENT, add the following:

Borrow Excavation for surcharge material and additional material for maintaining embankment grade elevations will be measured and paid in accordance with Article 230-5. *Unclassified Excavation* for surcharge material, additional material for maintaining embankment grade elevations and removing surcharges will be measured and paid in accordance with Article 225-7. When there is no pay item for *Borrow Excavation* or *Unclassified Excavation* in the contract, surcharge and additional material and removing surcharges will be paid as extra work in accordance with Article 104-7.

ROCK EMBANKMENTS:

(1-17-12)

Description

Construct rock embankments in accordance with the contract. Use core material as necessary or required where piles will be driven through rock embankments and as shown in the plans. Rock embankments are required to construct embankments in water at locations shown in the plans and as directed.

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	Section
Geotextile for Rock Embankments, Type 2	1056
Select Material	1016

Provide Type 2 geotextile for filtration geotextiles. Use Class VII select material for rock embankments. Use Class VI select material (standard size No. 57) for core material and over Class VII.

Construction Methods

Construct rock embankments in accordance with the slopes, dimensions and elevations shown in the plans and Section 235 of the *Standard Specifications*. If piles will be installed through rock embankments, place Class VII so there will be at least 5 ft between rock and piles. Place Class VII so smaller rocks are uniformly distributed throughout rock embankments. Provide a uniform surface free of obstructions, debris and groups of large rocks that could cause voids in embankments. When placing Class VII in lifts, place core material to top of the current lift before placing the next lift of Class VII.

Place and compact a layer of No. 57 stone at least 12" thick over rock embankments and core material. Install filtration geotextiles on top of No. 57 stone in accordance with Article 270-3 of the *Standard Specifications* before placing embankment fill material.

Measurement and Payment

Rock Embankments and *#57 Stone* will be measured and paid 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 *Rock Embankments* and *#57 Stone* will be full compensation for providing, hauling, handling, placing, compacting and maintaining select material.

Geotextile for Rock Embankments will be measured and paid in square yards. Geotextiles will be measured along the top of the No. 57 stone layer as the square yards of exposed geotextiles before placing embankment fill. 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 placing geotextiles.

Payment will be made under:

Pay Item	Pay Unit
Rock Embankments	Ton
#57 Stone	Ton
Geotextile for Rock Embankments	Square Yard

PIPE INSTALLATION:

(11-20-12)

300

SP3 R01

Revise the *2012 Standard Specifications* as follows:

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

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

DUCTILE IRON PIPE:

Description

Furnish and install ductile iron pipe at the locations indicated in the contract documents and as directed by the Engineer.

Materials

Ductile iron pipe shall meet the requirements of Article 1034-4 (A) of the *Standard Specifications*.

Construction

Install ductile iron pipe in accordance with the requirements of Section 300 of the *Standard Specifications*.

Measurement and Payment

___ " *Ductile Iron Pipe* will be measured and paid as the actual number of linear feet of pipe that has been incorporated into the completed and accepted work. Measurement of pipe will be made by counting the number of joints used and multiplying by the length of the joint to obtain the number of linear feet of pipe installed and accepted. Measurements of partial joints will be made along the longest length of the partial joint to the nearest 0.1 ft. Select bedding and backfill material will be included in the cost of the installed pipe.

Payment will be made under:

Pay Item

___" Ductile Iron Pipe

Pay Unit

Linear Foot

FLOWABLE FILL:

(9-17-02) (Rev 1-17-12)

300, 340, 450, 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 *2012 Standard Specifications*.

Item

Flowable Fill

Section

1000-6

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

Flowable Fill

Pay Unit

Cubic Yard

REINFORCED CONCRETE PIPE CULVERTS (CONTRACTOR DESIGN):

(10-20-09)

SPI 3-06

Description

This work consists of the design, manufacture and installation of reinforced concrete pipes in locations that require fill heights greater than 40 feet and less than or equal to 80 feet.

Materials

(A) Design

When the design of a reinforced concrete pipe is required in the contract plans, design the reinforced concrete pipe in accordance with the current edition of the AASHTO LRFD Bridge Design Specifications. Provide the diameter of pipe as indicated on the plans and manufacture the pipe in accordance with ASTM C 1417. Provide a reinforced concrete pipe that meets the requirements of Section 1032-6(B), Section 1077 and any other applicable parts of the Standard Specifications.

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

(B) Reinforced Concrete Pipe Sections

(1) Class

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

(2) Design Criteria

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

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

(C) Joints

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

(D) Manufacture

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

Measurement and Payment

_____ " R.C. Pipe Culvert (*Contractor Design*) will be measured and paid for in linear feet. Such price and payment will be full compensation for all work and will include, but not be limited to, furnishing all labor, materials, equipment and other incidentals necessary to complete this work.

Payment will be made under:

Pay Item	Pay Unit
_____ " R.C. Pipe Culvert (<i>Contractor Design</i>)	Linear Feet

BRIDGE APPROACH FILLS:

(10-19-10) (Rev. 1-17-12)

422

SP4 R02

Description

Bridge approach fills include bridge approach fills for sub regional tier bridges and reinforced bridge approach fills. Construct bridge approach fills in accordance with the contract and Standard Drawing No. 422.10 or 422.11 of the *2012 Roadway Standard Drawings*. Define "geosynthetics" as geotextiles or geomembranes.

Materials

Refer to Division 10 of the *2012 Standard Specifications*.

Item	Section
Anchor Pins	1056-2
Geotextiles	1056
Portland Cement Concrete	1000
Select Material	1016
Subsurface Drainage Materials	1044
Wire Staples	1060-8(D)

For bridge approach fills for sub regional tier bridges, provide Type 1 geotextile for filtration

geotextiles. For reinforced bridge approach fills, provide Type 5 geotextile for geotextile reinforcement and Type 1 geotextile and No. 78M stone for drains. Use Class B concrete for concrete pads.

Use Class III or V select material for reinforced bridge approach fills and only Class V select material (standard size No. 78M stone) for bridge approach fills for sub regional tier bridges. Provide PVC pipes, fittings and outlet pipes for subsurface drainage materials. For drains and PVC pipes behind end bents, use pipes with perforations that meet AASHTO M 278.

Use PVC, HDPE or linear low density polyethylene (LLDPE) geomembranes for reinforced bridge approach fills. For PVC geomembranes, provide grade PVC30 geomembranes that meet ASTM D7176. For HDPE and LLDPE geomembranes, use geomembranes with a nominal thickness of at least 30 mils that meet Geosynthetic Research Institute Standard Specifications GM13 or GM17, respectively. Handle and store geomembranes in accordance with Article 1056-2 of the *2012 Standard Specifications*. Provide material certifications for geomembranes in accordance with Article 1056-3 of the *2012 Standard Specifications*.

Construction Methods

Excavate as necessary for bridge approach fills in accordance with the contract. Notify the Engineer when foundation excavation is complete. Do not place geomembranes or filtration geotextiles until excavation dimensions and foundation material are approved. Attach geomembranes and filtration geotextiles to end bent cap back and wing walls with adhesives, tapes or other approved methods. Glue or weld geomembrane seams to prevent leakage.

For reinforced bridge approach fills, place geotextile reinforcement within 3" of locations shown in Standard Drawing No. 422.10 of the *2012 Roadway Standard Drawings* and in slight tension free of kinks, folds, wrinkles or creases. Install geotextile reinforcement with the orientation, dimensions and number of layers shown in Standard Drawing No. 422.10 of the *2012 Roadway Standard Drawings*. Place first layer of geotextile reinforcement directly on geomembranes with no void or material in between. Install geotextile reinforcement with the machine direction (MD) parallel to the roadway centerline. The MD is the direction of the length or long dimension of the geotextile roll. Do not splice or overlap geotextile reinforcement in the MD so seams are perpendicular to the roadway centerline. Wrap geotextile reinforcement at end bent cap back and wing walls as shown in Standard Drawing No. 422.10 of the *2012 Roadway Standard Drawings* and directed by the Engineer. Extend geotextile reinforcement at least 4 ft back behind end bent cap back and wing walls into select material.

Overlap adjacent geotextiles at least 18" with seams oriented parallel to the roadway centerline. Hold geotextiles in place with wire staples or anchor pins as needed. Contact the Engineer when existing or future obstructions such as foundations, pavements, pipes, inlets or utilities will interfere with geosynthetics.

For reinforced bridge approach fills, construct one foot square drains consisting of 4" diameter continuous perforated PVC pipes surrounded by No. 78M stone wrapped in Type 1 geotextiles. Install drains in accordance with Standard Drawing No. 422.10 of the *2012 Roadway Standard Drawings*. For bridge approach fills for sub regional tier bridges, install 4" diameter continuous perforated PVC drain pipes in accordance with Standard Drawing No. 422.11 of the *2012 Roadway Standard Drawings*.

Use solvent cement to connect PVC pipes so joints do not leak. Connect perforated pipes to outlet pipes just behind wing walls. Provide drain pipes and drains with positive drainage towards outlets. Place pipe sleeves in or under wing walls for outlet pipes so positive drainage is maintained. Use sleeves that can withstand wing wall loads.

Place select material in 8" to 10" thick lifts. Use only hand operated compaction equipment to compact select material for bridge approach fills. Compact Class III select material in accordance with Subarticle 235-3(C) of the *2012 Standard Specifications*. Compact No. 78M stone with a vibratory compactor to the satisfaction of the Engineer. Do not displace or damage geosynthetics, drain pipes or drains when placing and compacting select material. End dumping directly on geosynthetics is not permitted. Do not operate heavy equipment on geosynthetics, drain pipes or drains until they are covered with at least 8" of select material. Replace any damaged geosynthetics, drain pipes or drains to the satisfaction of the Engineer.

Cover open ends of outlet pipes with rodent screens as shown in Standard Drawing No. 815.03 of the *2012 Roadway Standard Drawings*. Connect ends of outlet pipes to concrete pads or existing drainage structures as directed by the Engineer. Construct concrete pads with an Ordinary surface finish that meets Subarticle 825-6(B) of the *2012 Standard Specifications*.

Measurement and Payment

Reinforced Bridge Approach Fill, Station _____ will be paid at the contract lump sum price. The contract lump sum price for *Reinforced Bridge Approach Fill, Station _____* will be full compensation for labor, tools, equipment and reinforced bridge approach fill materials, excavating, backfilling, hauling and removing excavated materials, compacting select material, connecting outlet pipes to existing drainage structures and supplying select materials, geosynthetics, drains, pipe sleeves and outlet components and any incidentals necessary to construct all reinforced bridge approach fills at each bridge.

Bridge Approach Fill - Sub Regional Tier, Station _____ will be paid at the contract lump sum price. The contract lump sum price for *Bridge Approach Fill - Sub Regional Tier, Station _____* will be full compensation for labor, tools, equipment and bridge approach fill materials, excavating, backfilling, hauling and removing excavated materials, compacting No. 78M stone, connecting outlet pipes to existing drainage structures and supplying No. 78M stone, filtration geotextiles, drain pipes, pipe sleeves and outlet components and any incidentals necessary to construct all bridge approach fills at each sub regional tier bridge.

Payment will be made under:

Pay Item	Pay Unit
Reinforced Bridge Approach Fill, Station _____	Lump Sum
Bridge Approach Fill - Sub Regional Tier, Station _____	Lump Sum

PREPARATION OF SUBGRADE AND BASE:

(1-16-96)

610

SP5 R05

On mainline portions and ramps of this project, prepare the subgrade and base beneath the pavement structure in accordance with the applicable sections of the *2012 Standard Specifications* except use an automatically controlled fine grading machine using string lines, laser controls or other approved methods to produce final subgrade and base surfaces meeting the lines, grades and cross sections required by the plans or established by the Engineer.

No direct payment will be made for the work required by this provision as it will be considered incidental to other work being paid for by the various items in the contract.

ASPHALT PAVEMENTS - SUPERPAVE:

(6-19-12) (Rev. 10-21-14)

605, 609, 610, 650, 660

SP6 R01

Revise the *2012 Standard Specifications* as follows:

Page 6-3, Article 605-7 APPLICATION RATES AND TEMPERATURES, replace this article, including Table 601-1, with the following:

Apply tack coat uniformly across the existing surface at target application rates shown in Table 605-1.

TABLE 605-1 APPLICATION RATES FOR TACK COAT	
Existing Surface	Target Rate (gal/sy)
	Emulsified Asphalt
New Asphalt	0.04 ± 0.01
Oxidized or Milled Asphalt	0.06 ± 0.01
Concrete	0.08 ± 0.01

Apply tack coat at a temperature within the ranges shown in Table 605-2. Tack coat shall not be overheated during storage, transport or at application.

TABLE 605-2 APPLICATION TEMPERATURE FOR TACK COAT	
Asphalt Material	Temperature Range
Asphalt Binder, Grade PG 64-22	350 - 400°F
Emulsified Asphalt, Grade RS-1H	130 - 160°F
Emulsified Asphalt, Grade CRS-1	130 - 160°F
Emulsified Asphalt, Grade CRS-1H	130 - 160°F
Emulsified Asphalt, Grade HFMS-1	130 - 160°F
Emulsified Asphalt, Grade CRS-2	130 - 160°F

Page 6-7, Article 609-3 FIELD VERIFICATION OF MIXTURE AND JOB MIX FORMULA ADJUSTMENTS, lines 35-37, delete the second sentence of the second paragraph.

Page 6-18, Article 610-1 DESCRIPTION, lines 40-41, delete the last sentence of the last paragraph.

Page 6-19, Subarticle 610-3(A) Mix Design-General, line 5, add the following as the first paragraph:

Warm mix asphalt (WMA) is allowed for use at the Contractor's option in accordance with the NCDOT Approved Products List for WMA Technologies available at:

<https://connect.ncdot.gov/resources/Materials/MaterialsResources/Warm%20Mix%20Asphalt%20Approved%20List.pdf>

Page 6-21, Subarticle 610-3(C) Job Mix Formula (JMF), replace Table 610-1 with the following:

**TABLE 610-1
DESIGN MIXING TEMPERATURE AT THE ASPHALT PLANT^A**

Binder Grade	HMA JMF Temperature	WMA JMF Temperature Range
PG 64-22	300°F	225 - 275°F
PG 70-22	315°F	240 - 290°F
PG 76-22	335°F	260 - 310°F

- A.** The mix temperature, when checked in the truck at the roadway, shall be within plus 15° and minus 25° of the temperature specified on the JMF.

Page 6-21, Subarticle 610-3(C) Job Mix Formula (JMF), lines 4-6, delete first sentence of the second paragraph. Line 7, in the second sentence of the second paragraph, replace “275°F” with “275°F or greater.”

Page 6-22, Article 610-4 WEATHER, TEMPERATURE AND SEASONAL LIMITATIONS FOR PRODUCING AND PLACING ASPHALT MIXTURES, lines 15-17, replace the second sentence of the first paragraph with the following:

Do not place asphalt material when the air or surface temperatures, measured at the location of the paving operation away from artificial heat, do not meet Table 610-5.

Page 6-23, Article 610-4 WEATHER, TEMPERATURE AND SEASONAL LIMITATIONS FOR PRODUCING AND PLACING ASPHALT MIXTURES, replace Table 610-5 with the following:

**TABLE 610-5
PLACEMENT TEMPERATURES FOR ASPHALT**

Asphalt Concrete Mix Type	Minimum Surface and Air Temperature
B25.0B, C	35°F
I19.0B, C, D	35°F
SF9.5A, S9.5B	40°F ^A
S9.5C, S12.5C	45°F ^A
S9.5D, S12.5D	50°F

- A.** For the final layer of surface mixes containing recycled asphalt shingles (RAS), the minimum surface and air temperature shall be 50°F.

Page 6-26, Article 610-7 HAULING OF ASPHALT MIXTURE, lines 22-23, in the fourth sentence of the first paragraph replace “so as to overlap the top of the truck bed and” with “to”.

Page 6-41, Subarticle 650-3(B) Mix Design Criteria, replace Table 650-1 with the following:

Sieve Size (mm)	Type FC-1	Type FC-1 Modified	Type FC-2 Modified
19.0	-	-	100
12.5	100	100	80 - 100
9.50	75 - 100	75 - 100	55 - 80
4.75	25 - 45	25 - 45	15 - 30
2.36	5 - 15	5 - 15	5 - 15
0.075	1.0 - 3.0	1.0 - 3.0	2.0 - 4.0

Page 6-50, Table 660-1 MATERIAL APPLICATION RATES AND TEMPERATURES, lines 1-2, replace Note A in Table 660-1 with the following:

- A. Use No. 6M, No. 67, No. 5 and No. 78M aggregate for retreatment before an asphalt overlay on existing pavement based on the width of the cracks in the existing pavement. Choose No. 78M for sections of roadway where the average width of existing cracks is 1/4" or less in width, No. 67 for sections of roadway where the average width of existing cracks are 1/4" to 5/8" in width and choose No. 5 for sections of roadway where the existing crack widths are greater than 5/8".

ASPHALT BINDER CONTENT OF ASPHALT PLANT MIXES:

(11-21-00) (Rev. 7-17-12)

609

SP6 R15

The approximate asphalt binder content of the asphalt concrete plant mixtures used on this project will be as follows:

Asphalt Concrete Base Course	Type B 25.0	4.4%
Asphalt Concrete Intermediate Course	Type I 19.0	4.8%
Asphalt Concrete Surface Course	Type S 4.75A	6.8%
Asphalt Concrete Surface Course	Type SA-1	6.8%
Asphalt Concrete Surface Course	Type SF 9.5A	6.7%
Asphalt Concrete Surface Course	Type S 9.5	6.0%
Asphalt Concrete Surface Course	Type S 12.5	5.6%

The actual asphalt binder content will be established during construction by the Engineer within the limits established in the *2012 Standard Specifications*.

ASPHALT PLANT MIXTURES:

(7-1-95)

609

SP6 R20

Place asphalt concrete base course material in trench sections with asphalt pavement spreaders made for the purpose or with other equipment approved by the Engineer.

PRICE ADJUSTMENT - ASPHALT BINDER FOR PLANT MIX:

(11-21-00)

620

SP6 R25

Price adjustments for asphalt binder for plant mix will be made in accordance with Section 620 of the *2012 Standard Specifications*.

The base price index for asphalt binder for plant mix is **\$611.92** per ton.

This base price index represents an average of F.O.B. selling prices of asphalt binder at supplier's terminals on **August 1, 2014**.

MILLED RUMBLE STRIPS (Portland Cement Concrete):**Description**

Mill rumble strips on portland cement concrete shoulders in accordance with the plans and as directed by the Engineer.

Equipment

Provide equipment consisting of a rotary type cutting head with an outside diameter of no more than 24" and no less than 16" long. Provide a cutting head that has the cutting tips arranged in such a pattern as to provide a relatively smooth cut as well as a cutting head that is on its own independent suspension from that of the power unit to allow the tool to self align with the slope of the shoulder and/or any irregularities in the shoulder surface. Provide a cutting tool equipped with guides to establish consistent alignment and uniformity of each cut in relation to the roadway.

Construction Methods

Demonstrate the ability to achieve desired surface inside each depression without tearing or snagging the portland cement concrete prior to beginning the work.

Provide rumble strips that have finished dimensions and pattern as detailed on the plans.

Material resulting from the operation shall become the property of the Contractor. Remove and dispose of material in accordance with the requirements of Section 802 of *Standard Specifications*.

At the end of each working day remove all equipment to a location where it does not present a traffic hazard, clean pavement, and reopen work area to traffic.

Measurement and Payment

Milled Rumble Strips (Concrete Shoulder) will be measured and paid for the actual number of linear feet of shoulder, measured longitudinally along the surface of each shoulder, where rumble strips have been constructed.

Payment will be made under:

Pay Item

Milled Rumble Strips (Concrete Shoulder)

Pay Unit

Linear Foot

FIELD OFFICE (Lump Sum):

(6-1-07)

SPI 8-1

Description

This work consists of furnishing, erecting, equipping, and maintaining 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 shall be erected and functional as an initial operation. Failure to have the field office functional when work first begins on the project will result in withholding payment of the Contractor's monthly progress estimate. The field office shall be operational throughout the duration of the project and shall be removed upon completion and final acceptance of the project.

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 10 feet, and the floor-to-ceiling height that is at least 7 feet 6 inches. Provide inside walls and a ceiling constructed of plywood, masonite, gypsum board, or other suitable materials. Have the exterior walls, ceiling, and floor insulated.

Provide a field office with at least 500 square feet of floor space and that is equipped with the following:

<u>Number</u>	<u>Item</u>
1	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.
1	Printing calculator.
2	2-drawer fire protection file, 15 inch drawer width, minimum UL rating of Class 350.
6	Office chairs with at least two chairs having casters.
2	Wastebaskets.
1	Pencil sharpener.
1	Copy machine (8 inch x 11 inch copies)
1	Telephone.
1	Fax Machine.
1	Answering machine.

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 easily 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.

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 Gage

Furnish the field office with an outside storage facility for the Department's nuclear gage. The storage facility shall not be located within 10 feet of any other structure including the field office.

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 of the light fixtures that is a fluorescent light situated over the plan and drafting table. Furnish electrical current and fuel for heating equipment.

Fire Extinguishers

Furnish and maintain one fire extinguisher for each required exterior passage door. Fire extinguisher may be chemical or dry powder. UL Classification 10-B:C (minimum), suitable for Type A:B:C: fires. 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 connections, maintain utilities, pay utility service fees and bills, and handle final disconnection of utilities. Furnish a telephone in each field office and permit the work necessary to install it.

Storage Facility for Test Equipment

Provide the field office with a storage facility, separate from the office for storage of test equipment, other than the nuclear gage. 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.

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, dust pan, mop and bucket, and general cleaning supplies.
3. Provide and maintain an all weather parking area for six vehicles, including graveled access to the paved surface.

Measurement and Payment

Payment at the contract lump sum bid price for *Field Office* will be full compensation for all work covered by this provision including but not limited to furnishing, erecting, maintaining, and removing the field office as outlined in this provision.

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	Lump Sum

MODIFIED CONCRETE FLUME WITH CONCRETE OUTLET:

(3-19-96)(Rev. 6-17-08)

825

SP8 R10

At locations shown in the plans, construct concrete flumes, concrete curb, and apron in accordance with the details in the plans. Use materials meeting the requirements of Section 825 of the *2012 Standard Specifications* except that the concrete must be Class B or of higher compressive strength.

Each concrete flume, concrete curb, and apron completed and accepted will be paid at the contract unit price per each for *Modified Concrete Flume*. Such price and payment will be full compensation for all materials, labor, equipment, tools, removing and disposing of the temporary slope drains, and any other incidentals necessary to complete the work satisfactorily.

The concrete curb and ditch outside the pay limits of the apron will be measured and paid in accordance with Section 846 and 850 of the *2012 Standard Specifications*.

Payment will be made under:

Pay Item	Pay Unit
Modified Concrete Flume	Each

CONVERT EXISTING OTCB TO 2GI:

(1-1-02) (Rev. 7-18-06)

840, 859

SP8 R50

At the proper phase of construction, convert the existing **OTCB** at locations indicated in the plans or where directed, to **2GI** in accordance with the details in the plans and the applicable requirements of Sections 840 and 859 of the *2012 Standard Specifications*.

Convert Existing OTCB to 2GI will be measured and paid as each, completed and accepted. Such price and payment is considered full compensation for all equipment, materials, labor, tools, and incidentals necessary to complete each conversion satisfactorily.

Payment will be made under:

Pay Item	Pay Unit
Convert Existing OTCB to 2GI	Each

GUARDRAIL ANCHOR UNITS, TYPE M-350:

(4-20-04) (Rev. 1-17-12)

862

SP8 R60

Description

Furnish and install guardrail anchor units in accordance with the details in the plans, the applicable requirements of Section 862 of the *2012 Standard Specifications*, and at locations shown in the plans.

Materials

The Contractor may, at his option, furnish any one of the following guardrail anchor units or approved equal.

The guardrail anchor unit (SRT-350) as manufactured by:

Trinity Industries, Inc.
2525 N. Stemmons Freeway
Dallas, Texas 75207
Telephone: 800-644-7976

The guardrail anchor unit (FLEAT) as manufactured by:

Road Systems, Inc.
3616 Old Howard County Airport
Big Springs, Texas 79720
Telephone: 915-263-2435

The guardrail anchor unit (REGENT) as manufactured by:

Energy Absorption Systems, Inc.
One East Wacker Drive
Chicago, Illinois 60601-2076
Telephone: 888-32-ENERGY

Prior to installation the Contractor shall submit to the Engineer:

- (A) FHWA acceptance letter for each guardrail anchor unit certifying it meets the requirements of NCHRP Report 350, Test Level 3, in accordance with Article 106-2 of the *2012 Standard Specifications*.
- (B) Certified working drawings and assembling instructions from the manufacturer for each guardrail anchor unit in accordance with Article 105-2 of the *2012 Standard Specifications*.

No modifications shall be made to the guardrail anchor unit without the express written permission from the manufacturer. Perform installation in accordance with the details in the plans, and details and assembling instructions furnished by the manufacturer.

Construction Methods

Guardrail end delineation shall be required on all approach and trailing end sections for both temporary and permanent installations. Guardrail end delineation consists of yellow reflective sheeting applied to the entire end section of the guardrail in accordance with Article 1088-3 of the *2012 Standard Specifications* and is incidental to the cost of the guardrail anchor unit.

Measurement and Payment

Measurement and payment will be made in accordance with Article 862-6 of the *2012 Standard Specifications*.

Payment will be made under:

Pay Item	Pay Unit
Guardrail Anchor Units, Type M-350	Each

GUARDRAIL ANCHOR UNITS, TYPE 350:

(4-20-04) (Rev. 8-16-11)

862

SP8 R65

Description

Furnish and install guardrail anchor units in accordance with the details in the plans, the applicable requirements of Section 862 of the *2012 Standard Specifications*, and at locations shown in the plans.

Materials

The Contractor may at his option, furnish any one of the guardrail anchor units or approved equal.

Guardrail anchor unit (ET-Plus) as manufactured by:

Trinity Industries, Inc.
2525 N. Stemmons Freeway
Dallas, Texas 75207
Telephone: 800-644-7976

The guardrail anchor unit (SKT 350) as manufactured by:

Road Systems, Inc.
3616 Old Howard County Airport
Big Spring, Texas 79720
Telephone: 915-263-2435

Prior to installation the Contractor shall submit to the Engineer:

- (A) FHWA acceptance letter for each guardrail anchor unit certifying it meets the requirements of NCHRP Report 350, Test Level 3, in accordance with Article 106-2 of the *2012 Standard Specifications*.

- (B) Certified working drawings and assembling instructions from the manufacturer for each guardrail anchor unit in accordance with Article 105-2 of the *2012 Standard Specifications*.

No modifications shall be made to the guardrail anchor unit without the express written permission from the manufacturer. Perform installation in accordance with the details in the plans, and details and assembling instructions furnished by the manufacturer.

Construction Methods

Guardrail end delineation is required on all approach and trailing end sections for both temporary and permanent installations. Guardrail end delineation consists of yellow reflective sheeting applied to the entire end section of the guardrail in accordance with Article 1088-3 of the *2012 Standard Specifications* and is incidental to the cost of the guardrail anchor unit.

Measurement and Payment

Measurement and payment will be made in accordance with Article 862-6 of the *2012 Standard Specifications*.

Payment will be made under:

Pay Item	Pay Unit
Guardrail Anchor Units, Type 350	Each

IMPACT ATTENUATOR UNITS, TYPE 350:

(4-20-04) (Rev. 1-17-12)

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

The Contractor may at his option, furnish any one of the **NON-GATING** impact attenuator units or approved equal:

The impact attenuator unit (QUADGUARD) as manufactured by:

Energy Absorption Systems, Inc.
One East Wacker Drive
Chicago, Illinois 60601-2076
Telephone: 312-467-6750

The impact attenuator unit (TRACC) as manufactured by:

Trinity Industries, Inc.
2525 N. Stemmons Freeway
Dallas, Texas 75207
Telephone: 800-644-7976

The Contractor may at his option, furnish any one of the **GATING** impact attenuator units or approved equal:

The impact attenuator unit (BRAKEMASTER) as manufactured by:

Energy Absorption Systems, Inc.
One East Wacker Drive
Chicago, Illinois 60601-2076
Telephone: 312-467-6750

The impact attenuator unit (CAT) as manufactured by:

Trinity Industries, Inc.
2525 N. Stemmons Freeway
Dallas, Texas 75207
Telephone: 800-644-7976

Prior to installation the Contractor shall submit to the Engineer:

- (A) FHWA acceptance letter for each impact attenuator unit certifying it meets the requirements of NCHRP Report 350, Test Level 3, in accordance with Article 106-2 of the *2012 Standard Specifications*.
- (B) Certified working drawings and assembling instructions from the manufacturer for each impact attenuator unit in accordance with Article 105-2 of the *2012 Standard Specifications*.

No modifications shall be made to the impact attenuator unit without the express written permission from the manufacturer. Perform installation in accordance with the details in the plans, and details and assembling instructions furnished by the manufacturer.

Construction Methods

If the median width is 40 feet or less, the Contractor shall supply one of the NON-GATING Impact Attenuator Units listed in the Materials Section herein.

If the median width is greater than 40 feet, the Contractor may use any of the GATING or NON-GATING Impact Attenuator Units listed in the Materials Section herein.

Measurement and Payment

Impact Attenuator Unit, Type 350 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 350	Each

PREFORMED SCOUR HOLE WITH LEVEL SPREADER APRON:

(10-15-02) (Rev. 10-20-09)

410

SP8 R105

Description

Construct and maintain preformed scour holes with spreader aprons at the locations shown on the plans and in accordance with the details in the plans. Work includes excavation, shaping and maintaining the hole and apron, furnishing and placing filter fabric, rip rap (class as specified in the plans) and permanent soil reinforcement matting.

Materials

Item	Section
Plain Rip Rap	1042
Filter Fabric	1056

The permanent soil reinforcement matting shall be permanent erosion control reinforcement mat and shall be constructed of synthetic or a combination of coconut and synthetic fibers evenly distributed throughout the mat between a bottom UV stabilized netting and a heavy duty UV stabilized top net. The matting shall be stitched together with UV stabilized polypropylene thread to form a permanent three dimensional structure. The mat shall have the following minimum physical properties:

Property	Test Method	Value Unit
Light Penetration	ASTM D6567	9 %
Thickness	ASTM D6525	0.40 in
Mass Per Unit Area	ASTM D6566	0.55 lb/sy
Tensile Strength	ASTM D6818	385 lb/ft
Elongation (Maximum)	ASTM D6818	49 %
Resiliency	ASTM D1777	>70 %
UV Stability *	ASTM 4355	≥80 %
Porosity (Permanent Net)	ECTC Guidelines	≥85 %
Maximum Permissible Shear Stress (Vegetated)	Performance Bench Test	≥8.0 lb/ft ²
Maximum Allowable Velocity (Vegetated)	Performance Bench Test	≥16.0 ft/s

*ASTM D1682 Tensile Strength and % strength retention of material after 1,000 hours of exposure.

Submit a certification (Type 1, 2, or 3) from the manufacturer showing:

- (A) The chemical and physical properties of the mat used, and
- (B) Conformance of the mat with this specification.

Construction Methods

All areas to be protected with the mat shall be brought to final grade and seeded in accordance with Section 1660 of the *2012 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. Areas where the mat is to be placed will not need to be mulched.

Measurement and Payment

Preformed Scour Holes with Level Spreader Aprons will be measured and paid as the actual number incorporated into the completed and accepted work. Such price and payment will be full compensation for all work covered by this provision.

Payment will be made under:

Pay Item	Pay Unit
Preformed Scour Hole with Level Spreader Aprons	Each

FOUNDATIONS AND ANCHOR ROD ASSEMBLIES FOR METAL POLES:

(1-17-12) (Rev. 5-21-13)

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 low level light standards supported by metal poles or upright trusses. Foundations consist of footings with pedestals and drilled piers with or without grade beams or wings. Anchor rod assemblies consist of anchor rods (also called anchor bolts) with nuts and washers on the exposed ends of rods and nuts and a plate or washers on the other ends of rods embedded in the foundation.

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

This provision does not apply to materials and anchor rod assemblies for standard foundations for low level light standards. See Section 1405 of the *2012 Standard Specifications* and Standard

Drawing No. 1405.01 of the *2012 Roadway Standard Drawings* for materials and anchor rod assemblies for standard foundations. For construction of standard foundations for low level light standards, standard foundations are considered footings in this provision.

This provision does not apply to foundations for signal pedestals; see Section 1743 of the *2012 Standard Specifications* and Standard Drawing No. 1743.01 of the *2012 Roadway Standard Drawings*.

Materials

Refer to the *2012 Standard Specifications*.

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

Provide Type 3 material certifications in accordance with Article 106-3 of the *2012 Standard Specifications* for 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 *2012 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 *2012 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 *2012 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 polymer slurry at all times so slurry meets Table 411-3 of the *2012 Standard Specifications* except for sand content.

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

Remove soft and loose material from bottom of holes using augers to the satisfaction of the Engineer. Assemble rebar cages and place cages and Drilled Pier concrete in accordance with Subarticle 411-4(E) of the *2012 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 *2012 Standard Specifications*. A drilled pier will be considered defective in accordance with Subarticle 411-5(D) of the *2012 Standard Specifications* and drilled pier acceptance is based in part on the criteria in Article 411-6 of the *2012 Standard Specifications* except for the top of pier tolerances in Subarticle 411-6(C) of the *2012 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 *2012 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 *2012 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 *2012 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. Backfill and fill in accordance with Article 410-8 of the *2012 Standard Specifications*. Proper compaction around footings and wings is critical for foundations to resist uplift and torsion forces. Place concrete against undisturbed soil and do not use forms for standard foundations for low level light standards.

(C) Anchor Rod Assemblies

Size anchor rods for design and the required projection above top of foundations. Determine required anchor rod projections from nut, washer and base plate thicknesses, 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
$\leq 1 \frac{1}{2}$	1/3 turn (2 flats)
$> 1 \frac{1}{2}$	1/6 turn (1 flat)

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

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

- (12) Between 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
$\geq 1\ 1/2$	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 *2012 Standard Specifications*. No payment will be made for remediation of unacceptable drilled piers or post repair testing.

MATERIALS:

(2-21-12) (Rev. 5-20-14)

1000, 1002, 1005, 1024, 1050, 1056, 1074, 1078, 1080, 1081, 1086, 1084, 1087, 1092

SP10 R01

Revise the 2012 Standard Specifications as follows:

Page 10-1, Article 1000-1, DESCRIPTION, lines 9-10, replace the last sentence of the first paragraph with the following:

Type IL, IP, IS or IT blended cement may be used instead of Portland cement.

Page 10-1, Article 1000-1, DESCRIPTION, line 14, add the following:

Use materials which do not produce a mottled appearance through rusting or other staining of the finished concrete surface.

Page 10-5, Table 1000-1, REQUIREMENTS FOR CONCRETE, replace with the following:

Class of Concrete	Min. Comp. Strength at 28 days	Maximum Water-Cement Ratio				Consistency Max. Slump		Cement Content			
		Air-Entrained Concrete		Non Air-Entrained Concrete		Vibrated	Non-Vibrated	Vibrated		Non-Vibrated	
		Rounded Aggregate	Angular Aggregate	Rounded Aggregate	Angular Aggregate			Min.	Max.	Min.	Max.
Units	psi					inch	inch	lb/cy	lb/cy	lb/cy	lb/cy
AA	4,500	0.381	0.426	-	-	3.5	-	639	715	-	-
AA Slip Form	4,500	0.381	0.426	-	-	1.5	-	639	715	-	-
Drilled Pier	4,500	-	-	0.450	0.450	-	5-7 dry 7-9 wet	-	-	640	800
A	3,000	0.488	0.532	0.550	0.594	3.5	4	564	-	602	-
B	2,500	0.488	0.567	0.559	0.630	2.5	4	508	-	545	-
B Slip Formed	2,500	0.488	0.567	-	-	1.5	-	508	-	-	-
Sand Light-weight	4,500	-	0.420	-	-	4	-	715	-	-	-
Latex Modified	3,000 7 day	0.400	0.400	-	-	6	-	658	-	-	-
Flowable Fill excavatable	150 max. at 56 days	as needed	as needed	as needed	as needed	-	Flowable	-	-	40	100
Flowable Fill non-excavatable	125	as needed	as needed	as needed	as needed	-	Flowable	-	-	100	as needed
Pavement	4,500 design, field 650 flexural, design only	0.559	0.559	-	-	1.5 slip form 3.0 hand place	-	526	-	-	-
Precast	See Table 1077-1	as needed	as needed	-	-	6	as needed	as needed	as needed	as needed	as needed
Prestress	per contract	See Table 1078-1	See Table 1078-1	-	-	8	-	564	as needed	-	-

Page 10-1, Article 1000-2, MATERIALS, line 16; Page 10-8, Subarticle 1000-7(A), MATERIALS, line 8; and Page 10-18, Article 1002-2, MATERIALS, line 9, add the following to the table of item references:

Item	Section
Type IL Blended Cement	1024-1

Page 10-23, Table 1005-1, AGGREGATE GRADATION-COARSE AGGREGATE, replace with the following:

Std. Size #	Percentage of Total by Weight Passing													Remarks
	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#40	#200		
4	100	90-100	20-55	0-15	-	0-5	-	-	-	-	-	-	A	Asphalt Plant Mix
467M	100	95-100	-	35-70	-	0-30	0-5	-	-	-	-	-	A	Asphalt Plant Mix
5	-	100	90-100	20-55	0-10	0-5	-	-	-	-	-	-	A	AST, Sediment Control Stone
57	-	100	95-100	-	25-60	-	0-10	0-5	-	-	-	-	A	AST, Str. Concrete, Shoulder Drain, Sediment Control Stone
57M	-	100	95-100	-	25-45	-	0-10	0-5	-	-	-	-	A	AST, Concrete Pavement
6M	-	-	100	90-100	20-55	0-20	0-8	-	-	-	-	-	A	AST
67	-	-	100	90-100	-	20-55	0-10	0-5	-	-	-	-	A	AST, Str. Concrete, Asphalt Plant Mix
78M	-	-	-	100	98-100	75-100	20-45	0-15	-	-	-	-	A	Asphalt Plant Mix, AST, Str. Conc. Weep Hole Drains
14M	-	-	-	-	-	100	35-70	5-20	-	0-8	-	-	A	Asphalt Plant Mix, AST, Weep Hole Drains, Str. Concrete
9	-	-	-	-	-	100	85-100	10-40	-	0-10	-	-	A	AST
ABC	-	100	75-97	-	55-80	-	35-55	-	25-45	-	14-30	4-12 ^B	-	Aggregate Base Course, Aggregate Stabilization
ABC (M)	-	100	100	-	79	-	20-40	-	0-25	-	-	0-12 ^B	-	Maintenance Stabilization
Light-C weight	-	-	-	-	100	80-100	5-40	0-20	-	0-10	-	0-2.5	-	AST

- A. See Subarticle 1005-4(A).
- B. See Subarticle 1005-4(B).
- C. For Lightweight Aggregate used in Structural Concrete, see Subarticle 1014-2(E)(6).

Page 10-46, Article 1024-1, PORTLAND CEMENT, line 33, add the following as the ninth paragraph:

Use Type IL blended cement that meets AASHTO M 240, except that the limestone content is limited to between 5 and 12% by weight and the constituents shall be interground. Class F fly ash can replace a portion of Type IL blended cement and shall be replaced as outlined in Subarticle 1000-4(I) for Portland cement. For mixes that contain cement with alkali content between 0.6% and 1.0% and for mixes that contain a reactive aggregate documented by the Department, use a pozzolan in the amount shown in Table 1024-1.

Page 10-65, Article 1050-1, GENERAL, line 41, replace the first sentence with the following:

All fencing material and accessories shall meet Section 106.

Page 10-73, Article 1056-1 DESCRIPTION, lines 7-8, delete the first sentence of the second paragraph and replace with the following:

Use geotextile fabrics that are on the NCDOT Approved Products List.

Page 10-73, Article 1056-2 HANDLING AND STORING, line 17, replace “mechanically stabilized earth (MSE) wall faces” with “temporary wall faces”.

Page 10-74, TABLE 1056-1 GEOTEXTILE REQUIREMENTS, replace table with the following:

TABLE 1056-1 GEOTEXTILE REQUIREMENTS						
Property	Requirement (MARV ^A)					Test Method
	Type 1 <i>Shoulder Drains</i>	Type 2 <i>Under Rip Rap</i>	Type 3 ^B <i>Temporary Silt Fence</i>	Type 4 <i>Soil Stabilization</i>	Type 5 ^C <i>Temporary Walls</i>	
Typical Application						
Elongation (MD & CD)	≥ 50%	≥ 50%	≤ 25%	< 50%	< 50%	ASTM D4632
Grab Strength (MD & CD)			100 lb		-	ASTM D4632
Tear Strength (MD & CD)	Table 1 ^D , Class 3	Table 1 ^D , Class 1	-	Table 1 ^D , Class 3	-	ASTM D4533
Puncture Strength			-		-	ASTM D6241
Ultimate Tensile Strength (MD & CD)	-	-	-	-	2,400 lb/ft (unless required otherwise in the contract)	ASTM D4595
Permittivity					0.20 sec ⁻¹	ASTM D4491
Apparent Opening Size	Table 2 ^D , 15% to 50% <i>in Situ</i> Soil		Table 7 ^D	Table 5 ^D	No. 30 ^E	ASTM D4751
UV Stability (Retained Strength)	Passing No. 200 ^E				70%	ASTM D4355

- A. MARV does not apply to elongation
- B. Minimum roll width of 36" required
- C. Minimum roll width of 13 ft required
- D. AASHTO M 288
- E. US Sieve No. per AASHTO M 92

Page 10-115, Subarticle 1074-7(B), Gray Iron Castings, lines 10-11, replace with the first two sentences with the following:

Supply gray iron castings meeting all facets of AASHTO M 306 excluding proof load. Proof load testing will only be required for new casting designs during the design process, and conformance to M306 loading (40,000 lbs.) will be required only when noted on the design documents.

Page 10-126, Table 1078-1, REQUIREMENTS FOR CONCRETE, replace with the following:

Property	28 Day Design Compressive Strength 6,000 psi or less	28 Day Design Compressive Strength greater than 6,000 psi
Maximum Water/Cementitious Material Ratio	0.45	0.40
Maximum Slump without HRWR	3.5"	3.5"
Maximum Slump with HRWR	8"	8"
Air Content (upon discharge into forms)	5 + 2%	5 + 2%

Page 10-151, Article 1080-4 Inspection and Sampling, lines 18-22, replace (B), (C) and (D) with the following:

- (B) At least 3 panels prepared as specified in 5.5.10 of AASHTO M 300, Bullet Hole Immersion Test.
- (C) At least 3 panels of 4"x6"x1/4" for the Elcometer Adhesion Pull Off Test, ASTM D4541.
- (D) A certified test report from an approved independent testing laboratory for the Salt Fog Resistance Test, Cyclic Weathering Resistance Test, and Bullet Hole Immersion Test as specified in AASHTO M 300.
- (E) A certified test report from an approved independent testing laboratory that the product has been tested for slip coefficient and meets AASHTO M253, Class B.

Page 10-161, Subarticle 1081-1(A) Classifications, lines 29-33, delete first 3 sentences of the description for Type 2 and replace with the following:

Type 2 - A low-modulus, general-purpose adhesive used in epoxy mortar repairs. It may be used to patch spalled, cracked or broken concrete where vibration, shock or expansion and contraction are expected.

Page 10-162, Subarticle 1081-1(A) Classifications, lines 4-7, delete the second and third sentences of the description for Type 3A. **Lines 16-22,** delete Types 6A, 6B and 6C.

Page 10-162, Subarticle 1081-1(B) Requirements, lines 26-30, replace the second paragraph with the following:

For epoxy resin systems used for embedding dowel bars, threaded rods, rebar, anchor bolts and other fixtures in hardened concrete, the manufacturer shall submit test results showing that the bonding system will obtain 125% of the specified required yield strength of the fixture. Furnish certification that, for the particular bolt grade, diameter and embedment depth required, the anchor system will not fail by adhesive failure and that there is no movement of the anchor bolt.

For certification and anchorage, use 3,000 psi as the minimum Portland cement concrete compressive strength used in this test. Use adhesives that meet Section 1081.

List the properties of the adhesive on the container and include density, minimum and maximum temperature application, setting time, shelf life, pot life, shear strength and compressive strength.

Page 10-163, Table 1081-1 Properties of Mixed Epoxy Resin Systems, replace table with the following:

Table 1081-1 Properties of Mixed Epoxy Resin Systems							
Property	Type 1	Type 2	Type 3	Type 3A	Type 4A	Type 4B	Type 5
Viscosity-Poises at 77°F ± 2°F	Gel	10-30	25-75	Gel	40-150	40-150	1-6
Spindle No.	-	3	4	--	4	4	2
Speed (RPM)	-	20	20	--	10	10	50
Pot Life (Minutes)	20-50	30-60	20-50	5-50	40-80	40-80	20-60
Minimum Tensile Strength at 7 days (psi)	1,500	2,000	4,000	4,000	1,500	1,500	4,000
Tensile Elongation at 7 days (%)	30 min.	30 min.	2-5	2-5	5-15	5-15	2-5
Min. Compressive Strength of 2" mortar cubes at 24 hours	3,000 (Neat)	4,000-	6,000-	6,000 (Neat)	3,000	3,000	6,000
Min. Compressive Strength of 2" mortar cubes at 7 days	5,000 (Neat)	-	-	-	-	5,000	-
Maximum Water Absorption (%)	1.5	1.0	1.0	1.5	1.0	1.0	1.0
Min. Bond Strength Slant Shear Test at 14 days (psi)	1,500	1,500	2,000	2,000	1,500	1,500	1,500

Page 10-164, Subarticle 1081-1(E) Prequalification, lines 31-33, replace the second sentence of the first paragraph with the following:

Manufacturers choosing to supply material for Department jobs must submit an application through the Value Management Unit with the following information for each type and brand name:

Page 10-164, Subarticle 1081-1(E)(3), line 37, replace this subarticle with the following:

(3) Type of the material in accordance with Articles 1081-1 and 1081-4,

Page 10-165, Subarticle 1081-1(E)(6), line 1, in the first sentence of the first paragraph replace “AASHTO M 237” with “the specifications”.

Page 10-165, Subarticle 1081-1(E) Prequalification, line 9-10, delete the second sentence of the last paragraph.

Page 10-165, Subarticle 1081-1(F) Acceptance, line 14, in the first sentence of the first paragraph replace “Type 1” with “Type 3”.

Page 10-169, Subarticle 1081-3(G) Anchor Bolt Adhesives, delete this subarticle.

Page 10-170, Article 1081-3 Hot Bitumen, line 9, add the following at the end of Section 1081:

1081-4 EPOXY RESIN ADHESIVE FOR BONDING TRAFFIC MARKINGS

(A) General

This section covers epoxy resin adhesive for bonding traffic markers to pavement surfaces.

(B) Classification

The types of epoxies and their uses are as shown below:

Type I – Rapid Setting, High Viscosity, Epoxy Adhesive. This type of adhesive provides rapid adherence to traffic markers to the surface of pavement.

Type II – Standard Setting, High Viscosity, Epoxy Adhesive. This type of adhesive is recommended for adherence of traffic markers to pavement surfaces when rapid set is not required.

Type III – Rapid Setting, Low Viscosity, Water Resistant, Epoxy Adhesive. This type of rapid setting adhesive, due to its low viscosity, is appropriate only for use with embedded traffic markers.

Type IV – Standard Set Epoxy for Blade Deflecting-Type Plowable Markers.

(C) Requirements

Epoxies shall conform to the requirements set forth in AASHTO M 237.

(D) Prequalification

Refer to Subarticle 1081-1(E).

(E) Acceptance

Refer to Subarticle 1081-1(F).

Page 10-173, Article 1084-2 STEEL SHEET PILES, lines 37-38, replace first paragraph with the following:

Steel sheet piles detailed for permanent applications shall be hot rolled and meet ASTM A572 or ASTM A690 unless otherwise required by the plans. Steel sheet piles shall be coated as required by the plans. Galvanized sheet piles shall be coated in accordance with Section 1076.

Metallized sheet piles shall be metallized in accordance to the Project Special Provision

“Thermal Sprayed Coatings (Metallization)” with an 8 mil, 99.9% aluminum alloy coating and a 0.5 mil seal coating. Any portion of the metallized sheet piling encased in concrete shall receive a barrier coat. The barrier coat shall be an approved waterborne coating with a low-viscosity which readily absorbs into the pores of the aluminum thermal sprayed coating. The waterborne coating shall be applied at a spreading rate that results in a theoretical 1.5 mil dry film thickness. The manufacturer shall issue a letter of certification that the resin chemistry of the waterborne coating is compatible with the 99.9% aluminum thermal sprayed alloy and suitable for tidal water applications.

Page 10-174, Subarticle 1086-1(B)(1) Epoxy, lines 18-24, replace this subarticle with the following:

The epoxy shall meet Article 1081-4.

The 2 types of epoxy adhesive which may be used are Type I, Rapid Setting, and Type II, Standard Setting. Use Type II when the pavement temperature is above 60°F or per the manufacturer’s recommendations whichever is more stringent. Use Type I when the pavement temperature is between 50°F and 60°F or per the manufacturer’s recommendations whichever is more stringent. Epoxy adhesive Type I, Cold Set, may be used to attach temporary pavement markers to the pavement surface when the pavement temperature is between 32°F and 50°F or per the manufacturer’s recommendations whichever is more stringent.

Page 10-175, Subarticle 1086-2(E) Epoxy Adhesives, line 27, replace “Section 1081” with “Article 1081-4”.

Page 10-177, Subarticle 1086-3(E) Epoxy Adhesives, line 22, replace “Section 1081” with “Article 1081-4”.

Page 10-179, Subarticle 1087-4(A) Composition, lines 39-41, replace the third paragraph with the following:

All intermixed and drop-on glass beads shall not contain more than 75 ppm arsenic or 200 ppm lead.

Page 10-180, Subarticle 1087-4(B) Physical Characteristics, line 8, replace the second paragraph with the following:

All intermixed and drop-on glass beads shall comply with NCGS § 136-30.2 and 23 USC § 109(r).

Page 10-181, Subarticle 1087-7(A) Intermixed and Drop-on Glass Beads, line 24, add the following after the first paragraph:

Use X-ray Fluorescence for the normal sampling procedure for intermixed and drop-on beads, without crushing, to check for any levels of arsenic and lead. If any arsenic or lead is detected, the sample shall be crushed and repeat the test using X-ray Fluorescence. If the X-ray Fluorescence test shows more than a LOD of 5 ppm, test the beads using United States Environmental Protection Agency Method 6010B, 6010C or 3052 for no more than 75 ppm arsenic or 200 ppm lead.

Page 10-204, Subarticle 1092-2(A) Performance and Test Requirements, replace Table 1092-3 Minimum Coefficient of Retroreflection for NC Grade A with the following:

Observation Angle, degrees	Entrance Angle, degrees	White	Yellow	Green	Red	Blue	Fluorescent Yellow Green	Fluorescent Yellow
0.2	-4.0	525	395	52	95	30	420	315
0.2	30.0	215	162	22	43	10	170	130
0.5	-4.0	310	230	31	56	18	245	185
0.5	30.0	135	100	14	27	6	110	81
1.0	-4.0	120	60	8	16	3.6	64	48
1.0	30.0	45	34	4.5	9	2	36	27

RIP RAP ENERGY DISSIPATOR:

(7-23-12)

SPI (Revised)

Description

This work consists of the construction and maintenance of an armored outlet structure located at culvert outlets or ditch termini.

Materials

Refer to Division 10 of the *Standard Specifications*:

Item

Class I Riprap
Geotextile for Drainage, Type 2

Section

Section 1042
Section 1056

Construction Methods

Rip Rap Energy Dissipators shall be constructed in accordance with the detail shown in the plans or as directed. From the outlet invert of a culvert or bottom of a ditch excavation will drop to a specified depth. Excavation will continue to widen through the dissipator. Rip rap will be placed along the banks and bottom of the dissipator and along the apron.

Excavate ditch in accordance with Section 240 of the *Standard Specifications*.

The quantity of energy dissipator material may be affected by site conditions during construction of the project. The quantity of materials may be increased, decreased, or eliminated at the direction of 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.

Measurement and Payment

Class I Riprap will be measured and paid for in accordance with Section 876 of the *Standard Specifications*.

Geotextile for Drainage will be measured and paid for in accordance with Section 876 of the *Standard Specifications*.

Drainage Ditch Excavation will be measured and paid for in accordance with Section 240 of the *Standard Specifications*.

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 construct the riprap energy dissipator.

SELECT MATERIAL, CLASS III, TYPE 3:

(1-17-12)

1016, 1044

SP10 R05

Revise the *2012 Standard Specifications* as follows:

Page 10-39, Article 1016-3, CLASS III, add the following after line 14:

Type 3 Select Material

Type 3 select material is a natural or manufactured fine aggregate material meeting the following gradation requirements and as described in Sections 1005 and 1006:

3/8"	#4	#8	#16	#30	#50	#100	#200
100	95-100	65-100	35-95	15-75	5-35	0-25	0-8

Page 10-39, Article 1016-3, CLASS III, line 15, replace “either type” with “Type 1, Type 2 or Type 3”.

Page 10-62, Article 1044-1, line 36, delete the sentence and replace with the following:

Subdrain fine aggregate shall meet Class III select material, Type 1 or Type 3.

Page 10-63, Article 1044-2, line 2, delete the sentence and replace with the following:

Subdrain coarse aggregate shall meet Class V select material.

NONWOVEN GEOTEXTILE INTERLAYER:

(01-13-14)

SPI 10-07

Description

Furnish and install a nonwoven geotextile interlayer at locations shown on the plans.

General

Schedule a Pre-Pave Meeting at least 3 weeks prior to paving to discuss installation and construction procedures for the nonwoven geotextile interlayer with representatives from the Contractor including Paving Superintendent, Subcontractor, Geotextile Manufacturer, Engineer, Roadway Inspector, Area Roadway Construction Engineer, Division Construction Engineer, and the State Pavement Construction Engineer.

Materials

The geotextile interlayer shall be constructed of a non-woven needle-punched geotextile, with no thermal treatment (calendaring or IR). The material shall be resistant to chemicals, mildew, and rot and shall not have any tears or holes that will adversely affect the in-situ performance and physical properties of the installed material.

Furnish with each shipment a Type 3 Certification in accordance with Article 106-3 of the *Standard Specifications* certifying that the paving mat is a non-woven needle-punched geotextile with no thermal treatment (calendaring or IR) meeting the requirements shown:

Property	Test Method	Units	Value
Minimum Mass per unit area	ASTM D 5261	oz/yd ²	15.0
Minimum thickness under load (a) at 2 kPa (0.29 psi) (b) at 20 kPa (2.9 psi) (c) at 200 kPa (29 psi)	ASTM D 5199	in	(a) 0.12 (b) 0.10 (c) 0.04
Minimum wide-width tensile strength	ASTM D 4595	lb/ft	685
Maximum wide-width elongation	ASTM D 4595	%	130
Minimum water permeability in normal direction under load (pressure) at 20 kPa (2.9 psi)	Mod. ASTM D 5493 or ASTM D 4491	ft/s	3.3x10 ⁻⁴
Minimum in-plane water permeability (transmissivity) under load (pressure) (a) at 20kPa (2.9 psi) (b) at 200kPa (29 psi)	Mod. ASTM D 6574 or ASTM D 4716	ft/s	(a) 1.6x10 ⁻³ (b) 6.6x10 ⁻⁴
Minimum weather resistance retained strength	ASTM D 4355 at 500 hrs. exposure	%	60
Alkali resistance, minimum polypropylene/polyethylene	Manufacturer certification of polymer	%	96

Note: Requirements must be met for 95 percent of samples.

General Requirements

A trained and experienced installer, certified by the Geotextile Manufacturer, shall be present on-site during the installation of the geotextile and until the crew has a comfort level working with this material.

Ensure that any potential for keying of the two cementitious layers is minimized through proper repair techniques. Clean the underlying surface to remove loose debris before applying the interlayer. Roll the geotextile out on the underlying layer. The geotextile shall be tight and without excess wrinkles and folds. No more than 650 feet of geotextile shall be installed in advance of the paving operation at a given time. The interlayer shall be placed no more than 3 days before concrete placement.

Keep driving on the interlayer to a minimum. Tight radius turns and excessive acceleration and braking shall be avoided.

The geotextile shall be secured to the underlying layer with pins or nails punched through 2 to 2.75 inch galvanized washers or disks every 6 feet or less. Additional fasteners shall be used as needed to ensure that the geotextile does not shift or fold before or during concrete placement. Edges of the geotextile shall overlap by 8 +/- 2 inches. No more than three layers of geotextile shall overlap at any location. Transverse seams of adjacent rolls shall be staggered to prevent four layers from coinciding at any location. The free edge of the geotextile shall extend beyond the edge of the new concrete into a location that facilitates drainage.

Measurement and Payment

Nonwoven Geotextile Interlayer will be measured and paid at the contract unit price per square yard. In measuring this quantity, the length will be the actual length installed, measured along the surface. The width will be the width measured along the underlying layer that has been acceptably placed. No separate measurement will be made for overlapping fabric.

The contract prices for this section shall include but not be limited to furnishing all labor, materials, tools, equipment and other incidentals necessary to perform the required work.

Payment will be made under:

Pay Item	Pay Unit
Nonwoven Geotextile Interlayer	Square Yard

SHOULDER AND SLOPE BORROW:

(3-19-13)

1019

SP10 R10

Use soil in accordance with Section 1019 of the *2012 Standard Specifications*. Use soil consisting of loose, friable, sandy material with a PI greater than 6 and less than 25 and a pH ranging from 5.5 to 7.0.

Soil with a pH ranging from 4.0 to 5.5 will be accepted without further testing if additional limestone is provided in accordance with the application rates shown in Table 1019-1A. Soil type is identified during the soil analysis. Soils with a pH above 7.0 require acidic amendments to be added. Submit proposed acidic amendments to the Engineer for review and approval. Soils with a pH below 4.0 or that do not meet the PI requirements shall not be used.

pH TEST RESULT	Sandy Soils Additional Rate (lbs. / Acre)	Silt Loam Soils Additional Rate (lbs. / Acre)	Clay Loam Soils Additional Rate (lbs. / Acre)
4.0 - 4.4	1,000	4,000	6,000
4.5 - 4.9	500	3,000	5,000
5.0 - 5.4	NA	2,000	4,000

Note: Limestone application rates shown in this table are in addition to the standard rate of 4000 lbs. / acre required for seeding and mulching.

No direct payment will be made for providing additional lime or acidic amendments for Ph adjustment.

TEMPORARY SHORING:

(2-20-07) (Rev. 5-21-13)

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 ft 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. Define “reinforcement” as geotextile, geogrid, welded wire grid or metallic strip reinforcement.

Temporary geosynthetic walls consist of geotextile or geogrid reinforcement wrapped behind welded wire facing. Define “temporary geotextile wall” as a temporary geosynthetic wall with geotextile reinforcement and “temporary geogrid wall” as a temporary geosynthetic wall with geogrid reinforcement.

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

(D) Embedment

Define “embedment” for cantilever, braced and anchored shoring as the pile depth below the grade in front of shoring. Define “embedment” for temporary walls as the wall height below the grade in front of walls.

(E) Positive Protection

Define “unanchored or anchored portable concrete barrier” as portable concrete barrier (PCB) that meets Standard Drawing No. 1170.01 of the *2012 Roadway Standard Drawings*. Define “concrete barrier” as unanchored or anchored PCB or an approved equal. Define “temporary guardrail” as temporary steel beam guardrail that meets Standard Drawing No. 862.02 of the *2012 Roadway Standard Drawings*.

Materials

Refer to the *2012 Standard Specifications*.

Item	Section
Anchor Pins	1056-2
Concrete Barrier Materials	1170-2
Flowable Fill, Excavatable	1000-6
Geotextiles	1056
Neat Cement Grout	1003
Portland Cement Concrete	1000
Select Material	1016
Steel Beam Guardrail Materials	862-2
Steel Plates	1072-2
Steel Sheet Piles and H-Piles	1084
Untreated Timber	1082-2

Item	Section
Welded Wire Reinforcement	1070-3
Wire Staples	1060-8(D)

Provide Type 6 material certifications for shoring materials in accordance with Article 106-3 of the *2012 Standard Specifications*. Use Class IV select material (standard size No. ABC) for temporary guardrail. Use nonshrink neat cement grout or Class A concrete that meets Article 450-2 of the *2012 Standard Specifications* 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. Provide steel bracing that meets ASTM A36.

(A) Shoring Backfill

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

(B) Anchors

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

(1) Ground Anchors

Use high-strength deformed steel bars that meet AASHTO M 275 or seven-wire strands that meet ASTM A886 or Article 1070-5 of the *2012 Standard Specifications*. Splice bars in accordance with Article 1070-9 of the *2012 Standard Specifications*. Do not splice strands. Use bondbreakers, spacers and centralizers that meet Article 6.3.5 of the *AASHTO LRFD Bridge Construction Specifications*.

(2) Helical Anchors

Use helical anchors with an ICC Evaluation Service, Inc. (ICC-ES) report. Helical anchors without an ICC-ES report may be approved at the discretion of the Engineer. Provide couplers, thread bar adapters and bolts recommended by the Anchor Manufacturer to connect helical anchors together and to piles.

(3) Anchorages

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

(C) Temporary Walls

(1) Welded Wire Facing

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

(2) Geotextiles

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

(3) Geogrid Reinforcement

Handle and store geogrids in accordance with Article 1056-2 of the *2012 Standard Specifications*. Define “machine direction” (MD) and “cross-machine direction” (CD) for geogrids in accordance with ASTM D4439.

Use geogrids with a roll width of at least 4 ft and an “approved” or “approved for provisional use” status code. The list of approved geogrids is available from: connect.ncdot.gov/resources/Materials/Pages/SoilsLaboratory.aspx

Provide geogrids for geogrid reinforcement with design strengths in accordance with the accepted submittals. Geogrids are typically approved for ultimate tensile strengths in the MD and CD or short-term design strengths for a 3-year design life in the MD based on material type. Define material type from the website above for shoring backfill as follows:

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 *2012 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 ft, 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 8 copies of working drawings and 3 copies of design calculations and a PDF copy of each for temporary shoring designs in accordance with Article 105-2 of the *2012 Standard Specifications*. Submit working drawings showing plan views, shoring profiles, typical sections and details of temporary shoring design and construction sequence. Do not begin shoring construction until a design submittal is accepted.

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

Use a prequalified MSE Wall Design Consultant to design temporary walls. Provide temporary wall designs sealed by a Design Engineer approved as a Geotechnical Engineer (key person) for the MSE Wall Design Consultant. Include details in temporary wall working drawings of geotextile and reinforcement types, locations and directions and obstructions extending through walls or interfering with reinforcement.

(1) Soil Parameters

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

(a) Unit weight (γ) = 120 lb/cf;

(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 lb/sf.

(2) Traffic Surcharge

Design temporary shoring for a traffic surcharge of 250 lb/sf if traffic will be above and within H of shoring. This traffic surcharge does not apply to construction traffic. Design temporary shoring for any construction surcharge if construction traffic will be above and within H of shoring. For LRFD shoring designs, apply traffic (live load) surcharge in accordance with Figure C11.5.5-3 of the *AASHTO LRFD Bridge Design Specifications*.

(3) Cantilever, Braced and Anchored Shoring Designs

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

Define “top of shoring” for cantilever, braced and anchored shoring as where the grade intersects the back of sheet piles or H-piles and timber lagging. Design cantilever, braced and anchored shoring for a traffic impact load of 2,000 lb/ft applied 18" above top of shoring if concrete barrier is above and next to shoring or temporary guardrail is above and attached to shoring. For anchored shoring designs, apply traffic impact load as horizontal load (P_{H1}) in accordance with Figure 3.11.6.3-2(a) of the *AASHTO LRFD specifications*.

Extend cantilever, braced and anchored shoring at least 32" above top of shoring if shoring is designed for traffic impact. Otherwise, extend shoring at least 6" above top of shoring.

Design cantilever, braced and anchored shoring for a maximum deflection of 3" if the horizontal distance to the closest edge of pavement or structure is less than H. Otherwise, design shoring for a maximum deflection of 6". Design cantilever and braced shoring in accordance with the plans 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 ft

behind the critical failure surface. Do not extend anchors beyond right-of-way or easement limits. If existing or future obstructions such as foundations, guardrail posts, pavements, pipes, inlets or utilities will interfere with anchors, maintain a clearance of at least 6" between obstructions and anchors.

(4) Temporary Wall Designs

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

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

Use the simplified method for determining maximum reinforcement loads in accordance with the AASHTO LRFD specifications. For geotextile reinforcement, use geotextile properties approved by the Department or default values in accordance with the AASHTO LRFD specifications. For geogrid reinforcement, use approved geogrid properties available from the website shown elsewhere in this provision. If the website does not list a short-term design strength for an approved geogrid, use a short-term design strength equal to the ultimate tensile strength divided by 3.5 for the geogrid reinforcement. Use geosynthetic properties for the direction reinforcement will be installed, a 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 and temporary geogrid walls for an R_c of at least 0.8. For geogrid reinforcement with an R_c of less than 1.0, use a maximum horizontal clearance between geogrids of 3 ft and stagger reinforcement so geogrids are centered over gaps in the reinforcement layer below.

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

For temporary wire walls with separate reinforcement and facing components, attach welded wire grid or metallic strip reinforcement to welded wire facing with

a connection approved by the Department. For temporary geogrid and wire walls, retain shoring backfill at welded wire facing with retention geotextiles and extend geotextiles at least 3 ft 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, schedule this meeting after all shoring submittals have been accepted. The Resident, District or Bridge Maintenance Engineer, Bridge or Roadway Construction Engineer, Geotechnical Operations Engineer, Contractor and Shoring Contractor Superintendent will attend this preconstruction meeting.

Construction Methods

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

Install positive protection in accordance with the contract and accepted submittals. Use PCB in accordance with Section 1170 of the *2012 Standard Specifications* and Standard Drawing No. 1170.01 of the *2012 Roadway Standard Drawings*. Use temporary guardrail in accordance with Section 862 of the *2012 Standard Specifications* and Standard Drawing No. 862.01, 862.02 and 862.03 of the *2012 Roadway Standard Drawings*.

(A) Tolerances

Construct shoring with the following tolerances:

- (1) Horizontal wires of welded wire facing are level in all directions,
- (2) Shoring location is within 6" of horizontal and vertical alignment shown in the accepted submittals, and
- (3) Shoring plumbness (batter) is not negative and within 2° of vertical.

(B) Cantilever, Braced and Anchored Shoring Installation

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

(1) Pile Installation

Install piles with the minimum required embedment and extension in accordance with Subarticles 450-3(D) and 450-3(E) of the *2012 Standard Specifications* except that a pile driving equipment data form is not required. Piles may be

installed with a vibratory hammer as approved by the Engineer.

Do not splice sheet piles. Use pile excavation to install drilled-in H-piles. After filling holes with concrete or grout to the elevations shown in the accepted submittals, remove any fluids and fill remaining portions of holes with flowable fill. Cure concrete or grout at least 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 ft. Remove flowable fill and material in between H-piles as needed to install timber lagging. Position lagging with at least 3" of contact in the horizontal direction between the lagging and pile flanges. Do not excavate the next lift until timber lagging for the current lift is installed and if applicable, bracing and anchors for the current lift are accepted. Backfill behind cantilever, braced or anchored shoring with shoring backfill.

(3) Anchor Installation

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

- (a) Materials in accordance with this provision 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.

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

(4) Anchor Testing

Proof test and lock-off anchors in accordance with the accepted submittals and

Article 6.5.5 of the *AASHTO LRFD Bridge Construction Specifications* except for the acceptance criteria in Article 6.5.5.5. For the AASHTO LRFD specifications, “ground anchor” refers to a ground or helical anchor and “tendon” refers to a bar, strand or shaft.

(a) Anchor Acceptance

Anchor acceptance is based in part on the following criteria.

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

(b) Anchor Test Results

Submit 2 copies of anchor test records including movement versus load plots for each load increment within 24 hours of completing each row of anchors. The Engineer will review the test records to determine if the anchors are acceptable.

If the Engineer determines an anchor is unacceptable, revise the anchor design or installation methods. Submit a revised anchored shoring design for acceptance and provide an acceptable anchor with the revised design or installation methods. If required, replace the anchor or provide additional anchors with the revised design or installation methods.

(C) Temporary Wall Installation

Excavate as necessary for temporary walls in accordance with the plans 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.

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

Place reinforcement within 3" of locations shown in the plans and accepted submittals and in slight tension 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" thick lifts. Compact A-2-4 soil and Class II, Type 1 and Class III select material in accordance with Subarticle 235-3(C) of the *2012 Standard Specifications*. Use only hand operated compaction equipment to compact backfill within 3 ft of welded wire facing. At a distance greater than 3 ft, compact shoring backfill with at least 4 passes of an 8 ton to 10 ton vibratory roller in a direction parallel to the wall face. Smooth wheeled or rubber tired rollers are also acceptable for compacting backfill. Do not use sheepsfoot, grid rollers or other types of compaction equipment with feet. Do not displace or damage reinforcement when placing and compacting shoring backfill. End dumping directly on geotextile or geogrid reinforcement is not permitted. Do not operate heavy equipment on reinforcement until it is covered with at least 8" of shoring backfill. Replace any damaged reinforcement to the satisfaction of the Engineer.

Backfill for temporary walls outside the reinforced zone in accordance with Article 410-8 of the *2012 Standard Specifications*. Bench temporary walls into the sides of excavations where applicable. For temporary geosynthetic walls with top of wall within 5 ft 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 Section 1170 of the *2012 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 Section 862 of the 2012 *Standard Specifications*.

Payment will be made under:

Pay Item	Pay Unit
Temporary Shoring	Square Foot

TRUCK MOUNTED CHANGEABLE MESSAGE SIGNS:

(8-21-12)

1101.02

SP11 R10

Revise the 2012 *Roadway Standard Drawings* as follows:

Drawing No. 1101.02, Sheet 12, TEMPORARY LANE CLOSURES, replace General Note #11 with the following:

11- TRUCK MOUNTED CHANGEABLE MESSAGE SIGNS (TMCMS) USED ON SHADOW VEHICLES FOR "IN LANE" ACTIVITIES SHALL BE A MINIMUM OF 43" X 73". THE DISPLAY PANEL SHALL HAVE FULL MATRIX CAPABILITY WITH THE CAPABILITY TO PROVIDE 2 MESSAGE LINES WITH 7 CHARACTERS PER LINE WITH A MINIMUM CHARACTER HEIGHT OF 18". FOR ADDITIONAL MESSAGING, CONTACT THE WORK ZONE TRAFFIC CONTROL SECTION.

12- TMCMS USED FOR ADVANCED WARNING ON VEHICLES LOCATED ON THE SHOULDER MAY BE SMALLER THAN 43" X 73". THE DISPLAY PANEL SHALL HAVE THE CAPABILITY TO PROVIDE 2 MESSAGE LINES WITH 7 CHARACTERS PER LINE WITH A MINIMUM CHARACTER HEIGHT OF 18". FOR ADDITIONAL MESSAGING, CONTACT THE WORK ZONE TRAFFIC CONTROL SECTION.

Drawing No. 1101.02, Sheet 13, TEMPORARY LANE CLOSURES, replace General Note #12 with the following:

12- TRUCK MOUNTED CHANGEABLE MESSAGE SIGNS (TMCMS) USED ON SHADOW VEHICLES FOR "IN LANE" ACTIVITIES SHALL BE A MINIMUM OF 43" X 73". THE DISPLAY PANEL SHALL HAVE FULL MATRIX CAPABILITY WITH THE CAPABILITY TO PROVIDE 2 MESSAGE LINES WITH 7 CHARACTERS PER LINE WITH A MINIMUM CHARACTER HEIGHT OF 18". FOR ADDITIONAL MESSAGING, CONTACT THE WORK ZONE TRAFFIC CONTROL SECTION.

13- TMCMS USED FOR ADVANCED WARNING ON VEHICLES LOCATED ON THE SHOULDER MAY BE SMALLER THAN 43" X 73". THE DISPLAY PANEL SHALL HAVE THE CAPABILITY TO PROVIDE 2 MESSAGE LINES WITH 7 CHARACTERS PER LINE WITH A MINIMUM CHARACTER HEIGHT OF 18". FOR ADDITIONAL MESSAGING, CONTACT THE WORK ZONE TRAFFIC CONTROL SECTION.

PERMANENT SEEDING AND MULCHING:

(7-1-95)

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 *2012 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.

AUTOMATED MACHINE GUIDANCE

(1-2-11)

SPI 5-5

General

This Special Provision contains requirements to be followed if the Contractor elects to use Global Positioning System (GPS) machine control grading and shall be used in conjunction with Section 801 of the *Standard Specifications*. The use of this technology is referenced as Automated Machine Guidance (AMG).

All equipment using AMG shall be able to generate end results that meet the *Standard Specifications*. Perform test sections for each type of work to be completed with AMG to demonstrate that the system has the capability to achieve acceptable results. If acceptable results can not be achieved, conform to the requirements for conventional stakeout.

The Contractor shall be responsible for all errors resulting from the use of AMG and shall correct deficiencies to the satisfaction of the Engineer at no cost to the Department.

Submittals

If the Contractor elects to use AMG, a Digital Terrain Model (DTM) of the design surface and all intermediate surfaces shall be developed and submitted to the Engineer for review.

At least 90 days prior to beginning grading operations, the Contractor shall submit to the Engineer an AMG work plan to include, but not limited to, proposed equipment, control software manufacturer and version, types of work to be completed using AMG, project site calibration report, repetitive calibration methods for construction equipment and rover units to be used for

the duration of the project, and local GPS base station to be used for broadcasting differential correction data to rover units (this may include the NC Network RTK). All surveys must be tied to existing project control as established by NCDOT.

Inspection

The Engineer will perform quality assurance checks of all work associated with AMG. If it is determined that work is not being performed in a manner that will assure accurate results, the Engineer may require corrective action at no cost to the Department.

The Contractor shall provide the Engineer with one GPS rover unit for use during the duration of the contract. The rover will be loaded with the same model that is used with the AMG and have the same capability as rover units used by the Contractor. The rover will be kept in the possession of the Engineer and will be returned to the Contractor upon completion of the contract. Any maintenance or repairs required for the rover will be the responsibility of the Contractor. Formal training of at least 8 hours shall be provided to the Engineer by the Contractor on the use of the proposed AMG system.

Subgrade and Base Controls

If the Contractor elects to use AMG for fine grading and placement of base or other roadway materials, the GPS shall be supplemented with a laser or robotic total station. Include details of the proposed system in the AMG work plan. In addition, the following requirements apply for the use of AMG for subgrade and base construction.

Provide control points at intervals along the project not to exceed 1,000 feet. The horizontal position of these points shall be determined by static GPS sessions or by traverse connection from the original base line control points. The elevation of these control points shall be established using differential leveling from project benchmarks, forming closed loops where practical. A copy of all new control point information shall be provided to the Engineer prior to construction activities.

Provide control points and conventional survey grade stakes at 500 foot intervals and at critical points such as, but not limited to, PCs, PTs, superelevation transition points, and other critical points as requested by the Engineer.

Provide hubs at the top of the finished subgrade at all hinge points on the cross section at 500 foot intervals. These hubs shall be established using conventional survey methods for use by the Engineer to check the accuracy of construction.

Measurement and Payment

No direct payment will be made for work required to utilize this provision. All work will be considered incidental to various grading operations.

STANDARD SPECIAL PROVISION
AVAILABILITY OF FUNDS – TERMINATION OF CONTRACTS

(5-20-08)

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(E) of the *2012 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:

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

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

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

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

FURTHER SPECIFICATIONS FOR EACH SEED GROUP ARE GIVEN BELOW:

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

Sericea Lespedeza
Oats (seeds)

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

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

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

Common or Sweet Sundangrass

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

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

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

Centipedegrass
Crownvetch
Pensacola Bahiagrass
Creeping Red Fescue

Japanese Millet
Reed Canary Grass
Zoysia

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

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

STANDARD SPECIAL PROVISION**ERRATA**

(1-17-12) (Rev. 1-21-14)

Z-4

Revise the *2012 Standard Specifications* as follows:

Division 2

Page 2-7, line 31, Article 215-2 Construction Methods, replace “Article 107-26” with “Article 107-25”.

Page 2-17, Article 226-3, Measurement and Payment, line 2, delete “pipe culverts”.

Page 2-20, Subarticle 230-4(B), Contractor Furnished Sources, change references as follows: **Line 1**, replace “(4) Buffer Zone” with “(c) Buffer Zone”; **Line 12**, replace “(5) Evaluation for Potential Wetlands and Endangered Species” with “(d) Evaluation for Potential Wetlands and Endangered Species”; and **Line 33**, replace “(6) Approval” with “(4) Approval”.

Division 3

Page 3-1, after line 15, Article 300-2 Materials, replace “1032-9(F)” with “1032-6(F)”.

Division 4

Page 4-77, line 27, Subarticle 452-3(C) Concrete Coping, replace “sheet pile” with “reinforcement”.

Division 6

Page 6-7, line 31, Article 609-3 Field Verification of Mixture and Job Mix Formula Adjustments, replace “30” with “45”.

Page 6-10, line 42, Subarticle 609-6(C)(2), replace “Subarticle 609-6(E)” with “Subarticle 609-6(D)”.

Page 6-11, Table 609-1 Control Limits, replace “Max. Spec. Limit” for the Target Source of $P_{0.075}/P_{be}$ Ratio with “1.0”.

Page 6-40, Article 650-2 Materials, replace “Subarticle 1012-1(F)” with “Subarticle 1012-1(E)”

Division 8

Page 8-23, line 10, Article 838-2 Materials, replace “Portland Cement Concrete, Class B” with “Portland Cement Concrete, Class A”.

Division 12

Page 12-7, Table 1205-3, add “FOR THERMOPLASTIC” to the end of the title.

Page 12-8, Subarticle 1205-5(B), line 13, replace “Table 1205-2” with “Table 1205-4”.

Page 12-8, Table 1205-4 and 1205-5, replace “THERMOPLASTIC” in the title of these tables with “POLYUREA”.

Page 12-9, Subarticle 1205-6(B), line 21, replace “Table 1205-4” with “Table 1205-6”.

Page 12-11, Subarticle 1205-8(C), line 25, replace “Table 1205-5” with “Table 1205-7”.

Division 15

Page 15-4, Subarticle 1505-3(F) Backfilling, line 26, replace “Subarticle 235-4(C)” with “Subarticle 235-3(C)”.

Page 15-6, Subarticle 1510-3(B), after line 21, replace the allowable leakage formula with the following: $W = LD\sqrt{P} \div 148,000$

Page 15-6, Subarticle 1510-3(B), line 32, delete “may be performed concurrently or” and replace with “shall be performed”.

Page 15-17, Subarticle 1540-3(E), line 27, delete “Type 1”.

Division 17

Page 17-26, line 42, Subarticle 1731-3(D) Termination and Splicing within Interconnect Center, delete this subarticle.

Revise the *2012 Roadway Standard Drawings* as follows:

1633.01 Sheet 1 of 1, English Standard Drawing for Matting Installation, replace “1633.01” with “1631.01”.

STANDARD SPECIAL PROVISION**PLANT AND PEST QUARANTINES****(Imported Fire Ant, Gypsy Moth, Witchweed, And Other Noxious Weeds)**

(3-18-03) (Rev. 10-15-13)

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, 919-733-6932, or <http://www.ncagr.gov/plantind/> to determine those specific project sites located in the quarantined area or for any regulated article used on this project originating in a quarantined county.

Regulated Articles Include

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

STANDARD SPECIAL PROVISION

AWARD OF CONTRACT

(6-28-77)

Z-6

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

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 or the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the executive Order and the regulations in *41 CFR Part 60-4*. Compliance with the goals will be measured against the total work hours performed.

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

**EMPLOYMENT GOALS FOR MINORITY
AND FEMALE PARTICIPATION**

Economic Areas

Area 023 29.7%

Bertie County
Camden County
Chowan County
Gates County
Hertford County
Pasquotank County
Perquimans County

Area 024 31.7%

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

Area 025 23.5%

Columbus County
Duplin County
Onslow County
Pender County

Area 026 33.5%

Bladen County
Hoke County
Richmond County
Robeson County
Sampson County
Scotland County

Area 027 24.7%

Chatham County
Franklin County
Granville County
Harnett County
Johnston County
Lee County
Person County
Vance County
Warren County

Area 028 15.5%

Alleghany County
Ashe County
Caswell County
Davie County
Montgomery County
Moore County
Rockingham County
Surry County
Watauga County
Wilkes County

Area 029 15.7%

Alexander County
Anson County
Burke County
Cabarrus County
Caldwell County
Catawba County
Cleveland County
Iredell County
Lincoln County
Polk County
Rowan County
Rutherford County
Stanly County

Area 0480 8.5%

Buncombe County
Madison County

Area 030 6.3%

Avery County
Cherokee County
Clay County
Graham County
Haywood County
Henderson County
Jackson County
McDowell County
Macon County
Mitchell County
Swain County
Transylvania County
Yancey County

SMSA Areas

Area 5720 26.6%

Currituck County

Area 9200 20.7%

Brunswick County

New Hanover County

Area 2560 24.2%

Cumberland County

Area 6640 22.8%

Durham County

Orange County

Wake County

Area 1300 16.2%

Alamance County

Area 3120 16.4%

Davidson County

Forsyth County

Guilford County

Randolph County

Stokes County

Yadkin County

Area 1520 18.3%

Gaston County

Mecklenburg County

Union County

Goals for Female

Participation in Each Trade

(Statewide) 6.9%

STANDARD SPECIAL PROVISION**REQUIRED CONTRACT PROVISIONS FEDERAL - AID CONSTRUCTION CONTRACTS**

FHWA - 1273 Electronic Version - May 1, 2012

Z-8

- I. General
- II. Nondiscrimination
- III. Nonsegregated 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. Compliance with Governmentwide Suspension and Debarment Requirements
- XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

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

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).
The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.
Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.
Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).
2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.
3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.
4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

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

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

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

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

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

1. **Equal Employment Opportunity:** Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:
 - a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

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

- c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.
 - d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.
8. **Reasonable Accommodation for Applicants / Employees with Disabilities:** The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.
9. **Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.
- a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.
 - b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.
10. **Assurance Required by 49 CFR 26.13(b):**
- a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.
 - b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.
11. **Records and Reports:** The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.
- a. The records kept by the contractor shall document the following:
 - (1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;
 - (2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and
 - (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;
 - b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

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

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

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

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

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

1. Minimum wages

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

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the

employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

- b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:
 - (i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
 - (ii) The classification is utilized in the area by the construction industry; and
 - (iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
 - (2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
 - (3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
 - (4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.
 - c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
 - d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.
2. **Withholding.** The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.
 3. **Payrolls and basic records**
 - a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.
 - b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency.
 - (2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

- (i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;
 - (ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;
 - (iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
- (3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.
- (4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.
- c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.
4. **Apprentices and trainees**
- a. Apprentices (programs of the USDOL). Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.
- The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.
- Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.
- In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
- b. Trainees (programs of the USDOL). Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.
- The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.
- Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.
- In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
- c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.
- d. Apprentices and Trainees (programs of the U.S. DOT). Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.
5. **Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.
6. **Subcontracts.** The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

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

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

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

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

VI. SUBLETTING OR ASSIGNING THE CONTRACT

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

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).
 - a. The term "perform work with its own organization" refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:
 - (1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
 - (2) the prime contractor remains responsible for the quality of the work of the leased employees;
 - (3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
 - (4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.
 - b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.
2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.
3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.
4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

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

VII. SAFETY: ACCIDENT PREVENTION

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

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

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

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

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

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

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

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

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

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

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

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

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

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

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

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

1. Instructions for Certification – First Tier Participants:

- a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.
- b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.
- c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.
- d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
- e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who

has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

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

* * * * *

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

- a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:
 - (1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;
 - (2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
 - (3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and
 - (4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
- b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Participants:

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

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

- i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

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

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

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

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

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

STANDARD SPECIAL PROVISION**ON-THE-JOB TRAINING**

(10-16-07) (Rev. 5-21-13)

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. A sample agreement is available at www.ncbowd.com/section/on-the-job-training.

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 NC140091 01/03/2014 NC91

Z-91

Date: January 3, 2014

General Decision Number: NC140091 01/03/2014 NC91

Superseded General Decision Numbers: NC20130091

State: North Carolina

Construction Type: HIGHWAY

COUNTIES:

Alamance	Forsyth	Yadkin
Davie	Stokes	

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects, railroad construction, bascule, suspension and spandrel arch bridges designed for commercial navigation, bridges involving marine construction, and other major bridges).

Modification Number
0

Publication Date
01/03/2014

SUNC2011-072 09/16/2011

	Rates	Fringes
CARPENTER (Form Work Only)		
Alamance County	13.04	
Davie	13.41	
Forsyth, Stokes, and Yadkin Counties	13.10	
CEMENT MASON/CONCRETE FINISHER		
Alamance County	14.08	
Davie, Forsyth, Stokes, and Yadkin Counties	14.51	
IRONWORKER (Reinforcing)	14.88	
LABORER		
Asphalt, Asphalt Distributor, Raker, and Spreader		
Alamance County	12.20	
Davie, Forsyth, Stokes, and Yadkin Counties	12.32	
Common or General		
Alamance County	10.10	
Davie County	10.72	
Forsyth County	10.03	
Stokes County	9.54	
Yadkin County	10.86	
Concrete Saw	13.52	
Landscape	9.89	
Luteman	12.73	
Mason Tender (Cement/Concrete)	11.43	
Pipelayer	12.69	
Traffic Control (Cone Setter)		
Alamance County	11.15	
Davie, Forsyth, Stokes, and Yadkin Counties	12.25	

	Rates	Fringes
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Traffic Control (Flagger)		
Alamance and Davie Counties	8.93	
Forsyth, Stokes, and Yadkin Counties	7.25	
POWER EQUIPMENT OPERATORS		
Backhoe/Excavator/Trackhoe		
Alamance County	14.78	
Davie County	15.43	
Forsyth, Stokes, and Yadkin Counties	14.96	
Broom/Sweeper	14.82	
Bulldozer		
Alamance County	14.66	
Davie, Forsyth, Stokes, and Yadkin Counties	16.15	
Crane		
Alamance County	16.83	
Davie County	16.31	
Forsyth, Stokes, and Yadkin Counties	16.13	
Curb Machine	14.43	
Distributor	15.27	
Drill	18.28	
Grader/Blade		
Alamance County	14.83	
Davie, Forsyth, Stokes, and Yadkin Counties	16.03	
Loader		
Alamance County	14.43	
Davie, Forsyth, Stokes, and Yadkin Counties	14.48	
Mechanic	14.00	
Milling Machine	14.38	
Oiler	13.58	
Paver		
Alamance County	16.00	
Davie, Forsyth, Stokes, and Yadkin Counties	16.06	
Roller	13.15	
Scraper	14.00	
Screed	14.85	
Tractor	12.94	
TRUCK DRIVER		
Distributor	16.75	
Dump Truck		
Alamance County	11.69	
Davie, Forsyth, and Stokes Counties	11.50	
Yadkin County	11.80	
Flatbed Truck	15.02	
Lowboy Truck	15.34	
Off the Road Truck	13.78	
Single Axle Truck	13.40	
Tack Truck	16.51	
Water Truck	13.03	

Welders – Receive rate prescribed for craft performing operation to which welding is incidental.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows 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. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

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 Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-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

ANCHORED SOLDIER PILE WALLS (SPECIAL)	GT-1.1 - GT-1.8
CONTINUOUS FLIGHT AUGER PILES FOR SOUND BARRIER WALLS (SPECIAL)	GT-2.1 - GT-2.5
SOLDIER PILE RETAINING WALLS (SPECIAL)	GT-3.1 - GT-3.5
CONCRETE BARRIER RAIL WITH MOMENT SLAB (1/17/2012)	GT-4.1 - GT-4.1
MSE RETAINING WALLS (11/19/2013)	GT-5.1 - GT-5.10
STANDARD SHORING (11/19/2013)	GT-6.1 - GT-6.4
GEOTEXTILE FOR PAVEMENT STABILIZATION (SPECIAL)	GT-7.1 - GT-7.3

ANCHORED SOLDIER PILE WALLS**(SPECIAL)****1.0 GENERAL**

Construct anchored soldier pile retaining walls consisting of ground anchors connected to soldier piles with waler. A ground anchor consists of a steel bar grouted in a drilled hole inclined at an angle below horizontal. Soldier piles are drilled-in with sheet piles installed in between. Design and construct anchored soldier pile walls based on actual elevations and wall dimensions in accordance with the contract and accepted submittals. Use a prequalified Anchored Wall Contractor to construct anchored soldier pile walls. Define “anchored wall” as an anchored soldier pile wall and “Anchored Wall Contractor” as the Contractor installing ground anchors. Define “anchor” as a ground anchor, and “soldier piles” as H-piles, W-piles, or similar steel structural member.

2.0 MATERIALS

Refer to the *Standard Specifications*.

Item	Section
Curing Agents	1026
Flowable Fill, Excavatable	1000-6
Neat Cement Grout	1003
Portland Cement Concrete	1000
Select Material, Class II or III	1016
Select Material, Class VI	1016
Walers	1072
Soldier Piles	1084-1
Sheet Piles	1084-2
Steel Plates	1072-2
Steel Casing	1072-2
Geosynthetics	1056
Perforated PVC Pipe	1044-6
Joint Materials	1028

The 2012 Standard Specifications shall be revised as follows:

Replace the first paragraph of Section 1084-2 – STEEL SHEET PILES with the following:

“Steel sheet piles detailed for permanent applications shall be hot rolled and meet ASTM A572 or ASTM A690 unless otherwise required by the plans. Steel sheet piles shall be coated as required by the plans. Galvanized sheet piles shall be coated in accordance with Section 1076. Metallized sheet piles shall be metallized in accordance to the Project Special Provision “Thermal Sprayed Coatings (Metallization)” with an 8 mil, 99.9% aluminum alloy coating and a 0.5 mil seal coating. Any portion of the metallized sheet piling encased in concrete shall receive a barrier coat. The barrier coat shall be an approved waterborne coating with a low-viscosity which readily absorbs into the pores of the aluminum thermal sprayed coating. The waterborne coating shall be applied at a spreading rate that results in a theoretical 1.5 mil dry film thickness. The manufacturer

shall issue a letter of certification that the resin chemistry of the waterborne coating is compatible with the 99.9% aluminum thermal sprayed alloy and suitable for tidal water applications.”

Use flowable fill or Class II or Class III select material for drilled-in piles above the bottom of sheet pile embedment. Use Class A concrete or nonshrink neat cement grout that meets Article 450-2 of the *Standard Specifications* for drilled-in piles below bottom of sheet pile embedment. Use Class A concrete for coping.

Provide anchors consisting of grouted steel bars and anchorages. Use high-strength deformed steel bars that meet AASHTO M 275. Splice bars in accordance with Article 1070-9 of the *Standard Specifications*.

Provide Class I corrosion protection (encapsulated) for anchorage head, unbonded length, and bonded length in accordance with *FHWA Geotechnical Engineering Circular No. 4 “Ground Anchors and Anchored Systems”* (Publication No. FHWA-IF-99-015). Use grease and grout filled sheaths for unbonded lengths of anchors and encapsulation for bond lengths of anchors that meet Article 6.3.4 of the *AASHTO LRFD Bridge Construction Specifications*. Use trumpets and centralizers that meet Articles 6.3.3 and 6.3.5 of the AASHTO LRFD specifications.

Provide sheet piles with a minimum thickness of 3/8”.

Provide galvanized hardware cloth according to ASTM A740 for rodent screens.

Provide anchorages consisting of bearing plates with washers and nuts for bars. Use steel plates for bearing plates and steel washers and hex nuts recommended by the Anchor Manufacturer.

Provide Type 3 material certifications for anchor 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 anchor wall materials so materials are kept clean and free of damage. Bent, damaged or defective materials will be rejected.

3.0 PRECONSTRUCTION REQUIREMENTS

A. Anchored Wall Surveys

The Retaining Wall Plans show a plan view, typical sections, details, notes and an elevation or profile view (wall envelope) for each anchored wall. Before beginning anchored wall design, survey existing ground elevations shown in the plans and other elevations in the vicinity of anchored wall locations as needed. Based on these elevations, finished grades and actual anchored wall dimensions and details, submit revised wall envelopes for acceptance. Use accepted wall envelopes for design.

B. Anchored Wall Designs

Submit 11 copies of working drawings and 3 copies of design calculations and a PDF copy of each for anchored wall designs at least 30 days before the preconstruction meeting. Do not begin anchored wall construction until a design submittal is accepted.

Use a prequalified Anchored Wall Design Consultant to design anchored walls. Provide designs sealed by a Design Engineer approved as a Geotechnical Engineer (key person) for the Anchored Wall Design Consultant.

Design anchored walls in accordance with the plans and Federal Highway Administration Geotechnical Engineering Circular No. 4, FHWA-IF-99-015 with a design life of 100 years.

Design anchored walls for a maximum lateral movement in the soldier piles of 2" or 0.5% of H, whichever is less, with H as shown in the plans.

Use a maximum soldier pile spacing of 10 ft. Install drilled-in soldier piles by excavating holes with diameters that will result in at least 3" of clearance all around piles. Where anchors go through soldier piles, reinforce soldier pile webs as shown in the plans or submit alternate reinforced web details.

Design anchors that meet the following unless otherwise approved:

1. Bond length of at least 15 ft in soil and 10 ft in rock where rock is as determined by the Engineer,
2. Unbonded length behind temporary soil nail wall of at least 5 feet,
3. Inclination of at least 12° below horizontal,
4. Clearance between ends of tendons and drill holes of at least 6",
5. Grout cover between encapsulation and drill hole walls of at least 1/2" and
6. Hole diameter of 6" to 10".

Four inch diameter anchors may be approved for anchors in rock at the discretion of the Engineer. Do not extend anchors beyond right-of-way or easement limits. If existing or future obstructions such as foundations, guardrail, fence or handrail posts, pavements, pipes, inlets or utilities will interfere with anchors, maintain a clearance of at least 6" between obstructions and anchors.

Use cast-in-place reinforced concrete coping at top of anchored walls. Use coping dimensions shown in the plans. When concrete barrier rail is required above anchored walls, use concrete barrier rail with moment slab as shown in the plans.

Design anchored walls for a live load (traffic) surcharge of 250 lb/sf. For steel beam guardrail with 8 ft posts above anchored walls, analyze walls for a horizontal load (P_{HI}) 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 anchored walls, analyze walls for a P_{HI} of 500 lb/ft of wall in accordance with Figure 3.11.6.3-2(a).

If the sheet piles are interlocked with the soldier piles (“king piles”), the sheet piles can be considered to contribute to the bending resistance of the king piles, with the approval of the Engineer.

Use limit equilibrium methods to ensure global and basal stability for both temporary and permanent conditions.

Use parameters for rock only for material with a rock auger penetration rate of less than 2" (50 mm) per 5 minutes of drilling at full crowd force. Rock must be continuous throughout the excavation and to 6 feet below the bottom of the hole.

Submit design calculations for each wall section with different surcharge loads, geometry or material parameters. Include analysis of temporary conditions. Use 10 year water elevations for temporary conditions. Include lateral movement calculations. Include unit grout/ground bond strengths and lock-off loads for acceptance in accordance with Article 105-2 of the *Standard Specifications*. At least one analysis is required for each wall section with different anchor lengths. When designing anchored walls with computer software, a hand calculation is required for the wall section with the longest anchors.

Submit working drawings showing plan views, wall profiles with pile and anchor locations including known performance test anchor locations, typical sections and details of piles including reinforced web details, anchors, and drainage. If necessary, include details on working drawings for concrete barrier rail with moment slab and obstructions extending through walls or interfering with piles, anchors, barriers or moment slabs.

C. Anchored Wall Construction Plan

Submit 4 copies and a PDF copy of an anchored wall construction plan at least 30 days before the preconstruction meeting. Do not begin anchored wall construction until the construction plan submittal is accepted. Provide detailed project specific information in the anchored wall construction plan that includes the following:

1. Overall description and sequence of anchored wall construction;
2. For drilled-in piles, installation details including drilling equipment and methods for stabilizing and filling holes and for driven piles, proposed pile driving methods and equipment in accordance with Subarticle 450-3(D)(2) of the *Standard Specifications*;
3. List and sizes of excavation equipment, drill rigs and tools, tremies and grouting equipment;
4. Procedures for excavations including temporary support, drilling and grouting, anchor and wall drainage system installation.
5. Plan and methods for anchor testing with calibration certificates dated within 90 days of the submittal date;
6. Examples of construction records to be used in accordance with Sections 4.0(G) of

this provision;

7. Approved packaged grout or grout mix design with acceptable ranges for grout flow and density that meets Section 1003 of the *Standard Specifications*; and
8. Other information shown in the plans or requested by the Engineer.

If alternate construction procedures are proposed or necessary, a revised anchored wall construction plan submittal may be required. If the work deviates from the accepted submittal without prior approval, the Engineer may suspend anchored wall construction until a revised plan is accepted.

D. Preconstruction Meeting

Before starting anchored wall construction, hold a preconstruction meeting to discuss the construction, inspection and testing of the anchored walls. Schedule this meeting after all anchored wall submittals have been accepted. The Resident or Bridge Maintenance Engineer, Bridge Construction Engineer, Geotechnical Operations Engineer, Contractor and Anchored Wall Contractor Superintendent will attend this preconstruction meeting.

4.0 CONSTRUCTION METHODS

Install anchored walls in accordance with the accepted submittals and as directed.

Control drainage during construction in the vicinity of anchored walls. Direct run off away from anchored walls and areas above and behind walls. Contain and maintain stone and protect material from erosion.

Notify the Engineer before blasting in the vicinity of soldier pile walls. Perform blasting in accordance with the contract.

Install piles with the minimum required embedment 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.

A. Soldier Pile Installation

Install piles within 1" of horizontal and vertical alignment shown in the accepted submittals and with no negative batter (piles leaning forward).

Use pile excavation to install drilled-in 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 suitable material or flowable fill. Cure concrete or grout at least 7 days before installing sheet piles.

B. Sheet Pile Installation

Remove boulders in between soldier piles as necessary to install sheet piles. Position

sheet piles with at least 3" of contact in the horizontal direction between the sheet piles and the soldier pile flanges, or interlock the sheet piles with the soldier piles. If contact between sheet piles and soldier piles cannot be maintained, fill gaps with joint filler.

Notify the Engineer if refusal is reached without the piles attaining the minimum required embedment. Unless the Contractor can provide evidence refusal was reached on nonscourable material (i.e. hard rock), the Engineer may require a revised anchored wall design or construction plan submittal.

C. Anchors

Fabricate and install anchors in accordance with the accepted submittals and Articles 6.4 and 6.5 of the *AASHTO LRFD Bridge Construction Specifications* except use anchor materials that meet Section 2.0 this provision instead of the AASHTO LRFD specifications and do not use heat-shrink sheaths for unbonded lengths of anchors.

Test anchors in accordance with the contract and as directed. Test anchors off of soil nail wall. Performance and proof tests are required in accordance with the accepted submittals, Article 6.5.5 of the AASHTO LRFD specifications and the following requirements.

1. Performance tests are required for at least 2 anchors or 5% of total anchors, whichever is greater, for each anchored wall instead of the requirements in Article 6.5.5.2 of the AASHTO LRFD specifications.
2. Electrical resistance load cells are required for performance tests.
3. An additional load increment equal to the alignment load (AL) is required between the maximum test and lock-off loads in Table 6.5.5.2-1 of the AASHTO LRFD specifications.
4. Competent rock in Article 6.5.5.5 of the AASHTO LRFD specifications will be as determined by the Engineer.
5. The lock-off load is as shown in the accepted submittals.

The Engineer will determine the number and locations of performance tests required. The approximate known performance test anchor locations are shown in the plans. Submit identification numbers and calibration records for load cells, jacks and pressure gauges with the anchored wall construction plan. Calibrate each jack and pressure gauge as a unit.

D. Weepholes

Drill weepholes and place PVC pipe wrapped in filter fabric and protected by a rodent screen according to the plans. If PVC pipe is not placed in stone, see Article 414-8.

E. Backfill

Within ten feet measured in plan view from ground anchors, backfill with Select

Material Class VI. Place stone in 8" to 10" thick lifts and compact to the satisfaction of the Engineer. Outside of ten feet of ground anchors, backfill behind piles in accordance with Article 410-8 of the *Standard Specifications*.

Do not displace or damage anchors when placing and compacting aggregate.

Use only hand operated compaction equipment to compact aggregate. Use only hand operated compaction equipment to compact fill within 3 ft of wall.

Place Type 1 Geotextile between natural ground and Select Material Class VI, and between random backfill and Select Material Class VI. 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

Repair galvanized surfaces that are exposed and damaged in accordance with Article 1076-7 of the *Standard Specifications*.

G. Coping

Construct coping as shown in the accepted submittals and in accordance with Subarticle 452-3(C) of the *Standard Specifications*.

H. Construction Records

Provide 2 copies of anchored wall construction records within 24 hours of completing each row of anchors. Include the following in construction records:

1. Names of Anchored Wall Contractor, Superintendent, 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. Anchor locations, dimensions and inclinations, tendon types, sizes and grades, corrosion protection and temporary casing information;
5. Date and time drilling begins and ends, tendons are inserted into drill holes, grout is mixed and arrives on-site and grout placement 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;
9. Anchor testing records including load versus movement and time versus creep movement plots; and
10. All other pertinent details related to anchored wall construction.

The Engineer will review the construction records to determine if anchors are acceptable. If the Engineer determines an anchor is unacceptable, revise the anchor design or installation methods. Submit a revised anchored wall design or construction plan for acceptance and provide an acceptable anchor with the revised design or installation methods. If necessary, provide additional anchors with the revised design or installation methods for the unacceptable anchors. After completing each anchored wall or stage of a wall, provide a PDF copy of all corresponding construction records.

5.0 MEASUREMENT AND PAYMENT

Anchored Soldier Pile Walls will be measured and paid in square feet. Anchored soldier pile walls will be measured as the square feet of wall face area with the height equal to the difference between top and bottom of wall elevations. Define “top of wall” as top of coping. Define “bottom of wall” as shown in the plans. No measurement will be made for portions of soldier pile walls embedded below bottom of wall elevations.

The contract unit price for *Anchored Soldier Pile Walls* will be full compensation for providing designs, submittals, labor, tools, equipment and anchored wall materials, installing piles and anchors, grouting, anchor testing, excavating, backfilling, hauling and removing excavated materials and supplying temporary support of excavations, weepholes, stone, and any incidentals necessary to construct anchored walls. No additional payment will be made and no extension of completion date or time will be allowed for repairing overexcavations or unstable excavations or unacceptable anchors.

The contract unit price for *Anchored Soldier Pile Walls* does not include the cost for ditches, barrier or guardrail associated with anchored walls as these items will be paid for elsewhere in the contract.

Payment will be made under:

Pay Item

Anchored Soldier Pile Walls

Pay Unit

Square Foot



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6/16/2014

CONTINUOUS FLIGHT AUGER PILES FOR SOUND BARRIER WALLS (SPECIAL)**1.0 GENERAL**

Continuous flight auger (CFA) piles are constructed by drilling a borehole with a continuous flight hollow stem auger and filling the borehole by pumping grout through the auger as it is withdrawn. After completing grout placement, reinforcement is inserted into the column of fluid grout. At the Contractor's option, construct CFA piles for sound barrier walls instead of pile excavation. Install CFA piles with the required depth in accordance with the contract and accepted submittals. Use a prequalified CFA Pile Subcontractor for CFA pile work. Define "pile" as a CFA pile and "reinforcement" as pile extending out of CFA pile.

2.0 INSTALLATION PLAN SUBMITTAL

Provide 4 copies and a PDF copy of the CFA pile installation plan submittal. Submit the installation plan at least 15 days before starting CFA pile construction. Do not begin pile construction until the CFA pile installation plan is accepted.

Provide detailed project specific information in the installation plan that includes the following:

1. List and sizes of proposed equipment including CFA drilling rigs, augers and other drilling tools and grouting equipment;
2. Step-by-step description of CFA pile installation and sequence of pile construction;
3. Methods for placing reinforcement with procedures for supporting and positioning the reinforcement;
4. Minimum grout volume factor;
5. Equipment and procedures for monitoring and recording grout volume;
6. Examples of construction records to be provided that meet Section 6.0 of this provision;
7. Procedures for containment and disposal of drilling spoils and waste grout;
8. Grout mix design including laboratory test results that meets Section 1003 of the *Standard Specifications*; and
9. Other information shown in the plans or requested by the Engineer.

If alternate installation procedures are proposed or necessary, a revised CFA pile installation plan submittal may be required. If the work deviates from the accepted submittal without prior approval, the Engineer may suspend CFA pile construction until a revised plan is accepted.

3.0 MATERIALS

Use grout that meets Section 1003 of the *Standard Specifications*, except change the first sentence of Subarticle 1003-3(C) to "Provide grout with a compressive strength at 3 and 28 days of at least 3000 psi."

Use piles extending out of CFA piles that meet the *Sound Barrier Wall* provision.

4.0 PRECONSTRUCTION MEETING

Before starting CFA pile construction, hold a preconstruction meeting to discuss the installation and monitoring of the piles. Schedule this meeting after all CFA pile submittals have been accepted and the CFA Pile Subcontractor has mobilized to the site. The Resident or Bridge Maintenance Engineer, Bridge Construction Engineer, Geotechnical Operations Engineer, Contractor and CFA Pile Subcontractor Superintendent and Project Manager will attend this preconstruction meeting.

5.0 CONSTRUCTION METHODS

Use equipment and methods accepted in the CFA pile installation plan or approved by the Engineer. Inform the Engineer of any deviations from the accepted plan.

Dispose of drilling spoils and waste grout as directed and in accordance with Section 802 of the *Standard Specifications*. Drilling spoils consist of all excavated material and fluids removed from boreholes.

A. Drilling

Use CFA piling rigs capable of drilling to the dimensions and depths shown in the plans or required otherwise by the Engineer. Install CFA piles with tip elevations no higher than shown in the plans or approved by the Engineer.

Use single helix hollow stem augers with uniform diameters and continuous flights from the top of the auger to the bottom tip of the cutting face. Provide augers with flights and teeth that cut the bottom of the borehole flat. Augers with outside diameters at least 97% of the pile design diameter are required. Augers capable of installing piles to a depth 20% greater than plan depth are also required.

Unless piles are installed with a hydraulic fixed mast installation platform and the stem to which the auger is fixed has an outside diameter 10" (250 mm) or greater, at least one guide connected to the leads of the CFA piling rig is required. Prevent the leads from rotating during drilling and grouting.

Seal the grout injection port to prevent entry during drilling. Keep the hollow stem of augers clean when drilling. Clearly mark augers or leads every foot (0.3 m) along their length with markings visible to the unaided eye from the ground. Check for correct pile location and alignment before beginning drilling. Do not begin drilling until enough grout to complete the pile is on the project site.

Advance the auger into the ground at a continuous rate. Do not raise the auger until beginning grout placement. Control the auger rotation speed to prevent excess spoil from being transported to the ground surface and surrounding soil being drawn laterally into the borehole.

If muck, organics, soft soil or other unsuitable materials are encountered within 5 ft (1.5 m) of the ground surface, contact the Engineer as these materials can cause problems with top of pile construction. If auger refusal is encountered before reaching plan depth, stop the auger rotation and inform the Engineer. Unless it is determined otherwise, define refusal as less than 1 ft (0.3 m) of auger penetration per minute.

B. Grouting

Remove oil, rust inhibitors, residual drilling slurries and similar foreign materials from holding tanks/hoppers, stirring devices, pumps and lines and all other equipment in contact with grout before use.

Place a screen between the ready mix truck and the grout pump to remove large particles or cement balls using a mesh that has openings no larger than $\frac{3}{4}$ " (19 mm).

Use a positive displacement piston type pump with a known volume per stroke that can develop peak pressures at the pump of at least 350 psi (2.4 MPa). Size the pump to maintain a smooth continuous delivery of grout while limiting pressure variations (particularly pressure drops) due to pump strokes. At the beginning of construction, provide the grout volume delivered by each pump stroke and verify this value is within 3% of the actual volume. Recalibrate the grout volume per pump stroke during construction as necessary or directed.

Place grout in accordance with the contract and accepted submittals. Pump grout without difficulty to fill any soft or porous zones and with sufficient pressure to ensure a continuous monolithic pile with at least the plan cross section from the maximum borehole depth to the top of the grout column. Provide grout free of segregation, intrusions, contamination, structural damage or inadequate consolidation (honeycombing).

Begin placing grout within 5 minutes after the auger has reached plan depth. At the beginning of grout placement, lift the auger 6" to 12" (150 mm to 300 mm) and remove the sealing device by applying grout pressure or with a steel bar. Do not lift the auger beyond this range in order to minimize soil movement. After initiating grout flow, reinsert the auger to the original depth.

Pump grout continuously while extracting the auger at a smooth steady rate. Maintain a positive grout pressure at the auger injection point at all times. If rotation occurs while removing the auger, rotate the auger in the same direction as during drilling. If grout placement is suspended for any reason, inform the Engineer and redrill the CFA pile.

Monitor the depth of the auger injection point while counting pump strokes during grouting. Record the grout volume and factor versus depth of the auger injection point in increments of 5 ft (1.5 m) or less. The grout volume factor is the grout volume placed divided by the theoretical grout volume for each depth increment. A grout volume factor of at least 1.15 is required.

C. Top of Pile Finishing and Protection

After placing grout, remove all excess grout and spoil from and place a temporary form within the top of the grout column. Use a form 3 ft to 5 ft (1 m to 1.5 m) long with a diameter equal to or larger than the pile diameter. Place the form with equal lengths above and below the ground surface. Recheck the top of the grout and remove any foreign material. After the Engineer determines that grout reaches initial set, remove the form without disturbing the ground surface around the pile.

After inserting reinforcement, square the top of the CFA pile with the pile axis while grout is still fluid or by cutting off hardened grout. Construct the top of CFA pile to the elevation shown in the plans.

D. Reinforcement

Provide reinforcement for CFA piles consisting of piles shown in the plans and accepted submittals. Insert reinforcement as a unit while the grout is still fluid. Lower or gently push reinforcement into the grout. Do not vibrate or drive the reinforcement. Support the reinforcement at the ground surface until the grout strength reaches 2,500 psi (17.2 MPa). Contact the Engineer if reinforcement cannot be properly inserted to the required depth.

6.0 CONSTRUCTION RECORDS

Provide 2 copies of CFA pile construction records after completing each pile. Include the following in construction records:

1. Names of CFA Pile Subcontractor, Superintendent, Drill Rig Operator and Project Manager;
2. Project description, county, Department's contract, TIP and WBS element number;
3. Wall station and number and pile location and identifier;
4. The grout volume and factor versus depth of the auger injection point in increments of 5 ft (1.5 m) or less;
5. CFA pile diameter, length and tip elevation, top of pile and ground surface elevations;
6. Auger diameter and theoretical volume of the borehole;
7. Grout temperature and flow for each ready mix truck;
8. Size, length, top elevation and grade of reinforcement;
9. Date and time drilling begins and ends, grout is mixed and arrives on-site, pumping grout begins and ends and reinforcement is placed;
10. Weather conditions including air temperature at time of grout placement; and
11. All other pertinent details related to CFA pile construction.

After completing CFA piles for each sound barrier wall, provide a PDF copy of all corresponding construction records.

7.0 CFA PILE ACCEPTANCE

CFA pile acceptance is based in part on the following criteria.

1. Grout volume factor is greater than the minimum required for any 5 ft (1.5 m) depth increment.
2. Grout is properly placed and does not have any evidence of segregation, intrusions, contamination, structural damage or inadequate consolidation (honeycombing).
3. CFA pile and reinforcement location, alignment and elevations are within tolerances for sound barrier walls for pile excavation and reinforcement is in accordance with the contract and accepted submittals.

If the Engineer determines a CFA pile is unacceptable, additional testing, remedial measures or replacement piles are required at no additional cost to the Department. Do not begin remediation work until remediation plans are approved.

8.0 MEASUREMENT AND PAYMENT

CFA piles for sound barrier walls will be paid at the contract unit price for *Sound Barrier Wall*. No separate payment will be made for CFA piles. The contract unit price for *Sound Barrier Wall* will be full compensation for all costs for submittals, monitoring and recording, labor, tools, equipment, reinforcement and grout complete and in place and all incidentals necessary to drill and construct CFA piles in accordance with this provision. No payment will be made for any costs associated with unacceptable CFA piles.



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SOLDIER PILE RETAINING WALLS**(SPECIAL)****1.0 GENERAL**

Construct soldier pile retaining walls consisting of drilled-in steel H-piles with driven sheet piles in between soldier piles. Provide cast-in-place 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.

2.0 MATERIALS

Refer to the *Standard Specifications*.

Item	Section
Neat Cement Grout, Nonshrink	1003
Portland Cement Concrete	1000
Flowable Fill, Excavatable	1000-6
Curing Agents	1026
Reinforcing Steel	1070
Geosynthetics	1056
Joint Filler	1028
Sheet Piles	1084-2
Steel H-Piles	1084-1
Select Material, Class II or III	1016
Select Material, Class VI (#57 stone)	1016

The 2012 Standard Specifications shall be revised as follows:

Replace the first paragraph of Section 1084-2 – STEEL SHEET PILES with the following:

“Steel sheet piles detailed for permanent applications shall be hot rolled and meet ASTM A572 or ASTM A690 unless otherwise required by the plans. Steel sheet piles shall be coated as required by the plans. Galvanized sheet piles shall be coated in accordance with Section 1076. Metallized sheet piles shall be metallized in accordance to the Project Special Provision “Thermal Sprayed Coatings (Metallization)” with an 8 mil, 99.9% aluminum alloy coating and a 0.5 mil seal coating. Any portion of the metallized sheet piling encased in concrete shall receive a barrier coat. The barrier coat shall be an approved waterborne coating with a low-viscosity which readily absorbs into the pores of the aluminum thermal sprayed coating. The waterborne coating shall be applied at a spreading rate that results in a theoretical 1.5 mil dry film thickness. The manufacturer shall issue a letter of certification that the resin chemistry of the waterborne coating is compatible with the 99.9% aluminum thermal sprayed alloy and suitable for tidal water applications.”

Use flowable fill or Class II or Class III select material for drilled-in piles above the bottom of sheet pile embedment. Use Class A concrete or nonshrink neat cement grout that meets Article 450-2 of the *Standard Specifications* for drilled-in piles below bottom of sheet pile embedment. Use Class A concrete for coping.

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. 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

Submit 11 copies of working drawings and 3 copies of design calculations and a PDF copy of each for soldier pile wall designs at least 30 days before the preconstruction meeting. Do not begin soldier pile wall construction until a design submittal is accepted.

Use a prequalified Anchored Wall Design Consultant to design soldier pile walls. Provide designs sealed by a Design Engineer approved as a Geotechnical Engineer (key person) for the Anchored 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 seismic if walls are located in seismic zone 2 based on Figure 2-1 of the *Structure Design Manual*. 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 lb/sf 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 horizontal load (P_{HI}) 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 P_{HI} of 500 lb/ft of wall in accordance with Figure 3.11.6.3-2(a).

Use a maximum H-pile spacing of 10 ft. Excavate 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 piles with No. 57 stone. Place separation geotextile between No. 57 stone and overlying fill or pavement sections except when concrete pavement, full depth asphalt or cement treated base is placed directly on stone.

Unless required otherwise in the plans, use cast-in-place reinforced concrete coping at top of soldier pile. Use coping dimensions shown in the plans. 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, and temporary support. 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 4 copies and a PDF copy 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 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. Schedule this meeting after all soldier pile wall submittals have been accepted. The Resident or Bridge Maintenance Engineer, Bridge Construction Engineer, Geotechnical Operations Engineer, Contractor and Cantilever Wall Contractor Superintendent will attend this preconstruction meeting.

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

Install piles within 1" of horizontal and vertical alignment shown in the accepted submittals and with no negative batter (piles leaning forward). Install piles with the minimum required embedment 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.

Position sheet piles with at least 3" of contact in the horizontal direction between the sheet piles and soldier pile flanges. If contact cannot be maintained, fill gaps with joint filler. Remove flowable fill and material in between piles as necessary to install sheet piles.

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

B. Weepholes

Drill weepholes and place PVC pipe wrapped in filter fabric and protected by a rodent screen according to the plans.

C. Coping

Construct coping as shown in the accepted submittals and in accordance with Subarticle 452-3(C) of the *Standard Specifications*.

D. Backfill

For fill sections or if a temporary slope is shown in the accepted submittals, backfill behind piles in accordance with Article 410-8 of the *Standard Specifications*. Otherwise, backfill voids behind piles with No. 57 stone as shown in the accepted submittals. Compact stone to the satisfaction of the Engineer. Use only hand operated compaction equipment to compact fill within 3 ft of wall. 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.

E. Pile Coatings

Repair galvanized surfaces that are exposed and damaged in accordance with Article 1076-7 of the *Standard Specifications*.

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 height equal to the difference between top and bottom of wall elevations. Define "top of wall" as top of coping. Define "bottom of wall" as shown in the plans. No measurement will be made for portions of soldier pile walls embedded below bottom of wall elevations.

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, backfilling, hauling and removing excavated materials and supplying temporary support of excavations, wall drainage systems, No. 57 stone, geotextiles 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 and pile coatings. No additional payment will be made and no extension of completion date or time will be allowed for repairing overexcavations or unstable excavations.

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.

Payment will be made under:

Pay Item
Soldier Pile Retaining Walls

Pay Unit
Square Foot



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6/16/2014

CONCRETE BARRIER RAIL WITH MOMENT SLAB

(1-17-12)

1.0 GENERAL

Construct concrete barrier rail connected to moment slabs to resist traffic impact above retaining walls. Construct concrete barrier rail with moment slab in accordance with the contract and accepted submittals.

2.0 MATERIALS

Refer to Division 10 of the *Standard Specifications*.

Item	Section
Barrier Delineators	1088-2
Portland Cement Concrete	1000
Reinforcing Steel	1070

Use Class AA concrete for concrete barrier rail and Class A concrete for moment slabs. Provide epoxy coated reinforcing steel that meets Article 1070-7 of the *Standard Specifications* for concrete barrier rail.

3.0 CONSTRUCTION METHODS

Construct concrete barrier rail with moment slab in accordance with the plans and accepted submittals. Construct cast-in-place reinforced concrete moment slabs in accordance with Section 420 of the *Standard Specifications* and concrete barrier rail in accordance with Subarticle 460-3(C) of the *Standard Specifications*. Do not remove forms until concrete attains a compressive strength of at least 2,400 psi.

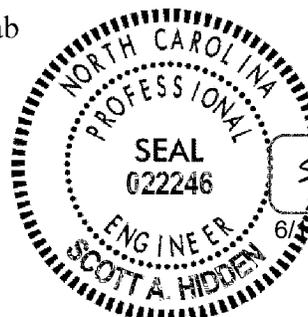
4.0 MEASUREMENT AND PAYMENT

Concrete Barrier Rail with Moment Slab will be measured and paid in linear feet. Concrete barrier rail with moment slab will be measured as the length of concrete barrier rail above retaining walls. The contract unit price for *Concrete Barrier Rail with Moment Slab* will be full compensation for submittals, labor, tools, equipment and concrete barrier rail with moment slab materials, excavating, backfilling, hauling and removing excavated materials and supplying any incidentals necessary to construct concrete barrier rail with moment slab.

Payment will be made under:

Pay Item
Concrete Barrier Rail with Moment Slab

Pay Unit
Linear Foot



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MECHANICALLY STABILIZED EARTH RETAINING WALLS**(11-19-13)****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. The facing elements may be precast concrete panels or segmental retaining wall (SRW) units unless required otherwise in the plans or the *NCDOT Policy for Mechanically Stabilized Earth Retaining Walls* prohibits the use of SRW units. At the Contractor's option, use coarse or fine aggregate in the reinforced zone of MSE retaining walls except do not use fine aggregate for walls subject to scour, walls that support or are adjacent to railroads or walls with design heights greater than 35 ft or internal acute corners less than 45°. Provide reinforced concrete coping 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" as a mechanically stabilized earth retaining wall and "MSE Wall Vendor" as the vendor supplying the chosen MSE wall system. Define a "segmental retaining wall" as an MSE wall with SRW units. Define an "abutment wall" as an 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.

Define "reinforcement" as steel or geosynthetic reinforcement and "geosynthetics" as geosynthetic grids (geogrids) or strips (geostrips). Define "aggregate" as coarse or fine aggregate. Define "panel" as a precast concrete panel and "coping" as precast or cast-in-place concrete coping.

Use an approved MSE wall system in accordance with the plans, NCDOT MSE wall policy and any NCDOT restrictions for the chosen system. Value engineering proposals for other MSE wall systems will not be considered. Do not use segmental retaining walls or MSE wall systems with an "approved for provisional use" status code for critical walls or MSE walls connected to critical walls. Critical walls are defined in the NCDOT MSE wall policy. The list of approved MSE wall systems and NCDOT MSE wall policy are available from:

connect.ncdot.gov/resources/Geological/Pages/Products.aspx

2.0 MATERIALS

Refer to the *Standard Specifications*.

Item	Section
Aggregate	1014
Anchor Pins	1056-2
Curing Agents	1026
Geotextiles, Type 2	1056
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
Shoulder Drain Materials	816-2
Wire Staples	1060-8(D)

Provide Type 2 geotextile for filtration and separation geotextiles. Use Class A concrete for cast-in-place coping, leveling concrete and pads.

Use panels and SRW units from producers approved by the Department and licensed by the MSE Wall Vendor. 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 except do not use No. 57 or 57M stone in the reinforced zone of MSE walls with geosynthetic reinforcement. Use 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*. Provide fine aggregate that meets the following requirements:

FINE AGGREGATE REQUIREMENTS					
Reinforcement or Connector Material	pH	Resistivity	Chlorides	Sulfates	Organics
Steel	5-10	≥ 3,000 Ω · cm	≤ 100 ppm	≤ 200 ppm	≤ 1%

Polyester Type (PET) Geogrid	5-8	N/A*	N/A*	N/A*	≤ 1%
Geotrip or Polyolefin Geogrid	4.5-9	N/A*	N/A*	N/A*	≤ 1%

* Resistivity, chlorides and sulfates are not applicable to geosynthetics.

Use fine aggregate from a source that meets the *Mechanically Stabilized Earth Wall Fine Aggregate Sampling and Testing Manual*. Perform organic content tests in accordance with AASHTO T 267 instead of Subarticle 1014-1(D) of the *Standard Specifications*. Perform electrochemical tests in accordance with the following test procedures:

Property	Test Method
pH	AASHTO T 289
Resistivity	AASHTO T 288
Chlorides	AASHTO T 291
Sulfates	AASHTO T 290

B. Reinforcement

Provide steel or geosynthetic reinforcement supplied by the MSE Wall Vendor or a manufacturer approved or licensed by the vendor. Use approved reinforcement 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 metallic strip reinforcement (“straps”) that meet ASTM A572 or A1011. Galvanize steel reinforcement in accordance with Section 1076 of the *Standard Specifications*.

2. Geosynthetic Reinforcement

Define “machine direction” (MD) for geosynthetics in accordance with ASTM D4439. Provide Type 1 material certifications for geosynthetic strengths in the MD in accordance with Article 1056-3 of the *Standard Specifications*. Test geosynthetics in accordance with ASTM D6637.

C. Bearing Pads

For MSE walls with panels, use bearing pads that meet Section 3.6.1.a of the *FHWA Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes – Volume I* (Publication No. FHWA-NHI-10-024). Provide bearing pads that meet the following requirements:

BEARING PAD THICKNESS REQUIREMENTS

Panel Facing Area (A)	Minimum Pad Thickness After Compression (based on 2 times panel weight above pads)
$A \leq 30$ sf	1/2"
$30 \text{ sf} < A \leq 75$ 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. Galvanize steel components in accordance with Section 1076 of the *Standard Specifications*. Provide approved miscellaneous components 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. 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

Submit 11 copies of working drawings and 3 copies of design calculations and a PDF copy of each for MSE wall designs at least 30 days before the preconstruction meeting. Note name and NCDOT ID number of the panel or SRW unit production facility on the working drawings. Do not begin MSE wall construction until a design submittal is accepted.

Use a prequalified MSE Wall Design Consultant to design MSE walls. Provide designs sealed by a Design Engineer approved as a Geotechnical Engineer (key person) for the MSE Wall Design Consultant.

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. Design MSE walls for seismic if walls are located in seismic zone 2 based on Figure 2-1 of the *Structure Design Manual*. Use a uniform reinforcement length throughout the wall height of at least $0.7H$ with H as defined for the embedment requirements in this provision or 6 ft, whichever is greater, unless shown 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 approved design parameters 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. Use corrosion loss rates for galvanizing in accordance with the AASHTO LRFD specifications for nonaggressive backfill and carbon steel corrosion rates in accordance with the following:

CARBON STEEL CORROSION RATES	
Aggregate Type (in the reinforced zone)	Corrosion Loss Rate (after zinc depletion)
Coarse	0.47 mil/year
Fine (except abutment walls)	0.58 mil/year
Fine (abutment walls)	0.70 mil/year

For geosynthetic reinforcement and connectors, use approved geosynthetic properties for the design life noted in the plans and aggregate type in the reinforced zone.

When noted in the plans, design MSE walls for a live load (traffic) surcharge of 250 lb/sf 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 the FHWA MSE wall manual shown elsewhere in this provision 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.

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. Locate reinforcement layers so all of reinforcement length is within 3" of corresponding connection elevations.

Use 6" thick cast-in-place 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:

EMBEDMENT REQUIREMENTS		
Front Slope¹ (H:V)	Minimum Embedment Depth² (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. Define "H" as the maximum design height plus embedment per wall with the design height and embedment as shown in the plans.

When noted in the plans, locate a continuous aggregate shoulder drain along base of reinforced zone behind aggregate. Provide wall drainage systems consisting of drains and outlet components in accordance with Standard Drawing No. 816.02 of the *Roadway Standard Drawings*.

For MSE walls with panels, place at least 2 bearing pads in each horizontal panel joint so the final horizontal joint opening is between 5/8" and 7/8". Additional bearing pads may be required for panels wider than 5 ft as determined by the Engineer. Cover joints at back of panels with filtration geotextiles at least 12" wide.

For segmental retaining walls, fill SRW unit core spaces with coarse aggregate and between and behind SRW units with coarse aggregate for a horizontal distance of at least 18".

Separation geotextiles are required between aggregate and overlying fill or pavement sections except when concrete pavement, full depth asphalt or cement treated base is placed directly on aggregate. Separation geotextiles may also be required between coarse aggregate and backfill or natural ground as determined by the Engineer.

Unless required otherwise in the plans, use reinforced concrete coping at top of walls. Use coping dimensions shown in the plans and cast-in-place concrete coping for segmental retaining walls and when noted in the plans. When shown in the plans and at the Contractor's option, connect cast-in-place concrete coping to panels and SRW units with dowels or extend coping down back of MSE walls. Also, connect cast-in-place leveling concrete for precast concrete coping to panels with dowels. 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 required resistances, 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, 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 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 version 3.0 with update 14.93 or later, 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 MSEW 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. Schedule this meeting after all MSE wall submittals have been accepted. The Resident or Bridge Maintenance Engineer, Bridge Construction Engineer, Geotechnical Operations Engineer, Contractor and MSE Wall Installer Superintendent will attend this preconstruction meeting.

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 the Materials and Tests (M&T) Unit 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, provide an MSE Wall Vendor representative 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 located in the reinforced zone before placing aggregate or reinforcement. 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 cast-in-place 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. Place SRW units with a maximum vertical joint width of 3/8".

Set panels with a vertical joint width of 3/4". Place bearing pads in horizontal panel joints 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.

Stagger panels and SRW units to create a running bond by centering panels or SRW units over joints in the row below as shown in the accepted submittals. Construct MSE walls with the following tolerances:

- A. SRW units are level from front to back and between units when checked with a 3 ft long level,
- B. 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
- C. Final wall plumbness (batter) is not negative 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. Place reinforcement in slight tension 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*.

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 cast-in-place concrete coping in accordance with Subarticle 452-3(C) 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.

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. 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 exposed wall face area with the height equal to the difference between top and bottom of wall elevations. Define "top of wall" as top of coping or top of panels or SRW units for MSE walls without coping. Define "bottom of wall" as shown in the plans and no measurement will be made for portions of MSE walls embedded below bottom of wall elevations.

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, backfilling, hauling and removing excavated materials and supplying site assistance, leveling pads, panels, SRW units, reinforcement, aggregate, wall drainage systems, geotextiles, 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 connected to and aggregate behind end bent caps in the reinforced zone, 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.

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

MSE Retaining Wall No. ___

Pay Unit

Square Foot



DocuSigned by:
Scott A. Hidden
F760CAEB96FC4D3...
6/13/2014

STANDARD SHORING:**(11-19-13)****Description**

Standard shoring includes standard temporary shoring and standard temporary mechanically stabilized earth (MSE) walls. At the Contractor's option, use standard shoring as noted in the plans or as directed. When using standard shoring, a temporary shoring design submittal is not required. Construct standard shoring based on actual elevations and shoring dimensions in accordance with the contract and Standard Drawing No. 1801.01 or 1801.02.

Define "standard temporary shoring" as cantilever shoring that meets the standard temporary shoring drawing (Standard Drawing No. 1801.01). Define "standard temporary wall" as a temporary MSE wall with geotextile or geogrid reinforcement that meets the standard temporary wall drawing (Standard Drawing No. 1801.02). Define "standard temporary geotextile wall" as a standard temporary wall with geotextile reinforcement and "standard temporary geogrid wall" as a standard temporary wall with geogrid reinforcement. Define "geosynthetics" as geotextiles or geogrids.

Provide positive protection for standard shoring at locations shown in the plans and as directed. See *Temporary Shoring* provision for positive protection types and definitions.

Materials

Refer to the *Standard Specifications*.

Item	Section
Anchor Pins	1056-2
Concrete Barrier Materials	1170-2
Flowable Fill, Excavatable	1000-6
Geotextiles	1056
Neat Cement Grout	1003
Portland Cement Concrete	1000
Select Material	1016
Steel Beam Guardrail Materials	862-2
Steel Sheet Piles and H-Piles	1084
Untreated Timber	1082-2
Welded Wire Reinforcement	1070-3
Wire Staples	1060-8(D)

Provide Type 6 material certifications for shoring materials. Use Class IV select material (standard size No. ABC) for temporary guardrail.

For drilled-in H-piles, use nonshrink neat cement grout or Class A concrete that meets Article 1000-4 of the *Standard Specifications* except as modified herein. Provide concrete with a slump of 6" to 8". Use an approved high-range water reducer to achieve this slump.

Based on actual shoring height, positive protection, groundwater elevation, slope or surcharge case and traffic impact at each standard temporary shoring location, use sheet piles with the minimum required section modulus or H-piles with the sizes shown in Standard Drawing No. 1801.01. Use untreated timber with a thickness of at least 3" and a bending stress of at least 1,000 psi for timber lagging.

(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 the following:

- (1) A-2-4 soil for backfill around culverts,
- (2) A-2-4 soil in the reinforced zone of standard temporary walls with a back slope and
- (3) Class VI select material in the reinforced zone of standard temporary geotextile walls.

(B) Standard Temporary Walls

Use welded wire reinforcement for welded wire facing, struts and wires with the dimensions and minimum wire sizes shown in Standard Drawing No. 1801.02. Provide Type 2 geotextile for separation and retention geotextiles. Define “machine direction” (MD) and “cross-machine direction” (CD) for geosynthetics in accordance with ASTM D4439. Do not use more than 4 different reinforcement strengths for each standard temporary wall.

(1) Geotextile Reinforcement

Provide Type 5 geotextile for geotextile reinforcement with a mass per unit area of at least 8 oz/sy in accordance with ASTM D5261. Based on actual wall height, groundwater elevation, slope or surcharge case and shoring backfill to be used in the reinforced zone at each standard temporary geotextile wall location, provide geotextiles with ultimate tensile strengths as shown in Standard Drawing No. 1801.02.

(2) Geogrid Reinforcement

Handle and store geogrids in accordance with Article 1056-2 of the *Standard Specifications*. Use geogrids with a roll width of at least 4 ft and an “approved” or “approved for provisional use” status code. The list of approved geogrids is available from:

connect.ncdot.gov/resources/Materials/Pages/SoilsLaboratory.aspx

Based on actual wall height, groundwater elevation, slope or surcharge case and shoring backfill to be used in the reinforced zone at each standard temporary geogrid wall location, provide geogrids for geogrid reinforcement with short-term design strengths as shown in Standard Drawing No. 1801.02. Geogrids are typically approved for ultimate tensile strengths in the MD and CD or short-term design strengths for a 3-year design life in the MD based on material type. Define material type from the website above for shoring backfill as follows:

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

If the website does not list a short-term design strength for an approved geogrid, use a short-term design strength equal to the ultimate tensile strength divided by 3.5 for the geogrid reinforcement.

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 standard shoring except for barrier above standard temporary walls. Concrete barrier with the minimum required clear distance is required above standard temporary walls.

(B) Temporary Guardrail

Define “clear distance” behind temporary guardrail as the horizontal distance between guardrail posts and standard shoring. At the Contractor’s option or if clear distance for standard temporary shoring is less than 4 ft, 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 standard temporary walls.

(C) Standard Shoring Selection Forms

Before beginning standard shoring construction, survey existing ground elevations in the vicinity of standard shoring locations to determine actual shoring or wall heights (H). Submit a standard shoring selection form for each location at least 7 days before starting standard shoring construction. Standard shoring selection forms are available from: connect.ncdot.gov/resources/Geological/Pages/Geotech_Forms_Details.aspx

(D) Preconstruction Meeting

The Engineer may require a shoring preconstruction meeting to discuss the construction and inspection of the standard shoring. If required, schedule this meeting after all standard shoring selection forms have been submitted. The Resident, District or Bridge Maintenance Engineer, Bridge or Roadway Construction Engineer, Geotechnical Operations Engineer, Contractor and Shoring Contractor Superintendent will attend this preconstruction meeting.

Construction Methods

Construct standard shoring in accordance with the *Temporary Shoring* provision.

(A) Standard Temporary Shoring Installation

Based on actual shoring height, positive protection, groundwater elevation, slope or surcharge case and traffic impact at each standard temporary shoring location, install piles with the minimum required embedment and extension for each shoring section in accordance with Standard Drawing No. 1801.01. For concrete barrier above and next to standard temporary shoring and temporary guardrail above and attached to standard temporary shoring, use “surcharge case with traffic impact” in accordance with Standard Drawing No. 1801.01. Otherwise, use “slope or surcharge case with no traffic impact” in accordance with Standard Drawing No. 1801.01. If refusal is reached before driven piles

attain the minimum required embedment, use drilled-in H-piles with timber lagging for standard temporary shoring.

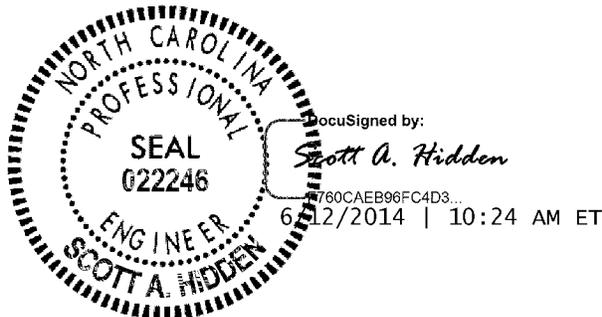
(B) Standard Temporary Walls Installation

Based on actual wall height, groundwater elevation, slope or surcharge case, geotextile or geogrid reinforcement and shoring backfill in the reinforced zone at each standard temporary wall location, construct walls with the minimum required reinforcement length and number of reinforcement layers for each wall section in accordance with Standard Drawing No. 1801.02. For standard temporary walls with pile foundations in the reinforced zone, drive piles through reinforcement after constructing temporary walls.

For standard temporary walls with interior angles less than 90°, wrap geosynthetics at acute corners as directed by the Engineer. Place geosynthetics as shown in Standard Drawing No. 1801.02. Place separation geotextiles 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, place separation geotextiles between shoring backfill and backfill or natural ground on top of and at the back of the reinforced zone.

Measurement and Payment

Standard shoring will be measured and paid in accordance with the *Temporary Shoring* provision.



GEOTEXTILE FOR PAVEMENT STABILIZATION:**(Special)****Description**

Furnish and place geotextile for pavement stabilization in accordance with the contract. Geotextile for pavement stabilization is required between the subgrade and pavement section at locations shown in the plans and as directed by the engineer.

Location of Geotextile

Use Geotextile for Pavement Stabilization at the following locations

LINE	From STATION	To STATION
-L-	490+25	513+45
-L-	520+00	529+75
-L-	557+95	627+20
-L-	630+25	641+00
-L-	644+20	646+25
-L-	657+00	670+10
-L-	685+25	689+50
-Y1-	17+00	29+00
-Y1-	37+00	47+00
-Y1LPA	18+00	21+64
-Y1LPD	19+00	22+21
-Y1RPA-	10+00	13+00
-Y1RPA-	28+25	30+89
-Y1RPD-	29+00	32+81
-Y4CD-	10+00	31+61
-Y4CD-	34+71	51+00
-Y4CD-	62+00	74+00
-Y4CD-	92+50	94+75
-Y4LPA-	10+00	17+00
-Y4LPD-	10+00	13+50
-Y4LPD-	14+50	18+00
-Y4RPA-	11+00	15+17
-Y4RPA-	19+02	26+00
-Y4RPB-	10+00	15+50
-Y4RPB-	17+75	29+25
-Y4RPBD-	10+00	25+16
-Y4RPBD-	27+80	42+54
-Y4RPBD-	42+54	51+68
-Y4RPBD-	54+98	63+25
-Y4RPBD-	70+00	76+25
-Y4RPBD-	80+00	83+50
-Y4RPC-	10+00	12+00
-Y4RPC-	29+75	35+00
-Y4RPD-	10+00	21+50
-Y4RPD-	26+00	30+00
-Y5-	17+00	22+70
-Y5-	24+37	26+45
-Y5-	31+06	33+00
-Y1DET-	35+25	42+50
-Y5DET-	13+00	18+00
-Y6-	24+00	31+50

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	Section
Geotextiles	1056

Provide Type 5 geotextile for geotextile for pavement stabilization that meets the following requirements:

GEOTEXTILE FOR PAVEMENT STABILIZATION REQUIREMENTS		
Property	Requirement (MARV ^A)	Test Method
Tensile Strength @ 5% Strain (MD & CD ^A)	1,900 lb/ft	ASTM D4595
Ultimate Tensile Strength (MD & CD ^A)	4,800 lb/ft	ASTM D4595
Melting Point	300° F	ASTM D276

A. Define “minimum average roll value” (MARV), “machine direction” (MD) and “cross-machine direction” (CD) in accordance with ASTM D4439.

Construction Methods

For stabilized subgrades, stabilize subgrade soils to 12" beyond the base course as shown in the plans. For subgrades without stabilization, allow 24 days to determine if geotextile for pavement stabilization is required.

Place geotextile for pavement stabilization on subgrades immediately below pavement sections as shown in the plans and in slight tension free of kinks, folds, wrinkles or creases. Install geotextiles with the MD perpendicular to the roadway centerline. The MD is the direction of the length or long dimension of the geotextile roll. Do not splice or overlap geotextiles in the MD so splices or overlaps are parallel to the roadway centerline. Extend geotextile for pavement stabilization 12" beyond the base course as shown in the plans.

Completely cover subgrades with geotextile for pavement stabilization so geotextiles are adjacent to each other in the CD, i.e., perpendicular to the MD. The CD is the direction of the width or short dimension of the geotextile roll. Overlapping geotextiles in the CD is permitted but not required. Overlap geotextiles in the direction that base course will be placed to prevent lifting the edge of the top geotextile.

For asphalt base courses, asphalt mixture temperatures in the truck may not exceed 315° F at the time of placement. Do not damage geotextile for pavement stabilization when constructing base courses. Place and compact base courses in accordance with the *Standard Specifications*. Do not operate heavy equipment on geotextiles any more than necessary to construct pavement sections. Replace any damaged geotextiles to the satisfaction of the Engineer.

Measurement and Payment

Geotextile for Pavement Stabilization will be measured and paid in square yards. Geotextiles will be measured along subgrades as the square yards of exposed geotextiles before placing base courses. No measurement will be made for overlapping geotextiles. The contract unit price for *Geotextile for Pavement Stabilization* will be full compensation for providing, transporting and placing geotextiles.

U-2579B

GT-7.3

Forsyth County

Payment will be made under:

Pay Item
Geotextile for Pavement Stabilization

Pay Unit
Square Yard



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7/22/2014



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Ronald W. King
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7/1/2014

OVERHEAD SIGN SUPPORTS:

Description

Design, fabricate, furnish and erect various types of overhead sign assemblies. Fabricate supporting structures using tubular members of either aluminum or steel. The types of overhead sign assemblies included in this specification are span structures, cantilever structures and sign structures attached to bridges.

Materials

Structural Steel	Section 1072
Overhead Sign Structures	Section 1096
Signing Materials	Section 1092
Organic Zinc Repair Paint	Article 1080-9
Reinforcing Steel	Section 1070
Direct Tension Indicators	Sections 440 and 1072

Construction Methods

A. General

Fabricate overhead sign assemblies in accordance with the details shown in the approved working drawings and the requirements of these specifications.

No welding, cutting or drilling will be permitted in the field, unless approved by the Engineer.

Drill bolt holes and slots to finished size. Holes may also be punched to finished size, provided the diameter of the punched holes is at least twice the thickness of the metal being punched. Flame cutting of bolt holes and slots is not permitted.

Erect sign panels in accordance with the requirements for Type A or B signs as indicated in the plans or Roadway Standard Drawings. Field drill two holes per connection in the Z bars for attaching signs to overhead structures. Provide two U-bolts at each U-bolt connection such as each truss chord to sign hanger and each truss chord to walkway support or light support. Provide two U-bolts at each U-bolt connection where ends of truss chords are supported. The minimum diameter of all U-bolts is ½ inch.

For all U-bolt connections of hanger beams to overhead assembly truss chords, provide all U-bolts with a flat washer and double nuts at each end of the U-bolts. All

double nuts that are on any U-bolt shall be the same thickness and weight. When assembled, the double nuts shall be brought tight against each other by the use of two wrenches.

Use two coats of a zinc-rich paint to touch up minor scars on all galvanized materials.

For high strength bolted connections, use direct tension indicators. Galvanize bolts, nuts and washers in accordance with the Standard Specifications.

B. Shop Drawings

Design the overhead sign supports, including foundations, prior to fabrication. Submit design calculations and working drawings of the designs to the Engineer for review and acceptance.

Have a professional engineer registered in the State of North Carolina perform the computations and render a set of sealed, signed and dated drawings detailing the construction of each structure.

Submit to the Engineer for review and acceptance complete design and fabrication details for each overhead sign assembly, including foundations and brackets for supporting the signs and maintenance walkways, if applicable, electrical control boxes, and lighting luminaires. Base design upon the revised structure line drawings, wind load area and the wind speed shown in the plans, and in accordance with the *Standard Specifications for Structural Structures for Highway Signs, Luminaires and Traffic Signals*.

Submit thirteen (13) copies of completely detailed working drawings and one copy of the design calculations including all design assumptions for each overhead sign assembly to the Engineer for approval prior to fabrication. Working drawings shall include complete design and fabrication details (including foundations); provisions for attaching signs, maintenance walkways (when applicable), lighting luminaires to supporting structures, applicable material specifications, and any other information necessary for procuring and replacing any part of the complete overhead sign assembly.

Allow 40 days for initial working drawing review after the Engineer receives them. If revisions to working drawings are required, an additional 40 days shall be required for review and approval of the final working drawings.

Approval of working drawings by the Engineer shall not relieve the Contractor of responsibility for the correctness of the drawings, or for the fit of all shop and field connections and anchors.

C. Design and Fabrication

The following criteria govern the design of overhead sign assemblies:

Design shall be in accordance with the Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 5th Edition, 2009 and the 2010 and 2011 Interim Revisions.

Within this Specification, there are several design criteria that are owner specified. They include:

- Overhead cantilever sign structures shall include galloping loads (exclude four-chord horizontal trusses).
- The natural wind gust speed in North Carolina shall be assumed to be 11.6 mph.
- The fatigue importance category used in the design, for each type of structure, shall be for:
 - Cantilever structures with span greater than 50 feet – Fatigue Category I.
 - Cantilever structures with span less than or equal to 50 feet – Fatigue Category II.
 - Non-cantilever structures – Fatigue Category II

The following Specification interpretations or criteria shall be used in the design of overhead sign assemblies:

- For design of supporting upright posts or columns, the effective length factor for columns “K”, as provided for in Appendix B, Section B.5, shall be taken as the following, unless otherwise approved by the Engineer:
 - Case 1 For a single upright post of cantilever or span type overhead sign structure, the effective column length factor, “K”, shall be taken as 2.0.
 - Case 2 For twin post truss-type upright post with the post connected to one chord of a horizontal truss, the effective column length factor for that column shall be taken as 2.0.
 - Case 3 For twin post truss-type upright post with the post connected to two truss chords of a horizontal tri-chord or box truss, the effective column length factor for that column shall be taken as 1.65
- For twin post truss-type uprights, the unbraced length of the post shall be from the chord to post connection to the top of base plate

- For twin post truss-type uprights when the post is subject to axial compression, bending moment, shear, and torsion, the post shall satisfy *Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals* Equations 5-17, 5-18 and 5-19. To reduce the effects of secondary bending, in lieu of Equation 5-18, the following equation may be used:

$$\frac{f_a}{F_a} + \frac{f_b}{\left(1 - \frac{0.6f_a}{F_c}\right)F_b} + \left(\frac{f_v}{F_v}\right)^2 \leq 1.0$$

Where f_a = Computed axial compression stress at base of post

- The base plate thickness for all uprights and poles shall be a minimum of 2" but not less than that determined by the following criteria and design.

Case 1 Circular or rectangular solid base plates with the upright pole welded to the top surface of base plate with full penetration butt weld, and where no stiffeners are provided. A base plate with a small center hole, which is less than 1/5 of the upright diameter, and located concentrically with the upright pole, may be considered as a solid base plate.

The magnitude of bending moment in the base plate, induced by the anchoring force of each anchor bolt shall be calculated as $M = (P \times D_1) / 2$.

Case 2 Circular or rectangular base plate with the upright pole socketed into and attached to the base plate with two lines of fillet weld, and where no stiffeners are provided, or any base plate with a center hole that is larger in diameter than 1/5 of the upright diameter
The magnitude of bending moment induced by the anchoring force of each anchor bolt shall be calculated as $M = P \times D_2$.

– M - bending moment at the critical section of the base plate induced by one anchor bolt

– P - anchoring force of each anchor bolt

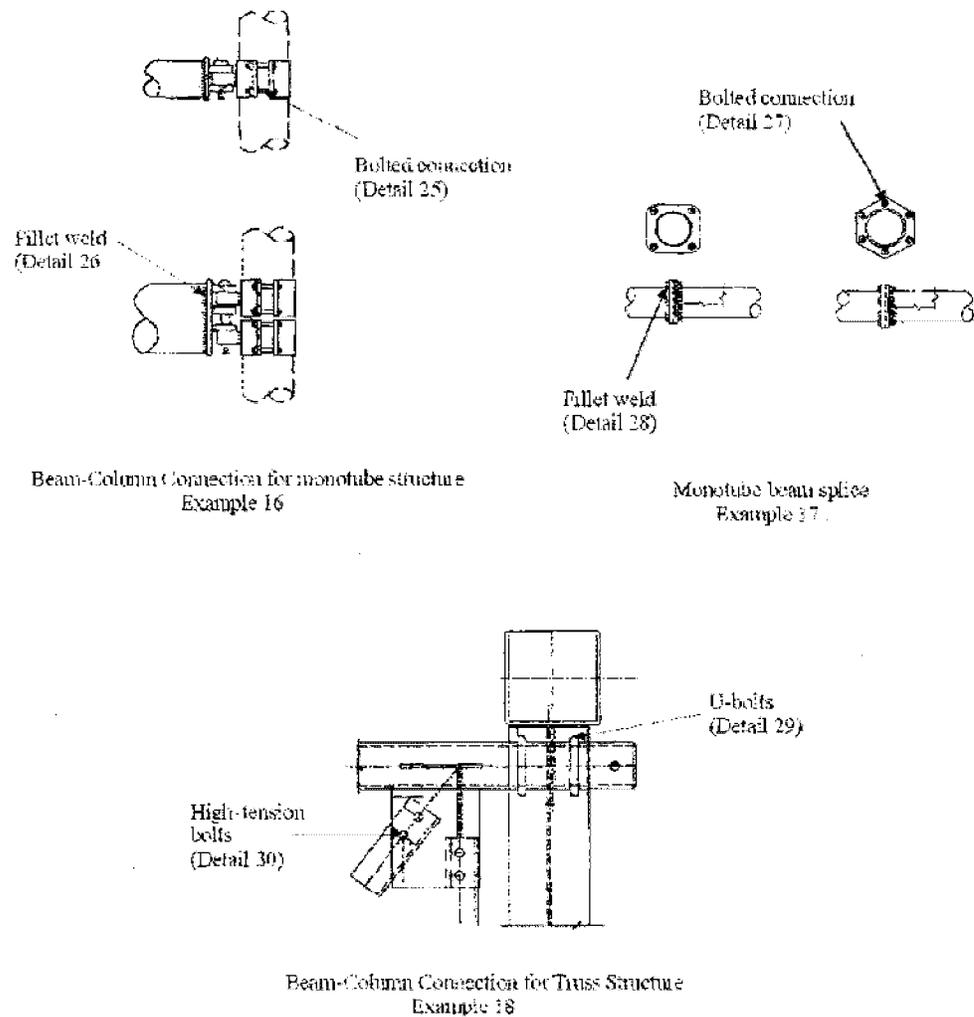
– D_1 - horizontal distance between the center of the anchor bolt and the outer face of the upright, or the difference between the radius of the bolt circle and the outside radius of the upright

– D_2 - horizontal distance between the face of the upright and the face of the anchor bolt nut

- The critical section shall be located at the face of the anchor bolt and perpendicular to the radius of the bolt circle. The overlapped part of two adjacent critical sections shall be considered ineffective.
- The thickness of Case 1 base plate shall not be less than that calculated based on formula for Case 2.
- Uprights, foundations, and trusses that support overhead signs shall be designed in accordance with the Overhead and Dynamic Message Sign Foundations Project Special Provision for the effects of torsion. Torsion shall be considered from dead load eccentricity of these attachments, as well as for attachments such as walkways, supporting brackets, lights, etc., that add to the torsion in the assembly. Truss vertical and horizontal truss diagonals in particular and any other assembly members shall be appropriately sized for these loads.
- Uprights, foundations, and trusses that support overhead mounted signs shall be designed for the proposed sign wind area and future wind areas. The design shall consider the effect of torsion induced by the eccentric force location of the center of wind force above (or below) the center of the supporting truss. Truss vertical and horizontal truss diagonals in particular and any other assembly members shall be appropriately sized for these loads.

For non-cantilevered monotube sign support structures, the following table and figures are considered as a required addition to the Standard Specifications for Structural Support for Highway Signs, Luminaires and Traffic Signals, 5th Edition, 2009:

<u>Construction</u>	<u>Detail</u>	<u>Stress Category</u>	<u>Application</u>	<u>Example</u>
Mechanically Fastened Connections Fillet Weld Connections	25. Bolts in Tension	D	Beam column connection for monotube structures	16
Mechanically Fastened Connections Fillet Weld Connections	26. Fillet welded with one side normal to applied stress	E'	Beam column connection for monotube structures	17
Mechanically Fastened Connections Fillet Weld Connections	27. High strength bolts in tension	D	Monotube or truss-chord splice	17
Mechanically Fastened Connections Fillet Weld Connections	28. Fillet welded with one side normal to applied stress	E'	Monotube or truss-chord splice	17
Mechanically Fastened Connections	29. U-bolts tied to transverse truss column to keep chords in place	D	Horizontal truss connection with vertical truss	18
Mechanically Fastened Connections	30. Net section of full-tightened, high tension bolts in shear	B	Truss bolted joint	18

Add to the Specifications, Figure 11-1:

Fabricate all overhead sign assemblies, including but not limited to foundations, in accordance with the details shown on the approved shop drawings and with the requirements of these Specifications.

Fabricate the span and cantilever supporting structures using tubular members of either aluminum or steel, using only one type of material throughout the project. Sign support structures that are to be attached to bridges shall be fabricated using other structural shapes.

Horizontal components of the supporting structures for overhead signs may be of a truss design or a design using singular (monotube) horizontal members to support the sign panels.

Truss or singular member centerline must coincide with the centerline of sign design area shown on the structure line drawing.

Provide permanent camber in addition to dead load camber in accordance with the *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*. Indicate on the shop drawings the amount of camber provided and the method employed in the fabrication of the support to obtain the camber.

Use cantilever sign structures that meet the following design criteria:

- a. Do not exceed an $L / 150$ vertical dead load deflection at the end of the arm due to distortions in the arm and vertical support, where L is the length of the arm from the center of the vertical support to the outer edge of the sign.
- b. Do not exceed an $L / 40$ horizontal deflection at the end of the arm due to distortions in the arm and vertical support, as a result of design wind load.

Fabricate attachment assemblies for mounting signs in a manner that allows easy removal of sign panels for repair.

Compensation

The work covered by this section will be paid for at the contract lump sum for each *Supports, Overhead Sign Structure @* _____. Such price will be full compensation for all work covered by this specification includes all design, fabrication, construction, transportation, and erection of the complete overhead sign structure, supporting structure, hardware, lighting support brackets, preparing and furnishing shop drawings, and attaching the signs to the overhead assembly.

Payment will be made under:

Supports, Overhead Sign Structure @ _____ Lump Sum



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7/1/2014

OVERHEAD AND DYNAMIC MESSAGE SIGN FOUNDATIONS:

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.

Assumed 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 lb/cf,
- (B) Friction angle (ϕ) = 30°,
- (C) Cohesion (c) = 0 lb/sf and
- (D) Groundwater 7 ft 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 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.

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 6th Edition of 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 lb/sf for footings.

Design drilled piers for side resistance only in accordance with Section 4.6 of the *AASHTO Standard Specifications for Highway Bridges* except reduce ultimate side resistance by 25% for uplift. Use the computer software LPILE version 6.0 or later manufactured by Ensoft, Inc. to analyze drilled piers. Provide drilled pier designs with a horizontal deflection of less than 1" at top of piers. For cantilever signs with single drilled pier foundations supporting metal poles, use wings to resist torsion forces. Provide drilled pier designs with a factor of safety of at least 2.0 for torsion.

For drilled pier sign foundations supporting upright trusses, use dual drilled piers connected with a grade beam having a moment of inertia approximately equal to that of either pier. The Broms' method is acceptable to analyze drilled piers with grade beams instead of LPILE. Use a safety factor of at least 3.5 for the Broms' design method in accordance with C13.6.1.1 of the *AASHTO 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 *2012 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 on 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 and supplying 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 *2012*

Standard Specifications.

Payment will be made under:

Pay Item
Overhead Footings

Pay Unit
Cubic Yard

Law Enforcement:

(02/06/2013)

Description

Furnish Law Enforcement Officers and marked Law Enforcement vehicles to direct traffic in accordance with the contract.

Construction Methods

Use uniformed Law Enforcement Officers and marked Law Enforcement vehicles equipped with blue lights mounted on top of the vehicle, and Law Enforcement vehicle emblems to direct or control traffic as required by the plans or by the Engineer.

Measurement and Payment

Law Enforcement will be measured and paid for in the actual number of hours that each Law Enforcement Officer is provided during the life of the project as approved by the Engineer. There will be no direct payment for marked Law Enforcement vehicles as they are considered incidental to the pay item.

Payment will be made under:

Pay Item

Law Enforcement

Pay Unit

Hour



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6/5/2014

TC-2

U-2579B

Forsyth County

TRAFFIC CONTROL DEVICES TO REMAIN ON PROJECT:

(02/05/2013)

Description

Furnish, install, maintain during the life of the project, and leave Traffic Control Devices on the project at its completion in accordance with the plans and specifications.

Construction Methods

Install and leave on the project the Traffic Control Devices necessary to accommodate the traffic pattern shown on sheet **TMP-45** of the Transportation Management Plan, unless otherwise directed by the Engineer.

Provide devices to remain on the project, which meet the requirements of their respective specifications in the 2012 Standard Specifications or their respective special provisions.

Provide devices to remain on the project that are in good condition and subject to the approval of the Engineer.

The devices required to remain on the project at its completion will become the property of the Department.

Basis Of Payment

No additional payment will be made specifically for leaving devices on the project. These devices will be paid under their respective pay items in the Contract which will include full compensation for furnishing, installing, maintaining during the life of the project, and leaving the devices on the project at its completion.



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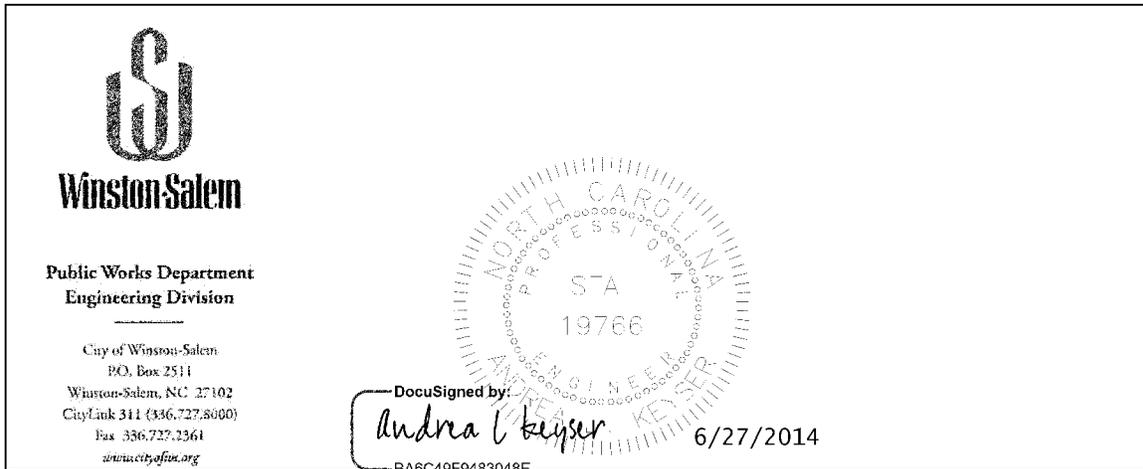
6/5/2014

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PROJECT SPECIAL PROVISIONS Utility Construction



Revise the 2012 Standard Specifications as follows:

Page **10-56, Sub-article 1034 Sanitary Sewer Pipe and Fittings:**
add the following:

1034-5 Casing Spacers

Casing spacers shall be made of Type 304 stainless steel (including risers and hardware). Each shell shall be PVC lined and shall have bolted flanges. Casing spacer runners shall be constructed of ultra high molecular weight polymer (minimum 1 ½" wide) with a friction coefficient of not more than .12. Risers shall be 10 gauge. Risers and runners for top and bottom shells shall be of equal height. With approval of the Engineer, unequal height risers and runners may be used to obtain proper grade for sanitary sewer mains. Casing spacers must be designed to ensure that only the runners of the spacer are in contact with the steel encasement pipe. The bell of the carrier pipe will not be allowed to be in contact with the encasement. Casing spacers shall be manufactured by one of the following or approved equal:

- (1) Cascade Waterworks Manufacturing Company
- (2) Advance Products and Systems, Inc.
- (3) BWM Company

1034-6 Retainer Glands

All retainer glands shall be wedge action glands with torque limiting twist off nuts. Glands shall be Megalug Series 1100 by EBBA Iron, Inc., Uni- Flange Series 1400 by Ford Meter Box Company, Inc., RomaGrip by Romac Industries, Inc., One-Lok Series

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PROJECT SPECIAL PROVISIONS Utility Construction

SLD by Sigma Corp., Stargrip Series 3000 by Star Pipe Products, Cam-Lock Series 111 by Smith-Blair, Inc., or approved equal.

Page 10-56, Sub-article 1034-1 Clay Pipe:

replace with the following:

Vitrified clay pipe shall be manufactured in accordance with ANSI/ASTM C700, tested in accordance with ANSI/ASTM C301 and shall be classified as extra strength pipe. The specific type of joint shall be the O-ring compression type joint. This joint shall conform to ANSI/ASTM C425. All clay pipes will be unglazed. Pipe shall be manufactured by one of the following or approved equal:

- Logan Clay Products Company
- Superior Clay Corporation
- Can Clay Corporation

Page 10-58, Sub-article 1036-1 General

add the following sentence:

All materials in contact with potable water shall be in conformance with Section 1417 of the Safe Drinking Water Act.

Page 10-58, Sub-article 1036-5 Ductile Iron Pipe and Fittings:

replace with the following:

Ductile iron pipe shall be designed to conform to ANSI A21.50 (AWWA C150) and shall be manufactured to conform to ANSI A21.51 (AWWA C151). The interior of pipe for water will be cement lined in accordance with ANSI A21.4 (AWWA C104). The interior of pipe for sanitary sewer will be lined with 40 mils of Protecto 401 Ceramic Epoxy. All bells and spigots for sanitary sewer pipe must be lined with a minimum of 8 mils of Protecto 401 Joint Compound or approved equal. The exterior of all pipe shall be coated with a bituminous coating. Pipe joints will be single rubber gasket push-on type or mechanical joint type unless otherwise specified or otherwise shown on the Engineer's drawings. Rubber gasket joints shall conform to ANSI A21.11 (AWWA C111). Pipe design laying condition will be Type 2, flat-bottom trench with backfill lightly consolidated to centerline of pipe. Pipe for sanitary sewer shall be minimum thickness Class 50. Pipe for water shall be pressure Class 350 for 3" - 16" and pressure Class 250 for 18" and above. Any deviations in class shall be otherwise specified or otherwise shown on the Engineer's drawings.

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Ductile iron flexible restrained joint pipe shall be installed at the locations shown on the Engineer's drawings. All restrained joint pipe shall have flexible push-on joints designed to deflect a minimum of 3° per joint. At locations where field cutting of restrained joint pipe is required, a special field cut kit shall be used by the Contractor. Field welding will not be allowed. Field cut kits shall provide restraint equivalent to factory manufactured restrained joint pipe. Field kits shall be provided by the pipe manufacturer. Restrained joint pipe with a gripping gasket as the only means of restraint will not be allowed. Pipe shall be Flex- Ring by American, TR Flex by U.S. Pipe, Snap-Lok by Griffin, Super-Lock by Clow or approved equal.

Ductile iron fittings shall meet all requirements of ANSI A21.10 (AWWA C110) and will be of the mechanical joint type unless otherwise specified. All glands shall be ductile iron, not gray iron. The interior of fittings for water will be cement lined in accordance with ANSI A21.4 (AWWA C104). The interior of fittings for sanitary sewer will be lined with 40 mils of Protecto 401 Ceramic Epoxy. All bells and spigots for sanitary sewer fittings must be lined with a minimum of 8 mils of Protecto 401 Joint Compound or approved equal. The exterior of all fittings shall be coated with a bituminous coating. Fittings coated on the interior and exterior with 8 mils of fusion bonded epoxy in accordance with ANSI/AWWA C116 and ANSI/AWWA C550 are acceptable. Fittings will have a minimum pressure rating of 250 psi unless otherwise specified by the Engineer. All Fittings are subject to approval by the Engineer, and his acceptance or rejection shall be final. Rubber gasket joints shall conform to ANSI A21.11 (AWWA C111). Ductile iron compact fittings conforming to ANSI A21.53 (AWWA C153) are acceptable. "DI" or "Ductile" shall be cast on each fitting.

Page 10-59, Sub-article 1036-6 Fire Hydrants: add the following:

Hydrants accepted by the City of Winston-Salem are as follows (or approved equal):

- (1) Super Centurion 250, manufactured by Mueller Company
- (2) MK-73-5, manufactured by American Flow Control
- (3) K-81D Guardian, manufactured by Kennedy Valve Company

Page 10-59, Sub-article 1036-7 (A) Gate Valves: replace with the following:

All gate valves shall be resilient-seated gate valves which meet the specifications of ANSI/AWWA C509 or ANSI/AWWA C515. The valve body, bonnet and seal plate shall be coated on all exterior and interior surfaces with a minimum of 8-10 mils of

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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. Valves used for buried service will have a non-rising stem, mechanical joint end connections, and a 2" square operating nut. 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 handwheel 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 handwheel. All valves will open by turning the nut or handwheel 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.

Resilient-seated gate valves shall be designed for a minimum working pressure of 250 psi. 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 10 years from date of purchase against defective materials and workmanship. Gate valves furnished under these specifications must be manufactured by one of the following or approved equal:

- (1) Clow Valve Company
- (2) M & H Valve Company
- (3) American Flow Control
- (4) U.S. Pipe and Foundry Company
- (5) Mueller Company
- (6) Kennedy Valve Company

Page 10-59, Sub-article 1036-7 (C) Tapping Valves:

replace with the following:

Use tapping valves conforming to Sub-article 1036-7 (A) with appropriately sized openings, with flanged by mechanical joint ends and pressure rated at 250 psi.

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Page 10-59, Sub-article 1036-8 (A) Tapping Sleeves:

replace with the following:

Tapping sleeves shall be a split sleeve with mechanical joint end connections and a flanged outlet. Sleeves shall be designed for a minimum working pressure of 200 psi.

Approved tapping sleeves are as follows (or approved equal):

- (1) Mueller Company
- (2) American Flow Control
- (3) Tyler Pipe Company
- (4) U.S. Pipe and Foundry Company
- (5) Kennedy Valve Company

Page 10-59, Sub-article 1036-8 Sleeves, Couplings and Miscellaneous:

add the following:

(C) Valve Boxes

Cast iron valve boxes will conform to ASTM A48, Class 30B. All boxes will conform to the shape and dimensions shown on the City of Winston-Salem detail drawings and will be free from holes, cracks or any other defects. All castings will be thoroughly coated with an asphaltic varnish. The name of the manufacturer shall be permanently cast on each piece. Valve boxes that do not meet specifications shall be rejected. Cast iron valve boxes furnished under these specifications shall be manufactured by one of the following or approved equal:

- (1) Sigma Corp.
- (2) SIP Industries
- (3) DSI International

Page 10-59, Sub-article 1036-9 Service Line Valves and Fittings:

add the following:

All brass fittings shall be manufactured in accordance with AWWA C800 and ASTM B-584. All brass components in contact with potable water must be made from CDA/UNS Brass Alloy C89833 with a maximum lead content of .25% by weight. Brass alloys not listed in ANSI/AWWA C800 Paragraph 4.1.2 are not approved. All fittings shall be UL classified to NSF/ANSI 61 and NSF/ANSI 372 standards and stamped or embossed with a mark or name indicating that the product is manufactured from the low-lead alloy as specified.

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PROJECT SPECIAL PROVISIONS Utility Construction

Page 15-1, Sub-article 1500-2 Cooperation with the Utility Owner, paragraph 2:
add the following sentences:

The utility owner is the Winston-Salem/Forsyth County Utilities Commission. The contact person is David Doss and he can be reached by phone at (336) 727-8063.

The materials and appurtenances installed by the contractor shall require approval by both NCDOT and the utility owner prior to installation.

Page 15-4, Sub-article 1505-3 (E), Thrust Restraint:
replace the fourth paragraph with the following:

All thrust blocks will be constructed of a minimum of Class A concrete. Thrust blocks for horizontal bends and fire hydrants shall be constructed in accordance with the City of Winston-Salem detail drawings. All blocking for vertical bends shall be designed and/or approved by the Engineer. On tie-in sections, the Contractor may be required by the Engineer, to anchor pipe bends, tees, etc. with precast concrete blocking, steel beams, rodding or other approved method to allow the water line to be placed back into service as soon as possible. Polyethylene shall be placed over all fittings before the concrete is poured. All nuts and bolts shall be clear of concrete so that the joint will be accessible. Plywood shall be used as forms for blocking. Concrete is to be poured only against stable undisturbed soil and should be allowed to set prior to any backfilling. Thrust blocks should be allowed to cure two days prior to pressure testing the water main. Higher strength concrete may be required when it is necessary to pressure test prior to the end of the two day curing time.

Page 15-6, Sub-article 1510-3 (B), Testing and Sterilization:
change the allowable leakage formula to:

$$W = LD\sqrt{P} \div 148,000$$

Page 15-6, Sub-article 1510-3 (B), Testing and Sterilization, sixth paragraph:
Replace the paragraph with the following:

Sterilize water lines in accordance with Section 1003 of The Rules Governing Public Water supply and AWWA C651 Section 4.4.3, the Continuous Feed Method. Provide a chlorine solution with between 50 parts per million and 100 parts per million in the initial feed. If the chlorine level drops below 10 parts per million during a 24 hour period, then flush, refill with fresh chlorine solution, and repeat for 24 hours. Provide certified

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bacteriological and contaminant test results from a state-approved or state-certified laboratory. Operate all valves and controls to assure thorough sterilization.

Page 15-6, Sub-article 1510-3 (B), Testing and Sterilization, seventh paragraph:

delete the words “may be performed concurrently or consecutively.”
and replace with “shall be performed consecutively.”

Page 15-7, Sub-article 1515-2 Materials, line 19:

replace the first sentence with the following:

Air release valves shall meet AWWA C512. The air release valve shall be a Type 316 stainless steel (all parts). The pressure air valve shall have an operation pressure of 0-200 psi. The bronze ball valve curb stops shall have a minimum working pressure of 200 psi.

Page 15-7, Sub-article 1515-3 Construction Methods:

add the following:

(H) Tapping Sleeves

Tapping sleeves shall be used for "wet" taps into existing water mains as indicated on the Engineer's drawings. The Contractor shall verify the type of material, size, etc., of the existing main prior to ordering the sleeve. All tapping sleeves and valves shall be water tested before the tap is made. Test pressure shall be 200 psi. All tapping sleeves and valves shall be installed level. The Engineer must be present during the entire tapping and testing process. Tapping sleeves are incidental to the valve installation.

Page 15-8, Sub-article 1515-3 (A), Valves:

add the following:

All valves 3” through 16” shall be gate valves.

Page 15-8, Sub-article 1515-3 (B), Meters:

add the following:

For relocated meters, the Contractor shall install a new meter box, angle valves, yoke, tee and ball valve as directed by the Engineer. The Contractor shall expose a portion of the

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water line from the dwelling to determine the material and have proper fittings for reconnection to the new meter box. At the approval of the Inspector, the Contractor shall remove the existing meter and install it in the new yoke. The Contractor shall reconnect the property side water line from the existing meter box to the new meter box. This reconnection shall be directed by the Engineer and performed in a timely manner so that the property is without water for a minimal amount of time. The Contractor shall remove and dispose of the existing meter box and yoke and backfill as shown on the plans or as directed by the Engineer.

Page 15-8, Sub-article 1515-3 (D), Hydrants: add the following:

Any fire hydrant removed, relocated, or adjusted that is a 1980 model or older, shall be delivered to the City's Utilities Construction and Maintenance Department and exchanged for a new hydrant.

Page 15-11, Sub-article 1520-3 (A) (2) Testing: replace with the following:

(2) Testing

(a) Infiltration, Exfiltration and Air Test

After the pipeline is completely backfilled and before being placed into service, a low-pressure air test with an approved pressure gauge will be conducted by the Contractor in accordance with ASTM C-828. Each section of pipeline (including connections) between manholes will be tested by plugging the upstream manhole and the downstream manhole. By using mirrors, lights, etc., the Contractor must show the Engineer that the 2 plugs are at the proper location and that the line is clear between the plugs. Air is added to the line until the pressure is between 3.0 psi and 4.0 psi. If the pressure drops more than 1.0 psi during the time shown on the chart below, the line is presumed to have failed the test. If the top of the pipe to be tested is below the ground water table, an infiltration test may be required. Infiltration shall not exceed 100 gallons per inch diameter per mile of pipe per 24 hours. An obvious leak in any section will be corrected even if the section passes testing. The Engineer must be present during the entire testing process. Any work done without his supervision will not be accepted. Air testing will be required for pipelines 42" and smaller. Larger pipelines will require infiltration and/or exfiltration testing. Exfiltration limits shall be the same as infiltration.

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Air test time shall be as follows:

MINIMUM AIR TEST TIME

<u>Main Size</u>	<u>Time (minutes per 100 feet of pipe)</u>
8"	1.5
10"	1.8
12"	2.1
15"	2.4
18"	2.7
21"	3.3
24"	3.9
27"	4.5
30"	5.1
36"	6.3
42"	7.6

(b) Video Inspection

As a final measure required for acceptance, the Contractor shall clean and televise all sanitary sewer mains prior to requesting final inspection. The Contractor shall televise the entire sewer main and all service connections. The process shall begin at the upstream manhole for each segment, and proceed to the downstream manhole for that same segment. Connections shall be televised from the cleanout to the main. Video inspection may occur only after Record Drawings are accepted and approved by the City of Winston-Salem. Prior to video inspection of mains in paved areas, structures must be raised to final grade and 2" of asphalt must be in place. The City will not accept video that is more than 90 days old unless approved by the Engineer.

The camera used for inspection shall be one specifically designed and constructed for sanitary sewer pipeline inspection. Lighting for the camera shall be suitable to provide a clear color picture of the entire periphery of the pipe. The camera must be able to pan and tilt in order to allow for 360 degree viewing. The camera must also be capable of receiving and transmitting a picture having not less than a resolution of 320(x) by 240(y). The television system shall be equipped to indicate the camera travel distance in feet by display on the video viewing screen. All television equipment (camera, monitor, etc.) must be capable of producing picture quality which is satisfactory to the Engineer.

Prior to video inspection, the Contractor shall clean the sewer mains with a high velocity water jet. All debris shall be collected in the downstream manhole and removed by the Contractor. Debris shall not be released into the existing sewer

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system. During the entire video process, the distance counter must be set at zero at the upstream manhole for each segment (i.e. reset the counter to zero at each manhole). The Contractor will be required to pan and tilt at each manhole and at each service connection. Each manhole must be marked with the manhole station on the interior with paint or some other legible identifier. Each cleanout stack must be marked with the house number or the lot number. The Contractor will also be required to pan and tilt when any potential problems or abnormalities are noticed or suspected. Maximum travel speed for the camera will be 30 feet per minute. The following video screen data will be required:

- Project name and project number
- Date of inspection
- Travel distance and time
- Station of start and end manholes
- Depth of start and end manholes
- Size of main
- Type of pipe

All above data shall be shown at the start and end manholes of each segment. While the camera is moving through the pipe, distance shall be the only data shown on the screen (top left or top right of screen).

The entire video inspection shall be submitted to the Engineer on DVD (2 copies) and formatted with software compatible and readable by the City of Winston-Salem. The City of Winston-Salem shall not be responsible for purchasing additional software necessary to view the DVD.

Any video that does not clearly show the pipe and service connections will be rejected. In the event that repairs are made, the segment receiving the repairs shall be flushed and televised again. The Engineer must oversee the entire cleaning and televising process. Prior to beginning the process, a 24 hour notice must be given by the Contractor to the Engineer. The cost of cleaning and televising shall be included in the unit price for pipe.

Page 15-13, Sub-article 1525-2, Materials, lines 15-19:

Replace with the following:

Manhole rings and covers will be made of cast iron and will conform to ASTM A48, Class 35B. 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 City of Winston-Salem detail drawing 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.

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The name of the manufacturer and the part number shall be cast permanently on the ring and the cover. Castings that do not meet specifications shall be rejected. Manhole rings and covers shall be Type 2, as shown in the detail drawings, unless otherwise indicated on the plans.

Page 15-15, Sub-article 1530-3, Construction Methods: add the following:

(E) Remove Blow-off Assembly

Remove blow-off assembly by closing the corporation cock at the main and removing all blow-off piping including the meter box.

Page 15-15, Sub-article 1530-3 (A), Abandoning Pipe: add the following paragraph:

When abandoning water mains up to a main that is to remain in service, any valve or tee associated with the main to be abandoned shall be removed. A sleeve and any necessary piping shall be installed to reconnect the water main to remain in service. All other main line valves on abandoned water mains shall be abandoned by removing the valve box. The work covered in this paragraph shall be considered incidental to the abandonment.

Page 15-16, Sub-article 1530-3 (C), Remove Water Meter: replace the first sentence with the following:

Remove water meter by closing the corporation cock at the main and removing the lateral including the angle valve, setter and meter box.

Page 15-16, Sub-article 1530-4, Measurement and Payment: replace with the following

Utility pipe that is abandoned by filling or removal will be measured and paid by the linear foot for the size of pipe. Utility pipe that is abandoned by plugging the ends only and leaving in place will not be measured or paid. Grout used for plugging of abandoned utility pipe is incidental to the work being performed. Utility pipe that is removed by other work of the contract will be incidental to the other work.

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Abandon Utility Manhole will be measured and paid per each.

Remove Utility Manhole will be measured and paid per each.

Remove Water Meter, Remove Fire Hydrant, and Remove Blow-off Assembly will be measured and paid per each.

Payment will be made under:

Pay Item	Pay Unit
Abandon __" Utility Pipe	Linear Foot
Abandon Utility Manhole	Each
Remove Utility Manhole	Each
Remove Water Meter	Each
Remove Fire Hydrant	Each
Remove Blow-off Assembly	Each

Page 15-17, Sub-article 1540-3 (D), Carrier Pipe Installation, lines 20-22:
replace with the following:

Encasement pipe shall be installed prior to laying the carrier pipe within 50 feet of either end of the encasement. Casing spacers are required and shall be placed at 10 foot intervals within the encasement. One spacer shall be placed not more than 2 feet from each end of the encasement. Only the runners of the casing spacer shall be in contact with the encasement. The bell of the carrier pipe will not be allowed to be in contact with the encasement. The Engineer must be present to observe the entire installation of the carrier pipe.

ANCHOR SEWER MAIN TO PROPOSED CULVERT:

The existing sewer main shall be supported and anchored within the culvert extension as shown on the anchor detail, as described in the provisions herein and in the contract and as directed by the Engineer.

Galvanizing Steel Strap:

Unless otherwise directed, all steel straps and hardware shall be galvanized in accordance with Section 1076 of the Standard Specifications. Straps shall be a 3" wide and 1/2" thick. Straps shall be spaced and installed as directed by the Engineer.

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Concrete Expansion Anchor:

The existing concrete anchors are ¾” Hilti Kwik Bolt II. The contractor shall use these anchors, or an approved equal, as directed by the Engineer. The anchors shall be installed per the detail and per the manufacturer’s recommendations.

Concrete Bench:

The concrete bench shall be installed with Class A Concrete as covered in Section 1000. The bench shall be constructed in accordance with Section 825 and dimensions shall match those of the existing. Any joint work, as covered in Section 825, required by the Engineer shall be considered incidental to all other work.

Concrete bench, galvanized steel straps, and concrete expansion anchors furnished and installed as required and accepted will be measured and paid for at the contract unit price per linear foot for "*Anchor Sewer Main to Proposed Culvert*". Such price and payments will be compensation in full for all materials, labor, equipment and incidentals necessary to complete the work.

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PROJECT SPECIAL PROVISIONS

Utilities by Others

General:

The following utility companies have facilities that will be in conflict with the construction of this project:

- A. Duke Energy Progress - Power Distribution
- B. A T & T - Telephone
- C. CenturyLink - Telephone
- D. Time Warner Cable - Cable TV
- E. Piedmont Natural Gas - Natural Gas
- F. City of Winston-Salem – Sewer

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.

Utilities Requiring Adjustment:

A. Duke Energy Progress - Power Distribution

- 1) Duke Energy Progress will remove its existing poles and overhead lines and install new poles and overhead lines within the project limits at the locations shown on the Utilities by Others Plans by August 1, 2015.
- 2) After completion of the bridge between -Y1- Station 32+92.05 and -Y1- Station 35+49.21 and after placement of fill along -Y1-, Duke will install a new overhead power pole line right of -Y1- see note on sheet UO-02.
- 3) Contact person for Duke Progress Energy is Ms. Paula Butner at 336-917-2525.

B. A T & T - Telephone

- 1) A T & T will remove its existing poles, overhead lines, and underground facilities and install new underground and overhead lines within the project limits at the locations shown on the Utilities by Others Plans by August 1, 2015.
- 2) Contact person for A T & T is Mr. Jim Brooks (Telics) 336-978-5627.

UBO-2

C. CenturyLink - Telephone

- 1) CenturyLink will remove its existing poles, underground, and overhead facilities and install new overhead lines and underground facilities within the project limits at the locations shown on the Utilities by Others Plans prior to date of availability.
- 2) Contact person for CenturyLink is Mr. Brian McNiff at 336-996-5999.

D. Time Warner Cable - Cable TV

- 1) Time Warner Cable will remove its existing overhead and underground facilities and install new overhead and underground facilities within the project limits at the locations shown on the Utilities by Others Plans by August 1, 2015.
- 2) Contact person for Time Warner Cable is Mr. Mike Westward at 336-382-3282.

E. Piedmont Natural Gas - Natural Gas

- 1) Piedmont Natural Gas will abandon its existing underground utilities and install new underground facilities within the project limits at the locations shown on the Utilities by Others Plans by March 31, 2015.
- 2) If any additional conflicts are found in the field, Piedmont will require one week notice and two weeks to make any necessary adjustments.
- 3) Contact person for Piedmont Natural Gas is Mr. David Robertson at 336-726-7769.

F. City of Winston-Salem - Sewer

- 1) The City of Winston-Salem will install a new gravity sewer line crossing line –L- at station 558+85 and will abandon the existing gravity sewer line crossing line – L- at Station 560+45 by June 1, 2015.
- 2) For all other City of Winston-Salem water and sewer conflicts, see the utility construction plans and special provisions.
- 3) Contact person for the City of Winston-Salem is Mr. David Doss at 336-727-8063.

**Project Special Provisions
Erosion Control**

STABILIZATION REQUIREMENTS:

Stabilization for this project shall comply with the time frame guidelines as specified by the NCG-010000 general construction permit effective August 3, 2011 issued by the North Carolina Department of Environment and Natural Resources Division of Water Quality. 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

2 nd Millennium	Duster	Magellan	Rendition
Avenger	Endeavor	Masterpiece	Scorpion
Barlexas	Escalade	Matador	Shelby
Barlexas II	Falcon II, III, IV & V	Matador GT	Signia
Barrera	Fidelity	Millennium	Silverstar
Barrington	Finesse II	Montauk	Southern Choice II
Biltmore	Firebird	Mustang 3	Stetson
Bingo	Focus	Olympic Gold	Tarheel
Bravo	Grande II	Padre	Titan Ltd
Cayenne	Greenkeeper	Paraiso	Titanium
Chapel Hill	Greystone	Picasso	Tomahawk
Chesapeake	Inferno	Piedmont	Tacer
Constitution	Justice	Pure Gold	Trooper
Chipper	Jaguar 3	Prospect	Turbo
Coronado	Kalahari	Quest	Ultimate
Coyote	Kentucky 31	Rebel Exeda	Watchdog
Davinci	Kitty Hawk	Rebel Sentry	Wolfpack
Dynasty	Kitty Hawk 2000	Regiment II	
Dominion	Lexington	Rembrandt	

Approved Kentucky Bluegrass Cultivars:

Alpine	Bariris	Envicta	Rugby
Apollo	Bedazzled	Impact	Rugby II
Arcadia	Bordeaux	Kenblue	Showcase
Arrow	Champagne	Midnight	Sonoma
Award	Chicago II	Midnight II	

Approved Hard Fescue Cultivars:

Chariot	Nordic	Rhino	Warwick
Firefly	Oxford	Scaldis II	
Heron	Reliant II	Spartan II	
Minotaur	Reliant IV	Stonehenge	

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

- 18# Creeping Red Fescue
- 8# Big Bluestem
- 6# Indiangrass
- 4# Switchgrass
- 35# Rye Grain
- 500# Fertilizer
- 4000# Limestone

May 1 – September 1

- 18# Creeping Red Fescue
- 8# Big Bluestem
- 6# Indiangrass
- 4# Switchgrass
- 25# German or Browntop Millet
- 500# Fertilizer
- 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 $\frac{3}{4}$ " 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 *Seeding 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*.

RESPONSE FOR EROSION CONTROL:**Description**

Furnish the labor, materials, tools and equipment necessary to move personnel, equipment, and supplies to the project necessary for the pursuit of any or all of the following work as shown herein, by an approved subcontractor.

Section	Erosion Control Item	Unit
1605	Temporary Silt Fence	LF
1606	Special Sediment Control Fence	LF/TON
1615	Temporary Mulching	ACR
1620	Seed - Temporary Seeding	LB
1620	Fertilizer - Temporary Seeding	TN
1631	Matting for Erosion Control	SY
SP	Coir Fiber Mat	SY
1640	Coir Fiber Baffles	LF
SP	Permanent Soil Reinforcement Mat	SY
1660	Seeding and Mulching	ACR

1661	Seed - Repair Seeding	LB
1661	Fertilizer - Repair Seeding	TON
1662	Seed - Supplemental Seeding	LB
1665	Fertilizer Topdressing	TON
SP	Safety/Highly Visible Fencing	LF
SP	Response for Erosion Control	EA

Construction Methods

Provide an approved subcontractor who performs an erosion control action as described in the NPDES Inspection Form SPPP30. Each erosion control action may include one or more of the above work items.

Measurement and Payment

Response for Erosion Control will be measured and paid for by counting the actual number of times the subcontractor moves onto the project, including borrow and waste sites, and satisfactorily completes an erosion control action described in Form 1675. The provisions of Article 104-5 of the *Standard Specifications* will not apply to this item of work.

Payment will be made under:

Pay Item

Response for Erosion Control

Pay Unit

Each

MINIMIZE REMOVAL OF VEGETATION:

The Contractor shall minimize removal of vegetation at stream banks and disturbed areas within the project limits as directed.

STOCKPILE AREAS:

The Contractor shall install and maintain erosion control devices sufficient to contain sediment around any erodible material stockpile areas as directed.

ACCESS AND HAUL ROADS:

At the end of each working day, the Contractor shall install or re-establish temporary diversions or earth berms across access/haul roads to direct runoff into sediment devices. Silt fence sections that are temporarily removed shall be reinstalled across access/haul roads at the end of each working day.

WASTE AND BORROW SOURCES:

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:

http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/fieldops/downloads/Files/ContractedReclamationProcedures.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 1630-4 of the *Standard Specifications*.

CLEAN WATER DIVERSION:**Description**

This work consists of installing, maintaining, and removing any and all material required for the construction of clean water diversions. The clean water diversions shall be used to direct water flowing from offsite around/away from specific area(s) of construction.

Materials

Refer to Division 10

Item

Geotextile for Soil Stabilization, Type 4

Section

1056

Construction Methods

The Contractor shall install the clean water diversions in accordance with the details in the plans and at locations indicated in the plans, and as directed. Upon installation, the excavated material

shall be immediately stabilized as provided in Section 1620 of the *Standard Specifications*. Other stabilization methods may be utilized with prior approval from the Engineer.

Line clean water diversion with geotextile unrolled in the direction of flow and lay smoothly but loosely on soil surface without creases. Bury top of slope geotextile edge in a trench at least 5" deep and tamp securely. Make vertical overlaps a minimum of 18" with upstream geotextile overlapping the downstream geotextile.

Secure geotextile with eleven gauge wire staples shaped into a *u* shape with a length of not less than 6" and a throat not less than 1" in width. Place staples along outer edges and throughout the geotextile a maximum of 3 ft. horizontally and vertically.

Measurement and Payment

Silt Excavation will be measured and paid for in accordance with Article 1630-4 of the *Standard Specifications*.

Geotextile for Soil Stabilization will be measured and paid for in accordance with Article 270-4 of the *Standard Specifications*.

Stabilization of the excavated material will be paid for as *Temporary Seeding* as provided in Section 1620 of the *Standard Specifications*.

Such price and payment shall be considered full compensation for all work covered by this section including all materials, construction, maintenance, and removal of the clean water diversions.

SAFETY FENCE AND JURISDICTIONAL FLAGGING:

Description

Safety Fence shall consist of furnishing materials, installing and maintaining polyethylene or polypropylene fence along the outside riparian buffer, wetland, or water boundary, or other boundaries located within the construction corridor to mark the areas that have been approved to infringe within the buffer, wetland, endangered vegetation, culturally sensitive areas or water. The fence shall be installed prior to any land disturbing activities.

Interior boundaries for jurisdictional areas noted above shall be delineated by stakes and highly visible flagging.

Jurisdictional boundaries at staging areas, waste sites, or borrow pits, whether considered outside or interior boundaries shall be delineated by stakes and highly visible flagging.

Materials

(A) Safety Fencing

Polyethylene or polypropylene fence shall be a highly visible preconstructed safety fence approved by the Engineer. The fence material shall have an ultraviolet coating.

Either wood posts or steel posts may be used. Wood posts shall be hardwood with a wedge or pencil tip at one end, and shall be at least 5 ft. in length with a minimum nominal 2" x 2" cross section. Steel posts shall be at least 5 ft. in length, and have a minimum weight of 0.85 lb/ft of length.

(B) Boundary Flagging

Wooden stakes shall be 4 feet in length with a minimum nominal 3/4" x 1-3/4" cross section. The flagging shall be at least 1" in width. The flagging material shall be vinyl and shall be orange in color and highly visible.

Construction Methods

No additional clearing and grubbing is anticipated for the installation of this fence. The fence shall be erected to conform to the general contour of the ground.

(A) Safety Fencing

Posts shall be set at a maximum spacing of 10 ft., maintained in a vertical position and hand set or set with a post driver. If hand set, all backfill material shall be thoroughly tamped. Wood posts may be sharpened to a dull point if power driven. Posts damaged by power driving shall be removed and replaced prior to final acceptance. The tops of all wood posts shall be cut at a 30-degree angle. The wood posts may, at the option of the Contractor, be cut at this angle either before or after the posts are erected.

The fence geotextile shall be attached to the wood posts with one 2" galvanized wire staple across each cable or to the steel posts with wire or other acceptable means.

Place construction stakes to establish the location of the safety fence in accordance with Article 105-9 or Article 801-1 of the *Standard Specifications*. No direct pay will be made for the staking of the safety fence. All stakeouts for safety fence shall be considered incidental to the work being paid for as "Construction Surveying", except that where there is no pay item for construction surveying, all safety fence stakeout will be performed by state forces.

The Contractor shall be required to maintain the safety fence in a satisfactory condition for the duration of the project as determined by the Engineer.

(B) Boundary Flagging

Boundary flagging delineation of interior boundaries shall consist of wooden stakes on 25 feet maximum intervals with highly visible orange flagging attached. Stakes shall be installed a minimum of 6” into the ground. Interior boundaries may be staked on a tangent that runs parallel to buffer but must not encroach on the buffer at any location. Interior boundaries of hand clearing shall be identified with a different colored flagging to distinguish it from mechanized clearing.

Boundary flagging delineation of interior boundaries will be placed in accordance with Article 105-9 or Article 801-1 of the *Standard Specifications*. No direct pay will be made for delineation of the interior boundaries. This delineation will be considered incidental to the work being paid for as *Construction Surveying*, except that where there is no pay item or construction surveying the cost of boundary flagging delineation shall be included in the unit prices bid for the various items in the contract. Installation for delineation of all jurisdictional boundaries at staging areas, waste sites, or borrow pits shall consist of wooden stakes on 25 feet maximum intervals with highly visible orange flagging attached. Stakes shall be installed a minimum of 6” into the ground. Additional flagging may be placed on overhanging vegetation to enhance visibility but does not substitute for installation of stakes.

Installation of boundary flagging for delineation of all jurisdictional boundaries at staging areas, waste sites, or borrow pits shall be performed in accordance with Subarticle 230-4(B)(3)(d) 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:**Description**

This work consists of furnishing and placing *Permanent Soil Reinforcement Mat*, of the type specified, over previously prepared areas as directed.

Materials

The product shall be a permanent erosion control reinforcement mat and shall be constructed of synthetic or a combination of coconut and synthetic fibers evenly distributed throughout the mat between a bottom UV stabilized netting and a heavy duty UV stabilized top net. The matting shall be stitched together with UV stabilized polypropylene thread to form a permanent three-dimensional structure. The mat shall have the following minimum physical properties:

Property	Test Method	Value	Unit
Light Penetration	ASTM D6567	9	%
Thickness	ASTM D6525	0.40	in
Mass Per Unit Area	ASTM D6566	0.55	lb/sy
Tensile Strength	ASTM D6818	385	lb/ft
Elongation (Maximum)	ASTM D6818	49	%
Resiliency	ASTM D1777	>70	%
UV Stability *	ASTM D4355	≥80	%
Porosity (Permanent Net)	ECTC Guidelines	≥85	%
Maximum Permissible Shear Stress (Vegetated)	Performance Bench Test	≥8.0	lb/ft ²
Maximum Allowable Velocity (Vegetated)	Performance Bench Test	≥16.0	ft/s

*ASTM D1682 Tensile Strength and % strength retention of material after 1000 hours of exposure.

Submit a certification (Type 1, 2, or 3) from the manufacturer showing:

- (A) the chemical and physical properties of the mat used, and
- (B) conformance of the mat with this specification.

Construction Methods

Matting shall be installed in accordance with Subarticle 1631-3(B) of the *Standard Specifications*.

All areas to be protected with the mat shall be brought to final grade and seeded 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. Areas where the mat is to be placed will not need to be mulched.

Measurement and Payment

Permanent Soil Reinforcement Mat 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 is installed and accepted. Overlaps will not be included in the measurement, and will be considered as incidental to the work. Such payment shall be full compensation for furnishing and installing the mat, including overlaps, and for all required maintenance.

Payment will be made under:

Pay Item	Pay Unit
Permanent Soil Reinforcement Mat	Square Yard

SKIMMER BASIN WITH BAFFLES:

Description

Provide a skimmer basin to remove sediment from construction site runoff at locations shown in the erosion control plans. See the Skimmer Basin with Baffles Detail sheet provided in the erosion control plans. Work includes constructing sediment basin, installation of temporary slope drain pipe and coir fiber baffles, furnishing, installation and cleanout of skimmer, providing and placing stone pad on bottom of basin underneath skimmer device, providing and placing a geotextile spillway liner, providing coir fiber mat stabilization for the skimmer outlet, disposing of excess materials, removing temporary slope drain, coir fiber baffles, geotextile liner and skimmer device, backfilling basin area with suitable material and providing proper drainage when basin area is abandoned.

Materials

Item	Section
Stone for Erosion Control, Class B	1042
Geotextile for Soil Stabilization, Type 4	1056
Fertilizer for Temporary Seeding	1060-2
Seed for Temporary Seeding	1060-4
Seeding and Mulching	1060-4
Matting for Erosion Control	1060-8
Staples	1060-8
Coir Fiber Mat	1060-14
Temporary Slope Drain	1622-2
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.

Anchors: Staples, stakes, or reinforcement bars shall be used as anchors.

Wooden Stakes:

Provide hardwood stakes 12"- 24" long with a 2" x 2" nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving through the coir fiber mat and down into the underlying soil. The other end of the stake needs to have a 1"- 2" long head at the top with a 1"- 2" notch following to catch and secure the coir fiber mat.

Steel Reinforcement Bars:

Provide uncoated #10 steel reinforcement bars 24" nominal length. The bars shall have a 4" diameter bend at one end with a 4" straight section at the tip to catch and secure the coir fiber mat.

Staples:

Provide staples made of 0.125" diameter new steel wire formed into a *u* shape not less than 12" in length with a throat of 1" in width.

Construction Methods

Excavate basin according to the erosion control plans with basin surface free of obstructions, debris, and pockets of low-density material. Install temporary slope drain pipe and construct the primary spillway according to the Skimmer Basin with Baffles Detail sheet in the erosion control plans. Temporary slope drain pipe at inlet of basin may be replaced by geotextile as directed. 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 4" Schedule 40 PVC pipe into dam on the lower side of basin 1 ft. from the bottom of the basin and according to the detail, and extend the pipe so the basin will drain. Attach a 6 ft. arm pipe to the coupling connection and skimmer according to manufacturer recommendations. 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 skimmer 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.

Line primary spillway with geotextile unrolled in the direction of flow and lay smoothly but loosely on soil surface without creases. Bury edges of geotextile in a trench at least 5" deep and tamp firmly. If geotextile for the primary spillway is not one continuous piece of material, make horizontal overlaps a minimum of 18" with upstream geotextile overlapping the downstream geotextile. Secure geotextile with eleven gauge wire staples shaped into a *u* shape with a length of not less than 12" and a throat not less than 1" in width. Place staples along outer edges and throughout the geotextile a maximum of 3 ft. horizontally and vertically. Geotextile shall be placed to the bottom and across the entire width of the basin according to the Skimmer Basin with Baffles detail. Place sealant inside basin around barrel pipe on top of geotextile with a minimum width of 6 in.

At the skimmer outlet, provide a smooth soil surface free from stones, clods, or debris that will prevent contact of the coir fiber matting with the soil. Unroll the matting and apply without stretching such that it will lie smoothly but loosely on the soil surface. Wooden stakes, reinforcement bars, or staples may be used as anchors in accordance with the details in the plans and as directed. Place anchors across the matting at the ends approximately 1 ft. apart. Place anchors along the outer edges and down the center of the matting 3 ft. apart.

All bare side slope sections of the skimmer basin shall be seeded with a temporary or permanent seed mix as directed and in accordance with Articles 1620-3, 1620-4, 1620-5, 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.

Geotextile for Soil Stabilization will be measured and paid for in accordance with Article 270-4 of the *Standard Specifications*.

Coir Fiber Baffles will be measured and paid for in accordance with Article 1640-4 of the *Standard Specifications*.

___" *Skimmer* will be measured in units of each. ___" *Skimmer* will be measured and paid for as the maximum number of each size skimmer acceptably installed and in use at any one time during the life of the project. Barrel and arm pipe, cleanout, relocation and reinstallation of ___" *Skimmer* is considered incidental to the measurement of the quantity of ___" *Skimmer* and no separate payment will be made. No separate payment shall be made if ___" *Skimmer*, barrel and/or arm pipe(s) are damaged by ice accumulation.

Coir Fiber Mat will be measured and paid for as the actual number of square yards measured along the surface of the ground over which coir fiber mat is installed and accepted.

Temporary Slope Drain will be measured and paid for in accordance with Article 1622-4 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*.

Seed for Temporary Seeding will be measured and paid for in accordance with Article 1620-6 of the *Standard Specifications*.

Fertilizer for Temporary Seeding will be measured and paid for in accordance with Article 1620-6 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.

Payment will be made under:

Pay Item	Pay Unit
__" Skimmer	Each
Coir Fiber Mat	Square Yard

TIERED SKIMMER BASIN WITH BAFFLES:

Description

Provide a tiered skimmer basin to remove sediment from construction site runoff at locations shown in the erosion control plans. See the Tiered Skimmer Basin Detail sheet provided in the erosion control plans. Tiered Skimmer Basins shall be installed in areas where topography creates a large elevation difference between the inlet and outlet of a single skimmer basin. Work includes constructing sediment basins, installation of coir fiber baffles, installation of temporary slope drains, furnishing, installation and cleanout of skimmer, providing and placing stone pad on bottom of basin underneath skimmer device, providing and placing geotextile spillway liners, providing coir fiber mat stabilization for the skimmer outlet, disposing of excess materials, removing temporary slope drains, coir fiber baffles, geotextile liner and skimmer device, backfilling basin area with suitable material and providing proper drainage when basin area is abandoned.

Materials

Item	Section
Stone for Erosion Control, Class B	1042

Geotextile for Soil Stabilization, Type 4	1056
Fertilizer for Temporary Seeding	1060-2
Seed for Temporary Seeding	1060-4
Seeding and Mulching	1060-4
Matting for Erosion Control	1060-8
Staples	1060-8
Coir Fiber Mat	1060-14
Temporary Slope Drain	1622-2
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.

Anchors: Staples, stakes, or reinforcement bars shall be used as anchors.

Wooden Stakes:

Provide hardwood stakes 12"- 24" long with a 2" x 2" nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving through the coir fiber mat and down into the underlying soil. The other end of the stake needs to have a 1"- 2" long head at the top with a 1"- 2" notch following to catch and secure the coir fiber mat.

Steel Reinforcement Bars:

Provide uncoated #10 steel reinforcement bars 24" nominal length. The bars shall have a 4" diameter bend at one end with a 4" straight section at the tip to catch and secure the coir fiber mat.

Staples:

Provide staples made of 0.125" diameter new steel wire formed into a *u* shape not less than 12" in length with a throat of 1" in width.

Construction Methods

Excavate basins according to the erosion control plans with basin surface free of obstructions, debris, and pockets of low-density material. Install temporary slope drains and construct the primary spillways according to the Tiered Skimmer Basin Detail sheet in the erosion control plans. Construct the coir fiber baffles according to *Roadway Standard Drawings* No. 1640.01

and Section 1640 of the *Standard Specifications*. Multiple upper basins, or Modified Silt Basins Type 'B' as labeled on the detail, may be required based on site conditions and as directed.

Install skimmer device according to manufacturer recommendations. Install 4" Schedule 40 PVC pipe into dam on the lower side of basin 1 ft. from the bottom of the basin and according to the detail, and extend the pipe so the basin will drain. Attach a 6 ft. arm pipe to the coupling connection and skimmer according to manufacturer recommendations. 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 skimmer 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.

Install a minimum of 2 (two) temporary slope drains to dewater the upper basin to the lower basin. The slope drains shall be installed a minimum of 6 inches, or one radius width of the temporary slope drain pipe, below the base of the primary spillway section of the upper basin. The outlet of the slope drains shall be placed on the bottom elevation of the lower basin.

Line primary spillways with geotextile unrolled in the direction of flow and lay smoothly but loosely on soil surface without creases. Bury edges of geotextile in a trench at least 5" deep and tamp firmly. If geotextile for primary spillways is not one continuous piece of material, make horizontal overlaps a minimum of 18" with upstream geotextile overlapping the downstream geotextile. Secure geotextile with eleven gauge wire staples shaped into a *u* shape with a length of not less than 12" and a throat not less than 1" in width. Place staples along outer edges and throughout the geotextile a maximum of 3 ft. horizontally and vertically. Geotextile shall be placed to the bottom and across the entire width of the basin according to the Tiered Skimmer Basin with Baffles detail.

At the skimmer outlet, provide a smooth soil surface free from stones, clods, or debris that will prevent contact of the coir fiber matting with the soil. Unroll the matting and apply without stretching such that it will lie smoothly but loosely on the soil surface. Wooden stakes, reinforcement bars, or staples may be used as anchors in accordance with the details in the plans and as directed. Place anchors across the matting at the ends approximately 1 ft. apart. Place anchors along the outer edges and down the center of the matting 3 ft. apart. Place sealant inside basin around barrel pipe on top of geotextile with a minimum width of 6 in.

All bare side slope sections of the skimmer basin shall be seeded with a temporary or permanent seed mix as directed and in accordance with Articles 1620-3, 1620-4, 1620-5, 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.

Geotextile for Soil Stabilization will be measured and paid for in accordance with Article 270-4 of the *Standard Specifications*.

Coir Fiber Baffles will be measured and paid for in accordance with Article 1640-4 of the *Standard Specifications*.

__" *Skimmer* will be measured in units of each. __" *Skimmer* will be measured and paid for as the maximum number of each size skimmer acceptably installed and in use at any one time during the life of the project. Barrel and arm pipe, cleanout, relocation and reinstallation of __" *Skimmer* is considered incidental to the measurement of the quantity of __" *Skimmer* and no separate payment will be made. No separate payment shall be made if __" *Skimmer*, barrel and/or arm pipe(s) are damaged by ice accumulation.

Coir Fiber Mat will be measured and paid for as the actual number of square yards measured along the surface of the ground over which coir fiber mat is installed and accepted.

Temporary Slope Drain will be measured and paid for in accordance with Article 1622-4 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*.

Seed for Temporary Seeding will be measured and paid for in accordance with Article 1620-6 of the *Standard Specifications*.

Fertilizer for Temporary Seeding will be measured and paid for in accordance with Article 1620-6 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.

Payment will be made under:

Pay Item	Pay Unit
__" Skimmer	Each

Coir Fiber Mat

Square Yard

COIR FIBER WATTLES WITH POLYACRYLAMIDE (PAM):**Description**

Coir Fiber Wattles are tubular products consisting of coir fibers (coconut fibers) encased in coir fiber netting. Coir Fiber Wattles are used on slopes or channels to intercept runoff and act as a velocity break. Coir Fiber Wattles are to be placed at locations shown on the plans or as directed. Installation shall follow the detail provided in the plans and as directed. Work includes furnishing materials, installation of coir fiber wattles, matting installation, PAM application, and removing wattles.

Materials

Coir Fiber Wattle shall meet the following specifications:

100% Coir (Coconut) Fibers	
Minimum Diameter	12 in.
Minimum Density	3.5 lb/ft ³ +/- 10%
Net Material	Coir Fiber
Net Openings	2 in. x 2 in.
Net Strength	90 lbs.
Minimum Weight	2.6 lbs./ft. +/- 10%

Anchors: Stakes shall be used as anchors.

Wooden Stakes:

Provide hardwood stakes a minimum of 2-ft. long with a 2 in. x 2 in. nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving down into the underlying soil.

Matting shall meet the requirements of Article 1060-8 of the *Standard Specifications*, or shall meet specifications provided elsewhere in this contract.

Provide staples made of 0.125" diameter new steel wire formed into a *u* shape not less than 12" in length with a throat of 1" in width.

Polyacrylamide (PAM) shall be applied in powder form and shall be anionic or neutrally charged. Soil samples shall be obtained in areas where the wattles will be placed, and from offsite material used to construct the roadway, and analyzed for the appropriate PAM flocculant to be utilized with each wattle. The PAM product used shall be listed on the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Quality (DWQ) web site as an approved PAM product for use in North Carolina.

Construction Methods

Coir Fiber Wattles shall be secured to the soil by wire staples approximately every 1 linear foot and at the end of each section of wattle. A minimum of 4 stakes shall be installed on the downstream side of the wattle with a maximum spacing of 2 linear feet along the wattle, and according to the detail. Install a minimum of 2 stakes on the upstream side of the wattle according to the detail provided in the plans. Stakes shall be driven into the ground a minimum of 10 in. with no more than 2 in. projecting from the top of the wattle. Drive stakes at an angle according to the detail provided in the plans.

Only install coir fiber wattle(s) to a height in ditch so flow will not wash around wattle and scour ditch slopes and according to the detail provided in the plans and as directed. Overlap adjoining sections of wattles a minimum of 6 in.

Installation of matting shall be in accordance with the detail provided in the plans, and in accordance with Article 1631-3 of the *Standard Specifications*, or in accordance with specifications provided elsewhere in this contract.

Apply PAM over the lower center portion of the coir fiber wattle where the water is going to flow over at a rate of 2 ounces per wattle, and 1 ounce of PAM on matting on each side of the wattle. PAM applications shall be done during construction activities after every rainfall event that is equal to or exceeds 0.50 in.

The Contractor shall maintain the coir fiber wattles until the project is accepted or until the wattles are removed, and shall remove and dispose of silt accumulations at the wattles when so directed in accordance with the requirements of Section 1630 of the *Standard Specifications*.

Measurement and Payment

Coir Fiber Wattles 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 *Coir Fiber Wattles*.

Matting will be measured and paid for in accordance with Article 1631-4 of the *Standard Specifications*, or in accordance with specifications provided elsewhere in this contract.

Polyacrylamide(PAM) will be measured and paid for by the actual weight in pounds of PAM applied to the coir fiber wattles. 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 apply the *Polyacrylamide(PAM)*.

Payment will be made under:

Pay Item	Pay Unit
Polyacrylamide(PAM)	Pound
Coir Fiber Wattle	Linear Foot

SILT FENCE COIR FIBER WATTLE BREAK:

(8-21-12)

1605,1630

Description

Silt fence coir fiber wattle breaks are tubular products consisting of coir fibers (coconut fibers) encased in coir fiber netting and used in conjunction with temporary silt fence at the toe of fills to intercept runoff. Silt fence coir fiber wattle breaks are to be placed at locations shown on the plans or as directed. Installation shall follow the detail provided in the plans and as directed. Work includes furnishing materials, installation, maintenance and removing Silt fence coir fiber wattle breaks.

Materials

Coir fiber wattle shall meet the following specifications:

100% Coir (Coconut) Fibers	
Minimum Diameter	12"
Minimum Length	10 ft
Minimum Density	3.5 lb/cf \pm 10%
Net Material	Coir Fiber
Net Openings	2" x 2"
Net Strength	90 lb.
Minimum Weight	2.6 lb/ft \pm 10%

Stakes shall be used as anchors. Provide hardwood stakes a minimum of 2-ft long with a 2" x 2" nominal square cross section. One end of the stake shall be sharpened or beveled to facilitate driving down into the underlying soil.

Provide staples made of 0.125" diameter new steel wire formed into a U-shape not less than 12" in length with a throat of 1" in width.

Construction Methods

Excavate a trench the entire length of each wattle with a depth of 1" to 2" for the wattle to be placed. Secure silt fence coir fiber wattle breaks to the soil by wire staples approximately every linear foot and at the end of each wattle. Install at least 4 stakes on the downslope side of the wattle with a maximum spacing of 2 linear feet and according to the detail. Install at least 2 stakes on the upslope side of the silt fence coir fiber wattle break according to the detail provided in the plans. Drive stakes into the ground at least 10" with no more than 2" projecting from the top of the wattle. Drive stakes at an angle according to the detail provided in the plans.

Install temporary silt fence in accordance with Section 1605 of the *2012 Standard Specifications* and overlap each downslope side of silt fence wattle break by 6".

Maintain the silt fence coir fiber wattle breaks until the project is accepted or until the silt fence coir fiber wattle breaks are removed, and remove and dispose of silt accumulations at the silt fence coir fiber wattle breaks when so directed in accordance with Section 1630 of the *2012 Standard Specifications*.

Measurement and Payment

Coir Fiber Wattle will be measured and paid as the actual number of linear feet of wattles 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 silt fence coir fiber wattle break.

Payment will be made under:

Pay Item	Pay Unit
Coir Fiber Wattle	Linear Foot

TEMPORARY ROCK SILT CHECK TYPE A WITH EXCELSIOR MATTING AND POLYACRYLAMIDE (PAM):

Description

Temporary Rock Silt Checks Type A with Excelsior Matting and Polyacrylamide (PAM) are devices utilized in temporary and permanent ditches to reduce runoff velocity and incorporate PAM into the construction runoff to increase settling of sediment particles and reduce turbidity of runoff. Temporary Rock Silt Checks Type A with Excelsior Matting and PAM are to be placed at locations shown on the plans or as directed. Installation shall follow the detail provided in the plans and as directed. Work includes furnishing materials, installation of Temporary Rock Silt Checks Type A, matting installation, PAM application, and removing Temporary Rock Silt Checks Type A with Excelsior Matting and PAM.

Materials

Structural stone shall be class B stone that meets the requirements of Section 1042 of the *Standard Specifications* for Stone for Erosion Control, Class B.

Sediment control stone shall be #5 or #57 stone, which meets the requirements of Section 1005 of the *Standard Specifications* for these stone sizes.

Matting shall meet the requirements of Excelsior Matting in Subarticle 1060-8(B) of the *Standard Specifications*, or shall meet specifications provided elsewhere in this contract.

Polyacrylamide (PAM) shall be applied in powder form and shall be anionic or neutrally charged. Soil samples shall be obtained in areas where the Temporary Rock Silt Checks Type A with Excelsior Matting and PAM will be placed, and from offsite material used to construct the roadway, and analyzed for the appropriate PAM flocculant to be utilized with each Temporary

Rock Silt Check Type A. The PAM product used shall be listed on the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Quality (DWQ) web site as an approved PAM product for use in North Carolina.

Construction Methods

Temporary Rock Silt Checks Type A shall be installed in accordance with Subarticle 1633-3(A) of the *Standard Specifications*, Roadway Standard Drawing No. 1633.01 and the detail provided in the plans.

Installation of matting shall be in accordance with the detail provided in the plans, and anchored by placing Class B stone on top of the matting at the upper and lower ends.

Apply PAM at a rate of 4 ounces over the center portion of the Temporary Rock Silt Checks Type A and matting where the water is going to flow over. PAM applications shall be done during construction activities and after every rainfall event that is equal to or exceeds 0.50 in.

The Contractor shall maintain the Temporary Rock Silt Checks Type A with Excelsior Matting and PAM until the project is accepted or until the Temporary Rock Silt Checks Type A with Excelsior Matting and PAM are removed, and shall remove and dispose of silt accumulations at the Temporary Rock Silt Checks Type A with Excelsior Matting and PAM when so directed in accordance with the requirements of Section 1630 of the *Standard Specifications*.

Measurement and Payment

Temporary Rock Silt Checks Type A will be measured and paid for in accordance with Article 1633-5 of the *Standard Specifications*, or in accordance with specifications provided elsewhere in this contract.

Matting will be measured and paid for in accordance with Article 1631-4 of the *Standard Specifications*, or in accordance with specifications provided elsewhere in this contract.

Polyacrylamide(PAM) will be measured and paid for by the actual weight in pounds of PAM applied to the Temporary Rock Silt Checks Type A. 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 apply the *Polyacrylamide(PAM)*.

Payment will be made under:

Pay Item	Pay Unit
Polyacrylamide(PAM)	Pound

CULVERT DIVERSION CHANNEL:**Description**

This work consists of providing a *Culvert Diversion Channel* to detour the existing stream around the culvert construction site at locations shown on the plans. Work includes constructing the diversion channel, disposing of excess materials, providing and placing geotextile liner, maintaining the diversion area in an acceptable condition, removing geotextile liner, backfilling diversion channel area with suitable material, and providing proper drainage when diversion channel area is abandoned.

Materials

Refer to Division 10

Item

Geotextile for Soil Stabilization, Type 4

Section

1056

Construction Methods

Grade channel according to the plans with channel surface free of obstructions, debris, and pockets of low-density material. Utilize suitable material and provide disposal area for unsuitable material.

Line channel with geotextile unrolled in the direction of flow and lay smoothly but loosely on soil surface without creases. Bury top of slope geotextile edge in a trench at least 5" deep and tamp securely. Make vertical overlaps a minimum of 18" with upstream geotextile overlapping the downstream geotextile.

Secure geotextile with eleven gauge wire staples shaped into a *u* shape with a length of not less than 6" and a throat not less than 1" in width. Place staples along outer edges and throughout the geotextile a maximum of 3 ft. horizontally and vertically.

Measurement and Payment

Culvert Diversion Channel will be measured and paid for as the actual number of cubic yards excavated, as calculated from the typical section throughout the length of the diversion channel as shown on the final approved plans.

Geotextile for Soil Stabilization will be measured and paid for in accordance with Article 270-4 of the *Standard Specifications*.

Such price and payment shall be considered full compensation for all work covered by this section including all materials, construction, maintenance, and removal of *Culvert Diversion Channel*.

Payment will be made under:

Pay Item	Pay Unit
Culvert Diversion Channel	Cubic Yard

IMPERVIOUS DIKE:

Description

This work consists of furnishing, installing, maintaining, 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.

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.

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. Such price and payment will be full compensation for all work including but not limited to furnishing materials, construction, maintenance, and removal of the impervious dike.

Payment will be made under:

Pay Item	Pay Unit
Impervious Dike	Linear Foot

COIR FIBER MAT:

Description

Furnish material, install and maintain coir fiber mat in locations shown on the plans or in locations as directed. Work includes providing all materials, excavating and backfilling, and placing and securing coir fiber mat with stakes, steel reinforcement bars or staples as directed.

Materials

Item	Section
Coir Fiber Mat	1060-14

Anchors: Stakes, reinforcement bars, or staples shall be used as anchors.

Wooden Stakes:

Provide hardwood stakes 12"- 24" long with a 2" x 2" nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving through the coir fiber mat and down into the underlying soil. The other end of the stake needs to have a 1"- 2" long head at the top with a 1"- 2" notch following to catch and secure the coir fiber mat.

Steel Reinforcement Bars:

Provide uncoated #10 steel reinforcement bars 24" nominal length. The bars shall have a 4" diameter bend at one end with a 4" straight section at the tip to catch and secure the coir fiber mat.

Staples:

Provide staples made of 0.125" diameter new steel wire formed into a *u* shape not less than 12" in length with a throat of 1" in width.

Construction Methods

Place the coir fiber mat immediately upon final grading. Provide a smooth soil surface free from stones, clods, or debris that will prevent the contact of the mat with the soil. Unroll the mat and apply without stretching such that it will lie smoothly but loosely on the soil surface.

For stream relocation applications, take care to preserve the required line, grade, and cross section of the area covered. Bury the top slope end of each piece of mat in a narrow trench at least 6 in. deep and tamp firmly. Where one roll of matting ends and a second roll begins, overlap the end of the upper roll over the buried end of the second roll so there is a 6 in. overlap. Construct check trenches at least 12 in. deep every 50 ft. longitudinally along the edges of the mat or as directed. Fold over and bury mat to the full depth of the trench, close and tamp firmly. Overlap mat at least 6 in. where 2 or more widths of mat are installed side by side.

Place anchors across the mat at the ends approximately 1 ft. apart. Place anchors along the outer edges and down the center of the mat 3 ft. apart.

Adjustments in the trenching or anchoring requirements to fit individual site conditions may be required.

Measurement and Payment

Coir Fiber Mat will be measured and paid for as the actual number of square yards measured along the surface of the ground over which coir fiber mat is installed and accepted.

No measurement will be made for anchor items.

Payment will be made under:

Pay Item	Pay Unit
Coir Fiber Mat	Square Yard

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

STREAMBANK REFORESTATION:

Description

Streambank Reforestation will be planted in areas as designated in the onsite stream mitigation plan, and as directed. See the Streambank Reforestation Detail Sheets.

The entire *Streambank Reforestation* operation shall comply with the requirements of Section 1670 of the *Standard Specifications*.

Materials

Item	Section
Coir Fiber Mat	1060-14

Live Stakes:

Type I Streambank Reforestation shall be live stakes, planted along both streambanks. Live stakes shall be ½" - 2" in diameter. Stakes shall also be 2 ft. - 3 ft. in length.

Live staking plant material shall consist of a random mix made up of 50% Black Willow (*Salix nigra*) and 50% Silky Dogwood (*Cornus amomum*). Other species may be substituted upon approval of the Engineer. All plant material shall be harvested locally (within the same physiographic ecoregion and plant hardiness zone) or purchased from a local nursery, with the approval of the Engineer. All live stakes shall be dormant at time of acquisition and planting.

Staples, stakes, or reinforcement bars shall be used as anchors and shall meet the following requirements:

Wooden Stakes:

Provide hardwood stakes 12"- 24" long with a 2" x 2" nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving through the coir fiber mat and down into the underlying soil. The other end of the stake needs to have a 1"- 2" long head at the top with a 1"- 2" notch following to catch and secure the coir fiber mat.

Steel Reinforcement Bars:

Provide uncoated #10 steel reinforcement bars 24" nominal length. The bars shall have a 4" diameter bend at one end with a 4" straight section at the tip to catch and secure the coir fiber mat.

Staples:

Provide staples made of 0.125" diameter new steel wire formed into a *u* shape not less than 12" in length with a throat of 1" in width.

Bare Root Seedlings:

Type II Streambank Reforestation shall be bare root seedlings 12"-18" tall.

Construction Methods

Coir fiber matting shall be installed on the streambanks where live staking is to be planted as shown on the Streambank Reforestation Detail Sheets and in locations as directed. Work includes providing all materials, excavating and backfilling, and placing and securing coir fiber mat.

Provide a smooth soil surface free from stones, clods, or debris that will prevent the contact of the matting with the soil. Place the matting immediately upon final grading and permanent seeding. Take care to preserve the required line, grade, and cross section of the area covered. Unroll the matting and apply without stretching such that it will lie smoothly but loosely on the soil surface. Bury the top slope end of each piece of matting in a narrow trench at least 6" deep and tamp firmly. Where one roll of matting ends and a second roll begins, overlap the end of the upper roll over the buried end of the second roll so there is a 6" overlap. Construct check trenches at least 12" deep every 50 ft. longitudinally along the edges of the matting, or as directed. Fold over and bury matting to the full depth of the trench, close and tamp firmly. Overlap matting at least 6" where 2 or more widths of matting are installed side by side.

Wooden stakes, reinforcement bars, or staples may be used as anchors in accordance with the Streambank Reforestation Detail Sheets and as directed. Place anchors across the matting at ends, junctions, and check trenches approximately 1 ft. apart. Place anchors down the center of each strip of matting 3 ft. apart. Place anchors along all lapped edges 1 ft. apart. Refer to the Streambank Reforestation Detail Sheets for anchoring pattern. The Engineer may require adjustments in the trenching or anchoring requirements to fit individual site conditions.

During preparation of the live stakes, the basal ends shall be cleanly cut at an angle to facilitate easy insertion into the soil, while the tops shall be cut square or blunt for tamping. All limbs shall be removed from the sides of the live cutting prior to installation.

Live stakes shall be installed within 48 hours of cutting. Outside storage locations should be continually shaded and protected from wind and direct sunlight. Live cut plant material shall remain moist at all times before planting.

Stakes shall be spaced approximately 4 ft. on center. Live stakes shall be installed according to the configuration presented on the Streambank Reforestation Detail Sheets.

Tamp live stakes perpendicularly into the finished bank slope with a dead blow hammer, with buds oriented in an upward direction. Stakes should be tamped until approximately $\frac{3}{4}$ of the stake length is within the ground. The area around each live stake shall be compacted by foot after the live stake has been installed.

1"- 2" shall be cut cleanly off of the top of each live stake with loppers at an angle of approximately 15 degrees following installation. Any stakes that are split or damaged during installation shall be removed and replaced.

The bare root seedlings shall be planted as soon as practical following permanent *Seeding and Mulching*. The seedlings shall be planted from top of bank out, along both sides of the stream, as designated on the plans.

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: Streambank reforestation shall be planted from November 15 through March 15.

Measurement and Payment

Streambank Reforestation will be measured and paid for as the actual number of acres of land measured along the surface of the ground, which has been acceptably planted in accordance with this section.

Payment will be made under:

Pay Item	Pay Unit
Streambank Reforestation	Acre

STRUCTURE STONE:**Description**

This work consists of furnishing, stockpiling, placing and maintaining approved stone used to construct rock cross-vanes, rock vanes, j-hook vanes, w-rock cross vanes, log vanes, root wad/log vanes, log cross vanes, root wad structures, rock cross vanes for step pools, channel blocks, double wing deflectors, single wing deflectors, stream crossings, rock energy dissipaters, constructed riffles, and for use in other locations as directed.

The quantity of stone to be installed will be affected by the actual conditions that occur during the construction of the project. The quantity of stone 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.

Materials

Refer to Division 10

Item	Section
No. 57 Stone	1005
Riprap, Class A, B, 1, and 2	1042
Geotextile for Drainage, Type 2	1056

Boulders shall meet the requirements of Section 1042 of the *Standard Specifications*. Boulders of minimum dimension 48" x 36" x 24" shall be individually picked for use in the structures. Boulders shall be relatively flat on either side in the same dimension, preferably the long dimension.

Construction Methods

The Contractor shall place geotextile and stone in locations and to the thickness, widths, and lengths as shown on the plans or as directed. All stone shall be placed to form a sediment and erosion control device, an in-stream structure, or a channel lining neatly and uniformly with an even surface in accordance with the contract and shall meet the approval of the Engineer.

Measurement and Payment

No. 57 Stone will be measured and paid as the actual number of tons that have been incorporated into the work, or have been delivered to and stockpiled on the project as directed. *No. 57 stone* that has been stockpiled will not be measured a second time.

Riprap, Class __ will be measured and paid for in accordance with Article 876-4 of the *Standard Specifications*.

Geotextile for Drainage will be measured and paid for in accordance with Article 876-4 of the *Standard Specifications*.

Boulders will be measured and paid for as the actual number of tons that have been incorporated into the work, or have been delivered to and stockpiled on the project as directed. Stone that has been stockpiled will not be measured a second time.

Such price and payment will be full compensation for all work covered by this section, including but not limited to furnishing, weighing, stockpiling, re-handling, placing, and maintaining the stone and disposal of any materials not incorporated into the project.

Payment will be made under:

Pay Item	Pay Unit
No. 57 Stone	Ton
Boulder	Ton

ROCK CROSS VANE:

Description

This work consists of the construction and maintenance of physical barriers placed in and along the stream at locations designated on the plans to direct the stream flow (thalweg) toward the center of the channel and to provide grade control.

The quantity of rock cross vanes to be installed will be affected by the actual conditions that occur during the construction of the project. The quantity of rock cross vanes 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.

Materials

Refer to Division 10

Item	Section
Boulder	1042 and SP for Structure Stone
No. 57 Stone	1005
Riprap, Class A	1042-1
Geotextile for Drainage, Type 2	1056

Boulders shall be used as header and footer rocks for this device.

Construction Methods

Rock cross vanes shall be constructed in accordance with the Rock Cross Vane Detail shown in the plans or as directed. Two vanes, each approximately 1/3 of the stream channel’s bankfull width, will form a 20°– 30° angle out from the streambank toward upstream. The top elevation of both vanes will decrease from bankfull elevation toward the center of the channel at a slope of 4 to 20 percent. A vane running perpendicular to the stream’s flow will connect the two outside

vanes on the upstream end. Install header and footer rocks according to the detail and plate the upstream side with Type 2 geotextile and No. 57 stone. Voids between the header and footer rocks can be filled with hand-placed Class A riprap as directed. Footer rocks shall be placed such that the header rock is at streambed elevation. The rock cross vane shall be keyed into the bank at the downstream end as shown on the Rock Cross Vane Detail.

Measurement and Payment

Boulders will be measured and paid for as provided elsewhere in this contract.

No. 57 Stone will be measured and paid for as provided elsewhere in this contract.

Riprap, Class __ will be measured and paid for in accordance with Article 876-4 of the *Standard Specifications*.

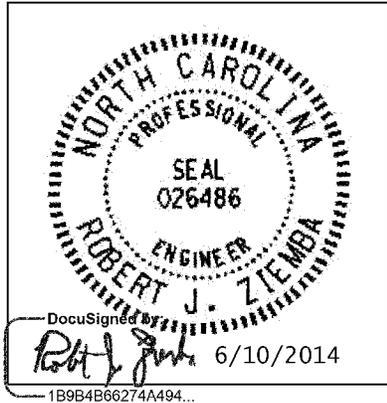
Geotextile for Drainage will be measured and paid for in accordance with Article 876-4 of the *Standard Specifications*.

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 construct the rock cross vanes.

Project Special Provisions
(Version 12.3)

Signals and Intelligent Transportation Systems

Prepared By: IOU
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1. GENERAL PROJECT INFORMATION

These traffic signals were designed and intended for installation under TIP U-2579B. Per the direction of the Regional Traffic Engineer and the Division 9 Traffic Engineer, these signals shall not be installed and made operational in the field until traffic volumes increase to meet warrants. The warrants for installation shall be approved by the Regional Traffic Engineer prior to any signal construction.

All equipment for these traffic signals shall be provided by the Contactor for U-2579B unless otherwise listed in the project contract or specifications. If the installation for one or both of these traffic signals is not warranted prior to the completion of construction for U-2579B, all signal equipment for these signals will be delivered to the Division 9 Traffic Services office unless otherwise directed by the Engineer. All approved signal equipment will become property of NCDOT and be the responsibility of Division 9 Traffic Services. If the signals are not installed prior to the completion of project U-2579B, Division 9 Traffic Services will be responsible for signal installation upon approval by the Regional Traffic Engineer.

2. 2012 STANDARD SPECIFICATIONS FOR ROADS & STRUCTURES

The 2012 Standard Specifications are revised as follows:

2.1. Polymer Concrete (PC) Junction Boxes (1091-5(B))

Page 10-202, revise paragraph starting on line 9 to read "Provide polymer concrete (PC) boxes which have bolted covers and open bottoms. Provide vertical extensions of 6" to 12" as required by project special provisions."

Page 10-202, revise sentence beginning on line 14 to read "Other thermoplastic materials may be used for components which are not normally exposed to sunlight."

2.2. Junction Boxes (1098-5)

Page 10-212, sub-Section 1098-5(C) Oversized Junction Boxes

Revise sentence to read, "Provide oversized junction boxes and covers with minimum inside dimensions of 28"(l) x 15"(w) x 22"(h)."

2.3. Controllers with Cabinets – Material (1751-2)

Page 17-37, Section 1751-2 Material

Add the following paragraph:

When the plans or specifications require a Type 2070L controller, contractor may provide a Type 2070E controller. Unless otherwise allowed by the Engineer, provide controllers of only one type.

3. SIGNAL HEADS

3.1. MATERIALS

A. General:

Fabricate vehicle signal head housings and end caps from die-cast aluminum. Provide visor mounting screws, door latches, and hinge pins fabricated from stainless steel. Provide interior screws, fasteners, and metal parts fabricated from stainless steel or corrosion resistant material.

Fabricate tunnel and traditional visors from sheet aluminum.

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Paint all surfaces inside and outside of signal housings and doors. Paint outside surfaces of tunnel and traditional visors, 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 or rigid vehicle signal head mounting brackets for mast-arm attachments.

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 light emitting diode (LED) traffic signal modules, provide the following requirements for inclusion on the Department's Qualified Products List for traffic signal equipment.

1. Sample submittal,
2. Third-party independent laboratory testing results for each submitted module with evidence of testing and conformance with all of the Design Qualification Testing specified in section 6.4 of each of the following Institute of Transportation Engineers (ITE) specifications:
 - Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Circular Signal Supplement
 - Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement

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- 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.

In addition to meeting the performance requirements for the minimum period of 60 months, provide a written warranty against defects in materials and workmanship for the modules for a period of 60 months after installation of the modules. During the warranty period, the manufacturer must provide new replacement modules within 45 days of receipt of modules that have failed at no cost to the State. Repaired or refurbished modules may not be used to fulfill the manufacturer's warranty obligations. Provide manufacturer's warranty documentation to the Department during evaluation of product for inclusion on Qualified Products List (QPL).

B. Vehicle Signal Heads:

Comply with the ITE standard "Vehicle Traffic Control Signal Heads". Provide housings with provisions for attaching backplates.

Provide visors that are 10 inches in length for 12-inch vehicle signal heads.

Provide a termination block with one empty terminal for field wiring for each indication plus one empty terminal for the neutral conductor. Have all signal sections wired to the termination block. Provide barriers between the terminals that have terminal screws with a minimum Number 8 thread size and that will accommodate and secure spade lugs sized for a Number 10 terminal screw.

Mount termination blocks in the yellow signal head sections on all in-line vehicle signal heads. Mount the termination block in the red section on five-section vehicle signal heads.

Furnish vehicle signal head interconnecting brackets. Provide one-piece aluminum brackets less than 4.5 inches in height and with no threaded pipe connections. Provide hand holes on the bottom of the brackets to aid in installing wires to the signal heads. Lower brackets that carry no wires and are used only for connecting the bottom signal sections together may be flat in construction.

For messenger cable mounting, provide messenger cable hangers, wire outlet bodies, balance adjusters, bottom caps, wire entrance fitting brackets, and all other hardware necessary to make complete, watertight connections of the vehicle signal heads to the messenger cable. Fabricate mounting assemblies from malleable iron or steel and provide serrated rings made of aluminum. Provide messenger cable hangers and balance adjusters that are galvanized before being painted. Fabricate balance adjuster eyebolt and eyebolt nut from stainless steel or galvanized malleable iron.

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Provide messenger cable hangers with U-bolt clamps. Fabricate washers, screws, bolts, clevis pins, cotter pins, nuts, and U-bolt clamps 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 60 months and to meet all parameters of this specification during this period of useful life.

For the modules, provide spade terminals crimped to the lead wires and sized for a #10 screw connection to the existing terminal block in a standard signal head. Do not provide other types of crimped terminals with a spade adapter.

Ensure the power supply is integral to the module assembly. On the back of the module, permanently mark the date of manufacture (month & year) or some other method of identifying date of manufacture.

Tint the red, yellow and green lenses to correspond with the wavelength (chromaticity) of the LED. Transparent tinting films are unacceptable. Provide a lens that is integral to the unit with a smooth outer surface.

1. LED Circular Signal Modules:

Provide modules in the following configurations: 12-inch circular sections. All makes and models of LED modules purchased for use on the State Highway System shall appear on the current NCDOT Traffic Signal Qualified Products List (QPL).

Provide the manufacturer's model number and the product number (assigned by the Department) for each module that appears on the 2012 or most recent Qualified Products List. In addition, provide manufacturer's certification in accordance with Article 106-3 of the *Standard Specifications*, that each module meets or exceeds the ITE "Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Circular Signal Supplement" dated June 27, 2005 (hereafter referred to as VTCSH Circular Supplement) and other requirements stated in this specification.

Provide modules that meet the following requirements when tested under the procedures outlined in the VTCSH Circular Supplement:

Module Type	Max. Wattage at 165° F	Nominal Wattage at 77° F
12-inch red circular	17	11
12-inch green circular	15	15

For yellow circular signal modules, provide modules tested under the procedures outlined in the VTCSH Circular Supplement to insure power required at 77° F is 22 Watts or less for the 12-inch circular module.

Note: Use a wattmeter having an accuracy of $\pm 1\%$ 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.

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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 2012 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 $\pm 1\%$ to measure the nominal wattage and maximum wattage of an arrow traffic signal module. Power may also be derived from voltage, current and power factor measurements.

C. Signal Cable:

Furnish 16-4 and 16-7 signal cable that complies with IMSA specification 20-1 except provide the following conductor insulation colors:

- For 16-4 cable: white, yellow, red, and green
- For 16-7 cable: white, yellow, red, green, yellow with black stripe tracer, red with black stripe tracer, and green with black stripe tracer. Apply continuous stripe tracer on conductor insulation with a longitudinal or spiral pattern.

Provide a ripcord to allow the cable jacket to be opened without using a cutter. IMSA specification 19-1 will not be acceptable. Provide a cable jacket labeled with the IMSA specification number and provide conductors constructed of stranded copper.

4. CONTROLLERS WITH CABINETS**4.1. MATERIALS – TYPE 2070L CONTROLLERS**

Conform to CALTRANS *Transportation Electrical Equipment Specifications (TEES)* (dated August 16, 2002, plus Errata 1 dated October 27, 2003 and Errata 2 dated June 08, 2004) except as required herein.

Furnish Model 2070L controllers. Ensure that removal of the CPU module from the controller will place the intersection into flash.

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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 2070L controllers with the latest version of OS9 operating software and device drivers, composed of the unit chassis and at a minimum the following modules and assemblies:

- MODEL 2070 1B, CPU Module, Single Board
- MODEL 2070-2A, 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
- MODEL 2070-7A, Async Serial Com Module (9-pin RS-232)

Furnish one additional MODEL 2070-7A, Async Serial Com Module (9-pin RS-232) for all master controller locations.

For each master location and central control center, furnish a U.S. Robotics V.92 or approved equivalent auto-dial/auto-answer external modem to accomplish the interface to the Department-furnished microcomputers. Include all necessary hardware to ensure telecommunications.

4.2. 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

4.3. MATERIALS – TYPE 170E CABINETS

A. Type 170 E Cabinets General:

Conform to the city of Los Angeles’ Specification No. 54-053-08, *Traffic Signal Cabinet Assembly Specification* (dated July 2008), except as required herein.

Furnish model 332 base mounted cabinets configured for 8 vehicle phases, 4 pedestrian phases, and 6 overlaps. When overlaps are required, provide auxiliary output files for the overlaps. Do not reassign load switches to accommodate overlaps unless shown on electrical details.

Provide model 200 load switches, model 222 loop detector sensors, model 252 AC isolators, and model 242 DC isolators according to the electrical details. As a minimum, provide one (1) model 2018 conflict monitor, one (1) model 206L power supply unit, two (2) model 204 flashers, one (1) DC isolator (located in slot I14), and four (4) model 430 flash transfer relays (provide seven (7) model 430 flash transfer relays if auxiliary output file is installed) with each cabinet.

B. Type 170 E Cabinet Electrical Requirements:

Provide a cabinet assembly designed to ensure that upon leaving any cabinet switch or conflict monitor initiated flashing operation, the controller starts up in the programmed start up phases and start up interval.

Furnish two sets of non-fading cabinet wiring diagrams and schematics in a paper envelope or container and placed in the cabinet drawer.

All AC+ power is subject to radio frequency signal suppression.

Provide surge suppression in the cabinet for each type of cabinet device. Provide surge protection for the full capacity of the cabinet input file. Provide surge suppression devices that operate properly over a temperature range of -40° F to +185° F. Ensure the surge suppression devices provide both common and differential modes of protection.

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Provide a pluggable power line surge protector that is installed on the back of the PDA (power distribution assembly) chassis to filter and absorb power line noise and switching transients. Ensure the device incorporates LEDs for failure indication and provides a dry relay contact closure for the purpose of remote sensing. Ensure the device meets the following specifications:

- Peak Surge Current (Single pulse, 8x20µs).....20,000A
- Occurrences (8x20µs waveform).....10 minimum @ 20,000A
- Maximum Clamp Voltage.....395VAC
- Operating Current.....15 amps
- Response Time.....< 5 nanoseconds

Provide a loop surge suppressor for each set of loop terminals in the cabinet. Ensure the device meets the following specifications:

- Peak Surge Current (6 times, 8x20µs)
 - (Differential Mode).....400A
 - (Common Mode).....1,000A
- Occurrences (8x20µs waveform).....500 min @ 200A
- Maximum Clamp Voltage
 - (Differential Mode @400A).....35V
 - (Common Mode @1,000A).....35V
- Response Time.....< 5 nanoseconds
- Maximum Capacitance.....35 pF

Provide a data communications surge suppressor for each communications line entering or leaving the cabinet. Ensure the device meets the following specifications:

- Peak Surge Current (Single pulse, 8x20µs).....10,000A
- Occurrences (8x20µs waveform).....100 min @ 2,000A
- Maximum Clamp Voltage.....Rated for equipment protected
- Response Time.....< 1 nanosecond
- Maximum Capacitance.....1,500 pF
- Maximum Series Resistance.....15Ω

Provide a DC signal surge suppressor for each DC input channel in the cabinet. Ensure the device meets the following specifications:

- Peak Surge Current (Single pulse, 8x20µs).....10,000A
- Occurrences (8x20µs waveform).....100 @ 2,000A
- Maximum Clamp Voltage.....30V
- Response Time.....< 1 nanosecond

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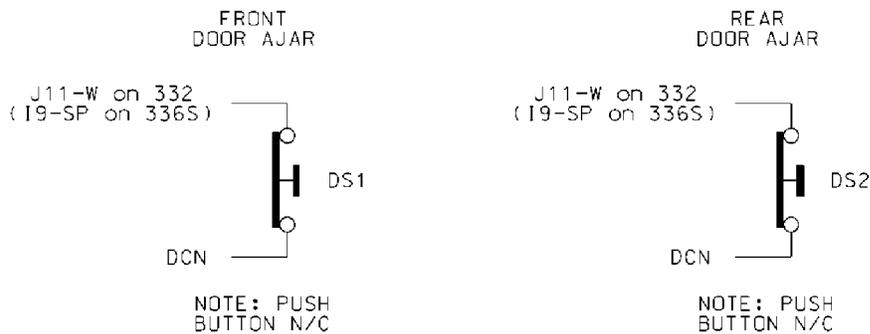
Provide a 120 VAC signal surge suppressor for each AC+ interconnect signal input. Ensure the device meets the following specifications:

- Peak Surge Current (Single pulse, 8x20µs).....20,000A
- Maximum Clamp Voltage.....350VAC
- Response Time.....< 200 nanoseconds
- Discharge Voltage.....<200 Volts @ 1,000A
- Insulation Resistance.....≥100 MΩ

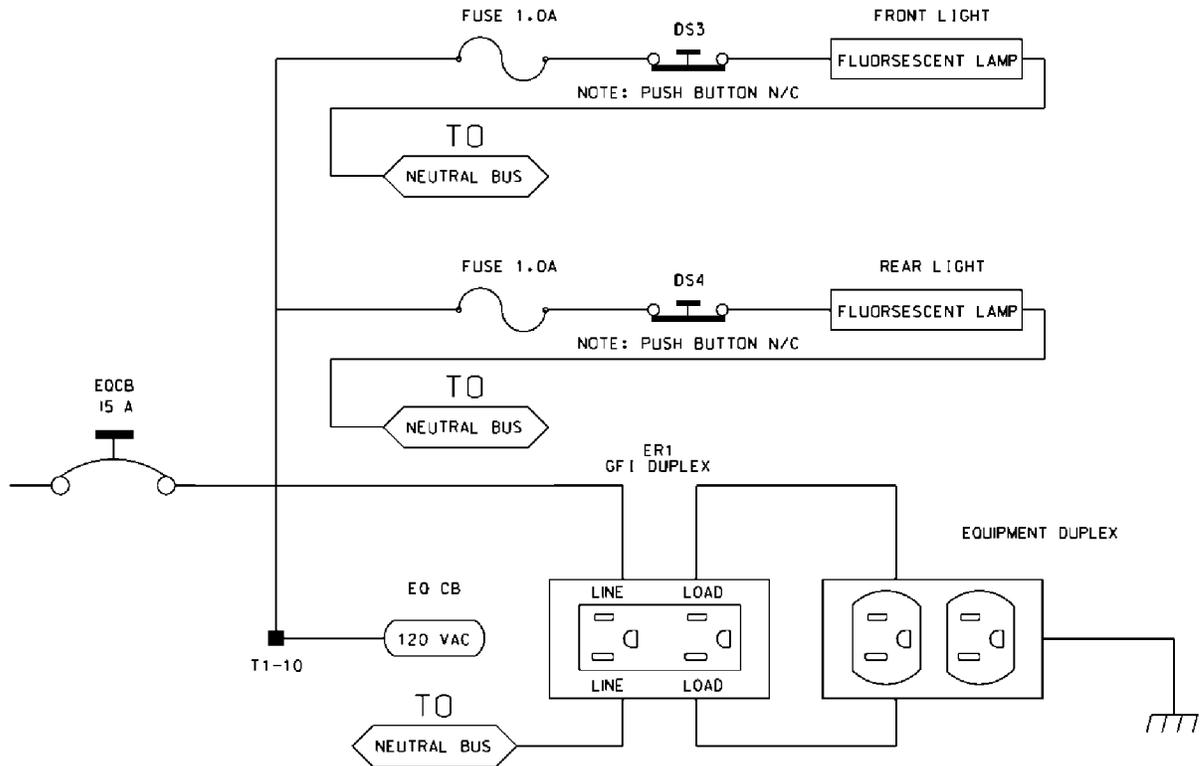
Provide conductors for surge protection wiring that are of sufficient size (ampacity) to withstand maximum overcurrents which could occur before protective device thresholds are attained and current flow is interrupted.

If additional surge protected power outlets are needed to accommodate fiber transceivers, modems, etc., install a UL listed, industrial, heavy-duty type power outlet strip with a minimum rating of 15 A / 125 VAC, 60 Hz. Provide a strip that has a minimum of 3 grounded outlets. Ensure the power outlet strip plugs into one of the controller unit receptacles located on the rear of the PDA. Ensure power outlet strip is mounted securely; provide strain relief if necessary.

Provide a door switch in the front and a door switch in the rear of the cabinet that will provide the controller unit with a Door Ajar alarm when either the front or the rear door is open. Ensure the door switches apply DC ground to the Input File when either the front door or the rear door is open.



Furnish a fluorescent fixture in the rear across the top of the cabinet and another fluorescent fixture in the front across the top of the cabinet at a minimum. Ensure that the fixtures provide sufficient light to illuminate all terminals, labels, switches, and devices in the cabinet. Conveniently locate the fixtures so as not to interfere with a technician’s ability to perform work on any devices or terminals in the cabinet. Provide a protective diffuser to cover exposed bulbs. Install 16 watt T-4 lamps in the fluorescent fixtures. Provide a door switch to provide power to each fixture when the respective door is open. Wire the fluorescent fixtures to the 15 amp ECB (equipment circuit breaker).



Furnish a police panel with a police panel door. Ensure that the police panel door permits access to the police panel when the main door is closed. Ensure that no rainwater can enter the cabinet even with the police panel door open. Provide a police panel door hinged on the right side as viewed from the front. Provide a police panel door lock that is keyed to a standard police/fire call box key. In addition to the requirements of LA Specification No. 54-053-08, provide the police panel with a toggle switch connected to switch the intersection operation between normal stop-and-go operation (AUTO) and manual operation (MANUAL). Ensure that manual control can be implemented using inputs and software such that the controller provides full programmed clearance times for the yellow clearance and red clearance for each phase while under manual control.

Provide a 1/4-inch locking phone jack in the police panel for a hand control to manually control the intersection. Provide sufficient room in the police panel for storage of a hand control and cord.

For model 332 base mounted cabinets, ensure terminals J14-E and J14-K are wired together on the rear of the Input File. Connect TB9-12 (J14 Common) on the Input Panel to T1-2 (AC-) on the rear of the PDA.

Provide detector test switches mounted at the top of the cabinet rack or other convenient location which may be used to place a call on each of eight phases based on the chart below. Provide three positions for each switch: On (place call), Off (normal detector operation), and Momentary On (place momentary call and return to normal detector operation after switch is released). Ensure that the switches are located such that the technician can read the controller display and observe the intersection.

Connect detector test switches for cabinets as follows:

332 Cabinet	
Detector Call Switches	Terminals
Phase 1	I1-W
Phase 2	I4-W
Phase 3	I5-W
Phase 4	I8-W
Phase 5	J1-W
Phase 6	J4-W
Phase 7	J5-W
Phase 8	J8-W

Provide the PCB 28/56 connector for the conflict monitor unit (CMU) with 28 independent contacts per side, dual-sided with 0.156 inch contact centers. Provide the PCB 28/56 connector contacts with solder eyelet terminations. Ensure all connections to the PCB 28/56 connector are soldered to the solder eyelet terminations.

Ensure that all cabinets have the CMU connector wired according to the 332 cabinet connector pin assignments (include all wires for auxiliary output file connection). Wire pins 13, 16, R, and U of the CMU connector to a separate 4 pin plug, P1, as shown below. Provide a second plug, P2, which will mate with P1 and is wired to the auxiliary output file as shown below. Provide an additional plug, P3, which will mate with P1 and is wired to the pedestrian yellow circuits as shown below. When no auxiliary output file is installed in the cabinet, provide wires for the green and yellow inputs for channels 11, 12, 17, and 18, the red inputs for channels 17 and 18, and the wires for the P2 plug. Terminate the two-foot wires with ring type lugs, insulated, and bundled for optional use.

PIN	P1		P2		P3	
	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.

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Wire the P20 connector to the output file and auxiliary output file using 22 AWG stranded wires. Ensure the length of these wires is a minimum of 42 inches in length. Provide a durable braided sleeve around the wires to organize and protect the wires.

Wire the P20 connector to the traffic signal red displays to provide inputs to the conflict monitor as shown below. Ensure the pedestrian Don't Walk circuits are wired to channels 13 through 16 of the P20 connector. When no auxiliary output file is installed in the cabinet, provide wires for channels 9 through 12 reds. Provide a wire for special function 1. Terminate the unused wires with ring type lugs, insulated, and bundled for optional use.

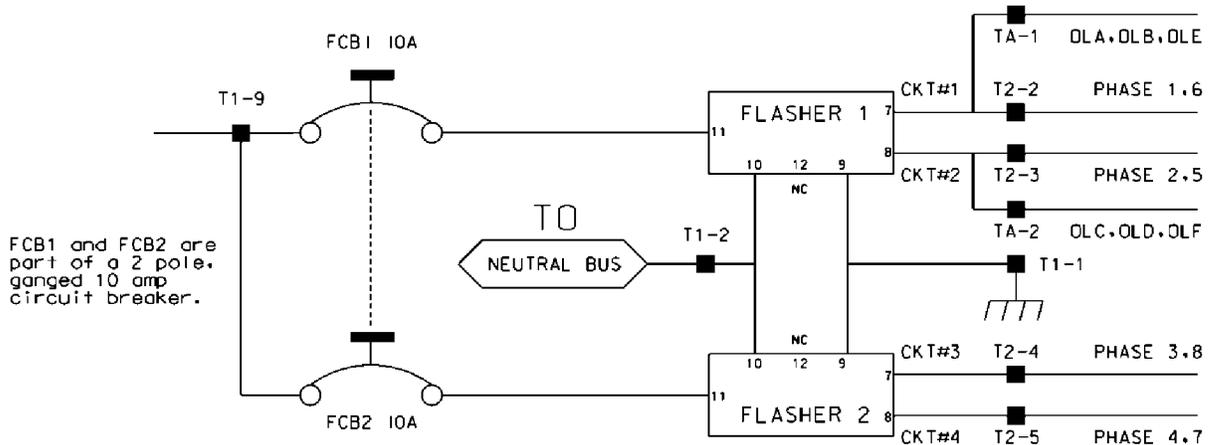
P20 Connector					
PIN	FUNCTION	CONN TO	PIN	FUNCTION	CONN TO
1	Channel 15 Red	119	2	Channel 16 Red	110
3	Channel 14 Red	104	4	Chassis GND	01-9
5	Channel 13 Red	113	6	N/C	
7	Channel 12 Red	AUX 101	8	Spec Function 1	
9	Channel 10 Red	AUX 124	10	Channel 11 Red	AUX 114
11	Channel 9 Red	AUX 121	12	Channel 8 Red	107
13	Channel 7 Red	122	14	Channel 6 Red	134
15	Channel 5 Red	131	16	Channel 4 Red	101
17	Channel 3 Red	116	18	Channel 2 Red	128
19	Channel 1 Red	125	20	Red Enable	01-14

Ensure the controller unit outputs to the auxiliary output file are pre-wired to the C5 connector. When no auxiliary output file is installed in the cabinet, connect the C5 connector to a storage socket located on the Input Panel or on the rear of the PDA.

Do not wire pin 12 of the load switch sockets.

In addition to the requirements of LA Specification No. 54-053-08, ensure relay K1 on the Power Distribution Assembly (PDA) is a four pole relay and K2 on the PDA is a two pole relay.

Provide a two pole, ganged circuit breaker for the flash bus circuit. Ensure the flash bus circuit breaker is an inverse time circuit breaker rated for 10 amps at 120 VAC with a minimum of 10,000 RMS symmetrical amperes short circuit current rating. Do not provide the auxiliary switch feature on the flash bus circuit breaker. Ensure the ganged flash bus circuit breaker is certified by the circuit breaker manufacturer to provide gang tripping operation.



Ensure auxiliary output files are wired as follows:

AUXILIARY OUTPUT FILE	
TERMINAL BLOCK TA ASSIGNMENTS	
POSITION	FUNCTION
1	Flasher Unit #1, Circuit 1/FTR1 (OLA, OLB)/FTR3 (OLE)
2	Flasher Unit #1, Circuit 2/FTR2 (OLC, OLD)/FTR3 (OLF)
3	Flash Transfer Relay Coils
4	AC -
5	Power Circuit 5
6	Power Circuit 5
7	Equipment Ground Bus
8	NC

Provide four spare load resistors mounted in each cabinet. Ensure each load resistor is rated as shown in the table below. Wire one side of each load resistor to AC-. Connect the other side of each resistor to a separate terminal on a four (4) position terminal block. Mount the load resistors and terminal block either inside the back of Output File No. 1 or on the upper area of the Service Panel.

ACCEPTABLE LOAD RESISTOR VALUES	
VALUE (ohms)	WATTAGE
1.5K – 1.9 K	25W (min)
2.0K – 3.0K	10W (min)

Provide Model 200 load switches, Model 204 flashers, Model 242 DC isolators, Model 252 AC isolators, and Model 206L power supply units that conform to CALTRANS' *Transportation Electrical Equipment Specifications* dated March 12, 2009 with Erratum 1.

C. Type 170 E Cabinet Physical Requirements:

Do not mold, cast, or scribe the name "City of Los Angeles" on the outside of the cabinet door as specified in LA Specification No. 54-053-08. Do not provide a Communications Terminal Panel as specified in LA Specification No. 54-053-08. Do not provide terminal block TBB on the Service Panel. Do not provide Cabinet Verification Test Program software or associated test jigs as specified in LA Specification No. 54-053-08.

Furnish unpainted, natural, aluminum cabinet shells. Ensure that all non-aluminum hardware on the cabinet is stainless steel or a Department approved non-corrosive alternate.

Ensure the lifting eyes, gasket channels, police panel, and all supports welded to the enclosure and doors are fabricated from 0.125 inch minimum thickness aluminum sheet and meet the same standards as the cabinet and doors.

Provide front and rear doors with latching handles that allow padlocking in the closed position. Furnish 0.75 inch minimum diameter stainless steel handles with a minimum 0.5 inch shank. Place the padlocking attachment at 4.0 inches from the handle shank center to clear the lock and key. Provide an additional 4.0 inches minimum gripping length.

Provide Corbin #2 locks on the front and rear doors. Provide one (1) Corbin #2 and one (1) police master key with each cabinet. Ensure main door locks allow removal of keys in the locked position only.

Provide a surge protection panel with 16 loop surge protection devices and designed to allow sufficient free space for wire connection/disconnection and surge protection device replacement. For model 332 cabinets, provide an additional 20 loop surge protection devices. Provide an additional two AC+ interconnect surge devices to protect one slot and eight DC surge protection devices to protect four slots. Provide no protection devices on slot I14.

For base mounted cabinets, mount surge protection panels on the left side of the cabinet as viewed from the rear. Attach each panel to the cabinet rack assembly using bolts and make it easily removable. Mount the surge protection devices in vertical rows on each panel and connect the devices to one side of 12 position, double row terminal blocks with #8 screws. For each surge protection panel, terminate all grounds from the surge protection devices on a copper equipment ground bus attached to the surge protection panel. Wire the terminals to the rear of a standard input file using spade lugs for input file protection.

Provide permanent labels that indicate the slot and the pins connected to each terminal that may be viewed from the rear cabinet door. Label and orient terminals so that each pair of inputs is next to

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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)

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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 +/- 150ms (2018 mode). Ensure that when the switch is in the OFF position the Red Fail fault timing value is set to 850 +/- 150ms (210 mode).

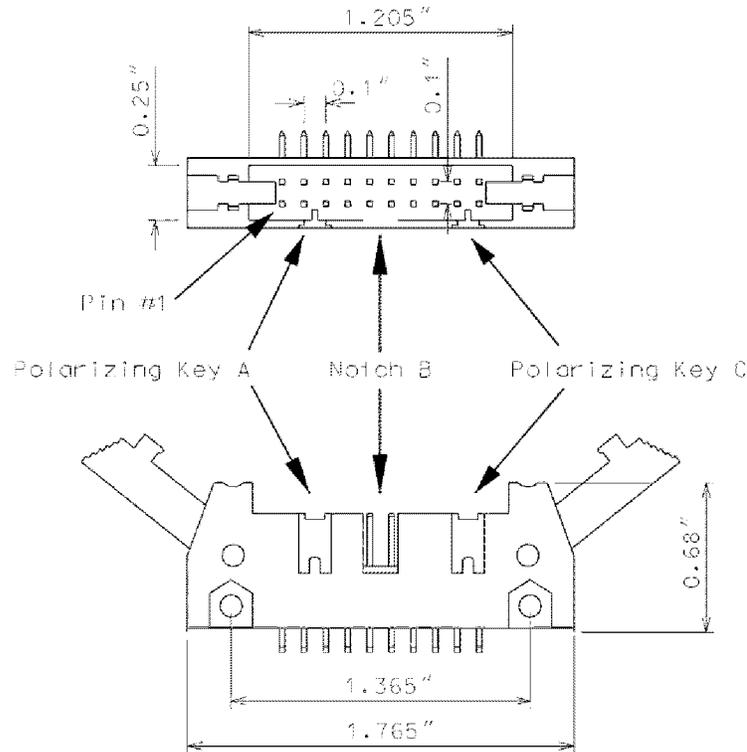
Provide a switch to set the Watchdog fault timing. Ensure that when the switch is in the ON position the Watchdog fault timing value is set to 1.0 +/- 0.1s (2018 mode). Ensure that when the switch is in the OFF position the Watchdog fault timing value is set to 1.5 +/- 0.1s (210 mode).

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 +/- 17ms (210 mode).

Provide a jumper or switch that will enable and disable the Watchdog Latch function. Ensure that when the jumper is not present or the switch is in the OFF position the Watchdog Latch function is disabled. In this mode of operation, a Watchdog fault will be reset following a power loss, brownout, or power interruption. Ensure that when the jumper is present or the switch is in the ON position the Watchdog Latch function is enabled. In this mode of operation, a Watchdog fault will be retained until a Reset command is issued.

Provide a jumper that will reverse the active polarity for pin #EE (output relay common). Ensure that when the jumper is not present pin #EE (output relay common) will be considered 'Active' at a voltage greater than 70 Vrms and 'Not Active' at a voltage less than 50 Vrms (Caltrans mode). Ensure that when the jumper is present pin #EE (output relay common) will be considered 'Active' at a voltage less than 50 Vrms and 'Not Active' at a voltage greater than 70 Vrms (Failsafe mode).

In addition to the connectors required by CALTRANS' 2009 TEES, provide the conflict monitor with a red interface connector mounted on the front of the monitor. Ensure the connector is a 20 pin, right angle, center polarized, male connector with latching clip locks and polarizing keys. Ensure the right angle solder tails are designed for a 0.062" thick printed circuit board. Keying of the connector shall be between pins 3 and 5, and between 17 and 19. Ensure the connector has two rows of pins with the odd numbered pins on one row and the even pins on the other row. Ensure the connector pin row spacing is 0.10" and pitch is 0.10". Ensure the mating length of the connector pins is 0.24". Ensure the pins are finished with gold plating 30μ" thick.



Ensure the red interface connector pins on the monitor have the following functions:

Pin #	Function	Pin #	Function
1	Channel 15 Red	2	Channel 16 Red
3	Channel 14 Red	4	Chassis Ground
5	Channel 13 Red	6	Special Function 2
7	Channel 12 Red	8	Special Function 1
9	Channel 10 Red	10	Channel 11 Red
11	Channel 9 Red	12	Channel 8 Red
13	Channel 7 Red	14	Channel 6 Red
15	Channel 5 Red	16	Channel 4 Red
17	Channel 3 Red	18	Channel 2 Red
19	Channel 1 Red	20	Red Enable

Ensure that removal of the P20 cable connector will cause the conflict monitor to recognize a latching fault condition and place the cabinet into flashing operation.

Provide Special Function 1 and Special Function 2 inputs to the unit which shall disable only Red Fail Monitoring when either input is sensed active. A Special Function input shall be sensed active when the input voltage exceeds 70 Vrms with a minimum duration of 550 ms. A Special Function

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input shall be sensed not active when the input voltage is less than 50 Vrms or the duration is less than 250 ms. A Special Function input is undefined by these specifications and may or may not be sensed active when the input voltage is between 50 Vrms and 70 Vrms or the duration is between 250 ms and 550 ms.

Ensure the conflict monitor recognizes field signal inputs for each channel that meet the following requirements:

- consider a Red input greater than 70 Vrms and with a duration of at least 500 ms as an “on” condition;
- consider a Red input less than 50 Vrms or with a duration of less than 200 ms as an “off” condition (no valid signal);
- consider a Red input between 50 Vrms and 70 Vrms or with a duration between 200 ms and 500 ms to be undefined by these specifications;
- consider a Green or Yellow input greater than 25 Vrms and with a duration of at least 500 ms as an “on” condition;
- consider a Green or Yellow input less than 15 Vrms or with a duration of less than 200 ms as an “off” condition; and
- consider a Green or Yellow input between 15 Vrms and 25 Vrms or with a duration between 200 ms and 500 ms to be undefined by these specifications.

Provide a conflict monitor that recognizes the faults specified by CALTRANS’ 2009 TEES and the following additional faults. Ensure the conflict monitor will trigger upon detection of a fault and will remain in the triggered (in fault mode) state until the unit is reset at the front panel or through the external remote reset input for the following failures:

1. **Red Monitoring or Absence of Any Indication (Red Failure):** A condition in which no “on” voltage signal is detected on any of the green, yellow, or red inputs to a given monitor channel. If a signal is not detected on at least one input (R, Y, or G) of a conflict monitor channel for a period greater than 1000 ms when used with a 170 controller and 1500 ms when used with a 2070L controller, ensure monitor will trigger and put the intersection into flash. If the absence of any indication condition lasts less than 750 ms when used with a 170 controller and 1200 ms when used with a 2070L controller, ensure conflict monitor will not trigger. Red fail monitoring shall be enabled on a per channel basis by the use of switches located on the conflict monitor. Have red monitoring occur when all of the following input conditions are in effect:
 - a) Red Enable input to monitor is active (Red Enable voltages are “on” at greater than 70 Vrms, off at less than 50 Vrms, undefined between 50 and 70 Vrms), and
 - b) Neither Special Function 1 nor Special Function 2 inputs are active.
 - c) Pin #EE (output relay common) is not active
2. **Short/Missing Yellow Indication Fault (Clearance Error):** Yellow indication following a green is missing or shorter than 2.7 seconds (with ± 0.1 -second accuracy). If a channel fails to detect an “on” signal at the Yellow input for a minimum of 2.7 seconds (± 0.1 second) following the detection of an “on” signal at a Green input for that channel, ensure that the monitor triggers and generates a clearance/short yellow error fault indication. Short/missing yellow (clearance) monitoring shall be enabled on a per channel basis by the use of switches

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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 $2 \text{ Hz} \pm 20\%$ 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 10 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 $4 \text{ Hz} \pm 20\%$ 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 for the following fault conditions: Conflict, Red Fail, Dual Indication, and Clearance. Provide a switch to select between the FYA mode and FYAc mode. Provide a switch to select each FYA phase movement for monitoring.

FYA mode

FYA Signal Head	Phase 1	Phase 3	Phase 5	Phase 7
Red Arrow	Channel 9 Red	Channel 10 Red	Channel 11 Red	Channel 12 Red
Yellow Arrow	Channel 9 Yellow	Channel 10 Yellow	Channel 11 Yellow	Channel 12 Yellow
Flashing Yellow Arrow	Channel 9 Green	Channel 10 Green	Channel 11 Green	Channel 12 Green
Green Arrow	Channel 1 Green	Channel 3 Green	Channel 5 Green	Channel 7 Green

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

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

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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 170/2070L controller or to a Department-furnished laptop computer. Electrically isolate the port interface electronics from all monitor electronics, excluding Chassis Ground. Ensure that the controller can receive all event log information through a controller Asynchronous Communications Interface Adapter (Type 170E) or Async Serial Comm Module (2070). Furnish and connect a serial cable from the conflict monitor's DB-9 connector to Comm Port 1 of the 2070 controller. Ensure conflict monitor communicates with the controller. Provide a Windows based graphic user interface software to communicate directly through the same monitor RS-232C/D compliant port to retrieve and view all event log information to a Department-furnished laptop computer. The RS-232C/D compliant port on the monitor shall allow the monitor to function as a DCE device with pin connections as follows:

Conflict Monitor RS-232C/D (DB-9 Female) Pinout		
Pin Number	Function	I/O
1	DCD	O
2	TX Data	O
3	RX Data	I
4	DTR	I
5	Ground	-
6	DSR	O
7	CTS	I
8	RTS	O
9	NC	-

MONITOR BOARD EDGE CONNECTOR

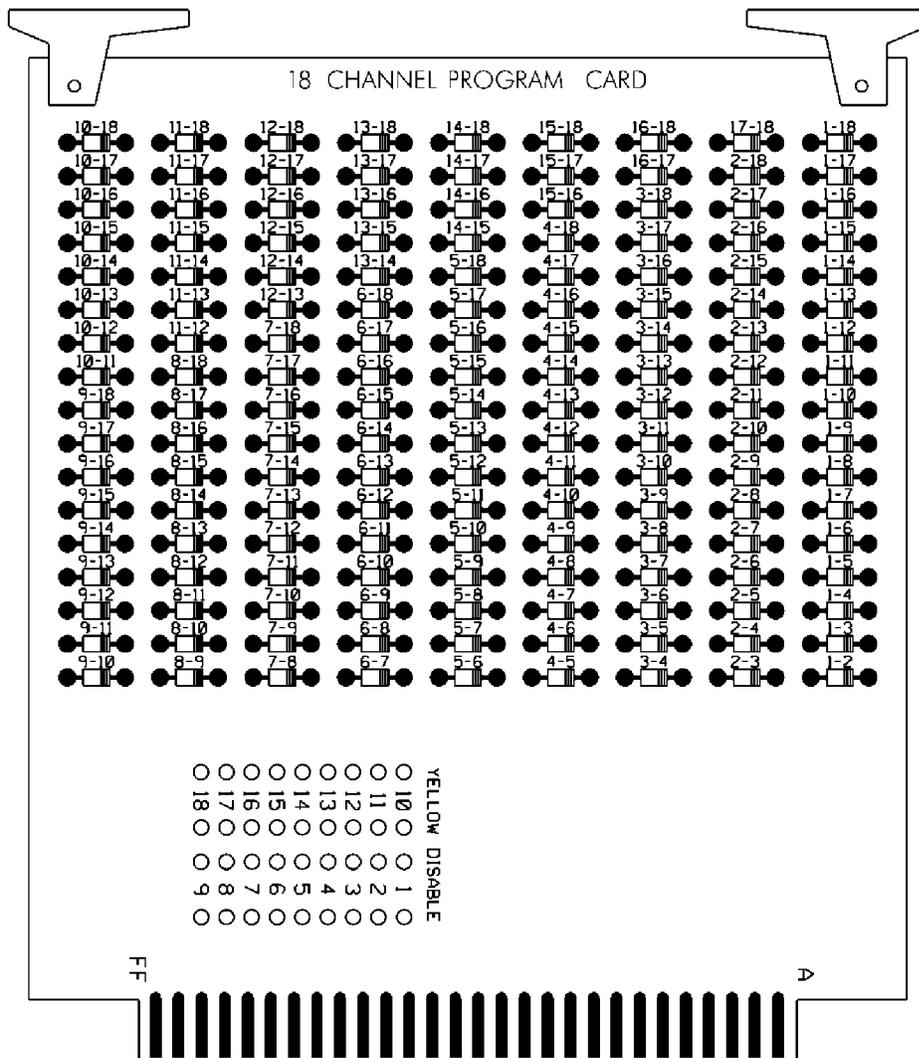
Pin #	Function (Back Side)	Pin #	Function (Component Side)
1	Channel 2 Green	A	Channel 2 Yellow
2	Channel 13 Green	B	Channel 6 Green
3	Channel 6 Yellow	C	Channel 15 Green
4	Channel 4 Green	D	Channel 4 Yellow
5	Channel 14 Green	E	Channel 8 Green
6	Channel 8 Yellow	F	Channel 16 Green
7	Channel 5 Green	H	Channel 5 Yellow
8	Channel 13 Yellow	J	Channel 1 Green
9	Channel 1 Yellow	K	Channel 15 Yellow
10	Channel 7 Green	L	Channel 7 Yellow
11	Channel 14 Yellow	M	Channel 3 Green
12	Channel 3 Yellow	N	Channel 16 Yellow
13	Channel 9 Green	P	Channel 17 Yellow
14	Channel 17 Green	R	Channel 10 Green
15	Channel 11 Yellow	S	Channel 11 Green
16	Channel 9 Yellow	T	Channel 18 Yellow
17	Channel 18 Green	U	Channel 10 Yellow
--		--	
18	Channel 12 Yellow	V	Channel 12 Green
19	Channel 17 Red	W	Channel 18 Red
20	Chassis Ground	X	Not Assigned
21	AC-	Y	DC Common
22	Watchdog Timer	Z	External Test Reset
23	+24VDC	AA	+24VDC
24	Tied to Pin 25	BB	Stop Time (Output)
25	Tied to Pin 24	CC	Not Assigned
26	Not Assigned	DD	Not Assigned
27	Relay Output, Side #3, N.O.	EE	Relay Output, Side #2, Common
28	Relay Output, Side #1, N.C.	FF	AC+

-- Slotted for keying between Pins 17/U and 18/V

CONFLICT PROGRAM CARD PIN ASSIGNMENTS

Pin #	Function (Back Side)	Pin #	Function (Component Side)
1	Channel 2 Green	A	Channel 1 Green
2	Channel 3 Green	B	Channel 2 Green
3	Channel 4 Green	C	Channel 3 Green
4	Channel 5 Green	D	Channel 4 Green
5	Channel 6 Green	E	Channel 5 Green
6	Channel 7 Green	F	Channel 6 Green
7	Channel 8 Green	H	Channel 7 Green
8	Channel 9 Green	J	Channel 8 Green
9	Channel 10 Green	K	Channel 9 Green
10	Channel 11 Green	L	Channel 10 Green
11	Channel 12 Green	M	Channel 11 Green
12	Channel 13 Green	N	Channel 12 Green
13	Channel 14 Green	P	Channel 13 Green
14	Channel 15 Green	R	Channel 14 Green
15	Channel 16 Green	S	Channel 15 Green
16	N/C	T	PC AJAR
17	Channel 1 Yellow	U	Channel 9 Yellow
18	Channel 2 Yellow	V	Channel 10 Yellow
19	Channel 3 Yellow	W	Channel 11 Yellow
20	Channel 4 Yellow	X	Channel 12 Yellow
21	Channel 5 Yellow	Y	Channel 13 Yellow
22	Channel 6 Yellow	Z	Channel 14 Yellow
23	Channel 7 Yellow	AA	Channel 15 Yellow
24	Channel 8 Yellow	BB	Channel 16 Yellow
--		--	
25	Channel 17 Green	CC	Channel 17 Yellow
26	Channel 18 Green	DD	Channel 18 Yellow
27	Channel 16 Green	EE	PC AJAR (Program Card)
28	Yellow Inhibit Common	FF	Channel 17 Green

-- Slotted for keying between Pins 24/BB and 25/CC



4.4. MATERIALS – TYPE 2070E CONTROLLERS

Conform to CALTRANS *Transportation Electrical Equipment Specifications (TEES)* (dated March 12, 2009, plus Errata 1 dated January 21, 2010) except as required herein.

Furnish Model 2070E controllers. Ensure that removal of the CPU module from the controller will place the intersection into flash.

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 2070E controllers with the latest version of OS9 operating software and device drivers, composed of the unit chassis and at a minimum the following modules and assemblies:

- MODEL 2070-1E, CPU Module, Single Board, with 8Mb Datakey (blue in color)
- MODEL 2070-2A or approved 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)

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- MODEL 2070-4, Power Supply Module, 10 AMP
- MODEL 2070-7A, Async Serial Com Module (9-pin RS-232)

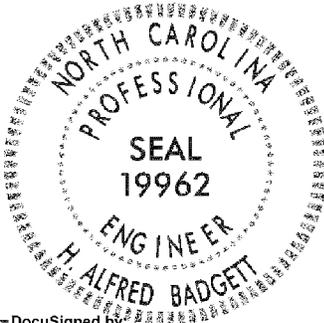
Furnish one additional MODEL 2070-7A, Async Serial Com Module (9-pin RS-232) for all master controller locations.

For each master location and central control center, furnish a U.S. Robotics V.92 or approved equivalent auto-dial/auto-answer external modem to accomplish the interface to the Department-furnished microcomputers. Include all necessary hardware to ensure telecommunications.

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Forsyth County



Intelligent Transportation Systems Dynamic Message Signs & CCTV

PROJECT SPECIAL PROVISIONS

Prepared by:

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DocuSigned by:
Alf Badgett 8/11/14
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1. PROJECT SPECIFIC REVISIONS TO THE STANDARD SPECIFICATIONS

Revise the *2012 Standard Specifications* as follows:

1.1. SECTION 1098 SIGNALS AND INTELLIGENT TRANSPORTATION SYSTEM MATERIALS

Page 10-208, Subarticle 1098-1(B) Submittal Requirements, insert the following sentence at the end of this subarticle:

Refer to the “Submittal Data” section of these Project Special Provisions for additional submittal requirements.

Page 10-208, Subarticle 1098-1(C) Observation Period, Lines 40 and 41, replace the last paragraph with the following:

Prior to final acceptance, all Contractor-furnished equipment and software shall successfully complete a 30-day Observation Period.

The 30-day Observation Period is considered to be part of the work included in the total contract time and must be completed prior to final acceptance of the project.

Final acceptance will occur following the successful completion of the 30-day Observation Period and after all documentation requirements have been fully satisfied.

Refer to the “Testing and Acceptance” section of these Project Special Provisions for additional requirements.

Page 10-209, Subarticle 1098-1(D) Warranties, Line 11, insert the following after “50 years” at the end of the sentence: “and will support user-definable parameters for setting the start and end dates for daylight savings time.”

Page 10-209, Subarticle 1098-1(D) Warranties, Line 14, insert the following sentence at the end of the last paragraph:

“Provide warranties in the name of the North Carolina Department of Transportation.”

Page 10-212, Article 1098-5 JUNCTION BOXES, insert the following subarticles at the end of the article:

(D) Special-Sized Junction Boxes

Provide special sized junction boxes and covers with minimum inside dimensions of 36"(l) x 24"(w) x 24"(d).

(E) Junction Box Cover Imprint/Logo

Provide the following imprints/logos on the covers (lids) of junction boxes:

Junction Box Size	Lid Imprint (Logo)
Standard	Traffic Signal
Oversized	NCDOT – F.O. <i>(line 1)</i> (336) 315-7080 <i>(line 2)</i>
Special-Sized	NCDOT – F.O. <i>(line 1)</i> (336) 315-7080 <i>(line 2)</i>

Page 10-215, Subarticle 1098-10 (A) SMFO Communications Cable, Lines 6-9. Replace sentence that begins with “Ensure” at end of Line 6 and ends with “material” at the beginning of line 9 with the following:

Except for 6-fiber drop cables, provide exactly 12 fibers per buffer tube in all cables regardless of the total number of fibers the cables contain. Do not provide cables with any other fiber count per buffer tube. Ensure that that all buffer tubes are filled with a water-blocking gel or water swellable material.

Page 10-215, Subarticle 1098-10 (A) SMFO Communications Cable, Line 14, and replace “Kevlar” with “aramid”.

Page 10-215, Subarticle 1098-10 (B) Drop Cable, replace the third paragraph with the following:

On one end of the cable, furnish LC connectors for termination of all drop cable fibers on connector panel mounted inside an equipment cabinet. Provide either factory preassembled drop cables with SMFO pigtails and LC connectors already attached or field install the pigtails and connectors. For field installed connectors, provide cabinet-mounted interconnect centers that are pre-equipped with factory-preassembled connector panels, SMFO pigtails with LC connectors and splice trays; then fusion splice all drop cable fibers to the SMFO pigtails.

Page 10-216, Subarticle 1098-11 (A) Interconnect Center, Line 34, insert the following sentence at the end of the line:

Provide interconnect centers for DMS and CCTV cabinets that are one rack unit (RU) high.

Page 10-216, Subarticle 1098-11 (A) Interconnect Center, Line 38, replace “ST-type” with “LC-type”.

Page 10-216, Subarticle 1098-11 (A) Interconnect Center, Lines 40 & 43, replace “PC-ST” with “LC”.

Page 10-217, Subarticle 1098-11 (B) Splice Enclosure, Line 12, insert “(i.e., uncut and unspliced)” between “expressed” and “through”.

Page 10-217, Article 1098-11 FIBER-OPTIC SPLICE CENTERS, insert the following subarticle at the end of this article:

(C) Hub Splice Center

Provide a hub splice center for terminating a single trunk fiber-optic cable that consists of a rack-mounted splice housing for the splice trays and a rack-mounted connector housing containing patch panels. Furnish a separate rack-mounted hub splice center for each new trunk fiber-optic communications cable entering and terminated inside the hub cabinet. Provide a hub splice center sized to accommodate fusion splicing of all fibers in the designated cable to pigtailed in splice trays housed inside the hub splice center and terminating those pigtailed on the hub splice center's connector panels (i.e., patch panels) as shown in the Plans. Equip the connector housings with LC-compatible connector panels with 12 connectors on each panel (arranged in a duplex arrangement) to terminate fibers from each buffer tube in the incoming cable on a unique connector panel (i.e., one connector panel per buffer tube).

Furnish connector housings and splice housings made by the same manufacturer and designed by the manufacturer to work together as a unit. Provide a hub splice center designed to house a separate splice tray for each buffer tube in the cable and to store buffer tubes following splicing. Provide splice housings that occupy no more than five rack units.

Provide splice trays that hold, protect, organize optical fibers, and secure fibers inside splice tray. Design and size the splice trays to be dielectric, to accommodate all fibers entering splice tray, and to provide sufficient space to prevent microbending of optical fibers.

Furnish SMFO pigtailed with the hub splice center. Provide pigtailed that are a maximum of six feet in length with factory-assembled LC connectors. Ensure SMFO pigtailed meet the operating characteristics of the SMFO cable with which it is to be coupled. Factory pre-terminated and pre-assembled pigtailed connector panels may be furnished in lieu pigtailed pre-assembled with LC connectors, subject to the Engineer's approval.

Furnish SMFO jumpers that are a minimum of three feet in length with factory-assembled LC connectors on both ends. Ensure SMFO jumpers meet the operating characteristics of the SMFO cable with which they are to be coupled. Furnish the quantity of SMFO jumpers necessary to provide the connectivity at each hub splice center required by the Plans.

Provide all hardware needed to install these units in the rack inside the hub cabinet.

1.2. SECTION 1550 TRENCHLESS INSTALLATION OF UTILITIES

Page 15-19, Subarticle 1550-4 (A) Bore and Jack, Line 38, insert the following paragraph at the beginning of the subarticle:

Comply with all requirements and specifications of Norfolk Southern (NS) Railroad Company and the railroad encroachment agreement. For work within NS rights of way, comply with latest approved edition of NCSE-4 (Specifications for Wire, Conduit and Cable Occupations of Norfolk Southern Corporation Property) and NSCE-8 (Specifications for Pipeline Occupancy of Norfolk Southern Corporation Property).

1.3. SECTION 1700 GENERAL REQUIREMENTS

Page 17-1, Article 1700-1 DESCRIPTION, insert the following subarticle at the end of the article:

U-2579B**ITS-10****Forsyth County****(A) Summary of Work**

This project consists of construction of CCTV surveillance camera assemblies, dynamic message sign (DMS) assemblies and fiber-optic communications cable along the Eastern Section of the proposed Winston-Salem Northern Beltway (U-2579B) in northeastern Forsyth County near Kernersville. The project constructs four miles of the Winston-Salem Northern Beltway from Business 40/US 421 to US 158 and includes widening along Business 40/US 421 in the vicinity of the new interchange with the Beltway.

At the new interchange between the Winston-Salem Northern Beltway and Business 40/US 421, the new fiber-optic communications cable on the Beltway will be linked to an existing Department-owned, 144-strand fiber-optic ITS communications cable that runs underground along the south side of Business 40/US 421. This existing 144-fiber cable provides the homerun communications link to the Triad Regional Transportation Management Center (TRTMC) in Greensboro to the east. Since the proposed widening of Business 40/US 421 will impact this existing underground cable, ITS work on this project includes constructing a temporary pole line along the southern right-of-way of Business 40/US 421 and rerouting this 144-fiber cable to a temporary aerial route that is clear of construction. A new permanent underground segment of 144-fiber cable will be installed in new underground conduit along the south side of Business 40/US 421 as road and bridge construction nears completion, at which time the temporary aerial route will be removed.

Construction along Business 40/US 421 will also necessitate the relocation of an existing DMS within the project limits.

D7-DMS 9 and CCTV 052 on Business 40 will be connected to an existing Ethernet circuit serving U-2800.

The Department will monitor and control all CCTV cameras and DMSs from the TRTMC via the 144-fiber trunk cable along Business 40/US 421 and the new 72-fiber trunk cable being installed along the Winston-Salem Northern Beltway Eastern Section under this project.

Coordinate the final locations of field devices with the Regional ITS Engineer. The Regional ITS Engineer shall confirm final device locations.

Intelligent transportation system (ITS) work on this project will include the following:

- Furnishing and installing an Ethernet-based, fault-tolerant, fiber-optic communications system comprised of approximately four roadway miles of fiber-optic cable;
- Modifying the Ethernet core switch at the TRTMC;
- Furnishing and installing managed Ethernet edge switches and digital hardware video encoders and decoders;
- Furnishing and installing an air-conditioned hub cabinet with managed Ethernet switch.
- Furnishing and installing five CCTV camera assemblies and two pedestal-type DMS assemblies;
- Relocating one existing DMS and erecting it on new supports/foundations in a new location.

U-2579B**ITS-11****Forsyth County**

Provide a complete, fully functional communications system. Perform the following major tasks under this contract, as shown in the Plans (the list that follows is not meant to be all-inclusive):

- Furnish and install a new Ethernet-based fiber-optic communications system comprised of fiber-optic cable, fiber-optic drop cables, and fiber-optic splice centers (i.e., splice enclosures, interconnect centers, hub splice centers, etc.), fiber-optic jumpers, hub cabinets, and related electronics;
- Furnish and install underground conduit/duct, junction boxes, risers with heat shrink tubing, messenger cable, fiber-optic cable storage guides, and pole guy assemblies with guy guards;
- Furnish and install Gigabit Ethernet Interface Converters (GBIC) in the existing managed Ethernet core switch in the TRTMC;
- Furnish and install single channel digital hardware video encoders and decoders in the TRTMC;
- Furnish and install managed Ethernet edge switches to connect CCTV assemblies and DMSs to the Ethernet communications network at eight locations;
- Furnish and install a managed Ethernet routing switch with air-conditioned hub cabinet at one location.

Page 17-1, Subarticle 1700-3(B) Regulations and Codes, Line 30, insert the following at the beginning of the first paragraph:

Furnish material and workmanship conforming to the National Electric Code (NEC), National Electric Safety Code (NESC), Underwriters Laboratories (UL), or other listing agencies approved by the North Carolina Department of Insurance, and all local safety codes in effect on the date of advertisement.

Page 17-2, Subarticle 1700-3(B) Regulations and Codes, Lines 1 and 2, replace the last paragraph with the following:

When required by the local ordinances and governmental agencies, upon completion of the work, have all systems inspected and approved in writing by the authorized governmental electrical inspector for the area. Furnish written certification of the authorized inspector's approval to the Engineer. Inspection by the authorized governmental electrical inspector must neither eliminate nor take the place of the inspections by the Engineer. Upon the Engineer's receipt of written certification and the Contractor's written request for a final inspection of the installations, the Engineer will perform a final inspection.

Where required, conform to ITE, AASHTO, and ASTM standards in effect on the date of advertisement.

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

Page 17-2, Subarticle 1700-3(C) Utility Services, insert the following paragraph at the beginning of the subarticle:

U-2579B**ITS-12****Forsyth County**

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

Page 17-2, Subarticle 1700-3(D) Maintenance and Repair of Material, Line 22, insert the following at the end of the second paragraph:

This requirement for maintaining and repairing said equipment shall remain in effect in the event of severe weather (see NOAA National Severe Storms Laboratory website <http://www.nssl.noaa.gov/primer/>) or a natural disaster, including but not limited to floods, winter weather, lightning, damaging winds, hail, tornado, tropical storm or hurricane.

Page 17-3, Subarticle 1700-3(F) Removal of Existing Equipment and Material, Lines 12-17, replace the entire subarticle with the following:

Remove all Department-owned equipment and material as called for in the Plans and the Project Special Provisions. Communications equipment and materials to be removed under this project include, but are not limited to fiber-optic communications cable, junction boxes, messenger cable, and guy assemblies. Assume ownership of removed poles (including stub poles), messenger cable, junction boxes, interconnect cable, and supporting hardware. Return all other Department-owned equipment and material between 8:00 a.m. and 12:00 p.m., Monday through Thursday, to the Regional ITS Office located at 201 South Chimney Rock Road in Greensboro, NC, 27409. The Department will deduct the cost of Department-owned damaged by the Contractor from money due to the Contractor.

Page 17-4, Subarticle 1700-3(J) Wire and Cable, Line 22, insert the following paragraph at the end of the subarticle:

Place permanent labels on all wires and cables to identify clearly each one. Use an indelible black ink marker or approved labeling devices to write on the permanent labels when required.

Page 17-5, Article 1700-3 CONSTRUCTION METHODS, Line 17, insert the following new subarticles between Line 17 and Line 18:

(O) Requirements for Cables Crossing Railroads

Copies of all executed railroad agreements and related correspondence may be obtained from the Engineer upon request.

(1) Railroad Crossings

Application has been made with Norfolk Southern Corporation (NS), hereinafter called the Railroad Company, for the encroachment agreement necessary under this Contract. Do not commence cable routing over or under railroad-owned facilities until notification and coordination with Engineer and the appropriate Railroad Company has occurred. Install fiber-optic communications cable as shown on the Plans. All work associated with the crossing is to conform to the Railroad Company's specifications. For work within NS rights of way, comply with latest approved edition of NCSE-4 (Specifications for Wire, Conduit and Cable Occupations of Norfolk Southern Corporation Property) and NSCE-8 (Specifications for Pipeline Occupancy of Norfolk Southern Corporation Property).

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Forsyth County

The cable crossing on this project is at the following location:

Plan Sheet	Location	Railroad Company
ITS-27	West Mountain Road (SR 2377) just north of Proposed Winston-Salem Northern Beltway overpass / Crossing # (TBD)	NS

(2) Insurance Requirements

The Department has provided Railroad Protective Liability Insurance to Norfolk Southern as part of the Department's encroachment agreements with Norfolk Southern for each of the NS locations listed in the table above.

If required by the railroad, pay for railroad personnel to be present when work is performed.

In addition to any other forms of insurance or bonds required under the terms of the Contract and the *Standard Specifications*, take out and keep in force from the commencement of all construction on railroad right-of-way until the final inspection and acceptance of the project by the Engineer, insurance of the following kinds and amount. It is understood that the amounts specified are minimum amounts and that larger amounts may be carried if so desired. Any insurance taken out due to these requirements shall be subject to the approval of the Engineer, and the Railroad Companies as to form and amount. Furnish satisfactory policies prior to beginning of the work on railroad right-of-way.

Refer to the following web links for more specific insurance requirements and requirements for working on the rights-of-way of each railroad company. In the event of a conflict between the requirements of one or more railroad companies and the requirements contained in the Plans or these Project Special Provisions, the requirements of the railroad company shall govern.

Norfolk Southern Corporation:

http://www.nscorp.com/nscportal/nscorp/Customers/Publications/pdf/SEC3_MISC3.pdf

Commercial General Liability Insurance

Furnish evidence to the Engineer of Contractor's commercial General Liability Insurance coverage with a combined single limit of not less than \$1,000,000 for each occurrence for operations performed on the railroad right-of-way. The Contractor's policy shall name Norfolk Southern Railway Company as an additional insured. If any part of the work is sublet, similar insurance in the same amounts and evidence thereof as required of the Prime Contractor shall be provided by or on behalf of the Subcontractor to cover Subcontractor's operations on the railroad right-of-way.

Keep such insurance in force until final inspection of the project, or that portion or portions within the railroad right-of-way, by the Engineer or, in the case of Subcontractors, until the Contractor furnishes a letter to the Engineer stating that the Subcontractor has completed his/her subcontracted work within the railroad right-of-way to Contractor's satisfaction, and that the Contractor will accomplish any additional work necessary on the railroad right-of-way with the Contractor's own forces.

U-2579B**ITS-14****Forsyth County****Termination of Insurance and Policies to be Submitted**

Any insurance policies given hereunder shall cover all Contractor-performed work the Contractor in connection with the work in the introductory paragraph within railroad right-of-way, but shall not be liable for accidents occurring after acceptance of the completed project by the Department. Such policies shall contain a clause requiring 30 days written notice be given to the Engineer and to the appropriate Railroad Company, prior to cancellation or change.

Submit to the Engineer the original and one copy of the Commercial General Liability Policy, one certified duplicate copy of all other policies, and certificates of insurance in an original and two copies as required by these Project Special Provisions.

No extra allowance will be made for the insurance required hereunder. The entire cost shall be included in the contract unit price bids for other pay items.

The named insured under the commercial General Liability Insurance Policy is the respective Railroad Company, and the designation of the job site description of work is as follows: All construction on the Norfolk Southern Corporation right-of-way on NCDOT Project No. U-2579B in Kernersville and Forsyth County, North Carolina.

(3) Flagging Protection or Watchman Service

Provide 72 hours advance notice to Norfolk Southern in order that flagging service can be arranged and provided. Do not undertake any work within the NS right-of-way until the flagman is at the job site.

(4) Delays Caused by Operations of Others

Neither the Department nor the Railroad Company assumes any responsibility for any work performed by others in connection with the construction of the project, and the Contractor shall have no claim whatsoever against the Department or the Railroad Company for any inconvenience, delay, or additional cost incurred by the Contractor on account of such operations by others.

(5) Time Extensions

No time extensions related to railroad encroachments will be allowed until the related work becomes the controlling factor relative to overall project completion.

(6) Cooperation with Others

Cooperate with others participating in the construction of the project to the end that all work may be carried on to the best advantage.

(7) Authority of Railroad Engineer

The authorized representative of the Railroad Company, hereinafter referred to as the Railroad Engineer, will have the final authority in all matters affecting the safe maintenance of railroad traffic of his company.

U-2579B**ITS-15****Forsyth County****(8) Interference with Railroad Operations**

Arrange and conduct work so that there will be no interference with railroad operations, including train, signal, telephone and telegraphic services, or damage to the property of the Railroad Company or to the poles, wire, and other facilities of tenants on the rights-of-way of the Railroad Company. Wherever work is liable to affect the operations or safety of trains, first submit the method of doing such work to the Railroad Engineer for approval. However, such approval will not relieve the Contractor from liability.

Should conditions arising from or in connection with the work, require that immediate and unusual provisions be made to protect train operations and property of the Railroad Company, it shall be a part of the required services by the Contractor to make such provisions and if, in the judgment of the Railroad Engineer such provisions are insufficient, the Railroad Engineer or the Department may, at the expense of the Contractor, require or provide such provisions as may be deemed necessary.

(9) Directional Drilling beneath Norfolk Southern Tracks

Prior to the commencement of horizontal directional drilling (HDD) beneath railroad tracks either owned or operated by Norfolk Southern Corporation, submit to NS for approval a complete construction procedure of the proposed directional drilling operation. Include with the submission the manufacturer's catalog information describing the type of equipment to be used. Comply with requirements of the encroachment agreement with NS and with "Specifications for Pipeline Occupancy of Norfolk Southern Corporation Property" (NSCE-8).

(10) Storage of Materials

Do not store materials and equipment where they will interfere with railroad operations, nor on the rights-of-way of the Railroad Company without first having obtained permission from the Railroad Engineer. Such permission will be with the understanding that the Railroad Company will not be liable or damage to such material and equipment from any cause, and that the Railroad Engineer may move or require the Contractor to move, at the Contractor's expense, such material and equipment.

(11) Completion and Acceptance of Work

Upon completion of the work, remove from within the limits of the railroad right-of-way all machinery, equipment, surplus materials, or rubbish and leave said rights-of-way in a neat and orderly condition. Acceptance of the work will be contingent upon final inspection by the Department and by the Railroad Company (if required by the Railroad Company) to determine if the work was completed satisfactorily in a manner acceptable to the Department and the Railroad Company.

Page 17-5, CONSTRUCTION METHODS, Line 17, insert the following new subarticles between Line 17 and Line 18:

(P) Construction Staging/Migration**(1) Introduction**

This section addresses the general flow of construction in regards to communications throughout the life of the project.

Follow the outline of construction described below. Submit a System Configuration Report to the Engineer for Department review and approval prior to beginning any work within the TRTMC. Submit the System Configuration Report in both hard copy and electronic form. Refer to "Submittal Data" section of these Project Special Provisions for additional requirements.

(2) Trunk Cable Installation and Field Device Communications

Notify the Triad Regional ITS Engineer at (336) 315-7080 at least two weeks prior to the commencement of splicing, installing or replacing fiber-optic jumpers or other work on the existing trunk cables along Business 40/US 421. Provide the Engineer updated splice details, updated field splicing location, and Contractor emergency contact information prior to beginning work. Do not cut the entire cable and re-splice all the fibers, unless prior approval is obtained from the Department. The interruption of connectivity of these cables shall be limited to 24 hours or less, and shall occur only on a non-holiday weekend. Repair at own expense, any damage to NCDOT fiber within 24 hours of notification of the incidence of damage. **Liquidated damages** for failure to restore communications in an existing NCDOT ITS fiber-optic communications cable or cellular modem service within 24 hours are **\$ 1,500 per 24-hour period or any portion thereof.**

Repair at own expense, any damage to NCDOT fiber within 24 hours of notification of the incidence of damage. **Liquidated damages** for failure to repair a damaged NCDOT ITS fiber-optic communications cable and restore communications within 24 hours are **\$ 1,500 per 24-hour period or any portion thereof.**

Construct a temporary overhead fiber-optic communications cable on wood poles to maintain communications during construction. Provide cable storage for subsequent and future splices where called for in the Plans.

Upon completion of the work on the south side of the roadway, construct the permanent underground conduit and fiber-optic cable along Business 40/US 421. Provide cable storage for subsequent and future splices where called for in the Plans.

Install fiber-optic jumpers at locations where shown in the Plans. Resplice or replace jumpers where shown in the Plans. Replace fiber-optic connectors where shown in the Plans.

(3) DMS Communications

Remove, temporarily store, then reinstall an existing DMS (D7-DMS 9) on Business 40/US 421 onto a new permanent overhead sign structure. Relocate the existing ground mounted cabinet to a new cabinet foundation at the new location and install a new electrical service. Install oversize junction box, conduit, fiber-optic interconnect center, fiber-optic drop cable, and an Ethernet edge switch into the relocated DMS cabinet. Remove the existing overhead DMS structure, its foundations and its electrical service.

While the existing DMS is out of service, provide a portable changeable message sign compatible and wireless communications with those in use by the Triad Region. Upon project completion, deliver the portable CMS to the TRTMC and relinquish ownership to the Department.

U-2579B**ITS-17****Forsyth County****(4) CCTV Communications**

At locations shown on the Plans, install oversize junction boxes, conduit, fiber-optic interconnect centers, fiber-optic drop cables, and Ethernet edge switches into proposed CCTV cabinets to connect the CCTV cabinets to the fiber-optic communications network. In lieu of separate CCTV cabinets, the camera equipment for CCTV-054 will be installed in a hub cabinet and the camera equipment for CCTV-193 will be installed in a DMS cabinet for D9-DMS 38.

While the existing CCTV camera on Business 40 is out of service provide a portable trailer mounted CCTV camera and wireless communications compatible with those in use by the Region. Upon project completion turn over and deliver the portable trailer-mounted CCTV camera to the TRTMC and relinquish ownership to the Department.

(5) Managed Ethernet Routing Switch

Install a managed Ethernet routing switch and fiber-optic jumpers in a new hub cabinet at location shown in the Plans. Install jumpers where shown in the Plans.

(6) Managed Ethernet Core Switch

Install GBICs and fiber-optic jumpers and at locations shown in the Plans. Resplice or replace jumpers where shown in the Plans. Install jumpers where shown in the Plans.

(7) Testing

Conduct system testing, acceptance and burn in period. Test the fiber-optic cable per the requirements of the "Testing and Acceptance" section of these Project Special Provisions.

(P) Documentation**(1) General**

Provide all as-built documentation. All as-built plans and documentation shall be reviewed and accepted by the Engineer prior to final acceptance of the project. All documentation, except as otherwise specifically approved by the Engineer, must meet the following requirements:

1. Provide any documentation that exceeds the size of 11" x 17" paper in a reproducible format 22" x 34" in size.
2. Documentation for as-built plans smaller than 11" x 17" will not be accepted.
3. Documentation smaller than 8.5" x 11" will not be accepted.
4. Do not fold or crease reproducibles.

As a minimum, provide the documentation described in the paragraphs below.

(2) Plan of Record Documentation

Provide as-built drawings that depict any changes of components, measurement or layout of the Plans. Show all construction changes, with the final location and depth of conduits, wiring external to the cabinet, locations of splice closures, and SMFO cable terminations, etc., in detail in a reproducible format. Submit as-built construction changes as soon as a change is complete. Note and date each change on the drawings. Failure to revise as-built documentation to reflect current work may result in withholding of payments until the as-

built documentation is updated. The submitted as-built documentation may be field-checked by the Engineer at his discretion. If the as-built documentation is found to have an unacceptable number of inaccuracies, the Engineer may withhold payment until the as-built plans are corrected. Include all field installation including the SMFO cable network installed on the drawings.

For underground conduit systems that house communications cable, furnish the Engineer with a plan of record drawing detailing the locations of the conduit system, including junction boxes and their corresponding GPS coordinates. For directionally-drilled underground conduit systems, identify the vertical location (i.e., depth) of the conduits along the run.

The Department will provide the Contractor one electronic copy of the Plans for his use in developing the as-built drawings. Modify the original electronic file such that all changes are marked with callout boxes or other method approved by the Engineer. Any other base maps that may be necessary for the Contractor to prepare the as-built drawings in accordance with these Project Special Provisions will be the Contractor's responsibility. Use CADD conventions that are consistent with those used on the original plans.

Prior to the beginning of the Observation Period, furnish one reproducible copy of the draft as-built plans in hard copy format for review. Provide draft hard copy as-built drawings on 11"x 17" bond plan sheets.

Upon receipt of review comments from the Engineer, correct any errors and make all necessary revisions to the draft as-built plans prior to final acceptance of the project. Submit final as-built plans in electronic and hard copy format. Provide electronic plans in MicroStation (latest release in use by the Department) format on CD or DVD.

(3) Manuals

Provide at least five hard copies along with one electronic copy (on CD or DVD) of the following manuals:

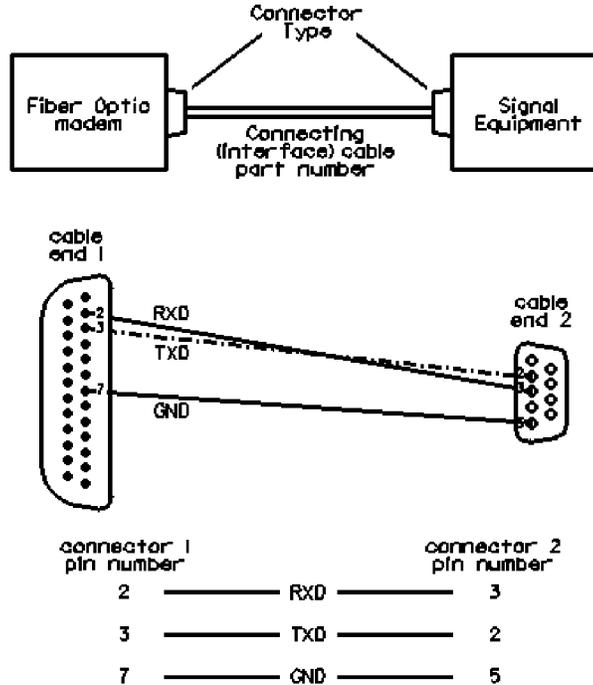
- Operator's manuals containing detailed operating instructions for each different type or model of equipment. Ensure that manuals contain instructions for possible modification to equipment.
- Maintenance procedures manuals containing detailed preventative and corrective maintenance procedures and troubleshooting procedures for each different type of model of equipment.
- Installation, operations, and training manuals for all Contractor-provided software.

The manuals provided above shall be in addition to manuals provided with and stored inside each equipment cabinet.

(4) Wiring Diagrams

Provide detailed wiring diagrams that include wired interconnection of equipment with pin-out configurations, pin functions, and cable parts numbers. This includes configuration at each field equipment cabinet or equipment cabinet at central locations. Provide two copies of system connection diagrams showing system interconnection cables and associated terminations. Use naming convention approved by the Engineer and conforming to Belcore standards. Provide one electronic copy of the wiring diagrams in MicroStation format.

Example:



(5) Splice Diagrams

Prepare as-built splice diagrams that depict the communications cable plant as constructed. Depict the splices made at each splice enclosure by identifying spliced fiber and buffer tube. Ensure the splice diagram is in a similar format to those provided with the project plans. Identify all expressed fibers, spare fibers, used fibers and capped fibers.

Original splice diagrams will be provided in electronic format in MicroStation format. Designate any changes to these diagrams by using a method approved by the Engineer. Furnish as-built splice diagrams in MicroStation format on CD or DVD and in hard copy.

Page 17-5, Article 1700-4 MEASUREMENT AND PAYMENT, Line 21, add the following sentence at the end of the first paragraph:

Include the incidental costs for furnishing and/or installing materials and equipment expressly required under the contract for successful completion of the contract, but whose measurement and payment is not specifically stated under any of the contract pay items, into the unit cost(s) for the various items in the contract.

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1.4. SECTION 1710 MESSENGER CABLE

Page 17-9, Article 1710-1 DESCRIPTION, add the following paragraph at the end of the article:

Furnish and install pole grounding systems consisting of #6 AWG solid bare copper wire, messenger bonding clamps, hot-dipped galvanized wire staples, ground rods, and exothermic welding.

1.5. SECTION 1715 UNDERGROUND CABLE INSTALLATION

Page 17-11, Article 1715-2 MATERIAL, add the following paragraph at the end of the article:

Furnish non-detectable underground marker tape with the wording “WARNING – Fiber-Optic Cable” in all trenches containing one or more conduits that will house fiber-optic communications cable.

Page 17-11, Subarticle 1715-3 (A) General, insert the following paragraph at the beginning of the subarticle:

Except where the Plans call for a specific installation method or where the Engineer directs otherwise, underground conduit may be installed by either trenching, directional drilling or plowing at the option of the Contractor but will be measured and paid for as “underground conduit,” regardless of installation method (see “Measurement and Payment” subsection).

Page 17-11, Subarticle 1715-3 (A) General, insert the following paragraphs after the third paragraph of the subarticle:

Install a minimum of two conduits (i.e., at least one for fiber-optic cable plus one dedicated spare) for all underground routes unless the Plans show otherwise.

Install junction boxes in underground conduit runs as shown on the Plans. Do not exceed 1,500 feet between junction boxes in any underground conduit route that conveys communications cable without the prior approval the Engineer.

Page 17-11, Subarticle 1715-3 (A)(1)(a) Conduit Entering Junction Boxes, insert “or special-sized” between “oversized” and “junction boxes” in the first sentence of the first paragraph and between “oversized” and “junction box” in the second sentence of the same paragraph. In the last sentence of the third paragraph, insert “Ethernet cable, coaxial cable,” between “communications cable” and “signal cable.”

Page 17-11, Subarticle 1715-3 (A)(1)(b) Conduit Entering Cabinet Foundations, insert “Ethernet cable, coaxial cable,” between “communications cable” and “signal cable.”

Page 17-11, Subarticle 1715-3 (A)(2) Tracer Wire, line 36, insert the following sentence: “Coil and store 10 feet of spare tracer wire in junction boxes.”

Page 17-11, Subarticle 1715-3 (A)(2) Tracer Wire, insert the following paragraph at the end for the subarticle:

For a given tracer wire run between two cabinets, bond the tracer wire to the equipment ground inside the cabinet at one end of run only; do not bond both ends of the tracer wire in a continuous run to cabinet grounds at each end of the run. Establish a consistent convention for

which end the tracer wire will be bonded along a give roadway or corridor. For example, bond the end of the tracer wire closest/to (in the direction of) the TRTMC.

Page 17-12, Subarticle 1715-3 (B)(1) General, Line 14, add the following phrase to the end of the last sentence: “longitudinally in the trench 6 to 12 inches below the unpaved ground surface or below the underside of the paved surface.”

Page 17-12, Subarticle 1715-3 (B)(1) General, insert the following paragraph at the end of the subarticle:

Use HDPE conduit in trenched areas unless otherwise specified in the Plans. Use 2-inch PVC or rigid galvanized conduit between junction boxes adjacent to base-mounted equipment cabinets and the 2-inch conduit stub-outs from the equipment cabinet foundation.

Page 17-14, Subarticle 1715-3 (D)(3) Drilling Fluids, Line 47, add the following sentence to the end of the line:

Disposal on public or railroad right-of-ways or within public or railroad drainage ditches/facilities is prohibited.

Page 17-15, Subarticle 1715-3(D), Directional Drilling, add the following subarticle at the end of the article:

(5) Maximum Length of Directional Drill

The length of a directional drill shall not exceed 1,500 feet measured horizontally along the route of the directionally drilled conduit(s), unless otherwise approved by the Engineer. For routes longer than 1,500 feet, begin a successive directional drill where the first directional drill reaches 1,500 feet and install an oversized junction box where the two directional drilled conduit runs meet. The spacing of junction boxes in a directionally drilled route shall not exceed 1,500 feet.

Page 17-15, Subarticle 1715-3(E), Bore and Jack, Line 9, insert the following paragraph between Line 9 and Line 10:

Where shown in the Plans, install HDPE conduits of the quantity and size specified inside the bored and jacked rigid metal conduit (i.e., casing pipe) after the boring and jacking has been completed. Simultaneously pull multiple HDPE conduits through the outer casing pipe. Extend ends of the HPDE conduits such that upon completion of the installation, the conduits will extend a minimum of 2 inches beyond the end of the casing pipe or 4 inches above the washed stone base inside the junction box at each end of the run, whichever is greater. Install continuous HDPE conduits free from splices or couplings.

Page 17-15, Article 1715-4, MEASUREMENT AND PAYMENT, Lines 17-30, delete the measurement paragraphs for “Unpaved Trenching”, “Paved Trenching” and “Plowing” and replace them with the following:

Underground conduit (qty) (size) will be measured in horizontal linear feet of underground conduit installation of each type furnished, installed, and accepted, without regard to the installation method. Measurement will be along the approximate centerline of the conduit system. Payment will be in linear feet.

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Page 17-15, Article 1715-4, MEASUREMENT AND PAYMENT , Line 33, add the following after the last sentence:

When directional drilling is used where the Plans call for “Underground Conduit”, directional drilling will be measured and paid for as Underground Conduit. There will be no additional compensation for field-investigating site conditions nor for providing any specialized equipment, tooling, personnel, or techniques necessary to complete the installation of the underground conduit through directional drilling for the soil conditions encountered, including, but not limited to rock.

Page 17-15, Article 1715-4, MEASUREMENT AND PAYMENT, Line 37, add the following sentence to the end of the paragraph:

No measurement will be made of HDPE conduits installed inside the bored and jacked conduit (i.e., casing pipe) where called for in the Plans as such work will be considered incidental to boring and jacking the casing pipe.

Page 17-15, Article 1715-4, Line 41, insert the following two paragraphs between Line 41 and Line 42:

No measurement will be made of horizontal segments between the base of a riser and an adjacent junction box or base-mounted cabinet foundation that are 10 feet or less in length measured from the center of the riser to the center of the junction box or from the center of the riser to the center of the vertical sweep through the cabinet foundation as these will be considered incidental to riser installation.

No measurement will be made of conduit segments between adjacent junction boxes that are 10 feet or less in length measured from center of junction box to center of junction box as these will be considered incidental to furnishing and installing the junction boxes.

Page 17-16, Article 1715-4, MEASUREMENT AND PAYMENT, delete the pay items for “Unpaved Trenching”, “Paved Trenching” and “Plowing” and replace them with the following pay item and pay unit:

Underground Conduit (qty)(size)	Linear Foot
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1.6. SECTION 1716 JUNCTION BOXES

Page 17-16, Article 1716-1, DESCRIPTION, replace “graded stone” with “washed stone.”

Page 17-16, Article 1716-2, MATERIALS, insert the following paragraph at the end of the article:

Provide #67 washed stone aggregates in conformance with Sections 545 and 1005 of the *Standard Specifications*.

Page 17-16, Article 1716-3, CONSTRUCTION METHODS, insert the following three paragraphs between Line 18 and Line 19:

Install junction boxes flush with finished grade. Backfill beneath and around the junction box using #67 washed stone as shown in *Roadway Standard Drawing* No. 1716.01. Do not install sealant compound between junction boxes and covers.

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Install oversized junction boxes as shown in the Plans in underground fiber-optic communications cable runs where the conduit run transitions from directionally drilled conduit to trenched conduit and where transitioning from below ground to a riser assembly. Install oversized junction boxes in underground fiber-optic communications cable runs at maximum intervals of 1,500 feet, or where shown in the Plans, whichever is less.

Install special-sized junction boxes at all underground splice enclosure locations in underground fiber-optic communications cable runs as shown in the Plans.

Page 17-16, Article 1716-3, MEASUREMENT AND PAYMENT, Line 6, replace “graded stone and grounding systems” with “washed stone, grounding systems, and removal of existing junction boxes.”

Page 17-16, Article 1716-3, MEASUREMENT AND PAYMENT, insert the following paragraph between Line 7 and Line 8:

No measurement will be made of collecting and recording GPS coordinates for junction boxes and compiling this data in the prescribed Microsoft Excel spreadsheet as such work will be considered incidental to furnishing and installing junction boxes.

1.7. SECTION 1720 WOOD POLES

Page 17-17, Article 1720-2, MATERIAL, insert the following paragraph between Line 14 and Line 15:

Unless otherwise specified in the Plans, furnish Class 3 wood poles that have a minimum length of 40 feet and are of a sufficient length to maintain the minimum required clearances above the roadway, obstructions, and affected railroad tracks. Where poles will be installed prior to construction of proposed cut slopes and fill embankments, furnish poles of sufficient length to provide required minimum vertical clearances both before and after cut slopes and fill embankments are constructed. Where the proposed messenger cable will span a proposed fill embankment, provide poles at both ends of the aerial span that are of sufficient length to maintain the required vertical clearances once the fill embankment is complete.

Page 17-18, Article 1720-3, CONSTRUCTION METHODS, Line 5, insert “8 ft behind face of guardrail” between “minimum of” and “6 ft behind face of curb”.

Page 17-18, Article 1720-3, CONSTRUCTION METHODS, Line 7, insert “proposed fill embankments” between “roadway and “obstructions”.

Page 17-18, Article 1720-3, CONSTRUCTION METHODS, Line 9, insert the following sentence between the sentence that ends with “5 ft.” and the sentence that begins with “Ensure”:

Where cut slopes are proposed, install poles deep enough to maintain the minimum required embedment length following construction of proposed cut slopes.”

Page 17-18, Article 1720-3, CONSTRUCTION METHODS, Lines 17 and 18, replace the last sentence in the last paragraph of the article with the following:

Use hot-dipped galvanized 1.5” wire staples to secure ground wire to pole, spacing the staples along the ground as follows:

- 4 inches apart from ground level to 8 feet above ground level;
- 24 inches apart from 8 feet above ground level to point adjacent to uppermost span.

1.8. SECTION 1721 GUY ASSEMBLIES

Page 17-18, Article 1721-3, CONSTRUCTION METHODS, insert the following sentence between Line 33 and Line 34:

Comply with *Roadway Standard Drawing* (RSD) No. 1721.01 when constructing guy assemblies.

Do not use guy anchors as grounding electrodes.

1.9. SECTION 1722 RISER ASSEMBLIES

Page 17-19, Article 1722-2, MATERIAL, insert the following paragraph at the end of the article:

Provide Schedule 40 PVC female adapter to connect an underground run of PVC conduit to the threaded end of a rigid metallic elbow/sweep at the base of a rigid metallic riser. Provide PVC adapters that have the same nominal diameter as the riser to join underground conduit of the same diameter to the riser. The interior surface of one end of the PVC female adapter shall be compatibly threaded to connect it to the threaded end of the rigid metallic riser without the aid of additional fittings, hardware, or adhesives. The opposite end of the adapter shall be non-threaded to permit a slip fit, glued connection to the underground PVC conduit.

Pages 17-19 and 17-20, Article 1722-3, CONSTRUCTION METHODS, insert the following paragraph at the end of the article:

Use 2-inch short risers to extend underground conduit vertically into the bottom of pole-mounted equipment cabinets to house fiber-optic communications drop cables. Connect 2-inch short risers to the bottom of the pole-mounted cabinet. Use a back-to-back pair of standard 45-degree elbows to attach the short riser to the bottom of the cabinet when the short riser is attached to the pole and offset laterally from the center of the cabinet.

Page 17-20, Article 1722-3, CONSTRUCTION METHODS, Line 21, insert the following sentence before the last sentence on this line:

Do not use a heat source with an open flame.

Page 17-20, Article 1722-3, CONSTRUCTION METHODS, Line 31, insert the following between Line 31 and Line 32:

Bond all new risers, a minimum of 10 feet above grade, to the pole ground using a #6 AWG minimum solid bare copper wire and an approve pipe clamp, a split-bolt connector or parallel groove clamp. On pole-mounted cabinets where the risers are connected to the cabinet, bond risers in the cabinet using ground bushings with a #6 AWG minimum solid bare copper wire to cabinet ground bus.

Page 17-20, Article 1722-3, CONSTRUCTION METHODS, Line 33, add the following to the end of this line:

Use PVC female adapters that have the same nominal diameter as the riser to join underground conduit of the same diameter to the riser. Apply pipe thread tape to the threads of rigid galvanized steel sweeping elbow before screwing the PVC adapter onto the threaded end of the elbow. Connect the threaded female end of the PVC adapter to the threaded male end of the rigid galvanized steel sweeping elbow without the use of additional fittings, hardware, or adhesives. Connect the opposite, non-threaded end of the adapter to the underground PVC conduit using a slip fit, glued connection.

Page 17-20, Article 1722-4, MEASUREMENT AND PAYMENT, Line 37, “conduit outlet bodies such as condulets, elbows, conduit fittings, PVC female adapters” between “shrink tubing” and “or”.

Page 17-20, Article 1722-4, MEASUREMENT AND PAYMENT, insert the following between Line 38 and Line 39:

No measurement will be made for installing pole grounding systems, as these will be considered incidental to furnishing and installing wood poles and messenger cable.

No measurement will be made for horizontal sections of underground conduit that connect the riser to stub-outs in an adjacent cabinet foundation or to an adjacent junction box and that measure 10 feet or less in horizontal length from the center of the riser to the center of junction box or from the center of the riser to the center of the vertical sweep through the equipment cabinet foundation. Such conduit will be considered incidental to furnishing and installing the riser assembly.

No measurement will be made for vertical conduit segments (i.e., short risers) extending from an entrance in the bottom of a pole-mounted cabinet to ground level below the cabinet to tie directly onto an underground conduit as such conduits will be considered incidental to furnishing and installing the underground conduit.

1.10. SECTION 1730 FIBER-OPTIC CABLE

Page 17-23, Subarticle 1730-3 (A), General, Line 29, add the following sentence to the end of this line:

No splicing is permitted at any field cabinets other than hub cabinets and splicing drop cable fibers to SMFO pigtailed in cabinet-mounted interconnect centers.

Page 17-23, Subarticle 1730-3 (A), General, Line 34, insert “breakaway” between “a” and “rotating”.

Page 17-23, Subarticle 1730-3 (A), General, insert the following paragraph at the end of this subarticle:

Seal all conduits containing fiber-optic communications cable in junction boxes and cabinet bases with duct and conduit sealer. Comply with the requirements for duct and conduit sealer in Article 1091-4 of the *Standard Specifications*.

Page 17-24, Subarticle 1730-3 (B), Aerial Installation, insert the following paragraph between Line 2 and Line 3:

Machine lashing of any cable is not permitted along any messenger cable span to which a traffic signal or overhead sign is or will be attached. Either reuse existing 0.05" x 0.30" aluminum wrapping tape or furnish and install new aluminum wrapping tape.

Page 17-24, Subarticle 1730-3 (B), Aerial Installation, Lines 5-6, replace the first sentence of the third paragraph of this subarticle with the following:

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

Page 17-24, Subarticle 1730-3 (B), Aerial Installation, Line 18, insert the following at the end of this line:

At splice enclosures, install a communications cable marker on one of the cables where it enters or exits the splice enclosure and ensure that the marker is installed so that it visible (but not necessarily readable) from the ground below. At fiber-optic cable storage guides (i.e., snow shoes), install a communications cable marker at each end, 6 inches or less from the inner edge of each snow shoe, to identify the cable being stored.

Page 17-24, Subarticle 1730-3 (C), Underground Installation, Line 21, insert the following at the end of this line:

Where more than one fiber-optic cable is being installed in a multiple conduit underground run, ensure that at least one conduit remains empty for future use by installing more than one cable in a conduit as needed, unless directed otherwise by the Engineer.

Page 17-24, Subarticle 1730-3 (C), Underground Installation, Lines 24-25, replace the first sentence of the third paragraph of this subarticle with the following:

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

Page 17-24, Subarticle 1730-3 (C), Underground Installation, insert the following at the end of the subarticle:

In a junction box where no splice enclosure is required, store 50 feet of each fiber-optic cable on all cable runs as shown in the Plans.

In a junction box where a splice enclosure is required but not immediately installed, store 50 feet of fiber-optic cable intended for the splice.

Page 17-24, Subarticle 1730-3 (D), Installation of Drop Cable Assembly, replace the second paragraph (lines 38-40) with the following:

At aerial splice enclosures, install the aerial splice enclosure and corresponding cable storage rack 50 feet apart and store between the splice enclosure and corresponding cable storage rack 50 feet of slack cable for each cable entering and exiting the splice enclosure. Coil and store any drop cable in excess of what is needed for overhead storage in the base of the equipment cabinet.

At below ground splice enclosures, coil 50 feet of slack cable for each cable entering and exiting the splice enclosure in the manhole or junction box where enclosure is located unless except where the Plans call for greater storage (e.g., at project termini). Coil and store any drop cable in excess of what is needed for storage in the manhole or junction box in the base of the

equipment cabinet. Where fiber-optic cables are installed but not immediately spliced, store 100 feet of drop cable and 100 feet of fiber-optic trunk cable inside the manhole or junction box to facilitate subsequent splicing in the splice enclosure unless otherwise shown in the Plans. Cap and seal ends of cables that have yet to be spliced or terminated with a waterproof heat-shrink cap/seal as approved by the Engineer.

Page 17-24, Subarticle 1730-3 (D), Installation of Drop Cable Assembly, Lines 41-42, replace the first sentence of the third paragraph with the following:

At the equipment cabinet end of a drop cable, terminate all fibers by splicing them to factory-assembled SMFO pigtailed with LC connectors, as shown in the Plans, and connecting the pigtailed to the connector panel. Label all connectors, pigtailed and the connector panel. At the aerial or underground splice location, cap off all unused fibers and label to correspond with the connector panel.

Page 17-24, Subarticle 1730-3 (D), Installation of Drop Cable Assembly, Lines 41-42, insert the following at the end of the subarticle:

Using an OTDR, test the end-to-end connectivity of the drop cable from patch panel installed inside the cabinet. Comply with the OTDR testing and reporting requirements of Subarticle 1731-3(G) of the *Standard Specifications* when testing drop cable.

Page 17-25, Article 1730-4, MEASUREMENT AND PAYMENT, Line 10, insert “SMFO jumpers and pigtailed, mechanical sealing devices and conduit seals/sealing putty,” between “markers” and “or”.

Page 17-25, Article 1730-4, MEASUREMENT AND PAYMENT, Line 11, insert “and drop cables” after “fiber-optic cable” at end of the sentence.

1.11. SECTION 1731 FIBER-OPTIC SPLICE CENTERS

Page 17-25, Subarticle 1731-3 (A), General, Line 27, insert “workmanship identification” between “following” and “information”.

Pages 17-26 and 17-27, ARTICLE 1731-3, CONSTRUCTION METHODS, replace Subarticles 1731-3(C) and 1731-3(D) with the following subarticles.

(C) Termination and Splicing within Interconnect Center

Install interconnect centers with connector panels, splice trays, storage for slack cable or fibers, mounting and strain relief hardware and all necessary hardware. Mount the interconnect center in the rack inside the equipment cabinet as shown on the Plans.

Terminate and fusion splice all fibers as shown in the Plans.

Label all fiber-optic connectors, whether on jumpers, connector panels, or other equipment, to prevent improper connection. Obtain approval of fiber-optic connector labeling method.

For all fibers designated for termination to a connector panel within an interconnect center or hub splice center, fusion splice the fibers to pigtailed.

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For all fibers designated to pass through interconnect center, neatly coil, and express the fibers without cutting. For all buffer tubes designated to pass through interconnect center, neatly coil excess tubing inside interconnect center without cutting.

Install SMFO jumpers between the appropriate connectors on the connector panels of the interconnect center and the Ethernet edge switch inside the cabinet as shown in the Plans.

(D) Termination and Splicing within Hub Splice Center

Install a hub splice center with connector panels, splice trays, storage for slack cable or fibers, and mounting and strain relief hardware, and all necessary hardware. Mount the hub splice center in the rack inside the hub cabinet as shown in the Plans.

Terminate and fusion splice all fibers as shown in the Plans.

Label all fiber-optic connectors, whether on jumpers, connector panels, or other equipment, to prevent improper connection. Obtain approval of fiber-optic connector labeling method.

For all fibers designated for termination to a connector panel within an interconnect center or hub splice center, fusion splice the fibers to pigtails.

For all fibers designated to pass through interconnect center, neatly coil, and express the fibers without cutting. For all buffer tubes designated to pass through interconnect center, neatly coil excess tubing inside interconnect center without cutting.

Install SMFO jumpers between the appropriate connectors on the connector panels of the splice center and the managed Ethernet switch inside the hub cabinet as shown in the Plans.

Page 17-27, Subarticle 1731-3 (E), Termination within Splice Enclosure, insert the following sentence between Line 9 and Line 10:

Do not install aerial splice enclosures and storage guides over roadways or driveways.

Page 17-27, Subarticle 1731-3 (E), Termination within Splice Enclosure, Lines 10-11, replace the second paragraph with the following:

Fusion splice all fibers including fibers designated to be coupled with fibers from a drop cable. For all fibers designated to pass through splice enclosure, coil and express the fibers without cutting.

Page 17-27, Subarticle 1731-3 (E), Termination within Splice Enclosure, Line 24, insert the following sentence at the end of the line:

Install underground splice enclosures only in special-sized junction boxes unless the Plans indicate otherwise or the Engineer approves otherwise.

Page 17-27, Subarticle 1731-3 (G), Testing, Lines 42, insert the following sentence at the end of the line:

Corrective action will be at no additional cost to the Department.

Page 17-28, Article 1731-4, MEASUREMENT AND PAYMENT, insert the following between Line 17 and Line 18:

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Hub splice center will be measured and paid as the actual number of fiber-optic hub splice centers furnished, installed in hub cabinets, and accepted.

Page 17-28, Article 1731-4, MEASUREMENT AND PAYMENT, Line 18, insert “fusion splices,” between “of” and “splice trays”. Insert “splice protectors,” between “splice trays” and “pigtails”. Insert “labeling, photographs,” between “connector panels” and “testing”.

Page 17-28, Article 1731-4, MEASUREMENT AND PAYMENT, Line 21, insert “hub splice centers,” between “interconnect centers” and “and splice enclosures”.

Page 17-28, Article 1731-4, MEASUREMENT AND PAYMENT, Line 22, insert the following pay item and pay unit below “Modifying Splice Enclosure” in the tabular pay item list:

Hub Splice Center	Each
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1.12. SECTION 1734 REMOVE EXISTING COMMUNICATIONS CABLE

Page 17-29, Article 1734-1 DESCRIPTION, Line 21, insert the following at the end of the line: “Remove existing wood poles, messenger cable, guy assemblies, guy anchors, risers and in-ground junction boxes as designated in the Plans.”

Page 17-29, Article 1734-2 CONSTRUCTION METHODS, Lines 23-24, replace the first paragraph with the following:

Removal of existing aerial communications cable includes sealing the ends of the communications cable, appropriately collecting the communications cable on a cable storage reel, and transporting the reel to Regional ITS Office located at 201 South Chimney Road in Greensboro. Use heavy duty, dielectric heat shrink end caps designed to seal off and provide chemical and mechanical protection to the ends of the fiber-optic communications cables and that are appropriately sized for the cable being sealed. The Department will retain ownership of the removed communications cable and will assume ownership of the cable storage reel upon delivery. Removal of existing aerial communications cable also includes proper disposal of messenger cable, splice enclosures, fiber-optic cable storage racks, wood poles vacated upon removal of existing communications cable, guy assemblies, guy anchors and pole mounting hardware, including abandoned risers.

Page 17-29, Article 1734-2 CONSTRUCTION METHODS, Line 28, insert “splice enclosures, fiber-optic cable storage guides” between “communications cable” and “messenger cable”. Insert “wood poles,” between “messenger cable” and “junction boxes”.

Page 17-30, Article 1734-3 MEASUREMENT AND PAYMENT, Lines 7-8, delete the following sentence: “Where multiple adjacent conduits exist (each containing multiple cables), each conduit will be measured and paid separately.”

Page 17-30, Article 1734-3 MEASUREMENT AND PAYMENT, Lines 10-11, insert “guy assemblies, guy anchors, splice enclosures, fiber-optic cable storage guides, wood poles, risers” between “pole attachment hardware” and “and junction boxes”.

Page 17-30, Article 1734-3 MEASUREMENT AND PAYMENT, Line 12, replace “hardware” with “cable”.

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Page 17-30, Article 1734-3 MEASUREMENT AND PAYMENT, insert the following paragraph between Line 12 and Line 13:

No measurement will be made of the collecting removed communications cable on a cable storage reel, of the cable storage reel, of sealing the ends of the removed cable with appropriate heat-shrink end caps, and of transporting the reel with the stored cable to the Regional ITS Office in Greensboro as such work will be considered incidental to removing the existing communications cable.

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2. EQUIPMENT CABINET BASE EXTENDER

2.1. DESCRIPTION

Furnish and install cabinet base extenders for base-mounted equipment cabinets with all necessary hardware for Type 170-family cabinets.

2.2. MATERIALS

Fabricate equipment cabinet base extenders from the same materials and with the same finish as cabinet housing. Fabricate base adapter and extender in the same manner as controller cabinets, meeting all applicable specifications called for in Section 7.5 of CALTRANS TEES (11/19/99). Provide base extenders that have a minimum height of 12". Provide equipment cabinet base extenders that comply with the details shown in the Plans and match the footprint of the existing or new equipment cabinet to be mounted on it.

2.3. CONSTRUCTION METHODS

Install an equipment cabinet base extender at locations requiring a new equipment cabinet on an existing/modified foundation or on a new equipment cabinet foundation. Install an equipment cabinet base extender at locations where an existing equipment cabinet is being relocated to a new equipment cabinet foundation.

Use permanent, flexible waterproof sealing material to:

- Seal between cabinet base and cabinet base extender, and
- Seal space between cabinet base extender and foundation.

2.4. MEASUREMENT AND PAYMENT

Equipment cabinet base extender will be measured and paid as the actual number of equipment cabinet base extenders furnished, installed, and accepted without regard to the size of base extender.

Payment will be made under:

Pay Item	Pay Unit
Equipment Cabinet Base Extender	Each

3. EQUIPMENT CABINET FOUNDATION

3.1. DESCRIPTION

Furnish and install foundations for base-mounted equipment cabinets and all necessary hardware.

Furnish poured concrete foundations and all necessary hardware. Obtain approval of foundation type.

3.2. MATERIALS

Furnish equipment cabinet foundations with chamfered top edges. Provide minimum Class B concrete.

Refer to Article 1000-4, Portland Cement Concrete, of the *Standard Specifications*.

Provide standard equipment cabinet foundations in unpaved areas with a minimum pad area that extends 36" from front and back of cabinet, and at least 3" from sides of cabinet but not less than 36" wide.

Furnish Portland cement concrete, in accordance with Article 848-2 of the *Standard Specifications*, to replace removed or damaged sections of existing sidewalk and restore locations to preconstruction condition.

3.3. CONSTRUCTION METHODS

Comply with Section 825, Incidental Concrete Construction – General, of the *Standard Specifications*.

Obtain approval for final equipment cabinet foundation locations before pouring concrete base or installing a preformed cabinet base. Maintain 12 inches minimum from service pole to closest point on foundation unless otherwise approved.

Do not install foundations over uncompacted fill or muck. Hand-tamp soil before placing concrete or preformed cabinet base and ensure ground is level.

When using poured concrete foundations, use procedures, equipment, and hardware as follows:

- Use a minimum of four 1/2-inch diameter expanding type anchor bolts to secure cabinet to foundation.
- In unpaved areas, install equipment cabinet foundations a minimum 4 inches above and 4 inches below finished grade. In paved areas, install foundations 1 inch above the paved surface at its highest point and 4 inches below the paved surface at its lowest point.
- Locate external stubbed out conduit at equipment cabinet foundation so conduit is in middle of cabinet. Provide a minimum of four 2" conduit stub outs, at least two of which are spares, and one 1" service conduit stub out. Provide service conduit as the rightmost conduit coming into cabinet. Provide two spare conduits stubbed out to the adjacent junction box or toward the direction of the nearest junction box if none are

adjacent to the foundation. Inscribe identification arrow in foundation indicating direction of spare conduits.

- Ensure that conduits extend 2” to 3” above finished cabinet foundation.
- Give cabinet foundation a broom finish. Seal space between cabinet base and foundation with permanent, flexible, waterproof sealing material.

Restore the disturbed ground surrounding the new equipment cabinet foundation to its original, preconstruction condition as determined and approved by the Engineer.

- For paved areas, replace removed or damaged pavement with in kind materials, matching the elevation, color, texture/finish and general appearance of the surrounding pavement. Replace concrete sidewalk in whole slabs from joint to joint and comply with Section 848 of the *Standard Specifications*. Place graded stone material to temporarily maintain pedestrian traffic where repairs cannot be performed immediately. Comply with Article 545-4 of the *Standard Specifications*.
- For unpaved areas, backfill excavations with removed material, tamp the backfilled material and rake smooth the top 1½ inches. Finish unpaved areas flush with surrounding natural ground and to match the original contour of the ground. Seed with same type of grass as surrounding area and mulch the newly seeded area. If unpaved area was not grassed, replace the original ground cover in kind as directed by the Engineer.

3.4. MEASUREMENT AND PAYMENT

Equipment cabinet foundation will be measured and paid as the actual number of equipment cabinet foundations of any size, furnished, installed, and accepted.

No measurement or payment will be made for restoration of the surrounding unpaved ground surfaces in accordance with these Project Special Provisions as such work will be considered incidental to furnishing and installing equipment cabinet foundations.

Payment will be made under:

Pay Item	Pay Unit
Equipment Cabinet Foundation	Each

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Install new electrical service equipment as shown in the Plans. Comply with the National Electrical Code (NEC), the National Electrical Safety Code (NESC), the Standard Specifications, the Project Special Provisions, and all local ordinances.

4.2. MATERIALS**(A) Electric Service**

Furnish new electric service as shown in the Plans. Provide meter base/disconnect combination panels that have a minimum of four (4) spaces in the disconnect. Furnish each meterbase/combination disconnect panel with a minimum of 10,000 RMS symmetrical amperes short circuit current rating in a lockable NEMA 3R enclosure. Ensure meter base/ disconnect combination panel is listed as meeting UL-67 and marked as being suitable for use as service equipment. Ensure circuit breakers are listed as meeting UL-489.

Fabricate enclosure from galvanized steel and electrostatically apply dry powder paint finish, light gray in color, to yield a minimum thickness of 2.4 mils. All exterior surfaces must be powder coated steel. Provide ground bus and neutral bus with a minimum of four terminals and a minimum wire capacity range of number 14 through number 1/0 AWG.

Furnish NEMA Type 3R meter base rated 100A minimum for overhead service and 200A minimum for underground service and that meets the requirements of the local utility. Provide meter base with sockets' ampere rating based on sockets being wired with a minimum of 167 degrees F insulated wire. With each meter base, provide a blank meter socket cover made from UV stabilized polycarbonate or metal and that is either clear or gray in color to prevent access to interior of meter base until meter is installed by the local power company. Furnish four terminal, 600 volt, single phase, 3-wire meter bases that comply with the following:

- Line, load, and neutral terminals accept 4/0 AWG and smaller Copper/Aluminum wire
- With or without horn bypass
- Made of galvanized steel
- Listed as meeting UL-414
- Overhead or underground service entrance as shown on the Plans.

Furnish 1" watertight hub for threaded rigid conduit with meter base at locations with aerial service.

At the main service disconnect, furnish, and install UL-approved lightning arresters that meet the following requirements:

Type of Design	Silicon Oxide Varistor
Voltage	120/240 Single phase, 3 wire
Maximum current	100,000 amps
Maximum energy	3000 joules per pole

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Maximum number of surges	Unlimited
Response time one milliamp test	5 nanoseconds
Response time to clamp 10,000 amps	10 nanoseconds
Response time to clamp 50,000 amps	25 nanoseconds
Leak current at double the rated voltage	None
Ground wire	Separate

As indicated below, provide the following:

CCTV Camera Cabinet:

- 1 single-pole 15A breaker
- 3 spare slots/spaces for up to four (4) additional breakers
- 3-wire stranded #12 AWG copper feeder conductors with THWN rating

Hub Cabinet:

- 1 single-pole 50A breaker
- 3 spare slots/spaces for up to four (4) additional breakers
- 3-wire stranded #8 AWG copper feeder conductors with THWN rating

DMS Cabinet:

- 1 double-pole 50A breaker
- 3 slots/spaces for up to four (4) additional breakers
- 4-wire stranded #8 AWG copper feeder conductors with THWN rating

Furnish 1" rigid galvanized conduit between disconnect and the equipment cabinets as required. For underground runs greater than 10 feet in length, the Contractor may transition from 1" rigid galvanized conduit to 1" PVC conduit for the remainder of the underground run beyond the initial 10 feet. Furnish Schedule 40 PVC female adapters to connect the PVC conduit to the threaded end of the rigid galvanized conduit. The interior surface of one end of the PVC female adapter shall be compatibly threaded to connect it to the threaded end of the rigid metallic riser without the aid of additional fittings, hardware, or adhesives. The opposite end of the adapter shall be non-threaded to permit a slip fit, glued connection to the underground PVC conduit.

Provide a grounding electrode system at all new electrical services. Provide marker tape for underground installation above ground grounding electrodes and buried ground wire. Provide all grounding electrodes and ground wire necessary to ensure that grounding system, whether existing or new.

(B) 10KVA Single Phase General Purpose Transformer

As shown on the Plans, furnish a double-wound, dry type general purpose transformer to isolate the line side voltages from the load side voltages as shown in the Plans. Provide the transformer with the following specifications:

- Primary Volts: 120/240 with 83/41 Amps Max. 60Hz.
- Secondary Volts: 120/240 with 83/41 Amps Max. 60Hz.

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- 10 kVA power rating.
- Electrostatic shielding between primary and secondary windings.
- Epoxy-silica encapsulated core and coil.
- Copper windings and copper lead wire terminations.
- Multiple front and bottom knockout for conduit entry/exit.
- Ground studs for conduit bonding.

Provide the transformer in a lockable NEMA 3R enclosure suitable for mounting on a metal pole or 6"x 6" treated wood post.

(C) Equipment Cabinet Disconnect

Provide new equipment cabinet disconnects at the locations shown in the Plans. Furnish panels that have a minimum of four (4) spaces in the disconnect. Furnish circuit breakers with a minimum of 10,000 RMS symmetrical amperes short circuit current rating in a lockable NEMA 3R enclosure. Ensure equipment cabinet disconnects are listed as meeting UL-67 and marked as being suitable for use as service equipment. Ensure circuit breakers are listed as meeting UL-489. Fabricate enclosure from galvanized steel and electrostatically apply dry powder paint finish, light gray in color, to yield a minimum thickness of 2.4 mils. All exterior surfaces must be powder coated steel. Provide ground bus and neutral bus with a minimum of four terminals and a minimum wire capacity range of number 14 through number 1/0 AWG.

(D) 4-Wire Copper Feeder Conductors

Furnish 4-wire stranded copper feeder conductors with THWN rating for supplying power to DMS field equipment cabinets. Provide conductors with black, red, white, and green insulation that are intended for power circuits at 600 Volts or less and comply with the following:

- Listed as meeting UL-83
- Meets ASTM B-3 and B-8 or B-787 standards.

See the Plans for wire sizes and quantities.

(E) 3-Wire Copper Feeder Conductors

Furnish 3-wire stranded copper feeder conductors with THWN rating for supplying power to CCTV camera equipment cabinets and hub cabinets. Provide conductors with black, white, and green insulation that are intended for power circuits at 600 Volts or less and comply with the following:

- Listed as meeting UL-83
- Meets ASTM B-3 and B-8 or B-787 standards.

See the Plans for wire sizes and quantities.

(F) Grounding System

Furnish 5/8"x10' copper clad steel grounding electrodes (ground rods), #4 AWG solid bare copper conductors, and exothermic welding kits for grounding system installations. Comply with the NEC, Standard Specifications, these Project Special Provisions, and the Plans.

U-2579B**ITS-37****Forsyth County****(G) 6" x 6" Treated Wood Post**

Furnish 6" x 6" treated wood post for mounting combination panels and equipment cabinet disconnects as shown in *Roadway Standard Drawing* No. 1700.01, Sheet 1 of 2. Provide wood posts that comply with Article 1082-3 of the *Standard Specifications*, and for mounting 10KVA single-phase transformers in accordance with the Plans and these Project Special Provisions

4.3. CONSTRUCTION METHODS**(A) General**

All work involving electrical service shall be coordinated with the appropriate electric utility company. Coordinate with the utility company to ascertain the feasibility of installing electrical service at each location before performing any work. Coordinate with the local power company concerning the location of the electric power service relative to the equipment cabinet and whether or not service will be provided underground or overhead. Obtain all required local permits before beginning work.

Run feeder conductors separately from all other conductors in a 1-inch rigid galvanized conduit. Do not allow feeder conductors to share conduits with any other conductors or cables. Do not route unfused electrical feeder conductors inside of metal poles. Permanently label conductors at all access points using nylon tags labeled with permanent ink. Ensure each conductor has a unique identifier. Label conductors immediately upon installation. Use component name and labeling scheme approved by the Engineer.

Use rigid galvanized conduit for all underground conduit runs 10 feet or less in length. For underground runs greater than 10 feet in length, the Contractor may transition from 1" rigid galvanized conduit to 1" PVC conduit for the remainder of the run beyond the initial 10 feet using an approved PVC female adapter. Apply thread seal tape to the threads of the rigid galvanized conduit before screwing the PVC adapter onto the threaded male end of the conduit. Connect the threaded female end of the PVC adapter to the threaded end of the rigid galvanized conduit, then connect the not threaded end of the adapter to the PVC conduit using a slip fit, glued connection.

Upon completion of electrical service installation and backfilling of all excavations, restore the disturbed ground to its original condition as determined and approved by the Engineer. For paved areas, replace removed or damaged pavement with in kind materials, matching the elevation, color, texture/finish, and general appearance of the surrounding pavement. For unpaved areas, backfill excavations with removed material, tamp the backfilled material and rake smooth the top 1½ inches. Finish unpaved areas flush with surrounding natural ground and to match the original contour of the ground. Seed with same type of grass as surrounding area and mulch the newly seeded area. If unpaved area was not grassed, replace the original ground cover in kind as directed by the Engineer.

Provide all necessary stainless steel banding hardware and clamps for securely attaching service disconnects, combination panels and service conduits and risers to metal poles.

(B) Electric Service

Install meter base/disconnect combination panels with lightning arresters as called for in the Plans. Route the feeder conductors from the meter base/disconnect to the general purpose transformer or disconnect in conduit as shown in the Plans.

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Install meter socket covers on new meter bases to block access to the wiring inside until the meter is attached to the meter base by the power company. Use only approved meter socket covers that comply with these Project Special Provisions; do not use cardboard, paper, plywood, sheet plastic, tape, etc. to cover the meter socket opening. Do not leave a meter socket uncovered. After installation of the meter base with meter socket cover, the local power company will remove the socket cover and transfer the existing meter or install a new meter and make any necessary connections to the power lines.

(C) 10KVA Single Phase General Purpose Transformer

As shown on the Plans, install a single-phase general-purpose transformer in a NEMA 3R enclosure. Route the conductors from the transformer secondary to the DMS equipment cabinet or equipment cabinet disconnect in rigid galvanized conduit. Bond the equipment cabinet disconnect in accordance with the NEC. Provide all mounting hardware and other parts and labor necessary to successfully install the transformer on a wood pole or on a 6"x6" treated wood post.

(D) Equipment Cabinet Disconnect

Install equipment cabinet disconnects and circuit breakers in locations as called for in the Plans. Install THWN stranded copper feeder conductors as shown in Plans between the general-purpose transformer and the equipment cabinet disconnect. Route the conductors from the equipment cabinet disconnect to the equipment cabinet in rigid galvanized steel conduit. Bond the equipment cabinet disconnect in accordance with the NEC. Ensure that the grounding system complies with the grounding requirements of these Project Special Provisions, the Standard Specifications and the Plans.

(E) 4-Wire Copper Feeder Conductors

At locations shown in the Plans, install 4-wire THWN stranded copper feeder conductors to supply 240/120 VAC to the DMS field equipment cabinets. Size the conductors as specified in the Plans. Comply with the Standard Specifications and Standard Drawings and all applicable electrical codes.

(F) 3-Wire Copper Feeder Conductors

At locations shown in the Plans, install 3-wire THWN stranded copper feeder conductors to supply 240/120 VAC to the DMS field equipment cabinets. Size the conductors as specified in the Plans. Comply with the Standard Specifications and Standard Drawings and all applicable electrical codes.

(G) Grounding System

In addition to NEC requirements, test grounding electrode resistance for a maximum of 20 ohms. Install additional ground rods to grounding electrode system as necessary to meet test requirements. Furnish 5/8" x 10' copper clad steel grounding electrode system (ground rods), #4 AWG solid bare copper conductors, and exothermic welding kits for grounding system installations. Comply with NEC, the Standard Specifications, these Project Special Provisions, and the Plans.

Where a grounding electrode system is connected to the electrical service in accordance with the NEC, test grounding electrode resistance for a maximum of 20 ohms. Grounding electrode resistance test must be verified or witnessed by the Engineer or the Engineer's designated

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representative. Furnish and install additional ground rods to grounding electrode system as necessary to meet the requirements of these Project Special Provisions and test requirements.

Follow test equipment's procedures for measuring grounding electrode resistance. When using clamp-type ground resistance meters, readings of less than 1 ohm typically indicate a ground loop. Rework bonding and grounding circuits as necessary to remove ground loop circuits and retest. If a ground loop cannot be identified and removed to allow the proper use of a clamp-type ground resistance meter, use the three-point test method.

Submit a completed Inductive Loop & Grounding Test Form available on the Department's website. The form is located on the Department's website at:

<https://connect.ncdot.gov/resources/safety/Pages/ITS-and-Signals.aspx>

Install a length of marker tape 6 to 12 inches below finished grade directly over grounding electrodes and conductors.

(H) New Overhead Electrical Service

For overhead service, install a new wood pole at the service point and install the combination panel on the new wood pole as shown in the Plans. Install an equipment cabinet disconnect on a 6" x 6" treated wood post adjacent to equipment cabinet, as required, when the service point is located at distance from the equipment cabinet.

(I) New Underground Electrical Service

For underground service, install a combination panel on one of the following as determined through coordination with the local power company and as directed by the Engineer:

- The CCTV metal pole or DMS assembly upright adjacent to the pole-mounted equipment cabinet.
- On a 6" x 6" treated wood post adjacent to a base-mounted cabinet.
- On a 6" x 6" treated wood post at the service point away from the equipment cabinet and install an equipment cabinet disconnect on a separate 6" x 6" treated wood post adjacent to the equipment cabinet.

4.4. MEASUREMENT AND PAYMENT

New electrical service will be measured and paid for as the actual number of complete, functional electrical service locations furnished, installed and tested, regardless of type (i.e., communications hub cabinet; CCTV cabinet; DMS cabinet).

No measurement will be made of risers with weatherheads for electrical service, as they will be considered incidental to furnishing and installing a new electrical service.

No measurement will be made of short risers (i.e., from disconnect to underground conduit, from underground conduit to bottom of cabinet or from underground conduit to transformer), meter socket covers, underground conduit between service risers and disconnects/meters, conduit for feeder conductors between the service disconnect and the equipment cabinet, PVC female adapters, acquisition of service fees, service entrance conductors, and any remaining hardware and conduit to connect the electrical service to the cabinets as they will be considered incidental to furnishing and installing new electrical service.

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No measurement will be made of 6" x 6" treated wood posts used for mounting combination panels, equipment cabinet disconnects, and 10KVA single-phase transformers as they will be considered incidental to furnishing and installing new electrical service, equipment cabinet disconnects, and 10KVA single-phase transformers.

10KVA single-phase transformer will be measured and paid as the actual number of 10KVA transformers in NEMA 3R cabinets furnished, installed and accepted.

Equipment cabinet disconnect will be measured and paid for as the actual number of equipment cabinet disconnects furnished, installed and accepted. No separate measurement will be made of disconnects installed as part of new electrical service as such disconnects are considered part of the new electrical service.

3-wire feeder conductor will be measured and paid as the actual horizontal linear feet of 3-wire feeder conductors furnished, installed and accepted. Measurement will be along the approximate centerline of the conduit system. Terminate all conductors before determining length of cable run. No measurement will be made of vertical segments.

4-wire feeder conductor will be measured and paid as the actual horizontal linear feet of 4-wire feeder conductors furnished, installed and accepted. Measurement will be along the approximate centerline of the conduit system. Terminate all conductors before determining length of cable run. No measurement will be made of vertical segments.

5/8" X 10' grounding electrode (ground rod) will be measured and paid as the actual number of 5/8" copper clad steel ground rods furnished, installed and accepted as part of grounding systems for new electrical services. Ground rods for equipment cabinet disconnects will be paid for separately. No separate payment will be made for #4 AWG solid bare copper grounding conductors or exothermic welding kits as they will be considered incidental to furnishing and installing the ground rod.

Wood poles for new overhead electrical service will be measured and paid separately in accordance with Section 1720, Wood Poles, as revised by the Project Special Provisions.

No measurement will be made of stainless steel banding hardware required to attach electrical service equipment (i.e, combination panels, equipment cabinet disconnects, risers, single phase transformer cabinets, etc.) to metal poles or the uprights of overhead DMS structures as such hardware will be considered incidental to furnishing and installing the electrical service hardware specified in this section.

No measurement will be made of labeling of cables, wires and conductors as required by this section as such work will be considered incidental to the other pay items in this section.

No measurement will be made of restoration of paved roadways/driveways and unpaved ground surfaces with like materials, including but not limited to backfill, graded stone, paved materials, seeding and mulching, as this work will be considered incidental to installation of a new electrical service.

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Payment will be made under:

Pay Item

Pay Unit

New Electrical Service

Each

10KVA Single Phase Transformer

Each

Equipment Cabinet Disconnect

Each

3-Wire Feeder Conductor

Linear Foot

4-Wire Feeder Conductor

Linear Foot

5/8" x 10' Grounding Electrode

Each

5. SOLAR POWER ASSEMBLY

5.1. DESCRIPTION

Furnish and install new solar power assembly equipment with equipment cabinets and all necessary hardware in accordance with these Project Special Provisions and the Plans. Comply with the provisions of Section 1700 of the *Standard Specifications*.

5.2. MATERIAL

Furnish a solar power assembly at the locations shown in the Plans consisting of the following:

- Solar Array
- Solar Charge Controller
- Batteries
- Assembly Cabinet
- Concrete Cabinet Pad

(A) Solar Array

Furnish solar modules made in North America and that have a minimum 20-year factory warranty. The solar array should have a minimum peak output of 100W. Solar modules must be UL listed, FM Class I, Div II, Group C & D approved. For the solar array, power wiring should be 10-2, stranded copper, double insulated, sunlight resistant, 600V 90C rated cable. The array mount will attach to the side of the CCTV pole with stainless steel fasteners. The array mount must be aluminum alloy or stainless steel. The array must be capable of withstanding 125 mph winds.

(B) Solar Charge Controller

Furnish solar charge controllers that are UL listed, a minimum 45A with solid state, low voltage disconnects. Ensure that the solar charge regulator is sealed with internal temperature compensation, lightning protection, reverse polarity protection, and LED indicators. Provide controllers with the capability of three functions: battery charging, load control, and diversion regulation. Controllers must be furnished with fully adjustable DIP switches and RS-232 communications port to adjust the unit's operational modes. Ensure the solar charge regulator is FMS Class I, Groups ABCD and have the CE mark.

(C) Batteries

Provide 12V gel electrolyte, non-spillable, maintenance free batteries. Furnish batteries capable of providing power for 10 days without being charged by the Solar Array and Solar Charge Controller. Furnish batteries with a minimum operating temperature of -76° F to 140°F.

(D) Solar Power Assembly Cabinet

Furnish a solar power assembly cabinet constructed of 0.125" aluminum with stainless steel hardware. There must be separate compartments for the batteries and the electronics. The enclosures must be NEMA 3R rated and large enough to contain all solar equipment and incidental components, including 20% spare space. Mount the solar power assembly cabinet on a 4" concrete pad.

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5.3. CONSTRUCTION METHODS

Furnish and install new solar power assemblies. Install solar power equipment as shown in the Plans. Provide wiring, disconnects, and all other required equipment as required by Article 690 of the NEC.

Install solar panel collectors at a height that will prohibit theft and/or vandalism. At a minimum, mount the solar panel collectors 20 feet from ground level. Installation of multiple collector panels shall be approved by the Engineer prior to installation.

Ensure that the maximum resistance between the grounding electrode and all points in the grounding system does not exceed 5 ohms.

In addition to the requirements of the NEC, test grounding electrode resistance at the connection point to the electrical service ground bus for a maximum of 20 ohms. Furnish and install ground rods to the grounding electrode system as necessary to meet the test requirements.

5.4. MEASUREMENT AND PAYMENT

Solar power assembly will be measured and paid as the actual number of solar power assemblies furnished, installed and accepted. No measurement will be made for solar arrays, solar power assembly equipment cabinet, installing breakers, inverters, temperature sensors, concrete cabinet pad, mounting system, grounding system, conduits, risers, wiring, and hardware as these will be considered incidental to furnishing and installing the solar power assembly.

Payment will be made under:

Pay Item	Pay Unit
Solar Power Assembly	Each

6. COMMUNICATIONS HARDWARE

6.1. DESCRIPTION

Furnish and install fiber-optic communications hardware, including managed Ethernet routing switches, Ethernet edge switches, and air conditioned hub cabinets with UPS units.

(A) **Managed Ethernet Core Switch Modifications**

Modify the existing managed Ethernet core switches in the TRTMC to add GBICs.

(B) **Managed Ethernet Routing Switch**

Furnish and install a managed Ethernet routing switch at locations as shown in the Plans. Ensure that the managed Ethernet routing switch provide Ethernet connectivity at transmission rates of 1000 megabits per second from each remote ITS device location to the TRTMC.

(C) **Ethernet Edge Switch**

Furnish and install hardened and managed field Ethernet edge switches (hereafter “edge switch”) for field devices at locations as shown in the Plans. Ensure that the edge switch provides Ethernet connectivity at transmission rates of 1000 megabits per second from each remote ITS device location as shown in the Plans to the existing managed core Ethernet switch at the TRTMC.

(D) **Hub Cabinet**

Furnish and install a Type 333 air-conditioned cabinet at locations as shown in the Plans to house managed Ethernet routing switches and fiber-optic splice enclosures described herein. Size the cabinet appropriately to fit all the equipment installed within the cabinet at the particular location. Size the cabinet to ensure ease of access to equipment and provide proper ventilation in order to maintain an internal operating environment that does not exceed the environmental operating ranges for devices placed within the cabinet.

(E) **UPS**

Furnish and install uninterruptible power supply (UPS) units for the managed Ethernet routing switch at locations as shown in the Plans. The UPS shall also include any ancillary equipment or incidental items, such as required mounting hardware and cabling.

6.2. MATERIALS

(A) **General**

(1) **Ethernet Switches Standards**

Ensure that the Ethernet switches comply 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 802.1P standard for Quality of Service (QoS),
- IEEE 802.1Q standard for port-based virtual local area networks (VLANs),
- IEEE 802.1Q-2005 standard for MAC bridges used with the Multiple Spanning Tree Protocol,

- IEEE 802.1w standard for MAC bridges used with the Rapid Spanning Tree Protocol (RSTP),
- 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, including auto negotiation of speed,
- IEEE 802.3u supplement standard regarding 100 Base TX/100 Base FX,
- IEEE 802.3x standard regarding flow control with full duplex operation, and
- RFC 783 – TFTP
- RFC 854 – Telnet Protocol Specification,
- RFC 1112 – IGMP v1,
- RFC 1541 – Dynamic Host Configuration Protocol for IPv4,
- RFC 2030 – SNMP
- RFC 2068 – HTTP
- RFC 2236 – IGMP v2,
- RFC 2865 – RADIUS
- RFC 3414 – SNMPv3-USM
- RFC 3415 – SNMPv3-VACM

Ensure that the Ethernet switches have a minimum mean time between failures (MTBF) of 10 years, or 87,600 hours, as calculated using the Bellcore/Telcordia SR-332 standard for reliability prediction.

(2) Functional Requirements

Ensure that the Ethernet switches support all Layer 2 management features and certain Layer 3 features related to multicast data transmission. These features shall include, but not be limited to:

- An STP healing/convergence rate that meets or exceeds specifications published in the IEEE 802.1D standard,
- An RSTP healing/convergence rate that meets or exceeds specifications published in the IEEE 802.1w standard,
- An Ethernet 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 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 the TFTP and SNMP. Ensure that the Ethernet edge switch supports port mirroring for troubleshooting purposes when combined with a network analyzer.

(3) **Electrical Requirements**

Ensure that the Ethernet switches operate and power is supplied at 120 VAC. Ensure that the Ethernet switches have a minimum operating input of 110 VAC and a maximum operating input of 130 VAC. Ensure that if the switch 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 Ethernet switches have diagnostic light emitting diodes (LEDs), including link, TX, RX, speed (for Category 5e ports only), and power LEDs.

(B) **Managed Ethernet Core Switch Modifications**

Provide GBICs in the existing core switches to provide optical ports to link the TRTMC to the hub cabinet. The managed Ethernet core switch at the TRTMC is a Cisco 6506-E with at least 12 spare ports for GBIC installation.

Optical Ports: Ensure that all single mode fiber-optic link ports operate at 1310 or 1550 nanometers. Include Type LC connectors, as specified in the Plans or by the Engineer. Do not use mechanical transfer registered jack (MTRJ) or ST type connectors. Provide six (6) fully functional single mode fiber-optic one Gbps ports with optical transceivers installed in the managed Ethernet routing switch. Each optical transceiver shall consist of fiber pairs; one fiber will transmit (TX) data and one fiber will receive (RX) data. Provide GBICs or small form-factor plug-able (SFP) ports that are user-configurable with 10 km, 25 km, 50, and 70 km optics.

Provide long range one Gbps optical transceivers that consist of fiber pairs; one fiber will transmit (TX) data and one fiber will receive (RX) data. Provide optical transceivers that meet the following minimum requirements:

- Optical receiver sensitivity: -23 dBm,
- Optical transmitter power: 0 dBm,
- Maximum transmission distance: 70 km, and
- Operating wavelength: 1550 nm.

(C) **Managed Ethernet Routing Switch**

Standards: In addition to the IEEE networking standards for Ethernet communications listed above, provide the following additional standards for the managed Ethernet routing switches:

- IEEE 802.3ad supplement link aggregation,
- RFC 2131 – Dynamic Host Configuration Protocol for IPv4,
- RFC 2328 – Open Shortest Path First (OSPF) v2,
- RFC 2338 – Virtual Router Redundancy Protocol (VRRP),
- RFC 2362 – Protocol Independent Multicast Sparse Mode (PIM-SM),
- RFC 3376 – IGMP v3,

- RFC 3973 – Protocol Independent Multicast Dense Mode (PIM-DM).

Mounting: Provide a mounting kit to attach the managed Ethernet routing switch to a vertical rack rail in the cabinet. Due to space constraints in the cabinet, the switch may only occupy three RU. The switch may be modular and utilize a gigabit fiber uplink cable.

Optical Ports: Ensure that all single mode fiber-optic link ports operate at 1310 or 1550 nanometers. Include Type LC connectors, as specified in the Plans or by the Engineer. Do not use mechanical transfer registered jack (MTRJ) or ST type connectors. Provide six (6) fully functional single mode fiber-optic one Gbps ports with optical transceivers installed in the managed Ethernet routing switch. Each optical transceiver shall consist of fiber pairs; one fiber will transmit (TX) data and one fiber will receive (RX) data. Provide GBICs or small form-factor plug-able (SFP) ports that are user-configurable with 10 km, 25 km, or 50 km optics.

Provide long range one Gbps optical transceivers that consist of fiber pairs; one fiber will transmit (TX) data and one fiber will receive (RX) data. Provide optical transceivers that meet the following minimum requirements:

- Optical receiver sensitivity: -23 dBm,
- Optical transmitter power: 0 dBm,
- Maximum transmission distance: 50 km, and
- Operating wavelength: 1550 nm.

Copper Ports: Provide a managed Ethernet routing switch that includes a minimum of three 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 5e unshielded twisted pair/shielded twisted pair network cables are compliant with the EIA/TIA-568-B standard.

Port Security: Ensure the managed Ethernet routing switch supports/complies with the following (remotely) minimum requirements:

- Ability to configure static MAC addresses,
- Ability to disable automatic address learning per ports, known 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 reset manually the port before communications are allowed.

Network Capabilities: Provide a managed Ethernet routing switch supports/complies with the following minimum requirements:

- Provide full implementation of IGMPv2 snooping (RFC 2236),
- Provide full implementation of SNMPv1, SNMPv2c, and/or SNMPv3,
- Have a non-blocking architecture,
- Route and switch unicast and multicast traffic simultaneously at wire speed,
- Capable of mirroring any port to any other port within the switch,
- A multicast forwarding database that supports a minimum of 2048 entries in hardware.

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- Support QoS queue management using weighted round robin (WRR) and strict priority (SP),
- 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,
- Provide support for the following RMON–I groups, at a minimum,
 - Part 1: Statistics
 - Part 2: History
 - Part 3: Alarm
 - Part 9: Event
- 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 a managed Ethernet routing switch 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) 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.

Power Supplies: Provide a managed Ethernet routing switch with redundant power supplies. Each power supply shall be able to supply full power to the switch. The switch shall auto select to an available power supply to maintain 120 VAC to the switch.

Environmental Requirements: Provide managed Ethernet routing switches that adhere to the following environmental constraints as defined in the environmental requirements section of the NEMA TS 2 standard if located within a climate-controlled environment:

- Operating temperature range: -40°F to 130°F,
- Storage temperature range: -40°F to 185°F, and
- Operating relative humidity range: 5% to 90%, non-condensing.

Verify that the managed Ethernet routing switch manufacturer certifies their device has successfully completed environmental testing as defined in the environmental requirements section of the NEMA TS 2 standard. Verify that vibration and shock resistance meet the requirements of Sections 2.1.9 and 2.1.10, respectively, of the NEMA TS 2 standard. Ensure that the Ethernet switch is protected from rain, dust, corrosive elements, and typical conditions found in a roadside environment.

The managed Ethernet routing switches shall meet or exceed the following environmental standards:

- IEEE 1613 (electric utility substations),
- IEC 6185003 (electric utility substations),

- IEEE 61800-3 (variable speed drive systems), and
- IEC 61000-6-2 (generic industrial).

(1) Ethernet Edge Switch

Mounting: Provide shelf mount edge switches. Optionally, if cabinet space dictates, provide a mounting kit to attach the edge switch to a vertical rack rail or a DIN rail in the cabinet. If the Contractor elects to use DIN rail mounting supply the DIN rail with the edge switch.

Ports: Provide 10/100/1000 Mbps auto-negotiating ports (RJ-45) copper 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 fully functional ports with Type LC connectors and the optics for the optical ports. Do not use mechanical transfer registered jack (MTRJ) or ST type connectors.

Provide edge switches having a minimum of two optical 100 Base FX ports capable of transmitting data at 100 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.

Provide 10/100/1000 Mbps optical ports that consist of fiber pairs, one fiber will transmit (TX) data and one fiber will receive (RX) data. Provide optical ports that meet the following minimum requirements:

- Optical receiver sensitivity: -32 dBm,
- Optical transmitter power: -15.5 dBm,
- Typical transmission distance: 40 km, and
- Operating wavelength: 1310 nm.

Copper Ports: Provide an edge switch that includes a minimum of six copper ports. Provide Type RJ-45 copper ports and that auto-negotiate speed (i.e., 10/100 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 5e 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,
- Ability to disable automatic address learning per ports, known 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 reset manually the port before communications are allowed.

Network Capabilities: Provide the edge switch supports/complies with the following minimum requirements:

- Provide full implementation of IGMPv2 snooping (RFC 2236),

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- Provide full implementation of SNMPv1, SNMPv2c, and/or SNMPv3,
- 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,
- 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 the edge switch 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) 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.

Environmental Requirements: Provide Ethernet edge switches that adhere to the following environmental constraints as defined in the environmental requirements section of the NEMA TS 2 standard if located within a climate-controlled environment:

- Operating temperature range: -30°F to 165°F,
- Storage temperature range: 14°F to 158°F, and
- Operating relative humidity range: 10% to 90%, non-condensing.

Verify that the Ethernet edge switch manufacturer certifies their device has successfully completed environmental testing as defined in the environmental requirements section of the NEMA TS 2 standard. Verify that vibration and shock resistance meet the requirements of Sections 2.1.9 and 2.1.10, respectively, of the NEMA TS 2 standard. Ensure that the Ethernet switch is protected from rain, dust, corrosive elements, and typical conditions found in a roadside environment.

The Ethernet switches shall meet or exceed the following environmental standards:

- IEEE 1613 (electric utility substations),
- IEC 6185003 (electric utility substations),
- IEEE 61800-3 (variable speed drive systems), and
- IEC 61000-6-2 (generic industrial).

(D) UPS

Provide UPS units that produce uninterruptible power and power conditioning for the managed Ethernet routing switches as shown in the Plans.

(1) Standards

Ensure that the UPS units comply with the following standards:

- ANSI,
- ASTM,
- CSA, and
- UL.

(2) Functional

Each UPS shall provide adequate capacity to run its respective equipment without commercial power for 20 minutes. Size the UPS units for the proposed loads. Provide load calculations for each configuration of equipment connecting to a UPS assuming a run time of 20 minutes.

Ensure that the UPS and its remote monitoring software perform the following functions:

- Remote environmental monitoring of temperature and humidity,
- Data logging,
- Event logging,
- Fault notification,
- Hibernation,
- Radius authentication,
- Protocols: HTTP, HTTPS, IPv4, IPv6, SMTP (v1-v3), Telnet, SSH v2, SSL,
- Manage all network UPS units,
- Operating system shutdown,
- Load shedding to turn off selected devices or groups of devices,
- Outlet control to turn off, reboot, or shutdown outlets,
- Power event summary,
- Recommended actions,
- Risk assessment summary,
- Run command file, and
- System event log integration.

(3) Physical Features

Supply each UPS unit described above with 25 percent spare outlets. Ensure that the UPS units meet the following material requirements:

- Rack-mounted,
- Sealed AGM type, maintenance free batteries,
- Minimum of four NEMA 5-15R and two NEMA 5-20R outlets,
- Ethernet network management card using 10/100 Base TX communications,
- USB interface/monitoring port,
- Remote environmental monitoring of temperature and humidity with telnet management,
- Status lights: power on, power source and overload,
- Alarms: audible and remote notification,

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- Manual power on/off switch, and
- Multi-pole noise filtering. Supply UPS with a terminal for connecting the UPS to a surge protection device.

(4) Environmental Specifications

Verify that the UPS units meet all specifications and is capable of performing all of its functions during and after being subjected to:

- Operating temperature: 32°F to 104°F,
- Operating relative humidity: 0-95%,
- Storage temperature: 5° F to 113° F, and
- Storage relative humidity: 95%.

(E) Hub Cabinet**(1) Standards**

Ensure that the hub cabinet complies with the following standards:

- ANSI;
- ASTM;
- IMSA ;
- ISO 9001;
- NEC;
- NEMA TS-2; and
- UL listed.

(2) Functional

Furnish a Caltrans Type 333 hub cabinet meeting the following minimum requirements:

- Side-by-side, double doors on both front and rear of cabinet;
- Fiber-optic splice centers (paid separately);
- Grounding bus bar;
- 19-inch rack system for mounting of all devices in the cabinet;
- Pull-out shelf for laptop and maintenance use;
- Maintenance access connections;
- Fluorescent lighting;
- Ventilation fans;
- 120VAC power supply;
- 120VAC ground fault circuit interrupter (GFCI)-protected duplex outlets for tools;
- 120VAC surge-protected duplex outlets for equipment;
- Sunshields;
- Lightning and surge protection on incoming and outgoing electrical lines (power and data);
- Managed Ethernet routing switch (paid separately);
- Power strip along vertical rail;
- Air conditioner for cooling Ethernet routing switch; and

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- UPS with sufficient capacity to hold hub's electrical load for 4 hours, (paid separately).

(3) Physical Features

Provide cabinets that are completely weatherproof to prevent the entry of water. Provide cabinet and door exterior seams that are continuously welded and all exterior welds are smooth. Provide cabinets with two full-size doors with three hinges, or a full-length stainless steel piano hinge, with stainless steel pins spot-welded at the top. Provide hinges that utilize stainless steel hinge pins. Provide hinges that are mounted so that they cannot be removed from the door or cabinet without first opening the door. Provide door and hinges braced to withstand a 100-pound per vertical foot of door height load applied vertically to the outer edge of the door when standing open. Ensure that there is no permanent deformation or impairment of any part of the door or cabinet body when the load is removed. Provide cabinet door fitted with a #2 Corbin lock. Provide two keys for each cabinet. Provide cabinet doors that are also pad lockable. Provide door openings that are double flanged on all four sides.

Provide cabinets constructed of unpainted sheet aluminum alloy H5052-H32 with a minimum thickness of 0.125 inch.

Provide the hub cabinet with sunshields outside to deflect solar heat away from the cabinet. The sunshields must be offset a minimum of one inch from the exterior cabinet walls. Ensure that the sunshields are fabricated from 5052-H32 aluminum sheet that is 0.125 inch thick, and that sunshield corners are rounded and smoothed for safety. Mount the sunshields on standoffs at the top and each side of the cabinet.

Provide doorstops at 90 and 180-degree positions. Ensure that both the door and the doorstop mechanism are of sufficient strength to withstand a simulated wind load of five pounds per square foot of door area applied to the both inside and outside surfaces without failure, permanent deformation, or compromising of door position and normal operation. Do not provide auxiliary police doors.

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

Provide cabinets that include predrilled holes of standard diameter and bolt pattern with four (4) anchor bolts with each cabinet unit as part of the unit price bid. Provide a panel with each cabinet that matches the rest of the cabinet; and is held in place by four bolts provided with the panel. Drill or punch the panel to accommodate the bolts; the drill holes shall match the bolt pattern of the base cabinet of the cabinet. Provide a panel designed to be fitted in the interior of the cabinet and fabricated of the same material and thickness as the cabinet bottom.

Provide rails to create a cage to mount hardware, wiring panels and miscellaneous mounting brackets. Provide rails constructed of .1345-inch steel or .105-inch stainless steel. Provide rails with a keyhole design with slots 2 inches on center with a top opening of 5/8 inch in diameter to allow the insertion of a .625-inch by 1-inch carriage bolt. Ensure that the rails are 1.5 to 2 inches wide by .5 inches deep. Drill and tap the rails for 10-32 screws or rack screws with EIA universal spacing.

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Provide rack assemblies that have a removable, standard 19-inch EIA compliant rack. The rack shall have a clearance between the rails of 17.5 inches.

Equip each cabinet with an aluminum storage compartment mounted in the rack assembly with the following dimensions (± 0.5 inch): 16 inches wide, 14 inches long, and 1.75 inches deep. Provide compartment with ball-bearing telescoping drawer guides to allow full extension from the rack assembly. Ensure that when extended, the storage compartment opens to provide storage space for cabinet documentation and other miscellaneous items. Ensure that the storage compartment is of adequate construction to support a weight of 20 pounds when extended without sagging. Provide a top to the storage compartment that is hinged aluminum. Provide two (2) removable metal shelves with each cabinet.

Furnish a cabinet base extender with each hub cabinet that complies with the requirements of the "Equipment Cabinet Base Extender" section of these Project Special Provisions.

(4) Lighting

Provide the field cabinet with two 20-watt fluorescent lamps and clear shatterproof shield assemblies which are mounted on the inside front and rear top of the cabinet. Ensure that these lamps are unobstructed and able to cast light on the equipment. Equip the field cabinet with door-actuated switches so that the lamps automatically turn on when either cabinet door is opened and go off when the doors are closed.

(5) Electrical

Provide a service panel assembly to function as the entry point for AC power to the cabinet and the location for power filtering, transient suppression, and equipment grounding. Provide AC isolation within the cabinet. Configure cabinet to accept 120 VAC from the utility company.

Provide circuit breakers that are UL listed and have an interrupt capacity of 5,000 amperes and insulation resistance of 100 M Ω at 500 VDC. Provide power distribution blocks that are suitable for use as power feed and as junction points for two and three wire circuits. Ensure that the line side of each block is capable of handling up to 2/0 AWG conductors. Ensure that the AC neutral and equipment ground wiring and terminal blocks are isolated from the line wiring by an insulation resistance of at least 10 M Ω when measured at the AC neutral.

Provide UL listed surge protection devices according to the UL 1449, 2nd edition standard that comply with the NEMA requirements as detailed in the NEMA LS 1 (1992) standard.

Provide branch circuits, surge protection devices, and grounding for the ITS device-connected load served by the cabinet, including ventilation fans, internal lights, electrical receptacles, etc., as shown on the Plans. Terminate field wiring on terminal blocks with the voltage and current rating of the terminal block is greater than the voltage and current rating of the wire fastened to it.

Furnish a power distribution assembly that fits in the EIA 19-inch rack and provides for protection and distribution of 120VAC power.

Ensure that ground bus bars are fabricated from a copper alloy material compatible with copper wire. Use ground bus bars that have at least two positions where a #6 AWG stranded copper wire can be attached.

Mount the ground bus bar on the side of the cabinet wall adjacent to the service panel assembly for the connection of AC neutral wires and chassis ground wires. If more than one ground bus bar is used in a cabinet, use a minimum of a #10 AWG copper wire to interconnect them.

Wire into the cabinet's circuitry the connector harnesses for the ITS devices and other accessory equipment to be housed therein.

Terminate conductors on terminal blocks using insulated terminal lugs large enough to accommodate the conductor to be terminated. When two or more conductors are terminated on field wiring terminal block screws, use a terminal ring lug for termination of those conductors. Number all terminal block circuits and cover the blocks with a clear insulating material to prevent inadvertent contact.

(6) Ventilation

Ensure the cabinet assembly can maintain the temperature and humidity within the environmental requirements of the hub switches.

Include two cooling fans with 100 CFM, minimum capacity. Provide thermostats to be incorporated into the ventilation system. Mount fans in the top of the cabinet.

Provide the cabinets with vent openings in the lower portion of the door to allow convection cooling of electronic components. Cover them fully on the inside with a commercially available disposable three layer graded type filter. All air entering the cabinet must pass through the air filter.

(7) Air Conditioner

Furnish each hub cabinet with a rack mounted air-cooled air conditioner that operates on 120VAC. The air conditioner shall be fit within a 19-inch EIA communications rack and shall not be external mounted on the cabinet. The air conditioner shall be mounted in the bottom of the cabinet to avoid damage to any communications equipment.

The air conditioners shall have a built-in condensate evaporator and condensate drain fitting and hose to the outside of the cabinet. The air conditioner shall be rated for a minimum of 3500 BTU. There shall be low temperature control to prevent overcooling.

Provide EMI/RFI transient spike protection. Equip the cabinet and air conditioner with remote monitoring of high temperature and low airflow conditions. Intake air shall enter through cabinet door vent and be exhausted through top cabinet vents. Air conditioners shall be CFC free R134a refrigerant and shall use closed loop cooling. Insulate all cold components (coolant lines, compressor, evaporator, etc.) with high-performance insulation.

Blower motors shall be UL listed. Ensure the blower motors are equipped with automatic reset thermal overload protection. Provide double sealed and double shielded ball bearings.

The air conditioners shall have permanent corrugated aluminum or stainless steel air filters. The filters shall be removable and washable.

All grilles shall be stainless steel.

(8) Environmental Requirements

Ensure the cabinet assembly can maintain the temperature and humidity within the environmental requirements of the managed Ethernet routing switch.

6.3. CONSTRUCTION METHODS**(A) Ethernet Switches**

Ensure that all communications hardware is UL listed.

Verify that network/field/data patch cords meet all ANSI/EIA/TIA requirements for Category 5e four-pair unshielded twisted pair cabling with stranded conductors and RJ-45 connectors.

Receive approval for the System Configuration Report described in these Project Special Provisions before submitting product submittal data, purchasing, installing, and configuring the communications hardware.

Ensure that all project IP addresses and VLAN IDs are assigned as defined in the System Configuration Report. Ensure that at a minimum, the switch configuration includes the following features: SNMP, STP, Port Security, all required VLANs. Ensure unused switch ports are disabled. Ensure the as-built documentation includes the identification of all IP addresses and VLANs, and associated hardware devices and device locations. Configure the Ethernet network so the existing CCTV cameras and DMS will be in separate VLANs.

Ensure that the Regional ITS Engineer will be able to manage each Ethernet switch individually or as a group/cluster for switch configuration, performance monitoring, and troubleshooting. Note that these specifications require additional minimum management intelligence (i.e., Layer 2+) typical of most current industrial Ethernet deployments. Ensure that the edge switch includes Layer 2+ capability providing architecture standardization, open connectivity (i.e., interoperability), bandwidth management, rate limiting, security filtering, and general integration management of an advanced Ethernet switching architecture.

Mount the Ethernet switches inside each field cabinet 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 is connectorized on both ends, primarily used for interconnecting termination or patching facilities and/or equipment. Use fiber-optic jumpers that are factory assembled and connectorized and are certified by the fiber-optic jumpers' manufacturer to meet the relevant performance standards required below. Verify that network/field/data jumper cables meet all ANSI/EIA/TIA requirements for Category 5e 4-pair unshielded twisted pair cabling with stranded conductors and RJ45 connectors.

(B) Managed Ethernet Core Switch

Install the GBICs in existing ports of the managed Ethernet core switch in the TRTMC. Modify the switch configuration to add the new fiber-optic GBICs. Install SMFO jumpers between the patch panel and the managed Ethernet core switch as shown in the Plans.

(C) Managed Ethernet Routing Switch

Mount one managed Ethernet routing switch inside the new communications hub cabinet as shown on the Plans. Install SMFO jumpers with LC-LC connectors to connect the 144-strand

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cable to the west, the 144-strand cable to the east and the 72-strand cables to the north and south along the Northern Beltway and the managed Ethernet routing switch as shown in the Plans.

(D) Ethernet Edge Switch

Mount an Ethernet edge switch inside the proposed CCTV and DMS cabinets as shown on the Plans.

(E) Hub Cabinet**(1) General**

Ensure all cabinet wiring is tagged and identified by the use of insulated pre-printed sleeves and follows the project's cable identification scheme. Ensure that the wire markers identify usage in plain words with sufficient details without abbreviations or codes.

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

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

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

Furnish and install a 48" 120 VAC power strip vertically along one of the rear rails of the communications rack. Provide a power strip that has at least eight outlets along its length.

Provide a cabinet that is ISO 9001 certified at the time of bid letting.

Equip the cabinet with lightning and surge protection described separately in these Project Special Provisions.

Install base mounted cabinets as shown on the Plans and as approved by the Engineer. Install the required number of conduits as shown on the Plans plus two additional spare stubbed out conduits. Position the ends of conduits approximately 2 inches above the finished surface of the concrete base.

Mount the hub cabinet on a cabinet base extender in accordance with the "Equipment Cabinet Base Extender" section of these Project Special Provisions.

Mount surge protection devices in the cabinet for the particular field devices that will be connected to that cabinet.

Terminate power service wire, and data cabling on the appropriate terminal strips, surge protection devices or jacks in the cabinet with insulated terminal lugs or connectors. Use a calibrated ratchet-type crimping tool to install the insulated terminal lugs onto the field wires.

Terminate the fiber-optic cable in the hub splice centers in the cabinet as described in these Project Special Provisions.

Label spare circuits of the data cables and connect them to the cabinet ground bus bar.

Neatly bundle and identify all field wiring cables in the cabinet with permanent waterproof tags.

Ground the hub cabinet in accordance with the requirements of these Project Special Provisions. Keep the ground wire from the cabinet ground bus bar to the ground rod assembly or array as short as possible. Ensure the ground wire is not in contact with any other part of the cabinet.

(F) UPS

Install a UPS unit in the new hub cabinet. Connect the UPS unit to a power outlet. Connect the UPS monitoring port to the managed Ethernet routing switch.

Install the UPS monitoring software on the ITS LAN workstations in the TRTMC to remotely monitor the UPS. Run the UPS diagnostics. Configure the remote monitoring to send email alerts.

Plug the power cord of the managed Ethernet routing switch into the UPS.

(G) Modify Existing Network Management Software

Utilize the existing TRTMC network management software (NMS) server application to manage all devices. Configure the software applications to monitor and manage the managed Ethernet routing and edge switches, and other Ethernet devices in this project. Establish/modify user access rights and monitoring rights. Expand the respective databases through an automatic utility within the NMS or manually enter the data. Establish groupings of devices with like functions or features, this would include geographically related, device types, owners. Setup automatic database and configuration backups, setup system and device alarms and alarm notifications.

Setup/modify the respective existing graphical network views. Use mapping images provided by manufacturers to geographically locate devices.

(H) Modify CCTV Software

Update the existing VideoPro server in the TRTMC and edit the existing device database to assign video inputs. The Engineer will assign input ports in the video server. All additions and edits to the databases must be viewable by all current users of the system.

The Protronix's VideoPro is the existing regional video sharing and distribution system that controls the existing video matrix switch at the TRTMC. The software utilizes a client-server architecture. Modify the Protronix CCTV central software configuration at the TRTMC to

display and map the proposed devices from the network so that the CCTV video can be displayed on the existing monitors and display devices in the TRTMC.

(I) Modify DMS Software

Update the existing DMS server in the TRTMC and edit the existing device database to add the new DMSs. All additions and edits to the database must be viewable by all current users of the system.

6.4. MEASUREMENT AND PAYMENT

The switches include all appropriate ports, cabling, grounding, redundancies, labeling, and any integration between the switches and the communications network as necessary to make a fully working installation. All power supplies, power cords, adapters, mounting hardware, DIN rail mounting brackets, DIN rails, connectors, serial cables, installation materials, and configuration software necessary to complete this work, will be included and will be incidental to the installation of the *Managed Ethernet core switch modifications*, *Managed Ethernet routing switch*, and *Ethernet edge switch*.

Managed Ethernet core switch modifications will be measured and paid for as the actual number of managed Ethernet core switches modified.

Managed Ethernet routing switch will be measured and paid for as the actual number of managed Ethernet routing switches furnished, installed, and accepted.

Ethernet edge switch will be measured and paid for as the actual number of Ethernet edge switches furnished, installed, and accepted.

Hub cabinet will be measured and paid as the actual number of hub cabinets furnished, installed, and accepted. There will be no separate measurement and payment for the air conditioner and communications rack as they are included in the hub cabinet.

No separate measurement will be made for relocating the SMFO jumpers, communication cables, Ethernet patch cables, electrical cables, mounting hardware, nuts, bolts, brackets, connectors, risers, grounding equipment, surge suppression, or training as these will be considered incidental to the pay items listed above.

UPS will be measured and paid as the actual number of UPS units furnished, installed, and accepted.

Modify Network Management Software will be measured and paid as the actual number of locations where the software is modified. This shall include furnishing, installing, and all materials, equipment, labor, tools, storage, shipping, and incidentals necessary to modify the existing software, complete system integration, and provide a complete operating system.

Modifying CCTV software will be incidental to the installation and integration of the CCTV cameras. There will be no separate measurement and payment for modifying the configuration of the existing CCTV software. This shall include all materials, equipment, labor, tools, storage, shipping, and incidentals necessary to modify the existing software, complete system integration, and provide a complete operating system.

Modifying DMS software incidental to the installation and integration of the DMSs. There will be no separate measurement and payment for modifying the configuration of the existing

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DMS software. This shall include all materials, equipment, labor, tools, storage, shipping, and incidentals necessary to modify the existing software, complete system integration, and provide a complete operating system.

Payment will be made under:

Pay Item	Pay Unit
Managed Ethernet Core Switch Modifications	Each
Managed Ethernet Routing Switch	Each
Ethernet Edge Switch	Each
Hub Cabinet	Each
UPS	Each
Modify Network Management Software	Each

7. CENTRAL VIDEO EQUIPMENT

7.1. DESCRIPTION

Furnish and install digital hardware video encoders and decoders for converting analog and digital video.

7.2. MATERIALS

(A) General

Furnish digital hardware video encoder and decoder components that utilize the Moving Picture Experts Group's H.264 video compression technology in accordance with the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) requirements detailed in the ISO/IEC 13818 and 14496-14 standards, respectively. Provide the ability for the user to select the video compression technology. Ensure that the hardware video encoder is capable of unicast and multicast operation, and that they support the Session Announcement Protocol (SAP) as recommended by the Internet Engineering Task Force (IETF) RFC 2974, and Differentiated Services/Quality of Service (DiffServ/QoS) software components. Ensure that the digital video encoder provides 99.999% error-free operation.

Provide digital hardware video encoder and decoder components that are hardware-based network devices able to accept a minimum of one analog National Television System Committee (NTSC) video input and digitize it for transport across IP networks.

(1) Video Specifications

Ensure that any video input utilizes a BNC connector and delivers one-volt peak-to-peak (Vp-p) NTSC composite video signals for encoding. Ensure that the DVE and DVD operate with both color and monochrome video, and that they allow the user to select and adjust video resolution. Ensure that the DVE and DVD support resolutions that include, but are not limited to those in table below. Ensure that the H.264 DVE and DVD are capable of delivering color and monochrome video at 30 fps regardless of resolution, and that they can do so using variable, programmable bit rates from 32 Kbps to 4 Mbps. Ensure that the DVE and DVD provides fixed and variable bit rate modes.

Provide resolutions of QCIF, CIF, 2CIF, 4CIF, and D1.

(4) Hardware Specifications

Furnish digital hardware video decoders that are card mounted and mount in a card cage. Each card shall fit in a 5.2" x .9" card slot.

(5) Electrical Specifications

Ensure that all wiring meets NEC requirements and standards. The cards shall operate on 12 volts DC.

(6) Environmental Specifications

Unless stated otherwise in the Plans, provide digital hardware video encoders and decoders that meet all specifications during and after being subjected to an ambient operating temperature range of -30°F to 165°F as defined in the environmental requirements section of the NEMA TS 2 standard, with a maximum non-condensing relative humidity of 95%.

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Ensure that the digital video encoder is resistant to vibration and shock, and conforms to Sections 2.1.9 and 2.1.10, respectively, of the NEMA TS 2 standard.

(B) Digital Hardware Video Encoder (DVE)

Furnish digital hardware video encoder hardware to create a video-over-IP network system, as shown in the Plans. The video encoder units may be shelf or rack-mounted.

Use a digital video encoder that provides a minimum of two serial data interfaces for transmission of command and control data to other devices (typically camera PTZ commands), as well as console and configuration functions.

(C) Digital Hardware Video Decoders (DVD)

Furnish digital single channel hardware video decoder cards create a video-over-IP network system, as shown in the Plans. The video decoder units shall be rack-mounted.

Use a digital hardware video decoder that provide a serial data interface for transmission of command and control data to other devices (typically camera PTZ commands), as well as console and configuration functions.

(D) Card Cage

Furnish a card cage that include a dual power supply and 12 slots to hold decoder cards. Each card slot shall accommodate a 5.2" x .9" card. The dual power shall operate in a redundant operation using a nominal 115 volts AC. The power supply shall supply 12 volts DC. The card cage shall occupy no more than four rack units high.

7.3. CONSTRUCTION METHODS**(A) General**

Utilize video inputs on the video matrix switches in the TRTMC as assigned by the Engineer.

Receive approval for the System Design Report described in these Project Special Provisions before submitting products submittal data, purchasing, installing and configuring the central video equipment described in this section of the Project Special Provisions.

(B) Digital Hardware Video Encoder**(1) Serial Interface**

Install hardware-based digital video encoders having a minimum of two serial data interfaces and connectors that conform to EIA-232/422/485 standards. Ensure that the serial interfaces support EIA-232 as well as 2-wire and 4-wire EIA-422/485 connections. Ensure that the serial port(s) support data rates up to 115.2 Kbps. Serial interface parameters, such as data format, number of bits, handshaking, and parity, shall be software programmable through local connection to the digital video encoders and through connections over the network. Serial interface ports may utilize RJ-45 connectors, D-sub connectors, or screw terminals.

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Ensure that the digital video encoder local area network (LAN) connection supports the requirements detailed in the IEEE 802.3 standard for 10/100 Ethernet connections. Provide a DVE having a minimum of one Ethernet port, which shall be a 10/100 Base-TX connection. Ensure that the connector complies with the EIA and Telecommunications Industry Association (TIA) requirements as detailed in the EIA/TIA-568-A standard. Provide copper-based network interface ports that utilize RJ-45 connectors.

Ensure that all Category 5e unshielded twisted pair/shielded twisted pair network cables are compliant with the EIA/TIA-568-B standard. Ensure that the network communication conforms to User Datagram Protocol (UDP), Version 4 of the Internet Protocol (IP) and Version 2 of the Internet Group Multicast Protocol (IGMP).

(3) Front Panel Status Indicators

Ensure the digital video encoders have light-emitting diode (LED) displays, liquid crystal displays (LCDs), or similar illuminated displays to configuration and management. Provide digital video encoders that support local and remote configuration and management. Configuration and management functions shall include access to all user-programmable features, including but not limited to addressing, serial port configuration, video settings, device monitoring, diagnostic utilities, and security functions. Ensure that the digital video encoders and digital video decoders support configuration and management via serial login, telnet login, and Simple Network Management Protocol (SNMP).

(4) Electrical Specifications

Ensure that all wiring meets NEC requirements and standards. Provide equipment that operates on a nominal voltage of 120 VAC. The equipment shall operate within a voltage range of 89 VAC to 135 VAC. The operating frequency range for power shall be 60-hertz ± 3 Hz. If the device requires operating voltages of less than 120 VAC, supply the appropriate voltage converter.

Furnish, install and integrate the digital video encoders in each CCTV cabinet shown in the Plans. Connect the analog input of the digital video encoder to the CCTV camera as defined above. Connect the Ethernet output of the digital video encoder to Ethernet edge switch. Use standard coax cable with BNC (gold-plated center pin) connectors. Connect the RS-422 PTZ serial communications from the camera to the serial port of the digital video encoder. Configure ports and IP addresses for multicast broadcast and VLANs.

(C) Digital Hardware Video Decoders**(1) Serial Interface**

Install digital hardware video decoders having a minimum of one serial data interfaces with connectors that conform to National Television System Committee (NTSC) standards described in these Project Special Provisions.

(2) Network Interface

Ensure that the digital hardware video decoder local area network (LAN) connection supports the requirements detailed in the IEEE 802.3 standard for 10/100 Ethernet connections.

Provide DVDs having a minimum of one Ethernet port, which shall be a 10/100 Base-TX connection. Ensure that the connector complies with the EIA and Telecommunications Industry Association (TIA) requirements as detailed in the EIA/TIA-568-A standard. Provide copper-based network interface ports that utilize RJ-45 connectors.

Ensure that all Category 5e unshielded twisted pair/shielded twisted pair network cables are compliant with the EIA/TIA-568-B standard. Ensure that the network communication conforms to User Datagram Protocol (UDP), Version 4 of the Internet Protocol (IP) and Version 2 of the Internet Group Multicast Protocol (IGMP).

(3) Video Interface

Use digital hardware video decoders having one analog video interfaces and connectors that conform to standards. Ensure that the serial interfaces support EIA-232 as well as 2-wire and 4-wire EIA-422/485 connections. Ensure that the serial port(s) support data rates up to 115.2 Kbps. Serial interface parameters, such as data format, number of bits, handshaking, and parity, shall be software programmable through local connection to the digital video encoders and through connections over the network. Serial interface ports may utilize RJ-45 connectors, D-sub connectors, or screw terminals.

(4) Front Panel Status Indicators

Ensure the digital hardware video decoders have light-emitting diode (LED) displays, liquid crystal displays (LCDs), or similar illuminated displays to configuration and management. Provide digital video encoders that support local and remote configuration and management. Configuration and management functions shall include access to all user-programmable features, including but not limited to addressing, serial port configuration, video settings, device monitoring, diagnostic utilities, and security functions. Ensure that the digital hardware video encoders support configuration and management via serial login, telnet login, and Simple Network Management Protocol (SNMP).

(D) Card Cage

Install the card cage in the communications rack installed in the TRTMC as part of this Project. Connect the power supply of each card cage to the power strip on the communications rack.

(E) Integration

Use standard coax cable with BNC (gold-plated center pin) connectors. Configure ports and IP addresses for multicast broadcast and VLANs.

(1) Digital Hardware Video Encoder

Connect the RS-422 PTZ serial communications cable and coaxial cable from the each CCTV to the serial and video ports of the respective digital hardware video encoder.

(2) Digital Hardware Video Decoder

Integrate the digital hardware video decoders in the TRTMC as shown in the Plans. Connect the analog port of each digital video decoder to the respective analog input port of the analog video matrix switch. Connect the Ethernet port of the digital video decoders to the existing managed Layer 3 Ethernet Core switch.

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7.4. MEASUREMENT AND PAYMENT

The materials provided in this section include all appropriate ports, cabling, grounding, redundancies, labeling, and any integration between the devices and the communications network as necessary to make a fully working installation.

For furnish and install and for furnish only materials all power supplies, power cords, adapters, mounting hardware, connectors, serial cables, coaxial cables, installation materials, and configuration software necessary to complete this work, are to be included and will be incidental to the pay items listed below.

Digital hardware video encoder will be measured and paid as the actual number of digital hardware video encoders furnished, installed, and accepted.

Digital hardware video decoder will be measured and paid as the actual number of digital hardware video decoders furnished, installed, and accepted.

Card cage will be measured and paid as the actual number of card cages furnished, installed, and accepted.

No separate measurement will be made for coaxial or serial cables, cable connectors, Ethernet cables between equipment housed within the same room/rack/cabinet, electrical cables, mounting hardware, nuts, bolts, brackets, connectors, grounding equipment, surge suppression or documentation as these will be considered incidental to the pay items listed above.

Payment will be made under:

Pay Item	Pay Unit
Digital Hardware Video Encoder	Each
Digital Hardware Video Decoder	Each
Card Cage	Each

8. COMMUNICATIONS RACK

8.1. DESCRIPTION

Furnish and install a freestanding communications rack and cable tray in the TRTMC Server Room as directed by the Regional ITS Engineer.

8.2. MATERIALS

(A) Communications Rack

Provide a communications rack meeting these minimum performance requirements:

- All equipment shall comply with ANSI/EIA RS-310D,
- Provide frame and external components with zinc coating per ASTM B633,
- Paint interior and exterior components per RAL 7035, and
- The thermostatically controlled fans shall provide up to 300 cubic feet per minute (cfm) of exhaust. Thermostats shall monitor both humidity and temperature.

Provide a communications rack meeting the following minimum material requirements:

- 19-inch EIA single-bay,
- Nominal height of less base and wheels: 42 rack units high (approx. 78 inches),
- Nominal 4-inch-high ventilated base,
- Nominal depth: 30 inches,
- All-metal components,
- Full-height locking window door on the front,
- Urethane gaskets for window sealing,
- ¼-inch-thick polymethyl methacrylate transparent thermoplastic window panes,
- Solid metal removable side panels with bottom vents,
- Full-height solid metal door for the back of each cabinet, and
- Vented top with three integral, thermostatically controlled, prewired fans.
- Set of four (4) heavy-duty, locking casters on base.

Mechanical: Construct all rack frames from 12-gauge, cold-formed steel. Construct all side panels and door panels of 14-gauge steel. Construct the vented base from 16-gauge steel. Construct the 19-inch electrical rack angles from 12-gauge steel.

Doors: Equip all doors with grounding brackets and doorstop kits. Door hinges shall have a maximum opening range of 130-140 degrees. Hinge kits shall permit left or right side mounting. Furnish the racks with tamper-proof hinges and removable hinge pins.

Provide the rack with flush swing handles with tamper resistant locks on all doors. Key all locks to the same key with two sets of keys provided for each unit. Locks shall have a three-point latch mechanism.

Wall Panels: Provide removable solid side panels with hanger tabs for easy alignment and assembly. Provide vents on front and rear panels, along with wire entry access plates with dust-tight seals.

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Finish: Furnish factory-applied paint or powder-coating that is black in color on the exterior and interior of all components.

Furnish one metal shelf kit per communications rack. Provide each shelf the full width and depth of the rack angles and attach directly to the rack angles. Furnish one metal keyboard slide out drawer per full-height communications rack.

(B) Cable Tray

Provide a cable tray to extend the existing overhead cable tray to a new communications rack at a location as directed by the Engineer.

Provide a wire mesh cable tray with connector assemblies, clamp assemblies, connector plates, splice kits. Provide the units with rounded edges and smooth surfaces and with the following additional construction features:

- Pre-Galvanized Steel Wire finish with Electro-Plated Zinc Galvanizing: Straight sections shall be made from steel meeting the minimum mechanical properties of ASTM A 510 Grade 1008 and shall be electro-plated zinc in accordance with ASTM B633, Sll straight section longitudinal wires with a continuous top wire safety edge and safety edge kinked and T-welded on all tray sizes.
- Wire mesh cable tray shall be made of high strength steel wires and formed into a standard 2 inch by 4 inch wire mesh pattern with intersecting wires welded together. All mesh sections must have at least one bottom longitudinal wire along entire length of straight section.
- Wire mesh cable tray sizes shall conform to the following nominal criteria:
 - All straight section longitudinal wires shall be constructed with a continuous top wire safety edge. Safety edge must be kinked and T-welded on all tray sizes.
 - Wire mesh cable tray shall be made of high strength steel wires and formed into a standard 2 inch by 4 inch wire mesh pattern with intersecting wires welded together.
 - All mesh sections must have at least one bottom longitudinal wire along entire length of straight section.
 - Straight sections shall be furnished in standard 118 inch lengths
 - Wire diameter shall be 0.196” minimum on all mesh sections
 - Wire mesh cable tray shall have a two-inch usable loading depth by 12 inches wide.
- All fittings shall be field formed, from straight sections, in accordance with manufacturer's instructions.
- In order for system to be approved as an Equipment Ground Conductor (EGC), all splicing assemblies shall be UL/CSA approved as an EGC.

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- Wire mesh cable tray supports shall be center support hangers, trapeze hangers or wall brackets as approved by the Engineer
- Trapeze hangers or center support hangers shall be supported by 1/4 inch or 3/8 inch diameter rods.

8.3. CONSTRUCTION METHODS**(A) Communications Rack**

Assemble the communications rack and install all rack components and accessories in the rack in accordance with the manufacturer's instructions and as shown in the Plans.

Locate the communications rack in location directed by the Engineer.

Ground the racks to a building ground.

For the full height racks, furnish and install an outlet strip and 10-foot power cord along one rear vertical rack frame. Connect the communications rack to the nearest available electrical outlet without running cords across the floor. Furnish and install strips that use 120 VAC 60 Hz power and shall contain at least 10 outlets over the 70 inches for full size racks. Furnish and install grounding bus bar system to ground the rack-mounted electrical equipment. Equip door with grounding studs.

Furnish and install cable management hardware for attachment vertically along the rack frame and horizontally between 19-inch rack angles. Cable management hardware shall run vertically up one rear rack frame and shall include six horizontal runs per rack. Provide hardware including cable organizers and clamps to provide strain relief and cable mounting.

Install the full-height communications rack cabinets in the TRTMC Server Room as shown in the Plans.

Install a keyboard shelf at a height comfortable for operator use when sitting on a stool. Provide tamper-resistant but removable screws through hinges and exterior panels. Furnish any special tools required to remove tamper resistant screws.

(B) Cable Tray

Install wire mesh cable tray in accordance with recognized industry practices (NEMA VE-2 2000), to ensure that the cable tray equipment complies with requirements of NEC, and applicable portions of NFPA 70B and NECA's "Standards of Installation" pertaining to general electrical installation practices.

Coordinate wire mesh cable tray with other electrical work as necessary to properly interface installation of wire mesh cable tray runway with other work.

Provide sufficient space encompassing wire mesh cable tray to permit access for installing and maintaining cables.

8.4. MEASUREMENT AND PAYMENT

Communications rack will be measured and paid as the actual number of communications racks furnished, installed, and accepted.

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No separate measurement and payment will be made for rack set-up and assembly, mounting of all accessories and equipment specified for installation within the rack, all brackets, fasteners, and hardware required for properly mounting equipment in the rack, as such materials and work will be considered incidental to furnishing and installing the communications rack.

No separate measurement and payment will be made for the cable tray and its installations as it will be considered incidental to furnishing and installing the communications rack.

Payment will be made under:

Pay Item

Pay Unit

Communications Rack

Each

9. CCTV FIELD EQUIPMENT

9.1. DESCRIPTION

Furnish and install CCTV field equipment, cabinets and local camera control software described in this Section. Remove and deliver existing CCTV field equipment and cabinets that will not be used per Subarticle 1700-3(F) of the *Standard Specifications* as revised by these Project Special Provisions and as shown in the Plans.

Provide a system to protect field devices and electronic equipment from lightning and surge protection using UL listed surge protection devices.

9.2. MATERIAL

(A) General

Provide new CCTV camera assemblies with composite cable and CCTV cabinets. Each CCTV camera assembly shall consist of the following:

- NEMA environmental dome enclosure,
- CCTV color digital signal processing camera unit with zoom lens, filter, control circuit, and accessories,
- Control receiver/driver that complies with the NTCIP specifications listed below,
- Motorized pan, tilt, and zoom,
- Power supplies,
- Pole-mount camera attachment hardware,
- All necessary cable, connectors and incidental hardware to make a complete and operable system,
- NEMA Type 4, IP 66 enclosure constructed of aluminum with a clear acrylic dome or approved equal camera unit housing,
- 60-foot composite cable for power supply and video and data transmission, and
- Surge protection devices.

Each CCTV cabinet assembly shall consist of the following:

- Type 336A pole-mounted cabinet
- Local interface panel,
- Power supplies/transformers,
- Transient voltage surge suppressors, and
- All necessary cable, connectors, and incidental hardware to make a complete and operable system.

Provide camera software as described herein only if the cameras are of a different model and brand from what currently exists in the Regional ITS CCTV system.

Provide CCTV field equipment that is fully compatible and interoperable with existing CCTV Pelco Spectra IV field equipment in the region.

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(B) Existing CCTV 052

Provide a trailer mounted, solar powered CCTV and wireless communications during the period the existing CCTV is out of service to monitor traffic along Business 40. The portable CCTV must be viewable on analog monitors and controllable from the TRTMC. Provide cellular communications between the portable CCTV camera assembly and the TRTMC for the duration of the project, including payment for monthly service. Provide warranty coverage for all parts and materials through the project completion date.

The unit must be compatible with the Pelco Spectra IV cameras and Raven wireless communications in use in the Region. The portable CCTV camera must be controllable from the TRTMC using the Department's existing software. Upon completion of the project turn over and deliver the trailer-mounted, solar powered CCTV complete to the TRTMC.

(C) Standards

- ANSI,
- ASTM,
- CE, Class B,
- EIA Standards 170, 232, 422, 250C and 485,
- FCC Rules Part 15, Sub-part J,
- FCC Class A,
- FCC, Class B,
- IEEE,
- ICEA,
- IMSA,
- ISO 9001,
- NEC,
- NEMA 4X, IP 66,
- NEMA Type 1,
- NTSC, and
- UL Listed.

Provide UL listed surge protection devices according to the UL 1449, 2nd edition standard that comply with the NEMA requirements as detailed in the NEMA LS 1 (1992) standard.

Provide a means to ground all equipment as called for in the *Standard Specifications*, these Project Special Provisions, and the Plans.

(D) Camera Assembly**(1) Cameras**

Provide new 1/4-inch charged-coupled device (CCD) color day/night cameras. Provide cameras with automatic gain control (AGC) for clear images in varying light levels. The camera must meet the following minimum requirements:

- Video signal format: NTSC composite color video output, 1 volt peak to peak,
- Horizontal resolution: 540 TV Lines,
- Image sensor resolution: 768 horizontal pixels by 752 vertical pixels,

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- Automatic gain control (AGC): 0-20 dB, peak-average adjustable,
- White balance: Automatic through the lens with manual override,
- Electronic-shutter: Dip-switch selectable NTSC electronic shutter with speed range from 1/2 of a second (off) to 1/30,000 of a second (NTSC),
- Overexposure protection: Built-in circuitry or a protection device to prevent any damage to the camera when pointed at strong light sources, including the sun,
- Gain control: Automatic and manual,
- Sensitivity: 1.5 lux at 90% scene reflectance,
- Sync system: Internal AC line lock, phase adjustable using remote control, V-sync,
- Signal to noise ratio: Greater than 50 dB,
- Video output connection: 1-volt peak to peak, 75 ohms terminated, BNC connector, and
- Primary voltage: 120 VAC,
- Camera voltage: 24 VAC or 24 VDC, and
- Camera power: 73 VA with heater at 24 VAC or 3A at 24 VDC.

(2) Lens

Provide each camera with a motorized zoom lens with automatic iris control with manual override and neutral density spot filter. Provide lenses that meet the following optical specifications:

- Automatic focus: Automatic with manual override,
- Horizontal angle of view: 54 degrees at 3.6 mm wide zoom and 2.5 degrees at 82 mm telephoto zoom,
- Focal length: 3.6 mm to 124 mm, 35X optical zoom, 12X electronic zoom,
- Zoom Speed: 2.9, 4.2 and 5.8 seconds,
- Lens aperture: Minimum of f/1.6,
- Maximum Sensitivity at 35 IRE: .025 lux at 1/2 second color, .1 lux at 1/60 second black and white, .004 lux at 1/2 sec. black and white,
- 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. Provide mechanical or electrical means 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) 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 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 dome must have an auto flip dome rotation to rotate and reposition camera for viewing objects

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passing below camera. Provide electronic image stabilization. The pan and tilt units must meet or exceed the following specifications:

- Pan: Continuous 360 degrees,
- Tilt: +2 to -92 degrees minimum,
- Presets: Minimum of 128 presets,
- Preset accuracy: .1 degree,
- Preset pan speed: .1 degrees/second to 200 degrees/second,
- Preset tilt speed: .1 degrees/second to 400 degrees/second,
- Privacy zones: Minimum of eight user configurable shapes,
- Input voltage: 24 VDC or 24 VAC, and
- Motors: Two-phase induction type, continuous duty, instantaneous reversing.

(4) Power Supplies

Provide all power supplies necessary for the camera and its pan tilt unit. Mount power supplies in the camera cabinet and utilize composite cable to supply power the camera and pan tilt unit.

(5) Control Receiver/Driver

Each new camera unit must contain a control receiver/driver that is integral to the CCTV dome assembly. The control receiver/driver must 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,
- Pan right/left, and
- Minimum of 128 preset positions for pan, tilt, and zoom.

In addition, each control receiver/driver must accept status information from pan/tilt unit and motorized lens for preset positioning of those components. The control receiver/driver must relay pan, tilt, zoom, and focus positions from the field to remote camera control units. 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.

(6) Camera Housing

Provide new dome style enclosure for assemblies with a high performance integrated dome system or approved equal. Provide the dome housing with a 1½" NPT threaded cable entry. Equip each camera housing with a mounting assembly for attachment to the CCTV camera pole. The enclosures must be equipped with a strip heater. Provide a sunshield fabricated from

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corrosion resistant aluminum and finished in a neutral color of weather resistant enamel. The viewing area of the enclosure must be tempered glass.

Provide surge protectors for all ungrounded conductors that will enter the CCTV enclosure as described below. House the surge protectors within the CCTV housing in a manner approved by the Engineer.

A dome-type environmental housing shall have a sustained ambient operating temperature of -50 degrees F to 122 degrees F, with 100 percent non-condensing relative humidity as defined within the NEMA TS-2 (1998) standard.

The enclosure shall have a NEMA 4X/IP-66 rating.

(D) Composite Cable

Provide a composite cable for carrying the CCTV power, analog video and serial data between the camera and CCTV cabinet. The composite cable shall consist of:

- Outer jacket composed of UV resistant PVC,
- RG-59U coaxial cable
 - Maximum outer diameter .75 in.,
 - PVC jacket,
 - 75 ohm rating,
 - Nominal capacitance of 17.5 pF/ft.,
 - 22 AWG stranded copper center conductor,
 - Bare copper stranded shield.
- Data cable
 - 22 AWG stranded cable,
 - Two twisted pairs,
 - Nominal capacitance of 26 pF/ft.,
 - Nominal impedance of 55 ohms,
 - Common shield/drain wire.
- Power Cable,
 - 16 AWG,
 - Four wire, and
 - THWN stranded.

(E) Camera Mounting Bracket

Provide a pole attachment assembly for the CCTV camera unit to mount on wood poles and metal poles. The attachment assembly shall use stainless steel banding around the pole approved by the Engineer.

Provide the CCTV attachment assembly that allows 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.

Provide CCTV camera attachment assembly that is able to withstand wind loading at the maximum wind speed and gust factor called for in the interim revision of the 5th Edition *AASHTO Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals* and can support a minimum camera unit dead load of 45 pounds.

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Provide Type 336A CCTV cabinets that provide for and meet the following minimum requirements:

- Ethernet edge switch (paid for separately),
- Digital video encoder (paid for separately),
- Termination of the composite cable to the camera,
- Local interface panel with maintenance access points for data and video connections to observe camera images and program/monitor camera status,
- Fiber-optic interconnect center (paid for separately),
- Grounding bus bar,
- 19-inch rack system for mounting of all devices in the cabinet,
- Pull-out shelf for laptop and maintenance use,
- Stationary shelf for shelf-mounting the digital video encoder and Ethernet edge switch,
- Fluorescent lighting,
- Ventilation fan,
- Thermostats,
- 120 VAC power supply,
- 120 VAC GFCI-protected duplex outlets for tools,
- 120 VAC surge protected duplex outlets for equipment,
- Surge protection on incoming and outgoing electrical lines (power and data),
- Transformers/power supplies, and
- Power strip along vertical rail.

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

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

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

Provide all cabinets and exterior door seams with continuously welded seams and with smooth exterior welds. Provide all cabinets with two (2) full-size doors (one front, one back).

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Provide the doors with three hinges, or a full-length stainless steel piano hinge, with stainless steel pins spot-welded at the top. The hinges shall utilize stainless steel hinge pins. Mount the hinges so that they cannot be removed from the door or cabinet without first opening the door. Brace the door and hinges to withstand a 100-pound per vertical foot of door height load applied vertically to the outer edge of the door when standing open. There shall be no permanent deformation or impairment of any part of the door or cabinet body when the load is removed. Provide the cabinet door with a #2 Corbin lock. Provide two keys for each cabinet. Provide the cabinet doors so they can be padlocked. Provide door openings with double flanges on all four sides.

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

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

Provide pole-mounted versions of the 336A CCTV cabinet as required by the Plans.

(2) Ventilation

Provide a cooling fan in all cabinets with a minimum capacity of 100 CFM. Provide a thermostat to control the ventilation system.

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

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

(3) Electrical

Provide a power distribution assembly that consists of power filters, transient voltage suppression, equipment grounding, main and branch circuit breakers for equipment, electrical outlets, lighting and ventilation.

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

Provide UL listed circuit breakers with an interrupt capacity of 5,000 amperes and insulation resistance of 100 MΩ at 500 VDC. Provide power distributions blocks for use as power feed and junction points for two and three wire circuits. The line side of each shall be capable of handling up to 2/0 AWG conductors. Isolate the AC neutral and equipment ground wiring and terminal blocks from the line wiring by an insulation resistance of at least 10 MΩ when measured at the AC neutral.

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For components that are furnished by the Contractor that are mounted on cabinet side panels, fasten with hex-head or Phillips-head machine screws. Install the screws into tapped and threaded holes in the panels. The components include, but are not limited to, terminal blocks, bus bars, and DC power supply chassis.

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

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

(4) Cable Terminations

Terminate all field cabling on the respective surge protection devices for composite coaxial video, 4-wire EIA 422 data communications, and 24 VAC power cable.

Provide an interface panel to permit a technician to connect a laptop and video monitor to the front side to control the camera locally and view live CCTV video without disconnecting the field wiring. All field wiring shall be routed through the surge protection units before the interface panel. Clearly label all connections on the interface panel.

Provide three adaptor cables to convert USB data to RS-422/RS-232.

Provide a video splitter on the video cable to simultaneously provide video to the video monitor port and to the encoder. Provide a switch for selecting and local camera PTZ control.

(5) Surge Suppression

Provide surge protection both ahead of and behind the ITS device electronics for the cameras. All surge protection devices shall have an ambient operating temperature of -40 degrees F to 165 degrees F with 95 percent non-condensing relative humidity. All surge protection devices shall comply with the following standards:

- UL 1449 version 3 for electrical power,
- UL 497B for paired data communications, and
- UL 497C for coaxial communications.

For those CCTV cabinets with Ethernet communications over twisted-pair copper cable, provide surge protection devices meeting UL 497A.

Grounding

Provide a cabinet grounding system as shown in the Plans. Incorporate a means to bond (i.e., connected) all metal components of the camera and cabinets to the grounding system with a grounding cable that uses a mechanical connection on the equipment side and an exothermic welded connection at the down cable.

Line Side CCTV Power

Each cabinet must be provided with a hybrid-type, power line surge protection device mounted inside the power distribution assembly. The protector must be installed between the applied line voltage and earth ground. The surge protector must be capable of reducing the effect of lightning transient voltages applied to the AC line. The protector must be mounted inside the power distribution assembly housing facing the rear of the cabinet. The protector must include the following features and functions:

- Maximum AC line voltage: 140 VAC,
- Twenty pulses of peak current, each of which must rise in 8 microseconds and fall in 20 microseconds to ½ the peak: 20,000 Amperes,
- The protector must be provided with the following terminals:
 - Main line (AC line first stage terminal),
 - Main neutral (AC neutral input terminal),
 - Equipment line out (AC line second stage output terminal, 19 amps),
 - Equipment neutral out (neutral terminal to protected equipment),
 - Ground (earth connection),
- The main AC line in and the equipment line out terminals must be separated by a 200 Microhenry (minimum) inductor rated to handle the 10 Amp AC service,
- The first stage clamp must be between main line and ground terminals,
- The second stage clamp must be between equipment line out and equipment neutral,
- The protector for the first and second stage clamp must have an MOV or similar solid-state device rated at 20 KA and must be of a completely solid-state design (i.e., no gas discharge tubes allowed),
- The main neutral and equipment neutral out must be connected together internally and must have an MOV similar solid-state device or gas discharge tube rated at 20 KA between main neutral and ground terminals,
- Peak clamp voltage: 350 volts at 20 KA (voltage measured between equipment line out and equipment neutral out terminals. Current applied between main line and ground terminals with ground and main neutral terminals externally tied together),
- Voltage must never exceed 350 volts, and
- The protector must be epoxy-encapsulated in a flame-retardant material.
- Continuous service current: 10 Amps at 120 VAC RMS.
- The equipment line out must provide power to cabinet CCTV and communications equipment and to the 24V power supply.

Load Side CCTV Power

Load side protection is designed to restrict surge current transients from entering the power source from the CCTV device and/or site. The surge protection for the CCTV power source shall have an operating voltage of 120 volts single phase and a maximum continuous operating voltage of 150 volts single phase.

The device's surge protection shall be rated at a minimum of 90,000 amps per phase and have maximum clamping voltage ratings of 330 volts at 500 amps, 395 volts at 3,000 amps, and 533 volts at 10,000 amps. The surge protection shall also be UL listed for a minimum

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suppressed voltage of 330 volts per line to the neutral/ground. The suppression device shall be of the metal oxide varistor (MOV) type.

Load Side CCTV Data/Video

Provide specialized surge protection devices at the supply and load sides of all low voltage connections to the CCTV device and its operating subsystems. Provide specialized surge protection devices at the supply and load sides of all low voltage Ethernet data connections between a CCTV and traffic signal cabinet. These connections include, but are not limited to, coaxial video cables and low voltage control serial and Ethernet data cables that comply with EIA requirements as detailed in the EIA-232/422/485 standards.

The surge protection shall have an operating voltage to match the characteristics of the CCTV, such as 24 volts of direct current (VDC) or 24 volts of alternating current and less than 5 VDC for data and video functions. These specialized surge protection units shall be UL listed according to the UL 497B (paired-data cable) and UL 497C (coaxial cable) standards. The minimum surge current rating for the surge protection shall be 2,000 amps for data and telecommunications, 2,000 amps for twisted pair video, and 4,000 amps for binary network connectors (BNC).

(G) Grounding

Provide a minimum of four grounding electrodes with a minimum length of 10 feet each and listed according to UL requirements as detailed in the *UL 467J* standard. Provide copper clad or solid copper electrodes.

(H) Software

Provide a Vendor-supplied GUI-based software to setup, configure and operate the cameras in the field. This software shall include features to set communications addresses and protocols, define camera ID lens control, digital signal processing (DSP) settings, azimuth configuration, presets, tours, and privacy zones. The software shall allow the user to control all functions of the camera locally from the CCTV cabinet at the base of the pole with a serial or USB cable.

9.3. CONSTRUCTION METHODS

(A) General

Mount the CCTV units on steel poles for CCTV-192, CCTV-193, CCTV-194 and CCTV-052. For CCTV-053 and CCTV-054, mount on steel poles equipped with a camera lowering device.

Obtain approval of the camera locations and orientation from the Engineer prior to installing the CCTV camera assemblies.

Mount CCTV cameras on the side nearest the intended field of view.

(B) Electrical and Mechanical Requirements

Ground all equipment as called for in the *Standard Specifications*, these Project Special Provisions, and the Plans.

Ground all equipment as called for in the *Standard Specifications*, these Special Provisions, and the Plans.

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Install surge protectors on all ungrounded conductors entering the CCTV enclosure. House the protectors in a small, ventilated weatherproof cabinet attached near the CCTV attachment point in a manner approved by the Engineer.

Furnish all tools, equipment, materials, supplies, and hardware necessary to install a fully operational CCTV camera system as depicted in the plans.

(C) CCTV Camera Assembly

Mount CCTV camera units at a height sufficient to adequately see traffic in all direction and as approved by the Engineer. Mount cameras on poles at the attachment heights shown on Special Details in the Plans.

Mount CCTV camera on the side of pole that is nearest to the intended field of view, to avoid occlusion of the view by the pole or utility lines. Obtain approval of camera orientation from the Engineer.

(D) Existing CCTV 052

If the operation of CCTV-052 cannot be maintained during construction provide and maintain a portable trailer mounted CCTV assembly with wireless communications compatible with those units already in use in the Triad Region while the existing CCTV is out of service. Assist the Department with integrating the portable CCTV camera into the regional system and with establishing communications with the TRTMC. Do not take the existing CCTV camera out of service until the portable CCTV camera has been fully integrated into the Triad Regional system and is communicating effectively with the TRTMC. When the existing CCTV camera is placed back into service, transport the portable CCTV camera assembly to the Regional ITS Office in Greensboro and relinquish ownership to the Department.

(E) CCTV Camera Attachment to Pole

Have the Engineer approve the new pole locations prior to setting a new pole. At locations shown in the Plans, assemble the camera attachment hardware for the CCTV camera unit and attach to the pole using stainless steel banding approved by the Engineer. Submit shop drawings for review and approval by the Engineer prior to installation.

Install the camera attachment assembly to the pole in a manner that allows 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.

Install CCTV camera attachment assembly that is able to withstand wind loading at the maximum wind speed and gust factor called for in the *AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, 4th Edition, 2006 Interim, and can support a minimum camera unit dead load of 45 pounds.

(F) CCTV Cabinet

Mount the CCTV cabinet on the pole supporting the CCTV camera it controls using approved hardware and attachment brackets. Mount the cabinet 4 feet from the ground to the center of the cabinet. Have the Engineer approve the proposed mounting position prior to attaching the CCTV cabinet to the pole.

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

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

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

Fasten all components installed by the Contractor to be mounted on cabinet side panels with hex-head or Phillips-head machine screws. Install the screws into tapped and threaded holes in the panels. The components include, but are not limited to, terminal blocks; bus bars, and DC power supply chassis.

Connect the CCTV camera cabinet to the CCTV camera assembly using a composite cable carrying the video, serial data and power. Terminal strips shall be provided with the cabinets to support 4-wire EIA 422 communications and the 24 VAC power as will be required for power and data.

Install the Ethernet edge switch inside the cabinet in accordance with the "Communications Hardware" section of these Project Special Provisions. Mount the edge switch on the same shelf in the CCTV cabinet as the video encoder. Connect the appropriate connectors on the interconnect center with those on the Ethernet edge switch using SMFO jumpers.

Furnish and install a level concrete maintenance pad directly in front and below both the front and rear doors of the pole-mounted CCTV cabinet. Construct a pad that is a minimum of 4" deep, 24" wide and 36" long.

(G) Power Service

Provide 120 VAC power as shown on the Plans. Install new power service under separate pay item as shown in the Plans. Comply with the "Electrical Service" section of these Project Special Provisions and the details shown in the Plans.

(H) Grounding

Ground the CCTV pole and subsystems in accordance with the special details in the Plans.

(1) Device Line Side

Connect the surge protection devices on the CCTV power source on the line side. This device shall provide protection between line-to-neutral, line-to-ground, line-to-line and neutral-to-ground.

(2) Device Load Side

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Connect the surge protection devices in the power line side ahead of all CCTV electronic equipment. This installation technique is designed to restrict earth current transients induced within the ground or directly from the power source from entering the ITS device through the incoming 120/240-volt power circuit. This device shall provide protection between line-to-neutral, line-to-ground, line-to-line and neutral to ground.

(3) Device Data/Video Supply

Connect the specialized surge protection devices at the supply and line sides of all low voltage connections to the CCTV device and its operating subsystems. These connections include, but are not limited to, Category 5E data cables and low voltage control cables that comply with EIA requirements as detailed in the EIA-232/422/485 standards.

(I) Software

If Vendor software is provided to program and operate the cameras, install the Vendor-supplied GUI-based software to setup, configure and operate the cameras on each laptop supplied with the project. If the approved Vendor of the cameras is already supplying cameras to the TRTMC vendor software will not be required.

(J) GPS Coordinates

Provide real world coordinates for all junction boxes and equipment cabinets installed or utilized under this project. Provide the coordinates in feet units using the North Carolina State Plane coordinate system (1983 North American Datum also known as NAD '83). Furnish coordinates that do not deviate more than 1.7 feet in the horizontal plane and 3.3 feet in the vertical plane. Global positioning system (GPS) equipment able to obtain the coordinate data within these tolerances may be used. Submit cut sheets on the GPS unit proposed to collect the data for approval by the Engineer.

Provide both a digital copy and hard copy of all information regarding the location (including but not limited to manufacturer, model number, and NCDOT inventory number) in the Microsoft Excel spreadsheet using the format shown in example below.

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NCDOT Inv #	Name	Location	Latitude	Longitude	Manufacturer	Model #
05-0134	Equipment Cabinet	US 70 at Raynor Rd./ Auburn-Knightdale	-78.5500	35.6873	McCain	Type-332
	Junction Box # 1 (Phase 2 Side)	US 70 at Raynor Rd./ Auburn-Knightdale	-78.5516	35.6879	Quazite	PG1118BA12(Box) PG118HA00(Cover)
	Junction Box # 2 (Phase 2 Side)	US 70 at Raynor Rd./ Auburn-Knightdale	-78.5506	35.6876	Quazite	PG1118BA12(Box) PG118HA00(Cover)
	Junction Box # 3 (Near Cabinet)	US 70 at Raynor Rd./ Auburn-Knightdale	-78.5501	35.6873	Quazite	PG1118BA12(Box) PG118HA00(Cover)
	Junction Box # 4 (Phase 6 Side)	US 70 at Raynor Rd./ Auburn-Knightdale	-78.5486	35.6873	Quazite	PG1118BA12(Box) PG118HA00(Cover)
	Junction Box # 5 (Phase 6 Side)	US 70 at Raynor Rd./ Auburn-Knightdale	-78.5493	35.6876	Quazite	PG1118BA12(Box) PG118HA00(Cover)
	Junction Box # 6 (Phase 4 Side)	US 70 at Raynor Rd./ Auburn-Knightdale	-78.5503	35.6879	Quazite	PG1118BA12(Box) PG118HA00(Cover)

9.4. MEASUREMENT AND PAYMENT

CCTV camera assembly will be measured and paid as the actual number of CCTV camera assemblies furnished, installed, integrated, and accepted. No separate measurement will be made for Ethernet cables, composite video cables, power conductors, connectors, CCTV camera attachment assemblies, conduit, condulets, risers, grounding equipment, surge protectors, CCTV control software, or any other equipment or labor required to install the CCTV assembly.

CCTV cabinet will be measured and paid as the actual number of pole-mounted CCTV cabinets furnished, installed, and accepted. No measurement will be made of maintenance pads as they will be considered incidental to the furnishing and installing the CCTV cabinet.

No separate measurement and payment will be made for hardware, fasteners and brackets required to mount CCTV cabinets to a metal pole as shown in the Plans as such work will be considered incidental to furnishing and installing the CCTV cabinets.

Portable CCTV will be measured and paid as the actual number of portable trailer mounted CCTV units furnished, installed, maintained and accepted. Payment will include acquisition of cellular telephone service and payments for monthly cell phone service for the project duration, assisting the Department with integrating the device into the regional system, and delivering the unit to Regional ITS Office and relinquishing ownership of the unit to the Department at the conclusion of the project.

Installation of Ethernet edge switches and digital video encoders will be measured and paid for in accordance with the "Communications Hardware" and "Central Video Equipment" sections of these Project Special Provisions.

Payment will be made under:

Pay Item	Pay Unit
CCTV Camera Assembly	Each
CCTV Cabinet	Each
Portable CCTV	Each

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10. CCTV METAL POLES

10.1. DESCRIPTION

Furnish and install CCTV metal poles, cameral lowering systems, drilled pier foundations, grounding systems, and all necessary hardware. Design, furnish, and install drilled pier foundations for CCTV metal poles with all necessary hardware. The work covered by this special provision includes requirements for the design, fabrication, and installation of custom designed CCTV metal poles.

10.2. MATERIALS

(A) CCTV Metal Poles

Comply with applicable sections of the *2012 STANDARD SPECIFICATIONS FOR ROADS & STRUCTURES*, hereinafter referred to as the *Standard Specifications*. Provide designs of completed assemblies with hardware that equals or exceeds *AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals* 5th Edition, 2009 (hereafter called 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.

Provide CCTV metal poles that are 50 feet high when not equipped with lowering devices as indicated in the Plans. Provide CCTV metal pole that are 70 feet high when equipped with lowering devices as indicated in the Plans. Design the pole for CCTV-053 to support the solar power assembly.

After fabrication, hot-dip galvanized steel poles, and all parts used in the assembly in accordance with section 1076 of the *Standard Specification*. Design structural assemblies with weep holes large enough and properly located to drain molten zinc during galvanization process. Galvanize structures to meet or exceed AASHTO M 111. Provide galvanizing on hardware that meets or exceeds ASTM Standard A-153. Ensure that threaded material is brushed and re-tapped as necessary after galvanizing. Perform repair of damaged galvanizing that complies with the following:

Repair of Galvanizing Article 1076-6

Standard Drawings for Metal Poles are available that supplement these project special provisions. These drawings are located on the Department's website:

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

Comply with article 1098-1B "General Requirements" of the *Standard Specifications* for submittal requirements. Furnish shop drawings for approval. Provide the copies of detailed shop drawings for each type of structure as summarized below. Ensure that shop drawings include material specifications for each component and identify welds by type and size on the drawing details, not in table format. Do not release structures for fabrication until shop drawings have been approved by NCDOT. Provide an itemized bill of materials for all structural components and associated connecting hardware on the drawings.

Comply with Subarticle 1098-1(A) "General Requirements" of the *Standard Specifications* for Qualified Products List (QPL) submittals. All shop drawings must include project location

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description, CCTV inventory number(s), and a project number or work order number on the drawings.

Summary of information required for metal pole review submittal:

Item	Hardcopy Submittal	Electronic Submittal	Comments / Special Instructions
Sealed, Approved ITS Plan/Loading Diagram	1	1	All structure design information needs to reflect the latest approved ITS plans
Custom Pole Shop Drawings	4 sets	1 set	Submit drawings on 11" x 17" format media. Show NCDOT inventory number(s), contractor's name and relevant revision number in the title block. in or above the title block. All drawings must have a <u>unique drawing</u> number for each project and identified for multiple pages.
Structure Calculations	1 set	1 set	Not required for Standard QPL Poles
Custom Foundation Drawings	4 sets	1 set	Submit drawings on 11" x 17" format media. If QPL Poles are used, include the corresponding QPL pole shop drawings with this submittal. All drawings must have a <u>unique drawing</u> number for each project and identified for multiple pages.
Foundation Calculations	1	1	Submit copies of LPILE input, output and pile tip deflection graph paper the "Non-Standard Foundation Design" subarticle of this section of these Project Special Provisions for each foundation.
Soil Boring Logs and Report	1	1	Report should 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 designs showing the NCDOT inventory number.

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. 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.

Fabricate CCTV metal poles from coil or plate steel to meet the requirements of ASTM A595 Grade A tubes. For structural steel shapes, plates and bars use A572 Gr 50 min or ASTM

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A709 Gr 50 min.. Provide poles that are round in cross section or multisided tubular shapes and have a uniform linear taper of 0.14 in/ft. Construct shafts from one piece of single ply plate or coil so there are no circumferential weld splices. Galvanize in accordance with AASHTO M111 and/or ASTM A123 or an approved equivalent.

Ensure that allowable pole deflection does not exceed that allowed per 5th Edition AASHTO. Ensure that maximum deflection at the top of the pole does not exceed 2.0 percent of the pole height.

Use the submerged arc process or other NCDOT previously approved process suitable for poles to continuously weld pole shafts along their entire length. The longitudinal seam weld will be finished flush to the outside contour of the base metal. Ensure shafts have no circumferential welds except at the lower end joining the shaft to the pole base. Provide welding that conforms to Article 1072-20 of the *Standard Specifications*, except that no field welding on any part of the pole will be permitted unless approved by a qualified engineer.

Refer to Metal Pole Standard Drawing Sheets M2 through M5 for fabrication details. Fabricate anchor bases from plate steel meeting, as a minimum, the requirements of ASTM A 36M or cast steel meeting the requirements of ASTM A 27M Grade 485-250, AASHTO M270 Gr 36 or an approved equivalent. Conform to the applicable bolt pattern and orientation as shown on Metal Pole Standard Drawing Sheet M2.

Ensure all hardware is galvanized steel or stainless steel. The Contractor is responsible for ensuring that the designer/fabricator specifies connecting hardware and/or materials that do not create a dissimilar metal corrosive reaction.

Unless otherwise required by the design, ensure each anchor rod is 2" diameter and 60" length. Provide 10" minimum thread projection at the top of the rod, and 8" minimum at the bottom of the rod. Use anchor rod assembly and drilled pier foundation materials that meet the *Foundations and Anchor Rod Assemblies for Metal Poles* provision.

For each structural bolt and other steel hardware, hot dip galvanizing shall conform to the requirements of AASHTO M 232 (ASTM A 153). Ensure end caps for poles are constructed of cast aluminum conforming to Aluminum Alloy 356.0F.

Provide a circular anchor bolt lock plate that will be secured to the anchor bolts at the embedded end with two washers and two nuts. Provide a base plate template that matches the bolt circle diameter of the anchor bolt lock plate. Construct plates and templates from ¼" minimum thick steel with a minimum width of 4". Galvanizing is not required.

Provide four heavy hex nuts and four 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.

Provide a 2inch hole equipped with an associated coupling and weatherhead approximately 5 feet below the top of the pole to accommodate passage of CCTV cables from inside the pole to the CCTV camera.

Provide a 2-hole equipped with an associated coupling and conduit fittings/bodies approximately 18" above the base of the pole accommodate passage of CCTV cables from the

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CCTV cabinet to the inside of the pole. Refer to Metal Pole Standard Drawing Sheet M3 for fabrication details.

Provide a hand hole access with a watertight cover at a height above the base of the pole and of the type and size required by the manufacture of the internal CCTV Lowering System to ensure smooth and efficient operation of the camera lowering system.

Have poles permanently stamped above the base hand hole with the identification tag details as shown on Metal Pole Standard Drawing Sheet M2.

For each pole, provide a 1/2 inch minimum thread diameter, coarse thread stud and nut for grounding which will accommodate #4 AWG ground wire. Ensure that 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 that the cap is cast aluminum conforming to Aluminum Association Alloy 356.0F. Furnish cap attached to the pole with a sturdy chain or cable approved by the Engineer. Ensure that the chain or cable is long enough to permit the cap to hang clear of the pole-top opening when the cap is removed.

(B) CCTV Lowering System

Provide a CCTV camera lowering system as an integral part of the CCTV metal pole for all 70 ft. poles as specified herein and at locations shown in the Plans. The lowering system will consist of a support arm, camera connection box, and all necessary cabling and wiring for installation. Provide the lowering device with a disconnect unit for electrically connecting the equipment installed on the lowering device's equipment connection box to the power, data, and video cables (as applicable); a divided support arm, a pole adapter for the assembly's attachment to the rotatable pole-top tenon, and a pole-top junction box.

All of the lowering device's external components must be made of corrosion-resistant materials that are powder-coated, galvanized, or otherwise protected from the environment by industry-accepted coatings that withstand exposure to a corrosive environment.

Provide a CCTV camera lowering system as an integral part of the CCTV metal pole. The lowering system will consist of a support arm, camera connection box, and all necessary cabling and wiring for installation.

Ensure that the disconnect unit has a minimum load capacity of 200 pounds with a 4:1 safety factor. Fixed and movable components of the disconnect unit must have a locking mechanism between them. Provide a minimum of two mechanical latches for the movable assembly and, when latched, ensure that all weight is removed from the lowering cable. Provide fixed unit with a heavy-duty cast tracking guide and a means to allow latching in the same position each time.

Provide a disconnect unit that securely holds the lowering device and the equipment installed on the lowering device. The interface and locking components must be stainless steel or aluminum.

The lowering cable shall be a minimum diameter of 0.125 inch and constructed of seven strands, 19 gauge, stainless steel aircraft cable with a minimum breaking strength of 1,740 pounds. The contractor shall ensure that the prefabricated components for the lift unit support system preclude the lifting cable from contacting the power or video cables.

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Provide a connector block as specified by the manufacturer or with the lowering device. The connector block shall be equipped with modular, self-aligning and self-adjusting female and male socket contact halves. The lowering device must be equipped with enough contacts to permit operation of all required functions of the camera, up to a maximum of 20 contacts. Provide a minimum of two spare contacts. The lowering device connections must carry the signals, voltages, and current required by the device(s) connected to them under full load conditions. Submit documentation to the Engineer showing pin assignment.

The female socket contacts and the male contact halves must be of heavy-duty construction and the connector blocks made of molded synthetic rubber, molded chlorosulfonated polyethylene, polymer body or approved equal. The connector pins shall be made of brass or gold-plated nickel, or gold-plated copper. The current-carrying male and female contacts shall have a minimum diameter of 0.1 inch.

Provide cored holes in the rubber to create moisture-tight seals when mated with the male connector. All wire leads from both the male and female contacts shall be permanently molded in a body of chlorosulfonated polyethylene, or an approved equal. All current-carrying wires and signal wires shall be minimum #18 AWG stranded copper cable.

All contacts shall be self-wiping with a shoulder at the base of each male contact so that it recesses in the female block, thereby giving each contact a rain-tight seal when mated.

Provide a metal-frame lowering tool with winch assembly and a cable with a combined weight less than 35 pounds; a quick release cable connector, and an adjustable safety clutch. The lowering tool shall be powered using a half-inch chuck, variable-speed reversible industrial-duty electric drill to match the manufacturer-recommended revolutions per minute, or be supplied with a drill motor for the lowering tool.

The lowering tool shall support itself and the load. The lowering tool shall be equipped with a positive braking mechanism to secure the cable reel during raising and lowering operations, and to prevent freewheeling.

The lowering tool shall be equipped with gearing that reduces the manual effort required to operate the lifting handle to raise and lower a capacity load. It shall be provided with an adapter for operating the lowering device with the portable half-inch chuck drill using a clutch mechanism.

The lowering tool shall be manufactured of durable, corrosion-resistant materials that are powder-coated, galvanized, or otherwise protected from the environment by industry-accepted coatings that withstand exposure to a corrosive environment.

10.3. DESIGN OF DRILLED PIER FOUNDATIONS FOR METAL POLES

(A) General Requirements

Design all CCTV pole foundations using actual soil conditions at each pole location. Perform soil test in accordance with Subarticle 10.3(B) "Soil Test and Foundation Determination, of this Project Special Provision.

The Contractor is responsible for providing the shop drawing and soil test information for each CCTV metal pole to the Contractor's selected pole fabricator for a foundation design.

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Analysis procedures and formulas shall be based on AASHTO 5th Edition, ACI code and the *Drilled Shafts: Construction Procedures and Design Methods* FHWA-IF99-025 manual. Design methods based on engineering publications or research papers needs to have prior approval from NCDOT. The Department reserves the right to accept or disapprove any method used for the analysis.

Use a Factor of Safety of 1.33 for torsion and 2.0 for bending for the foundation design.

Foundation design for lateral load shall not exceed 1" lateral deflection at top of foundation.

For lateral analysis, use LPILE Plus V6.0 or later. Inputs, results and corresponding graphs are to be submitted with the design calculations.

Skin Friction is to be calculated using the α -method for cohesive soils and the β -method for cohesion-less soils (**Bröms method will not be accepted**). Detailed descriptions of the " α " and " β " methods can be found in *FHWA-IF-99-025*.

Omit first 2.5ft for cohesive soils when calculating skin friction.

When extreme loading and poor soil conditions are encountered, the one diameter length omitted from the shaft depth calculations (per FHWA-1F-99-025) may be added back in for Torsion calculations (with prior NCDOT approval).

When hammer efficiency is not provided, assume a value of 0.70.

Design all custom foundations to carry the maximum capacity of each metal pole.

When poor soil conditions are encountered which could create an excessively large foundation design, consideration may be given to allowing an exemption to the maximum capacity design. The Contractor must gain approval from the Engineer before reducing a foundation's capacity. On projects where poor soil is known to be present, it is advisable that the Contractor gain foundation approval before releasing poles for fabrication.

(B) Soil Test and Foundation Determination

(1) General

Drilled piers are reinforced concrete sections, cast-in-place against in situ, undisturbed soil. Drilled piers are of straight shaft type and vertical.

Some drilled piers for supporting metal poles may require wing walls to resist torsional rotation. Based upon this provision and the results of the required soil test, a drilled pier length requirement may be determined and constructed in accordance with the plans.

Soil Test:

Perform a soil test at each proposed metal pole location. Complete all required fill placement and excavation at each signal 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-in. intervals.

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A total of 50 blows have been applied with < 3-in. penetration.

Describe each CCTV pole location along the project corridor in a manner that is easily discernible to both the contractor's designer and NCDOT reviewers. If a CCTV pole is at an intersection, label the boring the "Intersection of (*Route or SR #*), (*Street Name*) and (*Route or SR #*), (*Street Name*), _____ County, Signal 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 CCTV 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 geotechnical drilling Contractor. Include pole numbers in the boring label if they are available. If they are not available, ensure the boring labels can be cross-referenced to corresponding pole numbers or pole locations. For each boring, submit a legible (handwritten or typed) boring log signed and sealed by a licensed Geologist or Professional Engineer licensed in North Carolina. Include on each boring the SPT blow counts and N-values at each depth, depth of the boring, and a general description of the soil types encountered.

Borings that cannot be easily related 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 r this project.

(2) Standard Foundation Determination

Use the following method for determining the Design N-value:

$$N_{AVG} = \frac{(N@1' + N@2.5' + \dots + N@Deepest \text{ Boring Depth})}{\text{Total Number of N-values}}$$

$$Y = (N@1')^2 + (N@2.5')^2 + \dots + (N@Deepest \text{ Boring Depth})^2$$

$$Z = (N@1' + N@2.5' + \dots + N@Deepest \text{ Boring Depth})$$

$$N_{STD \text{ DEV}} = \left[\frac{(\text{Total Number of N-values} \times Y) - Z^2}{(\text{Total Number of N-values}) \times (\text{Total Number of N-values} - 1)} \right]^{0.5}$$

Design N-value equals lesser of the following two conditions:

$$N_{AVG} - (N_{STD \text{ DEV}} \times 0.45)$$

Or

$$\text{Average of First Four N-Values} = \frac{(N@1' + N@2.5' + N@5' + N@7.5')}{4}$$

Note: If less than four 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 for weight of hammer or weight of rod. If N-value is greater than 50, reduce N-value to 50 for calculations.

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Submit completed boring logs collected in accordance with Section 2 (Soil Test) above 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, contact the Engineer.

- The Design N-value is less than four.
- The drilled pier length, “L”, is greater than the depth of the corresponding boring.

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.

If assistance is needed, contact the Engineer.

(3) Non-Standard Foundation Design

Design non-standard foundations based upon site-specific soil test information collected in accordance with Section 2 (Soil Test) above. Design drilled piers for side resistance only in accordance with Section 4.6 of the *AASHTO Standard Specifications for Highway Bridges*. Use the computer software LPILE version 5.0 or later manufactured by Ensoft, Inc. to analyze drilled piers. Use the computer software gINT version 8.0 or later manufactured by Bentley Systems, Inc. with the current NCDOT gINT library and data template to produce SPT boring logs. Provide a drilled pier foundation for each pole with a length and diameter that result in a horizontal lateral movement of less than 1 inch at the top of the pier and a horizontal rotational movement of less than 1 inch at the edge of the pier. Submit and gain approval of foundation designs including drawings, calculations, and soil boring before construction. Foundations installed without prior approval may be rejected.

10.4. CONSTRUCTION METHODS

(A) CCTV Metal Pole Foundations

Construct drilled pier foundations and install anchor rod assemblies in accordance with the *Foundations and Anchor Rod Assemblies for Metal Poles* provision (SP09-R005) located on the Department’s 2012 Standard Specifications and Provisions website:

<https://connect.ncdot.gov/resources/Specifications/Pages/Specifications-and-Special-Provisions.aspx>

(B) CCTV Metal Poles

Erect CCTV metal poles only after concrete has attained a minimum allowable compressive strength of 3000 psi. Final approval of foundation is contingent upon concrete achieving a compressive strength of 4,500 psi strength as required by *Foundations and Anchor Rod Assemblies for Metal Poles* provision. Connect poles to grounding electrodes and bond them to the electrical service grounding electrodes.

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For holes in the poles used to accommodate cables, install grommets before wiring pole or arm. Do not cut or split grommets.

Attach the hand hole covers to the pole by a sturdy chain or cable. Ensure the chain or cable is long enough to permit the cover to hang clear of the opening when the cover is removed, and is strong enough to prevent vandalism. Ensure the chain or cable will not interfere with service to the cables in the pole.

Attach cap to pole with a sturdy chain or cable. Ensure the chain or cable is long enough to permit the cap to hang clear of the opening when the cap is removed.

Perform repair of damaged galvanizing that complies with the *Standard Specifications*, Article 1076-6 "Repair of Galvanizing".

Install galvanized wire mesh around the perimeter of the base plate to cover the gap between the base plate and top of foundation for debris and pest control.

Install a 1/4" thick plate for concrete foundation tag to include: concrete grade, depth, diameter, and reinforcement sizes of the installed foundation.

Install CCTV metal poles, hardware, and fittings as shown on the manufacturer's installation drawings. Install poles so that when the pole is fully loaded it is within .5 degrees of vertical.

(C) CCTV Lowering System

Install a CCTV lowering device on all 70 ft. poles as specified herein and at locations shown in the Plans. Ensure that the lowering device provides the electrical connections between the control cabinet and the equipment installed on the lowering device without reducing the function or effectiveness of the equipment installed on the lowering device or degrading the overall system in any way. Locate the stainless steel lowering cable inside conduit within the pole to avoid cable twisting and ensure that only the lowering cable is in motion inside the pole when the lowering device is operated. Ensure that all other cables remain stable and secure during lowering and raising operations.

Weights and/or counterweights shall be provided to assure the alignment for the camera connection can be raised into position without binding and that it can be lowered properly, unless otherwise approved by the Engineer. Ensure that the divided support arm and receiver brackets self-align the contact unit with the pole centerline during installation and that the contact unit cannot twist when subjected to the wind speed requirement as specified by the AASHTO Specifications. Supply internal conduit in the pole for the power, data, and video cabling to the CCTV only for camera lowering device locations

All pulleys installed for the lowering device and portable lowering tool must have sealed self-lubricated bearings, oil-tight bronze bearings, or sintered bronze bushings.

Provide 1.25-inch-diameter PVC conduit in the pole for the lowering cable. Verify that a conduit mount adapter is furnished for the interface between the conduit and the internal back side of the lowering device.

10.5. MEASUREMENT AND PAYMENT

CCTV metal pole () will be measured and paid as the actual number of CCTV metal poles of each height furnished, installed and accepted.

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CCTV camera lowering system will be measured and paid as the actual number of CCTV camera lowering systems furnished, installed and accepted. The cost to furnish and install the internal conduits shall be included in the cost of the CCTV metal pole.

Portable CCTV lowering tool will be measured and paid as the actual number of portable CCTV lowering tools, furnished, tested and accepted.

Soil test will be measured and paid as the actual number of soil tests with SPT borings performed, furnished and accepted.

Drilled pier foundation will be measured and paid as the actual volume of concrete poured in cubic yards that is furnished, installed and accepted. The cost of the foundation anchor rods shall be incidental to the cost of the drilled pier foundations

No measurement will be made for CCTV metal pole designs and drilled pier foundation designs, as these will be considered incidental to furnishing and installing CCTV Metal Poles and Drilled Pier Foundations.

No measurement will be made for conduits installed inside the CCTV Metal Pole for the CCTV camera lowering device cables, data cables, and power cables, as these will be considered incidental to furnishing and installing CCTV Metal Poles.

Payment will be made under:

Pay Item	Pay Unit
CCTV Metal Pole (70')	Each
CCTV Metal Pole (50')	Each
CCTV Camera Lowering System	Each
Portable CCTV Lowering Tool	Each
Soil Test	Each
Drilled Pier Foundation	Cubic Yard

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11. DYNAMIC MESSAGE SIGN (DMS)

11.1. DESCRIPTION

DMSs used on the State Highway System shall be preapproved on the current NCDOT ITS & Signals 2012 Qualified Products List (QPL) by the date of installation. DMSs not preapproved will not be allowed for use on the project. To ensure compatibility with the existing DMS Control Software deployed in the State, furnish NTCIP compliant DMSs that are fully compatible with Daktronics, Inc. Vanguard Version 4 software (also referred to hereinafter as the "Control Software"). The QPL is available on the Department's website. The QPL website is:

<https://connect.ncdot.gov/resources/safety/Pages/default.aspx>

Furnish and install DMSs compliant with UL standards 48, 50, 879, and 1433.

Add and configure the new DMSs in the system using the Control Software and computer system. Furnish, install, test, integrate and make fully operational the new DMSs at locations shown in the Plans.

Furnish operating DMS systems consisting of, but not limited to, the following:

- Full Matrix, 27 pixel high and 90 pixels wide LED DMS
- DMS mounting hardware
- DMS controllers, Uninterruptible Power Supplies (UPS), cabinets and accessories with interconnect and power cabling and conduit
- Branch circuit conductors and related equipment
- All other equipment and incidentals required for furnishing, installing, and testing the DMS system and system components

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

11.2. MATERIALS

(A) Environmental Requirements

Construct the DMS and DMS controller cabinet so the equipment within is protected against moisture, dust, corrosion, and vandalism.

Design the DMS system to comply with the requirements of Section 2.1 (Environmental and Operating Standards) of NEMA TS 4-2005.

(B) Full Matrix LED Dynamic Message Sign (DMS)

Construct the DMS to display at least three lines of text that, when installed, are clearly visible and legible to a person with 20/20 corrected vision from a distance of 900 feet in advance of the DMS at an eye height of 3.5 feet along the axis.

When displaying three lines, each line must display at least 15 equally spaced and equally sized alphanumeric individual characters. Each character must be at least 18 inches in height and composed from a luminous dot matrix. Provide an entire LED matrix that is a minimum of 27 pixels high and 90 pixels wide.

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Comply with the requirements of Section 3 (Sign Mechanical Construction) of NEMA TS 4-2005 as it applies to walk-in enclosures. The following requirements complement TS 4-2005.

Construct the DMS with a metal walk-in enclosure excluding the face. Provide an aluminum walking platform inside the enclosure that is at least 28 inches wide. Ensure the width of the walking platform is free of obstructions to a height of 7 feet. Construct the enclosure of welded aluminum type 6061-T6, 5052-H38, 5052-H34, or of an Engineer approved alternate at least 1/8-inch thick. Perform all welding of aluminum and aluminum alloys in accordance with the latest edition of AWS D1.2, Structural Welding Code - Aluminum. Continuously weld the seams using Gas Metal Arc Welding (GMAW).

Provide all exterior and interior DMS enclosure surfaces with natural, mill-finish aluminum. Remove all grind marks and discoloration from the surfaces.

Provide corrosion resistant nuts, bolts, washers, and other mounting and bonding parts and components used on the exterior of the DMS enclosure and ensure they are sealed against water intrusion.

Provide one key lockable, hinged, gasket-sealed inspection door for service and maintenance along each side of the enclosure. Install one appropriately sized fire extinguisher within 12 inches of each maintenance door. Equip the DMS enclosure with internal fluorescent lighting controlled by timers installed close to each inspection door. Make certain no light emitted from the fluorescent tubes or any other light source inside the enclosure not comprising the display is leaked to the outside of the enclosure. Equip the door with a door-hold-open device. Install GFCI duplex utility receptacles every 6 feet along the width of the DMS in convenient locations for powered service tools.

Do not place a manufacturer name, logo, or other information on the front face of the DMS or shield visible to the motorist.

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

Do not paint the stainless steel bolts on the Z-bar assemblies used for mounting the enclosure.

(2) DMS Interior Environment Control

Design the local field controller to monitor and control the interior DMS environment. Design environmental control to maintain the internal DMS temperature within +/- 10° F of the outdoor ambient temperature. Provide the DMS environmental control system with four primary subsystems as follows:

Internal Temperature Sensors – Provide the DMS with two internally mounted temperature sensors which are equipped with external thermocouples and which the field controller continuously monitors. Design the field controller to use this temperature information to determine when to activate and deactivate the environmental control systems described herein. Locate sensors on opposite ends of the upper 1/3 of the LED display matrix with their external thermocouples attached to and making contact with an LED pixel circuit board. Design the

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thermocouple and LED board to be easily detachable, in the event that one of the units requires removal and replacement. Provide sensors capable of measuring temperatures from -40° F to $+185^{\circ}$ F. Design the field controller to automatically shut down the LED display whenever one or both sensors indicates that LED board temperature has exceeded $+140^{\circ}$ F, and to automatically restart the LED display whenever the temperature falls below $+130^{\circ}$ F. Design both shutdown and re-start temperature thresholds to be user-programmable. Design the field controller to report sensor temperatures and DMS shutdown/re-start events to the DMS Control Software.

Housing Cooling System – Provide the DMS housing with a cooling system that circulates outside air into the DMS housing whenever the LED board temperature exceeds a user-programmable threshold. Provide this system with enough ventilation fans to exchange the internal DMS housing air volume at a minimum rate of two times per minute. Provide steel ball-bearing type fans. Mount fans in a line across the upper rear wall of the DMS housing to direct air out of the cabinet. Provide one filtered air intake port for each exhaust fan. Locate intake ports in a line across the lower rear wall of the DMS housing. Provide intake ports with a removable filter that will remove airborne particles measuring 500 microns in diameter and larger. Provide a filter that is of a size and style that is commercially readily available. Program the field controller to activate the DMS housing cooling system whenever the LED board temperature exceeds $+90^{\circ}$ F and to turn the cooling system off whenever LED board temperature falls below $+85^{\circ}$ F. On the DMS housing rear exterior wall, cover all air intake and exhaust ports on their top, front, and sides by an aluminum shroud fabricated from 0.090-inch aluminum sheeting. Taper the shrouds at the top. Securely fasten shrouds to the DMS housing, and provide gaskets at the interface to prevent water from entering the DMS. Design all air filters and fans to be removable from inside the DMS housing. Provide the DMS housing cooling system with an adjustable timer that will turn fans off after the set time has expired. Provide a timer that is adjustable to at least 4 hours, and locate it just inside the DMS housing door, within easy reach of a maintenance technician standing outside the DMS doorway.

LED Display Cooling System – Provide the DMS with an LED display cooling system which directs air across the LED display modules whenever LED board temperature exceeds a user-programmable threshold. Direct fan-forced air vertically across the backside of the entire LED display matrix using multiple ball-bearing fans. Program the field controller to activate the LED cooling fan system whenever LED board temperature exceeds $+90^{\circ}$ F and to deactivate the system whenever LED board temperature falls to $+85^{\circ}$ F. Locate cooling fans so as not to hinder removal of LED display modules and driver boards.

Front Face Panel Defog/Defrost System – Provide the DMS with a defog/defrost system which circulates warm, fan-forced air across the inside of the polycarbonate front face whenever LED board temperature falls below a user-programmable threshold. Provide multiple steel ball-bearing fans that provide uniform airflow across the face panel. Program the field controller to activate the defog/defrost system whenever LED board temperature falls below $+40^{\circ}$ F and to deactivate the defog/defrost system whenever LED board temperature exceeds $+106^{\circ}$ F. Mount a 100-watt pencil-style heating element in front of each defog/defrost fan to warm the air directed across the DMS face. Design heating elements to be on only when the defog/defrost fans are on.

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Install additional fans and/or heaters as needed to maintain the temperature inside the DMS enclosure within the operating temperature range of the equipment within the DMS enclosure as recommended by the equipment manufacturer(s).

(3) Front Panel

Protect the DMS face with contiguous, weather-tight, removable panels. These panels must be a polycarbonate material that are ultraviolet protected, have an antireflection coating, and are a minimum of 1/8- inch thick.

Furnish polycarbonate panels with the following characteristics:

- Tensile Strength, Ultimate: 10,000 PSI
- Tensile Strength, Yield: 9,300 PSI
- Tensile Strain at Break: 125%
- Tensile Modulus: 330,000 PSI
- Flexural Modulus: 330,000 PSI
- Impact Strength, Izod (1/8", notched): 17 ft-lbs/inch of notch
- Rockwell Hardness: M75, R118
- Heat Deflection Temperature Under Load: 264 PSI at 270F and 66 PSI at 288F
- Coefficient of Thermal Expansion: 3.9×10^{-5} in/in/F
- Specific Heat: 0.30 BTU/lb/F
- Initial Light Transmittance: 85% minimum
- Change in Light Transmittance, 3 years exposure in a Southern latitude: 3%
- Change in Yellowness Index, 3 years exposure in a Southern latitude: less than 5%

For substitutes, submit one 12" x 12" sample of the proposed material together with a description of the material attributes to the Engineer for review and approval. Install a .09" aluminum mask on the front of the panel (facing the motorists) that contains a circular opening for each LED pixel. Prime and coat the front side of the aluminum mask, which faces the viewing motorists, with automotive-grade flat black acrylic enamel paint or an approved equivalent. Guarantee all painted surfaces provide a minimum outdoor service life of 20 years.

Design the panels so they will not warp nor reduce the legibility of the characters. Differential expansion of the DMS housing and the front panel must not cause damage to any DMS component or allow openings for moisture or dust. Glare from sunlight, roadway lighting, commercial lighting, or vehicle headlights must not reduce the legibility or visibility of the DMS. Install the panels so that a maintenance person can easily remove or open them for cleaning.

(4) Display Modules

Manufacture each display module with a standard number of pixels, not to exceed an array of 9 x 5, which can be easily removed. Assemble the modules onto the DMS assemblies contiguously to form a continuous matrix to display the required number of lines, characters, and character height.

Design display modules that are interchangeable and replaceable without using special tools. Provide plug-in type power and communication cables to connect to a display module.

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Construct each display module as a rectangular array of 5 horizontal pixels by 7 to 9 vertical pixels. Provide the module with an equal vertical and horizontal pitch between pixels, and columns that are perpendicular to the rows (i.e., no slant). Design each module to display:

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

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

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

(5) Discrete LEDs

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

Provide LEDs that are untinted, non-diffused, high output solid state lamps utilizing indium gallium aluminum phosphide (InGaAlP) technology. Provide T1 3/4, 0.2 inch size LEDs that emit a true amber color at a wavelength of 590 ± 5 nm.

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

Obtain the LEDs used in the display from a single LED manufacturer that have a single part number. Obtain them from batches sorted for luminous output, where the highest luminosity LED is not more than fifty percent more luminous than the lowest luminosity LED when the LEDs are driven at the same forward current. Do not use more than two successive and overlapping batches in the LED display. Document the procedure to be used to comply with this requirement as part of the material submittal.

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

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

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

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

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Power the LED Display by means of multiple regulated switching DC power supplies that operate from 120 volts AC input power and have an output of 48 volts DC or less. Wire the supplies in a redundant parallel configuration that uses multiple power supplies per display. Provide the supplies with current sharing capability that allows equal amounts of current to their portion of the LED display. Provide power supplies rated such that if one supply fails the remaining supplies will be able to operate their portion of the display under full load conditions (i.e. all pixels on at maximum brightness) and at a temperature of 140° F.

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

Design the field controller to monitor the operational status (normal or failed) of each individual power supply and be able to display this information on the client computer screen.

(7) LED Pixels

A pixel is defined as the smallest programmable portion of a display module that consists of a cluster of closely spaced discrete LEDs. Design each pixel to be a maximum of 2 inches in diameter.

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

Ensure each pixel produces a luminous intensity of 40 Cd when driven with an LED drive current of 20 mA per string.

Power the LEDs in each pixel in strings. Use a redundant design so that the failure of an LED in one string does not affect the operation of any other string within the pixel. Provide the sign controller with the ability to detect the failure of any LED string and identify which LED string has failed. Submit a complete schematic of the LED power and driver circuits with the material submittals.

(8) Character Display

Design display modules to be easily removable without the use of tools. Position cooling fans so they do not prevent removal of an LED pixel board or driver board.

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

Design the controller to automatically detect failed LED strings or drivers and initiate a report of the event to the Control Software. Design the controller to be able to read the internal

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temperature of the DMS enclosure and the ambient temperature outside the DMS enclosure and report these to the Control Software.

(9) Display Capabilities

Design the DMS with at least the following message displays:

- Static display
- Flashing display with Dynamic flash rates
- At least two alternating Static and / or Flashing sequences (multi-page messages)

(10) DMS Mini Controller

Furnish and install a mini controller inside the DMS that is interconnected with the main controller using a fiber optic cable, CAT-5 cable, or an approved alternate. The mini controller will enable a technician to perform all functions available from the main controller. Provide the mini controller with an LCD/keypad interface. Size the LCD display screen to allow preview of an entire one-page message on one screen. Provide a 4 X 4 keypad.

Alternatively, install an EIA/TIA-232E port inside the DMS enclosure to enable a maintenance technician to communicate with the DMS main controller and obtain access to and perform all functions of the main controller using a laptop computer.

(C) DMS Enclosure Structure Mounting

Mount the DMS enclosure and interconnect system securely to the pedestal mount support structures. Design the DMS enclosure supports to allow full access to the DMS enclosure inspection door.

Furnish and install U-bolt connections of hanger beams to overhead assembly truss chords with a double nut at each end of the U-bolt. Bring the double nuts tight against each other by the use of two wrenches.

Submit plans for the DMS enclosure, mounting description and calculations to the Engineer for approval. Have such calculations and drawings approved by a Professional Engineer registered in the state of North Carolina, and bear his signature, seal, and date of acceptance.

Provide removable lifting eyes or the equivalent on the DMS enclosure rated for its total weight to facilitate handling and mounting the DMS enclosure.

Design the DMS structure to conform to the applicable requirements of the *Standard Specifications for Structural Supports for Highway Signs, Luminaires*, and the section titled "DMS Assemblies" of these Project Special Provisions.

(D) DMS / DMS Controller Interconnect

Furnish and install all necessary cabling, conduit, and terminal blocks to connect the DMS and the DMS controller. Use approved manufacturer's specifications and the Plans for cable and conduit types and sizes. Use fiber optic cable to interconnect sign and controller. Install fiber optic interconnect centers in the sign enclosure and cabinet to securely install and terminate the fiber optic cable. Submit material submittal cut sheets for the interconnect center.

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Furnish and install one DMS controller with accessories per DMS in a new equipment cabinet. Mount the new controller cabinets on the respective DMS support structure. Install cabinet so that the height from the ground to the middle of the cabinet is 4 feet. Ensure a minimum of 3 feet level working surface under each cabinet that provides maintenance technicians with a safe working environment.

Provide the DMS controller as a software oriented microprocessor and with resident software stored in non-volatile memory. The Control Software, controller and communications must comply with the NTCIP Standards identified in these Project Special Provisions. Provide sufficient non-volatile memory to allow storage of at least 500 multi-page messages and a test pattern program.

Furnish the controller cabinet with, but not limited to, the following:

- Power supply and distribution assemblies
- Power line filtering hybrid surge protectors
- Radio Interference Suppressor
- Communications surge protection devices
- Industrial-Grade UPS system and local disconnect
- Microprocessor based controller
- Display driver and control system (unless integral to the DMS)
- Industrial-grade dial-up modem and interface cable
- Industrial-grade telephone line surge and lightning protector
- Serial interface port for local laptop computer
- Local user interface
- Interior lighting and duplex receptacle
- Adjustable shelves as required for components
- Temperature control system
- All interconnect harnesses, connectors, and terminal blocks
- All necessary installation and mounting hardware

Furnish the DMS controller and associated equipment completely housed in a NEMA 3R cabinet made from 5052-H32 sheet aluminum at least 1/8" thick. Use natural aluminum cabinets. Perform all welding of aluminum and aluminum alloys in accordance with the latest edition of AWS D1.2, Structural Welding Code - Aluminum. Continuously weld the seams using Gas Metal Arc Welding (GMAW).

Slant the cabinet roof away from the front of the cabinet to prevent water from collecting on it.

Do not place a manufacturer name, logo, or other information on the faces of the controller cabinet visible to the motorist.

Provide cabinets capable of housing the components and sized to fit space requirement. Design the cabinet layout for ease of maintenance and operation, with all components easily accessible. Submit a cabinet layout plan for approval by the Engineer.

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Locate louvered vents with filters in the cabinet to direct airflow over the controller and auxiliary equipment, and in a manner that prevents rain from entering the cabinet. Fit the inside of the cabinet, directly behind the vents, with a replaceable, standard size, commercially available air filter of sufficient size to cover the entire vented area.

Provide a torsionally rigid door with a continuous stainless steel hinge on the side that permits complete access to the cabinet interior. Provide a gasket as a permanent and weather resistant seal at the cabinet door and at the edges of the fan / exhaust openings. Use a non-absorbent gasket material that will maintain its resiliency after long-term exposure to the outdoor environment. Construct the doors so that they fit firmly and evenly against the gasket material when closed. Provide the cabinet door with louvered vents and air filters near the bottom as described in the paragraph above.

The cabinet shall contain a full-height standard EIA 19-inch rack. The rack shall be secured within the cabinet by mounts at the top and bottom.

The rack shall contain a minimum of one (1) pullout drawer. The drawer shall be suitable for storing manuals and small tools, such as screwdrivers. The drawer shall be able to latch in the out position to function as a laptop/utility shelf.

Provide a convenient location on the inside of the door to store the cabinet wiring diagrams and other related cabinet drawings. Provide a Corbin #2 main door lock made of non-ferrous or stainless steel material. Key all locks on the project alike, and provide 10 keys to the Engineer. In addition, design the handle to permit pad-locking.

Provide the interior of the cabinet with ample space for housing the controller and all associated equipment and wiring; use no more than 75% of the useable space in the cabinet. Provide ample space in the bottom of the cabinet for the entrance and exit of all power, communications, and grounding conductors and conduit.

Arrange the equipment so as to permit easy installation of the cabling through the conduit so that they will not interfere with the operation, inspection, or maintenance of the unit. Provide adjustable metal shelves, brackets, or other support for the controller unit and auxiliary equipment. Leave a 3 inch minimum clearance from the bottom of the cabinet to all equipment, terminals, and bus bars.

Provide power supply monitoring circuitry to detect power failure and to automatically report the occurrence to the Control Software.

Install two 15-watt fluorescent light strips with shields, one in the top of the cabinet and the other under the bottom shelf. Design both lights to automatically turn on when the cabinet door is opened and turn off when the door closes.

Mount and wire a 120V ($\pm 10\%$) GFCI duplex receptacle of the 3-wire grounding type in the cabinet in a location that presents no electrical hazard when used by service personnel for the operation of power tools and work lights.

No cabinet resident equipment may utilize the GFCI receptacle. Furnish one spare non-GFCI receptacle for future equipment.

Mount a bug-proof and weatherproof thermostatically controlled fan and safety shield in the top of the cabinet. Size the fan to provide at least for two air exchanges per minute. Fuse the fan

at 125% of the capacity of the motor. The magnetic field of the fan motor must not affect the performance of the control equipment. Use a fan thermostat that is manually adjustable to turn on between 80°F and 160°F with a differential of not more than 10°F between automatic turn-on and turn-off. Mount it in an easily accessible location, but not within 6 inches of the fan.

Install additional fans and/or heaters as needed to maintain the temperature inside the cabinet within the operating temperature range of the equipment within the cabinet as recommended by equipment manufacturer(s).

Furnish one spare DMS controller for emergency restoration.

(1) Wiring

The requirements stated herein apply wherever electrical wiring is needed for any DMS system assemblies and subassemblies such as controller cabinet, DMS enclosure, electrical panel boards and etc.

Neatly arrange and secure the wiring inside the cabinet. Where cable wires are clamped to the walls of the control cabinet, provide clamps made of nylon, metal, plastic with rubber or neoprene protectors, or similar. Lace and jacket all harnesses, or tie them with nylon tie wraps spaced at 6 inches maximum to prevent separation of the individual conductors.

Individually and uniquely label all conductors. Ensure all conductor labels are clearly visible without moving the conductor. Connect all terminal conductors to the terminal strip in right angles. Remove excess conductor before termination of the conductor. Mold the conductor in such a fashion as to retain its relative position to the terminal strip if removed from the strip. Do not run a conductor across a work surface with the exception of connecting to that work surface. No conductor bundles can be support by fasteners that support work surfaces. Install all connectors, devices and conductors in accordance to manufactures guidelines. Comply with the latest NEC guideline in effect during installation. No conductor or conductor bundle may hang loose or create a snag hazard. Protect all conductors from damage. Ensure all solder joints are completed using industry accepted practices and will not fail due to vibration or movement. Protect lamps and control boards from damage.

No splicing will be allowed for feeder conductors and communication cables from the equipment cabinet to the DMS enclosure.

Insulate all conductors and live terminals so they are not hazardous to maintenance personnel.

Route and bundle all wiring containing line voltage AC and / or shield it from all low voltage control circuits. Install safety covers to prevent accidental contact with all live AC terminals located inside the cabinet.

Use industry standard, keyed-type connectors with a retaining feature for connections to the controller.

Label all equipment and equipment controls clearly.

Supply each cabinet with one complete set of wiring diagrams that identify the color-coding or wire tagging used in all connections. Furnish a water-resistant packet adequate for storing wiring diagrams, operating instructions, and maintenance manuals with each cabinet.

(2) Power Supply and Circuit Protection

Design the DMS and controller for use on a system with a line voltage of $120V \pm 10\%$ at a frequency of $60 \text{ Hz} \pm 3 \text{ Hz}$. Under normal operation, do not allow the voltage drop between no load and full load of the DMS and its controller to exceed 3% of the nominal voltage.

Blackout, brownout, line noise, chronic over-voltage, sag, spike, surge, and transient effects are considered typical AC voltage defects. Protect the DMS system equipment so that these defects do not damage the DMS equipment or interrupt their operation. Equip all cabinets with devices to protect the equipment in the cabinet from damage due to lightning and external circuit power and current surges.

(3) Circuit Breakers

Protect the DMS controller, accessories, and cabinet utilities with thermal magnetic circuit breakers. Provide the controller cabinet with a main circuit breaker sized according to the NEC. Use appropriately sized branch circuit breakers to protect the controller and accessories and for servicing DMS equipment and cabinet utilities.

(4) Surge Suppressor

Install and clearly label filtering hybrid power line surge protectors on the load side of the branch circuit breakers in a manner that permits easy servicing. Ground and electrically bond the surge protector to the cabinet within 2 inches.

Provide power line surge protector that meets the following requirements:

Peak surge current occurrences	20 minimum
Peak surge current for an 8 x 20 microsecond waveshape	50,000 amperes
Energy Absorption	> 500 Joules
Clamp voltage	240 volts
Response time	<1 nanosecond
Minimum current for filtered output	15 amperes for 120VAC*
Temperature range	-40°F to +158°F

*Capable of handling the continuous current to the equipment

(5) Radio Interference Suppressor

Provide each controller cabinet with sufficient electrical and electronic noise suppression to enable all equipment in it to function properly. Provide one or more radio interference suppressors (RIS) connected between the stages of the power line surge suppressor that minimize interference generated in the cabinet in both the broadcast and the aircraft frequencies. Each RIS must provide a minimum attenuation of 50 decibels over a frequency range of 200 KHz to 75 MHz. Clearly label the suppressor(s) and size them at least at the rated current of the main circuit breaker but not less than 50 amperes.

Provide RIS that are hermetically sealed in a substantial metal case which is filled with a suitable insulating compound and have nickel-plated 10/24 brass stud terminals of sufficient

external length to provide space to connect #8 AWG wires. Mount them so that the studs cannot be turned in the case. Properly insulate ungrounded terminals from each other, and maintain a surface linkage distance of not less than ¼” between any exposed current conductor and any other metallic parts. The terminals must have an insulation factor of 100-200 MΩ, dependent on external circuit conditions. Use RIS designed for 120 VAC \pm 10%, 60Hz, and which meet the standards of UL and the Radio Manufacturers Association.

(6) Communications Surge Protector

Equip the cabinet with properly labeled hybrid data line surge protectors that meet the following general requirements:

Surge current occurrences at 2000 ampere, 8 x 20 microsecond waveform	> 80
Surge current occurrences at 400 ampere, 10x700 microsecond waveform	> 80
Peak surge current for 8 x 20 microsecond waveform	10,000 A (2500 A/line)
Peak surge current for 10x700 microsecond waveform	500 A/line
Response time	< 1 nanosecond
Series resistance	< 15 Ω
Average capacitance	1500 pF
Temperature range	-10°F to 150°F
Clamp Voltage	As required to match equipment in application

(7) Lightning Arrester

Protect the system with an UL-approved lightning arrester installed at the main service disconnect that meets the following requirements:

Type of design	Silicon Oxide Varistor
Voltage	120/240 Single phase, 3 wires
Maximum current	100,000 amps
Maximum energy	3000 joules per pole
Maximum number of surges	Unlimited
Response time one milliamp test	5 nanoseconds
Response time to clamp 10,000 amps	10 nanoseconds
Response time to clamp 50,000 amps	25 nanoseconds

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Leak current at double the rated voltage	None
Ground Wire	Separate

(8) Uninterruptible Power Supply (UPS)

Provide the cabinet with an industrial grade power conditioning UPS unit to supply continuous power to operate the equipment connected to it if the primary power fails. The UPS must detect a power failure and provide backup power within 20 milliseconds. Transition to the UPS source from primary power must not cause loss of data or damage to the equipment being supplied with backup power. Provide an UPS with at least three outlets for supplying conditioned AC voltage to the DMS controller and modem. Provide a unit to meet the following requirements:

- Input Voltage Range: 120VAC +12%, -25%
- Power Rating: 1000 VA, 700 Watts
- Input Frequency: 45 to 65 Hz
- Input Current: 7.2A
- Output Voltage: 120VAC +/- 3%
- Output Frequency: 50/60 +/-1 Hz
- Output Current: 8.3A
- Output Crest Factor Ration: @50% Load Up to 4.8:1, @75% Load Up to 3.2:1, @100% Load Up to 2.4:1
- Output THD: 3% Max. (Linear), 5% Max. (Non-Linear)
- Output Overload: 110% for 10 min; 200% for 0.05 sec.
- Output Dynamic Response: +/- 4% for 100% Step Load Change, 0.5 ms Recovery Time.
- Output Efficiency @ 100% Load: 90% (Normal Mode)
- Operating Temperature: -40 °F to +165 °F
- Humidity: 0% to 95% Non-condensing
- Remote Monitoring Interface: RS-232
- Protection: Input/Output Short Circuit, Input/Output Overload, Excessive Battery Discharge
- Specifications: UL1778, FCC Class A, IEEE 587

Provide the UPS unit capable of supplying 30 minutes of continuous backup power to the equipment connected to it when the equipment is operating at full load.

Furnish one spare DMS UPS for emergency restoration.

(9) Controller Communications Interface

Provide the controller with the following interface ports:

- An EIA/TIA-232E port for remote communication using NTCIP
- An 10/100 Ethernet port for remote communication using NTCIP
- An EIA/TIA-232E port for onsite access using a laptop

- An EIA/TIA-232E auxiliary port for communication with a field device such as a UPS
- Fiber Optic ports for communication with the sign
- RJ45 ports for communication with the sign using CAT-5 cable
- RJ45 ports for communication with mini-controller located inside the sign enclosure

(10) Controller Local User Interface

Provide the controller with a Local User Interface (LUI) for at least the following functions:

- On / Off Switch: controls power to the controller.
- Control Mode Switch: for setting the controller operation mode to either remote or local mode.
- LCD Display and Keypad: Allow user to navigate through the controller menu for configuration (display, communications parameter, etc.) running diagnostics, viewing peripherals status, message creation, message preview, message activation, and etc. Furnish a LCD display with a minimum size of 240x64 dots with LED back light.

(11) Controller Address

Assign each DMS controller a unique address. Preface all commands from the Control Software with a particular DMS controller address. The DMS controller compares its address with the address transmitted; if the addresses match, then the controller processes the accompanying data.

(12) Controller Functions

Design the DMS controller to continuously control and monitor the DMS independent of the Control Software. Design the controller to display a message on the sign sent by the Control Software, a message stored in the sign controller memory, or a message created on-site by an operator using the controller keypad.

Provide the DMS controller with a watchdog timer to detect controller failures and to reset the microprocessor, and with a battery backed-up clock to maintain an accurate time and date reference. Set the clock through an external command from the Control Software or the Local User Interface.

(13) DMS Controller Memory

Furnish each DMS controller with non-volatile memory. Use the non-volatile memory to store and reprogram at least one test pattern sequence and 500 messages containing a minimum of two pages of 45 characters per page. The Control Software can upload messages into and download messages from each controller's non-volatile memory remotely.

Messages uploaded and stored in the controller's non-volatile memory may be erased and edited using the Control Software and the controller. New messages may be uploaded to and stored in the controller's non-volatile memory using the Control Software and the controller.

(14) Photoelectric Sensors

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

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

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

(F) Equipment List

Provide a general description of all equipment and all information necessary to describe the basic use or function of the major system components. Include a general "block diagram" presentation. Include tabular charts listing auxiliary equipment, if any is required. Include the nomenclature, physical and electrical characteristics, and functions of the auxiliary equipment unless such information is contained in an associated manual; in this case include a reference to the location of the information. Include an itemized list of equipment costs.

Include a table itemizing the estimated average and maximum power consumption for each major piece of equipment.

(G) Physical Description

Provide a detailed physical description of size, weight, center of gravity, special mounting requirements, electrical connections, and all other pertinent information necessary for proper installation and operation of the equipment.

(H) Parts List

Provide a parts list that contains all information needed to describe the characteristics of the individual parts, as required for identification. Include a list of all equipment within a group and a list of all assemblies, sub-assemblies, and replacement parts of all units. Arrange this data in a table, in alpha-numerical order of the schematic reference symbols, which gives the associated description, manufacturer's name, and part number, as well as alternate manufacturers and part numbers. Provide a table of contents or other appropriate grouping to identify major components, assemblies, etc.

(I) Character Set Submittal

Submit an engineering drawing of the DMS character set including 26 upper case and lower case letters, 10 numerals, an asterisk (*), a dash, a plus sign (+), a designated lane diamond, a slash, an ampersand, and arrows at 0, 45, 90, 135, 180, 225, 270, and 315 degrees.

(J) Wiring Diagrams

Provide a wiring diagram for each DMS and each controller cabinet, as well as interconnection wiring diagrams for the system as a whole.

Provide complete and detailed schematic diagrams to component level for all DMS assemblies and subassemblies such as driver boards, control boards, DMS controller, power

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supplies, and etc. Ensure that each schematic enables an electronics technician to successfully identify any component on a board or assemblies and trace its incoming and outgoing signals.

(K) Routine of Operation

Describe the operational routine, from necessary preparations for placing the equipment into operation to securing the equipment after operation. Show appropriate illustrations with the sequence of operations presented in tabular form wherever applicable. Include in this section a total list of the test instruments, aids and tools required to perform necessary measurements and measurement techniques for each component, as well as set-up, test, and calibration procedures.

(L) Maintenance Procedures

Specify the recommended preventative maintenance procedures and checks at pre-operation, monthly, quarterly, semi-annual, annual, and "as required" periods to assure equipment operates reliably. List specifications (including tolerances) for all electrical, mechanical, and other applicable measurements and / or adjustments.

(M) Repair Procedures

Include in this section all data and step-by-step procedures necessary to isolate and repair failures or malfunctions, assuming the maintenance technicians are capable of analytical reasoning.

Describe accuracy, limits, and tolerances for all electrical, physical, or other applicable measurements. Include instructions for disassemblies, overhaul, and re-assemblies, with shop specifications and performance requirements.

Give detailed instructions only where failure to follow special procedures would result in damage to equipment, improper operation, danger to operating or maintenance personnel, etc. Include such instructions and specifications only for maintenance that specialized technicians and engineers in a modern electromechanical shop would perform. Describe special test set-up, component fabrication, and the use of special tools, jigs, and test equipment.

(N) Field Trial

At the request of the Engineer, supply a three character demonstration module with characters of the size and type specified for the project, an appropriate control device and power supply to allow character display within 30 working days of the request. Perform a field trial on this module at a time and location selected by the Engineer.

This trial will allow the Engineer or his selected representatives to test the readability of the DMS at the maximum distance required for specified character size. Test the module with the sun directly above the DMS, and near the horizon in front of and behind the DMS (washout and back-lit conditions).

11.3. PORTABLE CHANGEABLE MESSAGE SIGN (CMS)

Provide a trailer-mounted portable changeable message sign that is solar-powered and compatible with similar units currently in use by the Triad Region. The units currently in use are VerMac PCMS 1500. Comply with Article 1089-7 of the *Standard Specifications*. Equip the changeable message sign with cellular communications service that enables communications between the workstations in the TRTMC and the portable CMS. Provide and maintain a cellular

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communications service agreement for each portable CMS for the duration of the project. The portable changeable message sign must be able to communicate with and be controllable from the TRTMC using the Department's existing Vanguard software. Provide a warranty for all CMS parts and materials that extends to the project completion date as a minimum .

11.4. CONSTRUCTION METHODS

(A) Description

This article establishes practices and procedures and gives minimum standards and requirements for the installation of Dynamic Message Sign systems, auxiliary equipment and the construction of related structures.

Provide electrical equipment described in this specification that conforms to the standards of NEMA, UL, or Electronic Industries Association (EIA), wherever applicable. Provide connections between controllers and electric utilities that conform to NEC standards. Express wire sizes according to the American Wire Gauge (AWG).

Provide stainless steel screws, nuts, and locking washers in all external locations. Do not use self-tapping screws unless specifically approved by the Engineer. Use parts made of corrosion resistant materials, such as plastic, stainless steel, brass, or aluminum. Use construction materials that resist fungus growth and moisture deterioration. Separate dissimilar metals by an inert dielectric material.

(B) Existing D7-DMS 9

Remove existing D7-DMS 38 from its existing location and reinstall it on a new overhead DMS assembly at a new location on the project as shown in the Plans according to the following sequence of work:

- (1) Prior to deactivation of D7-DMS 9 at its existing location, install a trailer mounted solar powered changeable message sign and establish wireless communications with the TRTMC. Locate the portable CMS in the vicinity of the existing D7 DMS 9 as approved by the Engineer. Assist the Department with the integration of the portable CMS and establishing communications with the CMS.
- (2) Prior to deactivating and removing the existing DMS, test the functionality of the existing DMS to verify all existing equipment is in satisfactory working order. Report all defective and damaged equipment to the Engineer so as not to be held responsible for said defects or damage. Identify, label and take digital photographs of all field wiring in the existing DMS cabinet prior to disconnecting any field wiring to facilitate reinstallation at new location.
- (3) Activate portable CMS, then deactivate existing DMS and disconnect electrical power service. Remove the existing DMS, DMS cabinet and DMS equipment housed therein and package for transporting. Do not deactivate and remove the existing CMS until the portable CMS is fully integrated and communicating effectively with the TRTMC.
- (4) Transport the removed DMS, DMS equipment cabinet and all equipment housed therein to a Contractor-provided storage facility. Provide a secure, indoor storage

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facility that protects the removed and stored equipment from inclement weather, theft and vandalism. .

- (5) Remove and dispose of the existing DMS assembly and its foundations and the DMS cabinet foundation.
- (6) Maintain the CMS during the period the existing DMS is out of service.
- (7) Erect new DMS assembly at proposed location, construct DMS cabinet foundation, establish new electrical service to the DMS cabinet. Reinstall existing DMS on new DMS assembly, reinstall DMS equipment cabinet on new foundation and connect all wires and cables per original installation to restore operation of the DMS. Connect the DMS to the fiber-optic communications network.
- (8) Retest the completed DMS sign, sign controller and other equipment as described in the "DMS Testing Requirements" of these Project Special Provisions.
- (9) Deliver the portable changeable message sign complete to the TRTMC and transfer ownership to the Department.

The Contractor shall be responsible for repairing or replacing any existing components that become damaged, defective, or inoperable while the equipment is in the Contractor's care from the time the sign is removed until the time it is reinstalled in new location, tested and accepted.

(C) Layout

The Engineer will establish the actual location of each Dynamic Message Sign assemblies. It is the Contractor's responsibility to ensure proper elevation, offset, and orientation of all DMS assemblies. The location of service poles as well as conduit lengths shown in the Plans, are approximate based on available project data. Make actual field measurements to place conduit and equipment at the required location.

(D) Construction Submittal

When the work is complete, submit "as built" plans, inventory sheets, and any other data required by the Engineer to show the details of actual construction and installation and any modifications made during installation.

The "as built" plans will show: the DMS, controller, and service pole locations; DMS enclosure and controller cabinet wiring layouts; and wire and conduit routing. Show all underground conduits and cables dimensioned from fixed objects.

Include detailed drawings that identify the routing of all conductors in the system by cable type, color code, and function. Clearly label all equipment in the DMS system, controller cabinet, and DMS enclosure.

(E) Conduit

Install the conduit system in accordance with section 1715 of *Standard Specifications* and NEC requirements for an approved watertight raceway.

Make bends in the conduit so as not to damage it or change its internal diameter. Install watertight and continuous conduit with as few couplings as standard lengths permit.

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Clean conduit before, during, and after installation. Install conduit in such a manner that temperature changes will not cause elongation or contraction that might damage the system.

Attach the conduit system to and install along the structural components of the DMS structure assemblies with beam clamps or stainless steel strapping. Install strapping according to the strapping manufacturer's recommendations. Do not use welding or drilling to fasten conduit to structural components. Space the fasteners at no more than 4 feet for conduit 1.5 inches and larger or six feet for conduit smaller than 1.25 inches. Place fasteners no more than 3 feet from the center of bends, fittings, boxes, switches, and devices.

Flexible conduit will only be allowed when the conduits transition from the horizontal structure segment to the horizontal truss segment and from the horizontal truss segment to the rear entrance of the DMS when installing the DMS communications and feeder cables. The maximum length of flexible conduit allowed at each transition will be 5 feet.

Locate underground conduit as shown in the Plans in a manner consistent with these Project Special Provisions.

Do not exceed the appropriate fill ratio on all cable installed in conduit as specified in the NEC.

(F) Wiring Methods

Do not pull permanent wire through a conduit system until the system is complete and has been cleaned.

Color-code all conductors per the NEC. Use approved marking tape, paint, sleeves or continuous colored conductors for No.8 AWG and larger. Do not mark a white conductor in a cable assemblies any other color.

Bury underground circuits at the depth shown in the Plans and surround it with at least 3 inches of sand or earth back-fill free of rocks and debris. Compact backfill in 6 inch layers. Do not splice underground circuits unless specifically noted in the Plans.

(G) Equipment and Cabinet Mounting

Mount equipment securely at the locations shown in the Plans, in conformance with the dimensions shown. Install fasteners as recommended by the manufacturer and space them evenly. Use all mounting holes and attachment points for attaching DMS enclosures and controller cabinets to the structures.

Drill holes for expansion anchors of the size recommended by the manufacturer of the anchors and thoroughly clean them of all debris.

Provide one key-operated, pin tumbler, dead bolt padlock, with brass or bronze shackle and case, conforming to Military Specification MIL-P-17802E (Grade I, Class 2, Size 2, Style A) for each electrical panel and switch on the project. Key all padlocks alike, and provide 10 keys to the Engineer.

Provide cabinets with all mounting plates, anchor bolts, and any other necessary mounting hardware in accordance with these Project Special Provisions and the Plans.

Seal all unused conduit installed in cabinets at both ends to prevent water and dirt from entering the conduit and cabinet with approved sealing material.

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Install a ground bushing attached inside the cabinet on all metal conduits entering the cabinet. Connect these ground bushings to the cabinet ground bus.

(H) Remove and Reinstall Existing DMS

Conduct a thorough and complete test of the existing DMS cabinet assembly for D7-DMS 38- on Business 40. Provide documentation to the Department prior to removal. Remove an existing overhead mounted DMS assembly and ground mounted DMS cabinet. Store the DMS and Cabinet assembly in a secure facility. Contractor assumes all responsibility for the condition of the equipment and restoring it to its condition prior to removal. The basis of the pre-removal condition will be the documentation provided to the Department. Reinstall and test the DMS as described in these Project Special Provisions using the procedures for a new installation.

(I) Work Site Clean-Up

Clean the site of all debris, excess excavation, waste packing material, wire, etc. Clean and clear the work site at the end of each workday. Do not throw waste material in storm drains or sewers.

11.5. MEASUREMENT AND PAYMENT

DMS will be measured and paid as the actual number of DMS furnished, installed, and accepted. Each DMS consists of a LED Dynamic Message Sign, communications equipment, strapping hardware, controller, UPS, controller cabinet, conduit, fittings, couplings, sweeps, conduit bodies, wire, flexible conduit, feeder conductors and communications cable between the controller cabinet and the DMS enclosure, connectors, circuit protection equipment, photo-electric sensors, spare DMS LED panels, spare DMS Controller, and spare DMS UPS, tools, materials, all related testing, cost of labor, cost of transportation, incidentals, and all other equipment necessary to furnish and install the DMS system.

DMS (remove and reinstall) will be measured and paid at the contract lump sum price. The price and payment will be full compensation for all work required to remove the existing DMS, DMS equipment cabinet and DMS equipment from their current location, store the removed equipment in a Contractor-provided secure indoor storage facility, and subsequently reinstalling the DMS and DMS cabinet at a new location on new DMS assembly and DMS cabinet foundation, and retesting the DMS. The DMS consists of a LED Dynamic Message Sign, communications equipment, strapping hardware, controller, UPS, controller cabinet, conduit, fittings, couplings, sweeps, conduit bodies, wire, flexible conduit, feeder conductors and communications cable between the controller cabinet and the DMS enclosure, connectors, circuit protection equipment, photo-electric sensors, tools, materials, all related testing, cost of labor, cost of transportation, incidentals, , and all other equipment necessary to remove and reinstall the DMS system. The lump sum work includes furnishing, installing and maintaining the solar-powered portable changeable message sign to replace the existing DMS while it is out of service, subsequently delivering the portable CMS to Regional ITS Office in Greensboro and transferring ownership to the Department. It also includes acquisition of cellular telephone service and service agreement, payment for cellular telephone service, providing warranties for parts and materials and assisting the Department with integrating the portable CMS.

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Removal and disposal of the existing DMS overhead support structure (i.e., DMS assembly) and its foundations will be measured and paid for as "Disposal of Support, Overhead Structure" in accordance with Section 907 of the *Standard Specifications*.

Payment will be made under:

Pay Item	Pay Unit
DMS	Each
DMS (Remove and Reinstall)	Lump Sum

12. NTCIP REQUIREMENTS

This section defines the detailed NTCIP requirements for the DMSs covered by these Project Special Provisions and Plans.

12.1. REFERENCES

This specification references several standards through their NTCIP designated names. The following list provides the full reference to the current version of each of these standards.

Implement the most recent version of the standard including any and all Approved or Recommended Amendments to these standards for each NTCIP Component covered by these Project Special Provisions.

Table 1: NTCIP Standards

Abbreviated Number	Full Number	Title
NTCIP 1101	NTCIP 1101:1997	<i>Simple Transportation Management Framework</i>
NTCIP 1201	NTCIP 1201:1997	<i>Global Object Definitions</i>
NTCIP 1203	NTCIP 1203:1997	<i>Object Definitions for Dynamic Message Signs</i>
NTCIP 2001	NTCIP 2001:1997	<i>Class B Profile</i>
NTCIP 2101	NTCIP 2101	<i>SP-PMPP/232 Subnet Profile for PMPP over RS-232</i>
NTCIP 2102	NTCIP 2102	<i>SP-PMPP/FSK Subnet Profile for PMPP over FSK Modem</i>
NTCIP 2103	NTCIP 2103	<i>SP-PPP/232 Subnetwork Profile for PPP over RS232 (Dial Up)</i>
NTCIP 2104	NTCIP 2104	<i>SP-Ethernet Subnet Profile for Ethernet</i>
NTCIP 2201	NTCIP 2201	<i>TP-Null</i>

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Abbreviated Number	Full Number	Title
		<i>Transport Profile</i>
NTCIP 2202	NTCIP 2202	<i>TP-Internet</i> <i>Internet Transport Profile</i> <i>(TCP/IP and UDP/IP)</i>
NTCIP 2301	NTCIP 2301	AP-STMF AP for Simple Transportation Management Framework

(A) General Requirements**(1) Subnet Level**

Ensure each serial port on each NTCIP Component supports NTCIP 2103 over a dial-up connection with a contractor provided external modem with data rates of 28.8 kbps, 19.2 kbps, 14.4 kbps, 9600 bps, 4800 bps, 2400 bps, 1200 bps, 600 bps, and 300 bps. Enable the NTCIP Component to make outgoing and receive incoming calls as necessary and support the following modem command sets:

- Hayes AT - Command Set
- MNP5
- MNP10
- V.42bis

Ensure each serial port on each NTCIP Component supports NTCIP 2103 over a null-modem connection with data rates of 19.2 kbps, 14.4 kbps, 9600 bps, 4800 bps, 2400 bps, 1200 bps, 600 bps, and 300 bps.

Ensure each serial port on each NTCIP Component supports NTCIP 2101 with data rates of 9600 bps, 4800 bps, 2400 bps, 1200 bps, 600 bps, and 300 bps.

Ensure NTCIP components support NTCIP 2102 and NTCIP 2104.

NTCIP Components may support additional Subnet Profiles at the manufacturer's option. At any one time, make certain only one Subnet Profile is active on a given serial port of the NTCIP Component. Ensure the NTCIP Component can be configured to allow the field technician to activate the desired Subnet Profile and provide a visual indication of the currently selected Subnet Profile.

(2) Transport Level

Ensure each NTCIP Component complies with NTCIP 2201 and 2202.

NTCIP Components may support additional Transport Profiles at the manufacturer's option. Ensure Response datagrams use the same Transport Profile used in the request. Ensure each

NTCIP Component supports the receipt of datagrams conforming to any of the identified Transport Profiles at any time.

(3) Application Level

Ensure each NTCIP Component complies with NTCIP 1101 and 2301 and meets the requirements for Conformance Level 1 (NOTE - See Amendment to standard).

Ensure each NTCIP Component supports SNMP traps. An NTCIP Component may support additional Application Profiles at the manufacturer's option. Ensure Responses use the same Application Profile used by the request. Ensure each NTCIP Component supports the receipt of Application data packets at any time allowed by the subject standards.

(4) Information Level

Guarantee each NTCIP Component provides Full, Standardized Object Range Support of all objects required by these Special Provisions unless otherwise indicated below. Make certain the maximum Response Time for any object or group of objects is 200 milliseconds.

Design the DMS to support all mandatory objects of all mandatory Conformance Groups as defined in NTCIP 1201 and NTCIP 1203. Table 2 indicates the modified object requirements for these mandatory objects.

Table 2: Modified Object Ranges for Mandatory Objects

Object	Reference	Project Requirement
ModuleTableEntry	NTCIP 1201 Clause 2.2.3	Contains at least one row with moduleType equal to 3 (software). The moduleMake specifies the name of the manufacturer, the moduleModel specifies the manufacturer's name of the component and the modelVersion indicates the model version number of the component.
MaxGroupAddresses	NTCIP 1201 Clause 2.7.1	At least 1
CommunityNamesMax	NTCIP 1201 Clause 2.8.2	At least 3
DmsNumPermanentMsg	NTCIP 1203 Clause 2.6.1.1.1.1	At least 1*
DmsMaxChangeableMsg	NTCIP 1203 Clause 2.6.1.1.1.3	At least 21
DmsFreeChangeableMemory	NTCIP 1203 Clause	At least 20 when no

Object	Reference	Project Requirement
	2.6.1.1.1.4	messages are stored.
DmsMessageMultiString	NTCIP 1203 Clause 2.6.1.1.1.8.3	The DMS supports any valid MULTI string containing any subset of those MULTI tags listed in Table 4
DmsControlMode	NTCIP 1203 Clause 2.7.1.1.1.1	Support at least the following modes: Local External central CentralOverride

* Ensure the Permanent Messages display the content shown in Table 3.

Ensure the sign blanks if a command to display a message contains an invalid Message CRC value for the desired message.

Table 3: Content of Permanent Messages

Perm. Msg. Num.	Description
1	Permanent Message #1 blanks the display (i.e., consist of and empty MULTI string). It has a run-time priority of one (1).

Table 4: Required MULTI Tags

Code	Feature
f1	field 1 - time (12hr)
f2	field 2 - time (24hr)
f8	field 8 – day of month
f9	field 9 – month
f10	field 10 - 2 digit year
f11	field 11 - 4 digit year

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Code	Feature
fl (and /fl)	flashing text on a line by line basis with flash rates controllable in 0.5 second increments.
fo	Font
jl2	Justification – line – left
jl3	Justification – line – center
jl4	Justification – line – right
jl5	Justification – line – full
jp2	Justification – page – top
jp3	Justification – page – middle
jp4	Justification – page – bottom
Mv	moving text
Nl	new line
Np	new page, up to 2 instances in a message (i.e., up to 3 pages/frames in a message counting first page)
Pt	page times controllable in 0.5 second increments.

The NTCIP Component implements all mandatory and optional objects of the following optional conformance groups with FSORS.

(5) Test Heading

Time Management

As defined in NTCIP 1201

Timebase Event Schedule

As defined in NTCIP 1201. The following list indicates the modified object requirements for this conformance group.

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Table 5: Modified Object Ranges for the Timebase Event Schedule Conformance Group

Object	Reference	Project Requirement
MaxTimeBaseScheduleEntries	NTCIP 1201 Clause 2.4.3.1	At least 28
maxDayPlans	NTCIP 1201 Clause 2.4.4.1	At least 14
maxDayPlanEvents	NTCIP 1201 Clause 2.4.4.2	At least 10

Report

As defined in NTCIP 1201. The following list indicates the modified object requirements for this conformance group.

Table 6: Modified Object Ranges for the Report Conformance Group

Object	Reference	Project Requirement
maxEventLogConfigs	NTCIP 1201 Clause 2.5.1	At least 50
eventConfigurationMode	NTCIP 1201 Clause 2.4.3.1	The NTCIP Component supports the following Event Configuration Modes: onChange greaterThanValue smallerThanValue
MaxEventLogSize	NTCIP 1201 Clause 2.5.3	At least 200
MaxEventClasses	NTCIP 1201 Clause 2.5.5	At least 16

PMPP

Font Configuration

As defined in NTCIP 1203. The following list indicates the modified object requirements for this conformance group.

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Table 7: Modified Object Ranges for the Font Configuration Conformance Group

Object	Reference	Project Requirement
NumFonts	NTCIP 1203 Clause 2.4.1.1.1.1	At least 4*
MaxFontCharacters	NTCIP 1203 Clause 2.4.1.1.1.3	At least 127**

*Upon delivery, the first font is a standard 18” font. The second font is a double-stroke 18” font. The third font is a 28” font. The fourth font is empty.

**Upon delivery, the first three font sets are configured in accordance with the ASCII character set for the following characters:

- “A” thru “Z”- All upper case letters.
- “0” thru “9”- All decimal digits.
- Space (i.e., ASCII code 0x20).
- Punctuation marks shown in brackets [. , ! ? - ‘ ’ “ ” / ()]
- Special characters shown in brackets [# & * +<>]

DMS Configuration

As defined in NTCIP 1203.

MULTI Configuration

As defined in NTCIP 1203. The following list indicates the modified object requirements for this conformance group.

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Table 8: Modified Object Ranges for the MULTI Configuration Conformance Group

Object	Reference	Project Requirement
DefaultBackgroundColor	NTCIP 1203 Clause 2.5.1.1.1.1	The DMS supports the following background colors: black
DefaultForegroundColor	NTCIP 1203 Clause 2.5.1.1.1.2	The DMS supports the following foreground colors: amber
DefaultJustificationLine	NTCIP 1203 Clause 2.5.1.1.1.6	The DMS supports the following forms of line justification: left center right full
defaultJustificationPage	NTCIP 1203 Clause 2.5.1.1.1.7	The DMS supports the following forms of page justification: top middle bottom
defaultPageOnTime	NTCIP 1203 Clause 2.5.1.1.1.8	The DMS supports the full range of these objects with step sizes no larger than 0.5 seconds
defaultPageOffTime	NTCIP 1203 Clause 2.5.1.1.1.9	The DMS supports the full range of these objects with step sizes no larger than 0.5 seconds
defaultCharacterSet	NTCIP 1203 Clause 2.5.1.1.1.10	The DMS supports the following character sets: eightBit

Default Message Control as defined in NTCIP 1203

Pixel Service Control as defined in NTCIP 1203

MULTI Error Control as defined in NTCIP 1203

Illumination/Brightness Control

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As defined in NTCIP 1203. The following list indicates the modified object requirements for this conformance group.

Table 9: Modified Object Ranges for the Illumination/Brightness Control Conformance Group

Object	Reference	Project Requirement
dmsIllumControl	NTCIP 1203 Clause 2.8.1.1.1.1	The DMS supports the following illumination control modes: photocell timer manual
dmsIllumNumBrightLevels	NTCIP 1203 Clause 2.8.1.1.1.4	At least 16

Auxiliary I/O

Scheduling

As defined in NTCIP 1203. The following list indicates the modified object requirements for this conformance group.

Table 10: Modified Object Ranges for the Scheduling Conformance Group

Object	Reference	Project Requirement
NumActionTableEntries	NTCIP 1203 Clause 2.9.1.1.1.1	At least 21

Sign Status as defined in NTCIP 1203

Status Error as defined in NTCIP 1203

Pixel Error Status as defined in NTCIP 1203

Fan Error Status as defined in NTCIP 1203

Power Status as defined in NTCIP 1203

Temperature Status as defined in NTCIP 120

Install necessary hardware for the support of items q, r, and s above.

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Table 11: Some Optional Object Requirements

Object	Reference	Project Requirement
DefaultFlashOn	NTCIP 1203 Clause 2.5.1.1.1.3	The DMS supports the full range of these objects with step sizes no larger than 0.5 seconds
DefaultFlashOff	NTCIP 1203 Clause 2.5.1.1.1.4	The DMS supports the full range of these objects with step sizes no larger than 0.5 seconds
DmsMultiOtherErrorDescription	NTCIP 1203 Clause 2.7.1.1.1.20	If the vendor implements any vendor-specific MULTI tags, the DMS shall provide meaningful error messages within this object whenever one of these tags generates an error.

(6) Documentation

Supply software with full documentation, including a CD-ROM containing ASCII versions of the following MIB files in Abstract Syntax Notation 1 (ASN.1) format:

- The relevant version of each official standard MIB Module referenced by the device functionality.
- If the device does not support the full range of any given object within a Standard MIB Module, a manufacturer specific version of the official Standard MIB Module with the supported range indicated in ASN.1 format in the SYNTAX and/or DESCRIPTION fields of the associated OBJECT TYPE macro. Name this file identical to the standard MIB Module, except that it will have the extension ".man".
- A MIB Module in ASN.1 format containing any and all manufacturer-specific objects supported by the device with accurate and meaningful DESCRIPTION fields and supported ranges indicated in the SYNTAX field of the OBJECT-TYPE macros.
- A MIB containing any other objects supported by the device.

Allow the use of any and all of this documentation by any party authorized by the Department for systems integration purposes at any time initially or in the future, regardless of what parties are involved in the systems integration effort.

(B) NTCIP Acceptance Testing

Test the NTCIP requirements outlined above by a third party testing firm. Submit to the Engineer for approval a portfolio of the selected firm. Include the name, address, and a history

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of the selected firm in performing NTCIP testing along with references. Also provide a contact person's name and phone number. Submit detailed NTCIP testing plans and procedures, including a list of hardware and software, to the Engineer for review and approval 10 days in advance of a scheduled testing date. Develop test documents based on the NTCIP requirements of these Project Special Provisions. The acceptance test will use the NTCIP Exerciser, and/or other authorized testing tools and will follow the guidelines established in the ENTERPRISE Test Procedures. Conduct the test in North Carolina on the installed system in the presence of the Engineer. Document and certify the results of the test by the firm conducting the test and submit the Engineer for review and approval. In case of failures, remedy the problem and have the firm retest in North Carolina. Continue process until all failures are resolved. The Department reserves the right to enhance these tests as deemed appropriate to ensure device compliance.

12.2. MEASUREMENT AND PAYMENT

There will be no direct payment for the work covered by this section.

Payment for this work will be covered in the applicable sections of these Project Special Provisions at the contract unit price for "DMS" and will be full compensation for all work listed above.

13. DMS TESTING REQUIREMENTS

13.1. GENERAL TEST PROCEDURE

Test the DMS system in a series of design approval and functional tests. The results of each test must 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 North Carolina Department of Transportation, to incorporate all design changes necessary to pass the required tests.

Provide four copies of all test procedures and requirements to the Engineer for review and approval at least 30 days prior to the testing start date.

Only use approved procedures for the tests. Include the following in the test procedures:

- A step-by-step outline of the test sequence, showing a test 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. The Engineer will reject all equipment not tested according to these requirements. It is the Contractor's responsibility to ensure the DMS system functions properly even after the Engineer accepts the DMS test results.

Provide four copies of the quantitative test results and data forms containing all data taken, highlighting any non-conforming results and remedies taken, to the Engineer for approval. An authorized representative of the manufacturer must sign the test results and data forms.

13.2. DESIGN APPROVAL TESTS

Design Approval Tests are applicable to DMS systems not currently on the QPL.

The Design Approval Tests consists of all tests described in Section 2.2 "DMS Equipment Tests" of NEMA TS 4-2005 (Hardware Standards for Dynamic Message Signs with NTCIP Requirements). Perform all tests and submit certified results for review and approval.

PROTOTYPE – Manufacture a prototype DMS and controller of the type and size described in the Project Special Provisions. In the presence of the Engineer, test the prototype according to the Design Approval and Operational Tests. When all corrections and changes (if any) have been made, the Department may accept the prototype DMS and controller as the physical and

functional standard for the system furnished under this contract. You may use the prototype units on this project if, after inspection and rework (if necessary), they meet all physical and functional specifications. In the case of standard product line equipment, if the Contractor can provide test results certified by an independent testing facility as evidence of prior completion of successful design approval tests, then the Engineer may choose to waive these tests.

In each Design Approval Test, successfully perform the Functional Tests described below. Apply the extreme conditions to all associated equipment unless stated otherwise in these Project Special Provisions.

13.3. OPERATIONAL FIELD TEST (ON-SITE COMMISSIONING)

Conduct an Operational Field Test of the DMS system installed on the project to exercise the normal operational functions of the equipment. The Operational Field Test will consist of the following tests as a minimum:

(A) Physical Examination

Examine each piece of equipment to verify that the materials, design, construction, markings, and workmanship comply with the mechanical, dimensional, and assembly requirements of these Project Special Provisions.

Perform the following tests as a minimum:

- Verify that all surfaces are free of dents, scratches, weld burns, or abrasions. Round sharp edges and corners.
- Verify bend radius of cables is not excessive or could potentially cause damage.
- Verify all modules, lamps, and components are properly secured.
- Verify that there are no exposed live terminals.

(B) Continuity Tests

Check the wiring to assure it conforms to the requirements of these Project Special Provisions.

(C) Functional Tests

Perform the following functional tests:

- Start-up and operate the DMS locally using a laptop computer.
- Use automatic (photo-electric sensor controlled) DMS Control Software to switch between “dim”, “normal”, and “bright” light levels.
- Operate the DMS with all display elements flashing continuously for 10 minutes at the maximum flash rate.
- Exercise the DMS by displaying static messages, flashing messages, and alternating static and flashing message sequences.
- Automatic poll the DMS by the Control Software at various intervals and verify the data received by Control Software from DMS.
- Download and edit messages using Control Software.
- Execute status request on the DMS controller.

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- Observe normal operations during uploading and downloading messages.
- Input and select messages from the sign controller's local user interface.
- Test sequence activation at chosen intervals.
- Display and verify all stored messages.
- Verify resumption of standard operation upon interruption of electrical power.
- Demonstrate detected failures and response functions.
- Demonstrate proper operation of the Failure Log.
- Set controller clock using the Control Software.
- Execute system shutdown using the Control Software and local user interface.
- Verify detection of a power failure in the DMS enclosure and the report feature of the failure to the Control Software.

Approval of Operational Field Test results does not relieve the Contractor to conform to the requirements in these Project Special Provisions. If the DMS system does not pass these tests, document a correction or substitute a new unit as approved by the Engineer. Re-test the system until it passes all requirements.

13.4. 30-DAY OBSERVATION PERIOD

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

Upon successful completion of all project work, the component tests, the System Test, and the correction of all deficiencies, including minor construction items, the 30-day Observation Period may commence. This observation consists of a 30-day period of normal, day-to-day operations of the new field equipment in operation with the new 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 said failures within forty-eight (48) hours. 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 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 failure in any of the major system components exceeding a total of three (3) occurrences will terminate the 30-day Observation Period and cause the 30-day Observation Period to be restarted from day zero when the redesigned components have been installed and/or the failures corrected. The major system components are:

- DMS Field Controller
- DMS Display Module

13.5. MEASUREMENT AND PAYMENT

There will be no direct payment for the work covered in this section.

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Payment for this work will be covered in the applicable sections of these Project Special Provisions at the contract unit price for “DMS” and will be full compensation for all work covered in this section.

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This section includes all design, fabrication, furnishing, and erection of the DMS assembly, maintenance platforms for access to the DMS inspection doors, CCTV extension poles, ladder attachments, and attachment of the DMS enclosures to the structures in accordance with the requirements of these Project Special Provisions and the Plans. Fabricate the supporting DMS assemblies from tubular steel. Furnish pedestal type and overhead full-span (i.e., gantry) DMS assemblies as shown in the Plans. Cantilevered and Monotube (horizontal truss) DMS structures will not be allowed.

Provide pedestal type DMS assembly structures with a minimum of 25 feet clearance from the high point of the road to the bottom of the DMS enclosure for D9-DMS 37 and D9-DMS 38. For D9-DMS 38 provide a pole extension for a 40' mounting height for a CCTV. Provide overhead full-span type DMS assembly structures with a minimum of 20 feet clearance from the high point of the road to the bottom of the DMS enclosure for D7-DMS 9.

It is the Contractor's responsibility to furnish final elevation drawings ("S" dimensions).

Design the DMS assemblies (including footings), maintenance platforms, and access ladders and submit shop drawings to the Engineer for acceptance. A Professional Engineer that is licensed in the state of North Carolina shall prepare such computations and drawings. These must bear his signature, seal, and date of acceptance.

The provisions of Section 900 of the *Standard Specifications* apply to all work covered by this section.

14.2. MATERIAL

Use materials that meet the following requirements of the *Standard Specifications*:

Structural Steel	Section 1072
Overhead Sign Structures	Section 1096
Signing Materials	Section 1092
Organic-Zinc Repair Paint	Article 1080-9
Reinforcing Steel	Sub-article 1070
Direct Tension Indicators	Sections 440 and 1072

14.3. CONSTRUCTION METHODS**(A) General**

Fabricate the new DMS assemblies, maintenance platforms, and access ladders in accordance with the details shown in the approved shop drawings and the requirements of these Project Special Provisions.

No welding, cutting, or drilling in any manner will be permitted in the field, unless approved by the Engineer.

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Drill bolt holes and slots to finished size. Holes may also be punched to finished size, provided the diameter of the punched holes is at least twice the thickness of the metal being punched. Flame cutting of bolt holes and slots is not permitted.

Erect DMS in accordance with the requirements indicated on the Plans and in these Project Special Provisions. Field drill two holes per connection in the Z bars for attaching the DMS to the structure. Use two bolts at each connection. Provide two (2) U-bolts at each U-bolt connection such as 1) each truss chord to sign hanger, or 2) each truss chord to platform support. Provide two (2) U-bolts at each U-bolts connection where ends of truss chords are supported. Minimum diameter of all U-bolts is to be ½ inch.

Use two coats of a zinc-rich paint to touch up minor scars on all galvanized materials. See Standard Specifications for Roads and Structures Section 1076-7.

For high strength bolted connections, provide direct tension indicator washer.

(B) Shop Drawing

Submit to the Engineer for approval a complete design for the DMS assemblies (including footings), maintenance platforms, access ladders, DMS assembly hardware, brackets for supporting the DMS and maintenance platforms. Base the design on the line drawings and correct wind speed in accordance with the latest edition of AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals, 5th Edition, 2009, and the latest Interim Revisions".

The manufacturer of the DMS assembly must ensure that design of the assembly is compatible with the DMSs for mounting and attachment.

Submit six copies of complete detailed shop drawings and one copy of the design computations for the DMS assembly to the Engineer for approval prior to fabrication. Show in the shop drawings complete design and fabrication details including foundations, provisions for attaching the DMS, maintenance platform and access ladders to supporting structures, applicable material specifications, and any other information necessary for procuring and replacing any part of the complete DMS assembly.

Allow a minimum of 40 working days for shop drawing approval after the Engineer receives them. If revised drawings are necessary, allow appropriate additional time for review and approval of final shop drawings.

Approval of shop drawings by the Engineer will not relieve the Contractor of his responsibility for the correctness of drawings, or for the fit of all shop and field connections and anchors.

(C) Design and Fabrication**(1) Dynamic Message Sign Assembly**

- Design must be in accordance with the Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 5th Edition, 2009, and the latest Interim Revisions.
- The wind pressure map that is developed from the 3-second gust speeds, as provided in Article 3.8, shall be used.

- The natural wind gust speed in North Carolina shall be assumed to be 5 meters per second or 11.6 mph for inland areas, and 7 meters per second or 15.7 mph for coastal areas. The coastal area shall be defined as any area within 2 miles from the waterfront facing the ocean or sound and all area where the design basic wind speed is above 120 mph, as shown in Figure 3-2.
- The fatigue importance category used in the design, for each type of structure, as provided for in Article 11.6, Fatigue Importance Factors, shall be Category II unless otherwise shown on the contract plans.
- Wind drag coefficient for Dynamic Message Sign enclosures shall be 1.7.

The following Specification interpretations or criteria shall be used in the design of overhead sign assemblies:

- For design of supporting upright posts or columns, the effective length factor for columns “K”, as provided for in Appendix B, Section B.5, shall be taken as the following, unless otherwise approved by the Engineer:
 - Case 1 For a single upright post of span type overhead sign structure, the effective column length factor, “K”, shall be taken as 2.0.
 - Case 2 For twin post truss-type upright post with the post connected to one chord of a horizontal truss, the effective column length factor for that column shall be taken as 2.0.
 - Case 3 For twin post truss-type upright post with the post connected to two truss chords of a horizontal tri-chord or box truss, the effective column length factor for that column shall be taken as 1.65.
- For twin post truss-type upright post, the unbraced length shall be from the chord to post connection to the top of base plate.
- For twin post truss-type upright post that is subject to axial compression, bending moment, shear, and torsion the post shall satisfy Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals Equations 5-17, 5-18 and 5-19. To reduce the effects of secondary bending, in lieu of Equation 5-18, the following equation may be used:

$$\frac{f_a}{F_a} + \frac{f_b}{\left(1 - \frac{0.6f_a}{F_c}\right)F_b} + \left(\frac{f_v}{F_v}\right)^2 \leq 1.0$$

Where

fa = Computed axial compression stress at base of post

- The base plate thickness for all uprights and poles shall be a minimum of 2” but not less than that determined by the following criteria and design.

Case 1 Circular or rectangular solid base plates with the upright pole welded to the top surface of base plate with full penetration butt weld, and where no stiffeners are provided. A base plate with a small center hole, which is less than 1/5 of the upright diameter, and located concentrically with the upright pole, may be considered as a solid base plate.

The magnitude of bending moment in the base plate, induced by the anchoring force of each anchor bolt shall be calculated using equation $M = (P \times D_1) / 2$.

Case 2 Circular or rectangular base plate with the upright pole socketed into and attached to the base plate with two lines of fillet weld, and where no stiffeners are provided, or any base plate with a center hole that is larger in diameter than 1/5 of the upright diameter.

The magnitude of bending moment induced by the anchoring force of each anchor bolt shall be calculated using equation $M = P \times D_2$.

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

- The critical section shall be located at the face of the anchor bolt and perpendicular to the radius of the bolt circle. The overlapped part of two adjacent critical sections shall be considered ineffective.
- The thickness of base plate of Case 1 shall not be less than that calculated based on formula for Case 2.
- Uprights, foundations, and trusses shall be designed in accordance with the "DMS Foundation" section of these Project Special Provision for the effects of torsion. Torsion shall be considered from dead load eccentricity of these attachments, as well as for attachments such as maintenance platforms, supporting brackets, etc., that add to the torsion in the assembly. Truss vertical and horizontal truss diagonals in particular and any other assembly members shall be appropriately sized for these loads.
- Uprights, foundations, and trusses shall be designed for the proposed sign wind area and future wind areas. The design shall consider the effect of torsion induced by the eccentric force location of the center of wind force above (or below) the center of the supporting truss. Truss vertical and horizontal truss diagonals in particular and any other assembly members shall be appropriately sized for these loads.

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Fabricate the supporting structures using tubular members of either aluminum or steel, using only one type of material throughout the project.

Horizontal components of the supporting structures for overhead DMS must be of a truss design to support the DMS. Truss centerline must coincide with centerline of the DMS design area shown on the structure line drawing. Provide permanent camber in addition to dead load camber in accordance with the 5th Edition of the *AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*. Indicate on the shop drawings the amount of camber provided and the method employed in the fabrication of the support to obtain the camber.

For all U-bolt connections of hanger beams to overhead assembly truss chords, provide all U-bolts with a flat washer, a lock washer and double nuts at each end of the U-bolts. All double nuts that are on any U-bolt shall be the same thickness and weight. When assembled, the double nuts shall be brought tight against each other by the use of two wrenches.

Fabricate attachment assemblies for the mounting DMS in a manner that allows easy removal of the sign.

(2) DMS Maintenance Platform (Walkway)

Provide a maintenance platform, a minimum of three feet wide with open skid resistant surface and safety railing on the DMS assemblies for access to the DMS inspection door. Provide platforms with fixed safety railings along both sides from the beginning of the platform to the inspection door.

Ensure the design, fabrication and installation of the access platforms on new DMS structures complies with the following:

1. The top of the platform grading surface is vertically aligned with the bottom of the DMS door. Ensure the platform extends from the DMS enclosure to the access ladder.
2. The DMS door will open 90-degrees from its closed position without any obstruction from the platform or safety handrails.
3. The platform is rigidly and directly connected to the walkway brackets and there is no uneven surface between sections.
4. Install a 4" x 4" safety angle parallel to and along both sides of the platform and extend it the entire length of the platform. Design the safety angle to withstand loading equivalent to the platform.
5. Ensure the platform design allows full access to the DMS enclosure inspection door with no interference or obstructions.

(3) DMS Access Ladder

Provide a fixed ladder, of the same material as the pedestal structures, leading to and ending at the access platform. Equip the ladder with a security cover (ladder guard) and lock to prohibit access by unauthorized persons. Design the rungs on 12-inch center to center typical spacing. The first ladder rung no more than 18 inches above the landing pad. Attach the security cover approximately 6 feet above the finished ground. Design the ladder and security cover as a

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permanent part of the DMS assembly and include complete design details in the DMS assembly shop drawings. Fabricate the ladder and cover to meet all OSHA requirements and applicable state and local codes, including but not limited to providing a ladder cage.

Furnish and install a level concrete pad a minimum of 4 inches deep, 24 inches wide, and 36 inches long to service as a landing pad for accessing the ladder. Design the landing pad to be directly below the bottom rung. Access to the ladder shall not be obstructed by the DMS foundation. Provide pre-formed or cast-in place concrete pads.

(4) CCTV Extension Pole

Design the DMS assembly with provisions to allow for the attachment of a CCTV camera to the assembly using a CCTV extension pole at the top of the DMS assembly. Design the CCTV extension pole to provide an attachment height for the camera of 45 feet above the finished grade. The maximum deflection at the top of the CCTV supporting member at 30 mph, non-gusting wind, shall be no more than one inch in any direction. The ultimate design load for the CCTV extension pole shall be AASHTO 2002 50-year wind speed for the area plus 50 lbs camera deadload. Design the extension pole as an integral part of the DMS assembly and submit the design along with the structural calculation for review and approval by the Engineer.

14.4. MEASUREMENT AND PAYMENT

DMS pedestal structure will be measured and paid as the actual number of pedestal mount dynamic message sign assemblies furnished, installed, and accepted. Payment includes all design, fabrication, construction, transportation, and attachment of the dynamic message sign assemblies (including Z-bars and U-bolts), CCTV pole extension, supporting structure, hardware, access platform, direct tension indicators, preparing and furnishing shop drawings, additional documentation, incidentals, and all other equipment and features necessary to furnish the system described above.

DMS overhead structure will be measured and paid as the actual number of overhead mount dynamic message sign assemblies furnished, installed, and accepted. Payment includes all design, fabrication, construction, transportation, and attachment of the dynamic message sign assemblies (including Z-bars and U-bolts), supporting structure, hardware, access platform, direct tension indicators, preparing and furnishing shop drawings, additional documentation, incidentals, and all other equipment and features necessary to furnish the system described above.

DMS Access Ladder will be measured and paid as the actual number of DMS access ladders furnished, installed and accepted. Payment includes design, fabrication, transportation, attachment to the DMS assembly, and the concrete landing pad as described above.

CCTV Extension Pole will be measured and paid as the actual number of CCTV extension poles furnished, installed and accepted. Payment includes design, fabrication, transportation, and attachment to the DMS assembly.

Payment will be made under:

Pay Item

Pay Unit

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DMS Pedestal Assembly	Each
DMS Overhead Assembly	Each
DMS Access Ladder	Each
CCTV Extension Pole	Each

15. FOUNDATIONS AND ANCHOR ROD ASSEMBLIES FOR METAL POLES

SP9 R05REV

15.1. DESCRIPTION

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

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

This provision does not apply to materials and anchor rod assemblies for standard foundations for low level light standards. See Section 1405 of the *2012 Standard Specifications* and Standard Drawing No. 1405.01 of the *2012 Roadway Standard Drawings* for materials and anchor rod assemblies for standard foundations. For construction of standard foundations for low level light standards, standard foundations are considered footings in this provision.

This provision does not apply to foundations for signal pedestals; see Section 1743 of the *2012 Standard Specifications* and Standard Drawing No. 1743.01 of the *2012 Roadway Standard Drawings*.

15.2. MATERIALS

Refer to the *2012 Standard Specifications*.

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

Provide Type 3 material certifications in accordance with Article 106-3 of the *2012 Standard Specifications* for 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

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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. Damaged or deformed 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:

www.ncdot.org/doh/preconstruct/highway/geotech/leftmenu/Polymer.html

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

- Straight anchor rods,
- Heavy hex top and leveling nuts and flat washers on exposed ends of rods, and
- Nuts and either flat plates or washers on the other ends of anchor rods embedded in foundations.

Do not use lock washers. Use steel anchor rods, nuts and washers that meet ASTM F1554 for Grade 55 rods and Grade A nuts. Use steel plates and washers embedded in concrete with a nominal thickness of at least 1/4". Galvanize anchor rods and exposed nuts and washers in accordance with Article 1076-4 of the 2012 *Standard Specifications*. It is not necessary to galvanize nuts, plates and washers embedded in concrete.

15.3. 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 2012 *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.

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

Contain and dispose of drilling spoils and waste concrete as directed and in accordance with Section 802 of the *2012 Standard Specifications*. 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 polymer slurry at all times so slurry meets Table 411-3 of the *2012 Standard Specifications* except for sand content.

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

Remove soft and loose material from bottom of holes using augers to the satisfaction of the Engineer. Assemble rebar cages and place cages and Drilled Pier concrete in accordance with Subarticle 411-4(E) of the *2012 Standard Specifications* except for the following:

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

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temporary casings until a procedure for placing anchor rod assemblies and conduit or constructing grade beams or wings is approved.

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

If drilled piers are questionable, pile integrity testing (PIT) and further investigation may be required in accordance with Article 411-5 of the *2012 Standard Specifications*. A drilled pier will be considered defective in accordance with Subarticle 411-5(D) of the *2012 Standard Specifications* and drilled pier acceptance is based in part on the criteria in Article 411-6 of the *2012 Standard Specifications* except for the top of pier tolerances in Subarticle 411-6(C) of the *2012 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 *2012 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 *2012 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 *2012 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. Backfill and fill in accordance with Article 410-8 of the *2012 Standard Specifications*. Proper compaction around footings and wings is critical for foundations to resist uplift and torsion forces. Place concrete against undisturbed soil and do not use forms for standard foundations for low level light standards.

(C) Anchor Rod Assemblies

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

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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

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turn-of-nut method for pretensioning. Do not pretension any nut all at once. Turn top nuts in increments for a total of one flat (1/6 revolution) for anchor rod diameters greater than 1 1/2" and 2 flats (1/3 revolution) for anchor rod diameters 1 1/2" or less. 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 over tighten top nuts.

- 13) Do not grout under base plate.

15.4. 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 *2012 Standard Specifications*. No payment will be made for remediation of unacceptable drilled piers or post repair testing.

16. DYNAMIC MESSAGE SIGN ASSEMBLY FOUNDATIONS

16.1. Description

Dynamic message sign assembly foundations include foundations for dynamic message signs (DMS) supported by metal poles/pedestals or upright trusses. DMS assembly foundations consist of footings with pedestals or drilled piers with or without grade beams or wings, conduit and anchor rod assemblies. Construct DMS assembly foundations in accordance with the contract and accepted submittals.

16.2. Material

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

(A) Assumed Subsurface Conditions

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

- 1) Unit weight (γ) = 120 lb/cf,
- 2) Friction angle (ϕ) = 30°,
- 3) Cohesion (c) = 0 lb/sf, and
- 4) Groundwater 7 ft 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.

(B) 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 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 8.0 or later manufactured by Bentley Systems, Inc. with the current NCDOT gINT library and data template to produce SPT boring logs. Provide boring logs sealed by a geologist or engineer licensed in the state of North Carolina.

(C) 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 5th Edition of the *AASHTO Standard Specifications for Structural*

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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 lb/sf for footings.

Design drilled piers for side resistance only in accordance with Section 4.6 of the *AASHTO Standard Specifications for Highway Bridges* except reduce ultimate side resistance by 25% for uplift. Use the computer software LPILE version 5.0 or later manufactured by Ensoft, Inc. to analyze drilled piers. Provide drilled pier designs with a horizontal deflection of less than 1" at top of piers. For cantilever signs with single drilled pier foundations supporting metal poles, use wings to resist torsion forces. Provide drilled pier designs with a factor of safety of at least 2.0 for torsion.

For drilled pier sign foundations supporting upright trusses, use dual drilled piers connected with a grade beam having a moment of inertia approximately equal to that of either pier. The Broms' method is acceptable to analyze drilled piers with grade beams instead of LPILE. Use a safety factor of at least 3.5 for the Broms' design method in accordance with C13.6.1.1 of the 5th *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 *2012 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.

16.3. 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.

16.4. Measurement and Payment

Overhead sign assembly footings will be measured and paid in cubic yards. Sign footings will be measured as the cubic yards of foundation concrete for footings, pedestals, drilled piers, grade beams and wings shown on the accepted submittals. The contract unit price for *Overhead Sign Assembly Footings* will be full compensation for providing labor, tools, equipment and foundation materials, stabilizing or shoring excavations and supplying 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 *2012 Standard Specifications*.

Payment will be made under:

Pay Item

Overhead Sign Assembly Footings

Pay Unit

Cubic Yard

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17. SYSTEM SUPPORT AND TEST EQUIPMENT

17.1. DESCRIPTION

Furnish ITS system support with all necessary hardware in accordance with the Plans and Project Special Provisions.

17.2. MATERIALS

(A) Communications Hardware

Provide one Ethernet edge switch and one UPS for a CCTV cabinet as described in the "Communications Hardware" section of these Project Special Provisions.

(B) Central Video Equipment

Provide two each digital hardware video encoders and decoders Ethernet Edge switch as described in the "Central Video Equipment" section of these Project Special Provisions.

(C) CCTV Field Equipment

Provide one complete CCTV assembly as described in the "CCTV Field Equipment" section of these Project Special Provisions.

(D) Dynamic Message Sign

Provide six DMS LED panels, one DMS Controller, and one DMS UPS as described in the "Dynamic Message Sign" section of these Project Special Provisions.

17.3. MEASUREMENT AND PAYMENT

Furnish CCTV Assembly will be measured and paid as the actual number of CCTV assemblies furnished and accepted.

Furnish Ethernet edge switch will be measured and paid as the actual number of Ethernet edge switches furnished and accepted.

Furnish digital hardware video encoder will be measured and paid as the actual number of digital hardware video encoders furnished and accepted.

Furnish digital hardware video decoder will be measured and paid as the actual number of digital hardware video decoders furnished and accepted.

No separate measurement and payment will be made for the spare UPS as it will be considered incidental to the furnishing and installing the CCTV cabinet.

No separate measurement and payment will be made for the DMS LED panels, DMS Controller, and DMS UPS as they will be considered incidental to the furnishing and installing the DMS.

Payment will be made under:

Pay Item	Pay Unit
Furnish CCTV Assembly	Each
Furnish Ethernet Edge Switch	Each

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Pay Item

Furnish Digital Hardware Video Encoder

Furnish Digital Hardware Video Decoder

Pay Unit

Each

Each

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18. SUBMITTAL DATA

18.1. DESCRIPTION

Provide project documentation as described below.

18.2. SUBMITTALS

(A) General

All documentation will be either 11" x 17" or 8½" x 11" format. No documentation may be smaller or larger than these formats. All submittals will be reviewed and approved by the Department. Absence of comment will not grant approval.

(B) Qualified Products

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

The ITS & Signals Qualified Products List (QPL) is available on the North Carolina Department of Transportation's Website. Certain signal and communications equipment, material, and hardware shall be pre-approved on the QPL by the date of installation. Equipment, material, and hardware not pre-approved when required will not be allowed for use on the project. Consult the QPL Website to obtain pre-approval procedures.

(C) System Configuration Report

Prepare a System Configuration Report to describe the proposed network architecture and its configuration. Provide a detailed description of the hardware and software to be installed. The report shall depict and describe:

- Network layout of the equipment and their connectivity
- Detailed listing of the hardware including brand and model numbers, functions and descriptions
- Detailed listing of the management, device, and routing VLAN configuration
- IP addressing scheme
- IP subnets, and masks if applicable
- Proposed configuration and guidelines for specific port assignments on each of the L2 and L3 devices
- Proposed configuration and guidelines for L2 broadcast storm prevention, loop prevention and fault tolerance mechanisms (Spanning Tree diagram with designated, blocking and forwarding ports indicated.
- Proposed configuration and guidelines to mitigate common security threats such as denial of service, man in the middle, MAC/IP spoofing and brute force dictionary attacks.
- Proposed configuration and guidelines for 802.1p Class of Service (COS) queue assignments

Submit the report and obtain approval before providing material submittals for the following packages of items:

- Central video equipment

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- Ethernet switches, and
- Software.

(D) Test Plan

Develop a Test Plan as described in the section “Testing and Acceptance” of these Project Special Provisions. Submit and obtain approval before beginning any testing.

(E) Submittal Requirements

Provide written certification to the Department that all Contractor-furnished material is in accordance with the contract. When requested by the Department, provide additional certifications from independent testing laboratories and sufficient data to verify item meets applicable specifications. Ensure additional certification states the testing laboratory is independent of the material manufacturer and neither the laboratory nor the manufacturer has a vested interest in the other.

The intent of submittals is to show completely the materials meet the requirements of the Plans and Project Special Provisions and how the Contractor intends to construct or configure the materials. The Contractor shall clearly demonstrate in the submittals that the desired materials shall meet or exceed the requirements of the Plans and Project Special Provisions. Each submittal shall be sufficiently complete and detailed for the Department to review and approve the submittal. If the Department deems the submittal insufficient in detail or completeness for review or approval, the submittal will be returned as rejected. Additional time will not be granted for resubmittal.

Before material submittal data begins, provide to the Department a list of all submittals with approximate dates of submission that the Contractor intends to make. It is incumbent upon the Contractor to schedule reviews in a timely manner that will not delay his schedule.

Certain groups of materials are related in function and operate as a subsystem together. To ensure individual and subsystem compliance with the project requirements materials shall be submitted as packages as follows:

Submittal Package	Description
System Configuration Report	See Subsection 18.2 (C) above.
Fiber-optic Cable	Fiber-optic Cable, Drop Cables, Splice Enclosures, Interconnect Centers, Hub Splice Centers, Splice Trays, Delineator Markers, Communications Cable Identification Markers
Communications Equipment*	GBICs, Communications Rack, Managed Ethernet Routing Switches, Ethernet Edge Switches, Hub Cabinets, Equipment Cabinets, Base Extenders, and UPS
CCTV Equipment	CCTV cameras, camera enclosures, camera mounting hardware

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Submittal Package	Description
Digital Video Equipment*	Digital Hardware Video Encoders and Decoders, Card Cage,
Field Infrastructure	Conduit, Risers, Junction Boxes, Wood Poles, Guys, Messenger Cable, Electrical Service Equipment, Solar Power Assembly, and Misc. Hardware, Pedestal and Overhead DMS structures, CCTV extension poles, CCTV Metal Poles, Pole Foundations, Camera Lowering Devices,
DMS	DMS cabinets, DMS Structure Foundations, DMS assembly, S" dimensions, and DMS shop drawings
Test Plans	Device test plans

* Indicates submittal packages that cannot be submitted for review until the System Configuration Report has been submitted and approved.

Identify all proprietary parts in Contractor-furnished material. The Department reserves the right to reject material that uses proprietary components not commercially available through electronic supply houses.

For Contractor-furnished material listed on the QPL, furnish submittals in the format defined by the QPL.

For Contractor-furnished material not on the QPL, furnish three copies of the equipment list including three copies of catalog cuts. Identify proposed material on catalog cuts by a reproducible means (highlighter pen does not transfer to copies). Ensure material lists contain material description, brand name, manufacturer's address and telephone number, stock number, size, identifying trademark or symbol, and other appropriate ratings. For submittals showing a variety of models and parts available from the manufacturer, clearly identify by circles, marking our other means the specific materials for which approval is requested.

Allocate 40 days for the Department to review and respond to a submittal. Do not deviate from what is approved without approval by the Department. Do not fabricate or order material until receipt of the Department's approval. All submittals will be returned as either "Approved (as submitted)", "Approved as Noted" or "Rejected". The Contractor may proceed with fabrication or ordering for items marked "Approved". If an item is marked "Approved as Noted" without any stipulation for resubmittal, then the Contractor may proceed with fabrication or ordering. For any other notations, the Contractor shall revise the submittal, address comments, and resubmit for approval.

18.3. MEASUREMENT AND PAYMENT

There will be no direct payment for work covered in this section. Payment at the contract unit prices for the various items in the contract will be full compensation for all work covered by this section.

19. TESTING AND ACCEPTANCE

19.1. GENERAL

Conduct and complete successfully the following progressive series of tests before acceptance: field demonstration test prior to installation, installed standalone tests, system test of the network hardware, network management software and an operational test. Develop a comprehensive series of test plans for each device to determine the equipment was correctly installed and meets the requirements of materials, workmanship, performance, and functionality required in the plans and project special provisions. The test plans shall describe the functions to be tested, purpose of test, setup requirements, procedures to be followed, any inputs and expected outputs for each test, criteria for pass/fail and any required tools or test equipment. Any software testers shall be pre-approved by the Department.

Develop as part of the Test Plan a Traceability Matrix of all the individual subsystem functional requirements to be used to cross-reference each planned test to a specific contract requirement to be verified. This Test Evaluation/Traceability Matrix shall be used by the Engineer to crosscheck the functional requirements and the results.

A key element of test plans, where appropriate, is the introduction of forced errors into the functional test. The test plan shall check the actual result of the forced error against the anticipated result. Tests will be performed by the Contractor and witnessed by the Department. No deviation from the written test procedure shall be permitted without approval from the Engineer. Any changes to the approved test procedure to accommodate unforeseen events during the time of testing shall be documented in a copy of the master test procedure. Immediately following the conclusion of each test, the Department and the Contractor shall meet to agree on the results observed and recorded during the testing. This will form the basis for the conclusions reported in the test plan. All test results, notes, and observations shall be maintained in both electronic and hard copy. Maintain complete records of all test results during all stages of testing.

Conduct DMS testing as described separately in these Project Special Provisions.

19.2. INSTALLED SITE TESTS

Conduct an approved, standalone equipment installation test at the field site. Test all standalone functions of the field equipment using equipment installed as detailed in the plans, or as directed by the Engineer.

Complete approved test plan forms and turn them over to the Engineer for review as a basis for rejection or acceptance. Provide a minimum notice of 30 calendar days prior to all tests to permit the Engineer or his representative to observe each test.

If any unit fails to pass its stand-alone test, correct the unit or substitute another unit in its place, then repeat the test.

If a unit has been modified as a result of a standalone test failure, prepare a report describing the nature of the failure and the corrective action taken and deliver it to the Engineer prior to re-testing the unit. If a failure pattern develops, the Engineer may direct that design and construction modifications be made to all units without additional cost to the Department or an extension of the contract period.

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Utilize vendor supplied device software to perform diagnostic tests of each device. The vendor supplied diagnostic software shall be provided to the Department before final acceptance. Test the following features of each competent as described below.

(A) Fiber-Optic Cable

Conduct optical time domain reflectometer (OTDR) tests on the cable on the reel and after the cable is installed and terminated. Provide written notification a minimum of ten days before beginning fiber-optic cable testing.

After splicing is completed, perform bi-directional OTDR tests on each fiber, including unused fibers, to ensure the following:

- Fusion splice loss does not exceed 0.05 dB,
- Terminations and connections have a loss of 0.5 dB or less, and
- Reflection loss is 40 dB or greater for each connector.

Install a 1000-foot pre-tested launch cable between the OTDR and fiber-optic cable to be tested.

If exceeded, remake splices until the loss falls below 0.05 dB. The Engineer will record each attempt for purposes of acceptance.

Test the fiber-optic cable at both 1310 and 1550 nm.

Furnish durable labeled plots and electronic copies on a CD or DVD of test results for each fiber including engineering calculations demonstrating that OTDR test results meet or exceed the attenuation requirements and that optical properties of the cable have not been impaired. Clearly label each OTDR trace identifying a starting and ending point for all fibers being tested.

Provide engineering calculations and tests for fiber-optic cable that demonstrate the loss budget where the fiber originates and where the fiber meets an electronic device. The calculations shall summarize the optical losses versus the allowable losses for the communications equipment between each pair of communications hardware. Provide a summary section or spreadsheet with a labeled tabular summary showing each test segment with begin and end points and actual versus allowable losses. Label the manufacturer's make, model number, and software version of the OTDR used for testing.

Furnish one hard copy of each of the OTDR trace results and electronic copies of all trace results on a CD or DVD.

If any fiber exceeds the maximum allowable attenuation or if the fiber-optic properties of the cable have been impaired, take approved corrective action including replacement of complete segments of fiber-optic cable if required. Corrective action will be at no additional cost to the Department.

19.3. SYSTEM TESTING**(A) General**

Conduct tests as described below of the CCTV subsystem. These tests shall be a demonstration of overall system stability to view video at the TRTMC. During this test period, limit downtime due to mechanical, electrical, or other malfunctions to a maximum of four hours.

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The Engineer has the right to suspend the test to correct deficiencies and restart the test or to extend the test period by time equal to the downtime in excess of eight hours.

Conduct device and subsystem tests of any repaired or replaced equipment.

The Engineer has the right to suspend the test to correct deficiencies and restart the test or to extend the test period by time equal to the downtime in excess of eight hours. If a component has been modified as a result of a test failure, prepare a report and deliver it to the Engineer prior to retesting.

(B) CCTV Subsystem

After completing the integration of the CCTV cameras, and the digital hardware video encoders and decoders into the CCTV subsystem software, conduct a minimum of a seven-day test of the CCTV subsystem hardware and software. This will include that portion of the communications network serving the CCTV subsystem. The Engineer has the right to suspend the test to correct deficiencies and restart the test or to extend the test period by time equal to the downtime in excess of eight hours. If during that time it is determined by the Department there are hardware or software failures that are the responsibility of the Contractor, the Contractor shall make repairs or replacements to the satisfaction of the Department.

Test the following features of each component as described below.

- Verify that all CCTV cameras can be shared and displayed at the TRTMC.
- Verify PTZ control of the same cameras by the TRTMC,
- Analog video can be encoded and sent from one TMC to the other TMC, decoded and displayed on the video wall, and
- Verify that video can be encoded and decoded using the digital hardware video encoders and decoders without loss of image resolution and framing rate at the TRTMC with the maximum of number of inputs and outputs utilized.

19.4. OBSERVATION PERIOD**(A) General**

The system tests described in the preceding subsections as well as the correction of all known deficiencies, including minor construction items and punch-list items developed by the Engineer. During this period, the Department shall observe equipment and software operation to determine that all components of the fiber-optic communications system operate properly and interface with the subsystem components according to the requirements of the Plans and these Project Special Provisions over an extended period of time.

During the Observation Period, respond to failures of the Contractor's equipment within two hours and make repairs within eight hours. For items that pose a traffic safety hazard such as a controller failure, make repairs within four hours. If any failures affect major system components for more than 48 hours, the Department shall suspend the Observation Period beginning when the failure occurred. Resume the Observation Period after successful repair or replacement. Failures of the following types will cause the Department to terminate the Observation Period and restart the Observation Period from zero once the failures have been corrected:

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- System or component failures that necessitate a redesign of any component; and
- Three or more major system component failures of like nature within any 30-day period.

Major system components include:

- The fiber-optic communications network
- Ethernet edge switch
- Managed Ethernet routing switch
- Managed Ethernet core switch modifications
- CCTV
- DMS
- UPS

Begin a new 30-day Observation Period with the approval of the Engineer after the faulty equipment has been repaired or replaced and the redesigned components have been installed.

A successful 30-day Observation Period shall consist of continuous operation with no more than a total of five calendar days of non-operation due to mechanical, electrical, or other malfunctions.

The Observation Period shall be completed by the project completion date and prior to final acceptance of the project. The Observation Period shall not begin until the both all subsystem tests have been successfully completed. The Observation Period shall not begin without the approval of the Engineer.

(B) CCTV Subsystem

During the Observation Period, the Department will observe equipment and software operation according to the requirements of the Plans and these Project Special Provisions. Verify the TRTMC can view and control the cameras and encode and decode images belonging to both TMCs.

19.5. 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 the CCTV and communications subsystems have been operated continuously and successfully for the 30-day Observation Period.

Final acceptance shall not occur until:

- All system, and operational tests have been satisfactorily completed;
- All punch-list discrepancies have been rectified; and
- All documentation has been delivered.

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Project Special Provisions Structures

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See Geotechnical special provisions for:

MSE Retaining Walls, Continuous Flight Auger Piles for Sound Barrier Walls,
Anchored Soldier Pile Walls, Soldier Pile Retaining Walls,
Concrete Barrier Rail with Moment Slab.

9/8/2014



DocuSigned by:

Laura E. Sutton

Excluding SP# 2, 5, 8, 9, 16, 20 and 21.

9/8/2014



DocuSigned by:

Terry Clelland

Excluding SP# 7, 11, 18 and 21.

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PROJECT SPECIAL PROVISIONS STRUCTURES

PROJECT U-2579B

FORSYTH COUNTY

MAINTENANCE AND PROTECTION OF TRAFFIC BENEATH PROPOSED STRUCTURE

(SPECIAL)

1.0 GENERAL

Maintain traffic on the travelways listed in Table 1 as shown in Traffic Control Plans and as directed by the Engineer.

Provide a minimum temporary vertical clearance as shown in Table 1 at all times during construction.

Table 1

Station	Travelway	Min Vertical Clearance
584+36.24 -L-	Pisgah Church Rd. (-Y2A-)	15'-0"
	West Mountain Rd. (-Y3-)	15'-0"
46+87.16 -Y4CD-	I-40 BUS / US 421 (-Y4-)	16'-6"
642+81.42 -L-	I-40 BUS / US 421	16'-6"
44+08.64 -Y4RPBD-	I-40 BUS / US 421	16'-6"

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.

2.0 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.

3.0 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.

4.0 BASIS OF PAYMENT

Payment at the contract unit prices for the various pay items will be full compensation for the above work.

TEMPORARY BENTS

(9-30-11)

When girder erection requires the use of temporary bents, design, construct, maintain and afterwards remove the temporary bents in accordance with the Standard Specifications and this Special Provision. For the purpose of this Special Provision, the term “temporary bents” includes girder erection temporary bents, vertical shoring and proprietary shoring systems.

Temporary bents for structures over railroads shall maintain a minimum horizontal clearance of 25’ from center of track.

Design temporary bents in accordance with the 1995 AASHTO Guide Design Specification for Bridge Temporary Works (including the 2008 Interim Revisions) and the Project Special Provision entitled “Falsework and Formwork”. The design calculations and detailed drawings of the structural components shall be signed and sealed by a North Carolina Registered Professional Engineer.

Submit design calculations and detailed drawings of temporary bents to the Engineer for review and approval. The detailed drawings shall show the position of the temporary bents in relationship to the existing travel way, the location of the temporary bents with respect to the ends of the girders, the top of support elevations for setting girders in the cambered position, and a girder erection procedure. For stream crossings, determine the bent stability assuming a scour depth equal to 250% of the pile diameter or width below the existing bed elevation. The Engineer may require a more detailed analysis of scour depth for temporary bents containing more than a single row of piles.

Include all material specifications for new and used materials in the detail drawings. In addition, show the location of the used materials indicating condition of the material, the location and geometry of existing but unused holes, attachments left over from previous use and any other irregularities in the material. Account for the condition of all used materials in the design calculations.

For all manufactured components, provide engineering data supplied by the manufacturer. For proprietary shoring systems, evaluate differential leg loading.

Provide access to all new and used materials for inspection prior to assembly.

Before the temporary bent is loaded, the contractor shall inspect the bent in the presence of the Engineer, and submit a written statement certifying that the erected bent complies with the approved detailed drawings. Any condition or material that does not comply with the accepted drawings, or any other condition deemed unsatisfactory by the Engineer, is cause for rejection until corrections are made.

Remove temporary bents in such a manner as to permit the structure to uniformly and gradually take the stresses due to its own weight. During removal do not disturb or otherwise damage the finished work.

Unless otherwise specified, temporary bents will not be directly measured. Payment will be full compensation at the contract unit prices for the various pay items requiring temporary bents.

PLACING LOAD ON STRUCTURE MEMBERS

(11-27-12)

The 2012 Standard Specifications shall be revised as follows:

In **Section 420-20 – Placing Load on Structure Members** replace the first sentence of the fifth paragraph with the following:

Do not place vehicles or construction equipment on a bridge deck until the deck concrete develops the minimum specified 28 day compressive strength and attains an age of at least 7 curing days.

STEEL REINFORCED ELASTOMERIC BEARINGS

(11-27-12)

The 2012 Standard Specifications shall be revised as follows:

In **Section 1079-1 – Preformed Bearing Pads** add the following after the second paragraph:

Internal holding pins are required for all shim plates when the contract plans indicate the structure contains the necessary corrosion protection for a corrosive site.

Repair laminated (reinforced) bearing pads utilizing external holding pins via vulcanization. Submit product data for repair material and a detailed application procedure to the Materials and Tests Unit for approval before use and annually thereafter.

DISC BEARINGS**(2-3-14)****1.0 GENERAL**

This item consists of furnishing, fabrication and installation of disc bearings in accordance with AASHTO LRFD Bridge Design Specifications, the Standard Specifications, the recommendations of the manufacturer, the details shown on the plans and as specified herein. Disc Bearings consist of a polyether urethane structural element (elastomeric disc) confined by upper and lower steel bearing plates. Equip disc bearings with a shear restriction mechanism (shear pin) to prevent movement of the disc. Supply disc bearings as fixed bearings and guided expansion bearings as designated by the Contract Documents.

Fixed disc bearings allow rotation but no longitudinal or transverse movement in the bearing plane. Fixed bearings consist of a steel sole plate, an elastomeric disc, a shear pin, a steel upper bearing plate, a steel lower bearing plate, a steel masonry plate, a preformed bearing pad, anchor bolts, nuts and washers.

Guided expansion disc bearings allow rotation and only longitudinal movement in the bearing plane. Guided expansion disc bearings consist of a steel sole plate, a polished stainless steel sheet welded to the bottom of the sole plate within the sliding region, a steel upper bearing plate, a layer of virgin polytetrafluoroethylene (PTFE) material bonded to the top and sides of the upper plate within the sliding regions, guide bars welded to the bottom of the sole plate surrounding the sliding region to restrict transverse movement, polished stainless steel sheets welded to the sides of the guide bars within the sliding regions, an elastomeric disc, a shear pin, a steel lower bearing plate, a steel masonry plate, a preformed bearing pad, anchor bolts, nuts, washers, pipe sleeves, a closure plate, grout and various sizes of standard pipe, and any other necessary material as detailed on the plans. Align the stainless steel sheet on the bottom of the sole plate with the PTFE material on the top of the upper bearing plate. Align the PTFE material on the sides of the upper bearing plate with the stainless steel sheets on the sides of the guide bars.

2.0 MATERIALS

Use disc bearings produced by the same manufacturer.

Use AASHTO M270 Grade 50W (345W) or Grade 50 (345) for all steel plates except the stainless steel sheets in the disc bearings. Clean, coat, and seal the plates in the disc bearing assemblies except for the areas with special facings and the areas that come in contact with the elastomer disc, in accordance with the Special Provision for “Thermal Sprayed Coatings (Metallization)”. The surfaces shall be coated to a thickness of 8 mils minimum on all external parts. Repair surfaces that are abraded or damaged after the application of metallizing in accordance with the Special Provision for “Thermal Sprayed Coatings (Metallization)”.

ST-6

U-2579B

Forsyth Co.

Provide anchor bolts and nuts in accordance with the Standard Specifications.

When the maximum plan dimension of the sheet is 12" or less, provide a stainless steel sheet in expansion disc bearings that is at least 16 gage or 1/16". When the maximum plan dimension is greater than 12", provide a stainless steel sheet that is at least 11 gage or 1/8". Ensure that all stainless steel sheets are in conformance with ASTM A240/A167 Type 304 and polished to a minimum #8 mirror surface finish.

Blast clean the surfaces of the steel sole plate and the steel guide bars that will be attached to the stainless steel sheets to a near white condition in accordance with the Standard Specifications. Position and clamp the back of the stainless steel sheets in contact with the steel sole plate and the steel guide bars. Apply the stainless steel sheets to the blast cleaned surfaces of the steel sole plate and the steel guide bars as soon as possible after blasting and before any visible oxidation of the blast cleaned surfaces occurs. Weld the stainless steel sheets continuously around the perimeter using a tungsten inert gas, wire-fed welder.

For the PTFE sheets bonded to the top and side sliding surfaces of the steel upper bearing plate, used as mating surfaces for the stainless steel sheets attached to the steel sole plate and the guide bars, provide an unfilled virgin PTFE sheet (recessed) or a glass-fiber filled PTFE sheet, resulting from skiving billets formed under hydraulic pressure and heat. Provide resin that conforms to the requirements of ASTM D4894 or D4895.

To bond the PTFE sheets and the steel upper bearing plate, use heat cured high temperature epoxy capable of withstanding temperature of -320°F to 500°F.

Weld the guide bars in expansion bearings to the bottom of the sole plate. Alternatively, integrate the guide bars and sole plate from the same piece of steel, ensuring that the required dimensions are provided. Provide 1/16" clearances between the stainless steel sheets attached to the side sliding surfaces of the guide bars and the PTFE sheet attached to the side sliding surface of the steel upper bearing plate.

Mold the polyether urethane structural element (elastomeric disc) from a polyether urethane compound. The top and bottom surfaces of the disc shall be roughened. Ensure that the physical properties of the polyether urethane conform to the following requirements:

Physical Property	ASTM Test Method	Requirements	
		Min.	Max.
Hardness, Type D Durometer	D2240	60	64
Tensile Stress psi At 100% elongation At 200% elongation	D412	2000 3700	-----
Tensile Strength psi	D412	5000	-----
Ultimate Elongation %	D412	220	-----
Compression Set % 22 hrs. at 158°F	D395	-----	40

3.0 DESIGN

Design the disc bearings for the loads and movements shown on the contract plans. However, use the anchor bolt size, length, spacing and masonry plate thickness as shown on the contract plans and provide an overall bearing height within ½ inch of the bearing assembly height shown on the contract plans. Either combine and cast the sole plate and upper bearing plate (for fixed bearings), the sole plate and guide bars (for expansion bearings), and the lower bearing plate and masonry plate (for fixed and expansion bearings) as a single unit or weld together prior to the installation of the disc.

Ensure access and removal of anchor bolt nut is not in conflict with the upper bearing plate, guide bars or sole plate.

When designing the bearings, use the following allowable bearing stresses:

On polyether urethane structural element: 5000 psi

On PTFE Sliding Surface, filled or unfilled PTFE (recessed): 3500 psi

Submit eight sets of shop drawings and one set of design calculations for review, comments and acceptance. Have a North Carolina Registered Professional Engineer check and seal the shop drawings and design calculations.

After the Engineer reviews the drawings and, if necessary, corrections are made, submit one 22" x 34" reproducible set of the working drawings.

4.0 SAMPLING AND TESTING**A. Sampling**

The manufacturer is responsible for randomly selecting and testing sample bearings from completed lots of bearings. The manufacturer is also responsible for certifying that the completed bearings and their components have been tested and are in compliance with the requirements of this Special Provision. The manufacturer shall furnish the results of the tests to the Materials and Tests Engineer.

B. Testing**1. Proof Load Test**

Load a test bearing to 150% of the bearing's rated design capacity and simultaneously subject it to a rotational range of 0.02 radians (1.146°) for a period of 1 hour.

Have the bearing visually examined both during the test and upon disassembly after the test. Any resultant visual defects, such as extruded or deformed elastomer or PTFE, damaged seals or rings, or cracked steel is cause for rejection.

Keep continuous and uniform contact between the polyether urethane element and the bearing plates and between the stainless steel sheets and the PTFE sheets (for expansion bearings) for the duration of the test. Any observed lift-off or separation is cause for rejection.

2. Sliding Coefficient of Friction

For all guided expansion bearings, measure the sliding coefficient of friction at the bearing's design capacity in accordance with the test method described below, and on the fifth and fiftieth cycles, at a sliding speed of 1 in/min.

Calculate the sliding coefficient of friction as the horizontal load required to maintain continuous sliding of one bearing, divided by the bearing's vertical design capacity.

The test results are evaluated as follows:

A maximum measured sliding coefficient of friction of 3%.

A visual examination both during and after the test. Any resultant visual defects, such as bond failure, physical destruction, cold flow of PTFE to the point of debonding, or damaged components is cause for rejection of the lot.

Using undamaged test bearings in the work is permitted.

3. Test Method

The test method and equipment shall meet the following requirements:

- a. Arrange the test to determine the coefficient of friction on the first movement of the manufactured bearing.
- b. Clean the bearing surface prior to testing.
- c. Conduct the test at maximum working stress for the PTFE surface with the test load applied continuously for 12 hours prior to measuring friction.
- d. Determine the first movement static and dynamic coefficient of friction of the test bearing at a sliding speed of less than 1 in/min, not to exceed:

0.04	unfilled PTFE
0.08	filled PTFE
- e. Subject the bearing specimen to 100 movements of at least 1 inch of relative movement and, if the test facility permits, the full design movement at a speed of less than 1 ft/min. Following this test determine the static and kinetic coefficient of friction again. The specimen is considered a failure if it exceeds the values measured in (d) above or if it shows any signs of bond failure or other defects.

Bearings represented by test specimens passing the above requirements are approved for use in the structure subject to on-site inspection for visible defects.

5.0 INSTALLATION

Store disc bearings delivered to the bridge site upright and under cover on a platform above the ground surface. Protect the bearings from injury at all times and, before placing the bearings, dry and clean all dirt, oil, grease or other foreign substances from the bearing. Do not disassemble the bearings during installation, except at the manufacturer's direction. Lift bearing assemblies by their bottom surfaces only, unless lifting brackets that have been designed and approved by the manufacturer are used. Ensure that the polyether urethane disc is not exposed to direct flame or sparks. Place the bearings in accordance with the recommendations of the manufacturer, Contract Drawings, and as directed by the Engineer. If there is any discrepancy between the recommendations of the manufacturer, Special Provisions, and Contract Drawings, the Engineer is the sole judge in reconciling any such discrepancy.

Provide preformed bearing pads under the masonry plates in accordance with Article 1079-1 of the Standard Specifications.

Do not install any bearing before the Engineer approves it.

6.0 BASIS OF PAYMENT

Payment for all disc bearings will be at the lump sum contract price bid for “Disc Bearings” which includes full compensation for furnishing all disc bearings, labor, materials, tools, equipment, testing and incidentals required to complete the work in accordance with the Standard Specifications, this Special Provision, the manufacturer’s requirements and as directed by the Engineer.

THERMAL SPRAYED COATINGS (METALLIZATION)**(9-30-11)****1.0 DESCRIPTION**

Apply a thermal sprayed coating (TSC) and sealer to metal surfaces as specified herein when called for on the plans or by other Special Provisions, or when otherwise approved by the Engineer in accordance with the SSPC-CS 23.00/AWS C2.23/NACE No. 12 Specification. Only Arc Sprayed application methods are used to apply TSC coatings, the Engineer must approve other methods of application.

2.0 QUALIFICATIONS

Only use NCDOT approved TSC Contractors meeting the following requirements:

1. The capability of blast cleaning steel surfaces to SSPC SP-5 and SP-10 Finishes.
2. Employ Spray Operator(s) qualified in accordance with AWS C.16/C2.16M2002 and Quality Control Inspector(s) who have documented training in the applicable test procedures of ASTM D-3276 and SSPC-CS 23.00.

A summary of the contractor’s related work experience and the documents verifying each Spray Operator’s and Quality Control Inspector’s qualifications are submitted to the Engineer before any work is performed.

3.0 MATERIALS

Provide wire in accordance with the metallizing equipment manufacturer’s recommendations. Use the wire alloy specified on the plans which meets the requirements in Annex C of the SSPC-CS 23.00 Specification. Have the contractor provide a certified analysis (NCDOT Type 2 Certification) for each lot of wire material.

Apply an approved sealer to all metallized surfaces in accordance with Section 9 of SSPC-CS 23. The sealer must either meet SSPC Paint 27 or is an alternate approved by the Engineer.

4.0 SURFACE PREPARATION AND TSC APPLICATION

Grind flame cut edges to remove the carbonized surface prior to blasting. Bevel all flame cut edges in accordance with Article 442-10(D) regardless of included angle. Blast clean surfaces to be metallized with grit or mineral abrasive in accordance with Steel Structures Painting Council SSPC SP-5/10(as specified) to impart an angular surface profile of 2.5 - 4.0 mils. Surface preparation hold times are in accordance with Section 7.32 of SSPC-CS 23. If flash rusting occurs prior to metallizing, blast clean the metal surface again. Apply the thermal sprayed coating only when the surface temperature of the steel is at least 5°F above the dew point.

At the beginning of each work period or shift, conduct bend tests in accordance with Section 6.5 of SSPC-CS 23.00. Any disbonding or delamination of the coating that exposes the substrate requires corrective action, additional testing, and the Engineer’s approval before resuming the metallizing process.

Apply TSC with the alloy to the thickness specified on the plans or as provided in the table below. All spot results (the average of 3 to 5 readings) must meet the minimum requirement. No additional tolerance (as allowed by SSPC PA-2) is permitted. (For Steel Beams: For pieces with less than 200 ft² measure 2 spots/surface per piece and for pieces greater than 200 ft² add 1 additional spots/surface for each 500 ft²).

Application	Thickness	Alloy	Seal Coat
Pot Bearings	8 mil	85/15 Zinc (W-Zn-Al-2)	0.5 mil
Armored Joint Angles	8 mil	85/15 Zinc (W-Zn-Al-2)	0.5 mil
Modular Joints	8 mil	99.99% Zn (W-Zn-1)	0.5 mil
Expansion Joint Seals	8 mil	99.99% Zn (W-Zn-1)	0.5 mil
Optional Disc Bearings	8 mil	85/15 Zinc (W-Zn-Al-2)	0.5 mil

When noted on the plans or as specified in the above chart, apply the sealer to all metallized surfaces in accordance with the manufacturer’s recommendations and these provisions. Apply the seal coat only when the air temperature is above 40°F and the surface temperature of the steel is at least 5°F above the dew point. If the sealer is not applied within eight hours after the final application of TSC, the applicator verifies acceptable TSC surfaces and obtains approval from the Engineer before applying the sealer.

5.0 INSPECTION FREQUENCY

The TSC Contractor must conduct the following tests at the specified frequency and the results documented in a format approved by the Engineer.

Test/Standard	Location	Frequency	Specification
Ambient Conditions	Site	Each Process	5°F above the dew point
Abrasive Properties	Site	Each Day	Size, angularity, cleanliness
Surface Cleanliness SSPC Vis 1	All Surfaces	Visual All Surfaces	SSPC-SP-10 Atmospheric Service SSPC-SP - 5 Immersion Service
Surface Profile ASTM D-4417 Method C	Random Surfaces	3 per 500 ft ²	2.5 - 4.0 mils
Bend Test SSPC-CS 23.00	Site	5 per shift	Pass Visual
Thickness SSPC PA-2R SSPC-CS 23.00	Each Surface	Use the method in PA-2 Appendix 3 for Girders and Appendix 4 for frames and miscellaneous steel. See Note 1.	Zn - 8 mils minimum Al - 8 mils minimum Zn Al - 8 mils minimum Areas with more than twice the minimum thickness are inspected for compliance to the adhesion and cut testing requirements of this specification.
Adhesion ASTM 4541	Random Surfaces Splice Areas	1 set of 3 per 500 ft ²	Zn > 500 psi Al > 1000 psi Zn Al > 750 psi
Cut Test - SSPC-CS 23.00	Random Surfaces	3 sets of 3 per 500 ft ²	No peeling or delamination
Job Reference Std. SSPC-CS 23.00	Site	1 per job	Meets all the above requirements

6.0 REPAIRS

All Repairs are to be performed in accordance with the procedures below, depending on whether the repair surface is hidden or exposed. As an exception to the following, field welded splices on joint angles and field welding bearing plates to girders may be repaired in accordance with the procedures for hidden surfaces.

For hidden surfaces (including but not limited to interior girders, interior faces of exterior girders, and below-grade sections of piles):

1. Welding of metallized surfaces may be performed only if specifically permitted by the Engineer. Remove metallizing at the location of field welds by blast cleaning (SSPC SP-6

finish), or hand (SSPC SP-2 finish) or power tool cleaning (SSPC SP-3 finish) just prior to welding. Clean sufficiently to prevent contamination of the weld. All repairs to welded connections are metallized in accordance with SSPC CS 23.00.

2. Minor areas less than or equal to 0.1 ft² exposing the substrate are metallized in accordance with SSPC CS 23.00 or painted in accordance with ASTM A780, "Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings."
3. Large areas greater than 0.1 ft² exposing the substrate are metallized in accordance with SSPC CS 23.00.
4. Damaged (burnished) areas not exposing the substrate with less than the specified coating thickness are metallized in accordance with SSPC CS 23.00 or painted in accordance with ASTM A780, "Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings."
5. Damaged (burnished) areas not exposing the substrate with more than the specified coating thickness are not repaired.
6. Defective coating is repaired by either method 2 or 3 depending on the area of the defect.

For Exposed Surfaces (including but not limited to exterior faces of exterior girders and above-grade sections of piles):

1. Welding of metallized surfaces may be performed only if specifically permitted by the Engineer. Remove metallization at the location of field welds by blast cleaning (SSPC SP-6 finish), or hand (SSPC SP-2 finish) or power tool cleaning (SSPC SP-3 finish) just prior to welding. Clean sufficiently to prevent contamination of the weld. All repairs to welded connections are metallized in accordance with SSPC CS 23.00.
2. All areas exposing the substrate are metallized in accordance with SSPC CS 23.00
3. Defective coating is repaired by either method 2 or 3 depending on the area of the defect.

7.0 TWELVE MONTH OBSERVATION PERIOD

The contractor maintains responsibility for the coating system for a twelve (12) month observation period beginning upon the satisfactory completion of all the work required in the plans or as directed by the engineer. The contractor must guarantee the coating system under the payment and performance bond (refer to Article 109-10). To successfully complete the observation period, the coating system must meet the following requirements after twelve(12) months service:

- No visible rust, contamination or application defect is observed in any coated area.
- Painted surfaces have a uniform color and gloss.
- Surfaces have an adhesion of no less than 500 psi when tested in accordance with ASTM D-4541.

8.0 BASIS OF PAYMENT

The contract price bid for the bridge component to which the coating is applied will be full compensation for the thermal sprayed coating.

SAND LIGHTWEIGHT CONCRETE

(9-30-11)

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 4500 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).

Determine the soundness in accordance with AASHTO T104. Loss of more than 10% of the lightweight aggregate in five 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.

ELASTOMERIC CONCRETE

(9-27-12)

1.0 DESCRIPTION

Elastomeric concrete is a mixture of a two-part polymer consisting of polyurethane and/or epoxy and kiln-dried aggregate. Provide an elastomeric concrete and binder system that is preapproved. Use the concrete in the blocked out areas on both sides of the bridge deck joints as indicated on the plans.

2.0 MATERIALS

Provide materials that comply with the following minimum requirements at 14 days (or at the end of the specified curing time).

ELASTOMERIC CONCRETE PROPERTIES	TEST METHOD	MINIMUM REQUIREMENT
Compressive Strength, psi	<i>ASTM D695</i>	2000
5% Deflection Resilience	ASTM D695	95
Splitting Tensile Strength, psi	ASTM D3967	625
Bond Strength to Concrete, psi	ASTM D882 (D882M)	450
Durometer Hardness	ASTM D2240	50

BINDER PROPERTIES (without aggregate)	TEST METHOD	MINIMUM REQUIREMENT
Tensile Strength, psi	ASTM D638	1000
Ultimate Elongation	ASTM D638	150%
Tear Resistance, lb/in	ASTM D624	200

In addition to the requirements above, the elastomeric concrete must be resistant to water, chemical, UV and ozone exposure and withstand temperature extremes. Elastomeric concrete systems requiring preheated aggregates are not allowed.

3.0 PREQUALIFICATION

Manufacturers of elastomeric concrete materials shall submit samples (including aggregate, primer and binder materials) and a Type 3 certification in accordance with Article 106-3 of the Standard Specifications for prequalification to:

North Carolina Department of Transportation
Materials and Tests Unit
1801 Blue Ridge Road
Raleigh, NC 27607

Prequalification will be determined for the system. Individual components will not be evaluated, nor will individual components of previously evaluated systems be deemed prequalified for use.

The submitted binder (a minimum volume of 1 gallon) and corresponding aggregate samples will be evaluated for compliance with the Materials requirements specified above. Systems satisfying all of the Materials requirements will be prequalified for a one year period. Before the end of this period new product samples shall be resubmitted for prequalification evaluation.

If, at any time, any formulation or component modifications are made to a prequalified system that system will no longer be approved for use.

4.0 INSTALLATION

The elastomeric concrete shall not be placed until the reinforced concrete deck slab has cured for seven full days and reached a minimum strength of 3000 psi.

Provide a manufacturer's representative at the bridge site during the installation of the elastomeric concrete to ensure that all steps being performed comply with all manufacturer installation requirements including, but not limited to weather conditions (ambient temperature, relative humidity, precipitation, wind, etc), concrete deck surface preparation, binder and aggregate mixing, primer application, elastomeric concrete placement, curing conditions and minimum curing time before joint exposure to traffic. Do not place elastomeric concrete if the ambient air or surface temperature is below 45°F.

Prepare the concrete surface within 48 hours prior to placing the elastomeric concrete. Before placing the elastomeric concrete, all concrete surfaces shall be thoroughly cleaned and dry. Sandblast the concrete surface in the blockout and clear the surface of all loose debris. Do not place the elastomeric concrete until the surface preparation is completed and approved.

Prepare and apply a primer, as per manufacturer's recommendations, to all concrete faces to be in contact with elastomeric concrete, and to areas specified by the manufacturer.

Prepare, batch, and place the elastomeric concrete in accordance with the manufacturer's instructions. Place the elastomeric concrete in the areas specified on the plans while the primer is still tacky and within 2 hours after applying the primer. Trowel the elastomeric concrete to a smooth finish.

The joint opening in the elastomeric concrete shall match the formed opening in the concrete deck prior to sawing the joint.

5.0 FIELD SAMPLING

Provide additional production material to allow freshly mixed elastomeric concrete to be sampled for acceptance. A minimum of six 2 inch cube molds and three 3x6 inch cylinders will be taken by the Department for each day's production. Compression, splitting tensile, and durometer hardness testing will be performed by the Department to determine acceptance. Materials failing to meet the requirements listed above are subject to removal and replacement at no cost to the Department.

6.0 BASIS OF PAYMENT

No separate payment will be made for elastomeric concrete. The lump sum contract price bid for "Foam Joint Seals" will be full compensation for furnishing and placing the Elastomeric Concrete.

FOAM JOINT SEALS

(9-27-12)

1.0 SEALS

Use preformed seals compatible with concrete and resistant to abrasion, oxidation, oils, gasoline, salt and other materials that are spilled on or applied to the surface. Use a resilient, UV stable, preformed, impermeable, flexible, expansion joint seal. The joint seal shall consist of low-density, closed cell, cross-linked polyethylene non-extrudable, foam. The joint seal shall contain no EVA (Ethylene Vinyl Acetate). Cell generation shall be achieved by being physically blown using nitrogen. No chemical blowing agents shall be used in the cell generation process.

Use seals manufactured with grooves 1/8"± wide by 1/8"± deep and spaced between 1/4" and 1/2" apart along the bond surface running the length of the joint. Use seals with a depth that meets the manufacturer's recommendation, but is not less than 70% of the uncompressed width. Provide a seal designed so that, when compressed, the center portion of the top does not extend upward above the original height of the seal by more than 1/4".

Provide a seal that has a working range of 30% tension and 60% compression and meets the requirements given below.

TEST	TEST METHOD	REQUIREMENT
Tensile strength	ASTM D3575-08, Suffix T	110 – 130 psi
Compression Set	ASTM D1056 Suffix B, 2 hr recovery	10% - 16%
Water Absorption	ASTM D3575	< 0.03 lb/ft ²
Elongation at Break	ASTM D3575	180% - 210%
Tear Strength	ASTM D624 (D3575-08, Suffix G)	14 – 20 pli
Density	ASTM D3575-08, Suffix W, Method A	1.8 – 2.2 lb/ft ³
Toxicity	ISO-10993.5	Pass (not cytotoxic)

Have the top of the joint seal clearly shop marked. Inspect the joint seals upon receipt to ensure that the marks are clearly visible before installation.

2.0 BONDING ADHESIVE

Use a two component, 100% solid, modified epoxy adhesive supplied by the joint seal manufacturer that meets the requirements given below.

TEST	TEST METHOD	REQUIREMENT
Tensile strength	ASTM D638	3000 psi (min.)
Compressive strength	ASTM D695	7000 psi (min.)
Hardness	Shore D Scale	75-85 psi
Water Absorption	ASTM D570	0.25% by weight max.
Elongation to Break	ASTM D638	5% (max.)
Bond Strength	ASTM C882	2000 psi (min.)

Use an adhesive that is workable to 40°F. When installing in ambient air or surface temperatures below 40°F or for application on moist, difficult to dry concrete surfaces, use an adhesive specified by the manufacturer of the joint seal.

3.0 SAWING THE JOINT

The joint opening shall be initially formed to the width shown on the plans including the blockout for the elastomeric concrete.

The elastomeric concrete shall have sufficient time to cure such that no damage can occur to the elastomeric concrete prior to sawing to the final width and depth as specified in the plans.

When sawing the joint to receive the foam seal, always use a rigid guide to control the saw in the desired direction. To control the saw and to produce a straight line as indicated on the plans, anchor and positively connect a template or a track to the bridge deck. Do not saw the joint by visual means such as a chalk line. Fill the holes used for holding the template or track to the deck with an approved, flowable non-shrink, non-metallic grout.

Saw cut to the desired width and depth in one or two passes of the saw by placing and spacing two metal blades on the saw shaft to the desired width for the joint opening.

The desired depth is the depth of the seal plus 1/4" above the top of the seal plus approximately 1" below the bottom of the seal. An irregular bottom of sawed joint is permitted as indicated on the plans. Grind exposed corners on saw cut edges to a 1/4" chamfer.

Saw cut a straight joint, centered over the formed opening and to the desired width specified in the plans. Prevent any chipping or damage to the sawed edges of the joint.

Remove any staining or deposited material resulting from sawing with a wet blade to the satisfaction of the Engineer.

4.0 PREPARATION OF SAWED JOINT FOR SEAL INSTALLATION

The elastomeric concrete shall cure a minimum of 24 hours prior to seal installation.

After sawing the joint, the Engineer will thoroughly inspect the sawed joint opening for spalls, popouts, cracks, etc. All necessary repairs will be made by the Contractor prior to blast cleaning and installing the seal.

Clean the joints by sandblasting with clean dry sand immediately before placing the bonding agent. Sandblast the joint opening to provide a firm, clean joint surface free of curing compound, loose material and any foreign matter. Sandblast the joint opening without causing pitting or uneven surfaces. The aggregate in the elastomeric concrete may be exposed after sandblasting.

After blasting, either brush the surface with clean brushes made of hair, bristle or fiber, blow the surface with compressed air, or vacuum the surface until all traces of blast products and abrasives are removed from the surface, pockets, and corners.

If nozzle blasting is used to clean the joint opening, use compressed air that does not contain detrimental amounts of water or oil.

Examine the blast cleaned surface and remove any traces of oil, grease or smudge deposited in the cleaning operations.

Bond the seal to the blast cleaned surface on the same day the surface is blast cleaned.

5.0 SEAL INSTALLATION

Install the joint seal according to the manufacturer's procedures and recommendations and as recommended below. Do not install the joint seal if the ambient air or surface temperature is below 45°F. Have a manufacturer's certified trained factory representative present during the installation of the first seal of the project.

Before installing the joint seal, check the uninstalled seal length to insure the seal is the same length as the deck opening. When the joint seal requires splicing, use the heat welding method by placing the joint material ends against a teflon heating iron of 425-475°F for 7 - 10 seconds, then pressing the ends together tightly. Do not test the welding until the material has completely cooled.

Begin installation by protecting the top edges of the concrete deck adjacent to the vertical walls of the joint as a means to minimize clean up. After opening both cans of the bonding agent, stir each can using separate stirring rods for each component to prevent premature curing of the bonding agent. Pour the two components, at the specified mixing ratio, into a clean mixing bucket. Mix the components with a low speed drill (400 rpm max.) until a uniform gray color is achieved without visible marbling. Apply bonding agent to both sides of the elastomeric concrete as well as both sides of the joint seal, making certain to completely fill the grooves with epoxy. With gloved hands, compress the joint seal and with the help of a blunt probe, push the seal into the joint opening until the seal is recessed approximately 1/4" below the surface. When pushing down on the joint seal, apply pressure only in a downward direction. Do not push the joint seal into the joint opening at an angle that would stretch the material. Seals that are stretched during installation shall be removed and rejected. Once work on placing a seal begins, do not stop until it is completed. Clean the excess epoxy from the top of the joint seal immediately with a trowel. Do not use solvents or any cleaners to remove the excess epoxy from the top of the seal. Remove the protective cover at the joint edges and check for any excess epoxy on the surface. Remove excess epoxy with a trowel, the use of solvents or any cleaners will not be allowed.

The installed system shall be watertight and will be monitored until final inspection and approval. Do not place pavement markings on top of foam joint seals.

6.0 BASIS OF PAYMENT

Payment for all foam joint seals will be at the lump sum contract price bid for "Foam Joint Seals". Prices and payment will be full compensation for furnishing all material, including elastomeric concrete, labor, tools and equipment necessary for installing these units in place and accepted.

EXPANSION JOINT SEALS

(9-30-11)

1.0 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.

2.0 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 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.

3.0 SHOP DRAWINGS

Submit nine sets of working drawings to the Engineer for review, comments and acceptance. Show complete details drawn to scale and include:

- The proposed template details including the makeup of the template
- The proposed method of holding the base angle assembly in place while concrete is cast around it
- The proposed procedure to correct for the effects of beam movement and rotation when setting width of joint opening
- The proposed chronology of installation including the sequence and direction of the concrete casting
- 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.
- The proposed method for removing the hold-down plate
- 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.

4.0 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.

5.0 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.

Watertight Integrity Test

- 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.
- 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.
- 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.

- 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.

6.0 BASIS OF PAYMENT

Basis of payment for all expansion joint seals will be at the lump sum contract price for "Expansion Joint Seals" which price and 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.

SOUND BARRIER WALL**(12-12-13)****1.0 DESCRIPTION**

This work consists of furnishing precast panels, structural steel, concrete, and all other materials; handling, transporting, fabricating, galvanizing, and storing materials; furnishing erection drawings, pile excavation, backfilling, erecting and installing the sound barrier wall members and all other materials as required by the plans, Standard Specifications and this Special Provision.

The Standard Plans allow a pile spacing of 10, 15 or 20 feet. Pile spacing greater than 15 feet will not be allowed for standard precast concrete panels. Provide consistent pile spacing the entire length of the wall. Use odd pile spacing, if necessary, only at the ends of the wall and at turning points as approved by the Engineer.

A maximum one foot drop or rise in elevation between wall sections is permitted. Elevation changes greater than one foot, if necessary, will be allowed only at the end of the wall. Top of wall elevation changes that result in a jagged appearance will not be allowed.

2.0 ALTERNATE PILE SPACING FOR STANDARD PRECAST PANELS

As an alternate, the Contractor may submit plans for pile spacing greater than 10 feet and less than 15 feet for review and approval. The excavated diameter, excavation depth and reinforcing steel shall be equal to the amount shown on the existing plans for the 15 feet pile spacing. A variance in the reinforcing steel will be allowed for the length of horizontal and number of vertical reinforcement bars in the precast panel for the alternate pile spacing.

Submit two sets of detailed plans for review. Include all details in the plans, including the size and spacing of required reinforcement necessary to fabricate the precast panels. Have a North Carolina Registered Professional Engineer check, seal and date the plans. After the plans are reviewed and, if necessary, the corrections made, submit one set of reproducible tracings in electronically sealed 22" x 34" PDFs to become part of the contract plans.

3.0 ALTERNATE WALL TYPE

Walls that have been assigned “Approved” or “Approved for Provisional Use” status by the Product Evaluation Program will be considered for substitution to the detailed Standard Sound Barrier Wall only when noted on the plans. Alternate wall types, piles and pile spacing must meet the design and construction requirements of the project. Pile spacing greater than 20 feet will not be permitted. Alternate pile and wall structural stability and connection details shall conform to the current edition of the AASHTO LRFD Bridge Design Specifications.

Prior to submittal of Working Drawings, as described herein, submit a copy of the signed NCDOT Product Status Notification Letter and two sets of preliminary plans for review and approval. Include material specifications for all components. Once preliminary plans are approved, submit Working Drawings in accordance with all applicable portions of the requirements herein, including details necessary to fabricate and construct the proposed alternate.

Have a North Carolina Registered Professional Engineer check, seal and date the plans and, when requested, calculations. After the plans are reviewed and, if necessary, corrections made, submit one set of reproducible tracings on 22” x 34” sheets to become part of the contract plans.

4.0 MATERIALS AND FABRICATION OF STANDARD PRECAST PANELS

Provide materials and fabricate members in accordance with the requirements of Division 10 of the Standard Specifications for Roads and Structures.

Provide precast panels that are 4 inches \pm ¼ inch thick with an exposed aggregate finish on one face. The panel face with the aggregate finish shall be installed facing the roadway. The depth of the exposure is required to range from 0 to ¼ inch. Furnish three 12" x 12" samples for approval which establish the acceptable variations in color, texture, and uniformity. After the color, texture, and uniformity of the furnished samples are approved, produce a full scale panel unit meeting design requirements. This mock-up and the furnished samples establish the standard quality for determining acceptance of the panels. When producing the final installed panels, use fine and coarse aggregate, retarder, and cement from the same source as those used in the approved sample panels.

5.0 CONSTRUCTION METHODS

Complete the final survey of existing ground profile after clearing the wall area but prior to submitting any working drawings. Submit the final groundline survey with the working drawings.

If the Department is responsible for the survey, the Engineer field verifies the existing ground profile along the sound barrier wall. Contact the Engineer to obtain the survey information. Otherwise, complete the existing ground survey prior to submittal of working drawings.

Excavate holes with the diameters shown on the plans. Perform pile excavation to the depths shown on the plans and install piles as shown on the plans or in the accepted submittals with a tolerance of 1/2 inch per foot from vertical. Backfill excavations with concrete after placing piles.

A. Pile Excavation

Use equipment of adequate capacity and capable of drilling through soil and non-soil including rock, boulders, debris, man-made objects and any other materials encountered. Blasting is not permitted to advance the excavation. Blasting for core removal is only permitted when approved by the Engineer. Dispose of drilling spoils in accordance with Section 802 of the Standard Specifications and as directed by the Engineer. Drilling spoils consist of all excavated material including water removed from the excavation either by pumping or drilling tools.

If unstable, caving or sloughing soils are anticipated or encountered, stabilize excavations with either slurry or steel casing. When using slurry, submit slurry details including product information, manufacturer's recommendations for use, slurry equipment information and written approval from the slurry supplier that the mixing water is acceptable before beginning drilling. When using steel casing, use either the sectional type or one continuous corrugated or non-corrugated piece. Steel casings should consist of clean watertight steel of ample strength to withstand handling and driving stresses and the pressures imposed by concrete, earth or backfill. Use steel casings with an outside diameter equal to the hole size and a minimum wall thickness of 1/4 inch.

B. Concrete Placement

Before placing concrete, center and support the pile in the excavation and check the water inflow rate in the excavation after any pumps have been removed. If the inflow rate is less than 6 inches per half hour, remove any water and free fall the concrete into the excavation. Ensure that concrete flows completely around the pile. If the water inflow rate is greater than 6 inches per half hour, propose a concrete placement procedure to the Engineer. The Engineer shall approve the concrete placement procedure before placing concrete.

Fill the excavation with Class A concrete in accordance with Section 1000 of the Standard Specifications except as modified herein. Provide concrete with a slump of 6 to 8 inches. Use an approved high-range water reducer to achieve this slump. Place concrete in a continuous manner and remove all casings.

6.0 WORKING DRAWINGS

Submit casting drawings for the precast face panels for approval in accordance with Article 1077-2 of the Standard Specifications prior to casting. Show the inserts, method of handling, and support details used for transportation on casting drawings. Submit metalwork fabrication drawings for approval prior to fabrication of steel wall components. Submit an erection plan and concrete face panel placing plan, including location of various

heights of panels, for review and acceptance prior to fabrication of metalwork. Submit five sets of detail drawings.

7.0 METHOD OF MEASUREMENT

The quantity of sound barrier wall to be paid for will be the actual square feet of precast panels used in the completed and accepted wall. Measurement will be made of the total area of precast panels used in the wall.

8.0 BASIS OF PAYMENT

The quantity of sound barrier wall, measured as provided above, will be paid for at the contract unit price bid per square foot for "Sound Barrier Wall".

The unit price bid per square foot will be full compensation for all work covered by this Special Provision including, but not limited to, furnishing precast panels, structural steel, concrete, and all other materials; handling, transporting, fabricating, galvanizing, and storing materials; furnishing erection drawings, backfilling, pile excavation including any casing or slurry, and erecting and installing the sound barrier wall members.

Payment will be made under:

Sound Barrier Wall..... Square Foot

FALSEWORK AND FORMWORK

(4-5-12)

1.0 DESCRIPTION

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.

2.0 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.

3.0 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. Submit the number of copies as called for by the contract.

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. Screenshot 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 1/2" from the edge of the top flange. Hanger hardware and rods must have a minimum safe working load of 6,000 lbs.

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 3/4".

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 1995 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 damage to the surface.

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.

4.0 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.

5.0 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.

6.0 METHOD OF MEASUREMENT

Unless otherwise specified, temporary works will not be directly measured.

7.0 BASIS OF PAYMENT

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**(8-9-13)****1.0 GENERAL**

Submit working drawings in accordance with Article 105-2 of the *Standard Specifications* and this provision. For this provision, "submittals" refers to only those listed in this 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 Resident Engineer. Either the Structure Design 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 Resident 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 Resident Engineer, Structure Design Unit contacts or the Geotechnical Engineering Unit contacts noted below.

In order 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.

2.0 ADDRESSES AND CONTACTS

For submittals to the Structure Design Unit, use the following addresses:

Via US mail:

Via other delivery service:

Mr. G. R. Perfetti, P. E.
State Structures Engineer
North Carolina Department
of Transportation
Structures Management Unit
1581 Mail Service Center
Raleigh, NC 27699-1581

Mr. G. R. Perfetti, P. E.
State Structures Engineer
North Carolina Department
of Transportation
Structures Management Unit
1000 Birch Ridge Drive
Raleigh, NC 27610

Attention: Mr. P. D. Lambert, P. E.

Attention: Mr. P. D. Lambert, P. E.

Submittals may also be made via email.

Send submittals to:

plambert@ncdot.gov (Paul Lambert)

Send an additional e-copy of the submittal to the following address:

jgaither@ncdot.gov (James Gaither)

jlbolden@ncdot.gov (James Bolden)

For submittals to the Geotechnical Engineering Unit, use the following addresses:

For projects in Divisions 1-7, use the following Eastern Regional Office address:

Via US mail:

Mr. K. J. Kim, Ph. D., P. E.
 Eastern Regional Geotechnical
 Manager
 North Carolina Department
 of Transportation
 Geotechnical Engineering Unit
 Eastern Regional Office
 1570 Mail Service Center
 Raleigh, NC 27699-1570

Via other delivery service:

Mr. K. J. Kim, Ph. D., P. E.
 Eastern Regional Geotechnical
 Manager
 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 address:

Via US mail:

Mr. Eric Williams, P. E.
 Western Regional Geotechnical
 Manager
 North Carolina Department
 of Transportation
 Geotechnical Engineering Unit
 Western Regional Office
 5253 Z Max Boulevard
 Harrisburg, NC 28075

Via other delivery service:

Mr. Eric Williams, P. E.
 Western Region Geotechnical
 Manager
 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 Structure Design Unit can be viewed from the Unit's web site, via the "Contractor Submittal" link.

Direct any questions concerning submittal review status, review comments or drawing markups to the following contacts:

Primary Structures Contact:

Paul Lambert (919) 707 – 6407
 (919) 250 – 4082 facsimile
plambert@ncdot.gov

Secondary Structures Contacts:

James Gaither (919) 707 – 6409
 James Bolden (919) 707 – 6408

Eastern Regional Geotechnical Contact (Divisions 1-7):

K. J. Kim (919) 662 – 4710
 (919) 662 – 3095 facsimile
kkim@ncdot.gov

Western Regional Geotechnical Contact (Divisions 8-14):

Eric Williams (704) 455 – 8902
 (704) 455 – 8912 facsimile
ewilliams@ncdot.gov

3.0 SUBMITTAL COPIES

- Furnish one complete copy of each submittal, including all attachments, to the Resident Engineer. At the same time, submit the number of hard copies shown below of the same complete submittal directly to the Structure Design Unit and/or the Geotechnical Engineering Unit.
- The first table below covers “Structure Submittals”. The Resident Engineer will receive review comments and drawing markups for these submittals from the Structure Design Unit. The second table in this section covers “Geotechnical Submittals”. The Resident 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 Structure Design 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	Copies Required by Structure Design Unit	Copies Required by Geotechnical Engineering Unit	Contract Reference Requiring Submittal ¹
Arch Culvert Falsework	5	0	Plan Note, SN Sheet & “Falsework and Formwork”
Box Culvert Falsework ⁷	5	0	Plan Note, SN Sheet & “Falsework and Formwork”
Cofferdams	6	2	Article 410-4
Foam Joint Seals ⁶	9	0	“Foam Joint Seals”
Expansion Joint Seals (hold down plate type with base angle)	9	0	“Expansion Joint Seals”
Expansion Joint Seals (modular)	2, then 9	0	“Modular Expansion Joint Seals”
Expansion Joint Seals (strip seals)	9	0	“Strip Seals”

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Falsework & Forms ² (substructure)	8	0	Article 420-3 & “Falsework and Formwork”
Falsework & Forms (superstructure)	8	0	Article 420-3 & “Falsework and Formwork”
Girder Erection over Railroad	5	0	Railroad Provisions
Maintenance and Protection of Traffic Beneath Proposed Structure	8	0	“Maintenance and Protection of Traffic Beneath Proposed Structure at Station ____”
Metal Bridge Railing	8	0	Plan Note
Metal Stay-in-Place Forms	8	0	Article 420-3
Metalwork for Elastomeric Bearings ^{4,5}	7	0	Article 1072-8
Miscellaneous Metalwork ^{4,5}	7	0	Article 1072-8
Optional Disc Bearings ⁴	8	0	“Optional Disc Bearings”
Overhead and Digital Message Signs (DMS) (metalwork and foundations)	13	0	Applicable Provisions
Placement of Equipment on Structures (cranes, etc.)	7	0	Article 420-20
Pot Bearings ⁴	8	0	“Pot Bearings”
Precast Concrete Box Culverts	2, then 1 reproducible	0	“Optional Precast Reinforced Concrete Box Culvert at Station ____”
Prestressed Concrete Cored Slab (detensioning sequences) ³	6	0	Article 1078-11
Prestressed Concrete Deck Panels	6 and 1 reproducible	0	Article 420-3
Prestressed Concrete Girder (strand elongation and detensioning sequences)	6	0	Articles 1078-8 and 1078- 11
Removal of Existing Structure over Railroad	5	0	Railroad Provisions
Revised Bridge Deck Plans (adaptation to prestressed deck panels)	2, then 1 reproducible	0	Article 420-3

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Revised Bridge Deck Plans (adaptation to modular expansion joint seals)	2, then 1 reproducible	0	“Modular Expansion Joint Seals”
Sound Barrier Wall (precast items)	10	0	Article 1077-2 & “Sound Barrier Wall”
Sound Barrier Wall Steel Fabrication Plans ⁵	7	0	Article 1072-8 & “Sound Barrier Wall”
Structural Steel ⁴	2, then 7	0	Article 1072-8
Temporary Detour Structures	10	2	Article 400-3 & “Construction, Maintenance and Removal of Temporary Structure at Station _____”
TFE Expansion Bearings ⁴	8	0	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 Structure Design 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	Copies Required by Geotechnical Engineering Unit	Copies Required by Structure Design Unit	Contract Reference Requiring Submittal ¹
Drilled Pier Construction Plans ²	1	0	Subarticle 411-3(A)
Crosshole Sonic Logging (CSL) Reports ²	1	0	Subarticle 411-5(A)(2)
Pile Driving Equipment Data Forms ^{2,3}	1	0	Subarticle 450-3(D)(2)
Pile Driving Analyzer (PDA) Reports ²	1	0	Subarticle 450-3(F)(3)
Retaining Walls ⁴	8 drawings, 2 calculations	2 drawings	Applicable Provisions
Temporary Shoring ⁴	5 drawings, 2 calculations	2 drawings	“Temporary Shoring” & “Temporary Soil Nail Walls”

FOOTNOTES

- 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*.
- Submit one hard copy of submittal to the Resident or Bridge Maintenance Engineer. Submit a second copy of submittal electronically (PDF via email) or by facsimile, US mail or other delivery service to the appropriate Geotechnical Engineering Unit regional office. Electronic submission is preferred.
- The Pile Driving Equipment Data Form is available from:
https://connect.ncdot.gov/resources/Geological/Pages/Geotech_Forms_Details.aspx
See second page of form for submittal instructions.
- Electronic copy of submittal is required. See referenced provision.

CRANE SAFETY**(8-15-05)**

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 regulations (OSHA).

Submit all items listed below to the Engineer prior to beginning crane operations involving critical lifts. A critical lift is defined as any lift that exceeds 75 percent of the manufacturer's crane chart capacity for the radius at which the load will be lifted or requires the use of more than one crane. 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:** **By July 1, 2006**, crane operators performing critical lifts shall be certified by NC CCO (National Commission for the Certification of Crane Operators), or satisfactorily complete the Carolinas AGC's Professional Crane Operator's Proficiency Program. Other approved nationally accredited programs will be considered upon request. All crane operators shall also have a current CDL medical card. Submit a list of anticipated critical lifts and corresponding crane operator(s). Include current certification for the type of crane operated (small hydraulic, large hydraulic, small lattice, large lattice) and medical evaluations for each operator.

GROUT FOR STRUCTURES**(9-30-11)****1.0 DESCRIPTION**

This special provision addresses grout for use in pile blockouts, grout pockets, shear keys, dowel holes and recesses for structures. This provision does not apply to grout placed in post-tensioning ducts for bridge beams, girders, or decks. Mix and place grout in accordance with the manufacturer's recommendations, the applicable sections of the Standard Specifications and this provision.

2.0 MATERIAL REQUIREMENTS

Use a Department approved pre-packaged, non-shrink, non-metallic grout. Contact the Materials and Tests Unit for a list of approved pre-packaged grouts and consult the manufacturer to determine if the pre-packaged grout selected is suitable for the required application.

When using an approved pre-packaged grout, a grout mix design submittal is not required.

The grout shall be free of soluble chlorides and contain less than one percent soluble sulfate. Supply water in compliance with Article 1024-4 of the Standard Specifications.

Aggregate may be added to the mix only where recommended or permitted by the manufacturer and Engineer. The quantity and gradation of the aggregate shall be in accordance with the manufacturer's recommendations.

Admixtures, if approved by the Department, shall be used in accordance with the manufacturer's recommendations. The manufacture date shall be clearly stamped on each container. Admixtures with an expired shelf life shall not be used.

The Engineer reserves the right to reject material based on unsatisfactory performance.

Initial setting time shall not be less than 10 minutes when tested in accordance with ASTM C266.

Test the expansion and shrinkage of the grout in accordance with ASTM C1090. The grout shall expand no more than 0.2% and shall exhibit no shrinkage. Furnish a Type 4 material certification showing results of tests conducted to determine the properties listed in the Standard Specifications and to assure the material is non-shrink.

Unless required elsewhere in the contract the compressive strength at 3 days shall be at least 5000 psi. Compressive strength in the laboratory shall be determined in accordance with ASTM C109 except the test mix shall contain only water and the dry manufactured material. Compressive strength in the field will be determined by molding and testing 4" x 8" cylinders in accordance with AASHTO T22. Construction loading and traffic loading shall not be allowed until the 3 day compressive strength is achieved.

When tested in accordance with ASTM C666, Procedure A, the durability factor of the grout shall not be less than 80.

3.0 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.

Do not place grout if the grout temperature is less than 50°F or more than 90°F or if the air temperature measured at the location of the grouting operation in the shade away from artificial heat is below 45°F.

Provide grout at a rate that permits proper handling, placing and finishing in accordance with the manufacturer's recommendations unless directed otherwise by the Engineer. Use grout free of any lumps and undispersed cement. Agitate grout continuously before placement.

Control grout delivery so the interval between placing batches in the same component does not exceed 20 minutes.

The Engineer will determine the locations to sample grout and the number and type of samples collected for field and laboratory testing. The compressive strength of the grout will be considered the average compressive strength test results of 3 cube or 2 cylinder specimens at 28 days.

4.0 BASIS OF 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.

MASS CONCRETE

(SPECIAL)

The following items are considered mass concrete:

Bent 1 cap, and Bent 2 footing and cap for Bridge at Station 33+15.67 –Y4CD-
Bent 1 footing and cap for Bridge at Station 44+08.64 –Y4RPBD-

The Contractor shall provide an analysis of the anticipated thermal developments in the mass concrete elements using his proposed mix design, casting procedures, and materials. Additionally, the Contractor shall describe the measures and procedures he intends to use to limit the temperature differential to 35°F or less between the interior and exterior of the designated mass concrete elements during curing. The proposed plan to control the temperature differential shall be submitted to the Department for review and comments at the time approval is requested for the mass concrete mix design.

Maintenance of the specified thermal differential may be accomplished through a combination of the following:

- A. Selection of concrete ingredients to minimize the heat generated by hydration of the cement.
- B. Cooling component materials to reduce the temperature of the concrete while in its plastic state.

- C. Controlling the rate of placing the concrete.
- D. Insulating the surface of the concrete to prevent heat loss.
- E. Providing supplemental heat at the surface of the concrete to prevent heat loss.
- F. Other acceptable methods which may be developed by the Contractor.

Mass concrete shall be the Class A Concrete as shown on the plans, vibrated, air-entrained, and shall contain an approved set-retarding, water-reducing admixture, and 30% flyash by weight of the total cementitious material. The total cementitious material shall not exceed 690 lbs. per cubic yard of concrete. The maximum water-cementitious material ratio shall be 0.366 for rounded aggregate and 0.410 for angular aggregate. The slump of the concrete shall not exceed 6 inches. The Contractor shall submit compressive strength results, the average of at least three cylinders made in the laboratory, of his proposed mix design. These cylinders shall show a minimum strength of 3500 psi for Class A concrete at 28 days.

Minimum compressive strength at 28 days of field placed Class A concrete shall be 3000 psi.

The Contractor shall meet the temperature monitoring requirements listed below for all elements designated as mass concrete elements. 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 he can limit the temperature differential to 35°F or less between the interior and exterior of a given element.

The Contractor shall provide and install a minimum of six temperature sensing devices in each mass concrete pour to monitor temperature differentials between the interior and exterior of the pour unless otherwise directed by the Engineer. These devices shall be accurate within $\pm 2^\circ\text{F}$ within the temperature range of 40°F to 180°F. One temperature sensing probe shall be placed near the center of mass of the pour, and another temperature sensing probe shall be placed at approximately 2 inches clear from the surface of the concrete furthest from the center of mass. The locations of the other temperature sensing probes shall be approved by the Engineer.

The monitoring devices shall be read and readings recorded at one hour intervals, beginning when casing is complete and continuing until the maximum temperature is reached and two consecutive readings indicate a temperature differential decrease between the interior and exterior of the element. At the option of the Contractor, the temperature may be recorded by an approved strip-chart recorder furnished by the Contractor. If monitoring indicated the 35°F differential has been exceeded, the Contractor shall make the necessary revisions to the approved plan to reduce the differential on any remaining placements to 35°F or less. Revisions to the approved plan must be approved by the Department prior to implementation.

Flyash used in the mass concrete mix shall meet the requirements of Article 1024-5 and 1024-7 of the Standard Specifications. Portland Cement shall meet the requirements of AASHTO M85 for Portland Cement Type II.

The temperature of mass concrete at the time of placement shall not be less than 40°F nor more than 75°F.

The placement of the mass concrete shall be continuous until the work is completed and the resulting structures shall be monolithic and homogeneous.

The entire cost of this work shall be included in the unit contract price bid for Class A Concrete.

SOUND BARRIER WALL (BRIDGE MOUNTED)**(SPECIAL)****1.0 DESCRIPTION**

This work consists of furnishing planks, structural steel, coloring stains, and all other materials; handling, transporting, fabricating, galvanizing, and storing materials; furnishing erection drawings, erecting and installing the sound barrier wall members and all other materials as required by the plans, Standard Specifications and this Special Provision.

The color of the Sound Barrier Wall (Bridge Mounted) shall match color of the proposed concrete panels for the Sound Barrier Walls along the project as closely as possible. See the Architectural Concrete Surface Treatment Special Provision.

Post spacing greater than 15 feet will not be permitted. Provide consistent post spacing the entire length of the wall. Use odd post spacing, if necessary, only at the ends of the wall.

A maximum one foot drop or rise in elevation between wall sections is permitted. Elevation changes greater than one foot, if necessary, will be allowed only at the end of the wall. Top of wall elevation changes that result in a jagged appearance will not be allowed.

2.0 ALTERNATE POST SPACING

As an alternate, the Contractor may submit plans for post spacing greater than 10 feet and less than 15 feet for review and approval. A submittal revising the post spacing shall include the plank material and design specifications. The submittal shall also include an elevation view depicting the revised post spacing and proposed top of wall elevations. The proposed top of wall elevations shall be equal to or greater than the plan dimensions.

Submit two sets of detailed plans for review. Include all details in the plans, including the size, spacing and materials of required piles. Have a North Carolina Registered Professional Engineer check, seal and date the plans. After the plans are reviewed and, if necessary, the corrections made, submit one set of reproducible tracings in electronically sealed 22" x 34" PDFs to become part of the contract plans.

3.0 WALL TYPE

Walls that have been assigned “Approved” or “Approved for Provisional Use” status by the Product Evaluation Program will be considered for use as the Sound Barrier Wall (Bridge Mounted) planks. Wall plank design details and materials must meet the design and construction requirements of the project and the applicable loadings except that the wall is not required to meet the traffic loading requirements. Wall structural stability and connection details shall conform to the current edition of the *AASHTO LRFD Bridge Design Specifications*, except that traffic loading shall not be applied to the sound barrier wall.

The wall shall meet the following aesthetic requirements. The traffic and non traffic faces of the wall planks shall be configured such that the only the post flanges extend beyond the face of the planks as shown in the plans such that a uniform surface is visible from the traffic an non traffic sides of the wall. This uniform surface appearance is to extend from the top of wall to the bottom of the vertical post members as shown in the plans. The bottom of the wall shall be detailed for free and complete drainage of wall areas. Additionally, the proposed plank configuration shall allow for visual inspection of the post to concrete barrier rail bolts from the bottom of the wall without the need to remove any components.

Prior to submittal of Working Drawings, as described herein, submit a copy of the signed NCDOT Product Status Notification Letter and two sets of preliminary plans for review and approval. Include material specifications for all components. Once preliminary plans are approved, submit Working Drawings in accordance with all applicable portions of the requirements herein, including details necessary to fabricate and construct the proposed components.

Have a North Carolina Registered Professional Engineer check, seal and date the plans and, when requested, calculations. After the plans are reviewed and, if necessary, corrections made, submit one set of reproducible tracings in electronically sealed 22" x 34" PDFs to become part of the contract plans.

4.0 MATERIALS AND FABRICATION

Provide materials and fabricate members in accordance with the requirements of Division 10 of the Standard Specifications. The structural planks for the Sound Barrier Wall (Bridge Mounted) are to have the following properties:

Flexural Strength	57,000 psi	ASTM D-790
Tensile Strength	60,000 psi	ASTM D-638
Compressive Strength	65,000 psi	ASTM D-695
Tensile Modulus	3,500,000 psi	ASTM D-638
Flexural Modulus	1,600,000 psi	ASTM D-790
Specific Gravity	1.88 (typ)	ASTM D-792

The structural planks are to be colored and shall be uniform throughout the pultruded composite. The texture and color shall be approved by the Engineer before the planks are delivered to the jobsite.

The structural planks shall exhibit good workmanship and shall be free of burrs, cracks or other objectionable marks which would adversely affect the barrier's performance or serviceability. All cracked, discolored, burned or damaged structural planks will be rejected either at the fabrication shop or the construction site even after installation, but prior to acceptance of the project.

The structural steel is to meet the requirements of the Standard Specifications. The posts, backing angles, bolts, nuts and washers are to be painted to match the structural planks. The paint system used is to be System 1 as described in Section 442 of the Standard Specifications, with the exception that the surfaces are not to be cleaned to an SSPC SP-10 finish after being galvanized and the top coat color is to be approved by the Engineer. After erection, the bolts, nuts, and washers are to be primed by brush, then the entire support system of posts, backing angles, bolts, nuts and washers are to be top-coated. The structural planks are to be masked off so no overspray or spatters occur. The Contractor is to provide 3 samples of paint close to the color of the structural planks to the Engineer for his selection of the final color. The limits of the painting are from the top of the posts to the bottom of the lowest plank.

5.0 CONSTRUCTION METHODS

The erection of the sound barrier components shall not begin until the concrete in the bridge railing has reached a minimum compressive strength of 3,000 psi. Install posts as shown on the plans or in the accepted submittals with a tolerance of ½ inch per foot from vertical or as necessary to conform to the plank design if more restrictive.

6.0 WORKING DRAWINGS

Submit plank design calculations and specifications for approval prior to purchasing the plank materials. Submit metalwork fabrication drawings for approval prior to fabrication of steel wall components. This submittal shall clearly indicate access for visual inspection of the post attached bolts. Submit an erection plan and plank support components, for review and acceptance prior to fabrication of metalwork. Submit five sets of detail drawings.

7.0 METHOD OF MEASUREMENT

The quantity of Sound Barrier Wall (Bridge Mounted), to be paid for will be the completed and accepted wall, according to the limits shown on the plans.

8.0 BASIS OF PAYMENT

The quantity of Sound Barrier Wall (Bridge Mounted) measured as provided above, will be paid for at the contract lump sum price bid for "Sound Barrier Wall (Bridge Mounted)".

The lump sum price bid will be full compensation for all work covered by this Special Provision including, but not limited to, furnishing panels, structural steel, and all other materials; architectural surface treatment; handling, transporting, fabricating, galvanizing, and storing materials; furnishing erection drawings, and erecting and installing the sound barrier wall components.

Payment will be made under:

Sound Barrier Wall (Bridge Mounted)Lump Sum

PLACEMENT OF NATURAL STREAM BED MATERIAL

(SPECIAL)

1.0 GENERAL

The existing stream bed material shall be excavated from the stream bed or floodplain during culvert excavation. This material shall be stockpiled on the jobsite for use in backfilling both the low and high flow barrels as shown in the contract plans. Only material excavated from stream bed may be used in the low flow barrels. Native material is subject to approval by the Engineer and may be subject to conditions in the permit.

If enough natural steam bed material is not available to backfill the high flow barrels, Class B Rip Rap may be used to supplement the natural steam bed material. If rip rap is needed to supplement the stream bed material, it shall be placed in the bottom of the culvert barrels and topped with a minimum 6" layer of natural stream bed material.

The top surface of the natural steam bed material shall be placed and leveled to a flat surface to allow for animal passage.

2.0 PAYMENT

Payment for stream bed material will be at the contract lump sum price bid for "Placement of Natural Steam Bed Material". Prices and payment will be full compensation for placing all natural stream bed material, Class B Rip Rap, labor, tools and equipment necessary to complete the item.

ARCHITECTURAL CONCRETE SURFACE TREATMENT

(SPECIAL)

1.0 GENERAL

The work covered by this special provision shall consist of constructing a simulated stone masonry textured surface on exposed faces of pre-cast concrete panels used in sound barrier walls and mechanically stabilized earth retaining walls as well as cast in place concrete bridge barrier rails as indicated on the Plans and in this Special Provision. The Contractor shall furnish all materials, labor, equipment, and incidentals necessary for the construction of architectural concrete surface treatment using simulated stone masonry form liners (molds). All exposed facing of the precast concrete panels; concrete medallion

panels and concrete surfaces as indicated on the Plans shall receive a compatible concrete coloring system. The mechanically stabilized earth retaining walls will not receive a colored stain. The Contractor is required to use the same source of form liner and color stains for all required elements. The architectural concrete surface treatment should match the appearance (stone size and shape, stone texture, pattern and relief) of natural stone to resemble an Ashlar Stone pattern with Federal Standard 595 Color # FS 36152 coloration as directed by the Engineer. All texture is to be in addition to the nominal thickness of each element within tolerances. Relief of any texture is not to exceed an average depth of 1 inch. Concrete sound barrier columns are to remain unstained in their natural concrete color. There shall be an appreciable contrast between the colors of the unstained concrete sound barrier columns, the unstained top 1'-0" of the top sound barrier wall panel and the stained panels. For information purposes only, sources of form liners in the ashlar stone pattern include, but are not limited to:

Scott System, Inc.
10777 E. 45th Avenue
Denver, Colorado 80239
www.scottssystem.com
Pattern: Ashlar Stone # C167C

Architectural Polymers, Inc.
1220 Little Gap Road
Palmerton, PA 18071
www.architecturalpolymers.com/
Pattern: Ashlar Stone # 904

Creative Form Liners, Inc.
3411 Windom Road
Brentwood, Maryland 20722
www.creativeformliners.com/
Pattern: Ashlar Stone # CFL-FF008

The Contractor has the option of supplying an alternative pattern of simulated stone form liners, as long as the patterns selected are approved, in writing, as an equal or approved alternative by the Engineer.

2.0 SUBMITTALS

Shop Drawings – The Contractor shall submit for review and acceptance, plan and elevation views and details showing overall simulated stone pattern, joint locations, form tie locations, and end, edge or other special conditions. The drawings should include typical cross sections of applicable surfaces, joints, corners, stone relief, stone size, pitch/working line, mortar joint and bed depths. If necessary, the Contractor shall revise the shop drawings until the proposed form liner patterns and arrangement have been accepted by the Engineer. Shop drawings should be of sufficient scale to show the detail of all stone and joints patterns. The size of the sheets used for the shop drawings shall be 22" x 34".

The form liner shall be patterned such that long continuous horizontal or vertical lines do not occur on the finished exposed surface. The line pattern shall be random in nature and shall conceal construction joint lines. Special attention should be given to details for wrapping form liners around corners. The top 1'-0" of the top sound barrier wall panel shall remain untreated. This portion shall have a smooth, non-textured finish, and remain in its natural concrete color.

Shop drawings shall be reviewed and accepted prior to fabrication of form liners.

Sample Panels – After shop drawings have been reviewed and accepted by the Engineer, the Contractor shall construct three 24" x 24" transportable sample panel(s) at the project site. The materials used in construction of the sample panel(s) shall comply with Section 420 of the Standard Specifications. The sample panel(s) shall be constructed using approved form liners. Any sample panel that is not accepted by the Engineer is to be removed from the project site and a new sample panel produced at no additional expense to the Department.

After the color, texture, and uniformity of the furnished samples are approved, produce a full scale unit meeting the design requirements. This mock-up and the furnished samples establish the standard quality for determining the acceptance of the panels.

Architectural surface treatments and patterns of the finished work shall achieve the same final effect as demonstrated on the accepted sample panel(s). Upon acceptance by the Engineer, the sample panel(s) shall be used as the quality standard for the project. After the acceptance of the completed structure, the Contractor shall dispose of the sample panels as directed by the Engineer.

3.0 MATERIAL REQUIREMENTS

Form Liner – The form liner shall be a high quality, reusable product manufactured of high strength urethane rubber or other approved material which attaches easily to the form work system, and shall not compress more than ¼" when concrete is poured at a rate of 10 vertical feet per hour. The form liners shall be removable without causing deterioration of the surface or underlying concrete. **Form Release Agent** – Form release agent shall be a non-staining petroleum distillate free from water, asphaltic, and other insoluble residue, or an equivalent product. Form release agents shall be compatible with the color system applied and any special surface finish.

Form Ties – Form ties shall be set back a minimum of 2" from the finished concrete surface. The ties shall be designed so that all material in the device to a depth of at least 2" back of the concrete face (bottom of simulated mortar groove) can be disengaged and removed without spalling or damaging the concrete. The Contractor shall submit the type of form ties to the Engineer for approval.

Concrete Color System/Stain – Special surface color system shall be performed using approved coloring systems/stains suitable for the purpose intended and applied in a manner consistent with the design intent of the project. The approved sample panel shall be the basis for determining the appropriate color/stain application.

Color stains shall be a special penetrating stain mix as provided by the manufacturer and shall be the equivalent of Federal Standard 595 Color # FS 36152 to achieve a full, natural color in the finished surface. The stain shall create a surface finish that is breathable (allowing water vapor transmission), and that resists deterioration from water, acid, alkali, fungi, sunlight, or weathering. Stain mix shall meet the requirements for mildew resistance of Federal Test Method Standard 144, Method 6271, and requirements for weathering resistance of 1,000 hours accelerated exposure measures by Weatherometer in accordance with ASTM G 26. Color samples must be submitted for approval. Final coloring system and the Contractor's equivalent of Federal Standard 595 Color # FS 36152 is subject to acceptance by the Engineer.

Quality Standards – Manufacturer of simulated stone masonry form liners and custom coloring system shall have at least five years' experience making stone masonry molds and color stains to create formed concrete surfaces to match natural stone shapes, surface textures and colors.

The Contractor shall schedule a pre-installation conference with manufacturer representative and the Engineer to assure understanding of simulated stone masonry form liner use, color application, requirements for construction of sample panel(s), and to coordinate the work. The Contractor shall be required to disclose their source of simulated stone masonry manufacturer and final coloration contractor at the Preconstruction Conference.

4.0 CONSTRUCTION

Form Liner Preparation – Prior to each concrete pour, the form liners shall be clean and free of build-up. Each liner shall be visually inspected for blemishes and tears. Repairs shall be made in accordance with the manufacturer's recommendations. Repairs shall be accepted by the Engineer before being used. Form liner panels that do not perform as intended or are no longer repairable shall be replaced.

Form Liner Attachment – Form liners shall be securely attached to forms in accordance with the manufacturer's recommendations, with less than a ¼" seam. Blend form liner butt joints into the stone pattern and finish off the final concrete surface. Create no visible vertical or horizontal seams or conspicuous form liner butt joint marks. At locations where the form liners are joined, carefully blend to match the balance of the stone pattern. Form liners shall be installed to withstand anticipated concrete placement pressures without leakage and without causing physical or visual defects. Wall ties shall be coordinated with the form liner system. The Contractor shall have a technical representative from the form liner manufacturer on site for technical supervision during the installation and removal of form liners. Unless directed by the Engineer, installation and removal of form liners shall not be permitted if the technical representative is not present.

Form Release Agent – Form release agent shall be applied in accordance with the manufacturer's recommendations. The material shall be compatible with the form liner material and the concrete coloring system and in accordance with this Special Provision. Form release agent should be worked into all areas, especially pattern recesses.

Patching – All form tie holes and other defects in finished uncolored surface shall be filled or repaired within 48 hours of form removal. Use patching materials and procedures in accordance with the manufacturer's recommendations.

Surface Finish – All surfaces that are to receive coloring agent application shall be free of all laitance, dirt, dust, grease, efflorescence, paint or any other foreign material prior to the application of coloring agent. Cleaning of surfaces shall be accomplished by pressure washing with water set at 3,000 psi to remove laitance. The fan nozzle shall be held perpendicular to the surface at a distance of 1 to 2 feet. Sandblasting will not be permitted.

Final surface shall be free of blemishes, discolorations, surface voids, and other irregularities. All patterns should be continuous without visual disruption.

Reinforced concrete shall be finished in accordance with the Standard Specifications, except that curing of concrete should be done to accommodate the application of coloring and surface finish treatment.

Grout Pattern Joints – Grout pattern joints shall be constructed to simulate the appearance of mortared joints produced in laid up masonry work. Grout pattern joints shall be produced in accordance with the form liner / concrete color system manufacturer.

Color/Stain Application – Finished concrete and patches shall stand in place 30 days after form liners are removed prior to application of coloring/staining agent. Maintain the concrete temperature between 40°F and 85°F during color/stain application and for 48 hours after color/stain application. Consult the manufacturer's recommendations for preparation, application, curing, and storage of coloring agents/stains. The contractor shall provide a Color Application Artist who is trained in the special techniques to achieve realistic surface appearances, if requested by the Engineer. Treated surfaces located adjacent to exposed soil or pavement shall be temporarily covered to prevent dirt or soil splatter from rain. Following the completion of all work, repairs of any damage made by other construction operations shall be made to the form lined and colored surfaces as directed by the Engineer.

Experience and Qualifications – The Contractor shall have a minimum of three consecutive years' experience in architectural concrete surface treatment construction on similar types of projects. The Contractor shall furnish, to the Engineer, five (5) references that were responsible for supervision of similar projects and will testify to the successful completion of these projects. Include name, address, telephone number, and specific type of application.

5.0 BASIS OF PAYMENT

This work performed for concrete panels used in sound barrier walls, concrete medallion panels, and mechanically stabilized earth retaining walls will not be measured for payment, but shall be included in the various pay items, as shown on plans. Payment will include the furnishing and use of all form liners, coloring stains, the construction, finishing, and

removal of all equipment, materials, labor, and incidentals necessary to complete the work in conformance with the Contract Documents.

Payment for work performed on the bridge cast-in-place concrete as detailed in the Plans and this Special Provision will be paid for as “Concrete Simulated Stone Form Liner” and “Concrete Staining”. Payment will include the furnishing and use of all form liners, coloring stains, the construction, finishing, and removal of all equipment, materials, labor, and incidentals necessary to complete the work in conformance with the Contract Documents.

PAY ITEMS

Concrete Simulated Stone Form Liner..... Sq. Ft.
Concrete Staining..... Sq. Ft.

CONCRETE MEDALLION PANEL

(SPECIAL)

The work covered by this special provision shall consist of constructing and installing concrete medallion panels as indicated on the Plans and in this Special Provision. The Contractor shall furnish all materials, labor, equipment, and incidentals necessary for the construction and installation of concrete medallion panels.

Concrete medallion panels shall be constructed in accordance with Section 1077 of the Standard Specifications and this Provision. Concrete medallion panels shall be Class “A” concrete using pea gravel as specified on the plans. All exposed facing of the concrete medallion panels shall be treated as indicated in the “Architectural Concrete Surface Treatment” special provision.

Payment for work performed on the concrete medallion panels as detailed in the Plans and this Special Provision will be paid for as “Concrete Medallion Panels”. Payment will include the fabrication of medallion panels, coloring stains, the construction, finishing, and removal of all equipment, materials, labor, and incidentals necessary to complete the work in conformance with the Contract Documents.

PAY ITEM

Concrete Medallion Panel Ea.

SPECIAL PROVISIONS FOR PROTECTION OF RAILWAY INTEREST

Under the terms of these provisions, the North Carolina Department of Transportation shall hereinafter be called “Department”, and the Norfolk Southern Railway Company shall hereinafter be called “Railroad”.

1. AUTHORITY OF RAILROAD ENGINEER AND DEPARTMENT ENGINEER:

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

The authorized representative of the North Carolina Department of Transportation, hereinafter referred to as the Department Engineer, shall have authority over all other matters as prescribed herein including Project Specifications, Special Provisions, and the plans.

2. NOTICE OF STARTING WORK:

A. The Contractor shall not commence any work on Railroad right of way until he has complied with the following conditions:

- (1) Give the Railroad written notice, with copy to the Department Engineer who is designated to be in charge of the work, at least ten (10) days in advance of the date he proposes to begin work on Railroad right of way to:

Office of Chief Engineer - Bridges & Structures
Norfolk Southern Corporation
1200 Peachtree Street NE
Internal Box 142
Atlanta, Georgia 30309

- (2) Obtain written approval from the Railroad of Railroad Protective Liability Insurance coverage as required by section 14 herein. The Railroad does not accept notation of Railroad protective insurance on a certificate of liability insurance form or Binders as Railroad must have the full original countersigned policy. The policy will be reviewed for compliance prior to written approval. Due to the number of projects system-wide, it typically takes a minimum of 30-45 days for Railroad to review.
- (3) Obtain Railroad’s Flagger Services as required by section 7 herein.

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- (4) Obtain written authorization from the Railroad to begin work on Railroad's right of way, such authorization to include an outline of specific conditions with which he must comply.
 - (5) Furnish a schedule for all work within the Railroad right of way as required by section 7B1 herein.
- B. The Railroad's written authorization to proceed with the work will include the names, addresses, and telephone numbers of the Railroad's representatives who are to be notified as hereinafter required. Where more than one representative is designated, the area of responsibility of each representative will be specified.

3. INTERFERENCE WITH RAILROAD OPERATIONS:

- A. The Contractor shall so arrange and conduct his work that there will be no interference with Railroad operations, including train, signal, telephone and telegraphic services, or damage to the property of the Railroad or to poles, wires, and other facilities of tenants on the right of way of the Railroad. Whenever work is liable to affect the operations or safety of trains, the method of doing such work shall first be submitted to the Railroad Engineer for approval, but such approval shall not relieve the Contractor from liability. Any work to be performed by the Contractor which requires flagging service or inspection service (watchman) shall be deferred by the Contractor until the flagging protection or inspection service required by the Railroad is available at the job site.
- B. Whenever work within Railroad's right of way is of such a nature that impediment to Railroad operations such as use of runaround tracks or necessity for reduced speed is unavoidable, the Contractor shall schedule and conduct his operations so that such impediment is reduced to the absolute minimum.
- C. Should conditions arising from, or in connection with the work, require that immediate and unusual provisions be made to protect operations and property of the Railroad, the Contractor shall make such provisions. If in the judgment of the Railroad Engineer, or in his absence, the Railroad's Division Engineer, such provision is insufficient, either may require or provide such provisions as he deems necessary. In any event, such unusual provisions shall be at the Contractor's expense and without cost to the Railroad or the Department.

4. TRACK CLEARANCES:

- A. The minimum track clearances to be maintained by the Contractor during construction are as follows:
- (1) Horizontal clearance measured from centerline of track to falsework:

13'-0" on tangent track
14'-0" on curved track

(2) Vertical clearance from top of rail to falsework: 22'-0"

B. However, before undertaking any work within Railroad's right of way, or before placing any obstruction over any track, the Contractor shall:

(1) Notify the Railroad Engineer at least 72 hours in advance of the work.

(2) Receive assurance from the Railroad Engineer that arrangements have been made for flagging service as may be necessary.

(3) Receive permission from the Railroad Engineer to proceed with the work.

(4) Ascertain that the Department Engineer has received copies of notice to the Railroad and of the Railroad's response thereto.

5. CONSTRUCTION PROCEDURES:

A. General:

Construction work and operations by the Contractor on Railroad's property shall be:

(1) Subject to the inspection and approval of the Railroad.

(2) In accord with the Railroad's written outline of specific conditions.

(3) In accord with the Railroad's general rules, regulations and requirements including those relating to safety, fall protection and personal protective equipment.

(4) In accord with these Special Provisions.

B. Excavation:

The subgrade of an operated track shall be maintained with edge of berm at least 10'-0" from centerline of track and not more than 24 inches below top of rail. The Contractor will not be required to make existing section meet this specification if substandard, in which case existing section will be maintained.

Additionally, the Railroad Engineer may require the Contractor to install orange construction safety fencing for protection of the work area.

C. Excavation for Structures:

The Contractor will be required to take special precaution and care in connection with excavating and shoring pits, and in driving piles or sheeting, for footings adjacent to tracks to provide adequate lateral support for the tracks and the loads which they carry, without

disturbance of track alignment and surface, and to avoid obstructing track clearances with working equipment, tools or other material. All plans and calculations for shoring shall be prepared and signed by a North Carolina Registered Professional Engineer. The Professional Engineer will be responsible for the accuracy for all controlling dimensions as well as the selection of soil design values which will accurately reflect the actual field conditions. The procedure for doing such work, including need of and plans for shoring, shall first be reviewed by the Department Engineer then reviewed and approved by the Railroad Engineer, but such approval shall not relieve the Contractor from liability.

Additionally, a walkway with handrail protection may be required as noted in section 11 herein.

D. Demolition, Erection, Hoisting:

- (1) Railroad tracks and other Railroad property must be protected from damage during the procedure.
- (2) The Contractor is required to submit a plan showing the locations of cranes, horizontally and vertically, operating radii, with delivery or disposal locations shown. The location of all tracks and other railroad facilities as well as wire lines, poles, adjacent structures, etc. must also be shown.
- (3) Crane rating sheets showing cranes to be adequate for 150% of the actual weight of the pick. A complete set of crane charts, including crane, counterweight, and boom nomenclature is to be submitted.
- (4) Plans and computations showing the weight of the picks must be submitted. Calculations shall be made from plans of the existing and/or proposed structure showing complete and sufficient details with supporting data for the demolition or erection of the structure. If plans do not exist, lifting weights must be calculated from filed measurements. The field measurements are to be made under the supervision of the North Carolina Registered Professional Engineer submitting the procedure and calculations.
- (5) A data sheet must be submitted listing the types, size and arrangements of all rigging and connection equipment.
- (6) A complete written procedure is to be submitted, including the order of lifts, time required for each lift, and any repositioning or rehitching of the crane or cranes.
- (7) All erection or demolition plans, procedures, data sheets, etc. submitted must be prepared, signed and sealed by a North Carolina Registered Professional Engineer.
- (8) The Railroad Engineer or his designated representative must be present at the site during the entire demolition and erection procedure period.

- (9) All procedures, plans and calculations shall first be reviewed by the Department Engineer and then approved by the Railroad Engineer, but such approval does not relieve the Contractor from liability.

E. Blasting:

- (1) The Contractor shall obtain advance approval of the Railroad Engineer and Department Engineer for use of explosives on or adjacent to Railroad property. The request for permission to use explosives shall include a detailed blasting plan. If permission for use of explosives is granted, the Contractor will be required to comply with the following:
 - (a) Blasting shall be done with light charges under the direct supervision of a responsible officer or employee of the Contractor and a licensed blaster.
 - (b) Electric detonating fuses shall not be used because of the possibility of premature explosions resulting from operation of two-way train radios.
 - (c) No blasting shall be done without the presence of the Railroad Engineer or his authorized representative. At least 72 hours advance notice to the person designated in the Railroad's notice of authorization to proceed (see section 2B above) will be required to arrange for the presence of an authorized Railroad representative and such flagging as the Railroad may require.
 - (d) Have at the job site adequate equipment, labor and materials and allow sufficient time to clean up debris resulting from the blasting without delay to trains, as well as correcting at his expense any track misalignment or other damage to Railroad property resulting from the blasting as directed by the Railroad Engineer. If his actions result in delay of trains, the Contractor shall bear the entire cost thereof.
- (2) The Railroad Engineer will:
 - (a) Determine the approximate location of trains and advise the Contractor the approximate amount of time available for the blasting operation and clean-up.
 - (b) Have the authority to order discontinuance of blasting if, in his opinion, blasting is too hazardous or is not in accord with these special provisions.

F. Maintenance of Railroad Facilities:

- (1) The Contractor will be required to maintain all ditches and drainage structures free of silt or other obstructions which may result from his operations and provide and maintain any erosion control measures as required. The Contractor will promptly

repair eroded areas within Railroad's right of way and repair any other damage to the property of the Railroad or its tenants.

- (2) All such maintenance and repair of damages due to the Contractor's operations shall be done at the Contractor's expense.

G. Storage of Materials and Equipment:

Materials and equipment shall not be stored where they will interfere with Railroad operations, nor on the right of way of the Railroad without first having obtained permission from the Railroad Engineer, and such permission will be with the understanding that the Railroad will not be liable for damage to such material and equipment from any cause and that the Railroad Engineer may move or require the Contractor to move, at the Contractor's expense, such material and equipment.

All grading or construction machinery that is left parked near the track unattended by a watchman shall be effectively immobilized so that it cannot be moved by unauthorized persons. The Contractor shall protect, defend, indemnify and save Railroad, and any associated, controlled or affiliated corporation, harmless from and against all loss, costs, expenses, claim or liability for loss of or damage to property or the loss of life or personal injury, arising out of or incident to the Contractor's failure to immobilize grading or construction machinery.

H. Cleanup:

Upon completion of the work, the Contractor shall remove from within the limits of the Railroad's right of way, all machinery, equipment, surplus materials, falsework, rubbish or temporary buildings of the Contractor, and leave said right of way in a neat condition satisfactory to the Chief Engineer of the Railroad or his authorized representative.

6. DAMAGES:

- A. The Contractor shall assume all liability for any and all damages to his work, employees, servants, equipment and materials caused by Railroad traffic.
- B. Any cost incurred by the Railroad for repairing damages to its property or to property of its tenants, caused by or resulting from the operations of the Contractor, shall be paid directly to the Railroad by the Contractor.

7. FLAGGING SERVICES:

A. Requirements:

Flagging services will not be provided until the Contractor's insurance has been reviewed and approved by the Railroad.

Under the terms of the agreement between the Department and Railroad, the Railroad has sole authority to determine the need for flagging required to protect its operations. In general, the requirements of such services will be whenever the Contractor's men or equipment are, or are likely to be, working on the Railroad's right of way, or across, over, adjacent to or under a track, or when such work has disturbed or is likely to disturb a Railroad structure, Railroad roadbed, or surface and alignment of any track to such extent that the movement of trains must be controlled by flagging.

Normally, the Railroad will assign one flagman to a project; but in some cases, more than one may be necessary, such as yard limits where three (3) flagmen may be required. However, if the Contractor works within distances that violate instructions given by the Railroad Engineer or performs work that has not been scheduled with the Railroad Engineer, a flagman or flagmen may be required full time until the project has been completed. Should such violations or unscheduled, unauthorized work by the Contractor result in full time flagging being required by the Railroad, the additional cost of such flagging above normal flagging cost shall be deducted from the final payment to the Contractor as provided in Article 109-9 of the Standard Specifications. Neither Department nor Railroad will be liable for damages resulting from unscheduled or unauthorized work.

B. Scheduling and Notification:

- (1) The Contractor's work requiring railroad flagging should be scheduled to limit the presence of a flagman at the site to a maximum of 50 hours per week. The Contractor shall receive Railroad approval of work schedules requiring a flagman presence in excess of 40 hours per week.
- (2) No later than the time that approval is initially requested to begin work on Railroad right of way, the Contractor shall furnish to the Department and Railroad a schedule for all work required to complete the portion of the project within Railroad right of way and arrange for a job site meeting between the Contractor, Department, and Railroad. Flagman or flagmen may not be provided until the job site meeting has been conducted and the Contractor's work scheduled.
- (3) The Contractor will be required to give the Railroad Engineer at least 10 working days of advance written notice of intent to begin work within Railroad's right of way in accordance with this special provision. Once begun, when such work is then suspended at any time, or for any reason, the Contractor will be required to give the Railroad Engineer at least 3 working days of advance notice before resuming work on Railroad's right of way. Such notices shall include sufficient details of the proposed work to enable the Railroad Engineer to determine if flagging will be required. If such notice is in writing, the Contractor shall furnish the Department Engineer a copy; if notice is given verbally, it shall be confirmed in writing with a copy to the Department Engineer.

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- (4) If flagging is required, no work shall be undertaken until the flagman, or flagmen, is present at the job site. It may take up to 30 days to obtain flagging initially from the Railroad. When flagging begins, the flagman is usually assigned by the Railroad to work at the project site on a continual basis until no longer needed and cannot be called for on a spot basis. If flagging becomes unnecessary and is suspended, it may take up to 30 days to again obtain from the Railroad. Due to labor agreements, it is necessary to give 5 working days notice before flagging service may be discontinued and responsibility for payment stopped.
- (5) If, after the flagman is assigned to the project site, emergencies arise which require the flagman's presence elsewhere, the Contractor shall delay work on Railroad right of way until such time as the flagman is again available. Any additional costs resulting from such delay shall be borne by the Contractor and not the Department or Railroad.

C. Payment:

- (1) The Department will be responsible for paying the Railroad directly for any and all costs of flagging which may be required to accomplish the construction. The Contractor shall reimburse the Railroad for any costs of the flagging which is required for work for the benefit of the Contractor.
- (2) The estimated cost of flagging service is the current rate per day based on a 10-hour work day. This cost includes the base pay for each flagman, overhead, and a per diem charge for travel expenses, meals and lodging. The charge by the Railroad will be the actual cost based on the rate of pay for the Railroad's employees who are available for flagging service at the time the service is required.
- (3) Work by a flagman in excess of 8 hours per day or 40 hours per week, but not more than 12 hours a day will result in overtime pay at 1½ times the appropriate rate. Work by a flagman in excess of 12 hours per day will result in overtime pay at 2 times the appropriate rate. If work is performed on a holiday, the flagging rate is 2½ times the normal rate.
- (4) Railroad work involved in preparing and handling bills will also be charged to the Department. Charges to the Department by the Railroad shall be in accordance with applicable provisions of the Federal-Aid Policy Guide, Title 23 Subchapter B, Part 140I and Subchapter G, Part 646B issued by the Federal Highway Administration on December 9, 1991, including all current amendments. Flagging costs are subject to change. The above estimates of flagging costs are provided for information only and are not binding in any way.

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D. Verification:

- (1) Railroad's flagman will electronically enter flagging time via Railroad's electronic billing system. Any complaints concerning flagman or flagmen must be resolved in a timely manner. If need for flagman or flagmen is questioned, please contact Railroad's System Engineer of Public Improvements at (404) 529-1641. All verbal complaints must be confirmed in writing by the Contractor within 5 working days with copy to the Department Engineer. Address all written correspondence to:

Office of Chief Engineer-Bridges & Structures
Attn: System Engineer of Public Improvements
Norfolk Southern Corporation
1200 Peachtree St. NE
Internal Box 142
Atlanta, GA 30309

- (2) The Railroad flagman assigned to the project will be responsible for notifying the Department Engineer upon arrival at the job site on the first day (or as soon thereafter as possible) that flagging services begin and on the last day that he performs such services for each separate period that services are provided. The Department Engineer will document such notification and general flagging times for verification purposes in the project records. When requested, the Department Engineer will also sign the flagman's diary showing daily time spent and activity at the project site. Also if requested, the flagman will cooperate with the Department by submitting daily timesheets or signing the Department Engineer's diary showing daily time spent at the project site.

8. HAUL ACROSS RAILROADS:

- A. Where the plans show or imply that materials of any nature must be hauled across a Railroad, unless the plans clearly show that the Department has included arrangements for such haul in its agreement with the Railroad, the Contractor will be required to make all necessary arrangements with the Railroad regarding means of transporting such materials across the Railroad. The Contractor will be required to bear all costs incidental, including flagging, to such crossings whether services are performed by his own forces or by Railroad personnel.
- B. No crossing may be established for use of the Contractor for transporting materials or equipment across the tracks of the Railroad unless specific authority for its installation, maintenance, necessary watching and flagging thereof and removal, all at the expense of the Contractor, is first obtained from the Railroad Engineer. The approval process for a temporary private crossing agreement executed between the Contractor and Railroad normally takes 90 days.

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9. WORK FOR THE BENEFIT OF THE CONTRACTOR:

- A. All temporary or permanent changes in wire lines or other facilities which are considered necessary to the project are shown on the plans and included in the force account agreement between the Department and the Railroad; or will be covered by appropriate revisions to same which will be initiated and approved by the Department and/or Railroad.
- B. Should the Contractor desire any changes in addition to the above, then he shall make separate arrangements with the Railroad for same to be accomplished at the Contractor's expense.

10. COOPERATION AND DELAYS:

- A. It shall be the Contractor's responsibility to arrange a schedule with the Railroad for accomplishing stage construction involving work by the Railroad or tenants of the Railroad. In arranging his schedule he shall ascertain, from the Railroad, the lead time required for assembling crews and materials and shall make due allowance therefore. The Contractor shall cooperate with others in the construction of the project to the end that all work may be accomplished to the best advantage.
- B. No charge or claims of the Contractor against either the Department or Railroad will be allowed for hindrance or delay on account of railroad traffic, any work done by the Railroad or other delay incident to or necessary for safe maintenance of railroad traffic or for any delays due to compliance with these special provisions.
- C. The Contractor's attention is called to the fact that neither the Department nor Railroad assumes any responsibility for any work performed by others in connection with the construction of the project, and the Contractor shall have no claim whatsoever against the Department, or Railroad for any inconvenience, delay, or additional cost incurred by him on account of such operations by others.

11. TRAINMAN'S WALKWAYS:

Along the outer side of each exterior track of multiple operated tracks, and on each side of single operated track, an unobstructed continuous space suitable for trainman's use in walking along trains, extending to a line not less than 10' from centerline of track, shall be maintained. Any temporary impediments to walkways and track drainage encroachments or obstructions allowed during work hours while Railroad's protective service is provided shall be removed before the close of each work day. If there is any excavation near the walkway, a handrail, with 10'-0" minimum clearance from centerline of track shall be placed.

12. GUIDELINES FOR PERSONNEL ON RAILROAD'S RIGHT OF WAY:

- A. All persons shall wear hard hats. Appropriate eye and hearing protection must be used. Working in shorts is prohibited. Shirts must cover shoulders, back and abdomen.

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Working in tennis or jogging shoes, sandals, boots with high heels, cowboy and other slip-on type boots is prohibited. Hard-sole, lace-up footwear, zippered boots or boots cinched up with straps which fit snugly about the ankle are adequate. Wearing Safety boots is strongly recommended. In the vicinity of at-grade crossings, it is strongly recommended to wear reflective vests.

- B. No one is allowed within 25' of the centerline of track without specific authorization from the flagman.
- C. All persons working near track while train is passing are to lookout for dragging bands, chains and protruding or shifted cargo.
- D. No one is allowed to cross tracks without specific authorization from the flagman.
- E. All welders and cutting torches working within 25' of track must stop when train is passing.
- F. No steel tape or chain will be allowed to cross or touch rails without permission.

13. GUIDELINES FOR EQUIPMENT ON RAILROAD'S RIGHT OF WAY:

- A. No crane or boom equipment will be allowed to set up to work or park within boom distance plus 15 ft. of centerline of track without specific permission from Railroad Engineer and flagman.
- B. No crane or boom equipment will be allowed to foul track or lift a load over the track without flag protection and track time.
- C. All employees will stay with their machines when crane or boom equipment is pointed toward track.
- D. All cranes and boom equipment under load will stop work while train is passing (including pile driving).
- E. Swinging loads must be secured to prevent movement while train is passing.
- F. No loads will be suspended above a moving train.
- G. No equipment will be allowed within 25' of centerline of track without specific authorization of the flagman.
- H. Trucks, tractors or any equipment will not touch ballast line without specific permission from railroad official and flagman.
- I. No equipment or load movement within 25' or above a standing train or railroad equipment without specific authorization of the flagman.

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- J. All operating equipment within 25' of track must halt operations when a train is passing. All other operating equipment may be halted by the flagman if the flagman views the operation to be dangerous to the passing train.
- K. All equipment, loads and cables are prohibited from touching rails.
- L. While clearing and grubbing, no vegetation will be removed from Railroad embankment with heavy equipment without specific permission from the Railroad Engineer and flagman.
- M. No equipment or materials will be parked or stored on Railroad's property unless specific authorization is granted from the Railroad Engineer.
- N. All unattended equipment that is left parked on Railroad's property shall be effectively immobilized so that it cannot be moved by unauthorized persons.
- O. All cranes and boom equipment will be turned away from track after each work day or whenever unattended by an operator.

14. INSURANCE:

- A. In addition to any other forms of insurance or bonds required under the terms of the contract and specifications, the Prime Contractor will be required to provide coverage conforming to the requirements of the Federal-Aid Policy Guide outlined under Title 23 Subchapter G, Part 646A for all work to be performed on Railroad's right of way by carrying insurance of the following kinds and amounts:

- (1) **Commercial General Liability Insurance** having a combined single limit of not less than \$2,000,000 per occurrence for all loss, damage, cost and expense, including attorneys' fees, arising out of bodily injury liability and property damage liability during the policy period. Said policy shall include explosion, collapse, and underground hazard (XCU) coverage, shall be endorsed to name Railroad specified in section 14A2(c) below both as the certificate holder and as an additional insured, and shall include a severability of interests provision.
- (2) **Railroad Protective Liability Insurance** having a combined single limit of not less than \$2,000,000 each occurrence and \$6,000,000 in the aggregate applying separately to each annual period. If the project involves track over which passenger trains operate, the insurance limits required are not less than a combined single limit of \$5,000,000 each occurrence and \$10,000,000 in the aggregate applying separately to each annual period. Said policy shall provide coverage for all loss, damage or expense arising from bodily injury and property damage liability, and physical damage to property attributed to acts or omissions at the job site.

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U-2579B

Forsyth Co.

The standards for the Railroad Protective Liability Insurance are as follows:

- (a) The insurer must be rated A- or better by A.M. Best Company, Inc.
- (b) The policy must be written using one of the following combinations of Insurance Services Office (“ISO”) Railroad Protective Liability Insurance Form Numbers:

- (1) CG 00 35 01 96 and CG 28 31 10 93; or
- (2) CG 00 35 07 98 and CG 28 31 07 98; or
- (3) CG 00 35 10 01; or
- (4) CG 00 35 12 04

- (c) The named insured shall read:

Norfolk Southern Railway Company
Three Commercial Place
Norfolk, Virginia 23510-2191
Attn: Risk Management

- (d) The description of operations must appear on the Declarations, must match the project description in this agreement, and must include the appropriate Department project and contract identification numbers.

The Description and Designation shall read:

Description and Designation: Construction of dual overhead bridges on the Winston-Salem Northern Beltway over West Mountain Road and the tracks of Norfolk Southern Railway Company near Milepost K-18.1 in Forsyth County, North Carolina identified as State TIP U-2579B and Federal Project NHF-0918(93).

- (e) The job location must appear on the Declarations and must include the city, state, and appropriate highway name/number.

NOTE: Do not include any references to milepost on the insurance policy.

- (f) The name and address of the prime contractor must appear on the Declarations.
- (g) The name and address of the Department must be identified on the Declarations as the “Involved Governmental Authority or Other Contracting Party.”

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Forsyth Co.

(h) Other endorsements/forms that will be accepted are:

- (1) Broad Form Nuclear Exclusion – Form IL 00 21
- (2) 30-day Advance Notice of Non-renewal or cancellation
- (3) 60-day written notice to the Department prior to cancellation or change
- (4) Quick Reference or Index Form CL/IL 240

(i) Endorsements/forms that are **NOT** acceptable are:

- (1) Any Pollution Exclusion Endorsement except CG 28 31
- (2) Any Punitive or Exemplary Damages Exclusion
- (3) Known injury or Damage Exclusion form CG 00 59
- (4) Any Common Policy Conditions form
- (5) Any other endorsement/form not specifically authorized in section 14A2(h) above.

B. If any part of the work is sublet, similar insurance, and evidence thereof as specified in section 14A1 above, shall be provided by or on behalf of the subcontractor to cover its operations on Railroad's right of way. As an alternative, the Prime Contractor may provide insurance for the subcontractor by means of separate and individual policies.

C. Prior to entry on Railroad's right of way, the original and one duplicate copy of the Railroad Protective Liability Insurance Policy shall be submitted by the Prime Contractor to the Department at the address below for its review and transmittal to the Railroad. In addition, certificates of insurance evidencing the Prime Contractor's and any subcontractors' Commercial General Liability Insurance shall be issued to the Department and Railroad at the addresses below, and one certified copy of the Prime Contractor and any Subcontractors policy is to be forwarded to the Department for its review and transmittal to the Railroad. All policies and certificates of insurance shall state that the insurance coverage will not be suspended, voided, canceled, or reduced in coverage or limits without (30) days advance written notice to the Department and Railroad. The Railroad will not permit any work on its right of way until it has reviewed and approved the evidence of insurance required herein.

DEPARTMENT:

NCDOT Rail Division
Engineering & Safety Branch
C/O State Railroad Agent
1556 Mail Service Center
Raleigh, NC 27699-1556

RAILROAD:

Risk Management
Norfolk Southern Railway Company
Three Commercial Place
Norfolk, Virginia 23510-2191

D. The insurance required herein shall in no way serve to limit the liability of Department or its Contractors under the terms of this agreement.

E. The insurance amounts specified are minimum amounts and the Contractor may carry insurance in larger amounts if he so desires. As to "aggregate limits", if the insurer

establishes loss reserves equal to or in excess of the aggregate limit specified in any of the required insurance policies, the Contractor shall immediately notify the Department and shall cease all operations until the aggregate limit is reinstated. If the insurer establishes loss reserves equal to or in excess of one/half of the aggregate limit, the Contractor shall arrange to restore the aggregate limit to at least the minimum amount stated in these requirements. Any insurance policies and certificates taken out and furnished due to these requirements shall be approved by the Department and Railroad as to form and amount prior to beginning work on Railroad's right of way.

- F. All insurance herein before specified shall be carried until the final inspection and acceptance of the project by the Department and Railroad, or acceptance of that portion of the project within Railroad's right of way. At this point, no work or any other activities by the Contractor shall take place in Railroad's right of way without written permission from both the Department and Railroad.

15. FAILURE TO COMPLY:

- A. In the event the Contractor violates or fails to comply with any of the requirements of these Special Provisions:

- (1) The Railroad Engineer may require that the Contractor vacate Railroad's property.
- (2) The Department Engineer may withhold all monies due the Contractor on monthly statements.

Any such orders shall remain in effect until the Contractor has remedied the situation to the satisfaction of the Department Engineer and the Railroad Engineer.

16. PAYMENT FOR COST OF COMPLIANCE:

No separate payment will be made for any extra cost incurred on account of compliance with these special provisions. All such cost shall be included in the various prices bid to perform the work.

17. COMPLETION AND ACCEPTANCE:

Upon completion of the work, the Contractor shall remove from within the limits of the Railroad's right of way all machinery, equipment, surplus materials, rubbish or temporary buildings of the Contractor, and leave said right of way in a neat and orderly condition. After the final inspection has been made and work found to be completed in a satisfactory manner acceptable to the Department and Railroad, the Department will be notified of the Railroad's acceptance in writing by the Railroad's Chief Engineer or his authorized representative within ten (10) days or as soon thereafter as practicable.

Railroad Site Data:

The following information was received from the Railroad, and is provided as a convenience to the Contractor in bidding this project. This information is subject to change and the Contractor may, at his discretion, contact the Railroad directly to verify its current accuracy. Since this information is shown as a convenience to the Contractor, but is subject to change, the Contractor shall have no claims whatsoever against either the Railroad or the Department of Transportation for any delays or additional costs incurred based on changes in this information which occur after the above date of receipt.

Type and number of tracks within 50 ft. of project (mainline, branchline, siding, yard, etc.).

1 – Mainline

Number of trains on affected track per day.

4 – Freight

Maximum authorized operating speed of trains.

35 mph

PROJECT SPECIAL PROVISION

(10-18-95) (Rev. 10-15-13)

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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

Dredge and Fill and/or
Work in Navigable Waters (404)
Water Quality (401)

AUTHORITY GRANTING THE PERMIT

U. S. Army Corps of Engineers
Division of Environmental Management, DENR
State of North Carolina

The Contractor shall comply with all applicable permit conditions during construction of this project. Those conditions marked by * are the responsibility of the Department and the Contractor has no responsibility in accomplishing those conditions.

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 *2012 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.

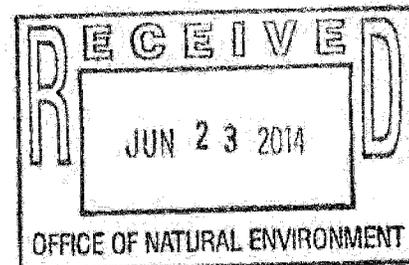
Where construction moratoriums are contained in a permit condition which restricts the Contractor's activities to certain times of the year, those moratoriums will apply only to the portions of the work taking place in the waters or wetlands provided that activities outside those areas is done in such a manner as to not affect the waters or wetlands.



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
69 DARLINGTON AVENUE
WILMINGTON, NORTH CAROLINA 28403-1343

June 17, 2014



Regulatory Division/1200A

Action ID: SAW-2008-03183

Mr. Richard W. Hancock, PE
North Carolina Department of Transportation
Project Development and Environmental Analysis
Natural Environment Section
1598 Mail Service Center
Raleigh, North Carolina 27699-1598

Dear Mr. Hancock:

In accordance with your written request of January 21, 2014, and the ensuing administrative record, enclosed is a Department of the Army (DA) Permit to authorize the permanent fill impacts to approximately 9,800 linear feet of jurisdictional stream channel, an additional 1,553 linear feet of temporary stream channel impact, permanently impact 1.96 acres of jurisdictional wetlands, and 4.36 acres of open water impact (ponds) associated with the NCDOT TIP No. U-2579B; Winston-Salem Northern Beltway Eastern Section B; from US 158 to I-40 Bus/US 421, east of Winston-Salem, Forsyth County, North Carolina.

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 notified you that your permit has been modified.

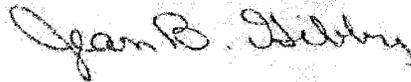
Carefully read your permit. The general and special conditions are important. Your failure to comply with these conditions could result in a violation of Federal law. Certain significant general conditions require that:

- a. You must complete construction before December 31, 2019.
- 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.

You should address all questions regarding this authorization to Mr. John Thomas in the Raleigh Regulatory Field Office, telephone number (919) 554-4884, extension 25.

Thank you in advance for completing our Customer Survey Form. This can be accomplished by visiting our web-site at <http://regulatory.usacesurvey.com> and completing the survey on-line. We value your comments and appreciate you taking the time to complete a survey each time you interact with our office.

Sincerely,



Per Steven A. Baker
Colonel, U.S. Army
District Commander

Enclosures

Copy Furnished (with enclosures):

Chief, Source Data Unit
NOAA/National Ocean Service
Attn: Sharon Tear N/CS261
1315 East-West Hwy., Rm 7316
Silver Spring, MD 20910-3282

Copies Furnished with special conditions and plans:

Mr. Pete Benjamin
U.S. Fish and Wildlife Service
Raleigh Ecological Service Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

Mr. Fritz Rohde
Habitat Conservation Division -- Atlantic Branch
101 Pivers Island Road
Beaufort, North Carolina 28516

Mr. Todd Bowers
Wetlands Regulatory Section
U.S. Environmental Protection Agency -- Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303-8931

Mr. Doug Huggett
Division Coastal Management
N.C. Department of Environment
and Natural Resources
400 Commerce Avenue
Morehead City, North Carolina 28557

Dr. Pace Wilber
Habitat Conservation Division -- Atlantic Branch
NOAA Fisheries Service
219 Fort Johnston Road
Charleston, South Carolina 29412

RECEIVED

JUN 11 2014

RALEIGH REGULATORY
FIELD OFFICE

DEPARTMENT OF THE ARMY PERMIT

Permittee: NORTH CAROLINA DEPARTMENT OF TRANSPORTATION -
ATTN: MR. RICHARD HANCOCK

Permit No: SAW-2008-03183

Issuing Office: USAED, WILMINGTON

Project Description: The project identified as TIP No. U-2579B, consists of construction on new alignment an eastern section of the proposed Winston-Salem Northern Beltway from US 158 to I-40 Bus/US 421. The new road alignment will consist in each direction 3 12-foot lanes plus 1 12-foot future lane with a 12-foot paved shoulder and a 22-foot grassed median. The road alignment will be a control access freeway with interchanges at US 158 and I-40 Bus/US 421. There will also be widening and merge lane improvements located east and west on the existing I-40 Bus/US 421 alignment at the proposed freeway interchange. The estimated length of the project is 4.06 miles. This project is included in the North Carolina Department of Transportation's Transportation Improvement Program (TIP). Total jurisdictional stream impacts within the Yadkin River Basin (HUC 030040101) include 9,800 linear feet of permanent stream channel impacts, which includes bank stabilization, and 1,553 linear feet of temporary stream channel impact. There will be a total of 1.96 acres of jurisdictional wetlands impact and 4.36 acres of open water impact (ponds) in the same Yadkin River Basin.

In order to compensate for impacts associated with this permit, NCDOT will provide onsite mitigation of 450 feet of warm water stream by restoring one stream channel at a proposed drained pond site (Permit Site No. 20) and payment to the North Carolina Ecosystem Enhancement Program (NCEEP) for 16,863 warm stream mitigation units within the Yadkin River Basin (Cataloging Unit 03040101), to mitigate for permanent loss impacts to 9,494 linear feet of streams with more than minimal function. NCDOT will provide payment to the NCEEP for 3.92 riparian wetland mitigation units within the Yadkin River Basin (Cataloging Unit 03040101) for permanent loss impacts to 1.96 acre of riparian wetlands.

Project Location: The project corridor for TIP No. U-2579B is a new alignment linear transportation corridor from US 158 running southeast to a new interchange with I-40 Bus / US 421 that includes widening up-grades at the existing I-40 Bus / US 421 alignment associated with the proposed new interchange, located east of Winston-Salem, Forsyth County, North Carolina.

Project Length: 4.06 miles Nearest Town: Winston-Salem; River Basin: Yadkin River; Nearest Waterways: Kerners Mill Creek & Lowery Creek LATITUDE & LONGITUDE: Latitude North: 36.1178311; Longitude West: -80.1380434.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on December 31, 2019. 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).
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 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.

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Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.



(PERMITTEE) NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
ATTN: RICHARD W. HANCOCK
06/04/2014 (DATE)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.


per (DISTRICT Commander) STEVEN A. BAKER, COLONEL
17 Jun 2014 (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.

(TRANSFEEE) (DATE)

Special Conditions
Action ID SAW-2008-03183
North Carolina Department of Transportation; TIP U-2579B

WORK LIMITS

- 1. CONSTRUCTION PLANS:** Except as authorized by this permit or any USACE 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 fill 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.
- 2. UNAUTHORIZED DREDGE OR FILL:** Except as authorized by this permit or any USACE 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. This permit does not authorize temporary placement or double handling of excavated or fill material within waters or wetlands outside the permitted area. This prohibition applies to all borrow and fill activities connected with this project.
- 3. MAINTAIN CIRCULATION AND FLOW OF WATERS:** 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 waters or wetlands or to reduce the reach of waters or wetlands.
- 4. DEVIATION FROM PERMITTED PLANS:** The permittee shall ensure that the construction design plans for this project do not deviate from the permit plans attached to this authorization. Written verification shall be provided that the final construction drawings comply with the attached permit drawings prior to any active construction in waters of the United States, including wetlands. Any deviation in the construction design plans will be brought to the attention of the Corps of Engineers, Mr. John Thomas, Raleigh Regulatory Field Office, prior to any active construction in waters or wetlands.
- 5. PRECONSTRUCTION MEETING:** The permittee shall schedule and attend a preconstruction meeting between its representatives, the contractors representatives, and the Corps of Engineers, Raleigh Field Office, NCDOT Regulatory Project Manager, prior to any

Special Conditions
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North Carolina Department of Transportation; TIP U-2579B

work within jurisdictional waters and wetlands to ensure that there is a mutual understanding of all the terms and conditions contained with this Department of Army Permit. The permittee shall provide the USACE, Raleigh 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 USACE, 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.

RELATED LAWS

6. WATER QUALITY CERTIFICATION: The North Carolina Division of Water Quality (DWQ) permit/certification number WQC003987 was issued for this project on April 11, 2014. Special conditions were issued associated with this water quality permit/certification and a copy of these conditions is attached as Exhibit A. These referenced conditions are hereby incorporated as special conditions of this permit.

7. WATER CONTAMINATION: All mechanized equipment will be regularly inspected and maintained to prevent contamination of waters and wetlands from fuels, lubricants, hydraulic fluids, or other toxic materials. In the event of a spill of petroleum products or any other hazardous waste, the permittee shall immediately report it to the N.C. Division of Water Quality at (919) 733-3300 or (800) 858-0368 and provisions of the North Carolina Oil Pollution and Hazardous Substances Control Act will be followed.

PROJECT MAINTENANCE

8. NOTIFICATION OF CONSTRUCTION COMMENCEMENT AND COMPLETION: The permittee shall advise the Corps in writing prior to beginning the work authorized by this permit and again upon completion of the work authorized by this permit.

9. CLEAN FILL: Unless otherwise authorized by this permit, all fill material placed in waters or wetlands shall be generated from an upland source and will be clean and free of any pollutants except in trace quantities. Metal products, organic materials (including debris from land clearing activities), or unsightly debris will not be used. Soils used for fill shall not be contaminated with any toxic substance in concentrations governed by Section 307 of the Clean Water Act.

Special Conditions
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North Carolina Department of Transportation; TIP U-2579B

10. 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, shall be available at the project site during construction and maintenance of this project.

11. SILT-FENCING: The permittee shall employ all sedimentation and erosion control measures necessary to prevent an increase in sedimentation or turbidity within waters and wetlands outside the permit area. 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 must remain in full compliance with all aspects of the Sedimentation Pollution Control Act of 1973 (North Carolina General Statutes Chapter 113A Article 4).

12. 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.

13. EROSION CONTROL MEASURES IN WETLANDS: The permittee shall remove all sediment and erosion control measures placed in wetlands or waters, and shall restore natural grades in those areas, prior to project completion.

ENFORCEMENT

14. REPORTING ADDRESS: All reports, documentation and correspondence required by the conditions of this permit shall be submitted to the following address: U.S. Army Corps of Engineers, Regulatory Division, Raleigh Regulatory Field Office, c/o Mr. John Thomas, 3331 Heritage Trade Drive, Suite 105, Wake Forest, NC 27587, and by telephone at: 919-554-4884, ext. 25. The Permittee shall reference the following permit number, SAW-2008-03183, on all submittals.

Special Conditions
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North Carolina Department of Transportation; TIP U-2579B

15. REPORTING VIOLATIONS OF THE CLEAN WATER ACT AND RIVERS AND HARBORS ACT: Violation of these conditions or violation of Section 404 of the Clean Water Act of Section 10 of the Rivers and Harbors Act must be reported in writing to the Wilmington District U.S. Army Corps of Engineers within 24 hours of the permittee's discovery of the violation.

16. 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.

* **17. COMPENSATORY MITIGATION:**

A. In Lieu Fee: 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 authorization.

B. Permittee Responsible Mitigation:

1. The Permittee shall fully implement the compensatory mitigation plan, entitled, Mitigation Plan Winston-Salem Northern Beltway Forsyth County, North Carolina, T.I.P. Number U-2579B, dated August 22, 2013. Activities prescribed by this plan shall be initiated prior to, or concurrently with, commencement of any construction activities within jurisdictional areas authorized by this permit. The permittee shall (re-establish, rehabilitate, enhance, establish) 450 linear feet of streams in accordance with the plan with the following conditions:
 - a) The permittee, NCDOT, is the party responsible for the implementation, performance and long term management of the compensatory mitigation project.
 - b) Any changes or modifications to your mitigation plan shall be approved by the Corps.

Special Conditions

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North Carolina Department of Transportation; TIP U-2579B

- c) The permittee shall maintain the entire mitigation site in its natural condition, as altered by the work in the mitigation plan, in perpetuity. Prohibited activities within the mitigation site specifically include, but are not limited to: Filling; grading; excavating; earth movement of any kind; construction of roads, walkways, buildings, signs, or any other structure; any activity that may alter the drainage patterns on the property; the destruction, cutting, removal, mowing, or other alteration of vegetation on the property; disposal or storage of any garbage, trash, debris or other waste material; graze or water animals, or use for any agricultural or horticultural purpose; or any other activity which would result in the property being adversely impacted or destroyed, except as specifically authorized by this permit.
- d) All mitigation areas shall be monitored for a minimum of 5 years or until deemed successful by the Corps in accordance with the monitoring requirements included in the mitigation plan.
2. Remedial Mitigation Plan: If the compensatory mitigation fails to meet the performance standards 5 years after completion of the compensatory mitigation objectives, the compensatory mitigation will be deemed unsuccessful. Within 60 days of notification by the Corps that the compensatory mitigation is unsuccessful, the Permittee shall submit to the Corps an alternate compensatory mitigation proposal to fully offset the functional loss that occurred as a result of the project. The alternate compensatory mitigation proposal may be required to include additional mitigation to compensate for the temporal loss of wetland function associated with the unsuccessful compensatory mitigation activities. The Corps reserves the right to fully evaluate, amend, and approve or reject the alternate compensatory mitigation proposal. Within 120 days of Corps approval, the Permittee will complete the alternate compensatory mitigation proposal.
3. Mitigation Release: The Permittee's responsibility to complete the required compensatory mitigation, as set forth in the Compensatory Mitigation Special Condition of this permit will not be considered fulfilled until mitigation success has been demonstrated and written verification has been provided by the Corps. A mitigation area which has been released will no longer require monitoring or reporting by the Permittee; however the Permittee, Successors and subsequent Transferees remain perpetually responsible to ensure that the mitigation area(s) remain in a condition appropriate to offset the authorized impacts in accordance with the approved mitigation and monitoring plan and the general and special conditions of this permit.

Special Conditions
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North Carolina Department of Transportation; TIP U-2579B

CONCRETE CONDITION

18. 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).

NC DOT STANDARD PERMIT CONDITIONS

19. CULVERTS:

A. Unless otherwise requested in the applicant's application and depicted on the approved work plans, culverts greater than 48 inches in diameter will be buried at least one foot below the bed of the stream. 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. The bottom of the culvert must be placed at a depth below the natural stream bottom to provide for passage during drought or low flow conditions. Destabilizing the channel and head cutting upstream should be considered in the placement of the culvert.

B. Measures will 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 should 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 should 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.

20. TEMPORARY FILLS: Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

Special Conditions
Action ID SAW-2008-03183
North Carolina Department of Transportation; TIP U-2579B

21. BORROW AND WASTE:

A. To ensure that all borrow and waste activities occur on high ground and do not result in the degradation of adjacent wetlands and streams, except as authorized by this permit, the permittee shall require its contractors and/or agents to identify all areas to be used to borrow material, or to dispose of dredged, fill, or waste material. The permittee shall provide the USACE with appropriate maps indicating the locations of proposed borrow or waste sites as soon as the permittee has that information. The permittee will coordinate with the USACE before approving any borrow or waste sites that are within 400 feet of any streams or wetlands.

B. 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 to borrow material or to dispose of dredged, fill or waste material. The permittee shall provide the Corps of Engineers with appropriate maps indicating the locations of proposed borrow or waste sites as soon as such information is available. The permittee will coordinate with the Corps of Engineers before approving any borrow or waste sites that are within 400 feet of any stream or wetland. All jurisdictional wetland delineations on borrow and waste areas shall be verified by the Corps of Engineers and shown on the approved reclamation plans. The permittee shall ensure that all such areas comply with the Special Condition 1 above, of this permit and shall require and maintain documentation of the location and characteristics of all borrow and disposal sites associated with this project. This documentation will include data regarding soils, vegetation and hydrology sufficient to clearly demonstrate compliance with Special Condition 1 above. All information will be available to the Corps of Engineers upon request. The permittee shall require its contractors to complete and execute reclamation plans for each waste and borrow site and provide written documentation that the reclamation plans have been implemented and all work is completed. This documentation will be provided to the Corps of Engineers within 30 days of the completion of the reclamation work.

U.S. ARMY CORPS OF ENGINEERS

Wilmington District

Compensatory Mitigation Responsibility Transfer Form

Permittee: NC Department of Transportation, Div. of Highways

Action ID: SAW-2008-03183

Project Name: Winston-Salem Northern Beltway Eastern Section B; TIP No. U-2579B

County: Forsyth

Instructions to Permittee: The Permittee must provide a copy of this form to the Mitigation Sponsor, either an approved Mitigation Bank or the North Carolina Ecosystem Enhancement Program (NCEEP), who will then sign the form to verify the transfer of the mitigation responsibility. Once the Sponsor has signed this form, it is the Permittee's responsibility to ensure that to the U.S. Army Corps of Engineers (USACE) Project Manager identified on page two is in receipt of a signed copy of this form before conducting authorized impacts, unless otherwise specified below. If more than one mitigation Sponsor will be used to provide the mitigation associated with the permit, or if the impacts and/or the mitigation will occur in more than one 8-digit Hydrologic Unit Code (HUC), multiple forms will be attached to the permit, and the separate forms for each Sponsor and/or HUC must be provided to the appropriate mitigation Sponsors.

Instructions to Sponsor: The Sponsor must verify that the mitigation requirements (credits) shown below are available at the identified site. By signing below, the Sponsor is accepting full responsibility for the identified mitigation, regardless of whether or not they have received payment from the Permittee. Once the form is signed, the Sponsor must update the bank ledger and provide a copy of the signed form and the updated bank ledger to the Permittee, the USACE Project Manager, and the Wilmington District Mitigation Office (see contact information on page 2). The Sponsor must also comply with all reporting requirements established in their authorizing instrument.

Permitted Impacts and Compensatory Mitigation Requirements:

Permitted Impacts Requiring Mitigation*

8-digit HUC and Basin: 03040101, Yadkin River Basin

Stream Impacts (linear feet)			Wetland Impacts (acres)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-Riverine	Non-Riparian	Coastal
9,044				1.96		

*If more than one mitigation sponsor will be used for the permit, only include impacts to be mitigated by this sponsor.

Compensatory Mitigation Requirements:

8-digit HUC and Basin: 03040101, Yadkin River Basin

Stream Mitigation (credits)			Wetland Mitigation (credits)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-Riverine	Non-Riparian	Coastal
16,863				3.92		

Mitigation Site Debited: NCEEP

(List the name of the bank to be debited. For umbrella banks, also list the specific site. For NCEEP, list NCEEP. If the NCEEP acceptance letter identifies a specific site, also list the specific site to be debited).

Section to be completed by the Mitigation Sponsor

Statement of Mitigation Liability Acceptance: I, the undersigned, verify that I am authorized to approve mitigation transactions for the Mitigation Sponsor shown below, and I certify that the Sponsor agrees to accept full responsibility for providing the mitigation identified in this document (see the table above), associated with the USACE Permittee and Action ID number shown. I also verify that released credits (and/or advance credits for NCEEP), as approved by the USACE, are currently available at the mitigation site identified above. Further, I understand that if the Sponsor fails to provide the required compensatory mitigation, the USACE Wilmington District Engineer may pursue measures against the Sponsor to ensure compliance associated with the mitigation requirements.

Mitigation Sponsor Name: _____

Name of Sponsor's Authorized Representative: _____

Signature of Sponsor's Authorized Representative

Date of Signature

USACE Wilmington District
Compensatory Mitigation Responsibility Transfer Form, Page 2

Conditions for Transfer of Compensatory Mitigation Credit:

- Once this document has been signed by the Mitigation Sponsor and the USACE is in receipt of the signed form, the Permittee is no longer responsible for providing the mitigation identified in this form, though the Permittee remains responsible for any other mitigation requirements stated in the permit conditions.
- Construction within jurisdictional areas authorized by the permit identified on page one of this form can begin only after the USACE is in receipt of a copy of this document signed by the Sponsor, confirming that the Sponsor has accepted responsibility for providing the mitigation requirements listed herein. For authorized impacts conducted by the North Carolina Department of Transportation (NCDOT), construction within jurisdictional areas may proceed upon permit issuance; however, a copy of this form signed by the Sponsor must be provided to the USACE within 30 days of permit issuance. NCDOT remains fully responsible for the mitigation until the USACE has received this form, confirming that the Sponsor has accepted responsibility for providing the mitigation requirements listed herein.
- Signed copies of this document must be retained by the Permittee, Mitigation Sponsor, and in the USACE administrative records for both the permit and the Bank/ILF Instrument. It is the Permittee's responsibility to ensure that the USACE Project Manager (address below) is provided with a signed copy of this form.
- If changes are proposed to the type, amount, or location of mitigation after this form has been signed and returned to the USACE, the Sponsor must obtain case-by-case approval from the USACE Project Manager and/or North Carolina Interagency Review Team (NCIRT). If approved, higher mitigation ratios may be applied, as per current District guidance and a new version of this form must be completed and included in the USACE administrative records for both the permit and the Bank/ILF Instrument.

Comments/Additional Conditions:

This form is not valid unless signed below by the USACE Project Manager and by the Mitigation Sponsor on Page 1. *Once signed, the Sponsor should provide copies of this form along with an updated bank ledger to: 1) the Permittee, 2) the USACE Project Manager at the address below, and 3) the Wilmington District Mitigation Office, Attn: Todd Tugwell, 11405 Falls of Neuse Road, Wake Forest, NC 27587 (email: todd.tugwell@usace.army.mil).* Questions regarding this form or any of the permit conditions may be directed to the USACE Project Manager below.

USACE Project Manager: John Thomas
 USACE Field Office: Raleigh Regulatory Field Office
 US Army Corps of Engineers
 3331 Heritage Trade Drive, Suite 105
 Wake Forest, North Carolina 27587
 Email: john.t.thomas.jr@usace.army.mil

USACE Project Manager Signature

June 02, 2014
Date of Signature

Current Wilmington District mitigation guidance, including information on mitigation ratios, functional assessments, and mitigation bank location and availability, and credit classifications (including stream temperature and wetland groupings) is available at <http://ribits.usace.army.mil>.

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: **NC Dept. of Transportation** File Number: **SAW-2008-03183** Date: **June 2, 2014**
 Attn: **Mr. Richard W. Hancock, PE**

Attached is:		See Section below
<input checked="" type="checkbox"/>	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
<input type="checkbox"/>	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
<input type="checkbox"/>	PERMIT DENIAL	C
<input type="checkbox"/>	APPROVED JURISDICTIONAL DETERMINATION	D
<input type="checkbox"/>	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I: The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at <http://www.usace.army.mil/inet/functions/cw/cecwo/reg> or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **OBJECT:** If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- **ACCEPT:** If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- **APPEAL:** If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- **ACCEPT:** You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- **APPEAL:** If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the district engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL OR OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION

If you have questions regarding this decision and/or the appeal process you may contact:

**District Engineer, Wilmington Regulatory Div.
Attn: Mr. John Thomas
3331 Heritage Trade Drive
Raleigh, North Carolina 27587
Phone: (919) 554-4884, extension 25**

If you only have questions regarding the appeal process you may also contact:

**Mr. Jason Steele, Administrative Appeal Review Officer
CESAD-PDO
U.S. Army Corps of Engineers, South Atlantic Division
60 Forsyth Street, Room 10M15
Atlanta, Georgia 30303-8801
Phone: (404) 562-5137**

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

Signature of appellant or agent.

Date:

Telephone number:

For appeals on Initial Proffered Permits send this form to:

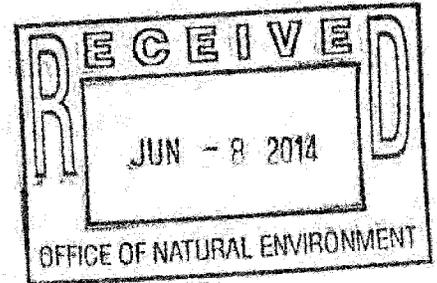
District Engineer, Wilmington Regulatory Division, Attn: John Thomas, 69 Darlington Avenue, Wilmington, North Carolina 28403



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
69 DARLINGTON AVENUE
WILMINGTON, NORTH CAROLINA 28403-1343

July 02, 2014



Regulatory Division/1200A

Action ID: SAW-2008-03183

Mr. Richard W. Hancock, PE
North Carolina Department of Transportation
Project Development and Environmental Analysis
Natural Environment Section
1598 Mail Service Center
Raleigh, North Carolina 27699-1598

Dear Mr. Hancock:

Reference is made to your Department of the Army (DA) permit issued on June 17, 2014, that authorized permanent discharge of fill impacts to 9,800 linear feet of jurisdictional stream channel, an additional 1,553 linear feet of temporary stream channel impact, permanently impact 1.96 acres of jurisdictional wetlands, and 4.36 acres of open water impact (ponds) associated with the NCDOT TIP No. U-2579B; Winston-Salem Northern Beltway Eastern Section B; from US 158 to I-40 Bus/US 421, east of Winston-Salem, Forsyth County, North Carolina.

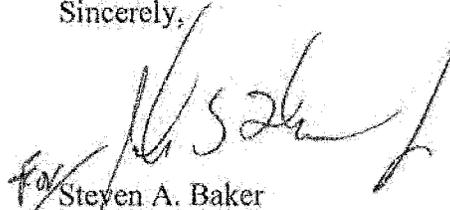
Reference also your written request of June 24, 2014, for a modification to your DA permit to authorize changes to impacts to jurisdictional waters as defined by plans included in your request associated with proposed construction changes for Site 23 (an additional 68 feet of temporary stream impacts) and Site 28 (an additional 340 feet of bank stabilization). These changes are associated with adding a retaining wall to keep the widening of US 421 out of Smith Creek.

We have determined that the proposed changes/modifications to the construction plans including temporary/permanent impacts to jurisdictional waters are minor. Therefore, a supplemental public notice is not necessary. The permit is hereby modified to include the change in impacts to jurisdictional waters as described in the referenced provided construction plans included with your June 24, 2014, modification request. It is understood that all other conditions of the original permit remain applicable, including the permit expiration date of December 31, 2019.

If the permitted work is not completed on or before the date herein specified, the authorization, if not previously revoked or specifically further extended, will cease and become null and void. If additional time is required to complete the project, you should contact this office with a request for an additional time extension.

Should you have questions, please contact Mr. John Thomas, Raleigh Regulatory Field Office, telephone (919) 554-4884 extension 25.

Sincerely,


Steven A. Baker
Colonel, U.S. Army
District Commander

CC:
NC DOT / Div 9
Amy Euliss
375 Silas Creek Parkway
Winston-Salem, North Carolina 27127

BCF:
CESAW-RG
CESAW-RG-R/Thomas
CESAW-RG-R/Compliance file



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

John E. Skvarla, III
Secretary

July 28, 2014

Mr. Richard W. Hancock, P.E., Manager
Project Development and Environmental Analysis
North Carolina Department of Transportation
1598 Mail Service Center
Raleigh, North Carolina, 27699-1598

Subject: 401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water with ADDITIONAL CONDITIONS for proposed Winston-Salem Northern Beltway Eastern Section from US 158 to I-40 Bus/US421, Forsyth County, TIP U-2579B; NCDWR Project No. 2014-0090v2.

Dear Mr. Hancock:

Attached hereto is a modification of Certification No. 3987 issued to The North Carolina Department of Transportation (NCDOT) originally dated April 11, 2014. This modification includes the revisions as requested in your application dated June 10, 2014 along with other modifications and editorial revisions. *This modification replaces the previous certifications dated April 11, 2014 and July 25, 2014.*

If we can be of further assistance, do not hesitate to contact us.

Sincerely,

Thomas A. Reeder, Director
Division of Water Resources

Attachments

cc: John Thomas, US Army Corps of Engineers, Raleigh Field Office (electronic copy only)
Amy Euliss, Division 9 Environmental Officer (if applicable)
Cynthia Van Der Wiele, Environmental Protection Agency (electronic copy only)
Marla Chambers, NC Wildlife Resources Commission (electronic copy only)
Jason Elliott, NCDOT, Natural Environment Section (electronic copy only)
Jim Stanfill, Ecosystem Enhancement Program
Dave Wanucha, NCDWR Winston-Salem Regional Office
File Copy

**401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act
with ADDITIONAL CONDITIONS**

THIS CERTIFICATION is issued in conformity with the requirements of Section 401 Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Division of Water Resources (NCDWR) Regulations in 15 NCAC 2H .0500. This certification authorizes the NCDOT to impact 1.96 acres of jurisdictional wetlands, permanently impact 10,140 linear feet of streams, temporarily impact 1,809 linear feet of streams and permanently impact 4.36 acres of open water/pond impacts. The project shall be constructed pursuant to the original application dated January 21, 2014 and the application for revisions dated June 10, 2014. The authorized impacts for the entire project are as summarized and described below:

Wetland Impacts in the Yadkin River Basin

Permit Site No.	JD Package ID	Permanent Fill (ac)	Excavation (ac)	Mechanized Clearing (ac)	Total Impacts (ac)	Impacts Requiring Mitigation (ac)
1	ES-W16	0.03	<0.01	0.02	0.06	0.06
6	ES-W18	0.03	-	<0.01	0.04	0.04
7	ES-W13	0.52	-	0.01	0.53	0.53
9	ES-W14	0.03	-	0.01	0.04	0.04
10	ES-W19	0.01	-	-	0.01	0.01
13	ESE-W1	0.33	-	-	0.33	0.33
14	ESE-W2	0.04	-	-	0.04	0.04
15	ESE-W3	0.18	-	-	0.18	0.18
17	ESE-W16	0.09	-	<0.01	0.10	0.10
19	ESE-W4	0.47	-	0.01	0.48	0.48
21	ES-W17	0.02	-	-	0.02	0.02
22	ESE-W22	0.01	-	-	0.01	0.01
24A	ESE-W20	0.03	-	-	0.03	0.03
24A	ESE-W21	0.03	-	-	0.03	0.03
27B	ESE-W17	0.05	-	-	0.05	0.05
29	No ID	-	-	<0.01	<0.01	<0.01
TOTALS (ac)		1.87	<0.01	0.08	1.96	1.96

Notes: Totals are rounded based upon sum of actual impacts. All permanent impacts require 2:1 USACE mitigation.

Open Water/Pond Impacts in the Yadkin River Basin

Permit Site No.	Permanent Fill in Open Waters (ac)	Total Fill in Open Waters (ac)
7	0.59	0.59
15	2.38	2.38
16	0.16	0.16
20 (On-site mitigation)	0.85	0.85
26	0.38	0.38
Total	4.36	4.36

Total Open Water Impacts for Project: 4.36 acres.

Stream Impacts in the Yadkin River Basin

Permit Site No.	Stream Name/ID Packet ID	I/P Flow Status	Impact Type	Permanent Impacts (ft)	Impacts requiring USACE mitigation (ft)	USACE Mitigation Ratio ¹	Impacts requiring NCDWR mitigation (ft)	Temp Impacts (ft)
1	UT to Lowery Mill Creek/ ES-S45	I	Fill	142	142	1:1	0 ³	0
2	UT to Lowery Mill Creek/ ES-S36	I	Fill	109	109	1:1	0 ³	0
		P	Fill	208	208	2:1	208	0
		P	BS	10	0 ²	-	10	37
3	UT to Lowery Mill Creek/ ES-S35	P	Fill	438	438	2:1	438	33
3A	UT to Lowery Mill Creek/ ES-S35	P	Temp Detour	0	0	-	0	545
3B	UT to Lowery Mill Creek/ ES-S47	P	Temp Detour	0	0	-	0	194
4	UT to Lowery Mill Creek/ ES-S37	P	Fill	493	493	2:1	493	18
		P	BS	9	0 ²	-	9	31
5	UT to Lowery Mill Creek/ ES-S38	P	Fill	740	740	2:1	740	22
5A	UT to Lowery Mill Creek/ ES-S39	I	Fill	306	306	1:1	0 ³	0
6	UT to Martin Mill Creek/ ES-S40	P	Fill	312	312	2:1	312	42
8	UT to Martin Mill Creek/ ES-S42	P	Fill	442	442	2:1	442	53
			BS	58	0 ²	-	58	44
10	UT to Martin Mill Creek/ ES-S43	P	Fill	783	783	2:1	783	22

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Permit Site No.	Stream Name/JD Packet ID	L/P Flow Status	Impact Type	Permanent Impacts (ft)	Impacts requiring USACE mitigation (ft)	USACE Mitigation Ratio ¹	Impacts requiring NCDWR mitigation (ft)	Temp Impacts (ft)
10A	UT to Martin Mill Creek/ ES-S44	P	Fill	684	684	2:1	684	0
11	Kerners Mill Creek/ ESE-S1	P	Fill	808	808	2:1	808	57
11A	Kerners Mill Creek/ ESE-S1	P	Fill	223	223	2:1	223	41
12	UT to Kerners Mill Creek/ ESE-S30	I	Fill	88	88	1:1	0 ³	205
14	UT to Smith Creek/ ESE-S3	I	Fill	688	688	1:1	0 ³	0
15	UT to Smith Creek/ ESE-S31	P	Fill	332	332	2:1	332	0
15A	UT to Smith Creek/ ESE-S32	I	Fill	108	108	1:1	0 ³	0
16	UT to Smith Creek/ ESE-S36	I	Fill	104	104	1:1	0 ³	0
17	UT to Fishers Branch/ ESE-S5	P	Fill	928	928	2:1	928	0
18	Fishers Branch/ ESE-S4	P	Fill	377	377	2:1	377	67
			BS	80	0 ²	-	80	59
20	UT to Fishers Branch/ ESE-S7	P	Fill	163	163	2:1	163	0
23	Smith Creek/ ESE-S29	P	Fill	100	100	2:1	100	32
			BS	54	0 ²	-	54	89

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Permit Site No.	Stream Name/JD Packet ID	I/P Flow Status	Impact Type	Permanent Impacts (ft)	Impacts requiring USACE mitigation (ft)	USACE Mitigation Ratio ¹	Impacts requiring NCDWR mitigation (ft)	Temp Impacts (ft)
23A	UT to Smith Creek/ ESE-S43	I	Fill	57	57	1:1	0 ³	0
23B	UT to Smith Creek/ ESE-S38	P	Fill	135	135	2:1	0 ⁴	0
24	UT to Smith Creek/ ESE-S40	P	Fill	202	202	2:1	202	0
25	UT to Smith Creek/ ESE-S41	I	Fill	73	73	1:1	0 ³	0
			BS	21	0 ²	-	0 ³	16
27A	UT to Smith Creek/ ESE-S24	P	Fill	205	205	2:1	205	0
27B	UT to Smith Creek/ ESE-S33	P	Fill	130	130	2:1	0 ⁴	14
27C	UT to Smith Creek/ ESE-S34	P	Fill	116	116	2:1	0 ⁴	0
28	Smith Creek/ ESE-S29	P	BS	<u>365</u>	0 ²	-	<u>365</u>	<u>188</u>
30	Smith Creek/ ESE-S29	P	BS	28	0 ²	-	0 ⁴	0
31	Martin Mill Creek/ ES-S41	P	BS	21	0 ²	-	0 ⁴	0
TOTALS (ft)				<u>10,140</u>	9,494	-	<u>7,830</u>	<u>1,809</u>

Notes: P = Perennial; I = Intermittent; BS = Bank Stabilization. Underlined values reflect June 10, 2014 impact modifications. ¹Determined by USACE during final JD packet review. ²Mitigation for bank stabilization not required by USACE. ³Intermittent streams grandfathered from NCDWR mitigation. ⁴Mitigation not required by NCDWR (less than 150 linear feet of stream).

The application provides adequate assurance that the discharge of fill material into the waters of the Yadkin River Basin in conjunction with the proposed development will not result in a violation of applicable Water Quality Standards and discharge guidelines. Therefore, the State of North Carolina certifies that this activity will not violate the applicable portions of Sections 301, 302, 303, 306, 307 of PL 92-500 and PL 95-217 if conducted in accordance with the application and conditions hereinafter set forth.

This approval is only valid for the purpose and design that you submitted in your application dated received January 24, 2014 and the subsequent modification request dated June 10, 2014. Should your project change, you are required to notify the NCDWR and submit a new application. If the property is sold, the new owner must be given a copy of this Certification and approval letter, and is thereby responsible for complying with all the conditions. If any additional wetland impacts, or stream impacts, for this project (now or in the future) exceed one acre or 150

linear feet, respectively, additional compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h) (6) and (7). For this approval to remain valid, you are required to comply with all the conditions listed below. In addition, you should obtain all other federal, state or local permits before proceeding with your project including (but not limited to) Sediment and Erosion control, Coastal Stormwater, Non-discharge and Water Supply watershed regulations. This Certification shall expire on the same day as the expiration date of the corresponding Corps of Engineers Permit.

Project Specific Condition(s) of Certification:

1. At locations where ponds will be drained, proper measures need to be employed to drain the ponds so that impact to aquatic species is limited. If pond draining techniques create significant disturbance to native aquatic species, additional measures such as collection and relocation may be necessary to prevent a significant fish kill. Natural channel construction techniques should be employed, if possible and where applicable, to ensure that the jurisdictional stream channel above and below the drained pond remains stable, and that no secondary impacts occur within the channel as a result of draining the ponds.

Stream and Wetland Mitigation--Payment to North Carolina Ecosystem Enhancement Program (EEP)

- * 2. Compensatory mitigation for impacts to 7,830 linear feet of streams at a replacement ratio of 1:1 is required. However, on-site compensatory mitigation for 450 linear feet of impacts to jurisdictional streams shall be provided as outlined below, resulting in 7,380 linear feet remaining that need mitigation. In addition, compensatory mitigation for impacts to 1.96 acres of riparian wetlands is required. We understand that you have chosen to perform compensatory mitigation for impacts to wetlands and streams through EEP and that EEP has agreed to implement the mitigation for the project. EEP has indicated in a letter dated January 17, 2014 that they will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for the above-reference project, in accordance with the EEP Mitigation Banking Instrument signed July 28, 2010.

On-Site Stream Mitigation

3. Compensatory mitigation for 450 linear feet of impacts to jurisdictional streams shall be provided by draining a pond (Site 20) and restoring the stream that forms in the relic pond. The on-site stream restoration shall be constructed in accordance with your Mitigation Plan dated August 22, 2013 that was submitted as part of the 401 Individual Water Quality Certification application dated January 21, 2014.
4. The Permittee will notify DWR when draining of the pond will commence.
- * 5. All on-site mitigation sites shall be protected in perpetuity by a conservation easement or through NCDOT fee simple acquisition and recorded in the NCDOT Natural Environment Unit mitigation geodatabase.
- *6. Please be reminded that an as-built for the stream restoration shall be submitted to the North Carolina Division of Water Resources 401 Wetlands Unit within 60 days following completion of the restoration project. If the parameters of this condition are not met, then the Permittee shall supply additional stream mitigation for the 450 linear feet of impacts.
7. The stream restoration should at least have a 50-foot wide native wooded buffer planted on both sides of the stream to the greatest extent possible and as practicable given site specific constraints.
8. Coir fiber matting (or other organic matting material) should be used if necessary for site stabilization.
9. Natural channel construction techniques should be employed if possible within the channel that forms in the relic pond to ensure that the jurisdictional stream channel upstream and downstream of the drained pond remains stable and that no secondary impacts occur within the channels as a result of draining the pond.
- * 10. If stream that forms in the relic pond does not stabilize by year 2, the Permittee should submit a plan to DWR describing how the Permittee intends to correct the problem and restabilize the stream channel.
- * 11. The Permittee shall note the presence of invasive vegetation in the monitoring reports and treat as needed.
- * 12. The Permittee shall adhere to performance standards and monitoring requirements as outlined in the Mitigation Plan dated August 22, 2013 as was submitted in the original application dated January 21, 2014 and include the following:
 - a) Visually monitor all stream bank and buffer vegetative plantings to assess stream bank stability and buffer success.
 - b) Buffer plantings shall be monitored quantitatively with representative plots that cover a minimum of four plots or 2% of the buffer.
 - c) Woody stems should be counted and recorded and provided as part of the annual monitoring report.

General Conditions of Certificate

1. 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 NCDWR. If this condition is unable to be met due to bedrock or other limiting features encountered during construction, please contact NCDWR for guidance on how to proceed and to determine whether or not a permit modification will be required.
2. If concrete is used during construction, a dry work area shall be maintained to prevent direct contact between curing concrete and stream water. Water that inadvertently contacts uncured concrete shall not be discharged to surface waters due to the potential for elevated pH and possible aquatic life and fish kills.
3. 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.
4. The dimension, pattern and profile of the stream above and below the crossing shall not be modified. Disturbed floodplains and streams shall be restored to natural geomorphic conditions.
5. 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.
- * 6. The Permittee shall ensure that the final design drawings adhere to the permit and to the permit drawings submitted for approval.
7. 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.
8. 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.
9. 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.
10. No rock, sand or other materials shall be dredged from the stream channel except where authorized by this certification.
11. Discharging hydroseed mixtures and washing out hydroseeders and other equipment in or adjacent to surface waters is prohibited.
12. 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.
13. All fill slopes located in jurisdictional wetlands shall be placed at slopes no flatter than 3:1, unless otherwise authorized by this certification.
14. A copy of this Water Quality Certification shall be maintained on the construction site at all times. In addition, the Water Quality Certification and all subsequent modifications, if any, shall be maintained with the Division Engineer and the on-site project manager.

15. 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.
16. The issuance of this certification does not exempt the Permittee from complying with any and all statutes, rules, regulations, or ordinances that may be imposed by other government agencies (i.e. local, state, and federal) having jurisdiction, including but not limited to applicable buffer rules, stormwater management rules, soil erosion and sedimentation control requirements, etc.
17. The Permittee shall report any violations of this certification to the Division of Water Resources within 24 hours of discovery.
- * 18. Upon completion of the project (including any impacts at associated borrow or waste sites), the NCDOT Division Engineer or designate shall complete and return the enclosed "Certification of Completion Form" to notify NCDWR when all work included in the 401 Certification has been completed.
19. 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.
20. There shall be no excavation from, or waste disposal into, jurisdictional wetlands or waters associated with this permit without appropriate modification. Should waste or borrow sites, or access roads to waste or borrow sites, be located in wetlands or streams, compensatory mitigation will be required since that is a direct impact from road construction activities.
21. Erosion and sediment control practices must be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices in order to protect surface waters standards:
 - 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.
22. Sediment and erosion control measures shall not be placed in wetlands or waters unless otherwise approved by this Certification.

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.

If you wish to contest any statement in the attached Certification you must file a petition for an administrative hearing. You may obtain the petition form from the office of Administrative hearings. You must file the petition with the office of Administrative Hearings within sixty (60) days of receipt of this notice. A petition is considered filed when it is received in the office of Administrative Hearings during normal office hours. The Office of Administrative Hearings accepts filings Monday through Friday between the hours of 8:00am and 5:00pm, except for official state holidays. The original and one (1) copy of the petition must be filed with the Office of Administrative Hearings.

P-30

The petition may be faxed-provided the original and one copy of the document is received by the Office of Administrative Hearings within five (5) business days following the faxed transmission.
The mailing address for the Office of Administrative Hearings is:

Office of Administrative Hearings
6714 Mail Service Center
Raleigh, NC 27699-6714
Telephone: (919)-431-3000, Facsimile: (919)-431-3100

A copy of the petition must also be served on DENR as follows:

Mr. Lacy Presnell, General Counsel
Department of Environment and Natural Resources
1601 Mail Service Center

This the 28th day of July 2014

DIVISION OF WATER RESOURCES



Thomas A. Reeder, Director
Division of Water Resources

WQC No. 3987

**Mitigation Plan
Winston Salem Northern Beltway
Forsyth County, North Carolina
T.I.P. Number U-2579B
WBS No. 34839.1.1
August 22, 2013**

1.0 BASELINE INFORMATION

Transportation Improvement Project (TIP) U-2579B involves the construction of a new section of highway known as the Winston Salem Northern Beltway in Forsyth County. The proposed construction of U-2579B involves unavoidable impacts to jurisdictional resources within USGS hydrologic unit 03040101 of the Upper Pee Dee River Basin. NCDOT proposes to offset a portion of these impacts with on-site mitigation.

TIP U-2579B is located in the Central Piedmont Ecoregion. The topography in the project study area is generally characterized as rolling hills with moderately steep slopes along the drainage ways. Elevations in the study area range from 850 to 900 feet above mean sea level (USGS 1971). The project study area and surrounding area consists of low density rural, residential, commercial, agricultural, and forested areas.

The mitigation site selection and mitigation work plan sections of this plan will refer to the identification labels given the affected jurisdictional resources in the associated permit drawings.

2.0 OBJECTIVES

The goal of the proposed onsite mitigation is to offset and mitigate for a portion of the impacts from the construction of U-2579B by restoring the natural flow regime to the stream channel through the removal of the dam and establishment of riparian buffer areas. This mitigation will result in a total of 450 linear feet of stream restoration.

3.0 SITE SELECTION

The proposed mitigation site is located within the proposed right-of-way for U-2579B. The site was evaluated both internally as well as discussed and reviewed with regulatory personnel during concurrence meetings and a field visit on August 1, 2013 with Amy Euliss of DWQ and Marella Buncick of the USFWS. The existing site conditions are described in this section.

U-2579B Mitigation Site 1-UT to Fisher Branch (ONE ID #034-004)

This site is located on plan sheet 19 from approximately Station 687+80 to 691+56 and coincides with Permit Drawing Site 20. An USACE Stream Quality Assessment Worksheet was not completed for this site because the site is currently a pond. UT to Fishers Branch has a NCDWQ Best usage classification of WS-III. The proposed work to UT to Fishers Branch includes the removal of the concrete dam on the UT to Fishers Branch. UT to Fisher Branch is a jurisdictional perennial stream where it enters NCDOT Right of Way. After the stream enters NCDOT Right of Way it becomes a pond that has been created by the construction of a concrete dam that is over 50 years old. The dam will be covered by roadway fill and therefore will be removed. The majority of the pond has an intact wooded buffer with some incidental clearing near the dam for access to the pond and dam.

4.0 MITIGATION WORK PLAN

The mitigation site will be constructed along with the construction of its associated section of the roadway project. Following the successful completion of the pond draining and stabilization, the site will be replanted with appropriate native tree species. The stream restoration areas will be stabilized by planting a mix of live stakes on three foot centers and matting with coir fiber on the banks as necessary. Reforestation plans are attached and can be found in Appendix A.

Native seed and mulch will be applied on all disturbed areas within the mitigation sites for stabilization purposes according to guidance and standard procedures of NCDOT's Roadside Environmental Unit. An as-built report will be submitted within 60 days of completion of the project.

The Natural Environment Section shall be contacted to provide construction assistance to ensure that each mitigation area is constructed appropriately.

U-2579B- Mitigation Site 1

The pond associated with this mitigation area, will be drained as part of the construction of U-2579B. The stream mitigation will be conducted within the drained pond. The Contractor will develop a Pond Drainage Plan for this pond and submit the plan to the Engineer at the preconstruction conference for approval. The Pond Drainage Plan shall include but not be limited to procedures and rate of water drawdown, sediment control measures, water quality monitoring, fish and wildlife relocation plan, shall address procedures avoiding the inundation of a receiving body of water with deoxygenated or nutrient rich water resulting in impacts to aquatic life or algae bloom and procedures for maintaining downstream channel stability

After the pond is drained, a natural flow regime will be restored. An evaluation of the stream channel will be conducted following dam removal. If any stabilization is needed on the channel it will be conducted at that time. Reforestation of the stream buffer will be conducted following any required channel work. Based on preliminary measurements, NCDOT will restore 450 ft. of the stream system within this drained pond area.

5.0 PERFORMANCE STANDARDS

An As-built will be submitted within 60 days of completion of the project. The As-built will document changes in the dimension, pattern, profile, vegetation plantings, and structures of the constructed channels.

Success for vegetation monitoring within the riparian buffer areas are based on the survival of at least 260 stems of five year old trees at year five. Assessment of channel stability will be based on the survival of riparian vegetation and lack of significant bank erosion, channel widening or down-cutting.

*** 6.0 MONITORING REQUIREMENTS**

All of the mitigation sites will be monitored according to the April 2003 Stream Mitigation Guidelines. The following components of Level 1 monitoring will be performed each year of the 5-year monitoring period: reference photos, plant survival (i.e., identify specific problem areas (missing, stressed, damaged or dead plantings), estimated causes and proposed/required remedial action); visual inspection of channel stability. Physical measurements of channel stability/morphology will not be performed. A monitoring report will be submitted within 60 days after completing the monitoring.

7.0 DETERMINATION OF CREDITS

NCDOT proposes to supplement mitigation provided by EEP with 450 feet of onsite stream mitigation. NCDOT proposes a 1:1 mitigation ratio for a total of 450 feet of stream credits.

An as-built report will be submitted within 60 days of completion of the each mitigation site to verify actual mitigation areas constructed and planted. The success of the mitigation areas and determination of final credits will be based upon successful completion and closeout of the monitoring period.

7.1 CREDIT RELEASE SCHEDULE

NCDOT proposes immediate, full release of the proposed mitigation to offset the unavoidable impacts associated with U-2579B.

8.0 GEOGRAPHIC SERVICE AREA

The proposed Geographic Service Area (GSA) for the mitigation sites is composed of the 8-digit Hydrologic Cataloging Unit (HUC) 03040101.

* **9.0 SITE PROTECTION INSTRUMENT**

The mitigation area is within the NCDOT Right-of-Way for the project. It will be managed to prohibit all use inconsistent with the use as a mitigation property, including any activity that would materially alter the biological integrity or functional and educational value of the site, consistent with the mitigation plan.

The site will be placed on the Natural Environment Section's (NES) Mitigation GeoDatabase. This database is provided to all NCDOT personnel as a record of mitigation sites and their attributes, including prohibited activities. NCDOT is held by virtue of the permit associated with these mitigation sites and the associated roadway impacts to protect the sites in perpetuity.

* **10.0 MAINTENANCE PLAN**

The mitigation sites will be held by NCDOT and placed on the NES Mitigation GeoDatabase. Once monitoring is completed and the sites are closed out, they will be placed in the NCDOT Stewardship Program for long term maintenance and protection.

If an appropriate third party recipient is identified in the future, then the transfer of the property will include a conservation easement or other measure to protect the natural features and mitigation value of the site in perpetuity.

* **11.0 LONG TERM ADAPTIVE MANAGEMENT PLAN**

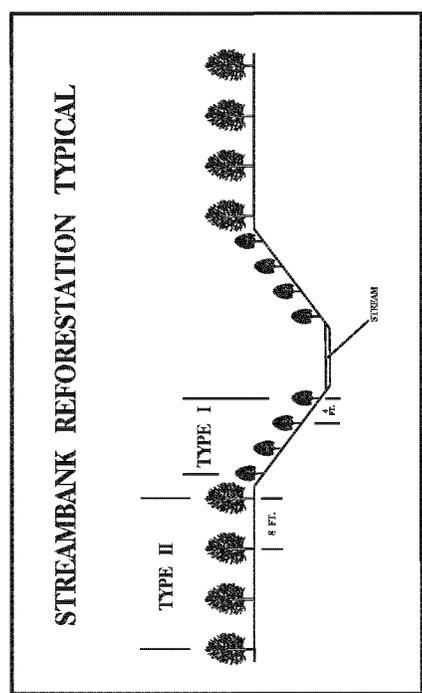
The sites will be managed by NCDOT according to the mitigation plan. Encroachments into the areas will be investigated and appropriate measures taken to minimize any negative effects. In the event that unforeseen issues arise that affect the management of the site, any remediation will be addressed by NCDOT in coordination with the Interagency Review Team.

* **12.0 FINANCIAL ASSURANCES**

NCDOT is held by permit conditions associated with U-2579B to construct, monitor, and steward the mitigation sites. NCDOT has established funds for each project and within each Division to monitor mitigation sites and protect them in perpetuity.

PROJECT REFERENCE NO.	SHEET NO.
U-2798	R-2
RDWATER REGION	ROADWAYS DIVISION
NO. SHEET NO.	TOTAL SHEETS
	10

- TYPE 1 STREAMBANK REFORESTATION SHALL BE PLANTED 3 FT. TO 5 FT. ON CENTER, RANDOM SPACING, AVERAGING 4 FT. ON CENTER, APPROXIMATELY 2724 PLANTS PER ACRE.
- TYPE 2 STREAMBANK REFORESTATION SHALL BE PLANTED 6 FT. TO 10 FT. ON CENTER, RANDOM SPACING, AVERAGING 8 FT. ON CENTER, APPROXIMATELY 680 PLANTS PER ACRE.
- NOTE: TYPE 1 AND TYPE 2 STREAMBANK REFORESTATION SHALL BE PAID FOR AS "STREAMBANK REFORESTATION"



STREAMBANK REFORESTATION MIXTURE, TYPE, SIZE, AND FURNISH SHALL CONFORM TO THE FOLLOWING:

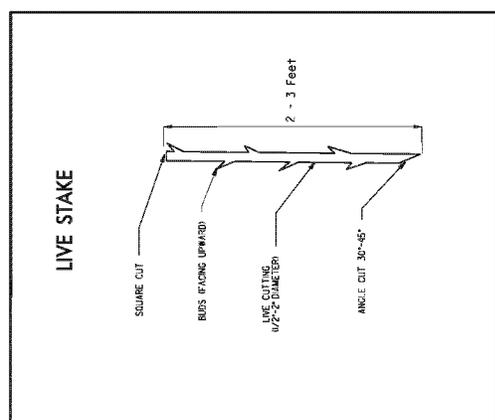
TYPE 1	
50% SALIX NIGRA	2 ft - 3 ft LIVE STAKES
50% CORNUS AMOMUM	SILKY DOGWOOD 2 ft - 3 ft LIVE STAKES
TYPE 2	
25% FRAXINUS PENNSYLVANICA	GREEN ASH 12 in - 18 in BR
25% PLATANUS OCCIDENTALIS	SYCAMORE 12 in - 18 in BR
25% QUERCUS PHELLOS	WILLOW OAK 12 in - 18 in BR
25% QUERCUS NIGRA	WATER OAK 12 in - 18 in BR

SEE PLAN SHEETS FOR AREAS TO BE PLANTED

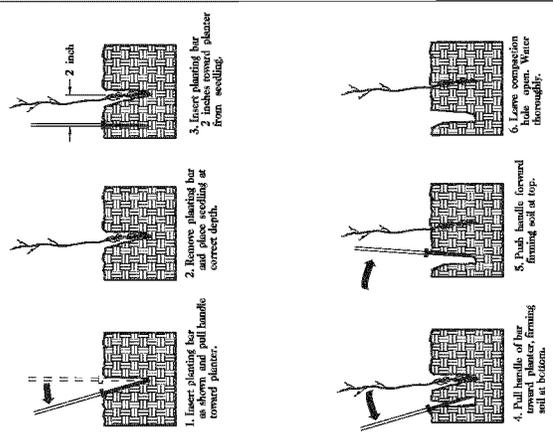
STREAMBANK REFORESTATION
DETAIL SHEET 1 OF 2
 NCDDAT - ROADSIDE ENVIRONMENTAL UNIT

PLANTING DETAILS

LIVE STAKES PLANTING DETAIL

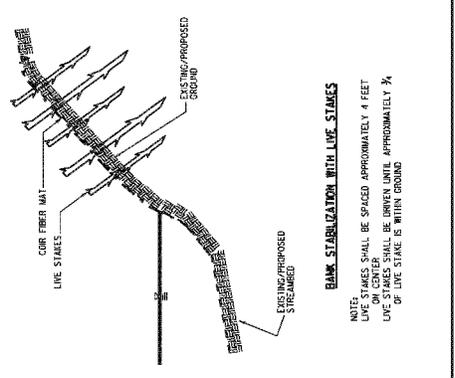


BAREROOT PLANTING DETAIL
DIBBLE PLANTING METHOD
 USING THE KBC PLANTING BAR



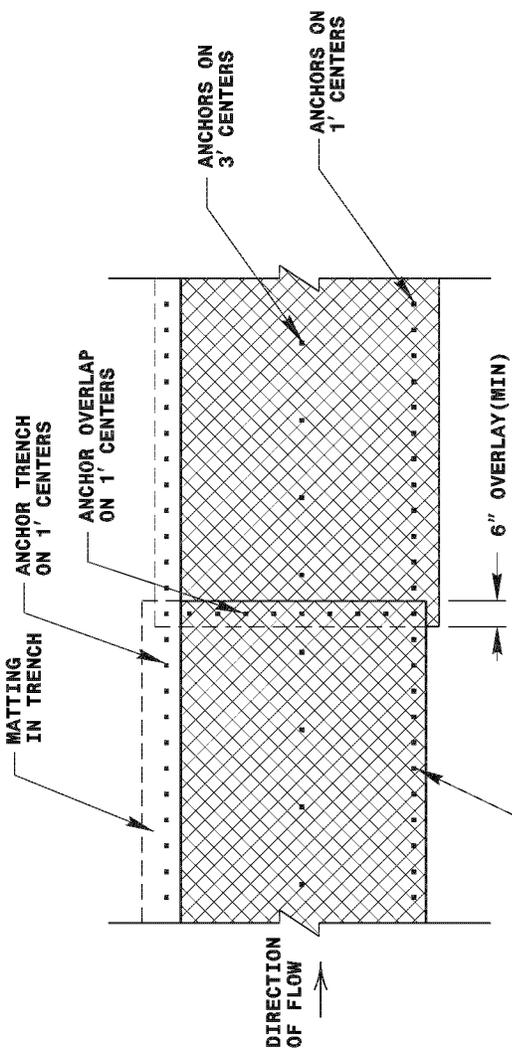
PLANTING NOTES:

- PLANTING BAR**
Dibbled planting seedlings should be kept in a moist container bag or similar until the roots resume from drying.
- KBC PLANTING BAR**
Planting bar shall have a blade with a triangular cross section, and shall be 22 inches long and 4 inches wide and 1 inch thick at center.
- ROOT PRUNING**
Roots shall be pruned, if necessary, so that no roots extend more than 10 inches below the root collar.

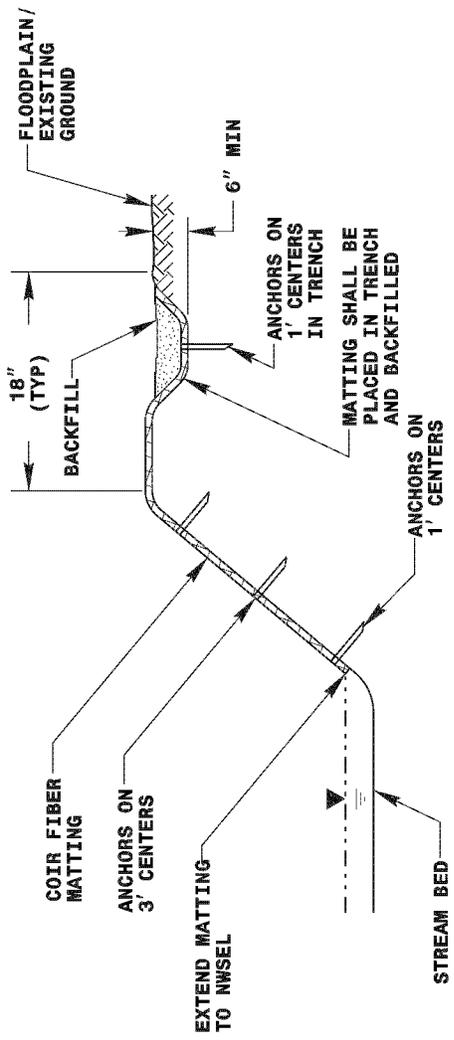


BANK STABILIZATION WITH LIVE STAKES
 NOTE:
 LIVE STAKES SHALL BE SPACED APPROXIMATELY 4 FEET ON CENTER
 LIVE STAKES SHALL BE DRIVEN UNTIL APPROXIMATELY 1/4 OF LIVE STAKE IS WITHIN GROUND

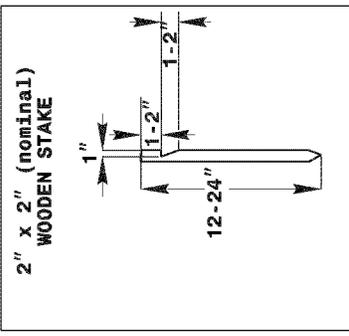
PROJECT REFERENCE NO. U-25799	SHEET NO. RF-3
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



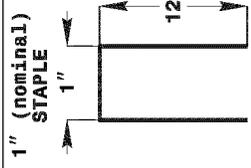
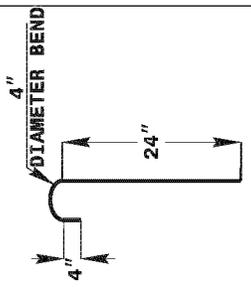
PLAN VIEW



TYPICAL CROSS SECTION



#10 STEEL REINFORCEMENT BAR

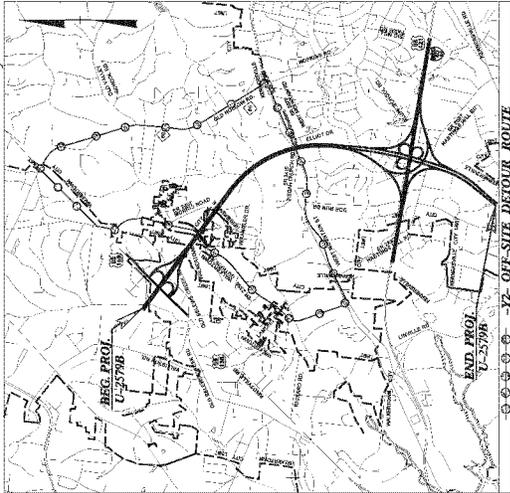


ANCHOR OPTIONS

STREAMBANK REFORESTATION
DETAIL SHEET 2 OF 2
N.C.DOT - ROADSIDE ENVIRONMENTAL UNIT

COIR FIBER MATTING DETAIL
NOT TO SCALE

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbol

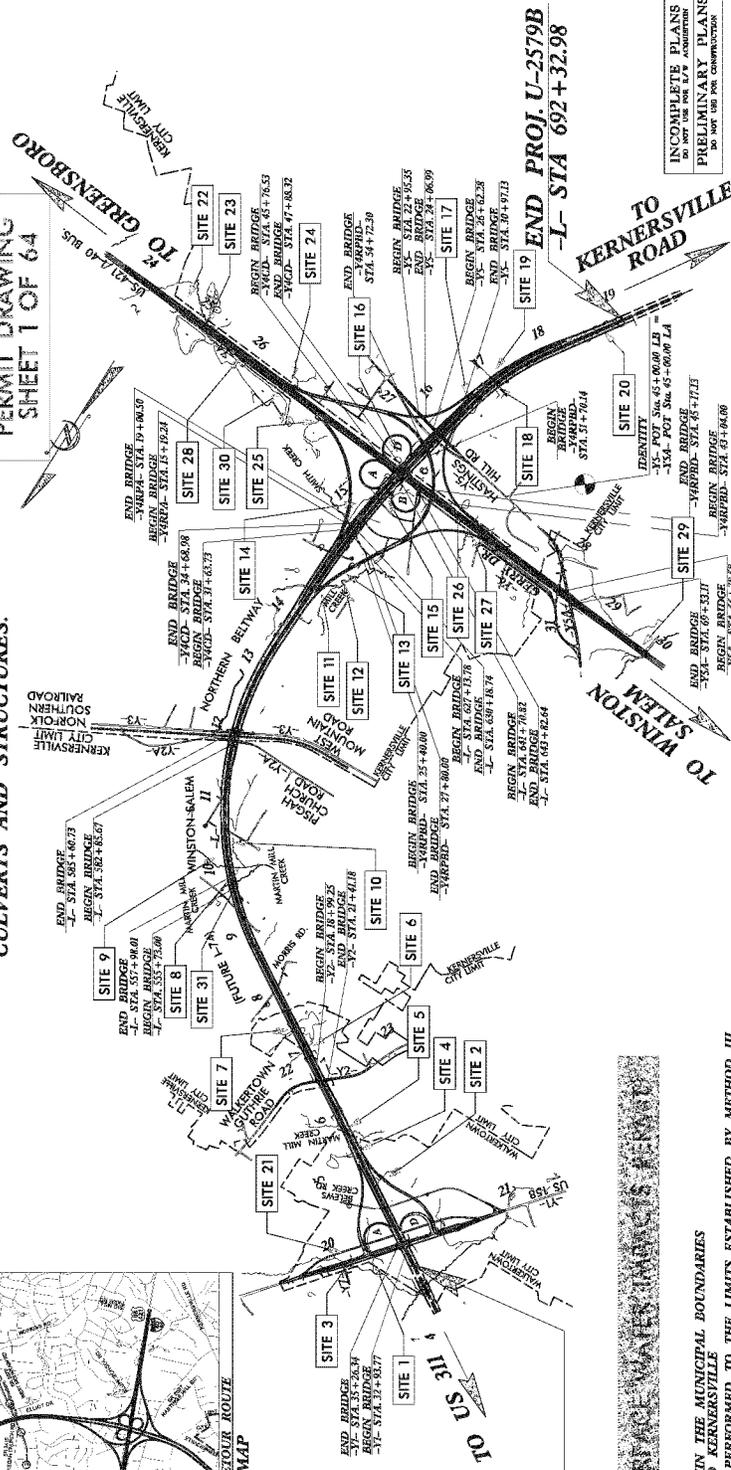


STATE	N.C.	STATE PROJECT NUMBER	U-2579B	SHEET	1	TOTAL SHEETS	1
DATE	3/4/09	DESIGNER	NA	PROFESSION	PE		
	3/4/09	DATE	3/4/09	BY	R.W.		
	3/4/09	DATE	3/4/09	BY	UTIL		

LOCATION: WINSTON SALEM NORTHERN BELTWAY (EASTERN SECTION)
(FUTURE I-74) FROM US 158 TO I-40 BUSBUS 421

TYPE OF WORK: WIDENING, GRADING, PAVING, DRAINAGE, SIGNING, SIGNALS,
CULVERTS AND STRUCTURES.

PERMIT DRAWING
SHEET 1 OF 64



INCOMPLETE PLANS
DO NOT USE FOR CONSTRUCTION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

HYDRAULICS ENGINEER

ROADWAY DESIGN ENGINEER

Prepared in the Office of:
DIVISION OF HIGHWAYS
1900 Birch Ridge Dr., Raleigh, NC, 27619

30M STANDARD SPECIFICATIONS

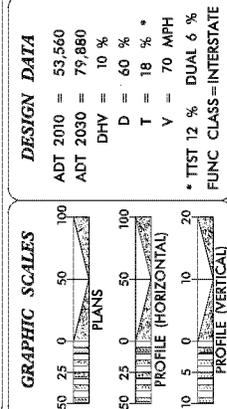
RIGHT OF WAY DATE:
JUNE 19, 2012

LETTING DATE:
OCTOBER 21, 2014

PROJECT ENGINEER:
TONY HOUSER, PE

PROJECT DESIGN ENGINEER:
LEE ANN MOORE

PROJECT LENGTH	DESIGN DATA
LENGTH OF ROADWAY PROJECT U-2579B = 3.86 Miles.	ADT 2010 = 53,560
LENGTH OF STRUCTURE PROJECT U-2579B = 0.19 Miles.	ADT 2030 = 79,860
TOTAL LENGTH OF PROJECT U-2579B = 4.06 Miles.	DHV = 10 %
	D = 60 %
	T = 18 % *
	V = 70 MPH
	* TTST 12 % DUAL 6 %
	FUNC CLASS = INTERSTATE



A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF WALKERTOWN AND KERNERSVILLE
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III

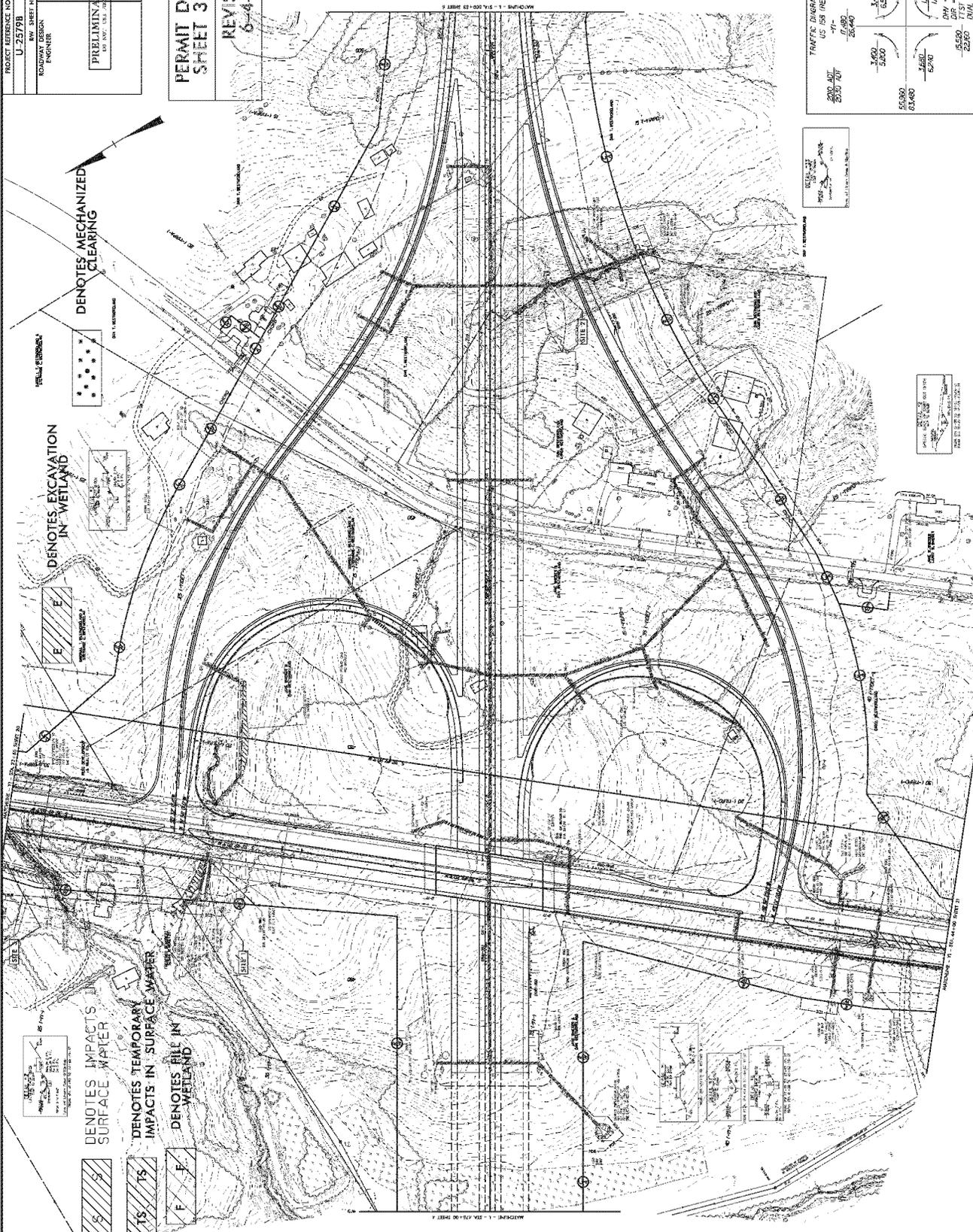
TIP PROJECT: U-2579B

CONTRACT:

PROJECT REFERENCE NO.	U-2579B	SHEET NO.	5
BY	ROADWAY DESIGN ENGINEER	DATE	11/15/12
BY	HYDRAULICS ENGINEER	DATE	11/15/12
PRELIMINARY PLANS <small>DO NOT USE FOR CONSTRUCTION</small>			

PERMIT DRAWING
SHEET 3 OF 64

REVISED
6-24-14



TRAFFIC DIAGRAM
US 158 (NEEDVILLE ROAD)

2000 ADT	3,480	DM = 0%
2500 ADT	5,000	DM = 0%
	6,480	DM = 0%
	7,960	DM = 0%
	9,440	DM = 0%
	10,920	DM = 0%
	12,400	DM = 0%
	13,880	DM = 0%
	15,360	DM = 0%
	16,840	DM = 0%
	18,320	DM = 0%
	19,800	DM = 0%
	21,280	DM = 0%
	22,760	DM = 0%
	24,240	DM = 0%
	25,720	DM = 0%
	27,200	DM = 0%
	28,680	DM = 0%
	30,160	DM = 0%
	31,640	DM = 0%
	33,120	DM = 0%
	34,600	DM = 0%
	36,080	DM = 0%
	37,560	DM = 0%
	39,040	DM = 0%
	40,520	DM = 0%
	42,000	DM = 0%
	43,480	DM = 0%
	44,960	DM = 0%
	46,440	DM = 0%
	47,920	DM = 0%
	49,400	DM = 0%
	50,880	DM = 0%
	52,360	DM = 0%
	53,840	DM = 0%
	55,320	DM = 0%
	56,800	DM = 0%
	58,280	DM = 0%
	59,760	DM = 0%
	61,240	DM = 0%
	62,720	DM = 0%
	64,200	DM = 0%
	65,680	DM = 0%
	67,160	DM = 0%
	68,640	DM = 0%
	70,120	DM = 0%
	71,600	DM = 0%
	73,080	DM = 0%
	74,560	DM = 0%
	76,040	DM = 0%
	77,520	DM = 0%
	79,000	DM = 0%
	80,480	DM = 0%
	81,960	DM = 0%
	83,440	DM = 0%
	84,920	DM = 0%
	86,400	DM = 0%
	87,880	DM = 0%
	89,360	DM = 0%
	90,840	DM = 0%
	92,320	DM = 0%
	93,800	DM = 0%
	95,280	DM = 0%
	96,760	DM = 0%
	98,240	DM = 0%
	99,720	DM = 0%
	101,200	DM = 0%
	102,680	DM = 0%
	104,160	DM = 0%
	105,640	DM = 0%
	107,120	DM = 0%
	108,600	DM = 0%
	110,080	DM = 0%
	111,560	DM = 0%
	113,040	DM = 0%
	114,520	DM = 0%
	116,000	DM = 0%
	117,480	DM = 0%
	118,960	DM = 0%
	120,440	DM = 0%
	121,920	DM = 0%
	123,400	DM = 0%
	124,880	DM = 0%
	126,360	DM = 0%
	127,840	DM = 0%
	129,320	DM = 0%
	130,800	DM = 0%
	132,280	DM = 0%
	133,760	DM = 0%
	135,240	DM = 0%
	136,720	DM = 0%
	138,200	DM = 0%
	139,680	DM = 0%
	141,160	DM = 0%
	142,640	DM = 0%
	144,120	DM = 0%
	145,600	DM = 0%
	147,080	DM = 0%
	148,560	DM = 0%
	150,040	DM = 0%
	151,520	DM = 0%
	153,000	DM = 0%
	154,480	DM = 0%
	155,960	DM = 0%
	157,440	DM = 0%
	158,920	DM = 0%
	160,400	DM = 0%
	161,880	DM = 0%
	163,360	DM = 0%
	164,840	DM = 0%
	166,320	DM = 0%
	167,800	DM = 0%
	169,280	DM = 0%
	170,760	DM = 0%
	172,240	DM = 0%
	173,720	DM = 0%
	175,200	DM = 0%
	176,680	DM = 0%
	178,160	DM = 0%
	179,640	DM = 0%
	181,120	DM = 0%
	182,600	DM = 0%
	184,080	DM = 0%
	185,560	DM = 0%
	187,040	DM = 0%
	188,520	DM = 0%
	190,000	DM = 0%
	191,480	DM = 0%
	192,960	DM = 0%
	194,440	DM = 0%
	195,920	DM = 0%
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	210,720	DM = 0%
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	213,680	DM = 0%
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	216,640	DM = 0%
	218,120	DM = 0%
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	222,560	DM = 0%
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	228,480	DM = 0%
	230,000	DM = 0%

6/17/12

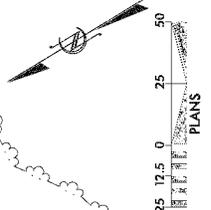
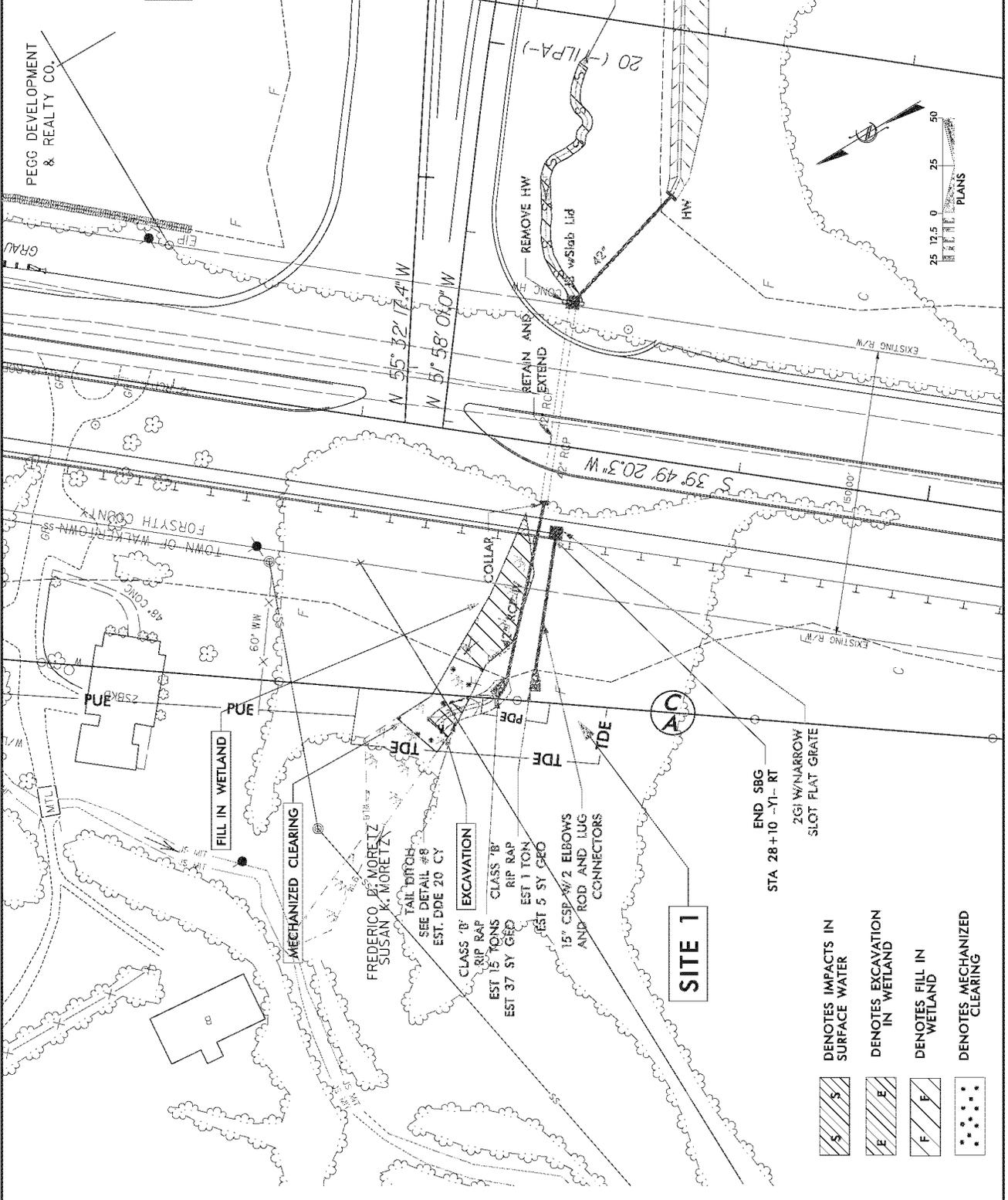
REVISIONS

RIGHT OF WAY REVISION 11/5/12 - PARCEL NUMBER 3 REMOVED

PROJECT REFERENCE NO. 07-2379B
 SHEET NO. 05-7
 TOWN OF WALKERTOWN ENGINEER
 PEGG DEVELOPMENT & REALTY CO. ENGINEER

INCOMPLETE PLANS
 DO NOT USE FOR CONSTRUCTION
 PRELIMINARY PLANS
 DO NOT USE FOR CONSTRUCTION

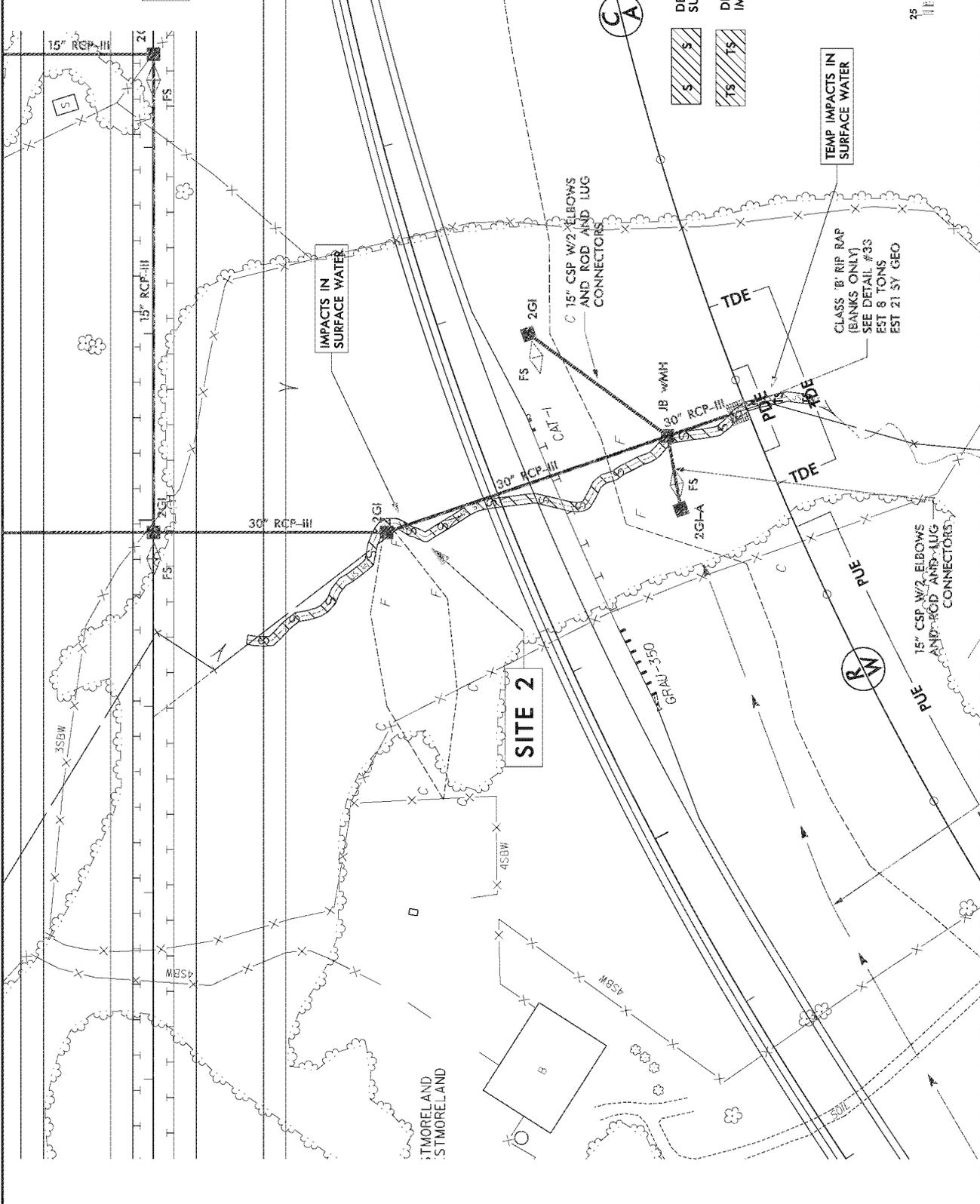
PERMIT DRAWING
 SHEET 4 OF 64



REVISIONS

NO.	DATE	DESCRIPTION

PROJECT REFERENCE NO. U-2579B	SHEET NO. 05-2
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS (NOT FOR CONSTRUCTION) PRELIMINARY PLANS (FOR PERMITTING PURPOSES)	
PERMIT DRAWING SHEET 5 OF 67	



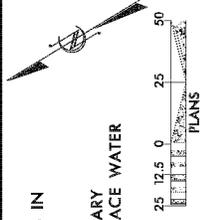
NO.	DATE	DESCRIPTION

REVISIONS

DATE: 11/15/11 11:58 AM

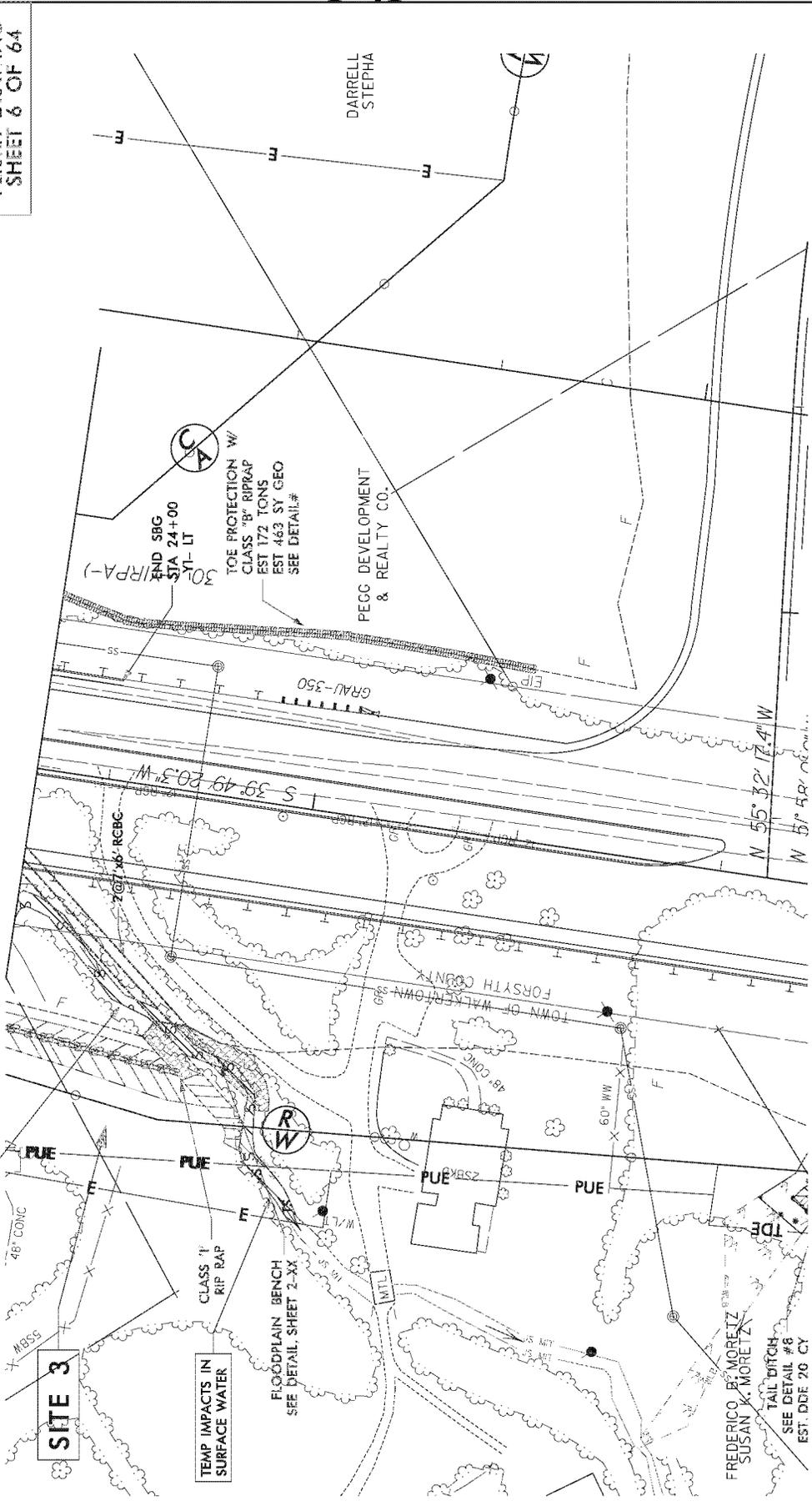
PROJECT REFERENCE NO. U-25092
 SHEET NO. 05-3
 ROADWAY DESIGN ENGINEER
 HYDRAULICS ENGINEER
 INCOMPLETE PLANS
 PRELIMINARY PLANS
 NO. NOT FOR CONSTRUCTION

**PERMIT DRAWING
 SHEET 6 OF 64**



IMPACTS IN SURFACE WATER
 DENOTES IMPACTS IN SURFACE WATER

TEMP IMPACTS IN SURFACE WATER
 DENOTES TEMPORARY IMPACTS IN SURFACE WATER



DARRELL STEPHA

PEGG DEVELOPMENT & REALTY CO.

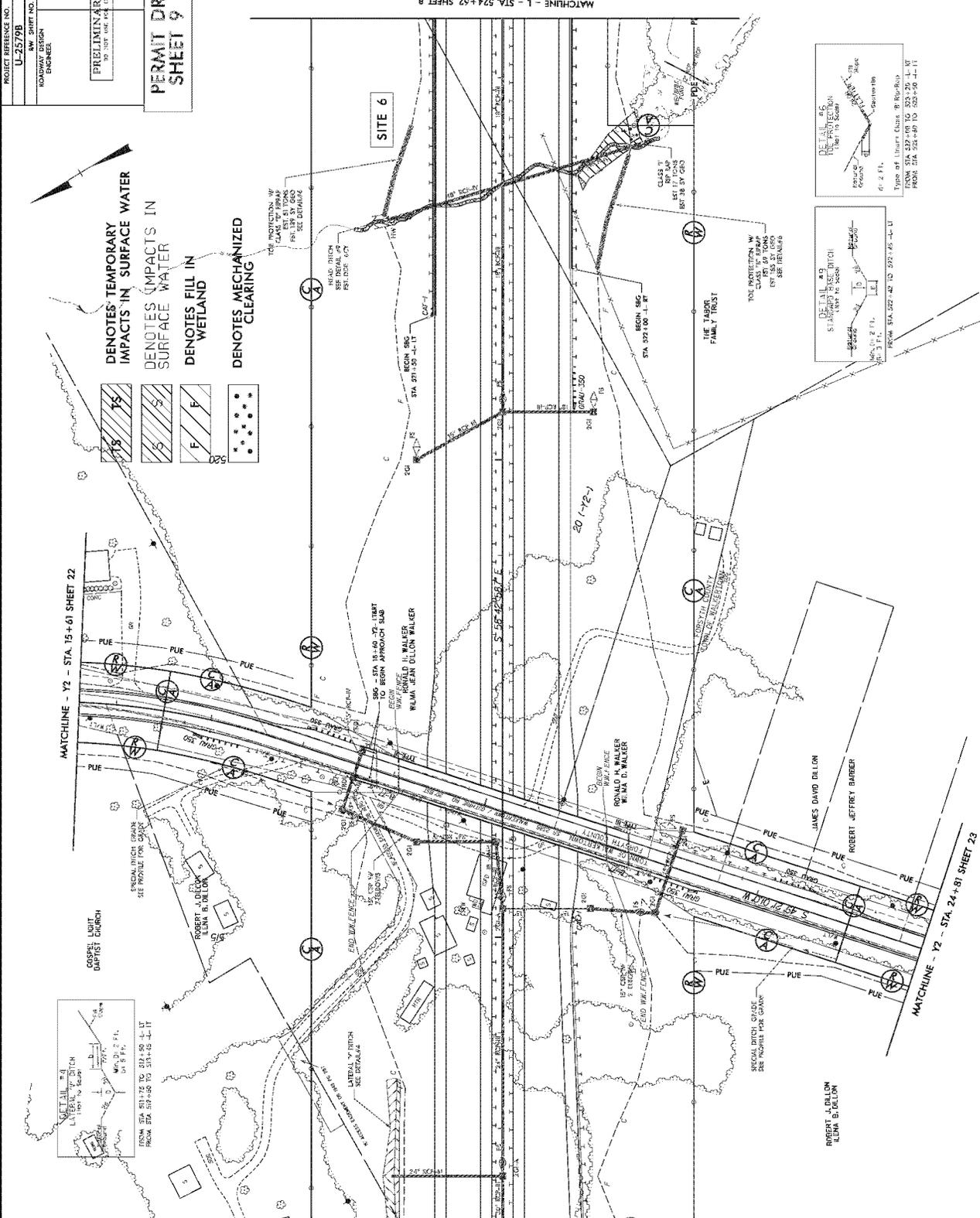
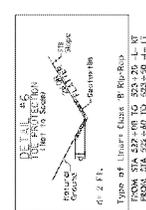
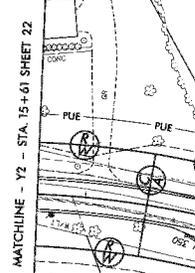
FREDERICO B. MORETZ
 SUSAN K. MORETZ
 TAIL DITCH
 SEE DETAIL #6
 EST. DDE 20 CY

REVISIONS

PROJECT REFERENCE NO. U-2579B
 SHEET NO. 7
 RW SHEET NO. HYDRAULICS ENGINEER
 ROADWAY DESIGN ENGINEER
 PRIMARY PLANS
 TO BE USED FOR CONSTRUCTION
PERMIT DRAWING
SHEET 9 OF 64



- DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- DENOTES IMPACTS IN SURFACE WATER
- DENOTES FILL IN WETLAND
- DENOTES MECHANIZED CLEARING



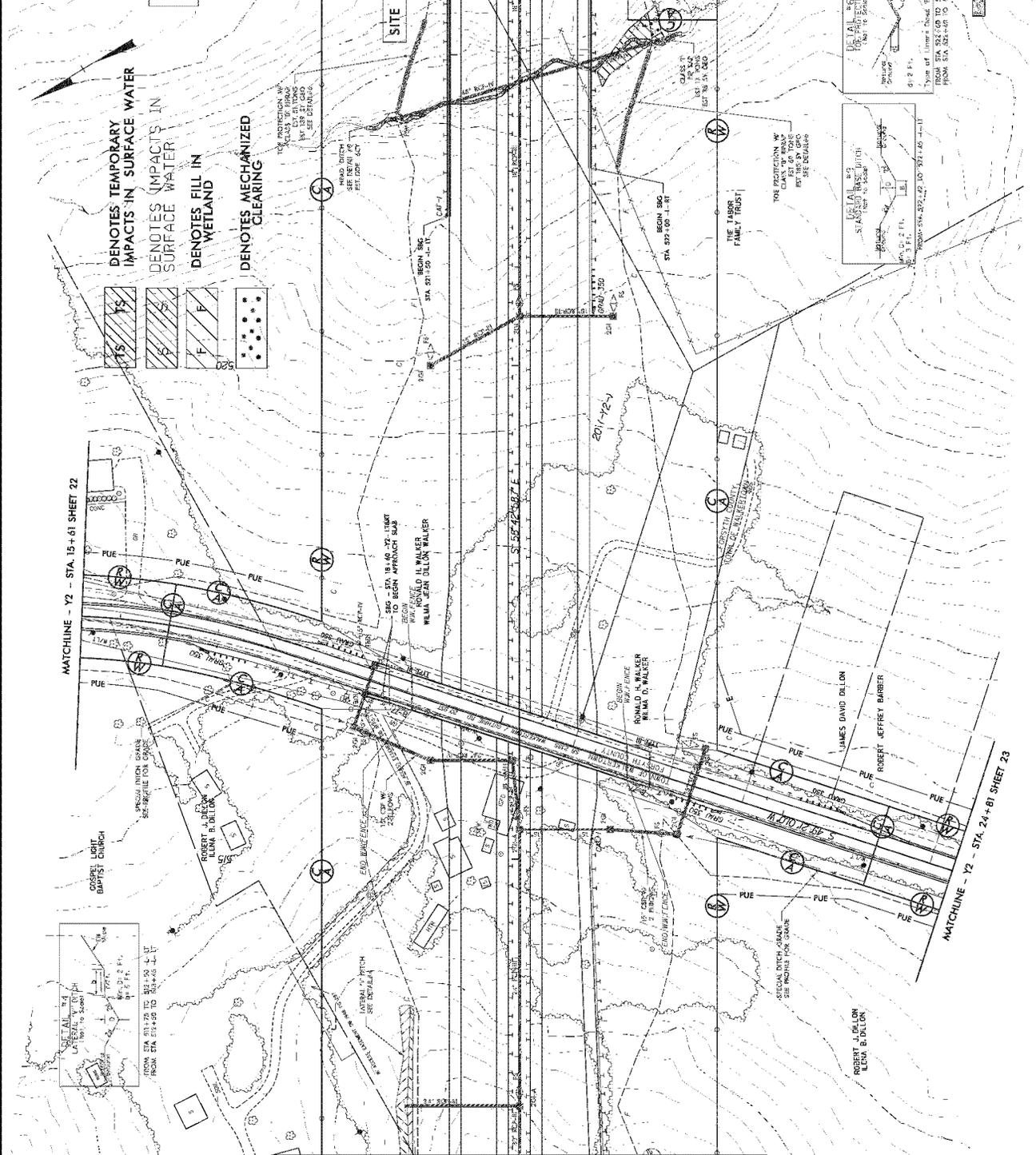
MATCHLINE - L - STA. 512+00 SHEET 6

MATCHLINE - Y2 - STA. 15+61 SHEET 22

MATCHLINE - Y2 - STA. 24+81 SHEET 23

MATCHLINE - L - STA. 524+52 SHEET 8

PROJECT REFERENCE NO. U-25798	SHEET NO. 7
RAW SHEET NO. ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
PERMIT DRAWING SHEET 10 OF 64	



MATCHLINE - 1 - STA. 512+00 SHEET 6

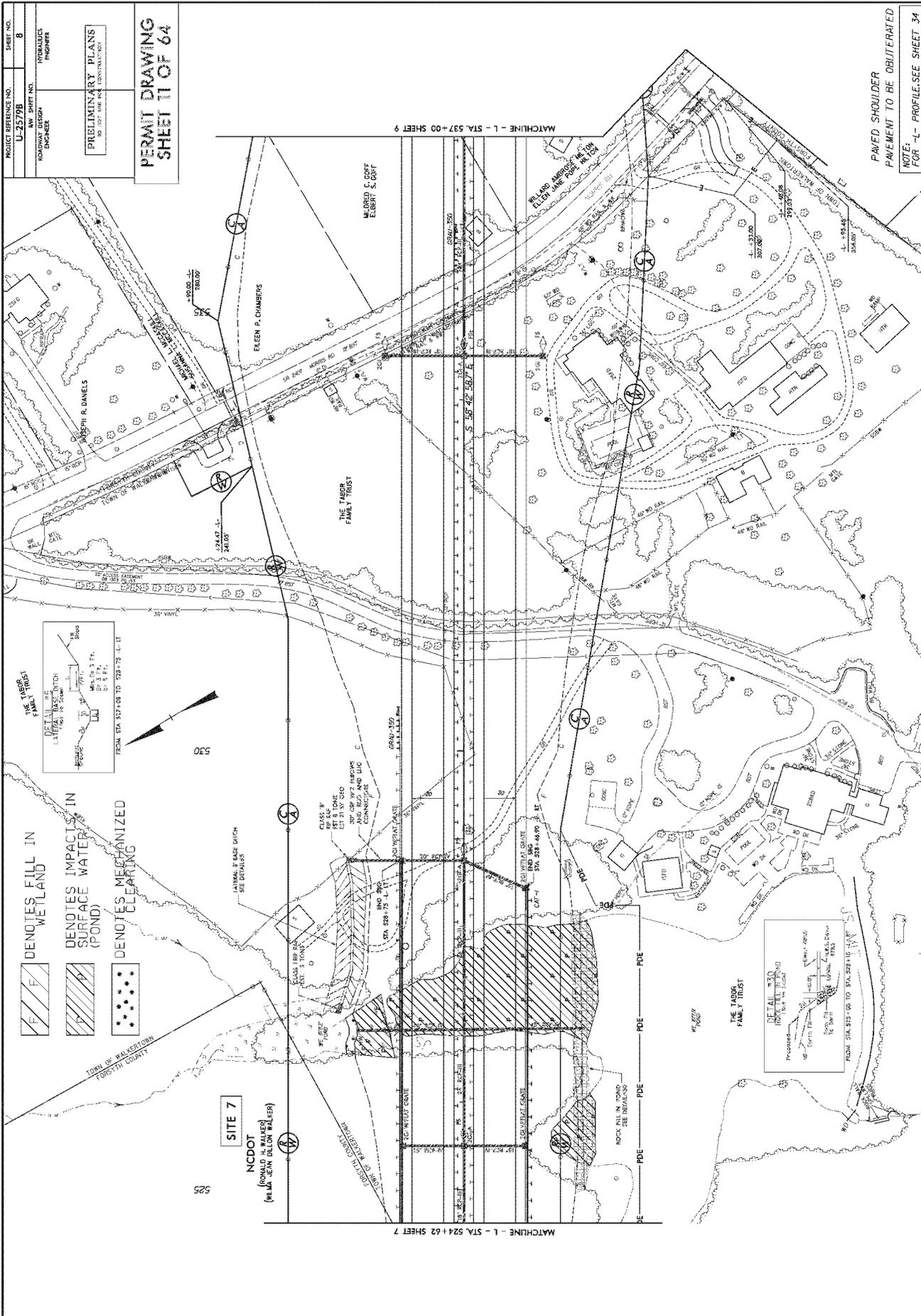
MATCHLINE - 2 - STA. 524+62 SHEET 8

MATCHLINE - Y2 - STA. 19+61 SHEET 22

MATCHLINE - Y2 - STA. 24+81 SHEET 23

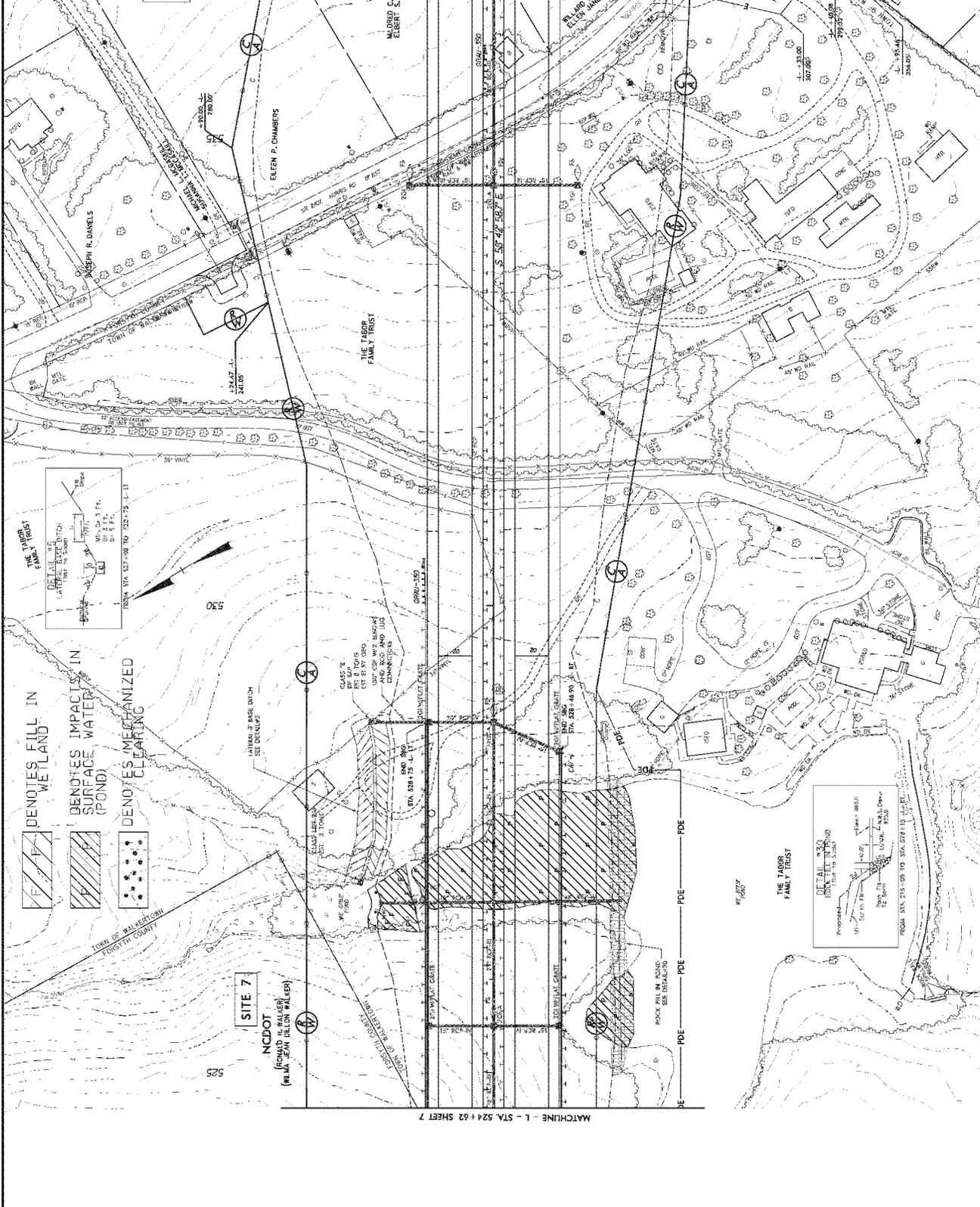
REVISIONS

NO.	DESCRIPTION



PROJECT REFERENCE NO. U-25798
 SHEET NO. 8
 HWY. SHIRT NO. 100
 ROADWAY DESIGN ENGINEER
 HYDRAULICS ENGINEER
 PRELIMINARY PLANS
 NOT FOR CONSTRUCTION

PERMIT DRAWING
SHEET 12 OF 64

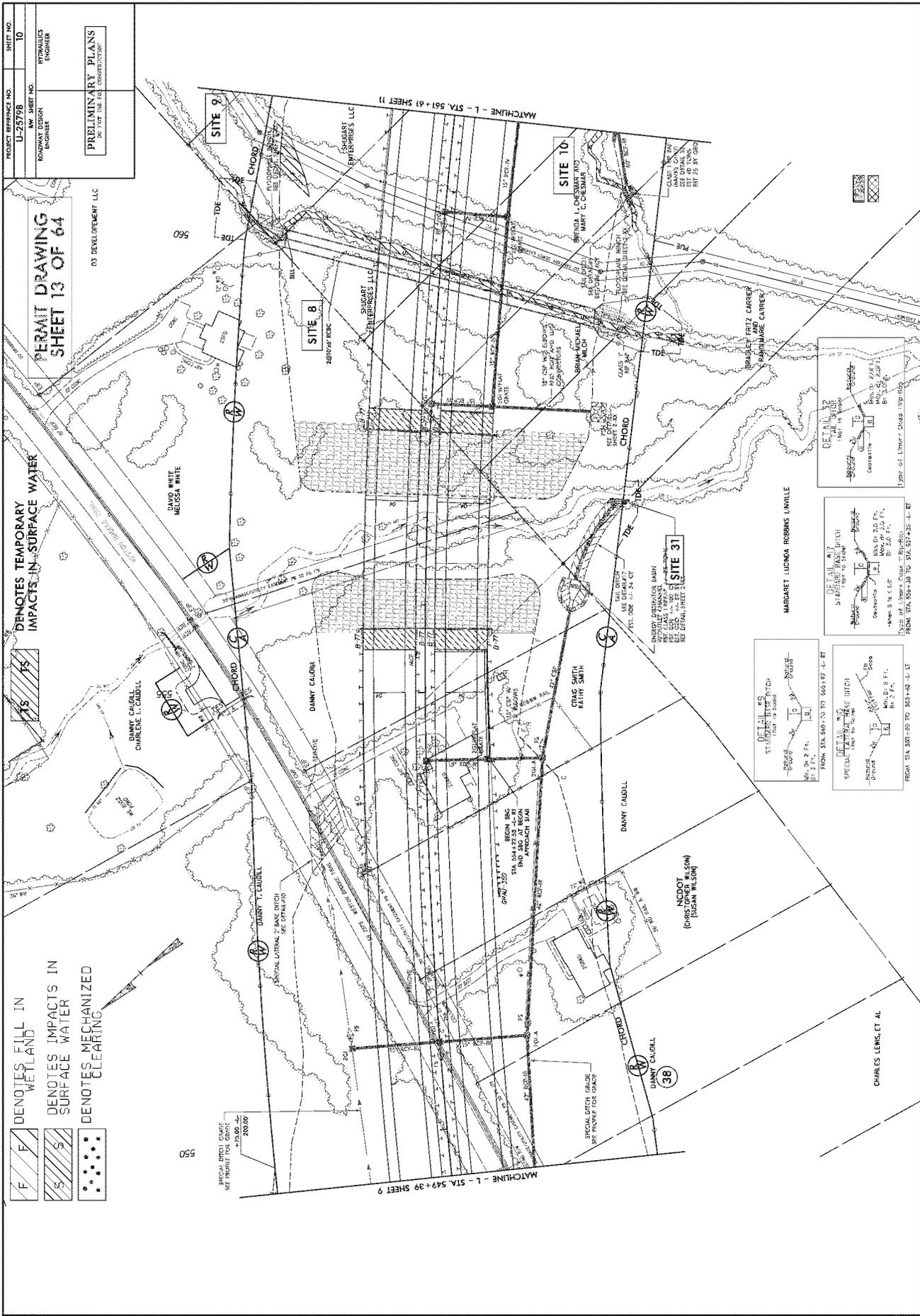


PAVED SHOULDER
PAVEMENT TO BE OBLITERATED
NOTE FOR -1- PROFILE, SEE SHEET 34

0/17/99

REVISIONS

0/17/99



PROJECT REFERENCE NO.	U-25708	SHEET NO.	10
ROADWAY DESIGN ENGINEER	DAVID WHITE	HYDRAULICS ENGINEER	DAVID WHITE
PRELIMINARY PLANS	DO NOT USE FOR CONSTRUCTION		

PERMIT DRAWING
SHEET 13 OF 64

03 DEVELOPMENT, LLC

DEMOTES TEMPORARY IMPACTS IN SURFACE WATER

DEMOTES FILL IN WETLAND

DEMOTES IMPACTS IN SURFACE WATER

DEMOTES MECHANIZED CLEARING

[Symbol]	DEMOTES FILL IN WETLAND
[Symbol]	DEMOTES IMPACTS IN SURFACE WATER
[Symbol]	DEMOTES MECHANIZED CLEARING

DETAIL #7
STATION BASE DITCH
FROM STA. 549+00 TO STA. 549+25
WIDE: 8' TO 10'
DEPT: 2' TO 3'
FROM STA. 549+00 TO STA. 549+25 - L-R

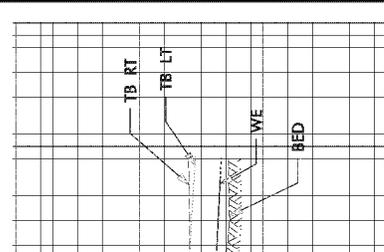
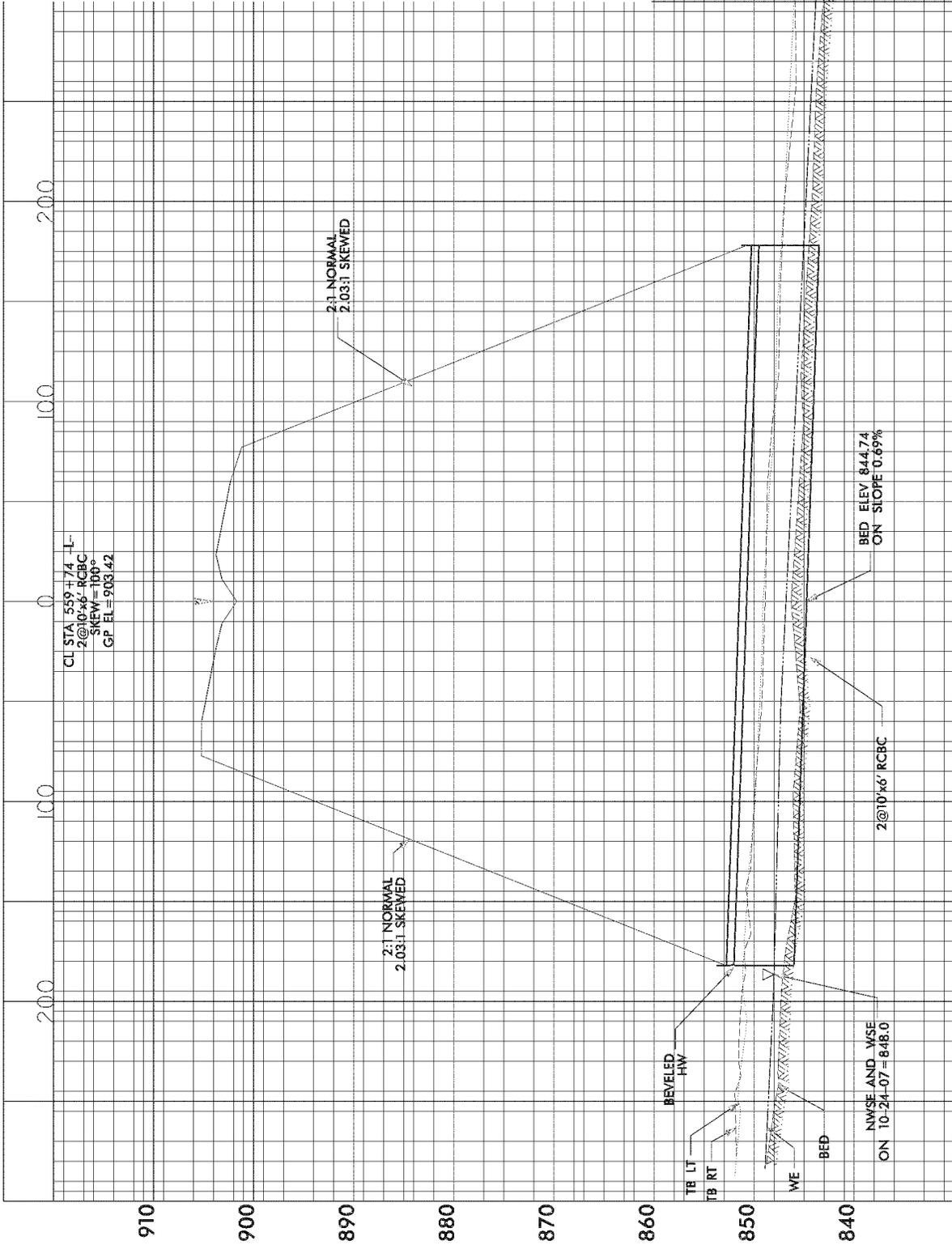
DETAIL #8
STATION BASE DITCH
FROM STA. 549+25 TO STA. 549+50
WIDE: 8' TO 10'
DEPT: 2' TO 3'
FROM STA. 549+25 TO STA. 549+50 - L-R

DETAIL #9
STATION BASE DITCH
FROM STA. 549+50 TO STA. 549+75
WIDE: 8' TO 10'
DEPT: 2' TO 3'
FROM STA. 549+50 TO STA. 549+75 - L-R

DETAIL #10
STATION BASE DITCH
FROM STA. 549+75 TO STA. 549+100
WIDE: 8' TO 10'
DEPT: 2' TO 3'
FROM STA. 549+75 TO STA. 549+100 - L-R

PROJECT REFERENCE NO. U-2575B	SHEET NO.
ROADWAY DESIGN ENGINEER	HYDRAULIC'S ENGINEER
INCOMPLETE PLANS DO NOT BE USED FOR ACQUISITION PRELIMINARY PLANS DO NOT CONSTITUTE CONTRACT	

PERMIT DRAWING
SHEET 15 OF 6A



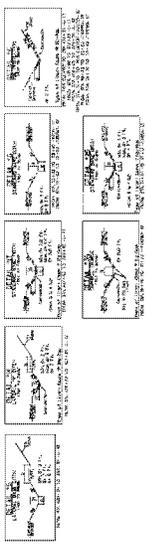
9/7/99

REVISIONS

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PROJECT REFERENCE NO. U-25793
 SHEET NO. 15
 RAW SHEET NO. HYDRAULICS ENGINEER
 ROADWAY DESIGN ENGINEER
 PRELIMINARY PLANS
 NOT FOR USE FOR CONSTRUCTION
 PERMIT DRAWING
 SHEET 18 OF 64

TRAFFIC DIAGRAM	
2010 ADT	47,720
2030 ADT	61,660
DIV = 10%	5,360
DIR = 60%	7,280
TTST = 12%	41,800
DUAL = 6%	24,660
53,560	36,980
79,860	49,400
L- BELTLINE	11,800
	5,420
DIV = 10%	21,000
DIR = 60%	27,300
TTST = 12%	27,300
DUAL = 5%	27,300
-Y4- (US 421/1-40 BUS.)	



RIGHT OF WAY REVISION 11/5/12 - PARCEL 98 ADJUSTED ON PLANS TO MAKE IT VISIBLE
 RIGHT OF WAY REVISION 11/5/12 - PARCEL 98A ADDED
 REVISIONS
 01/17/98

PROJECT REFERENCE NO. U-25798
 SHEET NO. 15
 RAW SHEET NO. HYDRAULICS ENGINEER
 ROADWAY DESIGN ENGINEER
 PRELIMINARY PLANS
 NOT FOR USE FOR CONSTRUCTION
 PERMIT DRAWING
 SHEET 19 OF 64

TRAFFIC DIAGRAM	
2010 ADT	47,720
2030 ADT	61,660
DIV = 10%	5,360
DIR = 60%	7,280
TTST = 12%	21,660
DUAL = 6%	36,980
53,560	4,940
79,680	5,420
L-BELTLINE	
6,600	11,800
DIV = 10%	21,300
DIR = 60%	27,300
TTST = 6%	27,300
DUAL = 5%	27,300
-Y4- (US 421/1-40 BUS.)	

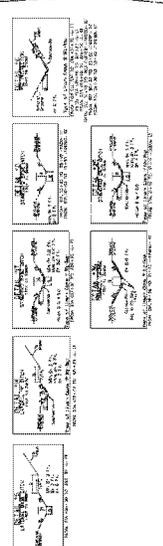


DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES STILL IN SURFACE WATER

DENOTES MUD IN SURFACE WATER

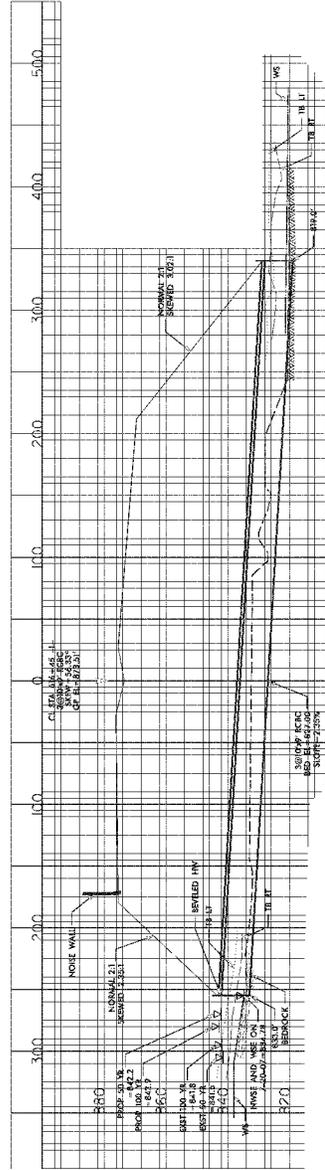


RIGHT OF WAY REVISION 11/5/12 - PARCEL 98 ADJUSTED ON PLANS TO MAKE IT VISIBLE

RIGHT OF WAY REVISION 11/5/12 - PARCEL 98A ADDED

REVISIONS

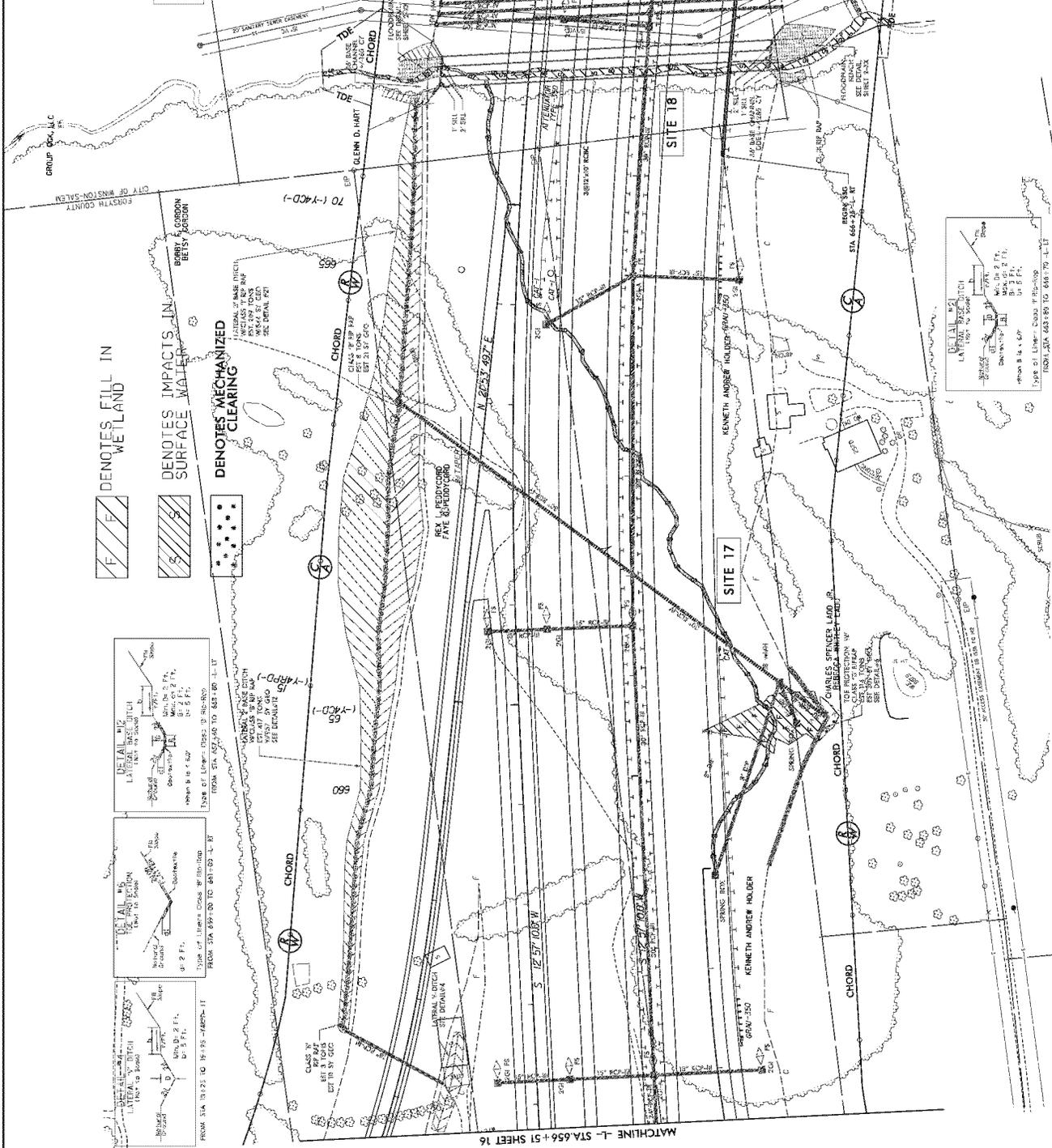
PROJECT REFERENCE NO. U-2579B	SHEET NO.
ROADWAY DESIGN ENGINEER	R/W SHEET NO.
HYDRAULICS ENGINEER	
INCOMPLETE PLANS PRELIMINARY PLANS NOT FOR CONSTRUCTION	
PERMIT DRAWING SHEET 22 OF 64	



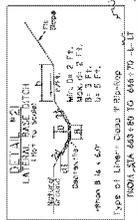
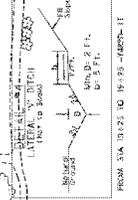
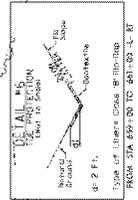
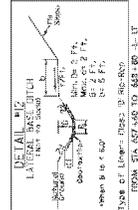
PROJECT REFERENCE NO.	U-2579B	SHEET NO.	17
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	

PRELIMINARY PLANS
NO. 107-200-100

PERMIT DRAWING
SHEET 26 OF 64

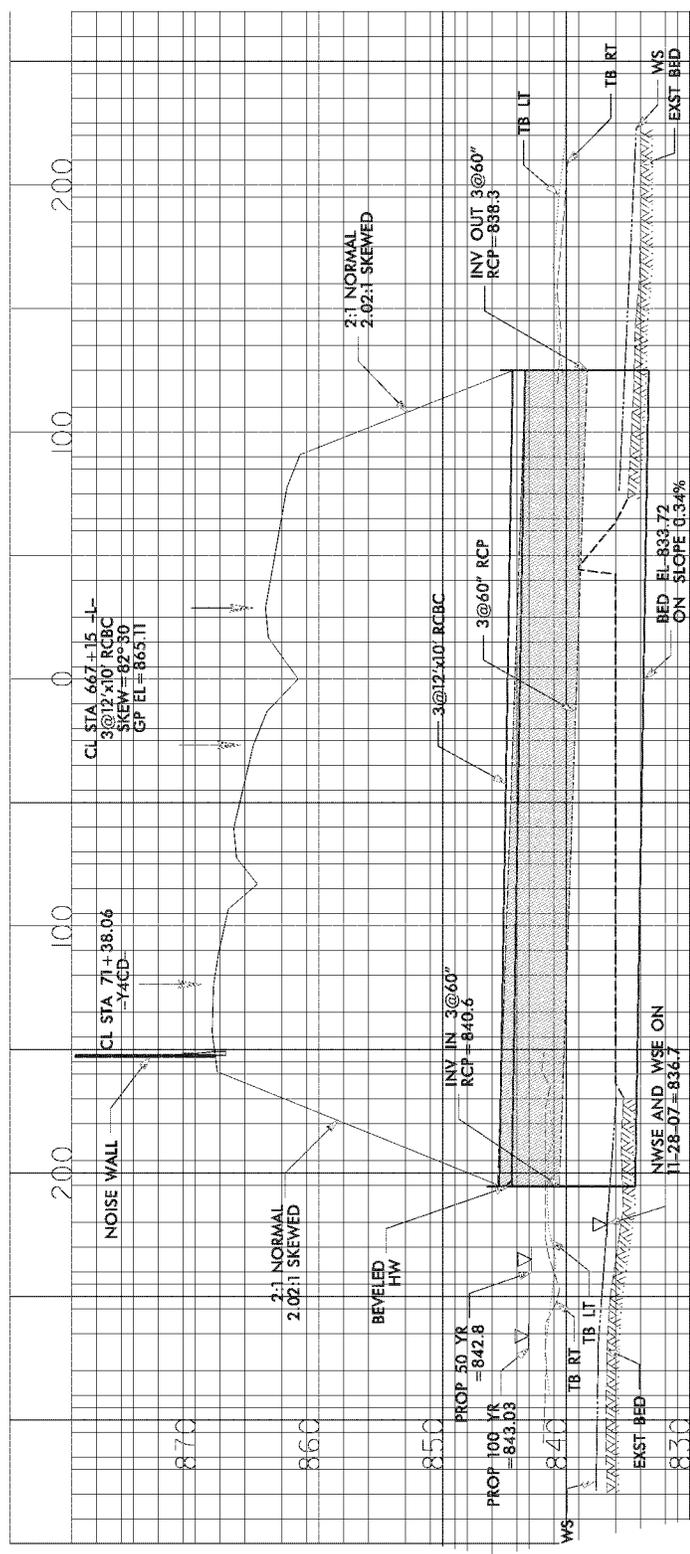


- DENOTES FILL IN WETLAND
- DENOTES IMPACTS IN SURFACE WATER
- DENOTES MECHANIZED CLEARING



PROJECT REFERENCE NO. U-25296	SHEET NO.
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS <small>DO NOT USE FOR CONSTRUCTION</small> PRELIMINARY PLANS <small>DO NOT USE FOR CONSTRUCTION</small>	

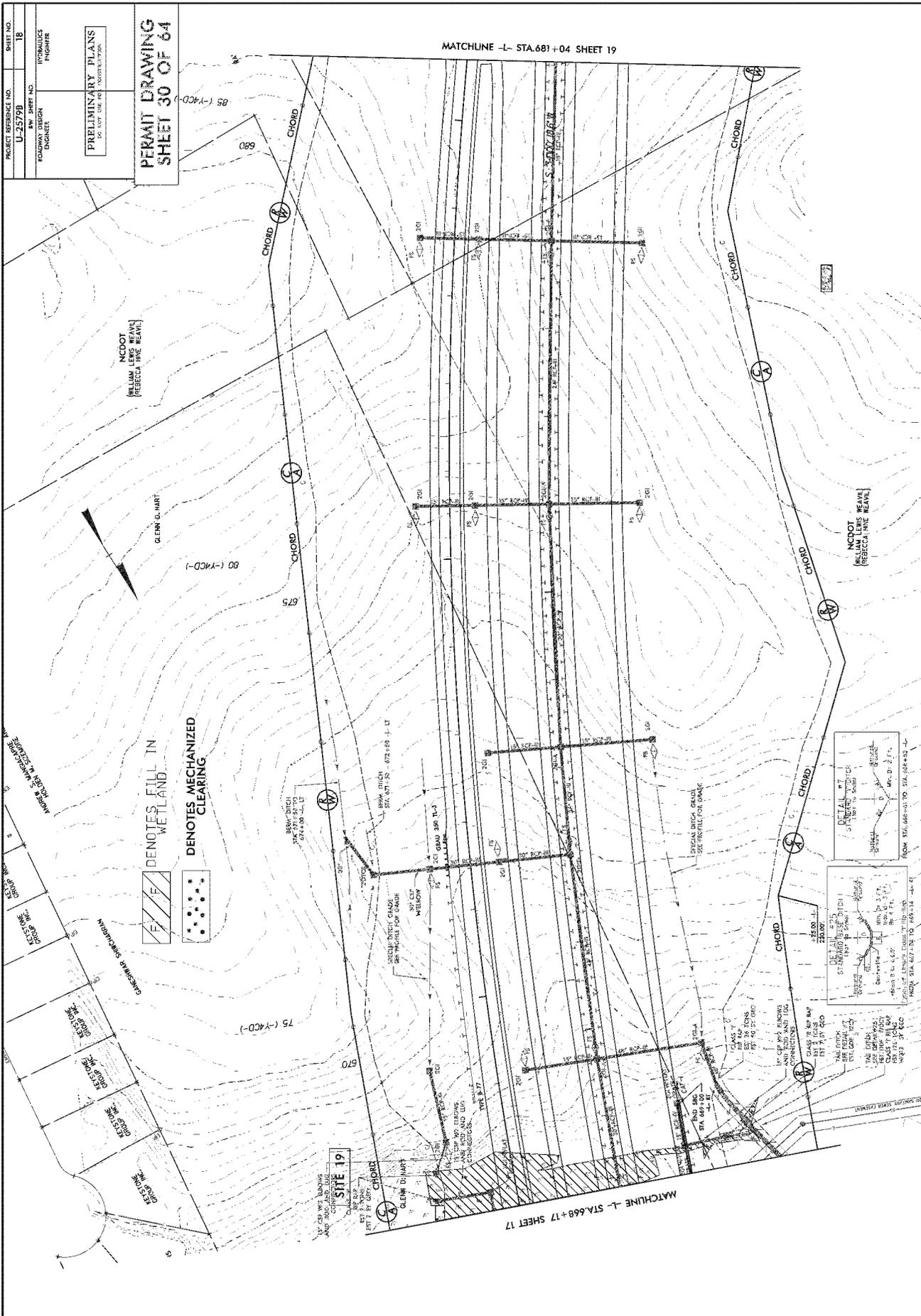
**PERMIT DRAWING
SHEET 28 OF 64**



8/27/28

REVISIONS

8/27/28 1:40 PM C:\Users\jgibson\OneDrive\Documents\2025\28 of 64.dwg



PROJECT REFERENCE NO.	U-2579B
SHEET NO.	18
ROW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

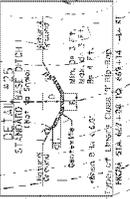
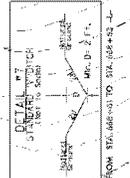
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 30 OF 64

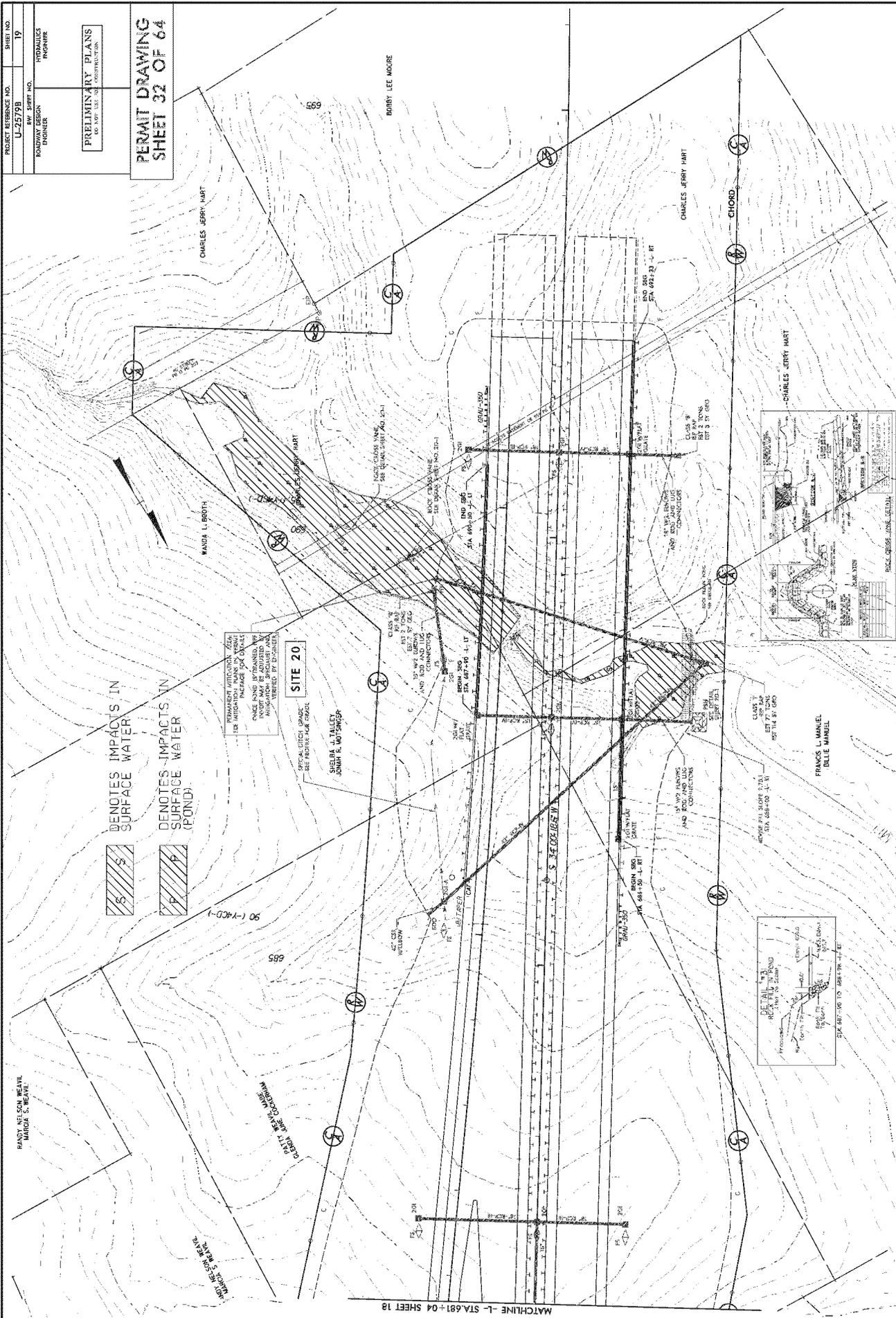
MATCHLINE -L- STA.681+04 SHEET 19

MATCHLINE -L- STA.668+17 SHEET 17

REVISIONS



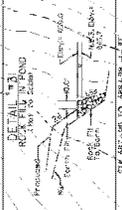
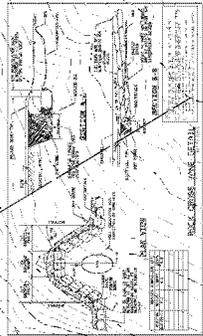
PROJECT REFERENCE NO. U-25798
 SHEET NO. 19
 ROADWAY DESIGN ENGINEER
 HYDRAULICS ENGINEER
 PRELIMINARY PLANS
 FOR 100% DESIGN
 PERMIT DRAWING
 SHEET 32 OF 64



 DENOTES IMPACTS IN SURFACE WATER
 DENOTES IMPACTS IN SURFACE WATER (POND)

SITE 20
 PROPOSED UTILITIES AND STRUCTURES SHALL BE INSTALLED AND CONSTRUCTION SHALL BE VERIFIED BY ENGINEER.

SPECIAL DITCH GRADE SEE PROFILE FOR TRAIL
 SHELBA J. TALLEY JOHN H. WOODRUP

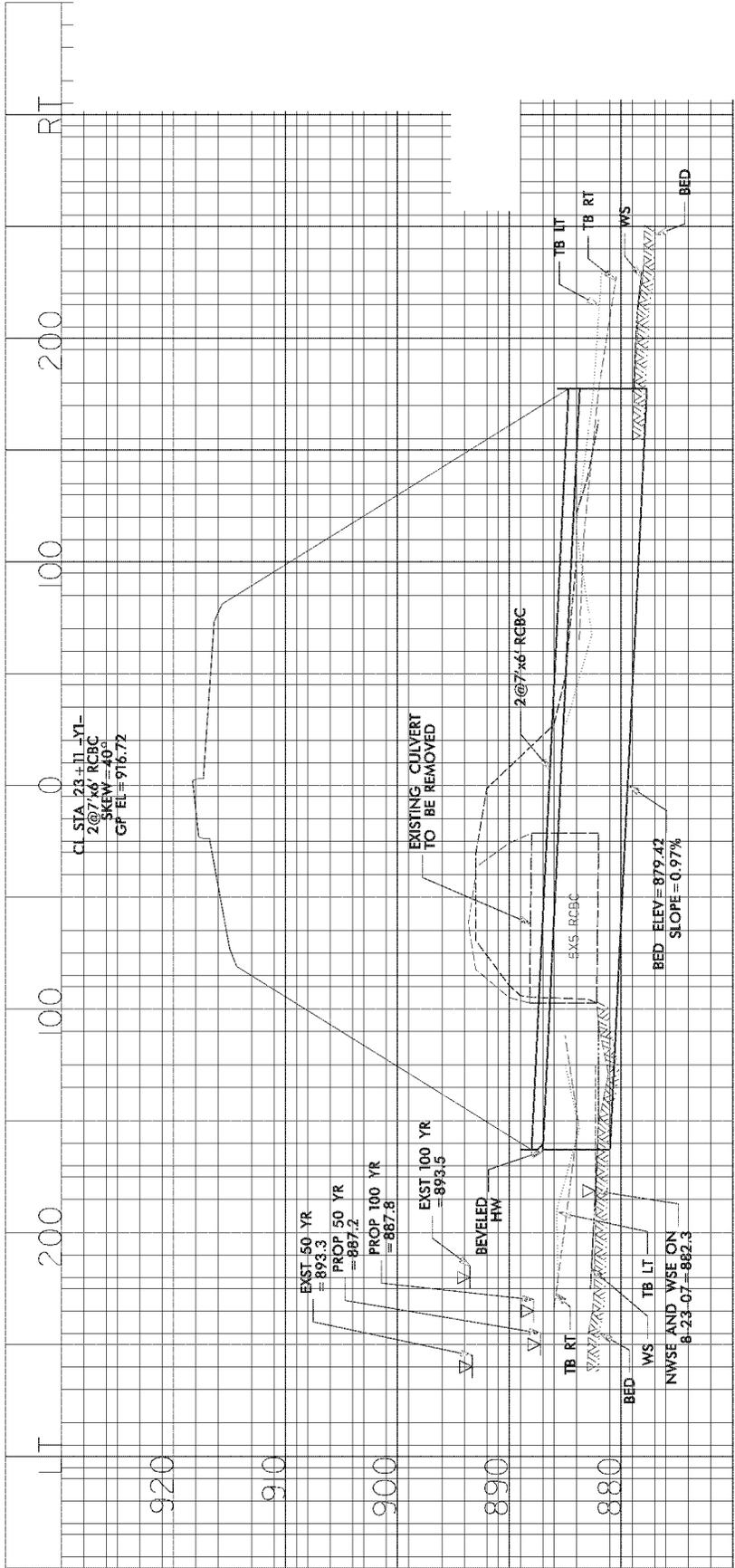


MATCHLINE 1- STA. 681+04 SHEET 18

REVISIONS

PROJECT REFERENCE NO. U-2579B	SHEET NO.
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR CONSTRUCTION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

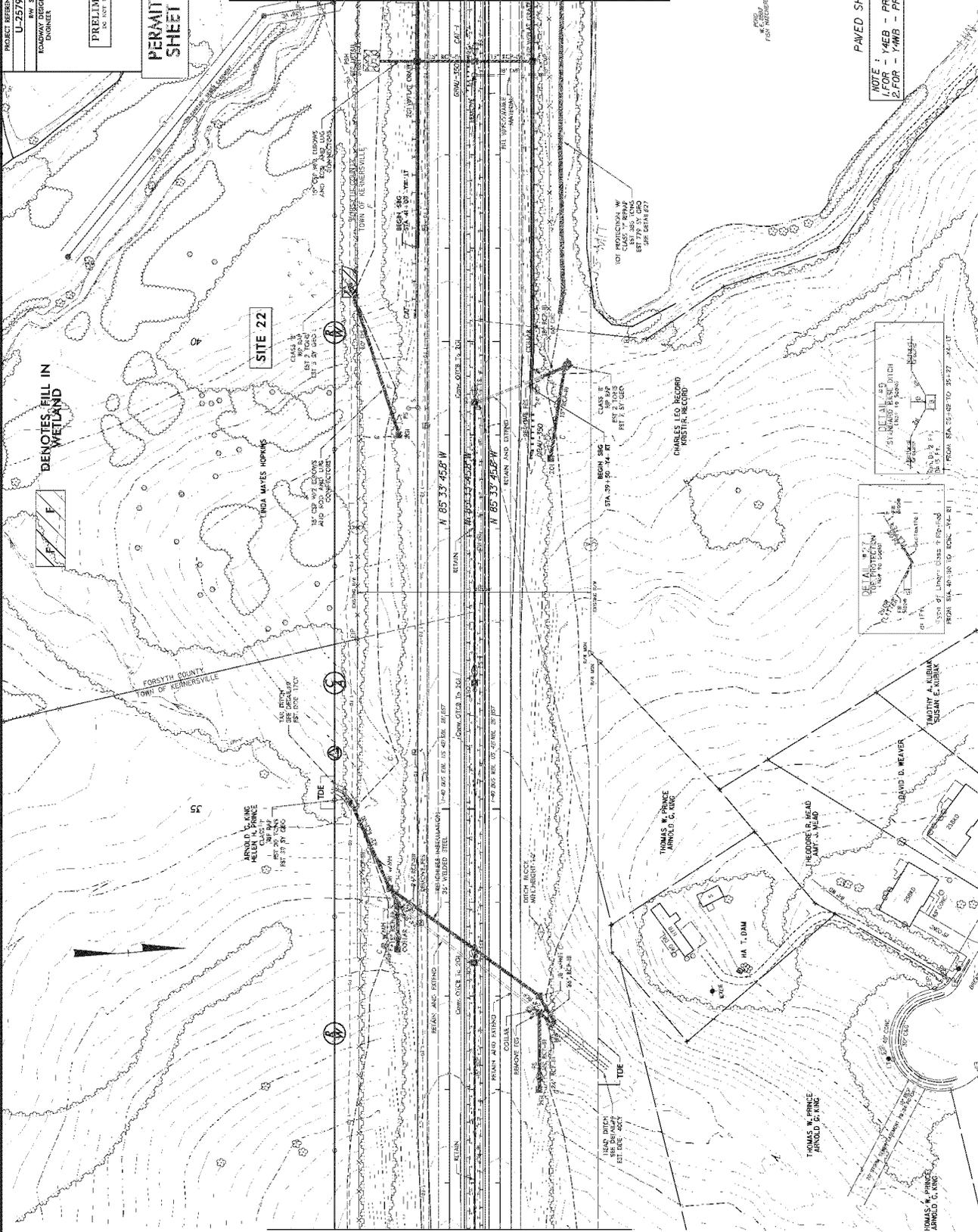
PERMIT DRAWING
SHEET 35 OF 64



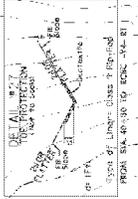
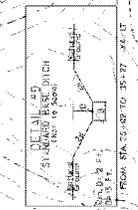
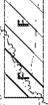
PROJECT REFERENCE NO.	U-2574B	SHEET NO.	25
BY	ROADWAY DESIGNER	DATE	10/20/11
DESIGNED BY	ROADWAY DESIGNER	CHECKED BY	ROADWAY DESIGNER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			

PERMIT DRAWING
SHEET 37 OF 64

MATCHLINE -Y4- STA. 43+65 SHEET 26



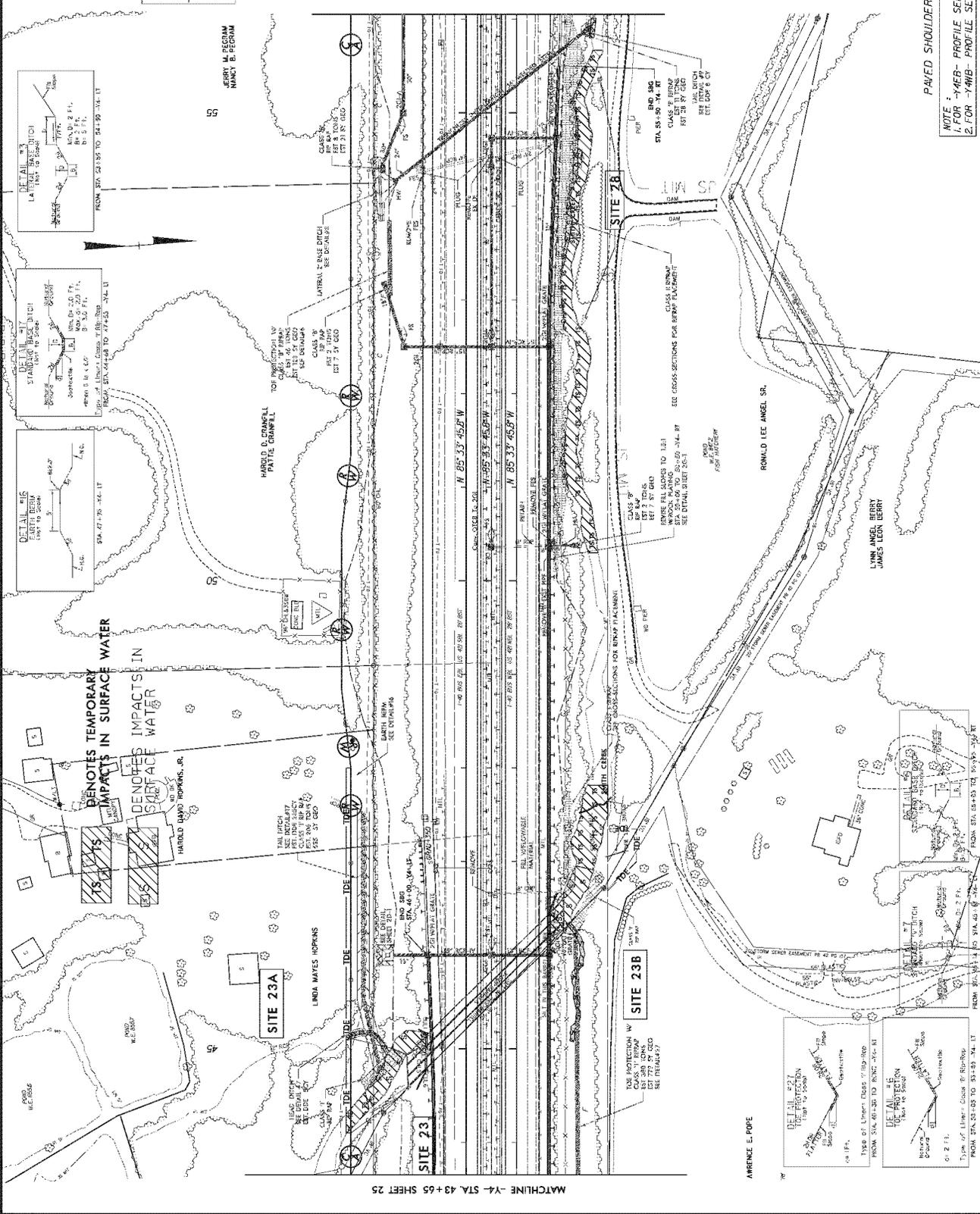
NOTE: 1-MEB - PROFILE SEE SHEET 50
2-FOR - 1-MEB - PROFILE SEE SHEET 55



MATCHLINE -Y4- STA. 30+50 SHEET 24

REVISIONS

PROJECT REFERENCE NO.	U-2572B	SHEET NO.	26
ROADWAY DESIGN ENGINEER	ROADWAY DESIGN ENGINEER	PERSONALITIES ENGINEER	PERSONALITIES ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			
PERMIT DRAWING SHEET 38 OF 64 REVISED 5-18-14			



NOTE:
 1. FOR -Y4EB- PROFILE SEE SHEET 50-51
 2. FOR -Y4WB- PROFILE SEE SHEET 55-56

REVISIONS	DATE	DESCRIPTION

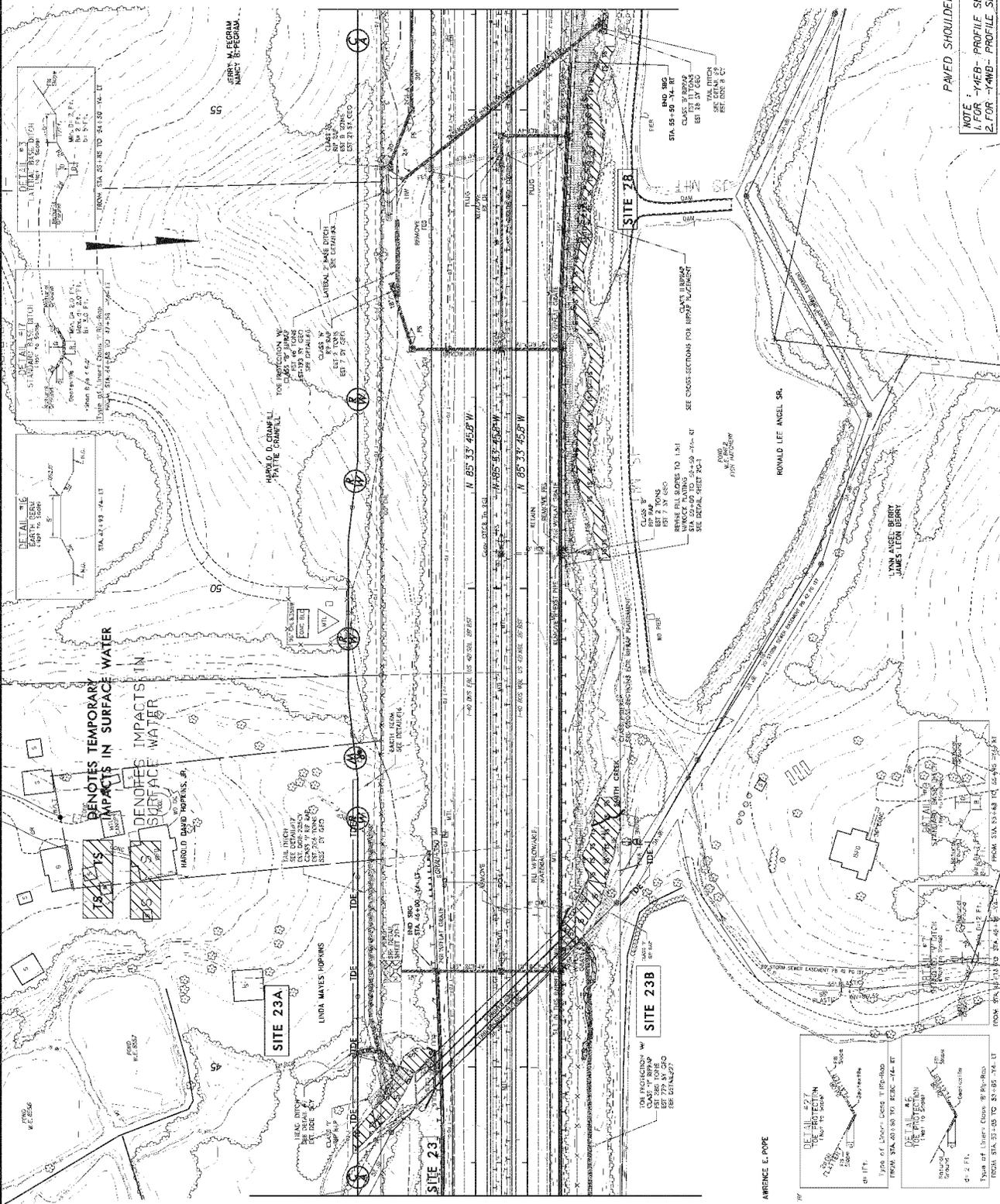
AWRENCE E. POPE
 DETAIL #17 - 2' SCALE
 DETAIL #18 - 2' SCALE
 DETAIL #19 - 2' SCALE
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 DETAIL #21 - 2' SCALE
 DETAIL #22 - 2' SCALE
 DETAIL #23 - 2' SCALE
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 DETAIL #99 - 2' SCALE
 DETAIL #100 - 2' SCALE

PROJECT REFERENCE NO. U-25793
 SHEET NO. 26
 HYDRAULICS ENGINEER
 ROADWAY DESIGN ENGINEER

PRELIMINARY PLANS
 AND NOT FOR CONSTRUCTION

PERMIT DRAWING
 SHEET 39 OF 64
 REVISED
 5-18-14

MATCHLINE -Y4- STA.56+61 SHEET 27



MATCHLINE -Y4- STA. 43+65 SHEET 25

PAVED SHOULDER

NOTE:
 1. FOR -Y4EB- PROFILE SEE SHEET 50-51
 2. FOR -Y4WD- PROFILE SEE SHEET 55-56

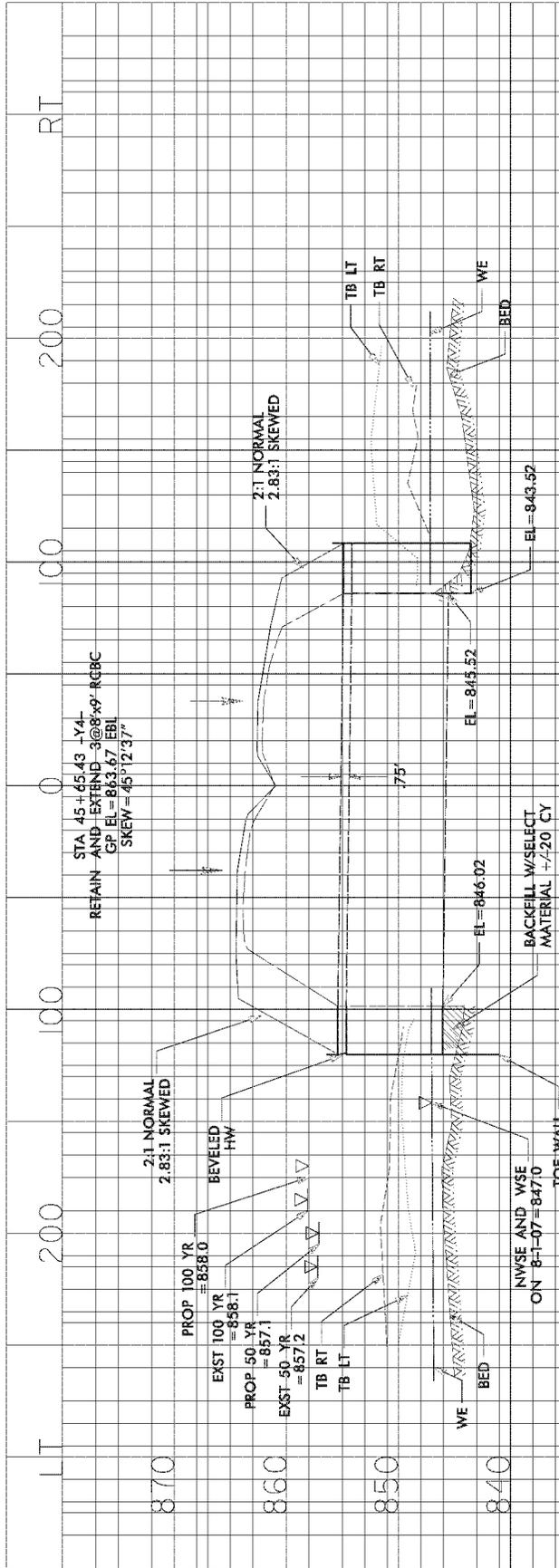
2/17/99

REVISIONS

6/2/2014
 1. Update from site visit on 6/2/2014

PROJECT REFERENCE NO. U-25799	SHEET NO.
RAW SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	INCOMPLETE PLANS DO NOT USE FOR CONSTRUCTION
	PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 41 OF 64



07/27/04

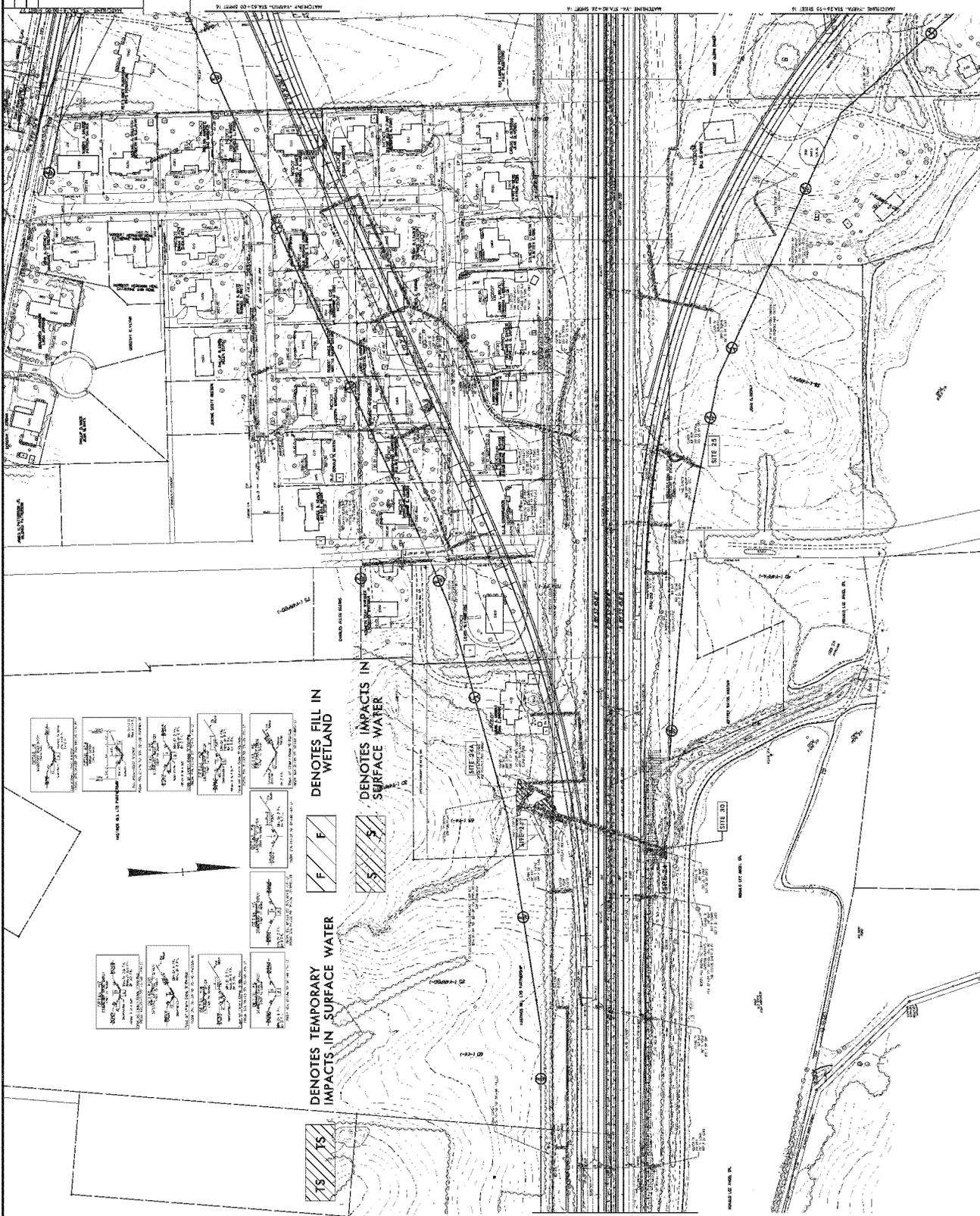
07/27/04 10:47:57 AM

REVISIONS

PROJECT REFERENCE NO. U-25793
 SHEET NO. 27
 HYDRAULICS ENGINEER
 ROADWAY DESIGN ENGINEER

PRELIMINARY PLANS
 AND NOT FOR CONSTRUCTION

PERMIT DRAWING
 SHEET 43 OF 64



6/2/2017

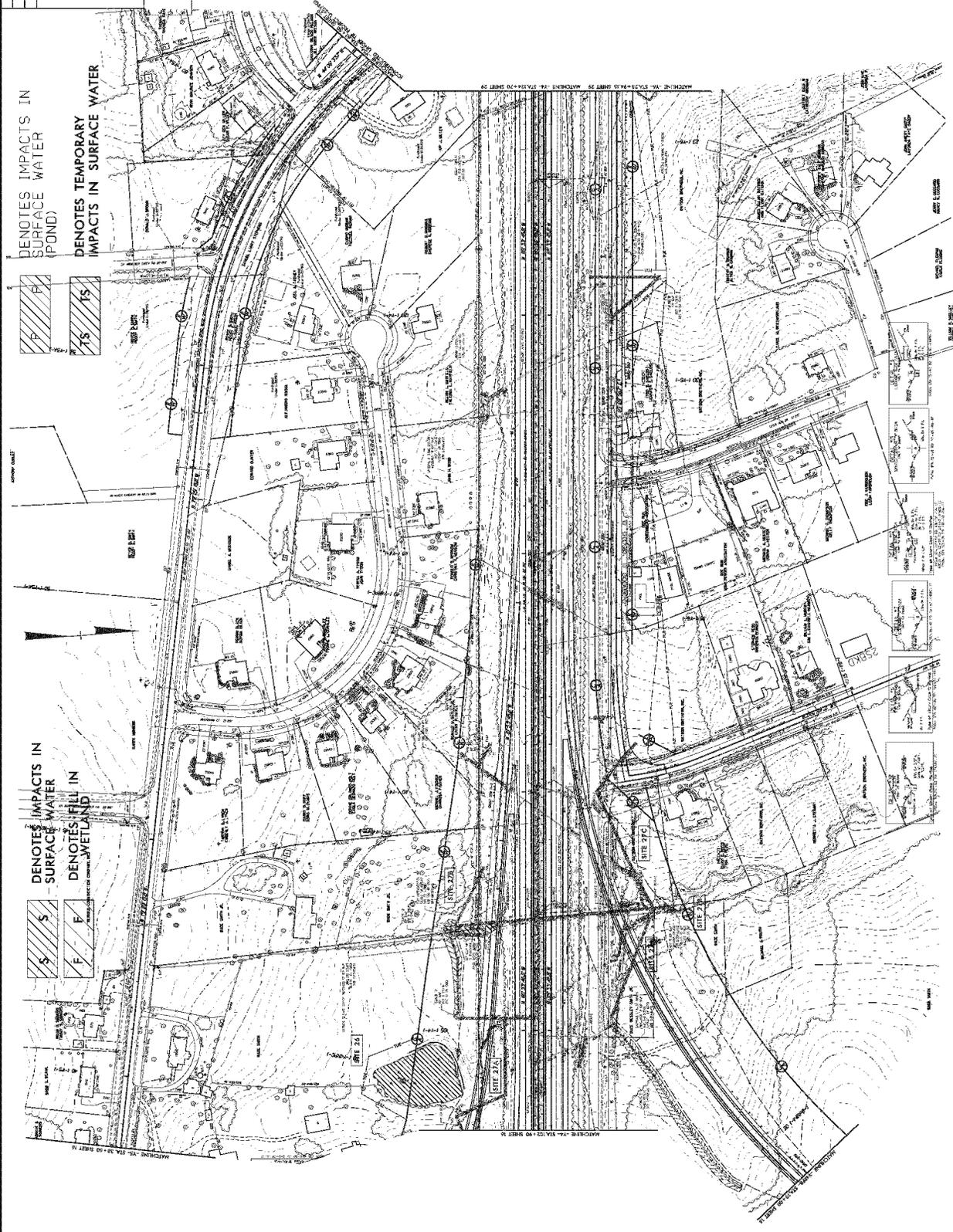
6/2/2017
 1/25/2017
 1/25/2017

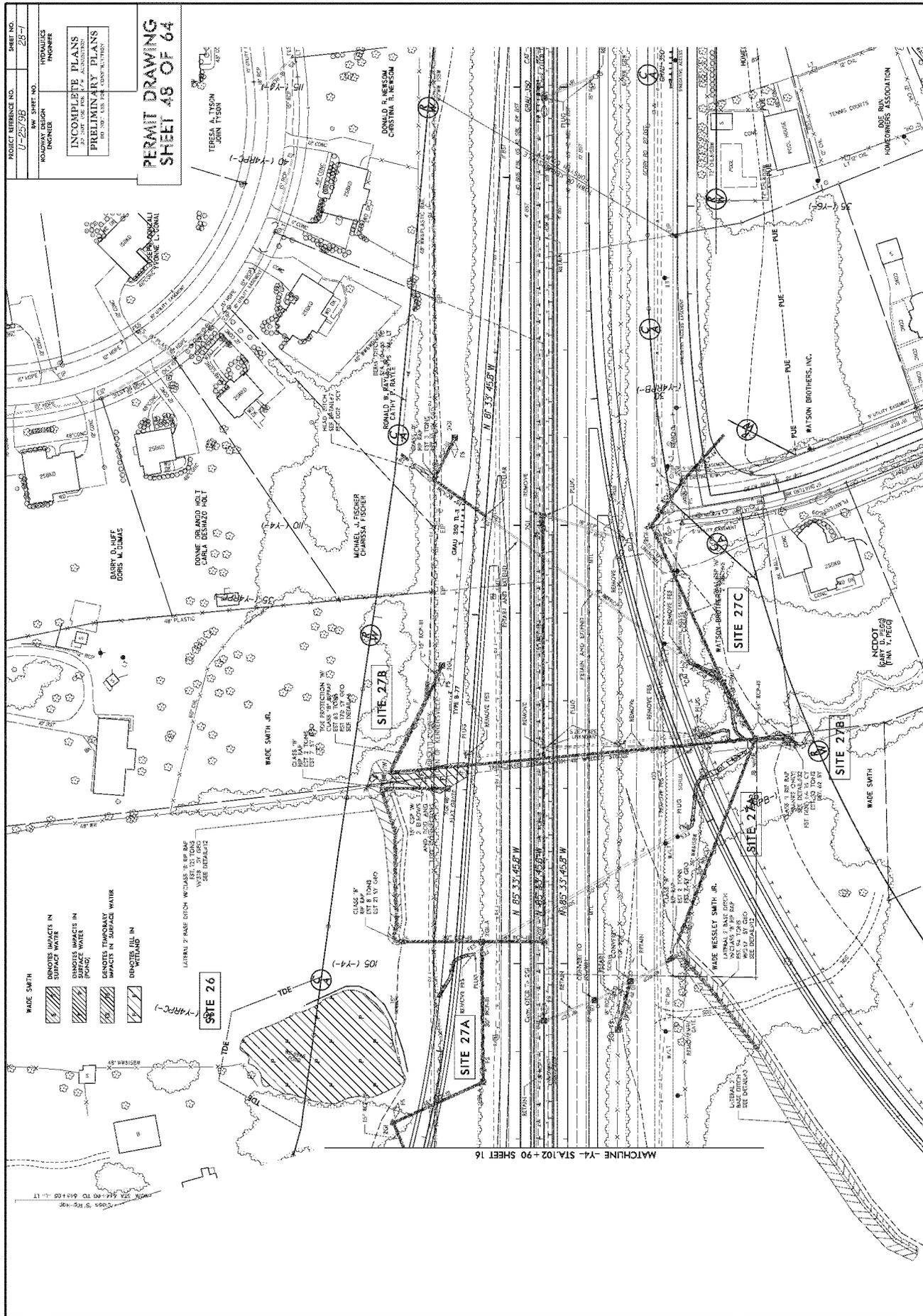
REVISIONS

PROJECT REFERENCE NO. U-25793
 RW SHEET NO. 28
 HYDRAULICS ENGINEERS

PRELIMINARY PLANS
 NOT FOR USE FOR CONSTRUCTION

PERMIT DRAWING
 SHEET 47 OF 64





PROJECT REFERENCE NO. U-25/28
 SHEET NO. 28-1
 ROADWAY DESIGN ENGINEER
 HYDRAULICS ENGINEER
 INCOMPLETE PLANS
 PRELIMINARY PLANS
 PERMIT DRAWING
 SHEET 48 OF 64

- WADE SMITH
- DIAMETER IMPACTS IN SURFACE WATER
 - DIAMETER IMPACTS IN PONDIC WATER
 - IMPACTS THROUGH SURFACE WATER
 - DIAMETER, ALL IN WATERSHED

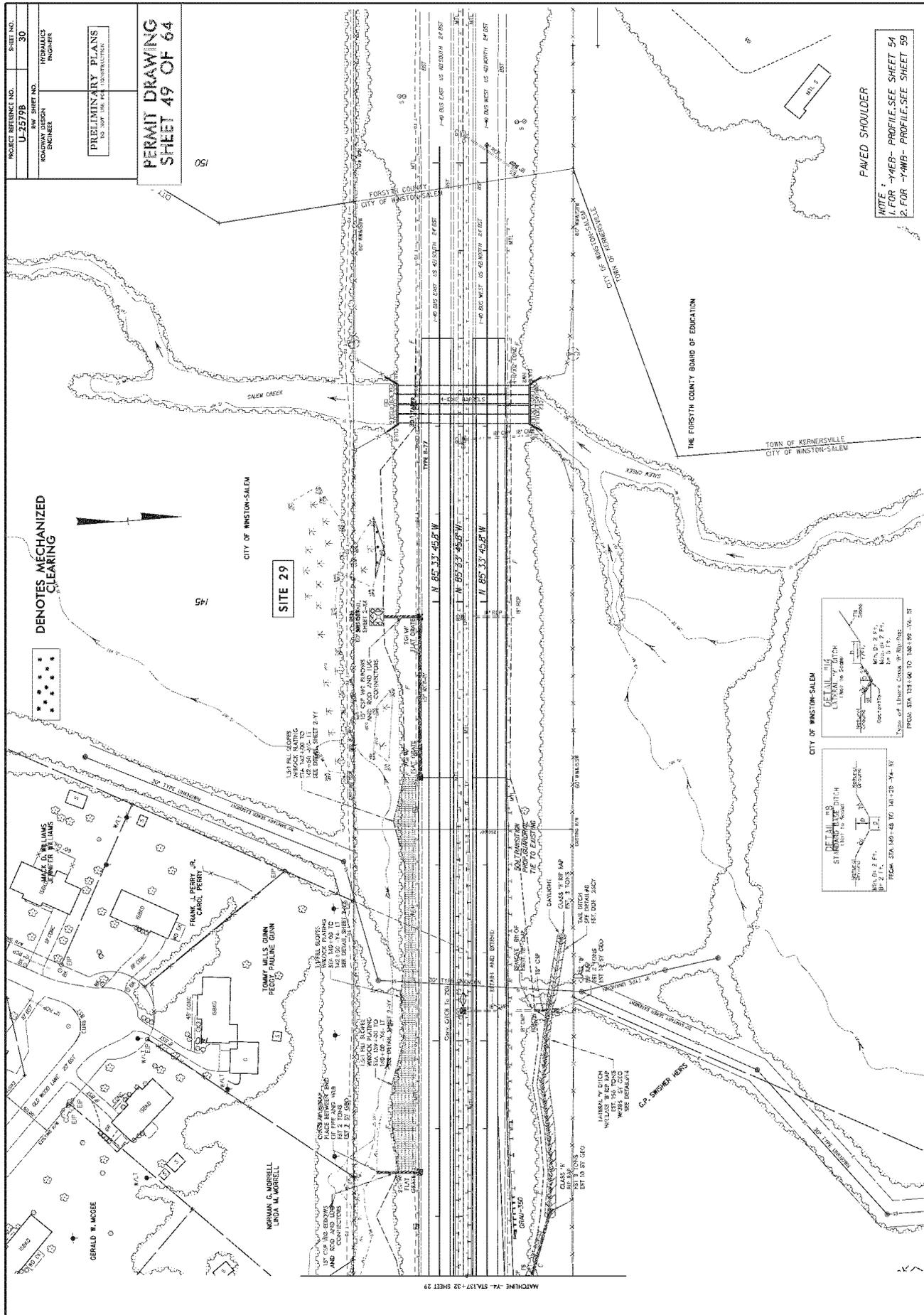
LATERAL 2 MADE DITCH W/GRASS 24" DIA. AND 18" HIGH
 18" DIA. AND 18" HIGH
 18" DIA. AND 18" HIGH
 SEE DETAILS

MATCHLINE -Y4- STA.102 + 90 SHEET 16

5/17/05

REVISIONS

5/2/05 11:17 AM



PROJECT REFERENCE NO. U-25798
 SHEET NO. 30
 HWY. SHEET NO. HYDRAULICS ENGINEER
 ROADWAY DESIGN ENGINEER
 PRELIMINARY PLANS FOR THE CITY OF WINSTON-SALEM
 PERMIT DRAWING SHEET 49 OF 64

PAVED SHOULDER
 NOTE:
 1. FOR -YMB- PROFILE, SEE SHEET 51
 2. FOR -YMB- PROFILE, SEE SHEET 59

DENOTES MECHANIZED CLEARING

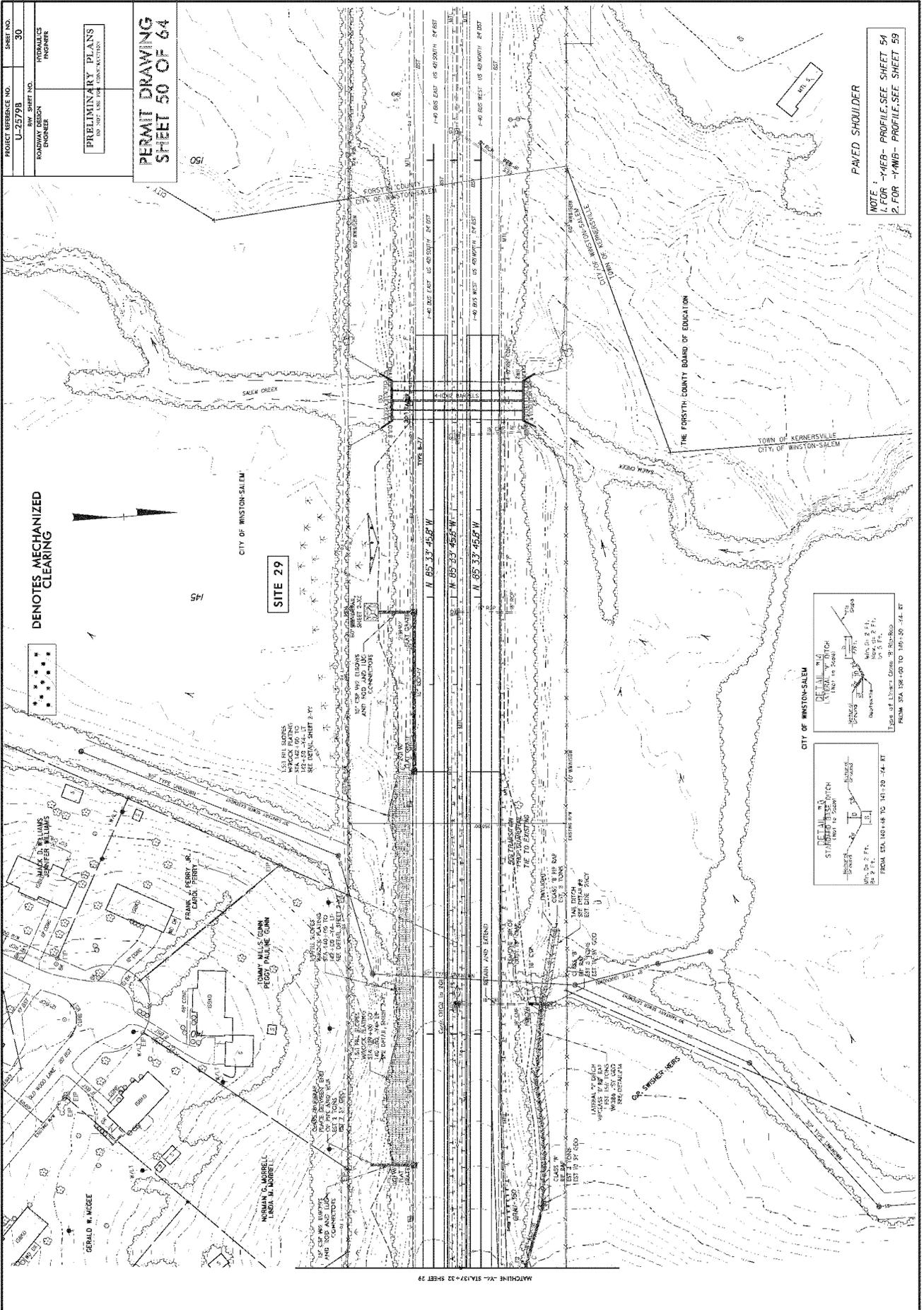
SITE 29

DETAIL NO. 10
 ST. 140+48 TO 141+25
 FROM STA 137+32 TO 142+00

DETAIL NO. 11
 ST. 141+25 TO 142+00
 FROM STA 137+32 TO 142+00

MATCHLINE - PA. STA 137+32 SHEET 29

REVISIONS



PROJECT REFERENCE NO. U-25798
 SHEET NO. 30
 ROADWAY DESIGN ENGINEER
 CIVIL ENGINEER

PRELIMINARY PLANS
 DO NOT USE FOR CONSTRUCTION

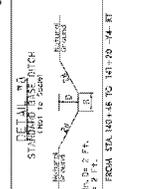
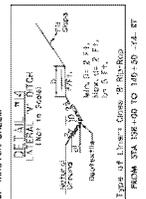
PERMIT DRAWING
 SHEET 50 OF 64

NOTE - YAE9 - PROFILE SEE SHEET 54
 1. FOR -YMB- PROFILE SEE SHEET 59
 2. FOR -YMB- PROFILE SEE SHEET 59

DENOTES MECHANIZED CLEARING



SITE 29



REVISIONS

0.1/17.95

10/20/2017 10:17 AM

SHEET NO. X-97
PROJ. REFERENCE NO. U-25758
0 5 10

PERMIT DRAWING
SHEET 53 OF 64

SITE 13

FILL IN WETLAND

621 + 00.0000

620 + 50.0000

620 + 00.0000

S.P. 14
L- 621 + 00.0000
YARPRD - 20 + 45.0000
ELEV. 854.175

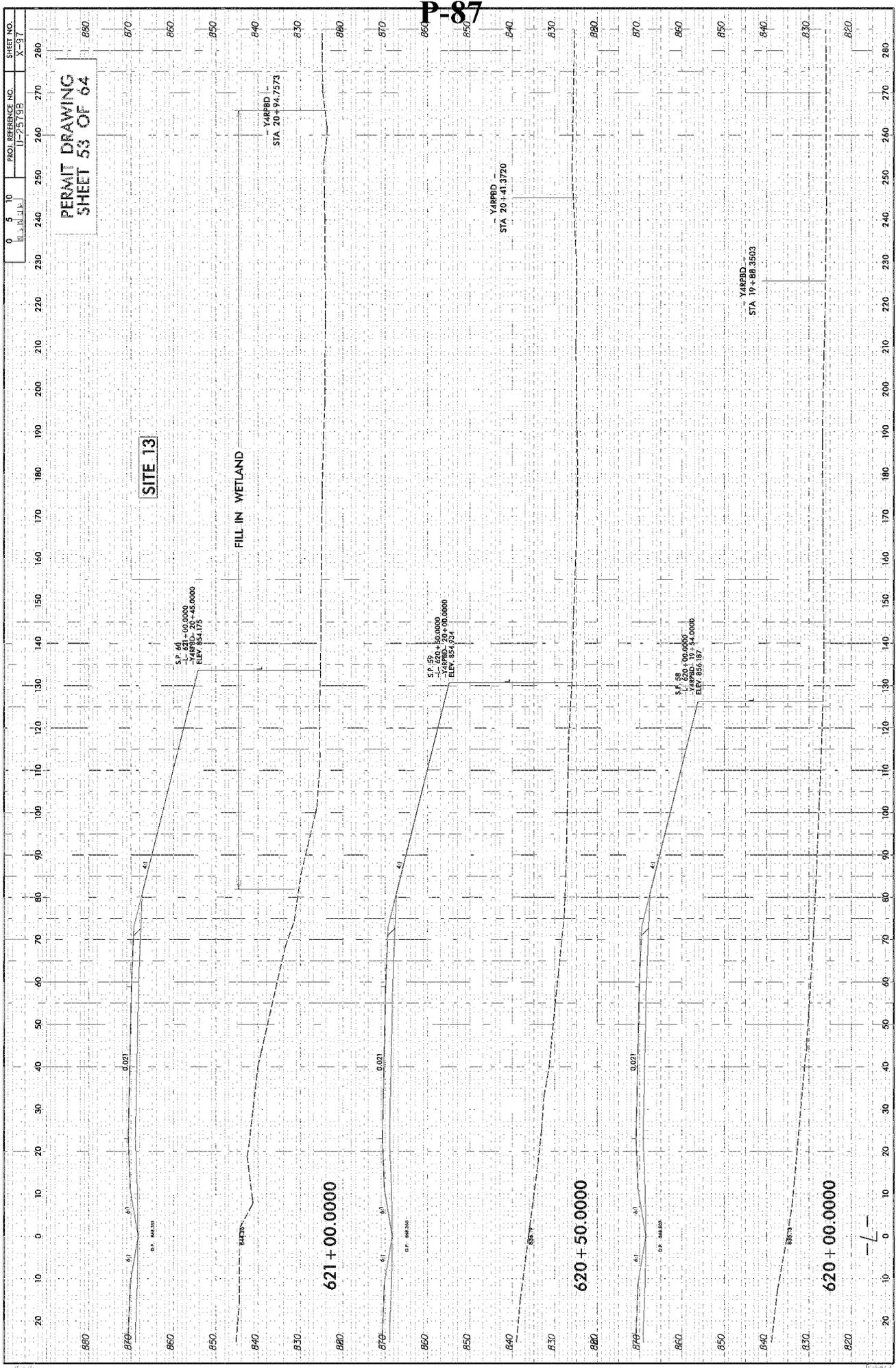
S.P. 20
L- 620 + 50.0000
YARPRD - 20 + 00.0000
ELEV. 854.754

S.P. 98
L- 620 + 00.0000
YARPRD - 19 + 88.3503
ELEV. 855.197

YARPRD
STA 20 + 74.7573

YARPRD
STA 20 + 41.3770

YARPRD
STA 19 + 88.3503



P-87

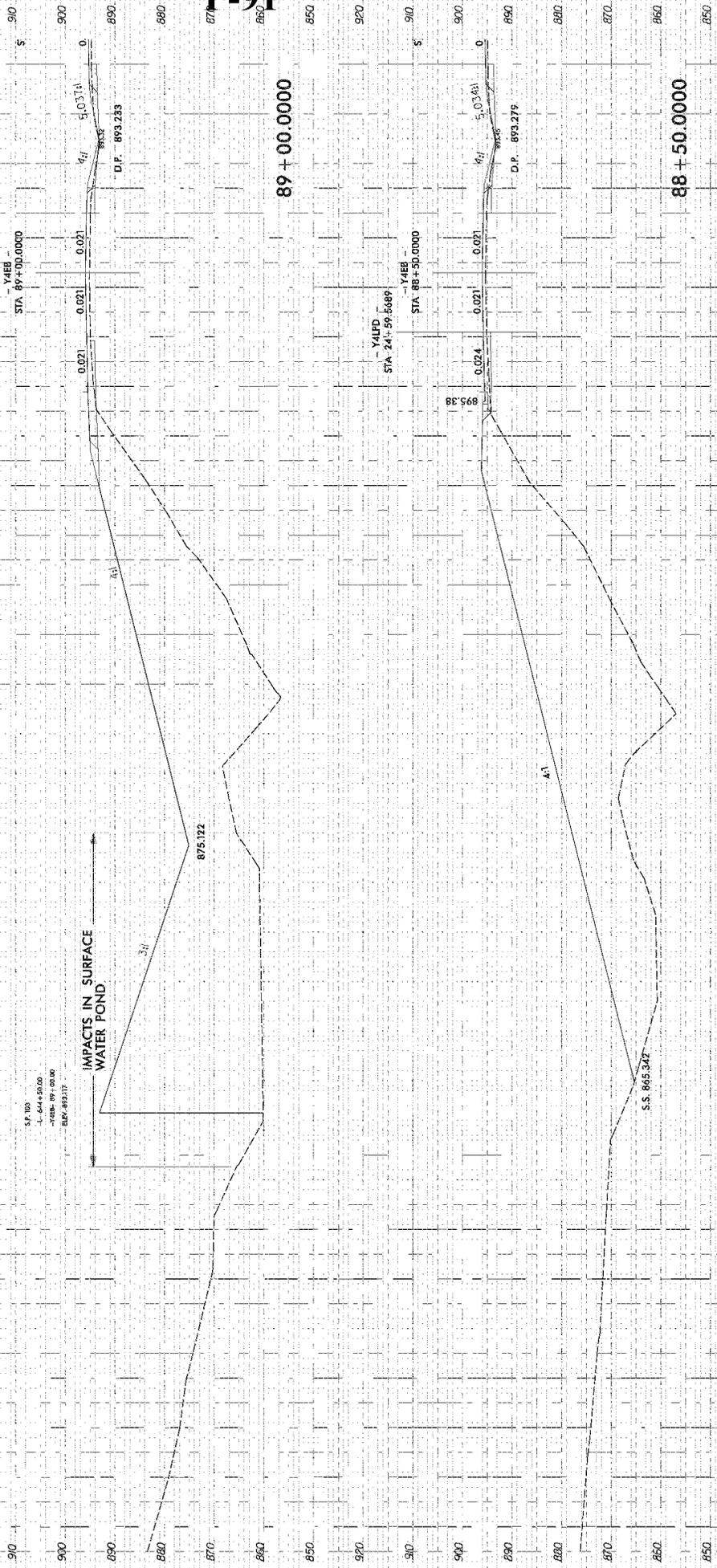
SHEET NO.	
0	10
PROJ. REFERENCE NO.	
U-2579B	
X-417	

PERMIT DRAWING
SHEET 57 OF 64

SITE 16

S.F. 103
 L. 644+50.00
 -788.89'±0.00
 ELEV. 893.17'

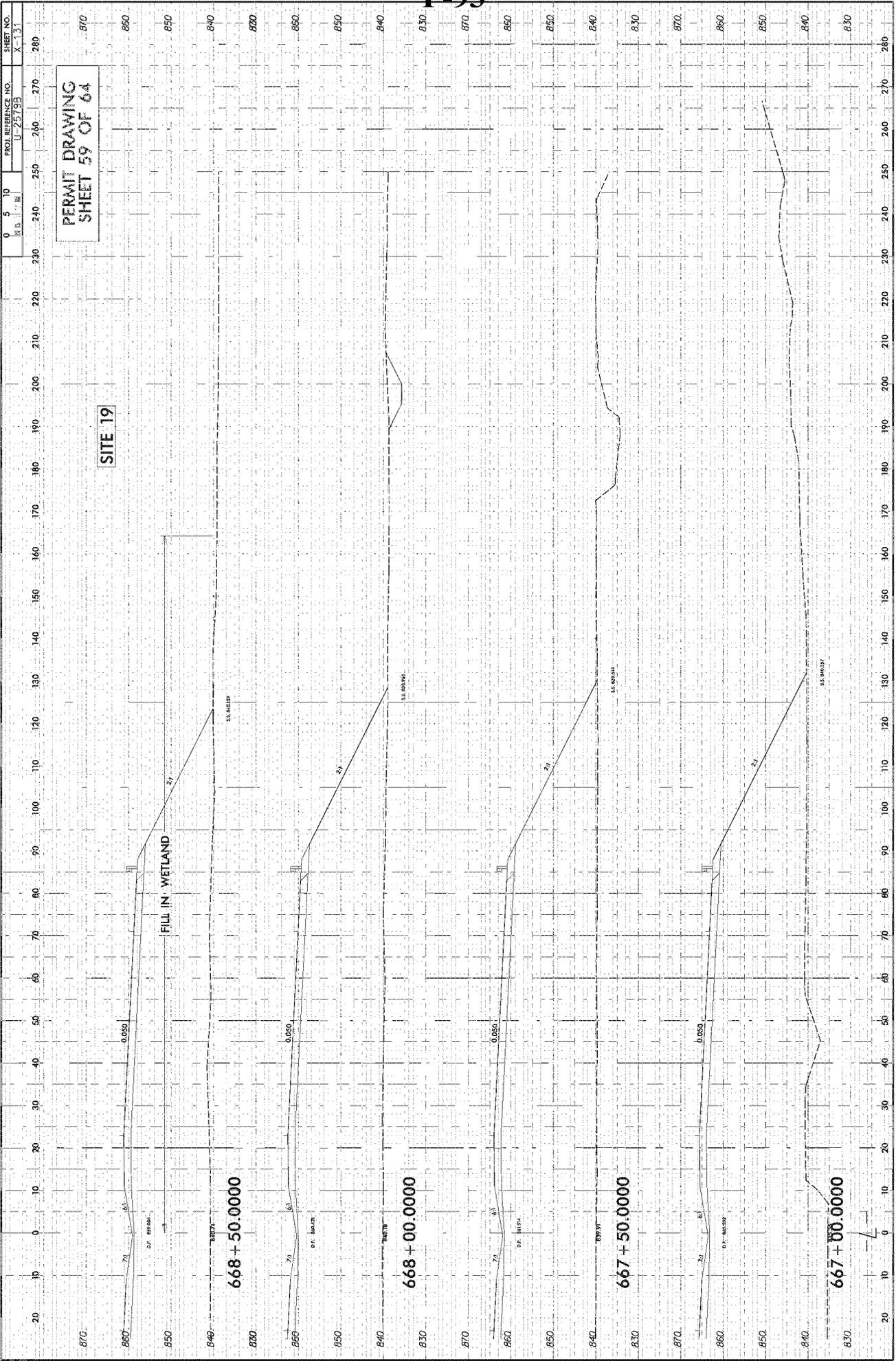
IMPACTS IN SURFACE
WATER POND

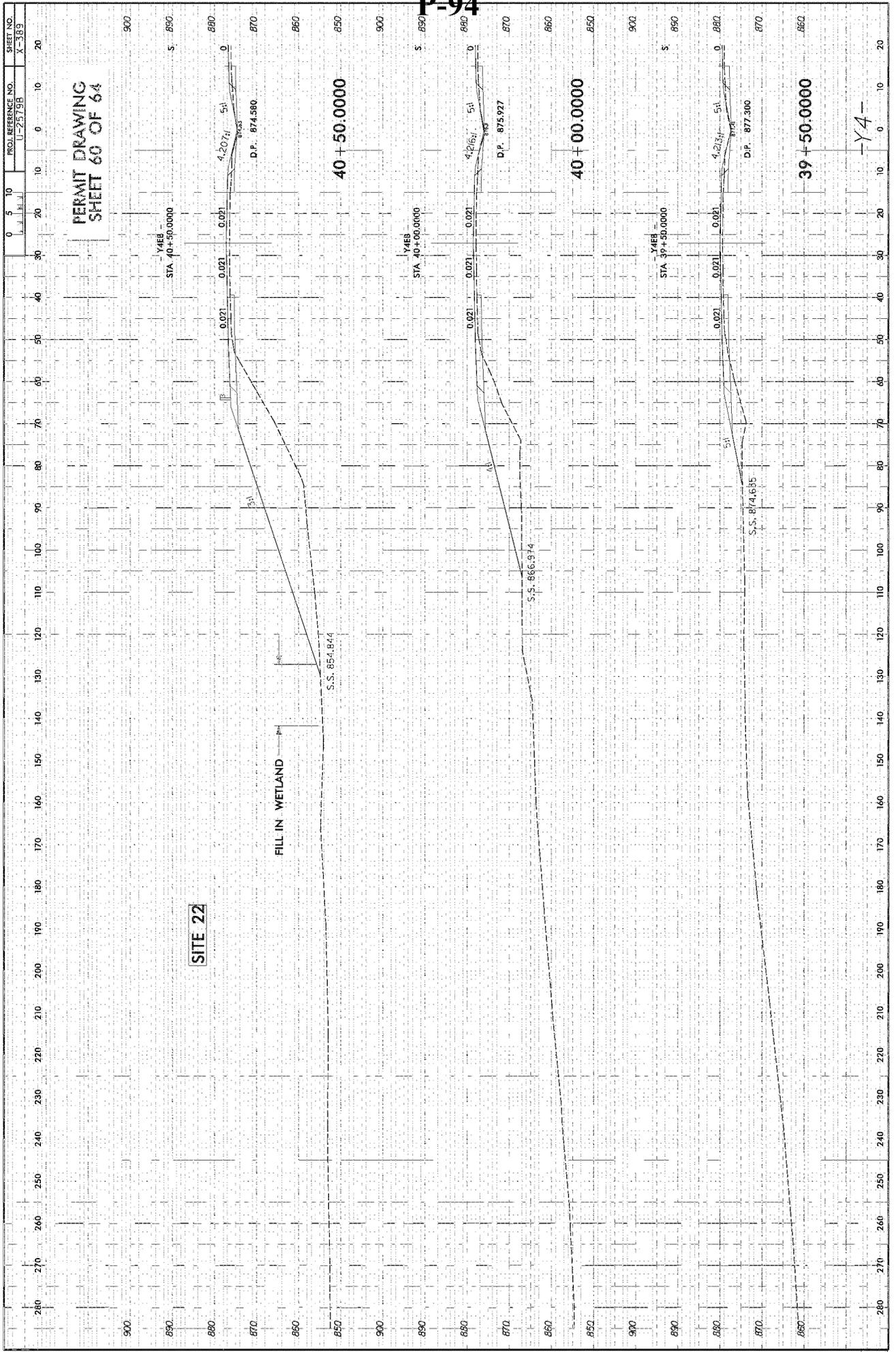


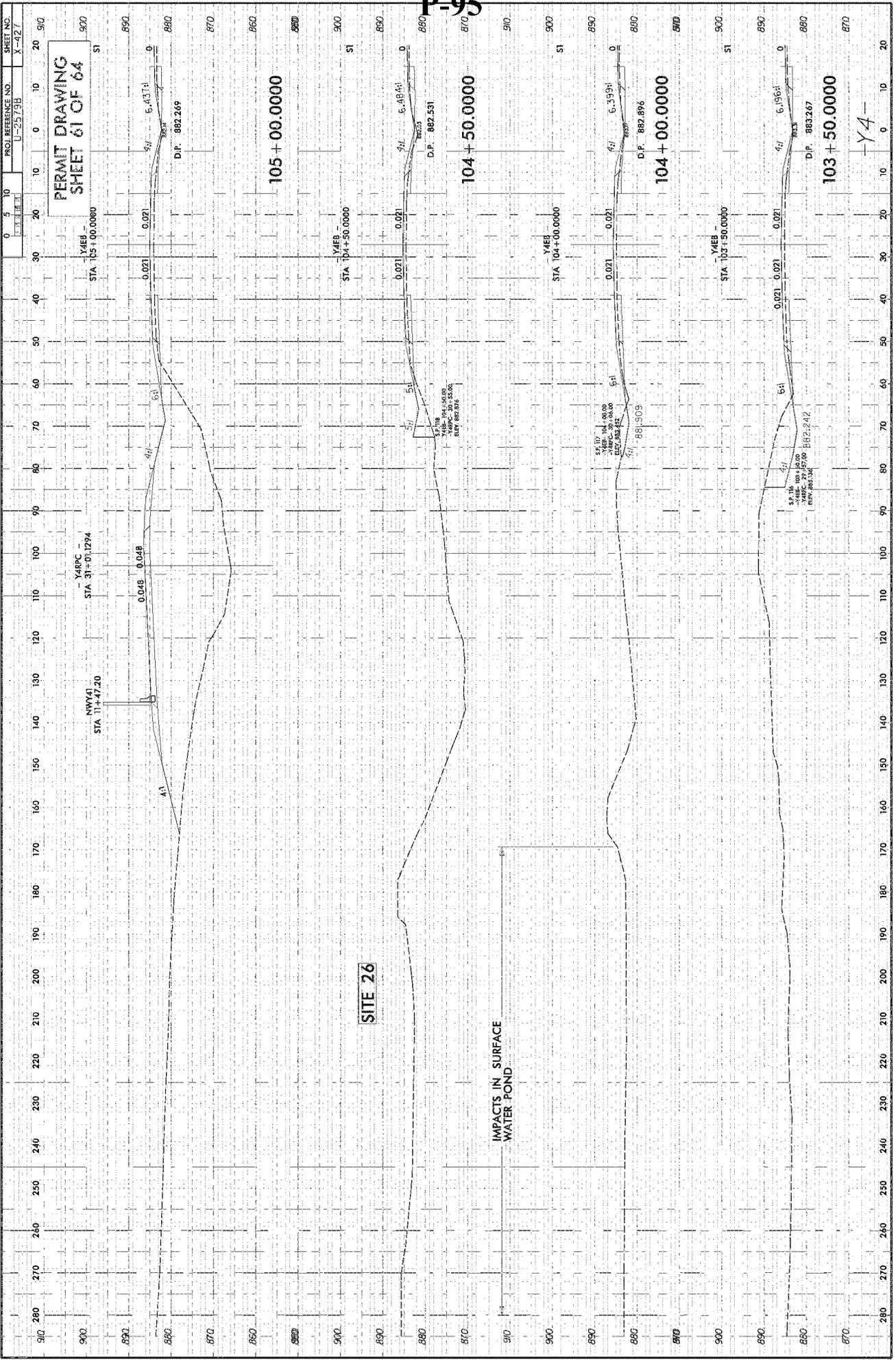
89 + 00.0000

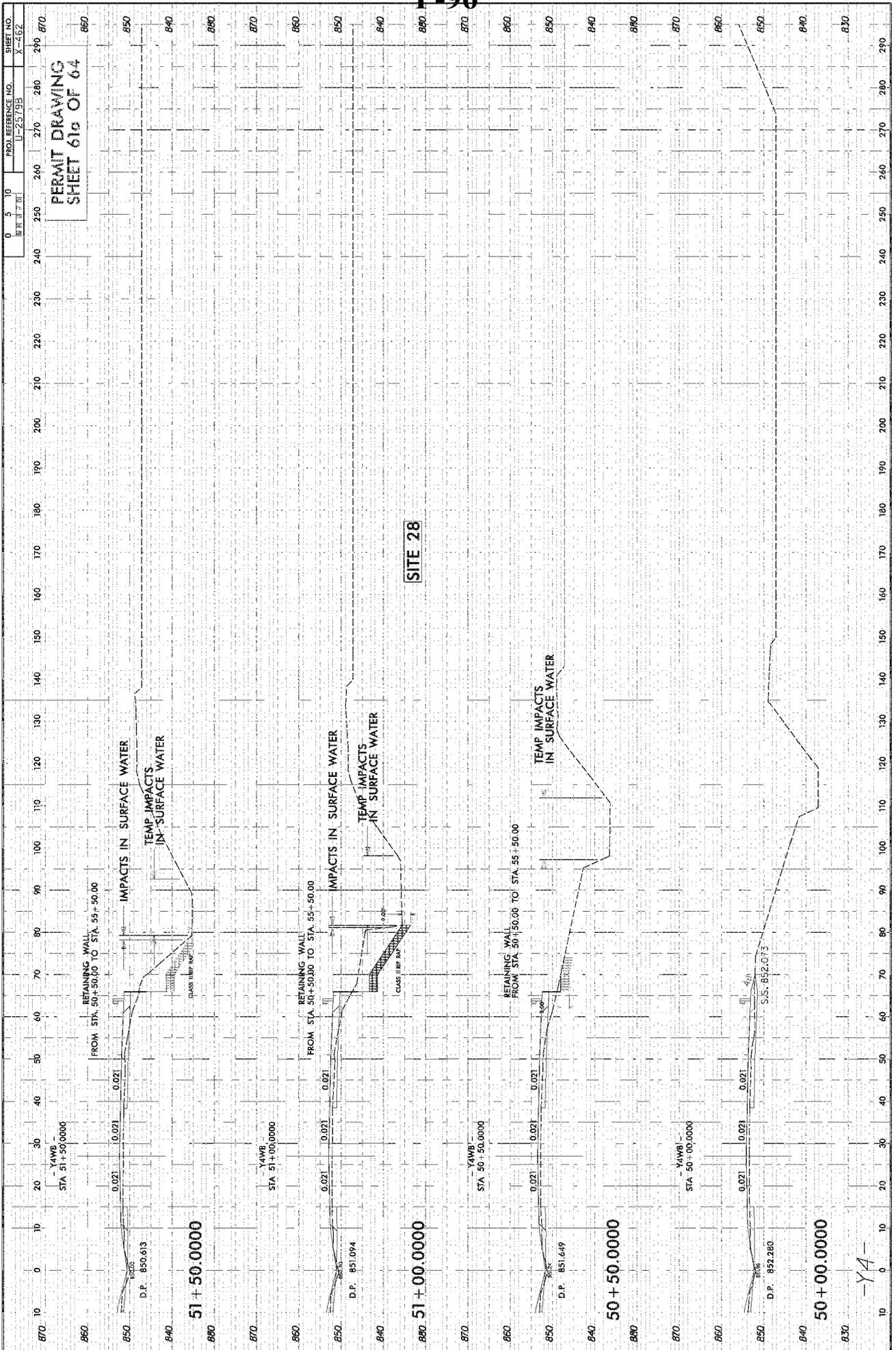
88 + 50.0000

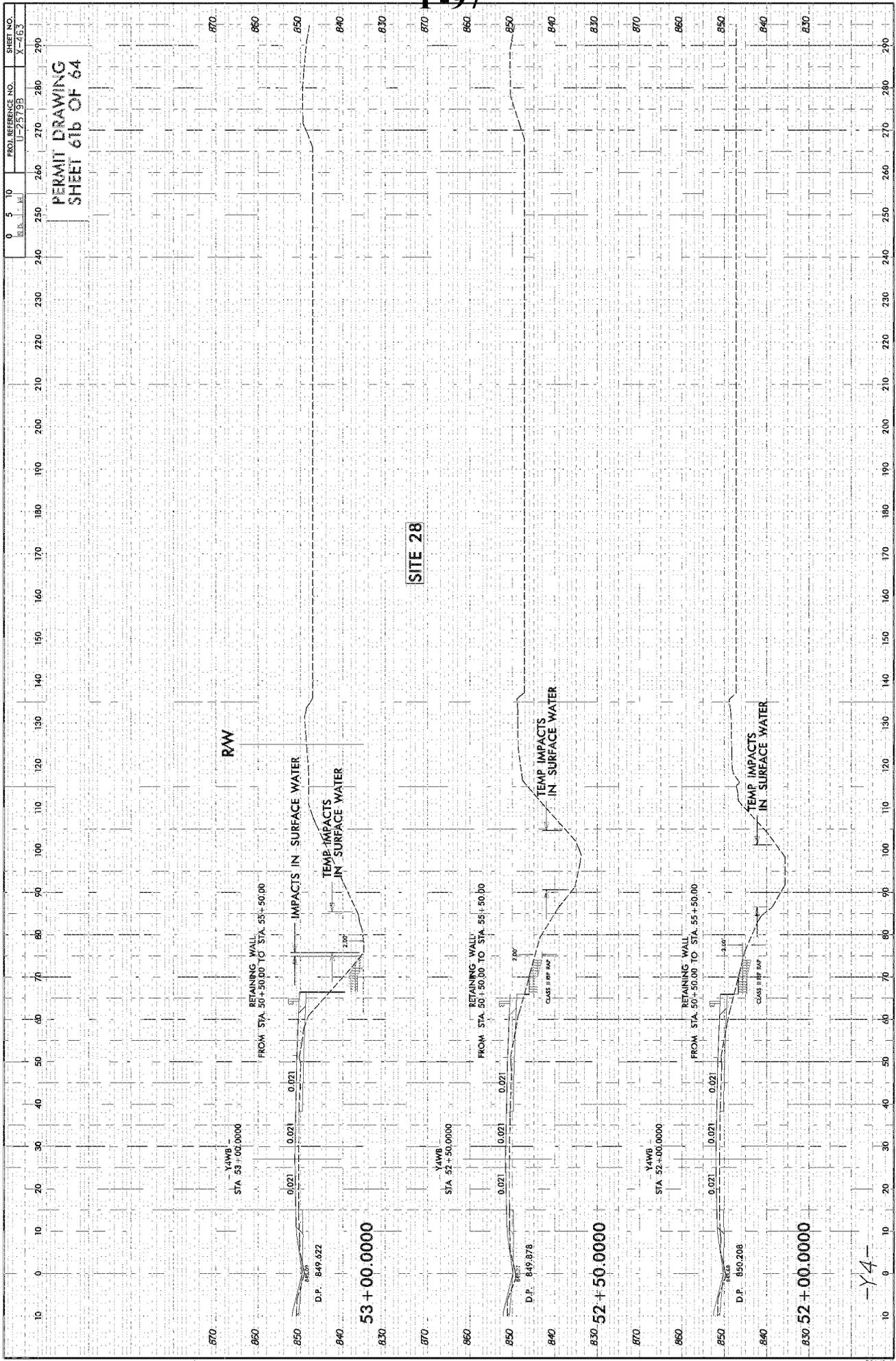
-Y4-







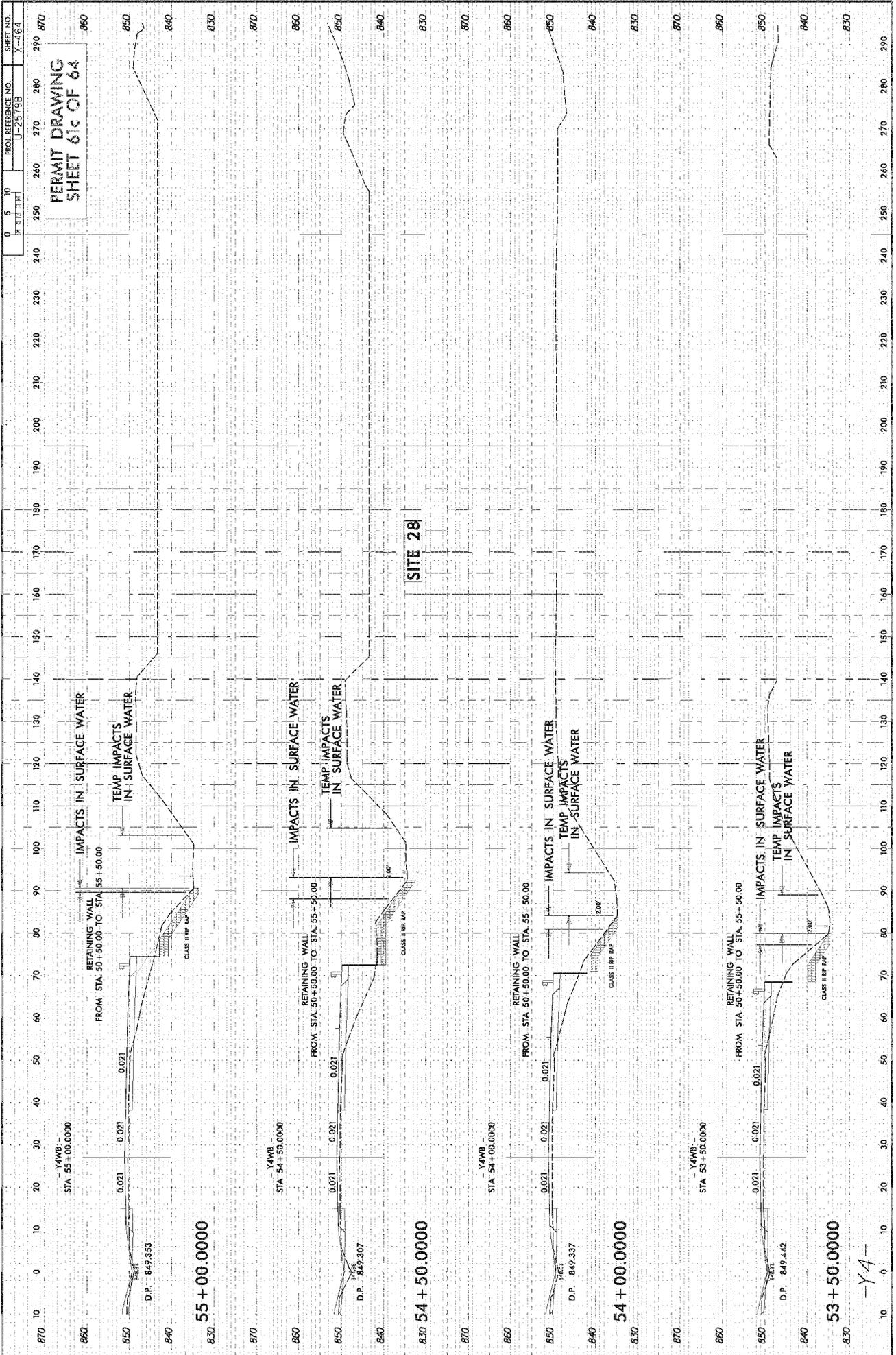


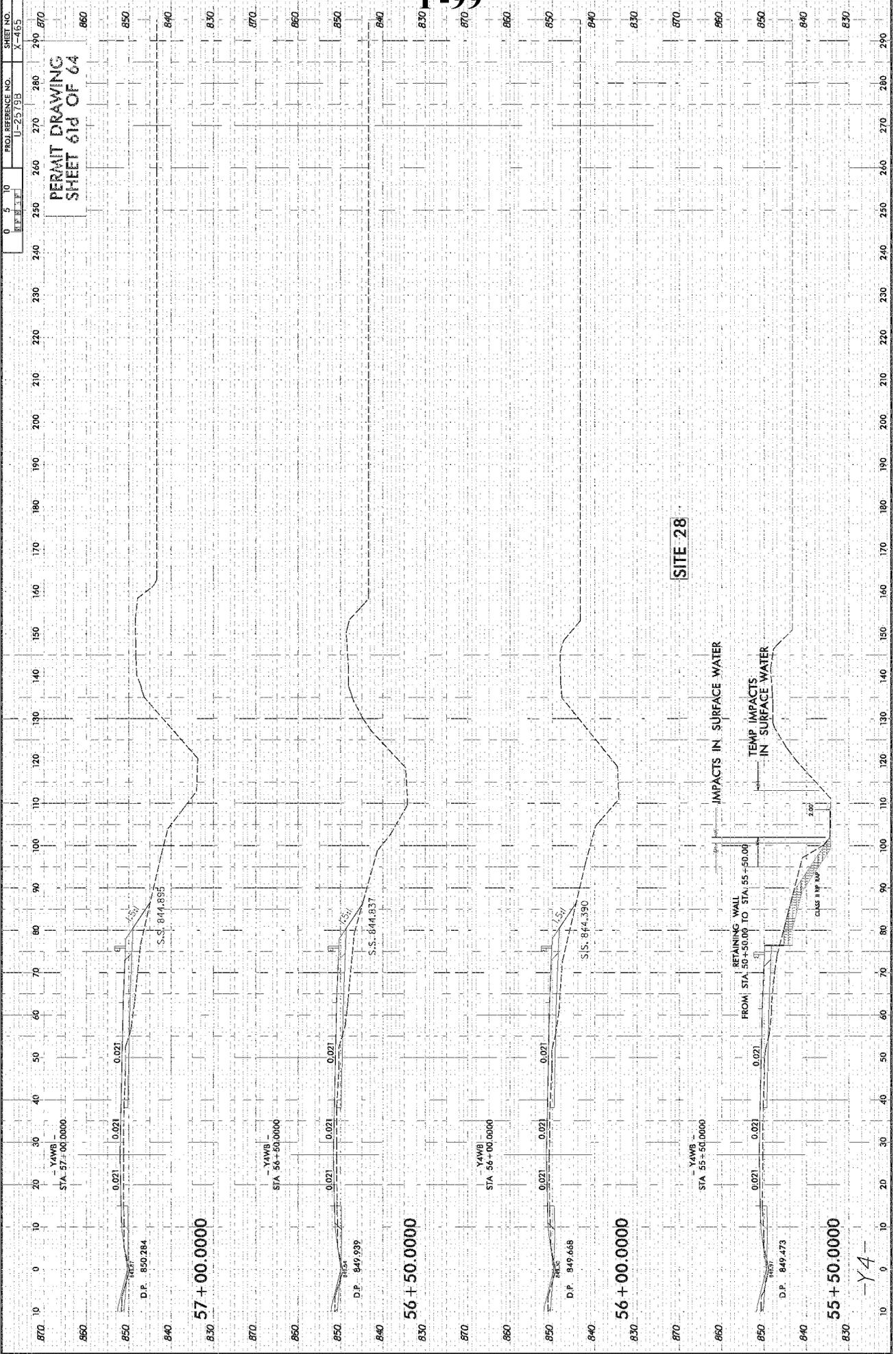


PERMIT DRAWING
SHEET 61b OF 64

SITE 28

-Y4-





		WETLAND PERMIT IMPACT 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	28+00 -Y1-	ROAD FILL	0.03		< 0.01	0.02		0.02		142		
2	16+00 -Y1RPD-	ROAD FILL - INTERMITTENT ROAD FILL - PERENNIAL						0.01 0.02		109 208		
3	21+56-25+22 -Y1-	STREAMBANK STABILIZATION						< 0.01	< 0.01	10	37	
3A	17+36-21+53 -Y1-	2 @ 7'x6' RCBC DETOUR - ROAD FILL						0.06	< 0.01	438	33	
3B	20+55-21+32 -Y1-	DETOUR - ROAD FILL						0.08			545	
4	501+51-503+21 -L-	ROAD FILL						0.03	0.03	493	18	
5	503+85-507+80 -L-	STREAMBANK STABILIZATION						< 0.01	< 0.01	9	31	
5A	507+39-509+64 -L-	ROAD FILL						0.05	< 0.01	740	22	
6	523+00 -L-	ROAD FILL	0.03			< 0.01		0.01		306		
7	527+00 -L-	ROAD FILL	0.52			0.01		0.02	< 0.01	312	42	
8	559+75 -L-	ROAD FILL-POND 2 @ 10'x6' RCBC						0.59				
9	560+75 -L-	STREAMBANK STABILIZATION						0.06	< 0.01	442	53	
10	560+50-568+74 -L-	ROAD FILL	0.03					< 0.01	< 0.01	58	44	
10A	566+84-572+75 -L-	ROAD FILL	0.01			0.01		0.07	< 0.01	783	22	
11	615+00 -L-	3 @ 10'x9' RCBC						0.05		684		
11A	19+76-21+44 -Y4RPBD-	CHANNEL CHANGE						0.43	0.02	808	57	
12	15+84-18+86 -Y4RPBD-	CHANNEL CHANGE						0.08	0.01	223	41	
								0.01	0.02	88	205	
SUBTOTALS*:			0.62		< 0.01	0.05		1.53	0.19	5853	1344	

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 6-2-14
 U-2579B FORSYTH COUNTY
 WINSTON SALEM NORTHERN BELTWAY
 (EASTERN SECTION) (FUTURE I-74)
 SHEET 62 OF 64

		WETLAND PERMIT IMPACT 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)
13	20+00-21+40 -Y4RPBD-	ROAD FILL	0.33									
14	629+95-635+90 -L-	ROAD FILL	0.04					0.05		688		
15	636+32-641+55 -L-	ROAD FILL	0.18					0.04		332		
		ROAD FILL-POND						2.38				
15A	644+00-645+00 -L-	ROAD FILL						< 0.01		108		
16	643+56-644+61 -L-	ROAD FILL						< 0.01		104		
		ROAD FILL-POND						0.16				
17	663+65-667+00 -L-	ROAD FILL	0.09			< 0.01		0.06		928		
18	667+15 -L-	3 @ 12'x10' RCBC						0.06	0.02	377	67	
		STREAMBANK STABILIZATION						0.02	0.01	80	59	
19	668+50 -L-	ROAD FILL	0.47			0.01						
20	687+80-691+59 -L-	ROAD FILL						0.03		163		450
		ROAD FILL-POND						0.85				
21	22+50 -Y1-	ROAD FILL	0.02									
22	40+50 -Y4-	OUTLET PAD	0.01									
23	45+65 -Y4-	CULVERT EXTENSION										
		STREAMBANK STABILIZATION										
23A	44+95-45+18 -Y4-	ROAD FILL						0.06	0.01	100	32	
23B	45+07-46+34 -Y4-	ROAD FILL						0.02	0.06	54	89	
24	80+73-81+57 -Y4RPBD-	ROAD FILL						< 0.01		57		
24A	80+50-81+51 -Y4RPBD-	ROAD FILL	0.06					0.01		135		
25	37+31 -Y4RPA-	30" RCP						0.02		202		
		STREAMBANK STABILIZATION						< 0.01		73		
								< 0.01	< 0.01	21	16	
SUBTOTALS*:			1.20			0.02		3.77	0.09	3422	263	450

*Rounded totals are sum of actual impacts

NOTES:
Revised: 5-18-14

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
6-2-14
U-2579B FORSYTH COUNTY
WINSTON SALEM NORTHERN BELTWAY
(EASTERN SECTION) (FUTURE I-74)
SHEET 63 OF 64

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
ROADWAY ITEMS						
0001	0000100000-N	800	MOBILIZATION	Lump Sum LS		
0002	0000400000-N	801	CONSTRUCTION SURVEYING	Lump Sum LS		
0004	0000700000-N	SP	FIELD OFFICE	Lump Sum LS		
0005	0001000000-E	200	CLEARING & GRUBBING .. ACRE(S)	Lump Sum LS		
0006	0008000000-E	200	SUPPLEMENTARY CLEARING & GRUB- BING	5 ACR		
0007	0015000000-N	205	SEALING ABANDONED WELLS	29 EA		
0008	0022000000-E	225	UNCLASSIFIED EXCAVATION	3,571,000 CY		
0009	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (17+10.18-Y4RPA-)	Lump Sum LS		
0010	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (20+20.21-Y2-)	Lump Sum LS		
0011	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (23+54.25-Y5-)	Lump Sum LS		
0012	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (26+48.62-Y4RPBD-)	Lump Sum LS		
0013	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (28+75.85-Y5-)	Lump Sum LS		
0014	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (33+16.49-Y4CD-)	Lump Sum LS		
0015	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (34+08.68-Y1-)	Lump Sum LS		
0016	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (44+18.64-Y4RPBD-)	Lump Sum LS		
0017	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (46+83.44-Y4CD-)	Lump Sum LS		

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0018	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (53+21.16-Y4RPBD-)	Lump Sum LS		
0019	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (556+85.00-L-LT)	Lump Sum LS		
0020	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (556+85.00-L-RT)	Lump Sum LS		
0021	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (584+17.77-L-LT)	Lump Sum LS		
0022	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (584+24.18-L-RT)	Lump Sum LS		
0023	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (628+57.75-L-RT)	Lump Sum LS		
0024	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (628+74.47-L-LT)	Lump Sum LS		
0025	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (642+75.24-L-LT)	Lump Sum LS		
0026	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (642+80.18-L-RT)	Lump Sum LS		
0027	0036000000-E	225	UNDERCUT EXCAVATION	7,500 CY		
0028	0106000000-E	230	BORROW EXCAVATION	2,900,000 CY		
0029	0134000000-E	240	DRAINAGE DITCH EXCAVATION	31,000 CY		
0030	0141000000-E	240	BERM DITCH CONSTRUCTION	2,860 LF		
0031	0156000000-E	250	REMOVAL OF EXISTING ASPHALT PAVEMENT	87,000 SY		
0032	0177000000-E	250	BREAKING OF EXISTING ASPHALT PAVEMENT	18,000 SY		
0033	0192000000-N	260	PROOF ROLLING	120 HR		

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0034	0195000000-E	265	SELECT GRANULAR MATERIAL	23,000 CY		
0035	0196000000-E	270	GEOTEXTILE FOR SOIL STABILIZATION	47,100 SY		
0036	0199000000-E	SP	TEMPORARY SHORING	6,000 SF		
0037	0220000000-E	SP	ROCK EMBANKMENTS	1,000 TON		
0038	0222000000-E	SP	GEOTEXTILE FOR ROCK EMBANKMENTS	820 SY		
0039	0223000000-E	275	ROCK PLATING	3,500 SY		
0040	0318000000-E	300	FOUNDATION CONDITIONING MATERIAL, MINOR STRUCTURES	6,836 TON		
0041	0320000000-E	300	FOUNDATION CONDITIONING GEOTEXTILE	23,076 SY		
0042	0342000000-E	310	*** SIDE DRAIN PIPE (30")	4,352 LF		
0043	0342000000-E	310	*** SIDE DRAIN PIPE (36")	864 LF		
0044	0342000000-E	310	*** SIDE DRAIN PIPE (42")	2,172 LF		
0045	0342000000-E	310	*** SIDE DRAIN PIPE (48")	52 LF		
0046	0342000000-E	310	*** SIDE DRAIN PIPE (54")	84 LF		
0047	0342000000-E	310	*** SIDE DRAIN PIPE (60")	604 LF		
0048	0343000000-E	310	15" SIDE DRAIN PIPE	12,240 LF		
0049	0344000000-E	310	18" SIDE DRAIN PIPE	5,968 LF		
0050	0345000000-E	310	24" SIDE DRAIN PIPE	4,348 LF		
0051	0348000000-E	310	*** SIDE DRAIN PIPE ELBOWS (15")	72 EA		

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0052	0348000000-E	310	**** SIDE DRAIN PIPE ELBOWS (18")	20 EA		
0053	0348000000-E	310	**** SIDE DRAIN PIPE ELBOWS (24")	7 EA		
0054	0348000000-E	310	**** SIDE DRAIN PIPE ELBOWS (30")	7 EA		
0055	0348000000-E	310	**** SIDE DRAIN PIPE ELBOWS (36")	2 EA		
0056	0350000000-E	SP	**** RC PIPE CULVERTS, CON- TRACTOR DESIGN (18")	484 LF		
0057	0350000000-E	SP	**** RC PIPE CULVERTS, CON- TRACTOR DESIGN (36")	380 LF		
0058	0350000000-E	SP	**** RC PIPE CULVERTS, CON- TRACTOR DESIGN (42")	1,308 LF		
0059	0350000000-E	SP	**** RC PIPE CULVERTS, CON- TRACTOR DESIGN (48")	1,276 LF		
0060	0350000000-E	SP	**** RC PIPE CULVERTS, CON- TRACTOR DESIGN (60")	308 LF		
0061	0354000000-E	310	**** RC PIPE CULVERTS, CLASS ***** (24", V)	408 LF		
0062	0354000000-E	310	**** RC PIPE CULVERTS, CLASS ***** (30", V)	460 LF		
0063	0354000000-E	310	**** RC PIPE CULVERTS, CLASS ***** (36", V)	472 LF		
0064	0354000000-E	310	**** RC PIPE CULVERTS, CLASS ***** (54", V)	368 LF		
0065	0354000000-E	310	**** RC PIPE CULVERTS, CLASS ***** (72", V)	324 LF		

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0066	0366000000-E	310	15" RC PIPE CULVERTS, CLASS III	4,292 LF		
0067	0372000000-E	310	18" RC PIPE CULVERTS, CLASS III	2,644 LF		
0068	0378000000-E	310	24" RC PIPE CULVERTS, CLASS III	1,080 LF		
0069	0384000000-E	310	30" RC PIPE CULVERTS, CLASS III	1,064 LF		
0070	0390000000-E	310	36" RC PIPE CULVERTS, CLASS III	380 LF		
0071	0396000000-E	310	42" RC PIPE CULVERTS, CLASS III	104 LF		
0072	0402000000-E	310	48" RC PIPE CULVERTS, CLASS III	124 LF		
0073	0448000000-E	310	****" RC PIPE CULVERTS, CLASS IV (48")	528 LF		
0074	0448000000-E	310	****" RC PIPE CULVERTS, CLASS IV (60")	1,020 LF		
0075	0448200000-E	310	15" RC PIPE CULVERTS, CLASS IV	3,780 LF		
0076	0448300000-E	310	18" RC PIPE CULVERTS, CLASS IV	1,540 LF		
0077	0448400000-E	310	24" RC PIPE CULVERTS, CLASS IV	404 LF		
0078	0448500000-E	310	30" RC PIPE CULVERTS, CLASS IV	880 LF		
0079	0448700000-E	310	42" RC PIPE CULVERTS, CLASS IV	504 LF		
0080	0576000000-E	310	**" CS PIPE CULVERTS, ***** THICK (36", 0.079")	172 LF		
0081	0576000000-E	310	**" CS PIPE CULVERTS, ***** THICK (42", 0.109")	28 LF		

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity	Unit	Unit Bid Price	Amount Bid
0082	0576000000-E	310	*** CS PIPE CULVERTS, ***** THICK (54", 0.109")	260	LF		
0083	0582000000-E	310	15" CS PIPE CULVERTS, 0.064" THICK	1,256	LF		
0084	0588000000-E	310	18" CS PIPE CULVERTS, 0.064" THICK	588	LF		
0085	0594000000-E	310	24" CS PIPE CULVERTS, 0.064" THICK	368	LF		
0086	0600000000-E	310	30" CS PIPE CULVERTS, 0.079" THICK	164	LF		
0087	0636000000-E	310	*** CS PIPE ELBOWS, ***** THICK (15", 0.064")	10	EA		
0088	0636000000-E	310	*** CS PIPE ELBOWS, ***** THICK (18", 0.064")	3	EA		
0089	0636000000-E	310	*** CS PIPE ELBOWS, ***** THICK (24", 0.064")	2	EA		
0090	0636000000-E	310	*** CS PIPE ELBOWS, ***** THICK (42", 0.109")	1	EA		
0092	0973100000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B IN SOIL (36", 0.500")	227	LF		
0093	0973100000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B IN SOIL (42", 0.625")	348	LF		
0094	0973100000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B IN SOIL (48", 0.625")	180	LF		
0096	0973300000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B NOT IN SOIL (36", 0.500")	227	LF		
0097	0973300000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B NOT IN SOIL (42", 0.625")	348	LF		

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0098	0973300000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B NOT IN SOIL (48", 0.625")	180 LF		
0099	0986000000-E	SP	GENERIC PIPE ITEM 8" DUCTILE IRON PIPE	548 LF		
0100	0995000000-E	340	PIPE REMOVAL	4,363 LF		
0101	1000000000-E	462	6" SLOPE PROTECTION	800 SY		
0102	1011000000-N	500	FINE GRADING	Lump Sum LS		
0103	1044000000-E	501	LIME TREATED SOIL (SLURRY METHOD)	130,610 SY		
0104	1066000000-E	501	LIME FOR LIME TREATED SOIL	1,380 TON		
0105	1077000000-E	SP	#57 STONE	505 TON		
0106	1099500000-E	505	SHALLOW UNDERCUT	5,000 CY		
0107	1099700000-E	505	CLASS IV SUBGRADE STABILIZATION	9,500 TON		
0108	1110000000-E	510	STABILIZER AGGREGATE	1,000 TON		
0109	1115000000-E	SP	GEOTEXTILE FOR PAVEMENT STABILIZATION	275,035 SY		
0110	1121000000-E	520	AGGREGATE BASE COURSE	90,000 TON		
0111	1176000000-E	542	SOIL CEMENT BASE	195,910 SY		
0112	1187000000-E	542	PORTLAND CEMENT FOR SOIL CEMENT BASE	5,486 TON		
0113	1209000000-E	543	ASPHALT CURING SEAL	48,980 GAL		
0114	1220000000-E	545	INCIDENTAL STONE BASE	2,000 TON		
0115	1275000000-E	600	PRIME COAT	2,240 GAL		
0116	1330000000-E	607	INCIDENTAL MILLING	2,650 SY		

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Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0117	1489000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0B	57,000 TON		
0118	1491000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0C	71,500 TON		
0119	1498000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0B	12,500 TON		
0120	1503000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C	40,000 TON		
0121	1519000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5B	12,000 TON		
0122	1523000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5C	51,000 TON		
0123	1525000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE SF9.5A	23,000 TON		
0124	1575000000-E	620	ASPHALT BINDER FOR PLANT MIX	13,445 TON		
0125	1693000000-E	654	ASPHALT PLANT MIX, PAVEMENT REPAIR	235 TON		
0126	1840000000-E	665	MILLED RUMBLE STRIPS (ASPHALT CONCRETE)	48,100 LF		
0127	1847000000-E	710	***** PORT CEM CONC PAVEMENT, THROUGH LANES (WITH DOWELS) (12-1/2")	257,000 SY		
0128	1869000000-E	710	***** PORT CEM CONC PAVEMENT, MISCELLANEOUS (WITHOUT DOWELS) (12-1/2")	11,000 SY		
0129	1881000000-E	SP	GENERIC PAVING ITEM MILLED RUMBLE STRIPS (CONC. SHLD.)	41,100 LF		
0130	1891000000-E	SP	GENERIC PAVING ITEM NONWOVEN GEOTEXTILE INTERLAYER	39,000 SY		
0131	1902000000-N	710	SURFACE TESTING CONCRETE PAVEMENT	Lump Sum LS		
0132	1913000000-E	720	CONCRETE SHOULDERS ADJACENT TO ***** PAVEMENT (12-1/2")	51,000 SY		

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Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0133	1924000000-N	725	FIELD LABORATORY RENTAL, PORT CEM CONC PAVEMENT	Lump Sum LS		
0134	2000000000-N	806	RIGHT OF WAY MARKERS	245 EA		
0135	2022000000-E	815	SUBDRAIN EXCAVATION	2,688 CY		
0136	2026000000-E	815	GEOTEXTILE FOR SUBSURFACE DRAINS	12,000 SY		
0137	2036000000-E	815	SUBDRAIN COARSE AGGREGATE	2,016 CY		
0138	2044000000-E	815	6" PERFORATED SUBDRAIN PIPE	12,000 LF		
0139	2070000000-N	815	SUBDRAIN PIPE OUTLET	24 EA		
0140	2077000000-E	815	6" OUTLET PIPE	144 LF		
0141	2099000000-E	816	SHOULDER DRAIN	22,800 LF		
0142	2110000000-E	816	4" SHOULDER DRAIN PIPE	22,800 LF		
0143	2121000000-E	816	4" OUTLET PIPE FOR SHOULDER DRAINS	840 LF		
0144	2132000000-N	816	CONCRETE PAD FOR SHOULDER DRAIN PIPE OUTLET	10 EA		
0145	2143000000-E	818	BLOTTING SAND	20 TON		
0146	2209000000-E	838	ENDWALLS	88.5 CY		
0147	2220000000-E	838	REINFORCED ENDWALLS	33 CY		
0148	2253000000-E	840	PIPE COLLARS	13 CY		
0149	2264000000-E	840	PIPE PLUGS	3 CY		
0150	2275000000-E	SP	FLOWABLE FILL	20 CY		
0151	2286000000-N	840	MASONRY DRAINAGE STRUCTURES	365 EA		
0152	2297000000-E	840	MASONRY DRAINAGE STRUCTURES	34 CY		

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0153	2308000000-E	840	MASONRY DRAINAGE STRUCTURES	242 LF		
0154	2354000000-N	840	FRAME WITH GRATE, STD 840.22	6 EA		
0155	2364000000-N	840	FRAME WITH TWO GRATES, STD 840.16	1 EA		
0156	2364200000-N	840	FRAME WITH TWO GRATES, STD 840.20	75 EA		
0157	2365000000-N	840	FRAME WITH TWO GRATES, STD 840.22	231 EA		
0158	2366000000-N	840	FRAME WITH TWO GRATES, STD 840.24	10 EA		
0159	2367000000-N	840	FRAME WITH TWO GRATES, STD 840.29	18 EA		
0160	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (E)	5 EA		
0161	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (F)	3 EA		
0162	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (G)	8 EA		
0163	2396000000-N	840	FRAME WITH COVER, STD 840.54	27 EA		
0164	2407000000-N	840	STEEL FRAME WITH TWO GRATES, STD 840.37	2 EA		
0165	2451000000-N	852	CONCRETE TRANSITIONAL SECTION FOR DROP INLET	1 EA		
0166	2542000000-E	846	1'-6" CONCRETE CURB & GUTTER	2,420 LF		
0167	2549000000-E	846	2'-6" CONCRETE CURB & GUTTER	5,260 LF		
0168	2556000000-E	846	SHOULDER BERM GUTTER	12,000 LF		
0169	2570000000-N	SP	MODIFIED CONCRETE FLUME	6 EA		
0170	2612000000-E	848	6" CONCRETE DRIVEWAY	140 SY		

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0171	2619000000-E	850	4" CONCRETE PAVED DITCH	260 SY		
0172	2655000000-E	852	5" MONOLITHIC CONCRETE ISLANDS (KEYED IN)	400 SY		
0173	2724000000-E	857	PRECAST REINFORCED CONCRETE BARRIER, SINGLE FACED	12,970 LF		
0174	2830000000-N	858	ADJUSTMENT OF MANHOLES	4 EA		
0175	2860000000-N	859	CONVERT EXISTING CATCH BASIN TO JUNCTION BOX	3 EA		
0176	2995000000-N	SP	GENERIC DRAINAGE ITEM CONVERT EXISTING OTCB TO 2GI	14 EA		
0177	3000000000-N	SP	IMPACT ATTENUATOR UNIT, TYPE 350	1 EA		
0178	3030000000-E	862	STEEL BM GUARDRAIL	98,212.5 LF		
0179	3045000000-E	862	STEEL BM GUARDRAIL, SHOP CURVED	212.5 LF		
0180	3105000000-N	862	STEEL BM GUARDRAIL TERMINAL SECTIONS	16 EA		
0181	3150000000-N	862	ADDITIONAL GUARDRAIL POSTS	10 EA		
0182	3210000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE CAT-1	44 EA		
0183	3215000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE III	8 EA		
0184	3270000000-N	SP	GUARDRAIL ANCHOR UNITS, TYPE 350	73 EA		
0185	3285000000-N	SP	GUARDRAIL ANCHOR UNITS, TYPE M-350	2 EA		
0186	3317000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE B-77	68 EA		
0187	3360000000-E	863	REMOVE EXISTING GUARDRAIL	37,138 LF		
0188	3503000000-E	866	WOVEN WIRE FENCE, 47" FABRIC	57,800 LF		

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0189	3509000000-E	866	4" TIMBER FENCE POSTS, 7'-6" LONG	3,670 EA		
0190	3515000000-E	866	5" TIMBER FENCE POSTS, 8'-0" LONG	840 EA		
0191	3557000000-E	866	ADDITIONAL BARBED WIRE	500 LF		
0192	3628000000-E	876	RIP RAP, CLASS I	3,100 TON		
0193	3635000000-E	876	RIP RAP, CLASS II	1,250 TON		
0194	3642000000-E	876	RIP RAP, CLASS A	20 TON		
0195	3649000000-E	876	RIP RAP, CLASS B	5,940 TON		
0196	3651000000-E	SP	BOULDERS	135 TON		
0197	3656000000-E	876	GEOTEXTILE FOR DRAINAGE	29,850 SY		
0198	3659000000-N	SP	PREFORMED SCOUR HOLES WITH LEVEL SPREADER APRON	11 EA		
0199	4048000000-E	902	REINFORCED CONCRETE SIGN FOUNDATIONS	10 CY		
0200	4057000000-E	SP	OVERHEAD FOOTING	406 CY		
0201	4060000000-E	903	SUPPORTS, BREAKAWAY STEEL BEAM	3,151 LB		
0202	4066000000-E	903	SUPPORTS, SIMPLE STEEL BEAM	4,261 LB		
0203	4072000000-E	903	SUPPORTS, 3-LB STEEL U-CHANNEL	3,333 LF		
0204	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (A - 28+00 -Y1RPA-)	Lump Sum LS		
0205	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (B - 502+50 -L-)	Lump Sum LS		
0206	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (C - 531+00 -L-)	Lump Sum LS		

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Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0207	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (D - 586+50 -L-)	Lump Sum LS		
0208	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (E - 595+00 -L-)	Lump Sum LS		
0209	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (F - 610+00 -L-)	Lump Sum LS		
0210	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (G - 31+50 -Y4RPBD-)	Lump Sum LS		
0211	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (H - 92+50 -Y4-)	Lump Sum LS		
0212	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (I - 89+50 -Y4-)	Lump Sum LS		
0213	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (J - 43+00 -Y4CD-)	Lump Sum LS		
0214	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (K - 42+00 -Y4-)	Lump Sum LS		
0215	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (L - 72+00 -Y4-)	Lump Sum LS		
0216	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (M - 113+00 -Y4-)	Lump Sum LS		
0217	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (N - 322' FRM S MAIN ST EXIT)	Lump Sum LS		
0218	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (O - 19+50 -Y4-)	Lump Sum LS		
0219	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (P - 144' FROM LINVILLE RD EXIT)	Lump Sum LS		

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Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0220	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (Q - 280' +/- FROM ROUTE MARKERS)	Lump Sum LS		
0221	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (R - 36+50 -Y1-)	Lump Sum LS		
0222	4096000000-N	904	SIGN ERECTION, TYPE D	9 EA		
0223	4102000000-N	904	SIGN ERECTION, TYPE E	124 EA		
0224	4108000000-N	904	SIGN ERECTION, TYPE F	10 EA		
0225	4110000000-N	904	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (A)	8 EA		
0226	4110000000-N	904	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (B)	2 EA		
0227	4114000000-N	904	SIGN ERECTION, MILEMARKERS	16 EA		
0228	4116100000-N	904	SIGN ERECTION, RELOCATE, TYPE **** (GROUND MOUNTED) (D)	1 EA		
0229	4143000000-N	907	DISPOSAL OF SUPPORT, OVERHEAD STRUCTURE	1 EA		
0230	4152000000-N	907	DISPOSAL OF SIGN SYSTEM, STEEL BEAM	8 EA		
0231	4155000000-N	907	DISPOSAL OF SIGN SYSTEM, U-CHANNEL	48 EA		
0232	4400000000-E	1110	WORK ZONE SIGNS (STATIONARY)	2,382 SF		
0233	4405000000-E	1110	WORK ZONE SIGNS (PORTABLE)	1,147 SF		
0234	4410000000-E	1110	WORK ZONE SIGNS (BARRICADE MOUNTED)	1,183 SF		
0235	4415000000-N	1115	FLASHING ARROW BOARD	4 EA		
0236	4420000000-N	1120	PORTABLE CHANGEABLE MESSAGE SIGN	14 EA		

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0237	4422000000-N	1120	PORTABLE CHANGEABLE MESSAGE SIGN (SHORT TERM)	379 DAY		
0238	4430000000-N	1130	DRUMS	880 EA		
0239	4435000000-N	1135	CONES	50 EA		
0240	4445000000-E	1145	BARRICADES (TYPE III)	1,200 LF		
0241	4450000000-N	1150	FLAGGER	2,224 HR		
0242	4465000000-N	1160	TEMPORARY CRASH CUSHIONS	10 EA		
0243	4470000000-N	1160	RESET TEMPORARY CRASH CUSHION	8 EA		
0244	4480000000-N	1165	TMA	4 EA		
0245	4485000000-E	1170	PORTABLE CONCRETE BARRIER	2,908 LF		
0246	4490000000-E	1170	PORTABLE CONCRETE BARRIER (ANCHORED)	23,400 LF		
0247	4500000000-E	1170	RESET PORTABLE CONCRETE BARRIER	6,375 LF		
0248	4510000000-N	SP	LAW ENFORCEMENT	406 HR		
0249	4520000000-N	1266	TUBULAR MARKERS (FIXED)	120 EA		
0250	4650000000-N	1251	TEMPORARY RAISED PAVEMENT MARKERS	391 EA		
0251	4710000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (24", 120 MILS)	130 LF		
0252	4721000000-E	1205	THERMOPLASTIC PAVEMENT MARKING CHARACTER (120 MILS)	4 EA		
0253	4725000000-E	1205	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)	60 EA		
0254	4810000000-E	1205	PAINT PAVEMENT MARKING LINES (4")	128,765 LF		
0255	4815000000-E	1205	PAINT PAVEMENT MARKING LINES (6")	300,040 LF		

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Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0256	4820000000-E	1205	PAINT PAVEMENT MARKING LINES (8")	345 LF		
0257	4825000000-E	1205	PAINT PAVEMENT MARKING LINES (12")	7,982 LF		
0258	4835000000-E	1205	PAINT PAVEMENT MARKING LINES (24")	84 LF		
0259	4847000000-E	1205	POLYUREA PAVEMENT MARKING LINES (4", *****) (HIGHLY REFLECTIVE ELEMENTS)	32,503 LF		
0260	4847100000-E	1205	POLYUREA PAVEMENT MARKING LINES (6", *****) (HIGHLY REFLECTIVE ELEMENTS)	174,105 LF		
0261	4847120000-E	1205	POLYUREA PAVEMENT MARKING LINES (12", *****) (HIGHLY REFLECTIVE ELEMENTS)	5,570 LF		
0262	4850000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (4")	8,896 LF		
0263	4900000000-N	1251	PERMANENT RAISED PAVEMENT MARKERS	156 EA		
0264	4905000000-N	1253	SNOWPLOWABLE PAVEMENT MARKERS	1,593 EA		
0265	4915000000-E	1264	7' U-CHANNEL POSTS	24 EA		
0266	4935000000-N	1267	FLEXIBLE DELINEATORS (CRYSTAL)	90 EA		
0267	4940000000-N	1267	FLEXIBLE DELINEATORS (YELLOW)	56 EA		
0268	4945000000-N	1267	FLEXIBLE DELINEATORS (CRYSTAL & RED)	5 EA		
0269	4950000000-N	1267	FLEXIBLE DELINEATORS (YELLOW & RED)	5 EA		
0270	4955000000-N	1264	OBJECT MARKERS (END OF ROAD)	24 EA		
0271	5255000000-N	1413	PORTABLE LIGHTING	Lump Sum LS		
0272	5325600000-E	1510	6" WATER LINE	1,423 LF		
0273	5325800000-E	1510	8" WATER LINE	1,125 LF		

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0274	5326200000-E	1510	12" WATER LINE	2,520 LF		
0275	5326600000-E	1510	16" WATER LINE	1,637 LF		
0276	5327000000-E	1510	20" WATER LINE	420 LF		
0277	5540000000-E	1515	6" VALVE	3 EA		
0278	5546000000-E	1515	8" VALVE	3 EA		
0279	5558000000-E	1515	12" VALVE	2 EA		
0280	5558600000-E	1515	16" VALVE	2 EA		
0281	5571600000-E	1515	6" TAPPING VALVE	3 EA		
0282	5589100000-E	1515	1" AIR RELEASE VALVE	3 EA		
0283	5648000000-N	1515	RELOCATE WATER METER	3 EA		
0284	5672000000-N	1515	RELOCATE FIRE HYDRANT	8 EA		
0285	5691300000-E	1520	8" SANITARY GRAVITY SEWER	1,165 LF		
0286	5691600000-E	1520	16" SANITARY GRAVITY SEWER	511 LF		
0287	5691700000-E	1520	18" SANITARY GRAVITY SEWER	724 LF		
0288	5691900000-E	1520	24" SANITARY GRAVITY SEWER	1,554 LF		
0289	5692000000-E	1520	30" SANITARY GRAVITY SEWER	367 LF		
0290	5775000000-E	1525	4' DIA UTILITY MANHOLE	13 EA		
0291	5776000000-E	1525	5' DIA UTILITY MANHOLE	11 EA		
0292	5777000000-E	1525	6' DIA UTILITY MANHOLE	4 EA		
0293	5781000000-E	1525	UTILITY MANHOLE WALL, 4' DIA	40 LF		
0294	5782000000-E	1525	UTILITY MANHOLE WALL, 5' DIA	133 LF		

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0295	5783000000-E	1525	UTILITY MANHOLE WALL, 6' DIA	16 LF		
0296	5801000000-E	1530	ABANDON 8" UTILITY PIPE	1,423 LF		
0297	5804000000-E	1530	ABANDON 12" UTILITY PIPE	100 LF		
0298	5810000000-E	1530	ABANDON 16" UTILITY PIPE	900 LF		
0299	5811000000-E	1530	ABANDON 18" UTILITY PIPE	1,003 LF		
0300	5812000000-E	1530	ABANDON 20" UTILITY PIPE	415 LF		
0301	5813000000-E	1530	ABANDON 24" UTILITY PIPE	1,333 LF		
0302	5814000000-E	1530	ABANDON 30" UTILITY PIPE	20 LF		
0303	5815000000-N	1530	REMOVE WATER METER	8 EA		
0304	5815500000-N	1530	REMOVE FIRE HYDRANT	7 EA		
0305	5816000000-N	1530	ABANDON UTILITY MANHOLE	7 EA		
0306	5828000000-N	1530	REMOVE UTILITY MANHOLE	13 EA		
0307	5835700000-E	1540	16" ENCASEMENT PIPE	810 LF		
0308	5836000000-E	1540	24" ENCASEMENT PIPE	300 LF		
0309	5836200000-E	1540	30" ENCASEMENT PIPE	810 LF		
0310	5888000000-E	SP	GENERIC UTILITY ITEM ANCHOR SEWER MAIN TO PROPOSED CULVERT	52 LF		
0311	5890000000-N	1510	GENERIC UTILITY ITEM REMOVE BLOWOFF ASSEMBLY	1 EA		
0312	6000000000-E	1605	TEMPORARY SILT FENCE	249,000 LF		
0313	6006000000-E	1610	STONE FOR EROSION CONTROL, CLASS A	5,375 TON		
0314	6009000000-E	1610	STONE FOR EROSION CONTROL, CLASS B	83,520 TON		

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0315	6012000000-E	1610	SEDIMENT CONTROL STONE	51,665 TON		
0316	6015000000-E	1615	TEMPORARY MULCHING	500 ACR		
0317	6018000000-E	1620	SEED FOR TEMPORARY SEEDING	82,400 LB		
0318	6021000000-E	1620	FERTILIZER FOR TEMPORARY SEED- ING	357 TON		
0319	6024000000-E	1622	TEMPORARY SLOPE DRAINS	25,000 LF		
0320	6029000000-E	SP	SAFETY FENCE	65,400 LF		
0321	6030000000-E	1630	SILT EXCAVATION	168,600 CY		
0322	6036000000-E	1631	MATTING FOR EROSION CONTROL	600,000 SY		
0323	6037000000-E	SP	COIR FIBER MAT	3,150 SY		
0324	6038000000-E	SP	PERMANENT SOIL REINFORCEMENT MAT	10,000 SY		
0325	6042000000-E	1632	1/4" HARDWARE CLOTH	16,350 LF		
0326	6046000000-E	1636	TEMPORARY PIPE FOR STREAM CROSSING	125 LF		
0327	6048000000-E	SP	FLOATING TURBIDITY CURTAIN	335 SY		
0328	6069000000-E	1638	STILLING BASINS	2,000 CY		
0329	6070000000-N	1639	SPECIAL STILLING BASINS	20 EA		
0330	6071012000-E	SP	COIR FIBER WATTLE	15,600 LF		
0331	6071020000-E	SP	POLYACRYLAMIDE (PAM)	11,150 LB		
0332	6071030000-E	1640	COIR FIBER BAFFLE	50,000 LF		
0333	6071050000-E	SP	*** SKIMMER (1-1/2")	131 EA		
0334	6071050000-E	SP	*** SKIMMER (2")	12 EA		

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0335	6071050000-E	SP	*** SKIMMER (2-1/2")	2 EA		
0336	6084000000-E	1660	SEEDING & MULCHING	600 ACR		
0337	6087000000-E	1660	MOWING	300 ACR		
0338	6090000000-E	1661	SEED FOR REPAIR SEEDING	7,200 LB		
0339	6093000000-E	1661	FERTILIZER FOR REPAIR SEEDING	28.75 TON		
0340	6096000000-E	1662	SEED FOR SUPPLEMENTAL SEEDING	14,350 LB		
0341	6108000000-E	1665	FERTILIZER TOPDRESSING	430 TON		
0342	6111000000-E	SP	IMPERVIOUS DIKE	1,500 LF		
0343	6114500000-N	1667	SPECIALIZED HAND MOWING	515 MHR		
0344	6117000000-N	SP	RESPONSE FOR EROSION CONTROL	150 EA		
0345	6120000000-E	SP	CULVERT DIVERSION CHANNEL	7,000 CY		
0346	6123000000-E	1670	REFORESTATION	10 ACR		
0347	6126000000-E	SP	STREAMBANK REFORESTATION	1 ACR		
0348	7060000000-E	1705	SIGNAL CABLE	1,750 LF		
0349	7120000000-E	1705	VEHICLE SIGNAL HEAD (12", 3 SECTION)	13 EA		
0350	7252000000-E	1710	MESSENGER CABLE (1/4")	12,699 LF		
0351	7264000000-E	1710	MESSENGER CABLE (3/8")	1,200 LF		
0352	7276000000-E	1715	BORE & JACK (***** (1, 6"))	270 LF		
0353	7279000000-E	1715	TRACER WIRE	33,556 LF		
0354	7300000000-E	1715	UNPAVED TRENCHING (***** (1, 2"))	1,225 LF		

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity	Unit	Unit Bid Price	Amount Bid
0355	7301000000-E	1715	DIRECTIONAL DRILL (***** (1, 2"))	386	LF		
0356	7301000000-E	1715	DIRECTIONAL DRILL (***** (2, 2"))	10,001	LF		
0357	7312000000-N	1716	JUNCTION BOX (***** (SPECIAL SIZED)	11	EA		
0358	7324000000-N	1716	JUNCTION BOX (STANDARD SIZE)	27	EA		
0359	7348000000-N	1716	JUNCTION BOX (OVER-SIZED, HEA- VY DUTY)	45	EA		
0360	7360000000-N	1720	WOOD POLE	88	EA		
0361	7372000000-N	1721	GUY ASSEMBLY	40	EA		
0362	7408000000-E	1722	1" RISER WITH WEATHERHEAD	2	EA		
0363	7420000000-E	1722	2" RISER WITH WEATHERHEAD	9	EA		
0364	7432000000-E	1722	2" RISER WITH HEAT SHRINK TUBING	6	EA		
0365	7444000000-E	1725	INDUCTIVE LOOP SAWCUT	1,350	LF		
0366	7456000000-E	1726	LEAD-IN CABLE (***** (14-2)	4,300	LF		
0367	7516000000-E	1730	COMMUNICATIONS CABLE (**FIBER) (144)	26,023	LF		
0368	7516000000-E	1730	COMMUNICATIONS CABLE (**FIBER) (72)	24,601	LF		
0369	7528000000-E	1730	DROP CABLE	1,639	LF		
0370	7540000000-N	1731	SPLICE ENCLOSURE	7	EA		
0371	7541000000-N	1731	MODIFY SPLICE ENCLOSURE	2	EA		
0372	7552000000-N	1731	INTERCONNECT CENTER	5	EA		
0373	7566000000-N	1733	DELINEATOR MARKER	49	EA		

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0374	7575142000-N	1736	900MHZ RADIO	2 EA		
0375	7575142200-N	SP	NEW ELECTRICAL SERVICE	7 EA		
0376	7575160000-E	1734	REMOVE EXISTING COMMUNICATIONS CABLE	24,611 LF		
0377	7613000000-N	SP	SOIL TEST	4 EA		
0378	7614100000-E	SP	DRILLED PIER FOUNDATION	32 CY		
0379	7636000000-N	1745	SIGN FOR SIGNALS	5 EA		
0380	7684000000-N	1750	SIGNAL CABINET FOUNDATION	2 EA		
0381	7756000000-N	1751	CONTROLLER WITH CABINET (TYPE 2070L, BASE MOUNTED)	2 EA		
0382	7780000000-N	1751	DETECTOR CARD (TYPE 2070L)	6 EA		
0383	7901000000-N	1753	CABINET BASE EXTENDER	2 EA		
0384	7980000000-N	SP	GENERIC SIGNAL ITEM 10KVA SINGLE PHASE TRANSFORMER	4 EA		
0385	7980000000-N	SP	GENERIC SIGNAL ITEM 5/8" X 10' GROUNDING ELECTRODE	27 EA		
0386	7980000000-N	SP	GENERIC SIGNAL ITEM CARD CAGES	1 EA		
0387	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV CABINET	5 EA		
0388	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV CAMERA ASSEMBLY	5 EA		
0389	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV CAMERA LOWERING SYSTEM	2 EA		
0390	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV EXTENSION POLE	1 EA		
0391	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV METAL POLE (50')	2 EA		

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity	Unit	Unit Bid Price	Amount Bid
0392	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV METAL POLE (70')	2	EA		
0393	7980000000-N	SP	GENERIC SIGNAL ITEM COMMUNICATIONS RACK	1	EA		
0394	7980000000-N	SP	GENERIC SIGNAL ITEM DIGITAL HARDWARE VIDEO DECODER	6	EA		
0395	7980000000-N	SP	GENERIC SIGNAL ITEM DIGITAL HARDWARE VIDEO ENCODER	6	EA		
0396	7980000000-N	SP	GENERIC SIGNAL ITEM DMS	2	EA		
0397	7980000000-N	SP	GENERIC SIGNAL ITEM DMS ACCESS LADDER	3	EA		
0398	7980000000-N	SP	GENERIC SIGNAL ITEM DMS OVERHEAD ASSEMBLY	1	EA		
0399	7980000000-N	SP	GENERIC SIGNAL ITEM DMS PEDESTAL ASSEMBLY	2	EA		
0400	7980000000-N	SP	GENERIC SIGNAL ITEM EQUIPMENT CABINET BASE EXTEND- ER	2	EA		
0401	7980000000-N	SP	GENERIC SIGNAL ITEM EQUIPMENT CABINET DISCONNECT	7	EA		
0402	7980000000-N	SP	GENERIC SIGNAL ITEM EQUIPMENT CABINET FOUNDATION	2	EA		
0403	7980000000-N	SP	GENERIC SIGNAL ITEM ETHERNET EDGE SWITCH	7	EA		
0404	7980000000-N	SP	GENERIC SIGNAL ITEM FURNISH CCTV ASSEMBLY	1	EA		
0405	7980000000-N	SP	GENERIC SIGNAL ITEM FURNISH DIGITAL HARDWARE VIDEO DECODER	2	EA		
0406	7980000000-N	SP	GENERIC SIGNAL ITEM FURNISH DIGITAL HARDWARE VIDEO ENCODER	2	EA		
0407	7980000000-N	SP	GENERIC SIGNAL ITEM FURNISH ETHERNET EDGE SWITCH	1	EA		

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0408	7980000000-N	SP	GENERIC SIGNAL ITEM HUB CABINET	1 EA		
0409	7980000000-N	SP	GENERIC SIGNAL ITEM HUB SPLICE CENTER	1 EA		
0410	7980000000-N	SP	GENERIC SIGNAL ITEM MANAGED ETHERNET CORE SWITCH MODIFICATIONS	1 EA		
0411	7980000000-N	SP	GENERIC SIGNAL ITEM MANAGED ETHERNET ROUTING SWITCH	1 EA		
0412	7980000000-N	SP	GENERIC SIGNAL ITEM MODIFY NETWORK MANAGEMENT SOFTWARE	1 EA		
0413	7980000000-N	SP	GENERIC SIGNAL ITEM PORTABLE CCTV	1 EA		
0414	7980000000-N	SP	GENERIC SIGNAL ITEM PORTABLE CCTV LOWERING TOOL	1 EA		
0415	7980000000-N	SP	GENERIC SIGNAL ITEM SOLAR POWER ASSEMBLY	1 EA		
0416	7980000000-N	SP	GENERIC SIGNAL ITEM UPS	1 EA		
0417	7985000000-N	SP	GENERIC SIGNAL ITEM DMS (REMOVE AND REINSTALL)	Lump Sum LS		
0418	7990000000-E	SP	GENERIC SIGNAL ITEM 3-WIRE FEEDER CONDUCTORS	3,178 LF		
0419	7990000000-E	SP	GENERIC SIGNAL ITEM 4-WIRE FEEDER CONDUCTORS	785 LF		
0420	7990000000-E	SP	GENERIC SIGNAL ITEM UNDERGROUND CONDUIT (1, 2")	2,655 LF		
0421	7990000000-E	SP	GENERIC SIGNAL ITEM UNDERGROUND CONDUIT (2, 2")	23,460 LF		
0422	7992000000-E	SP	GENERIC SIGNAL ITEM OVERHEAD SIGN ASSEMBLY FOOTINGS	16 CY		

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0423	8056000000-N	402	REMOVAL OF EXISTING STRUCTURE AT STATION ***** (23+11.00-Y1-)	Lump Sum LS		
0424	8126000000-N	414	CULVERT EXCAVATION, STA ***** (23+11.00-Y1-)	Lump Sum LS		
0425	8126000000-N	414	CULVERT EXCAVATION, STA ***** (559+74.00-L-)	Lump Sum LS		
0426	8126000000-N	414	CULVERT EXCAVATION, STA ***** (616+45.00-L-)	Lump Sum LS		
0427	8126000000-N	414	CULVERT EXCAVATION, STA ***** (667+15.00-L-)	Lump Sum LS		
0428	8126000000-N	414	CULVERT EXCAVATION, STA ***** (STA. 45+65.43 -Y4-)	Lump Sum LS		
0429	8133000000-E	414	FOUNDATION CONDITIONING MATER- IAL, BOX CULVERT	3,438 TON		
0430	8196000000-E	420	CLASS A CONCRETE (CULVERT)	9,004 CY		
0431	8245000000-E	425	REINFORCING STEEL (CULVERT)	820,225 LB		
0432	8804000000-N	SP	GENERIC CULVERT ITEM PLACEMENT OF NATURAL STREAM BED MATERIAL	Lump Sum LS		

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0433	8801000000-E	SP	MSE RETAINING WALL NO **** (1)	6,334 SF		
0434	8802014000-E	SP	SOLDIER PILE RETAINING WALLS	850 SF		
0435	8839000000-E	SP	GENERIC RETAINING WALL ITEM CONCRETE BARRIER RAIL WITH MOM ENT SLAB	500 LF		
0436	8847000000-E	SP	GENERIC RETAINING WALL ITEM ANCHORED SOLDIER PILE WALLS	7,900 SF		
0437	8847000000-E	SP	GENERIC RETAINING WALL ITEM SOUND BARRIER WALL	255,982 SF		

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity	Unit	Unit Bid Price	Amount Bid
0438	8084000000-N	410	FOUNDATION EXCAVATION FOR END BENT ** AT STATION ***** (2,52+94.28-Y4RPBD-)	Lump Sum	LS		
0439	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1, 17+10.00-Y4RPA-)	Lump Sum	LS		
0440	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1, 482+13.14 -L-)	Lump Sum	LS		
0441	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1, 516+31.30-L-)	Lump Sum	LS		
0442	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1, 584+36.24 -L-LT)	Lump Sum	LS		
0443	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1, 584+36.24-L-RT)	Lump Sum	LS		
0444	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1,28+50.16-Y5-)	Lump Sum	LS		
0445	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1,44+08.64-Y4RPBD-)	Lump Sum	LS		
0446	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1,46+87.16-Y4CD-)	Lump Sum	LS		
0447	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1,52+94.28-Y4RPBD-)	Lump Sum	LS		
0448	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1,642+81.42-L-LT)	Lump Sum	LS		
0449	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1,642+81.42-L-RT)	Lump Sum	LS		
0450	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (2, 584+36.24 -L-LT)	Lump Sum	LS		

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0451	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (2, 584+36.24-L-RT)	Lump Sum LS		
0452	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (2, 628+65.50-L-LT)	Lump Sum LS		
0453	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (2, 628+65.50-L-RT)	Lump Sum LS		
0454	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (2,28+50.16-Y5-)	Lump Sum LS		
0455	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (2,33+15.67-Y4CD-)	Lump Sum LS		
0456	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (2,52+94.28-Y4RPBD-)	Lump Sum LS		
0457	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (3,28+50.16-Y5-)	Lump Sum LS		
0458	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (4, 17+10.00-Y4RPA-)	Lump Sum LS		
0459	8096000000-E	450	PILE EXCAVATION IN SOIL	64 LF		
0460	8097000000-E	450	PILE EXCAVATION NOT IN SOIL	78 LF		
0461	8105500000-E	411	**1_**1 DIA DRILLED PIERS IN SOIL (4'-6")	454.8 LF		
0462	8105500000-E	411	**1_**1 DIA DRILLED PIERS IN SOIL (5'-0")	260 LF		
0463	8105500000-E	411	**1_**1 DIA DRILLED PIERS IN SOIL (5'-6")	74.6 LF		
0464	8105560000-E	411	4'-0" DIA DRILLED PIERS IN SOIL	437 LF		

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0465	8105600000-E	411	**1.****" DIA DRILLED PIERS NOT IN SOIL (4'-6")	132 LF		
0466	8105600000-E	411	**1.****" DIA DRILLED PIERS NOT IN SOIL (5'-0")	103 LF		
0467	8105600000-E	411	**1.****" DIA DRILLED PIERS NOT IN SOIL (5'-6")	34 LF		
0468	8105660000-E	411	4'-0" DIA DRILLED PIERS NOT IN SOIL	152 LF		
0469	8111000000-E	411	PERMANENT STEEL CASING FOR **1.****" DIA DRILLED PIER (4'-6")	292.6 LF		
0470	8111000000-E	411	PERMANENT STEEL CASING FOR **1.****" DIA DRILLED PIER (5'-0")	204 LF		
0471	8111600000-E	411	PERMANENT STEEL CASING FOR 4'-0" DIA DRILLED PIER	104 LF		
0472	8112730000-N	450	PDA TESTING	12 EA		
0473	8113000000-N	411	SID INSPECTIONS	6 EA		
0474	8114000000-N	411	SPT TESTING	1 EA		
0475	8115000000-N	411	CSL TESTING	7 EA		
0476	8147000000-E	420	REINFORCED CONCRETE DECK SLAB	225,152 SF		
0477	8154000000-E	420	REINFORCED CONCRETE DECK SLAB (SAND LIGHTWEIGHT CONC)	42,278 SF		
0478	8161000000-E	420	GROOVING BRIDGE FLOORS	285,922 SF		
0479	8182000000-E	420	CLASS A CONCRETE (BRIDGE)	5,746.3 CY		
0480	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (17+10.00-Y4RPA-)	Lump Sum LS		

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0481	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (23+59.12-Y5-)	Lump Sum LS		
0482	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (26+60.00-Y4RPBD-)	Lump Sum LS		
0483	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (28+50.16-Y5-)	Lump Sum LS		
0484	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (33+15.67-Y4CD-)	Lump Sum LS		
0485	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (44+08.64-Y4RPBD-)	Lump Sum LS		
0486	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (46+87.16-Y4CD-)	Lump Sum LS		
0487	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (482+13.14-L-)	Lump Sum LS		
0488	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (516+31.30-L-)	Lump Sum LS		
0489	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (52+94.28-Y4RPBD-)	Lump Sum LS		
0490	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (556+85.00-L-LT)	Lump Sum LS		
0491	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (556+85.00-L-RT)	Lump Sum LS		
0492	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (584+36.24-L-LT)	Lump Sum LS		
0493	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (584+36.24-L-RT)	Lump Sum LS		

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0494	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (628+65.50-L-LT)	Lump Sum LS		
0495	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (628+65.50-L-RT)	Lump Sum LS		
0496	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (642+81.42-L-LT)	Lump Sum LS		
0497	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (642+81.42-L-RT)	Lump Sum LS		
0498	8217000000-E	425	REINFORCING STEEL (BRIDGE)	1,162,502 LB		
0499	8238000000-E	425	SPIRAL COLUMN REINFORCING STEEL (BRIDGE)	153,179 LB		
0500	8265000000-E	430	54" PRESTRESSED CONCRETE GIR- DERS	5,829.92 LF		
0501	8274000000-E	430	MODIFIED 63" PRESTRESSED CONC GIRDERS	8,411.03 LF		
0502	8277000000-E	430	MODIFIED 72" PRESTRESSED CONC GIRDERS	11,704.64 LF		
0503	8280000000-E	440	APPROX LBS STRUCTURAL STEEL	445,000 LS		
0504	8364000000-E	450	HP12X53 STEEL PILES	37,197 LF		
0505	8384000000-E	450	HP14X73 STEEL PILES	4,380 LF		
0506	8391000000-N	450	STEEL PILE POINTS	247 EA		
0507	8392500000-E	450	PREDRILLING FOR PILES	242 LF		
0508	8475000000-E	460	TWO BAR METAL RAIL	1,023.62 LF		
0509	8503000000-E	460	CONCRETE BARRIER RAIL	8,793.23 LF		
0510	8517000000-E	460	1'****X ***** CONCRETE PARA- PET (1'-2" X 2'-6")	1,056 LF		

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0511	8531000000-E	462	4" SLOPE PROTECTION	9,157 SY		
0512	8608000000-E	876	RIP RAP CLASS II (2'-0" THICK)	20,827 TON		
0513	8622000000-E	876	GEOTEXTILE FOR DRAINAGE	23,135 SY		
0514	8654000000-N	SP	DISC BEARINGS	Lump Sum LS		
0515	8657000000-N	430	ELASTOMERIC BEARINGS	Lump Sum LS		
0516	8692000000-N	SP	FOAM JOINT SEALS	Lump Sum LS		
0517	8706000000-N	SP	EXPANSION JOINT SEALS	Lump Sum LS		
0518	8860000000-N	SP	GENERIC STRUCTURE ITEM SOUND BARRIER WALL (BRIDGE MOUNTED)	Lump Sum LS		
0519	8892000000-E	SP	GENERIC STRUCTURE ITEM CONCRETE SIMULATED STONE FORM LINER	3,592.2 SF		
0520	8892000000-E	SP	GENERIC STRUCTURE ITEM CONCRETE STAINING	18,581.1 SF		
0521	8897000000-N	SP	GENERIC STRUCTURE ITEM CONCRETE MEDALLION PANEL	8 EA		
0522	8111000000-E	411	PERMANENT STEEL CASING FOR **1.***" DIA DRILLED PIER (5'-6")	48.6 LF		

TOTAL AMOUNT OF BID FOR ENTIRE PROJECT

\$0.00

Vendor 1 of 10: DRAGADOS USA INC (8887)
Call Order 002 (Proposal: C203484)

Bid Information

Proposal County: FORSYTH

Vendor Address: 4600 Marriott Drive
Suite 420
Raleigh , NC , 27612

Signature Check: Rafael_De_La_Barreda_8887

Time Bid Received: October 21, 2014 01:55 PM

Amendment Count: 2

Bid Checksum: 6BECABE2

Bid Total: \$153,999,950.00

Items Total: \$153,999,950.00

Time Total: \$0.00

Bidding Errors:

None.

DBE Goal Set 14.0

DBE Goal Met 14.0

Vendor 1 of 10: DRAGADOS USA INC (8887)
Call Order 002 (Proposal: C203484)

Bid Bond Information

Projects:	Bond Maximum:
Counties:	State of Incorporation:
Bond ID: SNC14395982	Agency Execution Date: 10/16/2014 11
Paid by Check: No	Surety Name: surety2000
Bond Percent: 5%	Bond Agency Name: Liberty Mutual Insurance Company

Vendor 8887's Bid Information for Call 002, Letting L141021, 10/21/14

Dragados USA Inc (8887)
 Call Order 002 (Proposal ID C203484)

LIST OF DBE PARTICIPANTS

VENDOR NUMBER	DBE NAME ADDRESS	WORK CODE TYPE OF WORK	CERT TYPE AMOUNT
4880 WB	TRICOR CONSTRUCTION, INC. 625 POPLAR STREET , SPARTANBURG, SC 29302		Sub 253,360.00 Committed
5487	ATLANTIC CONTRACTING COMPANY, I 1149 PLEASANT RIDGE RD , GREENSBORO, NC 27409		Sub 0.00
7402 WB	REGIONAL SITE SOLUTIONS INC P.O. BOX 5047 , HIGH POINT, NC 27262		Sub 351,561.00 Committed
3765 WB	STAY ALERT SAFETY SERVICES INC POST OFFICE BOX 467 , KERNERSVILLE, NC 27285		Sub 228,539.94 Committed
4861 WB	PEACHTREE TELECOMMUNICATIONS 5835-B PEACHTREE CORNERS EAST , NORCROSS, GA 30092		Sub 597,389.31 Committed
3026 WB	KNOX CONTRACT SEEDING INC 550 KNOX ROAD , CLEVELAND, NC 27013		Sub 3,496,738.31 Committed
4247 WB	SEAL BROTHERS CONTRACTING LLC 131 W. CLEVE STREET , MOUNT AIRY, NC 27030		Sub 173,480.00 Committed
12802 WB	NICKELSTON INDUSTRIES, INC. POST OFFICE BOX 133 , LAWSONVILLE, NC 27022		Sub 1,654,979.51 Committed
4761 WB	TRAFFIC CONTROL SAFETY SERVICES POST OFFICE BOX 24511 , WINSTON-SALEM, NC 27114		Sub 2,314,326.05 Committed
4260 MB	JORGE AGUILA CARRILLO DBA AGUIL PO BOX 837 , SILER CITY, NC 27344		Sub 738,365.29 Committed
12445 MB	CUT-RITE CONCRETE CUTTING INC O 456 ANSLEY WALK TERRACE , ATLANTA, GA 30309		Sub 937,479.75 Committed
2432 WB	ACE STEEL OF NORTH CAROLINA, LL POST OFFICE BOX 296 , MT. AIRY, NC 27030		Sub 169,749.24 Committed
4417 WB	POZZOLANIC CONTRACTING & SUPPLY 2401 ASBURY ROAD , KNOXVILLE, TN 379146408		Sub 1,946,011.00 Committed
12278 WB	CLIFTON CONSTRUCTION CO., INC. 1435 GIDDENSVILLE ROAD , FAISON, NC 28341		Sub 618,442.00 Committed
5081 WB	ANDREW HAULING AND GRADING, INC 4640 BOILING SPRINGS RD. , TOBACCOVILLE, NC 27050		Sub 4,463,750.00 Committed
4867 WB	STEWART HAULING & BACKHOE 5760 BRINKLEY RD. , BELEWS CREEK, NC 27009		Sub 3,625,000.00 Committed
4434 WB	LONG BROTHERS OF SUMMERFIELD, I PO BOX 35048 , GREENSBORO, NC 27425		Sub 750,000.00 Committed
			TOTAL: \$22,319,171.4 14.49%

Vendor 8887's Bid Information for Call 002, Letting L141021, 10/21/14

Dragados USA Inc (8887)
 Call Order 002 (Proposal ID C203484)

Miscellaneous Data Info - Contractor Responses:
 =====

NON-COLLUSION AND DEBARMENT CERTIFICATION

Explanation of the prospective bidder that is unable to certify to any of the statements in this certification:

Explanation:
NOT ANSWERED
NOT ANSWERED
NOT ANSWERED
NOT ANSWERED

AWARD LIMITS ON MULTIPLE PROJECTS

By answering YES to this statement, the bidder acknowledges that they are using the award limits on multiple projects. No

It is the desire of the Bidder to be awarded contracts, the value of which will not exceed a total of NOT ANSWERED for those projects indicated herein, for which bids will be opened on (MM/DD/YY)

The Award Limits shall apply to the following projects:

Contract Number	County
NOT ANSWERED	

Bid Bond Data Info - Contractor Responses:

=====

BondID: SNC14395982
 Surety Registry Agency: surety2000
 Verified?: Yes
 Surety Agency: Liberty Mutual Insurance Company
 Bond Execution Date: 10/16/2014 11
 Bond Amount: \$7,699,997.50 (Five Percent of Bid)

Contract ID: C203484 Project(s): NHF-0918(93)
Letting Date: 10-21-14 Call Order: 002
Bidder: 8887 - Dragados USA Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars Cts	Bid Amount Dollars Cts
Section 0001 ROADWAY ITEMS - NPAR (CITY OF WINSTON-SALEM)				
Alt Group				
0001	0000100000-N MOBILIZATIO N	LUMP	LUMP	7,250,000.00
0002	0000400000-N CONSTRUCTIO N SURVEYING	LUMP	LUMP	1,766,345.00
0004	0000700000-N FIELD OFFICE	LUMP	LUMP	85,907.36
0005	0001000000-E CLEARING & GRUBBING .. ACRE(S)	LUMP	LUMP	950,000.00
0006	0008000000-E SUPPLEMENTA RY CLEARING & GRUB-BING	5.000 ACR	4,500.00000	22,500.00
0007	0015000000-N SEALING ABANDONED WELLS	29.000 EA	1,076.24000	31,210.96
0008	0022000000-E UNCLASSIFIE D EXCAVATION	3,571,000.000 CY	4.38000	15,640,980.00
0009	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (17+10.18-Y4RPA-)	LUMP	LUMP	33,325.07
0010	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (20+20.21-Y2-)	LUMP	LUMP	24,520.42
0011	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (23+54.25-Y5-)	LUMP	LUMP	30,113.53

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0012	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (26+48.62-Y4RPBD-)	LUMP	LUMP	23,124.11
0013	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (28+75.85-Y5-)	LUMP	LUMP	25,832.64
0014	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (33+16.49-Y4CD-)	LUMP	LUMP	22,395.83
0015	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (34+08.68-Y1-)	LUMP	LUMP	65,194.06
0016	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (44+18.64-Y4RPBD-)	LUMP	LUMP	39,884.57
0017	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (46+83.44-Y4CD-)	LUMP	LUMP	33,412.19
0018	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (53+21.16-Y4RPBD-)	LUMP	LUMP	32,401.61
0019	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (556+85.00-L-LT)	LUMP	LUMP	39,353.58
0020	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (556+85.00-L-RT)	LUMP	LUMP	39,353.58

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0021	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (584+17.77-L-LT)	LUMP	LUMP	56,961.25
0022	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (584+24.18-L-RT)	LUMP	LUMP	56,961.25
0023	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (628+57.75-L-RT)	LUMP	LUMP	51,286.93
0024	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (628+74.47-L-LT)	LUMP	LUMP	51,286.93
0025	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (642+75.24-L-LT)	LUMP	LUMP	42,406.89
0026	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ***** (642+80.18-L-RT)	LUMP	LUMP	52,477.65
0027	0036000000-E UNDERCUT EXCAVATION	7,500.000 CY	20.29000	152,175.00
0028	0106000000-E BORROW EXCAVATION	2,900,000.000 CY	4.03000	11,687,000.00
0029	0134000000-E DRAINAGE DITCH EXCAVATION	31,000.000 CY	2.89000	89,590.00
0030	0141000000-E BERM DITCH CONSTRUCTION	2,860.000 LF	8.49000	24,281.40

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0031	0156000000-E REMOVAL OF EXISTING ASPHALT PAVEMENT	87,000.000 SY	2.49000	216,630.00
0032	0177000000-E BREAKING OF EXISTING ASPHALT PAVEMENT	18,000.000 SY	2.49000	44,820.00
0033	0192000000-N PROOF ROLLING	120.000 HR	204.53000	24,543.60
0034	0195000000-E SELECT GRANULAR MATERIAL	23,000.000 CY	6.39000	146,970.00
0035	0196000000-E GEOTEXTILE FOR SOIL STABILIZATION	47,100.000 SY	1.50000	70,650.00
0036	0199000000-E TEMPORARY SHORING	6,000.000 SF	23.22000	139,320.00
0037	0220000000-E ROCK EMBANKMENTS	1,000.000 TON	13.60000	13,600.00
0038	0222000000-E GEOTEXTILE FOR ROCK EMBANKMENTS	820.000 SY	1.55000	1,271.00
0039	0223000000-E ROCK PLATING	3,500.000 SY	80.21000	280,735.00
0040	0318000000-E FOUNDATION CONDITIONING MATERIAL, MINOR STRUCTURES	6,836.000 TON	37.73000	257,922.28
0041	0320000000-E FOUNDATION CONDITIONING GEOTEXTILE	23,076.000 SY	2.38000	54,920.88
0042	0342000000-E **" SIDE DRAIN PIPE (30")	4,352.000 LF	46.21000	201,105.92

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Line No.	Item Description	Approx. Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cts	Dollars	Ct
0043	0342000000-E *** SIDE DRAIN PIPE (36")	864.000 LF	62.87000		54,319.68	
0044	0342000000-E *** SIDE DRAIN PIPE (42")	2,172.000 LF	76.75000		166,701.00	
0045	0342000000-E *** SIDE DRAIN PIPE (48")	52.000 LF	138.59000		7,206.68	
0046	0342000000-E *** SIDE DRAIN PIPE (54")	84.000 LF	371.66000		31,219.44	
0047	0342000000-E *** SIDE DRAIN PIPE (60")	604.000 LF	198.40000		119,833.60	
0048	0343000000-E 15" SIDE DRAIN PIPE	12,240.000 LF	25.98000		317,995.20	
0049	0344000000-E 18" SIDE DRAIN PIPE	5,968.000 LF	27.30000		162,926.40	
0050	0345000000-E 24" SIDE DRAIN PIPE	4,348.000 LF	44.57000		193,790.36	
0051	0348000000-E *** SIDE DRAIN PIPE ELBOWS (15")	72.000 EA	281.88000		20,295.36	
0052	0348000000-E *** SIDE DRAIN PIPE ELBOWS (18")	20.000 EA	364.94000		7,298.80	
0053	0348000000-E *** SIDE DRAIN PIPE ELBOWS (24")	7.000 EA	493.70000		3,455.90	
0054	0348000000-E *** SIDE DRAIN PIPE ELBOWS (30")	7.000 EA	617.13000		4,319.91	

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0055	0348000000-E *** SIDE DRAIN PIPE ELBOWS (36")	2.000 EA	740.55000	1,481.10
0056	0350000000-E **** RC PIPE CULVERTS, CON-TRACTOR DESIGN (18")	484.000 LF	21.95000	10,623.80
0057	0350000000-E **** RC PIPE CULVERTS, CON-TRACTOR DESIGN (36")	380.000 LF	78.03000	29,651.40
0058	0350000000-E **** RC PIPE CULVERTS, CON-TRACTOR DESIGN (42")	1,308.000 LF	93.45000	122,232.60
0059	0350000000-E **** RC PIPE CULVERTS, CON-TRACTOR DESIGN (48")	1,276.000 LF	110.30000	140,742.80
0060	0350000000-E **** RC PIPE CULVERTS, CON-TRACTOR DESIGN (60")	308.000 LF	179.73000	55,356.84
0061	0354000000-E **** RC PIPE CULVERTS, CLASS ***** (24", V)	408.000 LF	59.85000	24,418.80
0062	0354000000-E **** RC PIPE CULVERTS, CLASS ***** (30", V)	460.000 LF	72.52000	33,359.20
0063	0354000000-E **** RC PIPE CULVERTS, CLASS ***** (36", V)	472.000 LF	90.41000	42,673.52
0064	0354000000-E **** RC PIPE CULVERTS, CLASS ***** (54", V)	368.000 LF	179.71000	66,133.28
0065	0354000000-E **** RC PIPE CULVERTS, CLASS ***** (72", V)	324.000 LF	279.60000	90,590.40
0066	0366000000-E 15" RC PIPE CULVERTS, CLASS III	4,292.000 LF	23.66000	101,548.72

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0067	0372000000-E 18" RC PIPE CULVERTS, CLASS III	2,644.000 LF	23.51000	62,160.44
0068	0378000000-E 24" RC PIPE CULVERTS, CLASS III	1,080.000 LF	46.27000	49,971.60
0069	0384000000-E 30" RC PIPE CULVERTS, CLASS III	1,064.000 LF	55.29000	58,828.56
0070	0390000000-E 36" RC PIPE CULVERTS, CLASS III	380.000 LF	76.38000	29,024.40
0071	0396000000-E 42" RC PIPE CULVERTS, CLASS III	104.000 LF	86.88000	9,035.52
0072	0402000000-E 48" RC PIPE CULVERTS, CLASS III	124.000 LF	134.84000	16,720.16
0073	0448000000-E ****" RC PIPE CULVERTS, CLASS IV (48")	528.000 LF	121.91000	64,368.48
0074	0448000000-E ****" RC PIPE CULVERTS, CLASS IV (60")	1,020.000 LF	190.54000	194,350.80
0075	0448200000-E 15" RC PIPE CULVERTS, CLASS IV	3,780.000 LF	28.93000	109,355.40
0076	0448300000-E 18" RC PIPE CULVERTS, CLASS IV	1,540.000 LF	29.20000	44,968.00
0077	0448400000-E 24" RC PIPE CULVERTS, CLASS IV	404.000 LF	47.08000	19,020.32
0078	0448500000-E 30" RC PIPE CULVERTS, CLASS IV	880.000 LF	55.14000	48,523.20

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0079	0448700000-E 42" RC PIPE CULVERTS, CLASS IV	504.000 LF	90.58000	45,652.32
0080	0576000000-E **" CS PIPE CULVERTS, ***** THICK (36", 0.079")	172.000 LF	74.22000	12,765.84
0081	0576000000-E **" CS PIPE CULVERTS, ***** THICK (42", 0.109")	28.000 LF	115.28000	3,227.84
0082	0576000000-E **" CS PIPE CULVERTS, ***** THICK (54", 0.109")	260.000 LF	142.03000	36,927.80
0083	0582000000-E 15" CS PIPE CULVERTS, 0.064" THICK	1,256.000 LF	22.32000	28,033.92
0084	0588000000-E 18" CS PIPE CULVERTS, 0.064" THICK	588.000 LF	41.12000	24,178.56
0085	0594000000-E 24" CS PIPE CULVERTS, 0.064" THICK	368.000 LF	34.24000	12,600.32
0086	0600000000-E 30" CS PIPE CULVERTS, 0.079" THICK	164.000 LF	71.31000	11,694.84
0087	0636000000-E **" CS PIPE ELBOWS, ***** THICK (15", 0.064")	10.000 EA	123.89000	1,238.90
0088	0636000000-E **" CS PIPE ELBOWS, ***** THICK (18", 0.064")	3.000 EA	147.17000	441.51
0089	0636000000-E **" CS PIPE ELBOWS, ***** THICK (24", 0.064")	2.000 EA	222.56000	445.12
0090	0636000000-E **" CS PIPE ELBOWS, ***** THICK (42", 0.109")	1.000 EA	476.47000	476.47

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0092	0973100000-E *** WELDED STEEL PIPE, ***** THICK, GRADE B IN SOIL (36", 0.500")	227.000 LF	438.09000	99,446.43
0093	0973100000-E *** WELDED STEEL PIPE, ***** THICK, GRADE B IN SOIL (42", 0.625")	348.000 LF	526.80000	183,326.40
0094	0973100000-E *** WELDED STEEL PIPE, ***** THICK, GRADE B IN SOIL (48", 0.625")	180.000 LF	708.80000	127,584.00
0096	0973300000-E *** WELDED STEEL PIPE, ***** THICK, GRADE B NOT IN SOIL (36", 0.500")	227.000 LF	1,188.09000	269,696.43
0097	0973300000-E *** WELDED STEEL PIPE, ***** THICK, GRADE B NOT IN SOIL (42", 0.625")	348.000 LF	1,166.80000	406,046.40
0098	0973300000-E *** WELDED STEEL PIPE, ***** THICK, GRADE B NOT IN SOIL (48", 0.625")	180.000 LF	1,248.80000	224,784.00
0099	0986000000-E GENERIC PIPE ITEM 8" DUCTILE IRON PIPE	548.000 LF	36.00000	19,728.00
0100	0995000000-E PIPE REMOVAL	4,363.000 LF	14.90000	65,008.70
0101	1000000000-E 6" SLOPE PROTECTION	800.000 SY	65.00000	52,000.00
0102	1011000000-N FINE GRADING	LUMP	LUMP	3,500,000.00

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0103	1044000000-E LIME TREATED SOIL (SLURRY METHOD)	130,610.000 SY	2.40000	313,464.00
0104	1066000000-E LIME FOR LIME TREATED SOIL	1,380.000 TON	198.50000	273,930.00
0105	1077000000-E #57 STONE	505.000 TON	25.00000	12,625.00
0106	1099500000-E SHALLOW UNDERCUT	5,000.000 CY	14.59000	72,950.00
0107	1099700000-E CLASS IV SUBGRADE STABILIZATION	9,500.000 TON	23.00000	218,500.00
0108	1110000000-E STABILIZER AGGREGATE	1,000.000 TON	24.00000	24,000.00
0109	1115000000-E GEOTEXTILE FOR PAVEMENT STABILIZATION	275,035.000 SY	2.45000	673,835.75
0110	1121000000-E AGGREGATE BASE COURSE	90,000.000 TON	33.27000	2,994,300.00
0111	1176000000-E SOIL CEMENT BASE	195,910.000 SY	2.30000	450,593.00
0112	1187000000-E PORTLAND CEMENT FOR SOIL CEMENT BASE	5,486.000 TON	136.50000	748,839.00
0113	1209000000-E ASPHALT CURING SEAL	48,980.000 GAL	3.25000	159,185.00
0114	1220000000-E INCIDENTAL STONE BASE	2,000.000 TON	48.06000	96,120.00

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0115	1275000000-E PRIME COAT	2,240.000 GAL	3.55000	7,952.00
0116	1330000000-E INCIDENTAL MILLING	2,650.000 SY	7.06000	18,709.00
0117	1489000000-E ASPHALT CONC BASE COURSE, TYPE B25.0B	57,000.000 TON	40.60000	2,314,200.00
0118	1491000000-E ASPHALT CONC BASE COURSE, TYPE B25.0C	71,500.000 TON	42.50000	3,038,750.00
0119	1498000000-E ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0B	12,500.000 TON	44.30000	553,750.00
0120	1503000000-E ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C	40,000.000 TON	43.20000	1,728,000.00
0121	1519000000-E ASPHALT CONC SURFACE COURSE, TYPE S9.5B	12,000.000 TON	48.70000	584,400.00
0122	1523000000-E ASPHALT CONC SURFACE COURSE, TYPE S9.5C	51,000.000 TON	38.00000	1,938,000.00
0123	1525000000-E ASPHALT CONC SURFACE COURSE, TYPE SF9.5A	23,000.000 TON	41.70000	959,100.00
0124	1575000000-E ASPHALT BINDER FOR PLANT MIX	13,445.000 TON	599.49000	8,060,143.05
0125	1693000000-E ASPHALT PLANT MIX, PAVEMENT REPAIR	235.000 TON	109.88000	25,821.80
0126	1840000000-E MILLED RUMBLE STRIPS (ASPHALT CONCRETE)	48,100.000 LF	0.25000	12,025.00

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0127	1847000000-E *****" PORT CEM CONC PAVEMENT, THROUGH LANES (WITH DOWELS) (12-1/2")	257,000.000 SY	60.00000	15,420,000.00
0128	1869000000-E *****" PORT CEM CONC PAVEMENT, MISCELLANEOUS (WITHOUT DOWELS) (12-1/2")	11,000.000 SY	80.00000	880,000.00
0129	1881000000-E GENERIC PAVING ITEM MILLED RUMBLE STRIPS (CONC. SHLD.)	41,100.000 LF	0.50000	20,550.00
0130	1891000000-E GENERIC PAVING ITEM NONWOVEN GEOTEXTILE INTERLAYER	39,000.000 SY	2.30000	89,700.00
0131	1902000000-N SURFACE TESTING CONCRETE PAVE-MENT	LUMP	LUMP	135,000.00
0132	1913000000-E CONCRETE SHOULDERS ADJACENT TO*****" PAVEMENT (12-1/2")	51,000.000 SY	57.50000	2,932,500.00
0133	1924000000-N FIELD LABORATORY RENTAL, PORT CEM CONC PAVEMENT	LUMP	LUMP	40,000.00
0134	2000000000-N RIGHT OF WAY MARKERS	245.000 EA	145.00000	35,525.00
0135	2022000000-E SUBDRAIN EXCAVATION	2,688.000 CY	21.50000	57,792.00
0136	2026000000-E GEOTEXTILE FOR SUBSURFACE DRAINS	12,000.000 SY	5.00000	60,000.00
0137	2036000000-E SUBDRAIN COARSE AGGREGATE	2,016.000 CY	55.00000	110,880.00

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0138	2044000000-E 6" PERFORATED SUBDRAIN PIPE	12,000.000 LF	12.50000	150,000.00
0139	2070000000-N SUBDRAIN PIPE OUTLET	24.000 EA	350.00000	8,400.00
0140	2077000000-E 6" OUTLET PIPE	144.000 LF	30.00000	4,320.00
0141	2099000000-E SHOULDER DRAIN	22,800.000 LF	7.80000	177,840.00
0142	2110000000-E 4" SHOULDER DRAIN PIPE	22,800.000 LF	1.50000	34,200.00
0143	2121000000-E 4" OUTLET PIPE FOR SHOULDER DRAINS	840.000 LF	14.00000	11,760.00
0144	2132000000-N CONCRETE PAD FOR SHOULDER DRAIN PIPE OUTLET	10.000 EA	325.00000	3,250.00
0145	2143000000-E BLOTTING SAND	20.000 TON	59.60000	1,192.00
0146	2209000000-E ENDWALLS	88.500 CY	781.80000	69,189.30
0147	2220000000-E REINFORCED ENDWALLS	33.000 CY	777.28000	25,650.24
0148	2253000000-E PIPE COLLARS	13.000 CY	647.03000	8,411.39
0149	2264000000-E PIPE PLUGS	3.000 CY	568.57000	1,705.71

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0150	2275000000-E FLOWABLE FILL	20.000 CY	145.52000	2,910.40
0151	2286000000-N MASONRY DRAINAGE STRUCTURES	365.000 EA	970.00000	354,050.00
0152	2297000000-E MASONRY DRAINAGE STRUCTURES	34.000 CY	1,200.00000	40,800.00
0153	2308000000-E MASONRY DRAINAGE STRUCTURES	242.000 LF	194.00000	46,948.00
0154	2354000000-N FRAME WITH GRATE, STD 840.22	6.000 EA	743.60000	4,461.60
0155	2364000000-N FRAME WITH TWO GRATES, STD 840.16	1.000 EA	559.35000	559.35
0156	2364200000-N FRAME WITH TWO GRATES, STD 840.20	75.000 EA	558.14000	41,860.50
0157	2365000000-N FRAME WITH TWO GRATES, STD 840.22	231.000 EA	833.14000	192,455.34
0158	2366000000-N FRAME WITH TWO GRATES, STD 840.24	10.000 EA	840.40000	8,404.00
0159	2367000000-N FRAME WITH TWO GRATES, STD 840.29	18.000 EA	558.14000	10,046.52
0160	2374000000-N FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (E)	5.000 EA	610.85000	3,054.25
0161	2374000000-N FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (F)	3.000 EA	635.15000	1,905.45

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			Dollars	Cts	Dollars	Ct
0162	2374000000-N FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (G)	8.000 EA	635.15000		5,081.20	
0163	2396000000-N FRAME WITH COVER, STD 840.54	27.000 EA	462.54000		12,488.58	
0164	2407000000-N STEEL FRAME WITH TWO GRATES, STD 840.37	2.000 EA	1,750.00000		3,500.00	
0165	2451000000-N CONCRETE TRANSITIONAL SECTION FOR DROP INLET	1.000 EA	250.00000		250.00	
0166	2542000000-E 1'-6" CONCRETE CURB & GUTTER	2,420.000 LF	13.50000		32,670.00	
0167	2549000000-E 2'-6" CONCRETE CURB & GUTTER	5,260.000 LF	16.85000		88,631.00	
0168	2556000000-E SHOULDER BERM GUTTER	12,000.000 LF	15.50000		186,000.00	
0169	2570000000-N MODIFIED CONCRETE FLUME	6.000 EA	750.00000		4,500.00	
0170	2612000000-E 6" CONCRETE DRIVEWAY	140.000 SY	41.50000		5,810.00	
0171	2619000000-E 4" CONCRETE PAVED DITCH	260.000 SY	45.00000		11,700.00	
0172	2655000000-E 5" MONOLITHIC CONCRETE ISLANDS (KEYED IN)	400.000 SY	55.00000		22,000.00	
0173	2724000000-E PRECAST REINFORCED CONCRETE BARRIER, SINGLE FACED	12,970.000 LF	75.00000		972,750.00	

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			Dollars	Cts	Dollars	Ct
0174	2830000000-N ADJUSTMENT OF MANHOLES	4.000	415.15000		1,660.60	
		EA				
0175	2860000000-N CONVERT EXISTING CATCH BASIN TO JUNCTION BOX	3.000	750.00000		2,250.00	
		EA				
0176	2995000000-N GENERIC DRAINAGE ITEM CONVERT EXISTING OTCB TO 2GI	14.000	750.00000		10,500.00	
		EA				
0177	3000000000-N IMPACT ATTENUATOR UNIT, TYPE 350	1.000	13,250.00000		13,250.00	
		EA				
0178	3030000000-E STEEL BM GUARDRAIL	98,212.500	14.10000		1,384,796.25	
		LF				
0179	3045000000-E STEEL BM GUARDRAIL, SHOP CURVED	212.500	14.15000		3,006.88	
		LF				
0180	3105000000-N STEEL BM GUARDRAIL TERMINAL SECTIONS	16.000	30.00000		480.00	
		EA				
0181	3150000000-N ADDITIONAL GUARDRAIL POSTS	10.000	1.00000		10.00	
		EA				
0182	3210000000-N GUARDRAIL ANCHOR UNITS, TYPE CAT-1	44.000	410.00000		18,040.00	
		EA				
0183	3215000000-N GUARDRAIL ANCHOR UNITS, TYPE III	8.000	1,400.00000		11,200.00	
		EA				
0184	3270000000-N GUARDRAIL ANCHOR UNITS, TYPE 350	73.000	1,625.00000		118,625.00	
		EA				
0185	3285000000-N GUARDRAIL ANCHOR UNITS, TYPE M-350	2.000	1,600.00000		3,200.00	
		EA				

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0186	3317000000-N GUARDRAIL ANCHOR UNITS, TYPE B-77	68.000 EA	1,500.00000	102,000.00
0187	3360000000-E REMOVE EXISTING GUARDRAIL	37,138.000 LF	0.01000	371.38
0188	3503000000-E WOVEN WIRE FENCE, 47" FABRIC	57,800.000 LF	1.85000	106,930.00
0189	3509000000-E 4" TIMBER FENCE POSTS, 7'-6" LONG	3,670.000 EA	14.00000	51,380.00
0190	3515000000-E 5" TIMBER FENCE POSTS, 8'-0" LONG	840.000 EA	18.00000	15,120.00
0191	3557000000-E ADDITIONAL BARBED WIRE	500.000 LF	0.10000	50.00
0192	3628000000-E RIP RAP, CLASS I	3,100.000 TON	56.25000	174,375.00
0193	3635000000-E RIP RAP, CLASS II	1,250.000 TON	57.60000	72,000.00
0194	3642000000-E RIP RAP, CLASS A	20.000 TON	56.07000	1,121.40
0195	3649000000-E RIP RAP, CLASS B	5,940.000 TON	48.09000	285,654.60
0196	3651000000-E BOULDERS	135.000 TON	78.36000	10,578.60
0197	3656000000-E GEOTEXTILE FOR DRAINAGE	29,850.000 SY	3.11000	92,833.50

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0198	3659000000-N PREFORMED SCOUR HOLES WITH LEVEL SPREADER APRON	11.000 EA	1,095.13000	12,046.43
0199	4048000000-E REINFORCED CONCRETE SIGN FOUN-DATIONS	10.000 CY	650.00000	6,500.00
0200	4057000000-E OVERHEAD FOOTING	406.000 CY	750.00000	304,500.00
0201	4060000000-E SUPPORTS, BREAKAWAY STEEL BEAM	3,151.000 LB	3.55000	11,186.05
0202	4066000000-E SUPPORTS, SIMPLE STEEL BEAM	4,261.000 LB	3.00000	12,783.00
0203	4072000000-E SUPPORTS, 3-LB STEEL U-CHANNEL	3,333.000 LF	5.00000	16,665.00
0204	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (A - 28+00 -Y1RPA-)	LUMP	LUMP	38,000.00
0205	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (B - 502+50 -L-)	LUMP	LUMP	49,000.00
0206	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (C - 531+00 -L-)	LUMP	LUMP	104,000.00
0207	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (D - 586+50 -L-)	LUMP	LUMP	75,000.00

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			Dollars Cts	Dollars Ct
0208	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (E - 595+00 -L-)	LUMP	LUMP	52,000.00
0209	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (F - 610+00 -L-)	LUMP	LUMP	75,000.00
0210	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (G - 31+50 -Y4RPBD-)	LUMP	LUMP	44,000.00
0211	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (H - 92+50 -Y4-)	LUMP	LUMP	40,000.00
0212	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (I - 89+50 -Y4-)	LUMP	LUMP	48,500.00
0213	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (J - 43+00 -Y4CD-)	LUMP	LUMP	48,000.00
0214	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (K - 42+00 -Y4-)	LUMP	LUMP	38,500.00
0215	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (L - 72+00 -Y4-)	LUMP	LUMP	53,000.00
0216	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (M - 113+00 -Y4-)	LUMP	LUMP	42,000.00

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0217	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (N - 322' FRM S MAIN ST EXIT)	LUMP	LUMP	39,500.00
0218	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (O - 19+50 -Y4-)	LUMP	LUMP	28,500.00
0219	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (P - 144' FROM LINVILLE RD EXIT)	LUMP	LUMP	40,000.00
0220	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (Q - 280' +/- FROM ROUTE MARKERS)	LUMP	LUMP	28,000.00
0221	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ***** (R - 36+50 -Y1-)	LUMP	LUMP	83,000.00
0222	4096000000-N SIGN ERECTION, TYPE D	9.000 EA	100.00000	900.00
0223	4102000000-N SIGN ERECTION, TYPE E	124.000 EA	50.00000	6,200.00
0224	4108000000-N SIGN ERECTION, TYPE F	10.000 EA	100.00000	1,000.00
0225	4110000000-N SIGN ERECTION, TYPE *** (GROUND MOUNTED) (A)	8.000 EA	350.00000	2,800.00
0226	4110000000-N SIGN ERECTION, TYPE *** (GROUND MOUNTED) (B)	2.000 EA	200.00000	400.00

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0227	4114000000-N SIGN ERECTION, MILEMARKERS	16.000 EA	50.00000	800.00
0228	4116100000-N SIGN ERECTION, RELOCATE, TYPE ***** (GROUND MOUNTED) (D)	1.000 EA	100.00000	100.00
0229	4143000000-N DISPOSAL OF SUPPORT, OVERHEAD STRUCTURE	1.000 EA	2,000.00000	2,000.00
0230	4152000000-N DISPOSAL OF SIGN SYSTEM, STEELBEAM	8.000 EA	500.00000	4,000.00
0231	4155000000-N DISPOSAL OF SIGN SYSTEM, U- CHANNEL	48.000 EA	1.00000	48.00
0232	4400000000-E WORK ZONE SIGNS (STATIONARY)	2,382.000 SF	3.78000	9,003.96
0233	4405000000-E WORK ZONE SIGNS (PORTABLE)	1,147.000 SF	7.89000	9,049.83
0234	4410000000-E WORK ZONE SIGNS (BARRICADE MOUNTED)	1,183.000 SF	4.15000	4,909.45
0235	4415000000-N FLASHING ARROW BOARD	4.000 EA	2,348.00000	9,392.00
0236	4420000000-N PORTABLE CHANGEABLE MESSAGE SIGN	14.000 EA	8,448.00000	118,272.00
0237	4422000000-N PORTABLE CHANGEABLE MESSAGE SIGN (SHORT TERM)	379.000 DAY	28.80000	10,915.20
0238	4430000000-N DRUMS	880.000 EA	39.94000	35,147.20

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0239	4435000000-N CONES	50.000 EA	15.85000	792.50
0240	4445000000-E BARRICADES (TYPE III)	1,200.000 LF	16.85000	20,220.00
0241	4450000000-N FLAGGER	2,224.000 HR	40.00000	88,960.00
0242	4465000000-N TEMPORARY CRASH CUSHIONS	10.000 EA	4,000.00000	40,000.00
0243	4470000000-N RESET TEMPORARY CRASH CUSHION	8.000 EA	1,200.00000	9,600.00
0244	4480000000-N TMA	4.000 EA	18,000.00000	72,000.00
0245	4485000000-E PORTABLE CONCRETE BARRIER	2,908.000 LF	18.00000	52,344.00
0246	4490000000-E PORTABLE CONCRETE BARRIER (ANCHORED)	23,400.000 LF	35.00000	819,000.00
0247	4500000000-E RESET PORTABLE CONCRETE BARRIER	6,375.000 LF	4.00000	25,500.00
0248	4510000000-N LAW ENFORCEMENT	406.000 HR	45.00000	18,270.00
0249	4520000000-N TUBULAR MARKERS (FIXED)	120.000 EA	33.80000	4,056.00
0250	4650000000-N TEMPORARY RAISED PAVEMENT MARKERS	391.000 EA	6.00000	2,346.00

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0251	4710000000-E THERMOPLAST IC PAVEMENT MARKING LINES (24", 120 MILS)	130.000 LF	7.00000	910.00
0252	4721000000-E THERMOPLAST IC PAVEMENT MARKING CHARACTER (120 MILS)	4.000 EA	125.00000	500.00
0253	4725000000-E THERMOPLAST IC PAVEMENT MARKING SYMBOL (90 MILS)	60.000 EA	125.00000	7,500.00
0254	4810000000-E PAINT PAVEMENT MARKING LINES (4")	128,765.000 LF	0.25000	32,191.25
0255	4815000000-E PAINT PAVEMENT MARKING LINES (6")	300,040.000 LF	0.26000	78,010.40
0256	4820000000-E PAINT PAVEMENT MARKING LINES (8")	345.000 LF	1.00000	345.00
0257	4825000000-E PAINT PAVEMENT MARKING LINES (12")	7,982.000 LF	0.60000	4,789.20
0258	4835000000-E PAINT PAVEMENT MARKING LINES (24")	84.000 LF	3.00000	252.00
0259	4847000000-E POLYUREA PAVEMENT MARKING LINES (4", *****) (HIGHLY REFLECTIVE ELEMENTS)	32,503.000 LF	0.85000	27,627.55
0260	4847100000-E POLYUREA PAVEMENT MARKING LINES (6", *****) (HIGHLY REFLECTIVE ELEMENTS)	174,105.000 LF	1.17000	203,702.85

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0261	4847120000-E POLYUREA PAVEMENT MARKING LINES (12", *****)(HIGHLY REFLECTIVE ELEMENTS)	5,570.000 LF	2.30000	12,811.00
0262	4850000000-E REMOVAL OF PAVEMENT MARKING LINES (4")	8,896.000 LF	0.90000	8,006.40
0263	4900000000-N PERMANENT RAISED PAVEMENT MARKERS	156.000 EA	6.00000	936.00
0264	4905000000-N SNOWPLOWABLE PAVEMENT MARKERS	1,593.000 EA	30.00000	47,790.00
0265	4915000000-E 7' U-CHANNEL POSTS	24.000 EA	24.90000	597.60
0266	4935000000-N FLEXIBLE DELINEATORS (CRYSTAL)	90.000 EA	31.95000	2,875.50
0267	4940000000-N FLEXIBLE DELINEATORS (YELLOW)	56.000 EA	31.95000	1,789.20
0268	4945000000-N FLEXIBLE DELINEATORS (CRYSTAL & RED)	5.000 EA	31.95000	159.75
0269	4950000000-N FLEXIBLE DELINEATORS (YELLOW & RED)	5.000 EA	31.95000	159.75
0270	4955000000-N OBJECT MARKERS (END OF ROAD)	24.000 EA	50.00000	1,200.00
0271	5255000000-N PORTABLE LIGHTING	LUMP	LUMP	168,525.52

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0272	5325600000-E 6" WATER LINE	1,423.000 LF	40.36000	57,432.28
0273	5325800000-E 8" WATER LINE	1,125.000 LF	33.04000	37,170.00
0274	5326200000-E 12" WATER LINE	2,520.000 LF	49.63000	125,067.60
0275	5326600000-E 16" WATER LINE	1,637.000 LF	85.50000	139,963.50
0276	5327000000-E 20" WATER LINE	420.000 LF	85.50000	35,910.00
0277	5540000000-E 6" VALVE	3.000 EA	872.67000	2,618.01
0278	5546000000-E 8" VALVE	3.000 EA	1,229.72000	3,689.16
0279	5558000000-E 12" VALVE	2.000 EA	1,962.00000	3,924.00
0280	5558600000-E 16" VALVE	2.000 EA	5,143.00000	10,286.00
0281	5571600000-E 6" TAPPING VALVE	3.000 EA	2,250.00000	6,750.00
0282	5589100000-E 1" AIR RELEASE VALVE	3.000 EA	1,881.27000	5,643.81
0283	5648000000-N RELOCATE WATER METER	3.000 EA	816.97000	2,450.91

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			Dollars	Cts	Dollars	Ct
0284	5672000000-N RELOCATE FIRE HYDRANT	8.000 EA	1,905.88000		15,247.04	
0285	5691300000-E 8" SANITARY GRAVITY SEWER	1,165.000 LF	36.00000		41,940.00	
0286	5691600000-E 16" SANITARY GRAVITY SEWER	511.000 LF	99.00000		50,589.00	
0287	5691700000-E 18" SANITARY GRAVITY SEWER	724.000 LF	135.00000		97,740.00	
0288	5691900000-E 24" SANITARY GRAVITY SEWER	1,554.000 LF	149.40000		232,167.60	
0289	5692000000-E 30" SANITARY GRAVITY SEWER	367.000 LF	198.90000		72,996.30	
0290	5775000000-E 4' DIA UTILITY MANHOLE	13.000 EA	1,944.01000		25,272.13	
0291	5776000000-E 5' DIA UTILITY MANHOLE	11.000 EA	2,365.36000		26,018.96	
0292	5777000000-E 6' DIA UTILITY MANHOLE	4.000 EA	3,232.80000		12,931.20	
0293	5781000000-E UTILITY MANHOLE WALL, 4' DIA	40.000 LF	135.00000		5,400.00	
0294	5782000000-E UTILITY MANHOLE WALL, 5' DIA	133.000 LF	193.60000		25,748.80	
0295	5783000000-E UTILITY MANHOLE WALL, 6' DIA	16.000 LF	322.20000		5,155.20	

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0296	5801000000-E ABANDON 8" UTILITY PIPE	1,423.000 LF	5.27000	7,499.21
0297	5804000000-E ABANDON 12" UTILITY PIPE	100.000 LF	7.70000	770.00
0298	5810000000-E ABANDON 16" UTILITY PIPE	900.000 LF	3.83000	3,447.00
0299	5811000000-E ABANDON 18" UTILITY PIPE	1,003.000 LF	17.97000	18,023.91
0300	5812000000-E ABANDON 20" UTILITY PIPE	415.000 LF	36.00000	14,940.00
0301	5813000000-E ABANDON 24" UTILITY PIPE	1,333.000 LF	6.30000	8,397.90
0302	5814000000-E ABANDON 30" UTILITY PIPE	20.000 LF	30.60000	612.00
0303	5815000000-N REMOVE WATER METER	8.000 EA	171.00000	1,368.00
0304	5815500000-N REMOVE FIRE HYDRANT	7.000 EA	477.00000	3,339.00
0305	5816000000-N ABANDON UTILITY MANHOLE	7.000 EA	790.09000	5,530.63
0306	5828000000-N REMOVE UTILITY MANHOLE	13.000 EA	820.69000	10,668.97
0307	5835700000-E 16" ENCASUREMENT PIPE	810.000 LF	66.31000	53,711.10

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0308	5836000000-E 24" ENCASEMENT PIPE	300.000 LF	73.30000	21,990.00
0309	5836200000-E 30" ENCASEMENT PIPE	810.000 LF	68.40000	55,404.00
0310	5888000000-E GENERIC UTILITY ITEM ANCHOR SEWER MAIN TO PROPOSED CULVERT	52.000 LF	135.00000	7,020.00
0311	5890000000-N GENERIC UTILITY ITEM REMOVE BLOWOFF ASSEMBLY	1.000 EA	1,800.00000	1,800.00
0312	6000000000-E TEMPORARY SILT FENCE	249,000.000 LF	1.33000	331,170.00
0313	6006000000-E STONE FOR EROSION CONTROL, CLASS A	5,375.000 TON	42.60000	228,975.00
0314	6009000000-E STONE FOR EROSION CONTROL, CLASS B	83,520.000 TON	42.29000	3,532,060.80
0315	6012000000-E SEDIMENT CONTROL STONE	51,665.000 TON	42.33000	2,186,979.45
0316	6015000000-E TEMPORARY MULCHING	500.000 ACR	760.00000	380,000.00
0317	6018000000-E SEED FOR TEMPORARY SEEDING	82,400.000 LB	1.66000	136,784.00
0318	6021000000-E FERTILIZER FOR TEMPORARY SEED-ING	357.000 TON	570.00000	203,490.00
0319	6024000000-E TEMPORARY SLOPE DRAINS	25,000.000 LF	8.87000	221,750.00

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0320	6029000000-E SAFETY FENCE	65,400.000 LF	1.00000	65,400.00
0321	6030000000-E SILT EXCAVATION	168,600.000 CY	3.93000	662,598.00
0322	6036000000-E MATTING FOR EROSION CONTROL	600,000.000 SY	1.09000	654,000.00
0323	6037000000-E COIR FIBER MAT	3,150.000 SY	4.75000	14,962.50
0324	6038000000-E PERMANENT SOIL REINFORCEMENT MAT	10,000.000 SY	4.75000	47,500.00
0325	6042000000-E 1/4" HARDWARE CLOTH	16,350.000 LF	2.14000	34,989.00
0326	6046000000-E TEMPORARY PIPE FOR STREAM CROSSING	125.000 LF	22.50000	2,812.50
0327	6048000000-E FLOATING TURBIDITY CURTAIN	335.000 SY	23.03000	7,715.05
0328	6069000000-E STILLING BASINS	2,000.000 CY	13.60000	27,200.00
0329	6070000000-N SPECIAL STILLING BASINS	20.000 EA	259.09000	5,181.80
0330	6071012000-E COIR FIBER WATTLE	15,600.000 LF	7.60000	118,560.00
0331	6071020000-E POLYACRYLAMIDE (PAM)	11,150.000 LB	4.75000	52,962.50

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0332	6071030000-E COIR FIBER BAFFLE	50,000.000 LF	4.04000	202,000.00
0333	6071050000-E *** SKIMMER (1-1/2")	131.000 EA	715.64000	93,748.84
0334	6071050000-E *** SKIMMER (2")	12.000 EA	859.01000	10,308.12
0335	6071050000-E *** SKIMMER (2-1/2")	2.000 EA	900.00000	1,800.00
0336	6084000000-E SEEDING & MULCHING	600.000 ACR	1,349.00000	809,400.00
0337	6087000000-E MOWING	300.000 ACR	66.50000	19,950.00
0338	6090000000-E SEED FOR REPAIR SEEDING	7,200.000 LB	1.90000	13,680.00
0339	6093000000-E FERTILIZER FOR REPAIR SEEDING	28.750 TON	593.75000	17,070.31
0340	6096000000-E SEED FOR SUPPLEMENTAL SEEDING	14,350.000 LB	2.85000	40,897.50
0341	6108000000-E FERTILIZER TOPDRESSING	430.000 TON	712.50000	306,375.00
0342	6111000000-E IMPERVIOUS DIKE	1,500.000 LF	38.40000	57,600.00
0343	6114500000-N SPECIALIZED HAND MOWING	515.000 MHR	47.50000	24,462.50

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0344	6117000000-N RESPONSE FOR EROSION CONTROL	150.000 EA	95.00000	14,250.00
0345	6120000000-E CULVERT DIVERSION CHANNEL	7,000.000 CY	10.08000	70,560.00
0346	6123000000-E REFORESTATION	10.000 ACR	807.50000	8,075.00
0347	6126000000-E STREAMBANK REFORESTATION	1.000 ACR	760.00000	760.00
0348	7060000000-E SIGNAL CABLE	1,750.000 LF	3.43000	6,002.50
0349	7120000000-E VEHICLE SIGNAL HEAD (12", 3 SECTION)	13.000 EA	703.26000	9,142.38
0350	7252000000-E MESSENGER CABLE (1/4")	12,699.000 LF	2.04000	25,905.96
0351	7264000000-E MESSENGER CABLE (3/8")	1,200.000 LF	2.36000	2,832.00
0352	7276000000-E BORE & JACK (***** (1, 6"))	270.000 LF	80.76000	21,805.20
0353	7279000000-E TRACER WIRE	33,556.000 LF	0.54000	18,120.24
0354	7300000000-E UNPAVED TRENCHING (***** (1, 2"))	1,225.000 LF	4.93000	6,039.25
0355	7301000000-E DIRECTIONAL DRILL (***** (1, 2"))	386.000 LF	12.23000	4,720.78

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Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars Cts	Bid Amount Dollars Ct
0356	7301000000-E DIRECTIONAL DRILL (***** (2, 2")	10,001.000 LF	14.86000	148,614.86
0357	7312000000-N JUNCTION BOX (***** (SPECIAL SIZED)	11.000 EA	1,224.46000	13,469.06
0358	7324000000-N JUNCTION BOX (STANDARD SIZE)	27.000 EA	467.01000	12,609.27
0359	7348000000-N JUNCTION BOX (OVER-SIZED, HEA-VY DUTY)	45.000 EA	785.83000	35,362.35
0360	7360000000-N WOOD POLE	88.000 EA	599.30000	52,738.40
0361	7372000000-N GUY ASSEMBLY	40.000 EA	391.30000	15,652.00
0362	7408000000-E 1" RISER WITH WEATHERHEAD	2.000 EA	363.85000	727.70
0363	7420000000-E 2" RISER WITH WEATHERHEAD	9.000 EA	405.33000	3,647.97
0364	7432000000-E 2" RISER WITH HEAT SHRINK TUBING	6.000 EA	347.83000	2,086.98
0365	7444000000-E INDUCTIVE LOOP SAWCUT	1,350.000 LF	5.27000	7,114.50
0366	7456000000-E LEAD-IN CABLE (***** (14-2)	4,300.000 LF	2.73000	11,739.00
0367	7516000000-E COMMUNICATIONS CABLE (**FIBER) (144)	26,023.000 LF	2.59000	67,399.57

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Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars Cts	Bid Amount Dollars Ct
0368	7516000000-E COMMUNICATI ONS CABLE (**FIBER) (72)	24,601.000 LF	1.83000	45,019.83
0369	7528000000-E DROP CABLE	1,639.000 LF	1.36000	2,229.04
0370	7540000000-N SPLICE ENCLOSURE	7.000 EA	2,282.61000	15,978.27
0371	7541000000-N MODIFY SPLICE ENCLOSURE	2.000 EA	3,994.57000	7,989.14
0372	7552000000-N INTERCONNEC T CENTER	5.000 EA	1,059.78000	5,298.90
0373	7566000000-N DELINEATOR MARKER	49.000 EA	92.39000	4,527.11
0374	7575142000-N 900MHZ RADIO	2.000 EA	5,212.24000	10,424.48
0375	7575142200-N NEW ELECTRICAL SERVICE	7.000 EA	2,671.08000	18,697.56
0376	7575160000-E REMOVE EXISTING COMMUNICATIONSCABLE	24,611.000 LF	0.82000	20,181.02
0377	7613000000-N SOIL TEST	4.000 EA	657.13000	2,628.52
0378	7614100000-E DRILLED PIER FOUNDATION	32.000 CY	828.83000	26,522.56
0379	7636000000-N SIGN FOR SIGNALS	5.000 EA	305.11000	1,525.55

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Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars Cts	Bid Amount Dollars Ct
0380	7684000000-N SIGNAL CABINET FOUNDATION	2.000 EA	1,238.26000	2,476.52
0381	7756000000-N CONTROLLER WITH CABINET (TYPE 2070L, BASE MOUNTED)	2.000 EA	11,715.76000	23,431.52
0382	7780000000-N DETECTOR CARD (TYPE 2070L)	6.000 EA	116.11000	696.66
0383	7901000000-N CABINET BASE EXTENDER	2.000 EA	437.31000	874.62
0384	7980000000-N GENERIC SIGNAL ITEM 10KVA SINGLE PHASE TRANSFORMER	4.000 EA	1,348.37000	5,393.48
0385	7980000000-N GENERIC SIGNAL ITEM 5/8" X 10' GROUNDING ELECTRODE	27.000 EA	256.52000	6,926.04
0386	7980000000-N GENERIC SIGNAL ITEM CARD CAGES	1.000 EA	2,476.90000	2,476.90
0387	7980000000-N GENERIC SIGNAL ITEM CCTV CABINET	5.000 EA	4,104.40000	20,522.00
0388	7980000000-N GENERIC SIGNAL ITEM CCTV CAMERA ASSEMBLY	5.000 EA	4,023.37000	20,116.85
0389	7980000000-N GENERIC SIGNAL ITEM CCTV CAMERA LOWERING SYSTEM	2.000 EA	7,163.59000	14,327.18
0390	7980000000-N GENERIC SIGNAL ITEM CCTV EXTENSION POLE	1.000 EA	999.46000	999.46
0391	7980000000-N GENERIC SIGNAL ITEM CCTV METAL POLE (50')	2.000 EA	11,476.67000	22,953.34

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Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars Cts	Bid Amount Dollars Ct
0392	7980000000-N GENERIC SIGNAL ITEM CCTV METAL POLE (70')	2.000 EA	14,369.26000	28,738.52
0393	7980000000-N GENERIC SIGNAL ITEM COMMUNICATIONS RACK	1.000 EA	2,764.95000	2,764.95
0394	7980000000-N GENERIC SIGNAL ITEM DIGITAL HARDWARE VIDEO DECODER	6.000 EA	2,102.01000	12,612.06
0395	7980000000-N GENERIC SIGNAL ITEM DIGITAL HARDWARE VIDEO ENCODER	6.000 EA	2,102.01000	12,612.06
0396	7980000000-N GENERIC SIGNAL ITEM DMS	2.000 EA	81,506.30000	163,012.60
0397	7980000000-N GENERIC SIGNAL ITEM DMS ACCESS LADDER	3.000 EA	5,720.65000	17,161.95
0398	7980000000-N GENERIC SIGNAL ITEM DMS OVERHEAD ASSEMBLY	1.000 EA	56,788.63000	56,788.63
0399	7980000000-N GENERIC SIGNAL ITEM DMS PEDESTAL ASSEMBLY	2.000 EA	52,912.63000	105,825.26
0400	7980000000-N GENERIC SIGNAL ITEM EQUIPMENT CABINET BASE EXTEND-ER	2.000 EA	807.93000	1,615.86
0401	7980000000-N GENERIC SIGNAL ITEM EQUIPMENT CABINET DISCONNECT	7.000 EA	674.18000	4,719.26
0402	7980000000-N GENERIC SIGNAL ITEM EQUIPMENT CABINET FOUNDATION	2.000 EA	1,709.51000	3,419.02
0403	7980000000-N GENERIC SIGNAL ITEM ETHERNET EDGE SWITCH	7.000 EA	1,206.47000	8,445.29

State of NC
Dept of Transportation

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Revised: 10-10-14

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Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars Cts	Bid Amount Dollars Ct
0404	7980000000-N GENERIC SIGNAL ITEM FURNISH CCTV ASSEMBLY	1.000 EA	2,791.30000	2,791.30
0405	7980000000-N GENERIC SIGNAL ITEM FURNISH DIGITAL HARDWARE VIDEODECODER	2.000 EA	1,919.02000	3,838.04
0406	7980000000-N GENERIC SIGNAL ITEM FURNISH DIGITAL HARDWARE VIDEOENCODER	2.000 EA	1,919.02000	3,838.04
0407	7980000000-N GENERIC SIGNAL ITEM FURNISH ETHERNET EDGE SWITCH	1.000 EA	930.43000	930.43
0408	7980000000-N GENERIC SIGNAL ITEM HUB CABINET	1.000 EA	11,899.91000	11,899.91
0409	7980000000-N GENERIC SIGNAL ITEM HUB SPLICE CENTER	1.000 EA	24,836.96000	24,836.96
0410	7980000000-N GENERIC SIGNAL ITEM MANAGED ETHERNET CORE SWITCH MODIFICATIONS	1.000 EA	19,565.22000	19,565.22
0411	7980000000-N GENERIC SIGNAL ITEM MANAGED ETHERNET ROUTING SWITCH	1.000 EA	28,695.65000	28,695.65
0412	7980000000-N GENERIC SIGNAL ITEM MODIFY NETWORK MANAGEMENT SOFTWARE	1.000 EA	1,250.00000	1,250.00
0413	7980000000-N GENERIC SIGNAL ITEM PORTABLE CCTV	1.000 EA	37,853.26000	37,853.26

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Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars Cts	Bid Amount Dollars Ct
0414	7980000000-N GENERIC SIGNAL ITEM PORTABLE CCTV LOWERING TOOL	1.000 EA	1,755.42000	1,755.42
0415	7980000000-N GENERIC SIGNAL ITEM SOLAR POWER ASSEMBLY	1.000 EA	10,889.62000	10,889.62
0416	7980000000-N GENERIC SIGNAL ITEM UPS	1.000 EA	1,892.66000	1,892.66
0417	7985000000-N GENERIC SIGNAL ITEM DMS (REMOVE AND REINSTALL)	LUMP	LUMP	121,290.76
0418	7990000000-E GENERIC SIGNAL ITEM 3-WIRE FEEDER CONDUCTORS	3,178.000 LF	4.12000	13,093.36
0419	7990000000-E GENERIC SIGNAL ITEM 4-WIRE FEEDER CONDUCTORS	785.000 LF	10.13000	7,952.05
0420	7990000000-E GENERIC SIGNAL ITEM UNDERGROUND CONDUIT (1, 2")	2,655.000 LF	4.89000	12,982.95
0421	7990000000-E GENERIC SIGNAL ITEM UNDERGROUND CONDUIT (2, 2")	23,460.000 LF	6.17000	144,748.20
0422	7992000000-E GENERIC SIGNAL ITEM OVERHEAD SIGN ASSEMBLY FOOTINGS	16.000 CY	789.79000	12,636.64
Section 0001 Total				114,351,352.73

Section 0002 CULVERT ITEMS

Alt Group

0423	8056000000-N REMOVAL OF EXISTING STRUCTURE AT STATION ***** (23+11.00-Y1-)	LUMP	LUMP	10,000.00
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Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars Cts	Bid Amount Dollars Ct
0424	8126000000-N CULVERT EXCAVATION, STA ***** (23+11.00-Y1-)	LUMP	LUMP	37,872.81
0425	8126000000-N CULVERT EXCAVATION, STA ***** (559+74.00-L-)	LUMP	LUMP	31,181.85
0426	8126000000-N CULVERT EXCAVATION, STA ***** (616+45.00-L-)	LUMP	LUMP	56,127.29
0427	8126000000-N CULVERT EXCAVATION, STA ***** (667+15.00-L-)	LUMP	LUMP	49,890.93
0428	8126000000-N CULVERT EXCAVATION, STA ***** (STA. 45+65.43 -Y4-)	LUMP	LUMP	12,472.74
0429	8133000000-E FOUNDATION CONDITIONING MATER-IAL, BOX CULVERT	3,438.000 TON	50.00000	171,900.00
0430	8196000000-E CLASS A CONCRETE (CULVERT)	9,004.000 CY	350.00000	3,151,400.00
0431	8245000000-E REINFORCING STEEL (CULVERT)	820,225.000 LB	0.79000	647,977.75
0432	8804000000-N GENERIC CULVERT ITEM PLACEMENT OF NATURAL STREAM BED MATERIAL	LUMP	LUMP	149,700.00
Section 0002 Total				4,318,523.37
Section 0003 WALL ITEMS				
Alt Group				
0433	8801000000-E MSE RETAINING WALL NO **** (1)	6,334.000 SF	58.96000	373,452.64

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Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars Cts	Bid Amount Dollars Ct
0434	8802014000-E SOLDIER PILE RETAINING WALLS	850.000 SF	77.06000	65,501.00
0435	8839000000-E GENERIC RETAINING WALL ITEM CONCRETE BARRIER RAIL WITH MOMENT SLAB	500.000 LF	275.51000	137,755.00
0436	8847000000-E GENERIC RETAINING WALL ITEM ANCHORED SOLDIER PILE WALLS	7,900.000 SF	89.42000	706,418.00
0437	8847000000-E GENERIC RETAINING WALL ITEM SOUND BARRIER WALL	255,982.000 SF	22.00000	5,631,604.00
Section 0003 Total				6,914,730.64

Section 0004 STRUCTURE ITEMS

Alt Group

0438	8084000000-N FOUNDATION EXCAVATION FOR END BENT ** AT STATION (2,52+94.28-Y4RPBD-)	LUMP	LUMP	6,760.19
0439	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION (1,17+10.00-Y4RPA-)	LUMP	LUMP	6,760.19
0440	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION (1,482+13.14 -L-)	LUMP	LUMP	9,804.21
0441	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION (1,516+31.30-L-)	LUMP	LUMP	5,014.27

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Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars Cts	Bid Amount Dollars Cts
0442	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION ***** (1, 584+36.24 -L-LT)	LUMP	LUMP	10,028.54
0443	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION ***** (1, 584+36.24-L-RT)	LUMP	LUMP	10,028.54
0444	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION ***** (1, 28+50.16-Y5-)	LUMP	LUMP	5,014.27
0445	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION ***** (1, 44+08.64-Y4RPBD-)	LUMP	LUMP	9,267.34
0446	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION ***** (1, 46+87.16-Y4CD-)	LUMP	LUMP	7,521.39
0447	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION ***** (1, 52+94.28-Y4RPBD-)	LUMP	LUMP	6,760.19
0448	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION ***** (1, 642+81.42-L-LT)	LUMP	LUMP	5,014.27
0449	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION ***** (1, 642+81.42-L-RT)	LUMP	LUMP	5,014.27
0450	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION ***** (2, 584+36.24 -L-LT)	LUMP	LUMP	10,028.54

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Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars Cts	Bid Amount Dollars Cts
0451	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION ***** (2, 584+36.24-L-RT)	LUMP	LUMP	10,028.54
0452	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION ***** (2, 628+65.50-L-LT)	LUMP	LUMP	6,760.19
0453	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION ***** (2, 628+65.50-L-RT)	LUMP	LUMP	6,760.19
0454	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION ***** (2, 28+50.16-Y5-)	LUMP	LUMP	5,014.27
0455	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION ***** (2, 33+15.67-Y4CD-)	LUMP	LUMP	6,760.19
0456	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION ***** (2, 52+94.28-Y4RPBD-)	LUMP	LUMP	6,760.19
0457	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION ***** (3, 28+50.16-Y5-)	LUMP	LUMP	5,014.27
0458	8091000000-N FOUNDATION EXCAVATION FOR BENT** AT STATION ***** (4, 17+10.00-Y4RPA-)	LUMP	LUMP	6,760.19
0459	8096000000-E PILE EXCAVATION IN SOIL	64.000 LF	100.00000	6,400.00
0460	8097000000-E PILE EXCAVATION NOT IN SOIL	78.000 LF	100.00000	7,800.00

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Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars Cts	Bid Amount Dollars Ct
0461	8105500000-E **'-**" DIA DRILLED PIERS IN SOIL (4'-6")	454.800 LF	572.90000	260,554.92
0462	8105500000-E **'-**" DIA DRILLED PIERS IN SOIL (5'-0")	260.000 LF	563.52000	146,515.20
0463	8105500000-E **'-**" DIA DRILLED PIERS IN SOIL (5'-6")	74.600 LF	865.47000	64,564.06
0464	8105560000-E 4'-0" DIA DRILLED PIERS IN SOIL LF	437.000 LF	379.79000	165,968.23
0465	8105600000-E **'-**" DIA DRILLED PIERS NOT IN SOIL (4'-6")	132.000 LF	570.47000	75,302.04
0466	8105600000-E **'-**" DIA DRILLED PIERS NOT IN SOIL (5'-0")	103.000 LF	1,998.73000	205,869.19
0467	8105600000-E **'-**" DIA DRILLED PIERS NOT IN SOIL (5'-6")	34.000 LF	3,657.89000	124,368.26
0468	8105660000-E 4'-0" DIA DRILLED PIERS NOT IN SOIL LF	152.000 LF	3,786.16000	575,496.32
0469	8111000000-E PERMANENT STEEL CASING FOR **'-**" DIA DRILLED PIER (4'-6")	292.600 LF	503.72000	147,388.47
0470	8111000000-E PERMANENT STEEL CASING FOR **'-**" DIA DRILLED PIER (5'-0")	204.000 LF	503.72000	102,758.88
0471	8111600000-E PERMANENT STEEL CASING FOR 4'-0" DIA DRILLED PIER LF	104.000 LF	431.76000	44,903.04

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Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars Cts	Bid Amount Dollars Ct
0472	8112730000-N PDA TESTING	12.000 EA	1,900.00000	22,800.00
0473	8113000000-N SID INSPECTIONS	6.000 EA	1,000.00000	6,000.00
0474	8114000000-N SPT TESTING	1.000 EA	4,000.00000	4,000.00
0475	8115000000-N CSL TESTING	7.000 EA	2,500.00000	17,500.00
0476	8147000000-E REINFORCED CONCRETE DECK SLAB	225,152.000 SF	21.89000	4,928,577.28
0477	8154000000-E REINFORCED CONCRETE DECK SLAB (SAND LIGHTWEIGHT CONC)	42,278.000 SF	19.60000	828,648.80
0478	8161000000-E GROOVING BRIDGE FLOORS	285,922.000 SF	0.25000	71,480.50
0479	8182000000-E CLASS A CONCRETE (BRIDGE)	5,746.300 CY	745.03000	4,281,165.89
0480	8210000000-N BRIDGE APPROACH SLABS, STATION***** (17+10.00-Y4RPA-)	LUMP	LUMP	35,486.08
0481	8210000000-N BRIDGE APPROACH SLABS, STATION***** (23+59.12-Y5-)	LUMP	LUMP	33,126.21
0482	8210000000-N BRIDGE APPROACH SLABS, STATION***** (26+60.00-Y4RPBD-)	LUMP	LUMP	34,220.64

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Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars Cts	Bid Amount Dollars Cts
0483	8210000000-N BRIDGE APPROACH SLABS, STATION***** (28+50.16-Y5-)	LUMP	LUMP	32,128.11
0484	8210000000-N BRIDGE APPROACH SLABS, STATION***** (33+15.67-Y4CD-)	LUMP	LUMP	26,963.65
0485	8210000000-N BRIDGE APPROACH SLABS, STATION***** (44+08.64-Y4RPBD-)	LUMP	LUMP	36,965.05
0486	8210000000-N BRIDGE APPROACH SLABS, STATION***** (46+87.16-Y4CD-)	LUMP	LUMP	42,240.69
0487	8210000000-N BRIDGE APPROACH SLABS, STATION***** (482+13.14-L-)	LUMP	LUMP	84,549.79
0488	8210000000-N BRIDGE APPROACH SLABS, STATION***** (516+31.30-L-)	LUMP	LUMP	31,554.36
0489	8210000000-N BRIDGE APPROACH SLABS, STATION***** (52+94.28-Y4RPBD-)	LUMP	LUMP	35,784.16
0490	8210000000-N BRIDGE APPROACH SLABS, STATION***** (556+85.00-L-LT)	LUMP	LUMP	50,431.63
0491	8210000000-N BRIDGE APPROACH SLABS, STATION***** (556+85.00-L-RT)	LUMP	LUMP	50,431.63

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Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars Cts	Bid Amount Dollars Ct
0492	8210000000-N BRIDGE APPROACH SLABS, STATION***** (584+36.24-L-LT)	LUMP	LUMP	74,083.63
0493	8210000000-N BRIDGE APPROACH SLABS, STATION***** (584+36.24-L-RT)	LUMP	LUMP	74,083.63
0494	8210000000-N BRIDGE APPROACH SLABS, STATION***** (628+65.50-L-LT)	LUMP	LUMP	71,803.95
0495	8210000000-N BRIDGE APPROACH SLABS, STATION***** (628+65.50-L-RT)	LUMP	LUMP	71,803.95
0496	8210000000-N BRIDGE APPROACH SLABS, STATION***** (642+81.42-L-LT)	LUMP	LUMP	57,519.90
0497	8210000000-N BRIDGE APPROACH SLABS, STATION***** (642+81.42-L-RT)	LUMP	LUMP	69,636.61
0498	8217000000-E REINFORCING STEEL (BRIDGE)	1,162,502.000 LB	0.91000	1,057,876.82
0499	8238000000-E SPIRAL COLUMN REINFORCING STEEL (BRIDGE)	153,179.000 LB	1.75000	268,063.25
0500	8265000000-E 54" PRESTRESSED CONCRETE GIRDERS	5,829.920 LF	254.28000	1,482,432.06
0501	8274000000-E MODIFIED 63" PRESTRESSED CONC GIRDERS	8,411.030 LF	263.54000	2,216,642.85

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0502	8277000000-E MODIFIED 72" PRESTRESSED CONC GIRDERS	11,704.640 LF	286.24000	3,350,336.15
0503	8280000000-E APPROX LBS STRUCTURALSTEEL	LUMP	LUMP	1,062,371.22
0504	8364000000-E HP12X53 STEEL PILES	37,197.000 LF	60.23000	2,240,375.31
0505	8384000000-E HP14X73 STEEL PILES	4,380.000 LF	75.72000	331,653.60
0506	8391000000-N STEEL PILE POINTS	247.000 EA	143.92000	35,548.24
0507	8392500000-E PREDRILLING FOR PILES	242.000 LF	123.56000	29,901.52
0508	8475000000-E TWO BAR METAL RAIL	1,023.620 LF	119.00000	121,810.78
0509	8503000000-E CONCRETE BARRIER RAIL	8,793.230 LF	63.55000	558,809.77
0510	8517000000-E 1'-**"X *****" CONCRETE PARA- PET (1'-2" X 2'-6")	1,056.000 LF	55.61000	58,724.16
0511	8531000000-E 4" SLOPE PROTECTION	9,157.000 SY	37.31000	341,647.67
0512	8608000000-E RIP RAP CLASS II (2'-0" THICK)	20,827.000 TON	57.60000	1,199,635.20
0513	8622000000-E GEOTEXTILE FOR DRAINAGE	23,135.000 SY	2.25000	52,053.75

Contract ID: C203484 Project(s): NHF-0918(93)
Letting Date: 10-21-14 Call Order: 002
Bidder: 8887 - Dragados USA Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars Cts	Bid Amount Dollars Ct
0514	8654000000-N DISC BEARINGS	LUMP	LUMP	56,101.57
0515	8657000000-N ELASTOMERIC BEARINGS	LUMP	LUMP	153,896.73
0516	8692000000-N FOAM JOINT SEALS	LUMP	LUMP	17,508.97
0517	8706000000-N EXPANSION JOINT SEALS	LUMP	LUMP	352,212.94
0518	8860000000-N GENERIC STRUCTURE ITEM SOUND BARRIER WALL (BRIDGE MOUNTED)	LUMP	LUMP	125,147.16
0519	8892000000-E GENERIC STRUCTURE ITEM CONCRETE SIMULATED STONE FORM LINER	3,592.200 SF	5.00000	17,961.00
0520	8892000000-E GENERIC STRUCTURE ITEM CONCRETE STAINING	18,581.100 SF	5.00000	92,905.50
0521	8897000000-N GENERIC STRUCTURE ITEM CONCRETE MEDALLION PANEL	8.000 EA	1,500.00000	12,000.00
0522	8111000000-E PERMANENT STEEL CASING FOR ***'-***" DIA DRILLED PIER (5'-6")	48.600 LF	575.68000	27,978.05
	Section 0004 Total			28,415,343.26
	Bid Total			153,999,950.00

NON-COLLUSION AND DEBARMENT CERTIFICATION

The bidder certifies that neither he, nor any official, agent or employee of the bidder has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with this bid, and that the bidder intends to do the work with its own bonafide employees or subcontractors and is not bidding for the benefit of another contractor. In addition, submitting this electronic bid constitutes the bidder's certification of Status under penalty of perjury under the laws of the United States and in accordance with the Debarment Certification on file with the Department.

By submitting this bid, the bidder certifies to the best of his knowledge and belief that he and his principals:

- a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- b. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records; making false statements; or receiving stolen property;
- c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph b. of this certification; and
- d. Have not within a three-year period preceding this proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

Where the prospective bidder is unable to certify to any of the statements in this certification, the bidder shall submit an explanation in the blanks provided herein. The explanation will not necessarily result in denial of participation in a contract.

Explanation:
NOT ANSWERED
NOT ANSWERED
NOT ANSWERED
NOT ANSWERED

If the prequalified bidder's status changes, he shall immediately submit a new fully executed non-collusion affidavit and debarment certification with an explanation of the change to the Contract Office prior to submitting the bid.

Failure to furnish a certification or an explanation will be grounds for rejection of a bid

AWARD LIMITS ON MULTIPLE PROJECTS

By answering YES to this statement, the bidder acknowledges that they are using the award limits on multiple projects. No

A bidder who desires to bid on more than one project on which bids are to be opened on the same date, and who also desires to avoid receiving an award of more projects than he is equipped to handle, may bid on any number of projects but may limit the total amount of work awarded to him on selected projects by completing the AWARD LIMITS ON MULTIPLE PROJECTS.

The Award Limits on Multiple Projects must be filled in on each project bid for which the Bidder desires protection.

It is the desire of the Bidder to be awarded contracts, the value of which will not exceed a total of NOT ANSWERED for those projects indicated herein, for which bids will be opened on (MM/DD/YY)

The Award Limits shall apply to the following projects:

Contract Number	County
NOT ANSWERED	

It is agreed that if I am (we are) the low Bidder(s) on indicated projects, the total value of which is more than the above stipulated award limits, the Board of Transportation will award me (us) projects from among those indicated that have a total value not to exceed the award limit and will result in the lowest total bids to the Department of Transportation.

PROPOSAL: C203484
 LETTING: L141021 CALL: 002
 VENDOR: 8887 Dragados USA Inc

LINE NO.	ITEM NO.	ITEM DESC.	UNIT TYPE	SUBCONTRACTOR QUANTITY	SUBCONTRACTOR UNIT PRICE	EXTENDED AMOUNT
DBE SUBCONTRACTOR: 4880 TRICOR CONSTRUCTION, INC. Will Use Quote: Yes						
0433	8801000000-E	MSE RETAIN W SF		6334.000	40.00000	253360.00
DBE COMMITMENT TOTAL FOR SUBCONTRACTOR:						253,360.00 Committed
DBE COMMITMENT TOTAL FOR VENDOR (SubContractor)						253,360

DBE SUBCONTRACTOR: 5487 ATLANTIC CONTRACTING COMPANY, INC.
 Will Use Quote: Yes

0101	1000000000-E	6" SLOPE PRO SY		800.000		
DBE COMMITMENT TOTAL FOR SUBCONTRACTOR:						0.00
DBE COMMITMENT TOTAL FOR VENDOR (SubContractor)						0.00

DBE SUBCONTRACTOR: 7402 REGIONAL SITE SOLUTIONS INC
 Will Use Quote: Yes

0165	2451000000-N	CONC TRANS S EA		1.000	250.00000	250.00
0166	2542000000-E	1'-6" CONC C LF		2420.000	13.50000	32670.00
0167	2549000000-E	2'-6" CONC C LF		5260.000	16.85000	88631.00
0168	2556000000-E	SHOULDER BER LF		12000.000	15.50000	186000.00
0169	2570000000-N	MODIFIED CON EA		6.000	750.00000	4500.00
0170	2612000000-E	6" CONCRETE SY		140.000	41.50000	5810.00
0172	2655000000-E	5" MONO CONC SY		400.000	55.00000	22000.00
0171	2619000000-E	4" CONCRETE SY		260.000	45.00000	11700.00
DBE COMMITMENT TOTAL FOR SUBCONTRACTOR:						351,561.00 Committed
DBE COMMITMENT TOTAL FOR VENDOR (SubContractor)						351,561

DBE SUBCONTRACTOR: 3765 STAY ALERT SAFETY SERVICES INC
 Will Use Quote: Yes

0249	4520000000-N	TUBULAR MARK EA		120.000	33.80000	4056.00
0265	4915000000-E	7' U-CHANNEL EA		24.000	24.90000	597.60
0266	4935000000-N	FLEX DELINAT EA		90.000	31.95000	2875.50
0267	4940000000-N	FLEX DELINAT EA		56.000	31.95000	1789.20
0268	4945000000-N	FLEX DELINAT EA		5.000	31.95000	159.75
0269	4950000000-N	FLEX DELINAT EA		5.000	31.95000	159.75
0270	4955000000-N	OBJECT MARKE EA		24.000	50.00000	1200.00
0232	4400000000-E	WORK ZONE SI SF		2382.000	3.78000	9003.96
0233	4405000000-E	WORK ZONE SI SF		1147.000	7.89000	9049.83
0234	4410000000-E	WORK ZONE SI SF		1183.000	4.15000	4909.45
0235	4415000000-N	FLASHING ARR EA		4.000	2348.00000	9392.00
0237	4422000000-N	PORT CHANGE DAY		379.000	28.80000	10915.20
0236	4420000000-N	PORTABLE CHA EA		14.000	8448.00000	118272.00

LINE NO.	ITEM NO.	ITEM DESC.	UNIT TYPE	SUBCONTRACTOR QUANTITY	SUBCONTRACTOR UNIT PRICE	EXTENDED AMOUNT
0238	4430000000-N	DRUMS	EA	880.000	39.94000	35147.20
0239	4435000000-N	CONES	EA	50.000	15.85000	792.50
0240	4445000000-E	BARRICADES (LF		1200.000	16.85000	20220.00

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 228,539.94 Committed
 DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 228,539

DBE SUBCONTRACTOR: 4861 PEACHTREE TELECOMMUNICATIONS
 Will Use Quote: Yes

0348	7060000000-E	SIGNAL CABLE LF		1750.000	3.43000	6002.50
0349	7120000000-E	VEHICLE SIGN EA		13.000	703.26000	9142.38
0350	7252000000-E	MESSENGER CA LF		12699.000	2.04000	25905.96
0351	7264000000-E	MESSENGER CA LF		1200.000	2.36000	2832.00
0352	7276000000-E	BORE & JACK LF		270.000	45.76000	12355.20
0354	7300000000-E	UNPAVED TREN LF		1225.000	1.93000	2364.25
0355	7301000000-E	DIRECT DRILL LF		386.000	3.23000	1246.78
0356	7301000000-E	DIRECT DRILL LF		10001.000	4.86000	48604.86
0357	7312000000-N	JUNCTION BOX EA		11.000	774.46000	8519.06
0358	7324000000-N	JUNCTION BOX EA		27.000	342.01000	9234.27
0359	7348000000-N	JUNCTION BOX EA		45.000	524.72000	23612.40
0361	7372000000-N	GUY ASSEMBLY EA		40.000	391.30000	15652.00
0362	7408000000-E	1" RISER WIT EA		2.000	363.85000	727.70
0363	7420000000-E	2" RISER WIT EA		9.000	405.33000	3647.97
0364	7432000000-E	2" RISER WIT EA		6.000	347.83000	2086.98
0365	7444000000-E	INDUCTIVE LO LF		1350.000	0.58000	783.00
0366	7456000000-E	LEAD-IN CABL LF		4300.000	2.73000	11739.00
0367	7516000000-E	COMMUNICATIO LF		26023.000	2.59000	67399.57
0368	7516000000-E	COMMUNICATIO LF		24601.000	1.83000	45019.83
0369	7528000000-E	DROP CABLE LF		1639.000	1.36000	2229.04
0370	7540000000-N	SPLICE ENCLO EA		7.000	2282.61000	15978.27
0371	7541000000-N	MOD SPLICE E EA		2.000	3994.57000	7989.14
0372	7552000000-N	INTERCONNECT EA		5.000	1059.78000	5298.90
0373	7566000000-N	DELINEATOR M EA		49.000	92.39000	4527.11
0374	7575142000-N	900MHZ RADIO EA		2.000	3712.24000	7424.48
0375	7575142200-N	NEW ELECTRIC EA		7.000	2671.08000	18697.56
0376	7575160000-E	REM EXT COMM LF		24611.000	0.82000	20181.02
0377	7613000000-N	SOIL TEST EA		4.000	656.96000	2627.84
0378	7614100000-E	DRILLED PIER CY		32.000	656.96000	21022.72
0379	7636000000-N	SIGN FOR SIG EA		5.000	305.11000	1525.55
0380	7684000000-N	SIGNAL CABIN EA		2.000	1238.26000	2476.52
0381	7756000000-N	CONTRLR WITH EA		2.000	11715.76000	23431.52
0382	7780000000-N	DETECTOR CAR EA		6.000	116.11000	696.66
0383	7901000000-N	CABINET BASE EA		2.000	437.31000	874.62
0384	7980000000-N	GENERIC SIGN EA		4.000	1348.37000	5393.48
0385	7980000000-N	GENERIC SIGN EA		27.000	256.52000	6926.04
0386	7980000000-N	GENERIC SIGN EA		1.000	2476.90000	2476.90
0387	7980000000-N	GENERIC SIGN EA		5.000	4104.40000	20522.00
0388	7980000000-N	GENERIC SIGN EA		5.000	4023.37000	20116.85
0389	7980000000-N	GENERIC SIGN EA		2.000	7163.59000	14327.18
0390	7980000000-N	GENERIC SIGN EA		1.000	999.46000	999.46

LINE NO.	ITEM NO.	ITEM DESC.	UNIT TYPE	SUBCONTRACTOR QUANTITY	SUBCONTRACTOR UNIT PRICE	EXTENDED AMOUNT
0393	7980000000-N	GENERIC SIGN	EA	1.000		
0394	7980000000-N	GENERIC SIGN	EA	6.000		
0395	7980000000-N	GENERIC SIGN	EA	6.000		
0396	7980000000-N	GENERIC SIGN	EA	2.000		
0397	7980000000-N	GENERIC SIGN	EA	3.000		
0398	7980000000-N	GENERIC SIGN	EA	1.000		
0399	7980000000-N	GENERIC SIGN	EA	2.000		
0400	7980000000-N	GENERIC SIGN	EA	2.000		
0401	7980000000-N	GENERIC SIGN	EA	7.000		
0402	7980000000-N	GENERIC SIGN	EA	2.000		
0403	7980000000-N	GENERIC SIGN	EA	7.000		
0404	7980000000-N	GENERIC SIGN	EA	1.000		
0405	7980000000-N	GENERIC SIGN	EA	2.000		
0406	7980000000-N	GENERIC SIGN	EA	2.000		
0407	7980000000-N	GENERIC SIGN	EA	1.000		
0408	7980000000-N	GENERIC SIGN	EA	1.000		
0409	7980000000-N	GENERIC SIGN	EA	1.000		
0410	7980000000-N	GENERIC SIGN	EA	1.000		
0411	7980000000-N	GENERIC SIGN	EA	1.000		
0412	7980000000-N	GENERIC SIGN	EA	1.000		
0413	7980000000-N	GENERIC SIGN	EA	1.000		
0414	7980000000-N	GENERIC SIGN	EA	1.000		
0416	7980000000-N	GENERIC SIGN	EA	1.000		
0415	7980000000-N	GENERIC SIGN	EA	1.000		
0417	7985000000-N	GENERIC SIGN	LS	1.000		
0418	7990000000-E	GENERIC SIGN	LF	3178.000		
0419	7990000000-E	GENERIC SIGN	LF	785.000		
0420	7990000000-E	GENERIC SIGN	LF	2655.000		
0421	7990000000-E	GENERIC SIGN	LF	23460.000		
0422	7992000000-E	GENERIC SIGN	CY	16.000		
0353	7279000000-E	TRACER WIRE	LF	33556.000	0.54000	18120.24
0360	7360000000-N	WOOD POLE	EA	88.000	312.03000	27458.64
0391	7980000000-N	GENERIC SIGN	EA	2.000	10226.67000	20453.34
0392	7980000000-N	GENERIC SIGN	EA	2.000	14369.26000	28738.52

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 597,389.31 Committed
 DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 597,389

DBE SUBCONTRACTOR: 3026 KNOX CONTRACT SEEDING INC
 Will Use Quote: Yes

0312	6000000000-E	TEMPORARY SI	LF	249000.000	1.33000	331170.00
0316	6015000000-E	TEMPORARY MU	ACR	500.000	760.00000	380000.00
0317	6018000000-E	SEED FOR TEM	LB	82400.000	1.66000	136784.00
0318	6021000000-E	FERT FOR TEM	TON	357.000	570.00000	203490.00
0320	6029000000-E	SAFETY FENCE	LF	65400.000	1.00000	65400.00
0322	6036000000-E	MATTING FOR	SY	600000.000	1.09000	654000.00
0323	6037000000-E	COIR FIBER M	SY	3150.000	4.75000	14962.50
0324	6038000000-E	PERM SOIL RE	SY	10000.000	4.75000	47500.00
0325	6042000000-E	1/4" HARDWAR	LF	16350.000	2.14000	34989.00
0330	6071012000-E	COIR FIBER W	LF	15600.000	7.60000	118560.00

LINE NO.	ITEM NO.	ITEM DESC.	UNIT TYPE	SUBCONTRACTOR QUANTITY	SUBCONTRACTOR UNIT PRICE	EXTENDED AMOUNT
0331	6071020000-E	POLYACRYLAMI	LB	11150.000	4.75000	52962.50
0332	6071030000-E	COIR FIBER B	LF	50000.000	4.04000	202000.00
0336	6084000000-E	SEEDING AND	ACR	600.000	1349.00000	809400.00
0337	6087000000-E	MOWING	ACR	300.000	66.50000	19950.00
0338	6090000000-E	SEED FOR REP	LB	7200.000	1.90000	13680.00
0339	6093000000-E	FERT FOR REP	TON	28.750	593.75000	17070.31
0340	6096000000-E	SEED FOR SUP	LB	14350.000	2.85000	40897.50
0341	6108000000-E	FERTILIZER T	TON	430.000	712.50000	306375.00
0343	6114500000-N	SPECIALIZED	MHR	515.000	47.50000	24462.50
0344	6117000000-N	RESPONSE FOR	EA	150.000	95.00000	14250.00
0346	6123000000-E	REFORESTATIO	ACR	10.000	807.50000	8075.00
0347	6126000000-E	STREAMBANK R	ACR	1.000	760.00000	760.00

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 3,496,738.31 Committed
 DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 3,496,7

DBE SUBCONTRACTOR: 4247 SEAL BROTHERS CONTRACTING LLC
 Will Use Quote: Yes

0188	3503000000-E	WOVEN WIRE F	LF	57800.000	1.85000	106930.00
0189	3509000000-E	4" TIMBER PO	EA	3670.000	14.00000	51380.00
0190	3515000000-E	5" TIMBER PO	EA	840.000	18.00000	15120.00
0191	3557000000-E	ADDITIONAL B	LF	500.000	0.10000	50.00

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 173,480.00
 DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 173,480

DBE SUBCONTRACTOR: 12802 NICKELSTON INDUSTRIES, INC.
 Will Use Quote: Yes

0177	3000000000-N	IMPACT ATTEN	EA	1.000	13250.00000	13250.00
0178	3030000000-E	STL BM GUARD	LF	98212.500	14.10000	1384796.25
0179	3045000000-E	SBGR SHOP CU	LF	212.500	14.15000	3006.88
0180	3105000000-N	SBGR TERM SE	EA	16.000	30.00000	480.00
0181	3150000000-N	ADDIT GUARDR	EA	10.000	1.00000	10.00
0182	3210000000-N	GR ANCHOR TY	EA	44.000	410.00000	18040.00
0183	3215000000-N	GR ANCHOR TY	EA	8.000	1400.00000	11200.00
0184	3270000000-N	GR ANCHOR TY	EA	73.000	1625.00000	118625.00
0185	3285000000-N	GR ANCHOR TY	EA	2.000	1600.00000	3200.00
0186	3317000000-N	GR ANCHOR TY	EA	68.000	1500.00000	102000.00
0187	3360000000-E	REMOVE EXIST	LF	37138.000	0.01000	371.38

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 1,654,979.51
 DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 1,654,9

DBE SUBCONTRACTOR: 4761 TRAFFIC CONTROL SAFETY SERVICES, INC.
 Will Use Quote: Yes

0242	4465000000-N	TEMPORARY CR	EA	10.000	4000.00000	40000.00
0243	4470000000-N	RESET CRASH	EA	8.000	1200.00000	9600.00
0244	4480000000-N	TMA	EA	4.000	18000.00000	72000.00

LINE NO.	ITEM NO.	ITEM DESC.	UNIT TYPE	SUBCONTRACTOR QUANTITY	SUBCONTRACTOR UNIT PRICE	EXTENDED AMOUNT
0245	4485000000-E	PORT CONC BA	LF	2908.000	18.00000	52344.00
0246	4490000000-E	PORT CONC BA	LF	23400.000	35.00000	819000.00
0247	4500000000-E	RESET PORT C	LF	6375.000	4.00000	25500.00
0199	4048000000-E	REINF CONC F	CY	10.000	650.00000	6500.00
0230	4152000000-N	DISPOSE SIGN	EA	8.000	500.00000	4000.00
0231	4155000000-N	DISPOSE SIGN	EA	48.000	1.00000	48.00
0229	4143000000-N	DISPOSE SUPP	EA	1.000	2000.00000	2000.00
0228	4116100000-N	SIGN ERECT,	EA	1.000	100.00000	100.00
0227	4114000000-N	SIGN ERECTIO	EA	16.000	50.00000	800.00
0226	4110000000-N	SIGN ERECTIO	EA	2.000	200.00000	400.00
0225	4110000000-N	SIGN ERECTIO	EA	8.000	350.00000	2800.00
0224	4108000000-N	SIGN ERECTIO	EA	10.000	100.00000	1000.00
0223	4102000000-N	SIGN ERECTIO	EA	124.000	50.00000	6200.00
0222	4096000000-N	SIGN ERECTIO	EA	9.000	100.00000	900.00
0221	4082100000-N	SUPPORT, OVR	LS	1.000	83000.00000	83000.00
0220	4082100000-N	SUPPORT, OVR	LS	1.000	28000.00000	28000.00
0219	4082100000-N	SUPPORT, OVR	LS	1.000	40000.00000	40000.00
0218	4082100000-N	SUPPORT, OVR	LS	1.000	28500.00000	28500.00
0217	4082100000-N	SUPPORT, OVR	LS	1.000	39500.00000	39500.00
0216	4082100000-N	SUPPORT, OVR	LS	1.000	42000.00000	42000.00
0215	4082100000-N	SUPPORT, OVR	LS	1.000	53000.00000	53000.00
0214	4082100000-N	SUPPORT, OVR	LS	1.000	38500.00000	38500.00
0213	4082100000-N	SUPPORT, OVR	LS	1.000	48000.00000	48000.00
0212	4082100000-N	SUPPORT, OVR	LS	1.000	48500.00000	48500.00
0211	4082100000-N	SUPPORT, OVR	LS	1.000	40000.00000	40000.00
0210	4082100000-N	SUPPORT, OVR	LS	1.000	44000.00000	44000.00
0209	4082100000-N	SUPPORT, OVR	LS	1.000	75000.00000	75000.00
0208	4082100000-N	SUPPORT, OVR	LS	1.000	52000.00000	52000.00
0207	4082100000-N	SUPPORT, OVR	LS	1.000	75000.00000	75000.00
0206	4082100000-N	SUPPORT, OVR	LS	1.000	104000.00000	104000.00
0204	4082100000-N	SUPPORT, OVR	LS	1.000	38000.00000	38000.00
0205	4082100000-N	SUPPORT, OVR	LS	1.000	49000.00000	49000.00
0203	4072000000-E	SUPPORT, 3-L	LF	3333.000	5.00000	16665.00
0202	4066000000-E	SUPPORTS, SI	LB	4261.000	3.00000	12783.00
0201	4060000000-E	SUPPORT, BRE	LB	3151.000	3.55000	11186.05
0200	4057000000-E	OVERHEAD FOO	CY	406.000	750.00000	304500.00

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 2,314,326.05 Committed
 DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 2,314,3

DBE SUBCONTRACTOR: 4260 JORGE AGUILA CARRILLO DBA AGUILA'S MASONRY SERVICE
 Will Use Quote: Yes

0151	2286000000-N	MASNRY DRAIN	EA	365.000	970.00000	354050.00
0152	2297000000-E	MASNRY DRAIN	CY	34.000	1200.00000	40800.00
0153	2308000000-E	MASNRY DRAIN	LF	242.000	194.00000	46948.00
0154	2354000000-N	FRAME W/GRAT	EA	6.000	743.60000	4461.60
0155	2364000000-N	FRAME W/2GRT	EA	1.000	559.35000	559.35
0156	2364200000-N	FRAME W/2GRT	EA	75.000	558.14000	41860.50
0157	2365000000-N	FRAME W/2GRT	EA	231.000	833.14000	192455.34
0158	2366000000-N	FRAME W/2GRT	EA	10.000	840.40000	8404.00

LINE NO.	ITEM NO.	ITEM DESC.	UNIT TYPE	SUBCONTRACTOR QUANTITY	SUBCONTRACTOR UNIT PRICE	EXTENDED AMOUNT
0159	2367000000-N	FRAME W/2GRT	EA	18.000	558.14000	10046.52
0160	2374000000-N	FRAME-GRT-HD	EA	5.000	610.95000	3054.75
0161	2374000000-N	FRAME-GRT-HD	EA	3.000	635.15000	1905.45
0162	2374000000-N	FRAME-GRT-HD	EA	8.000	635.15000	5081.20
0163	2396000000-N	FRAME W/COVE	EA	27.000	462.54000	12488.58
0164	2407000000-N	STL FRAM W/	EA	2.000	1750.00000	3500.00
0175	2860000000-N	CONVERT CB T	EA	3.000	750.00000	2250.00
0176	2995000000-N	GENERIC DRAI	EA	14.000	750.00000	10500.00

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 738,365.29 Committed
 DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 738,365

DBE SUBCONTRACTOR: 12445 CUT-RITE CONCRETE CUTTING INC OF NORTH CAROLINA
 Will Use Quote: Yes

0005	0001000000-E	CLEARING & G	LS	1.000	91491.75000	91491.75
0127	1847000000-E	*****"PCC P	SY	257000.000	2.65200	681564.00
0128	1869000000-E	*****"PCC P	SY	11000.000	2.65200	29172.00
0132	1913000000-E	CONC SHLD AD	SY	51000.000	2.65200	135252.00

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 937,479.75 Committed
 DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 937,479

DBE SUBCONTRACTOR: 2432 ACE STEEL OF NORTH CAROLINA, LLC
 Will Use Quote: Yes

0476	8147000000-E	REINF CONCRE	SF	225152.000	0.63000	141845.76
0477	8154000000-E	REINF CONC D	SF	42278.000	0.66000	27903.48

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 169,749.24 Committed
 DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 169,749

DBE SUBCONTRACTOR: 4417 POZZOLANIC CONTRACTING & SUPPLY COMPANY, INC.
 Will Use Quote: Yes

0103	1044000000-E	LIME TRTD SO	SY	130610.000	2.40000	313464.00
0104	1066000000-E	LIME FOR LIM	TON	1380.000	198.50000	273930.00
0111	1176000000-E	SOIL CEMENT	SY	195910.000	2.30000	450593.00
0112	1187000000-E	PC FOR SOIL	TON	5486.000	136.50000	748839.00
0113	1209000000-E	ASPHALT CURI	GAL	48980.000	3.25000	159185.00

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 1,946,011.00 Committed
 DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 1,946,0

DBE SUBCONTRACTOR: 12278 CLIFTON CONSTRUCTION CO., INC.
 Will Use Quote: Yes

0135	2022000000-E	SUBDRAIN EXC	CY	2688.000	21.50000	57792.00
0136	2026000000-E	GEOTEXTILE F	SY	12000.000	5.00000	60000.00
0137	2036000000-E	SUBDRAIN COA	CY	2016.000	55.00000	110880.00
0138	2044000000-E	6" PERF SUBD	LF	12000.000	12.50000	150000.00

LINE NO.	ITEM NO.	ITEM DESC.	UNIT TYPE	SUBCONTRACTOR QUANTITY	SUBCONTRACTOR UNIT PRICE	EXTENDED AMOUNT
0139	2070000000-N	SUBDRN PIPE	EA	24.000	350.00000	8400.00
0140	2077000000-E	6" OUTLET PI	LF	144.000	30.00000	4320.00
0141	2099000000-E	SHOULDER DRA	LF	22800.000	7.80000	177840.00
0142	2110000000-E	4" SHOULDER	LF	22800.000	1.50000	34200.00
0143	2121000000-E	4" OUTLET PI	LF	840.000	14.00000	11760.00
0144	2132000000-N	CONC PAD SHL	EA	10.000	325.00000	3250.00

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 618,442.00 Committed
 DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 618,442

DBE SUBCONTRACTOR: 5081 ANDREW HAULING AND GRADING, INC.
 Will Use Quote: Yes

0008	0022000000-E	UNCLASSIFIED	CY	3571000.000	1.25000	4463750.00
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DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 4,463,750.00 Committed
 DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 4,463,7

DBE SUBCONTRACTOR: 4867 STEWART HAULING & BACKHOE
 Will Use Quote: Yes

0028	0106000000-E	BORROW EXCAV	CY	2900000.000	1.25000	3625000.00
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DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 3,625,000.00 Committed
 DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 3,625,0

DBE SUBCONTRACTOR: 4434 LONG BROTHERS OF SUMMERFIELD, INC.
 Will Use Quote: Yes

0102	1011000000-N	FINE GRADING	LS	1.000	750000.00000	750000.00
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DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 750,000.00 Committed
 DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 750,000

TOTAL DBE COMMITMENT FOR VENDOR: Entered: 14.49% or 22319171.40
 Required: 14.00% or 21559993.00
 <GOAL MET>

THIS PROPOSAL CONTAINS THE FOLLOWING ERRORS/WARNINGS (IF ANY)

This Bid contains 2 amendment files

00001 09-30-14 ADD, DELETE & MODIFY ITEMS
00002 10-09-14 DELETE & MODIFY ITEMS

Electronic Bid Submission

By submitting this bid electronically, I hereby acknowledge that all requirements included in the hard copy proposal, addendum, amendments, plans, standard specifications, supplemental specifications and special provisions are part of the bid and contract. Further, I acknowledge that I have read, understand, accept, acknowledge and agree to comply with all statements in this electronic bid.

I Hereby certify that I have the authority to submit this bid.

Signature

Agency

Date

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
ROADWAY ITEMS						
0001	0000100000-N	800	MOBILIZATION	Lump Sum LS	7,250,000.00	7,250,000.00
0002	0000400000-N	801	CONSTRUCTION SURVEYING	Lump Sum LS	1,766,345.00	1,766,345.00
0004	0000700000-N	SP	FIELD OFFICE	Lump Sum LS	85,907.36	85,907.36
0005	0001000000-E	200	CLEARING & GRUBBING .. ACRE(S)	Lump Sum LS	950,000.00	950,000.00
0006	0008000000-E	200	SUPPLEMENTARY CLEARING & GRUB- BING	5 ACR	4,500.00	22,500.00
0007	0015000000-N	205	SEALING ABANDONED WELLS	29 EA	1,076.24	31,210.96
0008	0022000000-E	225	UNCLASSIFIED EXCAVATION	3,571,000 CY	4.38	15,640,980.00
0009	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (17+10.18-Y4RPA-)	Lump Sum LS	33,325.07	33,325.07
0010	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (20+20.21-Y2-)	Lump Sum LS	24,520.42	24,520.42
0011	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (23+54.25-Y5-)	Lump Sum LS	30,113.53	30,113.53
0012	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (26+48.62-Y4RPBD-)	Lump Sum LS	23,124.11	23,124.11
0013	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (28+75.85-Y5-)	Lump Sum LS	25,832.64	25,832.64
0014	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (33+16.49-Y4CD-)	Lump Sum LS	22,395.83	22,395.83
0015	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (34+08.68-Y1-)	Lump Sum LS	65,194.06	65,194.06
0016	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (44+18.64-Y4RPBD-)	Lump Sum LS	39,884.57	39,884.57
0017	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (46+83.44-Y4CD-)	Lump Sum LS	33,412.19	33,412.19

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0018	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (53+21.16-Y4RPBD-)	Lump Sum LS	32,401.61	32,401.61
0019	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (556+85.00-L-LT)	Lump Sum LS	39,353.58	39,353.58
0020	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (556+85.00-L-RT)	Lump Sum LS	39,353.58	39,353.58
0021	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (584+17.77-L-LT)	Lump Sum LS	56,961.25	56,961.25
0022	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (584+24.18-L-RT)	Lump Sum LS	56,961.25	56,961.25
0023	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (628+57.75-L-RT)	Lump Sum LS	51,286.93	51,286.93
0024	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (628+74.47-L-LT)	Lump Sum LS	51,286.93	51,286.93
0025	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (642+75.24-L-LT)	Lump Sum LS	42,406.89	42,406.89
0026	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ***** (642+80.18-L-RT)	Lump Sum LS	52,477.65	52,477.65
0027	0036000000-E	225	UNDERCUT EXCAVATION	7,500 CY	20.29	152,175.00
0028	0106000000-E	230	BORROW EXCAVATION	2,900,000 CY	4.03	11,687,000.00
0029	0134000000-E	240	DRAINAGE DITCH EXCAVATION	31,000 CY	2.89	89,590.00
0030	0141000000-E	240	BERM DITCH CONSTRUCTION	2,860 LF	8.49	24,281.40
0031	0156000000-E	250	REMOVAL OF EXISTING ASPHALT PAVEMENT	87,000 SY	2.49	216,630.00
0032	0177000000-E	250	BREAKING OF EXISTING ASPHALT PAVEMENT	18,000 SY	2.49	44,820.00
0033	0192000000-N	260	PROOF ROLLING	120 HR	204.53	24,543.60

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0034	0195000000-E	265	SELECT GRANULAR MATERIAL	23,000 CY	6.39	146,970.00
0035	0196000000-E	270	GEOTEXTILE FOR SOIL STABILIZATION	47,100 SY	1.50	70,650.00
0036	0199000000-E	SP	TEMPORARY SHORING	6,000 SF	23.22	139,320.00
0037	0220000000-E	SP	ROCK EMBANKMENTS	1,000 TON	13.60	13,600.00
0038	0222000000-E	SP	GEOTEXTILE FOR ROCK EMBANKMENTS	820 SY	1.55	1,271.00
0039	0223000000-E	275	ROCK PLATING	3,500 SY	80.21	280,735.00
0040	0318000000-E	300	FOUNDATION CONDITIONING MATERIAL, MINOR STRUCTURES	6,836 TON	37.73	257,922.28
0041	0320000000-E	300	FOUNDATION CONDITIONING GEOTEXTILE	23,076 SY	2.38	54,920.88
0042	0342000000-E	310	*** SIDE DRAIN PIPE (30")	4,352 LF	46.21	201,105.92
0043	0342000000-E	310	*** SIDE DRAIN PIPE (36")	864 LF	62.87	54,319.68
0044	0342000000-E	310	*** SIDE DRAIN PIPE (42")	2,172 LF	76.75	166,701.00
0045	0342000000-E	310	*** SIDE DRAIN PIPE (48")	52 LF	138.59	7,206.68
0046	0342000000-E	310	*** SIDE DRAIN PIPE (54")	84 LF	371.66	31,219.44
0047	0342000000-E	310	*** SIDE DRAIN PIPE (60")	604 LF	198.40	119,833.60
0048	0343000000-E	310	15" SIDE DRAIN PIPE	12,240 LF	25.98	317,995.20
0049	0344000000-E	310	18" SIDE DRAIN PIPE	5,968 LF	27.30	162,926.40
0050	0345000000-E	310	24" SIDE DRAIN PIPE	4,348 LF	44.57	193,790.36
0051	0348000000-E	310	*** SIDE DRAIN PIPE ELBOWS (15")	72 EA	281.88	20,295.36

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0052	0348000000-E	310	***I SIDE DRAIN PIPE ELBOWS (18")	20 EA	364.94	7,298.80
0053	0348000000-E	310	***I SIDE DRAIN PIPE ELBOWS (24")	7 EA	493.70	3,455.90
0054	0348000000-E	310	***I SIDE DRAIN PIPE ELBOWS (30")	7 EA	617.13	4,319.91
0055	0348000000-E	310	***I SIDE DRAIN PIPE ELBOWS (36")	2 EA	740.55	1,481.10
0056	0350000000-E	SP	**** RC PIPE CULVERTS, CON- TRACTOR DESIGN (18")	484 LF	21.95	10,623.80
0057	0350000000-E	SP	**** RC PIPE CULVERTS, CON- TRACTOR DESIGN (36")	380 LF	78.03	29,651.40
0058	0350000000-E	SP	**** RC PIPE CULVERTS, CON- TRACTOR DESIGN (42")	1,308 LF	93.45	122,232.60
0059	0350000000-E	SP	**** RC PIPE CULVERTS, CON- TRACTOR DESIGN (48")	1,276 LF	110.30	140,742.80
0060	0350000000-E	SP	**** RC PIPE CULVERTS, CON- TRACTOR DESIGN (60")	308 LF	179.73	55,356.84
0061	0354000000-E	310	**** RC PIPE CULVERTS, CLASS ***** (24", V)	408 LF	59.85	24,418.80
0062	0354000000-E	310	**** RC PIPE CULVERTS, CLASS ***** (30", V)	460 LF	72.52	33,359.20
0063	0354000000-E	310	**** RC PIPE CULVERTS, CLASS ***** (36", V)	472 LF	90.41	42,673.52
0064	0354000000-E	310	**** RC PIPE CULVERTS, CLASS ***** (54", V)	368 LF	179.71	66,133.28
0065	0354000000-E	310	**** RC PIPE CULVERTS, CLASS ***** (72", V)	324 LF	279.60	90,590.40

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0066	0366000000-E	310	15" RC PIPE CULVERTS, CLASS III	4,292 LF	23.66	101,548.72
0067	0372000000-E	310	18" RC PIPE CULVERTS, CLASS III	2,644 LF	23.51	62,160.44
0068	0378000000-E	310	24" RC PIPE CULVERTS, CLASS III	1,080 LF	46.27	49,971.60
0069	0384000000-E	310	30" RC PIPE CULVERTS, CLASS III	1,064 LF	55.29	58,828.56
0070	0390000000-E	310	36" RC PIPE CULVERTS, CLASS III	380 LF	76.38	29,024.40
0071	0396000000-E	310	42" RC PIPE CULVERTS, CLASS III	104 LF	86.88	9,035.52
0072	0402000000-E	310	48" RC PIPE CULVERTS, CLASS III	124 LF	134.84	16,720.16
0073	0448000000-E	310	****" RC PIPE CULVERTS, CLASS IV (48")	528 LF	121.91	64,368.48
0074	0448000000-E	310	****" RC PIPE CULVERTS, CLASS IV (60")	1,020 LF	190.54	194,350.80
0075	0448200000-E	310	15" RC PIPE CULVERTS, CLASS IV	3,780 LF	28.93	109,355.40
0076	0448300000-E	310	18" RC PIPE CULVERTS, CLASS IV	1,540 LF	29.20	44,968.00
0077	0448400000-E	310	24" RC PIPE CULVERTS, CLASS IV	404 LF	47.08	19,020.32
0078	0448500000-E	310	30" RC PIPE CULVERTS, CLASS IV	880 LF	55.14	48,523.20
0079	0448700000-E	310	42" RC PIPE CULVERTS, CLASS IV	504 LF	90.58	45,652.32
0080	0576000000-E	310	***" CS PIPE CULVERTS, ***** THICK (36", 0.079")	172 LF	74.22	12,765.84
0081	0576000000-E	310	***" CS PIPE CULVERTS, ***** THICK (42", 0.109")	28 LF	115.28	3,227.84

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0082	0576000000-E	310	*** CS PIPE CULVERTS, ***** THICK (54", 0.109")	260 LF	142.03	36,927.80
0083	0582000000-E	310	15" CS PIPE CULVERTS, 0.064" THICK	1,256 LF	22.32	28,033.92
0084	0588000000-E	310	18" CS PIPE CULVERTS, 0.064" THICK	588 LF	41.12	24,178.56
0085	0594000000-E	310	24" CS PIPE CULVERTS, 0.064" THICK	368 LF	34.24	12,600.32
0086	0600000000-E	310	30" CS PIPE CULVERTS, 0.079" THICK	164 LF	71.31	11,694.84
0087	0636000000-E	310	*** CS PIPE ELBOWS, ***** THICK (15", 0.064")	10 EA	123.89	1,238.90
0088	0636000000-E	310	*** CS PIPE ELBOWS, ***** THICK (18", 0.064")	3 EA	147.17	441.51
0089	0636000000-E	310	*** CS PIPE ELBOWS, ***** THICK (24", 0.064")	2 EA	222.56	445.12
0090	0636000000-E	310	*** CS PIPE ELBOWS, ***** THICK (42", 0.109")	1 EA	476.47	476.47
0092	0973100000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B IN SOIL (36", 0.500")	227 LF	438.09	99,446.43
0093	0973100000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B IN SOIL (42", 0.625")	348 LF	526.80	183,326.40
0094	0973100000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B IN SOIL (48", 0.625")	180 LF	708.80	127,584.00
0096	0973300000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B NOT IN SOIL (36", 0.500")	227 LF	1,188.09	269,696.43
0097	0973300000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B NOT IN SOIL (42", 0.625")	348 LF	1,166.80	406,046.40

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0098	0973300000-E	330	*** WELDED STEEL PIPE, ***** THICK, GRADE B NOT IN SOIL (48", 0.625")	180 LF	1,248.80	224,784.00
0099	0986000000-E	SP	GENERIC PIPE ITEM 8" DUCTILE IRON PIPE	548 LF	36.00	19,728.00
0100	0995000000-E	340	PIPE REMOVAL	4,363 LF	14.90	65,008.70
0101	1000000000-E	462	6" SLOPE PROTECTION	800 SY	65.00	52,000.00
0102	1011000000-N	500	FINE GRADING	Lump Sum LS	3,500,000.00	3,500,000.00
0103	1044000000-E	501	LIME TREATED SOIL (SLURRY METHOD)	130,610 SY	2.40	313,464.00
0104	1066000000-E	501	LIME FOR LIME TREATED SOIL	1,380 TON	198.50	273,930.00
0105	1077000000-E	SP	#57 STONE	505 TON	25.00	12,625.00
0106	1099500000-E	505	SHALLOW UNDERCUT	5,000 CY	14.59	72,950.00
0107	1099700000-E	505	CLASS IV SUBGRADE STABILIZATION	9,500 TON	23.00	218,500.00
0108	1110000000-E	510	STABILIZER AGGREGATE	1,000 TON	24.00	24,000.00
0109	1115000000-E	SP	GEOTEXTILE FOR PAVEMENT STABILIZATION	275,035 SY	2.45	673,835.75
0110	1121000000-E	520	AGGREGATE BASE COURSE	90,000 TON	33.27	2,994,300.00
0111	1176000000-E	542	SOIL CEMENT BASE	195,910 SY	2.30	450,593.00
0112	1187000000-E	542	PORTLAND CEMENT FOR SOIL CEMENT BASE	5,486 TON	136.50	748,839.00
0113	1209000000-E	543	ASPHALT CURING SEAL	48,980 GAL	3.25	159,185.00
0114	1220000000-E	545	INCIDENTAL STONE BASE	2,000 TON	48.06	96,120.00
0115	1275000000-E	600	PRIME COAT	2,240 GAL	3.55	7,952.00
0116	1330000000-E	607	INCIDENTAL MILLING	2,650 SY	7.06	18,709.00

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0117	1489000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0B	57,000 TON	40.60	2,314,200.00
0118	1491000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0C	71,500 TON	42.50	3,038,750.00
0119	1498000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0B	12,500 TON	44.30	553,750.00
0120	1503000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C	40,000 TON	43.20	1,728,000.00
0121	1519000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5B	12,000 TON	48.70	584,400.00
0122	1523000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5C	51,000 TON	38.00	1,938,000.00
0123	1525000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE SF9.5A	23,000 TON	41.70	959,100.00
0124	1575000000-E	620	ASPHALT BINDER FOR PLANT MIX	13,445 TON	599.49	8,060,143.05
0125	1693000000-E	654	ASPHALT PLANT MIX, PAVEMENT REPAIR	235 TON	109.88	25,821.80
0126	1840000000-E	665	MILLED RUMBLE STRIPS (ASPHALT CONCRETE)	48,100 LF	0.25	12,025.00
0127	1847000000-E	710	***** PORT CEM CONC PAVEMENT, THROUGH LANES (WITH DOWELS) (12-1/2")	257,000 SY	60.00	15,420,000.00
0128	1869000000-E	710	***** PORT CEM CONC PAVEMENT, MISCELLANEOUS (WITHOUT DOWELS) (12-1/2")	11,000 SY	80.00	880,000.00
0129	1881000000-E	SP	GENERIC PAVING ITEM MILLED RUMBLE STRIPS (CONC. SHLD.)	41,100 LF	0.50	20,550.00
0130	1891000000-E	SP	GENERIC PAVING ITEM NONWOVEN GEOTEXTILE INTERLAYER	39,000 SY	2.30	89,700.00
0131	1902000000-N	710	SURFACE TESTING CONCRETE PAVEMENT	Lump Sum LS	135,000.00	135,000.00
0132	1913000000-E	720	CONCRETE SHOULDERS ADJACENT TO ***** PAVEMENT (12-1/2")	51,000 SY	57.50	2,932,500.00

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0133	1924000000-N	725	FIELD LABORATORY RENTAL, PORT CEM CONC PAVEMENT	Lump Sum LS	40,000.00	40,000.00
0134	2000000000-N	806	RIGHT OF WAY MARKERS	245 EA	145.00	35,525.00
0135	2022000000-E	815	SUBDRAIN EXCAVATION	2,688 CY	21.50	57,792.00
0136	2026000000-E	815	GEOTEXTILE FOR SUBSURFACE DRAINS	12,000 SY	5.00	60,000.00
0137	2036000000-E	815	SUBDRAIN COARSE AGGREGATE	2,016 CY	55.00	110,880.00
0138	2044000000-E	815	6" PERFORATED SUBDRAIN PIPE	12,000 LF	12.50	150,000.00
0139	2070000000-N	815	SUBDRAIN PIPE OUTLET	24 EA	350.00	8,400.00
0140	2077000000-E	815	6" OUTLET PIPE	144 LF	30.00	4,320.00
0141	2099000000-E	816	SHOULDER DRAIN	22,800 LF	7.80	177,840.00
0142	2110000000-E	816	4" SHOULDER DRAIN PIPE	22,800 LF	1.50	34,200.00
0143	2121000000-E	816	4" OUTLET PIPE FOR SHOULDER DRAINS	840 LF	14.00	11,760.00
0144	2132000000-N	816	CONCRETE PAD FOR SHOULDER DRAIN PIPE OUTLET	10 EA	325.00	3,250.00
0145	2143000000-E	818	BLOTTING SAND	20 TON	59.60	1,192.00
0146	2209000000-E	838	ENDWALLS	88.5 CY	781.80	69,189.30
0147	2220000000-E	838	REINFORCED ENDWALLS	33 CY	777.28	25,650.24
0148	2253000000-E	840	PIPE COLLARS	13 CY	647.03	8,411.39
0149	2264000000-E	840	PIPE PLUGS	3 CY	568.57	1,705.71
0150	2275000000-E	SP	FLOWABLE FILL	20 CY	145.52	2,910.40
0151	2286000000-N	840	MASONRY DRAINAGE STRUCTURES	365 EA	970.00	354,050.00
0152	2297000000-E	840	MASONRY DRAINAGE STRUCTURES	34 CY	1,200.00	40,800.00

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0153	2308000000-E	840	MASONRY DRAINAGE STRUCTURES	242 LF	194.00	46,948.00
0154	2354000000-N	840	FRAME WITH GRATE, STD 840.22	6 EA	743.60	4,461.60
0155	2364000000-N	840	FRAME WITH TWO GRATES, STD 840.16	1 EA	559.35	559.35
0156	2364200000-N	840	FRAME WITH TWO GRATES, STD 840.20	75 EA	558.14	41,860.50
0157	2365000000-N	840	FRAME WITH TWO GRATES, STD 840.22	231 EA	833.14	192,455.34
0158	2366000000-N	840	FRAME WITH TWO GRATES, STD 840.24	10 EA	840.40	8,404.00
0159	2367000000-N	840	FRAME WITH TWO GRATES, STD 840.29	18 EA	558.14	10,046.52
0160	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (E)	5 EA	610.85	3,054.25
0161	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (F)	3 EA	635.15	1,905.45
0162	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (G)	8 EA	635.15	5,081.20
0163	2396000000-N	840	FRAME WITH COVER, STD 840.54	27 EA	462.54	12,488.58
0164	2407000000-N	840	STEEL FRAME WITH TWO GRATES, STD 840.37	2 EA	1,750.00	3,500.00
0165	2451000000-N	852	CONCRETE TRANSITIONAL SECTION FOR DROP INLET	1 EA	250.00	250.00
0166	2542000000-E	846	1'-6" CONCRETE CURB & GUTTER	2,420 LF	13.50	32,670.00
0167	2549000000-E	846	2'-6" CONCRETE CURB & GUTTER	5,260 LF	16.85	88,631.00
0168	2556000000-E	846	SHOULDER BERM GUTTER	12,000 LF	15.50	186,000.00
0169	2570000000-N	SP	MODIFIED CONCRETE FLUME	6 EA	750.00	4,500.00
0170	2612000000-E	848	6" CONCRETE DRIVEWAY	140 SY	41.50	5,810.00

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0171	2619000000-E	850	4" CONCRETE PAVED DITCH	260 SY	45.00	11,700.00
0172	2655000000-E	852	5" MONOLITHIC CONCRETE ISLANDS (KEYED IN)	400 SY	55.00	22,000.00
0173	2724000000-E	857	PRECAST REINFORCED CONCRETE BARRIER, SINGLE FACED	12,970 LF	75.00	972,750.00
0174	2830000000-N	858	ADJUSTMENT OF MANHOLES	4 EA	415.15	1,660.60
0175	2860000000-N	859	CONVERT EXISTING CATCH BASIN TO JUNCTION BOX	3 EA	750.00	2,250.00
0176	2995000000-N	SP	GENERIC DRAINAGE ITEM CONVERT EXISTING OTCB TO 2GI	14 EA	750.00	10,500.00
0177	3000000000-N	SP	IMPACT ATTENUATOR UNIT, TYPE 350	1 EA	13,250.00	13,250.00
0178	3030000000-E	862	STEEL BM GUARDRAIL	98,212.5 LF	14.10	1,384,796.25
0179	3045000000-E	862	STEEL BM GUARDRAIL, SHOP CURVED	212.5 LF	14.15	3,006.88
0180	3105000000-N	862	STEEL BM GUARDRAIL TERMINAL SECTIONS	16 EA	30.00	480.00
0181	3150000000-N	862	ADDITIONAL GUARDRAIL POSTS	10 EA	1.00	10.00
0182	3210000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE CAT-1	44 EA	410.00	18,040.00
0183	3215000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE III	8 EA	1,400.00	11,200.00
0184	3270000000-N	SP	GUARDRAIL ANCHOR UNITS, TYPE 350	73 EA	1,625.00	118,625.00
0185	3285000000-N	SP	GUARDRAIL ANCHOR UNITS, TYPE M-350	2 EA	1,600.00	3,200.00
0186	3317000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE B-77	68 EA	1,500.00	102,000.00
0187	3360000000-E	863	REMOVE EXISTING GUARDRAIL	37,138 LF	0.01	371.38
0188	3503000000-E	866	WOVEN WIRE FENCE, 47" FABRIC	57,800 LF	1.85	106,930.00

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0189	3509000000-E	866	4" TIMBER FENCE POSTS, 7'-6" LONG	3,670 EA	14.00	51,380.00
0190	3515000000-E	866	5" TIMBER FENCE POSTS, 8'-0" LONG	840 EA	18.00	15,120.00
0191	3557000000-E	866	ADDITIONAL BARBED WIRE	500 LF	0.10	50.00
0192	3628000000-E	876	RIP RAP, CLASS I	3,100 TON	56.25	174,375.00
0193	3635000000-E	876	RIP RAP, CLASS II	1,250 TON	57.60	72,000.00
0194	3642000000-E	876	RIP RAP, CLASS A	20 TON	56.07	1,121.40
0195	3649000000-E	876	RIP RAP, CLASS B	5,940 TON	48.09	285,654.60
0196	3651000000-E	SP	BOULDERS	135 TON	78.36	10,578.60
0197	3656000000-E	876	GEOTEXTILE FOR DRAINAGE	29,850 SY	3.11	92,833.50
0198	3659000000-N	SP	PREFORMED SCOUR HOLES WITH LEVEL SPREADER APRON	11 EA	1,095.13	12,046.43
0199	4048000000-E	902	REINFORCED CONCRETE SIGN FOUNDATIONS	10 CY	650.00	6,500.00
0200	4057000000-E	SP	OVERHEAD FOOTING	406 CY	750.00	304,500.00
0201	4060000000-E	903	SUPPORTS, BREAKAWAY STEEL BEAM	3,151 LB	3.55	11,186.05
0202	4066000000-E	903	SUPPORTS, SIMPLE STEEL BEAM	4,261 LB	3.00	12,783.00
0203	4072000000-E	903	SUPPORTS, 3-LB STEEL U-CHANNEL	3,333 LF	5.00	16,665.00
0204	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (A - 28+00 -Y1RPA-)	Lump Sum LS	38,000.00	38,000.00
0205	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (B - 502+50 -L-)	Lump Sum LS	49,000.00	49,000.00
0206	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (C - 531+00 -L-)	Lump Sum LS	104,000.00	104,000.00

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Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0207	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (D - 586+50 -L-)	Lump Sum LS	75,000.00	75,000.00
0208	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (E - 595+00 -L-)	Lump Sum LS	52,000.00	52,000.00
0209	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (F - 610+00 -L-)	Lump Sum LS	75,000.00	75,000.00
0210	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (G - 31+50 -Y4RPBD-)	Lump Sum LS	44,000.00	44,000.00
0211	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (H - 92+50 -Y4-)	Lump Sum LS	40,000.00	40,000.00
0212	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (I - 89+50 -Y4-)	Lump Sum LS	48,500.00	48,500.00
0213	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (J - 43+00 -Y4CD-)	Lump Sum LS	48,000.00	48,000.00
0214	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (K - 42+00 -Y4-)	Lump Sum LS	38,500.00	38,500.00
0215	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (L - 72+00 -Y4-)	Lump Sum LS	53,000.00	53,000.00
0216	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (M - 113+00 -Y4-)	Lump Sum LS	42,000.00	42,000.00
0217	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (N - 322' FRM S MAIN ST EXIT)	Lump Sum LS	39,500.00	39,500.00
0218	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (O - 19+50 -Y4-)	Lump Sum LS	28,500.00	28,500.00
0219	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (P - 144' FROM LINVILLE RD EXIT)	Lump Sum LS	40,000.00	40,000.00

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0220	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (Q - 280' +/- FROM ROUTE MARKERS)	Lump Sum LS	28,000.00	28,000.00
0221	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ***** (R - 36+50 -Y1-)	Lump Sum LS	83,000.00	83,000.00
0222	4096000000-N	904	SIGN ERECTION, TYPE D	9 EA	100.00	900.00
0223	4102000000-N	904	SIGN ERECTION, TYPE E	124 EA	50.00	6,200.00
0224	4108000000-N	904	SIGN ERECTION, TYPE F	10 EA	100.00	1,000.00
0225	4110000000-N	904	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (A)	8 EA	350.00	2,800.00
0226	4110000000-N	904	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (B)	2 EA	200.00	400.00
0227	4114000000-N	904	SIGN ERECTION, MILEMARKERS	16 EA	50.00	800.00
0228	4116100000-N	904	SIGN ERECTION, RELOCATE, TYPE **** (GROUND MOUNTED) (D)	1 EA	100.00	100.00
0229	4143000000-N	907	DISPOSAL OF SUPPORT, OVERHEAD STRUCTURE	1 EA	2,000.00	2,000.00
0230	4152000000-N	907	DISPOSAL OF SIGN SYSTEM, STEEL BEAM	8 EA	500.00	4,000.00
0231	4155000000-N	907	DISPOSAL OF SIGN SYSTEM, U-CHANNEL	48 EA	1.00	48.00
0232	4400000000-E	1110	WORK ZONE SIGNS (STATIONARY)	2,382 SF	3.78	9,003.96
0233	4405000000-E	1110	WORK ZONE SIGNS (PORTABLE)	1,147 SF	7.89	9,049.83
0234	4410000000-E	1110	WORK ZONE SIGNS (BARRICADE MOUNTED)	1,183 SF	4.15	4,909.45
0235	4415000000-N	1115	FLASHING ARROW BOARD	4 EA	2,348.00	9,392.00
0236	4420000000-N	1120	PORTABLE CHANGEABLE MESSAGE SIGN	14 EA	8,448.00	118,272.00

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0237	4422000000-N	1120	PORTABLE CHANGEABLE MESSAGE SIGN (SHORT TERM)	379 DAY	28.80	10,915.20
0238	4430000000-N	1130	DRUMS	880 EA	39.94	35,147.20
0239	4435000000-N	1135	CONES	50 EA	15.85	792.50
0240	4445000000-E	1145	BARRICADES (TYPE III)	1,200 LF	16.85	20,220.00
0241	4450000000-N	1150	FLAGGER	2,224 HR	40.00	88,960.00
0242	4465000000-N	1160	TEMPORARY CRASH CUSHIONS	10 EA	4,000.00	40,000.00
0243	4470000000-N	1160	RESET TEMPORARY CRASH CUSHION	8 EA	1,200.00	9,600.00
0244	4480000000-N	1165	TMA	4 EA	18,000.00	72,000.00
0245	4485000000-E	1170	PORTABLE CONCRETE BARRIER	2,908 LF	18.00	52,344.00
0246	4490000000-E	1170	PORTABLE CONCRETE BARRIER (ANCHORED)	23,400 LF	35.00	819,000.00
0247	4500000000-E	1170	RESET PORTABLE CONCRETE BARRIER	6,375 LF	4.00	25,500.00
0248	4510000000-N	SP	LAW ENFORCEMENT	406 HR	45.00	18,270.00
0249	4520000000-N	1266	TUBULAR MARKERS (FIXED)	120 EA	33.80	4,056.00
0250	4650000000-N	1251	TEMPORARY RAISED PAVEMENT MARKERS	391 EA	6.00	2,346.00
0251	4710000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (24", 120 MILS)	130 LF	7.00	910.00
0252	4721000000-E	1205	THERMOPLASTIC PAVEMENT MARKING CHARACTER (120 MILS)	4 EA	125.00	500.00
0253	4725000000-E	1205	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)	60 EA	125.00	7,500.00
0254	4810000000-E	1205	PAINT PAVEMENT MARKING LINES (4")	128,765 LF	0.25	32,191.25
0255	4815000000-E	1205	PAINT PAVEMENT MARKING LINES (6")	300,040 LF	0.26	78,010.40

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0256	4820000000-E	1205	PAINT PAVEMENT MARKING LINES (8")	345 LF	1.00	345.00
0257	4825000000-E	1205	PAINT PAVEMENT MARKING LINES (12")	7,982 LF	0.60	4,789.20
0258	4835000000-E	1205	PAINT PAVEMENT MARKING LINES (24")	84 LF	3.00	252.00
0259	4847000000-E	1205	POLYUREA PAVEMENT MARKING LINES (4", *****) (HIGHLY REFLECTIVE ELEMENTS)	32,503 LF	0.85	27,627.55
0260	4847100000-E	1205	POLYUREA PAVEMENT MARKING LINES (6", *****) (HIGHLY REFLECTIVE ELEMENTS)	174,105 LF	1.17	203,702.85
0261	4847120000-E	1205	POLYUREA PAVEMENT MARKING LINES (12", *****) (HIGHLY REFLECTIVE ELEMENTS)	5,570 LF	2.30	12,811.00
0262	4850000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (4")	8,896 LF	0.90	8,006.40
0263	4900000000-N	1251	PERMANENT RAISED PAVEMENT MARKERS	156 EA	6.00	936.00
0264	4905000000-N	1253	SNOWPLOWABLE PAVEMENT MARKERS	1,593 EA	30.00	47,790.00
0265	4915000000-E	1264	7' U-CHANNEL POSTS	24 EA	24.90	597.60
0266	4935000000-N	1267	FLEXIBLE DELINEATORS (CRYSTAL)	90 EA	31.95	2,875.50
0267	4940000000-N	1267	FLEXIBLE DELINEATORS (YELLOW)	56 EA	31.95	1,789.20
0268	4945000000-N	1267	FLEXIBLE DELINEATORS (CRYSTAL & RED)	5 EA	31.95	159.75
0269	4950000000-N	1267	FLEXIBLE DELINEATORS (YELLOW & RED)	5 EA	31.95	159.75
0270	4955000000-N	1264	OBJECT MARKERS (END OF ROAD)	24 EA	50.00	1,200.00
0271	5255000000-N	1413	PORTABLE LIGHTING	Lump Sum LS	168,525.52	168,525.52
0272	5325600000-E	1510	6" WATER LINE	1,423 LF	40.36	57,432.28
0273	5325800000-E	1510	8" WATER LINE	1,125 LF	33.04	37,170.00

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0274	5326200000-E	1510	12" WATER LINE	2,520 LF	49.63	125,067.60
0275	5326600000-E	1510	16" WATER LINE	1,637 LF	85.50	139,963.50
0276	5327000000-E	1510	20" WATER LINE	420 LF	85.50	35,910.00
0277	5540000000-E	1515	6" VALVE	3 EA	872.67	2,618.01
0278	5546000000-E	1515	8" VALVE	3 EA	1,229.72	3,689.16
0279	5558000000-E	1515	12" VALVE	2 EA	1,962.00	3,924.00
0280	5558600000-E	1515	16" VALVE	2 EA	5,143.00	10,286.00
0281	5571600000-E	1515	6" TAPPING VALVE	3 EA	2,250.00	6,750.00
0282	5589100000-E	1515	1" AIR RELEASE VALVE	3 EA	1,881.27	5,643.81
0283	5648000000-N	1515	RELOCATE WATER METER	3 EA	816.97	2,450.91
0284	5672000000-N	1515	RELOCATE FIRE HYDRANT	8 EA	1,905.88	15,247.04
0285	5691300000-E	1520	8" SANITARY GRAVITY SEWER	1,165 LF	36.00	41,940.00
0286	5691600000-E	1520	16" SANITARY GRAVITY SEWER	511 LF	99.00	50,589.00
0287	5691700000-E	1520	18" SANITARY GRAVITY SEWER	724 LF	135.00	97,740.00
0288	5691900000-E	1520	24" SANITARY GRAVITY SEWER	1,554 LF	149.40	232,167.60
0289	5692000000-E	1520	30" SANITARY GRAVITY SEWER	367 LF	198.90	72,996.30
0290	5775000000-E	1525	4' DIA UTILITY MANHOLE	13 EA	1,944.01	25,272.13
0291	5776000000-E	1525	5' DIA UTILITY MANHOLE	11 EA	2,365.36	26,018.96
0292	5777000000-E	1525	6' DIA UTILITY MANHOLE	4 EA	3,232.80	12,931.20
0293	5781000000-E	1525	UTILITY MANHOLE WALL, 4' DIA	40 LF	135.00	5,400.00
0294	5782000000-E	1525	UTILITY MANHOLE WALL, 5' DIA	133 LF	193.60	25,748.80

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0295	5783000000-E	1525	UTILITY MANHOLE WALL, 6' DIA	16 LF	322.20	5,155.20
0296	5801000000-E	1530	ABANDON 8" UTILITY PIPE	1,423 LF	5.27	7,499.21
0297	5804000000-E	1530	ABANDON 12" UTILITY PIPE	100 LF	7.70	770.00
0298	5810000000-E	1530	ABANDON 16" UTILITY PIPE	900 LF	3.83	3,447.00
0299	5811000000-E	1530	ABANDON 18" UTILITY PIPE	1,003 LF	17.97	18,023.91
0300	5812000000-E	1530	ABANDON 20" UTILITY PIPE	415 LF	36.00	14,940.00
0301	5813000000-E	1530	ABANDON 24" UTILITY PIPE	1,333 LF	6.30	8,397.90
0302	5814000000-E	1530	ABANDON 30" UTILITY PIPE	20 LF	30.60	612.00
0303	5815000000-N	1530	REMOVE WATER METER	8 EA	171.00	1,368.00
0304	5815500000-N	1530	REMOVE FIRE HYDRANT	7 EA	477.00	3,339.00
0305	5816000000-N	1530	ABANDON UTILITY MANHOLE	7 EA	790.09	5,530.63
0306	5828000000-N	1530	REMOVE UTILITY MANHOLE	13 EA	820.69	10,668.97
0307	5835700000-E	1540	16" ENCASEMENT PIPE	810 LF	66.31	53,711.10
0308	5836000000-E	1540	24" ENCASEMENT PIPE	300 LF	73.30	21,990.00
0309	5836200000-E	1540	30" ENCASEMENT PIPE	810 LF	68.40	55,404.00
0310	5888000000-E	SP	GENERIC UTILITY ITEM ANCHOR SEWER MAIN TO PROPOSED CULVERT	52 LF	135.00	7,020.00
0311	5890000000-N	1510	GENERIC UTILITY ITEM REMOVE BLOWOFF ASSEMBLY	1 EA	1,800.00	1,800.00
0312	6000000000-E	1605	TEMPORARY SILT FENCE	249,000 LF	1.33	331,170.00
0313	6006000000-E	1610	STONE FOR EROSION CONTROL, CLASS A	5,375 TON	42.60	228,975.00
0314	6009000000-E	1610	STONE FOR EROSION CONTROL, CLASS B	83,520 TON	42.29	3,532,060.80

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0315	6012000000-E	1610	SEDIMENT CONTROL STONE	51,665 TON	42.33	2,186,979.45
0316	6015000000-E	1615	TEMPORARY MULCHING	500 ACR	760.00	380,000.00
0317	6018000000-E	1620	SEED FOR TEMPORARY SEEDING	82,400 LB	1.66	136,784.00
0318	6021000000-E	1620	FERTILIZER FOR TEMPORARY SEED- ING	357 TON	570.00	203,490.00
0319	6024000000-E	1622	TEMPORARY SLOPE DRAINS	25,000 LF	8.87	221,750.00
0320	6029000000-E	SP	SAFETY FENCE	65,400 LF	1.00	65,400.00
0321	6030000000-E	1630	SILT EXCAVATION	168,600 CY	3.93	662,598.00
0322	6036000000-E	1631	MATTING FOR EROSION CONTROL	600,000 SY	1.09	654,000.00
0323	6037000000-E	SP	COIR FIBER MAT	3,150 SY	4.75	14,962.50
0324	6038000000-E	SP	PERMANENT SOIL REINFORCEMENT MAT	10,000 SY	4.75	47,500.00
0325	6042000000-E	1632	1/4" HARDWARE CLOTH	16,350 LF	2.14	34,989.00
0326	6046000000-E	1636	TEMPORARY PIPE FOR STREAM CROSSING	125 LF	22.50	2,812.50
0327	6048000000-E	SP	FLOATING TURBIDITY CURTAIN	335 SY	23.03	7,715.05
0328	6069000000-E	1638	STILLING BASINS	2,000 CY	13.60	27,200.00
0329	6070000000-N	1639	SPECIAL STILLING BASINS	20 EA	259.09	5,181.80
0330	6071012000-E	SP	COIR FIBER WATTLE	15,600 LF	7.60	118,560.00
0331	6071020000-E	SP	POLYACRYLAMIDE (PAM)	11,150 LB	4.75	52,962.50
0332	6071030000-E	1640	COIR FIBER BAFFLE	50,000 LF	4.04	202,000.00
0333	6071050000-E	SP	*** SKIMMER (1-1/2")	131 EA	715.64	93,748.84
0334	6071050000-E	SP	*** SKIMMER (2")	12 EA	859.01	10,308.12

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0335	6071050000-E	SP	*** SKIMMER (2-1/2")	2 EA	900.00	1,800.00
0336	6084000000-E	1660	SEEDING & MULCHING	600 ACR	1,349.00	809,400.00
0337	6087000000-E	1660	MOWING	300 ACR	66.50	19,950.00
0338	6090000000-E	1661	SEED FOR REPAIR SEEDING	7,200 LB	1.90	13,680.00
0339	6093000000-E	1661	FERTILIZER FOR REPAIR SEEDING	28.75 TON	593.75	17,070.31
0340	6096000000-E	1662	SEED FOR SUPPLEMENTAL SEEDING	14,350 LB	2.85	40,897.50
0341	6108000000-E	1665	FERTILIZER TOPDRESSING	430 TON	712.50	306,375.00
0342	6111000000-E	SP	IMPERVIOUS DIKE	1,500 LF	38.40	57,600.00
0343	6114500000-N	1667	SPECIALIZED HAND MOWING	515 MHR	47.50	24,462.50
0344	6117000000-N	SP	RESPONSE FOR EROSION CONTROL	150 EA	95.00	14,250.00
0345	6120000000-E	SP	CULVERT DIVERSION CHANNEL	7,000 CY	10.08	70,560.00
0346	6123000000-E	1670	REFORESTATION	10 ACR	807.50	8,075.00
0347	6126000000-E	SP	STREAMBANK REFORESTATION	1 ACR	760.00	760.00
0348	7060000000-E	1705	SIGNAL CABLE	1,750 LF	3.43	6,002.50
0349	7120000000-E	1705	VEHICLE SIGNAL HEAD (12", 3 SECTION)	13 EA	703.26	9,142.38
0350	7252000000-E	1710	MESSENGER CABLE (1/4")	12,699 LF	2.04	25,905.96
0351	7264000000-E	1710	MESSENGER CABLE (3/8")	1,200 LF	2.36	2,832.00
0352	7276000000-E	1715	BORE & JACK (***** (1, 6"))	270 LF	80.76	21,805.20
0353	7279000000-E	1715	TRACER WIRE	33,556 LF	0.54	18,120.24
0354	7300000000-E	1715	UNPAVED TRENCHING (***** (1, 2"))	1,225 LF	4.93	6,039.25

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0355	7301000000-E	1715	DIRECTIONAL DRILL (***** (1, 2"))	386 LF	12.23	4,720.78
0356	7301000000-E	1715	DIRECTIONAL DRILL (***** (2, 2"))	10,001 LF	14.86	148,614.86
0357	7312000000-N	1716	JUNCTION BOX (***** (SPECIAL SIZED)	11 EA	1,224.46	13,469.06
0358	7324000000-N	1716	JUNCTION BOX (STANDARD SIZE)	27 EA	467.01	12,609.27
0359	7348000000-N	1716	JUNCTION BOX (OVER-SIZED, HEA- VY DUTY)	45 EA	785.83	35,362.35
0360	7360000000-N	1720	WOOD POLE	88 EA	599.30	52,738.40
0361	7372000000-N	1721	GUY ASSEMBLY	40 EA	391.30	15,652.00
0362	7408000000-E	1722	1" RISER WITH WEATHERHEAD	2 EA	363.85	727.70
0363	7420000000-E	1722	2" RISER WITH WEATHERHEAD	9 EA	405.33	3,647.97
0364	7432000000-E	1722	2" RISER WITH HEAT SHRINK TUBING	6 EA	347.83	2,086.98
0365	7444000000-E	1725	INDUCTIVE LOOP SAWCUT	1,350 LF	5.27	7,114.50
0366	7456000000-E	1726	LEAD-IN CABLE (***** (14-2)	4,300 LF	2.73	11,739.00
0367	7516000000-E	1730	COMMUNICATIONS CABLE (**FIBER) (144)	26,023 LF	2.59	67,399.57
0368	7516000000-E	1730	COMMUNICATIONS CABLE (**FIBER) (72)	24,601 LF	1.83	45,019.83
0369	7528000000-E	1730	DROP CABLE	1,639 LF	1.36	2,229.04
0370	7540000000-N	1731	SPLICE ENCLOSURE	7 EA	2,282.61	15,978.27
0371	7541000000-N	1731	MODIFY SPLICE ENCLOSURE	2 EA	3,994.57	7,989.14
0372	7552000000-N	1731	INTERCONNECT CENTER	5 EA	1,059.78	5,298.90
0373	7566000000-N	1733	DELINEATOR MARKER	49 EA	92.39	4,527.11

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0374	7575142000-N	1736	900MHZ RADIO	2 EA	5,212.24	10,424.48
0375	7575142200-N	SP	NEW ELECTRICAL SERVICE	7 EA	2,671.08	18,697.56
0376	7575160000-E	1734	REMOVE EXISTING COMMUNICATIONS CABLE	24,611 LF	0.82	20,181.02
0377	7613000000-N	SP	SOIL TEST	4 EA	657.13	2,628.52
0378	7614100000-E	SP	DRILLED PIER FOUNDATION	32 CY	828.83	26,522.56
0379	7636000000-N	1745	SIGN FOR SIGNALS	5 EA	305.11	1,525.55
0380	7684000000-N	1750	SIGNAL CABINET FOUNDATION	2 EA	1,238.26	2,476.52
0381	7756000000-N	1751	CONTROLLER WITH CABINET (TYPE 2070L, BASE MOUNTED)	2 EA	11,715.76	23,431.52
0382	7780000000-N	1751	DETECTOR CARD (TYPE 2070L)	6 EA	116.11	696.66
0383	7901000000-N	1753	CABINET BASE EXTENDER	2 EA	437.31	874.62
0384	7980000000-N	SP	GENERIC SIGNAL ITEM 10KVA SINGLE PHASE TRANSFORMER	4 EA	1,348.37	5,393.48
0385	7980000000-N	SP	GENERIC SIGNAL ITEM 5/8" X 10' GROUNDING ELECTRODE	27 EA	256.52	6,926.04
0386	7980000000-N	SP	GENERIC SIGNAL ITEM CARD CAGES	1 EA	2,476.90	2,476.90
0387	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV CABINET	5 EA	4,104.40	20,522.00
0388	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV CAMERA ASSEMBLY	5 EA	4,023.37	20,116.85
0389	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV CAMERA LOWERING SYSTEM	2 EA	7,163.59	14,327.18
0390	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV EXTENSION POLE	1 EA	999.46	999.46
0391	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV METAL POLE (50')	2 EA	11,476.67	22,953.34

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0392	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV METAL POLE (70')	2 EA	14,369.26	28,738.52
0393	7980000000-N	SP	GENERIC SIGNAL ITEM COMMUNICATIONS RACK	1 EA	2,764.95	2,764.95
0394	7980000000-N	SP	GENERIC SIGNAL ITEM DIGITAL HARDWARE VIDEO DECODER	6 EA	2,102.01	12,612.06
0395	7980000000-N	SP	GENERIC SIGNAL ITEM DIGITAL HARDWARE VIDEO ENCODER	6 EA	2,102.01	12,612.06
0396	7980000000-N	SP	GENERIC SIGNAL ITEM DMS	2 EA	81,506.30	163,012.60
0397	7980000000-N	SP	GENERIC SIGNAL ITEM DMS ACCESS LADDER	3 EA	5,720.65	17,161.95
0398	7980000000-N	SP	GENERIC SIGNAL ITEM DMS OVERHEAD ASSEMBLY	1 EA	56,788.63	56,788.63
0399	7980000000-N	SP	GENERIC SIGNAL ITEM DMS PEDESTAL ASSEMBLY	2 EA	52,912.63	105,825.26
0400	7980000000-N	SP	GENERIC SIGNAL ITEM EQUIPMENT CABINET BASE EXTEND- ER	2 EA	807.93	1,615.86
0401	7980000000-N	SP	GENERIC SIGNAL ITEM EQUIPMENT CABINET DISCONNECT	7 EA	674.18	4,719.26
0402	7980000000-N	SP	GENERIC SIGNAL ITEM EQUIPMENT CABINET FOUNDATION	2 EA	1,709.51	3,419.02
0403	7980000000-N	SP	GENERIC SIGNAL ITEM ETHERNET EDGE SWITCH	7 EA	1,206.47	8,445.29
0404	7980000000-N	SP	GENERIC SIGNAL ITEM FURNISH CCTV ASSEMBLY	1 EA	2,791.30	2,791.30
0405	7980000000-N	SP	GENERIC SIGNAL ITEM FURNISH DIGITAL HARDWARE VIDEO DECODER	2 EA	1,919.02	3,838.04
0406	7980000000-N	SP	GENERIC SIGNAL ITEM FURNISH DIGITAL HARDWARE VIDEO ENCODER	2 EA	1,919.02	3,838.04
0407	7980000000-N	SP	GENERIC SIGNAL ITEM FURNISH ETHERNET EDGE SWITCH	1 EA	930.43	930.43

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Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0408	7980000000-N	SP	GENERIC SIGNAL ITEM HUB CABINET	1 EA	11,899.91	11,899.91
0409	7980000000-N	SP	GENERIC SIGNAL ITEM HUB SPLICE CENTER	1 EA	24,836.96	24,836.96
0410	7980000000-N	SP	GENERIC SIGNAL ITEM MANAGED ETHERNET CORE SWITCH MODIFICATIONS	1 EA	19,565.22	19,565.22
0411	7980000000-N	SP	GENERIC SIGNAL ITEM MANAGED ETHERNET ROUTING SWITCH	1 EA	28,695.65	28,695.65
0412	7980000000-N	SP	GENERIC SIGNAL ITEM MODIFY NETWORK MANAGEMENT SOFTWARE	1 EA	1,250.00	1,250.00
0413	7980000000-N	SP	GENERIC SIGNAL ITEM PORTABLE CCTV	1 EA	37,853.26	37,853.26
0414	7980000000-N	SP	GENERIC SIGNAL ITEM PORTABLE CCTV LOWERING TOOL	1 EA	1,755.42	1,755.42
0415	7980000000-N	SP	GENERIC SIGNAL ITEM SOLAR POWER ASSEMBLY	1 EA	10,889.62	10,889.62
0416	7980000000-N	SP	GENERIC SIGNAL ITEM UPS	1 EA	1,892.66	1,892.66
0417	7985000000-N	SP	GENERIC SIGNAL ITEM DMS (REMOVE AND REINSTALL)	Lump Sum LS	121,290.76	121,290.76
0418	7990000000-E	SP	GENERIC SIGNAL ITEM 3-WIRE FEEDER CONDUCTORS	3,178 LF	4.12	13,093.36
0419	7990000000-E	SP	GENERIC SIGNAL ITEM 4-WIRE FEEDER CONDUCTORS	785 LF	10.13	7,952.05
0420	7990000000-E	SP	GENERIC SIGNAL ITEM UNDERGROUND CONDUIT (1, 2")	2,655 LF	4.89	12,982.95
0421	7990000000-E	SP	GENERIC SIGNAL ITEM UNDERGROUND CONDUIT (2, 2")	23,460 LF	6.17	144,748.20
0422	7992000000-E	SP	GENERIC SIGNAL ITEM OVERHEAD SIGN ASSEMBLY FOOTINGS	16 CY	789.79	12,636.64

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Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0423	8056000000-N	402	REMOVAL OF EXISTING STRUCTURE AT STATION ***** (23+11.00-Y1-)	Lump Sum LS	10,000.00	10,000.00
0424	8126000000-N	414	CULVERT EXCAVATION, STA ***** (23+11.00-Y1-)	Lump Sum LS	37,872.81	37,872.81
0425	8126000000-N	414	CULVERT EXCAVATION, STA ***** (559+74.00-L-)	Lump Sum LS	31,181.85	31,181.85
0426	8126000000-N	414	CULVERT EXCAVATION, STA ***** (616+45.00-L-)	Lump Sum LS	56,127.29	56,127.29
0427	8126000000-N	414	CULVERT EXCAVATION, STA ***** (667+15.00-L-)	Lump Sum LS	49,890.93	49,890.93
0428	8126000000-N	414	CULVERT EXCAVATION, STA ***** (STA. 45+65.43 -Y4-)	Lump Sum LS	12,472.74	12,472.74
0429	8133000000-E	414	FOUNDATION CONDITIONING MATER- IAL, BOX CULVERT	3,438 TON	50.00	171,900.00
0430	8196000000-E	420	CLASS A CONCRETE (CULVERT)	9,004 CY	350.00	3,151,400.00
0431	8245000000-E	425	REINFORCING STEEL (CULVERT)	820,225 LB	0.79	647,977.75
0432	8804000000-N	SP	GENERIC CULVERT ITEM PLACEMENT OF NATURAL STREAM BED MATERIAL	Lump Sum LS	149,700.00	149,700.00

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Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0433	8801000000-E	SP	MSE RETAINING WALL NO **** (1)	6,334 SF	58.96	373,452.64
0434	8802014000-E	SP	SOLDIER PILE RETAINING WALLS	850 SF	77.06	65,501.00
0435	8839000000-E	SP	GENERIC RETAINING WALL ITEM CONCRETE BARRIER RAIL WITH MOM ENT SLAB	500 LF	275.51	137,755.00
0436	8847000000-E	SP	GENERIC RETAINING WALL ITEM ANCHORED SOLDIER PILE WALLS	7,900 SF	89.42	706,418.00
0437	8847000000-E	SP	GENERIC RETAINING WALL ITEM SOUND BARRIER WALL	255,982 SF	22.00	5,631,604.00

Contract Item Sheets For C203484

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0438	8084000000-N	410	FOUNDATION EXCAVATION FOR END BENT ** AT STATION ***** (2,52+94.28-Y4RPBD-)	Lump Sum LS	6,760.19	6,760.19
0439	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1, 17+10.00-Y4RPA-)	Lump Sum LS	6,760.19	6,760.19
0440	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1, 482+13.14 -L-)	Lump Sum LS	9,804.21	9,804.21
0441	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1, 516+31.30-L-)	Lump Sum LS	5,014.27	5,014.27
0442	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1, 584+36.24 -L-LT)	Lump Sum LS	10,028.54	10,028.54
0443	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1, 584+36.24-L-RT)	Lump Sum LS	10,028.54	10,028.54
0444	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1,28+50.16-Y5-)	Lump Sum LS	5,014.27	5,014.27
0445	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1,44+08.64-Y4RPBD-)	Lump Sum LS	9,267.34	9,267.34
0446	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1,46+87.16-Y4CD-)	Lump Sum LS	7,521.39	7,521.39
0447	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1,52+94.28-Y4RPBD-)	Lump Sum LS	6,760.19	6,760.19
0448	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1,642+81.42-L-LT)	Lump Sum LS	5,014.27	5,014.27
0449	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (1,642+81.42-L-RT)	Lump Sum LS	5,014.27	5,014.27
0450	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (2, 584+36.24 -L-LT)	Lump Sum LS	10,028.54	10,028.54

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0451	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (2, 584+36.24-L-RT)	Lump Sum LS	10,028.54	10,028.54
0452	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (2, 628+65.50-L-LT)	Lump Sum LS	6,760.19	6,760.19
0453	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (2, 628+65.50-L-RT)	Lump Sum LS	6,760.19	6,760.19
0454	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (2,28+50.16-Y5-)	Lump Sum LS	5,014.27	5,014.27
0455	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (2,33+15.67-Y4CD-)	Lump Sum LS	6,760.19	6,760.19
0456	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (2,52+94.28-Y4RPBD-)	Lump Sum LS	6,760.19	6,760.19
0457	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (3,28+50.16-Y5-)	Lump Sum LS	5,014.27	5,014.27
0458	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ***** (4, 17+10.00-Y4RPA-)	Lump Sum LS	6,760.19	6,760.19
0459	8096000000-E	450	PILE EXCAVATION IN SOIL	64 LF	100.00	6,400.00
0460	8097000000-E	450	PILE EXCAVATION NOT IN SOIL	78 LF	100.00	7,800.00
0461	8105500000-E	411	**1_**" DIA DRILLED PIERS IN SOIL (4'-6")	454.8 LF	572.90	260,554.92
0462	8105500000-E	411	**1_**" DIA DRILLED PIERS IN SOIL (5'-0")	260 LF	563.52	146,515.20
0463	8105500000-E	411	**1_**" DIA DRILLED PIERS IN SOIL (5'-6")	74.6 LF	865.47	64,564.06
0464	8105560000-E	411	4'-0" DIA DRILLED PIERS IN SOIL	437 LF	379.79	165,968.23

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0465	8105600000-E	411	***.***" DIA DRILLED PIERS NOT IN SOIL (4'-6")	132 LF	570.47	75,302.04
0466	8105600000-E	411	***.***" DIA DRILLED PIERS NOT IN SOIL (5'-0")	103 LF	1,998.73	205,869.19
0467	8105600000-E	411	***.***" DIA DRILLED PIERS NOT IN SOIL (5'-6")	34 LF	3,657.89	124,368.26
0468	8105660000-E	411	4'-0" DIA DRILLED PIERS NOT IN SOIL	152 LF	3,786.16	575,496.32
0469	8111000000-E	411	PERMANENT STEEL CASING FOR ***.***" DIA DRILLED PIER (4'-6")	292.6 LF	503.72	147,388.47
0470	8111000000-E	411	PERMANENT STEEL CASING FOR ***.***" DIA DRILLED PIER (5'-0")	204 LF	503.72	102,758.88
0471	8111600000-E	411	PERMANENT STEEL CASING FOR 4'-0" DIA DRILLED PIER	104 LF	431.76	44,903.04
0472	8112730000-N	450	PDA TESTING	12 EA	1,900.00	22,800.00
0473	8113000000-N	411	SID INSPECTIONS	6 EA	1,000.00	6,000.00
0474	8114000000-N	411	SPT TESTING	1 EA	4,000.00	4,000.00
0475	8115000000-N	411	CSL TESTING	7 EA	2,500.00	17,500.00
0476	8147000000-E	420	REINFORCED CONCRETE DECK SLAB	225,152 SF	21.89	4,928,577.28
0477	8154000000-E	420	REINFORCED CONCRETE DECK SLAB (SAND LIGHTWEIGHT CONC)	42,278 SF	19.60	828,648.80
0478	8161000000-E	420	GROOVING BRIDGE FLOORS	285,922 SF	0.25	71,480.50
0479	8182000000-E	420	CLASS A CONCRETE (BRIDGE)	5,746.3 CY	745.03	4,281,165.89
0480	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (17+10.00-Y4RPA-)	Lump Sum LS	35,486.08	35,486.08

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0481	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (23+59.12-Y5-)	Lump Sum LS	33,126.21	33,126.21
0482	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (26+60.00-Y4RPBD-)	Lump Sum LS	34,220.64	34,220.64
0483	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (28+50.16-Y5-)	Lump Sum LS	32,128.11	32,128.11
0484	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (33+15.67-Y4CD-)	Lump Sum LS	26,963.65	26,963.65
0485	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (44+08.64-Y4RPBD-)	Lump Sum LS	36,965.05	36,965.05
0486	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (46+87.16-Y4CD-)	Lump Sum LS	42,240.69	42,240.69
0487	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (482+13.14-L-)	Lump Sum LS	84,549.79	84,549.79
0488	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (516+31.30-L-)	Lump Sum LS	31,554.36	31,554.36
0489	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (52+94.28-Y4RPBD-)	Lump Sum LS	35,784.16	35,784.16
0490	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (556+85.00-L-LT)	Lump Sum LS	50,431.63	50,431.63
0491	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (556+85.00-L-RT)	Lump Sum LS	50,431.63	50,431.63
0492	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (584+36.24-L-LT)	Lump Sum LS	74,083.63	74,083.63
0493	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (584+36.24-L-RT)	Lump Sum LS	74,083.63	74,083.63

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0494	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (628+65.50-L-LT)	Lump Sum LS	71,803.95	71,803.95
0495	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (628+65.50-L-RT)	Lump Sum LS	71,803.95	71,803.95
0496	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (642+81.42-L-LT)	Lump Sum LS	57,519.90	57,519.90
0497	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ***** (642+81.42-L-RT)	Lump Sum LS	69,636.61	69,636.61
0498	8217000000-E	425	REINFORCING STEEL (BRIDGE)	1,162,502 LB	0.91	1,057,876.82
0499	8238000000-E	425	SPIRAL COLUMN REINFORCING STEEL (BRIDGE)	153,179 LB	1.75	268,063.25
0500	8265000000-E	430	54" PRESTRESSED CONCRETE GIR- DERS	5,829.92 LF	254.28	1,482,432.06
0501	8274000000-E	430	MODIFIED 63" PRESTRESSED CONC GIRDERS	8,411.03 LF	263.54	2,216,642.85
0502	8277000000-E	430	MODIFIED 72" PRESTRESSED CONC GIRDERS	11,704.64 LF	286.24	3,350,336.15
0503	8280000000-E	440	APPROX LBS STRUCTURAL STEEL	445,000 LS	1,062,371.22	1,062,371.22
0504	8364000000-E	450	HP12X53 STEEL PILES	37,197 LF	60.23	2,240,375.31
0505	8384000000-E	450	HP14X73 STEEL PILES	4,380 LF	75.72	331,653.60
0506	8391000000-N	450	STEEL PILE POINTS	247 EA	143.92	35,548.24
0507	8392500000-E	450	PREDRILLING FOR PILES	242 LF	123.56	29,901.52
0508	8475000000-E	460	TWO BAR METAL RAIL	1,023.62 LF	119.00	121,810.78
0509	8503000000-E	460	CONCRETE BARRIER RAIL	8,793.23 LF	63.55	558,809.77
0510	8517000000-E	460	1'****X ***** CONCRETE PARA- PET (1'-2" X 2'-6")	1,056 LF	55.61	58,724.16

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0511	8531000000-E	462	4" SLOPE PROTECTION	9,157 SY	37.31	341,647.67
0512	8608000000-E	876	RIP RAP CLASS II (2'-0" THICK)	20,827 TON	57.60	1,199,635.20
0513	8622000000-E	876	GEOTEXTILE FOR DRAINAGE	23,135 SY	2.25	52,053.75
0514	8654000000-N	SP	DISC BEARINGS	Lump Sum LS	56,101.57	56,101.57
0515	8657000000-N	430	ELASTOMERIC BEARINGS	Lump Sum LS	153,896.73	153,896.73
0516	8692000000-N	SP	FOAM JOINT SEALS	Lump Sum LS	17,508.97	17,508.97
0517	8706000000-N	SP	EXPANSION JOINT SEALS	Lump Sum LS	352,212.94	352,212.94
0518	8860000000-N	SP	GENERIC STRUCTURE ITEM SOUND BARRIER WALL (BRIDGE MOUNTED)	Lump Sum LS	125,147.16	125,147.16
0519	8892000000-E	SP	GENERIC STRUCTURE ITEM CONCRETE SIMULATED STONE FORM LINER	3,592.2 SF	5.00	17,961.00
0520	8892000000-E	SP	GENERIC STRUCTURE ITEM CONCRETE STAINING	18,581.1 SF	5.00	92,905.50
0521	8897000000-N	SP	GENERIC STRUCTURE ITEM CONCRETE MEDALLION PANEL	8 EA	1,500.00	12,000.00
0522	8111000000-E	411	PERMANENT STEEL CASING FOR **1-***" DIA DRILLED PIER (5'-6")	48.6 LF	575.68	27,978.05

TOTAL AMOUNT OF BID FOR ENTIRE PROJECT

\$153,999,950.00

Contract No. C203484
County Forsyth

Rev. 5-19-11

**EXECUTION OF CONTRACT
NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN CERTIFICATION**

CORPORATION

The Contractor being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with this Contract, that the Contractor has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the Contractor intends to do the work with its own bonafide employees or subcontractors and did not bid for the benefit of another contractor.

By submitting this Execution of Contract, Non-Collusion Affidavit and Debarment Certification, the Contractor is certifying his status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

N.C.G.S. § 133-32 and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

SIGNATURE OF CONTRACTOR

DRAGADOS USA, Inc.

Full name of Corporation

810 7th Avenue, 9th Floor, New York, NY 10019

Address as Prequalified

Attest

Joseph G. Portela
Secretary/Assistant-Secretary
Select appropriate title

By

Rafael de la Barreda
President/Vice President/Assistant-Vice-President
Select appropriate title

Joseph G. Portela

Print or type Signer's name

Rafael de la Barreda

Print or type Signer's name

CORPORATE SEAL



AFFIDAVIT MUST BE NOTARIZED

Subscribed and sworn to before me this the
11 day of November 2014.

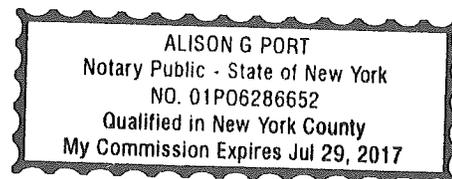
Alison Post
Signature of Notary Public

NOTARY SEAL

of New York County

State of New York

My Commission Expires: July 29, 2017



DEBARMENT CERTIFICATION

Conditions for certification:

1. The prequalified bidder shall provide immediate written notice to the Department if at any time the bidder learns that his certification was erroneous when he submitted his debarment certification or explanation filed with the Department, or has become erroneous because of changed circumstances.
2. The terms *covered transaction, debarred, suspended, ineligible, lower tier covered transaction, participant, person, primary covered transaction, principal, proposal, and voluntarily excluded*, as used in this provision, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Order 12549. A copy of the Federal Rules requiring this certification and detailing the definitions and coverages may be obtained from the Contract Officer of the Department.
3. The prequalified bidder agrees by submitting this form, that he will not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in NCDOT contracts, unless authorized by the Department.
4. For Federal Aid projects, the prequalified bidder further agrees that by submitting this form he will include the Federal-Aid Provision titled *Required Contract Provisions Federal-Aid Construction Contract (Form FHWA PR 1273)* provided by the Department, without subsequent modification, in all lower tier covered transactions.
5. The prequalified bidder may rely upon a certification of a participant in a lower tier covered transaction that he is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless he knows that the certification is erroneous. The bidder may decide the method and frequency by which he will determine the eligibility of his subcontractors.
6. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this provision. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
7. Except as authorized in paragraph 6 herein, the Department may terminate any contract if the bidder knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available by the Federal Government.

DEBARMENT CERTIFICATION

The prequalified bidder certifies to the best of his knowledge and belief, that he and his principals:

- a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- b. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records; making false statements; or receiving stolen property;
- c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph b. of this certification; and
- d. Have not within a three-year period preceding this proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
- e. Will submit a revised Debarment Certification immediately if his status changes and will show in his bid proposal an explanation for the change in status.

If the prequalified bidder cannot certify that he is not debarred, he shall provide an explanation with this submittal. An explanation will not necessarily result in denial of participation in a contract.

Failure to submit a non-collusion affidavit and debarment certification will result in the prequalified bidder's bid being considered non-responsive.

Check here if an explanation is attached to this certification.

EXPLANATION TO DEBARMENT CERTIFICATION

Dragados USA, Inc. ("DUSA"), maintains the highest standards of integrity, responsibility, and business ethics in its operations, has an ethics and compliance department implementing comprehensive policies and procedures, and has accurately certified to its responsibility in the accompanying form. In the interest of complete transparency, the following information is provided:

(i) On or about January 8, 2009, Yonkers/Dragados Joint Venture (a joint venture between Yonkers Contracting Co., Inc., and Dragados USA, Inc.) entered into a Memorandum of Understanding with the New York State Department of Transportation to resolve a Contract and Civil Rights Compliance process dispute concerning the utilization of a certain subcontractor in connection with the Disadvantaged Business Enterprise program for the I-287 (Cross-Westchester Expressway) Project D260081.

(ii) On or about March 1, 2010, Yonkers Contracting Co., Inc. ("Yonkers"), received a records subpoena from the United States Attorney for the Southern District of New York and addressed to Yonkers and/or Yonkers/Dragados Joint Venture (a joint venture between Yonkers and Dragados USA, Inc.) in connection with certain Disadvantaged/Minority/Women Business Enterprise subcontractors for the New York State Department of Transportation I-287 (Cross-Westchester Expressway) Project D260081 and the Metropolitan Transportation Authority Bridges and Tunnels Contract TN-83 (Orthotropic Deck Rehabilitation at the Throgs Neck Bridge). Dragados USA, Inc., was not served with said subpoena and was not involved with the Throgs Neck Bridge project. Upon information and belief, Yonkers has complied with the subpoena and Yonkers is dealing with the investigation in an ongoing manner. Moreover, the United States of America (the "Government") has informed Yonkers/Dragados Joint Venture (the "Joint Venture") that the Government is investigating certain potential civil causes of action against Yonkers and the Joint Venture under the False Claims Act, 31 U.S.C. §§ 3729 *et seq.*, other federal statutes, and the common law, arising in connection with the submission of claims regarding the use of Disadvantaged Business Enterprises ("DBEs") on the Cross-Westchester Expressway/I-287 (Contract SH CWE 56-1) Project.

(iii) On April 4, 2012, DUSA; Dragados/Judlau, a Joint Venture (of which DUSA and Dragados, S.A., were members); and Judlau Contracting, Inc. (the other member of the Joint Venture) entered into a civil settlement agreement with the United States Government and Metropolitan Transportation Authority Office of Inspector General relating to certain issues that DUSA had detected and reported concerning the Joint Venture's use of Disadvantaged Business Enterprises ("DBEs") on a project for the New York Metropolitan Transportation Authority ("MTA") called the Long Island Railroad to Grand Central Station Tunnel Project (the "East Side Access Project") that was funded in part with federal money through the United States Department of Transportation – Federal Transit Administration ("FTA").

The agreement required DUSA, Judlau and the JV to pay a total of \$7.5 million to settle the matter, but did not require DUSA to make any admissions of wrongdoing, pay any fines or have a judgment entered against it. Additionally, the settlement did not include any ongoing obligations of any kind, including in any manner relating to DUSA's compliance policies and procedures.

Nonetheless, DUSA maintains, at great commitment of time and resources, a separate, highly-developed, and sophisticated Ethics and Compliance Department under the leadership of an experienced compliance officer who reports directly to the president and board of directors. The Ethics and Compliance Department proactively monitors DUSA's operations throughout the country, provides training of all personnel, maintains a "helpline" for reporting (anonymously if desired) any ethics or compliance concerns, and regularly conducts reviews of projects to monitor DUSA's operations with a special focus on DBE utilization.

Thereafter, the JV, Judlau and DUSA, received a letter, dated May 9, 2012, from the FTA, requesting information regarding the present responsibility of the joint venture, Judlau and DUSA in connection with the above-mentioned civil settlement. DUSA responded to this request in a timely manner. Pursuant to a letter, dated October 4, 2012, FTA advised DUSA that the FTA had determined that, with regard to the conduct at issue in the civil settlement agreement, the JV took appropriate steps to rehabilitate its responsibility and is presently a responsible entity.

Contract No. **C203484**

County (ies): **Forsyth**

ACCEPTED BY THE
DEPARTMENT OF TRANSPORTATION

DocuSigned by:
Randy A. Hamer

A7079FC02A09470...

Contract Officer

11/18/2014

Date

Execution of Contract and Bonds
Approved as to Form:

DocuSigned by:
Scott Slusser

6A27950CCE8E4AE...

Attorney General

11/18/2014

Date

Signature Sheet (Bid - Acceptance by Department)

Contract No. C203484
County Forsyth

Rev 5-17-11

Bond No.
015046460 (Liberty)
PRF09172561 (F&D/Zurich)
929591496 (CIC)
US00068250SU14A (XL)

CONTRACT PAYMENT BOND

Date of Payment Bond Execution November 11, 2014

Name of Principal Contractor Dragados USA, Inc.
Liberty Mutual Insurance Company, Fidelity and Deposit Company of Maryland,
Zurich American Insurance Company, The Continental Insurance Company,
XL Specialty Insurance Company

Name of Surety:

Name of Contracting Body: North Carolina Department of Transportation
Raleigh, North Carolina

Amount of Bond: One Hundred Fifty-Three Million Nine Hundred Ninety-Nine Thousand
Nine Hundred Fifty and 00/100 (\$153,999,950.00) Dollars

Contract ID No.: C203484

County Name: Forsyth

KNOW ALL MEN BY THESE PRESENTS, That we, the PRINCIPAL CONTRACTOR (hereafter, PRINCIPAL) and SURETY above named, are held and firmly bound unto the above named Contracting Body, hereinafter called the Contracting Body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the Contracting Body, numbered as shown above and hereto attached:

NOW THEREFORE, if the principal shall promptly make payment to all persons supplying labor and material in the prosecution of the work provided for in said contract, and any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Contract No. C203484
County Forsyth

Rev 5-17-11

CONTRACT PAYMENT BOND

Liberty Mutual Insurance Company, Fidelity and Deposit Company of Maryland,
Zurich American Insurance Company, The Continental Insurance Company,
XL Specialty Insurance Company

Affix Seal of Surety Company

Print or type Surety Company Name

By Andrea E. Gorbert
Print, stamp or type name of Attorney-in-Fact

Andrea E. Gorbert

Signature of Attorney-in-Fact

Anne Potter

Signature of Witness

Anne Potter

Print or type Signer's name

390 N. Broadway, Jericho, NY 11753

Address of Attorney-in-Fact

Contract No.
County

C203484
Forsyth

Rev 5-17-11

CONTRACT PAYMENT BOND

CORPORATION

SIGNATURE OF CONTRACTOR (Principal)

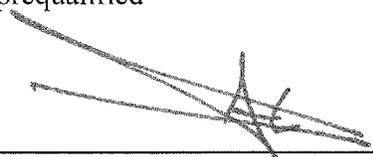
Dragados USA, Inc.

Full name of Corporation

810 7th Avenue, 9th Floor, NEW YORK, NY 10019
4600 Marriot Drive, Suite 420, Raleigh, NC 27212

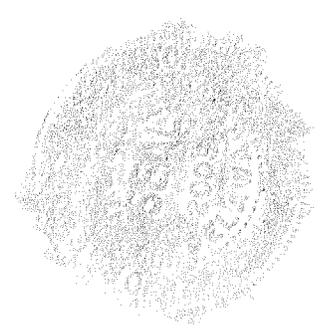
Address as prequalified

By

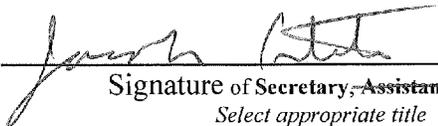

Signature of ~~President, Vice President, Assistant Vice President~~
Select appropriate title CFO

FERNANDO GONZALEZ ALCANIZ
Print or type Signer's name

Affix Corporate Seal



Attest


Signature of ~~Secretary, Assistant Secretary~~
Select appropriate title

JOSEPH PONTE
Print or type Signer's name

THIS POWER OF ATTORNEY IS NOT VALID UNLESS IT IS PRINTED ON RED BACKGROUND.

This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

Certificate No. 6549742

American Fire and Casualty Company
The Ohio Casualty Insurance Company

Liberty Mutual Insurance Company
West American Insurance Company

POWER OF ATTORNEY

KNOWN ALL PERSONS BY THESE PRESENTS: That American Fire & Casualty Company and The Ohio Casualty Insurance Company are corporations duly organized under the laws of the State of New Hampshire, that Liberty Mutual Insurance Company is a corporation duly organized under the laws of the State of Massachusetts, and West American Insurance Company is a corporation duly organized under the laws of the State of Indiana (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Andrea E. Gorbort; Anne Potter; Annette Leuschner; Beverly A. Woolford; David W. Rosehill; Nancy Schnee; Valorie Spates

all of the city of Jericho, state of NY each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 24th day of April, 2014.



American Fire and Casualty Company
The Ohio Casualty Insurance Company
Liberty Mutual Insurance Company
West American Insurance Company

By: David M. Carey
David M. Carey, Assistant Secretary

STATE OF PENNSYLVANIA ss
COUNTY OF MONTGOMERY

On this 24th day of April, 2014, before me personally appeared David M. Carey, who acknowledged himself to be the Assistant Secretary of American Fire and Casualty Company, Liberty Mutual Insurance Company, The Ohio Casualty Insurance Company, and West American Insurance Company, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Plymouth Meeting, Pennsylvania, on the day and year first above written.



COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Teresa Pastella, Notary Public
Plymouth Twp., Montgomery County
My Commission Expires March 28, 2017
Member, Pennsylvania Association of Notaries

By: Teresa Pastella
Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-laws and Authorizations of American Fire and Casualty Company, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company which resolutions are now in full force and effect reading as follows:

ARTICLE IV - OFFICERS - Section 12. Power of Attorney. Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and execution of any such instruments and to attach thereto the seal of the Corporation. When so executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

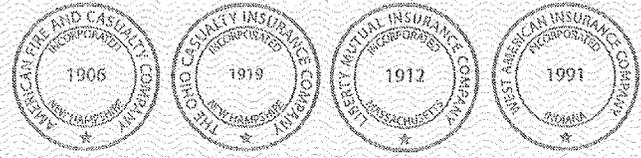
ARTICLE XIII - Execution of Contracts - SECTION 5. Surety Bonds and Undertakings. Any officer of the Company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Company by their signature and execution of any such instruments and to attach thereto the seal of the Company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

Certificate of Designation - The President of the Company, acting pursuant to the Bylaws of the Company, authorizes David M. Carey, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization - By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Gregory W. Davenport, the undersigned, Assistant Secretary, of American Fire and Casualty Company, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this NOV 11 2014 day of NOV, 2014.



By: Gregory W. Davenport
Gregory W. Davenport, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

To confirm the validity of this Power of Attorney call 1-610-832-8240 between 9:00 am and 4:30 pm EST on any business day.



LIBERTY MUTUAL INSURANCE COMPANY
 FINANCIAL STATEMENT — DECEMBER 31, 2013

Assets		Liabilities	
Cash and Bank Deposits	\$1,118,180,550	Unearned Premiums	\$5,940,431,054
*Bonds — U.S Government	1,888,225,943	Reserve for Claims and Claims Expense.....	17,305,063,560
*Other Bonds	12,039,490,815	Funds Held Under Reinsurance Treaties.....	212,659,311
*Stocks.....	9,030,962,112	Reserve for Dividends to Policyholders.....	1,226,236
Real Estate	251,301,907	Additional Statutory Reserve	63,348,980
Agents' Balances or Uncollected Premiums.....	4,781,042,931	Reserve for Commissions, Taxes and	
Accrued Interest and Rents	149,855,386	Other Liabilities	<u>5,826,683,629</u>
Other Admitted Assets.....	<u>15,216,749,451</u>	Total.....	<u>\$29,349,412,770</u>
		Special Surplus Funds.....	\$55,686,852
Total Admitted Assets.....	<u>\$44,475,809,095</u>	Capital Stock.....	11,250,000
		Paid in Surplus.....	7,898,288,167
		Unassigned Surplus.....	7,161,171,306
		Surplus to Policyholders	<u>15,126,396,325</u>
		Total Liabilities and Surplus	<u>\$44,475,809,095</u>



* Bonds are stated at amortized or investment value; Stocks at Association Market Values.
 The foregoing financial information is taken from Liberty Mutual Insurance Company's financial statement filed with the state of Massachusetts Department of Insurance.

I, TIM MIKOLAJEWSKI, Assistant Secretary of Liberty Mutual Insurance Company, do hereby certify that the foregoing is a true, and correct statement of the Assets and Liabilities of said Corporation, as of December 31, 2013, to the best of my knowledge and belief.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Corporation at Seattle, Washington, this 20th day of March, 2014.

TAMikolajewski

 Assistant Secretary



**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND
POWER OF ATTORNEY**

KNOW ALL MEN BY THESE PRESENTS: That the ZURICH AMERICAN INSURANCE COMPANY, a corporation of the State of New York, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, a corporation of the State of Maryland, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND a corporation of the State of Maryland (herein collectively called the "Companies"), by **THOMAS O. MCCLELLAN, Vice President**, in pursuance of authority granted by Article V, Section 8, of the By-Laws of said Companies, which are set forth on the reverse side hereof and are hereby certified to be in full force and effect on the date hereof, do hereby nominate, constitute, and appoint **David W. ROSEHILL, Nancy SCHNEE, Andrea E. GORBERT, Annette LEUSCHNER, Valorie SPATES, Beverly A. WOOLFORD and Anne POTTER, all of Jericho, New York, EACH** its true and lawful agent and Attorney-in-Fact, to make, execute, seal and deliver, for, and on its behalf as surety, and as its act and deed: **any and all bonds and undertakings**, and the execution of such bonds or undertakings in pursuance of these presents, shall be as binding upon said Companies, as fully and amply, to all intents and purposes, as if they had been duly executed and acknowledged by the regularly elected officers of the ZURICH AMERICAN INSURANCE COMPANY at its office in New York, New York., the regularly elected officers of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at its office in Owings Mills, Maryland., and the regularly elected officers of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at its office in Owings Mills, Maryland., in their own proper persons.

The said Vice President does hereby certify that the extract set forth on the reverse side hereof is a true copy of Article V, Section 8, of the By-Laws of said Companies, and is now in force.

IN WITNESS WHEREOF, the said Vice-President has hereunto subscribed his/her names and affixed the Corporate Seals of the said **ZURICH AMERICAN INSURANCE COMPANY, COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and FIDELITY AND DEPOSIT COMPANY OF MARYLAND**, this 19th day of August, A.D. 2014.

ATTEST:

**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND**



By: *Eric D. Barnes*
Assistant Secretary
Eric D. Barnes

Thomas O. McClellan
Vice President
Thomas O. McClellan

State of Maryland
City of Baltimore

On this 19th day of August, A.D. 2014, before the subscriber, a Notary Public of the State of Maryland, duly commissioned and qualified, **THOMAS O. MCCLELLAN, Vice President, and ERIC D. BARNES, Assistant Secretary**, of the Companies, to me personally known to be the individuals and officers described in and who executed the preceding instrument, and acknowledged the execution of same, and being by me duly sworn, deposed and saith, that he/she is the said officer of the Company aforesaid, and that the seals affixed to the preceding instrument are the Corporate Seals of said Companies, and that the said Corporate Seals and the signature as such officer were duly affixed and subscribed to the said instrument by the authority and direction of the said Corporations.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my Official Seal the day and year first above written.

Constance A. Dunn



Constance A. Dunn, Notary Public
My Commission Expires: July 14, 2015

EXTRACT FROM BY-LAWS OF THE COMPANIES

"Article V, Section 8, Attorneys-in-Fact. The Chief Executive Officer, the President, or any Executive Vice President or Vice President may, by written instrument under the attested corporate seal, appoint attorneys-in-fact with authority to execute bonds, policies, recognizances, stipulations, undertakings, or other like instruments on behalf of the Company, and may authorize any officer or any such attorney-in-fact to affix the corporate seal thereto; and may with or without cause modify or revoke any such appointment or authority at any time."

CERTIFICATE

I, the undersigned, Vice President of the ZURICH AMERICAN INSURANCE COMPANY, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND, do hereby certify that the foregoing Power of Attorney is still in full force and effect on the date of this certificate; and I do further certify that Article V, Section 8, of the By-Laws of the Companies is still in force.

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the ZURICH AMERICAN INSURANCE COMPANY at a meeting duly called and held on the 15th day of December 1998.

RESOLVED: "That the signature of the President or a Vice President and the attesting signature of a Secretary or an Assistant Secretary and the Seal of the Company may be affixed by facsimile on any Power of Attorney...Any such Power or any certificate thereof bearing such facsimile signature and seal shall be valid and binding on the Company."

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at a meeting duly called and held on the 5th day of May, 1994, and the following resolution of the Board of Directors of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at a meeting duly called and held on the 10th day of May, 1990.

RESOLVED: "That the facsimile or mechanically reproduced seal of the company and facsimile or mechanically reproduced signature of any Vice-President, Secretary, or Assistant Secretary of the Company, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power of attorney issued by the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seals of the said Companies, this 11 day of NOV 17 2019, 2019.



Michael Bond, Vice President

FIDELITY AND DEPOSIT COMPANY

OF MARYLAND

600 Red Brook Blvd., Suite 600, Owings Mills, MD 21117

Statement of Financial Condition
As Of December 31, 2013

ASSETS

Bonds.....	\$ 139,272,722
Stocks	22,258,887
Cash and Short Term Investments.....	6,595,113
Reinsurance Recoverable	17,970,134
Other Accounts Receivable	33,409,916
TOTAL ADMITTED ASSETS.....	\$ 219,506,772

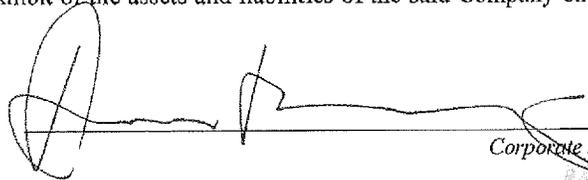
LIABILITIES, SURPLUS AND OTHER FUNDS

Reserve for Taxes and Expenses	\$ 1,787,480
Ceded Reinsurance Premiums Payable.....	42,146,005
Securities Lending Collateral Liability.....	6,613,750
TOTAL LIABILITIES	\$ 50,547,235
Capital Stock, Paid Up.....	\$ 5,000,000
Surplus.....	163,959,537
Surplus as regards Policyholders.....	168,959,537
TOTAL.....	\$ 219,506,772

Securities carried at \$58,378,690 in the above statement are deposited with various states as required by law.

Securities carried on the basis prescribed by the National Association of Insurance Commissioners. On the basis of market quotations for all bonds and stocks owned, the Company's total admitted assets at December 31, 2013 would be \$223,222,696 and surplus as regards policyholders \$172,675,461.

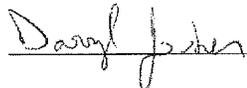
I, DENNIS F. KERRIGAN, Corporate Secretary of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND, do hereby certify that the foregoing statement is a correct exhibit of the assets and liabilities of the said Company on the 31st day of December, 2013.



 Corporate Secretary

State of Illinois }
City of Schaumburg } SS:

Subscribed and sworn to, before me, a Notary Public of the State of Illinois, in the City of Schaumburg, this 15th day of March, 2014.



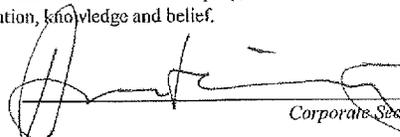
 Notary Public



ZURICH AMERICAN INSURANCE COMPANY
COMPARATIVE BALANCE SHEET
ONE LIBERTY PLAZA, 165 BROADWAY, 32nd FLOOR, NEW YORK, NY 10006
As of December 31, 2013 and December 31, 2012

	12/31/2013	12/31/2012
Assets		
Bonds	\$ 18,990,565,123	\$ 18,907,466,866
Preferred Stock	-	-
Common Stock	2,411,755,638	2,123,025,432
Other Invested Assets	2,505,133,631	2,035,077,824
Short-term Investments	327,019,081	126,053,209
Receivable for securities	123,767,865	134,410,839
Cash and cash equivalents	(65,045,469)	728,298,115
Securities lending reinvested collateral assets	208,060,537	225,335,750
Employee Trust for Deferred Compensation Plan	142,420,097	130,493,778
Total Cash and Invested Assets	\$ 24,643,676,503	\$ 24,410,161,814
Premiums Receivable	\$ 3,358,946,105	\$ 3,649,247,239
Funds Held with Reinsurers	2,383,155	3,681,443
Reinsurance Recoverable	391,812,478	215,451,507
Accrued Investment Income	113,886,701	121,729,727
Federal Income Tax Recoverable	940,033,456	930,267,731
Due from Affiliates	183,852,738	187,274,289
Other Assets	549,410,052	493,265,075
Total Assets	\$ 30,184,001,188	\$ 30,011,078,824
Liabilities and Policyholders' Surplus		
Liabilities:		
Loss and LAE Reserves	\$ 13,894,112,327	\$ 14,244,436,264
Unearned Premium Reserve	4,321,146,577	4,159,670,241
Funds Held with Reinsurers	185,460,548	212,412,675
Loss In Course of Payment	357,922,606	408,170,112
Commission Reserve	68,132,284	64,038,359
Federal Income Tax Payable	290,773,995	16,190,044
Remittances and Items Unallocated	111,710,550	196,410,982
Payable to parent, subs and affiliates	154,428,297	57,540,814
Provision for Reinsurance	43,942,761	66,649,220
Ceded Reinsurance Premiums Payable	807,651,125	551,510,878
Securities Lending Collateral Liability	208,060,537	225,335,750
Other Liabilities	1,942,241,242	2,166,453,164
Total Liabilities	\$ 22,385,582,849	\$ 22,368,818,502
Policyholders' Surplus:		
Common Capital Stock	\$ 5,000,000	\$ 5,000,000
Paid-In and Contributed Surplus	4,394,131,321	4,394,131,321
Surplus Notes	-	430,000,000
Special Surplus Funds	34,865,000	43,259,000
Cumulative Unrealized Gain	505,136,565	331,857,594
Unassigned Surplus	2,859,285,454	2,438,012,408
Total Policyholders' Surplus	\$ 7,798,418,339	\$ 7,642,260,323
Total Liabilities and Policyholders' Surplus	\$ 30,184,001,188	\$ 30,011,078,824

I, Dennis F. Kerrigan, Corporate Secretary of ZURICH AMERICAN INSURANCE COMPANY do hereby certify that the foregoing statement is a correct exhibit of the assets and liabilities of the said Company, on the 31st day of December, 2013, according to the best of my information, knowledge and belief.



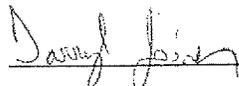
 Corporate Secretary



State of Illinois
 County of Cook

} SS:

Subscribed and sworn to, before me, a Notary Public of the State of Illinois, in the City of Schaumburg, this 15th day of March, 2014.



 Notary public



POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

Know All Men By These Presents, That The Continental Insurance Company, a Pennsylvania insurance company, is a duly organized and existing insurance company having its principal office in the City of Chicago, and State of Illinois, and that it does by virtue of the signature and seal herein affixed hereby make, constitute and appoint

Annette M Leuschner, Nancy Schnee, Valorie Spates, Andrea E Gorbert, Beverly A Woolford, Anne Potter, Individually, of Jericho, NY
Debra A Deming, Vivian Carti, Evangelina L Dominick, Annette M Leuschner, Cynthia Farrell, Sandra Diaz, Jessica Iannotta, Kelly O'Malley, Kevin T Walsh, Jr, Edward Reilly, Individually, of New York, NY

its true and lawful Attorney(s)-in-Fact with full power and authority hereby conferred to sign, seal and execute for and on its behalf bonds, undertakings and other obligatory instruments of similar nature

- In Unlimited Amounts -

and to bind them thereby as fully and to the same extent as if such instruments were signed by a duly authorized officer of the insurance company and all the acts of said Attorney, pursuant to the authority hereby given is hereby ratified and confirmed.

This Power of Attorney is made and executed pursuant to and by authority of the By-Law and Resolutions, printed on the reverse hereof, duly adopted, as indicated, by the Board of Directors of the insurance company.

In Witness Whereof, The Continental Insurance Company has caused these presents to be signed by its Vice President and its corporate seal to be hereto affixed on this 7th day of February, 2014.

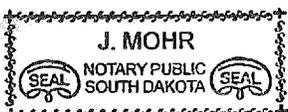


The Continental Insurance Company

Paul T. Bruflat
Paul T. Bruflat Vice President

State of South Dakota, County of Minnehaha, ss:

On this 7th day of February, 2014, before me personally came Paul T. Bruflat to me known, who, being by me duly sworn, did depose and say: that he resides in the City of Sioux Falls, State of South Dakota; that he is a Vice President of The Continental Insurance Company, a Pennsylvania insurance company, described in and which executed the above instrument; that he knows the seal of said insurance company; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said insurance company and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said insurance company.



My Commission Expires June 23, 2015

J. Mohr
J. Mohr Notary Public

CERTIFICATE

I, D. Bult, Assistant Secretary of The Continental Insurance Company, a Pennsylvania insurance company, do hereby certify that the Power of Attorney herein above set forth is still in force, and further certify that the By-Law and Resolution of the Board of Directors of the insurance company printed on the reverse hereof is still in force. In testimony whereof I have hereunto subscribed my name and affixed the seal of the said insurance company this _____ day of _____, 2014.



The Continental Insurance Company

D. Bult
D. Bult Assistant Secretary

Authorizing Resolutions

ADOPTED BY THE BOARD OF DIRECTORS OF THE CONTINENTAL INSURANCE COMPANY:

This Power of Attorney is made and executed pursuant to and by authority of the following By-Law duly adopted by the Board of Directors of the Company at a meeting held on May 10, 1995.

"RESOLVED: That any Group Vice President may authorize an officer to sign specific documents, agreements and instruments on behalf of the Company provided that the name of such authorized officer and a description of the documents, agreements or instruments that such officer may sign will be provided in writing by the Group Vice President to the Secretary of the Company prior to such execution becoming effective."

This Power of Attorney is signed by Paul T. Bruflat, Vice President, who has been authorized pursuant to the above resolution to execution power of attorneys on behalf of The Continental Insurance Company.

This Power of Attorney is signed and sealed by facsimile under and by the authority of the following Resolution adopted by the Board of Directors of the Company by unanimous written consent dated the 25th day of April, 2012:

"Whereas, the bylaws of the Company or specific resolution of the Board of Directors has authorized various officers (the "Authorized Officers") to execute various policies, bonds, undertakings and other obligatory instruments of like nature; and

Whereas, from time to time, the signature of the Authorized Officers in addition to being provided in original, hard copy format, may be provided via facsimile or otherwise in an electronic format (collectively, "Electronic Signatures"); Now therefore be it resolved: that the Electronic Signature of any Authorized Officer shall be valid and binding on the Company."

THE CONTINENTAL INSURANCE COMPANY
Radnor, Pennsylvania
Statement of Net Admitted Assets and Liabilities
December 31, 2013

ASSETS

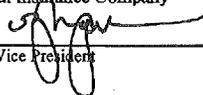
Bonds	\$ 1,684,328,034
Stocks	158,773,278
Cash and short-term investments	187,796,353
Amounts recoverable from reinsurers	193,598,356
Net deferred tax asset	73,211,237
Other assets	<u>47,825,939</u>
Total Assets	<u>\$ 2,345,533,197</u>

LIABILITIES AND SURPLUS

Losses	\$ 908,894,332
Loss adjustment expense	34,732,682
Unearned premiums	-
Ceded reinsurance premiums payable (net of ceding commissions)	26,174,058
Funds held by company under reinsurance treaties	719,991,228
Provision for reinsurance	76,000,000
Other liabilities	<u>(787,119,094)</u>
Total Liabilities	<u>978,673,206</u>
Surplus Account:	
Capital paid up	53,566,360
Gross paid in and contributed surplus	1,423,436,994
Special Surplus	105,639,025
Unassigned funds	<u>(215,782,388)</u>
Surplus as regards policyholders	<u>1,366,859,991</u>
Total Liabilities and Capital	<u>\$ 2,345,533,197</u>

I, OJ B. Magana, Assistant Vice President of The Continental Insurance Company hereby certify that the above is an accurate representation of the financial statement of the Company dated December 31, 2013, as filed with the various Insurance Departments and is a true and correct statement of the condition of The Continental Insurance Company as of that date.

The Continental Insurance Company

By 
Assistant Vice President

Subscribed and sworn to me this 12th day of March, 2014.

My commission expires:


Notary Public

"OFFICIAL SEAL"
KATHLEEN M. SCHROEDER
Notary Public State of Illinois
My Commission Expires 08/16/15





XL Group
Insurance
Reinsurance

Power of Attorney
XL Specialty Insurance Company
Greenwich Insurance Company
XL Reinsurance America Inc.

THIS IS NOT A BOND NUMBER
UNLIMITED POWER OF ATTORNEY
XL1514478

KNOW ALL MEN BY THESE PRESENTS: That XL Specialty Insurance Company, and Greenwich Insurance Company, Delaware insurance companies with offices located at 505 Eagleview Blvd., Exton, PA 19341, and XL Reinsurance America Inc., a New York insurance company with offices located at 70 Seaview Avenue, Stamford, CT 06902, do hereby nominate, constitute, and appoint: **Nancy Schnee, David W. Rosehill, Edward Reilly, Anne Potter, Beverly Woolford, Kevin T. Walsh, Kelly O'Malley, Andrea E. Gorbert, Valorie Spates, Annette M. Leuschner**

each its true and lawful Attorney(s) in fact to make, execute, attest, seal and deliver for and on its behalf, as surety, and as its act and deed, where required, any and all bonds and undertakings in the nature thereof, for the penal sum of no one of which is in any event to exceed UNLIMITED.

Such bonds and undertakings, when duly executed by the aforesaid Attorney (s) - in - Fact shall be binding upon each said Company as fully and to the same extent as if such bonds and undertakings were signed by the President and Secretary of the Company and sealed with its corporate seal.

The Power of Attorney is granted and is signed by facsimile under and by the authority of the following Resolutions adopted by the Board of Directors of each of the Companies on the 11th day of August 2014.

RESOLVED, that Gary Kaplan, David Hewett, William Mills, Gregory Boal and Kevin Mirsch are hereby appointed by the Board as authorized to make, execute, seal and deliver for and on behalf of the Company, any and all bonds, undertakings, contracts or obligations in surety or co-surety with others and that the Secretary or any Assistant Secretary of the Company be and that each of them hereby is authorized to attest the execution of any such bonds, undertakings, contracts or obligations in surety or co-surety and attach thereto the corporate seal of the Company.

RESOLVED, FURTHER, that Gary Kaplan, David Hewett, William Mills, Gregory Boal and Kevin Mirsch each is hereby authorized to execute powers of attorney qualifying the attorney named in the given power of attorney to execute, on behalf of the Company, bonds and undertakings in surety or co-surety with others, and that the Secretary or any Assistant Secretary of the Company be, and that each of them is hereby authorized to attest the execution of any such power of attorney, and to attach thereto the corporate seal of the Company.

RESOLVED, FURTHER, that the signature of such officers named in the preceding resolutions and the corporate seal of the Company may be affixed to such powers of attorney or to any certificate relating thereto by facsimile, and any such power of attorney or certificate bearing such facsimile signatures or facsimile seal shall be thereafter valid and binding upon the Company with respect to any bond, undertaking, contract or obligation in surety or co-surety with others to which it is attached.

IN WITNESS WHEREOF, the XL SPECIALTY INSURANCE COMPANY and GREENWICH INSURANCE COMPANY has caused its corporate seal to be hereunto affixed, and these presents to be signed by its duly authorized officers this August 11th, 2014.



**XL SPECIALTY INSURANCE COMPANY
GREENWICH INSURANCE COMPANY**

By: *David S. Hewett*
David S. Hewett, SENIOR VICE PRESIDENT

Attest: *Toni Ann Perkins*
Toni Ann Perkins, SECRETARY

STATE OF CONNECTICUT
COUNTY OF FAIRFIELD

On this 11th day of August, 2014, before me personally came David S. Hewett to me known, who, being duly sworn, did depose and say: that he is Executive Vice President of XL SPECIALTY INSURANCE COMPANY and Senior Vice President of GREENWICH INSURANCE COMPANY, described in and which executed the above instrument; that he knows the seals of said Companies; that the seals affixed to the aforesaid instrument are such corporate seals and were affixed thereto by order and authority of the Boards of Directors of said Companies; and that he executed the said instrument by like order.



Kim D. Sliva
Kim D. Sliva, NOTARY PUBLIC

STATE OF CONNECTICUT
COUNTY OF FAIRFIELD

I, Toni Ann Perkins, Secretary of XL SPECIALTY INSURANCE COMPANY and GREENWICH INSURANCE COMPANY, corporations of the State of Delaware, do hereby certify that the above and forgoing is a full, true and correct copy of a Power of Attorney issued by said Companies, and that I have compared same with the original and that it is a correct transcript therefrom and of the whole of the original and that the said Power of Attorney is still in full force and effect and has not been revoked.

NOV 11 2014

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Corporations, at the City of Stamford, this _____ day of _____



Toni Ann Perkins

Toni Ann Perkins, SECRETARY

IN WITNESS WHEREOF, XL REINSURANCE AMERICA INC. has caused its corporate seal to be hereunto affixed, and these presents to be signed by its duly authorized officers this 11th day of August, 2014.



XL REINSURANCE AMERICA INC.

by: *John P. Welch*
John P. Welch, PRESIDENT & CEO

Attest: *Toni Ann Perkins*
Toni Ann Perkins, SECRETARY

STATE OF CONNECTICUT
COUNTY OF FAIRFIELD

On this 11th day of August, 2014, before me personally came John P. Welch to me known, who, being duly sworn, did depose and say: that he is President & CEO of XL REINSURANCE AMERICA INC., described in and which executed the above instrument; that he knows the seal of said Corporation; that the seal affixed to the aforesaid instrument is such corporate seal and was affixed thereto by order and authority of the Board of Directors of said Corporation, and that he executed the said instrument by like order.



Kim D. Sliva

Kim D. Sliva, NOTARY PUBLIC

STATE OF CONNECTICUT
COUNTY OF FAIRFIELD

I, Toni Ann Perkins, Assistant Secretary of XL REINSURANCE AMERICA INC. a corporation of the State of New York, do hereby certify that the person who executed this Power of Attorney, with the rights, respectively of XL REINSURANCE AMERICA INC., do hereby certify that the above and forgoing is a full, true and correct copy of a Power of Attorney issued by said Corporation, and that I have compared same with the original and that it is a correct transcript therefrom and of the whole original and that the said Power of Attorney is still in full force and effect and has not been revoked.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Corporation, at the City of Stamford, this _____ day of _____



Toni Ann Perkins

Toni Ann Perkins, SECRETARY

This Power of Attorney may not be used to execute any bond with an inception date after August 11, 2019
SB0041

THIS DOCUMENT IS PRINTED ON A BLUE BACKGROUND

Contract No. C203484
County Forsyth

Rev 5-17-11

CONTRACT PERFORMANCE BOND

Liberty Mutual Insurance Company, Fidelity and Deposit Company of Maryland,
Zurich American Insurance Company, The Continental Insurance Company,
XL Specialty Insurance Company

Affix Seal of Surety Company

Print or type Surety Company Name

By Andrea E. Gorbert

Print, stamp or type name of Attorney-in-Fact

Andrea E. Gorbert

Signature of Attorney-in-Fact

Anne Potter

Signature of Witness

Anne Potter

Print or type Signer's name

390 N. Broadway, Jericho, NY 11753

Address of Attorney-in-Fact

Contract No.
County

C203484
Forsyth

Rev 5-17-11

CONTRACT PERFORMANCE BOND

CORPORATION

SIGNATURE OF CONTRACTOR (Principal)

Dragados USA, Inc.

Full name of Corporation

810 7th Avenue, 9th Floor, NEW YORK, NY 10019
4600 Marriot Drive, Suite 420, Raleigh, NC 27612

Address as prequalified

By

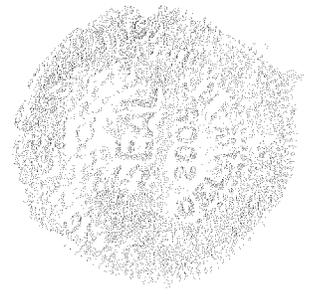


Signature of ~~President, Vice President, Assistant Vice President~~
Select appropriate title CFO

FERNANDO GONZALEZ ALCANTAR

Print or type Signer's name

Affix Corporate Seal



Attest


Signature of ~~Secretary, Assistant Secretary~~
Select appropriate title

Joseph L. Cantor

Print or type Signer's name

THIS POWER OF ATTORNEY IS NOT VALID UNLESS IT IS PRINTED ON RED BACKGROUND.

This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

Certificate No. 6549743

American Fire and Casualty Company
The Ohio Casualty Insurance Company

Liberty Mutual Insurance Company
West American Insurance Company

POWER OF ATTORNEY

KNOWN ALL PERSONS BY THESE PRESENTS: That American Fire & Casualty Company and The Ohio Casualty Insurance Company are corporations duly organized under the laws of the State of New Hampshire, that Liberty Mutual Insurance Company is a corporation duly organized under the laws of the State of Massachusetts, and West American Insurance Company is a corporation duly organized under the laws of the State of Indiana (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, Andrea E. Gorbert; Anne Potter; Annette Leuschner; Beverly A. Woolford; David W. Rosehill; Nancy Schnee; Valorie Spates

all of the city of Jericho, state of NY each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 24th day of April, 2014



American Fire and Casualty Company
The Ohio Casualty Insurance Company
Liberty Mutual Insurance Company
West American Insurance Company

By: David M. Carey
David M. Carey, Assistant Secretary

STATE OF PENNSYLVANIA ss
COUNTY OF MONTGOMERY

On this 24th day of April, 2014, before me personally appeared David M. Carey, who acknowledged himself to be the Assistant Secretary of American Fire and Casualty Company, Liberty Mutual Insurance Company, The Ohio Casualty Insurance Company, and West American Insurance Company, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Plymouth Meeting, Pennsylvania, on the day and year first above written.



COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Teresa Pastella, Notary Public
Plymouth Twp., Montgomery County
My Commission Expires March 28, 2017
Member, Pennsylvania Association of Notaries

By: Teresa Pastella
Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-laws and Authorizations of American Fire and Casualty Company, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company which resolutions are now in full force and effect reading as follows:

ARTICLE IV – OFFICERS – Section 12. Power of Attorney. Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and execution of any such instruments and to attach thereto the seal of the Corporation. When so executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

ARTICLE XIII – Execution of Contracts – SECTION 5. Surety Bonds and Undertakings. Any officer of the Company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Company by their signature and execution of any such instruments and to attach thereto the seal of the Company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

Certificate of Designation – The President of the Company, acting pursuant to the Bylaws of the Company, authorizes David M. Carey, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization – By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Gregory W. Davenport, the undersigned, Assistant Secretary, of American Fire and Casualty Company, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this _____ day of _____, 20____.



By: Gregory W. Davenport
Gregory W. Davenport, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

To confirm the validity of this Power of Attorney call 1-610-832-8240 between 9:00 am and 4:30 pm EST on any business day.



LIBERTY MUTUAL INSURANCE COMPANY
 FINANCIAL STATEMENT — DECEMBER 31, 2013

Assets	Liabilities
Cash and Bank Deposits	Unearned Premiums
*Bonds — U.S Government	Reserve for Claims and Claims Expense.....
*Other Bonds	Funds Held Under Reinsurance Treaties.....
*Stocks.....	Reserve for Dividends to Policyholders
Real Estate	Additional Statutory Reserve
Agents' Balances or Uncollected Premiums	Reserve for Commissions, Taxes and
Accrued Interest and Rents	Other Liabilities
Other Admitted Assets	Total.....
	Special Surplus Funds.....
	Capital Stock
	Paid in Surplus
	Unassigned Surplus.....
	Surplus to Policyholders
Total Admitted Assets.....	Total Liabilities and Surplus



* Bonds are stated at amortized or investment value; Stocks at Association Market Values.
 The foregoing financial information is taken from Liberty Mutual Insurance Company's financial statement filed with the state of Massachusetts Department of Insurance.

I, TIM MIKOLAJEWSKI, Assistant Secretary of Liberty Mutual Insurance Company, do hereby certify that the foregoing is a true, and correct statement of the Assets and Liabilities of said Corporation, as of December 31, 2013, to the best of my knowledge and belief.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Corporation at Seattle, Washington, this 20th day of March, 2014.

T. Mikolajewski

 Assistant Secretary



**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND
POWER OF ATTORNEY**

KNOW ALL MEN BY THESE PRESENTS: That the ZURICH AMERICAN INSURANCE COMPANY, a corporation of the State of New York, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, a corporation of the State of Maryland, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND a corporation of the State of Maryland (herein collectively called the "Companies"), by **THOMAS O. MCCLELLAN, Vice President**, in pursuance of authority granted by Article V, Section 8, of the By-Laws of said Companies, which are set forth on the reverse side hereof and are hereby certified to be in full force and effect on the date hereof, do hereby nominate, constitute, and appoint **David W. ROSEHILL, Nancy SCHNEE, Andrea E. GORBERT, Annette LEUSCHNER, Valorie SPATES, Beverly A. WOOLFORD and Anne POTTER, all of Jericho, New York, EACH** its true and lawful agent and Attorney-in-Fact, to make, execute, seal and deliver, for, and on its behalf as surety, and as its act and deed: **any and all bonds and undertakings**, and the execution of such bonds or undertakings in pursuance of these presents, shall be as binding upon said Companies, as fully and amply, to all intents and purposes, as if they had been duly executed and acknowledged by the regularly elected officers of the ZURICH AMERICAN INSURANCE COMPANY at its office in New York, New York., the regularly elected officers of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at its office in Owings Mills, Maryland., and the regularly elected officers of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at its office in Owings Mills, Maryland., in their own proper persons.

The said Vice President does hereby certify that the extract set forth on the reverse side hereof is a true copy of Article V, Section 8, of the By-Laws of said Companies, and is now in force.

IN WITNESS WHEREOF, the said Vice-President has hereunto subscribed his/her names and affixed the Corporate Seals of the said **ZURICH AMERICAN INSURANCE COMPANY, COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and FIDELITY AND DEPOSIT COMPANY OF MARYLAND**, this 19th day of August, A.D. 2014.

ATTEST:

**ZURICH AMERICAN INSURANCE COMPANY
COLONIAL AMERICAN CASUALTY AND SURETY COMPANY
FIDELITY AND DEPOSIT COMPANY OF MARYLAND**



By: *Eric D. Barnes*
Assistant Secretary
Eric D. Barnes

Thomas O. McClellan
Vice President
Thomas O. McClellan

State of Maryland
City of Baltimore

On this 19th day of August, A.D. 2014, before the subscriber, a Notary Public of the State of Maryland, duly commissioned and qualified, **THOMAS O. MCCLELLAN, Vice President, and ERIC D. BARNES, Assistant Secretary**, of the Companies, to me personally known to be the individuals and officers described in and who executed the preceding instrument, and acknowledged the execution of same, and being by me duly sworn, deposed and saith, that he/she is the said officer of the Company aforesaid, and that the seals affixed to the preceding instrument are the Corporate Seals of said Companies, and that the said Corporate Seals and the signature as such officer were duly affixed and subscribed to the said instrument by the authority and direction of the said Corporations.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my Official Seal the day and year first above written.

Constance A. Dunn



Constance A. Dunn, Notary Public
My Commission Expires: July 14, 2015

EXTRACT FROM BY-LAWS OF THE COMPANIES

"Article V, Section 8, Attorneys-in-Fact. The Chief Executive Officer, the President, or any Executive Vice President or Vice President may, by written instrument under the attested corporate seal, appoint attorneys-in-fact with authority to execute bonds, policies, recognizances, stipulations, undertakings, or other like instruments on behalf of the Company, and may authorize any officer or any such attorney-in-fact to affix the corporate seal thereto; and may with or without cause modify or revoke any such appointment or authority at any time."

CERTIFICATE

I, the undersigned, Vice President of the ZURICH AMERICAN INSURANCE COMPANY, the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY, and the FIDELITY AND DEPOSIT COMPANY OF MARYLAND, do hereby certify that the foregoing Power of Attorney is still in full force and effect on the date of this certificate; and I do further certify that Article V, Section 8, of the By-Laws of the Companies is still in force.

This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the ZURICH AMERICAN INSURANCE COMPANY at a meeting duly called and held on the 15th day of December 1998.

RESOLVED: "That the signature of the President or a Vice President and the attesting signature of a Secretary or an Assistant Secretary and the Seal of the Company may be affixed by facsimile on any Power of Attorney...Any such Power or any certificate thereof bearing such facsimile signature and seal shall be valid and binding on the Company."

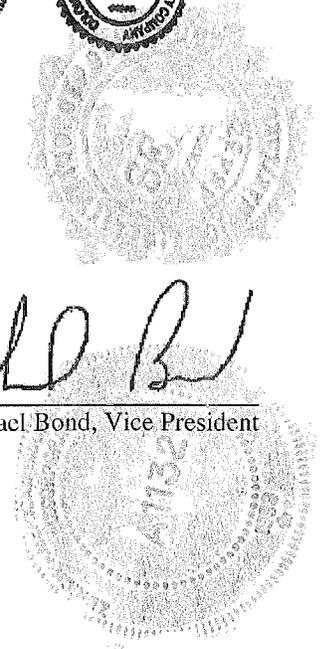
This Power of Attorney and Certificate may be signed by facsimile under and by authority of the following resolution of the Board of Directors of the COLONIAL AMERICAN CASUALTY AND SURETY COMPANY at a meeting duly called and held on the 5th day of May, 1994, and the following resolution of the Board of Directors of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND at a meeting duly called and held on the 10th day of May, 1990.

RESOLVED: "That the facsimile or mechanically reproduced seal of the company and facsimile or mechanically reproduced signature of any Vice-President, Secretary, or Assistant Secretary of the Company, whether made heretofore or hereafter, wherever appearing upon a certified copy of any power of attorney issued by the Company, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seals of the said Companies, this ____ day of NOV 11 2010.



Michael Bond, Vice President



FIDELITY AND DEPOSIT COMPANY

OF MARYLAND

600 Red Brook Blvd., Suite 600, Owings Mills, MD 21117

Statement of Financial Condition

As Of December 31, 2013

ASSETS

Bonds.....	\$ 139,272,722
Stocks	22,258,887
Cash and Short Term Investments.....	6,595,113
Reinsurance Recoverable	17,970,134
Other Accounts Receivable	33,409,916
TOTAL ADMITTED ASSETS.....	\$ 219,506,772

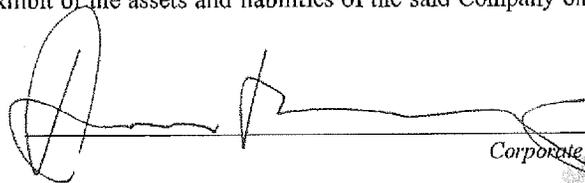
LIABILITIES, SURPLUS AND OTHER FUNDS

Reserve for Taxes and Expenses	\$ 1,787,480
Ceded Reinsurance Premiums Payable.....	42,146,005
Securities Lending Collateral Liability.....	6,613,750
TOTAL LIABILITIES	\$ 50,547,235
Capital Stock, Paid Up.....	\$ 5,000,000
Surplus.....	163,959,537
Surplus as regards Policyholders	168,959,537
TOTAL.....	\$ 219,506,772

Securities carried at \$58,378,690 in the above statement are deposited with various states as required by law.

Securities carried on the basis prescribed by the National Association of Insurance Commissioners. On the basis of market quotations for all bonds and stocks owned, the Company's total admitted assets at December 31, 2013 would be \$223,222,696 and surplus as regards policyholders \$172,675,461.

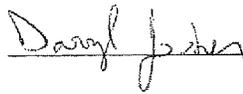
I, DENNIS F. KERRIGAN, Corporate Secretary of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND, do hereby certify that the foregoing statement is a correct exhibit of the assets and liabilities of the said Company on the 31st day of December, 2013.



 Corporate Secretary

State of Illinois }
City of Schaumburg } SS:

Subscribed and sworn to, before me, a Notary Public of the State of Illinois, in the City of Schaumburg, this 15th day of March, 2014.



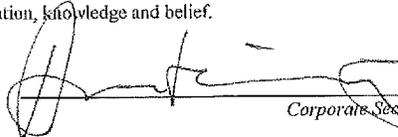
 Notary Public



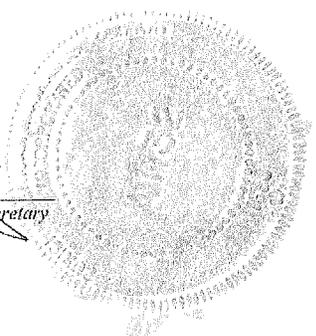
ZURICH AMERICAN INSURANCE COMPANY
COMPARATIVE BALANCE SHEET
ONE LIBERTY PLAZA, 165 BROADWAY, 32nd FLOOR, NEW YORK, NY 10006
As of December 31, 2013 and December 31, 2012

	12/31/2013	12/31/2012
Assets		
Bonds	\$ 18,990,565,123	\$ 18,907,466,866
Preferred Stock	-	-
Common Stock	2,411,755,638	2,123,025,432
Other Invested Assets	2,505,133,631	2,035,077,824
Short-term Investments	327,019,081	126,053,209
Receivable for securities	123,767,865	134,410,839
Cash and cash equivalents	(65,045,469)	728,298,115
Securities lending reinvested collateral assets	208,060,537	225,335,750
Employee Trust for Deferred Compensation Plan	142,420,097	130,493,778
Total Cash and Invested Assets	\$ 24,643,676,503	\$ 24,410,161,814
Premiums Receivable	\$ 3,358,946,105	\$ 3,649,247,239
Funds Held with Reinsurers	2,383,155	3,681,443
Reinsurance Recoverable	391,812,478	215,451,507
Accrued Investment Income	113,886,701	121,729,727
Federal Income Tax Recoverable	940,033,456	930,267,731
Due from Affiliates	183,852,738	187,274,289
Other Assets	549,410,052	493,265,075
Total Assets	\$ 30,184,001,188	\$ 30,011,078,824
Liabilities and Policyholders' Surplus		
Liabilities:		
Loss and LAE Reserves	\$ 13,894,112,327	\$ 14,244,436,264
Unearned Premium Reserve	4,321,146,577	4,159,670,241
Funds Held with Reinsurers	185,460,548	212,412,675
Loss In Course of Payment	357,922,606	408,170,112
Commission Reserve	68,132,284	64,038,359
Federal Income Tax Payable	290,773,995	16,190,044
Remittances and Items Unallocated	111,710,550	196,410,982
Payable to parent, subs and affiliates	154,428,297	57,540,814
Provision for Reinsurance	43,942,761	66,649,220
Ceded Reinsurance Premiums Payable	807,651,125	551,510,878
Securities Lending Collateral Liability	208,060,537	225,335,750
Other Liabilities	1,942,241,242	2,166,453,164
Total Liabilities	\$ 22,385,582,849	\$ 22,368,818,502
Policyholders' Surplus:		
Common Capital Stock	\$ 5,000,000	\$ 5,000,000
Paid-In and Contributed Surplus	4,394,131,321	4,394,131,321
Surplus Notes	-	430,000,000
Special Surplus Funds	34,865,000	43,259,000
Cumulative Unrealized Gain	505,136,565	331,857,594
Unassigned Surplus	2,859,285,454	2,438,012,408
Total Policyholders' Surplus	\$ 7,798,418,339	\$ 7,642,260,323
Total Liabilities and Policyholders' Surplus	\$ 30,184,001,188	\$ 30,011,078,824

I, Dennis F. Kerrigan, Corporate Secretary of ZURICH AMERICAN INSURANCE COMPANY do hereby certify that the foregoing statement is a correct exhibit of the assets and liabilities of the said Company, on the 31st day of December, 2013, according to the best of my information, knowledge and belief.



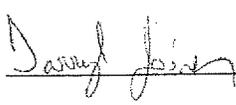
 Corporate Secretary



State of Illinois
 County of Cook

} SS:

Subscribed and sworn to, before me, a Notary Public of the State of Illinois, in the City of Schaumburg, this 15th day of March, 2014.



 Notary public



POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

Know All Men By These Presents, That The Continental Insurance Company, a Pennsylvania insurance company, is a duly organized and existing insurance company having its principal office in the City of Chicago, and State of Illinois, and that it does by virtue of the signature and seal herein affixed hereby make, constitute and appoint

Annette M Leuschner, Nancy Schnee, Valorie Spates, Andrea E Gorbart, Beverly A Woolford, Anne Potter, Individually, of Jericho, NY
Debra A Deming, Vivian Carti, Evangelina L Dominick, Annette M Leuschner, Cynthia Farrell, Sandra Diaz, Jessica Iannotta, Kelly O'Malley, Kevin T Walsh, Jr, Edward Reilly, Individually, of New York, NY

its true and lawful Attorney(s)-in-Fact with full power and authority hereby conferred to sign, seal and execute for and on its behalf bonds, undertakings and other obligatory instruments of similar nature

- In Unlimited Amounts -

and to bind them thereby as fully and to the same extent as if such instruments were signed by a duly authorized officer of the insurance company and all the acts of said Attorney, pursuant to the authority hereby given is hereby ratified and confirmed.

This Power of Attorney is made and executed pursuant to and by authority of the By-Law and Resolutions, printed on the reverse hereof, duly adopted, as indicated, by the Board of Directors of the insurance company.

In Witness Whereof, The Continental Insurance Company has caused these presents to be signed by its Vice President and its corporate seal to be hereto affixed on this 7th day of February, 2014.

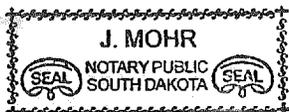


The Continental Insurance Company

Paul T. Bruflat
Paul T. Bruflat Vice President

State of South Dakota, County of Minnehaha, ss:

On this 7th day of February, 2014, before me personally came Paul T. Bruflat to me known, who, being by me duly sworn, did depose and say: that he resides in the City of Sioux Falls, State of South Dakota; that he is a Vice President of The Continental Insurance Company, a Pennsylvania insurance company, described in and which executed the above instrument; that he knows the seal of said insurance company; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said insurance company and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said insurance company.



My Commission Expires June 23, 2015

J. Mohr
J. Mohr Notary Public

CERTIFICATE

I, D. Bult, Assistant Secretary of The Continental Insurance Company, a Pennsylvania insurance company, do hereby certify that the Power of Attorney herein above set forth is still in force, and further certify that the By-Law and Resolution of the Board of Directors of the insurance company printed on the reverse hereof is still in force. In testimony whereof I have hereunto subscribed my name and affixed the seal of the said insurance company this _____ day of _____, 2014.



The Continental Insurance Company

D. Bult
D. Bult Assistant Secretary

Authorizing Resolutions

ADOPTED BY THE BOARD OF DIRECTORS OF THE CONTINENTAL INSURANCE COMPANY:

This Power of Attorney is made and executed pursuant to and by authority of the following By-Law duly adopted by the Board of Directors of the Company at a meeting held on May 10, 1995.

“RESOLVED: That any Group Vice President may authorize an officer to sign specific documents, agreements and instruments on behalf of the Company provided that the name of such authorized officer and a description of the documents, agreements or instruments that such officer may sign will be provided in writing by the Group Vice President to the Secretary of the Company prior to such execution becoming effective.”

This Power of Attorney is signed by Paul T. Bruflat, Vice President, who has been authorized pursuant to the above resolution to execution power of attorneys on behalf of The Continental Insurance Company.

This Power of Attorney is signed and sealed by facsimile under and by the authority of the following Resolution adopted by the Board of Directors of the Company by unanimous written consent dated the 25th day of April, 2012:

“Whereas, the bylaws of the Company or specific resolution of the Board of Directors has authorized various officers (the “Authorized Officers”) to execute various policies, bonds, undertakings and other obligatory instruments of like nature; and

Whereas, from time to time, the signature of the Authorized Officers in addition to being provided in original, hard copy format, may be provided via facsimile or otherwise in an electronic format (collectively, “Electronic Signatures”); Now therefore be it resolved: that the Electronic Signature of any Authorized Officer shall be valid and binding on the Company.”

THE CONTINENTAL INSURANCE COMPANY
Radnor, Pennsylvania
Statement of Net Admitted Assets and Liabilities
December 31, 2013

ASSETS

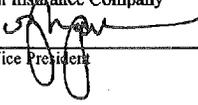
Bonds	\$ 1,684,328,034
Stocks	158,773,278
Cash and short-term investments	187,796,353
Amounts recoverable from reinsurers	193,598,356
Net deferred tax asset	73,211,237
Other assets	47,825,939
Total Assets	<u>\$ 2,345,533,197</u>

LIABILITIES AND SURPLUS

Losses	\$ 908,894,332
Loss adjustment expense	34,732,682
Unearned premiums	-
Ceded reinsurance premiums payable (net of ceding commissions)	26,174,058
Funds held by company under reinsurance treaties	719,991,228
Provision for reinsurance	76,000,000
Other liabilities	(787,119,094)
Total Liabilities	<u>978,673,206</u>
Surplus Account:	
Capital paid up	53,566,360
Gross paid in and contributed surplus	1,423,436,994
Special Surplus	105,639,025
Unassigned funds	<u>(215,782,388)</u>
Surplus as regards policyholders	1,366,859,991
Total Liabilities and Capital	<u>\$ 2,345,533,197</u>

I, OJ B. Magana, Assistant Vice President of The Continental Insurance Company hereby certify that the above is an accurate representation of the financial statement of the Company dated December 31, 2013, as filed with the various Insurance Departments and is a true and correct statement of the condition of The Continental Insurance Company as of that date.

The Continental Insurance Company

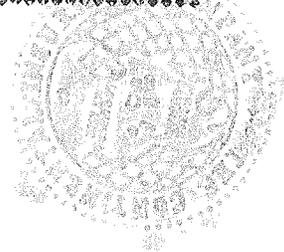
By 
Assistant Vice President

Subscribed and sworn to me this 12th day of March, 2014.

My commission expires:


Notary Public

"OFFICIAL SEAL"
KATHLEEN M SCHROEDER
Notary Public State of Illinois
My Commission Expires 08/16/15





Power of Attorney
 XL Specialty Insurance Company
 Greenwich Insurance Company
 XL Reinsurance America Inc.

THIS IS NOT A BOND NUMBER
 UNLIMITED POWER OF ATTORNEY
 XL1514479

KNOW ALL MEN BY THESE PRESENTS: That XL Specialty Insurance Company, and Greenwich Insurance Company, Delaware insurance companies with offices located at 505 Eagleview Blvd., Exton, PA 19341, and XL Reinsurance America Inc., a New York insurance company with offices located at 70 Seaview Avenue, Stamford, CT 06902, do hereby nominate, constitute, and appoint: **Nancy Schnee, David W. Rosehill, Edward Reilly, Anne Potter, Beverly Woolford, Kevin T. Walsh, Kelly O'Malley, Andrea E. Gorbert, Valorie Spates, Annette M. Leuschner**

each its true and lawful Attorney(s) in fact to make, execute, attest, seal and deliver for and on its behalf, as surety, and as its act and deed, where required, any and all bonds and undertakings in the nature thereof, for the penal sum of no one of which is in any event to exceed UNLIMITED.

Such bonds and undertakings, when duly executed by the aforesaid Attorney (s) - in - Fact shall be binding upon each said Company as fully and to the same extent as if such bonds and undertakings were signed by the President and Secretary of the Company and sealed with its corporate seal.

The Power of Attorney is granted and is signed by facsimile under and by the authority of the following Resolutions adopted by the Board of Directors of each of the Companies on the 11th day of August 2014.

RESOLVED, that Gary Kaplan, David Hewett, William Mills, Gregory Boal and Kevin Mirsch are hereby appointed by the Board as authorized to make, execute, seal and deliver for and on behalf of the Company, any and all bonds, undertakings, contracts or obligations in surety or co-surety with others and that the Secretary or any Assistant Secretary of the Company be and that each of them hereby is authorized to attest the execution of any such bonds, undertakings, contracts or obligations in surety or co-surety and attach thereto the corporate seal of the Company.

RESOLVED, FURTHER, that Gary Kaplan, David Hewett, William Mills, Gregory Boal and Kevin Mirsch each is hereby authorized to execute powers of attorney qualifying the attorney named in the given power of attorney to execute, on behalf of the Company, bonds and undertakings in surety or co-surety with others, and that the Secretary or any Assistant Secretary of the Company be, and that each of them is hereby authorized to attest the execution of any such power of attorney, and to attach thereto the corporate seal of the Company.

RESOLVED, FURTHER, that the signature of such officers named in the preceding resolutions and the corporate seal of the Company may be affixed to such powers of attorney or to any certificate relating thereto by facsimile, and any such power of attorney or certificate bearing such facsimile signatures or facsimile seal shall be thereafter valid and binding upon the Company with respect to any bond, undertaking, contract or obligation in surety or co-surety with others to which it is attached.

IN WITNESS WHEREOF, the XL SPECIALTY INSURANCE COMPANY and GREENWICH INSURANCE COMPANY has caused its corporate seal to be hereunto affixed, and these presents to be signed by its duly authorized officers this August 11th, 2014.



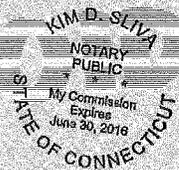
**XL SPECIALTY INSURANCE COMPANY
 GREENWICH INSURANCE COMPANY**

By: *David S. Hewett*
 David S. Hewett, SENIOR VICE PRESIDENT

Attest: *Toni Ann Perkins*
 Toni Ann Perkins, SECRETARY

STATE OF CONNECTICUT
 COUNTY OF FAIRFIELD

On this 11th day of August, 2014, before me personally came David S. Hewett to me known, who, being duly sworn, did depose and say: that he is Executive Vice President of XL SPECIALTY INSURANCE COMPANY and Senior Vice President of GREENWICH INSURANCE COMPANY, described in and which executed the above instrument; that he knows the seals of said Companies; that the seals affixed to the aforesaid instrument are such corporate seals and were affixed thereto by order and authority of the Boards of Directors of said Companies; and that he executed the said instrument by like order.



Kim D. Sliva
 Kim D. Sliva, NOTARY PUBLIC

STATE OF CONNECTICUT
COUNTY OF FAIRFIELD

I, Toni Ann Perkins, Secretary of XL SPECIALTY INSURANCE COMPANY and GREENWICH INSURANCE COMPANY, corporations of the State of Delaware, do hereby certify that the above and forgoing is a full, true and correct copy of a Power of Attorney issued by said Companies, and that I have compared same with the original and that it is a correct transcript therefrom and of the whole of the original and that the said Power of Attorney is still in full force and effect and has not been revoked.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Corporations, at the City of Stamford, this 11th day of August, 2014.



Toni Ann Perkins

Toni Ann Perkins, SECRETARY

IN WITNESS WHEREOF, XL REINSURANCE AMERICA INC. has caused its corporate seal to be hereunto affixed, and these presents to be signed by its duly authorized officers this 11th day of August, 2014.



XL REINSURANCE AMERICA INC.

by:

John P. Welch

John P. Welch, PRESIDENT & CEO

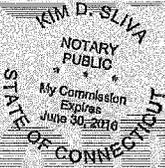
Attest:

Toni Ann Perkins

Toni Ann Perkins, SECRETARY

STATE OF CONNECTICUT
COUNTY OF FAIRFIELD

On this 11th day of August, 2014, before me personally came John P. Welch to me known, who, being duly sworn, did depose and say: that he is President & CEO of XL REINSURANCE AMERICA INC., described in and which executed the above instrument; that he knows the seal of said Corporation; that the seal affixed to the aforesaid instrument is such corporate seal and was affixed thereto by order and authority of the Board of Directors of said Corporation, and that he executed the said instrument by like order.



Kim D. Sliva

Kim D. Sliva, NOTARY PUBLIC

STATE OF CONNECTICUT
COUNTY OF FAIRFIELD

I, Toni Ann Perkins, Assistant Secretary of XL REINSURANCE AMERICA INC. a corporation of the State of New York, do hereby certify that the person who executed this Power of Attorney, with the rights, respectively of XL REINSURANCE AMERICA INC., do hereby certify that the above and forgoing is a full, true and correct copy of a Power of Attorney issued by said Corporation, and that I have compared same with the original and that it is a correct transcript therefrom and of the whole original and that the said Power of Attorney is still in full force and effect and has not been revoked.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Corporation, at the City of Stamford, this 11th day of August, 2014.



Toni Ann Perkins

Toni Ann Perkins, SECRETARY

This Power of Attorney may not be used to execute any bond with an inception date after August 11, 2019

SB0041

THIS DOCUMENT IS PRINTED ON A BLUE BACKGROUND

XL SPECIALTY INSURANCE COMPANY
 STATUTORY STATEMENT OF ADMITTED ASSETS,
 LIABILITIES, CAPITAL AND SURPLUS
 December 31, 2013
 (U.S. Dollars)

Assets:		Liabilities:	
Bonds	243,078,129	Loss & loss adjustment expenses	202,897,195
Stocks	47,367,742	Reinsurance payable on paid loss and loss adjustment expenses	550,213
Cash and short-term investments	103,941,689	Unearned premiums	36,049,248
Receivable for securities		Ceded reinsurance premium payable	
Total Invested Assets	394,387,560	Funds held by company under reinsurance treaties	10,668,107
		Payable for Securities	
		Other Liabilities	32,063,624
		Total Liabilities	282,228,387
Agents Balances	25,747,167	Capital and Surplus:	
		Aggregate write-ins for special surplus funds	
Funds held by or deposited with reinsured companies		Common capital Stock	5,812,500
Reinsurance recoverable on loss and loss adjustment expense payments		Gross paid in and contributed surplus	127,462,739
Accrued interest and dividends	1,346,314	Unassigned surplus	25,067,804
Other admitted assets	19,090,389	Total Capital and Surplus	158,343,043
Total Admitted Assets	440,571,430	Total Liabilities, Capital and Surplus	440,571,430

I, Andrew Robert Will, Vice President and Controller of XL Specialty Insurance Company (the "Corporation") do hereby certify that to the best of my knowledge and belief, the foregoing is a full and true Statutory Statement of Admitted Assets, Liabilities, Capital and Surplus of the Corporation, as of December 31, 2013, prepared in conformity with the accounting practices prescribed or permitted by the Insurance Department of the State of Delaware. The foregoing statement should not be taken as a complete statement of financial condition of the Corporation. Such a statement is available upon request at the Corporation's principal office located at Seaview House, 70 Seaview Avenue, Stamford, CT 06902-06040.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of the Corporation at Stamford, Connecticut.

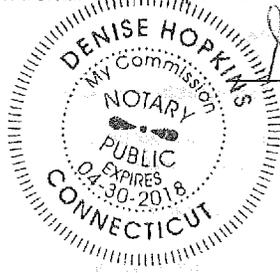


 Vice President and Controller

State of Connecticut

County of Fairfield

The foregoing financial information was acknowledged before me this 24th of March, 2014 by Andrew Robert Will of XL Specialty Insurance Company on behalf of the corporation.



Denise Hopkins

Notary Public

XL SPECIALTY INSURANCE COMPANY
 STATUTORY STATEMENT OF ADMITTED ASSETS,
 LIABILITIES, CAPITAL AND SURPLUS
 December 31, 2013
 (U.S. Dollars)

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Cash and short-term investments	103,941,689	Unearned premiums	36,049,248
Receivable for securities		Ceded reinsurance premium payable	
Total Invested Assets	394,387,560	Funds held by company under reinsurance treaties	10,668,107
		Payable for Securities	
		Other Liabilities	32,063,624
		Total Liabilities	282,228,387
Agents Balances	25,747,167	Capital and Surplus:	
		Aggregate write-ins for special surplus funds	
Funds held by or deposited with reinsured companies		Common capital Stock	5,812,500
Reinsurance recoverable on loss and loss adjustment expense payments		Gross paid in and contributed surplus	127,462,739
Accrued interest and dividends	1,346,314	Unassigned surplus	25,067,804
Other admitted assets	19,090,389	Total Capital and Surplus	158,343,043
Total Admitted Assets	440,571,430	Total Liabilities, Capital and Surplus	440,571,430

I, Andrew Robert Will, Vice President and Controller of XL Specialty Insurance Company (the "Corporation") do hereby certify that to the best of my knowledge and belief, the foregoing is a full and true Statutory Statement of Admitted Assets, Liabilities, Capital and Surplus of the Corporation, as of December 31, 2013, prepared in conformity with the accounting practices prescribed or permitted by the Insurance Department of the State of Delaware. The foregoing statement should not be taken as a complete statement of financial condition of the Corporation. Such a statement is available upon request at the Corporation's principal office located at Seaview House, 70 Seaview Avenue, Stamford, CT 06902-06040.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of the Corporation at Stamford, Connecticut.

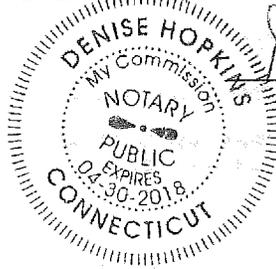


 Vice President and Controller

State of Connecticut

County of Fairfield

The foregoing financial information was acknowledged before me this 24th of March, 2014 by Andrew Robert Will of XL Specialty Insurance Company on behalf of the corporation.



Denise Hopkins
Notary Public

**UNANIMOUS WRITTEN CONSENT
OF THE
BOARD OF DIRECTORS OF
DRAGADOS USA, INC.**

Dated January 25, 2011

The undersigned, being all of the members of the board of directors (the "Board") of Dragados USA, Inc., a Delaware corporation (the "Corporation"), acting by written consent without a meeting pursuant to Section 141(1) of the Delaware General Corporation Law ("DGCL"), hereby adopt and consent to the adoption of the following resolutions with the same force and effect as though adopted at a meeting duly called and held:

RESOLVED, that Ricardo Franco Barberán, President
Fernando Gonzalez Alcañiz, Chief Financial Officer

be and they are hereby authorized and empowered to execute any and all bonds or undertakings of whatever kind of nature, including, but not limited to, bid, payment and performance bonds, in the name and on behalf of the Corporation;

FURTHER RESOLVED, that the Corporation, through its duly authorized officers or other authorized persons, is hereby authorized in the name and on behalf of the Corporation to certify as to the adoption of any and all such resolutions,

FURTHER RESOLVED, that the Corporation is authorized and directed to take such action and to execute all documents that the duly authorized officers or other authorized persons of the Corporation may deem necessary or advisable in order to carry out the purposes of this written consent, the taking of any such actions or execution, acknowledgment, delivery, filing or recording of any such documents, instruments or certificates to be conclusive evidence of the necessary or desirability thereof;

FURTHER RESOLVED, that the Corporation is authorized to make all payments of fees and expenses associated with, related to and arising out of the transactions contemplated by this written consent otherwise related to the transactions contemplated hereunder;

FURTHER RESOLVED, that this written consent may be executed in one or more counterparts, all of which together shall be deemed to be one and the same written consent.

IN WITNESS WHEREOF, each of the undersigned has executed this written consent as of the day first written above.



Ignacio Segura Surinach



José Antonio López- Monís Plaza

