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

C203199

CONTRACT AND CONTRACT BONDS

FOR CONTRACT NO. C203199

WBS	34491.3.GVS3 NHS-0017(124)
T.I.P NO.	R-2633BA
COUNTY OF	BRUNSWICK
THIS IS THE	ROADWAY & STRUCTURE CONTRACT
ROUTE NUMBER	US 17 LENGTH 4.638 MILES
LOCATION	US-17 (WILMINGTON BYPASS) FROM US-74/76 EAST OF MALMO TO SR-1430 (CEDAR HILL RD)
CONTRACTOR	BARNHILL CONTRACTING COMPANY
ADDRESS	P.O. BOX 1529 TARBORO, NC 278861529
BIDS OPENED	JANUARY 21, 2014
CONTRACT EXECUTION	FEB 19 2014

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

PROPOSAL

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

CONTRACT ID	C203199
WBS	34491.3.GVS3
FEDERAL-AID NO.	NHS-0017(124)
COUNTY	BRUNSWICK
T.I.P. NO.	R-2633BA
MILES	4.638
ROUTE NO.	US 17
LOCATION	US-17 (WILMINGTON BYPASS) FROM US-74/76 EAST OF MALMO TO SR-1430 (CEDAR HILL RD)
TYPE OF WORK	GRADING, DRAINAGE, PAVING, SIGNALS, ITS AND STRUCTURES.

NOTICE:

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

BIDS WILL BE RECEIVED AS SHOWN BELOW:

THIS IS A <u>ROADWAY & STRUCTURE</u> PROPOSAL

5% BID BOND OR BID DEPOSIT REQUIRED

PROPOSAL FOR THE CONSTRUCTION OF

CONTRACT No. C203199 IN BRUNSWICK 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. **C203199**; 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. **C203199** in **Brunswick 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.

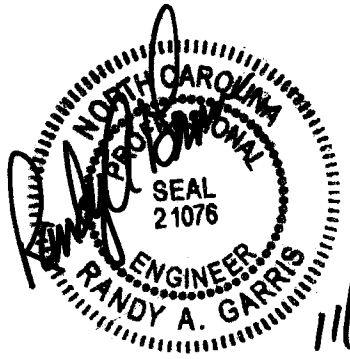
The published volume entitled *North Carolina Department of Transportation, Raleigh, Standard Specifications for Roads and Structures, January 2012* with all amendments and supplements thereto, is by reference incorporated into and made a part of this contract; that, except as herein modified, all the 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.



11/13/13

State Contract Officer

TABLE OF CONTENTS

COVER SHEET
PROPOSAL SHEET

PROJECT SPECIAL PROVISIONS

CONTRACT TIME AND LIQUIDATED DAMAGES: 1
INTERMEDIATE CONTRACT TIME NUMBER 1 AND LIQUIDATED DAMAGES: 1
INTERMEDIATE CONTRACT TIME NUMBER 2 AND LIQUIDATED DAMAGES: 2
INTERMEDIATE CONTRACT TIME NUMBER 3 AND LIQUIDATED DAMAGES: 3
INTERMEDIATE CONTRACT TIME NUMBER 4 AND LIQUIDATED DAMAGES: 3
INTERMEDIATE CONTRACT TIME NUMBER 5 AND LIQUIDATED DAMAGES: 4
PERMANENT VEGETATION ESTABLISHMENT: 4
DELAY OF CONSTRUCTION ACCESS: 5
DELAY IN RIGHT OF ENTRY: 5
MAJOR CONTRACT ITEMS: 5
SPECIALTY ITEMS: 5
FUEL PRICE ADJUSTMENT: 6
PAYOUT SCHEDULE: 6
SCHEDULE OF ESTIMATED COMPLETION PROGRESS: 7
DISADVANTAGED BUSINESS ENTERPRISE: 7
CERTIFICATION FOR FEDERAL-AID CONTRACTS: 20
CONTRACTOR'S LICENSE REQUIREMENTS: 21
U.S. DEPARTMENT OF TRANSPORTATION HOTLINE: 21
SUBSURFACE INFORMATION: 21
LOCATING EXISTING UNDERGROUND UTILITIES: 21
RESOURCE CONSERVATION: 22
DOMESTIC STEEL: 22
MAINTENANCE OF THE PROJECT: 22
COOPERATION BETWEEN CONTRACTORS: 23
TWELVE MONTH GUARANTEE: 23
GIFTS FROM VENDORS AND CONTRACTORS: 24
EROSION AND SEDIMENT CONTROL/STORMWATER CERTIFICATION: 24
PROCEDURE FOR MONITORING BORROW PIT DISCHARGE: 30
EMPLOYMENT: 31
STATE HIGHWAY ADMINISTRATOR TITLE CHANGE: 31
NOTE TO CONTRACTOR: 31
ROADWAY 32
GEOTECHNICAL 84
SIGNING 109
TRAFFIC CONTROL 120
UTILITY CONSTRUCTION 122
UTILITIES BY OTHERS 134
EROSION CONTROL 136
SIGNALS AND INTELLIGENT TRANSPORTATION SYSTEMS 166
PROJECT SPECIAL PROVISIONS STRUCTURE / CULVERTS 288

PERMITS R-1

STANDARD SPECIAL PROVISIONS

AVAILABILITY OF FUNDS – TERMINATION OF CONTRACTS 1
NCDOT GENERAL SEED SPECIFICATION FOR SEED QUALITY 2
ERRATA 5
PLANT AND PEST QUARANTINES 7
AWARD OF CONTRACT 8
MINORITY AND FEMALE EMPLOYMENT REQUIREMENTS 9
REQUIRED CONTRACT PROVISIONS FEDERAL - AID CONSTRUCTION CONTRACTS 12
ON-THE-JOB TRAINING 21
MINIMUM WAGES 24

PROPOSAL ITEM SHEET AND SIGNATURE SHEET

ITEM SHEET(S) (TAN SHEETS)
SIGNATURE SHEET (BID ACCEPTANCE BY DEPARTMENT)

PROJECT SPECIAL PROVISIONS

GENERAL

CONTRACT TIME AND LIQUIDATED DAMAGES:

(8-15-00) (Rev. 12-18-07) 108 SP1 G07 A

The date of availability for this contract is **March 3, 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, 2018**.

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

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

INTERMEDIATE CONTRACT TIME NUMBER 1 AND LIQUIDATED DAMAGES:

(7-1-95) (Rev. 2-21-12) 108 SP1 G13 A

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

The date of availability for this intermediate contract time is **March 3, 2014**.

The completion date for this intermediate contract time is **November 1, 2017**.

The liquidated damages for this intermediate contract time are **Twenty Thousand Dollars ($20,000.00)** per calendar day.

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

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

The Contractor shall complete the required work of installing, maintaining, and removing the traffic control devices for lane closures and restoring traffic to the existing traffic pattern. The Contractor shall not close or narrow a lane of traffic on **SR 1426 (Mt Misery Rd)** during the following time restrictions:

DAY AND TIME RESTRICTIONS

Monday through Friday
7:00 A.M. - 9:00 A.M.
and
4:00 P.M. - 6:00 P.M.

In addition, the Contractor shall not close or narrow a lane of traffic on **SR 1426 (Mt Misery Rd)**, detain and/or alter the traffic flow on or during holidays, holiday weekends, special events, or any other time when traffic is unusually heavy, including the following schedules:

HOLIDAY AND HOLIDAY WEEKEND LANE CLOSURE RESTRICTIONS

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

2. For **New Year's Day**, between the hours of **7:00 am** December 31st and **6:00 pm** January 2nd. If New Year's Day is on a Friday, Saturday, Sunday or Monday, then until **6:00 pm** the following Tuesday.

3. For **Easter**, between the hours of **7:00 am** Thursday and **6:00 pm** Monday.

4. For **Memorial Day**, between the hours of **7:00 am** Friday and **6:00 pm** Tuesday.

5. For **Independence Day**, between the hours of **7:00 am** the day before Independence Day and **6:00 pm** the day after Independence Day.

   If **Independence Day** is on a Friday, Saturday, Sunday or Monday, then between the hours of **7:00 am** the Thursday before Independence Day and **6:00 pm** the Tuesday after Independence Day.

6. For **Labor Day**, between the hours of **7:00 am** Friday and **6:00 pm** Tuesday.

7. For **Thanksgiving Day**, between the hours of **7:00 am** Tuesday and **6:00 pm** Monday.

8. For **Christmas**, between the hours of **7:00 am** the Friday before the week of Christmas Day and **6:00 pm** the following Tuesday after the week of Christmas Day.

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 **Five Hundred Dollars** (**$ 500.00**) per hour.

INTERMEDIATE CONTRACT TIME NUMBER 3 AND LIQUIDATED DAMAGES:
(2-20-07) (Rev. 6-18-13) 108 SP1 G14 F

The Contractor shall complete the work required of **Area 2, Phase I, Step 3** as shown on Sheet(s) **TMP-2B & TMP-6** in multiple weekends and shall place and maintain traffic on same.

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

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

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

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

The Contractor shall complete the work required of **Area 3, Phase I, Step 2** as shown on Sheet(s) **TMP-2 & TMP-18** in multiple weekends and shall place and maintain traffic on same.

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

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

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

INTERMEDIATE CONTRACT TIME NUMBER 5 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, Steps 1 thru 3** as shown on Sheet(s) **TMP- 2B, TMP-26 & TMP-27** 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 and fifty (150)** 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.

DELAY OF CONSTRUCTION ACCESS:

The Contractor shall not begin any work at Area 3, Phase II, Steps 1 thru 3 as shown on TMP-3A until April 15, 2015 or until EPA Superfund Site (P & W Waste Oil) located 10518 Royster Road has completed removal of hazardous wastes from the Site. The Contractor shall cooperate with the EPA's contractor who will be hauling materials from the Superfund site through this project via -Y9- Royster Road (SR 1431) and -Y8- Cedar Hill Road (SR 1430).

DELAY IN RIGHT OF ENTRY:

(7-1-95) 108 SP1 G22 A

The Contractor will not be allowed right of entry to the parcels listed below before **March 1, 2014** unless otherwise permitted by the Engineer.

Parcel No.	Property Owner
010	74 Holdings
010A	C P Brunswick
029	Tilman Ivey
040	Raiford Trask
040A	Raiford Trask

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
18	Borrow Excavation
66	Aggregate Base Course

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
110 thru 125	Guardrail
126 thru 135	Fencing
140 thru 166	Signing
180 thru 184, 187 thru 189	Long-Life Pavement Markings
191 thru 192	Permanent Pavement Markers
193 thru 223	Utility Construction
224 thru 258, 261	Erosion Control
259 thru 260	Reforestation
262 thru 314	Signals/ITS System
325 thru 329	Drilled Piers

FUEL PRICE ADJUSTMENT:
(11-15-05) (Rev. 1-17-12) 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 **$3.0850** 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
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
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. 5-21-13) 108-2 SP1 G58

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

	Fiscal Year	Progress (% of Dollar Value)
2014	(7/01/13 - 6/30/14)	5% of Total Amount Bid
2015	(7/01/14 - 6/30/15)	44% of Total Amount Bid
2016	(7/01/15- 6/30/16)	28% of Total Amount Bid
2017	(7/01/16 - 6/30/17)	18% of Total Amount Bid
2018	(7/01/17 - 6/30/18)	5% 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

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 **11.0** %

(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 SP1 G112 D

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

LOCATING EXISTING UNDERGROUND UTILITIES:
(3-20-12) 105 SP1 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 SP1 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 SP1 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.

MAINTENANCE OF THE PROJECT:
(11-20-07) (Rev. 1-17-12) 104-10 SP1 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 SP1 G133

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

R-2633BB, Brunswick – New Hanover, located on the east end of this project is currently under construction and will be completed the same time as R-2633BA.

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

TWELVE MONTH GUARANTEE:

(7-15-03) 108 SP1 G145

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

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

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

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

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

GIFTS FROM VENDORS AND CONTRACTORS:

(12-15-09) 107-1 SP1 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.

EROSION AND SEDIMENT CONTROL/STORMWATER CERTIFICATION:

(1-16-07) (Rev 9-18-12) 105-16, 225-2, 16 SP1 G180

General

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

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

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

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

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

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

Roles and Responsibilities

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

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

(a) Oversee the work of subcontractors so that appropriate erosion and sediment control/stormwater preventive measures are conformed to at each stage of the work.
(b) Prepare the required National Pollutant Discharge Elimination System (NPDES) Inspection Record and submit to the Engineer.
(c) Attend all weekly or monthly construction meetings to discuss the findings of the NPDES inspection and other related issues.
(d) Implement the erosion and sediment control/stormwater site plans requested.
(e) Provide any needed erosion and sediment control/stormwater practices for the Contractor's temporary work not shown on the plans, such as, but not limited to work platforms, temporary construction, pumping operations, plant and storage yards, and cofferdams.

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

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

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

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

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

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

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

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

(b) Inspect erosion and sediment control/stormwater devices and stormwater discharge outfalls at least once every 7 calendar days, 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 C*ease and Desist Order* for erosion and sediment control/stormwater related issues.

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

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

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

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

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

Failure to appeal within 10 calendar days will result in the proposed adverse action becoming effective on the date specified on the certified notice. Failure to appeal within the time specified will result in a waiver of all future appeal rights regarding the adverse action taken. The certificant will not be allowed to perform duties associated with the certification during the appeal process.

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

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

Measurement and Payment

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 SP1 G181

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

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

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

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

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

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

During the Environmental Assessment required by Article 230-4 of the *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 SP1 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) SP1 G185

Revise the *2012 Standard Specifications* as follows:

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

NOTE TO CONTRACTOR:

The Contractor's attention is directed to the note on Plan Sheet No. 11. If the Contractor elects to pursue a temporary at-grade railroad crossing, he will be required to obtain the crossing agreement directly from CSXT.

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*.

BUILDING REMOVAL:

(1-1-02) (Rev. 4-16-13) 215 SP2 R15 B

Remove the buildings, underground storage tanks and appurtenances listed below in accordance with Section 215 of the *2012 Standard Specifications*:

Building Removal
Parcel 029A – Right of Survey Station 16+00, Survey Line -RP_C2-
Modular Home

When the description of the work for an item requires a portion of the building to be cut off, that portion of the buildings and appurtenances located within the right of way and/or construction area shall be cut off by the Contractor and disposed of by him. The Engineer will denote on the building, the line where the building is to be cut off. The Contractor will be required to cut the building off on a neat line along the construction line or right of way boundary designated by the Engineer. The Contractor will not be required to do any repairing to that portion of the building located outside the right of way or construction area or to shore it up in any respect. All of the Contractor's work shall be confined to the right of way and construction area designated by the Engineer.

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*.

EMBANKMENT SETTLEMENT GAUGES:
(7-1-95) (Rev. 2-19-13) 235 SP2 R75

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. Settlement gauges may be required to monitor settlement at approximate locations shown in the plans and as directed.

Page 2-22, Article 235-2 MATERIALS, add the following:

Provide Schedule 40 black steel pipes and couplers with steel or wood bases for settlement gauges. Use steel plates with yield strength of at least 36 ksi and pressure treated wood boards for bases of settlement gauges.

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.

(F) Embankment Monitoring

Fabricate and install settlement gauges in accordance with the contract. Make settlement gauges highly visible so gauges are not disturbed while monitoring settlement. Use only hand operated compaction equipment to compact fill material around gauges.

Do not damage settlement gauges. Damaged settlement gauges may require replacement or additional gauges and waiting period extensions as determined by the Engineer.

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.

Embankment Settlement Gauges will be measured and paid in units of each. Settlement gauges will be measured as one per gauge location. The contract unit price for *Embankment Settlement Gauges* will be full compensation for fabricating and installing settlement gauges including placing and compacting fill material around gauges, adding pipes and couplers until embankment monitoring ends and any incidentals necessary to monitor settlement. No payment will be made for interfering with the Contractor's operations due to embankment monitoring or damaged settlement gauges as determined by the Engineer.

Payment will be made under:

Pay Item	**Pay Unit**
Embankment Settlement Gauges	Each

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.

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	Section
Flowable Fill	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	Pay Unit
Flowable Fill	Cubic Yard

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

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.

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.

AGGREGATE STABILIZATION:
(11-19-13) 510 SP5 R10

Revise the *2012 Standard Specifications* as follows:

Replace Section 510 with the following:

SECTION 510
AGGREGATE STABILIZATION

510-1 DESCRIPTION

Stabilize subgrades with aggregate base course (ABC) in accordance with the contract or as directed. Define "aggregate" as ABC for stabilizer aggregate or Class IV aggregate stabilization. Define "stabilizer aggregate" as mixing aggregate with subgrade soils. Define "Class IV aggregate stabilization" as replacing subgrade soils with aggregate. Remove material as needed in cut areas. Install geotextile for soil stabilization as needed and place aggregate at locations shown on the plans.

510-2 MATERIALS

Refer to Division 10.

Item	Section
Aggregate for Stabilization	1008
Geotextile for Soil Stabilization, Type 4	1056
Select Material, Class IV	1016

Use aggregate for stabilization for stabilizer aggregate and Class IV select material for Class IV aggregate stabilization.

510-3 CONSTRUCTION METHODS

When undercut is required for aggregate stabilization, undercut as needed to place aggregate as shown on the plans or as directed. Perform undercut excavation in accordance with Section 225.

(A) Stabilizer Aggregate

Spread aggregate uniformly and evenly with a mechanical spreader to the required thickness. Do not spread more aggregate than what can be mixed and compacted within a week. Mix aggregate with the top 3" of subgrade soils until aggregate and soils are

uniformly mixed. Compact stabilizer aggregate to 100% of AASHTO T 99 as modified by the Department.

(B) Class IV Aggregate Stabilization

When geotextile for soil stabilization is required, install geotextiles in accordance with Article 270-3. Place aggregate by end dumping aggregate on geotextiles or subgrade soils. Do not operate heavy equipment on geotextiles until geotextiles are covered with the required thickness of aggregate. Compact Class IV aggregate stabilization less than 6" thick with a smooth wheeled roller without vibration to the satisfaction of the Engineer. Compact Class IV aggregate stabilization with a thickness of 6" or more to 92% of AASHTO T 180 as modified by the Department or to the highest density that can be reasonably obtained.

(C) Maintenance

Maintain aggregate stabilization in an acceptable condition and minimize the use of heavy equipment on aggregate in order to avoid damaging subgrades. Provide and maintain drainage ditches and drains as required to prevent entrapping water in aggregate stabilization.

510-4 MEASUREMENT AND PAYMENT

Stabilizer Aggregate and *Class IV Aggregate Stabilization* will be measured and paid in tons. Aggregate will be measured by weighing material in trucks in accordance with Article 106-7. The contract unit price for *Stabilizer Aggregate* and *Class IV Aggregate Stabilization* will be full compensation for furnishing, hauling, handling, placing, mixing, compacting and maintaining aggregate.

Geotextile for Soil Stabilization will be measured and paid in accordance with Article 270-4.

Materials excavated to place aggregate below the subgrade or ground line, whichever is lower, will be measured and paid in accordance with Article 225-7, except when undercut excavation is in accordance with Section 226 and the Engineer requires undercut to be backfilled with aggregate. When this occurs, the second sentence of the sixth paragraph of Article 226-3 will not apply, as payment for aggregate will be made as described in this article.

Payment will be made under:

Pay Item	**Pay Unit**
Stabilizer Aggregate	Ton
Class IV Aggregate Stabilization	Ton

ASPHALT PAVEMENTS - SUPERPAVE:
(6-19-12) (Rev. 12-17-13) 605, 609, 610, 650 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
S9.5C, S12.5C	45°F
S9.5D, S12.5D	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, Subrticle 650-3(B) Mix Design Criteria, replace Table 650-1 with the following:

TABLE 650-1
OGAFC GRADATION CRITERIA

Grading Requirements	**Total Percent Passing**		
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

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 **$569.38** per ton.

This base price index represents an average of F.O.B. selling prices of asphalt binder at supplier's terminals on **November 1, 2013**.

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:

Number	Item
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

SANDBAG HEADWALLS:

(1-17-12) 420-9, 801-2, 1264-3 SPI 8-36

Description

Construct sandbag headwalls for temporary pipes in accordance with the contract. Sandbag headwalls are only for temporary applications and removed when no longer needed. When reinforced sandbag headwalls are required, install geotextile reinforcement as shown in the plans.

Materials

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

Item	Section
Anchor Pins	1056-2
Geotextiles	1056
Reinforcing Steel	1070
Select Material	1016
Wire Staples	1060-8(D)

Provide Type 5 geotextile for geotextile reinforcement with wide width tensile strengths at ultimate in the machine direction (MD) as shown in the plans. Use 8" long steel spikes or 24" long #4 reinforcing steel bars to connect sandbags. Use Class III select material to fill acrylic sandbags that meet the Federal Commercial Item Description A-A-52140A. Provide Type 3 material certifications in accordance with Article 106-3 of the *2012 Standard Specifications* for sandbags.

Construction Methods

Install temporary pipes and excavate as necessary for sandbag headwalls in accordance with the contract. Notify the Engineer when foundation excavation is complete. Do not place geotextile reinforcement or sandbags until excavation dimensions and foundation material are approved.

When reinforced sandbag headwalls are required, place geotextile reinforcement with the orientation, dimensions and number of layers shown in the plans and in slight tension free of kinks, folds, wrinkles or creases. Install geotextile reinforcement with the MD perpendicular to the headwall face. 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 parallel to the headwall face.

Fill sandbags so when tied each bag is approximately 13" wide, 21" long and 4" to 5" thick. Stack sandbags with no negative batter (wall face leaning forward) so the headwall position is as shown in the plans. Do not leave any gaps between sandbags and pipes. Stagger sandbags from the row above and below and connect bags with spikes or reinforcing bars as shown in the plans. Construct sandbag headwalls with the wall face as near to vertical as possible and within 3" of the horizontal and vertical alignment shown in the plans.

When reinforced sandbag headwalls are required, wrap geotextile reinforcement at the headwall face as shown in the plans. Extend geotextile reinforcement at least 3 ft back behind sandbags into backfill and cover reinforcement with at least 3" of backfill. Overlap adjacent geotextile reinforcement at least 18" with seams oriented perpendicular to the headwall face. Hold geotextile reinforcement in place with wire staples or anchor pins as needed.

Backfill sandbag headwalls in accordance with the contract. Place backfill in 8" to 10" thick lifts and compact backfill 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 sandbags.

Do not displace or damage geotextile reinforcement when placing and compacting backfill. Do not operate heavy equipment on geotextile reinforcement until it is covered with at least 8" of backfill. Replace any damaged geotextile reinforcement to the satisfaction of the Engineer.

After sandbag headwalls are no longer needed, remove headwalls and dispose of materials.

Measurement and Payment

Sandbag Headwalls will be measured and paid in square feet. Sandbag headwalls will be measured as the square feet of exposed headwall face area and no measurement will be made for openings in headwalls for temporary pipes.

The contract unit price for *Sandbag Headwalls* will be full compensation for providing labor, tools, equipment and headwall materials, excavating, backfilling, hauling and removing excavated materials, filling sandbags, removing headwalls and disposing of materials and supplying geotextile reinforcement, sandbags, select material, stakes, reinforcing bars and any incidentals necessary to construct sandbag headwalls.

Payment will be made under:

Pay Item	**Pay Unit**
Sandbag Headwalls	Square Foot

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**
≤ 1 1/2	1/3 turn (2 flats)
> 1 1/2	1/6 turn (1 flat)

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

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

(12) Between 4 and 14 days after pretensioning top nuts, use a torque wrench calibrated within the last 12 months to check nuts in the presence of the Engineer. Completely erect mast arm poles and cantilever signs and attach any hardware before checking top nuts for these structures. Check that top nuts meet the following torque requirements:

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

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

(13) Do not grout under base plate.

Measurement and Payment

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

No payment will be made for temporary casings that remain in drilled pier excavations. No payment will be made for PIT. No payment will be made for further investigation of defective piers. Further investigation of piers that are not defective will be paid as extra work in accordance with Article 104-7 of the *2012 Standard Specifications*. No payment will be made for remediation of unacceptable drilled piers or post repair testing.

MATERIALS:
(2-21-12) (Rev. 12-17-13) 1000, 1005, 1050, 1074, 1078, 1080, 1081, 1086, 1084, 1087, 1092 SP10 R01

Revise the *2012 Standard Specifications* as follows:

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:

TABLE 1000-1
REQUIREMENTS FOR CONCRETE

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	-	Flow-able	-	-	40	100
Flowable Fill non-excavatable	125	as needed	as needed	as needed	as needed	-	Flow-able	-	-	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 10-65, Article 1050-1, GENERAL, line 41, replace the first sentence with:

All fencing material and accessories shall meet Section 106.

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

TABLE 1005-1
AGGREGATE GRADATION - COARSE AGGREGATE

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	75-100	-	45-79	-	20-40	-	0-25	-	-	0-12[B]	Maintenance Stabilization
Light-weight[C]	-	-	-	-	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 10-115, 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:

TABLE 1078-1
REQUIREMENTS FOR CONCRETE

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:

TABLE 1092-3
MINIMUM COEFFICIENT OF RETROREFLECTION FOR NC GRADE A
(Candelas Per Lux Per Square Meter)

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

HIGH STRENGTH CONCRETE FOR DRIVEWAYS:
(11-21-00) (Rev. 1-17-12) 848 SP10 R02

Use high early strength concrete for all driveways shown in the plans and as directed by the Engineer. Provide high early strength concrete that meets the requirements of Article 1000-5 of the *2012 Standard Specifications.*

Measurement and payment will be in accordance with Section 848 of the *2012 Standard Specifications.*

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:

Percentage of Total by Weight Passing							
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.

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.

TABLE 1019-1A
ADDITIONAL LIMESTONE APPLICATION RATE TO RAISE pH

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
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.

SANITARY SEWER:

(11-19-13) 1520 SP15 R20

Revise the *2012 Standard Specifications* as follows:

Page 15-11, Article 1520-3(A)(2) Testing, line 5, replace the second paragraph with the following:

Test all 24" and smaller gravity sewer lines for leakage using infiltration, exfiltration, or air test. Perform visual inspection on gravity sewer lines larger than 24". Perform line and grade testing and deflection testing on all gravity sewer lines.

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.

VERTICAL WICK DRAINS AND DRAINAGE LAYER: **(SPECIAL)**

Description:

Furnish, place and install vertical wick drains, including augering, and Select Material, Class III in accordance with the details in the plans and as specified in the provisions, or as directed by the Engineer. Select Material, Class III is the same as Select Granular Material, Class III Type 1 or 3 within this provision and plans.

Materials:

A. Wick Drain

The wick drains must be a prefabricated type composed of a drainage plastic core. The core must be fabricated with suitable drainage channels. The plastic core must be wrapped in a filter of a non-woven polyester material. The filter fabric material used must meet the following minimum requirements:

Item	ASTM Standard	Min. Roll Value
Grab Tensile Strength	D4632	90 lb
Trapezoidal Tear	D4533	40 lb
Puncture Strength	D3787	35 lb
Mullen Burst	D3786	130 psi
Permeability	D4491	0.01 in/sec

Furnish to the Engineer a Type 2 Typical Certified Mill Test Report for the wick drain in accordance with Section 106-3 of the NCDOT Standard Specification. All wick drain materials shall, however, be subject to inspection, test or approval by the Engineer. Four weeks prior to construction of wick drains, provide a sample of 5 foot long wick drain to the Engineer for testing.

B. Select Granular Material

Select Granular Material must meet the requirements for Class III Type 1 of Section 1016 of the Standard Specifications or Class III Type 3, a natural or manufactured fine aggregate material meeting the following gradation requirements and as described in Sections 1005 and 1006:

Percentage of Total by Weight Passing							
3/8"	#4	#8	#16	#30	#50	#100	#200
100	95-100	65-100	35-95	15-75	5-35	0-25	0-8

Equipment:

Select the proper size and amount of equipment to provide the desired results, but provide the following basic items. The type of carrier to be used will depend on the desired installation force, but it must be equipped with a mandrel or sleeve of cross sectional area not to exceed 10 square inches.

Submit to the Engineer full details of all equipment proposed for drain installation at least two weeks before beginning work. Replace or supplement any equipment found unsatisfactory. All equipment approved for use will be on a trial basis. If after a short test section the equipment proves unsatisfactory, it must be removed, replaced or supplemented as deemed necessary to accomplish the desired results.

Installation of Wick Drains:

At least two weeks before the installation of wick drains, submit to the Engineer for his review and approval, details regarding the sequence of construction and method of installation. Approval by the Engineer of the sequence and method of installation will not necessarily constitute acceptance for the duration of the project. If, at any time, the Engineer considers that the method of installation is not satisfactory, the Contractor must alter his method and/or equipment as necessary to comply with the requirements.

If installation of wick drains through overlying layers and/or obstructions cannot be accomplished with the proper equipment, the Contractor will be permitted to use augering or other approved methods. Any holes augured must have a minimum diameter required to permit the mandrel or sleeve carrying the wick and wick anchorage to penetrate into the underlying soft soils. Penetration of more than 24 inches into the soft layer will not be allowed.

Install the wick drains after placement of the geotextile for soil stabilization. For geotextile for soil stabilization, see Section 270 of the Standard Specifications. The drainage layer must consist of 3 feet of Select Granular Material, Class III Type 1 or 3. Install wick drains at the designated locations using a mandrel or sleeve which completely encloses the wick drain, thereby protecting it from tears, cuts, and abrasions during installation. Provide the mandrel or sleeve with an anchor plate or similar arrangement at the bottom to prevent the soil from entering the bottom of the mandrel during installation of the drain, and to anchor the drain tip at the required depth at the time of mandrel withdrawal. Push the mandrel into the ground to the depth indicated on the plans unless otherwise directed by the Engineer. Retract the mandrel leaving the wick in place to function as a vertical drain. Cut the wick neatly at its upper end with 3 inches of wick material protruding above the drainage layer.

Splices or connections of the wick drain material must be done in a workmanlike manner to ensure the hydraulic continuity of the drain. One (1) splice per wick drain location is permitted. Overlap the jacket and core a minimum of six (6) inches per splice. Form the splice by inserting

the bottom side of the wick drain into the upper end to ensure continuous full flow. Use a minimum of ten (10) staples (4 on each side and 2 in the middle) to hold the splice.

Installed wicks must not deviate more than 1 inch per foot from the vertical. Wicks that are out of their proper location by more than 6 inches, damaged in construction or improperly completed will be rejected by the Engineer.

Provide a suitable means of making a linear determination of the depth of the wick drain at any time during installation. Each wick drain length that is complete and in place will be recorded and used to determine total quantity of vertical wick drains for payment.

Provide the necessary steps to protect the instrumentation devices. Any devices that are damaged or become unreliable due to the contractor's fault or negligence must be replaced at no additional cost to the Department.

Measurement and Payment:

Wick drain will be measured and paid for at the contract unit price per linear foot for "Wick Drains" complete and in place. Payment will be full compensation for work required to install the wick drains, including any augering required and furnishing all labor, equipment, tools, and incidentals necessary to complete the work.

Augering for wick drains installation will be considered to be incidental to the cost of wick drains, and no separate measurement for payment will be made.

Select Granular Material, Class III Type 1 or 3 will be paid for as Select Granular Material, Class III unless the material is obtained from the same source as the borrow material and the contract includes a pay item for Borrow Excavation. When this occurs, select granular material will be paid for as Borrow Excavation in accordance with Article 230-5 of the Standard Specifications and no payment for Select Granular Material, Class III will be made.

Select Granular Material, Class III will be measured and paid for in cubic yards. Select granular material will be measured by in place measurement in accordance with Article 230-5 of the Standard Specifications or by weighing material in trucks in accordance with Article 106-7 of the Standard Specifications as determined by the Engineer. When select granular material is weighed in trucks, a unit weight of 135 pcf will be used to convert the weight of select granular material to cubic yards. At the Engineer's discretion, truck measurement in accordance with Article 230-5 of the Standard Specifications may be used in lieu of weighing material in trucks. The contract unit prices for Select Granular Material, Class III and Borrow Excavation as described above will be full compensation for furnishing, hauling, handling, placing, compacting and maintaining select granular material.

Payment will be made under:

Pay Item	Pay Unit
Wick Drains	FT
Select Granular Material, Class III	CY

GEOTEXTILE FOR EMBANKMENT STABILIZATION (SPECIAL)

DESCRIPTION:

This work consists of furnishing and installing synthetic geotextile for stabilizing embankment in accordance with this provision and as directed by the Engineer. The work shall include maintaining the geotextile in the required configuration until completion and acceptance of overlying work items. The geotextile shall be placed at the locations shown in the plans or as directed by the Engineer.

MATERIAL:

The geotextile for embankment stabilization shall be made of high-tenacity polyester in the machine direction with a plain or straight-warp weave pattern and polyester or polypropylene in the cross machine direction or approved equal. The geotextile shall be composed of strong rot-proof synthetic fibers formed into a geotextile of the woven type. The geotextile shall be free of any treatment or coating which might significantly alter its physical properties after installation.

The geotextile shall contain stabilizers and/or inhibitors to make the filaments resistant to deterioration resulting from ultraviolet or heat exposure. The geotextile shall be a pervious sheet of synthetic fibers oriented into a stable network so that the fibers retain their relative positions with respect to each other. The edges of the geotextile shall be finished to prevent the outer yarn from pulling away from the geotextile. The geotextile shall be free of defects or flaws which significantly affect its physical and/or filtering properties. Sheets of geotextile shall be sewn together with a seam that furnishes the required minimum strengths, when sewing is required. The seam thread shall be made of synthetic fibers which are resistant to deterioration, as are the geotextile fibers. No seams are permitted perpendicular to machine direction (MD). Lamination of geotextile sheets to produce the physical requirements of a geotextile layer will not be accepted.

During all periods of shipment and storage, the geotextile shall be wrapped in a heavy duty protective covering to protect the geotextile from direct sunlight ultraviolet rays, mud, dust, dirt, and debris. The geotextile shall not be exposed to temperatures greater than 140°F. After the protective wrapping has been removed, the geotextile shall not be left uncovered under any circumstances for longer than one (1) week.

The geotextile shall meet the following physical requirements:

All values represent minimum average roll values (MARV) as defined by ASTM D4439 for geotextile properties (any roll in a lot (a single day's production) should meet or exceed the minimum values in this table). Machine direction (MD) and cross-machine direction (CD) are as defined by ASTM D4439.

Provide Type 1 Certified Mill Test Report in accordance with Article 106-3 of the *Standard Specifications* with minimum average roll values (MARV) as defined by ASTM D4439 for geotextile properties. For testing geotextiles, a lot is defined as a single day's production. The Engineer reserves the right to inspect or test the geotextiles at any time. If requested by the Engineer, provide a sample of the geotextile for testing.

Use woven polyester or polypropylene geotextiles with properties meeting the following requirements.

Geotextile for Embankment Stabilization 1

Property	ASTM Test Method	Requirement (MARV)
Wide Width Tensile Strength @ 5% Strain (MD)	D4595	27,000 lbf/ft
Wide Width Tensile Strength @ Ultimate (MD)	D4595	68,000 lbf/ft
Apparent Opening Size[1]	D4751	No. 20 to No. 70
Ultraviolet Stability (retained strength)[2]	D4355	50%
Ultimate Seam Strength	D4884	2,700 lbf/ft

[1]Per AASHTO M92
[2]After 250 hours of exposure

Geotextile for Embankment Stabilization 2

Property	ASTM Test Method	Requirement (MARV)
Wide Width Tensile Strength @ 5% Strain (MD)	D4595	14,000 lbf/ft
Wide Width Tensile Strength @ Ultimate (MD)	D4595	40,000 lbf/ft
Apparent Opening Size[1]	D4751	No. 20 to No. 70
Ultraviolet Stability (retained strength)[2]	D4355	50%
Ultimate Seam Strength	D4884	1,600 lbf/ft

[1]Per AASHTO M92
[2]After 250 hours of exposure

CONSTRUCTION METHODS:

The geotextile for embankment stabilization shall be placed at locations shown in the plans or as directed by the Engineer. The locations should be cleared and free of obstructions, debris and pockets. Stumps shall be cut smooth at the ground elevation with the root system left intact. At

the time of installation, the geotextile shall be rejected if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation, or storage.

The geotextile for embankment stabilization shall be placed with the machine directions as shown on the plans or as directed by the engineer. Geotextile shall be laid smooth and free from tension, stress fold, wrinkles or creases without any joint, seam, or overlapping in the machine (roll) direction. All joints in the cross machine direction must be either overlapped a minimum of 18 inches or sewn by an approved method to develop the required seam strength. All sewn seams must be placed upward to allow for inspection. All geotextile which is damaged as a result of installation shall be replaced or repaired at the discretion of the Engineer with no additional cost to the Department. Compaction equipment must be operated such that it will not damage the geotextile.

Any geotextile which is left uncovered for longer than one week after placement shall be replaced at no additional cost to the Department.

METHOD OF MEASUREMENT

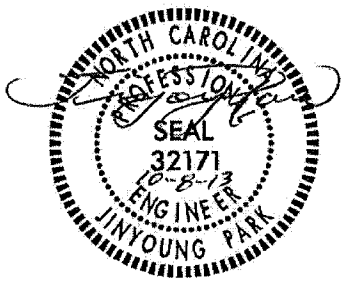
The quantity of geotextile to be paid for will be the number of square yards of "Geotextile for Embankment Stabilization 1" and "Geotextile for Embankment Stabilization 2" measured along the surface of the ground, which has been placed and accepted by the engineer. No separate measurement for payment will be made of any overlapping geotextile.

BASIS OF PAYMENT:

The quantity of geotextile, measured as provided above, will be paid for at the contract unit price per square yard for "Geotextile for Embankment Stabilization 1" and "Geotextile for Embankment Stabilization 2". Such price and payment will be full compensation for furnishing, transporting, placing, sewing, testing, and all incidentals necessary to complete the work as described in this provision and the plans.

Payment will be made under:

Pay Item	**Pay Unit**
Geotextile for Embankment Stabilization 1	SY
Geotextile for Embankment Stabilization 2	SY



EMBANKMENT INSTRUMENTATION: **(SPECIAL)**

DESCRIPTION

The instrumentation will consist of vibrating wire (vw) piezometers, horizontal inclinometers and hydraulic settlement gauges.

Purchase and deliver to the Engineer instruments and materials for vw piezometers and horizontal inclinometer casings for horizontal inclinometers at least 20 working days prior to the start of wick drain installation. Before starting wick drain installation, conduct a preconstruction meeting to discuss the instrumentation installation. Schedule this meeting after instrumentation items have been delivered to the Engineer. The Resident Engineer, Geotechnical Operations Engineer, and Contractor will attend this preconstruction meeting.

The Engineer will install and monitor all instrumentation. The Engineer will retain ownership of all instruments and materials after completion of the project. Provide access and assistance to the Engineer in installing the instrumentation, casings and cables as shown on the plans. Provide access to the Engineer to monitor instrumentation during the entire duration of the project. Access and assistance is incidental to the cost of the *Embankment Instrumentation* pay items.

Supply vw piezometers and horizontal inclinometer casings from one of the companies listed below or equal as approved by the Engineer. Contact Information for Durham Geo Slope Indicator and Geokon is listed below

1) Durham Geo Slope Indicator
   2175 West Park Court
   Stone Mountain, GA 30087
   Tel (770) 465-7557
   Fax (770) 465-7447
   www.durhamgeo.com
   www.slopeindicator.com

2) Geokon
   48 Spencer Street
   Lebanon, NH 03766
   Tel (603) 448-1562
   Fax (603) 448-3216
   www.geokon.com

MATERIALS AND CONSTRUCTION

1. VW Piezometers:

Furnish 12 vibrating wire piezometers with signal cables from the list of specified manufactures and models as listed below.

1) Durham Geo Slope Indicator Model 52611020 with Durham Geo Slope Indicator Polyurethane Signal Cable Model 50613524.

2) Geokon Model 4500S with a pressure range of 50 psi and Geokon signal cable.

3) Equivalent type and quality of vw piezometer and signal cable as approved by the Engineer.

Provide instrumentation calibration data sheets for all piezometers. VW Piezometers will be installed by the Engineer prior to construction of the embankment. All vw piezometer signal cables shall be installed in trenches. Provide installation assistance to the Engineer in the form of excavation and backfilling of a 1 ft by 1 ft trench extending to outside the slope stake limits or connecting vw piezometers as shown on the Embankment Instrumentation plan sheet. One or two vw piezometers will be installed at each piezometer locations shown on the Embankment Instrumentation plan sheet. Piezometer instrumentation cables can be installed in the Horizontal Inclinometer Casing trench. The Engineer will read vw piezometers over the duration of the project.

2. Horizontal Inclinometer

Furnish horizontal inclinometer casings to extend to a minimum 2 ft outside the slope stake line as shown on the Embankment Instrumentation plan sheet.

Horizontal inclinometer casings shall be brand new and from the list of specified manufactures and models as shown below.

1) Durham Geo Slope Indicator QC Casing with an external diameter of 3.34 inch.

2) Geokon Model 6400 Glue-Snap ABS Inclinometer Casing with an external diameter of 3.34 inch.

3) Equivalent type and quality of Horizontal Inclinometer Casings as approved by the Engineer.

Horizontal inclinometer casings will be installed by the Engineer before construction of the embankment. Provide installation assistance to the Engineer in the form of excavation and backfilling of a 1 ft by 1 ft trench extending to minimum 2 ft outside the slope stake limits as

shown on the plans. The Engineer will read horizontal inclinometer casings over the duration of the project.

3. Assistance for Hydraulic Settlement Gauge Installation

When installing conventional settlement gauges as shown on the embankment monitoring instrumentation plan, assist the Engineer in installing hydraulic settlement gauges by performing excavation and backfilling. Inform the Engineer at least five days before installing conventional settlement gauges.

Excavate a hole into drainage layer for vertical wick drains at least one foot deep and three feet square at the locations as shown on the plan. Each hydraulic settlement gauge location shall be within 10 feet of the nearest conventional settlement gauge location. Dig a trench one foot deep and one foot wide from the hole to a reservoir location near the toe of fill slope as shown on the plan or as chosen by the Engineer. Hydraulic settlement gauge tubing can be installed in the trench for horizontal inclinometer casings and vw piezometers. Grade the excavation for the tubing from the hole to the reservoir location without excessive undulations.

The Engineer installs the hydraulic gauges consisting of settlement cells, tubing and reservoir and need approximately 24 hours for calibration. Backfill the trench with sand immediately after the Engineer's instrumentation installation and calibration before doing any other work near the trench. After installation, take all precautions to protect the hydraulic settlement gauges as well as the vw piezometers and horizontal inclinometer casings from damage during construction.

MEASUREMENT AND PAYMENT

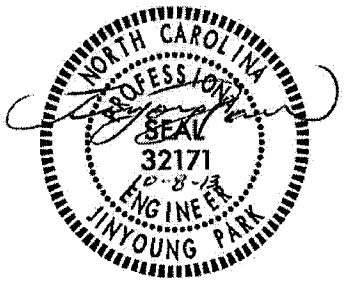
The quantity of "*VW Piezometer*" to be measured for payment will be the actual number of each of these items which have been delivered to the Engineer for use. The quantity of piezometers, measured as provided above, will be paid for at the contract unit price per each for "*VW Piezometer*". Such price and payment will be full compensation for all materials, instrumentation cables, labor, equipment and other necessary to complete the work satisfactorily.

The quantity of "*Horizontal Inclinometer Casing*" to be measured for payment will be the linear feet of this item which have been delivered to the Engineer for use. The quantity of horizontal inclinometer casing measured as provided above, will be paid for at the contract unit price per foot for "*Horizontal Inclinometer Casing*". Such price and payment will be full compensation for all materials, labor, equipment and other necessary to complete the work satisfactorily.

The cost to provide assistance for installing vw piezometers, horizontal inclinometer casings and hydraulic settlement gauges will be incidental and no separate payment will be made.

Payment will be made under:

Pay Item	Pay Unit
VW Piezometer	Each
Horizontal Inclinometer Casing	FT



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.

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	$\geq$ 3,000 $\Omega \cdot$ cm	$\leq$ 100 ppm	$\leq$ 200 ppm	$\leq$ 1%

Polyester Type (PET) Geogrid	5-8	N/A*	N/A*	N/A*	≤ 1%
Geostrip 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.S teel 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.Ge osynthetic 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 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 Slope[1] (H:V)	**Minimum Embedment Depth[2] (whichever is greater)**	
6:1 or flatter (except abutment walls)	H/20	1 ft for H ≤ 10 ft 2 ft for H > 10 ft
6:1 or flatter (abutment walls)	H/10	2 ft
> 6:1 to < 3:1	H/10	2 ft
3:1 to 2:1	H/7	2 ft

1. Front slope is as shown in the plans.
2. 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. __*.

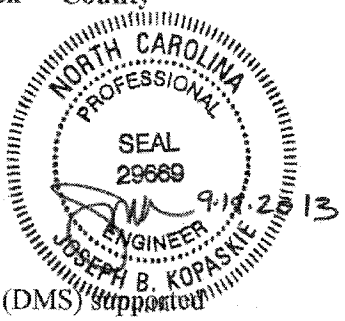
The contract unit price for *MSE Retaining Wall No. __* does not include the cost for ditches, fences, handrails, barrier or guardrail associated with MSE walls as these items will be paid for elsewhere in the contract.

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	**Pay Unit**
MSE Retaining Wall No. __	Square Foot



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 5th 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.

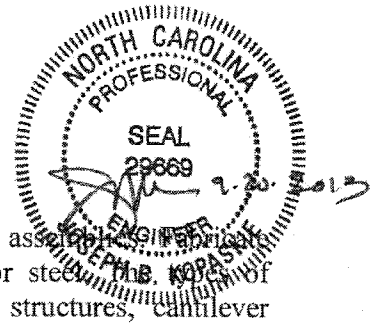
Measurement and Payment

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*.

TIP # R-2633BA **Brunswick County**

Payment will be made under:

Pay Item	**Pay Unit**
Overhead Footings	Cubic Yard



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:

$$\frac{f_a}{F_a} + \frac{f_b}{1 - \frac{f_a}{F'_e}} + \left(\frac{f_v}{F_v}\right)^2 \leq 1.0$$

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 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.

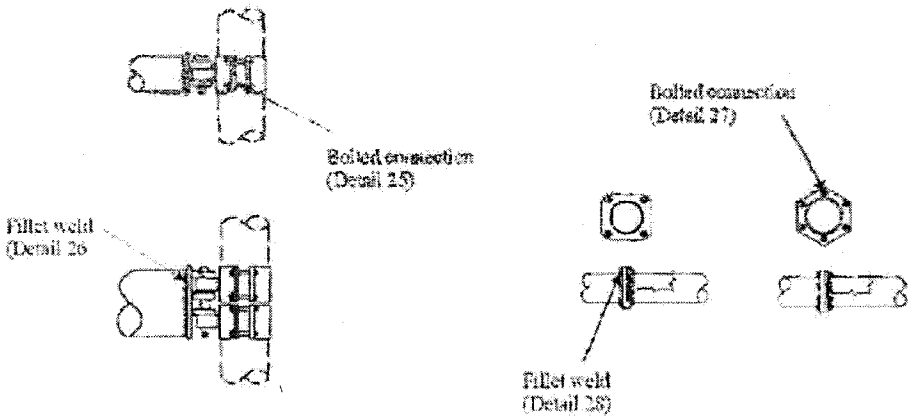
- Uprights, foundations, and trusses that support overhead signs shall be designed in accordance with the Overhead and Dynamic Message Sign Foundations Project Special Provision for the effects of torsion. Torsion shall be considered from dead load eccentricity of these attachments, as well as for attachments 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:

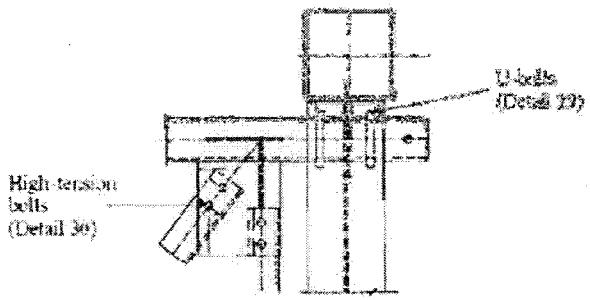
Construction	Detail	Stress Category	Application	Example
Mechanically Fastened Connections	25. Bolts in Tension	D	Beam column connection for monotube structures	16
Fillet Weld Connections	26. Fillet welded with one side normal to applied stress	E'	Beam column connection for monotube structures	17
Mechanically Fastened Connections	27. High strength bolts in tension	D	Monotube or truss-chord splice	17
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:



Beam-Column Connection for monotube structure
Example 16

Monotube beam splice
Example 17



Beam-Column Connection for Truss Structure
Example 18

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 Overhead 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 @ Station 37+30 -Y5WBL-	Lump Sum
Supports, Overhead Sign Structure @ Station 19+00 -Y5EBL-	Lump Sum

R-2633BA Brunswick County

WORK ZONE TRAFFIC CONTROL
Project Special Provisions

TRAFFIC CONTROL DEVICES REMAINING FROM PREVIOUS PROJECT:
(02/06/2013)

Description

Accept ownership, monitor, maintain, replace, and remove the following traffic control devices, which are remaining from the previous project in accordance with the plans and specifications.

1-**Type III Barricades**

Materials

Replace any of the above mentioned devices which do not meet the material requirements of their respective specifications as directed by the Engineer.

Construction Methods

Accept ownership and maintenance responsibilities of the above mentioned devices and retain ownership at the completion of the project.

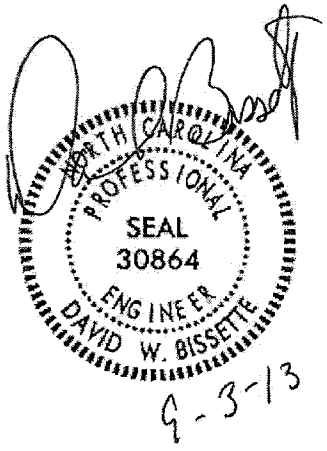
Section 1105-3 of the 2012 Standard Specifications applies to this special provision.

Maintenance

Maintain the above mentioned devices in accordance with Section 1105-4 of the 2012 Standard Specifications.

Basis of Payment

No separate payment will be made for the maintenance, replacement, and removal of the above mentioned devices. Such work will be considered as incidental to the other traffic control items listed in the contract.



WORK ZONE TRAFFIC CONTROL
Project Special Provisions

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-13, TMP-14, TMP-24 & TMP-25** of the Traffic Control Plan, unless otherwise directed by the Engineer.

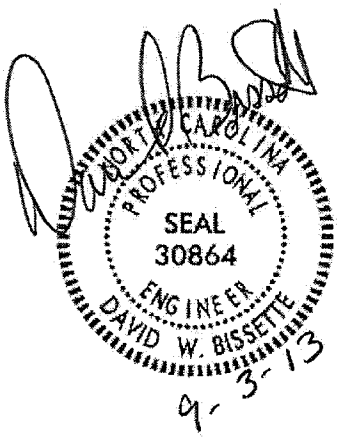
Provide devices to remain on the project, which meet the requirements of their respective specifications in the 2012 Standard Specifications or their respective special provisions.

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.



PROJECT SPECIAL PROVISIONS
Utility Construction

I. GENERAL CONSTRUCTION REQUIREMENTS

The proposed utility construction shall meet the applicable requirements of the NC Department of Transportation's "Standard Specifications for Roads and Structures" dated January 2012, and the following Special Provisions:

DIVISION 10 – MATERIALS

1. SECTION 1034 - SANITARY SEWER PIPE AND FITTINGS

- Page 10-57; Article 1034-4(A), Gravity Flow Sewer Pipe, delete line 33 and insert with the following:

  "...standard size fittings or ANSI/AWWA C153/A21.53 for compact fittings. Manufactured pipe and fittings shall be lined with an amine cured novalac ceramic epoxy containing at least 20% by volume of ceramic quartz pigment. The lining material shall have a permeability rating of zero when tested in accordance with Method A – ASTM E-96-66, Procedure A with a test duration of 30 days. The lining shall be applied by a competent firm with a successful history of applying linings to the interior of ductile iron pipe and fittings. After the surface preparation and within 8 hours of surface preparation, the interior of the pipe shall receive 40 mils nominal DFT. No lining shall take place when the substrate or ambient temperature is below 40°F. The surface shall also be dry and dust free. The lining shall not be used on the face of flanges.

  Due to the tolerances involved, the gasket area and spigot end up to 6-inches back from the end of the spigot end must be coated with 6 mils nominal, 10 mils maximum of the lining compound. The lining compound shall be applied by brush to ensure coverage. Care should be taken that the lining compound is smooth without excess buildup in the gasket seat or on the spigot ends. Coating of the gasket seat and spigot ends shall be done after the application of the lining.

  The number of coats of lining material applied and the touch-up and repair of the lining shall be as recommended by the manufacturer. The pipe manufacturer shall provide a certification attesting to the fact that the application meets or exceeds the requirements of these Special

Provisions. Lining materials made with calcium aluminate shall not be acceptable."

- Page 10-57; Article 1034-4(B), Force Main Sewer Pipe, delete lines 38 through 40 and insert with the following:

  "...standard size fittings or ANSI/AWWA C153/A21.53 for compact fittings. Manufactured pipe and fittings shall be lined with an amine cured novalac ceramic epoxy containing at least 20% by volume of ceramic quartz pigment. The lining material shall have a permeability rating of zero when tested in accordance with Method A – ASTM E-96-66, Procedure A with a test duration of 30 days. The lining shall be applied by a competent firm with a successful history of applying linings to the interior of ductile iron pipe and fittings. After the surface preparation and within 8 hours of surface preparation, the interior of the pipe shall receive 40 mils nominal DFT. No lining shall take place when the substrate or ambient temperature is below 40°F. The surface shall also be dry and dust free. The lining shall not be used on the face of flanges.

  Due to the tolerances involved, the gasket area and spigot end up to 6-inches back from the end of the spigot end must be coated with 6 mils nominal, 10 mils maximum of lining compound. The lining compound shall be applied by brush to ensure coverage. Care should be taken that the lining compound is smooth without excess buildup in the gasket seat or on the spigot ends. Coating of the gasket seat and spigot ends shall be done after the application of the lining.

  The number of coats of lining material applied and the touch-up and repair of the lining shall be as recommended by the manufacturer. The pipe manufacturer shall provide a certification attesting to the fact that the application meets or exceeds the requirements of these Special Provisions. Lining materials made with calcium aluminate shall not be acceptable."

3. SECTION 1036 – WATER PIPE AND FITTINGS

- Page 10-59; Article 1036-5, Ductile Iron Pipe and Fittings, add the following after line 4:

  All ductile iron pipe indicated on the Plans for the CFPUA 30-Inch Raw Water Pipeline [W (M3)] shall be Class 52.

- Page 10-59; Article 1036-8, Sleeves, Couplings and Miscellaneous, add the following after Subparagraph (B):

(C) RCCP to DIP Transition Couplings (Adapters)

RCCP to DIP Adapters shall be used to connect buried Lock Joint Reinforced Concrete Cylinder Pressure Pipe (RCCP) to ductile iron pipe. All RCCP and specials shall conform to AWWA C301 for "Prestressed Concrete Pressure Pipe, Steel Cylinder, for Water and Other Liquids". The pipe and specials shall be designed in accordance with the design pressure of the adjacent pipe or pipe it is being connected to and overburden conditions as shown on the Plans, plus an H-20 truck load, all in accordance with Design Appendix A of AWWA C301, with the exception that all shorts and closure cylinders shall be designed for the maximum overburden conditions plus an H-20 truckload so as to permit their use at any location along the entire pipeline.

Under no circumstances shall the design pressure be less than 350 psi. Joints shall be of the steel ring, bell and spigot, rubber gasket type. Soap, gaskets, and diapers shall be supplied by the pipe supplier. Cement used for the manufacture of the pipe shall conform to ASTM C150, Type I.

Steel cylinders shall be designed for restrained pipe and shall be designed to withstand lateral forces that occur at fittings or specials and to linearly transmit the thrust developed at each fitting or special, and overburden conditions specified herein and shown on the Plans. All restrained pipe and specials shall be "fully restrained" in accordance with the pipe manufacturer's recommendations. The manufacturer shall design the pipe, fittings and specials to withstand the thrust caused by the design pressure specified herein.

Adapter couplings shall be suitable for connection to the adjacent pipe without requiring modifications to the connecting pipe joint. The pressure rating and service of the adapter coupling shall be the same as that of the connected piping. Gaskets shall be of rubber and bolts and nuts shall be heat treated carbon steel and shall be plated. After installation, buried couplings shall receive two coats of coal tar epoxy (min. 24 dry mil thickness), which shall be compatible with the finish of the adapter coupling. (No exposed steel will be allowed.)

(D) MJ Solid Sleeve Couplings and MJ Transition Sleeve Couplings

MJ Solid Sleeve Couplings shall be used to connect ductile iron piping to ductile iron and MJ Transition Sleeve Couplings shall be used to connect ductile iron pipe to cast iron pipe for buried service, where shown on the Plans. Solid sleeves shall be ductile iron and conform to the requirements of ANSI A21.10 (AWWA C110). MJ Solid Sleeve Couplings shall be Style A11760, and MJ Transition Sleeve Couplings shall be Style A10766, as manufactured by American Cast Iron Pipe Co., or equal.

(E) Mechanical Joint Restraints

Mechanical joint restraints shall be specifically selected for the appropriate application. The gland body, wedges and wedge actuating components shall be cast from 65-45-12 ductile iron in accordance with ASTM A536. The gripping wedges shall be heat treated within a range of 370 to 470 BNH. Mechanical joint restraints shall be Mega-Lug Series 1100 (or variation thereof), as manufactured by EBAA Iron, Inc.

DIVISION 15 – UTILITY CONSTRUCTION

1. SECTION 1500 – GENERAL UTILITY REQUIREMENTS

- Page 15-1, Article 1500-2, Cooperation with the Utility Owner, add the following to Paragraph 2:

  The utility owners are the Cape Fear Public Utility Authority (CFPUA), Brunswick County Public Utilities, and the Town of Navassa. The contacts are:

  - Cape Fear Public Utility Authority: Gil DuBois (910-332-6424)
  - Brunswick County Public Utilities: John Nichols (910-253-2653)
  - Town of Navassa: Eulis Willis (910-371-2432)

- Page 15-1, Article 1500-2, Cooperation with the Utility Owner, add the following to Paragraph 2:

  The utility owners will provide the Contractor with new fire hydrants for installation where utility construction plans call for "fire hydrant" or "relocate fire hydrant". This applies to all fire hydrants associated with this Project. The Contractor shall notify the utility owner's representative prior to the proposed "fire hydrant" or "relocate fire hydrant". The Contractor shall remove existing fire hydrants and store in a secure location, and arrange for the utility owners to take possession of the existing hydrant and remove it from the project site.

- Page 15-1, Article 1500-3, Utility Locations and Contractor's Responsibility, add the following:

  The Contractor shall field verify the exact location, orientation, size, dimension, and material of all existing pipes to be connected to prior to ordering materials. Any costs whatsoever, associated with the Contractor's failure to perform this task shall be borne by the Contractor.

  CFPUA records indicated the 30-Inch Raw Water Pipeline is Reinforced Concrete Cylinder Pressure Pipe (RCCP) manufactured by the Lock Joint Pipe Company in 1943. This pipe has a steel cylinder with circumferential reinforcing but the reinforcing is not prestressed. The joint consists of a steel bell and spigot with a rubber sealing gasket, and were supplied in 16-foot lengths. The Contractor shall locate the nearest joint to the proposed connection and make the connection at that joint. ***Connections to the existing RCCP can only be made at the joint.***

  The Contractor shall contact Hanson Pipe & Precast and arrange for a field technician/engineer to visit the project site to perform all required RCCP pipe joint assessments and accurately measure the existing 30-inch RCCP at each location designated on the Plans for a proposed connection. The field technician/engineer shall determine the required RCCP to DIP transition coupling (adapter) design based on the actual pipe class and type of pipe joint (bell or spigot). The Contractor shall provide all required ancillary products required to complete the work indicated for connecting to the existing 30-inch RCCP.

  The Contractor shall have the option of installing all encasements (Encasement Pipe and "Dummy" Encasement Pipe) by either the "Open Cut" method as specified in Article 1540 – Encasement or the "Bore and Jack" method as specified in Article 1550 – Trenchless Installation of Utilities.

  The Contractor shall be advised that Cape Fear Public Utility Authority can shut down the 30" raw water pipeline once a year, any time between October 1st and March 30th, for a maximum of 30 consecutive days. Cape Fear Public Utility Authority will provide the Contractor 30 days advance notice of the date this can occur.

2. SECTION 1505 – EXCAVATION, TRENCHING, PIPE LAYING AND BACKFILLING FOR UTILITIES

- Page 15-4, Article 1505-3, Construction Methods, add the following after Subparagraph (F):

(G) Concrete Thrust Collars

Concrete thrust collars shall be installed where shown on the Plans and as required under Article 1505-3, Subparagraph (E). Concrete thrust collars shall be provided at the locations shown on the Plans or as requested by the Engineer. The excavation at such location(s) shall receive special attention with such undisturbed materials within as short a distance as possible from the pipe. Concrete thrust collars shall be installed in accordance with the Detail 0222119R, as shown on the Plans. The ductile iron pipe manufacture shall provide a section of pipe with a welded-on thrust collar that is welded 360° around the barrel of the pipe. The welded-on thrust collars shall not be spaced any closer than 5-feet relative to each other on a single joint of pipe. The welded-on thrust collar shall meet the following minimum requirements and dimensions:

Pipe Size (inches)	Collar O.D. (inches)	Collar Thickness (inches)	Allowable Load per Collar (lbs)
4	8.00	½	4,500
6	10.00	½	9,300
8	12.50	½	16,000
10	14.50	½	24,000
12	16.50	½	34,000
14	19.50	¾	46,000
16	21.75	¾	59,000
18	23.75	¾	75,000
20	25.75	¾	92,000
24	30.25	¾	130,000
30	36.50	1	200,000
36	43.00	1	290,000
42	49.50	1¼	390,000
48	56.50	1¼	510,000
54	63.00	1½	650,000
60	70.25	1½	745,000

All reinforcing steel shall be Grade 60 in accordance with Article 1070-2. All concrete shall be Class AA in accordance with Article 1000-4.

(H) Polyethylene Encasement

WHERE SPECIFICALLY INDICATED ON THE PLANS, ALL DUCTILE IRON PIPE AND FITTINGS SHALL BE WRAPPED WITH POLYETHYLENE ENCASEMENT. Polyethylene encasement shall conform to ANSI/AWWA C105/A21.5. Polyethylene encasement shall be provided in tube rolls, accordion bundles or sheets, and shall be manufactured of virgin polyethylene material conforming to ANSI/ASTM D1248. The specified nominal thickness for low-density polyethylene film is 0.008 in. (8 mils). The specified nominal thickness for high-density cross-laminated polyethylene film is 0.004 in. (4 mils). The minus thickness tolerance shall not exceed 10% of the nominal thickness on both material types. Joints in the polyethylene encasement shall be taped. Installation of polyethylene encasement shall conform to ANSI/AWWA C105/A21.5 and DIPRA's "Polyethylene Encasement" brochure.

- Page 15-4, Article 1505-6, Measurement and Payment, add the following after Line 43:

  Concrete thrust collars shall be shall be included and paid for as part of Connection Detail No. 2 and Connection Detail No. 4. No additional payment will be made.

  Polyethylene encasement shall be included and paid for as part of the ____" Water Line pay item. No additional payment will be made.

3. SECTION 1510 - WATER LINES

- Page 15-6, Article 1510-3 (B), Testing and Sterilization, change the allowable leakage formula to:

$$W = LD\sqrt{P} \div 148{,}000$$

- Page 15-6, Article 1510-3 (B) Line 32, Testing and Sterilization, in the seventh paragraph, delete the words "may be performed concurrently or" and replace with "shall be performed".

  The process shall follow AWWA C651, Section 4.4.3 (the Continuous Feed Method) and NCAC Title 15A, Subchapter 18C, Section .1003. The bacteriological samples need to be tested at a state approved laboratory.

4. SECTION 1515 – UTILITY CONTROLS

- Page 15-8, Article 1515-3, Construction Methods, add the following to Subparagraph (D) Fire Hydrants:

  Fire Hydrants

  The utility owner's will provide the Contractor with new fire hydrants for installation where utility construction plans call for a "fire hydrant". This applies to all fire hydrants on this Project. The Contractor shall notify the utility owner's representative prior to the proposed "fire hydrant" installation.

  Relocate Fire Hydrants

  The utility owner's will provide the Contractor with new fire hydrants for installation where utility construction plans call for a "relocate fire hydrant". This applies to all fire hydrants on this Project. The Contractor shall notify the utility owner's representative prior to the proposed "relocate fire hydrant" installation. The Contractor shall remove the existing fire hydrant and store it in a secure location, and arrange for the utility owner's to take possession of the existing hydrant and remove it from the project site.

- Page 15-9, Article 1515-3, Construction Methods, add the following after Subparagraph (G):

  (H) RCCP to DIP Transition Couplings (Adapters)

  RCCP to DIP Transition coupling adapters shall be included and paid for as an integral part of Connection Detail No. 2 and no additional payment will be made.

  (I) MJ "Long Body" Solid Sleeve Couplings and MJ Transition Sleeve Couplings

  MJ "Long Body" Solid Sleeve Couplings and MJ Transition Sleeve Couplings shall be included and paid for as an integral part of Connection Detail No. 2 and Connection Detail No. 4 and no additional payment will be made. All other MJ "Long Body" Solid Sleeve Couplings and MJ Transition Sleeve Couplings required for the Project shall be included and paid for as part of the ____" Water Line pay item. No additional payment will be made.

(J) Mechanical Joint Restraints

Mechanical joint restraints shall be included and paid for as an integral part of Connection Detail No. 2 and Connection Detail No. 4 and no additional payment will be made. All other mechanical joint restraints required for the Project shall be considered as incidental to the Project and no additional payment will be made.

(K) Miscellaneous Connection Details

The Work shall include the total amount of pipe, fittings, valves, couplings, mechanical joint restraints, adapters, sleeves, transition pieces, plugs, rodding, concrete, excavation and backfill, crushed stone, and appurtenances shown on the Plans and as required for a complete and operable connection installation. All piping and fittings shall be ductile iron, unless otherwise shown on the Plans.

All other Work required to complete the miscellaneous connection details shall be considered as incidental to the project and no specific payment will be made. Payment for completing the work specified herein and as shown on the Plans shall be measured and paid for at the contract unit price per each, for each size of associated connection pipe.

All other miscellaneous connections to existing pipe shall be installed in accordance with Article 1036-8 (B) and shall be considered as incidental to the Project and no additional payment will be made.

(L) 4-Inch Water Meter Assembly

The Work shall include a new precast concrete meter vault and associated pipe, fittings, valves, couplings, adapters, sleeves, transition pieces, plugs, threaded rodding, mechanical joint restraints, 4-inch water meter and meter strainer, sump pump, relocation of the power wiring from the existing water meter assembly, concrete, excavation and backfill, crushed stone, and appurtenances shown on the Plans and as required for a complete and fully operable installation. All pipe and fittings shall be ductile iron, unless otherwise shown on the Plans. The existing water meter and strainer in the existing 4-inch meter vault will be relocated and installed in the new 4-inch water meter assembly vault.

The Contractor shall notify and coordinate the Work with the Brunswick County representative prior to the proposed 4-inch water meter assembly installation.

All other work required to complete the installation of the proposed 4-inch water meter assembly shall be considered as incidental to the project and no specific payment will be made. Payment for completing the work specified herein and as shown on the Plans shall be paid for at the Lump Sum contract unit price.

- Page 15-9, Article 1515-4, Measurement and Payment, add the following to the Pay Item table:

Connection Detail No. 2	Each
Connection Detail No. 4	Each
4-Inch Water Meter Assembly	LS

5. SECTION 1520 – SANITARY SEWER

- Page 15-12; Article 1520-3(B)(2), Force Main Sanitary Sewer Testing, after the second Paragraph change the formula information to read:

"$W = LD(\sqrt{P})/133{,}200$

Where: W = maximum allowable leakage, in gallons per hour
L = length of pipe tested, in feet
D = nominal diameter of pipe, in inches
P = average test pressure during leakage test, in psi"

6. SECTION 1530 – ABANDON OR REMOVE UTILITIES

- Page 15-16; Article 1530-3, Construction Methods, Subparagraph D, delete line 26 and add the following:

Removed hydrants become the property of the utility owner. The Contractor shall remove and dispose of all other ancillary items. The Contractor shall notify the utility owner's representative prior to the proposed "remove fire hydrant". The Contractor shall remove the existing fire hydrant and store it in a secure location, and arrange for the utility owner's to take possession of the existing hydrant and remove it from the project site.

- Page 15-16; Article 1530-3, Construction Methods, add the following after Subparagraph (D):

  (E) Remove Existing 4-Inch Water Meter Assembly

  Remove the existing 4-inch water meter assembly by disconnecting and plugging the water meter leg piping as close to the inlet and outlet water mains as possible. This applies only to the existing 4-inch water meter assembly so designated, that connects the Brunswick County water system to the Navassa water system. The Contractor shall notify the Brunswick County representative prior to the proposed "remove existing 4-inch water meter assembly". The Contractor shall remove the existing 4-inch water meter and strainer and store it in a secure location, and arrange for Brunswick County to take possession of the existing equipment and remove it from the project site.

- Page 15-16; Article 1530-4, Measurement and Payment, add the following to the Pay Item table:

  Remove Existing 4-Inch Water Meter Assembly LS

7. SECTION 1540 – ENCASEMENT

- Page 15-17; Article 1540-3, Construction Methods, in Subparagraph (D), delete line 20 and insert the following:

  All carrier pipe spacers, regardless of the manufacturer, shall be manufactured with an ultra-high molecular (high-density) low coefficient of friction runner tip to isolate the spacer from the casing pipe and to minimize drag and damage to the casing pipe as the carrier pipe is installed. All spacers shall be manufactured from stainless steel.

- Page 15-17; Article 1540-3, Construction Methods, add the following after subparagraph (E):

  (F) "Dummy" Encasement Pipe

  "Dummy" encasement pipes shall be installed as shown on the Plans and in accordance with Section 1540 – Encasement, except there shall be no carrier pipe installation, no casing pipe filling, and each end of the encasement pipe shall be sealed closed and made watertight with a ½-inch thick steel plate in accordance with Article 1072-2, and welded in accordance with Article 1032-5.

- Page 15-17; Article 1540-4, Measurement and Payment, delete lines 30 and 31 and insert the following:

  _____" Encasement Pipe and _____" Dummy Encasement Pipe will be measured from end to end and paid at the contract unit price per linear foot for each size.

- Page 15-17, Article 1540-4, Measurement and Payment, add the following to the Pay Item table:

  _____" Dummy Encasement Pipe Linear Foot

END OF SPECIAL PROVISIONS

County: Brunswick

Project: R-2633BA

PROJECT SPECIAL PROVISIONS
Utility

UTILITIES BY OTHERS

General:

The following utility companies have facilities that will be in conflict with the construction of this project.

A) Duke Energy – Power (Distribution)
B) AT&T – Telephone (Fiber Optic Cable)
C) Time Warner Cable – Cable TV
D) Piedmont Natural Gas – Gas

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 owner. 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 – Power (Distribution)
   1) See Utilities by Others Plans.
   2) Contact person is Mr. Eddie Watkins 919-882-5051
   3) Relocation will be completed by 4/1/2014.

B) AT & T – Telephone (Fiber Optic Cable)
   1) See Utilities by Others Plans.
   2) Mr. Shannon Coston 910-341-1623
   3) Relocation will be completed by 3/1/2014

C) Time Warner Cable – Cable TV
   1) See Utilities by Others Plans.
   2) Contact person is Mr. Robert John 910-772-5757
   3) Relocation will be completed by 5/1/2014

D) Piedmont Natural Gas – Gas
   1) See Utilities by Others Plans.
   2) Contact person is Mr. Dave Vena 704-731-4496
   3) Relocation will be completed by 3/1/2014

NOTE: All other utilities will remain in place and will be adjusted as necessary.

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: **(East)**

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.

All Roadway Areas

March 1 - August 31		**September 1 - February 28**	
50#	Tall Fescue	50#	Tall Fescue
10#	Centipede	10#	Centipede
25#	Bermudagrass (hulled)	35#	Bermudagrass (unhulled)
500#	Fertilizer	500#	Fertilizer
4000#	Limestone	4000#	Limestone

Waste and Borrow Locations

March 1 – August 31		**September 1 - February 28**	
75#	Tall Fescue	75#	Tall Fescue
25#	Bermudagrass (hulled)	35#	Bermudagrass (unhulled)
500#	Fertilizer	500#	Fertilizer
4000#	Limestone	4000#	Limestone

Note: 50# of Bahiagrass may be substituted for either Centipede or Bermudagrass only upon Engineer's request.

Approved Tall Fescue Cultivars

2nd 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	

On cut and fill slopes 2:1 or steeper Centipede shall be applied at the rate of 5 pounds per acre and add 20# of Sericea Lespedeza from 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 **(East)**

Native Grass Seeding and Mulching shall be performed on the disturbed areas of wetlands and riparian areas, and adjacent to Stream Relocation 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.

March 1 - August 31		September 1 - February 28	
18#	Creeping Red Fescue	18#	Creeping Red Fescue
6#	Indiangrass	6#	Indiangrass
8#	Little Bluestem	8#	Little Bluestem
4#	Switchgrass	4#	Switchgrass
25#	Browntop Millet	35#	Rye Grain
500#	Fertilizer	500#	Fertilizer
4000#	Limestone	4000#	Limestone

Approved Creeping Red Fescue Cultivars:

Aberdeen	Boreal	Epic	Cindy Lou

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

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

Measurement and Payment

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

All areas seeded and mulched shall be tacked with asphalt. Crimping of straw in lieu of asphalt tack shall not be allowed on this project.

CRIMPING STRAW MULCH:

Crimping shall be required on this project adjacent to any section of roadway where traffic is to be maintained or allowed during construction. In areas within six feet of the edge of pavement, straw is to be applied and then crimped. After the crimping operation is complete, an additional application of straw shall be applied and immediately tacked with a sufficient amount of undiluted emulsified asphalt.

Straw mulch shall be of sufficient length and quality to withstand the crimping operation.

Crimping equipment including power source shall be subject to the approval of the Engineer providing that maximum spacing of crimper blades shall not exceed 8".

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. Sweet Sudan Grass, 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 on all roadway areas except slopes 2:1 and steeper shall be 10-20-20 grade and shall be applied at the rate of 500 pounds per acre. 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 10-20-20 analysis and as directed.

Fertilizer used for topdressing on slopes 2:1 and steeper and waste and borrow areas 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*, with the exception that no centipede seed will be used in the seed mix for supplemental seeding. The rate of application for supplemental seeding 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 4 inches.

LAWN TYPE APPEARANCE:

All areas adjacent to lawns must be hand finished as directed to give a lawn type appearance. Remove all trash, debris, and stones ¾" and larger in diameter or other obstructions that could interfere with providing a smooth lawn type appearance. These areas shall be reseeded to match their original vegetative conditions, unless directed otherwise by the Field Operations Engineer.

REFORESTATION:

Description

Reforestation will be planted within interchanges and along the outside borders of the road, and in other areas as directed. *Reforestation* is not shown on the plan sheets. See the Reforestation Detail Sheet.

All non-maintained riparian buffers impacted by the placement of temporary fill or clearing activities shall be restored to the preconstruction contours and revegetated with native woody species.

The entire *Reforestation* operation shall comply with the requirements of Section 1670 of the *Standard Specifications*.

Materials

Reforestation shall be bare root seedlings 12"-18" tall.

Construction Methods

Reforestation shall be shall be planted as soon as practical following permanent S*eeding and Mulching*. The seedlings shall be planted in a 16-foot wide swath adjacent to mowing pattern line, or as directed.

Root dip: The roots of reforestation seedlings shall be coated with a slurry of water, and either a fine clay (kaolin) or a superabsorbent that is designated as a bare root dip. The type, mixture ratio, method of application, and the time of application shall be submitted to the Engineer for approval.

With the approval of the Engineer, seedlings may be coated before delivery to the job or at the time of planting, but at no time shall the roots of the seedlings be allowed to dry out. The roots shall be moistened immediately prior to planting.

Seasonal Limitations: *Reforestation* shall be planted from November 15 through March 15.

Measurement and Payment

Reforestation will be measured and paid for in accordance with Article 1670-17 of the *Standard Specifications*.

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	**Pay Unit**
Response for Erosion Control	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*.

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: **(East)**

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.

The geotextile for the spillway liner shall meet the following minimum physical properties for low permeability, woven polypropylene geotextiles:

Property	**Test Method**	**Value**	**Unit**
Tensile Strength	ASTM D-4632	315	lb.
Tensile Elongation (Maximum)	ASTM D-4632	15	%
Trapezoidal Tear	ASTM D-4533	120	lbs.
CBR Puncture	ASTM D-6241	900	lbs.
UV Resistance (% retained at 500 hrs.)	ASTM D-4355	70	%
Apparent Opening Size (AOS)	ASTM D-4751	40	US Std. Sieve
Permittivity	ASTM D-4491	0.05	sec^{-1}
Water Flow Rate	ASTM D-4491	4	$gal/min/ft^2$

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 Type 4 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 low permeability polypropylene 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*.

Low Permeability Geotextile will be measured and paid for as the actual number of square yards measured along the surface of the spillway over which the geotextile is installed and accepted.

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
Low Permeability Geotextile	Square Yard

INFILTRATION BASIN WITH BAFFLES: **(East)**

Description

Provide an infiltration basin to remove sediment from construction site runoff at locations shown in the erosion control plans. See the Infiltration Basin with Baffles Detail sheet provided in the erosion control plans. Work includes constructing sediment basin, installation of coir fiber baffles, providing and placing geotextile spillway liner, providing coir fiber mat stabilization for the primary spillway outlet, disposing of excess materials, removing geotextile liner and coir fiber mat, backfilling basin area with suitable material and providing proper drainage when basin area is abandoned.

Materials

Item	Section
Staples	1060-8
Coir Fiber Mat	1060-14
Coir Fiber Baffle	1640

The geotextile for the spillway liner shall meet the following minimum physical properties for low permeability, woven polypropylene geotextiles:

Property	Test Method	Value	Unit
Tensile Strength	ASTM D-4632	315	lb.
Tensile Elongation (Maximum)	ASTM D-4632	15	%
Trapezoidal Tear	ASTM D-4533	120	lbs.
CBR Puncture	ASTM D-6241	900	lbs.
UV Resistance (% retained at 500 hrs.)	ASTM D-4355	70	%
Apparent Opening Size (AOS)	ASTM D-4751	40	US Std. Sieve
Permittivity	ASTM D-4491	0.05	sec^{-1}
Water Flow Rate	ASTM D-4491	4	$gal/min/ft^2$

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. Excavation into or below the water table shall not occur, and avoid compacting the bottom of the basin with equipment tires, excavation bucket, etc. Construct the coir fiber baffles according to *Roadway Standard Drawings* No. 1640.01 and Section 1640 of the *Standard Specifications*. Construct earth berm around perimeter of infiltration basin as shown in the detail and the earth berm height shall be limited to 3 ft.

Construct the primary spillway according to the Infiltration Basin with Baffles Detail sheet in the erosion control plans. Line primary spillway with low permeability polypropylene 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. 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 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 Infiltration Basin with Baffles detail.

At the primary spillway 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.

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.

Low Permeability Geotextile will be measured and paid for as the actual number of square yards measured along the surface of the spillway over which the geotextile is installed and accepted.

Coir Fiber Baffles will be measured and paid for in accordance with Article 1640-4 of the *Standard Specifications*.

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 other items or for over excavation or stockpiling.

Payment will be made under:

Pay Item	Pay Unit
Coir Fiber Mat	Square Yard
Low Permeability Geotextile	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 ± 10%
Net Material	Coir Fiber
Net Openings	2" x 2"
Net Strength	90 lb.
Minimum Weight	2.6 lb/ft ± 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

BORROW PIT DEWATERING BASIN:
(3-17-09) (Rev 3-2-11)

Description

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.

Construct, maintain and remove earth embankments used to reduce turbidity from dewatering borrow sites. Work includes providing porous coir fiber baffle, filtration geotextile, stone and outlet structures; cleaning out, maintaining, removing and disposing of the borrow pit dewatering basin and all components; and reshaping, dressing, seeding and mulching the area.

Materials

Refer to Division 10

Item	Section
Riprap, Class A, B, 1, and 2	1042
Geotextile for Drainage, Type 2	1056
Coir Fiber Baffle	1640-2

Use suitable excavated materials, as specified in Sections 225, 230 and 240 of the *Standard Specifications* in the construction of earth embankments for borrow pit dewatering basins, except where otherwise specified.

Construction Methods

Construct borrow pit dewatering basins according to the detail in the erosion control plans, and at locations shown on Reclamation Plans or in areas as directed.

The volume of the borrow pit dewatering basin will be based on a 2 hour retention time. The pump rate shall not exceed 1,000 GPM. The Contractor, at his option, may use a greater retention time for managing turbidity.

The straight line distance between the inlet and outlet shall be divided to include a forebay chamber in the upper quarter cell. Install one porous coir fiber baffle across the full width of the basin to delineate the forebay chamber. Do not use earthen or rock baffle. Install filtration geotextile on the interior side slopes and the floor of the forebay.

The water pumped from the borrow pit into the dewatering basin shall be obtained from the top of the water column and shall be discharged into the forebay in a non-erodible manner.

The borrow pit dewatering basin outlet shall be a vertical non-perforated riser pipe or flash board riser attached with a watertight connection to a barrel that carries the water through the embankment.

Maintenance and Removal

Maintain the borrow pit dewatering basin, coir fiber baffle, and remove and dispose of silt accumulations in accordance with Article 1630-3 of the *Standard Specifications*. The Contractor may include a drain device for maintenance and removal at his discretion.

Remove the borrow pit dewatering basin once dewatering operations are completed. Grade, seed, and mulch the area after removal of the borrow pit dewatering basin in accordance with Section 1660 of the *Standard Specifications*. The area shall be stabilized with an approved groundcover before final acceptance of the site.

Measurement and Payment

No direct payment will be made for borrow pit dewatering basins with the exception of the work of silt removal during dewatering basin operation and the work of seeding and mulching after removal of the dewatering basin. All other work and materials required for installation, maintenance and removal of borrow pit dewatering basins shall be incidental to *Borrow Excavation.* Such price and payments will be full compensation for the work of constructing, maintaining and removing the borrow pit dewatering basin including, but not limited to, the construction and removal of the borrow pit dewatering basin; furnishing of the outlet structure, baffle, filtration geotextile, stone and optional drain devices; and removal of all such items once dewatering operations are completed.

Removal and disposal of silt accumulations during dewatering operations will be measured and paid at the contract unit price per cubic yard for *Silt Excavation* in accordance with Article 1630-4 of the *Standard Specifications.*

Grading, seeding, and mulching the area after removal of the borrow pit dewatering basin will be measured and paid at the contract unit price per acre for *Seeding and Mulching* in accordance with Section 1660-8 of the *Standard Specifications.*

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

TEMPORARY PIPE FOR CULVERT CONSTRUCTION:

Description

This work consists of furnishing, installing, maintaining and removing any and all temporary pipe used on this project in conjunction with the culvert construction.

Construction Methods

The Contractor shall install temporary pipe in locations shown on the plans in such a manner approved by the Engineer. The temporary pipe shall provide a passageway for the stream through the work-site. The minimum size requirements will be as stated on the erosion control plans.

Measurement and Payment

__" *Temporary Pipe* will be measured and paid for at the contract unit price per linear foot of temporary pipe approved by the Engineer and measured in place from end to end. Such price and payment will be full compensation for all work covered by this section including but not limited to furnishing all materials required for installation, construction, maintenance, and removal of temporary pipe.

Payment will be made under:

Pay Item	Pay Unit
__" Temporary Pipe	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 stength	480 psi
Trapezoid tear strength	*md-100 lbs *cd-60 lbs
Apparent opening size	70 US standard sieve
Percent open area	4% permittivity 0.28 sec-1

*md - machine direction
*cd - cross machine direction

In the event that more than one width of fabric is required, a 6" overlap of the material shall also be required.

The curtain material shall be supported by a flotation material having over 29 lbs/ft buoyancy. The floating curtain shall have a 5/16" galvanized chain as ballast and dual 5/16" galvanized wire ropes with a heavy vinyl coating as load lines.

Construction Methods

The Contractor shall maintain the *Floating Turbidity Curtain* in a satisfactory condition until its removal is requested by the Engineer. The curtain shall extend to the bottom of the jurisdictional resource. Anchor the curtain according to manufacturer recommendations.

Measurement and Payment

Floating Turbidity Curtain will be measured and paid for as the actual number of square yards of curtain furnished as specified and accepted. Such price and payment will be full compensation for the work as described in this section including but not limited to furnishing all materials, tools, equipment, and all incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
Floating Turbidity Curtain	Square Yard

STREAMBANK REFORESTATION:

Description

Streambank Reforestation will be planted in areas designated on the plans 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 ¾ 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

COMPOST BLANKET:

Description

This work shall consist of furnishing, installing, maintaining, and seeding a water permeable *Compost Blanket* to reduce soil erosion and sediment by promoting the establishment of vegetation on sandy soils where vegetation is difficult to establish.

Materials

Compost:

Compost used for Compost Blankets shall be weed free and derived from a well-decomposed source of organic matter. The compost shall be produced using an aerobic composting process meeting CFR 503 regulations, including time and temperature data indicating effective weed seed, pathogen, and insect larvae kill. The compost shall be free of any refuse, contaminants or other materials toxic to plant growth. Non-composted products will not be accepted. Test methods for the items below should follow USCC TMECC guidelines for laboratory procedures:

1. pH between 5.0-8.0 in accordance with TMECC 04.11-A, "Electrometric pH Determinations for Compost".
2. For seeded Compost Blankets, seed should be incorporated at the time of application in the entire depth of the compost blanket, at rates per foot, per square yard, or per acre, as acceptable to the engineer. The following particle sizes shall also be followed: 100% passing a 2" sieve; 99% passing a 1" sieve; minimum of 60% passing a ½" sieve. All other testing parameters remain the same. The seeding rates are generally similar or slightly higher than those used when considering application of seed via hydroseeding or other seeding methods.
3. Moisture content of less than 60% in accordance with standardized test methods for moisture determination.
4. Material shall be relatively free (<1% by dry weight) of inert or foreign man made materials.
5. A sample shall be submitted to the engineer for approval prior to being used and must comply with all local, state and federal regulations.

Construction Methods

1. Compost Blankets will be placed as directed. Unless otherwise specified, Compost Blankets should be installed at a minimum depth of 1".
2. The Compost Blanket shall be seeded at time of installation for establishment of permanent vegetation. The Engineer will specify seeding requirements.
3. Compost Blankets are not to be used in direct flow situations or in runoff channels.
4. The type and rate of seed, fertilizer and lime shall be in accordance with the Seeding and Mulching provisions of this contract and as directed.

Maintenance

1. The Contractor shall perform routine inspections and maintain the Compost Blanket in a functional condition at all times.
2. Where the Compost Blanket fails, it will be routinely repaired.
3. The Compost Blanket will be seeded on site, at rates and seed types as determined by the Engineer. Once vegetation is established, final seeding is not required.

Performance

1. The Contractor is responsible for establishing a working erosion control system and may, with approval of the Engineer, work outside the minimum construction requirements as needed.
2. Where the Compost Blanket deteriorates or fails, it will be repaired or replaced with a more effective approved alternative.

Measurement and Payment

The Contractor shall provide the Engineer with proof that a 1" thick Compost Blanket has been applied. This rate equals approximately 270 cubic yards of compost material per acre of application area. The Contractor shall supply satisfactory evidence that the specified amount of material has been effectively placed (i.e., truck load tickets).

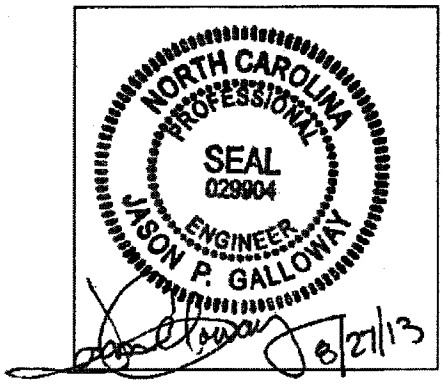
Compost Blanket will be measured and paid for as the actual number of acres measured along the surface of the ground over which the Compost Blanket is installed and accepted.

Payment will be made under:

Pay Item	Pay Unit
Compost Blanket	Acre

R-2633BA **Brunswick County**

Signals & Intelligent Transportation Systems



Project Special Provisions
(Version 12.2)
Signals and Intelligent Transportation Systems

Prepared By: JPG
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Contents

1. 2012 STANDARD SPECIFICATIONS FOR ROADS & STRUCTURES 3
1.1. JUNCTION BOXES (1098-5) 3
1.2. CONTROLLERS WITH CABINETS – MATERIAL (1751-2) 3
2. SIGNAL HEADS 3
2.1. MATERIALS 3
A. General: 3
B. Vehicle Signal Heads: 4
C. Signal Cable: 7
3. TRAFFIC SIGNAL SUPPORTS 7
3.1. METAL TRAFFIC SIGNAL SUPPORTS – ALL POLES 7
A. General: 7
B. Materials: 9
C. Construction Methods: 10
3.2. METAL STRAIN POLE 10
A. Materials: 10
B. Construction Methods: 12
3.3. METAL POLE WITH MAST ARM 13
A. Materials: 13
B. Construction Methods: 14
3.4. DRILLED PIER FOUNDATIONS FOR METAL TRAFFIC SIGNAL POLES 14
A. Description: 14
B. Soil Test and Foundation Determination: 15
C. Drilled Pier Construction: 17
3.5. CUSTOM DESIGN OF TRAFFIC SIGNAL SUPPORTS 17
A. General: 17
B. Metal Poles: 18
C. Mast Arms: 20
3.6. POLE NUMBERING SYSTEM 21
A. New Poles 21
3.7. MEASUREMENT AND PAYMENT 21
4. CONTROLLERS WITH CABINETS 21
4.1. MATERIALS – TYPE 2070L CONTROLLERS 21
4.2. MATERIALS – GENERAL CABINETS 22
4.3. MATERIALS – TYPE 170E CABINETS 23
A. Type 170 E Cabinets General: 23
B. Type 170 E Cabinet Electrical Requirements: 23
C. Type 170 E Cabinet Physical Requirements: 31
D. Model 2018 Enhanced Conflict Monitor: 33

E. Preemption and Sign Control Box *42*
4.4. MATERIALS – TYPE 170 DETECTOR SENSOR UNITS 45
4.5. MATERIALS – TYPE 2070E CONTROLLERS 45

5. WIRELESS MAGNETIC SENSOR VEHICLE DETECTION SYSTEM 45
5.1. DESCRIPTION 45
5.2. MATERIALS 45
5.3. CONSTRUCTION METHODS 47
5.4. MEASUREMENT AND PAYMENT 47

1. 2012 STANDARD SPECIFICATIONS FOR ROADS & STRUCTURES

The 2012 Standard Specifications are revised as follows:

1.1. 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)."

1.2. 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.

2. SIGNAL HEADS

2.1. MATERIALS

A. General:

Fabricate vehicle signal head housings and end caps from die-cast aluminum. Fabricate 12-inch and 16-inch pedestrian signal head housings and end caps from die-cast aluminum. Fabricate 9-inch pedestrian signal head housings, end caps, and visors from virgin polycarbonate material. Provide visor mounting screws, door latches, and hinge pins fabricated from stainless steel. Provide interior screws, fasteners, and metal parts fabricated from stainless steel or corrosion resistant material.

Fabricate tunnel and traditional visors from sheet aluminum.

Paint all surfaces inside and outside of signal housings and doors. Paint outside surfaces of tunnel and traditional visors, 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."

For pole mounting, provide side of pole mounting assemblies with framework and all other hardware necessary to make complete, watertight connections of the signal heads to the poles and pedestals. Fabricate the mounting assemblies and frames from aluminum with all necessary hardware, screws, washers, etc. to be stainless steel. Provide mounting fittings that match the positive locking device on the signal head with the serrations integrally cast into the brackets. Provide upper and lower pole plates that have a 1 ¼-inch vertical conduit entrance hubs with the hubs capped on the lower plate and 1 ½-inch horizontal hubs. Ensure that the assemblies provide rigid attachments to poles and pedestals so as to allow no twisting or swaying of the signal heads. Ensure that all raceways are free of sharp edges and protrusions, and can accommodate a minimum of ten Number 14 AWG conductors.

For pedestal mounting, provide a post-top slipfitter mounting assembly that matches the positive locking device on the signal head with serrations integrally cast into the slipfitter. Provide stainless steel hardware, screws, washers, etc. Provide a minimum of six 3/8 X 3/4-inch long square head bolts for attachment to pedestal. Provide a center post for multi-way slipfitters.

For light emitting diode (LED) traffic signal modules, provide the following requirements for inclusion on the Department's Qualified Products List for traffic signal equipment.

1. Sample submittal,
2. Third-party independent laboratory testing results for each submitted module with evidence of testing and conformance with all of the Design Qualification Testing specified in section 6.4 of each of the following Institute of Transportation Engineers (ITE) specifications:
   - Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Circular Signal Supplement
   - Vehicle Traffic Control Signal Heads – Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement
   - 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 8 inches in length for 8-inch vehicle signal head sections. Provide visors that are 10 inches in length for 12-inch vehicle signal heads.

Provide a termination block with one empty terminal for field wiring for each indication plus one empty terminal for the neutral conductor. Have all signal sections wired to the termination block. Provide barriers between the terminals that have terminal screws with a minimum Number 8 thread size and that will accommodate and secure spade lugs sized for a Number 10 terminal screw.

Mount termination blocks in the yellow signal head sections on all in-line vehicle signal heads. Mount the termination block in the red section on five-section vehicle signal heads.

Furnish vehicle signal head interconnecting brackets. Provide one-piece aluminum brackets less than 4.5 inches in height and with no threaded pipe connections. Provide hand holes on the bottom of the brackets to aid in installing wires to the signal heads. Lower brackets that carry no wires and are used only for connecting the bottom signal sections together may be flat in construction.

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. Provide messenger cable hangers with U-bolt clamps. Fabricate washers, screws, bolts, clevis pins, cotter pins, nuts, and U-bolt clamps from stainless steel.

For mast-arm mounting, provide rigid vehicle signal head mounting brackets and all other hardware necessary to make complete, watertight connections of the vehicle signal heads to the mast arms and to provide a means for vertically adjusting the vehicle signal heads to proper alignment. Fabricate the mounting assemblies from aluminum, and provide serrated rings made of aluminum. Provide stainless steel cable attachment assemblies to secure the brackets to the mast arms. Ensure all fastening hardware and fasteners are fabricated from stainless steel.

Provide LED vehicular traffic signal modules (hereafter referred to as modules) that consist of an assembly that uses LEDs as the light source in lieu of an incandescent lamp for use in traffic signal sections. Use LEDs that are aluminum indium gallium phosphorus (AlInGaP) technology for red and yellow indications and indium gallium nitride (InGaN) for green indications. Install the ultra bright type LEDs that are rated for 100,000 hours of continuous operation from -40°F to +165°F. Design modules to have a minimum useful life of 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, and 8-inch circular sections. All makes and models of LED modules purchased for use on the State Highway System shall appear on the current NCDOT Traffic Signal Qualified Products List (QPL).

Provide the manufacturer's model number and the product number (assigned by the Department) for each module that appears on the 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
8-inch red circular	13	8
12-inch green circular	15	15
8-inch green circular	12	12

For yellow circular signal modules, provide modules tested under the procedures outlined in the VTCSH Circular Supplement to insure power required at 77° F is 22 Watts or less for the 12-inch circular module and 13 Watts or less for the 8-inch circular module.

Note: Use a wattmeter having an accuracy of ±1% to measure the nominal wattage and maximum wattage of a circular traffic signal module. Power may also be derived from voltage, current and power factor measurements.

2. LED Arrow Signal Modules

Provide 12-inch omnidirectional arrow signal modules. All makes and models of LED modules purchased for use on the State Highway System shall appear on the current NCDOT Traffic Signal Qualified Products List (QPL).

Provide the manufacturer's model number and the product number (assigned by the Department) for each module that appears on the 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 ±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.

3. TRAFFIC SIGNAL SUPPORTS

3.1. METAL TRAFFIC SIGNAL SUPPORTS – ALL POLES

A. General:

Furnish and install metal strain poles and metal poles with mast arms, grounding systems, and all necessary hardware. The work covered by this special provision includes requirements for the design, fabrication, and installation of both standard and custom/site specifically designed metal traffic signal supports and associated foundations.

Provide metal traffic signal support systems that contain no guy assemblies, struts, or stay braces. 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 5th Edition AASHTO), including the latest interim specifications. Provide assemblies with a round or near-round (18 sides or more) cross-section, or a multi sided cross section with no less than six sides. The sides may be straight, convex, or concave.

Pole heights shown on signal plans are estimated from available data for bid purposes. Prior to furnishing metal signal poles, use field measurements and adjusted cross-sections to determine whether pole heights are sufficient to obtain required clearances. If pole heights are not sufficient, the Contractor should immediately notify the Engineer of the required revised pole heights.

Ensure that metal signal poles permit cables to be installed inside poles and any required mast arms. For holes in the poles and arms used to accommodate cables, provide full-circumference grommets. Arm flange plate wire access holes should be deburred, non grommeted, and oversized to fit around the 2" diameter grommeted shaft flange plate wire access hole.

After fabrication, have steel poles, required mast arms, and all parts used in the assembly hot-dip galvanized per section 1076. Design structural assemblies with weep holes large enough and properly located to drain molten zinc during galvanization process. Provide hot-dip galvanizing on structures that meets or exceeds ASTM Standard A-123. Provide galvanizing on hardware that meets or exceeds ASTM Standard A-153. Ensure that threaded material is brushed and retapped as

necessary after galvanizing. Perform repair of damaged galvanizing that complies with the following:

Repair of Galvanizing.....Article 1076-7

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 of the *2012 STANDARD SPECIFICATIONS FOR ROADS & STRUCTURES*, hereinafter referred to as 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 article 1098-1A of the *Standard Specifications* for Qualified Products List (QPL) submittals. All shop drawings must include project location description, signal 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 Signal Plan/Loading Diagram	1	1	All structure design information needs to reflect the latest approved signal plans
Custom Pole Shop Drawings	4 sets	1 set	Submit drawings on 11" x 17" format media Show NCDOT inventory number(s) in or above the title block
Standard Pole Shop Drawings (from the QPL)	4 sets	1 set	Submit drawings on 11" x 17" format media Show NCDOT inventory number(s) in or above the title block
Structure Calculations	1 set	1 set	Not required for Standard QPL Poles
Standard Pole Foundation Drawings	1 set	1 set	Submit drawings on 11" x 17" format media. Submit a completed Standard Foundation Selection form for each pole using foundation table on Metal Pole Drawing M-8.
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.
Foundation Calculations	1	1	**Submit LPile calculations per Section 11.4 of**

			this specification. Not required for Standard QPL Poles
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 drawings 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.

B. Materials:

Fabricate metal pole and arm shaft from coil or plate steel to meet the requirements of ASTM A 595 Grade A tubes. For structural steel shapes, plates and bars use A572 Gr 50 min or ASTM A709 Gr 50 min. Provide pole and arm shafts 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 M 111 or an approved equivalent.

Use the submerged arc process or other NCDOT previously approved process suitable for pole shaft and arms to continuously weld pole shafts and arm 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 and arm base. Provide welding that conforms to Article 1072-18 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.

Provide a minimum of four (4) 1-1/2" diameter high strength bolts for connection between arm plate and pole plate. Increase number of bolts to six (6) 1-1/2" diameter high strength bolts when arm lengths are greater than 50'-0" long.

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 or mast arms 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 2 washers and 2 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 for both plates.

Provide 4 heavy hex nuts and 4 flat washers for each anchor bolt. For nuts, use AASHTO M291 grade 2H, DH, or DH3 or equivalent material. For flat washers, use AASHTO M293 or equivalent material.

C. Construction Methods:

Erect signal support poles only after concrete has attained a minimum allowable compressive strength of 3000 psi. Install anchor rod assemblies in accordance with the *Foundations and Anchor Rod Assemblies for Metal Poles* provision.

For further construction methods, see construction methods for Metal Strain Pole, or Metal Pole with Mast Arm.

Connect poles to grounding electrodes and bond them to the electrical service grounding electrodes.

For holes in the poles used to accommodate cables, install grommets before wiring pole or arm. Do not cut or split grommets.

Attach the terminal compartment cover 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 compartment 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 base.

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 1076-7 "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 ¼" thick plate for concrete foundation tag to include: concrete grade, depth, diameter, and reinforcement sizes of the installed foundation.

3.2. METAL STRAIN POLE

A. Materials:

Provide either steel or aluminum poles as indicated on the plans.

Comply with the following for Aluminum Poles:

- Have poles fabricated from Aluminum Association Alloy 6061-T6, 6063-T6, or approved equivalent. The structural requirement does not pertain to castings that are decorative only.
- Have shafts tapered by spinning and cold-working a seamless extruded tube of the aluminum alloy.
- Have shafts with no circumferential welds except at the lower end joining the shaft to the base.
- Ensure aluminum poles are properly protected from damage prior to shipment.
- Have bases of the shaft fabricated in accordance with the Aluminum Association Alloy 356.0-T6, and of adequate strength, shape and size, and capable of withstanding the design load of the shaft.
- Have aluminum surfaces in contact with concrete or dissimilar metal coated with bituminous paint.

Comply with the following for Steel Poles:

- Have shafts of the tapered tubular type and fabricated of steel conforming to ASTM A-595 Grade A or an approved equivalent.
- Have galvanization in accordance with AASHTO M 111 or an approved equivalent.
- Have shafts that are continuously welded for the entire length by the submerged arc process, and with exposed welds ground or rolled smooth and flush with the base metal. Provide welding that conforms to Article 1072-18 per *Standard Specification* except that no field welding on any part of the pole will be permitted.
- Have anchor bases for steel poles fabricated 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 or an approved equivalent.

For each strain pole, provide 2 messenger cable (span wire) clamps and associated hardware for attachment of support cable of the messenger cable suspension. Ensure that diameter of the clamp is appropriate to its location on the pole and that the diameter of the clamps is appropriately designed to be adjustable from 1'-6" below the top, down to 6'-6" below the top of the pole. Do not attach more than one support cable to a messenger cable clamp.

For strain poles, provide a minimum of three (3) 2 inch (50 mm) holes equipped with an associated coupling and weatherhead on the messenger cable load side of the pole to accommodate passage of signal cables from inside the pole to the suspension. Provide galvanized threaded plugs for all unused couplings at pole entrance points. Refer to Metal Pole Standard Drawing Sheet M3 for fabrication details.

Provide a grounding lug(s) in the approximate vicinity of the messenger cable clamp for bonding and grounding messenger cable. Lugs must accept #4 or #6 AWG wire to bond messenger cables to the pole in order to provide an effective ground fault circuit path. Refer to Metal Pole Standard Drawing Sheet M6 for construction details.

Have poles permanently stamped above the hand holes with the identification tag details as shown on Metal Pole Standard Drawing Sheet M2.

Provide liquid tight flexible metal conduit (Type LFMC), liquid tight flexible nonmetallic conduit (Type LFNC), high density polyethylene conduit (Type HDPE), or approved equivalent to isolate conductors feeding luminaires.

Fabricate poles from a single piece of steel or aluminum with single line seam weld with no transverse butt welds. Fabrication of two ply pole shafts is unacceptable with the exception of fluted shafts. Provide tapers for all shafts that begin at base and that have diameters which decrease uniformly at the rate of not more than 0.14 inch per foot (11.7 millimeters per meter) of length.

Ensure that allowable pole deflection does not exceed that allowed per 5th Edition AASHTO. For messenger cable poles (with primarily transverse loads), ensure that maximum deflection at the top of the pole does not exceed 2.5 percent of the pole height. For mast arm poles (with primarily moment loads), ensure that maximum angular rotation of the top of the pole does not exceed 1° 40'.

Provide four anchor nuts and four washers for each anchor bolt. Ensure that anchor bolts have required diameters, lengths, and positions, and will develop strengths comparable to their respective poles.

Provide a terminal compartment with cover and screws in each pole that encompasses the hand hole and contains a 12-terminal barrier type terminal block. Provide two terminal screws with a removable shorting bar between them for each termination. Furnish terminal compartment covers attached to the pole by a sturdy chain or cable approved by the Engineer. Ensure that the chain or cable is long enough to permit the cover to hang clear of the compartment opening when the cover is removed, and is strong enough to prevent vandals from being able to disconnect the cover from the pole. Ensure that the chain or cable will not interfere with service to the cables in the pole base.

Install grounding lugs that will accept #4 or #6 AWG wire to electrically bond messenger cables to the pole. Refer to Metal Pole Standard Drawing Sheet M6 for construction details.

For each pole, provide a 1/2 inch minimum thread diameter, coarse thread stud and nut for grounding which will accommodate #6 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.

When required by the plans, furnish couplings 42 inches above the bottom of the base for mounting of pedestrian pushbuttons. Provide mounting points consisting of 1-1/2 inch internally threaded half-couplings that comply with the NEC and that are mounted within the poles. Ensure that couplings are essentially flush with the outside surfaces of the poles and are installed before any required galvanizing. Provide a threaded plug in each mounting point. Ensure that the surface of the plug is essentially flush with the outer end of the mounting point when installed and has a recessed hole to accommodate a standard wrench.

B. Construction Methods:

Install metal poles, hardware, and fittings as shown on the manufacturer's installation drawings. Install metal poles so that when the pole is fully loaded it is within 2 degrees of vertical. Install poles with the manufacturer's recommended "rake." Use threaded leveling nuts to establish rake if required.

3.3. METAL POLE WITH MAST ARM

Provide signal support mast arm assemblies. Comply with the previous Section – Metal Strain Pole – except as noted herein.

Provide pole plates and associated gussets and fittings for attachment of required mast arms. As part of each mast arm attachment, provide a cable passage hole in the pole to allow passage of signal cables from the pole to the arm.

Ensure that allowable mast arm deflection does not exceed that allowed per 5th Edition AASHTO. Also when arm is fully loaded, tip of the arm shall not go below the arm attachment point with the pole for all load conditions per 5th Edition AASHTO.

Furnish all arm plates and necessary attachment hardware, including bolts and brackets.

Provide two extra bolts for each arm.

Provide grommet holes on the arms to accommodate cables for the signals.

Provide arms with weatherproof connections for attaching to the shaft of the pole.

Provide hardware that is galvanized steel, stainless steel, or corrosive-resistant aluminum.

Provide a removable end cap with stainless steel attachment screws for the end of each mast arm. Ensure that the cap is cast aluminum conforming to Aluminum Association Alloy 356.0F. Furnish cap attached to the arm 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 arm end opening when the cap is removed.

Comply with the following for Aluminum Arms:

- Conform to Aluminum Association Alloy 6061-T6, 6063-T6 or approved equivalent.
- Conform to the welding requirements of the aluminum poles.
- Have satin brush finished and furnish individually wrapped.

Comply with the following for Steel Luminaire Arms:

- In addition to tapered tube, luminaire arms may be standard weight black steel pipe conforming to ASTM A 53-90a, Type E or Type S, Grade B or an approved equivalent.
- Conform to the welding requirements of the steel poles.
- After all fabricating, cutting, punching, and welding are completed, luminaire arms should be hot-dipped galvanized inside and outside.
- In accordance with the National Electrical Code (NEC) Article 230.2(E), provide identification of the electrical source provider for the luminaire feeder circuit with contact information on a permanent label located in the pole hand hole in the vicinity of the feeder circuit raceway.

A. Materials:

Fabrication of two ply pole shafts and arms is unacceptable with the exception of fluted members.

After all fabricating, cutting, punching, and welding are completed, hot-dip galvanize the structure in accordance with the AASHTO M 111 or an approved equivalent.

B. Construction Methods:

Install horizontal-type arms with sufficient manufactured rise to keep arm from deflecting below the arm attachment height.

Attach cap to the mast arm with a sturdy chain or cable. Ensure that the chain or cable is long enough to permit the cap to hang clear of the arm opening when the cap is removed.

For mast arm poles, use full penetration welds with back-up ring at the pole base and at the arm base connection.

3.4. DRILLED PIER FOUNDATIONS FOR METAL TRAFFIC SIGNAL POLES

Analysis procedures and formulas shall be based on AASHTO, ACI code and per FHWA manuals. 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.

Design all custom foundations to carry the maximum capacity of each metal pole. For standard case strain poles only, if a custom foundation is designed, use the actual moment reactions from the Standard Foundation Selection Table shown on Standard Drawing No. M8.

To prevent design of oversized drilled shafts or other foundation types, do not use mast arm lengths exceeding 50'-0" and refrain from using dual mast arms, when installing new mast arm structures east of US Route 17.

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 consider getting foundations approved before releasing poles for fabrication.

Have the contractor notify the engineer if the proposed foundation is to be installed on a slope other than 8H: 1V or flatter.

A. Description:

Furnish and install foundations for NCDOT metal poles with all necessary hardware in accordance with the plans and specifications.

Metal Pole Standards have been developed and implemented by NCDOT for use at signalized intersections in North Carolina. If the plans call for a standard pole, then a standard foundation may be selected from the plans. However, the Contractor is not required to use a standard foundation. If the Contractor chooses to design a non-standard site-specific foundation for a standard pole or if the plans call for a non-standard site-specific pole, design the foundation to conform to the applicable provisions in the NCDOT Metal Pole Standards and Section B4 (Non-Standard Foundation Design) below. If non-standard site specific foundations are designed for standard QPL approved strain poles, the foundation designer must use the design moment specified by load case on Metal Pole

Standard Drawing Sheet M8. Failure to conform to this requirement will be grounds for rejection of the design.

If the Contractor chooses to design a non-standard foundation for a standard pole and the soil test results indicate a standard foundation is feasible for the site, the Contractor will be paid the cost of the standard foundation (drilled pier and wing wall, if applicable). Any additional costs associated with a non-standard site-specific foundation including additional materials, labor and equipment will be considered incidental to the cost of the standard foundation. All costs for the non-standard foundation design will also be considered incidental to the cost of the standard foundation.

B. Soil Test and Foundation Determination:

1. General:

Drilled piers are reinforced concrete sections, cast-in-place against in situ, undisturbed material. Drilled piers are of straight shaft type and vertical.

Some standard drilled piers for supporting poles with mast arms may require wing walls to resist torsional rotation. Based upon this provision and the results of the required soil test, a drilled pier length and wing wall requirement may be determined and constructed in accordance with the plans.

For non-standard site-specific poles, the contractor-selected pole fabricator will determine if the addition of wing walls is necessary for the supporting foundations.

2. 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 2 consecutive 6-in. intervals.
- A total of 50 blows have been applied with < 3-in. penetration.

Describe each intersection as 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. Pole numbers should be made available to the Drill Contractor. Include pole numbers in the boring label if they are available. If they are not available, ensure the boring labels can be cross-referenced to corresponding pole numbers. For each boring, submit a legible (hand written or typed) boring log signed and sealed by a licensed Geologist or Professional Engineer registered in North Carolina. Include on each boring the SPT blow counts and N-values at each depth, depth of the boring, hammer efficiency and a general description of the soil types encountered.

3. Standard Foundation Determination:

Use the following method for determining the Design N-value:

$$N_{AVG} = \frac{(N@1' + N@2.5' + \ldots\ldots N@\text{Deepest Boring Depth})}{\text{Total Number of N-values}}$$

$$Y = (N@1')^2 + (N@2.5')^2 + \ldots\ldots\ldots (N@\text{Deepest Boring Depth})^2$$

$$Z = (N@1' + N@2.5' + \ldots\ldots\ldots N@\text{Deepest Boring Depth})$$

$$N_{STD\ DEV} = \left(\frac{(\text{Total Number of N-values} \times Y) - Z^2}{(\text{Total Number of N-values}) \times (\text{Total Number of N-values} - 1)} \right)^{0.5}$$

Design N-value equals lesser of the following two conditions:

$N_{AVG} - (N_{STD\ DEV} \times 0.45)$

Or

$$\text{Average of First Four N-Values} = \frac{(N@1' + N@2.5' + N@5' + N@7.5')}{4}$$

Note: If less than 4 N-values are obtained because of criteria listed in Section 2 above, use average of N-values collected for second condition. Do not include the N-value at the deepest boring depth for above calculations if the boring is discontinued at or before the required boring depth because of criteria listed in Section 2 above. Use N-value of zero for weight of hammer or weight of rod. If N-value is greater than 50, reduce N-value to 50 for calculations.

If standard NCDOT strain poles are shown on the plans and the Contractor chooses to use standard foundations, determine a drilled pier length, "L," for each signal pole from the Standard Foundations Chart (sheet M 8) based on the Design N-value and the predominant soil type. For each standard pole location, submit a completed "Metal Pole Standard Foundation Selection Form" signed by the Contractor's representative. Signature on form is for verification purposes only. Include the Design N-value calculation and resulting drilled pier length, "L," on each form.

If non-standard site-specific poles are shown on the plans, submit completed boring logs collected in accordance with Section 2 (Soil Test) 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, the Standard Foundations Chart shown on the plans may not be used and a non-standard foundation may be required. In such case, contact the Engineer.

- The Design N-value is less than 4.
- The drilled pier length, "L", determined from the Standard Foundations Chart, is greater than the depth of the corresponding boring.

In the case where a standard foundation cannot be used, the Department will be responsible for the additional cost of the non-standard foundation.

Foundation designs are based on level ground around the traffic signal pole. If the slope around the edge of the drilled pier is steeper than 8:1 (H:V) or the proposed foundation will be less than 10 feet from the top of an embankment slope, the Contractor is responsible for providing slope information to the foundation designer and to the Engineer so it can be considered in the design.

The "Metal Pole Standard Foundation Selection Form" may be found at:

http://www.ncdot.gov/doh/preconstruct/highway/geotech/formdet/misc/MetalPole.pdf

If assistance is needed, contact the Engineer.

4. Non-Standard Foundation Design:

Design non-standard foundations based upon site-specific soil test information collected in accordance with Section 2 (Soil Test) 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. Contact the Engineer for pole loading diagrams for standard poles to be used for non-standard foundation designs. Submit any non-standard foundation designs including drawings, calculations, and soil boring logs to the Engineer for review and approval before construction.

C. Drilled Pier Construction:

Construct drilled pier foundations in accordance with the *Foundations and Anchor Rod Assemblies for Metal Poles* provision.

3.5. CUSTOM DESIGN OF TRAFFIC SIGNAL SUPPORTS

A. General:

Design traffic signal supports with foundations consisting of metal strain poles or metal poles with mast arms.

The lengths of the metal signal poles shown on the plans are estimated from available data for bid purposes. Determine the actual length of each pole from field measurements and adjusted cross-sections. Furnish the revised pole heights to the Engineer. Use all other dimensional requirements shown on the plans.

Ensure each pole includes an identification tag with information and location positions as defined on Metal Pole Standard Drawing Sheets M2, M3 and M4. All pole shaft tags must include the NCDOT Inventory number followed by the pole number shown on the traffic signal or ITS (non-signalized locations) plan.

Design all traffic signal support structures using the following 5th Edition AASHTO specifications:

- Design for a 50 year service life as recommended by Table 3-3.
- Use the wind pressure map developed from 3-second gust speeds, as provided in Article 3.8.
- Ensure signal support structures include natural wind gust loading and truck-induced gust loading in the fatigue design, as provided for in Articles 11.7.3 and 11.7.4, respectively. Designs need not consider periodic galloping forces.
- Assume the natural wind gust speed in North Carolina is 11.2 mph. For natural wind fatigue stress calculations, utilize a drag coefficient (C_d) computed for 11.2 mph wind velocity and not the basic wind speed velocity.

- Design for Category II fatigue, as provided for in Article 11.6, unless otherwise specified.
- Calculate all stresses using applicable equations from Section 5. The Maximum allowable stress ratios for all signal support designs are 0.9.
- Conform to article 10.4.2 and 11.8 for all deflection requirements.

Ensure that the design permits cables to be installed inside poles and mast arms.

Unless otherwise specified by special loading criteria, the computed surface area for ice load on signal heads is:

- 3-section, 12-inch, Surface area: 26.0 ft^2 (17.0 ft^2 without back plate)
- 4-section, 12-inch, Surface area: 32.0 ft^2 (21.0 ft^2 without back plate)
- 5-section, 12-inch, Surface area: 42.0 ft^2 (29.0 ft^2 without back plate)

The ice loading for signal heads defined above includes the additional surface area that back plates will induce. Special loading criteria may be specified in instances where back plates will not be installed on signal heads. Refer to the Loading Schedule on each Metal Pole Loading Diagram for revised signal head surface areas. The pole designer should revise ice loads accordingly in this instance. Careful examination of the plans when this is specified is important as this may impact sizing of the metal support structure and foundation design which could affect proposed bid quotes. All maximum stress ratios of 0.9 still apply.

Assume the combined minimum weight of a messenger cable bundle (including messenger cable, signal cable and detector lead-in cables) is 1.3 lbs/ft. Assume the combined minimum diameter of this cable bundle is 1.3 inches.

Ensure that designs provide a removable pole cap with stainless steel attachment screws for each pole top and mast arm end.

B. Metal Poles:

Submit design drawings for approval including pre-approved QPL pole drawings. Show all the necessary details and calculations for the metal poles including the foundation and connections. Include signal inventory number on design drawings. Include as part of the design calculations the ASTM specification numbers for the materials to be used. Provide the types and sizes of welds on the design drawings. Include a Bill of Materials on design drawings. Ensure design drawings and calculations are signed, dated, and sealed by the responsible professional engineer licensed in the state of North Carolina. Immediately bring to the attention of the Engineer any structural deficiency that becomes apparent in any assembly or member of any assembly as a result of the design requirements imposed by these specifications, the plans, or the typical drawings. Said Professional Engineer is wholly responsible for the design of all poles and arms. Review and acceptance of these designs by the Department does not relieve the said Professional Engineer of his responsibility. Do not fabricate the assemblies until receipt of the Department's approval of the design drawings.

For mast arm poles, provide designs with provisions for pole plates and associated gussets and fittings for mast arm attachment. As part of each mast arm attachment, provide a grommeted 2" diameter hole on the shaft side of the connection to allow passage of the signal cables from the pole to the arm.

Where ice is present, assume wind loads as shown in Figure 3-5 of the 5th Edition AASHTO Specification for Group III loading.

For each strain pole, provide two messenger cable clamps and associated hardware to attach the messenger support cable. Ensure that the diameter of the clamps is appropriately designed to be adjustable from 1'-6" inches below the top, down to 6'-6" below the top of the pole. Do not attach more than one messenger support cable to a messenger cable clamp.

Provide a grounding lug(s) in the approximate vicinity of the messenger cable clamp for bonding and grounding messenger cable. Lugs must accept #4 or #6 AWG wire to bond messenger cables to the pole in order to provide an effective ground fault circuit path. Refer to Metal Pole Standard Drawing Sheet M6 for construction details.

Design tapers for all pole shafts that begin at the base with diameters that decrease uniformly at the rate of 0.14 inch per foot of length.

Design a base plate on each pole. The minimum base plate thickness for all poles is determined by the following criteria:

Case 1 Circular or rectangular solid base plate with the upright pole welded to the top surface of base plate with full penetration butt weld, and where no stiffeners are provided. A base plate with a small center hole, which is less than 1/3 of the upright diameter, and located concentrically with the upright pole, may be considered as a solid base plate.

The magnitude of bending moment in the base plate, induced by the anchoring force of each anchor bolt is $M = (P \times D_1) / 2$, where

M = bending moment at the critical section of the base plate induced by one anchor bolt

P = anchoring force of each anchor bolt

D_1 = horizontal distance between the anchor bolt center and the outer face of the upright, or the difference between the bolt circle radius and the outside radius of the upright

Locate the critical section at the face of the anchor bolt and perpendicular to the bolt circle radius. The overlapped part of two adjacent critical sections is considered ineffective.

Case 2 Circular or rectangular base plate with the upright pole socketed into and attached to the base plate with two lines of fillet weld, and where no stiffeners are provided, or any base plate with a center hole that is larger in diameter than 1/3 of the upright diameter.

The magnitude of bending moment induced by the anchoring force of each anchor bolt is $M = P \times D_2$,

where P = anchoring force of each anchor bolt

D_2 = horizontal distance between the face of the upright and the face of the anchor bolt nut

Locate the critical section at the face of the anchor bolt top nut and perpendicular to the radius of the bolt circle. The overlapped part of two adjacent critical sections is considered ineffective.

If the base plate thickness calculated for Case 2 is less than Case 1, use the thickness calculated for Case 1.

The following additional owner requirements apply concerning pole base plates.

- Ensure that whichever case governs as defined above, the anchor bolt diameter is set to match the base plate thickness. If the minimum diameter required for the anchor bolt exceeds the thickness required for the base plate, set the base plate thickness equal to the required bolt diameter.
- For dual mast arm supports, or for single mast arm supports 50' or greater, use a minimum 8 bolt orientation with 2" diameter anchor bolts, and a 2" thick base plate.
- For all metal poles with mast arms, use a full penetration groove weld with a backing ring to connect the pole upright component to the base. Refer to Metal Pole Standard Drawing Sheet M4.

Ensure that designs have anchor bolt holes with a diameter 1/4 inch larger than the anchor bolt diameters in the base plate.

Ensure that the anchor bolts have the required diameters, lengths, and positions, and will develop strengths comparable to their respective poles.

Provide designs with a 6 x 12-inch hand hole with a reinforcing frame for each pole.

Provide designs with a terminal compartment with cover and screws in each pole that encompasses the hand hole and contains provisions for a 12-terminal barrier type terminal block.

For each pole, provide designs with provisions for a 1/2 inch minimum thread diameter, coarse thread stud and nut for grounding which will accommodate a #6 AWG ground wire. Ensure the lug is electrically bonded to the pole and is conveniently located inside the pole at the hand hole.

When required, design couplings on the pole for mounting pedestrian pushbuttons at a height of 42 inches above the bottom of the base. Provide mounting points consisting of 1-1/2 inch internally threaded half-couplings that comply with the NEC that are mounted within the poles. Ensure the couplings are essentially flush with the outside surfaces of the poles and are installed before any required galvanizing. Provide a threaded plug for each half coupling. Ensure that the surface of the plug is essentially flush with the outer end of the mounting point when installed and has a recessed hole to accommodate a standard wrench.

C. Mast Arms:

Design all arm plates and necessary attachment hardware, including bolts and brackets as required by the plans.

Design for grommeted holes on the arms to accommodate the cables for the signals if specified.

Design arms with weatherproof connections for attaching to the shaft of the pole.

Always use a full penetration groove weld with a backing ring to connect the mast arm to the pole. Refer to Metal Pole Standard Drawing Sheet M5.

Capacity of tapped flange plate must be sufficient to develop the full capacity of the connecting bolts. In all cases the flange plate of both arm and shaft must be at least as thick as the arm connecting bolts are in diameter.

3.6. POLE NUMBERING SYSTEM

A. New Poles

Attach an identification tag to each pole shaft and mast arm section as shown on Metal Pole Standard Drawing Sheet M2 "Typical Fabrication Details Common To All Metal Poles".

3.7. MEASUREMENT AND PAYMENT

Actual number of metal poles with single mast arms furnished, installed, and accepted.

Actual number of metal poles with dual mast arms furnished, installed, and accepted.

Actual number of soil tests with SPT borings drilled furnished and accepted.

Actual volume of concrete poured in cubic yards of drilled pier foundation furnished, installed and accepted.

Actual number of designs for mast arms with metal poles furnished and accepted.

No measurement will be made for foundation designs prepared with metal pole designs, as these will be considered incidental to designing signal support structures.

Payment will be made under:

Metal Pole with Single Mast Arm ..... Each
Metal Pole with Dual Mast Arm ..... Each
Soil Test ..... Each
Drilled Pier Foundation ..... Cubic Yard
Mast Arm with Metal Pole Design ..... Each

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.

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 336S pole 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 336S pole mounted cabinets that are 46" high with 40" high internal rack assemblies.

Furnish model 332 base mounted cabinets configured for 8 vehicle phases, 4 pedestrian phases, and 6 overlaps. When overlaps are required, provide auxiliary output files for the overlaps. Do not reassign load switches to accommodate overlaps unless shown on electrical details.

Provide model 200 load switches, model 222 loop detector sensors, model 252 AC isolators, and model 242 DC isolators according to the electrical details. As a minimum, provide one (1) model 2018 conflict monitor, one (1) model 206L power supply unit, two (2) model 204 flashers, one (1) DC isolator (located in slot I14), and four (4) model 430 flash transfer relays (provide seven (7) model 430 flash transfer relays if auxiliary output file is installed) with each cabinet.

B. Type 170 E Cabinet Electrical Requirements:

Provide a cabinet assembly designed to ensure that upon leaving any cabinet switch or conflict monitor initiated flashing operation, the controller starts up in the programmed start up phases and start up interval.

Furnish two sets of non-fading cabinet wiring diagrams and schematics in a paper envelope or container and placed in the cabinet drawer.

All AC+ power is subject to radio frequency signal suppression.

Provide surge suppression in the cabinet for each type of cabinet device. Provide surge protection for the full capacity of the cabinet input file. Provide surge suppression devices that

operate properly over a temperature range of -40° F to +185° F. Ensure the surge suppression devices provide both common and differential modes of protection.

Provide a pluggable power line surge protector that is installed on the back of the PDA (power distribution assembly) chassis to filter and absorb power line noise and switching transients. Ensure the device incorporates LEDs for failure indication and provides a dry relay contact closure for the purpose of remote sensing. Ensure the device meets the following specifications:

Peak Surge Current (Single pulse, 8x20µs).....20,000A

Occurrences (8x20µs waveform).....10 minimum @ 20,000A

Maximum Clamp Voltage.....395VAC

Operating Current.....15 amps

Response Time.....< 5 nanoseconds

Provide a loop surge suppressor for each set of loop terminals in the cabinet. Ensure the device meets the following specifications:

Peak Surge Current (6 times, 8x20µs)

(Differential Mode).....400A

(Common Mode).....1,000A

Occurrences (8x20µs waveform).....500 min @ 200A

Maximum Clamp Voltage

(Differential Mode @400A).....35V

(Common Mode @1,000A).....35V

Response Time.....< 5 nanoseconds

Maximum Capacitance.....35 pF

Provide a data communications surge suppressor for each communications line entering or leaving the cabinet. Ensure the device meets the following specifications:

Peak Surge Current (Single pulse, 8x20µs).....10,000A

Occurrences (8x20µs waveform).....100 min @ 2,000A

Maximum Clamp Voltage.....Rated for equipment protected

Response Time.....< 1 nanosecond

Maximum Capacitance.....1,500 pF

Maximum Series Resistance.....15Ω

Provide a DC signal surge suppressor for each DC input channel in the cabinet. Ensure the device meets the following specifications:

Peak Surge Current (Single pulse, 8x20μs).....10,000A

Occurrences (8x20μs waveform).....100 @ 2,000A

Maximum Clamp Voltage.....30V

Response Time.....< 1 nanosecond

Provide a 120 VAC signal surge suppressor for each AC+ interconnect signal input. Ensure the device meets the following specifications:

Peak Surge Current (Single pulse, 8x20μs).....20,000A

Maximum Clamp Voltage.....350VAC

Response Time.....< 200 nanoseconds

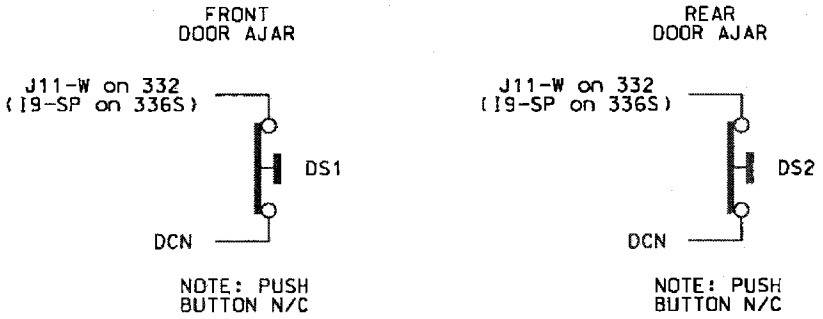
Discharge Voltage.....<200 Volts @ 1,000A

Insulation Resistance.....≥100 MΩ

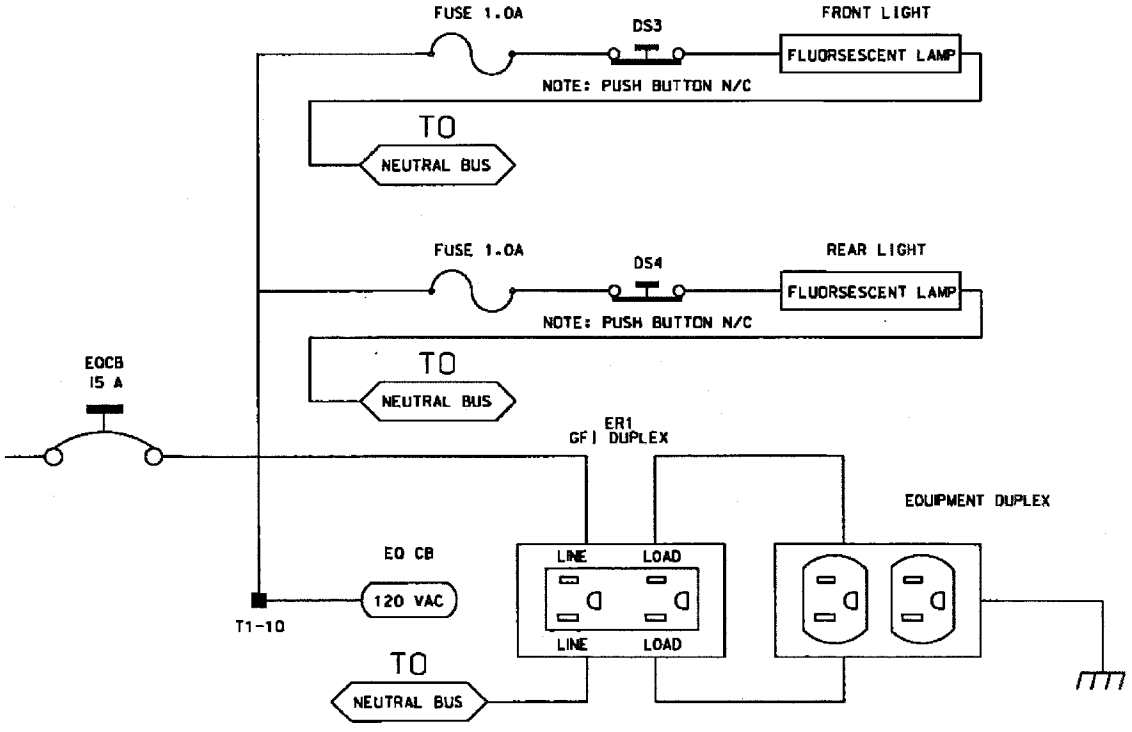
Provide conductors for surge protection wiring that are of sufficient size (ampacity) to withstand maximum overcurrents which could occur before protective device thresholds are attained and current flow is interrupted.

If additional surge protected power outlets are needed to accommodate fiber transceivers, modems, etc., install a UL listed, industrial, heavy-duty type power outlet strip with a minimum rating of 15 A / 125 VAC, 60 Hz. Provide a strip that has a minimum of 3 grounded outlets. Ensure the power outlet strip plugs into one of the controller unit receptacles located on the rear of the PDA. Ensure power outlet strip is mounted securely; provide strain relief if necessary.

Provide a door switch in the front and a door switch in the rear of the cabinet that will provide the controller unit with a Door Ajar alarm when either the front or the rear door is open. Ensure the door switches apply DC ground to the Input File when either the front door or the rear door is open.



Furnish a fluorescent fixture in the rear across the top of the cabinet and another fluorescent fixture in the front across the top of the cabinet at a minimum. Ensure that the fixtures provide sufficient light to illuminate all terminals, labels, switches, and devices in the cabinet. Conveniently locate the fixtures so as not to interfere with a technician's ability to perform work on any devices or terminals in the cabinet. Provide a protective diffuser to cover exposed bulbs. Install 16 watt T-4 lamps in the fluorescent fixtures. Provide a door switch to provide power to each fixture when the respective door is open. Wire the fluorescent fixtures to the 15 amp ECB (equipment circuit breaker).



Furnish a police panel with a police panel door. For model 336S cabinets, mount the police panel on the rear door. Ensure that the police panel door permits access to the police panel when the main door is closed. Ensure that no rainwater can enter the cabinet even with the police panel door open. Provide a police panel door hinged on the right side as viewed from the front. Provide a police panel

door lock that is keyed to a standard police/fire call box key. In addition to the requirements of LA Specification No. 54-053-08, provide the police panel with a toggle switch connected to switch the intersection operation between normal stop-and-go operation (AUTO) and manual operation (MANUAL). Ensure that manual control can be implemented using inputs and software such that the controller provides full programmed clearance times for the yellow clearance and red clearance for each phase while under manual control.

Provide a 1/4-inch locking phone jack in the police panel for a hand control to manually control the intersection. Provide sufficient room in the police panel for storage of a hand control and cord.

Ensure the 336S cabinet Input File is wired as follows:

336S Cabinet Port-Bit/C-1 Pin Assignment														
Slot #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
C-1 (Spares)	59	60	61	62	63	64	65	66	75	76	77	78	79	80
Port	3-2	1-1	3-4	1-3	3-1	1-2	3-3	1-4	2-5	5-5	5-6	5-1	5-2	6-7
C-1	56	39	58	41	55	40	57	42	51	71	72	67	68	81
Port	2-1	1-5	2-3	1-7	2-2	1-6	2-4	1-8	2-6	5-7	5-8	5-3	5-4	6-8
C-1	47	43	49	45	48	44	50	46	52	73	74	69	70	82

For model 332 base mounted cabinets, ensure terminals J14-E and J14-K are wired together on the rear of the Input File. Connect TB9-12 (J14 Common) on the Input Panel to T1-2 (AC-) on the rear of the PDA.

Provide detector test switches mounted at the top of the cabinet rack or other convenient location which may be used to place a call on each of eight phases based on the chart below. Provide three positions for each switch: On (place call), Off (normal detector operation), and Momentary On (place momentary call and return to normal detector operation after switch is released). Ensure that the switches are located such that the technician can read the controller display and observe the intersection.

Connect detector test switches for cabinets as follows:

336S Cabinet		332 Cabinet	
Detector Call Switches	**Terminals**	**Detector Call Switches**	**Terminals**
Phase 1	I1-F	Phase 1	I1-W
Phase 2	I2-F	Phase 2	I4-W
Phase 3	I3-F	Phase 3	I5-W
Phase 4	I4-F	Phase 4	I8-W
Phase 5	I5-F	Phase 5	J1-W
Phase 6	I6-F	Phase 6	J4-W
Phase 7	I7-F	Phase 7	J5-W
Phase 8	I8-F	Phase 8	J8-W

Provide the PCB 28/56 connector for the conflict monitor unit (CMU) with 28 independent contacts per side, dual-sided with 0.156 inch contact centers. Provide the PCB 28/56 connector contacts with solder eyelet terminations. Ensure all connections to the PCB 28/56 connector are soldered to the solder eyelet terminations.

Ensure that all cabinets have the CMU connector wired according to the 332 cabinet connector pin assignments (include all wires for auxiliary output file connection). Wire pins 13, 16, R, and U of the CMU connector to a separate 4 pin plug, P1, as shown below. Provide a second plug, P2, which will mate with P1 and is wired to the auxiliary output file as shown below. Provide an additional plug, P3, which will mate with P1 and is wired to the pedestrian yellow circuits as shown below. When no auxiliary output file is installed in the cabinet, provide wires for the green and yellow inputs for channels 11, 12, 17, and 18, the red inputs for channels 17 and 18, and the wires for the P2 plug. Terminate the two-foot wires with ring type lugs, insulated, and bundled for optional use.

	P1		P2		P3	
PIN	**FUNCTION**	**CONN TO**	**FUNCTION**	**CONN TO**	**FUNCTION**	**CONN TO**
1	CH-9G	CMU-13	OLA-GRN	A123	2P-YEL	114
2	CH-9Y	CMU-16	OLA-YEL	A122	4P-YEL	105
3	CH-10G	CMU-R	OLB-GRN	A126	6P-YEL	120
4	CH-10Y	CMU-U	OLB-YEL	A125	8P-YEL	111

Do not provide the P20 terminal assembly (red monitor board) or red interface ribbon cable as specified in LA Specification No. 54-053-08.

Provide a P20 connector that mates with and is compatible with the red interface connector mounted on the front of the conflict monitor. Ensure that the P20 connector and the red interface

connector on the conflict monitor are center polarized to ensure proper connection. Ensure that removal of the P20 connector will cause the conflict monitor to recognize a latching fault condition and place the cabinet into flashing operation.

Wire the P20 connector to the output file and auxiliary output file using 22 AWG stranded wires. Ensure the length of these wires is a minimum of 42 inches in length. Provide a durable braided sleeve around the wires to organize and protect the wires.

Wire the P20 connector to the traffic signal red displays to provide inputs to the conflict monitor as shown below. Ensure the pedestrian Don't Walk circuits are wired to channels 13 through 16 of the P20 connector. When no auxiliary output file is installed in the cabinet, provide wires for channels 9 through 12 reds. Provide a wire for special function 1. Terminate the unused wires with ring type lugs, insulated, and bundled for optional use.

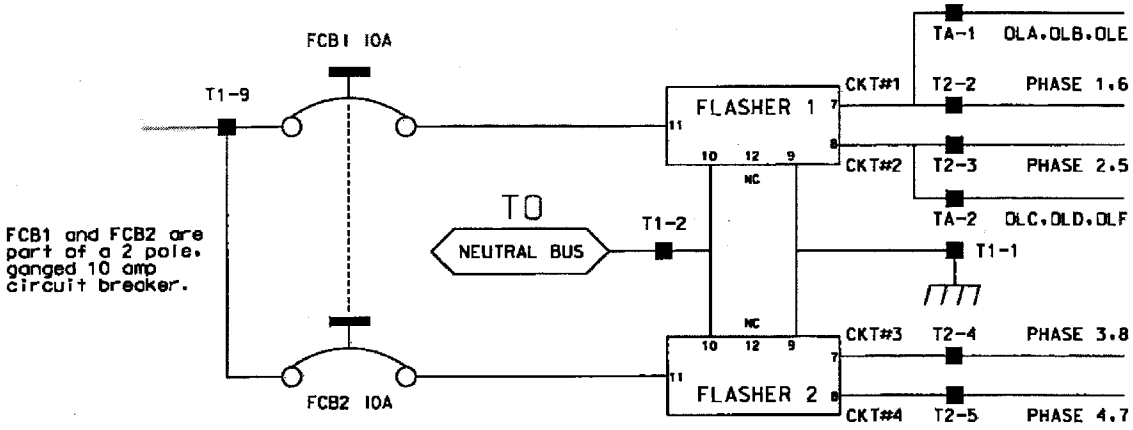
	P20 Connector				
PIN	FUNCTION	CONN TO	PIN	FUNCTION	CONN TO
1	Channel 15 Red	119	2	Channel 16 Red	110
3	Channel 14 Red	104	4	Chassis GND	01-9
5	Channel 13 Red	113	6	N/C	
7	Channel 12 Red	AUX 101	8	Spec Function 1	
9	Channel 10 Red	AUX 124	10	Channel 11 Red	AUX 114
11	Channel 9 Red	AUX 121	12	Channel 8 Red	107
13	Channel 7 Red	122	14	Channel 6 Red	134
15	Channel 5 Red	131	16	Channel 4 Red	101
17	Channel 3 Red	116	18	Channel 2 Red	128
19	Channel 1 Red	125	20	Red Enable	01-14

Ensure the controller unit outputs to the auxiliary output file are pre-wired to the C5 connector. When no auxiliary output file is installed in the cabinet, connect the C5 connector to a storage socket located on the Input Panel or on the rear of the PDA.

Do not wire pin 12 of the load switch sockets.

In addition to the requirements of LA Specification No. 54-053-08, ensure relay K1 on the Power Distribution Assembly (PDA) is a four pole relay and K2 on the PDA is a two pole relay.

Provide a two pole, ganged circuit breaker for the flash bus circuit. Ensure the flash bus circuit breaker is an inverse time circuit breaker rated for 10 amps at 120 VAC with a minimum of 10,000 RMS symmetrical amperes short circuit current rating. Do not provide the auxiliary switch feature on the flash bus circuit breaker. Ensure the ganged flash bus circuit breaker is certified by the circuit breaker manufacturer to provide gang tripping operation.



Ensure auxiliary output files are wired as follows:

AUXILIARY OUTPUT FILE TERMINAL BLOCK TA ASSIGNMENTS	
POSITION	**FUNCTION**
1	Flasher Unit #1, Circuit 1/FTR1 (OLA, OLB)/FTR3 (OLE)
2	Flasher Unit #1, Circuit 2/FTR2 (OLC, OLD)/FTR3 (OLF)
3	Flash Transfer Relay Coils
4	AC -
5	Power Circuit 5
6	Power Circuit 5
7	Equipment Ground Bus
8	NC

Provide four spare load resistors mounted in each cabinet. Ensure each load resistor is rated as shown in the table below. Wire one side of each load resistor to AC-. Connect the other side of each resistor to a separate terminal on a four (4) position terminal block. Mount the load resistors and terminal block either inside the back of Output File No. 1 or on the upper area of the Service Panel.

ACCEPTABLE LOAD RESISTOR VALUES	
VALUE (ohms)	**WATTAGE**
1.5K – 1.9 K	25W (min)
2.0K – 3.0K	10W (min)

Provide Model 200 load switches, Model 204 flashers, Model 242 DC isolators, Model 252 AC isolators, and Model 206L power supply units that conform to CALTRANS' "*Transportation Electrical Equipment Specifications*" dated March 12, 2009 with Erratum 1.

C. Type 170 E Cabinet Physical Requirements:

Do not mold, cast, or scribe the name "City of Los Angeles" on the outside of the cabinet door as specified in LA Specification No. 54-053-08. Do not provide a Communications Terminal Panel as specified in LA Specification No. 54-053-08. Do not provide terminal block TBB on the Service Panel. Do not provide Cabinet Verification Test Program software or associated test jigs as specified in LA Specification No. 54-053-08.

Furnish unpainted, natural, aluminum cabinet shells. Ensure that all non-aluminum hardware on the cabinet is stainless steel or a Department approved non-corrosive alternate.

Ensure the lifting eyes, gasket channels, police panel, and all supports welded to the enclosure and doors are fabricated from 0.125 inch minimum thickness aluminum sheet and meet the same standards as the cabinet and doors.

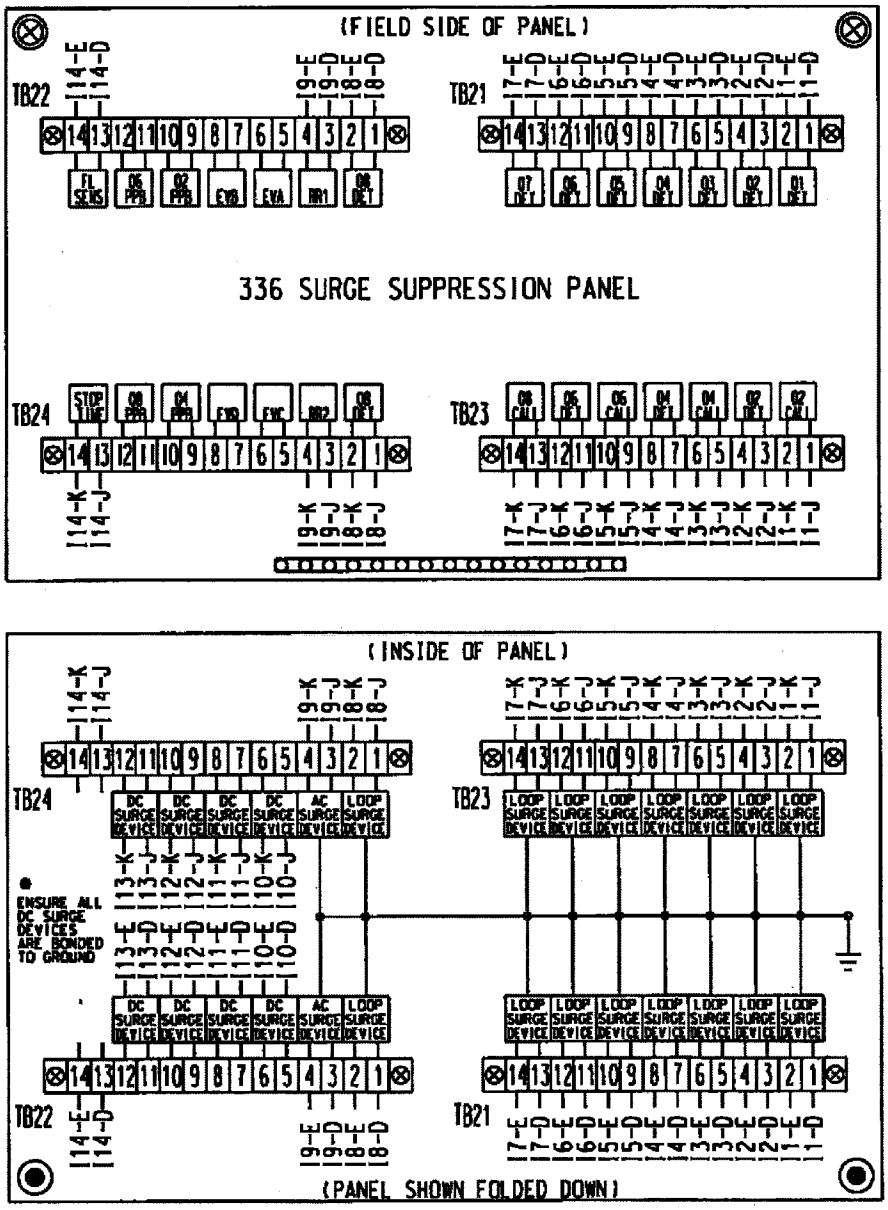
Provide front and rear doors with latching handles that allow padlocking in the closed position. Furnish 0.75 inch minimum diameter stainless steel handles with a minimum 0.5 inch shank. Place the padlocking attachment at 4.0 inches from the handle shank center to clear the lock and key. Provide an additional 4.0 inches minimum gripping length.

Provide Corbin #2 locks on the front and rear doors. Provide one (1) Corbin #2 and one (1) police master key with each cabinet. Ensure main door locks allow removal of keys in the locked position only.

Provide a surge protection panel with 16 loop surge protection devices and designed to allow sufficient free space for wire connection/disconnection and surge protection device replacement. For model 332 cabinets, provide an additional 20 loop surge protection devices. Provide an additional two AC+ interconnect surge devices to protect one slot and eight DC surge protection devices to protect four slots. Provide no protection devices on slot I14.

For pole mounted cabinets, mount surge protection devices for the AC+ interconnect inputs, inductive loop detector inputs, and low voltage DC inputs on a swing down panel assembly fabricated from sturdy aluminum. Attach the swing down panel to the bottom rear cabinet rack assembly using thumb screws. Ensure the swing down panel allows for easy removal of the input file without removing the surge protection panel assembly or its parts. Have the surge protection devices mounted horizontally on the panel and soldered to the feed through terminals of four 14 position terminal blocks with #8 screws mounted on the other side. Ensure the top row of terminals is connected to the upper slots and the bottom row of terminals is connected to the bottom slots. Provide a 15 position copper equipment ground bus attached to the field terminal side (outside) of

the swing down panel for termination of loop lead-in shield grounds. Ensure that a Number 4 AWG green wire connects the surge protection panel assembly ground bus to the main cabinet equipment ground.



For base mounted cabinets, mount surge protection panels on the left side of the cabinet as viewed from the rear. Attach each panel to the cabinet rack assembly using bolts and make it easily removable. Mount the surge protection devices in vertical rows on each panel and connect the

devices to one side of 12 position, double row terminal blocks with #8 screws. For each surge protection panel, terminate all grounds from the surge protection devices on a copper equipment ground bus attached to the surge protection panel. Wire the terminals to the rear of a standard input file using spade lugs for input file protection.

Provide permanent labels that indicate the slot and the pins connected to each terminal that may be viewed from the rear cabinet door. Label and orient terminals so that each pair of inputs is next to each other. Indicate on the labeling the input file (I or J), the slot number (1-14) and the terminal pins of the input slots (either D & E for upper or J & K for lower).

Provide a minimum 14 x 16 inch pull out, hinged top shelf located immediately below controller mounting section of the cabinet. Ensure the shelf is designed to fully expose the table surface outside the controller at a height approximately even with the bottom of the controller. Ensure the shelf has a storage bin interior which is a minimum of 1 inch deep and approximately the same dimensions as the shelf. Provide an access to the storage area by lifting the hinged top of the shelf. Fabricate the shelf and slide from aluminum or stainless steel and ensure the assembly can support the 2070L controller plus 15 pounds of additional weight. Ensure shelf has a locking mechanism to secure it in the fully extended position and does not inhibit the removal of the 2070L controller or removal of cards inside the controller when fully extended. Provide a locking mechanism that is easily released when the shelf is to be returned to its non-use position directly under the controller.

D. Model 2018 Enhanced Conflict Monitor:

Furnish Model 2018 Enhanced Conflict Monitors that provide monitoring of 18 channels. Ensure each channel consists of a green, yellow, and red field signal input. Ensure that the conflict monitor meets or exceeds CALTRANS' Transportation Electrical Equipment Specifications dated March 12, 2009 with Erratum 1 (hereafter referred to as CALTRANS' 2009 TEES) for a model 210 monitor unit and other requirements stated in this specification.

Ensure the conflict monitor is provided with an 18 channel conflict programming card. Pin EE and Pin T of the conflict programming card shall be connected together. Pin 16 of the conflict programming card shall be floating. Ensure that the absence of the conflict programming card will cause the conflict monitor to trigger (enter into fault mode), and remain in the triggered state until the programming card is properly inserted and the conflict monitor is reset.

Provide a conflict monitor that incorporates LED indicators into the front panel to dynamically display the status of the monitor under normal conditions and to provide a comprehensive review of field inputs with monitor status under fault conditions. Ensure that the monitor indicates the channels that were active during a conflict condition and the channels that experienced a failure for all other per channel fault conditions detected. Ensure that these indications and the status of each channel are retained until the Conflict Monitor is reset. Furnish LED indicators for the following:

- AC Power (Green LED indicator)
- VDC Failed (Red LED indicator)
- WDT Error (Red LED indicator)
- Conflict (Red LED indicator)
- Red Fail (Red LED indicator)
- Dual Indication (Red LED indicator)

- Yellow/Clearance Failure (Red LED indicator)
- PCA/PC Ajar (Red LED indicator)
- Monitor Fail/Diagnostic Failure (Red LED indicator)
- 54 Channel Status Indicators (1 Red, 1 Yellow, and 1 Green LED indicator for each of the 18 channels)

Provide a switch to set the Red Fail fault timing. Ensure that when the switch is in the ON position the Red Fail fault timing value is set to 1350 +/- 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).

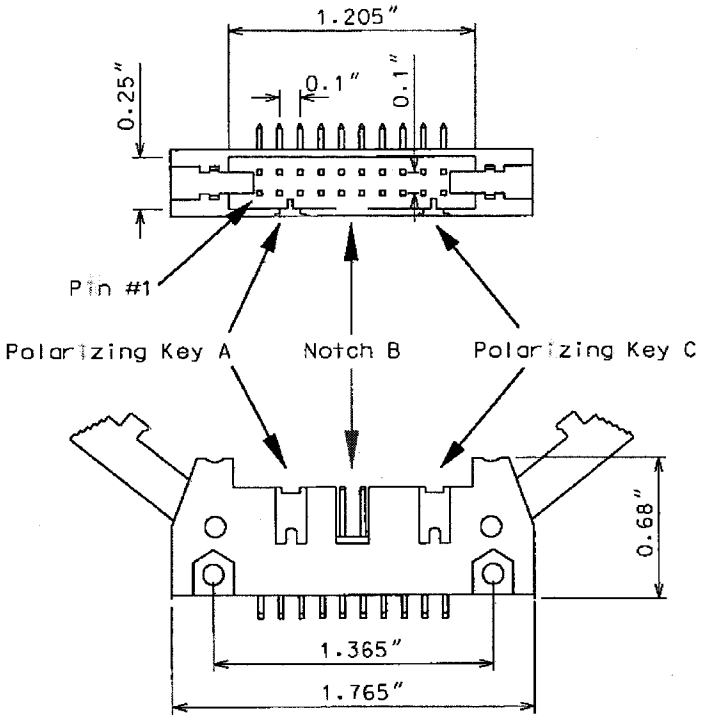
Provide a switch to set the Watchdog fault timing. Ensure that when the switch is in the ON position the Watchdog fault timing value is set to 1.0 +/- 0.1s (2018 mode). Ensure that when the switch is in the OFF position the Watchdog fault timing value is set to 1.5 +/- 0.1s (210 mode).

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 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 that 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 located on the conflict monitor. This fault shall not occur when the channel is programmed for Yellow Inhibit, when the Red Enable signal is inactive or pin #EE (output relay common) is active.

3. **Dual Indications on the Same Channel:** In this condition, more than one indication (R,Y,G) is detected as "on" at the same time on the same channel. If dual indications are detected for a period greater than 500 ms, ensure that the conflict monitor triggers and displays the proper failure indication (Dual Ind fault). If this condition is detected for less than 200 ms, ensure that the monitor does not trigger. G-Y-R dual indication monitoring shall be enabled on a per channel basis by the use of switches located on the conflict monitor. G-Y dual indication monitoring shall be enabled for all channels by use of a switch located on the conflict monitor. This fault shall not occur when the Red Enable signal is inactive or pin #EE (output relay common) is active.
4. **Configuration Settings Change:** The configuration settings are comprised of (as a minimum) the permissive diode matrix, dual indication switches, yellow disable jumpers, any option switches, any option jumpers, and the Watchdog Enable switch. Ensure the conflict monitor compares the current configuration settings with the previous stored configuration settings on power-up, on reset, and periodically during operation. If any of the configuration settings are changed, ensure that the conflict monitor triggers and causes the program card indicator to flash. Ensure that configuration change faults are only reset by depressing and holding the front panel reset button for a minimum of three seconds. Ensure the external remote reset input does not reset configuration change faults.

Ensure the conflict monitor will trigger and the AC Power indicator will flash at a rate of 2 Hz ± 20% with a 50% duty cycle when the AC Line voltage falls below the "drop-out" level. Ensure the conflict monitor will resume normal operation when the AC Line voltage returns above the "restore" level. Ensure the AC Power indicator will remain illuminated when the AC voltage returns above the "restore" level. Should an AC Line power interruption occur while the monitor is in the fault mode, then upon restoration of AC Line power, the monitor will remain in the fault mode and the correct fault and channel indicators will be displayed.

Provide a flash interval of at least 6 seconds and at most 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 Hz ± 20% with a 50% duty cycle during this interval. Ensure the termination of the flash interval after at least 6 seconds if the Watchdog input has made 5 transitions between the True and False state and the AC Line voltage is greater than the "restore" level. If the watchdog input has not made 5 transitions between the True and False state within 10 ± 0.5 seconds, the monitor shall enter a WDT error fault condition.

Ensure the conflict monitor will monitor an intersection with a minimum of four approaches using the four-section Flashing Yellow Arrow (FYA) vehicle traffic signal as outlined by the NCHRP 3-54 research project for protected-permissive left turn signal displays. Ensure the conflict monitor will operate in the FYA mode and FYAc (Compact) mode as specified below to monitor each channel 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.

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 (2070L). 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

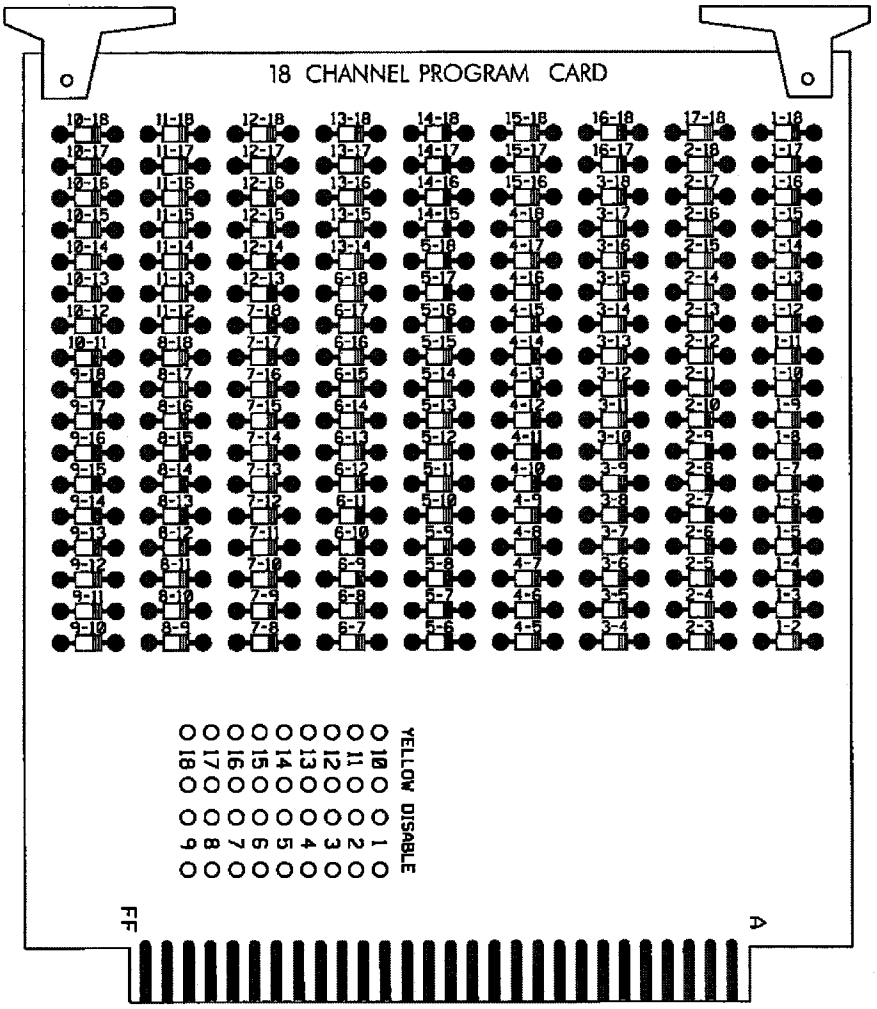
Pin #	Function (Back Side)	Pin #	Function (Component Side)
1	Channel 2 Green	A	Channel 2 Yellow
2	Channel 13 Green	B	Channel 6 Green
3	Channel 6 Yellow	C	Channel 15 Green
4	Channel 4 Green	D	Channel 4 Yellow
5	Channel 14 Green	E	Channel 8 Green
6	Channel 8 Yellow	F	Channel 16 Green
7	Channel 5 Green	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



E. Preemption and Sign Control Box

Provide preemption and sign control box to operate in a Model 332 and Model 336S cabinet. Provide hardware to mount the box to the cage of the cabinet to ensure the front side is facing the opposite side of the cabinet. Furnish the material of the box from a durable finished metallic or thermoplastic case. Ensure the size of the box is not greater than 7(l) x 5(w) x 5(d) inches. Ensure that no modification is necessary to mount the box on the cabinet cage.

Provide the following components in the preemption and sign control box: relays, fuses, terminal blocks, MOVs, resistor, RC network, lamp, and push button switch.

Provide UL Listed or Recognized relay K1 as a DPDT enclosed relay (120 VAC, 60 Hz coil) with an 8-pin octal-style plug and associated octal base. Provide contact material made of AgCdO with a 10 amp, 240 VAC rating. Ensure the relay has a specified pickup voltage of 102 VAC.

Provide relay SSR1 as a Triac SPST normally open solid state relay that is rated for 120 VAC input and zero-crossing (resistive load) 25 amp @ 120 VAC output. Ensure the relay turns on at 90 Vrms within 10 ms and turns off at 10 Vrms within 40 ms. Ensure the relay has physical

characteristics as shown in the wiring detail in Figure 1. Provide 4 terminal screws with saddle clamps.

Provide fuses F1 and F2 as a UL Listed ¼" x 1-1/4" glass tube rated at 250 volts with a 10kA interrupting rating. Ensure F1 non-delay (fast-acting) and F2 slow-blow (time-delay) fuses have a maximum opening times of 60 minutes and 120 seconds for currents of 135 and 200 percent of the ampere rating, respectively. Ensure F2 slow-blow (time-delay) fuses have a minimum opening times of 12 seconds at 200 percent of the ampere rating. Provide fuse holders that are UL Recognized panel-mounted holders rated 250V, 15 ampere minimum with bayonet-type knobs which accept ¼" x 1-1/4" glass tube fuses.

Provide terminal blocks that are rated for 300V and are made of electrical grade thermoplastic or thermosetting plastic. Ensure each terminal block is of closed back design and has recessed-screw terminals with molded barriers between terminals. Ensure each terminal block is labeled with a block designation. Ensure each terminal is labeled with the function and a number.

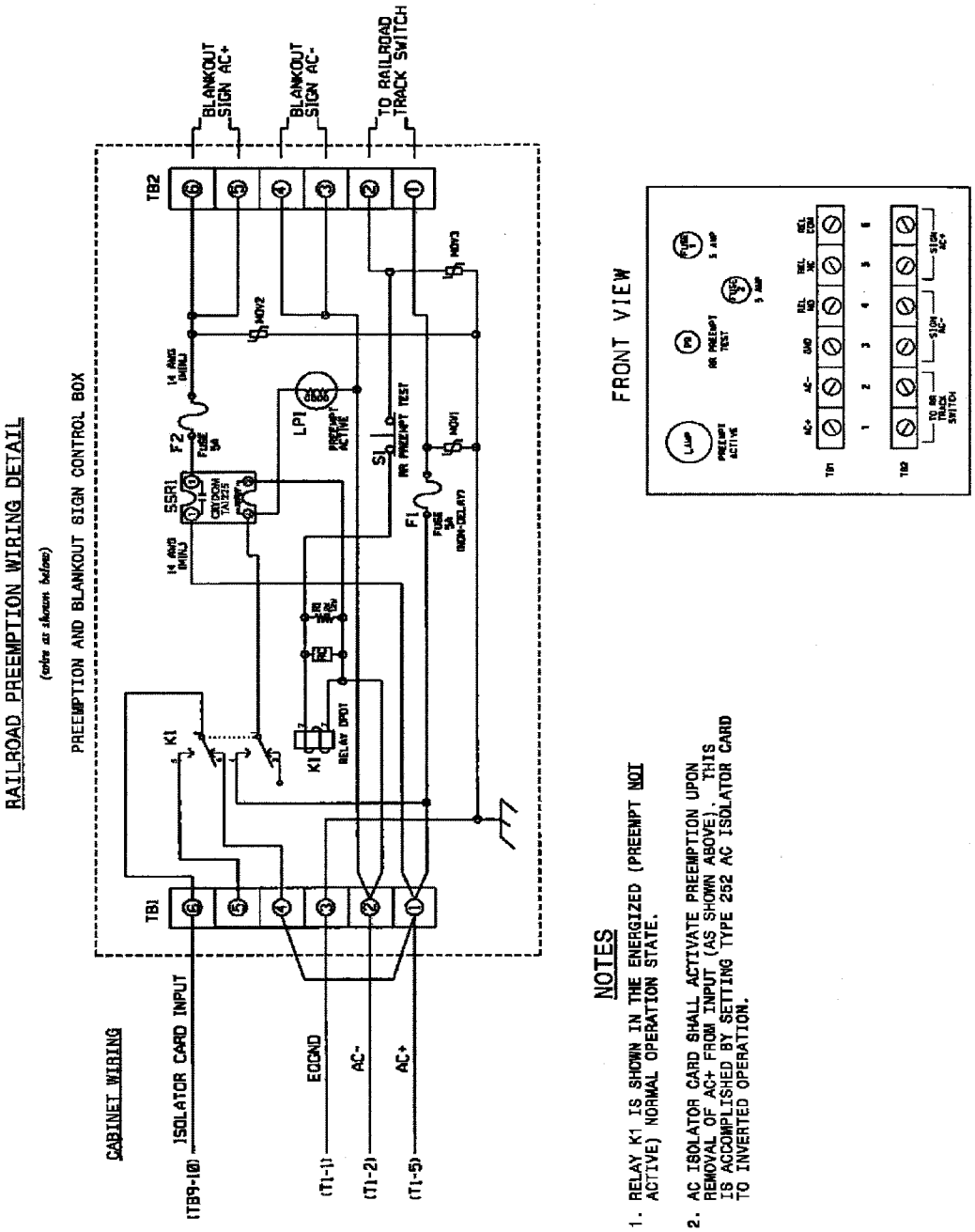
Provide 3/4-inch diameter radial lead UL-recognized metal oxide varistors (MOVs) that have electrical performance as outlined below.

PROPERTIES OF MOV SURGE PROTECTOR	
Maximum Continuous Applied Voltage at 185° F	150 VAC (RMS) 200 VDC
Maximum Peak 8x20µs Current at 185° F	6500 A
Maximum Energy Rating at 185° F	80 J
Voltage Range 1 mA DC Test at 77° F	212-268 V
Max. Clamping Voltage 8x20µs, 100A at 77° F	395 V
Typical Capacitance (1 MHz) at 77° F	1600 pF

Provide resistor R1 as a 2K ohm, 12 watt, wirewound resistor with tinned terminals and attaching leads. Ensure the resistor is spaced apart from surrounding wires.

Provide a LED or incandescent lamp that has a voltage rating of 120 VAC with a minimum life rating at 50,000 hours.

Wire the preemption and sign control box as shown in Figure 1.



NOTES

1. RELAY K1 IS SHOWN IN THE ENERGIZED (PREEMPT NOT ACTIVE) NORMAL OPERATION STATE.
2. AC ISOLATOR CARD SHALL ACTIVATE PREEMPTION UPON REMOVAL OF AC+ FROM INPUT (AS SHOWN ABOVE). THIS IS ACCOMPLISHED BY SETTING TYPE 252 AC ISOLATOR CARD TO INVERTED OPERATION.

Figure 1

4.4. MATERIALS – TYPE 170 DETECTOR SENSOR UNITS

Furnish detector sensor units that comply with Chapter 5 Section 1, "General Requirements," and Chapter 5 Section 2, "Model 222 & 224 Loop Detector Sensor Unit Requirements," of the CALTRANS "Transportation Electrical Equipment Specifications" dated March 12, 2009 with Erratum 1.

4.5. 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)
- 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.

5. WIRELESS MAGNETIC SENSOR VEHICLE DETECTION SYSTEM

5.1. DESCRIPTION

Furnish a vehicle detection system that uses battery-powered magnetic field sensors for pavement installation that communicate traffic detection data by wireless communication to a transceiver for a local traffic signal cabinet. Ensure each sensor responds to the change in the earth's local magnetic field resulting from the presence and passage of a vehicle. Ensure the system contains sensor(s), transceiver(s), and any other device(s) to provide detection data to a traffic signal controller.

5.2. MATERIALS

Furnish material, equipment, and hardware under this section that is pre-approved on the ITS and Signals QPL.

Provide magnetic sensors to detect vehicle traffic such as cars, trucks, and motorcycles. Ensure each sensor is sized for an installation into a 4-inch diameter by 3-inch deep hole. Ensure the sensor

provides vehicle traffic data for volume and occupancy. Ensure the sensor holds a detection call when a vehicle is stopped in its detection field. Provide a sensor to simulate a detection zone of a 6' x 6' inductive loop. Provide a combination of sensors to simulate a detection zone of a 6' x 40' quadrupole inductive loop and a 6' x 60' quadrupole inductive loop. Ensure the sensors operate as specified by the intersection design plans.

Provide two-way wireless communication between the sensors and the transceiver devices. Ensure no disruption to the wireless communication when the transceiver devices are located on the side of the road surface. Ensure that the sensors can communicate with the transceiver devices for a minimum distance of 100 feet. Ensure all wireless communications within the system operate in an unlicensed frequency band and avoid interference with other devices operating in the unlicensed frequency band. Provide at least 16 frequency channels that are user-configurable.

Provide each sensor to transmit its detection data within 150 ms of a detected event. Ensure the sensor samples the earth's magnetic field at a rate of 128 Hz or faster. Ensure that each sensor transmits a unique identifying code. Ensure that each sensor automatically recalibrates its threshold values in response to changes in the ambient magnetic field based on user-programmed criteria.

Furnish each sensor that is manufactured as a single housing module that conforms to NEMA Type 6P enclosure. Ensure that the components of the sensor are fully encapsulated within the housing to prevent moisture from degrading the components. Ensure the sensor operates at temperatures from -37 degrees F to 176 degrees F. Provide battery-power with an average life expectancy of 10 years when the sensor is operating under normal traffic conditions.

Provide a clear injection molded clamshell style case made of polypropylene for protecting the sensor in the roadway. Ensure case protects the sensor from sealant material. Ensure the case holds the sensor in place and is form-fitting to ensure cured sealant does not collapse when exposed to traffic loads.

Furnish the transceiver to provide detection data to the traffic signal cabinet and ensure the traffic signal controller receives each sensor detection call. Ensure the traffic signal controller receives both presence mode and pulse mode detection calls.

Provide indications inside the traffic signal cabinet to display each channel detection status and fault condition. Provide a switch inside the traffic signal cabinet to select presence mode and pulse mode for each channel. Provide user-selectable sensitivity levels for vehicle detection. Furnish equipment to operate in Type 332 and 336S traffic signal cabinets.

Provide software for installation and use on personal computers to upload and download configuration data to each sensor. Ensure application software is compatible with Windows 2000 and Windows XP operating systems. Ensure software does not require administrative permissions to load and operate. Ensure the software can retrieve and store detection data from the sensors. Ensure the software on the personal computer transmits data from the personal computer to each sensor through the transceiver by wireless communication. Also, provide any update to the firmware in each sensor by wireless communication. Provide a license to the Department to allow the duplication of the personal computer software as needed to design, install and maintain these systems.

5.3. CONSTRUCTION METHODS

Install the wireless magnetic sensor vehicle detector system in accordance with the manufacturer's recommendations. Enclose the wireless magnetic sensor in a molded clamshell style case before installation into the roadway. When installing each sensor into the hole, ensure epoxy sufficiently covers the sensor in the road surface.

Arrange and conduct site surveys with the system manufacturer's representative and Department personnel to determine proper sensor and transceiver selection and placement. Provide the Department at least 3 working days notice before conducting site surveys. The Engineer will approve final locations of sensors, transceivers and any necessary repeaters.

Install the transceiver in such a manner that avoids conflicts with other utilities and as specified in the manufacturer's recommendations. Secure the transceiver mounting hardware to the pole and route the cabling such that no strain is placed on connectors.

Before beginning work at locations that require a wireless magnetic sensor vehicle detector system, furnish system software. Upon activation of the system, provide detector configuration files.

Place system into operation. Configure wireless magnetic sensor vehicle detector system to achieve required detection in designated areas. Have a certified manufacturer's representative on site to supervise and assist with installation, set up, and testing of the system.

Install the necessary processing and communications equipment in the signal controller cabinet. Make all necessary modifications to install equipment in cabinet. Ensure the traffic signal controller receives each sensor detection call.

Place a copy of all manufacturer equipment specifications and instruction and maintenance manuals in the equipment cabinet.

Provide at least 4 hours of training on the set up, operation, troubleshooting, and maintenance of the wireless magnetic sensor vehicle detector system to a maximum of ten Department personnel. Arrange for training to be conducted by the manufacturer's representative at an approved site within the Division responsible for administration of the project. Thirty days before conducting training submit a detailed course curriculum, draft manuals and materials, and resumes. Obtain approval of the submittal before conducting the training. At least one week before beginning training, provide three sets of complete documentation necessary to maintain and operate the system. Do not perform training until installation of the wireless magnetic sensor vehicle detector system is complete.

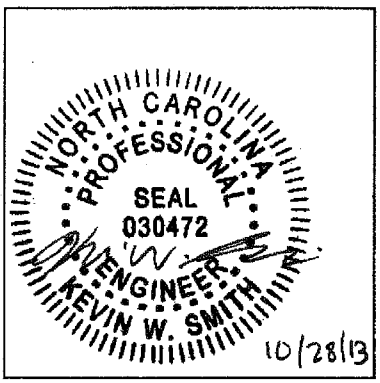
5.4. MEASUREMENT AND PAYMENT

Actual number of wireless magnetic sensor vehicle detector systems furnished, installed, and accepted.

No measurement will be made of cables or hardware, as these will be considered incidental to furnishing and installing wireless magnetic sensor vehicle detector system.

Payment will be made under:

Wireless Magnetic Sensor Vehicle Detector System.....Each



Not Valid Unless Signed

R-2633BA
INTELLIGENT TRANSPORTATION SYSTEMS CCTV AND DMS INSTALLATIONS

FINAL PROJECT SPECIAL PROVISIONS

Contents

1. GENERAL REQUIREMENTS 6
1.1. DESCRIPTION 6
A. General 6
B. Scope 6
C. Sequence of Construction 6
1.2. MATERIAL 7
A. Qualified Products 7
B. Plan of Record Documentation 7
2. UNDERGROUND CONDUIT 8
2.1. DESCRIPTION 8
2.2. MATERIAL 8
2.3. CONSTRUCTION METHODS 8
2.4. MEASUREMENT AND PAYMENT 8
3. JUNCTION BOXES 9
3.1. DESCRIPTION 9
3.2. MATERIAL 9
3.3. CONSTRUCTION METHODS 9
3.4. MEASUREMENT AND PAYMENT 9
4. WOOD POLES 10
4.1 DESCRIPTION 10
4.2 MATERIAL 10
A. General 10
B. Wood Pedestal 10
C. Wood Pole 10
D. CCTV Wood Pole 10
4.3 CONSTRUCTION METHOD 10
4.4 MEASUREMENT AND PAYMENT 10

5. RISER ASSEMBLIES 12
5.1 DESCRIPTION 12
5.2 MATERIAL 12
5.3 CONSTRUCTION METHOD 12
5.4 MEASUREMENT AND PAYMENT 12
6. ELECTRICAL SERVICE 13
6.1. DESCRIPTION 13
6.2. MATERIAL 13
A. Meter Base/Disconnect Combination Panel 13
B. Equipment Cabinet Disconnect 14
C. 3-Wire Copper Service Conductors 14
D. 4-Wire Copper Feeder Conductors 14
E. 3-Wire Copper Feeder Conductors 15
F. Grounding System 15
6.3. CONSTRUCTION METHODS 15
A. General 15
B. Meter Base/Disconnect Combination Panel 15
C. Equipment Cabinet Disconnect 15
D. 3-Wire Copper Service Conductors 16
E. 4-Wire Copper Feeder Conductors 16
F. 3-Wire Copper Feeder Conductors 16
G. Grounding System 16
6.4. MEASUREMENT AND PAYMENT 16
7. SOLAR POWER ASSEMBLY 18
7.1. DESCRIPTION 18
7.2. MATERIALS 18
A. General 18
B. Solar Power System Design Requirements 18
C. Solar Array 18
D. Solar Charger Controller 19
E. Batteries 19
F. Solar Power Assembly Cabinet 19
7.3. CONSTRUCTION METHODS 19
7.4. MEASURMENT AND PAYMENT 19
8. CCTV EQUIPMENT 20
8.1. DESCRIPTION 20
8.2. MATERIAL 20
A. General 20
B. Camera and Lens 20
C. Camera Housing 21
D. Pan and Tilt Unit 21
E. Control Receiver/Driver 21
F. CCTV Camera Attachment to Pole 22
G. Surge Suppression 22
8.3. CONSTRUCTION METHODS 22

A. General 22
B. Electrical and Mechanical Requirements 22
8.4. MEASUREMENT AND PAYMENT 23

9. CCTV FIELD EQUIPMENT CABINET 24
9.1. DESCRIPTION 24
9.2. MATERIAL 24
A. Shelf Drawer 24
B. Cabinet Light 24
C. Surge Protection for System Equipment 25
9.3. CONSTRUCTION METHODS 27
9.4. MEASUREMENT AND PAYMENT 27

10. LOCAL AREA NETWORK EQUIPMENT 28
10.1. DESCRIPTION 28
10.2. MATERIAL 28
A. General 28
B. Field Video Ethernet Encoder 28
C. Central Video Ethernet Decoder 29
D. Central Media Converter 30
10.3. CONSTRUCTION METHODS 30
A. General 30
B. Field Video Ethernet Encoder 30
C. Central Video Ethernet Decoder 30
D. Central Media Converter 30
10.4. MEASUREMENT AND PAYMENT 31

11. DYNAMIC MESSAGE SIGN (DMS) 32
11.1. DESCRIPTION 32
11.2. MATERIALS 32
A. Environmental Requirements 32
B. Full Matrix LED Dynamic Message Sign (DMS) 32
C. DMS Enclosure Structure Mounting 38
D. DMS / DMS Controller Interconnect 38
E. DMS Controller and DMS Cabinet 38
F. Photo-Electric Sensors 45
G. Equipment List 46
H. Physical Description 46
I. Parts List 46
J. Character Set Submittal 46
K. Wiring Diagrams 46
L. Routine of Operation 46
M. Maintenance Procedures 47
N. Repair Procedures 47
O. Field Trial 47
11.3. CONSTRUCTION METHODS 47
A. Description 47
B. Layout 48

C. Construction Submittal ... *48*
D. Conduit ... *48*
E. Wiring Methods ... *48*
F. Equipment and Cabinet Mounting ... *49*
G. Work Site Clean-Up ... *49*
11.4. MEASUREMENT AND PAYMENT ... 49

12. NTCIP REQUIREMENTS ... 50
12.1. REFERENCES ... 50
A. General Requirements ... *51*
B. NTCIP Acceptance Testing ... *58*
12.2. MEASUREMENT AND PAYMENT ... 59

13. DMS ASSEMBLIES ... 60
13.1. DESCRIPTION ... 60
13.2. MATERIAL ... 60
13.3. CONSTRUCTION METHODS ... 60
A. General ... *60*
B. Shop Drawing ... *61*
C. Design and Fabrication ... *61*
13.4. MEASUREMENT AND PAYMENT ... 65

14. OVERHEAD AND DYNAMIC MESSAGE SIGN FOUNDATIONS ... 66
14.1. DESCRIPTION ... 66
14.2. MATERIAL ... 66
A. Assumed Subsurface Conditions ... *66*
B. Subsurface Investigations ... *66*
C. Sign Foundation Designs ... *66*
14.3. CONSTRUCTION METHODS ... 67
14.4. MEASUREMENT AND PAYMENT ... 67

15. INTEGRATION AND CONFIGURATION ... 68
15.1. DESCRIPTION ... 68
15.2. CENTRAL INTEGRATION ... 68
15.3. CENTRAL CONFIGURATION ... 68
15.4. MEASUREMENT AND PAYMENT ... 69

16. TESTING & ACCEPTANCE ... 70
16.1. GENERAL TEST PROCEDURE ... 70
16.2. DESIGN APPROVAL TESTS ... 70
A. DMS System ... *70*
B. CCTV System ... *71*
C. Central Hardware ... *71*
16.3. COMPATIBILITY TESTS ... 71
A. DMS System ... *71*
B. CCTV System ... *71*
C. Central Hardware ... *71*
16.4. OPERATIONAL FIELD TEST (ON-SITE COMMISSIONING) ... 71
A. DMS System ... *71*

B. CCTV System *73*
C. Central Hardware *74*
16.5. 30-DAY OBSERVATION PERIOD 74
16.6. FINAL ACCEPTANCE 74
16.7. MEASUREMENT AND PAYMENT 75

1. GENERAL REQUIREMENTS

1.1. DESCRIPTION

A. General

Conform to these Project Special Provisions, Project Plans, and the *2012 Standard Specifications for Roads and Structures* (also referred to hereinafter as the "Standard Specifications"). The current edition of these specifications and publications in effect on the date of advertisement will apply.

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

B. Scope

The scope of this project includes the installation and integration of six (6) new pedestal mount dynamic message signs (DMS) and eight (8) new closed circuit television (CCTV) cameras. New electrical service will be installed at each new DMS and CCTV, except for one CCTV that will utilize solar power. The Contractor shall coordinate with the appropriate electric utility company in the area to establish service.

Note that the locations of each proposed device shown in the Plans are an approximation. Locate and mark proposed device locations in the field and receive approval from the Engineer before beginning construction.

Communications between field devices and central will be completed by others outside of this Project using Department-furnished cellular modems. Coordinate with the Engineer to establish the communications.

Install new video decoder units to integrate the new video with the existing video matrix switch at the City of Wilmington Traffic Management Center located at 265 Operations Center Drive in Wilmington.

Conduct device and system tests as described in these Project Special Provisions.

C. Sequence of Construction

The Contractor shall sequence the construction in coordination with other NCDOT roadway projects in the area as follows:

1. The Contractor shall first perform central integration and configuration such that when new CCTV and DMS installations are constructed they may immediately be available to the NCDOT Division 3 Traffic Services Office and City of Wilmington Traffic Management Center.
2. The Contractor shall next install and fully integrate the group of devices on existing roadways (including CCTV-1, CCTV-6, CCTV-7, DMS-1, DMS-2, DMS-3, and DMS-6).
3. The Contractor shall next install and fully integrate the group of devices within the project limits for R-2633BB (including CCTV-5 and DMS-5) as soon as possible based on the roadway construction progress.

4. The Contractor shall next install and fully integrate the group of devices within the project limits for R-2633BA (including CCTV-2, CCTV-3, CCTV-4, and DMS-4) as soon as possible based on the roadway construction progress.

1.2.Material

A. 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.

Furnish factory assembled cables without adapters, unless otherwise approved by the Engineer, for all cables required to interconnect any field or central equipment including but not limited to fiber optic transceivers.

Certain equipment listed in these Project Special Provisions must be pre-approved on the Department's ITS & Signals Qualified Products List (QPL) by the date of installation. Equipment, material, and hardware not pre-approved when required will not be allowed for use on the project.

The QPL is available on the Department's website. The QPL website is:

https://connect.ncdot.gov/resources/safety/Pages/ITS-and-Signals-Qualified-Products.aspx

B. Plan of Record Documentation

Comply with all requirements of Article 1098-1(F) of the Standard Specifications for providing plan of record documentation for all work performed under this Project.

2. UNDERGROUND CONDUIT

2.1. DESCRIPTION

Furnish and install conduit for underground installation with miscellaneous fittings, all necessary hardware, marker tape, backfill, graded stone, paving materials, and seeding and mulching in accordance with Section 1715 of the Standard Specifications

2.2. MATERIAL

Material, equipment, and hardware furnished under this section shall be pre-approved on the Department's QPL.

Refer to Articles 1091-3 (Conduit), 1091-4 (Duct and Conduit Sealer), 1018-2 (Backfill), and 545-2 and 545-3 (Graded Stone) of the Standard Specifications.

Furnish underground HDPE conduits as shown in the Plans. All vertical conduits (entrance to electrical service and equipment disconnect and pole mounted cabinet) must be rigid galvanized steel.

2.3. CONSTRUCTION METHODS

Install underground conduit in compliance with all requirements of Section1715-3 of the Standard Specifications.

2.4. MEASUREMENT AND PAYMENT

Unpaved Trenching (qty) (size) will be measured horizontal linear feet of trenching for underground conduit installation of each type furnished, installed, and accepted. Measurement will be along the approximate centerline of the conduit system. Payment will be in linear feet.

Directional Drill (qty) (size) will be measured horizontal linear feet of directional drill for underground conduit installation furnished, installed, and accepted. Measurement will be along the approximate centerline of the conduit system. Payment will be in linear feet.

No measurement will be made of vertical segments, non-metallic conduit, metallic conduit, conduit sealing material, backfill, graded stone, paved materials, miscellaneous fittings, non-detectable marker tape, pull lines, seeding and mulching as these will be considered incidental to conduit installation.

Payment will be made under:

Pay Item	Pay Unit
Unpaved Trenching (2) (1.5")	Linear Foot
Directional Drill (2) (1.5")	Linear Foot

3. JUNCTION BOXES

3.1. DESCRIPTION

Furnish and install junction boxes (pull boxes) with covers, graded stone, grounding systems, and all necessary hardware. Comply with Section 1716 of the Standard Specifications.

3.2. MATERIAL

Material, equipment, and hardware furnished under this section shall be pre-approved on the Department's QPL.

Refer to Article 1098-5 (Junction Boxes) and Section 545 (Graded Stone) of the Standard Specifications.

3.3. CONSTRUCTION METHODS

Install junction boxes in compliance with all requirements of Section1716-3 of the Standard Specifications.

Install standard junction boxes for electrical cables.

3.4. MEASUREMENT AND PAYMENT

Junction Boxes (_____) will be measured and paid in actual number of junction boxes of each size and type furnished, installed, and accepted.

No measurement will be made of covers, graded stone, and grounding systems as these will be considered incidental to furnishing and installing junction boxes.

Payment will be made under:

Pay Item	**Pay Unit**
Junction Boxes (Standard Size)	Each

4. WOOD POLES

4.1 DESCRIPTION

Furnish and install wood poles with grounding systems and all necessary hardware in accordance with Section 1720 of the Standard Specifications.

4.2 MATERIAL

A. General

Material, equipment, and hardware furnished under this section shall be pre-approved on the Department's QPL.

Refer to Articles 1082-3 (Treated Timber and Lumber), 1082-4 (Preservative Treatment), 1091-2 (Wire), and 1091-6 (Grounding Electrodes) of the Standard Specifications.

B. Wood Pedestal

Furnish 6" x 6" x 8' wood pedestals for electrical service equipment as shown in the Plans.

C. Wood Pole

Furnish 40' Class 4 or better wood poles for mounting electrical service equipment as shown in the Plans.

D. CCTV Wood Pole

Furnish Class 3 or better wood poles to mount CCTV cameras and cabinets that are a minimum of 50' long to permit the CCTV camera to be mounted 35 feet above the ground at the pole.

4.3 CONSTRUCTION METHOD

Install wood poles and wood posts in compliance with all requirements of Section1720-3 of the Standard Specifications.

4.4 MEASUREMENT AND PAYMENT

Wood Pedestal will be measured and paid as the actual number of 8' wood pedestals furnished, installed, and accepted.

Wood Pole will be measured and paid as the actual number of 40' wood poles furnished, installed, and accepted.

CCTV Wood Pole will be measured and paid as the actual number of 60' wood poles furnished, installed, and accepted.

No measurement will be made for installing grounding systems as these will be incidental to furnishing and installing poles.

Payment will be made under:

Pay Item	Pay Unit
Wood Pedestal	Each
Wood Pole	Each
CCTV Wood Pole	Each

5. RISER ASSEMBLIES

5.1 DESCRIPTION

Furnish and install riser assemblies with clamp-on, aluminum weatherheads or head shrink tubing, galvanized pole attachment fittings, and all necessary hardware in accordance with Section 1722 of the Standard Specifications.

5.2 MATERIAL

Material, equipment, and hardware furnished under this section shall be pre-approved on the Department's QPL. Provide rigid metallic conduit for risers. Refer to Articles 1091-3 (Rigid Metal Conduit), 1098-4 (Riser Sealing Devices), 1091-2 (Wire), 1091-6 (Grounding Electrodes), and 1098-6 (Pole Line Hardware) of the Standard Specifications.

5.3 CONSTRUCTION METHOD

Install risers with required weatherheads or heat shrink tubing on poles using pole attachment fittings. Comply with all requirements of Section 1722-3 of the Standard Specifications.

5.4 MEASUREMENT AND PAYMENT

__" *Riser with* _____ will be measured and paid as the actual number of risers of each type and size furnished, installed, and accepted. No measurement will be made of weatherheads, heat shrink tubing, or pole attachment fittings as these will be considered incidental to furnishing and installing risers.

Payment will be made under:

Pay Item	**Pay Unit**
1.5" Riser with Weatherhead	Each

6. ELECTRICAL SERVICE

6.1. DESCRIPTION

Install new electrical service equipment as shown in the Plans. The first item of work on this project is the installation of all electrical service poles and meter base/disconnect combination panels to expedite the power service connections. Comply with the National Electrical Code (NEC), the National Electrical Safety Code (NESC), the Standard Specifications, the Project Special Provisions, and all local ordinances. All work involving electrical service shall be coordinated with the appropriate utility company and the Engineer.

6.2. MATERIAL

A. Meter Base/Disconnect Combination Panel

Furnish and install new meter base/disconnect combination panels as shown in the Plans. Provide meter base/disconnect combination panels that have a minimum of eight (8) spaces in the disconnect. Furnish a double pole 50A circuit breaker at DMS-3 location. Furnish a double pole 100A circuit breaker at DMS-1/DMS-2 location. Furnish single pole 15A circuit breakers at CCTV-1A, CCTV-1B, CCTV-2, and CCTV-3 locations. Furnish double pole 70A circuit breakers at CCTV-4/DMS-4, CCTV-5/DMS-5, and CCTV-6/DMS-6 locations. Furnish each with a minimum of 10,000 RMS symmetrical amperes short circuit current rating in a lockable NEMA 3R enclosure. Ensure meter base/ disconnect combination panel is listed as meeting UL Standard UL-67 and marked as being suitable for use as service equipment. Ensure circuit breakers are listed as meeting UL-489. Fabricate enclosure from galvanized steel and electrostatically apply dry powder paint finish, light gray in color, to yield a minimum thickness of 2.4 mils. All exterior surfaces must be powder coated steel. Provide ground bus and neutral bus with a minimum of four terminals and a minimum wire capacity range of number 8 through number 1/0 AWG.

Furnish NEMA Type 3R combinational panel rated 100 Ampere minimum 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. Furnish 4 terminal, 600 volt, single phase, 3-wire meter bases that comply with the following:

- Line, Load, and Neutral Terminals accept 4/0 AWG and smaller Copper/Aluminum wire
- With or without horn bypass
- Made of galvanized steel
- Listed as meeting UL Standard US-414
- Overhead or underground service entrance specified.

Furnish 1.5" watertight hub for threaded rigid conduit with meter base.

At the main service disconnect, furnish and install UL-approved lightning arrestors that meet the following requirements:

Type of design	Silicon Oxide Varistor
Voltage	120/240 Single Phase, 3 wire
Maximum current	100,000 amps
Maximum energy	3000 joules per pole
Maximum number of surges	Unlimited
Response time one milliamp test	5 nanoseconds
Response time to clamp 10,000 amps	10 nanoseconds
Response time to clamp 50,000 amps	25 nanoseconds
Leak current at double the rated voltage	None
Ground wire	Separate

B. Equipment Cabinet Disconnect

Provide new equipment cabinet disconnects as shown in the Plans. Furnish one single pole 15A circuit breaker at CCTV-1A, CCTV-1B, CCTV-2, CCTV-3, and CCTV-6 locations. Furnish one double pole 50A circuit breaker at DMS-3, DMS-4, and DMS-5locations. Furnish two double pole 50A circuit breakers at DMS-1/DMS-2 location. Furnish one single pole 15A circuit breaker and one double pole 50A circuit breaker at CCTV-4, CCTV-5, and CCTV-6/DMS-6 locations. Furnish panels that have a minimum of eight (8) 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 8 through number 1/0 AWG.

C. 3-Wire Copper Service Conductors

Furnish 3-wire stranded copper service entrance conductors with THWN rating. Provide conductors with black, red, and white insulation that are intended for power circuits at 600 Volts or less and comply with the following:

- Listed as meeting UL Standard UL-83
- Meets ASTM B-3 and B-8 or B-787 standards.

See the Plans for wire sizes and quantities.

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 Standard 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 field equipment cabinets. Provide conductors with black or red, white, and green insulation that are intended for power circuits at 600 Volts or less and comply with the following:

- Listed as meeting UL Standard UL-83
- Meets ASTM B-3 and B-8 or B-787 standards.

See the Plans 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.

6.3. CONSTRUCTION METHODS

A. General

Coordinate with the Engineer and the utility company to de-energize the existing service temporarily prior to starting any modifications.

Permanently label cables at all access points using nylon tags labeled with permanent ink. Ensure each cable has a unique identifier. Label cables immediately upon installation. Use component name and labeling scheme approved by the Engineer.

B. Meter Base/Disconnect Combination Panel

Install meter base/disconnect combination panels with lightning arrestors and mount to wood pedestal or wood poles as called for in the Plans. At all new DMS locations, route the feeder conductors from the meter base/disconnect to the DMS equipment cabinet in conduit. At all new CCTV locations, route the feeder conductors from the meter base/disconnect to the CCTV equipment cabinet in conduit. Provide rigid galvanized conduit for above ground and PVC for below ground installations.

C. Equipment Cabinet Disconnect

Install equipment cabinet disconnects and circuit breakers as called for in the Plans. Install THWN stranded copper feeder conductors as shown in Plans between the electrical service disconnect and the equipment cabinet disconnect. Route the conductors from the equipment cabinet disconnect to the equipment cabinet in rigid galvanized steel conduit. Bond the equipment cabinet disconnect in accordance with the NEC. Ensure that the grounding system complies with the grounding requirements of these Project Special Provisions, the Standard Specifications and the Plans.

D. 3-Wire Copper Service Conductors

At locations shown in the Plans, furnish and install 3-wire THWN stranded copper service entrance conductors in 1.25 inch rigid galvanized risers as shown in the plans. Install a waterproof hub on top of the electrical service disconnect for riser entrance/exit. Size the conductors as specified in the Plans. Comply with the Standard Specifications and Standard Drawings and all applicable electrical codes.

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 120 VAC to the CCTV 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

Install ground rods as indicated in the Plans. Connect the #4 AWG grounding conductor to ground rods using an exothermic welding process. Test the system to ensure a ground resistance of 20-ohms or less is achieved. Drive additional ground rods as necessary or as directed by the Engineer to achieve the proper ground resistance.

6.4. MEASUREMENT AND PAYMENT

Meter base/disconnect combination panel will be measured and paid as the actual number of complete and functional meter base/disconnect combination panel service locations furnished, installed and accepted. Breakers, lightning arrestors, exposed vertical conduit runs to the cabinet, and any remaining hardware, fittings, and conduit bodies to connect the electrical service to the cabinet will be considered incidental to meter base/disconnect combination panels. All other required feeder conductors will be paid for separately.

Equipment cabinet disconnect will be measured and paid as the actual number of complete and functional equipment cabinet disconnects furnished, installed and accepted. Breakers, exposed vertical conduit runs to the cabinet, ground rods, ground wire and any remaining hardware and conduit to connect the equipment cabinet disconnect to the cabinet will be considered incidental to the equipment cabinet disconnect.

3-Wire copper service conductors will be measured and paid as the actual linear feet of 3-wire THWN stranded copper service entrance conductors furnished, installed and accepted. Payment is for all three conductors. Measurement will be for the actual linear footage of combined conductors after all terminations are complete. No separate payment will be made for each individual conductor. No payment will be made for excess wire coiled at the top of the riser.

4-Wire copper feeder conductors will be measured and paid as the actual linear feet of 4-wire THWN stranded copper feeder conductors furnished, installed and accepted. Payment is for all four conductors. Measurement will be for the actual linear footage of combined conductors after all

terminations are complete. No separate payment will be made for each individual conductor. No separate payment will be made for different wire sizes. No payment will be made for excess wire in the cabinets.

3-Wire copper feeder conductors will be measured and paid as the actual linear feet of 3-wire THWN stranded copper feeder conductors furnished, installed and accepted. Payment is for all three conductors. Measurement will be for the actual linear footage of combined conductors after all terminations are complete. No separate payment will be made for each individual conductor. No separate payment will be made for different wire sizes. No payment will be made for excess wire in the cabinets.

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. No separate payment will be made for exothermic welding kit as they will be considered incidental to the installation of the ground rod.

#4 solid bare grounding conductor will be measured and paid as the actual linear feet of #4 AWG solid bare copper grounding conductor furnished, installed and accepted. Measurement will be along the approximate centerline from the base of the electrical service disconnect to the last grounding electrode.

Payment will be made under:

Pay Item	**Pay Unit**
Meter Base/Disconnect Combination Panel	Each
Equipment Cabinet Disconnect	Each
3-Wire Copper Service Entrance Conductors	Linear Foot
4-Wire Copper Feeder Conductors	Linear Foot
3-Wire Copper Feeder Conductors	Linear Foot
5/8" X 10' Grounding Electrode	Each
#4 Solid Bare Grounding Conductor	Linear Foot

7. SOLAR POWER ASSEMBLY

7.1. DESCRIPTION

Furnish and install new solar power assembly equipment in a NEMA Type 3R enclosure 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.

Furnish material and workmanship conforming to the National Electrical Code (NEC), the National Electrical Safety Code (NESC), Underwriter's Laboratories (UL) or a third-party listing agency accredited by the North Carolina Department of Insurance, and all local safety codes in effect on the date of advertisement. Comply with all regulations and codes imposed by the owner of affected utility poles.

7.2.MATERIALS

A. General

Furnish a Solar Power Assembly consisting of the following:

- Solar Array
- Solar Charge Controller
- Battery(ies)
- Solar Power Assembly Cabinet
- Concrete Cabinet Pad

Ensure that DC disconnects are supplied between the Solar Array and the Solar Charge Controller, and between the Solar Charge Controller and the Battery(ies), and between the Battery(ies) and any other equipment.

B. Solar Power System Design Requirements

Provide to the Engineer for Approval, a submittal package with Engineering Calculations consisting of, as a minimum, schematic drawing, technical data sheets, and supporting documentation. Ensure the documentation demonstrates, in theory, that the battery(ies) will provide for continuous operation for a minimum of ten (10) consecutive days with no additional charging under the following conditions:

- Fully powering the CCTV camera operating 24 hours a day with 50% of that time being in a standby (sleep) mode; and 50% of the time being in operational mode.

Provide drawings showing dimension, location of required equipment, cabinet electrical diagrams, part numbers and descriptions of required equipment and accessories to the Engineer.

C. Solar Array

Furnish solar modules made in North America and have a minimum 20 year factory warranty. The solar array should have a minimum peak output of 100 Watts. 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. Ensure the solar array mount is manufactured from an aluminum alloy or stainless steel and is capable of withstanding 140 mph winds.

D. Solar Charger Controller

Furnish solar charge controllers that are UL listed, a minimum 45A, low voltage disconnects. The solar charge controller must be sealed with internal temperature compensation, lightning protection, reverse polarity protection, and LED indicators. Furnish controllers with the capability of 3 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 controller is listed as a FMS Class I, Div. II, Groups ABCD device and has the CE mark.

E. Batteries

Provide a 12V gel electrolyte, non-spillable, maintenance free battery. The battery(ies) should be able to provide power for 10 days without being charged by the Solar Array. Furnish battery(ies) with a minimum operating temperature of -76° F to 140°F.

F. 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 concrete pad.

7.3.CONSTRUCTION METHODS

Furnish and install new solar power assemblies. Install solar power equipment as shown in the Plans. Provide wiring, disconnect, 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.

7.4. MEASURMENT AND PAYMENT

Actual number of Solar Power Assemblies furnished, installed and accepted.

No measurement will be made for solar arrays, solar power assembly equipment cabinet, install 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

8. CCTV EQUIPMENT

8.1. DESCRIPTION

Furnish and install CCTV equipment described in these Project Special Provisions. Furnish equipment that is compatible, interoperable, and completely interchangeable with existing Pelco Spectra IV high performance dome equipment currently in use by NCDOT and the City of Wilmington in this Region. Ensure that the equipment is fully compatible with all features of the existing *VideoPro* video management software currently in use by the City of Wilmington and the NCDOT Division 3 Traffic Services Office.

8.2. MATERIAL

A. General

Furnish and install new CCTV camera assemblies at the locations shown on the Plans. Each assembly consists of the following:

- One Dome CCTV camera that contains in a single enclosed unit the following functionality and accessories:
  1. CCTV color digital signal processing camera unit with zoom lens, filter, control circuit, and accessories
  2. Motorized pan, tilt, and zoom
  3. Pole-mount camera attachment assembly
  4. All necessary cable, connectors and incidental hardware to make a complete and operable system
- A lightning arrestor installed in-line between the CCTV camera and the equipment cabinet components.
- A NEMA Type 4 enclosure constructed of aluminum with a clear acrylic dome or approved equal Camera Unit housing.

B. Camera and Lens

1. Cameras

Furnish new charged-coupled device (CCD) color cameras. Furnish 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
- Automatic Gain Control (AGC): 0-20 dB, peak-average adjustable
- Automatic focus: Automatic with manual override
- White balance: Automatic through the lens with manual override
- Electronic-Shutter: dip-switch selectable electronic shutter with speed range from 1/60 of a second (off) to 1/30,000th of a second
- Overexposure protection: The camera must have built-in circuitry or a protection device to prevent any damage to the camera when pointed at strong light sources, including the sun
- Sensitivity: 1.5 lux at 90% scene reflectance
- Signal to noise ratio: Greater than 48-dB
- Video output Connection: 1-volt peak to peak, 75 ohms terminated, BNC connector

- Power: 24 VAC or less

2. Zoom Lens

Furnish each camera with a motorized zoom lens that is high performance integrated dome system or approved equivalent with automatic iris control with manual override and neutral density spot filter. Furnish lenses that meet the following optical specifications:

- Focal length: 0.16" – 3.45", 35X optical zoom, and 12X electronic zoom
- Preset positioning: 64 Presets

The lens must be capable of both automatic and remote manual control iris and focus override operation. The lens must be equipped for remote control of zoom and focus, including automatic movement to any of the preset zoom and focus positions. Mechanical or electrical means must be provided to protect the motors from overrunning in extreme positions. The operating voltages of the lens must be compatible with the outputs of the camera control.

C. Camera Housing

Furnish new dome style enclosure for the CCTV assemblies. Equip each housing with mounting assembly for attachment to the CCTV camera pole. The enclosures must be equipped with a sunshield and be fabricated from corrosion resistant aluminum and finished in a neutral color of weather resistant enamel. The enclosure must meet or exceed NEMA 4X ratings. The viewing area of the enclosure must be tempered glass.

D. Pan and Tilt Unit

Equip each new dome style assembly with a pan and tilt unit. The pan and tilt unit must be integral to the high performance integrated dome system. The pan and tilt unit must be rated for outdoor operation, provide dynamic braking for instantaneous stopping, prevent drift, and have minimum backlash. The pan and tilt units must meet or exceed the following specifications:

- Pan: continuous 360 Degrees
- Tilt: up/down 180 degrees minimum
- Input voltage: 24 VAC 50/60Hz
- Motors: Two-phase induction type, continuous duty, instantaneous reversing
- Preset Positioning: 64 PTZ presets per camera

E. Control Receiver/Driver

Provide each new camera unit with a control receiver/driver that is integral to the CCTV dome assembly. The control receiver/driver will receive serial asynchronous data initiated from a camera control unit, decode the command data, perform error checking, and drive the pan/tilt unit, camera controls, and motorized lens. As a minimum, the control receiver/drivers must provide the following functions:

- Zoom in/out
- Automatic focus with manual override
- Tilt up/down
- Automatic iris with manual override
- Pan right/left
- Minimum 64 preset positions for pan, tilt, and zoom

In addition, each control receiver/driver must accept status information from the pan/tilt unit and motorized lens for preset positioning of those components. The control receiver/driver will relay pan, tilt, zoom, and focus positions from the field to the remote camera control unit. The control receiver/driver must accept "goto" preset commands from the camera control unit, decode the command data, perform error checking, and drive the pan/tilt and motorized zoom lens to the correct preset position. The preset commands from the camera control unit will consist of unique values for the desired pan, tilt, zoom, and focus positions.

F. CCTV Camera Attachment to Pole

At locations shown in the Plans where new CCTV cameras are to be installed on new CCTV poles, furnish an attachment assembly for the CCTV camera unit. Use stainless steel banding approved by the Engineer. Submit shop drawings for review and approval by the Engineer prior to installation.

Furnish CCTV attachments that allow for the removal and replacement of the CCTV enclosure as well as providing a weatherproof, weather tight, seal that does not allow moisture to enter the enclosure.

Furnish a CCTV Camera Attachment Assembly that is able to withstand wind loading at the maximum wind speed and gust factor called for in these Special Provisions and can support a minimum camera unit dead load of 45 pounds (20.4 kg).

G. Surge Suppression

Protect all equipment at the top of the pole grounded metal oxide varistors connecting each power conductor to ground.

Protect coaxial cable from each camera by a surge protector at each end of the cable.

8.3. CONSTRUCTION METHODS

A. General

Mount CCTV camera units at a height of 35 feet above ground level.

Mount the CCTV camera units such that a minimum 5 feet of clearance is maintained between the camera and the top of the pole.

Obtain approval of the camera locations and orientation from the Engineer prior to installing the CCTV camera assemblies.

Mount CCTV cameras on the side of poles nearest intended field of view. Avoid occluding the view with the pole.

B. Electrical and Mechanical Requirements

Ground all equipment as called for in the Standard Specifications, these Special Provisions, and the Plans.

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.

8.4. MEASUREMENT AND PAYMENT

CCTV camera assembly will be measured and paid as the actual number of CCTV assemblies furnished, installed, integrated, and accepted. No separate measurement will be made for cabling, connectors, CCTV camera attachment assemblies, conduit, condulets, grounding equipment, surge protectors, CCTV control software, or any other equipment or labor required to install the CCTV assembly.

No separate payment will be made for coaxial cable. Coaxial cable, furnished and installed in the quantities required, will be incidental to the "CCTV Camera Assembly" pay item.

Payment will be made under:

Pay Item	Pay Unit
CCTV Camera Assembly	Each

9. CCTV FIELD EQUIPMENT CABINET

9.1. DESCRIPTION

Furnish 336S pole mounted cabinets to house CCTV control and transmission equipment. The cabinets must consist of a cabinet housing, 19-inch EIA mounting cage, and power distribution assembly (PDA #3 as described in the CALTRANS TSCES).

The cabinet housing must conform to sections 6.2.2 (Housing Construction), 6.2.3 (Door Latches and Locks), 6.2.4 (Housing Ventilation), and 6.2.5 (Hinges and Door Catches) of the CALTRANS TSCES. Do not equip the cabinet housings with a police panel.

The cabinet cage must conform to section 6.3 of the CALTRANS TSCES.

Terminal blocks on the PDA #3 Assembly have internal wiring for the Model 200 switch pack sockets. Do not use terminal blocks on PDA #3 as power terminals for cabinet devices. Do not furnish cabinet with "Input Panels" described in section 6.4.7.1 of the TSCES. Do furnish cabinet with "Service Panels" as described in section 6.4.7.1 of the TSCES and as depicted on drawing TSCES-9 in the TSCES. Use service panel #2.

Furnish terminal blocks for power for cabinet CCTV and communications devices as needed to accommodate the number of devices in the cabinet.

Do not furnish cabinets with C1, C5, or C6 harness, input file, output file, monitor units, model 208 unit, model 430 unit, or switch packs.

Furnish all conduits, shelving, mounting adapters, and other equipment as necessary to route cabling, mount equipment, and terminate conduit in equipment cabinet.

9.2. MATERIAL

A. Shelf Drawer

Provide a pull out, hinged-top drawer, having sliding tracks, with lockout and quick disconnect feature, such as a Vent-Rak Retractable Writing Shelf, #D-4090-13 or equivalent in the equipment cabinet. Furnish a pullout drawer that extends a minimum of 14 inches that is capable of being lifted to gain access to the interior of the drawer. Minimum interior dimensions of the drawer are to be 1 inch high, 13 inches deep, and 16 inches wide. Provide drawers capable of supporting a 40-pound device or component when fully extended.

B. Cabinet Light

Each cabinet must include two (2) fluorescent lighting fixtures (one front, one back) mounted horizontally inside the top portion of the cabinet. The fixtures must include a cool white lamp, and must be operated by normal power factor UL-listed ballast. A door-actuated switch must be installed to turn on the applicable cabinet light when the front door or back door is opened. The lights must be mounted not to interfere with the upper door stay.

C. Surge Protection for System Equipment

Each cabinet must be provided with devices to protect the CCTV and communications equipment from electrical surges and over voltages as described below.

1. Main AC Power Input

Each cabinet must be provided with a hybrid-type, power line surge protection device mounted inside the power distribution assembly. The protector must be installed between the applied line voltage and earth ground. The surge protector must be capable of reducing the effect of lighting transient voltages applied to the AC line. The protector must be mounted inside the Power Distribution Assembly housing facing the rear of the cabinet. The protector must include the following features and functions:

- Maximum AC line voltage: 140 VAC.
- Twenty pulses of peak current, each of which must rise in 8 microseconds and fall in 20 microseconds to ½ the peak: 20000 Amperes.
- The protector must be provided with the following terminals:
  - Main Line (AC Line first stage terminal).
  - Main Neutral (AC Neutral input terminal).
  - Equipment Line Out (AC line second state output terminal, 19 amps).
  - Equipment Neutral Out (Neutral terminal to protected equipment).
  - GND (Earth connection).
- The Main AC line in and the Equipment Line out terminals must be separated by a 200 Microhenry (minimum) inductor rated to handle 10 AMP AC Service.
- The first stage clamp must be between Main Line and Ground terminals.
- The second stage clamp must be between Equipment Line Out and Equipment Neutral.
- The protector for the first and second stage clamp must have an MOV or similar solid state device rated at 20 KA and must be of a completely solid state design (i.e., no gas discharge tubes allowed).
- The Main Neutral and Equipment Neutral Out must be connected together internally and must have an MOV similar solid state device or gas discharge tube rated at 20 KA between Main Neutral and Ground terminals.
- Peak Clamp Voltage: 350 volts at 20 KA. (Voltage measured between Equipment Line Out and Equipment Neutral Out terminals. Current applied between Main Line and Ground Terminals with Ground and Main Neutral terminals externally tied together).
- Voltage must never exceed 350 volts.
- The Protector must be epoxy-encapsulated in a flame-retardant material.
- Continuous service current: 10 Amps at 120 VAC RMS.
- The Equipment Line Out must provide power to cabinet CCTV and communications equipment and to the 24V power supply.

2. Ground Bus

Provide a neutral bus that is not connected to the earth ground or the logic ground anywhere within the cabinet. Ensure that the earth ground bus and the neutral ground bus each have ten compression type terminals, each of which can accommodate wires ranging from number 14 through number 4 AWG.

3. Uninterruptible Power Supply (UPS)

Furnish and install one rack mounted UPS in each new cabinet that meet the following minimum specifications:

Output	
Output Power Capacity	480 Watts / 750 VA
Max Configurable Power	480 Watts / 750 VA
Nominal Output Voltage	120V
Output Voltage Distortion	Less than 5% at full load
Output Frequency (sync to mains)	57 - 63 Hz for 60 Hz nominal
Crest Factor	up to 5:1
Waveform Type	Sine wave
Output Connections	(4) NEMA 5-15R
Input	
Nominal Input Voltage	120V
Input Frequency	50/60 Hz +/- 3 Hz (auto sensing)
Input Connections	NEMA 5-15P
Cord Length	6 feet
Input voltage range for main operations	82 - 144V
Input voltage adjustable range for mains operation	75 -154 V
Battery Type	
Maintenance-free sealed Lead-Acid battery with suspended electrolyte, leak-proof.	
Typical recharge time	2 hours
Communications & Management	
Interface Port(s)	DB-9 RS-232, USB
Control panel	LED status display with load and battery bar-graphs
Surge Protection and Filtering	
Surge energy rating	480 Joules
Environmental	
Operating Environment	32 - 104 °F
Operating Relative Humidity	0 - 95%
Storage Temperature	5 - 113 °F
Storage Relative Humidity	0 - 95%
Conformance	
Regulatory Approvals	FCC Part 15 Class A,UL 1778

9.3.CONSTRUCTION METHODS

For each field equipment cabinet installation, use stainless steel banding or other method approved by the Engineer to fasten cabinet to pole. Install field equipment cabinets so that the height to the middle of the enclosure is 4 feet from ground level. No risers shall enter the top or sides of the equipment cabinet.

Install all conduits, condulets, and attachments to equipment cabinets in a manner that preserves the minimum bending radius of cables and creates water proof connections and seals.

Install a UPS in each cabinet and power all CCTV cameras from the UPS.

9.4. MEASUREMENT AND PAYMENT

Field equipment cabinet will be measured and paid as the actual number of CCTV equipment cabinets furnished, installed and accepted.

No payment will be made for the UPS, cabling, connectors, cabinet attachment assemblies, conduit, condulets, risers, grounding equipment, surge protectors, or any other equipment or labor required to install the field equipment cabinet and integrate the cabinets with the CCTV equipment.

Payment will be made under:

Pay Item	**Pay Unit**
Field Equipment Cabinet	Each

10. LOCAL AREA NETWORK EQUIPMENT

10.1. DESCRIPTION

Furnish, install, and fully integrate new local area network (LAN) equipment as called for in the Plans.

10.2. MATERIAL

A. General

Furnish equipment for the LAN that complies with IEEE standard 802. Furnish Ethernet Switches that comply with the following electrical safety requirements: UL60950 or CSA C22.2 No. 60950 (safety requirements for IT equipment) and FCC Part15 Class A for EMI emissions.

B. Field Video Ethernet Encoder

Furnish a field-hardened video Ethernet encoder designed for unheated/uncooled "outdoor" applications such as roadside control cabinets. The video encoder shall be installed in equipment cabinet and shall allow for the encoding and transmission of analog NTSC video signals from new CCTV units that will be provided under this Project.

Furnish a shelf-mountable, field-hardened video encoder to convert analog NTSC video signals into two digital video streams that can be transported over Ethernet. The video encoder shall allow for the simultaneous encoding and transmission of the two digital video streams - one in MPEG-2 or MPEG-4 format (high-resolution) and one in MPEG-4 format (low-resolution). High resolution streams shall allow video bit rates from 1 to 4 Mbps and the low resolution stream shall allow video bit rates from 64 kbps to 2 Mbps. The Contractor shall configure these formats for 2 Mbps and 384kbps, respectively. The video encoder shall also transmit pan-tilt-zoom control data from all CCTV control points to the CCTV camera via a serial connection to the CCTV camera resident on the video encoder.

The video encoder shall support the following digital transport standards at a minimum: RTP/IP, UDP/IP, TCP/IP, and unicast/multicast IP. The Contractor shall use UDP/IP for video transport and TCP/IP for camera control transport unless otherwise approved by the Engineer.

The video shall support resolutions of CIF (352 (H) x 240 (V)), 1/2 D1 (352 (H) x 480 (V)), and D1 (720 (H) x 480 (V)) at a minimum. The video encoder units shall provide a display showing diagnostic data such as data rate, quality level, frame rate, and video status on the front panel. All supporting user interface software shall be provided with each encoder unit.

The video encoder shall be equipped with at least one NTSC video input, two RS-232/422 serial ports and one 10/100BaseTX Ethernet port. The 10/100BaseTX port shall support half-duplex or full-duplex and provide auto negotiation, and shall be configured for full-duplex.

The video encoder shall be remotely manageable using standard network applications such as telnet, SNMP monitors, and/or web interface administration. The video encoder shall be equipped with LED or other approved indicators for the following functions:

- Power
- Link
- Activity

1. Electrical Requirements

The video encoder shall operate from 115 VAC (+/-10%) power at 60 Hz. The Contractor shall furnish any external step down transformers, power converters, and/or regulation equipment needed to operate the video encoder.

2. Physical and Environmental Requirements

The video encoder enclosure shall be constructed of high-strength galvanized steel. For Contractor-supplied cameras, the video encoder shall be installed in equipment cabinets and secured to the cabinet in a manner that is approved by the Engineer. The video encoder enclosure, including adapters/connectors, shall fit neatly within the confines of the equipment cabinet. All necessary mounting hardware shall be provided by the Contractor.

The video encoder shall meet or exceed NEMA TS-2 requirements for shock, temperature, humidity, and vibration. The video encoder shall operate at ambient temperatures from -40° to 185° F (-40° to 85° C) and ambient relative humidity from 0% to 90% (non-condensing). No cooling airflow shall be required.

3. Communication Interface Requirements

The video encoder shall comply with the 10/100BaseTX standard and have at least one standard RJ-45 interface. The 10/100BaseTX port shall operate as half-duplex or full-duplex and provide auto negotiation.

The video encoder shall have at least one video input that supports composite NTSC format compatible with the CCTV video interface cables. Interconnection with the NTSC video input shall be made with a surge protector that provides an external electrical ground bonding capability and does not require an electrical receptacle. The CCTV coaxial surge protector shall provide a clamping voltage no greater than 30 volts.

The video encoder shall have at least two serial ports – one for pan-tilt-zoom camera control and the other for local maintenance or data transport. The two serial ports shall support RS-232 and RS-422 data transmission and shall be transparent to the central system using TCP/IP network access methods. Interconnection with camera control receivers with or without adapters or converters (i.e. RS-422/232 for compatibility with CCTVs) shall provide opto-isolated surge suppression. The optical isolation shall provide an isolation of no greater than 2000 VAC for data signals and ground.

4. Cables and Connectors

The Contractor shall furnish and install all cables and connectors necessary for video encoder installation. This shall include at a minimum CAT 5E cables with RJ-45 connectors to connect the Video Encoder to the Field Ethernet Switch in the equipment cabinet or traffic controller cabinet and standard serial data cables to connect the Video Encoder to the CCTV camera for pan-tilt-zoom functions and local configuration administration.

C. Central Video Ethernet Decoder

Furnish central video Ethernet decoder units to decode the transmission from the field video encoder units to analog NTSC video and serial data. Furnish central video decoder units from the same manufacturer as the field video encoder units installed under this project. Furnish central video decoder units that are card-based and chassis installed.

D. Central Media Converter

Furnish central media converters that serve as a wiring concentrator to provide connectivity of existing central DMS server with serial, EIA-232, compliant ports to the LAN, as shown on the Plans.

The central media converters shall have the following features:

- A minimum 10 Base-T port for connectivity to the core Ethernet switch.
- EIA-232 serial port, which shall support data rates up to 115.2 kbps.
- Multi-protocol support of LAT, Novell, IPX, Telnet 3270, and TCP/IP
- TCP/IP support of RLOGIN, Dynamic SLIP, PPP, BOOTP, TFTP and SNMP.
- Minimum 2 MB RAM.
- Standard 19" Equipment Rack-mountable.
- Contain all software and drivers required to support access of serial ports from servers and client workstations.

10.3. CONSTRUCTION METHODS

A. General

Furnish media access control (MAC) addresses for all equipment utilized as part of this project. Affix MAC Address label to each device utilized. Furnish IP addresses for all equipment utilized as part of this project. Affix final IP address each device utilized. Use labels that do not smear or fade.

Fully integrate LAN to accomplish local device failover and fault tolerance.

Fully integrate LAN equipment to provide virus protection, user authentication, and security functions to prevent unauthorized users and data from entering the LAN.

B. Field Video Ethernet Encoder

At locations where the field video encoder unit is called for installation into new equipment cabinet, integrate field video encoder with Department-furnish cellular modem, CCTV assembly, CCTV test panel, power distribution assembly, and surge protection. Ground and provide electrical transient protection to the video encoder in accord with these Project Special Provisions and the video encoder manufactures requirements.

C. Central Video Ethernet Decoder

Install the central video decoder units in the existing rack cabinet at the City of Wilmington Traffic Management Center as shown in the Plans. Integrate the video decoder units with the rack cabinet power supply and UPS. Integrate the decoders with the existing network Ethernet switch. Integrate the video decoder video outputs with the existing master distribution amplifiers and inputs on the existing video matrix switch.

D. Central Media Converter

Install six (6) central media converters in the existing rack cabinet at the NCDOT Division 3 Traffic Services Office. Integrate with the existing network Ethernet switch and existing DMS server to facilitate communications with the field DMS units.

10.4. MEASUREMENT AND PAYMENT

Video Ethernet (Encoder/Decoder) will be measured and paid for as the actual number of units, furnished, installed, integrated, and accepted. All cabling and patch cables, integration, and configuration required to install the video encoder and decoder units shall be incidental and not be paid for separately.

Central Media Converter will be measured and paid for as the actual number of units furnished, installed, integrated, and accepted. All cabling and patch cables, integration, and configuration required to install the media converter shall be incidental and not be paid for separately.

Payment for all LAN integration, architecture development, cabling, jumpers, adapters, sockets, LAN patch panels, and other hardware shall be considered incidental and no separate payment will be made.

Payment will be made under:

Pay Item	**Pay Unit**
Video Ethernet Encoder	Each
Video Ethernet Decoder	Each
Central Media Converter	Each

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 V4 software (also referred to hereinafter as the "Control Software").

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:

- Walk-In Enclosure DMS
    - Full Matrix, 27 pixel high and 90 pixels wide LED Walk-In DMS
    - Pedestal type DMS support structures and 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.

1. DMS Enclosure

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 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° 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° F, and to automatically restart the LED display whenever the temperature falls below +130° 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 2 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° F and to turn the cooling system off whenever LED board temperature falls below +85° 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° F and to deactivate the system whenever LED board temperature falls to +85° 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° F and to deactivate the defog/defrost system whenever LED board temperature exceeds +106° 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.

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 is 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: 3.9X10-5 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.

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 installed 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. No substitutions will be allowed. Provide T1 ¾, 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.

6. LED Power Supplies

Power the LED Display by means of multiple regulated switching DC power supplies that operate from 120 volts AC input power and have an output of 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 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 supporting structures. Design the DMS enclosure supports and structure 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, structure, mounting description and calculations to the Engineer for approval. Have such calculations and drawings approved by a Professional Engineer registered in the state of North Carolina, and bear his signature, seal, and date of acceptance.

Provide removable lifting eyes or the equivalent on the DMS enclosure rated for its total weight to facilitate handling and mounting the DMS enclosure.

Design the DMS structure to conform to the applicable requirements of 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.

E. DMS Controller and DMS Cabinet

Furnish and install one DMS controller with accessories per DMS in a protective cabinet. Mount the controller cabinet on the 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 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.

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).

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 Hz $\pm$ 3 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 ± 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
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. 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.

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.

F. Photo-Electric 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.

G. 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.

H. 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.

I. 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.

J. 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.

K. 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 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.

L. 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.

M. 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.

N. Repair Procedures

Include in this section all data and step-by-step procedures necessary to isolate and repair failures or malfunctions, assuming the maintenance technicians are capable of analytical reasoning using the information provided in the section titled "Wiring Diagrams and Theory of Operation."

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.

O. 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. 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. 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.

C. 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.

D. Conduit

Install the conduit system in accordance with section 1715 of Standard Specification and NEC requirements for an approved watertight raceway.

Make bends in the conduit so as not to damage it or change its internal diameter. Install watertight and continuous conduit with as few couplings as standard lengths permit.

Clean conduit before, during, and after installation. Install conduit in such a manner that temperature changes will not cause elongation or contraction that might damage the system.

Attach the conduit system to and install along the structural components of the 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 6 feet for conduit smaller than 1.25 inches. Place fasteners no more than 3 feet from the center of bends, fittings, boxes, switches, and devices.

Flexible conduit will only be allowed when the conduits transition from the horizontal structure segment to the horizontal truss segment and from the horizontal truss segment to the rear entrance of the DMS when installing the DMS communications and feeder cables. The maximum length of flexible conduit allowed at each transition will be 5 feet.

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.

E. 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.

F. 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.

Install a ground bushing attached inside the cabinet on all metal conduits entering the cabinet. Connect these ground bushings to the cabinet ground bus.

G. 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.

11.4. 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, spare display modules, 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 furnish and install the DMS system.

Payment will be made under:

Pay Item	Pay Unit
DMS	Each

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 specifications.

Table 1: NTCIP Standards

Abbreviated Number	Full Number	Title
NTCIP 1101	**NTCIP 1101:1997**	*Simple Transportation Management Framework*
NTCIP 1201	**NTCIP 1201:1997**	*Global Object Definitions*
NTCIP 1203	**NTCIP 1203:1997**	*Object Definitions for Dynamic Message Signs*
NTCIP 2001	**NTCIP 2001:1997**	*Class B Profile*
NTCIP 2101	**NTCIP 2101**	*SP-PMPP/232* *Subnet Profile for PMPP over RS-232*
NTCIP 2102	**NTCIP 2102**	*SP-PMPP/FSK* *Subnet Profile for PMPP over FSK Modem*
NTCIP 2103	**NTCIP 2103**	*SP-PPP/232* *Subnetwork Profile for PPP over RS232 (Dial Up)*
NTCIP 2104	**NTCIP 2104**	*SP-Ethernet* *Subnet Profile for Ethernet*

Abbreviated Number	Full Number	Title
NTCIP 2201	**NTCIP 2201**	*TP-Null* *Transport Profile*
NTCIP 2202	**NTCIP 2202**	*TP-Internet* *Internet Transport Profile (TCP/IP and UDP/IP)*
NTCIP 2301	**NTCIP 2301**	AP-STMF AP for Simple Transportation Management Framework

A. General Requirements

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.

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.

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.

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 2.6.1.1.1.4	At least 20 when no messages are stored.

Object	Reference	Project Requirement
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
fl (and /fl)	flashing text on a line by line basis with flash rates controllable in 0.5 second increments.
fo	Font

Code	Feature
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.

Test Heading

a. Time Management

As defined in NTCIP 1201

b. Timebase Event Schedule

As defined in NTCIP 1201. The following list indicates the modified object requirements for this conformance group.

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

c. 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

d. PMPP

e. Font Configuration

As defined in NTCIP 1203. The following list indicates the modified object requirements for this conformance group.

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 [# & * +< >]

f. DMS Configuration

As defined in NTCIP 1203.

g. MULTI Configuration

As defined in NTCIP 1203. The following list indicates the modified object requirements for this conformance group.

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

h. Default Message Control as defined in NTCIP 1203

i. Pixel Service Control as defined in NTCIP 1203

j. **MULTI Error Control** as defined in NTCIP 1203

k. **Illumination/Brightness Control**

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

l. **Auxiliary I/O**

m. **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

n. **Sign Status** as defined in NTCIP 1203

o. **Status Error** as defined in NTCIP 1203

p. **Pixel Error Status** as defined in NTCIP 1203

q. **Fan Error Status** as defined in NTCIP 1203

r. **Power Status as** defined in NTCIP 1203

s. **Temperature Status** as defined in NTCIP 1203

Install necessary hardware for the support of items q, r, and s above.

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.

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 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 ASSEMBLIES

13.1. DESCRIPTION

This section includes all design, fabrication, furnishing, and erection of the DMS assemblies, platforms, walkways, and ladders for access to the DMS inspection doors 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 DMS assemblies as shown in the Plans. Furnish one pedestal type, back-to-back DMS assembly as shown in the Plans.

Provide pedestal DMS structures with a minimum of 25 feet clearance from the high point of the road to the bottom of the DMS enclosure.

Furnish the back-to-back, pedestal type DMS structure at the DMS-1/DMS-2 location with one ladder, safety cage, and maintenance platform to service both DMS.

Design the new DMS assemblies (including footings), DMS mounting assemblies, maintenance platforms, and access ladders and submit shop drawings for approval. A Professional Engineer that is registered in the state of North Carolina will 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.

It is the Contractor's responsibility to provide DMS S-dimension elevation drawings for the DMS 3 and DMS-4 locations to the Engineer for approval.

13.2. 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

13.3. CONSTRUCTION METHODS

A. General

Fabricate the new DMS assemblies, access platforms, walkway 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.

Drill bolt holes and slots to finished size. Holes may also be punched to finished size, provided the diameter of the punched holes are 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 1076-6.

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) access platforms, walkway platforms, access ladders, DMS assembly hardware, brackets for supporting the DMS and the access platform. 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, with 2010 and 211 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 and walkway platform 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, 4th Edition, 2001, and the latest Interim Specifications.
- 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:

$$\frac{f_a}{F_a} + \frac{f_b}{\left(1 - \frac{0.6 f_a}{F_{\acute{e}}}\right) F_b} + \left(\frac{f_v}{F_v}\right)^2 \leq 1.0$$

  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 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 walkway 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.

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 "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 (walkway), 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.
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. Start 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 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.

13.4. MEASUREMENT AND PAYMENT

DMS Pedestal Structure (___) will be measured and paid as the actual number of dynamic message sign assemblies furnished, installed, and accepted. Payment includes all design, fabrication, construction, transportation, and attachment of the complete dynamic message sign assemblies, 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.

The Type A DMS pedestal structure shall accommodate a single DMS while the Type B DMS pedestal structure shall accommodate two DMS in a back-to-back configuration at the DMS-1/DMS-2 location.

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, and attachment to the DMS assembly as described above.

Payment will be made under:

Pay Item	**Pay Unit**
DMS Pedestal Structure (Type A)	Each
DMS Pedestal Structure (Type B)	Each
DMS Access Ladder	Each

14. OVERHEAD AND DYNAMIC MESSAGE SIGN FOUNDATIONS

14.1. 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.*

14.2. 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:

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.

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 4th 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 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 *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.

14.3. 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.

14.4. MEASUREMENT AND PAYMENT

ITS 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 *ITS 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	**Pay Unit**
ITS Overhead Footings	Cubic Yards

15. INTEGRATION AND CONFIGURATION

15.1. DESCRIPTION

Fully integrate new central equipment at the NCDOT Division 3 Traffic Services Office and City of Wilmington Traffic Management Center. Fully configure existing central software at the NCDOT Division 3 Traffic Services Office and City of Wilmington Traffic Management Center to establish communications with new CCTV and DMS devices as shown on the System Block Diagram in the Plans.

Coordinate the working hours and building access for all central configuration activities with the Engineer.

15.2. CENTRAL INTEGRATION

Furnish media access control (MAC) addresses for all equipment utilized as part of this project. Affix MAC Address label to each device utilized. Furnish IP addresses for all equipment utilized as part of this project. Affix final IP address each device utilized. Use labels that do not smear or fade.

At the NCDOT Division 3 Traffic Service:

- Configure the existing network Ethernet switch and ports as required to establish communications to field devices.
- Integrate the existing network Ethernet switch with the existing video processing unit and video server. Configure the CCTV system software to establish a fully functional video system to view and control the CCTV cameras.
- Integrate the new media converters with the existing network Ethernet switch and existing DMS server. Configure the existing DMS server to recognize the new DMS units and process control data.

At the City of Wilmington Traffic Management Center:

- Configure the existing network Ethernet switch and ports as required to establish communications to existing CCTV cameras.
- Integrate the central video decoder units with the existing network Ethernet switch and existing video matrix switch. Configure the video matrix switch to add the new CCTV devices as new inputs to the switch. Configure the existing CCTV server to recognize the new CCTV units and process the video and control data.

15.3. CENTRAL CONFIGURATION

The existing DMS central software that controls the DMS units at the NCDOT Division 3 Traffic Services Office is Daktronic's Vanguard (version 4). Modify the existing DMS central software configuration to display and map the new DMS units in the software GUI. Ensure that the software also allows for full communications and control of the DMS unit.

The existing CCTV central software at the NCDOT Division 3 Traffic Services Office is Protronix's VideoPro. This software includes on-screen pan-tilt-zoom controls of each camera in the system. Modify the Protronix CCTV central software configuration to display and map the new CCTV devices so that the CCTV video can be displayed on the existing monitors.

The existing CCTV central software that controls the existing video matrix switch at the City of Wilmington Traffic Management Center is Protronix's VideoPro. This software includes on-screen pan-tilt-zoom controls of each camera in the system. Modify the Protronix CCTV central software configuration to display and map the new CCTV devices so that the CCTV video can be displayed on the existing monitors and display devices.

15.4. MEASUREMENT AND PAYMENT

Integration and Configuration will be measured and paid as a lump sum price. This item shall include the installation, testing, and all materials, equipment, labor, tools, storage, shipping, and incidentals necessary to complete the integration and configuration of CCTV and DMS devices with the existing systems at the NCDOT Division 3 Traffic Services Office and City of Wilmington Traffic Management Center.

All cabling, labeling, sockets, or other accessories required to configure, integrate, and interconnect computer equipment shall be considered incidental and shall not be paid for separately.

Central devices installed for communications to new field devices will be measured and paid for under the corresponding Sections of these Project Special Provisions.

Payment will be made under:

Pay Item	**Pay Unit**
Integration and Configuration	Lump Sum

16. TESTING & ACCEPTANCE

16.1. GENERAL TEST PROCEDURE

Test the DMS and CCTV systems 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 4 copies of all test procedures and requirements to the Engineer for review and approval at least 30 days prior to the testing start date.

Only use approved procedures for the tests. Include the following in the test procedures:

- A step-by-step outline of the test sequence, 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 system functions properly even after the Engineer accepts the DMS test results.

Provide 4 copies of the quantitative test results and data forms containing all data taken, highlighting any non-conforming results and remedies taken, to the Engineer for approval. An authorized representative of the manufacturer must sign the test results and data forms.

16.2. DESIGN APPROVAL TESTS

A. DMS System

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.

B. CCTV System

No design approval test is required.

C. Central Hardware

No design approval test is required.

16.3. COMPATIBILITY TESTS

A. DMS System

No compatibility test is required.

B. CCTV System

Compatibility Tests are applicable to CCTV cameras and video transceivers that the Contractor wishes to furnish but are of a different manufacturer or model series than the existing units in the field installed by NCDOT or the City of Wilmington. If required, the Compatibility Test shall be completed and accepted by the Engineer prior to approval of the material submittal.

The Compatibility Test shall be performed in a laboratory environment at a facility chosen by the Engineer based on the type of unit being tested. Provide notice to the Engineer with the material submitted that a Compatibility Test is requested. The notice shall include a detailed test plan that will show compatibility with existing equipment. The notice shall be given a minimum of 15 calendar days prior to the beginning of the Compatibility Test.

The Contractor shall provide, install, and integrate a full-functioning unit to be tested. The Department will provide access to existing equipment to facilitate these testing procedures. The Contractor is responsible for configuring proposed equipment and proving compatibility. The Engineer will determine if the Compatibility Test was acceptable for each proposed device.

C. Central Hardware

No compatibility test is required.

16.4. OPERATIONAL FIELD TEST (ON-SITE COMMISSIONING)

A. DMS System

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:

1. 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.

2. Continuity Tests

Check the wiring to assure it conforms to the requirements of these Project Special Provisions.

3. 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.
- 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.

B. CCTV System

Perform the following local operational field tests at the camera assembly field site in accordance with the test plans. A laptop computer shall provide camera control and positioning. After completing the installation of the camera assembly, including the camera hardware, video transceiver unit, power supply, and connecting cables:

- Furnish all equipment, appliances, and labor necessary to test the installed cable and to perform the following tests before any connections are made;
- Verify that physical construction has been completed;
- Inspect the quality and tightness of ground and surge protector connections;
- Check the power supply voltages and outputs;
- Connect devices to the power sources;
- Verify installation of specified cables and connections between the camera, PTZ, camera control receiver, and control cabinet;
- Perform the CCTV assembly manufacturer's initial power-on test in accordance with the manufacturer's recommendation;
- Set the camera control address;
- Verify the presence and quality of the video image with a portable NTSC-approved monitor;
- Exercise the pan, tilt, zoom, focus, iris opening, and manual iris control selections, and the operation, preset positioning, and power on/off functions;
- Demonstrate the pan and tilt speeds and extent of movement to meet all applicable standards, specifications, and requirements;
- Verify proper voltage of all power supplies; and
- Interconnect the communication interface device with the communication network's assigned fiber-optic trunk cable and verify that there is a transmission LED illuminated.
- Verify that the video codec unit is properly encoding the video from the field camera

Approval of Operational Field Test results does not relieve the Contractor to conform to the requirements in these Project Special Provisions. If the CCTV system does not pass these tests, document a correction or substitute a new unit as approved by the Engineer. Re-test the system until it passes all requirements.

C. Central Hardware

The Contractor shall perform a Network System Test (NST) on the local area network. During the NST, the Contractor must demonstrate successful local operation of field equipment operating from the network Ethernet switches as well as successful control of the equipment from the NCDOT Division 3 Traffic Services Office and City of Wilmington Traffic Management Center.

In the event of a failed NST, the Contractor, at his expense, must perform all necessary activities required to provide proper operation of the LAN, which can include full replacement of field equipment or cabling.

The Engineer or his representative will witness all NSTs. Documentation of all testing procedures and activities must be provided to the Engineer prior to full acceptance of the system ring.

16.5. 30-DAY OBSERVATION PERIOD

The 30-Day Observation Period shall not be considered 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 and Display Module
- CCTV Camera, PTZ
- Local Area Network including Video Ethernet Encoders/Decoders

16.6. FINAL ACCEPTANCE

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

The project will be ready for final acceptance upon the satisfactory completion of all tests detailed in this Section of the Project Special provisions; the rectification of all punch-list discrepancies; and the submittal of all project documentation.

16.7. MEASUREMENT AND PAYMENT

There will be no direct payment for the work covered in this section.

Payment for this work will be covered in the applicable sections of these Project Special Provisions at the contract unit price for other items furnished on this Project.

Project R-2633BA **Brunswick County**

Project Special Provisions
Structures

Table of Contents

S.P. #		Page #
1	Maintenance & Protection of Traffic Beneath Proposed Structures at Station 281+51.83 -L- (8-13-04)	1
2	Placing Load on Structure Members (11-27-12)	1
3	Steel Reinforced Elastomeric Bearings (11-27-12)	2
4	Thermal Sprayed Coatings (Metallization) (9-30-11)	2
5	Expansion Joint Seals (9-30-11)	6
6	Optional Precast Reinforced Concrete Box Culvert at Station 52+09.00 -Y7- (2-10-12)	9
7	Electrical Conduit System for Signals (9-30-11)	14
8	Falsework and Formwork (4-5-12)	17
9	Submittal of Working Drawings (8-9-13)	23
10	Crane Safety (8-15-05)	29
11	Grout for Structures (9-30-11)	30
12	Bridge Mounted Chain Link Fence (SPECIAL)	32
13	20" Composite Piles (SPECIAL)	32
14	Construction, Maintenance & Removal of Temporary Access at Sta. 48+79.00 -Y8-, 265+53.58 -L- (SPECIAL)	32
15	Disc Bearings (SPECIAL)	33
16	Railroad Provisions	37

For Mse Retaining Walls, see Geotechnical special provisions.

NORTH CAROLINA PROFESSIONAL SEAL 22274 ENGINEER OMAR R. AZIZI 10/22/13

Except for 1, 6, 13, 14, and 16

Jesse McArthur Bailey 10/22/13

NORTH CAROLINA PROFESSIONAL SEAL 022506 ENGINEER JESSE McARTHUR BAILEY

Except For 1, 7, 12, 15, & 16

NORTH CAROLINA PROFESSIONAL SEAL 14081 ENGINEER BUCK CHARLES HUNT 10/22/13

Except for 6 - 7, and 12-16

NORTH CAROLINA PROFESSIONAL SEAL 26980 ENGINEER DAVID S. STUTTS 10/22/13

Except for: 1, 6, 7, 12, 13, 15, 16

PROJECT SPECIAL PROVISIONS
STRUCTURES

MAINTENANCE AND PROTECTION OF TRAFFIC BENEATH PROPOSED STRUCTURES AT STATION 281+51.83 –L- (8-13-04)

1.0 GENERAL

Maintain traffic on –Y8- (SR 1430) as shown in Traffic Control Plans and as directed by the Engineer.

Provide a minimum temporary vertical clearance of 15'-11" at all times during construction.

Submit plans and calculations for review and approval for protecting traffic and bracing girders, as described herein, at the above station before beginning work at this location. Have the drawings and design calculations prepared, signed, and sealed by a North Carolina Registered Professional Engineer. The approval of the Engineer will not relieve the Contractor of the responsibility for the safety of the method or equipment.

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.

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.

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 ft^2 measure 2 spots/surface per piece and for pieces greater than 200 ft^2 add 1 additional spots/surface for each 500 ft^2).

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 ft^2 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 ft^2 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.

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.

OPTIONAL PRECAST REINFORCED CONCRETE BOX CULVERT AT STATION 52+09.00 –Y7- (2-10-12)

1.0 GENERAL

This Special Provision covers the design, fabrication and construction of precast reinforced concrete box culverts intended for the conveyance of storm water.

If the option is indicated on the plans, the submittal for a precast reinforced box culvert in lieu of a cast-in-place culvert is permitted. Design the precast culvert sections in accordance with ASTM C1577 or the latest edition of the AASHTO LRFD Bridge Design Specifications. Provide the size and number of barrels as indicated on the plans. Detail the culvert with cast in place wings walls and footings. Precast wing walls and footings will

not be allowed. Provide a precast box culvert that meets the requirements of Section 1077 and any other applicable parts of the Standard Specifications.

The design of the precast members 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 build the precast box culvert. Have a North Carolina Registered Professional Engineer check and seal the plans and any required design calculations. After the plans and design calculations 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.

If the span, rise and design earth cover for the precast reinforced concrete box culvert are identical to a previously approved submittal, the Contractor may request the previously approved design calculations and plans be considered as the submittal for review and approval.

2.0 PRECAST REINFORCED CONCRETE BOX SECTIONS

A. Types

Precast reinforced concrete box sections manufactured in accordance with this Special Provision are designated by span, rise, and design earth cover.

B. Design

1. Design – The box section dimensions and reinforcement details are subject to the provisions of Section F.

2. Placement of Reinforcement – Provide a 1 inch concrete cover over the reinforcement subject to the provisions of Section F. Extend the inside reinforcement into the tongue portion of the joint and the outside reinforcement into the groove portion of the joint. Detail the clear distance of the end wires so it is not less than 1/2 inch nor more than 2 inches from the ends of the box section. Assemble reinforcement per the requirements of ASTM C1577 or the approved design. The exposure of the ends of the wires used to position the reinforcement is not a cause for rejection.

3. Laps and Spacing – Use lap splices for the transverse reinforcement. Detail the transverse wires so that the center to center spacing is not less than 2 inches nor more than 4 inches. Do not detail the longitudinal wires with a center to center spacing of more than 8 inches.

4. The design earth cover is reported on the plans as the elevation difference between the point of maximum fill and the top of the top slab.

C. Joints

1. Produce the precast reinforced concrete box section with tongue and groove ends. Design and form these ends of the box section so, when the sections are laid together, they make a continuous line of box sections with a smooth interior free of

appreciable irregularities in the flowline, all compatible with the permissible variations given in Section F. The internal joint formed at the tongue and groove ends of the precast units shall be sealed with either bitumen/butyl sealant or closed-cell neoprene material. The internal joint material shall be installed in accordance with the manufacturer's recommendations. The material shall be shown on the shop drawings when they are submitted for review.

2. Seal the external joint with an outside sealer wrap conforming to ASTM C877 that is at least 12 inches wide and covers the joint on both the sides and the top of the box section. Use ConWrap CS-212 from Concrete Sealants, Inc., EZ-Wrap from Press-Seal Gasket Corporation, Seal Wrap from Mar-Mac Manufacturing Co., Inc., Cadilloc External Pipe Joint from Cadilloc, or an approved equal for the outside sealer wrap. If the outside sealer wrap is not applied in a continuous strip along the entire joint, a 12 inch minimum lap of the outside sealer wrap is permitted. Before placing the outside sealer wrap, clean and prime the area receiving the outside sealer wrap in accordance with the sealer wrap manufacturer recommendations. The joint wrap manufacturer installation recommendations shall be included with shop drawings submitted for review. The external joint wrap shall be installed in pieces, as indicated on Figure 1 below:

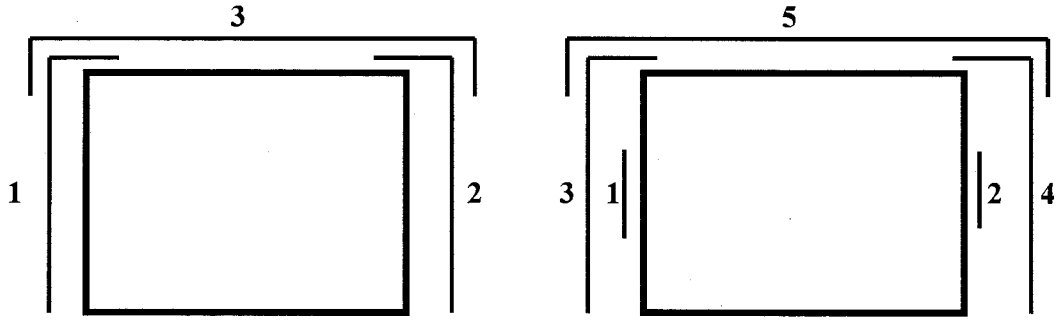


Figure 1

Cover the external joint sealer with a 3 foot strip of filter fabric conforming to Type 4 requirements in Section 1056 of the Standard Specifications.

Place multiple lines of a precast reinforced concrete box culvert such that the longitudinal joint between the sections has a minimum width of 3 inches. Fill the joint between multiple lines of precast box sections with Class A concrete. Use Class A concrete that meets the requirements listed in the Standard Specifications except that Field Compressive Strength Specimens are not required.

D. Manufacture

Precast box culverts may be manufactured by either the wet cast method or dry cast method.

1. Mixture – In addition to the requirements of Section 1077 of the Standard Specifications, do not proportion the mix with less than 564 lb/yd^3 of portland cement.

2. Strength – Make sure that all concrete develops a minimum 28-day compressive strength of 5000 psi. Movement of the precast sections should be minimized during the initial curing period. Any damage caused by moving or handling during the initial curing phase will be grounds for rejection of that precast section.

3. Air Entrainment – Air entrain the concrete in accordance with Section 1077 - 5(A) of the Standard Specifications. For dry cast manufacturing, air entrainment is not required.

4. Testing – Test the concrete in accordance with the requirements of Section 1077 - 5(B).

5. Handling – Handling devices or holes are permitted in each box section for the purpose of handling and laying. Submit details of handling devices or holes for approval and do not cast any concrete until approval is granted. Remove all handling devices flush with concrete surfaces as directed. Fill holes in a neat and workmanlike manner with an approved non-metallic non-shrink grout, concrete, or hole plug.

E. Physical Requirements

Acceptability of precast culvert sections is based on concrete cylinders made and tested in accordance with AASHTO T22 and AASHTO T23.

F. Permissible Variations

1. Flatness – All external surfaces shall be flat, true, and plumb. Irregularities, depressions, or high spots on all external surfaces shall not exceed 1/2 inch in 8 feet.

2. Internal Dimensions – Produce sections so that the internal and haunch dimensions do not vary more than 1/4 inch from the plan dimensions.

3. Adjacent Sections - Internal, external, and haunch dimensions for connecting sections shall not vary more than 1/2 inch.

4. Length of Tongue and Groove – The minimum length of the tongue shall be 4 inches. The minimum length of the groove shall be 4 inches. The dimensions of the tongue and groove shall not vary more than 1/4 inch from the plan dimensions.

5. Slab and Wall Thickness – Produce sections so that the slab and wall thickness are not less than that shown on the plans by more than 5% or 3/16 inch, whichever is greater. A thickness more than that required on the plans is not a cause for rejection.

6. Length of Opposite Surfaces – Produce sections so that variations in laying lengths of two opposite surfaces of the box section meet the requirements of ASTM C1577, Section 11.3.

7. Length of Section – Produce sections so that the underrun in length of a section is not more than 1/2 inch in any box section.

8. Position of Reinforcement – Produce sections so that the maximum variation in the position of the reinforcement is ±3/8 inch for slab and wall thicknesses of 5 inches or less and ±1/2 inch for slab and wall thicknesses greater than 5 inches. Produce sections so that the concrete cover is never less than 5/8 inch as measured to the internal surface or the external surface. The preceding minimum cover limitations do not apply at the mating surfaces of the joint.

9. Area of Reinforcement – Use the design steel shown on the plans for the steel reinforcement. Steel areas greater than those required are not cause for rejection. The permissible variation in diameter of any wire in finished fabric is prescribed for the wire before fabrication by either AASHTO M32 or M225.

G. Marking

1. Each section shall be match-marked in order of intended installation as indicated on the approved shop drawings. Ensure that pieces fit together neatly and in a workmanlike manner. In order to ensure a good, neat field fit, the Department will verify assembly of the first five adjacent sections or 20% of the total culvert length, whichever is greater, at the producer's facility and match-mark the pieces. This will require that a minimum of three adjacent sections of the culvert be fitted at the production yard at a time and then match-marked. Once three sections have been match-marked, the first section may be removed for shipment and a fourth section set for marking. Continue in a progressive manner until all sections have been properly match-marked. The producer shall document the GO-NO-GO dimensional measurements of each box culvert section produced through the post-pour inspection process.

2. Clearly mark each section of the box culvert in accordance with ASTM C1577, Section 15.

H. Construction

1. Pre-installation Meeting – A pre-installation meeting is required prior to installation. Representatives from the Contractor, the precast box manufacturer, and the Department should attend this meeting. The precast box manufacturer representative shall be on site during installation.

2. Foundation – Foundation for precast box culvert shall meet the requirements of Section 414 of the Standard Specifications. In addition, Type VI foundation material shall be encapsulated in filter fabric conforming to Type 4 requirements in Section 1056 of the Standard Specifications. The filter fabric shall be placed perpendicular to the culvert barrel. Provide sufficient overhang beyond the excavation to allow a minimum lap of 3 feet when the foundation material is placed and fabric wrapped on top. Perpendicular sections of fabric shall be continuous. A minimum lap of 2 feet shall be provided between sections of fabric.

3. Installation – Sections shall be placed at the beginning of the outlet end of the culvert with the groove end being laid upgrade. Tongue sections shall be laid into the groove sections. Positive means shall be provided to pull each section firmly into the previously placed section so that the joints are tightly homed. Use a "come-along", box pullers or other approved methods to create a positive means of joining box sections. Construction equipment shall not have direct contact with the box section. The load of the box shall be suspended by lifting device during joining procedure.

4. Backfill – Complete backfill in accordance with Section 414 of the Standard Specifications.

3.0 BASIS OF PAYMENT

Any additional cost of redesigning will be paid for by the Contractor if Precast Reinforced Concrete Culvert is used in lieu of the cast-in-place culvert shown on the plans. Except for Foundation Conditioning Material and Culvert Excavation, payment for the Precast Box Culvert will be a lump sum amount equal to the payment that would be allowed for construction of a Cast-in-Place Box Culvert. Plan quantities and unit bid prices will be used to compute the lump sum amount. Such price and payment will be full compensation for all work covered by this Special Provision, the plans and applicable parts of the Standard Specifications and will include, but not be limited to, furnishing all labor, materials (including all filter fabric), equipment and other incidentals necessary to complete this work. Such price and payment will also be full compensation for concrete, reinforcing steel, labor, equipment and all other related materials necessary for the completion of the barrel section, and the construction of the headwalls, leveling pad, end curtain walls, wings and wing footings.

ELECTRICAL CONDUIT SYSTEM FOR SIGNALS (9-30-11)

1.0 GENERAL

The work covered by this section consists of furnishing and installing a conduit system suspended beneath structures and buried. Perform all work in accordance with these special provisions, the plans, and the National Electrical Code (NEC). Install the conduit system in accordance with NEC requirements as an approved raceway for electrical circuits.

The Contractor actually performing the work described in these special provisions is required to have a license of the proper classification from the North Carolina State Board of Examiners of Electrical Contractors.

The licensed Electrical Contractor is required to be available on the job site when the work is being performed or when requested by the Engineer. The licensed Electrical Contractor is required to have a set of plans and special provisions in his possession on the job site, and must maintain accurate "as built" plans.

2.0 MATERIALS

Submit eight (8) copies of catalog cuts and/or drawings for all proposed materials for the Engineer's review and approval. Include the brand name, stock number, description, size, rating, manufacturing specification, and applicable contract item number(s) on each submittal. Allow forty (40) days for submittal review. The Engineer will advise the Contractor of reasons for rejected submittals and will return approved submittals to the Contractor. Do not deliver material to the project prior to submittal approval.

For the work covered by this section, the term conduit applies to a system of components consisting of an outer duct, 4 inner ducts, internal spacers, special-purpose spin couplings and all necessary components, referred to as a multi-cell raceway system.

For the outer duct of RGC multi-cell raceway, use rigid galvanized conduit per UL 6 "Rigid Metallic Conduit" with rigid full weight galvanized threaded fittings. Provide factory installed reverse-spin couplings with 3 set screws, to allow assembly without turning the outer duct, and prevent the coupling from backing off before and after installation. Provide an O-ring gasket in the coupling body to resist pullout and to create a watertight seal. Provide pre-installed, smooth walled, pre-lubricated PVC inner ducts, with one white "tracer" duct and internal spacers to maintain alignment throughout the raceway system. Do not use materials provided by more than one manufacturer.

When deflection couplers are detailed on the plans, use deflection couplers that are designed for use with RGC multi-cell raceway, and meet all the requirements for RGC outer duct stated above. Provide deflection couplers that allow a 30 degree bend in any direction and ¾ inch mis-alignment in all axis. Provide factory installed reverse-spin couplings with 3 set screws, to allow assembly without turning the outer duct, and prevent the coupling from backing off before and after installation. Provide deflection couplers with a middle section consisting of a rubber boot attached by spin couplings and galvanized straps, with inner ducts that bend in unison with the rubber boot.

Use expansion joints that are designed for use with RGC multi-cell raceway, and meet the requirements for RGC outer duct stated above. Provide expansion joints that allow 8 inches of longitudinal movement. Use expansion joints consisting of a female end with a lead-in coupling body and spin coupling, an exterior sliding joint, and a fixed inner duct with an internal sliding joint. Provide expansion joints that have factory installed reverse-spin couplings with 3 set screws, to allow assembly without turning the outer duct and prevent the coupling from backing off before and after installation.

Use transition adapters that allow RGC raceway and PVC raceway to be coupled together while maintaining the same inner duct alignment. Provide adapters consisting of a threaded female adapter, an outer duct adapter, and a modified coupling body with a sleeve, thin wall couplings and an end spacer.

For the outer duct of PVC multi-cell raceway use schedule 40 PVC per UL 651 "Rigid Nonmetallic Conduit." Use PVC raceway with 6 inch bell ends and an O-ring gasket to resist pullout and provide a watertight seal. Provide PVC raceway having a print line that states "Install Print Line Up" to help facilitate correct installation. Use PVC raceway with pre-lubricated PVC inner ducts, with one white "tracer" duct and internal spacers to

maintain alignment throughout the raceway system. Do not use material provided by more than one manufacturer.

Use terminations designed for PVC raceway, to seal each inner duct and the outer duct, and to provide watertight protection.

Use schedule 40 PVC for sleeves in accordance with UL 651 "Rigid Nonmetallic Conduit."

Provide concrete inserts made of galvanized malleable iron, with internal threads for suspending loads from a fixed point beneath a concrete ceiling or deck where no lateral adjustment is required. Use inserts that can be secured to the concrete forms, preventing movement during concrete placement.

For stabilizers and hangers, use galvanized rods that conform to ASTM-A36 or A-575. Galvanized rods may be threaded on both ends or threaded continuously. Use steel stabilizer clamps and attachment brackets, sized as noted in the plans and hot dipped galvanized per ASTM-A123. Provide high strength bolts, nuts and washers that are galvanized in accordance with Article 1072-5 of the Standard Specifications.

Use adjustable clevis-type pipe hangers that allow for vertical adjustment and limited movement of the pipe. Use galvanized pipe hangers that are listed with Underwriters Laboratories, or are Factory Mutual approved for the size conduit shown in the plans. Use hangers that comply with Federal Specification WW-H-171E Type 1 and Manufacturers Standardization Society SP-69 Type 1. Plastic-coat the saddle area of the hanger.

Provide pull lines specifically designed for pulling rope through conduit. Use pull lines made of 2-ply line, with a tensile strength of 240 pounds minimum. Use rot and mildew resistant pull lines that are resistant to tangling when being dispensed.

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

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

Provide zinc rich paint conforming to Section 1080-9 of the Standard Specifications.

3.0 INSTALLATION

To ensure against corrosion in the area where hot dipped galvanizing has been damaged, cover all raw metal surfaces with a cold galvanized, zinc rich paint.

Stub the raceway out at an accessible location and seal with termination kits designed specifically for that purpose. Use termination kits of the same material as the raceway.

Install Stabilizers as shown on the plans to assure proper movement of the conduit expansion joints. Securely fasten the clamps with attachment brackets and stabilizer rods to the conduit at the indicated locations to assure these locations remain stationary. Install the stabilizer rods parallel to the alignment of the conduit, and tilt rod upward at an orientation of 45 degrees to the bottom of the bridge deck.

Insert a pull line in each inner duct with sufficient slack for future use.

Securely fasten all components to prevent movement during concrete placement.

Smooth all sleeve ends and make them flush with surrounding concrete surfaces. Remove burrs and rough edges by filing or grinding. A torch may be used to cut the ends of metal sleeves. Use shields to protect all surfaces during torch-cutting operations.

Place backfill in accordance with Section 300-7 of the Standard Specifications.

Fill the space between the raceway and the sleeve with mastic and jute. Install the mastic with a minimum distance of 2 inches at each end of the sleeve and the remaining interior space filled with jute. Finish the mastic by making it smooth and flush with the concrete.

Coordinate electrical conduit system work with work by others, and allow installation of circuitry or fiber optic cables during the construction process as directed by the Engineer.

Ensure that the concrete inserts are in the proper position and installed correctly, including when they are located in prestressed concrete deck panels.

Keep the raceway system clean of all debris during construction, with the completed system clean and ready for installation of circuitry or fiber optic cables.

The Engineer must inspect and approve all work before concealment.

4.0 BASIS OF PAYMENT

No direct measurement will be made for the conduit system, since it will be paid for on a lump sum basis.

Payment for the conduit system will be made at the contract lump sum price for "Electrical Conduit System for Signals at station _____".

Such price and payment for the conduit system as provided above will be considered full compensation for all materials, equipment, and labor necessary to complete the work in accordance with the plans and these special provisions.

Payment will be made under:

Electrical Conduit System for Signals at station _____ Lump Sum

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. Screed Wheel Weight, (lbs.)	Bracket Min. Vertical Leg Extension, (inches)
II	36	39	14	2000	26
III	45	42	14	2000	35
IV	54	45	14	2000	44
MBT	63	51	12	2000	50
MBT	72	55	12	1700	48

Overhang width is measured from the centerline of the girder to the edge of the deck slab.

For Type II, III & IV prestressed concrete girders (PCG), 45-degree cast-in-place half hangers and rods must have a minimum safe working load of 6,000 lbs.

For MBT prestressed concrete girders, 45-degree angle holes for falsework hanger rods shall be cast through the girder top flange and located, measuring along the top of the member, 1'-2 ½" from the edge of the top flange. Hanger hardware and rods must have a minimum safe working load of 6,000 lbs.

The overhang bracket provided for the diagonal leg shall have a minimum safe working load of 3,750 lbs. The vertical leg of the bracket shall extend to the point that the heel bears on the girder bottom flange, no closer than 4 inches from the bottom of the member. However, for 72-inch members, the heel of the bracket shall bear on the web, near the bottom flange transition.

Provide adequate overhang falsework and determine the appropriate adjustments for deck geometry, equipment, casting procedures and casting conditions.

If the optional overhang falsework spacing is used, indicate this on the falsework submittal and advise the girder producer of the proposed details. Failure to notify the Engineer of hanger type and hanger spacing on prestressed concrete girder casting drawings may delay the approval of those drawings.

Falsework hangers that support concentrated loads and are installed at the edge of thin top flange concrete girders (such as bulb tee girders) shall be spaced so as not to exceed 75% of the manufacturer's stated safe working load. Use of dual leg hangers (such as Meadow Burke HF-42 and HF-43) are not allowed on concrete girders with thin top flanges. Design the falsework and forms supporting deck slabs and overhangs on girder bridges so that there will be no differential settlement between the girders and the deck forms during placement of deck concrete.

When staged construction of the bridge deck is required, detail falsework and forms for screed and fluid concrete loads to be independent of any previous deck pour components when the mid-span girder deflection due to deck weight is greater than ¾".

Note on the working drawings any anchorages, connectors, inserts, steel sleeves or other such devices used as part of the falsework or formwork that remains in the permanent structure. If the plan notes indicate that the structure contains the necessary corrosion protection required for a Corrosive Site, epoxy coat, galvanize or metalize these devices. Electroplating will not be allowed. Any coating required by the Engineer will be considered incidental to the various pay items requiring temporary works.

Design falsework and formwork requiring submittals in accordance with the 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:

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

Attention: Mr. P. D. Lambert, P. E.

Via other delivery service:

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.

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

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
1570 Mail Service Center
Raleigh, NC 27699-1570

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"
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	8	0	"Maintenance and

Traffic Beneath Proposed Structure			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
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

1. References are provided to help locate the part of the contract where the submittals are required. References in quotes refer to the provision by that name. Subarticles refer to the *Standard Specifications*.

2. Submit one hard copy of submittal to the 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.

3. 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.

4. 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

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.

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.

Crane Inspections: Inspection records for all cranes shall be current and readily accessible for review upon request.

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.

BRIDGE MOUNTED CHAIN LINK FENCE **(SPECIAL)**

Construct the chain link fence in accordance with the applicable sections of the Standard Specifications, the details shown on the plans and this special provision.

The quantity of chain link fence will be the actual number of linear feet of fence, measured in place from end post to end post, which has been completed and accepted. All posts used for the chain link fence are included in the price of the fence and will not be paid for separately. There will be no measurement made for installing adhesive anchors in concrete barrier rail as such work is considered incidental.

Work includes but is not limited to furnishing and installing fence fabric, tie wires, stretcher bars, stretcher bar bands, tie rods, turnbuckles, brace rails, posts, post caps, brackets, adhesive anchors, fittings and any other materials necessary to complete the work as described in the plans and this special provision.

Payment will be made under:

72" Chain Link Fence _____Linear Foot.

20" COMPOSITE PILES **(SPECIAL)**

20" composite piles shall consist of a 20" prestressed concrete pile and an HP 10 X 57 steel piles meeting the requirements of Section 450 of the Standard Specifications. The 20" prestressed concrete pile shall be the length specified on the plans. The HP 10 X 57 shall extend beyond said length a distance equal to the difference between the tip elevation of the concrete pile and the tip elevation of the steel pile as given in the plans.

Payment shall be made under: 20" Composite Piles .....Linear Foot.

CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS AT STATION 48+79.00 –Y8-, AND 265+53.58 –L- **(SPECIAL)**

1. **GENERAL**

Construct, maintain, and remove the temporary access required to provide the working area necessary for construction of the new bridge, construction of the temporary detour structure, or for the removal of an existing bridge, as applicable. Temporary access may include other methods than those outlined in this Special Provision; however, all types of

temporary access are required to meet the requirements of all permits, the Standard Specifications, and this Special Provision.

2. TEMPORARY WORK BRIDGE

Construction of a temporary work bridge is permitted as shown on the plans. The temporary work bridge shall have a minimum span length of 20 feet. Piles for the temporary work bridge shall not be located within 5 diameters (center to center) of the proposed permanent bridge piles. Submit details of the temporary work bridge to the Engineer prior to constructing the work bridge to ensure conformance with the plans and all permits. Completely remove the temporary bridge including the temporary piles prior to final acceptance or as otherwise required by the permits.

3. BASIS OF PAYMENT

The lump sum price bid for "Construction, Maintenance and Removal of Temporary Access at Station _____" will be full compensation for the above work, or other methods of access, including all material, work bridge components, equipment, tools, labor, disposal, and incidentals necessary to complete the work.

DISC BEARINGS (SPECIAL)

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 and as specified herein.

Disc Bearings consist of a polyether urethane structural element (disc) confined by upper and lower steel bearing plates. Equip disc bearings with a shear restriction mechanism 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 sole plate, an elastomer disc, upper bearing plate, lower bearing plate, masonry plate, 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 sole plate, a top steel plate with a polished stainless steel sheet facing bearing on a fixed disc bearing with a layer of virgin polytetraflouroethylene (PTFE) material on its top, masonry plate, anchor bolt assembly which includes 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. To allow longitudinal movement, bond a polytetraflouroethylene (PTFE) sheet to the upper steel bearing plate. Support a sliding steel top bearing plate with the upper steel bearing plate. Face the mating surface of the sliding steel top bearing plate with polished stainless steel. Use either a guide bar or keyway system to restrict transverse movement. Face the sliding surfaces of the guide bar or keyway systems with either PTFE sheets or stainless steel.

2.0 MATERIALS

Use disc bearings produced by the same manufacturer.

Use AASHTO M270 Grade 50W (345W) for all steel 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)".

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 surface of the plate that will be attached to the stainless sheet to a near white condition in accordance with the Standard Specifications. Position and clamp the back of the stainless sheet that is to be in contact with the steel plate on the steel plate. Apply the stainless steel to the blast cleaned surface of the steel plate as soon as possible after blasting and before any visible oxidation of the blast cleaned surface occurs. Weld the stainless sheet continuously around its perimeter using a tungsten inert gas, wire-fed welder.

For the PTFE sheet, used as a mating surface for the stainless sheet, 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 and the bearing plate, use heat cured high temperature epoxy capable of withstanding temperature of –320°F to 500°F.

Mold the polyether urethane structural element from a polyether urethane compound. Conform the physical properties of the polyether urethane 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 height of the bearing assembly that is at least the height shown on the contract plans, but no more than 1/2 inch greater than this height. Either combine and cast the sole plate and top plate/upper bearing plate and the lower bearing plate and masonry plate as a single unit or weld together prior to the installation of the disc.

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 sliding steel top plate and the upper bearing plate for the duration of the test. Any observed lift-off is cause for rejection.

2. Sliding Coefficient of Friction

For all guided and non-guided expansion type 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 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. 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.

CSX TRANSPORTATION, INC. - RAILROAD SPECIAL PROVISIONS

NOTICE TO THE RAILROAD COMPANY OF START OF WORK:

The Contractor shall notify CSX Transportation, Inc., herein called the Railroad Company, at least thirty (30) days in advance of the date on which he expects to start work on the railroad right-of-way. A written notice is required. No work shall commence on CSXT right-of-way until the Railroad Company has received and approved the Contractor's insurance policy.

RELOCATION OF WIRE LINES:

Any temporary or permanent changes in wire lines necessitated by the construction of the project will be made by others without cost to the Contractor. However, the Contractor will be required to bear the cost of any changes that are made at his request solely for his convenience in the conduct of his operations.

DELAYS CAUSED BY OPERATIONS OF OTHERS:

The Contractor's attention is called to the fact that neither the North Carolina Department of Transportation, herein called the Department of Transportation, 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 of

Transportation or the Railroad Company for any inconvenience, delay, or additional cost incurred by him on account of such operations by others.

COOPERATION WITH OTHERS:

The Contractor shall cooperate with others participating in the construction of the project to the end that all work may be carried on to the best advantage.

AUTHORITY OF RAILROAD ENGINEER:

The authorized representative of the Railroad Company hereinafter referred to as Railroad Engineer, shall have the final authority in all matters affecting the safe maintenance of railroad traffic of his company.

CONSTRUCTION CORRESPONDENCE AND SUBMITTALS:

Initially, direct all construction related correspondence to the Philadelphia AECOM office, CSXT's General Engineering Contractor. The Philadelphia office address is:

Mr. Brian V. Harrison, PE
AECOM
1700 Market Street
Suite 1600
Philadelphia, PA 19103

And a copy to:

Clyde Gray
CSX Transportation
1610 Forest Avenue
Suite 120
Richmond, VA 23229

All required construction submittals shall be forwarded to and approved in writing by the Railroad Company prior to proceeding with construction of each applicable phase. Thirty (30) days will be required to review all construction submittals. An additional thirty (30) day will be required to review any subsequent submissions returned not approved.

EMERGENCY ACTION PLAN:

The Contractor shall develop and submit an emergency action plan indicating the location of the site, contact names and phone numbers, access to the site, instructions for emergency response, and location of the nearest hospitals. The plan shall also cover the Contractor's means of fire suppression that may include the phone number and location of the nearest fire department. The plan shall cover all items required in the event of an emergency at the site.

CONSTRUCTION SCHEDULE:

The Contractor shall prepare and submit a detailed construction schedule for the duration of the project clearly indicating the time periods while working on and around CSXT right-of-way.

INTERFERENCE WITH RAILROAD OPERATIONS:

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 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, 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.

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 judgement of the Railroad Engineer such provisions is insufficient, the Railroad Engineer or the Highway Engineer, may at the expense of the Contractor, require or provide such provisions as may be deemed necessary.

The Contractor will not be permitted to provide less than the following temporary clearances during construction of the proposed overhead bridge:

15'-0" horizontal clearance measured to track from centerline of track to falsework.
22'-0" vertical clearance from top of rail to falsework.

STRUCTURE EXCAVATION AND SHORING:

The Contractor shall furnish evidence to the Department of Transportation and the Railroad Company that, upon starting construction of the proposed grade separation structure, he shall expedite the excavation and bridge work continuously and diligently to completion.

The Contractor will be required to take special precaution and care in connection with excavating and shoring pits, and in driving piles, for highway bridge footings adjacent to track to provide adequate lateral support for the track and loads which it carries without disturbance of track alignment and service, and to avoid obstructing track clearances with working equipment, tools or other material. The procedure for doing such work, including need of and plans for shoring, shall first be approved by the Railroad, but such approval shall not relieve the contractor from liability.

Shoring or sheeting protection shall be provided when excavating adjacent to an active railroad track, except as noted below.

Shoring will not be required if both the following conditions are satisfied:

1. Excavation does not encroach upon a 1½ horizontal: 1 vertical theoretical slope line starting 1'-6" below top of rail and at 12'-0" minimum from centerline of the track.

2. Track is on level ground or in a cut section and on stable soil.

When track is on embankment, excavating the toe of embankment without shoring may affect the stability of the embankment. Therefore, excavation of embankment toe without shoring will not be permitted.

Preferred protection is the cofferdam type that completely encloses the excavation. Where dictated by conditions, partial cofferdams with open sides away from the track may be used. Cofferdams shall be constructed using steel sheet piling or steel soldier beams with timber lagging. Wales and struts shall be provided as needed. The following shall be considered when designing cofferdams:

a. Sheeting shall be designed to resist a vertical live load surcharge of 1800 lbs per square foot, in addition to active earth pressure. The surcharge shall be assumed to act on a continuous strip, 8'-6" wide. Lateral pressures due to surcharge shall be computed using the strip load formula shown in A.R.E.M.A. specifications, Chapter 8, Part 20.

b. Allowable stresses in materials shall be in accordance with A.R.E.M.A. Specifications, Chapter 7, 8, and 15.

c. A construction procedure for temporary shoring shall be shown on the drawing.

d. Safety railing shall be installed when temporary shoring is within 12 feet of track.

e. A minimum distance of 10 feet from centerline of the track to face of sheeting shall be maintained.

The Contractor shall submit the following drawings and calculations for Railroad review and approval.

1. Three (3) sets of detailed drawings of the shoring systems showing sizes of all structural members, details of connections, and distances from centerline of track to face of shoring. Drawing shall show a section showing height of sheeting and track elevation in relation to bottom of excavation.

2. One set of calculations of the cofferdam design prepared in accordance with CSXT's Criteria for Overhead Bridges dated September 14, 2007. The drawings and calculations shall be prepared by a North Carolina Registered Professional Engineer experienced in the design of shoring and cofferdams and shall bear his seal and signature.

The subgrade of an operated track shall be maintained with edge of berm at least 10' from centerline of track and not more than 24" below top of rail. Unless so indicated on the plans the Contractor will not be required to make the existing section meet this specification and if substandard, the existing section will be maintained.

DEMOLITION OF EXISTING STRUCTURE:

Railroad tracks shall be protected from damage during demolition of existing structure or replacement of deck slab.

During demolition of the deck, a protection shield shall be erected over the track to catch falling debris. The protection shield shall be supported from girders or beams and shall not be lower than allowed temporary clearance. The deck shall be removed by cutting it in sections and lifting out. All cranes and hardware used in picks is to account for a 150% Factor of Safety. Factor of safety implied in crane charts is not to be considered in determination of lifting capacity. Large pieces of deck shall not be allowed to fall on protection shield.

Blasting will not be permitted to demolish a structure over or within railroad right-of-way.

The Contractor shall submit detailed demolition plans, including protection shield details to the Railroad Engineer for approval prior to the start of demolition. The plans shall also indicate the location and capacity of the proposed cranes and estimated lifting loads. The plans shall be prepared by a North Carolina Registered Professional Engineer and shall bear his seal and signature.

BLASTING:

Explosives shall not be used adjacent to any track or other railroad property without the advance approval of the Highway Engineer and the Railroad Engineer, but such approval will not relieve the Contractor of any liability. If use of explosives is permitted, the blasting shall be done with light charges under the direct experienced supervision of a responsible officer or employee of the Contractor, or of the Department of Transportation. Electric detonating fuses or charges shall not be used on account of possible premature explosions resulting from operation of 2-way train radios. Every precaution shall be taken to avoid damage to property, injury to persons and interruption of railroad operations.

No blasting shall be done without an authorized Railroad representative present, who will determine the approximate location of trains in order that the Contractor can be certain whether or not sufficient time will be available for blasting and subsequent cleanup without delaying trains. The Contractor shall notify the Railroad Engineer at least 10 days in advance of blasting to permit arrangement for the presence of an authorized Railroad representative and such flagging service as may be deemed necessary.

The Contractor shall have adequate equipment, labor, and materials at the job site and provide sufficient time to clean up the debris resulting from the blasting without delay to trains. He will at his expense correct any track misalignment or other damage to railroad property resulting from the blasting as directed by the Railroad Engineer. If his actions result in delays to trains, the Contractor shall bear the entire cost thereof.

Blasting shall be discontinued immediately upon notice by the Railroad Engineer or the Highway Engineer that it is too hazardous.

STORAGE OF MATERIALS:

Materials and equipment shall not be stored 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, and such permission will be with the understanding that the Railroad Company 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.

DAMAGES:

The Contractor shall assume all liability for any and all damages to his work, employees, servants, equipment and materials caused by railroad traffic.

MAINTENANCE OF DITCHES ADJACENT TO RAILROAD TRACKS:

The Contractor shall submit plans indicating the proposed methods of erosion control during construction, in particular, excavation for the piers and grading.

The Contractor shall exercise necessary precautions to prevent fouling of track ballast and existing ditches in the excavation of material at the proposed structure site. He shall maintain the existing railroad ditches free from obstruction and silt through the duration of his construction operations and upon completion of the structure shall leave the ditches in conditions satisfactory to the Railroad Engineer.

Should material from excavating at the proposed structure site foul the track ballast, the Contractor will be required to clean or replace the fouled ballast under the direction of and to the satisfaction of the Railroad Engineer.

Any cost incurred by the Railroad Company for repairing damage to its property or to property of its tenants, caused by or resulting from the operations of the Contractor, shall be paid by the Contractor to the Railroad Company.

TEMPORARY RAILROAD GRADE CROSSINGS:

Where the plans show or imply that equipment or materials of any nature must be transported across a Railroad, unless the Department of Transportation has included arrangements for such crossings in its agreement with the Railroad, the Contractor will be required to first obtain authority for its installation, maintenance, and removal from the Railroad Engineer. The Contractor shall execute CSX Railroad's standard private road crossing agreement. Railroad Forces will do all work within two feet of the rail and the Contractor will pay all cost associated with the installation, maintenance and removal of the temporary grade crossing. The Contractor shall arrange for any resulting necessity of watching and flagging and to furnish the Railroad Company with a separate Railroad Protective Liability Policy other than the one required by these special provisions. All the above shall be at no cost to the Department of Transportation.

In the event the Department of Transportation has made arrangements for the Temporary Grade Crossings, the Contractor will need to have a railroad flagman on site during any use of the

crossing and the crossings must be physically barricaded during such times that it is not required for use. The Contractor shall construct the road and approaches such that it does not interrupt existing drainage patterns and to the satisfaction of the Railroad. Flagman must be on site for construction and the roadway must be removed upon completion of the project. The Contractor shall restore the property including any drainage ditches. The Contractor's attention is called to the fact that he will not be required to bear the cost of the flagging services required by the Railroad Company or provide any additional railroad insurance except that required by the Insurance Special Provision.

ERECTION PROCEDURE:

The Contractor shall submit a detailed procedure for erecting the spans over railroad tracks. Equipment used for the erection, or removal of structures over railroad facilities, shall have a minimum lifting capacity of one hundred-fifty percent (150%). Factor of safety implied in crane charts is not to be considered in determination of lifting capacity. The procedure shall indicate the capacity of cranes, location of cranes with respect to the tracks and estimated lifting loads. The erection procedure must follow CSX Construction Guidelines and be prepared by a North Carolina Registered Professional Engineer and shall bear his seal and signature. The procedure must be approved by the Railroad.

FLAGGING PROTECTION OR WATCHMAN SERVICE:

The watchman and flagging service required by the Railroad Company for the safety of railroad operations because of work performed by the Contractor or subcontractors in connection with the construction of the proposed overhead bridge will be provided by CSX Transportation, Inc. and the Contractor's special attention is called to the fact that he will not be required to bear the cost of any watchman or flagging service required by CSX Transportation, Inc., other than that required at any temporary grade crossing, as the Railroad Company will be reimbursed by the Department of Transportation on bills rendered monthly. All bills to be prepared in accordance with the Federal-Aid Policy Guide 23 CFR 646B.

When the Contractor's men or equipment are working within eighteen (18) feet of the nearest rail, over, under or adjacent to the track over which trains are operated, or when work is being performed adjacent to an operated track which may present a hazard to train operations, or when equipment is being used which does, or may infringe on such limits, and at other times, when in the opinion of the Railroad Engineer such protection is necessary, the services of a man or men will be used for flagman or watchman service.

The Contractor shall give 10 days advance notice to the Railroad Engineer in order that flagging service can be arranged and provided. No work shall be undertaken until the flagman, or flagmen, are at the job site. The estimated number and classification of men are shown in the Force Account Estimate.

The estimated cost of Flagging Protection or Watchman Service is shown in the Force Account Estimates prepared by CSX Transportation, Inc., and made a part of the Plans, Specifications and Estimate.

If the Railroad Company for any reason finds it necessary to furnish a watchman or flagman of a different classification from that shown in the Force Account Estimate, bills will be rendered and shall be paid on the basis of the rate of pay for the men used whether that is above or below the rate given. If the rate of pay of any employee that is to be used for watchman or flagging service is changed before the work is started or during the progress of the work, either by law or agreement between the Railroad Company and its employees, or if the tax rates on labor are changed, bills will be rendered by the Railroad Company and paid by the Department of Transportation on the new rates.

The Contractor's attention is also called to the fact that he will be required to carry on his operations which require flagging protection or watchman service in such a manner and sequence that the cost of such will be as economical as possible.

COMPLETION AND ACCEPTANCE OF WORK:

Upon completion of the work, the Contractor shall remove from within the limits of the railroad right of way all machinery, equipment, surplus materials, rubbish or temporary buildings of the Contractor, and leave said rights-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 of Transportation and the Railroad Company, the Department of Transportation will be notified of the Railroad Company's acceptance in writing by the Railroad Engineer within ten (10) days or as soon thereafter as practicable.

At project completion, a complete set of "As Built" plans for the proposed construction shall be submitted to CSXT Bridge Maintenance and Design Group. CSXT will keep these plans on file in Jacksonville for future reference. Please address these plans to:

Mr. Rick Garro
500 Water Street
J-350
Jacksonville, FL 32202

INSURANCE SPECIAL PROVISIONS FOR

CSX TRANSPORTATION, INC.

STRUCTURE

TIP: R-2633BA **Brunswick County**

A. In addition to any other forms of insurance or bonds required elsewhere in the contract documents, the Contractor will be required to provide coverage conforming to the requirements of the Federal-Aid Policy Guide outlined under 23 CFR 646A for all work to be performed on Railroad right(s)-of-way under the terms of the contract by carrying insurance of the following kinds:

1. CONTRACTOR'S COMMERCIAL GENERAL LIABILITY INSURANCE:

a. The Contractor shall furnish an original and one copy of the certificates of insurance and one certified copy of the policy to the Department of Transportation as evidence that, with respect to the operations he performs on railroad right-of-way, he carries Commercial General Liability Insurance including "XCU" coverage providing for limits of liability as follows:

COVERAGE	MINIMUM COMBINED LIMITS OF LIABILITY
Bodily Injury Liability Property Damage Liability	$ 5,000,000 Per Occurrence $ 5,000,000 Aggregate

b. If any part of the work is sublet, similar insurance and evidence thereof in the same amounts as required of the Prime Contractor, shall be provided by the subcontractor to cover his operations on railroad right-of-way. As an alternative, the Prime Contractor may provide insurance for the subcontractor by means of separate and individual policies.

c. Certificates of Insurance holders are to be sent to the addressees given below. Certificates shall make reference to the project, milepost and county.

NCDOT Rail Division
Engineering & Safety Branch
c/o State Railroad Agent
1556 Mail Service Center
Raleigh, N.C. 27699-1556

CSX Transportation, Inc.
Risk Manager
500 Water Street
Jacksonville, Florida
32202

2. RAILROAD PROTECTIVE LIABILITY INSURANCE:

a. The Contractor shall furnish to the Department of Transportation an original and one duplicate of the Railroad Protective Liability Insurance Policy with limits of liability as follows:

COVERAGE	MINIMUM COMBINED LIMITS OF LIABILITY
Bodily Injury Liability Property Damage Liability Physical Damage to Property	$5,000,000 Per Occurrence $10,000,000 Aggregate Per Annual Policy Period

b. The Railroad Protective Liability Policy is to be written on the ISO/RIMA Form No. CG 00 35 10 93 (or updates thereof) including Endorsements CG 28 31 11 85 and IL 00 21 or their equivalents.

c. The insurer must be financially stable and rated A- or better in A.M. Best & Company's Insurance Reports.

d. The name and address of Contractor and Department of Transportation must be shown on the Declarations page.

e. The named insured, description of the work and designation of the job site to be shown on the Policy are as follows:

Named Insured: CSX Transportation, Inc.
Casualty Insurance Department (J-907)
500 Water Street
Jacksonville, Florida 32202

Description and Designation: construct dual bridges on US 17 (Wilmington Bypass) over the tracks of CSX Transportation, Inc. in Brunswick County, North Carolina near Railroad Milepost SE-356.0 and bridge on SR 1426 (Mt. Misery Rd.) over the tracks of CSX Transportation, Inc. in Brunswick County, North Carolina near Railroad Milepost SE-356.7 identified as State Project 34491.3.GVS3 (R-2633BA) and Federal Project NHS-17(124) .

B. The Railroad Protective Liability Policy shall contain a clause requiring that sixty (60) days written notice be given the Department of Transportation and the Railroad Company prior to cancellation or change.

All other policies and certificates shall contain a clause requiring that thirty (30) days written notice be given to the Department of Transportation and the Railroad Company prior to cancellation or change. The notices shall make reference to the project, milepost and county.

NOTICE TO:	COPY NOTICE TO:
CSX Transportation, Inc. Risk Manager 500 Water St. Jacksonville, Florida 32202	NCDOT Rail Division Engineering & Safety Branch c/o State Railroad Agent 1556 Mail Service Center Raleigh, N. C. 27699-1556

C. All insurance herein before specified shall be carried until the final inspection and acceptance of the project, or that portion of the project within railroad right-of-way, by the Department of Transportation or, in the case of subcontractors, until the Contractor furnishes a letter to the Engineer stating that the subcontractor has completed his subcontracted work within railroad right-of-way to the satisfaction of the Contractor and that the Contractor will accomplish any additional work necessary on railroad right-of-way with his own forces. It is understood that the amounts specified are minimum amounts and that 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, Contractor shall immediately notify the Department of Transportation 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, 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 of Transportation and the Railroad Company as to form and amount prior to beginning work on railroad right-of-way.

No extra allowance will be made for the insurance required hereunder; the entire cost of same is to be included in the unit contract price bids for the several pay items.

D. Evidence of insurance as required above shall be furnished for review to the Department of Transportation at the address shown below after which it will be forwarded by the Department of Transportation to the Railroad.

Send to Department:
NCDOT Rail Division
Engineering & Safety Branch
c/o State Railroad Agent
1556 Mail Service Center
Raleigh, NC 27699-1556

Railroad Site Data

The following information was received from the Railroad on Oct 10, 2013, 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.

10

Type of trains (passenger or freight).

Freight

Maximum authorized operating speed of trains.

49 mph

Type and number of RR employees assigned to job.

1 - Flagman

PROJECT SPECIAL PROVISION

(10-18-95) Z-1

PERMITS

The Contractor's attention is directed to the following permits, which have been issued to the Department of Transportation by the authority granting the permit.

PERMIT	AUTHORITY GRANTING THE PERMIT
Dredge and Fill and/or Work in Navigable Waters (404)	U. S. Army Corps of Engineers
State Dredge and Fill and/or CAMA	Division of Coastal Management, DENR State of North Carolina
Water Quality (401)	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.

PLEASE NOTE
The following sheets in the approved permits were not made part of this contract:

Sheets 43 through 61 of 73
Sheets 71 through 72 of 73
Sheets 6, 7, 8, of 15

R-2

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
69 DARLINGTON AVENUE
WILMINGTON, NORTH CAROLINA 28403-1343

REPLY TO
ATTENTION OF:

RECEIVED
JUL 10 2013
DIVISION OF HIGHWAYS
PDEA OFFICE OF NATURAL ENVIRONMENT

July 9, 2013

Regulatory Division

Action ID No. SAW-1994-03552

Gregory J. Thorpe, Ph.D.
Environmental Management Director, PDEA
N.C. Department of Transportation
1598 Mail Service Center
Raleigh, North Carolina 27699-1598

Dear Mr. Thorpe:

Reference the Department of the Army (DA) permit issued on February 28, 2011, for the discharge of fill material into waters and wetlands adjacent to various Creeks, and their tributaries in order to construct Section A of TIP# R -2633 (Wilmington Bypass), Brunswick County, North Carolina. Reference is also made to your permit modification dated April 8, 2013 with revisions dated May 2, 6, 14, and 24, 2013. With the referenced revisions and updated information received for Section B, which totals 8.02 miles starting along Highway 74/76 in Leland, Brunswick County and terminating at US 421 north of Wilmington in New Hanover County, the existing permit is currently being modified to include the Section B.

I have determined that the proposed project modifications described above are not contrary to the public interest and consistent with the 404 (B)(1) and therefore, the DA permit is hereby modified. The following conditions specific to Section B have been added:

All original conditions in the February 28, 2011 permit remain valid and are enforceable with Section B authorization. The Special Conditions for the permit modification are the following:

1. This permit modification only authorizes work on Section B of TIP R-2633. The permittee has minimized impacts to waters and wetlands to the maximum extent practicable, any modifications to the plans, and a compensatory mitigation plan, have been approved by the US Army Corps of Engineers (COE). Approved permit plans for Section B are attached.

2. 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 modification authorization.

Section A impact breakdown is:
- Riparian 7.16 acres (2:1 ratio from offsite) = 14.32 acres
- Non Riparian 16.38 acres (2:1 ratio from offsite) = 32.76 acres
- Stream 504 linear feet (2:1 ratio from offsite) = 1008 linear feet

Section B impact breakdown is:
- Riparian 0.12 acre (2:1 ratio from offsite) = 0.24 acre
- Non Riparian 39.65 acres (2:1 ratio from offsite) = 79.30 acres
- Stream 5 linear feet (2:1 ratio from offsite) = 10 linear feet

Total: Riparian 14.56 acres, Non riparian 112.06, and stream 1,018 linear feet

The attached mitigation transfer form will cover the combined impacts of Section A and B.

This modification approval will be utilized for future compliance of the project. If you have questions, please contact Brad Shaver of the Wilmington Regulatory Field Office, at telephone (910) 251-4611.

Sincerely,

for Steven A. Baker
Colonel, U. S. Army
District Commander

Enclosures

Copies Furnished (electronic w/o attachments):

Mr. Mason Herndon, NCDWQ
Mr. Stoney Mathis, NCDOT
Mr. Chris Rivenbark, NCDOT
Mr. Rachelle Beauregard, NCDOT
Mr. Chris Militscher, USEPA
Mr. Gary Jordan, USFWS
Mr, Travis Wilson, NCWRC
Ms. Beth Harmon, NCEEP
Mr. Todd Tugwell, USACE

R-4

U.S. ARMY CORPS OF ENGINEERS

Wilmington District

✳ Compensatory Mitigation Responsibility Transfer Form

Permittee: North Carolina Department of Transportation **Action ID:** SAW-1994-03552
Project Name: R-2633 A and B Wilmington Bypass **County:** Brunswick

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 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 appropriate ledger and provide a copy of the signed form to the Permittee and to the USACE Bank/In-Lieu Fee Program Manager. 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:** 03030005, Cape Fear River Basin

Stream Impacts (linear feet)			Wetland Impacts (acres)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-riverine	Non-Riparian	Coastal
509				7.28	56.03	

*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:** 03030005, Cape Fear River Basin

Stream Mitigation (credits)			Wetland Mitigation (credits)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-riverine	Non-Riparian	Coastal
1,018				14.56	112.06	

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**

R-5

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 transfer form combines the impacts previously authorized in the section A authorization and combines them with the new section B authorization impact numbers and required mitigation.

This form is not valid unless signed by the mitigation Sponsor and USACE Project Manager. For questions regarding this form or any of the conditions of the permit authorization, contact the Project Manager at the address below.

USACE Project Manager: Brad Shaver
USACE Field Office: Wilmington Regulatory Field Office
US Army Corps of Engineers
69 Darlington Avenue
Wilmington, NC 28403

Email:

Brad E Shaver

USACE Project Manager Signature

July 8, 2013

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.

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete the Customer Satisfaction Survey located at our website at http://regulatory.usacesurvey.com/ to complete the survey online.

North Carolina Department of Environment and Natural Resources
Division of Water Quality
Charles Wakild, P. E.
Director

Pat McCrory
Governor

John E. Skvarla, III
Secretary

JUN 12 2013

May 31, 2013

Dr. Greg Thorpe, PhD., Manager
Project Development and Environmental Analysis
North Carolina Department of Transportation
1598 Mail Service Center
Raleigh, North Carolina, 27699-1598

Subject: Modification to the 401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act and ISOLATED WETLANDS PERMIT Pursuant to IWGP100000 with ADDITIONAL CONDITIONS for Proposed improvements to the Wilmington Bypass from US 17 in Brunswick County, north of the NC 87 intersection, to US 421 in New Hanover County. Federal Aid Project Nos. NHF-0017(96) and STM-0017(97), State Project Nos. 34491.1.3.GV2 and 34497.3.ST1, Brunswick and New Hanover Counties, TIP R-2633AA/AB and R-2633B.

NCDWQ Project No. 20100867 v. 4

Dear Dr. Thorpe:

Attached hereto is a modification of Certification No. 3842 issued to The North Carolina Department of Transportation (NCDOT) dated January 7, 2011and reissuance dated January 13, 2011.

If we can be of further assistance, do not hesitate to contact us.

Sincerely,

Charles Wakild
Director

Attachments

cc: Brad Shaver, US Army Corps of Engineers, Wilmington Field Office (electronic copy only)
Stoney Mathis, Division 3 Environmental Officer
Chris Militscher, Environmental Protection Agency (electronic copy only)
Gary Jordan, US Fish and Wildlife Service (electronic copy only)
Travis Wilson, NC Wildlife Resources Commission (electronic copy only)
Rachelle Beauregard, NCDOT, Natural Environment Section (electronic copy only)
Jason Elliot, NCDOT, Natural Environment Section (electronic copy only)
Steve Sollod, NC Coastal Management (electronic copy only)
Jim Stanfill, Ecosystem Enhancement Program
Sonia Carrillo, NCDWQ Central Office
File Copy

Transportation and Permitting Unit
1650 Mail Service Center, Raleigh, North Carolina 27699-1617
Location: 512 N. Salisbury St. Raleigh, North Carolina 27604
Phone: 919-807-6300 \ FAX: 919-807-6492
Internet: www.ncwaterquality.org

An Equal Opportunity \ Affirmative Action Employer

One North Carolina Naturally

Modification to the 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 Quality (NCDWQ) Regulations in 15 NCAC 2H .0500. This certification modification authorizes the NCDOT to impact 103.65 acres of jurisdictional wetlands, 0.22 acres of isolated wetlands, 0.23 acres of waters and 978 linear feet of jurisdictional streams in Brunswick and New Hanover Counties. The project shall be constructed pursuant to the modification dated received April 3, 2013 and revisions received on May 8, 2013, May 14, 2013 and May 24, 2013. The modified authorized impacts are as described below:

Stream Impacts in the Cape Fear River Basin

Site	Station	Permanent Fill in Intermittent Stream (linear ft)	Temporary Fill in Intermittent Stream (linear ft)	Permanent Fill in Perennial Stream (linear ft)	Temporary Fill in Perennial Stream (linear ft)	Total Stream Impact (linear ft)	Stream Impacts Requiring Mitigation (linear ft)
SECTION AA & AB[1]							
Total		**16**	**115**	**683**	**30**	**844**	**627**
SECTION B							
19	-Y7- 52+90	0	0	5	39	44	0
19	-Y7 DET- 16+45	0	0	0	90	90	0
Total		**0**	**0**	**5**	**129**	**134**	**0**
Project Total		**16**	**115**	**688**	**159**	**978**	**627**

[1]Impacts authorized in the original 401 certification dated January 7, 2011, reissuance on January 11, 2011 and modifications dated May 9, 2011 and April 5, 2012.

Total Stream Impact for Project: 978 linear feet (134 linear feet for Section B)

Wetland Impacts in the Cape Fear River Basin

Site	Station	Wetland Type[1]	Fill (ac)	Fill (temporary) (ac)	Excavation (ac)	Mechanized Clearing (ac)	Hand Clearing (ac)	Total Wetland Impact (ac)	Impacts Requiring Mitigation (ac)
SECTION AA & AB[2]									
Total			**22.56**	**0.53**	**0.34**	**1.57**	**1.70**	**26.70**	**24.47**
SECTION B									
3	-LREV- 339+73 to 358+92	NR	7.45	0	0.03	0	0.58	8.06	7.48
5	-LREV-372+74 to-L-85+08	NR	1.04	0	0	0	0.12	1.16	1.04
6	-L- 109+28 to 134+54	NR	9.72	0	0	0	1.13	10.85	9.72
6A	-L- 138+11 to 140+70	NR	0.68	0	0	0	0	0.68	0.68
6B	-L-141+20 to 144+29	NR	0.41	0	0	0	0.02	0.43	0.41
7	-L- 146+78 to 165+66	NR	10.55	0	0	0	0.98	11.53	10.55
9	-L- 186+97 to 191+88	NR	1.04	0	0	0	0.09	1.13	1.04
11	-L- 194+75 to 216+13	NR	8.72	0	0	0	0.93	9.65	8.72
14	-L- 264+32 to 266+94	R	0	0	0	0.03	0.30	0.33	0.03
15	-L- 319+46 to 387+92	R	0.05	0	0.93[3]	0	29.40	30.38	0.05
19	-Y7 DET- 16+45	R	0	0.06	0	0	0.03	0.09	0
20	-Y8- 47+74 to 49+95	R	<0.01	0	0	0.04	0.31	0.35	0.04
	EC measures in HC areas		0	0.75	0	0	0	0.75	0
SECTION B UTILITIES									
1	-Y8- 48+60	R	0	0	0	0	0.15	0.15	0
1	-Y8- 48+58	R	<0.01	0	0	0	0	<0.01	0
2	-L- 138+96 to 141+92	NR	0	0	0	0	0.83	0.83	0
2	-L- 140+36 to 140+74	NR	0	0	0.02[3]	0	0	0.02[3]	0
2	-L- 140+62 to 147+63	NR	0	0	0	0	0.48	0.48	0
2	-L- 147+50 to 147+89	NR	0	0	0.02[3]	0	0	0.02[3]	0
2	-L- 147+75 to 148+80	NR	0	0	0	0	0.05	0.05	0

Total*	**39.67**	**0.81**	**1.00**	**0.07**	**35.40**	**76.95**	**39.77**
Project Total	**62.23**	**1.34**	**1.34**	**1.64**	**37.10**	**103.65**	**64.24**

(1) Wetland Type: R = Riparian; NR=Non-Riparian. (2) Impacts authorized in the original 401 certification dated January 7, 2011, reissuance on January 11, 2011 and modifications dated May 9, 2011 and April 5, 2012. (3) Denotes temporary excavation and does not require mitigation. *totals may not match sum of individual impacts due to rounding.

Total Wetland Impact for Project: 103.65 (76.95 acres for Section B)

Isolated Wetland Impacts in the Cape Fear River Basin

Site	Station	Fill (ac)	Fill (temporary) (ac)	Excavation (ac)	Mechanized Clearing (ac)	Hand Clearing (ac)	Total Wetland Impact (ac)	Impacts Requiring Mitigation (ac)
SECTION AA & AB(1)								
Total		**0**	**0**	**0**	**0**	**0**	**0**	**0**
SECTION B								
16	-L-399+43 to 400+51	0.22	0	0	0	0	0.22	0.22
Total		**0.22**	**0**	**0**	**0**	**0**	**0.22**	**0.22**
Project Total		**0.22**	**0**	**0**	**0**	**0**	**0.22**	**0.22**

Total Isolated Wetland Impact for Project: 0.22 acres.

Open Water (Ponds/Tributary) Impacts in the Cape Fear River Basin

Site	Station	Permanent Fill in Open Waters (ac)	Temporary Fill in Open Waters (ac)	Total Fill in Open Waters (ac)
R-2303A(1)				
Total		**0**	**0**	**0**
R-2303B				
11	-L- 194+75 to 216+13	0.07	<0.01	0.07
14	-L- 264+32 to 266+94	<0.01	0	<0.01
15	-L- 319+46 to 387+92	0.13	0.03	0.16
Total		**0.20**	**0.03**	**0.23**
Project Total		**0.20**	**0.03**	**0.23**

(1)Impacts authorized in the original 401 certification dated January 7, 2011, reissuance on January 11, 2011 and modifications dated May 9, 2011 and April 5, 2012.

Total Open Water Impact for Project: 0.23 acres. (0.23 acres for Section B)

The application provides adequate assurance that the discharge of fill material into the waters of the Cape Fear 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 modified application dated received April 3, 2013 and revisions received on May 8, 2013. All the authorized activities and conditions of certification associated with the original Water Quality Certification dated January 7, 2011(reissuance on January 11, 2011) and modifications dated May 9, 2011 and April 5, 2012 still apply except where superceded by this certification. Should your project change, you are required to notify NCDWQ 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.

Condition(s) of Certification:

Project Specific Conditions

1. This modification is applicable only to the additional proposed activities. All of the authorized activities and conditions of certification associated with the original Water Quality Certification dated January 7, 2011 (reissuance on January 11, 2011) and modifications dated May 9, 2011 and April 5, 2012 still apply except where superseded by this certification

2. The B-Section of this project must be constructed in accordance with the Stormwater Management Plan submitted in the application and dated April 3, 2013.

3. Compensatory mitigation for permanent impacts to 627 linear feet of streams is required for R-2633AA & AB and R-2633B based on the final impact numbers provided for the B-section. Mitigation will be provided through a combination of both onsite and offsite mitigation. Mitigation will be credited as detailed below:

   a. The NCDOT will provide compensatory mitigation for 180 linear feet of streams to be performed onsite at Bishops Branch Mitigation Site at a required 1:1 ratio. Compensatory mitigation for the above impacts to jurisdictional streams will be through a combination of restoration and preservation. The NCDOT will restore 66 linear feet of stream via removal of the existing culvert at a 1:1 credit ratio (66 linear feet). Additionally, 570 linear feet of preservation will occur at a 5:1 ratio for 114 linear feet of credit. The onsite restoration shall be constructed in accordance with the design submitted in your application dated October 18, 2010.

   b. All onsite mitigation requirements listed in Conditions 17 b, 17c and 17d in the original Water Quality Certification dated January 7, 2011 (reissuance on January 11, 2011) still apply.

   c. We understand that you have chosen to perform compensatory mitigation for the remaining permanent impacts to 447 linear feet of jurisdictional streams through the North Carolina Ecosystem Enhancement Program (EEP), and that the EEP has agreed to implement the mitigation for the project. EEP has indicated in a letter dated May 30, 2013 that they will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for the above-referenced project, in accordance with the EEP Mitigation Banking Instrument signed July 28, 2010.

   Based on the above information, stream mitigation can be summarized as follows:

Mitigation Source	Mitigation Required (feet)	Debit Ratio	Debits Required (feet)
Sections AA & AB			
EEP	447	1:1	447
On Site Restoration	66	1:1	66
On Site Preservation	114	5:1	570
TOTAL:	627		1,083
Section B			
TOTAL:	0		0
Project Total			
TOTAL:	627		1,083

4. Mitigation for permanent impacts to 64.46 acres of wetland (404 and isolated) is required for R-2633AA & AB and R-2633B based on the final impact numbers provided for the B-section. Mitigation will be provided through a combination of both onsite and offsite mitigation. Mitigation will be credited as detailed below:

   a. The NCDOT will provide compensatory mitigation impacts for 1.22 acres (0.63 acres restoration and 0.59 acres preservation) on site at the Bishop Branch Mitigation Site. The permittee shall comply with the on-site wetland mitigation plan submitted with the application dated October 18, 2010.

   b. All onsite mitigation requirements listed in Conditions 18 b and 18c in the original Water Quality Certification dated January 7, 2011 (reissuance on January 11, 2011) still apply.

   c. We understand that you have chosen to perform compensatory mitigation for the remaining 63.24 acres of impact (6.99 acres riparian and 56.25 acres non-riparian) wetlands through the North Carolina Ecosystem Enhancement Program (EEP), and that the EEP has agreed to implement the

mitigation for the project. EEP has indicated in a letter dated May 30, 2013 that they will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for the above-referenced project, in accordance with the EEP Mitigation Banking Instrument signed July 28, 2010.

Based on the above information, wetland mitigation can be summarized as follows:

Mitigation Source	Wetland Type	Mitigation Credits Required	Debit Ratio	Credit or Debits (acres) Required
Sections AA & AB				
EEP	Riparian	6.87	2:1	13.74 (credits)
EEP	Non Riparian	16.38	2:1	32.76 (credits)
On Site Restoration	Riparian	0.63	1:1	0.63 (acres)
On Site Preservation	Riparian	0.59	5:1	2.95 (acres)
Section B				
EEP	Riparian	0.12	2:1	0.24
EEP	Non Riparian	39.87	2:1	79.74

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.

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
Raleigh, NC 27699-1601

This the 31st day of May 2013

DIVISION OF WATER QUALITY

Charles Wakild
Director

WQC No. 3842

R-11

RECEIVED
JUL 2 2013
DIVISION OF HIGHWAYS
PDEA-OFFICE OF NATURAL ENVIRONMENT

North Carolina Department of Environment and Natural Resources
Division of Coastal Management

Pat McCrory
Governor

Braxton C. Davis
Director

John E. Skvarla, III
Secretary

June 28, 2013

Gregory J. Thorpe, Ph.D.
Environmental Manager Director
Project Development and Environmental Analysis Branch
NC Department of Transportation
1598 Mail Service Center
Raleigh, North Carolina 27699-1598

Dear Dr. Thorpe:

The enclosed permit constitutes authorization under the Coastal Area Management Act, and where applicable, the State Dredge and Fill Law, for you to proceed with your project proposal. The original (buff-colored form) is retained by you and it must be available on site when the project is inspected for compliance. Please sign both the original and the copy and return the copy to this office in the enclosed envelope. Signing the permit and proceeding means you have waived your right of appeal described below.

If you object to the permit or any of the conditions, you may request a hearing pursuant to NCGS 113A-121.1 or 113-229. Your petition for a hearing must be filed in accordance with NCGS Chapter 150B with the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, NC 27611-6714, (919) 733-2698 within twenty (20) days of this decision on your permit. You should also be aware that if another qualified party submits a valid objection to the issuance of this permit within twenty (20) days, the matter must be resolved prior to work initiation. The Coastal Resources Commission makes the final decision on any appeal.

The project plan is subject to those conditions appearing on the permit form. Otherwise, all work must be carried out in accordance with your application. Modifications, time extensions, and future maintenance require additional approval. Please read your permit carefully prior to starting work and review all project plans, as approved. If you are having the work done by a contractor, it would be to your benefit to be sure that he fully understands all permit requirements.

From time to time, Department personnel will visit the project site. To facilitate this review, we request that you complete and mail the enclosed Notice Card just prior to work initiation. However, if questions arise concerning permit conditions, environmental safeguards, or problem areas, you may contact Department personnel at any time for assistance. By working in accordance with the permit, you will be helping to protect our vitally important coastal resources.

Sincerely,

Douglas V Huggett

Douglas V. Huggett
Major Permits and Consistency Manager

Enclosure

R-12

Permit Class
NEW

Permit Number
76-13

STATE OF NORTH CAROLINA
Department of Environment and Natural Resources
and
Coastal Resources Commission

Permit

for

X Major Development in an Area of Environmental Concern pursuant to NCGS 113A-118

X Excavation and/or filling pursuant to NCGS 113-229

Issued to **N.C. Department of Transportation, 1598 Mail Service Center, Raleigh, NC 27699-1548**

Authorizing development in Brunswick and New Hanover County at a new crossing of the Cape Fear River and Toomers Creek (US 17 Wilmington Bypass) as requested in the permittee's application dated 4/3/13, including the attached drawings as referenced in Condition No. 1 of this permit.

This permit, issued on **6/28/13**, is subject to compliance with the application (where consistent with the permit), all applicable regulations, special conditions and notes set forth below. Any violation of these terms may be subject to fines, imprisonment or civil action; or may cause the permit to be null and void.

US 17 Bypass of Wilmington (TIP No. R-2633B)

1) Unless specifically altered herein, all work authorized by this permit shall be carried out in accordance with the following seventy seven (76) workplan drawings:

½ size drawings: Twenty six (26) drawings dated 11/30/12, five (5) drawings dated 12/3/12, two (2) drawings dated 2/8/13, three (3) drawings dated as received on 4/8/13, twenty four (24) drawings dated 5/2/13, three (3) drawings dated 5/6/13, two (2) drawings dated 5/14/13, and eleven (11) drawings dated 5/24/13.

(See attached sheets for Additional Conditions)

This permit action may be appealed by the permittee or other qualified persons within twenty (20) days of the issuing date. An appeal requires resolution prior to work initiation or continuance as the case may be.

This permit must be accessible on-site to Department personnel when the project is inspected for compliance.

Any maintenance work or project modification not covered hereunder requires further Division approval.

All work must cease when the permit expires on

No Expiration Date, pursuant to GS 136-44.7B

In issuing this permit, the State of North Carolina agrees that your project is consistent with the North Carolina Coastal Management Program.

Signed by the authority of the Secretary of DENR and the Chairman of the Coastal Resources Commission.

Douglas V Huggett
for

Braxton C. Davis, Director
Division of Coastal Management

This permit and its conditions are hereby accepted.

E. L. Lusk for Gregory J. Thorpe, PhD

Signature of Permittee

ADDITIONAL CONDITIONS

2) In accordance with project commitments made within the CAMA permit application, and in order to protect anadromous fish during spawning periods and through embryonic, larval or juvenile life stages, no in-water work shall be conducted in the Cape Fear River and Toomers Creek from February 1st through June 15th of any year without prior approval of the NC Division of Coastal Management (DCM), in consultation with the NC Wildlife Resources Commission (WRC) and the NC Division of Marine Fisheries (DMF). For the purposes of this moratorium, in-water is defined as extending 35 meters (115 feet) from the main channel where the vegetation line meets open water and into adjacent wetlands. The in-water work moratorium prohibits pile installation, both vibratory and impact, and activities associated with the construction of any temporary work bridge.

3) Unless specifically altered herein, the permittee shall implement NCDOT's Stream Crossing Guidelines for Anadromous Fish Passage.

4) The West Indian Manatee, *Trichecus manatus*, which is listed as a federally endangered species, has been reported in North Carolina waters. Therefore, in accordance with commitments made by the permittee and in order to protect the West Indian Manatee all work should be done during the period from November 1 to May 31. If work must be done during the period from June through October the enclosed guidelines prepared by the U.S. Fish and Wildlife Service (USFWS), entitled "Guidelines for Avoiding Impacts to the West Indian Manatee: Precautionary Measures for Construction Activities in North Carolina Waters (rev. 06/03)" shall be followed.

5) The authorized project is located within a Primary Nursery Area (PNA). Therefore, in accordance with T15A:07H.0208 of the rules of the Coastal Resources Commission, no new dredging or excavation within PNA shall be permitted. Dredging in any manner, including "kicking" with boat propellers is not authorized. This prohibition shall be applied and enforced throughout the construction and any following maintenance activities.

6) The permanent and temporary work bridge piles shall be installed with vibratory hammer, pile driver, or drilling. Should jetting of any bridge piles become necessary, additional authorization shall be required by DCM in consultation with the appropriate resource agencies.

7) Turbidity curtains shall be used to isolate all in-water work areas from the adjacent waterbody, including but not limited to pile driving/drilling or removal activities and excavation and filling activities. The turbidity curtains shall encircle the immediate work area but, shall not impede navigation. The turbidity curtains shall be properly maintained and retained in the water until construction is complete and shall only be removed when turbidity within the curtains reaches ambient levels.

8) Drill slurry, uncured concrete, and water that has been in contact with uncured concrete, shall not be allowed to contact waters of the State or water that will enter waters of the State. Drilling fluids shall be disposed of in an upland disposal site. Water returning to the river shall be of sufficient quality so as not to pose as threat to aquatic organisms or otherwise violate State water quality standards.

9) Excavated material from the drill-shaft construction shall be removed from the encasements directly into containment vessels and sufficient efforts shall be utilized to minimize spillage of spoil material into waters of the State.

ADDITIONAL CONDITIONS

10) Excavated material from the drill-shaft construction shall be removed from the encasements directly into containment vessels and sufficient efforts shall be utilized to minimize spillage of spoil material into waters of the State.

11) The permittee and/or his contractor shall exercise all available precautions in day-to-day operations to prevent waste from entering the adjacent waters and wetlands.

12) Any debris resulting from the construction of the new bridges shall not enter wetlands or waters of the State, even temporarily.

13) Any waste materials and debris associated with bridge construction or other activities shall be disposed of at an approved upland site or shall be recycled in an environmentally appropriate manner provided appropriate authorizations are obtained from any relevant state, federal, or local authorities.

14) The permittee and/or his contractor shall provide for proper storage and handling of all oils, chemicals, etc., necessary to carry out the project.

15) Construction staging areas shall be located only in upland areas, and not in wetlands or waters of the State.

16) Placement of riprap shall be limited to the areas as depicted on the attached workplan drawings. The riprap material shall be free from loose dirt or any pollutant. The riprap material shall consist of clean rock or masonry materials, such as but not limited to, granite, marl, or broken concrete.

17) The temporary work bridges shall be removed in their entirety within 90 days after they are no longer needed. However, if this timeframe occurs while the moratorium referenced in Condition No. 2 of this permit is in effect, then the temporary work bridge shall be removed in its entirety within 90 days of the moratorium end date.

18) The permittee shall minimize the need to cross wetlands in transporting equipment to the maximum extent practicable.

19) Construction mats shall be utilized to support equipment within wetland areas to minimize temporary wetland impacts. These mats shall be removed immediately following project completion.

20) There shall be no clearing or grubbing of wetlands outside of the areas indicated on the attached workplan drawings without prior approval from DCM.

21) In accordance with project commitments made within the permit application, bridge deck drains shall not be located over the open waters of the Cape Fear River or Toomers Creek and shall not cause erosion of adjacent wetlands.

22) During bridge construction, the permittee shall make every attempt to allow the same navigation that is currently possible in the Cape Fear River. If this is not possible, then adequate notice shall be provided to the public that navigation will be limited during construction. The notice shall include an estimate of the amount of time that the limited navigation will occur.

ADDITIONAL CONDITIONS

23) During bridge construction, the permittee shall make every attempt to allow the same navigation that is currently possible in the Cape Fear River. If this is not possible, then adequate notice shall be provided to the public that navigation will be limited during construction. The notice shall include an estimate of the amount of time that the limited navigation will occur.

24) In accordance with project commitments made within the Record of Decision, dated October 2007, protective fencing shall be installed to ensure that no inadvertent impacts occur to populations of Pickering's Dawnflower, a listed Federal Species of Concern and state-listed endangered species, outside the limits of the construction easement.

Excavation and Fill

25) No excavation or filling shall take place at any time in any vegetated wetlands or surrounding waters outside of the alignment of the areas indicated on the attached workplan drawings, without permit modification.

26) Material excavated may be used in fill areas associated with the project or shall be removed from the site and taken to an approved high ground location.

27) All excavated materials shall be confined above normal high water level and landward of regularly or irregularly flooded wetlands behind adequate dikes or other retaining structures to prevent spillover of solids into any wetlands or surrounding waters.

28) No excavated or fill material shall be placed at any time in any vegetated wetlands or surrounding waters outside of the alignment of the areas as indicated on the attached workplan drawings, without permit modification.

29) The temporary placement and double handling of any excavated or fill material within waters or vegetated wetlands is not authorized.

30) All fill material shall be clean and free of any pollutants except in trace quantities.

Barges

31) Barges shall be removed promptly when they are no longer needed.

32) Barges shall be utilized only in areas of sufficient depth such that the barges do not rest on the bottom during periods of low tide.

33) Caution shall be exercised with placement and removal of any barges to ensure that impacts to shallow water habitat are avoided and minimized to the maximum extent practicable.

ADDITIONAL CONDITIONS

Sedimentation and Erosion Control

34) This project shall conform to all requirements of the NC Sedimentation Pollution Control Act and NC DOT's Memorandum of Agreement with the Division of Energy, Mineral and Land Resources.

35) Unless specifically altered herein, the permittee shall follow "Best Management Practices for the Protection of Surface Waters (3/97)" and shall also implement sedimentation and erosion control measures sufficient to protect aquatic resources. At a minimum, appropriate sedimentation and erosion control devices, measures or structures shall be implemented to ensure that eroded materials do not enter adjacent wetlands, watercourses, and property (e.g. silt fence, diversion swales or berms, etc.).

Compensatory Mitigation

36) Due to the possibility that compaction, mechanized clearing and/or other site alterations might prevent any temporary Coastal Wetland impact area from re-attaining pre-project Coastal Wetland functions, the permittee shall monitor temporary Coastal Wetland impacts for three years after project completion. The permittee shall schedule a meeting with DCM to verify the extent and location of temporary impacts upon project completion. The permittee shall then provide an annual update on any Coastal Wetland areas temporarily impacted by this project. This annual update shall consist of photographs and written report on the progress of these temporarily impacted areas in re-attaining Coastal Wetland jurisdictional status. Three years after project completion, the permittee shall schedule an agency field meeting with DCM to determine if the Coastal Wetland areas temporarily impacted by this project have re-attained pre-project Coastal Wetland functions. If at the end of 3 years the Coastal Wetland areas temporarily impacted by this project have not re-attained pre-project Coastal Wetland functions, DCM shall determine whether compensatory Coastal Wetland mitigation shall be required.

NOTE: The Ecosystem Enhancement Program (EEP) agreed to provide mitigation for the entire project (R-2633AA&AB and R-2633B) impacts of 7.28 acres of riparian wetlands, 56.25 acres of non-riparian wetlands, and 509.0 linear feet of stream impacts, in accordance to the EEP Mitigation Acceptance Letter, dated 5/30/13.

Utilities Relocation

37) Any relocation of utility lines that has not been previously permitted by DCM or is not already depicted on the attached work plan drawings, or described within the attached permit application, shall require approval by DCM, either under the authority of this permit, or by the utility company obtaining separate authorization.

General

38) The permittee and/or contractor shall contact the DCM Transportation Field Representative at (252) 808-2808 extension No. 208 to schedule a pre-construction conference prior to project initiation.

ADDITIONAL CONDITIONS

39) DWQ authorized the proposed project (DWQ Project No. 20100867 v.4) on 5/31/13 under Certification No. 3842 as a modification to the original Water Quality Certification, dated 1/7/11 and reissued on 1/13/11. Any violation of the Certification approved by the DWQ shall be considered a violation of this CAMA permit.

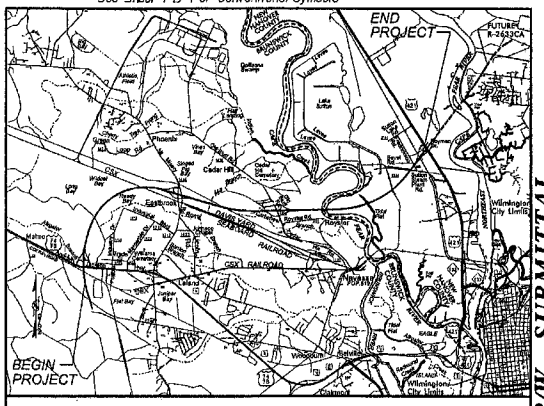
NOTE: DWQ provided confirmation that the subject project is excluded from State Coastal Stormwater permitting requirements by way of the Stormwater Permit Exclusion letter, dated ~~12/17/10~~ 5/13/13 (Project No. SW8 101115).

NOTE: If it is determined that additional permanent and/or temporary impacts are necessary that are not shown on the attached permit drawings or described in the authorized permit application, permit modification or additional authorization from DCM shall be required.

NOTE: This permit does not eliminate the need to obtain any additional state, federal, or local permits, approvals, or authorizations that may be required, including, but not limited to, the US Army Corps of Engineers and/or the US Coast Guard.

CONTRACT: TIP PROJECT: R-2633B

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols



VICINITY MAP FOR STATE PROJECT R-2633B

R/W SUBMITTAL

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

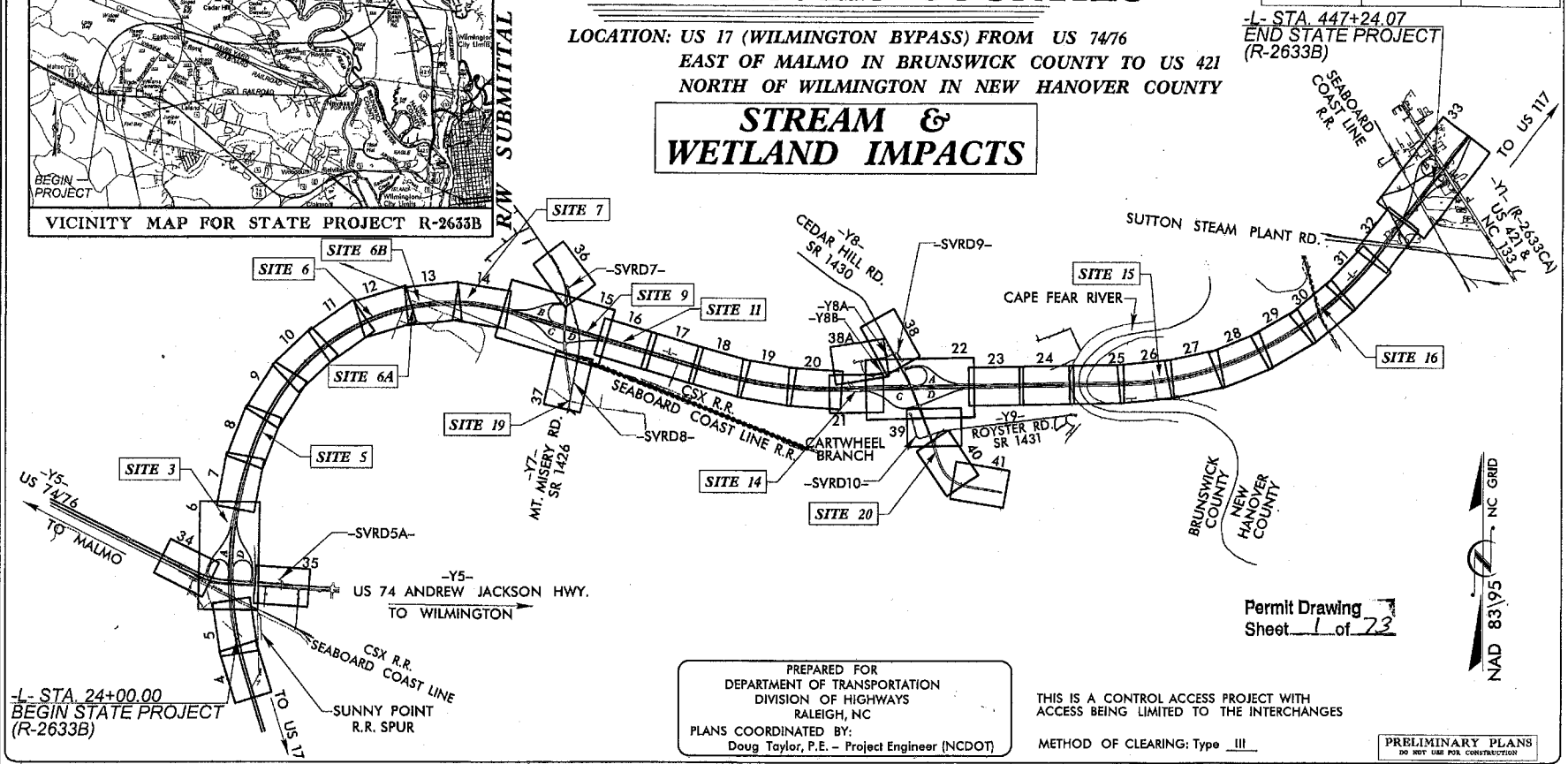
BRUNSWICK & NEW HANOVER COUNTIES

LOCATION: US 17 (WILMINGTON BYPASS) FROM US 74/76
EAST OF MALMO IN BRUNSWICK COUNTY TO US 421
NORTH OF WILMINGTON IN NEW HANOVER COUNTY

STREAM & WETLAND IMPACTS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2633B	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34491.1.2	STPNHF-17(1)	P.E.
34491.2.3		R/W



Permit Drawing
Sheet 1 of 73

PREPARED FOR
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, NC
PLANS COORDINATED BY:
Doug Taylor, P.E. – Project Engineer (NCDOT)

THIS IS A CONTROL ACCESS PROJECT WITH ACCESS BEING LIMITED TO THE INTERCHANGES

METHOD OF CLEARING: Type III

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

50' 25' 0 50' 100'
PLANS

50' 25' 0 50' 100'
PROFILE (HORIZONTAL)

10' 5' 0 10' 20'
PROFILE (VERTICAL)

DESIGN DATA

ADT 2009 = 16,400
ADT 2025 = 24,900
DHV = 12 %
D = 60 %
T = 15 % *
V = 70 MPH
* TTST 10% DUAL 5%
FUNC. CLASS. = INTERSTATE

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2633B = 6.24 Miles
LENGTH STRUCTURES TIP PROJECT R-2633B = 1.78 Miles
TOTAL LENGTH STATE TIP PROJECT R-2633B = 8.02 Miles

THIS IS A FULL CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS SHOWN ON THE PLANS.

Prepared In the Office of:
LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: June 20, 2008

LETTING DATE: July 19, 2011

Brian K. Eason, P.E.
PROJECT ENGINEER

Jeffrey R. Hext
PROJECT DESIGN ENGINEER

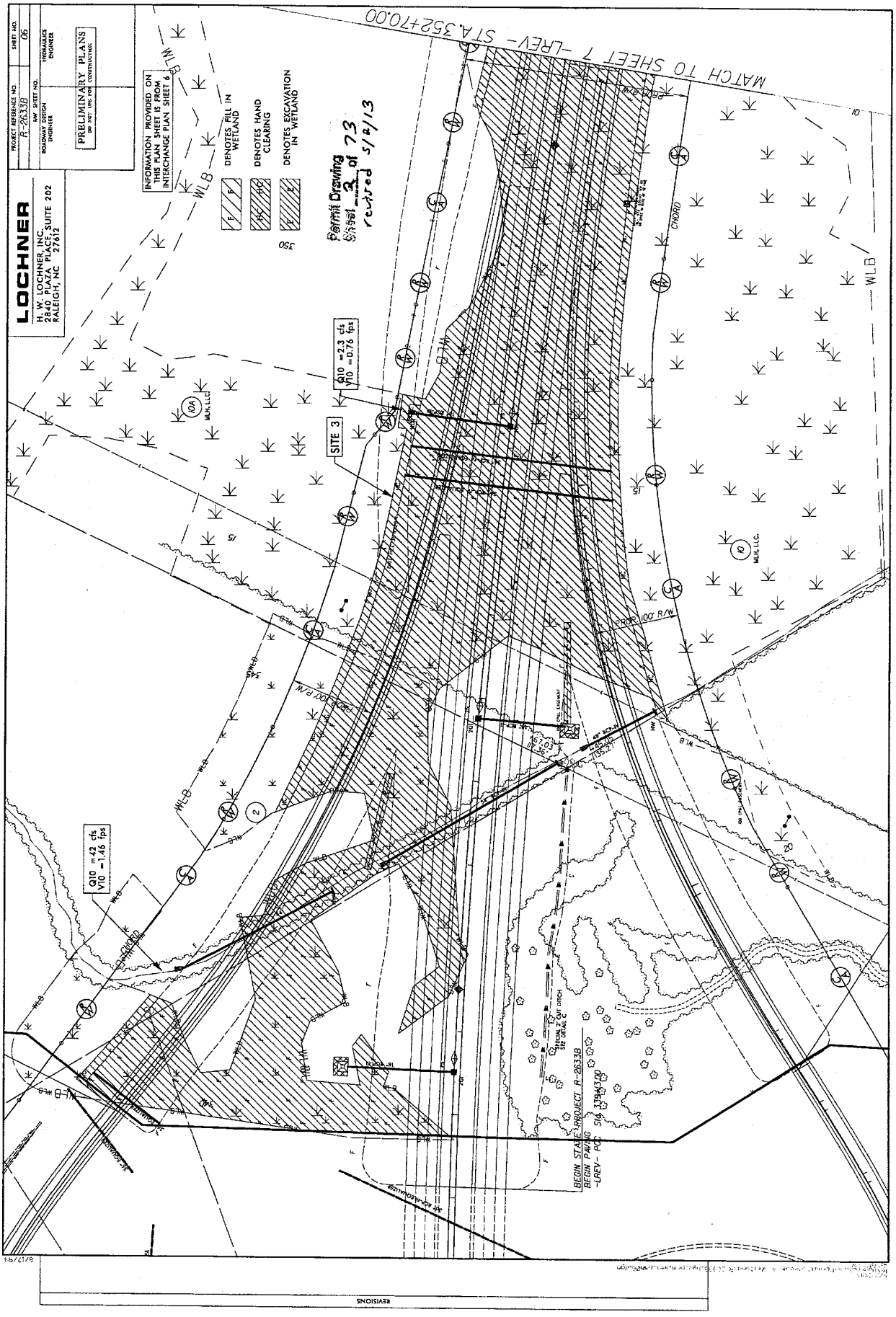
HYDRAULICS ENGINEER
SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER
SIGNATURE: P.E.

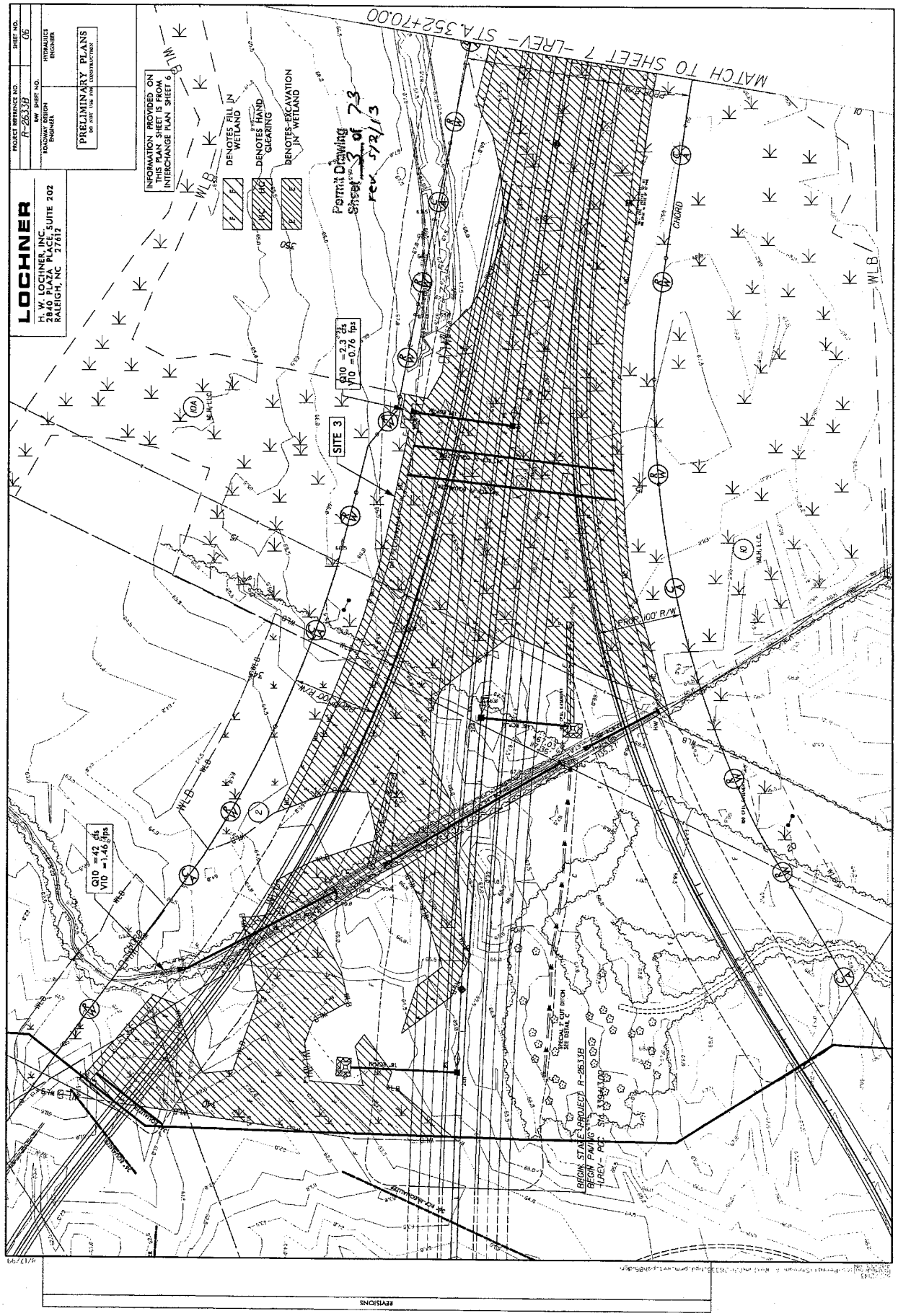
DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE HIGHWAY DESIGN ENGINEER P.E.

$$$$$SYSTIME$$$$$
$$$$$USERNAME$$$$$

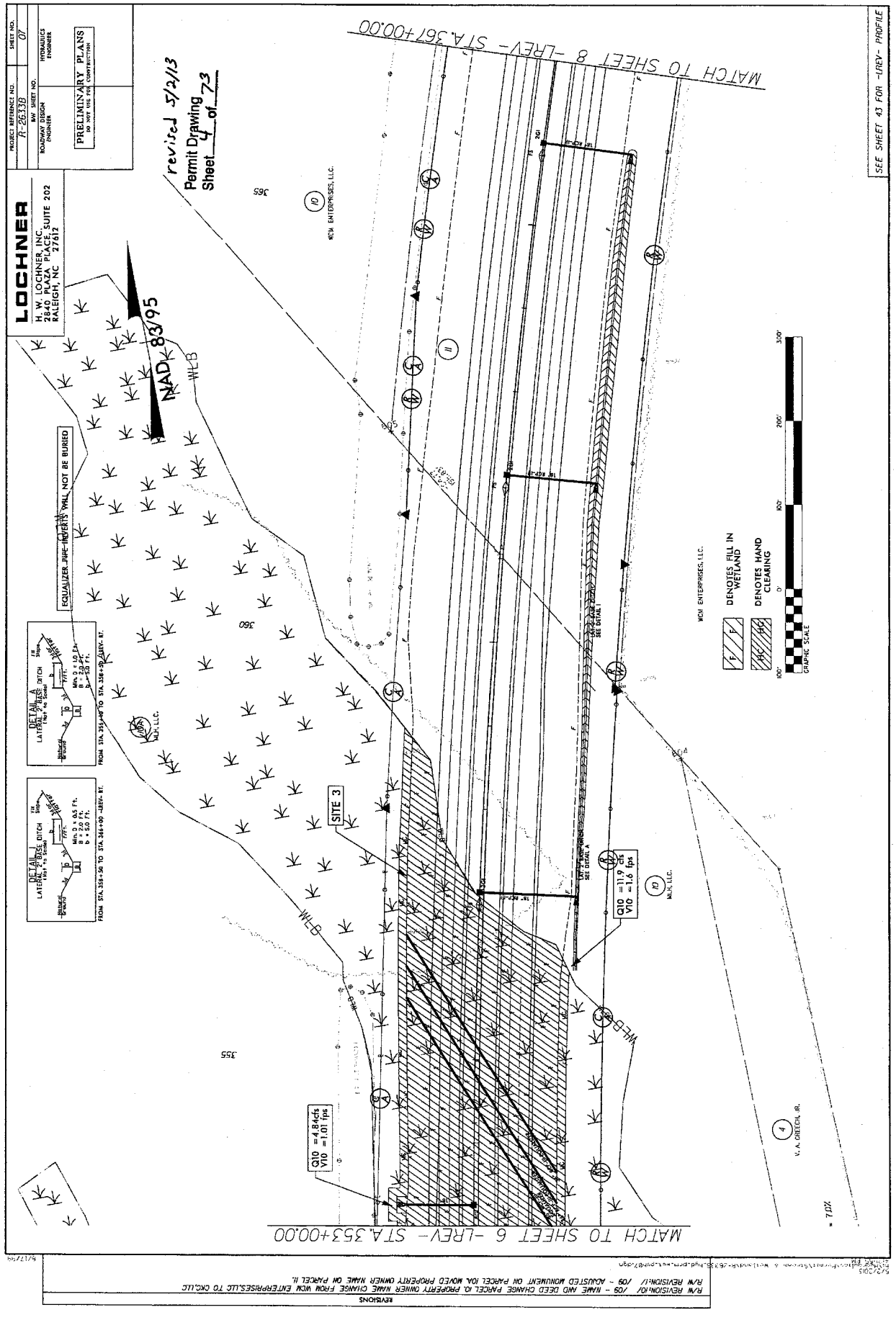

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO.
R-2633B
SHEET NO.
06
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
INFORMATION PROVIDED ON THIS PLAN SHEET IS FROM INTERCHANGE PLAN SHEET 6
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
DENOTES EXCAVATION IN WETLAND
Permit Drawing
Sheet 3 of 73
revised 5/2/13
MATCH TO SHEET 7 -LREV- STA.352+70.00
Q10 =2.3 cfs
V10 =0.76 fps
SITE 3
Q10 =42 cfs
V10 =1.46 fps
WLB
CHORD
PROP. 100' R/W
BEGIN STATE PROJECT R-2633B
BEGIN PAVING
-LREV- PCC
REVISIONS

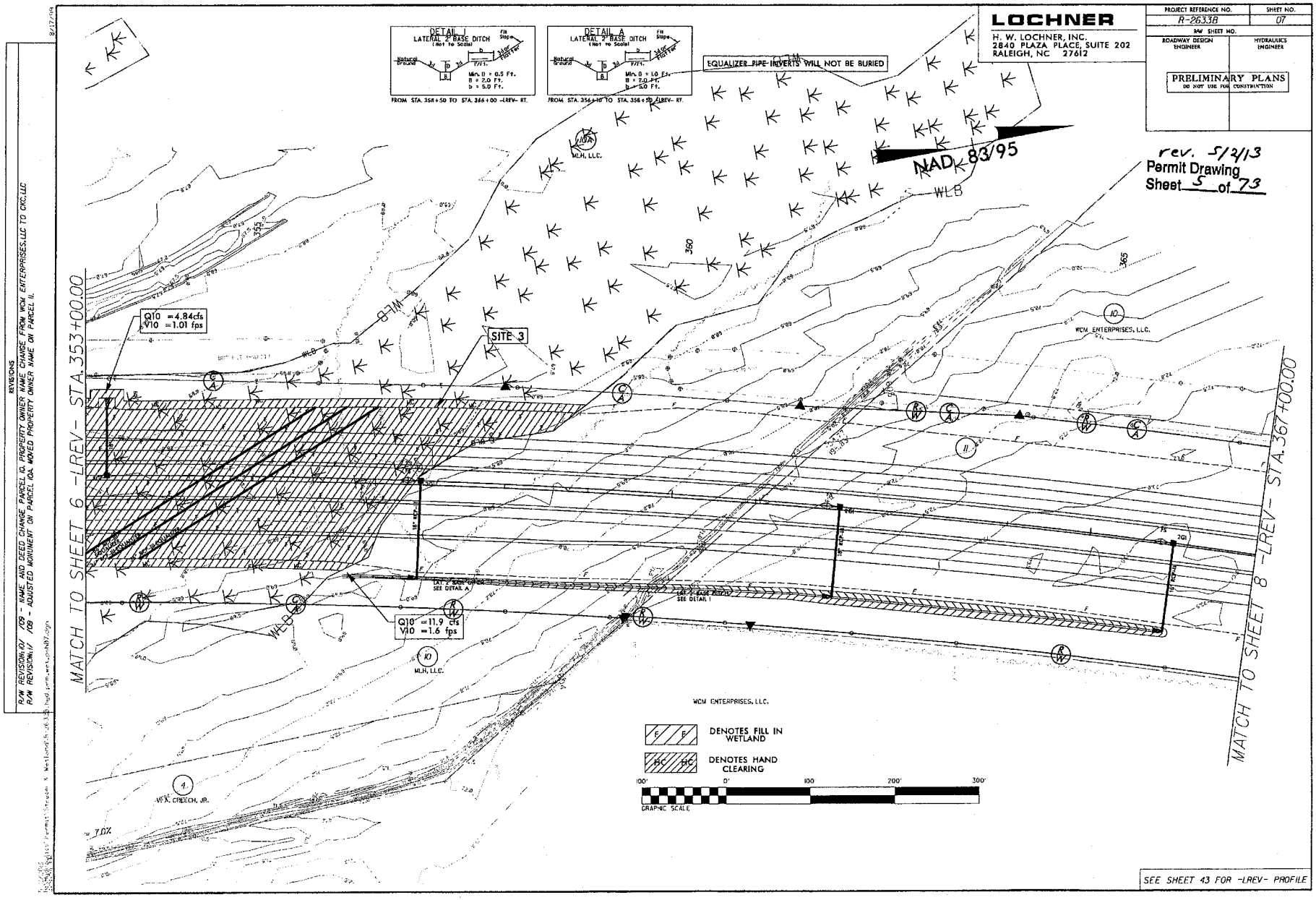
R-20

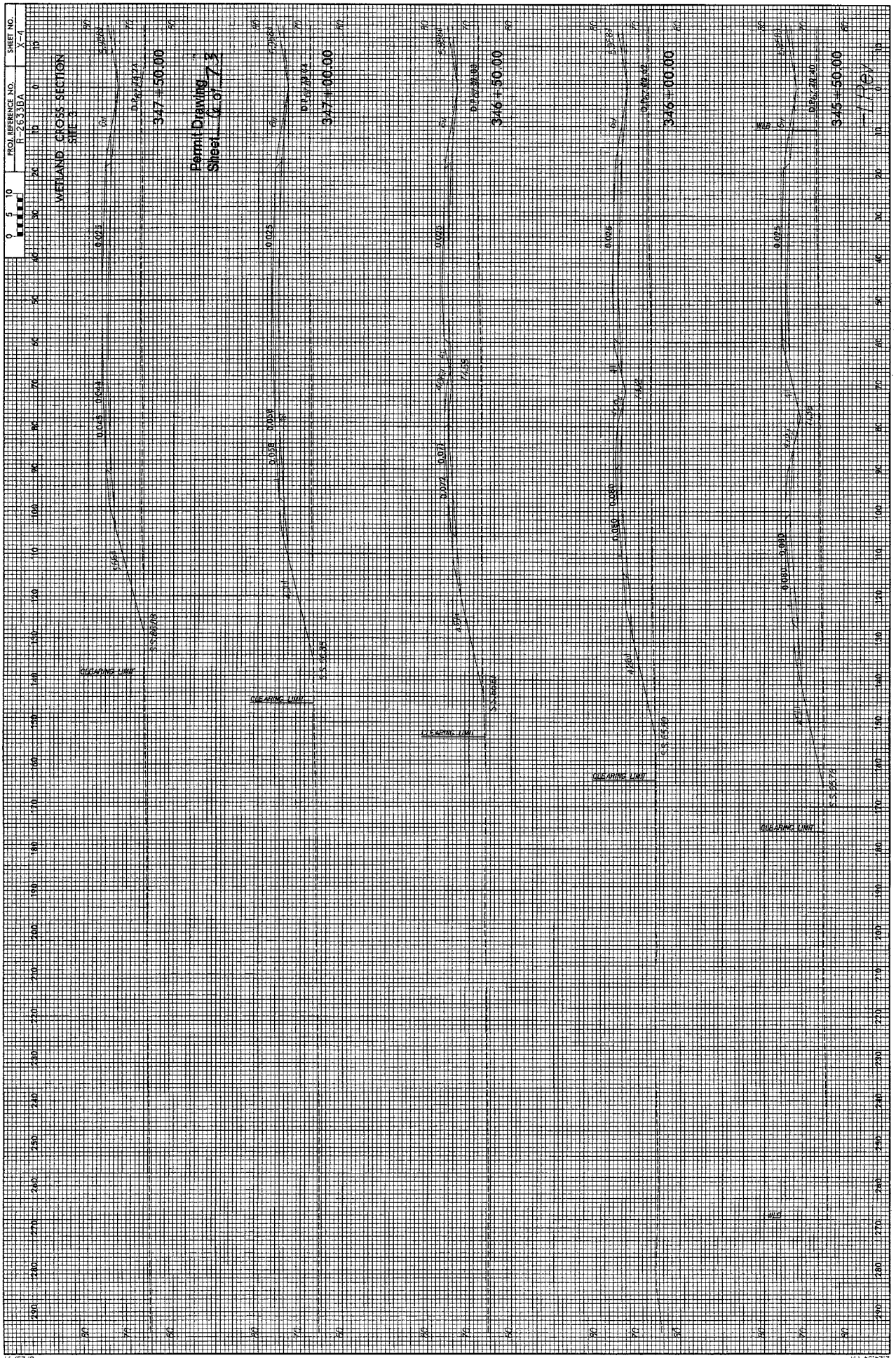


LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO.
R-2633B
SHEET NO.
06
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
INFORMATION PROVIDED ON THIS PLAN SHEET IS FROM INTERCHANGE PLAN SHEET 6
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
DENOTES EXCAVATION IN WETLAND
Permit Drawing
Sheet 3 of 73
rev 5/2/13
MATCH TO SHEET 7 -LREV- STA.352+70.00
SITE 3
Q10 =2.3 cfs
V10 =0.76 fps
Q10 =42 cfs
V10 =1.46 fps
PROP. 100' R/W
CHORD
WLB
BEGIN STATE PROJECT R-2633B
BEGIN PAVING
-LREV- PC
REVISIONS

R-21


LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO. A-2633B
SHEET NO. 07
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
NO RIGHT OF WAY, NO CONSTRUCTION
revised 5/2/13
Permit Drawing
Sheet 4 of 73
NAD 83/95
MATCH TO SHEET 8 -LREV- STA. 367+00.00
MATCH TO SHEET 6 -LREV- STA. 353+00.00
SEE SHEET 43 FOR -LREV- PROFILE
EQUALIZER PIPE INVERTS SHALL NOT BE BURIED
SITE 3
WCM ENTERPRISES, LLC.
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
GRAPHIC SCALE
Q10 =4.84cfs
V10 =1.01 fps
Q10 =11.9 cfs
V10 =1.6 fps
DETAIL A
DETAIL C
V. A. GREECH, JR.
REVISIONS


LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO.
R-2633B
SHEET NO.
07
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
DETAIL J
LATERAL 2' BASE DITCH
(Not to Scale)
Min. D = 0.5 Ft.
B = 2.0 Ft.
b = 5.0 Ft.
FROM STA. 358+50 TO STA. 366+00 -LREV- RT.
DETAIL A
LATERAL 2' BASE DITCH
(Not to Scale)
Min. D = 1.0 Ft.
B = 2.0 Ft.
b = 5.0 Ft.
FROM STA. 356+10 TO STA. 358+50 -LREV- RT.
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
NAD 83/95
rev. 5/2/13
Permit Drawing
Sheet 5 of 73
MATCH TO SHEET 6 -LREV- STA.353+00.00
MATCH TO SHEET 8 -LREV- STA.367+00.00
Q10 =4.84cfs
V10 =1.01 fps
SITE 3
Q10 =11.9 cfs
V10 =1.6 fps
WLB
MLH, LLC.
WCM ENTERPRISES, LLC.
W.A. CREECH, JR.
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
100' 0' 100' 200' 300'
GRAPHIC SCALE
SEE SHEET 43 FOR -LREV- PROFILE
REVISIONS
R/W REVISION: 10/ /09 - NAME AND DEED CHANGE PARCEL 10. PROPERTY OWNER NAME CHANGE FROM WCM ENTERPRISES, LLC TO CKC, LLC
R/W REVISION: 1/ /09 - ADJUSTED MONUMENT ON PARCEL 10A. MOVED PROPERTY OWNER NAME ON PARCEL 11.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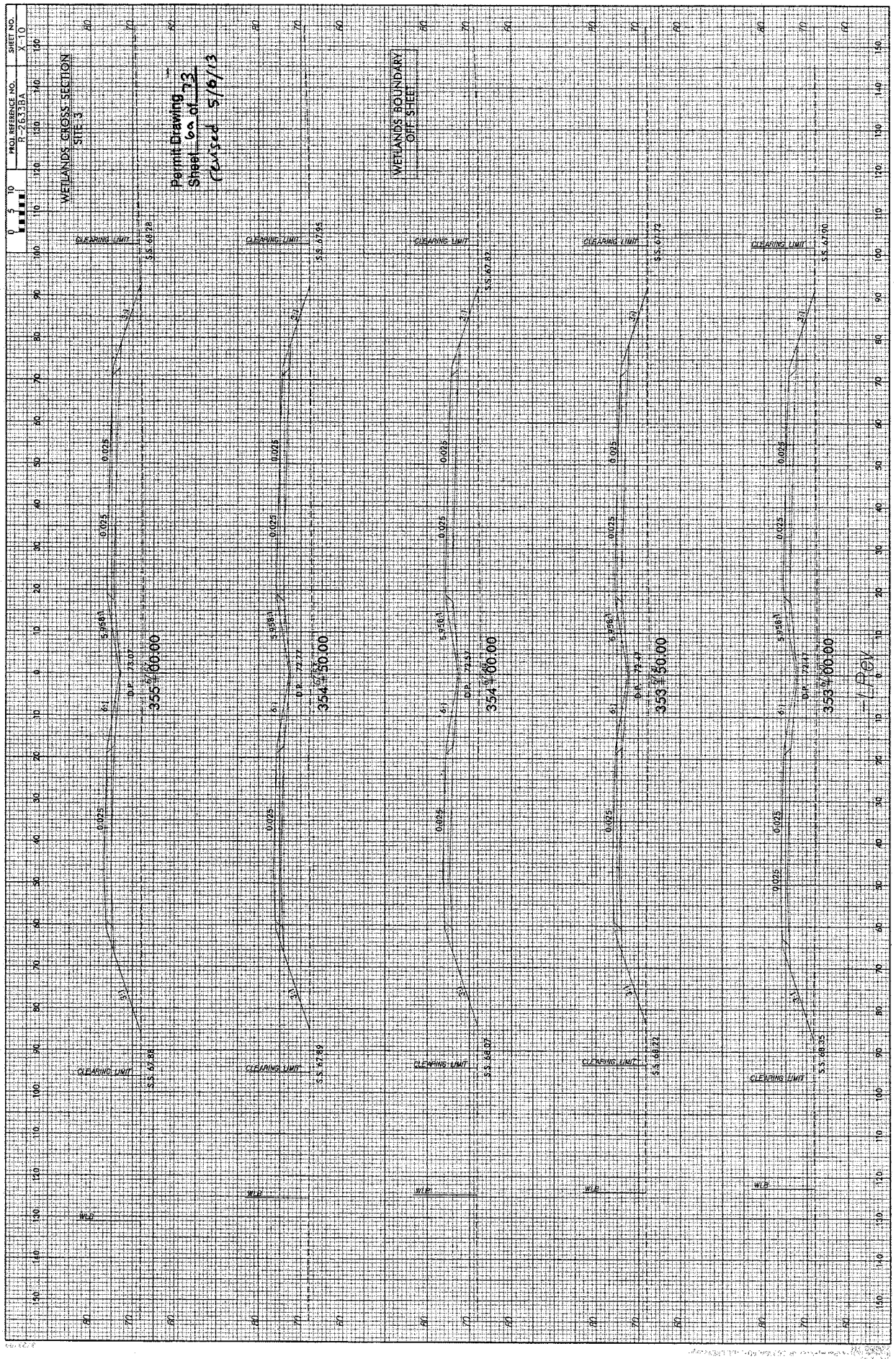
R-2633BA
SHEET NO.
X-4
WETLAND CROSS SECTION
SITE 3
347+50.00
347+00.00
346+50.00
346+00.00
345+50.00
Permit Drawing
Sheet 6 of 73
CLEARING LIMIT
WLB
8/23/99

R-24



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R-2633BA
SHEET NO.
X-10
WETLANDS CROSS SECTION
SITE 3
Permit Drawing
Sheet 6a of 73
Revised 5/6/13
WETLANDS BOUNDARY
OFF SHEET
CLEARING LIMIT
WLB
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354+50.00
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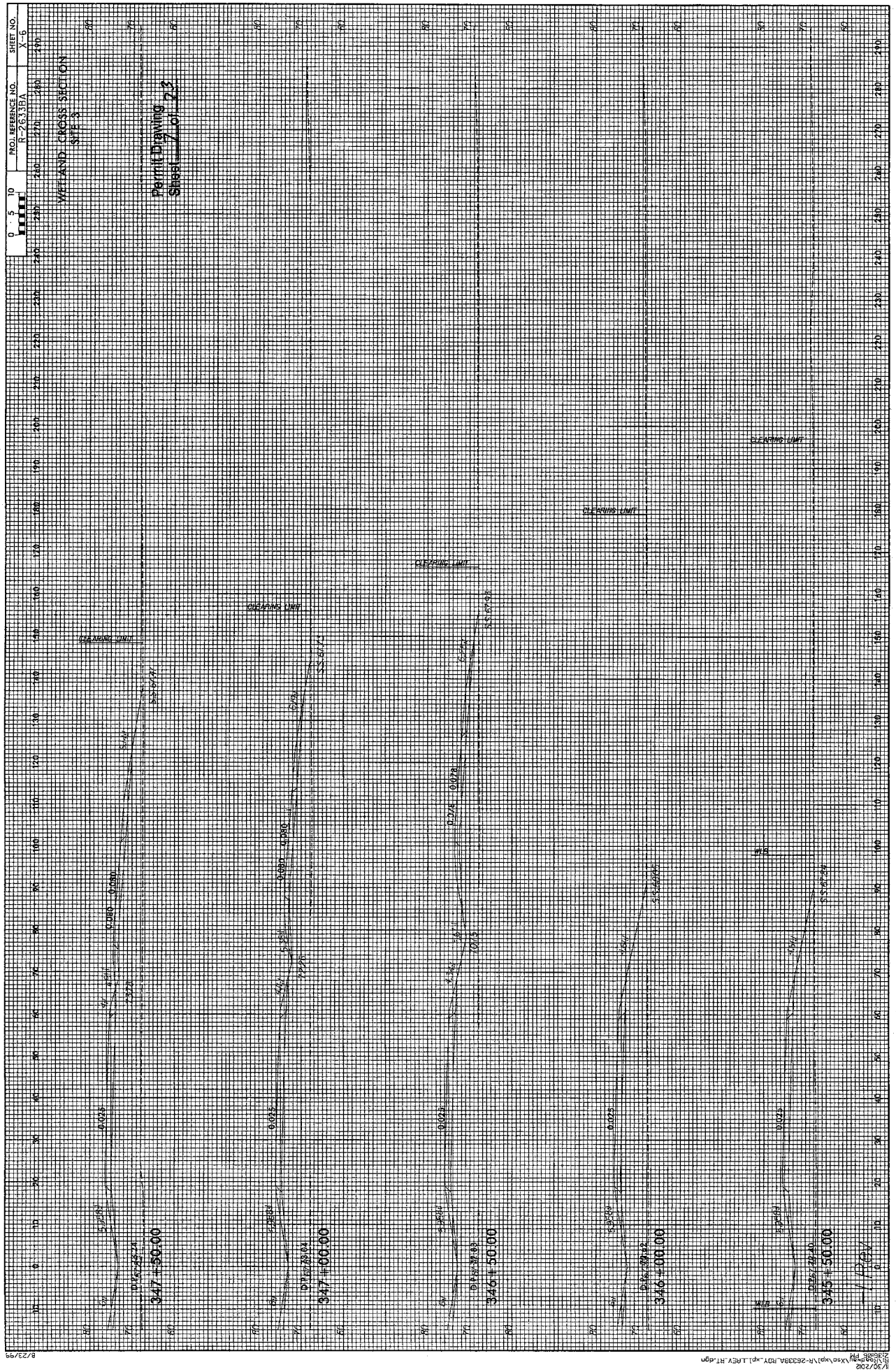
353+50.00
353+00.00
-L Rev

R-25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X-6
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WETLAND CROSS SECTION
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Permit Drawing 2.3
Sheet 7 of 23
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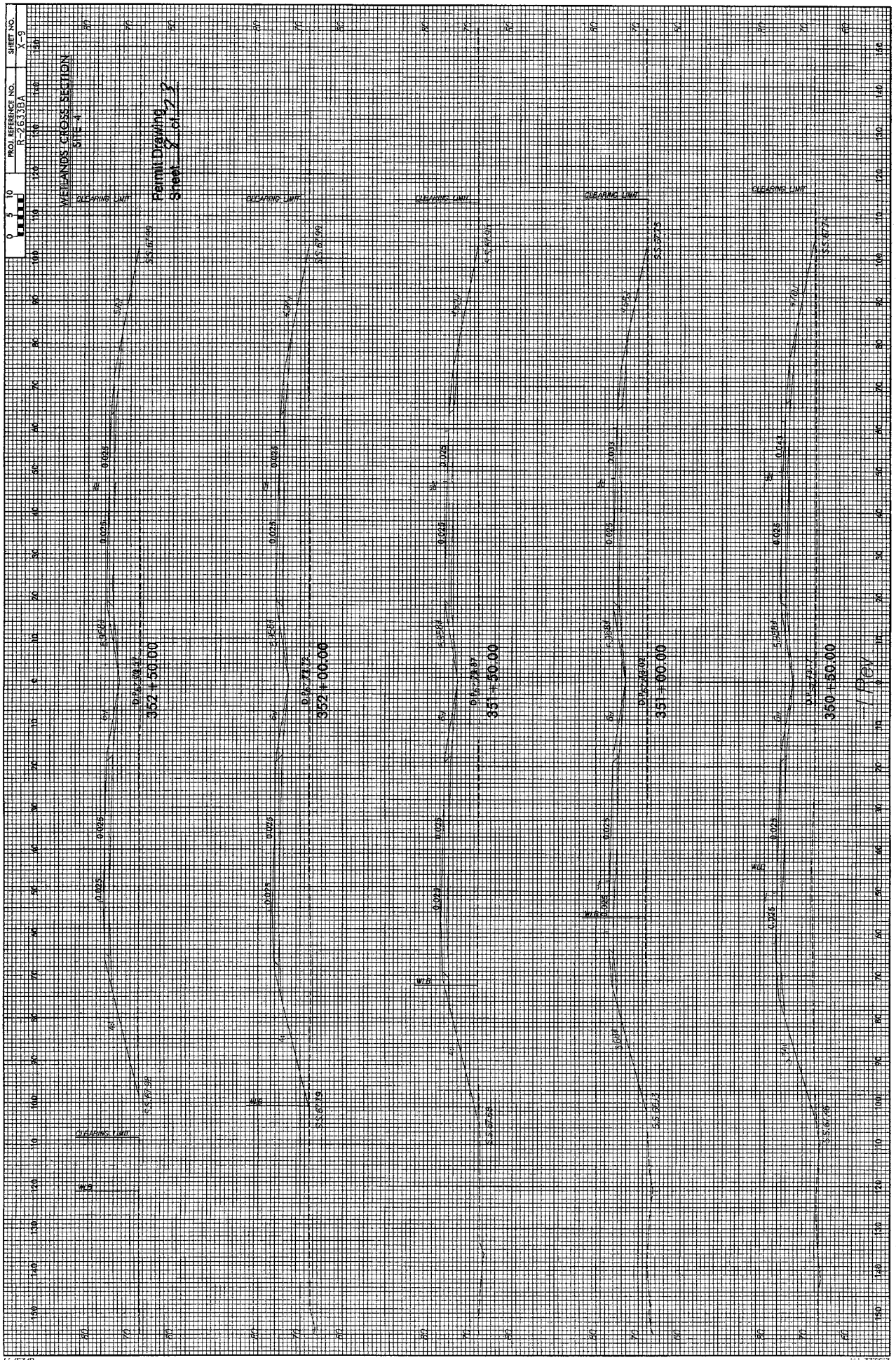
345+50.00
WLB
8/23/99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X-9
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Permit Drawing
Sheet 2 of 23
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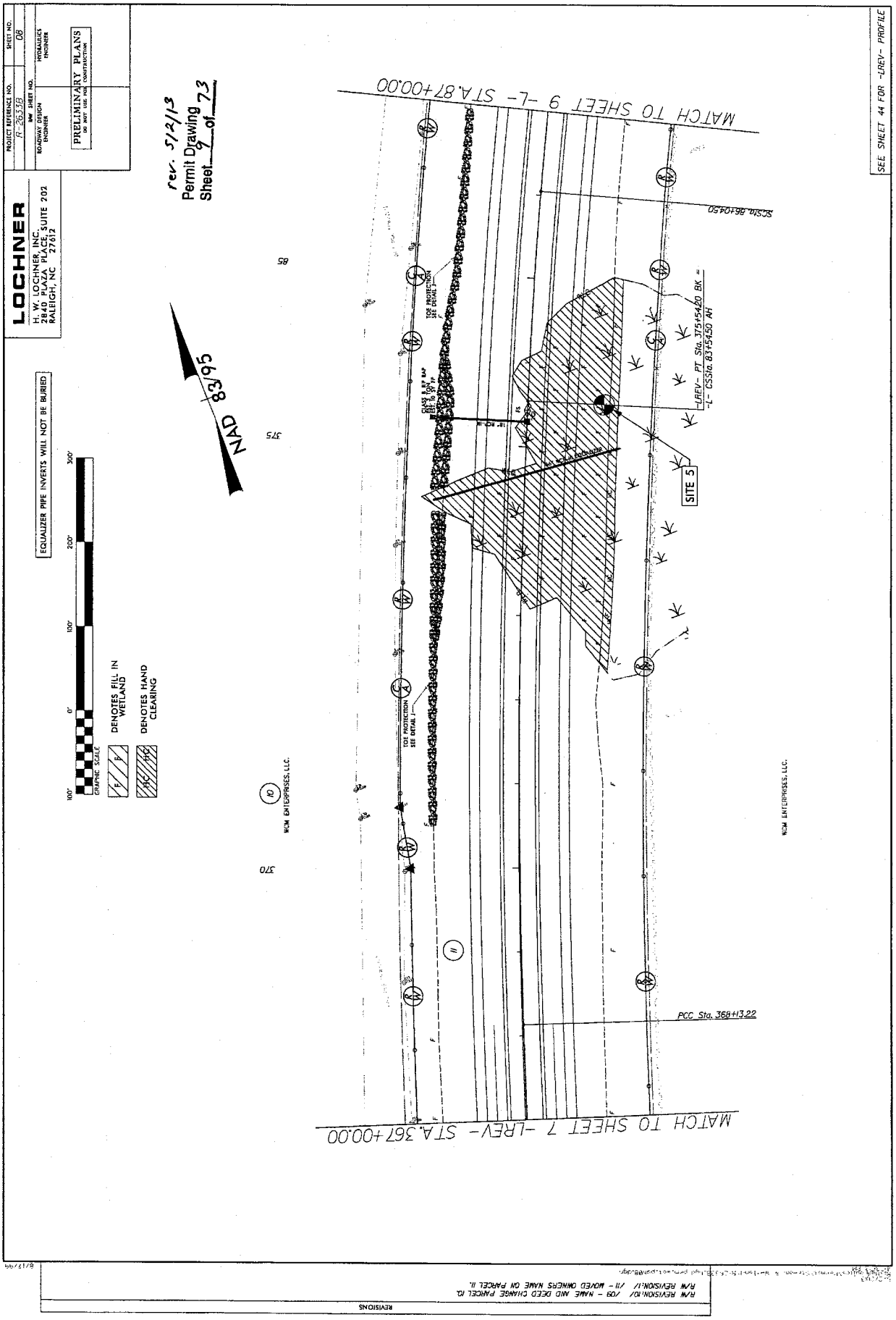
351+50.00
351+00.00
350+50.00
1 Pev

R-27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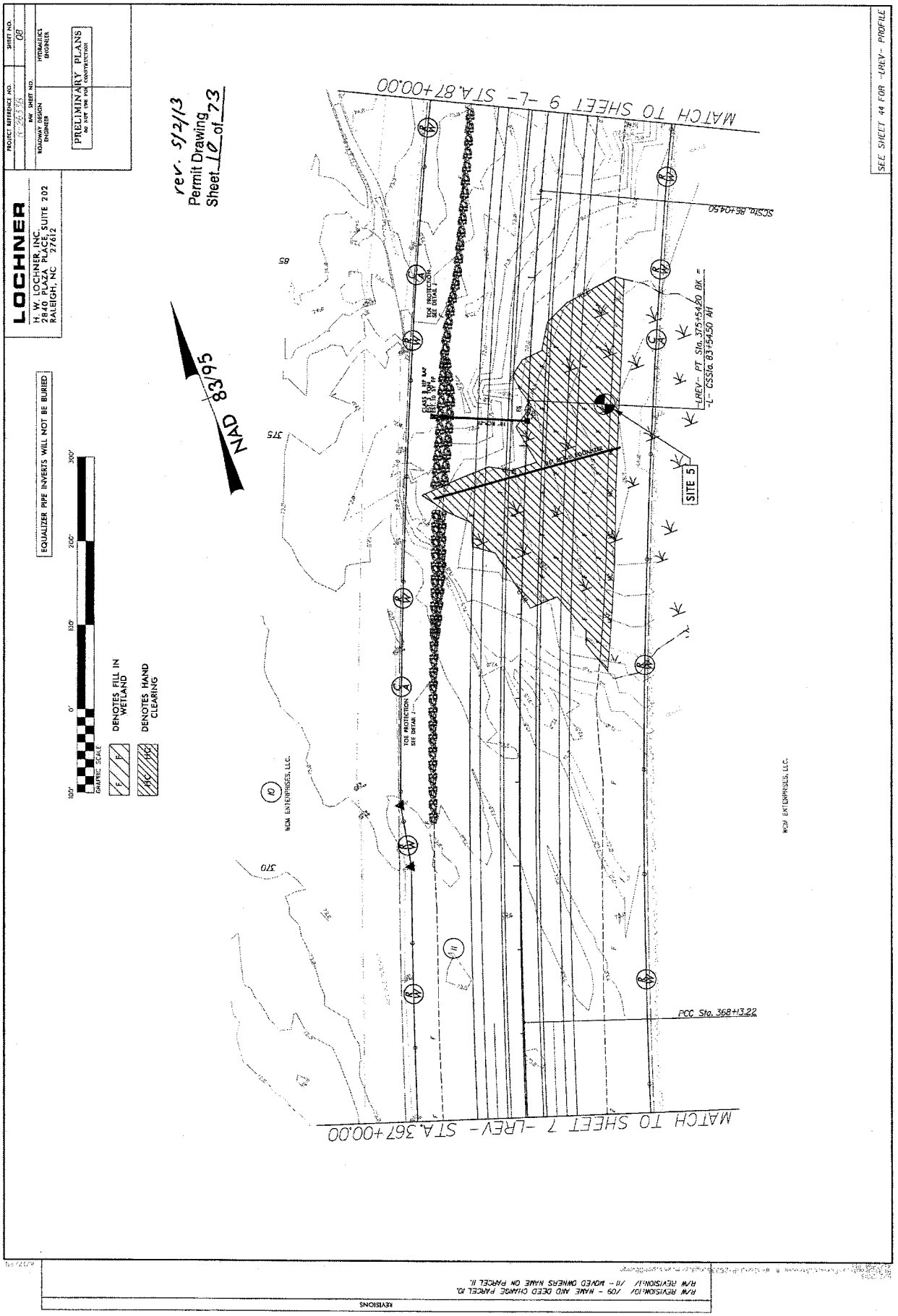
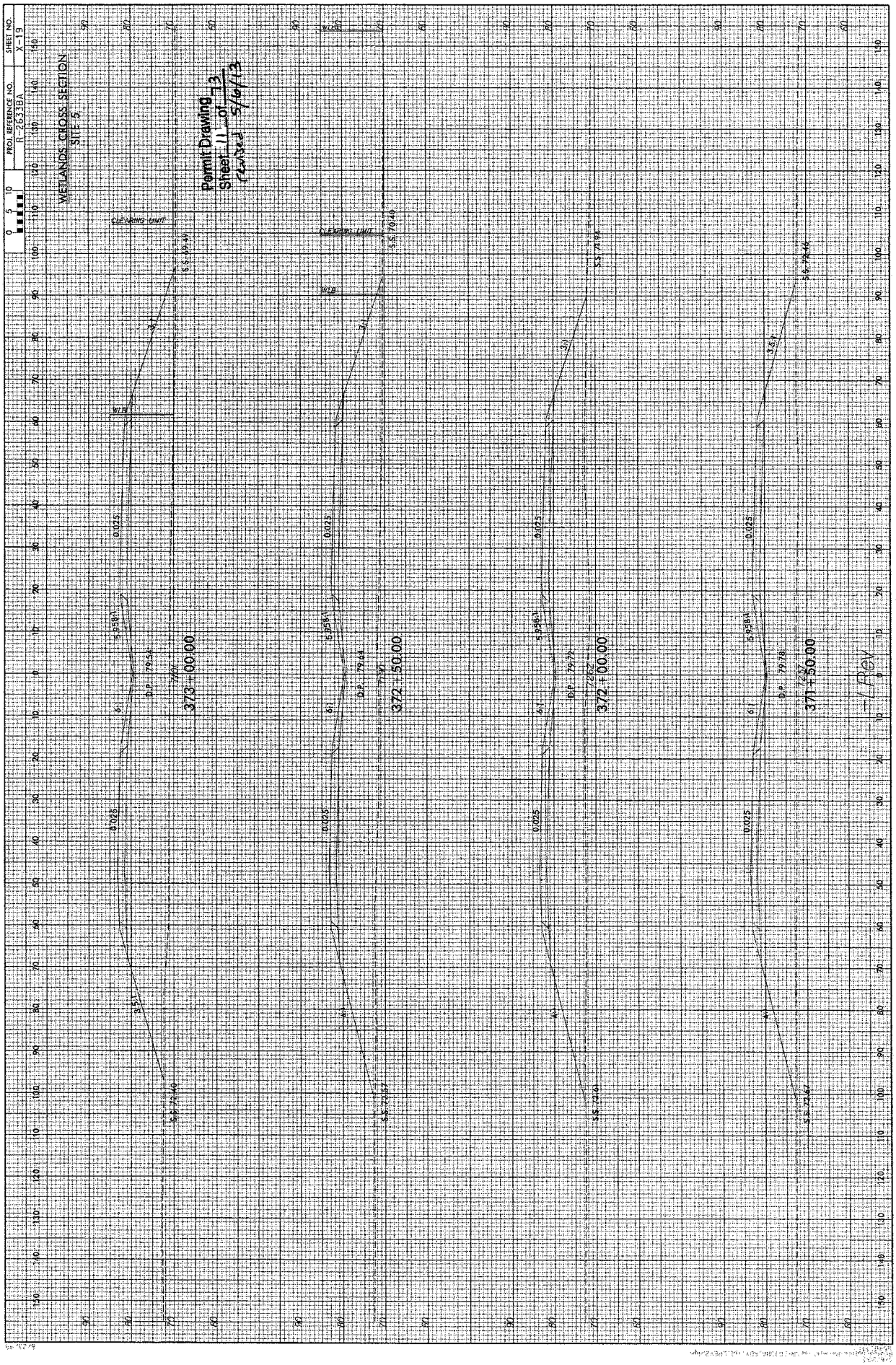
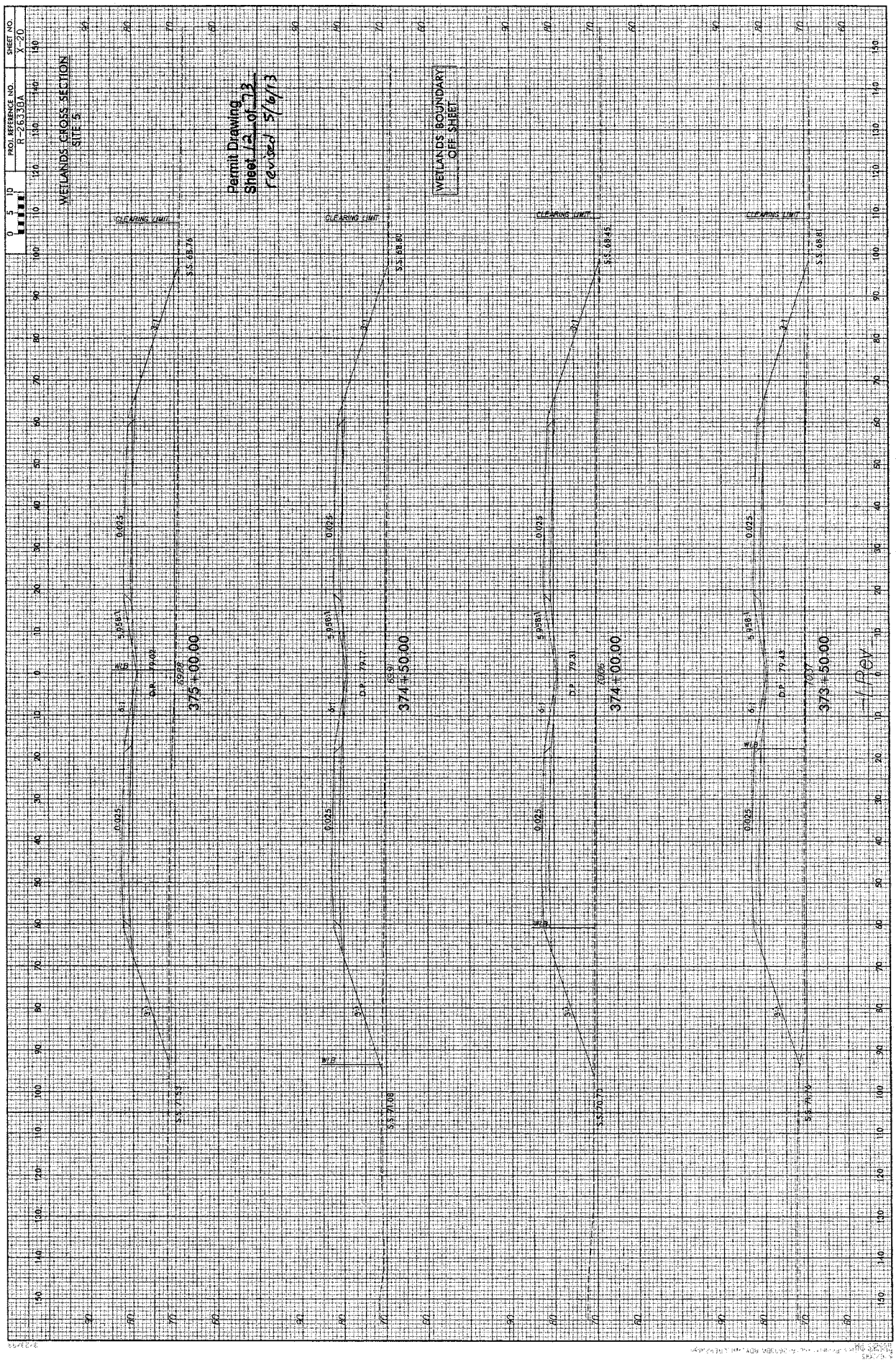
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO. R-2633B
SHEET NO. 08
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
rev. 5/2/13
Permit Drawing
Sheet 9 of 73
NAD 83/95
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
GRAPHIC SCALE
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
MATCH TO SHEET 9 -L- STA. 87+00.00
MATCH TO SHEET 7 -LREV- STA. 367+00.00
SEE SHEET 44 FOR -LREV- PROFILE
SITE 5
PCC Sta. 368+13.22
WOW ENTERPRISES, LLC.
REVISIONS


LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PRELIMINARY PLANS
NO RIGHT OF WAY OR CONSTRUCTION
rev. 5/2/13
Permit Drawing
Sheet 10 of 23
NAD 83/95
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
SITE 5
MATCH TO SHEET 9 -L- STA. 87+00.00
MATCH TO SHEET 7 -LREV- STA. 367+00.00
SCSIa. 86+04.50
PCC Sta. 368+13.22
TOE PROTECTION SEE DETAIL
WDM ENTERPRISES, LLC.
SEE SHEET 44 FOR -LREV- PROFILE
REVISIONS

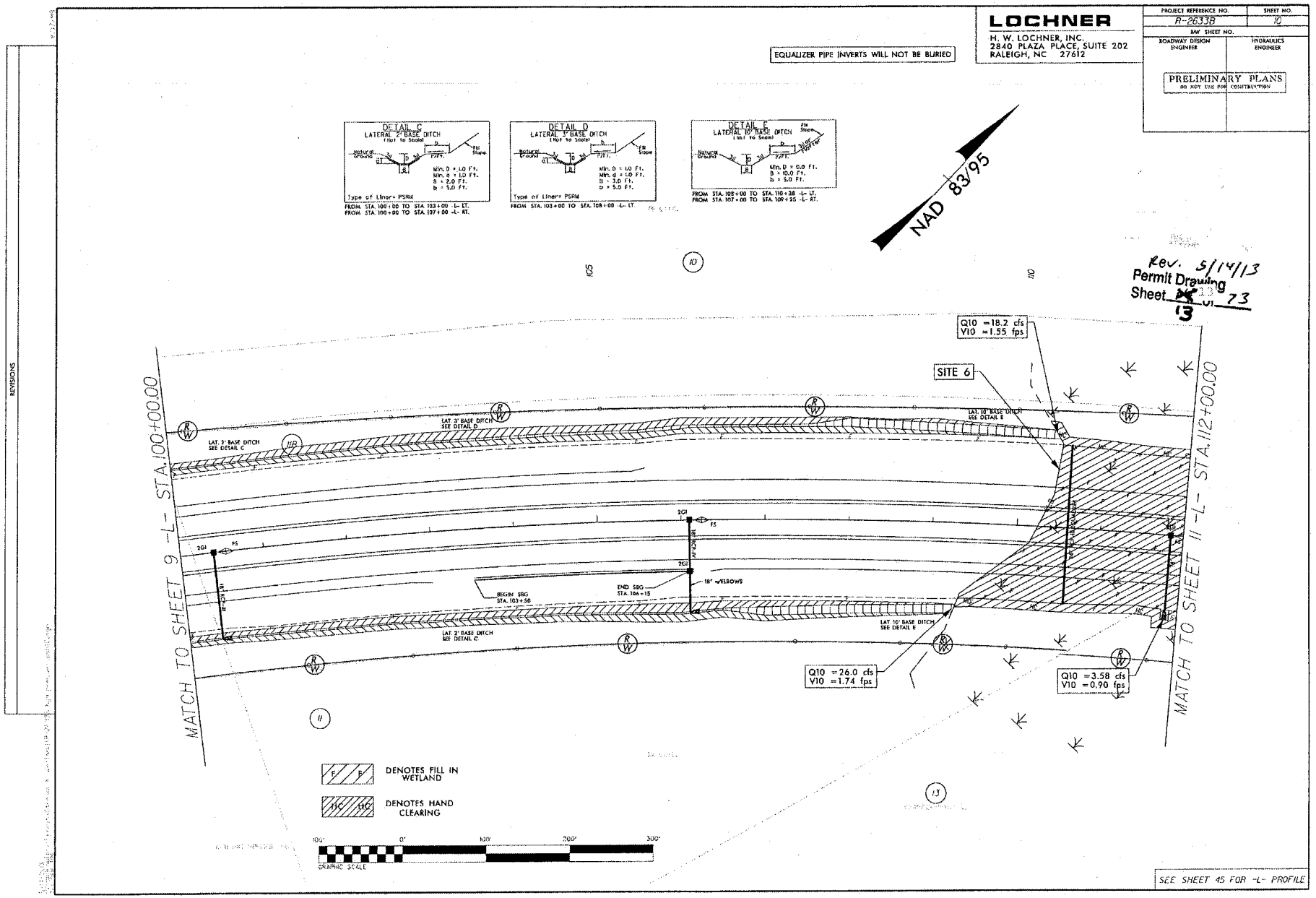
R-29

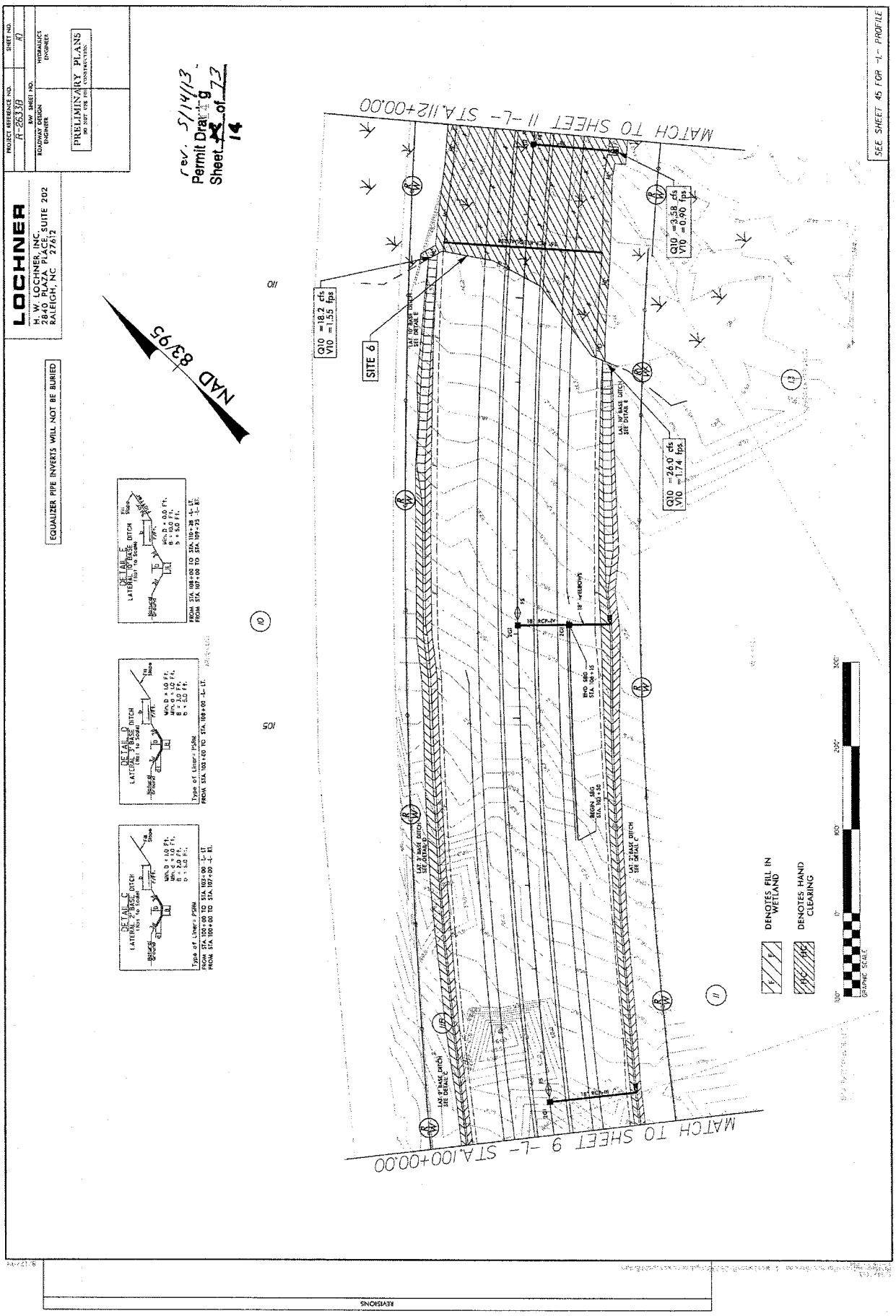

WETLANDS CROSS SECTION
SITE 5
PROJ. REFERENCE NO.
R-2633BA
SHEET NO.
X-19
Permit Drawing 7-3
Sheet 11 of 13
Revised 5/6/13
CLEARING LIMIT
W1B
373+00.00
372+50.00
372+00.00
371+50.00
Rev

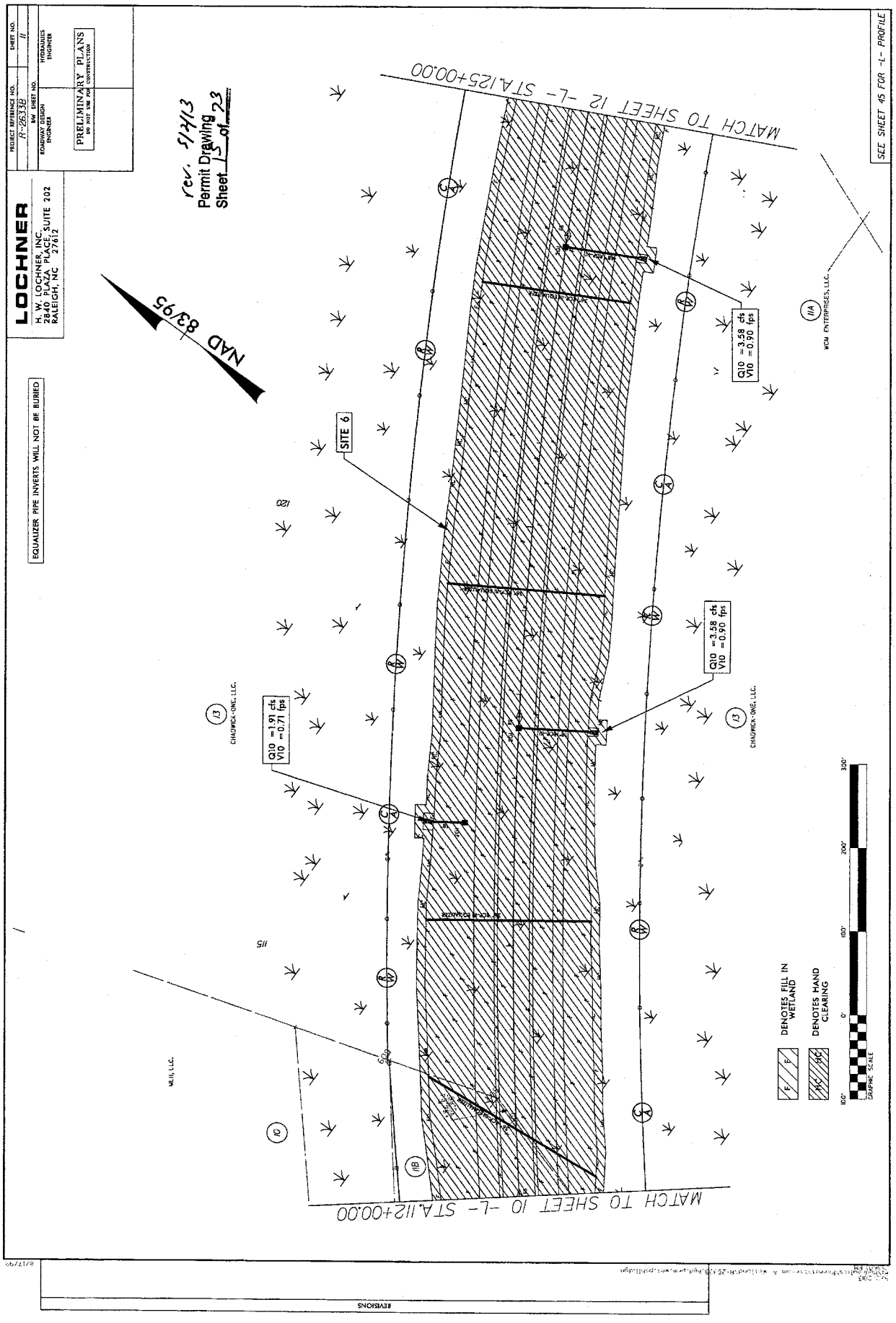
R-30



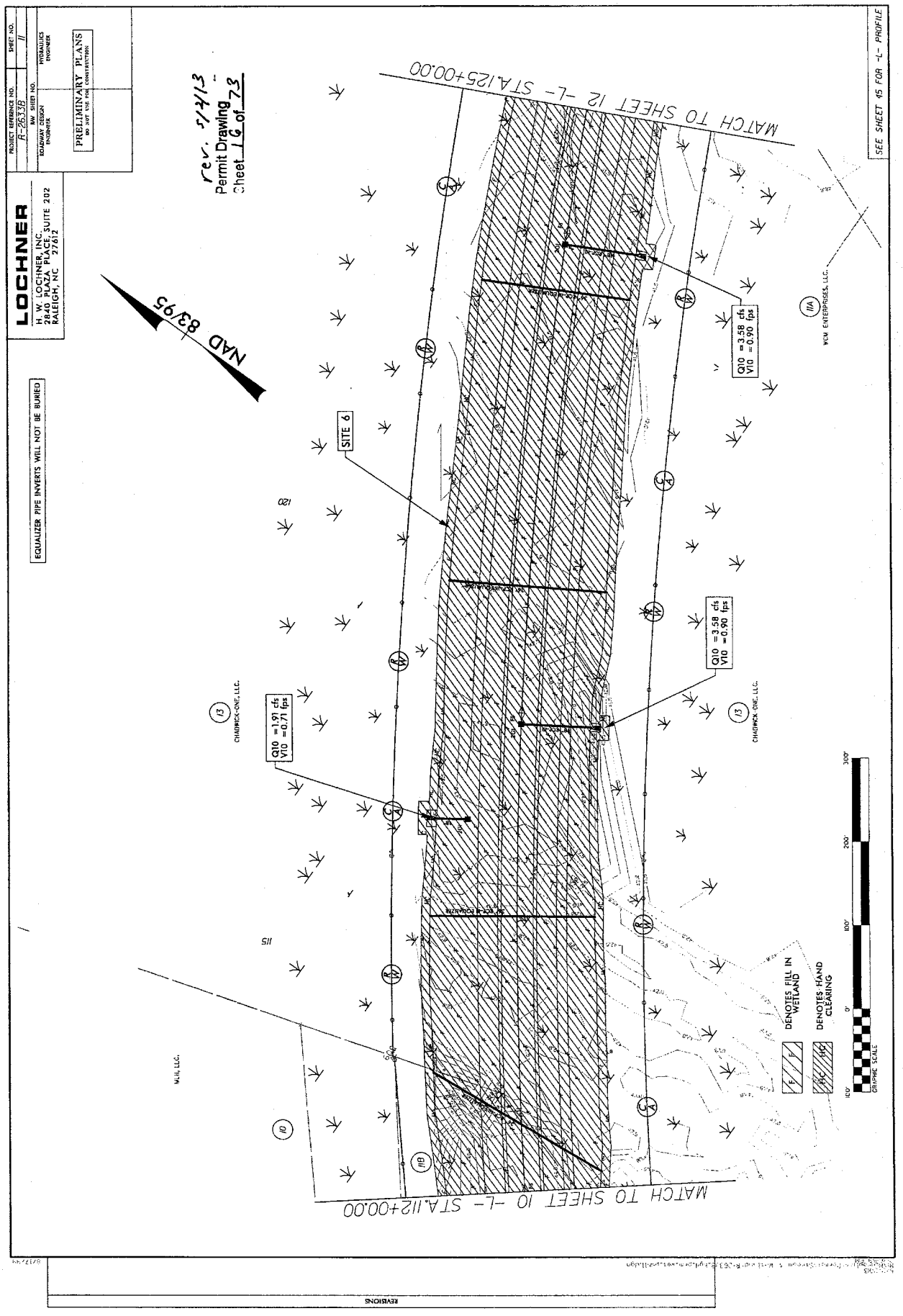
WETLANDS CROSS SECTION
SITE 5
Permit Drawing
Sheet 12 of 73
revised 5/6/13
WETLANDS BOUNDARY
OFF SHEET
CLEARING LIMIT
375+00.00
374+50.00
374+00.00
373+50.00
-1 Rev


LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO.
R-2633B
SHEET NO.
10
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
DETAIL C
LATERAL 2' BASE DITCH
(Not to Scale)
Min. D = 1.0 Ft.
Min. d = 1.0 Ft.
B = 2.0 Ft.
b = 5.0 Ft.
Type of Liner= PSRM
FROM STA. 100+00 TO STA. 103+00 -L- LT.
FROM STA. 100+00 TO STA. 107+00 -L- RT.
DETAIL D
LATERAL 3' BASE DITCH
(Not to Scale)
Min. D = 1.0 Ft.
Min. d = 1.0 Ft.
B = 3.0 Ft.
b = 5.0 Ft.
Type of Liner= PSRM
FROM STA. 103+00 TO STA. 108+00 -L- LT.
DETAIL E
LATERAL 10' BASE DITCH
(Not to Scale)
Min. D = 0.0 Ft.
B = 10.0 Ft.
b = 5.0 Ft.
FROM STA. 108+00 TO STA. 110+38 -L- LT.
FROM STA. 107+00 TO STA. 109+25 -L- RT.
NAD 83/95
Rev. 5/14/13
Permit Drawing
Sheet 13 of 73
Q10 =18.2 cfs
V10 =1.55 fps
SITE 6
LAT. 2' BASE DITCH SEE DETAIL C
LAT. 3' BASE DITCH SEE DETAIL D
LAT. 10' BASE DITCH SEE DETAIL E
BEGIN SBG STA. 103+50
END SBG STA. 106+15
18" w/ELBOWS
Q10 =26.0 cfs
V10 =1.74 fps
Q10 =3.58 cfs
V10 =0.90 fps
MATCH TO SHEET 9 -L- STA.100+00.00
MATCH TO SHEET 11 -L- STA.112+00.00
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
GRAPHIC SCALE
SEE SHEET 45 FOR -L- PROFILE
REVISIONS

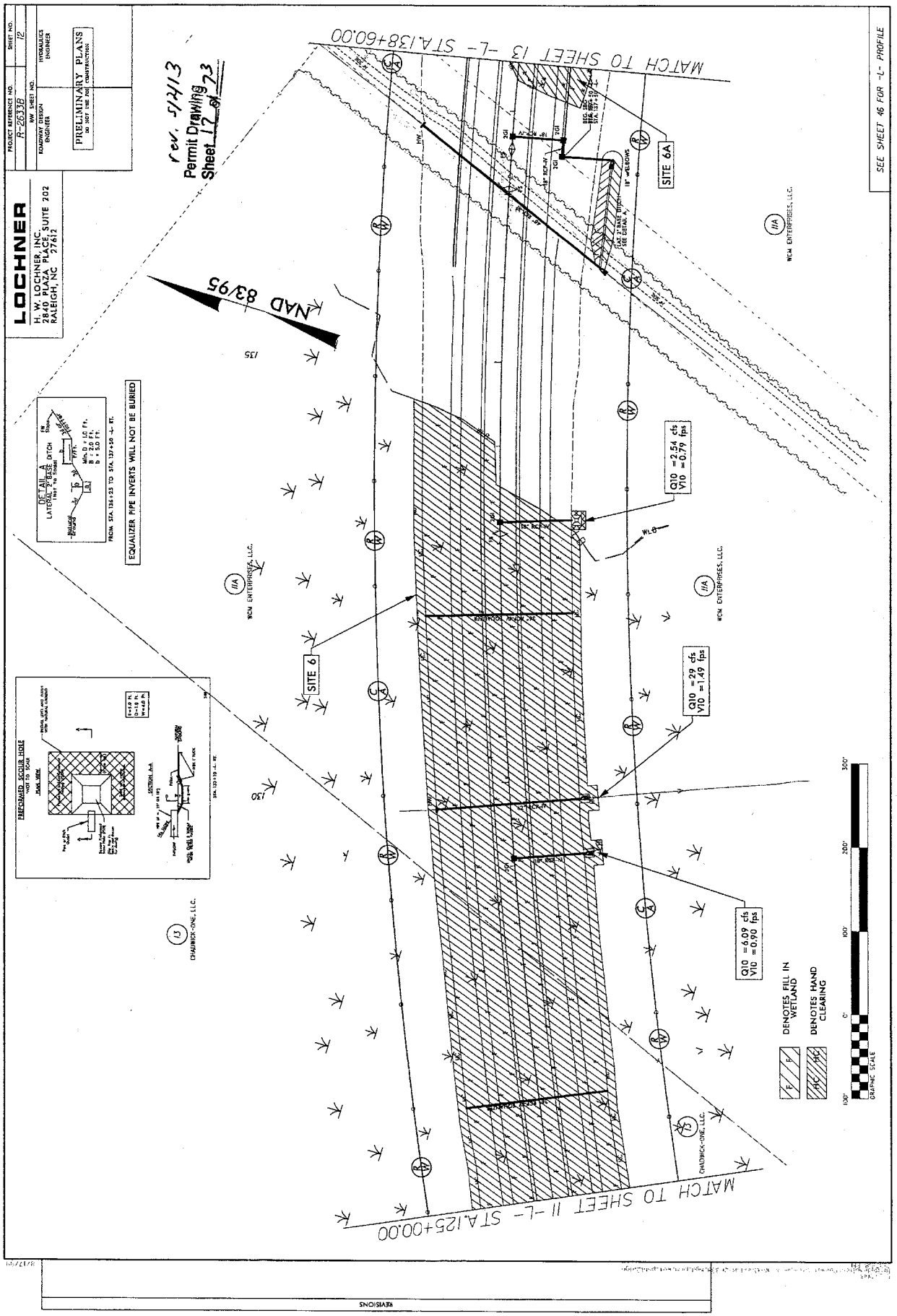

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO. R-2633B
SHEET NO. 10
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
NO RIGHT OF WAY OR CONSTRUCTION
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
NAD 83/95
rev. 5/14/13
Permit Drawing
Sheet 12 of 73
14
MATCH TO SHEET 11 -L- STA.112+00.00
MATCH TO SHEET 9 -L- STA.100+00.00
SEE SHEET 45 FOR -L- PROFILE
SITE 6
Q10 =18.2 cfs
V10 =1.55 fps
Q10 =3.58 cfs
V10 =0.90 fps
Q10 =24.0 cfs
V10 =1.74 fps
DETAIL C
LATERAL "C" BASE DITCH
DETAIL D
LATERAL "D" BASE DITCH
DETAIL E
LATERAL "E" BASE DITCH
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
GRAPHIC SCALE
REVISIONS


LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO. R-2633B
SHEET NO. 11
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
rev. 5/4/13
Permit Drawing
Sheet 13 of 23
NAD 83/95
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
SEE SHEET 45 FOR -L- PROFILE
MATCH TO SHEET 12 -L- STA.125+00.00
MATCH TO SHEET 10 -L- STA.112+00.00
SITE 6
Q10 = 3.58 cfs
V10 = 0.90 fps
Q10 = 1.91 cfs
V10 = 0.71 fps
Q10 = 3.58 cfs
V10 = 0.90 fps
CHADWICK-ONE, LLC.
WCM ENTERPRISES, LLC.
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
GRAPHIC SCALE
REVISIONS

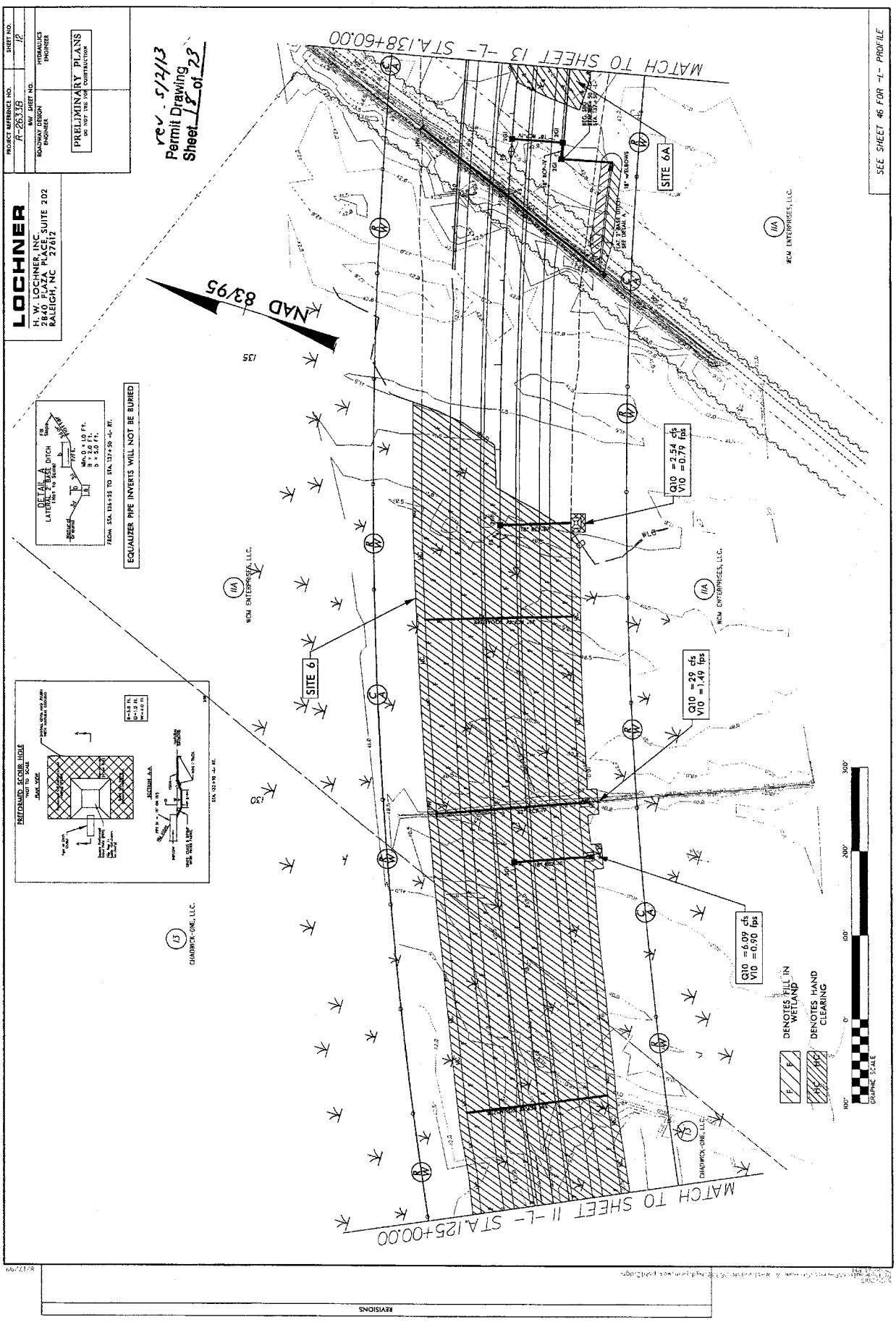
R-34


LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO.
R-2633B
SHEET NO.
11
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
NOT FOR CONSTRUCTION
rev. 5/4/13
Permit Drawing
Sheet 16 of 73
NAD 83/95
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
MATCH TO SHEET 12 -L- STA.125+00.00
MATCH TO SHEET 10 -L- STA.112+00.00
SEE SHEET 45 FOR -L- PROFILE
SITE 6
Q10 =1.91 cfs
V10 =0.71 fps
Q10 =3.58 cfs
V10 =0.90 fps
Q10 =3.58 cfs
V10 =0.90 fps
CHADWICK-ONE, LLC.
WCM ENTERPRISES, LLC.
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
GRAPHIC SCALE
REVISIONS

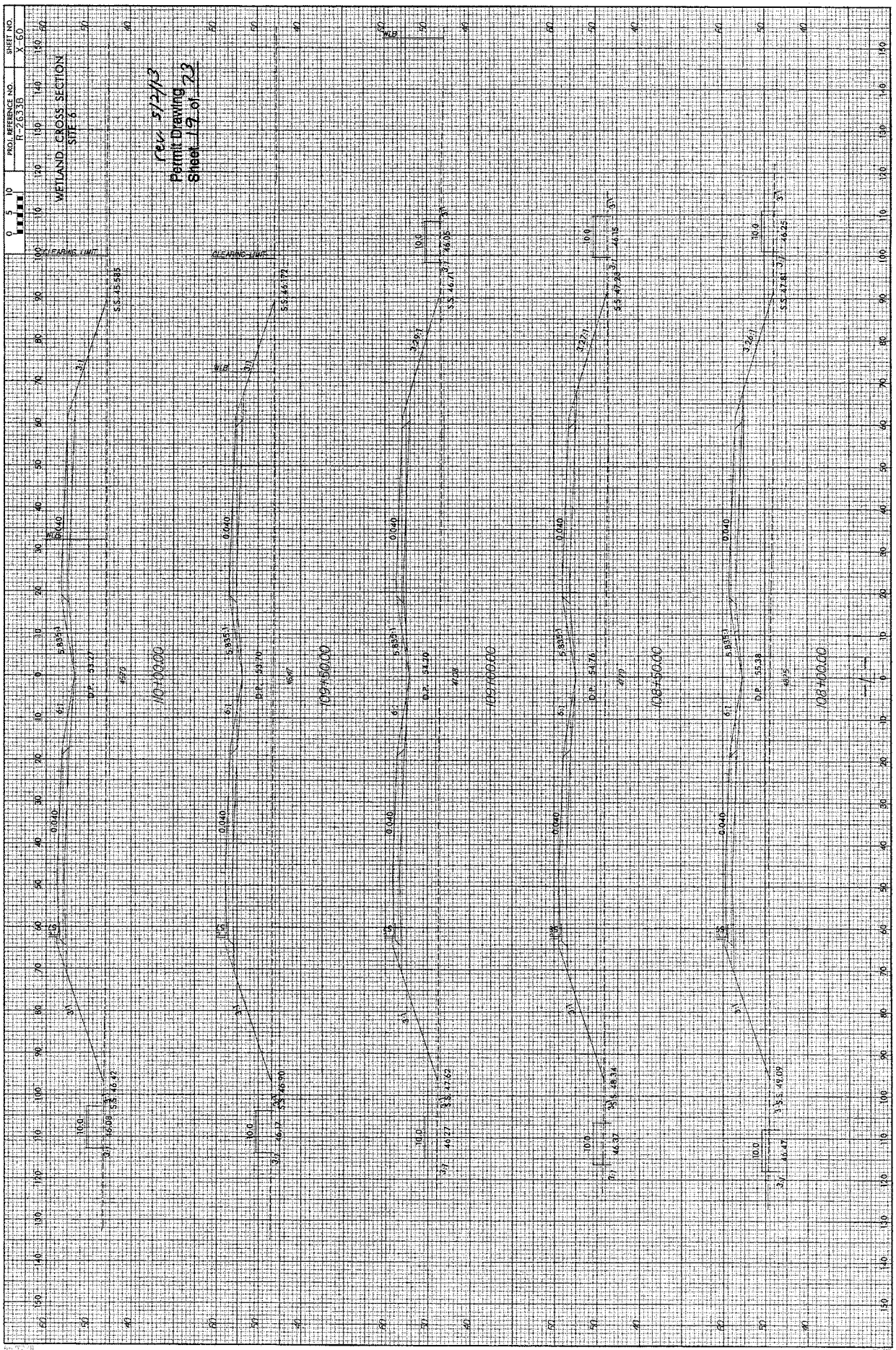
R-35


LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PRELIMINARY PLANS
NOT FOR CONSTRUCTION
rev. 5/24/13
Permit Drawing
Sheet 12 of 23
NAD 83/95
MATCH TO SHEET 13 -L- STA.138+60.00
MATCH TO SHEET 11 -L- STA.125+00.00
SEE SHEET 46 FOR -L- PROFILE
SITE 6
SITE 6A
Q10 =2.54 cfs
V10 =0.79 fps
Q10 =29 cfs
V10 =1.49 fps
Q10 =6.09 cfs
V10 =0.90 fps
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
GRAPHIC SCALE
WCM ENTERPRISES, LLC.
CHADWICK-ONE, LLC.

R-36

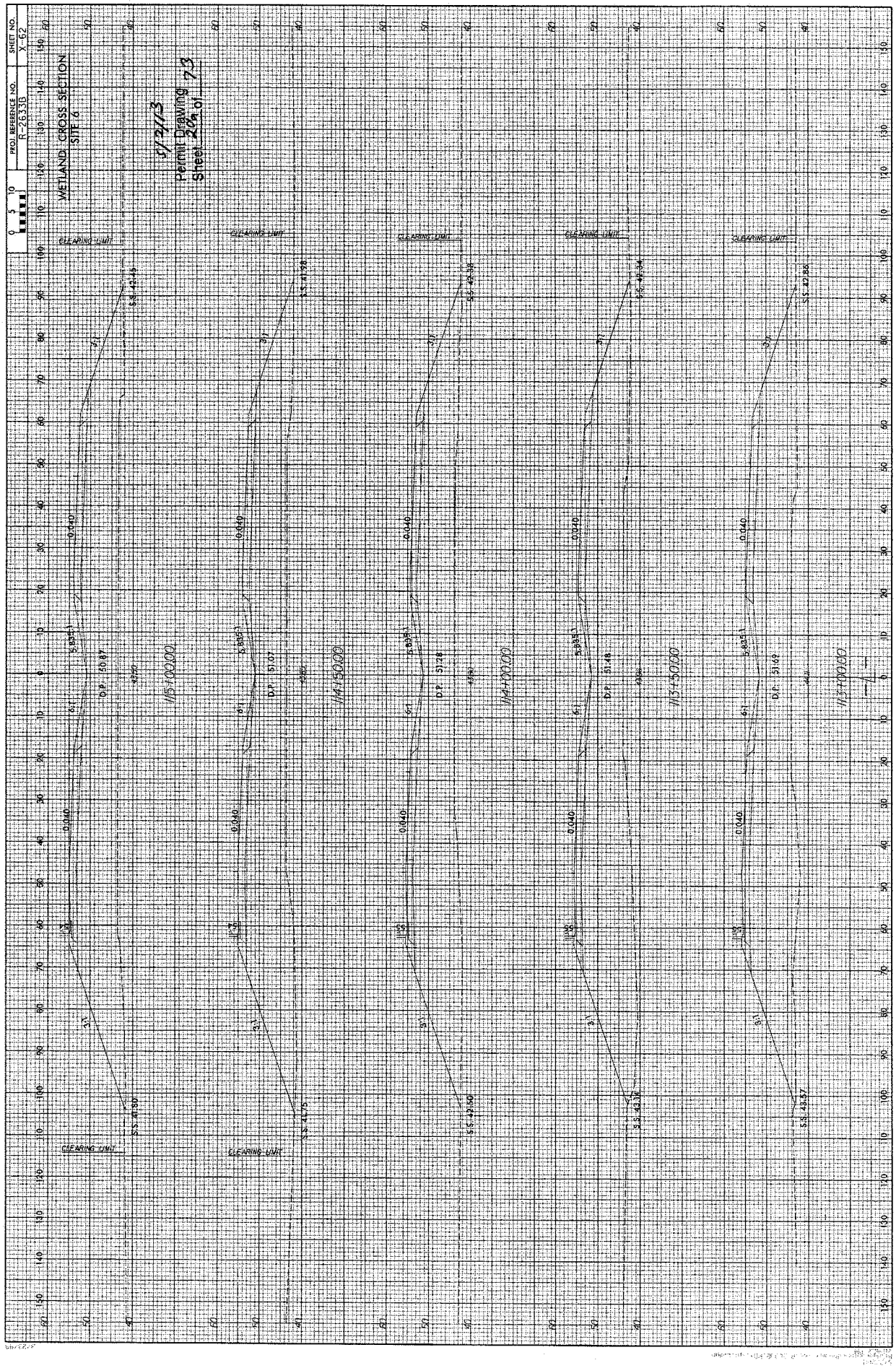

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO.
R-2633B
SHEET NO.
12
RW. SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
rev. 5/7/13
Permit Drawing
Sheet 18 of 23
NAD 83/95
MATCH TO SHEET 13 -L- STA.138+60.00
MATCH TO SHEET 11 -L- STA.125+00.00
SEE SHEET 46 FOR -L- PROFILE
SITE 6
SITE 6A
Q10 = 2.54 cfs
V10 = 0.79 fps
Q10 = 29 cfs
V10 = 1.49 fps
Q10 = 6.09 cfs
V10 = 0.90 fps
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
DETAIL A
LATERAL 2 BASE DITCH
PREFORMED SCOUR HOLE
NOT TO SCALE
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
GRAPHIC SCALE
WCM ENTERPRISES, LLC.
CHADWICK-ONE, LLC.
REVISIONS

R-37

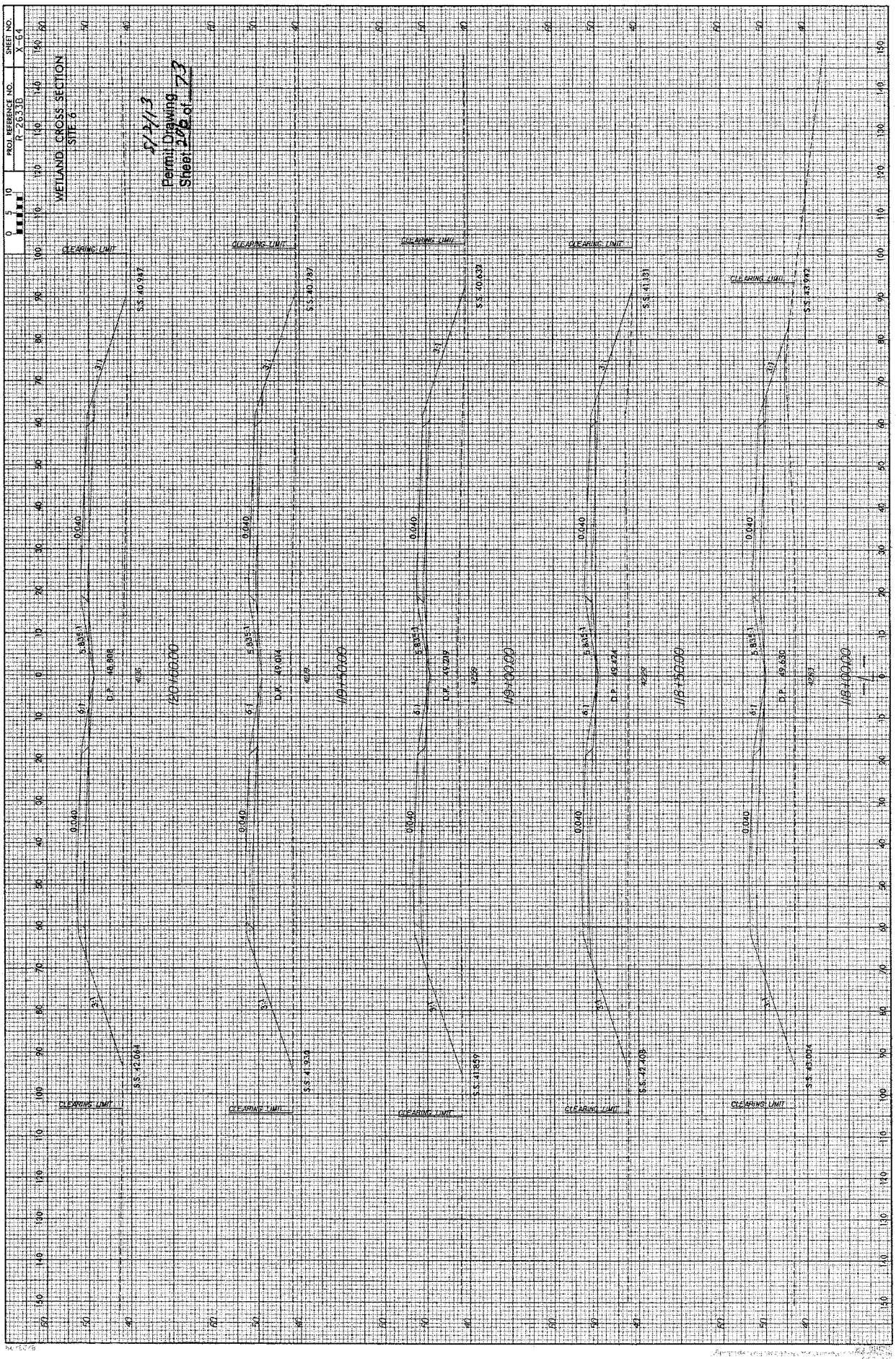

PROJ. REFERENCE NO.
R-2633B
SHEET NO.
X-60
WETLAND CROSS SECTION
SITE 61
rev. 3/2/13
Permit Drawing
Sheet 19 of 23
CLEARING LIMIT
10+100.00
109+50.00
109+00.00
108+50.00
108+00.00

PROJ. REFERENCE NO.
R-2633B
SHEET NO.
X-65
WETLAND CROSS SECTION
SITE 6
Permit Drawing
Sheet 22 of 23
CLEARING LIMIT
122+50.00
122+00.00
121+50.00
121+00.00
120+00.00
8/23/99

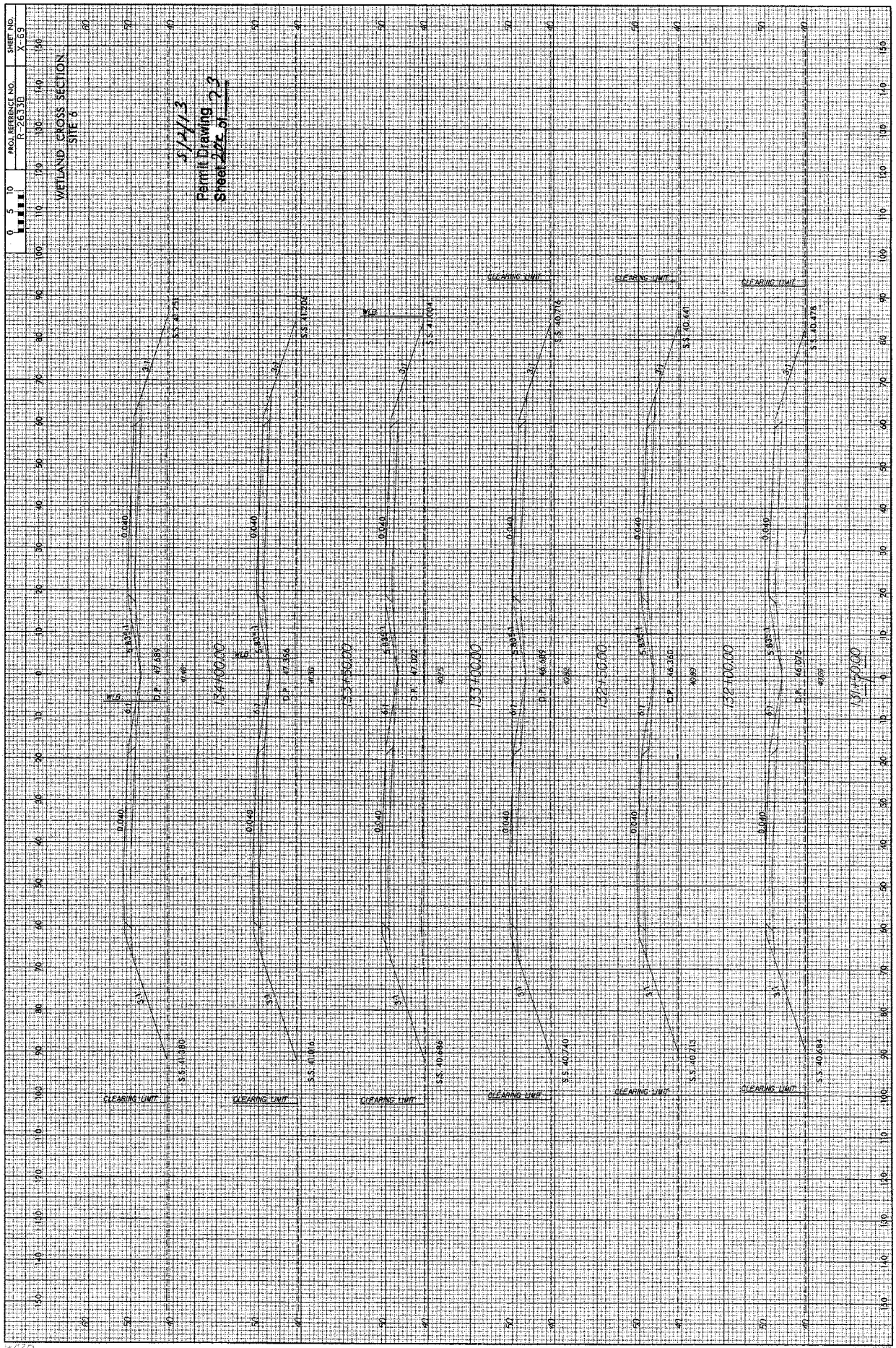
R-39

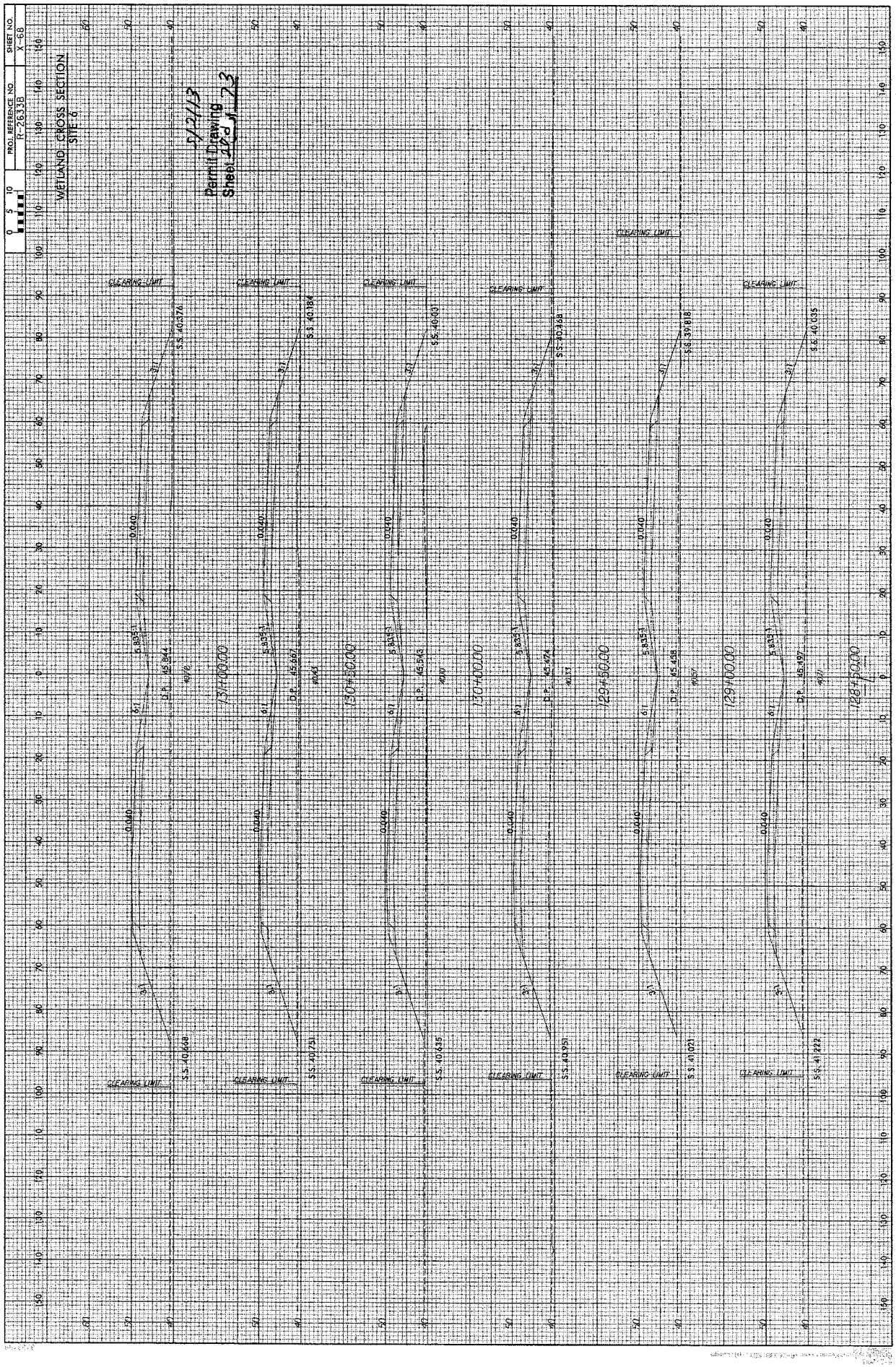

PROJ. REFERENCE NO.
R-2633B
SHEET NO.
X-62
WETLAND GROSS SECTION
SITE 6
5/2/13
Permit Drawing 23
Sheet 20a of 23
CLEARING LIMIT
#5+00.00
#4+50.00
#4+00.00
#3+50.00
#3+00.00

R-40

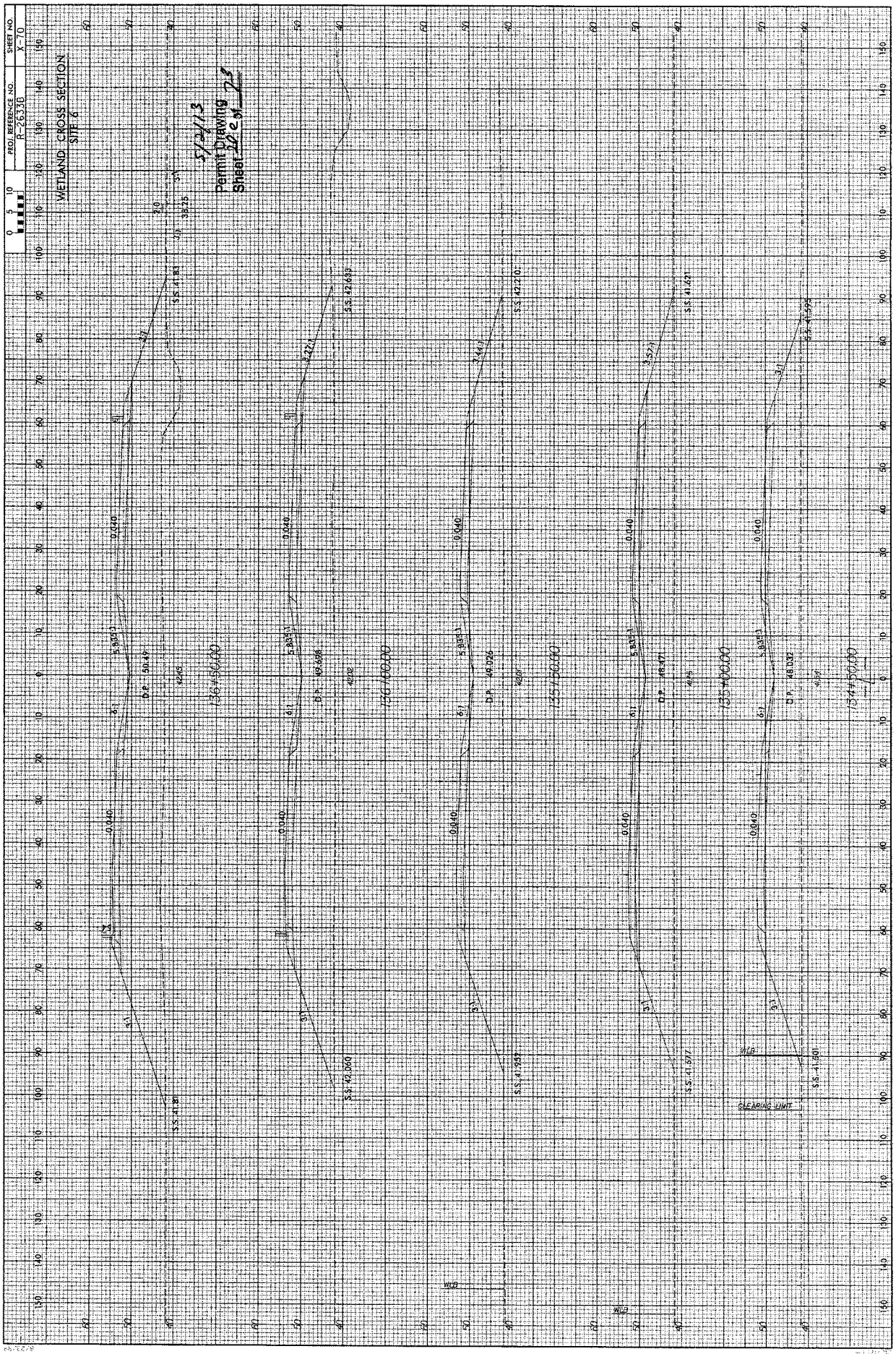


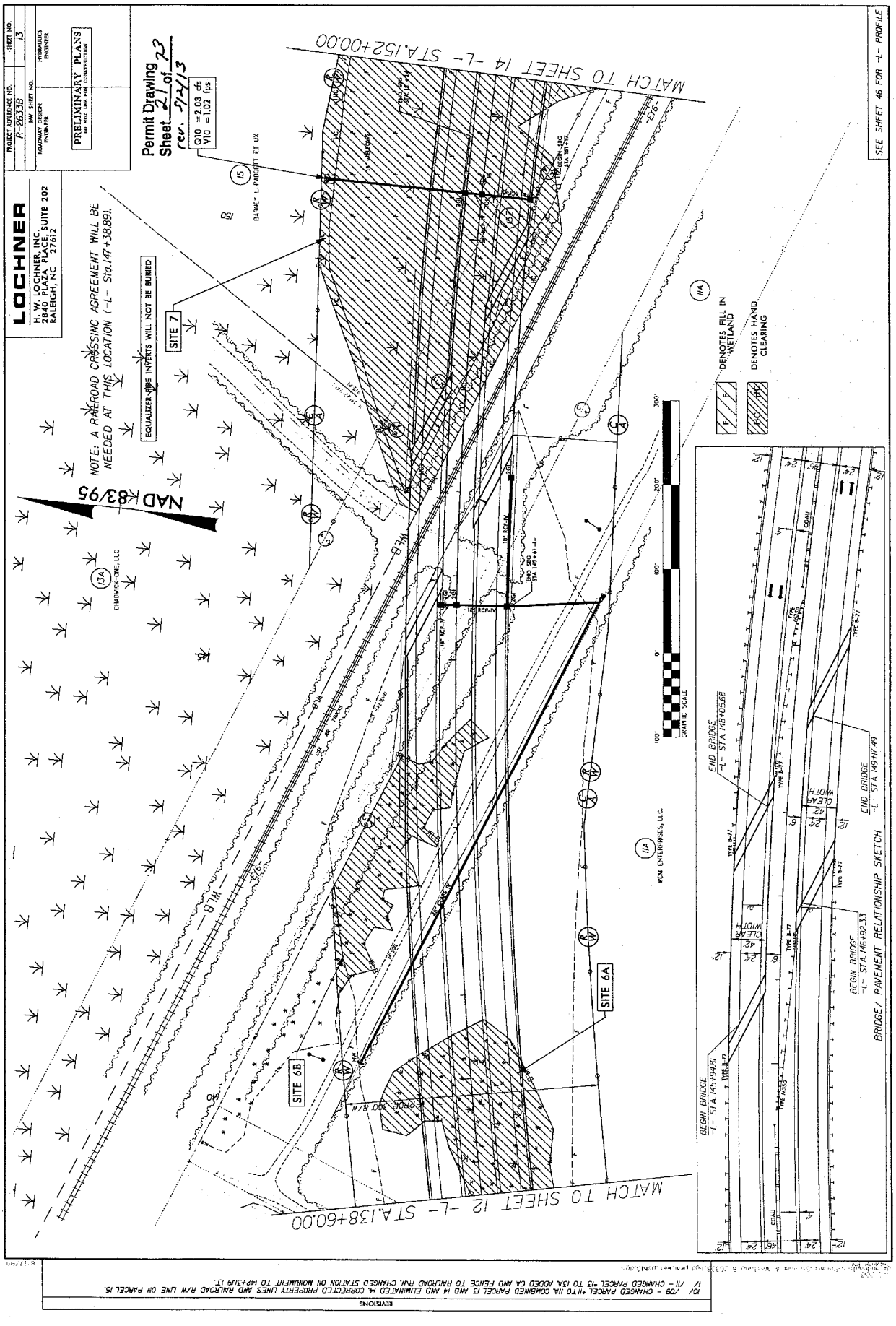
PROJ. REFERENCE NO.
R-2633B
SHEET NO.
X-64
WETLAND CROSS SECTION
SITE 6
Permit Drawing
Sheet 206 of 73
CLEARING LIMIT
S.S. 40.947
S.S. 40.787
S.S. 40.632
S.S. 41.181
S.S. 43.942
S.S. 42.064
S.S. 41.930
S.S. 41.859
S.S. 42.408
S.S. 43.004
D.P. 48.808
D.P. 49.014
D.P. 49.219
D.P. 49.424
D.P. 49.630
120+00.00
119+50.00
119+00.00
118+50.00
118+00.00

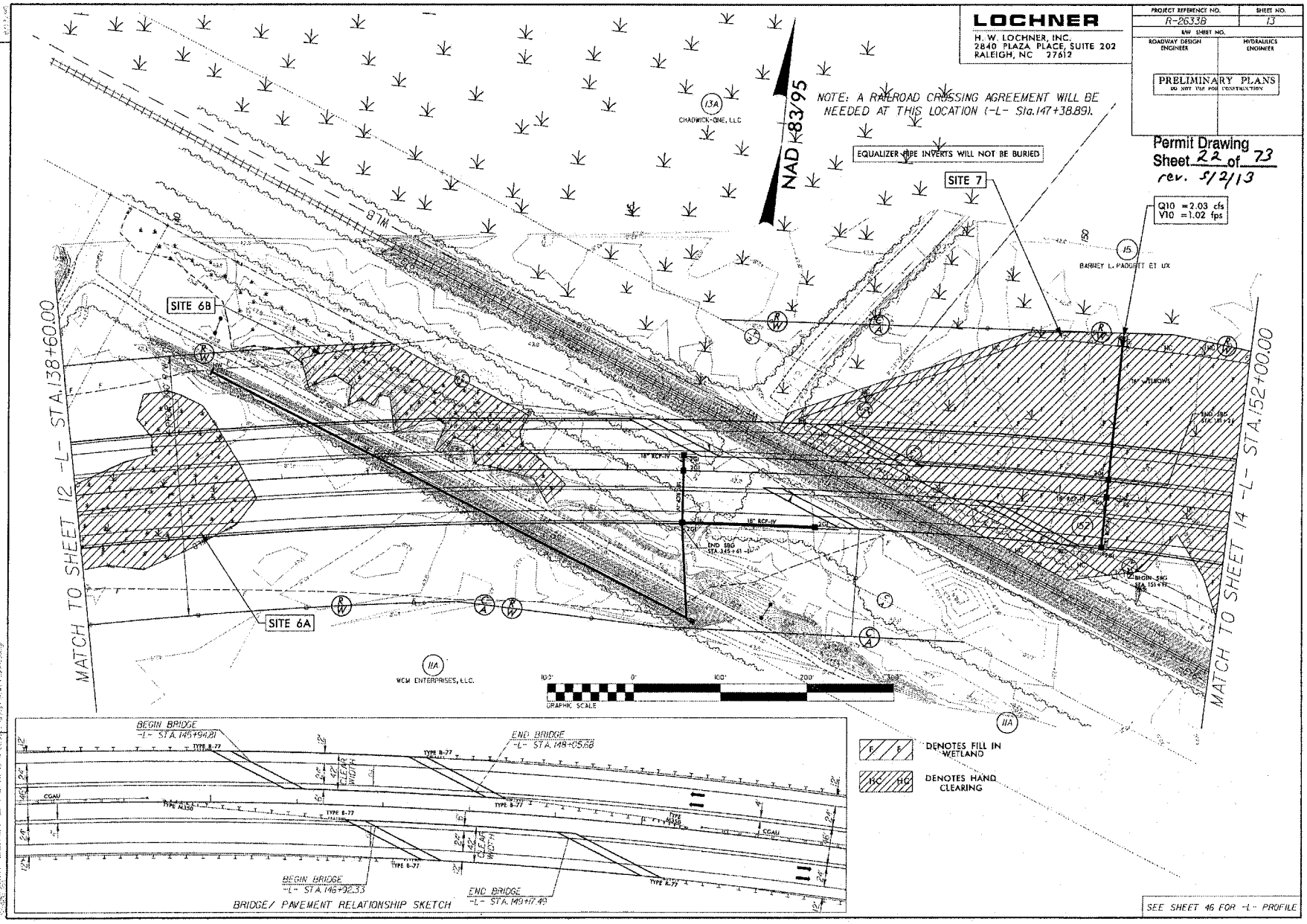

WETLAND CROSS SECTION
SITE 6
PROJ. REFERENCE NO.
R-2633B
SHEET NO.
X-69
Permit Drawing
Sheet 20c of 23
CLEARING LIMIT
134+00.00
133+50.00
133+00.00
132+50.00
132+00.00
131+50.00


PROJ. REFERENCE NO.
R-2633B
SHEET NO.
X-68
WETLAND CROSS SECTION
SITE 6
Permit Drawing
Sheet 22 of 23
CLEARING LIMIT
131+00.00
130+50.00
130+00.00
129+50.00
129+00.00
128+50.00

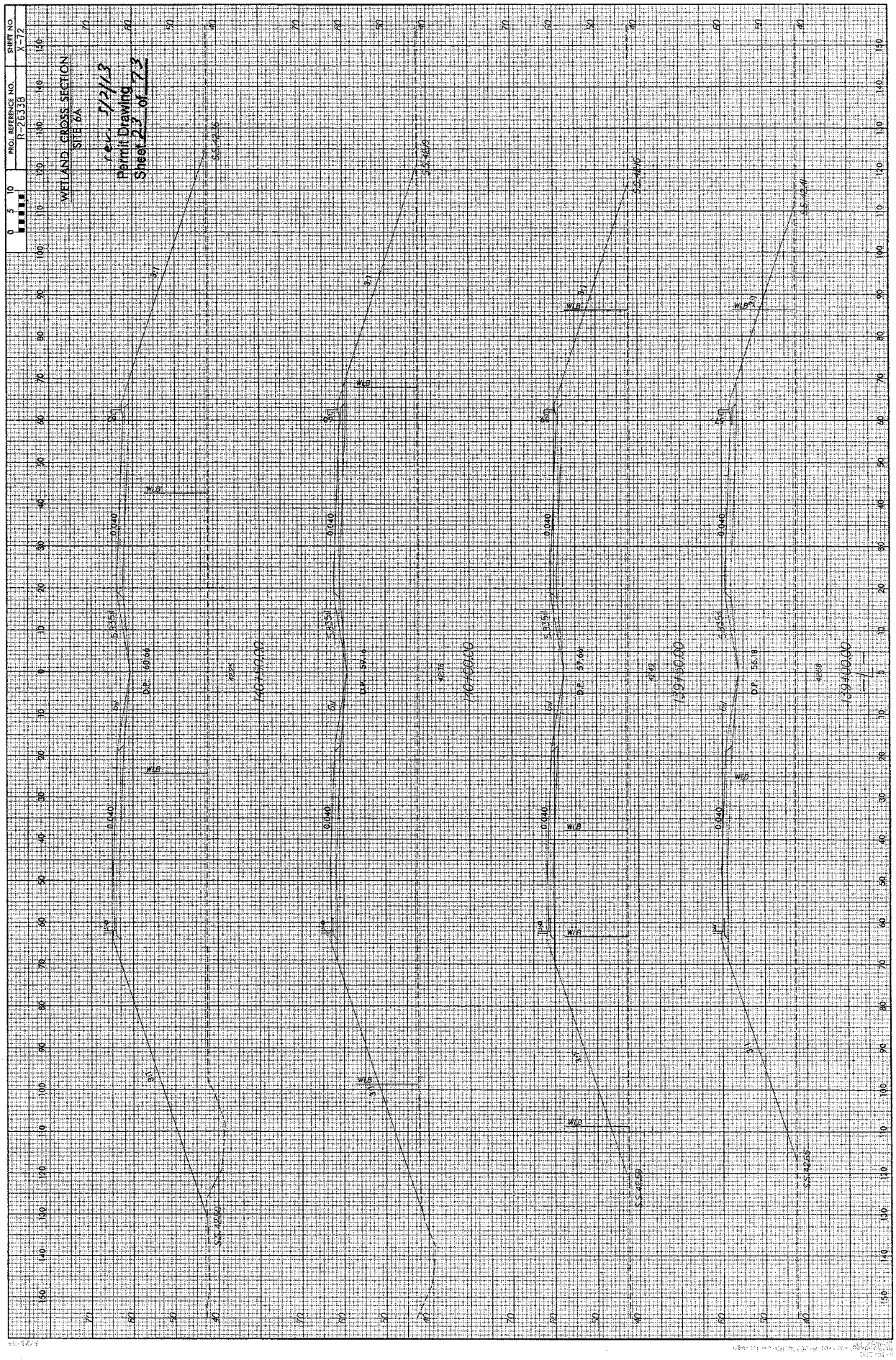
R-43

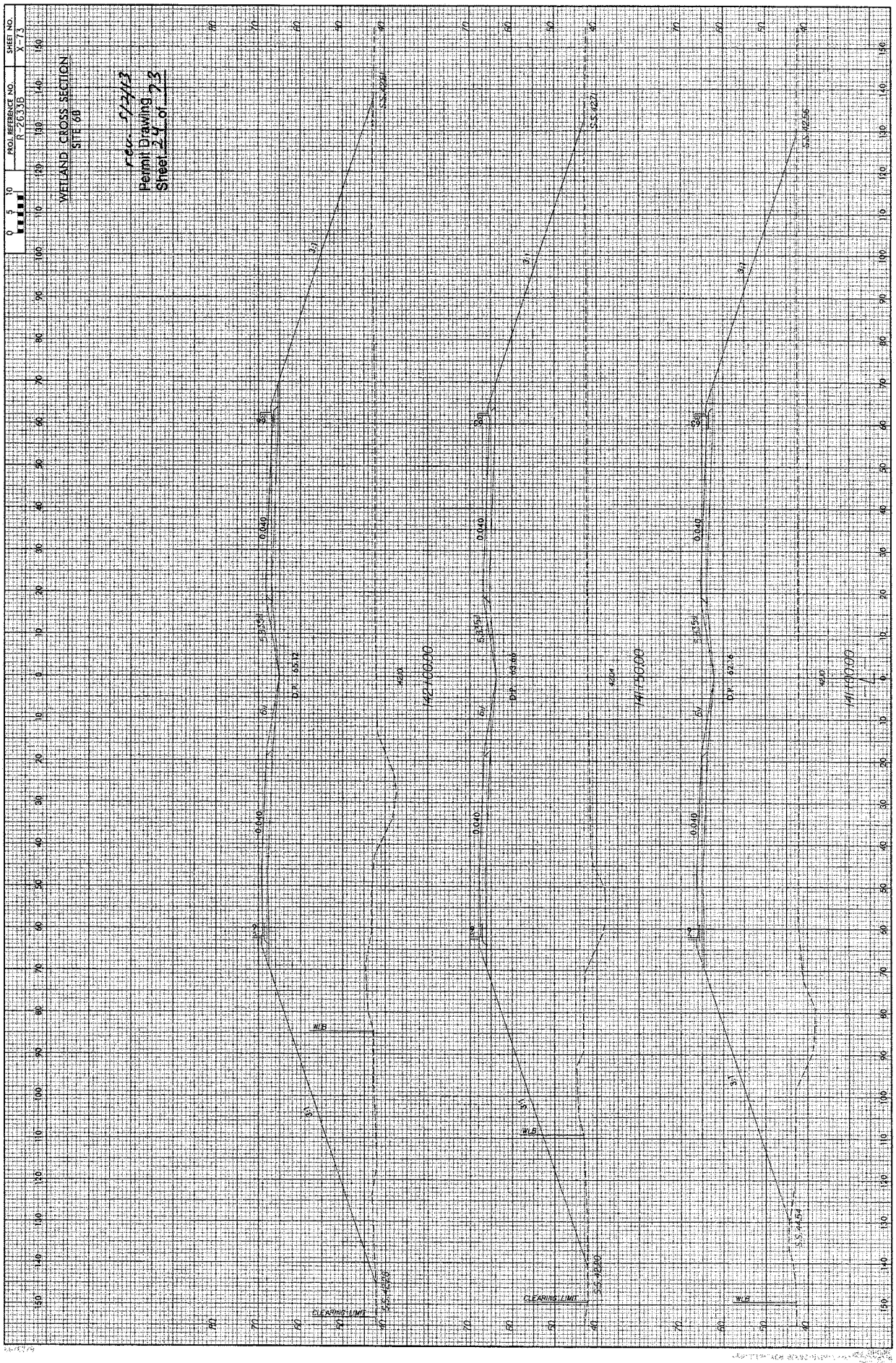

WETLAND CROSS SECTION
SITE 6
PROJ. REFERENCE NO.
R-2633B
SHEET NO.
X-70
0 5 10
5/2/13
Permit Drawing
Sheet 22 of 72
136+50.00
136+00.00
135+50.00
135+00.00
134+50.00
CLEARING LIMIT
W.B.

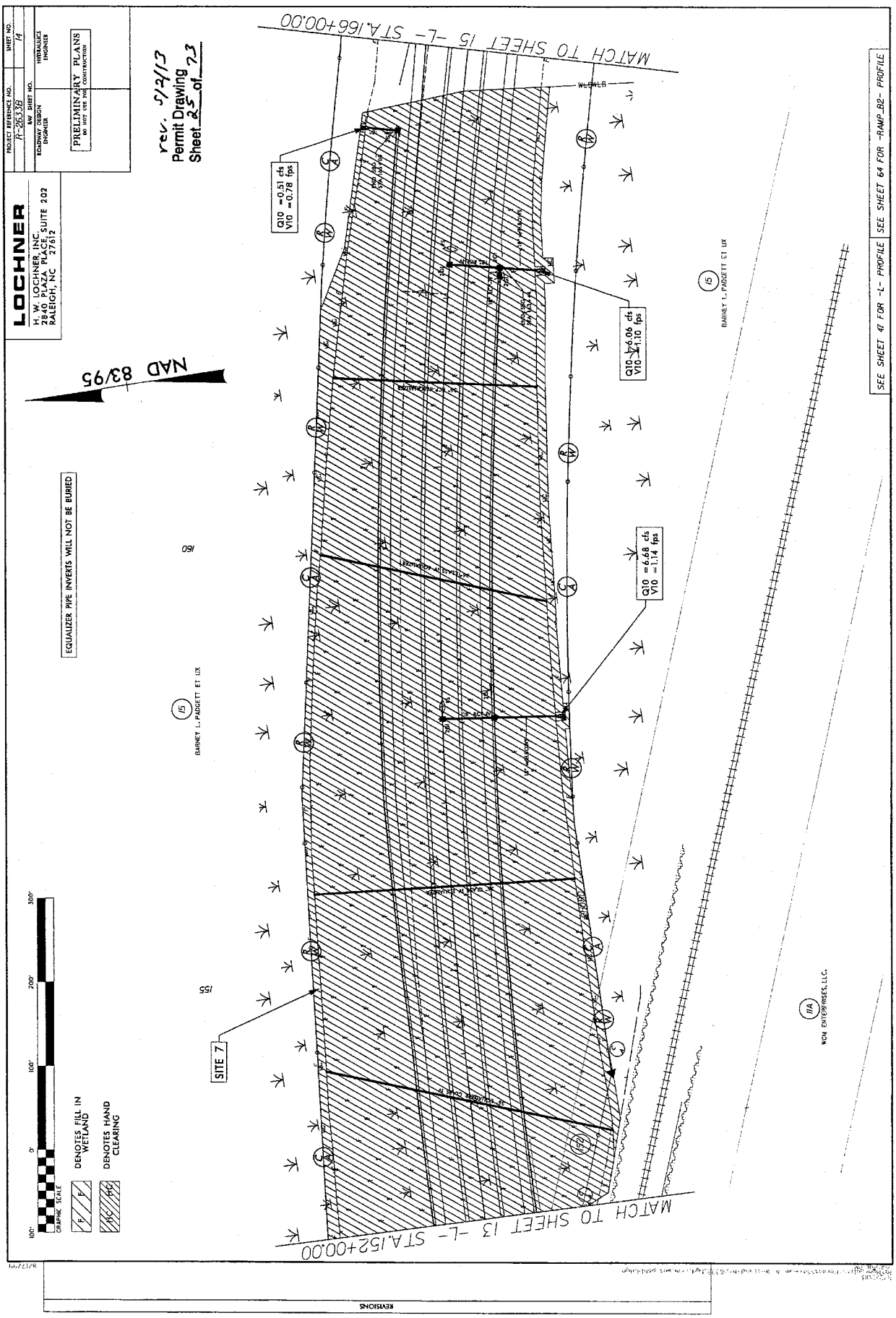

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO. R-2633B
SHEET NO. 13
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 21 of 23
rev. 12/13
Q10 = 2.03 cfs
V10 = 1.02 fps
NOTE: A RAILROAD CROSSING AGREEMENT WILL BE NEEDED AT THIS LOCATION (-L- Sta.147+38.89).
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
SITE 7
SITE 6A
SITE 6B
MATCH TO SHEET 14 -L- STA.152+00.00
MATCH TO SHEET 12 -L- STA.138+60.00
NAD 83/95
CHADWICK-ONE, LLC
BARNEY L. PADGETT ET UX
WCW ENTERPRISES, LLC
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
GRAPHIC SCALE
BRIDGE / PAVEMENT RELATIONSHIP SKETCH
BEGIN BRIDGE -L- STA. 145+94.81
BEGIN BRIDGE -L- STA. 146+92.33
END BRIDGE -L- STA. 148+05.68
END BRIDGE -L- STA. 149+17.49
SEE SHEET 46 FOR -L- PROFILE
REVISIONS
10/ /09 - CHANGED PARCEL #11D IIA COMBINED PARCEL 13 AND 14 AND ELIMINATED 14. CORRECTED PROPERTY LINES AND RAILROAD R/W LINE ON PARCEL 15.
11/ /11 - CHANGED PARCEL #13 TO 13A ADDED CA AND FENCE TO RAILROAD R/W. CHANGED STATION ON MONUMENT TO 142+13.19 LT.

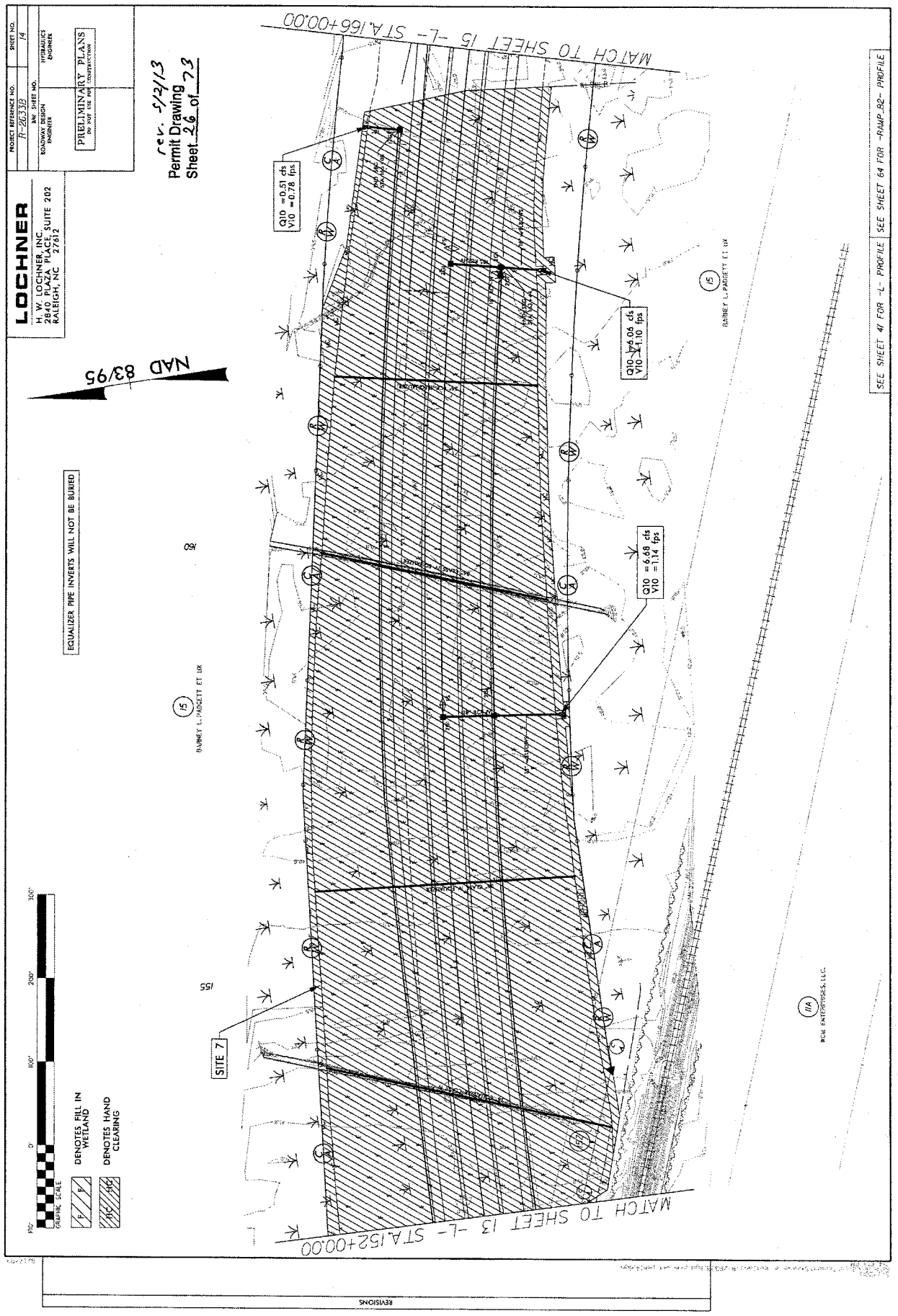

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO. R-2633B
SHEET NO. 13
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 22 of 73
rev. 5/2/13
NOTE: A RAILROAD CROSSING AGREEMENT WILL BE NEEDED AT THIS LOCATION (-L- Sta.147+38.89).
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
NAD 83/95
Q10 = 2.03 cfs
V10 = 1.02 fps
SITE 6B
SITE 6A
SITE 7
MATCH TO SHEET 12 -L- STA.138+60.00
MATCH TO SHEET 14 -L- STA.152+00.00
13A CHADWICK-ONE, LLC
15 BARNEY L. PADGETT ET UX
IIA WCM ENTERPRISES, LLC.
GRAPHIC SCALE
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
BEGIN BRIDGE -L- STA.145+94.21
END BRIDGE -L- STA.148+05.88
BEGIN BRIDGE -L- STA.146+32.33
END BRIDGE -L- STA.149+17.49
BRIDGE/ PAVEMENT RELATIONSHIP SKETCH
SEE SHEET 46 FOR -L- PROFILE
REVISIONS
10/ 109 - CHANGED PARCEL #11TO IIA, COMBINED PARCEL 13 AND 14 AND ELIMINATED 14, CORRECTED PROPERTY LINES AND RAILROAD R/W LINE ON PARCEL 15.
11/ 111 - CHANGED PARCEL #13 TO 13A, ADDED CA AND FENCE TO RAILROAD R/W, CHANGED STATION ON MONUMENT TO 142+38.89 LT.

R-46

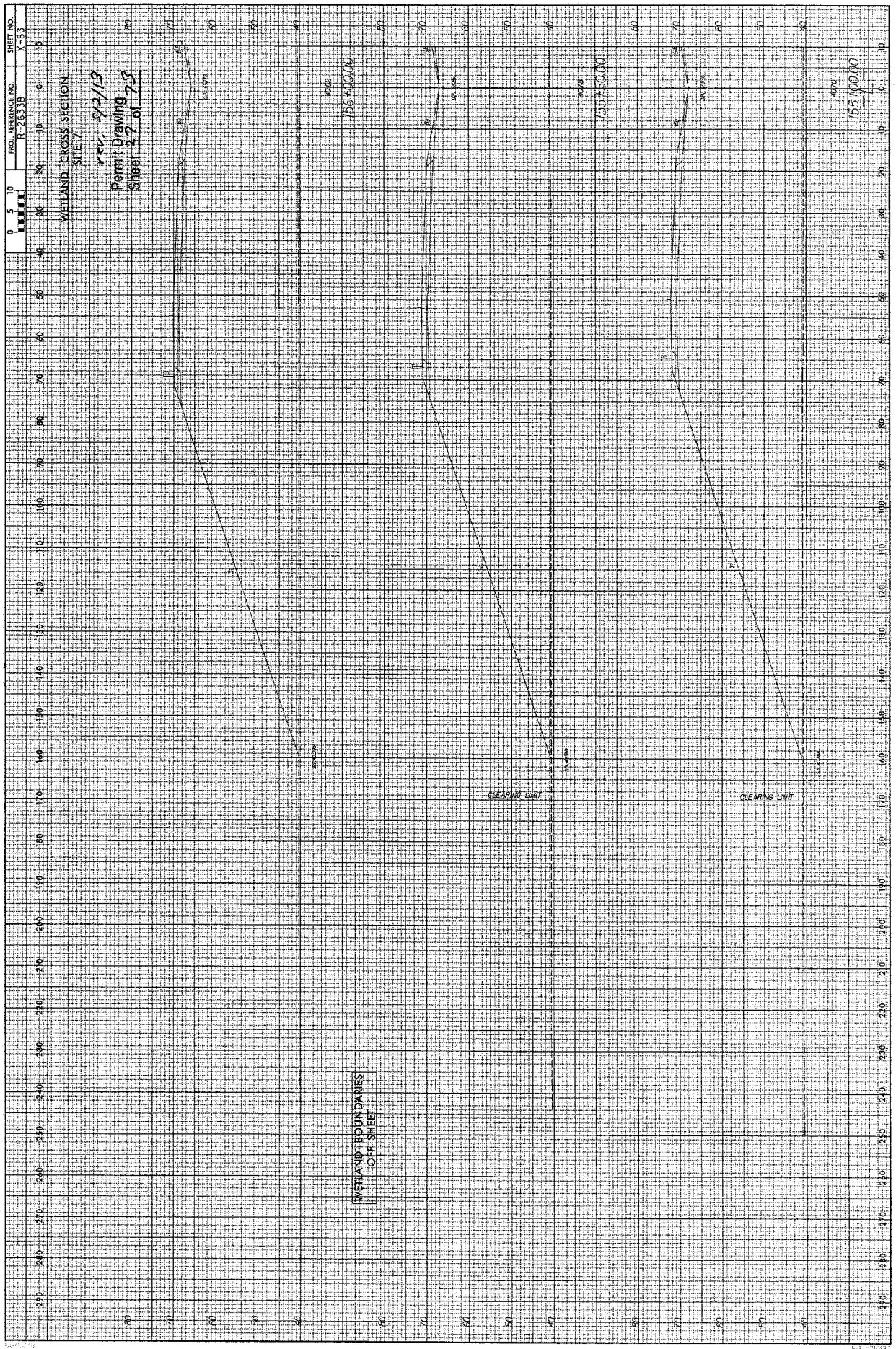

PROJ. REFERENCE NO.
R-2633B
SHEET NO.
X-72
WETLAND CROSS SECTION
SITE 6A
e.c. 5/2/13
Permit Drawing
Sheet 23 of 73

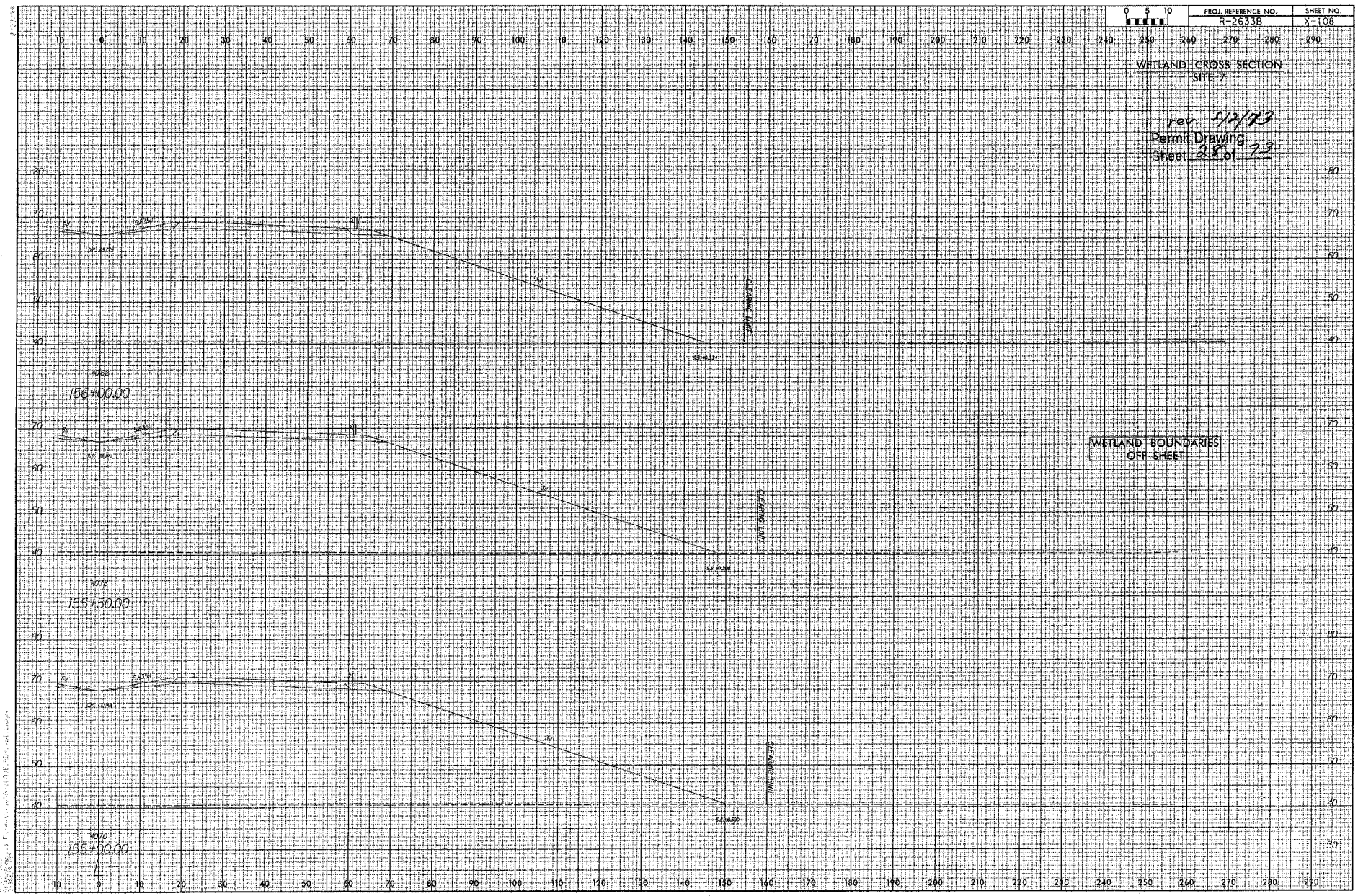

PROJ. REFERENCE NO.
R-2633B
SHEET NO.
X-73
WETLAND CROSS SECTION
SITE 6B
Permit Drawing
Sheet 24 of 73
CLEARING LIMIT
CLEARING LIMIT
WLB
WLB
WLB
142+00.00
141+50.00
141+00.00


LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO. R-2633B
SHEET NO. 14
NW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
rev. 5/2/13
Permit Drawing
Sheet 25 of 23
NAD 83/95
MATCH TO SHEET 15 -L- STA.166+00.00
MATCH TO SHEET 13 -L- STA.152+00.00
Q10 =0.51 cfs
V10 =0.78 fps
Q10 =6.06 cfs
V10 =1.10 fps
Q10 =6.68 cfs
V10 =1.14 fps
SITE 7
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
BARNEY L. PADGETT ET UX
MCM ENTERPRISES, LLC.
SEE SHEET 47 FOR -L- PROFILE
SEE SHEET 64 FOR -RAMP_B2- PROFILE
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
GRAPHIC SCALE
REVISIONS

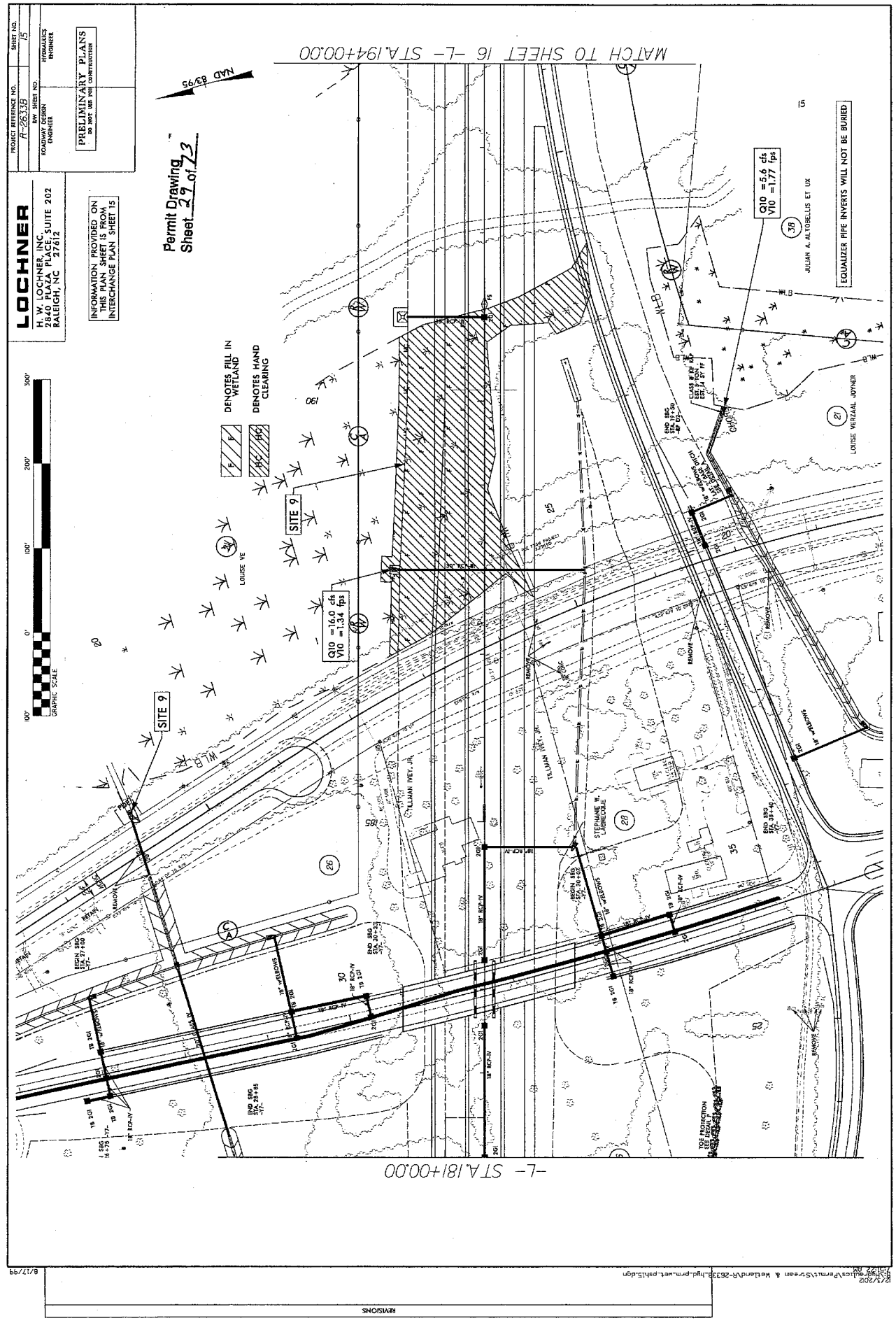

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO. R-2633B
SHEET NO. 14
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
NOT FOR CONSTRUCTION
rev. 5/2/13
Permit Drawing
Sheet 26 of 73
NAD 83/95
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
MATCH TO SHEET 15 -L- STA.166+00.00
MATCH TO SHEET 13 -L- STA.152+00.00
SEE SHEET 47 FOR -L- PROFILE
SEE SHEET 64 FOR -RAMP_B2- PROFILE
Q10 =0.51 cfs
V10 =0.78 fps
Q10 =6.06 cfs
V10 =1.10 fps
Q10 =6.68 cfs
V10 =1.14 fps
SITE 7
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
GRAPHIC SCALE
REVISIONS

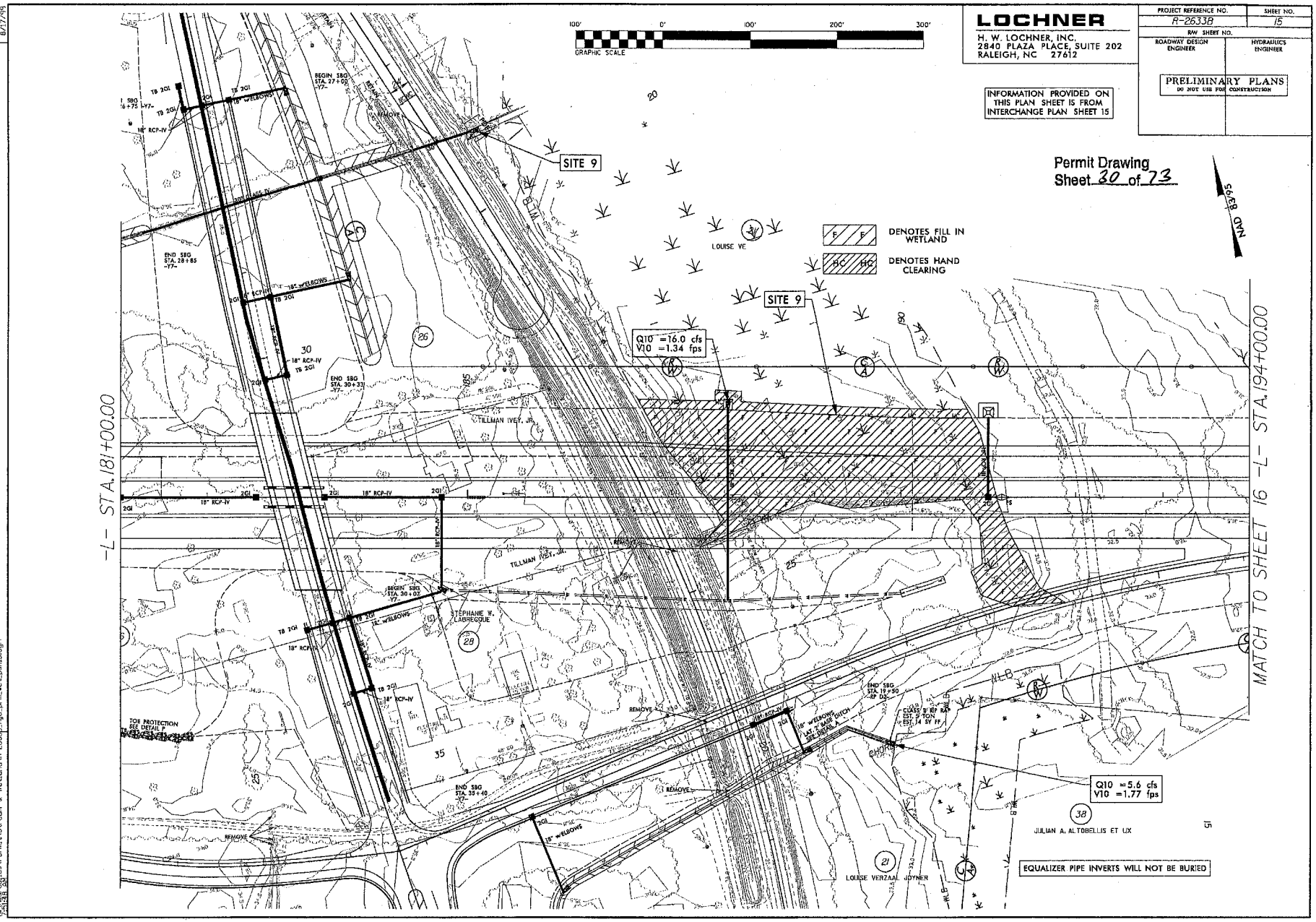
R-50

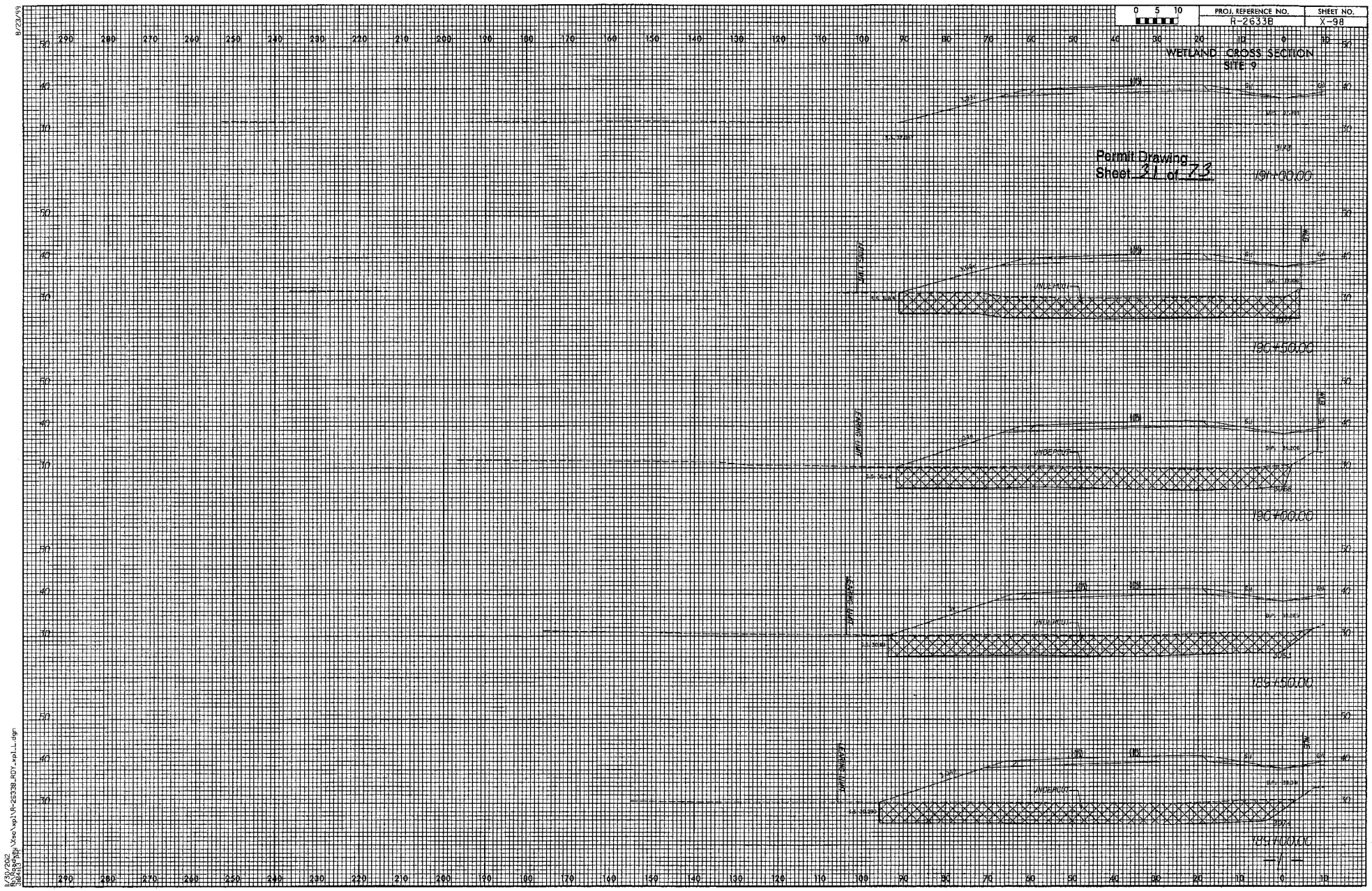

PROJ. REFERENCE NO.
R-2633B
SHEET NO.
X-83
WETLAND CROSS SECTION
SITE 7
rev. 9/2/13
Permit Drawing
Sheet 27 of 73
WETLAND BOUNDARIES
OFF SHEET
CLEARING LIMIT
CLEARING LIMIT


0 5 10
PROJ. REFERENCE NO.
R-2633B
SHEET NO.
X-108
WETLAND CROSS SECTION
SITE 7
rev. 9/2/03
Permit Drawing
Sheet 28 of 29
WETLAND BOUNDARIES
OFF SHEET
CLEARING LIMIT
166+00.00
155+50.00
155+00.00

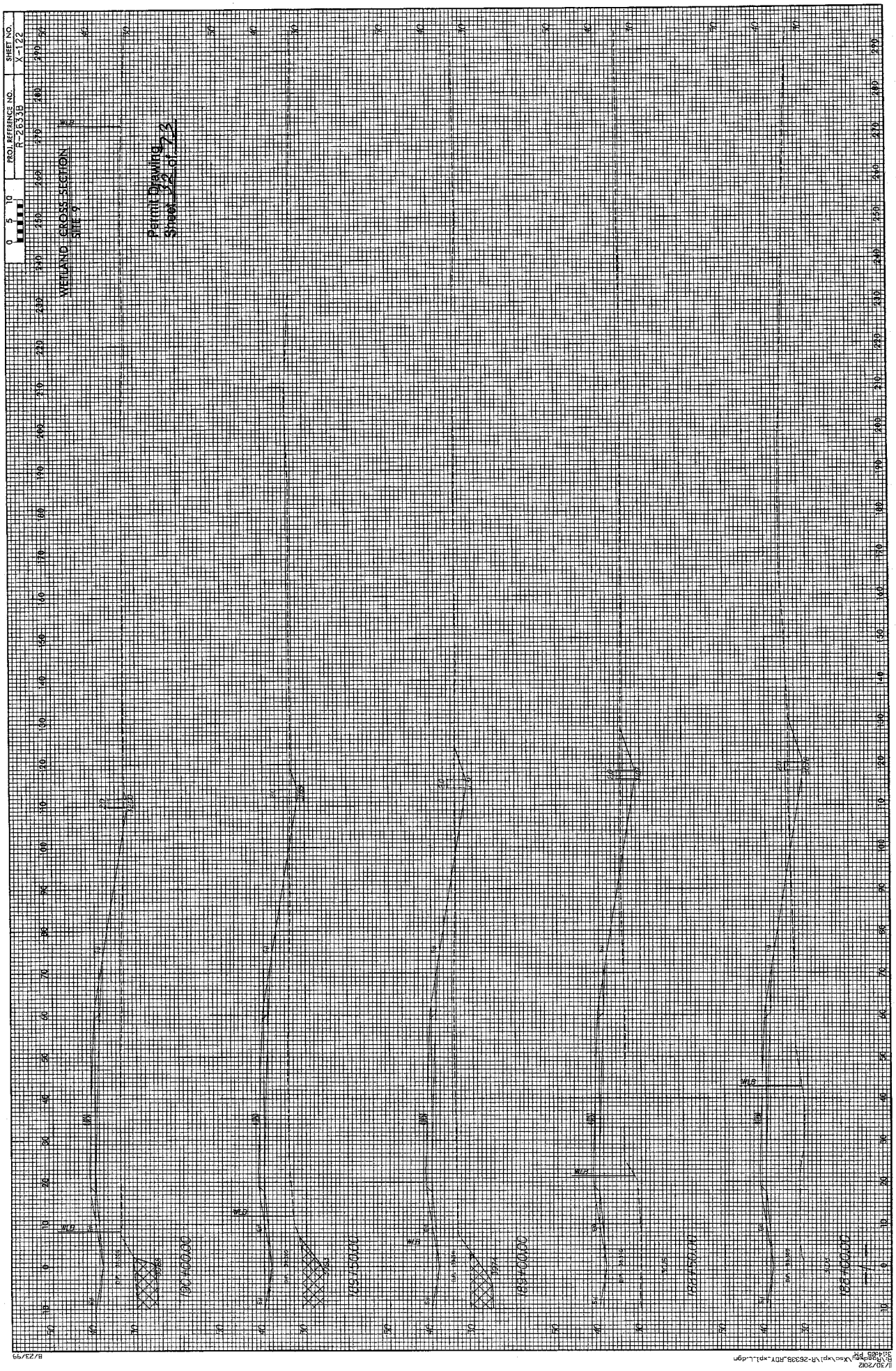
R-51

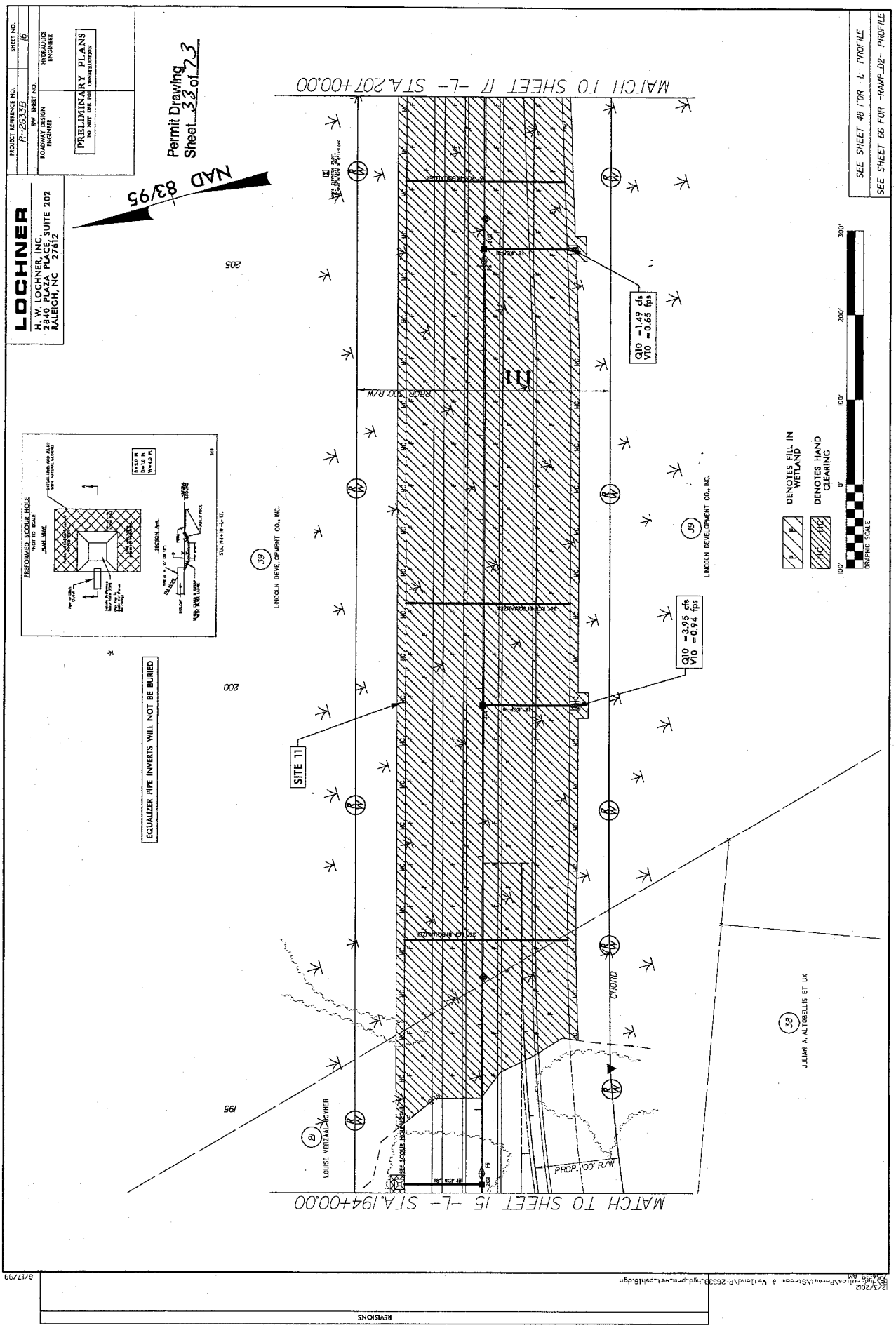

LOCHNER
H. W. LOCHNER, INC.
PLAZA I, SUITE 202
RALEIGH, NC 27612
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
PROJECT REFERENCE NO.
A-26338
SHEET NO.
15
Permit Drawing
Sheet 29 of 73
NAD 83/95
INFORMATION PROVIDED ON THIS PLAN SHEET IS FROM INTERCHANGE PLAN SHEET 15
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
MATCH TO SHEET 16 -L- STA.194+00.00
-L- STA.181+00.00
SITE 9
SITE 9
Q10 =16.0 cfs
V10 =1.34 fps
Q10 =5.6 cfs
V10 =1.77 fps
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
LOUISE VE
LOUISE VERJAAL JOYNER
JULIAN A. ALTOBELLIS ET UX
TILLMAN IVEY, JR.
STEPHANIE M. LABRECQUE
GRAPHIC SCALE
100'
0'
100'
200'
300'

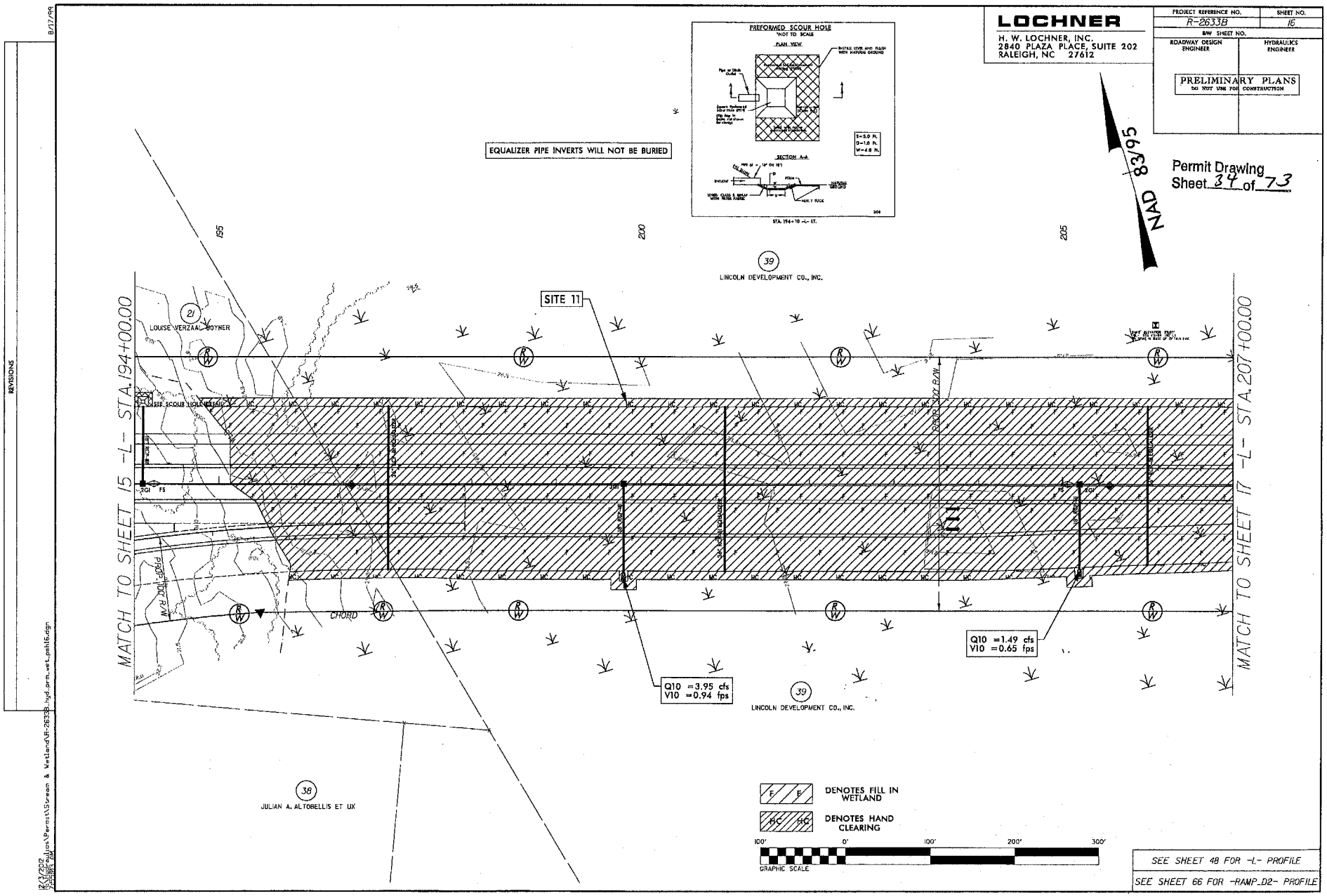

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO.
R-2633B
SHEET NO.
15
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
INFORMATION PROVIDED ON THIS PLAN SHEET IS FROM INTERCHANGE PLAN SHEET 15
Permit Drawing
Sheet 30 of 73
NAD 83/95
GRAPHIC SCALE
100' 0' 100' 200' 300'
SITE 9
SITE 9
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
Q10 =16.0 cfs
V10 =1.34 fps
Q10 =5.6 cfs
V10 =1.77 fps
-L- STA.181+00.00
MATCH TO SHEET 16 -L- STA.194+00.00
LOUISE VE
TILLMAN IVEY, JR.
STEPHANIE W. LABREGQUE
JULIAN A. ALTOBELLIS ET UX
LOUISE VERZAAL JOYNER
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
TOE PROTECTION SEE DETAIL P
REVISIONS
8/17/99
12/3/2012
R:\Hydraulics\Permit\Stream & Wetland\R-2633B_hyd_prm_wet_psh15.dgn



PROJ. REFERENCE NO.
R-2633B
SHEET NO.
X-98
WETLAND CROSS SECTION
SITE 9
Permit Drawing
Sheet 31 of 73
191+00.00
190+50.00
190+00.00
189+50.00
189+00.00
UNDERCUT
EARING LIMIT


PROJ. REFERENCE NO.
R-2633B
SHEET NO.
X-122
0 5 10
WETLAND CROSS SECTION
SITE 9
Permit Drawing
Sheet 122 of 122
8/30/2012
8/23/99


LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO. R-2633B
SHEET NO. 16
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
NO RPT USE FOR CONSTRUCTION
Permit Drawing Sheet 33 of 33
NAD 83/95
SEE SHEET 48 FOR -L- PROFILE
SEE SHEET 66 FOR -RAMP_D2- PROFILE
MATCH TO SHEET 17 -L- STA. 207+00.00
MATCH TO SHEET 15 -L- STA. 194+00.00
Q10 =1.49 cfs
V10 =0.65 fps
Q10 =3.95 cfs
V10 =0.94 fps
SITE 11
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
PREFORMED SCOUR HOLE
LINCOLN DEVELOPMENT CO., INC.
LOUISE VERZAAL HOYMER
JULIAN A. ALTOBELLIS ET UX
PROP. 100' R/W
CHORD
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
GRAPHIC SCALE
REVISIONS
8/17/99


LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO.
R-2633B
SHEET NO.
16
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 34 of 73
NAD 83/95
PREFORMED SCOUR HOLE
NOT TO SCALE
PLAN VIEW
SECTION A-A
STA. 194+10 -L- LT.
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
195
200
205
39
LINCOLN DEVELOPMENT CO., INC.
SITE 11
21
LOUISE VERZAAL BOYNER
MATCH TO SHEET 15 -L- STA.194+00.00
MATCH TO SHEET 17 -L- STA.207+00.00
PROP. 100' R/W
CHORD
Q10 =3.95 cfs
V10 =0.94 fps
Q10 =1.49 cfs
V10 =0.65 fps
38
JULIAN A. ALTOBELLIS ET UX
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
100'
0'
100'
200'
300'
GRAPHIC SCALE
SEE SHEET 48 FOR -L- PROFILE
SEE SHEET 66 FOR -RAMP_D2- PROFILE
REVISIONS
8/17/99
12/3/2012
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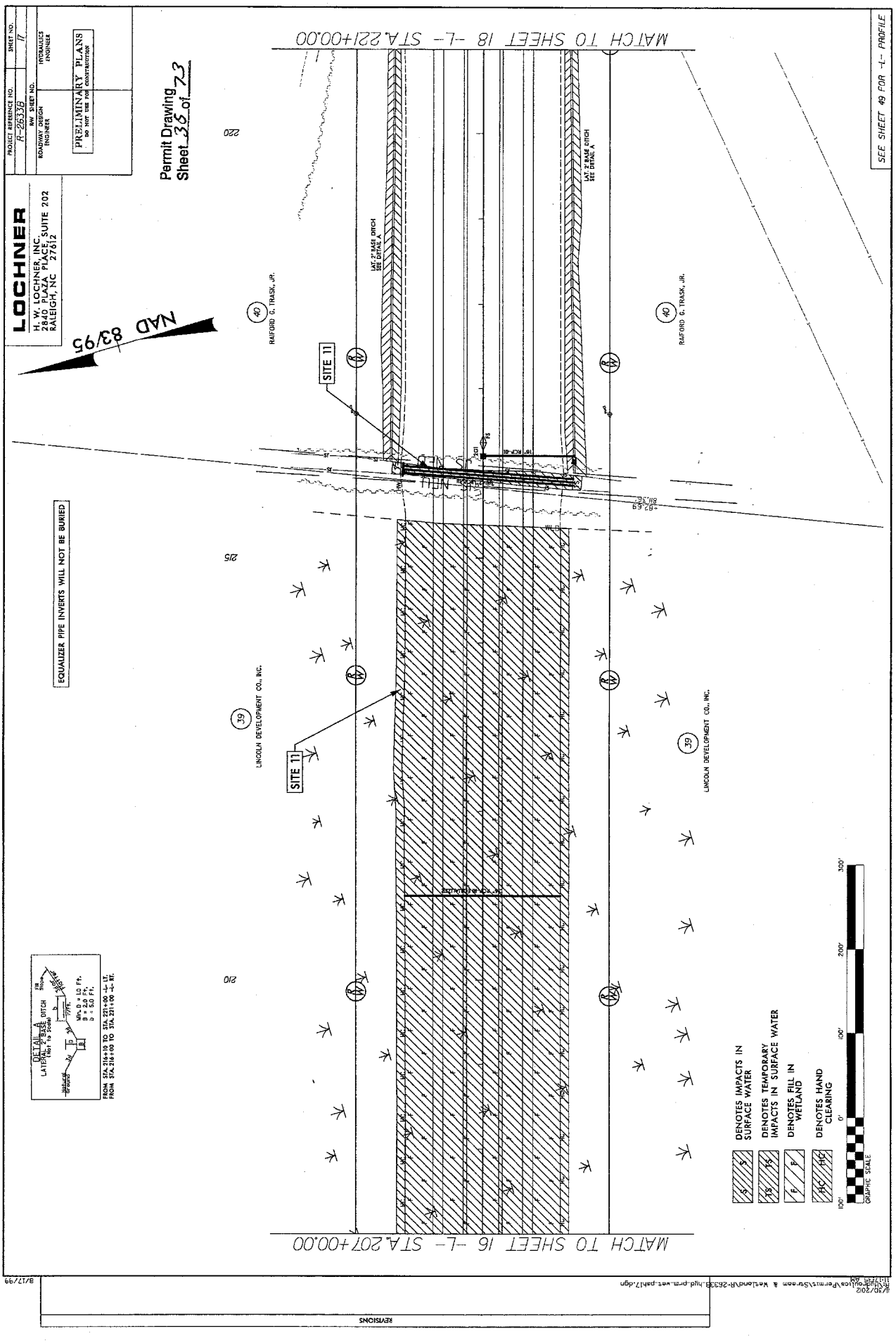
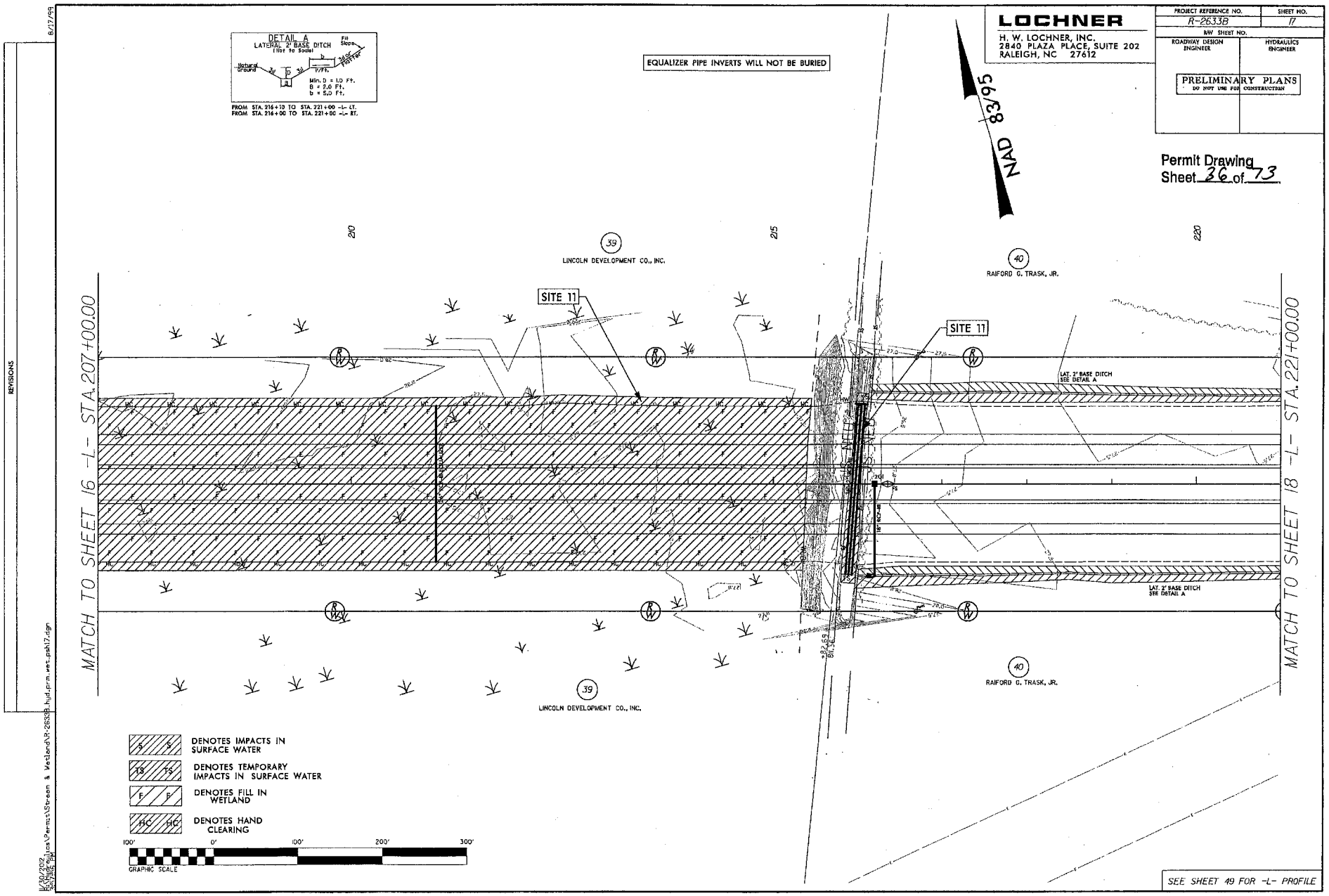
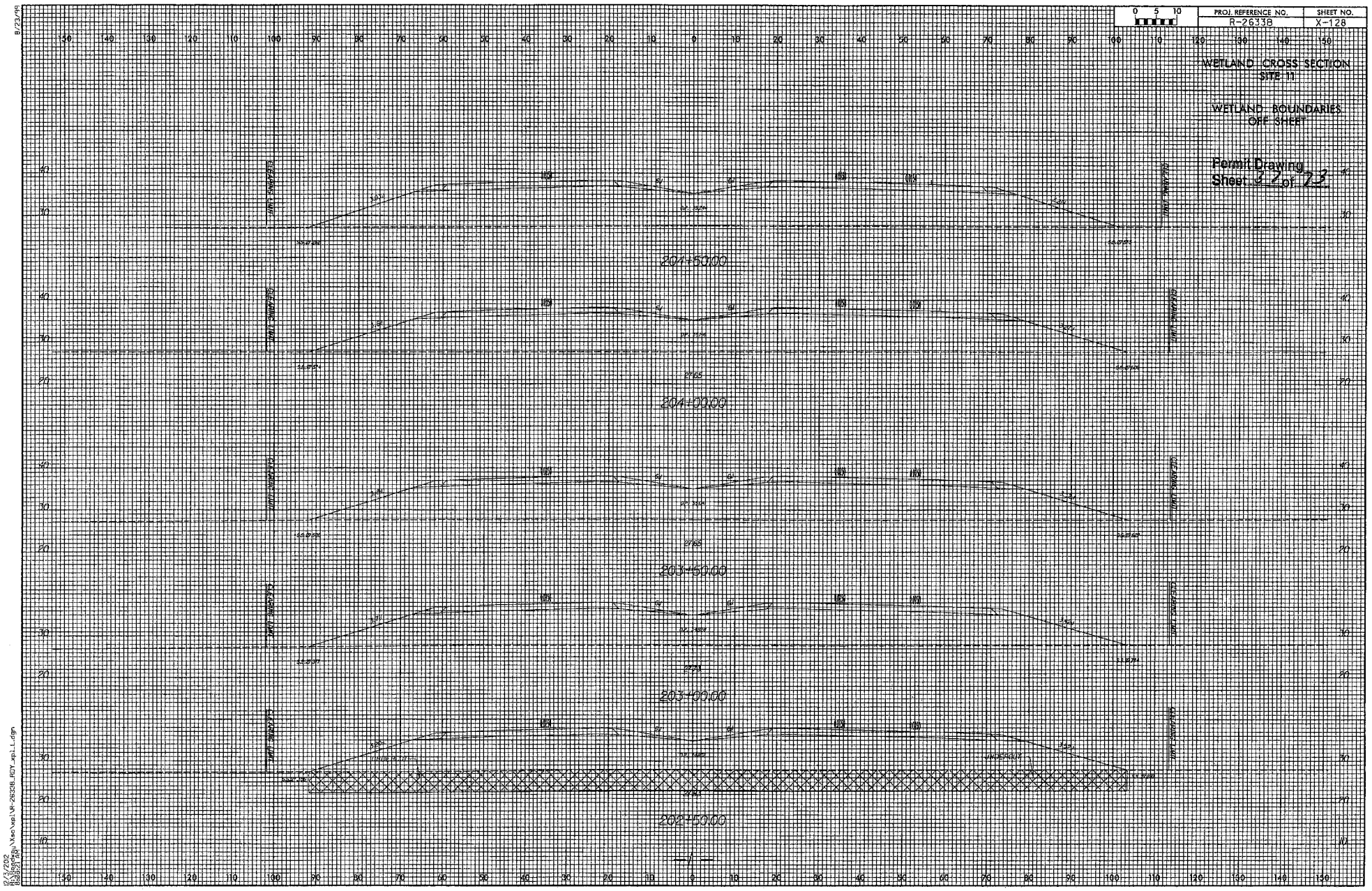

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO. R-2633B
SHEET NO. 17
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing Sheet 38 of 73
NAD 83/95
MATCH TO SHEET 18 -L- STA. 221+00.00
MATCH TO SHEET 16 -L- STA. 207+00.00
SEE SHEET 49 FOR -L- PROFILE
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
SITE 11
SITE 11
RAIFORD G. TRASK, JR.
LINCOLN DEVELOPMENT CO., INC.
LAT. 2' BASE DITCH SEE DETAIL A
DETAIL A
LATERAL DITCH
FROM STA. 216+10 TO STA. 221+00 -L- LT.
FROM STA. 216+00 TO STA. 221+00 -L- RT.
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
GRAPHIC SCALE
REVISIONS
8/17/99



LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO.
R-2633B
SHEET NO.
17
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 36 of 73
DETAIL A
LATERAL 2' BASE DITCH
(Not to Scale)
Fill Slope
Natural Ground
Min. D = 1.0 Ft.
B = 2.0 Ft.
b = 5.0 Ft.
FROM STA. 216+10 TO STA. 221+00 -L- LT.
FROM STA. 216+00 TO STA. 221+00 -L- RT.
EQUALIZER PIPE INVERTS WILL NOT BE BURIED
NAD 83/95
210
215
220
39
LINCOLN DEVELOPMENT CO., INC.
40
RAIFORD G. TRASK, JR.
SITE 11
SITE 11
LAT. 2' BASE DITCH SEE DETAIL A
LAT. 2' BASE DITCH SEE DETAIL A
MATCH TO SHEET 16 -L- STA. 207+00.00
MATCH TO SHEET 18 -L- STA. 221+00.00
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
100' 0' 100' 200' 300'
GRAPHIC SCALE
SEE SHEET 49 FOR -L- PROFILE
REVISIONS
8/17/99

R-59

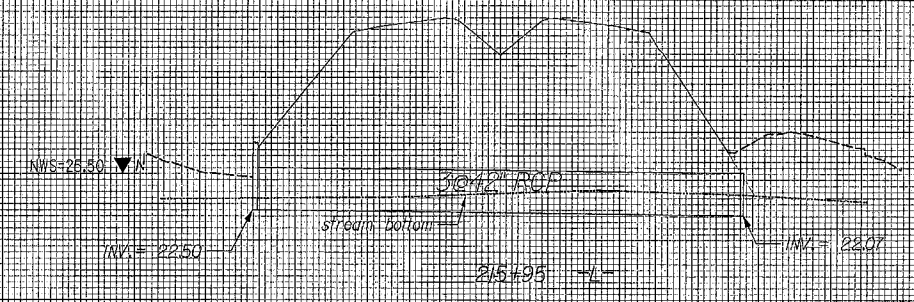


PROJ. REFERENCE NO.
R-26338
SHEET NO.
X-128
WETLAND CROSS SECTION
SITE 11
WETLAND BOUNDARIES
OFF SHEET
Permit Drawing
Sheet 32 of 73
204+50.00
204+00.00
203+50.00
203+00.00
202+50.00

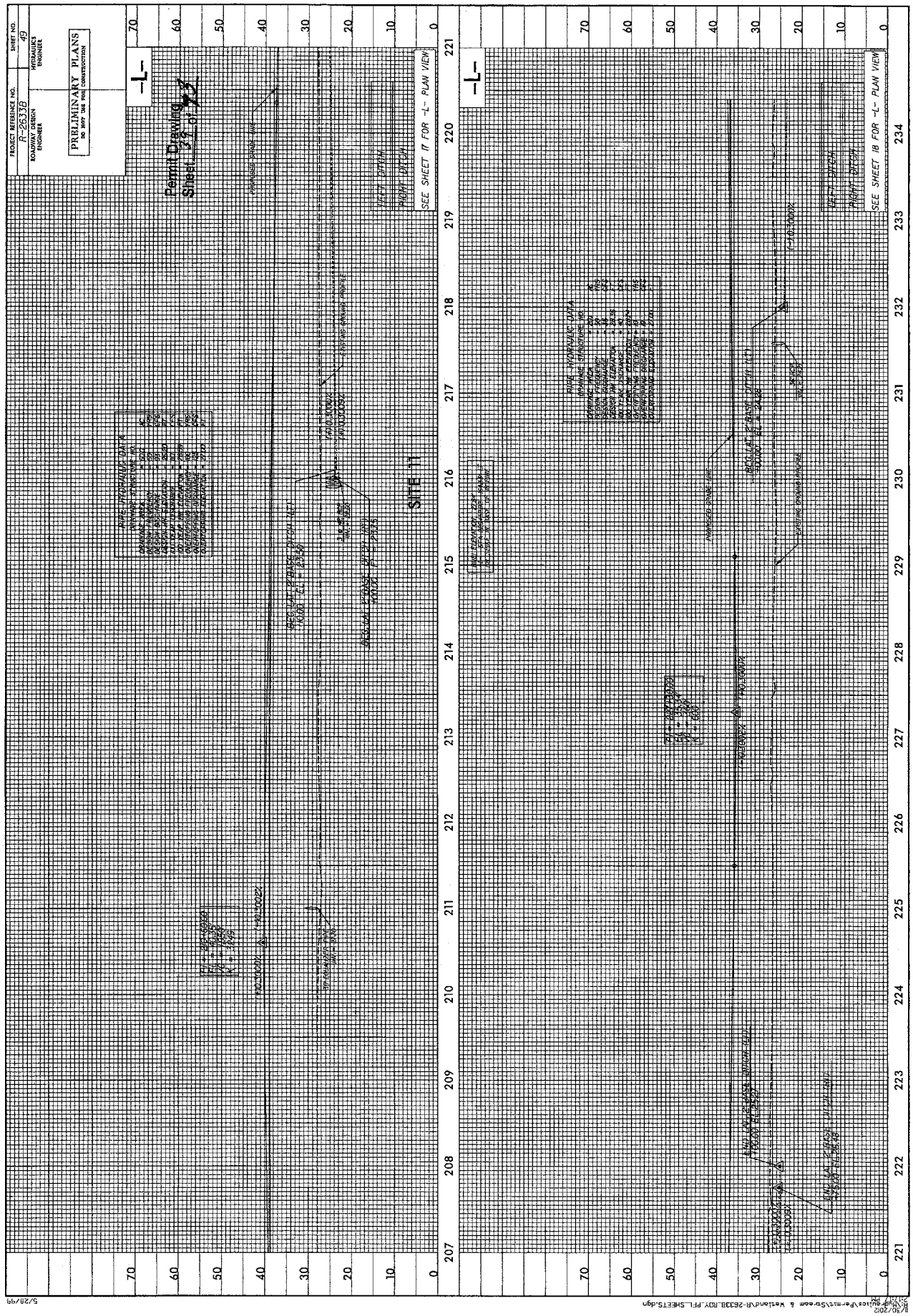
0 25	PROJ. REFERENCE NO.	SHEET NO.
	R-2633B	-L- 215+95

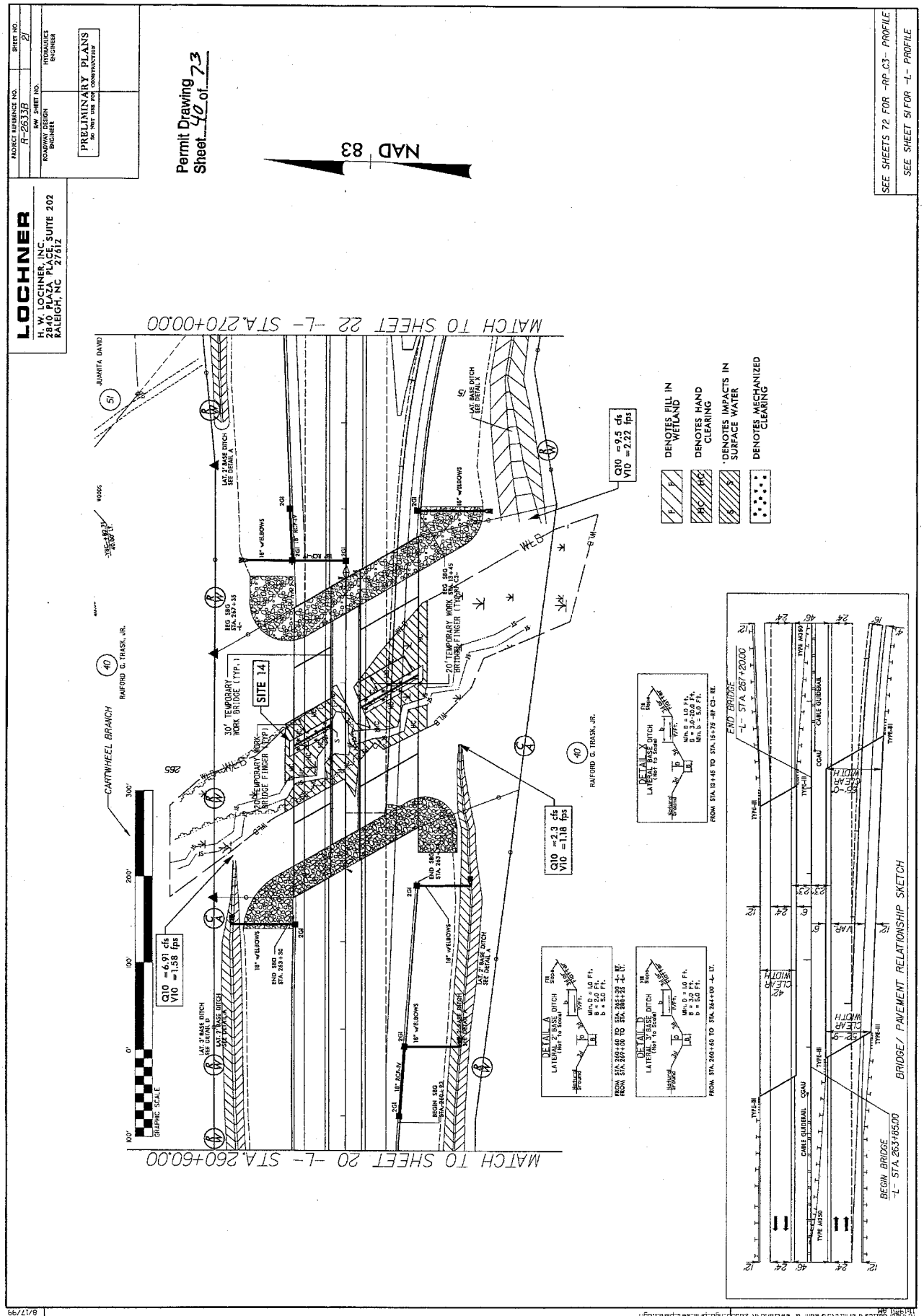
Permit Drawing
Sheet 38 of 73

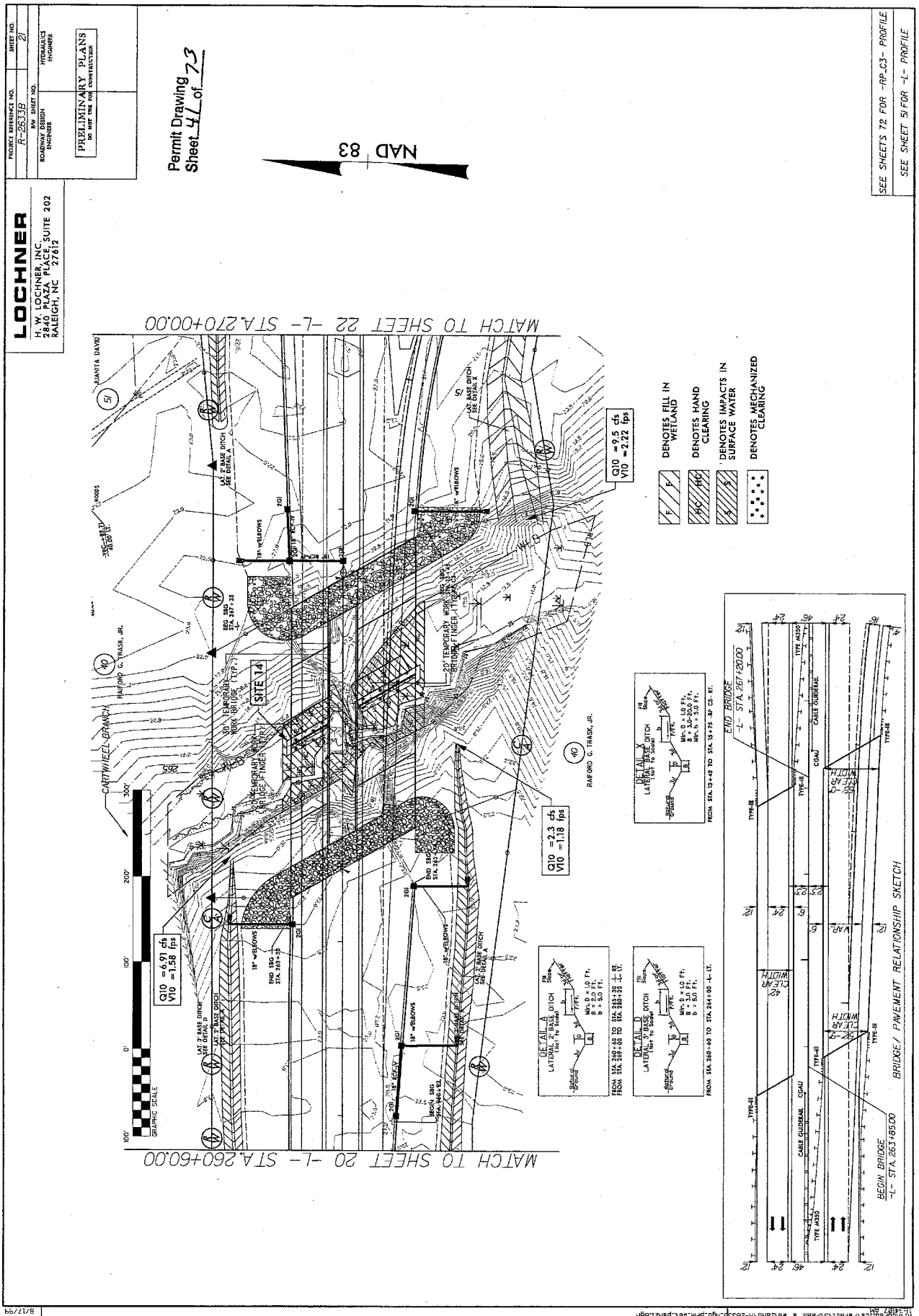
SITE 11
JURISDICTIONAL STREAM PROFILE
-L- 215+95



R-61


PROJECT REFERENCE NO.
R-2633B
SHEET NO.
49
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
NO SCALE THIS CONSTRUCTION
-L-
Permit Drawing
Sheet 33 of 47
SITE 11
SEE SHEET 17 FOR -L- PLAN VIEW
SEE SHEET 18 FOR -L- PLAN VIEW
5/28/99

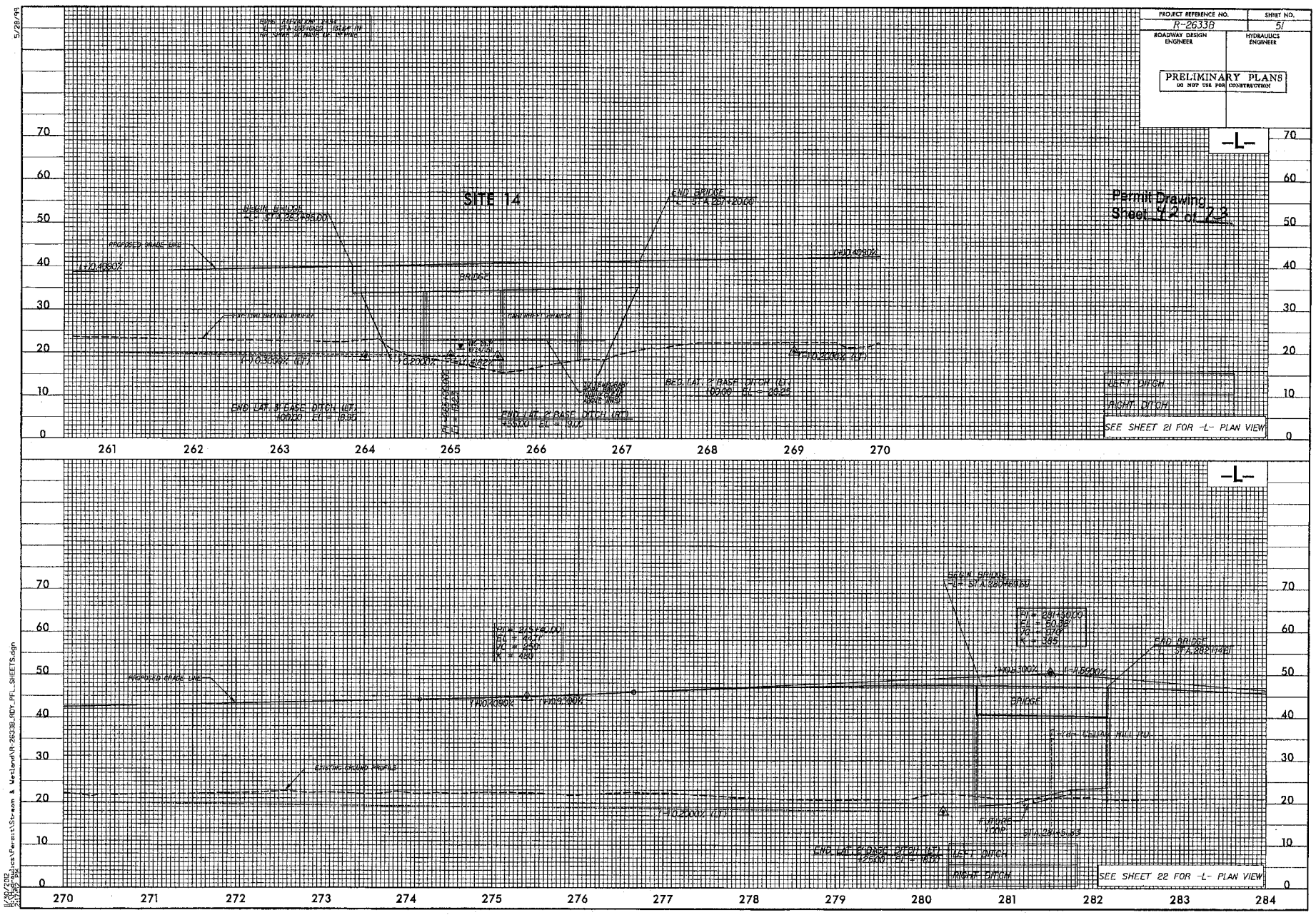

LOCHNER
H.W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO. A-2633B
SHEET NO. 21
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
NO RIGHT OF WAY CONSTRUCTION
Permit Drawing Sheet 40 of 73
NAD 83
SEE SHEETS 72 FOR -RP_C3- PROFILE
SEE SHEET 51 FOR -L- PROFILE
MATCH TO SHEET 22 -L- STA 270+00.00
MATCH TO SHEET 20 -L- STA 260+60.00
CARTWHEEL BRANCH
JUANITA DAVID
RAIFORD G. TRASK, JR.
SITE 14
30' TEMPORARY WORK BRIDGE (TYP.)
20' TEMPORARY WORK BRIDGE FINGER (TYP.)
Q10 =6.91 cfs
V10 =1.58 fps
Q10 =2.3 cfs
V10 =1.18 fps
Q10 =9.5 cfs
V10 =2.22 fps
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
DENOTES IMPACTS IN SURFACE WATER
DENOTES MECHANIZED CLEARING
DETAIL A LATERAL 2' BASE DITCH
DETAIL D LATERAL 3' BASE DITCH
DETAIL X LATERAL BASE DITCH
END BRIDGE -L- STA. 267+20.00
BEGIN BRIDGE -L- STA. 263+95.00
BRIDGE / PAVEMENT RELATIONSHIP SKETCH
GRAPHIC SCALE
REVISIONS
8/17/98



REVISIONS

RW Revision August 5, 2008, Revised rw label from -RP_C2- to -RP_C3-.

8/17/99


PROJECT REFERENCE NO.
R-2633B
SHEET NO.
51
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
-L-
SITE 14
Permit Drawing
Sheet 42 of 73
BEGIN BRIDGE
END BRIDGE
PROPOSED GRADE LINE
BRIDGE
EXISTING GROUND PROFILE
LEFT DITCH
RIGHT DITCH
SEE SHEET 21 FOR -L- PLAN VIEW
-L-
BEGIN BRIDGE
END BRIDGE
PROPOSED GRADE LINE
BRIDGE
EXISTING GROUND PROFILE
FUTURE LOOP
LEFT DITCH
RIGHT DITCH
SEE SHEET 22 FOR -L- PLAN VIEW
5/28/99
11/30/2012
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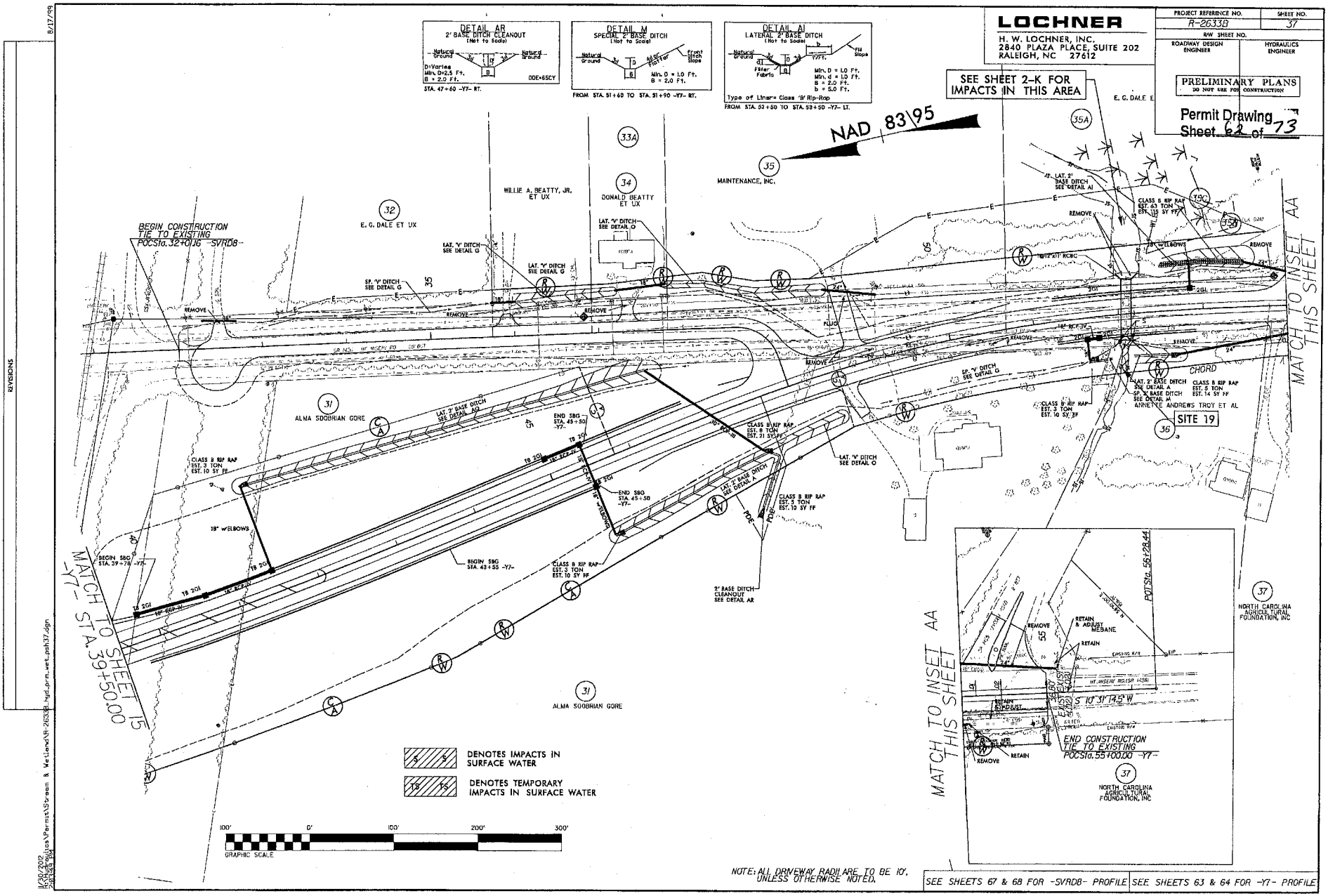
LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO. R-2633B
SHEET NO. 37
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 62 of 73
SEE SHEET 2-K FOR IMPACTS IN THIS AREA
NAD 83/95
DETAIL AR
2' BASE DITCH CLEANOUT
(Not to Scale)
STA. 47+60 -Y7- RT.
DETAIL M
SPECIAL 2' BASE DITCH
(Not to Scale)
FROM STA. 51+60 TO STA. 51+90 -Y7- RT.
DETAIL AI
LATERAL 2' BASE DITCH
(Not to Scale)
FROM STA. 52+50 TO STA. 53+50 -Y7- LT.
BEGIN CONSTRUCTION
TIE TO EXISTING
POCSta. 32+01.16 -SVRD8-
E. G. DALE ET UX
WILLIE A. BEATTY, JR. ET UX
DONALD BEATTY ET UX
MAINTENANCE, INC.
ALMA SOOBRIAN GORE
ANNETTE ANDREWS TROY ET AL
SITE 19
NORTH CAROLINA AGRICULTURAL FOUNDATION, INC
MATCH TO INSET AA THIS SHEET
MATCH TO SHEET 15 -Y7- STA. 39+50.00
END CONSTRUCTION
TIE TO EXISTING
POCSta. 55+00.00 -Y7-
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
NOTE: ALL DRIVEWAY RADII ARE TO BE 10', UNLESS OTHERWISE NOTED.
SEE SHEETS 67 & 68 FOR -SVRD8- PROFILE
SEE SHEETS 63 & 64 FOR -Y7- PROFILE
REVISIONS
8/17/99
11/30/2012
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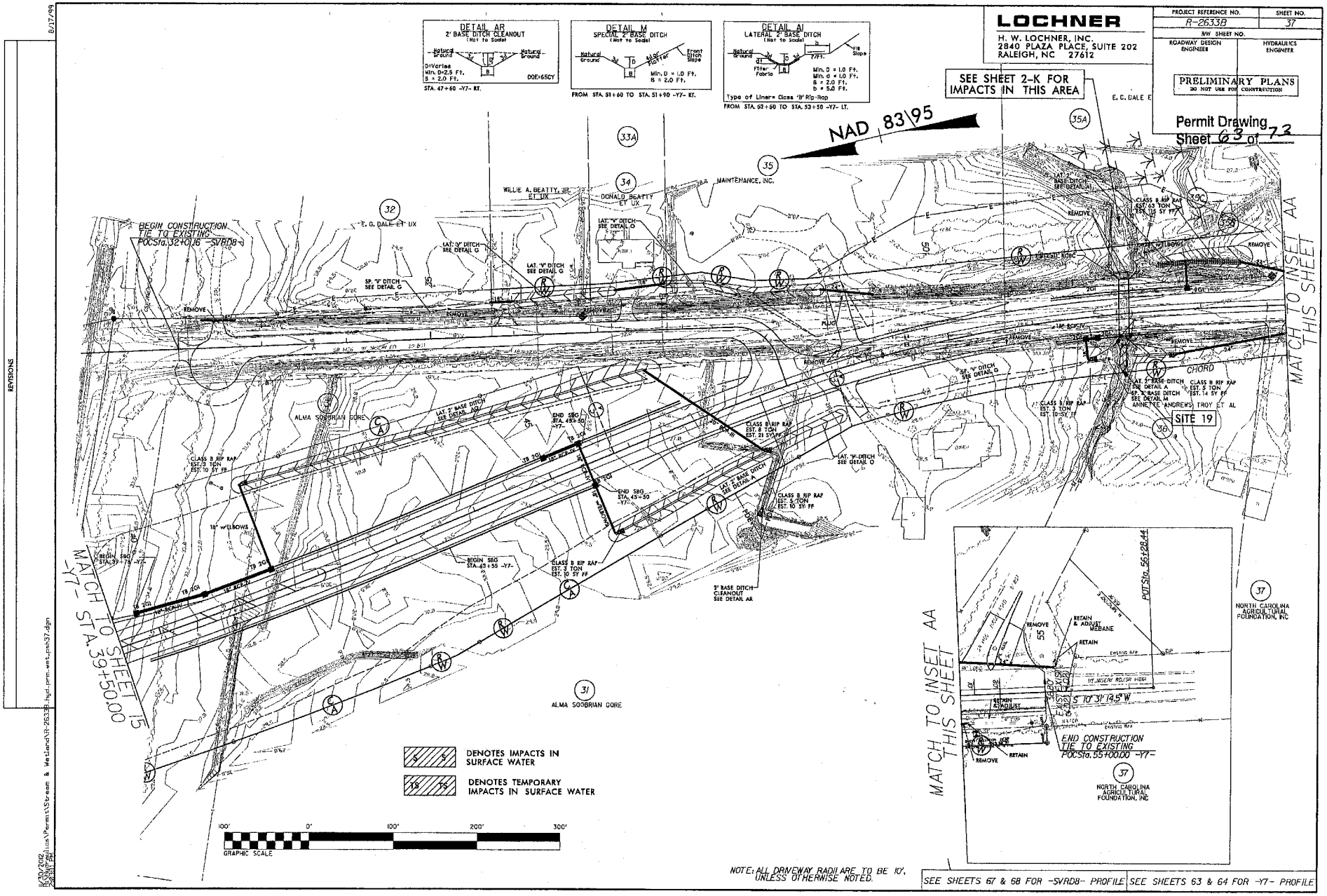
LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO. R-2633B
SHEET NO. 37
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 63 of 73
SEE SHEET 2-K FOR IMPACTS IN THIS AREA
NAD 83\95
DETAIL AR
2' BASE DITCH CLEANOUT
(Not to Scale)
STA. 47+60 -Y7- RT.
DETAIL M
SPECIAL 2' BASE DITCH
(Not to Scale)
FROM STA. 51+60 TO STA. 51+90 -Y7- RT.
DETAIL AI
LATERAL 2' BASE DITCH
(Not to Scale)
FROM STA. 52+50 TO STA. 53+50 -Y7- LT.
BEGIN CONSTRUCTION
TIE TO EXISTING
POCSta. 32+01.16 -SVRD8-
MATCH TO SHEET 15
-Y7- STA. 39+50.00
MATCH TO INSET AA
THIS SHEET
ALMA SOOBRIAN GORE
SITE 19
CHORD
ANNETTE ANDREWS TROY ET AL
NORTH CAROLINA AGRICULTURAL FOUNDATION, INC
END CONSTRUCTION
TIE TO EXISTING
POCSta. 55+00.00 -Y7-
POTSta. 56+28.44
S 10° 31' 14.5" W
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
NOTE: ALL DRIVEWAY RADII ARE TO BE 10', UNLESS OTHERWISE NOTED.
SEE SHEETS 67 & 68 FOR -SVRD8- PROFILE
SEE SHEETS 63 & 64 FOR -Y7- PROFILE
REVISIONS
8/17/99
11/30/2012
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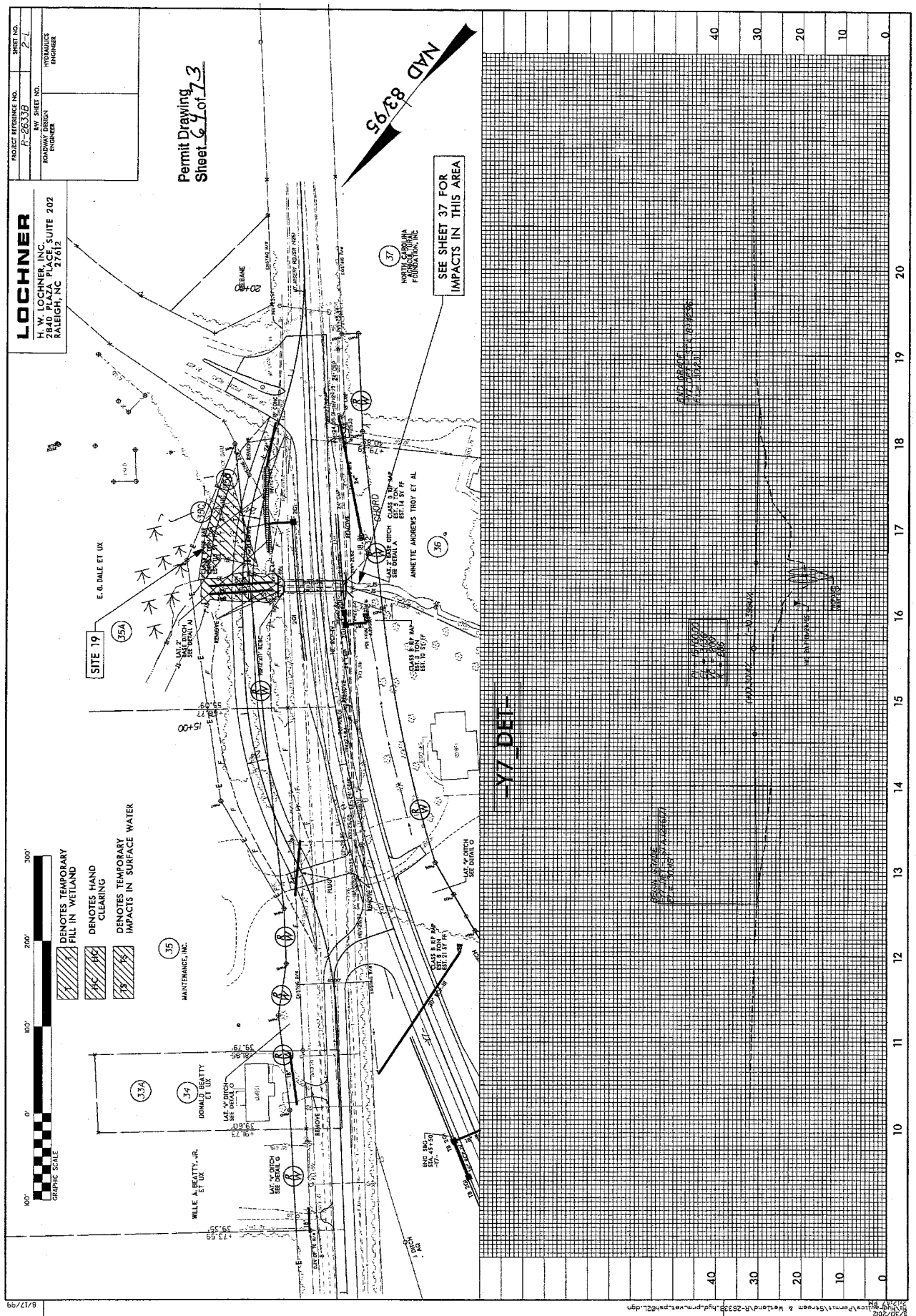
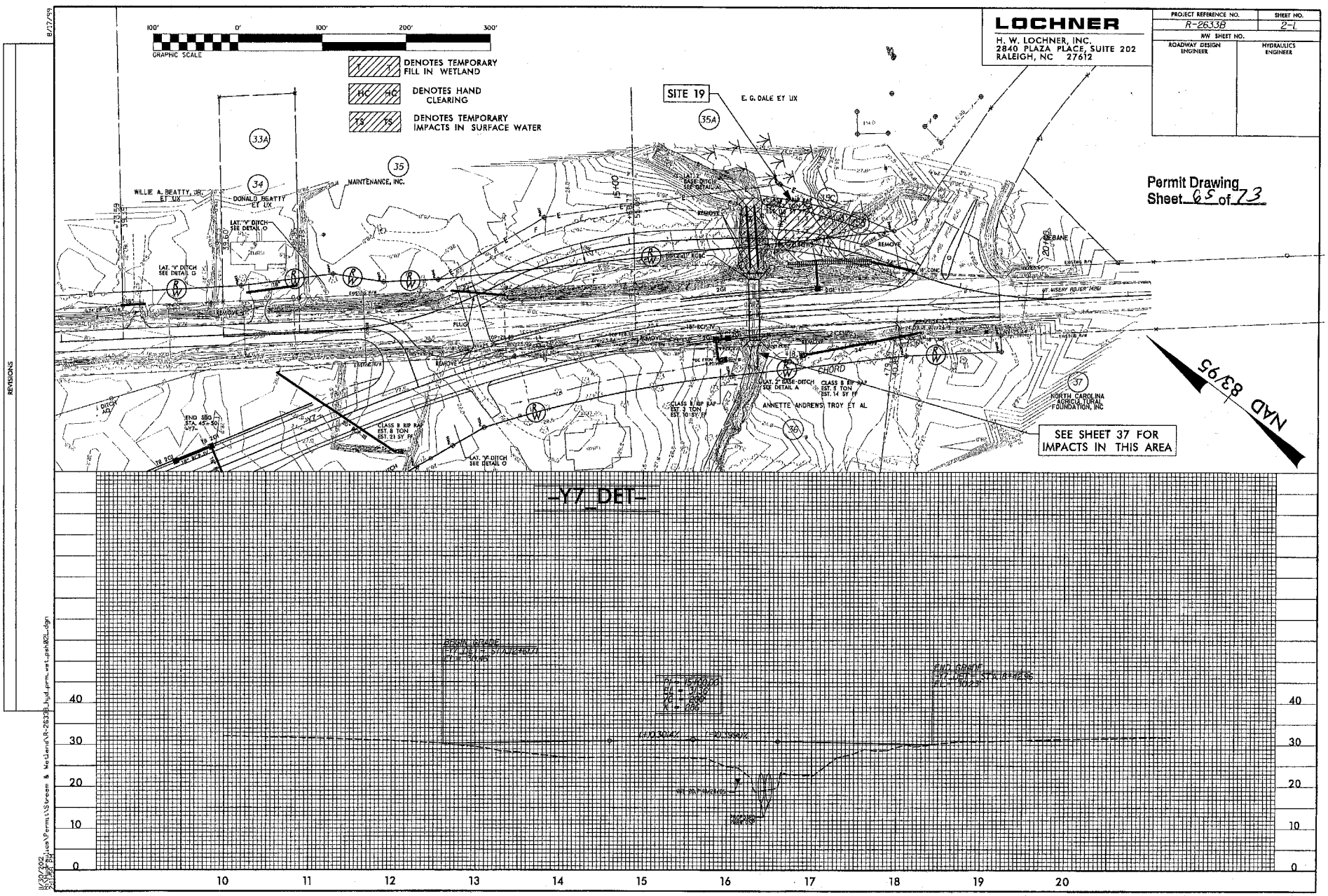
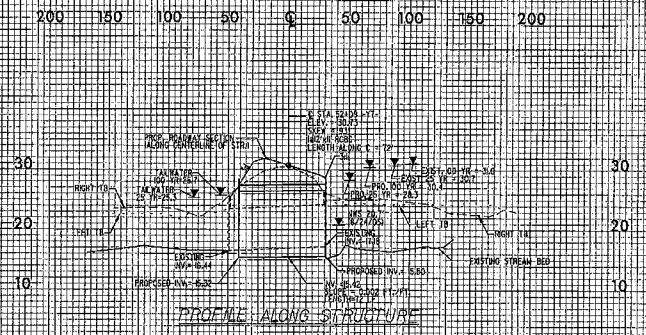

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO.
R-2633B
SHEET NO.
2-L
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
Permit Drawing
Sheet 64 of 73
NAD 83/95
SEE SHEET 37 FOR IMPACTS IN THIS AREA
SITE 19
DENOTES TEMPORARY FILL IN WETLAND
DENOTES HAND CLEARING
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
E. G. DALE ET UX
MAINTENANCE, INC.
DONALD BEATTY ET UX
WILLIE A. BEATTY, JR. ET UX
ANNETTE ANDREWS TROY ET AL
NORTH CAROLINA BIOMEDICAL FOUNDATION, INC
-Y7 DET-


LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO.
R-2633B
SHEET NO.
2-L
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
GRAPHIC SCALE
100' 0' 100' 200' 300'
DENOTES TEMPORARY FILL IN WETLAND
DENOTES HAND CLEARING
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
SITE 19
E. G. DALE ET UX
WILLIE A. BEATTY, JR. ET UX
DONALD BEATTY ET UX
MAINTENANCE, INC.
ANNETTE ANDREWS TROY ET AL
NORTH CAROLINA AGRICULTURAL FOUNDATION, INC
CHORD
SEE SHEET 37 FOR IMPACTS IN THIS AREA
NAD 83/95
Permit Drawing
Sheet 65 of 73
-Y7_DET-
BEGIN GRADE
END GRADE
REVISIONS
8/17/99
11/30/2012

0 25	PROJ. REFERENCE NO.	SHEET NO.
	R-2633B	-Y7- 52+09

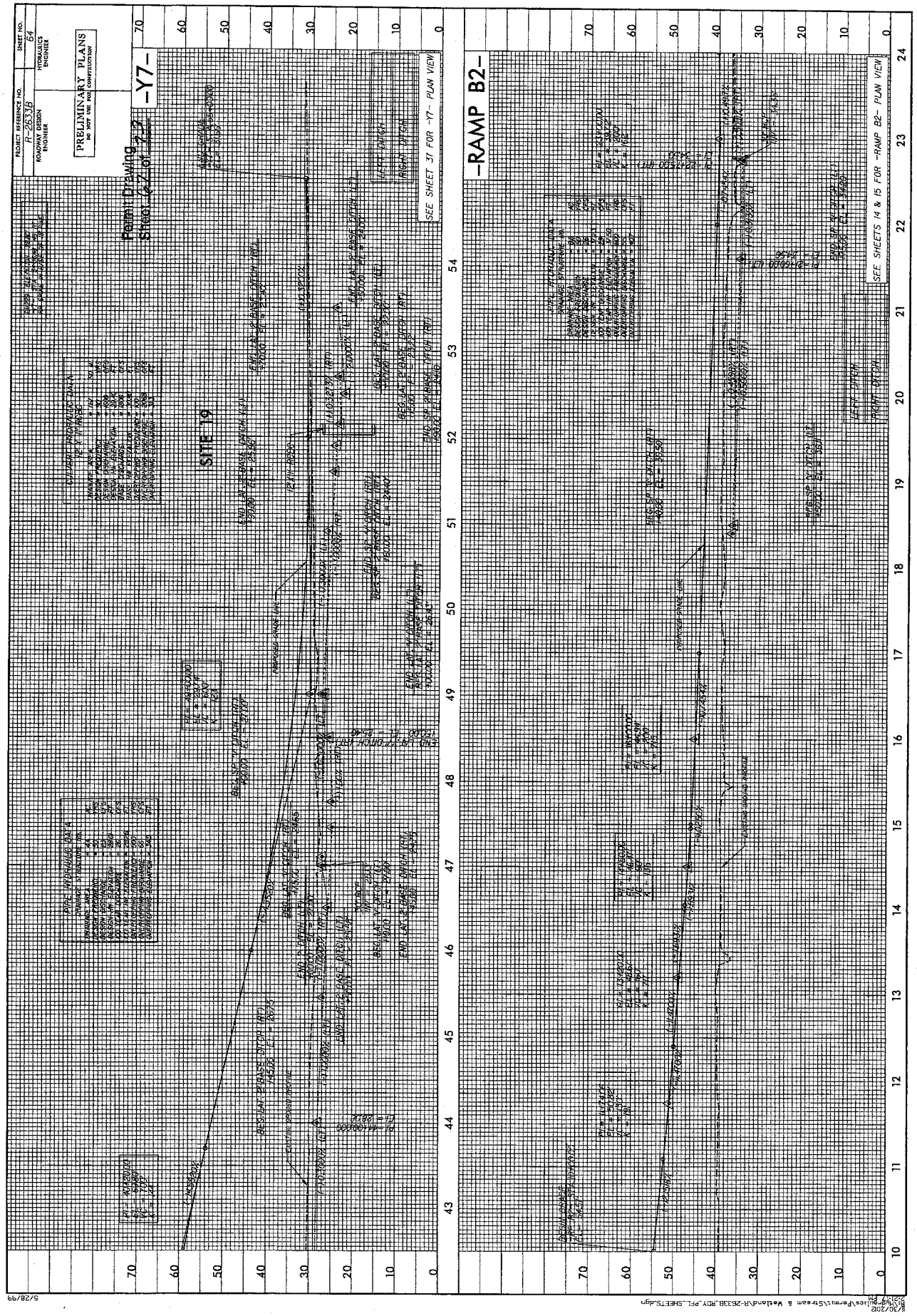
Permit Drawing
Sheet 66 of 73

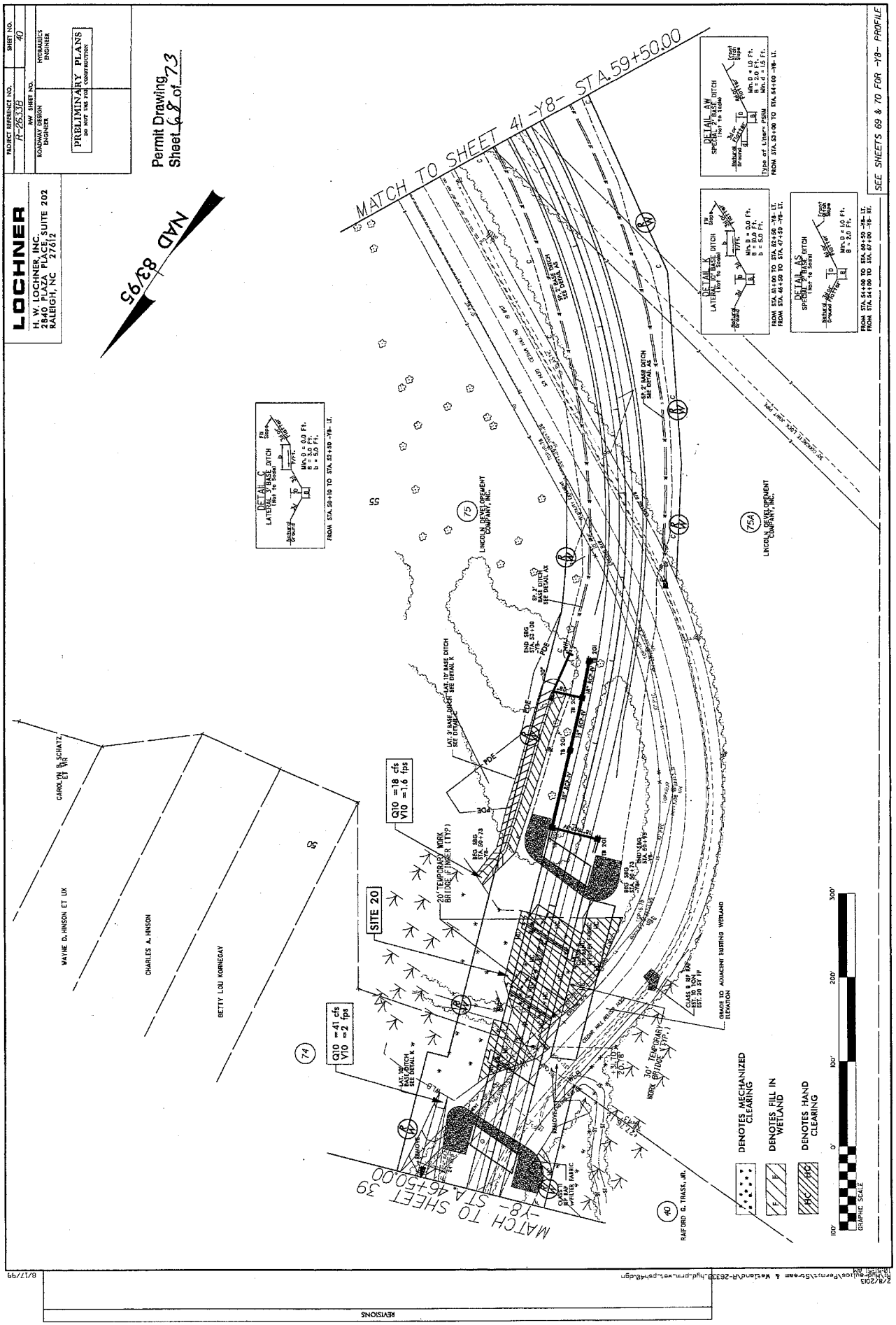
SITE 19
JURISDICTIONAL STREAM PROFILE
-Y7- 52+09

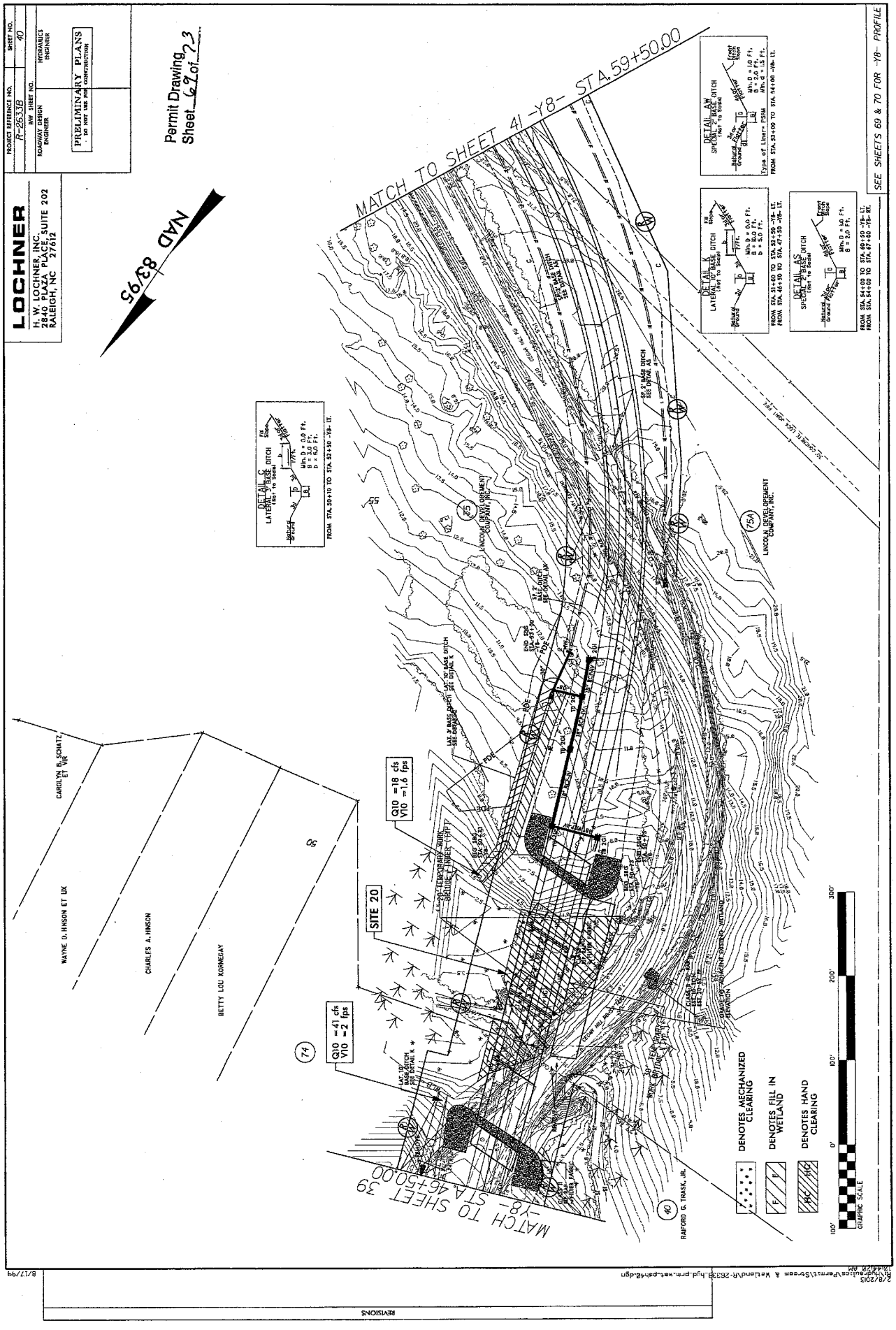


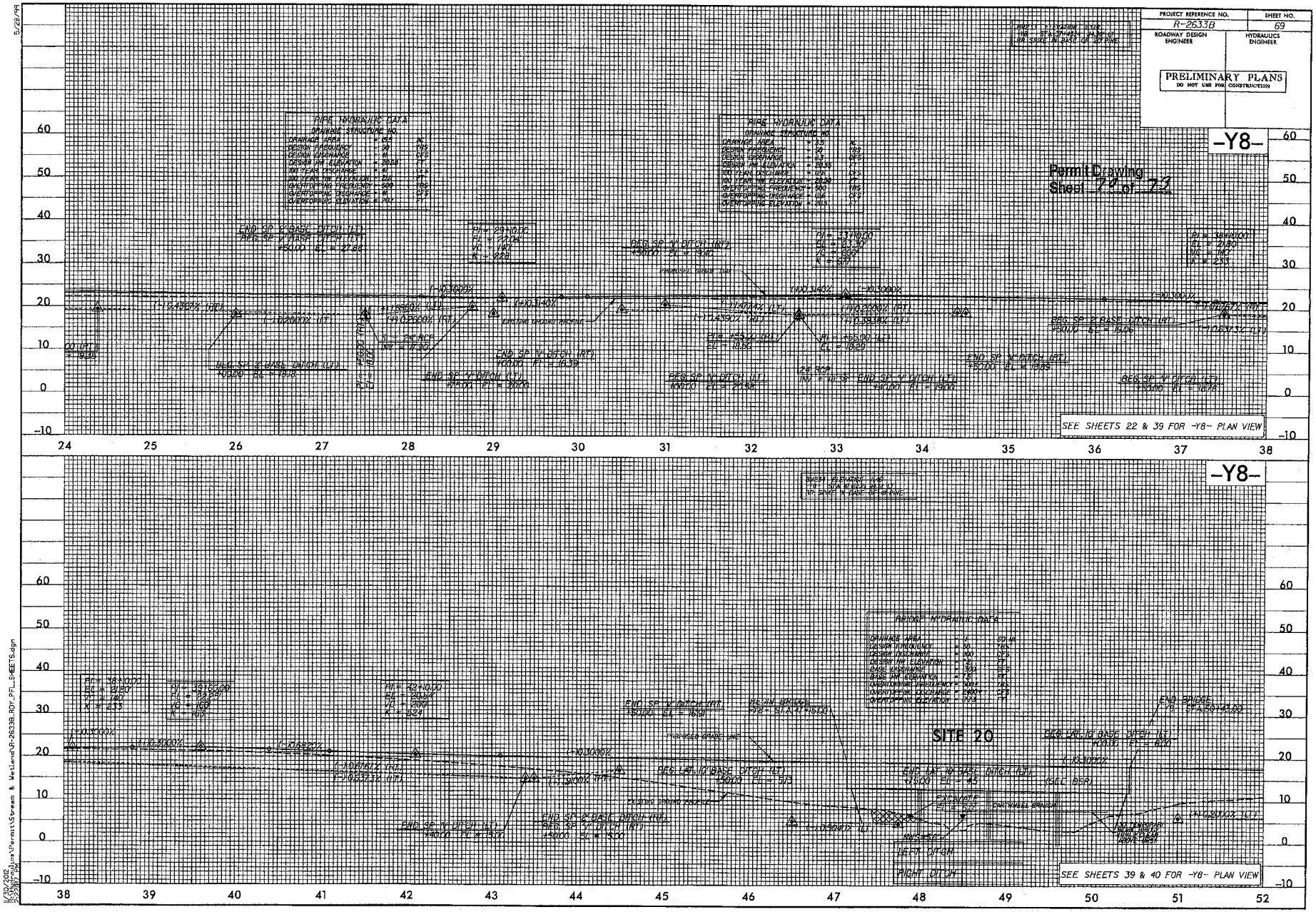
PROFILE ALONG STRUCTURE

R-70


PROJECT REFERENCE NO.
R-2633B
SHEET NO.
64
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
NO RIGHT OF WAY CONSTRUCTION
Permit Drawing
Sheet 22 of 22
-Y7-
SITE 19
-RAMP B2-
SEE SHEET 37 FOR -Y7- PLAN VIEW
SEE SHEETS 14 & 15 FOR -RAMP B2- PLAN VIEW
5/28/99


LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO. R-2633B
SHEET NO. 40
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
NOT TO BE USED FOR CONSTRUCTION
Permit Drawing Sheet 68 of 73
NAD 83/95
MATCH TO SHEET 41 -Y8- STA 59+50.00
MATCH TO SHEET 39 -Y8- STA 46+50.00
SEE SHEETS 69 & 70 FOR -Y8- PROFILE
SITE 20
Q10 = 18 cfs
V10 = 1.6 fps
Q10 = 41 cfs
V10 = 2 fps
DETAIL C
LATERAL 3' BASE DITCH
DETAIL K
LATERAL 10' BASE DITCH
DETAIL AK
SPECIAL 2' BASE DITCH
DETAIL AS
SPECIAL 2' BASE DITCH
DENOTES MECHANIZED CLEARING
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
GRAPHIC SCALE
CAROLYN B. SCHATZ ET VIR
WAYNE D. HINSON ET UX
CHARLES A. HINSON
BETTY LOU KORNEGAY
LINCOLN DEVELOPMENT COMPANY, INC.
RAFFORD G. TRASK, JR.
20' TEMPORARY WORK BRIDGE (TYP.)
GRADE TO ADJACENT EXISTING WETLAND ELEVATION
REVISIONS
8/17/99


LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
PROJECT REFERENCE NO. R-2633B
SHEET NO. 40
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing Sheet 62 of 73
NAD 83/95
MATCH TO SHEET 41 -Y8- STA 4,59+50.00
MATCH TO SHEET 39 -Y8- STA 46+50.00
SEE SHEETS 69 & 70 FOR -Y8- PROFILE
SITE 20
Q10 =18 cfs
V10 =1.6 fps
Q10 =41 cfs
V10 =2 fps
CAROLYN B. SCHATZ ET VIR
WAYNE D. HINSON ET UX
CHARLES A. HINSON
BETTY LOU KORNEGAY
LINCOLN LEVEL DEVELOPMENT COMPANY, INC.
RAFFORD G. TRASK, JR.
DETAIL G LATERAL TO BASE DITCH
DETAIL K LATERAL TO BASE DITCH
DETAIL AW SPECIAL 2' BASE DITCH
DETAIL AS SPECIAL 2' BASE DITCH
DENOTES MECHANIZED CLEARING
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
GRAPHIC SCALE
REVISIONS
8/17/99


PROJECT REFERENCE NO.
R-2633B
SHEET NO.
69
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
-Y8-
Permit Drawing
Sheet 22 of 77
SEE SHEETS 22 & 39 FOR -Y8- PLAN VIEW
-Y8-
SITE 20
SEE SHEETS 39 & 40 FOR -Y8- PLAN VIEW
5/28/99
11/30/2012
R-74

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS: 404 Permanent Fill In Wetlands (ac)	CAMA Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	404 Hand Clearing in Wetlands (ac)	CAMA Hand Clearing in Wetlands (ac)	SURFACE WATER IMPACTS: Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1***	~~-L- 24+75 Lt.~~	~~Roadway Fill~~												
2***	~~-L- 37+96 Rt.~~	~~Bridge~~												
3****	-LREV- 339+73 to 358+92	Roadway Fill	7.45			0.03		0.58						
4	-RP_D1- 22+60	Deleted due to new JS delineation												
5*	-LREV- 372+74 to -L-85+08	Roadway Fill	1.04					0.12						
6*	-L- 109+28 to 134+54	Roadway Fill	9.72					1.13						
6A**	-L- 138+11 to 140+70	Roadway Fill	0.68											
6B**	-L- 141+20 to 144+29	Roadway Fill	0.41					0.02						
7*	-L- 146+78 to 165+66	Roadway Fill	10.55					0.98						
8	-L 166+60	Deleted due to new JS delineation												
9*	-L- 186+97 to 191+88	Roadway Fill	1.04					0.09						
10	-RP_D2- 19+20 Lt.	Deleted due to new JS delineation												
11*	-L- 194+75 to 216+13	Roadway Fill; 3@42"	8.72					0.93		0.07	<0.01	205	20	
12	-L- 230+39 to 242+11	Deleted due to new JS delineation												
13	-L- 256+36 to 265+87	Deleted due to new JS delineation												
14*	-L- 264+32 to 266+94	Bridge					0.03	0.20		<0.01				
		Temp. Work Bridge						0.10						
15*	319+46 to 387+92	Bridge	0.05			*****0.93		10.48	7.79	0.13	0.03			
		Temp. Work Bridge						6.43	4.70					
16*	-L- 399+43 to 400+51	Roadway Fill	0.22											
17***	~~-Y5-16+25 Rt~~	~~48" RCP~~												
18***	~~-Y5-16+25 Lt~~	~~48" RCP~~												
19*	-Y7- 52+09	Culvert								<0.01	<0.01	5	39	
	-Y7 DET- 16+45	Detour Culvert			0.06			0.03			0.61		90	
20*	-Y8- 47+74 to 49+88	Bridge	<0.01				0.04	0.17						
	-Y8- 48+78 to 49+95	Temp. Work Bridge						0.14						
TOTALS:			39.89		0.06	0.96	0.07	21.40	12.49	0.20	0.63	210	149	0.00

Site 14 See Structures sheet for Bridge Impacts on Cartwheel Branch
Site 15 Impacts for Permanent Dual Bridges CAMA=0.07 Ac, 404=0.07 Ac, Surface Water=0.0 1Ac; Total=0.15 Ac.
Site 15 Impacts for Temporary Work Bridge CAMA=0.16 Ac, 404=0.21 Ac, Surface Water=0.01 Ac; Total=0.38 Ac.
* Revised due to new JS Delineation
** New Site due to new JS Delineation
*** Sites 1, 2, 17, and 18 are now permitted with R-2633AA & AB and the impacts are included with that project.
**** A portion of Site 3 is now permitted with R-2633AA & AB and the impacts are included with that project.
***** Temporary Excavation. CAMA=0.41Ac, 404 =0.52 Ac.; Total=0.91 Ac.
0.75 acres of Temp. Fill in 404 Wetlands in the Hand Clearing areas for Erosion Control Measures

ATN Revised 3/31/05

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
BRUNSWICK AND NEW HANOVER COUNTIES
WBS - 34491.1.2 (R-2633B)
SHEET 73 of 73

rev. 5/24/13

NOTE: Permit Sites #15 and #16 do not apply to project R-2633BA

TIP PROJECT: R-2633B

T.I.P. NO.	SHEET NO.
R-2633B	1

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

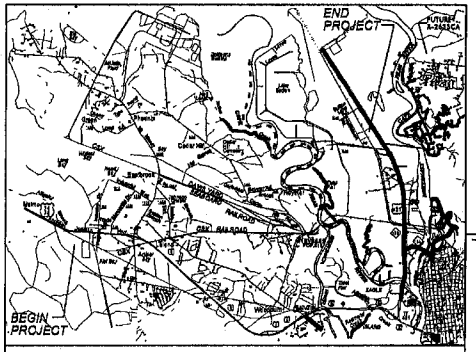
Utility Permit Drawing
Sheet 1 of 15
Revised 3/28/13

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

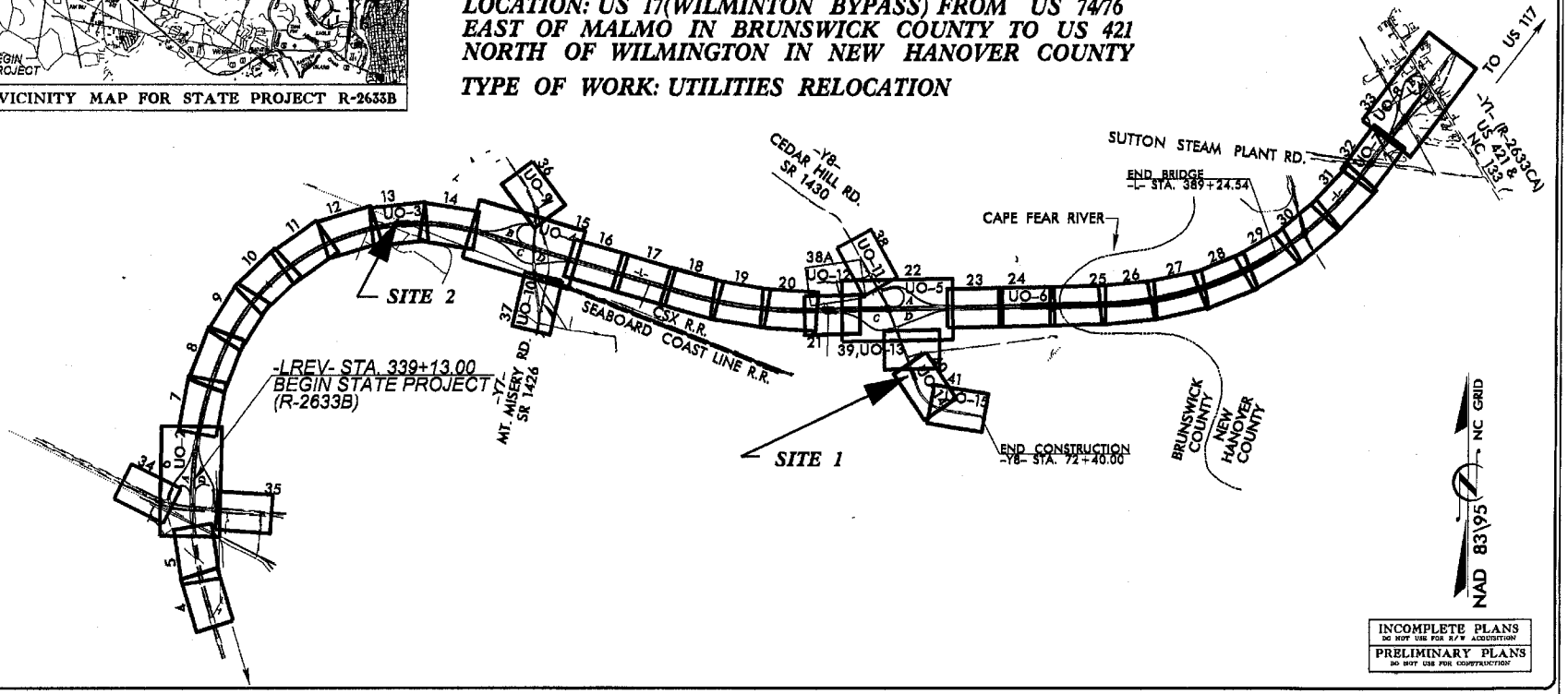
NEU PERMIT PLANS BRUNSWICK -NEW HANOVER COUNTY

LOCATION: US 17(WILMINTON BYPASS) FROM US 74/76 EAST OF MALMO IN BRUNSWICK COUNTY TO US 421 NORTH OF WILMINGTON IN NEW HANOVER COUNTY

TYPE OF WORK: UTILITIES RELOCATION



VICINITY MAP FOR STATE PROJECT R-2633B



INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

PLANS: 50 25 0 50 100

PROFILE (HORIZONTAL): 50 25 0 50 100

PROFILE (VERTICAL): 10 5 0 10 20

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
NUO-1	TITLE SHEET
NUO-2 THRU NUO-3	UTILITY'S WETLAND IMPACT

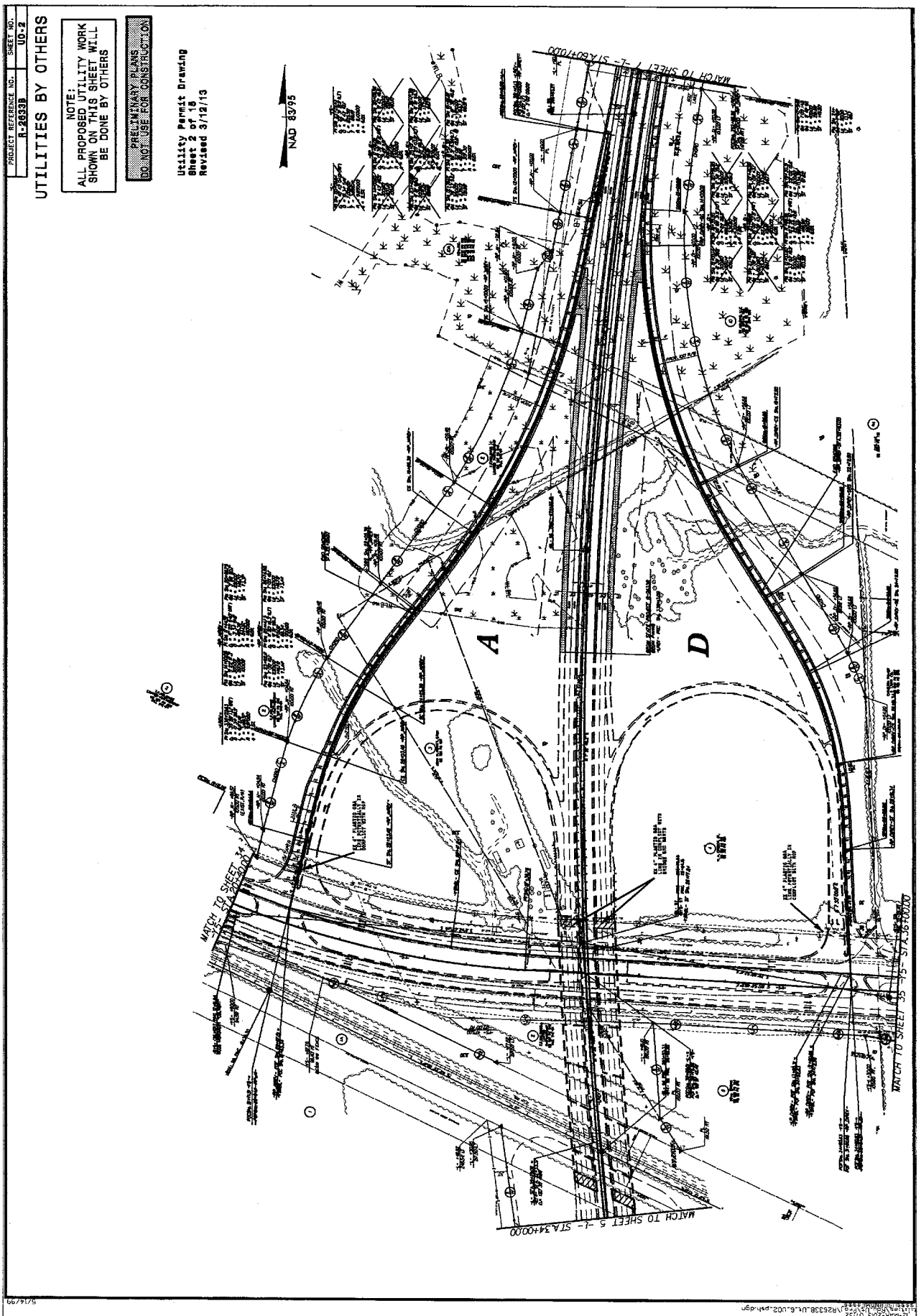
UTILITY OWNERS ON PROJECT

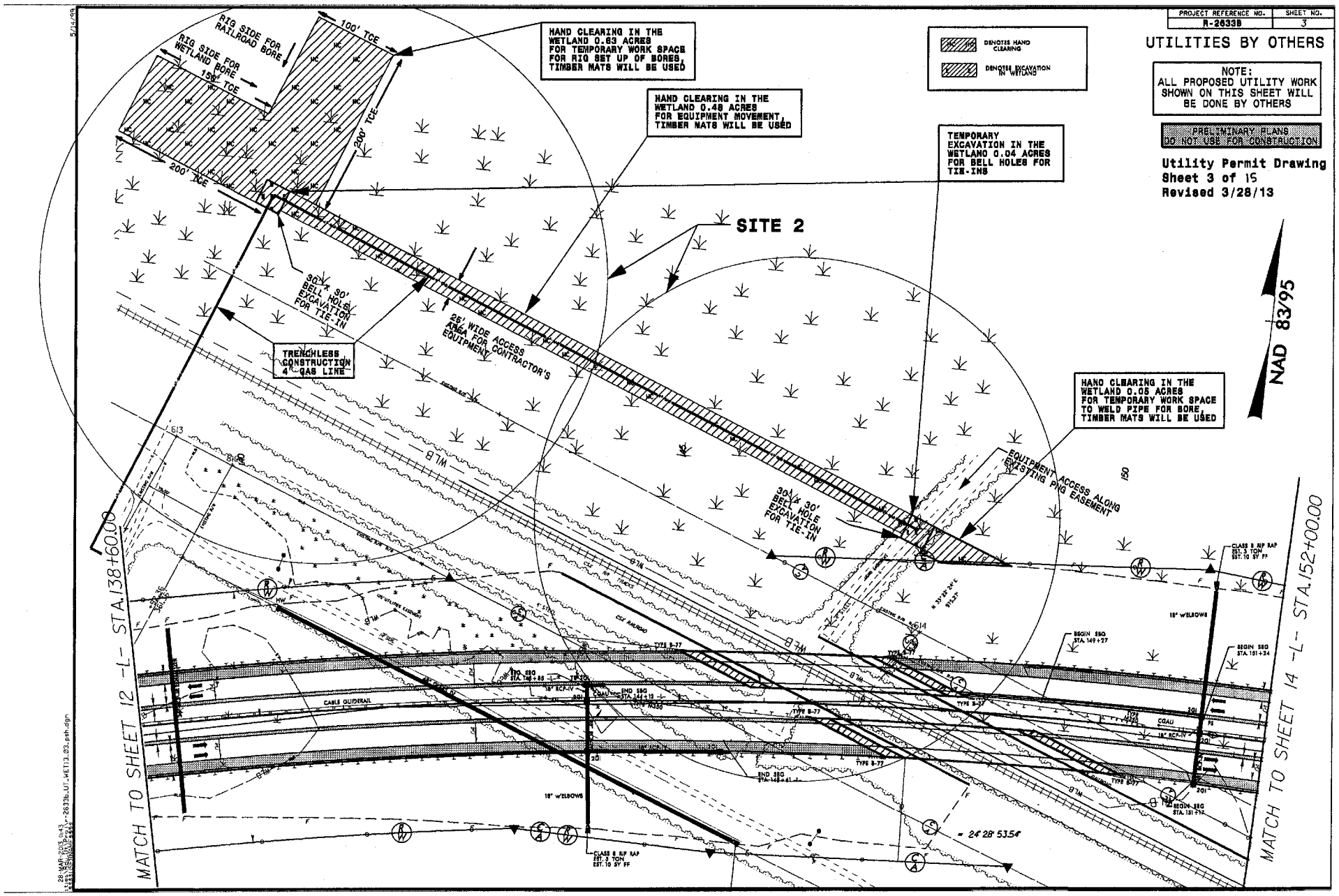
(1) POWER : PROGRESS ENERGY
(2) TELEPHONE : AT & T
(3) GAS : PIEDMONT NATURAL GAS

PREPARED IN THE OFFICE OF:
DIVISION OF HIGHWAYS
UTILITIES UNIT
UTILITIES ENGINEERING
1555 MAIL SERVICES CENTER
RALEIGH NC 27699-1555
PHONE (919) 707-6690
FAX (919) 250-4151

Roger Worthington, P.E. — UTILITIES SECTION ENGINEER
R.B. Wilkins, P.E. — UTILITIES SQUAD LEADER PROJECT ENGINEER
Jong-Tae Yoon — UTILITIES PROJECT DESIGNER

09/08/99
28-MAR-2013 08:52
R:\Utilities\Rdy\Ut\Proj\R2633B_Ut_Title_WET01_psh.dgn
$$$$USERNAME$$$$


PROJECT REFERENCE NO.
R-2633B
SHEET NO.
U0-2
UTILITIES BY OTHERS
NOTE:
ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION
Utility Permit Drawing
Sheet 2 of 18
Revised 3/12/13
NAD 83/95
MATCH TO SHEET 4 -L- STA 60+00.00
MATCH TO SHEET 5 -L- STA 34+00.00
MATCH TO SHEET 3 -L- STA 86+00.00
A
D


PROJECT REFERENCE NO.
R-2633B
SHEET NO.
3
UTILITIES BY OTHERS
NOTE:
ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Utility Permit Drawing
Sheet 3 of 15
Revised 3/28/13
DENOTES HAND CLEARING
DENOTES EXCAVATION IN WETLAND
HAND CLEARING IN THE WETLAND 0.63 ACRES FOR TEMPORARY WORK SPACE FOR RIG SET UP OF BORES, TIMBER MATS WILL BE USED
HAND CLEARING IN THE WETLAND 0.48 ACRES FOR EQUIPMENT MOVEMENT, TIMBER MATS WILL BE USED
TEMPORARY EXCAVATION IN THE WETLAND 0.04 ACRES FOR BELL HOLES FOR TIE-INS
HAND CLEARING IN THE WETLAND 0.05 ACRES FOR TEMPORARY WORK SPACE TO WELD PIPE FOR BORE, TIMBER MATS WILL BE USED
SITE 2
RIG SIDE FOR RAILROAD BORE
RIG SIDE FOR WETLAND BORE
100' TCE
150' TCE
200' TCE
30' x 30' BELL HOLE EXCAVATION FOR TIE-IN
25' WIDE ACCESS AREA FOR CONTRACTOR'S EQUIPMENT
TRENCHLESS CONSTRUCTION 4" GAS LINE
EQUIPMENT ACCESS ALONG EXISTING PNG EASEMENT
NAD 83/95
MATCH TO SHEET 12 -L- STA.138+60.00
MATCH TO SHEET 14 -L- STA.152+00.00
CABLE GUIDERAIL
CSX RAILROAD
18" w/ELBOWS
CLASS B RIP RAP EST. 3 TON EST. 10 SY FF
BEGIN SBG STA. 149+27
BEGIN SBG STA. 151+24
BEGIN SBG STA. 151+17
= 24° 28' 53.54"

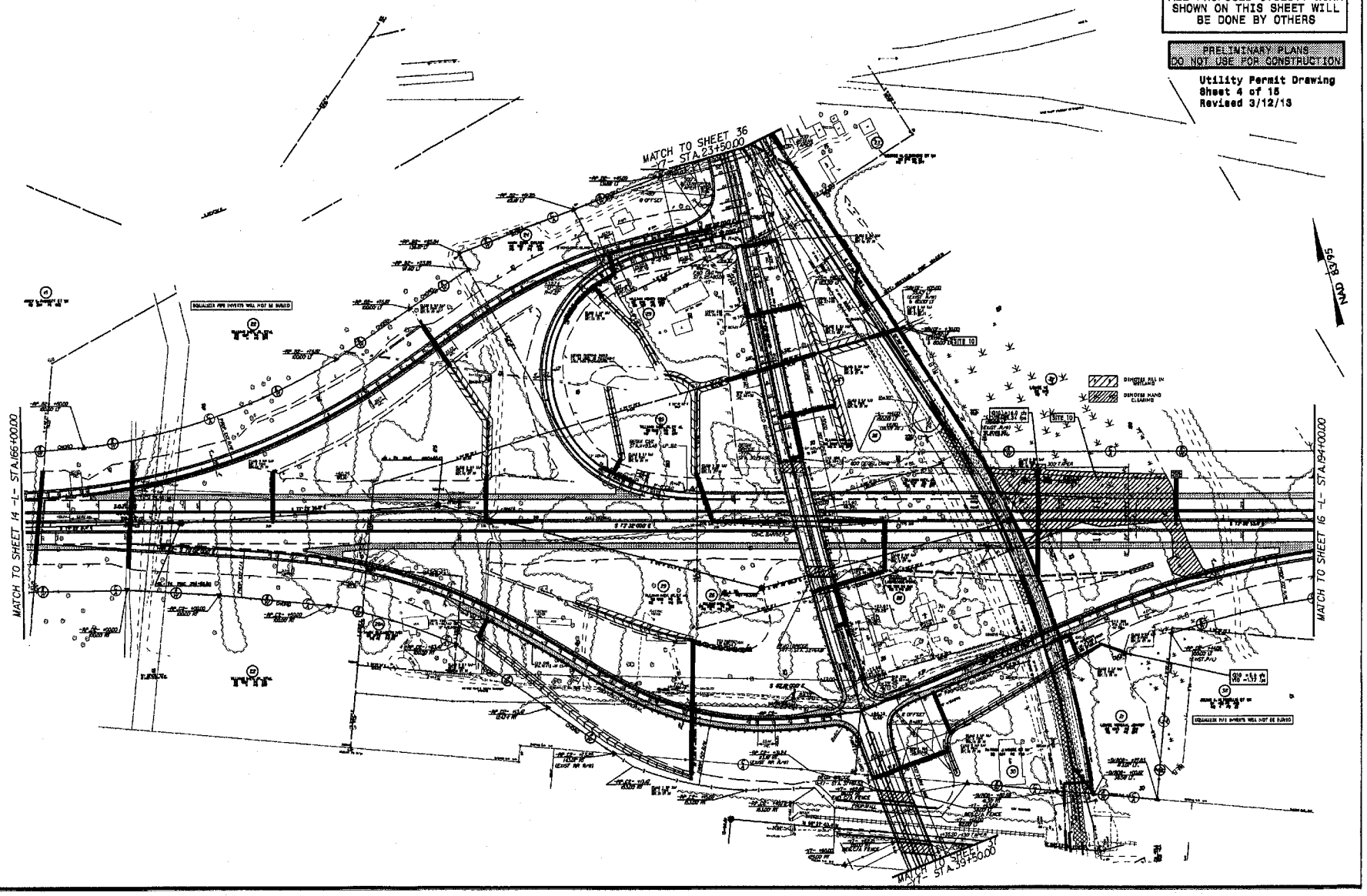
PROJECT REFERENCE NO.	SHEET NO.
R-2633B	U0-4

UTILITIES BY OTHERS

NOTE:
ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Utility Permit Drawing
Sheet 4 of 15
Revised 3/12/13



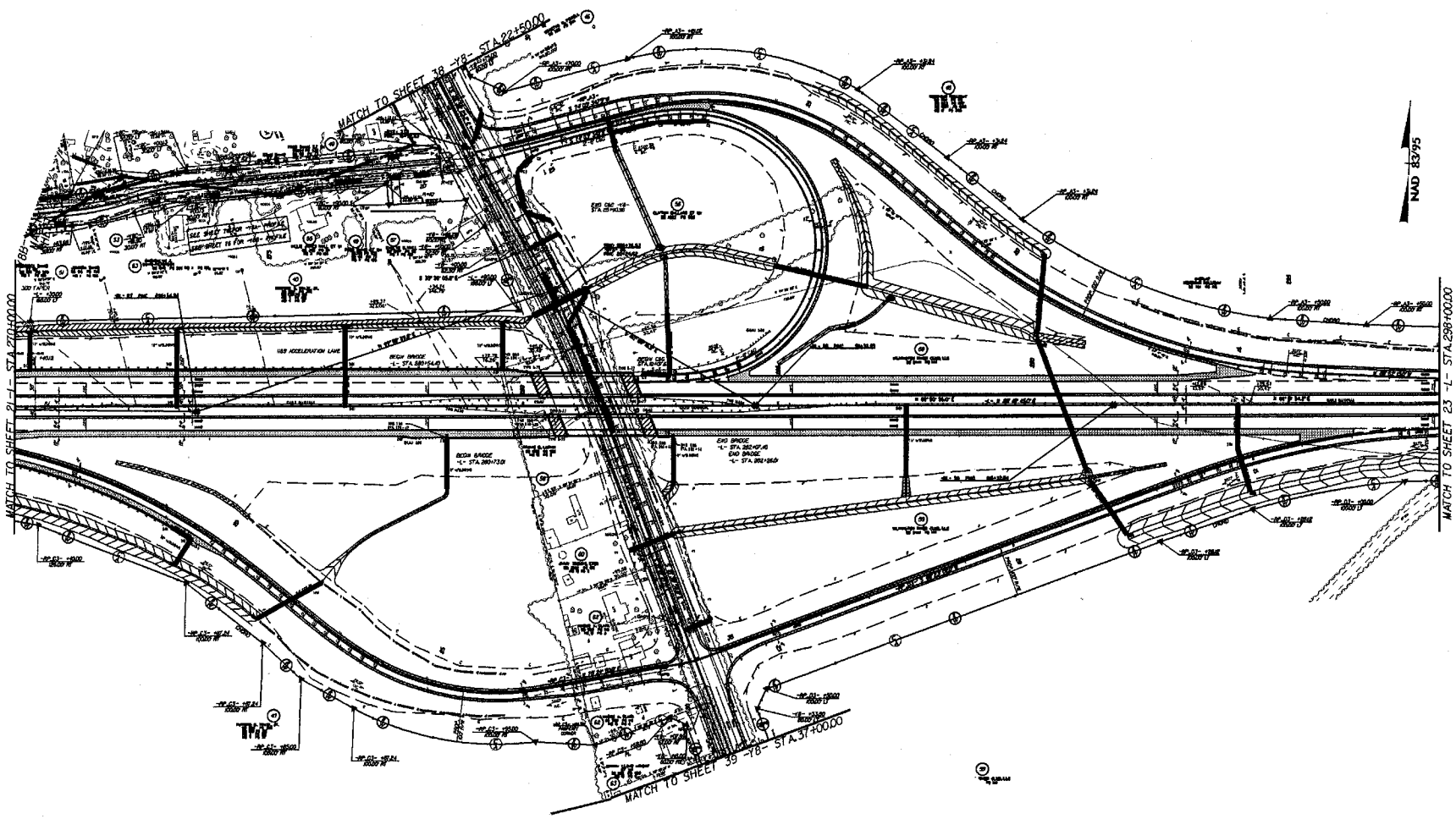
PROJECT REFERENCE NO.	SHEET NO.
R-2633B	U0-5

UTILITIES BY OTHERS

NOTE:
ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS

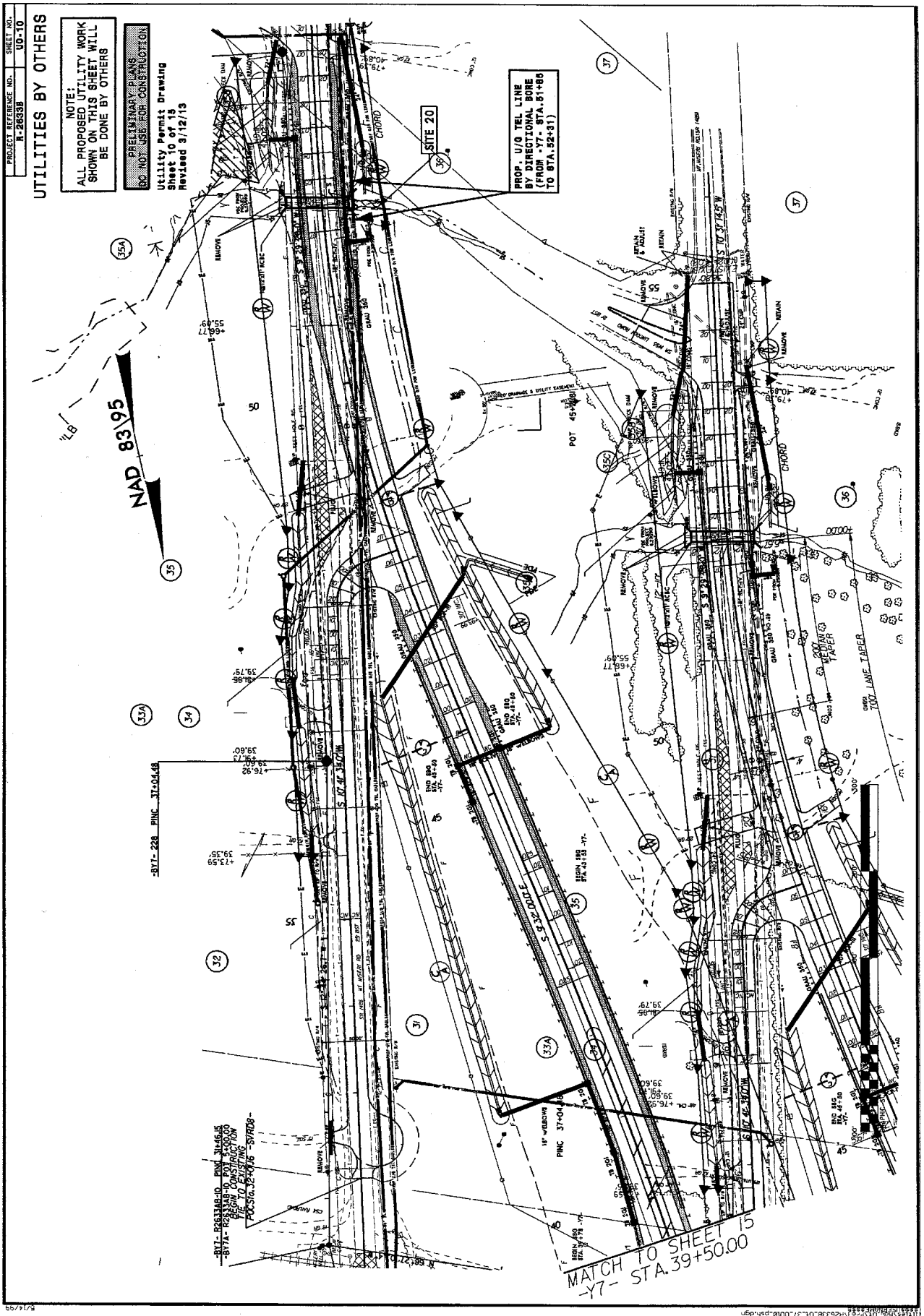
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

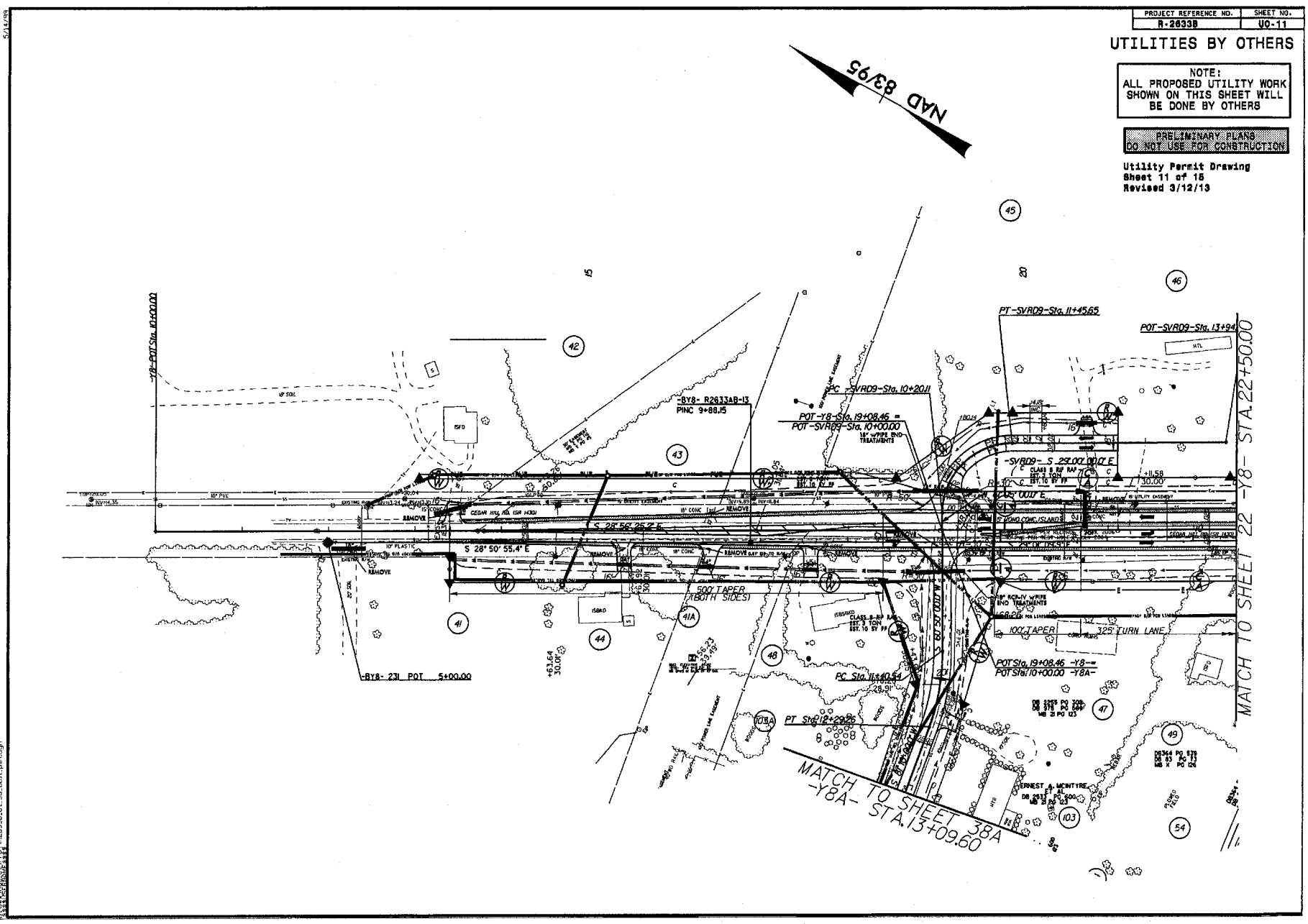
Utility Permit Drawing
Sheet 5 of 15
Revised 3/12/13



R-81

PROJECT REFERENCE NO.
R-2633B
SHEET NO.
U0-9
UTILITIES BY OTHERS
NOTE:
ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Utility Permit Drawing
Sheet 9 of 15
Revised 3/12/13
NAD 83/95
BEGIN CONSTRUCTION
POC-Y7-Sta.15+00.00


PROJECT REFERENCE NO.
R-2633B
SHEET NO.
UO-10
UTILITIES BY OTHERS
NOTE:
ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION
Utility Permit Drawing
Sheet 10 of 15
Revised 3/12/13
SITE 20
PROP. U/G TEL LINE BY DIRECTIONAL BORE (FROM -Y7- STA.51+85 TO STA.52+31)
NAD 83\95
MATCH TO SHEET 15
-Y7- STA.39+50.00


PROJECT REFERENCE NO.
R-2633B
SHEET NO.
UO-11
UTILITIES BY OTHERS
NOTE:
ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Utility Permit Drawing
Sheet 11 of 15
Revised 3/12/13
NAD 83/95
MATCH TO SHEET 22 -Y8- STA.22+50.00
MATCH TO SHEET 38A -Y8A- STA.13+09.60
PT-SVRD9-Sta. 11+45.65
POT-SVRD9-Sta. 13+94
PC -SVRD9-Sta. 10+20.11
POT-Y8-Sta. 19+08.46 = POT-SVRD9-Sta. 10+00.00
-BY8- R2633AB-13
PINC 9+88.15
-Y8-POT Sta. 10+00.00
-BY8- 231 POT 5+00.00
S 28° 50' 55.4" E
S 28° 56' 25.2" E
500' TAPER (BOTH SIDES)
100' TAPER
325' TURN LANE
POT Sta. 19+08.46 -Y8- = POT Sta. 10+00.00 -Y8A-
PC Sta. 11+40.54
PT Sta. 12+29.26
ERNEST A. MCINTYRE
REMOVE
10" PLASTIC
18" CONC
CEDAR HILL RD. (SR 1430)
ISFD
ISBKD
HTL
45
46
42
43
41
41A
44
48
47
49
103
103A
54

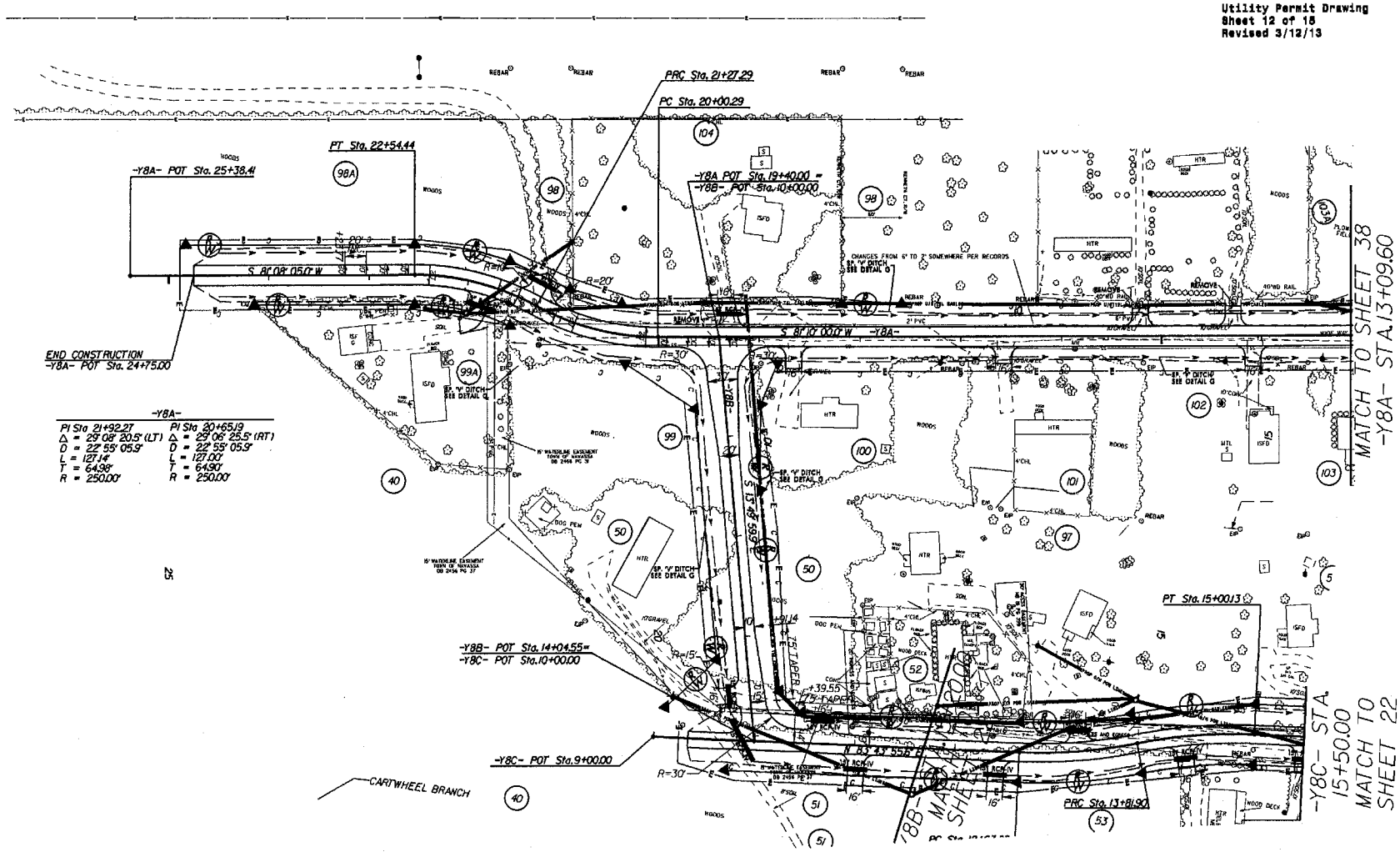
PROJECT REFERENCE NO.	SHEET NO.
R-2633B	UO-12

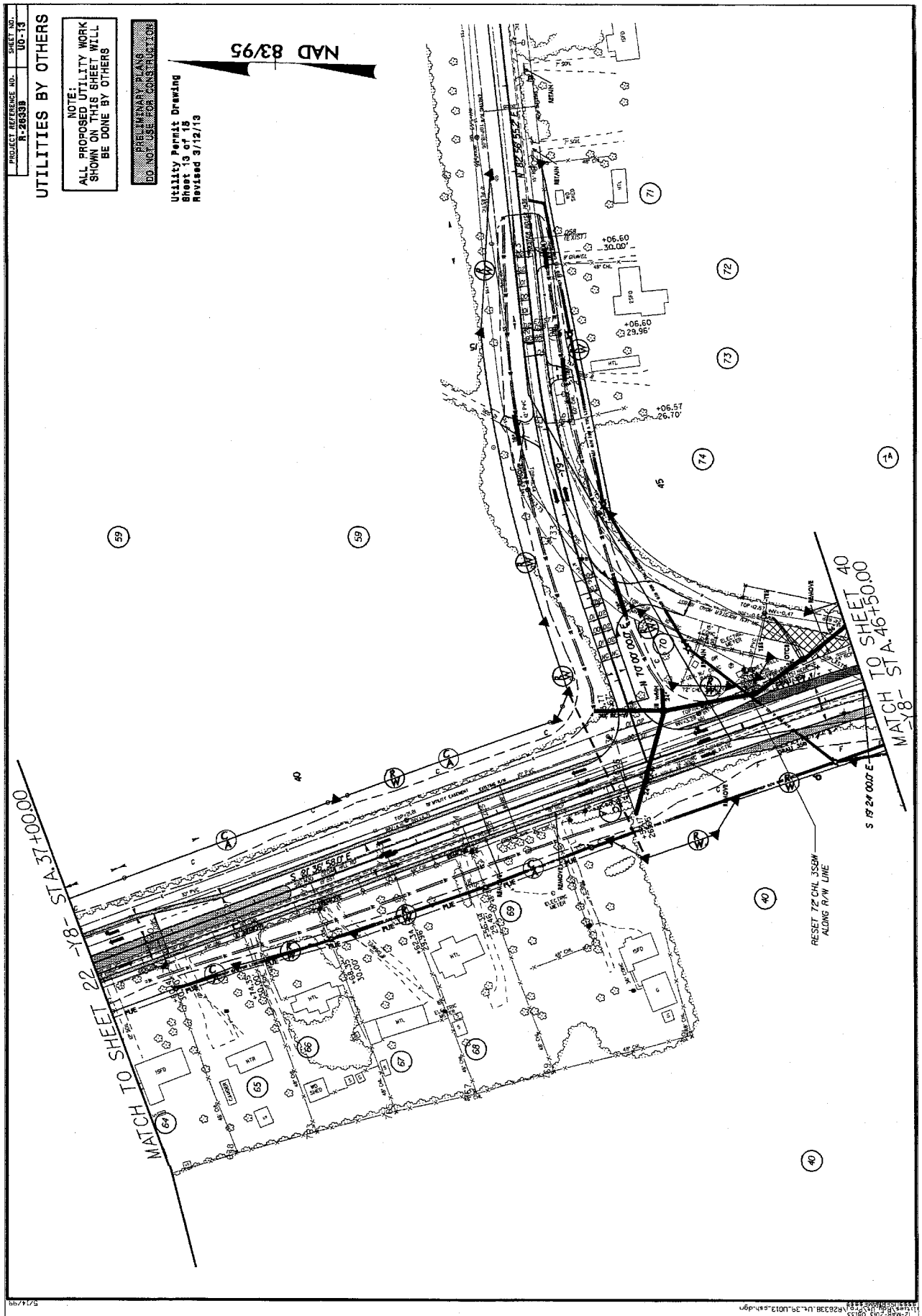
UTILITIES BY OTHERS

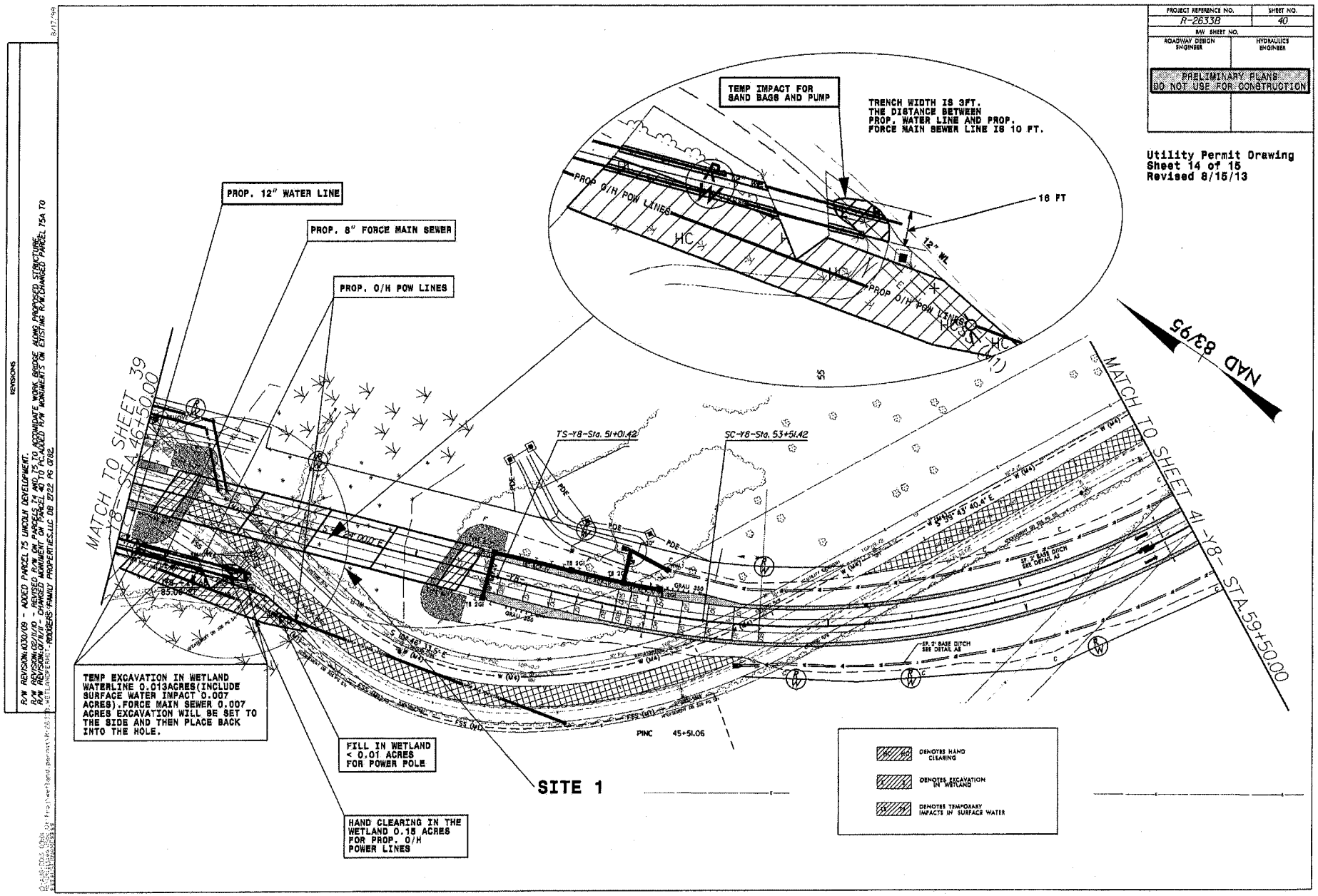
NOTE:
ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Utility Permit Drawing
Sheet 12 of 15
Revised 3/12/13




PROJECT REFERENCE NO.
R-2633B
SHEET NO.
UO-13
UTILITIES BY OTHERS
NOTE:
ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Utility Permit Drawing
Sheet 13 of 15
Revised 3/12/13
NAD 83/95
MATCH TO SHEET 22 -Y8- STA.37+00.00
MATCH TO SHEET 40 -Y8- STA.46+50.00
RESET 72" CHL 3SBW ALONG R/W LINE
S 19°24'00.0" E
+06.60 30.00'
+06.60 29.96'
+06.57 26.70'


PROJECT REFERENCE NO.
R-2633B
SHEET NO.
40
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Utility Permit Drawing
Sheet 14 of 15
Revised 8/15/13
TEMP IMPACT FOR SAND BAGS AND PUMP
TRENCH WIDTH IS 3FT. THE DISTANCE BETWEEN PROP. WATER LINE AND PROP. FORCE MAIN SEWER LINE IS 10 FT.
16 FT
12" WL
PROP O/H POW LINES
PROP. 12" WATER LINE
PROP. 8" FORCE MAIN SEWER
PROP. O/H POW LINES
NAD 83/95
MATCH TO SHEET 39 Y8- STA 46+50.00
MATCH TO SHEET 41-Y8- STA.59+50.00
TS-Y8-Sta. 51+01.42
SC-Y8-Sta. 53+51.42
PINC 45+51.06
TEMP EXCAVATION IN WETLAND WATERLINE 0.013ACRES(INCLUDE SURFACE WATER IMPACT 0.007 ACRES).FORCE MAIN SEWER 0.007 ACRES EXCAVATION WILL BE SET TO THE SIDE AND THEN PLACE BACK INTO THE HOLE.
FILL IN WETLAND < 0.01 ACRES FOR POWER POLE
HAND CLEARING IN THE WETLAND 0.15 ACRES FOR PROP. O/H POWER LINES
SITE 1
DENOTES HAND CLEARING
DENOTES EXCAVATION IN WETLAND
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
REVISIONS
R/W REVISION:1030/09 - ADDED PARCEL 75 LINCOLN DEVELOPMENT.
R/W REVISION:02/11/10 - REVISED R/W ON PARCELS 74 AND 75 TO ACCOMIDATE WORK BRIDGE ALONG PROPOSED STRUCTURE.
R/W REVISION:01/11/11 - CHANGED MONUMENT ON PARCEL 40 TO PC.ADDED R/W MONUMENTS ON EXISTING R/W.CHANGED PARCEL 75A TO WETLANDPERMIT-RODGERS-FAMILY PROPERTIES,LLC DB 2722 PG 0782.
8/17/99

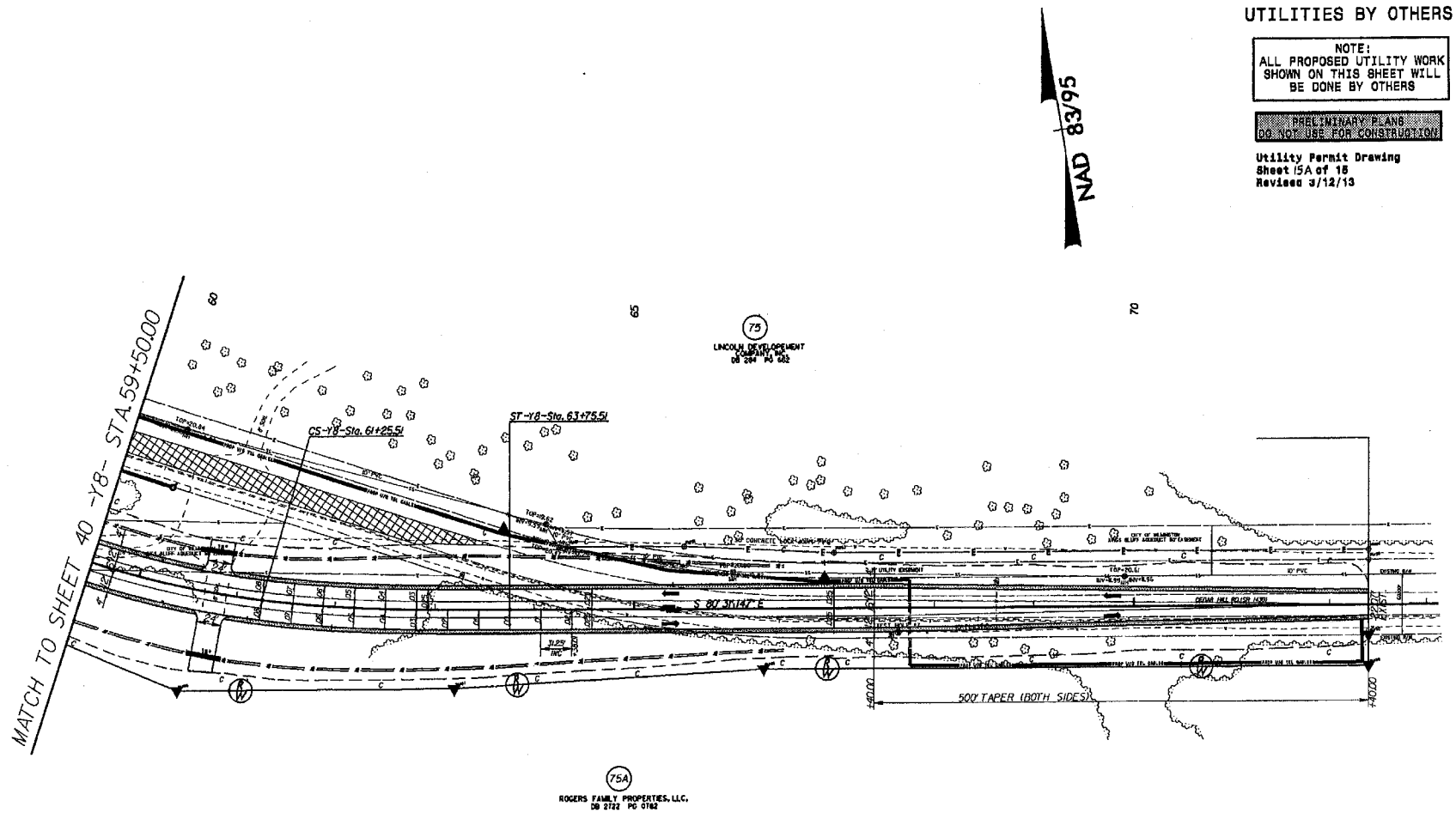
PROJECT REFERENCE NO.	SHEET NO.
R-2633B	U0-15

UTILITIES BY OTHERS

NOTE:
ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Utility Permit Drawing
Sheet 15A of 15
Revised 3/12/13



WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS: 404 Permanent Fill In Wetlands (ac)	CAMA Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	404 Hand Clearing in Wetlands (ac)	CAMA Hand Clearing in Wetlands (ac)	SURFACE WATER IMPACTS: Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	-Y8- 46+60	Prop. O/H Power line						0.15						
	-Y8- 48+58	Prop. Power Pole	<0.01											
	-Y8_ 46+77 ~ 48+10	Prop. Water Line				<0.01*					<0.01*		16	
	-Y8- 46+72 ~ 47+58	Prop. Force Main Sewer				<0.01*								
2	-L- 138+96~141+92	Rig set up of bores 4" gas line						0.83						
	-L- 140+36~140+74	Bell holes for tie-ins 4" gas line				0.02*								
	-L- 140+62~147+63	Equipment Movement						0.48						
	-L- 147+50~147+89	Bell holes for tie-ins 4" gas line				0.02*								
	-L- 147+75~148+80	Weld pipe for bore						0.05						
TOTALS:			<0.01		0.00	0.05	0.00	1.51	0.00	0.00	<0.01	0	16	0.00

* Temporary Excavation
* Excavation will be set to the side and then place back into the hole.

NC DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

BRUNSWICK AND NEW HANOVER COUNTIES
WBS - 34491.1.2 (R-2633B)

SHEET 15 of 15

rev. 8/15/13

ATN Revised 3/31/06

R-88

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:

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

Seed of Pensacola Bahiagrass shall not contain more than 7% inert matter, Kentucky Bluegrass, Centipede and Fine or Hard Fescue shall not contain more than 5% inert matter whereas a maximum of 2% inert matter will be allowed on all other kinds of seed. In addition, all seed shall not contain more than 2% other crop seed nor more than 1% total weed seed. The germination rate as tested by the North Carolina Department of Agriculture shall not fall below 70%, which includes both dormant and hard seed. Seed shall be labeled with not more than 7%, 5% or 2% inert matter (according to above specifications), 2% other crop seed and 1% total weed seed.

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

FURTHER SPECIFICATIONS FOR EACH SEED GROUP ARE GIVEN BELOW:

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

Sericea Lespedeza
Oats (seeds)

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

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

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

Common or Sweet Sundangrass

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

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

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

Centipedegrass
Crownvetch
Pensacola Bahiagrass
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. 10-15-13) 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 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 10

Page 10-74, Table 1056-1 Geotextile Requirements, replace "50%" for the UV Stability (Retained Strength) of Type 5 geotextiles with "70%".

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 contacting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.
4. **Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

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

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).
    a. The term "perform work with its own organization" refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees

from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:
(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
(2) the prime contractor remains responsible for the quality of the work of the leased employees;
(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

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

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.
3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.
4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.
5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

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

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

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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2. **Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:**
   a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:
      (1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;
      (2) 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 NC130095 01/04/2013 NC95

Z-95

Date: January 4, 2013

General Decision Number: NC130095 01/04/2013 NC95

Superseded General Decision Numbers: NC20120095

State: North Carolina

Construction Type: HIGHWAY

COUNTIES:

Brunswick	New Hanover	Pender

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	Publication Date
0	01/04/2013

SUNC2011-076 09/16/2011

	Rates	Fringes
CARPENTER (Form Work Only)	13.69	
CEMENT MASON/CONCRETE FINISHER	12.35	
IRONWORKER (Reinforcing)	14.88	
LABORER		
Asphalt, Asphalt Distributor, Raker, and Spreader	12.20	
Common or General		
Brunswick County	10.04	
New Hanover and Pender Counties	10.88	
Concrete Saw	13.52	
Landscape	9.34	
Luteman	12.73	
Mason Tender (Cement/Concrete)	11.43	
Pipelayer	12.05	
Traffic Control (Cone Setter)	11.15	
Traffic Control (Flagger)	9.89	
POWER EQUIPMENT OPERATORS		
Backhoe/Excavator/Trackhoe	13.86	
Broom/Sweeper	13.97	
Bulldozer	12.88	
Crane	19.87	
Curb Machine	14.43	
Distributor	15.27	
Drill	18.28	
Grader/Blade	16.47	
Loader	14.16	
Mechanic	17.37	
Milling Machine	14.38	
Oiler	13.58	
Paver	15.64	
Roller	13.94	
Scraper	14.35	
Screed	14.86	
Tractor	14.47	
TRUCK DRIVER		
Distributor	16.75	
Dump Truck	11.13	
Flatbed Truck	15.02	
Lowboy Truck	15.34	
Off the Road Truck	13.78	
Single Axle Truck	12.13	
Tack Truck	16.51	
Water Truck	13.39	

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

County : Brunswick

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
			ROADWAY ITEMS			
0001	0000100000-N	800	MOBILIZATION	Lump Sum	L.S.	
0002	0000400000-N	801	CONSTRUCTION SURVEYING	Lump Sum	L.S.	
0003	0000700000-N	SP	FIELD OFFICE	Lump Sum	L.S.	
0004	0001000000-E	200	CLEARING & GRUBBING .. ACRE(S)	Lump Sum	L.S.	
0005	0008000000-E	200	SUPPLEMENTARY CLEARING & GRUBBING	5 ACR		
0006	0015000000-N	205	SEALING ABANDONED WELLS	12 EA		
0007	0022000000-E	225	UNCLASSIFIED EXCAVATION	63,600 CY		
0008	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (144+41.79 -L- LT)	Lump Sum	L.S.	
0009	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (145+67.97 -L- RT)	Lump Sum	L.S.	
0010	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (265+00.00 -L- LT)	Lump Sum	L.S.	
0011	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (265+00.00 -L- RT)	Lump Sum	L.S.	
0012	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (281+51.83 -L- LT)	Lump Sum	L.S.	
0013	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (281+51.83 -L- RT)	Lump Sum	L.S.	
0014	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (31+63.68 -Y7-)	Lump Sum	L.S.	
0015	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (48+79 -Y8-)	Lump Sum	L.S.	
0016	0036000000-E	225	UNDERCUT EXCAVATION	16,400 CY		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0017	0084000000-E	SP	WICK DRAINS	863,000 LF		
0018	0106000000-E	230	BORROW EXCAVATION	2,723,900 CY		
0019	0127000000-N	SP	EMBANKMENT SETTLEMENT GAUGES	15 EA		
0020	0134000000-E	240	DRAINAGE DITCH EXCAVATION	22,600 CY		
0021	0156000000-E	250	REMOVAL OF EXISTING ASPHALT PAVEMENT	8,000 SY		
0022	0177000000-E	250	BREAKING OF EXISTING ASPHALT PAVEMENT	2,000 SY		
0023	0192000000-N	260	PROOF ROLLING	60 HR		
0024	0194000000-E	SP	SELECT GRANULAR MATERIAL, CLASS III	70,500 CY		
0025	0195000000-E	265	SELECT GRANULAR MATERIAL	87,400 CY		
0026	0196000000-E	270	GEOTEXTILE FOR SOIL STABILIZATION	130,000 SY		
0027	0199000000-E	SP	TEMPORARY SHORING	250 SF		
0028	0241000000-E	SP	GENERIC GRADING ITEM GEOTEXTILE FOR EMBANKMENT STABILIZATION 1	67,800 SY		
0029	0241000000-E	SP	GENERIC GRADING ITEM GEOTEXTILE FOR EMBANKMENT STABILIZATION 2	24,900 SY		
0030	0257000000-E	SP	GENERIC GRADING ITEM HORIZONTAL INCLINOMETER CASING	270 LF		
0031	0262000000-N	SP	GENERIC GRADING ITEM VW PIEZOMETER	12 EA		
0032	0318000000-E	300	FOUNDATION CONDITIONING MATERIAL, MINOR STRUCTURES	3,530 TON		
0033	0320000000-E	300	FOUNDATION CONDITIONING GEOTEXTILE	7,950 SY		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0034	0342000000-E	310	**" SIDE DRAIN PIPE (30")	48 LF		
0035	0342000000-E	310	**" SIDE DRAIN PIPE (36")	224 LF		
0036	0343000000-E	310	15" SIDE DRAIN PIPE	24 LF		
0037	0344000000-E	310	18" SIDE DRAIN PIPE	2,256 LF		
0038	0345000000-E	310	24" SIDE DRAIN PIPE	220 LF		
0039	0348000000-E	310	**" SIDE DRAIN PIPE ELBOWS (18")	50 EA		
0040	0354000000-E	310	***" RC PIPE CULVERTS, CLASS ***** (30", V)	292 LF		
0041	0354000000-E	310	***" RC PIPE CULVERTS, CLASS ***** (36", V)	344 LF		
0042	0372000000-E	310	18" RC PIPE CULVERTS, CLASS III	2,364 LF		
0043	0378000000-E	310	24" RC PIPE CULVERTS, CLASS III	48 LF		
0044	0384000000-E	310	30" RC PIPE CULVERTS, CLASS III	772 LF		
0045	0390000000-E	310	36" RC PIPE CULVERTS, CLASS III	4,488 LF		
0046	0396000000-E	310	42" RC PIPE CULVERTS, CLASS III	792 LF		
0047	0402000000-E	310	48" RC PIPE CULVERTS, CLASS III	732 LF		
0048	0408000000-E	310	54" RC PIPE CULVERTS, CLASS III	464 LF		
0049	0448000000-E	310	****" RC PIPE CULVERTS, CLASS IV (48")	708 LF		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0050	0448200000-E	310	15" RC PIPE CULVERTS, CLASS IV	728 LF		
0051	0448300000-E	310	18" RC PIPE CULVERTS, CLASS IV	4,552 LF		
0052	0448400000-E	310	24" RC PIPE CULVERTS, CLASS IV	784 LF		
0053	0448500000-E	310	30" RC PIPE CULVERTS, CLASS IV	600 LF		
0054	0448600000-E	310	36" RC PIPE CULVERTS, CLASS IV	1,412 LF		
0055	0448700000-E	310	42" RC PIPE CULVERTS, CLASS IV	172 LF		
0056	0453000000-E	310	**" PIPE END SECTION (18")	4 EA		
0057	0546000000-E	310	**" CAA PIPE CULVERTS, *****" THICK (18", 0.064")	784 LF		
0058	0546000000-E	310	**" CAA PIPE CULVERTS, *****" THICK (84", 0.105")	192 LF		
0059	0564000000-E	310	**" CAA PIPE ELBOWS, *****" THICK (18", 0.064")	14 EA		
0060	0995000000-E	340	PIPE REMOVAL	2,536 LF		
0061	1000000000-E	462	6" SLOPE PROTECTION	350 SY		
0062	1011000000-N	500	FINE GRADING	Lump Sum	L.S.	
0063	1099500000-E	505	SHALLOW UNDERCUT	1,000 CY		
0064	1099700000-E	505	CLASS IV SUBGRADE STABILIZA-TION	1,900 TON		
0065	1111000000-E	SP	CLASS IV AGGREGATE STABILIZA-TION	18,750 TON		
0066	1121000000-E	520	AGGREGATE BASE COURSE	193,000 TON		
0067	1220000000-E	545	INCIDENTAL STONE BASE	5,000 TON		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0068	1275000000-E	600	PRIME COAT	4,879 GAL		
0069	1330000000-E	607	INCIDENTAL MILLING	1,000 SY		
0070	1489000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0B	13,300 TON		
0071	1491000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0C	51,400 TON		
0072	1498000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0B	7,900 TON		
0073	1503000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C	38,000 TON		
0074	1519000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5B	15,700 TON		
0075	1523000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5C	37,100 TON		
0076	1575000000-E	620	ASPHALT BINDER FOR PLANT MIX	8,205 TON		
0077	1693000000-E	654	ASPHALT PLANT MIX, PAVEMENT REPAIR	1,090 TON		
0078	1840000000-E	665	MILLED RUMBLE STRIPS (ASPHALT CONCRETE)	93,100 LF		
0079	2022000000-E	815	SUBDRAIN EXCAVATION	2,500 CY		
0080	2026000000-E	815	GEOTEXTILE FOR SUBSURFACE DRAINS	7,400 SY		
0081	2036000000-E	815	SUBDRAIN COARSE AGGREGATE	1,250 CY		
0082	2044000000-E	815	6" PERFORATED SUBDRAIN PIPE	7,400 LF		
0083	2070000000-N	815	SUBDRAIN PIPE OUTLET	15 EA		
0084	2077000000-E	815	6" OUTLET PIPE	90 LF		
0085	2199000000-E	SP	SANDBAG HEADWALLS	355 SF		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0086	2209000000-E	838	ENDWALLS	57.2 CY		
0087	2220000000-E	838	REINFORCED ENDWALLS	10.4 CY		
0088	2253000000-E	840	PIPE COLLARS	1 CY		
0089	2264000000-E	840	PIPE PLUGS	1 CY		
0090	2275000000-E	SP	FLOWABLE FILL	12 CY		
0091	2286000000-N	840	MASONRY DRAINAGE STRUCTURES	148 EA		
0092	2308000000-E	840	MASONRY DRAINAGE STRUCTURES	36 LF		
0093	2354000000-N	840	FRAME WITH GRATE, STD 840.22	7 EA		
0094	2364000000-N	840	FRAME WITH TWO GRATES, STD 840.16	18 EA		
0095	2364200000-N	840	FRAME WITH TWO GRATES, STD 840.20	34 EA		
0096	2365000000-N	840	FRAME WITH TWO GRATES, STD 840.22	49 EA		
0097	2367000000-N	840	FRAME WITH TWO GRATES, STD 840.29	24 EA		
0098	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (E)	3 EA		
0099	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (F)	3 EA		
0100	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (G)	11 EA		
0101	2396000000-N	840	FRAME WITH COVER, STD 840.54	2 EA		
0102	2407000000-N	840	STEEL FRAME WITH TWO GRATES, STD 840.37	3 EA		
0103	2440000000-N	852	CONCRETE TRANSITIONAL SECTION FOR CATCH BASIN	2 EA		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0104	2451000000-N	852	CONCRETE TRANSITIONAL SECTION FOR DROP INLET	18 EA		
0105	2549000000-E	846	2'-6" CONCRETE CURB & GUTTER	2,400 LF		
0106	2556000000-E	846	SHOULDER BERM GUTTER	14,900 LF		
0107	2647000000-E	852	5" MONOLITHIC CONCRETE ISLANDS (SURFACE MOUNTED)	3,010 SY		
0108	2724000000-E	857	PRECAST REINFORCED CONCRETE BARRIER, SINGLE FACED	128 LF		
0109	2830000000-N	858	ADJUSTMENT OF MANHOLES	8 EA		
0110	3000000000-N	SP	IMPACT ATTENUATOR UNIT, TYPE 350	3 EA		
0111	3030000000-E	862	STEEL BM GUARDRAIL	18,500 LF		
0112	3045000000-E	862	STEEL BM GUARDRAIL, SHOP CURVED	525 LF		
0113	3105000000-N	862	STEEL BM GUARDRAIL TERMINAL SECTIONS	2 EA		
0114	3150000000-N	862	ADDITIONAL GUARDRAIL POSTS	10 EA		
0115	3195000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE AT-1	5 EA		
0116	3210000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE CAT-1	13 EA		
0117	3270000000-N	SP	GUARDRAIL ANCHOR UNITS, TYPE 350	20 EA		
0118	3285000000-N	SP	GUARDRAIL ANCHOR UNITS, TYPE M-350	6 EA		
0119	3317000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE B-77	34 EA		
0120	3360000000-E	863	REMOVE EXISTING GUARDRAIL	525 LF		
0121	3380000000-E	862	TEMPORARY STEEL BM GUARDRAIL	250 LF		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0122	3389100000-N	SP	TEMPORARY GUARDRAIL ANCHOR UNITS, TYPE 350	4 EA		
0123	3389200000-E	865	CABLE GUIDERAIL	22,500 LF		
0124	3389500000-N	865	ADDITIONAL GUIDERAIL POSTS	10 EA		
0125	3389600000-N	865	CABLE GUIDERAIL ANCHOR UNITS	26 EA		
0126	3503000000-E	866	WOVEN WIRE FENCE, 47" FABRIC	50,900 LF		
0127	3509000000-E	866	4" TIMBER FENCE POSTS, 7'-6" LONG	3,320 EA		
0128	3515000000-E	866	5" TIMBER FENCE POSTS, 8'-0" LONG	610 EA		
0129	3536000000-E	866	CHAIN LINK FENCE, 48" FABRIC	2,700 LF		
0130	3542000000-E	866	METAL LINE POSTS FOR 48" CHAIN LINK FENCE	230 EA		
0131	3548000000-E	866	METAL TERMINAL POSTS FOR 48" CHAIN LINK FENCE	20 EA		
0132	3557000000-E	866	ADDITIONAL BARBED WIRE	500 LF		
0133	3564000000-E	866	SINGLE GATES, **" HIGH, **' WIDE, **' OPENING (47", 20', 20')	9 EA		
0134	3572000000-E	867	CHAIN LINK FENCE RESET	1,600 LF		
0135	3574000000-E	867	GENERIC FENCING ITEM 40" WOOD RAIL FENCE RESET	100 LF		
0136	3628000000-E	876	RIP RAP, CLASS I	320 TON		
0137	3649000000-E	876	RIP RAP, CLASS B	1,000 TON		
0138	3656000000-E	876	GEOTEXTILE FOR DRAINAGE	7,975 SY		
0139	3659000000-N	SP	PREFORMED SCOUR HOLES WITH LEVEL SPREADER APRON	5 EA		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0140	4048000000-E	902	REINFORCED CONCRETE SIGN FOUNDATIONS	70 CY		
0141	4054000000-E	902	PLAIN CONCRETE SIGN FOUNDATIONS	2 CY		
0142	4057000000-E	SP	OVERHEAD FOOTING	30 CY		
0143	4060000000-E	903	SUPPORTS, BREAKAWAY STEEL BEAM	32,150 LB		
0144	4066000000-E	903	SUPPORTS, SIMPLE STEEL BEAM	13,868 LB		
0145	4072000000-E	903	SUPPORTS, 3-LB STEEL U-CHANNEL	3,592 LF		
0146	4078000000-E	903	SUPPORTS, 2-LB STEEL U-CHANNEL	40 EA		
0147	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ****** (19+00 -Y5- EBL)	Lump Sum	L.S.	
0148	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ****** (37+30 -Y5- WBL)	Lump Sum	L.S.	
0149	4096000000-N	904	SIGN ERECTION, TYPE D	13 EA		
0150	4102000000-N	904	SIGN ERECTION, TYPE E	90 EA		
0151	4108000000-N	904	SIGN ERECTION, TYPE F	32 EA		
0152	4109000000-N	904	SIGN ERECTION, TYPE *** (OVERHEAD) (A)	8 EA		
0153	4110000000-N	904	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (A)	25 EA		
0154	4110000000-N	904	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (B)	19 EA		
0155	4114000000-N	904	SIGN ERECTION, MILEMARKERS	40 EA		
0156	4115000000-N	904	SIGN ERECTION, OVERLAY (OVERHEAD)	3 EA		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0157	4116000000-N	904	SIGN ERECTION, OVERLAY (GROUND MOUNTED)	4 EA		
0158	4116100000-N	904	SIGN ERECTION, RELOCATE, TYPE **** (GROUND MOUNTED) (A)	1 EA		
0159	4116100000-N	904	SIGN ERECTION, RELOCATE, TYPE **** (GROUND MOUNTED) (B)	5 EA		
0160	4116200000-N	904	SIGN ERECTION, REPOSITION OVERHEAD	4 EA		
0161	4138000000-N	907	DISPOSAL OF SUPPORT, STEEL BEAM	2 EA		
0162	4152000000-N	907	DISPOSAL OF SIGN SYSTEM, STEEL BEAM	7 EA		
0163	4155000000-N	907	DISPOSAL OF SIGN SYSTEM, U-CHANNEL	24 EA		
0164	4234000000-N	907	DISPOSAL OF SIGN, A OR B (OVERHEAD)	4 EA		
0165	4236000000-N	907	DISPOSAL OF SIGN, A, B OR C (GROUND MOUNTED)	2 EA		
0166	4238000000-N	907	DISPOSAL OF SIGN, D, E OR F	1 EA		
0167	4400000000-E	1110	WORK ZONE SIGNS (STATIONARY)	682 SF		
0168	4405000000-E	1110	WORK ZONE SIGNS (PORTABLE)	412 SF		
0169	4410000000-E	1110	WORK ZONE SIGNS (BARRICADE MOUNTED)	365 SF		
0170	4420000000-N	1120	PORTABLE CHANGEABLE MESSAGE SIGN	2 EA		
0171	4430000000-N	1130	DRUMS	350 EA		
0172	4435000000-N	1135	CONES	100 EA		
0173	4445000000-E	1145	BARRICADES (TYPE III)	408 LF		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0174	4455000000-N	1150	FLAGGER	376 DAY		
0175	4465000000-N	1160	TEMPORARY CRASH CUSHIONS	2 EA		
0176	4480000000-N	1165	TMA	2 EA		
0177	4485000000-E	1170	PORTABLE CONCRETE BARRIER	390 LF		
0178	4516000000-N	1180	SKINNY DRUM	100 EA		
0179	4650000000-N	1251	TEMPORARY RAISED PAVEMENT MARKERS	203 EA		
0180	4685000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (4", 90 MILS)	27,589 LF		
0181	4686000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (4", 120 MILS)	31,369 LF		
0182	4695000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (8", 90 MILS)	1,150 LF		
0183	4710000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (24", 120 MILS)	330 LF		
0184	4725000000-E	1205	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)	58 EA		
0185	4810000000-E	1205	PAINT PAVEMENT MARKING LINES (4")	181,911 LF		
0186	4835000000-E	1205	PAINT PAVEMENT MARKING LINES (24")	130 LF		
0187	4847000000-E	1205	POLYUREA PAVEMENT MARKING LINES (4", **********) (HIGHLY REFLECTIVE ELEMENTS)	4,051 LF		
0188	4847100000-E	1205	POLYUREA PAVEMENT MARKING LINES (6", **********) (HIGHLY REFLECTIVE ELEMENTS)	130,847 LF		
0189	4847120000-E	1205	POLYUREA PAVEMENT MARKING LINES (12", **********) (HIGHLY REFLECTIVE ELEMENTS)	3,492 LF		
0190	4850000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (4")	7,100 LF		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0191	4900000000-N	1251	PERMANENT RAISED PAVEMENT MARKERS	232 EA		
0192	4905000000-N	1253	SNOWPLOWABLE PAVEMENT MARKERS	1,067 EA		
0193	5325600000-E	1510	6" WATER LINE	182 LF		
0194	5326200000-E	1510	12" WATER LINE	6,149 LF		
0195	5328000000-E	1510	30" WATER LINE	2,104 LF		
0196	5540000000-E	1515	6" VALVE	4 EA		
0197	5558000000-E	1515	12" VALVE	11 EA		
0198	5560000000-E	1515	30" VALVE	6 EA		
0199	5589100000-E	1515	1" AIR RELEASE VALVE	1 EA		
0200	5648000000-N	1515	RELOCATE WATER METER	16 EA		
0201	5666000000-E	1515	FIRE HYDRANT	1 EA		
0202	5672000000-N	1515	RELOCATE FIRE HYDRANT	8 EA		
0203	5691300000-E	1520	8" SANITARY GRAVITY SEWER	115 LF		
0204	5691400000-E	1520	10" SANITARY GRAVITY SEWER	631 LF		
0205	5709400000-E	1520	8" FORCE MAIN SEWER	395 LF		
0206	5709600000-E	1520	12" FORCE MAIN SEWER	476 LF		
0207	5768000000-N	1520	SANITARY SEWER CLEAN-OUT	1 EA		
0208	5775000000-E	1525	4' DIA UTILITY MANHOLE	3 EA		
0209	5776000000-E	1525	5' DIA UTILITY MANHOLE	6 EA		
0210	5781000000-E	1525	UTILITY MANHOLE WALL, 4' DIA	2 LF		
0211	5782000000-E	1525	UTILITY MANHOLE WALL, 5' DIA	54 LF		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0212	5801000000-E	1530	ABANDON 8" UTILITY PIPE	348 LF		
0213	5802000000-E	1530	ABANDON 10" UTILITY PIPE	761 LF		
0214	5804000000-E	1530	ABANDON 12" UTILITY PIPE	5,720 LF		
0215	5814000000-E	1530	ABANDON 30" UTILITY PIPE	1,817 LF		
0216	5835000000-E	1540	**" ENCASEMENT PIPE (42")	550 LF		
0217	5836000000-E	1540	24" ENCASEMENT PIPE	700 LF		
0218	5882000000-N	SP	GENERIC UTILITY ITEM CONNECTION DETAIL NO 2	6 EA		
0219	5882000000-N	SP	GENERIC UTILITY ITEM CONNECTION DETAIL NO 4	14 EA		
0220	5888000000-E	SP	GENERIC UTILITY ITEM 42" DUMMY ENCASEMENT PIPE	550 LF		
0221	5888000000-E	SP	GENERIC UTILITY ITEM 54" DUMMY ENCASEMENT PIPE	280 LF		
0222	5912000000-N	SP	GENERIC UTILITY ITEM 4" WATER METER ASSEMBLY	Lump Sum	L.S.	
0223	5912000000-N	SP	GENERIC UTILITY ITEM REMOVE EXISTING 4" WATER METER ASSEMBLY	Lump Sum	L.S.	
0224	6000000000-E	1605	TEMPORARY SILT FENCE	125,000 LF		
0225	6006000000-E	1610	STONE FOR EROSION CONTROL, CLASS A	3,025 TON		
0226	6009000000-E	1610	STONE FOR EROSION CONTROL, CLASS B	6,000 TON		
0227	6012000000-E	1610	SEDIMENT CONTROL STONE	6,000 TON		
0228	6015000000-E	1615	TEMPORARY MULCHING	300 ACR		
0229	6018000000-E	1620	SEED FOR TEMPORARY SEEDING	7,850 LB		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0230	6021000000-E	1620	FERTILIZER FOR TEMPORARY SEEDING	32 TON		
0231	6024000000-E	1622	TEMPORARY SLOPE DRAINS	30,000 LF		
0232	6029000000-E	SP	SAFETY FENCE	15,600 LF		
0233	6030000000-E	1630	SILT EXCAVATION	100,000 CY		
0234	6036000000-E	1631	MATTING FOR EROSION CONTROL	100,000 SY		
0235	6037000000-E	SP	COIR FIBER MAT	2,600 SY		
0236	6038000000-E	SP	PERMANENT SOIL REINFORCEMENT MAT	2,350 SY		
0237	6042000000-E	1632	1/4" HARDWARE CLOTH	9,550 LF		
0238	6043000000-E	SP	LOW PERMEABILITY GEOTEXTILE	950 SY		
0239	6045000000-E	SP	**" TEMPORARY PIPE (24")	100 LF		
0240	6046000000-E	1636	TEMPORARY PIPE FOR STREAM CROSSING	50 LF		
0241	6048000000-E	SP	FLOATING TURBIDITY CURTAIN	25 SY		
0242	6069000000-E	1638	STILLING BASINS	400 CY		
0243	6070000000-N	1639	SPECIAL STILLING BASINS	6 EA		
0244	6071012000-E	SP	COIR FIBER WATTLE	4,000 LF		
0245	6071020000-E	SP	POLYACRYLAMIDE (PAM)	925 LB		
0246	6071030000-E	1640	COIR FIBER BAFFLE	8,000 LF		
0247	6071050000-E	SP	**" SKIMMER (1-1/2")	29 EA		
0248	6071050000-E	SP	**" SKIMMER (2")	4 EA		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0249	6071050000-E	SP	*** SKIMMER (3")	1 EA		
0250	6084000000-E	1660	SEEDING & MULCHING	300 ACR		
0251	6087000000-E	1660	MOWING	120 ACR		
0252	6090000000-E	1661	SEED FOR REPAIR SEEDING	3,600 LB		
0253	6093000000-E	1661	FERTILIZER FOR REPAIR SEEDING	19.25 TON		
0254	6096000000-E	1662	SEED FOR SUPPLEMENTAL SEEDING	9,525 LB		
0255	6108000000-E	1665	FERTILIZER TOPDRESSING	285.5 TON		
0256	6111000000-E	SP	IMPERVIOUS DIKE	255 LF		
0257	6114500000-N	1667	SPECIALIZED HAND MOWING	225 MHR		
0258	6117000000-N	SP	RESPONSE FOR EROSION CONTROL	150 EA		
0259	6123000000-E	1670	REFORESTATION	5 ACR		
0260	6126000000-E	SP	STREAMBANK REFORESTATION	0.14 ACR		
0261	6135000000-E	SP	GENERIC EROSION CONTROL ITEM COMPOST BLANKET	20 ACR		
0262	7060000000-E	1705	SIGNAL CABLE	1,275 LF		
0263	7120000000-E	1705	VEHICLE SIGNAL HEAD (12", 3 SECTION)	8 EA		
0264	7132000000-E	1705	VEHICLE SIGNAL HEAD (12", 4 SECTION)	2 EA		
0265	7252000000-E	1710	MESSENGER CABLE (1/4")	390 LF		
0266	7279000000-E	1715	TRACER WIRE	1,450 LF		
0267	7300000000-E	1715	UNPAVED TRENCHING (**********) (1, 2")	1,040 LF		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0268	7300000000-E	1715	UNPAVED TRENCHING (**********) (2, 2")	160 LF		
0269	7300000000-E	1715	UNPAVED TRENCHING (**********) (2,1-1/2")	1,815 LF		
0270	7301000000-E	1715	DIRECTIONAL DRILL (**********) (1, 2")	450 LF		
0271	7301000000-E	1715	DIRECTIONAL DRILL (**********) (2, 1-1/2")	1,585 LF		
0272	7301000000-E	1715	DIRECTIONAL DRILL (**********) (2, 2")	180 LF		
0273	7324000000-N	1716	JUNCTION BOX (STANDARD SIZE)	32 EA		
0274	7348000000-N	1716	JUNCTION BOX (OVER-SIZED, HEA-VY DUTY)	5 EA		
0275	7360000000-N	1720	WOOD POLE	7 EA		
0276	7372000000-N	1721	GUY ASSEMBLY	2 EA		
0277	7384000000-E	1722	***" RISER WITH ********** (1-1/2", WEATHERHEAD)	5 EA		
0278	7444000000-E	1725	INDUCTIVE LOOP SAWCUT	895 LF		
0279	7456000000-E	1726	LEAD-IN CABLE (**********) (14-2)	1,525 LF		
0280	7485000000-N	SP	WIRELESS MAGNETIC SENSOR VEHI-CLE DETECTOR SYSTEM	1 EA		
0281	7516000000-E	1730	COMMUNICATIONS CABLE (**FIBER) (12)	1,550 LF		
0282	7552000000-N	1731	INTERCONNECT CENTER	2 EA		
0283	7564000000-N	1732	FIBER-OPTIC TRANSCEIVER, DROP & REPEAT	2 EA		
0284	7566000000-N	1733	DELINEATOR MARKER	5 EA		
0285	7588000000-N	SP	METAL POLE WITH SINGLE MAST ARM	1 EA		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0286	7590000000-N	SP	METAL POLE WITH DUAL MAST ARM	1 EA		
0287	7613000000-N	SP	SOIL TEST	2 EA		
0288	7614100000-E	SP	DRILLED PIER FOUNDATION	16 CY		
0289	7631000000-N	SP	MAST ARM WITH METAL POLE DESIGN	2 EA		
0290	7684000000-N	1750	SIGNAL CABINET FOUNDATION	1 EA		
0291	7756000000-N	1751	CONTROLLER WITH CABINET (TYPE 2070L, BASE MOUNTED)	1 EA		
0292	7780000000-N	1751	DETECTOR CARD (TYPE 2070L)	5 EA		
0293	7901000000-N	1753	CABINET BASE EXTENDER	1 EA		
0294	7980000000-N	SP	GENERIC SIGNAL ITEM 5/8" X 10' GROUNDING ELECTRODE	60 EA		
0295	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV CAMERA ASSEMBLY	8 EA		
0296	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV WOOD POLE	7 EA		
0297	7980000000-N	SP	GENERIC SIGNAL ITEM CENTRAL MEDIA CONVERTER	6 EA		
0298	7980000000-N	SP	GENERIC SIGNAL ITEM DMS	6 EA		
0299	7980000000-N	SP	GENERIC SIGNAL ITEM DMS ACCESS LADDER	5 EA		
0300	7980000000-N	SP	GENERIC SIGNAL ITEM DMS PEDESTAL STRUCTURE (TYPE A)	4 EA		
0301	7980000000-N	SP	GENERIC SIGNAL ITEM DMS PEDESTAL STRUCTURE (TYPE B)	1 EA		
0302	7980000000-N	SP	GENERIC SIGNAL ITEM EQUIPMENT CABINET DISCONNECT	12 EA		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0303	7980000000-N	SP	GENERIC SIGNAL ITEM FIELD EQUIPMENT CABINET	8 EA		
0304	7980000000-N	SP	GENERIC SIGNAL ITEM METER BASE/DISCONNECT COMBINA-TION PANEL	9 EA		
0305	7980000000-N	SP	GENERIC SIGNAL ITEM SOLAR POWER ASSEMBLY	1 EA		
0306	7980000000-N	SP	GENERIC SIGNAL ITEM VIDEO ETHERNET DECODER	4 EA		
0307	7980000000-N	SP	GENERIC SIGNAL ITEM VIDEO ETHERNET ENCODER	8 EA		
0308	7980000000-N	SP	GENERIC SIGNAL ITEM WOOD PEDESTAL	4 EA		
0309	7985000000-N	SP	GENERIC SIGNAL ITEM INTEGRATION AND CONFIGURATION	Lump Sum	L.S.	
0310	7990000000-E	SP	GENERIC SIGNAL ITEM #4 SOLID BARE GROUNDING CON-DUCTOR	520 LF		
0311	7990000000-E	SP	GENERIC SIGNAL ITEM 3-WIRE COPPER FEEDER CONDUC-TORS	1,895 LF		
0312	7990000000-E	SP	GENERIC SIGNAL ITEM 3-WIRE COPPER SERVICE ENTRANCE CONDUCTORS	125 LF		
0313	7990000000-E	SP	GENERIC SIGNAL ITEM 4-WIRE COPPER FEEDER CONDUC-TORS	1,630 LF		
0314	7992000000-E	SP	GENERIC SIGNAL ITEM ITS OVERHEAD FOOTING	40 CY		
			CULVERT ITEMS			
0315	8126000000-N	414	CULVERT EXCAVATION, STA ****** (52+09.00-Y7-)	Lump Sum	L.S.	

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0316	8133000000-E	414	FOUNDATION CONDITIONING MATERIAL, BOX CULVERT	97 TON		
0317	8196000000-E	420	CLASS A CONCRETE (CULVERT)	173.3 CY		
0318	8245000000-E	425	REINFORCING STEEL (CULVERT)	23,796 LB		
			WALL ITEMS			
0319	8801000000-E	SP	MSE RETAINING WALL NO **** (1)	5,500 SF		
0320	8801000000-E	SP	MSE RETAINING WALL NO **** (2)	5,450 SF		
			STRUCTURE ITEMS			
0321	8017000000-N	SP	CONSTRUCTION, MAINTENANCE, & REMOVAL OF TEMP ACCESS AT STA ********** (265+53.58-L-)	Lump Sum	L.S.	
0322	8017000000-N	SP	CONSTRUCTION, MAINTENANCE, & REMOVAL OF TEMP ACCESS AT STA ********** (48+79.00-Y8-)	Lump Sum	L.S.	
0323	8084000000-N	410	FOUNDATION EXCAVATION FOR END BENT ** AT STATION ********** (01, 38+50.27-Y7-)	Lump Sum	L.S.	
0324	8084000000-N	410	FOUNDATION EXCAVATION FOR END BENT ** AT STATION ********** (02, 38+50.27-Y7-)	Lump Sum	L.S.	
0325	8108000000-E	411	**'-**" DIA DRILLED PIERS (6'-0")	2,424 LF		
0326	8112730000-N	450	PDA TESTING	7 EA		
0327	8113000000-N	411	SID INSPECTIONS	8 EA		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0328	8114000000-N	411	SPT TESTING	16 EA		
0329	8115000000-N	411	CSL TESTING	4 EA		
0330	8147000000-E	420	REINFORCED CONCRETE DECK SLAB	132,228 SF		
0331	8161000000-E	420	GROOVING BRIDGE FLOORS	135,259 SF		
0332	8175000000-E	420	CLASS AA CONCRETE (BRIDGE)	705.3 CY		
0333	8182000000-E	420	CLASS A CONCRETE (BRIDGE)	1,985.9 CY		
0334	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (147+38.89-L-LT)	Lump Sum	L.S.	
0335	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (147+38.89-L-RT)	Lump Sum	L.S.	
0336	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (182+99.94-L-)	Lump Sum	L.S.	
0337	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (265+53.58-L-LT)	Lump Sum	L.S.	
0338	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (265+53.58-L-RT)	Lump Sum	L.S.	
0339	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (281+51.83-L-LT)	Lump Sum	L.S.	
0340	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (281+51.83-L-RT)	Lump Sum	L.S.	
0341	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (38+50.27-Y7-)	Lump Sum	L.S.	
0342	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (48+79.00-Y8-)	Lump Sum	L.S.	
0343	8217000000-E	425	REINFORCING STEEL (BRIDGE)	630,691 LB		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0344	8224000000-E	425	EPOXY COATED REINFORCING STEEL (BRIDGE)	115,573 LB		
0345	8238000000-E	425	SPIRAL COLUMN REINFORCING STEEL (BRIDGE)	114,806 LB		
0347	8265000000-E	430	54" PRESTRESSED CONCRETE GIRDERS	6,352.55 LF		
0348	8274000000-E	430	MODIFIED 63" PRESTRESSED CONC GIRDERS	1,891.37 LF		
0349	8280000000-E	440	APPROX ..... LBS STRUCTURAL STEEL	4,232,116 LS		
0350	8333000000-E	450	16" PRESTRESSED CONCRETE PILES	2,588 LF		
0351	8336000000-E	450	20" PRESTRESSED CONCRETE PILES	3,700 LF		
0352	8350000000-E	450	24" PRESTRESSED CONCRETE PILES	2,260 LF		
0353	8364000000-E	450	HP12X53 STEEL PILES	6,895 LF		
0354	8391000000-N	450	STEEL PILE POINTS	30 EA		
0355	8392500000-E	450	PREDRILLING FOR PILES	200 LF		
0356	8393000000-N	450	PILE REDRIVES	101 EA		
0357	8503000000-E	460	CONCRETE BARRIER RAIL	5,368.35 LF		
0358	8524000000-E	SP	**" CHAIN LINK FENCE (72")	2,204.19 LF		
0359	8531000000-E	462	4" SLOPE PROTECTION	12,556 SY		
0360	8608000000-E	876	RIP RAP CLASS II (2'-0" THICK)	3,159 TON		
0361	8622000000-E	876	GEOTEXTILE FOR DRAINAGE	3,505 SY		
0362	8654000000-N	SP	DISC BEARINGS	Lump Sum	L.S.	
0363	8657000000-N	430	ELASTOMERIC BEARINGS	Lump Sum	L.S.	

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0364	8706000000-N	SP	EXPANSION JOINT SEALS	Lump Sum	L.S.	
0365	8727000000-N	SP	ELECTRICAL CONDUIT SYSTEM FOR SIGNALS AT STA********** (147+38.89-L-RT)	Lump Sum	L.S.	
0366	8727000000-N	SP	ELECTRICAL CONDUIT SYSTEM FOR SIGNALS AT STA********** (38+50.27-Y7-)	Lump Sum	L.S.	
0367	8867000000-E	SP	GENERIC STRUCTURE ITEM 20" COMPOSITE PILE	1,000 LF		

Vendor 2 of 7: BARNHILL CONTRACTING COMPANY (3516)
Call Order 002 (Proposal: C203199)

Bid Information

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Address: 2311 North Main Street, PO Box 1529
Tarboro , NC , 27886
Signature Check: Drew_M._Johnson_3516
Time Bid Received: January 21, 2014 01:56 PM
Amendment Count: 1

Bid Checksum: A6222F0F
Bid Total: $79,683,198.70
Items Total: $79,683,198.70 ✓
Time Total: $0.00

DBE Goal Set 11.0
DBE Goal Met 11.0

Bidding Errors:
None.

Vendor 2 of 7: BARNHILL CONTRACTING COMPANY (3516)
Call Order 002 (Proposal: C203199)

Bid Bond Information

Projects:		**Bond Maximum:**	
Counties:		**State of Incorporation:**	
Bond ID:	SNC14169142	**Agency Execution Date:**	1/21/2014 8
Paid by Check:	No	**Surety Name:**	surety2000
Bond Percent:	5%	**Bond Agency Name:**	Travelers Casualty and Surety Company of America

Vendor 3516's Bid Information for Call 002, Letting L140121, 01/21/14

Barnhill Contracting Company (3516)
Call Order 002 (Proposal ID C203199)

LIST OF DBE PARTICIPANTS

VENDOR NUMBER	DBE NAME / ADDRESS	WORK CODE	TYPE OF WORK	CERT TYPE	AMOUNT	
12278 WB	CLIFTON CONSTRUCTION CO., INC. 1435 GIDDENSVILLE ROAD , FAISON, NC 28341			Sub	278,500.00	Committed
4898 WB	BULLINGTON CONSTRUCTION INC 417 FOXGLOVE LANE , INDIAN TRAIL, NC 28079			Sub	631,000.13	Committed
4247 WB	SEAL BROTHERS CONTRACTING LLC 131 W. CLEVE STREET , MOUNT AIRY, NC 27030			Sub	221,294.00	Committed
3080 WB	CURTIN TRUCKING & DRAINAGE, INC POST OFFICE BOX 38220 , CHARLOTTE, NC 282781003			Sub	36,321.00	Committed
11468 MB	HINES TRUCKING INC 241 STALLINGS MILL ROAD , LOUISBURG, NC 27549			Sub	3,607,450.00	Committed
11468 MB	HINES TRUCKING INC 241 STALLINGS MILL ROAD , LOUISBURG, NC 27549			Sub	607,500.00	Committed
3765 WB	STAY ALERT SAFETY SERVICES INC POST OFFICE BOX 467 , KERNERSVILLE, NC 27285			Sub	3,403.18	Committed
7621 WB	DOSS TRUCKING INC 479 FOY LOCKAMY RD , JACKSONVILLE, NC 28540			Sub	686,018.50	Committed
2324 WB	FREEMAN CURB & GUTTER, INC. POST OFFICE BOX 1021 , BURGAW, NC 28425			Sub	367,785.00	Committed
5678 WB	BEAR & CO. SIGNS & LIGHTING, IN 2201 WEST LEE STREET , GREENSBORO, NC 27403			Sub	450,966.89	Committed
4880 WB	TRICOR CONSTRUCTION, INC. 625 POPLAR STREET , SPARTANBURG, SC 29302			Sub	1,082,838.00	Committed
8003 WB	HUNTING CREEK CONSTRUCTION INC 356 SHEFFIELD ROAD , HARMONY, NC 28634			Sub	242,556.71	Committed
5659 WB	SOUTHERN CONCRETE & CONSTRUCTIO P.O. BOX 1673 , ANDERSON, SC 29622			Sub	800,840.00	Committed
3145 WB	WATTS BARRIER WALLS 55 MUSCADINE LANE , MOUNTVILLE, SC 29370			Sub	267,075.41	Committed
				TOTAL:	$9,283,548.82 11.65%	

Vendor 3516's Bid Information for Call 002, Letting L140121, 01/21/14

Barnhill Contracting Company (3516)
Call Order 002 (Proposal ID C203199)

Miscelleneous Data Info - Contractor Responses:
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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 acknowleges 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	
NOT ANSWERED	
NOT ANSWERED	
NOT ANSWERED	
NOT ANSWERED	
NOT ANSWERED	

Bid Bond Data Info - Contractor Responses:

BondID: SNC14169142
Surety Registry Agency: surety2000
Verified?: Yes
Surety Agency: Travelers Casualty and Surety Company of America
Bond Execution Date: 1/21/2014 8
Bond Amount: $3,984,159.94 (Five Percent of Bid)

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
Section 0001	ROADWAY ITEMS - NPAR (TOWN OF NAVASSA)					
	Alt Group					
0001	0000100000-N MOBILIZATION	LUMP	LUMP		4,000,000.00	
0002	0000400000-N CONSTRUCTION SURVEYING	LUMP	LUMP		278,100.00	
0003	0000700000-N FIELD OFFICE	LUMP	LUMP		40,000.00	
0004	0001000000-E CLEARING & GRUBBING .. ACRE(S)	LUMP	LUMP		6,620,000.00	
0005	0008000000-E SUPPLEMENTARY CLEARING & GRUB-BING	5.000 ACR	7,000.00000		35,000.00	
0006	0015000000-N SEALING ABANDONED WELLS	12.000 EA	1,000.00000		12,000.00	
0007	0022000000-E UNCLASSIFIED EXCAVATION	63,600.000 CY	10.00000		636,000.00	
0008	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ********** (144+41.79 -L- LT)	LUMP	LUMP		23,200.00	
0009	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ********** (145+67.97 -L- RT)	LUMP	LUMP		23,200.00	
0010	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ********** (265+00.00 -L- LT)	LUMP	LUMP		16,600.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0011	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ********** (265+00.00 -L- RT)	LUMP	LUMP		22,800.00	
0012	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ********** (281+51.83 -L- LT)	LUMP	LUMP		11,500.00	
0013	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ********** (281+51.83 -L- RT)	LUMP	LUMP		10,800.00	
0014	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ********** (31+63.68 -Y7-)	LUMP	LUMP		8,700.00	
0015	0029000000-N REINFORCED BRIDGE APPROACH FILL, STATION ********** (48+79 -Y8-)	LUMP	LUMP		9,100.00	
0016	0036000000-E UNDERCUT EXCAVATION	16,400.000 CY	4.00000		65,600.00	
0017	0084000000-E WICK DRAINS	863,000.000 LF	0.35000		302,050.00	
0018	0106000000-E BORROW EXCAVATION	2,723,900.000 CY	4.88000		13,292,632.00	
0019	0127000000-N EMBANKMENT SETTLEMENT GAUGES	15.000 EA	750.00000		11,250.00	
0020	0134000000-E DRAINAGE DITCH EXCAVATION	22,600.000 CY	4.00000		90,400.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0021	0156000000-E REMOVAL OF EXISTING ASPHALT PAVEMENT	8,000.000 SY	3.00000		24,000.00	
0022	0177000000-E BREAKING OF EXISTING ASPHALT PAVEMENT	2,000.000 SY	3.00000		6,000.00	
0023	0192000000-N PROOF ROLLING	60.000 HR	180.00000		10,800.00	
0024	0194000000-E SELECT GRANULAR MATERIAL, CLASS III	70,500.000 CY	4.88000		344,040.00	
0025	0195000000-E SELECT GRANULAR MATERIAL	87,400.000 CY	4.88000		426,512.00	
0026	0196000000-E GEOTEXTILE FOR SOIL STABILIZA-TION	130,000.000 SY	1.32000		171,600.00	
0027	0199000000-E TEMPORARY SHORING	250.000 SF	25.00000		6,250.00	
0028	0241000000-E GENERIC GRADING ITEM GEOTEXTILE FOR EMBANKMENT STABILIZATION 1	67,800.000 SY	13.50000		915,300.00	
0029	0241000000-E GENERIC GRADING ITEM GEOTEXTILE FOR EMBANKMENT STABILIZATION 2	24,900.000 SY	10.64000		264,936.00	
0030	0257000000-E GENERIC GRADING ITEM HORIZONTAL INCLINOMETER CASING	270.000 LF	9.00000		2,430.00	
0031	0262000000-N GENERIC GRADING ITEM VW PIEZOMETER	12.000 EA	1,700.00000		20,400.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0032	0318000000-E FOUNDATION CONDITIONING MATE- RIAL, MINOR STRUCTURES	3,530.000 TON	37.00000		130,610.00	
0033	0320000000-E FOUNDATION CONDITIONING GEO-TEXTILE	7,950.000 SY	2.25000		17,887.50	
0034	0342000000-E **" SIDE DRAIN PIPE (30")	48.000 LF	45.50000		2,184.00	
0035	0342000000-E **" SIDE DRAIN PIPE (36")	224.000 LF	57.50000		12,880.00	
0036	0343000000-E 15" SIDE DRAIN PIPE	24.000 LF	22.00000		528.00	
0037	0344000000-E 18" SIDE DRAIN PIPE	2,256.000 LF	26.00000		58,656.00	
0038	0345000000-E 24" SIDE DRAIN PIPE	220.000 LF	34.00000		7,480.00	
0039	0348000000-E **" SIDE DRAIN PIPE ELBOWS (18")	50.000 EA	350.00000		17,500.00	
0040	0354000000-E ***" RC PIPE CULVERTS, CLASS ***** (30", V)	292.000 LF	57.50000		16,790.00	
0041	0354000000-E ***" RC PIPE CULVERTS, CLASS ***** (36", V)	344.000 LF	73.50000		25,284.00	
0042	0372000000-E 18" RC PIPE CULVERTS, CLASS III	2,364.000 LF	26.00000		61,464.00	
0043	0378000000-E 24" RC PIPE CULVERTS, CLASS III	48.000 LF	34.00000		1,632.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0044	0384000000-E 30" RC PIPE CULVERTS, CLASS III	772.000 LF	46.00000		35,512.00	
0045	0390000000-E 36" RC PIPE CULVERTS, CLASS III	4,488.000 LF	58.00000		260,304.00	
0046	0396000000-E 42" RC PIPE CULVERTS, CLASS III	792.000 LF	71.00000		56,232.00	
0047	0402000000-E 48" RC PIPE CULVERTS, CLASS III	732.000 LF	88.00000		64,416.00	
0048	0408000000-E 54" RC PIPE CULVERTS, CLASS III	464.000 LF	147.00000		68,208.00	
0049	0448000000-E **** RC PIPE CULVERTS, CLASS IV (48")	708.000 LF	96.00000		67,968.00	
0050	0448200000-E 15" RC PIPE CULVERTS, CLASS IV	728.000 LF	24.00000		17,472.00	
0051	0448300000-E 18" RC PIPE CULVERTS, CLASS IV	4,552.000 LF	27.50000		125,180.00	
0052	0448400000-E 24" RC PIPE CULVERTS, CLASS IV	784.000 LF	37.50000		29,400.00	
0053	0448500000-E 30" RC PIPE CULVERTS, CLASS IV	600.000 LF	50.00000		30,000.00	
0054	0448600000-E 36" RC PIPE CULVERTS, CLASS IV	1,412.000 LF	63.00000		88,956.00	
0055	0448700000-E 42" RC PIPE CULVERTS, CLASS IV	172.000 LF	77.00000		13,244.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0056	0453000000-E **" PIPE END SECTION (18")	4.000 EA	700.00000		2,800.00	
0057	0546000000-E **" CAA PIPE CULVERTS, *****" THICK (18", 0.064")	784.000 LF	33.00000		25,872.00	
0058	0546000000-E **" CAA PIPE CULVERTS, *****" THICK (84", 0.105")	192.000 LF	335.00000		64,320.00	
0059	0564000000-E **" CAA PIPE ELBOWS, *****" THICK (18", 0.064")	14.000 EA	270.00000		3,780.00	
0060	0995000000-E PIPE REMOVAL	2,536.000 LF	10.00000		25,360.00	
0061	1000000000-E 6" SLOPE PROTECTION	350.000 SY	100.00000		35,000.00	
0062	1011000000-N FINE GRADING	LUMP	LUMP		350,000.00	
0063	1099500000-E SHALLOW UNDERCUT	1,000.000 CY	3.00000		3,000.00	
0064	1099700000-E CLASS IV SUBGRADE STABILIZA- TION	1,900.000 TON	29.00000		55,100.00	
0065	1111000000-E CLASS IV AGGREGATE STABILIZA- TION	18,750.000 TON	29.00000		543,750.00	
0066	1121000000-E AGGREGATE BASE COURSE	193,000.000 TON	29.00000		5,597,000.00	
0067	1220000000-E INCIDENTAL STONE BASE	5,000.000 TON	29.00000		145,000.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0068	1275000000-E PRIME COAT	4,879.000 GAL	4.50000		21,955.50	
0069	1330000000-E INCIDENTAL MILLING	1,000.000 SY	15.00000		15,000.00	
0070	1489000000-E ASPHALT CONC BASE COURSE, TYPE B25.0B	13,300.000 TON	45.50000		605,150.00	
0071	1491000000-E ASPHALT CONC BASE COURSE, TYPE B25.0C	51,400.000 TON	42.50000		2,184,500.00	
0072	1498000000-E ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0B	7,900.000 TON	45.00000		355,500.00	
0073	1503000000-E ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C	38,000.000 TON	42.25000		1,605,500.00	
0074	1519000000-E ASPHALT CONC SURFACE COURSE, TYPE S9.5B	15,700.000 TON	50.50000		792,850.00	
0075	1523000000-E ASPHALT CONC SURFACE COURSE, TYPE S9.5C	37,100.000 TON	44.00000		1,632,400.00	
0076	1575000000-E ASPHALT BINDER FOR PLANT MIX	8,205.000 TON	550.00000		4,512,750.00	
0077	1693000000-E ASPHALT PLANT MIX, PAVEMENT REPAIR	1,090.000 TON	75.00000		81,750.00	
0078	1840000000-E MILLED RUMBLE STRIPS (ASPHALT CONCRETE)	93,100.000 LF	0.08000		7,448.00	
0079	2022000000-E SUBDRAIN EXCAVATION	2,500.000 CY	25.00000		62,500.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0080	2026000000-E GEOTEXTILE FOR SUBSURFACE DRAINS	7,400.000 SY	3.50000		25,900.00	
0081	2036000000-E SUBDRAIN COARSE AGGREGATE	1,250.000 CY	55.00000		68,750.00	
0082	2044000000-E 6" PERFORATED SUBDRAIN PIPE	7,400.000 LF	15.00000		111,000.00	
0083	2070000000-N SUBDRAIN PIPE OUTLET	15.000 EA	350.00000		5,250.00	
0084	2077000000-E 6" OUTLET PIPE	90.000 LF	40.00000		3,600.00	
0085	2199000000-E SANDBAG HEADWALLS	355.000 SF	15.00000		5,325.00	
0086	2209000000-E ENDWALLS	57.200 CY	740.00000		42,328.00	
0087	2220000000-E REINFORCED ENDWALLS	10.400 CY	800.00000		8,320.00	
0088	2253000000-E PIPE COLLARS	1.000 CY	1,000.00000		1,000.00	
0089	2264000000-E PIPE PLUGS	1.000 CY	1,000.00000		1,000.00	
0090	2275000000-E FLOWABLE FILL	12.000 CY	225.00000		2,700.00	
0091	2286000000-N MASONRY DRAINAGE STRUCTURES	148.000 EA	1,050.00000		155,400.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0092	2308000000-E MASONRY DRAINAGE STRUCTURES	36.000 LF	200.00000		7,200.00	
0093	2354000000-N FRAME WITH GRATE, STD 840.22	7.000 EA	325.00000		2,275.00	
0094	2364000000-N FRAME WITH TWO GRATES, STD 840.16	18.000 EA	485.00000		8,730.00	
0095	2364200000-N FRAME WITH TWO GRATES, STD 840.20	34.000 EA	455.00000		15,470.00	
0096	2365000000-N FRAME WITH TWO GRATES, STD 840.22	49.000 EA	435.00000		21,315.00	
0097	2367000000-N FRAME WITH TWO GRATES, STD 840.29	24.000 EA	445.00000		10,680.00	
0098	2374000000-N FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (E)	3.000 EA	540.00000		1,620.00	
0099	2374000000-N FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (F)	3.000 EA	540.00000		1,620.00	
0100	2374000000-N FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (G)	11.000 EA	540.00000		5,940.00	
0101	2396000000-N FRAME WITH COVER, STD 840.54	2.000 EA	350.00000		700.00	
0102	2407000000-N STEEL FRAME WITH TWO GRATES, STD 840.37	3.000 EA	1,300.00000		3,900.00	
0103	2440000000-N CONCRETE TRANSITIONAL SECTION FOR CATCH BASIN	2.000 EA	485.00000		970.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0104	2451000000-N CONCRETE TRANSITIONAL SECTION FOR DROP INLET	18.000 EA	485.00000		8,730.00	
0105	2549000000-E 2'-6" CONCRETE CURB & GUTTER	2,400.000 LF	14.00000		33,600.00	
0106	2556000000-E SHOULDER BERM GUTTER	14,900.000 LF	14.00000		208,600.00	
0107	2647000000-E 5" MONOLITHIC CONCRETE ISLANDS(SURFACE MOUNTED)	3,010.000 SY	38.50000		115,885.00	
0108	2724000000-E PRECAST REINFORCED CONCRETE BARRIER, SINGLE FACED	128.000 LF	105.00000		13,440.00	
0109	2830000000-N ADJUSTMENT OF MANHOLES	8.000 EA	450.00000		3,600.00	
0110	3000000000-N IMPACT ATTENUATOR UNIT, TYPE 350	3.000 EA	8,300.00000		24,900.00	
0111	3030000000-E STEEL BM GUARDRAIL	18,500.000 LF	15.00000		277,500.00	
0112	3045000000-E STEEL BM GUARDRAIL, SHOP CURVED	525.000 LF	16.00000		8,400.00	
0113	3105000000-N STEEL BM GUARDRAIL TERMINAL SECTIONS	2.000 EA	100.00000		200.00	
0114	3150000000-N ADDITIONAL GUARDRAIL POSTS	10.000 EA	45.00000		450.00	
0115	3195000000-N GUARDRAIL ANCHOR UNITS, TYPE AT-1	5.000 EA	400.00000		2,000.00	

Contract ID: C203199 Project(s): NHS-0017(124)
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Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0116	3210000000-N GUARDRAIL ANCHOR UNITS, TYPE CAT-1	13.000 EA	450.00000		5,850.00	
0117	3270000000-N GUARDRAIL ANCHOR UNITS, TYPE 350	20.000 EA	1,900.00000		38,000.00	
0118	3285000000-N GUARDRAIL ANCHOR UNITS, TYPE M-350	6.000 EA	1,700.00000		10,200.00	
0119	3317000000-N GUARDRAIL ANCHOR UNITS, TYPE B-77	34.000 EA	1,450.00000		49,300.00	
0120	3360000000-E REMOVE EXISTING GUARDRAIL	525.000 LF	1.00000		525.00	
0121	3380000000-E TEMPORARY STEEL BM GUARDRAIL	250.000 LF	10.00000		2,500.00	
0122	3389100000-N TEMPORARY GUARDRAIL ANCHOR UNITS, TYPE 350	4.000 EA	1,200.00000		4,800.00	
0123	3389200000-E CABLE GUIDERAIL	22,500.000 LF	7.00000		157,500.00	
0124	3389500000-N ADDITIONAL GUIDERAIL POSTS	10.000 EA	55.00000		550.00	
0125	3389600000-N CABLE GUIDERAIL ANCHOR UNITS	26.000 EA	1,500.00000		39,000.00	
0126	3503000000-E WOVEN WIRE FENCE, 47" FABRIC	50,900.000 LF	2.25000		114,525.00	
0127	3509000000-E 4" TIMBER FENCE POSTS, 7'-6" LONG	3,320.000 EA	14.00000		46,480.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0128	3515000000-E 5" TIMBER FENCE POSTS, 8'-0" LONG	610.000 EA	25.00000		15,250.00	
0129	3536000000-E CHAIN LINK FENCE, 48" FABRIC	2,700.000 LF	4.00000		10,800.00	
0130	3542000000-E METAL LINE POSTS FOR 48" CHAINLINK FENCE	230.000 EA	20.00000		4,600.00	
0131	3548000000-E METAL TERMINAL POSTS FOR 48" CHAIN LINK FENCE	20.000 EA	45.00000		900.00	
0132	3557000000-E ADDITIONAL BARBED WIRE	500.000 LF	1.00000		500.00	
0133	3564000000-E SINGLE GATES, **" HIGH, **' WIDE, **' OPENING (47", 20', 20')	9.000 EA	600.00000		5,400.00	
0134	3572000000-E CHAIN LINK FENCE RESET	1,600.000 LF	10.00000		16,000.00	
0135	3574000000-E GENERIC FENCING ITEM 40" WOOD RAIL FENCE RESET	100.000 LF	25.00000		2,500.00	
0136	3628000000-E RIP RAP, CLASS I	320.000 TON	61.40000		19,648.00	
0137	3649000000-E RIP RAP, CLASS B	1,000.000 TON	61.00000		61,000.00	
0138	3656000000-E GEOTEXTILE FOR DRAINAGE	7,975.000 SY	2.14000		17,066.50	

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Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0139	3659000000-N PREFORMED SCOUR HOLES WITH LEVEL SPREADER APRON	5.000 EA	3,500.00000		17,500.00	
0140	4048000000-E REINFORCED CONCRETE SIGN FOUN-DATIONS	70.000 CY	950.00000		66,500.00	
0141	4054000000-E PLAIN CONCRETE SIGN FOUNDA-TIONS	2.000 CY	450.00000		900.00	
0142	4057000000-E OVERHEAD FOOTING	30.000 CY	1,200.00000		36,000.00	
0143	4060000000-E SUPPORTS, BREAKAWAY STEEL BEAM	32,150.000 LB	3.20000		102,880.00	
0144	4066000000-E SUPPORTS, SIMPLE STEEL BEAM	13,868.000 LB	2.20000		30,509.60	
0145	4072000000-E SUPPORTS, 3-LB STEEL U-CHANNEL	3,592.000 LF	4.10000		14,727.20	
0146	4078000000-E SUPPORTS, 2-LB STEEL U-CHANNEL	40.000 EA	34.80000		1,392.00	
0147	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ****** (19+00 -Y5-EBL)	LUMP	LUMP		54,063.25	
0148	4082100000-N SUPPORTS, OVERHEAD SIGN STRUC-TURE AT STA ****** (37+30 -Y5-WBL)	LUMP	LUMP		67,939.75	
0149	4096000000-N SIGN ERECTION, TYPE D	13.000 EA	65.00000		845.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0150	4102000000-N SIGN ERECTION, TYPE E	90.000 EA	55.00000		4,950.00	
0151	4108000000-N SIGN ERECTION, TYPE F	32.000 EA	75.00000		2,400.00	
0152	4109000000-N SIGN ERECTION, TYPE *** (OVER-HEAD) (A)	8.000 EA	575.00000		4,600.00	
0153	4110000000-N SIGN ERECTION, TYPE *** (GROUND MOUNTED) (A)	25.000 EA	475.00000		11,875.00	
0154	4110000000-N SIGN ERECTION, TYPE *** (GROUND MOUNTED) (B)	19.000 EA	375.00000		7,125.00	
0155	4114000000-N SIGN ERECTION, MILEMARKERS	40.000 EA	55.00000		2,200.00	
0156	4115000000-N SIGN ERECTION, OVERLAY (OVER-HEAD)	3.000 EA	675.00000		2,025.00	
0157	4116000000-N SIGN ERECTION, OVERLAY (GROUNDMOUNTED)	4.000 EA	675.00000		2,700.00	
0158	4116100000-N SIGN ERECTION, RELOCATE, TYPE **** (GROUND MOUNTED) (A)	1.000 EA	475.00000		475.00	
0159	4116100000-N SIGN ERECTION, RELOCATE, TYPE **** (GROUND MOUNTED) (B)	5.000 EA	475.00000		2,375.00	
0160	4116200000-N SIGN ERECTION, REPOSITION OVERHEAD	4.000 EA	4,240.00000		16,960.00	
0161	4138000000-N DISPOSAL OF SUPPORT, STEEL BEAM	2.000 EA	150.00000		300.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0162	4152000000-N DISPOSAL OF SIGN SYSTEM, STEELBEAM	7.000 EA	150.00000		1,050.00	
0163	4155000000-N DISPOSAL OF SIGN SYSTEM, U- CHANNEL	24.000 EA	1.00000		24.00	
0164	4234000000-N DISPOSAL OF SIGN, A OR B (OVERHEAD)	4.000 EA	175.00000		700.00	
0165	4236000000-N DISPOSAL OF SIGN, A, B OR C (GROUND MOUNTED)	2.000 EA	100.00000		200.00	
0166	4238000000-N DISPOSAL OF SIGN, D, E OR F	1.000 EA	1.00000		1.00	
0167	4400000000-E WORK ZONE SIGNS (STATIONARY)	682.000 SF	4.99000		3,403.18	
0168	4405000000-E WORK ZONE SIGNS (PORTABLE)	412.000 SF	22.50000		9,270.00	
0169	4410000000-E WORK ZONE SIGNS (BARRICADE MOUNTED)	365.000 SF	9.35000		3,412.75	
0170	4420000000-N PORTABLE CHANGEABLE MESSAGE SIGN	2.000 EA	5,000.00000		10,000.00	
0171	4430000000-N DRUMS	350.000 EA	40.00000		14,000.00	
0172	4435000000-N CONES	100.000 EA	18.00000		1,800.00	
0173	4445000000-E BARRICADES (TYPE III)	408.000 LF	36.00000		14,688.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0174	4455000000-N FLAGGER	376.000 DAY	170.00000		63,920.00	
0175	4465000000-N TEMPORARY CRASH CUSHIONS	2.000 EA	6,000.00000		12,000.00	
0176	4480000000-N TMA	2.000 EA	3,000.00000		6,000.00	
0177	4485000000-E PORTABLE CONCRETE BARRIER	390.000 LF	27.90000		10,881.00	
0178	4516000000-N SKINNY DRUM	100.000 EA	36.00000		3,600.00	
0179	4650000000-N TEMPORARY RAISED PAVEMENT MARKERS	203.000 EA	5.00000		1,015.00	
0180	4685000000-E THERMOPLASTIC PAVEMENT MARKINGLINES (4", 90 MILS)	27,589.000 LF	0.60000		16,553.40	
0181	4686000000-E THERMOPLASTIC PAVEMENT MARKING LINES (4", 120 MILS)	31,369.000 LF	0.68000		21,330.92	
0182	4695000000-E THERMOPLASTIC PAVEMENT MARKINGLINES (8", 90 MILS)	1,150.000 LF	2.90000		3,335.00	
0183	4710000000-E THERMOPLASTIC PAVEMENT MARKINGLINES (24", 120 MILS)	330.000 LF	6.00000		1,980.00	
0184	4725000000-E THERMOPLASTIC PAVEMENT MARKINGSYMBOL (90 MILS)	58.000 EA	115.00000		6,670.00	
0185	4810000000-E PAINT PAVEMENT MARKING LINES (4")	181,911.000 LF	0.14000		25,467.54	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0186	4835000000-E PAINT PAVEMENT MARKING LINES (24")	130.000 LF	2.00000		260.00	
0187	4847000000-E POLYUREA PAVEMENT MARKING LINES (4", **********) (HIGHLY REFLECTIVE ELEMENTS)	4,051.000 LF	0.80000		3,240.80	
0188	4847100000-E POLYUREA PAVEMENT MARKING LINES (6", **********) (HIGHLY REFLECTIVE ELEMENTS)	130,847.000 LF	0.95000		124,304.65	
0189	4847120000-E POLYUREA PAVEMENT MARKING LINES (12", **********) (HIGHLY REFLECTIVE ELEMENTS)	3,492.000 LF	2.75000		9,603.00	
0190	4850000000-E REMOVAL OF PAVEMENT MARKING LINES (4")	7,100.000 LF	0.70000		4,970.00	
0191	4900000000-N PERMANENT RAISED PAVEMENT MARKERS	232.000 EA	5.75000		1,334.00	
0192	4905000000-N SNOWPLOWABLE PAVEMENT MARKERS	1,067.000 EA	25.00000		26,675.00	
0193	5325600000-E 6" WATER LINE	182.000 LF	50.00000		9,100.00	
0194	5326200000-E 12" WATER LINE	6,149.000 LF	72.50000		445,802.50	
0195	5328000000-E 30" WATER LINE	2,104.000 LF	275.00000		578,600.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

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0196	5540000000-E 6" VALVE	4.000 EA	1,000.00000		4,000.00	
0197	5558000000-E 12" VALVE	11.000 EA	2,300.00000		25,300.00	
0198	5560000000-E 30" VALVE	6.000 EA	27,500.00000		165,000.00	
0199	5589100000-E 1" AIR RELEASE VALVE	1.000 EA	7,000.00000		7,000.00	
0200	5648000000-N RELOCATE WATER METER	16.000 EA	550.00000		8,800.00	
0201	5666000000-E FIRE HYDRANT	1.000 EA	3,750.00000		3,750.00	
0202	5672000000-N RELOCATE FIRE HYDRANT	8.000 EA	3,750.00000		30,000.00	
0203	5691300000-E 8" SANITARY GRAVITY SEWER	115.000 LF	100.00000		11,500.00	
0204	5691400000-E 10" SANITARY GRAVITY SEWER	631.000 LF	190.00000		119,890.00	
0205	5709400000-E 8" FORCE MAIN SEWER	395.000 LF	150.00000		59,250.00	
0206	5709600000-E 12" FORCE MAIN SEWER	476.000 LF	245.00000		116,620.00	
0207	5768000000-N SANITARY SEWER CLEAN-OUT	1.000 EA	1,500.00000		1,500.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

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0208	5775000000-E 4' DIA UTILITY MANHOLE	3.000 EA	4,000.00000		12,000.00	
0209	5776000000-E 5' DIA UTILITY MANHOLE	6.000 EA	6,000.00000		36,000.00	
0210	5781000000-E UTILITY MANHOLE WALL, 4' DIA	2.000 LF	125.00000		250.00	
0211	5782000000-E UTILITY MANHOLE WALL, 5' DIA	54.000 LF	150.00000		8,100.00	
0212	5801000000-E ABANDON 8" UTILITY PIPE	348.000 LF	10.00000		3,480.00	
0213	5802000000-E ABANDON 10" UTILITY PIPE	761.000 LF	10.00000		7,610.00	
0214	5804000000-E ABANDON 12" UTILITY PIPE	5,720.000 LF	7.50000		42,900.00	
0215	5814000000-E ABANDON 30" UTILITY PIPE	1,817.000 LF	26.00000		47,242.00	
0216	5835000000-E **" ENCASEMENT PIPE (42")	550.000 LF	325.00000		178,750.00	
0217	5836000000-E 24" ENCASEMENT PIPE	700.000 LF	110.00000		77,000.00	
0218	5882000000-N GENERIC UTILITY ITEM CONNECTION DETAIL NO 2	6.000 EA	56,500.00000		339,000.00	
0219	5882000000-N GENERIC UTILITY ITEM CONNECTION DETAIL NO 4	14.000 EA	4,750.00000		66,500.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
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Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0220	5888000000-E GENERIC UTILITY ITEM 42" DUMMY ENCASEMENT PIPE	550.000 LF	260.00000		143,000.00	
0221	5888000000-E GENERIC UTILITY ITEM 54" DUMMY ENCASEMENT PIPE	280.000 LF	390.00000		109,200.00	
0222	5912000000-N GENERIC UTILITY ITEM 4" WATER METER ASSEMBLY	LUMP	LUMP		20,000.00	
0223	5912000000-N GENERIC UTILITY ITEM REMOVE EXISTING 4" WATER METER ASSEMBLY	LUMP	LUMP		5,500.00	
0224	6000000000-E TEMPORARY SILT FENCE	125,000.000 LF	1.45000		181,250.00	
0225	6006000000-E STONE FOR EROSION CONTROL, CLASS A	3,025.000 TON	61.40000		185,735.00	
0226	6009000000-E STONE FOR EROSION CONTROL, CLASS B	6,000.000 TON	61.40000		368,400.00	
0227	6012000000-E SEDIMENT CONTROL STONE	6,000.000 TON	56.30000		337,800.00	
0228	6015000000-E TEMPORARY MULCHING	300.000 ACR	400.00000		120,000.00	
0229	6018000000-E SEED FOR TEMPORARY SEEDING	7,850.000 LB	6.00000		47,100.00	
0230	6021000000-E FERTILIZER FOR TEMPORARY SEED-ING	32.000 TON	800.00000		25,600.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
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0231	6024000000-E TEMPORARY SLOPE DRAINS	30,000.000 LF	4.00000		120,000.00	
0232	6029000000-E SAFETY FENCE	15,600.000 LF	1.00000		15,600.00	
0233	6030000000-E SILT EXCAVATION	100,000.000 CY	3.00000		300,000.00	
0234	6036000000-E MATTING FOR EROSION CONTROL	100,000.000 SY	0.80000		80,000.00	
0235	6037000000-E COIR FIBER MAT	2,600.000 SY	2.50000		6,500.00	
0236	6038000000-E PERMANENT SOIL REINFORCEMENT MAT	2,350.000 SY	4.00000		9,400.00	
0237	6042000000-E 1/4" HARDWARE CLOTH	9,550.000 LF	3.50000		33,425.00	
0238	6043000000-E LOW PERMEABILITY GEOTEXTILE	950.000 SY	2.00000		1,900.00	
0239	6045000000-E **" TEMPORARY PIPE (24")	100.000 LF	50.00000		5,000.00	
0240	6046000000-E TEMPORARY PIPE FOR STREAM CROSSING	50.000 LF	50.00000		2,500.00	
0241	6048000000-E FLOATING TURBIDITY CURTAIN	25.000 SY	50.00000		1,250.00	
0242	6069000000-E STILLING BASINS	400.000 CY	35.00000		14,000.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

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0243	6070000000-N SPECIAL STILLING BASINS	6.000 EA	150.00000		900.00	
0244	6071012000-E COIR FIBER WATTLE	4,000.000 LF	5.00000		20,000.00	
0245	6071020000-E POLYACRYLAMIDE (PAM)	925.000 LB	6.00000		5,550.00	
0246	6071030000-E COIR FIBER BAFFLE	8,000.000 LF	3.50000		28,000.00	
0247	6071050000-E **" SKIMMER (1-1/2")	29.000 EA	650.00000		18,850.00	
0248	6071050000-E **" SKIMMER (2")	4.000 EA	1,000.00000		4,000.00	
0249	6071050000-E **" SKIMMER (3")	1.000 EA	1,200.00000		1,200.00	
0250	6084000000-E SEEDING & MULCHING	300.000 ACR	1,600.00000		480,000.00	
0251	6087000000-E MOWING	120.000 ACR	100.00000		12,000.00	
0252	6090000000-E SEED FOR REPAIR SEEDING	3,600.000 LB	8.00000		28,800.00	
0253	6093000000-E FERTILIZER FOR REPAIR SEEDING	19.250 TON	800.00000		15,400.00	
0254	6096000000-E SEED FOR SUPPLEMENTAL SEEDING	9,525.000 LB	4.00000		38,100.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

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0255	6108000000-E FERTILIZER TOPDRESSING	285.500 TON	600.00000		171,300.00	
0256	6111000000-E IMPERVIOUS DIKE	255.000 LF	100.00000		25,500.00	
0257	6114500000-N SPECIALIZED HAND MOWING	225.000 MHR	50.00000		11,250.00	
0258	6117000000-N RESPONSE FOR EROSION CONTROL	150.000 EA	1.00000		150.00	
0259	6123000000-E REFORESTATION	5.000 ACR	1,000.00000		5,000.00	
0260	6126000000-E STREAMBANK REFORESTATION	0.140 ACR	10,000.00000		1,400.00	
0261	6135000000-E GENERIC EROSION CONTROL ITEM COMPOST BLANKET	20.000 ACR	4,800.00000		96,000.00	
0262	7060000000-E SIGNAL CABLE	1,275.000 LF	1.50000		1,912.50	
0263	7120000000-E VEHICLE SIGNAL HEAD (12", 3 SECTION)	8.000 EA	700.00000		5,600.00	
0264	7132000000-E VEHICLE SIGNAL HEAD (12", 4 SECTION)	2.000 EA	825.00000		1,650.00	
0265	7252000000-E MESSENGER CABLE (1/4")	390.000 LF	1.85000		721.50	
0266	7279000000-E TRACER WIRE	1,450.000 LF	0.55000		797.50	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

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0267	7300000000-E UNPAVED TRENCHING (**********) (1, 2")	1,040.000 LF	7.00000		7,280.00	
0268	7300000000-E UNPAVED TRENCHING (**********) (2, 2")	160.000 LF	9.00000		1,440.00	
0269	7300000000-E UNPAVED TRENCHING (**********) (2,1-1/2")	1,815.000 LF	8.75000		15,881.25	
0270	7301000000-E DIRECTIONAL DRILL (**********) (1, 2")	450.000 LF	16.00000		7,200.00	
0271	7301000000-E DIRECTIONAL DRILL (**********) (2, 1-1/2")	1,585.000 LF	19.00000		30,115.00	
0272	7301000000-E DIRECTIONAL DRILL (**********) (2, 2")	180.000 LF	18.75000		3,375.00	
0273	7324000000-N JUNCTION BOX (STANDARD SIZE)	32.000 EA	400.00000		12,800.00	
0274	7348000000-N JUNCTION BOX (OVER-SIZED, HEA-VY DUTY)	5.000 EA	600.00000		3,000.00	
0275	7360000000-N WOOD POLE	7.000 EA	1,000.00000		7,000.00	
0276	7372000000-N GUY ASSEMBLY	2.000 EA	420.00000		840.00	
0277	7384000000-E ***" RISER WITH ********** (1-1/2", WEATHERHEAD)	5.000 EA	525.00000		2,625.00	
0278	7444000000-E INDUCTIVE LOOP SAWCUT	895.000 LF	7.25000		6,488.75	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

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0279	7456000000-E LEAD-IN CABLE (**********) (14-2)	1,525.000 LF	1.10000		1,677.50	
0280	7485000000-N WIRELESS MAGNETIC SENSOR VEHI-CLE DETECTOR SYSTEM	1.000 EA	13,500.00000		13,500.00	
0281	7516000000-E COMMUNICATIONS CABLE (**FIBER) (12)	1,550.000 LF	1.30000		2,015.00	
0282	7552000000-N INTERCONNECT CENTER	2.000 EA	1,340.00000		2,680.00	
0283	7564000000-N FIBER-OPTIC TRANSCEIVER, DROP & REPEAT	2.000 EA	2,000.00000		4,000.00	
0284	7566000000-N DELINEATOR MARKER	5.000 EA	89.00000		445.00	
0285	7588000000-N METAL POLE WITH SINGLE MAST ARM	1.000 EA	12,000.00000		12,000.00	
0286	7590000000-N METAL POLE WITH DUAL MAST ARM	1.000 EA	18,500.00000		18,500.00	
0287	7613000000-N SOIL TEST	2.000 EA	1,250.00000		2,500.00	
0288	7614100000-E DRILLED PIER FOUNDATION	16.000 CY	700.00000		11,200.00	
0289	7631000000-N MAST ARM WITH METAL POLE DE- SIGN	2.000 EA	52.50000		105.00	
0290	7684000000-N SIGNAL CABINET FOUNDATION	1.000 EA	800.00000		800.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

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0291	7756000000-N CONTROLLER WITH CABINET (TYPE 2070L, BASE MOUNTED)	1.000 EA	14,500.00000		14,500.00	
0292	7780000000-N DETECTOR CARD (TYPE 2070L)	5.000 EA	160.00000		800.00	
0293	7901000000-N CABINET BASE EXTENDER	1.000 EA	450.00000		450.00	
0294	7980000000-N GENERIC SIGNAL ITEM 5/8" X 10' GROUNDING ELECTRODE	60.000 EA	90.00000		5,400.00	
0295	7980000000-N GENERIC SIGNAL ITEM CCTV CAMERA ASSEMBLY	8.000 EA	4,600.00000		36,800.00	
0296	7980000000-N GENERIC SIGNAL ITEM CCTV WOOD POLE	7.000 EA	1,950.00000		13,650.00	
0297	7980000000-N GENERIC SIGNAL ITEM CENTRAL MEDIA CONVERTER	6.000 EA	410.00000		2,460.00	
0298	7980000000-N GENERIC SIGNAL ITEM DMS	6.000 EA	73,500.00000		441,000.00	
0299	7980000000-N GENERIC SIGNAL ITEM DMS ACCESS LADDER	5.000 EA	5,375.00000		26,875.00	
0300	7980000000-N GENERIC SIGNAL ITEM DMS PEDESTAL STRUCTURE (TYPE A)	4.000 EA	45,700.00000		182,800.00	
0301	7980000000-N GENERIC SIGNAL ITEM DMS PEDESTAL STRUCTURE (TYPE B)	1.000 EA	54,500.00000		54,500.00	
0302	7980000000-N GENERIC SIGNAL ITEM EQUIPMENT CABINET DISCONNECT	12.000 EA	200.00000		2,400.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

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0303	7980000000-N GENERIC SIGNAL ITEM FIELD EQUIPMENT CABINET	8.000 EA	4,200.00000		33,600.00	
0304	7980000000-N GENERIC SIGNAL ITEM METER BASE/DISCONNECT COMBINA-TION PANEL	9.000 EA	700.00000		6,300.00	
0305	7980000000-N GENERIC SIGNAL ITEM SOLAR POWER ASSEMBLY	1.000 EA	13,500.00000		13,500.00	
0306	7980000000-N GENERIC SIGNAL ITEM VIDEO ETHERNET DECODER	4.000 EA	825.00000		3,300.00	
0307	7980000000-N GENERIC SIGNAL ITEM VIDEO ETHERNET ENCODER	8.000 EA	800.00000		6,400.00	
0308	7980000000-N GENERIC SIGNAL ITEM WOOD PEDESTAL	4.000 EA	150.00000		600.00	
0309	7985000000-N GENERIC SIGNAL ITEM INTEGRATION AND CONFIGURATION	LUMP	LUMP		5,100.00	
0310	7990000000-E GENERIC SIGNAL ITEM #4 SOLID BARE GROUNDING CON- DUCTOR	520.000 LF	1.75000		910.00	
0311	7990000000-E GENERIC SIGNAL ITEM 3-WIRE COPPER FEEDER CONDUC- TORS	1,895.000 LF	1.75000		3,316.25	
0312	7990000000-E GENERIC SIGNAL ITEM 3-WIRE COPPER SERVICE ENTRANCE CONDUCTORS	125.000 LF	4.00000		500.00	
0313	7990000000-E GENERIC SIGNAL ITEM 4-WIRE COPPER FEEDER CONDUC- TORS	1,630.000 LF	15.00000		24,450.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0314	7992000000-E GENERIC SIGNAL ITEM ITS OVERHEAD FOOTING	40.000 CY	725.00000		29,000.00	
	Section 0001 Total				56,911,661.29	

Section 0002 CULVERT ITEMS

Alt Group

0315	8126000000-N CULVERT EXCAVATION, STA ****** (52+09.00-Y7-)	LUMP	LUMP		25,000.00	
0316	8133000000-E FOUNDATION CONDITIONING MATER-IAL, BOX CULVERT	97.000 TON	50.00000		4,850.00	
0317	8196000000-E CLASS A CONCRETE (CULVERT)	173.300 CY	650.00000		112,645.00	
0318	8245000000-E REINFORCING STEEL (CULVERT)	23,796.000 LB	1.00000		23,796.00	
	Section 0002 Total				166,291.00	

Section 0003 WALL ITEMS

Alt Group

0319	8801000000-E MSE RETAINING WALL NO **** (1)	5,500.000 SF	87.44000		480,920.00	
0320	8801000000-E MSE RETAINING WALL NO **** (2)	5,450.000 SF	87.44000		476,548.00	
	Section 0003 Total				957,468.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
Section 0004	STRUCTURE ITEMS					
	Alt Group					
0321	8017000000-N CONSTRUCTION, MAINTENANCE, & REMOVAL OF TEMP ACCESS AT STA ********** (265+53.58-L-)	LUMP	LUMP		625,000.00	
0322	8017000000-N CONSTRUCTION, MAINTENANCE, & REMOVAL OF TEMP ACCESS AT STA ********** (48+79.00-Y8-)	LUMP	LUMP		625,000.00	
0323	8084000000-N FOUNDATION EXCAVATION FOR END BENT ** AT STATION ********** (01, 38+50.27-Y7-)	LUMP	LUMP		10,000.00	
0324	8084000000-N FOUNDATION EXCAVATION FOR END BENT ** AT STATION ********** (02, 38+50.27-Y7-)	LUMP	LUMP		10,000.00	
0325	8108000000-E **'-**" DIA DRILLED PIERS (6'-0")	2,424.000 LF	700.00000		1,696,800.00	
0326	8112730000-N PDA TESTING	7.000 EA	1,600.00000		11,200.00	
0327	8113000000-N SID INSPECTIONS	8.000 EA	1,200.00000		9,600.00	
0328	8114000000-N SPT TESTING	16.000 EA	1,500.00000		24,000.00	
0329	8115000000-N CSL TESTING	4.000 EA	2,200.00000		8,800.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0330	8147000000-E REINFORCED CONCRETE DECK SLAB	132,228.000 SF	24.30000		3,213,140.40	
0331	8161000000-E GROOVING BRIDGE FLOORS	135,259.000 SF	0.35000		47,340.65	
0332	8175000000-E CLASS AA CONCRETE (BRIDGE)	705.300 CY	759.00000		535,322.70	
0333	8182000000-E CLASS A CONCRETE (BRIDGE)	1,985.900 CY	520.00000		1,032,668.00	
0334	8210000000-N BRIDGE APPROACH SLABS, STATION********** (147+38.89-L-LT)	LUMP	LUMP		41,000.00	
0335	8210000000-N BRIDGE APPROACH SLABS, STATION********** (147+38.89-L-RT)	LUMP	LUMP		41,000.00	
0336	8210000000-N BRIDGE APPROACH SLABS, STATION********** (182+99.94-L-)	LUMP	LUMP		46,000.00	
0337	8210000000-N BRIDGE APPROACH SLABS, STATION********** (265+53.58-L-LT)	LUMP	LUMP		41,000.00	
0338	8210000000-N BRIDGE APPROACH SLABS, STATION********** (265+53.58-L-RT)	LUMP	LUMP		53,000.00	
0339	8210000000-N BRIDGE APPROACH SLABS, STATION********** (281+51.83-L-LT)	LUMP	LUMP		43,000.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0340	8210000000-N BRIDGE APPROACH SLABS, STATION********** (281+51.83-L-RT)	LUMP	LUMP		40,000.00	
0341	8210000000-N BRIDGE APPROACH SLABS, STATION********** (38+50.27-Y7-)	LUMP	LUMP		63,000.00	
0342	8210000000-N BRIDGE APPROACH SLABS, STATION********** (48+79.00-Y8-)	LUMP	LUMP		52,000.00	
0343	8217000000-E REINFORCING STEEL (BRIDGE)	630,691.000 LB	0.95000		599,156.45	
0344	8224000000-E EPOXY COATED REINFORCING STEEL(BRIDGE)	115,573.000 LB	0.95000		109,794.35	
0345	8238000000-E SPIRAL COLUMN REINFORCING STEEL (BRIDGE)	114,806.000 LB	1.50000		172,209.00	
0347	8265000000-E 54" PRESTRESSED CONCRETE GIR-DERS	6,352.550 LF	217.00000		1,378,503.35	
0348	8274000000-E MODIFIED 63" PRESTRESSED CONC GIRDERS	1,891.370 LF	270.00000		510,669.90	
0349	8280000000-E APPROX ..... LBS STRUCTURALSTEEL	LUMP	LUMP		6,780,000.00	
0350	8333000000-E 16" PRESTRESSED CONCRETE PILES	2,588.000 LF	66.00000		170,808.00	
0351	8336000000-E 20" PRESTRESSED CONCRETE PILES	3,700.000 LF	80.00000		296,000.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0352	8350000000-E 24" PRESTRESSED CONCRETE PILES	2,260.000 LF	112.00000		253,120.00	
0353	8364000000-E HP12X53 STEEL PILES	6,895.000 LF	53.00000		365,435.00	
0354	8391000000-N STEEL PILE POINTS	30.000 EA	70.00000		2,100.00	
0355	8392500000-E PREDRILLING FOR PILES	200.000 LF	150.00000		30,000.00	
0356	8393000000-N PILE REDRIVES	101.000 EA	400.00000		40,400.00	
0357	8503000000-E CONCRETE BARRIER RAIL	5,368.350 LF	69.00000		370,416.15	
0358	8524000000-E **" CHAIN LINK FENCE (72")	2,204.190 LF	109.00000		240,256.71	
0359	8531000000-E 4" SLOPE PROTECTION	12,556.000 SY	64.75000		813,001.00	
0360	8608000000-E RIP RAP CLASS II (2'-0" THICK)	3,159.000 TON	88.00000		277,992.00	
0361	8622000000-E GEOTEXTILE FOR DRAINAGE	3,505.000 SY	3.95000		13,844.75	
0362	8654000000-N DISC BEARINGS	LUMP	LUMP		75,000.00	
0363	8657000000-N ELASTOMERIC BEARINGS	LUMP	LUMP		61,000.00	

Contract ID: C203199 Project(s): NHS-0017(124)
Letting Date: 01-21-14 Call Order: 002
Bidder: 3516 - Barnhill Contracting Company

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0364	8706000000-N EXPANSION JOINT SEALS	LUMP	LUMP		601,000.00	
0365	8727000000-N ELECTRICAL CONDUIT SYSTEM FOR SIGNALS AT STA********** (147+38.89-L-RT)	LUMP	LUMP		67,000.00	
0366	8727000000-N ELECTRICAL CONDUIT SYSTEM FOR SIGNALS AT STA********** (38+50.27-Y7-)	LUMP	LUMP		17,200.00	
0367	8867000000-E GENERIC STRUCTURE ITEM 20" COMPOSITE PILE	1,000.000 LF	134.00000		134,000.00	
	Section 0004 Total				21,647,778.41	
	Bid Total				79,683,198.70	

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 acknowleges 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	
NOT ANSWERED	
NOT ANSWERED	
NOT ANSWERED	
NOT ANSWERED	
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: C203199
LETTING: L140121 CALL: 002
VENDOR: 3516 Barnhill Contracting Company

LINE NO.	ITEM NO.	ITEM DESC.	UNIT TYPE	SUBCONTRACTOR QUANTITY	SUBCONTRACTOR UNIT PRICE	EXTENDED AMOUNT
DBE SUBCONTRACTOR: 12278 CLIFTON CONSTRUCTION CO., INC.						
Will Use Quote: Yes						
0079	2022000000-E	SUBDRAIN EXC	CY	2500.000	25.00000	62500.00
0080	2026000000-E	GEOTEXTILE F	SY	7400.000	3.50000	25900.00
0081	2036000000-E	SUBDRAIN COA	CY	1250.000	55.00000	68750.00
0082	2044000000-E	6" PERF SUBD	LF	7400.000	15.00000	111000.00
0083	2070000000-N	SUBDRN PIPE	EA	15.000	350.00000	5250.00
0084	2077000000-E	6" OUTLET PI	LF	90.000	40.00000	3600.00
0001	0000100000-N	MOBILIZATION	LS	1.000	1500.00000	1500.00
		DBE COMMITMENT TOTAL FOR SUBCONTRACTOR:				278,500.00 Committed
		DBE COMMITMENT TOTAL FOR VENDOR (SubContractor)				278,500
DBE SUBCONTRACTOR: 4898 BULLINGTON CONSTRUCTION INC						
Will Use Quote: Yes						
0110	3000000000-N	IMPACT ATTEN	EA	3.000	8300.00000	24900.00
0111	3030000000-E	STL BM GUARD	LF	18500.000	15.00000	277500.00
0112	3045000000-E	SBGR SHOP CU	LF	525.000	16.00000	8400.00
0113	3105000000-N	SBGR TERM SE	EA	2.000	100.00000	200.00
0114	3150000000-N	ADDIT GUARDR	EA	10.000	45.00000	450.00
0115	3195000000-N	GR ANCHOR TY	EA	5.000	400.00000	2000.00
0116	3210000000-N	GR ANCHOR TY	EA	13.000	450.00000	5850.00
0117	3270000000-N	GR ANCHOR TY	EA	20.000	1900.00000	38000.00
0118	3285000000-N	GR ANCHOR TY	EA	6.000	1700.00000	10200.00
0119	3317000000-N	GR ANCHOR TY	EA	34.000	1450.00000	49300.00
0120	3360000000-E	REMOVE EXIST	LF	525.000	1.00000	525.00
0121	3380000000-E	TEMP STL BM	LF	250.000	10.00000	2500.00
0122	3389100000-N	TEMP GDRL AN	EA	4.000	1200.00000	4800.00
0123	3389200000-E	CABLE GUIDER	LF	22500.000	7.00000	157500.00
0124	3389500000-N	ADDITIONAL G	EA	10.000	55.00000	550.00
0125	3389600000-N	CBL GUIDERAI	EA	26.000	1500.00000	39000.00
0001	0000100000-N	MOBILIZATION	LS	1.000	9325.13000	9325.13
		DBE COMMITMENT TOTAL FOR SUBCONTRACTOR:				631,000.13 Committed
		DBE COMMITMENT TOTAL FOR VENDOR (SubContractor)				631,000
DBE SUBCONTRACTOR: 4247 SEAL BROTHERS CONTRACTING LLC						
Will Use Quote: Yes						
0126	3503000000-E	WOVEN WIRE F	LF	50900.000	2.25000	114525.00
0127	3509000000-E	4" TIMBER PO	EA	3320.000	14.00000	46480.00
0128	3515000000-E	5" TIMBER PO	EA	610.000	25.00000	15250.00
0129	3536000000-E	CHN LK FENCE	LF	2700.000	4.00000	10800.00
0130	3542000000-E	MET LINE PST	EA	230.000	20.00000	4600.00
0131	3548000000-E	MET TERM PST	EA	20.000	45.00000	900.00

LINE NO.	ITEM NO.	ITEM DESC.	UNIT TYPE	SUBCONTRACTOR QUANTITY	SUBCONTRACTOR UNIT PRICE	EXTENDED AMOUNT
0132	3557000000-E	ADDITIONAL B	LF	500.000	1.00000	500.00
0133	3564000000-E	SGL GATE **H	EA	9.000	600.00000	5400.00
0134	3572000000-E	CHAIN LINK F	LF	1600.000	10.00000	16000.00
0135	3574000000-E	GENERIC FENC	LF	100.000	25.00000	2500.00
0001	0000100000-N	MOBILIZATION	LS	1.000	4339.00000	4339.00

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 221,294.00 Committed
DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 221,294

DBE SUBCONTRACTOR: 3080 CURTIN TRUCKING & DRAINAGE, INC.
Will Use Quote: Yes

0108	2724000000-E	PC REINF BAR	LF	128.000	105.00000	13440.00
0175	4465000000-N	TEMPORARY CR	EA	2.000	6000.00000	12000.00
0177	4485000000-E	PORT CONC BA	LF	390.000	27.90000	10881.00

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 36,321.00 Committed
DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 36,321.

DBE SUBCONTRACTOR: 11468 HINES TRUCKING INC
Will Use Quote: Yes

0018	0106000000-E	BORROW EXCAV	CY	1350000.000	2.45000	3307500.00
	Haul Only					
0024	0194000000-E	SELECT GRANU	CY	70000.000	2.45000	171500.00
	Haul Only					
0025	0195000000-E	SELECT GRANU	CY	87000.000	1.35000	117450.00
	Haul Only					
0225	6006000000-E	EROS CONTRL	TON	2000.000	5.50000	11000.00
	Haul Only					

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 3,607,450.00 Committed
DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 3,607,4

DBE SUBCONTRACTOR: 11468 HINES TRUCKING INC
Will Use Quote: Yes

0018	0106000000-E	BORROW EXCAV	CY	450000.000	1.35000	607500.00
	Haul Only					

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 607,500.00 Committed
DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 607,500

DBE SUBCONTRACTOR: 3765 STAY ALERT SAFETY SERVICES INC
Will Use Quote: Yes

0167	4400000000-E	WORK ZONE SI	SF	682.000	4.99000	3403.18

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 3,403.18 Committed
DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 3,403.1

LINE NO.	ITEM NO.	ITEM DESC.	UNIT TYPE	SUBCONTRACTOR QUANTITY	SUBCONTRACTOR UNIT PRICE	EXTENDED AMOUNT
DBE SUBCONTRACTOR: 7621 DOSS TRUCKING INC Will Use Quote: Yes						
0064	1099700000-E	CLASS IV SUB	TON	1200.000	2.80000	3360.00
	Haul Only					
0065	1111000000-E	CLASS IV AGG	TON	14000.000	2.80000	39200.00
	Haul Only					
0066	1121000000-E	AGGREGATE BA	TON	132000.000	2.80000	369600.00
	Haul Only					
0067	1220000000-E	INCIDENTAL S	TON	3200.000	2.80000	8960.00
	Haul Only					
0136	3628000000-E	RIP RAP, CLA	TON	220.000	3.80000	836.00
	Haul Only					
0137	3649000000-E	RIP RAP, CLA	TON	700.000	3.80000	2660.00
	Haul Only					
0226	6009000000-E	EROS CONTRL	TON	4000.000	3.80000	15200.00
	Haul Only					
0227	6012000000-E	SEDIMENT CON	TON	4000.000	2.80000	11200.00
0071	1491000000-E	ASP CONC BAS	TON	16348.000	5.75000	94001.00
	Haul Only					
0073	1503000000-E	ASP CONC INT	TON	12261.000	5.75000	70500.75
	Haul Only					
0075	1523000000-E	ASP CONC SUR	TON	12261.000	5.75000	70500.75
	Haul Only					
		DBE COMMITMENT TOTAL FOR SUBCONTRACTOR:				686,018.50 Committed
		DBE COMMITMENT TOTAL FOR VENDOR (SubContractor)				686,018
DBE SUBCONTRACTOR: 2324 FREEMAN CURB & GUTTER, INC. Will Use Quote: Yes						
0103	2440000000-N	CONC TRANS S	EA	2.000	485.00000	970.00
0104	2451000000-N	CONC TRANS S	EA	18.000	485.00000	8730.00
0105	2549000000-E	2'-6" CONC C	LF	2400.000	14.00000	33600.00
0106	2556000000-E	SHOULDER BER	LF	14900.000	14.00000	208600.00
0107	2647000000-E	5" MONO CONC	SY	3010.000	38.50000	115885.00
		DBE COMMITMENT TOTAL FOR SUBCONTRACTOR:				367,785.00 Committed
		DBE COMMITMENT TOTAL FOR VENDOR (SubContractor)				367,785
DBE SUBCONTRACTOR: 5678 BEAR & CO. SIGNS & LIGHTING, INC. Will Use Quote: Yes						
0140	4048000000-E	REINF CONC F	CY	70.000	950.00000	66500.00
0141	4054000000-E	PLN CONC FOU	CY	2.000	450.00000	900.00
0142	4057000000-E	OVERHEAD FOO	CY	30.000	1200.00000	36000.00
0143	4060000000-E	SUPPORT, BRE	LB	32150.000	3.20000	102880.00
0144	4066000000-E	SUPPORTS, SI	LB	13868.000	2.20000	30509.60
0145	4072000000-E	SUPPORT, 3-L	LF	3592.000	4.10000	14727.20
0146	4078000000-E	SUPPORT, 2-L	EA	40.000	34.80000	1392.00
0147	4082100000-N	SUPPORT, OVR	LS	1.000	54063.25000	54063.25

LINE NO.	ITEM NO.	ITEM DESC.	UNIT TYPE	SUBCONTRACTOR QUANTITY	SUBCONTRACTOR UNIT PRICE	EXTENDED AMOUNT
0148	4082100000-N	SUPPORT, OVR	LS	1.000	67939.75000	67939.75
0149	4096000000-N	SIGN ERECTIO	EA	13.000	65.00000	845.00
0150	4102000000-N	SIGN ERECTIO	EA	90.000	55.00000	4950.00
0151	4108000000-N	SIGN ERECTIO	EA	32.000	75.00000	2400.00
0152	4109000000-N	SIGN ERECTIO	EA	8.000	575.00000	4600.00
0153	4110000000-N	SIGN ERECTIO	EA	25.000	475.00000	11875.00
0154	4110000000-N	SIGN ERECTIO	EA	19.000	375.00000	7125.00
0155	4114000000-N	SIGN ERECTIO	EA	40.000	55.00000	2200.00
0156	4115000000-N	SIGN ERECTIO	EA	3.000	675.00000	2025.00
0157	4116000000-N	SIGN ERECTIO	EA	4.000	675.00000	2700.00
0158	4116100000-N	SIGN ERECT,	EA	1.000	475.00000	475.00
0159	4116100000-N	SIGN ERECT,	EA	5.000	475.00000	2375.00
0160	4116200000-N	SIGN ERECTIO	EA	4.000	4240.00000	16960.00
0161	4138000000-N	DISPOSE SUPP	EA	2.000	150.00000	300.00
0162	4152000000-N	DISPOSE SIGN	EA	7.000	150.00000	1050.00
0163	4155000000-N	DISPOSE SIGN	EA	24.000	1.00000	24.00
0164	4234000000-N	DISPOSE SIGN	EA	4.000	175.00000	700.00
0165	4236000000-N	DISPOSE SIGN	EA	2.000	100.00000	200.00
0166	4238000000-N	DISPOSE SIGN	EA	1.000	1.00000	1.00
0001	0000100000-N	MOBILIZATION	LS	1.000	15250.09000	15250.09
						450,966.89

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: Committed
DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 450,966

DBE SUBCONTRACTOR: 4880 TRICOR CONSTRUCTION, INC.
Will Use Quote: Yes

0001	0000100000-N	MOBILIZATION	LS	1.000	125370.00000	125370.00
0319	8801000000-E	MSE RETAIN W	SF	5500.000	87.44000	480920.00
0320	8801000000-E	MSE RETAIN W	SF	5450.000	87.44000	476548.00
						1,082,838.00

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: Committed
DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 1,082,8

DBE SUBCONTRACTOR: 8003 HUNTING CREEK CONSTRUCTION INC
Will Use Quote: Yes

0001	0000100000-N	MOBILIZATION	LS	1.000	2300.00000	2300.00
0358	8524000000-E	**" CHAIN LI	LF	2204.190	109.00000	240256.71
						242,556.71

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: Committed
DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 242,556

DBE SUBCONTRACTOR: 5659 SOUTHERN CONCRETE & CONSTRUCTION INC
Will Use Quote: Yes

0001	0000100000-N	MOBILIZATION	LS	1.000	9812.00000	9812.00
0359	8531000000-E	4" SLOPE PRO	SY	12556.000	63.00000	791028.00

LINE NO.	ITEM NO.	ITEM DESC.	UNIT TYPE	SUBCONTRACTOR QUANTITY	SUBCONTRACTOR UNIT PRICE	EXTENDED AMOUNT
		DBE COMMITMENT TOTAL FOR SUBCONTRACTOR:				800,840.00 Committed
		DBE COMMITMENT TOTAL FOR VENDOR (SubContractor)				800,840
DBE SUBCONTRACTOR: 3145 WATTS BARRIER WALLS Will Use Quote: Yes						
0357	8503000000-E	CONCRETE BAR	LF	5368.350	49.75000	267075.41
		DBE COMMITMENT TOTAL FOR SUBCONTRACTOR:				267,075.41 Committed
		DBE COMMITMENT TOTAL FOR VENDOR (SubContractor)				267,075

TOTAL DBE COMMITMENT FOR VENDOR: Entered: 11.65% or 9283548.82
Required: 11.00% or 8765151.86
<GOAL MET>

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
			ROADWAY ITEMS			
0001	0000100000-N	800	MOBILIZATION	Lump Sum LS	4,000,000.00	4,000,000.00
0002	0000400000-N	801	CONSTRUCTION SURVEYING	Lump Sum LS	278,100.00	278,100.00
0003	0000700000-N	SP	FIELD OFFICE	Lump Sum LS	40,000.00	40,000.00
0004	0001000000-E	200	CLEARING & GRUBBING .. ACRE(S)	Lump Sum LS	6,620,000.00	6,620,000.00
0005	0008000000-E	200	SUPPLEMENTARY CLEARING & GRUBBING	5 ACR	7,000.00	35,000.00
0006	0015000000-N	205	SEALING ABANDONED WELLS	12 EA	1,000.00	12,000.00
0007	0022000000-E	225	UNCLASSIFIED EXCAVATION	63,600 CY	10.00	636,000.00
0008	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (144+41.79 -L- LT)	Lump Sum LS	23,200.00	23,200.00
0009	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (145+67.97 -L- RT)	Lump Sum LS	23,200.00	23,200.00
0010	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (265+00.00 -L- LT)	Lump Sum LS	16,600.00	16,600.00
0011	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (265+00.00 -L- RT)	Lump Sum LS	22,800.00	22,800.00
0012	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (281+51.83 -L- LT)	Lump Sum LS	11,500.00	11,500.00
0013	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (281+51.83 -L- RT)	Lump Sum LS	10,800.00	10,800.00
0014	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (31+63.68 -Y7-)	Lump Sum LS	8,700.00	8,700.00
0015	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (48+79 -Y8-)	Lump Sum LS	9,100.00	9,100.00
0016	0036000000-E	225	UNDERCUT EXCAVATION	16,400 CY	4.00	65,600.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0017	0084000000-E	SP	WICK DRAINS	863,000 LF	0.35	302,050.00
0018	0106000000-E	230	BORROW EXCAVATION	2,723,900 CY	4.88	13,292,632.00
0019	0127000000-N	SP	EMBANKMENT SETTLEMENT GAUGES	15 EA	750.00	11,250.00
0020	0134000000-E	240	DRAINAGE DITCH EXCAVATION	22,600 CY	4.00	90,400.00
0021	0156000000-E	250	REMOVAL OF EXISTING ASPHALT PAVEMENT	8,000 SY	3.00	24,000.00
0022	0177000000-E	250	BREAKING OF EXISTING ASPHALT PAVEMENT	2,000 SY	3.00	6,000.00
0023	0192000000-N	260	PROOF ROLLING	60 HR	180.00	10,800.00
0024	0194000000-E	SP	SELECT GRANULAR MATERIAL, CLASS III	70,500 CY	4.88	344,040.00
0025	0195000000-E	265	SELECT GRANULAR MATERIAL	87,400 CY	4.88	426,512.00
0026	0196000000-E	270	GEOTEXTILE FOR SOIL STABILIZA-TION	130,000 SY	1.32	171,600.00
0027	0199000000-E	SP	TEMPORARY SHORING	250 SF	25.00	6,250.00
0028	0241000000-E	SP	GENERIC GRADING ITEM GEOTEXTILE FOR EMBANKMENT STABILIZATION 1	67,800 SY	13.50	915,300.00
0029	0241000000-E	SP	GENERIC GRADING ITEM GEOTEXTILE FOR EMBANKMENT STABILIZATION 2	24,900 SY	10.64	264,936.00
0030	0257000000-E	SP	GENERIC GRADING ITEM HORIZONTAL INCLINOMETER CASING	270 LF	9.00	2,430.00
0031	0262000000-N	SP	GENERIC GRADING ITEM VW PIEZOMETER	12 EA	1,700.00	20,400.00
0032	0318000000-E	300	FOUNDATION CONDITIONING MATE-RIAL, MINOR STRUCTURES	3,530 TON	37.00	130,610.00
0033	0320000000-E	300	FOUNDATION CONDITIONING GEO-TEXTILE	7,950 SY	2.25	17,887.50
0034	0342000000-E	310	**" SIDE DRAIN PIPE (30")	48 LF	45.50	2,184.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0035	0342000000-E	310	**" SIDE DRAIN PIPE (36")	224 LF	57.50	12,880.00
0036	0343000000-E	310	15" SIDE DRAIN PIPE	24 LF	22.00	528.00
0037	0344000000-E	310	18" SIDE DRAIN PIPE	2,256 LF	26.00	58,656.00
0038	0345000000-E	310	24" SIDE DRAIN PIPE	220 LF	34.00	7,480.00
0039	0348000000-E	310	**" SIDE DRAIN PIPE ELBOWS (18")	50 EA	350.00	17,500.00
0040	0354000000-E	310	***" RC PIPE CULVERTS, CLASS ***** (30", V)	292 LF	57.50	16,790.00
0041	0354000000-E	310	***" RC PIPE CULVERTS, CLASS ***** (36", V)	344 LF	73.50	25,284.00
0042	0372000000-E	310	18" RC PIPE CULVERTS, CLASS III	2,364 LF	26.00	61,464.00
0043	0378000000-E	310	24" RC PIPE CULVERTS, CLASS III	48 LF	34.00	1,632.00
0044	0384000000-E	310	30" RC PIPE CULVERTS, CLASS III	772 LF	46.00	35,512.00
0045	0390000000-E	310	36" RC PIPE CULVERTS, CLASS III	4,488 LF	58.00	260,304.00
0046	0396000000-E	310	42" RC PIPE CULVERTS, CLASS III	792 LF	71.00	56,232.00
0047	0402000000-E	310	48" RC PIPE CULVERTS, CLASS III	732 LF	88.00	64,416.00
0048	0408000000-E	310	54" RC PIPE CULVERTS, CLASS III	464 LF	147.00	68,208.00
0049	0448000000-E	310	****" RC PIPE CULVERTS, CLASS IV (48")	708 LF	96.00	67,968.00
0050	0448200000-E	310	15" RC PIPE CULVERTS, CLASS IV	728 LF	24.00	17,472.00
0051	0448300000-E	310	18" RC PIPE CULVERTS, CLASS IV	4,552 LF	27.50	125,180.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0052	0448400000-E	310	24" RC PIPE CULVERTS, CLASS IV	784 LF	37.50	29,400.00
0053	0448500000-E	310	30" RC PIPE CULVERTS, CLASS IV	600 LF	50.00	30,000.00
0054	0448600000-E	310	36" RC PIPE CULVERTS, CLASS IV	1,412 LF	63.00	88,956.00
0055	0448700000-E	310	42" RC PIPE CULVERTS, CLASS IV	172 LF	77.00	13,244.00
0056	0453000000-E	310	**" PIPE END SECTION (18")	4 EA	700.00	2,800.00
0057	0546000000-E	310	**" CAA PIPE CULVERTS, *****" THICK (18", 0.064")	784 LF	33.00	25,872.00
0058	0546000000-E	310	**" CAA PIPE CULVERTS, *****" THICK (84", 0.105")	192 LF	335.00	64,320.00
0059	0564000000-E	310	**" CAA PIPE ELBOWS, *****" THICK (18", 0.064")	14 EA	270.00	3,780.00
0060	0995000000-E	340	PIPE REMOVAL	2,536 LF	10.00	25,360.00
0061	1000000000-E	462	6" SLOPE PROTECTION	350 SY	100.00	35,000.00
0062	1011000000-N	500	FINE GRADING	Lump Sum LS	350,000.00	350,000.00
0063	1099500000-E	505	SHALLOW UNDERCUT	1,000 CY	3.00	3,000.00
0064	1099700000-E	505	CLASS IV SUBGRADE STABILIZA-TION	1,900 TON	29.00	55,100.00
0065	1111000000-E	SP	CLASS IV AGGREGATE STABILIZA-TION	18,750 TON	29.00	543,750.00
0066	1121000000-E	520	AGGREGATE BASE COURSE	193,000 TON	29.00	5,597,000.00
0067	1220000000-E	545	INCIDENTAL STONE BASE	5,000 TON	29.00	145,000.00
0068	1275000000-E	600	PRIME COAT	4,879 GAL	4.50	21,955.50
0069	1330000000-E	607	INCIDENTAL MILLING	1,000 SY	15.00	15,000.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0070	1489000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0B	13,300 TON	45.50	605,150.00
0071	1491000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0C	51,400 TON	42.50	2,184,500.00
0072	1498000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0B	7,900 TON	45.00	355,500.00
0073	1503000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C	38,000 TON	42.25	1,605,500.00
0074	1519000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5B	15,700 TON	50.50	792,850.00
0075	1523000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5C	37,100 TON	44.00	1,632,400.00
0076	1575000000-E	620	ASPHALT BINDER FOR PLANT MIX	8,205 TON	550.00	4,512,750.00
0077	1693000000-E	654	ASPHALT PLANT MIX, PAVEMENT REPAIR	1,090 TON	75.00	81,750.00
0078	1840000000-E	665	MILLED RUMBLE STRIPS (ASPHALT CONCRETE)	93,100 LF	0.08	7,448.00
0079	2022000000-E	815	SUBDRAIN EXCAVATION	2,500 CY	25.00	62,500.00
0080	2026000000-E	815	GEOTEXTILE FOR SUBSURFACE DRAINS	7,400 SY	3.50	25,900.00
0081	2036000000-E	815	SUBDRAIN COARSE AGGREGATE	1,250 CY	55.00	68,750.00
0082	2044000000-E	815	6" PERFORATED SUBDRAIN PIPE	7,400 LF	15.00	111,000.00
0083	2070000000-N	815	SUBDRAIN PIPE OUTLET	15 EA	350.00	5,250.00
0084	2077000000-E	815	6" OUTLET PIPE	90 LF	40.00	3,600.00
0085	2199000000-E	SP	SANDBAG HEADWALLS	355 SF	15.00	5,325.00
0086	2209000000-E	838	ENDWALLS	57.2 CY	740.00	42,328.00
0087	2220000000-E	838	REINFORCED ENDWALLS	10.4 CY	800.00	8,320.00
0088	2253000000-E	840	PIPE COLLARS	1 CY	1,000.00	1,000.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0089	2264000000-E	840	PIPE PLUGS	1 CY	1,000.00	1,000.00
0090	2275000000-E	SP	FLOWABLE FILL	12 CY	225.00	2,700.00
0091	2286000000-N	840	MASONRY DRAINAGE STRUCTURES	148 EA	1,050.00	155,400.00
0092	2308000000-E	840	MASONRY DRAINAGE STRUCTURES	36 LF	200.00	7,200.00
0093	2354000000-N	840	FRAME WITH GRATE, STD 840.22	7 EA	325.00	2,275.00
0094	2364000000-N	840	FRAME WITH TWO GRATES, STD 840.16	18 EA	485.00	8,730.00
0095	2364200000-N	840	FRAME WITH TWO GRATES, STD 840.20	34 EA	455.00	15,470.00
0096	2365000000-N	840	FRAME WITH TWO GRATES, STD 840.22	49 EA	435.00	21,315.00
0097	2367000000-N	840	FRAME WITH TWO GRATES, STD 840.29	24 EA	445.00	10,680.00
0098	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (E)	3 EA	540.00	1,620.00
0099	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (F)	3 EA	540.00	1,620.00
0100	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (G)	11 EA	540.00	5,940.00
0101	2396000000-N	840	FRAME WITH COVER, STD 840.54	2 EA	350.00	700.00
0102	2407000000-N	840	STEEL FRAME WITH TWO GRATES, STD 840.37	3 EA	1,300.00	3,900.00
0103	2440000000-N	852	CONCRETE TRANSITIONAL SECTION FOR CATCH BASIN	2 EA	485.00	970.00
0104	2451000000-N	852	CONCRETE TRANSITIONAL SECTION FOR DROP INLET	18 EA	485.00	8,730.00
0105	2549000000-E	846	2'-6" CONCRETE CURB & GUTTER	2,400 LF	14.00	33,600.00
0106	2556000000-E	846	SHOULDER BERM GUTTER	14,900 LF	14.00	208,600.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0107	2647000000-E	852	5" MONOLITHIC CONCRETE ISLANDS (SURFACE MOUNTED)	3,010 SY	38.50	115,885.00
0108	2724000000-E	857	PRECAST REINFORCED CONCRETE BARRIER, SINGLE FACED	128 LF	105.00	13,440.00
0109	2830000000-N	858	ADJUSTMENT OF MANHOLES	8 EA	450.00	3,600.00
0110	3000000000-N	SP	IMPACT ATTENUATOR UNIT, TYPE 350	3 EA	8,300.00	24,900.00
0111	3030000000-E	862	STEEL BM GUARDRAIL	18,500 LF	15.00	277,500.00
0112	3045000000-E	862	STEEL BM GUARDRAIL, SHOP CURVED	525 LF	16.00	8,400.00
0113	3105000000-N	862	STEEL BM GUARDRAIL TERMINAL SECTIONS	2 EA	100.00	200.00
0114	3150000000-N	862	ADDITIONAL GUARDRAIL POSTS	10 EA	45.00	450.00
0115	3195000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE AT-1	5 EA	400.00	2,000.00
0116	3210000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE CAT-1	13 EA	450.00	5,850.00
0117	3270000000-N	SP	GUARDRAIL ANCHOR UNITS, TYPE 350	20 EA	1,900.00	38,000.00
0118	3285000000-N	SP	GUARDRAIL ANCHOR UNITS, TYPE M-350	6 EA	1,700.00	10,200.00
0119	3317000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE B-77	34 EA	1,450.00	49,300.00
0120	3360000000-E	863	REMOVE EXISTING GUARDRAIL	525 LF	1.00	525.00
0121	3380000000-E	862	TEMPORARY STEEL BM GUARDRAIL	250 LF	10.00	2,500.00
0122	3389100000-N	SP	TEMPORARY GUARDRAIL ANCHOR UNITS, TYPE 350	4 EA	1,200.00	4,800.00
0123	3389200000-E	865	CABLE GUIDERAIL	22,500 LF	7.00	157,500.00
0124	3389500000-N	865	ADDITIONAL GUIDERAIL POSTS	10 EA	55.00	550.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0125	3389600000-N	865	CABLE GUIDERAIL ANCHOR UNITS	26 EA	1,500.00	39,000.00
0126	3503000000-E	866	WOVEN WIRE FENCE, 47" FABRIC	50,900 LF	2.25	114,525.00
0127	3509000000-E	866	4" TIMBER FENCE POSTS, 7'-6" LONG	3,320 EA	14.00	46,480.00
0128	3515000000-E	866	5" TIMBER FENCE POSTS, 8'-0" LONG	610 EA	25.00	15,250.00
0129	3536000000-E	866	CHAIN LINK FENCE, 48" FABRIC	2,700 LF	4.00	10,800.00
0130	3542000000-E	866	METAL LINE POSTS FOR 48" CHAIN LINK FENCE	230 EA	20.00	4,600.00
0131	3548000000-E	866	METAL TERMINAL POSTS FOR 48" CHAIN LINK FENCE	20 EA	45.00	900.00
0132	3557000000-E	866	ADDITIONAL BARBED WIRE	500 LF	1.00	500.00
0133	3564000000-E	866	SINGLE GATES, **' HIGH, **' WIDE, **' OPENING (47", 20', 20')	9 EA	600.00	5,400.00
0134	3572000000-E	867	CHAIN LINK FENCE RESET	1,600 LF	10.00	16,000.00
0135	3574000000-E	867	GENERIC FENCING ITEM 40" WOOD RAIL FENCE RESET	100 LF	25.00	2,500.00
0136	3628000000-E	876	RIP RAP, CLASS I	320 TON	61.40	19,648.00
0137	3649000000-E	876	RIP RAP, CLASS B	1,000 TON	61.00	61,000.00
0138	3656000000-E	876	GEOTEXTILE FOR DRAINAGE	7,975 SY	2.14	17,066.50
0139	3659000000-N	SP	PREFORMED SCOUR HOLES WITH LEVEL SPREADER APRON	5 EA	3,500.00	17,500.00
0140	4048000000-E	902	REINFORCED CONCRETE SIGN FOUNDATIONS	70 CY	950.00	66,500.00
0141	4054000000-E	902	PLAIN CONCRETE SIGN FOUNDATIONS	2 CY	450.00	900.00
0142	4057000000-E	SP	OVERHEAD FOOTING	30 CY	1,200.00	36,000.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0143	4060000000-E	903	SUPPORTS, BREAKAWAY STEEL BEAM	32,150 LB	3.20	102,880.00
0144	4066000000-E	903	SUPPORTS, SIMPLE STEEL BEAM	13,868 LB	2.20	30,509.60
0145	4072000000-E	903	SUPPORTS, 3-LB STEEL U-CHANNEL	3,592 LF	4.10	14,727.20
0146	4078000000-E	903	SUPPORTS, 2-LB STEEL U-CHANNEL	40 EA	34.80	1,392.00
0147	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ****** (19+00 -Y5- EBL)	Lump Sum LS	54,063.25	54,063.25
0148	4082100000-N	SP	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ****** (37+30 -Y5- WBL)	Lump Sum LS	67,939.75	67,939.75
0149	4096000000-N	904	SIGN ERECTION, TYPE D	13 EA	65.00	845.00
0150	4102000000-N	904	SIGN ERECTION, TYPE E	90 EA	55.00	4,950.00
0151	4108000000-N	904	SIGN ERECTION, TYPE F	32 EA	75.00	2,400.00
0152	4109000000-N	904	SIGN ERECTION, TYPE *** (OVERHEAD) (A)	8 EA	575.00	4,600.00
0153	4110000000-N	904	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (A)	25 EA	475.00	11,875.00
0154	4110000000-N	904	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (B)	19 EA	375.00	7,125.00
0155	4114000000-N	904	SIGN ERECTION, MILEMARKERS	40 EA	55.00	2,200.00
0156	4115000000-N	904	SIGN ERECTION, OVERLAY (OVERHEAD)	3 EA	675.00	2,025.00
0157	4116000000-N	904	SIGN ERECTION, OVERLAY (GROUND MOUNTED)	4 EA	675.00	2,700.00
0158	4116100000-N	904	SIGN ERECTION, RELOCATE, TYPE **** (GROUND MOUNTED) (A)	1 EA	475.00	475.00
0159	4116100000-N	904	SIGN ERECTION, RELOCATE, TYPE **** (GROUND MOUNTED) (B)	5 EA	475.00	2,375.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0160	4116200000-N	904	SIGN ERECTION, REPOSITION OVERHEAD	4 EA	4,240.00	16,960.00
0161	4138000000-N	907	DISPOSAL OF SUPPORT, STEEL BEAM	2 EA	150.00	300.00
0162	4152000000-N	907	DISPOSAL OF SIGN SYSTEM, STEEL BEAM	7 EA	150.00	1,050.00
0163	4155000000-N	907	DISPOSAL OF SIGN SYSTEM, U-CHANNEL	24 EA	1.00	24.00
0164	4234000000-N	907	DISPOSAL OF SIGN, A OR B (OVERHEAD)	4 EA	175.00	700.00
0165	4236000000-N	907	DISPOSAL OF SIGN, A, B OR C (GROUND MOUNTED)	2 EA	100.00	200.00
0166	4238000000-N	907	DISPOSAL OF SIGN, D, E OR F	1 EA	1.00	1.00
0167	4400000000-E	1110	WORK ZONE SIGNS (STATIONARY)	682 SF	4.99	3,403.18
0168	4405000000-E	1110	WORK ZONE SIGNS (PORTABLE)	412 SF	22.50	9,270.00
0169	4410000000-E	1110	WORK ZONE SIGNS (BARRICADE MOUNTED)	365 SF	9.35	3,412.75
0170	4420000000-N	1120	PORTABLE CHANGEABLE MESSAGE SIGN	2 EA	5,000.00	10,000.00
0171	4430000000-N	1130	DRUMS	350 EA	40.00	14,000.00
0172	4435000000-N	1135	CONES	100 EA	18.00	1,800.00
0173	4445000000-E	1145	BARRICADES (TYPE III)	408 LF	36.00	14,688.00
0174	4455000000-N	1150	FLAGGER	376 DAY	170.00	63,920.00
0175	4465000000-N	1160	TEMPORARY CRASH CUSHIONS	2 EA	6,000.00	12,000.00
0176	4480000000-N	1165	TMA	2 EA	3,000.00	6,000.00
0177	4485000000-E	1170	PORTABLE CONCRETE BARRIER	390 LF	27.90	10,881.00
0178	4516000000-N	1180	SKINNY DRUM	100 EA	36.00	3,600.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0179	4650000000-N	1251	TEMPORARY RAISED PAVEMENT MARKERS	203 EA	5.00	1,015.00
0180	4685000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (4", 90 MILS)	27,589 LF	0.60	16,553.40
0181	4686000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (4", 120 MILS)	31,369 LF	0.68	21,330.92
0182	4695000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (8", 90 MILS)	1,150 LF	2.90	3,335.00
0183	4710000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (24", 120 MILS)	330 LF	6.00	1,980.00
0184	4725000000-E	1205	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)	58 EA	115.00	6,670.00
0185	4810000000-E	1205	PAINT PAVEMENT MARKING LINES (4")	181,911 LF	0.14	25,467.54
0186	4835000000-E	1205	PAINT PAVEMENT MARKING LINES (24")	130 LF	2.00	260.00
0187	4847000000-E	1205	POLYUREA PAVEMENT MARKING LINES (4", **********) (HIGHLY REFLECTIVE ELEMENTS)	4,051 LF	0.80	3,240.80
0188	4847100000-E	1205	POLYUREA PAVEMENT MARKING LINES (6", **********) (HIGHLY REFLECTIVE ELEMENTS)	130,847 LF	0.95	124,304.65
0189	4847120000-E	1205	POLYUREA PAVEMENT MARKING LINES (12", **********) (HIGHLY REFLECTIVE ELEMENTS)	3,492 LF	2.75	9,603.00
0190	4850000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (4")	7,100 LF	0.70	4,970.00
0191	4900000000-N	1251	PERMANENT RAISED PAVEMENT MARKERS	232 EA	5.75	1,334.00
0192	4905000000-N	1253	SNOWPLOWABLE PAVEMENT MARKERS	1,067 EA	25.00	26,675.00
0193	5325600000-E	1510	6" WATER LINE	182 LF	50.00	9,100.00
0194	5326200000-E	1510	12" WATER LINE	6,149 LF	72.50	445,802.50
0195	5328000000-E	1510	30" WATER LINE	2,104 LF	275.00	578,600.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0196	5540000000-E	1515	6" VALVE	4 EA	1,000.00	4,000.00
0197	5558000000-E	1515	12" VALVE	11 EA	2,300.00	25,300.00
0198	5560000000-E	1515	30" VALVE	6 EA	27,500.00	165,000.00
0199	5589100000-E	1515	1" AIR RELEASE VALVE	1 EA	7,000.00	7,000.00
0200	5648000000-N	1515	RELOCATE WATER METER	16 EA	550.00	8,800.00
0201	5666000000-E	1515	FIRE HYDRANT	1 EA	3,750.00	3,750.00
0202	5672000000-N	1515	RELOCATE FIRE HYDRANT	8 EA	3,750.00	30,000.00
0203	5691300000-E	1520	8" SANITARY GRAVITY SEWER	115 LF	100.00	11,500.00
0204	5691400000-E	1520	10" SANITARY GRAVITY SEWER	631 LF	190.00	119,890.00
0205	5709400000-E	1520	8" FORCE MAIN SEWER	395 LF	150.00	59,250.00
0206	5709600000-E	1520	12" FORCE MAIN SEWER	476 LF	245.00	116,620.00
0207	5768000000-N	1520	SANITARY SEWER CLEAN-OUT	1 EA	1,500.00	1,500.00
0208	5775000000-E	1525	4' DIA UTILITY MANHOLE	3 EA	4,000.00	12,000.00
0209	5776000000-E	1525	5' DIA UTILITY MANHOLE	6 EA	6,000.00	36,000.00
0210	5781000000-E	1525	UTILITY MANHOLE WALL, 4' DIA	2 LF	125.00	250.00
0211	5782000000-E	1525	UTILITY MANHOLE WALL, 5' DIA	54 LF	150.00	8,100.00
0212	5801000000-E	1530	ABANDON 8" UTILITY PIPE	348 LF	10.00	3,480.00
0213	5802000000-E	1530	ABANDON 10" UTILITY PIPE	761 LF	10.00	7,610.00
0214	5804000000-E	1530	ABANDON 12" UTILITY PIPE	5,720 LF	7.50	42,900.00
0215	5814000000-E	1530	ABANDON 30" UTILITY PIPE	1,817 LF	26.00	47,242.00
0216	5835000000-E	1540	**" ENCASEMENT PIPE (42")	550 LF	325.00	178,750.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0217	5836000000-E	1540	24" ENCASEMENT PIPE	700 LF	110.00	77,000.00
0218	5882000000-N	SP	GENERIC UTILITY ITEM CONNECTION DETAIL NO 2	6 EA	56,500.00	339,000.00
0219	5882000000-N	SP	GENERIC UTILITY ITEM CONNECTION DETAIL NO 4	14 EA	4,750.00	66,500.00
0220	5888000000-E	SP	GENERIC UTILITY ITEM 42" DUMMY ENCASEMENT PIPE	550 LF	260.00	143,000.00
0221	5888000000-E	SP	GENERIC UTILITY ITEM 54" DUMMY ENCASEMENT PIPE	280 LF	390.00	109,200.00
0222	5912000000-N	SP	GENERIC UTILITY ITEM 4" WATER METER ASSEMBLY	Lump Sum LS	20,000.00	20,000.00
0223	5912000000-N	SP	GENERIC UTILITY ITEM REMOVE EXISTING 4" WATER METER ASSEMBLY	Lump Sum LS	5,500.00	5,500.00
0224	6000000000-E	1605	TEMPORARY SILT FENCE	125,000 LF	1.45	181,250.00
0225	6006000000-E	1610	STONE FOR EROSION CONTROL, CLASS A	3,025 TON	61.40	185,735.00
0226	6009000000-E	1610	STONE FOR EROSION CONTROL, CLASS B	6,000 TON	61.40	368,400.00
0227	6012000000-E	1610	SEDIMENT CONTROL STONE	6,000 TON	56.30	337,800.00
0228	6015000000-E	1615	TEMPORARY MULCHING	300 ACR	400.00	120,000.00
0229	6018000000-E	1620	SEED FOR TEMPORARY SEEDING	7,850 LB	6.00	47,100.00
0230	6021000000-E	1620	FERTILIZER FOR TEMPORARY SEEDING	32 TON	800.00	25,600.00
0231	6024000000-E	1622	TEMPORARY SLOPE DRAINS	30,000 LF	4.00	120,000.00
0232	6029000000-E	SP	SAFETY FENCE	15,600 LF	1.00	15,600.00
0233	6030000000-E	1630	SILT EXCAVATION	100,000 CY	3.00	300,000.00
0234	6036000000-E	1631	MATTING FOR EROSION CONTROL	100,000 SY	0.80	80,000.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0235	6037000000-E	SP	COIR FIBER MAT	2,600 SY	2.50	6,500.00
0236	6038000000-E	SP	PERMANENT SOIL REINFORCEMENT MAT	2,350 SY	4.00	9,400.00
0237	6042000000-E	1632	1/4" HARDWARE CLOTH	9,550 LF	3.50	33,425.00
0238	6043000000-E	SP	LOW PERMEABILITY GEOTEXTILE	950 SY	2.00	1,900.00
0239	6045000000-E	SP	**" TEMPORARY PIPE (24")	100 LF	50.00	5,000.00
0240	6046000000-E	1636	TEMPORARY PIPE FOR STREAM CROSSING	50 LF	50.00	2,500.00
0241	6048000000-E	SP	FLOATING TURBIDITY CURTAIN	25 SY	50.00	1,250.00
0242	6069000000-E	1638	STILLING BASINS	400 CY	35.00	14,000.00
0243	6070000000-N	1639	SPECIAL STILLING BASINS	6 EA	150.00	900.00
0244	6071012000-E	SP	COIR FIBER WATTLE	4,000 LF	5.00	20,000.00
0245	6071020000-E	SP	POLYACRYLAMIDE (PAM)	925 LB	6.00	5,550.00
0246	6071030000-E	1640	COIR FIBER BAFFLE	8,000 LF	3.50	28,000.00
0247	6071050000-E	SP	**" SKIMMER (1-1/2")	29 EA	650.00	18,850.00
0248	6071050000-E	SP	**" SKIMMER (2")	4 EA	1,000.00	4,000.00
0249	6071050000-E	SP	**" SKIMMER (3")	1 EA	1,200.00	1,200.00
0250	6084000000-E	1660	SEEDING & MULCHING	300 ACR	1,600.00	480,000.00
0251	6087000000-E	1660	MOWING	120 ACR	100.00	12,000.00
0252	6090000000-E	1661	SEED FOR REPAIR SEEDING	3,600 LB	8.00	28,800.00
0253	6093000000-E	1661	FERTILIZER FOR REPAIR SEEDING	19.25 TON	800.00	15,400.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0254	6096000000-E	1662	SEED FOR SUPPLEMENTAL SEEDING	9,525 LB	4.00	38,100.00
0255	6108000000-E	1665	FERTILIZER TOPDRESSING	285.5 TON	600.00	171,300.00
0256	6111000000-E	SP	IMPERVIOUS DIKE	255 LF	100.00	25,500.00
0257	6114500000-N	1667	SPECIALIZED HAND MOWING	225 MHR	50.00	11,250.00
0258	6117000000-N	SP	RESPONSE FOR EROSION CONTROL	150 EA	1.00	150.00
0259	6123000000-E	1670	REFORESTATION	5 ACR	1,000.00	5,000.00
0260	6126000000-E	SP	STREAMBANK REFORESTATION	0.14 ACR	10,000.00	1,400.00
0261	6135000000-E	SP	GENERIC EROSION CONTROL ITEM COMPOST BLANKET	20 ACR	4,800.00	96,000.00
0262	7060000000-E	1705	SIGNAL CABLE	1,275 LF	1.50	1,912.50
0263	7120000000-E	1705	VEHICLE SIGNAL HEAD (12", 3 SECTION)	8 EA	700.00	5,600.00
0264	7132000000-E	1705	VEHICLE SIGNAL HEAD (12", 4 SECTION)	2 EA	825.00	1,650.00
0265	7252000000-E	1710	MESSENGER CABLE (1/4")	390 LF	1.85	721.50
0266	7279000000-E	1715	TRACER WIRE	1,450 LF	0.55	797.50
0267	7300000000-E	1715	UNPAVED TRENCHING (**********) (1, 2")	1,040 LF	7.00	7,280.00
0268	7300000000-E	1715	UNPAVED TRENCHING (**********) (2, 2")	160 LF	9.00	1,440.00
0269	7300000000-E	1715	UNPAVED TRENCHING (**********) (2,1-1/2")	1,815 LF	8.75	15,881.25
0270	7301000000-E	1715	DIRECTIONAL DRILL (**********) (1, 2")	450 LF	16.00	7,200.00
0271	7301000000-E	1715	DIRECTIONAL DRILL (**********) (2, 1-1/2")	1,585 LF	19.00	30,115.00
0272	7301000000-E	1715	DIRECTIONAL DRILL (**********) (2, 2")	180 LF	18.75	3,375.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0273	7324000000-N	1716	JUNCTION BOX (STANDARD SIZE)	32 EA	400.00	12,800.00
0274	7348000000-N	1716	JUNCTION BOX (OVER-SIZED, HEA-VY DUTY)	5 EA	600.00	3,000.00
0275	7360000000-N	1720	WOOD POLE	7 EA	1,000.00	7,000.00
0276	7372000000-N	1721	GUY ASSEMBLY	2 EA	420.00	840.00
0277	7384000000-E	1722	***" RISER WITH ********** (1-1/2", WEATHERHEAD)	5 EA	525.00	2,625.00
0278	7444000000-E	1725	INDUCTIVE LOOP SAWCUT	895 LF	7.25	6,488.75
0279	7456000000-E	1726	LEAD-IN CABLE (**********) (14-2)	1,525 LF	1.10	1,677.50
0280	7485000000-N	SP	WIRELESS MAGNETIC SENSOR VEHI-CLE DETECTOR SYSTEM	1 EA	13,500.00	13,500.00
0281	7516000000-E	1730	COMMUNICATIONS CABLE (**FIBER) (12)	1,550 LF	1.30	2,015.00
0282	7552000000-N	1731	INTERCONNECT CENTER	2 EA	1,340.00	2,680.00
0283	7564000000-N	1732	FIBER-OPTIC TRANSCEIVER, DROP & REPEAT	2 EA	2,000.00	4,000.00
0284	7566000000-N	1733	DELINEATOR MARKER	5 EA	89.00	445.00
0285	7588000000-N	SP	METAL POLE WITH SINGLE MAST ARM	1 EA	12,000.00	12,000.00
0286	7590000000-N	SP	METAL POLE WITH DUAL MAST ARM	1 EA	18,500.00	18,500.00
0287	7613000000-N	SP	SOIL TEST	2 EA	1,250.00	2,500.00
0288	7614100000-E	SP	DRILLED PIER FOUNDATION	16 CY	700.00	11,200.00
0289	7631000000-N	SP	MAST ARM WITH METAL POLE DE-SIGN	2 EA	52.50	105.00
0290	7684000000-N	1750	SIGNAL CABINET FOUNDATION	1 EA	800.00	800.00
0291	7756000000-N	1751	CONTROLLER WITH CABINET (TYPE 2070L, BASE MOUNTED)	1 EA	14,500.00	14,500.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0292	7780000000-N	1751	DETECTOR CARD (TYPE 2070L)	5 EA	160.00	800.00
0293	7901000000-N	1753	CABINET BASE EXTENDER	1 EA	450.00	450.00
0294	7980000000-N	SP	GENERIC SIGNAL ITEM 5/8" X 10' GROUNDING ELECTRODE	60 EA	90.00	5,400.00
0295	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV CAMERA ASSEMBLY	8 EA	4,600.00	36,800.00
0296	7980000000-N	SP	GENERIC SIGNAL ITEM CCTV WOOD POLE	7 EA	1,950.00	13,650.00
0297	7980000000-N	SP	GENERIC SIGNAL ITEM CENTRAL MEDIA CONVERTER	6 EA	410.00	2,460.00
0298	7980000000-N	SP	GENERIC SIGNAL ITEM DMS	6 EA	73,500.00	441,000.00
0299	7980000000-N	SP	GENERIC SIGNAL ITEM DMS ACCESS LADDER	5 EA	5,375.00	26,875.00
0300	7980000000-N	SP	GENERIC SIGNAL ITEM DMS PEDESTAL STRUCTURE (TYPE A)	4 EA	45,700.00	182,800.00
0301	7980000000-N	SP	GENERIC SIGNAL ITEM DMS PEDESTAL STRUCTURE (TYPE B)	1 EA	54,500.00	54,500.00
0302	7980000000-N	SP	GENERIC SIGNAL ITEM EQUIPMENT CABINET DISCONNECT	12 EA	200.00	2,400.00
0303	7980000000-N	SP	GENERIC SIGNAL ITEM FIELD EQUIPMENT CABINET	8 EA	4,200.00	33,600.00
0304	7980000000-N	SP	GENERIC SIGNAL ITEM METER BASE/DISCONNECT COMBINA-TION PANEL	9 EA	700.00	6,300.00
0305	7980000000-N	SP	GENERIC SIGNAL ITEM SOLAR POWER ASSEMBLY	1 EA	13,500.00	13,500.00
0306	7980000000-N	SP	GENERIC SIGNAL ITEM VIDEO ETHERNET DECODER	4 EA	825.00	3,300.00
0307	7980000000-N	SP	GENERIC SIGNAL ITEM VIDEO ETHERNET ENCODER	8 EA	800.00	6,400.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0308	7980000000-N	SP	GENERIC SIGNAL ITEM WOOD PEDESTAL	4 EA	150.00	600.00
0309	7985000000-N	SP	GENERIC SIGNAL ITEM INTEGRATION AND CONFIGURATION	Lump Sum LS	5,100.00	5,100.00
0310	7990000000-E	SP	GENERIC SIGNAL ITEM #4 SOLID BARE GROUNDING CON-DUCTOR	520 LF	1.75	910.00
0311	7990000000-E	SP	GENERIC SIGNAL ITEM 3-WIRE COPPER FEEDER CONDUC-TORS	1,895 LF	1.75	3,316.25
0312	7990000000-E	SP	GENERIC SIGNAL ITEM 3-WIRE COPPER SERVICE ENTRANCE CONDUCTORS	125 LF	4.00	500.00
0313	7990000000-E	SP	GENERIC SIGNAL ITEM 4-WIRE COPPER FEEDER CONDUC-TORS	1,630 LF	15.00	24,450.00
0314	7992000000-E	SP	GENERIC SIGNAL ITEM ITS OVERHEAD FOOTING	40 CY	725.00	29,000.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0315	8126000000-N	414	CULVERT EXCAVATION, STA ****** (52+09.00-Y7-)	Lump Sum LS	25,000.00	25,000.00
0316	8133000000-E	414	FOUNDATION CONDITIONING MATERIAL, BOX CULVERT	97 TON	50.00	4,850.00
0317	8196000000-E	420	CLASS A CONCRETE (CULVERT)	173.3 CY	650.00	112,645.00
0318	8245000000-E	425	REINFORCING STEEL (CULVERT)	23,796 LB	1.00	23,796.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0319	8801000000-E	SP	MSE RETAINING WALL NO **** (1)	5,500 SF	87.44	480,920.00
0320	8801000000-E	SP	MSE RETAINING WALL NO **** (2)	5,450 SF	87.44	476,548.00

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0321	8017000000-N	SP	CONSTRUCTION, MAINTENANCE, & REMOVAL OF TEMP ACCESS AT STA ********** (265+53.58-L-)	Lump Sum LS	625,000.00	625,000.00
0322	8017000000-N	SP	CONSTRUCTION, MAINTENANCE, & REMOVAL OF TEMP ACCESS AT STA ********** (48+79.00-Y8-)	Lump Sum LS	625,000.00	625,000.00
0323	8084000000-N	410	FOUNDATION EXCAVATION FOR END BENT ** AT STATION ********** (01, 38+50.27-Y7-)	Lump Sum LS	10,000.00	10,000.00
0324	8084000000-N	410	FOUNDATION EXCAVATION FOR END BENT ** AT STATION ********** (02, 38+50.27-Y7-)	Lump Sum LS	10,000.00	10,000.00
0325	8108000000-E	411	**'-**" DIA DRILLED PIERS (6'-0")	2,424 LF	700.00	1,696,800.00
0326	8112730000-N	450	PDA TESTING	7 EA	1,600.00	11,200.00
0327	8113000000-N	411	SID INSPECTIONS	8 EA	1,200.00	9,600.00
0328	8114000000-N	411	SPT TESTING	16 EA	1,500.00	24,000.00
0329	8115000000-N	411	CSL TESTING	4 EA	2,200.00	8,800.00
0330	8147000000-E	420	REINFORCED CONCRETE DECK SLAB	132,228 SF	24.30	3,213,140.40
0331	8161000000-E	420	GROOVING BRIDGE FLOORS	135,259 SF	0.35	47,340.65
0332	8175000000-E	420	CLASS AA CONCRETE (BRIDGE)	705.3 CY	759.00	535,322.70
0333	8182000000-E	420	CLASS A CONCRETE (BRIDGE)	1,985.9 CY	520.00	1,032,668.00
0334	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (147+38.89-L-LT)	Lump Sum LS	41,000.00	41,000.00
0335	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (147+38.89-L-RT)	Lump Sum LS	41,000.00	41,000.00
0336	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (182+99.94-L-)	Lump Sum LS	46,000.00	46,000.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0337	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (265+53.58-L-LT)	Lump Sum LS	41,000.00	41,000.00
0338	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (265+53.58-L-RT)	Lump Sum LS	53,000.00	53,000.00
0339	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (281+51.83-L-LT)	Lump Sum LS	43,000.00	43,000.00
0340	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (281+51.83-L-RT)	Lump Sum LS	40,000.00	40,000.00
0341	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (38+50.27-Y7-)	Lump Sum LS	63,000.00	63,000.00
0342	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (48+79.00-Y8-)	Lump Sum LS	52,000.00	52,000.00
0343	8217000000-E	425	REINFORCING STEEL (BRIDGE)	630,691 LB	0.95	599,156.45
0344	8224000000-E	425	EPOXY COATED REINFORCING STEEL (BRIDGE)	115,573 LB	0.95	109,794.35
0345	8238000000-E	425	SPIRAL COLUMN REINFORCING STEEL (BRIDGE)	114,806 LB	1.50	172,209.00
0347	8265000000-E	430	54" PRESTRESSED CONCRETE GIR-DERS	6,352.55 LF	217.00	1,378,503.35
0348	8274000000-E	430	MODIFIED 63" PRESTRESSED CONC GIRDERS	1,891.37 LF	270.00	510,669.90
0349	8280000000-E	440	APPROX ..... LBS STRUCTURAL STEEL	4,232,116 LS	6,780,000.00	6,780,000.00
0350	8333000000-E	450	16" PRESTRESSED CONCRETE PILES	2,588 LF	66.00	170,808.00
0351	8336000000-E	450	20" PRESTRESSED CONCRETE PILES	3,700 LF	80.00	296,000.00
0352	8350000000-E	450	24" PRESTRESSED CONCRETE PILES	2,260 LF	112.00	253,120.00
0353	8364000000-E	450	HP12X53 STEEL PILES	6,895 LF	53.00	365,435.00

Contract Item Sheets For C203199

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0354	8391000000-N	450	STEEL PILE POINTS	30 EA	70.00	2,100.00
0355	8392500000-E	450	PREDRILLING FOR PILES	200 LF	150.00	30,000.00
0356	8393000000-N	450	PILE REDRIVES	101 EA	400.00	40,400.00
0357	8503000000-E	460	CONCRETE BARRIER RAIL	5,368.35 LF	69.00	370,416.15
0358	8524000000-E	SP	**" CHAIN LINK FENCE (72")	2,204.19 LF	109.00	240,256.71
0359	8531000000-E	462	4" SLOPE PROTECTION	12,556 SY	64.75	813,001.00
0360	8608000000-E	876	RIP RAP CLASS II (2'-0" THICK)	3,159 TON	88.00	277,992.00
0361	8622000000-E	876	GEOTEXTILE FOR DRAINAGE	3,505 SY	3.95	13,844.75
0362	8654000000-N	SP	DISC BEARINGS	Lump Sum LS	75,000.00	75,000.00
0363	8657000000-N	430	ELASTOMERIC BEARINGS	Lump Sum LS	61,000.00	61,000.00
0364	8706000000-N	SP	EXPANSION JOINT SEALS	Lump Sum LS	601,000.00	601,000.00
0365	8727000000-N	SP	ELECTRICAL CONDUIT SYSTEM FOR SIGNALS AT STA********** (147+38.89-L-RT)	Lump Sum LS	67,000.00	67,000.00
0366	8727000000-N	SP	ELECTRICAL CONDUIT SYSTEM FOR SIGNALS AT STA********** (38+50.27-Y7-)	Lump Sum LS	17,200.00	17,200.00
0367	8867000000-E	SP	GENERIC STRUCTURE ITEM 20" COMPOSITE PILE	1,000 LF	134.00	134,000.00

TOTAL AMOUNT OF BID FOR ENTIRE PROJECT **$79,683,198.70**

Contract No. C203199 Rev. 5-19-11

County Brunswick

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

Barnhill Contracting Company
Full name of Corporation

P. O. Box 1529, 2311 N. Main Street, Tarboro, N. C. 27886
Address as Prequalified

Attest _____ By _____
~~Secretary~~/Assistant Secretary
Select appropriate title

~~President~~/Vice ~~President~~/Assistant Vice ~~President~~
Select appropriate title

Helen W. Spain
Print or type Signer's name

Drew M. Johnson, P. E.
Print or type Signer's name

CORPORATE SEAL

AFFIDAVIT MUST BE NOTARIZED

Subscribed and sworn to before me this the

2nd day of February 2014.

NOTARY SEAL

_____
Signature of Notary Public

Judith Sessoms

of Edgecombe County

State of North Carolina

My Commission Expires: 8-9-2015

Contract No. C203199
County Brunswick

Rev. 5-19-11

DEBARMENT CERTIFICATION

Conditions for certification:

1. The prequalified bidder shall provide immediate written notice to the Department if at any time the bidder learns that his certification was erroneous when he submitted his debarment certification or explanation filed with the Department, or has become erroneous because of changed circumstances.

2. The terms *covered transaction, debarred, suspended, ineligible, lower tier covered transaction, participant, person, primary covered transaction, principal, proposal,* and *voluntarily excluded,* as used in this provision, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Order 12549. A copy of the Federal Rules requiring this certification and detailing the definitions and coverages may be obtained from the Contract Officer of the Department.

3. The prequalified bidder agrees by submitting this form, that he will not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in NCDOT contracts, unless authorized by the Department.

4. For Federal Aid projects, the prequalified bidder further agrees that by submitting this form he will include the Federal-Aid Provision titled *Required Contract Provisions Federal-Aid Construction Contract (Form FHWA PR* 1273) provided by the Department, without subsequent modification, in all lower tier covered transactions.

5. The prequalified bidder may rely upon a certification of a participant in a lower tier covered transaction that he is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless he knows that the certification is erroneous. The bidder may decide the method and frequency by which he will determine the eligibility of his subcontractors.

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

7. Except as authorized in paragraph 6 herein, the Department may terminate any contract if the bidder knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available by the Federal Government.

Contract No. C203199 Rev. 5-19-11

County Brunswick

DEBARMENT CERTIFICATION

The prequalified bidder certifies to the best of his knowledge and belief, that he and his principals:

a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

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

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

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

e. Will submit a revised Debarment Certification immediately if his status changes and will show in his bid proposal an explanation for the change in status.

If the prequalified bidder cannot certify that he is not debarred, he shall provide an explanation with this submittal. An explanation will not necessarily result in denial of participation in a contract.

Failure to submit a non-collusion affidavit and debarment certification will result in the prequalified bidder's bid being considered non-responsive.

☐ Check here if an explanation is attached to this certification.

Contract No. **C203199**

County (ies): **Brunswick**

ACCEPTED BY THE
DEPARTMENT OF TRANSPORTATION

Contract Officer

2/19/14
Date

Execution of Contract and Bonds
Approved as to Form:

Asst. Attorney General

Contract No. **C203199**
County **Brunswick**

Rev 2-1-10

106025943

CONTRACT PAYMENT BOND

Date of Payment Bond Execution	2/4/2014
Name of Principal Contractor	**Barnhill Contracting Company**
Name of Surety:	**Travelers Casualty and Surety Company of America**
Name of Contracting Body:	**North Carolina Department of Transportation** **Raleigh, North Carolina**
Amount of Bond:	**Seventy-nine Million Six Hundred Eighty-three Thousand One Hundred Ninety-eight And 70/100THS**
Contract ID No.:	**C203199**
County Name:	**Brunswick**

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. C203199
County Brunswick

Rev 2-1-10

CONTRACT PAYMENT BOND

Affix Seal of Surety Company

Travelers Casualty and Surety Company of America
Print or type Surety Company Name

By **H. Thomas Dawkins**
Print, stamp or type name of Attorney-in-Fact

Signature of Attorney-in-Fact

Signature of Witness

Jenny Peterson
Print or type Signer's name

2820 Selwyn Avenue, Suite 375
Charlotte, NC 28209

Address of Attorney-in-Fact

Contract No. C203199
County Brunswick

Rev 2-1-10

CONTRACT PAYMENT BOND

CORPORATION

SIGNATURE OF CONTRACTOR (Principal)

Barnhill Contracting Company
Full name of Corporation

P.O. Box 1529, Tarboro, NC 27886
Address as prequalified

By _____
Signature of **President, Vice President, ~~Assistant Vice President~~**
Select appropriate title

Drew M. Johnson, P. E.
Print or type Signer's name

Affix Corporate Seal

Attest _____
Signature of **~~Secretary~~, Assistant Secretary**
Select appropriate title

Helen W. Spain
Print or type Signer's name

Contract No. **C203199**
County **Brunswick**

Rev 2-1-10

106025943

CONTRACT PERFORMANCE BOND

Date of Performance Bond Execution: 2/4/2014

Name of Principal Contractor: **Barnhill Contracting Company**

Name of Surety: **Travelers Casualty and Surety Company of America**

Name of Contracting Body: **North Carolina Department of Transportation**

Raleigh, North Carolina

Amount of Bond: **Seventy-nine Million Six Hundred Eighty-three Thousand One Hundred Ninety-eight And 70/100THS**

Contract ID No.: **C203199**

County Name: **Brunswick**

KNOW ALL MEN BY THESE PRESENTS, That we, the PRINCIPAL CONTRACTOR (hereafter, PRINCIPAL) and SURETY above named, are held and firmly bound unto the above named Contracting Body, hereinafter called the Contracting Body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the Contracting Body, numbered as shown above and hereto attached:

NOW THEREFORE, if the principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the Contracting Body, with or without notice to the Surety, and during the life of any guaranty required under the contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Contract No. **C203199**
County **Brunswick**

Rev 2-1-10

CONTRACT PERFORMANCE BOND

Affix Seal of Surety Company

Travelers Casualty and Surety Company of America
Print or type Surety Company Name

By **H. Thomas Dawkins**
Print, stamp or type name of Attorney-in-Fact

Signature of Attorney-in-Fact

Signature of Witness

Jenny Peterson
Print or type Signer's name

2820 Selwyn Avenue, Suite 375
Charlotte, NC 28209

Address of Attorney-in-Fact

Contract No. C203199
County Brunswick

Rev 2-1-10

CONTRACT PERFORMANCE BOND

CORPORATION

SIGNATURE OF CONTRACTOR (Principal)

Barnhill Contracting Company
Full name of Corporation

P.O. Box 1529, Tarboro, NC 27886
Address as prequalified

By _____
Signature of ~~President~~, Vice President, ~~Assistant Vice President~~
Select appropriate title

Drew M. Johnson, P. E.
Print or type Signer's name

Affix Corporate Seal

Attest _____
Signature of Secretary, ~~Assistant Secretary~~
Select appropriate title

Helen W.Spain
Print or type Signer's name

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

TRAVELERS

POWER OF ATTORNEY

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

Attorney-In Fact No. 223862 **Certificate No.** 005680659

KNOW ALL MEN BY THESE PRESENTS: That Farmington Casualty Company, St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company are corporations duly organized under the laws of the State of Connecticut, that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc., is a corporation duly organized under the laws of the State of Wisconsin (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint

H. Thomas Dawkins, and Hunter T. Dawkins

of the City of Charlotte, State of North Carolina, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this 24th day of October, 2013.

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

State of Connecticut
City of Hartford ss.

By: _____
Robert L. Raney, Senior Vice President

On this the 24th day of October, 2013, before me personally appeared Robert L. Raney, who acknowledged himself to be the Senior Vice President of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, and that he, as such, being authorized so to do, executed 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 hereunto set my hand and official seal.
My Commission expires the 30th day of June, 2016.

Marie C. Tetreault, Notary Public

58440-8-12 Printed in U.S.A.

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, Kevin E. Hughes, the undersigned, Assistant Secretary, of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is in full force and effect and has not been revoked.

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 4th day of February, 20 14

Kevin E. Hughes, Assistant Secretary

To verify the authenticity of this Power of Attorney, call 1-800-421-3880 or contact us at www.travelersbond.com. Please refer to the Attorney-In-Fact number, the above-named individuals and the details of the bond to which the power is attached.

WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER