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

PROPOSAL

INCLUDES ADDENDUM No.1 DATED 11-7-14

DATE AND TIME OF BID OPENING: **NOVEMBER 18, 2014 AT 2:00 PM**

CONTRACT ID	C203358
WBS	35609.3.S2

FEDERAL-AID NO.	STATE FUNDED
COUNTY	MITCHELL, YANCEY
T.I.P. NO.	R-2519B
MILES	7.852
ROUTE NO.	US 19
LOCATION	US-19E FROM NC-80 IN YANCEY COUNTY TO MULTILANE SECTION WEST OF SPRUCE PINES IN MITCHELL COUNTY.
TYPE OF WORK	GRADING, DRAINAGE, PAVING AND STRUCTURES.

NOTICE:

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

BIDS WILL BE RECEIVED AS SHOWN BELOW:

THIS IS A ROADWAY & STRUCTURE PROPOSAL

5% BID BOND OR BID DEPOSIT REQUIRED

_____

PROPOSAL FOR THE CONSTRUCTION OF

CONTRACT No. C203358 IN MITCHELL AND YANCEY COUNTIES, 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. **C203358**; 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. **C203358** in **Mitchell and Yancey Counties**, for the unit or lump sum prices, as the case may be, bid by the Bidder in his bid and according to the proposal, plans, and specifications prepared by said Department, which proposal, plans, and specifications show the details covering this project, and hereby become a part of this contract.

The published volume entitled *North Carolina Department of Transportation, Raleigh, Standard Specifications for Roads and Structures, January 2012* with all amendments and supplements thereto, is by reference incorporated into and made a part of this contract; that, except as herein modified, all the construction and work included in this contract is to be done in accordance with the specifications contained in said volume, and amendments and supplements thereto, under the direction of the Engineer.

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

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

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

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

State Contract Officer

DocuSigned by:
11/7/2014
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TABLE OF CONTENTS

UNIT PROJECT SPECIAL PROVISIONS

PROPOSAL ITEM SHEET

ITEM SHEET(S) (TAN SHEETS)

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 **February 15, 2015, except from -L- Station 250+00 to -L- Station 430+34.01 (end of Project) which will not be available until October 15, 2015**; and 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 **December 29, 2019**.

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

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

INTERMEDIATE CONTRACT TIME NUMBER 1 AND LIQUIDATED DAMAGES:
(7-1-95) (Rev. 2-21-12) 108 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 **February 15, 2015, except for the delay in availability as provided above.**

The completion date for this intermediate contract time is **July 1, 2019**.

The liquidated damages for this intermediate contract time are **Four Thousand Dollars ($4,000.00)** 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 **US 19E** during the following time restrictions:

DAY AND TIME RESTRICTIONS

MONDAY THROUGH FRIDAY
6:00 AM TO 9:00 AM
4:00 PM TO 7:00 PM

In addition, the Contractor shall not close or narrow a lane of traffic on **US 19E**, detain and/or alter the traffic flow on or during holidays, holiday weekends, special events, or any other time when traffic is unusually heavy, including the following schedules:

HOLIDAY AND HOLIDAY WEEKEND LANE CLOSURE RESTRICTIONS

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

2. For **New Year's Day**, between the hours of **6:00 a.m.** December 31st and **9:00 a.m.** January 2nd. If New Year's Day is on a Friday, Saturday, Sunday or Monday, then until **9:00 a.m.** the following Tuesday.

3. For **Easter**, between the hours of **6:00 a.m.** Thursday and **9:00 a.m.** Monday.

4. For **Memorial Day**, between the hours of **6:00 a.m.** Friday and **9:00 a.m.** Tuesday.

5. For **Independence Day**, between the hours of **6:00 a.m.** the day before Independence Day and **9:00 a.m.** the day after Independence Day.

   If **Independence Day** is on a Friday, Saturday, Sunday or Monday, then between the hours of **6:00 a.m.** the Thursday before Independence Day and **9:00 a.m.** the Tuesday after Independence Day.

6. For **Labor Day**, between the hours of **6:00 a.m.** Friday and **9:00 a.m.** Tuesday.

7. For **Thanksgiving Day**, between the hours of **6:00 a.m.** Tuesday and **9:00 a.m.** Monday.

8. For **Christmas**, between the hours of **6:00 a.m.** the Friday before the week of Christmas Day and **9:00 a.m.** 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 **One Thousand Dollars ($1,000.00)** per hour.

INTERMEDIATE CONTRACT TIME NUMBER 3 AND LIQUIDATED DAMAGES
(01-12-11) SP1 G14 E

Stopping traffic will only be allowed for blasting operations. The Contractor shall complete the required work of installing, maintaining and removing the traffic control devices for **stopping traffic** and restoring traffic to a **two**-lane, **two**-way traffic pattern. The Contractor shall not **stop traffic on US 19E** during the following time restrictions:

DAY AND TIME RESTRICTIONS

Monday through **Friday** from **6:00 a.m.** to **9:00 a.m.**
and
Monday through **Friday** from **4:00 p.m.** to **7:00 p.m.**

The maximum allowable time for **stopping traffic for blasting operations** is **fifteen (15)** minutes for **US 19E**. The Contractor shall reopen the travel lanes to traffic until the existing traffic queue is depleted.

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

The completion time for this intermediate contract time will be the time the Contractor is required to complete the removal of traffic control devices required for the **stopping traffic** according to the time restrictions stated herein and restore traffic a **two**-lane, **two**-way traffic pattern.

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

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.

PROSECUTION OF WORK FOR PERMIT REQUIREMENTS:
(7-24-13)

The Contractors attention is directed to the fact that there are specific Permit requirements included in this contract that sets specific time frames for the construction, demolition, and completion of the structures located over the South Toe River on US 19, station 122+22.50. At the Preconstruction conference, the contractor shall submit a schedule for approval by the Engineer for the construction, demolition, and completion of these structures, including mile stone dates that will be used to determine if work is being pursued in a continuous manner and with sufficient effort to comply with permit requirements.

The Contractor shall prosecute the work in a continuous and uninterrupted manner from the time he begins the work until completion of each phase of structure construction, demolition and completion. The contractor will not be permitted to suspend his operations except for reasons beyond his control or except where the Engineer has authorized a suspension of the Contractors' operations in writing.

In the event that the Contractor's operations are suspended in violation of the above provisions or it is determined the Contractor is not deemed to be pursuing the work in a continuous manner in accordance with his submitted and approved schedule, the sum of **$800.00** will be charged the Contractor for each and every calendar day that such suspensions take place. The said amount is hereby agreed upon as liquidated damages due to extra engineering and maintenance costs and due to increased public hazard, and violation of contract permit requirements. Liquidated damages chargeable due to suspension of the work will be additional to any liquidated damages that may become chargeable due to failure to complete the work on time.

CONSTRUCTION MORATORIAM:

(7-9-14) (Revised 8-22-14)

1. No in water work or land disturbance within the 25 foot wide buffer zone will be allowed from October 15 through April 15 of any year. This trout moratorium applies to the following:

   - Big Crabtree Creek and unnamed tributaries to Big Crabtree Creek

2. No in water work or land disturbance within the 25 foot wide buffer zone will be allowed from January 1 to April 15 of any year. This trout moratorium applies to the following:

   - Brushy Creek and unnamed tributaries to Brushy Creek
   - Long Branch Creek and unnamed tributaries to Long Branch Creek
   - Little Crabtree Creek and unnamed tributaries to Little Crabtree Creek

3. Conduct all tree cutting during the winter tree cutting period between August 15 and April 15 of any year as an avoidance measure for the Northern Long-eared Bat. Any felled trees that are not part of an active work area during this time shall be left in place until clearing, grubbing and seeding can commence after April 15. Any winter tree cutting conducted in a trout buffer will be cut by hand only and the felled trees shall be left in place until the trout moratorium has ended (after April 15 of any year). Within the trout buffer area dropping trees into the stream must be avoided whenever possible.

DELAY IN RIGHT OF ENTRY:

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

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

Parcel No.	Property Owner	Date
001A	ANTHONY R. ROBINSON	12/01/2014
009	MESSIAH OF THE MOUNTAIN CHURCH	12/01/2014
011	JANET W. WYATT	12/01/2014
029B	HOY BOONE	12/01/2014
036A	DALE ROBINSON	12/01/2014
041	TERRY LEDFORD	12/01/2014
044	PATTI PETERSON	12/01/2014
049A	WOODROW HOWELL	12/01/2014
053	GREG ROBINSON	12/01/2014
068	ANITA FORTNER	12/01/2014
073	BILLY DELLINGER	12/01/2014
074A	PHILLIP DAVENPORT	12/01/2014
075	JUANITA PRESNELL	12/01/2014
075A	CLARENCE DEYTON	12/01/2014
075C	GREGORY STYLES	12/01/2014

103	CHEVER METCALF	12/01/2014
115	ZURICH, NA	12/01/2014
115A	FRANK BRASWELL	12/01/2014
125	TRAVIS L. ROBINSON	12/01/2014
125A	CAROLYN CARPENTER	12/01/2014
127	RALPH SPARKS, JR.	12/01/2014
130	CLAYTON CASTEEL	12/01/2014
134	NORMAN HOLLAND	12/01/2014
135	VERA PRESNELL	12/01/2014
136	MARIE SPARKS	12/01/2014
140	TIM BURLESON	12/01/2014
140A	CAROLYN B. ADKINS	12/01/2014
142	WILLIAM GOFF	12/01/2014
148	HUENDO MELCHOR	12/01/2014
152	ROBERT V. HOUSTON, JR.	12/01/2014
153	APRIL PITTMAN SPARKS	12/01/2014
156	GEORGE L. BUCHANAN	12/01/2014
157	JERRY WILLIS	12/01/2014
159	GREGG W. JOHNSON	12/01/2014
159A	JOHN E. KEEN	12/01/2014
162	NATALIE SPARKS	12/01/2014
163	RALPH SPARKS, JR.	12/01/2014
164	MARIE SPARKS	12/01/2014
164C	JAMES A. MILLER	12/01/2014
165	KENNETH HENLINE	12/01/2014
166	DONALD BOONE	12/01/2014
167	MARY BELL SPARKS	12/01/2014
173	LISA BUTNER	12/01/2014
174	ANDREA HINSON	12/01/2014
175	JIMMY L. COOKE	12/01/2014
176	DENNIS WOODY	12/01/2014
179	NATALIE SPARKS	12/01/2014
180	GAY O. HOLCOMBE	12/01/2014
181	LITTLETON FAMILY LIMITED	12/01/2014
182A	TERMINEX SERVICES, INC.	12/01/2014
182B	THOMAS LITTLETON	12/01/2014
183	THOMAS LITTLETON	12/01/2014
185	POTEAT PROPERTY, LLC	12/01/2014
188	COMMUNITIES OF PENLAND, LLC	12/01/2014
189	JERRY SMITH	12/01/2014

190	MFSL LAND HOLDINGS	12/01/2014
194B	RODNEY M. WESFALL	12/01/2014
195	ROSETTA M. THOMPSON	12/01/2014
196	CARLOS L. YELTON	12/01/2014
197	BRP OF U.S.	12/01/2014

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
90	−	Asphalt Concrete Intermediate Course, Type I19.0C
239 or 245	−	Unclassified Excavation

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
135 thru 148	Guardrail
149 thru 154	Fencing
162 thru 167	Signing
184 thru 185 and 192 thru 193	Long-Life Pavement Markings
186	Removable Tape
197	Permanent Pavement Markers
198 thru 232 and 235 thru 238	Erosion Control
233 thru 234	Reforestation
278 thru 284	Drilled Piers

FUEL PRICE ADJUSTMENT:

(11-15-05) (Rev. 2-18-14) 109-8 SP1 G43

Revise the *2012 Standard Specifications* as follows:

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

The base index price for DIESEL #2 FUEL is **$2.7552** per gallon. Where any of the following are included as pay items in the contract, they will be eligible for fuel price adjustment.

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

Description	Units	Fuel Usage Factor Diesel
Unclassified Excavation	Gal/CY	0.29
Borrow Excavation	Gal/CY	0.29
Class IV Subgrade Stabilization	Gal/Ton	0.55
Aggregate Base Course	Gal/Ton	0.55
Sub-Ballast	Gal/Ton	0.55
Asphalt Concrete Base Course, Type ____	Gal/Ton	2.90
Asphalt Concrete Intermediate Course, Type ____	Gal/Ton	2.90
Asphalt Concrete Surface Course, Type ____	Gal/Ton	2.90
Open-Graded Asphalt Friction Course	Gal/Ton	2.90
Permeable Asphalt Drainage Course, Type ____	Gal/Ton	2.90
Sand Asphalt Surface Course, Type ____	Gal/Ton	2.90
Aggregate for Cement Treated Base Course	Gal/Ton	0.55
Portland Cement for Cement Treated Base Course	Gal/Ton	0.55
__" Portland Cement Concrete Pavement	Gal/SY	0.245
Concrete Shoulders Adjacent to __" Pavement	Gal/SY	0.245

PAYOUT SCHEDULE:

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

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

SCHEDULE OF ESTIMATED COMPLETION PROGRESS:

(7-15-08) (Rev. 5-20-14) 108-2 SP1 G58

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

2015	(7/01/14 - 6/30/15)	**12** % of Total Amount Bid
2016	(7/01/15- 6/30/16)	**31** % of Total Amount Bid
2017	(7/01/16 - 6/30/17)	**25** % of Total Amount Bid
2018	(7/01/17 - 6/30/18)	**19** % of Total Amount Bid
2019	(7/01/17 - 6/30/19)	**13** % 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.

MINORITY BUSINESS ENTERPRISE AND WOMEN BUSINESS ENTERPRISE:

(10-16-07)(Rev. 12-17-13) 102-15(J) SP1 G66

Description

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

Definitions

Additional MBE/WBE Subcontractors - Any MBE/WBE submitted at the time of bid that will not be used to meet either the MBE or WBE goal. No submittal of a Letter of Intent is required, unless the additional participation is used for banking purposes.

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

Contract Goals Requirement - The approved MBE and WBE participation at time of award, but not greater than the advertised contract goals for each.

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

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

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

Regular Dealer - A firm that owns, 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 MBE/WBE certification. The MBE/WBE program follows the same regulations as the federal Disadvantaged Business Enterprise (DBE) program in accordance with 49 CFR Part 26.

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

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

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

Forms and Websites Referenced in this Provision

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

DBE-IS *Subcontractor Payment Information* - Form for reporting the payments made to all MBE/WBE firms working on the project. This form is for paper bid projects only. http://www.ncdot.org/doh/forms/files/DBE-IS.xls

RF-1 *MBE/WBE Replacement Request Form* - Form for replacing a committed MBE or WBE. 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 MBE/WBE subcontractor, manufacturer or regular dealer that affirms that a portion of said contract is going to be performed by the signed MBE/WBE for the amount listed at the time of bid. http://connect.ncdot.gov/letting/LetCentral/Letter%20of%20Intent%20to%20Perform%20as%20a%20Subcontractor.pdf

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

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

MBE and WBE Goal

The following goals for participation by Minority Business Enterprises and Women Business Enterprises are established for this contract:

(A) Minority Business Enterprises **3.0%**

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

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

(B) Women Business Enterprises **6.0%**

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

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

Directory of Transportation Firms (Directory)

Real-time information is available about firms doing business with the Department and firms that are certified through NCUCP in the Directory of Transportation Firms. Only firms identified in the Directory as MBE and WBE certified shall be used to meet the MBE and WBE goals respectively. 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 MBE/WBE Subcontractors

At the time of bid, bidders shall submit <u>all</u> MBE and WBE participation that they anticipate to use during the life of the contract. Only those identified to meet the MBE goal and the WBE goal will be considered committed, even though the listing shall include both committed MBE/WBE subcontractors and additional MBE/WBE subcontractors. Any additional MBE/WBE subcontractor participation above the goal for which letters of intent are received will follow the banking guidelines found elsewhere in this provision. All other additional

MBE/WBE subcontractor participation submitted at the time of bid will be used toward the Department's overall race-neutral goals. Only those firms with current MBE and WBE certification at the time of bid opening will be acceptable for listing in the bidder's submittal of MBE and WBE participation. The Contractor shall indicate the following required information:

(A) Electronic Bids

Bidders shall submit a listing of MBE and WBE participation in the appropriate section of Expedite, the bidding software of Bid Express®.

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

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

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

(B) Paper Bids

(1) *If either the MBE or WBE goal is more than zero,*

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

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

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

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

MBE or WBE Prime Contractor

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

For example, on a proposed contract, the WBE goal is 10%, and the MBE goal is 8%. A WBE bidder puts in a bid where they will perform 40% of the contract work and have a WBE subcontractor which will perform another 5% of the work. Together the two WBE firms submit on the *Listing of MBE and WBE Subcontractors* a value of 45% of the contract which fulfills the WBE goal. The 8% MBE goal shall be obtained through MBE participation with MBE certified subcontractors or documented through a good faith effort. It should be noted that you cannot combine the two goals to meet an overall value. The two goals shall remain separate.

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

Written Documentation – Letter of Intent

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

The documentation shall be received in the office of the State Contractor Utilization Engineer or at DBE@ncdot.gov no later than 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 MBE and WBE to be used toward the MBE and WBE goals, or if the form is incomplete (i.e. both signatures are not present), the MBE/WBE participation will not count toward meeting the MBE/WBE goal. If the lack of this participation drops the commitment below either the MBE or WBE goal, the Contractor shall submit evidence of good faith efforts for the goal not met, 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 either the MBE or the WBE goal, the apparent lowest responsive bidder shall submit to the Department documentation of adequate good faith efforts made to reach that specific goal(s).

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 would be 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 MBE/WBE quotations shall be a part of the good faith effort submittal. This documentation may include written subcontractor quotations, telephone log notations of verbal quotations, or other types of quotation documentation.

Consideration of Good Faith Effort for Projects with MBE/WBE 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 MBE/WBE participation. Adequate good faith efforts also mean that the bidder actively and aggressively sought MBE/WBE participation. Mere *pro forma* efforts are not considered good faith efforts.

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

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

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

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

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

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

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

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

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

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

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

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

(I) Any other evidence that the bidder submits which shows that the bidder has made reasonable good faith efforts to meet the MBE and WBE 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 MBE and WBE goals.

(2) The bidders' past performance in meeting the MBE and WBE goals.

(3) The performance of other bidders in meeting the MBE and WBE goals. For example, when the apparent successful bidder fails to meet the goals, but others meet it, you may reasonably raise the question of whether, with additional reasonable efforts the apparent successful bidder could have met the goals. If the apparent successful bidder fails to meet the MBE and WBE goals, but meets or exceeds the average MBE and WBE participation obtained by other bidders, the Department may view this, in conjunction with other factors, as evidence of the apparent successful bidder having made a good faith effort.

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

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 MBE/WBE Participation Toward Meeting MBE/WBE Goals

(A) Participation

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

(B) Joint Checks

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

(C) Subcontracts (Non-Trucking)

A MBE/WBE may enter into subcontracts. Work that a MBE subcontracts to another MBE firm may be counted toward the MBE contract goal requirement. The same holds for work that a WBE subcontracts to another WBE firm. Work that a MBE subcontracts to a non-MBE firm does not count toward the MBE contract goal requirement. Again, the same holds true for the work that a WBE subcontracts to a non-WBE firm. If a MBE or WBE contractor or subcontractor subcontracts a significantly greater portion of the work of the contract than would be expected on the basis of standard industry practices, it shall be presumed that the MBE or WBE is not performing a commercially useful function. The MBE/WBE may present evidence to rebut this presumption to the Department. The Department's decision on the rebuttal of this presumption may be subject to review by the Office of Inspector General, NCDOT.

(D) Joint Venture

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

(E) Suppliers

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

(F) Manufacturers and Regular Dealers

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

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

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

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

(B) MBE/WBE Utilization in Trucking

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

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

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

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

(4) The MBE may subcontract the work to another MBE firm, including an owner-operator who is certified as a MBE. The same holds true that a WBE may subcontract the work to another WBE firm, including an owner-operator who is certified as a WBE. When this occurs, the MBE or WBE who subcontracts work receives credit for the total value of the transportation services the subcontracted MBE or WBE provides on the contract. It should be noted that every effort shall be made by MBE and WBE contractors to subcontract to the

same certification (i.e., MBEs to MBEs and WBEs to WBEs), in order to fulfill the goal requirement. This, however, may not always be possible due to the limitation of firms in the area. If the MBE or WBE firm shows a good faith effort has been made to reach out to similarly certified transportation service providers and there is no interest or availability, and they can get assistance from other certified providers, the Engineer will not hold the prime liable for meeting the goal.

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

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

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

Banking MBE/WBE Credit

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

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

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

MBE/WBE Replacement

When a Contractor has relied on a commitment to a MBE or WBE firm (or an approved substitute MBE or WBE firm) to meet all or part of a contract goal requirement, the contractor shall not terminate the MBE/WBE for convenience. This includes, but is not limited to, instances in which the Contractor seeks to perform the work of the terminated subcontractor with another MBE/WBE subcontractor, a non-MBE/WBE subcontractor, or with the Contractor's own forces or those of an affiliate. A MBE/WBE 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 MBE/WBE firm shall be submitted to the Engineer for approval on Form RF-1 *(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 MBE/WBE:

(A) Performance Related Replacement

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

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

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

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

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

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

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

(B) Decertification Replacement

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

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

Changes in the Work

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

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

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

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

Reports and Documentation

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

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

Within 30 calendar days of entering into an agreement with a MBE/WBE for materials, supplies or services, not otherwise documented by the SAF as specified above, the Contractor shall furnish the Engineer a copy of the agreement. The documentation shall also indicate the percentage (60% or 100%) of expenditures claimed for MBE/WBE credit.

Reporting Minority and Women Business Enterprise Participation

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

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

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

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

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

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

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

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

(A) Electronic Bids Reporting

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

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:

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

All steel and iron products that are permanently incorporated into this project shall be produced in the United States except minimal amounts of foreign steel and iron products may be used provided the combined material cost of the items involved does not exceed 0.1% of the total amount bid for the entire project or $2,500, whichever is greater. If invoices showing the cost of the material are not provided, the amount of the bid item involving the foreign material will be used for calculations. This minimal amount of foreign produced steel and iron products permitted for use is not applicable to high strength fasteners. Domestically produced high strength fasteners are required.

PORTABLE CONCRETE BARRIER - (Partial Payments for Materials):
(7-1-95) (Rev. 8-16-11) 1170-4 SP1 G121

When so authorized by the Engineer, partial materials payments will be made up to 95 percent of the delivered cost of portable concrete barrier, provided that these materials have been delivered on the project and stored in an acceptable manner, and further provided the documents listed in Subarticle 109-5(C) of the *2012 Standard Specifications* have been furnished to the Engineer.

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

REMOVABLE PAVEMENT MARKINGS - (Partial Payments for Materials):
(7-1-95) (Rev. 8-16-11) 1205-10 SP1 G124

When so authorized by the Engineer, partial materials payments will be made up to 95 percent of the delivered cost of pavement marking tape, provided that these materials have been delivered on or in the vicinity of the project, stored in an acceptable manner, not to exceed the shelf life recommended by the manufacturer, and further provided the documents listed in Subarticle 109-5(C) of the *2012 Standard Specifications* have been furnished to the Engineer.

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

The provisions of Article 109-6 of the *2012 Standard Specifications* will not apply to removable pavement marking materials.

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-2519A, Yancey County located on the west end of this project is currently under construction and will be completed prior to the completion of R-2519B.

It is anticipated Yancey County will let a waterline installation contract located between Station 15+68.90 -L- to Station 48+00 -L- during the construction of this project.

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

BID DOCUMENTATION:
(1-1-02) (Rev. 9-18-12) 103 SP1 G142

General

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

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

Terms

Bid Documentation - Bid Documentation shall mean all written information, working papers, computer printouts, electronic media, charts, and all other data compilations which contain or reflect information, data, and calculations used by the Bidder in the preparation of the bid. The term *bid documentation* includes, but is not limited to, contractor equipment rates, contractor overhead rates, labor rates, efficiency or productivity factors, arithmetical calculations, and quotations from subcontractors and material suppliers to the extent that such rates and quotations

were used by the Bidder in formulating and determining the bid. The term *bid documentation* also includes any manuals, which are standard to the industry used by the Bidder in determining the bid. Such manuals may be included in the bid documentation by reference. Such reference shall include the name and date of the publication and the publisher. *Bid Documentation* does not include bid documents provided by the Department for use by the Bidder in bidding on this project.

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

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

Escrow Agreement Information

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

Failure to Provide Bid Documentation

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

Submittal of Bid Documentation

(A) Appointment – Email specs@ncdot.gov or call 919.707.6900 to schedule an appointment.

(B) Delivery - A representative of the Bidder shall deliver the original, unaltered bid documentation or a certified copy of the original, unaltered bid documentation to the Department, in a container suitable for sealing, within 10 days after the notice of award is received by him. Bid documentation will be considered a certified copy if the Bidder includes a letter to the Department from a chief officer of the company stating that the enclosed documentation is an *EXACT* copy of the original documentation. The letter shall be signed by a chief officer of the company, have the person's name and title typed below the signature, and the signature shall be notarized at the bottom of the letter.

(C) Packaging – The container shall be no larger than 15.5 inches in length by 12 inches wide by 11 inches high and shall be water resistant. The container shall be clearly marked on the face and the back of the container with the following information: Bid Documentation, Bidder's Name, Bidder's Address, Date of Escrow Submittal, Contract Number, TIP Number if applicable, and County.

Affidavit

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

Verification

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

Confidentiality of Bid Documentation

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

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

Duration and Use

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

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

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

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

Release of Bid Documentation to the Contractor

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

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

Payment

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

TWELVE MONTH GUARANTEE:

(7-15-03) 108 SP1 G145

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

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

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

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

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

OUTSOURCING OUTSIDE THE USA:

(9-21-04) (Rev. 5-16-06) SP1 G150

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

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

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

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.

LIABILITY INSURANCE:
(5-20-14) SP1 G160

Revise the *2012 Standard Specifications* as follows:

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

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

EROSION AND SEDIMENT CONTROL/STORMWATER CERTIFICATION:
(1-16-07) (Rev 9-18-12) 105-16, 225-2, 16 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 Special Provisions entitled "Contractor Requirements for Stream Relocations, Restorations and Enhancements", located in the Erosion Control Project Special Provisions. This requirement is only for the stream relocations at Permit Site 6 (Station 125+95 to 127+17 Lt -L-), Permit Site 8 (Station 152+50 to 155+00 Rt. -L- and Station 155+98 to 157+80 Lt. -L-) and Permit Site 30 (Station 323+00 Lt. -L-).

Per the Environmental Permit Conditions, all channel relocations shall be constructed in a dry work area, shall be completed and stabilized, and must be approved on-site by an environmental regulatory agency representative prior to diverting water into the new channel. Whenever possible, channel relocations shall be allowed to stabilize for an entire growing season (May 2 to October 8 for Yancey County and April 19 to October 15 for Mitchell County), unless approved by the Environmental Regulatory Agencies.

Construction Surveying for Mitigation, Diversion Pumping for Mitigation and Grading for Mitigation only applies to Permit Site 6 (Station 125+95 to 127+17 Lt -L-), Permit Site 8 (Station 152+50 to 155+00 Rt. -L- and Station 155+98 to 157+80 Lt. -L-) and Permit Site 30 (Station 323+00 Lt. -L-).

SUBLETTING OF CONTRACT:
(11-18-2014) 108-6 SP1 G186

Revise the *2012 Standard Specifications* as follows:

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

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

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

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

PROJECT SPECIAL PROVISIONS

ROADWAY

CLEARING AND GRUBBING - METHOD II:

(9-17-02) (Rev. 1-17-12) 200 SP2 R02A

Perform clearing on this project to the limits established by Method "II" shown on Standard Drawing No. 200.02 of the *2012 Roadway Standard Drawings*.

BUILDING REMOVAL:

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

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

Building Removal
Parcel 49 - Left of Survey Station 110+50, Survey Line -L-
Block Well House

Building Removal
Parcel 140 - Left of Survey Station 309+50, Survey Line -L-
Frame Shed

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*.

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.

WELDED STEEL PIPE LINER:

Description

Furnish, haul and install all pipe, fittings, couplings and other material; grout; construct joint connections; and clean out the existing pipe for the Welded Steel Pipe Liner inside the existing corrugated steel pipe as shown in the plans.

Materials

Refer to Division 10:

Item	Section
Welded Steel Pipe	Article 1032-5

Construction Methods

Install the pipe in accordance with the detail in the plans and as directed by the Engineer.

Measurement and Payment

Pipe liner will be measured and paid for as the actual number of linear feet of pipe liner that has been incorporated into the completed and accepted work.

Measurement of pipe liner will be made by counting the number of joints used and multiplying by the length of the joint to obtain the number of linear feet of pipe liner installed and accepted. Measurements of partial joints will be made along the longest length of the partial joint to the nearest 0.1 ft.

No separate measurement or payment will be made for grout as the cost of such shall be incidental to the welded steel pipe liner.

Payment will be made under:

Pay Item	Pay Unit
___" Welded Steel Pipe Liner	Linear Foot

FLOWABLE FILL:

(9-17-02) (Rev 1-17-12) 300, 340, 450, 1000, 1530, 1540, 1550 SP3 R30

Description

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

Materials

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

Item	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

#57 STONE:

7-18-06 SPI 10 -1

Description

The Contractor shall place #57 stone in accordance with the details in the plans and the following provision.

Materials

Item	**Section**
# 57 Stone	1005

Construction Methods

The stone shall be placed and compacted as directed by the Engineer.

Measurement and Payment

#57 Stone will be measured and paid in tons that are completed and accepted. The stone will be measured by being weighed in trucks on certified platform scales or other certified weighing devices. The price and payment will be full compensation for furnishing, hauling, placing, and all incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
#57 Stone	Ton

ASPHALT PAVEMENTS - SUPERPAVE:

(6-19-12) (Rev. 10-21-14) 605, 609, 610, 650, 660 SP6 R01

Revise the *2012 Standard Specifications* as follows:

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

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

TABLE 605-1
APPLICATION RATES FOR TACK COAT

Existing Surface	Target Rate (gal/sy)
	Emulsified Asphalt
New Asphalt	0.04 ± 0.01
Oxidized or Milled Asphalt	0.06 ± 0.01
Concrete	0.08 ± 0.01

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

TABLE 605-2
APPLICATION TEMPERATURE FOR TACK COAT

Asphalt Material	Temperature Range
Asphalt Binder, Grade PG 64-22	350 - 400°F
Emulsified Asphalt, Grade RS-1H	130 - 160°F
Emulsified Asphalt, Grade CRS-1	130 - 160°F
Emulsified Asphalt, Grade CRS-1H	130 - 160°F
Emulsified Asphalt, Grade HFMS-1	130 - 160°F
Emulsified Asphalt, Grade CRS-2	130 - 160°F

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

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

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

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

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

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

TABLE 610-1
DESIGN MIXING TEMPERATURE AT THE ASPHALT PLANT[A]

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

A. The mix temperature, when checked in the truck at the roadway, shall be within plus 15º and minus 25º 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 "275ºF" with "275ºF or greater."

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

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

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

TABLE 610-5
PLACEMENT TEMPERATURES FOR ASPHALT

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

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

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

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

TABLE 650-1
OGAFC GRADATION CRITERIA

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

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

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

ASPHALT BINDER CONTENT OF ASPHALT PLANT MIXES:
(11-21-00) (Rev. 7-17-12) 609 SP6 R15

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

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

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

ASPHALT PLANT MIXTURES:
(7-1-95) 609 SP6 R20

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

PRICE ADJUSTMENT - ASPHALT BINDER FOR PLANT MIX:
(11-21-00) 620 SP6 R25

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

The base price index for asphalt binder for plant mix is **$624.23** per ton.

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

SLUICE GATE:
(7-1-95) (Rev. 3-17-09) 838 SP8 R20

Description

This work consists of the construction of a sluice gate on an endwall in accordance with the details in the plans, the applicable requirements of Section 838 of the *2012 Standard Specifications,* in accordance with the manufacturer's recommendations and as directed by the Engineer.

Materials

Sluice gates shall meet the manufacturer's recommendations for the corresponding pipe size. Due to variations in individual manufacturer's products, a slight variation from the size specified may be allowed. Submit the proposed catalog cut to the Engineer for approval prior to use.

Construction Methods

Provide a gate that forms a watertight seal when closed.

Measurement and Payment

____*" Sluice Gate* will be measured and paid as each for the actual number of sluice gates incorporated into the completed and accepted work. Such prices and payment will be full compensation for all materials, labor, tools, equipment and incidentals necessary to complete the work.

The endwall will be measured and paid in accordance with Article 838-4 of the *2012 Standard Specifications*.

Payment will be made under:

Pay Item	**Pay Unit**
____" Sluice Gate	Each

EMERGENCY VEHICLE ACCESS:

At location shown in the plans, construct emergency vehicle access in accordance with the detail in the plans and Section 852 of the *Standard Specifications*.

Each emergency vehicle access section completed and accepted will be paid for at the contract unit price per each for *Emergency Vehicle Access*. Such price and payment will be full compensation for all materials, labor, equipment, tools, and any other incidentals necessary to complete the work satisfactorily.

The concrete island outside the pay limits of the emergency vehicle access limits will be measured and paid for in accordance with Section 852 of the *Standard Specifications*.

Payment will be made under:

Pay Item	**Pay Unit**
Emergency Vehicle Access	Each

GUARDRAIL ANCHOR UNITS, TYPE 350 TL-2:

(10-21-08) (Rev. 8-16-11) 862 SP8 R64

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) 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 2 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 TL-2	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

EARLY FENCING

(Rev 11-7-08) SPI 8-18

As part of the first operation, install Control of Access fence prior to removing the existing fence on the following parcels to constrain livestock in the appropriate area.

Number	Parcel	Name
1.	13	Deborah W. Young
2.	94	Troy Huskins
3.	100	Chad J. and Ciji B. Dellinger
4.	109	Robert Abeel Brewster and Brenda Bennet
5.	156	George L. Buchanan

VINYL COATED CHAIN LINK FENCE, __" FABRIC:

(1-1-02) (Rev.4-30-12) SPI 8-37

Provide vinyl coated chain link fence that complies with the plans and Section 866 of the *2012 Standard Specifications*. *Vinyl Coated Chain Link Fence, __" Fabric* will be measured and paid in linear feet, of fence measured in place from center of each post or gate post to center of end post or gate post exclusive of gate sections, that has been completed and accepted.

Work includes, but is not limited to, clearing and grading; and furnishing and installing fence fabric, staples, tie wires, stretcher bars, top rails, tension wire, posts and post braces, concrete, gates, fittings and any other materials.

When use of short pieces of woven wire is permitted, furnish and install the additional required brace posts and braces at no additional cost to the Department.

Payment will be made under:

Pay Item	Pay Unit
Vinyl Coated Chain Link Fence, __" Fabric	Linear Foot

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

STREET SIGNS AND MARKERS AND ROUTE MARKERS:

(7-1-95) 900 SP9 R02

Move any existing street signs, markers, and route markers out of the construction limits of the project and install the street signs and markers and route markers so that they will be visible to the traveling public if there is sufficient right of way for these signs and markers outside of the construction limits.

Near the completion of the project and when so directed by the Engineer, move the signs and markers and install them in their proper location in regard to the finished pavement of the project.

Stockpile any signs or markers that cannot be relocated due to lack of right of way, or any signs and markers that will no longer be applicable after the construction of the project, at locations directed by the Engineer for removal by others.

The Contractor shall be responsible to the owners for any damage to any street signs and markers or route markers during the above described operations.

No direct payment will be made for relocating, reinstalling, and/or stockpiling the street signs and markers and route markers as such work shall be considered incidental to other work being paid for by the various items in the contract.

MATERIALS:

(2-21-12) (Rev. 5-20-14) 1000, 1002, 1005, 1024, 1050, 1056, 1074, 1078, 1080, 1081, 1086, 1084, 1087, 1092 SP10 R01

Revise the *2012 Standard Specifications* as follows:

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

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

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

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

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

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

Item	Section
Type IL Blended Cement	1024-1

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

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

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

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

All fencing material and accessories shall meet Section 106.

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

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

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

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

TABLE 1056-1
GEOTEXTILE REQUIREMENTS

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

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

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

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

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

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:

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.

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.

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.

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. 11-18-14) Z-4

Revise the *2012 Standard Specifications* as follows:

Division 2

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

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

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

Division 3

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

Division 4

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

Division 6

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

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

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

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

Division 8

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

Division 10

Page 10-166, Article 1081-3 Hot Bitumen, replace "Table 1081-16" with "Table 1081-2", replace "Table 1081-17" with "Table 1081-3", and replace "Table 1081-18" with "Table 1081-4".

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

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

MINIMUM WAGES

(7-21-09) Z-5

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

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

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

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

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

This determination of the intent of the application of this act to the contract on this project is the responsibility of the Contractor.

The Contractor shall have no claim against the Department of Transportation for any changes in the minimum wage laws, Federal or State. It is the responsibility of the Contractor to keep fully informed of all Federal and State Laws affecting his contract.

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.

PROJECT SPECIAL PROVISIONS

GEOTECHNICAL

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Geotechnical Engineering Unit
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9/19/2014

GEOTEXTILE FOR PAVEMENT STABILIZATION: (1-21-14)

Description

Furnish and place geotextile for pavement stabilization in accordance with the contract. Geotextile for pavement stabilization may be required to prevent pavement cracking and provide separation between the subgrade and pavement section at locations shown in the plans and as directed.

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	Section
Geotextiles	1056

Provide Type 5 geotextile for geotextile for pavement stabilization that meets the following requirements:

GEOTEXTILE FOR PAVEMENT STABILIZATION REQUIREMENTS		
Property	**Requirement (MARV[A])**	**Test Method**
Tensile Strength @ 5% Strain (MD & CD[A])	1,900 lb/ft	ASTM D4595
Ultimate Tensile Strength (MD & CD[A])	4,800 lb/ft	ASTM D4595
Melting Point	300° F	ASTM D276

A. Define "minimum average roll value" (MARV), "machine direction" (MD) and "cross-machine direction" (CD) in accordance with ASTM D4439.

Construction Methods

Notify the Engineer when the roadbed is completed within 2" of subgrade elevation. The Engineer will sample and test subgrade soils for quality to determine if geotextile for pavement stabilization is required at locations shown in the plans and other locations as directed. For subgrades without stabilization, allow 24 days to determine if geotextile for pavement stabilization is required. For stabilized subgrades with geotextile for pavement stabilization, stabilize subgrade soils to 12" beyond the base course as shown in the plans.

Place geotextile for pavement stabilization on subgrades immediately below pavement sections as shown in the plans and in slight tension free of kinks, folds, wrinkles or creases. Install geotextiles with the MD perpendicular to the roadway centerline. The MD is the direction of the length or long dimension of the geotextile roll. Do not splice or overlap geotextiles in the MD so splices or overlaps are parallel to the roadway centerline. Extend geotextile for pavement stabilization 12" beyond the base course as shown in the plans.

Completely cover subgrades with geotextile for pavement stabilization so geotextiles are adjacent to each other in the CD, i.e., perpendicular to the MD. The CD is the direction of the width or short dimension of the geotextile roll. Overlapping geotextiles in the CD is permitted but not required. Overlap geotextiles in the direction that base course will be placed to prevent lifting the edge of the top geotextile.

For asphalt base courses, asphalt mixture temperatures in the truck may not exceed 315° F at the time of placement. Do not damage geotextile for pavement stabilization when constructing base

courses. Place and compact base courses in accordance with the *Standard Specifications*. Do not operate heavy equipment on geotextiles any more than necessary to construct pavement sections. Replace any damaged geotextiles to the satisfaction of the Engineer.

Measurement and Payment

Geotextile for Pavement Stabilization will be measured and paid in square yards. Geotextiles will be measured along subgrades as the square yards of exposed geotextiles before placing base courses. No measurement will be made for overlapping geotextiles. The contract unit price for *Geotextile for Pavement Stabilization* will be full compensation for providing, transporting and placing geotextiles.

Payment will be made under:

Pay Item	**Pay Unit**
Geotextile for Pavement Stabilization	Square Yard

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Scott A. Hidden
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7/23/2014

SOIL NAIL RETAINING WALLS (11-19-13)

1.0 GENERAL

Construct soil nail retaining walls consisting of soil nails spaced at a regular pattern and connected to a cast-in-place reinforced concrete face. A soil nail consists of a steel bar grouted in a drilled hole inclined at an angle below horizontal. Use shotcrete for temporary support of excavations during construction. Design and construct soil nail retaining walls based on actual elevations and wall dimensions in accordance with the contract and accepted submittals. Use a prequalified Anchored Wall Contractor to construct soil nail retaining walls. Define "soil nail wall" as a soil nail retaining wall and "Soil Nail Wall Contractor" as the Anchored Wall Contractor installing soil nails and applying shotcrete. Define "nail" as a soil nail and "concrete facing" as a cast-in-place reinforced concrete face.

2.0 MATERIALS

Refer to the *Standard Specifications*.

Item	Section
Anchor Pins	1056-2
Curing Agents	1026
Geocomposites	1056
Joint Materials	1028
Masonry	1040
Neat Cement Grout, Nonshrink	1003
Portland Cement Concrete, Class A	1000
Reinforcing Steel	1070
Select Material, Class VI	1016
Shotcrete	1002
Shoulder Drain Materials	816-2
Steel Plates	1072-2
Welded Stud Shear Connectors	1072-6

Provide Class VI select material (standard size No. 57 stone) for leveling pads. Use Class A concrete for concrete facing.

Provide soil nails consisting of grouted steel bars and nail head assemblies. Use epoxy coated or encapsulated deformed steel bars that meet AASHTO M 275 or M 31, Grade 60 or 75. Splice bars in accordance with Article 1070-9 of the *Standard Specifications*. Provide epoxy coated bars that meet Article 1070-7 of the *Standard Specifications*.

For encapsulated bars, use nonperforated corrugated HDPE sheaths at least 0.04" thick that meet AASHTO M 252. Provide at least 0.4" of grout cover between bars and sheathing and at least 0.8" of grout cover between sheathing and drill hole walls.

Fabricate centralizers from schedule 40 PVC plastic pipe or tube, steel or other material not detrimental to steel bars (no wood). Size centralizers to position bars within 1" of drill hole

centers and allow tremies to be inserted to ends of holes. Use centralizers that do not interfere with grout placement or flow around bars. Centralizers are required both inside and outside sheaths for encapsulated nails.

Provide nail head assemblies consisting of nuts, washers and bearing plates with welded stud shear connectors. Use steel plates for bearing plates and steel washers and hex nuts recommended by the Soil Nail Manufacturer.

Provide Type 3 material certifications for soil nail materials in accordance with Article 106-3 of the *Standard Specifications*. Store steel materials on blocking at least 12" above the ground and protect it at all times from damage; and when placing in the work make sure it is free from dirt, dust, loose mill scale, loose rust, paint, oil or other foreign materials. Load, transport, unload and store soil nail wall materials so materials are kept clean and free of damage. Do not crack, fracture or otherwise damage grout inside sheaths of encapsulated nails. Bent, damaged or defective materials will be rejected.

3.0 PRECONSTRUCTION REQUIREMENTS

A. Soil Nail Wall Surveys

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

B. Soil Nail Wall Designs

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

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

Design soil nail walls in accordance with the plans and allowable stress design method in the *FHWA Geotechnical Engineering Circular No. 7 "Soil Nail Walls"* (Publication No. FHWA-IF-03-017) unless otherwise required. Design soil nail walls for seismic if walls are located in seismic zone 2 based on Figure 2-1 of the *Structure Design Manual*.

Design soil nails that meet the following unless otherwise approved:

1. Horizontal and vertical spacing of at least 3 ft,
2. Inclination of at least 12° below horizontal,

3. Clearance between ends of bars and drill holes of at least 6" and
4. Diameter of 6" to 10".

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

When noted in the plans, design soil nail walls for a live load (traffic) surcharge of 250 lb/sf. For steel beam guardrail with 8 ft posts above soil nail walls, analyze walls for a horizontal load of 300 lb/ft of wall. For concrete barrier rail above soil nail walls, analyze walls for a horizontal load of 500 lb/ft of wall.

Provide wall drainage systems consisting of geocomposite drain strips, drains and outlet components. Place drain strips with a horizontal spacing of no more than 10 ft and center strips between adjacent nails. Attach drain strips to excavation faces and connect strips to leveling pads. Locate a continuous aggregate shoulder drain along the base of concrete facing in front of leveling pads. Provide drains and outlet components in accordance with Standard Drawing No. 816.02 of the *Roadway Standard Drawings*.

Use shotcrete at least 4" thick and reinforce shotcrete with #4 waler bars around nail heads. Two waler bars (one on each side of nail head) in the horizontal and vertical directions are required for a total of 4 bars per nail.

Use No. 57 stone for aggregate leveling pads. Use 6" thick leveling pads beneath concrete facing. Unless required otherwise in the plans, embed top of leveling pads at least 12" below bottom of walls shown in the plans.

Use concrete facing with the dimensions shown in the plans and attach facing to nail heads with welded stud shear connectors. When concrete barrier rail is required above soil nail walls, use concrete barrier rail with moment slab as shown in the plans.

Submit working drawings and design calculations including unit grout/ground bond strengths for acceptance in accordance with Article 105-2 of the *Standard Specifications*. Submit working drawings showing plan views, wall profiles with nail locations including known test nail locations, typical sections and details of nails, drainage, shotcrete, leveling pads and concrete facing. If necessary, include details on working drawings for concrete barrier rail with moment slab and obstructions extending through walls or interfering with nails, 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 nail lengths. When designing soil nail walls with computer software, a hand calculation is required for the wall section with the longest nails.

C. Soil Nail Wall Construction Plan

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

1. Overall description and sequence of soil nail wall construction;
2. List and sizes of excavation equipment, drill rigs and tools, tremies and grouting equipment;
3. Procedures for excavations, drilling and grouting, soil nail and wall drainage system installation and facing construction;
4. Details of shotcrete equipment and application including mix process, test panels, thickness gauges and shooting methods;
5. Shotcrete nozzleman with certification in accordance with Article 1002-1 of the *Standard Specifications*;
6. Plan and methods for nail testing with calibration certificates dated within 90 days of the submittal date;
7. Examples of construction and test nail records to be used in accordance with Sections 4.0(F) and 5.0(E) of this provision;
8. Approved packaged grout or grout mix design with acceptable ranges for grout flow and density that meets Section 1003 of the *Standard Specifications*;
9. Shotcrete mix design that meets Section 1002 of the *Standard Specifications*; and
10. Other information shown in the plans or requested by the Engineer.

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

D. Preconstruction Meeting

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

4.0 CONSTRUCTION METHODS

Control drainage during construction in the vicinity of soil nail walls. Direct run off away from soil nail walls and areas above and behind walls.

Notify the Engineer before blasting in the vicinity of soil nail walls. Perform blasting in accordance with the contract. Unless required otherwise in the plans, install foundations located behind soil nail walls before beginning wall construction.

Install soil nail walls in accordance with the accepted submittals and as directed. Do not excavate behind soil nail walls. If overexcavation occurs, repair walls with an approved method and a revised soil nail wall design or construction plan may be required.

A. Excavation

Excavate for soil nail walls from the top down in accordance with the accepted submittals. Excavate in staged horizontal lifts with no negative batter (excavation face leaning forward). Excavate lifts in accordance with the following:

1. Heights not to exceed vertical nail spacing,
2. Bottom of lifts no more than 3 ft below nail locations for current lift and
3. Horizontal and vertical alignment within 2" of location shown in the accepted submittals.

Remove any cobbles, boulders, rubble or debris that will protrude more than 2" into the required shotcrete thickness. Rocky ground such as colluvium, boulder fills and weathered rock may be difficult to excavate without leaving voids.

Apply shotcrete to excavation faces within 24 hours of excavating each lift unless otherwise approved. Shotcreting may be delayed if it can be demonstrated that delays will not adversely affect excavation stability. If excavation faces will be exposed for more than 24 hours, use polyethylene sheets anchored at top and bottom of lifts to protect excavation faces from changes in moisture content.

If an excavation becomes unstable at any time, suspend soil nail wall construction and temporarily stabilize the excavation by immediately placing an earth berm up against the unstable excavation face. When this occurs, repair walls with an approved method and a revised soil nail wall design or construction plan may be required.

Do not excavate the next lift until nail installations and testing and shotcrete application for the current lift are accepted and grout and shotcrete for the current lift have cured at least 3 days and 1 day, respectively.

B. Soil Nails

Install soil nails in the same way as acceptable test nails. Drill and grout nails the same day and do not leave drill holes open overnight.

Control drilling and grouting to prevent excessive ground movements, damaging structures and pavements or fracturing rock and soil formations. If ground heave or subsidence occurs, suspend soil nail wall construction and take corrective action to minimize movement. If property damage occurs, make repairs with an approved method and a revised soil nail wall design or construction plan may be required.

1. Drilling

Use drill rigs of the sizes necessary to install soil nails and with sufficient capacity

to drill through whatever materials are encountered. Drill straight and clean holes with the dimensions and inclination shown in the accepted submittals. Drill holes within 6" of locations and 2° of inclination shown in the accepted submittals unless otherwise approved.

Stabilize drill holes with temporary casings if unstable, caving or sloughing material is anticipated or encountered. Do not use drilling fluids to stabilize drill holes or remove cuttings.

2. Steel Bars

Center steel bars in drill holes with centralizers. Securely attach centralizers along bars at no more than 8 ft centers. Attach uppermost and lowermost centralizers 18" from excavation faces and ends of holes.

Do not insert steel bars into drill holes until hole locations, dimensions, inclination and cleanliness are approved. Do not vibrate, drive or otherwise force bars into holes. If a steel bar cannot be completely and easily inserted into a drill hole, remove the bar and clean or redrill the hole.

3. Grouting

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

Inject grout at the lowest point of drill holes through tremies, e.g., grout tubes, casings, hollow-stem augers or drill rods, in one continuous operation. Fill drill holes progressively from ends of holes to excavation faces and withdraw tremies at a slow even rate as holes are filled to prevent voids in grout. Extend tremies into grout at least 5 ft at all times except when grout is initially placed in holes.

Provide grout free of segregation, intrusions, contamination, structural damage or inadequate consolidation (honeycombing). Cold joints in grout are not allowed except for test nails. Remove any temporary casings as grout is placed and record grout volume for each drill hole.

4. Nail Heads

Weld stud shear connectors to bearing plates of nails in accordance with Article 1072-6 of the *Standard Specifications*. Install nail head assemblies after shotcreting. Before shotcrete reaches initial set, seat bearing plates and tighten nuts so plates contact shotcrete uniformly. If uniform contact is not possible, install nail head assemblies on mortar pads so nail heads are evenly loaded.

C. Wall Drainage Systems

Install wall drainage systems as shown in the accepted submittals and in accordance

with Section 816 of the *Standard Specifications*. Before installing shotcrete reinforcement, place geocomposite drain strips with the geotextile side against excavation faces. For highly irregular faces and at the discretion of the Engineer, drain strips may be placed after shotcreting over weep holes through the shotcrete. Hold drain strips in place with anchor pins so strips are in continuous contact with surfaces to which they are attached and allow for full flow the entire height of soil nail walls. Discontinuous drain strips are not allowed. If splices are needed, overlap drain strips at least 12" so flow is not impeded. Connect drain strips to leveling pads by embedding strip ends at least 4" into No. 57 stone.

D. Shotcrete

Clean ungrouted zones of drill holes and excavation faces of loose materials, mud, rebound and other foreign material. Moisten surfaces to receive shotcrete. Install shotcrete reinforcement in accordance with the contract and accepted submittals. Secure reinforcing steel so shooting does not displace or vibrate reinforcement. Install approved thickness gauges on 5 ft centers in the horizontal and vertical directions to measure shotcrete thickness.

Apply shotcrete in accordance with the contract, accepted submittals and Subarticle 1002-3(F) of the *Standard Specifications*. Use approved shotcrete nozzlemen who made satisfactory preconstruction test panels to apply shotcrete. Direct shotcrete at right angles to excavation faces except when shooting around reinforcing steel. Rotate nozzle steadily in small circular patterns and apply shotcrete from bottom of lifts up.

Make shotcrete surfaces uniform and free of sloughing or sagging. Completely fill ungrouted zones of drill holes and any other voids with shotcrete. Taper construction joints to a thin edge over a horizontal distance of at least the shotcrete thickness. Wet joint surfaces before shooting adjacent sections.

Repair surface defects as soon as possible after shooting. Remove any shotcrete which lacks uniformity, exhibits segregation, honeycombing or lamination or contains any voids or sand pockets and replace with fresh shotcrete to the satisfaction of the Engineer. Protect shotcrete from freezing and rain until shotcrete reaches initial set.

E. Leveling Pads and Concrete Facing

Construct aggregate leveling pads at elevations and with dimensions shown in the accepted submittals. Compact leveling pads with a vibratory compactor to the satisfaction of the Engineer.

Construct concrete facing in accordance with the accepted submittals and Section 420 of the *Standard Specifications*. Do not remove forms until concrete attains a compressive strength of at least 2,400 psi. Unless required otherwise in the plans, provide a Class 2 surface finish for concrete facing that meets Subarticle 420-17(F) of the *Standard Specifications*. Construct concrete facing joints at a spacing of 10 ft to 12 ft unless required otherwise in the plans. Make 1/2" thick expansion joints that meet Article 420-10 of the *Standard Specifications* for every third joint and 1/2" deep

grooved contraction or sawed joints that meet Subarticle 825-10(B) or 825-10(E) respectively for the remaining joints. Stop reinforcing steel for concrete facing 2" on either side of expansion joints.

If a brick veneer is required, construct brick masonry in accordance with Section 830 of the *Standard Specifications*. Anchor brick veneers to soil nail walls with approved brick to concrete type anchors in accordance with the manufacturer's instructions. Space anchors no more than 16" apart in the vertical direction and no more than 32" apart in the horizontal direction with each row of anchors staggered 16" from the row above and below.

Seal joints above and behind soil nail walls between concrete facing and slope protection with silicone sealant.

F. Construction Records

Provide 2 copies of soil nail wall construction records within 24 hours of completing each lift. Include the following in construction records:

1. Names of Soil Nail Wall Contractor, Superintendent, Nozzleman, Drill Rig Operator, Project Manager and Design Engineer;
2. Wall description, county, Department's contract, TIP and WBS element number;
3. Wall station and number and lift location, dimensions, elevations and description;
4. Nail locations, dimensions and inclinations, bar types, sizes and grades, corrosion protection and temporary casing information;
5. Date and time drilling begins and ends, steel bars are inserted into drill holes, grout and shotcrete are mixed and arrives on-site and grout placement and shotcrete application begins and ends;
6. Grout volume, temperature, flow and density records;
7. Ground and surface water conditions and elevations if applicable;
8. Weather conditions including air temperature at time of grout placement and shotcrete application; and
9. All other pertinent details related to soil nail wall construction.

After completing each soil nail wall or stage of a wall, provide a PDF copy of all corresponding construction records.

5.0 NAIL TESTING

Test soil nails in accordance with the contract and as directed. "Verification tests" are performed on nails not incorporated into soil nail walls, i.e., sacrificial nails and "proof tests" are performed on nails incorporated into walls, i.e., production nails. Define "verification test nail" and "proof test nail" as a nail tested with either a verification or proof test, respectively. Define "test nails" as verification or proof test nails.

Verification tests are typically required for at least one nail per soil type per soil nail wall or 2 nails per wall, whichever is greater. Proof tests are typically required for at least one nail per nail row per soil nail wall or at least 5% of production nails, whichever is greater. More or less test nails may be required depending on subsurface conditions encountered. The Engineer will determine the number and locations of verification and proof tests required. The approximate known test nail locations are shown in the plans.

Do not test nails until grout and shotcrete attain the required 3 day compressive strength. Do not install any production nails until verification tests are accepted.

A. Test Equipment

Use the following equipment to test nails:

1. Two dial gauges with rigid supports,
2. Hydraulic jack and pressure gauge,
3. Jacking block or reaction frame and
4. Electrical resistance load cell (verification tests only).

Provide dial gauges with enough range and precision to measure the maximum test nail movement to 0.001". Use pressure gauges graduated in 100 psi increments or less. Submit identification numbers and calibration records for load cells, jacks and pressure gauges with the soil nail wall construction plan. Calibrate each jack and pressure gauge as a unit.

Align test equipment to uniformly and evenly load test nails. Use a jacking block or reaction frame that does not damage or contact shotcrete within 3 ft of nail heads. Place dial gauges opposite each other on either side of test nails and align gauges within 5° of bar inclinations. Set up test equipment so resetting or repositioning equipment during nail testing is not needed.

B. Test Nails

Test nails include both unbonded and bond lengths. Grout only bond lengths before nail testing. Provide unbonded and bond lengths of at least 3 ft and 10 ft, respectively.

Steel bars for production nails may be overstressed under higher test nail loads. If necessary, use larger size or higher grade bars with more capacity for test nails instead of shortening bond lengths to less than the minimum required.

C. Verification Tests

Install verification test nails with the same equipment, installation methods and drill hole diameter and inclination as production nails.

Determine maximum bond length for verification test nails (L_{BVT}) using the following:

$$L_{BVT} \leq (C_{RT} \times A_t \times f_y) / (Q_{ALL} \times 3)$$

Where,
L_{BVT} = bond length (ft),
C_{RT} = reduction coefficient, 0.9 for Grade 60 and 75 bars or 0.8 for Grade 150 bars,
A_t = bar area (in^2),
f_y = bar yield stress (ksi) and
Q_{ALL} = allowable unit grout/ground bond strength (kips/ft).

Determine design test load for verification test nails (DTL_{VT}) based on as-built bond length and allowable unit grout/ground bond strength using the following:

$$DTL_{VT} = L_{BVT} \times Q_{ALL}$$

Where,
DTL_{VT} = design test load (kips).

Perform verification tests by incrementally loading nails to failure or a load of 300% of DTL_{VT} based on the following schedule:

Load	Hold Time
AL*	1 minute
0.25 DTL_{VT}	10 minutes
0.50 DTL_{VT}	10 minutes
0.75 DTL_{VT}	10 minutes
1.00 DTL_{VT}	10 minutes
1.25 DTL_{VT}	10 minutes
1.50 DTL_{VT}	60 minutes (creep test)
1.75 DTL_{VT}	10 minutes
2.00 DTL_{VT}	10 minutes
2.50 DTL_{VT}	10 minutes
3.00 DTL_{VT}	10 minutes
AL*	1 minute

* Alignment load (AL) is the minimum load needed to align test equipment and should not exceed 0.05 DTL_{VT}.

Reset dial gauges to zero after applying alignment load. Record test nail movement at each load increment and permanent set after load is reduced to alignment load. Monitor verification test nails for creep at the 1.5 DTL_{VT} load increment. Measure and record movement during creep test at 1, 2, 3, 5, 6, 10, 20, 30, 50 and 60 minutes. Repump jack as needed to maintain load during hold times.

D. Proof Tests

Determine maximum bond length for proof test nails (L_{BPT}) using the following:

$$L_{BPT} \leq (C_{RT} \times A_t \times f_y) / (Q_{ALL} \times 1.5)$$

Where variables are defined in Section 5.0(C) above.

Determine design test load for proof test nails (DTL_{PT}) based on as-built bond length and allowable unit grout/ground bond strength using the following:

$$DTL_{PT} = L_{BPT} \times Q_{ALL}$$

Where variables are defined in Section 5.0(C) above.

Perform proof tests by incrementally loading nails to failure or a load of 150% of DTL_{PT} based on the following schedule:

Load	Hold Time
AL*	Until movement stabilizes
0.25 DTL_{PT}	Until movement stabilizes
0.50 DTL_{PT}	Until movement stabilizes
0.75 DTL_{PT}	Until movement stabilizes
1.00 DTL_{PT}	Until movement stabilizes
1.25 DTL_{PT}	Until movement stabilizes
1.50 DTL_{PT}	10 or 60 minutes (creep test)
AL*	1 minute

* Alignment load (AL) is the minimum load needed to align test equipment and should not exceed 0.05 DTL_{PT}.

Reset dial gauges to zero after applying alignment load. Record test nail movement at each load increment and monitor proof test nails for creep at the 1.5 DTL_{PT} load increment. Measure and record movement during creep test at 1, 2, 3, 5, 6 and 10 minutes. If test nail movement between 1 and 10 minutes is greater than 0.04", maintain the 1.5 DTL_{PT} load increment for an additional 50 minutes and record movement at 20, 30, 50 and 60 minutes. Repump jack as needed to maintain load during hold times.

E. Test Nail Acceptance

Submit 2 copies of test nail records including load versus movement and time versus creep movement plots within 24 hours of completing each verification or proof test. The Engineer will review the test nail records to determine if test nails are acceptable. Test nail acceptance is based in part on the following criteria.

1. For verification tests, total movement during creep test is less than 0.08" between the 6 and 60 minute readings and creep rate is linear or decreasing throughout hold time.
2. For proof tests, total movement during creep test is less than 0.04" between the 1 and 10 minute readings or less than 0.08" between the 6 and 60 minute readings and creep rate is linear or decreasing throughout hold time.
3. Total movement at maximum load exceeds 80% of the theoretical elastic elongation of the unbonded length.
4. Pullout failure does not occur at or before the 2.0 DTL_{VT} or 1.5 DTL_{PT} load

increment. Define "pullout failure" as the inability to increase load while movement continues. Record pullout failure load as part of test nail data.

For proof test nails, maintain stability of unbonded lengths for subsequent grouting. If a proof test nail is accepted but the unbonded length cannot be satisfactorily grouted, do not incorporate the proof test nail into the soil nail wall and add another production nail to replace the test nail.

If the Engineer determines a verification test nail is unacceptable, revise the soil nail design or installation methods. Submit a revised soil nail wall design or construction plan for acceptance and provide acceptable verification test nails with the revised design or installation methods.

If the Engineer determines a proof test nail is unacceptable, either perform additional proof tests on adjacent production nails or revise the soil nail design or installation methods for the production nails represented by the unacceptable proof test nail as determined by the Engineer. Submit a revised soil nail wall design or construction plan for acceptance, provide an acceptable proof test nail with the revised design or installation methods and install additional production nails for the nails represented by the unacceptable proof test nail.

After completing nail testing for each soil nail wall or stage of a wall, provide a PDF copy of all corresponding test nail records.

6.0 MEASUREMENT AND PAYMENT

Soil Nail Retaining Walls will be measured and paid in square feet. Soil nail walls will be measured as the square feet of wall face area with the pay height equal to the difference between top of wall and top of leveling pad elevations. Define "top of wall" as top of concrete facing.

The contract unit price for *Soil Nail Retaining Walls* will be full compensation for providing designs, submittals, labor, tools, equipment and soil nail wall materials, excavating, hauling and removing excavated materials, installing soil nails, grouting, shotcreting and supplying wall drainage systems, leveling pads, concrete facing and any incidentals necessary to construct soil nail walls. The contract unit price for *Soil Nail Retaining Walls* will also be full compensation for brick veneers, if required. No additional payment will be made and no extension of completion date or time will be allowed for repairing property damage, overexcavations or unstable excavations, unacceptable test nails or thicker shotcrete or concrete facing.

The contract unit price for *Soil Nail Retaining Walls* does not include the cost for ditches, fences, handrails, barrier or guardrail associated with soil nail walls as these items will be paid for elsewhere in the contract.

Soil Nail Verification Tests and *Soil Nail Proof Tests* will be measured and paid in units of each. Soil nail testing will be measured as the number of initial verification or proof tests

performed. The contract unit prices for *Soil Nail Verification Tests* and *Soil Nail Proof Tests* will be full compensation for initial nail testing. No payment will be made for subsequent nail testing performed on the same or replacement test nails.

Payment will be made under:

Pay Item	**Pay Unit**
Soil Nail Retaining Walls	Square Foot
Soil Nail Verification Tests	Each
Soil Nail Proof Tests	Each

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SOLDIER PILE RETAINING WALLS (11-19-13)

1.0 GENERAL

Construct soldier pile retaining walls consisting of driven or drilled-in steel H-piles with either precast concrete panels in between piles or a cast-in-place reinforced concrete face attached to front of piles unless required otherwise in the plans. Timber lagging is typically used for temporary support of excavations during construction. Provide cast-in-place reinforced concrete coping as required. Design and construct soldier pile retaining walls based on actual elevations and wall dimensions in accordance with the contract and accepted submittals. Use a prequalified Cantilever Wall Contractor to construct soldier pile retaining walls. Define "soldier pile wall" as a soldier pile retaining wall. Define "panel" as a precast concrete panel and "concrete facing" as a cast-in-place reinforced concrete face. Define "pile" as a steel H-pile and "coping" as cast-in-place concrete coping.

2.0 MATERIALS

Refer to the *Standard Specifications*.

Item	Section
Anchor Pins	1056-2
Curing Agents	1026
Flowable Fill, Excavatable	1000-6
Geosynthetics	1056
Joint Materials	1028
Masonry	1040
Neat Cement Grout, Nonshrink	1003
Portland Cement Concrete	1000
Reinforcing Steel	1070
Retaining Wall Panels	1077
Select Material, Class VI	1016
Shoulder Drain Materials	816-2
Steel H-Piles	1084-1
Untreated Timber	1082-2
Welded Stud Shear Connectors	1072-6
Wire Staples	1060-8(D)

Provide Type 2 geotextile for separation geotextiles and Class VI select material (standard size No. 57 stone) for leveling pads and backfilling. Use Class A concrete for concrete facing and coping and Class A concrete that meets Article 450-2 of the *Standard Specifications* for drilled-in piles. Use untreated timber with a thickness of at least 3" and a bending stress of at least 1,000 psi for timber lagging.

Unless required otherwise in the contract, produce panels with a smooth flat final finish that meets Article 1077-11 of the *Standard Specifications*. When noted in the plans, produce panels with an exposed aggregate finish that meets Article 1077-12 of the *Standard Specifications*. Produce panels within 1/4" of the panel dimensions shown in the accepted submittals. Damaged panels with excessive discoloration, chips or cracks as

determined by the Engineer will be rejected.

For soldier pile walls with panels, galvanize piles in accordance with Section 1076 of the *Standard Specifications*. When noted in the plans, paint galvanized piles in accordance with Article 442-12 of the *Standard Specifications*. Apply the following system to paint galvanized piles gray with waterborne paints that meet Article 1080-11 of the *Standard Specifications*. For painting galvanized piles other colors, contact the Materials and Tests (M&T) Unit for an appropriate paint system.

GRAY PAINT SYSTEM FOR GALVANIZED PILES			
Coat	**Color**	**Dry/Wet Film Thickness (Mils)**	
		Min.	**Max.**
Intermediate	Brown	3.0 DFT	5.0 DFT
Stripe	White	4.0 WFT	7.0 WFT
Topcoat	Gray	2.0 DFT	4.0 DFT
Total		**5.0 DFT**	**9.0 DFT**

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

3.0 PRECONSTRUCTION REQUIREMENTS

A. Soldier Pile Wall Surveys

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

B. Soldier Pile Wall Designs

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

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

Design soldier pile walls in accordance with the plans and Article 11.8 of the *AASHTO LRFD Bridge Design Specifications* unless otherwise required. Design soldier pile

walls for seismic if walls are located in seismic zone 2 based on Figure 2-1 of the *Structure Design Manual*. Design soldier pile walls for a maximum deflection of 2" or 1.5% of H, whichever is less, with H as shown in the plans.

When noted in the plans, design soldier pile walls for a live load (traffic) surcharge of 250 lb/sf in accordance with Article 11.5.6 of the AASHTO LRFD specifications. For steel beam guardrail with 8 ft posts above soldier pile walls, analyze walls for a horizontal load (P_{H1}) of 300 lb/ft of wall in accordance with Figure 3.11.6.3-2(a) of the AASHTO LRFD specifications. For concrete barrier rail above soldier pile walls, analyze walls for a P_{H1} of 500 lb/ft of wall in accordance with Figure 3.11.6.3-2(a).

Use a maximum H-pile spacing of 10 ft. At the Contractor's option, use driven or drilled-in piles for soldier pile walls with concrete facing unless otherwise required. For soldier pile walls with panels, use drilled-in piles unless noted otherwise in the plans. Use concrete or grout for embedded portions of drilled-in piles. Install drilled-in piles by excavating holes with diameters that will result in at least 3" of clearance all around piles.

Provide temporary support of excavations for excavations more than 4 ft deep and timber lagging in accordance with the *AASHTO Guide Design Specifications for Bridge Temporary Works*. At the Contractor's option and when noted in the plans, provide temporary slopes instead of temporary support of excavations. Do not extend temporary slopes outside right-of-way or easement limits. Except for fill sections or when using temporary slopes, backfill voids behind panels, lagging and piles with No. 57 stone. Place separation geotextile between No. 57 stone and overlying fill or pavement sections except when concrete pavement, full depth asphalt or cement treated base is placed directly on stone.

At the Contractor's option, use panels or concrete facing unless required otherwise in the plans. Design panels and concrete facing in accordance with the plans and Section 5 of the *AASHTO LRFD Bridge Design Specifications*. Provide reinforcing steel of sufficient density to satisfy Article 5.7.3.4 of the AASHTO LRFD specifications. Use panels or concrete facing with the dimensions shown in the plans and attach facing to front of H-piles with welded stud shear connectors.

Use No. 57 stone for aggregate leveling pads. Use 6" thick leveling pads beneath panels and concrete facing. Unless required otherwise in the plans, embed top of leveling pads at least 12" below bottom of walls shown in the plans.

Provide wall drainage systems consisting of geocomposite drain strips, drains and outlet components. Place drain strips with a horizontal spacing of no more than 10 ft and center strips between adjacent piles. Attach drain strips to front of timber lagging or back of panels or concrete facing and connect strips to leveling pads. Locate a continuous aggregate shoulder drain along the base of panels or concrete facing in front of piles and leveling pads. Provide drains and outlet components in accordance with Standard Drawing No. 816.02 of the *Roadway Standard Drawings*.

Unless required otherwise in the plans, use cast-in-place reinforced concrete coping at top of soldier pile walls with panels. Use coping dimensions shown in the plans and at the Contractor's option, connect coping to panels with dowels or extend coping down back of panels. When concrete barrier rail is required above soldier pile walls, use concrete barrier rail with moment slab as shown in the plans.

Submit working drawings and design calculations for acceptance in accordance with Article 105-2 of the *Standard Specifications*. Submit working drawings showing plan views, wall profiles with pile locations, typical sections and details of piles, drainage, temporary support, leveling pads, panels and concrete facing. If necessary, include details on working drawings for coping, concrete barrier rail with moment slab and obstructions extending through walls or interfering with piles, barriers or moment slabs. Submit design calculations including deflection calculations for each wall section with different surcharge loads, geometry or material parameters. Include analysis of temporary conditions in design calculations. When designing soldier pile walls with computer software, a hand calculation is required for the tallest wall section.

C. Soldier Pile Wall Construction Plan

Submit 4 copies and a PDF copy of a soldier pile wall construction plan at least 30 days before the preconstruction meeting. Do not begin soldier pile wall construction until the construction plan submittal is accepted. Provide project specific information in the soldier pile wall construction plan including a detailed construction sequence. For driven piles, submit proposed pile driving methods and equipment in accordance with Subarticle 450-3(D)(2) of the *Standard Specifications*. For drilled-in piles, submit installation details including drilling equipment and methods for stabilizing and filling holes. Provide details in the construction plan of excavations including temporary support and any other information shown in the plans or requested by the Engineer.

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

D. Preconstruction Meeting

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

4.0 CONSTRUCTION METHODS

Control drainage during construction in the vicinity of soldier pile walls. Direct run off away from soldier pile walls and areas above and behind walls. Contain and maintain No. 57 stone and backfill and protect material from erosion.

Notify the Engineer before blasting in the vicinity of soldier pile walls. Perform blasting in accordance with the contract. Unless required otherwise in the plans, install foundations located behind soldier pile walls before beginning wall construction if the horizontal distance to the closest foundation is less than the height of the tallest wall section.

Install soldier pile walls in accordance with the accepted submittals and as directed. Do not excavate behind soldier pile walls unless a temporary slope is shown in the accepted submittals. If overexcavation occurs and is not approved, repair walls with an approved method and a revised soldier pile wall design or construction plan may be required.

A. Piles

If a temporary slope is shown in the accepted submittals, excavate the slope before installing piles. Otherwise, install piles before excavating for soldier pile walls. Weld stud shear connectors to piles in accordance with Article 1072-6 of the *Standard Specifications*.

Install piles within 1" of horizontal and vertical alignment shown in the accepted submittals and with no negative batter (piles leaning forward). Minimize alignment variations between piles for soldier pile walls with concrete facing since variations can result in thicker concrete facing in some locations in order to provide the minimum required facing thickness elsewhere. Locate piles so the minimum required concrete facing thickness, if applicable, and roadway clearances are maintained for variable pile alignments.

Install piles with the minimum required embedment in accordance with Subarticles 450-3(D) and 450-3(E) of the *Standard Specifications*. Piles may be installed with a vibratory hammer as approved by the Engineer. Do not splice piles. If necessary, cut off piles at elevations shown in the accepted submittals along a plane normal to the pile axis.

Use pile excavation to install drilled-in piles. If overexcavation occurs, fill to required elevations with No. 57 stone before setting piles. After filling holes with concrete or grout to the elevations shown in the accepted submittals, remove any fluids and fill remaining portions of holes with flowable fill. Cure concrete or grout at least 7 days before excavating.

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

B. Excavation

If a temporary slope is shown in the accepted submittals, excavate the slope as shown. Otherwise, excavate in front of piles from the top down in accordance with the accepted submittals. Excavate in staged horizontal lifts with a maximum height of 5 ft. Use timber lagging or an alternate approved method for temporary support of excavations in accordance with the accepted submittals.

Install temporary support within 24 hours of excavating each lift unless otherwise approved. The installation may be delayed if it can be demonstrated that delays will not adversely affect excavation stability. If excavation faces will be exposed for more than 24 hours, use polyethylene sheets anchored at top and bottom of lifts to protect excavation faces from changes in moisture content.

If an excavation becomes unstable at any time, suspend soldier pile wall construction and temporarily stabilize the excavation by immediately placing an earth berm up against the unstable excavation face. When this occurs, repair walls with an approved method and a revised soldier pile wall design or construction plan may be required.

Remove flowable fill and material in between piles as necessary to install timber lagging. Position lagging with at least 3" of contact in the horizontal direction between the lagging and pile flanges. Do not excavate the next lift until temporary support for the current lift is accepted.

C. Wall Drainage Systems

Install wall drainage systems as shown in the accepted submittals and in accordance with Section 816 of the *Standard Specifications*. Place geocomposite drain strips with the geotextile side facing away from wall faces. Secure drain strips so strips are in continuous contact with surfaces to which they are attached and allow for full flow the entire height of soldier pile walls. Discontinuous drain strips are not allowed. If splices are needed, overlap drain strips at least 12" so flow is not impeded. Connect drain strips to leveling pads by embedding strip ends at least 4" into No. 57 stone.

D. Leveling Pads, Panels, Coping and Concrete Facing

Construct aggregate leveling pads at elevations and with dimensions shown in the accepted submittals. Compact leveling pads with a vibratory compactor to the satisfaction of the Engineer.

Set panels against pile flanges as shown in the accepted submittals. Position panels with at least 2" of contact in the horizontal direction between the panels and pile flanges. If contact cannot be maintained, remove panels, fill gaps with joint filler and reset panels. Securely support panels until enough No. 57 stone or backfill is placed to hold panels in place.

Construct coping as shown in the accepted submittals and Subarticle 452-3(C) of the *Standard Specifications*. When single faced precast concrete barrier is required in front of and against soldier pile walls, stop coping just above barrier so coping does not interfere with placing barrier up against wall faces.

Construct concrete facing in accordance with the accepted submittals and Section 420 of the *Standard Specifications*. Do not remove forms until concrete attains a compressive strength of at least 2,400 psi. Unless required otherwise in the plans, provide a Class 2 surface finish for concrete facing that meets Subarticle 420-17(F) of the *Standard Specifications*. Construct concrete facing joints at a spacing of 10 ft to 12

ft unless required otherwise in the plans. Make 1/2" thick expansion joints that meet Article 420-10 of the *Standard Specifications* for every third joint and 1/2" deep grooved contraction or sawed joints that meet Subarticle 825-10(B) or 825-10(E) respectively for the remaining joints. Stop reinforcing steel for concrete facing 2" on either side of expansion joints.

If a brick veneer is required, construct brick masonry in accordance with Section 830 of the *Standard Specifications*. Anchor brick veneers to soldier pile walls with approved brick to concrete type anchors in accordance with the manufacturer's instructions. Space anchors no more than 16" apart in the vertical direction and no more than 32" apart in the horizontal direction with each row of anchors staggered 16" from the row above and below.

Seal joints above and behind soldier pile walls between coping or concrete facing and concrete slope protection with silicone sealant.

E. Backfill

For fill sections or if a temporary slope is shown in the accepted submittals, backfill behind piles, panels and concrete facing in accordance with Article 410-8 of the *Standard Specifications*. Otherwise, backfill voids behind panels, lagging and piles with No. 57 stone as shown in the accepted submittals. Ensure all voids between panels and lagging and between piles, lagging and excavation faces are filled with No. 57 stone. Compact stone to the satisfaction of the Engineer. When separation geotextiles are required, overlap adjacent geotextiles at least 18" and hold separation geotextiles in place with wire staples or anchor pins as needed.

F. Pile Coatings

For soldier pile walls with panels, clean exposed galvanized or painted surfaces of piles with a 2,500 psi pressure washer after wall construction is complete. Repair galvanized surfaces that are exposed and damaged in accordance with Article 1076-7 of the *Standard Specifications*. Repair painted surfaces that are exposed and damaged by applying 4.0 to 7.0 mils wet film thickness of a topcoat to damaged areas with brushes or rollers. Use the same paint for damaged areas that was used for the topcoat when painting piles initially. Feather or taper topcoats in damaged areas to be level with surrounding areas.

5.0 MEASUREMENT AND PAYMENT

Soldier Pile Retaining Walls will be measured and paid in square feet. Soldier pile walls will be measured as the square feet of wall face area with the pay height equal to the difference between top of wall and top of leveling pad elevations. Define "top of wall" as top of coping or top of panels or concrete facing for soldier pile walls without coping.

The contract unit price for *Soldier Pile Retaining Walls* will be full compensation for

providing designs, submittals, labor, tools, equipment and soldier pile wall materials, installing piles, excavating, backfilling, hauling and removing excavated materials and supplying temporary support of excavations, wall drainage systems, leveling pads, panels, concrete facing, No. 57 stone, geotextiles and any incidentals necessary to construct soldier pile walls. The contract unit price for *Soldier Pile Retaining Walls* will also be full compensation for coping, pile coatings and brick veneers, if required. No additional payment will be made and no extension of completion date or time will be allowed for repairing overexcavations or unstable excavations or thicker concrete facing.

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

Where it is necessary to provide backfill material behind soldier pile walls from sources other than excavated areas or borrow sources used in connection with other work in the contract, payment for furnishing and hauling such backfill material will be paid as extra work in accordance with Article 104-7 of the *Standard Specifications*. Placing and compacting such backfill material is not considered extra work but is incidental to the work being performed.

Payment will be made under:

Pay Item	**Pay Unit**
Soldier Pile Retaining Walls	Square Foot

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PILE DRIVING CRITERIA **(9-18-12)**

Revise the *2012 Standard Specifications* as follows:

Page 4-72, Subarticle 450-3(D)(3) Required Driving Resistance, lines 26-30, delete first paragraph and replace with the following:

The Engineer will determine if the proposed pile driving methods and equipment are acceptable and provide the blows/ft and equivalent set for the required driving resistance noted in the plans, i.e., "pile driving criteria" except for structures with pile driving analyzer (PDA) testing. For structures with PDA testing, provide pile driving criteria for any bents and end bents with piles in accordance with Subarticle 450-3(F)(4).

Page 4-73, Subarticle 450-3(F) Pile Driving Analyzer, lines 45-48, delete third paragraph and replace with the following:

The Engineer will complete the review of the proposed pile driving methods and equipment within 7 days of receiving PDA reports and pile driving criteria. Do not place concrete for caps or footings on piles until PDA reports and pile driving criteria have been accepted.

Page 4-75, Subarticle 450-3(F) Pile Driving Analyzer, add the following:

(4) Pile Driving Criteria

Analyze pile driving with the GRL Wave Equation Analysis Program (GRLWEAP) manufactured by Pile Dynamics, Inc. Use the same PDA Consultant that provides PDA reports to perform GRLWEAP analyses and develop pile driving criteria. Provide driving criteria sealed by an engineer approved as a Project Engineer (key person) for the same PDA Consultant.

Analyze pile driving so driving stresses, energy transfer, ram stroke and blows/ft from PDA testing and resistances from CAPWAP analyses correlate to GRLWEAP models. Provide pile driving criteria for each combination of required driving resistance and pile length installed for all pile types and sizes. Submit 2 copies of pile driving criteria with PDA reports. Include the following for driving criteria:

(a) Project information in accordance with Subarticle 450-3(F)(3)(a)
(b) Table showing blows/ft and equivalent set vs. either stroke for multiple strokes in increments of 6" or bounce chamber pressure for multiple pressures in increments of 1 psi
(c) Maximum stroke or blows/ft or pile cushion requirements to prevent overstressing piles as needed
(d) GRLWEAP software version information
(e) PDF copy of all pile driving criteria and executable GRLWEAP input and output files

Page 4-76, Article 450-4 MEASUREMENT AND PAYMENT, add the following:

The contract unit price for *PDA Testing* will also be full compensation for performing GRLWEAP analysis and developing and providing pile driving criteria.

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MECHANICALLY STABILIZED EARTH RETAINING WALLS (11-19-13)

1.0 GENERAL

Construct mechanically stabilized earth (MSE) retaining walls consisting of steel or geosynthetic reinforcement in the reinforced zone connected to vertical facing elements. The facing elements may be precast concrete panels or segmental retaining wall (SRW) units unless required otherwise in the plans or the *NCDOT Policy for Mechanically Stabilized Earth Retaining Walls* prohibits the use of SRW units. At the Contractor's option, use coarse or fine aggregate in the reinforced zone of MSE retaining walls except do not use fine aggregate for walls subject to scour, walls that support or are adjacent to railroads or walls with design heights greater than 35 ft or internal acute corners less than 45°. Provide reinforced concrete coping as required. Design and construct MSE retaining walls based on actual elevations and wall dimensions in accordance with the contract and accepted submittals. Use a prequalified MSE Wall Installer to construct MSE retaining walls.

Define "MSE wall" as a mechanically stabilized earth retaining wall and "MSE Wall Vendor" as the vendor supplying the chosen MSE wall system. Define a "segmental retaining wall" as an MSE wall with SRW units. Define an "abutment wall" as an MSE wall with bridge foundations in any portion of the reinforced zone or an MSE wall connected to an abutment wall. Even if bridge foundations only penetrate a small part of the reinforced zone, the entire MSE wall is considered an abutment wall.

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

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

2.0 MATERIALS

Refer to the *Standard Specifications*.

Item	Section
Aggregate	1014
Anchor Pins	1056-2
Curing Agents	1026
Geotextiles, Type 2	1056
Joint Materials	1028

Portland Cement Concrete, Class A	1000
Precast Retaining Wall Coping	1077
Reinforcing Steel	1070
Retaining Wall Panels	1077
Segmental Retaining Wall Units	1040-4
Shoulder Drain Materials	816-2
Wire Staples	1060-8(D)

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

Use panels and SRW units from producers approved by the Department and licensed by the MSE Wall Vendor. Unless required otherwise in the contract, produce panels with a smooth flat final finish that meets Article 1077-11 of the *Standard Specifications*. Accurately locate and secure reinforcement connectors in panels and maintain required concrete cover. Produce panels within 1/4" of the panel dimensions shown in the accepted submittals.

Damaged panels or SRW units with excessive discoloration, chips or cracks as determined by the Engineer will be rejected. Do not damage reinforcement connection devices or mechanisms in handling or storing panels and SRW units.

Store steel materials on blocking at least 12" above the ground and protect it at all times from damage; and when placing in the work make sure it is free from dirt, dust, loose mill scale, loose rust, paint, oil or other foreign materials. Handle and store geosynthetics in accordance with Article 1056-2 of the *Standard Specifications*. Load, transport, unload and store MSE wall materials so materials are kept clean and free of damage. Bent, damaged or defective materials will be rejected.

A. Aggregate

Use standard size No. 57, 57M, 67 or 78M that meets Table 1005-1 of the *Standard Specifications* for coarse aggregate except do not use No. 57 or 57M stone in the reinforced zone of MSE walls with geosynthetic reinforcement. Use the following for fine aggregate:

1. Standard size No. 1S, 2S, 2MS or 4S that meets Table 1005-2 of the *Standard Specifications* or
2. Gradation that meets Class III, Type 3 select material in accordance with Article 1016-3 of the *Standard Specifications*.

Fine aggregate is exempt from mortar strength in Subarticle 1014-1(E) of the *Standard Specifications*. Provide fine aggregate that meets the following requirements:

FINE AGGREGATE REQUIREMENTS					
Reinforcement or Connector Material	**pH**	**Resistivity**	**Chlorides**	**Sulfates**	**Organics**
Steel	5-10	$\geq$ 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. Steel Reinforcement

Provide Type 1 material certifications in accordance with Article 106-3 of the *Standard Specifications* for steel reinforcement. Use welded wire grid reinforcement ("mesh", "mats" and "ladders") that meet Article 1070-3 of the *Standard Specifications* and metallic strip reinforcement ("straps") that meet ASTM A572 or A1011. Galvanize steel reinforcement in accordance with Section 1076 of the *Standard Specifications*.

2. Geosynthetic Reinforcement

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

C. Bearing Pads

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

BEARING PAD THICKNESS REQUIREMENTS

Panel Facing Area (A)	Minimum Pad Thickness After Compression (based on 2 times panel weight above pads)
$A \leq 30$ sf	1/2"
30 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 wall face area with the pay height equal to the difference between top of wall and top of leveling pad elevations. Define “top of wall” as top of coping or top of panels or SRW units for MSE walls without coping.

The contract unit price for *MSE Retaining Wall No. __* will be full compensation for providing designs, submittals, labor, tools, equipment and MSE wall materials, excavating, 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

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7/23/2014

CONCRETE BARRIER RAIL WITH MOMENT SLAB (1-17-12)

1.0 GENERAL

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

2.0 MATERIALS

Refer to Division 10 of the *Standard Specifications*.

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

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

3.0 CONSTRUCTION METHODS

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

4.0 MEASUREMENT AND PAYMENT

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

Payment will be made under:

Pay Item	Pay Unit
Concrete Barrier Rail with Moment Slab	Linear Foot

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7/23/2014

REINFORCED SOIL SLOPES: (11-19-13)

Description

Construct reinforced soil slopes (RSS) consisting of select material and geogrid reinforcement in the reinforced zone with permanent soil reinforcement matting on slope faces. Construct RSS in accordance with the contract and if included in the plans, Standard Drawing No. 1803.01. RSS are required to reinforce embankments and stabilize slopes at locations shown in the plans and as directed. Define "geogrids" as primary or secondary geogrids and "standard RSS" as a RSS that meets the standard reinforced soil slope drawing (Standard Drawing No. 1803.01).

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	Section
Anchor Pins	1056-2
Select Material	1016
Shoulder and Slope Borrow	1019-2
Wire Staples	1060-8(D)

Unless required otherwise in the plans, use Class I, II or III select material in the reinforced zone for 1.5:1 (H:V) or flatter RSS. For RSS steeper than 1.5:1 (H:V), use Class I select material in the reinforced zone that meets Article 1019-2 of the *Standard Specifications* except for select material that meets AASHTO M 145 for soil classifications A-4 and A-5. Do not use A-4 or A-5 soil or Class II or III select material for RSS steeper than 1.5:1 (H:V).

Use permanent soil reinforcement matting on slope faces of RSS that meets the *Permanent Soil Reinforcement Mat* provision.

(A) Geogrids

Handle and store geogrids in accordance with Article 1056-2 of the *Standard Specifications*. Define "machine direction" (MD) and "cross-machine direction" (CD) for geogrids in accordance with ASTM D4439. Provide Type 1 material certifications for geogrid strengths in the MD and CD in accordance with Article 1056-3 of the *Standard Specifications*. Test geogrids in accordance with ASTM D6637.

Use geogrids with a roll width of at least 4 ft. Use primary geogrids with an "approved" status code and secondary geogrids with an "approved" or "approved for provisional use" status code. Do not use geogrids with an "approved for provisional use" status code for primary geogrids. The list of approved geogrids is available from: connect.ncdot.gov/resources/Materials/Pages/SoilsLaboratory.aspx

Provide geogrids with design strengths in accordance with the plans. For standard RSS and based on actual RSS angle and height and select material to be used in the reinforced zone at each standard RSS location, provide geogrids with long-term design strengths in accordance with Standard Drawing No. 1803.01. Geogrids are typically approved for ultimate tensile strengths in the MD and CD or long-term design strengths for a 75-year design life in the MD based on material type. Define material type from the website above for select material as follows:

Material Type	Select Material

Borrow	Class I Select Material
Fine Aggregate	Class II or Class III Select Material

If the website does not list a long-term design strength in the MD for an approved geogrid, do not use the geogrid for primary geogrid. If the website does not list a long-term design strength in the CD for an approved geogrid, use a long-term design strength equal to the ultimate tensile strength divided by 7 for the secondary geogrid

Construction Methods

Before starting RSS construction, the Engineer may require a preconstruction meeting to discuss the construction and inspection of the RSS. If required, schedule this meeting after all material certifications have been submitted. The Resident or District Engineer, Roadway Construction Engineer, Geotechnical Operations Engineer, Contractor and RSS Contractor Superintendent will attend this preconstruction meeting.

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

Excavate as necessary for RSS in accordance with the contract. Maintain a horizontal clearance of at least 12" between the ends of primary geogrids and limits of reinforced zone as shown in the plans. When excavating existing slopes, bench slopes in accordance with Subarticle 235-3(A) of the *Standard Specifications*. Notify the Engineer when excavation is complete. Do not place primary geogrids until excavation dimensions and in-situ material are approved.

Place geogrids within 3" of locations shown in the plans and in slight tension free of kinks, folds, wrinkles or creases. Hold geogrids in place with wire staples or anchor pins as needed. Install geogrids with the orientation, dimensions and number of layers shown in the plans. Contact the Engineer when existing or future obstructions such as foundations, pavements, pipes, inlets or utilities will interfere with geogrids. If necessary, the top geogrid layer may be lowered up to 9" to avoid obstructions. Extend geogrids to slope faces.

Install primary geogrids with the MD perpendicular to the embankment centerline. The MD is the direction of the length or long dimension of the geogrid roll. Unless shown otherwise in the plans, do not splice or overlap primary geogrids in the MD so splices or overlaps are parallel to toe of RSS. Unless shown otherwise in the plans and except for clearances at the ends of primary geogrids, completely cover select material at each primary geogrid layer with geogrid so primary geogrids are adjacent to each other in the CD, i.e., perpendicular to the MD. The CD is the direction of the width or short dimension of the geogrid roll.

Install secondary geogrids with MD parallel to toe of RSS. Secondary geogrids should be continuous for each secondary geogrid layer. If secondary geogrid roll length is too short, overlap ends of secondary geogrid rolls at least 12" in the direction that select material will be placed to prevent lifting the edge of the top geogrid.

Place select material in the reinforced zone in 8" to 10" thick lifts and compact material in accordance with Subarticle 235-3(C) of the *Standard Specifications*. For RSS steeper than 1.5:1 (H:V), compact slope faces with an approved method. Do not use sheepsfoot, grid rollers or other types of compaction equipment with feet. Do not displace or damage geogrids when placing and compacting select material. End dumping directly on geogrids is not permitted. Do

not operate heavy equipment on geogrids until they are covered with at least 8" of select material. To prevent damaging geogrids, minimize turning and avoid sudden braking and sharp turns with compaction equipment. Replace any damaged geogrids to the satisfaction of the Engineer. Construct remaining portions of embankments outside the reinforced zone in accordance with Section 235 of the *Standard Specifications*.

Plate slope faces of RSS with at least 6" of shoulder and slope borrow except when select material in the reinforced zone meets Article 1019-2 of the *Standard Specifications*. Install permanent soil reinforcement matting in accordance with the *Permanent Soil Reinforcement Mat* provision to minimize sloughing of RSS until vegetation is established. Seed slope faces and install permanent soil reinforcement matting as soon as possible to prevent erosion damage to slope faces of RSS. If damage occurs, repair RSS and reseed slope faces before installing matting.

Measurement and Payment

Reinforced Soil Slopes will be measured and paid in square yards. RSS will be measured along the slope faces of RSS before installing permanent soil reinforcement matting as the square yards of RSS. No payment will be made for repairing damaged RSS.

The contract unit price for *Reinforced Soil Slopes* will be full compensation for providing labor, tools, equipment and RSS materials, compacting select materials and supplying and placing geogrids, select material, shoulder and slope borrow and any incidentals necessary to construct RSS except for permanent soil reinforcement matting. The contract unit price for *Reinforced Soil Slopes* will also be full compensation for excavating and hauling and removing excavated materials to install RSS.

Permanent soil reinforcement matting will be measured and paid in accordance with the *Permanent Soil Reinforcement Mat* provision.

Payment will be made under:

Pay Item	**Pay Unit**
Reinforced Soil Slopes	Square Yard

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7/23/2014

ROCK BLASTING: **(SPECIAL)**

Description

Blast rock to excavate, break up or remove rock and construct stable rock cuts using production, controlled and trench blasting. Use production blasting to fracture rock into manageable sizes for excavation. Use controlled blasting to form cut slopes in rock by limiting the effects of blasting with pre-splitting, cushion or trim blasting. Use trench blasting to create trenches in rock for utilities and pipes and construct open ditches. Provide blasting submittals, use blasting consultants, conduct pre-blast surveys and test blasts, design and monitor blasts, blast and pre-split rock and produce post-blast reports in accordance with the contract, accepted submittals and Section 220 of the *Standard Specifications*.

Project Requirements

At a minimum, conduct pre-blast surveys for any structure where a PPV of more than 0.4"/sec may occur. Determine PPV based on distance to structures and maximum charge per delay for blasts using the following:

$$PPV = K \left(D / \sqrt{W} \right)^m \quad \text{or} \quad PPV = K \, (D_S)^m$$

Where,

PPV = peak particle velocity ("/sec),
K = confinement factor (K factor),
D = distance to structure (ft),
W = maximum charge per delay (lb),
m = decay constant and
D_S = scaled distance ($ft/lb^{0.5}$).

Typically, K is 240 and m is -1.6. However, K and m are site specific and may be determined from regression analysis of multiple PPV and D_S data pairs. Select K and m based on site conditions, rock type and structure, subsurface information and blast monitoring results.

Provide pre-blast surveys and post-blast reports approved as a Project Manager (key person) for the Blast Monitoring Consultant.

Design blasts for the total project length so the PPV and air overpressure at any utility or structure meet the following blasting criteria:

Variable	Warning Level	Not-to-Exceed Limit
PPV (frequency < 40 Hz)	0.40"/sec	0.50"/sec
PPV (frequency > 40 Hz)	0.75"/sec	1.0"/sec
Air Overpressure	120 dB (linear)	133 dB (linear)

If warning levels are exceeded, the Engineer may require additional blast monitoring.

Conduct test blasts before blasting from Station 325+00 to Station 326+75.

Pre-splitting is required for rock cuts from Station 325+00 to Station 326+75.

Construction Methods

(A) Blasting Submittals

Submit 2 copies and a PDF copy of blasting plans and post-blast reports and if required, a personnel and experience submittal and pre-blast surveys. Submit one copy to the Resident Engineer and the other copy and PDF copy to the appropriate Geotechnical Engineering Unit regional office.

(1) Personnel and Experience Submittal

Submit the proposed personnel and experience submittal for acceptance at least 30 days before submitting the general blasting plan. The Engineer may waive this submittal if blasting consultants are not required and the Blaster-in-Charge was previously accepted within the last 3 years for another NCDOT project with blasting similar to that anticipated for this project. Do not submit the general blasting plan until the personnel and experience submittal is waived or a submittal is accepted.

Submit documentation that the proposed Blaster-in-Charge is approved as a Blaster-in-Charge (key person) for the Blasting Contractor and has at least 5 years of experience with subsurface conditions and blasting of a scope and complexity similar to that anticipated for this project. Documentation should include resumes, references, letters, certifications, project lists, experience descriptions and details, etc. If the Blaster-in-Charge changes, discontinue explosives use until a new Blaster-in-Charge is accepted.

If a Blast Design Consultant is required, submit documentation that the proposed independent consultant is approved as a Geotechnical Engineer (key person) for the blasting consultant. If a Blast Monitoring Consultant is required, submit documentation that the proposed independent consultant is approved as a Project Manager (key person) for the blasting consultant. Employees of the Contractor, any affiliated companies or product suppliers may not be independent consultants.

(2) Blasting Plans

Submit the proposed general blasting plan for acceptance that meets Subarticle 220-3(B) of the *Standard Specifications* and includes the site specific blasting plan format and if required, test blast locations, pre-blast survey criteria and methods and which structures require pre-blast surveys.

After a general blasting plan is accepted, submit a site specific blasting plan for each blast at least 24 hours before beginning drilling. Site specific blasting plans may be waived for non-critical blasts as determined by the Engineer. Provide site specific blasting plans that meet Subarticle 220-3(B)(4) of the *Standard Specifications* and include blast locations by station and offset, distance to nearest utility or structure and blast monitoring locations. Do not exceed the maximum charge per delay accepted in the general blasting plan or submit a revised plan to increase the maximum charge per delay allowed.

(3) Pre-Blast Surveys

If a Blast Monitoring Consultant is required, provide pre-blast surveys signed by

the Project Manager. Otherwise, provide pre-blast surveys signed by the Blaster-in-Charge.

After a general blasting plan is accepted and if pre-blast surveys are required, submit pre-blast surveys at least 24 hours before starting blasting. Provide pre-blast surveys that include at least the following:

(a) Summary with pre-blast survey date and time, comments about existing structure condition and name of individual conducting survey;

(b) 3-megapixel digital color pictures documenting existing cracks and structure condition; and

(c) If required, video recordings showing interior and exterior walls, existing cracks, foundations and structure condition.

(4) Post-Blast Reports

If a Blast Monitoring Consultant is required, provide blast monitoring results signed by the Project Manager. Provide post-blast reports that meet Subarticle 220-3(E) of the *Standard Specifications*.

(B) Blast Designs

Design blasts in accordance with the Project Requirements Section of this provision, if applicable, Subarticle 220-3(A) of the *Standard Specifications* and the following unless otherwise approved:

(1) Production Blasting

(a) Provide at least 6 ft clearance between production blast holes and slope faces.

(b) Drill production blast holes with a maximum diameter of 6".

(c) Do not drill production blast holes below bottom of adjacent controlled blast holes.

(d) Use delay blasting to detonate production blast holes towards a free face.

(2) Controlled Blasting

Use controlled blasting for slopes steeper than 1.5:1 (H:V) with rock cuts taller than 10 ft.

(a) Pre-Splitting

(i) Drill pre-split blast holes with a diameter of 2" to 3".

(ii) Space pre-split blast holes at least 10 pre-split hole diameters apart.

(iii) Limit subdrilling to the offset width between lifts.

(iv) Do not subdrill below finished grade.

(v) Pre-split rock at least 30 ft beyond blasting limits or to the end of cuts.

(vi) Provide benches or lifts with a maximum height of 25 ft.

(vii) Do not use ANFO or other bulk loaded products.

(viii) Use cartridge explosives or other explosive types designed for pre-splitting.

(ix) Use charges with a maximum diameter of one-half the pre-split hole diameter except for charges in bottom 2 ft of holes.

(x) If pre-split and production blast holes are fired in the same blast, fire pre-split holes at least 25 ms before production holes.

(b) Cushion or Trim Blasting

(i) Drill cushion or trim blast holes with a maximum diameter of 6".

(ii) Limit subdrilling to that necessary for excavation of slopes.

(iii) Do not subdrill below finished grade.

(iv) Provide benches or lifts with a maximum height of 25 ft.

(v) Do not use ANFO or other bulk loaded products.

(vi) Design cushion or trim blasting with a maximum charge density and burden of one-half the charge density and burden for production blasting.

(vii) If cushion, trim and production blast holes are fired in the same blast, fire cushion or trim holes at least 25 ms after production holes.

(3) Trench Blasting

(a) Drill trench blast holes with a maximum diameter of 3".

(b) Do not use ANFO or other bulk loaded products.

(c) Use cartridge explosives or other explosive types designed for trench blasting.

(d) Use charges with a diameter of 1/2" to 3/4" less than the trench hole diameter.

(C) Test Blasts

Define a “test blast” as drilling, blasting and excavating a test section before starting or resuming blasting. If test blasts are required, conduct at least one test blast for each blast type (production, controlled or trench blasting) and location requiring test blasts.

If blasting results in injuries or damages or PPV or air overpressure limits are exceeded at any utility or structure in any direction from blasts, the Engineer may suspend blasting and require test blasts before resuming blasting. When this occurs, inform the Engineer of test blast locations before submitting blasting plans.

Submit a site specific blasting plan for each test blast at least 72 hours before beginning drilling. Conduct test blasts in accordance with the accepted submittals and Article 220-3 of the *Standard Specifications*. Production, controlled or trench blasting may not begin or resume until the post-blast report for a test blast is reviewed, the rock cut from a test

blast is fully exposed and the Engineer determines the exposed cut is acceptable. Examples of test blast results that may be unacceptable include excessive vibration, air overpressure or flyrock, overbreakage or overhangs and damaged rock cuts.

(D) Pre-Splitting Requirements

If pre-splitting is required, pre-split rock in accordance with the accepted submittals and Subarticle 220-3(D) of the *Standard Specifications*. Pre-split rock so irregularities in pre-split rock cuts between holes are less than 1 ft from slope planes.

Alignment is crucial for pre-split blast holes. Maintain pre-split hole alignment within 1' of slope planes and parallel to adjacent pre-split blast holes. Monitor and accurately measure pre-split hole alignment during drilling with a method acceptable to the Engineer.

When rock cut heights require multiple benches or lifts, offset pre-split blast holes horizontally for each lift no more than the clearance necessary for drilling equipment.

Measurement and Payment

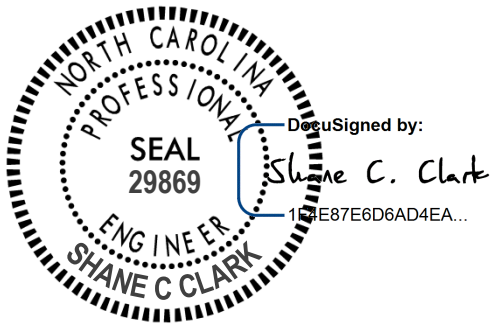
No direct payment will be made for blasting including blasting submittals, blasting consultants, pre-blast surveys, test blasts, blast monitoring, post-blast reports, scaling and stabilizing rock cuts. Blasting will be considered incidental to other items in the contract in accordance with Article 220-4 of the *Standard Specifications*.

Pre-splitting of Rock will be measured and paid in square yards. Pre-splitting will be measured along the slope faces of pre-split rock cuts as the square yards of exposed pre-split rock. No payment will be made for unsatisfactory pre-splitting as determined by the Engineer. Geologic conditions may affect pre-split results. The contractor will be compensated for successful pre-split blasting that does not result in negative outcomes such as overbreak or misalignment of holes.

No additional payment will be made and no extension of completion date or time will be allowed when the Engineer suspends blasting and requires test blasts or additional blast monitoring or blasting submittals.

Payment will be made under:

Pay Item	**Pay Unit**
Pre-splitting of Rock	Square Yard



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.

DocuSigned by:
Scott A. Hidden
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7/30/2014

TEMPORARY SOIL NAIL WALLS: (11-19-13)

Description

Construct temporary soil nail walls consisting of soil nails spaced at a regular pattern and connected to a reinforced shotcrete face. A soil nail consists of a steel bar grouted in a drilled hole inclined at an angle below horizontal. At the Contractor's option, use temporary soil nail walls instead of temporary shoring for full cut sections. Design and construct temporary soil nail walls based on actual elevations and wall dimensions in accordance with the contract and accepted submittals. Use a prequalified Anchored Wall Contractor to construct temporary soil nail walls. Define "soil nail wall" as a temporary soil nail wall and "Soil Nail Wall Contractor" as the Anchored Wall Contractor installing soil nails and applying shotcrete. Define "nail" as a soil nail.

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

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	Section
Anchor Pins	1056-2
Geocomposites	1056
Neat Cement Grout, Nonshrink	1003
Reinforcing Steel	1070
Shotcrete	1002
Select Material, Class IV	1016
Steel Plates	1072-2

Use Class IV select material (standard size No. ABC) for temporary guardrail.

Provide soil nails consisting of grouted steel bars and nail head assemblies. Use deformed steel bars that meet AASHTO M 275 or M 31, Grade 60 or 75. Splice bars in accordance with Article 1070-9 of the *Standard Specifications*.

Fabricate centralizers from schedule 40 PVC plastic pipe or tube, steel or other material not detrimental to steel bars (no wood). Size centralizers to position bars within 1" of drill hole centers and allow tremies to be inserted to ends of holes. Use centralizers that do not interfere with grout placement or flow around bars.

Provide nail head assemblies consisting of nuts, washers and bearing plates. Use steel plates for bearing plates and steel washers and hex nuts recommended by the Soil Nail Manufacturer.

Provide Type 6 material certifications for soil nail materials in accordance with Article 106-3 of the *Standard Specifications*. Store steel materials on blocking at least 12" above the ground and protect it at all times from damage; and when placing in the work make sure it is free from dirt, dust, loose mill scale, loose rust, paint, oil or other foreign materials. Load, transport, unload and store soil nail wall materials so materials are kept clean and free of damage. Bent, damaged or defective materials will be rejected.

Preconstruction Requirements

(A) Concrete Barrier

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

(B) Temporary Guardrail

Define "clear distance" behind temporary guardrail as the horizontal distance between guardrail posts and soil nail walls. At the Contractor's option or if clear distance for soil nail walls is less than 4 ft, use temporary guardrail with 8 ft posts and a clear distance of at least 2.5 ft. Place ABC in clear distance and around guardrail posts instead of pavement.

(C) Soil Nail Wall Designs

Before beginning soil nail wall design, survey existing ground elevations in the vicinity of wall locations to determine actual design heights (H). Use a prequalified Anchored Wall Design Consultant to design soil nail walls. Provide designs sealed by a Design Engineer approved as a Geotechnical Engineer (key person) for the Anchored Wall Design Consultant.

Submit 8 copies of working drawings and 3 copies of design calculations and a PDF copy of each for soil nail wall designs in accordance with Article 105-2 of the *Standard Specifications*. Submit working drawings showing plan views, wall profiles, typical sections and details of soil nail wall design and construction sequence. Include details in working drawings of soil nail locations, unit grout/ground bond strengths, shotcrete reinforcement and if necessary, obstructions extending through walls or interfering with nails. Include details in construction sequence of excavation, grouting, installing reinforcement, nail testing and shotcreting with mix designs and shotcrete nozzleman certifications. Do not begin soil nail wall construction until a design submittal is accepted.

Design soil nail walls in accordance with the plans and allowable stress design method in the *FHWA Geotechnical Engineering Circular No. 7 "Soil Nail Walls"* (Publication No. FHWA-IF-03-017) unless otherwise required.

Design soil nails that meet the following unless otherwise approved:

(1) Horizontal and vertical spacing of at least 3 ft,

(2) Inclination of at least 12° below horizontal and

(3) Diameter of 4" to 10".

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

Design soil nail walls for a traffic surcharge of 250 lb/sf if traffic will be above and within H of walls. This traffic surcharge does not apply to construction traffic. Design soil nail walls for any construction surcharge if construction traffic will be above and

within H of walls. For temporary guardrail with 8 ft posts above soil nail walls, analyze walls for a horizontal load of 300 lb/ft of wall.

Place geocomposite drain strips with a horizontal spacing of no more than 10 ft and center strips between adjacent nails. Attach drain strips to excavation faces. Use shotcrete at least 4" thick and reinforce shotcrete with #4 waler bars around nail heads. Two waler bars (one on each side of nail head) in the horizontal and vertical directions are required for a total of 4 bars per nail.

(D) Preconstruction Meeting

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

Construction Methods

Control drainage during construction in the vicinity of soil nail walls. Direct run off away from soil nail walls and areas above and behind walls.

Install foundations located behind soil nail walls before beginning wall construction. Do not excavate behind soil nail walls. If overexcavation occurs, repair walls with an approved method and a revised soil nail wall design may be required.

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

(A) Excavation

Excavate for soil nail walls from the top down in accordance with the accepted submittals. Excavate in staged horizontal lifts with no negative batter (excavation face leaning forward). Excavate lifts in accordance with the following:

(1) Heights not to exceed vertical nail spacing,

(2) Bottom of lifts no more than 3 ft below nail locations for current lift and

(3) Horizontal and vertical alignment within 6" of location shown in the accepted submittals.

Remove any cobbles, boulders, rubble or debris that will protrude more than 2" into the required shotcrete thickness. Rocky ground such as colluvium, boulder fills and weathered rock may be difficult to excavate without leaving voids.

Apply shotcrete to excavation faces within 24 hours of excavating each lift unless otherwise approved. Shotcreting may be delayed if it can be demonstrated that delays will not adversely affect excavation stability. If excavation faces will be exposed for more than 24 hours, use polyethylene sheets anchored at top and bottom of lifts to protect

excavation faces from changes in moisture content.

If an excavation becomes unstable at any time, suspend soil nail wall construction and temporarily stabilize the excavation by immediately placing an earth berm up against the unstable excavation face. When this occurs, repair walls with an approved method and a revised soil nail wall design may be required.

Do not excavate the next lift until nail installations and testing and shotcrete application for the current lift are accepted and grout and shotcrete for the current lift have cured at least 3 days and 1 day, respectively.

(B) Soil Nails

Drill and grout nails the same day and do not leave drill holes open overnight. Control drilling and grouting to prevent excessive ground movements, damaging structures and pavements or fracturing rock and soil formations. If ground heave or subsidence occurs, suspend soil nail wall construction and take corrective action to minimize movement. If property damage occurs, make repairs with an approved method and a revised soil nail wall design may be required.

(1) Drilling

Use drill rigs of the sizes necessary to install soil nails and with sufficient capacity to drill through whatever materials are encountered. Drill straight and clean holes with the dimensions and inclination shown in the accepted submittals. Drill holes within 6" of locations and 2° of inclination shown in the accepted submittals unless otherwise approved.

Stabilize drill holes with temporary casings if unstable, caving or sloughing material is anticipated or encountered. Do not use drilling fluids to stabilize drill holes or remove cuttings.

(2) Steel Bars

Center steel bars in drill holes with centralizers. Securely attach centralizers along bars at no more than 8 ft centers. Attach uppermost and lowermost centralizers 18" from excavation faces and ends of holes.

Do not insert steel bars into drill holes until hole locations, dimensions, inclination and cleanliness are approved. Do not vibrate, drive or otherwise force bars into holes. If a steel bar cannot be completely and easily inserted into a drill hole, remove the bar and clean or redrill the hole.

(3) Grouting

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

Inject grout at the lowest point of drill holes through tremies, e.g., grout tubes, casings, hollow-stem augers or drill rods, in one continuous operation. Fill drill holes progressively from ends of holes to excavation faces and withdraw tremies at a slow even rate as holes are filled to prevent voids in grout. Extend tremies into grout at least 5 ft at all times except when grout is initially placed in holes.

Provide grout free of segregation, intrusions, contamination, structural damage or inadequate consolidation (honeycombing). Cold joints in grout are not allowed except for test nails. Remove any temporary casings as grout is placed and record grout volume for each drill hole.

(4) Nail Heads

Install nail head assemblies after shotcreting. Before shotcrete reaches initial set, seat bearing plates and tighten nuts so plates contact shotcrete uniformly. If uniform contact is not possible, install nail head assemblies on mortar pads so nail heads are evenly loaded.

(C) Drain Strips

Install geocomposite drain strips as shown in the accepted submittals. Before installing shotcrete reinforcement, place drain strips with the geotextile side against excavation faces. For highly irregular faces and at the discretion of the Engineer, drain strips may be placed after shotcreting over weep holes through the shotcrete. Hold drain strips in place with anchor pins so strips are in continuous contact with surfaces to which they are attached and allow for full flow the entire height of soil nail walls. Discontinuous drain strips are not allowed. If splices are needed, overlap drain strips at least 12" so flow is not impeded. Cut off excess drain strip length and expose strip ends below shotcrete when soil nail wall construction is complete.

(D) Shotcrete

Clean ungrouted zones of drill holes and excavation faces of loose materials, mud, rebound and other foreign material. Moisten surfaces to receive shotcrete. Install shotcrete reinforcement in accordance with the contract and accepted submittals. Secure reinforcing steel so shooting does not displace or vibrate reinforcement. Install approved thickness gauges on 5 ft centers in the horizontal and vertical directions to measure shotcrete thickness.

Apply shotcrete in accordance with the contract, accepted submittals and Subarticle 1002-3(F) of the *Standard Specifications*. Use approved shotcrete nozzlemen who made satisfactory preconstruction test panels to apply shotcrete. Direct shotcrete at right angles to excavation faces except when shooting around reinforcing steel. Rotate nozzle steadily in small circular patterns and apply shotcrete from bottom of lifts up.

Make shotcrete surfaces uniform and free of sloughing or sagging. Completely fill ungrouted zones of drill holes and any other voids with shotcrete. Taper construction joints to a thin edge over a horizontal distance of at least the shotcrete thickness. Wet joint surfaces before shooting adjacent sections.

Repair surface defects as soon as possible after shooting. Remove any shotcrete which lacks uniformity, exhibits segregation, honeycombing or lamination or contains any voids or sand pockets and replace with fresh shotcrete to the satisfaction of the Engineer. Protect shotcrete from freezing and rain until shotcrete reaches initial set.

(E) Construction Records

Provide 2 copies of soil nail wall construction records within 24 hours of completing each lift. Include the following in construction records:

(1) Names of Soil Nail Wall Contractor, Superintendent, Nozzleman, Drill Rig Operator, Project Manager and Design Engineer;

(2) Wall description, county, Department's contract, TIP and WBS element number;

(3) Wall station and number and lift location, dimensions, elevations and description;

(4) Nail locations, dimensions and inclinations, bar types, sizes and grades and temporary casing information;

(5) Date and time drilling begins and ends, steel bars are inserted into drill holes, grout and shotcrete are mixed and arrives on-site and grout placement and shotcrete application begins and ends;

(6) Grout volume, temperature, flow and density records;

(7) Ground and surface water conditions and elevations if applicable;

(8) Weather conditions including air temperature at time of grout placement and shotcrete application; and

(9) All other pertinent details related to soil nail wall construction.

After completing each soil nail wall or stage of a wall, provide a PDF copy of all corresponding construction records.

Nail Testing

"Proof tests" are performed on nails incorporated into walls, i.e., production nails. Define "test nail" as a nail tested with a proof test. Proof tests are typically required for at least one nail per nail row per soil nail wall or at least 5% of production nails, whichever is greater. More or less test nails may be required depending on subsurface conditions encountered. The Engineer will determine the number and locations of proof tests required. Do not test nails until grout and shotcrete attain the required 3 day compressive strength.

(A) Test Equipment

Use the following equipment to test nails:

(1) Two dial gauges with rigid supports,

(2) Hydraulic jack and pressure gauge and

(3) Jacking block or reaction frame.

Provide dial gauges with enough range and precision to measure the maximum test nail movement to 0.001". Use pressure gauges graduated in 100 psi increments or less. Submit identification numbers and calibration records for load cells, jacks and pressure gauges with the soil nail wall design. Calibrate each jack and pressure gauge as a unit.

Align test equipment to uniformly and evenly load test nails. Use a jacking block or reaction frame that does not damage or contact shotcrete within 3 ft of nail heads. Place dial gauges opposite each other on either side of test nails and align gauges within 5° of bar inclinations. Set up test equipment so resetting or repositioning equipment during nail testing is not needed.

(B) Test Nails

Test nails include both unbonded and bond lengths. Grout only bond lengths before nail testing. Provide unbonded and bond lengths of at least 3 ft and 10 ft, respectively.

Steel bars for production nails may be overstressed under higher test nail loads. If necessary, use larger size or higher grade bars with more capacity for test nails instead of shortening bond lengths to less than the minimum required.

(C) Proof Tests

Determine maximum bond length (L_B) using the following:

$$L_B \leq (C_{RT} \times A_t \times f_y) / (Q_{ALL} \times 1.5)$$

Where,

L_B = bond length (ft),
C_{RT} = reduction coefficient, 0.9 for Grade 60 and 75 bars or 0.8 for Grade 150 bars,
A_t = bar area (in^2),
f_y = bar yield stress (ksi) and
Q_{ALL} = allowable unit grout/ground bond strength (kips/ft).

Determine design test load (DTL) based on as-built bond length and allowable unit grout/ground bond strength using the following:

$$DTL = L_B \times Q_{ALL}$$

Where,

DTL = design test load (kips).

Perform proof tests by incrementally loading nails to failure or a load of 150% of DTL based on the following schedule:

Load	Hold Time
AL*	Until movement stabilizes
0.25 DTL	Until movement stabilizes
0.50 DTL	Until movement stabilizes
0.75 DTL	Until movement stabilizes
1.00 DTL	Until movement stabilizes
1.25 DTL	Until movement stabilizes
1.50 DTL	10 or 60 minutes (creep test)
AL*	1 minute

* Alignment load (AL) is the minimum load needed to align test equipment and should not exceed 0.05 DTL.

Reset dial gauges to zero after applying alignment load. Record test nail movement at each load increment and monitor test nails for creep at the 1.5 DTL load increment. Measure and record movement during creep test at 1, 2, 3, 5, 6 and 10 minutes. If test nail movement between 1 and 10 minutes is greater than 0.04", maintain the 1.5 DTL load increment for an additional 50 minutes and record movement at 20, 30, 50 and 60 minutes. Repump jack as needed to maintain load during hold times.

(D) Test Nail Acceptance

Submit 2 copies of test nail records including load versus movement and time versus creep movement plots within 24 hours of completing each proof test. The Engineer will review the test nail records to determine if test nails are acceptable. Test nail acceptance is based in part on the following criteria.

(1) Total movement during creep test is less than 0.04" between the 1 and 10 minute readings or less than 0.08" between the 6 and 60 minute readings and creep rate is linear or decreasing throughout hold time.

(2) Total movement at maximum load exceeds 80% of the theoretical elastic elongation of the unbonded length.

(3) Pullout failure does not occur at or before the 1.5 DTL load increment. Define "pullout failure" as the inability to increase load while movement continues. Record pullout failure load as part of test nail data.

Maintain stability of unbonded lengths for subsequent grouting. If a test nail is accepted but the unbonded length cannot be satisfactorily grouted, do not incorporate the test nail into the soil nail wall and add another production nail to replace the test nail.

If the Engineer determines a test nail is unacceptable, either perform additional proof tests on adjacent production nails or revise the soil nail design or installation methods for the production nails represented by the unacceptable test nail as determined by the Engineer. Submit a revised soil nail wall design for acceptance, provide an acceptable test nail with the revised design or installation methods and install additional production nails for the nails represented by the unacceptable test nail.

After completing nail testing for each soil nail wall or stage of a wall, provide a PDF copy of all corresponding test nail records.

Measurement and Payment

Temporary soil nail walls will be measured and paid in square feet. Temporary soil nail walls will be paid for at the contract unit price for *Temporary Shoring*. Temporary soil nail walls will be measured as the square feet of exposed wall face area. No measurement will be made for any embedment or pavement thickness above soil nail walls.

The contract unit price for *Temporary Shoring* will be full compensation for providing soil nail wall designs, submittals, labor, tools, equipment and soil nail wall materials, excavating, hauling and removing excavated materials, installing and testing soil nails, grouting, shotcreting and supplying drain strips and any incidentals necessary to construct soil nail walls. No additional payment will be made and no extension of completion date or time will be allowed for repairing property damage, overexcavations or unstable excavations, unacceptable test nails or thicker shotcrete.

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

PCB will be measured and paid in accordance with Section 1170 of the *Standard Specifications*. No additional payment will be made for anchoring PCB for soil nail walls. Costs for anchoring

PCB will be incidental to soil nail walls.

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

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7/30/2014

PROJECT SPECIAL PROVISIONS
GEOENVIRONMENTAL

CONTAMINATED SOIL (8/27/2014)

The Contractor's attention is directed to the fact that soil contaminated with petroleum hydrocarbon compounds exist within the project area. The known areas of contamination are indicated on corresponding plans sheets. Information relating to these contaminated areas, sample locations, and investigation reports are available at the following web address by navigating to the correct letting year and month then selecting, "Plans and Proposals", "Yancey-Mitchell R-2519B", "GeoEnvironmental":

http://dotw-xfer01.dot.state.nc.us/dsplan/

Petroleum contaminated soil may be encountered during any earthwork activities on the project. The Contractor shall only excavate those soils that the Engineer designates necessary to complete a particular task. The Engineer shall determine if soil is contaminated based on petroleum odors and unusual soil staining. Contaminated soil not required to be excavated is to remain in place and undisturbed. Undisturbed soil shall remain in place, whether contaminated or not. The Contractor shall transport all contaminated soil excavated from the project to a facility licensed to accept contaminated soil.

In the event that the Contractor chooses to stockpile the soil temporarily, the stockpile shall be created within the property boundaries of the source material and in accordance with the Stockpile Detail found in the plans. If the volume of contaminated material exceeds available space on site, the Contractor shall obtain a permit from the NCDENR UST Section's Regional Office for off-site temporary storage. Stockpiling contaminated soil will be incidental to the project. The Contractor shall provide disposal manifests and weigh tickets to the Engineer for review and approval. The Engineer will in turn provide the GeoEnvironmental Section with a copy of the disposal manifests and weigh tickets for their records.

Measurement and Payment:

The quantity of contaminated soil hauled, and disposed of shall be the actual number of tons of material, which has been acceptably transported and weighed with certified scales as documented by disposal manifests and weigh tickets. The quantity of contaminated soil, measured as provided above, shall be paid for at the contract unit price per ton for "Hauling, and Disposal of Petroleum Contaminated Soil".

The above price and payment shall be full compensation for all work covered by this section, including, but not limited to loading, transportation, weighing, laboratory testing, disposal, equipment, decontamination of equipment, labor, and personal protective equipment. Excavation of petroleum contaminated soil will be incidental to the project.

Payment shall be made under:

Pay Item	**Pay Unit**
Hauling and Disposal of Petroleum Contaminated Soil	Ton

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Cyrus Parker
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8/27/2014

TC-1

R-2519B Yancey & Mitchell Counties
Date: 10-14-2013

WORK ZONE TRAFFIC CONTROL
Project Special Provisions

Law Enforcement:
(05/14/2013)

Description

Furnish Law Enforcement Officers and marked Law Enforcement vehicles to control traffic in lane closures and direct traffic through intersections in accordance with the contract.

Construction Methods

Use uniformed Law Enforcement Officers and marked Law Enforcement vehicles equipped with blue lights mounted on top of the vehicle, and Law Enforcement vehicle emblems to direct or control traffic as required by the plans or by the Engineer.

Measurement and Payment

Law Enforcement will be measured and paid for in the actual number of hours that each Law Enforcement Officer is provided during the life of the project as approved by the Engineer. There will be no direct payment for marked Law Enforcement vehicles as they are considered incidental to the pay item.

Payment will be made under:

Pay Item	**Pay Unit**
Law Enforcement	Hour

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NORTH CAROLINA PROFESSIONAL SEAL 19862 ENGINEER J. W. WOOLARD, JR.

7/30/2014

TC-2

R-2519B Yancey & Mitchell Counties
Date: 10-14-2013

FLAGGERS
01-04-11 SPI

Description

Furnish, relocate, and maintain the flaggers, hats, vests and STOP/SLOW Paddles and any other incidentals necessary to complete the work in accordance with the contract.

Materials

Refer to Standard Specifications for Roads and Structures - Division 10:

Item	Section
Flaggers	1089-12

Construction Methods

Provide the services of competent and properly equipped flagger(s) (see Roadway Standard Drawing No. 1150.01) at locations and times for such periods as necessary for the control and protection of vehicular and pedestrian traffic. Use flagging methods that comply with the guidelines in the MUTCD and NCDOT Roadway Standard Drawings.

Flagging operations are not allowed for the convenience of the Contractor's operations. However, if safety issues exist (i.e. sight/stopping site distance), the Engineer may approve the use of flagging operations.

Measurement and Payment

Flaggers will be paid for at the contract lump sum price. Payment for Flaggers will be made on the following schedule:

40% of the unit bid upon the first use of flagging on the project.
30% of the unit bid when the project is 50% complete.
30% of the unit bid when the project is 100% complete.

Pay Item	Pay Unit
Flaggers	Lump Sum

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7/30/2014

PROJECT SPECIAL PROVISIONS
Utilities by Others

M A ENGINEERING CONSULTANTS, INC.
598 E. Chatham Street, Suite 137, Cary, NC 27511

General:

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

A) Duke Energy Progress – Transmission Power
B) Duke Energy Progress – Distribution Power
C) French Broad EMC – Distribution Power
D) Frontier Communication – Telephone
E) AT&T – Telephone
F) Charter Communication – CATV
G) Country Cablevision - CATV
H) 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 owners. All utilities are shown on the plans from the best available information.

The Contractor's attention is directed to Article 105-8 of the 2012 Standard Specifications for Roads and Structures.

Utilities Requiring Adjustment:

Utility relocations are shown on the Utilities by Others Plans.

A) Duke Energy Progress – Transmission Power
   1) Duke Energy Progress has structures inside the project limits from sheet UO-23 (Sta. 340+00 right) to sheet UO-25 (Sta. 365+00 right). Their facilities should not be in conflict with the proposed project construction.
   2) Contact person for Duke Energy Progress is Mr. Jamie Loy at 919-546-6034. jamie.loy@duke-energy.com

PROJECT SPECIAL PROVISIONS
Utilities by Others

B) Duke Energy Progress – Distribution Power
   1) Duke Energy Progress will complete their relocation from sheet UO-4 (Sta. 47+00) to sheet UO-17 (Sta. 246+00) by the date of availability to the contractor. They will complete the remainder of the project by June 1, 2015.
   2) Contact person for Duke Energy Progress is Mr. Cory Hamlin at 828-429-4342. cory.hamlin@duke-energy.com

C) French Broad EMC – Distribution Power
   1) French Broad EMC has a pole line crossing at Sta. 34+00 (UO sheet 3) that will be relocated prior to the date of availability to the contractor.
   2) Contact person for French Broad EMC is Mr. Donald Webb at 828-682-6121. Donald.webb@frenchbroademc.com

D) Frontier Communication – Telephone
   1) Frontier Communication is the telephone utility from the beginning of the project to sheet UO-19 (Sta. 248+00) and will complete all their relocation by March 1, 2015.
   2) Contact person for Frontier Communication is Mr. John Reese at 828-645-1829. john.reese@ftr.com

E) AT&T – Telephone
   1) AT&T is the phone utility from sheet UO-19 (Sta. 248+00) to the end of the project. They will begin their work on February 1, 2015 and will complete their work by September 1, 2015.
   2) Contact person for AT&T is Mr. Danny Little at 704-254-4289. dflittle@carolina.rr.com

F) Charter Communication – CATV
   1) Charter Communication will complete their relocation from sheet UO-4 (Sta. 47+00) to sheet UO-17 (Sta. 246+00) by March 1, 2015. They will complete the remainder of their work by September 1, 2015.
   2) Contact person for Charter Communication is Mr. Michael Rogers at 828-505-7753. michael.rodgers@chartercomm.com

G) Country Cablevision – CATV
   1) Country Cablevision will complete their relocation from sheet UO-4 (Sta. 47+00) to sheet UO-17 (Sta. 246+00) by March 1, 2015. They will complete the remainder of their work by September 1, 2015.
   2) Contact person for Country Cablevision is Mr. Randy Miller at 800-722-4074.

PROJECT SPECIAL PROVISIONS
Utilities by Others

H) Piedmont Natural Gas – GAS

1) Piedmont Natural Gas will abandon its 6" steel line from Sta. 339+00 right, to Sta. 350+00 by January 1, 2016. They will relocate outside of the project limits.
2) Contact person for Piedmont Natural Gas is Mr. Aaron Weldon at 704-731-4153. aaron.weldon@piedmontng.com

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: (WestEd)

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

Shoulder and Median Areas

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

Areas Beyond the Mowing Pattern, Waste and Borrow Areas:

August 1 - June 1		**May 1 - September 1**	
100#	Tall Fescue	100#	Tall Fescue
15#	Kentucky Bluegrass	15#	Kentucky Bluegrass
30#	Hard Fescue	30#	Hard Fescue
25#	Rye Grain	10#	German or Browntop Millet
500#	Fertilizer	500#	Fertilizer
4000#	Limestone	4000#	Limestone

Approved Tall Fescue Cultivars

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	

Approved Kentucky Bluegrass Cultivars:

Alpine	Bariris	Envicta	Rugby
Apollo	Bedazzled	Impact	Rugby II
Arcadia	Bordeaux	Kenblue	Showcase
Arrow	Champagne	Midnight	Sonoma
Award	Chicago II	Midnight II	

Approved Hard Fescue Cultivars:

Chariot	Nordic	Rhino	Warwick
Firefly	Oxford	Scaldis II	
Heron	Reliant II	Spartan II	
Minotaur	Reliant IV	Stonehenge	

On cut and fill slopes 2:1 or steeper add 20# Sericea Lespedeza and 15# Crown Vetch January 1 - December 31.

The Crown Vetch Seed should be double inoculated if applied with a hand seeder. Four times the normal rate of inoculant should be used if applied with a hydroseeder. If a fertilizer-seed slurry is used, the required limestone should also be included to prevent fertilizer acidity from killing the inoculant bacteria. Caution should be used to keep the inoculant below 80° F to prevent harm to the bacteria. The rates and grades of fertilizer and limestone shall be the same as specified for *Seeding and Mulching*.

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

Native Grass Seeding And Mulching (West)

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

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

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

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

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

Measurement and Payment

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

TEMPORARY SEEDING:

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

FERTILIZER TOPDRESSING:

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

AERIAL FERTILIZER TOPDRESSING:

Description

Aerial Fertilizer Topdressing shall be accomplished by helicopter and shall be required on areas of this project which are determined to be unreachable or inappropriate by traditional methods. The actual areas to be topdressed shall be identified by the Engineer at time of application request. The aerial application of fertilizer topdressing shall be in accordance with Section 1665 of *Standard Specifications* and all federal, state, and local laws and ordinances.

Materials

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

Construction Methods

The Contractor shall obtain aircraft liability insurance with minimum amounts of $1,000,000.00 for personal injury per occurrence and $1,000,000.00 for property damage. Evidence of this insurance shall be provided to the Engineer prior to starting the work of Aerial Fertilizer Topdressing.

The Contractor shall be required to utilize equipment capable of uniformly broadcasting a granular fertilizer to obtain a 90% coverage of the areas indicated by the Engineer to be topdressed.

Measurement and Payment

Aerial Fertilizer Topdressing will be measured in accordance with the requirements of Article 1665-4 of the *Standard Specifications* and will be paid for at the contract unit price per ton for *Aerial Fertilizer Topdressing*.

The above price and payment will be full compensation for all work covered by this section including but not limited to furnishing and uniformly distributing fertilizer topdressing by aerial application.

Payment will be made under:

Pay Item	Pay Unit
Aerial Fertilizer Topdressing	Ton

SUPPLEMENTAL SEEDING:

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

MOWING:

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

LAWN TYPE APPEARANCE:

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

SEEDING EQUIPMENT:

Due to the size and environmental sensitivity of this project, the contractor shall retain sufficient equipment and materials onsite to perform seeding, mulching and matting operations on a continuous basis. Since seeding, mulching and matting operations will be performed in a continuous manner, no additional payments shall be made for the requirements of this section

The contractor may utilize equipment from the project during inactive times to perform work on other projects, as directed.

JAPANESE KNOTWEED TREATMENT:

All Japanese Knotweed (*Polygonum cuspidatum)* populations located in the project corridor shall be treated with herbicides by NCDOT State Forces. Any Japanese Knotweed populations disturbed by construction activities shall have the plant material and soil with root mass buried 6 feet under fill or in waste areas. Contact Roadside Environmental Field Operations Engineer for plant identification.

REFORESTATION:

Description

Reforestation will be planted 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

HIGH QUALITY WATERS:

Description

The South Toe River has been identified as high quality waters. This designation requires special procedures to be used for clearing and grubbing, temporary stream crossings, and grading operations within the High Quality Water Zone and as designated by the Engineer. The High Quality Water Zones are identified on the plans as Environmentally Sensitive Areas. This also requires special procedures to be used for seeding and mulching and staged seeding.

The High Quality Water Zone/Environmentally Sensitive Area shall be defined as a 50-foot buffer zone on both sides of the stream measured from top of streambank.

Construction Methods

(A) Clearing and Grubbing

In areas identified as High Quality Water Zones/Environmentally Sensitive Areas, the Contractor may perform clearing operations, but not grubbing operations until immediately prior to beginning grading operations as described in Article 200-1 of the *Standard Specifications*. Only clearing operations (not grubbing) shall be allowed in this buffer zone until immediately prior to beginning grading operations. Erosion control devices shall be installed immediately following the clearing operation.

(B) Grading

Once grading operations begin in identified High Quality Water Zones/ Environmentally Sensitive Areas, work shall progress in a continuous manner until complete. All construction within these areas shall progress in a continuous manner such that each phase is complete and areas are permanently stabilized prior to beginning of next phase. Failure on the part of the Contractor to complete any phase of construction in a continuous manner in High Quality Water Zones/ Environmentally Sensitive Areas will be just cause for the Engineer to direct the suspension of work in accordance with Article 108-7 of the *Standard Specifications*.

(C) Temporary Stream Crossings

Any crossing of streams within the limits of this project shall be accomplished in accordance with the requirements of Subarticle 107-12 of the *Standard Specifications*.

(D) Seeding and Mulching

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

Seeding and mulching shall be performed on the areas disturbed by construction immediately following final grade establishment. No appreciable time shall lapse into the contract time without stabilization of slopes, ditches and other areas within the High Quality Water Zones/Environmentally Sensitive Areas.

(E) Stage Seeding

The work covered by this section shall consist of the establishment of a vegetative cover on cut and fill slopes as grading progresses. Seeding and mulching shall be done in stages on cut and fill slopes that are greater than 20 feet in height measured along the slope, or greater than 2 acres in area. Each stage shall not exceed the limits stated above.

Additional payments will not be made for the requirements of this section, as the cost for this work shall be included in the contract unit prices for the work involved.

MINIMIZE REMOVAL OF VEGETATION:

The Contractor shall minimize removal of vegetation 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*.

TEMPORARY EARTH BERMS:

Description

This work consists of installing, maintaining, and removing any and all material required for the construction of temporary earth berms. The temporary earth berms shall be used to direct the flow of water to specific erosion control device(s), or to direct water flowing from offsite around/away from specific area(s) of construction.

Construction Methods

The Contractor shall install the temporary earth berms in accordance with the details in the plans and at locations indicated in the plans, and as directed. Upon installation, the earth berms shall be immediately stabilized as provided in Section 1620 of the *Standard Specifications*. Other stabilization methods may be utilized with prior approval from the Engineer.

Upon completion of the project, the temporary earth berms shall be removed. The earth material can be utilized in the filling of silt ditches and detention devices, or graded to match the existing contours and permanently seeded and mulched.

Measurement and Payment

The installation of the temporary earth berms will be paid for as *Borrow Excavation* as provided in Section 230 of the *Standard Specifications* or included in the lump sum price for grading.

Stabilization of the temporary earth berms will be paid for as *Temporary Seeding* as provided in Section 1620 of the *Standard Specifications*.

Such price and payment shall be considered full compensation for all work covered by this section including all materials, construction, maintenance, and removal of the temporary earth berms.

CLEAN WATER DIVERSION:

Description

This work consists of installing, maintaining, and removing any and all material required for the construction of clean water diversions. The clean water diversions shall be used to direct water flowing from offsite around/away from specific area(s) of construction.

Materials

Refer to Division 10

Item	Section
Geotextile for Soil Stabilization, Type 4	1056

Construction Methods

The Contractor shall install the clean water diversions in accordance with the details in the plans and at locations indicated in the plans, and as directed. Upon installation, the excavated material shall be immediately stabilized as provided in Section 1620 of the *Standard Specifications*. Other stabilization methods may be utilized with prior approval from the Engineer.

Line clean water diversion with geotextile unrolled in the direction of flow and lay smoothly but loosely on soil surface without creases. Bury top of slope geotextile edge in a trench at least 5" deep and tamp securely. Make vertical overlaps a minimum of 18" with upstream geotextile overlapping the downstream geotextile.

Secure geotextile with eleven gauge wire staples shaped into a *u* shape with a length of not less than 6" and a throat not less than 1" in width. Place staples along outer edges and throughout the geotextile a maximum of 3 ft. horizontally and vertically.

Measurement and Payment

Silt Excavation will be measured and paid for in accordance with Article 1630-4 of the *Standard Specifications*.

Geotextile for Soil Stabilization will be measured and paid for in accordance with Article 270-4 of the *Standard Specifications*.

Stabilization of the excavated material will be paid for as *Temporary Seeding* as provided in Section 1620 of the *Standard Specifications*.

Such price and payment shall be considered full compensation for all work covered by this section including all materials, construction, maintenance, and removal of the clean water diversions.

SAFETY FENCE AND JURISDICTIONAL FLAGGING:

Description

Safety Fence shall consist of furnishing materials, installing and maintaining polyethylene or polypropylene fence along the outside riparian buffer, wetland, or water boundary, or other boundaries located within the construction corridor to mark the areas that have been approved to infringe within the buffer, wetland, endangered vegetation, culturally sensitive areas or water. The fence shall be installed prior to any land disturbing activities.

Interior boundaries for jurisdictional areas noted above shall be delineated by stakes and highly visible flagging.

Jurisdictional boundaries at staging areas, waste sites, or borrow pits, whether considered outside or interior boundaries shall be delineated by stakes and highly visible flagging.

Materials

(A) Safety Fencing

Polyethylene or polypropylene fence shall be a highly visible preconstructed safety fence approved by the Engineer. The fence material shall have an ultraviolet coating.

Either wood posts or steel posts may be used. Wood posts shall be hardwood with a wedge or pencil tip at one end, and shall be at least 5 ft. in length with a minimum nominal 2" x 2" cross section. Steel posts shall be at least 5 ft. in length, and have a minimum weight of 0.85 lb/ft of length.

(B) Boundary Flagging

Wooden stakes shall be 4 feet in length with a minimum nominal 3/4" x 1-3/4" cross section. The flagging shall be at least 1" in width. The flagging material shall be vinyl and shall be orange in color and highly visible.

Construction Methods

No additional clearing and grubbing is anticipated for the installation of this fence. The fence shall be erected to conform to the general contour of the ground.

(A) Safety Fencing

Posts shall be set at a maximum spacing of 10 ft., maintained in a vertical position and hand set or set with a post driver. If hand set, all backfill material shall be thoroughly tamped. Wood posts may be sharpened to a dull point if power driven. Posts damaged by power driving shall be removed and replaced prior to final acceptance. The tops of all wood posts shall be cut at a 30-degree angle. The wood posts may, at the option of the Contractor, be cut at this angle either before or after the posts are erected.

The fence geotextile shall be attached to the wood posts with one 2" galvanized wire staple across each cable or to the steel posts with wire or other acceptable means.

Place construction stakes to establish the location of the safety fence in accordance with Article 105-9 or Article 801-1 of the *Standard Specifications.* No direct pay will be made for the staking of the safety fence. All stakeouts for safety fence shall be considered incidental to the work being paid for as "Construction Surveying", except that where there is no pay item for construction surveying, all safety fence stakeout will be performed by state forces.

The Contractor shall be required to maintain the safety fence in a satisfactory condition for the duration of the project as determined by the Engineer.

(B) Boundary Flagging

Boundary flagging delineation of interior boundaries shall consist of wooden stakes on 25 feet maximum intervals with highly visible orange flagging attached. Stakes shall be installed a minimum of 6" into the ground. Interior boundaries may be staked on a tangent that runs parallel to buffer but must not encroach on the buffer at any location. Interior boundaries of hand clearing shall be identified with a different colored flagging to distinguish it from mechanized clearing.

Boundary flagging delineation of interior boundaries will be placed in accordance with Article 105-9 or Article 801-1 of the *Standard Specifications*. No direct pay will be made for delineation of the interior boundaries. This delineation will be considered incidental to the work being paid for as *Construction Surveying*, except that where there is no pay item or construction surveying the cost of boundary flagging delineation shall be included in the unit prices bid for the various items in the contract. Installation for delineation of all jurisdictional boundaries at staging areas, waste sites, or borrow pits shall consist of wooden stakes on 25 feet maximum intervals with highly visible orange flagging attached. Stakes shall be installed a minimum of 6" into the ground. Additional flagging may be placed on overhanging vegetation to enhance visibility but does not substitute for installation of stakes.

Installation of boundary flagging for delineation of all jurisdictional boundaries at staging areas, waste sites, or borrow pits shall be performed in accordance with Subarticle 230-4(B)(3)(d) or Subarticle 802-2(F) of the *Standard Specifications*. No direct pay will be made for this delineation, as the cost of same shall be included in the unit prices bid for the various items in the contract.

The Contractor shall be required to maintain alternative stakes and highly visible flagging in a satisfactory condition for the duration of the project as determined by the Engineer.

Measurement and Payment

Safety Fence will be measured and paid as the actual number of linear feet of polyethylene or polypropylene fence installed in place and accepted. Such payment will be full compensation including but not limited to furnishing and installing fence geotextile with necessary posts and post bracing, staples, tie wires, tools, equipment and incidentals necessary to complete this work.

Payment will be made under:

Pay Item	**Pay Unit**
Safety Fence	Linear Foot

PERMANENT SOIL REINFORCEMENT MAT:

Description

This work consists of furnishing and placing *Permanent Soil Reinforcement Mat*, of the type specified, over previously prepared areas as directed.

Materials

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

Property	**Test Method**	**Value**	**Unit**
Light Penetration	ASTM D6567	9	%
Thickness	ASTM D6525	0.40	in
Mass Per Unit Area	ASTM D6566	0.55	lb/sy
Tensile Strength	ASTM D6818	385	lb/ft
Elongation (Maximum)	ASTM D6818	49	%
Resiliency	ASTM D1777	>70	%
UV Stability *	ASTM D4355	$\geq$80	%
Porosity (Permanent Net)	ECTC Guidelines	$\geq$85	%
Maximum Permissible Shear Stress (Vegetated)	Performance Bench Test	$\geq$8.0	lb/ft^2
Maximum Allowable Velocity (Vegetated)	Performance Bench Test	$\geq$16.0	ft/s

*ASTM D1682 Tensile Strength and % strength retention of material after 1000 hours of exposure.

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

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

Construction Methods

Matting shall be installed in accordance with Subarticle 1631-3(B) of the *Standard Specifications*.

All areas to be protected with the mat shall be brought to final grade and seeded in accordance with Section 1660 of the *Standard Specifications*. The surface of the soil shall be smooth, firm, stable and free of rocks, clods, roots or other obstructions that would prevent the mat from lying in direct contact with the soil surface. Areas where the mat is to be placed will not need to be mulched.

Measurement and Payment

Permanent Soil Reinforcement Mat will be measured and paid for as the actual number of square yards measured along the surface of the ground over which Permanent Soil Reinforcement Mat is installed and accepted. Overlaps will not be included in the measurement, and will be considered as incidental to the work. Such payment shall be full compensation for furnishing and installing the mat, including overlaps, and for all required maintenance.

Payment will be made under:

Pay Item	**Pay Unit**
Permanent Soil Reinforcement Mat	Square Yard

SKIMMER BASIN WITH BAFFLES:

Description

Provide a skimmer basin to remove sediment from construction site runoff at locations shown in the erosion control plans. See the Skimmer Basin with Baffles Detail sheet provided in the erosion control plans. Work includes constructing sediment basin, installation of temporary slope drain pipe and coir fiber baffles, furnishing, installation and cleanout of skimmer, providing and placing stone pad on bottom of basin underneath skimmer device, providing and placing a geotextile spillway liner, providing coir fiber mat stabilization for the skimmer outlet, disposing of excess materials, removing temporary slope drain, coir fiber baffles, geotextile liner and skimmer device, backfilling basin area with suitable material and providing proper drainage when basin area is abandoned.

Materials

Item	Section
Stone for Erosion Control, Class B	1042
Geotextile for Soil Stabilization, Type 4	1056
Fertilizer for Temporary Seeding	1060-2
Seed for Temporary Seeding	1060-4
Seeding and Mulching	1060-4
Matting for Erosion Control	1060-8
Staples	1060-8
Coir Fiber Mat	1060-14
Temporary Slope Drain	1622-2
Coir Fiber Baffle	1640

Provide appropriately sized and approved skimmer device.

Provide Schedule 40 PVC pipe with a length of 6 ft. to attach to the skimmer and the coupling connection to serve as the arm pipe. For skimmer sizes of 2.5 in. and smaller, the arm pipe diameter shall be 1.5 inches. For skimmer sizes of 3 in. and larger, refer to manufacturer recommendation.

Provide 4” diameter Schedule 40 PVC pipe to attach to coupling connection of skimmer to serve as the barrel pipe through the earthen dam.

Anchors: Staples, stakes, or reinforcement bars shall be used as anchors.

Wooden Stakes:

Provide hardwood stakes 12"- 24" long with a 2" x 2" nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving through the coir fiber mat and down into the underlying soil. The other end of the stake needs to have a 1"- 2" long head at the top with a 1"- 2" notch following to catch and secure the coir fiber mat.

Steel Reinforcement Bars:

Provide uncoated #10 steel reinforcement bars 24" nominal length. The bars shall have a 4" diameter bend at one end with a 4" straight section at the tip to catch and secure the coir fiber mat.

Staples:

Provide staples made of 0.125" diameter new steel wire formed into a *u* shape not less than 12" in length with a throat of 1" in width.

Construction Methods

Excavate basin according to the erosion control plans with basin surface free of obstructions, debris, and pockets of low-density material. Install temporary slope drain pipe and construct the primary spillway according to the Skimmer Basin with Baffles Detail sheet in the erosion control plans. Temporary slope drain pipe at inlet of basin may be replaced by geotextile as directed. Construct the coir fiber baffles according to *Roadway Standard Drawings* No. 1640.01 and Section 1640 of the *Standard Specifications*.

Install skimmer device according to manufacturer recommendations. Install 4" Schedule 40 PVC pipe into dam on the lower side of basin 1 ft. from the bottom of the basin and according to the detail, and extend the pipe so the basin will drain. Attach a 6 ft. arm pipe to the coupling connection and skimmer according to manufacturer recommendations. Attach the rope included with the skimmer to the tee between the vent socket and the tube inlet, and the other end to a wooden stake or metal post. Clean out skimmer device when it becomes clogged with sediment and/or debris and is unable to float at the top of water in skimmer basin. Take appropriate measures to avoid ice accumulation in the skimmer device. Construct a stone pad of Class B stone directly underneath the skimmer device at bottom of basin. The pad shall be a minimum of 12" in height, and shall have a minimum cross sectional area of 4 ft. by 4 ft.

Line primary spillway with geotextile unrolled in the direction of flow and lay smoothly but loosely on soil surface without creases. Bury edges of geotextile in a trench at least 5" deep and tamp firmly. If geotextile for the primary spillway is not one continuous piece of material, make horizontal overlaps a minimum of 18" with upstream geotextile overlapping the downstream geotextile. Secure geotextile with eleven gauge wire staples shaped into a *u* shape with a length of not less than 12" and a throat not less than 1" in width. Place staples along outer edges and throughout the geotextile a maximum of 3 ft. horizontally and vertically. Geotextile shall be placed to the bottom and across the entire width of the basin according to the Skimmer Basin with Baffles detail. Place sealant inside basin around barrel pipe on top of geotextile with a minimum width of 6 in.

At the skimmer outlet, provide a smooth soil surface free from stones, clods, or debris that will prevent contact of the coir fiber matting with the soil. Unroll the matting and apply without stretching such that it will lie smoothly but loosely on the soil surface. Wooden stakes, reinforcement bars, or staples may be used as anchors in accordance with the details in the plans and as directed. Place anchors across the matting at the ends approximately 1 ft. apart. Place anchors along the outer edges and down the center of the matting 3 ft. apart.

All bare side slope sections of the skimmer basin shall be seeded with a temporary or permanent seed mix as directed and in accordance with Articles 1620-3, 1620-4, 1620-5, 1660-4, 1660-5 and 1660-7 of the *Standard Specifications*. Straw or excelsior matting shall be installed on all bare side slope sections immediately upon the completion of seeding and in accordance with Article 1631-3 of the *Standard Specifications*.

Measurement and Payment

Silt Excavation will be measured and paid for in accordance with Article 1630-4 of the *Standard Specifications,* as calculated from the typical section throughout the length of the basin as shown on the final approved plans.

Geotextile for Soil Stabilization will be measured and paid for in accordance with Article 270-4 of the *Standard Specifications*.

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

__" *Skimmer* will be measured in units of each. __" *Skimmer* will be measured and paid for as the maximum number of each size skimmer acceptably installed and in use at any one time during the life of the project. Barrel and arm pipe, cleanout, relocation and reinstallation of __" *Skimmer* is considered incidental to the measurement of the quantity of __" *Skimmer* and no separate payment will be made. No separate payment shall be made if __" *Skimmer*, barrel and/or arm pipe(s) are damaged by ice accumulation.

Coir Fiber Mat will be measured and paid for as the actual number of square yards measured along the surface of the ground over which coir fiber mat is installed and accepted.

Temporary Slope Drain will be measured and paid for in accordance with Article 1622-4 of the *Standard Specifications*.

Stone for Erosion Control, Class __ will be measured and paid for in accordance with Article 1610-4 of the *Standard Specifications*.

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

Seed for Temporary Seeding will be measured and paid for in accordance with Article 1620-6 of the *Standard Specifications*.

Fertilizer for Temporary Seeding will be measured and paid for in accordance with Article 1620-6 of the *Standard Specifications*.

Matting for Erosion Control will be measured and paid for in accordance with Article 1631-4 of the *Standard Specifications*.

No measurement will be made for other items or for over excavation or stockpiling.

Payment will be made under:

Pay Item	Pay Unit
__" Skimmer	Each
Coir Fiber Mat	Square Yard

TIERED SKIMMER BASIN WITH BAFFLES:

Description

Provide a tiered skimmer basin to remove sediment from construction site runoff at locations shown in the erosion control plans. See the Tiered Skimmer Basin Detail sheet provided in the erosion control plans. Tiered Skimmer Basins shall be installed in areas where topography creates a large elevation difference between the inlet and outlet of a single skimmer basin. Work includes constructing sediment basins, installation of coir fiber baffles, installation of temporary slope drains, furnishing, installation and cleanout of skimmer, providing and placing stone pad on bottom of basin underneath skimmer device, providing and placing geotextile spillway liners, providing coir fiber mat stabilization for the skimmer outlet, disposing of excess materials, removing temporary slope drains, coir fiber baffles, geotextile liner and skimmer device, backfilling basin area with suitable material and providing proper drainage when basin area is abandoned.

Materials

Item	Section
Stone for Erosion Control, Class B	1042
Geotextile for Soil Stabilization, Type 4	1056
Fertilizer for Temporary Seeding	1060-2
Seed for Temporary Seeding	1060-4
Seeding and Mulching	1060-4
Matting for Erosion Control	1060-8
Staples	1060-8
Coir Fiber Mat	1060-14
Temporary Slope Drain	1622-2
Coir Fiber Baffle	1640

Provide appropriately sized and approved skimmer device.

Provide Schedule 40 PVC pipe with a length of 6 ft. to attach to the skimmer and the coupling connection to serve as the arm pipe. For skimmer sizes of 2.5 in. and smaller, the arm pipe diameter shall be 1.5 inches. For skimmer sizes of 3 in. and larger, refer to manufacturer recommendation.

Provide 4” diameter Schedule 40 PVC pipe to attach to coupling connection of skimmer to serve as the barrel pipe through the earthen dam.

Anchors: Staples, stakes, or reinforcement bars shall be used as anchors.

Wooden Stakes:

Provide hardwood stakes 12"- 24" long with a 2" x 2" nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving through the coir fiber mat and down into the underlying soil. The other end of the stake needs to have a 1"- 2" long head at the top with a 1"- 2" notch following to catch and secure the coir fiber mat.

Steel Reinforcement Bars:

Provide uncoated #10 steel reinforcement bars 24" nominal length. The bars shall have a 4" diameter bend at one end with a 4" straight section at the tip to catch and secure the coir fiber mat.

Staples:

Provide staples made of 0.125" diameter new steel wire formed into a *u* shape not less than 12" in length with a throat of 1" in width.

Construction Methods

Excavate basins according to the erosion control plans with basin surface free of obstructions, debris, and pockets of low-density material. Install temporary slope drains and construct the primary spillways according to the Tiered Skimmer Basin Detail sheet in the erosion control plans. Construct the coir fiber baffles according to *Roadway Standard Drawings* No. 1640.01 and Section 1640 of the *Standard Specifications*. Multiple upper basins, or Modified Silt Basins Type 'B' as labeled on the detail, may be required based on site conditions and as directed.

Install skimmer device according to manufacturer recommendations. Install 4" Schedule 40 PVC pipe into dam on the lower side of basin 1 ft. from the bottom of the basin and according to the detail, and extend the pipe so the basin will drain. Attach a 6 ft. arm pipe to the coupling connection and skimmer according to manufacturer recommendations. Attach the rope included with the skimmer to the tee between the vent socket and the tube inlet, and the other end to a wooden stake or metal post. Clean out skimmer device when it becomes clogged with sediment and/or debris and is unable to float at the top of water in skimmer basin. Take appropriate measures to avoid ice accumulation in the skimmer device. Construct a stone pad of Class B stone directly underneath the skimmer device at bottom of basin. The pad shall be a minimum of 12" in height, and shall have a minimum cross sectional area of 4 ft. by 4 ft.

Install a minimum of 2 (two) temporary slope drains to dewater the upper basin to the lower basin. The slope drains shall be installed a minimum of 6 inches, or one radius width of the temporary slope drain pipe, below the base of the primary spillway section of the upper basin. The outlet of the slope drains shall be placed on the bottom elevation of the lower basin.

Line primary spillways with geotextile unrolled in the direction of flow and lay smoothly but loosely on soil surface without creases. Bury edges of geotextile in a trench at least 5" deep and tamp firmly. If geotextile for primary spillways is not one continuous piece of material, make horizontal overlaps a minimum of 18" with upstream geotextile overlapping the downstream geotextile. Secure geotextile with eleven gauge wire staples shaped into a *u* shape with a length of not less than 12" and a throat not less than 1" in width. Place staples along outer edges and throughout the geotextile a maximum of 3 ft. horizontally and vertically. Geotextile shall be placed to the bottom and across the entire width of the basin according to the Tiered Skimmer Basin with Baffles detail.

At the skimmer outlet, provide a smooth soil surface free from stones, clods, or debris that will prevent contact of the coir fiber matting with the soil. Unroll the matting and apply without stretching such that it will lie smoothly but loosely on the soil surface. Wooden stakes, reinforcement bars, or staples may be used as anchors in accordance with the details in the plans and as directed. Place anchors across the matting at the ends approximately 1 ft. apart. Place anchors along the outer edges and down the center of the matting 3 ft. apart. Place sealant inside basin around barrel pipe on top of geotextile with a minimum width of 6 in.

All bare side slope sections of the skimmer basin shall be seeded with a temporary or permanent seed mix as directed and in accordance with Articles 1620-3, 1620-4, 1620-5, 1660-4, 1660-5 and 1660-7 of the *Standard Specifications*. Straw or excelsior matting shall be installed on all bare side slope sections immediately upon the completion of seeding and in accordance with Article 1631-3 of the *Standard Specifications*.

Measurement and Payment

Silt Excavation will be measured and paid for in accordance with Article 1630-4 of the *Standard Specifications*, as calculated from the typical section throughout the length of the basin as shown on the final approved plans.

Geotextile for Soil Stabilization will be measured and paid for in accordance with Article 270-4 of the *Standard Specifications*.

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

__" Skimmer will be measured in units of each. *__" Skimmer* will be measured and paid for as the maximum number of each size skimmer acceptably installed and in use at any one time during the life of the project. Barrel and arm pipe, cleanout, relocation and reinstallation of *__" Skimmer* is considered incidental to the measurement of the quantity of *__" Skimmer* and no separate payment will be made. No separate payment shall be made if *__" Skimmer*, barrel and/or arm pipe(s) are damaged by ice accumulation.

Coir Fiber Mat will be measured and paid for as the actual number of square yards measured along the surface of the ground over which coir fiber mat is installed and accepted.

Temporary Slope Drain will be measured and paid for in accordance with Article 1622-4 of the *Standard Specifications*.

Stone for Erosion Control, Class __ will be measured and paid for in accordance with Article 1610-4 of the *Standard Specifications*.

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

Seed for Temporary Seeding will be measured and paid for in accordance with Article 1620-6 of the *Standard Specifications*.

Fertilizer for Temporary Seeding will be measured and paid for in accordance with Article 1620-6 of the *Standard Specifications*.

Matting for Erosion Control will be measured and paid for in accordance with Article 1631-4 of the *Standard Specifications*.

No measurement will be made for other items or for over excavation or stockpiling.

Payment will be made under:

Pay Item	Pay Unit
__" Skimmer	Each
Coir Fiber Mat	Square Yard

EARTHEN DAM WITH SKIMMER:

Description

Provide an earthen dam with a skimmer attached to a barrel pipe at the outlet of a proposed roadway ditch to remove sediment from construction site runoff at locations shown in the erosion control plans. See the Earthen Dam with Skimmer Detail sheet provided in the erosion control plans. Work includes constructing earthen dam, installation of coir fiber baffles, furnishing, installation and cleanout of skimmer, providing and placing stone pad on bottom of ditch underneath skimmer device, providing and placing geotextile spillway liner, providing coir fiber mat stabilization for the skimmer outlet, removing earthen dam, coir fiber baffles, geotextile liner and skimmer device, and disposing of excess materials.

Materials

Item	Section
Stone for Erosion Control, Class B	1042
Geotextile for Soil Stabilization, Type 4	1056
Staples	1060-8
Coir Fiber Mat	1060-14

Coir Fiber Baffle 1640
Provide appropriately sized and approved skimmer device.

Provide Schedule 40 PVC pipe with a length of 6 ft. to attach to the skimmer and the coupling connection to serve as the arm pipe. For skimmer sizes of 2.5 in. and smaller, the arm pipe diameter shall be 1.5 inches. For skimmer sizes of 3 in. and larger, refer to manufacturer recommendation.

Provide 4" diameter Schedule 40 PVC pipe to attach to coupling connection of skimmer to serve as the barrel pipe through the earthen dam.

Anchors: Staples, stakes, or reinforcement bars shall be used as anchors.

Wooden Stakes:

Provide hardwood stakes 12"- 24" long with a 2" x 2" nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving through the coir fiber mat and down into the underlying soil. The other end of the stake needs to have a 1"- 2" long head at the top with a 1"- 2" notch following to catch and secure the coir fiber mat.

Steel Reinforcement Bars:

Provide uncoated #10 steel reinforcement bars 24" nominal length. The bars shall have a 4" diameter bend at one end with a 4" straight section at the tip to catch and secure the coir fiber mat.

Staples:

Provide staples made of 0.125" diameter new steel wire formed into a *u* shape not less than 12" in length with a throat of 1" in width.

Construction Methods

Excavate proposed ditch according to the roadway plans and cross sections with ditch surface free of obstructions, debris, and pockets of low-density material. Construct earthen dam and install the primary spillway according to the Earthen Dam with Skimmer Detail sheet in the erosion control plans. Construct the coir fiber baffles according to *Roadway Standard Drawings* No. 1640.01 and Section 1640 of the *Standard Specifications*. Accumulated silt behind the earthen dam and baffles shall be removed regularly and as directed.

Install skimmer device according to manufacturer recommendations. Install 4" Schedule 40 PVC pipe into dam on the lower side of basin 1 ft. from the bottom of the basin and according to the detail, and extend the pipe so the basin will drain. Attach a 6 ft. arm pipe to the coupling connection and skimmer according to manufacturer recommendations. Attach the rope included with the skimmer to the tee between the vent socket and the tube inlet, and the other end to a wooden stake or metal post. Clean out skimmer device when it becomes clogged with sediment

and/or debris and is unable to float at the top of water impounded in the ditch. 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 ditch. The pad shall be a minimum of 12" in height, and shall have a minimum cross sectional area of 4 ft. by 4 ft.

Line primary spillway with geotextile unrolled in the direction of flow and lay smoothly but loosely on soil surface without creases. Bury edges of geotextile in a trench at least 5" deep and tamp firmly. If geotextile for the primary spillway is not one continuous piece of material, make horizontal overlaps a minimum of 18" with upstream geotextile overlapping the downstream geotextile. Secure geotextile with eleven gauge wire staples shaped into a *u* shape with a length of not less than 12" and a throat not less than 1" in width. Place staples along outer edges and throughout the geotextile a maximum of 3 ft. horizontally and vertically. Geotextile shall be placed to the bottom and across the entire width of the ditch according to the Earthen Dam with Skimmer 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.

Measurement and Payment

The construction of the earthen dam will be paid for as *Borrow Excavation* as provided in Section 230 of the *Standard Specifications* or included in the lump sum price for grading.

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 ditch as shown on the final approved plans.

Geotextile for Soil Stabilization will be measured and paid for in accordance with Article 270-4 of the *Standard Specifications*.

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

__" *Skimmer* will be measured in units of each. __" *Skimmer* will be measured and paid for as the maximum number of each size skimmer acceptably installed and in use at any one time during the life of the project. Barrel and arm pipe, cleanout, relocation and reinstallation of __" *Skimmer* is considered incidental to the measurement of the quantity of __" *Skimmer* and no separate payment will be made. No separate payment shall be made if __" Skimmer, barrel and/or arm pipe(s) are damaged by ice accumulation.

Coir Fiber Mat will be measured and paid for as the actual number of square yards measured along the surface of the ground over which coir fiber mat is installed and accepted.
Stone for Erosion Control, Class __ will be measured and paid for in accordance with Article 1610-4 of the *Standard Specifications*.

No measurement will be made for other items or for over excavation or stockpiling.

Payment will be made under:

Pay Item	Pay Unit
__" Skimmer	Each
Coir Fiber Mat	Square Yard

COIR FIBER WATTLES WITH POLYACRYLAMIDE (PAM):

Description

Coir Fiber Wattles are tubular products consisting of coir fibers (coconut fibers) encased in coir fiber netting. Coir Fiber Wattles are used on slopes or channels to intercept runoff and act as a velocity break. Coir Fiber Wattles are to be placed at locations shown on the plans or as directed. Installation shall follow the detail provided in the plans and as directed. Work includes furnishing materials, installation of coir fiber wattles, matting installation, PAM application, and removing wattles.

Materials

Coir Fiber Wattle shall meet the following specifications:

100% Coir (Coconut) Fibers	
Minimum Diameter	12 in.
Minimum Density	3.5 lb/ft^3 +/- 10%
Net Material	Coir Fiber
Net Openings	2 in. x 2 in.
Net Strength	90 lbs.
Minimum Weight	2.6 lbs./ft. +/- 10%

Anchors: Stakes shall be used as anchors.

Wooden Stakes:

Provide hardwood stakes a minimum of 2-ft. long with a 2 in. x 2 in. nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving down into the underlying soil.

Matting shall meet the requirements of Article 1060-8 of the *Standard Specifications*, or shall meet specifications provided elsewhere in this contract.

Provide staples made of 0.125" diameter new steel wire formed into a *u* shape not less than 12" in length with a throat of 1" in width.

Polyacrylamide (PAM) shall be applied in powder form and shall be anionic or neutrally charged. Soil samples shall be obtained in areas where the wattles will be placed, and from offsite material used to construct the roadway, and analyzed for the appropriate PAM flocculant to be utilized with each wattle. The PAM product used shall be listed on the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Quality (DWQ) web site as an approved PAM product for use in North Carolina.

Construction Methods

Coir Fiber Wattles shall be secured to the soil by wire staples approximately every 1 linear foot and at the end of each section of wattle. A minimum of 4 stakes shall be installed on the downstream side of the wattle with a maximum spacing of 2 linear feet along the wattle, and according to the detail. Install a minimum of 2 stakes on the upstream side of the wattle according to the detail provided in the plans. Stakes shall be driven into the ground a minimum of 10 in. with no more than 2 in. projecting from the top of the wattle. Drive stakes at an angle according to the detail provided in the plans.

Only install coir fiber wattle(s) to a height in ditch so flow will not wash around wattle and scour ditch slopes and according to the detail provided in the plans and as directed. Overlap adjoining sections of wattles a minimum of 6 in.

Installation of matting shall be in accordance with the detail provided in the plans, and in accordance with Article 1631-3 of the *Standard Specifications*, or in accordance with specifications provided elsewhere in this contract.

Apply PAM over the lower center portion of the coir fiber wattle where the water is going to flow over at a rate of 2 ounces per wattle, and 1 ounce of PAM on matting on each side of the wattle. PAM applications shall be done during construction activities after every rainfall event that is equal to or exceeds 0.50 in.

The Contractor shall maintain the coir fiber wattles until the project is accepted or until the wattles are removed, and shall remove and dispose of silt accumulations at the wattles when so directed in accordance with the requirements of Section 1630 of the *Standard Specifications*.

Measurement and Payment

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

Matting will be measured and paid for in accordance with Article 1631-4 of the *Standard Specifications*, or in accordance with specifications provided elsewhere in this contract.

Polyacrylamide(PAM) will be measured and paid for by the actual weight in pounds of PAM applied to the coir fiber wattles. Such price and payment will be full compensation for all work covered by this section, including, but not limited to, furnishing all materials, labor, equipment and incidentals necessary to apply the *Polyacrylamide(PAM).*

Payment will be made under:

Pay Item	Pay Unit
Polyacrylamide(PAM)	Pound
Coir Fiber Wattle	Linear Foot

WATTLE BARRIER:
(5-20-13) 1630

Description

Wattle barriers are tubular products consisting of excelsior fibers encased in natural or synthetic netting and used at the toe of fills or on slopes to intercept runoff. Wattle barriers 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 wattle barriers.

Materials

Wattle shall meet the following specifications:

Inner Material	100% Curled Wood (Excelsior) Fibers
Minimum Diameter	12"
Minimum Length	10 ft.
Minimum Density	2.9 lb./c.f.± 10%
Net Material	Synthetic
Net Openings	1" x 1"
Net Configuration	Totally Encased
Minimum Weight	5 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

Align wattle barriers in an overlapping and alternating pattern. Secure wattle barriers 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 wattle barrier 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.

Maintain the wattle barriers until the project is accepted or until the wattle barriers are removed, and remove and dispose of silt accumulations at the wattle barriers when so directed in accordance with Section 1630 of the *2012 Standard Specifications*.

Measurement and Payment

Wattle Barrier 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 wattle barrier.

Payment will be made under:

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

TEMPORARY ROCK SILT CHECK TYPE A WITH EXCELSIOR MATTING AND POLYACRYLAMIDE (PAM):

Description

Temporary Rock Silt Checks Type A with Excelsior Matting and Polyacrylamide (PAM) are devices utilized in temporary and permanent ditches to reduce runoff velocity and incorporate PAM into the construction runoff to increase settling of sediment particles and reduce turbidity of runoff. Temporary Rock Silt Checks Type A with Excelsior Matting and PAM are to be placed at locations shown on the plans or as directed. Installation shall follow the detail provided in the plans and as directed. Work includes furnishing materials, installation of Temporary Rock Silt Checks Type A, matting installation, PAM application, and removing Temporary Rock Silt Checks Type A with Excelsior Matting and PAM.

Materials

Structural stone shall be class B stone that meets the requirements of Section 1042 of the *Standard Specifications* for Stone for Erosion Control, Class B.

Sediment control stone shall be #5 or #57 stone, which meets the requirements of Section 1005 of the *Standard Specifications* for these stone sizes.

Matting shall meet the requirements of Excelsior Matting in Subarticle 1060-8(B) of the *Standard Specifications*, or shall meet specifications provided elsewhere in this contract.

Polyacrylamide (PAM) shall be applied in powder form and shall be anionic or neutrally charged. Soil samples shall be obtained in areas where the Temporary Rock Silt Checks Type A with Excelsior Matting and PAM will be placed, and from offsite material used to construct the roadway, and analyzed for the appropriate PAM flocculant to be utilized with each Temporary Rock Silt Check Type A. The PAM product used shall be listed on the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Quality (DWQ) web site as an approved PAM product for use in North Carolina.

Construction Methods

Temporary Rock Silt Checks Type A shall be installed in accordance with Subarticle 1633-3(A) of the *Standard Specifications,* Roadway Standard Drawing No. 1633.01 and the detail provided in the plans.

Installation of matting shall be in accordance with the detail provided in the plans, and anchored by placing Class B stone on top of the matting at the upper and lower ends.

Apply PAM at a rate of 4 ounces over the center portion of the Temporary Rock Silt Checks Type A and matting where the water is going to flow over. PAM applications shall be done during construction activities and after every rainfall event that is equal to or exceeds 0.50 in.

The Contractor shall maintain the Temporary Rock Silt Checks Type A with Excelsior Matting and PAM until the project is accepted or until the Temporary Rock Silt Checks Type A with Excelsior Matting and PAM are removed, and shall remove and dispose of silt accumulations at the Temporary Rock Silt Checks Type A with Excelsior Matting and PAM when so directed in accordance with the requirements of Section 1630 of the *Standard Specifications*.

Measurement and Payment

Temporary Rock Silt Checks Type A will be measured and paid for in accordance with Article 1633-5 of the *Standard Specifications,* or in accordance with specifications provided elsewhere in this contract.

Matting will be measured and paid for in accordance with Article 1631-4 of the *Standard Specifications,* or in accordance with specifications provided elsewhere in this contract.

Polyacrylamide(PAM) will be measured and paid for by the actual weight in pounds of PAM applied to the Temporary Rock Silt Checks Type A. Such price and payment will be full compensation for all work covered by this section, including, but not limited to, furnishing all materials, labor, equipment and incidentals necessary to apply the *Polyacrylamide(PAM).*
Payment will be made under:

Pay Item	**Pay Unit**
Polyacrylamide(PAM)	Pound

CULVERT DIVERSION CHANNEL:

Description

This work consists of providing a *Culvert Diversion Channel* to detour the existing stream around the culvert construction site at locations shown on the plans. Work includes constructing the diversion channel, disposing of excess materials, providing and placing geotextile liner, maintaining the diversion area in an acceptable condition, removing geotextile liner, backfilling diversion channel area with suitable material, and providing proper drainage when diversion channel area is abandoned.

Materials

Refer to Division 10

Item	Section
Geotextile for Soil Stabilization, Type 4	1056

Construction Methods

Grade channel according to the plans with channel surface free of obstructions, debris, and pockets of low-density material. Utilize suitable material and provide disposal area for unsuitable material.

Line channel with geotextile unrolled in the direction of flow and lay smoothly but loosely on soil surface without creases. Bury top of slope geotextile edge in a trench at least 5" deep and tamp securely. Make vertical overlaps a minimum of 18" with upstream geotextile overlapping the downstream geotextile.

Secure geotextile with eleven gauge wire staples shaped into a *u* shape with a length of not less than 6" and a throat not less than 1" in width. Place staples along outer edges and throughout the geotextile a maximum of 3 ft. horizontally and vertically.

Measurement and Payment

Culvert Diversion Channel will be measured and paid for as the actual number of cubic yards excavated, as calculated from the typical section throughout the length of the diversion channel as shown on the final approved plans.

Geotextile for Soil Stabilization will be measured and paid for in accordance with Article 270-4 of the *Standard Specifications*.
Such price and payment shall be considered full compensation for all work covered by this section including all materials, construction, maintenance, and removal of *Culvert Diversion Channel*.

Payment will be made under:

Pay Item	Pay Unit
Culvert Diversion Channel	Cubic Yard

IMPERVIOUS DIKE:

Description

This work consists of furnishing, installing, maintaining, and removing an *Impervious Dike* for the purpose of diverting normal stream flow around the construction site. The Contractor shall construct an impervious dike in such a manner approved by the Engineer. The impervious dike shall not permit seepage of water into the construction site or contribute to siltation of the stream. The impervious dike shall be constructed of an acceptable material in the locations noted on the plans or as directed.

Materials

Acceptable materials shall include but not be limited to sheet piles, sandbags, and/or the placement of an acceptable size stone lined with polypropylene or other impervious geotextile.

Earth material shall not be used to construct an impervious dike when it is in direct contact with the stream unless vegetation can be established before contact with the stream takes place.

Measurement and Payment

Impervious Dike will be measured and paid as the actual number of linear feet of impervious dike(s) constructed, measured in place from end to end of each separate installation that has been completed and accepted. Such price and payment will be full compensation for all work including but not limited to furnishing materials, construction, maintenance, and removal of the impervious dike.

Payment will be made under:

Pay Item	Pay Unit
Impervious Dike	Linear Foot

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

CONTRACTOR REQUIREMENTS FOR STREAM RELOCATIONS, RESTORATIONS AND ENHANCEMENTS:

If the successful bidder has not completed at least two (2) stream relocation, restoration, or enhancement projects, a minimum of 1000 linear feet each or one(1) project of minimum length of 2500 linear feet, that have included channel reconstruction or relocation based upon natural geomorphic designs incorporating in-stream structures (i.e., rock cross vanes, rock vanes, j-hook vanes and rootwads), they will be required to sublet such work to a contractor who has the experience in this type of work. Documentation of past experience must be submitted to the Resident Engineer before any work begins on the stream relocation, restoration, or enhancement.

If the Resident Engineer deems that the qualified contractor is performing unsatisfactory work, the Resident Engineer reserves the right to request another qualified contractor to complete the work.

STREAM CHANNEL RELOCATION LIMITATIONS:

The following sequence of construction shall be followed in the areas designated on the plans as stream relocations. Failure on the part of the Contractor to follow this sequence, and complete each step prior to proceeding in this area as specified, will be just cause for the Engineer to direct the suspension of work in accordance with Article 108-7 of the *Standard Specifications*.

(A) Clear, but do not grub area within the Environmentally Sensitive Area on the existing stream to be relocated.
(B) Construct and stabilize, with vegetation or erosion control materials sufficient to restrain erosion, the proposed stream channel relocation as shown on the plans.
(C) Divert water into newly constructed channel only after it has been stabilized and approved.
(D) Begin grubbing and/or grading within the Environmentally Sensitive Area of the existing stream.

The Contractor shall perform seeding and mulching and install erosion control matting to all cut/fill slopes adjacent to stream relocations in accordance with the contract.

The above requirements apply to the stream channels being constructed at the following stations:

Approx. Sta. 122+00 to 124+00
Approx. Sta. 152+50 to 155+00
Approx. Sta. 156+00 to 157+75
Approx. Sta. 214+00 to 214+50
Approx. Sta. 244+00 to 248+00
Approx. Sta. 281+50 to 282+00
Approx. Sta. 299+00 to 300+00
Approx. Sta. 320+00 to 323+00
Approx. Sta. 324+00 to 325+00
Approx. Sta. 346+50 to 348+50

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

SURVEYING FOR MITIGATION:

Description

Surveying for Mitigation shall be performed in accordance with the applicable requirements of Section 801 of the *Standard Specifications* and shall include but not be limited to the layout of the stream channel, temporary and permanent easements, and all sensitive areas associated with the implementation of the design as indicated in the plans. The contractor shall maintain a level and rod onsite at all times for use by the Engineer to ensure adequate stream grades are achieved. This will not alleviate the contractor’s responsibility to make certain that the stream is constructed in accordance with the project plans and provisions.

Construction Methods

Stakeout of the stream channel in its entirety shall be performed in such a way that the Engineer can verify the layout of the stream channel prior to construction activities commencing. The Contractor shall mark the proposed location of the top of banks and centerline of the channel. At a minimum, ditch stakes shall be placed to indicate the head of riffle and max pool locations within the proposed channel. Differing front and back slopes shall be indicated on the stake. Stakes should be maintained until final inspection of the project. There will be no additional payment for re-staking.

Upon completion of the stakeout and prior to beginning construction, the contractor shall give the Engineer a 48-hour notice in order to approve the stream alignment.

Measurement and Payment

Payment for surveying for mitigation will be made for providing all construction layout, boundary surveying, and engineering necessary for the proper construction of the project in accordance with the project plans and special provisions. Surveying for adjustments to the stream alignment shall be considered incidental to the lump sum price for S*urveying for Mitigation*.

Payment will be made under:

Pay Item	**Pay Unit**
Surveying for Mitigation	Lump Sum

SITE GRADING FOR MITIGATION:

Description

The Contractor shall perform grading as necessary to attain final surface elevations as shown on the plans and in the details for Permit Site 6 (Sta. 125+95 to 127+17 Lt –L-), Permit Site 8 (Sta. 152+50 to 155+00 Rt. –L- and Sta. 155+98 to 157+80 Lt. –L-) and Permit Site 30 (Sta. 323+00 Lt. –L-)

Construction Methods

(A) Site Grading

The Contractor shall perform grading as necessary to attain final surface elevations as shown on the plans and in the details. Field modifications shall be approved by the Engineer. Final grades shall meet the plan and stream dimensions within a tolerance of +/- 0.2 feet (2.4 inches).

(B) Stream Excavation/Ditch Filling

In areas where ditches are to be filled, the Contractor shall comply with the requirements of Subarticle 235-4(C) of the *Standard Specifications* to obtain a minimum 95% compaction rate. Lift thickness shall not exceed 1 ft. and compaction shall be achieved by use of mechanical compaction equipment only. Fill material shall be such that the Plasticity Index (PI) shall be equal to or greater than that of the PI in each surrounding soil strata. No compaction shall be performed for graded areas unless directed by the Engineer.

Excess material shall be disposed of as shown on the plans or as directed.

Measurement and Payment

All work completed under this section will be measured paid for as lump sum for *Grading*.

The above prices and payments will be full compensation for all work covered by this section.

Payment will be made under:

Pay Item	**Pay Unit**
Grading for Mitigation	Lump Sum

PUMP AROUND OPERATION FOR MITIGATION:

Description

The work covered by this section consists of furnishing, installing, maintaining and removing any and all pump around systems used on Permit Site 6 (Sta. 125+95 to 127+17 Lt –L-), Permit Site 8 (Sta. 152+50 to 155+00 Rt. –L- and Sta. 155+98 to 157+80 Lt. –L-) and Permit Site 30 (Sta. 323+00 Lt. –L-). The Contractor shall install a pump around system in locations chosen by the contractor and approved by the Engineer. The pump around system shall provide a passageway for the stream flow around the work site.

The quantity of pump around systems may be increased, decreased, or eliminated entirely as directed. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work. See example pump around operation detail on the plans.

Construction Methods

Install an impervious dike as shown on the detail. Pump water around the work site. If the water is turbid or exposed to bare soil, pump through a special stilling basin. Follow detail for the pump around operation. Once the work is complete in an area remove the impervious dike and pump system. Place structures in the area and stabilize immediately following removal of pump around system.

Measurement and Payment

Impervious dikes will be considered incidental to the pump around operation.

The pump around operation will be measured and paid for as lump sum for *Diversion Pumping For Mitigation*. This measurement shall include multiple installations and removals of the pump around system.

The above prices and payments will be full compensation for all work covered by this section including, but not limited to furnishing all of the necessary materials, construction, maintenance and removal of the impervious dike and pump around system.
Payment will be made under:

Pay Item	**Pay Unit**
Diversion Pumping for Mitigation	Lump Sum

IMPERVIOUS DIKE - DIVERSION PUMPING FOR MITIGATION:

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 fabric.

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 - Diversion Pumping for Mitigation will not be measured and paid for under this article, but will be considered incidental to the pump around operation.

Diversion Pumping for Mitigation will be measured and paid for as provided elsewhere in this contract. This payment shall be considered full compensation for all work including but not limited to furnishing materials, construction, maintenance, and removal of the impervious dike.

STRUCTURE STONE:

Description

This work consists of furnishing, stockpiling, placing and maintaining approved stone used to construct rock cross-vanes, rock vanes, j-hook vanes, w-rock cross vanes, log vanes, root wad/log vanes, log cross vanes, root wad structures, rock cross vanes for step pools, channel blocks, double wing deflectors, single wing deflectors, stream crossings, rock energy dissipaters, constructed riffles, and for use in other locations as directed.

The quantity of stone to be installed will be affected by the actual conditions that occur during the construction of the project. The quantity of stone may be increased, decreased, or eliminated entirely as directed. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

Materials

Refer to Division 10

Item	Section
No. 57 Stone	1005
Riprap, Class A, B, 1, and 2	1042
Filter Fabric for Drainage, Type 2	1056

Boulders shall meet the requirements of Section 1042 of the *Standard Specifications*. Boulders of minimum dimension 48" x 36" x 24" shall be individually picked for use in the structures. Boulders shall be relatively flat on either side in the same dimension, preferably the long dimension.

Construction Methods

The Contractor shall place filter fabric and stone in locations and to the thickness, widths, and lengths as shown on the plans or as directed. All stone shall be placed to form a sediment and erosion control device, an in-stream structure, or a channel lining neatly and uniformly with an even surface in accordance with the contract and shall meet the approval of the Engineer.

Measurement and Payment

No. 57 Stone will be measured and paid as the actual number of tons that have been incorporated into the work, or have been delivered to and stockpiled on the project as directed. No. 57 stone that has been stockpiled will not be measured a second time.

Riprap, Class __ will be measured and paid for in accordance with Article 876-4 of the *Standard Specifications*.

Filter Fabric for Drainage will be measured and paid for in accordance with Article 876-4 of the *Standard Specifications*.

Boulders will be measured and paid for as the actual number of tons that have been incorporated into the work, or have been delivered to and stockpiled on the project as directed. Stone that has been stockpiled will not be measured a second time.

Such price and payment will be full compensation for all work covered by this section, including but not limited to furnishing, weighing, stockpiling, re-handling, placing, and maintaining the stone and disposal of any materials not incorporated into the project.

Payment will be made under:

Pay Item	Pay Unit
No. 57 Stone	Ton
Boulder	Ton

ROCK CROSS VANE:

Description

This work consists of the construction and maintenance of physical barriers placed in and along the stream at locations designated on the plans to direct the stream flow (thalweg) toward the center of the channel and to provide grade control.

The quantity of rock cross vanes to be installed will be affected by the actual conditions that occur during the construction of the project. The quantity of rock cross vanes may be increased, decreased, or eliminated entirely as directed. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

Materials

Refer to Division 10

Item	Section
Boulder	1042 and SP for Structure Stone
No. 57 Stone	1005
Riprap, Class A	1042-1
Filter Fabric for Drainage, Type 2	1056

Boulders shall be used as header and footer rocks for this device.

Construction Methods

Rock cross vanes shall be constructed in accordance with the Rock Cross Vane Detail shown in the plans or as directed. Two vanes, each approximately 1/3 of the stream channel's bankfull width, will form a 20°– 30° angle out from the streambank toward upstream. The top elevation

of both vanes will decrease from bankfull elevation toward the center of the channel at a slope of 4 to 10 percent. A vane running perpendicular to the stream's flow will connect the two outside vanes on the upstream end. Install header and footer rocks according to the detail and plate the upstream side with Type 2 filter fabric and No. 57 stone. Voids between the header and footer rocks can be filled with hand-placed Class A riprap as directed. Footer rocks shall be placed such that the header rock is at streambed elevation. The rock cross vane shall be keyed into the bank at the downstream end as shown on the Rock Cross Vane Detail.

Measurement and Payment

Boulders will be measured and paid for as provided elsewhere in this contract.

No. 57 Stone will be measured and paid for as provided elsewhere in this contract.

Riprap, Class __ will be measured and paid for in accordance with Article 876-4 of the *Standard Specifications*.

Filter Fabric for Drainage will be measured and paid for in accordance with Article 876-4 of the *Standard Specifications*.

Such price and payment will be full compensation for all work covered by this section, including, but not limited to furnishing all materials, labor, equipment, and incidentals necessary to construct the rock cross vanes.

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

Project R-2519B **Mitchell/Yancey Co.**

Project Special Provisions
Structures and Culverts

Table of Contents

For Pile Driving Criteria, MSE Retaining Walls, Soil Nail Retaining Walls, Soldier Pile Retaining Walls, and Concrete Barrier with Moment Slab see Geotechnical special provisions.

7/30/2014

NORTH CAROLINA PROFESSIONAL SEAL 13014 ENGINEER QUANG H. NGUYEN

DocuSigned by:
Quang H. Nguyen
E1C74D1D9225477...

For SP #8 thru 12

7/30/2014

NORTH CAROLINA PROFESSIONAL SEAL 26936 ENGINEER DAVID S. STUTTS

DocuSigned by:
David Stutts
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For SP #1 thru 7, and #9 thru 14

PROJECT SPECIAL PROVISIONS
STRUCTURES

PROJECT R-2519B **MITCHELL-YANCEY COUNTIES**

MAINTENANCE AND PROTECTION OF TRAFFIC (8-13-04)
BENEATH PROPOSED STRUCTURE AT STATION 24+11.31 -L-

1.0 GENERAL

Maintain traffic on **SR 1308 (-Y1-)** as shown in Traffic Control Plans and as directed by the Engineer.

Provide a minimum temporary vertical clearance of **22'-2"** 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.

CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS AT STATION 122+22.50 -L- **(9-30-11)**

1.0 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.

2.0 TEMPORARY ROCK CAUSEWAY [WORKPAD]

Construction of a temporary rock causeway [workpad] within the limits shown on the plans is permitted. Build the causeway [workpad] with Class II riprap topped by a layer of Class B riprap or as otherwise designated on the plans or approved by the Engineer. If desired, recycle the Class II riprap used in the causeway [workpad] for placement in the final riprap slope protection as directed by the Engineer. No payment will be made for recycled riprap as this material is considered incidental to the causeway [workpad] placement and removal. If this option is exercised, no adjustment in contract bid price will be allowed due to an underrun in the quantity of "Rip Rap Class II (2'-0" Thick)".

Completely remove all causeway [workpad] material including pipes and return the entire causeway [workpad] footprint to the original contours and elevations within 90 days of the completion of the deck slab or as otherwise required by permits.

For sites affected by moratoriums or restrictions on in-stream work: Do not construct or remove causeway [workpad] during the moratorium period shown on the permit. If the completion of the deck slab falls within the prohibitive dates for causeway [workpad] construction or removal, begin causeway [workpad] removal immediately following the prohibitive dates.

3.0 TEMPORARY WORK BRIDGE

At the contractor's option, construction of a temporary work bridge in lieu of the causeway(s) [workpad] is acceptable, provided the temporary work bridge satisfies all permits. Submit details of the temporary work bridge to the Engineer prior to constructing the work bridge to ensure conformance with the plans and all permits. Completely remove the temporary bridge prior to final acceptance or as otherwise required by the permits.

4.0 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, pipes, work bridge components, equipment, tools, labor, disposal, and incidentals necessary to complete the work.

TEMPORARY BENTS **(9-30-11)**

When girder erection requires the use of temporary bents, design, construct, maintain and afterwards remove the temporary bents in accordance with the Standard Specifications and this Special Provision. For the purpose of this Special Provision, the term "temporary bents" includes girder erection temporary bents, vertical shoring and proprietary shoring systems.

Temporary bents for structures over railroads shall maintain a minimum horizontal clearance of 25' from center of track.

Design temporary bents in accordance with the 1995 AASHTO Guide Design Specification for Bridge Temporary Works (including the 2008 Interim Revisions) and the Project Special Provision entitled "Falsework and Formwork". The design calculations and detailed drawings of the structural components shall be signed and sealed by a North Carolina Registered Professional Engineer.

Submit design calculations and detailed drawings of temporary bents to the Engineer for review and approval. The detailed drawings shall show the position of the temporary bents in relationship to the existing travel way, the location of the temporary bents with respect to the ends of the girders, the top of support elevations for setting girders in the cambered position, and a girder erection procedure. For stream crossings, determine the bent stability assuming a scour depth equal to 250% of the pile diameter or width below the existing bed elevation. The Engineer may require a more detailed analysis of scour depth for temporary bents containing more than a single row of piles.

Include all material specifications for new and used materials in the detail drawings. In addition, show the location of the used materials indicating condition of the material, the location and geometry of existing but unused holes, attachments left over from previous use and any other irregularities in the material. Account for the condition of all used materials in the design calculations.

For all manufactured components, provide engineering data supplied by the manufacturer. For proprietary shoring systems, evaluate differential leg loading.

Provide access to all new and used materials for inspection prior to assembly.

Before the temporary bent is loaded, the contractor shall inspect the bent in the presence of the Engineer, and submit a written statement certifying that the erected bent complies with the approved detailed drawings. Any condition or material that does not comply with the accepted drawings, or any other condition deemed unsatisfactory by the Engineer, is cause for rejection until corrections are made.

Remove temporary bents in such a manner as to permit the structure to uniformly and gradually take the stresses due to its own weight. During removal do not disturb or otherwise damage the finished work.

Unless otherwise specified, temporary bents will not be directly measured. Payment will be full compensation at the contract unit prices for the various pay items requiring temporary bents.

PLACING LOAD ON STRUCTURE MEMBERS (11-27-12)

The 2012 Standard Specifications shall be revised as follows:
In **Section 420-20 – Placing Load on Structure Members** replace the first sentence of the fifth paragraph with the following:

Do not place vehicles or construction equipment on a bridge deck until the deck concrete develops the minimum specified 28 day compressive strength and attains an age of at least 7 curing days.

STEEL REINFORCED ELASTOMERIC BEARINGS (11-27-12)

The 2012 Standard Specifications shall be revised as follows:
In **Section 1079-1 – Preformed Bearing Pads** add the following after the second paragraph:

Internal holding pins are required for all shim plates when the contract plans indicate the structure contains the necessary corrosion protection for a corrosive site.

Repair laminated (reinforced) bearing pads utilizing external holding pins via vulcanization. Submit product data for repair material and a detailed application procedure to the Materials and Tests Unit for approval before use and annually thereafter.

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 STATIONS 44+11.92 -L-, 155+44.57 -L-, 319+76.16 -L-, 323+58.66 -L-, 327+50.47 -L-, 14+90.30 -Y17-, 11+07.96 -Y34- **(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:

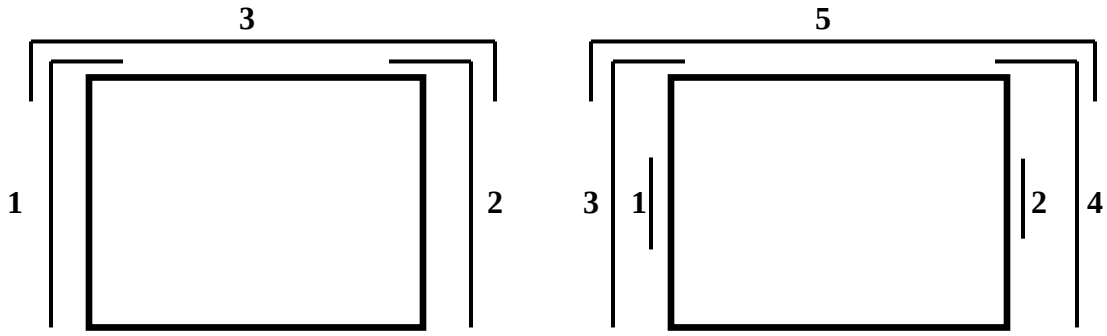

Figure 1

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.

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
Geotechnical Engineering Unit
Eastern Regional Office
1570 Mail Service Center
Raleigh, NC 27699-1570

Via other delivery service:

Mr. K. J. Kim, Ph. D., P. E.
Eastern Regional Geotechnical Manager
North Carolina Department of Transportation
Geotechnical Engineering Unit
Eastern Regional Office
3301 Jones Sausage Road, Suite 100
Garner, NC 27529

For projects in Divisions 8-14, use the following Western Regional Office address:

Via US mail:

Mr. Eric Williams, P. E.
Western Regional Geotechnical Manager
North Carolina Department of Transportation
Geotechnical Engineering Unit
Western Regional Office
5253 Z Max Boulevard
Harrisburg, NC 28075

Via other delivery service:

Mr. Eric Williams, P. E.
Western Region Geotechnical Manager
North Carolina Department of Transportation
Geotechnical Engineering Unit
Western Regional Office
5253 Z Max Boulevard
Harrisburg, NC 28075

The status of the review of structure-related submittals sent to the Structure Design Unit can be viewed from the Unit's web site, via the "Contractor Submittal" link.

Direct any questions concerning submittal review status, review comments or drawing markups to the following contacts:

Primary Structures Contact: Paul Lambert (919) 707 – 6407
(919) 250 – 4082 facsimile
plambert@ncdot.gov

Secondary Structures Contacts: James Gaither (919) 707 – 6409
James Bolden (919) 707 – 6408

Eastern Regional Geotechnical Contact (Divisions 1-7):
K. J. Kim (919) 662 – 4710
(919) 662 – 3095 facsimile
kkim@ncdot.gov

Western Regional Geotechnical Contact (Divisions 8-14):
Eric Williams (704) 455 – 8902
(704) 455 – 8912 facsimile
ewilliams@ncdot.gov

3.0 SUBMITTAL COPIES

- Furnish one complete copy of each submittal, including all attachments, to the Resident Engineer. At the same time, submit the number of hard copies shown below of the same complete submittal directly to the Structure Design Unit and/or the Geotechnical Engineering Unit.

- The first table below covers "Structure Submittals". The Resident Engineer will receive review comments and drawing markups for these submittals from the Structure Design Unit. The second table in this section covers "Geotechnical Submittals". The Resident Engineer will receive review comments and drawing markups for these submittals from the Geotechnical Engineering Unit.

- Unless otherwise required, submit one set of supporting calculations to either the Structure Design Unit or the Geotechnical Engineering Unit unless both units require submittal copies in which case submit a set of supporting calculations to each unit. Provide additional copies of any submittal as directed.

STRUCTURE SUBMITTALS

Submittal	Copies Required by Structure Design Unit	Copies Required by Geotechnical Engineering Unit	Contract Reference Requiring Submittal [1]
Arch Culvert Falsework	5	0	Plan Note, SN Sheet & "Falsework and Formwork"
Box Culvert Falsework [7]	5	0	Plan Note, SN Sheet & "Falsework and Formwork"
Cofferdams	6	2	Article 410-4
Foam Joint Seals [6]	9	0	"Foam Joint Seals"

Expansion Joint Seals (hold down plate type with base angle)	9	0	"Expansion Joint Seals"
Expansion Joint Seals (modular)	2, then 9	0	"Modular Expansion Joint Seals"
Expansion Joint Seals (strip seals)	9	0	"Strip Seals"
Falsework & Forms [2] (substructure)	8	0	Article 420-3 & "Falsework and Formwork"
Falsework & Forms (superstructure)	8	0	Article 420-3 & "Falsework and Formwork"
Girder Erection over Railroad	5	0	Railroad Provisions
Maintenance and Protection of Traffic Beneath Proposed Structure	8	0	"Maintenance and Protection of Traffic Beneath Proposed Structure at Station ___"
Metal Bridge Railing	8	0	Plan Note
Metal Stay-in-Place Forms	8	0	Article 420-3
Metalwork for Elastomeric Bearings [4,5]	7	0	Article 1072-8
Miscellaneous Metalwork [4,5]	7	0	Article 1072-8
Optional Disc Bearings [4]	8	0	"Optional Disc Bearings"
Overhead and Digital Message Signs (DMS) (metalwork and foundations)	13	0	Applicable Provisions
Placement of Equipment on Structures (cranes, etc.)	7	0	Article 420-20
Pot Bearings [4]	8	0	"Pot Bearings"
Precast Concrete Box Culverts	2, then 1 reproducible	0	"Optional Precast Reinforced Concrete Box Culvert at Station ___"
Prestressed Concrete Cored Slab (detensioning sequences) [3]	6	0	Article 1078-11
Prestressed Concrete Deck Panels	6 and 1 reproducible	0	Article 420-3

Prestressed Concrete Girder (strand elongation and detensioning sequences)	6	0	Articles 1078-8 and 1078-11
Removal of Existing Structure over Railroad	5	0	Railroad Provisions
Revised Bridge Deck Plans (adaptation to prestressed deck panels)	2, then 1 reproducible	0	Article 420-3
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

A. **Competent Person:** Provide the name and qualifications of the "Competent Person" responsible for crane safety and lifting operations. The named competent person will have the responsibility and authority to stop any work activity due to safety concerns.

B. **Riggers:** Provide the qualifications and experience of the persons responsible for rigging operations. Qualifications and experience should include, but not be limited to, weight calculations, center of gravity determinations, selection and inspection of sling and rigging equipment, and safe rigging practices.

C. **Crane Inspections:** Inspection records for all cranes shall be current and readily accessible for review upon request.

D. **Certifications:** **By July 1, 2006**, crane operators performing critical lifts shall be certified by NC CCO (National Commission for the Certification of Crane Operators), or satisfactorily complete the Carolinas AGC's Professional Crane Operator's Proficiency Program. Other approved nationally accredited programs will be considered upon request. All crane operators shall also have a current CDL medical card. Submit a list of anticipated critical lifts and corresponding crane operator(s). Include current certification for the type of crane operated (small hydraulic, large hydraulic, small lattice, large lattice) and medical evaluations for each operator.

GROUT FOR STRUCTURES (9-30-11)

1.0 DESCRIPTION

This special provision addresses grout for use in pile blockouts, grout pockets, shear keys, dowel holes and recesses for structures. This provision does not apply to grout placed in post-tensioning ducts for bridge beams, girders, or decks. Mix and place grout in accordance with the manufacturer's recommendations, the applicable sections of the Standard Specifications and this provision.

2.0 MATERIAL REQUIREMENTS

Use a Department approved pre-packaged, non-shrink, non-metallic grout. Contact the Materials and Tests Unit for a list of approved pre-packaged grouts and consult the manufacturer to determine if the pre-packaged grout selected is suitable for the required application.

When using an approved pre-packaged grout, a grout mix design submittal is not required.

The grout shall be free of soluble chlorides and contain less than one percent soluble sulfate. Supply water in compliance with Article 1024-4 of the Standard Specifications.

Aggregate may be added to the mix only where recommended or permitted by the manufacturer and Engineer. The quantity and gradation of the aggregate shall be in accordance with the manufacturer's recommendations.

Admixtures, if approved by the Department, shall be used in accordance with the manufacturer's recommendations. The manufacture date shall be clearly stamped on each container. Admixtures with an expired shelf life shall not be used.

The Engineer reserves the right to reject material based on unsatisfactory performance.

Initial setting time shall not be less than 10 minutes when tested in accordance with ASTM C266.

Test the expansion and shrinkage of the grout in accordance with ASTM C1090. The grout shall expand no more than 0.2% and shall exhibit no shrinkage. Furnish a Type 4 material certification showing results of tests conducted to determine the properties listed in the Standard Specifications and to assure the material is non-shrink.

Unless required elsewhere in the contract the compressive strength at 3 days shall be at least 5000 psi. Compressive strength in the laboratory shall be determined in accordance with ASTM C109 except the test mix shall contain only water and the dry manufactured material. Compressive strength in the field will be determined by molding and testing 4" x 8" cylinders in accordance with AASHTO T22. Construction loading and traffic loading shall not be allowed until the 3 day compressive strength is achieved.

When tested in accordance with ASTM C666, Procedure A, the durability factor of the grout shall not be less than 80.

3.0 SAMPLING AND PLACEMENT

Place and maintain components in final position until grout placement is complete and accepted. Concrete surfaces to receive grout shall be free of defective concrete, laitance, oil, grease and other foreign matter. Saturate concrete surfaces with clean water and remove excess water prior to placing grout.

Do not place grout if the grout temperature is less than 50°F or more than 90°F or if the air temperature measured at the location of the grouting operation in the shade away from artificial heat is below 45°F.

Provide grout at a rate that permits proper handling, placing and finishing in accordance with the manufacturer's recommendations unless directed otherwise by the Engineer. Use grout free of any lumps and undispersed cement. Agitate grout continuously before placement.

Control grout delivery so the interval between placing batches in the same component does not exceed 20 minutes.

The Engineer will determine the locations to sample grout and the number and type of samples collected for field and laboratory testing. The compressive strength of the grout will be considered the average compressive strength test results of 3 cube or 2 cylinder specimens at 28 days.

4.0 BASIS OF PAYMENT

No separate payment will be made for "Grout for Structures". The cost of the material, equipment, labor, placement, and any incidentals necessary to complete the work shall be considered incidental to the structure item requiring grout.

STRUCTURE DRAINAGE SYSTEM AT STATION 122+22.50 -L- (SPECIAL)

1.0 GENERAL

The work in this section covers the furnishing of materials and installation of the drainage system and all its appurtenances called for on the plans at the locations on the plans to the lines and grades shown. The work shall also include the construction of joints or connections to other drainage structures to complete the system as shown on the plans. The pipe, pipe anchors, pipe hangers, inserts and components of each shall be manufactured in accordance with the details and as indicated on the plans. All steel and hardware shall be galvanized.

Install the structure drainage system in accordance with the drawings and manufacturer's recommendations or as directed by the Engineer.

2.0 BASIS OF PAYMENT

Payment will be made at the contract lump sum price for "Structure Drainage System at Station 122+22.50 -L-". Such payment will include full compensation for all work, but not limited to providing materials and labor to install the structure drainage system as detailed in the plans.

74" MODIFIED PRESTRESSED CONCRETE GIRDERS (SPECIAL)

74" Modified Prestressed Concrete Girders shall be in accordance with the contract plans and Section 430 of the Standard Specifications.

Payment will be made under:

74" Modified Prestressed Concrete Girders ……Lin. Ft.

PROJECT SPECIAL PROVISION

(10-18-95) (Rev. 10-15-13) Z-1

PERMITS

The Contractor's attention is directed to the following permits, which have been issued to the Department of Transportation by the authority granting the permit.

PERMIT	AUTHORITY GRANTING THE PERMIT
Dredge and Fill and/or Work in Navigable Waters (404)	U. S. Army Corps of Engineers
Water Quality (401)	Division of Environmental Management, DENR State of North Carolina
Trout Buffer Zone Waiver	Division of Energy, Mineral, and Land Resources, 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.

DEPARTMENT OF THE ARMY PERMIT

Permittee **NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**

Permit No. **2004-9987181 / 2004-30631 TIP NO. R-2519B**

Issuing Office **CESAW-RG-A**

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: **to conduct the following activities in waters of the U.S. for TIP No. R-2519B: permanently impact 7,256 linear feet (lf) of stream and 0.15 acre of wetland, and temporarily impact 1,360 lf of stream and <0.01 acre of surface waters (a pond) in order to widen approximately 7.5 miles of US Highway 19E from SR 1186, west of Micaville in Yancey County, to the existing multilane section west of Spruce Pine in Mitchell County, North Carolina.**

Project Location: **US Highway 19E from SR 1186, west of Micaville in Yancey County, to the existing multilane section west of Spruce Pine in Mitchell County, North Carolina.**

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on **December 31, 2019.** If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit,

Special Conditions:

SEE ATTACHED SPECIAL CONDITIONS

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

( ) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit, Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

Randy W. Griffin Jr 8·15·14

(PERMITTEE) **NORTH CAROLINA DEPARTMENT OF TRANSPORTATION** *(DATE)*

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

20 August 2014

(DISTRICT COMMANDER) **KEVIN P. LANDERS, SR. COLONEL, U.S. ARMY** *(DATE)*

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(TRANSFEREE) *(DATE)*

*U.S. GOVERNMENT PRINTING OFFICE: 1986 - 717-425

U.S. ARMY CORPS OF ENGINEERS
Wilmington District
Compensatory Mitigation Responsibility Transfer Form

Permittee: North Carolina Department of Transportation **Action ID: SAW-2004-9987181/ 2004-30631**
Project Name: TIP No. R-2519B (Yancey and Mitchell) **County: Yancey**

Instructions to Permittee: The Permittee must provide a copy of this form to the Mitigation Sponsor, either an approved Mitigation Bank or the North Carolina Ecosystem Enhancement Program (NCEEP), who will then sign the form to verify the transfer of the mitigation responsibility. Once the Sponsor has signed this form, it is the Permittee's responsibility to ensure that to the U.S. Army Corps of Engineers (USACE) Project Manager identified on page two is in receipt of a signed copy of this form before conducting authorized impacts, unless otherwise specified below. If more than one mitigation Sponsor will be used to provide the mitigation associated with the permit, or if the impacts and/or the mitigation will occur in more than one 8-digit Hydrologic Unit Code (HUC), multiple forms will be attached to the permit, and the separate forms for each Sponsor and/or HUC must be provided to the appropriate mitigation Sponsors.

Instructions to Sponsor: The Sponsor must verify that the mitigation requirements (credits) shown below are available at the identified site. By signing below, the Sponsor is accepting full responsibility for the identified mitigation, regardless of whether or not they have received payment from the Permittee. Once the form is signed, the Sponsor must update the bank ledger and provide a copy of the signed form and the updated bank ledger to the Permittee, the USACE Project Manager, and the Wilmington District Mitigation Office (see contact information on page 2). The Sponsor must also comply with all reporting requirements established in their authorizing instrument.

Permitted Impacts and Compensatory Mitigation Requirements:

Permitted Impacts Requiring Mitigation* **8-digit HUC and Basin:** 06010108, French Broad River Basin

Stream Impacts (linear feet)			Wetland Impacts (acres)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-Riverine	Non-Riparian	Coastal
		* see comments	0.15			

*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:** 06010108, French Broad River Basin

Stream Mitigation (credits)			Wetland Mitigation (credits)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-Riverine	Non-Riparian	Coastal
		11,250	0.26			

Mitigation Site Debited: NCEEP
(List the name of the bank to be debited. For umbrella banks, also list the specific site. For NCEEP, list NCEEP. If the NCEEP acceptance letter identifies a specific site, also list the specific site to be debited).

Section to be completed by the Mitigation Sponsor

Statement of Mitigation Liability Acceptance: I, the undersigned, verify that I am authorized to approve mitigation transactions for the Mitigation Sponsor shown below, and I certify that the Sponsor agrees to accept full responsibility for providing the mitigation identified in this document (see the table above), associated with the USACE Permittee and Action ID number shown. I also verify that released credits (and/or advance credits for NCEEP), as approved by the USACE, are currently available at the mitigation site identified above. Further, I understand that if the Sponsor fails to provide the required compensatory mitigation, the USACE Wilmington District Engineer may pursue measures against the Sponsor to ensure compliance associated with the mitigation requirements.

Mitigation Sponsor Name: _____

Name of Sponsor's Authorized Representative: _____

_____ _____
Signature of Sponsor's Authorized Representative **Date of Signature**

USACE Wilmington District
Compensatory Mitigation Responsibility Transfer Form, Page 2

Conditions for Transfer of Compensatory Mitigation Credit:

- Once this document has been signed by the Mitigation Sponsor and the USACE is in receipt of the signed form, the Permittee is no longer responsible for providing the mitigation identified in this form, though the Permittee remains responsible for any other mitigation requirements stated in the permit conditions.
- Construction within jurisdictional areas authorized by the permit identified on page one of this form can begin only after the USACE is in receipt of a copy of this document signed by the Sponsor, confirming that the Sponsor has accepted responsibility for providing the mitigation requirements listed herein. For authorized impacts conducted by the North Carolina Department of Transportation (NCDOT), construction within jurisdictional areas may proceed upon permit issuance; however, a copy of this form signed by the Sponsor must be provided to the USACE within 30 days of permit issuance. NCDOT remains fully responsible for the mitigation until the USACE has received this form, confirming that the Sponsor has accepted responsibility for providing the mitigation requirements listed herein.
- Signed copies of this document must be retained by the Permittee, Mitigation Sponsor, and in the USACE administrative records for both the permit and the Bank/ILF Instrument. It is the Permittee's responsibility to ensure that the USACE Project Manager (address below) is provided with a signed copy of this form.
- If changes are proposed to the type, amount, or location of mitigation after this form has been signed and returned to the USACE, the Sponsor must obtain case-by-case approval from the USACE Project Manager and/or North Carolina Interagency Review Team (NCIRT). If approved, higher mitigation ratios may be applied, as per current District guidance and a new version of this form must be completed and included in the USACE administrative records for both the permit and the Bank/ILF Instrument.

Comments/Additional Conditions:

Total permanent loss of stream for this project, including stream relocations, is 6,609 lf of cold water stream.
Of this 6,609 lf, mitigation at a 2:1 ratio is required for 6,140 lf and at a 1:1 ratio for 469 lf; as such, the total required amount of compensatory mitigation for stream losses is 12,749 lf of cold water stream credits.
On-site mitigation will generate 1,499 lf of stream credit and NCEEP will supply the remaining 11,250 lf of cold water stream credit.

This form is not valid unless signed below by the USACE Project Manager and by the Mitigation Sponsor on Page 1. ***Once signed, the Sponsor should provide copies of this form along with an updated bank ledger to: 1) the Permittee, 2) the USACE Project Manager at the address below, and 3) the Wilmington District Mitigation Office, Attn: Todd Tugwell, 11405 Falls of Neuse Road, Wake Forest, NC 27587 (email: todd.tugwell@usace.army.mil).*** Questions regarding this form or any of the permit conditions may be directed to the USACE Project Manager below.

USACE Project Manager: Lori Beckwith
USACE Field Office: Asheville Regulatory Field Office
US Army Corps of Engineers
151 Patton Avenue, Room 208
Asheville, North Carolina 28801-5006
Email: loretta.a.beckwith@usace.army.mil

BECKWITH.LORETTA.ANN.1173452264
Digitally signed by BECKWITH.LORETTA.ANN.1173452264
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=BECKWITH.LORETTA.ANN.1173452264
Date: 2013.12.13 16:16:36 -05'00'

Lori Beckwith — **USACE Project Manager Signature**

December 13, 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.

SPECIAL CONDITIONS
Action ID # SAW-2004-9987181/ 2004-30631
TIP No. R-2519B

Failure to institute and carry out the details of the following special conditions will result in a directive to cease all ongoing and permitted work within waters of the U.S. associated with the permitted project, or such other remedies and/or fine as the Wilmington District Engineer, or his authorized representatives, may seek.

WORK LIMITS

1) All work authorized by this permit must be performed in strict compliance with the Wetland/Surface Water Permit Drawings that were submitted with the application dated July 10, 2013, titled "TIP Project: R-2519B," Sheets 1-114, to include the revisions of October 2013, which are a part of this permit. Any modification to these plans must be approved by the U.S. Army Corps of Engineers (USACE) prior to implementation.

2) Except as authorized by this permit or any USACE approved modification to this permit, no excavation, fill or mechanized land-clearing activities shall take place at any time in the construction or maintenance of this project, within waters or wetlands. This permit does not authorize temporary placement or double handling of excavated or fill material within waters or wetlands outside the permitted area. This prohibition applies to all borrow and fill activities connected with this project.

3) Except as specified in the permit plans referenced in special condition number 1 above, no excavation, fill or mechanized land-clearing activities shall take place at any time in the construction or maintenance of this project, in such a manner as to impair normal flows and circulation patterns within waters or wetlands or to reduce the reach of waters or wetlands.

* 4) The permittee shall schedule a pre-construction meeting between their representatives, the contractor, and the USACE, Wilmington District, Asheville Regulatory Field Office, NCDOT Regulatory Project Manager, prior to any work in jurisdictional waters of the U.S. to ensure that there is a mutual understanding of all terms and conditions contained in this DA permit. The permittee shall provide the NCDOT Regulatory Project Manager with a copy of the final plans at least two (2) weeks prior to the pre-construction meeting along with a description of any changes that have been made to the project's design, construction methodology or construction timeframe. The permittee shall schedule the pre-construction meeting for a time when the USACE and the North Carolina Division of Water Resources (NCDWR) Project Managers can attend. The permittee shall notify the USACE and NCDWR Project Managers a minimum of thirty (30) days in advance of the meeting.

5) The permittee shall advise the USACE in writing at least two (2) weeks prior to beginning the work authorized by this permit and again upon completion of the work authorized by this permit.

RELATED LAWS

6) The permittee shall fully implement and abide by all stipulations identified in the Memorandum of Agreement titled "Memorandum of Agreement Between the Department of the Army, Corps of Engineers and the State Historic Preservation Officer for US 19E Improvements to a Multilane Facility between Micaville and Spruce Pine Yancy *(sic)* and Mitchell Counties, North Carolina Transportation Improvement Project R-25198," signed June 2012, which is incorporated herein by reference.

7) NCDOT shall comply with its commitments regarding the National Register eligible E.W. and Dollie Huskins House. The final design shall include a seeded slope that is feasible for mowing/is maintainable by the property owner.

8) If the permittee discovers any previously unknown historic or archaeological sites while accomplishing the authorized work, he shall immediately stop work and notify the USACE, Asheville Regulatory Field Office NCDOT Regulatory Project Manager who will initiate the required State/Federal coordination.

9) This USACE permit does not authorize you to take an endangered species, in particular, the Appalachian elktoe mussel (*Alasmidonta raveneliana*). In order to legally take a listed species, you must have separate authorization under the Endangered Species Act (ESA) (e.g., a Biological Opinion under the ESA, Section 7, with "incidental take" provisions with which you must comply). The U.S. Fish and Wildlife Service's (USFWS's) Biological Opinion, dated March 14, 2008, and amended on January 9, 2009, and August 1, 2013 (collectively referred to hereinafter as BO), contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is specified in the BO. Your authorization under this USACE permit is conditional upon your compliance with all the mandatory terms and conditions associated with incidental take of the BO, which terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the BO, where a take of the listed species occurs, would constitute an unauthorized take, and it would also constitute non- compliance with your USACE permit. The USFWS is the appropriate authority to determine compliance with the terms and conditions of its BO, and with the ESA.

10) NCDOT will conduct winter tree cutting between August 15 and April 15 (of any year) as an avoidance measure for the Northern Long-eared Bat (*Myotis septentrionalis*). Any felled trees that are not part of an active work area during this time shall be left in place until clearing, grubbing and seeding can commence after April 15. Any winter tree cutting conducted in a trout buffer will be cut by hand only and the felled trees will be left in place until the trout moratorium has ended (after April 15 of any year). Within the trout buffer area, dropping trees into the stream must be avoided whenever possible. This condition is project specific and applies only to the R-2519B, US 19E Widening Project in Yancey and Mitchell Counties of North Carolina.

11) All necessary precautions and measures will be implemented so that any activity will not kill, injure, capture, harass, or otherwise harm any protected federally listed species. While accomplishing the authorized work, if the permittee discovers or observes a damaged or hurt listed endangered or threatened species, the USACE Wilmington District Engineer will be immediately notified to initiate the required Federal coordination.

12) The permittee will comply with all conditions in the attached letter from the North Carolina Wildlife Resources Commission (WRC), dated September, 11, 2007, with the exceptions of the in-water work moratorium for the South Toe River and tree removal activities, as long as tree removal activities are conducted in accordance with special condition number 10 of these conditions. Additionally, the permittee will comply with the moratoria detailed in the WRC letter dated July 19, 2007, for all streams in the R-2519B project corridor, with the exceptions of the in-water work moratorium for the South Toe River and tree removal activities, as long as tree removal activities are conducted in accordance with special condition number 10 of these conditions. Within the trout buffer area, dropping trees into the stream must be avoided whenever possible.

13) The North Carolina Division of Water Resources has issued a conditioned Water Quality Certification for this project. The conditions of that certification are hereby incorporated as special conditions of this permit. A copy of this certification is attached.

14) This Department of the Army permit does not obviate the need to obtain other Federal, State, or local authorizations required by law.

PROJECT MAINTENANCE

15) Unless otherwise authorized by this permit, all fill material placed in waters or wetlands shall be generated from an upland source and will be clean and free of any pollutants except in trace quantities. Metal products, organic materials (including debris from land clearing activities), or unsightly debris will not be used. Soils used for fill shall not be contaminated with any toxic substance in concentrations governed by Section 307 of the Clean Water Act.

16) All mechanized equipment will be regularly inspected and maintained to prevent contamination of waters and wetlands from fuels, lubricants, hydraulic fluids, or other toxic materials. In the event of a spill of petroleum products or any other hazardous waste, the permittee shall immediately report it to the N.C. Division of Water Resources at (919) 733-3300 or (800) 858-0368 and provisions of the North Carolina Oil Pollution and Hazardous Substances Control Act will be followed.

17) The permittee shall require its contractors and/or agents to comply with the terms and conditions of this permit in the construction and maintenance of this project, and shall provide each of its contractors and/or agents associated with the construction or maintenance of this project with a copy of this permit. A copy of this permit, including all conditions, shall be available at the project site during construction and maintenance of this project.

18) The permittee shall remove all sediment and erosion control measures placed in wetlands or waters, and shall restore natural grades in those areas, prior to project completion.

19) No fill or excavation impacts for the purposes of sedimentation and erosion control shall occur within jurisdictional waters, including wetlands, unless the impacts are included on the plan drawings and specifically authorized by this permit.

20) The permittee shall implement Design Standards in Sensitive Watersheds throughout the project corridor. Erosion and sediment control practices must be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices. This shall include, but is not limited to, the immediate installation of silt fencing or similar appropriate devices around all areas subject to soil disturbance or the movement of earthen fill, and the immediate stabilization of all disturbed areas. Additionally, the project must remain in full compliance with all aspects of the Sedimentation Pollution Control Act of 1973 (North Carolina General Statutes Chapter 113A Article 4). Adequate sedimentation and erosion control measures must be implemented prior to any ground disturbing activities to minimize impacts to downstream aquatic resources. These measures must be inspected and maintained regularly, especially following rainfall events. All fill material must be adequately stabilized at the earliest practicable date to prevent sediment from entering into adjacent waters or wetlands.

21) The permittee shall ensure that all excavation and/or construction areas in waters of the U.S. are temporarily dewatered during work.

* 22) Prior to commencing construction within jurisdictional waters of the U.S. for any portion of the project, the permittee shall forward the latest version of project construction drawings to the USACE, Asheville Regulatory Field Office NCDOT Regulatory Project Manager. Half-size drawings will be acceptable.

23) During the clearing phase of the project, heavy equipment must not be operated in surface waters or stream channels. Temporary stream crossings will be used to access the opposite sides of stream channels. All temporary diversion channels and stream crossings will be constructed of non-erodible materials. Grubbing of riparian vegetation will not occur until immediately before construction begins on a given segment of stream channel.

24) The permittee shall take measures to prevent live or fresh concrete, including bags of uncured concrete, from coming into contact with any water in or entering into waters of the U.S. Water inside coffer dams or casings that has been in contact with concrete shall only be returned to waters of the U.S. when it no longer poses a threat to aquatic organisms (concrete is set and cured).

25) Unless otherwise requested in the application and depicted on the approved work plans, culverts greater than 48 inches in diameter will be buried at least one foot below the bed of the stream. Culverts 48 inches in diameter and less shall be buried or placed on the stream bed as practicable and appropriate to maintain aquatic passage, and every effort shall be

made to maintain existing channel slope. The bottom of the culvert must be placed at a depth below the natural stream bottom to provide for passage during drought or low flow conditions. Destabilizing the channel and head cutting upstream should be considered in the placement of the culvert.

26) Measures will be included in the construction/installation that will promote the safe passage of fish and other aquatic organisms. The dimension, pattern, and profile of the stream above and below a pipe or culvert should not be modified by widening the stream channel or by reducing the depth of the stream in connection with the construction activity. The width, height, and gradient of a proposed opening should be such as to pass the average historical low flow and spring flow without adversely altering flow velocity. Spring flow should be determined from gauge data, if available. In the absence of such data, bankfull flow can be used as a comparable level.

27) To ensure that all borrow and waste activities occur on high ground and do not result in the degradation of adjacent wetlands and streams, except as authorized by this permit, the permittee shall require its contractors and/or agents to identify all areas to be used to borrow material, or to dispose of dredged, fill, or waste material. The permittee shall provide the USACE with appropriate maps indicating the locations of proposed borrow or waste sites as soon as the permittee has that information. The permittee will coordinate with the USACE before approving any borrow or waste sites that are within 400 feet of any streams or wetlands.

28) Design and placement of culverts and other structures including temporary erosion control measures shall not be conducted in a manner that may result in the disequilibrium of wetlands, streambeds or stream banks adjacent to, upstream of or downstream of the structures. Riprap armoring of streams at culvert inlets and outlets shall be minimized above ordinary high water elevation in favor of bioengineering techniques such as bank sloping, erosion control matting and revegetation with deep-rooted native woody plants.

29) The permittee shall implement all reasonable and practicable measures to ensure that equipment, structures, fill pads, work, and operations associated with this project do not adversely affect upstream and/or downstream reaches. Adverse effects include, but are not limited to, channel instability, flooding, and/or stream bank erosion. The permittee shall routinely monitor for these effects, cease all work when detected, take initial corrective measures to correct actively eroding areas, and notify this office immediately. Permanent corrective measures may require additional authorization by the USACE.

30) As noted in the Project Commitments for this project, the permittee will put forth its best effort to suppress the Japanese Knotweed population within the project limits, with the use of aquatic labeled glycophosate. Additionally, the construction contract(s) for this project will stipulate that any knotweed material disturbed through construction activities at the two bridge sites, as well as in identified mitigation sites, will be buried within the project boundaries in fill or waster areas, below the depth of topsoil.

31) Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

32) The permittee, upon receipt of a notice of revocation of this permit or upon its expiration before completion of the work will, without expense to the United States and in such time and manner as the Secretary of the Army or his authorized representative may direct, restore the water or wetland to its pre-project condition.

33) All reports, documentation and correspondence required by the conditions of this permit shall be submitted to the following address: U.S. Army Corps of Engineers, Asheville Regulatory Field Office, NCDOT Regulatory Project Manager (Division 13), 151 Patton Avenue, Room 208, Asheville, NC 28801-5006, and by telephone at: (828) 271-7980. The Permittee shall reference the following permit number, SAW-2004-9987181/ 2004-30631, TIP No. R-2519B, on all submittals.

COMPENSATORY MITIGATION

34) The Permittee shall fully implement the compensatory mitigation plan titled "Mitigation Plan, US 19E Widening, Yancey & Mitchell Counties, North Carolina, T.I.P. Number R-2519, WBS No. 35609.1.1, May 6, 2013 (Revised November 4, 2013)," in order to compensate for a portion of the unavoidable impacts to waters of the U.S. associated with this project. Activities prescribed by this plan shall be initiated prior to, or concurrently with, commencement of any construction activities within jurisdictional areas authorized by this permit. The permittee shall conduct all mitigation and monitoring activities in accordance with the above referenced plan and with the following conditions:

a) As the permittee, NCDOT is the party responsible for the implementation, performance and long term management of the on-site compensatory mitigation project.

b) Any changes or modifications to the mitigation plan must be approved by the USACE.

c) The permittee shall maintain the entire mitigation site in its natural condition, as altered by the work in the mitigation plan, in perpetuity. Prohibited activities within the mitigation site specifically include, but are not limited to: filling; grading; excavating; earth movement of any kind; construction of roads, walkways, buildings, signs, or any other structure; any activity that may alter the drainage patterns on the property; the destruction, cutting, removal, mowing, or other alteration of vegetation on the property; disposal or storage of any garbage, trash, debris or other waste material; graze or water animals, or use for any agricultural or horticultural purpose; or any other activity which would result in the property being adversely impacted or destroyed, except as specifically authorized by this permit.

35) The permittee shall not sell or otherwise convey any interest in the mitigation property used to satisfy the mitigation requirements for this permit to any third party, without written approval from the Wilmington District USACE.

36) In order to compensate for a portion of the 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.

ENFORCEMENT

37) A representative of the USACE will periodically and randomly inspect the work for compliance with these conditions. Deviations from these procedures may result in an administrative financial penalty and/or directive to cease work until the problem is resolved to the satisfaction of the USACE.

38) Violation of these conditions or violation of Section 404 of the Clean Water Act of Section 10 of the Rivers and Harbors Act must be reported in writing to the Wilmington District USACE within 24 hours of the permittee's discovery of the violation.

North Carolina Wildlife Resources Commission

Richard B. Hamilton, Executive Director

TO: Jeff Hemphill, Natural Environment Unit
N. C. Department of Transportation

FROM: Marla Chambers, Western NCDOT Permit Coordinator
Habitat Conservation Program, NCWRC

Marla Chambers

DATE: July 19, 2007

SUBJECT: Moratoria for the US 19E widening project from I-26 in Madison County to the existing multilane section west of Spruce Pine in Mitchell County. TIP Nos. R-2518, R-2519A, and R-2519B.

As requested, this is to provide a list of moratoria recommended for the portion of the US 19 E widening project from Madison County to Mitchell County, specifically TIP Nos. R-2518, R-2519A, and R-2519B. These recommendations were originally made in our comment letters and communications at earlier stages of the project planning process for specific segments of the project. Recent fish sampling by NCDOT (May 2006 and May 2007) and NCWRC (August 2006) has provided information that allows the appropriate moratoria to be determined for specific bodies of water. They are provided below for your convenience.

Our comments dated May 23, 2003 and November 21, 2005 for R-2519B and February 24, 2005 for R-2518 and R-2519A, as well as email comments dated February 6, 2007, which referred to all three project segments, provided moratoria recommendations. A clarification should be noted regarding the two comment letters for R-2519B; Big Crabtree Creek was erroneously referred to as Cranberry Creek in both letters. This correction was also announced at a recent Concurrence meeting (April 17, 2007).

On the western end, we are not requesting a moratorium for Middle Fork Creek or its unnamed tributaries. An in-water work moratorium from April 1 to June 30 will apply to Cane River and South Toe River to protect federal and state listed species, including the federally Endangered Appalachian elktoe (*Alasmidonta raveneliana*). Smallmouth bass, an important game fish, will also receive some reproduction protection with this moratorium.

Mailing Address: Division of Inland Fisheries • 1721 Mail Service Center • Raleigh, NC 27699-1721
Telephone: (919) 707-0220 • **Fax:** (919) 707-0028

The remaining perennial streams within the project will need to adhere to a trout moratorium prohibiting in-stream work and land disturbance within the 25-foot trout buffer from October 15 to April 15 for streams containing brook or brown trout or from January 1 to April 15 for streams in which the only trout species occurring is rainbow trout. Current data lead us to recommend the October 15 to April 15 trout moratorium for Big Crabtree Creek and the January 1 to April 15 trout moratorium for California Creek, Bald Creek, Little Crabtree Creek, Prices Creek, Brushy Creek, and Long Branch. Unnamed tributaries should use the moratorium appropriate for the named stream they flow to, unless survey data indicate otherwise.

To summarize, we recommend the following work moratoria for waters within the R-2518, R-2519A, and R-2519B projects:

April 1 to June 30 in-water work moratorium: Cane River and South Toe River

October 15 to April 15 trout moratorium: Big Crabtree Creek

January 1 to April 15 trout moratorium: California Creek, Bald Creek, Little Crabtree Creek, Prices Creek, Brushy Creek, and Long Branch

We hope this information clarifies the moratoria needed for the subject project segments. These recommendations are subject to change if new information is presented. If you have any questions, please contact me at (704) 984-1070.

cc: David Baker, USACE
Brian Wrenn, NCDWQ
Marella Buncick, USFWS
Christopher Militscher, USEPA

North Carolina Wildlife Resources Commission

TO: David Baker, NCDOT Coordinator
Asheville Regulatory Field Office, USACE

FROM: Marla Chambers, Western NCDOT Permit Coordinator
Habitat Conservation Program, NCWRC

Marla Chambers

DATE: September 11, 2007

SUBJECT: Review of NCDOT's application for a Section 404 Permit and 401 Water Quality Certification for the proposed improvements to US 19/US 19E from future I-26 (existing US 19-23) in Madison County to SR 1186 near Micaville in Yancey County. Madison and Yancey Counties. TIP No. R-2518A, R-2518B, and R-2519A.

North Carolina Department of Transportation (NCDOT) has submitted an application to obtain a Section 404 Individual Permit from the U.S. Army Corps of Engineers (USACE) and a 401 Water Quality Certification from the Division of Water Quality (NCDWQ). Staff biologists with the North Carolina Wildlife Resources Commission (NCWRC) have reviewed the information provided and have participated in the Merger 01 process by attending field, concurrence and hydraulics meetings and submitting comments at various steps in the project development process. These comments are provided in accordance with the provisions of the National Environmental Policy Act (42 U.S.C. 4332(2)(c)) and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667d).

The subject project consists of NCDOT's proposal to widen US 19/US 19E from future I-26 (existing US 19-23) in Madison County to SR 1186 near Micaville in Yancey County to a four-lane divided highway with shoulder section outside the Burnsville Municipal Limits and a curb and gutter section within Burnsville. This project includes three segments (TIP Nos. R-2518A, R-2518B, and R-2519A) of a larger widening plan for this roadway that extends at least into Avery County. The permit application for this 21-mile long project is a "phased application" as final design plans and impact determinations have only been presented for the western most section of the project, R-2518A, and preliminary calculations were provided for R-2518B and R-

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2519A. It is anticipated that construction will be authorized for the first section initially and NCDOT will apply for permit modifications for the latter two sections as designs are finalized. Some portions of the project are on new location to improve alignment. Final permanent impact calculations for the R-2518A section include 0.42 acres of wetland and 6,591 linear feet of stream. Preliminary calculations of permanent impacts for all three sections are 0.94 acres of wetland and 14,766 linear feet of stream.

Waters within the project area are located in the Nolichucky River system of the French Broad River basin. Streams in the Madison County portion of the project drain to Little Ivy Creek. In Yancey County, project streams west of Burnsville drain to the Cane River and those east of Burnsville drain to the South Toe River. All streams within the R-2518A section have a DWQ stream classification of WS II – HQW (High Quality Waters) except Bald Creek, which is Class C water. The named streams include Middle Fork Creek, Bailey Branch, Turkey Branch, Polly Branch, Holland Creek and Ivy Gap Branch. In the Yancey County portion of the project, the Cane River has a significant smallmouth bass fishery and is inhabited by the Appalachian elktoe (*Alasmidonta raveneliana*), a federal and state Endangered (E) mussel, and the following listed fish species: striped shiner (*Luxilus chrysocephalus*), state Threatened (T); olive darter (*Percina squamata*), Federal Species of Concern (FSC) and state Special Concern (SC); sharphead darter (*Etheostoma acuticeps*), FSC and state T; and stonecat (*Noturus flavus*), state E. The remaining perennial streams crossing the project support reproducing trout populations.

The South Toe River, which crosses US 19 E a short distance east of this project (within the R-2519B section), is designated B Tr ORW (Outstanding Resource Waters). The following protected species have been found in the South Toe River in the US 19E project area: Appalachian elktoe, federal and state E; wavy-rayed lampmussel (*Lampsilis fasciola*), state SC; blotchside logperch (*Percina burtoni*), state E; olive darter, FSC and state SC; and hellbender (*Cryptobranchus alleganiensis*), FSC and state SC.

We sincerely appreciate the efforts of NCDOT to minimize and mitigate impacts to these important natural resources throughout the Merger process for this project. Sediment and erosion control measures will follow the Design Standards in Sensitive Watershed for the entire project. NCDOT plans to construct a bridge at the Bald Creek crossing, close off deck drains on the existing bridges, and incorporate a hazardous spill basin at the Cane River bridge. Efforts were made to provide stormwater treatment and aquatic life passage at stream crossings wherever feasible in the given terrain.

The "Detail" pages in the plan sheets provided clear, easy to read specifics on constructing various aspects of the project, including in-stream structures. This should help to ensure that plans are properly carried out in the field. We recommend that NCDOT review plans for all culvert installations and extensions to ensure alternating baffles were included where appropriate to improve aquatic life passage potential, such as at Site 24 in the R-2518A section. This is a site where baffles were indicated during a hydraulics meeting, but not on the current plans. NCDOT should also consider using enhanced sediment and erosion control measures due to the sensitive and high quality nature of the aquatic resources of the project area. NCDOT and NCSU recently studied such techniques on some mountain road projects with very encouraging results, showing

a considerable reduction in off-site sedimentation over standard practices. These new techniques also appear to cost less than the traditional methods.

We also commend NCDOT for their considerable efforts to provide on-site mitigation along the project corridor and protecting the mitigation sites by including them in the right-of-way. Approximately 4,341 linear feet (lf) of stream restoration/relocation, 640 lf of stream enhancement and 15,335 lf of stream preservation are proposed for R-2518A. An additional 279 lf of stream restoration and 5,131 lf of stream enhancement are proposed for R-2518B. No on-site mitigation is proposed for R-2519A, only stream relocations.

The Merger Team previously discussed supporting better mitigation credit ratios for the preservation component in order to encourage protection of these important natural resources, fish and wildlife habitat, and water quality from future impacts and development. NCDOT proposed a 3:1 credit ratio in the permit application cover letter, as opposed to the typical 5:1 ratio. Table 6 listed a buffer width, but no details as to the width on each side of the stream, how much of the site failed to meet buffer requirements, or why buffer requirements were not met. The stream mitigation plan for R-2518A indicated "narrow" buffers on many of the preservation sites, and no buffer at one site. These sites, their boundaries, and buffers were not clearly indicated on the plan sheets or any map. It appears additional details are needed to determine appropriate mitigation credit ratios.

During project field meetings, several locations were noted to have Japanese knotweed, an invasive plant of serious concern. Surveys should be conducted and any Japanese knotweed found within construction limits for the project or mitigation sites should be eradicated using proper techniques. Procedures should be developed for treatment and handling of the plant material and soils to prevent the spread of the plant and ensure eradication so that the mitigation sites and habitat along the project corridor are not diminished.

Our recommendations for work moratoria on this project and the section immediately east (R-2519B) have been provided to NCDOT and appropriate Team members previously. The most recent letter, dated July 19, 2007, indicated no work moratorium for Middle Fork Creek or its unnamed tributaries. An in-water work moratorium from April 1 to June 30 will apply to Cane River and South Toe River to protect federal and state listed species, including the federally Endangered Appalachian elktoe. Smallmouth bass, an important game fish, will also receive some reproduction protection with this moratorium. The remaining perennial streams will need to adhere to a trout moratorium prohibiting in-stream work and land disturbance within the 25-foot trout buffer from October 15 to April 15 for streams containing brook or brown trout or from January 1 to April 15 for streams in which the only trout species occurring is rainbow trout. Current data lead us to recommend the October 15 to April 15 trout moratorium for Big Crabtree Creek and the January 1 to April 15 trout moratorium for California Creek, Bald Creek, Little Crabtree Creek, Prices Creek, Brushy Creek, and Long Branch. Unnamed tributaries should use the moratorium appropriate for the named stream they flow to, unless survey data indicate otherwise.

We are concerned about cumulative and secondary impacts to the valuable and sensitive natural resources in the project vicinity as a result of this project. The US 19/19E widening project will

be the only four-lane road in Yancey and Mitchell Counties and is situated between Asheville and Boone. This and other projects in the area will improve regional accessibility throughout this part of western North Carolina. The area is becoming an important tourist destination, largely due to the scenic beauty and nature-based recreational opportunities, such as fishing, hiking, canoeing and site-seeing. Any induced growth has the potential to degrade water quality, scenic views, and recreational amenities, and the potential increases when development controls are not in place. Local communities have a desire to grow the manufacturing employment base and this project may influence intraregional land development location decisions.

NCDOT will provide partial control of access for the project, limiting the number of access points connecting to the highway. They also propose to place on-site mitigation sites in the right-of-way, effectively controlling access in these areas and protecting the sites from direct impacts from future development. We applaud these commitments! Local authorities, however, must provide appropriate protection for the remaining developable land in the project vicinity, not just the highway corridor, in order to protect the valuable natural resources that are key to the tourism that is vital to the area's economy. Strong stormwater management requirements, limits on impervious area, and protection of natural buffers along waterways are important measures to preserve the water quality, fish and wildlife habitats, and scenic beauty. Other measures to mitigate secondary and cumulative impacts can be found in the Guidance Memorandum to Address and Mitigate Secondary and Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality (NCWRC 2002). We urge local authorities and NCDOT to adopt many of these measures and to use low impact development techniques (see www.lowimpactdevelopment.org for information) to manage stormwater quantity and quality in developing areas. Additional information can be found at www.ncstormwater.org.

In addition, we can concur with the permit issuance if the following conditions are implemented:

1. Sediment and erosion control measures shall adhere to the Design Standards for Sensitive Watersheds and be strictly maintained until project completion to avoid impacts to downstream aquatic resources.

2. Temporary or permanent herbaceous vegetation should be planted on all bare soil **as soon as possible**, but within 21 calendar days of temporary or permanent grade establishment, to provide long-term erosion control.

3. Tall fescue should not be used in riparian areas. We encourage NCDOT to utilize onsite vegetation and materials for streambank stabilization when practicable. Erosion control matting should be used in riparian areas and steep slopes, instead of straw mulch, and well anchored with 12" staples, wooden survey stakes or live stakes.

4. The natural dimension, pattern, and profile of the streams above and below the culverts should not be modified by widening the stream channel or changing the depth of the stream.

5. Culverts that are less than 48-inch diameter should have the floor of the barrel installed 20% of the diameter of the culvert below the level of the stream bottom, as appropriate.

Culverts that are 48-inch diameter or larger should be placed with the floor of the barrel approximately 12 inches below the stream bottom to allow natural stream bottom materials to become established in the culvert following installation and to provide aquatic life passage during periods of low flow. This may require increasing the size of the culvert to meet flow conveyance requirements. These measurements must be based on natural thalweg depths. Any perched outlets should be corrected during construction, as appropriate.

6. Removal of vegetation in riparian areas should be minimized. Native trees and shrubs should be planted along the stream banks to reestablish the riparian zone and to provide long-term erosion control.

7. Grading and backfilling should be minimized, and tree and shrub growth should be retained, if possible. Backfill materials should be obtained from upland sites.

8. Rip rap should be minimized. Rip rap placed for bank stabilization should be limited to the stream bank below the high water mark, and vegetation should be used for stabilization above the high water elevation.

9. Excavation of the stream crossings should be conducted in the dry, if possible. Sandbags, cofferdams, flexible pipe, or other diversion structures should be used to minimize excavation in flowing water.

10. Rock check dams at culvert outlets should be removed at project completion. These structures could impede movement of aquatic life.

11. Stormwater should be directed to buffer areas or retention basins and should not be routed directly into streams whenever possible.

12. If concrete will be used during construction, work must be accomplished so that wet (uncured) concrete does not contact surface waters. This will lessen the chance of altering the water chemistry and causing a fish kill.

13. Discharging hydroseeding mixtures and washing out hydroseeders and other equipment in or adjacent to surface waters is strictly prohibited.

14. Heavy equipment should be operated from the bank rather than in the stream channel whenever possible in order to minimize sedimentation and reduce the likelihood of introducing other pollutants into the stream. All mechanized equipment operated near surface waters should be inspected and maintained regularly to prevent contamination of stream waters from fuels, lubricants, hydraulic fluids or other toxic materials.

Thank you for the opportunity to review and comment on this project. If you have any questions regarding these comments, please contact me at (704) 984-1070.

Literature Cited:

NCWRC (North Carolina Wildlife Resources Commission). 2002. Guidance Memorandum to Address and Mitigate Secondary and Cumulative Impacts to Aquatic and Terrestrial Wildlife Resources and Water Quality. NCWRC, Raleigh. Available: http://www.ncwildlife.org/pg07_WildlifeSpeciesCon/pg7c3_impacts.pdf. (February 2003).

cc: David Baker, USACE
Brian Wrenn, NCDWQ
Marella Buncick, USFWS
Christopher Militscher, USEPA

P-22

From: Chambers, Marla J
Sent: Wednesday, July 18, 2013 4:43 PM
To: Dagnino, Carla S
Cc: Hemphill, Jeffrey L; Wallace, Heather L
Subject: RE: R-2519B, Yancey and Mitchell Counties, Moratorium

I've heard back from our staff and we agree to drop the listed species moratorium for the South Toe River crossing of this project. No moratoria will be requested for this crossing.

Marla Chambers

Marla J. Chambers
Western NCDOT Permit Coordinator
North Carolina Wildlife Resources Commission
12275 Swift Road
Oakboro, NC 28129
Office & Fax: 704-485-8291
Work cell: 704-984-1070
marla.chambers@ncwildlife.org
ncwildlife.org

P-23

From: Buncick, Marella [mailto:marella_buncick@fws.gov]
Sent: Tuesday, July 09, 2013 3:33 PM
To: Wallace, Heather L
Cc: Beckwith, Loretta A SAW; john_fridell@fws.gov; Ratzlaff, Allen
Subject: Re: draft amendment to US 19 BO (UNCLASSIFIED)

According to the plans and also our discussions in the field, during Phase 2 that causeway is just to the edge and there was thought that even that could be eliminated. So, yes, I am looking for added protection during phases 1 and 2 while any remaining animals could be protected (minimizing take) since that is a year and a half.

John also said there really isn't a need for the moratorium on pg 2, particularly if that means the construction could be shortened if it is not in place.

thanks marella

North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

John E. Skvarla, III
Secretary

August 28, 2014

Mr. Barney Blackburn, PE
Soil & Water Engineering Supervisor
N C Department of Transportation
Roadside Environmental Unit
1557 Mail Service Center
Raleigh, NC 27699-1557

Subject: Trout Buffer Zone Waiver
US 19E from SR 1186 in Yancey County to Multi-Lane Section West of Spruce Pine in Mitchell County
TIP Project R-2519B
Yancey/Mitchell Counties

Dear Mr. Blackburn:

This office has received your plan for US 19E from SR 1186 in Yancey County to Multi-Lane Section West of Spruce Pine in Mitchell County, North Carolina. Your plan was submitted to this office for approval because of the proposed encroachments into the buffer zone of designated trout waters. In accordance with NCGS 113A-57(1) and Title 15A NCAC 4B .0125(c) this letter will serve as written approval to encroach on the buffer zone of the South toe River, Class B, Trout, Outstanding Resource Waters, and Ayles Creek, Long Branch, Big Crabtree Creek and Brushy Creek and their unnamed tributaries, Class C, Trout. This authority has been delegated to me by Tracy E. Davis, Director, Division of Energy, Mineral and Land Resources, in accordance with NCGS 143B-10. The following conditions will apply to this approval:

1. This approval is based on the revised plans received via electronic message on November 26, 2013 and December 3, 2013.

2. Uncovered areas draining to the South Toe River and its unnamed tributaries upstream of US 19E shall be limited at any time to a maximum total area of 20 acres. Only the portion of the land-disturbing activity draining to Outstanding Resource Waters (a subset of High Quality Waters) shall be governed by this

condition. Larger areas may be uncovered within the Outstanding Resource Waters watershed with the written approval of the Director, Division of Energy, Mineral and Land Resources.

3. No land disturbing activity may take place within the trout buffer zone according to the following schedule:

    a. Big Crabtree Creek and its unnamed tributaries: from October 15 to April 15 of each year;
    b. Brushy Creek and its unnamed tributaries: from January 1 to April 15 of each year;
    c. Long Branch and its unnamed tributaries: from January 1 to April 15 of each year.
    d. South Toe River: moratorium only on in-stream work in the South Toe River from April 1 to June 30 of each year.
    e. Tree removal activities shall be conducted in accordance with special condition no. 10 of your approved 404 permit.

4. Submit two (2) complete sets of final plans to the Asheville Regional Office for their files.

5. Schedule a Preconstruction Conference with the Asheville Regional Office before initiating any land-disturbing activity.

6. This approval does not absolve the permittee from compliance with the surface water quality turbidity standard. More protective erosion and sedimentation control measures may be required in order to comply with this water quality standard.

Your cooperation in protecting our environment is most appreciated. If you have any questions about this approval, please contact me at ashley.rodgers@ncdenr.gov or (919) 707-9215.

Sincerely,

Ashley L Rodgers

Ashley L. Rodgers, PE
State Sedimentation Specialist

cc: Laura Herbert, PE, Asheville Regional Engineer

NCDENR
North Carolina Department of Environment and Natural Resources
Division of Water Resources
Water Quality Programs
Thomas A. Reeder
Director

Pat McCrory
Governor

John E. Skvarla, III
Secretary

December 2, 2013

Mr. Richard W. Hancock, P.E., Manager
Project Development and Environmental Analysis
North Carolina Department of Transportation
1598 Mail Service Center
Raleigh, North Carolina, 27699-1598

Subject: 401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act with ADDITIONAL CONDITIONS for Proposed improvements to US 19E from SR 1186 in Yancey County to multilane section west of Spruce Pine in Mitchell County, State Project No. 6.909001T, WBS Element No. 35609.1.1, TIP R-2519B. NCDWR Project No. 2013-0743v.2.

Dear Mr. Hancock:

Attached hereto is a copy of Certification No. 3977 issued to The North Carolina Department of Transportation (NCDOT) dated December 2, 2013.

If we can be of further assistance, do not hesitate to contact us.

Sincerely,

Thomas A. Reeder

Attachments

cc: Lori Beckwith, US Army Corps of Engineers, Asheville Field Office (electronic copy only)
Mark Davis, Division 14 Engineer
Chris Militscher, Environmental Protection Agency (electronic copy only)
Marla Chambers, NC Wildlife Resources Commission (electronic copy only)
Jason Elliott, NCDOT, Roadside Environmental Unit
Marella Buncick, US Fish and Wildlife Services (electronic copy only)
Beth Harmon, Ecosystem Enhancement Program
NCDWR Asheville Regional Office
File Copy

Transportation and Permitting Unit
1650 Mail Service Center, Raleigh, North Carolina 27699-1650
Location: 512 N. Salisbury St. Raleigh, North Carolina 27604
Phone: 919-807-6300 \ FAX 919-733-1290
Internet: www.ncwaterquality.org

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 authorizes the NCDOT to impact 0.088 acres of jurisdictional wetlands, 8579 linear feet of jurisdictional streams in Yancey and Mitchell County. The project shall be constructed pursuant to the application dated received November 7, 2013. The authorized impacts are as described below:

Stream Impacts in the French Broad River Basin

Site	Permanent Fill in perennial (linear ft)	Rip rap stabilization (linear ft)	Temp. impact (linear ft)	Total Stream Impacts (linear ft)	Natural Channel Design (linear ft)	Stream Impacts Requiring Mitigation-DWR (linear ft)
1	43	0	0	43	0	0
2	235	0	97	332	0	235
2A	65	0	44	109	0	0
3	311	12	21	344	0	315
4	97	44	15	156	0	0
4A	18	16	0	34	0	0
5	0	0	160	160	0	0
5A	148	0	0	148	148	0
6	28	0	57	85	144	0
7	358	0	15	373	0	358
7A	24	0	0	24	0	0
7 B	131	0	0	131	0	0
7C	70	0	15	85	0	0
8	432	0	0	432	449	0
8A	79	15	11	105	0	0
8B	58	0	0	58	0	58
8C	69	0	11	80	0	69
9	0	37	10	10	40	0
10	96	87	15	198	0	183
11	0	50	0	50	0	50
12	79	0	25	104	0	0
13	110	0	0	110	0	110
14	220	0	0	220	0	220
15	78	0	15	93	0	78
16	32	50	0	82	0	0
17	33	20	0	53	0	0
18	152	0	8	160	70	0
19	132	12	0	144	0	144
21	412	0	0	412	396	0
22	0	23	177	200	0	0
23	27	20	34	81	0	47
24	175	0	12	187	0	175
25	174	0	15	189	94	0
26	129	10	15	154	0	0
27	56	10	10	76	0	0
28	80	40	0	120	0	0
28A	141	0	0	141	0	0
29	89	62	30	181	0	0
29A	149	0	0	149	0	149

30	321	0	10	331	635	321
31	59	32	31	122	0	91
32	52	0	10	62	0	0
33	444	0	0	444	300	144
34	33	23	118	174	0	0
35	88	10	8	106	46	0
37	247	10	0	257	0	250
38	22	10	5	37	0	0
39	0	58	15	73	0	0
40	258	11	15	284	0	269
41	103	10	15	128	0	0
42	244	10	18	272	0	254
43	16	10	15	41	0	0
44	147	0	0	147	0	0
45	0	0	288	288	0	0
TOTAL	**6564**	**692**	**1352**	**8579**	**2252**	**3520**

Total Stream Impact for Project: 8579 linear feet

Wetland Impacts in the French Broad River Basin

Site	Fill (ac)	Fill (temporary) (ac)	Excavation (ac)	Mechanized Clearing (ac)	Hand Clearing (ac)	Area under Bridge (ac)	Total Wetland Impact (ac)
8	0	0	0.014	0.037	0	0	0.051
13	0.06	0	0	0	0		0.06
20	0	0	0.037	0	0	0	0.037
Total	**0.06**	0	**0.051**	**0.037**	**0**	**0**	**0.148**

Total Wetland Impact for Project: 0.148 acres.

Open Water (Pond) Impacts in the French Broad River Basin

Site	Permanent Fill in Open Waters (ac)	Temporary Fill in Open Waters (ac)	Total Fill in Open Waters (ac)
R-2519B	0	0.01	0.01
Total	**0**	**0.01**	**0.01**

Total Open Water Impact for Project: 0.01acres.

The application provides adequate assurance that the discharge of fill material into the waters of the French Broad River Basin in conjunction with the proposed development will not result in a violation of applicable Water Quality Standards and discharge guidelines. Therefore, the State of North Carolina certifies that this activity will not violate the applicable portions of Sections 301, 302, 303, 306, 307 of PL 92-500 and PL 95-217 if conducted in accordance with the application and conditions hereinafter set forth.

This approval is only valid for the purpose and design that you submitted in your application dated received November 12, 2013. Should your project change, you are required to notify the NCDWR and submit a new application. If the property is sold, the new owner must be given a copy of this Certification and approval letter, and is thereby responsible for complying with all the conditions. If any additional wetland impacts, or stream impacts, for this project (now or in the future) exceed one acre or 150 linear feet, respectively, additional compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h) (6) and (7). For this approval to remain valid, you are required to comply with all the conditions listed below. In addition, you should obtain all other federal, state

or local permits before proceeding with your project including (but not limited to) Sediment and Erosion control, Coastal Stormwater, Non-discharge and Water Supply watershed regulations. This Certification shall expire on the same day as the expiration date of the corresponding Corps of Engineers Permit.

Conditions of Certification:

1. The permittee shall visually monitor the vegetative plantings to assess and ensure complete stabilization of the mitigation stream segments. Riparian area success shall be determined by conducting stem counts to ensure a tree survival rate of 320 stems/acre. The monitoring shall be conducted annually for a minimum of 3 years after final planting. Photo documentation shall be utilized to document the success of the riparian vegetation and submitted to NCDWR in a final report within sixty (60) days after completing monitoring. After 3 years the NCDOT shall contact NCDWR to schedule a site visit to "close out" the mitigation site.
2. Compensatory mitigation for impacts to streams at a replacement ratio of 1:1 is required. Compensatory mitigation for impacts to jurisdictional streams shall be provided by natural channel design of 2252 linear feet of Stream in French Broad basin. The onsite stream restoration shall be constructed in accordance with the design submitted in your November 7, 2013 application. All on-site mitigation sites shall be protected in perpetuity by a conservation easement or through NCDOT fee simple acquisition and recorded in the NCDOT Natural Environment Unit mitigation geodatabase. Please be reminded that as-builts for the completed streams shall be submitted to the North Carolina Division of Water Resources 401 Wetlands Unit with the as-builts for the rest of the project. If the parameters of this condition are not met, then the permittee shall supply additional stream mitigation for the impacts. All channel relocations will be constructed in a dry work area, will be completed and stabilized, and must be approved on site by NCDWR staff, prior to diverting water into the new channel. Whenever possible, channel relocations shall be allowed to stabilize for an entire growing season. All stream relocations shall have a 50-foot wide native wooded buffer planted on both sides of the stream unless otherwise authorized by this Certification. A transitional phase incorporating rolled erosion control product (RECP) and appropriate temporary ground cover is allowable.
* **3.** Off-site Compensatory mitigation for 3520 linear feet of impact to streams is required by DWR. We understand that you have chosen to perform compensatory mitigation for impacts to 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 November 5, 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.
* 4. Two copies of the final construction drawings shall be furnished to the NCDWR Central Office prior to the pre-construction meeting. The permittee shall provide written verification that the final construction drawings comply with the permit drawings contained in the application dated November 7, 2013. Any deviations from the approved drawings are not authorized unless approved by the NC Division of Water Resources.
5. All channel relocations will be constructed in a dry work area and stabilized before stream flows are diverted. Channel relocations will be completed and stabilized, and must be approved on site by NCDWR staff, prior to diverting water into the new channel. Whenever possible, channel relocations shall be allowed to stabilize for an entire growing season. Vegetation used for bank stabilization shall be limited to native woody species, and should include establishment of a 30 foot wide wooded and an adjacent 20 foot wide vegetated buffer on both sides of the relocated channel to the maximum extent practical. All stream banks shall be matted with coir fiber matting. Also, rip-rap may be allowed if it is necessary to maintain the physical integrity of the stream, but the applicant must provide written justification and any calculations used to determine the extent of rip-rap coverage requested. Once the stream has been turned into the new channel, it may be necessary to relocate stranded fish to the new channel to prevent fish kills.
6. The post-construction removal of any temporary bridge structures must return the project site to its preconstruction contours and elevations. The impacted areas shall be revegetated with appropriate native species.
7. Strict adherence to the most recent version of NCDOT's Best Management Practices For Bridge Demolition and Removal approved by the US Army Corps of Engineers is a condition of the 401 Water Quality Certification.

8. Bridge deck drains shall not discharge directly into the stream. Stormwater shall be directed across the bridge and pre-treated through site-appropriate means (grassed swales, pre-formed scour holes, vegetated buffers, etc.) before entering the stream. Please refer to the most current version of *Stormwater Best Management Practices*.
9. Bridge piles and bents shall be constructed using driven piles (hammer or vibratory) or drilled shaft construction methods. More specifically, jetting or other methods of pile driving are prohibited without prior written approval from the NCDWR first.
10. No drill slurry or water that has been in contact with uncured concrete shall be allowed to enter surface waters. This water shall be captured, treated, and disposed of properly.
11. A turbidity curtain will be installed in the stream if driving or drilling activities occur within the stream channel, on the stream bank, or within 5 feet of the top of bank. This condition can be waived with prior approval from the NCDWR.
12. All bridge construction shall be performed from the existing bridge, temporary work bridges, temporary causeways, or floating or sunken barges. If work conditions require barges, they shall be floated into position and then sunk. The barges shall not be sunk and then dragged into position. Under no circumstances should barges be dragged along the bottom of the surface water.
13. Unless otherwise approved in this certification, placement of culverts and other structures in open waters and streams, shall be placed below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20 percent of the culvert diameter for culverts having a diameter less than 48 inches, to allow low flow passage of water and aquatic life. Design and placement of culverts and other structures including temporary erosion control measures shall not be conducted in a manner that may result in dis-equilibrium of wetlands or streambeds or banks, adjacent to or upstream and down stream of the above structures. The applicant is required to provide evidence that the equilibrium is being maintained if requested in writing by the NCDWR. If this condition is unable to be met due to bedrock or other limiting features encountered during construction, please contact the NCDWR for guidance on how to proceed and to determine whether or not a permit modification will be required.
14. If multiple pipes or barrels are required, they shall be designed to mimic natural stream cross section as closely as possible including pipes or barrels at flood plain elevation and/or sills where appropriate. Widening the stream channel should be avoided. Stream channel widening at the inlet or outlet end of structures typically decreases water velocity causing sediment deposition that requires increased maintenance and disrupts aquatic life passage.
15. Riprap shall not be placed in the active thalweg channel or placed in the streambed in a manner that precludes aquatic life passage. Bioengineering boulders or structures should be properly designed, sized and installed.
16. For all streams being impacted due to site dewatering activities, the site shall be graded to its preconstruction contours and revegetated with appropriate native species.
17. The stream channel shall be excavated no deeper than the natural bed material of the stream, to the maximum extent practicable. Efforts must be made to minimize impacts to the stream banks, as well as to vegetation responsible for maintaining the stream bank stability. Any applicable riparian buffer impact for access to stream channel shall be temporary and be revegetated with native riparian species.
18. The permittee will need to adhere to all appropriate in-water work moratoria (including the use of pile driving or vibration techniques) prescribed by the NC Wildlife Resources Commission. In addition, the permittee shall conform to the NCDOT policy entitled "Stream Crossing Guidelines for Anadromous Fish Passage (May 12, 1997) at all times. In-stream work and land disturbance within the 25-foot buffer zone are prohibited during the trout-spawning season of October 15 through April 15 to protect the egg and fry stages of trout.
19. For projects impacting waters classified by the NC Environmental Management Commission as Trout (Tr), High Quality Waters (HQW), or Water Supply I or II (WSI, WSII) stormwater shall be directed to vegetated buffer areas, grass-lined ditches or other means appropriate to the site for the purpose of pre-treating storm water runoff prior to discharging directly into streams. Mowing of existing vegetated buffers is strongly discouraged.
20. The permittee shall use /Design Standards in Sensitive Watersheds/(15A NCAC 4B.0124[a]-[e]) in areas draining to ORW or Trout waters. However, due to the size of the project, the NCDOT shall not be required to meet 15A NCAC 4B .0124(a) regarding the maximum amount of uncovered acres. Temporary cover (wheat, millet, or similar annual grain) or permanent herbaceous cover shall be planted on all bare soil within 15 business days of ground disturbing activities to provide erosion control.

21. NCDOT shall be in compliance with the NCS00250 issued to the NCDOT, including the applicable requirements of the NCG01000. Please note the extra protections for the sensitive watersheds.
22. Tall fescue shall not be used in the establishment of temporary or permanent groundcover within riparian areas. For the establishment of permanent herbaceous cover, erosion control matting shall be used in conjunction with an appropriate native seed mix on disturbed soils within the riparian area and on disturbed steep slopes with the following exception. Erosion control matting is not necessary if the area is contained by perimeter erosion control devices such as silt fence, temporary sediment ditches, basins, etc. Matting should be secured in place with staples, stakes, or wherever possible, live stakes of native trees. Erosion control matting placed in riparian areas shall not contain a nylon mesh grid, which can impinge and entrap small animals. For the establishment of temporary groundcover within riparian areas, hydroseeding along with wood or cellulose based hydro mulch applied from a fertilizer- and limestone-free tank is allowable at the appropriate rate in conjunction with the erosion control measures. Discharging hydroseed mixtures and wood or cellulose mulch into surface waters in prohibited. Riparian areas are defined as a distance 25 feet landward from top of stream bank.

General Conditions

1. Unless otherwise approved in this certification, placement of culverts and other structures in open waters and streams shall be placed below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20 percent of the culvert diameter for culverts having a diameter less than 48 inches, to allow low flow passage of water and aquatic life. Design and placement of culverts and other structures including temporary erosion control measures shall not be conducted in a manner that may result in dis-equilibrium of wetlands or streambeds or banks, adjacent to or upstream and down stream of the above structures. The applicant is required to provide evidence that the equilibrium is being maintained if requested in writing by NCDWR. If this condition is unable to be met due to bedrock or other limiting features encountered during construction, please contact NCDWR for guidance on how to proceed and to determine whether or not a permit modification will be required.
2. If concrete is used during construction, a dry work area shall be maintained to prevent direct contact between curing concrete and stream water. Water that inadvertently contacts uncured concrete shall not be discharged to surface waters due to the potential for elevated pH and possible aquatic life and fish kills.
3. During the construction of the project, no staging of equipment of any kind is permitted in waters of the U.S., or protected riparian buffers.
4. The dimension, pattern and profile of the stream above and below the crossing shall not be modified. Disturbed floodplains and streams shall be restored to natural geomorphic conditions.
5. The use of rip-rap above the Normal High Water Mark shall be minimized. Any rip-rap placed for stream stabilization shall be placed in stream channels in such a manner that it does not impede aquatic life passage.
* 6. The Permittee shall ensure that the final design drawings adhere to the permit and to the permit drawings submitted for approval.
7. Prior to commencing ground disturbing activities, an acceptable monitoring and mitigation plan for the presence of sulfide-bearing rock must be approved by the NCDWR.
8. All work in or adjacent to stream waters shall be conducted in a dry work area. Approved BMP measures from the most current version of NCDOT Construction and Maintenance Activities manual such as sandbags, rock berms, cofferdams and other diversion structures shall be used to prevent excavation in flowing water.
9. Heavy equipment shall be operated from the banks rather than in the stream channel in order to minimize sedimentation and reduce the introduction of other pollutants into the stream.
10. All mechanized equipment operated near surface waters must be regularly inspected and maintained to prevent contamination of stream waters from fuels, lubricants, hydraulic fluids, or other toxic materials.
11. No rock, sand or other materials shall be dredged from the stream channel except where authorized by this certification.
12. Discharging hydroseed mixtures and washing out hydroseeders and other equipment in or adjacent to surface waters is prohibited.
13. The permittee and its authorized agents shall conduct its activities in a manner consistent with State water quality standards (including any requirements resulting from compliance with §303(d) of the Clean Water Act) and any other appropriate requirements of State and Federal law. If the NCDWR determines that such standards or laws are not being mêt (including the failure to sustain a designated or achieved use) or that State

or federal law is being violated, or that further conditions are necessary to assure compliance, the NCDWR may reevaluate and modify this certification.

14. All fill slopes located in jurisdictional wetlands shall be placed at slopes no flatter than 3:1, unless otherwise authorized by this certification.
15. A copy of this Water Quality Certification shall be maintained on the construction site at all times. In addition, the Water Quality Certification and all subsequent modifications, if any, shall be maintained with the Division Engineer and the on-site project manager.
16. The outside buffer, wetland or water boundary located within the construction corridor approved by this authorization shall be clearly marked by highly visible fencing prior to any land disturbing activities. Impacts to areas within the fencing are prohibited unless otherwise authorized by this certification.
17. The issuance of this certification does not exempt the Permittee from complying with any and all statutes, rules, regulations, or ordinances that may be imposed by other government agencies (i.e. local, state, and federal) having jurisdiction, including but not limited to applicable buffer rules, stormwater management rules, soil erosion and sedimentation control requirements, etc.
18. The Permittee shall report any violations of this certification to the Division of Water Resources within 24 hours of discovery.
* 19. Upon completion of the project (including any impacts at associated borrow or waste sites), the NCDOT Division Engineer shall complete and return the enclosed "Certification of Completion Form" to notify NCDWR when all work included in the 401 Certification has been completed.
20. Native riparian vegetation (**ex. list herbaceous, trees, and shrubs native to your geographic region**) must be reestablished in the riparian areas within the construction limits of the project by the end of the growing season following completion of construction.
21. There shall be no excavation from, or waste disposal into, jurisdictional wetlands or waters associated with this permit without appropriate modification. Should waste or borrow sites, or access roads to waste or borrow sites, be located in wetlands or streams, compensatory mitigation will be required since that is a direct impact from road construction activities.
22. Erosion and sediment control practices must be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices in order to protect surface waters standards:
    a. The erosion and sediment control measures for the project must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Sediment and Erosion Control Planning and Design Manual.*
    b. The design, installation, operation, and maintenance of the sediment and erosion control measures must be such that they equal, or exceed, the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual.* The devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) projects, including contractor-owned or leased borrow pits associated with the project.
    c. For borrow pit sites, the erosion and sediment control measures must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual.*
    d. The reclamation measures and implementation must comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act.
23 Sediment and erosion control measures shall not be placed in wetlands or waters unless otherwise approved by this Certification.

Violations of any condition herein set forth may result in revocation of this Certification and may result in criminal and/or civil penalties. This Certification shall become null and void unless the above conditions are made conditions of the Federal 404 and/or Coastal Area Management Act Permit. This Certification shall expire upon the expiration of the 404 or CAMA permit.

If you wish to contest any statement in the attached Certification you must file a petition for an administrative hearing. You may obtain the petition form from the office of Administrative hearings. You must file the petition with the office of Administrative Hearings within sixty (60) days of receipt of this notice. A petition is considered filed when it is received in the office of Administrative Hearings during normal office hours. The Office of Administrative Hearings accepts filings Monday through Friday between the hours of 8:00am and 5:00pm, except for official state holidays. The original and one (1) copy of the petition must be filed with the Office of Administrative Hearings.

The petition may be faxed-provided the original and one copy of the document is received by the Office of Administrative Hearings within five (5) business days following the faxed transmission.
The mailing address for the Office of Administrative Hearings is:

Office of Administrative Hearings
6714 Mail Service Center
Raleigh, NC 27699-6714
Telephone: (919)-431-3000, Facsimile: (919)-431-3100

A copy of the petition must also be served on DENR as follows:

Mr. Lacy Presnell, General Counsel
Department of Environment and Natural Resources
1601 Mail Service Center

This the 2nd day of December 2013

DIVISION OF WATER RESOURCES

Thomas A. Reeder

WQC No. 3977

R2518 & R2519

P-34

E. Lusk

United States Department of the Interior

Hemphill

FISH AND WILDLIFE SERVICE
Asheville Field Office
160 Zillicoa Street
Asheville, North Carolina 28801

March 14, 2008

Mr. Dave Baker
Asheville Regulatory Field Office
U.S. Army Corps of Engineers
151 Patton Avenue, Room 208
Asheville, North Carolina 28801-5006

Dear Mr. Baker:

Subject: Proposed Widening of US 19 in Madison, Mitchell, and Yancey Counties, North Carolina, and Its Effects on the Federally Endangered Appalachian Elktoe and Its Designated Critical Habitat

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion) based on our review of the Biological Assessment (BA) of the effects of the subject highway widening and associated bridge construction on the Appalachian elktoe (*Alasmidonta raveneliana*) and its designated critical habitat in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.) (Act).

This Opinion is based on information provided in the August 9, 2007, BA; supplemental information to the BA (received February 7, 2008); other available literature; personal communications with experts on the federally endangered Appalachian elktoe; and other sources of information. A complete administrative record of this consultation is on file at our office.

In the BA, the North Carolina Department of Transportation (NCDOT) determined that the following federally listed species would not be affected by the proposed project: Carolina northern flying squirrel (*Glaucomys sabrinus coloratus*), Virginia big-eared bat (*Corynorhinus townsendii virginianus*), Eastern cougar (*Puma concolor couguar*), spruce-fir moss spider (*Microhexura montivaga*), spreading avens (*Geum radiatum*), Heller's blazing star (*Liatris helleri*), Roan Mountain bluet (*Hedyotis purpurea* var. *montana*), Blue Ridge goldenrod (*Solidago spithamaea*), spotfin chub (*Erimonax monachus*), gray bat (*Myotis grisescens*), Virginia big-eared bat *(Corynorhinus townsendii virginianus),* and rock gnome lichen (*Gymnoderma lineare*). In addition, the NCDOT determined that the project was "not likely to adversely affect" the Indiana bat (*Myotis sodalis*) or Virginia spiraea (*Spiraea virginiana*). We concur with these determinations. Therefore, we believe the requirements under section 7 of the

Act are fulfilled for these species. However, obligations under section 7 of the Act must be reconsidered if: (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered, (2) this action is subsequently modified in a manner that was not considered in this review, or (3) a new species is listed or critical habitat is determined that may be affected by the identified action.

CONSULTATION HISTORY

A consultation history of this project is provided in Appendix A.

BIOLOGICAL OPINION

I. DESCRIPTION OF THE PROPOSED ACTION

As defined in the Service's section 7 regulations (50 CFR 402.02), "action" means "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States or upon the high seas." The action area is defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." The direct and indirect effects of the actions and activities must be considered in conjunction with the effects of other past and present federal, state, or private activities, as well as the cumulative effects of reasonably certain future state or private activities within the action area. This Opinion addresses only those actions from which the Service believes adverse effects may result. In their BA, the NCDOT outlined those activities involved in the widening of US 19 that would affect the Appalachian elktoe and its designated critical habitat; they include the following: adding lanes of pavement, lengthening existing culverts, adding a bridge over the Cane River, and replacing a bridge over the South Toe River. This Opinion addresses whether the widening of US 19 (and associated activities) is likely to jeopardize the continued existence of the Appalachian elktoe or adversely modify or destroy its designated critical habitat.

The NCDOT proposes to widen existing US 19 and US 19E from I-26 (US 23) in Madison County east to State Route (SR) 1336 in Yancey County (R-2518A and R-2518B) and then from SR 1336 in Yancey County to an existing multilane section west of the Town of Spruce Pine in Mitchell County (R-2519A and R-2519B). The proposed project, combined, will be 29.3 miles (mi) long, with about 21 mi occurring in the Nolichucky River basin, portions of which are occupied by the Appalachian elktoe. The elktoe has been found in the vicinity of proposed project crossings of the Cane River and South Toe River. The South Toe River crossing occurs within designated critical habitat for this species. The entire area within R-2518B, R-2519A, and R-2519B and a small portion at the eastern terminus of R-2518A eventually drain into occupied habitat and into some reaches of designated critical habitat for the Appalachian elktoe within the Cane, South Toe, or North Toe Rivers.

In order to minimize impacts to the natural and human environments, the preferred design uses a "best fit" combination of symmetric and asymmetric widening. The typical section

consists of a four-lane divided shoulder section with a 17.5-foot raised median on R-2518A, and R-2519A and a 20-foot raised median on the remaining nonurban areas. The urban sections of the road will have a right-of-way width of between 200 and 400 feet (ft), depending on terrain. The right-of-way through the town of Burnsville will be 150 ft to 230 ft wide and will consist of a curb-and-gutter section from station 252+00 –L- to station 299+76 –L-. A total of 169 stream crossings/stream-impact areas were identified in the preliminary impact summary sheets for projects R-2518A and B, and R-2519A and B. Of the 169 crossings, 108 occur in the Nolichucky River basin.

As part of this project, the NCDOT has incorporated measures that minimize impacts in the design of the roadway improvements and new bridge structures. The NCDOT also is committing to a number of protective measures that will be implemented during construction of the highway and the bridges and in postconstruction monitoring and follow-up remediation where necessary. Specific measures addressing stream stability at tributary crossings, storm-water runoff controls, and erosion and sediment controls are described in more detail below.

As individual stream crossings are evaluated and designs are determined, the NCDOT will consider a variety of measures to help ensure stream stability and fish passage at culverted stream crossings. Possible measures, alone or in combination, include:

1. The incorporation of low-flow sills with a low-flow channel in new culvert installations or retrofitting existing culverts where enough hydraulic conveyance exists.

2. On multiple-barrel culverts, the use of sills at the entrance of one or more barrels to maintain normal flow depth through the remaining barrel(s).

3. The construct of a low-flow floodplain bench at the entrance and outlet of the culvert to maintain normal channel dimensions where the existing or new culvert is larger than the stream channel.

4. Burying new culverts below the streambed to allow natural bed material to deposit in the culvert bottom. On steeper stream grades, baffles should be placed in the culvert bottom to aid retention of natural bed material.

5. The use of natural rock energy-dissipater basins at pipe outlets to lower velocities.

6. The use of rock cross vanes to maintain stream grade, alleviate stream-bank erosion, and maintain stream grade control near culvert outlets and/or inlets.

7. The use of riprap on stream banks only at pipe outlets, not in the streambed.

8. The removal of existing culverts that are perched, replacing them with new culverts that have low-flow sills and/or low-flow channels.

9. The removal of existing undersized pipe culverts, replacing them with properly sized and aligned pipe culverts.

The NCDOT has documented major stream-crossing designs and measures taken to protect stream stability and fish passage in Stormwater Management Plans (SMPs) for each section of the project. An SMP for the R-2519B section will also be prepared and document the stream-crossing designs and measures taken to protect stream stability and fish passage for that section of the project. Complete SMPs for R-2518A, R-2518B, and R-2519A are located in Appendix C.

The NCDOT will use a number of Best Management Practices (BMPs) to minimize impacts from postconstruction increases in storm-water runoff from the project. These BMPs include grass swales, preformed scour holes, hazardous spill basins, dry detention basins, and grass-lined roadway ditches and shoulders. In the first three sections of this project, the NCDOT has designed over 32,000 linear feet (lf) of grass swales, 29 preformed scour holes, and at least 1 dry detention basin. These BMPs will cover 14 mi of the total 21-mi project. The remaining 7 mi, when designed, will meet or exceed the standards in the first three sections. The current BMPs are designed to treat the amount of roadway that will be drained and are tailored for each segment of the highway. Individual designs can be found in Appendix C. The storm drainage systems for the project have been designed to avoid the direct discharge of storm drainpipes into receiving surface waters. Direct discharge was minimized to the greatest extent possible; but because of steep terrain, roadway grades, and urban development (in the Town of Burnsville area), this could not be done in all cases.

Grass swales are used extensively on this project. Grass swales are vegetated channels designed to convey and treat runoff from small drainage areas, reduce flow velocity, and promote infiltration while removing suspended solids, metals, and nutrients through sedimentation, vegetative filtration, infiltration, and biological uptake.[1] The typical roadway ditch section along existing US 19 has been enhanced. The ditches for the project are wider with flatter slopes and provide a 66% increase in vegetated flow length on the shoulders when compared to existing cross sections. In addition to grass swales, preformed scour holes will be used extensively throughout this project. Preformed scour holes are riprap-lined depressions constructed at the outlet of a point discharge to dissipate energy and promote diffuse flow.[2]

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[1]Studies have shown that vegetated roadway swales, designed as described previously, are effective in removing pollutants (Wisconsin Department of Transportation [WisDOT] 2007, NCDOT unpublished data) NCDOT research has shown that a grassed filter strip removed from 68% and 97% of Total Suspended Solids (TSS) and grassed shoulders showed a 40% removal of TSS. In a synthesis report prepared by the WisDOT, studies of grass swales and grassed shoulders from seven state departments of transportation demonstrate reductions in a number of pollutants other than TSS, including metals Results varied by type of vegetation, time of year, and distance of treatment run available (WisDOT 2007)

[2]Preformed scour holes reduce the amount of end-of-pipe erosion by eliminating unabated scour By inducing diffuse flow conditions, preformed scour holes promote runoff infiltration and reduce downgrade erosion Preformed scour holes will be used throughout the length of the project. Many will be used in flat floodplain areas where the discharge will be allowed to diffuse and infiltrate in the floodplain areas.

Two hazardous spill basins will be constructed on the R-2518B project at the Cane River crossing. At least two more will be provided on the R-2519B section of the project at the South Toe River crossing.

In their SMPs, the NCDOT has documented BMPs that will be used to offset impacts due to postconstruction storm-water runoff for the R-2518A, R-2518B, and R-2519A sections of the project (Appendix C). An SMP for R-2519B will be prepared during final design for that section of the project and will incorporate the same or greater protections.

Where curb-and-gutter was used through the town of Burnsville, an effort was made to discharge the storm drain systems into grass-lined ditches, grass swales, and preformed scour holes behind the curb-and-gutter before entering into surface waters. Along this portion of the project, 1,000 ft of grass swales, eight preformed scour holes, and 550 ft of grass-lined ditches have been designed. This information is documented in the SMP for project R-2519A (Appendix C).

In addition to the control measures described previously, the NCDOT has a statewide National Pollutant Discharge Elimination System (NPDES) storm-water permit. This permit requires the NCDOT to perform 14 programs to manage storm-water runoff. While all programs have provided benefits to the Nolichucky River basin, the following are noteworthy:

1. Illicit Discharge and Detection and Elimination Program: The NCDOT facilitates a web-based system that allows their field staff to report illicit discharges to the storm-water system. The reports are then forwarded to the North Carolina Division of Water Quality (DWQ) for appropriate action. If the discharge is within the NCDOT right-of-way, the NCDOT will take appropriate action to remove the source.

2. BMPs Retrofits: This program requires the NCDOT to develop structural or nonstructural BMPs to treat storm-water runoff on existing facilities. This program can be used to retrofit existing facilities or address future storm-water runoff concerns. Although the current project design incorporates storm-water BMPs in the design, the NCDOT will investigate retrofit opportunities on other existing facilities in the Nolichucky River basin.

3. BMPs Inspection and Maintenance Program: The NPDES permit requires the NCDOT to develop an inspection and maintenance program for structural storm-water controls. A program is currently being piloted in NCDOT's Divisions 3, 4, and 5 and will be implemented across the state in the next few years. The NCDOT Hydraulics Unit and Division 13 will coordinate to determine whether projects R-2518B and R-2519 can be included in this pilot program.

4. Research and Program Assessment: The NCDOT performs research on the characterization of highway pollutants as well as the performance of structural storm-water controls. This program is currently looking at the effectiveness of

storm-water controls in North Carolina. The previously mentioned BMPs Inspection and Maintenance pilot program is for maintenance, while the research program objective would be for quantitative assessment. The NCDOT has an annual research cycle where proposals are submitted on an annual basis. The NCDOT plans to propose further research on the performance of the grass swales along the 19E project. This research will be proposed to the NCDOT Research Program in the summer of 2008, when the program annually solicits proposals.

Given the length of this project and the sensitivity of the watershed, the NCDOT has developed specific erosion-control measures for this project that are designed to protect environmentally sensitive areas. In addition, they are committed to enhanced monitoring and reporting to achieve the highest level of compliance with standards for sediment and erosion control for this project. To help ensure accountability, there are a number of inspections required at specific times (Appendix B).

The NCDOT Erosion and Sediment Control Program requires that all land-disturbing activities comply with the Sedimentation Pollution Control Act of 1973 (SPCA). Inspections will be performed by certified Level I or II erosion- and sediment-control/ storm-water professionals to ensure that all erosion- and sediment-control devices are installed and maintained according to the approved plan. Inspections will include weekly written reports or within 24 hours of a $\geq$0.5-inch (in) rainfall event that will document the progress of the project and what items need attention. All erosion- and sediment-control/storm-water BMPs will be installed by a contractor supervised by a Level I or II certified professional.

A certified Level II erosion- and sediment-control/storm-water supervisor will perform erosion- and sediment-control management for the project and will be responsible for coordinating the grading operations, with phasing and implementation of the erosion- and sediment-control plan. When corrective actions are identified, the supervisor will coordinate efforts to resolve issues and coordinate the overall inspection of the project to ensure that the necessary documentation is being completed and maintained for review by the regulatory agencies. A contractor's Level II foreman will be present on the project to ensure compliance. A certified Level III erosion- and sediment-control/storm-water designer will design reclamation plans. The designer will be responsible for ensuring that the reclamation plans comply with the SPCA and all project permit conditions.

The NCDOT's Division 13 (Division) construction staff will provide secondary oversight for erosion and sedimentation control on the project. They will perform routine inspections to see if installation, maintenance, and project documentation are occurring as required. All inspection documents completed by the Division staff will be maintained on site for review by the regulatory agencies. Division construction inspection staff will hold Level I or II certification, as applicable.

Roadside Environmental Unit's Field Operations (REUFO) will provide the third level of oversight for erosion and sedimentation control on the project. REUFO will perform reviews that will document the condition of the project's erosion- and

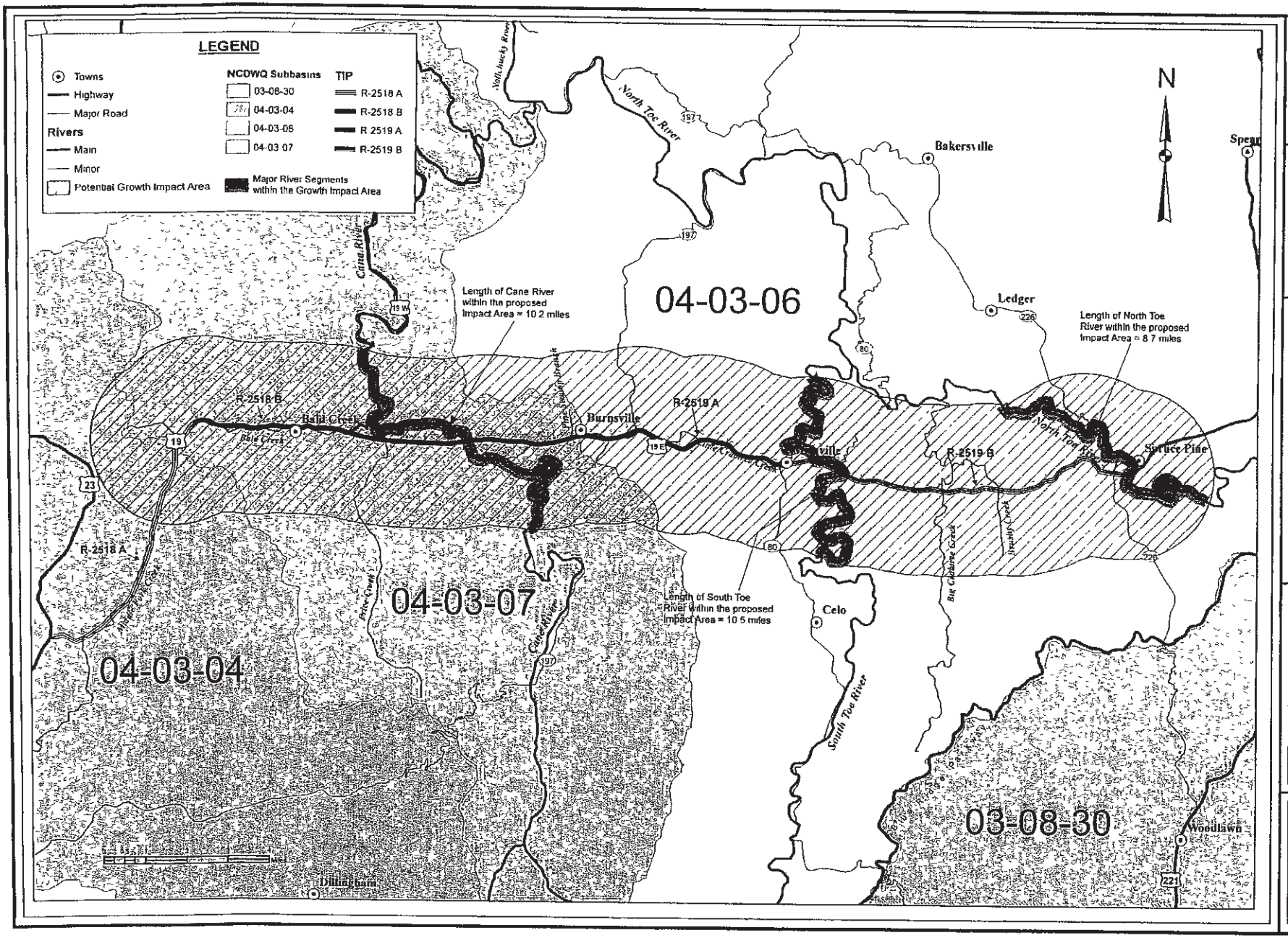
sediment-control/storm-water compliance and the progress on needed corrective actions. REUFO will also review revisions to the erosion- and sedimentation-control plan and provide advice on design modifications. REUFO's reviews will be maintained for on-site inspection by regulatory agencies or delivered electronically upon request. REUFO personnel who perform reviews will be certified professionals in erosion and sediment control and/or certified professionals in storm-water quality.

In the event a violation to the SPCA occurs, the REUFO will issue an Immediate Corrective Action that will initiate project suspension. If a violation of a permit condition occurs, the REUFO staff will issue a Permit Consultation Needed. The lead engineer and the Division's environmental officer will be notified, and the appropriate corrective actions will be taken. The Division staff may suspend work at any time they deem necessary to correct an issue, and the Division's environmental officer may review and recommend corrective actions in order to comply with permit conditions. The NCDOT will notify the Service of any violations to the SPCA.

A. Action Area

The action area ("all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action") for the proposed project includes: (1) the area directly impacted by construction activities, primarily the existing roadway and land immediately adjacent; (2) areas potentially affected by indirect impacts, defined as a 2-mi-wide "potential growth area" on either side of the existing highway; and (3) proposed conservation areas to help offset impacts to the Appalachian elktoe and its designated critical habitat. Within the action area (Figure 1) there are about 10.2 mi of the main stem of the Cane River, 10.5 mi of the main stem of the South Toe River, and 8.7 mi of the main stem of the North Toe River in Mitchell and Yancey Counties. Additional streams within the project area include Middle Fork Creek, Bald Creek, Price Creek, Pine Swamp Branch, Little Crabtree Creek, and Big Crabtree Creek. Middle Fork Creek flows to the south from Bethel to the French Broad River. Bald Creek flows to the north from the top of Ivy Gap to the Cane River. Price Creek flows north from Chestnut Mountain to the Cane River. The Cane River flows north from the Pisgah National Forest, converging with the North Toe River (also known as the Toe River downstream of its confluence with the South Toe River; in this Opinion, when we refer to the Toe River, we are speaking of that portion of the North Toe River downstream of its confluence with the South Toe River) to form the Nolichucky River. Pine Swamp Branch flows to the west from Burnsville and is a tributary to the Cane River. Little Crabtree Creek flows to the east from Burnsville and is a tributary to the South Toe River. Big Crabtree Creek flows north along the Yancey/Mitchell County line into the North Toe River. Brushy Creek is a tributary to Big Crabtree Creek

Physical Characteristics within the Action Area - The South Toe flows into the North Toe River west of the Town of Spruce Pine. The Toe River then flows northwest and combines with the Cane River to form the Nolichucky River, a tributary to the French Broad River. The North Toe River originates in central Avery County, 5 mi northeast



The Catena Group

Date
November 2006

Scale
As Shown

Job No
3157

Title

Action Area Map

Appalachian Elktoe Biological Opinion

US 19 Widening R-2518 & R-2519

Mitchell and Yancey Counties North Carolina

Client

NCDOT

Figure

1

P-41

of Newland. From Newland, the river flows west for 4 mi to Minneapolis. The river generally flows in a southwesterly direction from Minneapolis, through the city of Spruce Pine in Mitchell County, where it is joined by the South Toe River near Kona. The Toe River continues to flow northwest along the Mitchell/Yancey County border through Toecane and Relief until its confluence with the Cane River near Huntdale. The headwaters of the Cane River arise in Mount Mitchell State Park in Yancey County The Cane River flows generally north for 40 mi before joining the Toe River near Huntdale to form the Nolichucky River.

The Nolichucky River watershed occupies parts of two physiographic provinces. The upstream parts of the watershed (upstream from about Dry Creek, at river mile [rm] 87.5) and the higher slopes along the eastern side of the river are in the Blue Ridge Province. The remainder of the watershed and most of the length of the Nolichucky River are located in the Valley and Ridge Province. One-third of the watershed is located in the Blue Ridge Province and is characterized by high, steep ridges with narrow valleys. The mountains in this part of the watershed rise 1,000 ft to 2,500 ft above the adjacent lowlands. The western part of the Blue Ridge Province has long and narrow individual ridges, aligned parallel to the trend of the range and similar to the more subdued ridges of the Valley and Ridge Province. The main mountain mass along the Tennessee/North Carolina state line is a tumbled confusion of peaks and valleys that appear to have no regular pattern.

Land Use – The dominant land use in the action area is forested/wetland (85%), with about 13% of the area in pasture/managed herbaceous. Urban area comprises less than 1% of the action area. Both the South Toe and the Cane Rivers originate in Mount Mitchell State Park, and two-thirds of the Cane River watershed is in the Pisgah National Forest. A significant portion of land along the alluvial areas of the middle North Toe, the South Toe, and Toe Rivers is cultivated cropland and pasture (14%), with a small portion (<1%) in residential/golf course (North Carolina Department of Environment and Natural Resources [NCDENR], DWQ, 2005). Historically, the economy of the entire Nolichucky River basin depended on natural resources. The mining of mica, feldspar, kaolin, or olivine in the Spruce Pine mining district within the North Toe and South Toe watersheds was the main source of income for the area Feldspar, mica, and kaolin have been extensively mined in this watershed in North Carolina since the early 1900s (Muncy 1981) Nearly half of the nation's mica is produced in this region.

Ecological Significance – The Nolichucky River basin supports a number of rare fish and freshwater mussel species Table 1). The stonecat (*Noturus flavus*) is found only in North Carolina, in the Nolichucky and Little Tennessee River watersheds The Cane River contains several rare animals, the most notable of which is almost the entire North Carolina population of the sharphead darter (*Etheostoma acuticeps*).

The lower stretches of the North Toe and Nolichucky Rivers provide habitat for the olive darter (*Percina squamata*), logperch (*Percina caprodes*), and tangerine darter (*Percina aurantiaca*), as well as the federally endangered Appalachian elktoe mussel

Table 1. Rare Aquatic Species in the North Toe, Toe, and Cane Rivers.

Scientific Name	Common Name	North Carolina Status	Federal Status
Mussels:			
Alasmidonta raveneliana	Appalachian elktoe	Endangered	Endangered
Lampsilis fasciola	Wavy-rayed lampmussel	Special Concern	None
Amphibians:			
Cryptobranchus alleganiensis	Hellbender	Special Concern	Federal Species of Concern
Fishes:			
Etheostoma acuticeps	Sharphead darter	Threatened	Federal Species of Concern
Etheostoma vulneratum	Wounded darter	Special Concern	Federal Species of Concern
Percina squamata	Olive darter	Special Concern	Federal Species of Concern
Noturus flavus	Stonecat	Endangered	None

The wavy-rayed lampmussel (*Lampsilis fasciola*) and the hellbender (*Cryptobranchus alleganiensis*) have been found in the same reaches of the upper Nolichucky River subbasin where the Appalachian elktoe occurs. The North Carolina Natural Heritage Program (NCNHP) describes the aquatic habitat of the South Toe, a portion of the North Toe, the Toe, and the Nolichucky River as having "National Significance," and the aquatic habitat of the Cane River as having "Statewide Significance."

Water Quality Assessment and Best Usage Classification - Sedimentation from mining and agricultural practices in the basin is well-documented (Tennessee Valley Authority [TVA] 1981, Ahlstedt and Rashleigh 1996). Historically, sedimentation and pollution from mining operations throughout the Nolichucky River basin (primarily in the North Toe watershed) significantly degraded cool-warm water habitats (North Carolina Wildlife Resources Commission [NCWRC] 2005). However, the North Carolina Mining Control Act of 1971 and the Sedimentation and Pollution Control Act of 1973 have helped improve the water quality of this basin (NCDENR 2003, Ahlstedt and Rashleigh 1996). In 2002, bioassessments, including benthic macroinvertebrate and fish sampling, in the Nolichucky River basin by the DWQ indicated improving conditions in the basin (Tables 2 and 3).

Table 2. EPT Scores for Water Bodies Monitored in Nolichucky River Basin for Basinwide Assessment.

Water Body	County	Location	1997	2002
North Toe River	Mitchell	SR 1321	Good	Good
North Toe River	Avery	US 19E	Good	Good
North Toe River	Mitchell	SR 1162	Fair	Good
North Toe River	Yancey	SR 1314	Good	Good
Big Crabtree Creek	Mitchell	US 19E	Excellent	Excellent
South Toe River	Yancey	SR 1167	Excellent	Excellent
Big Rock Creek	Mitchell	NC 197	Good	Excellent
Jacks Creek	Yancey	SR 1337	Fair	Fair
Pigeonroost Creek	Mitchell	SR 1349/NC 197	Excellent	Excellent
Cane River	Yancey	US 19E	Excellent	Excellent
Bald Mountain Creek	Yancey	SR 1408	Good	Excellent
Price Creek	Yancey	SR 1126	Good/Fair	Good

Sampling conducted by the DWQ indicates overall water quality is good in the Nolichucky River basin (based on the parameters that are sampled and evaluated by the DWQ), but sediment is a growing concern. Sedimentation has been considered a significant problem in the Nolichucky River system for many years. Mining impacts are widespread, and croplands and development contribute to nonpoint-source pollution, including pesticides, fertilizers, oil, heavy metals, animal waste, and eroded sediment, that is washed from land or paved surfaces when it rains. Habitat in the North Toe River between Spruce Pine and its confluence with the South Toe River continues to be degraded, seemingly from discharges and runoff from mining operations and the town of Spruce Pine. Floodplain gravel mining in the upper Cane River watershed, both permitted and unpermitted actions, presents a potential threat to long-term channel stability and habitat quality.

In 2006, the DWQ added two river reaches in the action area to North Carolina's list of impaired streams (303(d) list). These include a reach of the lower Cane River (~3.5 mi) and a reach of the North Toe River (~11.3 mi). In addition, in 2008 the DWQ added the main stem of the Nolichucky River, throughout its entirety in North Carolina (~10.0 mi), to the draft 303(d) list. The portions of the Cane, North Toe, and Nolichucky Rivers that have been added to the state's list of impaired streams are all occupied, designated critical habitat for the Appalachian elktoe. Reasons for listing include turbidity standard violations for the Cane and Nolichucky Rivers and turbidity standard violations and impaired biological integrity in the North Toe River. The nonpoint-source runoff of silt/sediments is identified as the most likely cause of impairment of these three river reaches.

Table 3. Tennessee Valley Authority Fish Community Assessment in the Nolichucky River Basin (DWQ 2003).[3]

Water Body	County	Location	Date	Score/Rating
North Toe River	Mitchell	US 19	1999	50/Good
North Toe River	Yancey	NC 80	1997 1999	40/Good 50/Good
Toe River	Avery	SR 1314	1997 1999	40/Fair 56/Good - Excellent
Toe River	Mitchell	SR 1336	1997	48/Good
South Toe River	Mitchell	NC 80	1997	48/Good
Little Crabtree Creek	Yancey	US 19E	1997 1999	44/Fair 40/Fair
Cane Creek	Mitchell	NC 80	1997 1999	32/Poor 34/Poor
Big Rock Creek	Mitchell	NC 197	1997 2000	50/Good 50/Good
Jacks Creek	Yancey	SR 1336	2000	40/Fair
Cane River	Yancey	US 19E	1997 2000	44/Fair 50/Good
Cane River	Yancey	US 19W	1997 2000	40/Fair 48/Good
Cane River	Yancey	US 19W	1997	46/Fair - Good
Nolichucky River	Mitchell	SR 1321	1997 2002	50/Good 52/Good

The NCDENR assigns a best usage classification (15A NCAC 02B.0101 GENERAL PROCEDURES) to all the waters of North Carolina. These classifications provide for a level of water quality protection to ensure that the designated usage of that water body is maintained. The portions of the Toe, Cane, and North Toe Rivers that are occupied by the Appalachian elktoe have a "Class C, Trout," usage classification, and the Nolichucky River from its source to the North Carolina/Tennessee state line has a usage classification of "Class B."

[3]The Fish Community Assessment assigns an Index of Biotic Integrity (IBI), which is another method of assessing water quality. The IBI evaluates species richness and composition, trophic composition, and fish abundance and condition.

Point-source Pollution - Point-source pollution is defined as pollutants that enter surface waters through a pipe, ditch, or other well-defined conveyance. These include municipal (city and county) and industrial wastewater treatment facilities; small domestic discharging treatment systems (schools, commercial offices, subdivisions, and individual residences); and storm-water systems from large urban areas and industrial sites. The primary substances and compounds associated with point-source discharge include· nutrients; oxygen-demanding wastes; and toxic substances, such as chlorine, ammonia, and metals.

Under Section 301 of the Clean Water Act of 1977, the discharge of pollutants into surface waters is regulated by the Environmental Protection Agency. Section 402 of the Clean Water Act establishes the NPDES Permitting Program, which delegates permitting authority to qualifying states. In North Carolina, the DWQ is responsible for the permitting and enforcement of the NPDES Program. There were 23 NPDES permitted discharges in the Nolichucky basin in 2003 (NCDENR 2005), although additional discharges have been permitted recently (including a new wastewater treatment plant [WWTP] discharge into the South Toe River below Highway 19E). Most of these discharges are small WWTPs that serve schools or subdivisions, including the Spruce Pine WWTP, Newland WWTP, and Bakersville WWTP and multiple mining process discharges, including Unimin Mining Company's four discharges.

Nonpoint-source Pollution – Nonpoint-source pollution refers to runoff that enters surface waters through storm water or snowmelt. There are many types of land-use activities that are sources of nonpoint-source pollution, including land development; construction activity; animal waste disposal; mining, agricultural, and forestry operations; and impervious surfaces, such as roadways and parking lots. Various nonpoint-source management programs have been developed by a number of agencies to control specific types of nonpoint-source pollution (e.g., pollution related to forestry, pesticide, urban, and construction activities). Each of these management programs develops BMPs to control the specific type of nonpoint-source pollution.

The SECP applies to construction activities, such as roadway construction, and is established and authorized under the SPCA. This act delegates the responsibility for its administration and enforcement to the NCDENR's Division of Land Resources (Land Quality Section). The SECP requires, prior to construction, the submission and approval of erosion-control plans on all projects disturbing an acre or more. On-site inspections by the Division of Land Resources are conducted to determine compliance with the plan and to evaluate the effectiveness of the BMPs·that are being used. The NCDOT, in cooperation with the DWQ, has developed a sedimentation-control program for highway projects using BMPs for the protection of surface waters. Additional erosion-control measures, outlined in Design Standards in Sensitive Watersheds (NCAC T15A:04B.0124), are implemented by the NCDOT for projects within WS-I or WS-II water supply watersheds, critical areas, waters designated for shellfishing, or any waters designated by the DWQ as "High Quality Waters." When crossing an aquatic resource containing a federally listed species, the NCDOT has

committed to implement erosion-control guidelines that go beyond both the standard BMPs and the Design Standards in Sensitive Watersheds, regardless of the DWQ classification. These areas are designated as "Environmentally Sensitive Areas" on the erosion-control plans.

B. Conservation Measures

Conservation measures represent actions, pledged in the project description, that the action agency will implement to minimize the effects of the proposed action and further the recovery of the species under review. Such measures should be closely related to the action and should be achievable within the authority of the action agency. The beneficial effects of conservation measures are taken into consideration in the Service's determination of a jeopardy versus a nonjeopardy opinion and in the analysis of incidental take. However, such measures must minimize impacts to listed species within the action area in order to be factored into the Service's analyses.

The NCDOT proposes to offset project-related impacts by implementing a number of conservation measures. Included in the overall proposal are measures that will help aid recovery by conserving or restoring habitat and measures intended to minimize direct impacts through project design, construction practices, and monitoring and remediation.

Habitat Conservation and Restoration

1. The NCDOT has committed to providing riparian habitat protection in at least five locations within the Nolichucky basin, to provide a total of 57.6 acres (ac) and 19,005 lf of protection. Sites will be reviewed by the Service before purchase.

2. The NCDOT is using on-site stream mitigation to offset unavoidable impacts to existing streams within the project alignment. A total of 29,783 lf of on-site mitigation has been identified for the entire project. Of the total, 11,299 lf is identified and planned within the Nolichucky River basin and includes a variety of practices to restore stream pattern, dimension, and profile; correct channel instability; restore riparian buffers; and preserve stable stream reaches. These sites will be purchased as part of the NCDOT right-of-way and will be permanently protected from future development. Stream restoration and buffer preservation in the project corridor will help offset project-related impacts and will benefit downstream resources, including the Appalachian elktoe, by correcting existing problems in the watershed. Mitigation plans are developed in coordination with the U.S. Army Corps of Engineers (Corps), DWQ, and the Service.

3. The NCDOT will relocate all native mussels, including the Appalachian elktoe, from the footprints of the bridge construction projects to an appropriate relocation site as determined in coordination with the Service and the NCWRC. The procedure for relocation will be detailed in a site-specific plan developed in cooperation with the Service, NCWRC, and NCDOT. The relocation procedures will emphasize relocating freshwater mussels in such a way as to reduce stress and

minimize the risk of injury while the animals are in transit. If at any time during the relocation it is determined that these procedures are not meeting the stated objectives, more stringent methods may be developed, in cooperation with the NCWRC and the Service, to ensure that the mussels are relocated successfully. The relocation site(s) will be monitored for the survival of relocated mussels and the movement of mussels a month after they have been removed from the defined salvage areas. The relocation site(s) will then be monitored for recovery, survival (of recovered mussels), movement, and growth of the mussels once a year for 5 years after project completion. Annual reports will be provided to the Service and the NCWRC.

4. Japanese knotweed (*Fallopia japonica)*, an aggressive and invasive nonnative plant, is colonizing floodplain and stream-bank areas in the Nolichucky River basin. Japanese knotweed can quickly form dense thickets that exclude native vegetation and greatly alter the natural riparian ecosystem. The NCDOT has identified Japanese knotweed within the project limits of R-2518 and R-2519. To minimize the potential spread of this species from construction-related activities, the NCDOT proposes to attempt to suppress the knotweed within their right-of-way at the following locations: R-2518A Mitigation Site 1, R-2518B Mitigation Site 4, R-2518B Bridge at Sta. 223+50 (Cane River Bridge), and R-2519B Bridge at Sta. 121+00 (South Toe River Bridge).

5. The contract(s) for this project will stipulate that any Japanese knotweed material disturbed through construction activities at the two bridges and at the identified mitigation sites will be buried within the project boundaries in fill or waste areas below the depth of the topsoil. The NCDOT prefers on-site disposal to ensure proper disposal. Any chemical treatment will be proposed and planned in coordination with the Service and the NCDOT. The NCDOT also has initiated a research project with North Carolina State University to further investigate techniques to control Japanese knotweed. Control tests in the project area will be coordinated with the Service.

Design Measures

1. In some road sections, where streams run parallel to the current road alignment and opportunities to avoid impacts or relocate streams are limited, the NCDOT will construct retaining walls. In these cases, retaining walls replace fill slopes, thereby reducing the linear feet of stream that must be culverted and placed under fill. The NCDOT has avoided impacts to 4,704 lf of streams throughout the project, including 3,569 lf of streams in the Nolichucky River basin. Although these stream segments do not provide suitable habitat for the Appalachian elktoe, they flow into a reach of either the South Toe River or North Toe River, both of which are occupied by the Appalachian elktoe and are designated critical habitat for this species. Reducing impacts in these streams will minimize potential downstream impacts, such as sedimentation, erosion, and stream-bank instability, to the Appalachian elktoe and its designated critical habitat.

2. The existing culvert crossing of Bald Creek at Station # 175+60 –L- is being replaced with a bridge. This crossing is 0.7 mi from the confluence of Bald Creek and the Cane River, in a reach of the Cane River that is occupied by the Appalachian elktoe.

3 Deck drains will be placed at the ends of the replacement bridges. Storm water will be directed into catch basins and will then flow through a vegetated buffer so that no drainage will occur over the Cane River or South Toe River. Currently, drainage from the decks of both the existing structures flows directly into the river. Storm water coming off the approaching roadways at the bridge locations will be managed in a similar manner.

4. The design of the Cane River Bridge and the South Toe River Bridge minimized or eliminated piers in the rivers.

5. Bridge designs at Price's Creek and at Bald Creek will direct deck drainage to a vegetated buffer and will span the respective Creeks.

Construction Measures

1. In addition to relocating all mussels found in the footprint of the impact area, the NCDOT will conduct final mussel surveys in the project footprints just prior to construction and will move any additional mussels found to the appropriate relocation area.

2. For the entire 21-mi-long project within the Nolichucky River basin, the NCDOT will implement erosion-control measures that exceed the standard BMPs and incorporate the Design Standards in Sensitive Watersheds [15A NCAC 04B.0124 (b) – (e)], regardless of the DWQ stream classification.

3. The areas adjacent to jurisdictional water bodies in the watersheds of the Cane, North Toe, and South Toe Rivers will be identified as "Environmentally Sensitive Areas" on the Sedimentation and Erosion Control Plans for this project. By definition, an "Environmentally Sensitive Area" will be identified as a 50-foot buffer zone on both sides of the stream, measured from the top of the stream bank. Within the identified 50-foot Environmentally Sensitive Areas, the following shall apply:

   a. The contractor may perform clearing operations, but not grubbing operations, until immediately prior to beginning grading operations;

   b. Once grading operations begin, work shall progress in a continuous manner until complete;

c. Erosion-control devices shall be installed immediately following the clearing operation;

d. Seeding and mulching shall be performed on the areas disturbed by construction immediately following final grade establishment; and

e. Seeding and mulching shall be done in stages on cut and fill slopes that are greater than 20 ft in height, measured along the slope, or greater than 2 ac in area, whichever is less.

4. All sedimentation- and erosion-control measures, throughout the project limits, must be cleaned out when half full with sediment to ensure proper function of the measures.

5. The contractor will be required to submit a bridge demolition plan to the resident engineer and the bridge construction engineer for their approval. This plan must be sealed by a registered North Carolina professional engineer and must use demolition techniques that minimize the amount of debris that will enter the river. The plan should be reviewed by the Service prior to the approval and initiation of bridge removal.

6. In order to avoid and minimize environmental impacts associated with this project, all standard procedures and measures, including the NCDOT's BMPs for construction and maintenance activities and TVA's Water Management Standard Conditions, will be strictly enforced during the project. Provisions to preclude contamination by toxic substances during the project will also be strictly enforced.

7. The NCDOT's Project Development and Environmental Analysis Branch and the Service will be invited to the preconstruction conference to discuss with the contractor the provisions of this Opinion. Prior to construction the contractor will be required to give notification of the construction initiation date to the Service, NCWRC, and TVA.

Monitoring

1 The NCDOT will monitor fish and benthic macroinvertebrates at nine locations along the project corridor. These data will help detect differences in the two fauna communities above and below the project and will provide information on possible effects on the communities due to project construction. Baseline data have been gathered and will be compared to data collected after project completion (Table 4).

2. A DWQ Assessment Field Data Sheet will be completed at each biological monitoring site. This assessment tool provides an evaluation of physical stream-habitat parameters, such as bank stability, substrate embeddedness, sediment loads, and habitat complexity. These factors are important in determining the overall

Table 4. The NCDOT's Fish Community and Benthic Macroinvertebrate Sample Locations.

Stream	Location	Project Section	Collection Date(s)
California Creek	above US 19 at SR 1608	R-2518A	5/06, 5/07*
	below US 19 at SR 1541		5/06, 5/07*
Bald Creek	near SR 1134	R-2518B	5/06
Price Creek	above US 19 at SR 1126	R-2518B	5/06
	below US 19 at SR 1454		5/06
Bald Creek	above and Below US 19E near SR 1128	R-2518B	Not sampled yet
Cane River	below US 19	R-2518B	5/06
Little Crabtree Creek	above and below US 19 at NC 80 (Micaville)	R-2519A	5/06, 5/07*
Long Branch	below US 19 at SR 1424	R-2519B	5/07
Big Crabtree Creek	below US 19	R-2519B	5/06
Brushy Creek	above and below US 19 at SR 1235	R-2519B	5/06

*A subset of sites was sampled more than once in order to evaluate between year variations in the fish communities.

stability and health of a stream and its ability to support aquatic life. See Appendix D for data sheets and location maps.

3. The NCDOT will monitor the river channel and banks at the Cane River Bridge and the South Toe River Bridge sites upstream, at the construction sites, and downstream to determine changes in habitat resulting from activities at these sites. If any problems with regard to stream stability are detected during the monitoring, the NCDOT will correct the problems. This monitoring also will help evaluate the impacts of construction on habitat in the rivers.

4. Stream stability at culvert replacement and extension sites will be monitored visually during construction, through the assessment described previously at the biological monitoring sites, and at a final field inspection by the NCDOT and agency representatives before close out of the contract for a particular segment.

II. STATUS OF THE SPECIES AND ITS CRITICAL HABITAT

A. Species Description, Life History, and Critical Habitat Description

The Appalachian elktoe has a thin, but not fragile, kidney-shaped shell, reaching up to about 4.0 in in length. Juveniles generally have a yellowish-brown periostracum (outer shell surface), while the periostracum of the adults is usually dark brown to greenish-black in color. Although rays are prominent on some shells, particularly in the posterior portion of the shell, many individuals have only obscure greenish rays. The shell nacre (inside shell surface) is shiny, often white to bluish-white, changing to a salmon, pinkish, or brownish color in the central and beak cavity portions of the shell; some specimens may be marked with irregular brownish blotches.

The Appalachian elktoe has been reported from relatively shallow, medium-sized creeks and rivers with cool, clean, well-oxygenated, moderate- to fast-flowing water. The species is most often found in riffles, runs, and shallow flowing pools with stable, relatively silt-free, coarse sand and gravel substrate associated with cobble, boulders, and/or bedrock (Gordon 1991; Service 1994, 1996, 2002). Stability of the substrate appears to be critical to the Appalachian elktoe, and the species is seldom found in stream reaches with accumulations of silt or shifting sand, gravel, or cobble (Service 2002). Individual specimens that have been encountered in these areas are believed to have been scoured out of upstream areas during periods of heavy rain and have not been found on subsequent surveys (Service 2002).

Like other freshwater mussels, the Appalachian elktoe feeds by filtering food particles from the water column. The specific food habits of the species are unknown, but other freshwater mussels have been documented to feed on detritus (decaying organic matter), diatoms (various minute algae) and other algae and phytoplankton (microscopic floating aquatic plants), and zooplankton (microscopic floating aquatic animals). The reproductive cycle of the Appalachian elktoe is similar to that of other native freshwater mussels. Males release sperm into the water column, and the sperm are then taken in by the females through their siphons during feeding and respiration. The females retain the fertilized eggs in their gills until the larvae (glochidia) fully develop. The mussel glochidia are released into the water and, within a few days, must attach to the appropriate species of fish, which they then parasitize for a short time while they develop into juvenile mussels. They then detach from their fish host and sink to the stream bottom where they continue to develop, provided they land in a suitable substrate with the correct water conditions. The banded sculpin (*Cottus carolinae*) was identified as a host species for glochidia of the Appalachian elktoe at the time the elktoe was listed, and the mottled sculpin (*C. bairdi*) was identified as a host species soon after the listing (Service 2002). Dr. Jim Layzer (Tennessee Technological University, unpublished data) has recently identified eight additional species of fish that successfully transformed glochidia of the Appalachian elktoe into juveniles under laboratory condition. These eight species include the wounded darter (*Etheostoma vulneratum*), greenfin darter (*E chlorobranchium*), greenside darter (*E blennioides*), river chub (*Nocomis micropogon*), northern hogsucker (*Hypentilum*

nigracans), central stoneroller (*Campostoma anomalum*), longnose dace (*Rhinichthys cataractae*), and rosyside dace (*Clinostomus funduloides*). The life span and many other aspects of the Appalachian elktoe's life history are currently unknown.

Critical habitat was designated for the Appalachian elktoe in 2002 (Service 2002). The areas designated as critical habitat for the Appalachian elktoe total 144.3 mi of various segments of rivers in North Carolina and one river in Tennessee. Critical habitat identifies specific areas that are essential to the conservation of a listed species and that may require special management considerations or protection. Section 7(a)(2) of the Act requires that each federal agency shall, in consultation with the Service, ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of an endangered or threatened species or result in the destruction or adverse modification of critical habitat.

The following constituent elements are part of the critical habitat designation and are essential to the conservation of the Appalachian elktoe:

1. Permanent, flowing, cool, clean water;

2. Geomorphically stable stream channels and banks;

3. Pool, riffle, and run sequences within the channel;

4. Stable sand, gravel, cobble, and boulder or bedrock substrates with no more than low amounts of fine sediment;

5. Moderate to high stream gradient;

6. Periodic natural flooding; and

7. Fish hosts, with adequate living, foraging, and spawning areas for them.

In the Nolichucky River basin, critical habitat is designated for the Appalachian elktoe in the main stem of the Nolichucky River, Cane River, Toe River, South Toe River, and North Toe River.

B. Status and Distribution

The Appalachian elktoe is known only from the mountain streams of western North Carolina and eastern Tennessee Although the complete historical range of the Appalachian elktoe is unknown, available information suggests that the species once lived in the majority of the rivers and larger creeks of the upper Tennessee River system in North Carolina, with the possible exception of the Hiawassee and Watauga River systems (the species has not been recorded from either of these river systems). In Tennessee, the species is known only from its present range in the main stem of the Nolichucky River

Currently, the Appalachian elktoe has a fragmented, relict distribution. The species survives in scattered pockets of suitable habitat in portions of the Little Tennessee River system, Pigeon River system, Mills River, and Little River in North Carolina and the Nolichucky River system in North Carolina and Tennessee.

Little Tennessee River Subbasin - In the Little Tennessee River system in North Carolina, populations survive in the reach of the main stem of the Little Tennessee River, between the city of Franklin and Fontana Reservoir, in Swain and Macon Counties (McGrath 1999; Service 1994, 1996, 2002), and in scattered reaches of the main stem of the Tuckasegee River in Jackson and Swain Counties (McGrath 1998; Tim Savidge, NCDOT, personal communication, 2001; Service 2002), from below the town of Cullowhee downstream to Bryson City. Monitoring by the NCWRC of the Appalachian elktoe population in the Little Tennessee River over the last couple of years has revealed that the population is experiencing a significant decline. A single live individual and one shell were recorded in 2000 from the Cheoah River, below Santeetlah Lake, in Graham County (Service 2002). Biologists with the NCDOT, U.S. Forest Service, and the Service have recorded up to 11 live Appalachian elktoe specimens from the Cheoah River, below the Santeetlah Dam, during surveys of portions of the river in 2002, 2003, 2004, and 2005.

French Broad River Subbasin - In the Pigeon River system in North Carolina, a small population of the Appalachian elktoe occurs in small scattered sites in the West Fork Pigeon River and in the main stem of the Pigeon River, above Canton, in Haywood County (McGrath 1999, Service 2002). The Little River (upper French Broad River system) population of the species, in Transylvania County, North Carolina (Service 2002), is restricted to small scattered pockets of suitable habitat downstream of Cascade Lake. In the Mills River, Henderson County, North Carolina, the Appalachian elktoe occurs in a short reach of the river, from just above the Highway 280 bridge (Savidge, Catena Group, personal communication, 2003) to about 1 mi below the bridge (Jeff Simmons, NCWRC, personal communication, 2004). In addition, NCWRC biologists have recently discovered a few individuals of the species at a site in the main stem of the French Broad River, below the mouth of the Little River (Steve Fraley, NCWRC, personal communication, 2005).

Nolichucky River Subbasin - In the Nolichucky River system, the Appalachian elktoe survives in scattered areas of suitable habitat in the Toe River, Yancey and Mitchell Counties, North Carolina (McGrath 1996, 1999; Service 1994, 1996); the Cane River, Yancey County, North Carolina (McGrath 1997; Service 1994, 1996); and the main stem of the Nolichucky River, Yancey and Mitchell Counties, North Carolina, extending downstream to the vicinity of Erwin, Unicoi County, Tennessee (Service 1994, 1996, 2002). A cooperative and comprehensive mussel survey effort was undertaken between 2000 and 2003 by the NCWRC, NCDOT, NCNHP, and Service throughout the upper Nolichucky River system in Yancey, Mitchell, and Avery Counties, North Carolina. Given that many areas in the Nolichucky River system had not been surveyed since the 1990s, the primary goal for these surveys was a

reassessment of the Appalachian elktoe's population status. The survey efforts indicate that suitable habitat within at least 73 mi of stream in the Nolichucky River system is presently occupied by the Appalachian elktoe, an apparent 15-mi increase from reported occupied habitat prior to 2000 (Fraley and Simmons 2004). These surveys also indicate that this population appears to be growing in numbers as well. Sites where mussels were found during 2000 and 2003 produced higher catch per unit efforts than the nearest sites sampled prior to 2000 (Fraley and Simmons 2004). However, the available habitat in the basin is a limiting factor; therefore, the Appalachian elktoe is not evenly dispersed throughout the 15-mi increase in the basin.

During August and September of 2004, significant flooding from Hurricanes Frances and Ivan occurred in the Nolichucky River drainage. The NCWRC surveyed sites in the Nolichucky River drainage for federally listed and state-listed mussels after the hurricanes and compared the results to survey results prior to the hurricanes. As stated previously, based on the results in 2000 and 2003, prior to the 2004 floods, Appalachian elktoe populations in the Nolichucky basin were found to be increasing in abundance and expanding their range. The 2004 flooding resulted in stream-bank erosion and stream-channel scour in several areas in the upper Nolichucky River system, significantly reducing the species' numbers and distribution at several sites throughout this river system (Fraley and Simmons 2006). Fraley and Simmons (2006) reported decreases in numbers of the Appalachian elktoe at nearly all of the sites they surveyed. They also reported that they failed to detect the Appalachian elktoe in the Cane and South Toe Rivers at sites that represented the upstream limit of their distribution prior to the flooding; however, they noted that only a single individual had been found at each of these sites during previous surveys and these individuals may have been lost or may have not been detected during surveys after the flooding. Currently, the Nolichucky population appears to be a relatively large (at least in terms of spatial distribution) metapopulation that is more or less contiguous, with at least the opportunity for some level of gene flow throughout the basin (Fraley and Simmons 2006).

Extirpated Sites - Historically, the Appalachian elktoe has been recorded from Tulula Creek (Tennessee River drainage), the main stem of the French Broad River at Asheville, and the Swannanoa River (French Broad River system) (Clarke 1981), but it has apparently been eliminated (except from a small section of the main stem of the French Broad River at the confluence of the Little River) from these streams (Service 1994, 1996). There is also a historical record of the Appalachian elktoe from the North Fork Holston River in Tennessee (S. S. Haldeman collection); however, this record is believed to represent a mislabeled locality (Gordon 1991). If the historical record for the species in the North Fork Holston River is accurate, the species has apparently been eliminated from this river as well.

Available information indicates that several factors have contributed to the decline and loss of populations of the Appalachian elktoe and threaten the remaining populations. These factors include pollutants in wastewater discharges (sewage treatment plants and industrial discharges); habitat loss and alteration associated with impoundments,

channelization, and dredging operations; and the runoff of silt, fertilizers, pesticides, and other pollutants from land-disturbing activities that were implemented without adequate measures to control erosion and/or storm water (Service 1994, 1996). Mussels are known to be sensitive to numerous pollutants, including, but not limited to, a wide variety of heavy metals, high concentrations of nutrients, ammonia, and chlorine—pollutants commonly found in many domestic and industrial effluents (Havlik and Marking 1987). In the early 1900s, Ortmann (1909) noted that the disappearance of unionids (mussels) is the first and most reliable indicator of stream pollution. Keller and Zam (1991) concluded that mussels are more sensitive to metals than commonly tested fish and aquatic insects. The life cycle of native mussels makes the reproductive stages especially vulnerable to pesticides and other pollutants (Fuller 1974, Gardner et al. 1976, Ingram 1957, Stein 1971). Effluent from sewage treatment facilities can be a significant source of pollution that can severely affect the diversity and abundance of aquatic mollusks. The toxicity of chlorinated sewage effluents to aquatic life is well-documented (Bellanca and Bailey 1977, Brungs 1976, Goudreau et al. 1988, Tsai 1975), and mussel glochidia (larvae) rank among the most sensitive invertebrates in their tolerance of the toxicants present in sewage effluents (Goudreau et al. 1988). Goudreau et al. (1988) found that the recovery of mussel populations may not occur for up to 2 mi below the discharge points of chlorinated sewage effluent.

Land-clearing and -disturbance activities carried out without proper sedimentation and storm-water control pose a significant threat to the Appalachian elktoe and other freshwater mussels. Mussels are sedentary and are not able to move long distances to more suitable areas in response to heavy silt loads. Natural sedimentation resulting from seasonal storm events probably does not significantly affect mussels, but human activities often create excessively heavy silt loads that can have severe effects on mussels and other aquatic organisms. Siltation has been documented to adversely affect native freshwater mussels, both directly and indirectly (Aldridge et al. 1987, Ellis 1936, Kat 1982, Marking and Bills 1979). Siltation degrades water and substrate quality, limiting the available habitat for freshwater mussels (and their fish hosts), thereby limiting their distribution and potential for the expansion and maintenance of their populations; irritates and clogs the gills of filter-feeding mussels, resulting in reduced feeding and respiration; smothers mussels if sufficient accumulation occurs; and increases the potential exposure of the mussels to other pollutants. Ellis (1936) found that less than 1 in of sediment deposition caused high mortality in most mussel species. Sediment accumulations that are less than lethal to adults may adversely affect or prevent the recruitment of juvenile mussels into the population. Also, sediment loading in rivers and streams during periods of high discharge is abrasive to mussel shells. Erosion of the outer shell allows acids to reach and corrode underlying layers that are composed primarily of calcium, which dissolves under acid conditions (Harman 1974).

The effects of impoundments on mussels are also well-documented. For the most part, lakes do not occur naturally in western North Carolina and eastern Tennessee (most of them are man-made); and the Appalachian elktoe, like the majority of our other native mussels, fish, and other aquatic species in these areas, is adapted to stream conditions

(flowing, highly oxygenated water and coarse sand and gravel bottoms). Dams change the habitat from flowing to still water. Water depth increases, flow decreases, and silt accumulates on the bottom (Williams et al. 1992), altering the quality and stability of the remaining stream reaches by affecting water flow regimes, velocities, temperature, and chemistry. Cold water released from near the bottom of reservoirs lowers the water temperature downstream, changing downstream reaches from warm- or cool-water streams to cold-water streams, affecting their suitability for many native species that historically inhabited these stream reaches (Miller et al. 1984, Layzer et al. 1993). The effects of impoundments result in changes in fish communities (fish host species may be eliminated) (Brimm 1991) and in mussel communities (species requiring clean gravel and sand substrates are eliminated) (Bates 1962). In addition, dams result in the fragmentation and isolation of populations of species and act as effective barriers to the natural upstream and downstream expansion or recruitment of mussel and fish species.

The information available demonstrates that habitat deterioration resulting from sedimentation and pollution from numerous point and nonpoint sources, when combined with the effects of other factors (including habitat destruction, alteration, and fragmentation resulting from impoundments, channelization projects, etc.), has played a significant role in the decline of the Appalachian elktoe. We believe this is particularly true of the extirpation of the Appalachian elktoe from the Swannanoa River, most of the French Broad River, and long reaches of the Pigeon, upper Little River, and upper Little Tennessee River systems. We believe these factors also have contributed to the extirpation of the species from parts of the upper Tuckasegee River, Cheoah River, and Tulula Creek, though the effects of impoundments are believed to have played an even more significant role in the loss of the species in the upper reaches of these streams.

Immediate threats to the remaining populations of the Appalachian elktoe are associated with sedimentation and other pollutants (i.e., fertilizers, pesticides, heavy metals, oil, salts, organic wastes, etc.) from point and nonpoint sources, specifically from WWTPs. Much of the Nolichucky River in North Carolina contains heavy loads of sediment, primarily from past land-disturbing activities within its watershed, and suitable habitat for the Appalachian elktoe appears to be very limited in this river system. The species has not been found in the Nolichucky River system in substrates with accumulations of silt and shifting sand; it is restricted to small scattered pockets of stable, relatively clean, and gravelly substrates. The same is true of the other surviving populations of the species.

C. Analysis of the Species and Critical Habitat Likely to be Affected

Species - During the comprehensive mussel survey efforts mentioned previously, at least 73 mi of stream in the Nolichucky River system were found to be occupied by the Appalachian elktoe Mussels were located immediately upstream of the Cane River Bridge on US 19 and in the footprint of the existing bridge over the South Toe on US 19. The highest catch per unit effort for the Appalachian elktoe during the comprehensive surveys in the basin was 16 per hour (total of 96 individuals); this occurred at a site in the South Toe River (Fraley and Simmons 2004).

Appalachian elktoe densities vary, depending on the many factors that cause their distribution pattern to be scattered and difficult to generalize. Based on surveys for the Appalachian elktoe from other drainages, the number below the substrate surface is highly variable and dependent on the substrate. In general, mussels can be very difficult to locate in the substrate, and most mussel surveys detect only those specimens located at or on the surface of the substrate. It is likely that additional mussels were present in the survey areas but were overlooked or were not visible on the surface of the stream bottom. It is also likely that fewer mussels are currently present at the survey sites because of impacts from the 2004 hurricanes. Therefore, accurate estimates of the total number of Appalachian elktoes that will be impacted (both above and below the surface of the stream bottom) are not possible, but the numbers are likely different from those recorded during the surveys.

Critical Habitat – In the Nolichucky River basin, designated critical habitat (Unit 6) includes 3.7 mi of the main stem of the North Toe River, Yancey and Mitchell Counties, North Carolina, from the confluence with Big Crabtree Creek, downstream to the confluence of the South Toe River; 14.1 mi of the main stem of the South Toe River, Yancey County, North Carolina, from the SR 1152 crossing, downstream to its confluence with the North Toe River; 21.6 mi of the main stem of the Toe River, Yancey and Mitchell Counties, North Carolina, from the confluence of the North Toe River and South Toe River, downstream to the confluence of the Cane River; 16.5 mi of the main stem of the Cane River, Yancey County, North Carolina, from the SR 1381 crossing, downstream to its confluence with the Toe River; and 13.5 mi of the main stem of the Nolichucky River from the confluence of the Toe River and the Cane River in Yancey and Mitchell Counties, North Carolina, downstream to the US 23/19W crossing, southwest of Erwin, Unicoi County, Tennessee.

Given that the Appalachian elktoe occurs within the area of the Cane River Bridge and the South Toe River Bridge and throughout the area of the highway widening in the Nolichucky River basin, it follows that the constituent elements necessary for critical habitat are present within the project area. Following is a brief description of the status of the constituent elements within the project area:

1. Permanent, flowing, cool, clean water - There is variation in stream flow within critical habitat; however, there is always permanent flowing water. Based on the DWQ's bioassessments of benthic macroinvertebrate and fish sampling, the water appears to be cool and clean enough to sustain a population of the Appalachian elktoe.

2. Geomorphically stable stream channels and banks - Overall, the stream channels and banks are stable in the project area, although there are unstable areas on some river reaches

3. Pool, riffle, and run sequences within the channel - The Cane River, Toe River, and North Toe River have natural pool, riffle, and run sequences, varied by the local

stream gradient and bedrock influence. There is a natural pool, riffle, and run sequence at the sites of the Cane River Bridge and the South Toe River Bridge and over the total project area.

4. Stable sand, gravel, cobble, and boulder or bedrock substrates with no more than low amounts of fine sediment - The habitat within the project area at the South Toe Bridge site consists of large cobble with some exposed bedrock and small patches of gravel and course sand providing microhabitat for the Appalachian elktoe. The Cane River crossing has poor habitat, consisting primarily of fine sediments directly under the bridge. Habitat within the project area for the highway widening is patchy, with some areas having more fine sediments than others

5. Moderate to high stream gradient - The Cane River, Toe River, and North Toe River are characterized as having a high stream gradient. Some portions of these reaches in the alluvial floodplain have some moderate stream gradient, but nowhere can the stream be characterized as having a low gradient.

6. Periodic natural flooding - Natural peak events occur throughout the Nolichucky River basin.

7 Fish hosts, with adequate living, foraging, and spawning areas for them - Recent sampling by the NCWRC and TVA identified fairly diverse fish communities, including many of the potential host fishes for the Appalachian elktoe in the Cane River, Toe River, and North Toe River.

III. ENVIRONMENTAL BASELINE

Under section 7(a)(2) of the Act, when considering the "effects of the action" on federally listed species, we are required to take into consideration the environmental baseline. The environmental baseline includes past and ongoing natural factors and the past and present impacts of all federal, state, or private actions and other activities in the action area (50 CFR 402.02), including federal actions in the area that have already undergone section 7 consultation, and the impacts of state or private actions that are contemporaneous with the consultation in process. The environmental baseline for this Opinion considers all projects approved prior to the initiation of formal consultation.

A. Status of the Species within the Action Area

Surveys occurring between 2000 and 2003 indicated that suitable habitat within at least 73 mi of stream in the Nolichucky River system were occupied by the Appalachian elktoe; an apparent 15-mi increase from reported occupied habitat prior to 2000 (Fraley and Simmons 2004). These surveys also suggest that the population was growing in numbers because sites occupied during surveys in 2000 and 2003 produced higher catch per unit efforts than the nearest sites sampled prior to 2000 (Fraley and Simmons 2004). The Appalachian elktoe is not evenly dispersed throughout the 73-mi range

within the basin because contiguous suitable habitat is a limiting factor. The NCWRC's sampling efforts after the floods of 2004 indicate that the flooding had a significant negative impact on the existing population, however, though apparently fewer in number, elktoe specimens were found throughout most of the occupied range known in 2003.

In addition to the NCWRC sampling conducted after the flooding, another set of sites was surveyed in 2005 (TCG 2006) to determine the presence of the Appalachian elktoe at specific sites where flood recovery work was proposed by the Natural Resources Conservation Service (NRCS). This set of surveys located elktoe specimens at a number of sites in the Cane, North Toe, and South Toe Rivers. Although these surveys were not as comprehensive as those conducted in 2003, they do indicate that the Appalachian elktoe was present at a number of specific sites in the year after the flooding.

The constituent elements necessary for critical habitat are present within the project area and could be affected by project construction and related activities. The following is a list of the constituent elements that may be impacted by the project:

1. Permanent, flowing, cool, clean water - There could be increases in the amount of sediment and other pollutants that enter the rivers from construction activities and the demolition of the South Toe River Bridge. There also may be impacts from the project after construction, including increases in the total discharge and pollutant loading from roadway runoff and increases in sediments from destabilized tributary channels after culvert extension or replacement.

2. Geomorphically stable stream channels and banks – The river channels will be temporarily impacted during the construction process at the bridge sites.

3. Pool, riffle, and run sequences within the channel – Tributaries that are impacted from the highway widening may be destabilized and impact the rivers downstream. The flow of the rivers could change while the temporary causeways are in place.

4. Stable sand, gravel, cobble, and boulder or bedrock substrates with no more than low amounts of fine sediment – As stated previously, the amount of sediment could increase during the construction period from the highway widening, bridge construction and demolition, and culvert extensions or replacements on tributaries.

B. Factors Affecting the Species' Environment in the Action Area

Some residential development and agricultural practices have impacted the aquatic habitat in the action area, particularly the riparian habitat. Because riparian areas have been cleared of trees and other woody vegetation and rock has been placed on the riverbanks, high-water events have resulted in bank erosion and failure at several areas in the Nolichucky River basin. The deforested and fragmented riparian buffer also reduces the effectiveness of the buffer to filter sediments and chemical pollutants. In

addition, Japanese knotweed has invaded riparian areas and essentially eliminated native deeper-rooted vegetation, creating riparian instability, particularly during high flows.

Two bridges along the Toe River--B-2081 and B-3089--have been replaced within the last 10 years. No mussels were discovered within the impact area of these bridges, and critical habitat was not designated at that time. During August and September of 2004, significant flooding occurred in the Nolichucky River drainage. The NRCS proposed the implementation of the Emergency Watershed Protection (EWP) Program to restore areas impacted by the flooding. In December 2005, a biological opinion was issued to the NRCS for implementation of the EWP Program. That biological opinion assessed the direct and indirect impacts to 3,325 lf of stream within the Nolichucky River basin and any additional indirect impacts to 1,312 ft downstream of each of the 18 individual restoration project "footprints." Other federal actions include two bridge replacements on the Toe River—B-1443 and B-2848--that are currently under construction. Formal consultation was completed for these projects in 2006. The biological opinion assessed impacts from the construction and demolition of the two bridges and permanent impacts to 89 ft^2 of river habitat. Mussels were relocated out of the footprint of the two construction sites. We do not have information concerning any additional federal actions ongoing or proposed for the action area at the present time.

IV. EFFECTS OF THE ACTION

Under section 7(a)(2) of the Act, "effects of the action" refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action. The federal agency is responsible for analyzing these effects. The effects of the proposed action are added to the environmental baseline to determine the future baseline, which serves as the basis for the determination in this Opinion. Should the effects of the federal action result in a situation that would jeopardize the continued existence of the species, we may propose reasonable and prudent alternatives that the federal agency can take to avoid a violation of section 7(a)(2). The discussion that follows is our evaluation of the anticipated direct and indirect effects of the highway widening, the addition of a new bridge over the Cane River, and the replacement of the bridge over the South Toe River. Indirect effects are those caused by the proposed action that occur later in time but are still reasonably certain to occur (50 CFR 402.02).

A. Factors to be Considered

Proximity of the Action – Based on the 2002 mussel survey conducted by the NCDOT and subsequent surveys in 2004 and 2005 by the NCWRC and others, Appalachian elktoe mussels occur throughout the Cane, North Toe, and South Toe Rivers, downstream of the highway widening and in the vicinity of the existing bridges where construction will occur Although measures to avoid and minimize impacts to the rivers and the Appalachian elktoe are included in the project plans, implementation of

the bridge projects and the highway widening will result in unavoidable impacts to the river habitat and to individual mussels.

Nature of the Effect – Permanent impacts to 108 tributaries from culvert extensions will occur along the 21 mi of highway widening within the Nolichucky River basin, with some impacts likely reaching the main stem of the Toe and Cane Rivers. Additionally, there will be impacts to the continuity of aquatic habitat in the project area from these culvert extensions.

About 50 ft^2 of in-stream habitat will be impacted permanently at the Cane River crossing by placing one pier at the wetted perimeter of the river. Temporary impacts of 700 ft^2 and 9,600 ft^2 will occur at the Cane and South Toe river crossings, respectively. Suitable in-stream habitat at both construction sites also will be affected for the duration of the construction and demolition and likely for some period after completion of the projects. Portions of the habitat may be impacted permanently by the construction and use of the causeways. A small portion of the riparian area at both sites may be cleared for equipment access, which could result in temporary increases in water temperature at each location until reforestation can occur.

Disturbance Duration, Frequency, and Intensity – The highway widening will create disturbance to tributaries and downstream resources that will be ongoing in different segments of the project for years. With appropriate sediment- and erosion-control measures, large inputs of sediment should be avoided during construction. After the project is completed and the roadway opens to traffic, there will be increases in storm-water runoff volume and pollutants, some of which may reach areas occupied by and designated as critical habitat for the Appalachian elktoe.

Disturbance to the riverbed from bridge construction will occur over a relatively short period of time from the construction of the bridge piers at the Cane River crossing. However, the disturbance to the river's flow pattern at the piers will exist throughout the life of the bridge. The causeways for construction and demolition will be in place for the length of time needed to construct and demolish the bridges; therefore, the disturbance to the riverbed associated with the causeways will be over an extended period of time. Although there will be direct impacts to the riverbed associated with the causeways, the construction of the causeways will be phased to limit the amount of causeway in the river at any one time, and only the causeways needed for an activity will be in place during that activity and will be removed when the action is completed. The causeways will be constructed with clean stone and pipes so that the river can flow through, not just over, the causeways However, there will be temporary impacts to the hydrology of the river both upstream and downstream of the causeways.

B. Analyses of Effects of the Action

Potential Beneficial Effects - The construction and demolition of the existing bridges and the highway widening have negative impacts but also have some long-term beneficial effects, primarily because of the opportunity to change or augment structures

and designs to correct existing problems and minimize impacts to the environment. Specifically, the NCDOT has described the following beneficial effects that could result from these projects:

1. *Reduction of direct storm-water runoff at bridge locations.* Storm water from the existing bridges enters the river directly from the bridge decks. The new bridges will collect and direct storm water to the ends of the bridges and discharge the deck drainage into vegetated buffers before entering the river. Storm water coming off the approaching roadways at the bridge locations will be managed in a similar manner. The elimination of direct roadway discharge into the Cane and South Toe Rivers should result in localized improvement of water quality and potentially have some beneficial effect on the Appalachian elktoe. Additionally, hazardous spill catch basins will be constructed at the crossings to further provide protection for the rivers from possible future hazardous spills.

2. *Elimination of bents in the main river channel.* The existing crossing of the South Toe River has three sets of double piers in the river channel that will be eliminated with a new spanning structure. The elimination of these piers in the South Toe River is expected to reduce the bridge's effects on stream-flow patterns at this bridge site.

3. *Japanese knotweed control.* The NCDOT has committed to control Japanese knotweed at the two bridge construction sites and at other identified locations throughout the highway-widening project. Soil contaminated with the plant material will be removed and buried on-site to prevent spread to other areas, and areas occupied by the plant may be treated with appropriate herbicides.

4. *Replacing the existing culvert over Bald Creek with a bridge.* An existing box culvert on Bald Creek will be replaced with a bridge. The creek will be able to follow a more natural valley course and will be able to reestablish access to its floodplain when it is removed from the current culvert. This will restore connectivity and function in this reach of Bald Creek.

5. *On-site stream restoration.* The majority of the existing highway follows valley bottoms, where tributaries to the Cane and Toe Rivers have been moved and channelized and have little or no riparian buffer. As described previously in the "Conservation Measures" section, the NCDOT identified over 11,000 lf of on-site stream preservation, enhancement, and restoration that will be implemented in the Nolichucky River basin (see Appendix E). In addition to meeting regulatory requirements to mitigate unavoidable stream impacts, on-site mitigation provides an opportunity to improve these tributaries to the Cane and Toe Rivers, thereby improving water quality and habitat stability in the watershed.

Direct Effects - Actions associated with bridge replacement that may result in direct impacts include the installation of causeways for the construction of new structures and the demolition of an existing structure, land clearing for access, potential toxic spills,

removal of causeways after construction, and demolition of the existing bridge structure at the South Toe River. Actions associated with highway widening that may result in direct impacts include the replacement or lengthening of culverts on tributaries and increases in impervious surfaces and storm-water runoff along the highway widening. All of these activities have the potential to kill or injure mussels, either by crushing them; poisoning them with the release of some toxic substance; or causing siltation, which may suffocate them and/or destroy suitable habitat or their fish hosts. These actions may result in direct harm to individuals or negative changes in currently suitable habitat.

The following impacts section is separated into two discussions--(1) the impacts from bridge construction and demolition at the occupied river sites and (2) the impacts from the highway widening.

BRIDGE CONSTRUCTION AT THE CANE AND SOUTH TOE RIVERS

Substrate Disturbance and/or Habitat Loss

The existing bridge on US 19E over the Cane River (Bridge No. 9) will be widened during project construction. Widening the bridge involves constructing an adjacent structure to the north (downstream) of the existing bridge. The piers for the new bridge line up with the existing piers to reduce scour around the piers from accumulated debris. The east interior bent is currently on the bank. For bent construction, a stone work pad would be necessary but would not be installed in the river. The west interior bent is approximately 10 ft out in the river. The distance between the bank and the new west interior bent becomes smaller downstream of the existing bridge. A small causeway will be needed to construct the west interior bent. Temporary impacts to the streambed for this causeway are approximately 500 ft^2. A total of four drilled piers with 4-foot-diameter shafts would be needed for the new adjacent structure. The total direct impact to the streambed is 50 ft^2 for the four shafts.

The current proposal is to set the new bridge girders in place from the bank. If the girders cannot be set from the bank, a work bridge will be necessary. The streambed impacts from a work bridge would be temporary. A conservative estimate of streambed impact would be 5 ft by 20 ft (100 ft^2) per bridge foundation. Two foundations would be needed for the work bridge. Total streambed impacts for the work bridge foundations would be 200 ft^2.

The proposed structure will result in 50 ft^2 of permanent impacts to the streambed as a result of bent placement in the river. Additionally, 500 ft^2 of streambed will be impacted by a causeway needed to construct the west interior bent, and 200 ft^2 of streambed will be impacted by the work bridge foundations.

The existing US 19E Bridge over the South Toe River (Bridge No. 43) is proposed to be replaced with a new dual structure on similar alignment, 40 ft south of the existing

structure. The US 19E South Toe Bridge preliminary design for R-2519B is proposed to span the river with a simple span plate girder bridge with a main span of 170 ft.

Based on current information, a total of five causeways are proposed for construction of the South Toe River Bridge. Two 40- by 60-foot causeways will be needed for placing the temporary bents in the water. Two 30- by 50-foot causeways are recommended for placing the girders. One 30- by 60-foot causeway will be needed for removing the existing bent The total temporary impacts would be 9,600 ft^2, which is a worst-case scenario. Further details regarding removal of the existing Bridge No. 43 will be developed in coordination with the Corps, NCWRC, DWQ, and Service. It is assumed in this impact analysis that the bridge will be removed in a manner that will prevent debris from the bridge from entering the river.

Impacts from Sedimentation

Because of the topography and the erodible nature of the soils in the area adjacent to the bridge projects (fine loamy soils with moderate erodibility), project construction has the potential to result in some sedimentation in the Cane and South Toe Rivers. The amount of sedimentation will be minimized by the implementation and maintenance of specific erosion-control measures for these projects, designed to protect environmentally sensitive areas. The placement and removal of causeway stone will create some turbidity from disturbance of the channel bed, but the impacts will be negligible. The clearing of vegetation on the riverbanks will be minimized, and erosion-control measures will remain in place until vegetation is reestablished.

Impacts from Roadway Runoff

Direct highway ditch discharge will be eliminated at the two new bridges. Discharge will be routed through the spill basins or through a grass-lined ditch prior to reaching the respective rivers. This will reduce roadway runoff into the Cane River and South Toe River. The elimination/reduction of runoff to the rivers is expected to result in a decrease of daily pollutant loads in the receiving water. This may result in localized improvements to water quality and thus have a beneficial effect on the Appalachian elktoe or a reduction of the likely adverse effects. Upon completion of the combined projects, there will be a reduction in the amount of roadway runoff directly entering the Cane River and South Toe River at these respective crossings as a result of storm-water management and the elimination of direct discharge.

Impacts from Changes in Hydrology

The temporary causeways proposed at both bridge sites will narrow the channel and alter hydrology, resulting in localized changes in flow patterns at the respective sites. The change in hydrology and any associated scour could result in the loss or displacement of mussels. However, the change in hydrology will be temporary, during the life of the respective causeways, and the design of the causeways (allowing for flow through the causeways) should minimize the impacts to hydrology and associated

impacts. The NCDOT will monitor the riverbed and stream-bank stability before, during, and after construction at both bridge sites. If any problems with regard to stream stability are detected during the monitoring, the NCDOT will correct the problems.

The NCDOT will monitor river conditions at both bridge sites before and after the construction to document any negative changes to the stream cross section because of construction. In particular, at the Cane River crossing, if there are negative changes in river geomorphology related to the new bridge, the NCDOT will take appropriate steps to protect the mussel populations near the bridge. This may include placing other structures in the water to redirect the flow. The need for any in-stream structures will be determined through monitoring but may include cross vanes or other appropriate devices.

Impacts to Fish Hosts

In addition to the potential changes in hydrology as a result of the causeways, there is the potential for the causeways to act as velocity barriers to fish movement. The disruption of fish movement could impact the Appalachian elktoe if fish hosts for the elktoe are unable to move freely in the rivers. These temporary disruptions to fish movement may cause some loss in recruitment to upstream or downstream areas for the time the causeways are in place. The following design factors should reduce the impacts to fish movement: the causeways will be temporary structures in the river, at least 50% of the channel will be unrestricted by the causeways at any given time, and the causeways are designed to allow for linear flow. Given these design features, the causeways are not expected to have a significant long-term impact on fish movement or the life cycle or distribution of the Appalachian elktoe in the Cane or South Toe Rivers.

HIGHWAY WIDENING

Impacts to Tributaries in the Nolichucky River Basin

The primary impacts to tributaries will be through culvert extension and/or increasing diameter and may include stream destabilization and fragmentation of aquatic habitat. To accommodate the highway widening, existing tributaries crossed by a culvert will have the current culvert extended by adding to the existing structure or the culvert will be removed and replaced with a new, longer culvert. Some culverts will be replaced with structures that also have greater capacity. Culverts will be extended to approximately triple their current length. For example, if the stream crosses under the road perpendicular to the road alignment, a culvert will be extended from about 50 ft to 150 ft in length. This accounts for two additional lanes, a grassed median, and paved shoulders The additional culvert lengths will be greater in situations where they must be placed at a skew to the road These culvert extensions and/or increased diameters could significantly impact the stability of the tributaries and cause erosion, increased sediment, and downstream habitat degradation.

Increases in storm-water inputs to tributaries from the road surface and shoulders also can concentrate and convey chemical pollutants directly into larger streams. With the increased amount of paved surface, chemical pollutants (including a variety of metals, petroleum substances, and winter deicing chemicals) will increase. Concentrations of metals in stream sediments are positively related to the volume of traffic and accumulate in proportion to the length of highway drained, suggesting that pollution will be most severe when large highways are drained by small streams (Wheeler et al. 2005). In addition to changes in sediment and chemical loads, smaller tributaries, especially those on steeper gradients, will be fragmented (for some species) by longer culvert lengths. This aquatic fragmentation can change sediment inputs over time, isolate aquatic populations, and greatly decrease downstream habitat quality.

There are 108 tributaries to the Cane, South Toe, and North Toe Rivers that will be impacted by this project. The impacts vary in length from a 10-foot tail ditch to a 750-foot-long concrete box culvert. Forty-one percent of the impact area occurs within 1 mi of either the Cane River or the South Toe River, and seventy-seven percent of the impact area occurs within 3 mi or less of the Cane, South Toe and North Toe Rivers.

Cane River -There are 42 stream-impact sites within the Cane River subbasin. Bald Creek is the major tributary west of the project crossing of the Cane River, and Pine Swamp Branch is the major tributary on the east side of the project crossing of the river. The roadway corridor follows the valley formed by these two streams and crosses the streams multiple times, including 20 tributaries to Bald Creek and 3 tributaries to Pine Swamp Branch. Price Creek, Phipps Creek, and an unnamed tributary to the Cane River also are crossed.

Of the 42 tributaries crossed, 20 of the impact sites are within a mile of the Cane River. The majority of these crossings are small unnamed tributaries to Bald and Price's Creeks. Given the size of the streams and length of the culvert extensions, it is likely that the upstream and downstream portions of these tributaries will be effectively fragmented from each other. Thirty-eight of the tributary crossings are 3 mi or less from the Cane River. The total length of culvert extension impacts to tributaries within 3 mi of the Cane River is over 5,000 lf.

South Toe River - There are 48 tributary impact sites in the R-2519A and B sections of the proposed action that occur within the South Toe River subbasin. Little Crabtree Creek is the major tributary to the South Toe River, arising approximately 7.5 mi west of the South Toe River in Burnsville. Little Crabtree Creek flows through the town of Burnsville. Roadway plans for this urban section are curb-and-gutter, currently designed without storm-water treatment. Of the 48 tributaries impacted by these sections of the project, 24 sites are within a mile of the South Toe River. Thirty-six of the tributary crossings are 3 mi or less from the South Toe. The total length of culvert extension impacts to tributaries within 3 mi of the South Toe is over 6,200 lf.

North Toe River - The North Toe River is not crossed by the proposed action; however, a total of 18 stream segments within the North Toe River subbasin will be impacted

based on the preliminary design plans for the preferred alternative for this action Of the tributaries affected by the project, three are crossed within 3 mi of the North Toe River. There are a number of North Toe tributary crossings affected by the project, but they are farther away from the main-stem river because of the existing road position in the valley.

Of particular concern are the project's impacts to Big Crabtree Creek and its tributaries. Big Crabtree Creek is very important to the North Toe River and the Appalachian elktoe because of its excellent water quality and relative lack of disturbance from the headwaters to the North Toe. Big Crabtree Creek is eligible for "Outstanding Resource Water" designation. This large, high-quality tributary drains a large area and provides suitable habitat for the Appalachian elktoe. At its confluence with the North Toe, it is designated critical habitat for the elktoe. The North Toe is occupied by the elktoe upstream and downstream of the confluence with Big Crabtree Creek, and the occupied range of the elktoe has expanded in this river reach over the last decade. The four-barrel box culvert that carries Big Crabtree Creek under US 19 has created overwidening of the channel upstream and scour downstream of the crossing.

The majority of these tributaries currently are impacted by the existing highway. The NCDOT has committed to culvert design and installation that will maintain stream stability and fish passage and correct existing problems, such as perched culverts and barriers to aquatic passage. Even with the careful design and installation of new culverts and culvert extensions, this project will result in negative impacts to overall aquatic function and connectivity in the watershed.

Impervious Surfaces and Roadway Runoff

According to the numbers provided in the BA, the new lanes of highway will create an additional 88.6 ac of impervious surface area in the Nolichucky River basin. This is about 4 ac of additional impervious surface per mile of road widening or roughly the equivalent of building a WalMart, including the parking area, along every mile of the roadway project. Without appropriate treatment for chemical and thermal pollutants and infiltration areas to absorb the additional volume, this added impervious surface area will have a negative impact on water quality and habitat in the Nolichucky River basin and on the Appalachian elktoe and its habitat. The NCDOT has designed this project with grass swales and other BMPs proven to treat storm water and remove significant percentages of sediment and other pollutants and provide for the infiltration and attenuation of runoff. With these measures in place, significant impacts to the Appalachian elktoe and its critical habitat are not expected.

Direct Impacts - Critical Habitat - There is a projected temporary loss of habitat from construction causeways at the South Toe River crossing that occurs in designated critical habitat (Unit 6). The 9,600 ft^2 of projected temporary impacts likely will be reduced as final construction and demolition plans are made. The projected temporary impact is very small compared to the total amount of habitat occurring in the 69.4 rm

comprising Unit 6 This temporary loss of habitat is not expected to significantly impact any of the primary constituent elements from the impacted river reach.

Project-related erosion and sedimentation coming from the multiple tributary crossings could potentially impact critical habitat in the Cane, South Toe, and North Toe Rivers. The potential for this type of impact decreases with increasing distance of the tributary from the receiving river. Erosion-control standards will be strictly enforced by the NCDOT to ensure that these potential impacts are minimal. The enforcement of the stringent erosion-control measures proposed for this project will minimize the potential for these impacts to occur.

Indirect Effects - Indirect effects are defined as those that are caused by the proposed action and are later in time but are still reasonably certain to occur (50 CFR 402.02). Indirect effects to the Appalachian elktoe may include a higher potential for toxic spills; highway widening effects on tributaries that lead to aquatic fragmentation or chronic instability and sedimentation; and changes in land use, induced development, and urbanization, including increases in impervious surface area in the watershed.

Potential for Toxic Spills

The current bridges on US 19 at the Cane and South Toe River crossings discharge deck drainage directly into the rivers and have no hazardous spill basins. The construction of new bridges at these locations will eliminate the direct discharge of bridge deck drainage to the Cane and South Toe Rives, and hazardous spill basins will be constructed at both crossings. The elimination of direct discharge and the installation and proper use of hazardous spill basins in these locations will minimize the possibility of impacts from toxic spills to a level equal to or less than that which occurs with the current highway.

Tributaries

The negative effects of culverts on fish passage and stream geomorphology are well-documented (Baggett et al. 2001, Moser and Terra 1999, Carey and Wagner 1996, Formann et al. 2003). As previously described, many of the stream crossings along the project alignment are proposed to be extensions of existing structures. Although the design of the culverts incorporates measures that reduce the potential for impacts, many of these culverts will still act as barriers to some fish species, and some of the culverts will negatively impact stream geomorphology. The majority of the tributaries impacted do not support the Appalachian elktoe because they are too small, have too high a gradient, or have other habitat restrictions. However, all of the tributaries are important to overall aquatic ecosystem function. The smaller tributaries provide habitat for a number of important species not found in larger rivers and food sources and woody debris that support the larger streams and rivers. In addition, changes to the current structures in these tributaries can destabilize the streams, causing bed and bank erosion, adding to sediment in the receiving waters or over the longer term and permanently influencing sedimentation patterns and habitat quality Appropriate design and

commitment to postconstruction monitoring and remediation will minimize future problems with stream stability. In addition, existing problems will be identified and corrected through implementation of the project.

Land Use

The 2004 Indirect and Cumulative Effects (ICE) analysis for this project (HNTB North Carolina 2004) identified a Potential Growth Impact Area (PGIA) of approximately 2.0 mi on either side of the existing roadway. Accounting for meanders and direction of flow (running parallel to the road), 10 rm of the Cane River, 6.5 rm of the South Toe River, and 3.5 rm of the North Toe River occur within the PGIA. The majority of the river reaches within the PGIA are occupied by the Appalachian elktoe. Additionally, the entire reach of the South Toe River in the PGIA is designated critical habitat, as well as 1.25 mi of the North Toe River and 0.25 mi of the Cane River.

The proposed project will improve access to future I-26 and I-40 and provide new construction and expansion opportunities for businesses. Highway-oriented commercial development is anticipated near the US 19 and future I-26 interchange (NCDOT 2001) as well as within or adjacent to Burnsville and Spruce Pine, where sewer and water services exist or are planned (NCDOT 2007). Although slight declines in the permanent population have occurred in the project study areas in recent years, additional new growth that is likely to occur may be related to second-home and retiree development and the associated tourism sectors of the economy as the number of new home starts has grown in recent years (NCDOT 2007).

Within the PGIA, areas with "High Potential for Impact" and "Medium Potential for Impact" are identified. The areas with the highest potential for impacts are at the western terminus of the project with I-26 in Madison County, within the Town of Burnsville, and at the eastern terminus of the US 19E widening in Spruce Pine. The 2007 ICE likewise recognized the western terminus of the project and the cities of Burnsville and Spruce Pine as having the highest potential for induced growth because these areas have, or are proposed to have, sewer and water service infrastructure. Development within unincorporated areas outside of these three identified areas is expected to continue at historic rates and patterns due to constraints associated with the lack of sewer and water services, steep topography, and other natural constraints (NCDOT 2007).

Yancey County experienced a 15.3% population growth from 1990 to 2000, compared to 3.2% from 1980 to 1990. Mitchell County experienced lower growth rates between these decades--0.1% from 1980 to 1990 to 8.6% from 1990 to 2000. The 16.2% growth rate of the demographic area studied in the 2004 ICE for this project is higher than the overall growth rates of the respective counties, suggesting that development patterns in these counties is largely occurring along the US 19/US 19E corridor. However, these growth rates are still less than the 21 4% statewide increase during the period from 1990 to 2000 (HNTB North Carolina 2004).

The difference in growth rate of Yancey County as compared to that of North Carolina appears to be due in part to distance from interstate highways and large metropolitan areas, the shortage of easily developable lands in the Appalachian region, and limited water and sewer services. However, development pressures do exist within this region. Tourism, an increasingly important part of the local economy, is assisting the market for second-home development. Regionally, the proposed improvements to US 19E, in combination with other area projects, will strengthen the link between the Asheville and Boone areas and will make the area more accessible to a greater number of tourists, enhance truck access to I-26 and I-40, and shorten the commute to metropolitan Asheville (NCDOT 2001).

Yancey County and the Town of Burnsville adopted a Land Development Plan in 2001. It directs intensive urban development away from environmentally sensitive areas and promotes cluster development adjacent to US 19/19E, where sewer and water services currently exist or are proposed and some development already exists (NCDOT 2007). Yancey County does not have a zoning ordinance but does implement a watershed water supply protection ordinance through its building permits and inspections office (NCDOT 2007). Despite the fact that a zoning ordinance is in place, local officials in Burnsville indicate that special permits and variances are commonly requested and granted (HNTB North Carolina 2004). There are no formal land-use plans in place for Mitchell County or the Town of Spruce Pine; however, Spruce Pine does have a zoning ordinance enforced by the Mitchell County Department of Inspections (NCDOT 2007).

Although existing land-use plans and zoning ordinances tend to discourage strip commercial development along the corridor (NCDOT 2007), some tourist-oriented businesses, which provide goods and services for through travelers, would likely locate along US 19E The improved corridor would create better access and volume of business in addition to having water and sewer services available or proposed. This could result in linear sprawl, with its associated congestion and safety concerns. The use of medians with the proposed improvement should minimize this possibility (NCDOT 2001).

Recent development trends in Yancey County indicate that upscale residential communities of second homes and small-scale commercial uses (HNTB North Carolina 2004) are becoming more prevalent (NCDOT 2007). Additionally, the improved roadway may make commuting to areas outside the demographic area more attractive, bringing new permanent residents to the area. This effect diminishes from west to east as the distance from Asheville, the regions largest employment center, increases (NCDOT 2007). The amount of induced development will vary along the corridor but will most likely be greatest within areas that are currently, or proposed to be, serviced by water and sewer.

Substantial industrial development is not considered likely due to the steep topography of the area. Local officials, however, have stated that there are some available industrial sites and that "the communities have a desire to grow the manufacturing employment base" and are hopeful that the improved accessibility provided by the

widened roadway will encourage future development to locate in the area (HNTB North Carolina 2004). There are no known plans for any redevelopment of the closed industrial and manufacturing facilities or new plants for future manufacturing (NCDOT 2007).

Impacts from changes in land use can result in adverse impacts to the Appalachian elktoe and its designated critical habitat. The most likely induced land-use impact is small-scale residential community and commercial developments. Development activities can result in various adverse impacts to water quality, such as sedimentation/erosion while the sites are being developed, increased storm-water impacts from an overall increase in impervious surface area, and the potential for increases in point-source and nonpoint-source pollution as the population expands and the watershed is developed Future residential developments and future businesses may propose new sites for wastewater discharge or tap into existing facilities, all of which would result in an increase in the amount of wastewater discharge into the watershed.

The land suitability development potential within the identified ICE study area was analyzed under: (1) existing conditions; (2) a No-Build scenario (R-2518/R-2519); (3) a Future-Build 1 scenario (R-2518/R-2519), along with water and sewer infrastructure improvements; and (4) a Future-Build 2 scenario (R-2518/R-2519), with a higher weighting factor for the proposed roadway improvements. The results of this model indicate that the potential for induced development in the ICE study area is primarily due to the expansion of water and sewer services, and the overall projected growth with the project build is only slightly higher than under a No-Build scenario (NCDOT 2007).

Impervious Surface Area

Impervious surface areas can result in adverse effects to water quality. Multiple studies have demonstrated that water quality and stream ecosystem degradation begins to occur when impervious surface area in a watershed begins to increase. The NCWRC recommendation for the management of protected aquatic species watersheds is to limit imperviousness to 6% of the watershed (NCWRC 2002).

Future development and associated future improvements in the respective watersheds within the project action area will result in an increase in impervious surface area in the form of rooftops, driveways, parking lots, etc. Land-development trends indicate that there was little change in the level of imperviousness, modeled at 5.1%, within the ICE study area from 1986 to 2001 (NCDOT 2007)

Further examination, using the 2001 land cover data of the three subbasins of concern to the Appalachian elktoe, was conducted by Earth Tech (Earth Tech 2007). The Earth Tech data are described, by subbasin, as follows:

> "The North Toe River has 5.5 percent imperviousness The North Toe subbasin contains 16,810 acres, of which 918 were impervious surface

acres. In order for the subbasin to reach six percent imperviousness an additional 91 acres of impervious surface would need to be built. Because of the coefficient or multiplier, this would be equivalent to 676 acres of low intensity residential, 311 acres of high intensity residential, or 186 acres of commercial/industrial land uses, or some combination thereof. The development of 676 acres of low intensity residential would represent a 41 percent increase over 2001 development levels. Likewise the 311 acres of high intensity residential would be a 93 percent increase and the 186 acres represents a 144 percent increase in commercial/industrial land uses.

"The South Toe subbasin contains 17,708 acres, of which 929 were calculated to be impervious surface acres (5.2 percent imperviousness). In order for the subbasin to reach six percent imperviousness an additional 134 acres of impervious surface would need to be built or the equivalent of 998 acres of low intensity residential, 459 acres of high intensity residential, or 275 acres of commercial/industrial land uses. The development of 998 acres of low intensity residential would represent a 53 percent increase over 2001 development levels. The 459 acres of high intensity residential would be a 180 percent increase and the 275 acres represents a 333 percent increase in commercial/industrial land uses.

"The Cane River subbasin contains 24,943 acres, of which 1,235 were impervious surface acres (4.9 percent imperviousness). In order for the subbasin to reach six percent imperviousness, an additional 263 acres of impervious surface would need to be built or the equivalent of 1,959 acres of low intensity residential, 902 acres of high intensity residential, or 539 acres of commercial/industrial land uses. The development of 1,959 acres of low intensity residential would represent a 91 percent increase over 2001 development levels. The 902 acres of high intensity residential would be a 435 percent increase and the 539 acres represents a 726 percent increase in commercial/industrial land uses."

Based on this analysis, there will be changes in land use and a gradual increase in impervious surface area in the Nolichucky River basin over time. Growth is predicted to be in the areas already serviced by sewer and water; and while this project will induce some development, the contribution of the project is "slight" compared to the expansion of sewer and water services. Linear sprawl will be controlled somewhat by the use of medians along the corridor. Increases in impervious surface area in the watershed will occur, but the rate is expected to remain gradual.

Indirect Impacts - Critical Habitat - Indirect impacts to critical habitat for the Appalachian elktoe (Unit 6) resulting from the proposed action include possible water quality degradation from induced changes in land use in the form of residential and, to a lesser extent, commercial and industrial development projects induced by this project.

These water quality impacts may compromise the primary constituent element of "clean" water in localized areas within the Unit 6 but are not expected to be widespread.

The other primary constituent elements of the designated critical habitat within the action areas, including stable streams and the presence of fish host species, are not expected to be significantly compromised by any indirect impacts associated with the proposed project. The construction of the Cane River and South Toe River crossings is not expected to result in significant channel instability or habitat degradation over time. The careful design and installation of the various culvert and pipe crossings on tributaries will minimize the potential for channel instability, which could ultimately affect critical habitat downstream of the respective crossings in the Cane, South Toe, and North Toe Rivers. Monitoring and remediation at these sites will further reduce the likelihood of impacts to critical habitat. Likely fish host species for the Appalachian elktoe will not be eliminated from the action area as a result of project-related indirect impacts.

V. CUMULATIVE EFFECTS

Action Area

Cumulative effects include the combined effects of any future state, local, or private actions that are reasonably certain to occur within the action area covered in this Opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

We are aware of several potential private actions that may occur and produce significant cumulative impacts. A proposed 40-unit affordable housing development is proposed on the north side of US 19E in Burnsville, near Mountain Heritage High School and near the confluence of the South and North Toe Rivers. In Mitchell County, just north of Spruce Pine, 2,000 to 5,000 ac within the North Toe River drainage area (owned by Penland Bailey Corporation) was sold for development but is currently on hold. A local watershed advocacy group is recommending the conservation of forested riparian buffers in this area, but at this time there has been no commitment to provide the buffers. A golf course development (planned to be patterned after the Mountain Air Country Club in Yancey County) is proposed near Altapass in Mitchell County, within the North Toe River watershed. A 100-ac development is being planned near Huntdale, in Yancey and Mitchell Counties, with over 13,000 lf of the Cane River and over 2,000 lf of the Toe River occurring within the property boundary

Although these various actions have been discussed or proposed, it is uncertain if they will be developed or if they will need a federal permit or federal monies to construct them. Therefore, we will not address these developments further in this Opinion. We are not aware of other future state, local, or private actions that are reasonably certain to occur within the action area that would not be subject to section 7 review. Therefore, cumulative

effects, as defined by the Act, will not occur and will not be addressed further in this Opinion.

Cumulative Impacts of Incidental Take Anticipated by the Service in Previously Issued Biological Opinions

In reaching a decision as to whether the implementation of activities outlined in the BA are likely or are not likely to jeopardize the continued existence of the Appalachian elktoe, we must factor into our analysis previous biological opinions issued involving the species, especially those opinions where the Service quantified incidental take as the area of habitat disturbed instead of the number of individual mussels. There have been five biological opinions for the Appalachian elktoe. In May of 2005 we issued a biological opinion to the Corps on the effect of their permit on the Appalachian elktoe for a sewer line crossing along the Mills River. The amount of incidental take was limited to the disturbance of habitat 20 ft in width at the construction corridor and 100 ft downstream and upstream of the construction corridor. The three other biological opinions were rendered to the NRCS in 2005 for the implementation of the EWP Program in the Nolichucky, Pigeon, and Mills River subbasins. These biological opinions limited the amount of incidental take to all Appalachian elktoes within at least 3,325 lf of stream within the Nolichucky, Pigeon, and Mills River subbasins and any additional indirect impacts to the Appalachian elktoe 1,312 ft downstream of each of the 40 individual restoration project "footprints." In July 2006 we issued a biological opinion for two bridge replacements over the Toe River. Incidental take was limited to permanent habitat impacts of 89 ft^2 for both of those projects.

Cumulative Impacts - Critical Habitat

The proposed actions will directly and indirectly result in some adverse impacts to designated critical habitat for the Appalachian elktoe. However, these impacts will not appreciably diminish the value of the designated critical habitat. Future land-use impacts and infrastructure projects, combined with the project-related actions described above, have the potential to impact the "clean water" constituent element of critical habitat for the Appalachian elktoe (Unit 6) to the point where conservation values are compromised in localized areas. These localized areas are expected to be small and will not extend into the majority of the areas contained within Unit 6.

VI. CONCLUSION

After reviewing the current status of the Appalachian elktoe; the environmental baseline for the action area; the effects of bridge construction, demolition, and highway widening; measures identified in the NCDOT's BA to help minimize the potential impacts of the proposed project and assist in the protection, management, and recovery of the species, previously issued Service nonjeopardy biological opinions that allow various levels of incidental take, any potential interrelated and interdependent actions associated with the proposed action; and any potential cumulative effects, it is the Service's biological opinion that implementing this project is not likely to jeopardize the continued existence of the

Appalachian elktoe nor will adverse impacts to critical habitat be significant enough to destroy or adversely modify designated critical habitat.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and federal regulations pursuant to section 4(d) of the Act prohibit the taking of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, such as breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not for the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the Act, provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Amount of Take Anticipated

The Service anticipates that incidental take of the Appalachian elktoe may occur as a result of the construction of the bridges at the Cane and South Toe Rivers. During construction, individual mussels may be crushed, harmed by siltation or other water quality degradation, or dislocated because of physical changes in their habitat.

There will be a combined permanent loss of 50.0 ft^2 of stream habitat at the two bridge project sites. There will also be a combined temporary loss of stream habitat from the construction/demolition causeways of 10,300 ft^2. Downstream impacts (sedimentation), if any, are expected to occur within 1,300 ft of the construction sites. Because there are no reliable data on the number of Appalachian elktoes buried in the substrate compared to those on the surface (and even those on the surface are difficult to detect), it is not possible to base the amount of incidental take on numbers of individual mussels. Rather, the amount of incidental take will be exceeded if the project "footprint" exceeds 700 ft^2 at the Cane River crossing and 9,600 ft^2 at the South Toe River crossing or downstream impacts are occurring more than 1,300 ft downstream from the "footprint" of each project. If incidental take is exceeded, all work should stop, and the Service should be contacted immediately.

EFFECT OF THE TAKE

In this Opinion the Service has determined that this level of take is not likely to result in jeopardy to the Appalachian elktoe or destruction or adverse modification of its critical habitat.

In addition to the subsequent measures listed in the "Reasonable and Prudent Measures" and "Terms and Conditions" sections of this Opinion, the measures listed in the "Conservation Measures" section of this opinion must be implemented. The conservation measures are project minimization measures for the construction of the projects that were described by the NCDOT in the BA. The conservation measures include, but are not limited to, the following:

1. The NCDOT will provide, or contract with biologists who have experience in mussel relocation techniques, for the removal of Appalachian elktoe mussels from the impact sites at the Cane and South Toe River bridge crossings and relocate them to approved relocation sites. Detailed procedures will be developed in coordination with the Service and will be approved by the Service. Procedures will include appropriate collection methods; tagging and recapture; handling and transportation of individuals; and monitoring protocols, which includes the monitoring of the relocation sites for recovery, survival (of recovered mussels), movement, and growth of mussels for a period of 5 years.

2. In coordination with the Service, the NCDOT will develop plans for monitoring the river channel and banks at upstream sites, at the bridge construction sites, and downstream to determine changes in habitat resulting from activities at these sites. If any problems with regard to stream stability are detected during the monitoring, the NCDOT will, in cooperation with the Service, develop a plan to address the problems.

3. As committed to by the NCDOT in the BA, the NCDOT will protect and/or restore riparian buffers for 19,000 lf of stream within the action area. Given that the conservation areas have not been determined or obtained by the NCDOT at the time of the issuance of this Opinion, the Service will continue to review sites that the NCDOT is considering and approve sites that are ultimately acquired.

4 To minimize the potential spread of Japanese knotweed from construction-related activities, the NCDOT has identified Japanese knotweed within the project limits of R-2518 and R-2519. The NCDOT proposes to attempt to suppress Japanese knotweed within their right-of-way, via mechanical means, at the following locations: R-2518A Mitigation Site 1, R-2518B Mitigation Site 4, R-2518B Bridge at Sta. 223+50 (Cane River Bridge), and R-2519B Bridge at Sta. 121+00 (South Toe River Bridge). Application of a glyphosate herbicide will require further planning and consultation with the Service.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the Appalachian elktoe. These nondiscretionary measures include, but are not limited to, the commitments in the BA addendum and the terms and conditions outlined in this Opinion.

1. This multiphase project will receive one Clean Water Act Section 404 permit from the Corps' Wilmington District. Individual sections of the highway project will be reviewed as impact numbers are refined, and the NCDOT will request a permit modification before proceeding with work on a new section. The Corps will coordinate with the Service to review permit modifications and monitoring results to determine if the project is meeting the terms and conditions set forth in this Opinion.

2 The NCDOT will ensure that contractors understand and follow the measures listed in the "Conservation Measures," "Reasonable and Prudent Measures," and "Terms and Conditions" sections of this Opinion.

3. The NCDOT will send copies of all monitoring reports to the Service's Asheville Field Office at specified times over the life of the project.

4. The NCDOT will notify the Service and the Corps immediately if monitoring reveals any significant problems so that remediation can occur as quickly as possible.

5. New or extended culverts on tributaries will be constructed in a manner that will not contribute to channel instability and downstream habitat changes.

6. The NCDOT will employ construction methods and mitigation actions that will minimize/prevent the spread of Japanese knotweed.

7. The NCDOT will minimize aquatic habitat fragmentation in the Nolichucky River basin by replacing perched culverts or other aquatic passage barriers and, where possible, enhancing aquatic life passage and stream habitat.

8 Containment systems will be developed for particular stages of the demolition and construction of the bridges in order to minimize impacts to the Appalachian elktoe and its habitat.

9. Bridge demolition activities and the relocation of mussels will be conducted during time periods that will result in fewer impacts to the Appalachian elktoe.

10 During the relocation of mussels, the Service may alter, if needed, methods and plans for moving the mussels.

11. All appropriate NCDOT BMPs for erosion control; storm-water management; and bridge maintenance, construction, and demolition will be followed or exceeded for the project, and any additional BMPs listed in the "Terms and Conditions" section of this Opinion will be followed.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the NCDOT must comply with the following terms and conditions, which implement the reasonable and

prudent measures described previously and outline required reporting and/or monitoring requirements These terms and conditions are nondiscretionary and apply to the Toe and Cane Rivers and their affected tributaries.

1. The Corps will notify the Service of requests for permit modifications from the NCDOT and, if necessary, have a meeting to review the changes and status of the project before issuing the modified permit.

2. A Service biologist will be present at the preconstruction meeting(s) to cover permit conditions and discuss any questions the contractor has regarding implementation of the project. After the contractor submits plans for various stages of the project, a Service biologist will review and provide comments on the plans and will attend any meetings to discuss implementation of the plans.

3. The NCDOT will use special provisions that exceed the standard BMPs for erosion control. These erosion-control measures incorporate the Design Standards in Sensitive Watersheds (15A NCAC 04B.0124(b)-(e)).

4. The NCDOT will provide three levels of oversight for the control of erosion and sediment on the project

5. The NCDOT will perform compliance inspections of the erosion-control devices weekly or within 24 hours of a ≥0.5-in rainfall event during construction of the project.

6. The NCDOT will submit a proposal through their internal research group to study the effectiveness of storm-water-treatment and -control measures specific to this project.

7. During construction, culvert inlets and outlets will be evaluated by the engineer with regard to stream stability immediately following installation and quarterly for a period of 1 year at each location. Indicators of instability, such as headcutting, scour, aggradation, or degradation, will be used to determine the need for any corrective actions.

8. A final field inspection will be held with the contractor to evaluate culvert placement and stream stability before the project is considered complete. If instability is detected during any of these reviews, corrective actions will be performed when deemed necessary by the engineer or by the conditions of any federal and state permits required by Section 404/401 of the Clean Water Act.

9. In order to minimize effects to the Appalachian elktoe and it designated critical habitat, the NCDOT will replace the four-barrel box culvert at the crossing of US 19 and Big Crabtree Creek with a bridge. Replacing this culvert with a bridge will reduce aquatic fragmentation, correct downstream scour and upstream overwidening, reestablish a connection to the floodplain in this reach, and restore habitat in this important tributary to the North Toe.

10 The NCDOT will conduct the benthic macroinvertebrate monitoring proposed in the "Conservation Measures" section to provide a habitat assessment, including (but not limited to) parameters such as existing habitat structure and sediment load at each of the nine sites.

Measures Specific to Bridge Construction

1. The NCDOT will ensure that a qualified aquatic biologist is present at critical times to monitor certain phases of construction, including, but not limited to, initial clearing for construction, when the causeways are installed, when demolition begins, and when the causeways are removed. This individual will be present to ensure that the procedures listed in the "Conservation Measures," "Reasonable and Prudent Measures," and "Terms and Conditions" sections of this Opinion are being implemented and that all project plans are being implemented in a manner to ensure that the conditions of the Opinion are met

2. A containment system will be developed and installed prior to the removal of the bridge deck and piers. The system should be of sufficient strength to capture material that may enter the river.

3. When constructing drilled shafts, a containment system will be developed so that material does not enter the river. Any material by-product will be pumped out of the shaft to an upland disposal area and treated through a proper stilling basin or silt bag.

4. The NCDOT will not relocate mussels between May 1 and June 30, the time at which the Appalachian elktoe releases glochidia. The NCDOT will relocate the mussels during low flow, low turbidity, and relatively cool weather; the most appropriate time to accomplish this would be in the fall.

5. In the BA, the NCDOT proposed to relocate all native mussels, including the Appalachian elktoe, from the project "footprints," extending downstream and upstream of the two bridge replacements. Representatives of the Service's Asheville Field Office may determine during relocation of the mussels that the area the mussels are moved from should be reduced.

6. A Service biologist will review and provide comments on plans proposed to correct problems that may be revealed in the monitoring of the river channel and banks within the project area.

7 The erosion-control plan will be in place prior to any ground disturbance. When needed, combinations of erosion-control measures (such as silt bags in combination with a stilling basin) will be used to ensure that the most protective measures are being implemented.

8. Activities in the floodplain will be limited to those needed to construct the proposed bridges and remove the existing bridge.

9. Work pads will be used when equipment must be staged in the floodplain to complete the project construction. The work pads will be constructed by placing fabric matting down prior to placing the stone work pad. All of the stone and matting will be removed and disposed of off-site, or the stone can be used in areas that require permanent stone protection after project completion.

10. Access roads and construction staging areas will be minimized to the maximum extent practicable. The access roads and construction staging areas should be established from the start of the project and designed with erosion-control measures. The placement of the access roads and staging areas will be discussed with the Service and determined at the preconstruction meetings.

11. Riparian vegetation, especially large trees, will be maintained wherever possible. If riparian areas are disturbed, they will be revegetated with native species as soon as possible after construction.

12. Upon completion of the project the existing approach fills will be removed to natural grade, and the area will be planted with native grasses and tree species.

13. Erosion-control measures will remain in place until riparian vegetation is successfully reestablished at each of the bridge sites.

14. Construction will be accomplished in a manner that prevents wet concrete from coming into contact with water entering or flowing in the river.

15. Unconsolidated material (such as sand and dirt) will not be placed directly on the causeways since the material could be washed off of the causeways or settle into the causeways and enter the river. Any equipment that is placed on the causeways will be removed anytime throughout a work day when the water level rises, or is expected to rise overnight, to a point where the equipment could be flooded or during periods of inactivity (two or more consecutive days). The only exception to this measure is that the drill rig may be left in place for periods of inactivity; however, it must also be removed if the water rises, or is expected to rise, to a point where the drill rig could be flooded.

16. All construction equipment should be refueled outside the 100-year floodplain or at least 200 ft from all water bodies (whichever distance is greater) and be protected with secondary containment. During crucial periods of construction and demolition, when the drill rig and crane cannot be moved, the drill rig and crane can be refueled while inside the 100-year floodplain provided that spill response materials (such as spill blankets and fueling diapers) are used during the refueling. Hazardous materials, fuel, lubricating oils, or other chemicals will be stored outside the 100-year floodplain or at least 200 ft from all water bodies (whichever distance is greater), preferably at an upland site. Areas used for borrow or construction by-products will not be located in wetlands or in the 100-year floodplain.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. The following conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. Where opportunities exist, work with landowners, the general public, and other agencies to promote education and information about the Appalachian elktoe and its conservation.

2. In order to address sources of impairment in the Nolichucky River basin and work toward removing habitat occupied by the Appalachian elktoe from the 303(d) list of impaired waters, consider funding a position with a conservation organization to help identify and pursue additional buffers and conservation opportunities along the main stem of the Cane River, North Toe River, and Toe Rivers and their tributaries, either individually or in concert with other conservation programs.

3. Establish an escrow account to provide funding for land acquisition and/or conservation easements/agreements to better take advantage of conservation opportunities as they arise.

4. Explore opportunities to work with local and state water quality officials in order to minimize or eliminate wastewater and storm-water discharges into the Cane River, North Toe River, and Toe River

5. Work with Yancey and Mitchell Counties to develop tools such as land-use plans, ordinances, and incentives to protect the Appalachian elktoe and its designated critical habitat from the effects of development activities.

6 Consult with the Service on projects affecting aquatic habitat in the Nolichucky River basin, regardless of funding source, to ensure compliance with all provisions of the Act.

7. Work with partners to assess and prioritize structures that fragment aquatic habitat and create barriers to fish passage in the Nolichucky River basin and begin replacing those structures with more appropriate structures when opportunities arise.

In order for the Service to be kept informed about actions that minimize or avoid adverse effects or that benefit listed species or their habitats, we request notification of the implementation of any conservation recommendations.

REINITIATION/CLOSING STATEMENT

This concludes formal consultation on the actions outlined in the NCDOT's BA dated August 9, 2007. As provided in 50 CFR 402.16, the reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion, or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operation causing such take must cease, pending reinitiation. Consultation should also be reinitiated if new biological information comes to light that invalidates the assumptions made regarding the biology or distribution of the Appalachian elktoe within the project area of the Nolichucky River basin in North Carolina.

If you or your staff have any questions concerning this Opinion, please contact Ms. Marella Buncick of our staff at 828/258-3939, Ext. 237, or me, Ext. 223. We have assigned our Log No. 4-2-03-063 to this project; please refer to it in any future correspondence concerning this matter.

Sincerely,

Brian P. Cole

Brian P. Cole
Field Supervisor

cc:

Dr. Gregory J. Thorpe, Manager, Project Development and Environmental Analysis Branch, North Carolina Department of Transportation, 1548 Mail Service Center, Raleigh, NC 27699-1548

Dr. Charles P. Nicholson, NEPA Policy Program Manager, Tennessee Valley Authority, 400 West Summit Hill Drive, WT 11B, Knoxville, TN 37902-1499

Electronic copy with Appendix A (Appendices B-E available upon request).

Ms. Marla J Chambers, Western NCDOT Permit Coordinator, North Carolina Wildlife Resources Commission, 12275 Swift Road, Oakboro, NC 28129

Mr. Brian Wrenn, North Carolina Division of Water Quality, Central Office, 2321 Crabtree Blvd., Suite 250, Raleigh, NC 27604

Mr. Chris Militscher, Environmental Protection Agency, 1313 Alderman Circle, Raleigh, NC 27603

Regional Director, FWS, Atlanta, GA (ES/TE, Attention: Mr. Ken Graham)

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Asheville Field Office
160 Zillicoa Street
Asheville, North Carolina 28801

August 1, 2013

Mr. Scott Jones
Asheville Regulatory Field Office
U.S. Army Corps of Engineers
151 Patton Avenue, Room 208
Asheville, North Carolina 28801-5006

Dear Mr. Jones:

Subject: Amendment to the Biological Opinion for the Proposed Widening of US 19 in Madison, Mitchell, and Yancey Counties, North Carolina, and Its Effects on the Federally Endangered Appalachian Elktoe and Its Designated Critical Habitat

This document transmits the U.S. Fish and Wildlife Service's (USFWS) Amended Biological Opinion (Opinion) based on our review of updated information regarding the construction of a new bridge and replacement of the existing bridge over the South Toe River and the impacts to the federally endangered Appalachian elktoe (*Alasmidonta raveneliana*) and its designated critical habitat in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act). We received your March 29, 2013, request for reinitiation of formal consultation on April 2, 2013. This amendment is based on information provided in the March 29, 2013, amendment package and addresses specific changes from the 2008 Biological Opinion.

The reinitiation of consultation was requested for the following reasons: (1) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in the 2008 Biological Opinion and (2) the agency action has been modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the 2008 Biological Opinion. More than 5 years have elapsed since the 2008 Biological Opinion was rendered, and greatly refined project plans and updated surveys have changed the impacts previously considered. The following document updates and clarifies the activities associated with constructing the new bridges over the South Toe River and reassesses the impact on the Appalachian elktoe and its designated critical habitat. No significant changes

have occurred with the design or construction of the roadway. Therefore, this amendment is applicable only to the bridges and crossing of the South Toe River.

AMENDMENT TO THE 2008 BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The North Carolina Department of Transportation (NCDOT) proposes to replace the two-lane bridge crossing the South Toe River on US 19 with a new structure and add another parallel bridge to provide two new travel lanes. The existing structure will be replaced in its current location and become the west-bound lanes of the widened US 19, and a new structure will be built immediately upstream to accommodate east-bound traffic. The new structures will have three spans of reinforced concrete deck on prestressed girders. The end bents will be concrete cap on piles; interior bents will be 4-foot concrete columns on 54-inch drilled shafts. In addition to the bridge structures, hazardous spill basins will be constructed for both structures.

CONSERVATION MEASURES SPECIFIC TO CONSTRUCTION

The NCDOT has committed to demolition and construction techniques which minimize impacts to the Appalachian elktoe and the South Toe River. Specifically, the time frame for demolition and construction will be compressed to roughly 2 years and 8 months. This will allow time for construction of the new bridge, demolition of the existing bridge, and construction of the replacement bridge while limiting the duration of exposure to the river from construction. In particular, demolition of the old bridge and construction of the new replacement bridge will be compressed to an 18-month period. Construction and demolition may or may not occur in a continuous manner; there may be periods of inactivity between each phase. If each phase is not completed within the designated time frame, there would be a financial penalty levied for each day of overrun. It may be necessary to have causeways in place, simultaneously, on both sides of the river if a spanning work bridge is needed to prevent dropping material in the river during demolition or to set the center span during construction of the new bridges. If this is necessary, the causeways will be small enough to allow 50 percent of the river channel to remain open.

Construction Phasing - Bridge construction and demolition will occur in three phases (Appendix A). Each phase is described in detail below. Language outlining the phased construction/demolition will also be included in the construction contract.

Phase 1 - A new bridge will be constructed south of the existing bridge. Small causeways will be necessary to allow equipment to set the girders and spans for the new bridge.

Long Branch will be relocated to its historic position, tying in to the South Toe River slightly north of its existing location. Construction of the new channel will occur just prior to or during Phase 1. Construction and seeding will be completed at least one growing season prior to turning water into the channel. (A note to this effect will be placed on the plan sheets.) This will allow newly planted vegetation to establish itself on the banks and

provide stabilization. Relocating this stream will allow room for construction equipment to access the area without having to pipe a section of the stream. It will also improve the long-term stability of the stream and may reduce sediment input to the river. Native seed mixes and/or planting materials will be utilized to vegetate the relocated channel.

Access roads and construction staging areas will be minimized to the maximum extent practicable. The access roads and construction staging areas will be established from the start of the project and designed with erosion-control measures. Access roads are shown on designs included in Appendix A.

This phase of the construction will be limited to 14 months.

Phase 2 – The existing bridge will be demolished. During this phase, causeways will be required on both sides of the river but at least 50 percent of the channel will always remain open.

In an attempt to maintain the flow of well-oxygenated water over the existing mussel bed just downstream of the causeway planned for the west side of the river during Phase 2, the NCODT will investigate the use of one pipe near the edge of the riverbank. If a pipe can be located far enough from the crane lift area, it will be installed in the causeway. Given the size of the equipment needed to perform the work and concerns for the stability of the causeway, multiple pipes throughout the causeway will not be possible.

There are two types of footings possible on the existing bridge; they are: (1) "Spread footing,"which is a concrete slab that supports the weight of the columns, and (2) "Pile footing," which is a concrete slab that supports the weight of the column but with piles underneath. During demolition, removal of the bents will be accomplished by tipping them over and removing the entire bent or by cutting/chipping off the bent 1 to 2 feet below the streambed or ground. Exposed steel will be cut off, and the remaining portion of the bent will be covered in natural material. The method of removal will be dependent on which type of bent is actually present on site. According to existing bridge plans, there should only be a spread footing (no piles underneath) on existing Bents 1, 2, and 4 (upstream side only). For the west-bound lane, the proposed Bent 1 will be situated in nearly the identical location of the existing bents. No portion of this existing bent can remain in the streambed. A spread footing is presumably associated with the existing Bent 2; however, if this is not the case, and piles are actually present underneath the footing, then more excavation will be necessary. If material is needed to backfill the areas excavated during bent removal, substrate immediately downstream from the existing Bent 2 will NOT be used, as this portion of the river is preferred habitat for mussels.

A containment system will be developed and installed prior to the removal of the bridge deck and piers. The system will be of sufficient strength to capture material that falls. No pieces of the existing bridge will be dropped into the water during bridge removal. If bridge material inadvertently ends up in the river, it will be removed.

The USFWS will review the demolition plans and provide comments prior to the finalization of the plans. The USFWS will also be notified prior to the start of bridge demolition, so they may have a representative onsite during that phase of the project.

This phase of the construction will be limited to 2 months.

Phase 3 - A new bridge will be constructed to replace the demolished structure, creating the west-bound lanes. All construction techniques discussed previously also will be applied to construction of this bridge.

This phase of the construction will be limited to 16 months.

Rock Causeways - Rock causeways will be used as work pads for the construction cranes. The permit drawings depict the maximum size of the proposed work pads. Causeway size will be minimized as much as possible during each phase of the construction. The NCDOT will:

- Require the contractor to use washed rock for the construction of the causeways. This will minimize unnecessary sediment input into the river.

- Require all of the stone to be removed and disposed of off-site or be used in areas that require permanent stone protection after project completion. The NCDOT also will require that concrete barriers be placed along the downstream edge of each causeway in order to limit the downstream movement of causeway material during high flow events.

- Limit moving of causeways to minimize streambed disturbance. Individual causeways will be left in place for the duration of the construction/demolition phase where each is required.

- Remove equipment from the causeways anytime during a work day if the water level rises or is expected to rise overnight to a point where the equipment could be flooded or during periods of inactivity (two or more consecutive days). The only exception to this measure is that the drill rig may be left in place for periods of inactivity; however, it must also be removed if the water rises, or is expected to rise, to a point where the drill rig could be flooded.

Construction fabric will not be used under the causeway material. This was a provision in the 2008 Biological Opinion in order to help with causeway stone removal. Experience at the Cane River construction site showed that regardless of the care taken, the fabric tears and ends up in pieces in the river. Therefore, the original intent of helping with stone removal was not met.

CONSERVATION MEASURES IN THE AFFECTED AREA

Activities in the Floodplain - Activities in the floodplain will be limited to those needed to construct the proposed bridges and remove the existing bridge.

All construction equipment should be refueled outside the 100-year floodplain or at least 200 feet from all water bodies (whichever distance is greater) and be protected with secondary containment. During crucial periods of construction and demolition, when the drill rig and crane cannot be moved, the drill rig and crane can be refueled while inside the 100-year floodplain provided that spill response materials (such as spill blankets and fueling diapers) are used during the refueling. Hazardous materials, fuel, lubricating oils, or other chemicals will be stored outside the 100-year floodplain or at least 200 feet from all water bodies (whichever distance is greater), preferably at an upland site. Areas used for borrow or construction by-products will not be located in wetlands or in the 100-year floodplain.

Riparian vegetation, especially large trees, will be maintained wherever possible. If riparian areas are disturbed, they will be revegetated with native species as soon as possible after construction. Upon completion of the project, the existing approach fills will be removed to natural grade, and the area will be planted with native grasses and tree species. Erosion-control measures will remain in place until riparian vegetation is successfully reestablished at the bridge sites.

Hazardous Spill Basins - Two hazardous spill basins will be constructed south of the bridges, one on each side of the river.

1. Station 111+50 to station 119+00–L - right side. Lateral base grassed swale/hazardous spill basin. Capacity=2,509 cubic yards, Storage required=236.2 cubic yards.

2. Station 124+50 to station 127+00–L - right side. Grassed swale/hazardous spill basin/dry detention basin. Capacity=532 cubic yards, Storage required=81 cubic yards. This basin also doubles as a dry detention basin.

Stormwater Controls - The Stormwater Management Plan (Appendix B) for R-2519B outlines many of the stormwater controls for the roadway section and gives detailed information on each structure. Measures specific to the South Toe River crossing are included in the overall plan.

Erosion Control - The erosion-control plan will be in place prior to any ground disturbance. When needed, combinations of erosion-control measures (such as silt bags in conjunction with a stilling basin) will be used to ensure that the most protective measures are being implemented.

At this project site, the NCDOT will use erosion-control measures that exceed the standard Best Management Practices and will incorporate the Design Standards in Sensitive Watersheds [15A NCAC 04B.0124 (b)–(e)]. The areas adjacent to jurisdictional water bodies in the South Toe River watersheds will be identified as "Environmentally Sensitive Areas" on the Sedimentation and Erosion Control Plans for this project. By definition, the Environmentally Sensitive Areas will be identified as 50-foot buffer zones on both sides of the stream, measured from the top of

the streambank. Within the identified 50-foot Environmentally Sensitive Areas, the following shall apply:

1. The contractor may perform clearing operations, but not grubbing operations, until immediately prior to beginning grading operations.

2. Once grading operations begin, work shall progress in a continuous manner until complete.

3. Erosion-control devices shall be installed immediately following the clearing operation.

4. Seeding and mulching shall be performed on the areas disturbed by construction immediately following final grade establishment.

5. Seeding and mulching shall be done in stages on cut and fill slopes that are greater than 20 feet (6.1 meters) in height, measured along the slope, or greater than 2 acres (0.81 hectares) in area, whichever is less.

6. Throughout the project limits, all sedimentation- and erosion-control measures, must be cleaned out when half full with sediment in order to ensure proper function of the measures.

Bridge Deck Drainage - Drainage from the deck of the existing structure currently flows directly into the river. The design for the bridge over the South Toe River eliminates deck drain discharge into the river by directing runoff into the grassed swales/hazardous spill basins/dry detention basins adjacent to the bridge on either side of the river. The amount of direct discharge from the roadway entering the river will be significantly reduced with the new structure. This commitment has been incorporated in the Structure Design Plan.

Preconstruction Surveys and Mussel Relocations - The NCDOT conducts final surveys (just prior to construction) in the vicinity of projects that impact waters known to contain protected mussel species. The NCDOT typically relocates mussels found within or near the project footprint, per guidance from the USFWS. The Appalachian elktoe is known to occur at the South Toe River crossing, and the NCDOT has already begun to relocate mussels to appropriate upstream habitat. A final preconstruction survey will be performed and any additional mussels will be relocated following the guidelines presented in the relocation plan (included in the original Biological Assessment). The NCDOT will not relocate mussels between May 1 and June 30, the time at which the Appalachian elktoe releases glochidia. The NCDOT will relocate the mussels during low flow, low turbidity, and relatively cool weather; the most appropriate time to accomplish this would be in the fall.

Agency Coordination - The NCDOT will invite representatives from the USFWS and the North Carolina Wildlife Resources Commission to the preconstruction meeting for this project as well as to all subsequent field inspections prior to construction in order to ensure compliance with all special project commitments.

CONSERVATION MEASURES FROM 2008 BIOLOGICAL OPINION

Steam Channel Monitoring - As detailed in the original Biological Assessment, the NCDOT will monitor the river channel and banks at upstream sites, at the bridge construction site, and downstream to determine changes in habitat resulting from bridge construction activities. If any problems with regard to stream stability are detected during the monitoring, the NCDOT will, in cooperation with the USFWS, develop a plan to address the problems. Analysis will include mapping of the channel bed, cross sections, longitudinal profiles, bed material analyses, bank erosion hazard index estimates, and photographs. On-site surveys will be conducted to document existing channel conditions at the two bridge relocation sites. The results of the surveys will be compiled into a report.

Japanese Knotweed Control - Due to concerns of the USFWS, the NCDOT has identified the existence of Japanese knotweed (*Reynoutria japonica*) within the project limits of R-2519. To minimize the potential spread of Japanese knotweed from construction-related activities, the NCDOT proposes to attempt to suppress the Japanese knotweed within the NCDOT right-of-way at the South Toe River bridge with the application of a glyphosate herbicide, according to the product label. Treatment will only occur prior to disturbance of the area since the application of the herbicide will create the potential for erosion to occur. Once the grading operations are complete and a stabilized vegetative cover has been established, an annual spot treatment will occur at the bridge locations to suppress the Japanese knotweed until traffic is allowed to travel the new roadway.

The NCDOT will put forth its best effort to suppress the Japanese knotweed population with the use of aquatic labeled glyphosate but cannot guarantee the eradication of the species using this method. Additionally, the contract for this project will stipulate that any knotweed material disturbed through construction activities at the bridge will be buried within the project boundaries in fill or waste areas below the depth of the topsoil. The NCDOT prefers this action to allowing the contractor to haul it offsite because this would result in a loss of control over proper disposal.

Sediment- and Erosion-Control Inspections - The NCDOT has developed erosion-control measures for this project specifically to protect the Appalachian elktoe and its habitat. Inspections of erosion-control devices are done on a daily basis by the Construction Project Inspector. The NCDOT's Roadside Environmental Unit also has Field Operations Engineers who perform compliance inspections of the erosion-control devices weekly or within 24 hours of a $\geq$0.5-inch rainfall event during construction of the project.

Other Measures - A USFWS biologist will be present at the preconstruction meeting(s) to cover permit conditions and discuss any questions the contractor has regarding implementation of the project. After the contractor submits plans for various stages of the project, a USFWS biologist will review and provide comments on the plans and will attend any meetings to discuss implementation of the plans.

The NCDOT will ensure that a qualified aquatic biologist is present at critical times to monitor certain phases of construction, including, but not limited to, initial clearing for construction,

when the causeways are installed, when demolition begins, and when the causeways are removed. This individual will be present to ensure that the procedures listed in the "Conservation Measures," "Reasonable and Prudent Measures," and "Terms and Conditions" sections of this Opinion are being implemented and that all project plans are being implemented in a manner to ensure that the conditions of the Opinion are met.

When constructing drilled piers, a containment system will be developed so that material does not enter the river. Any material by-product will be pumped out of the shaft to an upland disposal area and treated through a proper stilling basin or silt bag.

Construction of new bridges will be accomplished in a manner that prevents wet concrete from coming into contact with water entering or flowing in the river.

EFFECTS OF THE ACTION

In 2008, the total impacts to the Appalachian elktoe and its designated critical habitat at this crossing of the South Toe River were estimated to be 9,600 square feet of temporary impact from construction causeways. There were no anticipated permanent impacts because it was thought that a bridge could be built to completely span the River in this location. After numerous field meetings and structure design changes, it was determined that building a structure to completely span the river was not possible. The current design will permanently impact 31.8 square feet of the river by placing one pier and a part of another pier in the water. The location of these structures is as far out of the active channel as possible. The refined plans allowed the temporary impacts to be reduced from 9,600 square feet to 6,534 square feet, or about 30 percent. Although there will be some permanent impact, there is an overall reduction in permanent impact by removing several existing piers. Given that the total negative impacts in the action area have been reduced and the commitments to construction timing will further reduce exposure to the river from construction, the overall change from the 2008 Biological Opinion is positive.

After reviewing the current status of the Appalachian elktoe, the environmental baseline for the action area, the effects of the proposed bridge construction, the cumulative effects, and the proposed conservation measures, it is our biological opinion that the project as proposed is not likely to jeopardize the continued existence of the Appalachian elktoe or adversely modify its designated critical habitat.

REINITIATION/CLOSING STATEMENT

This concludes formal consultation on the action outlined in your March 29, 2013, request for reinitiation of formal consultation. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over an action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this Opinion, or (4) a new species is listed or critical habitat is designated that may be affected by the action.

If you have any questions concerning this Opinion, please contact Ms. Marella Buncick of our staff at 828/258-3939, Ext. 237.

Sincerely

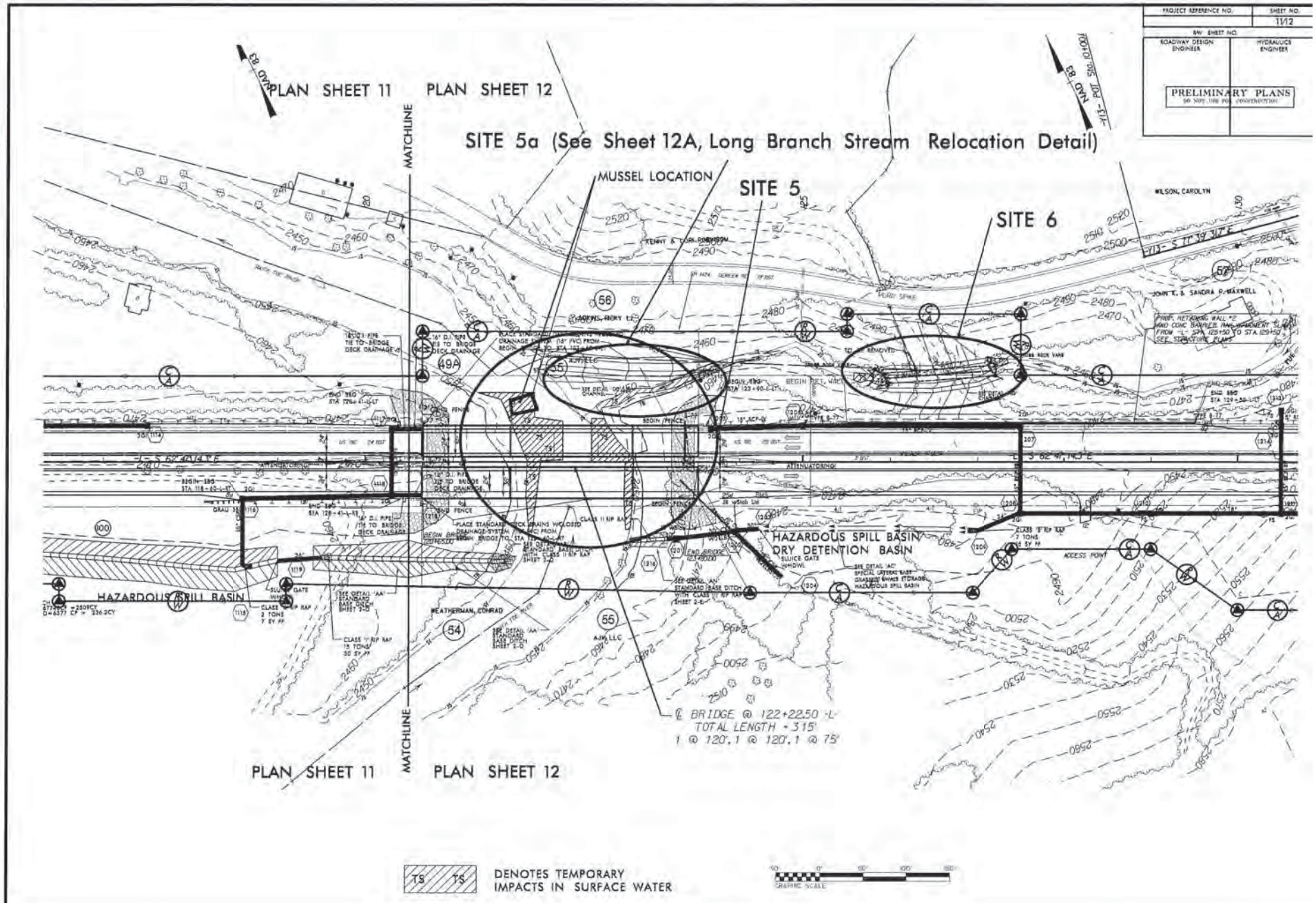
Gary E. Peeples
Acting Field Supervisor

Electronic copies to:

Ms. Marla J. Chambers, North Carolina Wildlife Resources Commission
Mr. Chris Militscher, Environmental Protection Agency
Ms. Heather Wallace, North Carolina Department of Transportation
Ms. Amy Euliss, North Carolina Division of Water Quality

APPENDIX A

DETAILED DRAWINGS FOR BRIDGE CONSTRUCTION

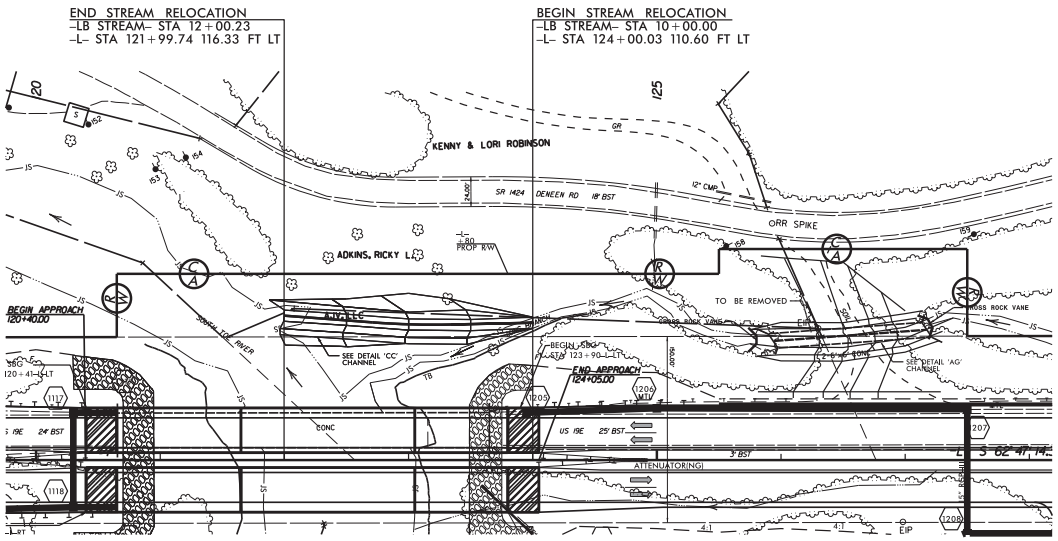

PROJECT REFERENCE NO.
SHEET NO.
11/12
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
NOT FOR CONSTRUCTION
PLAN SHEET 11
PLAN SHEET 12
MATCHLINE
SITE 5a (See Sheet 12A, Long Branch Stream Relocation Detail)
MUSSEL LOCATION
SITE 5
SITE 6
HAZARDOUS SPILL BASIN
DRY DETENTION BASIN
HAZARDOUS SPILL BASIN
℄ BRIDGE @ 122+22.50 -L-
TOTAL LENGTH = 315'
1 @ 120', 1 @ 120', 1 @ 75'
PLAN SHEET 11
PLAN SHEET 12
MATCHLINE
TS TS
DENOTES TEMPORARY
IMPACTS IN SURFACE WATER
GRAPHIC SCALE

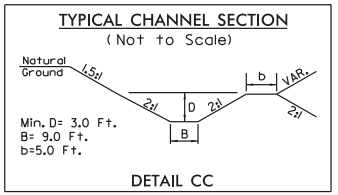
LONG BRANCH STREAM RELOCATION
SITE 5a

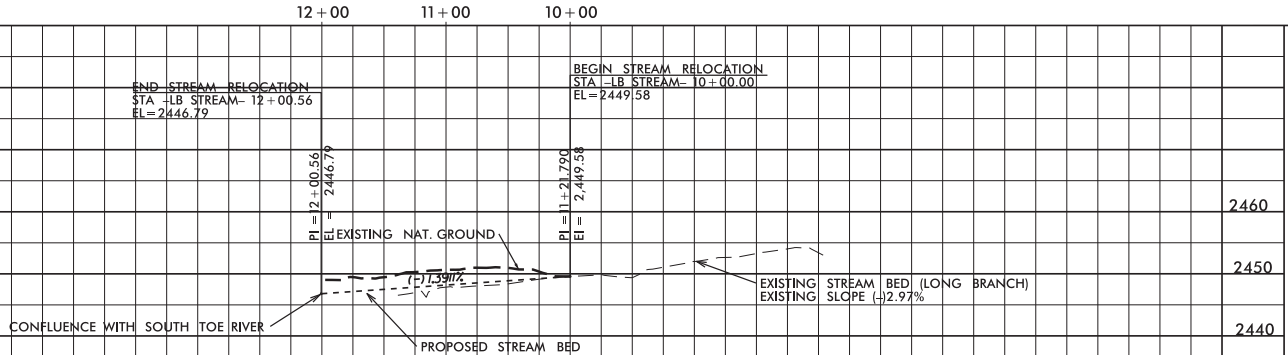
PROJECT REFERENCE NO.	SHEET NO.
R-2519B	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

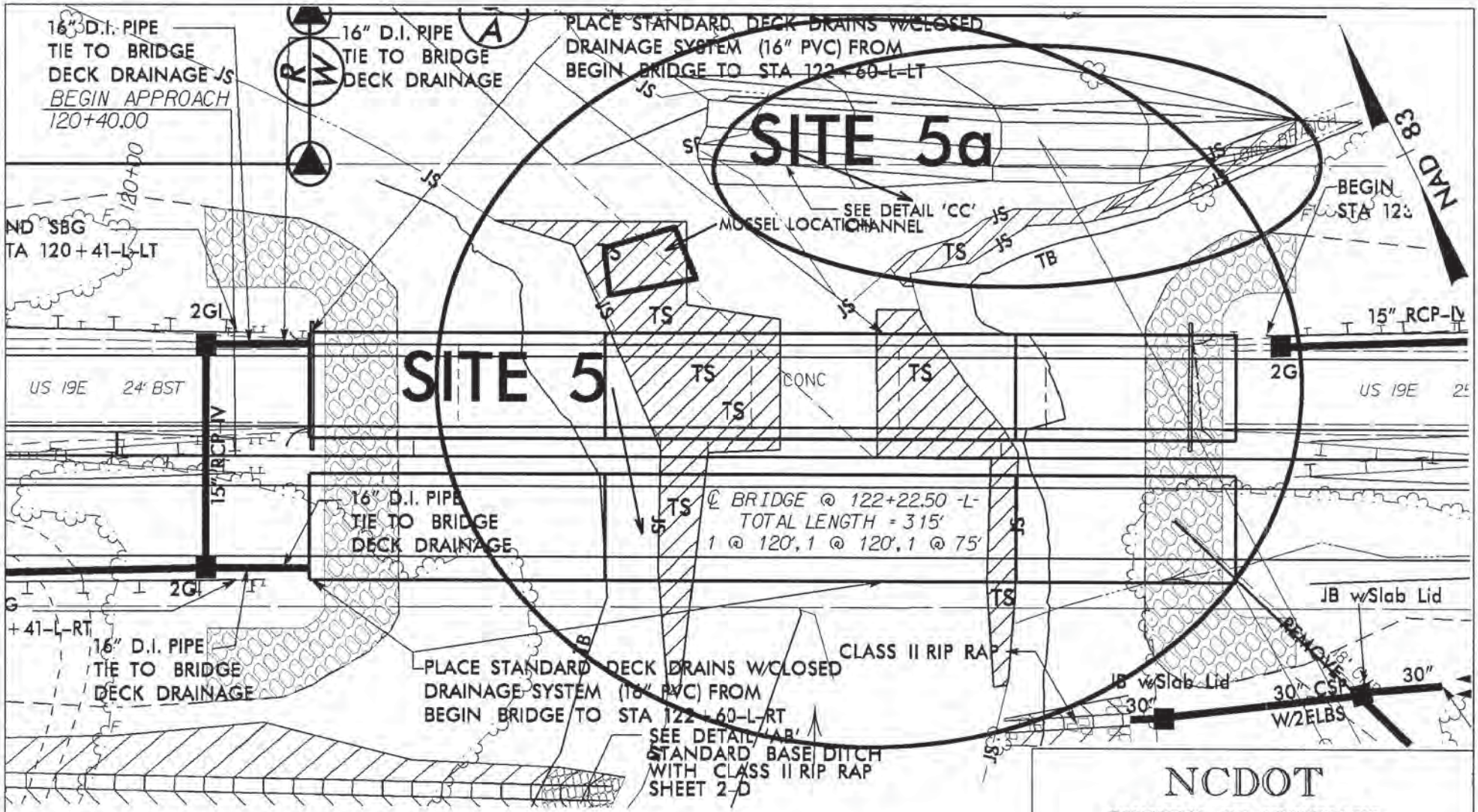
50' 0' 50' 100'
GRAPHIC SCALE







PROPOSED LONG BRANCH
HORIZONTAL ALIGNMENT
PI -LP STREAM- Sta 10+97.20
Δ = 5° 35' 17.0" (RT)
D = 8° 46' 14.7"
L = 637.1'
T = 318.8'
R = 653.26'



IMPACT ENLARGEMENT

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 50'

GRAPHIC SCALE

NCDOT

DIVISION OF HIGHWAYS

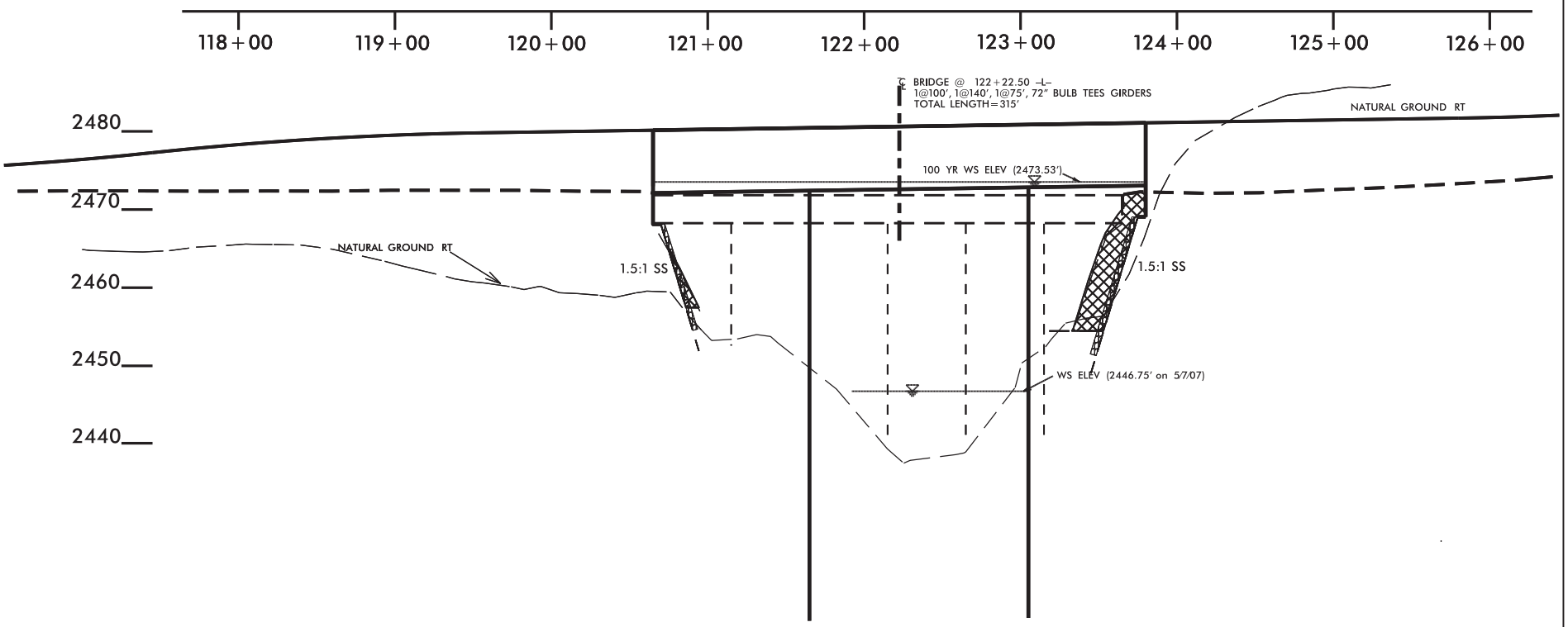
YANCEY / MITCHELL COUNTY

PROJECT: 35609.1.1 (R-2519B)

US 19 EAST FROM NC 80 IN YANCEY TO WEST OF SPRUCE PINES IN MITCHELL

SHEET OF 01 / 16 / 13

P-100



A DECK DRAINAGE SYSTEM WILL BE REQUIRED

PROFILE

SITE 5

CRANE PAD AND CAUSEWAY WILL BE NEEDED TO INSTALL THE PIERS AND SET GIRDER.

ACCESS SHOWN FOR DEMOLITION OF THE EXISTING STRUCTURE.

EACH CAUSEWAY CAN BE INSTALLED AT DIFFERENT TIMES TO MAINTAIN 50% RIVER FLOW.

CAUSEWAY WILL BE NEEDED FOR DRILLING THE PIERS AND GIRDER ERECTION.

LONG BRANCH CREEK WILL BE REALIGNED TO ALLOW MIN. OF 1 GROWING SEASON PRIOR TO PROJECT COMPLETION.

SCALE

1:100' HORIZONTAL

1:20' VERTICAL

NCDOT

DIVISION OF HIGHWAYS

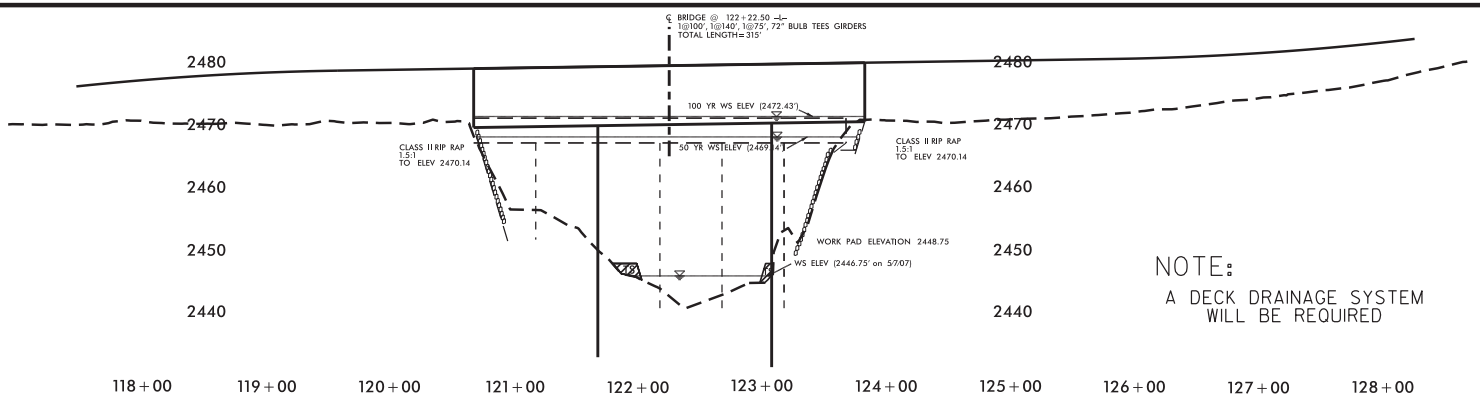
YANCEY / MITCHELL COUNTY

PROJECT: 35609.1.1 (R2519B)

US 19 EAST FROM NC 80 IN YANCEY TO WEST OF SPRUCE PINES IN MITCHELL

SHEET OF 01 / 16 / 13

P-101



NOTE:
A DECK DRAINAGE SYSTEM WILL BE REQUIRED

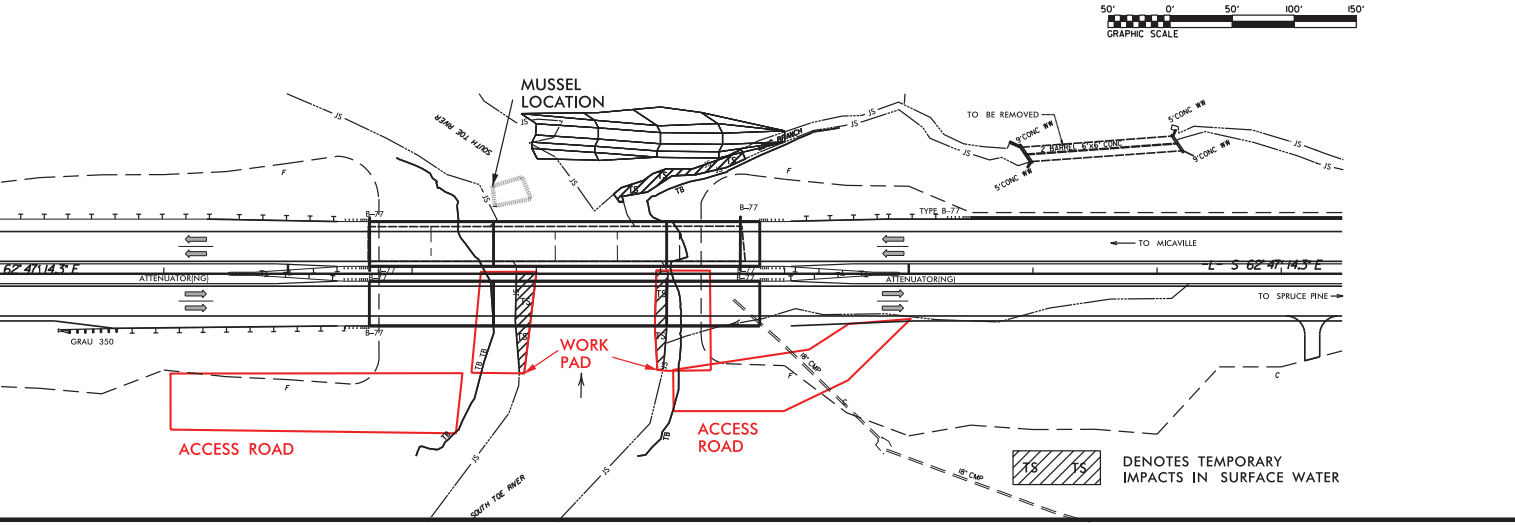
PROJECT REFERENCE NO.	SHEET NO.
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

3 SPANS–1@100', 1@140', 1 @ 75'; CONCRETE GIRDER BRIDGE

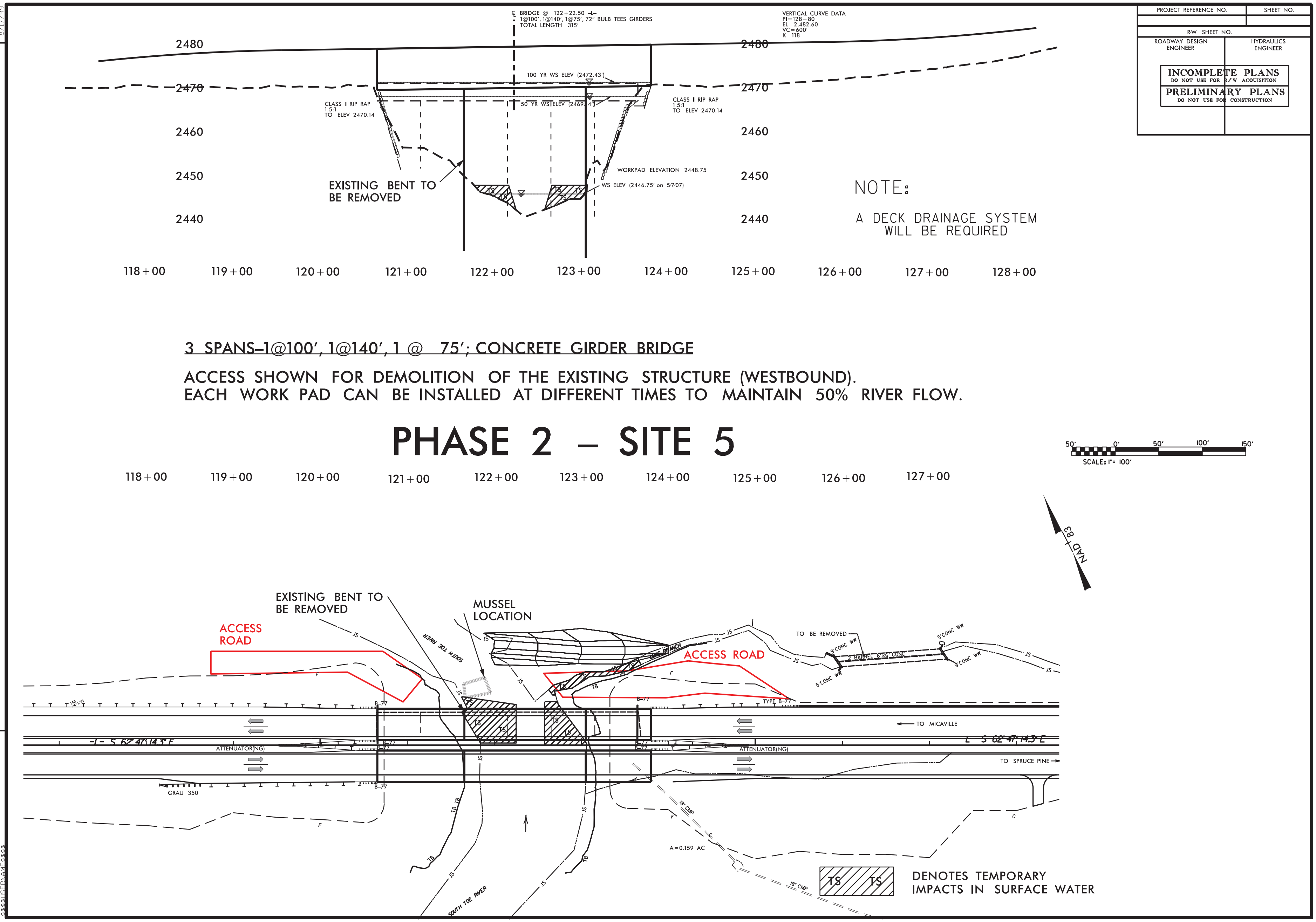
RELOCATE LONG BRANCH CREEK TO ALLOW MIN. OF 1 GROWING SEASON PRIOR TO PROJECT COMPLETION. WORK PAD WILL BE NEEDED TO INSTALL THE PIERS AND SET GIRDERS (EASTBOUND).

PHASE 1 – SITE 5

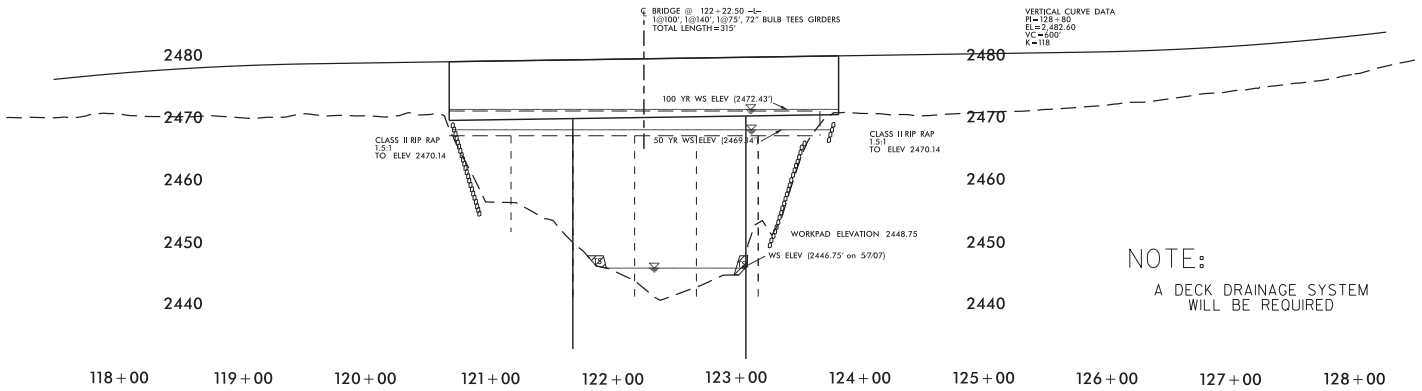


P-102

REVISIONS 8/17/99



PROJECT REFERENCE NO.
SHEET NO.
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
℄ BRIDGE @ 122+22.50 -L-
1@100', 1@140', 1@75', 72" BULB TEES GIRDERS
TOTAL LENGTH=315'
VERTICAL CURVE DATA
PI=128+80
EL=2,482.60
VC=600'
K=118
100 YR WS ELEV (2472.43')
50 YR WS ELEV (2469.41')
CLASS II RIP RAP
1.5:1
TO ELEV 2470.14
WORKPAD ELEVATION 2448.75
WS ELEV (2446.75' on 5/7/07)
EXISTING BENT TO BE REMOVED
2480
2470
2460
2450
2440
NOTE:
A DECK DRAINAGE SYSTEM WILL BE REQUIRED
118+00
119+00
120+00
121+00
122+00
123+00
124+00
125+00
126+00
127+00
128+00
3 SPANS–1@100', 1@140', 1 @ 75'; CONCRETE GIRDER BRIDGE
ACCESS SHOWN FOR DEMOLITION OF THE EXISTING STRUCTURE (WESTBOUND).
EACH WORK PAD CAN BE INSTALLED AT DIFFERENT TIMES TO MAINTAIN 50% RIVER FLOW.
PHASE 2 – SITE 5
50' 0' 50' 100' 150'
SCALE: 1"= 100'
NAD 83
EXISTING BENT TO BE REMOVED
MUSSEL LOCATION
ACCESS ROAD
ACCESS ROAD
SOUTH TOE RIVER
TO BE REMOVED
5'CONC WW
TYPE B-77
B-77
ATTENUATOR(NG)
TO MICAVILLE
TO SPRUCE PINE
-L- S 62° 47' 14.3" E
-L- S 62° 47' 14.3" E
GRAU 350
18" CMP
A=0.159 AC
TS
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
REVISIONS
8/17/99



NOTE:
A DECK DRAINAGE SYSTEM WILL BE REQUIRED

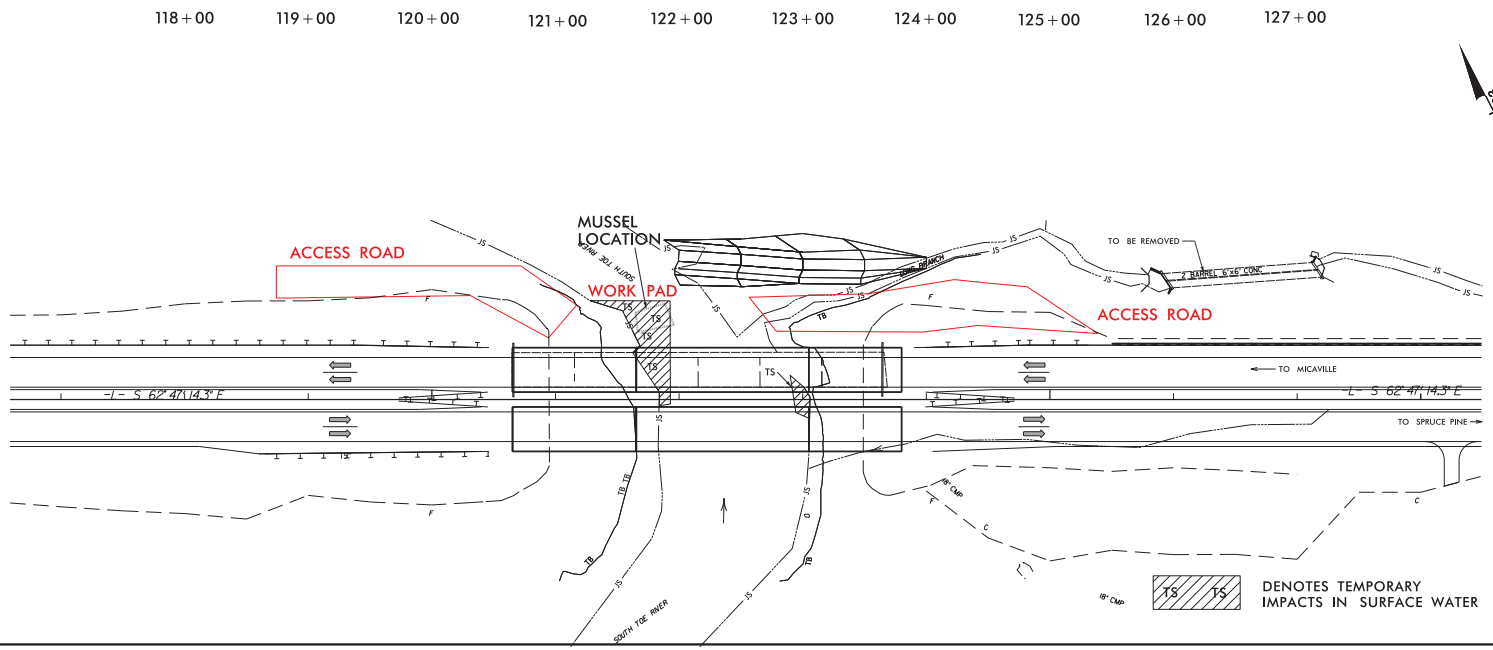
PROJECT REFERENCE NO.	SHEET NO.
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

3 SPANS–1@100', 1@140', 1 @ 75'; CONCRETE GIRDER BRIDGE

WORK PADS WILL BE NEEDED FOR DRILLING THE PIERS AND GIRDER ERECTION. LONG BRANCH CREEK WILL HAVE ALREADY BEEN RELOCATED.

PHASE 3 – SITE 5



REVISIONS

8/17/99

P-104

APPENDIX B

STORMWATER MANAGEMENT PLAN

P-106

STORMWATER MANAGEMENT PLAN

R-2519B, State Project: 35609.1.1 March 6, 2013
County: Yancey/Mitchell
Hydraulics Project Manager: Stephen Morgan, PE

ROADWAY DESCRIPTION

The project involves the widening of US 19E from SR 1186 (Old US 19) on the west side of Micaville in Yancey County to Multi-Lane section west of Spruce Pine in Mitchell County. The proposed typical section is a four lane divided shoulder and ditch section with a 20 ft. raised median.

ENVIRONMENTAL DESCRIPTION

(State Environmental Assessment, NRTR; NCDOT)

The study area is located in the Blue Ridge physiographic province of western North Carolina. The topography in the project study area is generally characterized as rolling hills with steeply sloping, deeply cut drainage ways. Elevations in the study area range from 2,600 to 3,000 feet above mean sea level (USGS 1978, 1994). The project study area consists of existing maintained right-of-way including fill slopes, rural residential, commercial, agricultural, and forested areas.

The project study area is located within the French Broad River Basin. All streams in the study area classified by NCDWQ have been assigned a Best Usage Classification of B, C, and may contain Tr and/or ORW supplemental classifications (NCDENR 2003). The unnamed tributaries (UT) present within the project area have not been individually classified by NCDWQ; therefore, they carry the same classification as their receiving streams. The major streams are shown in Table1, along with identifications, indexes and best usage classifications. The physical characteristics of all the streams within the project study area are shown in Table 2 and Table 3.

Table 1: NCDWQ Stream Identification, Index Numbers, and Best Usage Classification for the Major Drainages within the R-2519B Study Area. (*NCDOT NRTR, 2004)*

NCDWQ Stream Identification	Stream Identification and Map Code	NCDWQ Stream Index Number (SIN)	DWQ Best Usage Classification
South Toe River	STR	7-2-52-(30.5)	B; Tr, ORW
Little Crabtree Creek	2A	7-2-52-33	C; Tr
Big Crabtree Creek	1CC	7-2-48	C; Tr
Long Branch	2D, 6UT2D	7-2-48-52-31	C; Tr
Mine Branch	UT STR	7-2-52-32	C; Tr
Brushy Creek	2BC	7-2-48-4	C; Tr
English Creek	1F, 2UT1F	7-2-42	C; Tr
Ayles Creek	3UT2A	7-2-52-33-11	C; Tr

Table 2. Physical Characteristics of Surface Water within the R-2519B Study Area. (*NCDOT NRTR, 2004)*

Stream ID and Map Code*	Bank Height (feet)	Bankfull Width (feet)	Bank Stability	Sinuosity	Substrate	Water Clarity	USACE Stream Quality Assessment Score	Stream Determination**
UT2A	3-6	3	Stable	None	Gravel/sand	Clear	45.5	Perennial
2A	18-20	15	Stable	Low	Sand/gravel/cobble	Clear	74.5	Perennial
2UT2A	3	2.5	Stable	None	Sand/gravel/cobble	Clear	48.5	Perennial
3UT2A	10	15	Stable	Low	Sand/cobble	Clear	63	Perennial
2B	5-10	3	Stable	Low	Sand/cobble	Clear	60	Perennial
UT2B	0.5	2	Stable	Low	Sand/cobble	Clear	51	Perennial
2C	3-40	3	Stable	Moderate	Sand/cobble	Clear	65	Perennial
STR	10-30	60-100	Stable	Moderate	Sand/gravel/cobble	Clear	83	Perennial
2UT STR	5	3	Stable	Low	Sand/cobble	Clear	41	Perennial
UT STR	5	3	Stable	Low	Sand/cobble	Clear	63	Perennial
3UT STR	0.5-10	2	Stable	Low	Sand/gravel/cobble	Clear	34	Perennial
2D Upstream	3-4	5-6	Stable	Moderate	Sand/gravel/cobble	Clear	60	Perennial
2D Midstream	3-40	10	Stable	Low	Sand/gravel/cobble	Clear	88	Perennial
2D Downstream	2-8	12	Stable	Low	Sand/gravel/cobble	Clear	75	Perennial
UT2D Upstream	2	4	Stable	Low	Sand/gravel	Clear	32	Intermittent
UT2D Downstream	1-3	0.5-1	Stable	Low	Sand/gravel	Clear	55	Perennial
2UT2D	4	2-3	Stable	Moderate	Sand	Clear	62	Perennial
3UT2D	3	3-15	Stable	Low	Sand	Clear	59	Perennial
4UT2D	0.5-10	2-20	Stable	Moderate	Sand/gravel/cobble	Clear	61	Perennial
UT4UT2D	0.5-6	2-3	Stable	Low	Sand/gravel/cobble	Clear	62	Perennial
5UT2D	1-3	1-3	Stable	Low	Sand/gravel/cobble	Clear	51	Perennial
6UT2D	1-3	1-3	Stable	Low	Sand/gravel/cobble	Clear	43	Perennial
7UT2D	2-3	2-3	Stable	Low	Sand/gravel/cobble	Clear	25	Perennial
8UT2D	1-3	2-6	Stable	Low	Sand/gravel/cobble	Clear	25	Perennial
9UT2D	1-2	1-4	Stable	Low	Sand/gravel/cobble	Clear	35	Perennial
10UT2D	0.5	1	Stable	Low	Sand/gravel/cobble	Clear	42	Perennial
11UT2D	3-5	1.5-3	Stable	Moderate	Sand/gravel/cobble	Clear	50	Perennial
12UT2D	3-18	2-3	Stable	Moderate	Sand/gravel/cobble	Clear	35	Perennial
14UT2D	1-3	1-1.5	Stable	Moderate	Sand/gravel/cobble	Clear	45	Perennial
13UT2D	1-3	1-1.5	Stable	Low	Sand/gravel/cobble	Clear	54	Perennial
1H	2-30	3-40	Stable	High	Sand/gravel/cobble	Clear	72	Perennial
4UT1H	2	1-3	Stable	Low	Cobble/gravel/silt	Clear	64	Perennial
UT1H	1-3	1-2	Stable	Low	Cobble/gravel/silt	Clear	77	Perennial
2UT1H	2-10	2-6	Stable	Moderate	Cobble/gravel/silt	Clear	54	Perennial
1I Upstream	1-3	1-3	Stable	Low	Gravel/sand/mud	Clear	75	Perennial
1I Downstream	0.5-10	0.5-6	Stable	Low	Cobble/sand	Clear	60	Perennial
UT1I	0.5	1	Stable	Low	Sand/gravel/cobble	Clear	47	Perennial
1CC	5-20	25	Stable	Moderate	Sand/gravel/cobble	Clear	77	Perennial
UT1CC	5-20	1-5	Stable	Moderate	Sand/gravel/cobble	Clear	67	Perennial
UTUT1CC	1	1	Stable	Low	Silt/cobble	Clear	57	Perennial

P-107

Table 2 Continued… Physical Characteristics of Surface Water within the R-2519B Study Area. *(NCDOT NRTR, 2004)*

Stream ID and Map Code*	Bank Height (feet)	Bankfull Width (feet)	Bank Stability	Sinuosity	Substrate	Water Clarity	USACE Stream Quality Assessment Score	Stream Determination**
2UTUT1CC	1-20	1	Stable	Low	Silt/cobble	Clear	54	Perennial
2UT1CC	1	2	Stable	Moderate	Silt/cobble	Clear	78	Perennial
3UTUT1CC	0.5-5	1-5	Stable	Moderate	Silt/cobble	Clear	72	Perennial
UT3UTUT1CC	0.5-5	1-2	Stable	Moderate	Silt/cobble	Clear	69	Perennial
UTUT3UTUT1CC	0.5-3	1-5	Stable	Low	Silt/cobble	Clear	67	Perennial
2E	2-4	6	Stable	Moderate	Cobble/gravel/sand	Clear	69	Perennial
UT2E	1	4	Stable	Moderate	Cobble/gravel/sand	Clear	54	Perennial
2UT2E	2	5	Stable	Moderate	Silt/cobble	Clear	50	Perennial
3UT2E	2	3	Stable	Moderate	Silt/sand/gravel	Clear	69	Perennial
UT3UT2E	2	0.5	Stable	Low	Sand/gravel	Clear	37	Perennial
2BC	2-4	15	Stable	Moderate	Cobble/gravel/sand	Clear	21	Perennial
UT2BC	1	3	Stable	Low	Gravel/sand	Clear	55	Perennial
11UT1G	3-5	3-6	Stable	Low	Gravel/cobble/sand	Clear	68	Perennial
1G Upstream	0.5-1.5	2-8	Stable	Low	Gravel/cobble/sand	Clear	73	Perennial
1G Downstream	1-4	4-10	Stable	Moderate	Silt/sand/gravel/cobble	Clear	58	Perennial
UT1G	0.5-29	2-4	Stable	Low	Sand/cobble	Clear	50	Perennial
2UT1G	1-2	3-6	Stable	Moderate	Sand/cobble	Clear	66	Perennial
3UT1G	2-6	2-4	Stable	Low	Sand/cobble	Clear	12	Perennial
4UT1G	0-2	1-4	Stable	Low	Sand/cobble	Clear	51	Perennial
5UT1G	2	5	Stable	Low	Sand/silt/gravel	Clear	40	Perennial
6UT1G	1	2	Stable	Low	Sand/gravel	Clear	18	Perennial
7UT1G	0.5	1-2	Stable	Low	Silt/sand	Clear	6	Perennial
8UT1G	0.5	1	Stable	Low	Silt/gravel	Clear	53	Perennial
9UT1G	4	1	Stable	Low	Gravel/sand	Clear	52	Perennial
10UT1G	0.5	1	Stable	Low	Silt	Clear	72	Perennial
1D	0.5-2	1-8	Stable	Low	Gravel/Sand	Clear	52	Perennial
1B	2-8	2-4	Stable	Moderate	Sand/clay	Clear	60	Perennial
1C	0.5-3	2-8	Stable	Moderate	Sand/clay	Clear	64	Perennial
1F	0.5-2	1-3	Stable	Moderate	Sand/clay	Clear	70	Perennial
UT1F	0.5-2	0.5-2	Stable	Moderate	Sand/clay	Clear	60	Perennial
2UT1F	3-15	1-2	Stable	Moderate	Sand/clay	Clear	57	Perennial
1A	4-8	1.5-2	Stable	Low	Clay/sand	Clear	59	Perennial
1Z	2-18	1-2	Stable	Moderate	Sand/clay	Clear	51	Perennial

*UT = Unnamed tributary

** Stream Determination is derived from information gathered during the completion of USACE Stream Quality Assessment Worksheets and NCDWQ Stream Classification Forms

P-108

Table 3: Updated 2012 Change Summary from 2004 Verification *(NCDOT Natural Environment Section)*

Resource Type	Map Id.	Status	Size in Study Area	Project Location	Comments
Stream	SA	Added	468 lf x 5 lf	Figures 2 & 3	Perennial stream connected to Little Crabtree Creek
Stream	SB	Added	449 lf x 3 lf	Figure 5	Perennial stream connected to the South Toe River
Stream	3UTSTR	Removed	346 lf x 5 lf	Figure 6	Stream no longer exists – original survey prior to drought
Wetland	5UT2D	Removed	0.2 ac	Figure 7	Wetland filled by property owner
Wetland	2DO	Partially removed	0.1 ac/0.06 ac remaining	Figure 10	Wetland partially filled by property owner
Wetland	WA	Added	0.01 ac	Figure 10	Wetland connected to stream 1H
Wetland	1IC	Partially disturbed	0.03 ac	Figure 12	Wetland partially disturbed by property owner (Horse corral) though wetland function remains
Wetland	UT1CC-B	Removed	0.1 ac	Figure 13	Wetland filled by property owner
Stream	SC	Removed	303 lf x 2 lf	Figure 14	Stream SC was added for the 2012 Re-Verification by NCDOT but was thrown out by DWQ & USACE
Stream	UT1CC	Extended	3,368 lf x 320 lf	Figure 14	Perennial stream extended 320 lf from original endpoint just past Wetland UT1CC-C
Stream	SD	Added	235 lf x 2 lf	Figure 15	Perennial stream that connects to Stream 2E
Wetland	WB	Added	0.03 ac	Figure 15	Wetland connected to Stream SD
Stream	2UT2E	Removed	171	Figure 15	Couldn't find this channel – possibly combined with flow of main channel – 2E
Stream	SE	Added	565 lf x 2 lf	Figure 16	Stream SE connects to Brushy Creek
Wetland	UT2BC	Removed	0.3 ac	Figure 16	Hydrology has been apparently changed not sure if natural or intentional
Stream	SL	Added	149 x 2 lf	Figure 16	Perennial Stream emerges from a spring and is connected to Stream SE
Stream	SF	Added	620 lf x 3 lf	Figure 18	Perennial stream that connects to stream 1G
Stream	SG	Added	478 lf x 2 lf	Figure 18	Perennial stream that connects to stream 1G
Stream	SH	Added	176 lf x 1 lf	Figure 19	Perennial stream that may connect to Pond H
Stream	SI	Added	547 lf x 2 lf	Figures 19 & 20	Perennial stream that emerges from a spring
Stream	1B	Removed	208 lf x 5 lf	Figure 20	Perennial tributary to stream 1C that existed prior to the drought
Stream	SJ	Added	248 lf x 2 lf	Figure 21	Perennial tributary to stream to English Creek
Stream	SK	Added	238 lf x 4 lf	Figure 21	Perennial tributary to the North Toe River
Stream	SKA	Added	645 lf x 1 lf	Figure 21	Perennial stream SKA emerges from a spring and runs in a pipe and concrete ditch to Stream SK
Stream	SKB	Added	107 lf x 3 lf	Figure 21	Perennial tributary to SK

P-109

ENVIRONMENTAL DESCRIPTION, continued

(State Environmental Assessment, NCDOT)

The South Toe River and nearly all its tributaries are classified as ORW. The endangered Appalachian Elktoe Mussel has been found in the South Toe River. No streams within the study area are designated as North Carolina Natural and Scenic Rivers, or as National Wild and Scenic Rivers. Furthermore, the French Broad River Basin is not currently subject to riparian buffer protection rules by the NCDWQ. None of the water resources within the project vicinity are designated as biologically impaired water bodies regulated under the provisions of CWA §303(d) (NCDWQ 2002).

PROJECT IMPACTS

To accommodate road widening, existing drainage structures and waterway conveyances will need to be extended, replaced, or relocated. There are 9 Reinforced Concrete Box Culverts (RCBC) on this project. The following streams are conveyed with RCBC's: Little Crabtree Creek, Long Branch Creek (2), Tributary to Long Branch Creek, Brushy Creek, and Unnamed Tributary to Brushy Creek (4). There are 2 bridges on the project, one over South Toe River and one over Big Crabtree Creek. Six sites will require stream relocations. A summary of project impacts is listed in Table 4.

Table 4 Summary of Project Impacts

	Permanent Fill In Wetlands	Temp. Fill In Wetlands	Excavation in Wetlands	Mechanized Clearing in Wetlands	Hand Clearing in Wetlands	Permanent SW impacts	Temp. SW impacts	Exist. Channel Impacts Permanent	Exist. Channel Impacts Temp.	Natural Stream Design
	ac	ac	ac	ac	ac	ac	ac	ft	ft	ft
Total Impacts	0.07		0.05	0.04		1.08	0.46	7646	1052	2231

Short-term impacts to water quality, such as sedimentation and turbidity, may result from construction-related activities. Temporary construction impacts due to erosion and sedimentation will be minimized through implementation of NCDOT's "Design Standards in Sensitive Watersheds" (15A NCAC 04B.0024).

BEST MANAGEMENT PRACTICES AND MAJOR STRUCTURES

Best Management Practices (BMPs) and measures used on the project are an attempt to reduce the stormwater impacts to the receiving streams due to erosion and runoff. The primary BMP on this project is the grass swale. Grass swales were used to reduce velocities and promote infiltration. Grass swales remove suspended solids, metals, and nutrients through sedimentation, vegetative filtration, infiltration, and biological uptake. The use of grassed roadway ditches (which meet grass swale criteria) and shoulders also aids in pollutant removal through vegetative filtration and infiltration.

Preformed scour holes (PSHs) and energy dissipaters will be used to attenuate and disperse flow. Preformed scour holes promote runoff infiltration and reduce downgrade erosion. Rip rapped ditches and riprap along stream banks were used where warranted to control erosion. Where possible, piped drainage systems were designed to outlet away

from surface waters to allow time for infiltration in ditches or natural areas. Ditches were ended in flat floodplain areas where possible to allow dispersal and infiltration.

Hazardous Spill Basins will be used at the South Toe River crossing. Dry detention, where practicable, will be used on the project. A dry detention basin is a stormwater runoff quantity control BMP that attenuates stormwater flows, promotes settlement of suspended solids and reduces erosive velocities downstream of the outlet structure. The dry detention basin is a permanent BMP device that will be maintained under NCDOT's Inspection and Maintenance program.

The inverts of new culverts on jurisdictional streams or wetlands will be buried 20% of the pipe diameter up to 1 ft. deep. Culverts were designed to protect stream stability and provide fish passage where possible. Low flow sills with low flow channels were used on new culverts and culvert extensions where enough hydraulic conveyance exists.

Hazardous Spill Basins

- Station 111+50 to station 119+00 –L- right side. South Toe River. Capacity=2509 cy, Storage required=236.2 cy.
- Station 124+50 to station 127+00 –L- right side. South Toe River. Capacity=532 cy, Storage required=81 cy. This basin also doubles as a Dry Detention Basin.

Dry Detention Basins

- Station 83+00 to station 84+50 –L- right side. Capacity required=326 cy, capacity provided=426 cy.
- Station 155+00 to station 157+00 –L- right side. Capacity required=208 cy., capacity provided=197 cy.
- Station 250+75 to station 252+00 –L- Capacity required=545 cy, capacity provided= 678 cy.

Preformed Scour Holes (PSH)

- Station 246+30 –L- LT
- Station 324+70 –L- LT
- Station 337+90 –L- RT

Culverts (9 Total)

- Station 44+12 –L-. (Site 2) Little Crabtree Creek (Stream 2A). Retain existing 4@12'x9' RCBC and extend up and downstream with a 4@ 12'x9' RCBC. The culvert extensions are buried 1' below the stream bed. The downstream extension has 1' high baffles spaced at 35 ft. intervals. Floodplain benches are used up and downstream in the outer barrels of the culvert. Class II riprap is used for bank stabilization at the inlet and outlet.
- Station 134+80 –L-. (Site 7) Long Branch Creek. (Stream 2D) Extend 2 @ 6'x6' RCBC on US 19 upstream and connect to existing 2 @ 6'x6' RCBC on –Y14_ and extend 2 @ 6'x6' RCBC on –Y14- upstream. The upstream culvert extension is buried 1' below the streambed.

- Station 155+45 –L- (Site 8B) Tributary to Long Branch Creek. (Stream 2D) Retain existing 7'x5' RCBC and extend with 1 @ 7'x5' RCBC upstream and extend with 1 @ 7'x7' RCBC downstream with sills at outlet. Use rock cross vanes at outlet backfilled with native stone to bring stream grade up to culvert outlet elevation. Rock cross vanes are used at the outlet stream. Natural stream design is not used due to the limited right of way.
- Station 158+00 –L- (Site 8C) Tributary to Long Branch Creek. (Stream 2D) Replace existing 1@10'x5' stone culvert (w/concrete top slab) with 1@ 8'x6' RCBC with alternating 0.5' and 1.0' sills @ 20' intervals. There will be a low flow meandering channel inside the culvert. Downstream of this culvert is a stream relocation with 2 rock cross vanes. Class I rip rap is used downstream for bank stabilization. Construct floodplain bench at outlet of culvert. Natural stream design is not used due to the limited right of way
- Station 320+00 –L-. (Site 29) Brushy Creek. (Stream 2BC) Extend existing 3@8'x8' RCBC upstream and extend at 3@8'x11' RCBC downstream with fish ladder. Include 1' high sill in 2 outer barrels of culvert at entrance only. Include 6" high sill in middle barrel @12' spacing in existing culvert and at entrance of proposed culvert extension. Existing culvert outlet is perched. Bank stabilization is used up and downstream.
- Station 324+00 –L-. (Site 30) Unnamed Tributary to Brushy Creek. (Stream 1G) Install a new 2 @ 8'x8' RCBC with low flow meandering channel and sills. Place alternating 0.5' and 1.0' high sills @ 20' intervals in western most barrel. Upstream is a stream relocation and downstream there is bank stabilization and natural stream design, placing the tributary back in its historical location.
- Station 327+50 –L-. (Site 31) Unnamed Tributary to Brushy Creek. (Stream 1G) Extend existing 2 @ 7'x7' RCBC downstream. Culvert extension is buried 1'. Bank stabilization is used downstream.
- Station 346+50 –L-. (Site 33) Unnamed Tributary to Brushy Creek. (Stream 1G) Extend existing 2@7'x6' RCBC upstream. The upstream extension is buried 0.5'. There is stream relocation on the upstream side with natural stream design. The design includes a low flow bench at the upstream side of the culvert extension.
- Station 11+00 –Y34-. (Site 34) Unnamed Tributary to Brushy Creek. (Stream 5UT1G) Replace 1 @ 6'x6' concrete culvert with concrete wing walls with 1@6'x7' RCBC with alternating 0.5' and 1.0' sills @ 15' intervals. Channel improvements will be done upstream and 20' of channel transition will be done downstream. The culvert is buried 1' upstream and 0.5' downstream.

STORMWATER OUTFALLS
(Permit sites referenced)
(BMP's noted where used)

Plan sheet 4 (Site 1)

- **(Site 1)** Station 23+45 –L- (11+88 –Y1-). (Stream 2UT2A) Part of existing 30" CMP is replaced with a junction box and 30" RCP outlet to Class 'I' rip rap. This will dissipate the energy and help reduce the outlet velocities.
- Station 25+50 –L- Lt. (Stream 2UT2A) A small drainage system drains to standard 'V' ditch for 115 ft. and then to standard 'V' ditch with PSRM for 240 ft. before entering stream 17' away.

Plan sheet 5 (No Site, Non JS)

- Station 32+70 –L- Rt. (Non JS) Existing 15" CMP has a 7' vertical drop at outlet. The existing 18" CMP downstream is perched 1'. The new drainage system includes a grass ditch into a drainage system with a junction box to dissipate the energy and another open throat catch basin (where there is currently a large 4'deep x8'wide scour hole) to dissipate the energy again before discharging onto a rip rap pad reducing outlet velocities before entering Little Crabtree Creek (Stream 2A).

Plan sheet 6 (Site 2/2A)

- **(Site 2)** Station 44+50 –L- (Stream 2A) Little Crabtree Creek. Retain existing 4@12'x9' RCBC and extend up and downstream with a 4@ 12'x9' RCBC. The culvert extensions are buried 1' below the stream bed. The downstream extension has 1' high baffles spaced at 35 ft. intervals. Floodplain benches are used up and downstream in the outer barrels of the culvert. Class II riprap is used for bank stabilization at the inlet and outlet. During construction, erosion control devices, such as stilling basin and impervious dikes may be used.
  There is also an existing 18" CMP cross pipe that will be removed. This drainage is now in a system that outlets further away from Little Crabtree Creek in a standard base ditch lined with rip rap.

- **(Site 2A)** Station 9+70 –Y4- (Stream SA) Replace existing 15" PVC pipe with 2 @ 30". Place Class I Rip Rap on banks at outlet for bank stabilization.
- Along –Y4- on the right side is a long lateral base grassed swale approximately 450' long (see detail 'T' on plan sheet 2-D of the roadway plans). This minimizes impacts to stream SA.

Plan sheet 7 (site 3)

- **(Site 3)** Station 55+00 –L- (Stream 2B) Drainage system outlets into stream with rip rap stream bank protection at the outlet. Several drop structures will be used to dissipate the energy in the drainage system and reduce outlet velocities.
- Station 57+60 to 58+50 –L- Rt. (Non JS) Use lateral grassed swale before flow goes over rip rap toe protection Station 58+50 to 59+00 -L-Rt. and enters stream. Toe protection also used upstream from Station 59+05 to 60+00 –L- Rt. before flow enters stream.

Plan sheet 9 (Site 4)

- **(Site 4)** Station 79+00 –L- Lt. (Stream 2C) (Phipps Ck) Existing 4'x4' RCBC has a large scour hole at the outlet. The existing outlet is perched 2.6'. The new drainage system will have several deep junction boxes to dissipate the energy and reduce the outlet velocities. Use Class 'II' rip rap at outlet on bank only. (Stream 2C)
- Station 83+00 to 84+50 –L- Rt. Hazardous Spill Basin/Dry Detention Basin before drainage system to South Toe River (STR)

Plan sheet 10 (Site 4A)

- **(Site 4A)** Station 99+65 –L-. (Stream SB) Replace existing 36" (labeled 42") CMP with 36" welded steel pipe. Existing outlet is perched 2.3'. In lieu of rock cross vanes, the proposed drainage system will include several junction boxes to dissipate the energy and reduce outlet velocities. Use Class 'I' rip rap at outlet before entering stream. Rip rap only on the bank is not practicable at this location.

Plan sheet 11/12 (Site 5,5A,6) South Toe River

- **(Site 5) South Toe River Bridge** This bridge design includes 2 hazardous spill basins on either side of the bridge. The proposed bridge design minimizes piers in the water (as described in the BO). The design is going from a 6 span bridge to a 3 span bridge. Two piers in the main channel are being eliminated. Phase 1 of the bridge construction will involve temporary impacts due to work pad needed to install the piers and set girder of the south side of the proposed bridge (eastbound). Phase 2 of the bridge construction includes work pads installed on either side of the South Toe River at different times to maintain 50% river flow. The temporary work pads are used to remove the existing bridge on the north side (westbound). Phase 3 of the bridge construction includes work pads needed for drilling the piers and girder erection. Note: Mussels will be relocated prior to any work on this bridge. A deck drainage system is included in the proposed design to further minimize the impacts to the stream. The proposed work pads are minimized to a temporary impact of 0.15 ac=6,534 sf versus the preliminary estimate of 9,600 sf. included in the BO. Permanent impacts are not totally avoided due to piers at the bank on the east side of the bridge (31.8 sf.)

- **(Site 5A)** Station 122+00 to Station 124+00 –L- (Lt) Stream relocation of Long Branch Creek. As an alternative to having impacts to Long Branch Creek during

construction , the stream will be relocated within the floodplain away from the work zone using similar dimension and profile. The relocated stream will be stabilized with native vegetation. The preference is for the stream to be relocated prior to bridge construction, with a minimum of one growing season prior to project completion.

- From Station 111+50 to 119+00 –L- (Rt.) Lateral base grassed swale/ Hazardous Spill Basin. From station 119+50 to 121+50 –L- (Rt.) Standard base ditch. (Excavation 67,740 cf.=2509 cy., storage required=6377 cf=236.2 cy.) From Station 121+50 to 121+75 –L- (Rt.) Standard Base ditch with Class 'II' rip rap before entering stream (South Toe River).
- Grassed Swale/Hazardous Spill Basin/Dry Detention Basin to small drainage system then to standard base ditch with Class 'II' rip rap from Station 123+00 to 123+50 –L- Rt. (Stream 3UTSTR) to South Toe River. (STR)
- Hazardous Spill Basin volume required=2,208 cf=81 cy
- Dry Detention Basin water quality volume required=3,009 cf=111 cy
- Basin capacity =14,355 cf=532 cy
- **(Site 6)** Station 125+75 to 127+20 -L- Lt. (Stream 2D) Long Branch Creek. Remove existing 2@ 6'x6' RCBC and replace with channel between US 19 and SR 1424 (Deneen Rd.)

Plan sheet 13 (Site 7) Long Branch Creek

- **(Site 7)** Station 135+00 to Station 138+00 –L- Long Branch Creek (Stream 2D) Extend existing 2@6'x6' RCBC upstream. Continue existing 2 @ 6'x6' RCBC between 2 culverts (2@6'x6').
- **(Site 7A)** Station 136+00 (Stream UT2D) Tie in stream to culvert with 30" CSP.
- **(Site 7B)** Station 137+50 –L- Rt. (Stream 2UT2D) Replace existing 24" CMP drive pipe with 30" alternate pipe storm drainage system near SR 1151 Black Jack Rd. An extra depth 2GI is used near the outlet to dissipate the energy and reduce outlet velocities.
- **(Site 7C)** Station 139+50 –L- (Stream 3UT2D) Replace existing 54" CMP cross pipe with 54" CSP and 54" RCP near SR 1431 (Silver Springs Rd.).

Plan sheet 14 (Site 8)

- **(Site 8)** Station 152+00 to 155+00 -L- Rt. and 156+00 to 157+50 –L- Lt. (Stream 2D) The stream was filled over with roadway fill and relocated further away from the –L- line. The dimensions are similar to those of the existing stream. Rock cross vanes are used in the design to maintain a stable slope.
- **(Site 8A)** Station 150+90 –L- Existing 30" CMP is replaced with 36" RCP and 36" CSP. A junction box is used in the system to reduce outlet velocities.
- (Non JS) Station 155+40 to 157+00 –L- Rt. (Stream 2D) Dry Detention Basin is used at the end of a drainage system before outlet to culvert for energy dissipation.
- **(Site 8B)** Station 155+00 –L- (Site 8) Tributary to Long Branch Creek. (Stream 2D) Retain existing 7'x5' RCBC and extend with 1 @ 7'x5' RCBC upstream and extend

with 1 @ 7'x7' RCBC downstream with sills at outlet. Rock cross vanes at outlet backfilled with native stone to bring stream grade up to culvert outlet elevation.

- **(Site 8C)** Station 158+00 –L- (14+90 –Y17-) (Stream 2D) Tributary to Long Branch Creek. Replace existing 1@10'x5' stone culvert (w/concrete top slab) with 1@ 8'x6' RCBC with alternating 0.5' and 1.0' sills @ 20' intervals. There will be a low flow meandering channel inside the culvert. Downstream of this culvert is a stream relocation with 2 rock cross vanes. Class I rip rap is used downstream for bank stabilization. Construct floodplain bench at outlet of culvert.
- Note: Wetland 5UT2D is no longer present.

Plan sheet 15

- Avoided wetlands with roadway design.

Plan sheet 16 (Site 9,10,11)

- **(Site 9)** Station 179+80 –L- (Stream 2D) Remove existing 36" CMP and replace with Special Lateral Base Ditch.
- **(Site 10)** Station 182+80 –L- (Stream 12UT2C) Plug existing 36" CMP and replace with drainage system. Outlet lined with rip rap. Inlet standard base ditch lined with rip rap.
- **(Site 11)** Station 186+50 –L- (Stream 2D) Bank Stabilization used at outlet of drainage system.

Plan sheet 17 (Sites 12-15)

- **(Site 12)** Station 191+50 –L- (Stream 13UT2D) Stream replaced with 42" RCP in drainage system. Outlet of system has bank stabilization.
- **(Site 13)** Station 195+00 –L- (Wet 2DM) Fill in wetlands (0.05 ac.) Replace portion of stream (Stream 2D) with drainage system. Outlet of drainage system has bank stabilization.
- **(Site 14)** Station 197+00 –L- (Stream 2D) Fill in portion of stream and replace with drainage system.
- **(Site 15)** Station 198+50 –L- (Stream 2D) Fill in portion of stream and replace with drainage system.

Plan sheet 18 (Site 16-18)

- **(Site 16)** Station 205+66 –L- Lt. (Stream 1H) Remove existing 36" CMP and remove 18" HDPE and replace with 36" RCP and 60' of bank stabilization (where 18" HDPE was existing).
- **(Site 17)** Station 206+55 –L- Lt. (Stream UT1H) Remove existing 12" CMP and replace with 18" RCP and 18" CSP and bank stabilization.
- **(Site 18)** Station 214+00 –L- (Stream 2UT1H) Plug existing 54" CMP and replace with 54" Welded Steel Pipe and 54"RCP. Near the outlet, place a junction box to dissipate the energy and outlet with 60" RCP and standard base ditch with rip rap.

Plan sheet 20 -21 (Sites 19-23) Big Crabtree Creek

- **(Site 19)** Station 12+00 –Y21- (Stream 1I) Replace existing 42" RCP with 48" alternate pipe and Class "I' rip rap at outlet.
- **(Site 20)** Station 244+50 –L- Rt. (Wetland 1IC) Standard base ditch through wetland. All of wetland is being taken.
- **(Site 21)** Station 246+00 –L- Rt. (Stream 1I) Fill over existing stream due to road being widened. Stream is replaced parallel to the roadway with standard base ditch. Natural stream design is not used due to limited right of way.
- **(Site 22)** Station 247+85 –L- **(Big Crabtree Creek)** (Stream 1CC) 4@ 12'x12' RCBC replaced with bridge. (Single span 185' long, 96" steel girders) One alternative reviewed at this location was to extend the culvert and use retaining walls. This alternative was not acceptable to several agencies, therefore the culvert is being replaced by a bridge. Due to the bridge design, the grade had to be raised at this location. This pushed out the location of the slope stakes. This is a single span bridge, therefore there will be no piers in the channel. Existing Big Crabtree Creek channel dimensions will be matched for the day-lighted stream.
- **(Site 23)** Station 15+00 –Y23A- (Stream UT1CC) Replace 48" CMP with 60" RCP due to extending the limits of –Y23A-.
- Station 251+50 –L- (Rt) Dry detention basin used to minimize stormwater effects. Best management practice.

Plan sheet 22

- (Non JS) Three existing outlets are heavily eroded (some have 10' deep holes) on the south side of the project. These outlets will no longer be used. Pipe drainage system will convey storm drainage past these outlets to the basin

Plan sheet 23 (Site 24)

- **(Site 24)** Station 281+50 –L- (Stream UT1CC) Plug existing 24" CMP and replace with a drainage system. Outlet of drainage system has standard 'V' ditch with Class 'I' rip rap as requested in a previous 4B meeting.

Plan sheet 24 (Site 25)

- **(Site 25)** Station 300+00 –L- (Stream 2E) Replace stream with drainage system. Existing 60" CMP is lined with 54" welded steel pipe. Standard base ditch is used at outlet of system.

Plan sheet 25 (Site 26-27)

- **(Site 26)** Station 302+50 –L- Lt. (Stream 2E) Portion of stream has bank stabilization at outlet. Portion of stream has 60" CSP replacing stream. At the outlet of the storm drain system is a 4' base ditch lined with rip rap.

- **(Site 27)** Station 305+50 –L- Lt. (Stream SD) Existing 18" CMP is replaced with storm drain system. Bank stabilization is used at outlet of system.

Plan sheet 26 (Site 28-31) Brushy Creek

- **(Site 28)** Station 317+00 –L- (Stream SE) Existing 30" CMP is plugged and filled with flowable material. A new 30" welded steel pipe is installed using trenchless installation. The proposed drainage system has Class 'I' rip rap at the outlet. The inlet side has a standard base ditch lined with Class "I" rip rap.
- **(Site 29)** Station 320+00 –L- (Stream 2BC/1G) **Brushy Creek**. Extend existing 3@8'x8' RCBC with 3@8'x8' RCBC (buried 0.5') upstream. Place 1' high sill in 2 outer barrels at entrance only with 6" high sill in middle barrel @ 12' spacing in existing culvert and at entrance of proposed culvert extension. Extend existing 3@8'x11' RCBC downstream with fish ladder. During construction, erosion control devices, such as stilling basins and impervious dikes may be used. Due to the widening of the road, Stream 1G is filled in. (see next)
- **(Site 30)** Station 324+00 –L- (Stream 1G) Remove existing RCBC on SR 1235 Old US 19E (-Y30 -) Remove 2 each 72" CMP from driveways, Fill over stream and replace with new stream relocation. Install new 2@8'x8' RCBC. Space alternating 0.5' and 1.0' high sills @ 20' intervals in western most barrel. Natural stream design is used downstream of new culvert. (See UT to Brushy Creek Stream Relocation sheet.) There was a remnant stream located where the new natural stream will be placed. Station 324+70 –L- (Rt) preformed scour hole (PSH) at outlet of storm drainage system.
- **(Site 31)** Station 327+50 –L- (Stream 1G) Extend existing 2@ 7'x6' RCBC with 2@7'x7' RCBC downstream. Low flow is in western barrel only. Bank stabilization is used downstream for flood plain benching. Downstream extension is buried 1.5'. Temporary impacts are designated upstream to be used during construction.

Plan sheet 28 (Site 32-34)

- **(Site32)** Station 345+00 –L- Rt. (Stream 8UT1G) Stream is replaced with junction box and 24" RCP. The junction box will dissipate the energy and reduce outlet velocities.
- **(Site 33)** Station 346+50 –L- Rt. (Stream 1G) Extend existing 2@ 7'x6' RCBC with 2@ 7'x6' RCBC upstream. Bury culvert 0.5'. Channel improvement upstream of proposed culvert extension. Proposed 24" CSP in the vicinity of -DR13- outlets into a standard base ditch with rip rap as requested in previous 4B meeting.
- **(Site 34)** Station 11+00 –Y34- (Stream 5UT1G) Replace existing 1@ 6'x6' RCBC with 1@ 6'x7' RCBC with 0.5' and 1.0' alternating sills. Bank stabilization is used downstream of the culvert. Channel improvements upstream of the culvert extend for 120 ft. Culvert is buried 1.0'.

Plan sheet 29 (Site 35 and Site 37) (No Site 36)

- **(Site 35)** Station 358+50 –L- (Stream SF) Site 35 Replace 30" CMP with 30" welded steel pipe and junction boxes. Bank stabilization is used downstream of the drainage system. Standard 'V' ditch is used upstream of the system.
- NOTE: There is no Site 36.
- **(Site 37)** Station 368+50 –L- (Stream SG) Site 37 Replace existing 42" CMP with 42" welded steel pipe. Replace stream with 42" RCP upstream. Junction boxes are used in the system to dissipate the energy and reduce outlet velocities. Bank stabilization is used downstream of the system.

Plan sheet 30 (Site 38)

- **(Site 38)** Station 384+00 –L- (Stream 1D) Replace 24" CMP with 24" alternate pipe and junction box. The JB will dissipate the energy and reduce outlet velocities. Bank stabilization is used downstream of the system.

Plan sheet 31 (Site 39-40)

- **(Site 39)** Station 388+00 –L- (Stream SH) Existing 18" CMP is replaced with 18" CSP with elbows. Class I rip rap is used downstream of drainage system.
- **(Site 40)** Station 397+75 –L- (Stream SI) Replace stream with drainage system. 24" CSP with elbows and rod and lug connectors are used. Use several junction boxes to dissipate energy and reduce outlet velocities. Class I rip rap is used at outlet of system.

Plan sheet 32 (Site 41-42)

- **(Site 41)** Station 404+50 –L- Rt. (Stream 1C) Existing 18" CMP cross pipe is plugged and filled with flowable material. Stream is replaced with drainage system including 24" CSP with elbows and junction box near outlet to dissipate energy and reduce outlet velocities. Bank stabilization is used downstream of the system.

- **(Site 42)** Station 409+00 –L- Rt. (Stream 1Z) Existing 18" CMP cross pipe is plugged and filled with flowable material. Existing Stream is replaced with drainage system including 15" CSP with elbows and 24" CSP with elbows and junction box near outlet to dissipate energy and reduce outlet velocities. Bank stabilization is used downstream of the system. Toe protection is also used on the fill slope.

Plan sheet 33 (Site 43)

- **(Site 43)** Station 419+75 –L- Rt. (Stream SJ) Existing 18" CMP and 24" CMP cross pipes are plugged and filled with flowable material. Existing Stream is replaced with drainage system including 24" CSP with elbows and junction boxes near outlet to dissipate energy and reduce outlet velocities. Class 'B' rip rap is used downstream of the system.

Plan sheet 34 (Site 44-45)

- **(Site 44)** Station 428+50 –L- Lt. (Stream SKA) Remove existing concrete lined ditch and replace with drainage system including 30" CSP and open throat catch basin near outlet.
- **(Site 45)** Station 431+00 –L- Rt. (Stream SK) Remove concrete lined ditch and replace with Class 'I' rip rap lined standard base ditch. No net loss.

STREAM RELOCATIONS

- **(Site 5A)** Station 122+00 to station 124+00 –L-(Lt.) Long Branch Creek (Stream 2D) Relocate 148 ft. of existing stream where Long Branch Creek ties into the South Toe River due to the construction of the new bridge over the South Toe River. Currently there are beaver dams in this stream. The new stream will have similar dimensions and profile as that of the existing stream. The new stream will be contained inside the right of way. Further upstream **(Site 6)** from Station 125+95 to station 127+17, approximately 144' of Long Branch Creek (Stream 2D) is reclaimed after removing an existing 2@ 6'x6' RCBC. With this stream design, 2 rock cross vanes are used for grade control. The new stream will have similar dimensions and profile as that of the existing stream. The new stream will be contained inside the right of way.

- **(Site 8)** Station 152+50 to station 155+00 –L- (Rt.) Long Branch Creek (Stream 2D) 257 feet of stream relocation proposed downstream. The existing stream flows along the toe of fill and crosses under the road with a 7'x5' RCBC. The culvert is extended upstream and downstream due to widening of the road. The stream is relocated parallel to the road with similar dimensions and profile. Rock cross vanes are used for grade control. On the downstream side, rip rap is used along the toe of fill. Bank stabilization is also used in the vicinity of the culvert extensions. On the upstream side from Station 155+98 to 157+80 –L- (Lt.) 192 feet of stream relocation is proposed. The stream is relocated parallel to the road with similar dimensions and profile. Rock cross vanes are used for grade control. The culvert on Newdale Church Way is being replaced due to the widening on –Y17-.

- **(Site 19)** -Y21-Hemlock Rd is being widened and an existing 42" RCP will be replaced with a new 48" pipe. (Stream 1I) From Station 244+10 to station 247+88 –L- (Rt.) 396 feet of stream is being relocated. The existing stream is stable. The proposed stream is parallel to the road similar to the existing stream. Due to the widening, the stream will be relocated further south. The proposed stream has similar channel dimensions and profile. The proposed stream is inside the right of way.

- **(Site 25)** Station 299+30 to station 300+31 –L- (Rt.) 94 feet of stream is being relocated. The stream is being relocated due to the road being widened. A standard base ditch with similar channel dimensions and profile will replace the

stream. The proposed stream is parallel to the road and contained within the right of way.

- **(Site 30)** Station 320+00 to station 323+00 –L- (Lt.) (Stream 1G) 660 feet of new stream is proposed. It appears during original construction of US 19, the unnamed tributary to Brushy Creek was realigned to fall along the south side of US 19/Old US 19/ Penland Rd. and then travel through the triple 8'x8' RCBC at Brushy Creek. The new double 8'x8' RCBC will convey water across the widened US 19 and outlet into a newly constructed stream that ties in with Brushy Creek at the same location as that of the remnant channel. The project will reestablish the original flow path of the tributary in the new double barrel culvert. At this time, the remnant channel is visible at the same location as that of the new stream. The existing triple 8'x8' RCBC will be extended on both sides. Bank stabilization will be used both upstream and downstream along Brushy Creek. The new stream will be fully contained within the right of way. On the upstream side, an old culvert will be removed and the new channel dimensions will mimic the old stream.

- **(Site 33)** Station 346+42 to station 348+50 –L- (Rt.) (Stream 1G) Due to the widening of the road, 275 feet of stream realignment is proposed. The new stream will run parallel to the toe of fill. The existing double 7'x6' RCBC will be extended upstream. The new stream will be contained within the right of way. Natural stream design techniques will be used in the design to mimic the existing stream dimensions and profile.

CONCRETE DITCH REMOVAL

- **(Site 45)** Station 429+67 to 432+94 –L- Rt. (Stream SK) Existing concrete ditch will be removed and replaced with rip rap.

STRUCTURE REMOVAL

- **(Site 6)** Station 126+50 –L- (Lt) Remove existing 2@6'x6' RCBC and replace with channel. (Total length=144')
- **(Non Site)** Station 27+550 –Y16- Remove existing bridge structure.
- **(Site 22)** Big Crabtree Creek. Remove 4 barrel culvert and replace with bridge.
- **(Site 30)** Remove existing RCBC on –Y30- (Old US 19) near Station 324+70 –L- (Rt).

RETAINING WALLS

- Wall #1 Station 78+50 to 87+50 –L- (Lt) reduced the impacts to the South Toe River.
- Wall #2 Station 125+50 to 129+50 –L- (Lt) reduced the impacts to Long Branch Creek.

- Wall #4 Station 226+50 to 229+50 –L- (Rt) reduced the impacts to JS (Stream 1I) and wetland (Wet 1IB).
- Wall #11 Station 360+72 to 363+50 –L- (Rt) reduced the impacts to JS (Stream 1G) and wetland (Wet1G-B).

Mitigation Plan
US 19E Widening
Yancey & Mitchell Counties, North Carolina
T.I.P. Number R-2519B
WBS No. 35609.1.1
May 6, 2013 (Revised November 4, 2013)

1.0 BASELINE INFORMATION

Transportation Improvement Project (TIP) R-2519B involves improvements to existing US 19 from SR 1186 (Old US 19) on the west side of Micaville in Yancey County to multi-lane sections west of Spruce Pine in Mitchell County. The proposed construction of R-2519B involves unavoidable impacts to jurisdictional resources within USGS hydrologic unit 06010108, the Nolichucky River Sub basin.

The R-2519B study area is located in the Blue Ridge physiographic province of western North Carolina. The topography in the project study area is generally characterized as rolling hills with steeply sloping, deeply cut drainage ways. Elevations in the study area range from 2,600 to 3,000 feet above mean sea level (USGS 1978, 1994). The project study area consists of existing maintained right-of-way including fill slopes, rural, residential, commercial, agricultural, and forested areas. Surrounding land uses include agricultural, residential, commercial, and forested lands.

The R-2519B Natural Resources Technical Report (NRTR) dated October 2004 provides further details concerning existing roadway/project study area conditions and jurisdictional resources. The mitigation site selection and mitigation work plan sections of this plan will refer to the identification labels given the affected jurisdictional resources in that NRTR. However, the site names match the associated permit impact site number. Additional information about the Nolichucky Sub basin can also be found in the NCDWR French Broad River Basinwide Water Quality Plan dated 2011.

2.0 OBJECTIVES

NCDOT proposes to provide a portion of its mitigation requirements associated with the unavoidable impacts of this project, as allowable per the Federal Mitigation Rule, 33 CFR 332.3 with on-site and in-kind mitigation while acquiring the remainder through the North Carolina Ecosystem Enhancement Program's in-lieu fee program.

NCDOT has been providing mitigation for road projects for more than 20 years and has established a record of acquiring, designing, and constructing successful mitigation sites with over 225 closed out sites protected in perpetuity either through fee-simple ownership or conservation easements throughout the state.

Through in-kind stream relocations, removal of in-stream structures, and the use of natural channel

design, NCDOT proposes to offset and mitigate for a portion of its impacts adjacent to the R-2519B corridor. These mitigation sites are located within the same USGS hydrologic unit and watershed, as well as on the same reach of channel as the associated, permitted impact where it is most likely that the mitigation will replace the lost aquatic resource functions and services incurred by both the associated impact and the project as a whole. This will be achieved by: improving floodplain functions; establishing protected riparian buffers; improving water quality within the watershed by reducing sediment, nutrient, and pollutant inputs; and increasing channel stability while reducing bank erosion. The removal of perched structures at several sites will improved channel stability as well as increase habitat connectivity through improved access and passage. Additionally, many of the sites occur on multiple sections or unnamed tributaries of the same streams (Long Branch, Brushy Creek) which will provide improvements to habitat connectivity within the South Toe-North Toe and Headwater North Toe watersheds respectively as well as within the Nolichucky Sub basin as a whole and more specifically within designated trout waters.

The mitigation will be performed on ten individual sites described below on a total of 2322 linear feet of relocated or adjacent streams of the R-2519B project.

3.0 SITE SELECTION

Each site was evaluated both internally as well as discussed and reviewed with regulatory personnel during concurrence meetings and field visits. Many involve either the removal of perched structures or stream channel relocations due to the road project. All sites are located either within the existing or the proposed NCDOT Right-of-Way for US 19.

Site 5A - Long Branch
ONE ID# 100-013
This site is located on plan sheet 12 from Station 122+00 to 124+00 Lt and involves the relocation of 148 feet of Long Branch (2D). Long Branch is a tributary of the South Toe River and has a NCDWQ Best Use Classification of C and Tr. Long Branch has an USACE Stream Quality Assessment Worksheet score of 53.5 at this location where it flows between US 19 and SR 1424, Deneen Road. Relocating this portion of Long Branch prior to construction of the South Toe Bridge will avoid impacts directly to the channel as well as result in an improved tie-in further downstream from the existing confluence. The new tie-in will prevent Long Branch from discharging directly into the existing Appalachian Elktoe habitat located in the South Toe River. Existing conditions on Long Branch include a bankfull width of 12 feet, eroding banks ranging from two to eight feet in height, beaver dams, and lack of a wooded buffer. There is currently an overhead utility line with a 30 foot easement that crosses Long Branch near the beginning of the relocation and runs parallel to Long Branch at this site.

Site 6 – Long Branch
ONE ID# 100-014
Located on plan sheet 12 from station 125+95 to 127+17 Lt, this site involves the removal of a perched, two-barrel, six foot by six foot, reinforced concrete box culvert (RCBC) on Long Branch (2D). NCDOT will restore 144 linear feet of Long Branch through the removal of the existing RCBC and soil path. The stress of the existing structure is evident by the presence of flow behind

one of the wing walls at the inlet as well as a blowhole at the outlet that is causing channel instability and increased sedimentation through erosion. Removal of the perched structure will prevent future sedimentation issues that could be negatively impacting the existing Appalachian elktoe habitat located 400 feet downstream in the South Toe River. Long Branch has an USACE Stream Quality Assessment Worksheet score of 62.5 at this location where it flows between US 19 and SR 1424, Deneen Road. The US19 utility plans indicate that there are no existing utility easements at this location.

Site 8 – Long Branch
ONE ID# 100-015
NCDOT plans to relocate a total of 449 feet of Long Branch (2D) from station 152+50 to 155+00 Rt. and 155+98 to 157+80 Lt. to avoid additional impacts to the channel due to the road widening and associated fill slopes. Long Branch has an USACE Stream Quality Assessment Worksheet score of 59 at this location. Existing conditions include a scarcely vegetated buffer on the upstream portion, adjacent fill slope and cutover buffer conditions downstream, and a perched culvert. The upstream portion has fairly stable stream conditions, but the downstream portion has eroding, collapsing, and undercut banks. Removing the perched structure, restoring more stable channel dimensions, and planting a protected wooded riparian buffer will establish a stable channel and reduce erosion and sedimentation downstream in the watershed while improving water quality and in-stream habitat throughout this reach. Utility plans show an existing overhead utility just south of Long Branch from station 152+00 to 155+00 Rt. The current buffer is affected by mowing of this utility easement.

Site 9 – Long Branch
ONE ID# 100-016
NCDOT will remove a perched 36 inch corrugated metal pipe and restore 40 feet of Long Branch at this site which is located on plan sheet 15 at station 179+80. Existing channel conditions include a bankfull width of five to six feet, bank heights of two to three feet, and a narrow scrubby vegetated buffer approximately 10-15 feet wide. Long Branch at this location has an USACE Stream Quality Assessment Worksheet score of 60.5. Existing adjacent conditions include an agricultural field and a cutover. The utility plans indicate that there are no existing utility easements at this location. Removal of the perched pipe and establishment of a protected, wooded, riparian buffer will improve channel stability and reduce erosion, sedimentation and nutrient input into the channel.

Site 18 – Parsnip Branch
ONE ID# 100-017
Due to the installation of a new 54” pipe, NCDOT plans to relocate 70 feet of Parsnip branch instead of extending the new pipe structure at this site which is located on plan sheet 18 at station 214+00 Lt. Existing channel conditions include a varying bankfull width from two to six feet, bank heights ranging from two to ten feet and an existing 54” pipe that is perched 12-18”. Parsnip Branch has a sparsely vegetated buffer on one side, a grass buffer on the other, and scored 60.5 on the USACE Stream Quality Assessment Worksheet at this location. The utility plans indicate that there are no existing utilities at this location. Removing the perched structure, restoring more stable channel dimensions, reconnecting the channel with the floodplain, and planting a protected wooded riparian buffer will establish a stable reach and reduce erosion and sedimentation

downstream in the watershed while improving water quality and in-stream habitat throughout this reach

Site 21 – UT Big Crabtree Creek
ONE ID# 100-018
This site involves the relocation of 396 feet of UT Crabtree Creek (1I) due to the widening of the roadway. This site is located on plan sheets 20 and 21 from station 244+10 to 247+94 Rt. Existing conditions include a very narrow buffer with a few trees on the north side due to the proximity of the existing US 19 fill slope and a narrow buffer on the southern side due to the adjacent pasture. UT Big Crabtree Creek has an USACE Stream Quality Assessment Worksheet score of 59.5 at this location. The utility plans indicate an existing overhead utility that crosses UT Big Crabtree Creek near the confluence with Big Crabtree Creek. Through the acquisition of additional right-of-way at this site; wider, protected, riparian buffer areas can be planted with native, woody species which will decrease sedimentation and nutrient inputs from adjacent land uses while improving in-stream habitat and water quality along this reach as well as downstream in the watershed.

Site 25 – Fox Hollow Creek
ONE ID# 061-003
Located on plan sheet 24 at station 299+30 to 300+31 Rt., this site involves the relocation of 94 feet of Fox Hollow Creek (stream 2E) due to the road widening and a new 54 inch reinforced concrete pipe at this location. Existing conditions of Fox Hollow Creek include a bankfull width of six feet, bank heights of two to four feet (some of which are unstable), a slight head cut in the channel, and a wooded buffer on both sides greater than 50 feet. The stream has an USACE Stream Quality Assessment Worksheet score of 67. No current utility easements exist that neither cross nor run adjacent to the stream at this location. The stream relocation will increase channel stability through improved channel dimensions as well as the removal of the head cut feature.

Site 30 – UT Brushy Creek
ONE ID# 061-004
This site involves the relocation and restoration of 635 feet of an unnamed tributary to Brushy Creek (stream 1G) into the historic, relic channel location. It is located on plan sheet 26 at station 325+00. The existing channel currently runs parallel between US 19 and a gas station/repair shop and parking lot. The channel has a narrow, maintained, grass buffer and receives direct storm water runoff from the parking lot and road. There are several areas exhibiting severe erosion problems. Existing channel conditions include a bankfull width of four to six feet, bank heights between one and two feet, and an USACE Stream Quality Assessment Worksheet score of 22.5. There are no existing utility easements at this location. More stable channel dimensions will reduce erosion and sedimentation while a protected, planted, riparian buffer will provide for improved in-stream habitat and water quality both along the reach and downstream within the watershed.

Site 33 – UT Brushy Creek
ONE ID# 061-005
This site is located on plan sheet 28 at station 346+50 Rt. and involves the relocation of 300 feet of an unnamed tributary to Brushy Creek (stream 1G). The existing channel runs parallel to US 19

with a narrow, fifteen foot wide, wooded buffer on both sides of the channel. It has an existing bankfull width of six feet, two foot bank heights, and an USACE Stream Quality Assessment Worksheet score of 60.5. Adjacent land uses include agricultural fields and livestock pastures. Currently, there is an overhead transmission line that both crosses as well as runs parallel to the stream at this location. There is also an existing gas line that crosses the stream at this location. Planting a protected, riparian, buffer on the relocated channel will decrease pollutant and nutrient inputs from adjacent land uses and improve in-stream habitat and water quality along the reach and downstream in the watershed.

Site 35 – UT Brushy Creek
ONE ID# 061-006
On plan sheet 29 at station 358+50, NCDOT plans to relocate 46 feet of UT Brushy Creek to establish a better alignment with the new structure. An existing 24 inch reinforced concrete pipe and a 30 inch corrugated metal pipe are being removed and replaced with a 30 inch welded steel pipe which UT Brushy Creek will flow through under US 19. The existing channel has a bankfull width of two to three feet, one foot bank heights, and an USACE Stream Quality Assessment Worksheet score of 65. There are no existing utility easements at this location. Planting a protected, wooded buffer on the relocated channel will reduce nutrient and pollutant inputs from the adjacent land uses and improve in-stream habitat and water quality along the reach and downstream in the watershed.

4.0 SITE PROTECTION INSTRUMENT

The mitigation areas are within the NCDOT Right-of-Way for the project. They will be managed to prohibit all use inconsistent with their use as mitigation properties, including any activity that would materially alter the biological integrity or functional and educational value of the sites, consistent with the mitigation plan.

The sites will be placed on the NCDOT-Natural Environment Section (NES) Mitigation GeoDatabase. This database is provided to all NCDOT personnel as a record of mitigation sites and their attributes, including prohibited activities. NCDOT is held by virtue of the permit associated with these mitigation sites and the associated roadway impacts to protect the sites in perpetuity.

5.0 MITIGATION WORK PLAN

Each mitigation site will be constructed in conjunction with the construction of the roadway project. Following the successful completion of site grading and stabilization, each site will be reforested with a mix of bare-root tree species and live stakes as described in the Streambank Reforestation Detail in Appendix A. The stream channels will be stabilized by planting live stakes on three foot centers and matting with coir fiber on the banks as necessary.

In accordance with the guidance and standard procedures of NCDOT's Roadside Environmental Unit (REU), seeding and mulching will be performed on all disturbed areas within the mitigation sites for stabilization purposes. An as-built report will be submitted within 60 days of completion of the project.

The Natural Environment Section shall be contacted to provide construction assistance to ensure that each mitigation area is constructed appropriately.

For all the proposed mitigation sites with either existing or proposed utility line relocations that will affect the site, Appendix C contains the MOA signed between NCDOT and Duke Energy. This MOA addresses vegetation maintenance in NCDOT Right-of-Way areas. Duke Energy has also been provided the link to NCDOT-NES Mitigation Geodatabase.

Site 5A - Long Branch
ONE ID# 100-013
This site involves the relocation of 148 feet of Long Branch at the confluence with the South Toe River. The proposed stream channel will be nine feet wide with a three foot bankfull depth and a 21 foot bankfull width. A five foot wide bankfull bench will be constructed along the southern bank for the entire length of the relocation. The new channel will have a 25 ft. buffer on the north bank and a 30 ft. buffer on the south bank. The utility plans show that the existing utility will remain unchanged along this section therefore utility maintenance will continue to affect the buffer along Long Branch at this location. Twenty feet from top of bank on left side will be impacted by utility line maintenance along the entire relocated channel length as shown in Appendix B.

Site 6 - Long Branch
ONE ID# 100-014
The proposed removal of two, existing, six foot by six foot barrel RCBCs and a soil path at this location will restore 144 feet of Long Branch. The proposed stream channel design will be nine feet wide with a three foot bankfull depth and a 21 foot bankfull width. A five foot wide bankfull bench will be constructed on both sides of the new channel. A 50 foot buffer will be planted on the north side and a 30 foot buffer will be planted on the south side (Appendix A). A small section of the buffer will be impacted by a proposed overhead utility. As shown in Appendix B, the last 15 feet of the stream will have the buffer reduced from 30 feet to 25 feet on the left bank.

Site 8 - Long Branch
ONE ID# 100-015
NCDOT will relocate two sections of Long Branch for a total of 449 feet. The new channel will be six feet wide and two feet deep with a bankfull width of 14 feet. A five foot bankfull bench will be constructed on the south bank for the entire 449 feet. Also, six cross vanes will be installed for grade control. Additionally, installation of an extension structure at the outlet of the culvert in conjunction with the channel relocation will correct the perched culvert condition. The new stream channel will have a total forested buffer width of 35 feet on the upstream section and approximately 20 feet wide on the downstream section (Appendix A). Proposed utility plans indicate that the existing overhead utility will remain in place until approximately Sta. 153+75 Rt and then shift slightly south until Sta. 155+00 Rt**.** The proposed overhead utility will reduce the buffer to between 0 and 10 feet on the left hand side for 130 feet downstream of the culvert under US 19 (Appendix B).

Site 9 - Long Branch
ONE ID# 100-016
This site involves removal of a 36 inch corrugated metal pipe and associated daylighting and

restoration of 40 feet of Long Branch. The restored channel will be three feet deep with a three foot wide base resulting in a bankfull width of 13.5 feet. The stream bank adjacent to the new roadway fill slope will be lined with Class II rip rap to provide stability while the other bank will have a 20 foot reforested buffer (Appendix A). No proposed utility easements will affect this mitigation area.

Site 18 - Parsnip Branch
ONE ID# 100-017
Proposed conditions for the relocation of 70 feet of Parsnip Branch include a constructed channel base of five feet with a two foot depth resulting in a 13 foot bankfull width. The channel will be lined with Class I rip rap from the channel toe up the side slopes to a height of 1.5 feet. A 50 foot buffer will be planted on the eastern bank and a 40-50 foot wide buffer will be planted on the western side (Appendix A). The utility plans indicate a new overhead utility will be installed just west of Arbuckle Road. The utility will affect the last 15 feet of stream on the right hand side by reducing the buffer to between 25 and 30 feet.

Site 21 - UT Big Crabtree Creek
ONE ID# 100-018
Proposed channel design for the relocation of 396 feet of UT Crabtree Creek includes a channel base of four feet with a two foot depth. A buffer ranging in width from 18 to 45 feet will be planted along the southern bank and a buffer 12 feet wide will be planted along the northern bank between the stream restoration and US 19 (Appendix A). The utility plans indicate an existing overhead utility that crosses UT Big Crabtree Creek near the confluence with Big Crabtree Creek will be removed.

Site 25 – Fox Hollow Creek
ONE ID# 061-002
NCDOT will relocate 94 feet of Fox Hollow Creek due to the road widening and new 54 inch reinforced concrete pipe at this location. Proposed channel design for Fox Hollow Creek include a five foot wide base with a depth of two and a half feet resulting in a bankfull width of 15 feet. The stream will have a 50 foot buffer on the northern bank and a 10-25 foot buffer on the southern bank (Appendix A). The US 19 utility plans show no proposed utility easements that would affect the mitigation area.

Site 30 – UT Brushy Creek
ONE ID# 061-003
This site involves the proposed relocation and restoration of 635 feet of an unnamed tributary to Brushy Creek to its historic, relic channel location. The stream will run under US 19 through two, new, 8x8, reinforced concrete box culverts and will flow into an adjacent field reestablishing the original flow path. The proposed channel design includes a six foot wide base with a two foot depth in the riffle sections resulting in a bankfull width of 14 feet. The proposed design also includes construction of a 10 foot wide bankfull bench. The new stream channel will have a wooded buffer greater than 50 feet on both sides (Appendix A). There are no proposed utility easements at this location.

Site 33 – UT Brushy Creek
ONE ID# 061-004
Due to the roadway fill, the existing UT to Brushy Creek culvert under US 19 will be extending with two, new, 7x7 reinforced concrete box culverts on the inlet side. Also, the existing stream channel will be filled. Therefore, NCDOT plans to relocate 300 feet of UT to Brushy Creek at this location. The proposed channel design has an eight foot base and a two foot depth resulting in a bankfull width of 16 feet. A five feet wide bench on the northern bank and a 10 feet wide bench on the southern bank will also be constructed. The existing transmission line, proposed overhead utility line and gas line will not be moved per the utility plans for this project and will continue to impact the buffer for the entire relocated length.

Site 35 – UT Brushy Creek
ONE ID# 061-005
Due to the installation of a new location structure, NCDOT will daylight and relocate portions of UT Brushy Creek for 46 feet at the inlet end of the stream to provide a better alignment and tie-in. The proposed design includes a "v" shaped channel with a bankfull width of seven feet. The channel will be lined with a permanent soil reinforcement matting and a wooded buffer of 10 feet will be planted on each side of the stream (Appendix A).There are no utility easements proposed per the utility plans at this location.

6.0 PERFORMANCE STANDARDS

Performance standards are based on the April 2003 Stream Mitigation Guidelines. Success for vegetation monitoring within the riparian buffer areas will be based on the survival of at least 260 stems of five year old trees at year five. Assessment of channel stability will be based on the survival of riparian vegetation and lack of significant bank erosion, channel widening or down-cutting.

7.0 MONITORING REQUIREMENTS

Each site will be monitored for five (5) years with no less than two bankfull events, which must occur in separate monitoring years and be documented. If less than two bankfull events occur during the first five years, monitoring will continue until the second bankfull event is documented. The following components of Level 1 monitoring will be performed annually for the monitoring period: reference photos, plant survival monitoring (identification of specific problem areas and remedial action), and visual inspection of channel stability. Vegetation stem counts will be conducted on Sites 8, 21 and 30 only. Physical measurements of channel stability/morphology will only be performed on Site 30. An as-built will be submitted for each site and will include stream channel profile and cross-section surveys which will provide a baseline for comparison if it is determined at any time during the monitoring period that a problem has occurred. Annual monitoring reports will be made available on the NCDOT website.

8.0 OTHER INFORMATION

No additional information to provide.

9.0 DETERMINATION OF CREDITS

NCDOT plans to relocate, restore, and enhance approximately 2,322 feet of streams associated with the R-2519B project to fulfill a portion of its mitigation requirements. The streams and associated riparian buffer areas are being acquired as right-of-way for the roadway project. These sites will have controlled access to ensure they are protected from local landowner encroachment. Acquiring these streams and riparian buffer areas fee simple assists in ensuring that no future impacts will occur directly to these channels due to commercial or residential development along the corridor.

Based on field and meeting discussions with agency personal pre-401/404 permit applications as well as follow up discussions (phone conversation on October 9, 2013), emails, and an ACOE letter dated October 15, 2013, NCDOT proposes the follow mitigation credits:

Site/Impact #	ONE ID #	Mitigation (ft.)	Credit (ft.)
5A	100-013	148	148
6	100-014	144	144
8	100-015	449	113
9	100-016	40	40
18	100-017	70	35
21	100-018	396	198
25	061-002	94	24
30	061-003	635	635
33	061-004	300	150
35	061-005	46	12
Totals:		**2322**	**1499**

An as-built report will be submitted within 60 days of completion of the each mitigation site to verify actual mitigation lengths and areas constructed and planted. The success of the mitigation sites and determination of final credits will be based upon successful completion and closeout of the monitoring period at each site.

9.1 CREDIT RELEASE SCHEDULE

NCDOT proposes immediate, full release of the proposed mitigation to offset the unavoidable impacts associated with R-2519B.

10.0 GEOGRAPHIC SERVICE AREA

The proposed Geographic Service Area (GSA) for the mitigation sites is composed of the 8-digit Hydrologic Cataloging Unit (HUC) 06010108.

11.0 MAINTENANCE PLAN

The mitigation sites will be held by NCDOT and placed on the NCDOT-NES Mitigation Geodatabase. Once the monitoring period is completed and the sites are closed out, they will be placed in the NCDOT Stewardship Program for long term maintenance and protection. Stewardship Inspection Reports will be made available through the NCDOT website.

If an appropriate third party recipient is identified in the future, then the transfer of the property will include a conservation easement or other measure to protect the natural features and mitigation value of the site in perpetuity.

12.0 LONG TERM ADAPTIVE MANAGEMENT PLAN

The sites will be managed by NCDOT according to the mitigation plan. Encroachments into the areas will be investigated and appropriate measures taken to minimize any negative effects. In the event that unforeseen issues arise that affect the management of the site, any remediation will be addressed by NCDOT in coordination with the Interagency Review Team.

13.0 FINANCIAL ASSURANCES

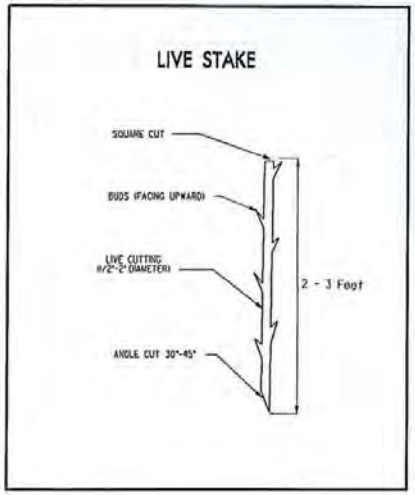
NCDOT is held by permit conditions associated with R-2519B to construct, monitor, and steward the mitigation sites. NCDOT has established funds for each project and within each Division to monitor mitigation sites and protect them in perpetuity.

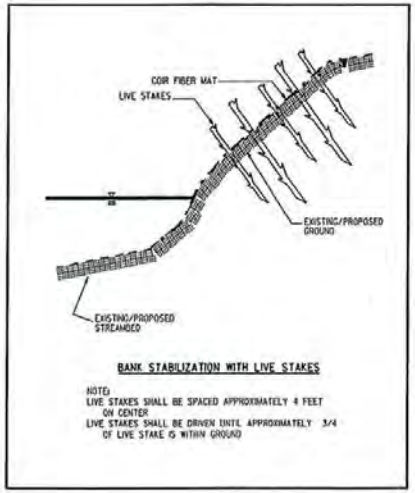
APPENDIX A.

R-2598	RF-2
SW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PLANTING DETAILS

LIVE STAKES PLANTING DETAIL

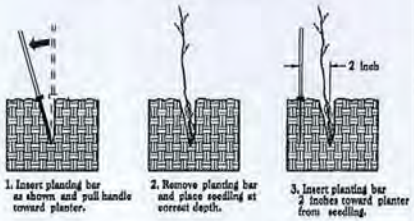




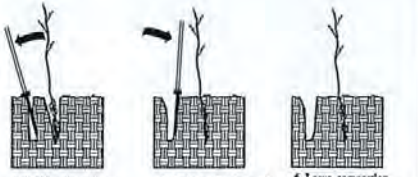
BANK STABILIZATION WITH LIVE STAKES

NOTE:
LIVE STAKES SHALL BE SPACED APPROXIMATELY 4 FEET ON CENTER
LIVE STAKES SHALL BE DRIVEN UNTIL APPROXIMATELY 3/4 OF LIVE STAKE IS WITHIN GROUND

BAREROOT PLANTING DETAIL DIBBLE PLANTING METHOD USING THE KBC PLANTING BAR



1. Insert planting bar as shown and pull handle toward planter.
2. Remove planting bar and place seedling at correct depth.
3. Insert planting bar 2 inches toward planter from seedling.



4. Pull handle of bar toward planter, firming soil at bottom.
5. Push handle forward firming soil at top.
6. Leave compaction hole open. Water thoroughly.

PLANTING NOTES:

PLANTING BAG
During planting, seedlings shall be kept in a moist canvas bag or similar container to prevent the root systems from drying.

KBC PLANTING BAR
Planting bar shall have a blade with a triangular cross section, and shall be 12 inches long, 4 inches wide and 1 inch thick at center.

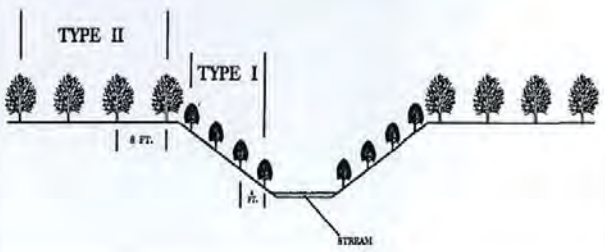
ROOT PRUNING
All seedlings shall be root pruned, if necessary, so that no roots extend more than 10 inches below the root collar.

☐ TYPE 1 STREAMBANK REFORESTATION SHALL BE PLANTED 3 FT. TO 5 FT. ON CENTER, RANDOM SPACING, AVERAGING 4 FT. ON CENTER, APPROXIMATELY 2724 PLANTS PER ACRE.

☐ TYPE 2 STREAMBANK REFORESTATION SHALL BE PLANTED 6 FT. TO 10 FT. ON CENTER, RANDOM SPACING, AVERAGING 8 FT. ON CENTER, APPROXIMATELY 680 PLANTS PER ACRE.

☐ NOTE: TYPE 1 AND TYPE 2 STREAMBANK REFORESTATION SHALL BE PAID FOR AS "STREAMBANK REFORESTATION"

STREAMBANK REFORESTATION TYPICAL



STREAMBANK REFORESTATION

MIXTURE, TYPE, SIZE, AND FURNISH SHALL CONFORM TO THE FOLLOWING:

TYPE 1		
50% SALIX NIGRA	BLACK WILLOW	2 ft - 3 ft LIVE STAKES
50% CORNUS AMOMUM	SILKY DOGWOOD	2 ft - 3 ft LIVE STAKES
TYPE 2		
25% LIRIODENDRON TULIPIFERA	TULIP POPLAR	12 in - 18 in BR
25% PLATANUS OCCIDENTALIS	SYCAMORE	12 in - 18 in BR
25% FRAXINUS PENNSYLVANICA	GREEN ASH	12 in - 18 in BR
25% QUERCUS ALBA	WHITE OAK	12 in - 18 in BR

☐ SEE PLAN SHEETS FOR AREAS TO BE PLANTED

STREAMBANK REFORESTATION
DETAIL SHEET 1 OF 2

N.C.D.O.T. - ROADSIDE ENVIRONMENTAL UNIT

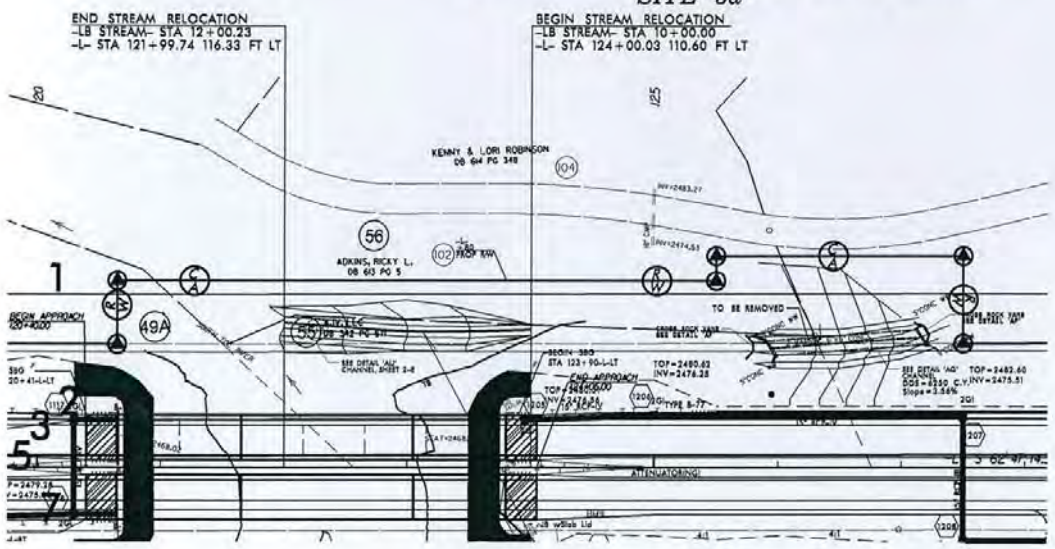
LONG BRANCH STREAM RELOCATION
SITE 5a

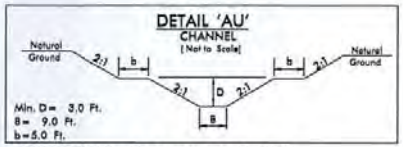
PROJECT REFERENCE NO.	SHEET NO.
B-2598	26
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALE 50' 0' 50' 100'





FROM STA. 122+00 TO STA. 124+00 -L- LT

END STREAM RELOCATION
STA -LB STREAM- 12+00.56
EL = 2446.79

BEGIN STREAM RELOCATION
STA -LB STREAM- 10+00.00
EL = 2449.58

PI = 12+00.56
EL = 2446.79

PI = 11+21.790
EL = 2,449.58

EXISTING NAT. GROUND

(-) 1.53%

EXISTING STREAM BED (LONG BRANCH)
EXISTING SLOPE (-) 2.97%

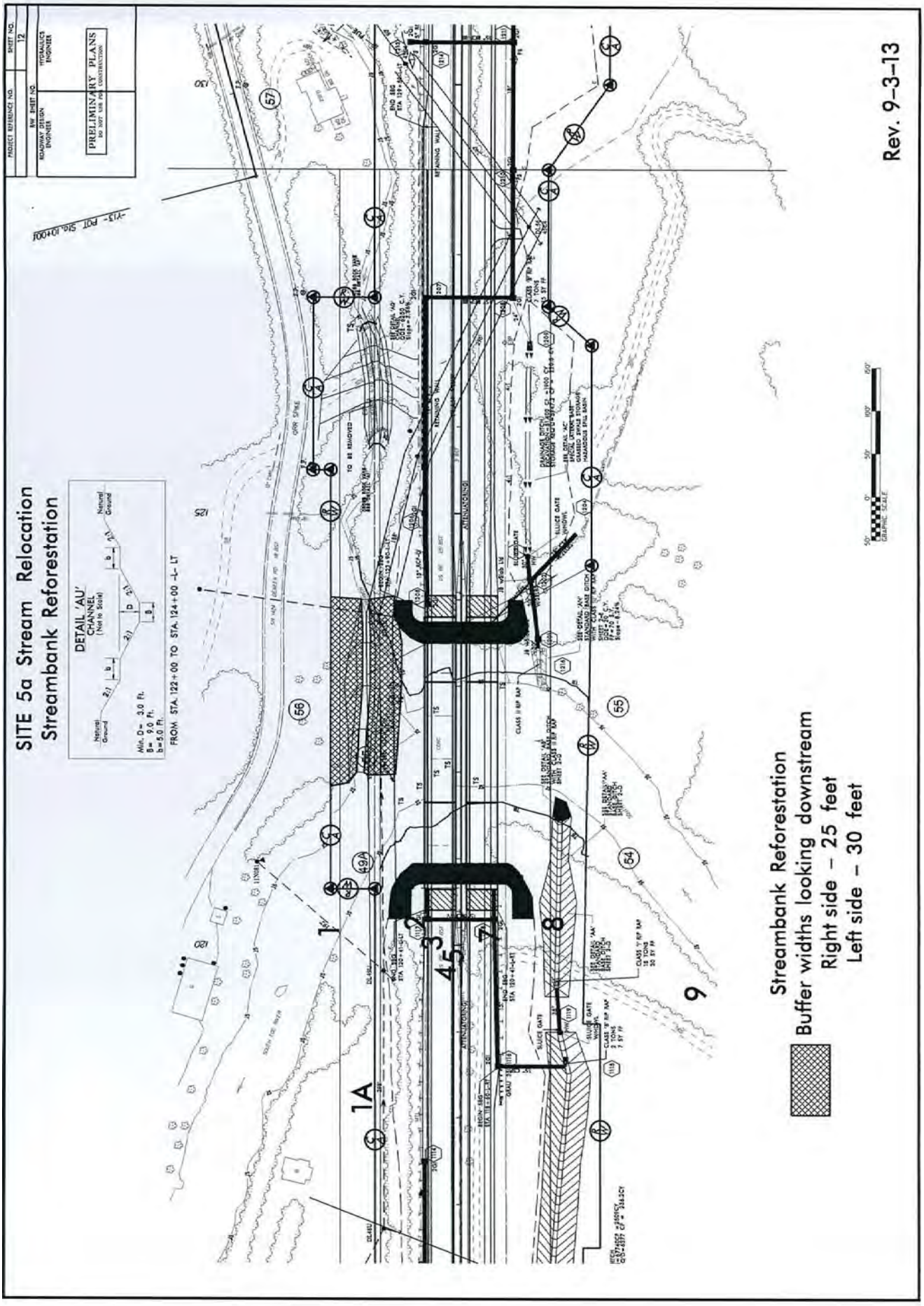
CONFLUENCE WITH SOUTH TOE RIVER

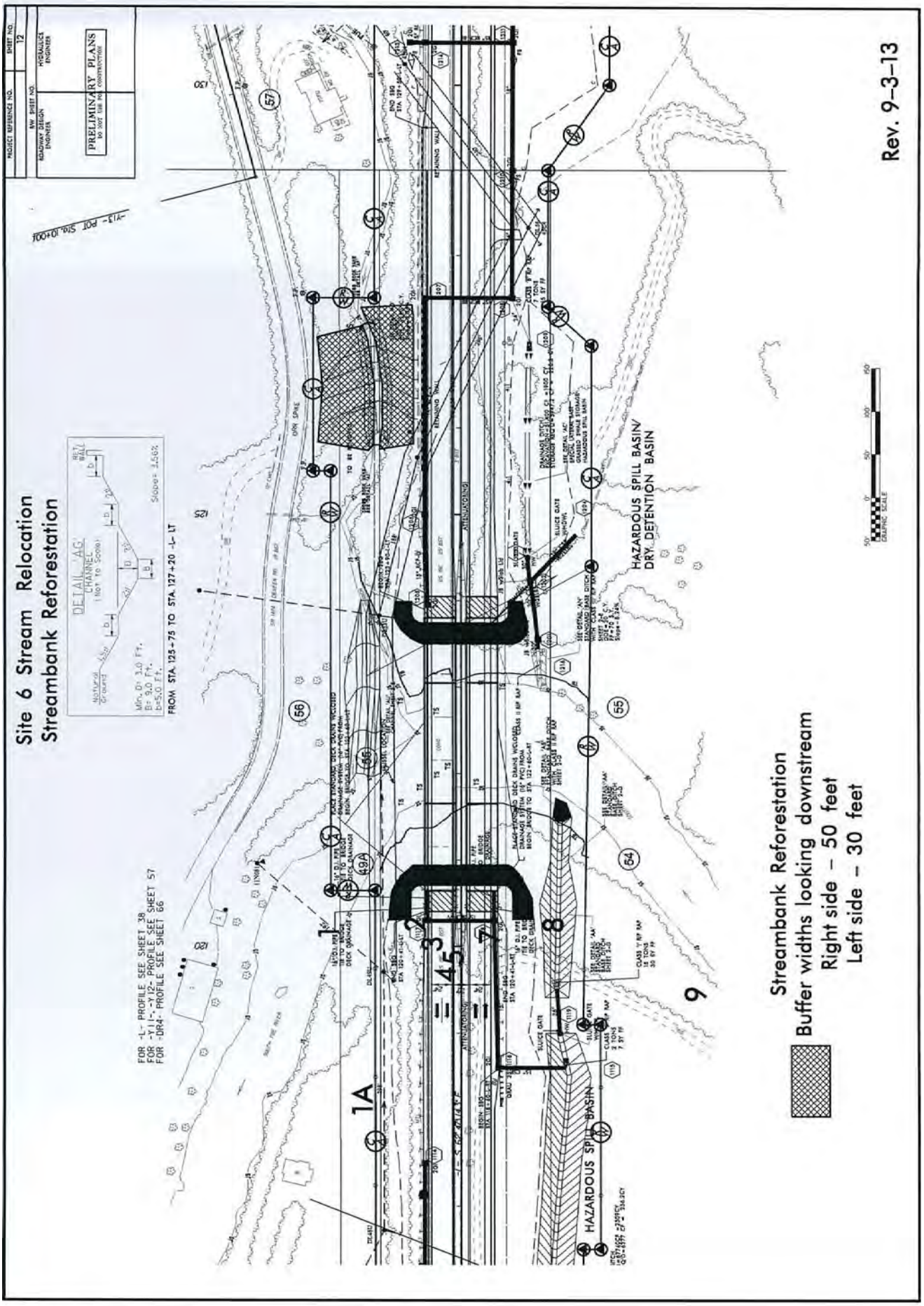
PROPOSED STREAM BED

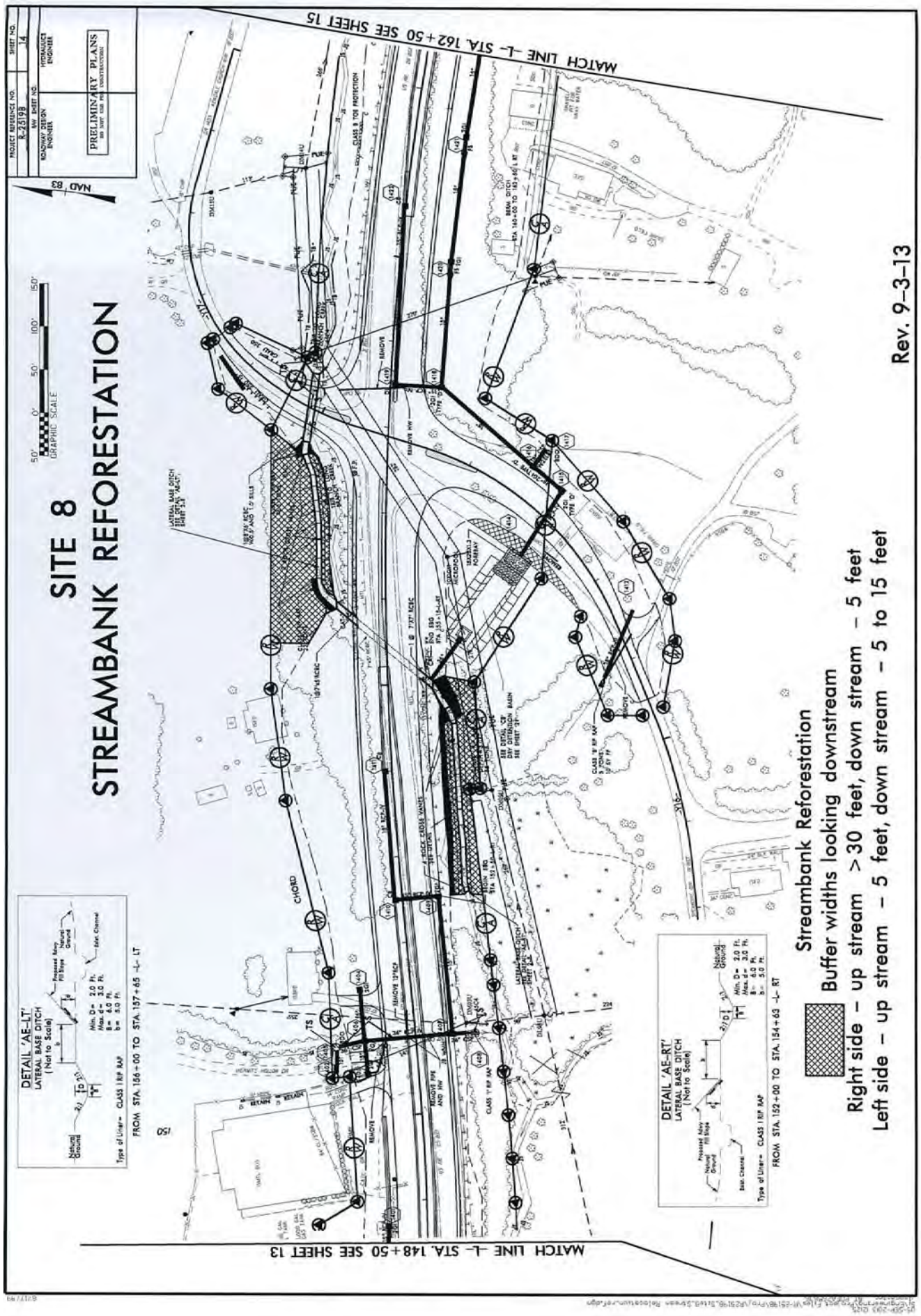
2460
2450
2440

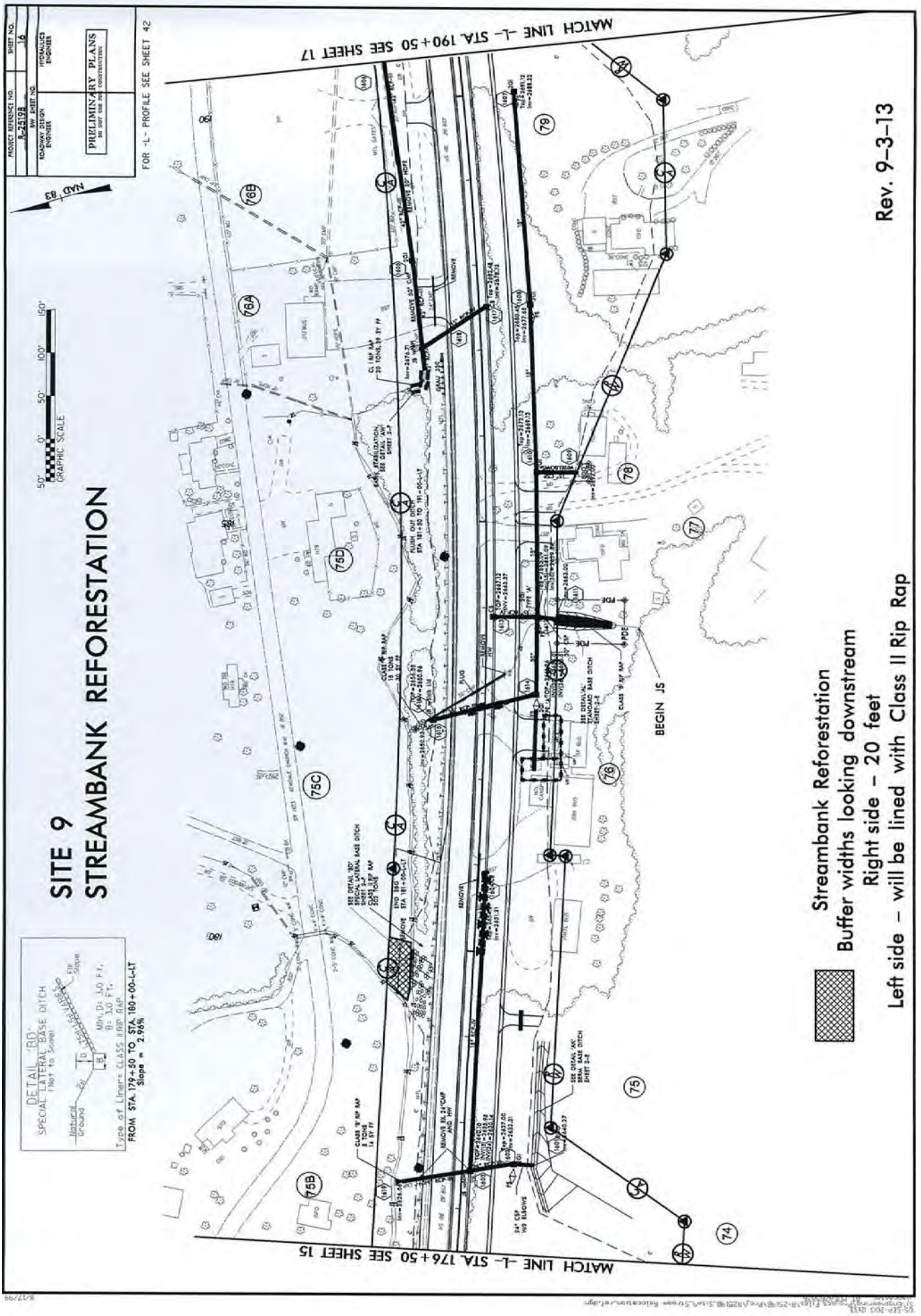
PROPOSED LONG BRANCH
HORIZONTAL ALIGNMENT

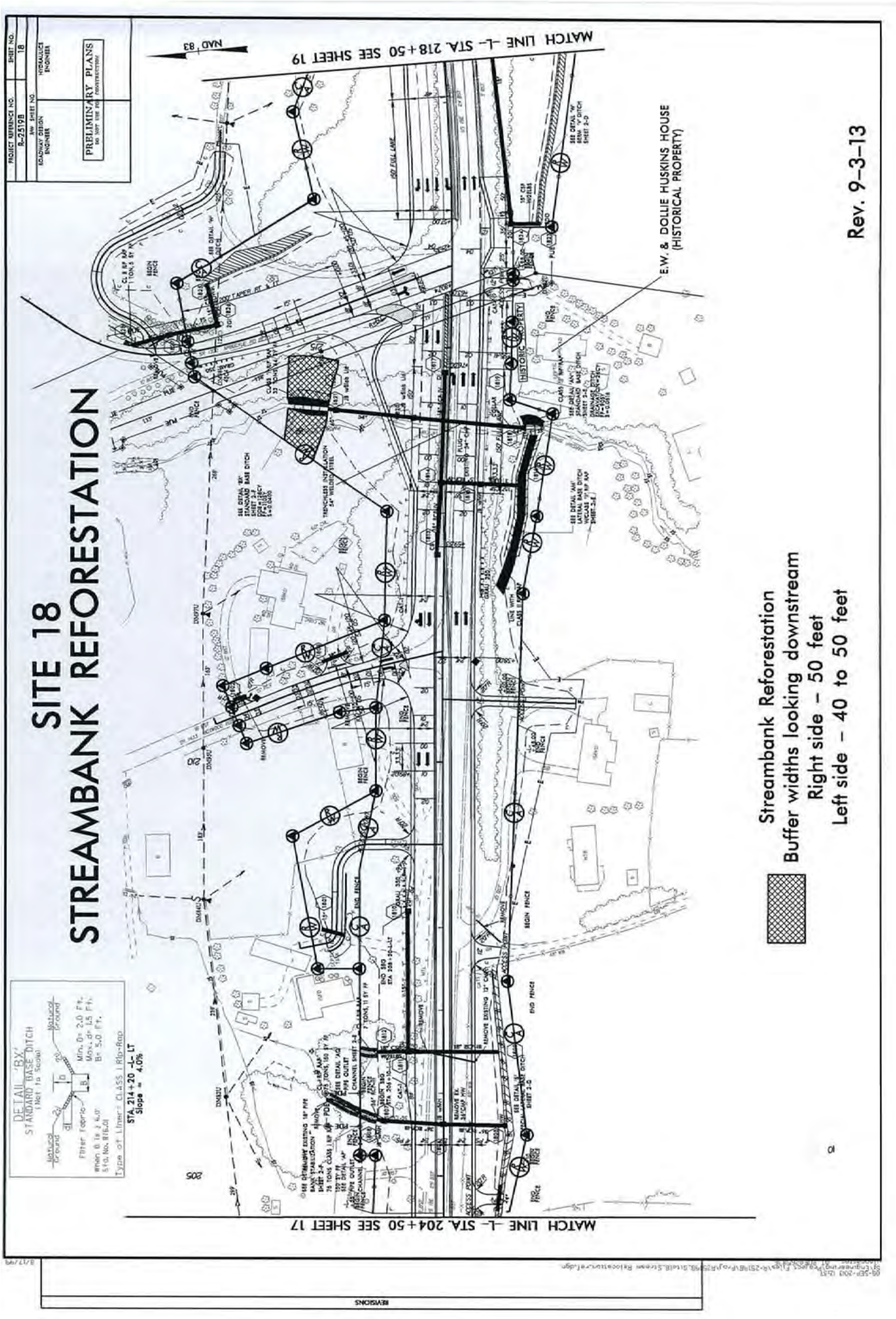
PI -LP STREAM- Sta 10+97.20
Δ = 5° 35' 17.0" (RT)
D = 8° 46' 14.7"
L = 637.1'
T = 318.8'
R = 653.26'

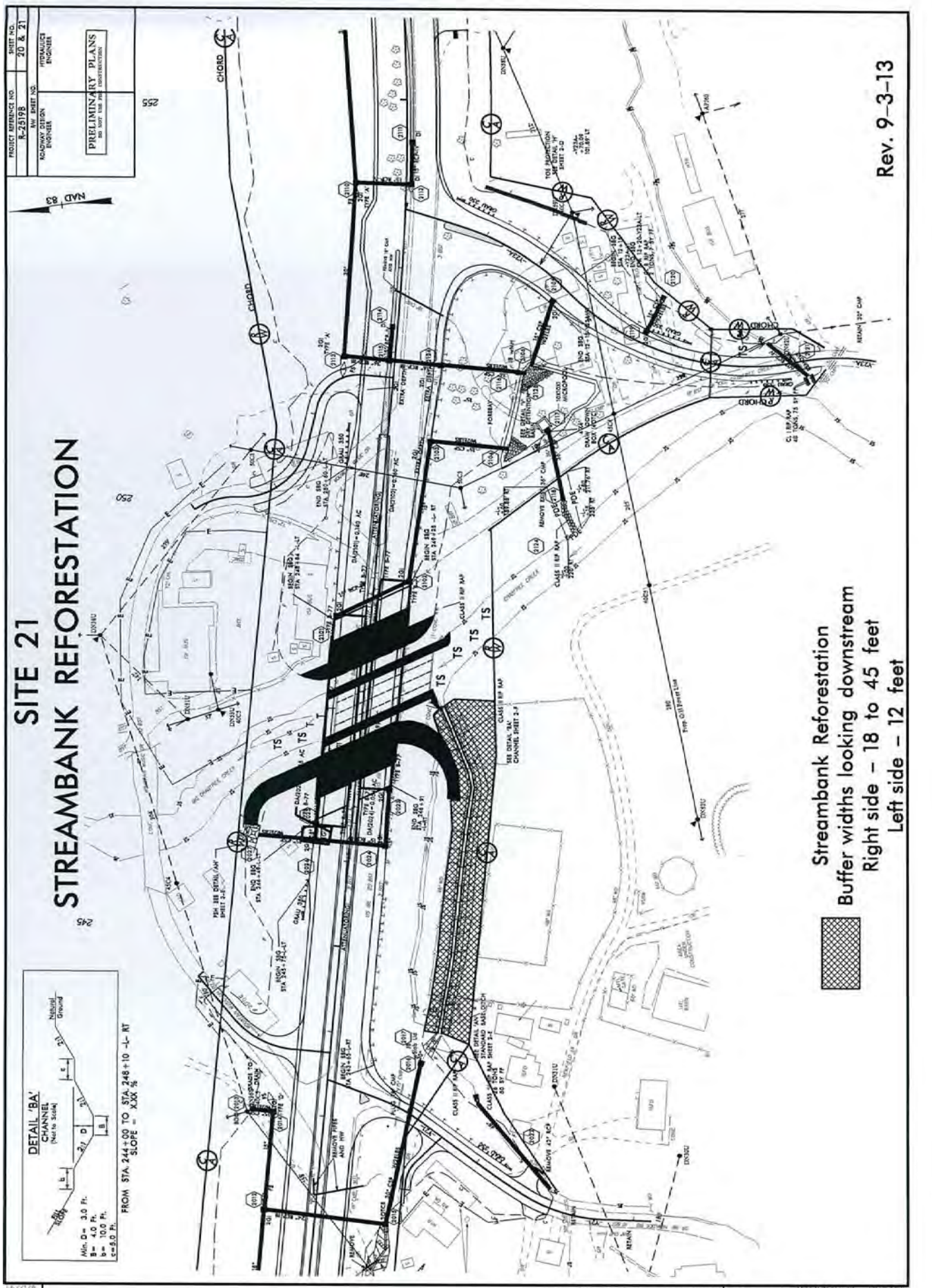

SITE 5a Stream Relocation
Streambank Reforestation
DETAIL 'AU'
CHANNEL
(Not to Scale)
Natural Ground
Min. D= 3.0 Ft.
B= 9.0 Ft.
b=5.0 Ft.
FROM STA. 122+00 TO STA. 124+00 -L- LT
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Streambank Reforestation
Buffer widths looking downstream
Right side – 25 feet
Left side – 30 feet
Rev. 9-3-13

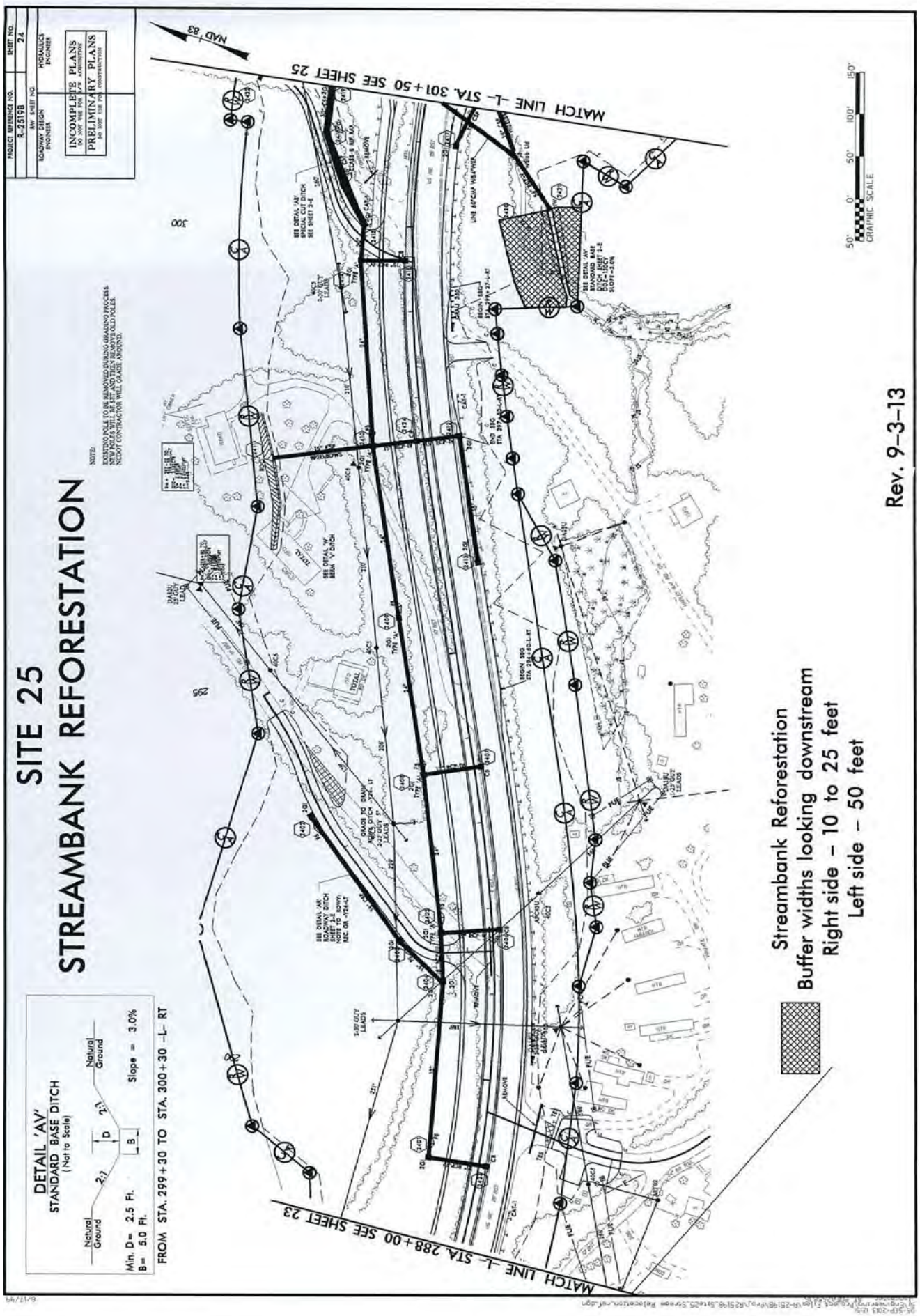

Site 6 Stream Relocation
Streambank Reforestation
PRELIMINARY PLANS
DETAIL 'AG'
CHANNEL
(Not To Scale)
Slope= 2.5:1
FROM STA. 125+75 TO STA. 127+20 -L- LT
FOR -L- PROFILE SEE SHEET 38
FOR -Y11-,-Y12- PROFILE SEE SHEET 57
FOR -DR4- PROFILE SEE SHEET 66
HAZARDOUS SPILL BASIN/
DRY DETENTION BASIN
HAZARDOUS SPILL BASIN
Streambank Reforestation
Buffer widths looking downstream
Right side - 50 feet
Left side - 30 feet
Rev. 9-3-13


SITE 8
STREAMBANK REFORESTATION
GRAPHIC SCALE
50' 0' 50' 100' 150'
NAD 83
PROJECT REFERENCE NO. R-2519B
SHEET NO. 14
PRELIMINARY PLANS
MATCH LINE -L- STA. 162+50 SEE SHEET 15
MATCH LINE -L- STA. 148+50 SEE SHEET 13
DETAIL 'AE-LT'
LATERAL BASE DITCH
(Not to Scale)
Type of Liner= CLASS I RIP RAP
FROM STA. 156+00 TO STA. 157+65 -L- LT
DETAIL 'AE-RT'
LATERAL BASE DITCH
(Not to Scale)
Type of Liner= CLASS I RIP RAP
FROM STA. 152+00 TO STA. 154+63 -L- RT
Streambank Reforestation
Buffer widths looking downstream
Right side - up stream >30 feet, down stream - 5 feet
Left side - up stream - 5 feet, down stream - 5 to 15 feet
Rev. 9-3-13


SITE 9
STREAMBANK REFORESTATION
PRELIMINARY PLANS
DETAIL 'RD'
SPECIAL LATERAL BASE DITCH
Type of Liner= CLASS II RIP RAP
FROM STA. 179+50 TO STA. 180+00-L-LT
Slope = 2.96%
MATCH LINE -L- STA. 190+50 SEE SHEET 17
MATCH LINE -L- STA. 176+50 SEE SHEET 15
FOR -L- PROFILE SEE SHEET 42
BEGIN JS
Streambank Reforestation
Buffer widths looking downstream
Right side – 20 feet
Left side – will be lined with Class II Rip Rap
Rev. 9-3-13


SITE 18
STREAMBANK REFORESTATION
Streambank Reforestation
Buffer widths looking downstream
Right side - 50 feet
Left side - 40 to 50 feet
Rev. 9-3-13
MATCH LINE -L- STA. 218+50 SEE SHEET 19
MATCH LINE -L- STA. 204+50 SEE SHEET 17
E.W. & DOLLIE HUSKINS HOUSE
(HISTORICAL PROPERTY)
PRELIMINARY PLANS
R-2519B
18
NAD 83
STA. 214+20 -L- LT
Slope = 4.0%


SITE 21
STREAMBANK REFORESTATION
PRELIMINARY PLANS
PROJECT REFERENCE NO. R-2519B
SHEET NO. 20 & 21
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
NAD 83
DETAIL 'BA' CHANNEL
Min. D= 3.0 Ft.
B= 4.0 Ft.
b= 10.0 Ft.
c=3.0 Ft.
FROM STA. 244+00 TO STA. 248+10 -L- RT
SLOPE = XXX %
Streambank Reforestation
Buffer widths looking downstream
Right side - 18 to 45 feet
Left side - 12 feet
Rev. 9-3-13


SITE 25
STREAMBANK REFORESTATION
PROJECT REFERENCE NO. R-2519B
SHEET NO. 24
INCOMPLETE PLANS
PRELIMINARY PLANS
NAD 83
MATCH LINE -L- STA. 301+50 SEE SHEET 25
MATCH LINE -L- STA. 288+00 SEE SHEET 23
GRAPHIC SCALE
DETAIL 'AV'
STANDARD BASE DITCH
Natural Ground
Slope = 3.0%
Min. D= 2.5 Ft.
B= 5.0 Ft.
FROM STA. 299+30 TO STA. 300+30 -L- RT
Streambank Reforestation
Buffer widths looking downstream
Right side - 10 to 25 feet
Left side - 50 feet
Rev. 9-3-13

SITE 30 UT TO BRUSHY CREEK STREAM RELOCATION REFORESTATION

PROJECT REFERENCE NO.	SHEET NO.
R-2595	2H
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

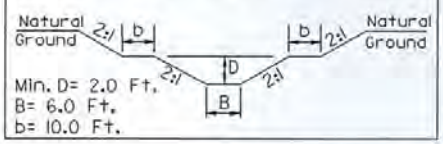
BEGIN STREAM RELOCATION
STA 10+00.00 UT TO BRUSHY CREEK
-L- STA 323+03.10 63.67 FT LT

END STREAM RELOCATION
STA 15+14.4 UT TO BRUSHY CREEK
-L- STA 319+92.70 432.68 FT LT

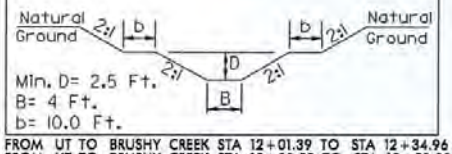
BEGIN STREAM RELOCATION
STA 10+00.00 US UT TO BRUSHY CREEK
-L- STA 325+10.93 110.14 FT RT

END STREAM RELOCATION
STA 11+20.9 US UT TO BRUSHY CREEK
-L- STA 324+10.51 69.42 FT RT

TYPICAL CHANNEL SECTION
(Not to Scale)



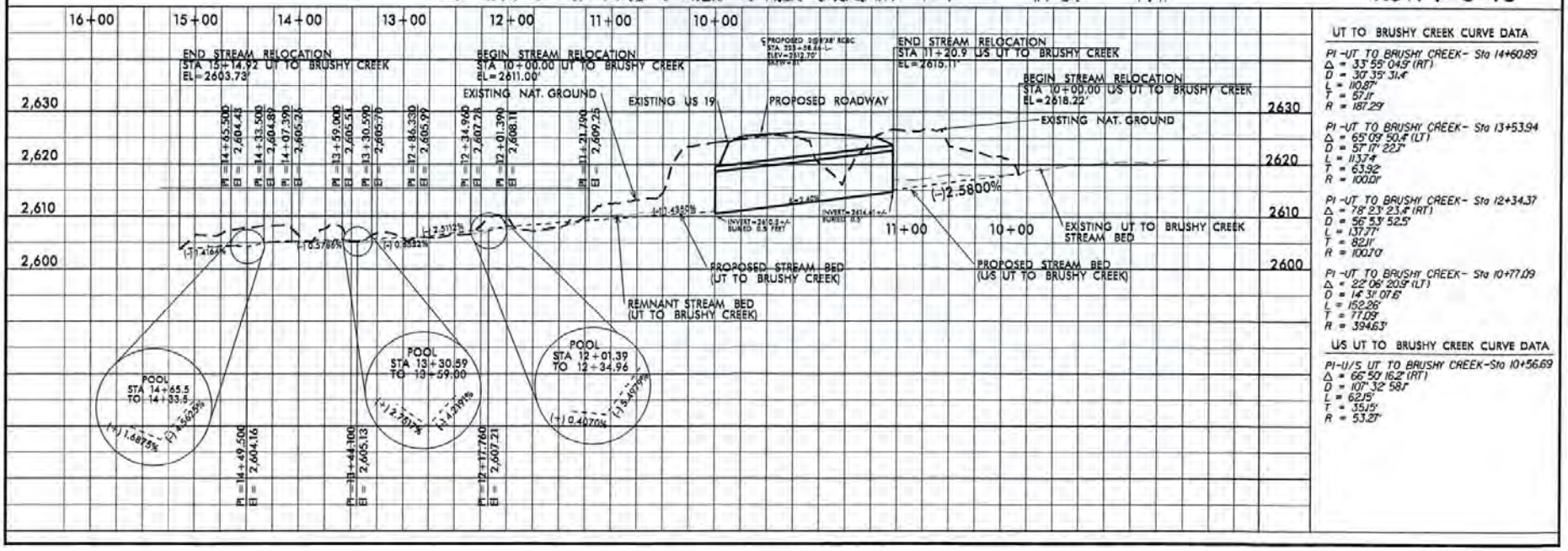
TYPICAL POOL SECTION
(Not to Scale)



FROM UT TO BRUSHY CREEK STA 12+01.39 TO STA 12+34.96
FROM UT TO BRUSHY CREEK STA 13+30.59 TO STA 13+59.00
FROM UT TO BRUSHY CREEK STA 14+33.50 TO STA 14+65.5

Streambank Reforestation
Buffer 30 foot
or greater

Rev. 9-3-13



UT TO BRUSHY CREEK CURVE DATA

PI -UT TO BRUSHY CREEK- Sta 14+60.89
Δ = 33° 55' 04.5" (RT)
D = 30° 35' 31.4"
L = 110.87'
T = 57.1'
R = 187.29'

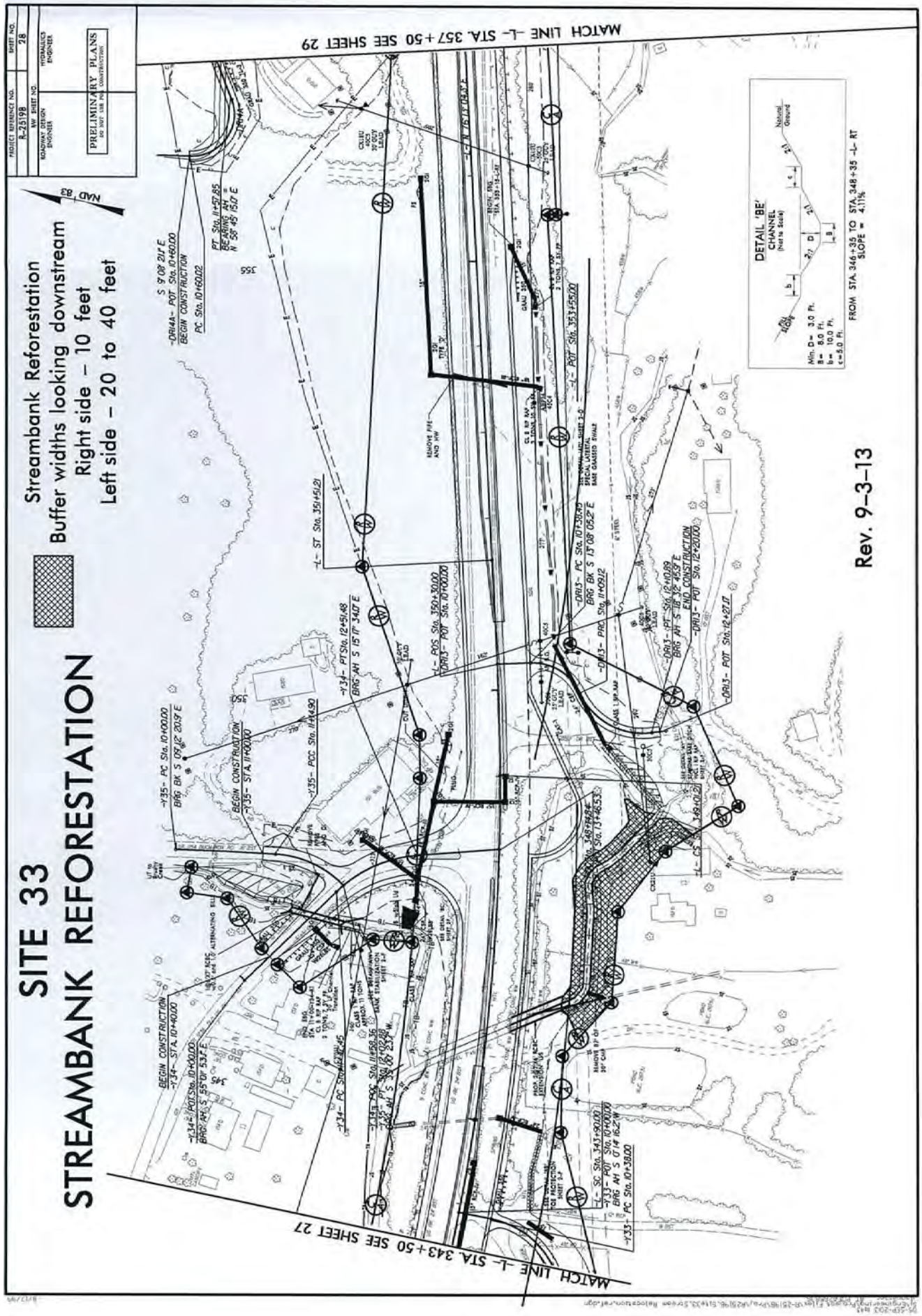
PI -UT TO BRUSHY CREEK- Sta 13+53.94
Δ = 65° 09' 50.4" (LT)
D = 57° 11' 22.7"
L = 113.7'
T = 63.92'
R = 100.01'

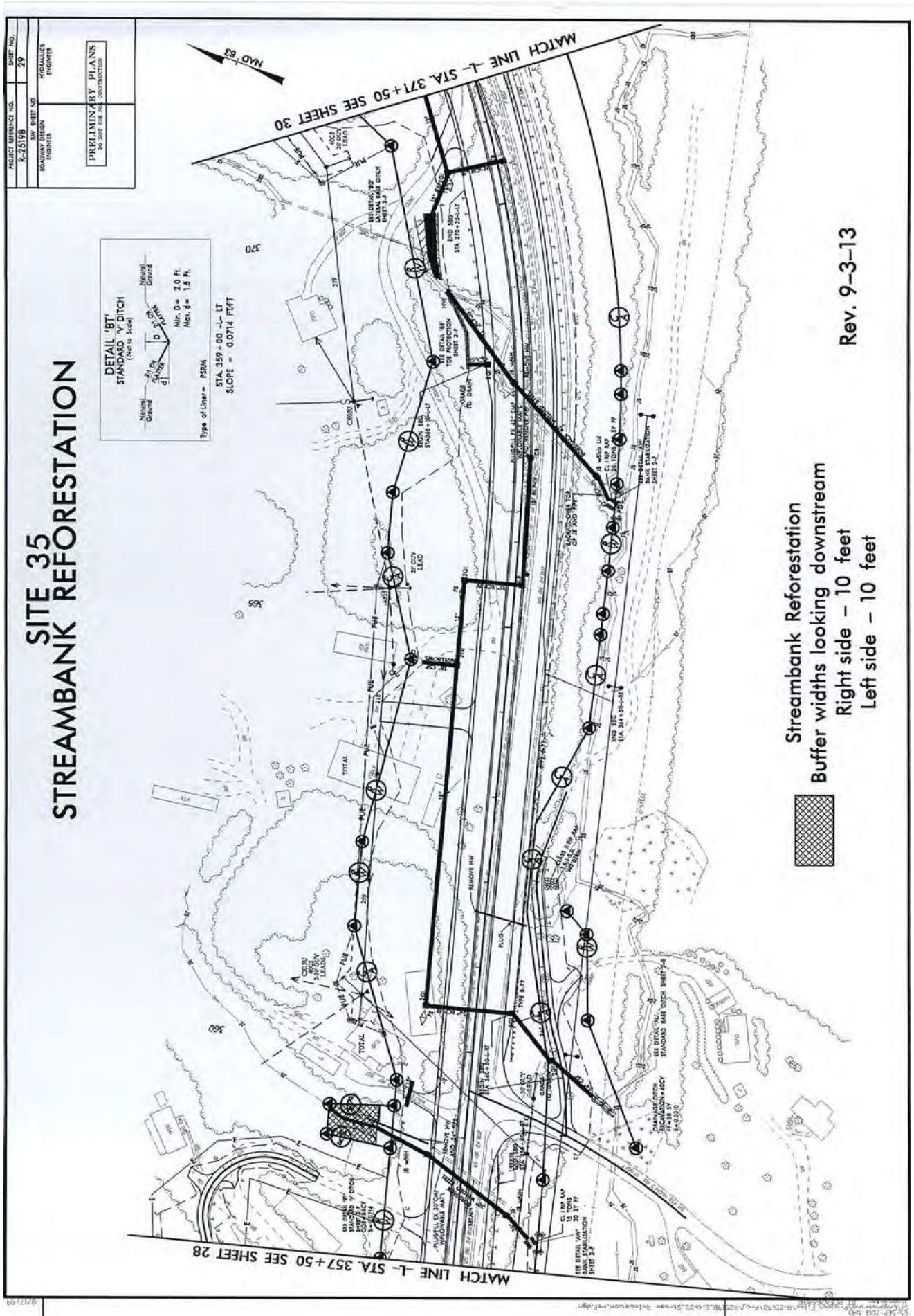
PI -UT TO BRUSHY CREEK- Sta 12+34.37
Δ = 78° 23' 23.4" (RT)
D = 56° 53' 52.5"
L = 137.71'
T = 82.1'
R = 100.7'

PI -UT TO BRUSHY CREEK- Sta 10+77.09
Δ = 22° 06' 20.9" (LT)
D = 14° 31' 07.6"
L = 152.26'
T = 77.09'
R = 394.63'

US UT TO BRUSHY CREEK CURVE DATA

PI-U/S UT TO BRUSHY CREEK-Sta 10+56.69
Δ = 66° 50' 16.2" (RT)
D = 107° 32' 58.5"
L = 62.15'
T = 35.15'
R = 53.27'


SITE 33
STREAMBANK REFORESTATION
Streambank Reforestation
Buffer widths looking downstream
Right side – 10 feet
Left side – 20 to 40 feet
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
PROJECT REFERENCE NO. R-2519B
SHEET NO. 28
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
NAD 83
MATCH LINE -L- STA. 357+50 SEE SHEET 29
MATCH LINE -L- STA. 343+50 SEE SHEET 27
DETAIL 'BE'
CHANNEL
Natural Ground
Min. D= 3.0 Ft.
B= 8.0 Ft.
b= 10.0 Ft.
c=5.0 Ft.
FROM STA. 346+35 TO STA. 348+35 -L- RT
SLOPE = 4.11%
Rev. 9-3-13


SITE 35
STREAMBANK REFORESTATION
PROJECT REFERENCE NO. R-2519B
SHEET NO. 29
RW SHEET NO
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
NOT FOR CONSTRUCTION
NAD 83
MATCH LINE -L- STA. 371+50 SEE SHEET 30
MATCH LINE -L- STA. 357+50 SEE SHEET 28
DETAIL 'BT'
STANDARD 'V' DITCH
(Not to Scale)
Natural Ground
3:1 or Flatter
Natural Ground
Min. D= 2.0 Ft.
Max. d= 1.5 Ft.
Type of Liner = PSRM
STA 359+00 -L- LT
SLOPE = 0.0714 FT/FT
Streambank Reforestation
Buffer widths looking downstream
Right side – 10 feet
Left side – 10 feet
Rev. 9-3-13
REVISIONS

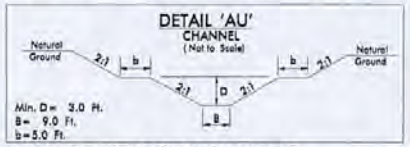
APPENDIX B.

SITE 5a STREAM RELOCATION
UTILITY IMPACTS TO MITIGATION SITE

PROJECT REFERENCE NO.	SHEET NO.
	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

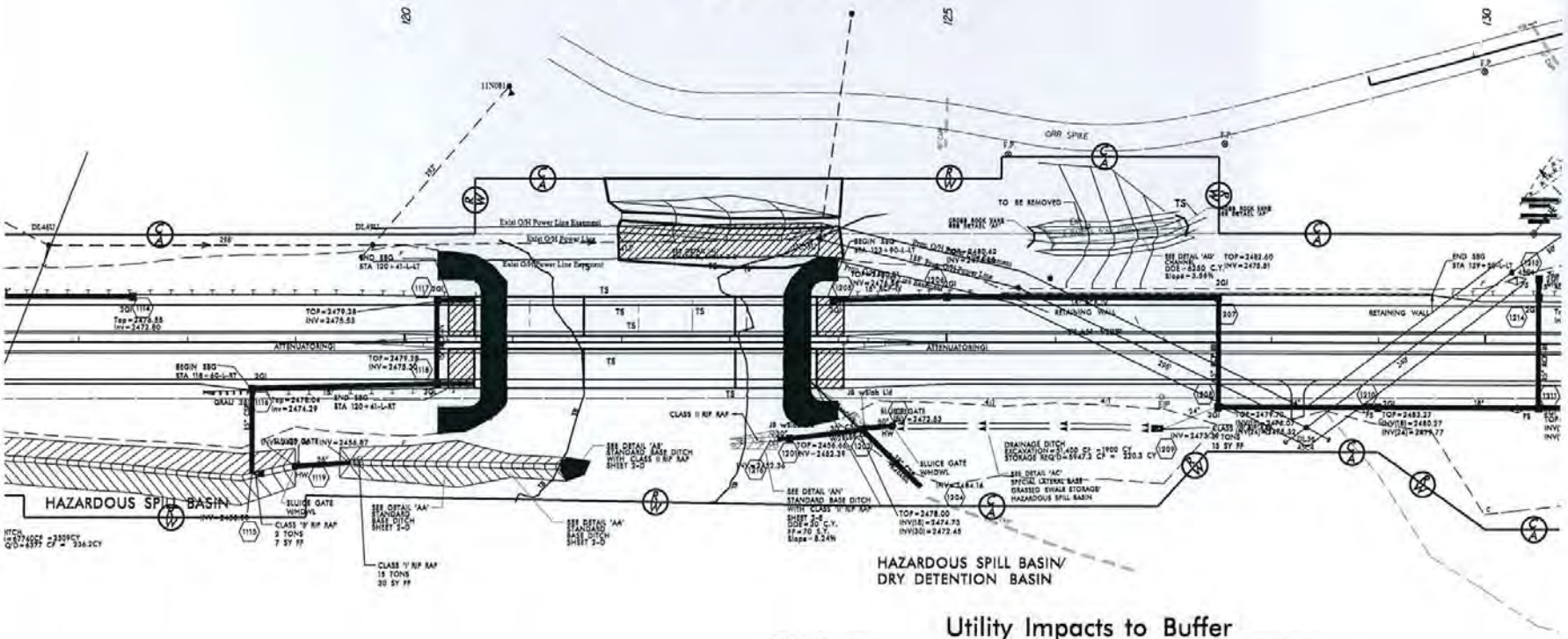
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DETAIL 'AU'
CHANNEL
(Not to Scale)



Min. D = 3.0 Ft.
B = 9.0 Ft.
b = 5.0 Ft.

FROM STA. 122+00 TO STA. 124+00 -L- LT



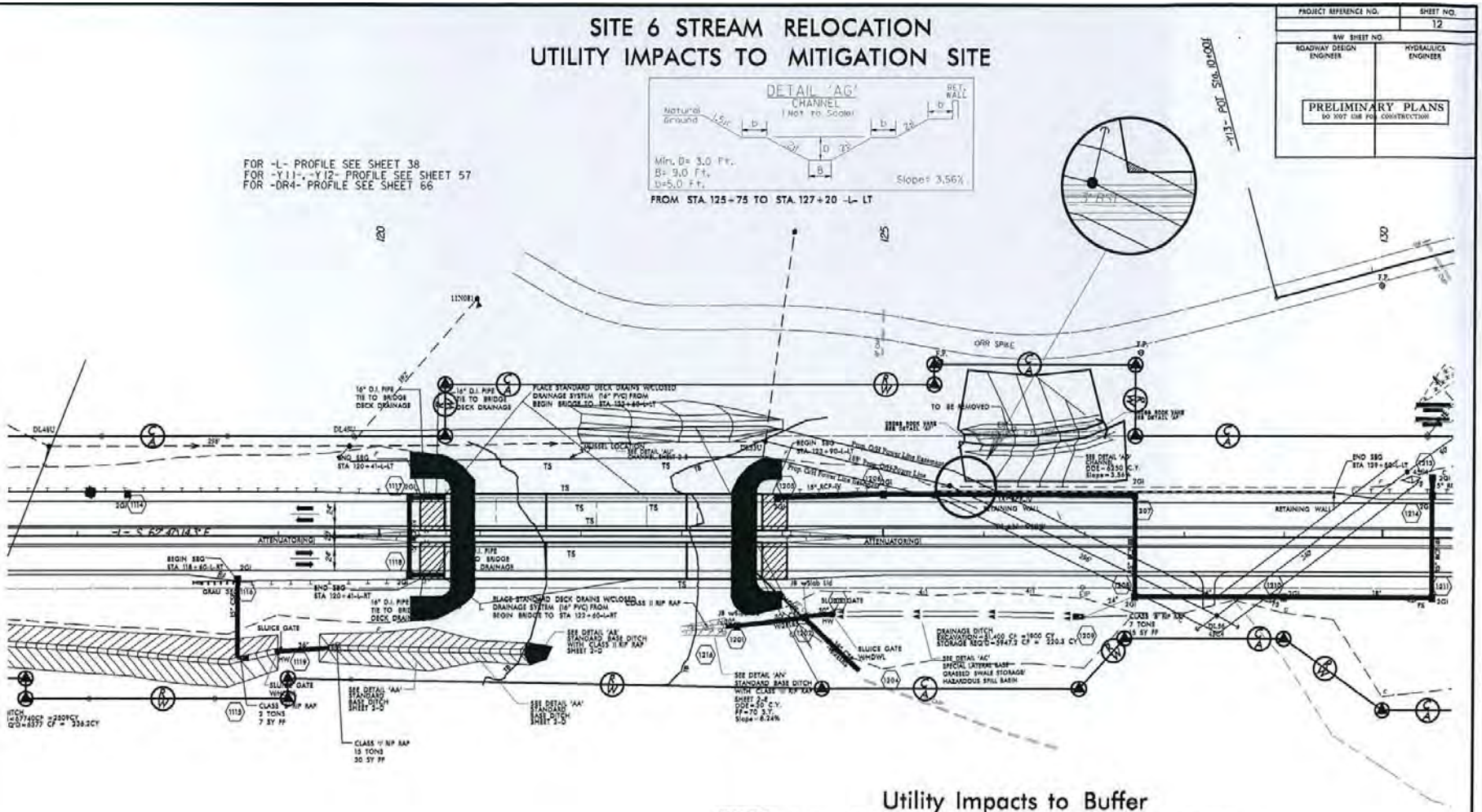
Utility Impacts to Buffer
20 feet from Top of Bank on Left Side
Impacted by Utility Easement for the entire
relocated length (148 feet)

Streambank Reforestation
Buffer widths looking downstream
Right side – 25 feet
Left side – 30 feet

50' 0' 50' 100' 150'
GRAPHIC SCALE

P-147

SITE 6 STREAM RELOCATION
UTILITY IMPACTS TO MITIGATION SITE



Utility Impacts to Buffer

Last 15 feet of stream has buffer widths between 25 to 30 feet on the left hand side

Remainder of buffer is 30 feet.

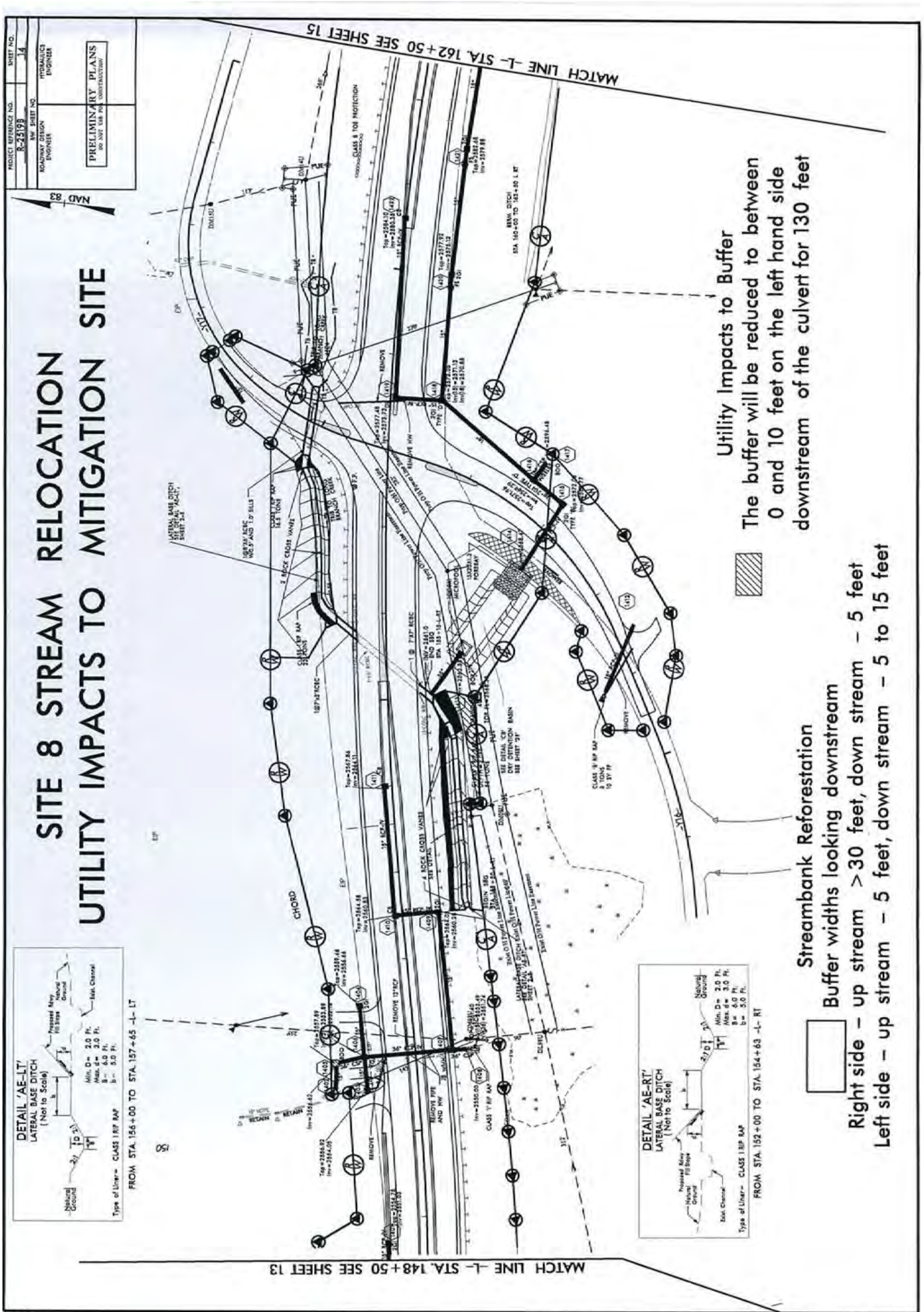
Streambank Reforestation

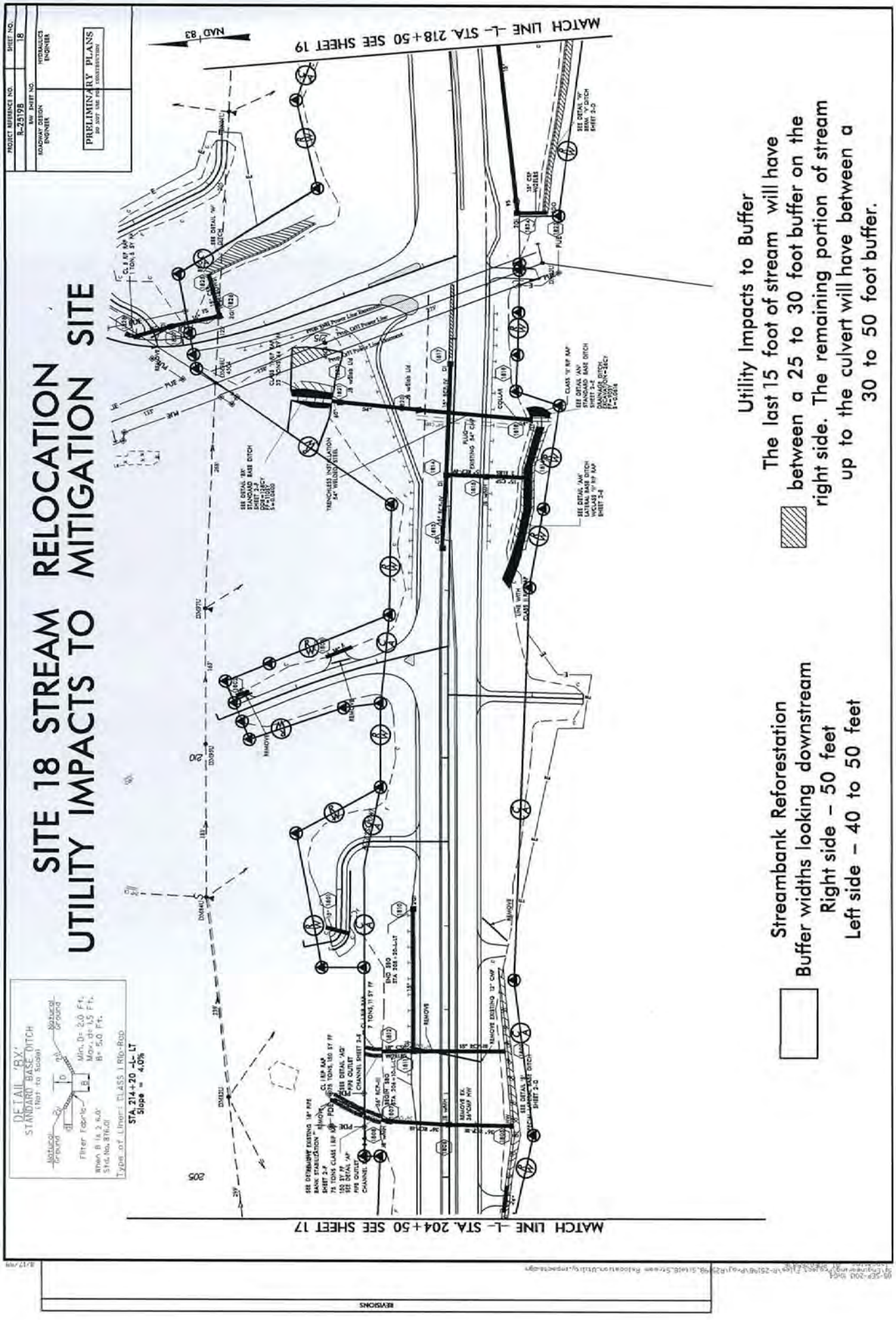
Buffer widths looking downstream

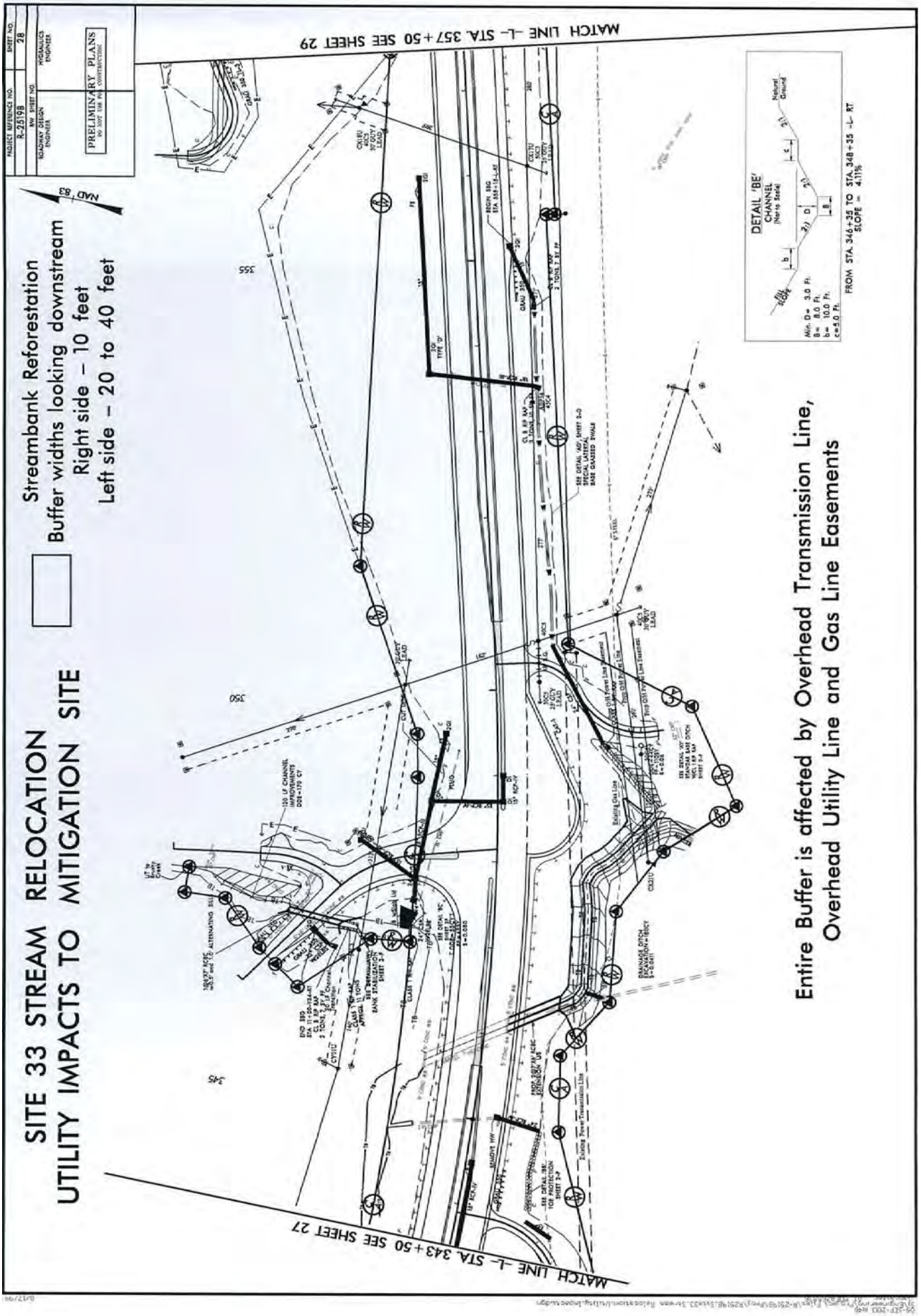
Right side – 50 feet

Left side – 30 feet

GRAPHIC SCALE


SITE 8 STREAM RELOCATION
UTILITY IMPACTS TO MITIGATION SITE
Utility Impacts to Buffer
The buffer will be reduced to between
0 and 10 feet on the left hand side
downstream of the culvert for 130 feet
Streambank Reforestation
Buffer widths looking downstream
Right side – up stream >30 feet, down stream – 5 feet
Left side – up stream – 5 feet, down stream – 5 to 15 feet
MATCH LINE -L- STA. 162+50 SEE SHEET 15
MATCH LINE -L- STA. 148+50 SEE SHEET 13
DETAIL 'AE-LT'
LATERAL BASE DITCH
(Not to Scale)
FROM STA. 156+00 TO STA. 157+65 -L- LT
DETAIL 'AE-RT'
LATERAL BASE DITCH
(Not to Scale)
FROM STA. 152+00 TO STA. 154+63 -L- RT
CHORD
PRELIMINARY PLANS
R-2519B
14
NAD 83


SITE 18 STREAM RELOCATION
UTILITY IMPACTS TO MITIGATION SITE
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
PROJECT REFERENCE NO. R-2519B
SHEET NO. 18
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
NAD 83
MATCH LINE -L- STA. 218+50 SEE SHEET 19
MATCH LINE -L- STA. 204+50 SEE SHEET 17
DETAIL 'RX'
STANDARD BASE DITCH
STA. 214+20 -L- LT
Slope = 4.0%
Type of Liner: CLASS I Rip-Rap
Utility Impacts to Buffer
The last 15 foot of stream will have between a 25 to 30 foot buffer on the right side. The remaining portion of stream up to the culvert will have between a 30 to 50 foot buffer.
Streambank Reforestation
Buffer widths looking downstream
Right side - 50 feet
Left side - 40 to 50 feet
REVISIONS


SITE 33 STREAM RELOCATION
UTILITY IMPACTS TO MITIGATION SITE
Streambank Reforestation
Buffer widths looking downstream
Right side – 10 feet
Left side – 20 to 40 feet
Entire Buffer is affected by Overhead Transmission Line,
Overhead Utility Line and Gas Line Easements
PRELIMINARY PLANS
DETAIL 'BE'
CHANNEL
MATCH LINE -L- STA. 343+50 SEE SHEET 27
MATCH LINE -L- STA. 357+50 SEE SHEET 29

CONTRACT: TIP PROJECT: R-2519B

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

YANCEY/MITCHELL COUNTIES

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2519B	1	

STATE PROJECT	F.A. PROJECT	DESCRIPTION
35609.1.1		PE
35609.2.2		RW, UTIL

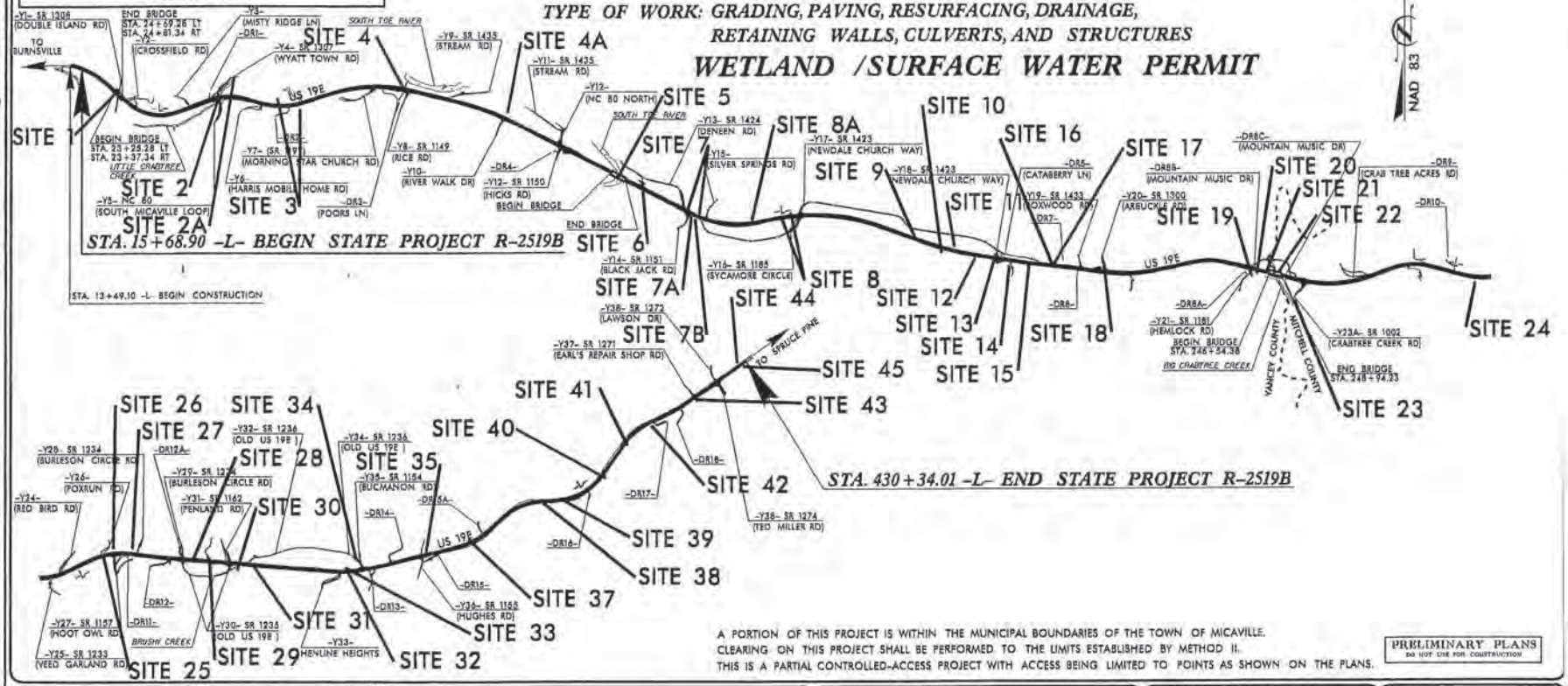
VICINITY MAP

LOCATION: US 19E FROM SR 1186 (OLD US 19) IN YANCEY COUNTY TO MULTI-LANE SECTION WEST OF SPRUCE PINE IN MITCHELL COUNTY

TYPE OF WORK: GRADING, PAVING, RESURFACING, DRAINAGE, RETAINING WALLS, CULVERTS, AND STRUCTURES

WETLAND /SURFACE WATER PERMIT

NAD 83



A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE TOWN OF MICAVILLE.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.
THIS IS A PARTIAL CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON THE PLANS.

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

DESIGN DATA

ADT 2014 = 13,277
ADT 2034 = 19,181
DHV = 11 %
D = 60 %
T = 7 % *
V = 60 MPH
* (TTST 3% + DUAL 4%)
FUNC. CLASS. = ARTERIAL
STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2519B	= 7.724 MI
LENGTH STRUCTURE TIP PROJECT R-2519B	= 0.129 MI
TOTAL LENGTH TIP PROJECT R-2519B	= 7.853 MI

Prepared in the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh, NC, 27610

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: JANUARY 27, 2012

LETTING DATE: FEBRUARY 18, 2014

G. E. BREW, PE
PROJECT ENGINEER

THAD F. DUNCAN, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

Permit Drawing
Sheet 1 of 114

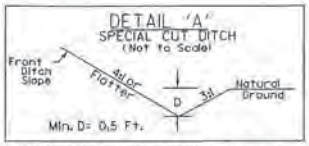
P-152

PROJECT REFERENCE NO.	SHEET NO.
R-2519B	2-D
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

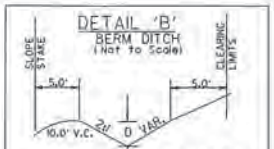
REVISIONS

DETAIL 'A'
SPECIAL CUT DITCH
(Not to Scale)



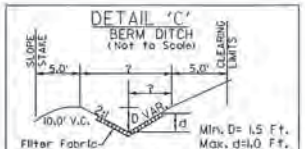
FROM STA. 19+00 TO STA. 21+00 -L- RT

DETAIL 'B'
BERM DITCH
(Not to Scale)



FROM STA. 18+00 TO STA. 18+50 -L- LT

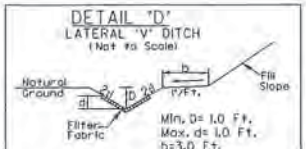
DETAIL 'C'
BERM DITCH
(Not to Scale)



Type of Liner= CLASS 'B' RIP RAP

FROM STA. 18+50 TO STA. 19+50 -L- LT

DETAIL 'D'
LATERAL 'V' DITCH
(Not to Scale)



Type of Liner= CLASS 'I' Rip-Rap

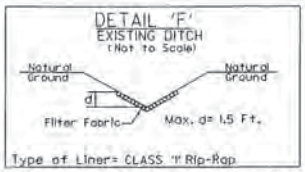
FROM STA. 21+50 TO STA. 23+25 -L- LT

DETAIL 'E'
TOE PROTECTION
(Not to Scale)

Type of Liner= CLASS I Rip-Rap

FROM STA. 22+10 TO STA. 22+70 -L- RT

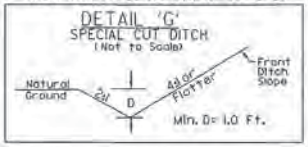
DETAIL 'F'
EXISTING DITCH
(Not to Scale)



Type of Liner= CLASS 'I' Rip-Rap

FROM STA. 22+70 TO STA. 23+80 -L- RT

DETAIL 'G'
SPECIAL CUT DITCH
(Not to Scale)



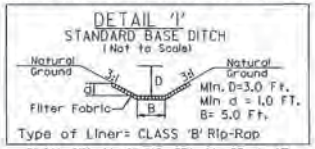
FROM STA. 71+20 TO STA. 71+60 -L- LT
FROM STA. 12+50 TO STA. 12+75 -Y38- RT
FROM STA. 13+70 TO STA. 14+30 -DR3- RT
FROM STA. 12+00 TO STA. 12+50 -Y31- LT

DETAIL 'H'
TOE PROTECTION
(Not to Scale)

Type of Liner= Class 'B' Rip-Rap

FROM STA. 52+80 TO STA. 53+50 -L- RT
FROM STA. 58+50 TO STA. 59+00 -L- RT
FROM STA. 91+50 TO STA. 92+00 -L- LT
FROM STA. 139+00 TO STA. 140+50 -L- RT
FROM STA. 276+00 TO STA. 276+50 -L- LT
FROM STA. 283+50 TO STA. 284+00 -L- LT
FROM STA. 282+00 TO STA. 284+50 -L- RT
FROM STA. 10+80 TO STA. 11+80 -Y23A- LT

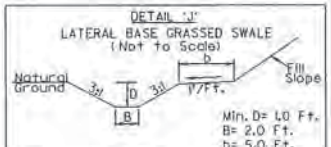
DETAIL 'I'
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS 'B' Rip-Rap

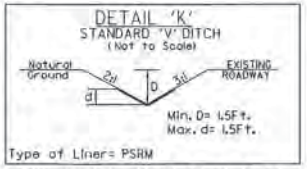
FROM STA. 46+10 TO STA. 46+50 -L- LT

DETAIL 'J'
LATERAL BASE GRASSED SWALE
(Not to Scale)



FROM STA. 46+50 TO STA. 49+50 -L- LT
FROM STA. 237+00 TO STA. 241+00 -L- RT

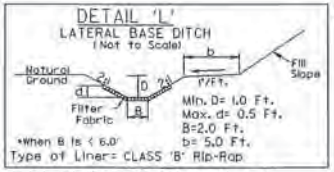
DETAIL 'K'
STANDARD 'V' DITCH
(Not to Scale)



Type of Liner= PSRM

FROM STA. 12+92 TO STA. 15+20 -Y1- LT

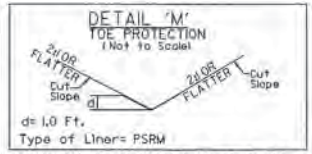
DETAIL 'L'
LATERAL BASE DITCH
(Not to Scale)



*When B is < 6.0'
Type of Liner= CLASS 'B' Rip-Rap

FROM STA. 49+50 TO STA. 50+50 -L- LT

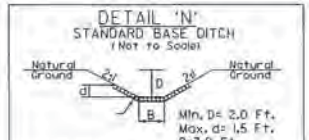
DETAIL 'M'
TOE PROTECTION
(Not to Scale)



Type of Liner= PSRM

FROM STA. 48+00 TO STA. 51+50 -L- RT

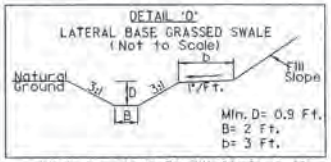
DETAIL 'N'
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= Class 'B' Rip-Rap

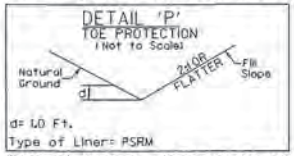
STA. 52+80 -L- LT

DETAIL 'O'
LATERAL BASE GRASSED SWALE
(Not to Scale)



FROM STA. 52+80 TO STA. 54+50 -L- LT

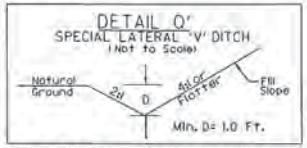
DETAIL 'P'
TOE PROTECTION
(Not to Scale)



Type of Liner= PSRM

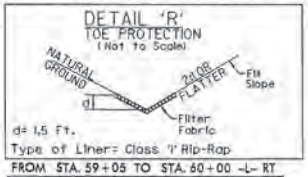
FROM STA. 10+50 TO STA. 13+00 -DR2- RT
FROM STA. 10+50 TO STA. 13+50 -DR2- LT

DETAIL 'Q'
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM STA. 224+00 TO STA. 225+50 -L- LT

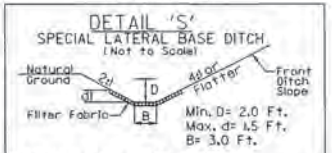
DETAIL 'R'
TOE PROTECTION
(Not to Scale)



Type of Liner= Class 'I' Rip-Rap

FROM STA. 59+05 TO STA. 60+00 -L- RT

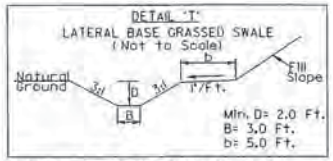
DETAIL 'S'
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS 'B' Rip-Rap

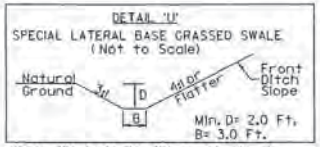
FROM STA. 43+00 TO STA. 43+50 -L- LT
FROM STA. 204+50 TO STA. 207+00 -L- RT

DETAIL 'T'
LATERAL BASE GRASSED SWALE
(Not to Scale)



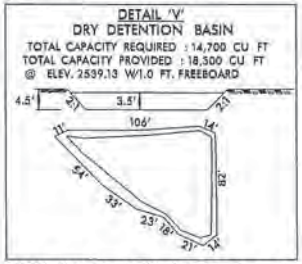
FROM STA. 13+00 TO STA. 13+72 -Y4- RT

DETAIL 'U'
SPECIAL LATERAL BASE GRASSED SWALE
(Not to Scale)



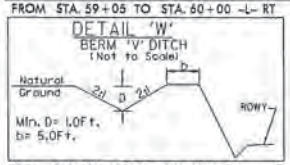
FROM STA. 9+85 TO STA. 13+00 -Y4- RT

DETAIL 'V'
DRY DETENTION BASIN
TOTAL CAPACITY REQUIRED : 14,700 CU FT
TOTAL CAPACITY PROVIDED : 18,300 CU FT
@ ELEV. 2539.13 W/1.0 FT. FREEBOARD



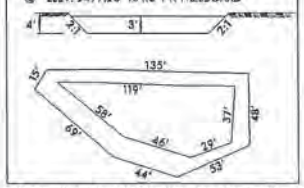
FROM STA. 250+75 TO STA. 252+01 -L- RT

DETAIL 'W'
BERM 'V' DITCH
(Not to Scale)



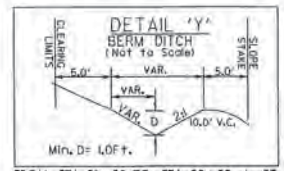
FROM STA. 194+50 TO STA. 195+80 -L- RT
FROM STA. 216+50 TO STA. 219+00 -L- RT
FROM STA. 227+50 TO STA. 232+50 -L- LT
FROM STA. 235+57 TO STA. 240+00 -L- LT
FROM STA. 296+50 TO STA. 298+00 -L- LT
FROM STA. 10+50 TO STA. 12+00 -Y20- LT
FROM STA. 258+00 TO STA. 259+00 -L- LT
FROM STA. 284+40 TO STA. 285+20 -L- LT

DETAIL 'X'
DRY DETENTION BASIN
TOTAL CAPACITY REQUIRED : 8792 CU FT
TOTAL CAPACITY PROVIDED : 11305 CU FT
@ ELEV. 2477.20 W/1.0 FT. FREEBOARD



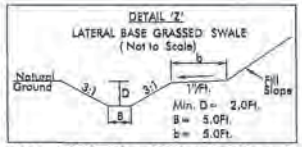
FROM STA. 83+00 TO STA. 84+50 -L- RT

DETAIL 'Y'
BERM DITCH
(Not to Scale)



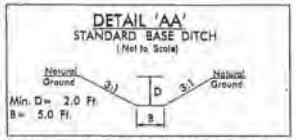
FROM STA. 91+50 TO STA. 95+00 -L- RT
FROM STA. 410+00 TO STA. 412+50 -L- LT
FROM STA. 11+50 TO STA. 12+00 -Y8- LT

DETAIL 'Z'
LATERAL BASE GRASSED SWALE
(Not to Scale)



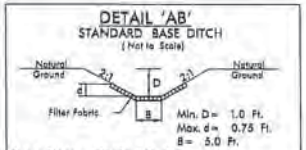
FROM STA 111+50-L- TO STA 119+00 -L- RT
FROM STA 319+62-L- TO STA 321+84 -L- LT

DETAIL 'AA'
STANDARD BASE DITCH
(Not to Scale)



FROM STA. 119+50 TO STA. 121+50 -L- RT

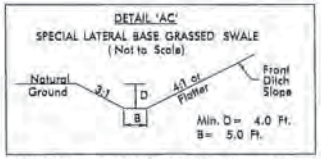
DETAIL 'AB'
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS II Rip-Rap

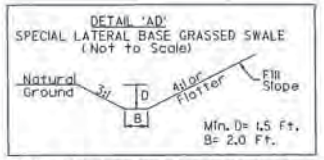
FROM STA. 121+50 TO STA. 121+75 -L- RT

DETAIL 'AC'
SPECIAL LATERAL BASE GRASSED SWALE
(Not to Scale)



FROM STA. 124+50 TO STA.127+00 -L- RT

DETAIL 'AD'
SPECIAL LATERAL BASE GRASSED SWALE
(Not to Scale)



FROM STA. 135+75 TO STA. 139+00 -L- LT
FROM STA. 350+50 TO STA. 354+50 -L- RT

P-153

Permit Drawing
Sheet 2 of 114

R-2519B | 2E

NW SHEET NO.

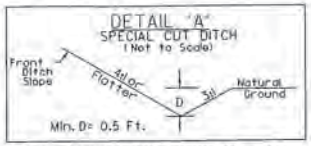
ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

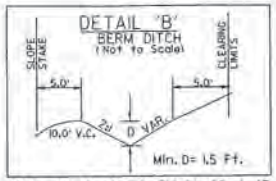
REVISIONS

DETAIL 'A'
SPECIAL CUT DITCH
(Not to Scale)



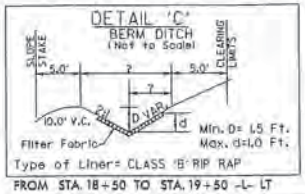
FROM STA. 19+00 TO STA. 21+00 -L- RT

DETAIL 'B'
BERM DITCH
(Not to Scale)



FROM STA. 18+00 TO STA. 18+50 -L- LT

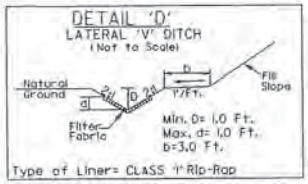
DETAIL 'C'
BERM DITCH
(Not to Scale)



Type of Liner= CLASS 'B' RIP RAP

FROM STA. 18+50 TO STA. 19+50 -L- LT

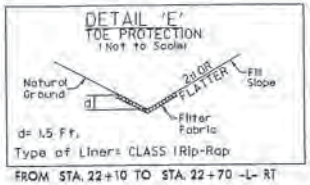
DETAIL 'D'
LATERAL 'V' DITCH
(Not to Scale)



Type of Liner= CLASS 'I' Rip-Rap

FROM STA. 21+50 TO STA. 23+25 -L- LT

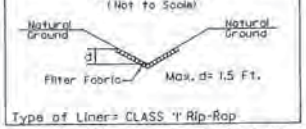
DETAIL 'E'
TOE PROTECTION
(Not to Scale)



Type of Liner= CLASS I Rip-Rap

FROM STA. 22+10 TO STA. 22+70 -L- RT

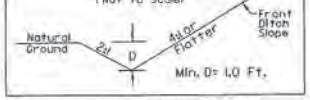
DETAIL 'F'
EXISTING DITCH
(Not to Scale)



Type of Liner= CLASS 'I' Rip-Rap

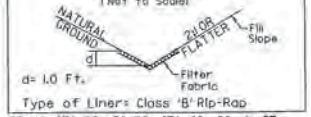
FROM STA. 22+70 TO STA. 23+80 -L- RT

DETAIL 'G'
SPECIAL CUT DITCH
(Not to Scale)



FROM STA. 57+50 TO STA. 59+00 -L- RT
FROM STA. 71+00 TO STA. 71+50 -L- LT
FROM STA. 12+50 TO STA. 12+75 -Y38- RT
FROM STA. 13+70 TO STA. 14+30 -DR3- RT
STA 12+00 -Y31- LT

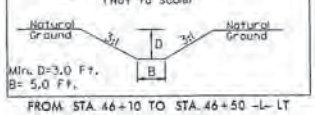
DETAIL 'H'
TOE PROTECTION
(Not to Scale)



Type of Liner= Class 'B' Rip-Rap

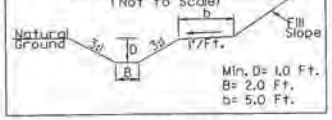
FROM STA. 32+50 TO STA. 32+80 -L- RT
FROM STA. 52+80 TO STA. 53+50 -L- RT
FROM STA. 84+65 TO STA. 85+00 -L- RT
FROM STA. 91+50 TO STA. 92+00 -L- LT
FROM STA. 276+00 TO STA. 276+50 -L- LT
FROM STA. 283+50 TO STA. 284+00 -L- LT
FROM STA. 282+00 TO STA. 284+50 -L- RT
FROM STA. 10+80 TO STA. 11+80 -Y23A- LT

DETAIL 'I'
STANDARD BASE DITCH
(Not to Scale)



FROM STA. 46+10 TO STA. 46+50 -L- LT

DETAIL 'J'
LATERAL BASE GRASSED SWALE
(Not to Scale)



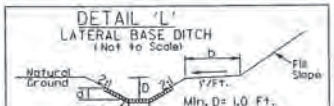
FROM STA. 46+50 TO STA. 49+50 -L- LT
FROM STA. 237+00 TO STA. 241+00 -L- RT

DETAIL 'K'
STANDARD 'V' DITCH
(Not to Scale)

Type of Liner= PSRM

FROM STA. 12+92 TO STA. 15+20 -Y1- LT

DETAIL 'L'
LATERAL BASE DITCH
(Not to Scale)



*When B is < 6.0'
Type of Liner= CLASS 'B' Rip-Rap

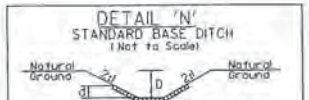
FROM STA. 49+50 TO STA. 50+50 -L- LT

DETAIL 'M'
TOE PROTECTION
(Not to Scale)

Type of Liner= PSRM

FROM STA. 48+00 TO STA. 51+50 -L- RT

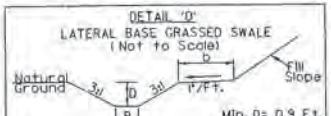
DETAIL 'N'
STANDARD BASE DITCH
(Not to Scale)



*When B is < 6.0'
Type of Liner= Class 'B' Rip-Rap

STA. 52+80 -L- LT

DETAIL 'O'
LATERAL BASE GRASSED SWALE
(Not to Scale)



FROM STA. 52+80 TO STA. 54+50 -L- LT

DETAIL 'P'
TOE PROTECTION
(Not to Scale)

Type of Liner= PSRM

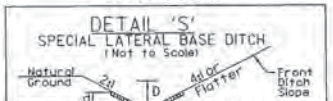
FROM STA. 10+50 TO STA. 13+00 -DR2- RT
FROM STA. 10+50 TO STA. 13+50 -DR2- LT

DETAIL 'R'
TOE PROTECTION
(Not to Scale)

Type of Liner= Class 'I' Rip-Rap

FROM STA. 59+00 TO STA. 60+00 -L- RT

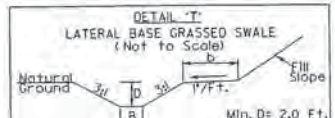
DETAIL 'S'
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS 'B' Rip-Rap

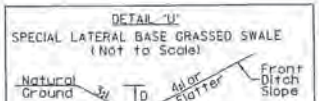
FROM STA. 43+00 TO STA. 43+50 -L- LT
FROM STA. 204+50 TO STA. 207+00 -L- RT

DETAIL 'T'
LATERAL BASE GRASSED SWALE
(Not to Scale)



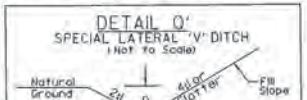
FROM STA. 13+00 TO STA. 13+72 -Y4- RT

DETAIL 'U'
SPECIAL LATERAL BASE GRASSED SWALE
(Not to Scale)



FROM STA. 9+85 TO STA. 13+00 -Y4- RT

DETAIL 'O'
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



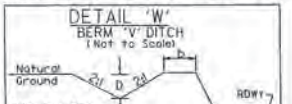
FROM STA. 224+00 TO STA. 225+50 -L- LT

DETAIL 'V'
TOE PROTECTION
(Not to Scale)

Type of Liner= CLASS 'I' Rip-Rap

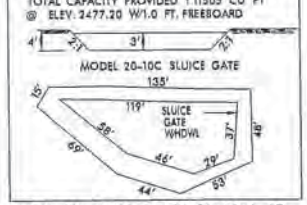
FROM STA. 71+50 TO STA. 72+60 -L- LT

DETAIL 'W'
BERM 'V' DITCH
(Not to Scale)



FROM STA. 194+50 TO STA. 195+80 -L- RT
FROM STA. 216+50 TO STA. 219+00 -L- RT
FROM STA. 227+50 TO STA. 232+50 -L- LT
FROM STA. 235+57 TO STA. 240+00 -L- LT
FROM STA. 296+50 TO STA. 298+00 -L- LT
FROM STA. 10+50 TO STA. 12+00 -Y20- LT

DETAIL 'X'
HAZARDOUS SPILLBASIN
TOTAL CAPACITY REQUIRED : 8793 CU FT
TOTAL CAPACITY PROVIDED : 11505 CU FT
@ ELEV. 2477.20 W/1.0 FT. FREEBOARD

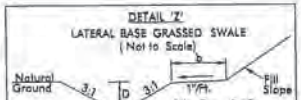


FROM STA. 83+00 TO STA. 84+50 -L- RT

DETAIL 'Y'
BERM DITCH
(Not to Scale)

FROM STA. 91+50 TO STA. 96+50 -L- RT
FROM STA. 410+00 TO STA. 412+50 -L- LT
FROM STA. 11+50 TO STA. 12+00 -Y8- LT

DETAIL 'Z'
LATERAL BASE GRASSED SWALE
(Not to Scale)

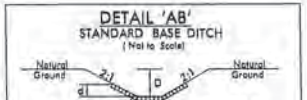


FROM STA 111+50-L- TO STA 119+00 -L- RT
FROM STA 319+80-L- TO STA 321+80 -L- LT

DETAIL 'AA'
STANDARD BASE DITCH
(Not to Scale)

FROM STA. 119+50 TO STA. 121+50 -L- RT

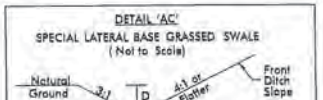
DETAIL 'AB'
STANDARD BASE DITCH
(Not to Scale)



*When B is < 6.0'
Type of Liner= CLASS II Rip-Rap

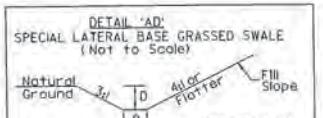
FROM STA. 121+50 TO STA. 121+75 -L- RT

DETAIL 'AC'
SPECIAL LATERAL BASE GRASSED SWALE
(Not to Scale)



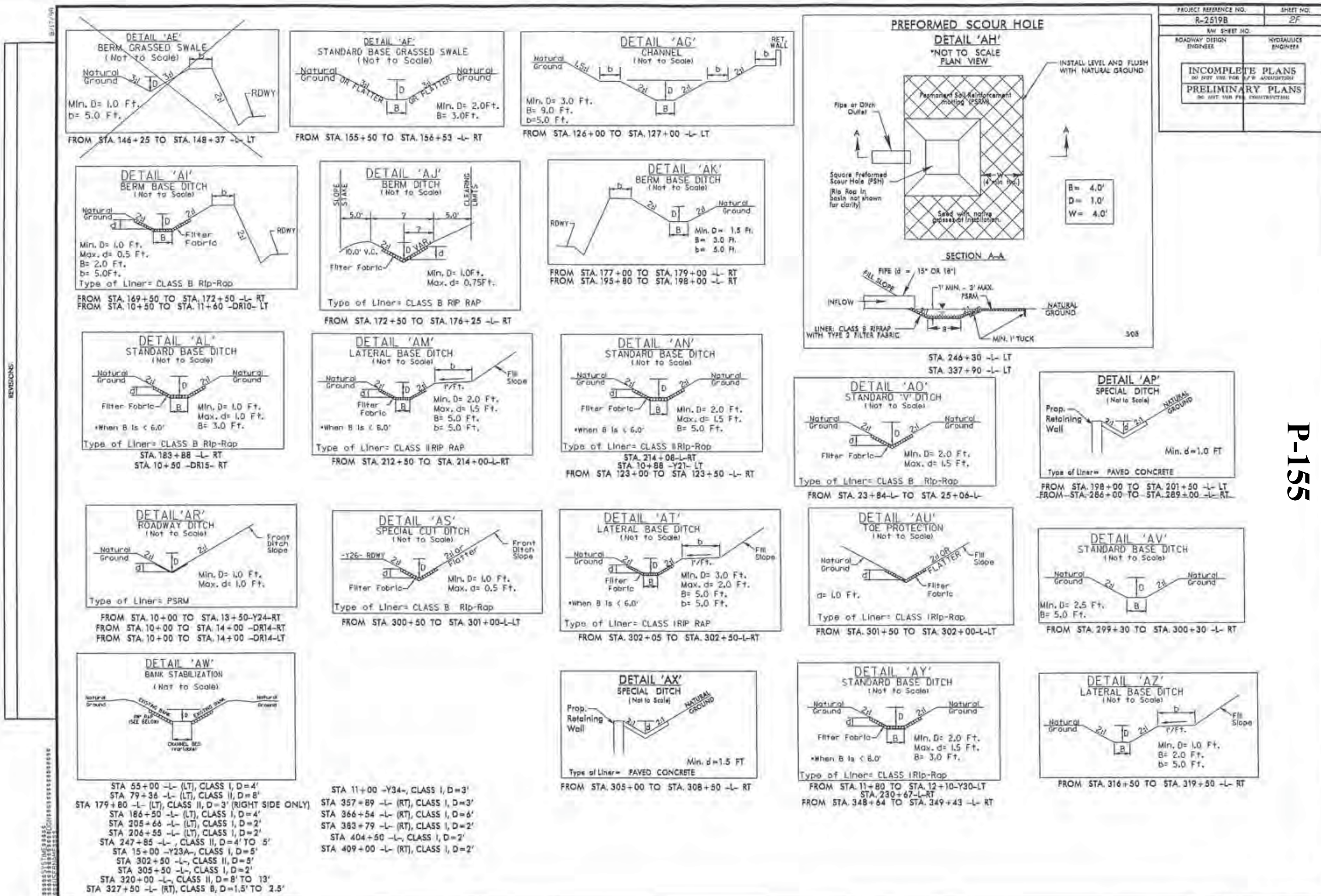
FROM STA. 124+50 TO STA.127+00 -L- RT

DETAIL 'AD'
SPECIAL LATERAL BASE GRASSED SWALE
(Not to Scale)



FROM STA. 135+75 TO STA. 139+00 -L- LT
FROM STA. 350+50 TO STA. 354+50 -L- RT

Permit Drawing
Sheet 3 of 114


PROJECT REFERENCE NO. R-2519B
SHEET NO. 2F
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
PRELIMINARY PLANS
DETAIL 'AE' BERM GRASSED SWALE (Not to Scale)
Min. D= 1.0 Ft. b= 5.0 Ft.
FROM STA. 146+25 TO STA. 148+37 -L- LT
DETAIL 'AF' STANDARD BASE GRASSED SWALE (Not to Scale)
Min. D= 2.0Ft. B= 3.0Ft.
FROM STA. 155+50 TO STA. 156+53 -L- RT
DETAIL 'AG' CHANNEL (Not to Scale)
Min. D= 3.0 Ft. B= 9.0 Ft. b=5.0 Ft.
FROM STA. 126+00 TO STA. 127+00 -L- LT
PREFORMED SCOUR HOLE
DETAIL 'AH'
*NOT TO SCALE PLAN VIEW
INSTALL LEVEL AND FLUSH WITH NATURAL GROUND
B= 4.0' D= 1.0' W= 4.0'
SECTION A-A
LINER: CLASS B RIPRAP WITH TYPE 2 FILTER FABRIC
STA. 246+30 -L- LT
STA. 337+90 -L- LT
DETAIL 'AI' BERM BASE DITCH (Not to Scale)
Min. D= 1.0 Ft. Max. d= 0.5 Ft. B= 2.0 Ft. b= 5.0Ft.
Type of Liner= CLASS B Rip-Rap
FROM STA. 169+50 TO STA. 172+50 -L- RT
FROM STA. 10+50 TO STA. 11+60 -DR10- LT
DETAIL 'AJ' BERM DITCH (Not to Scale)
Min. D= 1.0Ft. Max. d= 0.75Ft.
Type of Liner= CLASS B RIP RAP
FROM STA. 172+50 TO STA. 176+25 -L- RT
DETAIL 'AK' BERM BASE DITCH (Not to Scale)
Min. D= 1.5 Ft. B= 3.0 Ft. b= 5.0 Ft.
FROM STA. 177+00 TO STA. 179+00 -L- RT
FROM STA. 195+80 TO STA. 198+00 -L- RT
DETAIL 'AL' STANDARD BASE DITCH (Not to Scale)
Min. D= 1.0 Ft. Max. d= 1.0 Ft. B= 3.0 Ft.
*When B is < 6.0'
Type of Liner= CLASS B Rip-Rap
STA. 183+88 -L- RT
STA. 10+50 -DR15- RT
DETAIL 'AM' LATERAL BASE DITCH (Not to Scale)
Min. D= 2.0 Ft. Max. d= 1.5 Ft. B= 5.0 Ft. b= 5.0 Ft.
Type of Liner= CLASS II RIP RAP
FROM STA. 212+50 TO STA. 214+00-L-RT
DETAIL 'AN' STANDARD BASE DITCH (Not to Scale)
Min. D= 2.0 Ft. Max. d= 1.5 Ft. B= 5.0 Ft.
Type of Liner= CLASS II Rip-Rap
STA. 214+08-L-RT
STA. 10+88 -Y21- LT
FROM STA 123+00 TO STA 123+50 -L- RT
DETAIL 'AO' STANDARD 'V' DITCH (Not to Scale)
Min. D= 2.0 Ft. Max. d= 1.5 Ft.
Type of Liner= CLASS B Rip-Rap
FROM STA. 23+84-L- TO STA. 25+06-L-
DETAIL 'AP' SPECIAL DITCH (Not to Scale)
Min. d=1.0 FT
Type of Liner= PAVED CONCRETE
FROM STA. 198+00 TO STA. 201+50 -L- LT
FROM STA. 286+00 TO STA. 289+00 -L- RT
DETAIL 'AR' ROADWAY DITCH (Not to Scale)
Min. D= 1.0 Ft. Max. d= 1.0 Ft.
Type of Liner= PSRM
FROM STA. 10+00 TO STA. 13+50-Y24-RT
FROM STA. 10+00 TO STA. 14+00 -DR14-RT
FROM STA. 10+00 TO STA. 14+00 -DR14-LT
DETAIL 'AS' SPECIAL CUT DITCH (Not to Scale)
Min. D= 1.0 Ft. Max. d= 0.5 Ft.
Type of Liner= CLASS B Rip-Rap
FROM STA. 300+50 TO STA. 301+00-L-LT
DETAIL 'AT' LATERAL BASE DITCH (Not to Scale)
Min. D= 3.0 Ft. Max. d= 2.0 Ft. B= 5.0 Ft. b= 5.0 Ft.
Type of Liner= CLASS I RIP RAP
FROM STA. 302+05 TO STA. 302+50-L-RT
DETAIL 'AU' TOE PROTECTION (Not to Scale)
d= 1.0 Ft.
Type of Liner= CLASS I Rip-Rap
FROM STA. 301+50 TO STA. 302+00-L-LT
DETAIL 'AV' STANDARD BASE DITCH (Not to Scale)
Min. D= 2.5 Ft. B= 5.0 Ft.
FROM STA. 299+30 TO STA. 300+30 -L- RT
DETAIL 'AW' BANK STABILIZATION (Not to Scale)
STA 55+00 -L- (LT), CLASS I, D=4'
STA 79+36 -L- (LT), CLASS II, D=8'
STA 179+80 -L- (LT), CLASS II, D=3' (RIGHT SIDE ONLY)
STA 186+50 -L- (LT), CLASS I, D=4'
STA 205+66 -L- (LT), CLASS I, D=2'
STA 206+55 -L- (LT), CLASS I, D=2'
STA 247+85 -L-, CLASS II, D=4' TO 5'
STA 15+00 -Y23A-, CLASS I, D=5'
STA 302+50 -L-, CLASS II, D=5'
STA 305+50 -L-, CLASS I, D=2'
STA 320+00 -L-, CLASS II, D=8' TO 13'
STA 327+50 -L- (RT), CLASS B, D=1.5' TO 2.5'
STA 11+00 -Y34-, CLASS I, D=3'
STA 357+89 -L- (RT), CLASS I, D=3'
STA 366+54 -L- (RT), CLASS I, D=6'
STA 383+79 -L- (RT), CLASS I, D=2'
STA 404+50 -L-, CLASS I, D=2'
STA 409+00 -L- (RT), CLASS I, D=2'
DETAIL 'AX' SPECIAL DITCH (Not to Scale)
Min. d=1.5 FT
Type of Liner= PAVED CONCRETE
FROM STA. 305+00 TO STA. 308+50 -L- RT
DETAIL 'AY' STANDARD BASE DITCH (Not to Scale)
Min. D= 2.0 Ft. Max. d= 1.5 Ft. B= 3.0 Ft.
Type of Liner= CLASS I Rip-Rap
FROM STA. 11+80 TO STA. 12+10-Y30-LT
STA. 230+67-L-RT
FROM STA. 348+64 TO STA. 349+43 -L- RT
DETAIL 'AZ' LATERAL BASE DITCH (Not to Scale)
Min. D= 1.0 Ft. B= 2.0 Ft. b= 5.0 Ft.
FROM STA. 316+50 TO STA. 319+50 -L- RT
REVISIONS

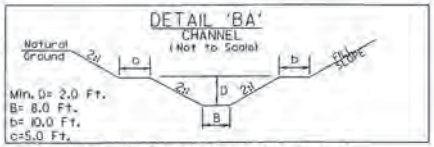
PROJECT REFERENCE NO.	SHEET NO.
R-2519B	2G
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

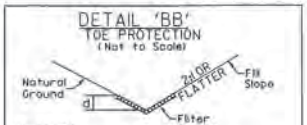
DETAIL 'BA'
CHANNEL
(Not to Scale)



Min. D= 2.0 Ft.
B= 8.0 Ft.
b= 10.0 Ft.
c=5.0 Ft.

FROM STA. 346+39 TO STA. 348+40 -L- RT

DETAIL 'BB'
TOE PROTECTION
(Not to Scale)

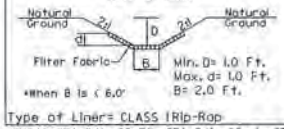


d= 1.0 Ft.

Type of Liner= CLASS B Rip-Rap

FROM STA. 344+00 TO STA. 345+00 -L- RT
FROM STA. 368+10 TO STA. 369+00 -L- LT
FROM STA. 409+00 TO STA. 410+88 -L- RT
FROM STA. 413+76 TO STA. 414+87 -L- RT

DETAIL 'BC'
STANDARD BASE DITCH
(Not to Scale)



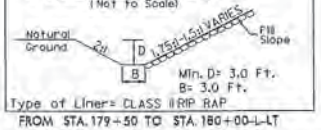
Min. D= 1.0 Ft.
Max. d= 1.0 Ft.
B= 2.0 Ft.

*When B is < 6.0'

Type of Liner= CLASS I Rip-Rap

FROM STA. 241+00 TO STA. 241+80 -L- RT
FROM STA. 347+16 TO STA. 347+39 -L- LT

DETAIL 'BD'
SPECIAL LATERAL BASE DITCH
(Not to Scale)

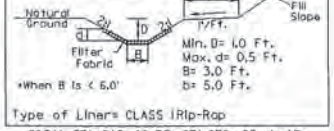


Min. D= 3.0 Ft.
B= 3.0 Ft.

Type of Liner= CLASS II RIP RAP

FROM STA. 179+50 TO STA. 180+00-L-LT

DETAIL 'BG'
LATERAL BASE DITCH
(Not to Scale)



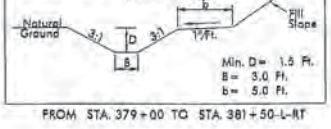
Min. D= 1.0 Ft.
Max. d= 0.5 Ft.
B= 3.0 Ft.
b= 5.0 Ft.

*When B is < 6.0'

Type of Liner= CLASS I Rip-Rap

FROM STA. 369+10 TO STA. 370+00 -L- LT

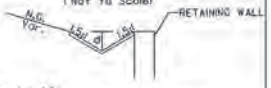
DETAIL 'BH'
LATERAL BASE GRASSED SWALE
(Not to Scale)



Min. D= 1.5 Ft.
B= 3.0 Ft.
b= 5.0 Ft.

FROM STA. 379+00 TO STA. 381+50-L-RT

DETAIL 'BJ'
SPECIAL DITCH
(Not to Scale)

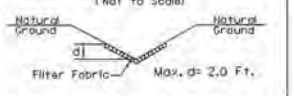


Min. d = 1.0'

Type of Liner= PAVED CONCRETE

FROM STA. 398+50 TO STA. 402+50 -L- LT

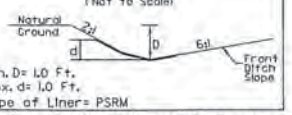
DETAIL 'BK'
EXISTING DITCH
(Not to Scale)



Type of Liner= CLASS B Rip-Rap

STA. 388+40-L-RT

DETAIL 'BL'
ROADWAY DITCH
(Not to Scale)

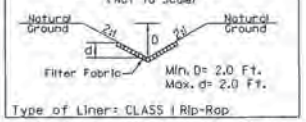


Min. D= 1.0 Ft.
Max. d= 1.0 Ft.

Type of Liner= PSRM

FROM STA. 410+00 TO STA. 418+24-L-LT
FROM STA 420+10 TO STA 424+00-L-LT
FROM STA 425+50 TO STA 427+90-L-RT

DETAIL 'BM'
STANDARD 'V' DITCH
(Not to Scale)

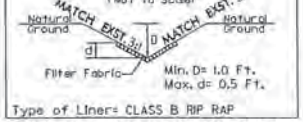


Min. D= 2.0 Ft.
Max. d= 2.0 Ft.

Type of Liner= CLASS I Rip-Rap

FROM STA. 281+50 TO STA. 282+00-L-RT

DETAIL 'BN'
STANDARD 'V' DITCH
(Not to Scale)

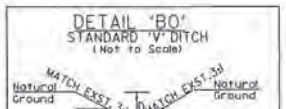


Min. D= 1.0 Ft.
Max. d= 0.5 Ft.

Type of Liner= CLASS B RIP RAP

FROM STA. 427+75 TO STA. 428+74-L-LT
FROM STA. 427+90 TO STA. 429+05-L-LT

DETAIL 'BO'
STANDARD 'V' DITCH
(Not to Scale)

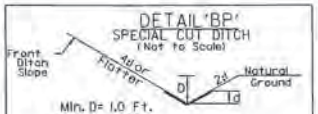


Min. D= 1.0 Ft.
Max. d= 1.0 Ft.

Type of liner: PSRM

FROM STA. 429+10 TO STA. 430+30-L-LT

DETAIL 'BP'
SPECIAL CUT DITCH
(Not to Scale)

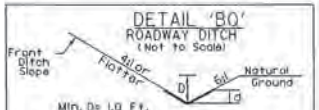


Min. D= 1.0 Ft.
Max d= 1.0Ft.

Type of Liner= PSRM

FROM STA. 423+00 TO STA. 424+00-L-RT
FROM STA. 15+00 TO STA. 15+60-Y38-RT

DETAIL 'BQ'
ROADWAY DITCH
(Not to Scale)

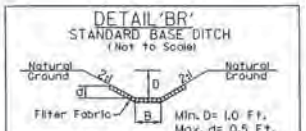


Min. D= 1.0 Ft.
Max. d= 1.0 Ft.

Type of Liner= PSRM

FROM STA. 14+25 TO STA.15+00-Y38-RT

DETAIL 'BR'
STANDARD BASE DITCH
(Not to Scale)



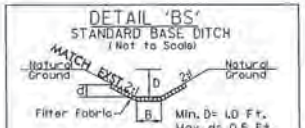
Min. D= 1.0 Ft.
Max. d= 0.5 Ft.
B= 3.0 Ft.

*When B is < 6.0'

Type of Liner= CLASS I RIP RAP

FROM STA. 427+90 TO STA. 429+60-L-RT

DETAIL 'BS'
STANDARD BASE DITCH
(Not to Scale)



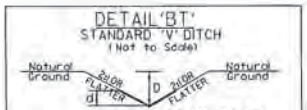
Min. D= 1.0 Ft.
Max. d= 0.5 Ft.
B= 5.0 Ft.

*When B is < 6.0'

Type of Liner= CLASS I RIP RAP

FROM STA. 429+60 TO STA. 431+30 -L- RT

DETAIL 'BT'
STANDARD 'V' DITCH
(Not to Scale)

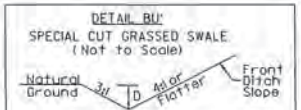


Min. D= 2.0 Ft.
Max. d= 1.5 Ft.

Type of Liner= PSRM

STA. 359+00-L-LT

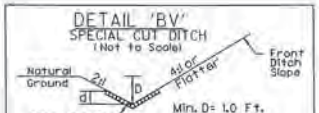
DETAIL 'BU'
SPECIAL CUT GRASSED SWALE
(Not to Scale)



Min. D= 1.0 Ft.

FROM STA. 331+50 TO STA. 332+50-L-LT

DETAIL 'BV'
SPECIAL CUT DITCH
(Not to Scale)

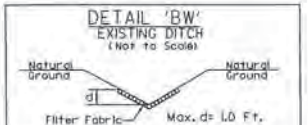


Min. D= 1.0 Ft.
Max. d= 0.5Ft.

Type of Liner= CLASS B Rip-Rap

FROM STA. 330+78 TO STA. 331+50-L-LT

DETAIL 'BW'
EXISTING DITCH
(Not to Scale)

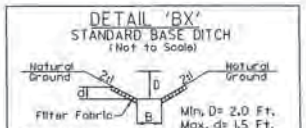


Max. d= 1.0 Ft.

Type of Liner= CLASS B Rip-Rap

FROM STA. 330+50 TO STA. 330+78-L-LT
FROM STA. 222+75 TO STA. 223+00-L-RT

DETAIL 'BX'
STANDARD BASE DITCH
(Not to Scale)



Min. D= 2.0 Ft.
Max. d= 1.5 Ft.
B= 5.0 Ft.

When B is > 6.0'
Std. No. 876.01

Type of Liner= CLASS I Rip-Rap

STA. 214+20 -L- LT

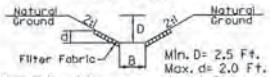
P-156

Permit Drawing
Sheet 5 of 114

8/17/09

REVISIONS

DETAIL 'BY'
STANDARD BASE DITCH
(Not to Scale)



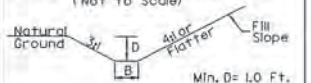
Min. D= 2.5 Ft.
Max. d= 2.0 Ft.
B= 6.0 Ft.

When B is > 6.0'
Std. No. 876.01

Type of Liner= CLASS I Rip-Rap

FROM STA. 9+58 -Y4- LT

DETAIL 'BZ'
SPECIAL LATERAL BASE GRASSED SWALE
(Not to Scale)



Min. D= 1.0 Ft.
B= 2.0 Ft.

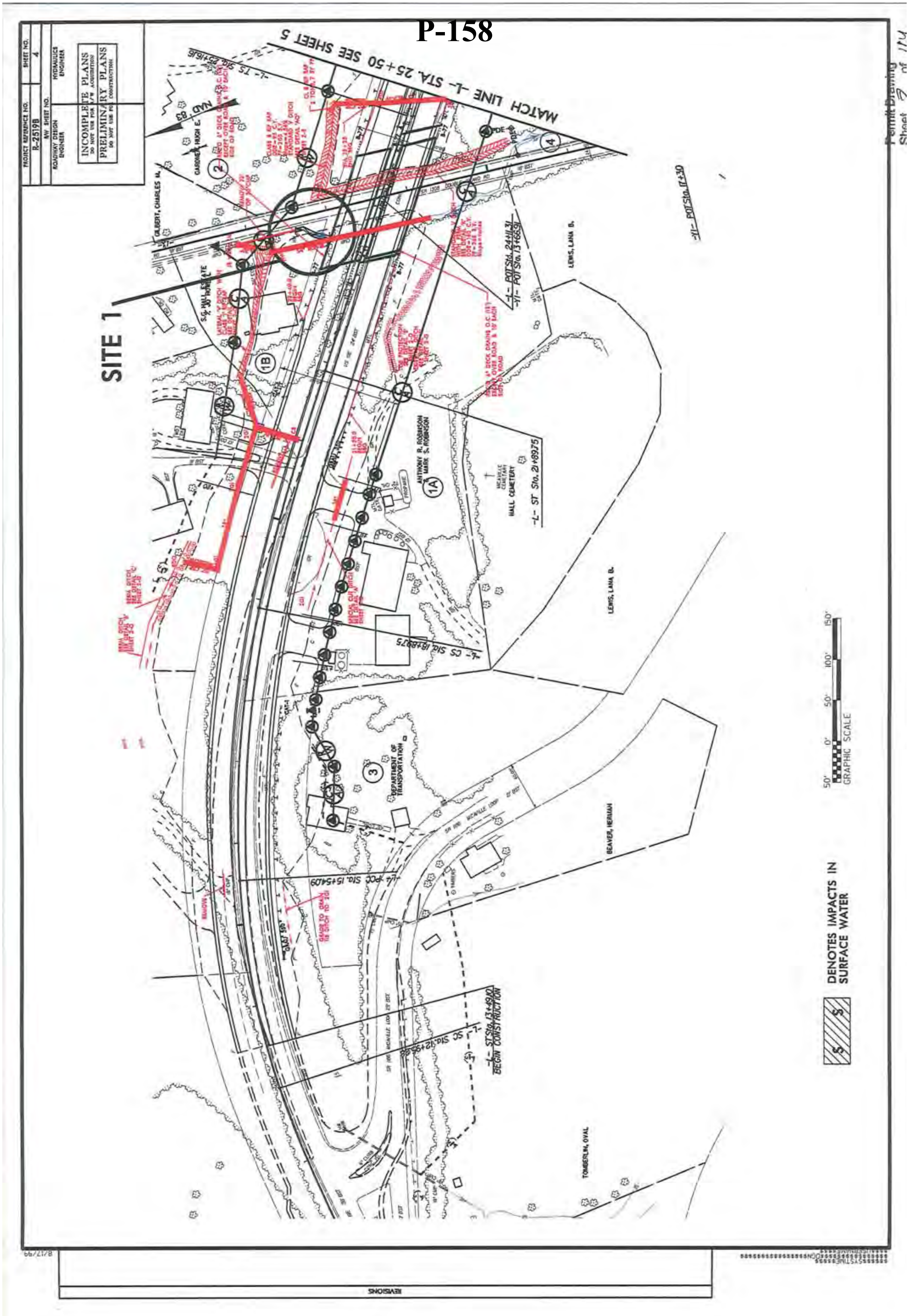
FROM STA. 239+00 TO STA. 241+00 -L- RT

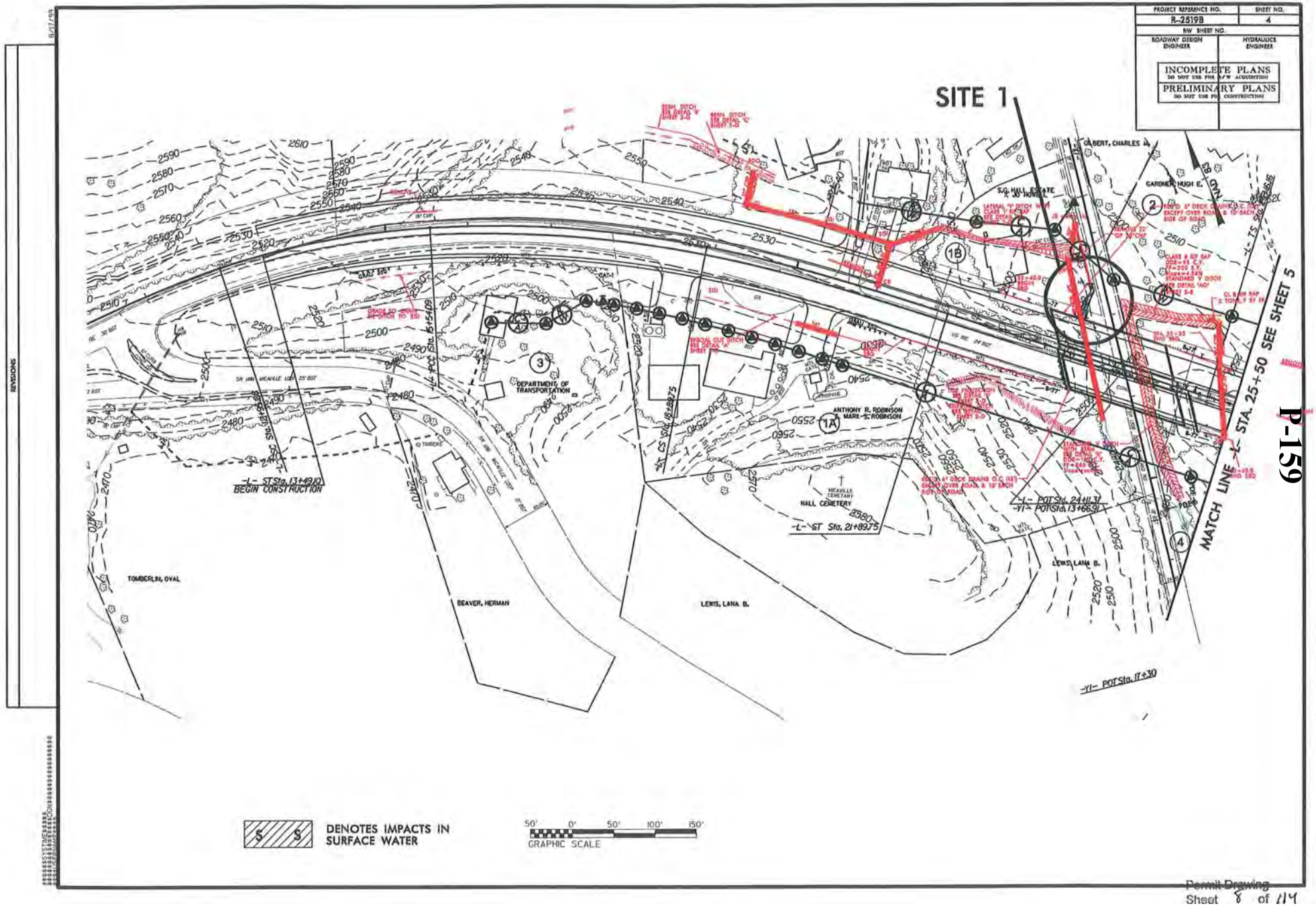
PROJECT REFERENCE NO.	SHEET NO.
R-2519B	2H
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

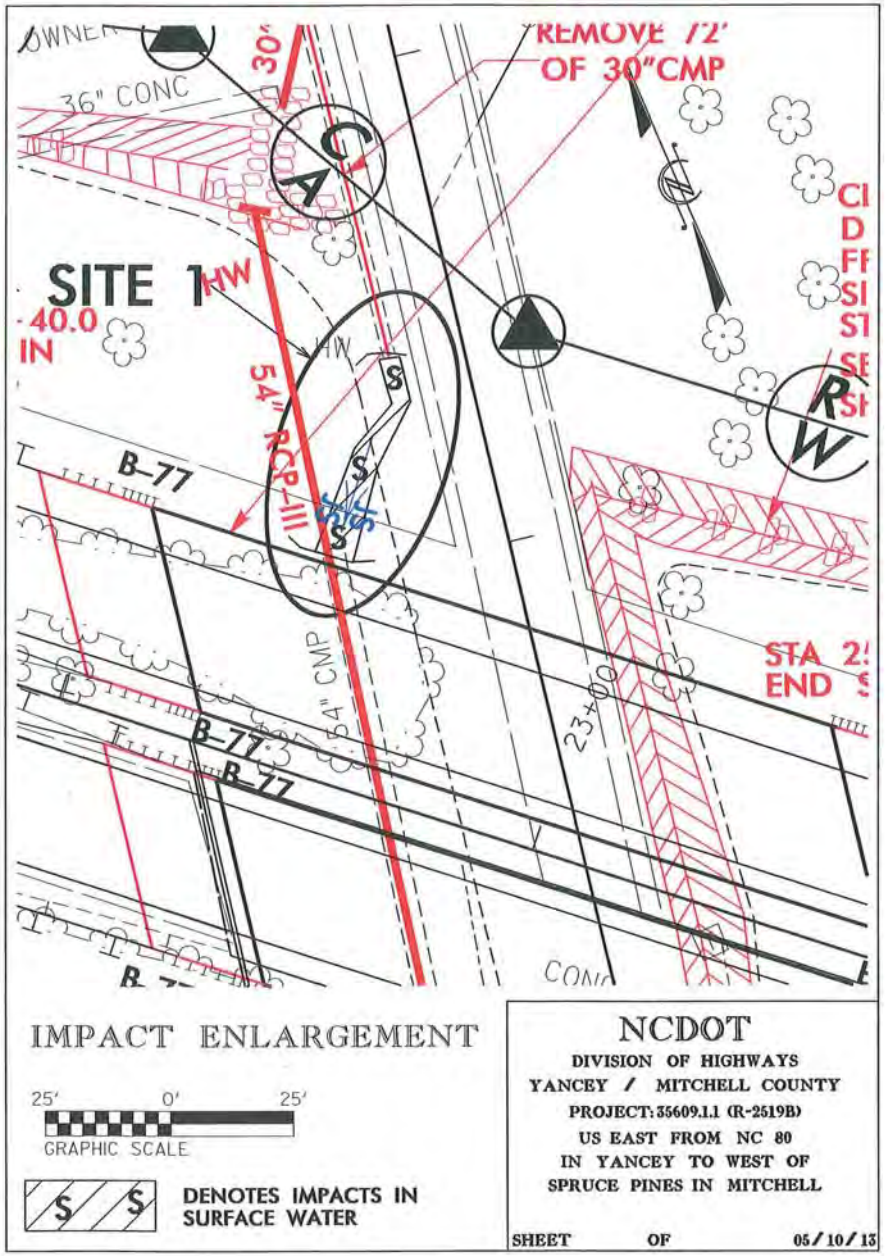
P-157

Permit Drawing
Sheet 6 of 114


SITE 1
MATCH LINE -L- STA. 25+50 SEE SHEET 5
R-2519B
INCOMPLETE PLANS
PRELIMINARY PLANS
DEPARTMENT OF TRANSPORTATION
HALL CEMETERY
LEWIS, LANA B.
BEAVER, HERMAN
TOMBERLIN, OVAL
DENOTES IMPACTS IN SURFACE WATER
GRAPHIC SCALE
REVISIONS



Permit Drawing
Sheet 8 of 114



IMPACT ENLARGEMENT

25' 0' 25'

GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

NCDOT

DIVISION OF HIGHWAYS

YANCEY / MITCHELL COUNTY

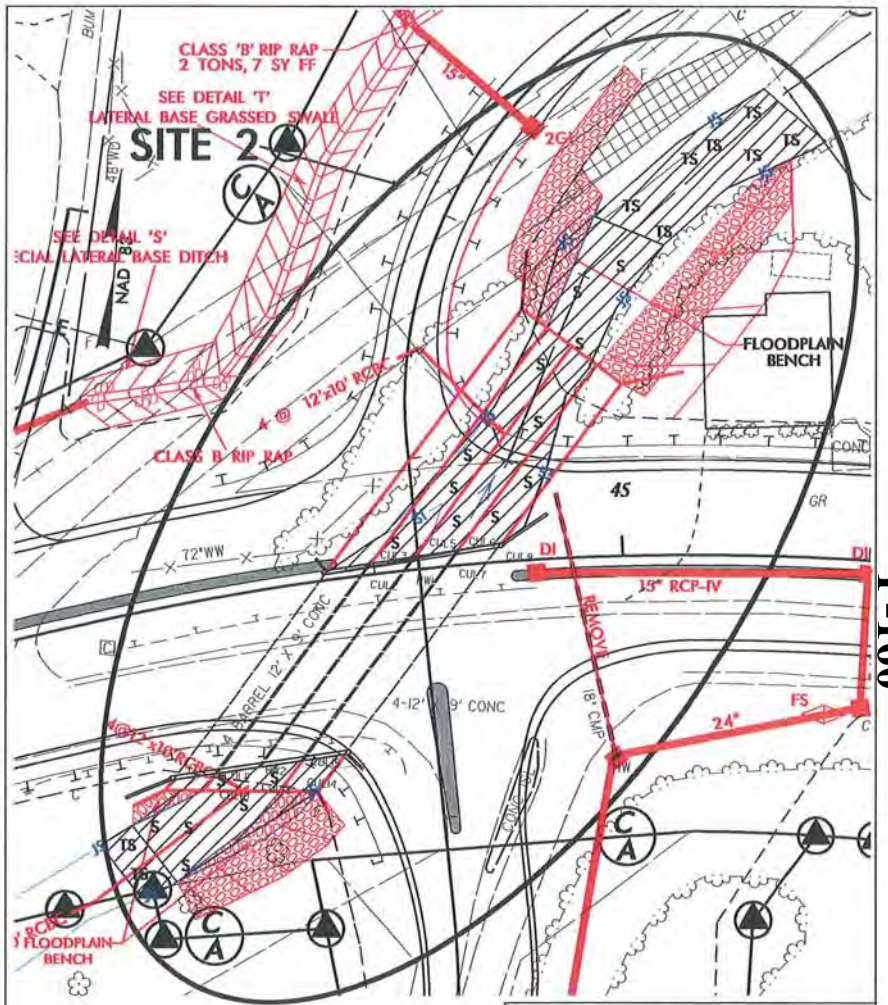
PROJECT: 35609.1.1 (R-2519B)

US EAST FROM NC 80

IN YANCEY TO WEST OF

SPRUCE PINES IN MITCHELL

SHEET OF 05/10/13



IMPACT ENLARGEMENT

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 50'

GRAPHIC SCALE

NCDOT

DIVISION OF HIGHWAYS

YANCEY / MITCHELL COUNTRY

PROJECT: 35609.1.1 (R-2519B)

US 19 EAST FROM NC 80

IN YANCEY TO WEST OF

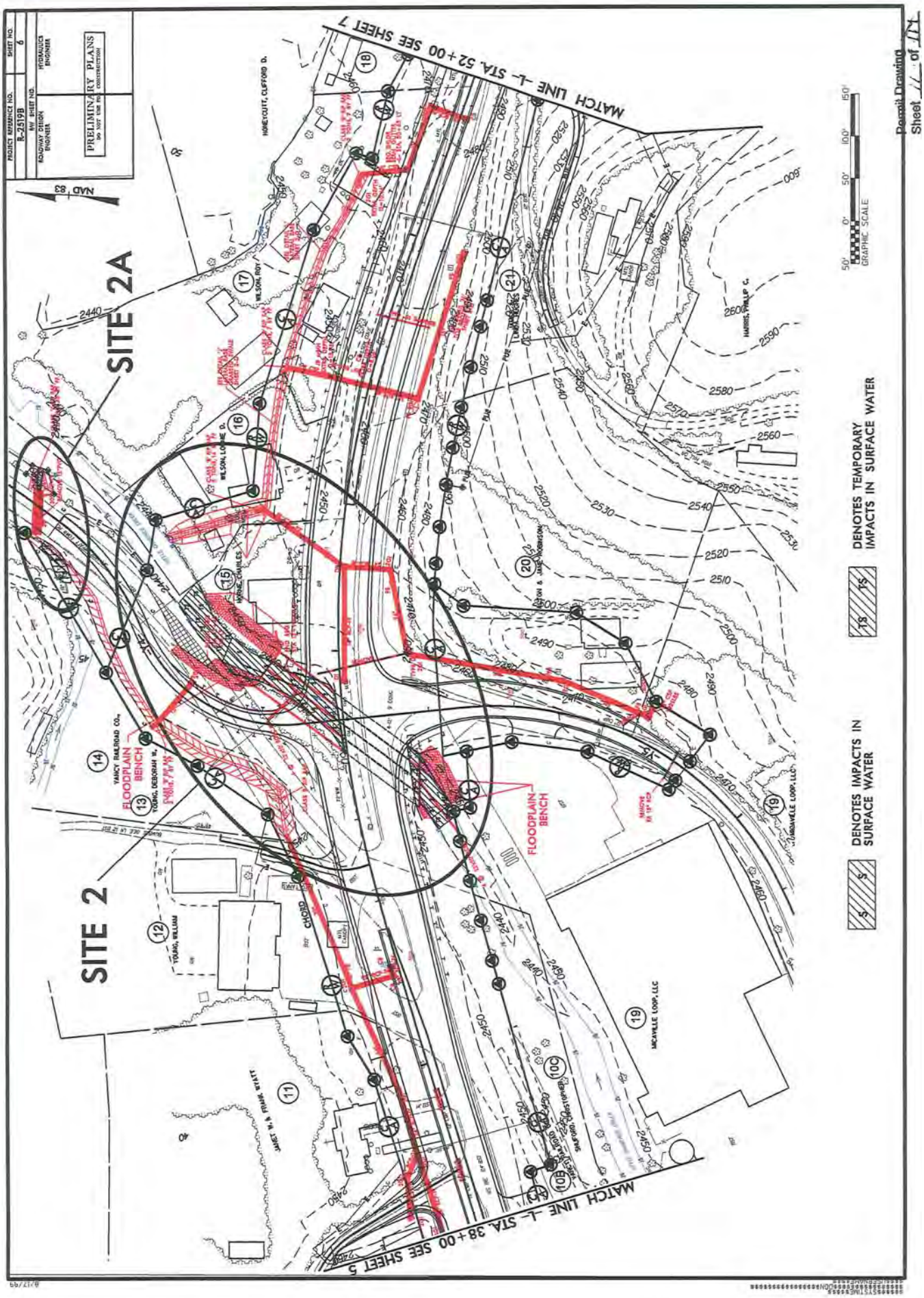
SPRUCE PINES IN MITCHELL

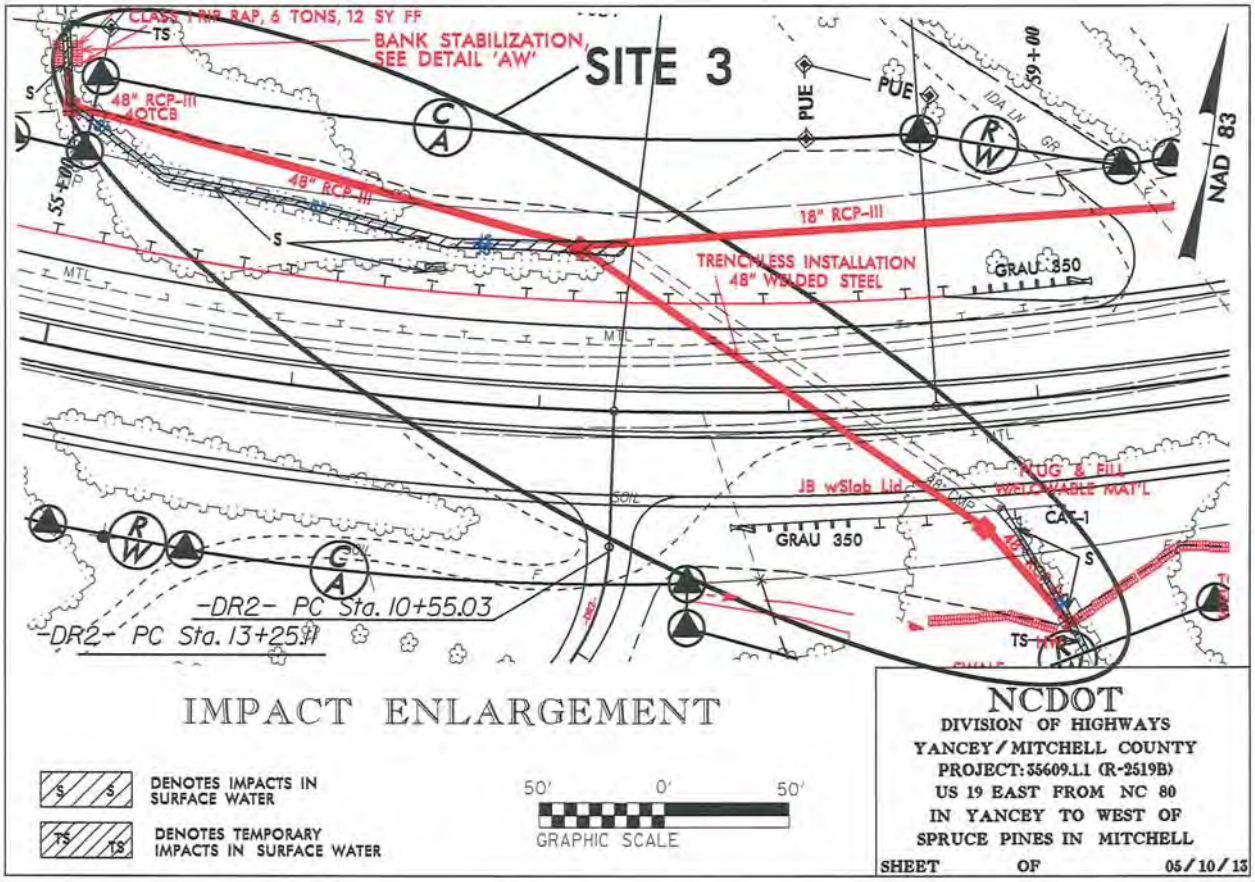
SHEET OF 05/10/13

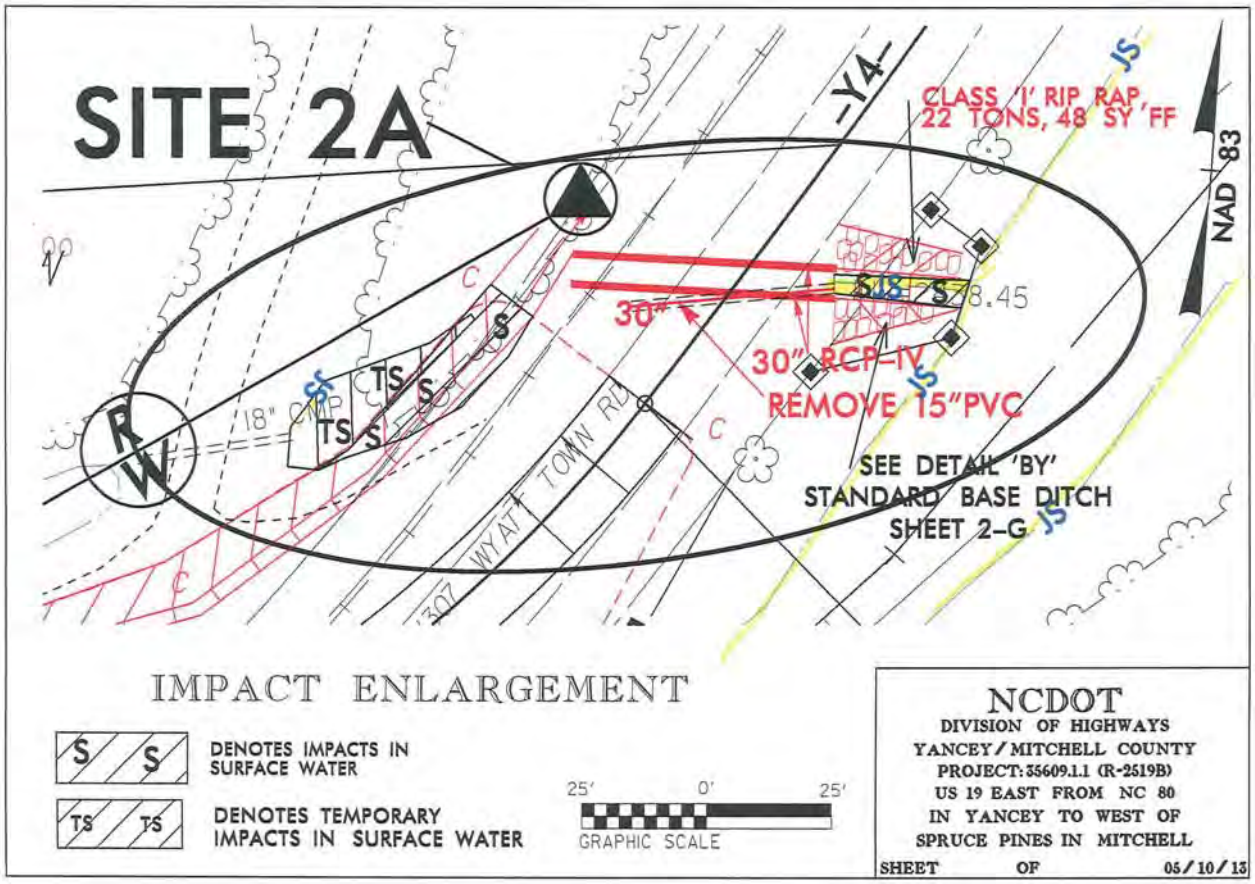
Permit Drawing
Sheet 9 of 114

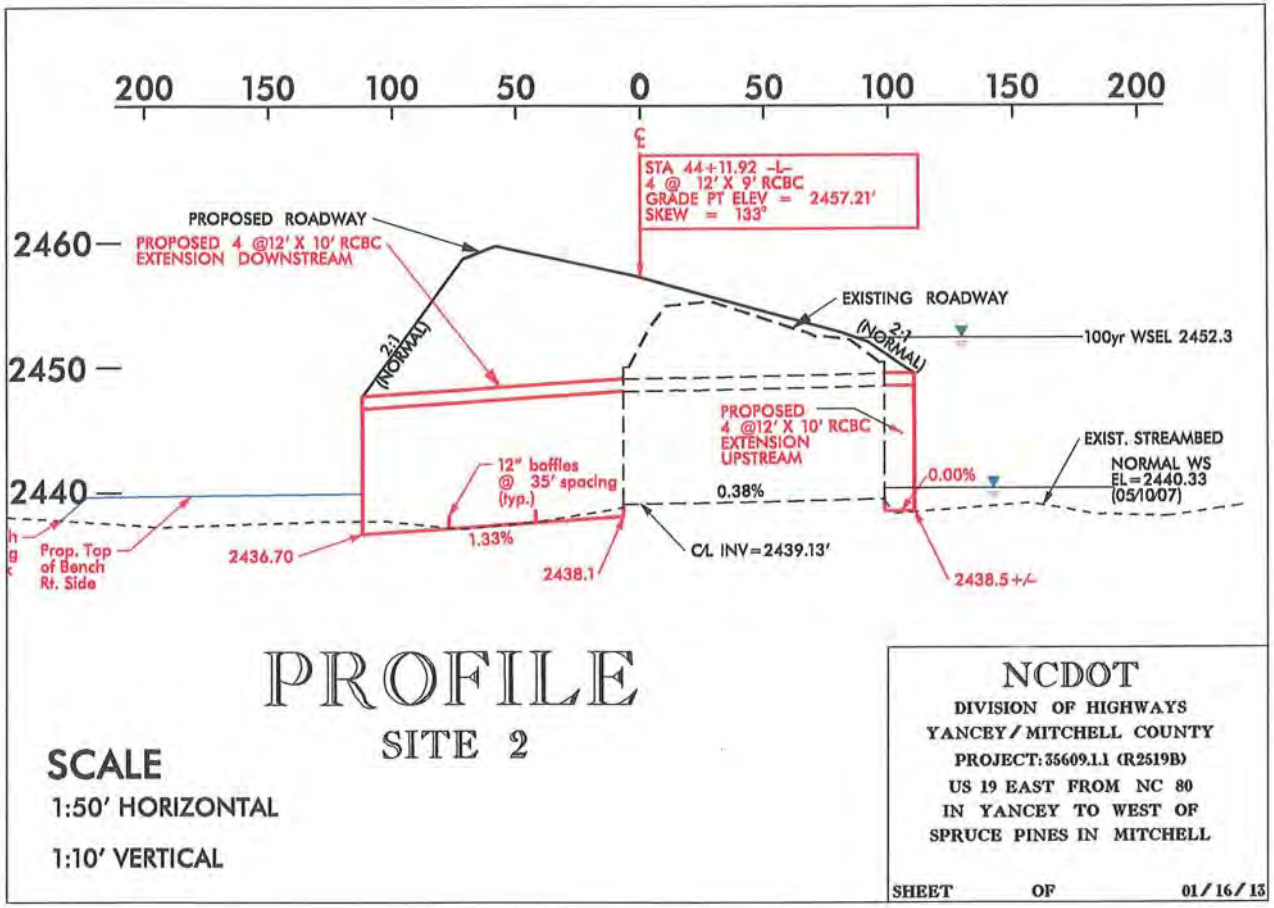
P-160

SITE 2A
SITE 2
MATCH LINE -L- STA. 52+00 SEE SHEET 7
MATCH LINE -L- STA. 38+00 SEE SHEET 5
FLOODPLAIN BENCH
FLOODPLAIN BENCH
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
PRELIMINARY PLANS
NOT FOR CONSTRUCTION
NAD 83
GRAPHIC SCALE
Permit Drawing
Sheet 15 of 117


PROJECT REFERENCE NO. R-2519B
SHEET NO. 6
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83
SITE 2A
SITE 2
MATCH LINE -L- STA. 52+00 SEE SHEET 7
MATCH LINE -L- STA. 38+00 SEE SHEET 5
FLOODPLAIN BENCH
FLOODPLAIN BENCH
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
Permit Drawing
Sheet 17 of 17


CLASS I RIP RAP, 6 TONS, 12 SY FF
BANK STABILIZATION, SEE DETAIL 'AW'
SITE 3
48" RCP-III
40TCB
48" RCP III
18" RCP-III
TRENCHLESS INSTALLATION
48" WELDED STEEL
GRAU 350
PUE
PUE
59+00
55+00
IDA LN
NAD 83
MTL
SOIL
PLUG & FILL
JB w/Slab Lid
CAT-1
-DR2- PC Sta. 10+55.03
-DR2- PC Sta. 13+25.11
TS
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
50' 0' 50'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05 / 10 / 13


SITE 2A
-Y4-
CLASS 'I' RIP RAP
22 TONS, 48 SY 'FF
NAD 83
30"
30" RCP-IV
REMOVE 15"PVC
SEE DETAIL 'BY'
STANDARD BASE DITCH
SHEET 2-G
18" CMP
WYATT TOWN RD
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
25' 0' 25'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05 / 10 / 13



PROFILE

SITE 2

SCALE

1:50' HORIZONTAL

1:10' VERTICAL

NCDOT

DIVISION OF HIGHWAYS

YANCEY / MITCHELL COUNTY

PROJECT: 35609.1.1 (R2519B)

US 19 EAST FROM NC 80

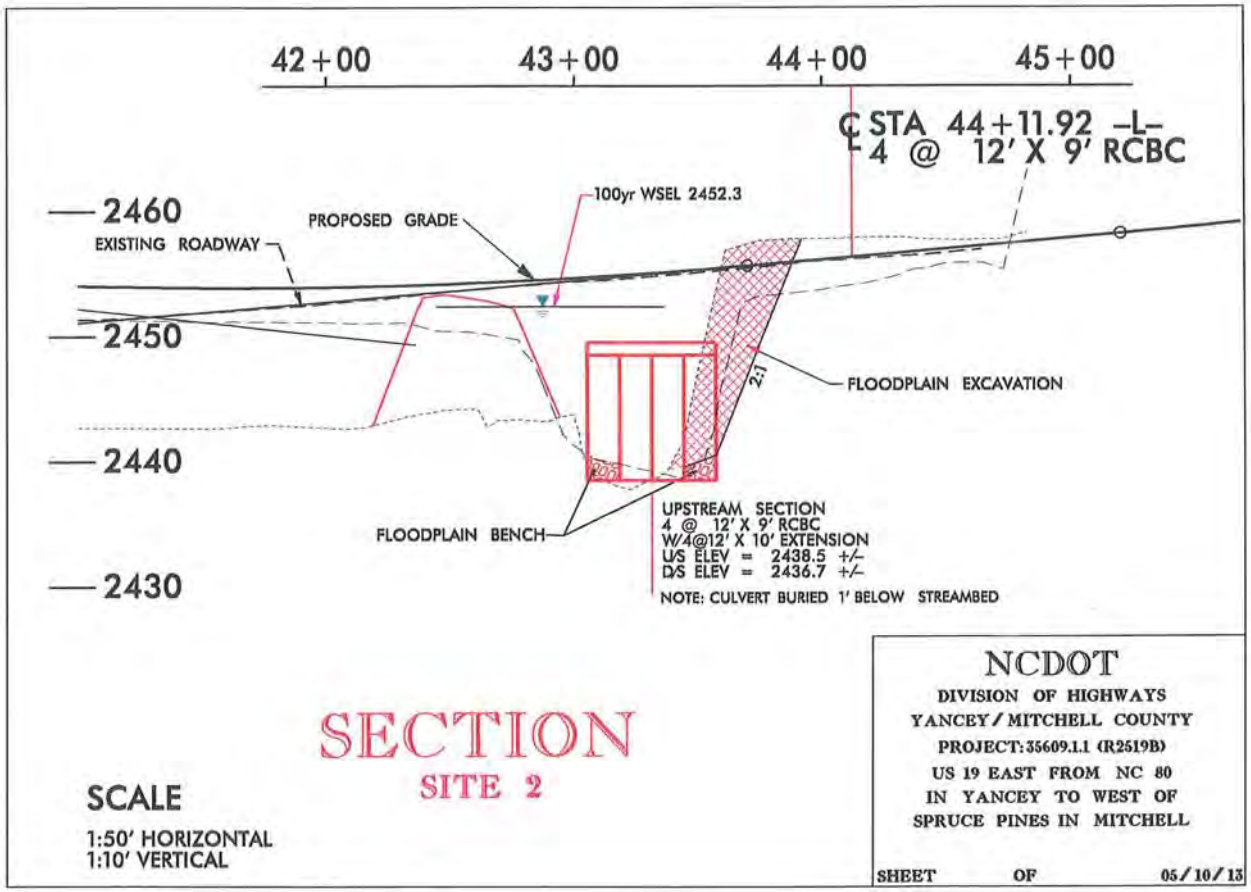
IN YANCEY TO WEST OF

SPRUCE PINES IN MITCHELL

SHEET OF 01/16/13

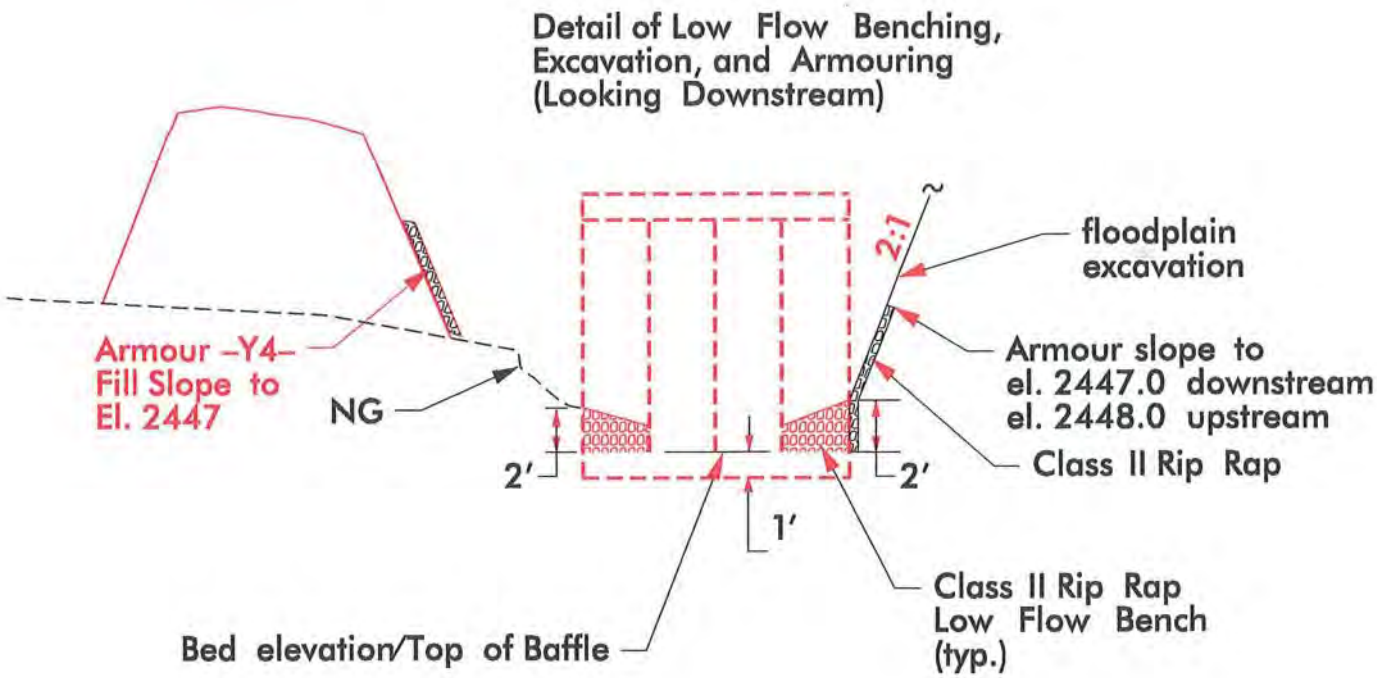
P-164

Permit Drawing
Sheet 13 of 114



P-165

Permit Drawing
Sheet 14 of 114



DETAIL

(NOT TO SCALE)

SITE 2

NCDOT

DIVISION OF HIGHWAYS

YANCEY / MITCHELL COUNTY

PROJECT: 35609.1.1 (R2519B)

US 19 EAST FROM NC 80

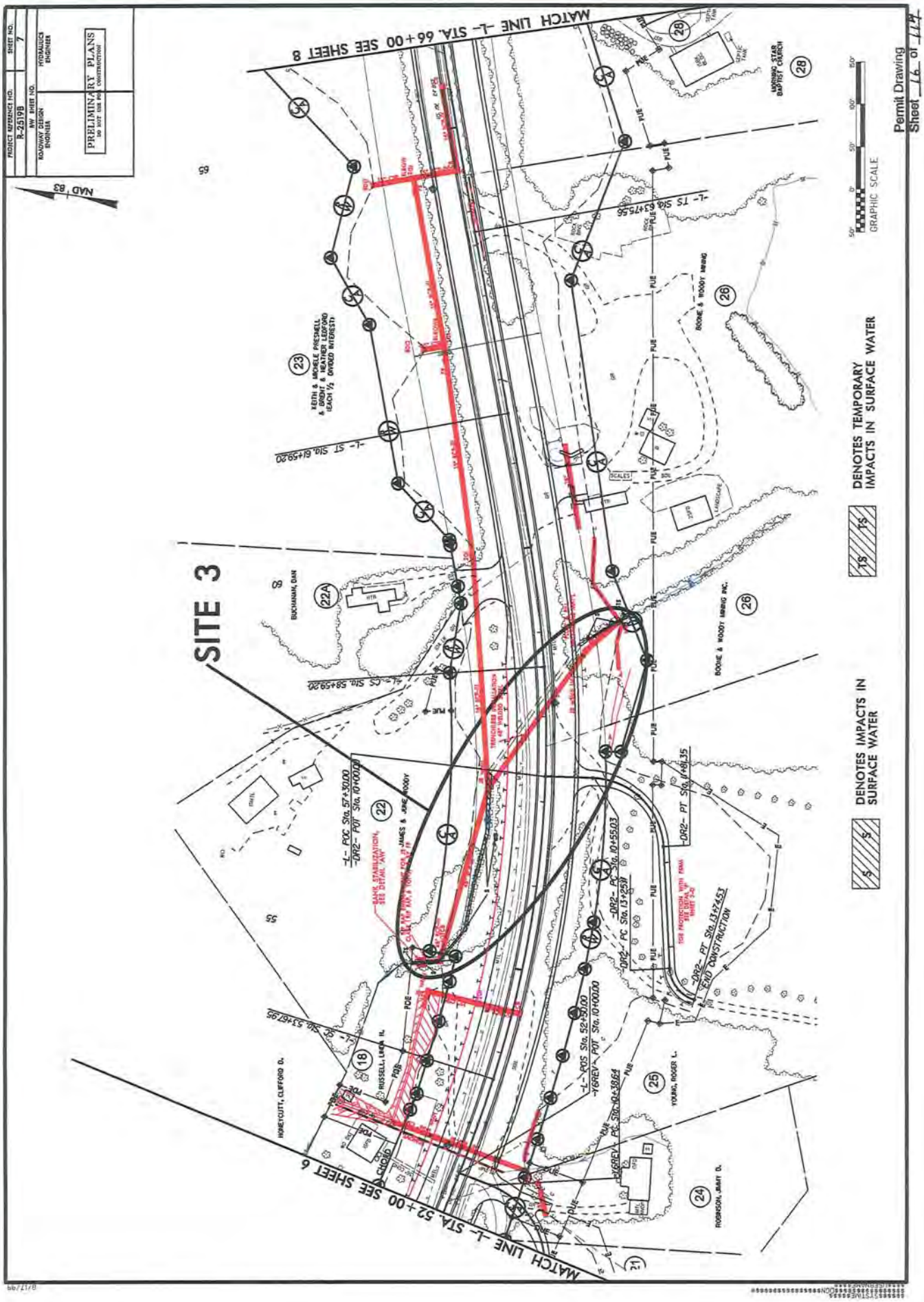
IN YANCEY TO WEST OF

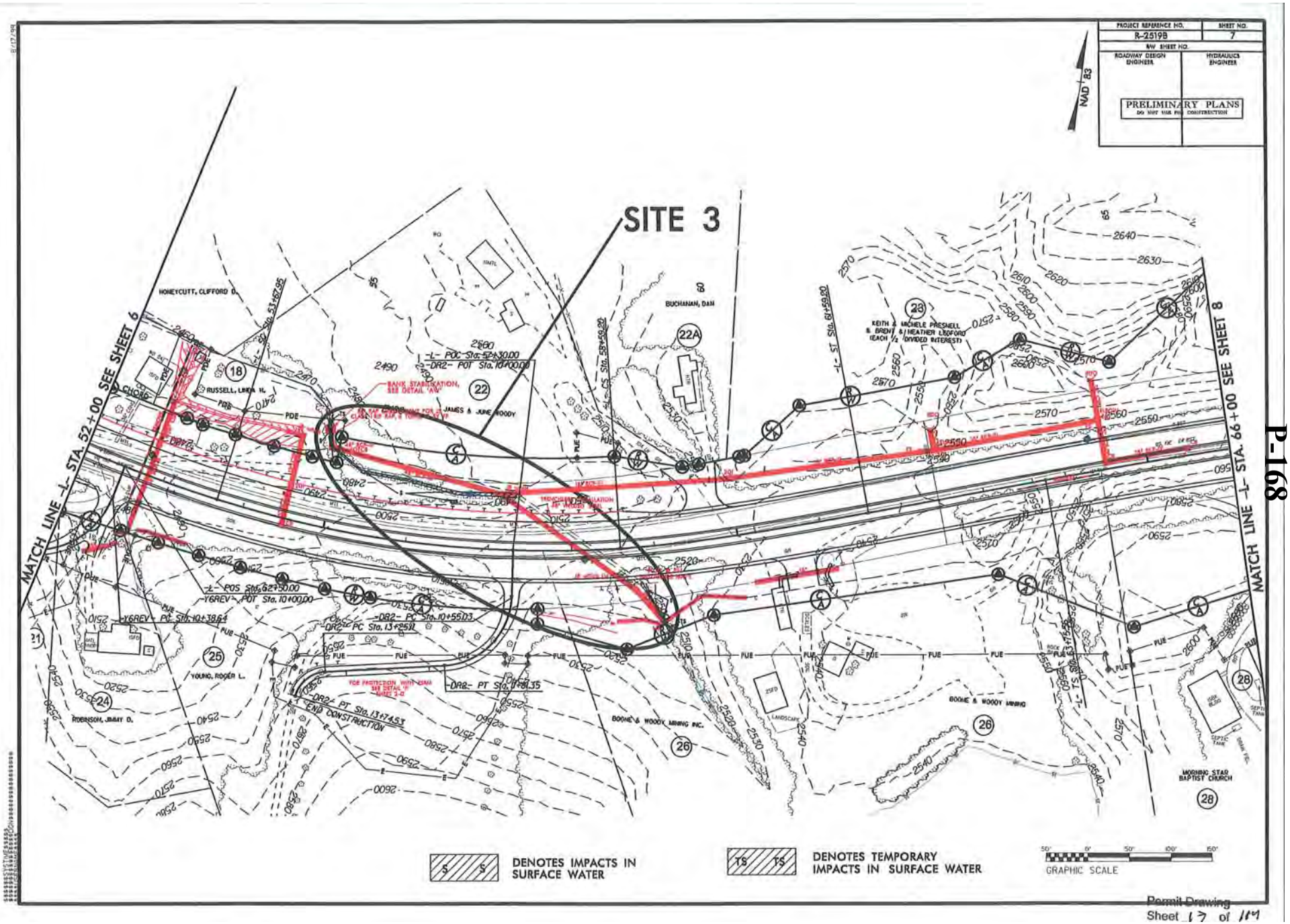
SPRUCE PINES IN MITCHELL

SHEET OF 01 / 16 / 13

P-166

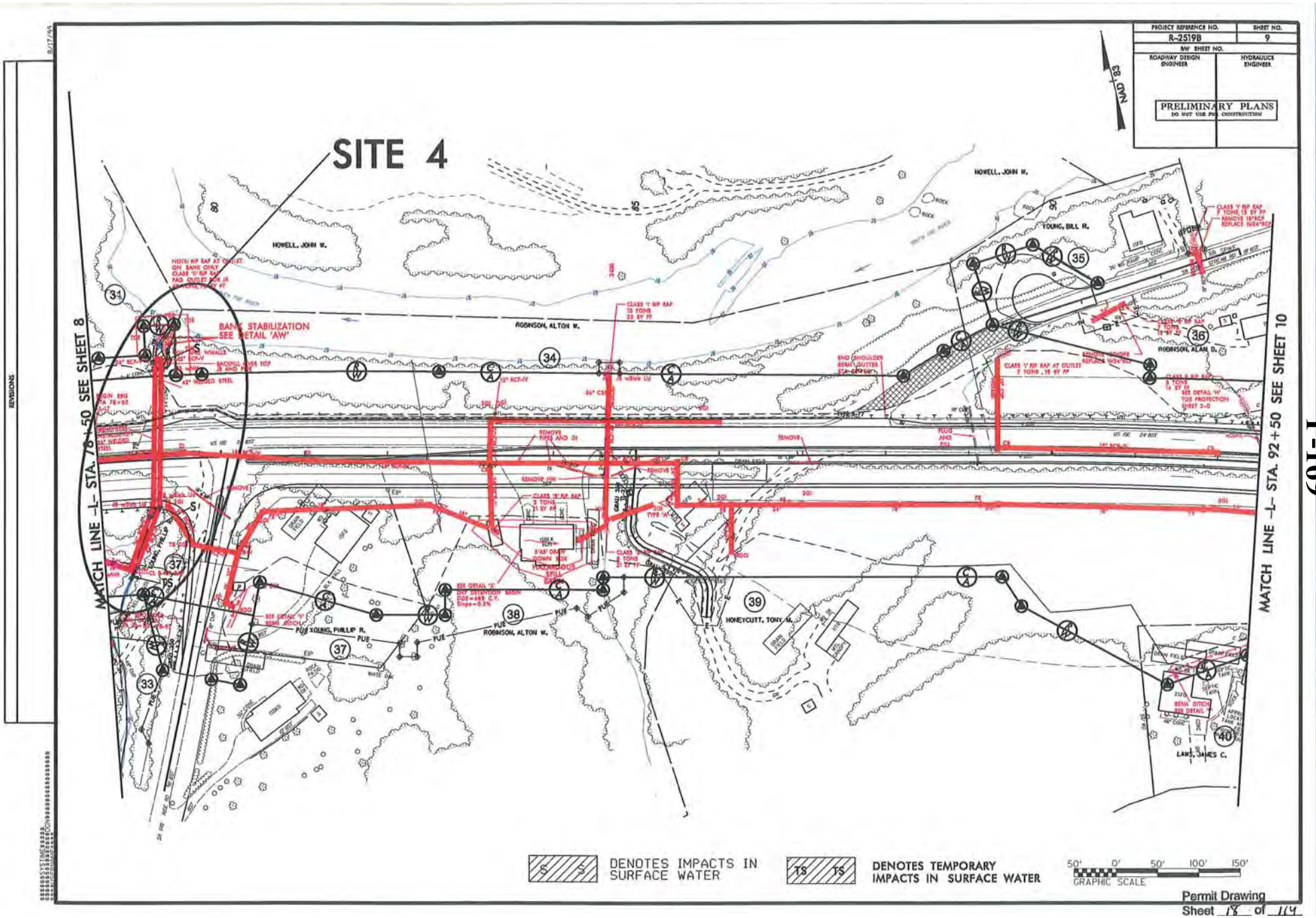
Permit Drawing
Sheet 15 of 114


PRELIMINARY PLANS
NOT FOR CONSTRUCTION
PROJECT REFERENCE NO. R-2519B
SHEET NO. 7
AW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
NAD 83
SITE 3
MATCH LINE -L- STA. 52+00 SEE SHEET 6
MATCH LINE -L- STA. 64+00 SEE SHEET 8
-L- POC Sta. 57+30.00
-DR2- POT Sta. 10+00.00
-DR2- PC Sta. 10+55.03
-DR2- PT Sta. 11+81.35
-DR2- PC Sta. 13+25.91
-DR2- PT Sta. 13+74.53
END CONSTRUCTION
-L- POC Sta. 52+30.00
-L- POT Sta. 10+00.00
-DR2- PC Sta. 10+38.64
-L- ST Sta. 61+59.20
-L- CS Sta. 58+59.20
-L- TS Sta. 63+75.56
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
Permit Drawing
Sheet 16 of 17

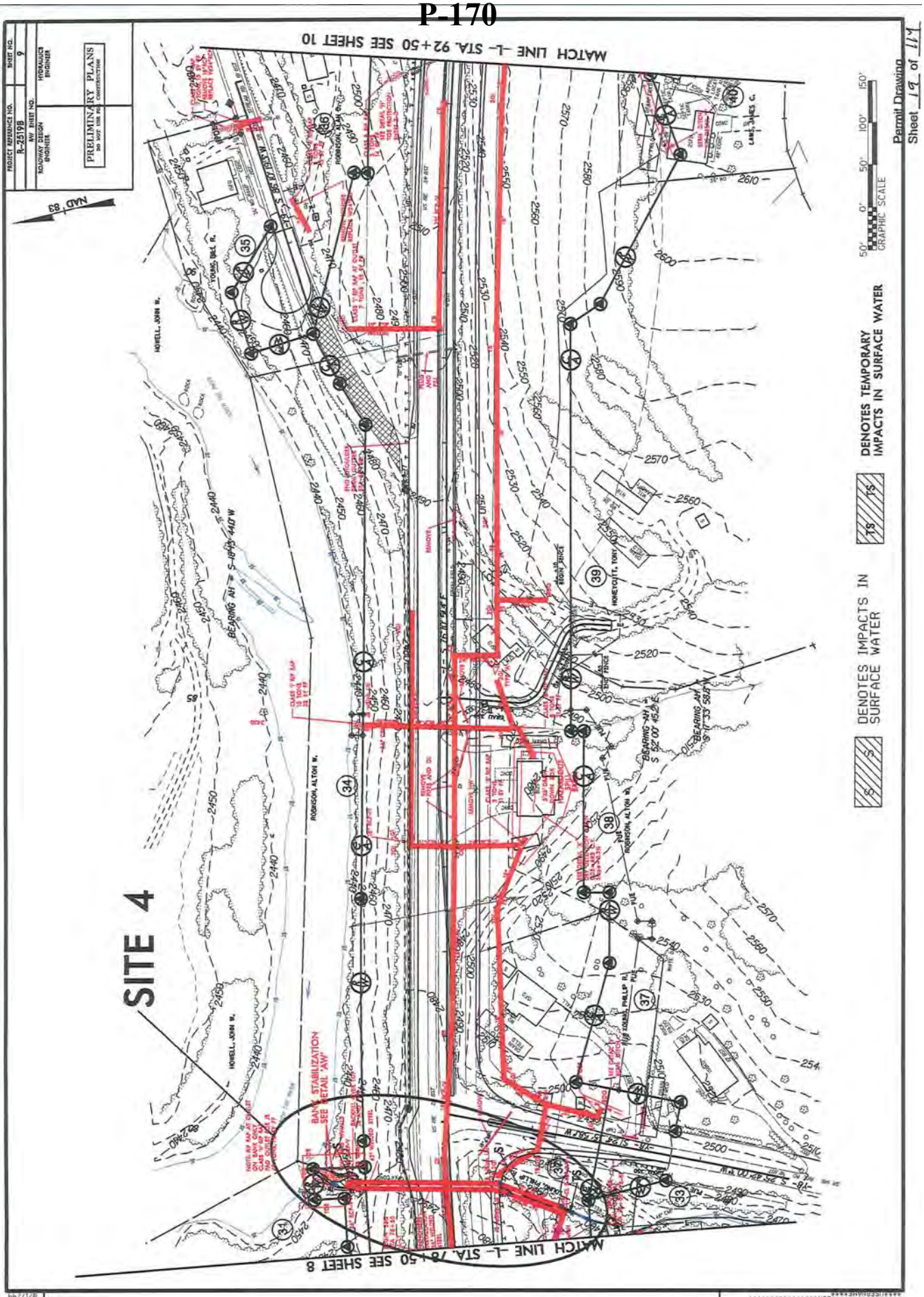


P-168

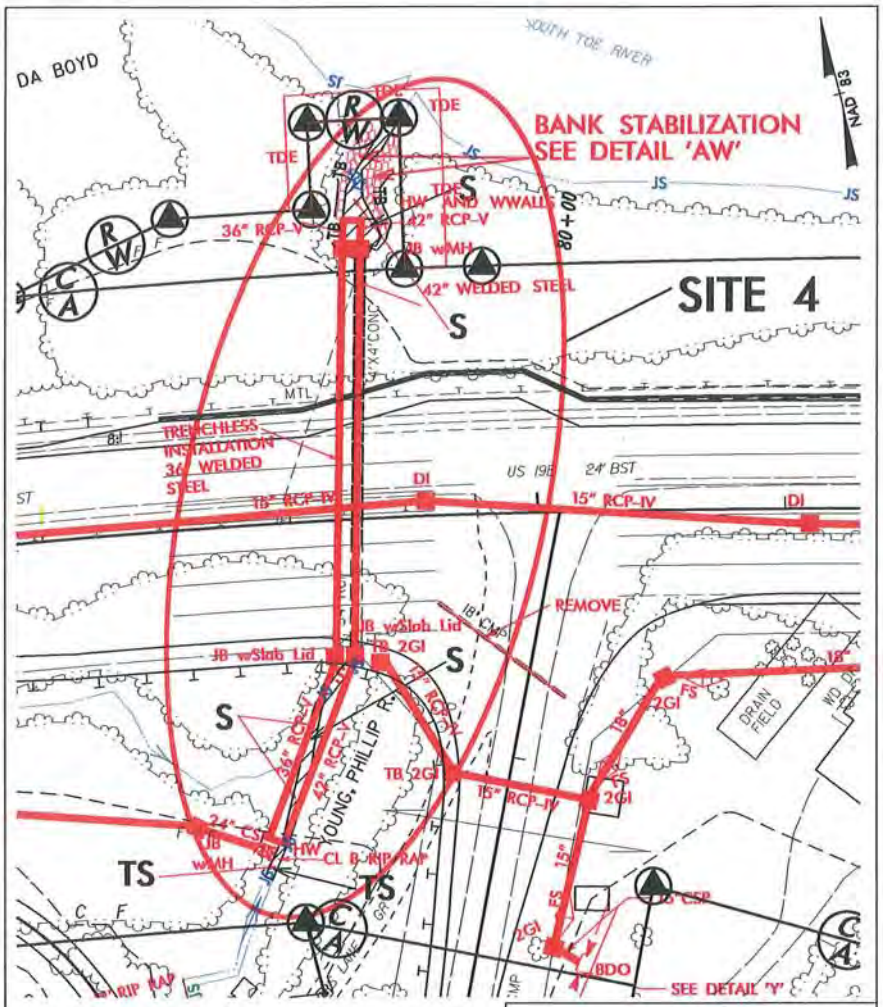
Permit Drawing
Sheet 17 of 104

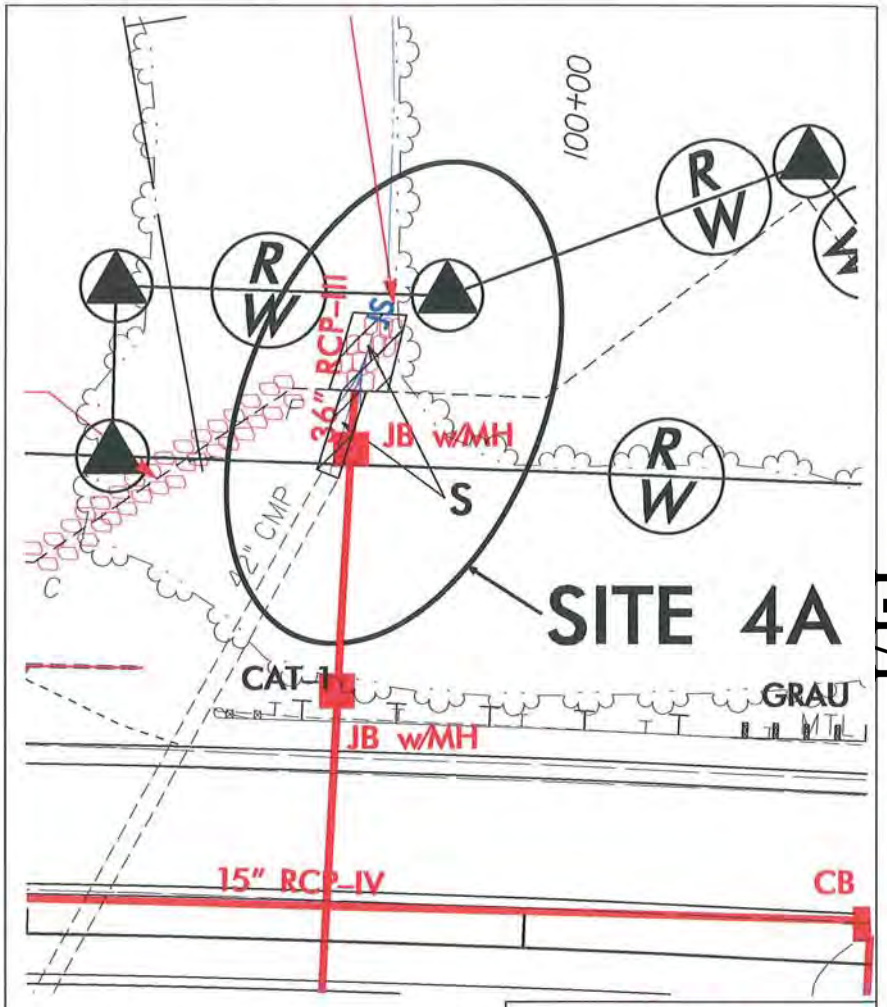


Permit Drawing
Sheet 18 of 114



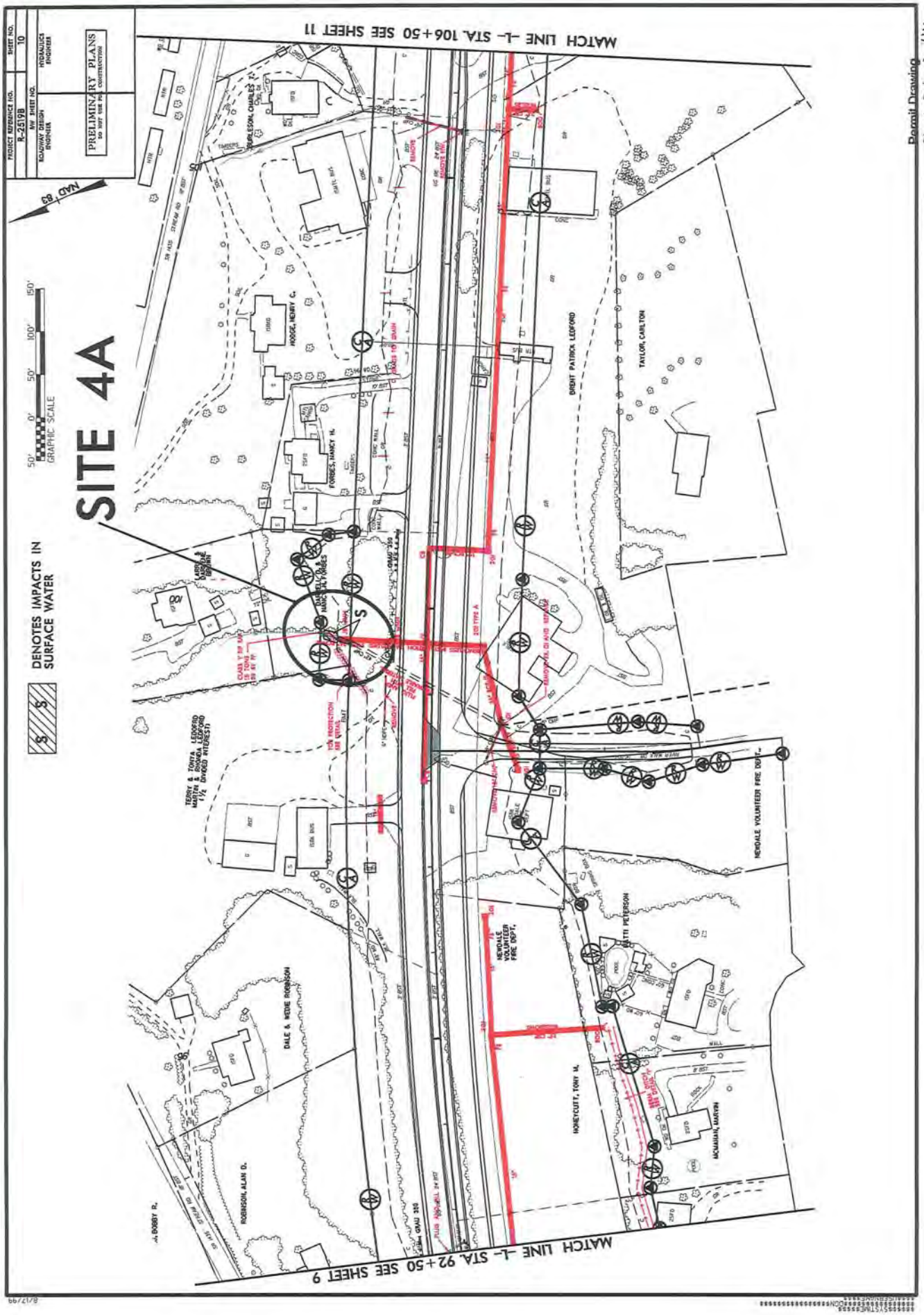
Permit Drawing
Sheet 19 of 117

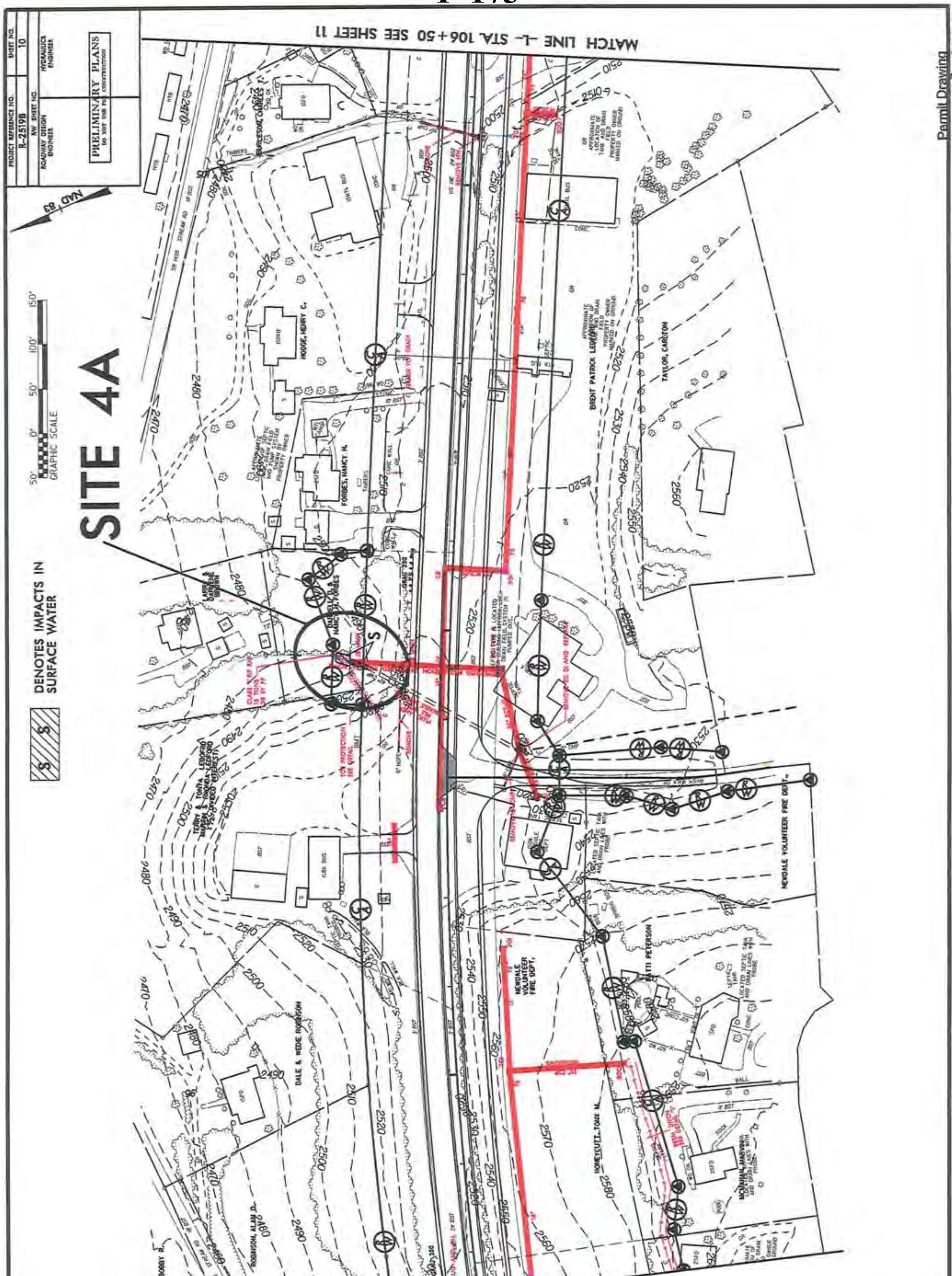


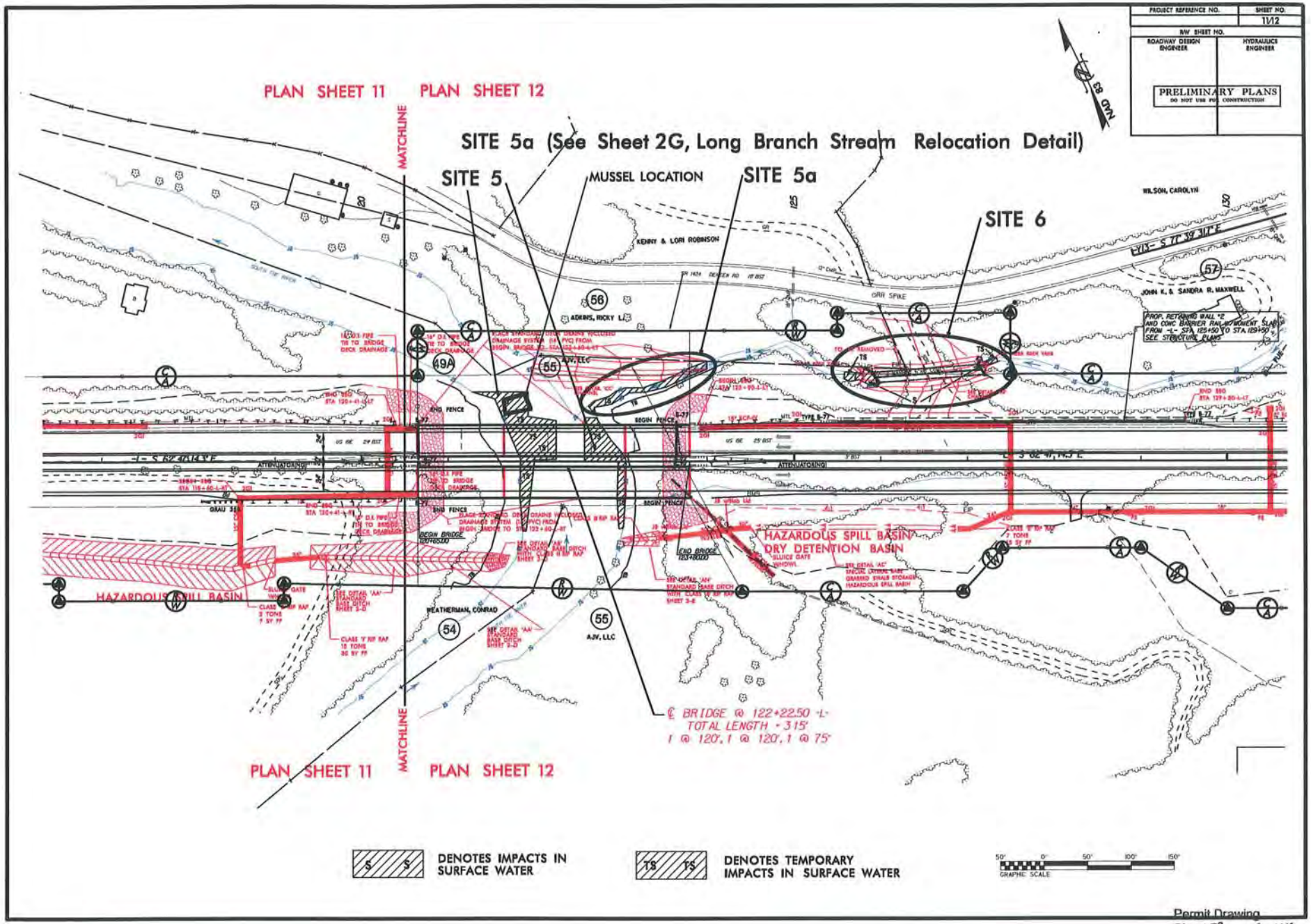


P-171

Permit Drawing
Sheet 20 of 114

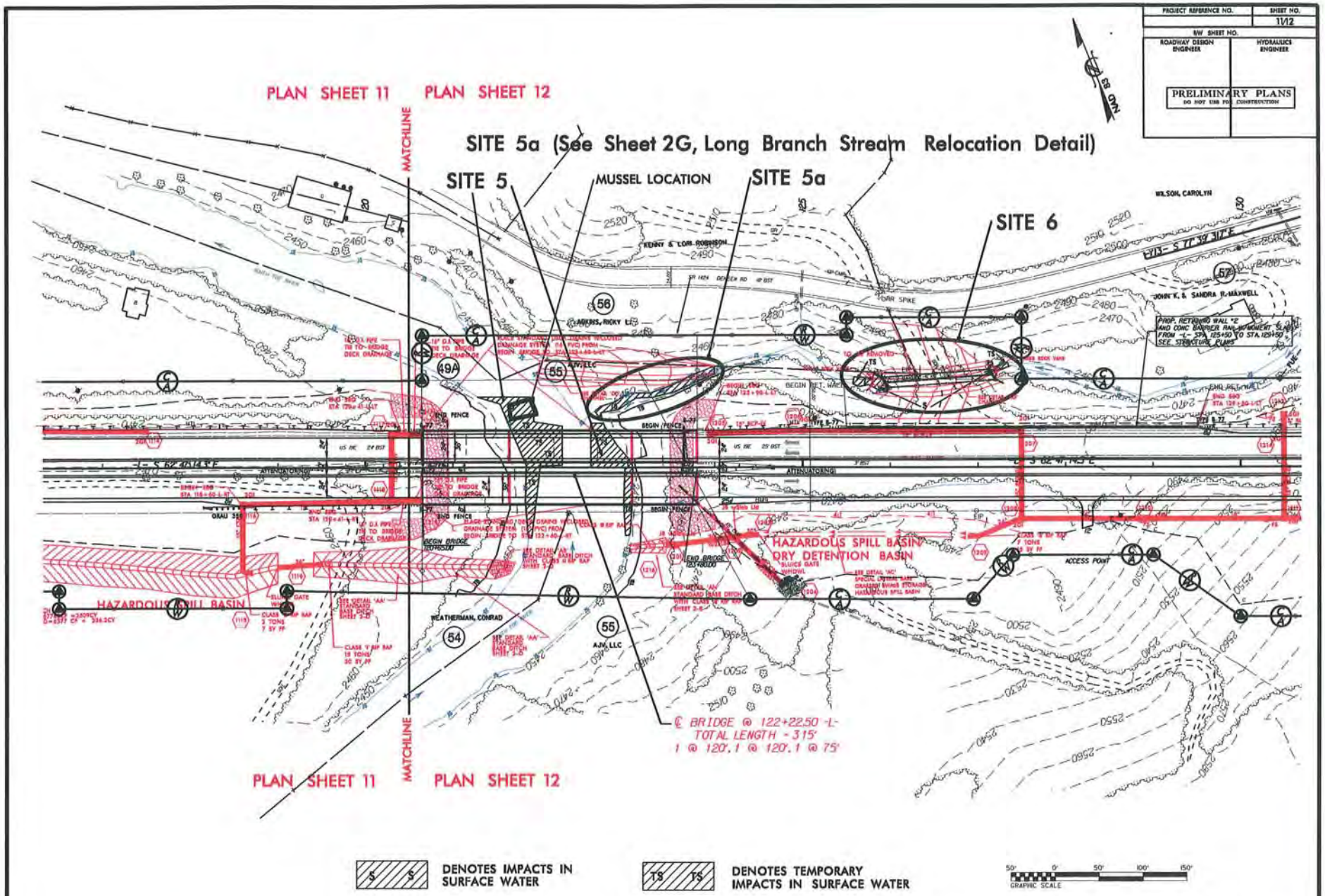

SITE 4A
DENOTES IMPACTS IN SURFACE WATER
GRAPHIC SCALE
0' 50' 100' 150'
50' 0' 50'
NAD 83
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
PROJECT REFERENCE NO. R-2519B
SHEET NO. 10
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
MATCH LINE -L- STA. 106+50 SEE SHEET 11
MATCH LINE -L- STA. 92+50 SEE SHEET 9
HOUSE, HENRY C.
FORBES, NANCY H.
BRENT PATRICK LEDFORD
TAYLOR, CARLTON
TERRY & TONYA LEDFORD MARVIN & RHONDA LEDFORD 1/2 UNDIV. INTEREST
DALE & WEDIE ROBINSON
ROBINSON, ALAN D.
NEWDALE VOLUNTEER FIRE DEPT.
HONEYCUTT, TONY M.
MCFARLAND, MARVIN
KEITH PETERSON
Permit Drawing
Sheet 21 of 114

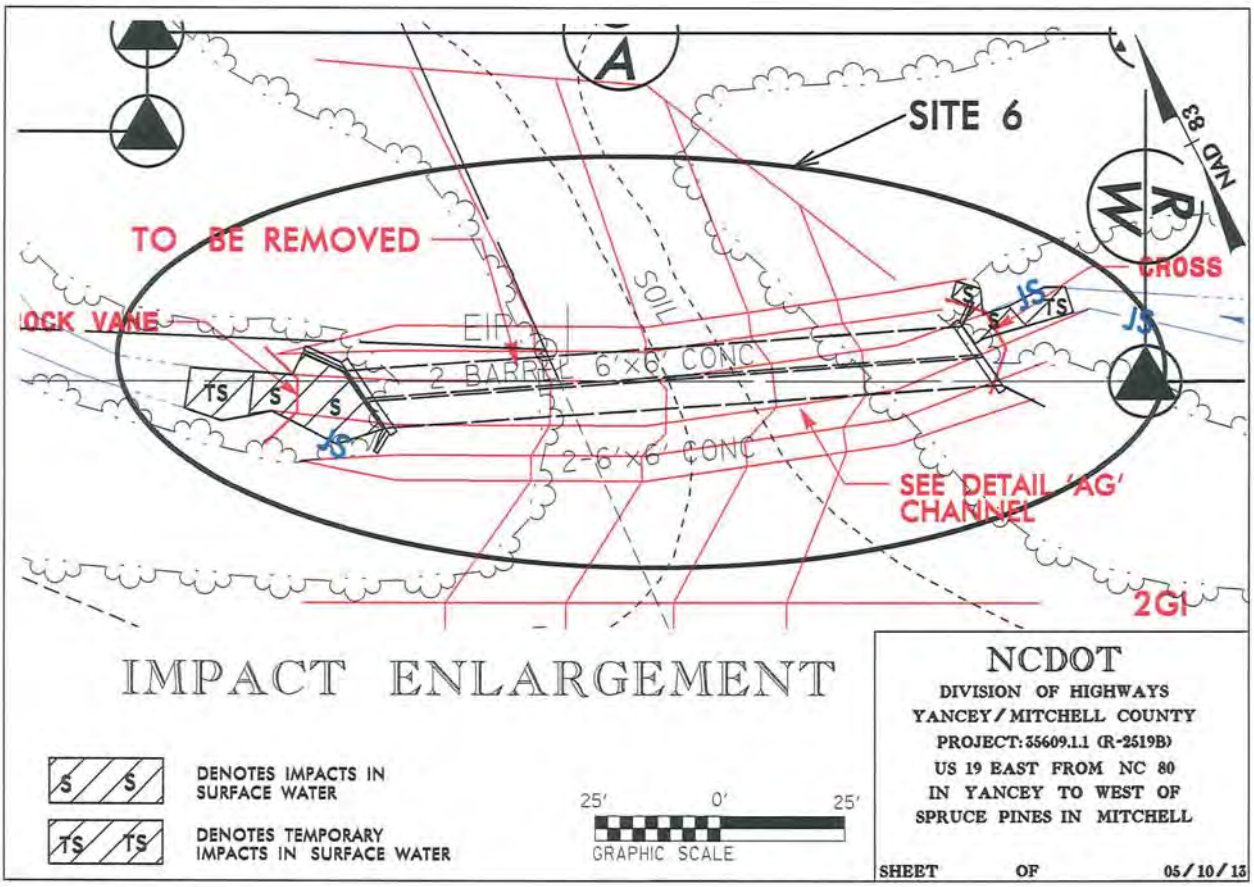

SITE 4A
DENOTES IMPACTS IN SURFACE WATER
GRAPHIC SCALE
NAD 83
PROJECT REFERENCE NO.
R-2519B
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
MATCH LINE -L- STA. 106+50 SEE SHEET 11
MATCH LINE -L- STA. 92+50 SEE SHEET 9
HODGE, HENRY C.
FORBES, NANCY H.
BRENT PATRICK LEDFORD
TAYLOR, CARLTON
NEWDALE VOLUNTEER FIRE DEPT.
HONEYCUTT, TONY M.
DALE & WEDIE ROBINSON
ROBINSON, ALAN D.
Permit Drawing
Sheet

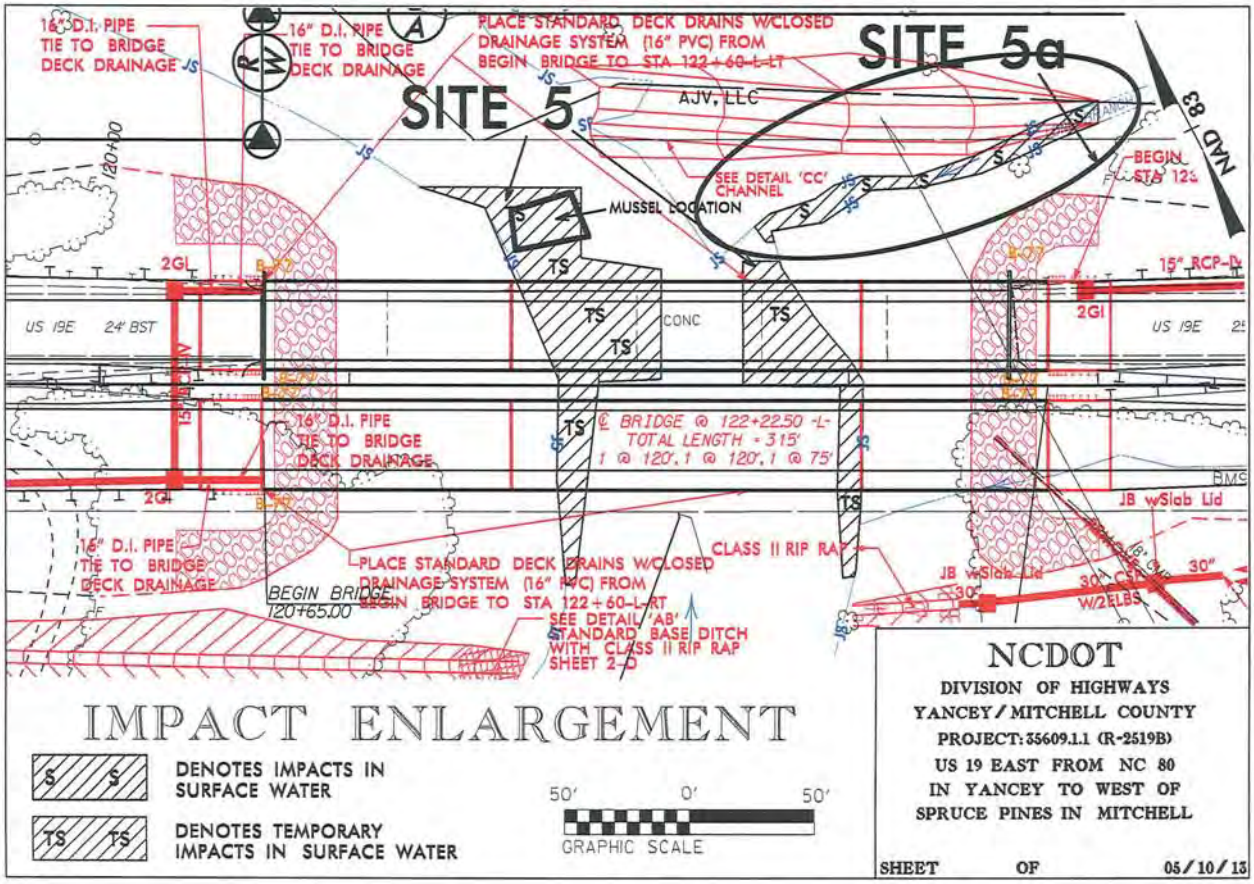


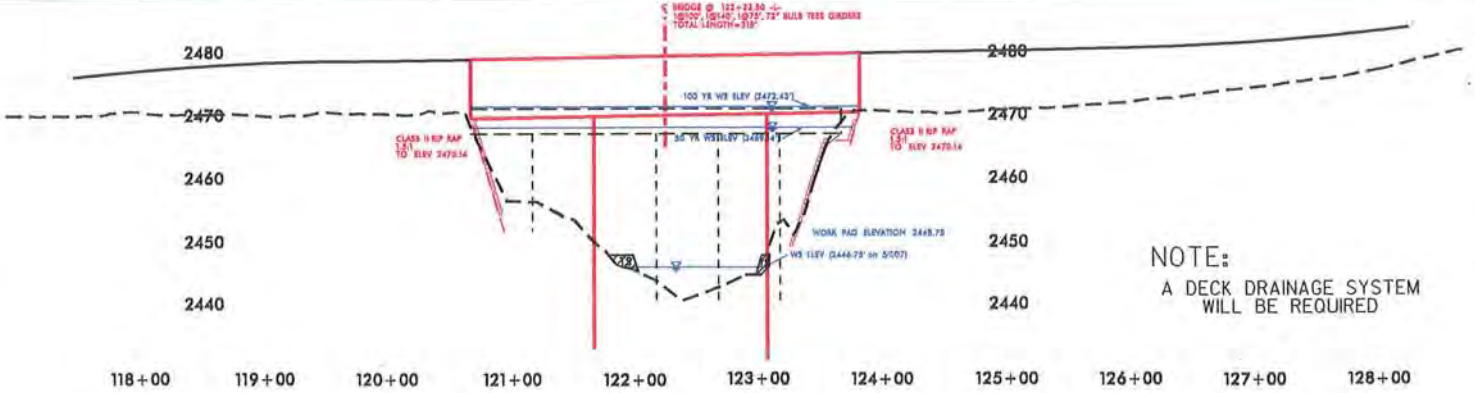
Permit Drawing
Sheet 23 of 114

P-174


PROJECT REFERENCE NO.
SHEET NO.
11/12
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
PLAN SHEET 11
PLAN SHEET 12
MATCHLINE
SITE 5a (See Sheet 2G, Long Branch Stream Relocation Detail)
SITE 5
MUSSEL LOCATION
SITE 5a
SITE 6
KENNY & LORI ROBINSON
WILSON, CAROLYN
JOHN K. & SANDRA R. MAXWELL
HAZARDOUS SPILL BASIN
DRY DETENTION BASIN
ACCESS POINT
HEATHERMAN, CONRAD
A.J.V. LLC
℄ BRIDGE @ 122+22.50 -L-
TOTAL LENGTH = 315'
1 @ 120'-1 @ 120'-1 @ 75'
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
Permit Drawing
Sheet 24 of 114


SITE 6
TO BE REMOVED
ROCK VANE
CROSS
SOIL
EIP
2 BARREL 6'x6' CONC
2-6'x6' CONC
SEE DETAIL 'AG' CHANNEL
2GI
NAD 83
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
25' 0' 25'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05 / 10 / 13


SITE 5
SITE 5a
16" D.I. PIPE TIE TO BRIDGE DECK DRAINAGE
PLACE STANDARD DECK DRAINS W/CLOSED DRAINAGE SYSTEM (16" PVC) FROM BEGIN BRIDGE TO STA 122+60-L-LT
AJV, LLC
SEE DETAIL 'CC' CHANNEL
MUSSEL LOCATION
BEGIN STA 123
NAD 83
2GI
US 19E 24' BST
CONC
15" RCP-D
℄ BRIDGE @ 122+22.50 -L-
TOTAL LENGTH = 315'
1 @ 120', 1 @ 120', 1 @ 75'
JB w/Slab Lid
CLASS II RIP RAP
PLACE STANDARD DECK DRAINS W/CLOSED DRAINAGE SYSTEM (16" PVC) FROM BEGIN BRIDGE TO STA 122+60-L-RT
BEGIN BRIDGE 120+65.00
SEE DETAIL 'AB' STANDARD BASE DITCH WITH CLASS II RIP RAP SHEET 2-D
30" CSP W/2ELBS
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
50' 0' 50'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05 / 10 / 13



NOTE:
A DECK DRAINAGE SYSTEM WILL BE REQUIRED

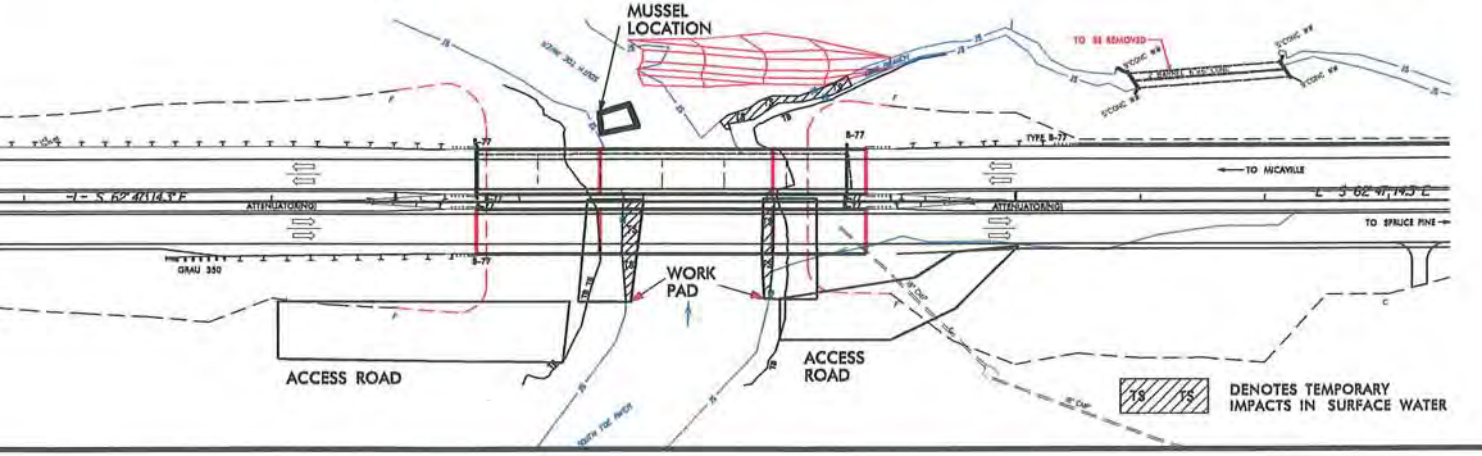
PROJECT REFERENCE NO.	SHEET NO.
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

3 SPANS–1@100', 1@140', 1 @ 75'; CONCRETE GIRDER BRIDGE

RELOCATE LONG BRANCH CREEK TO ALLOW MIN. OF 1 GROWING SEASON PRIOR TO PROJECT COMPLETION. WORK PAD WILL BE NEEDED TO INSTALL THE PIERS AND SET GIRDERS (EASTBOUND).

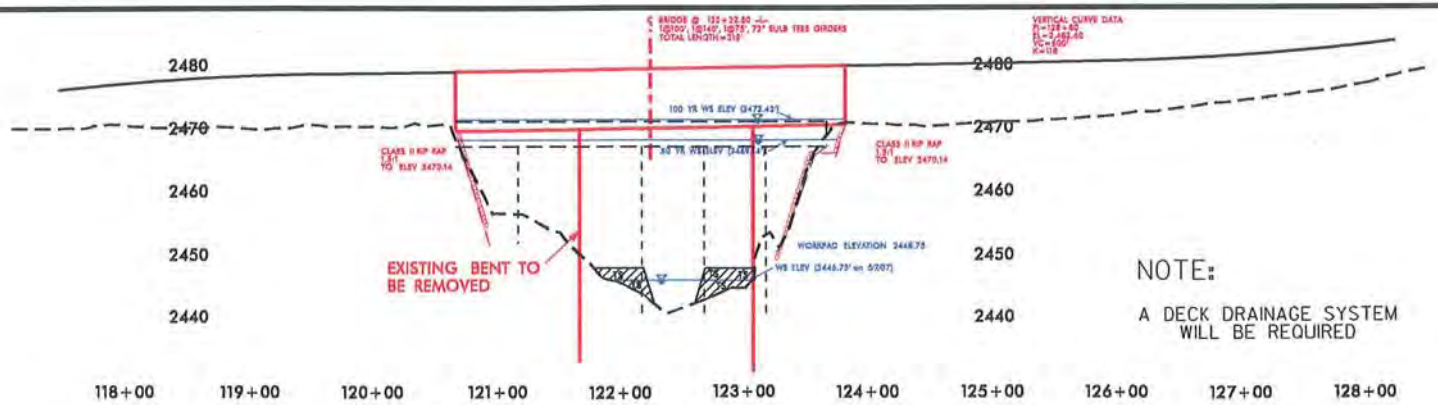
PHASE 1 – SITE 5



REVISIONS

P-177

Permit Drawing
Sheet 26 of 114

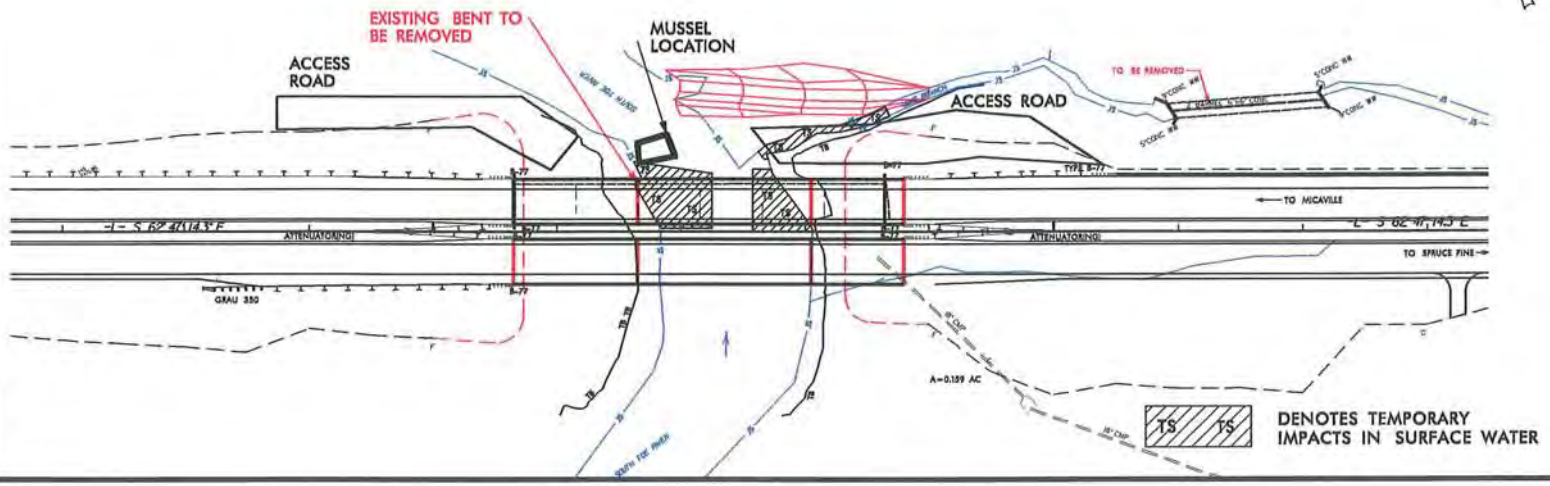


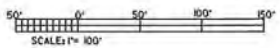
NOTE:
A DECK DRAINAGE SYSTEM WILL BE REQUIRED

3 SPANS–1@100', 1@140', 1 @ 75'; CONCRETE GIRDER BRIDGE

ACCESS SHOWN FOR DEMOLITION OF THE EXISTING STRUCTURE (WESTBOUND).
EACH WORK PAD CAN BE INSTALLED AT DIFFERENT TIMES TO MAINTAIN 50% RIVER FLOW.

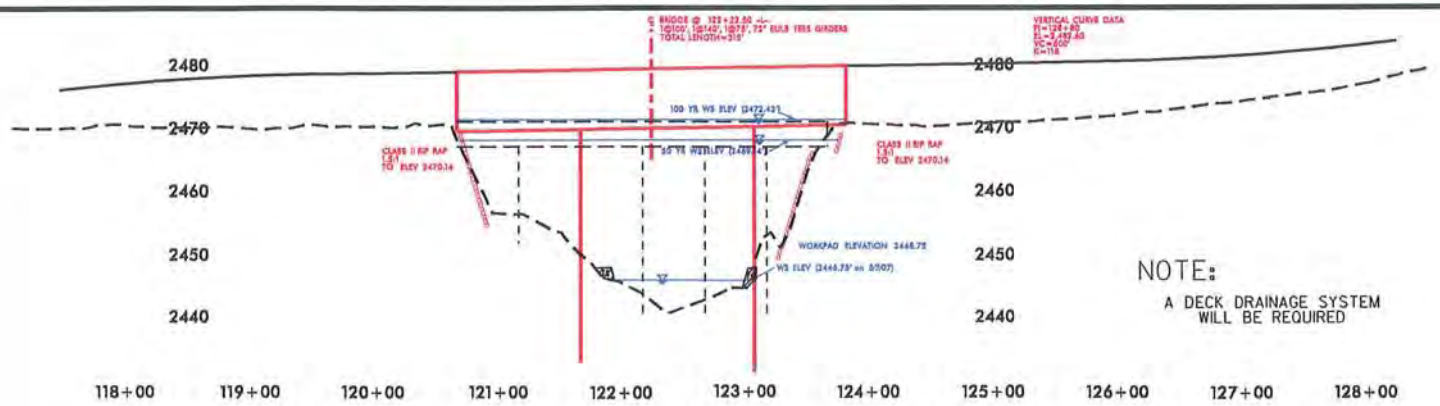
PHASE 2 – SITE 5





P-178

Permit Drawing
Sheet 27 of 114



PROJECT REFERENCE NO.	SHEET NO.
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

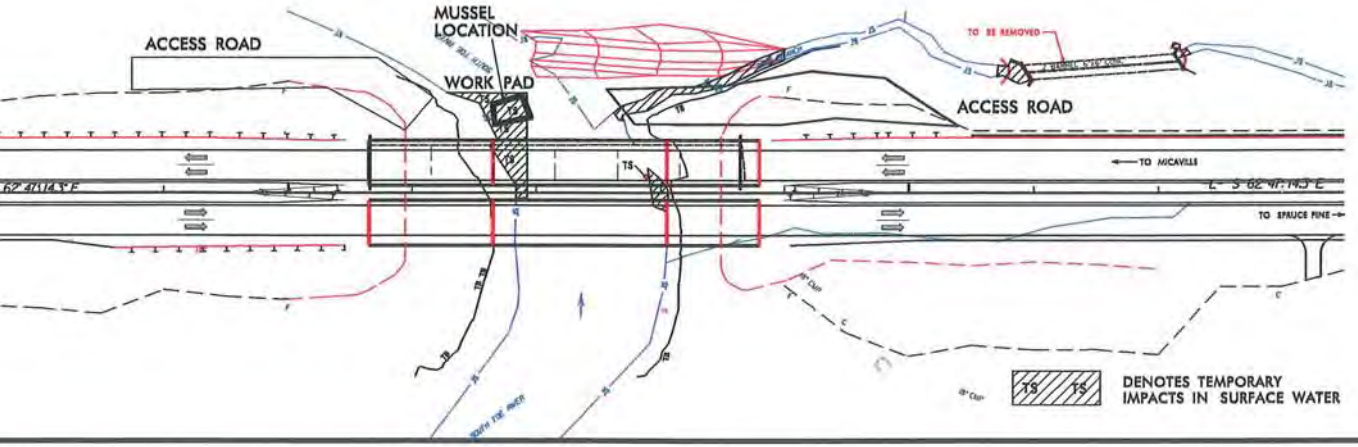
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS 8/17/99

3 SPANS–1@100', 1@140', 1 @ 75'; CONCRETE GIRDER BRIDGE

WORK PADS WILL BE NEEDED FOR DRILLING THE PIERS AND GIRDER ERECTION. LONG BRANCH CREEK WILL HAVE ALREADY BEEN RELOCATED.

PHASE 3 – SITE 5



P-179

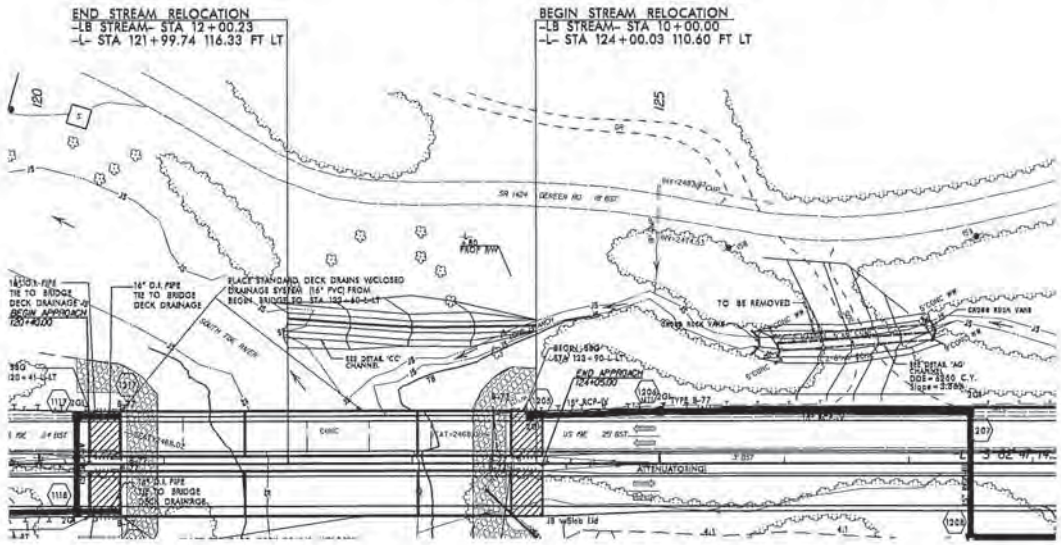
Permit Drawing
Sheet 28 of 119

LONG BRANCH STREAM RELOCATION
SITE 5a

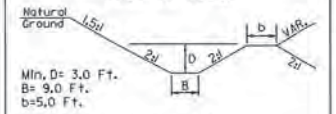
PROJECT REFERENCE NO.	SHEET NO.
R-2519B	2G
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

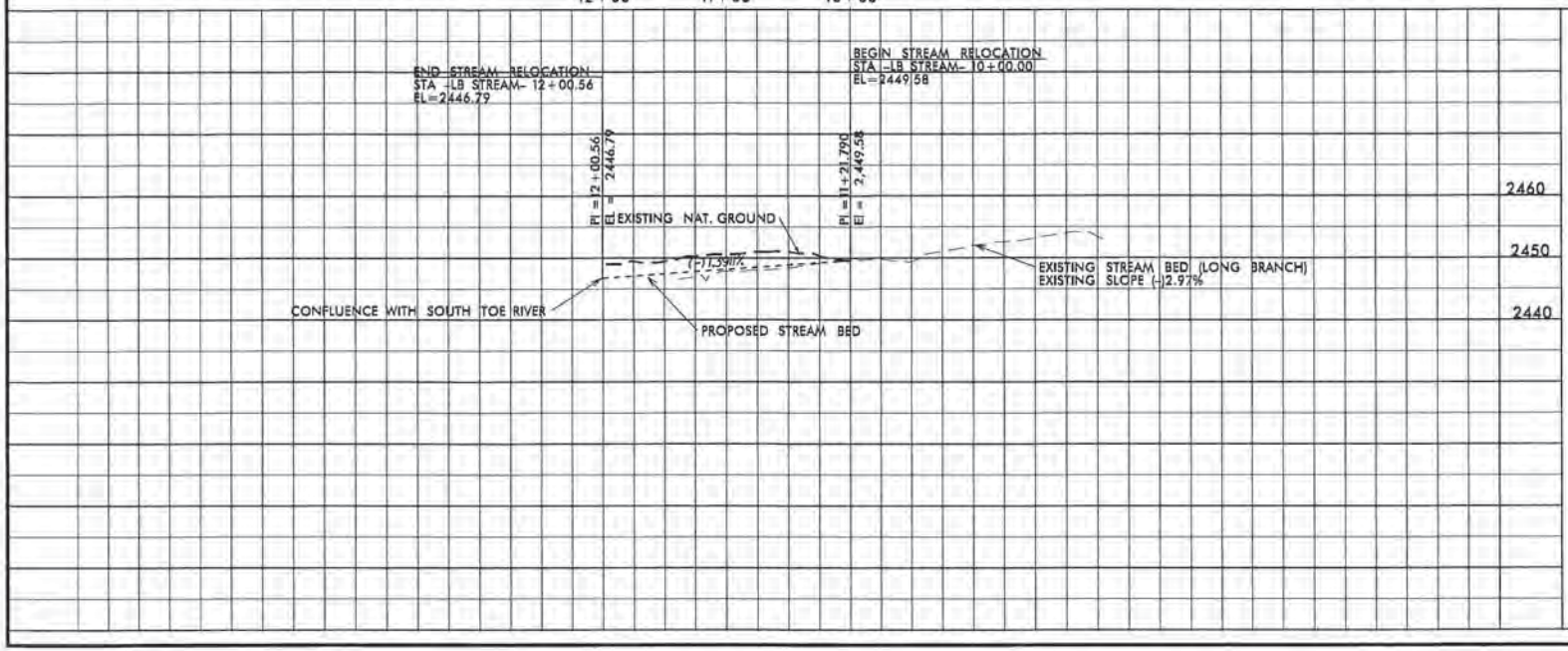
50' 0' 50' 100'
GRAPHIC SCALE



TYPICAL CHANNEL SECTION
(Not to Scale)



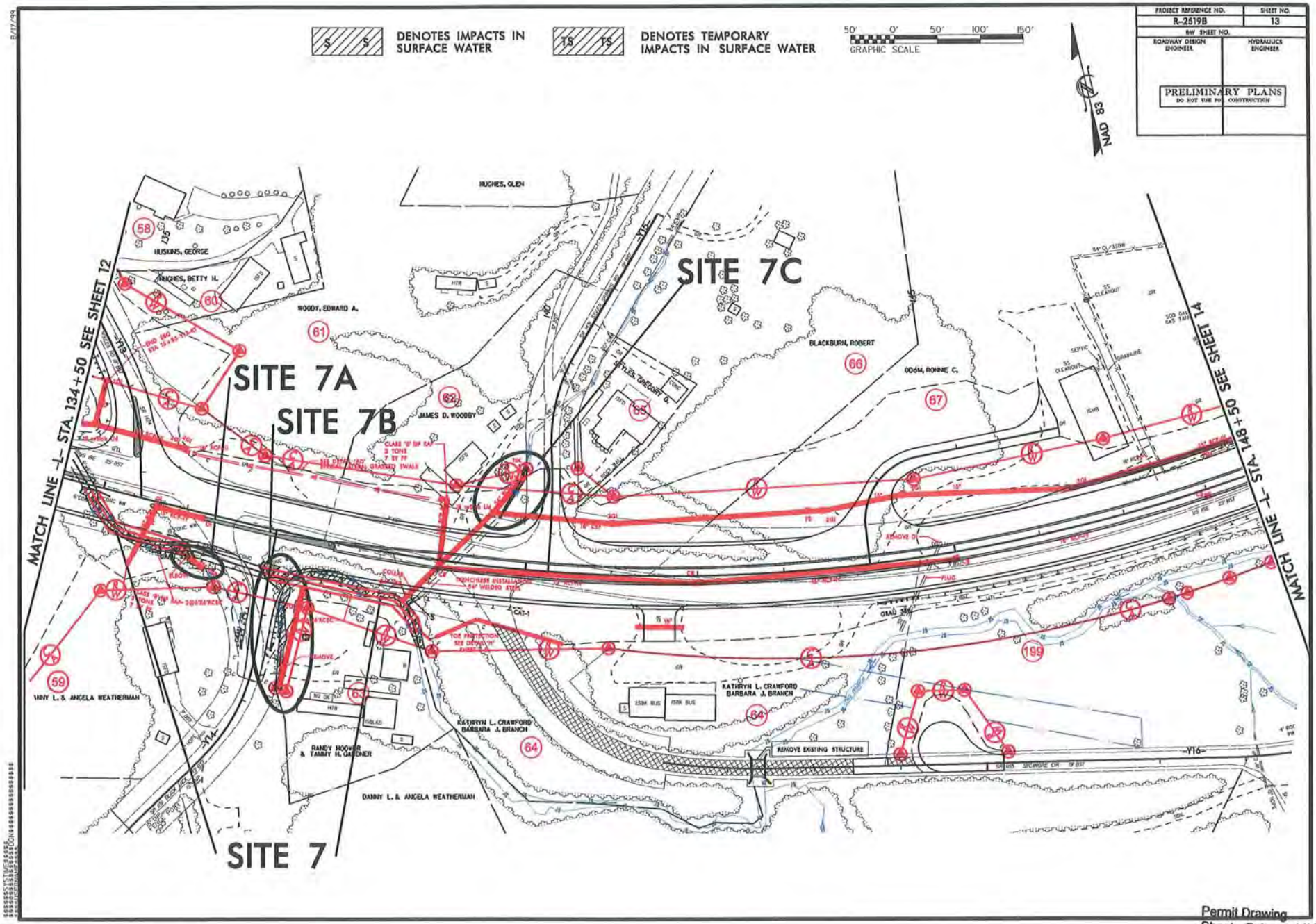
DETAIL CC



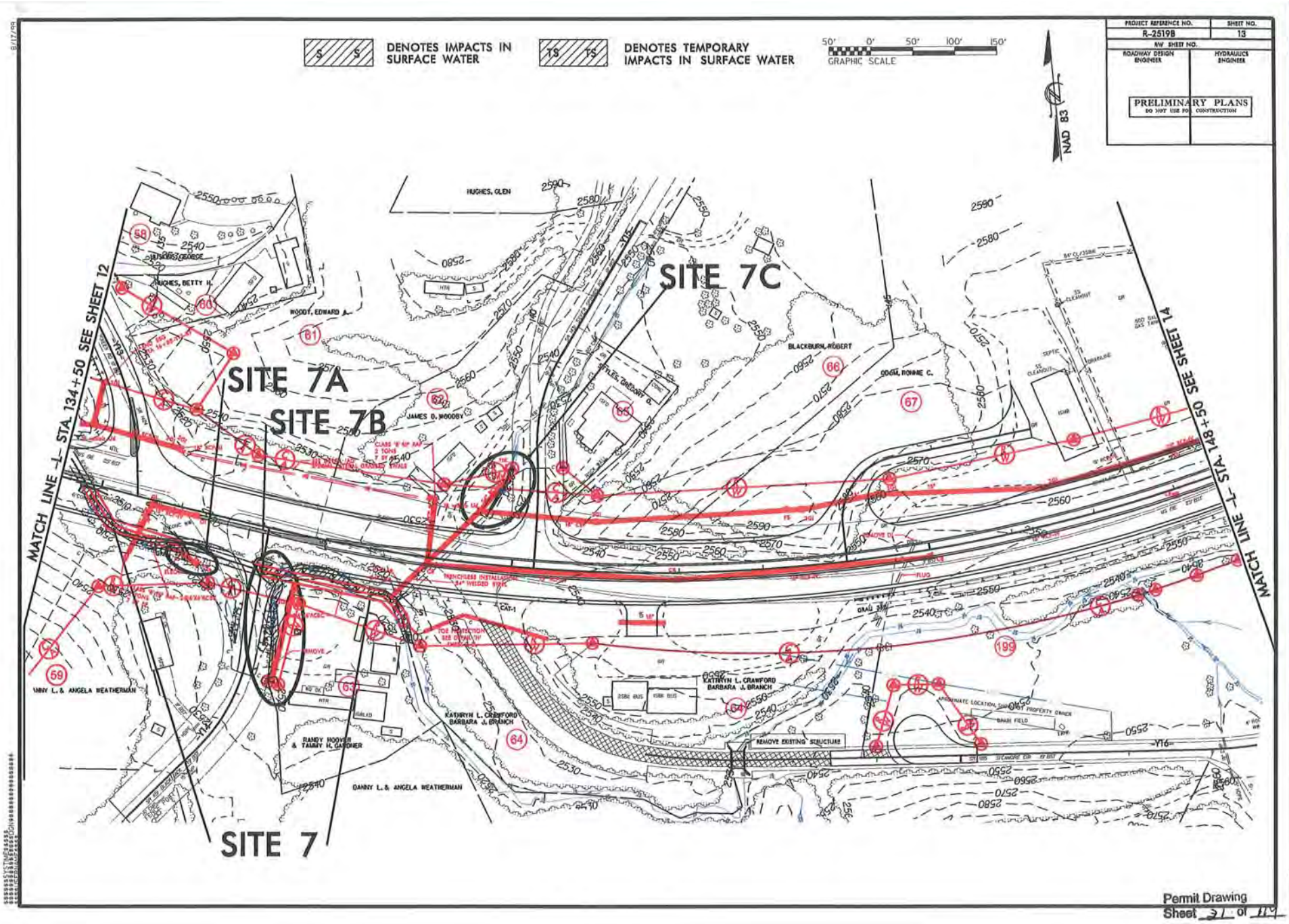
PROPOSED LONG BRANCH
HORIZONTAL ALIGNMENT
PI -LP STREAM- Sta 10+97.20
Δ = 5° 35' 17.0" (RT)
D = 8° 46' 14.7"
L = 637.1'
T = 318.8'
R = 653.26'

Permit Drawing
Sheet 29 of 114

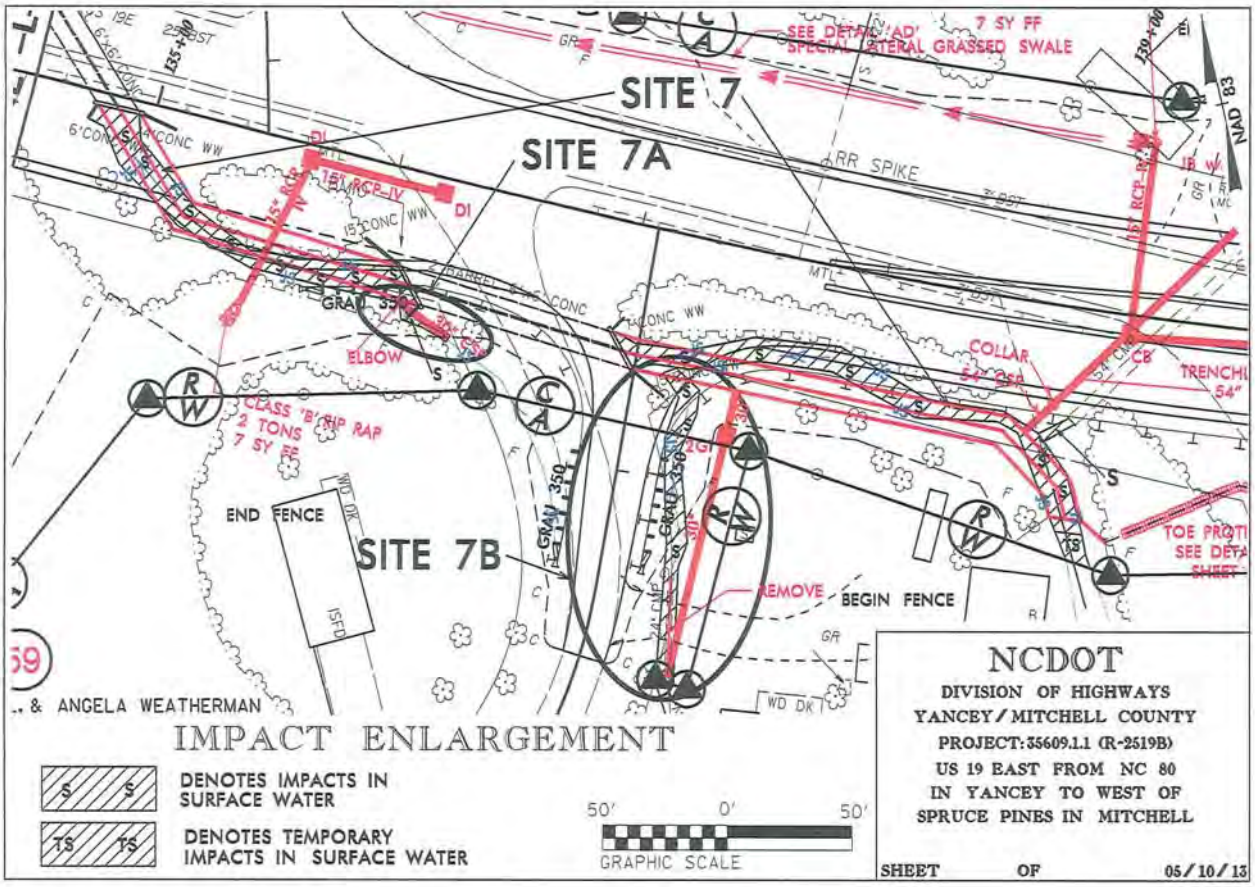
P-180

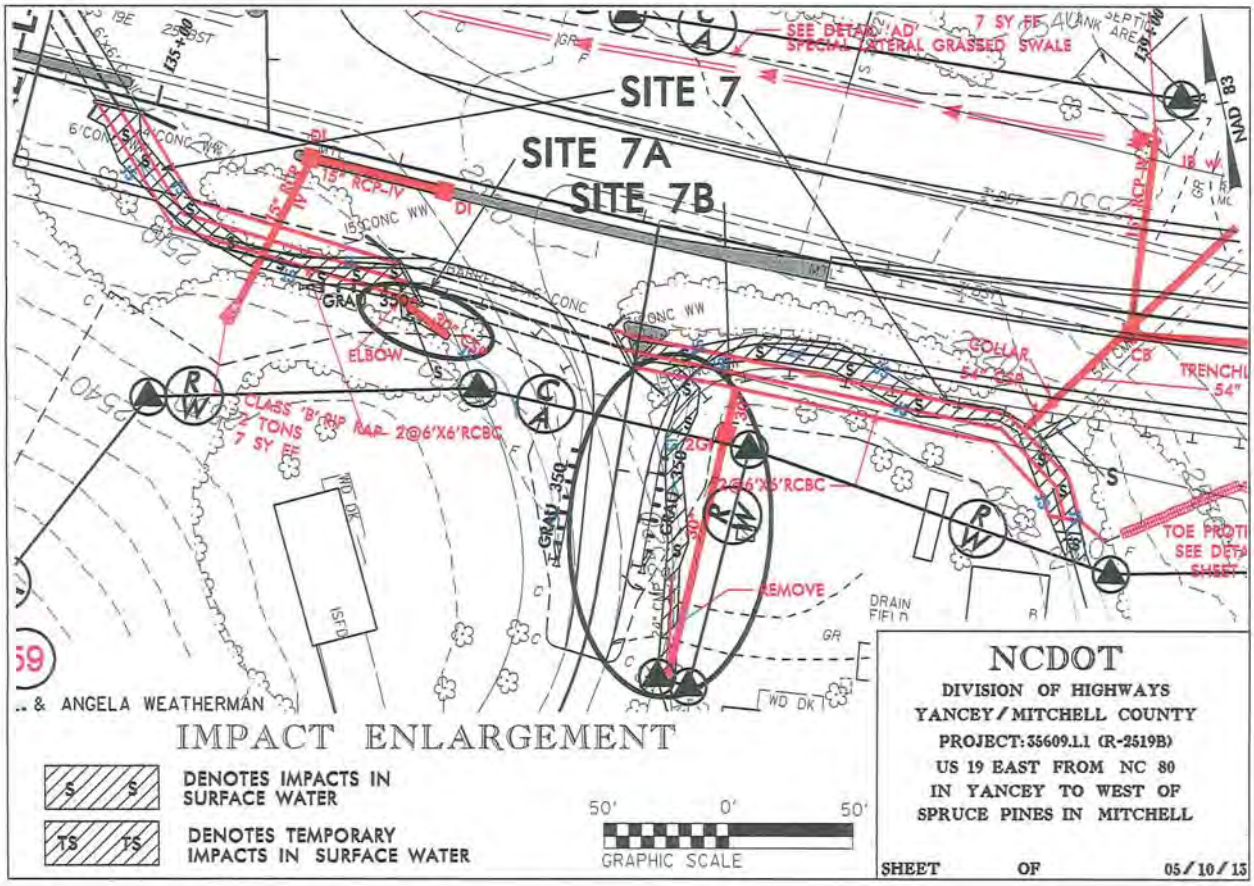

DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
NAD 83
PROJECT REFERENCE NO. R-2519B
SHEET NO. 13
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
MATCH LINE -L- STA 134+50 SEE SHEET 12
MATCH LINE -L- STA 148+50 SEE SHEET 14
SITE 7A
SITE 7B
SITE 7C
SITE 7
HUGHES, GLEN
HUSKINS, GEORGE
HUGHES, BETTY H.
WOODY, EDWARD A.
JAMES D. WOODBY
BLACKBURN, ROBERT
ODOM, RONNIE C.
DANNY L. & ANGELA WEATHERMAN
KATHRYN L. CRAWFORD
BARBARA J. BRANCH
RANDY HOOVER & TAMMY H. GARDNER
REMOVE EXISTING STRUCTURE
Permit Drawing
Sheet 30 of 114

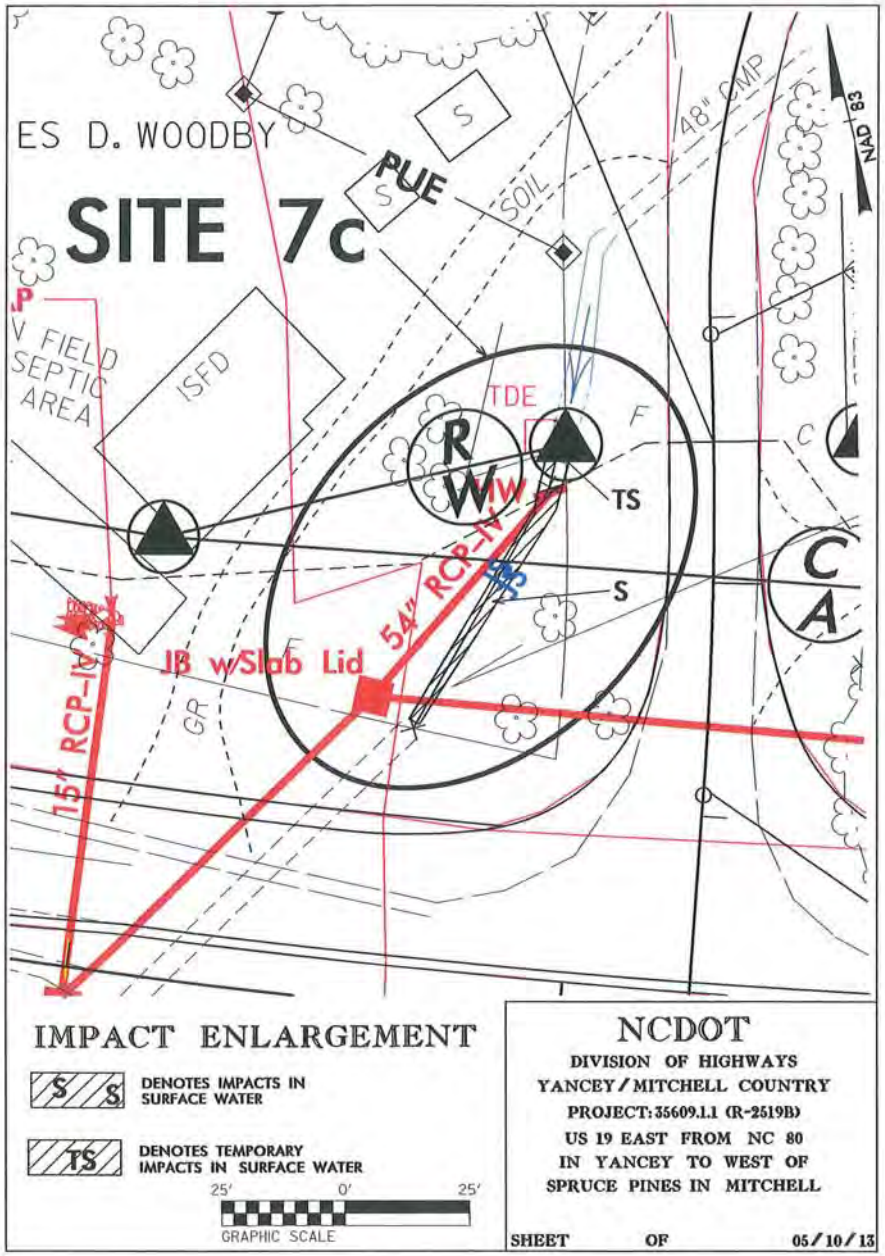
P-181

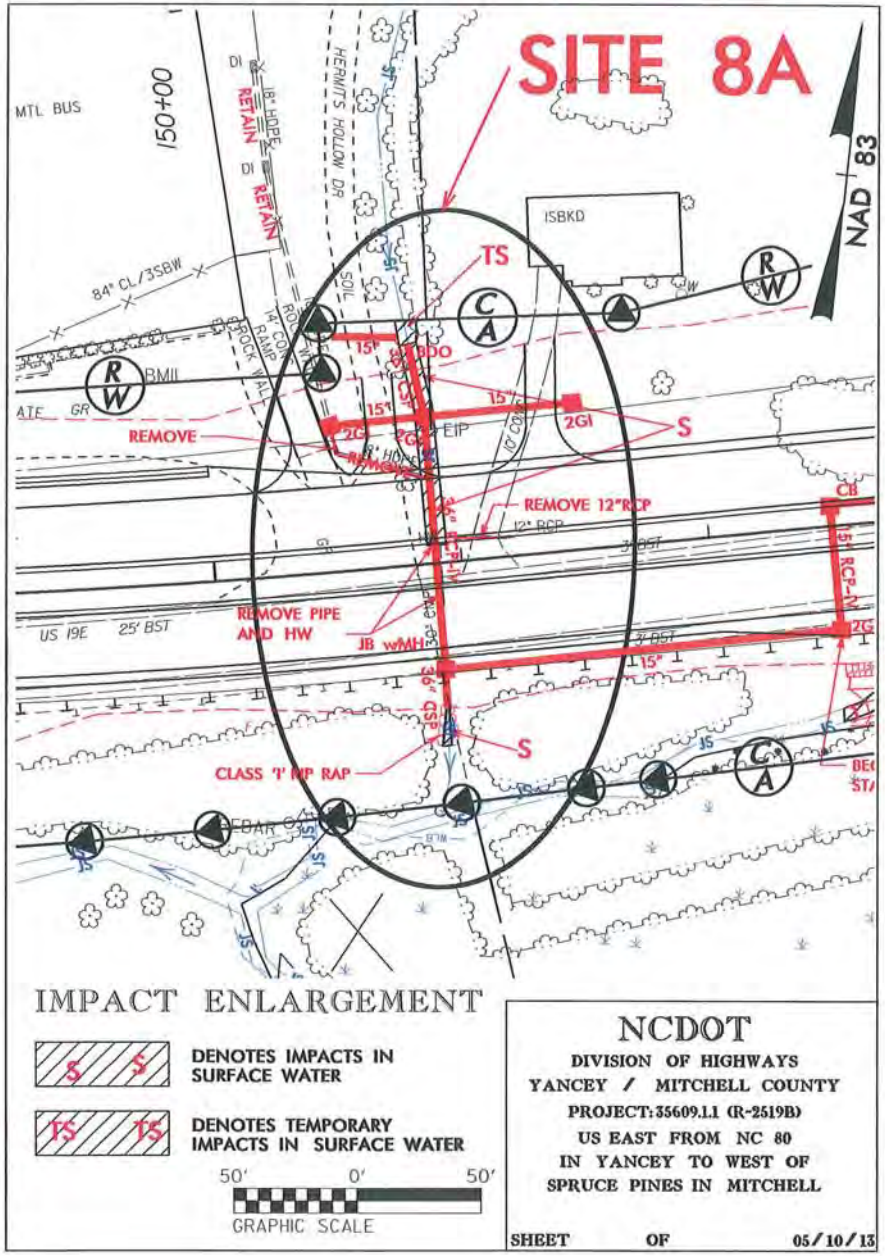

DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
NAD 83
PROJECT REFERENCE NO. R-2519B
SHEET NO. 13
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
MATCH LINE -L- STA. 134+50 SEE SHEET 12
MATCH LINE -L- STA. 148+50 SEE SHEET 14
SITE 7C
SITE 7A
SITE 7B
SITE 7
HUGHES, GLEN
HUGHES, BETTY H.
WOODY, EDWARD A.
JAMES O. WOODBY
BLACKBURN, ROBERT
ODOM, RONNIE C.
KATHRYN L. CRAWFORD
BARBARA J. BRANCH
RANDY HOOVER & TAMMY H. GARDNER
DANNY L. & ANGELA WEATHERMAN
REMOVE EXISTING STRUCTURE
Permit Drawing
Sheet 37 of 114

P-182


SITE 7
SITE 7A
SITE 7B
SEE DETAIL 'AD' SPECIAL LATERAL GRASSED SWALE
7 SY FF
RR SPIKE
15" RCP-IV
DI
ELBOW
CLASS 'B' RIP RAP
2 TONS
7 SY FF
END FENCE
REMOVE
BEGIN FENCE
COLLAR
TRENCH
TOE PROT
SEE DETA
SHEET
NAD 83
& ANGELA WEATHERMAN
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
50' 0' 50'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05 / 10 / 13

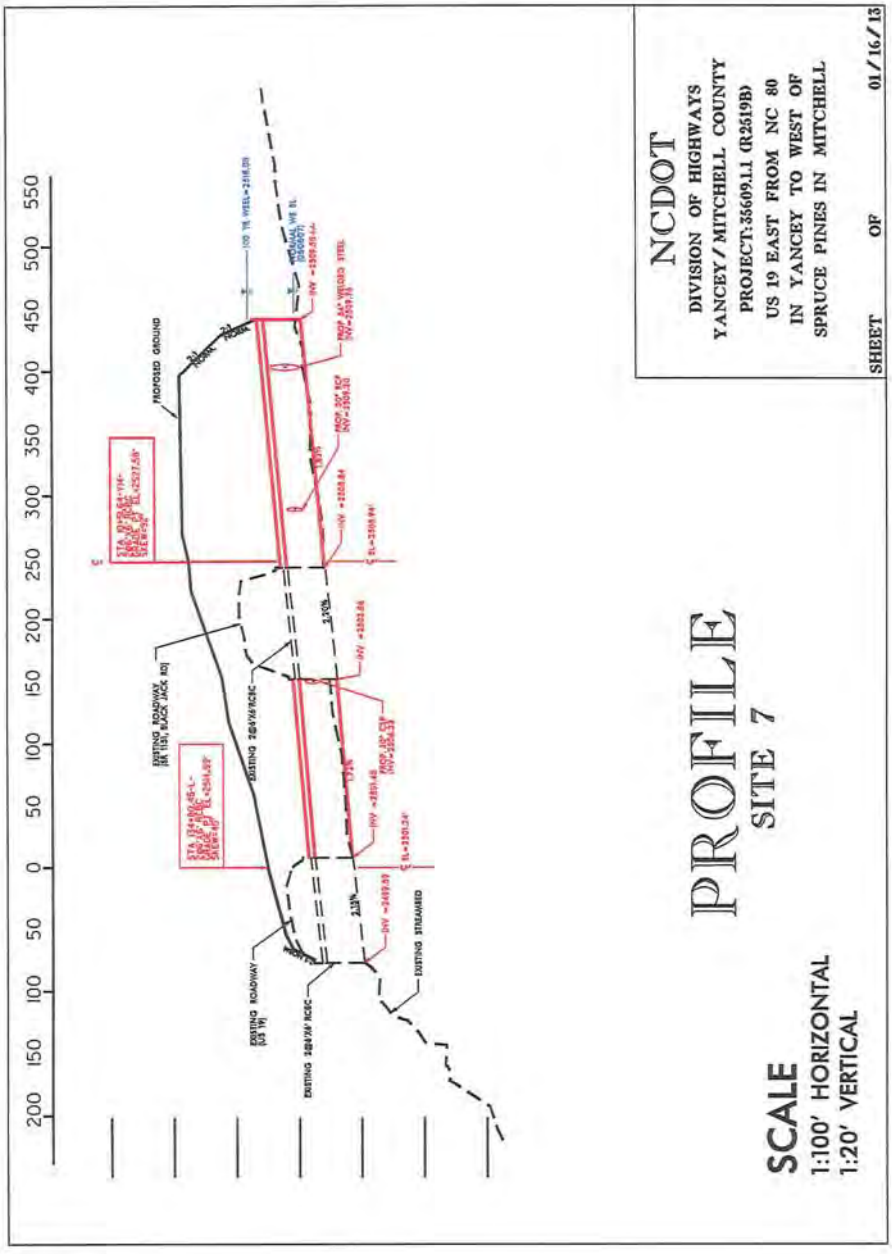

SITE 7
SITE 7A
SITE 7B
SEE DETAIL 'AD' SPECIAL LATERAL GRASSED SWALE
7 SY FF
15" RCP-IV
DI
ELBOW
CLASS 'B' RIP RAP 2@6'X6'RCBC
2 TONS
7 SY FF
2@6'X6'RCBC
REMOVE
DRAIN FIELD
COLLAR
TRENCH
TOE PROT
SEE DETA
SHEET
NAD 83
& ANGELA WEATHERMAN
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
50' 0' 50'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05 / 10 / 13

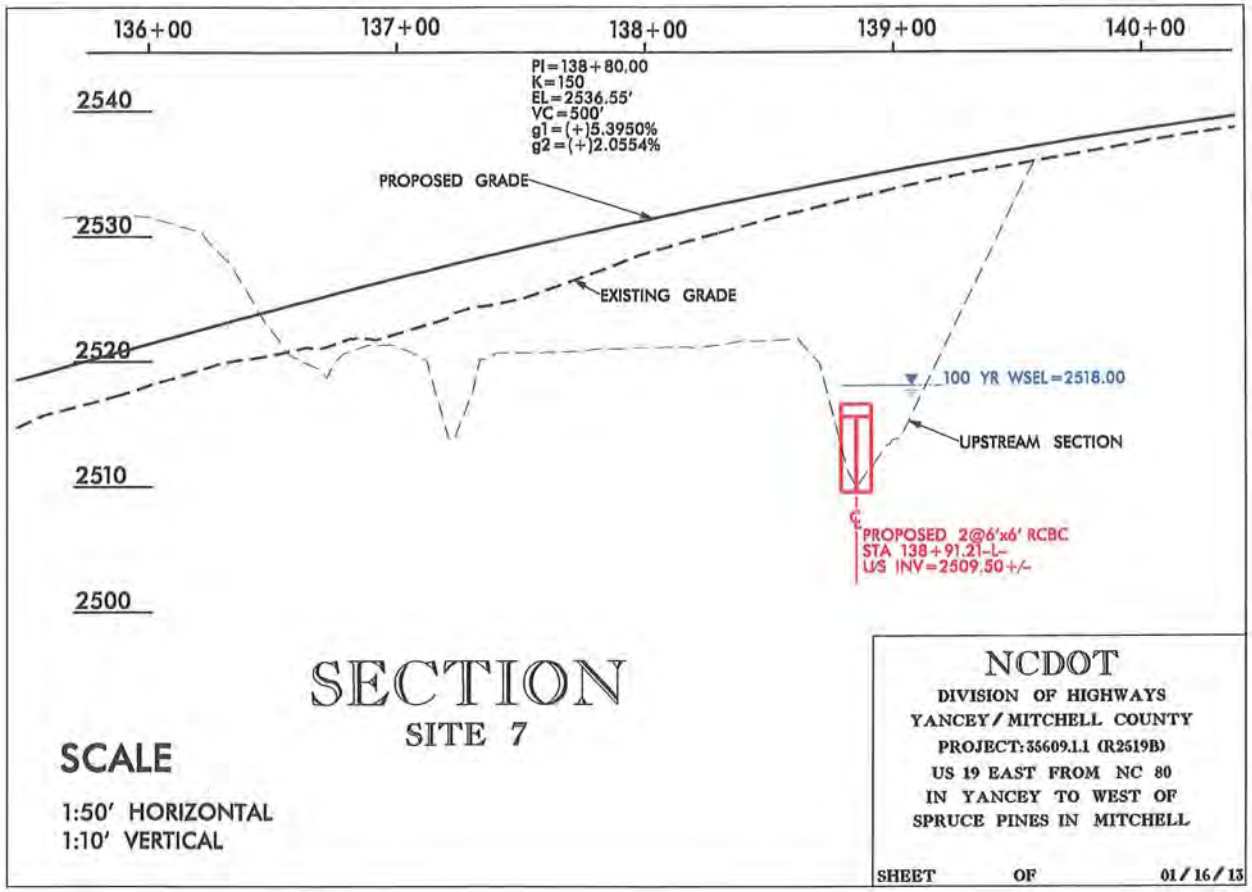




P-184

Permit Drawing
Sheet 33 of 114


NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 01/16/13
PROFILE
SITE 7
SCALE
1:100' HORIZONTAL
1:20' VERTICAL
200 150 100 50 0 50 100 150 200 250 300 350 400 450 500 550
PROPOSED GROUND
EXISTING ROADWAY
EXISTING ROADWAY RCBC
EXISTING STREAMBED



SECTION

SITE 7

SCALE

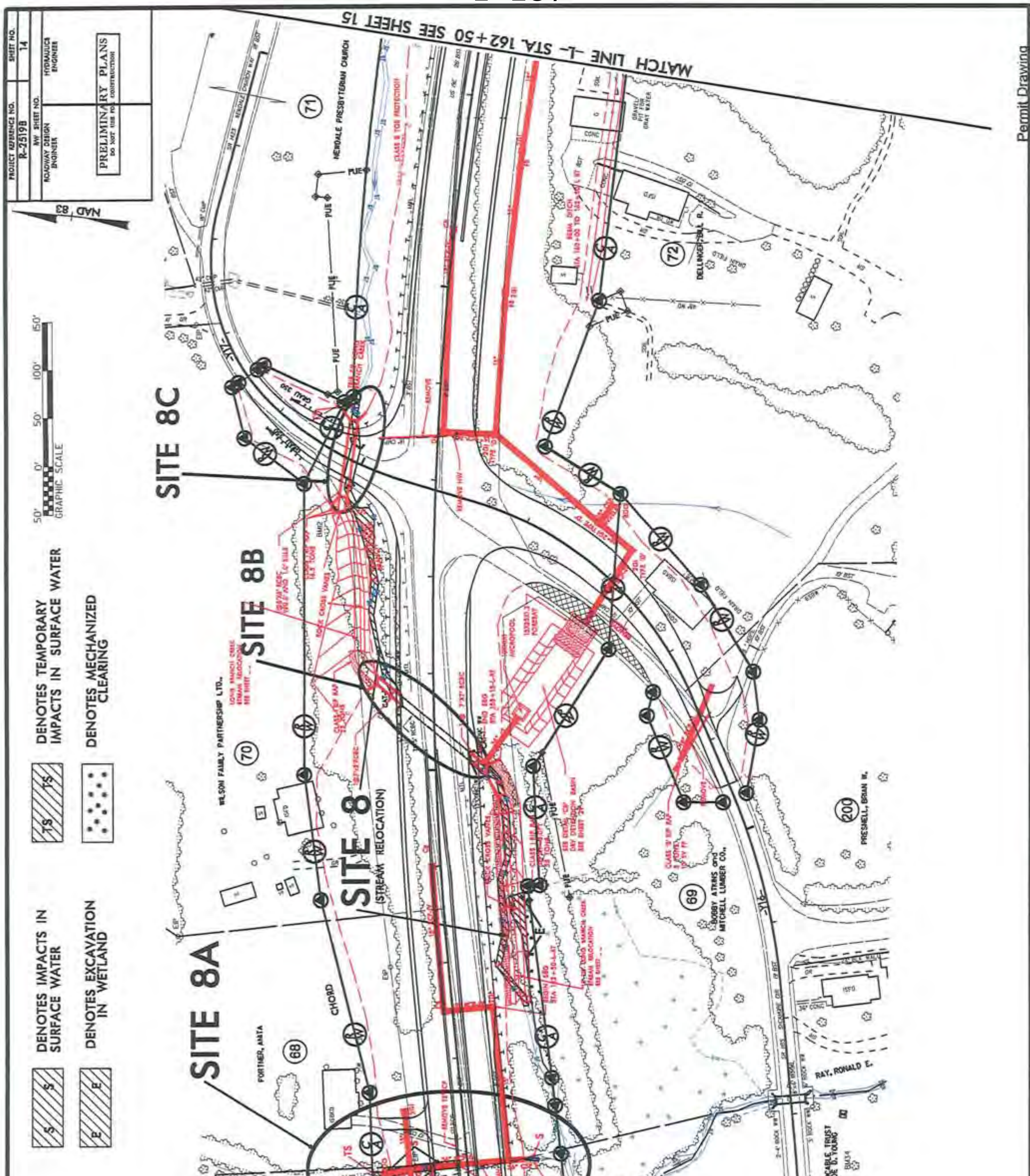
1:50' HORIZONTAL
1:10' VERTICAL

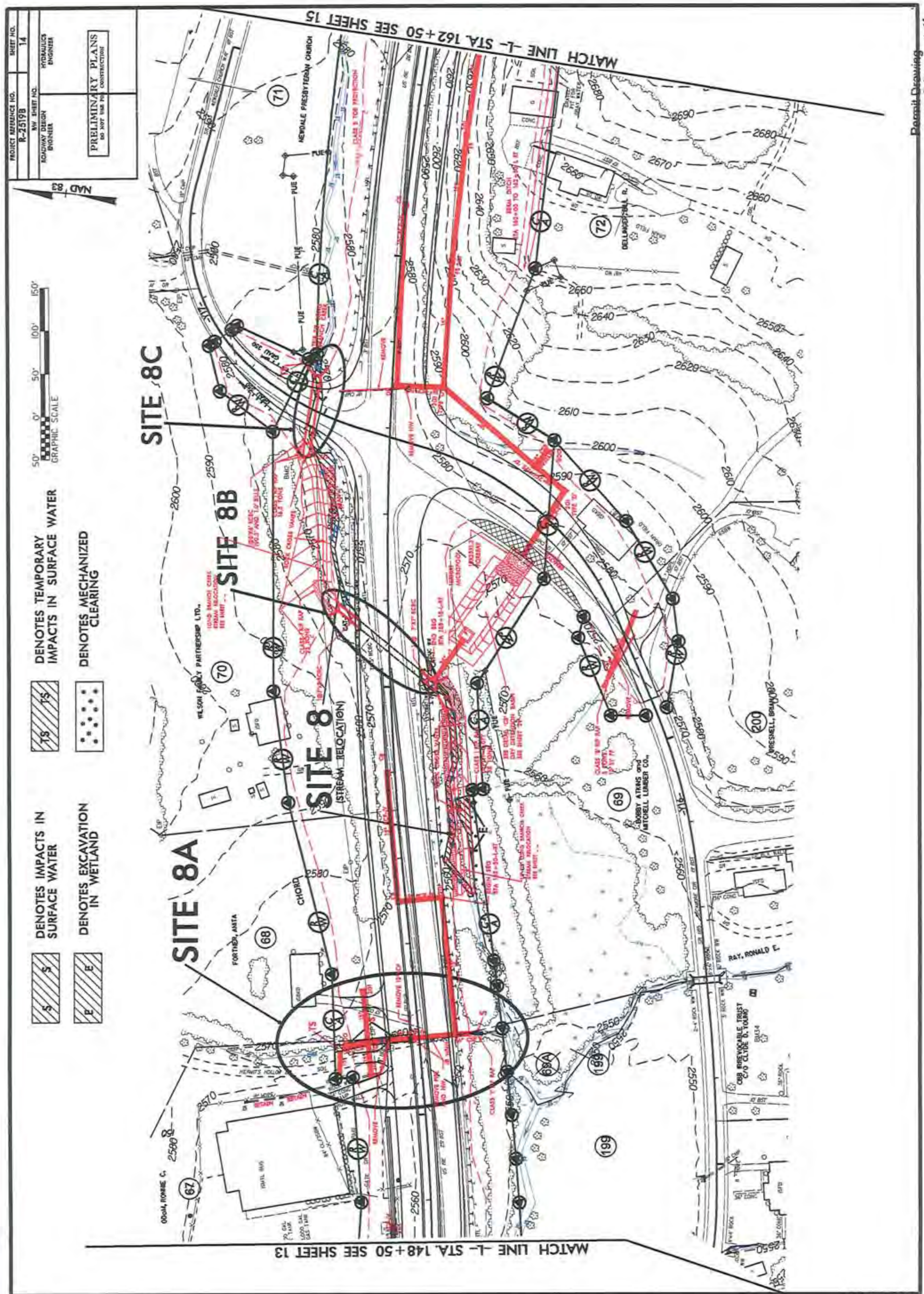
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL

SHEET OF 01/16/13

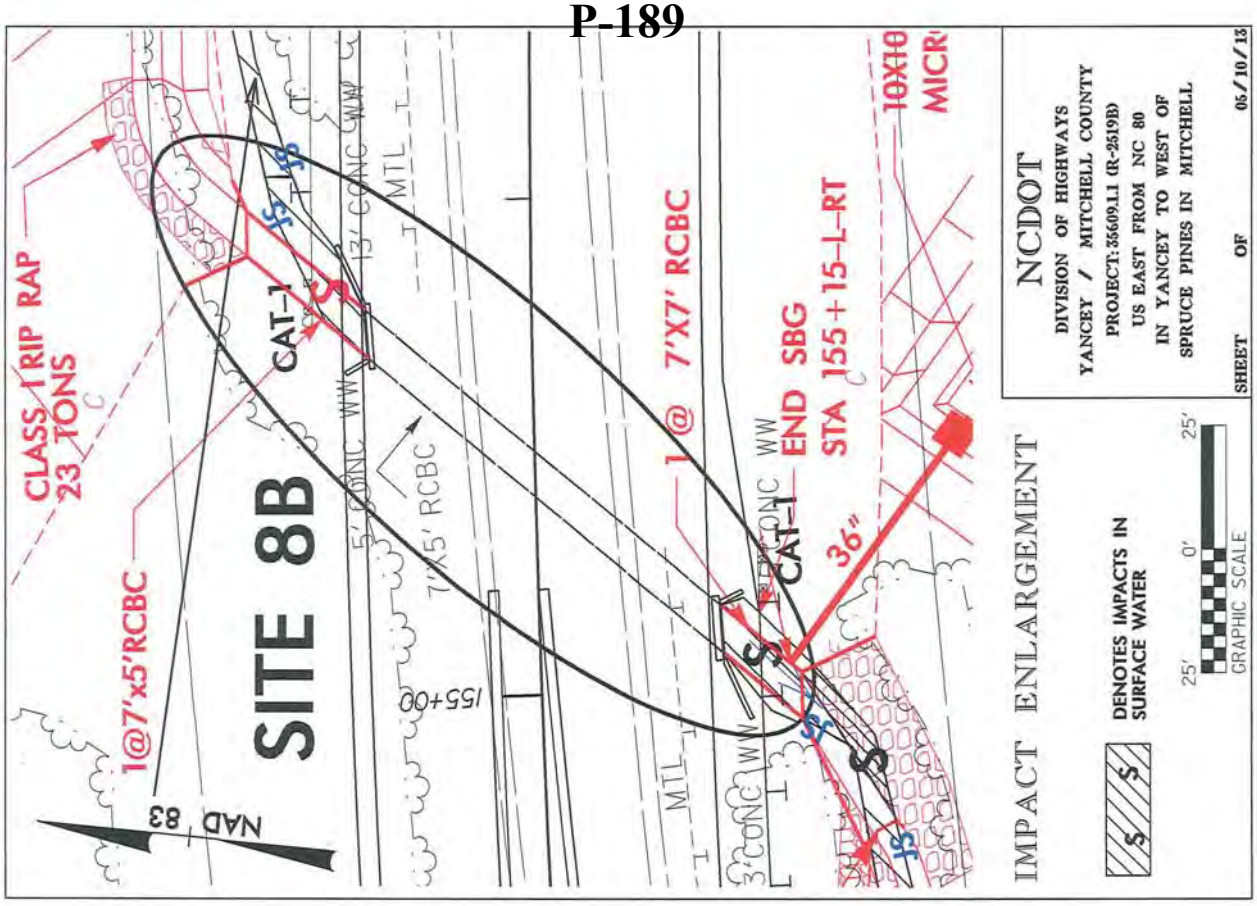
P-186

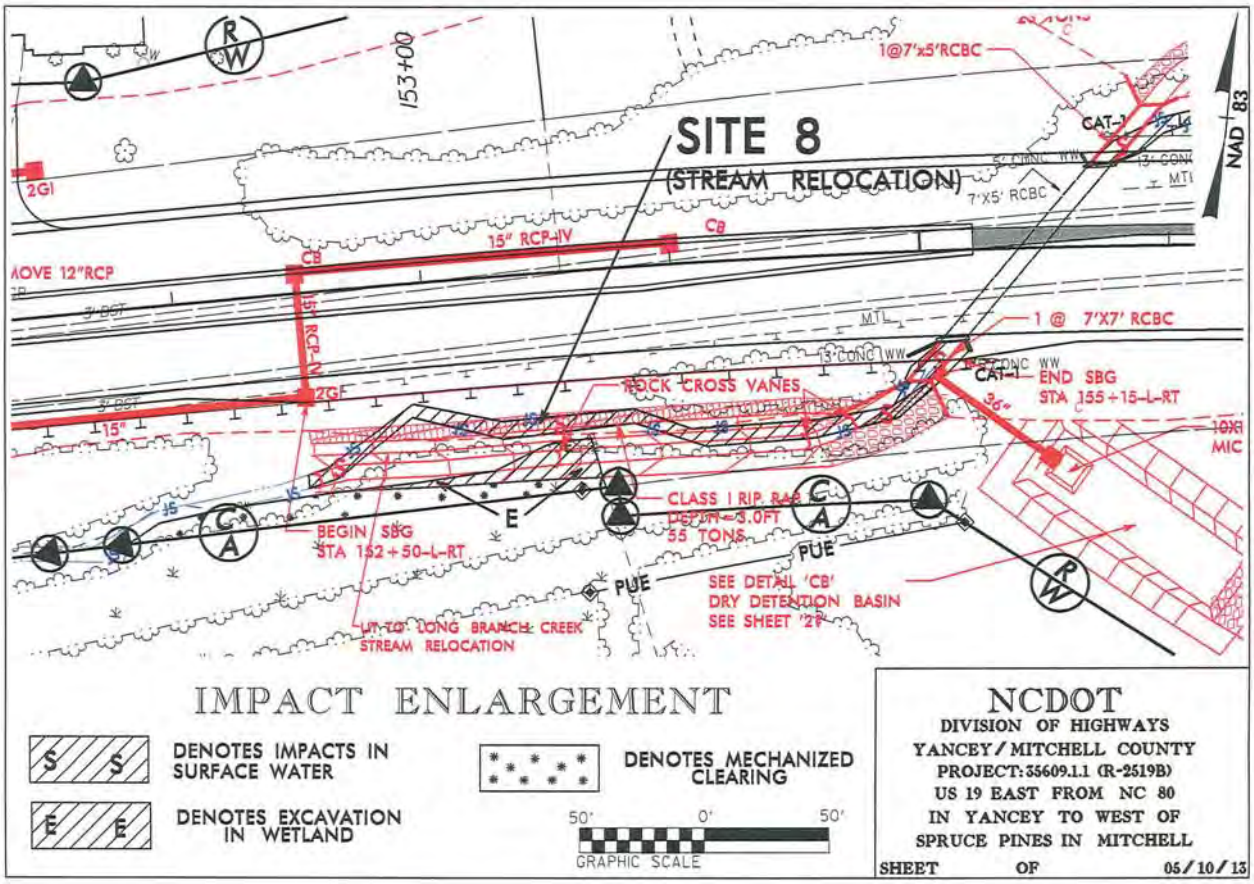
Permit Drawing
Sheet 25 of 114

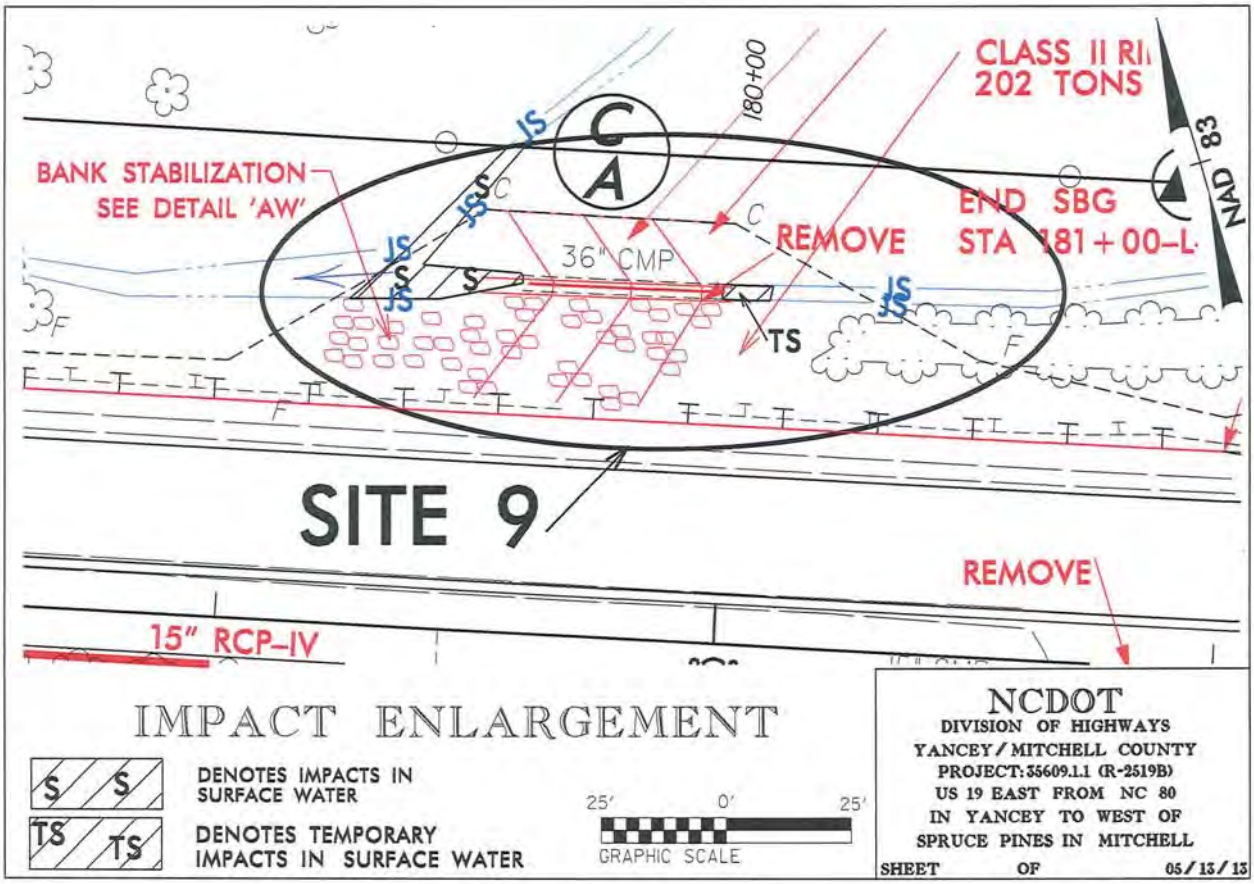

PROJECT REFERENCE NO. R-2519B
SHEET NO. 14
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83
GRAPHIC SCALE
50' 0' 50' 100' 150'
DENOTES IMPACTS IN SURFACE WATER
DENOTES EXCAVATION IN WETLAND
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES MECHANIZED CLEARING
SITE 8A
SITE 8
(STREAM RELOCATION)
SITE 8B
SITE 8C
MATCH LINE -L- STA. 162+50 SEE SHEET 15
MATCH LINE -L- STA. 148+50 SEE SHEET 13
HENDALE PRESBYTERIAN CHURCH
WILSON FAMILY PARTNERSHIP LTD.
FORTNER, ANITA
BOBBY ATKINS and MITCHELL LUMBER CO.
PRESNELL, BRIAN W.
RAY, RONALD E.
DELLINGER, BILL R.
71
72
70
68
67
69
200
199
69A
Permit Drawing
Sheet 36 of 114

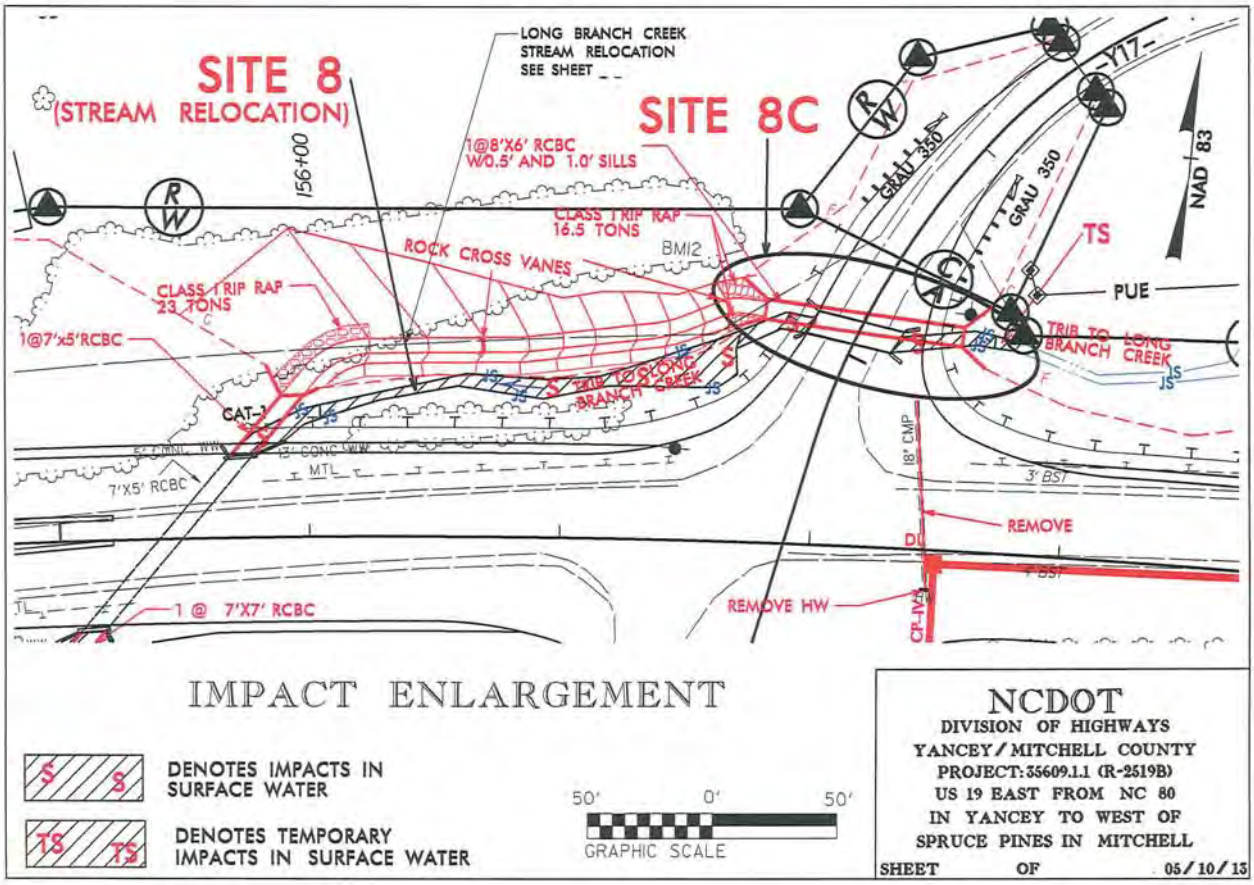


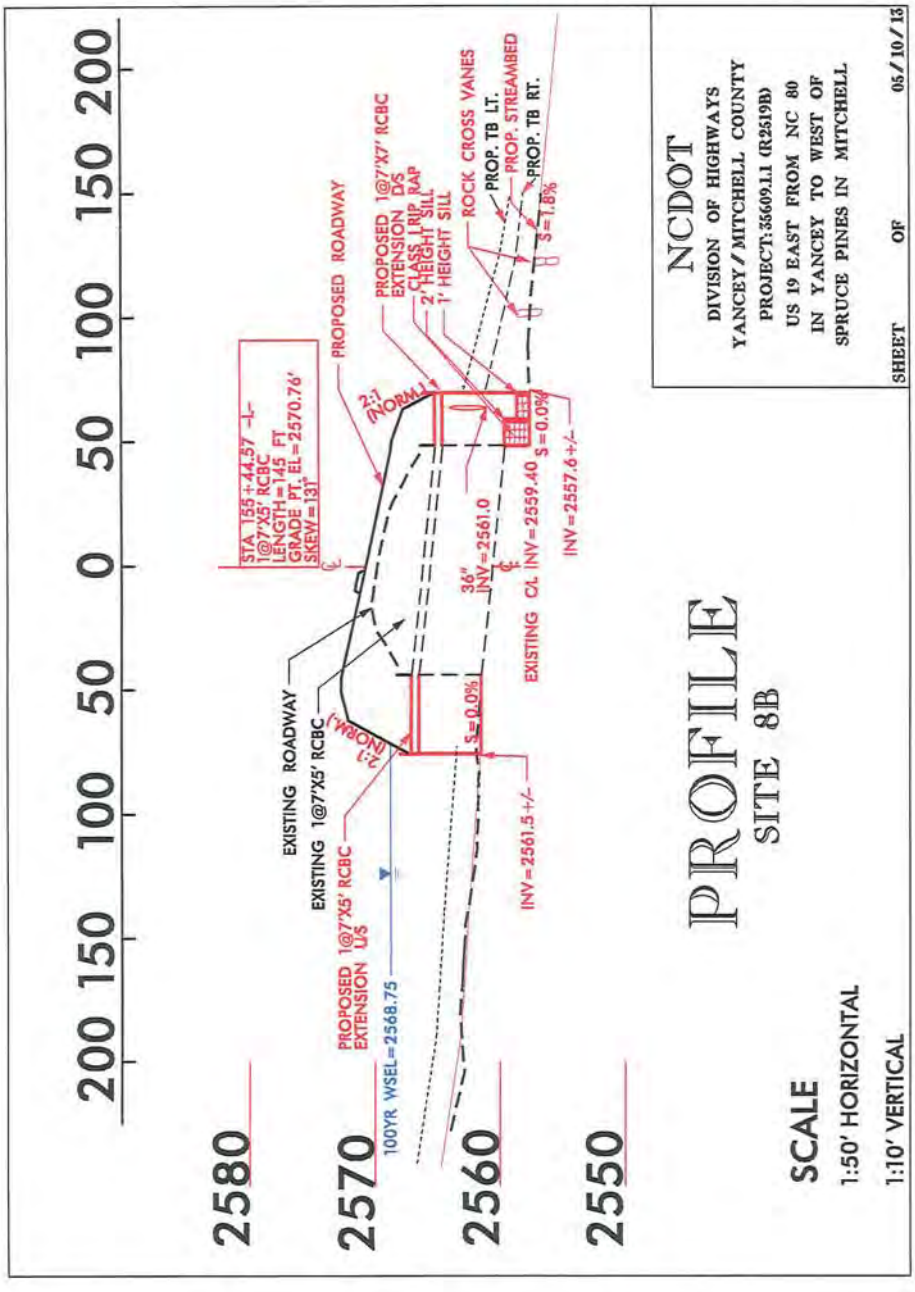
MATCH LINE -L- STA 162+50 SEE SHEET 15
MATCH LINE -L- STA 148+50 SEE SHEET 13
R-2519B
14
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83
GRAPHIC SCALE
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES EXCAVATION IN WETLAND
DENOTES MECHANIZED CLEARING
SITE 8A
SITE 8
(STREAM RELOCATION)
SITE 8B
SITE 8C
NEWDALE PRESBYTERIAN CHURCH
WILSON FAMILY PARTNERSHIP LTD.
BOBBY ATKINS and MITCHELL LUMBER CO.
RAY, RONALD E.
BRESSELL, BRANDON
Permit Drawing

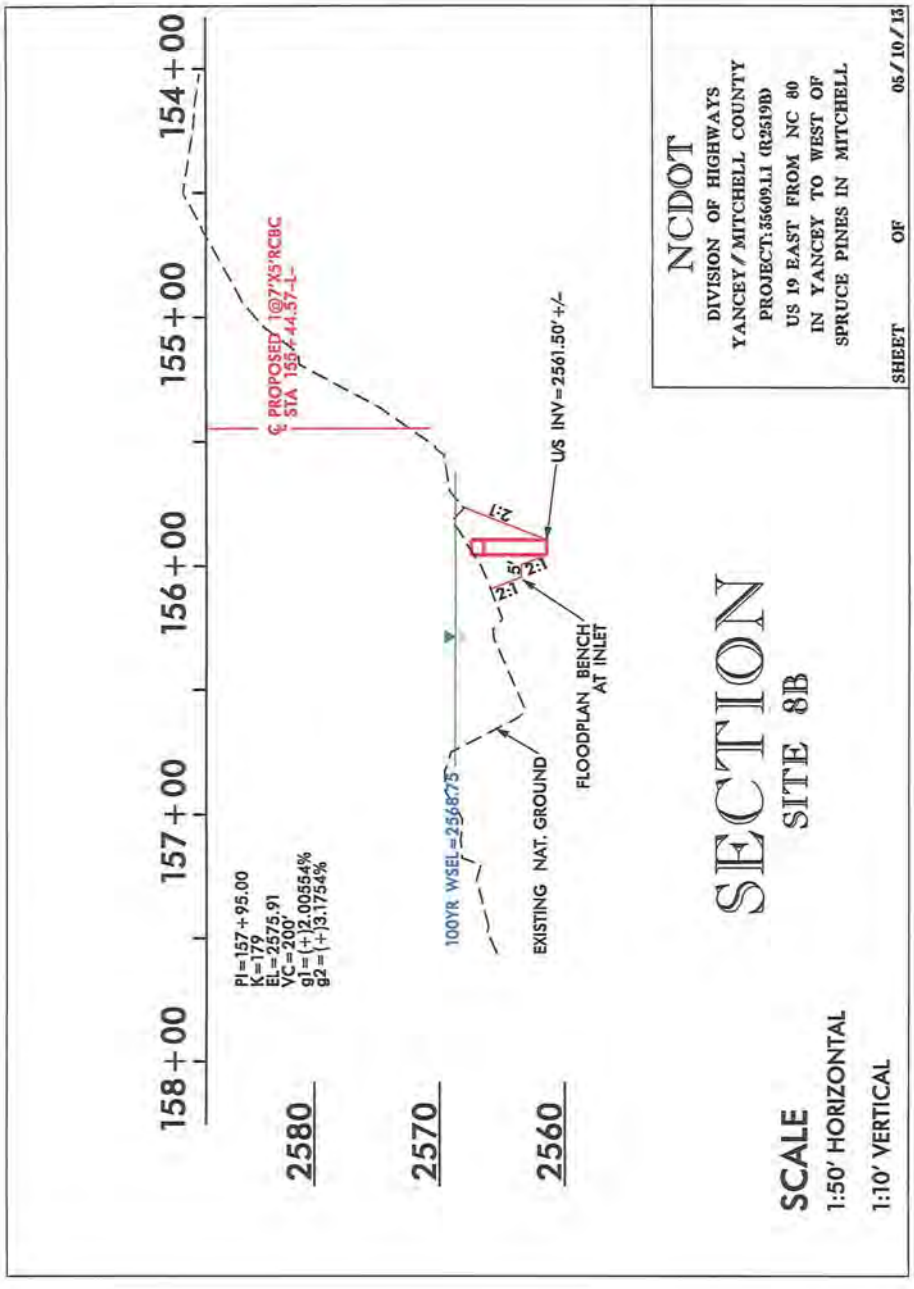

SITE 8B
CLASS I RIP RAP
23 TONS
1@7'x5'RCBC
CAT-1
5' CONC WW
13' CONC WW
MTL
7'X5' RCBC
155+00
1@ 7'X7' RCBC
END SBG
STA 155+15-L-RT
36"
NAD 83
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF
05/10/13

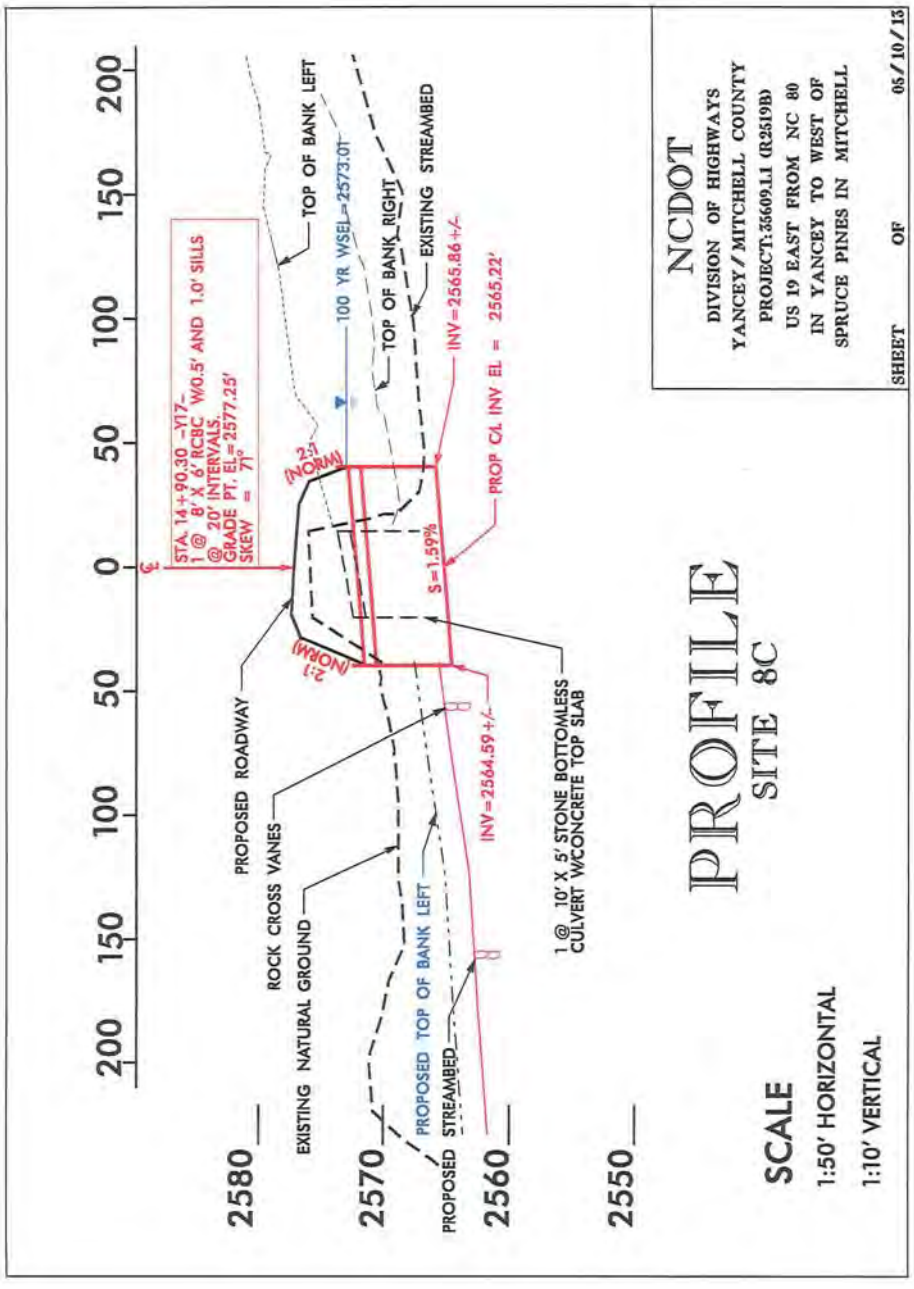

SITE 8
(STREAM RELOCATION)
153+00
1@7'x5'RCBC
CAT-1
7'X5' RCBC
NAD 83
15" RCP-IV
CB
ROCK CROSS VANES
1 @ 7'X7' RCBC
END SBG
STA 155+15-L-RT
CLASS I RIP RAP
DEPTH=3.0FT
55 TONS
BEGIN SBG
STA 152+50-L-RT
PUE
SEE DETAIL 'CB'
DRY DETENTION BASIN
SEE SHEET '21'
TIE TO LONG BRANCH CREEK
STREAM RELOCATION
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
DENOTES MECHANIZED CLEARING
DENOTES EXCAVATION IN WETLAND
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF
05/10/13

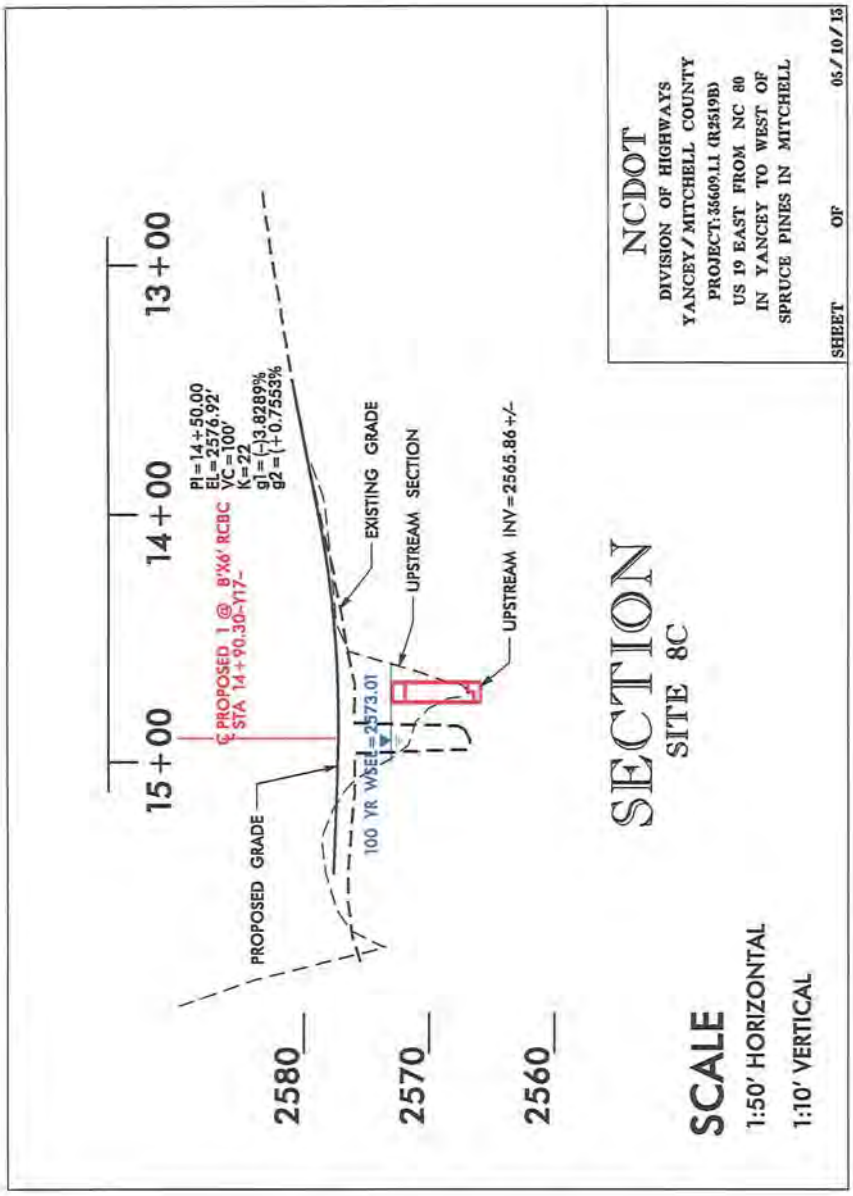

BANK STABILIZATION
SEE DETAIL 'AW'
180+00
CLASS II RI
202 TONS
END SBG
STA 181+00-L
NAD 83
REMOVE
36" CMP
TS
SITE 9
REMOVE
15" RCP-IV
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
25' 0' 25'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05/13/13


SITE 8
(STREAM RELOCATION)
LONG BRANCH CREEK
STREAM RELOCATION
SEE SHEET --
156+00
SITE 8C
1@8'X6' RCBC
W/0.5' AND 1.0' SILLS
CLASS I RIP RAP
16.5 TONS
ROCK CROSS VANES
BMI2
CLASS I RIP RAP
23 TONS
1@7'x5'RCBC
CAT-1
7'X5' RCBC
1 @ 7'X7' RCBC
GRAU 350
NAD 83
TS
PUE
TRIB TO LONG BRANCH CREEK
18" CMP
3' BST
REMOVE
REMOVE HW
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
50' 0' 50'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05/10/13




158+00
157+00
156+00
155+00
154+00
2580
2570
2560
PI=157+95.00
K=179
EL=2575.91
VC=200'
g1=(+)2.00554%
g2=(+)3.1754%
℄ PROPOSED 1@7'X5'RCBC
STA 155+44.37 -L-
100YR WSEL=2568.75'
EXISTING NAT. GROUND
FLOODPLAN BENCH AT INLET
US INV=2561.50'+/-
2:1
5'
2:1
2:1
SECTION
SITE 8B
SCALE
1:50' HORIZONTAL
1:10' VERTICAL
NCDOT
DIVISION OF HIGHWAYS
YANCEY/MITCHELL COUNTY
PROJECT: 35609.1.1 (R2519D)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF
05/10/13

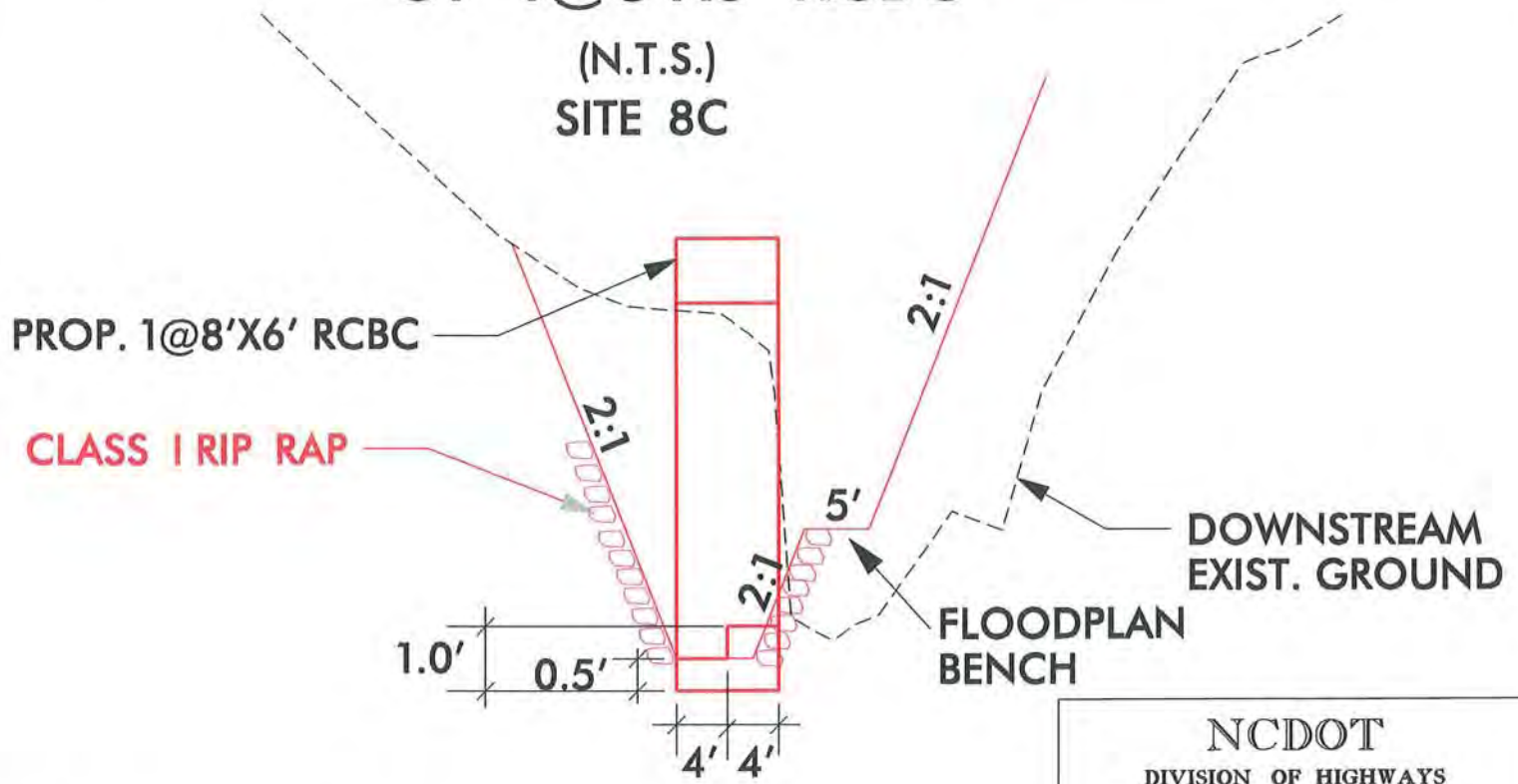

NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R2519D)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05 / 10 / 13
PROFILE
SITE 8C
SCALE
1:50' HORIZONTAL
1:10' VERTICAL
2580
2570
2560
2550
200 150 100 50 0 50 100 150 200
STA. 14+90.30 -Y17-
1 @ 8' X 6' RCBC W/0.5' AND 1.0' SILLS
@ 20' INTERVALS
GRADE PT. EL= 2577.25'
SKEW = 71°
PROPOSED ROADWAY
ROCK CROSS VANES
EXISTING NATURAL GROUND
PROPOSED TOP OF BANK LEFT
PROPOSED STREAMBED
INV=2564.59+/-
1 @ 10' X 5' STONE BOTTOMLESS
CULVERT W/CONCRETE TOP SLAB
2:1 (NORM)
2:1 (NORM)
S=1.59%
100 YR WSEL=2573.01'
TOP OF BANK LEFT
TOP OF BANK RIGHT
EXISTING STREAMBED
INV=2565.86+/-
PROP C/L INV EL = 2565.22'



DETAIL OF SILLS AT DOWNSTREAM FACE OF 1@8'X6' RCBC

(N.T.S.)

SITE 8C



NOTE: SPACE ALTERNATING 0.5' AND 1.0' HIGH SILLS @ 20' INTERVALS.

NCDOT

DIVISION OF HIGHWAYS

YANCEY / MITCHELL COUNTY

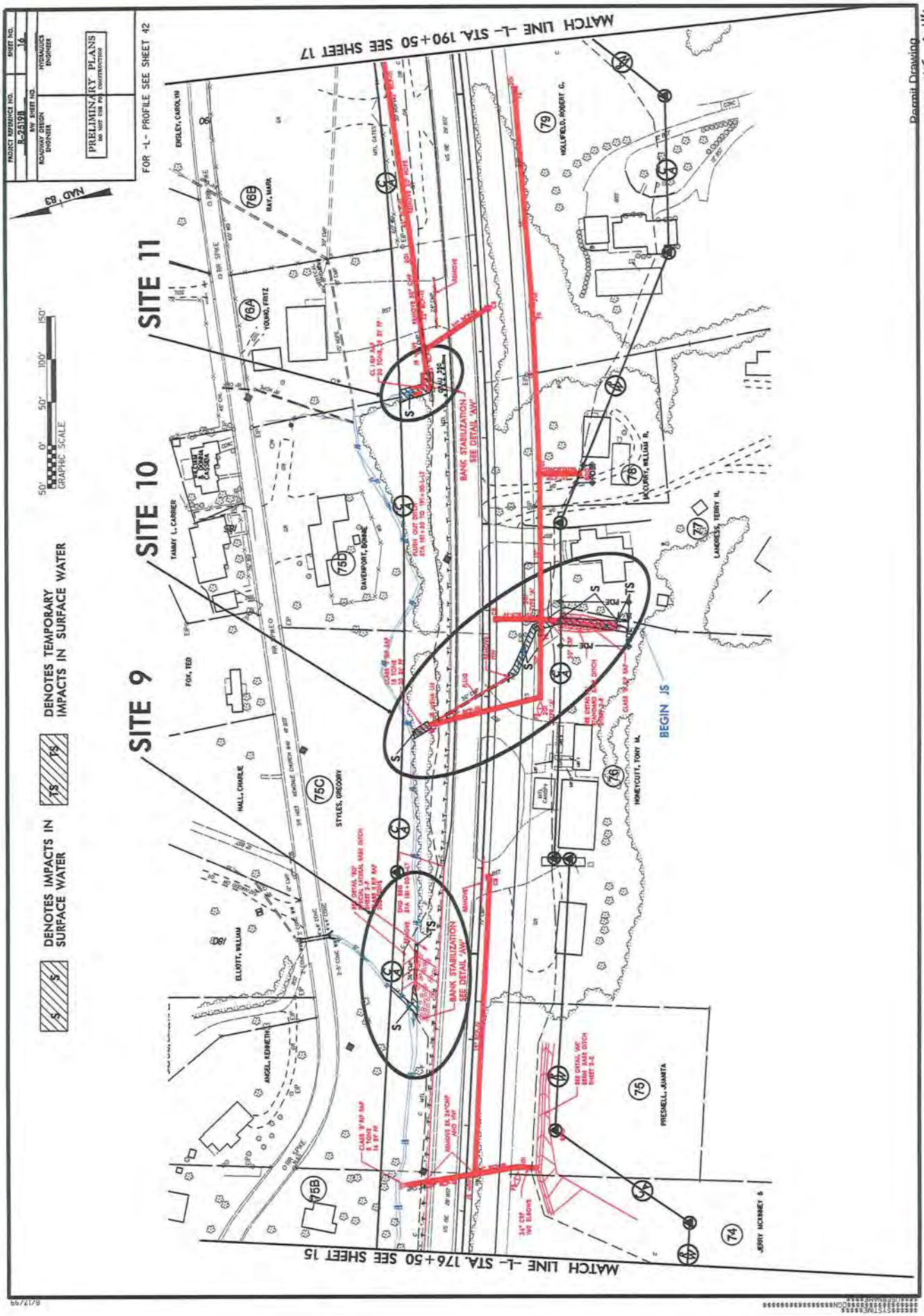
PROJECT: 35609.1.1 (R2519B)

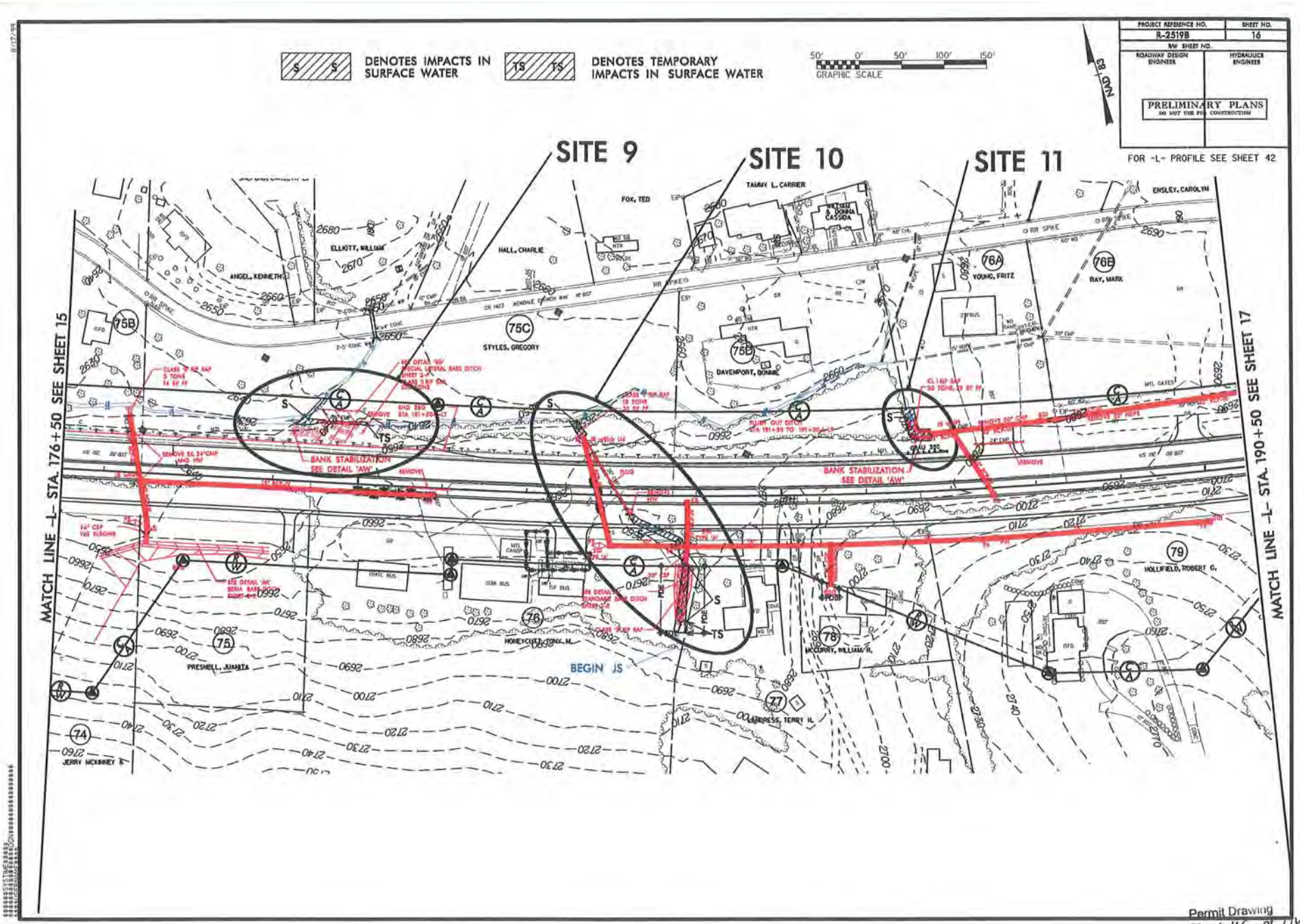
US 19 EAST FROM NC 80 IN YANCEY TO WEST OF SPRUCE PINES IN MITCHELL

SHEET OF 05 / 10 / 13

P-195

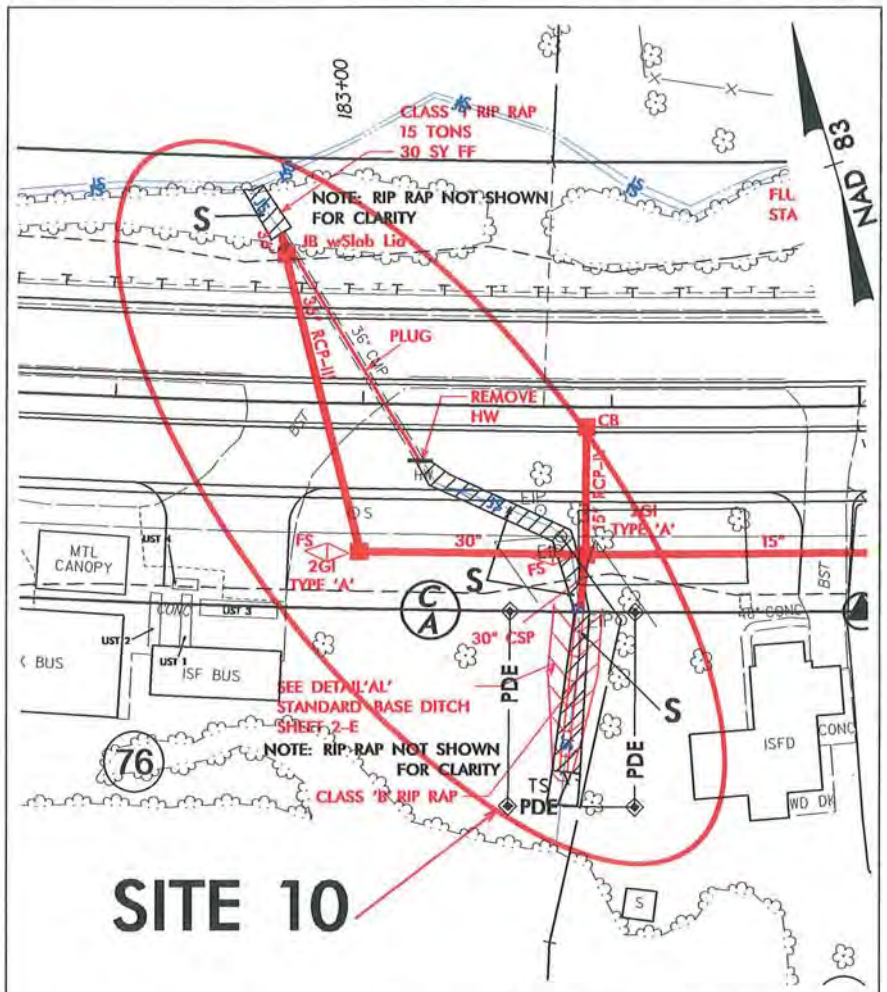
Permit Drawing
Sheet 44 of 44


SITE 9
SITE 10
SITE 11
MATCH LINE -L- STA. 176+50 SEE SHEET 15
MATCH LINE -L- STA. 190+50 SEE SHEET 17
FOR -L- PROFILE SEE SHEET 42
PRELIMINARY PLANS
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
BEGIN JS
BANK STABILIZATION SEE DETAIL 'AW'
Permit Drawing
Sheet 45 of 114



P-197

Permit Drawing
Sheet 46 of 74



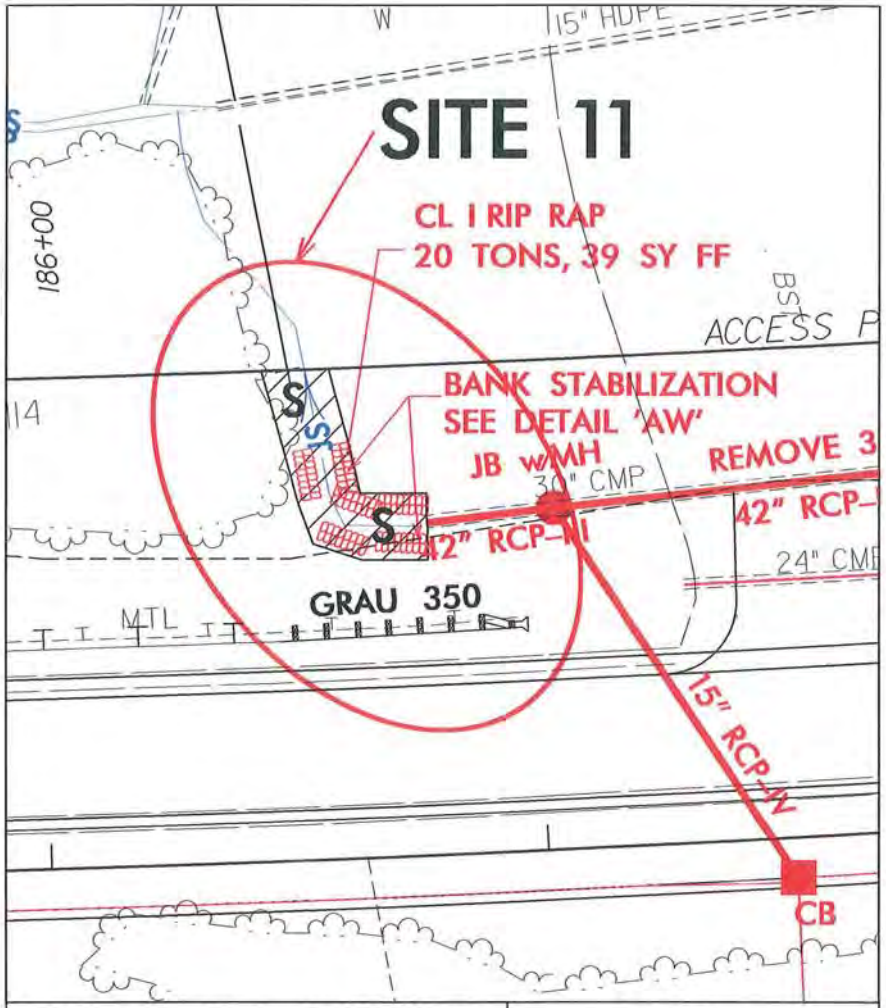
IMPACT ENLARGEMENT

S S DENOTES IMPACTS IN SURFACE WATER

50' 0' 50'
GRAPHIC SCALE

NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTRY
PROJECT: 35609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL

SHEET OF 05 / 13 / 13



IMPACT ENLARGEMENT

S S DENOTES IMPACTS IN SURFACE WATER

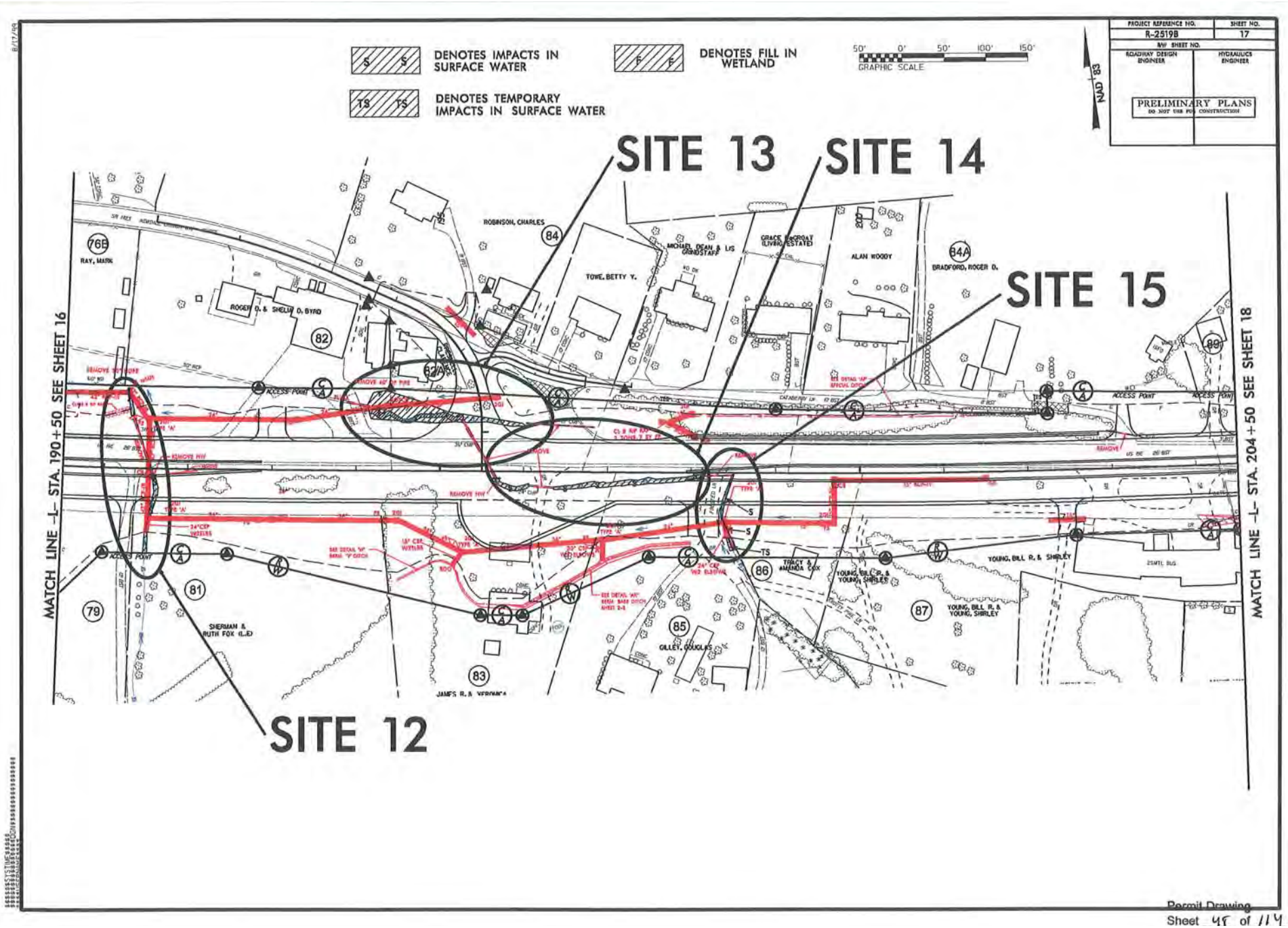
25' 0' 25'
GRAPHIC SCALE

NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTRY
PROJECT: 35609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL

SHEET OF 05 / 13 / 13

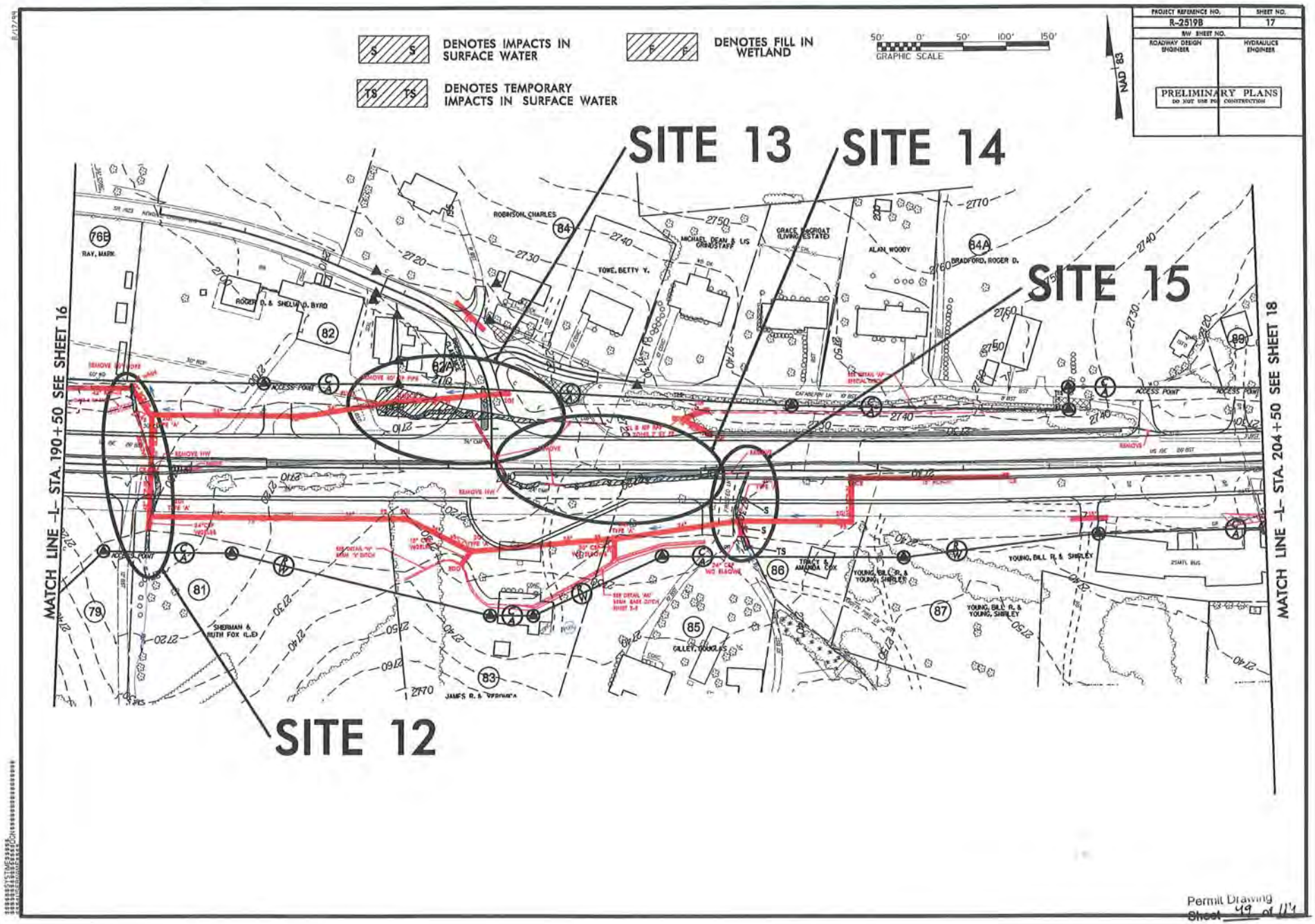
P-198

Permit Drawing
Sheet 47 of 114



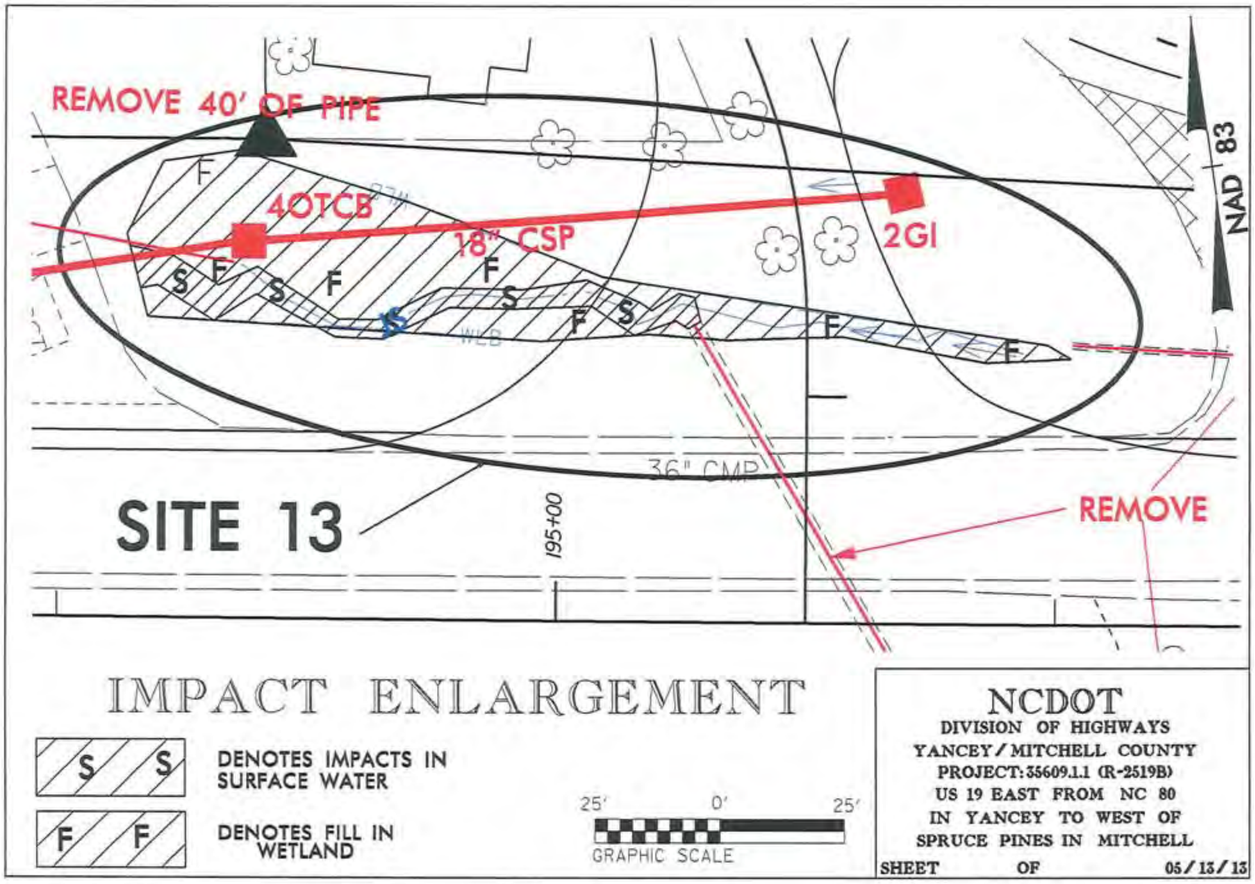
P-199

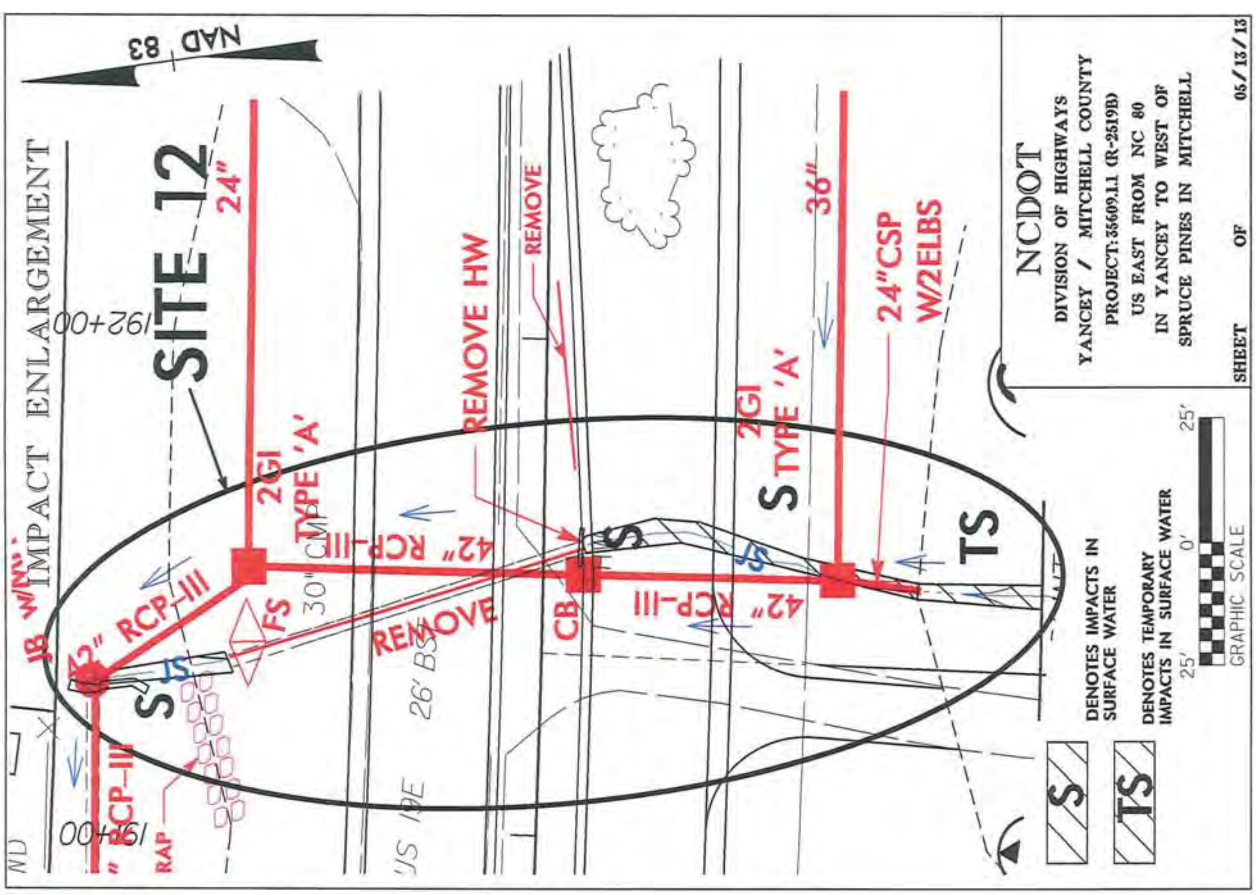
Permit Drawing
Sheet 48 of 114

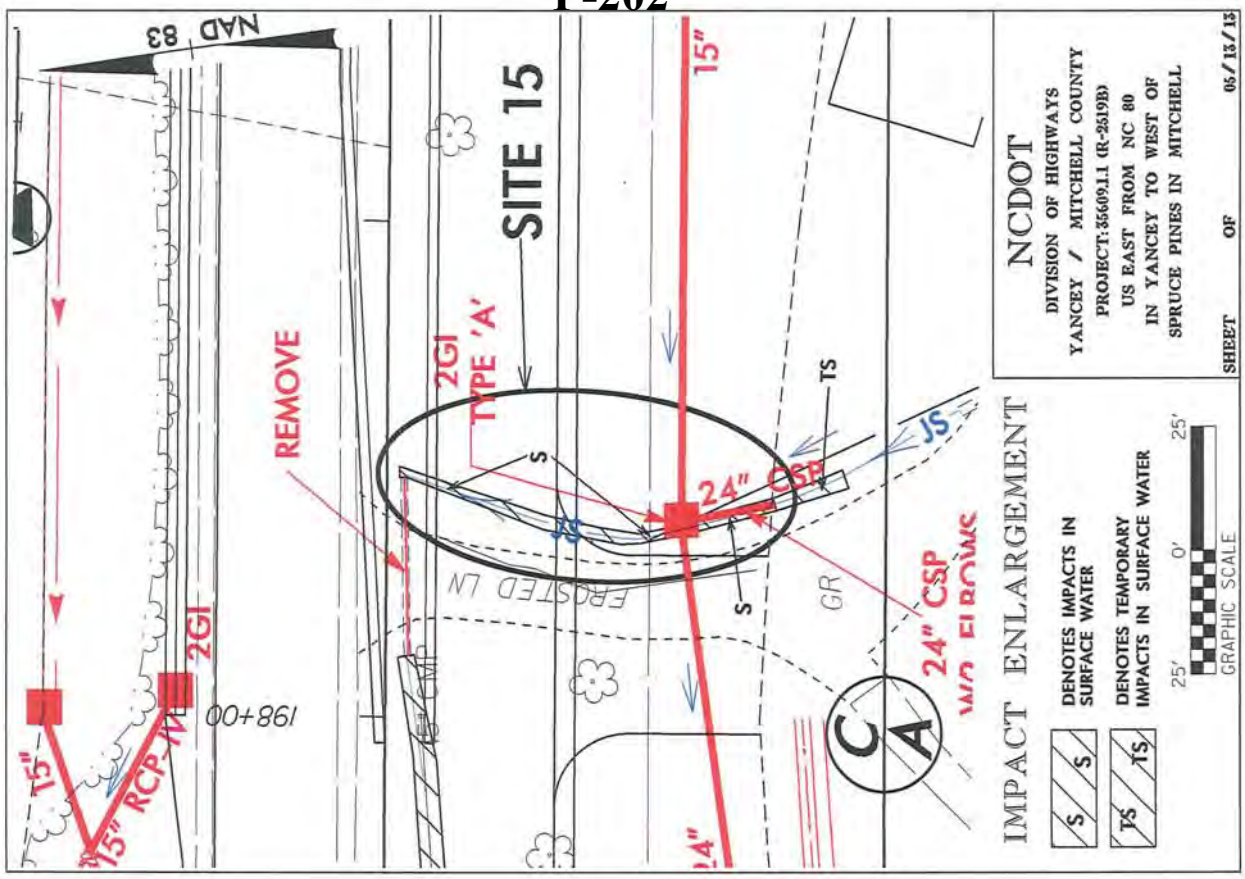


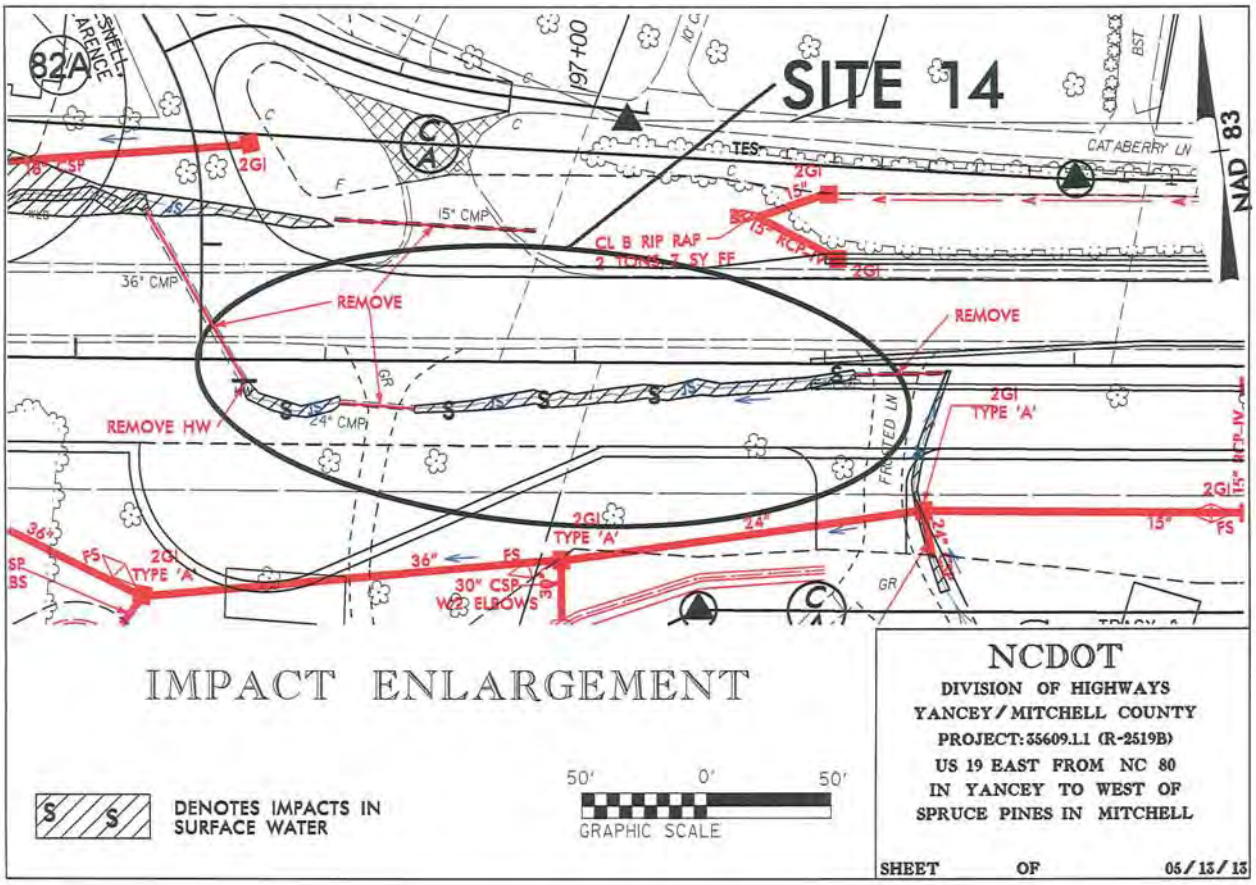
P-200

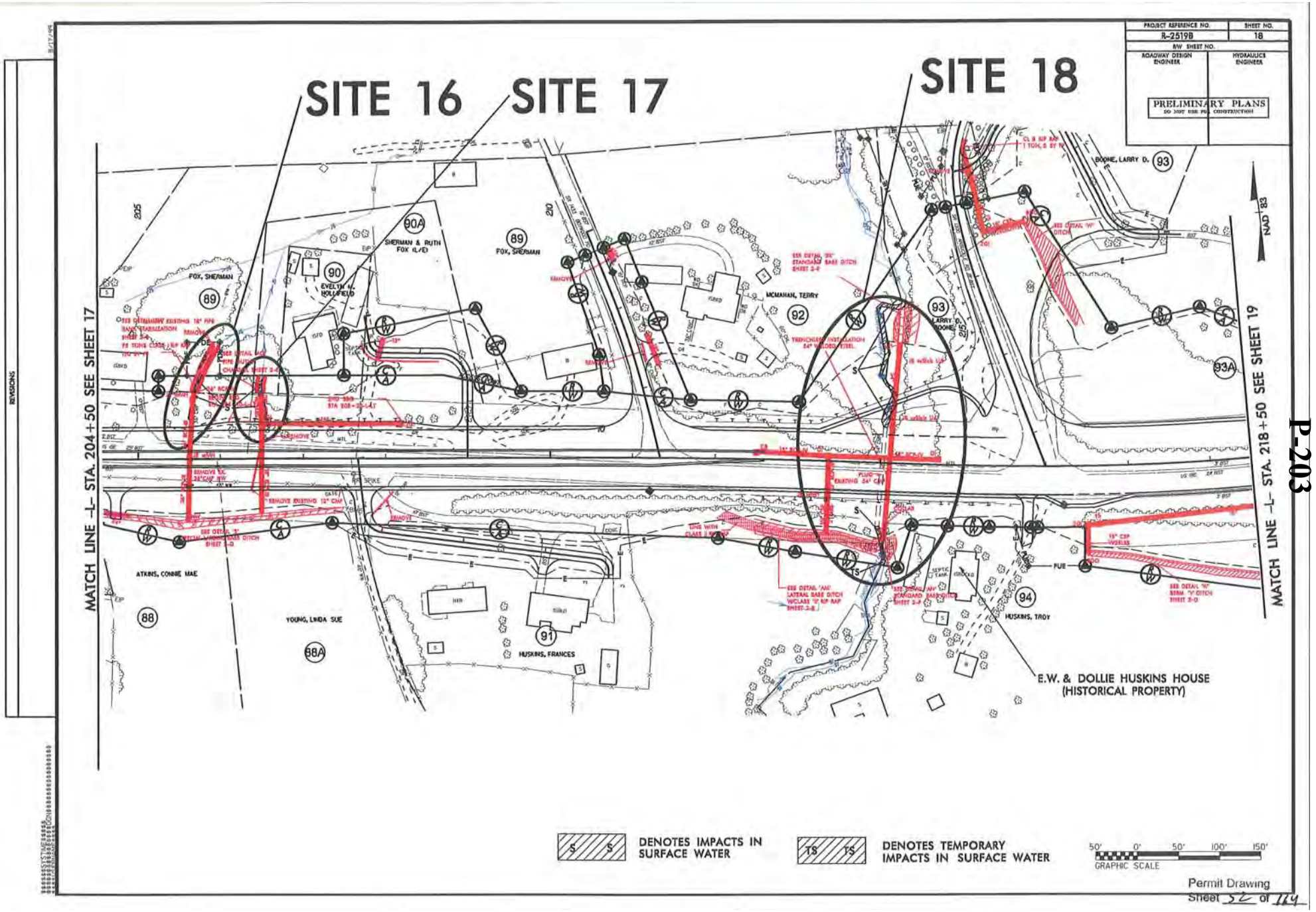
Permit Drawing
Sheet 49 of 114

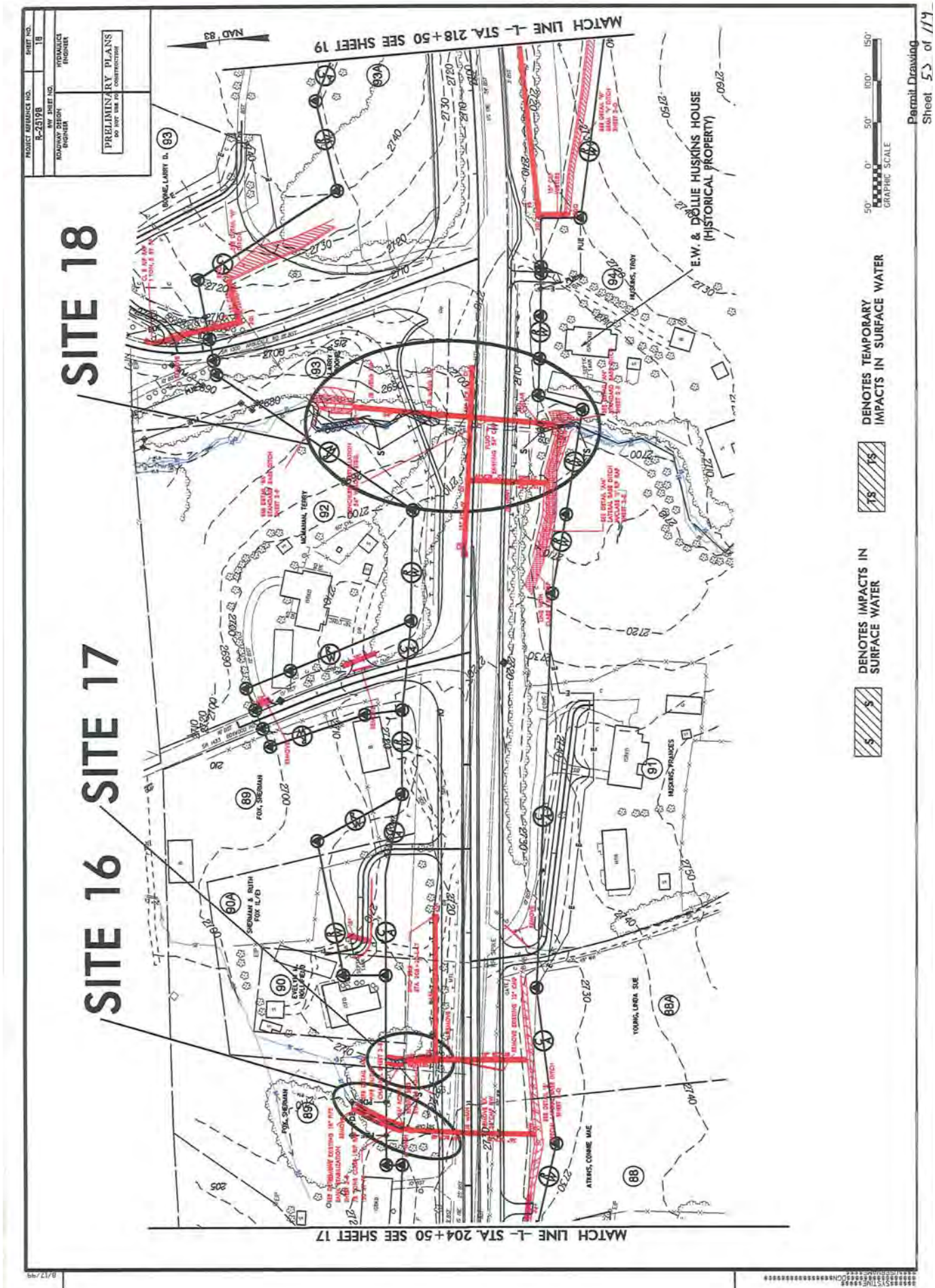

REMOVE 40' OF PIPE
4OTCB
18" CSP
2GI
NAD 83
36" CMP
SITE 13
195+00
REMOVE
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
25' 0' 25'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05 / 13 / 13

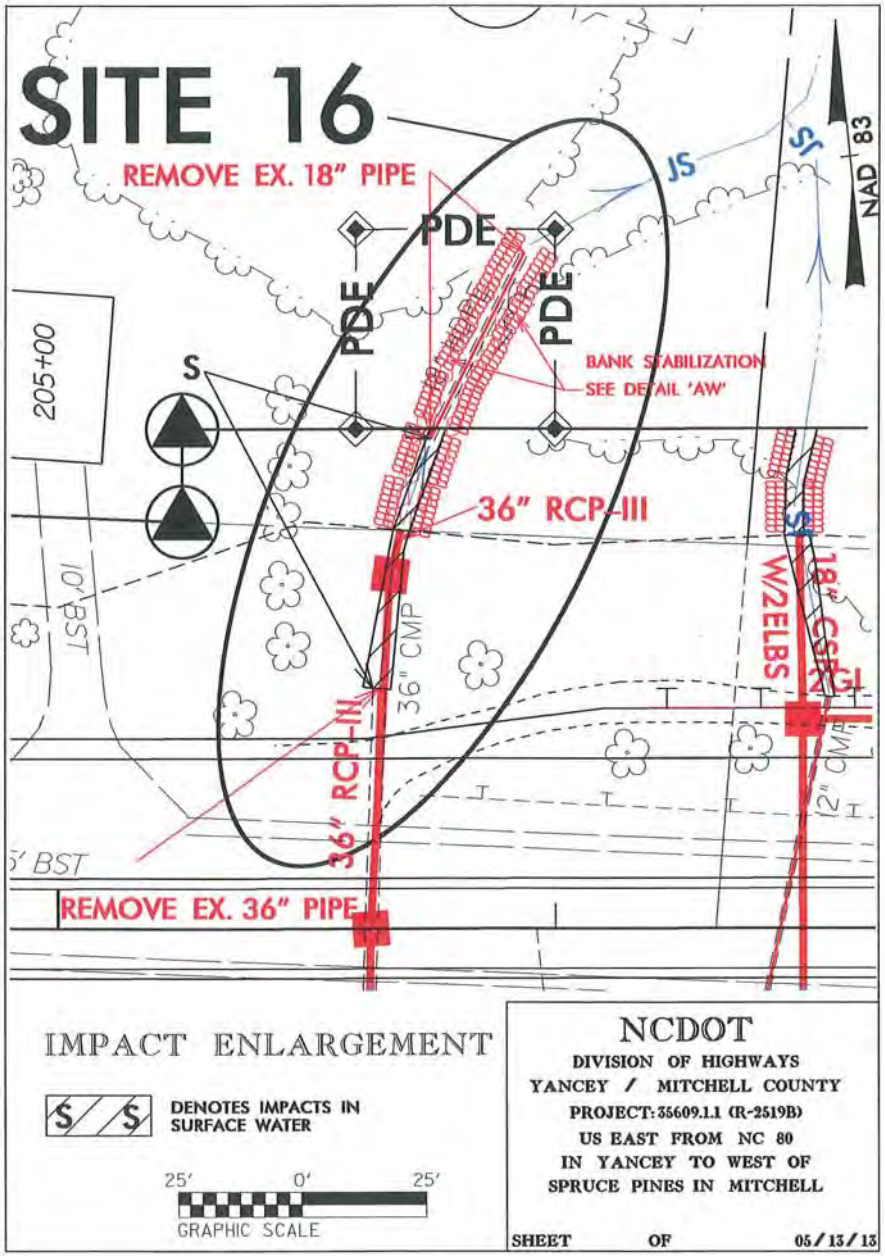

IMPACT ENLARGEMENT
NAD 83
SITE 12
24"
192+00
191+00
2GI TYPE 'A'
42" RCP-III
30" CMP
REMOVE
26' BS
REMOVE HW
REMOVE
CB
36"
24"CSP W/2ELBS
TS
RAP
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
25' 0' 25'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05 / 13 / 13


NAD 83
SITE 15
REMOVE
2GI
TYPE 'A'
15"
TS
JS
24" CSP
24" CSP
W/2 ELBOWS
15" RCP-IV
2GI
00+861
FROSTED LN
GR
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
25' 0' 25'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05/13/13


SITE 14
82A
SHELL ARENCE
197+00
NAD 83
CAT ABERRY LN
FROSTED LN
15" CMP
36" CMP
24" CMP
CL B RIP RAP
2 TONS, 7 SY FF
REMOVE
REMOVE HW
2GI
TYPE 'A'
15" RCP-IV
24"
36"
30" CSP
W/2 ELBOWS
GR
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
50' 0' 50'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05/13/13


SITE 16
SITE 17
SITE 18
PROJECT REFERENCE NO.
R-2519B
SHEET NO.
18
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
REVISIONS
MATCH LINE -L- STA. 204+50 SEE SHEET 17
MATCH LINE -L- STA. 218+50 SEE SHEET 19
NAD 83
FOX, SHERMAN
EVELYN M. HOLLIFIELD
SHERMAN & RUTH FOX (L/E)
MCMAHAN, TERRY
BOONE, LARRY D.
ATKINS, CONNIE MAE
YOUNG, LINDA SUE
HUSKINS, FRANCES
HUSKINS, TROY
E.W. & DOLLIE HUSKINS HOUSE
(HISTORICAL PROPERTY)
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
Permit Drawing
Sheet 52 of 114
P-203


SITE 18
SITE 16
SITE 17
MATCH LINE -L- STA. 218+50 SEE SHEET 19
MATCH LINE -L- STA. 204+50 SEE SHEET 17
E.W. & DOLLIE HUSKINS HOUSE (HISTORICAL PROPERTY)
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
PROJECT REFERENCE NO. R-2519B
SHEET NO. 18
NAD 83
Permit Drawing
Sheet 53 of 119



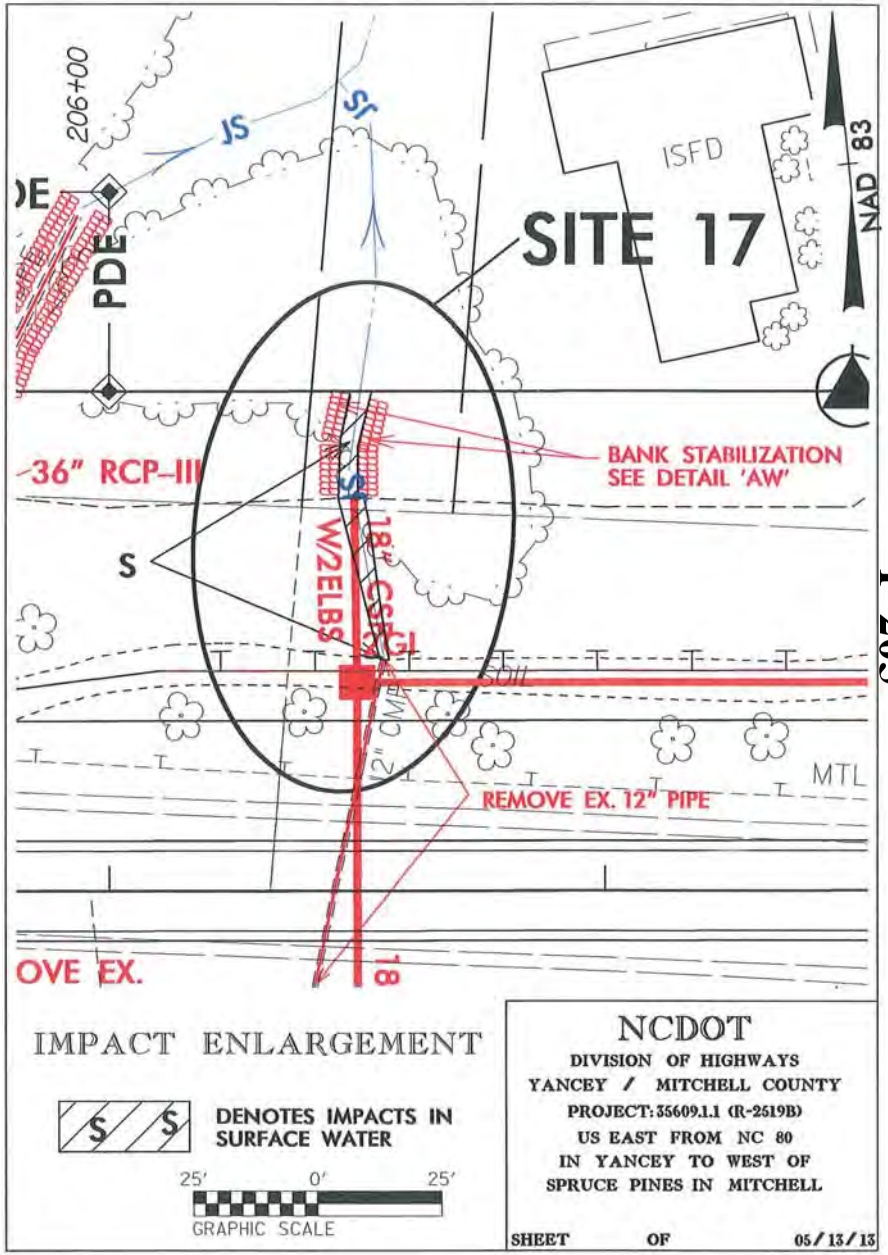
IMPACT ENLARGEMENT

S S DENOTES IMPACTS IN SURFACE WATER

25' 0' 25'
GRAPHIC SCALE

NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL

SHEET OF 05/13/13



IMPACT ENLARGEMENT

S S DENOTES IMPACTS IN SURFACE WATER

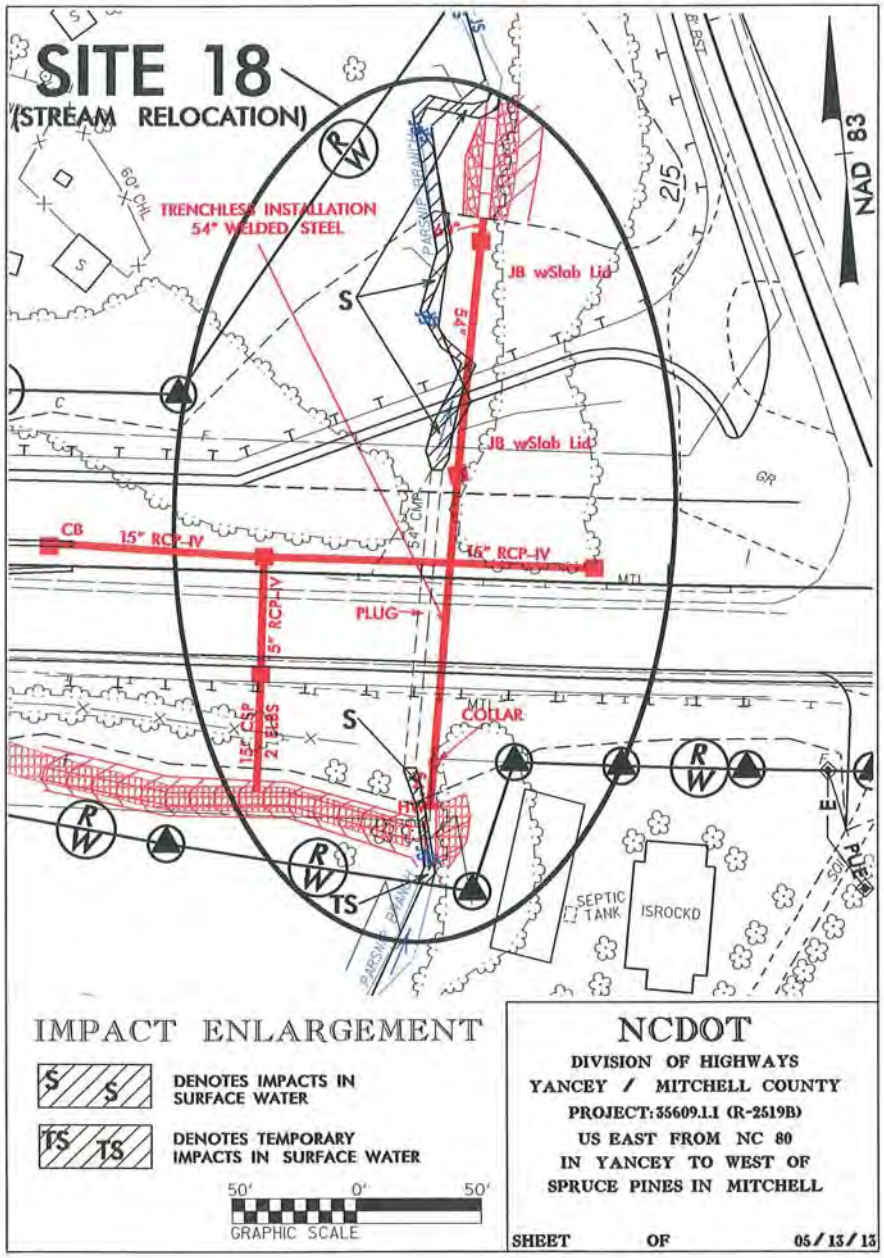
25' 0' 25'
GRAPHIC SCALE

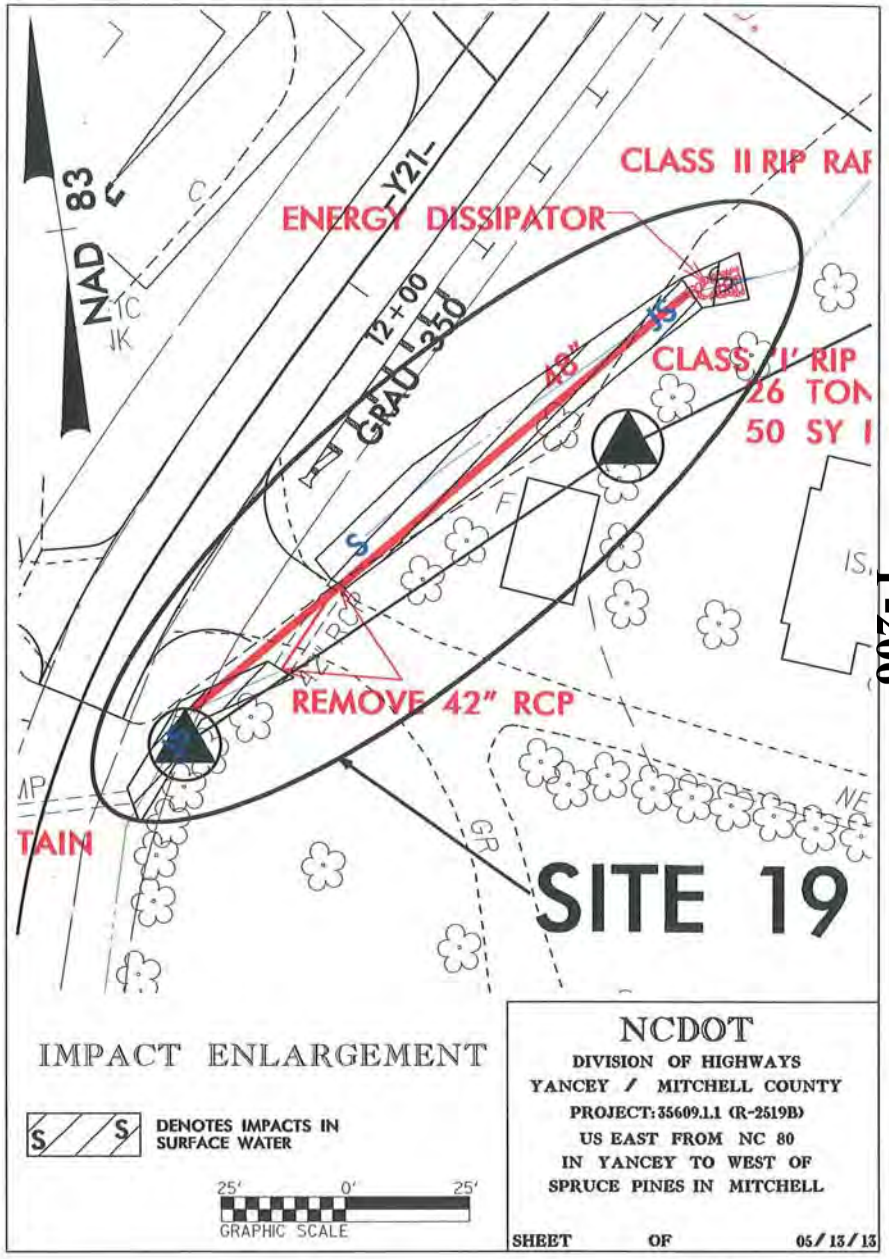
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL

SHEET OF 05/13/13

P-205

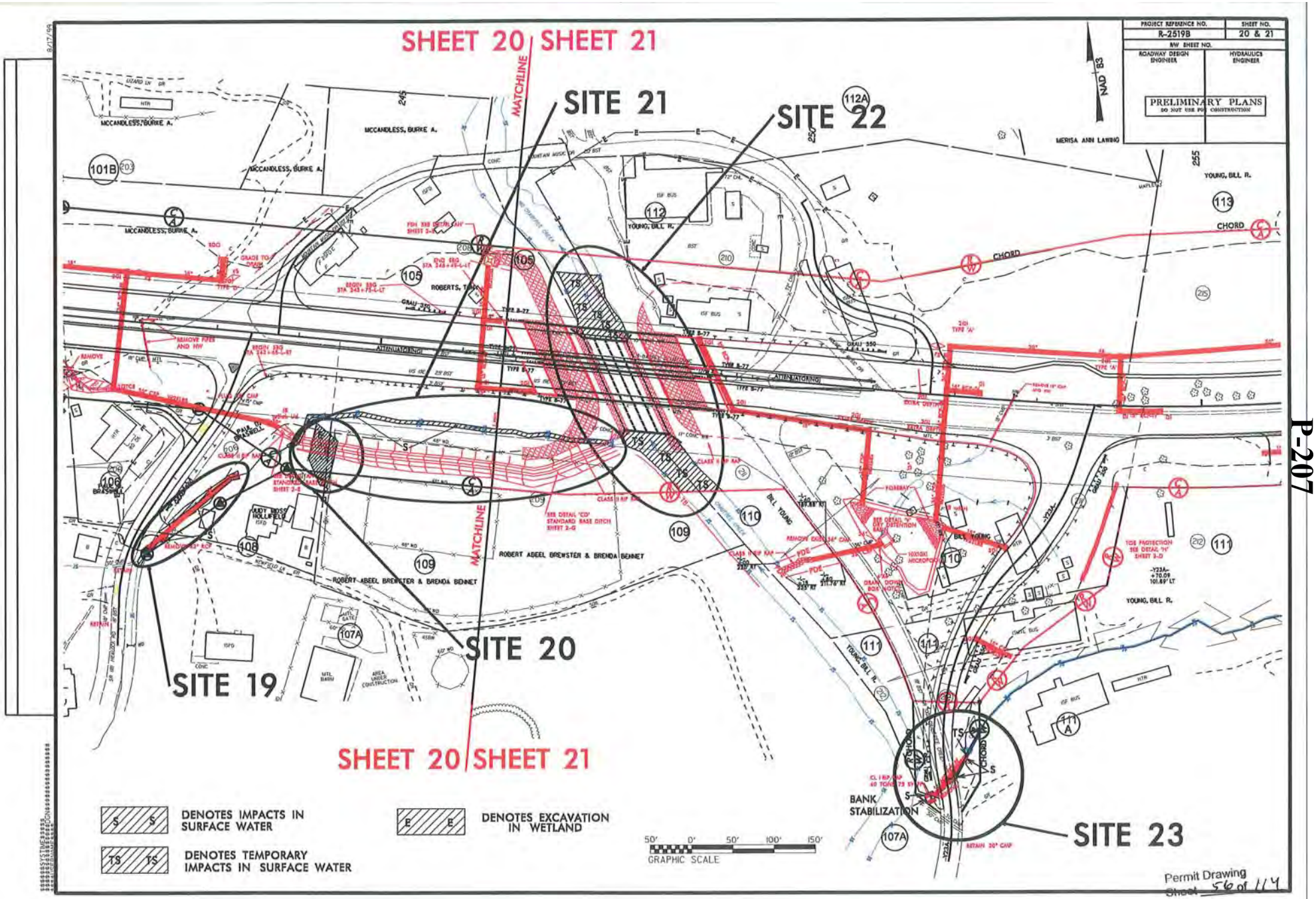
Permit Drawing
Sheet 54 of 114





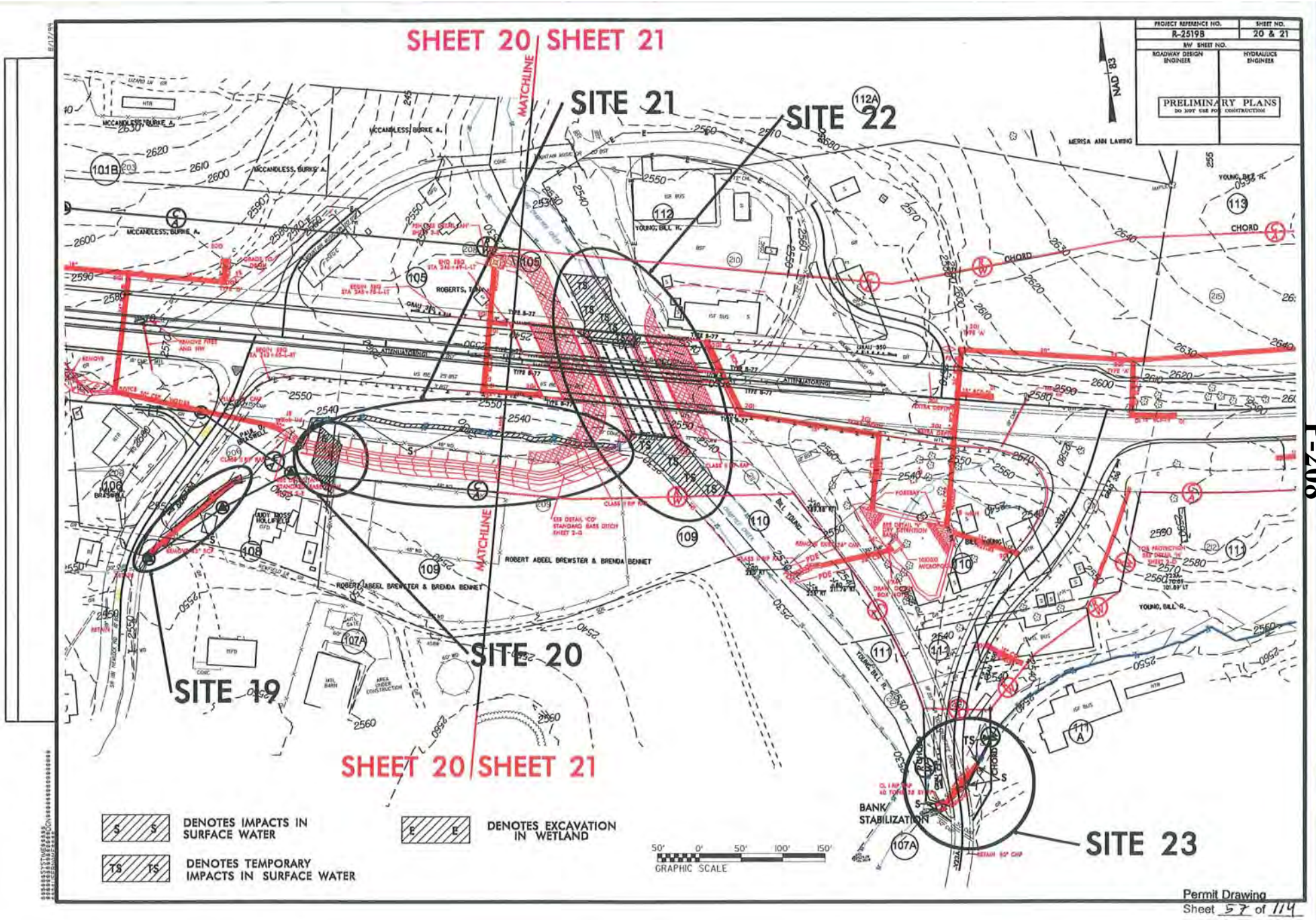
P-206

Permit Drawing
Sheet 53 of 114



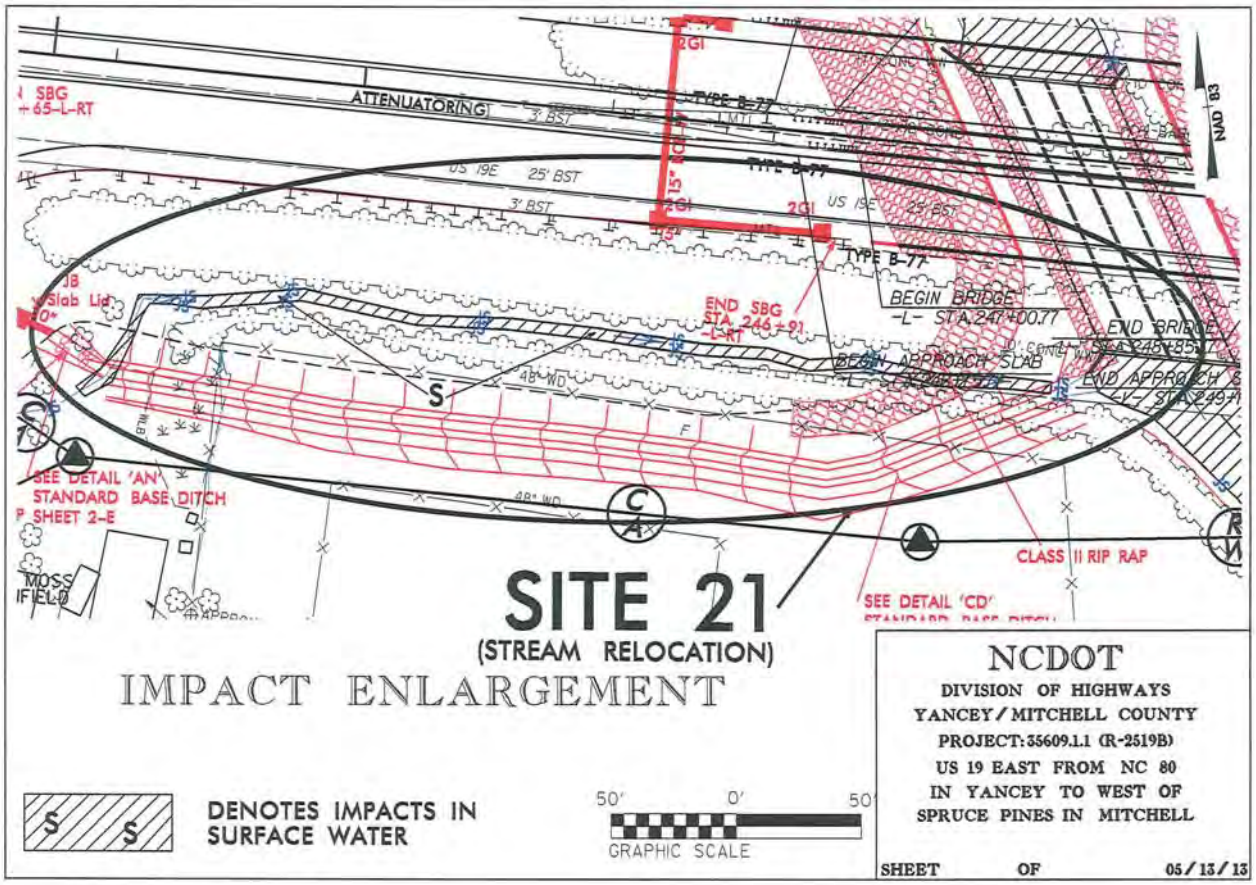
P-207

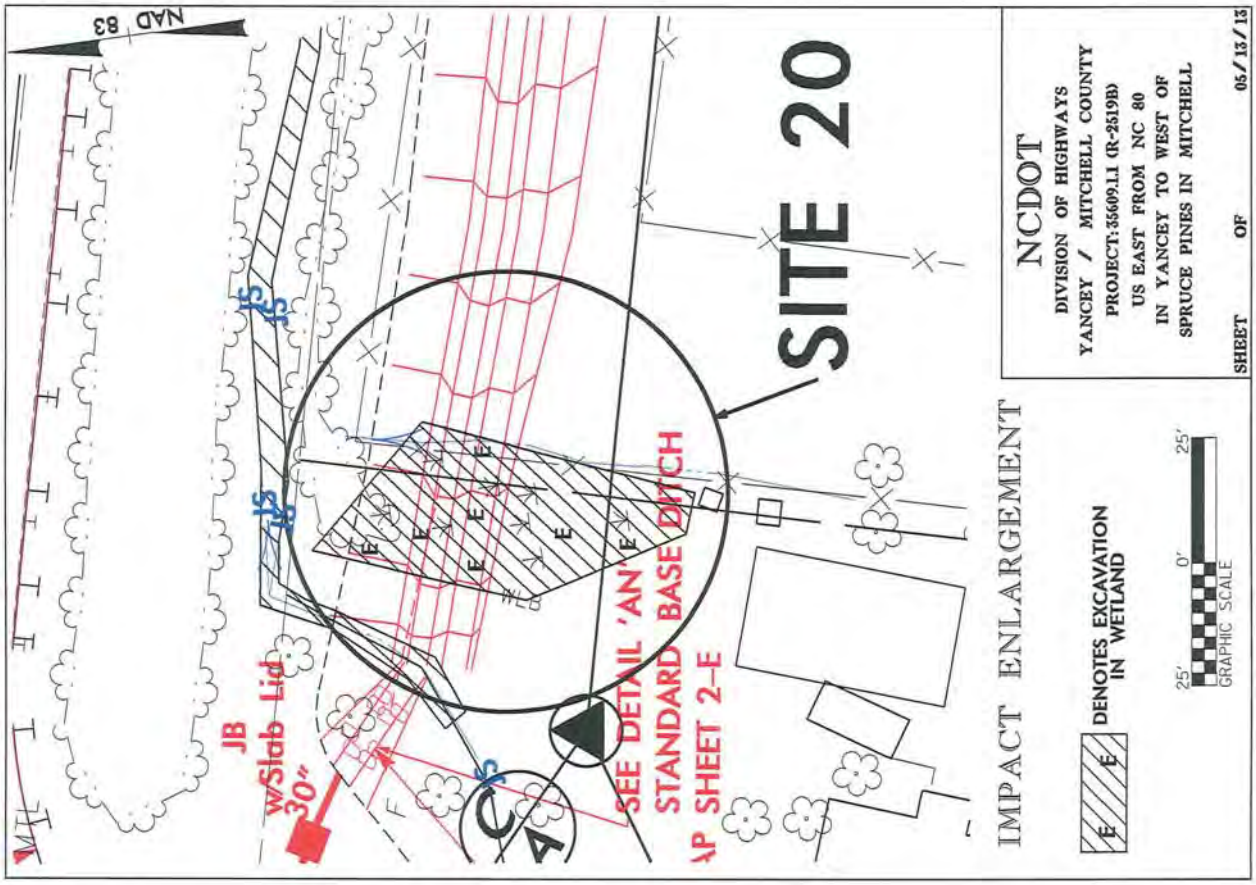
Permit Drawing
Sheet 56 of 114

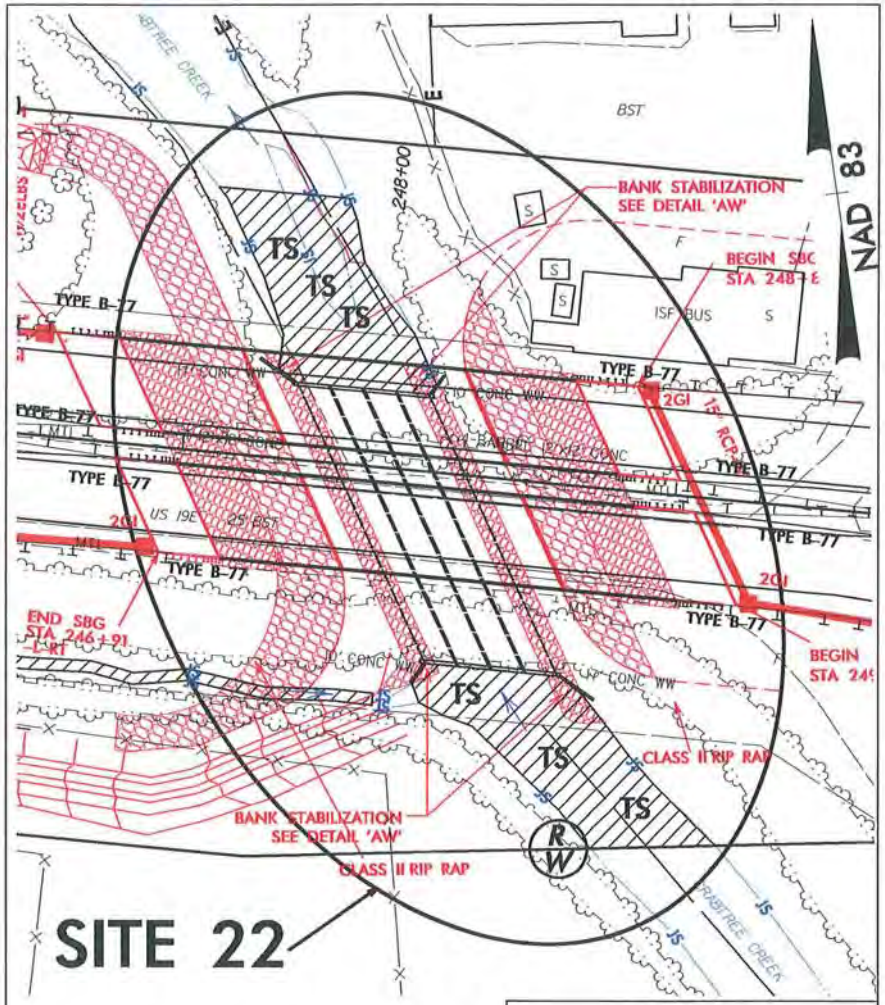


P-208

Permit Drawing
Sheet 57 of 114


SBG
+65-L-RT
ATTENUATOR(TNG)
3' BST
US 19E
25' BST
TYPE B-77
2GI
15" RCP
JB
w/Slab Lid
30"
END SBG
STA. 246+91
-L-RT
BEGIN BRIDGE
-L- STA 247+00.77
END BRIDGE
BEGIN APPROACH SLAB
END APPROACH S
-L- STA 249+
NAD 83
48" WD
SEE DETAIL 'AN'
STANDARD BASE DITCH
P SHEET 2-E
MOSS
IFIELD
CLASS II RIP RAP
SEE DETAIL 'CD'
SITE 21
(STREAM RELOCATION)
IMPACT ENLARGEMENT
DENOTES IMPACTS IN
SURFACE WATER
50' 0' 50'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05/13/13


NAD 83
SITE 20
JB
w/Slab Lid
30"
SEE DETAIL 'AN'
STANDARD BASE DITCH
P SHEET 2-E
WLB
IMPACT ENLARGEMENT
DENOTES EXCAVATION
IN WETLAND
25' 0' 25'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05/13/13



IMPACT ENLARGEMENT

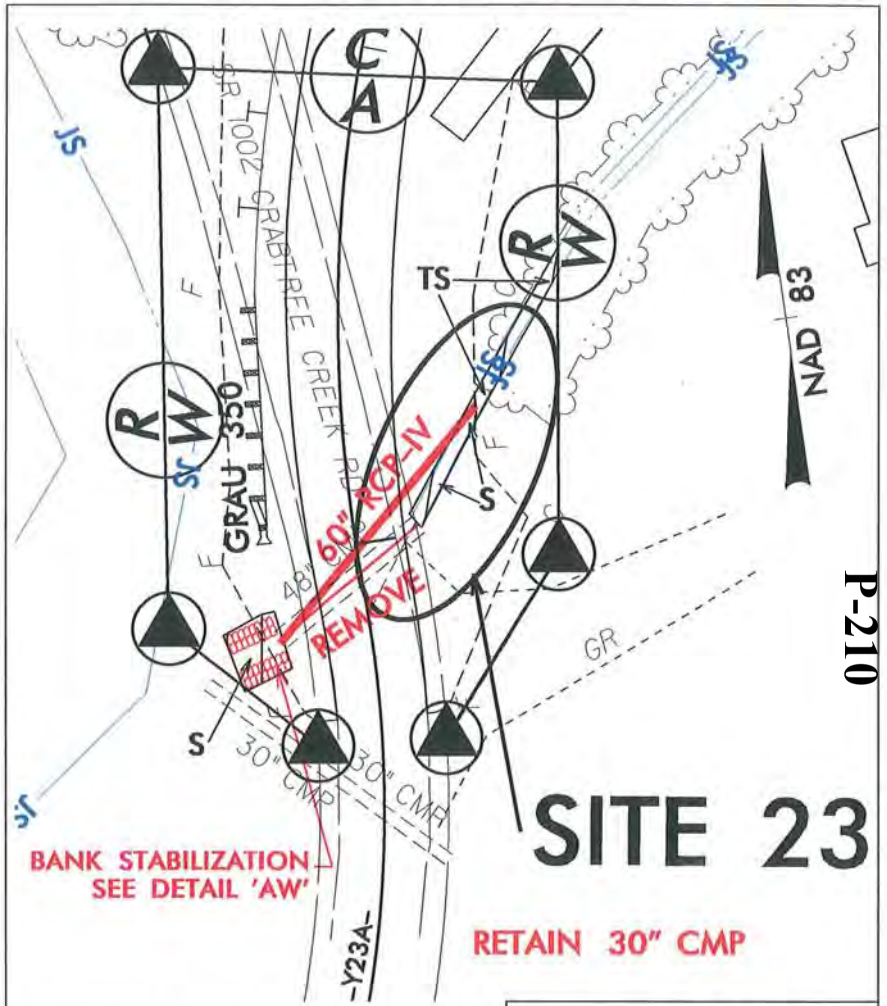
S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 50'
GRAPHIC SCALE

NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL

SHEET OF 05/13/13



IMPACT ENLARGEMENT

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

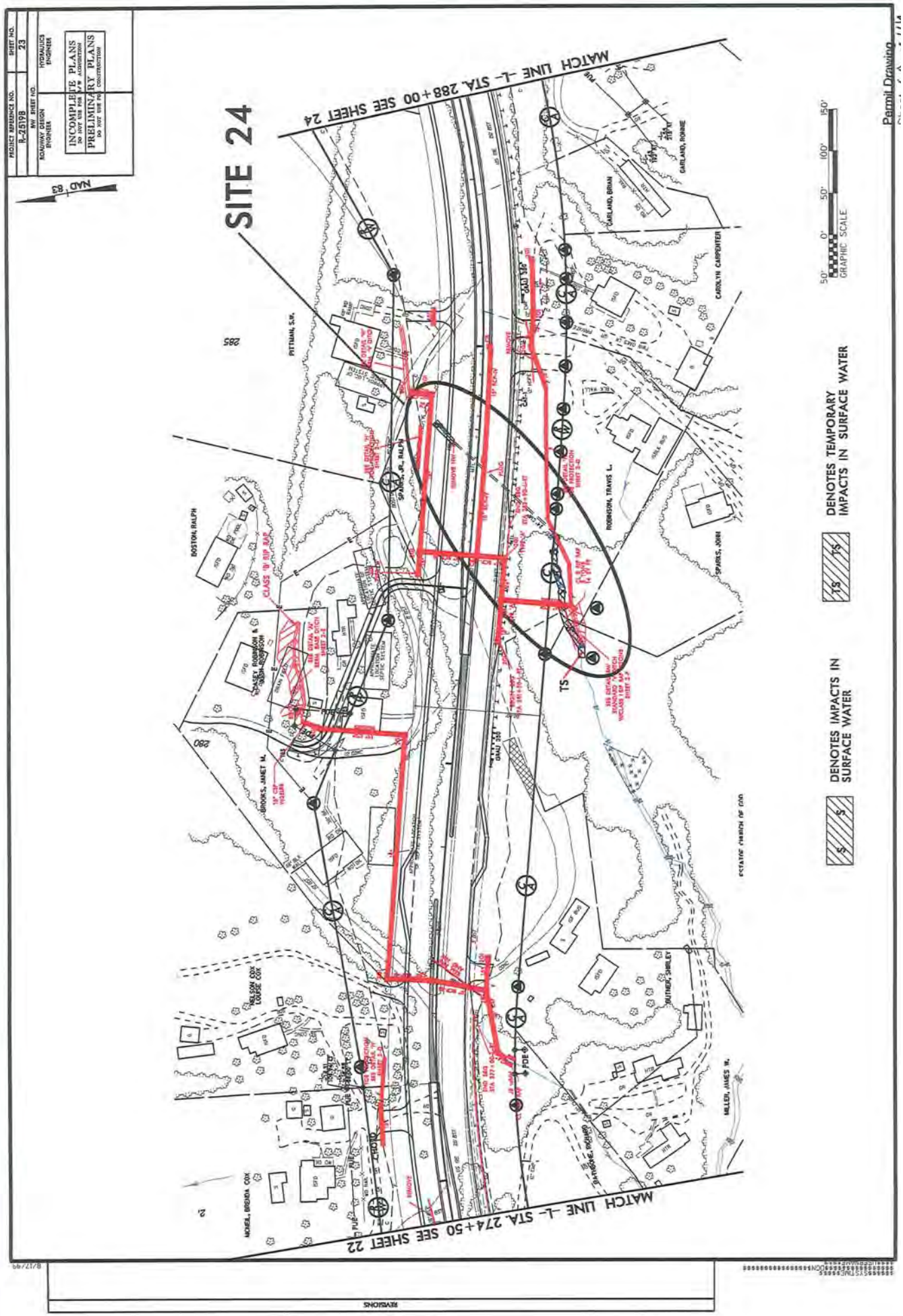
25' 0' 25'
GRAPHIC SCALE

NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL

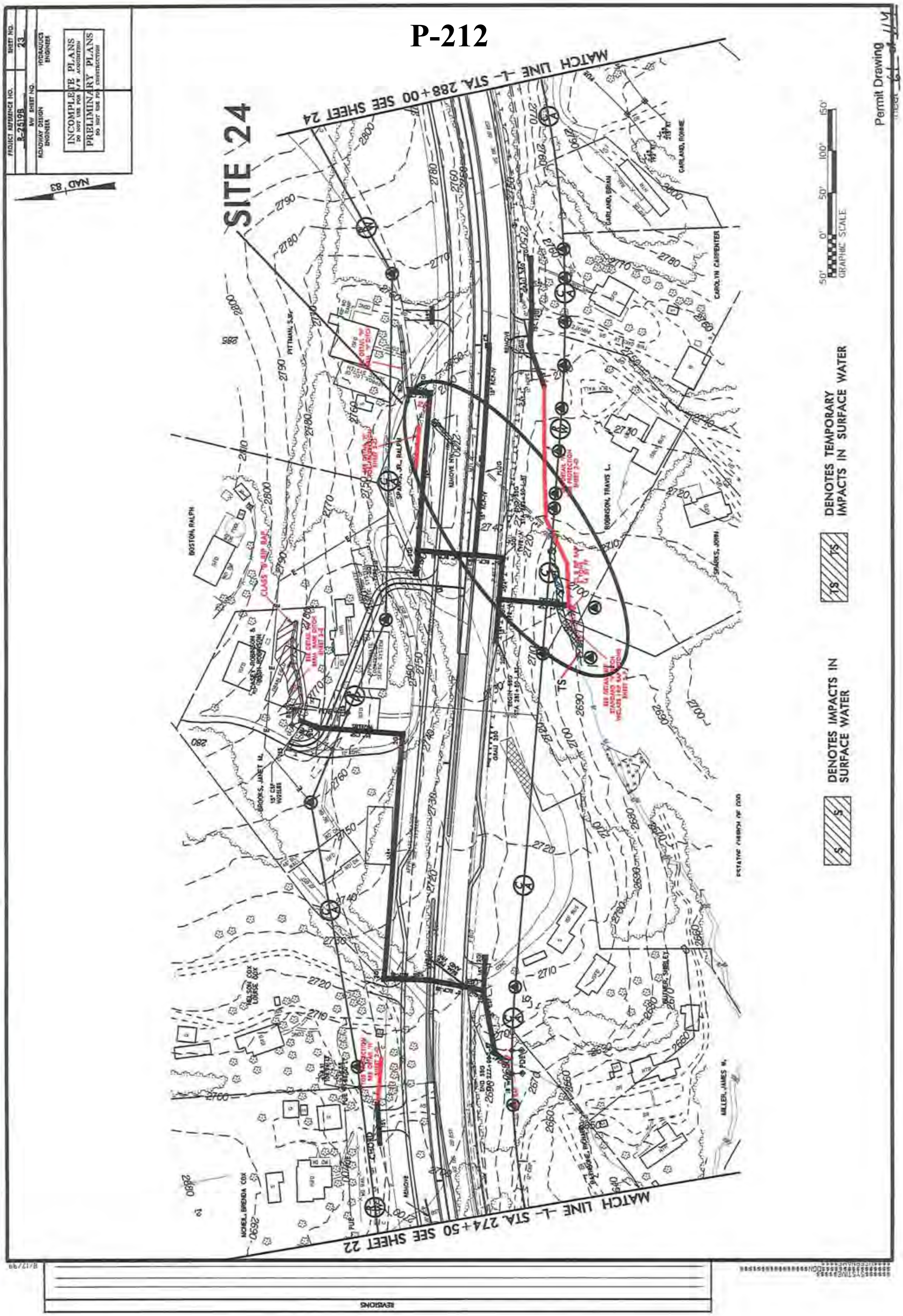
SHEET OF 05/13/13

P-210

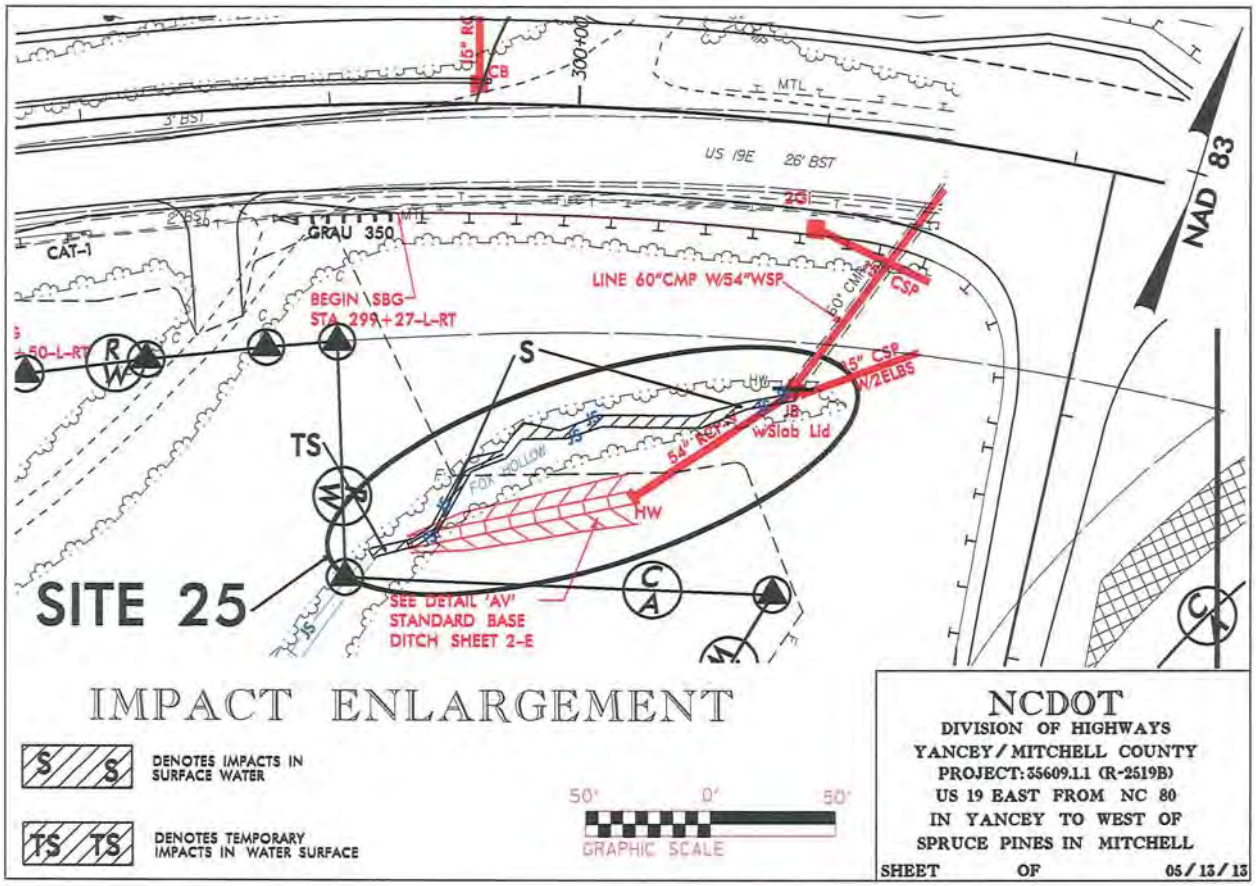
Permit Drawing
Sheet 59 of 114

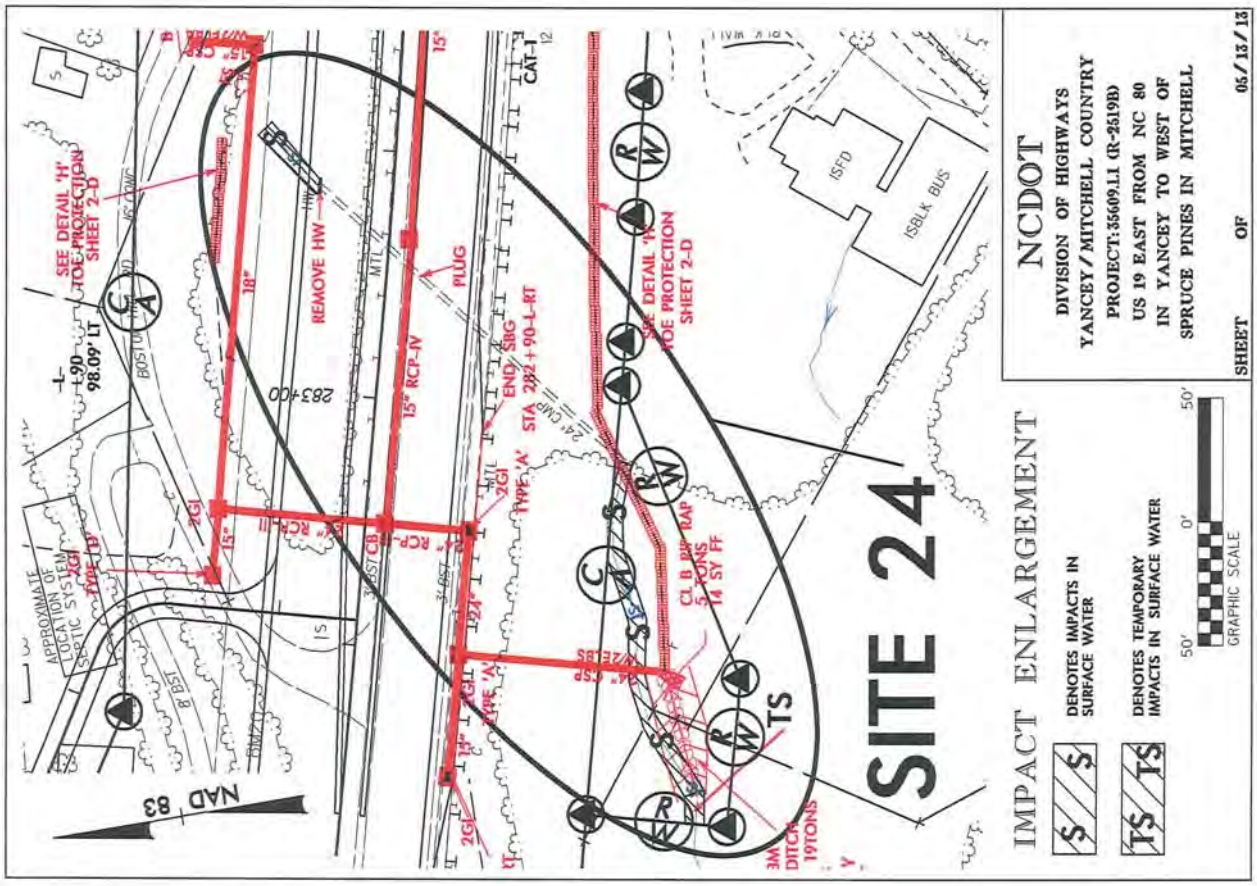

SITE 24
MATCH LINE -L- STA. 288+00 SEE SHEET 24
MATCH LINE -L- STA. 274+50 SEE SHEET 22
PROJECT REFERENCE NO.
R-2519B
SHEET NO.
23
INCOMPLETE PLANS
PRELIMINARY PLANS
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
NAD 83
REVISIONS
Permit Drawing

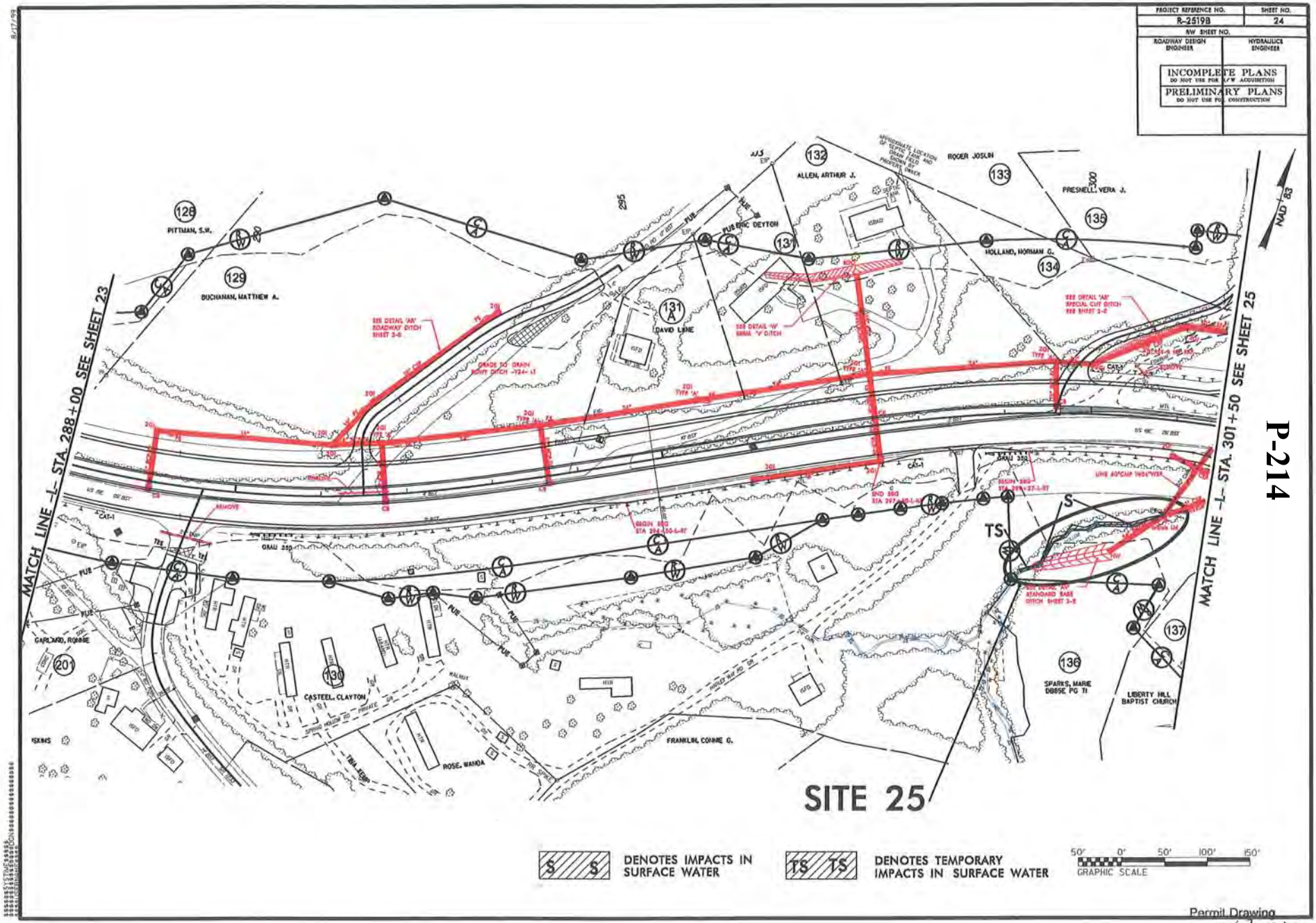
P-212



SITE 24
MATCH LINE -L- STA. 288+00 SEE SHEET 24
MATCH LINE -L- STA. 274+50 SEE SHEET 22
NAD 83
PROJECT REFERENCE NO.
R-2519B
SHEET NO.
23
INCOMPLETE PLANS
PRELIMINARY PLANS
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER
GRAPHIC SCALE
REVISIONS
Permit Drawing

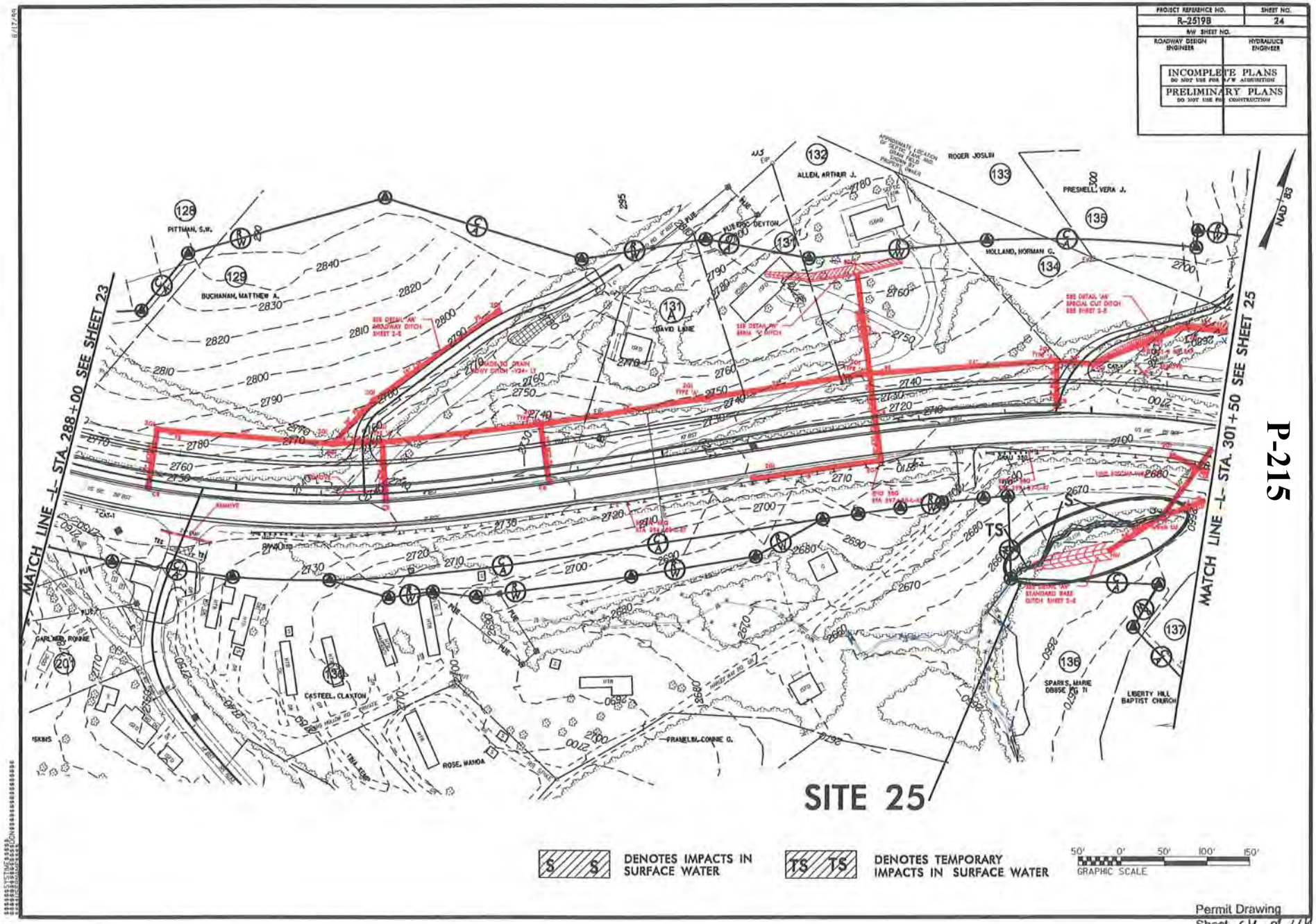

SITE 25
IMPACT ENLARGEMENT
NAD 83
US 19E 26' BST
GRAU 350
CAT-1
BEGIN SBG
STA 299+27-L-RT
LINE 60"CMP W/54"WSP
15" CSP W/ELBS
w/Slab Lid
54" RCP
HW
TS
S
SEE DETAIL 'AV'
STANDARD BASE
DITCH SHEET 2-E
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN WATER SURFACE
50' 0' 50'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 55609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05 / 13 / 13

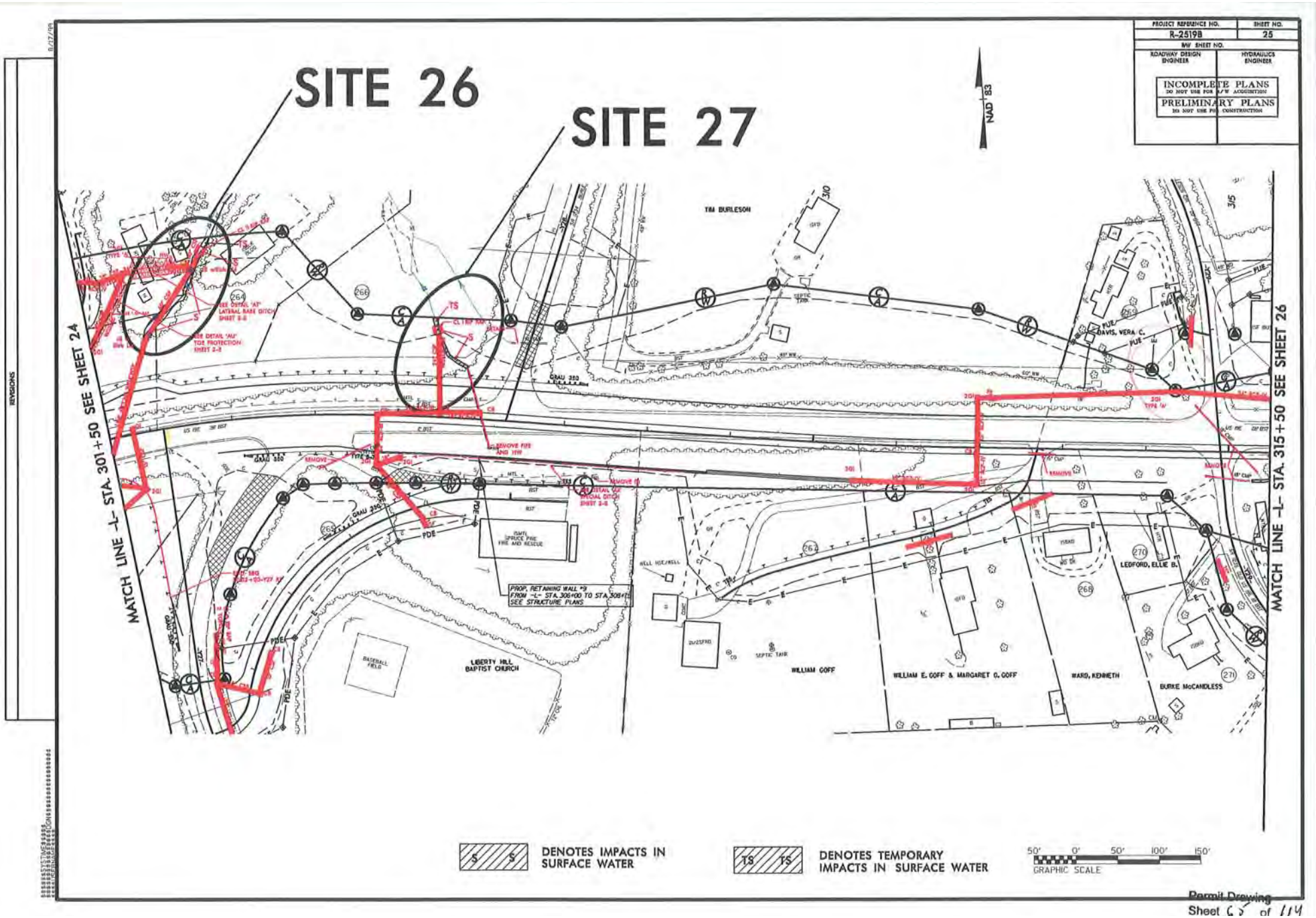

SITE 24
IMPACT ENLARGEMENT
NAD 83
SEE DETAIL 'H' TOE PROTECTION SHEET 2-D
REMOVE HW
PLUG
15" RCP-IV
END SBG STA 282+90-L-RT
SEE DETAIL 'H' TOE PROTECTION SHEET 2-D
CL B RIP RAP 5 TONS 14 SY FF
3M DITCH 19TONS
ISFD
ISBLK BUS
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
50' 0' 50'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTRY
PROJECT: 55609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05 / 13 / 13



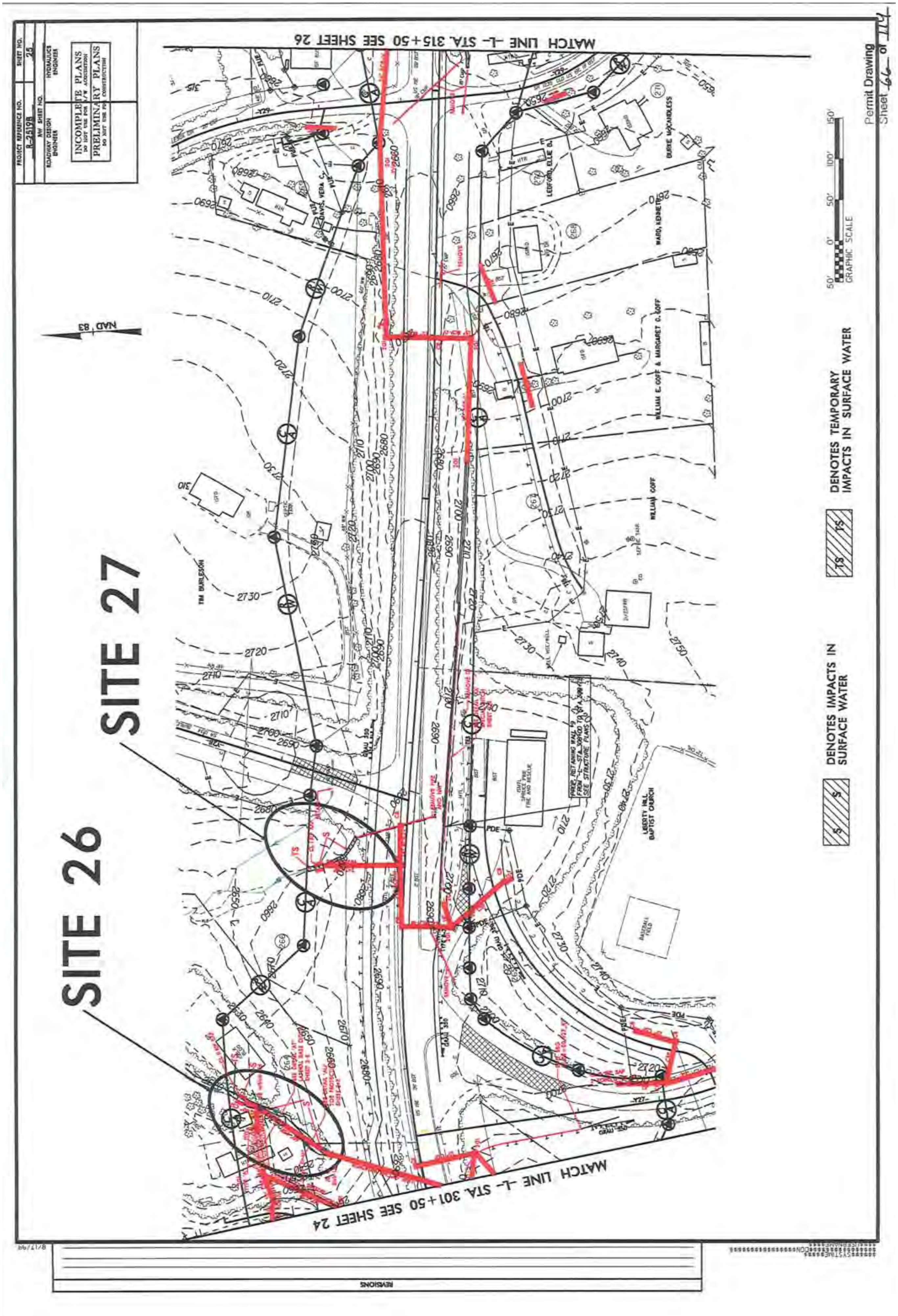
P-214

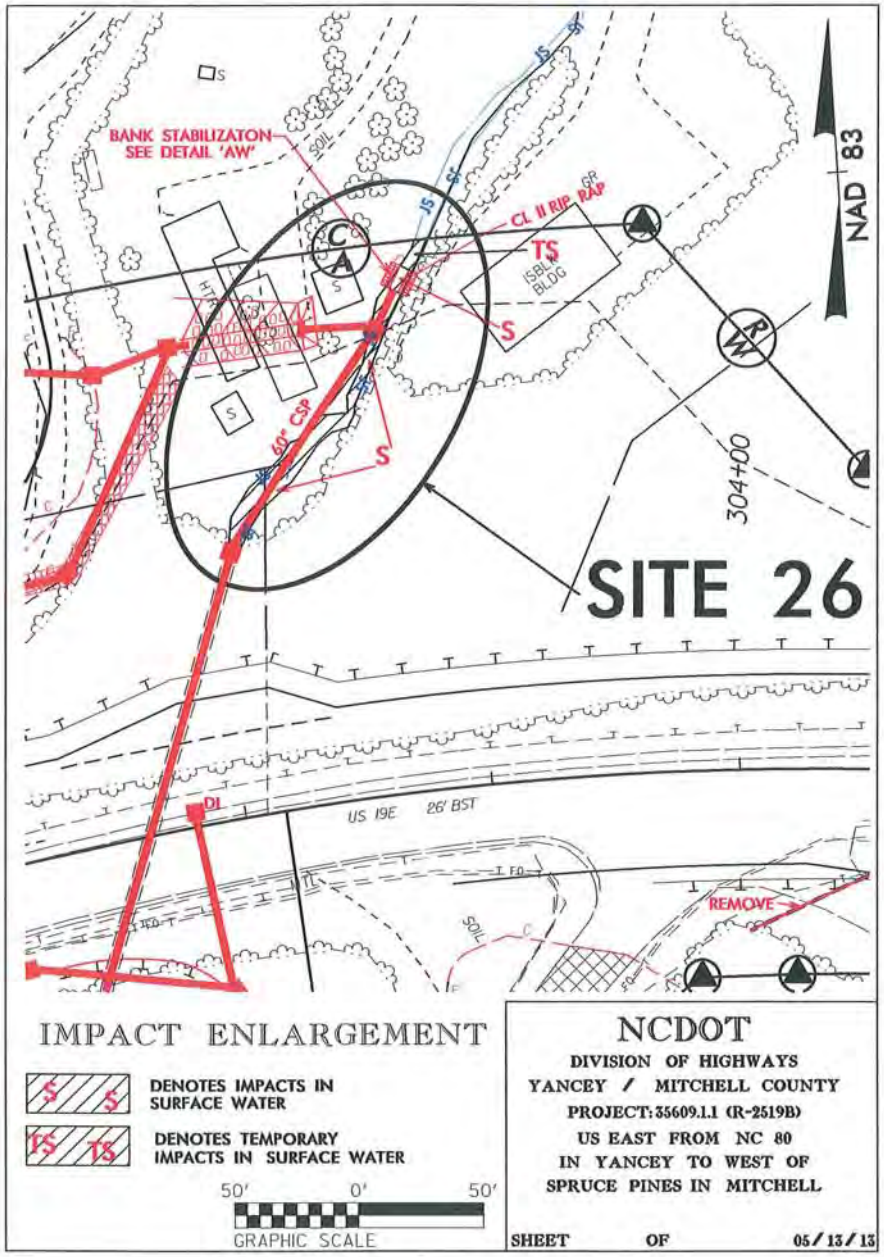
Permit Drawing
163 of 174

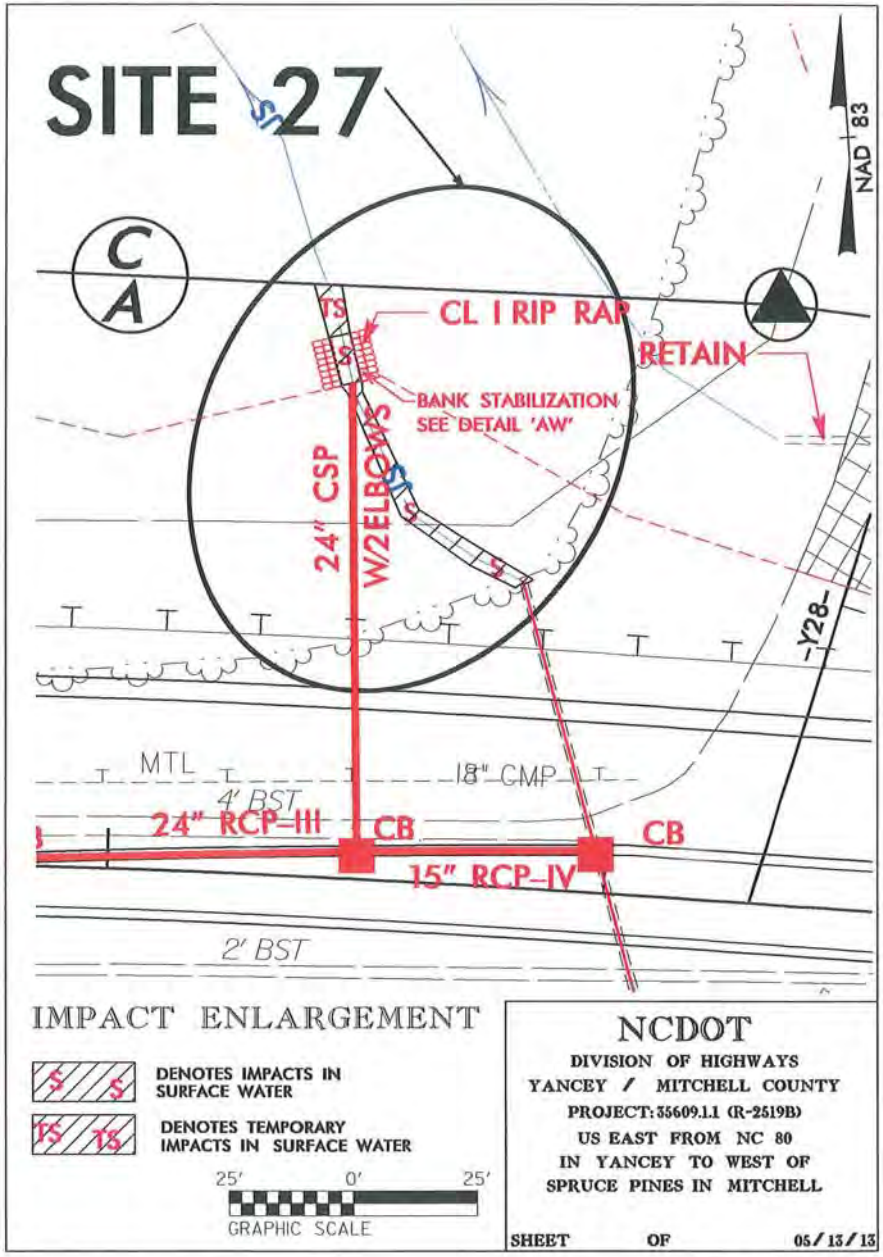

PROJECT REFERENCE NO.
R-2519B
SHEET NO.
24
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
MATCH LINE -L- STA. 288+00 SEE SHEET 23
MATCH LINE -L- STA. 301+50 SEE SHEET 25
NAD 83
PITTMAN, S.W.
BUCHANAN, MATTHEW A.
ALLEN, ARTHUR J.
ROGER JOSLIN
PRESNELL, VERA J.
MOLLAND, NORMAN C.
DAVID LANE
GARLAND, RONNIE
CASTEEL, CLAYTON
FRANKLIN, CONNIE G.
ROSE, MAHOA
SPARKS, MARIE
LIBERTY HILL BAPTIST CHURCH
SITE 25
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
P-215
Permit Drawing
Sheet 64 of 114


SITE 26
SITE 27
NAD 83
PROJECT REFERENCE NO.
R-2519B
SHEET NO.
25
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
MATCH LINE -L- STA. 301+50 SEE SHEET 24
MATCH LINE -L- STA. 315+50 SEE SHEET 26
TIM BURLESON
DAVIS, VERA C.
LEDFORD, ELLIE B.
LIBERTY HILL BAPTIST CHURCH
WILLIAM GOFF
WILLIAM E. GOFF & MARGARET O. GOFF
WARD, KENNETH
BURKE McCANDLESS
PROP. RETAINING WALL #9 FROM -L- STA. 308+00 TO STA. 308+75 SEE STRUCTURE PLANS
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
REVISIONS
Permit Drawing
Sheet 65 of 114

P-216

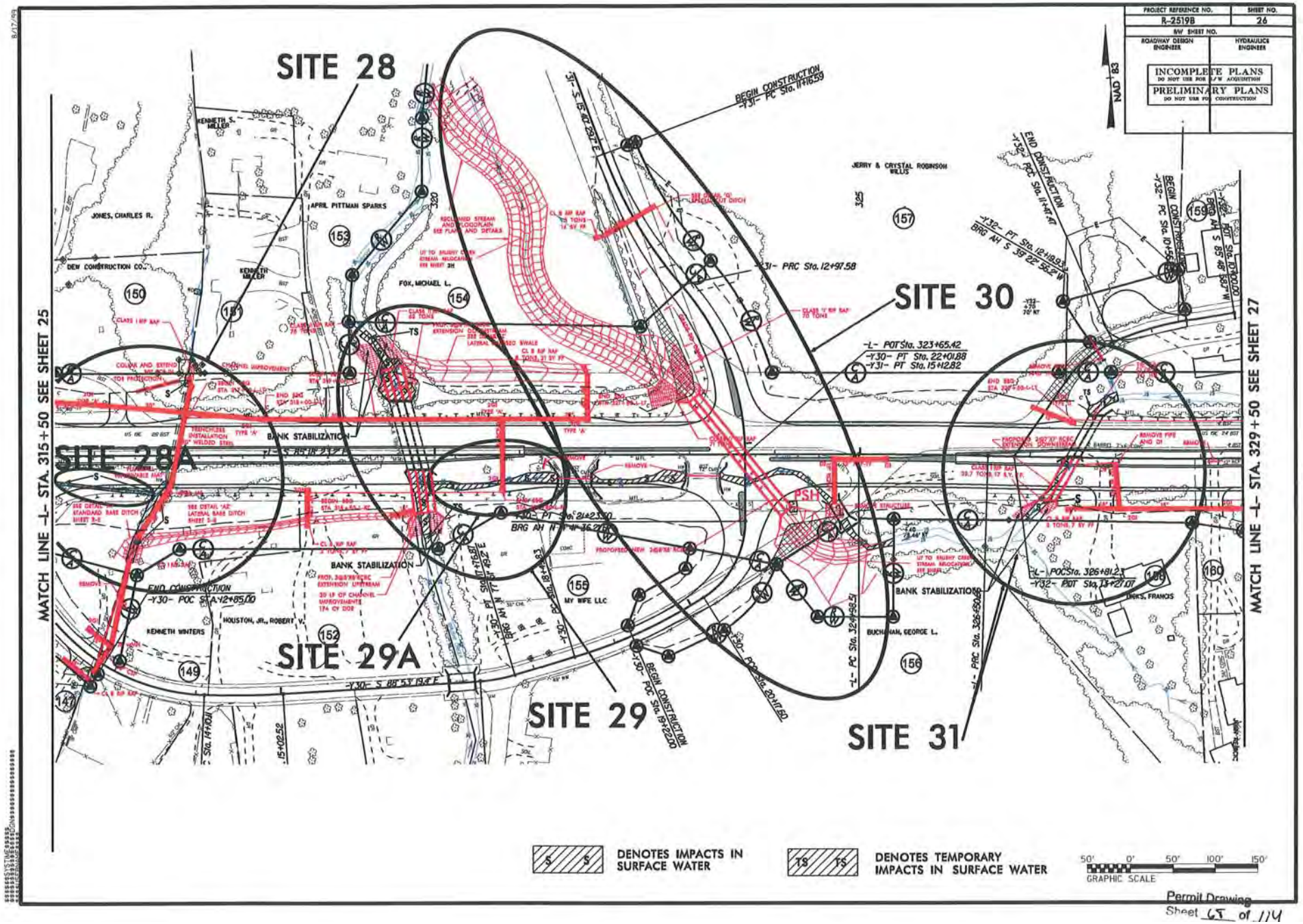

SITE 26
SITE 27
MATCH LINE -L- STA. 315+50 SEE SHEET 26
MATCH LINE -L- STA. 301+50 SEE SHEET 24
NAD 83
R-2519B
INCOMPLETE PLANS
PRELIMINARY PLANS
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
Permit Drawing
Sheet 66 of 114
REVISIONS





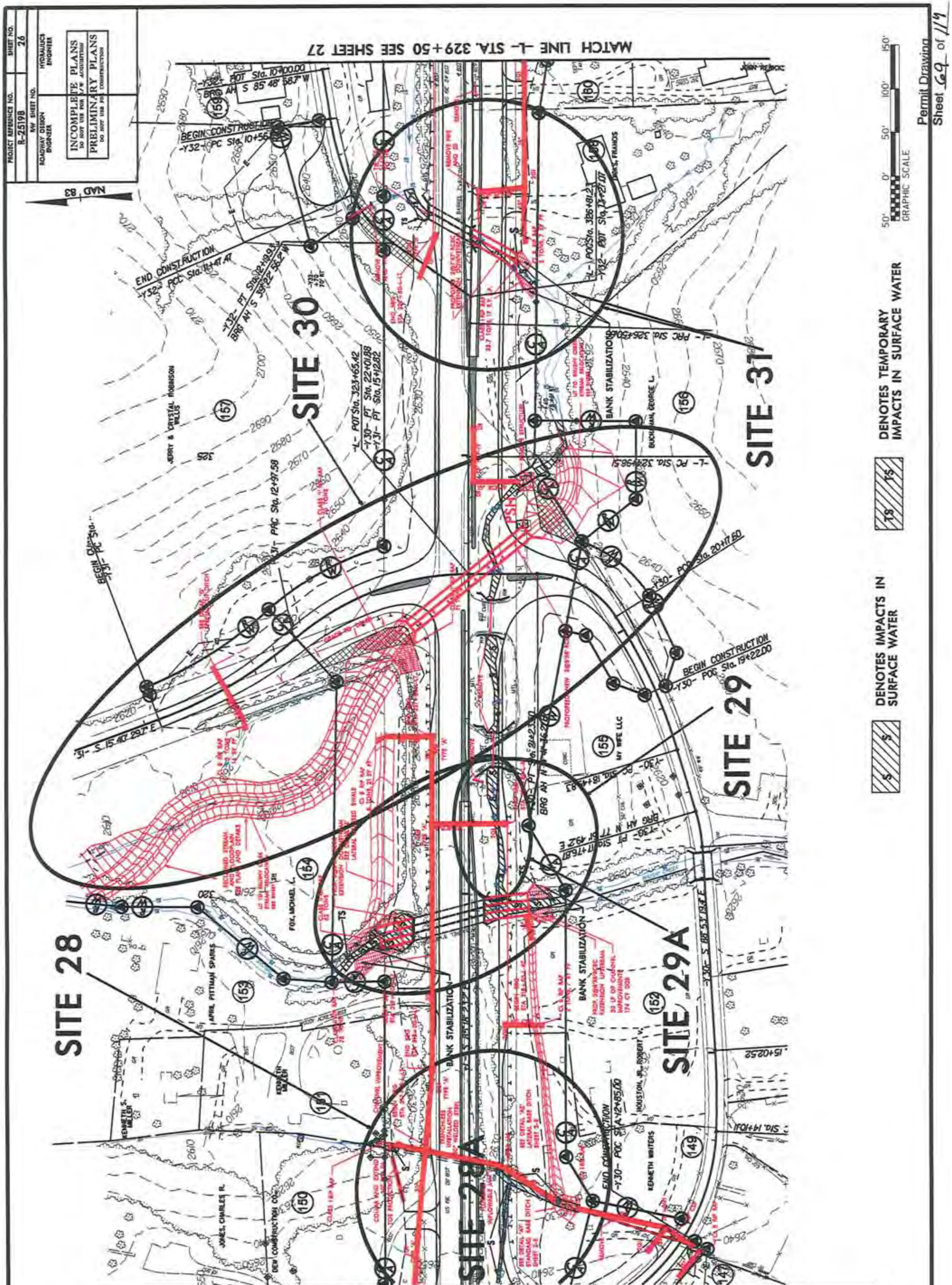
P-218

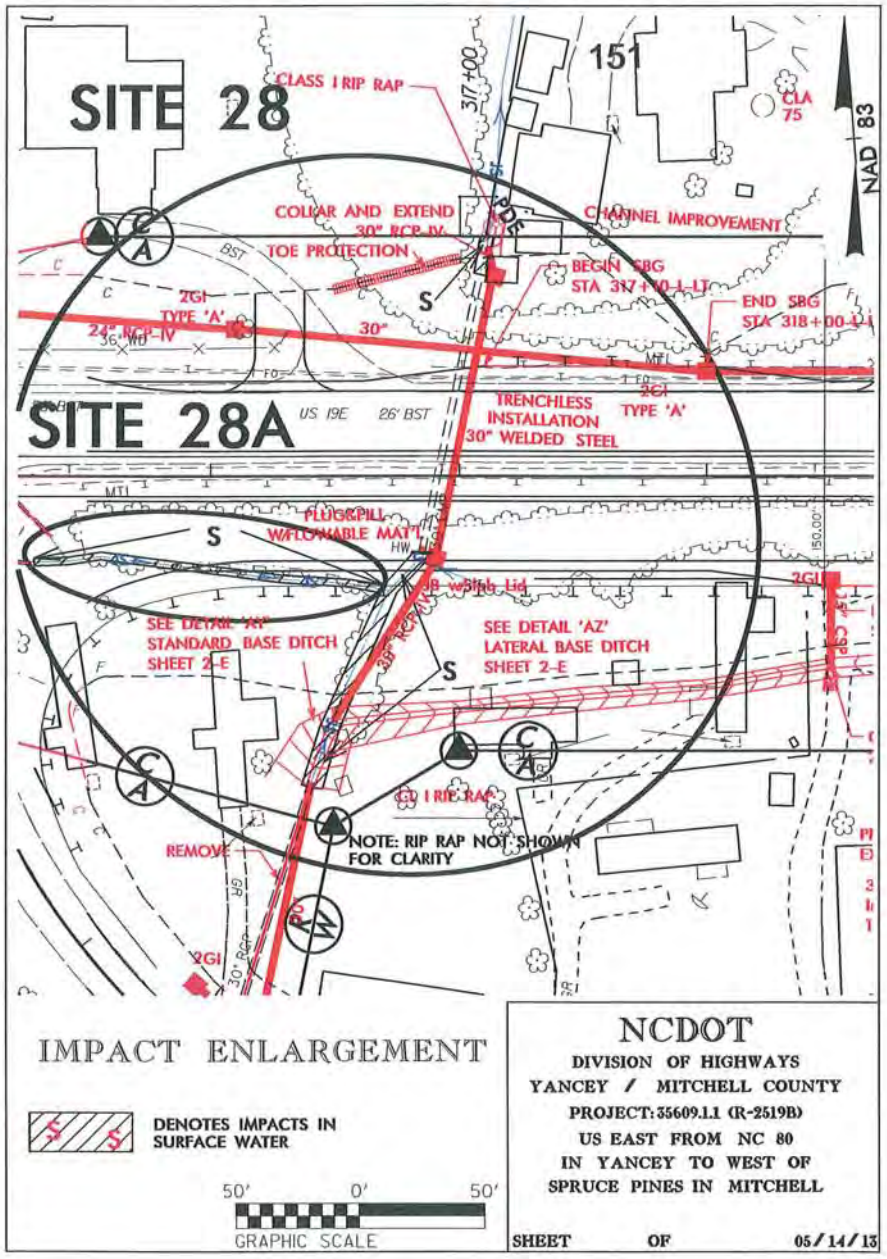
Permit Drawing
Sheet 67 of 114

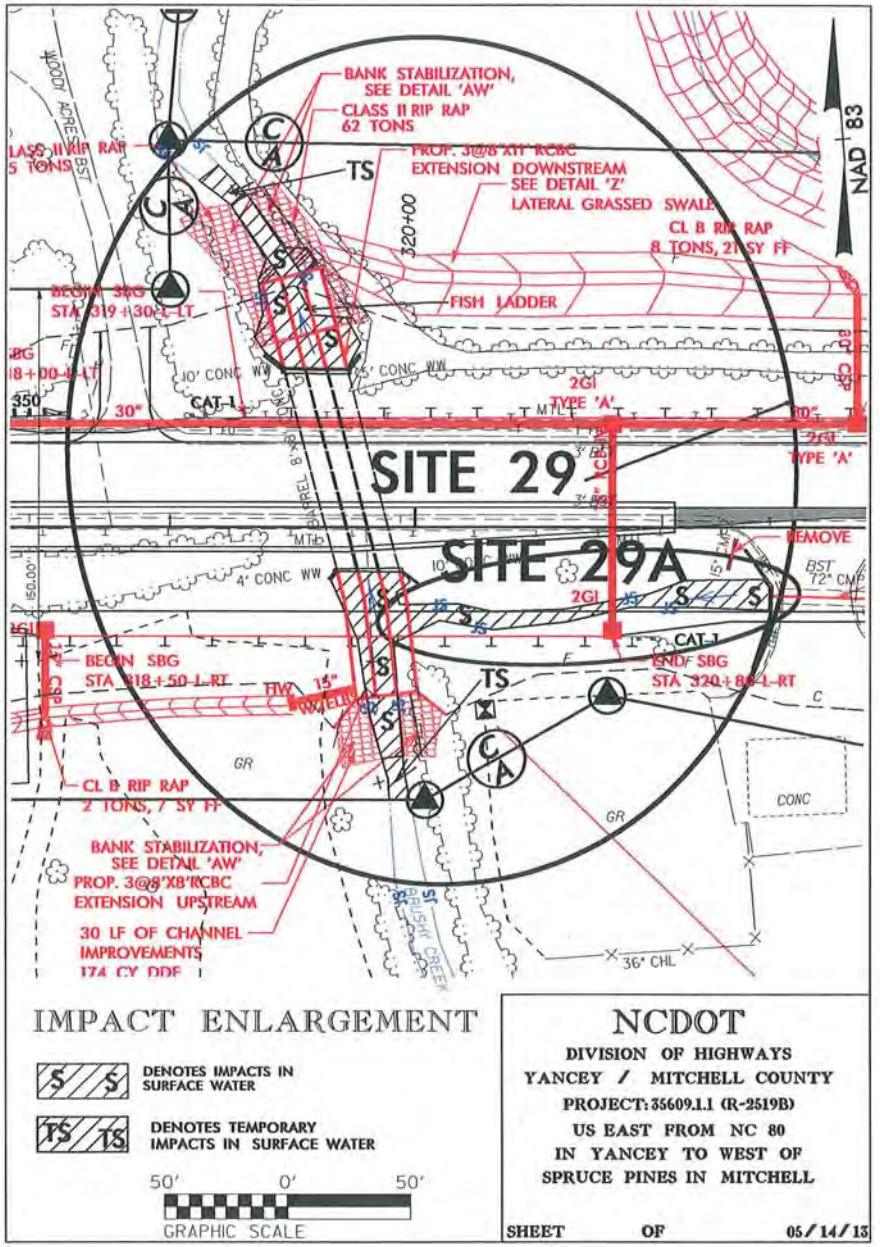


P-219

Permit Drawing
Sheet 63 of 114


MATCH LINE -L- STA. 329+50 SEE SHEET 27
MATCH LINE -L- STA. 315+50 SEE SHEET 25
SITE 28
SITE 28A
SITE 29
SITE 29A
SITE 30
SITE 31
BANK STABILIZATION
BEGIN CONSTRUCTION
END CONSTRUCTION
NAD 83
INCOMPLETE PLANS
PRELIMINARY PLANS
R-2519B
26
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
Permit Drawing

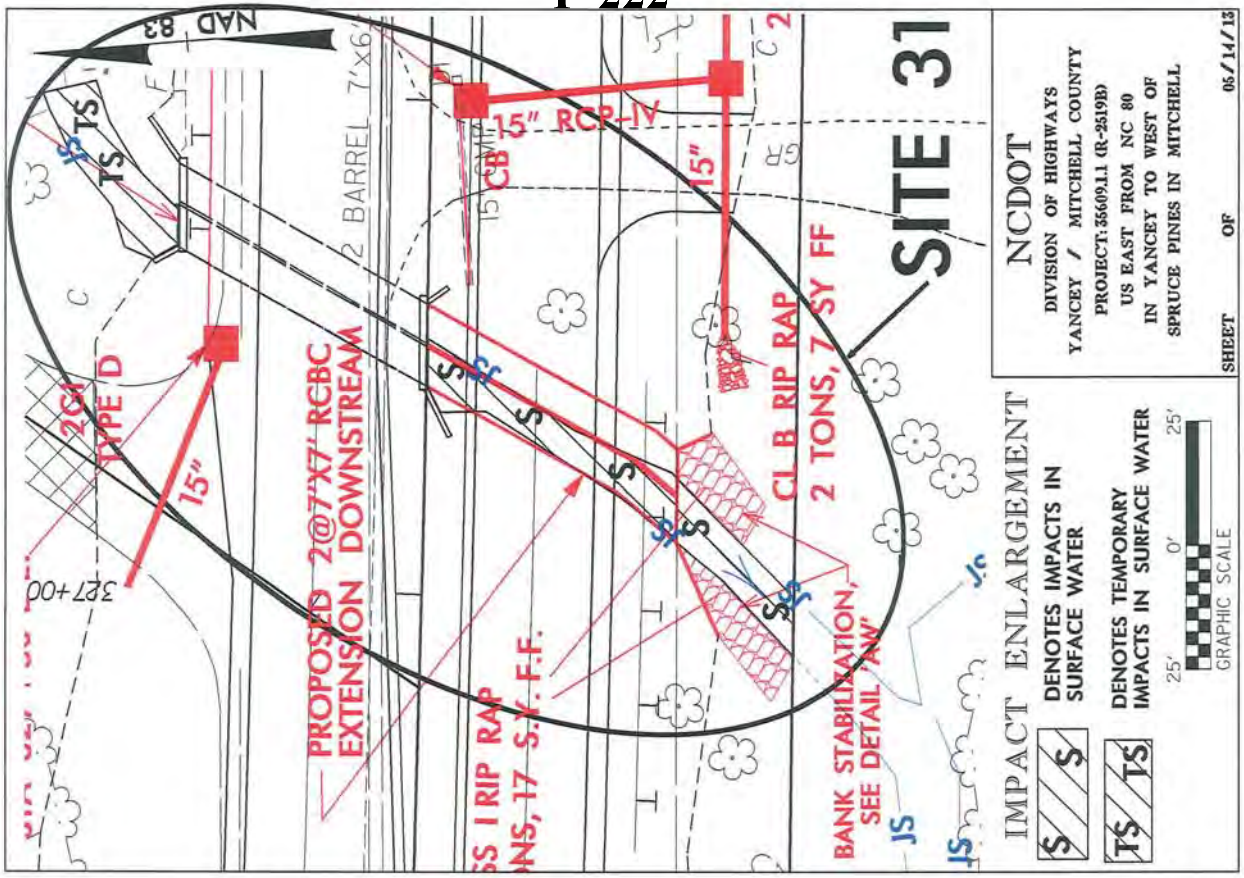




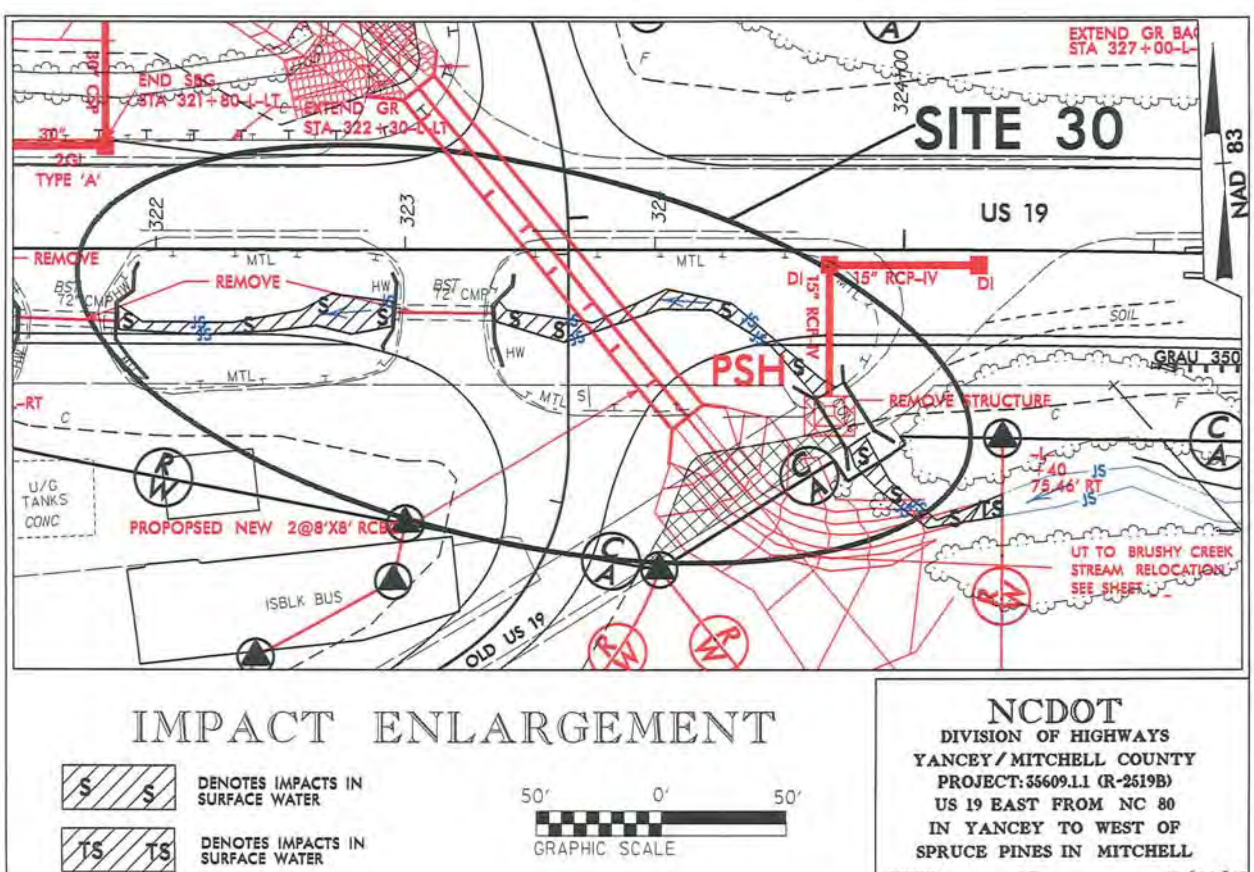
P-221

Permit Drawing
Sheet 20 of 114

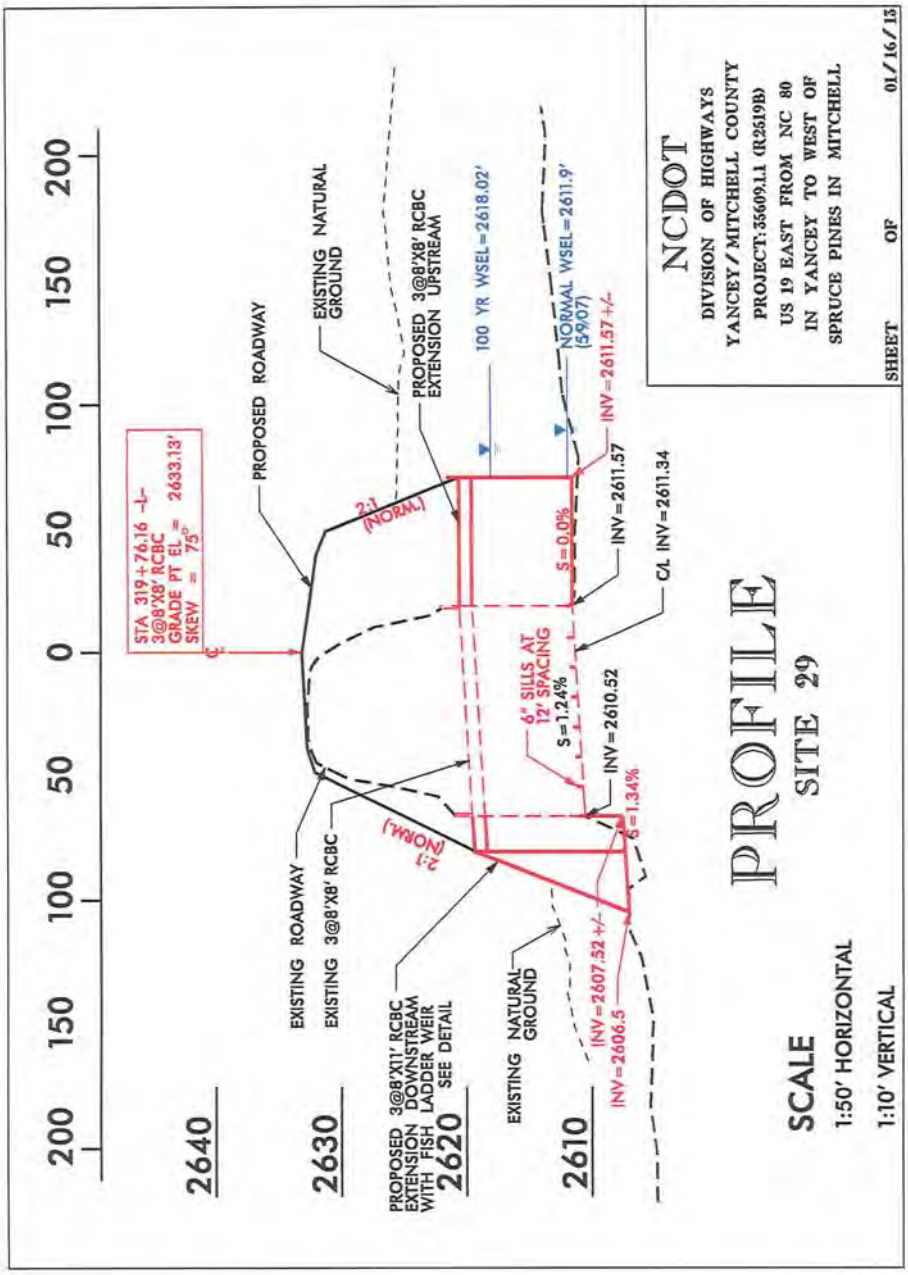
P-222

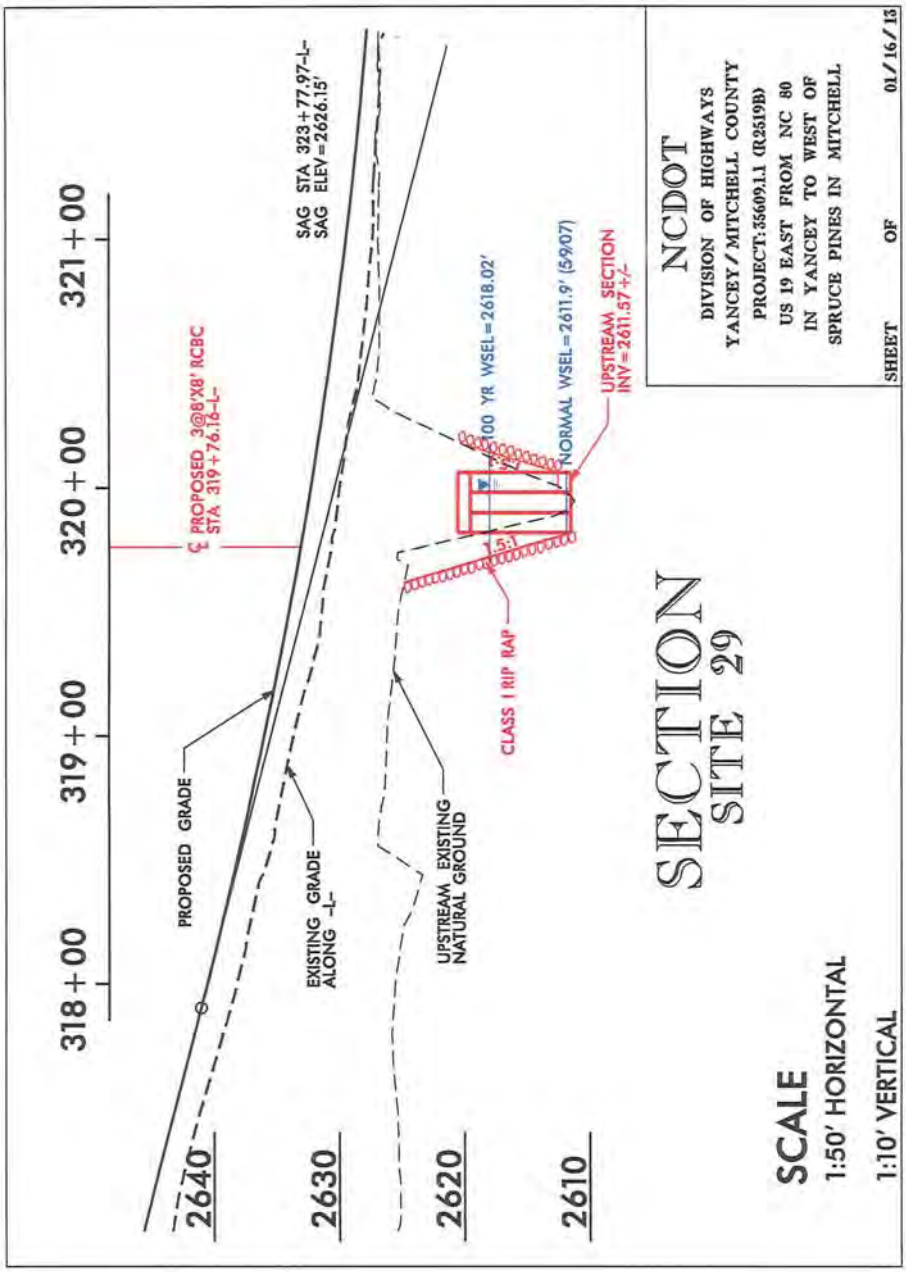


NAD 83
SITE 31
2 BARREL 7'X6'
15" RCP-IV
CB
15"
2GI TYPE D
15"
327+00
PROPOSED 2@7'X7' RCBC EXTENSION DOWNSTREAM
CL B RIP RAP 2 TONS, 7 SY FF
BANK STABILIZATION, SEE DETAIL "AW"
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
25' 0' 25'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05/14/13

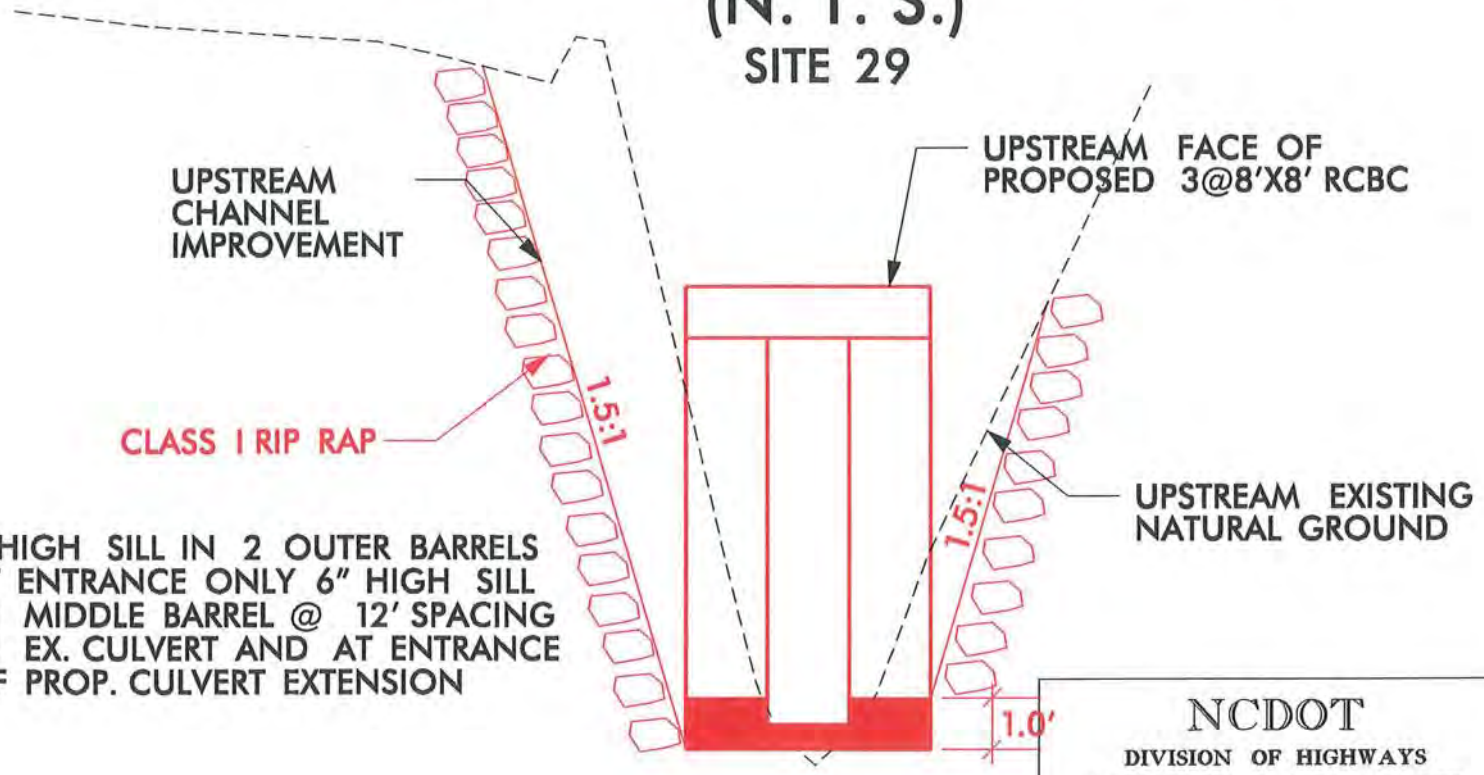


SITE 30
END SBG STA 321+80-L-LT
EXTEND GR STA 322+30-L-LT
2GI TYPE 'A'
EXTEND GR BAG STA 327+00-L-
US 19
NAD 83
REMOVE
72" CMP
HW
15" RCP-IV
DI
PSH
REMOVE STRUCTURE
U/G TANKS
CONC
PROPOSED NEW 2@8'X8' RCBC
ISBLK BUS
OLD US 19
UT TO BRUSHY CREEK STREAM RELOCATION SEE SHEET
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER
50' 0' 50'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY/MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05/14/13


200 150 100 50 0 50 100 150 200
2640
2630
2620
2610
STA 319+76.16 -L-
3@8'X8' RCBC
GRADE PT EL = 2633.13'
SKEW = 75°
PROPOSED ROADWAY
EXISTING NATURAL GROUND
PROPOSED 3@8'X8' RCBC EXTENSION UPSTREAM
100 YR WSEL=2618.02'
NORMAL WSEL=2611.9' (59.07)
INV=2611.57 +/-
2:1 (NORM.)
S=0.0%
INV=2611.57
C/L INV=2611.34
6" SILLS AT 12' SPACING
S=1.24%
INV=2610.52
S=1.34%
EXISTING ROADWAY
EXISTING 3@8'X8' RCBC
PROPOSED 3@8'X11' RCBC EXTENSION WITH FISH LADDER WEIR SEE DETAIL
EXISTING NATURAL GROUND
INV=2607.32 +/-
INV=2606.5
PROFILE
SITE 29
SCALE
1:50' HORIZONTAL
1:10' VERTICAL
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 01/16/15



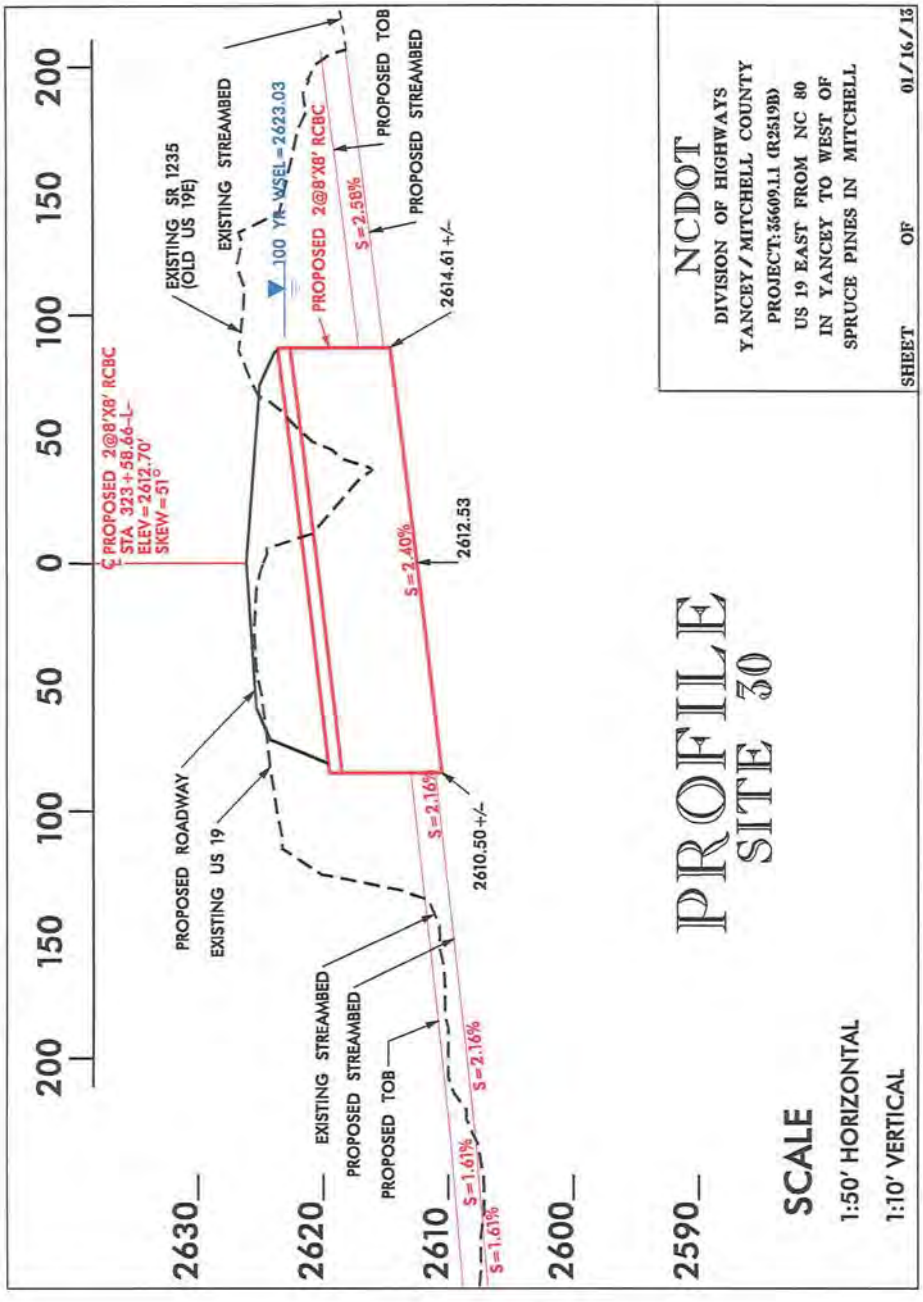
DETAIL OF UPSTREAM RCBC
(N. T. S.)
SITE 29

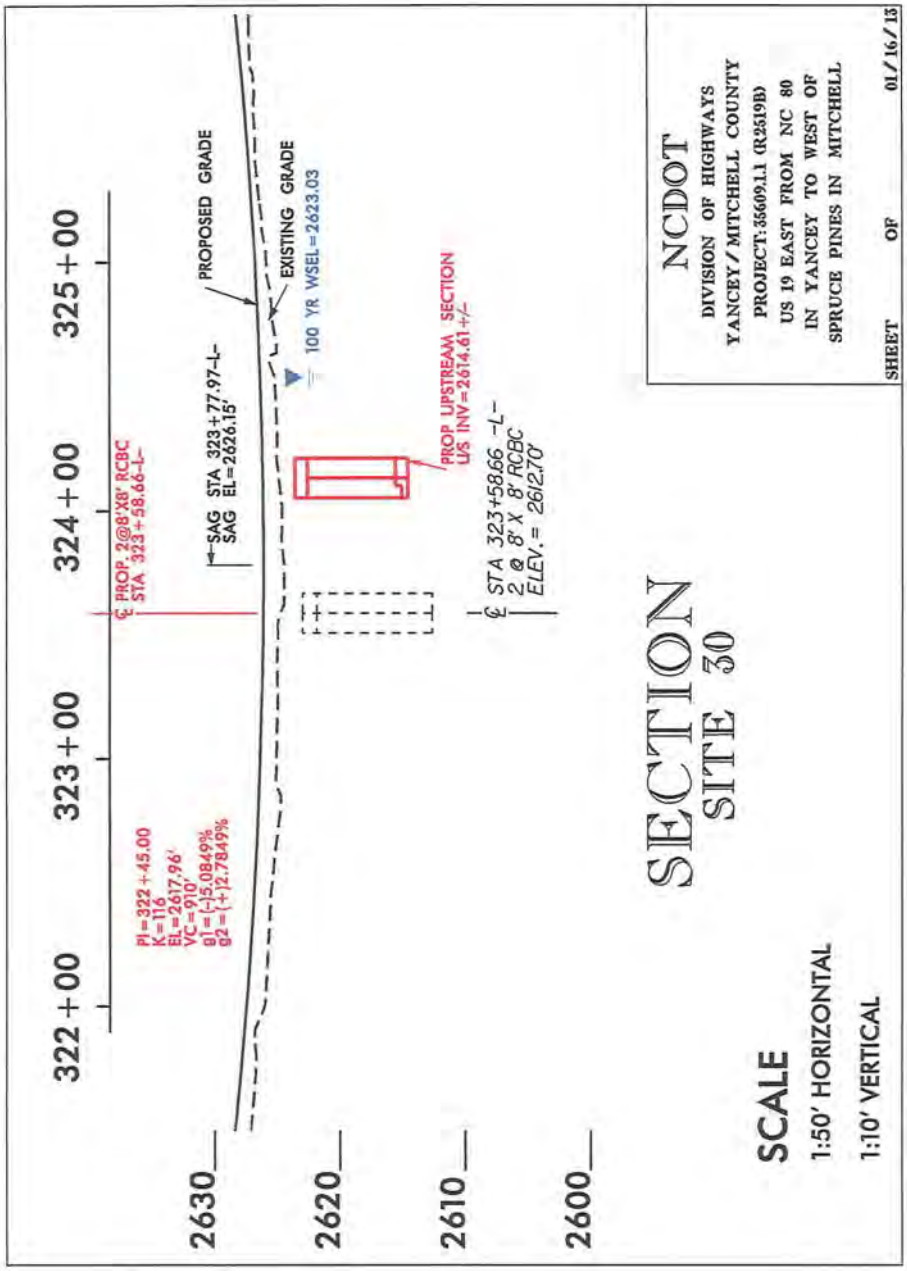


1' HIGH SILL IN 2 OUTER BARRELS AT ENTRANCE ONLY 6" HIGH SILL IN MIDDLE BARREL @ 12' SPACING IN EX. CULVERT AND AT ENTRANCE OF PROP. CULVERT EXTENSION

NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL

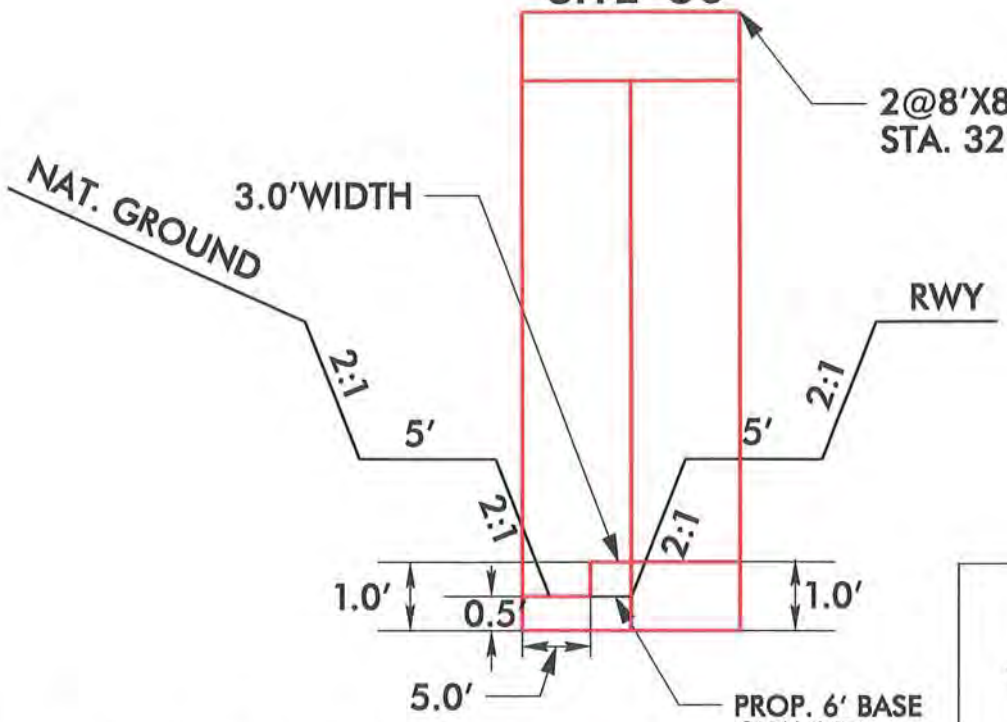
SHEET OF 01 / 16 / 13


200 150 100 50 0 50 100 150 200
2630
2620
2610
2600
2590
℄ PROPOSED 2@8'X8' RCBC
STA 323+58.66-L-
ELEV=2612.70'
SKEW=51°
EXISTING SR 1235
(OLD US 19E)
EXISTING STREAMBED
100 YR WSEL=2623.03
PROPOSED 2@8'X8' RCBC
S=2.58%
PROPOSED TOB
PROPOSED STREAMBED
2614.61 +/-
S=2.40%
2612.53
PROPOSED ROADWAY
EXISTING US 19
EXISTING STREAMBED
PROPOSED STREAMBED
PROPOSED TOB
S=2.16%
2610.50 +/-
S=1.61%
S=2.16%
S=1.61%
PROFILE
SITE 30
SCALE
1:50' HORIZONTAL
1:10' VERTICAL
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 55609.1.1 (R2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 01/16/13



DETAIL OF SILLS AT UPSTREAM OF RCBC (N.T.S.)

SITE 30



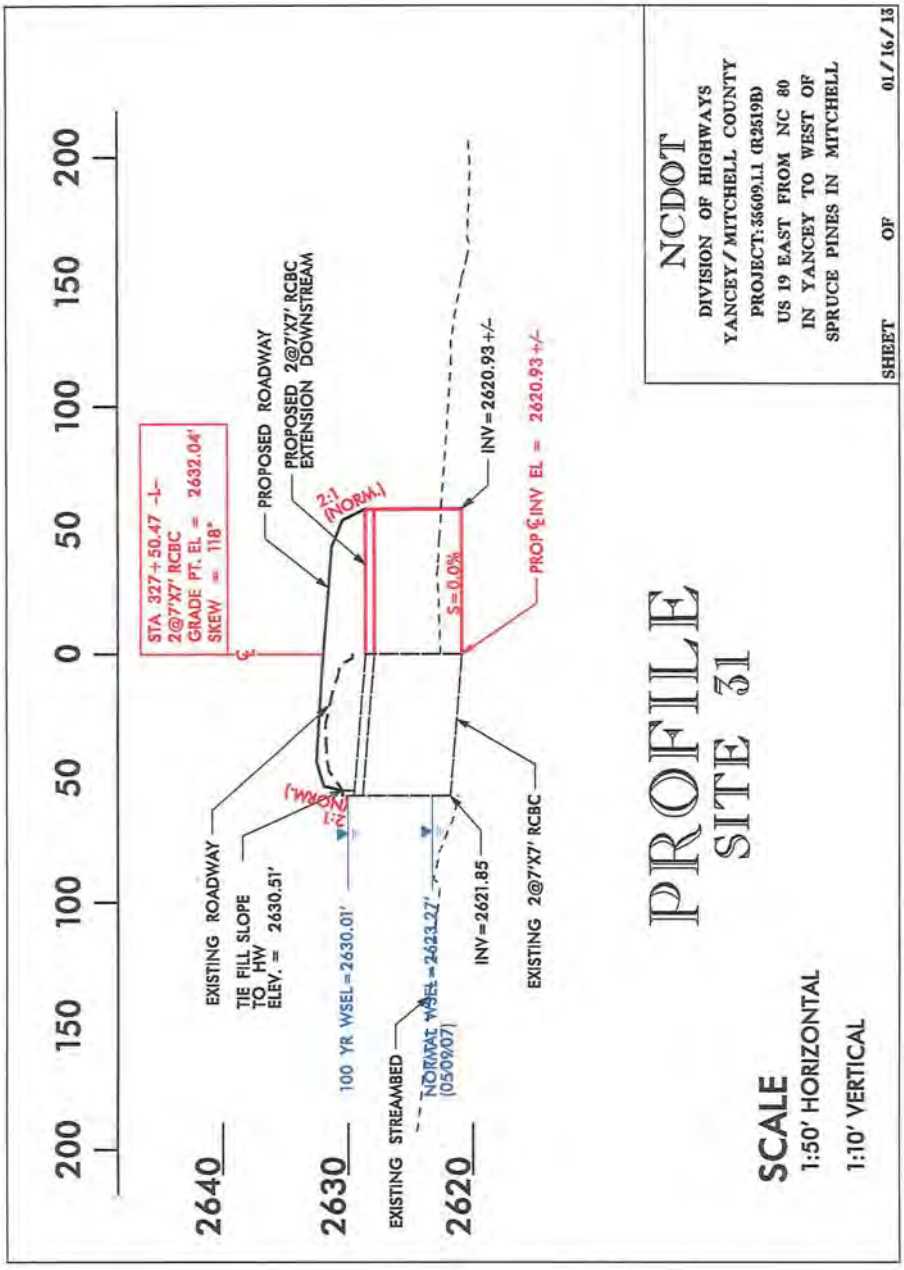
NOTE: Space alternating 0.5' and 1.0' high sills @ 20' intervals in western most barrel.

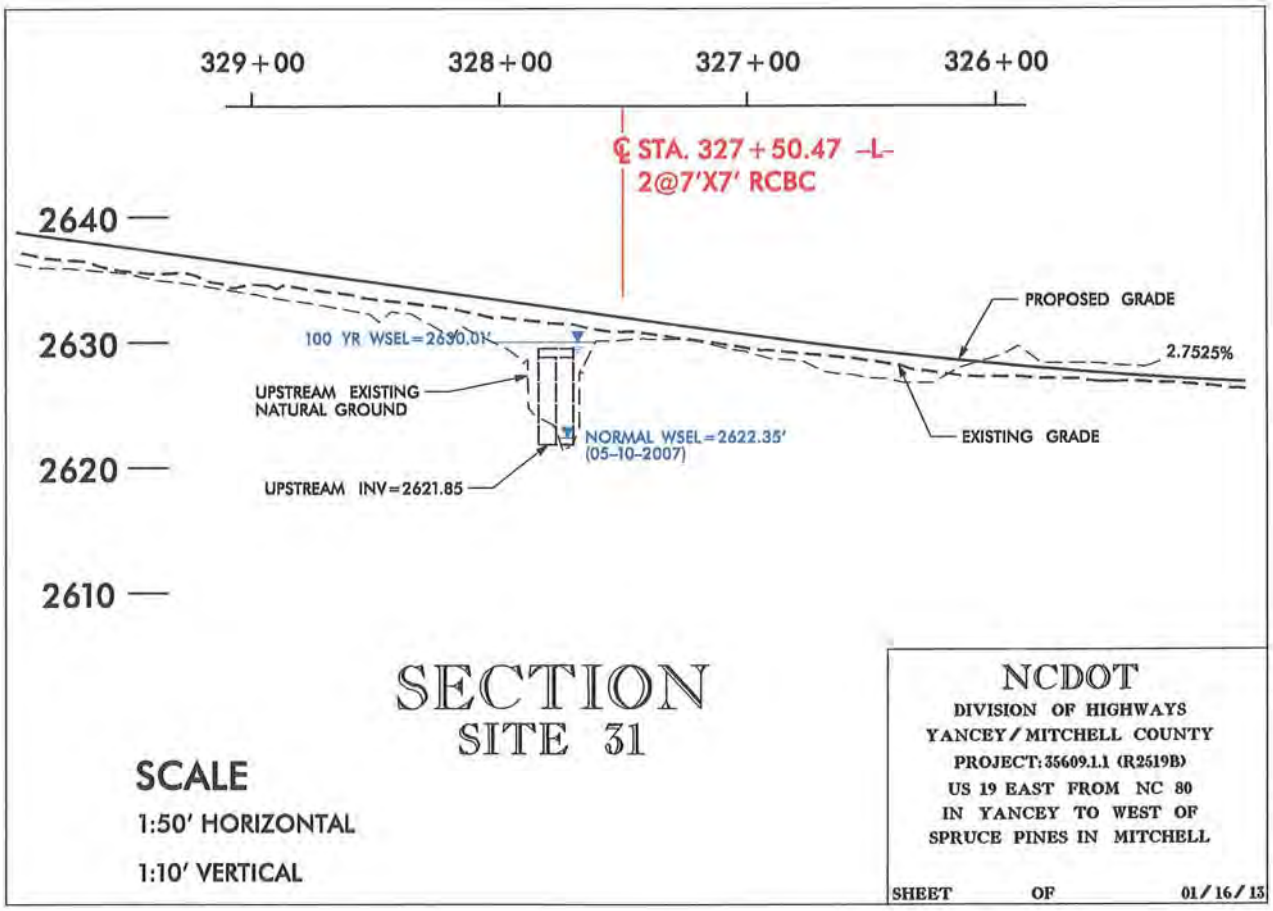
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL

SHEET OF 01 / 16 / 13

P-228

Permit Drawing
Sheet 77 of 114


200 150 100 50 0 50 100 150 200
2640
2630
2620
EXISTING ROADWAY
TIE FILL SLOPE TO HW ELEV. = 2630.51'
STA. 327+50.47 -L-
2@7'X7' RCBC
GRADE PT. EL = 2632.04'
SKEW = 118°
PROPOSED ROADWAY
PROPOSED 2@7'X7' RCBC EXTENSION DOWNSTREAM
2:1 (NORM.)
2:1 (NORM.)
100 YR WSEL = 2630.01'
EXISTING STREAMBED
NORMAL WSEL = 2623.27' (05/09/07)
INV = 2621.85
EXISTING 2@7'X7' RCBC
S = 0.0%
INV = 2620.93 +/-
PROP ℄ INV EL = 2620.93 +/-
PROFILE
SITE 31
SCALE
1:50' HORIZONTAL
1:10' VERTICAL
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 01/16/13



P-230

Permit Drawing
Sheet 79 of 114

UT TO BRUSHY CREEK STREAM RELOCATION

PROJECT REFERENCE NO.	SHEET NO.
R-2519B	2H
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALE

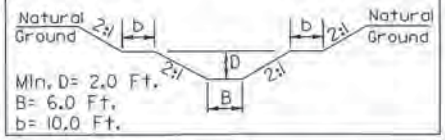
BEGIN STREAM RELOCATION
STA 10+00.00 UT TO BRUSHY CREEK
-L- STA 323+03.10 63.67 FT LT

END STREAM RELOCATION
STA 15+14.4 UT TO BRUSHY CREEK
-L- STA 319+92.70 432.68 FT LT

BEGIN STREAM RELOCATION
STA 10+00.00 US UT TO BRUSHY CREEK
-L- STA 325+10.93 110.14 FT RT

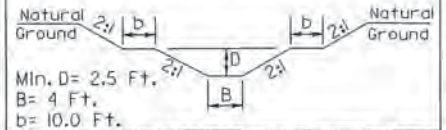
END STREAM RELOCATION
STA 11+20.9 US UT TO BRUSHY CREEK
-L- STA 324+10.51 69.42 FT RT

TYPICAL CHANNEL SECTION
(Not to Scale)



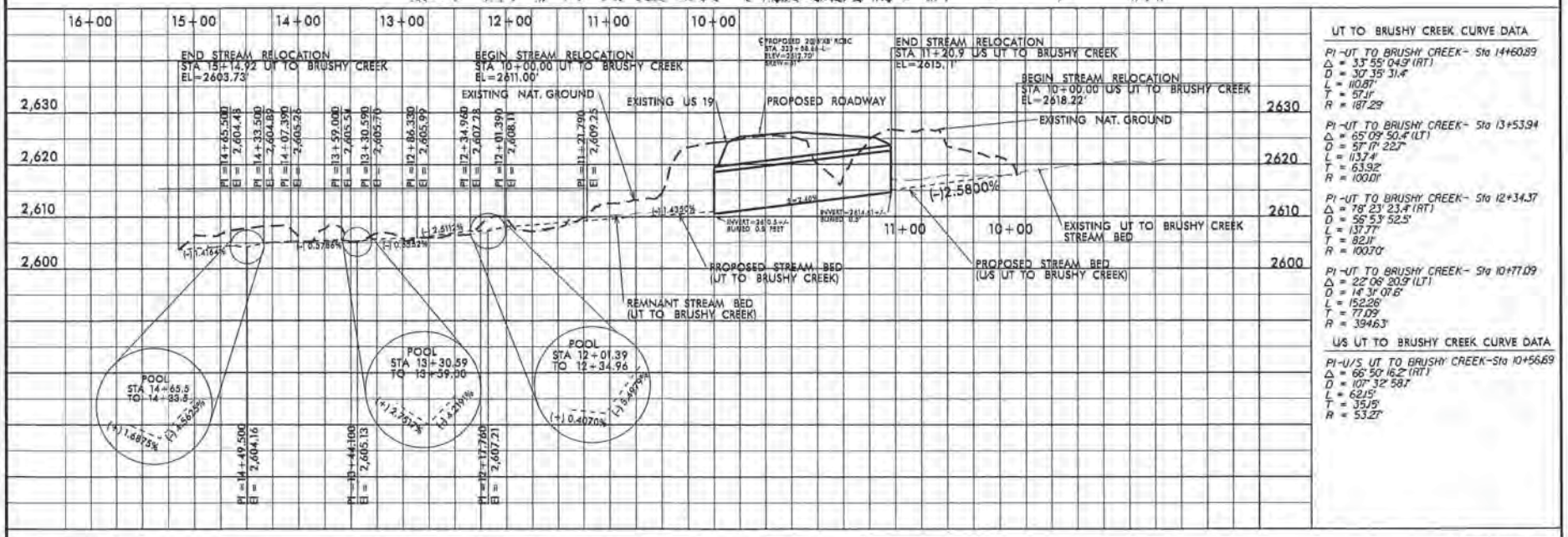
Min. D= 2.0 Ft.
B= 6.0 Ft.
b= 10.0 Ft.

TYPICAL POOL SECTION
(Not to Scale)



Min. D= 2.5 Ft.
B= 4 Ft.
b= 10.0 Ft.

FROM UT TO BRUSHY CREEK STA 12+01.39 TO STA 12+34.96
FROM UT TO BRUSHY CREEK STA 13+30.59 TO STA 13+59.00
FROM UT TO BRUSHY CREEK STA 14+33.50 TO STA 14+65.5



UT TO BRUSHY CREEK CURVE DATA

PI -UT TO BRUSHY CREEK- Sta 14+60.89
Δ = 33° 55' 04.9" (RT)
D = 30° 35' 31.4"
L = 110.87'
T = 57.1'
R = 187.29'

PI -UT TO BRUSHY CREEK- Sta 13+53.94
Δ = 65° 09' 50.4" (LT)
D = 57° 17' 22.7"
L = 113.74'
T = 63.92'
R = 100.01'

PI -UT TO BRUSHY CREEK- Sta 12+34.37
Δ = 78° 23' 23.4" (RT)
D = 56° 53' 52.5"
L = 137.77'
T = 82.1'
R = 100.70'

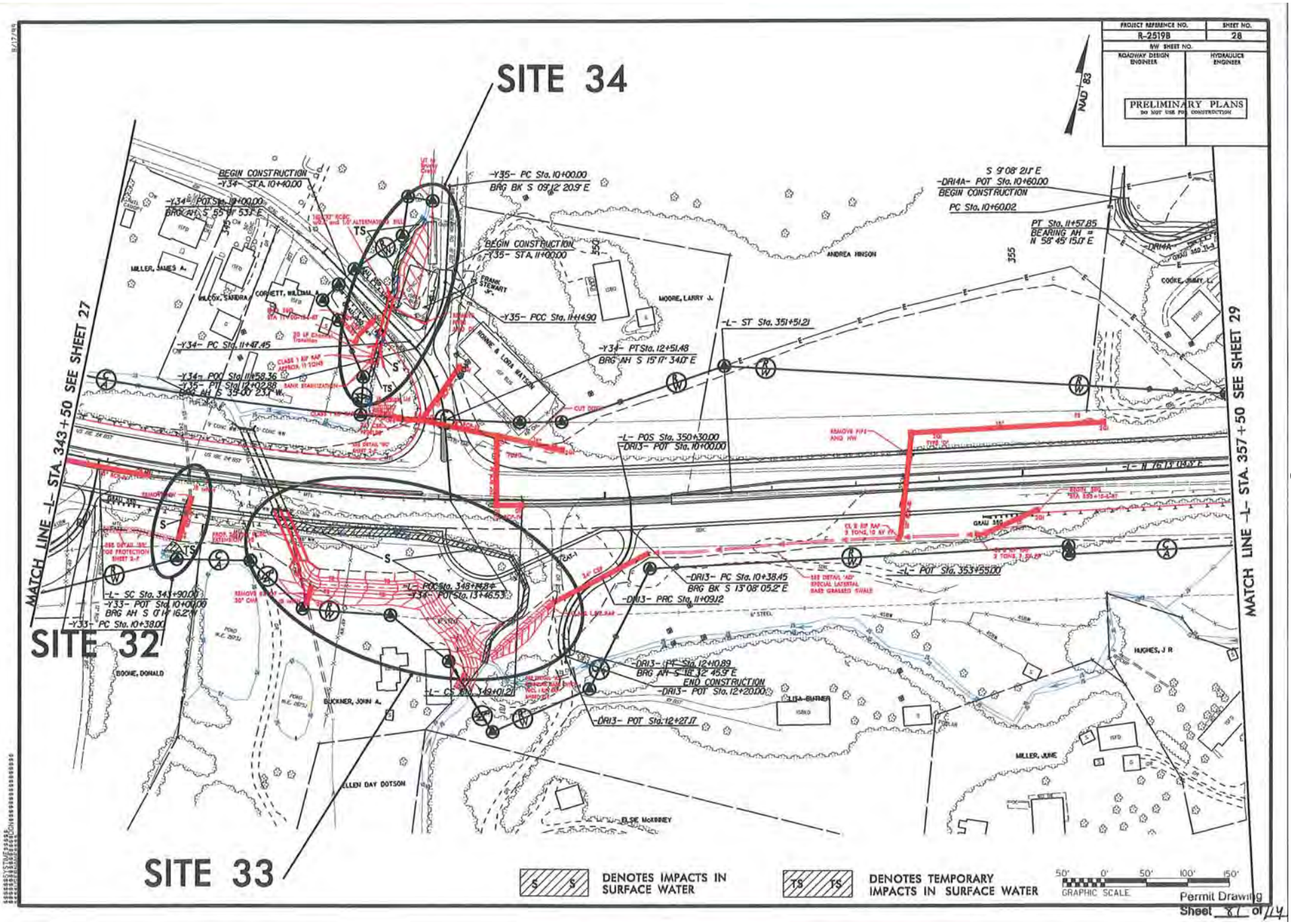
PI -UT TO BRUSHY CREEK- Sta 10+77.09
Δ = 22° 06' 20.9" (LT)
D = 14° 31' 01.8"
L = 152.26'
T = 77.09'
R = 394.63'

US UT TO BRUSHY CREEK CURVE DATA

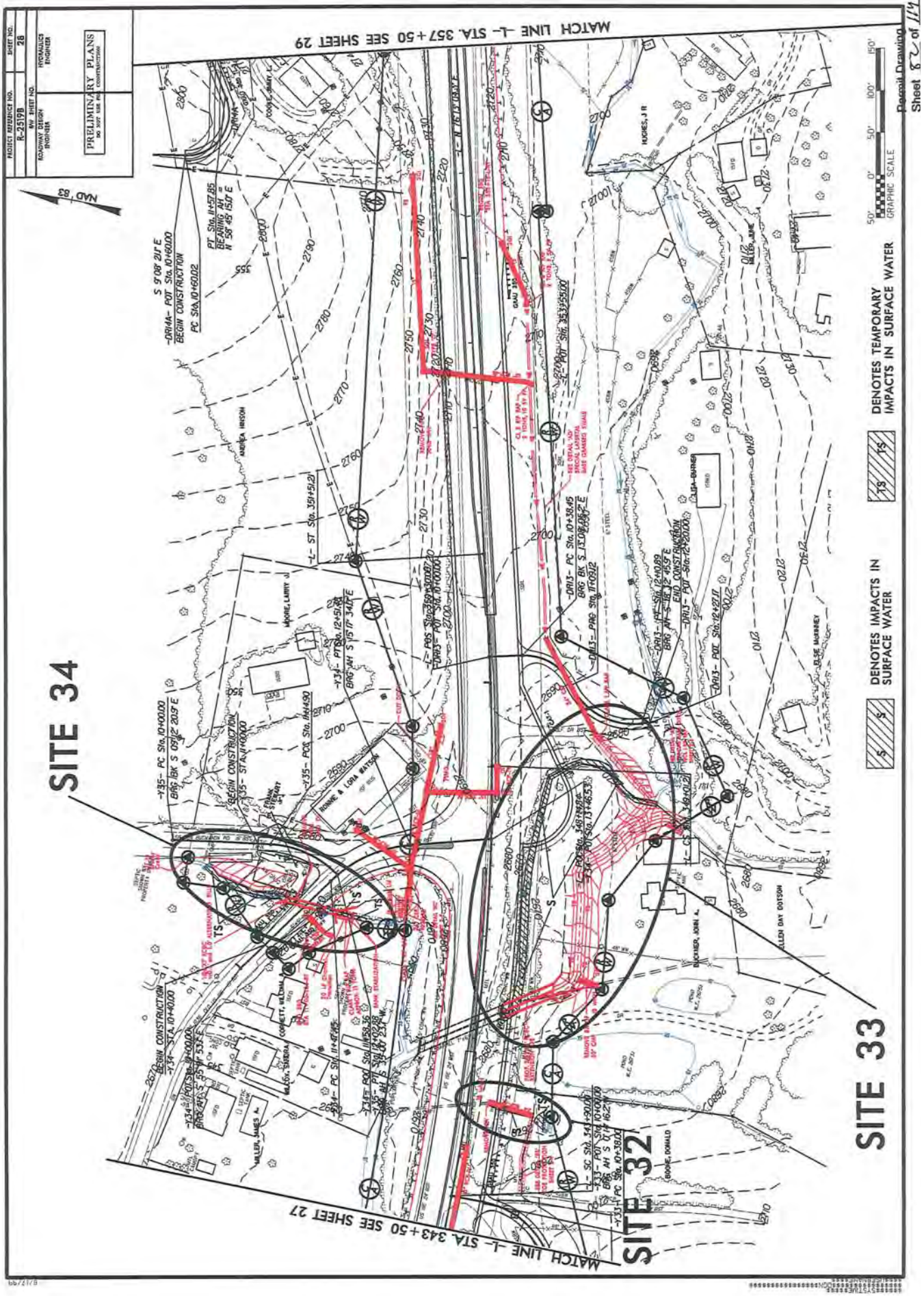
PI-U/S UT TO BRUSHY CREEK-Sta 10+56.69
Δ = 66° 50' 16.2" (RT)
D = 107° 32' 58.1"
L = 62.15'
T = 35.15'
R = 53.27'

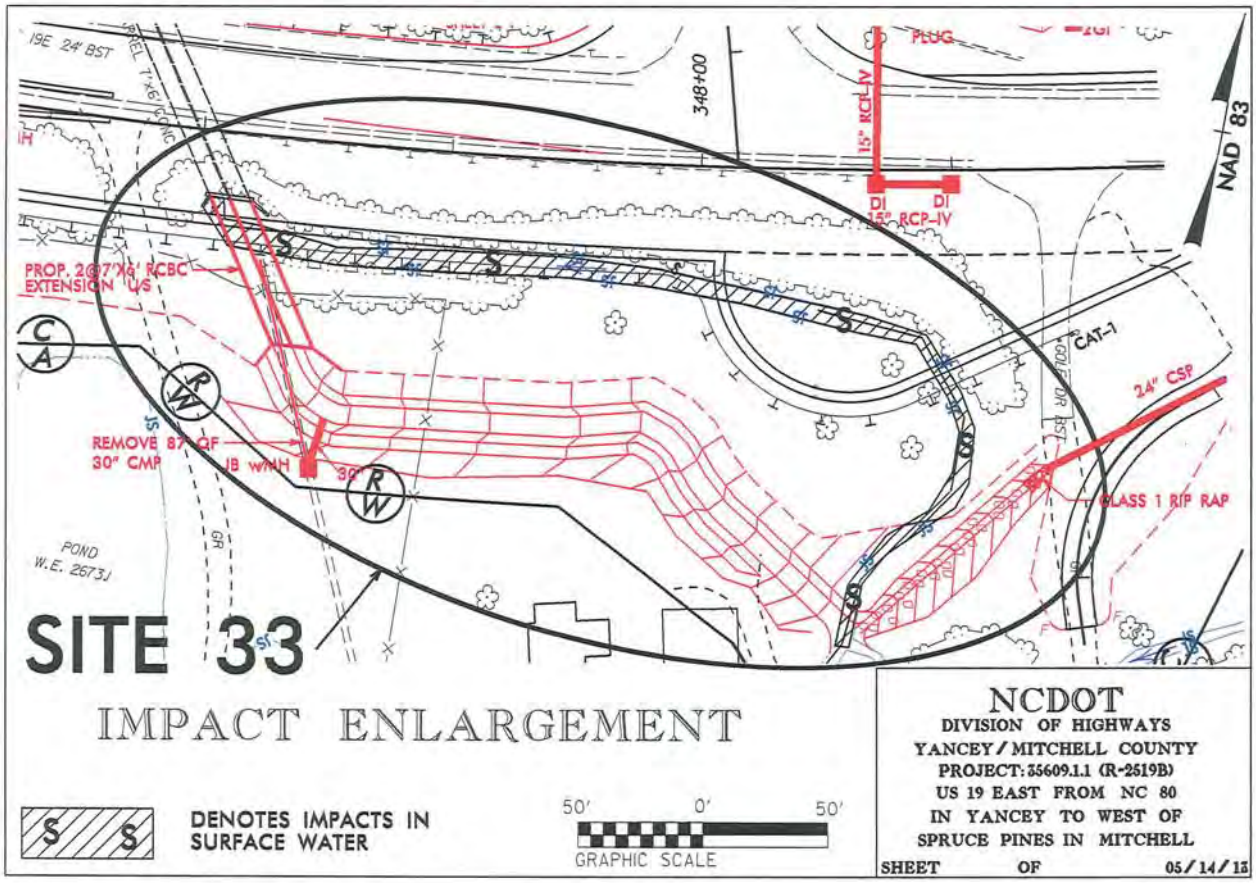
P-231

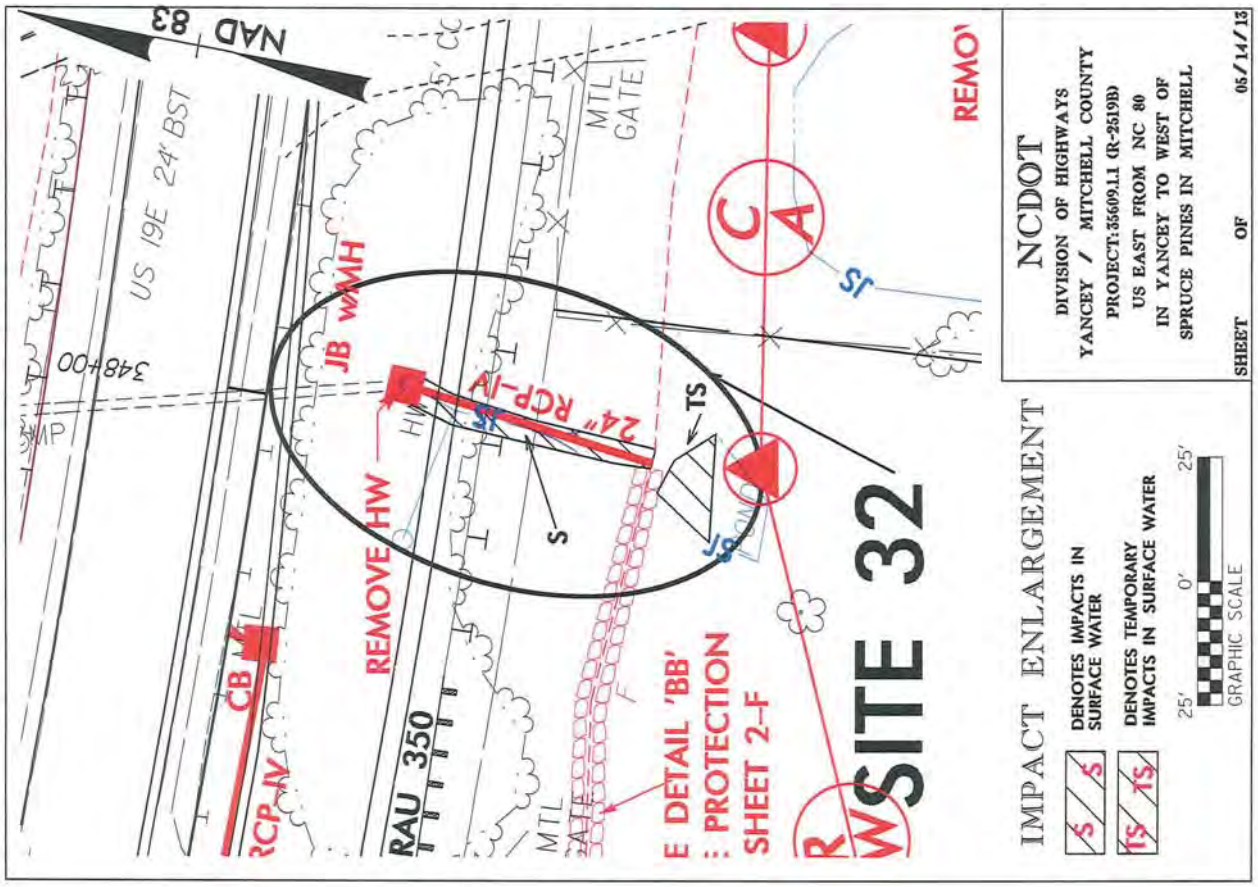
Permit Drawing
Sheet 50 of 114

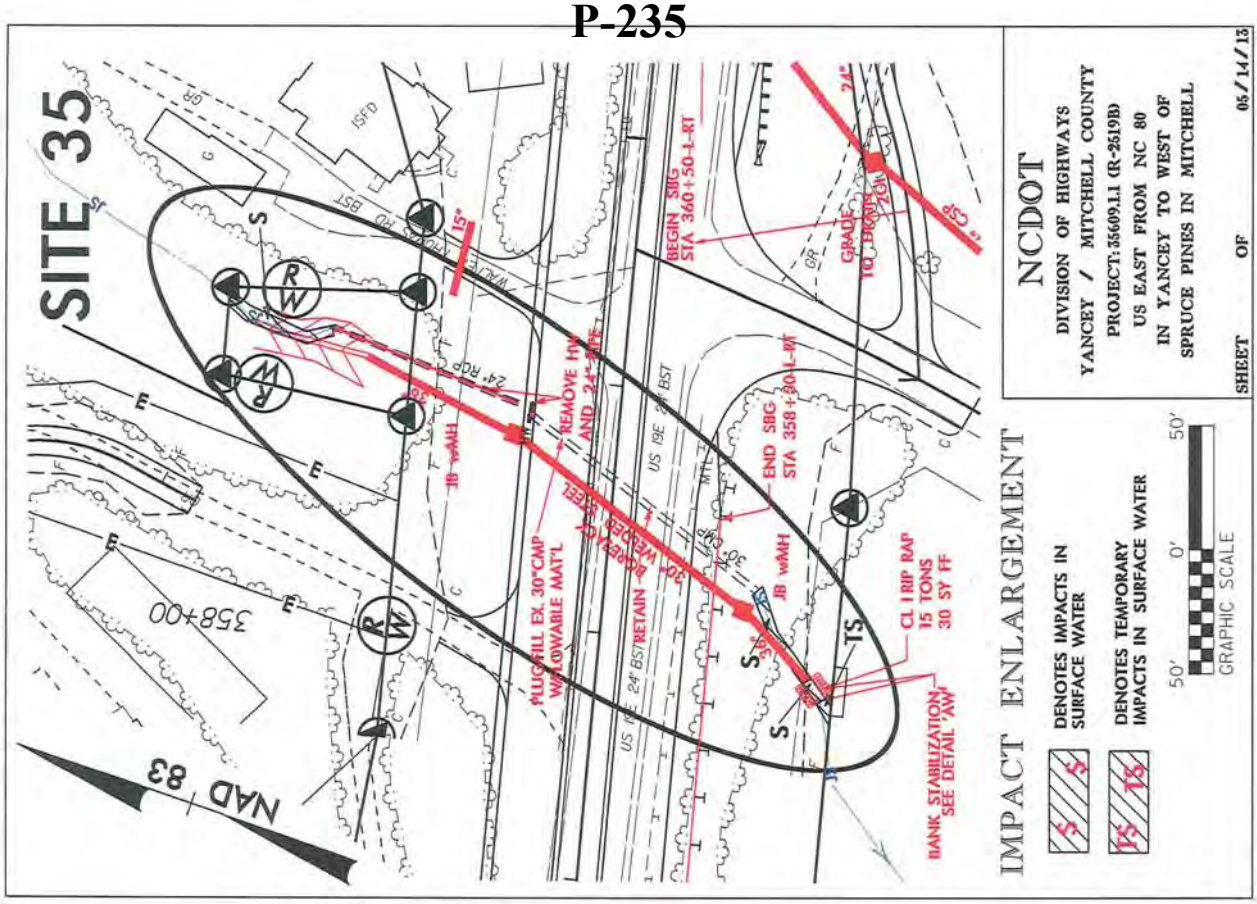

SITE 34
SITE 32
SITE 33
PROJECT REFERENCE NO. R-2519B
SHEET NO. 28
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83
MATCH LINE -L- STA. 343+50 SEE SHEET 27
MATCH LINE -L- STA. 357+50 SEE SHEET 29
BEGIN CONSTRUCTION -Y34- STA. 10+40.00
-Y34- POT Sta. 10+00.00 BRG AH S 55° 19' 53.2" E
-Y35- PC Sta. 10+00.00 BRG BK S 09° 12' 20.9" E
BEGIN CONSTRUCTION -Y35- STA. 11+00.00
-Y34- PC Sta. 11+47.45
-Y34- POT Sta. 11+58.36
-Y35- PT Sta. 12+02.88 BRG AH S 33° 00' 23.1" W
-Y35- PCC Sta. 11+14.90
-Y34- PT Sta. 12+51.48 BRG AH S 15° 17' 34.0" E
-L- ST Sta. 351+51.21
-L- POS Sta. 350+30.00
-DRI3- POT Sta. 10+00.00
-L- SC Sta. 343+90.00
-Y33- POT Sta. 10+00.00 BRG AH S 0° 19' 16.2" W
-Y33- PC Sta. 10+38.00
-L- POC Sta. 348+28.84
-Y34- POT Sta. 13+46.53
-DRI3- PC Sta. 10+38.45 BRG BK S 13° 08' 05.2" E
-DRI3- PRC Sta. 11+09.12
-L- POT Sta. 353+55.00
-L- CC Sta. 349+01.21
-DRI3- PT Sta. 12+10.89 BRG AH S 18° 32' 45.9" E
END CONSTRUCTION
-DRI3- POT Sta. 12+20.00
-DRI3- POT Sta. 12+27.17
S 9° 08' 21.1" E
-DRI4A- POT Sta. 10+60.00
BEGIN CONSTRUCTION
PC Sta. 10+60.02
PT Sta. 11+57.85 BEARING AH = N 58° 45' 15.0" E
-DRI4A-
-L- N 76° 13' 08.4" E
ANDREA HINSON
FRANK STEWART JR.
MOORE, LARRY J.
RONNIE & LORA WATSON
MILLER, JAMES A.
WILCOX, SANDRA
CORNETT, WILLIAM
COOKE, JIMMY L.
BOONE, DONALD
BUCKNER, JOHN A.
ELLEN DAY DOTSON
ELSIE McKINNEY
LISA BARNER
HUGHES, J R
MILLER, JUNE
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
50' 0' 50' 100' 150'
GRAPHIC SCALE
Permit Drawing
Sheet 27 of 74

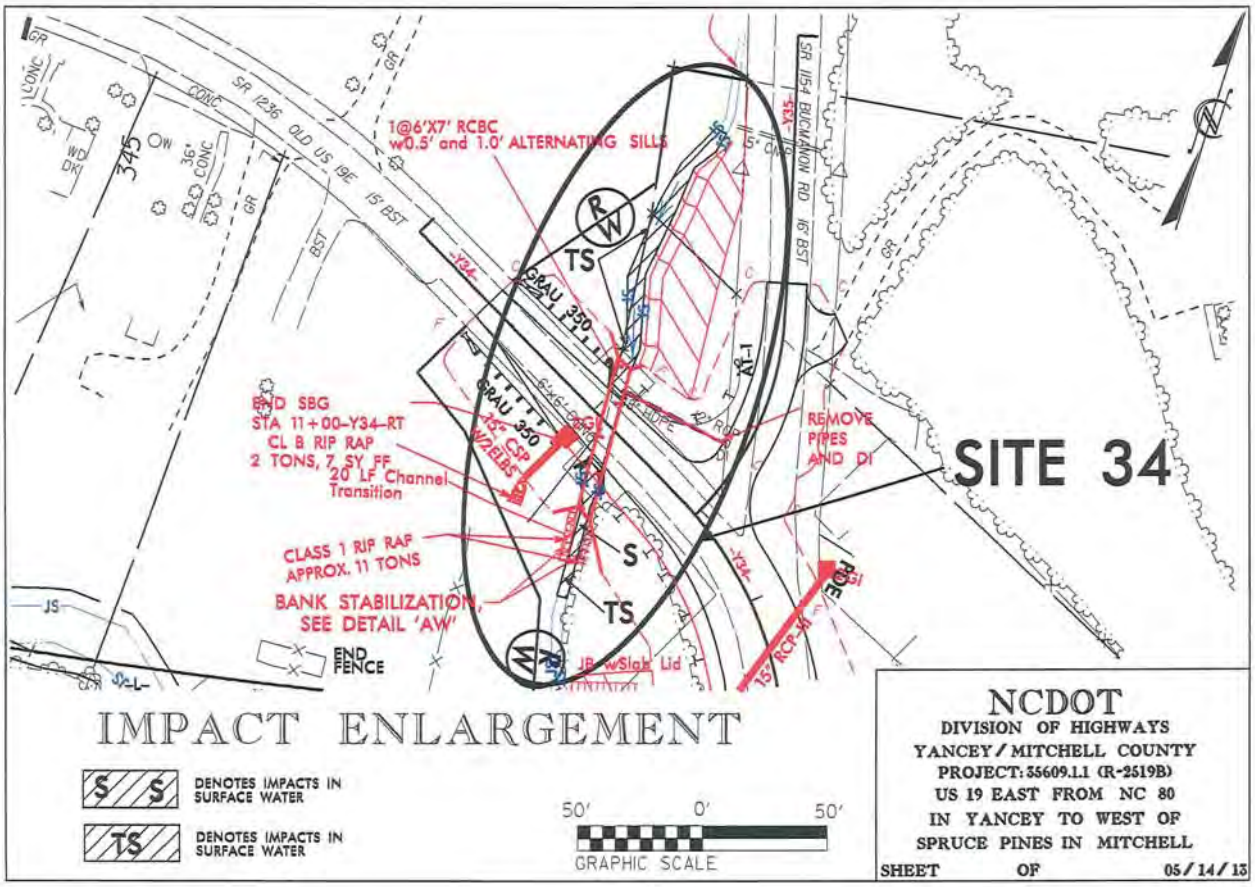
P-232

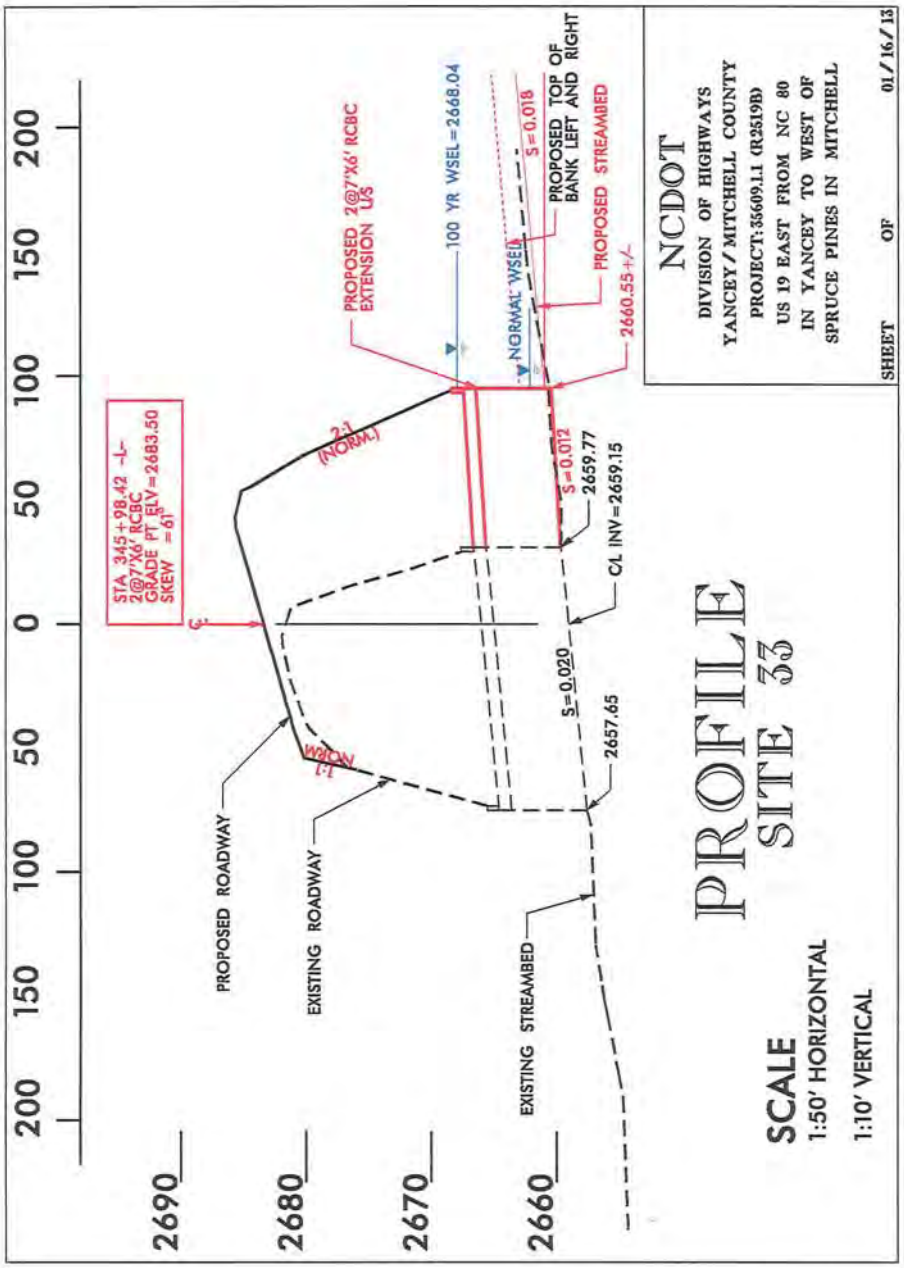

PRELIMINARY PLANS
NOT SUBJECT TO RIGHT OF CONSTRUCTION
PROJECT REFERENCE NO. R-2519B
SHEET NO. 28
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
NAD '83
MATCH LINE -L- STA. 357+50 SEE SHEET 29
MATCH LINE -L- STA. 343+50 SEE SHEET 27
SITE 34
SITE 33
SITE 32
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
Sheet 82 of 114
Permit Drawing

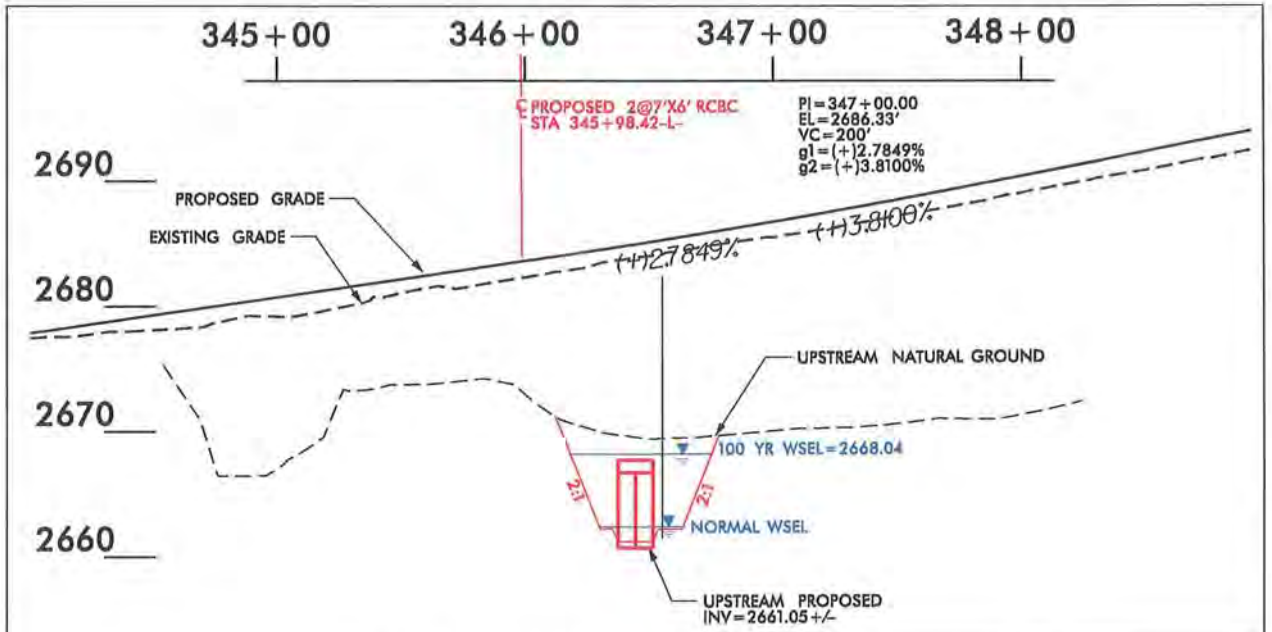

19E 24' BST
348+00
PLUG
15" RCP-IV
DI
DI
15" RCP-IV
NAD 83
PROP. 2@7'X6' RCBC
EXTENSION U/S
CAT-1
24" CSP
REMOVE 87' OF
30" CMP
JB w/HH
30"
CLASS 1 RIP RAP
POND
W.E. 2673
SITE 33
IMPACT ENLARGEMENT
DENOTES IMPACTS IN
SURFACE WATER
50' 0' 50'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05/14/13


NAD 83
US 19E 24' BST
348+00
MTL
GATE
REMO
JB w/HH
24" RCP-IV
TS
REMOVE HW
CB
RCP-IV
RAU 350
MTL
E DETAIL 'BB'
: PROTECTION
SHEET 2-F
SITE 32
IMPACT ENLARGEMENT
DENOTES IMPACTS IN
SURFACE WATER
DENOTES TEMPORARY
IMPACTS IN SURFACE WATER
25' 0' 25'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05/14/13


SITE 35
NAD 83
358+00
BEGIN SBG STA 360+50-L-RT
END SBG STA 358+30-L-RT
REMOVE HW AND 24" RCP
PLUG/FILL EX. 30"CMP W/FLOWABLE MAT'L
RETAIN 20' PC CONCRETE SHEET
CL I RIP RAP 15 TONS 30 SY FF
BANK STABILIZATION SEE DETAIL 'AW'
GRADE TO DRAIN
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 55609.1.1 (R-2519B)
US EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05/14/13


SITE 34
1@6'X7' RCBC w0.5' and 1.0' ALTERNATING SILLS
END SBG STA 11+00-Y34-RT
CL B RIP RAP 2 TONS, 7 SY FF
20 LF Channel Transition
CLASS 1 RIP RAP APPROX. 11 TONS
BANK STABILIZATION, SEE DETAIL 'AW'
REMOVE PIPES AND DI
END FENCE
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 55609.1.1 (R-2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05/14/13


200 150 100 50 0 50 100 150 200
2690
2680
2670
2660
STA 345+98.42 -L-
2@7'X6' RCBC
GRADE PT ELV=2683.50
SKEW = 61°
PROPOSED 2@7'X6' RCBC
EXTENSION U/S
100 YR WSEL=2668.04
NORMAL WSEL
S=0.018
PROPOSED TOP OF
BANK LEFT AND RIGHT
PROPOSED STREAMBED
2660.55+/-
2:1
(NORM.)
S=0.012
2659.77
CL INV=2659.15
S=0.020
2657.65
PROPOSED ROADWAY
EXISTING ROADWAY
EXISTING STREAMBED
PROFILE
SITE 33
SCALE
1:50' HORIZONTAL
1:10' VERTICAL
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 01/16/13



SECTION
SITE 33

SCALE
1:50' HORIZONTAL
1:10' VERTICAL

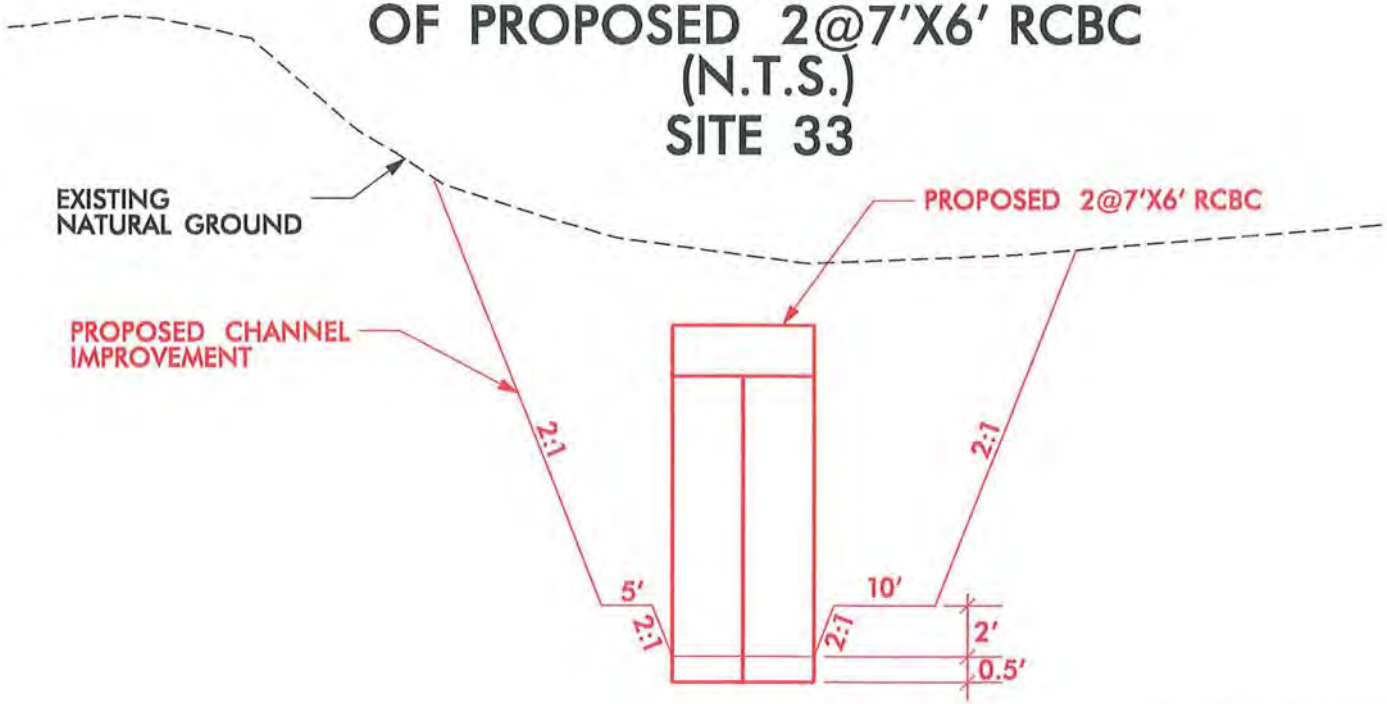
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL

SHEET OF 01/16/13

P-237

Permit Drawing
Sheet 86 of 114

DETAIL OF UPSTREAM FACE OF PROPOSED 2@7'X6' RCBC (N.T.S.) SITE 33



NCDOT

DIVISION OF HIGHWAYS

YANCEY / MITCHELL COUNTY

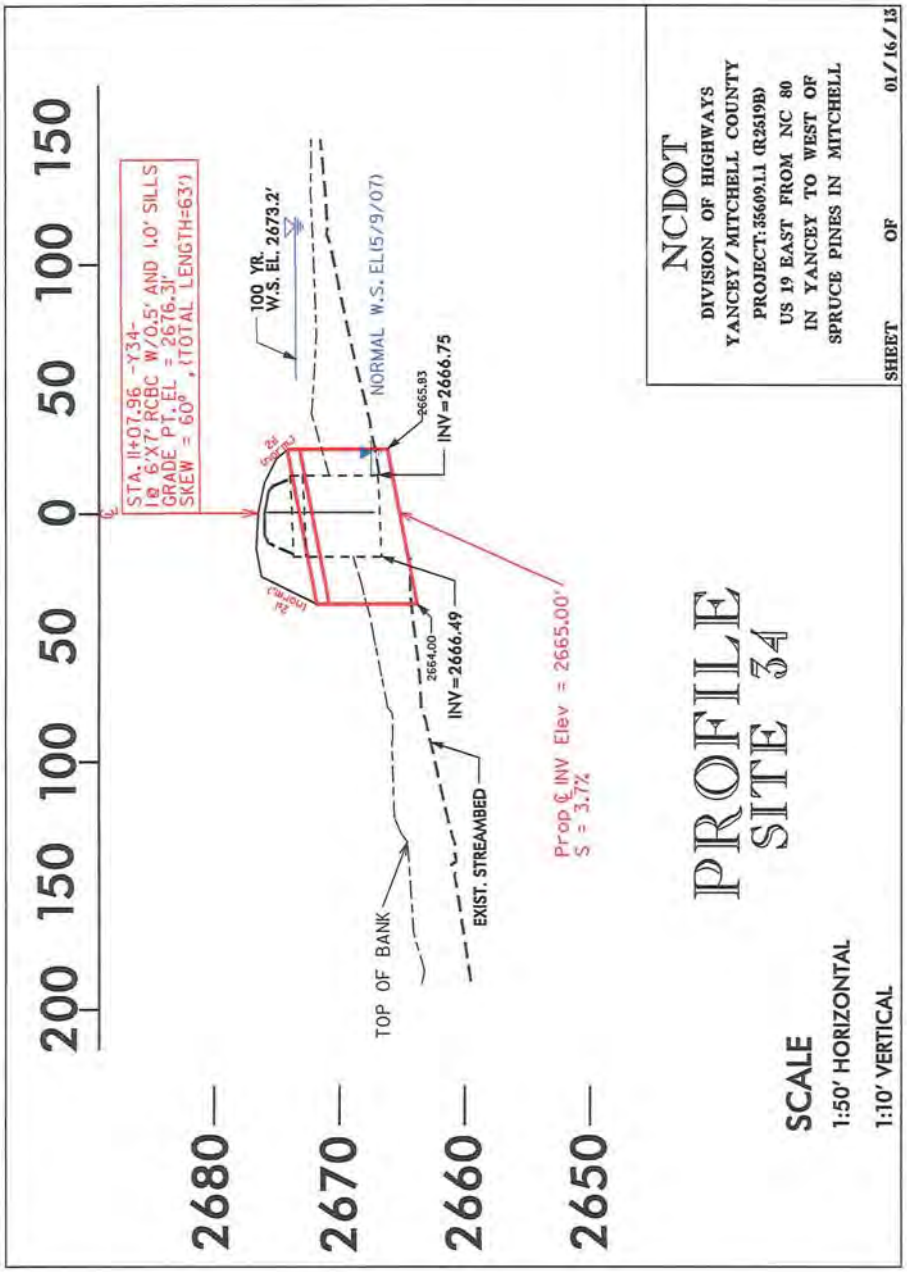
PROJECT: 35609.1.1 (R2519B)

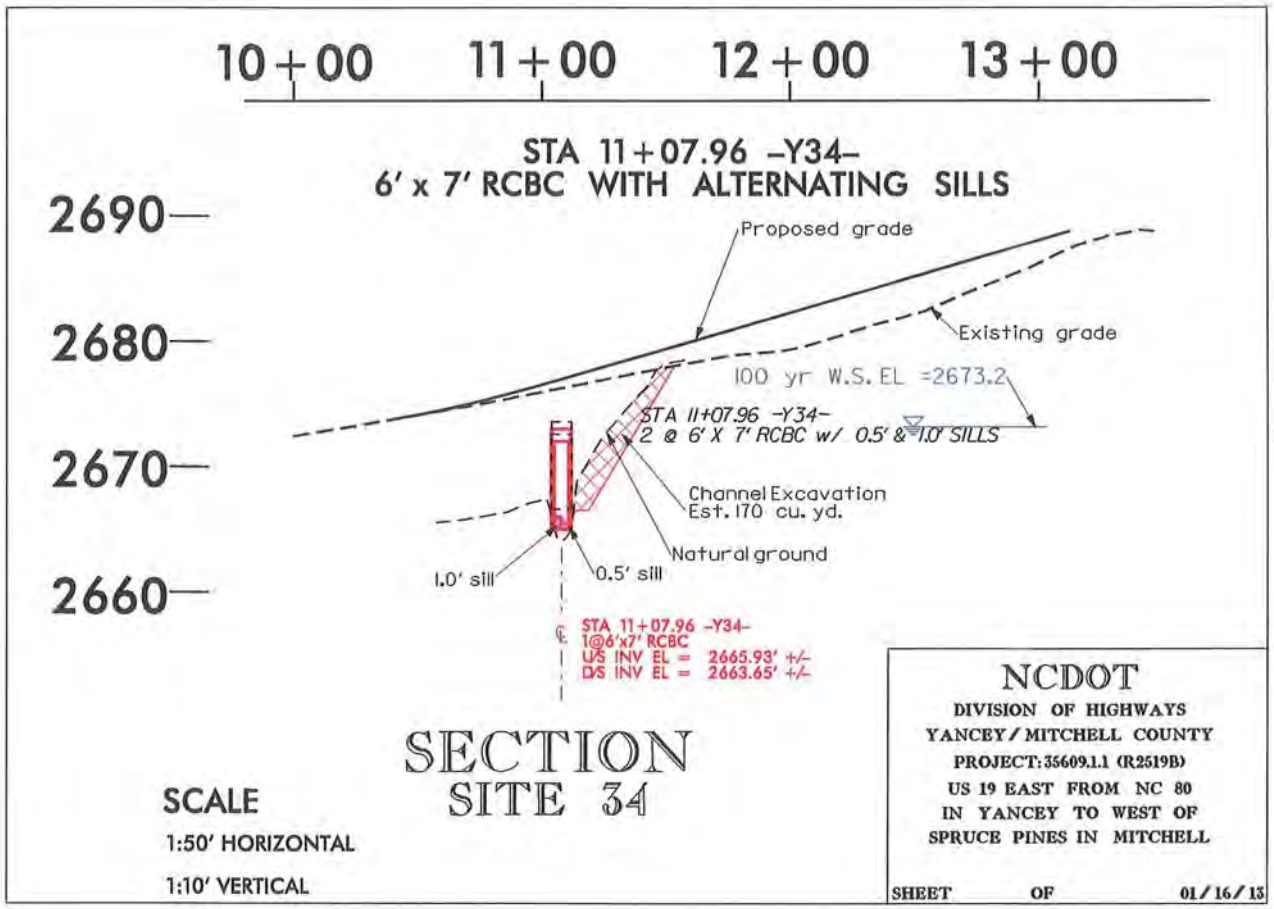
US 19 EAST FROM NC 80 IN YANCEY TO WEST OF SPRUCE PINES IN MITCHELL

SHEET OF 01 / 16 / 13

P-238

Permit Drawing
Sheet 52 of 114

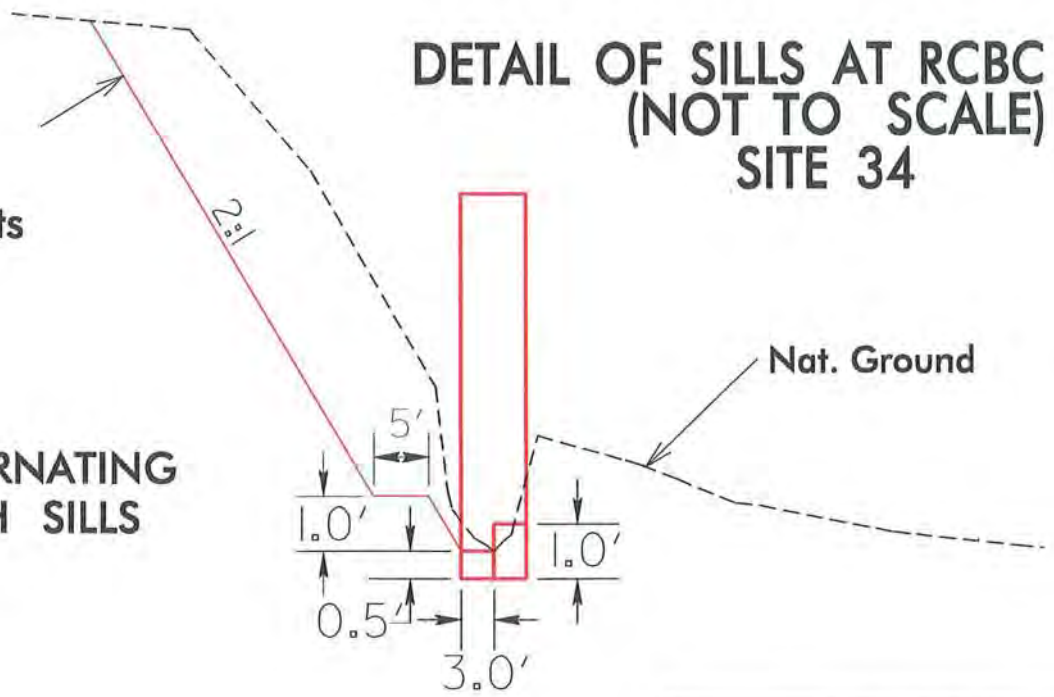

200 150 100 50 0 50 100 150
2680
2670
2660
2650
STA. 11+07.96 -Y34-
1 @ 6'X7' RCBC W/0.5' AND 1.0' SILLS
GRADE PT. EL = 2676.31'
SKEW = 60°, (TOTAL LENGTH=63')
100 YR.
W.S. EL. 2673.2'
NORMAL W.S. EL(5/9/07)
2665.83
INV=2666.75
2664.00
INV=2666.49
TOP OF BANK
EXIST. STREAMBED
Prop ℄ INV Elev = 2665.00'
S = 3.7%
PROFILE
SITE 34
SCALE
1:50' HORIZONTAL
1:10' VERTICAL
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 01 / 16 / 13



P-240

Permit Drawing
Sheet 89 of 114

DETAIL OF SILLS AT RCBC (NOT TO SCALE) SITE 34



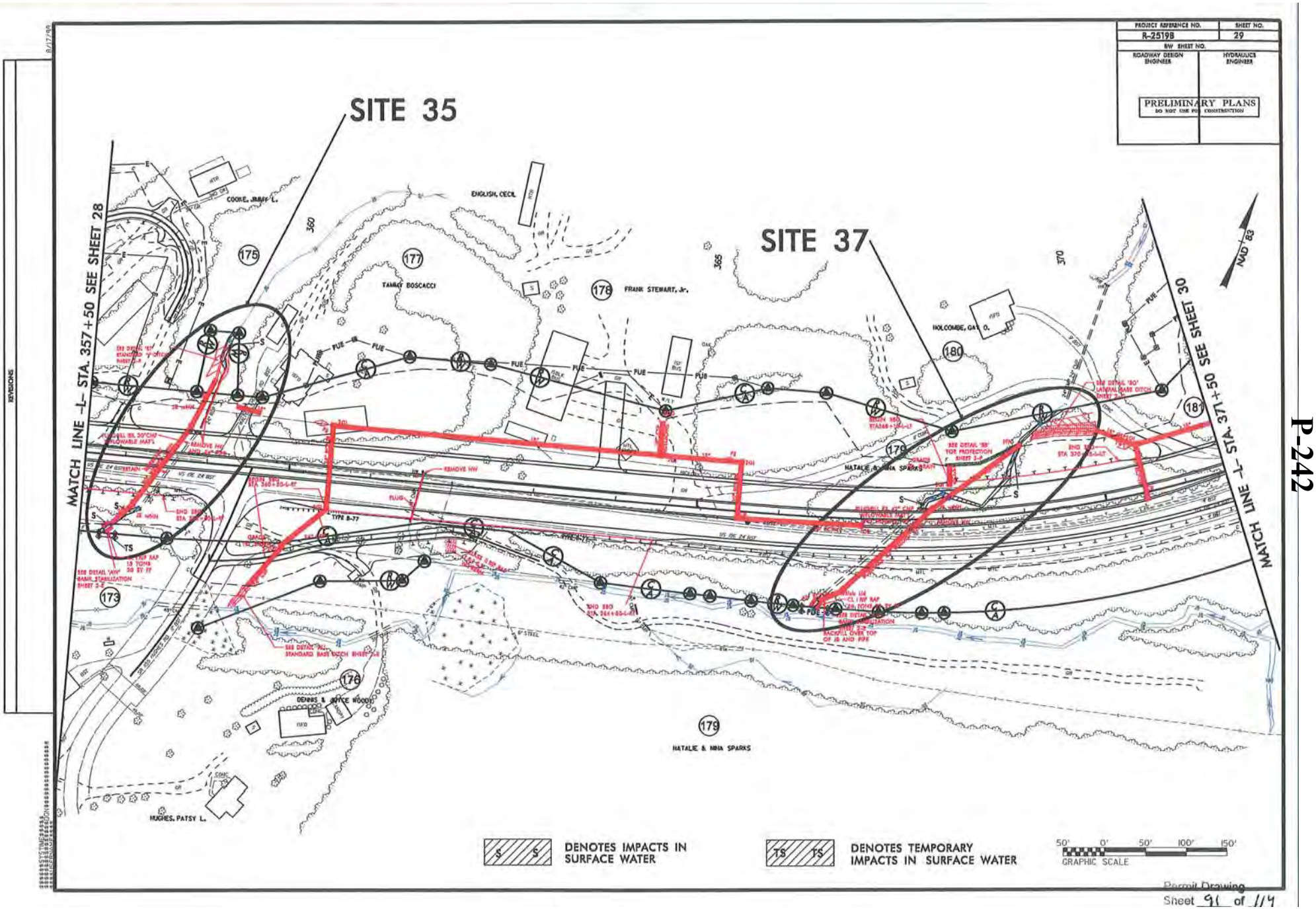
NOTE: SPACE ALTERNATING 0.5' AND 1.0' HIGH SILLS @ 15' INTERVALS

NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R2519B)
US 19 EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL

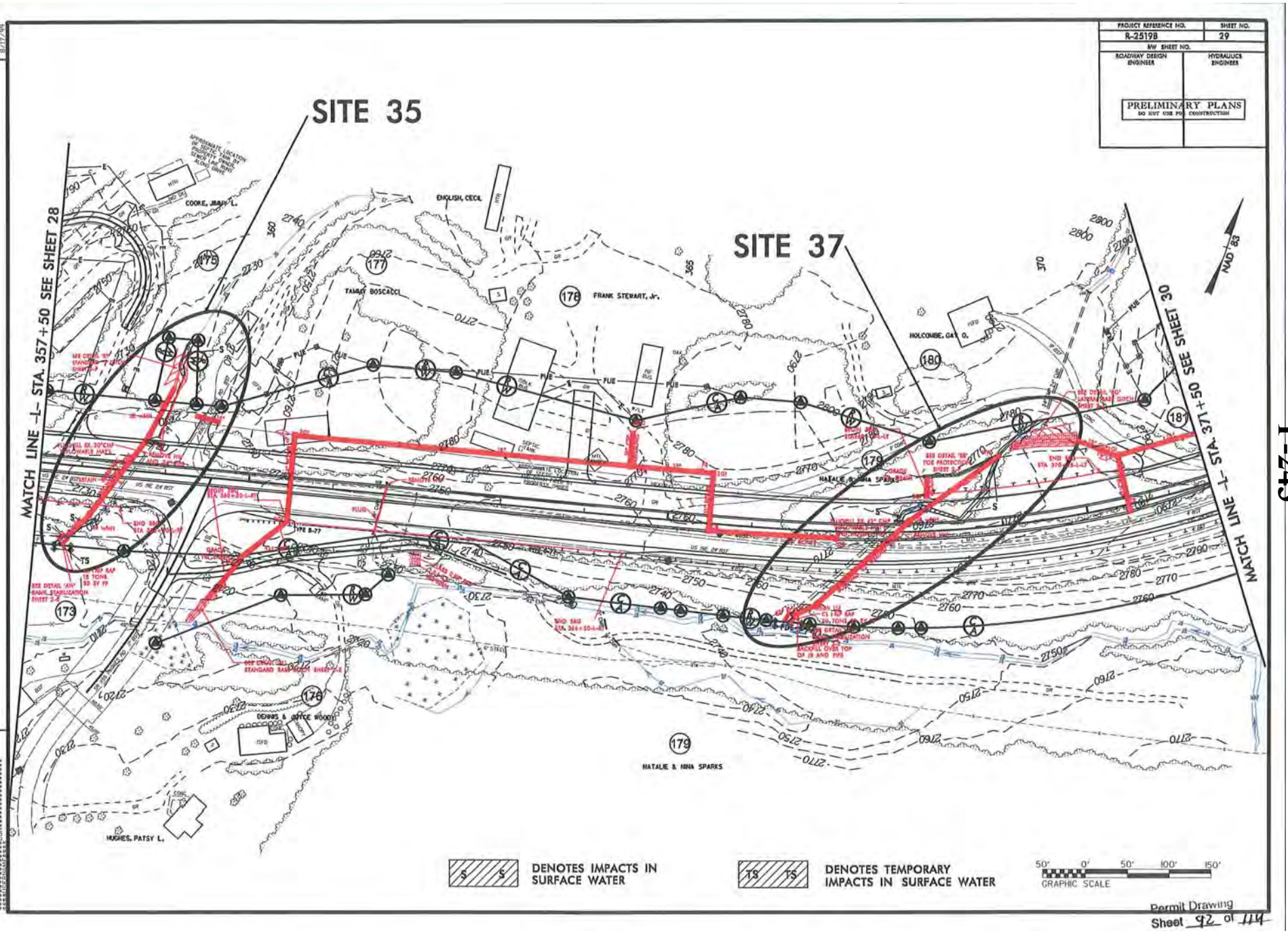
SHEET OF 01 / 16 / 13

P-241

Permit Drawing
Sheet 90 of 114

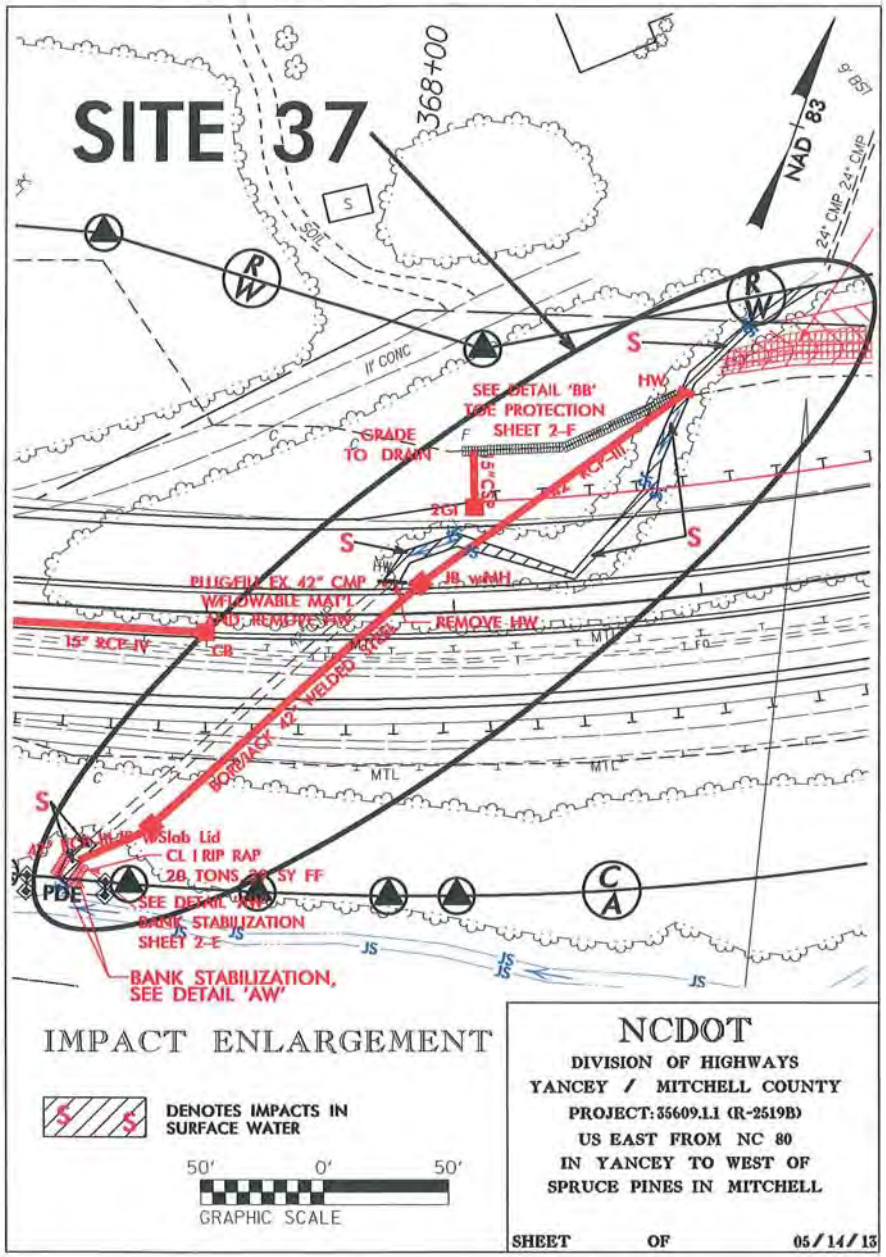

SITE 35
SITE 37
MATCH LINE -L- STA. 357+50 SEE SHEET 28
MATCH LINE -L- STA. 371+50 SEE SHEET 30
PROJECT REFERENCE NO.
R-2519B
SHEET NO.
29
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
COOKE, JIMMY L.
TAMMY BOSCACCI
FRANK STEWART, Jr.
HOLCOMBE, GAIL D.
NATALIE & NINA SPARKS
DENNIS & JOYCE WOODS
HUGHES, PATSY L.
NAD 83
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
Permit Drawing
Sheet 91 of 114

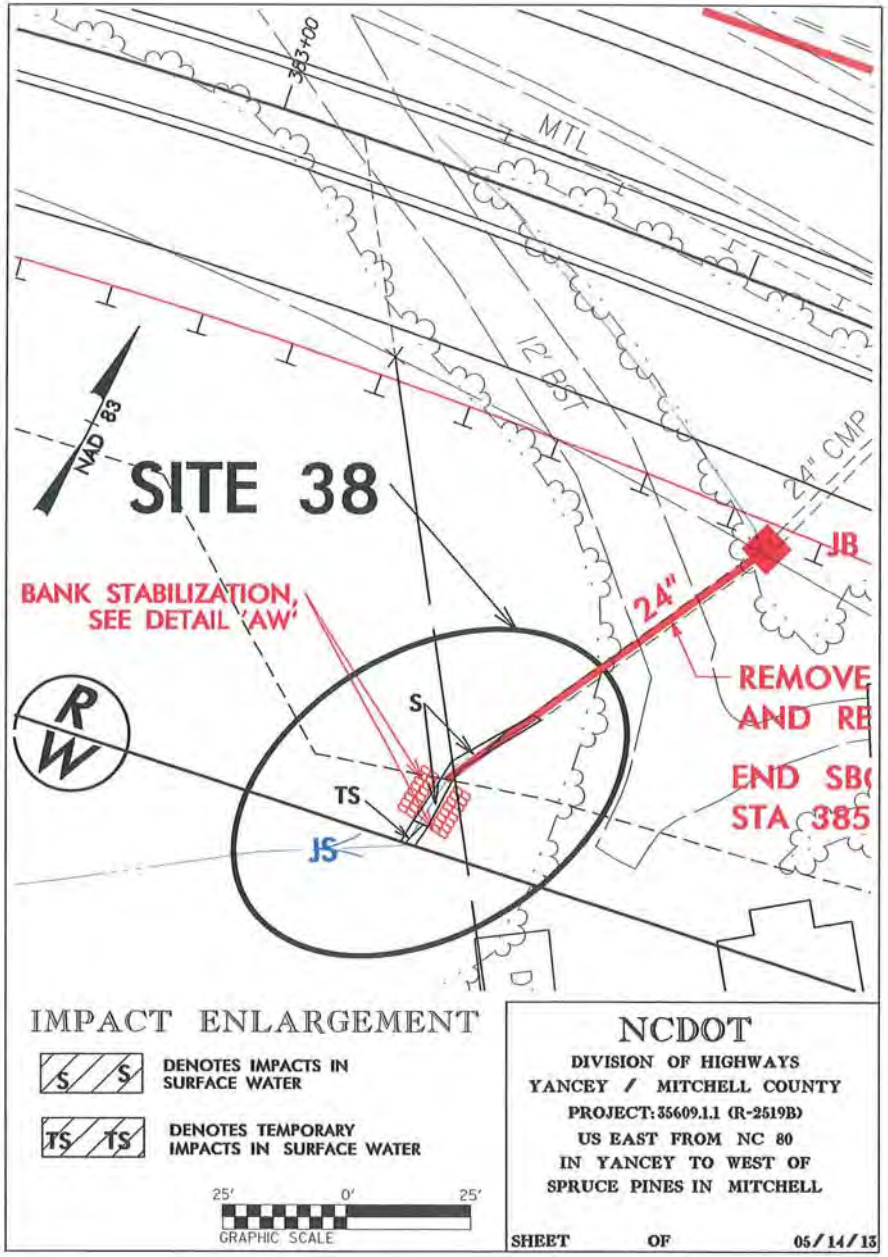
P-242



Permit Drawing
Sheet 92 of 114

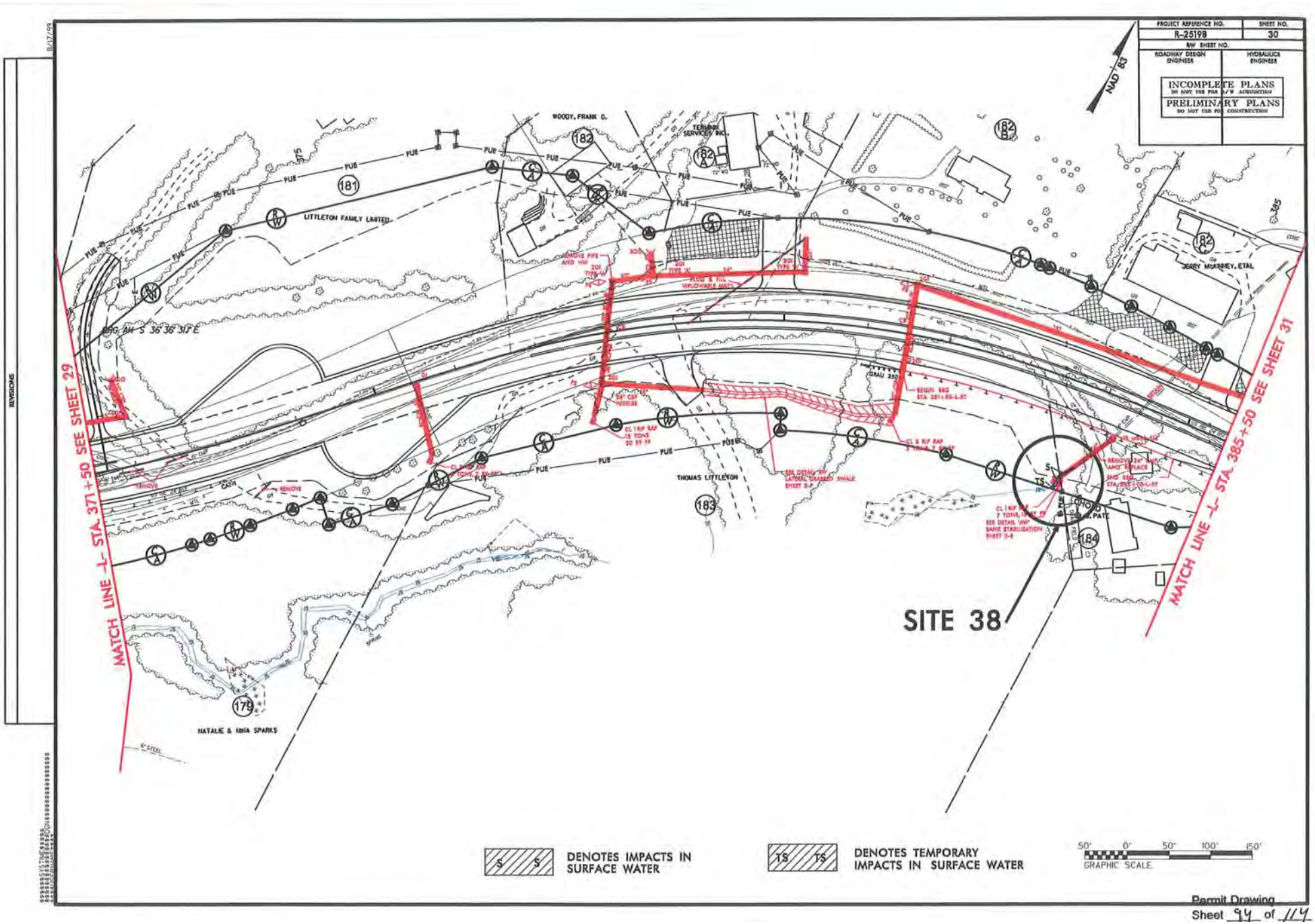
P-243

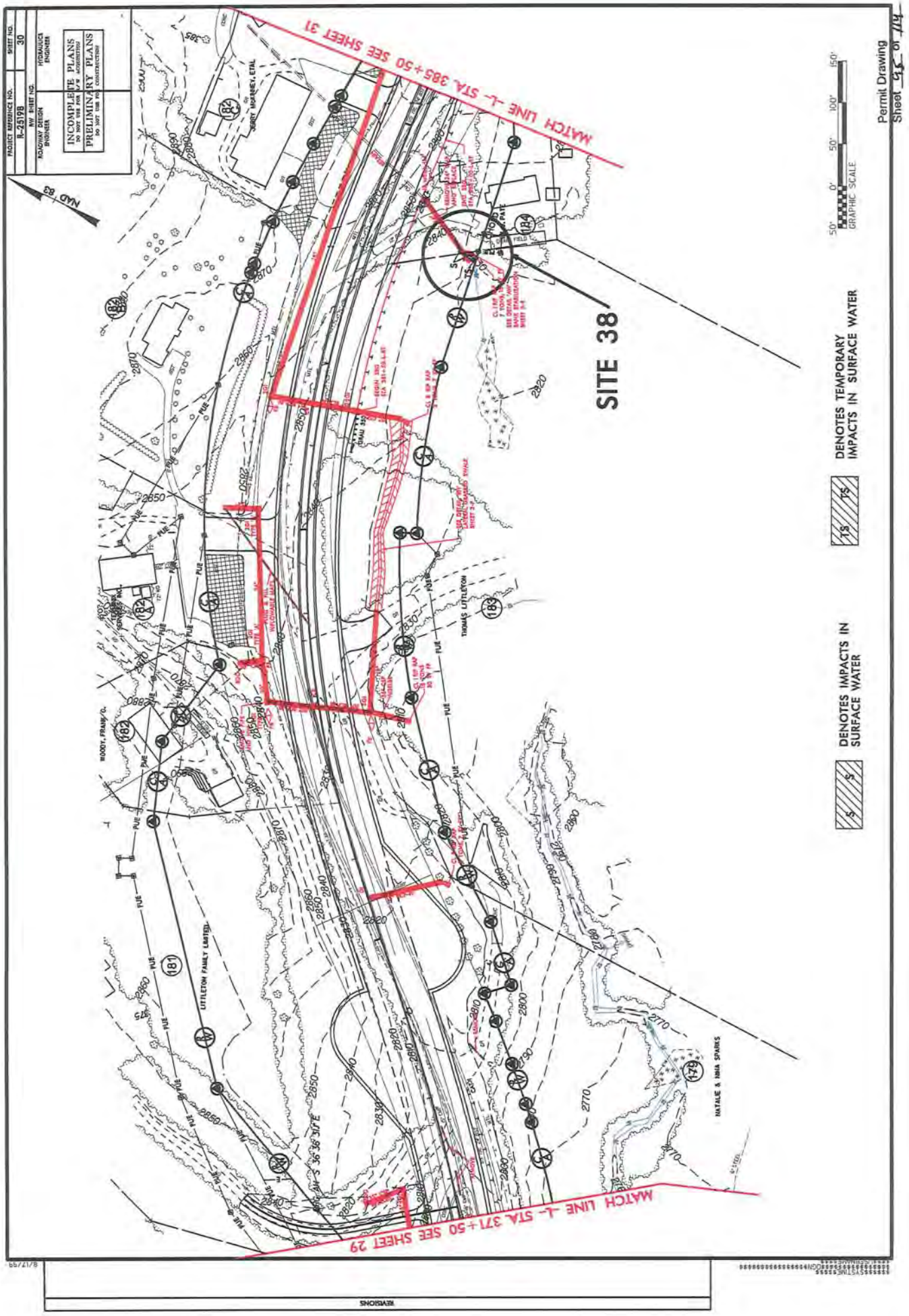




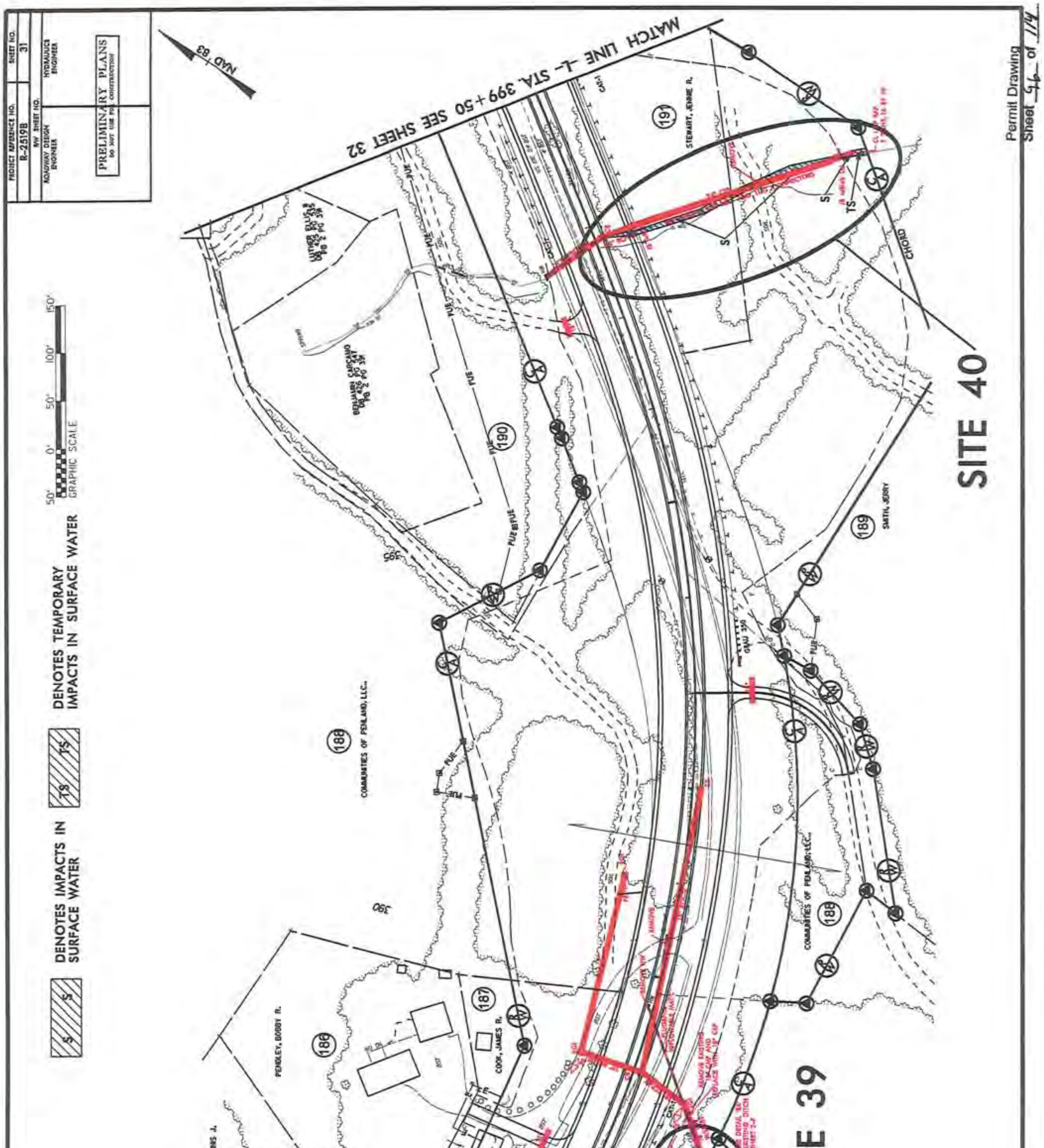
P-244

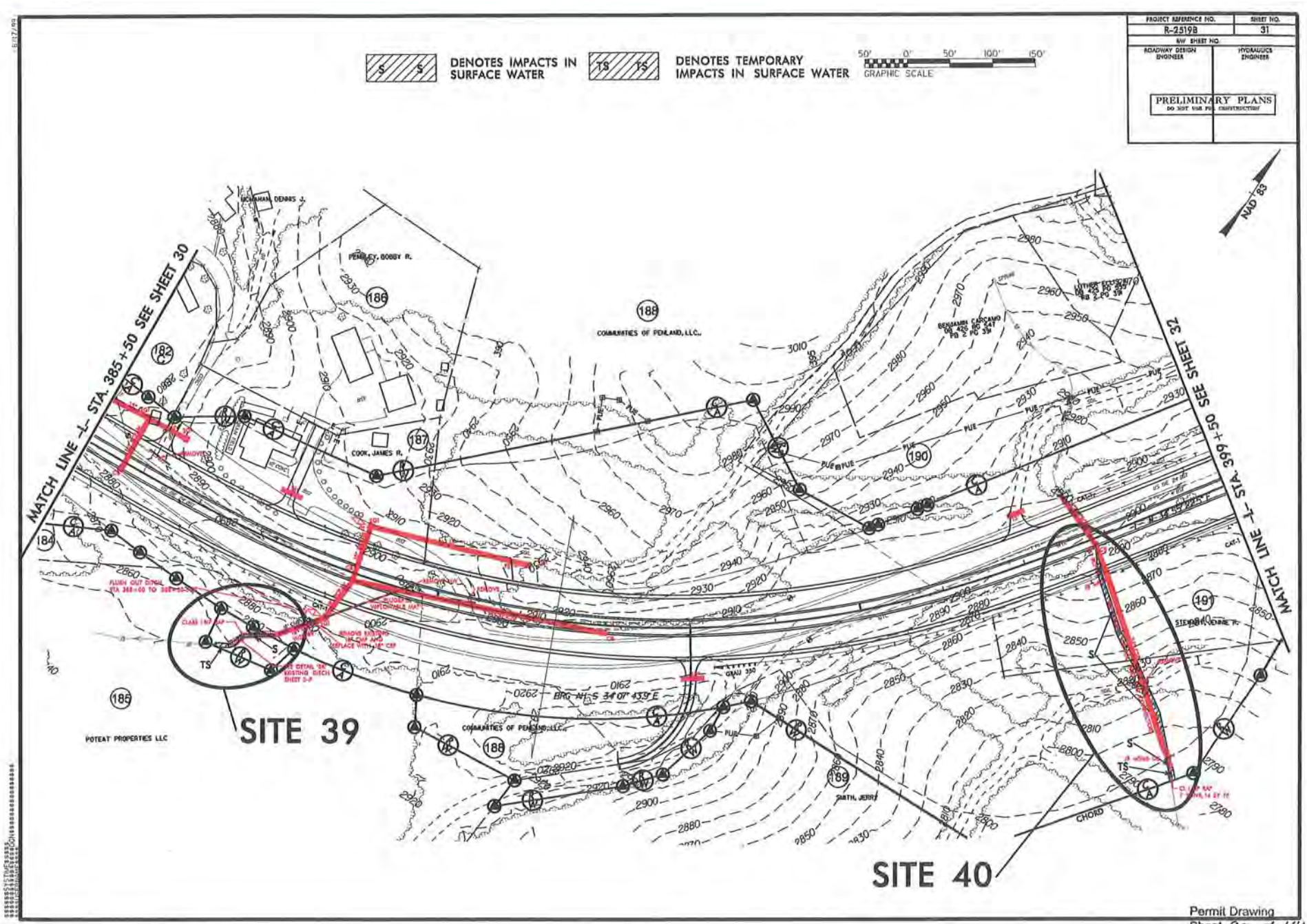
Permit Drawing
Sheet 93 of 124


PROJECT REFERENCE NO.
R-2519B
SHEET NO.
30
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83
REVISIONS
8/17/99
WOODY, FRANK O.
TERMINIX SERVICES INC.
LITTLETON FAMILY LIMITED
JERRY MCKINNEY, ETAL
THOMAS LITTLETON
NATALIE & NINA SPARKS
BSG AM S 36°36'31"E
MATCH LINE -L- STA. 371+50 SEE SHEET 29
MATCH LINE -L- STA. 385+50 SEE SHEET 31
SITE 38
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
Permit Drawing
Sheet 94 of 114



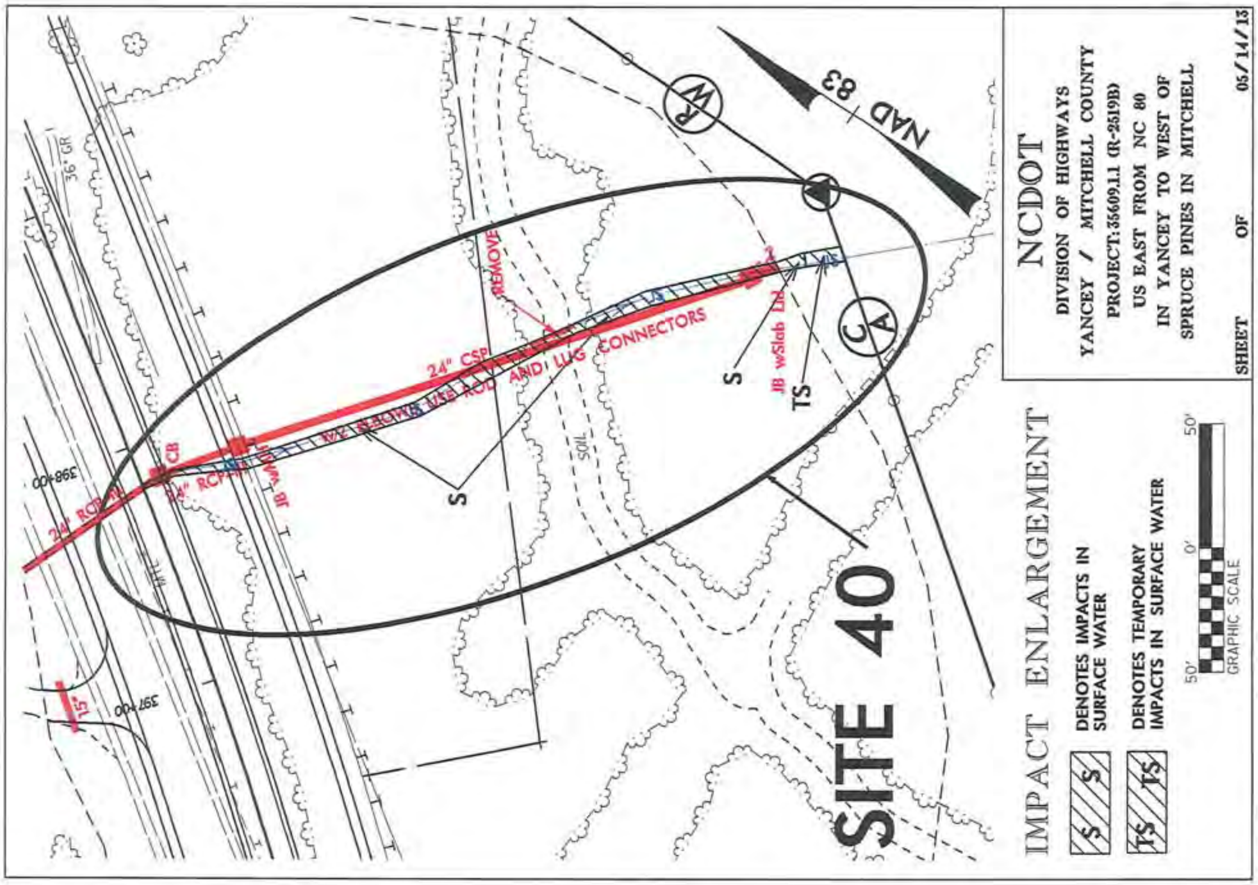
Permit Drawing
Sheet 55 of 114

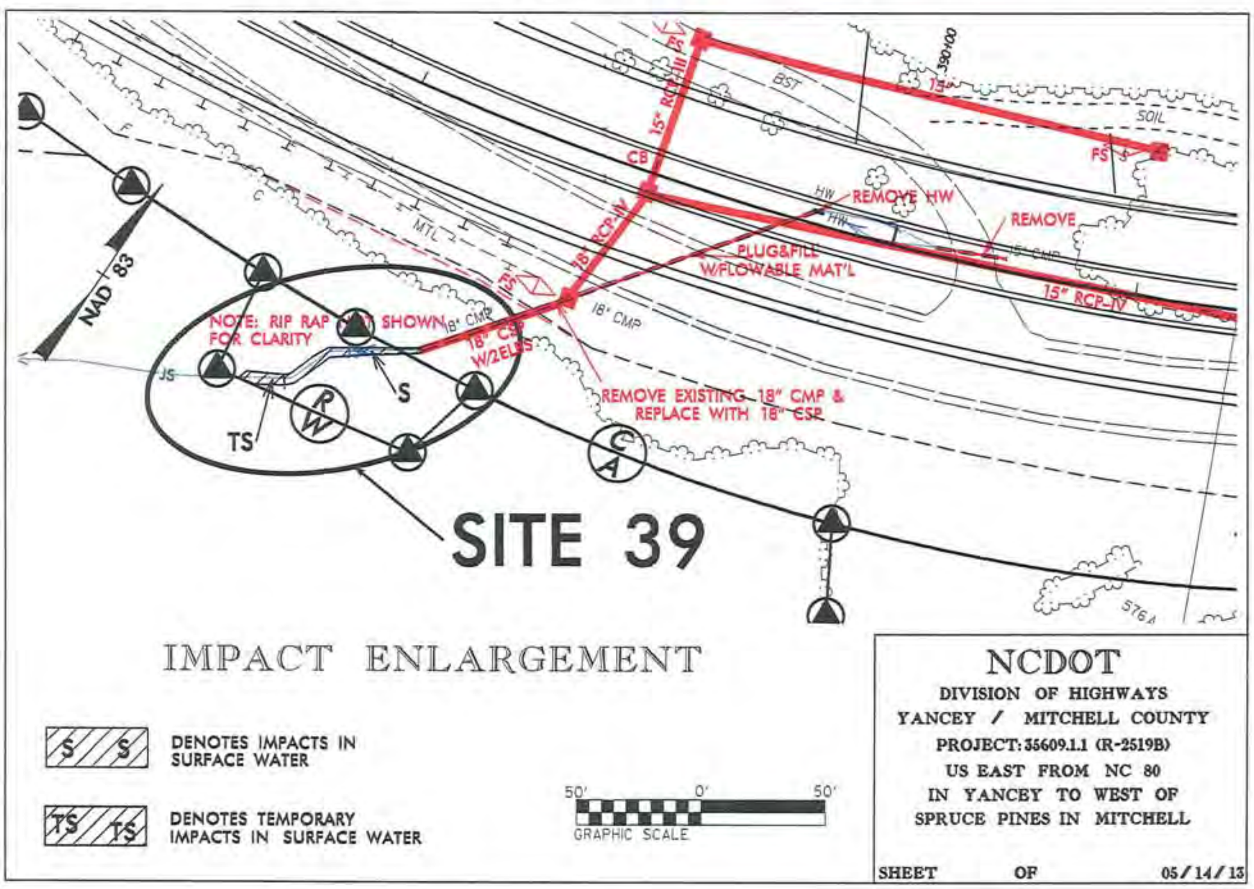

PROJECT REFERENCE NO.
R-2519B
SHEET NO.
31
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
MATCH LINE -L- STA. 399+50 SEE SHEET 32
MATCH LINE -L- STA. 385+50 SEE SHEET 30
SITE 39
SITE 40
STEWART, JENNIE R.
SMITH, JERRY
COMMUNITIES OF PENLAND, LLC
PENDLEY, BOBBY R.
COOK, JAMES R.
POTEAT PROPERTIES LLC
Permit Drawing
Sheet 46 of 114

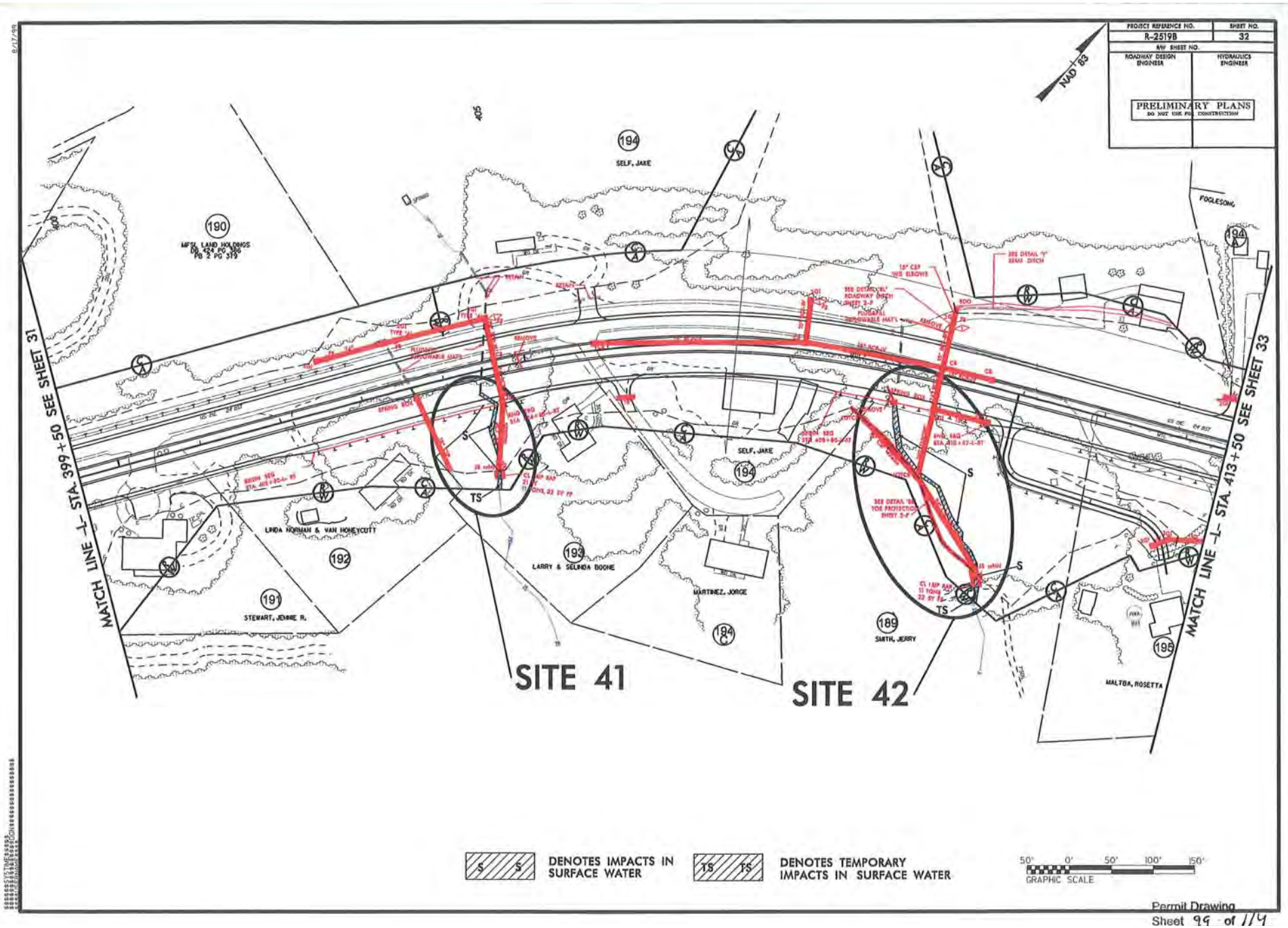


P-248

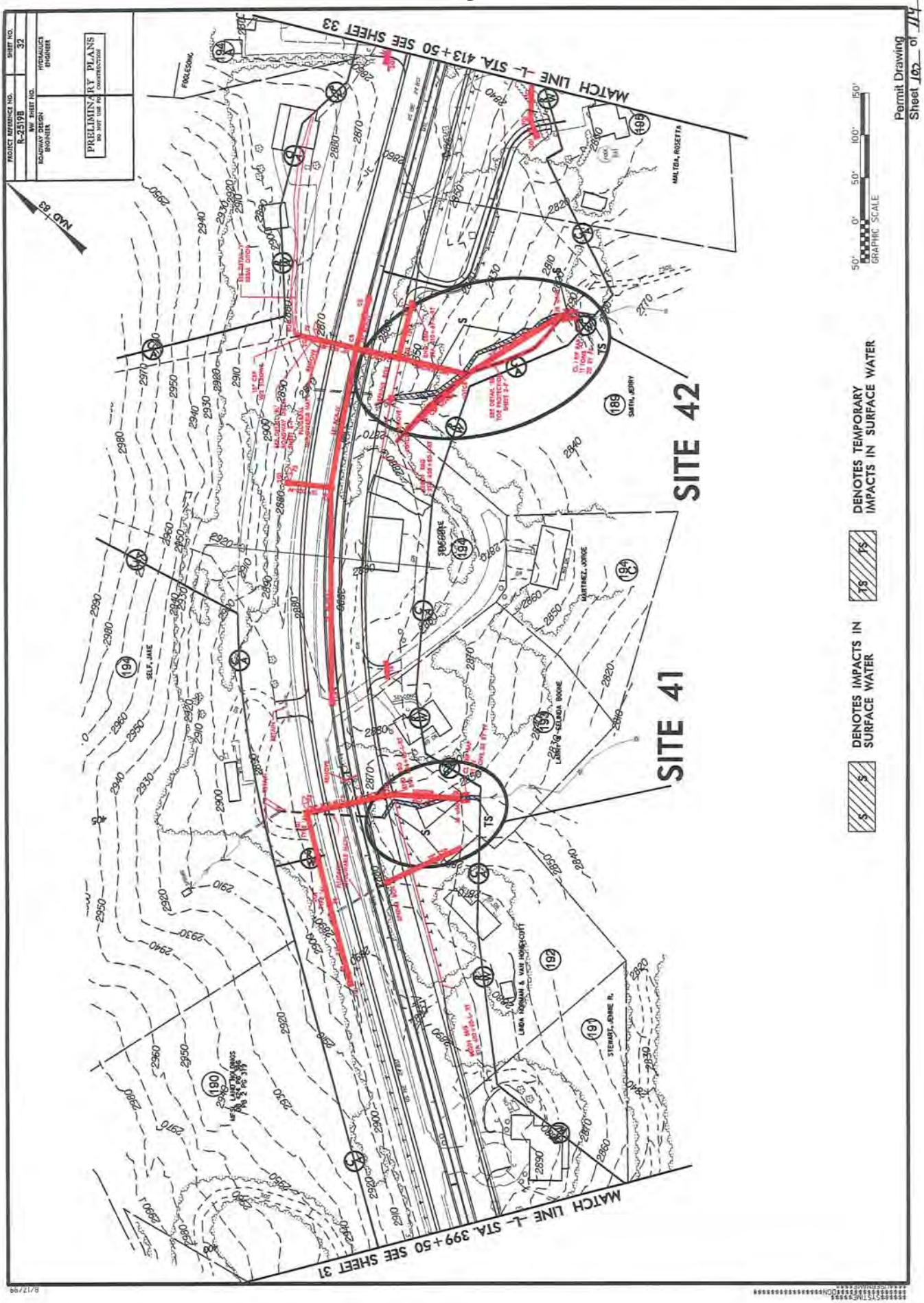
Permit Drawing
Sheet 97 of 114

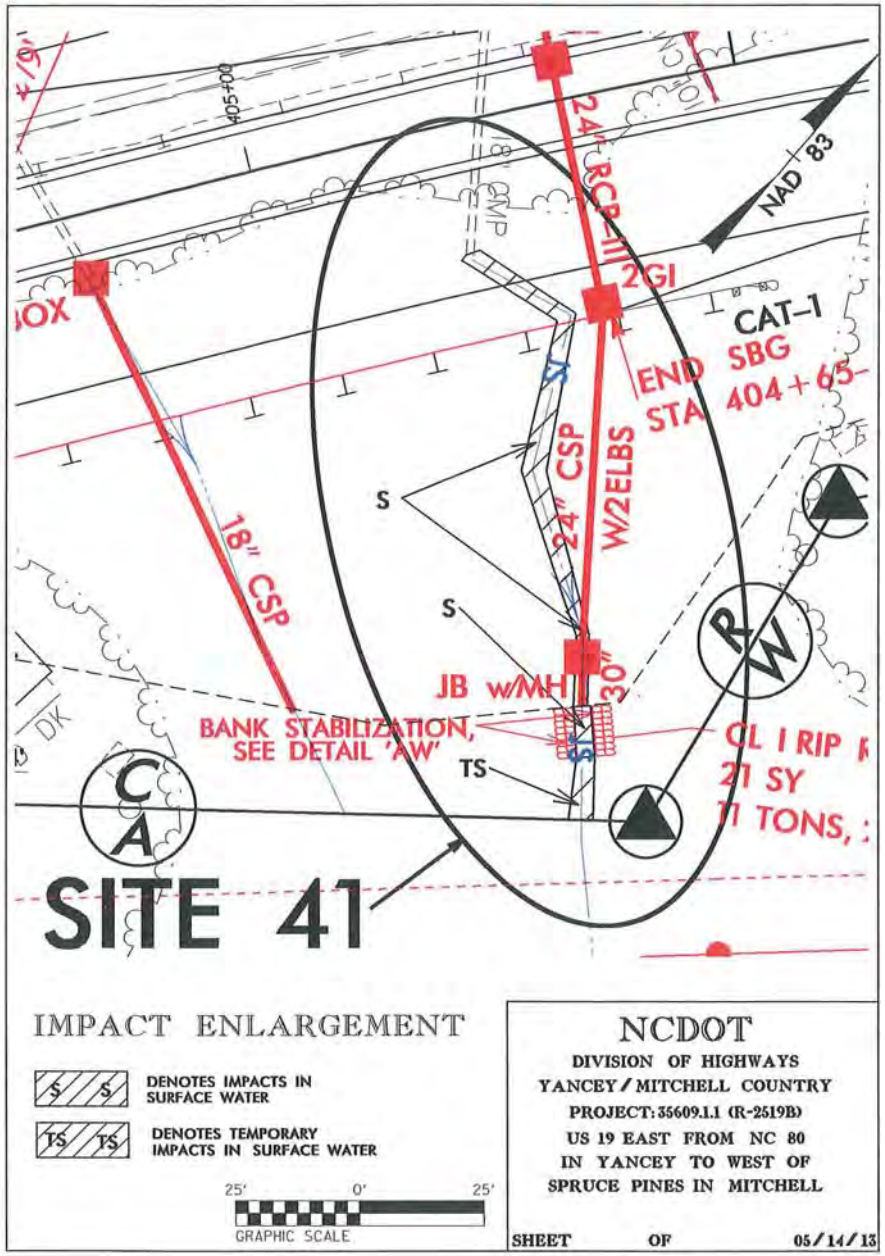

SITE 40
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
50' 0' 50'
NAD 83
24" RCP-IV
24" RCP-IV
CB
JB w/Slab Lid
W/ ELBOWS USE ROD AND LUG CONNECTORS
24" CSP
REMOVE
JB w/Slab Lid
S
TS
SOIL
398+00
397+00
15"
36" GR
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05/14/13


SITE 39
NAD 83
NOTE: RIP RAP NOT SHOWN FOR CLARITY
18" CSP W/2ELBS
18" CMP
S
TS
FS
18" RCP-IV
CB
15" RCP-III
FS
15"
SOIL
BST
390+00
REMOVE HW
REMOVE
PLUG&FILL W/FLOWABLE MAT'L
15" RCP-IV
REMOVE EXISTING 18" CMP & REPLACE WITH 18" CSP
MTL
IMPACT ENLARGEMENT
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
50' 0' 50'
GRAPHIC SCALE
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL
SHEET OF 05/14/13


PROJECT REFERENCE NO.
R-2519B
SHEET NO.
32
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83
MATCH LINE -L- STA. 399+50 SEE SHEET 31
MATCH LINE -L- STA. 413+50 SEE SHEET 33
SITE 41
SITE 42
SELF, JAKE
MFH LAND HOLDINGS
LINDA NORMAN & VAN HONEYCUTT
LARRY & SELINDA BOONE
MARTINEZ, JORGE
STEWART, JENNIE R.
SMITH, JERRY
MALTBA, ROSETTA
FOGLESONG
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
Permit Drawing
Sheet 99 of 114

P-250


PRELIMINARY PLANS
NOT FOR CONSTRUCTION
PROJECT REFERENCE NO. R-2519B
SHEET NO. 32
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
NAD '83
MATCH LINE -L- STA. 413+50 SEE SHEET 33
MATCH LINE -L- STA. 399+50 SEE SHEET 31
SITE 41
SITE 42
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
Permit Drawing
Sheet 102 of 107



IMPACT ENLARGEMENT

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

25' 0' 25'

GRAPHIC SCALE

NCDOT

DIVISION OF HIGHWAYS

YANCEY / MITCHELL COUNTRY

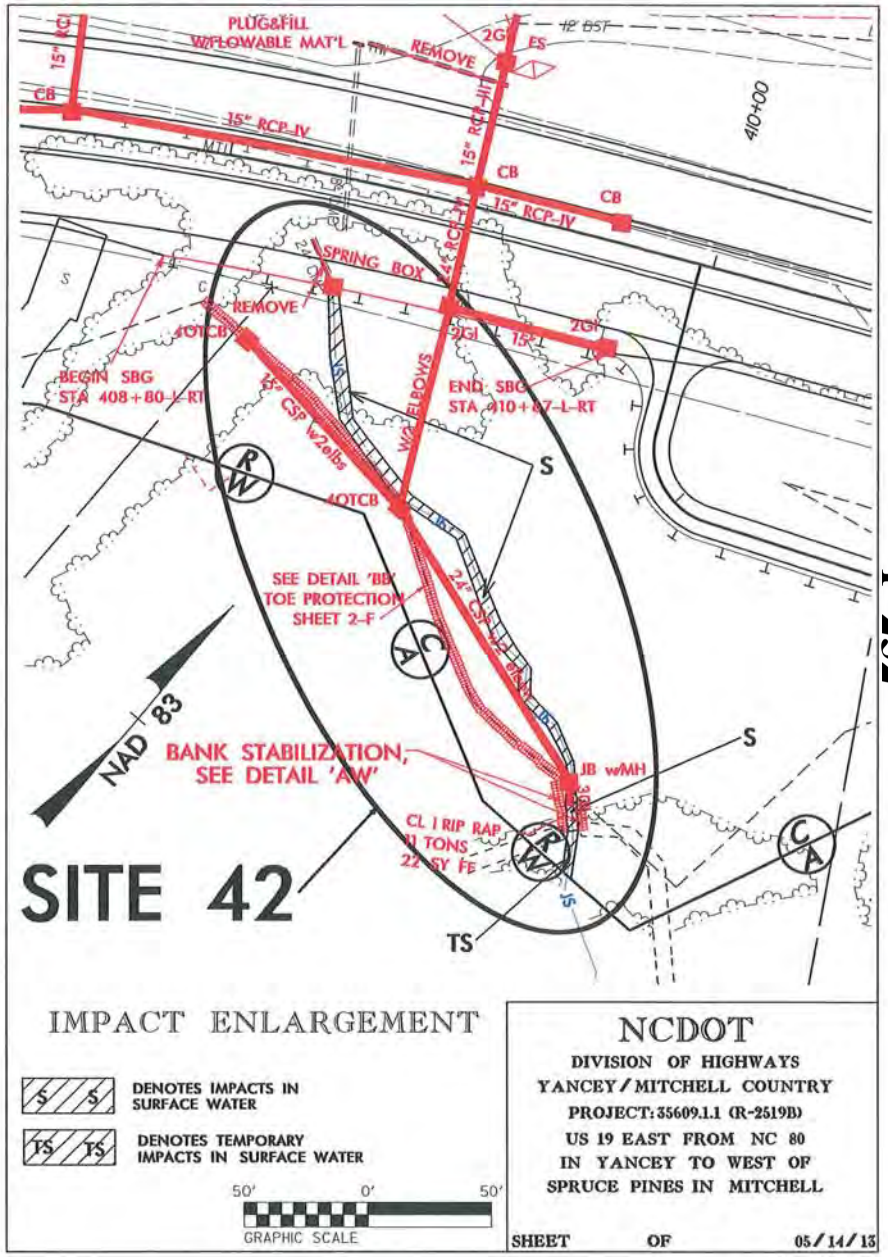
PROJECT: 35609.1.1 (R-2519B)

US 19 EAST FROM NC 80

IN YANCEY TO WEST OF

SPRUCE PINES IN MITCHELL

SHEET OF 05/14/13



IMPACT ENLARGEMENT

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 50'

GRAPHIC SCALE

NCDOT

DIVISION OF HIGHWAYS

YANCEY / MITCHELL COUNTRY

PROJECT: 35609.1.1 (R-2519B)

US 19 EAST FROM NC 80

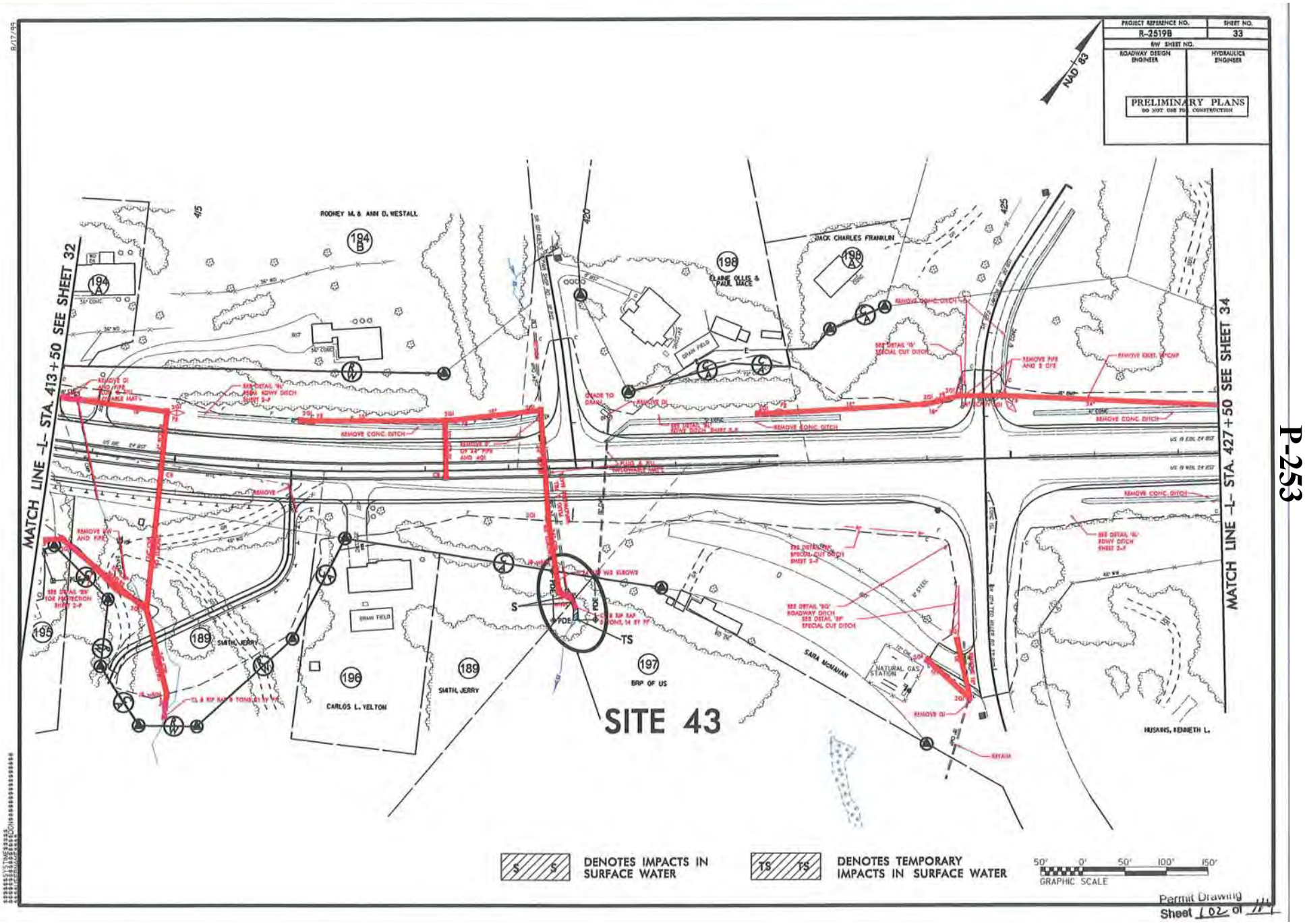
IN YANCEY TO WEST OF

SPRUCE PINES IN MITCHELL

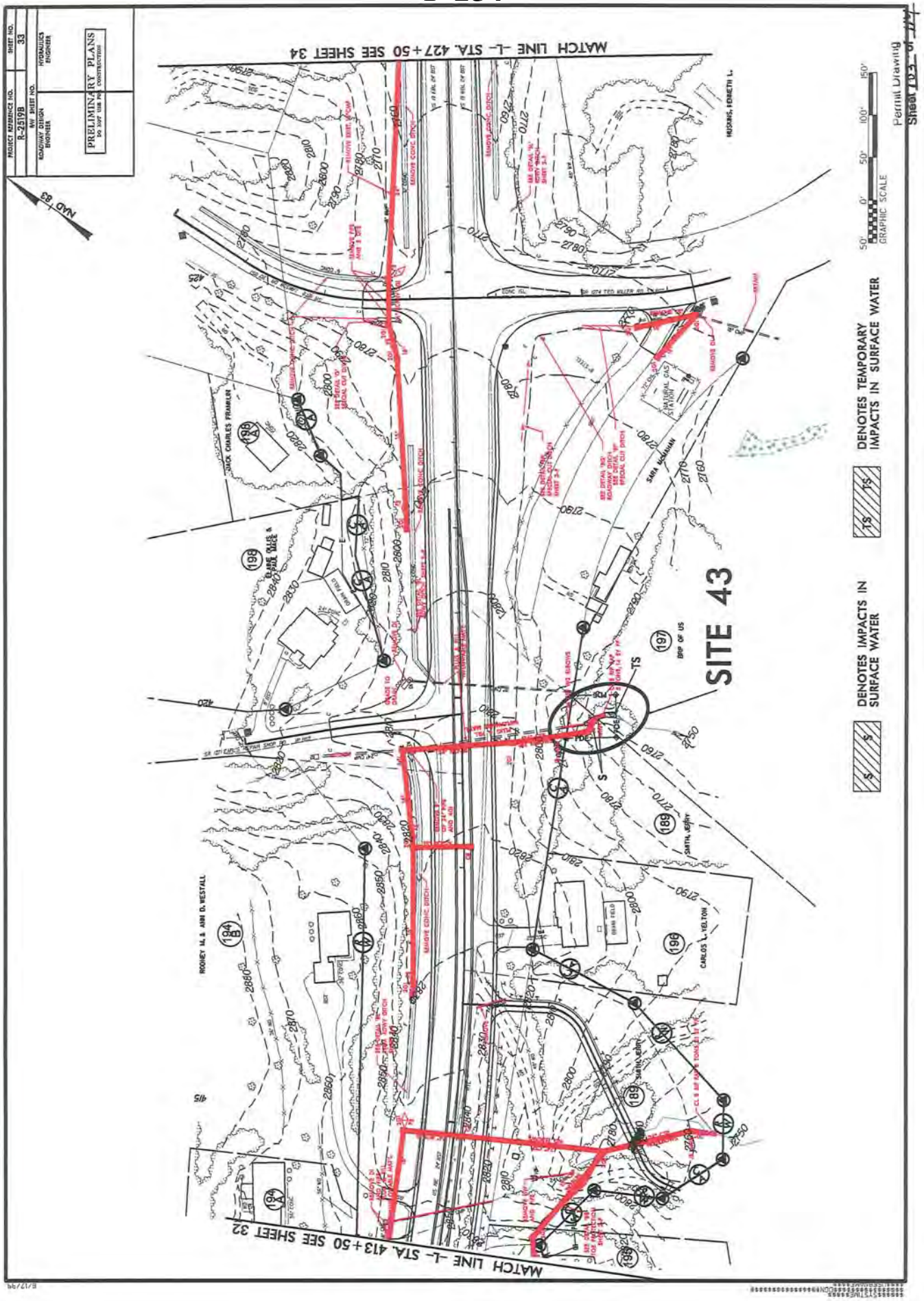
SHEET OF 05/14/13

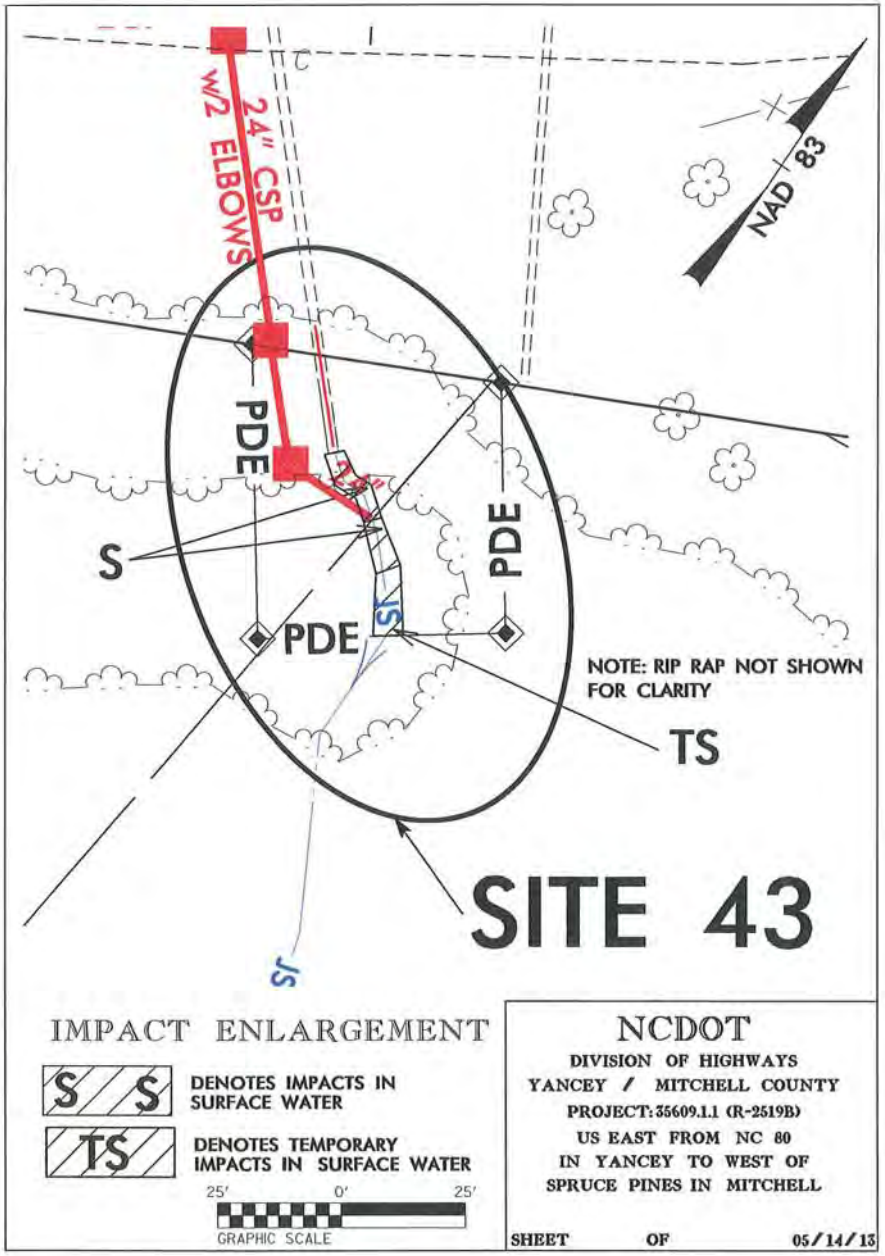
P-252

Permit Drawing
Sheet 101 of 114


PROJECT REFERENCE NO.
R-2519B
SHEET NO.
33
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83
MATCH LINE -L- STA. 413+50 SEE SHEET 32
MATCH LINE -L- STA. 427+50 SEE SHEET 34
ROONEY M. & ANN D. WESTALL
JACK CHARLES FRANKLIN
CLARKE OLLIS & PAUL MACE
SMITH, JERRY
CARLOS L. YELTON
SARA McMAHAN
HUSKINS, KENNETH L.
NATURAL GAS STATION
BRP OF US
SITE 43
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
Permit Drawing
Sheet 102 of 114

P-253


PROJECT REFERENCE NO.
R-2519B
SHEET NO.
33
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83
MATCH LINE -L- STA. 427+50 SEE SHEET 34
MATCH LINE -L- STA. 413+50 SEE SHEET 32
SITE 43
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
Permit Drawing
Sheet 33 of 44



IMPACT ENLARGEMENT

S / S DENOTES IMPACTS IN SURFACE WATER

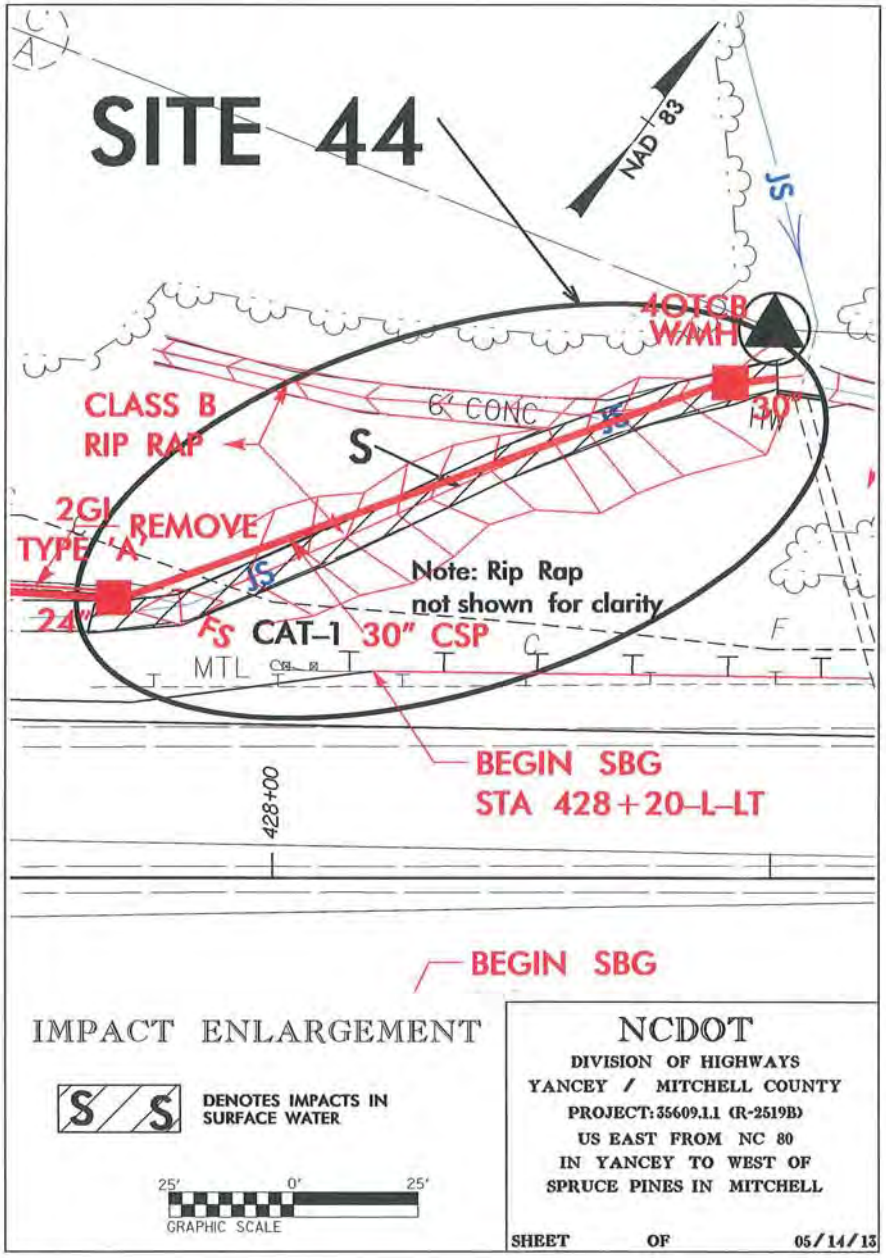
TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

25' 0' 25'

GRAPHIC SCALE

NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL

SHEET OF 05/14/13



IMPACT ENLARGEMENT

S / S DENOTES IMPACTS IN SURFACE WATER

25' 0' 25'

GRAPHIC SCALE

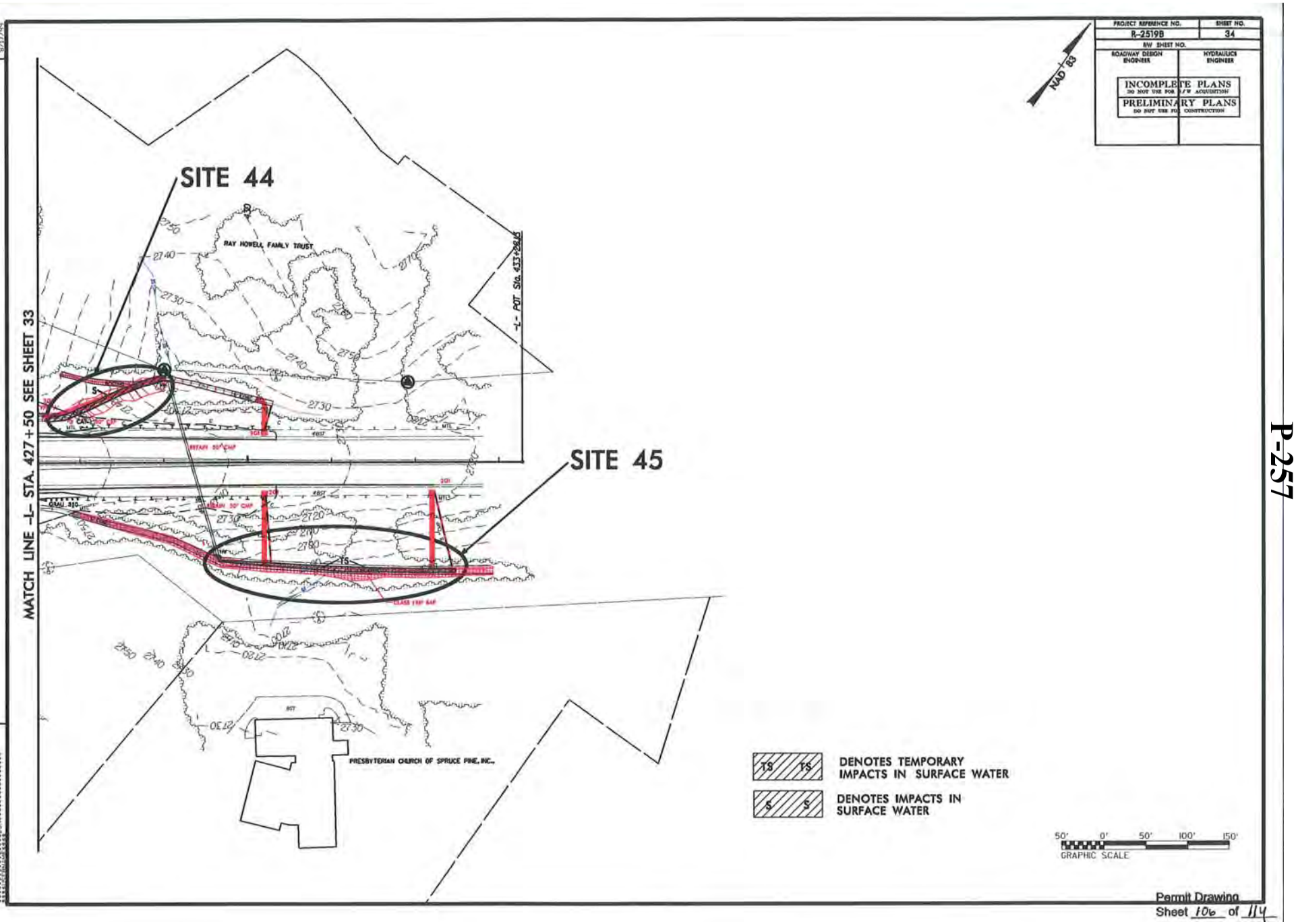
NCDOT
DIVISION OF HIGHWAYS
YANCEY / MITCHELL COUNTY
PROJECT: 35609.1.1 (R-2519B)
US EAST FROM NC 80
IN YANCEY TO WEST OF
SPRUCE PINES IN MITCHELL

SHEET OF 05/14/13

P-255

Permit Drawing
Sheet 104 of 114

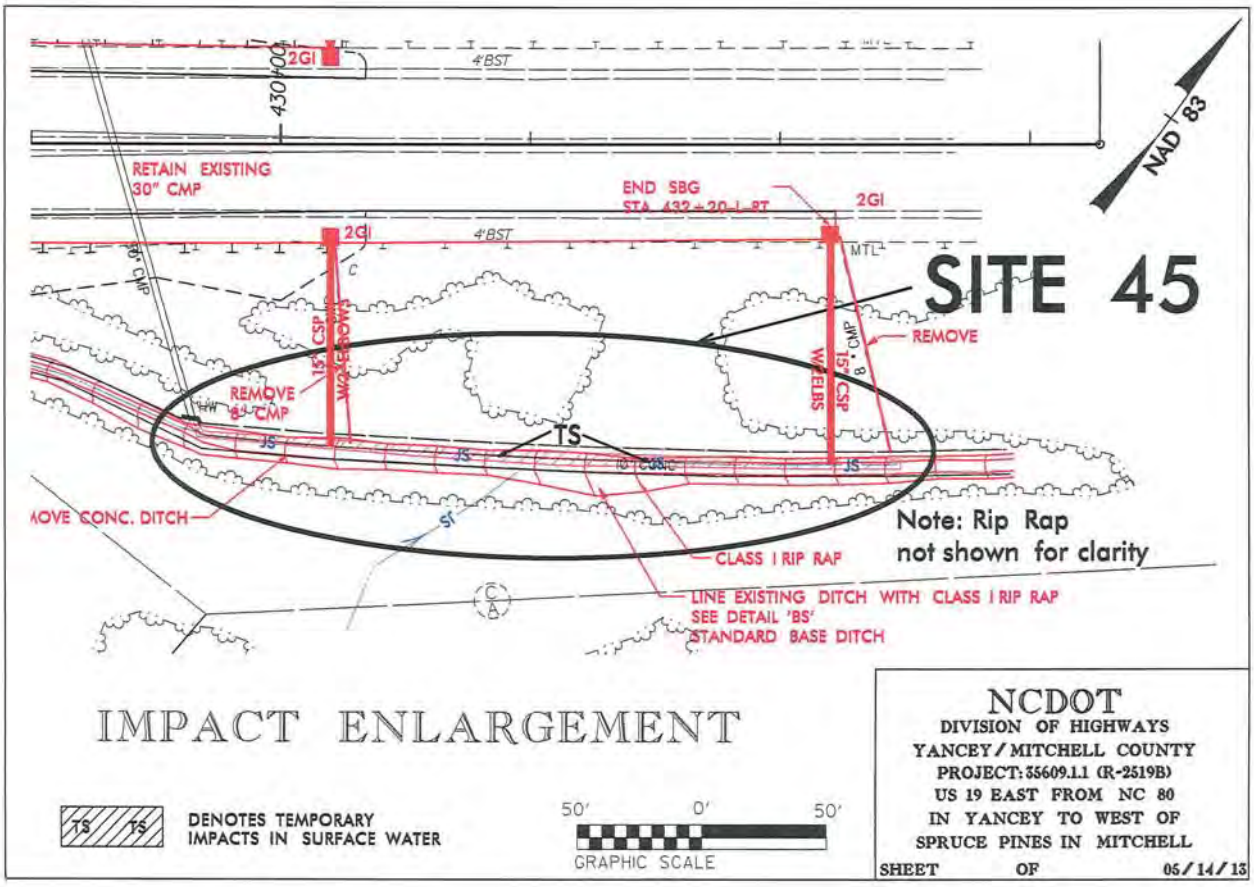
PROJECT REFERENCE NO.
R-2519B
SHEET NO.
34
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
NAD 83
REVISIONS
8/12/99
SITE 44
SITE 45
RAY HOWELL FAMILY TRUST
PRESBYTERIAN CHURCH OF SPRUCE PINE, INC.
-L- POT Sta. 433+28.45
MATCH LINE -L- STA. 427+50 SEE SHEET 33
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER
TS
S
50' 0' 50' 100' 150'
GRAPHIC SCALE
Permit Drawing
Sheet 33 of 44



P-257

Permit Drawing
Sheet 106 of 114

Permit Drawing Sheet 102 of



NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

YANCEY/MITCHELL COUNTY
WBS - 35609.1.1 (R-2519B)

11/7/2013

WETLAND PERMIT IMPACT SUMMARY SHEET 1 OF 7

				WETLAND IMPACTS					SURFACE WATER IMPACTS					
Feature	Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)	Notes
2UT2A	1	23+45 -L-	54" RCP						0.01		43			
2A	2	44+50 -L-	4 @ 12'X10' RCBC						0.09		117			
		Little Crabtree Ck.	Floodplain Bench						0.07		118			
			Temp. Const.							0.06		97		
SA	2A	9+70 -Y4-	Base Ditch								27			
			Lateral Base Grass Swale								38			
			Temp. Const. (Inlet side)							0.01		44		
2B	3	55+00 -L-	48" RCP						0.02		303			
			Temp. Const.							<0.01		21		
			Bank Stabilization						<0.01		12			
UT2B	3	55+00 -L- LT	Roadway Fill						<0.01		8			
2C	4	79+00 -L-	36" RCP & 42" RCP						0.02		97			
		Phipps Ck.	Bank Stabilization								44			
			Temp. Const.							<0.01		15		
SB	4A	99+65 -L-	36" RCP						0.01		18			
			Rip Rap						0.01		16			
STR	5	122+50 -L-	315' BRIDGE						<0.01	0.15		160		Perm. surface water imp. due to piers = 31.8 SQ. FT., (0.15ac=6,534 sf)
2D	5A	123+00 -L-	STREAM RELOC.*								148		148	Site 5A is an in-kind stream relocation of Long Branch (See Sht 12A)
														Length of NSD equals length of culvert - 148 LF of stream mitigation credit
2D	6	126+50 -L-	2 @ 6'X6' RCBC Removal							0.01		57	144	Site will generate 144 LF of stream mitigation credit
			Rock Cross Vanes							<0.01	28			
2D	7	135+00 -L-	2 @ 6'X6' RCBC						0.04		144			
		138+00 -L-	2 @ 6'X6' RCBC						0.04		214			
		Long Branch Ck.	Temp. Const.							<0.01		15		
UT2D	7A	136+00 -L-	Roadway Fill						<0.01		24			
2UT2D	7B	137+50 -L-	30" Alternate Pipe						0.02		131			
3UT2D	7C	139+50 -L-	54" RCP						<0.01		70			
			Temp. Const.							<0.01		15		
TOTAL SHEET 1:									0.33	0.25	1600	424	292	292 LF of stream mitigation credit for the Natural Stream Design

Revised October 2013
Permit Drawing
Sheet 108 of 114

P-259

WETLAND PERMIT IMPACT SUMMARY SHEET 2 OF 7

				WETLAND IMPACTS					SURFACE WATER IMPACTS					
Feature	Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)	Notes
2D	8	152+00/157+50-L-	Stream Relocation			0.014	0.037		0.07		432		449	Site will generate 113 LF of stream mitigation credit
7UT2D	8A	150+90 -L-	36"CSP/36" RCP						0.05		79			
			Rip Rap Outlet						<0.01		15			
			Pipe Installation							<0.01		11		
2D	8B	155+00 -L-	7'X7' & 7'X5' RCBC ext.						0.01		58			
2D	8C	158+00 -L-	8'X6' RCBC						0.01		69			
			Temp. Const.							0.01		11		
11UT2D/2D	9	179+80 -L-	36" CMP Removal							<0.01		10	40	Includes 40' of stream that will be restored due to pipe removal.
			Bank Stabilization						0.01		37			Site will generate 40 LF of stream mitigation credit
12UT2D	10	182+80 -L-	36" RCP						0.02	<0.01	96	15		
			Rip Rap/Base Ditch						0.02		87			
2D	11	186+50 -L-	Bank Stabilization						0.01		50			
13UT2D	12	191+50 -L-	42" RCP						0.01		79			
			Temp. Const.							<0.01		25		
2DM	13	195+00 -L-	Roadway Fill	0.06					0.01		110			
2D	13													
2D	14	197+00 -L-	Roadway Fill						0.02		220			
2D	15	198+50 -L-	Roadway Fill						<0.01		59			
			24" CSP						<0.01		19			
			Temp. Const.							<0.01		15		
TOTAL SHEET 2:				0.06		0.01	0.04		0.25	0.02	1410	87	489	153 LF of stream mitigation credit for the 489 LF of Natural Stream Design

P-260

Revised October 2013
Permit Drawing
Sheet 109 of 114

WETLAND PERMIT IMPACT SUMMARY SHEET 3 OF 7

				WETLAND IMPACTS					SURFACE WATER IMPACTS					
Feature	Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)	Notes
1H	16	205+66 -L-	36" RCP						<0.01		32			
			Bank Stabilization						<0.01		50			Includes 40' of pipe removal
UT1H	17	206+55 -L-	18" CSP						<0.01		33			
			Bank Stabilization						<0.01		20			
2UT1H	18	214+00 -L-	Stream Relocation						0.02	<0.01	152	8		
			New Channel										70	Site will generate 35 LF of stream mitigation credit
1I	19	12+00 -Y21-	48" Pipe						0.03		132			
			Rip Rap Energy Dissipator								12			
1IC	20	244+50 -L-	Excavation			0.037								
1I	21	246+00 -L-	Stream Relocation						0.04		412		396	Site will generate 198 LF of stream mitigation credit
1CC	22	247+85 -L-	Culvert Removal/Replace with Bridge							0.17		177		Includes 123' of culvert removal, 40' of daylighting
			Bank Stabilization						0.01		23			
UT1CC	23	15+00 -Y23A-	60" RCP						<0.01	<0.01	27	34		
			Bank Stabilization								20			
TOTAL SHEET 3:						0.04			0.12	0.17	913	219	466	233 LF of stream mitigation credit for the 466 LF of Natural Stream Design

P-261

Revised October 2013
Permit Drawing
Sheet 116 of 114

WETLAND PERMIT IMPACT SUMMARY SHEET 4 OF 7

				WETLAND IMPACTS					SURFACE WATER IMPACTS					
Feature	Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)	Notes
UT1CC	24	281+50 -L-	Stream Relocation						0.03	<0.01	175	12		
2E	25	300+00 -L-	Stream Relocation						0.02	<0.01	174	15	94	Includes 94' of stream relocation that will generate 24 LF of stream mitigation credit
2E	26	302+50 -L-	60"CSP						0.02		129			
			Bank Stabilization						<0.01		10			
			Temp. Const.							<0.01		15		
SD	27	305+50 -L-	24" CSP						<0.01		56			
			Bank Stabilization						<0.01		10			
			Temp. Const.							<0.01		10		
SE	28	317+00 -L-	30" RCP						<0.01		80			
			Rip Rap						0.01		40			
SL	28A	316+00 -L-	Roadway Fill						0.01		141			
2BC	29	320+00 -L-	3 @ 8'X8' RCBC						0.03		64			
		BRUSHY CREEK	Fish Ladder						0.01		25			
		320+50 -L-	Bank Stabilization						0.02		62			
			Temp. Const.							0.01		30		
1G	29A	320+00 -L-	Roadway Fill/St. Reloc.						0.03		149			
TOTAL SHEET 4:									0.18	0.01	1115	82	94	24 LF of stream mitigation credit for the 94 LF of Natural Stream Design

P-262

Revised October 2013
Permit Drawing
Sheet 111 of 114

WETLAND PERMIT IMPACT SUMMARY SHEET 5 OF 7

				WETLAND IMPACTS					SURFACE WATER IMPACTS					
Feature	Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)	Notes
1G	30	324+00 -L-	Stream Relocation						0.05		321		635	Stream Relocation see details.
			Temp. Const.							<0.01		10		Site will generate 635 LF of stream mitigation credit
1G	31	327+50 -L-	2 @ 7'X7' RCBC						0.01	0.01	59	31		
			Bank Stabilization						0.01		32			
8UT1G	32	345+00 -L-	24" RCP						0.01	<0.01	52	10		
1G	33	346+50 -L-	2 @ 7'X6' RCBC /						0.07		444			
			Stream Relocation										300	Site will generate 150 LF of stream mitigation credit
5UT1G	34	11+00 -Y34-	6'X7' RCBC						<0.01		33			
			Bank Stabilization								23			
			Temp. Const.							0.02		118		
SF	35	358+50 -L-	Stream Realignment						0.01		46		46	Includes 46' of stream realignment
			30" Welded Steel						<0.01		42			Site will generate 12 LF of stream mitigation credit
		357+89 -L- (RT)	Bank Stabilization						<0.01		10			
			Temp. Const.							<0.01		8		
	36	N/A												
SG	37	368+50 -L-	42" RCP/ Stream Reloc.						0.02		247			
		366+54 -L- (RT)	Bank Stabilization						<0.01		10			
TOTAL SHEET 5:									0.18	0.03	1319	177	981	797 LF of stream mitigation credit for the 981 LF of Natural Stream Design

P-263

Revised October 2013
Permit Drawing
Sheet 112 of 114

WETLAND PERMIT IMPACT SUMMARY SHEET 6 OF 7

				WETLAND IMPACTS					SURFACE WATER IMPACTS					
Feature	Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)	Notes
1D	38	384+00 -L-	24"						<0.01		22			
		383+79 -L- (RT)	Bank Stabilization						<0.01		10			
			Temp. Const.							<0.01		5		
SH	39	388+00 -L-	Rip Rap						<0.01		58			
			Temp. Const.							<0.01		15		
SI	40	397+75 -L-	24" CSP						0.03		258			
			Rip Rap						<0.01		11			
			Temp. Const.							<0.01		15		
1C	41	404+50 -L-	24" CSP						0.01		103			
			Bank Stabilization						<0.01		10			
			Temp. Const.							<0.01		15		
1Z	42	409+00 -L-	15" CSP & 24" CSP						0.03		244			
			Bank Stabilization						<0.01		10			
			Temp. Const.							<0.01		18		
SJ	43	419+75 -L-	24" CSP						<0.01		16			
			Rip Rap						<0.01		10			
			Temp. Const.							<0.01		15		
SKA	44	428+50 -L-	30" CSP						0.02		147			
SK	45	431+00 -L-	Ditch Lined /							0.03		288		(288') Existing concrete ditch replaced with (288') rip rap
			Class I Rip Rap											No Net Loss
TOTAL SHEET 6:									0.10	0.04	899	371		

P-264

Revised October 2013
Permit Drawing
Sheet 113 of 174

	WETLAND IMPACTS					SURFACE WATER IMPACTS					
	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)	Notes
Total Sheet 1						0.33	0.25	1600	424	292	292 LF of stream mitigation credit for the 292 LF of Natural Stream Design
Total Sheet 2	0.06		0.01	0.04		0.25	0.02	1410	87	489	153 LF of stream mitigation credit for the 489 LF of Natural Stream Design
Total Sheet 3			0.04			0.12	0.17	913	219	466	233 LF of stream mitigation credit for the 466 LF of Natural Stream Design
Total Sheet 4						0.18	0.01	1115	82	94	24 LF of stream mitigation credit for the 94 LF of Natural Stream Design
Total sheet 5						0.18	0.03	1319	177	981	797 LF of stream mitigation credit for the 981 LF of Natural Stream Design
Total sheet 6						0.10	0.04	899	371		
TOTAL	0.06		0.05	0.04		1.15	0.52	7256	1360	2322	1499 LF of stream mitigation credit for the 2322 LF of Natural Stream Design

P-265

Revised October 2013
Permit Drawing
Sheet 114 of 114

P-266
Tennessee Valley Authority
Section 26a Approval

Permit # 235194 **Reservoir** Gray-Morristown - Off **Category** 3

DOT Project # R-2519 B - SR 1186 Micaville West of Spruce Pine - Yancey/Mitchell Counties

Name	Company	Address	Phone/Email
	NCDOT- North Carolina Department of Transportation	Structure Design 1581 Mall Service Center Raleigh NC 27699	919-250-4037

Tract(s)

Subdivision/Lot(s)	Stream	Mile	Bank	Map Sheet(s)
Subdivision: N/A	Crabtree Cr			209 Quad Sheet NW
	Little Crabtree Cr			
	South Toe R			
	Unnamed Tributary			

The facilities and/or activities listed below are APPROVED subject to the plans and general and special conditions attached.

1.	Bridge - Vehicular	Length (ft., in.): 40'; Width (ft., in.): 185'
2.	Culvert - Roadway	Length (ft., in.): 10'; Width (ft., in.): 12'
3.	Culvert - Roadway	Length (ft., in.): 10'; Width (ft., in.): 12'
4.	Culvert - Roadway	Length (ft., in.): 10'; Width (ft., in.): 12'
5.	Culvert - Roadway	Length (ft., in.): 10'; Width (ft., in.): 12'
6.	Culvert - Roadway	Length (ft., in.): 6'; Width (ft., in.): 6'
7.	Culvert - Roadway	Length (ft., in.): 6'; Width (ft., in.): 6'
8.	Culvert - Roadway	Length (ft., in.): 5'; Width (ft., in.): 7'
9.	Culvert - Roadway	Length (ft., in.): 6'; Width (ft., in.): 8'
10.	Culvert - Roadway	Length (ft., in.): 12'; Width (ft., in.): 8'
11.	Culvert - Roadway	Length (ft., in.): 12'; Width (ft., in.): 8'
12.	Culvert - Roadway	Length (ft., in.): 12'; Width (ft., in.): 8'
13.	Culvert - Roadway	Length (ft., in.): 8'; Width (ft., in.): 8'
14.	Culvert - Roadway	Length (ft., in.): 8'; Width (ft., in.): 8'
15.	Culvert - Roadway	Length (ft., in.): 7'; Width (ft., in.): 7'

P-267
Tennessee Valley Authority
Section 26a Approval

The facilities and/or activities listed below are APPROVED subject to the plans and general and special conditions attached. (continued)

16. Culvert - Roadway	Length (ft., in.): 7'; Width (ft., in.): 7'
17. Culvert - Roadway	Length (ft., in.): 6'; Width (ft., in.): 7'
18. Culvert - Roadway	Length (ft., in.): 6'; Width (ft., in.): 7'
19. Culvert - Roadway	Length (ft., in.): 7'; Width (ft., in.): 6'
20. Culvert - Roadway	
21. Bridge - Vehicular	Length (ft., in.): 80'; Width (ft., in.): 315'

This permit SUPERSEDES all previous TVA approvals at this location including permits approved under land record numbers:

TVA Representative: Anne W Patrick **Date:** 10/27/2014

May require review by U.S. Army Corps of Engineers (USACE). Plans have been forwarded to the USACE.
No construction shall commence until you have written approval or verification that no permit is required.

Applicant is also responsible for all local and state approvals that may be required relating to water quality.
No construction shall commence until you have written approval or verification that no permit is required.

GENERAL AND STANDARD CONDITIONS
Section 26a

General Conditions

1) You agree to make every reasonable effort to construct and operate the facility authorized herein in a manner so as to minimize any adverse impact on water quality, aquatic life, wildlife, vegetation, and natural environmental values.

2) This permit may be revoked by TVA by written notice if:

a) the structure is not completed in accordance with approved plans;

b) if in TVA's judgment the structure is not maintained in a good state of repair and in good, safe, and substantial condition;

c) the structure is abandoned;

d) the structure or work must be altered or removed to meet the requirements of future reservoir or land management operations of the United States or TVA;

e) TVA finds that the structure has an adverse effect upon navigation, flood control, or public lands or reservations;

f) all invoices related to this permit are not timely paid;

g) you no longer have sufficient property rights to maintain a structure at this location; or

h) a land use agreement (e.g., license, easement, lease) for use of TVA land at this location related to this permit expires, is terminated or cancelled, or otherwise ceases to be effective.

3) If this permit for this structure is revoked, you agree to remove the structure, at your expense, upon written notice from TVA. In the event you do not remove the structure within 30 days of written notice to do so, TVA shall have the right to remove or cause to have removed, the structure or any part thereof. You agree to reimburse TVA for all costs incurred in connection with removal.

4) In issuing this Approval of Plans, TVA makes no representations that the structures or work authorized or property used temporarily or permanently in connection therewith will not be subject to damage due to future operations undertaken by the United States and/or TVA for the conservation or improvement of navigation, for the control of floods, or for other purposes, or due to fluctuations in elevations of the water surface of the river or reservoir, and no claim or right to compensation shall accrue from any such damage. By the acceptance of this approval, applicant covenants and agrees to make no claim against TVA or the United States by reason of any such damage, and to indemnify and save harmless TVA and the United States from any and all claims by other persons arising out of any such damage.

5) In issuing this Approval of Plans, TVA assumes no liability and undertakes no obligation or duty (in tort, contract, strict liability or otherwise) to the applicant or to any third party for any damages to property (real or personal) or personal injuries (including death) arising out of or in any way connected with applicant's construction, operation, or maintenance of the facility which is the subject of this Approval of Plans.

6) This approval shall not be construed to be a substitute for the requirements of any federal, state, or local statute, regulation, ordinance, or code, including, but not limited to, applicable building codes, now in effect or hereafter enacted. State 401 water quality certification may apply.

7) The facility will not be altered, or modified, unless TVA's written approval has been obtained prior to commencing work.

8) You understand that covered second stories are prohibited by Section 1304.204 of the Section 26a Regulations.

9) You agree to notify TVA of any transfer of ownership of the approved structure to a third party. Third party is required to make application to TVA for permitting of the structure in their name (1304.10). Any permit which is not transferred within 60 days is subject to revocation.

10) You agree to stabilize all disturbed areas within 30 days of completion of the work authorized. All land-disturbing activities shall be conducted in accordance with Best Management Practices as defined by Section 208 of the Clean Water Act to control erosion and sedimentation to prevent adverse water quality and related aquatic impacts. Such practices shall be consistent with sound engineering and construction principles; applicable federal, state, and local statutes, regulations, or ordinances; and proven techniques for controlling erosion and sedimentation, including any required conditions under Section 6 of the Standard Conditions.

11) You agree not to use or permit the use of the premises, facilities, or structures for any purposes that will result in draining or dumping into the reservoir of any refuse, sewage, or other material in violation of applicable standards or requirements relating to pollution control of any kind now in effect or hereinafter established.

12) The Native American Graves Protection and Repatriation Act and the Archaeological Resources Protection Act apply to archaeological resources located on the premises of land connected to any application made unto TVA. If LESSEE {or licensee or grantee (for easement) or applicant (for 26a permit)} discovers human remains, funerary objects, sacred objects, objects of cultural patrimony, or any other archaeological resources on or under the premises, LESSEE {or licensee, grantee, or applicant} shall immediately stop activity in the area of the discovery, make a reasonable effort to protect the items, and notify TVA by telephone (865-228-1374). Work may not be resumed in the area of the discovery until approved by TVA.

13) You should contact your local government official(s) to ensure that this facility complies with all applicable local floodplain regulations.

14) You agree to abide by the conditions of the vegetation management plan. Unless otherwise stated on this permit, vegetation removal is prohibited on TVA land.

15) You agree to securely anchor all floating facilities to prevent them from floating free during major floods.

16) You are responsible for accurately locating your facility, and this authorization is valid and effective only if your facility is located as shown on your application or as otherwise approved by TVA in this permit. The facility must be located on land owned or leased by you, or on TVA land at a location approved by TVA.

17) You agree to allow TVA employees access to your water use facilities to ensure compliance with any TVA issued approvals.

18) It is understood that you own adequate property rights at this location. If at any time it is determined that you do not own sufficient property rights, or that you have only partial ownership rights in the land at this location, this permit may be revoked. TVA may require the applicant to provide appropriate verification of ownership.

19) In accordance with 18 CFR Part 1304.9, Approval for construction covered by this permit expires 18 months after the date of issuance unless construction has been initiated.

Standard Conditions (Only items that pertain to this request have been listed.)

2) Ownership Rights

b) You are advised that TVA retains the right to flood this area and that TVA will not be liable for damages resulting from flooding.

e) You recognize and understand that this authorization conveys no property rights, grants no exclusive license, and in no way restricts the general public's privilege of using shoreland owned by or subject to public access rights owned by TVA. It is also subject to any existing rights of third parties. Nothing contained in this approval shall be construed to detract or deviate from the rights of the United States and TVA held over this land under the Grant of Flowage Easement. This Approval of Plans does not give any property rights in real estate or material and does not authorize any injury to private property or invasion of private or public rights. It merely constitutes a finding that the facility, if constructed at the location specified in the plans submitted and in accordance with said plans, would not at this time constitute an obstruction unduly affecting navigation, flood control, or public lands or reservations.

3) Shoreline Modification and Stabilization

a) For purposes of shoreline bank stabilization, all portions will be constructed or placed, on average, no more than two feet from the existing shoreline at normal summer pool elevation.

c) Bank, shoreline, and floodplain stabilization will be permanently maintained in order to prevent erosion, protect water quality, and preserve aquatic habitat.

5) Bridges and Culverts

a) You agree to design/construct any instream piers in such a manner as to discourage river scouring or sediment deposition.

b) Applicant agrees to construct culvert in phases, employing adequate streambank protection measures, such that the diverted streamflow is handled without creating streambank or streambed erosion/sedimentation and without preventing fish passage.

c) Concrete box culverts and pipe culverts (and their extensions) must create/maintain velocities and flow patterns which offer refuge for fish and other aquatic life, and allow passage of indigenous fish species, under all flow conditions. Culvert floor slabs and pipe bottoms must be buried below streambed elevation, and filled with naturally occurring streambed materials. If geologic conditions do not allow burying the floor, it must be otherwise designed to allow passage of indigenous fish species under all flow conditions.

d) All natural stream values (including equivalent energy dissipation, elevations, and velocities; riparian vegetation; riffle/pool sequencing; habitat suitable for fish and other aquatic life) must be provided at all stream modification sites. This must be accomplished using a combination of rock and bioengineering, and is not accomplished using solid, homogeneous riprap from bank to bank.

e) You agree to remove demolition and construction by-products from the site for recycling if practicable, or proper disposal--outside of the 100-year floodplain. Appropriate BMPs will be used during the removal of any abandoned roadway or structures.

6) Best Management Practices

a) You agree that removal of vegetation will be minimized, particularly any woody vegetation providing shoreline/streambank stabilization.

b) You agree to installation of cofferdams and/or silt control structures between construction areas and surface waters prior to any soil-disturbing construction activity, and clarification of all water that accumulates behind these devices to meet state water quality criteria at the stream mile where activity occurs before it is returned to the unaffected portion of the stream. Cofferdams must be used wherever construction activity is at or below water elevation.

c) A floating silt screen extending from the surface to the bottom is to be in place during excavation or dredging to prevent sedimentation in surrounding areas. It is to be left in place until disturbed sediments are visibly settled.

d) You agree to keep equipment out of the reservoir or stream and off reservoir or stream banks, to the extent practicable (i.e., performing work "in the dry").

e) You agree to avoid contact of wet concrete with the stream or reservoir, and avoid disposing of concrete washings, or other substances or materials, in those waters.

f) You agree to use erosion control structures around any material stockpile areas.

g) You agree to apply clean/shaken riprap or shot rock (where needed at water/bank interface) over a water permeable/soil impermeable fabric or geotextile and in such a manner as to avoid stream sedimentation or disturbance, or that any rock used for cover and stabilization shall be large enough to prevent washout and provide good aquatic habitat.

h) You agree to remove, redistribute, and stabilize (with vegetation) all sediment which accumulates behind cofferdams or silt control structures.

i) You agree to use vegetation (versus riprap) wherever practicable and sustainable to stabilize streambanks, shorelines, and adjacent areas. These areas will be stabilized as soon as practicable, using either an appropriate seed mixture that includes an annual (quick cover) as well as one or two perennial legumes and one or two perennial grasses, or sod. In winter or summer, this will require initial planting of a quick cover annual only, to be followed by subsequent establishment of the perennials. Seed and soil will be protected as appropriate with erosion control netting and/or mulch and provided adequate moisture. Streambank and shoreline areas will also be permanently stabilized with native woody plants, to include trees wherever practicable and sustainable (this vegetative prescription may be altered if dictated by geologic conditions or landowner requirements). You also agree to install or perform additional erosion control structures/techniques deemed necessary by TVA.

Additional Conditions

Consistent with TVA's Finding of No Significant Impact, you agree to adhere to and implement all conditions, measures and commitments identified in the USACE Environmental Assessment and Memorandum of Agreement regarding historic resources. The USACE Project Commitment List and MOA are attached to this permit for reference.

County : Mitchell, Yancey

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	0001000000-E	200	CLEARING & GRUBBING .. ACRE(S)	Lump Sum	L.S.	
0004	0008000000-E	200	SUPPLEMENTARY CLEARING & GRUBBING	5 ACR		
0005	0015000000-N	205	SEALING ABANDONED WELLS	7 EA		
0006	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (122+22.50 -L- LT)	Lump Sum	L.S.	
0007	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (122+22.50 -L- RT)	Lump Sum	L.S.	
0008	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (24+03.57 -L- LT)	Lump Sum	L.S.	
0009	0029000000-N	SP	REINFORCED BRIDGE APPROACH FILL, STATION ********** (24+15.62 -L- RT)	Lump Sum	L.S.	
0010	0036000000-E	225	UNDERCUT EXCAVATION	7,000 CY		
0011	0098000000-E	SP	PRE-SPLITTING OF ROCK	3,080 SY		
0012	0134000000-E	240	DRAINAGE DITCH EXCAVATION	35,200 CY		
0013	0141000000-E	240	BERM DITCH CONSTRUCTION	3,960 LF		
0014	0156000000-E	250	REMOVAL OF EXISTING ASPHALT PAVEMENT	53,900 SY		
0015	0177000000-E	250	BREAKING OF EXISTING ASPHALT PAVEMENT	27,680 SY		
0016	0192000000-N	260	PROOF ROLLING	70 HR		
0017	0195000000-E	265	SELECT GRANULAR MATERIAL	1,500 CY		

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0018	0196000000-E	270	GEOTEXTILE FOR SOIL STABILIZATION	24,000 SY		
0019	0199000000-E	SP	TEMPORARY SHORING	18,300 SF		
0020	0225000000-E	SP	REINFORCED SOIL SLOPES	950 SY		
0021	0255000000-E	SP	GENERIC GRADING ITEM HAULING & DISPOSAL OF PETROLEUM CONTAMINATED SOIL	2,200 TON		
0022	0318000000-E	300	FOUNDATION CONDITIONING MATERIAL, MINOR STRUCTURES	5,690 TON		
0023	0320000000-E	300	FOUNDATION CONDITIONING GEOTEXTILE	17,890 SY		
0024	0342000000-E	310	**" SIDE DRAIN PIPE (12")	14 LF		
0025	0342000000-E	310	**" SIDE DRAIN PIPE (30")	2,748 LF		
0026	0342000000-E	310	**" SIDE DRAIN PIPE (36")	852 LF		
0027	0342000000-E	310	**" SIDE DRAIN PIPE (42")	42 LF		
0028	0342000000-E	310	**" SIDE DRAIN PIPE (48")	152 LF		
0029	0343000000-E	310	15" SIDE DRAIN PIPE	20,362 LF		
0030	0344000000-E	310	18" SIDE DRAIN PIPE	4,032 LF		
0031	0345000000-E	310	24" SIDE DRAIN PIPE	4,250 LF		
0032	0354000000-E	310	***" RC PIPE CULVERTS, CLASS ***** (54", V)	76 LF		
0033	0354000000-E	310	***" RC PIPE CULVERTS, CLASS ***** (60", V)	124 LF		
0034	0366000000-E	310	15" RC PIPE CULVERTS, CLASS III	1,698 LF		

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0035	0372000000-E	310	18" RC PIPE CULVERTS, CLASS III	1,560 LF		
0036	0378000000-E	310	24" RC PIPE CULVERTS, CLASS III	1,694 LF		
0037	0384000000-E	310	30" RC PIPE CULVERTS, CLASS III	228 LF		
0038	0390000000-E	310	36" RC PIPE CULVERTS, CLASS III	712 LF		
0039	0396000000-E	310	42" RC PIPE CULVERTS, CLASS III	748 LF		
0040	0402000000-E	310	48" RC PIPE CULVERTS, CLASS III	224 LF		
0041	0408000000-E	310	54" RC PIPE CULVERTS, CLASS III	200 LF		
0042	0448000000-E	310	****" RC PIPE CULVERTS, CLASS IV (48")	52 LF		
0043	0448000000-E	310	****" RC PIPE CULVERTS, CLASS IV (54")	172 LF		
0044	0448000000-E	310	****" RC PIPE CULVERTS, CLASS IV (60")	80 LF		
0045	0448200000-E	310	15" RC PIPE CULVERTS, CLASS IV	10,412 LF		
0046	0448300000-E	310	18" RC PIPE CULVERTS, CLASS IV	656 LF		
0047	0448400000-E	310	24" RC PIPE CULVERTS, CLASS IV	1,096 LF		
0048	0448500000-E	310	30" RC PIPE CULVERTS, CLASS IV	516 LF		
0049	0448600000-E	310	36" RC PIPE CULVERTS, CLASS IV	236 LF		
0050	0453000000-E	310	**" PIPE END SECTION (15")	13 EA		
0051	0453000000-E	310	**" PIPE END SECTION (18")	1 EA		

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0052	0576000000-E	310	**" CS PIPE CULVERTS, *****" THICK (12", 0.064")	236 LF		
0053	0576000000-E	310	**" CS PIPE CULVERTS, *****" THICK (36", 0.079")	432 LF		
0054	0576000000-E	310	**" CS PIPE CULVERTS, *****" THICK (54", 0.109")	20 LF		
0055	0576000000-E	310	**" CS PIPE CULVERTS, *****" THICK (60", 0.138")	116 LF		
0056	0582000000-E	310	15" CS PIPE CULVERTS, 0.064" THICK	3,628 LF		
0057	0588000000-E	310	18" CS PIPE CULVERTS, 0.064" THICK	1,416 LF		
0058	0594000000-E	310	24" CS PIPE CULVERTS, 0.064" THICK	1,592 LF		
0059	0600000000-E	310	30" CS PIPE CULVERTS, 0.079" THICK	1,024 LF		
0060	0636000000-E	310	**" CS PIPE ELBOWS, *****" THICK (15", 0.064)	82 EA		
0061	0636000000-E	310	**" CS PIPE ELBOWS, *****" THICK (18", 0.064)	16 EA		
0062	0636000000-E	310	**" CS PIPE ELBOWS, *****" THICK (24", 0.064)	34 EA		
0063	0636000000-E	310	**" CS PIPE ELBOWS, *****" THICK (30", 0.079)	16 EA		
0064	0636000000-E	310	**" CS PIPE ELBOWS, *****" THICK (36", 0.079)	10 EA		
0065	0973100000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B IN SOIL (30", 0.500")	116 LF		

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0066	0973100000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B IN SOIL (42", 0.625")	72 LF		
0067	0973100000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B IN SOIL (48", 0.625")	100 LF		
0068	0973100000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B IN SOIL (54", 0.875")	133 LF		
0069	0973300000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B NOT IN SOIL (30", 0.500")	116 LF		
0070	0973300000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B NOT IN SOIL (42", 0.625")	72 LF		
0071	0973300000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B NOT IN SOIL (48", 0.625")	100 LF		
0072	0973300000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B NOT IN SOIL (54", 0.875")	133 LF		
0073	0986000000-E	SP	GENERIC PIPE ITEM 54" WELDED STEEL PIPE LINER	244 LF		
0074	0995000000-E	340	PIPE REMOVAL	12,783 LF		
0075	1011000000-N	500	FINE GRADING	Lump Sum	L.S.	
0076	1044000000-E	501	LIME TREATED SOIL (SLURRY METHOD)	104,520 SY		
0077	1066000000-E	501	LIME FOR LIME TREATED SOIL	1,050 TON		
0078	1077000000-E	SP	#57 STONE	75 TON		
0079	1099500000-E	505	SHALLOW UNDERCUT	2,500 CY		
0080	1099700000-E	505	CLASS IV SUBGRADE STABILIZA-TION	4,725 TON		
0081	1110000000-E	510	STABILIZER AGGREGATE	500 TON		

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0082	1115000000-E	SP	GEOTEXTILE FOR PAVEMENT STABILIZATION	18,600 SY		
0083	1176000000-E	542	SOIL CEMENT BASE	104,520 SY		
0084	1187000000-E	542	PORTLAND CEMENT FOR SOIL CEMENT BASE	2,875 TON		
0085	1209000000-E	543	ASPHALT CURING SEAL	31,360 GAL		
0086	1220000000-E	545	INCIDENTAL STONE BASE	12,000 TON		
0087	1297000000-E	607	MILLING ASPHALT PAVEMENT, ***" DEPTH (2.5")	82,200 SY		
0088	1330000000-E	607	INCIDENTAL MILLING	1,950 SY		
0089	1489000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0B	5,500 TON		
0090	1503000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C	75,800 TON		
0091	1519000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5B	800 TON		
0092	1523000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5C	47,200 TON		
0093	1525000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE SF9.5A	4,650 TON		
0094	1693000000-E	654	ASPHALT PLANT MIX, PAVEMENT REPAIR	4,000 TON		
0095	2000000000-N	806	RIGHT OF WAY MARKERS	712 EA		
0096	2022000000-E	815	SUBDRAIN EXCAVATION	10,763.2 CY		
0097	2033000000-E	815	SUBDRAIN FINE AGGREGATE	8,072.4 CY		
0098	2043000000-E	815	4" PERFORATED SUBDRAIN PIPE	25,810 LF		
0099	2044000000-E	815	6" PERFORATED SUBDRAIN PIPE	22,240 LF		

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0100	2070000000-N	815	SUBDRAIN PIPE OUTLET	97 EA		
0101	2076000000-E	815	4" OUTLET PIPE	312 LF		
0102	2077000000-E	815	6" OUTLET PIPE	270 LF		
0103	2143000000-E	818	BLOTTING SAND	15 TON		
0104	2209000000-E	838	ENDWALLS	30.246 CY		
0105	2220000000-E	838	REINFORCED ENDWALLS	32 CY		
0106	2253000000-E	840	PIPE COLLARS	6.26 CY		
0107	2264000000-E	840	PIPE PLUGS	0.298 CY		
0108	2275000000-E	SP	FLOWABLE FILL	1,055 CY		
0109	2286000000-N	840	MASONRY DRAINAGE STRUCTURES	526 EA		
0110	2297000000-E	840	MASONRY DRAINAGE STRUCTURES	74.64 CY		
0111	2308000000-E	840	MASONRY DRAINAGE STRUCTURES	407.67 LF		
0112	2354200000-N	840	FRAME WITH GRATE, STD 840.24	1 EA		
0113	2364000000-N	840	FRAME WITH TWO GRATES, STD 840.16	22 EA		
0114	2366000000-N	840	FRAME WITH TWO GRATES, STD 840.24	226 EA		
0115	2367000000-N	840	FRAME WITH TWO GRATES, STD 840.29	79 EA		
0116	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (E)	3 EA		
0117	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (F)	53 EA		

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0118	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (G)	32 EA		
0119	2396000000-N	840	FRAME WITH COVER, STD 840.54	65 EA		
0120	2440000000-N	852	CONCRETE TRANSITIONAL SECTION FOR CATCH BASIN	42 EA		
0121	2451000000-N	852	CONCRETE TRANSITIONAL SECTION FOR DROP INLET	19 EA		
0122	2462000000-E	SP	**" SLUICE GATE (30")	1 EA		
0123	2462000000-E	SP	**" SLUICE GATE (36")	1 EA		
0124	2535000000-E	846	**"X **" CONCRETE CURB (8" X 18")	440 LF		
0125	2538000000-E	846	**'-**" CONCRETE CURB & GUTTER (2'-9")	23,650 LF		
0126	2542000000-E	846	1'-6" CONCRETE CURB & GUTTER	44,760 LF		
0127	2549000000-E	846	2'-6" CONCRETE CURB & GUTTER	870 LF		
0128	2556000000-E	846	SHOULDER BERM GUTTER	11,200 LF		
0129	2577000000-E	846	CONCRETE EXPRESSWAY GUTTER	2,150 LF		
0130	2612000000-E	848	6" CONCRETE DRIVEWAY	50 SY		
0131	2619000000-E	850	4" CONCRETE PAVED DITCH	670 SY		
0132	2647000000-E	852	5" MONOLITHIC CONCRETE ISLANDS (SURFACE MOUNTED)	4,450 SY		
0133	2724000000-E	857	PRECAST REINFORCED CONCRETE BARRIER, SINGLE FACED	400 LF		
0134	2759000000-N	SP	GENERIC PAVING ITEM EMERGENCY VEHICLE ACCESS	1 EA		
0135	3000000000-N	SP	IMPACT ATTENUATOR UNIT, TYPE 350	6 EA		

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0136	3030000000-E	862	STEEL BM GUARDRAIL	27,725 LF		
0137	3045000000-E	862	STEEL BM GUARDRAIL, SHOP CURVED	1,512.5 LF		
0138	3105000000-N	862	STEEL BM GUARDRAIL TERMINAL SECTIONS	6 EA		
0139	3150000000-N	862	ADDITIONAL GUARDRAIL POSTS	15 EA		
0140	3165000000-N	SP	GUARDRAIL ANCHOR UNITS, TYPE ********** (TL-2)	22 EA		
0141	3195000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE AT-1	2 EA		
0142	3210000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE CAT-1	43 EA		
0143	3270000000-N	SP	GUARDRAIL ANCHOR UNITS, TYPE 350	66 EA		
0144	3317000000-N	862	GUARDRAIL ANCHOR UNITS, TYPE B-77	33 EA		
0145	3360000000-E	863	REMOVE EXISTING GUARDRAIL	25,746 LF		
0146	3380000000-E	862	TEMPORARY STEEL BM GUARDRAIL	600 LF		
0147	3382000000-E	862	TEMPORARY STEEL BM GUARDRAIL (SHOP CURVED)	75 LF		
0148	3389100000-N	SP	TEMPORARY GUARDRAIL ANCHOR UNITS, TYPE 350	4 EA		
0149	3503000000-E	866	WOVEN WIRE FENCE, 47" FABRIC	71,100 LF		
0150	3509000000-E	866	4" TIMBER FENCE POSTS, 7'-6" LONG	4,300 EA		
0151	3515000000-E	866	5" TIMBER FENCE POSTS, 8'-0" LONG	1,600 EA		
0152	3524000000-E	SP	VINYL COATED CHAIN LINK FENCE, **" FABRIC (48")	2,450 LF		

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0153	3542000000-E	866	METAL LINE POSTS FOR 48" CHAIN LINK FENCE	210 EA		
0154	3548000000-E	866	METAL TERMINAL POSTS FOR 48" CHAIN LINK FENCE	20 EA		
0155	3628000000-E	876	RIP RAP, CLASS I	1,625 TON		
0156	3635000000-E	876	RIP RAP, CLASS II	1,350 TON		
0157	3642000000-E	876	RIP RAP, CLASS A	35 TON		
0158	3649000000-E	876	RIP RAP, CLASS B	2,600 TON		
0159	3651000000-E	SP	BOULDERS	220 TON		
0160	3656000000-E	876	GEOTEXTILE FOR DRAINAGE	20,675 SY		
0161	3659000000-N	SP	PREFORMED SCOUR HOLES WITH LEVEL SPREADER APRON	3 EA		
0162	4072000000-E	903	SUPPORTS, 3-LB STEEL U-CHANNEL	5,839 LF		
0163	4096000000-N	904	SIGN ERECTION, TYPE D	19 EA		
0164	4102000000-N	904	SIGN ERECTION, TYPE E	289 EA		
0165	4108000000-N	904	SIGN ERECTION, TYPE F	47 EA		
0166	4116100000-N	904	SIGN ERECTION, RELOCATE, TYPE **** (GROUND MOUNTED) (D)	14 EA		
0167	4155000000-N	907	DISPOSAL OF SIGN SYSTEM, U-CHANNEL	154 EA		
0168	4400000000-E	1110	WORK ZONE SIGNS (STATIONARY)	1,048 SF		
0169	4405000000-E	1110	WORK ZONE SIGNS (PORTABLE)	341 SF		
0170	4410000000-E	1110	WORK ZONE SIGNS (BARRICADE MOUNTED)	572 SF		
0171	4415000000-N	1115	FLASHING ARROW BOARD	2 EA		

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0172	4420000000-N	1120	PORTABLE CHANGEABLE MESSAGE SIGN	2 EA		
0173	4430000000-N	1130	DRUMS	956 EA		
0174	4435000000-N	1135	CONES	68 EA		
0175	4445000000-E	1145	BARRICADES (TYPE III)	1,144 LF		
0176	4465000000-N	1160	TEMPORARY CRASH CUSHIONS	14 EA		
0177	4470000000-N	1160	RESET TEMPORARY CRASH CUSHION	5 EA		
0178	4480000000-N	1165	TMA	2 EA		
0179	4485000000-E	1170	PORTABLE CONCRETE BARRIER	9,355 LF		
0180	4500000000-E	1170	RESET PORTABLE CONCRETE BARRIER	1,200 LF		
0181	4510000000-N	SP	LAW ENFORCEMENT	80 HR		
0182	4589000000-N	SP	GENERIC TRAFFIC CONTROL ITEM FLAGGERS	Lump Sum	L.S.	
0183	4650000000-N	1251	TEMPORARY RAISED PAVEMENT MARKERS	936 EA		
0184	4710000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (24", 120 MILS)	800 LF		
0185	4725000000-E	1205	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)	191 EA		
0186	4770000000-E	1205	COLD APPLIED PLASTIC PAVEMENT MARKING LINES, TYPE ** (4") (IV)	3,164 LF		
0187	4810000000-E	1205	PAINT PAVEMENT MARKING LINES (4")	626,220 LF		
0188	4820000000-E	1205	PAINT PAVEMENT MARKING LINES (8")	1,392 LF		
0189	4835000000-E	1205	PAINT PAVEMENT MARKING LINES (24")	1,816 LF		

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0190	4840000000-N	1205	PAINT PAVEMENT MARKING CHARAC-TER	16 EA		
0191	4845000000-N	1205	PAINT PAVEMENT MARKING SYMBOL	40 EA		
0192	4847000000-E	1205	POLYUREA PAVEMENT MARKING LINES (4", **********) (HIGHLY REFLECTIVE ELEMENTS)	143,695 LF		
0193	4847110000-E	1205	POLYUREA PAVEMENT MARKING LINES (8", **********) (HIGHLY REFLECTIVE ELEMENTS)	70 LF		
0194	4850000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (4")	7,648 LF		
0195	4875000000-N	1205	REMOVAL OF PAVEMENT MARKING SYMBOLS & CHARACTERS	5 EA		
0196	4880000000-E	1205	CURING COMPOUND REMOVAL, LINES	825 LF		
0197	4905000000-N	1253	SNOWPLOWABLE PAVEMENT MARKERS	1,133 EA		
0198	6000000000-E	1605	TEMPORARY SILT FENCE	100,000 LF		
0199	6006000000-E	1610	STONE FOR EROSION CONTROL, CLASS A	10,000 TON		
0200	6009000000-E	1610	STONE FOR EROSION CONTROL, CLASS B	40,000 TON		
0201	6012000000-E	1610	SEDIMENT CONTROL STONE	20,000 TON		
0202	6015000000-E	1615	TEMPORARY MULCHING	600 ACR		
0203	6018000000-E	1620	SEED FOR TEMPORARY SEEDING	26,300 LB		
0204	6021000000-E	1620	FERTILIZER FOR TEMPORARY SEED-ING	107 TON		
0205	6024000000-E	1622	TEMPORARY SLOPE DRAINS	20,000 LF		
0206	6029000000-E	SP	SAFETY FENCE	10,000 LF		
0207	6030000000-E	1630	SILT EXCAVATION	161,700 CY		

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0208	6036000000-E	1631	MATTING FOR EROSION CONTROL	642,890 SY		
0209	6037000000-E	SP	COIR FIBER MAT	2,625 SY		
0210	6038000000-E	SP	PERMANENT SOIL REINFORCEMENT MAT	22,800 SY		
0211	6042000000-E	1632	1/4" HARDWARE CLOTH	10,000 LF		
0212	6045000000-E	SP	**" TEMPORARY PIPE (15")	115 LF		
0213	6045000000-E	SP	**" TEMPORARY PIPE (72")	100 LF		
0214	6048000000-E	SP	FLOATING TURBIDITY CURTAIN	50 SY		
0215	6070000000-N	1639	SPECIAL STILLING BASINS	30 EA		
0216	6071012000-E	SP	COIR FIBER WATTLE	5,000 LF		
0217	6071013000-E	SP	WATTLE BARRIER	2,500 LF		
0218	6071020000-E	SP	POLYACRYLAMIDE (PAM)	7,850 LB		
0219	6071030000-E	1640	COIR FIBER BAFFLE	46,580 LF		
0220	6071050000-E	SP	**" SKIMMER (1-1/2")	162 EA		
0221	6071050000-E	SP	**" SKIMMER (2")	12 EA		
0222	6071050000-E	SP	**" SKIMMER (3")	1 EA		
0223	6084000000-E	1660	SEEDING & MULCHING	400 ACR		
0224	6087000000-E	1660	MOWING	200 ACR		
0225	6090000000-E	1661	SEED FOR REPAIR SEEDING	6,000 LB		
0226	6093000000-E	1661	FERTILIZER FOR REPAIR SEEDING	21 TON		

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0227	6096000000-E	1662	SEED FOR SUPPLEMENTAL SEEDING	10,025 LB		
0228	6108000000-E	1665	FERTILIZER TOPDRESSING	300 TON		
0229	6111000000-E	SP	IMPERVIOUS DIKE	2,800 LF		
0230	6114500000-N	1667	SPECIALIZED HAND MOWING	160 MHR		
0231	6117000000-N	SP	RESPONSE FOR EROSION CONTROL	150 EA		
0232	6120000000-E	SP	CULVERT DIVERSION CHANNEL	2,700 CY		
0233	6123000000-E	1670	REFORESTATION	31 ACR		
0234	6126000000-E	SP	STREAMBANK REFORESTATION	4.62 ACR		
0235	6133000000-N	SP	GENERIC EROSION CONTROL ITEM DIVERSION PUMPING FOR MITIGATION	Lump Sum	L.S.	
0236	6133000000-N	SP	GENERIC EROSION CONTROL ITEM GRADING FOR MITIGATION	Lump Sum	L.S.	
0237	6133000000-N	SP	GENERIC EROSION CONTROL ITEM SURVEYING FOR MITIGATION	Lump Sum	L.S.	
0238	6150000000-E	SP	GENERIC EROSION CONTROL ITEM AERIAL FERTILIZER TOPDRESSING	75 TON		

********* BEGIN SCHEDULE AA *********
********* (2 ALTERNATES) *********

0239 **AA1**	0022000000-E	225	UNCLASSIFIED EXCAVATION	2,002,500 CY		
0240 **AA1**	1121000000-E	520	AGGREGATE BASE COURSE	93,500 TON		
0241 **AA1**	1231000000-E	560	SHOULDER BORROW	58,000 CY		
0242 **AA1**	1275000000-E	600	PRIME COAT	4,125 GAL		
0243 **AA1**	1491000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0C	30,000 TON		

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0244	1575000000-E	620	ASPHALT BINDER FOR PLANT MIX	8,345		
AA1				TON		
			***** OR *****			
0245	0022000000-E	225	UNCLASSIFIED EXCAVATION	1,989,600		
AA2				CY		
0246	1121000000-E	520	AGGREGATE BASE COURSE	5,330		
AA2				TON		
0247	1231000000-E	560	SHOULDER BORROW	45,400		
AA2				CY		
0248	1275000000-E	600	PRIME COAT	3,810		
AA2				GAL		
0249	1491000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0C	61,000		
AA2				TON		
0250	1575000000-E	620	ASPHALT BINDER FOR PLANT MIX	9,710		
AA2				TON		
			******* END SCHEDULE AA *******			
			CULVERT ITEMS			
0251	8126000000-N	414	CULVERT EXCAVATION, STA ****** (11+07.96-Y34-)	Lump Sum	L.S.	
0252	8126000000-N	414	CULVERT EXCAVATION, STA ****** (134+80.45-L-)	Lump Sum	L.S.	
0253	8126000000-N	414	CULVERT EXCAVATION, STA ****** (14+90.30-Y17-)	Lump Sum	L.S.	
0254	8126000000-N	414	CULVERT EXCAVATION, STA ****** (155+44.57-L-)	Lump Sum	L.S.	
0255	8126000000-N	414	CULVERT EXCAVATION, STA ****** (319+76.16-L-)	Lump Sum	L.S.	
0256	8126000000-N	414	CULVERT EXCAVATION, STA ****** (323+58.66-L-)	Lump Sum	L.S.	
0257	8126000000-N	414	CULVERT EXCAVATION, STA ****** (327+50.47-L-)	Lump Sum	L.S.	
0258	8126000000-N	414	CULVERT EXCAVATION, STA ****** (345+98.42-L-)	Lump Sum	L.S.	

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0259	8126000000-N	414	CULVERT EXCAVATION, STA ****** (44+1.92-L-)	Lump Sum	L.S.	
0260	8133000000-E	414	FOUNDATION CONDITIONING MATERIAL, BOX CULVERT	1,435 TON		
0261	8196000000-E	420	CLASS A CONCRETE (CULVERT)	2,426.6 CY		
0262	8245000000-E	425	REINFORCING STEEL (CULVERT)	292,752 LB		
			WALL ITEMS			
0263	8801000000-E	SP	MSE RETAINING WALL NO **** (1)	6,700 SF		
0264	8801000000-E	SP	MSE RETAINING WALL NO **** (2)	2,300 SF		
0265	8801000000-E	SP	MSE RETAINING WALL NO **** (5)	2,400 SF		
0266	8801000000-E	SP	MSE RETAINING WALL NO **** (6)	2,625 SF		
0267	8801000000-E	SP	MSE RETAINING WALL NO **** (7)	1,800 SF		
0268	8802010000-E	SP	SOIL NAIL RETAINING WALLS	3,700 SF		
0269	8802014000-E	SP	SOLDIER PILE RETAINING WALLS	6,250 SF		
0270	8802015100-N	SP	SOIL NAIL VERIFICATION TESTS	2 EA		
0271	8802015110-N	SP	SOIL NAIL PROOF TESTS	8 EA		
0272	8867000000-E	SP	GENERIC STRUCTURE ITEM CONC BARRIER RAIL WITH MOMENT SLAB	2,175 LF		

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
			STRUCTURE ITEMS			
0273	8017000000-N	SP	CONSTRUCTION, MAINTENANCE, & REMOVAL OF TEMP ACCESS AT STA ********** (122+22.50-L-LT)	Lump Sum	L.S.	
0274	8035000000-N	402	REMOVAL OF EXISTING STRUCTURE AT STATION ********** (122+22.50-L-LT)	Lump Sum	L.S.	
0275	8035000000-N	402	REMOVAL OF EXISTING STRUCTURE AT STATION ********** (24+11.31-L-RT)	Lump Sum	L.S.	
0276	8035000000-N	402	REMOVAL OF EXISTING STRUCTURE AT STATION ********** (247+87.50-L-LT)	Lump Sum	L.S.	
0277	8035000000-N	402	REMOVAL OF EXISTING STRUCTURE AT STATION ********** (247+87.50-L-RT)	Lump Sum	L.S.	
0278	8105500000-E	411	**'-**" DIA DRILLED PIERS IN SOIL (4'-6")	192 LF		
0279	8105600000-E	411	**'-**" DIA DRILLED PIERS NOT IN SOIL (4'-6")	134 LF		
0280	8111000000-E	411	PERMANENT STEEL CASING FOR **'-**" DIA DRILLED PIER (4'-6")	117.6 LF		
0281	8112730000-N	450	PDA TESTING	6 EA		
0282	8113000000-N	411	SID INSPECTIONS	8 EA		
0283	8114000000-N	411	SPT TESTING	8 EA		
0284	8115000000-N	411	CSL TESTING	4 EA		
0285	8121000000-N	412	UNCLASSIFIED STRUCTURE EXCAVATION AT STATION ******** (122+22.50-L-LT)	Lump Sum	L.S.	
0286	8121000000-N	412	UNCLASSIFIED STRUCTURE EXCAVATION AT STATION ******** (122+22.50-L-RT)	Lump Sum	L.S.	

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0287	8121000000-N	412	UNCLASSIFIED STRUCTURE EXCAVATION AT STATION ******** (247+87.50-L-LT)	Lump Sum	L.S.	
0288	8121000000-N	412	UNCLASSIFIED STRUCTURE EXCAVATION AT STATION ******** (247+87.50-L-RT)	Lump Sum	L.S.	
0289	8147000000-E	420	REINFORCED CONCRETE DECK SLAB	49,338 SF		
0290	8161000000-E	420	GROOVING BRIDGE FLOORS	50,754 SF		
0291	8182000000-E	420	CLASS A CONCRETE (BRIDGE)	753.3 CY		
0292	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (122+22.50-L-LT)	Lump Sum	L.S.	
0293	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (122+22.50-L-RT)	Lump Sum	L.S.	
0294	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (24+11.31-L-LT)	Lump Sum	L.S.	
0295	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (24+11.31-L-RT)	Lump Sum	L.S.	
0296	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (247+87.50-L-LT)	Lump Sum	L.S.	
0297	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (247+87.50-L-RT)	Lump Sum	L.S.	
0298	8217000000-E	425	REINFORCING STEEL (BRIDGE)	164,893 LB		
0299	8238000000-E	425	SPIRAL COLUMN REINFORCING STEEL (BRIDGE)	13,665 LB		
0300	8280000000-E	440	APPROX ..... LBS STRUCTURAL STEEL	795,200 LS		
0301	8364000000-E	450	HP12X53 STEEL PILES	1,103 LF		
0302	8384000000-E	450	HP14X73 STEEL PILES	5,300 LF		

County : Mitchell, Yancey

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0303	8393000000-N	450	PILE REDRIVES	47 EA		
0304	8503000000-E	460	CONCRETE BARRIER RAIL	2,674.76 LF		
0305	8531000000-E	462	4" SLOPE PROTECTION	1,276 SY		
0306	8594000000-E	876	RIP RAP, CLASS B	400 TON		
0307	8608000000-E	876	RIP RAP CLASS II (2'-0" THICK)	1,897 TON		
0308	8622000000-E	876	GEOTEXTILE FOR DRAINAGE	2,970 SY		
0309	8657000000-N	430	ELASTOMERIC BEARINGS	Lump Sum	L.S.	
0310	8706000000-N	SP	EXPANSION JOINT SEALS	Lump Sum	L.S.	
0311	8741000000-N	SP	STRUCTURE DRAINAGE SYSTEM AT STA********** (122+22.50-L-LT)	Lump Sum	L.S.	
0312	8741000000-N	SP	STRUCTURE DRAINAGE SYSTEM AT STA********** (122+22.50-L-RT)	Lump Sum	L.S.	
0313	8867000000-E	SP	GENERIC STRUCTURE ITEM 74" MOD PRESTR CONC GDRS	3,783.26 LF		