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

PROPOSAL

INCLUDES ADDENDUM No. 1 DATED 06-29-2023

DATE AND TIME OF BID OPENING: **Jul 18, 2023 AT 02:00 PM**

CONTRACT ID	C204851
WBS	34497.3.12

FEDERAL-AID NO.	STATE FUNDED
COUNTY	CLEVELAND
T.I.P NO.	R-2707D, R-2707E
MILES	6.099
ROUTE NO.	US-74
LOCATION	US-74 SHELBY BYPASS FROM EAST OF NC-150 TO WEST OF SR-1001 (STONEY POINT RD).
TYPE OF WORK	GRADING, DRAINAGE, PAVING, SIGNING, 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. C204851 IN CLEVELAND COUNTY, NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION,

RALEIGH, NORTH CAROLINA

The Bidder has carefully examined the location of the proposed work to be known as Contract No. **C204851** 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 be 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 2018 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. **C204851** in **Cleveland County**, for the unit or lump sum prices, as the case may be, bid by the Bidder in his bid and according to the proposal, plans, and specifications prepared by said Department, which proposal, plans, and specifications show the details covering this project, and hereby become a part of this contract.

The published volume entitled *North Carolina Department of Transportation, Raleigh, Standard Specifications for Roads and Structures, January 2018* 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:
Ronald Elton Davenport, Jr.
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06/29/2023

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PROJECT SPECIAL PROVISIONS

GENERAL

CONTRACTOR PREQUALIFICATION:

(10-18-22) 102 SP1 G01

Revise the *2018 Standard Specifications* as follows:

Page 1-10, Subarticle 102-2(A) Bidder Prequalification, lines 30-31, delete and replace the first sentence with the following:

Prospective bidders shall obtain prequalification approval at least two business days prior to any letting in which they intend to submit a bid. It is recommended that the prospective bidder file all required statements and documents with the State Prequalifications Engineer no less than 4 weeks before a given letting.

Page 1-11, Subarticle 102-2(B) Purchase Order Bidder Prequalification, lines 16-18, delete and replace the first sentence with the following:

Prospective bidders shall obtain prequalification approval at least two business days prior to any letting in which they intend to submit a bid. It is recommended that the applicant file all required statements and documents with the State Prequalifications Engineer no less than 4 weeks before a given bid opening for their bid to be considered.

Page 1-11, Subarticle 102-2(C) Subcontractor Prequalification, lines 44-45, delete and replace the first sentence with the following:

The subcontractor shall file all required statements and documents with the State Prequalifications Engineer no less than 4 weeks before beginning work.

Page 1-12, Subarticle 102-2(E) Renewal and Requalification, lines 38-40, delete and replace the first sentence with the following:

It is recommended that the renewing or requalifying firm file all required statements and documents with the State Prequalifications Engineer no less than 4 weeks before a given letting for their bid to be considered.

INTERESTED PARTIES LIST:

(6-21-22)(Rev. 7-19-22) 102 SP1 G02

Revise the *2018 Standard Specifications* as follows:

Page 1-12, Article 102-3 PROPOSALS AND PLAN HOLDER LISTS, lines 45-49, delete and replace with the following:

102-3 PROPOSALS AND INTERESTED PARTIES LIST

On Department projects advertised, the prospective bidder shall sign up on the *Interested Parties List* no later than one business day prior to the Letting day of that project, for which he intends to submit a bid. There is no cost for signing up on the *Interested Parties List* that can be found on the Department's website at connect.ncdot.gov/letting.

Page 1-12, Article 102-3 PROPOSALS AND PLAN HOLDER LISTS, lines 1-3, delete and replace the first sentence of the second paragraph with the following:

The proposal will state the location of the contemplated construction and show a schedule of contract items with the approximate quantity of each of these items for which bid prices are invited.

Page 1-14, Article 102-8 PREPARATION AND SUBMISSION OF BIDS, lines 30-31, delete and replace the first paragraph with the following:

Prior to submitting a bid on a project, the bidder shall sign up on the *Interested Parties List* in conformance with Article 102-3. The bidder shall submit a unit or lump sum price for every item in the proposal other than items that are authorized alternates to those items for which a bid price has been submitted.

LIABILITY INSURANCE:

(5-16-23) 107 SP1 G05

Revise the *2018 Standard Specifications* as follows:

Page 1-64, Article 107-15 LIABILITY INSURANCE, replace the first sentence with the following:

The Contractor shall at its sole cost and expense obtain and furnish to the Department an original standard Association for Cooperative Operations Research and Development (ACORD) certificate of liability insurance evidencing commercial general liability with a limit for bodily injury and property damage in the amount of $5,000,000 per occurrence and $5,000,000 general aggregate, covering the Contractor from claims or damages for bodily injury, personal injury, or for property damages that may arise from operating under the contract by the employees and agents of the Contractor.

CONTRACT TIME AND LIQUIDATED DAMAGES:

(8-15-00) (Rev. 5-16-23) 108 SP1 G08 A

The date of availability for this contract is **August 28, 2023**, except that work in jurisdictional waters and wetlands shall not begin until a meeting between the DOT, Regulatory Agencies, and the Contractor is held as stipulated in the permits contained elsewhere in this proposal. This delay in availability has been considered in determining the contract time for this project.

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

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

the final completion date shall be a part of the work covered by the performance and payment bonds.

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

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

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

The date of availability for this intermediate contract time is **August 28, 2023**.

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

The liquidated damages for this intermediate contract time are **Ten Thousand Dollars ($ 10,000.00)** per calendar day.

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

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

The Contractor shall complete the required work of installing, maintaining, and removing the traffic control devices for lane closures and restoring traffic to the existing traffic pattern. The Contractor shall not close or narrow a lane of traffic on **US 74 (-L- and/or -Y5)** during the following time restrictions:

DAY AND TIME RESTRICTIONS

Monday thru Sunday, 6:00 A.M. to 8:00 P.M.

In addition, the Contractor shall not close or narrow a lane of traffic on **US 74 (-L- and/or -Y5-)**, 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 **8:00 P.M.** January 2nd. If New Year's Day is on a Friday, Saturday, Sunday or Monday, then until **8:00 P.M.** the following Tuesday.

3. For **Easter**, between the hours of **6:00 A.M.** Thursday and **8:00 P.M.** Monday.

4. For **Memorial Day**, between the hours of **6:00 A.M.** Friday and **8:00 P.M.** Tuesday.

5. For **Independence Day**, between the hours of **6:00 A.M.** the day before Independence Day and **8:00 P.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 **8:00 P.M.** the Tuesday after Independence Day.

6. For **Labor Day**, between the hours of **6:00 A.M.** Friday and **8:00 P.M.** Tuesday.

7. For **Thanksgiving**, between the hours of **6:00 A.M.** Tuesday and **8:00 P.M.** Monday.

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

9. For the **American Legion Baseball World Series**, between the hours of **6:00 A.M**. the Wednesday in August before the start of the **American Legion Baseball World Series** and **8:00 P.M.** the Wednesday after the end of the **American Legion Baseball World Series**.

10. For the **Cleveland County Fair**, between the hours of **6:00 A.M.** the day before the beginning of the **Cleveland County Fair** and **8:00 P.M**. the day after the end of the **Cleveland County Fair**.

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

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

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

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

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

The Contractor shall complete the required work of installing, maintaining, and removing the traffic control devices for lane closures and restoring traffic to the existing traffic pattern. The Contractor shall not close or narrow a lane of traffic on **-Y2- (Elizabeth Avenue) and/or -Y3- (Borders Road)** during the following time restrictions:

DAY AND TIME RESTRICTIONS

Monday thru Friday, 6:00 A.M. to 8:00 A.M. and 4:00 P.M. to 6:00 P.M.

The Contractor shall not narrow or close a lane of traffic on **-Y2- (Elizabeth Avenue)**, detain and /or alter the traffic flow on or during 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 **8:00 P.M.** January 2nd. If New Year's Day is on a Friday, Saturday, Sunday or Monday, then until **8:00 P.M.** the following Tuesday.

3. For **Easter**, between the hours of **6:00 A.M.** Thursday and **8:00 P.M.** Monday.

4. For **Memorial Day**, between the hours of **6:00 A.M.** Friday and **8:00 P.M.** Tuesday.

5. For **Independence Day**, between the hours of **6:00 A.M.** the day before Independence Day and **8:00 P.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 **8:00 P.M.** the Tuesday after Independence Day.

6. For **Labor Day**, between the hours of **6:00 A.M.** Friday and **8:00 P.M.** Tuesday.

7. For **Thanksgiving**, between the hours of **6:00 A.M.** Tuesday and **8:00 P.M.** Monday.

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

9. For the **American Legion Baseball World Series**, between the hours of **6:00 A.M**. the Wednesday in August before the start of the **American Legion Baseball World Series** and **8:00 P.M.** the Wednesday after the end of the **American Legion Baseball World Series**.

10. For the **Cleveland County Fair**, between the hours of **6:00 A.M.** the day before the beginning of the **Cleveland County Fair** and **8:00 P.M**. the day after the end of the **Cleveland County Fair**.

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 are not 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 herein and place traffic in the existing traffic pattern.

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

INTERMEDIATE CONTRACT TIME NUMBER 4 AND LIQUIDATED DAMAGES:
(2-20-07) 108 SP1 G14 E

The Contractor shall complete the required work of installing, maintaining and removing the traffic control devices for road closures and restoring traffic to the existing traffic pattern. The Contractor shall not close **US 74 (-L-)** during the following time restrictions:

DAY AND TIME RESTRICTIONS

Monday thru Sunday, 5:00 A.M. to 9:00 P.M.

The maximum allowable time for **Overhead Girder Installation** is **thirty (30)** minutes for **US 74 (-L-)**. 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 the road closures according to the time restrictions stated herein.

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

The liquidated damages are **Two Thousand Five Hundred Dollars ($ 2,500.00)** 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 *2018 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 *2018 Standard Specifications*. No additional compensation will be made for maintenance and removal of temporary erosion control items.

DELAY IN RIGHT OF ENTRY:

(7-1-95) 108 SP1 G22 A

The Contractor will not be allowed right of entry to the parcels listed below before May 31, 2023 unless otherwise permitted by the Engineer.

Parcel No.	**Property Owner**
R-2707D 600	Jacqueline Harrison
R-2707D 631	Brian Donald Melton
R-2707E 81	David Wayne Allen
R-2707E 635	Wesley Lail

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 *2018 Standard Specifications*):

Line #	Description
7	Unclassified Excavation
19	Borrow Excavation
112	Asphalt Concrete Intermediate Course, Type I19.0 C

SPECIALTY ITEMS:

(7-1-95)(Rev. 7-20-21) 108-6 SP1 G37

Items listed below will be the specialty items for this contract (see Article 108-6 of the *2018 Standard Specifications*).

Line #	Description
169-185	Guardrail
186-193	Fencing
200-236, 276-277	Signing
252-257, 259-261, 267-269	Long-Life Pavement Markings
258	Removable Tape
274-275	Permanent Pavement Markers
279-310	Utility Construction
311-349, 352-357	Erosion Control
350-351	Reforestation
381-383, 385-386	Drilled Piers

FUEL PRICE ADJUSTMENT:

(11-15-05) (Rev. 11-15-22) 109-8 SP1 G43

Revise the *2018 Standard Specifications* as follows:

Page 1-87, Article 109-8, Fuel Price Adjustments, add the following:

The base index price for DIESEL #2 FUEL is **$ 2.6511** per gallon. Where any of the following are included as pay items in the contract, they will be eligible for fuel price adjustment.

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

Description	Units	Fuel Usage Factor Diesel
Unclassified Excavation	Gal/CY	0.29
Borrow Excavation	Gal/CY	0.29
Class IV Subgrade Stabilization	Gal/Ton	0.55
Aggregate Base Course	Gal/Ton	0.55
Sub-Ballast	Gal/Ton	0.55

Erosion Control Stone	Gal/Ton	0.55
Rip Rap, Class _____	Gal/Ton	0.55
Asphalt Concrete Base Course, Type ____	Gal/Ton	0.90 or 2.90
Asphalt Concrete Intermediate Course, Type ____	Gal/Ton	0.90 or 2.90
Asphalt Concrete Surface Course, Type ____	Gal/Ton	0.90 or 2.90
Open-Graded Asphalt Friction Course	Gal/Ton	0.90 or 2.90
Permeable Asphalt Drainage Course, Type ____	Gal/Ton	0.90 or 2.90
Sand Asphalt Surface Course, Type ____	Gal/Ton	0.90 or 2.90
Ultra-thin Bonded Wearing Course	Gal/Ton	0.90 or 2.90
Aggregate for Cement Treated Base Course	Gal/Ton	0.55
Portland Cement for Cement Treated Base Course	Gal/Ton	0.55
> 11" Portland Cement Concrete Pavement	Gal/SY	0.327
Concrete Shoulders Adjacent to > 11” Pavement	Gal/SY	0.327
9” to 11" Portland Cement Concrete Pavement	Gal/SY	0.272
Concrete Shoulders Adjacent to 9” to 11” Pavement	Gal/SY	0.272
< 9” Portland Cement Concrete Pavement	Gal/SY	0.245
Concrete Shoulders Adjacent to < 9” Pavement	Gal/SY	0.245

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

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

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

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

STEEL PRICE ADJUSTMENT:

(4-19-22)(Rev. 6-20-23) SP1 G47

Description and Purpose

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

Eligible Items

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

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

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

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

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

Bid Submittal Requirements

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

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

The Contractor shall provide Form SPA-1 listing the Contract Line Number, (with corresponding Item Number, Item Description, and Category) for the steel products they wish to have an adjustment calculated. Only the contract items corresponding to the list of eligible item numbers for steel price adjustment may be entered on Form SPA-1. The Contractor may choose to have steel price adjustment applied to any, all, or none of the eligible items. However, the Contractor's selection of items for steel price adjustment or non-selection (non-participation) may not be changed once Form SPA-1 has been received by the Department. Items the Bidder chooses for steel price adjustment must be designated by writing the word "Yes" in the column titled "Option" by each Pay Item chosen for adjustment. Should the bidder elect an eligible steel price item, the entire quantity of the line item will be subject to the price adjustment for the duration of the Contract. The Bidder's designations on Form SPA-1 must be written in ink or typed and signed by the Bidder (Prime Contractor) to be considered complete. Items not properly designated, designated with "No", or left blank on the Bidder's Form SPA-1 will automatically be removed from consideration for adjustment. No steel items will be eligible for steel price adjustment on this Project if the Bidder fails to return Form SPA-1 in accordance with this provision.

Establishing the Base Price

The Department will use a blend of monthly average prices as reported from the Fastmarkets platform to calculate the monthly adjustment indices (BI and MI). This data is typically

available on the first day of the month for the preceding month. The indices will be calculated by the Department for the different categories found on the Product Relationship Table below. For item numbers that include multiple types of steel products, the category listed for that item number will be used for adjusting each steel component.

The bidding index for Category 1 Steel items is **$ 48.25** per hundredweight.
The bidding index for Category 2 Steel items is **$ 74.26** per hundredweight.
The bidding index for Category 3 Steel items is **$ 66.48** per hundredweight.
The bidding index for Category 4 Steel items is **$ 58.60** per hundredweight.
The bidding index for Category 5 Steel items is **$ 59.19** per hundredweight.
The bidding index for Category 6 Steel items is **$ 78.86** per hundredweight.
The bidding index for Category 7 Steel items is **$ 51.93** per hundredweight.
The bidding index represents a selling price of steel based on Fastmarkets data for the month of **April 2023**.

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

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

Steel Product (Title)	BI, MI*	Adjustment Date for MI	Category
Reinforcing Steel, Bridge Deck, and SIP Forms	Based on one or more Fastmarkets indices	Delivery Date from Producing Mill	1
Structural Steel and Encasement Pipe	Based on one or more Fastmarkets indices	Delivery Date from Producing Mill	2
Steel H-Piles, Soldier Pile Walls	Based on one or more Fastmarkets indices	Delivery Date from Producing Mill	3
Guardrail Items and Pipe Piles	Based on one or more Fastmarkets indices	Material Received Date**	4
Fence Items	Based on one or more Fastmarkets indices	Material Received Date**	5
Overhead Sign Assembly, Signal Poles, High Mount Standards	Based on one or more Fastmarkets indices	Material Received Date**	6
Prestressed Concrete Members	Based on one or more Fastmarkets indices	Cast Date of Member	7

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

Submittal Requirements

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

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

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

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

Step 1 (Form SPA -2)

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

a. Documentation package number: (Insert the contract line-item) - (Insert sequential package number beginning with "1").
   Example: 412 - 1,
   412 - 2,
   424 – 1,
   424 – 2,
   424 – 3, etc.
b. The steel product quantity in pounds
   i. The following sources should be used, in declining order of precedence, to determine the weight of steel/iron, based on the Engineers decision:
      1. Department established weights of steel/iron by contract pay item per pay unit;
      2. Approved Shop Drawings;
      3. Verified Shipping Documents;
      4. Contract Plans;
      5. Standard Drawing Sheets;
      6. Industry Standards (i.e., AISC Manual of Steel Construction, AWWA Standards, etc.); and
      7. Manufacture's data.
   ii. Any item requiring approved shop drawings shall have the weights of steel calculated and shown on the shop drawings or submitted and certified separately by the fabricator.
c. The date the steel product, subject to adjustment, was shipped from the producing mill (Categories 1-3), received on the project (Categories 4-6), or casting date (Category 7).

Step 2 (Monthly Calculator Spreadsheet)

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

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

Price Adjustment Conditions

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

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

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

Price Adjustment Calculations

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

Price increase/decrease will be computed as follows:

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

Where;

SPA = Steel price adjustment in dollars

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

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

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

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

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

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

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

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

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

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

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

using the indices that were utilized to calculate the steel price adjustment for the quantity of structural steel represented by the last initial structural steel documentation package submission. The package used will be the one with the greatest sequential number.

Extra Work/Force Account:

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

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

Examples **Form SPA-2**

Steel Price Adjustment Submission Form

Contract Number __C203394_____ Bid Reference Month __January 2019__

Submittal Date ___8/31/2019_____

Contract Line Item _____237_____

Line Item Description __APPROX….LBS Structural Steel_____

Sequential Submittal Number _____2_____

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

Note: Attach the following supporting documentation to this form.

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

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

Printed Name Signature

Examples **Form SPA-2**

Steel Price Adjustment Submission Form

Contract Number C203394 Bid Reference Month January 2019

Submittal Date August 31, 2019

Contract Line Item 237

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

Sequential Submittal Number 2

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

Note: Attach the following supporting documentation to this form.

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

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

Printed Name _____ Signature _____

Price Adjustment Sample Calculation (increase)

Project bid on September 17, 2019

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

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

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

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

The Steel Price Adjustment formula is as follows:

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

Where; SPA = Steel price adjustment in dollars

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

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

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

BI = $36.12/ CWT

MI = $64.89 / CWT

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

Q = 450,000 lbs.

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

SPA = 0.79651162791* $36.12 *4,500

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

Price Adjustment Sample Calculation (decrease)

Project bid on December 18, 2018

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

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

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

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

The Steel Price Adjustment formula is as follows:

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

Where;

SPA = Steel price adjustment in dollars

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

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

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

BI = $46.72/ CWT

MI = $27.03 / CWT

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

Q = 600,000 lbs.

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

SPA = -0.421446917808 * $46.72 *6,000

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

Price Adjustment Sample Calculation (increase)

Project bid on July 16, 2020

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

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

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

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

The Steel Price Adjustment formula is as follows:

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

Where; SPA = Steel price adjustment in dollars

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

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

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

BI = $29.21/ CWT

MI = $43.13 / CWT

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

Q = 103932 lbs.

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

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

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

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

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

SCHEDULE OF ESTIMATED COMPLETION PROGRESS:
(7-15-08) (Rev. 6-20-23) 108-2 SP1 G58

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

	Fiscal Year	Progress (% of Dollar Value)
2024	(7/01/23 - 6/30/24)	**22**% of Total Amount Bid
2025	(7/01/24 - 6/30/25)	**22**% of Total Amount Bid
2026	(7/01/25 - 6/30/26)	**21**% of Total Amount Bid
2027	(7/01/26 - 6/30/27)	**19**% of Total Amount Bid
2028	(7/01/27 - 6/30/28)	**13**% of Total Amount Bid
2029	(7/01/28 - 6/30/29)	**3**% of Total Amount Bid

The Contractor shall also furnish his own progress schedule in accordance with Article 108-2 of the *2018 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. 8-17-21) 102-15(J) SP1 G66

Description

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

Definitions

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

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

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

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

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

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

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

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

Regular Dealer - A firm that owns, 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.

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

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

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

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

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

Forms and Websites Referenced in this Provision

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

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

RF-1 *MBE/WBE Replacement Request Form* - Form for replacing a committed MBE or WBE. 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 estimated amount (based on quantities and unit prices) listed at the time of bid. http://connect.ncdot.gov/letting/LetCentral/Letter%20of%20Intent%20to%20Perform%20as%20a%20Subcontractor.pdf

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

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

Combined MBE/WBE Goal

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

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

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

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

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

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

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

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

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

Directory of Transportation Firms (Directory)

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

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

Listing of MBE/WBE Subcontractors

At the time of bid, bidders shall submit <u>all</u> MBE and WBE participation that they anticipate to use during the life of the contract. Only those identified to meet the Combined MBE/WBE Goal will be considered committed, even though the listing shall include both committed MBE/WBE subcontractors and additional MBE/WBE subcontractors. Any additional MBE/WBE

subcontractor participation above the goal will follow the banking guidelines found elsewhere in this provision. All other additional MBE/WBE subcontractor participation submitted at the time of bid will be used toward the Department's overall race-neutral goals. Only those firms with current MBE and WBE certification at the time of bid opening will be acceptable for listing in the bidder's submittal of MBE and WBE participation. The Contractor shall indicate the following required information:

(A) Electronic Bids

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

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

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

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

(B) Paper Bids

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

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

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

(c) The bidder shall be responsible for ensuring that the MBE/WBE is certified at the time of bid by checking the Directory of Transportation Firms. If the

firm is not certified at the time of the bid-letting, that MBE's or WBE's participation will not count towards achieving the Combined MBE/WBE Goal.

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

MBE or WBE Prime Contractor

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

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

Written Documentation – Letter of Intent

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

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

If the bidder fails to submit the Letter of Intent from each committed MBE and WBE to be used toward the Combined MBE/WBE Goal, or if the form is incomplete (i.e. both signatures are not present), the MBE/WBE participation will not count toward meeting the Combined MBE/WBE Goal. If the lack of this participation drops the commitment below the Combined MBE/WBE Goal, the Contractor shall submit evidence of good faith efforts for the goal, completed in its entirety, to the State Contractor Utilization Engineer or DBE@ncdot.gov no later than 10:00 a.m. on the eighth calendar day following opening of bids, unless the eighth day falls on an official state holiday. In that situation, it is due in the office of the State Contractor Utilization Engineer no later than 10:00 a.m. on the next official state business day.

Banking MBE/WBE Credit

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

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

Submission of Good Faith Effort

If the bidder fails to meet or exceed the Combined MBE/WBE Goal, the apparent lowest responsive bidder shall submit to the Department documentation of adequate good faith efforts made to reach that specific goal.

A hard copy and an electronic copy of this information shall be received in the office of the State Contractor Utilization Engineer or at DBE@ncdot.gov no later than 10:00 a.m. on the sixth calendar day following opening of bids unless the sixth day falls on an official state holiday. In that situation, it would be due in the office of the State Contractor Utilization Engineer no later than 10:00 a.m. on the next official state business day. If the contractor cannot send the information electronically, then one complete set and 5 copies of this information shall be received under the same time constraints above.

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

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

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

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

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

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

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

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

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

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

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

efforts. Bidding contractors are not, however, required to accept higher quotes from MBEs/WBEs if the price difference is excessive or unreasonable.

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

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

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

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

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

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

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

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

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

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

Non-Good Faith Appeal

The State Prequalification Engineer will notify the contractor verbally and in writing of non-good faith. A contractor may appeal a determination of non-good faith made by the Goal Compliance Committee. If a contractor wishes to appeal the determination made by the Committee, they shall provide written notification to the State Prequalification Engineer 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 the Combined MBE/WBE Goal

(A) Participation

The total dollar value of the participation by a committed MBE/WBE will be counted toward the contract goal requirements. The total dollar value of participation by a committed MBE/WBE will be based upon the value of work 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 anticipated MBE participation. The same holds true for work that a WBE subcontracts to another WBE firm. Work that a MBE/WBE subcontracts to a non-MBE/WBE firm does <u>not</u> count toward the contract goal requirement. It should be noted that every effort shall be made by MBE and WBE contractors to subcontract to the same certification (i.e., MBEs to MBEs and WBEs to WBEs), in order to fulfill the MBE or WBE participation breakdown. This, however, may not always be possible due to the limitation of firms in the area. If the MBE or WBE firm shows a good faith effort has been made to reach out to similarly certified firms and there is no interest or availability, and they can get assistance from other certified firms, the Engineer will not hold the prime responsible for meeting the individual MBE or WBE breakdown. If a MBE or WBE contractor or subcontractor subcontracts a significantly greater portion of the work of the contract than would be expected on the basis of standard industry practices, it shall be presumed that the MBE or WBE is not performing a commercially useful function.

(D) Joint Venture

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

(E) Suppliers

A contractor may count toward its MBE/ 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/ 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. If it is determined that a MBE or WBE is not performing a Commercially Useful Function, the contractor may present evidence to rebut this presumption to the Department.

(B) MBE/WBE Utilization in Trucking

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

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

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

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

(4) The MBE may subcontract the work to another MBE firm, including an owner-operator who is certified as a MBE. The same holds true that a WBE may subcontract the work to another WBE firm, including an owner-operator who is certified as a WBE. When this occurs, the MBE or WBE who subcontracts work receives credit for the total value of the transportation services the subcontracted MBE or WBE provides on the contract. It should be noted that every effort shall be made by MBE and WBE contractors to subcontract to the same certification (i.e., MBEs to MBEs and WBEs to WBEs), in order to fulfill the participation breakdown. This, however, may not always be possible due to the limitation of firms in the area. If the MBE or WBE firm shows a good faith effort has been made to reach out to similarly certified transportation service providers and there is no interest or availability, and they can get assistance from other certified providers, the Engineer will not hold the prime responsible for meeting the individual MBE or WBE participation breakdown.

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

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

use of the leased truck. This type of lease may count toward the MBE/WBE's credit as long as the driver is under the MBE/WBE's payroll.

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

MBE/WBE Replacement

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

The Contractor must give notice in writing both by certified mail and email to the MBE/WBE subcontractor, with a copy to the Engineer of its intent to request to terminate and/or substitute, and the reason for the request. The Contractor must give the MBE/WBE subcontractor five (5) business days to respond to the Contractor's Notice of Intent to Request Termination and/or Substitution. If the MBE/WBE subcontractor objects to the intended termination/substitution, the MBE/WBE, within five (5) business days must advise the Contractor and the Department of the reasons why the action should not be approved. The five-day notice period shall begin on the next business day after written notice is provided to the MBE/WBE subcontractor.

A committed MBE/WBE subcontractor may only be terminated after receiving the Department's written approval based upon a finding of good cause for the proposed termination and/or substitution. For purposes of this section, good cause shall include the following circumstances:

(a) The listed MBE/WBE subcontractor fails or refuses to execute a written contract;
(b) The listed MBE/WBE subcontractor fails or refuses to perform the work of its subcontract in a way consistent with normal industry standards. Provided, however, that good cause does not exist if the failure or refusal of the MBE/WBE subcontractor to perform its work on the subcontract results from the bad faith or discriminatory action of the prime contractor;
(c) The listed MBE/WBE subcontractor fails or refuses to meet the prime contractor's reasonable, nondiscriminatory bond requirements;
(d) The listed MBE/WBE subcontractor becomes bankrupt, insolvent, or exhibits credit unworthiness;
(e) The listed MBE/WBE subcontractor is ineligible to work on public works projects because of suspension and debarment proceedings pursuant to 2 CFR Parts 180, 215 and 1,200 or applicable state law;
(f) The listed MBE/WBE subcontractor is not a responsible contractor;
(g) The listed MBE/WBE voluntarily withdraws from the project and provides written notice of withdrawal;
(h) The listed MBE/WBE is ineligible to receive MBE/WBE credit for the type of work required;
(i) A MBE/WBE owner dies or becomes disabled with the result that the listed MBE/WBE contractor is unable to complete its work on the contract;
(j) Other documented good cause that compels the termination of the MBE/WBE subcontractor. Provided, that good cause does not exist if the prime contractor seeks to terminate a MBE/WBE it relied upon to obtain the contract so that the prime contractor can self-perform the work for which

the MBE/WBE contractor was engaged or so that the prime contractor can substitute another MBE/WBE or non-MBE/WBE contractor after contract award.

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

(A) Performance Related Replacement

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

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

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

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

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

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

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

(B) Decertification Replacement

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

(2) When a committed MBE/WBE is decertified prior to the Department receiving the SAF (*Subcontract Approval Form*) for the named MBE/WBE firm, the Contractor shall take all necessary and reasonable steps to replace the MBE/WBE subcontractor with another MBE/WBE subcontractor to perform at least the same amount of work to meet the Combined MBE/WBE goal requirement. If a

MBE/WBE firm is not found to do the same amount of work, a good faith effort must be submitted to NCDOT (see A herein for required documentation).

(3) Exception: If the MBE/WBE's ineligibility is caused solely by its having exceeded the size standard during the performance of the contract, 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 and overall goal.

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

Changes in the Work

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

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

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

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

Reports and Documentation

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

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

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

Reporting Minority and Women Business Enterprise Participation

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

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

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

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

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

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

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

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

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

Failure to Meet Contract Requirements

Failure to meet contract requirements in accordance with Subarticle 102-15(J) of the *2018 Standard Specifications* may be cause to disqualify the Contractor.

RESTRICTIONS ON ITS EQUIPMENT AND SERVICES:

(11-17-20) SP01 G090

All telecommunications, video or other ITS equipment or services installed or utilized on this project must be in conformance with UNIFORM ADMINISTRATIVE REQUIREMENTS, COST

PRINCIPLES, AND AUDIT REQUIREMENTS FOR FEDERAL AWARDS **2 CFR, § 200.216 Prohibition on certain telecommunications and video surveillance services or equipment.**

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

The Contractor shall adhere to all Federal, State and Local regulations and guidelines for the use of Unmanned Aircraft Systems (UAS). This includes but is not limited to US 14 CFR Part 107 *Small UAS Rule*, NC GS 15A-300.2 *Regulation of launch and recovery sites,* NC GS 63-95 *Training required for the operation of unmanned aircraft systems*, NC GS 63-96 *Permit required for commercial operation of unmanned aircraft system,* and NCDOT UAS Policy. The required operator certifications include possessing a current Federal Aviation Administration (FAA) Remote Pilot Certificate, a NC UAS Operator Permit as well as operating a UAS registered with the FAA.

Prior to beginning operations, the Contractor shall complete the NCDOT UAS – Flight Operation Approval Form and submit it to the Engineer for approval. All UAS operations shall be approved by the Engineer prior to beginning the operations.

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

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

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

Exercise reduced fuel consumption and reduced equipment emissions during the construction of all work associated with this contract. Employees engaged in the construction of this project should turn off vehicles when stopped for more than thirty (30) minutes and off-highway equipment should idle no longer than fifteen (15) consecutive minutes.

These guidelines for turning off vehicles and equipment when idling do not apply to:

1. Idling when queuing.
2. Idling to verify the vehicle is in safe operating condition.
3. Idling for testing, servicing, repairing or diagnostic purposes.
4. Idling necessary to accomplish work for which the vehicle was designed (such as operating a crane, mixing concrete, etc.).
5. Idling required to bring the machine system to operating temperature.
6. Emergency vehicles, utility company, construction, and maintenance vehicles where the engines must run to perform needed work.
7. Idling to ensure safe operation of the vehicle.
8. Idling when the propulsion engine is providing auxiliary power for other than heating or air conditioning. (such as hydraulic systems for pavers)
9. When specific traffic, safety, or emergency situations arise.

10. If the ambient temperature is less than 32 degrees Fahrenheit. Limited idling to provide for the safety of vehicle occupants (e.g. to run the heater).
11. If the ambient temperature is greater than 90 degrees Fahrenheit. Limited idling to provide for the safety of vehicle occupants of off-highway equipment (e.g. to run the air conditioning) no more than 30 minutes.
12. Diesel powered vehicles may idle for up to 30 minutes to minimize restart problems.

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

SUBSURFACE INFORMATION:

(7-1-95) 450 SP1 G112 C

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

PORTABLE CONCRETE BARRIER - (Partial Payments for Materials):

(7-1-95) (Rev. 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 *2018 Standard Specifications* have been furnished to the Engineer.

The provisions of Subarticle 109-5(B) of the *2018 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 *2018 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 *2018 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 *2018 Standard Specifications* as follows:

Page 1-39, 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 1-39, 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 1-39, 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 *2018 Standard Specifications*.

HO-0002A, HO-0002B, HO-0002C (C204556 - US-74 Broadband Infrastructure Project from Asheville to Wilmington) is located throughout the project limits. HO-0002A, etc. is currently under construction and not anticipated to be complete prior to the letting of this project.

R-2707C (C203905) is located adjacent to this project. R-2707C is currently under construction and not anticipated to be complete prior to the letting 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.

ELECTRONIC BIDDING:

(2-19-19) 101, 102, 103 SP1 G140

Revise the *2018 Standard Specifications* as follows:

Page 1-4, Article 101-3, DEFINITIONS, BID (OR PROPOSAL) ***Electronic Bid,*** **line 1,** replace "Bid Express®" with "the approved electronic bidding provider".

Page 1-15, Subarticle 102-8(B), Electronic Bids, lines 39-40, replace "to Bid Express®" with "via the approved electronic bidding provider".

Page 1-15, Subarticle 102-8(B)(1), Electronic Bids, line 41, delete "from Bid Express®"

Page 1-17, Subarticle 102-9(C)(2), Electronic Bids, line 21, replace "Bid Express® miscellaneous folder within the .ebs" with "electronic submittal".

Page 1-29, Subarticle 103-4(C)(2), Electronic Bids, line 32, replace ".ebs miscellaneous data file of Expedite" with "electronic submittal file"

AWARD LIMITS:

(4-19-22) 103 SP1 G141

Revise the *2018 Standard Specifications* as follows:

Page 1-29, Subarticle 103-4(C), Award Limits, line 4-8, delete and replace the first sentence in the first paragraph with the following:

A bidder who desires to bid on more than one project on which bids are to be opened in the same letting and who desires to avoid receiving an award of more projects than he is equipped to handle, may bid on any number of projects but may limit the total amount of work awarded to him on selected projects by completing the form Award Limits on Multiple Projects for each project subject to the award limit.

BID DOCUMENTATION:

(1-1-02) (Rev.8-18-15) 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. The Bid Documentation can be in the form of electronic submittal (i.e. thumb drive) or paper. If the Bidder elects to submit the Bid Documentation in electronic format, the Department requires a backup submittal (i.e. a second thumb drive) in case one is corrupted.

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 draft copy of the Escrow Agreement will be mailed to the Bidder after 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 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.

(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

Bid documentation will be considered a certified copy if the Bidder includes an affidavit stating that the enclosed documentation is an EXACT copy of the original documentation used by the Bidder to determine the bid for this project. The affidavit shall also 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 for escrow. 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 bid documentation has been included. The affidavit 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 affidavit.

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.

EROSION AND SEDIMENT CONTROL/STORMWATER CERTIFICATION:

(1-16-07) (Rev 12-15-20) 105-16, 225-2, 16 SP1 G180

General

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

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

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

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

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

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

Roles and Responsibilities

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(c) Maintain an onsite rain gauge or use the Department's Multi-Sensor Precipitation Estimate website to maintain a daily record of rainfall amounts and dates.
(d) Maintain erosion and sediment control/stormwater inspection records for review by Department and Regulatory personnel upon request.
(e) Implement approved reclamation plans on all borrow pits, waste sites and staging areas.
(f) Maintain a log of turbidity test results as outlined in the Department's Procedure for Monitoring Borrow Pit Discharge.
(g) Provide secondary containment for bulk storage of liquid materials.
(h) Provide training for employees concerning general erosion and sediment control/stormwater awareness, the Department's NPDES Stormwater Permit NCS000250 requirements, and the applicable requirements of the *General Permit, NCG010000*.
(i) Report violations of the NPDES permit to the Engineer immediately who will notify the Division of Water Quality Regional Office within 24 hours of becoming aware of the violation.

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

(a) Follow permit requirements related to the Contractor and subcontractors' construction activities.
(b) Ensure that all operators and subcontractors on site have the proper erosion and sediment control/stormwater certification.
(c) Notify the Engineer when the required certified erosion and sediment control/stormwater personnel are not available on the job site when needed.
(d) Conduct the inspections required by the NPDES permit.
(e) Take corrective actions in the proper timeframe as required by the NPDES permit for problem areas identified during the NPDES inspections.
(f) Incorporate erosion control into the work in a timely manner and stabilize disturbed areas with mulch/seed or vegetative cover on a section-by-section basis.
(g) Use flocculants approved by state regulatory authorities where appropriate and where required for turbidity and sedimentation reduction.
(h) Ensure proper installation and maintenance of temporary erosion and sediment control devices.
(i) Remove temporary erosion or sediment control devices when they are no longer necessary as agreed upon by the Engineer.
(j) The Contractor's quality control and inspection procedures shall be subject to review by the Engineer. Maintain NPDES inspection records and make records available at all times for verification by the Engineer.

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

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

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

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

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

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

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

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

Preconstruction Meeting

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

Ethical Responsibility

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

Revocation or Suspension of Certification

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

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

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

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

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

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

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

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

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

Measurement and Payment

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. 4-5-19) 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 *2018 Standard Specifications*, the Contractor shall define the point at which the discharge enters into the State's surface waters and the appropriate sampling locations. Sampling locations shall include points upstream and downstream from the point at which the discharge enters these waters. Upstream sampling location shall be located so that it is not influenced by backwater conditions and represents natural background conditions. Downstream sampling location shall be located at the point where complete mixing of the discharge and receiving water has occurred.

The discharge shall be closely monitored when water from the dewatering activities is introduced into jurisdictional wetlands. Any time visible sedimentation (deposition of sediment) on the wetland surface is observed, the dewatering activity will be suspended until turbidity levels in the stilling basin can be reduced to a level where sediment deposition does not occur. Staining of

wetland surfaces from suspended clay particles, occurring after evaporation or infiltration, does not constitute sedimentation. No activities shall occur in wetlands that adversely affect the functioning of a wetland. Visible sedimentation will be considered an indication of possible adverse impacts on wetland use.

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

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

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

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

NOTE TO CONTRACTOR:

The Contractors attention is directed to pages P-2 through P-4 and P-12, Project Specific Condition Number 2. The previous U.S. Army Corps of Engineers permits, and additional Water Quality Certifications referenced, may be found at the below link. Unless otherwise noted, the original permit remains in effect. All changes in the 2023 modification supersedes the original permit.

xfer.services.ncdot.gov - /pdea/PermIssued/

PROJECT SPECIAL PROVISIONS

ROADWAY

CLEARING AND GRUBBING - METHOD III:

(4-6-06) (Rev.8-18-15) 200 SP2 R02B

Perform clearing on this project to the limits established by Method "III" shown on Standard Drawing No. 200.03 of the *2018 Roadway Standard Drawings*. Conventional clearing methods may be used except where permit drawings or conditions have been included in the proposal which require certain areas to be cleared by hand methods.

HAND CLEARING:

11-18-08 SPI 2-09

Perform the work of hand clearing in those locations indicated on the plans and as directed by the Engineer. No separate measurement will be made for hand clearing. The cost of this work will be included in the lump sum payment for *Clearing & Grubbing*.

FIELD OFFICE (Lump Sum):

(6-1-07)(Rev. 2-15-22) SPI 8-01

Description

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

Procedures

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

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

Provide a field office with at least 1,200 square feet of floor space and that is equipped with the following:

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

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

Windows and Doors

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

Kitchenette

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

Steps

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

Storage Facility for Nuclear Gauge

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

Lighting, Heating, and Air Conditioning

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

Fire Extinguishers

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

Toilets

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

Utilities

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

Storage Facility for Test Equipment

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

Miscellaneous Items

The field office shall also include the following:

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

Measurement and Payment

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

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

Payment will be made under:

Pay Item	**Pay Unit**
Field Office	Lump Sum

DEMOLITION OF BUILDINGS AND APPURTENANCES:

(1-1-02) (Rev. 1-17-12) 210 SP2 R10

Demolish the buildings and appurtenances listed below in accordance with Section 210 of the *2018 Standard Specifications*:

R-2707D

Parcel: 600 Item #:1 Description: BK Split Level SFD and Storage Buildings Right of Survey Station 667+50, Survey Line -L

Parcel: 601 Item #:2 Description: 1 SFD Right of Survey Station 677+50, Survey Line L

Parcel: 602 Item #:3 Description: 1 BK SFD Right of Survey Station 40+75, Survey Line L

Parcel: 622 Item #:4 Description: 1 Story Brick Frame dwelling, 1 wood barn, 1 chicken coop Right of Survey Station 635+00, Survey Line L

Parcel: 623 Item #:5 Description: DOT block storage building Right of Survey Station 722+00, Survey Line L

Parcel: 624 Item #: 6 Description: SWMH (abandoned) misc sheds, barns (abandoned) Left of Survey Station 652+90, Survey Line L

Parcel: 625 Item #:7 Description: (3) SWMH, detached garage/ shed Left of Survey Station 672+75, Survey Line L

Parcel 626 Item # 8 Description: 1 BKD, 1 Vacant SFD, Left of Survey Station 691+15, Survey Line L

Parcel 627 Item # 9 Description: 2 Story Block Shed (barn) Right of Survey Station 686+00 Survey Line L

Parcel 630 Item # 10 Description: 1SFD (abandoned) Left of Survey Station 746+00 Survey Line L

Parcel 631 Item # 11 Description: 1 SFD, workshop building, storage sheds Right of Survey Station 810+00 SL-L

Parcel 634 Item # 12 Description: Wood Frame Business, Apartment unit, storage buildings Right of Survey Station 849+00 SL-L

R-2707E

Parcel: 086 Item #: 1 Description: 1 Story Brick Dwelling, shed Left of Survey Station 880+00, Survey Line -L

Parcel: 087 Item #: 2 Description: 1SFRD, well house, storage buildings Left of Survey Station 11+35, Survey Line -SR9-

Parcel: 096 Item #:3 Description: SWMH, storage building Right of Survey Station 16+85, Survey Line -SR9-

Parcel: 099 Item #: 4 Description: 1.5SFD, detached garage, misc outbuildings Right of Survey Station 10+50 Survey Line -SR10-

Parcel: 604 Item #: 5 Description: 1 Story Frame Dwelling, barn Right of Survey Station 883+10, Survey Line L

Parcel: 605 Item #: 6 Description: 1 DBL Wide Manufactured, (2) SWMH Left of Survey Station 19+25, Survey Line -Y42RPC

Parcel: 606 Item #: 7 Description: (2) 1SFD Left of Survey Station 10+52, Survey Line -SR9-

Parcel 607 Item # 8 Description: 1SFD, misc sheds Left of Survey Station 23+15, Survey Line - Y42RPC

Parcel 608 Item # 9 Description: 1SFD, detached 2 car carport/ storage building Right of Survey Station 883+40 Survey Line L

Parcel 609 Item # 10 Description: 1 Story Brick Business, lean to shed Left of Survey Station 887+00 Survey Line L

Parcel 610 Item # 11 Description: 1.5 Story SFD (abandoned), misc sheds Right of Survey Station 22+50 SL-Y42RPB

Parcel 612 Item # 12 Description: 1 Story Brick Business Left of Survey Station 902+00 SL-L

Parcel 613 Item #13 Description: 1 Story log/ wood framed business Left of SS 51+00 -SR7-

Parcel 614 Item #14 Description: 1 Story Frame Dwelling, 1 shed Left of Survey Station 52+75 -SR7-

Parcel 615 Item # 15 Description : 1 SFD, storage shed Left of SS 939+50 -L

Parcel 616 Item # 16 Description: 1.5 SFD, workshop/ apt unit, storage sheds Left of SS 66+25 -SR7-

Parcel 617 Item #17 Description: 1SBKD Left of SS 57+75 - L

Parcel 636 Item # 18 Description: 1SFD, Modular Home, detached barn/ garage, misc sheds Left of SS 877+00

Parcel 637 Item # 19 Description: 1.5 Story SFD, 1 shed Left of SS 882+00

Parcel 638 Item # 20 Description: 1 SFD, 1 shed, 2 storage units Left of SS 12+75 -SR9-

Parcel 639 Item # 21 Description: Storage Buildings Right of Survey Station 11+90 -SR9-

Parcel 640 Item #22 Description: 1 SFD, two wooden storage units Right of Survey Station 15+00 -SR9-

Parcel 641 Item #23 Description: 1 Story Brick dwelling, Misc sheds Left of Survey Station 29+50 -SR7-

Parcel 643 Item #24 Description: 1SFD Left of SS 914+50 -L-

Parcel 644 Item #25 Description: 1 office/ retail building Left of SS 43+25 -SR7-

Parcel 645 Item #26 Description: 1SFD, (2) carports misc sheds Right of SS 929+75 -L

Parcel 647 Item # 27 Description: 1 SFD Left of SS 53+50 -SR7-

Parcel 648 Item # 28 Description: 1SFD Right of SS 13+10.00 -Y46-

Parcel 650 Item # 29 Description: 2SFD, 1 Single Story Church Left of SS 58+80 -SR7-

Parcel 651 Item # 30 Description: 2 SFD, Business Building, shed Left of SS 943+90 -L-

EARTHWORK FOR DRY DETENTION AND HAZARDOUS SPILL BASINS:

Description

The Contractor shall perform all earthwork for Dry Detention Basins and Hazardous Spill Basins at locations indicated in the plans, in accordance with the details in the plans, this provision, the applicable requirements of the *Standard Specifications* and as directed by the Engineer.

Construction

Perform all earthwork, excavation and/or embankment, in accordance with the contract, including the applicable requirements of Division 2 of the *Standard Specifications*.

Measurement and Payment

Earthwork for Dry Detention Basin @ Sta ____ and *Earthwork for Hazardous Spill Basin @ Sta* will be paid at the lump sum price bid for the work detailed in this special provision, which has been completed and accepted by the Engineer. Such price and payment will be considered full compensation for all excavation, embankment, labor, materials and incidentals necessary for all earthwork associated with the construction of Dry Detention Basins and Hazardous Spill Basins.

Pay Item	**Pay Unit**
Earthwork for Dry Detention Basin @ Sta ____	Lump Sum
Earthwork for Hazardous Spill Basin @ Sta ____	Lump Sum

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 *2018 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 *2018 Standard Specifications*.

MANUFACTURED QUARRY FINES IN EMBANKMENTS:

(01-17-17) 235 SP02 R72

Description

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

Materials

Manufactured Quarry Fines.

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

The following MQFs are unacceptable:

(A) Frozen material,

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

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

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

Geotextiles

Areas of embankment where MQFs are incorporated, Geotextile for Pavement Stabilization shall be used. If the Geotextile for Pavement Stabilization special provision is not included elsewhere in this contract, then it along with a detail will be incorporated as part of the contractors request to use. Notification of subgrade elevation, sampling and waiting period as required in the Construction Methods section of the Geotextile for Pavement Stabilization special provision are not required.

Preconstruction Requirements

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

(A) Description, purpose and location of project.

(B) Estimated start and completion dates of project.

(C) Estimated volume of MQFs to be used on project with specific locations and construction details of the placement.

(D) The names, address, and contact information for the generator of the MQFs.

(E) Physical location of the site at which the MQFs were generated.

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

Construction Methods

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

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

Areas of embankment where MQFs are incorporated, Geotextile for Pavement Stabilization shall be used. See Geotextile for Pavement Stabilization special provision for geotextile type and construction method.

Measurement and Payment

Borrow Excavation will be measured by truck volume and paid in cubic yards in accordance with Article 230-5 of the *2018 Standard Specifications*. As an alternate weigh tickets can be provided and payment made by converting weight to cubic yards based on the verifiable unit weight.

Where the pay item of *Geotextile for Pavement Stabilization* is included in the original contract the material will be measured and paid in square yards (see Geotextile for Pavement Stabilization special provision). Where the pay item of *Geotextile for Pavement Stabilization* is not included in the original contract then no payment will be made for this item and will be considered incidental to the use of MQFs in embankment.

FLOWABLE FILL:

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

Description

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

Materials

Refer to Division 10 of the *2018 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

CORRUGATED ALUMINUM ALLOY CULVERT PIPE:

(9-21-21) 305, 310 SP3 R34

Revise the *Standard Specifications* as follows:

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

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

Page 3-5, Article 305-3, CONSTRUCTION METHODS, add the following after line 24:

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

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

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

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

Select bedding and backfill material and coating will be included in the cost of the installed pipe. Such price and payment will be full compensation for all materials, labor, equipment, and other incidentals necessary to complete the work.

CULVERT PIPE:

(8-20-19)(Rev. 5-17-22) 305,310 SP3 R35

Revise the *2018 Standard Specifications* as follows:

Page 3-5, Article 305-1 DESCRIPTION, lines 12-14, replace with the following:

Where shown in the plans, the Contractor may use reinforced concrete pipe, aluminum alloy pipe, aluminized corrugated steel pipe, galvanized corrugated steel pipe, HDPE pipe, Polypropylene pipe or PVC pipe in accordance with the following requirements.

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

Item	**Section**
Polypropylene Pipe	1032-9
Galvanized Corrugated Steel Pipe	1032-3

Page 3-6, Article 310-2 MATERIALS, add the following after line 9:

Item	**Section**
Polypropylene Pipe	1032-9
Galvanized Corrugated Steel Pipe	1032-3

Page 3-6, Article 310-4 SIDE DRAIN PIPE, lines 24-25, replace the first sentence of the second paragraph with the following:

Where shown in the plans, side drain pipe may be Class II reinforced concrete pipe, aluminized corrugated steel pipe, galvanized corrugated steel pipe, corrugated aluminum alloy pipe, Polypropylene pipe, HDPE pipe or PVC pipe.

Page 3-7, Article 310-5 PIPE END SECTIONS, lines 2-4, replace the second sentence with the following:

Both corrugated steel and concrete pipe end sections will work on concrete pipe, corrugated steel pipe, Polypropylene pipe and HDPE smooth lined corrugated plastic pipe.

Page 3-7, Article 310-6 MEASUREMENT AND PAYMENT, add the following after line 14:

Pay Item	**Pay Unit**
__″ Polypropylene Pipe	Linear Foot

Page 10-60, add Article 1032-9:

(A) General

Use polypropylene pipe from sources participating in the Department's Polypropylene Pipe QA/QC Program. A list of participating sources is available from the Materials and Tests Unit. The Department will remove a manufacturer of polypropylene pipe from this program if the monitoring efforts indicated that non-specification material is being provided or test procedures are not being followed.

Use polypropylene culvert pipe that meets AASHTO M 330 for Type S or Type D, or ASTM F2881 or ASTM F2764 Double or Triple wall; and has been evaluated by NTPEP.

(B) End Treatments, Pipe Tees and Elbows

End treatments, pipe tees and elbows shall meet AASHTO M 330, Section 7.7, or ASTM F2764, Section 6.6.

(C) Marking

Clearly mark each section of pipe, end section, tee and elbow and other accessories according to the Department's Polypropylene Pipe QC/QA Program:

(1) AASHTO or ASTM Designation
(2) The date of manufacture
(3) Name or trademark of the manufacturer

When polypropylene pipe, end sections, tees and elbows have been inspected and accepted a sticker will be applied to the inside of the pipe. Do no use pipe sections, flared end sections, tees or elbows which do not have this seal of approval.

REINFORCED CONCRETE PIPE CULVERT, CONTRACTOR DESIGN:

(10-20-09) SPI 3-06(Rev)

Description

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

Materials

(A) Design

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

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

(B) Reinforced Concrete Pipe Sections

(1) Class

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

(2) Design Criteria

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

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

(C) Joints

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

(D) Manufacture

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

Measurement and Payment

____ *" R.C. Pipe Culvert, Contractor Design* will be measured and paid for in linear feet. Such price and payment will be full compensation for all work and will include, but not be

limited to, furnishing all labor, materials, equipment and other incidentals necessary to complete this work.

Payment will be made under:

Pay Item	Pay Unit
_" R.C. Pipe Culvert, Contractor Design	Linear Feet

BRIDGE APPROACH FILLS:

(10-19-10) (Rev. 1-16-18) 422 SP4 R02A

Description

Bridge approach fills consist of backfilling behind bridge end bents with select material or aggregate to support all or portions of bridge approach slabs. Install drains to drain water from bridge approach fills and geotextiles to separate approach fills from embankment fills, ABC and natural ground as required. For bridge approach fills behind end bents with mechanically stabilized earth (MSE) abutment walls, reinforce bridge approach fills with MSE wall reinforcement connected to end bent caps. Construct bridge approach fills in accordance with the contract, accepted submittals and 2018 Roadway Standard Drawing Nos. 422.01 or 422.02 or Roadway Detail Drawing No. 422D10.

Define bridge approach fill types as follows:

Approach Fills – Bridge approach fills in accordance with 2018 Roadway Standard Drawing Nos. 422.01 or 422.02 or Roadway Detail Drawing No. 422D10;

Standard Approach Fill – Type I Standard Bridge Approach Fill in accordance with 2018 Roadway Standard Drawing No. 422.01;

Modified Approach Fill – Type II Modified Bridge Approach Fill in accordance with 2018 Roadway Standard Drawing No. 422.02 and

Reinforced Approach Fill – Type III Reinforced Bridge Approach Fill in accordance with Roadway Detail Drawing No. 422D10.

Materials

Refer to Division 10 of the *2018 Standard Specifications*.

Item	Section
Geotextiles, Type 1	1056
Portland Cement Concrete	1000
Select Materials	1016
Subsurface Drainage Materials	1044

Provide Type 1 geotextile for separation geotextiles and Class B concrete for outlet pads. Use Class V or Class VI select material for standard and modified approach fills. For an approach fill behind a bridge end bent with an MSE abutment wall, backfill the reinforced approach fill with

the same aggregate type approved for the reinforced zone in the accepted MSE wall submittal. For MSE wall aggregate, reinforcement and connector materials, see the *Mechanically Stabilized Earth Retaining Walls* provision. Provide PVC pipes, fittings and outlet pipes for subsurface drainage materials. For PVC drain pipes, use pipes with perforations that meet AASHTO M 278.

Construction Methods

Excavate as necessary for approach fills in accordance with the contract. Notify the Engineer when foundation excavation is complete. Do not place separation geotextiles or aggregate until approach fill dimensions and foundation material are approved.

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

Attach separation geotextiles to end bent cap backwalls and wing walls with adhesives, tapes or other approved methods. Overlap adjacent separation 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 separation geotextiles or MSE wall reinforcement.

Install continuous perforated PVC drain pipes with perforations pointing down in accordance with 2018 Roadway Standard Drawing Nos. 422.01 or 422.02. Connect drain pipes to outlet pipes just beyond wing walls. Connect PVC pipes, fittings and outlet pipes with solvent cement in accordance with Article 815-3 of the *2018 Standard Specifications* and place outlet pads in accordance with 2018 Roadway Standard Drawing No. 815.03.

Install drain pipes so water drains towards outlets. If the groundwater elevation is above drain pipe elevations, raise drains up to maintain positive drainage towards outlets. Place pipe sleeves in or under wing walls so water drains towards outlets. Use sleeves that can withstand wing wall loads.

Place select material or aggregate in 8" to 10" thick lifts. Compact fine aggregate for reinforced approach fills in accordance with Subarticle 235-3(C) of the *2018 Standard Specifications* except compact fine aggregate to a density of at least 98%. Compact select material for standard or modified approach fills and coarse aggregate for reinforced approach fills with a vibratory compactor to the satisfaction of the Engineer. Do not displace or damage geosynthetics, MSE wall reinforcement or drains when placing and compacting select material or aggregate. End dumping directly on geosynthetics is not permitted. Do not operate heavy equipment on geosynthetics or drain pipes until they are covered with at least 8" of select material or aggregate. Replace any damaged geosynthetics or drains to the satisfaction of the Engineer. When approach fills extend beyond bridge approach slabs, wrap separation geotextiles over select material or aggregate as

shown in 2018 Roadway Standard Drawing No. 422.01 or 2018 Roadway Detail Drawing No. 422D10.

Measurement and Payment

Type I Standard Approach Fill, Station ____, *Type II Modified Approach Fill, Station ____* and *Type III Reinforced Approach Fill, Station ____* will be paid at the contract lump sum price. The lump sum price for each approach fill will be full compensation for providing labor, tools, equipment and approach fill materials, excavating, backfilling, hauling and removing excavated materials, installing geotextiles and drains, compacting backfill and supplying select material, aggregate, separation geotextiles, drain pipes, pipe sleeves, outlet pipes and pads and any incidentals necessary to construct approach fills behind bridge end bents.

The contract lump sum price for *Type III Reinforced Approach Fill, Station ____* will also be full compensation for supplying and connecting MSE wall reinforcement to end bent caps but not designing MSE wall reinforcement and connectors. The cost of designing reinforcement and connectors for reinforced approach fills behind bridge end bents with MSE abutment walls will be incidental to the contract unit price for *MSE Retaining Wall No. __*.

Payment will be made under:

Pay Item	**Pay Unit**
Type I Standard Approach Fill, Station ____	Lump Sum
Type II Modified Approach Fill, Station ____	Lump Sum
Type III Reinforced Approach Fill, Station ____	Lump Sum

ALTERNATE BRIDGE APPROACH FILLS FOR INTEGRAL ABUTMENTS:

(1-16-18) 422 SP4 R02B

Description

At the Contractors option, use Type A Alternate Bridge Approach Fills instead of Type I or II Bridge Approach Fills to support bridge approach slabs for integral bridge abutments. An alternate bridge approach fill consists of constructing an approach fill with a temporary geotextile wall before placing all or a portion of the concrete for the backwall and wing walls of the integral end bent cap. The temporary geotextile wall is designed for a crane surcharge, remains in place and aligned so the wall face functions as a form for the end bent cap backwall and wing walls. Install drains, welded wire facing and geotextiles and backfill approach fills and temporary walls with select material as required. Define "geotextiles" as separation or reinforcement geotextiles, "temporary wall" as a temporary geotextile wall and "alternate approach fill" as a Type A Alternate Bridge Approach Fill in accordance with 2018 Roadway Standard Drawing No. 422.03.

Materials

Refer to Division 10 of the *2018 Standard Specifications*.

Item	**Section**
Geotextiles	1056
Portland Cement Concrete	1000

Select Materials	1016
Subsurface Drainage Materials	1044
Welded Wire Reinforcement	1070-3

For temporary walls, use welded wire reinforcement for welded wire facing and Type 5 geotextile for reinforcement geotextiles. Use Type 5 geotextile with lengths and an ultimate tensile strength as shown in 2018 Roadway Standard Drawing No. 422.03. Provide Type 1 geotextile for separation geotextiles and Class B concrete for outlet pads. Use Class V or Class VI select material for alternate approach fills and temporary walls. Provide PVC pipes, fittings and outlet pipes for subsurface drainage materials. For PVC drain pipes, use pipes with perforations that meet AASHTO M 278.

Construction Methods

Excavate as necessary for alternate approach fills and temporary walls in accordance with the contract. Notify the Engineer when foundation excavation is complete. Do not place geotextiles until approach fill dimensions and foundation material are approved.

Install geotextiles as shown in 2018 Roadway Standard Drawing No. 422.03. Attach separation geotextiles to end bent cap backwalls and wing walls as needed with adhesives, tapes or other approved methods. 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 geotextiles.

Install continuous perforated PVC drain pipes with perforations pointing down in accordance with 2018 Roadway Standard Drawing No. 422.03. Connect drain pipes to outlet pipes just beyond wing walls. Connect PVC pipes, fittings and outlet pipes with solvent cement in accordance with Article 815-3 of the *2018 Standard Specifications* and place outlet pads in accordance with 2018 Roadway Standard Drawing No. 815.03.

Install drain pipes so water drains towards outlets. If the groundwater elevation is above drain pipe elevations, raise drains up to maintain positive drainage towards outlets. Place pipe sleeves in or under wing walls so water drains towards outlets. Use sleeves that can withstand wing wall loads.

At the Contractor's option, construct bottom portion of integral end bents before temporary walls as shown in 2018 Roadway Standard Drawings No. 422.03. Erect and set welded wire facing so facing functions as a form for the end bent cap backwall. Place welded wire facing adjacent to each other in the horizontal and vertical directions to completely cover the temporary wall face. Stagger welded wire facing to create a running bond by centering facing over joints in the row below.

Wrap reinforcement geotextiles at the temporary wall face in accordance with 2018 Roadway Standard Drawing No. 422.03 and cover geotextiles with at least 3" of select material. Place layers of reinforcement geotextiles within 3" of locations shown in 2018 Roadway Standard Drawing No. 422.03. Before placing select material, pull reinforcement geotextiles taut so they are in tension and free of kinks, folds, wrinkles or creases. Install reinforcement geotextiles with the direction shown in 2018 Roadway Standard Drawing No. 422.03. Do not splice or overlap

reinforcement geotextiles so seams are parallel to the temporary wall face.

Place select material in 8" to 10" thick lifts and compact select material with a vibratory compactor to the satisfaction of the Engineer. Do not displace or damage geotextiles or drains when placing and compacting select material. End dumping directly on geotextiles is not permitted. Do not operate heavy equipment on geotextiles or drain pipes until they are covered with at least 8" of select material. Replace any damaged geotextiles or drains to the satisfaction of the Engineer. When alternate approach fills extend beyond bridge approach slabs, wrap separation geotextiles over select material as shown in 2018 Roadway Standard Drawing No. 422.03.

Temporary walls are designed for a surcharge pressure in accordance with 2018 Roadway Standard Drawing No. 422.03. If the crane surcharge will exceed the wall design, contact the Engineer before positioning the crane over reinforcement geotextiles.

Measurement and Payment

Alternate approach fills will be paid at the contract lump sum for either *Type I Standard Approach Fill, Station* ____ or *Type II Modified Approach Fill, Station* ____ based on the approach fill type that the alternate approach fill is replacing. The lump sum price for each approach fill will be full compensation for providing labor, tools, equipment and alternate approach fill materials, excavating, backfilling, hauling and removing excavated materials, constructing temporary walls, installing wall facing, geotextiles and drains, compacting backfill and supplying select material, separation and reinforcement geotextiles, welded wire facing, drain pipes, pipe sleeves, outlet pipes and pads and any incidentals necessary to construct alternate approach fills for integral abutments.

BRIDGE APPROACH FILLS – GEOTEXTILE:

(5-17-22) SP4 R03

Place a single layer of Type 5 Geotextile one foot below the approach slab for the full width and length of the approach fill. Type 5 Geotextile shall meet the requirements of Section 1056 of the *Standard Specifications*. This revision applies to Roadway Standard 422.01, 422.02, 422.03 and Detail in Lieu of Standard 422DO10.

No separate measurement or payment will be made for the work required by this provision as the cost of such work shall be included in the lump sum price bid for *Type I Standard Approach Fill Station _____, Type III Reinforced Approach Fill, Station _____* or *Type II Modified Approach Fill, Station _____*.

PILES:

(10-19-21)(Rev. 12-20-22) 450 SP4 R05

Revise the *2018 Standard Specifications* as follows:

Page 4-65, Article 450-1 DESCRIPTION, lines 8-9, replace the fourth sentence of the first paragraph with the following:

Galvanize, metallize, restrike, redrive, splice, cut off and build up piles and perform predrilling, spudding and pile driving analyzer testing as necessary or required.

Page 4-65, Article 450-1 DESCRIPTION, lines 14-16, replace the third paragraph with the following:

The estimated pile lengths shown in the plans are sufficient for the minimum required pile embedment and penetration and are estimates of the pile lengths needed for required driving resistance. For prestressed concrete piles, use estimated pile lengths for pile order lengths or the Engineer will provide pile order lengths based on testing prestressed concrete piles with the pile driving analyzer (PDA). For bridges with staged construction and pile order lengths based on testing prestressed concrete piles with the PDA, order lengths for latter stages will not be provided until pile driving for previous stage of construction is complete.

Page 4-66, Article 450-3(C) Pile Accessories, line 14, insert the following as the second, third and fourth sentence of the first paragraph:

Steel pile points for steel pipe piles include pipe pile cutting shoes and conical points. Use "inside fit" pipe pile cutting shoes, i.e., cutting shoes with an outside diameter equal to the pipe pile diameter. Use pipe pile plates with a diameter equal to the pipe pile diameter.

Page 4-66, Article 450-3(D) Driven Piles, lines 37-39, replace the fourth paragraph with the following:

Redrive piles raised or moved laterally due to driving adjacent piles. For initial drive of prestressed concrete piles below a depth of 10 ft or 20% of pile length, whichever is greater, drive each pile continuously except to pause driving for one hour or less to change pile cushions and remove templates. Design and construct templates so prestressed concrete piles can be driven to pile cut-off without exceeding the one-hour time limit. When a prestressed concrete pile attains the required resistance and pile penetration, do not drive the pile any further to avoid cutting off the pile. If a prestressed concrete pile does not have the minimum required driving resistance when the pile head is 1 ft above pile cut-off, stop driving the pile.

Page 4-68, Article 450-3(D)(3) Required Driving Resistance, lines 10-11, replace the second paragraph with the following:

Stop driving piles if “refusal” is reached. Refusal occurs at 240 blows per foot (20 blows per inch) or any equivalent set (maximum set of 1/2 inch in 10 blows) with the required stroke as per the pile driving criteria.

Page 4-68, Article 450-3(D)(4) Restriking and Redriving Piles, lines 13-15, replace the first sentence of the first paragraph with the following:

If piles do not attain the required resistance with the estimated or order lengths, the Engineer may require the Contractor to stop driving piles, wait and restrike or redrive piles to attain the required resistance.

Page 4-69, Article 450-3(F) Pile Driving Analyzer, lines 16-18, replace the first and second sentences of the second paragraph with the following:

Test piles in accordance with the plans or as directed by the Engineer. Provide piles for PDA

testing with lengths shown in the plans.

Page 4-69, Article 450-3(F)(1) PDA Testing, line 33 and 34, replace the fifth sentence of the second paragraph with the following:

The PDA Operator or Engineer may require modified pile installation procedures during driving, including but not limited to driving piles deeper or to a higher driving resistance than stated in the plans.

Page 4-71, Article 450-4 MEASUREMENT AND PAYMENT, lines 27-28, replace the second sentence of the third paragraph with the following:

Steel piles will be measured as the pile length before installation minus any pile cut-offs. Prestressed concrete piles will be measured as the authorized pile length before installation.

Page 4-71, Article 450-4 MEASUREMENT AND PAYMENT, lines 40-45, replace the fifth paragraph with the following:

After steel piles attain the required resistance and pile penetration and at the Contractor's option, drive piles to grade instead of cutting off steel piles provided the remaining portions of steel piles do not exceed 5 ft and steel piles can be driven without damage or exceeding the maximum stroke or refusal. When this occurs, the additional pile length driven will be measured and paid at the contract unit prices for ____ *Steel Piles* and ____ *Galvanized Steel Piles*.

AUTOMATED FINE GRADING:

(1-16-96) 610 SP5 R05

On mainline portions and ramps of this project, prepare the subgrade and base beneath the pavement structure in accordance with the applicable sections of the *2018 Standard Specifications* except use an automatically controlled fine grading machine using string lines, laser controls or other approved methods to produce final subgrade and base surfaces meeting the lines, grades and cross sections required by the plans or established by the Engineer.

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

AGGREGATE SUBGRADE:

(5-15-18)(Rev. 4-18-23) 505 SP5 R8

Revise the *2018 Standard Specifications* as follows:

Page 5-8, Section 505 AGGREGATE SUBGRADE, lines 3-32, replace the section with the following:

505-1 DESCRIPTION

Construct aggregate subgrades in accordance with the contract. Install geotextile for subgrade stabilization and place Class IV subgrade stabilization at locations shown in the plans and as directed by the Engineer.

Undercut natural soil materials if necessary to construct aggregate subgrades. Define "subsoil" as the portion of the roadbed below the Class IV subgrade stabilization. For Type 2 aggregate subgrades, undercut subsoil as needed. The types of aggregate subgrade with thickness and compaction requirements for each are as shown below.

Type 1 – A 6 to 24 inch thick aggregate subgrade with Class IV subgrade stabilization compacted to 92% of AASHTO T 180 as modified by the Department or to the highest density that can be reasonably obtained.

Type 2 – An 8 inch thick aggregate subgrade on a proof rolled subsoil with Class IV subgrade stabilization compacted to 97% of AASHTO T 180 as modified by the Department.

505-2 MATERIALS

Refer to Division 10.

Item	Section
Geotextile for Subgrade Stabilization, Type 5	1056
Select Material, Class IV	1016

Use Class IV select material for Class IV subgrade stabilization.

505-3 CONSTRUCTION METHODS

When shallow undercut is required to construct aggregate subgrades, undercut 6 inches to 24 inches as shown on the plans or as directed by the Engineer. For Type 2 aggregate subgrades, proof roll subsoil in accordance with Section 260 before installing geotextile for subgrade stabilization. Perform undercut excavation in accordance with Section 225.

Do not leave geotextiles exposed for more than 7 days before covering geotextiles with Class IV subgrade stabilization (standard size no. ABC). Install geotextile for subgrade stabilization on subsoil with the long dimension, i.e., machine direction (MD), of the roll parallel to the roadway centerline and completely cover subsoil with geotextiles. For fill sections, the minimum roll width is required under roadway edges and shoulders nearest to fill slopes as shown in the plans. Overlap adjacent geotextiles at least 18 inches in the direction that ABC will be placed to prevent lifting the edge of the top geotextile. Pull geotextiles taut so they are in tension and free of kinks, folds, wrinkles or creases. Hold geotextiles in place as needed with wire staples or anchor pins.

Place Class IV subgrade stabilization by end dumping ABC on geotextiles. Do not operate heavy equipment on geotextiles until geotextiles are covered with Class IV subgrade stabilization. Compact ABC as required for the type of aggregate subgrade constructed.

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

505-4 MEASUREMENT AND PAYMENT

Shallow Undercut of natural soil materials from subsoil for Type 1 aggregate subgrades will be measured and paid in cubic yards, measured in the original position and computed by the average end area method that is acceptably excavated in accordance with the contract. The contract unit price for *Shallow Undercut* will be full compensation for excavating, hauling and disposing of materials to construct aggregate subgrades.

Undercut Excavation of natural soil materials from subsoil for Type 2 aggregate subgrades will be measured and paid in accordance with Article 225-7 or 226-3. No measurement will be made for any undercut excavation of fill materials from subsoil.

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

Geotextile for Subgrade Stabilization will be measured and paid in square yards. Geotextiles will be measured along the ground surface as the square yards of exposed geotextiles before placing ABC. No measurement will be made for overlapping geotextiles. The contract unit price for *Geotextile for Subgrade Stabilization* will be full compensation for providing, transporting and installing geotextiles, wire staples and anchor pins.

Payment will be made under:

Pay Item	**Pay Unit**
Shallow Undercut	Cubic Yard
Class IV Subgrade Stabilization	Ton
Geotextile for Subgrade Stabilization	Square Yard

AGGREGATE SUBGRADE IN LIEU OF CHEMICAL STABILIZATION:

(6-16-15) (Rev. 3-21-23) 501, 505, 542 SP5 R17

Description

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

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	**Section**
Geotextile for Subgrade Stabilization, Type 5	1056

Construction Methods

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

Measurement and Payment

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

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

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

INCIDENTAL MILLING:

(11-15-22)(Rev. 1-17-23) 607 SP6 R02R

Revise the *2018 Standard Specifications* as follows:

Page 6-5, Article 607-3 CONSTRUCTION METHODS, add the following paragraph after line 45:

Variable depth milling is intended to improve the cross-sectional slope of the pavement.

Page 6-6, Article 607-3 CONSTRUCTION METHODS, line 9, delete and replace the first sentence in the sixth paragraph with the following:

The Engineer may require re-milling of any area exhibiting pavement laminations, scabbing or other defects.

Page 6-6, Article 607-4 TOLERANCE, lines 17-18, delete and replace the second sentence with the following:

The Engineer may vary the depth of milling by not more than one inch. In the event the directed depth of milling cut is altered by the Engineer more than one inch, either the Department or the Contractor may request an adjustment in unit price in accordance with Article 104-3. In administering Article 104-3, the Department will give no consideration to value given to RAP due to the deletion or reduction in quantity of milling. Article 104-3 will not apply to the item of *Incidental Milling*.

Page 6-6, Subarticle 607-5(A) Milled Asphalt Pavement, lines 21-23, delete and replace the first sentence with the following:

Milled Asphalt Pavement, __" Depth will be measured and paid as the actual number of square yards of pavement surface milled in accordance with this specification.

Page 6-6, Subarticle 607-5(A) Milled Asphalt Pavement, lines 24-28, delete and replace the third and fourth sentence with the following:

The width will be the width required by the plans or directed by the Engineer, measured along the pavement surface. Areas to be paid under this item include mainline travel lanes, full width turn lanes greater than 500 feet in length, collector lanes, shoulders, and any additional equipment necessary to remove pavement in the area of manholes, water valves, curb, gutter and other obstructions.

Page 6-6, Subarticle 607-5(B) Milled Asphalt Pavement Depth Varies from Required Depth, lines 29-37, delete and replace the title and first paragraph with the following:

(B) Variable Depth Milled Asphalt Pavement

Milling Asphalt Pavement, __" to __" will be measured and paid as the actual number of square yards of pavement surface milled in accordance with this specification. In measuring this quantity, the length will be the actual length milled, measured along the pavement surface. The width will be the width required by the plans or directed by the Engineer, measured along the pavement surface. Areas to be paid under this item include mainline travel lanes, full width turn lanes greater than 500 feet in length, collector lanes, shoulders, and any additional equipment necessary to remove pavement in the area of manholes, water valves, curb, gutter and other obstructions.

Page 6-6, Subarticle 607-5(C) Incidental Milling, lines 45-49, delete and replace the first and second sentence with the following:

Incidental Milling will be measured and paid as the actual number of square yards of surface milled where the Contractor is required to mill butt joints, irregular areas, full width turn lanes 500 feet or less, intersections and re-mill areas that are not due to the Contractor's negligence. In measuring this quantity, the length will be the actual length milled, measured along the pavement surface. The width will be the width required by the plans or directed by the Engineer, measured along the pavement surface.

Page 6-7, Subarticle 607-5(D) Milling of Defects, lines 6-10, delete and replace the second sentence with the following:

If the Engineer directs re-milling of an area and is not due to the Contractor's negligence, the re-milled area will be measured as provided in Subarticle 607-5(C) and paid at the contract unit price per square yard for *Incidental Milling*.

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 *2018 Standard Specifications.*

The base price index for asphalt binder for plant mix is **$ 639.38** per ton.

This base price index represents an average of F.O.B. selling prices of asphalt binder at supplier's terminals on **May 1, 2023**.

MILLING ASPHALT PAVEMENT:
(1-15-19) 607 SP6 R59

Revise the *2018 Standard Specifications* as follows:

Page 6-5, Article 607-2, EQUIPMENT, lines 14-16, delete the seventh sentence of this Article and replace with the following:

Use either a non-contacting laser or sonar type ski system with a minimum of three referencing stations mounted on the milling machine at a length of at least 24 feet.

ASPHALT CONCRETE PLANT MIX PAVEMENTS:
(2-20-18) (Rev. 6-20-23) 610, 1012 SP6 R65

Revise the *2018 Standard Specifications* as follows:

Page 6-14, Table 609-3, LIMITS OF PRECISION FOR TEST RESULTS, replace with the following:

TABLE 609-3
LIMITS OF PRECISION FOR TEST RESULTS

Mix Property	Limits of Precision
25.0 mm sieve (Base Mix)	± 10.0%
19.0 mm sieve (Base Mix)	± 10.0%
12.5 mm sieve (Intermediate & Type P-57)	± 6.0%
9.5 mm sieve (Surface Mix)	± 5.0%
4.75 mm sieve (Surface Mix)	± 5.0%
2.36 mm sieve (All Mixes, except S4.75A)	± 5.0%
1.18 mm sieve (S4.75A)	± 5.0%
0.075 mm sieve (All Mixes)	± 2.0%
Asphalt Binder Content	± 0.5%
Maximum Specific Gravity (G_{mm})	± 0.020
Bulk Specific Gravity (G_{mb})	± 0.030
TSR	± 15.0%
QA retest of prepared QC Gyratory Compacted Volumetric Specimens	± 0.015
Retest of QC Core Sample	± 1.2% (% Compaction)
Comparison QA Core Sample	± 2.0% (% Compaction)

QA Verification Core Sample	± 2.0% (% Compaction)
Density Gauge Comparison of QC Test	± 2.0% (% Compaction)
QA Density Gauge Verification Test	± 2.0% (% Compaction)

Page 6-17, Table 610-1, MIXING TEMPERATURE AT THE ASPHALT PLANT, replace with the following:

TABLE 610-1
MIXING TEMPERATURE AT THE ASPHALT PLANT

Binder Grade	JMF Temperature
PG 58-28; PG 64-22	250 - 290°F
PG 76-22	300 - 325°F

Page 6-17, Subarticle 610-3(C), Job Mix Formula (JMF), lines 38-39, delete the fourth paragraph.

Page 6-18, Subarticle 610-3(C), Job Mix Formula (JMF), line 12, replace "SF9.5A" with "S9.5B".

Page 6-18, Table 610-3, MIX DESIGN CRITERIA, replace with the following:

TABLE 610-3
MIX DESIGN CRITERIA

Mix Type	Design ESALs millions [A]	Binder PG Grade	Compaction Levels G_{mm} @		Max. Rut Depth (mm)	Volumetric Properties [B]			
			N_{ini}	N_{des}		VMA % Min.	VTM %	VFA Min.-Max.	$\%G_{mm}$ @ N_{ini}
S4.75A	< 1	64 - 22	6	50	11.5	16.0	4.0 - 6.0	65 - 80	≤ 91.5
S9.5B	0 - 3	64 - 22	6	50	9.5	16.0	3.0 - 5.0	70 - 80	≤ 91.5
S9.5C	3 - 30	64 - 22	7	65	6.5	15.5	3.0 - 5.0	65 - 78	≤ 90.5
S9.5D	> 30	76 - 22	8	100	4.5	15.5	3.0 - 5.0	65 - 78	≤ 90.0
I19.0C	ALL	64 - 22	7	65	-	13.5	3.0 - 5.0	65 - 78	≤ 90.5
B25.0C	ALL	64 - 22	7	65	-	12.5	3.0 - 5.0	65 - 78	≤ 90.5
	Design Parameter					**Design Criteria**			
All Mix Types	Dust to Binder Ratio ($P_{0.075}$ / P_{be})					0.6 - 1.4 [C]			
	Tensile Strength Ratio (TSR) [D]					85% Min. [E]			

A. Based on 20 year design traffic.
B. Volumetric Properties based on specimens compacted to N_{des} as modified by the Department.
C. Dust to Binder Ratio ($P_{0.075}$ / P_{be}) for Type S4.75A is 1.0 - 2.0.
D. NCDOT-T-283 (No Freeze-Thaw cycle required).
E. TSR for Type S4.75A & B25.0C mixes is 80% minimum.

Page 6-19, Table 610-5, BINDER GRADE REQUIREMENTS (BASED ON RBR%), replace with the following:

TABLE 610-5
BINDER GRADE REQUIREMENTS (BASED ON RBR%)

Mix Type	%RBR ≤ 20%	21% ≤ %RBR ≤ 30%	%RBR ≥ 30%
S4.75A, S9.5B, S9.5C, I19.0C, B25.0C	PG 64-22	PG 64-22[A]	PG-58-28
S9.5D, OGFC	PG 76-22[B]	n/a	n/a

A. If the mix contains any amount of RAS, the virgin binder shall be PG 58-28.
B. Maximum Recycled Binder Replacement (%RBR) is 18% for mixes using PG 76-22 binder.

Page 6-20, Table 610-6, PLACEMENT TEMPERATURES FOR ASPHALT, replace with the following:

TABLE 610-6 PLACEMENT TEMPERATURES FOR ASPHALT	
Asphalt Concrete Mix Type	**Minimum Surface and Air Temperature**
B25.0C	35°F
I19.0C	35°F
S4.75A, S9.5B, S9.5C	40°F [A]
S9.5D	50°F

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

Page 6-21, Article 610-8, SPREADING AND FINISHING, lines 34-35, delete the second sentence and replace with the following:

Use an MTV for all surface mix regardless of binder grade on Interstate, US Routes, and NC Routes (primary routes) that have 4 or more lanes and median divided.

Page 6-21, Article 610-8, SPREADING AND FINISHING, lines 36-38, delete the fourth sentence and replace with the following:

Use MTV for all ramps, loops, Y-line that have 4 or more lanes and are median divided, full width acceleration lanes, full width deceleration lanes, and full width turn lanes that are greater than 1000 feet in length.

Page 6-23, Table 610-7, DENSITY REQUIREMENTS, replace with the following:

TABLE 610-7 DENSITY REQUIREMENTS	
Mix Type	**Minimum % G_{mm} (Maximum Specific Gravity)**
S4.75A	85.0 [A]
S9.5B	90.0
S9.5C, S9.5D, I19.0C, B25.0C	92.0

A. Compaction to the above specified density will be required when the S4.75A mix is applied at a rate of 100 lbs/sy or higher.

Page 6-24, Article 610-13, FINAL SURFACE TESTING, lines 35-36, delete the second sentence and replace with the following:

Final surface testing is not required on ramps, loops and turn lanes.

Page 6-26, Subarticle 610-13(A)(1), Acceptance for New Construction, lines 29-30, delete the second sentence and replace with the following:

Areas excluded from testing by the profiler may be tested using a 10-foot straightedge in accordance with Article 610-12.

Page 6-27, Subarticle 610-13(B), Option 2- North Carolina Hearne Straightedge, lines 41-46, delete the eighth and ninth sentence of this paragraph and replace with the following:

Take profiles over the entire length of the final surface travel lane pavement exclusive of structures, approach slabs, paved shoulders, tapers, or other irregular shaped areas of pavement, unless otherwise approved by the Engineer. Test in accordance with this provision all mainline travel lanes, full width acceleration or deceleration lanes and collector lanes.

Page 6-28, Subarticle 610-13(B), Option 2- North Carolina Hearne Straightedge, lines 1-2, delete these two lines.

Page 6-32, Article 610-16 MEASUREMENT AND PAYMENT, replace with the following:

Pay Item	**Pay Unit**
Asphalt Concrete Base Course, Type B25.0C	Ton
Asphalt Concrete Intermediate Course, Type I19.0C	Ton
Asphalt Concrete Surface Course, Type S4.75A	Ton
Asphalt Concrete Surface Course, Type S9.5B	Ton
Asphalt Concrete Surface Course, Type S9.5C	Ton
Asphalt Concrete Surface Course, Type S9.5D	Ton

Page 10-30, Table 1012-1, AGGREGATE CONSENSUS PROPERTIES, replace with the following:

TABLE 1012-1
AGGREGATE CONSENSUS PROPERTIES[A]

Mix Type	**Coarse Aggregate Angularity[B] % Minimum**	**Fine Aggregate Angularity % Minimum**	**Sand Equivalent % Minimum**	**Flat and Elongated 5 : 1 Ratio % Maximum**
Test Method	*ASTM D5821*	*AASHTO T 304*	*AASHTO T 176*	*ASTM D4791*
S4.75A; S9.5B	75 / -	40	40	-
S9.5C; I19.0C; B25.0C	95 / 90	45	45	10
S9.5D	100 / 100	45	50	10
OGFC	100 / 100	45	45	10
UBWC	100 / 85	45	45	10

A. Requirements apply to the design aggregate blend.
B. 95 / 90 denotes that 95% of the coarse aggregate has one fractured face and 90% has 2 or more fractured faces.

Page 10-30, Subarticle 1012-1(B)(6), Toughness (Resistance to Abrasion) , line 12, replace "OGAFC" with "OGFC".

SUPPLEMENTAL SURVEYING:

(4-20-21) 801 SP8 R03

Revise the *2018 Standard Specifications* as follows:

Page 8-7, Article 801-3 MEASUREMENT AND PAYMENT, lines 10-11, replace with the following:

Supplemental Surveying Office Calculations will be paid at the stated price of $85.00 per hour. *Supplemental Field Surveying* will be paid at the stated price of $145.00 per hour. The

GUARDRAIL END UNITS & TEMPORARY GUARDRAIL END UNITS, TYPE - TL-2:

(10-21-08) (Rev. 5-16-23) 862 SP8 R64

Description

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

Materials

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

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

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 *Standard Specifications* and is incidental to the cost of the guardrail end unit.

Measurement and Payment

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

Payment will be made under:

Pay Item	**Pay Unit**
Guardrail End Units, Type TL-2	Each
Temporary Guardrail End Units, Type TL-2	Each

GUARDRAIL END UNITS & TEMPORARY GUARDRAIL END UNITS, TYPE - TL-3:

(4-20-04) (Rev. 5-16-23) 862 SP8 R65

Description

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

Materials

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

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

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 *Standard Specifications* and is incidental to the cost of the guardrail end unit.

Measurement and Payment

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

Payment will be made under:

Pay Item	**Pay Unit**
Guardrail End Units, Type TL-3	Each
Temporary Guardrail End Units, Type TL-3	Each

GUARDRAIL ANCHOR UNITS AND TEMPORARY GUARDRAIL ANCHOR UNITS:

(1-16-2018) 862 SP8 R70

Guardrail anchor units will be in accordance with the details in the plans and the applicable requirements of Section 862 of the *2018 Standard Specifications*.

Revise the *2018 Standard Specifications* as follows:

Page 8-42, Article 862-6 MEASUREMENT AND PAYMENT, add the following:

Guardrail Anchor Units, Type ___ and Temporary Guardrail Anchor Units Type ___ will be measured and paid as units of each completed and accepted. No separate measurement will be

made of any rail, terminal sections, posts, offset blocks, concrete, hardware or any other components of the completed unit that are within the pay limits shown in the plans for the unit as all such components will be considered to be part of the unit.

Payment will be made under:

Pay Item	**Pay Unit**
Guardrail Anchor Units, Type ____	Each
Temporary Guardrail Anchor Units, Type ___	Each

IMPACT ATTENUATOR UNITS, TYPE TL-3:

(4-20-04) (Rev. 12-18-18) SP8 R75

Description

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

Materials

Furnish impact attenuator units listed on the Approved Products List at https://apps.dot.state.nc.us/vendor/approvedproducts/ or approved equal. 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 the Manual for Assessing Safety Hardware (MASH-16), Test Level 3, in accordance with Article 106-2 of the *2018 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 *2018 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 NON-GATING Impact Attenuator Units.

If the median width is greater than 40 feet, the Contractor may use GATING or NON-GATING Impact Attenuator Units.

Measurement and Payment

Impact Attenuator Unit, Type TL-3 will be measured and paid at the contract unit price per each. Such prices and payment will be full compensation for all work covered by this provision

including, but not limited to, furnishing, installing and all incidentals necessary to complete the work.

Payment will be made under:

Pay Item	Pay Unit
Impact Attenuator Units, Type TL-3	Each

ADJUSTMENT OF CATCH BASINS, MANHOLES, DROP INLETS, METER BOXES AND VALVE BOXES:

(11-15-22) 858 SP8 R98R

Revise the *2018 Standard Specifications* as follows:

Page 8-38, Article 858-4 MEASUREMENT AND PAYMENT, lines 10-11, delete and replace the fifth paragraph with the following:

Where any catch basin, drop inlet, manhole, meter box or valve box is adjusted more than once because of milling operations, each adjustment will be measured and paid.

FOUNDATIONS AND ANCHOR ROD ASSEMBLIES FOR METAL POLES:

(1-17-12) (Rev. 1-16-18) 9, 14, 17 SP9 R05

Description

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

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

This provision does not apply to foundations for signal pedestals; see Section 1743 of the *2018 Standard Specifications* and 2018 Roadway Standard Drawing No. 1743.01.

Materials

Refer to the *2018 Standard Specifications*.

Item	Section
Conduit	1091-3
Grout, Type 2	1003

Item	Section
Polymer Slurry	411-2(B)(2)
Portland Cement Concrete	1000
Reinforcing Steel	1070
Rollers and Chairs	411-2(C)
Temporary Casings	411-2(A)

Provide Type 3 material certifications in accordance with Article 106-3 of the *2018 Standard Specifications* for conduit, rollers, chairs and anchor rod assemblies. Store steel materials on blocking at least 12" above the ground and protect it at all times from damage; and when placing in the work make sure it is free from dirt, dust, loose mill scale, loose rust, paint, oil or other foreign materials. Load, transport, unload and store foundation and anchor rod assembly materials so materials are kept clean and free of damage. Bent, damaged or defective materials will be rejected.

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

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

(A) Straight anchor rods,

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

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

Do not use lock washers. Use steel anchor rods, nuts and washers that meet ASTM F1554 for Grade 55 rods and Grade A nuts. Use steel plates and washers embedded in concrete with a thickness of at least 1/4". Galvanize anchor rods and exposed nuts and washers in accordance with Article 1076-4 of the *2018 Standard Specifications*. It is not necessary to galvanize nuts, plates and washers embedded in concrete.

Construction Methods

Install the required size and number of conduits in foundations in accordance with the plans and accepted submittals. Construct top of piers, footings, pedestals, grade beams and wings flat, level and within 1" of elevations shown in the plans or approved by the Engineer. Provide an Ordinary Surface finish in accordance with Subarticle 825-6(B) of the *2018 Standard Specifications* for portions of foundations exposed above finished grade. Do not remove anchor bolt templates or pedestal or grade beam forms or erect metal poles or upright trusses onto foundations until concrete attains a compressive strength of at least 3,000 psi.

(A) Drilled Piers

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

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

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

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

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

Contain and dispose of drilling spoils and waste concrete as directed and in accordance with Section 802 of the *2018 Standard Specifications*. Drilling spoils consist of all materials and fluids removed from excavations.

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

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

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

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

Remove soft and loose material from bottom of holes using augers to the satisfaction of the Engineer. Assemble rebar cages and place cages and Drilled Pier concrete in accordance with Subarticle 411-4(E) of the *2018 Standard Specifications* except for the following:

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

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

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

If drilled piers are questionable, pile integrity testing (PIT) and further investigation may be required in accordance with Article 411-5 of the *2018 Standard Specifications*. A drilled pier will be considered defective in accordance with Subarticle 411-5(D) of the *2018 Standard Specifications* and drilled pier acceptance is based in part on the criteria in Article 411-6 of the *2018 Standard Specifications* except for the top of pier tolerances in Subarticle 411-6(C) of the *2018 Standard Specifications*.

If a drilled pier is under further investigation, do not grout core holes, backfill around the pier or perform any work on the drilled pier until the Engineer accepts the pier. If the drilled pier is accepted, dewater and grout core holes and backfill around the pier with approved material to finished grade. If the Engineer determines a pier is unacceptable, remediation is required in accordance with Article 411-6 of the *2018 Standard Specifications*. No extension of completion date or time will be allowed for remediation of unacceptable drilled piers or post repair testing.

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

(B) Footings, Pedestals, Grade Beams and Wings

Excavate as necessary for footings, grade beams and wings in accordance with the plans, accepted submittals and Section 410 of the *2018 Standard Specifications*. If unstable, caving or sloughing materials are anticipated or encountered, shore foundation excavations

as needed with an approved method. Notify the Engineer when foundation excavation is complete. Do not place concrete or reinforcing steel until excavation dimensions and foundation material are approved.

Construct cast-in-place reinforced concrete footings, pedestals, grade beams and wings with the dimensions shown in the plans and in accordance with Section 825 of the *2018 Standard Specifications*. Use forms to construct portions of pedestals and grade beams protruding above finished grade. Provide a chamfer with a 3/4" horizontal width for pedestal and grade beam edges exposed above finished grade. Place concrete against undisturbed soil or backfill and fill in accordance with Article 410-8 of the *2018 Standard Specifications*. Proper compaction around footings and wings is critical for foundations to resist uplift and torsion forces.

(C) Anchor Rod Assemblies

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

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

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

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

(1) Turn leveling nuts onto anchor rods to a distance of one nut thickness between the top of foundation and bottom of leveling nuts. Place washers over anchor rods on top of leveling nuts.
(2) Determine if nuts are level using a flat rigid template on top of washers. If necessary, lower leveling nuts to level the template in all directions or if applicable, lower nuts to tilt the template so the metal pole or upright truss will lean as shown in the plans. If leveling nuts and washers are not in full contact with the template, replace washers with galvanized beveled washers.
(3) Verify the distance between the foundation and leveling nuts is no more than one nut thickness.
(4) Place base plate with metal pole or upright truss over anchor rods on top of washers. High mount luminaires may be attached before erecting metal poles but do not attach cables, mast arms or trusses to metal poles or upright trusses at this time.

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

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

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

(8) Repeat (7) for leveling nuts.

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

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

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

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

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

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

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

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

(13) Do not grout under base plate.

Measurement and Payment

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

No payment will be made for temporary casings that remain in drilled pier excavations. No payment will be made for PIT. No payment will be made for further investigation of defective piers. Further investigation of piers that are not defective will be paid as extra work in accordance with Article 104-7 of the *2018 Standard Specifications*. No payment will be made for remediation of unacceptable drilled piers or post repair testing.

OVERHEAD AND DYNAMIC MESSAGE SIGN FOUNDATIONS:

(1-16-18) SP9 R07

Description

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

Materials

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

Subsurface Conditions

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

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

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

Subsurface Investigations

Use a prequalified geotechnical consultant to perform one standard penetration test (SPT) boring in accordance with ASTM D1586 at each sign location requiring a subsurface investigation. Rough grade sign locations to within 2 feet of finished grade before beginning drilling. Drill

borings to 2 drilled pier diameters below anticipated pier tip elevations or refusal, whichever is higher.
Use the computer software gINT version V8i or later manufactured by Bentley Systems, Inc. with the current NCDOT gINT library and data template to produce SPT boring logs. Provide boring logs sealed by a geologist or engineer licensed in the state of North Carolina.

Sign Foundation Designs

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

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

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

Submit boring logs, if any, working drawings and design calculations for acceptance in accordance with Article 105-2 of the *2018 Standard Specifications*. Submit working drawings showing plan views, required foundation dimensions and elevations and typical sections with reinforcement, conduit and anchor rod assembly details. Include all boring logs, design calculations and LPILE output for sign foundation design submittals. Have sign foundations designed, detailed and sealed by an engineer licensed in the state of North Carolina.

Construction Methods

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

Measurement and Payment

Overhead Footings will be measured and paid in cubic yards. Sign foundations will be measured as the cubic yards of foundation concrete for footings, pedestals, drilled piers, grade beams and wings shown in the accepted submittals. The contract unit price for *Overhead Footings* will be full compensation for providing labor, tools, equipment and foundation materials, stabilizing or shoring excavations, supplying and placing concrete, reinforcing steel, conduit, anchor rod assemblies and any incidentals necessary to construct sign foundations. Subsurface investigations required by the Engineer will be paid as extra work in accordance with Article 104-7 of the *2018 Standard Specifications*.

Payment will be made under:

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

PORTLAND CEMENT CONCRETE PRODUCTION AND DELIVERY:

(9-15-20) 1000, 1014, 1024 SP10 R01

Revise the *2018 Standard Specifications* as follows:

Page 10-6, Table 1000-1, REQUIREMENTS FOR CONCRETE, replace with the following:

TABLE 1000-1
REQUIREMENTS FOR CONCRETE

Class of Concrete	Min. Compressive Strength at 28 days	Maximum Water-Cement Ratio				Consistency Maximum Slump		Cement Content			
		Air-Entrained Concrete		Non-Air-Entrained Concrete		Vibrated	Non-Vibrated	Vibrated		Non-Vibrated	
		Rounded Aggregate	Angular Aggregate	Rounded Aggregate	Angular Aggregate			Min.	Max.	Min.	Max.
Units	*psi*					*inch*	*inch*	*lb/cy*	*lb/cy*	*lb/cy*	*lb/cy*
AA	4500	0.381	0.426	---	---	3.5[A]	---	639	715	---	---
AA Slip Form	4500	0.381	0.426	---	---	1.5	---	639	715	---	---
Drilled Pier	4500	---	---	0.450	0.450	---	5 – 7 dry 7 - 9 wet	---	---	640	800
A	3000	0.488	0.532	0.550	0.594	3.5 [A]	4.0	564	---	602	---
B	2500	0.488	0.567	0.559	0.630	1.5 machine placed 2.5 [A] hand placed	4.0	508	---	545	---
Sand Light-weight	4500	---	0.420	---	---	4.0 [A]	---	715	---	---	---

Latex Modified	3000 (at 7 days)	0.400	0.400	---	---	6.0	---	658	---	---	---
Flowable Fill excavatable	150 max. (at 56 days)	as needed	as needed	as needed	as needed	---	Flowable	---	---	40	100
Flowable Fill non-excavatable	125	as needed	as needed	as needed	as needed	---	Flowable	---	---	100	as needed
Pavement	4500 Design, field 650 flexural, design only	0.559	0.559	---	---	1.5 slip form 3.0 hand placed	---	526	---	---	---
Precast	See Table 1077-1	as needed	as needed	---	---	6.0	as needed	as needed	as needed	as needed	as needed
Prestressed	per contract	See Table 1078-1	See Table 1078-1	---	---	8.0	---	564	as needed	---	---

A. The slump may be increased to 6 inches, provided the increase in slump is achieved by adding a chemical admixture conforming to Section 1024-3. In no case shall the water-cement ratio on the approved design be exceeded. Concrete exhibiting segregation and/or excessive bleeding will be rejected. Utilizing an Admixture to modify slump does not relinquish the contractor's responsibility to ensure the final product quality and overall configuration meets design specifications. Caution should be taken when placing these modified mixes on steep grades to prevent unintended changes to the set slope.

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 *2018 Standard Specifications*.

Measurement and payment will be in accordance with Section 848 of the *2018 Standard Specifications*.

THERMOPLASTIC INTERMIXED BEAD TESTING:

7-19-22 1087 SP10 R04

Revise the *2018 Standard Specifications* as follows:

Page 10-183, Subarticle 1087-7(B) Thermoplastic Pavement Marking Material Composition, delete line 34 and 35.

Page 10-184, Article 1087-8 MATERIAL CERTIFICATION, delete and replace with the following after line 34:

Drop-on Glass Beads	Type 3 Material Certification and Type 4 Material Certification
Intermix Glass Beads	Type 2 Material Certification and Type 3 Material Certification
Paint	Type 3 Material Certification
Removable Tape	Type 3 Material Certification
Thermoplastic	Type 3 Material Certification and Type 4 Material Certification
Cold Applied Plastic	Type 2 Material Certification and Type 3 Material Certification
Polyurea	Type 2 Material Certification and Type 3 Material Certification

THERMOPLASTIC PAVEMENT MARKING MATERIAL – COLOR TESTING:

3-19-19 1087 SP10 R05

Revise the *2018 Standard Specifications* as follows:

Pages 10-183 and 10-184, Subarticle 1087-7(D)(1)(b) Yellow, lines 9-11, delete and replace with the following:

Obtain Color Values Y,x,y per ASTM E1349 using C/2° illuminant/observer.
Results shall be Y ≥ 45%, and x,y shall fall within PR#1 chart chromaticity limits.

POLYUREA PAVEMENT MARKING MATERIAL – TYPE 2 TYPICAL CERTIFIED MILL TEST REPORT:

3-19-19 1087 SP10 R06

Amend the *2018 Standard Specifications* as follows:

Page 10-184, Subarticle 1087-8 Material Certification, in accordance with Subarticle 106-3 provide a Type 2 Typical Certified Mill Test Report and a Type 3 Manufacturer's Certification for Polyurea pavement marking material.

When tested, the material shall meet the physical and chemical characteristics provided by the manufacturer. NCDOT reserves the right to compare these test results to baseline test results gathered by the NCDOT Materials and Test Unit.

NON-CAST IRON SNOWPLOWABLE PAVEMENT MARKERS:

10-19-21 (Rev. 11-16-21) 1086, 1250, 1253 SP10 R08

Revise the *2018 Standard Specifications* as follows:

Pages 10-177 and 10-178, Subarticle 1086-3 SNOWPLOWABLE PAVEMENT MARKERS, delete items (A), (B) and (C)(1) and replace with the following:

(A) General

Use non-cast iron snowplowable pavement markers evaluated by NTPEP. The non-cast iron snowplowable pavement marker shall consist of a housing with one or more glass or plastic face lens type reflective lenses to provide the required color designation. The marker shall be designed or installed in a manner that minimizes damage from snowplow blades. Plastic lens faces shall use an abrasion resistant coating.

(B) Housings

(1) Dimensions
The dimension, slope and minimum area of reflecting surface shall conform to dimensions as shown in the plans. The minimum area of each reflecting surface shall be 1.44 sq.in.

(2) Materials
Use non-cast iron snowplowable pavement markers that are on the NCDOT Approved Products List.

(3) Surface
The surface of the housing shall be free of scale, dirt, rust, oil, grease or any other contaminant which might reduce its bond to the epoxy adhesive.

(4) Identification
Mark the housing with the manufacturer's name and model number of marker.

(C) Reflectors

(1) General
Laminate the reflector to an elastomeric pad and attach with adhesive to the housing. The thickness of the elastomeric pad shall be 0.04".

Pages 12-14, Subarticle 1250-3(C) Removal of Existing Pavement Markers, lines 19-29, delete and replace with the following:

Remove the existing raised pavement markers or the snowplowable pavement markers including the housings, before overlaying an existing roadway with pavement. Repair the pavement by filling holes as directed by the Engineer.

When traffic patterns are changed in work zones due to construction or reconstruction, remove all raised pavement markers or snowplowable markers including housings that conflict with the new traffic pattern before switching traffic to the new traffic pattern. Lens removal in lieu of total housing removal is not an acceptable practice for snowplowable markers.

Properly dispose of the removed pavement markers. No direct payment will be made for removal or disposal of existing pavement markers or repair of pavement, as such work will be incidental to other items in the contract.

Pages 12-16, Subarticle 1253-1 DESCRIPTION, lines 4-5, delete and replace with the following:

Furnish, install and maintain non-cast iron snowplowable pavement markers in accordance with the contract.

Pages 12-16 and 12-17, Subarticle 1253-3 CONSTRUCTION METHODS, delete items (A), (B) and (C) and replace with the following:

(A) General

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

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

Protect the non-cast iron snowplowable pavement markers until the epoxy has initially cured and is track free.

(B) Reflector Replacement

In the event that a reflector is damaged, replace the damaged reflector by using adhesives and methods recommended by the manufacturer of the markers and approved by the Engineer. This work is considered incidental if damage occurs during the initial installation of the marker housings and maintenance of initial non-cast iron snowplowable markers specified in this section. This work will be paid for under the pay item for the type of reflector replacement if the damage occurred after the initial installation of the non-cast iron snowplowable pavement marker.

Missing housings shall be replaced. Broken housings shall be removed and replaced. In both cases the slot for the housings shall be properly prepared prior to installing the new housing; patch the existing marker slots as directed by the Engineer and install the new marker approximately one foot before or after the patch. Removal of broken housings and preparation of slots will be considered incidental to the work of replacing housings.

Pages 12-17, Subarticle 1253-4 MAINTENANCE, lines 5, delete and replace with the following:

Maintain all installed non-cast iron snowplowable pavement markers until acceptance.

Pages 12-17, Subarticle 1253-5 MEASUREMENT AND PAYMENT, lines 7-8, delete and replace with the following:

Non-Cast Iron Snowplowable Pavement Markers will be measured and paid as the actual number of non-cast iron snowplowable pavement markers satisfactorily placed and accepted by the Engineer.

Pages 12-17, Subarticle 1253-5 MEASUREMENT AND PAYMENT, lines 11, delete and replace with the following:

Payment will be made under:

Pay Item	**Pay Unit**
Non-Cast Iron Snowplowable Pavement Marker	Each
Replace Snowplowable Pavement Marker Reflector	Each

MATERIALS FOR PORTLAND CEMENT CONCRETE:

(9-15-20) 1000, 1024 SP10 R24

Revise the *2018 Standard Specifications* as follows:

Page 10-52, Article 1024-4, WATER, lines 3-6, delete and replace with the following:

Test water from wells at all locations. Test public water supplies from all out of state locations and in the following counties: Beaufort, Bertie, Brunswick, Camden, Carteret, Chowan, Craven, Currituck, Dare, Gates, Hyde, New Hanover, Onslow, Pamlico, Pasquotank, Pender, Perquimans, Tyrell and Washington unless the Engineer waives the testing requirements.

Page 10-52, Table 1024-2, PHYSICAL PROPERTIES OF WATER, replace with the following:

Property	Requirement	Test Method
Compression Strength, minimum percent of control at 3 and 7 days	90%	ASTM C1602
Time of set, deviation from control	From 1:00 hr. earlier to 1:30 hr. later	ASTM C1602
pH	4.5 to 8.5	ASTM D1293 *
Chloride Ion Content, Max.	250 ppm	ASTM D512 *
Total Solids Content (Residue), Max.	1,000 ppm	SM 2540B *
Resistivity, Min.	0.500 kohm-cm	ASTM D1125 *

*Denotes an alternate method is acceptable. Test method used shall be referenced in the test report.

GEOSYNTHETICS:

(03-21-23)(Rev. 4-18-23) 1056 SP10 R56

Revise the *Standard Specifications* as follows:

Page 10-77, Article 1056-1 DESCRIPTION, lines 13-16, delete and replace the second sentence in the second paragraph with the following:

Steel anchor pins shall have a diameter of at least 3/16 inch, a length of at least 18 inches, a point at one end and a head at the other end that will retain a steel washer with an outside diameter of at least 1.5 inches.

Page 10-77, Article 1056-2 HANDLING AND STORING, lines 20-21, delete and replace the third sentence in the first paragraph with the following:

Geosynthetics with defects, flaws, deterioration or damage will be rejected by the Engineer.

Page 10-77, Article 1056-3 CERTIFICATIONS AND IDENTIFICATION, lines 25-27, delete and replace the first sentence in the first paragraph with the following:

Provide Type 1, Type 2 or Type 4 material certifications in accordance with Article 106-3 for geosynthetics except certifications are not required for Type 1 through Type 5 geotextiles.

Page 10-77, Article 1056-3 CERTIFICATIONS AND IDENTIFICATION, lines 32-35, delete the second paragraph.

Page 10-77, Article 1056-3 CERTIFICATIONS AND IDENTIFICATION, lines 36-41, delete and replace the third paragraph with the following:

Allow the Engineer to visually identify geosynthetic products before installation. Open packaged geosynthetics just before use in the presence of the Engineer to verify the correct product. Geosynthetics that are missing original packaging or product labels or that have been unwrapped or previously opened will be rejected unless otherwise approved by the Engineer.

Page 10-77, Article 1056-4 GEOTEXTILES, lines 43-45, delete the first paragraph.

Page 10-78, Article 1056-4 GEOTEXTILES, before line 1 and lines 1-5, delete Table 1056-1 and lines 1-5 and replace with the following:

TABLE 1056-1 GEOTEXTILE REQUIREMENTS						
Property[A]	**Requirement (MARV[A])**					**Test Method**
	Type 1	**Type 2**	**Type 3[B]**	**Type 4**	**Type 5[C]**	
Typical Application	*Shoulder Drains*	*Under Rip Rap*	*Silt Fence Fabric*	*Soil Stabilization*	*Subgrade Stabilization*	
Elongation (MD & CD)	≥ 50%	≥ 50%	≤ 25%	< 50%	< 50%	ASTM D4632
Grab Strength (MD & CD)[A]	Table 1[D], Class 3	Table 1[D], Class 1	100 lb	Table 1[D], Class 3	–	ASTM D4632
Tear Strength (MD & CD)[A]			–			ASTM D4533
Puncture Strength			–			ASTM D6241
Ultimate Tensile Strength (MD & CD)[A]	–	–	–	–	Table 12[D], Class 4A	ASTM D4595
Permittivity	Table 2[D], 15% to 50% *in Situ* Soil Passing 0.075 mm	Table 6[D], 15% to 50% *in Situ* Soil Passing 0.075 mm	Table 7[D]	Table 5[D]	Table 12[D], Class 4A	ASTM D4491
Apparent Opening Size						ASTM D4751
UV Stability (Retained Strength)						ASTM D4355

A. MD, CD and MARV per Article 1056-3.
B. Minimum roll width of 36 inches required.
C. Minimum roll width of 13 feet required unless otherwise approved by the Engineer for the application.
D. Per AASHTO M 288.

Page 10-78, Article 1056-5 GEOCOMPOSITE DRAINS, before line 9 and lines 9-10, delete Table 1056-2 and lines 9-10 and replace with the following:

TABLE 1056-2 GEOCOMPOSITE DRAIN REQUIREMENTS				
Property	**Requirement**			**Test Method**
	Sheet Drain	**Strip Drain**	**Wick Drain**	
Width	≥ 12"	12" ±1/4"	4" ±1/4"	N/A
In-Plane Flow Rate[A] (with gradient of 1.0 and 24-hour seating period)	6 gpm/ft @ applied normal compressive stress of 10 psi	15 gpm/ft @ applied normal compressive stress of 7.26 psi	1.5 gpm[B] @ applied normal compressive stress of 1.45 psi	ASTM D4716

A. MARV per Article 1056-3.
B. Per foot of width tested.

Page 10-79, Article 1056-5 GEOCOMPOSITE DRAINS, before line 3, delete Table 1056-3 and replace with the following:

TABLE 1056-3 DRAINAGE CORE REQUIREMENTS			
Property	**Requirement**		**Test Method**
	Sheet Drain	**Strip Drain**	
Thickness	1/4"	1"	ASTM D1777 or D5199
Compressive Strength[A]	40 psi	30 psi	ASTM D6364

A. MARV per Article 1056-3.

Page 10-79, Article 1056-5 GEOCOMPOSITE DRAINS, before line 6 and lines 6-11, delete Table 1056-4, lines 6-7 and the last paragraph and replace with the following:

TABLE 1056-4 WICK DRAIN GEOTEXTILE REQUIREMENTS		
Property	**Requirement**	**Test Method**
Elongation	≥ 50%	ASTM D4632
Grab Strength	Table 1[A], Class 3	ASTM D4632
Tear Strength		ASTM D4533
Puncture Strength		ASTM D6241
Permittivity[B]	0.7 sec^{-1}	ASTM D4491
Apparent Opening Size (AOS)	Table 2[A], > 50% *in Situ* Soil Passing 0.075 mm	ASTM D4751
UV Stability (Retained Strength)		ASTM D4355

A. Per AASHTO M 288.
B. MARV per Article 1056-3.

For wick drains with a geotextile fused to both faces of a corrugated drainage core along the peaks of the corrugations, use wick drains with an ultimate tensile strength of at least 1,650 lbs. per 4 inch width in accordance with ASTM D4595 and geotextiles with a permittivity, AOS and UV stability that meet Table 1056-4.

Page 10-80, Article 1056-6 GEOCELLS, before line 1 and lines 1-4, delete Table 1056-5 and lines 1-4 and replace with the following:

TABLE 1056-5 GEOCELL REQUIREMENTS		
Property	**Requirement**	**Test Method**
Cell Depth	4"	N/A
Fully Expanded Cell Area	100 sq.in. max	N/A
Sheet Thickness	50 mil -5%, +10%	ASTM D5199
Density	58.4 pcf min	ASTM D1505
Carbon Black Content	1.5% min	ASTM D1603 or D4218
ESCR[A]	5000 hr min	ASTM D1693
Coefficient of Direct Sliding (with material that meets AASHTO M 145 for soil classification A-2)	0.85 min	ASTM D5321
Short-Term Seam (Peel) Strength (for 4" seam)	320 lb min	USACE[C] Technical Report GL-86-19, Appendix A
Long-Term Seam (Hang) Strength[B] (for 4" seam)	160 lb min	

A. Environmental Stress Crack Resistance.

B. Minimum test period of 168 hours with a temperature change from 74°F to 130°F in 1-hour cycles.

C. US Army Corps of Engineers (USACE).

TEMPORARY SHORING:

(2-20-07) (Rev. 10-19-21) SP11 R02

Description

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

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

(A) Cantilever and Braced Shoring

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

(B) Anchored Shoring

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

(C) Temporary MSE Walls

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

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

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

(D) Embedment

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

(E) Positive Protection

Define "unanchored or anchored portable concrete barrier" as portable concrete barrier (PCB) that meets 2018 Roadway Standard Drawing No. 1170.01. Define "concrete barrier" as unanchored or anchored PCB or an approved equal. Define "temporary guardrail" as temporary steel beam guardrail that meets 2018 Roadway Standard Drawing No. 862.02.

Materials

Refer to the *2018 Standard Specifications*.

Item	Section
Concrete Barrier Materials	1170-2
Flowable Fill, Excavatable	1000-6
Geosynthetics	1056
Grout, Type 1	1003
Portland Cement	1024-1
Portland Cement Concrete	1000
Select Materials	1016
Steel Beam Guardrail Materials	862-2
Steel Plates	1072-2
Steel Sheet Piles and H-Piles	1084
Untreated Timber	1082-2
Water	1024-4
Welded Wire Reinforcement	1070-3

Provide Type 6 material certifications for shoring materials in accordance with Article 106-3 of the *2018 Standard Specifications*. Use Class IV select material for temporary guardrail and Class A concrete that meets Article 450-2 of the *2018 Standard Specifications* or Type 1 grout for drilled-in piles. Provide untreated timber with a thickness of at least 3 inches and a bending stress of at least 1,000 pounds per square inch for timber lagging. Provide steel bracing that meets ASTM A36.

(A) Shoring Backfill

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

(B) Anchors

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

(1) Ground Anchors

Use high-strength deformed steel bars that meet AASHTO M 275 or seven-wire strands that meet ASTM A886 or Article 1070-5 of the *2018 Standard Specifications*. Splice bars in accordance with Article 1070-9 of the *2018 Standard Specifications*. Do not splice strands. Use bondbreakers, spacers and centralizers that meet Article 6.3.5 of the *AASHTO LRFD Bridge Construction Specifications*.

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

(2) Helical Anchors

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

(3) Anchorages

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

(C) Temporary Walls

(1) Welded Wire Facing

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

(2) Geotextiles

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

(3) Geogrid and Geostrip Reinforcement

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

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

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

(4) Welded Wire Grid and Metallic Strip Reinforcement

Provide welded wire grid and metallic strip reinforcement supplied by the Wire Wall Vendor or a manufacturer approved or licensed by the vendor. Use welded wire grid reinforcement ("mesh", "mats" and "ladders") that meet Article 1070-3 of the *2018 Standard Specifications* and metallic strip reinforcement ("straps") that meet ASTM A572 or A1011.

Preconstruction Requirements

(A) Concrete Barrier

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

(B) Temporary Guardrail

Define "clear distance" behind temporary guardrail as the horizontal distance between guardrail posts and temporary shoring. At the Contractor's option or if clear distance for cantilever, braced and anchored shoring is less than 4 feet, attach guardrail to traffic side of shoring as shown in the plans. Place ABC in clear distance and around guardrail posts instead of pavement. Do not use temporary guardrail above temporary walls.

(C) Temporary Shoring Designs

Before beginning temporary shoring design, survey existing ground elevations in the vicinity of shoring locations to determine actual design heights (H). Submit PDF files of working drawings and design calculations for temporary shoring designs in accordance with Article 105-2 of the *2018 Standard Specifications*. Submit working drawings showing plan views, shoring profiles, typical sections and details of temporary shoring design and construction sequence. Do not begin shoring construction until a design submittal is accepted.

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

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

(1) Soil Parameters

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

(a) Unit weight (γ) = 120 pcf,

(b)

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

(c) Cohesion (c) = 0 psf.

(2) Traffic Surcharge

Design temporary shoring for a traffic surcharge of 250 pounds per square foot if traffic will be above and within H of shoring. This traffic surcharge does not apply to construction traffic. Design temporary shoring for any construction surcharge if construction traffic will be above and within H of shoring. Design temporary shoring for a traffic (live load) surcharge in accordance with Article 11.5.6 of the *AASHTO LRFD Bridge Design Specifications*.

(3) Cantilever, Braced and Anchored Shoring Designs

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

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

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

Design Specifications for Bridge Temporary Works.

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

(4) Temporary Wall Designs

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

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

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

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

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

back behind facing into shoring backfill. Attach geostrip reinforcement to welded wire facing with a connection approved by the Department.

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

(D) Preconstruction Meeting

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

Construction Methods

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

Install positive protection in accordance with the contract and accepted submittals. Use PCB in accordance with Section 1170 of the *2018 Standard Specifications* and 2018 Roadway Standard Drawing No. 1170.01. Use temporary guardrail in accordance with Section 862 of the *2018 Standard Specifications* and 2018 Roadway Standard Drawing Nos. 862.01, 862.02 and 862.03.

(A) Tolerances

Construct shoring with the following tolerances:

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

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

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

(B) Cantilever, Braced and Anchored Shoring Installation

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

(1) Pile Installation

Install piles with the minimum required embedment and extension in accordance with Subarticles 450-3(D) and 450-3(E) of the *2018 Standard Specifications* except that a pile driving equipment data form is not required. Piles may be installed with a vibratory hammer as approved by the Engineer.

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

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

(2) Excavation

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

(3) Anchor Installation

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

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

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

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

(d) Mix and place neat cement grout in accordance with Subarticles 1003-5, 1003-6 and 1003-7 of the *2018 Standard Specifications*. Measure grout temperature, density and flow during grouting with at least the same

frequency grout cubes are made for compressive strength. Perform density and flow field tests in the presence of the Engineer in accordance with American National Standards Institute/American Petroleum Institute Recommended Practice 13B-1 (Section 4, Mud Balance) and ASTM C939 (Flow Cone), respectively.

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

(4) Anchor Testing

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

(a) Anchor Acceptance

Anchor acceptance is based in part on the following criteria.

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

(b) Anchor Test Results

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

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

(C) Temporary Wall Installation

Excavate as necessary for temporary walls in accordance with the plans and accepted submittals. If applicable, install foundations located in the reinforced zone before placing

shoring backfill or reinforcement unless otherwise approved. Notify the Engineer when foundation excavation is complete. Do not place shoring backfill or reinforcement until excavation dimensions and foundation material are approved.

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

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

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

Place shoring backfill in the reinforced zone in 8 to 10 inch thick lifts. Compact A-2-4 soil and Class II, Type 1 and Class III select material in accordance with Subarticle 235-3(C) of the *2018 Standard Specifications*. Use only hand operated compaction equipment to compact backfill within 3 feet of welded wire facing. At a distance greater than 3 feet, compact shoring backfill with at least 4 passes of an 8 to 10 ton vibratory roller in a direction parallel to the wall face. Smooth wheeled or rubber tired rollers are also acceptable for compacting backfill. Do not use sheepsfoot, grid rollers or other types of compaction equipment with feet. Do not displace or damage reinforcement when placing and compacting shoring backfill. End dumping directly on geosynthetics is not permitted. Do not operate heavy equipment on reinforcement until it is covered with at least 8 inches of shoring backfill. Replace any damaged reinforcement to the satisfaction of the Engineer.

Backfill for temporary walls outside the reinforced zone in accordance with Article 410-8 of the *2018 Standard Specifications*. Bench temporary walls into the sides of excavations where applicable. For temporary geosynthetic walls with top of wall within 5 feet of finished grade, remove top facing and incorporate top reinforcement layer into fill when placing fill in front of wall. Temporary walls remain in place permanently unless otherwise required.

Measurement and Payment

Temporary Shoring will be measured and paid in square feet. Temporary walls will be measured

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

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

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

PCB will be measured and paid in accordance with Section 1170 of the *2018 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 *2018 Standard Specifications*.

Payment will be made under:

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

MATERIAL AND EQUIPMENT STORAGE & PARKING OF PERSONAL VEHICLES:

11-17-21(Rev. 8-16-22) 1101 SP11 R03

Revise the *2018 Standard Specifications* as follows:

Page 11-2, Article 1101-8 MATERIAL AND EQUIPMENT STORAGE, line 35-38, delete and replace with the following:

When work is not in progress, keep all personnel, equipment, machinery, tools, construction debris, materials and supplies away from active travel lanes that meets Table 1101-1.

TABLE 1101-1 MATERIAL AND EQUIPMENT STORAGE FROM ACTIVE TRAVEL LANES	
Posted Speed Limit (mph)	Distance (ft)
40 or less	≥ 18
45-50	≥ 28
55	≥ 32
60 or higher	≥ 40

When vehicles, equipment and materials are protected by concrete barrier or guardrail, they shall be offset at least 5 feet from the barrier or guardrail.

Page 11-2, Article 1101-9 PARKING OF PERSONAL VEHICLES, line 40-41, delete and replace with the following:

Provide staging areas for personal vehicle parking in accordance with Article 1101-8 or as directed by the Engineer before use.

WORK ZONE INSTALLER:

(7-20-21)(Rev. 8-16-22) 1101, 1150 SP11 R04

Provide the service of at least one qualified work zone installer during the setup, installation, and removal of temporary traffic control within the highway right of way. The qualified work zone installer shall serve as crew leader and shall be on site and directing the installation and removal of temporary traffic control. If multiple temporary traffic control installations or removals are occurring simultaneously, then each shall have a qualified work zone installer.

The work zone installer shall be qualified by an NCDOT approved training agency or other NCDOT approved training provider in the safe and competent set up of temporary traffic control. For a complete listing of approved training agencies, see the Work Zone Safety Training webpage.

A work zone supervisor, in accordance with Article 1101-13 of the *Standard Specifications*, may fulfill the role of the work zone installer during the setup, installation, and removal of temporary traffic control within the highway right of way provided they are on site and directing the installation and removal of temporary traffic control.

All other individuals participating in the setup, installation, and removal of temporary traffic control within the highway right of way shall be certified as a qualified flagger in accordance with Article 1150-3 of the *Standard Specifications*, even if flagging is not being performed as part of the traffic control.

Provide the name and contact information of all qualified work zone installers to the Engineer prior to or at the preconstruction conference. Additionally, provide a qualification statement that all other individuals participating in the setup, installation, and removal of temporary traffic control are qualified flaggers that have been properly trained through an NCDOT approved training agency or other NCDOT approved training provider.

All certification records for qualified work zone installers and flaggers shall be uploaded by the approved training agency or other NCDOT approved training provider to the Department's Work Zone Education Verification App (WZ-EVA) prior to the qualified work zone installer or flagger

performing any traffic control duties on the project. For more information about WZ-EVA, see the Work Zone Safety Training webpage.

PORTABLE CHANGEABLE MESSAGE SIGNS:

(9-20-22)(Rev. 11-15-22) 1089, 1120 SP11 R10

Revise the *2018 Standard Specifications* as follows:

Page 10-197, Subarticle 1089-7(D) Controller, line 16, add the following after the third sentence of the first paragraph:

Change the controller password from the factory default and periodically change the controller password to deter unauthorized programming of the controller.

Page 10-197, Subarticle 1089-7(D) Controller, lines 16-19, replace the forth sentence of the first paragraph with the following:

The password system is recommended to include at least two levels of security such that operators at one level may only change message sequences displayed using preprogrammed sequences and operators at a higher level may create and store messages or message sequences.

Page 10-197, Subarticle 1089-7(D) Controller, line 24 replace the sentence with the following:

The controller shall be stored in a locked, weather and vandal resistant box when not in use and after changes to the messages are made.

Page 11-8, Article 1120-3 CONSTRUCTION METHODS, lines 26-32, replace the second paragraph with the following:

Provide an experienced operator for the portable changeable message sign during periods of operation to ensure that the messages displayed on the sign panel are in accordance with the plans and Subarticle 1089-7(D). Change the controller password from the factory default and periodically change the controller password to deter unauthorized programming of the controller. Using two levels of password security is recommended such that operators at one level may only change message sequences displayed using preprogrammed sequences and operators at a higher level may create and store messages or message sequences. Lock the controller in a weather and vandal resistant box when not in use and after changes to the messages are made.

LAW ENFORCEMENT:

(6-21-22)(Rev. 11-15-22) 1190 SP11 R30

Revise the *2018 Standard Specifications* as follows:

Page 11-19, Article 1190-1 DESCRIPTION, lines 4-5, replace the paragraph with the following:

Furnish Law Enforcement Officers and official Law Enforcement vehicles to direct traffic in accordance with the contract.

Page 11-19, Article 1190-2 CONSTRUCTION METHODS, lines 7-10, replace the first and second paragraph with the following:

Use off duty uniformed Law Enforcement Officers and official Law Enforcement vehicles equipped with blue lights to direct or control traffic as required by the plans or by the Engineer.

Law Enforcement vehicles shall not be parked within the buffer space on any roadway. Law Enforcement vehicles shall not be used to close or block an active travel lane on multilane roadways with a posted speed limit of 45 MPH or higher, except as allowed during rolling roadblock operations as shown in the *Roadway Standard Drawings* or while responding to an emergency.

Page 11-19, Article 1190-3 MEASUREMENT AND PAYMENT, lines 14-15, replace the second sentence of the first paragraph with the following:

There will be no direct payment for official Law Enforcement vehicles as they are considered incidental to the pay item.

EXTRUDED THERMOPLASTIC PAVEMENT MARKING THICKNESS:

3-19-19 (Rev. 6-21-22) 1205 SP12 R05

Revise the *2018 Standard Specifications* as follows:

Page 12-6, Subarticle 1205-4(A)(1) General, lines 5-8, delete the second sentence and replace with the following:

Use application equipment that provides multiple width settings ranging from 4 inches to 12 inches and multiple thickness settings to achieve the required thickness above the surface of the pavement as shown in Table 1205-3.

Page 12-7, Table 1205-3, THICKNESS REQUIREMENTS FOR THERMOPLASTIC, replace with the following:

TABLE 1205-3 MINIMUM THICKNESS REQUIREMENTS FOR THERMOPLASTIC	
Thickness	**Location**
240 mils	In-lane and shoulder-transverse pavement markings (rumble strips). May be placed in 2 passes.
90 mils	Center lines, skip lines, transverse bands, mini-skip lines, characters, bike lane symbols, crosswalk lines, edge lines, gore lines, diagonals, and arrow symbols

PORTABLE CONSTRUCTION LIGHTING:

4-19-22 1413 SP14 R13

Revise the *2018 Standard Specifications* as follows:

Page 14-24, Article 1413-3 TOWER LIGHT, lines 2-7, delete and replace the first and second sentence in the first paragraph with the following:

Use tower lights which consist of mercury vapor, metal halide, high pressure sodium, low pressure sodium or light emitting diode (with correlated color temperature of 4000 Kelvin or less) fixtures mounted on a tower approximately 30 feet in height. Use tower light fixtures which are heavy duty flood, area, or roadway style with wide beam spread, have sufficient output to provide the minimum illumination requirements for the Category of work, are weatherproof and supplied with attached waterproof power cord and plug.

Page 14-24, Article 1413-3 TOWER LIGHT, lines 11-12, delete and replace the second paragraph with the following:

Provide tower lights of sufficient wattage or quantity to provide the minimum average maintained horizontal illuminance over the work area based on the Category of work as shown in Table 1413-1. For any work not covered in Table 1413-1, provide a minimum average maintained horizontal illuminance of 20.0 footcandles over the work area.

Category	Description of Construction and Maintenance Task	Minimum Average Maintained Horizontal Illuminance
I	Excavation; Embankment, Fill and Compaction; Maintenance of Embankment; Asphalt Pavement Rolling; Subgrade, Stabilization and Construction; Base Course Rolling; Sweeping and Cleaning; Landscaping, Sod and Seeding; Reworking Shoulders.	5.0 footcandle
II	Barrier Wall and Traffic Separators; Milling, Removal of Pavement; Asphalt Paving and Resurfacing; Concrete Pavement; Base Course Grading and Shaping; Surface Treatment; Waterproofing and Sealing; Sidewalk Construction; Guardrails and Fencing; Striping and Pavement Marking; Highway Signs; Bridge Decks; Drainage Structures and Drainage Piping; Other Concrete Structures; Repair of Concrete Pavement; Pothole Filling; Repair of Guardrail and Fencing.	10.0 footcandle
III	Traffic Signals; Highway Lighting Systems; Crack Filling.	20.0 footcandle

Page 14-24, Article 1413-4 MACHINE LIGHTS, lines 18-21, delete and replace the first and second sentence in the first paragraph with the following:

Use machine lights which have mercury vapor, metal halide, high pressure sodium, low pressure sodium or light emitting diode (with correlated color temperature of 4000 Kelvin or less) fixtures mounted on supports attached to the construction machine at a height of approximately 13 feet.

Page 14-24, Article 1413-5 CONSTRUCTION METHODS, lines 33-34, delete and replace the third and fourth sentence in the first paragraph with the following:

Submit photometric calculations showing the minimum average maintained horizontal illuminance over the work area and the tower spacing to the Engineer for review and approval prior to installation.

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 *2018 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(D) of the *2018 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

(10-16-18) (Rev. 6-20-23) Z-4

Revise the *2018 Standard Specifications* as follows:

Division 1

Page 1-1, Article 101-2 Abbreviations, line 13, replace " American National Standards Institute, Inc." with "American National Standards Institute".

Page 1-1, Article 101-2 Abbreviations, line 32, replace "Equivalent Single Axis Load" with "Equivalent Single Axle Load".

Page 1-16, Subarticle 102-9(A) General, line 26, replace "10 U.S.C. 2304(g)" with "10 U.S.C. 3205".

Page 1-43, Article 104-13 RECYCLED PRODUCTS OR SOLID WASTE MATERIALS, line 4, replace "104-13(B)(2)" with "104-13(B)".

Page 1-52, Article 106-1 RECYCLED PRODUCTS OR SOLID WASTE MATERIALS, line 25, replace "13 NCAC 7CF.0101(a)(99)" with "29 CFR 1910.1200".

Page 1-79, Article 109-1 MEASUREMENT AND PAYMENT, Test Method prior to line 34, replace "AASHTO M 32" with "AASHTO M 336".

Division 2

Page 2-5, Article 210-2 CONSTRUCTION METHODS, line 21, replace " NCGS §§ 130A-444 to -452" with "NCGS §§ 130A-444 to -453".

Page 2-13, Article 225-2 EROSION CONTROL REQUIREMENTS, line 17, replace "the Sedimentation and Pollution Control Act" with "Article 107-12".

Page 2-20, Subarticle 230-4(B)(3) Reclamation Plan, line 12, replace " Department's borrow and waste site reclamation procedures for contracted projects" with "Department's *Borrow Waste and Staging Site Reclamation Procedures for Contract Projects*".

Page 2-25, Subarticle 235-3(E) Surcharges and Waiting Periods, line 21 and 27, delete "Department's Materials and Tests Unit.".

Page 2-27, Article 240-4 MEASUREMENT AND PAYMENT, line 23, replace "Section 225" with "Article 225-7".

Page 2-30, Article 275-4 MEASUREMENT AND PAYMENT, line 33, replace "Section 815" with "Article 815-4".

Division 4

Page 4-18, Subarticle 411-5(C)(3) Coring, line 11, replace "in accordance with ASTM D5079" with "with methods acceptable to the Engineer".

Page 4-50, Article 430-2 MATERIALS, prior to line 15, replace Section "1080-9" with "1080-7".

Page 4-53, Article 440-2 MATERIALS, prior to line 6, replace Section "1080-9" with "1080-7".

Page 4-58, Article 442-2 MATERIALS, prior to line 15, replace Section "1080-6" with "1080-12".

Page 4-59, Subarticle 442-7(A) Blast Cleaning, line 36, replace Article "1080-6" with "1080-12".

Page 4-76, Article 454-2 MATERIALS, prior to line 24, replace Section "815-2" with "1044".

Page 4-79, Article 455-2 MATERIALS, prior to line 21, replace Section "815" with "1044".

Page 4-80, Subarticle 455-3(B) Precast Gravity Wall Designs, line 23 and lines 25-26, replace "AASHTO LRFD specifications" with "*AASHTO LRFD Bridge Design Specifications*".

Page 4-84, Article 458-5 MEASUREMENT AND PAYMENT, line 31, replace article number "454-1" with "458-1".

Division 6

Page 6-7, Article 609-1 DESCRIPTION, line 29, replace article number "609-10" with "609-9".

Page 6-10, Subarticle 609-6(C) Control Charts, line 17, replace Section number "7021" with "7.20.1".

Page 6-13, Article 609-9 QUALITY ASSURANCE, line 31, replace Section number "7.60" with "7.6".

Page 6-26, Subarticle 610-13(A)(1) Acceptance for New Construction, line 31, replace Table number "610-7" with "610-8".

Page 6-29, Subarticle 610-13(B) North Carolina Hearne Straightedge, line 32, replace Table number "610-8" with "610-9".

Page 6-31, Article 610-14 DENSITY ACCEPTANCE, Specified Density prior to line 30 and line 32, replace Table number "610-6" with "610-7".

Page 6-37, Article 650-5 CONSTRUCTION METHODS, line 10, replace Section number "9.5(E)" with "9.5.1(E)".

Page 6-44, Subarticle 660-8(B) Asphalt Mat and Seal, line 40, replace Subarticle number "660-8(A)" with "660-8(C)".

Page 6-44, Subarticle 660-8(B) Asphalt Mat and Seal, line 42, replace Subarticle number "660-8(C)" with "660-8(A)".

Division 7

Page 7-11, Subarticle 700-15(E) Compressive Strength, line 5, replace "AASHTO T 23" with "AASHTO R 100".

Page 7-24, Article 723-4 Very High Early Strength Concrete for Concrete Pavement Repair, line 4, replace "AASHTO T126" with "AASHTO R 39".

Page 7-24, Article 723-5 MEASUREMENT AND PAYMENT, line 34, replace "Section 225" with "Article 225-7".

Page 7-24, Article 723-5 MEASUREMENT AND PAYMENT, line 36, replace "Section 270" with "Article 270-4".

Page 7-27, Article 725-1 MEASUREMENT AND PAYMENT, line 4, replace article number "725-1" with "724-4".

Page 7-28, Article 725-1 MEASUREMENT AND PAYMENT, line 10, replace article number "725-1" with "725-3".

Division 8

Page 8-11, Article 815-1 MATERIALS, after line 35, replace "1080-12" with "1080-10".

Page 8-13, Article 816-1 MATERIALS, after line 28, replace "1080-12" with "1080-10".

Page 8-17, Article 825-1 Description, line 5, delete "853" and "855".

Division 10

Page 10-2, Subarticle 1000-3(B) Air Entrainment, line 33, replace "Chase" with "Chace".

Page 10-4, Subarticle 1000-4(A) Composition and Design, after line 17, replace "T23" with "R100".

Page 10-4, Subarticle 1000-4(B) Air Entrainment, line 31 and 33, replace "Chase" with "Chace".

Page 10-4, Subarticle 1000-4(C) Strength of Concrete, line 39 and 41, replace "T 23" with "R 100".

Page 10-15, Subarticle 1000-11(B) Mixing Time for Central Mixed Concrete, after line 35, replace "T 23" with "R 100".

Page 10-22, Article 1003-3 COMPOSITION AND DESIGN, line 9, replace "Engineer" with "engineer".

Page 10-23, Article 1003-4 GROUT REQUIREMENTS, line 16 and 18, replace "T 23" with "R 100".

Page 10-26, Article 1005-4 TESTING, after line 26, replace "1014-2€(6)" with "1014-2€(6)"in C. of Table 1005-1 footnote and replace "Lightweight[B]" with "Lightweight[C]".

Page 10-29, Subarticle 1012-1(B)(4) Flat and Elongated Pieces, line 44, delete "SF9.5A"

Page 10-36, Subarticle 1012-2(E) Toughness (Resistance to Abrasion), line 31, replace "course" with "coarse".

Page 10-37, Article 1012-4, LIGHTWEIGHT AGGREGATE, line 4, replace Table number "1012-8" with "1012-5".

Page 10-48, Subarticle 1020-10(A) Mineral Fibers, line 27, replace "Table 1012-5" with "Table 1020-2".

Page 10-52, Article 1024-5 FLY ASH, line 12, replace "Table 2" with "Table 3".

Page 10-60, Subarticle 1032-6(F) Joint Materials, line 15, replace "AASHTO M 198" with "ASTM C990" and delete "Type B".

Page 10-61, Article 1034-3 CONCRETE SEWER PIPE, line 33, replace "AASHTO M 198" with "ASTM C990" and delete "Type A or B".

Page 10-64, Article 1040-1 BRICK, line 12, replace "ASTM C62" with "ASTM C62 or ASTM C216".

Page 10-67, Article 1044-7 CORRUGATED PLASTIC PIPE AND FITTINGS, line 24, replace "AASHTO M 294 for heavy duty tubing" with "Article 1032-7 and AASHTO M 252".

Page 10-68, Subarticle 1046-3(D) Offset Blocks, lines 30-32, delete "Before beginning the installation of recycled offset block, submit the FHWA acceptance letter for each type of block to the Engineer for approval."

Page 10-69, Subarticle 1046-3(D) Offset Blocks, before line 1, replace "WIRE DIAMETER" with "COMPOSITE OFFSET BLOCKS" as the tile of Table 1046-1, delete "Testing" property and associated requirement from Table 1046-1, and replace "Approval" requirement of "Approved for use by the FHWA" with "Approved for use on the NCDOT APL" in Table 1046-1.

Page 10-80, Article 1060-2 FERTILIZER, line 18, replace "North Carolina Fertilizer Law" with "North Carolina Commercial Fertilizer Law".

Page 10-83, Article 1060-9 WATER, line 9, replace "15 NCAC 2B.0200" with "15A NCAC 02B.0200".

Page 10-86, Article 1070-3 COLD DRAWN STEEL WIRE AND WIRE REINFORCEMENT, line 23 and 25, replace "M 32" and "M 55" with "M 336".

Page 10-87, Article 1070-6 DOWELS AND TIE BARS FOR PORTLAND CEMENT CONCRETE PAVEMENT, line 17, replace "AASHTO M 32" with "AASHTO M 336".

Page 10-88, Subarticle 1070-7(D) Handling, Storage and Transportation, line 40, replace "Section" with "Subarticle".

Page 10-89, Article 1070-8 SPIRAL COLUMN REINFORCING STEEL, line 21, replace "AASHTO M 32" with "AASHTO M 336".

Page 10-91, Article 1072-3 BEARING PLATE ASSEMBLIES, line 44, replace "Article 1080-9" with "Article 1080-7".

Page 10-92, Subarticle 1072-5(A) General, after line 30, replace "SAMPLING REQUIREMENTS FOR HIGH STRENGTH BOLTS, NUTS AND WASHERS" with "SAMPLING REQUIREMENTS FOR HIGH STRENGTH BOLTS, NUTS AND WASHERS TO INCLUDE DIRECT TENSION INDICATORS" as the title of Table 1072-1.

Page 10-95, Subarticle 1072-5(D)(7)(a) Mill Test Report(s), line 18, replace title with "Mill Test Report(s) (MTR)".

Page 10-95, Subarticle 1072-5(D)(7)(b) Manufacturer Certified Test Report(s), line 24, replace title with "Manufacturer Certified Test Report(s) (MCTR)".

Page 10-96, Subarticle 1072-5(D)(7)(c) Distributor Certified Test Report(s), line 1, replace title with "Distributor Certified Test Report(s) (DCTR)".

Page 10-98, Subarticle 1072-5(F) Galvanized High Strength Bolts, Nuts and Washers, line 11, replace "Article 1080-9" with "Article 1080-7".

Page 10-98, Subarticle 1072-5(F) Galvanized High Strength Bolts, Nuts and Washers, line 11, replace "Article 1080-9" with "Article 1080-7".

Page 10-111, Subarticle 1072-18(B) General, line 24, replace "Structural Welding Code-Reinforcing Steel" with "Structural Welding Code-Steel Reinforcing Bars".

Page 10-117, Article 1074-1 WELDING, lines 21-22, replace "Structural Welding Code-Reinforcing Steel" with "Structural Welding Code-Steel Reinforcing Bars".

Page 10-119, Article 1074-7(B) Gray Iron Castings, line 16, replace "M306" with "AASHTO M 306".

Page 10-121, Article 1076-7, REPAIR OF GALVANIZING, line 8, replace article number "1080-9" with "1080-7".

Page 10-125, Subarticle 1077-5(B) Testing, line 31, replace "T 23" with "R 100".

Page 10-131, Subarticle 1078-4(A) Composition and Design, after line 23, in Table 1078-2 replace "T 23" with "R 100".

Page 10-135, Subarticle 1078-4(J)(2) Mixing Time for Central Mixed Concrete, line 46, replace "Table 1078-2" with "Table 1078-3"

Page 10-136, Subarticle 1078-4(J)(2) Mixing Time for Central Mixed Concrete, after line 17, replace "T23" with "R100".

Page 10-153, Subarticle 1079-1 PREFORMED BEARING PADS, line 8, replace "MIL-C882-D" with "MIL-C-882-E".

Page 10-154, Subarticle 1079-2(A) General, line 6, delete "and 1079-2(E)".

Page 10-156, Article 1080-5 SELF-CURING INORGANIC ZINC PAINT, line 8, replace "AASHTO M 252" with "AASHTO M 300".

Page 10-156, Article 1080-5 SELF-CURING INORGANIC ZINC PAINT, line 20, replace "AASHTO M 253" with "AASHTO M 300".

Page 10-156, Subarticle 1080-9(A) Composition, line 40, replace "Tables 1080-7 through 1080-14" with "Tables 1080-1 through 1080-3".

Page 10-157, Subarticle 1080-9(B) Properties, line 5, replace "Tables 1080-7 through 1080-14" with "Tables 1080-1 through 1080-3".

Page 10-157, Subarticle 1080-9(B) Properties, line 35, replace "Materials and Tests Standards CLS-P-1.0" with "*Structural Steel Shop Coatings Program*".

Page 10-159, Subarticle 1080-9(E) Color Variation, Table 1080-1, replace "ASTM D1159" with "ASTM D1199".

Page 10-159, Subarticle 1080-9(E) Color Variation, Table 1080-1, replace "NCDOT M&T P-10" with "ASTM D6280".

Page 10-161, Subarticle 1080-9(E) Color Variation, Table 1080-3, replace "ASTM D13278" and "ASTM D3278".

Page 10-161, Subarticle 1080-9(E) Color Variation, Table 1080-3, replace "NCDOT M&T P-10" and "Structural Steel Shop Coatings Program".

Page 10-161, Subarticle 1080-9(E) Color Variation, Table 1080-3, add Test Method "ASTM D4400" for the Leneta Sag Test property in Table 1080-3.

Page 10-161, Subarticle 1080-9(E) Color Variation, Table 1080-3, add Test Method "ASTM D523" for the Gloss, Specular property in Table 1080-3.

Page 10-161, Subarticle 1080-9(E) Color Variation, Table 1080-3, replace Test Method "ASTM" with "ASTM E70" for the pH property in Table 1080-3.

Page 10-162, Article 1080-50 PAINT FOR VERTICAL MARKERS, line 1, replace article number "1080-50" with "1080-10".

Page 10-162, Article 1080-61 EPOXY RESIN FOR REINFORCING STEEL, line 5, replace article number "1080-61" with "1080-11".

Page 10-162, Article 1080-72 ABRASIVE MATERIALS FOR BLAST CLEANING STEEL, line 22, replace article number "1080-72" with "1080-12".

Page 10-163, Article 1080-83 FIELD PERFORMANCE AND SERVICES, line 25, replace article number "1080-83" with "1080-13".

Page 10-166, Subarticle 1081-1(E) Prequalification, line 24, replace "Value Management Unit" with "Product Evaluation Program".

Page 10-168, Subarticle 1081-3(A) Physical Requirements, after line 25, replace "Subarticle 1081-4(B)" with "Subarticle 1081-3(B)" in Table 1081-2.

Page 10-168, Subarticle 1087-2(A) Paint Composition, lines 19-20, replace "Federal Specification TTP 1952F" with "Federal Specification TT-P-1952".

Page 10-200, Subarticle 1090-1(C) Anchor Bolts, line 38, replace ASTM number "A325" with "F3125".

Page 10-202, Subarticle 1091-3(F) Solid Wall HDPE Conduit, line 5, replace ", Table 1091-1, 1091-2 and 1091-3" with "and Table 1091-1".

Page 10-208, Subarticle 1094-1(A) Breakaway or Simple Steel Beam Sign Supports, line 19, replace ASTM number "A325" with "F3125".

Page 10-209, Subarticle 1094-1(D) Steel Square Tube Posts, line 10, replace ASTM number "A123" with "A653".

Page 10-209, Subarticle 1094-1(E) Wood Supports, line 17, replace "Article 1082-2 and 1082-3" with "Section 1082".

Page 10-212, Subarticle 1098-1(H) Electrical Service, line 21, replace "NEMA Type 3R" with "NEMA 3R".

Page 10-212, Subarticle 1098-1(H) Electrical Service, line 36, replace "UL Standard 231" with "UL Standard UL-231".

Page 10-212, Subarticle 1098-1(H) Electrical Service, line 37, replace "UL Standard 67" with "UL Standard UL-67".

Page 10-224, Subarticle 1098-14(H)(1) Type I – Pedestrian Pushbutton Post, line 3, replace ASTM number "325" with "F3125".

Page 10-224, Article 1098-16 CABINET BASE ADAPTER/EXTENDER, line 33, replace Section number "6.7" with "6.8".

Division 14

Page 14-11, Subarticle 1401-2(B) Lowering Device, line 36, replace Military Specification "MIL-W-83420E" with "MIL-DTL-83420".

Page 14-22, Article 1412-2 MATERIALS, line 29, replace UL Standard "1572" with "1598".

Division 15

Page 15-6, Subarticle 1510-3(B) Testing and Sterilization, line 40, replace Section number "4.4.3" with "4.4".

Page 15-14, Article 1525-2 MATERIALS, line 9, replace "AASHTO M 198" with "ASTM C990".

Page 15-14, Article 1525-2 MATERIALS, lines 17-18, delete "in the Grout Production and Delivery provision".

Page 15-19, Article 1550-2 MATERIALS, line 16, replace "*AASHTO LRFD Bridge Design Specifications*" with "*AASHTO LRFD Bridge Construction Specifications*".

Division 16

Page 16-9, Article 1630-3 MEASUREMENT AND PAYMENT, line 7, replace "Section 225" with "Article 225-7".

Page 16-9, Article 1630-3 MEASUREMENT AND PAYMENT, line 8, replace "Section 230" with "Article 230-5".

Page 16-16, Article 1637-5 MEASUREMENT AND PAYMENT, line 17, replace "Section 310" with "Article 310-6".

Division 17

Page 17-15, Article 1715-4 MEASUREMENT AND PAYMENT, lines 42-44, replace the second sentence with the following:

An example is an installation of a single 1.25 inch HDPE conduit would be paid as:

Directional Drill (1)(1.25″) Linear Foot

Page 17-15, Subarticle 1715-3(E) Bore and Jack, line 5, replace article number "1540-4" with "1550-4".

Page 17-15, Subarticle 1715-3(E) Bore and Jack, lines 10 & 11, replace "*NCDOT Policies and Procedures for Accommodating Utilities on Highway Rights of Way*" with "*NCDOT Utilities Accommodations Manual*".

STANDARD SPECIAL PROVISION

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

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

Within Quarantined Area

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

Originating in a Quarantined County

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

Contact

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

Regulated Articles Include

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

STANDARD SPECIAL PROVISION

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

TITLE VI AND NONDISCRIMINATION:

(6-28-77)(Rev 6/19/2018) Z-6

Revise the *2018 Standard Specifications* as follows:

Replace Article 103-4(B) with the following:

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

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

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

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

(a) Compliance with Regulations

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

(b) Nondiscrimination

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

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

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

(d) Information and Reports

The contractor shall provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the FHWA to be pertinent to ascertain compliance with such Acts,

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

(e) Sanctions for Noncompliance:
In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it and/or the FHWA may determine to be appropriate, including, but not limited to:
(i) Withholding payments to the contractor under the contract until the contractor complies; and/or
(ii) Cancelling, terminating, or suspending a contract, in whole or in part.

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

(2) **Title VI Nondiscrimination Program (23 CFR 200.5(p))**
The North Carolina Department of Transportation (NCDOT) has assured the USDOT that, as a condition to receiving federal financial assistance, NCDOT will comply with Title VI of the Civil Rights Act of 1964 and all requirements imposed by Title 49 CFR part 21 and related nondiscrimination authorities to ensure that no person shall, on the ground of race, color, national origin, limited English proficiency, sex, age, or disability (including religion/creed or income-level, where applicable), be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any programs, activities, or services conducted or funded by NCDOT. Contractors and other organizations under contract or agreement with NCDOT must also comply with Title VI and related authorities, therefore:

(a) During the performance of this contract or agreement, contractors (e.g., subcontractors, consultants, vendors, prime contractors) are responsible for complying with NCDOT's Title VI Program. Contractors are not required to prepare or submit Title VI Programs. To comply with this section, the prime contractor shall:
1. Post NCDOT's Notice of Nondiscrimination and the Contractor's own Equal Employment Opportunity (EEO) Policy in conspicuous locations accessible to all employees, applicants and subcontractors on the jobsite.
2. Physically incorporate the required Title VI clauses into all subcontracts on federally-assisted and state-funded NCDOT projects, and ensure inclusion by subcontractors into all lower-tier subcontracts.
3. Required Solicitation Language. The Contractor shall include the following notification in all solicitations for bids and requests for work or material, regardless of funding source:
"The North Carolina Department of Transportation, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 US.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract

entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award. In accordance with other related nondiscrimination authorities, bidders and contractors will also not be discriminated against on the grounds of sex, age, disability, low-income level, creed/religion, or limited English proficiency in consideration for an award."

4. Physically incorporate the FHWA-1273, in its entirety, into all subcontracts and subsequent lower tier subcontracts on Federal-aid highway construction contracts only.
5. Provide language assistance services (i.e., written translation and oral interpretation), free of charge, to LEP employees and applicants. Contact NCDOT OCR for further assistance, if needed.
6. For assistance with these Title VI requirements, contact the NCDOT Title VI Nondiscrimination Program at 1-800-522-0453.

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

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

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

1. Applicability
   Title VI and related laws protect participants and beneficiaries (e.g., members of the public and contractors) from discrimination by NCDOT employees, subrecipients and contractors, regardless of funding source.
2. Eligibility
   Any person—or class of persons—who believes he/she has been subjected to discrimination based on race, color, national origin, Limited English Proficiency (LEP), sex, age, or disability (and religion in the context of employment, aviation, or transit) may file a written complaint. The law also prohibits intimidation or retaliation of any sort.
3. Time Limits and Filing Options
   Complaints may be filed by the affected individual(s) or a representative and must be filed no later than 180 calendar days after the following:
   (i) The date of the alleged act of discrimination; or
   (ii) The date when the person(s) became aware of the alleged discrimination; or
   (iii) Where there has been a continuing course of conduct, the date on which that conduct was discontinued or the latest instance of the conduct.

   Title VI and related discrimination complaints may be submitted to the following entities:
   - North Carolina Department of Transportation, Office of Civil Rights, Title VI Program, 1511 Mail Service Center, Raleigh, NC 27699-1511; toll free 1-800-522-0453
   - Federal Highway Administration, North Carolina Division Office, 310 New Bern Avenue, Suite 410, Raleigh, NC 27601, 919-747-7010

- US Department of Transportation, Departmental Office of Civil Rights, External Civil Rights Programs Division, 1200 New Jersey Avenue, SE, Washington, DC 20590; 202-366-4070

4. Format for Complaints
   Complaints must be in writing and signed by the complainant(s) or a representative, and include the complainant's name, address, and telephone number. Complaints received by fax or e-mail will be acknowledged and processed. Allegations received by telephone will be reduced to writing and provided to the complainant for confirmation or revision before processing. Complaints will be accepted in other languages, including Braille.
5. Discrimination Complaint Form
   Contact NCDOT Civil Rights to receive a full copy of the Discrimination Complaint Form and procedures.
6. Complaint Basis
   Allegations must be based on issues involving race, color, national origin (LEP), sex, age, disability, or religion (in the context of employment, aviation or transit). "Basis" refers to the complainant's membership in a protected group category.

TABLE 103-1
COMPLAINT BASIS

Protected Categories	Definition	Examples	Applicable Nondiscrimination Authorities
Race and Ethnicity	An individual belonging to one of the accepted racial groups; or the perception, based usually on physical characteristics that a person is a member of a racial group	Black/African American, Hispanic/Latino, Asian, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, White	Title VI of the Civil Rights Act of 1964; 49 CFR Part 21; 23 CFR 200; 49 U.S.C. 5332(b); 49 U.S.C. 47123. *(Executive Order 13166)*
Color	Color of skin, including shade of skin within a racial group	Black, White, brown, yellow, etc.	
National Origin *(Limited English Proficiency)*	Place of birth. Citizenship is not a factor. (*Discrimination based on language or a person's accent is also covered)*	Mexican, Cuban, Japanese, Vietnamese, Chinese	
Sex	Gender. The sex of an individual. *Note:* Sex under this program does not include sexual orientation.	Women and Men	1973 Federal-Aid Highway Act; 49 U.S.C. 5332(b); 49 U.S.C. 47123.
Age	Persons of any age	21-year-old person	Age Discrimination Act of 1975 49 U.S.C. 5332(b); 49 U.S.C. 47123.
Disability	Physical or mental impairment, permanent or temporary, or perceived.	Blind, alcoholic, para-amputee, epileptic, diabetic, arthritic	Section 504 of the Rehabilitation Act of 1973; Americans with Disabilities Act of 1990

Religion (in the context of employment) *(Religion/ Creed in all aspects of any aviation or transit-related construction)*	An individual belonging to a religious group; or the perception, based on distinguishable characteristics that a person is a member of a religious group. In practice, actions taken as a result of the moral and ethical beliefs as to what is right and wrong, which are sincerely held with the strength of traditional religious views. ***Note:*** Does not have to be associated with a recognized religious group or church; if an individual sincerely holds to the belief, it is a protected religious practice.	Muslim, Christian, Sikh, Hindu, etc.	Title VII of the Civil Rights Act of 1964; 23 CFR 230; FHWA-1273 Required Contract Provisions. *(49 U.S.C. 5332(b);* *49 U.S.C. 47123)*

(3) **Pertinent Nondiscrimination Authorities**

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

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

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

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

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

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

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

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

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

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

(j) Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures Nondiscrimination against minority populations by discouraging programs, policies, and activities with

disproportionately high and adverse human health or environmental effects on minority and low-income populations;

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

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

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

(4) **Additional Title VI Assurances**

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

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

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

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

(HABENDUM CLAUSE)

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

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

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

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

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

1. The (grantee, lessee, permittee, etc. as appropriate) for himself/herself, his/her heirs, personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree [in the case of deeds and leases add "as a covenant running with the land"] that:
   (i.) In the event facilities are constructed, maintained, or otherwise operated on the property described in this (deed, license, lease, permit, etc.) for a purpose for which a U.S. Department of Transportation activity, facility, or program is extended or for another purpose involving the provision of similar services or benefits, the (grantee, licensee, lessee, permittee, etc.) will maintain and operate such facilities and services in compliance with all requirements imposed by the Acts and Regulations (as may be amended) such that no person on the grounds of race, color, or national origin, will be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities.
2. With respect to licenses, leases, permits, etc., in the event of breach of any of the above Nondiscrimination covenants, the NCDOT will have the right to terminate the (lease, license, permit, etc.) and to enter, re-enter, and repossess said lands and facilities thereon, and hold the same as if the (lease, license, permit, etc.) had never been made or issued. *
3. With respect to a deed, in the event of breach of any of the above Nondiscrimination covenants, the NCDOT will have the right to enter or re-enter the lands and facilities thereon, and the above described lands and facilities will there upon revert to and vest in and become the absolute property of the NCDOT and its assigns. *

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

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

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

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

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

STANDARD SPECIAL PROVISION

ON-THE-JOB TRAINING

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

Description

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

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

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

Minorities and Women

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

Assigning Training Goals

The Department, through the OJT Program Manager, will assign training goals for a calendar year based on the contractors' past three years' activity and the contractors' anticipated upcoming year's activity with the Department. At the beginning of each year, all contractors eligible will be contacted by the Department to determine the number of trainees that will be assigned for the upcoming calendar year. At that time the Contractor shall enter into an agreement with the Department to provide a self-imposed on-the-job training program for the calendar year. This agreement will include a specific number of annual training goals agreed to by both parties. The number of training assignments may range from 1 to 15 per contractor per calendar year. The Contractor shall sign an agreement to fulfill their annual goal for the year.\

Training Classifications

The Contractor shall provide on-the-job training aimed at developing full journeyman level workers in the construction craft/operator positions. Preference shall be given to providing training in the following skilled work classifications:

Equipment Operators	Office Engineers
Truck Drivers	Estimators
Carpenters	Iron / Reinforcing Steel Workers
Concrete Finishers	Mechanics
Pipe Layers	Welders

The Department has established common training classifications and their respective training requirements that may be used by the contractors. However, the classifications established are not all-inclusive. Where the training is oriented toward construction applications, training will be allowed in lower-level management positions such as office engineers and estimators. Contractors shall submit new classifications for specific job functions that their employees are performing. The Department will review and recommend for acceptance to FHWA the new classifications proposed by contractors, if applicable. New classifications shall meet the following requirements:

Proposed training classifications are reasonable and realistic based on the job skill classification needs, and

The number of training hours specified in the training classification is consistent with common practices and provides enough time for the trainee to obtain journeyman level status.

The Contractor may allow trainees to be trained by a subcontractor provided that the Contractor retains primary responsibility for meeting the training and this provision is made applicable to the subcontract. However, only the Contractor will receive credit towards the annual goal for the trainee.

Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. The number of trainees shall be distributed among the work classifications on the basis of the contractor's needs and the availability of journeymen in the various classifications within a reasonable area of recruitment.

No employee shall be employed as a trainee in any classification in which they have successfully completed a training course leading to journeyman level status or in which they have been employed as a journeyman.

Records and Reports

The Contractor shall maintain enrollment, monthly and completion reports documenting company compliance under these contract documents. These documents and any other information as requested shall be submitted to the OJT Program Manager.

Upon completion and graduation of the program, the Contractor shall provide each trainee with a certification Certificate showing the type and length of training satisfactorily completed.

Trainee Interviews

All trainees enrolled in the program will receive an initial and Trainee/Post graduate interview conducted by the OJT program staff.

Trainee Wages

Contractors shall compensate trainees on a graduating pay scale based upon a percentage of the prevailing minimum journeyman wages (Davis-Bacon Act). Minimum pay shall be as follows:

60 percent	of the journeyman wage for the first half of the training period
75 percent	of the journeyman wage for the third quarter of the training period
90 percent	of the journeyman wage for the last quarter of the training period

In no instance shall a trainee be paid less than the local minimum wage. The Contractor shall adhere to the minimum hourly wage rate that will satisfy both the NC Department of Labor (NCDOL) and the Department.

Achieving or Failing to Meet Training Goals

The Contractor will be credited for each trainee employed by him on the contract work who is currently enrolled or becomes enrolled in an approved program and who receives training for at least 50 percent of the specific program requirement. Trainees will be allowed to be transferred between projects if required by the Contractor's scheduled workload to meet training goals.

If a contractor fails to attain their training assignments for the calendar year, they may be taken off the NCDOT's Bidders List.

Measurement and Payment

No compensation will be made for providing required training in accordance with these contract documents.

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STANDARD SHORING: **(10-19-21)**

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 Geotechnical Standard Detail No. 1801.01 or 1801.02.

Define "standard temporary shoring" as cantilever shoring that meets the standard temporary shoring detail (Geotechnical Standard Detail No. 1801.01). Define "standard temporary wall" as a temporary MSE wall with geotextile or geogrid reinforcement that meets the standard temporary wall detail (Geotechnical Standard Detail 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.

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
Concrete Barrier Materials	1170-2
Flowable Fill, Excavatable	1000-6
Geosynthetics	1056
Grout, Type 1	1003
Portland Cement Concrete, Class A	1000
Select Materials	1016
Steel Beam Guardrail Materials	862-2
Steel Sheet Piles and H-Piles	1084
Untreated Timber	1082-2
Welded Wire Reinforcement	1070-3

Provide Type 6 material certifications for shoring materials. Use Class IV select material for temporary guardrail. Use Class A concrete that meets Article 450-2 of the *Standard Specifications* or Type 1 grout for drilled-in piles.

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 Geotechnical Standard Detail 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,

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(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 Geotechnical Standard Detail No. 1801.02. Provide Type 2 geotextile for separation and retention geotextiles. 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 Geotechnical Standard Detail No. 1801.02.

(2) Geogrid Reinforcement

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

Based on actual wall height, groundwater or flood 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 Geotechnical Standard Detail No. 1801.02. Geogrids are approved for short-term design strengths (3-year design life) in the machine direction (MD) and cross-machine direction (CD) based on material type. Define material type from the website above for shoring backfill as follows:

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

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.

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(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

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 Geotechnical Standard Detail 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 Geotechnical Standard Detail No. 1801.01. Otherwise, use "slope or surcharge case with no traffic impact" in accordance with Geotechnical Standard Detail 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 Geotechnical Standard Detail 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 Geotechnical Standard Detail 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.

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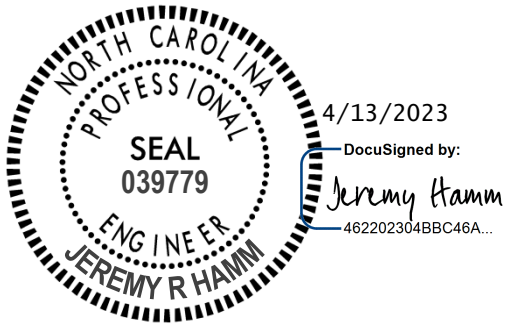

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TEMPORARY SOIL NAIL WALLS: (10-19-21)

Description

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

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

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	Section
Geocomposites	1056
Portland Cement	1024-1
Reinforcing Steel	1070
Shotcrete	1002
Select Material, Class IV	1016
Steel Plates	1072-2
Water	1024-4

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

Use Class IV select material for temporary guardrail. Provide soil nails consisting of grouted steel bars and nail head assemblies. Use deformed solid steel bars that meet AASHTO M 275 or M 31, Grade 60, 75 or 80. Splice solid bars in accordance with Article 1070-9 of the *Standard Specifications*. Use hollow steel bars manufactured by DYWIDAG-Systems International USA Inc., Nucor Skyline, Williams Form Engineering Corp. or an approved equal.

Use centralizers that meet Article 34.3.4 of the *AASHTO LRFD Bridge Construction Specifications*. Provide nail head assemblies consisting of nuts, washers and bearing plates. Use steel plates for bearing plates and steel washers and hex nuts recommended by the Soil Nail Manufacturer.

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

Preconstruction Requirements

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(A) Concrete Barrier

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

(B) Temporary Guardrail

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

(C) Soil Nail Wall Designs

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

Design soil nail walls in accordance with the plans and the *AASHTO LRFD Bridge Design Specifications* unless otherwise required. Design soil nails that meet the following unless otherwise approved:

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

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

(3) Diameter of 4" to 10".

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

Design soil nail walls for a traffic surcharge of 250 psf if traffic will be above and within H of walls. This traffic surcharge does not apply to construction traffic. Design soil nail walls for any construction surcharge if construction traffic will be above and within H of walls. For temporary guardrail with 8 ft posts above soil nail walls, analyze shotcrete and top row of nails for a nominal horizontal load of 300 lb/ft of wall with a load factor of 1.0.

Place geocomposite sheet drains with a horizontal spacing of no more than 10 ft and center drains between adjacent nails. Attach sheet drains to excavation faces. Design shotcrete in accordance with Article 11.12.6.2 of the *AASHTO LRFD Bridge Design Specifications*.

Submit PDF files of working drawings and design calculations for soil nail wall designs in accordance with Article 105-2 of the *Standard Specifications*. Submit working drawings showing plan views, wall profiles, typical sections and details of soil nail wall design and construction sequence. Include details in working drawings of soil nail locations, unit grout/ground bond strengths, shotcrete reinforcement and if necessary, obstructions extending through walls or interfering with nails. Include details in construction sequence

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of excavation, grouting, installing reinforcement, nail testing and shotcreting with mix designs and shotcrete nozzleman certifications. Do not begin soil nail wall construction until a design submittal is accepted.

Submit design calculations for each wall section with different surcharge loads, geometry or material parameters. Include analysis of temporary conditions during construction in design calculations. At least one analysis is required for each wall section with different nail lengths. Analyze internal and compound stability with a computer software program that uses limit equilibrium methods and submit all PDF output files from the program with the design calculations. See Article C11.12.2 of the AASHTO LRFD specifications for determining the maximum soil nail force, T_{maxsn}. Once T_{maxsn} and pullout length behind slip surface, L_P, are determined from limit equilibrium methods at the target soil failure resistance factor (1 over factor of safety output from computer software), use these values for soil nail (pullout and tensile resistance) and wall facing (flexure, punching shear and headed-stud tensile resistance) design in accordance with Articles 11.12.5.2, 11.12.6.1 and 11.12.6.2 of the AASHTO LRFD specifications.

(1) When designing soil nail walls with computer software Snail manufactured by the California Department of Transportation (CALTRANS), use Snail version 2.2.0 or later, to calculate factors of safety and T_{maxsn} and L_P values in accordance with the following:Allowable Stress Design for Analysis Method with no load factors applied except those applied to factored surcharge loads from structures or traffic,

(2) Perform Below Toe Search option selected when any soil layer has a friction angle less than 30° and

(3) Default value of 0.33 for Interface Friction Reduction Factor.

When designing soil nail walls with computer software other than Snail, use bi-linear (or tri-linear, as applicable) search surfaces intended to reproduce Snail results. Factors of safety and T_{maxsn} and L_P values are acceptable if they are within 5% of the factors of safety and T_{maxsn} and L_P values calculated by the Engineer using the computer software Slide2 manufactured by Rocscience, Inc.

(D) Preconstruction Meeting

Before starting soil nail wall construction, hold a preconstruction meeting to discuss the construction, inspection and testing of the soil nail walls. If this meeting occurs before all soil nail wall submittals have been accepted, additional preconstruction meetings may be required before beginning construction of soil nail walls without accepted submittals. The Resident, District or Bridge Maintenance Engineer, Area Construction Engineer, Geotechnical Operations Engineer, Contractor and Soil Nail Wall Contractor Superintendent will attend preconstruction meetings.

Construction Methods

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

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

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

(A) Excavation

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

(1) Heights not to exceed vertical nail spacing,

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

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

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

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

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

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

(B) Soil Nails

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

The drilling, steel bar and grouting requirements below are for solid bar nails and may not apply to hollow bar nails. Hollow bar nails are typically installed by simultaneously drilling and grouting as a sacrificial drill bit is advanced and grout is pumped through the bar. For hollow bar nails, submit drilling and grouting procedures for approval before installing soil nails.

(1) Drilling

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

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

(2) Steel Bars

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

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

(3) Grouting

Mix and place grout in accordance with Subarticles 1003-5, 1003-6 and 1003-7 of the *Standard Specifications*. Remove oil, rust inhibitors, residual drilling fluids and similar foreign materials from holding tanks/hoppers, stirring devices, pumps, lines, tremie pipes and any other equipment in contact with grout before use. Measure grout temperature, density and flow during grouting with at least the same frequency grout cubes are made for compressive strength. Perform density and flow field tests in the presence of the Engineer in accordance with American National Standards Institute/American Petroleum Institute Recommended Practice 13B-1 (Section 4, Mud Balance) and ASTM C939 (Flow Cone), respectively.

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

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

(4) Nail Heads

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

(C) Sheet Drains

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

(D) Shotcrete

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

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

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

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

(E) Construction Records

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

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

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

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

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

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

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

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

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

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

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

Nail Testing

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

(A) Test Equipment

Use the following equipment to test nails:

(1) Two dial gauges with rigid supports,

(2) Hydraulic jack and pressure gauge and

(3) Jacking block or reaction frame.

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

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

(B) Test Nails

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

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

(C) Proof Tests

Test proof test nails in accordance with the accepted submittals and Article 34.5.5.3, respectively of the *AASHTO LRFD Bridge Construction Specifications*.

(D) Test Nail Acceptance

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Submit 2 copies of test nail records including load versus movement and time versus creep movement plots within 24 hours of completing each proof test. The Engineer will review the test nail records to determine if test nails are acceptable. Test nail acceptance is based in part on the acceptance criteria in Article 34.5.5.4 of the *AASHTO LRFD Bridge Construction Specifications*.

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

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

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

Measurement and Payment

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

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

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

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

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

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GEOTEXTILE FOR SUBGRADE STABILIZATION (SPECIAL)

Description

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

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	Section
Geotextile, Type 5	1056

Provide Type 5 geotextile for geotextile for subgrade stabilization that has a melting point of 300° F or greater in accordance with ASTM D276.

Construction Methods

Do not leave geotextiles exposed for more than 7 days before covering geotextiles with asphalt base course or ABC. Place geotextile for subgrade stabilization on subgrades as shown in the plans. Install geotextile for subgrade stabilization on subgrades with the long dimension of the roll parallel to the roadway centerline and the minimum roll width under roadway edges and shoulders adjacent to fill slopes. Overlap adjacent geotextiles at least 18 inches in the direction that asphalt base course or ABC will be placed to prevent lifting the edge of the top geotextile. Pull geotextiles taut so they are in tension and free of kinks, folds, wrinkles or creases. Hold geotextiles in place as needed with wire staples or anchor pins.

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 subgrade stabilization when placing asphalt base course or ABC. Place and compact asphalt base course or ABC in accordance with the contract and *Standard Specifications*. Do not operate heavy equipment on geotextiles any more than necessary to construct base courses. Replace any damaged geotextiles to the satisfaction of the Engineer.

Measurement and Payment

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

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REINFORCED SOIL SLOPES (SPECIAL)

Description

Construct reinforced soil slopes (RSS) consisting of select material and geogrid reinforcement in the reinforced zone with erosion control products on slope faces. Slope erosion control includes matting with shoulder and slope borrow or geocells with compost blankets. Construct RSS in accordance with the contract and applicable sheets in the plans. 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 "matting" as coir fiber mats or matting for erosion control. Define "RSS" as an RSS that meets any of the reinforced soil slope drawings.

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	Section
Geogrids	1056
Matting for Erosion Control	1060-8
Select Materials	1016
Shoulder and Slope Borrow	1019-2

Unless required otherwise in the plans, use Class I, II or III select material in the reinforced zone of RSS. Use geocells that meet the *Cellular Confinement Systems* provision, seeded compost blankets that meet the *Compost Blanket* provision and coir fiber mats that meet the *Coir Fiber Mat* provision.

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 per Article 1056-3 of the *Standard Specifications*. Provide Type 1 material certifications and identify geogrids in accordance with Article 1056-3 of the *Standard Specifications*.

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

Provide primary geogrids with design strengths in accordance with the plans. For RSS and based on actual RSS angle and height and select material to be used in the reinforced zone at each RSS location, provide primary geogrids with long-term design strengths in accordance with the plans. Primary geogrids are approved for 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 III Select Material

For secondary geogrids, provide extruded geogrids produced in the United States and manufactured from punched and drawn polypropylene sheets. Use secondary geogrids with a roll width of at least 6 ft that meet the following:

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Property	Requirement[1]	Test Method
Aperture Dimensions[2]	1" x 1.3"	Direct Measure
Minimum Rib Thickness[2]	0.03" x 0.03"	Direct Measure
Tensile Strength @ 2% Strain[2]	280 lb/ft x 450 lb/ft	ASTM D6637, Method B
Tensile Strength @ 5% Strain[2]	580 lb/ft x 920 lb/ft	
Ultimate Tensile Strength[2]	850 lb/ft x 1,300 lb/ft	
Junction Efficiency[3] (MD)	93%	ASTM D7737
Flexural Rigidity[4]	250,000 mg–cm	ASTM D7748
Aperture Stability Modulus[5]	0.32 lb–ft/degrees	ASTM D7864
UV Resistance (500 hr exposure)	100% retained	ASTM D4355

1. MARV per Article 1056-3 of the *Standard Specifications* except dimensions and thickness are nominal.
2. Requirement for MD x CD.
3. Junction Efficiency (%) = (Average Junction Strength (Xj_{ave}) / Ultimate Tensile Strength in the MD from ASTM D6637, Method A) × 100.
4. Test specimens two ribs wide, with transverse ribs cut flush with exterior edges of longitudinal ribs, and sufficiently long to enable measurement of the overhang dimension.
5. Applied moment of 17.7 lb–inch (torque increment).

Construction Methods

Before starting RSS construction, the Engineer may require a preconstruction meeting to discuss the construction and inspection of the RSS. If this meeting is required and occurs before all RSS submittals and material certifications have been accepted, additional preconstruction meetings may be required before beginning construction of RSS without accepted submittals. The Resident or District Engineer, Area Construction Engineer, Geotechnical Operations Engineer, Contractor and RSS Contractor Superintendent will attend preconstruction meetings.

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. Install geogrids with the orientation, dimensions and number of layers shown in the plans. Before placing select material, pull geogrids taut so they are in tension and free of kinks, folds, wrinkles or creases. 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.

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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. 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 using geocells for slope erosion control. Install slope erosion control as shown in the plans and as soon as possible to prevent damage to slope faces of RSS. If damage occurs, repair RSS and slope faces to the satisfaction of the Engineer before seeding or installing erosion control products. For matting, seed slope faces and cover shoulder and slope borrow with coir fiber mat or matting for erosion control as shown in the plans in accordance with the *Coir Fiber Mat* provision or Section 1631 of the *Standard Specifications*, respectively. Install geocells filled with seeded compost in accordance with the accepted submittals and the *Cellular Confinement Systems* and *Compost Blanket* provisions. Maintain slope erosion control until vegetation is established.

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 slope erosion control as the square yards of RSS. No payment will be made for repairing damaged RSS or slope faces.

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 erosion control products. The contract unit price for *Reinforced Soil Slopes* will also be full compensation for excavating and hauling and removing excavated materials to install RSS.

Coir fiber mat and matting for erosion control will be measured and paid in accordance with the *Coir Fiber Mat* provision and Article 1631-4 of the *Standard Specifications*, respectively. Geocells and seeded compost blankets will be measured and paid in accordance with the *Cellular*

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Confinement Systems and *Compost Blanket* provisions, respectively.

Payment will be made under:

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

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MECHANICALLY STABILIZED EARTH RETAINING WALLS (10-19-21)

1.0 GENERAL

Construct mechanically stabilized earth (MSE) retaining walls consisting of steel or geosynthetic reinforcement in the reinforced zone connected to vertical facing elements. Use precast concrete panels for vertical facing elements and coarse aggregate in the reinforced zone unless noted otherwise in the plans. Provide reinforced concrete coping and pile sleeves as required. Design and construct MSE retaining walls based on actual elevations and wall dimensions in accordance with the contract and accepted submittals. Use a prequalified MSE Wall Installer to construct MSE retaining walls.

Define MSE wall terms as follows:
Geosynthetic Reinforcement – Polyester Type (PET), HDPE or Polypropylene (PP) geosynthetic grids, i.e., geogrid reinforcement or polymer straps, i.e., geostrip reinforcement,
Geogrid – PET, HDPE or PP geogrid,
Reinforcement – Steel or geosynthetic reinforcement,
Aggregate – Coarse or fine aggregate,
Panel – Precast concrete panel,
Coping – Precast or CIP concrete coping,
Design Height (H) – Wall height + wall embedment as shown in the plans,
MSE Wall – Mechanically stabilized earth retaining wall,
MSE Wall Vendor – Vendor supplying the chosen MSE wall system,
MSE Panel Wall – MSE wall with panels,
MSE Segmental Wall – MSE wall with segmental retaining wall (SRW) units and
Abutment Wall – MSE wall with bridge foundations in any portion of the reinforced zone or an MSE wall connected to an abutment wall (even if bridge foundations only penetrate a small part of the reinforced zone, the entire MSE wall is considered an abutment wall).

For bridge approach fills behind end bents with MSE abutment walls, design reinforcement connected to end bent caps in accordance with the plans and this provision. Construct Type III Reinforced Bridge Approach Fills in accordance with the *Bridge Approach Fills* provision and Roadway Detail Drawing No. 422D10.

Use an approved MSE wall system in accordance with the plans and any NCDOT restrictions or exceptions for the chosen system. Value engineering proposals for other MSE wall systems will not be considered. Do not use MSE wall systems with an "approved for provisional use" status for MSE walls with design heights greater than 35 ft or walls supporting or adjacent to railroads or interstate highways. The list of approved MSE wall systems with approval status is available from:
connect.ncdot.gov/resources/Geological/Pages/Products.aspx

2.0 MATERIALS

Refer to the *Standard Specifications*.

Item	Section

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Aggregate	1014
Asphalt Concrete Base Course, Type B25.0C	620
Corrugated Steel Pipe	1032-3
Epoxy, Type 3A	1081
Geosynthetics	1056
Grout, Type 3	1003
Joint Materials	1028
Portland Cement Concrete, Class A	1000
Precast Retaining Wall Coping	1077
Reinforcing Steel	1070
Retaining Wall Panels	1077
Segmental Retaining Wall Units	1040-4
Select Material, Class V	1016
Shoulder Drain Materials	816-2
Steel Pipe	1036-4(A)

Use galvanized corrugated steel pipe with a zinc coating weight of 2 oz/sf (G200) for pile sleeves. Provide Type 2 geotextile for filtration and separation geotextiles. Use Class A concrete for CIP coping, leveling concrete and pads. Use galvanized steel pipe, threaded rods and nuts for the PET geogrid reinforcement vertical obstruction detail. Provide galvanized Grade 36 anchor rods and Grade A hex nuts that meet AASHTO M 314 for threaded rods and nuts.

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

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

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

A. Aggregate

Use standard size No. 57, 57M, 67 or 78M that meets Table 1005-1 of the *Standard Specifications* for coarse aggregate and the following for fine aggregate:

1. Standard size No. 1S, 2S, 2MS or 4S that meets Table 1005-2 of the *Standard*

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Specifications or

2. Gradation that meets Class III, Type 3 select material in accordance with Article 1016-3 of the *Standard Specifications*.

Fine aggregate is exempt from mortar strength in Subarticle 1014-1(E) of the *Standard Specifications*. Use fine aggregate with a maximum organic content of 1.0%. Provide aggregate with chemical properties that meet the following requirements:

AGGREGATE pH REQUIREMENTS		
Aggregate Type (in reinforced zone)	**Reinforcement or Connector Material**	**pH**
Coarse or Fine	Steel	5 – 10
Coarse or Fine	Geosynthetic	4.5 – 9

AGGREGATE ELECTROCHEMICAL REQUIREMENTS (Steel Reinforcement/Connector Materials Only)			
Aggregate Type (in reinforced zone)	**Resistivity**	**Chlorides**	**Sulfates**
Coarse	≥ 5,000 Ω · cm	≤ 100 ppm	≤ 200 ppm
Fine	≥ 3,000 Ω · cm		

Use aggregate from sources participating in the Department's Aggregate QC/QA Program as described in Section 1006 of the *Standard Specifications*. Sample and test aggregate in accordance with the *Mechanically Stabilized Earth Wall Aggregate Sampling and Testing Procedures*.

B. Reinforcement

Provide steel or geosynthetic reinforcement supplied by the MSE Wall Vendor or a manufacturer approved or licensed by the vendor. Use reinforcement approved for the chosen MSE wall system. The list of approved reinforcement for each MSE wall system is available from the website shown elsewhere in this provision.

1. Steel Reinforcement

Provide Type 1 material certifications in accordance with Article 106-3 of the *Standard Specifications* for steel reinforcement. Use welded wire grid reinforcement ("mesh", "mats" and "ladders") that meet Article 1070-3 of the *Standard Specifications* and steel strip reinforcement ("straps") that meet ASTM A572, A1011 or A463. Use 10 gauge or heavier structural steel Grade 50 or higher for steel strip reinforcement. Galvanize steel reinforcement in accordance with Section 1076 of the *Standard Specifications* or provide aluminized steel strip reinforcement that meet ASTM A463, Type 2-100.

2. Geosynthetic Reinforcement

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Provide Type 1 material certifications and identify geosynthetic reinforcement in accordance with Article 1056-3 of the *Standard Specifications*. Define machine direction (MD) and cross-machine direction (CD) for geogrids per Article 1056-3 of the *Standard Specifications*.

Use HDPE or PP geogrid for geogrid reinforcement cast into backwalls of end bent caps. Use PET or HDPE geogrid for geogrid reinforcement connected directly to SRW units and only HDPE geogrid for geogrid reinforcement cast into panels.

Provide extruded geogrids produced in the United States and manufactured from punched and drawn polypropylene sheets for PP geogrids that meet the following:

PP GEOGRID REQUIREMENTS		
Property	**Requirement[1]**	**Test Method**
Aperture Dimensions[2]	1" x 1.2"	N/A
Minimum Rib Thickness[2]	0.07" x 0.07"	N/A
Tensile Strength @ 2% Strain[2]	580 lb/ft x 690 lb/ft	ASTM D6637, Method B
Tensile Strength @ 5% Strain[2]	1,200 lb/ft x 1,370 lb/ft	
Ultimate Tensile Strength[2]	1,850 lb/ft x 2,050 lb/ft	
Junction Efficiency[3] (MD)	93%	ASTM D7737
Flexural Rigidity[4]	2,000,000 mg–cm	ASTM D7748
Aperture Stability Modulus[5]	0.55 lb–ft/degrees	ASTM D7864
UV Stability (Retained Strength)	100% (after 500 hr of exposure)	ASTM D4355

1. MARV per Article 1056-3 of the *Standard Specifications* except dimensions and thickness are nominal.
2. Requirement for MD x CD.
3. Junction Efficiency (%) = (Average Junction Strength (X_{Jave}) / Ultimate Tensile Strength in the MD from ASTM D6637, Method A) × 100.
4. Test specimens two ribs wide, with transverse ribs cut flush with exterior edges of longitudinal ribs, and sufficiently long to enable measurement of the overhang dimension.
5. Applied moment of 17.7 lb–inch (torque increment).

C. Bearing Pads

For MSE panel walls, use preformed ethylene propylene diene monomer rubber bearing pads that meet ASTM D2000 Grade 2, Type A, Class A with a durometer hardness of 60 or 80 ± 5. Provide bearing pads with thicknesses that meet the following:

BEARING PAD THICKNESS	
Facing Area per Panel (A)	**Minimum Pad Thickness After Compression (based on 2 times panel weight above pads)**
$A \leq 30$ sf	1/2"
30 sf $< A \leq 75$ sf	3/4"

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D. Miscellaneous Components

Miscellaneous components may include connectors (e.g., anchors, bars, clamps, pins, plates, ties, etc.), fasteners (e.g., bolts, nuts, washers, etc.) and any other MSE wall components not included above. Use 10 gauge or heavier structural steel Grade 50 or higher for steel strip panel anchors and connectors. Galvanize steel components in accordance with Section 1076 of the *Standard Specifications*. Provide miscellaneous components approved for the chosen MSE wall system. The list of approved miscellaneous components for each MSE wall system is available from the website shown elsewhere in this provision.

3.0 PRECONSTRUCTION REQUIREMENTS

A. MSE Wall Surveys

The Retaining Wall Plans show a plan view, typical sections, details, notes and an elevation or profile view (wall envelope) for each MSE wall. Before beginning MSE wall design, survey existing ground elevations shown in the plans and other elevations in the vicinity of MSE wall locations as needed. For proposed slopes above or below MSE walls, survey existing ground elevations to at least 10 ft beyond slope stake points. Based on these elevations, finished grades and actual MSE wall dimensions and details, submit revised wall envelopes for acceptance. Use accepted wall envelopes for design.

B. MSE Wall Designs

For MSE wall designs, submit PDF files of working drawings and design calculations at least 30 days before the preconstruction meeting. Note name and NCDOT ID number of the panel or SRW unit production facility on working drawings. Do not begin MSE wall construction until a design submittal is accepted.

Use a prequalified MSE Segmental Wall Design Consultant to design MSE segmental walls. Provide MSE segmental wall designs sealed by a Design Engineer approved as a Geotechnical Engineer (key person) for the MSE Segmental Wall Design Consultant. Provide MSE panel wall designs sealed by a Design Engineer licensed in the state of North Carolina and employed or contracted by the MSE Wall Vendor.

Design MSE walls in accordance with the plans, *AASHTO LRFD Bridge Design Specifications* and any NCDOT restrictions for the chosen MSE wall system unless otherwise required. For abutment walls only, design MSE walls for seismic if wall sites meet either or both of the following:

- Wall site is in seismic zone 2 based on Figure 2-1 of the *Structure Design Manual*,
- Wall site is classified as AASHTO Site Class E, as noted in the plans, and is in or west of Pender, Duplin, Wayne, Johnston, Wake, Durham or Person County.

Connect reinforcement to panels or SRW units with methods or devices approved for the chosen system. Use a uniform reinforcement length throughout the height of the

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wall of at least 0.7H or 6 ft, whichever is longer, unless noted otherwise in the plans. Extend the reinforced zone at least 6" beyond end of reinforcement. Do not locate drains, the reinforced zone or leveling pads outside right-of-way or easement limits.

Use the simplified method for determining maximum reinforcement loads and design parameters approved for the chosen MSE wall system or default values in accordance with the AASHTO LRFD specifications. Design steel components including reinforcement and connectors for the design life noted in the plans and aggregate type in the reinforced zone. If an MSE wall system with geosynthetic reinforcement includes any steel parts for obstructions, bin walls, connections or other components, design steel exposed to aggregate for the design life noted in the plans and aggregate type in the reinforced zone. Use "loss of galvanizing" metal loss rates for nonaggressive backfill in accordance with the AASHTO LRFD specifications for galvanized and aluminized steel and metal loss rates for carbon steel in accordance with the following:

CARBON STEEL CORROSION RATES	
Aggregate Type (in reinforced zone)	**Carbon Steel Loss Rate (after coating depletion)**
Coarse	0.47 mil/year
Fine (except abutment walls)	0.58 mil/year
Fine (abutment walls)	0.70 mil/year

For PET or HDPE geogrid and geostrip reinforcement and geosynthetic connectors, use approved geosynthetic properties for the design life noted in the plans and aggregate type in the reinforced zone. For geogrid reinforcement connected to end bent caps, embed reinforcement or connectors in caps as shown in the plans. For PP geogrid reinforcement connected to end bent caps, use the following design parameters for the aggregate type in the reinforced approach fill.

PP GEOGRID REINFORCEMENT DESIGN PARAMETERS				
Aggregate Type (in reinforced zone)	**T_{al} (MD)**	**F***	**α**	**ρ**
Coarse	400 lb/ft	0.70	0.8	32.0°
Fine	428 lb/ft	0.54	0.8	28.35°

Where,

T_{al} = long-term design strength (LTDS),
F* = pullout resistance factor,
α = scale effect correction factor and
ρ = soil-geogrid friction angle.

When noted in the plans, design MSE walls for a live load (traffic) surcharge of 250 psf in accordance with Figure C11.5.6-3(b) of the AASHTO LRFD specifications. For steel beam guardrail with 8 ft posts or concrete barrier rail above MSE walls, analyze top 2 reinforcement layers for traffic impact loads in accordance with Section 7.2 of *FHWA Design and Construction of Mechanically Stabilized Earth Walls and*

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Reinforced Soil Slopes – Volume I (Publication No. FHWA-NHI-10-024) except use the following for geosynthetic reinforcement rupture:

$$\phi\, T_{al}\, R_c \geq T_{max} + (T_I / RF_{CR})$$

Where,

ϕ = resistance factor for tensile resistance in accordance with Section 7.2.1 of the FHWA MSE wall manual,

T_{al} = long-term geosynthetic design strength approved for chosen MSE wall system,

R_c = reinforcement coverage ratio = 1 for continuous geosynthetic reinforcement,

T_{max} = factored static load in accordance with Section 7.2 of the FHWA MSE wall manual,

T_I = factored impact load in accordance with Section 7.2 of the FHWA MSE wall manual and

RF_{CR} = creep reduction factor approved for chosen MSE wall system.

When shown in the plans for abutment walls, use pile sleeves to segregate piles from aggregate in the reinforced zone. If existing or future obstructions such as foundations, guardrail, fence or handrail posts, moment slabs, pavements, pipes, inlets or utilities will interfere with reinforcement, maintain a clearance of at least 3" between obstructions and reinforcement unless otherwise approved. Design reinforcement for obstructions and locate reinforcement layers so all of reinforcement length is within 3" of corresponding connection elevations. Modify PET geogrid reinforcement for obstructions as shown in the plans.

Use 6" thick CIP unreinforced concrete leveling pads beneath panels and SRW units that are continuous at steps and extend at least 6" in front of and behind bottom row of panels or SRW units. Unless required otherwise in the plans, embed top of leveling pads in accordance with the following requirements:

WALL EMBEDMENT REQUIREMENTS		
Front Slope[1] (H:V)	**Minimum Embedment Depth[2] (whichever is greater)**	
6:1 or flatter (except abutment walls)	H/20	1 ft for H ≤ 10 ft 2 ft for H > 10 ft
6:1 or flatter (abutment walls)	H/10	2 ft
> 6:1 to < 3:1	H/10	2 ft
3:1 to 2:1	H/7	2 ft

1. Front slope is as shown in the plans.
2. H is the maximum design height per wall.

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

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For MSE panel walls, cover joints at back of panels with filtration geotextiles at least 12" wide. If the approval of the chosen MSE wall system does not require a minimum number of bearing pads, provide the number of pads in accordance with the following:

NUMBER OF BEARING PADS		
Facing Area per Panel (A)	**Maximum Height of Wall Above Horizontal Panel Joint**	**Minimum Number of Pads per Horizontal Panel Joint**
A ≤ 30 sf	25 ft	2
	35 ft[1]	3
30 sf < A ≤ 75 sf	25 ft	3
	35 ft[1]	4

1. Additional bearing pads per horizontal panel joint may be required for wall heights above joints greater than 35 ft.

For MSE segmental walls, coarse aggregate is required in any SRW unit core spaces and between and behind SRW units for a horizontal distance of at least 18".

Separation geotextiles are required between the aggregate and overlying fill sections. When noted in the plans, separation geotextiles are also required at the back of the reinforced zone between the aggregate and backfill or natural ground. When placing pavement sections directly on the reinforced zone, cap aggregate with 4" of asphalt concrete base course. Unless required otherwise in the plans, use reinforced concrete coping at top of walls that meets the following requirements:

1. Coping dimensions as shown in the plans,
2. At the Contractor's option, coping that is precast or CIP concrete for MSE panel walls unless CIP coping is required as shown in the plans,
3. CIP concrete coping for MSE segmental walls and
4. At the Contractor's option and when shown in the plans, CIP concrete coping that extends down back of panels or SRW units or connects to panels or SRW units with dowels.

For MSE segmental walls with dowels, attach dowels to top courses of SRW units in accordance with the following:

1. Set dowels in core spaces of SRW units filled with grout instead of coarse aggregate or
2. Embed adhesively anchored dowels in holes of solid SRW units with epoxy.

For MSE panel walls with coping, connect CIP concrete coping or leveling concrete for precast concrete coping to top row of panels with dowels cast into panels. When concrete barrier rail is required above MSE walls, use concrete barrier rail with moment slab as shown in the plans.

Submit working drawings and design calculations for acceptance in accordance with

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Article 105-2 of the *Standard Specifications*. Submit working drawings showing plan views, wall profiles with foundation pressures, typical sections with reinforcement and connection details, aggregate locations and types, geotextile locations and details of leveling pads, panels or SRW units, coping, bin walls, slip joints, pile sleeves, etc. If necessary, include details on working drawings for concrete barrier rail with moment slab, reinforcement splices if allowed for the chosen MSE wall system, reinforcement connected to end bent caps, curved MSE walls with tight (short) radii and obstructions extending through walls or interfering with reinforcement, leveling pads, barriers or moment slabs. Submit design calculations for each wall section with different surcharge loads, geometry or material parameters. At least one analysis is required for each wall section with different reinforcement lengths. When designing MSE walls with computer software other than MSEW, use MSEW manufactured by ADAMA Engineering, Inc. to verify the design. At least one MSEW analysis is required per 100 ft of wall length with at least one analysis for the wall section with the longest reinforcement. Submit electronic MSEW input files and PDF output files with design calculations.

C. Preconstruction Meeting

Before starting MSE wall construction, hold a preconstruction meeting to discuss the construction and inspection of the MSE walls. If this meeting occurs before all MSE wall submittals have been accepted, additional preconstruction meetings may be required before beginning construction of MSE walls without accepted submittals. The Resident or Bridge Maintenance Engineer, Area Construction Engineer, Geotechnical Operations Engineer, Contractor and MSE Wall Installer Superintendent will attend preconstruction meetings.

4.0 CORROSION MONITORING

Corrosion monitoring is required for MSE walls with steel reinforcement. The Engineer will determine the number of monitoring locations and where to install the instrumentation. Contact M&T before beginning wall construction. M&T will provide the corrosion monitoring instrumentation kits and if necessary, assistance with installation.

5.0 SITE ASSISTANCE

Unless otherwise approved, an MSE Wall Vendor representative is required to assist and guide the MSE Wall Installer on-site for at least 8 hours when the first panels or SRW units and reinforcement layer are placed. If problems are encountered during construction, the Engineer may require the vendor representative to return to the site for a time period determined by the Engineer.

6.0 CONSTRUCTION METHODS

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

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Excavate as necessary for MSE walls in accordance with the accepted submittals. If applicable and at the Contractor's option, use temporary shoring for wall construction instead of temporary slopes to construct MSE walls. Define "temporary shoring for wall construction" as temporary shoring not shown in the plans or required by the Engineer including shoring for OSHA reasons or the Contractor's convenience.

Unless required otherwise in the plans, install foundations and if required, pile sleeves located in the reinforced zone before placing aggregate or reinforcement. Brace piles in the reinforced zone to maintain alignment when placing and compacting aggregate. Secure piles together with steel members near top of piles. Clamp members to piles instead of welding if bracing is at or below pile cut-off elevations.

Notify the Engineer when foundation excavation is complete. Do not place leveling pad concrete, aggregate or reinforcement until excavation dimensions and foundation material are approved.

Construct CIP concrete leveling pads at elevations and with dimensions shown in the accepted submittals and in accordance with Section 420 of the *Standard Specifications*. Cure leveling pads at least 24 hours before placing panels or SRW units.

Erect and support panels and stack SRW units so the final wall position is as shown in the accepted submittals. Stagger SRW units to create a running bond by centering SRW units over joints in the row below as shown in the accepted submittals. Space bearing pads in horizontal panel joints as shown in the accepted submittals and cover all panel joints with filtration geotextiles as shown in the accepted submittals. Attach filtration geotextiles to back of panels with adhesives, tapes or other approved methods.

Construct MSE walls with the following tolerances:

A. SRW units are level from front to back and between units when checked with a 4 ft long level,

B. Vertical joint widths are 1/4" maximum for SRW units and 3/4", ±1/4" for panels,

C. Final wall face is within 3/4" of horizontal and vertical alignment shown in the accepted submittals when measured along a 10 ft straightedge and

D. Final wall plumbness (batter) is not negative (wall face leaning forward) and within 0.5° of vertical unless otherwise approved.

Place reinforcement at locations and elevations shown in the accepted submittals and within 3" of corresponding connection elevations. Install reinforcement with the direction shown in the accepted submittals. Before placing aggregate, pull geosynthetic reinforcement taut so it is in tension and free of kinks, folds, wrinkles or creases. Reinforcement may be spliced once per reinforcement length if shown in the accepted submittals. Use reinforcement pieces at least 6 ft long. Contact the Engineer when unanticipated existing or future obstructions such as foundations, guardrail, fence or handrail posts, pavements, pipes, inlets or utilities will interfere with reinforcement. To avoid obstructions, deflect, skew or modify reinforcement as shown in the accepted submittals.

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Place aggregate in the reinforced zone in 8" to 10" thick lifts. Compact fine aggregate in accordance with Subarticle 235-3(C) of the *Standard Specifications*. Use only hand operated compaction equipment to compact aggregate within 3 ft of panels or SRW units. At a distance greater than 3 ft, compact aggregate with at least 4 passes of an 8 ton to 10 ton vibratory roller in a direction parallel to the wall face. Smooth wheeled or rubber tired rollers are also acceptable for compacting aggregate. Do not use sheepsfoot, grid rollers or other types of compaction equipment with feet. Do not displace or damage reinforcement when placing and compacting aggregate. End dumping directly on geosynthetics is not permitted. Do not operate heavy equipment on reinforcement until it is covered with at least 8" of aggregate. Replace any damaged reinforcement to the satisfaction of the Engineer.

Backfill for MSE walls outside the reinforced zone in accordance with Article 410-8 of the *Standard Specifications*. If a drain is required, install wall drainage systems as shown in the accepted submittals and in accordance with Section 816 of the *Standard Specifications*. If pile sleeves are required, fill sleeves with loose uncompacted sand before constructing end bent caps.

Install dowels as necessary for SRW units and place and construct coping and leveling concrete as shown in the accepted submittals. Construct leveling concrete in accordance with Section 420 of the *Standard Specifications*. Construct CIP concrete coping in accordance with Subarticle 452-4(B) of the *Standard Specifications*. When single faced precast concrete barrier is required in front of and against MSE walls, stop coping just above barrier so coping does not interfere with placing barrier up against wall faces. If the gap between a single faced barrier and wall face is wider than 2", fill gap with Class V select material (standard size No. 78M stone). Otherwise, fill gap with backer rod and seal joint between barrier and MSE wall with silicone sealant.

When separation geotextiles are required, overlap adjacent geotextiles at least 18" and hold geotextiles in place with wire staples or anchor pins as needed. Seal joints above and behind MSE walls between coping and concrete slope protection with silicone sealant.

7.0 MEASUREMENT AND PAYMENT

MSE Retaining Wall No. __ will be measured and paid in square feet. MSE walls will be measured as the square feet of wall face area with the pay height equal to the difference between top of wall and top of leveling pad elevations. Define “top of wall” as top of coping or top of panels or SRW units for MSE walls without coping.

The contract unit price for *MSE Retaining Wall No. __* will be full compensation for providing designs, submittals, labor, tools, equipment and MSE wall materials, excavating, hauling and removing excavated materials, placing and compacting aggregate and backfill material and supplying site assistance, leveling pads, panels, SRW units, reinforcement, aggregate, wall drainage systems, geotextiles, aggregate concrete base course, bearing pads, coping, miscellaneous components and any incidentals necessary to construct MSE walls. The contract unit price for *MSE Retaining Wall No. __* will also be full compensation for reinforcement and connector design for reinforcement connected to end

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bent caps, wall modifications for obstructions, pile sleeves filled with sand, joints sealed with silicone sealant and gaps between barriers and MSE walls filled with backer rod or No. 78M stone, if required.

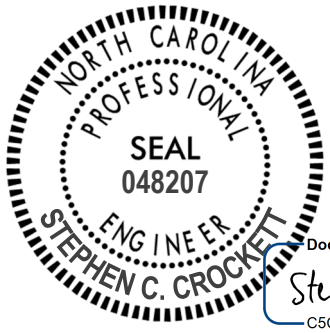
No separate payment will be made for temporary shoring for wall construction. Temporary shoring for wall construction will be incidental to the contract unit price for *MSE Retaining Wall No. __*.

The contract unit price for *MSE Retaining Wall No. __* does not include the cost for ditches, fences, handrails, barrier or guardrail associated with MSE walls as these items will be paid for elsewhere in the contract. The contract unit price for *MSE Retaining Wall No. __* also does not include the cost for constructing bridge approach fills behind end bents with MSE abutment walls. See *Bridge Approach Fills* provision for measurement and payment of Type III Reinforced Bridge Approach Fills.

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

Payment will be made under:

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



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Stephen Crockett
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4/13/2023

PROJECT SPECIAL PROVISIONS
GEOENVIRONMENTAL

CONTAMINATED SOIL (4/12/2023)

The Contractor's attention is directed to the fact that soil contaminated with petroleum hydrocarbon compounds exists within the project area. The known areas of contamination are indicated on corresponding plans sheets. Information relating to these contaminated areas, sample locations, and investigation reports will be available at the following web address by navigating to the correct letting year and month then selecting, "Plans and Proposals", "R-2707D, R-2707E", "Individual Sheets/520 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 areas shown on the plans, petroleum odors, and unusual soil staining. Contaminated soil not required to be excavated is to remain in place and undisturbed. Undisturbed soil shall remain in place, whether contaminated or not. The Contractor shall transport all contaminated soil excavated from the project to a facility licensed to accept contaminated soil.

In the event that a stockpile is needed, the stockpile shall be created within the property boundaries of the source material and in accordance with the Diagram for Temporary Containment and Treatment of Petroleum-Contaminated Soil per North Carolina Department of Environmental Quality's (NCDEQ) Division of Waste Management UST Section GUIDELINES FOR EX SITU PETROLEUM CONTAMINATED SOIL REMEDIATION. If the volume of contaminated material exceeds available space on site, the Contractor shall obtain a permit from the NCDEQ UST Section's Regional Office for off-site temporary storage. The Contractor shall provide copies of disposal manifests completed per the disposal facilities requirements and weigh tickets to the Engineer.

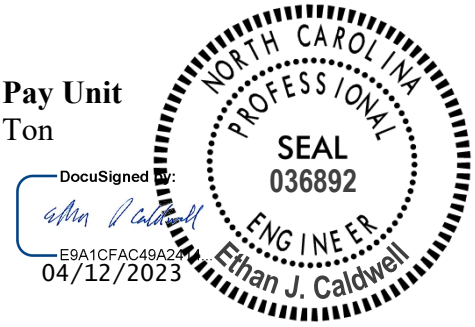
Measurement and Payment:

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 stockpiling, loading, transportation, weighing, laboratory testing, disposal, equipment, decontamination of equipment, labor, and personal protective equipment.

Payment shall be made under:

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



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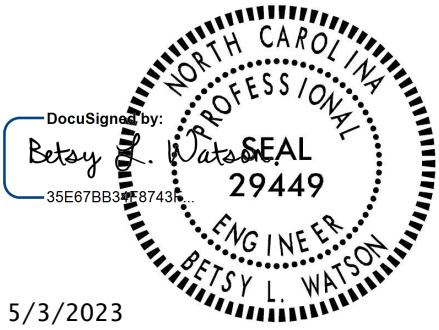

DISPOSAL OF FLASHER SYSTEM

The work covered by this special provision consists of removal and disposal of a flasher system. The system includes the sign and the sign post, utility service pole, electric meter and base, circuit breaker panel and breaker(s), control devices such as relays, wire, cable, conduit, flasher units, and all other devices and equipment in the system.

All material shall be removed and disposed according to the State and Local codes, regulations, and ordinances and shall be in accordance with the Section 907 of the NCDOT Standard Specifications for Roads and Structures.

Compensation:

Disposal of a Flasher System as described above shall be paid for at the contract lump sum price for each Flasher System.

Payment will be made under:

Disposal of Flasher System ..... Lump Sum

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Matthew V. Springer
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8/27/2020

POLYUREA PAVEMENT MARKING MEDIA AND THICKNESS:
(08-27-20)

Amend the *NCDOT 2018 Standard Specifications* as follows:

Page 12-8, Subarticle 1205-5(B), lines 14-16, replace with the following:

Produce polyurea pavement marking lines that have a minimum dry thickness of 20 mils above the pavement surface when placed on concrete and asphalt pavements. Produce polyurea pavement marking lines that have a minimum dry thickness of 30 mils above the pavement surface on textured surfaces such as OGFC and on surfaces where the polyurea will be placed over a previously removed pavement marking.

Page 12-9, replace **Table 1205-4 Minimum Reflectometer Requirement for Polyurea** with the following:

TABLE 1205-4
MINIMUM REFLECTOMETER REQUIREMENTS
FOR POLYUREA

Item	Color	Reflectivity
Standard Glass Beads	White	375 mcd/lux/m^2
	Yellow	250 mcd/lux/m^2

The installer may choose to use an AASHTO Type 4/Type 1 or AASHTO Type 3/Type 1 double drop system, but no price adjustment will be made, and these systems will be incidental to the polyurea pavement marking.

Pay Item	Pay Unit
Polyurea Pavement Marking Lines,___",_____mils (Standard Glass Beads)	Linear Foot

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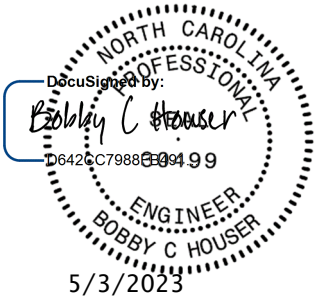
Project: R-2707D/R-2707E **UC-1** County: Cleveland

PROJECT SPECIAL PROVISIONS
Utility Construction

B. Chad Houser, PE, PLS | Project Manager
TGS Engineers
201 W. Marion St. Suite 200| Shelby, NC 28150 | 704-476-0003 ex 311
chouser@tgsengineers.com

Utility Owner:
Cleveland County Water
439 Casar Lawndale Road
Lawndale, NC 28090



Revise the 2018 Standard Specifications as follows:

Page 15-1, Sub-article 1500-2 Cooperation with the Utility Owner, paragraph 2:
add the following sentences:

Utility owner is Cleveland County Water. The contact person is Jeff Earl and he can be reached by phone at **704-472-6212**.

Page 15-2, Sub-article 1500-9 Placing Pipelines into Service, paragraph 2, sentence 2:
replace in its entirety with the following sentences:

The contractor shall not operate any existing water valves without a representative of Cleveland County Water on site. Interruptions in water service for all distribution mains shall be limited to a maximum of 4 hours unless otherwise specifically approved by the owner. Interruptions in water service require advanced notice to the owner at least one week prior. Advanced notice will be email and phone call to Cleveland County Water Representative.

COMMENCEMENT OF WORK

A pre-construction meeting is required before work may begin. Cleveland County Water shall be notified 72 hours prior to project mobilization

MATERIALS APPROVAL

All utility materials shall be approved by the owner prior to delivery to the project.

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TESTING AND STERILIZATION

All waterline testing shall be in accordance with section 1510-3(B) of the 2018 NCDOT Standards and Specification and shall occur at the time of construction. A designated representative from Cleveland County Water shall be notified to witness testing prior to their acceptance.

RESTRAINED JOINT DUCTILE IRON PIPE

Page 10-63, Sub-article 1036-5 Ductile Iron Pipe and Fittings:
delete and add the following paragraphs:

Ductile Iron Pipe, 4 Inch through 12 Inch

Ductile Iron pipe shall be utilized at for all proposed water line 4 inch through 12 inch and all fittings shall be restrained.

Pipe: AWWA C151 "Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand Lined Molds, for Water and Other Liquids." Pressure Class 350 unless shown otherwise on the drawings.

Fittings: Class 350 ductile iron restrained joint in accordance with ANSI A21.10/AWWA C110 and ANSI A21.4/AWWA C104, grey or ductile iron; or AWWA C153, ductile iron restrained joint compact fittings

Joints: AWWA C111 push-on or mechanical for general buried service.

Linings: AWWA C104 cement lining, standard thickness, bituminous exterior seal coat

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Page 15-6, Sub-article 1510-3 Construction Methods:
Add the following in its entirety as Article (A) 1 Polyethylene Encasement:

Polyethylene Encasement

Polyethylene encasement shall be applied to any ductile iron pipe and fittings located within 10 feet of existing or proposed gas lines or as shown on the plans. Polyethylene encasement shall also be applied to any ductile iron pipe and fittings located in areas where contaminated soil is encountered or where directed by the Engineer.

Polyethylene material, thickness and width, shall conform to latest revision of AWWA/ANSI C-105/A21.5 . Only tubes shall be used on the main pipeline. Minimum thickness shall be 8 mil. The inside surface of the polyethylene wrap to be in contact with the pipe exterior shall be infused with a blend of anti-microbial biocide to mitigate microbiologically influenced corrosion and a volatile corrosion inhibitor to control galvanic corrosion.

Polyethylene encasement shall be installed, per AWWA C600 and ANSI/ C105/A21.5, where shown on the drawings on ductile iron pipe, fittings, and valves in accordance with AWWA C105. Method C, using polyethylene sheets, shall only be used when directed by the Engineer.

Payment will be under:

Pay Item	Pay Unit
Polyethylene Encasement	Linear Feet

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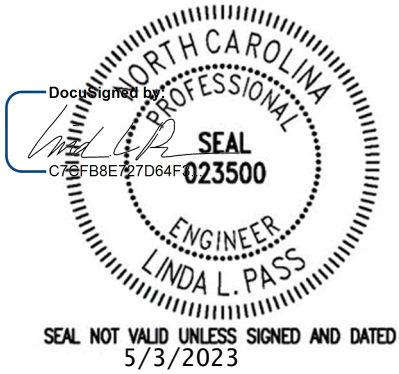
Project: R-2707D/R-2707E **UC-4** County: Cleveland

Stantec Consulting Services Inc.
One West Fourth St., Suite 820
Winston-Salem, NC 27101
336-770-9026
Firm License No.: F-0672



SEAL NOT VALID UNLESS SIGNED AND DATED
5/3/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Utility Owner:
City of Shelby
Utilities – Water Resources Department
824 W Grover Street
Shelby, NC 28150
Mailing:
P.O. Box 201
Shelby, NC 28151-0207

Revise the 2018 Standard Specifications as follows:

Page 15-1, Sub-article 1500-2, Cooperation with the Utility Owner, insert the following after Line 23:

"The water utility owner is the City of Shelby, Water Resources Department. The Water Resources Operation Manager is Brian Wilson and he can be reached at 704-484-6840. The Engineering Services Director is Ben Yarboro and he can be reached by phone at 704-669-2060."

Page 15-18, Sub-article 1540-3, CONSTRUCTION METHODS, insert the following Paragraph after Line 25:

"(F) Polyethylene Encasement

Polyethylene encasement shall be applied to any ductile iron pipe and fittings located within 10 feet of existing or proposed gas lines or as shown on the plans. Polyethylene encasement shall also be applied to any ductile iron pipe and fittings located in areas where contaminated soil is encountered or where directed by the Engineer.

Polyethylene material, thickness and width shall conform to the latest revision of AWWA/ANSI C-105/A21.5. Only tubes shall be used on the main pipeline. Minimum thickness shall be 8 mil.

DocuSign Envelope ID: F0EE28CB-C06E-49B5-AC91-4C52BFC38263

The inside surface of the polyethylene wrap to be in contact with the pipe exterior shall be infused with a blend of anti-microbial biocide to mitigate the microbiologically influenced corrosion and a volatile corrosion inhibitor to control galvanic corrosion.

Polyethylene encasement shall be installed, per AWWA C600 and ANSI/C105/A21.5, where shown on the drawings on ductile iron pipe, fittings, and valves in accordance with AWWA C105. Method C, using polyethylene sheets, shall only be used when directed by the Engineer."

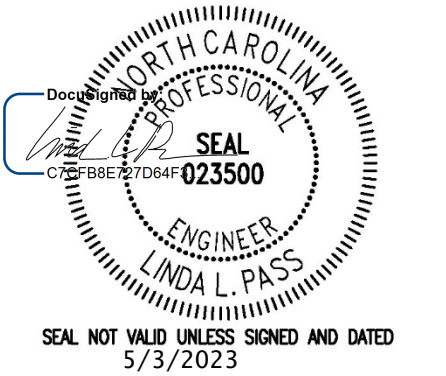
Payment will be under:

Pay Item	**Pay Unit**
Polyethylene Encasement	Linear Feet

DocuSign Envelope ID: F0EE28CB-C06E-49B5-AC91-4C52BFC38263

Project: R-2707D/R-2707E **UC-6** County: Cleveland

Stantec Consulting Services Inc.
One West Fourth St., Suite 820
Winston-Salem, NC 27101
336-770-9026
Firm License No.: F-0672



SEAL NOT VALID UNLESS SIGNED AND DATED
5/3/2023

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

Utility Owner:
City of Kings Mountain
1013 N. Piedmont Avenue
Kings Mountain, NC 28086

Revise the 2018 Standard Specifications as follows:

Page 15-1, Sub-article 1500-2, Cooperation with the Utility Owner, insert the following after Line 23:

"The utility owner is the City of Kings Mountain. The Kings Mountain Water Resources Director is Ricky Duncan, and he can be reached at 704-734-4531."

Project: R-2707D **UbO-1** County: Cleveland

PROJECT SPECIAL PROVISIONS
Utilities by Others

Michael Baker Engineering, Inc.
8000 Regency Parkway, Suite 600
Cary, North Carolina 27518
Phone: 919-463-5488
Fax: 919-463-5490

General:

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

A) Duke Energy – Power (Distribution)
B) AT&T – Communications
C) RST Global – Communications
D) SEGRA – Communications
E) Conterra - Communications
F) Spectrum - Communications
G) Shelby 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 2018 Standard Specifications.

Utilities Requiring Adjustment:

Utility relocations are shown on the Utilities by Others Plans.

A) Duke Energy – Power (Distribution)
1) Duke Energy's relocation work for Phase 2 will be completed by November 10, 2023. Phase 1 will be completed by February 16, 2024.
   - Phase 2: -L- 807+00 – 851+00.
   - Phase 1: -L- 664+00 – 760+00, including -Y1- (SR 2067), Lowman Rd (SR 2125), -Y2- (SR 2052) and -Y3- (SR 2047).
2) Contact person for Duke Energy is Austin Paysinger at (864) 906-6657 or APaysinger@pike.com

PROJECT SPECIAL PROVISIONS
Utilities by Others

B) AT&T – Communications
   1) AT&T's relocation work for Phase 2 will be completed by August 10, 2024. Phase 1 will be completed by January 16, 2025.
      - Phase 2: -L- 807+00 – 851+00.
      - Phase 1: -L- 664+00 – 760+00, including -Y1- (SR 2067), Lowman Rd (SR 2125), -Y2- (SR 2052) and -Y3-(SR 2047).
   2) Contact person for AT&T is Danny Little at (704) 254-4289 or dflittle@carolina.rr.com

C) RST Global – Communications
   1) Contact person for RST Global is Tom Lancaster at (803) 810-7533 or tom.lancaster@diversifiedutilitygroup.com

D) SEGRA – Communications
   1) Contact person for SEGRA is Robert Robinson at (803) 230-0515 or robert.robinson@segra.com

E) Conterra – Communications
   1) Contact person for Conterra is Kim Brown at (704) 778-5685 or kbrown@conterra.com

F) Spectrum-Communications
   1) Spectrum's relocation work for Phase 2 will be completed by February 10, 2024. Phase 1 will be completed by July 16, 2024.
      - Phase 2: -L- 807+00 – 851+00.
      - Phase 1: -L- 664+00 – 760+00, including -Y1- (SR 2067), Lowman Rd (SR 2125), -Y2-(SR 2052) and -Y3- (SR 2047).
   2) Contact person for Spectrum is Neal Barker at (980)-722-7101 or Neal.Barker@charter.com

G) Shelby Gas – Gas
   1) Shelby Gas's relocation work will be completed by January 26, 2024.
   2) Contact person for Shelby Gas is Jeff Champion at (704) 669-6574 or jeff.champian@cityofshelby.com

Project: R-2707E **UbO-3** County: Cleveland

PROJECT SPECIAL PROVISIONS
Utilities by Others

Michael Baker INTERNATIONAL

Michael Baker Engineering, Inc.
8000 Regency Parkway, Suite 600
Cary, North Carolina 27518
Phone: 919-463-5488
Fax: 919-463-5490

General:

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

A) Duke Energy – Power (Transmission)
B) Duke Energy – Power (Distribution)
C) AT&T – Communications (Transmission)
D) AT&T – Communications (Distribution)
E) Spectrum - Communications
F) Shelby 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 2018 Standard Specifications.

Utilities Requiring Adjustment:

Utility relocations are shown on the Utilities by Others Plans.

A) Duke Energy – Power (Transmission)
   1) Contact person for Duke Energy is Brandi Collier at (980) 373-6523 or Brandi.Collier@duke-energy.com

B) Duke Energy – Power (Distribution)
   1) Duke Energy's relocation work will be completed by November 29, 2025.
   2) Contact person for Duke Energy is Austin Paysinger at (864) 906-6657 or APaysinger@pike.com

C) AT&T – Communications (Transmission)
   1) Contact person for AT&T is Levi Kendrick at (706) 781-8316 or levi.kendrick@windstream.net

PROJECT SPECIAL PROVISIONS
Utilities by Others

D) AT&T – Communications (Distribution)
   1) AT&T's relocation work for will be completed by November 29, 2025.
   2) Contact person for AT&T is Danny Little at (704) 254-4289 or dflittle@carolina.rr.com

E) Spectrum – Communications
   1) Spectrum's relocation work will be completed by May 29, 2025.
   2) Contact person for Spectrum is Neal Barker at (704) 671-6103 or Neal.Barker@charter.com

F) Shelby Gas – Gas
   1) Shelby Gas's relocation work will be completed by February 27, 2024.
   2) Contact person for Shelby Gas is Jeff Champion at (704) 669-6574 or jeff.champion@cityofshelby.com

Project Special Provisions
Erosion Control

STABILIZATION REQUIREMENTS:

(4-30-2019)

Stabilization for this project shall comply with the time frame guidelines as specified by the NCG-010000 general construction permit effective April 1, 2019 issued by the North Carolina Department of Environmental Quality Division of Water Resources. Temporary or permanent ground cover stabilization shall occur within 7 calendar days from the last land-disturbing activity, with the following exceptions in which temporary or permanent ground cover shall be provided in 14 calendar days from the last land-disturbing activity:

- Slopes between 2:1 and 3:1, with a slope length of 10 ft. or less
- Slopes 3:1 or flatter, with a slope of length of 50 ft. or less
- Slopes 4:1 or flatter

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

SEEDING AND MULCHING: **(West)**

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

Shoulder and Median Areas

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

Areas Beyond the Mowing Pattern, Waste and Borrow Areas:

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

Approved Tall Fescue Cultivars

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

Approved Kentucky Bluegrass Cultivars:

4-Season	Blue Velvet	Gladstone	Quantum Leap
Alexa II	Blueberry	Granite	Rambo

America	Boomerang	Hampton	Rhapsody
Apollo	Brilliant	Harmonie	Rhythm
Arcadia	Cabernet	Impact	Rita
Aries	Champagne	Jefferson	Royce
Armada	Champlain	Juliet	Rubicon
Arrow	Chicago II	Jump Start	Rugby II
Arrowhead	Corsair	Keeneland	Shiraz
Aura	Courtyard	Langara	Showcase
Avid	Delight	Liberator	Skye
Award	Diva	Madison	Solar Eclipse
Awesome	Dynamo	Mercury	Sonoma
Bandera	Eagleton	Midnight	Sorbonne
Barduke	Emblem	Midnight II	Starburst
Barnique	Empire	Moon Shadow	Sudden Impact
Baroness	Envicta	Moonlight SLT	Total Eclipse
Barrister	Everest	Mystere	Touche
Barvette HGT	Everglade	Nu Destiny	Tsunami
Bedazzled	Excursion	NuChicago	Unique
Belissimo	Freedom II	NuGlade	Valor
Bewitched	Freedom III	Odyssey	Voyager II
Beyond	Front Page	Perfection	Washington
Blacksburg II	Futurity	Pinot	Zinfandel
Blackstone	Gaelic	Princeton 105	
Blue Note	Ginney II	Prosperity	

Approved Hard Fescue Cultivars:

Aurora II	Eureka II	Oxford	Scaldis II
Aurora Gold	Firefly	Reliant II	Spartan II
Berkshire	Granite	Reliant IV	Stonehenge
Bighorn GT	Heron	Rescue 911	
Chariot	Nordic	Rhino	

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

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

Native Grass Seeding And Mulching **(West)**

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

be performed in the permanent soil reinforcement mat section of preformed scour holes, and in other areas as directed.

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

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

Approved Creeping Red Fescue Cultivars:

Aberdeen Boreal Epic Cindy Lou

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

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

Measurement and Payment

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

TEMPORARY SEEDING:

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

FERTILIZER TOPDRESSING:

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

SUPPLEMENTAL SEEDING:

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

MOWING:

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

LAWN TYPE APPEARANCE:

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

REFORESTATION:

Description

Reforestation will be planted in areas designated on the plans and as directed by the Engineer. See the Reforestation Plan Sheets.

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

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

Materials

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

Construction Methods

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

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

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

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

Measurement and Payment

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

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

ENVIRONMENTALLY SENSITIVE AREAS:

Description

This project is located in an *Environmentally Sensitive Area*. This designation requires special procedures to be used for clearing and grubbing, temporary stream crossings, and grading operations within the Environmentally Sensitive Areas identified on the plans and as designated by the Engineer. This also requires special procedures to be used for seeding and mulching and staged seeding within the project.

The Environmentally Sensitive Area shall be defined as a 50-foot buffer zone on both sides of the stream or depression measured from top of streambank or center of depression.

Construction Methods

(A) Clearing and Grubbing

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

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.

CONSTRUCTION MATERIALS MANAGEMENT

(3-19-19) (rev. 04-27-20)

Description

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

Polyacrylamides (PAMS) and Flocculants

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

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

Equipment Fluids

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

Waste Materials

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

Herbicide, Pesticide, and Rodenticides

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

Concrete Materials

Concrete materials onsite, including excess concrete, must be controlled and managed to avoid contact with surface waters, wetlands or buffers. No concrete or cement slurry shall be discharged from the site. (Note that discharges from onsite concrete plants require coverage under a separate NPDES permit – NCG140000.) Concrete wash water shall be managed in accordance with the *Concrete Washout Structure* provision. Concrete slurry shall be managed and disposed of in accordance with *NCDOT DGS and HOS DCAR Distribution of Class A Residuals Statewide* (Permit No. WQ0035749). Any hardened concrete residue will be disposed of, or recycled on site, in accordance with state solid waste regulations.

Earthen Material Stock Piles

Earthen material stock piles shall be located at least 50 feet away from storm drain inlets and surface waters unless it can be shown that no other alternatives are reasonably available.

Measurement and Payment

Conditions set within the *Construction Materials Management* provision are incidental to the project for which no direct compensation will be made.

WASTE AND BORROW SOURCES:

(2-16-11) (Rev. 3-17-22)

Payment for temporary erosion control measures, except those made necessary by the Contractor's own negligence or for his own convenience, will be paid for at the appropriate contract unit price for the devices or measures utilized in borrow sources and waste areas.

No additional payment will be made for erosion control devices or permanent seeding and mulching in any commercial borrow or waste pit. All erosion and sediment control practices that may be required on a commercial borrow or waste site will be done at the Contractor's expense.

All offsite Staging Areas, Borrow and Waste sites shall be in accordance with "Borrow and Waste Site Reclamation Procedures for Contracted Projects" located at:

https://connect.ncdot.gov/resources/roadside/FieldOperationsDocuments/Contract%20Reclamation%20Procedures.pdf

All forms and documents referenced in the "Borrow and Waste Site Reclamation Procedures for Contracted Projects" shall be included with the reclamation plans for offsite staging areas, and borrow and waste sites.

TEMPORARY DIVERSION:

This work consists of installation, maintenance, and cleanout of *Temporary Diversions* in accordance with Section 1630 of the *Standard Specifications*. The quantity of excavation for installation and cleanout will be measured and paid for as *Silt Excavation* in accordance with Article 1630-3 of the *Standard Specifications*.

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. Posts shall be installed a minimum of 2 ft. into the ground. If hand set, all backfill material shall be thoroughly tamped. Wood posts may be sharpened to a dull point if power driven. Posts damaged by power driving shall be removed and replaced prior to final acceptance. The tops of all wood posts shall be cut at a 30-degree angle. The wood posts may, at the option of the Contractor, be cut at this angle either before or after the posts are erected.

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

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

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

(B) Boundary Flagging

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

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

Installation of boundary flagging for delineation of all jurisdictional boundaries at staging areas, waste sites, or borrow pits shall be performed in accordance with Subarticle 230-4(B)(5) or Subarticle 802-2(F) of the *Standard Specifications*. No direct pay will be made for this delineation, as the cost of same shall be included in the unit prices bid for the various items in the contract.

The Contractor shall be required to maintain alternative stakes and highly visible flagging in a satisfactory condition for the duration of the project as determined by the Engineer.

Measurement and Payment

Safety Fence will be measured and paid as the actual number of linear feet of polyethylene or polypropylene fence installed in place and accepted. Such payment will be full compensation including but not limited to furnishing and installing fence geotextile with necessary posts and post bracing, staples, tie wires, tools, equipment and incidentals necessary to complete this work.

Payment will be made under:

Pay Item	**Pay Unit**
Safety Fence	Linear Foot

PERMANENT SOIL REINFORCEMENT MAT:

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. The coupling shall be rigid and non-buoyant and not exceed a diameter of 4” and 12” in length. Attach the rope included with the skimmer to the tee between the vent socket and the tube inlet, and the other end to a wooden stake or metal post. Clean out skimmer device when it becomes clogged with sediment and/or debris and is unable to float at the top of water in 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 drain pipe, 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 drain pipe, 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 drain pipe 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. The coupling shall be rigid and non-buoyant and not exceed a diameter of 4” and 12” in length. Attach the rope included with the

skimmer to the tee between the vent socket and the tube inlet, and the other end to a wooden stake or metal post. Clean out skimmer device when it becomes clogged with sediment and/or debris and is unable to float at the top of water in 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 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. The coupling shall be rigid and non-buoyant and not exceed a diameter of 4” and 12” in length. Attach the rope included with the skimmer to the tee between the vent socket and the tube inlet, and the other end to a wooden stake or metal post. Clean out skimmer device when it becomes clogged with sediment and/or debris and is unable to float at the top of water 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

STORMWATER BASIN EROSION CONTROL:

Description

Provide a skimmer to remove sediment from construction site runoff in permanent stormwater basins at locations shown in the erosion control plans. Work includes constructing basin, installation of coir fiber baffles, furnishing, installation and cleanout of skimmer, providing and placing stone pad on bottom of basin underneath skimmer device, stabilizing side slopes of basin with matting and seed, disposing of excess materials, removing coir fiber baffles, and skimmer device.

Materials

Item	Section
Seeding and Mulching	1060-4
Matting for Erosion Control	1060-8
Staples	1060-8
Coir Fiber Baffle	1640

Provide appropriately sized and approved skimmer device.

Provide Schedule 40 PVC pipe with a length of 6 ft. to attach to the skimmer and the coupling connection to serve as the arm pipe. For skimmer sizes of 2.5 in. and smaller, the arm pipe diameter shall be 1.5 inches. For skimmer sizes of 3 in. and larger, refer to manufacturer recommendation.

Provide 4” diameter Schedule 40 PVC pipe to attach to coupling connection of skimmer to serve as the barrel pipe through the earthen dam.

Construction Methods

Construct permanent stormwater basin according to the plans with basin surface free of obstructions, debris, and pockets of low-density material. Construct the coir fiber baffles according to *Roadway Standard Drawings* No. 1640.01 and Section 1640 of the *Standard Specifications*.

Install skimmer device according to manufacturer recommendations. Install the coupling connection provided with the skimmer 1 ft. from the bottom of the basin and attach to permanent stormwater drainage structure. Attach the 6 ft. arm pipe to the coupling connection and skimmer according to manufacturer recommendations. The coupling shall be rigid and non-buoyant and not exceed a diameter of 4” and 12” in length. Attach the rope included with the skimmer to the tee between the vent socket and the tube inlet, and the other end to a wooden stake or metal post. Clean out skimmer device when it becomes clogged with sediment and/or debris and is unable to float at the top of water in basin. Take appropriate measures to avoid ice accumulation in the skimmer device. Construct a stone pad of Class B stone directly underneath the skimmer device at bottom of basin. The pad shall be a minimum of 12” in height, and shall have a minimum cross sectional area of 4 ft. by 4 ft.

All bare side slope sections of the stormwater basin shall be seeded with a permanent seed mix as directed and in accordance with Articles 1660-4, 1660-5 and 1660-7 of the *Standard Specifications*. Straw or excelsior matting shall be installed on all bare side slope sections immediately upon the completion of seeding and in accordance with Article 1631-3 of the *Standard Specifications*.

Measurement and Payment

Silt Excavation will be measured and paid for in accordance with Article 1630-4 of the *Standard Specifications,* as calculated from the typical section throughout the length of the basin as shown on the final approved plans.

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

__" Skimmer will be measured 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.

Stone for Erosion Control, Class __ will be measured and paid for in accordance with Article 1610-4 of the *Standard Specifications*.

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

Matting for Erosion Control will be measured and paid for in accordance with Article 1631-4 of the *Standard Specifications*.

No measurement will be made for other items or for over excavation or stockpiling.

Payment will be made under:

Pay Item	**Pay Unit**
__" Skimmer	Each

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 Environmental Quality Division of Water Resources 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

COIR FIBER WATTLE BARRIER:
(5-20-13) 1630

Description

Coir fiber wattle barriers are tubular products consisting of coir fibers (coconut fibers) encased in coir fiber or synthetic netting and used at the toe of fills or on slopes to intercept runoff. Coir fiber 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 coir fiber wattle barriers.

Materials

Coir fiber wattle shall meet the following specifications:

Inner Material	100% Coir (Coconut) Fibers
Minimum Diameter	18"
Minimum Length	10 ft.
Minimum Density	5 lb./c.f. ± 10%
Net Material	Coir (Coconut) or Synthetic
Net Openings	2" x 2"
Net Strength	90 lb.
Minimum Weight	10 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 coir fiber wattle barriers in an overlapping and alternating pattern. Excavate a trench the entire length of each wattle with a depth of 2" to 3" for the wattle to be placed. Secure coir fiber

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 coir fiber wattle barriers 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.

For coir fiber wattle barriers used to reduce runoff velocity for large slopes, use a maximum spacing of 25 ft. for the barrier measured along the slope.

Maintain the coir fiber wattle barriers until the project is accepted or until the coir fiber wattle barriers are removed, and remove and dispose of silt accumulations at the coir fiber wattle barriers when so directed in accordance with Section 1630 of the *Standard Specifications*.

Measurement and Payment

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

Payment will be made under:

Pay Item	**Pay Unit**
Coir Fiber 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 Environmental Quality Division of Water Resources 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:
(9-9-11)(Rev. 11-15-22)

Description

This work consists of furnishing, installing, maintaining, pumping and removing an *Impervious Dike* for the purpose of diverting normal stream flow around the construction site. The Contractor shall construct an impervious dike in such a manner approved by the Engineer. The impervious dike shall not permit seepage of water into the construction site or contribute to siltation of the stream. The impervious dike shall be constructed of an acceptable material in the locations noted on the plans or as directed by the Engineer.

Materials

Acceptable materials shall include but not be limited to sheet piles, sandbags, and/or the placement of an acceptable size stone lined with polypropylene or other impervious geotextile.

Earth material shall not be used to construct an impervious dike when it is in direct contact with the stream unless vegetation can be established before contact with the stream takes place.

Construction Methods

Where impervious dikes are shown on the plans and used to dewater or lower the water elevation, construct in accordance with Article 410-4 and 410-5.

Measurement and Payment

Impervious Dike will be measured and paid as the actual number of linear feet of impervious dike(s) constructed, measured in place from end to end of each separate installation that has been completed and accepted by the Engineer. Such price and payment will be full compensation for all work including but not limited to furnishing materials, construction, maintenance, pumping and removal of the impervious dike.

Payment will be made under:

Pay Item	Pay Unit
Impervious Dike	Linear Foot

PUMP AROUND OPERATION:

Description

The work covered by this section consists of furnishing, installing, maintaining and removing any and all pump around systems used on this project. The Contractor shall install a pump around system in locations as shown in the plans and in other locations approved by the Engineer. The pump around system shall provide a passageway for the stream flow around the work site.

The quantity of pump around systems may be increased, decreased, or eliminated entirely as directed. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work. See NCDOT *Best Management Practices for Construction and Maintenance Activities* manual for example pump around operation.

Materials

Item	Section
Special Stilling Basin	1639

Impervious Dike shall meet the specifications as provided elsewhere in this contract.

Pumps shall be of sufficient size to divert the stream flow around the work area, as approved by the Engineer.

Construction Methods

Install *impervious dike(s)* as shown on the plans or as directed. Pump water around the work site. If the water is turbid or exposed to bare soil, pump through a *special stilling basin*. Once the work is complete in an area remove the *impervious dike(s)* and pump system, and stabilize the area.

Measurement and Payment

Impervious Dike will be measured and paid for as provided elsewhere in this contract.

Special Stilling Basin will be measured and paid for in accordance with Article 1639-4 of the *Standard Specifications*.

Payment for pumping operations shall be considered incidental to the work of installing pipes and culverts. The pumping operations shall include but not be limited to, diverting the stream flow around the work area and pumping runoff from the work area into a stilling basin, special stilling basin or other sediment control device. No additional payment will be made for furnishing materials or maintenance of the pumping operations for the installation of pipes and culverts.

The above prices and payments will be full compensation for all work covered by this section including, but not limited to furnishing all of the necessary materials, construction, maintenance and removal of the impervious dike and pump around system.

COIR FIBER MAT:

Description

Furnish material, install and maintain coir fiber mat in locations shown on the plans or in locations as directed. Work includes providing all materials, excavating and backfilling, and placing and securing coir fiber mat with stakes, steel reinforcement bars or staples as directed.

Materials

Item	Section
Coir Fiber Mat	1060-14

Anchors: Stakes, reinforcement bars, or staples shall be used as anchors.

Wooden Stakes:

Provide hardwood stakes 12"- 24" long with a 2" x 2" nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving through the coir fiber mat and down into the underlying soil. The other end of the stake needs to have a 1"- 2" long head at the top with a 1"- 2" notch following to catch and secure the coir fiber mat.

Steel Reinforcement Bars:

Provide uncoated #10 steel reinforcement bars 24" nominal length. The bars shall have a 4" diameter bend at one end with a 4" straight section at the tip to catch and secure the coir fiber mat.

Staples:

Provide staples made of 0.125" diameter new steel wire formed into a *u* shape not less than 12" in length with a throat of 1" in width.

Construction Methods

Place the coir fiber mat immediately upon final grading. Provide a smooth soil surface free from stones, clods, or debris that will prevent the contact of the mat with the soil. Unroll the mat and apply without stretching such that it will lie smoothly but loosely on the soil surface.

For stream relocation applications, take care to preserve the required line, grade, and cross section of the area covered. Bury the top slope end of each piece of mat in a narrow trench at least 6 in. deep and tamp firmly. Where one roll of matting ends and a second roll begins, overlap the end of the upper roll over the buried end of the second roll so there is a 6 in. overlap. Construct check trenches at least 12 in. deep every 50 ft. longitudinally along the edges of the mat or as directed. Fold over and bury mat to the full depth of the trench, close and tamp firmly. Overlap mat at least 6 in. where 2 or more widths of mat are installed side by side.

Place anchors across the mat at the ends approximately 1 ft. apart. Place anchors along the outer edges and down the center of the mat 3 ft. apart.

Adjustments in the trenching or anchoring requirements to fit individual site conditions may be required.

Measurement and Payment

Coir Fiber Mat will be measured and paid for as the actual number of square yards measured along the surface of the ground over which coir fiber mat is installed and accepted.

No measurement will be made for anchor items.

Payment will be made under:

Pay Item	**Pay Unit**
Coir Fiber Mat	Square Yard

FLOATING TURBIDITY CURTAIN:

Description

This work consists of furnishing a *Floating Turbidity Curtain* to deter silt suspension and movement of silt particles during construction. The floating turbidity curtain shall be constructed at locations as directed.

Materials

The curtain material shall be made of a tightly woven nylon, plastic or other non-deteriorating material meeting the following specifications:

Property	**Value**
Grab tensile strength	*md-370 lbs *cd-250 lbs
Mullen burst stength	480 psi
Trapezoid tear strength	*md-100 lbs *cd-60 lbs
Apparent opening size	70 US standard sieve
Percent open area	4% permittivity 0.28 sec-1

*md - machine direction
*cd - cross machine direction

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

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

Construction Methods

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

Measurement and Payment

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

Payment will be made under:

Pay Item	**Pay Unit**
Floating Turbidity Curtain	Square Yard

POND DRAINAGE PLAN REQUIREMENT:

The Contractor shall develop a Pond Drainage Plan for all ponds that are required to be drained for the construction of this project and submit the plan to the Engineer at the preconstruction conference for approval. The Pond Drainage Plan shall include but not be limited to procedures and rate of water drawdown, sediment control measures, water quality monitoring, fish and wildlife relocation plan, shall address procedures avoiding the inundation of a receiving body of water with deoxygenated or nutrient rich water resulting in impacts to aquatic life or algae bloom and procedures for maintaining downstream channel stability. If such ponds to be drained are on the NC DEQ Dam Safety Inventory List, all NC DEQ Dam Safety procedures must be followed.

Any erosion control devices or permanent seeding and mulching in areas where ponds have been drained will be paid for at the contract unit price for the item required. All additional erosion and sediment control practices not included in the contract documents that may be required on a pond drainage site will be done at the Contractor's expense.

No direct payment will be made for developing or implementing the Pond Drainage Plan as the cost of such shall be included in the lump sum price bid for *Clearing and Grubbing*.

CONCRETE WASHOUT STRUCTURE:

(12-10-20)

Description

Concrete washout structures are enclosures above or below grade to contain concrete waste water and associated concrete mix from washing out ready-mix trucks, drums, pumps, or other equipment. Concrete washouts must collect and retain all the concrete washout water and solids, so that this material does not migrate to surface waters or into the ground water. These enclosures are not intended for concrete waste not associated with wash out operations.

The concrete washout structure may include constructed devices above or below ground and or commercially available devices designed specifically to capture concrete wash water.

Materials

Item	Section
Temporary Silt Fence	1605

Safety Fence shall meet the specifications as provided elsewhere in this contract.

Geomembrane basin liner shall meet the following minimum physical properties for low permeability; it shall consist of a polypropylene or polyethylene 10 mil think geomembrane. If the minimum setback dimensions can be achieved the liner is not required. (5 feet above groundwater, 50 feet from top of bank of perennial stream, other surface water body, or wetland.)

Construction Methods

Build an enclosed earthen berm or excavate to form an enclosure in accordance with the details and as directed.

Install temporary silt fence around the perimeter of the enclosure in accordance with the details and as directed if structure is not located in an area where existing erosion and sedimentation control devices are capable to containing any loss of sediment.

Post a sign with the words “Concrete Washout” in close proximity of the concrete washout area, so it is clearly visible to site personnel. Install safety fence as directed for visibility to construction traffic.

The construction details for the above grade and below grade concrete washout structures can be found on the following web page link:

https://connect.ncdot.gov/resources/roadside/SoilWaterDocuments/ConcreteWashoutStructuredetail.pdf

Alternate details for accommodating concrete washout may be submitted for review and approval.

The alternate details shall include the method used to retain and dispose of the concrete waste water within the project limits and in accordance with the minimum setback requirements. (5 feet above groundwater, 50 feet from top of bank of perennial stream, other surface water body, or wetland.)

Maintenance and Removal

Maintain the concrete washout structure(s) to provide adequate holding capacity plus a minimum freeboard of 12 inches. Remove and dispose of hardened concrete and return the structure to a functional condition after reaching 75% capacity.

Inspect concrete washout structures for damage and maintain for effectiveness.

Remove the concrete washout structures and sign upon project completion. Grade the earth material to match the existing contours and permanently seed and mulch area.

Measurement and Payment

Concrete Washout Structure will be paid for per each enclosure installed in accordance with the details. If alternate details or commercially available devices are approved, then those devices will also be paid for per each approved and installed device.

Temporary Silt Fence will be measured and paid for in accordance with Article 1605-5 of the *Standard Specifications*.

Safety Fence shall be measured and paid for as provided elsewhere in this contract.

No measurement will be made for other items or for over excavation or stockpiling.

Payment will be made under:

Pay Item	**Pay Unit**
Concrete Washout Structure	Each

LITTER REMOVAL (MOWING AREAS ONLY):
(07-19-22)

Description

This work consists of the pickup, removal, and disposal of litter from roadsides within the construction project prior to mowing operations.

Construction Methods

Provide labor, equipment and materials necessary for the pickup and removal of litter from non-construction sources and the disposal of same into state approved landfills. The Contractor shall

abide by all ordinances, laws and regulations regarding disposal of litter and recycling of eligible materials. Wastes generated from construction activities shall be managed as provided elsewhere in the contract. Litter items may consist of any item not considered normal to the right-of-way, including but not limited to, varied sizes of bottles, cans, paper, tires, tire pieces, lumber, vehicle parts, building supplies, metals, household furnishings, cardboard, plastics, ladders, brush and other items not considered normal to the right of way. Litter removal shall be performed in designated areas within five days prior to any mowing operations and as directed. Designated areas shall include vegetated medians and shoulders within the project limits including all interchange ramps and other areas to be mown. Designated areas may be omitted for litter removal by the Engineer due to safety concerns.

The Contractor shall provide adequate personnel and materials to collect and remove litter. The Contractor shall be responsible for locating and utilizing approved local landfills and recycling facilities. Refer to Section 105-27 of the *Standard Specifications* for potential hazardous materials. All collected litter shall be containerized immediately and kept off the traveled portions of the roadway, shoulders, and rights-of-way (including paved shoulders). All collected litter that is small enough to be placed in a bag shall be bagged immediately. All collected litter that is too large for a bag shall be placed into a vehicle. Extended storage or stockpiling of collected litter and recyclables will not be permitted.

The Contractor's personnel shall dispose of any litter in a landfill approved by North Carolina Division of Waste Management. The Contractor will not be allowed to use NCDOT accounts at the landfills/recycling centers nor be allowed to dispose of the litter in NCDOT trash containers on any NCDOT property.

The Contractor shall report online the number of bags of litter and any recycling on the NCDOT Litter Management Website on the date of the pickup at the following website:

https://apps.ncdot.gov/LM

An access code ('Pickup Key') for the online reporting portal may be obtained via emailing the Roadside Environmental Unit Litter Management Section at ncdot.clr@ncdot.gov. The Contractor shall request access to the litter removal reporting website prior to starting initial litter collection operations.

Measurement and Payment

The quantity of litter removal to be performed will be affected by the actual conditions that occur during construction of the project. The quantity of litter removal may be increased, decreased, or eliminated entirely as directed. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

Manual Litter Removal will be measured and paid as the actual number of man hours each worker spends picking up litter. Such price and payment will be full compensation for all litter removal work covered by *Litter Removal*, including, but not limited to, furnishing all materials, labor, equipment, transport, reporting, and incidentals necessary to accomplish the work.

Litter Disposal will be measured and paid for by the actual number of tons of litter collected and properly disposed of at a state approved landfill. Such price and payment will be full compensation for all fees, labor, transport, and incidentals necessary to dispose of collected litter associated with *Litter Removal*.

All traffic control necessary to provide a safe work area for *Litter Removal* shall be paid for as specified elsewhere in the contract.

Payment will be made under:

Pay Item	Pay Unit
Manual Litter Removal	MHR
Litter Disposal	TON

TACK FOR MULCH FOR EROSION CONTROL:
(07-19-22)

Description

This work consists of supplying and installing of an approved material for binding mulch for erosion control in accordance with Section 1060-5, Section 1615 and Section 1660 of the *Standard Specifications*. This provision defines acceptable materials and rates for tacking material for holding mulch in place.

Materials

(a) Emulsified Asphalt

Asphalt emulsion tack shall conform to the requirements of AASHTO M 140, Specification for Emulsified Asphalt. The emulsified asphalt may be rapid setting, medium setting, or slow setting. Apply emulsified asphalt tackifier at a rate of 0.10 gallons per square yard (approximately 484 gallons per acre).

(b) Cellulose Hydromulch

Cellulose hydromulch products shall be non-toxic, weed-free, prepackaged cellulose fiber (pulp) material containing no more than 3% ash or other inert materials. Cellulose hydromulches may contain dyes or binders specifically formulated to enhance the adhesive qualities of the hydromulch. Apply cellulose hydromulches at a rate of 1000 pounds (dry weight) per acre.

Wood fiber or wood fiber blend hydromulches may be substituted for cellulose hydromulch at the same application rate.

(c) Other tackifiers

Other approved materials, specifically designed and manufactured for application as a straw mulch tacking agent, may be used at the manufacturer's recommended rate.

Construction Methods

Apply the Tack for Mulch for Erosion Control uniformly across straw mulch per Section 1615 and Section 1660 of the *Standard Specifications.*

Payment

Tack for Mulch for Erosion Control is incidental to the application of *Temporary Mulching*, Section 1615-4, and *Seeding and Mulching*, Section 1660-8, and no additional payment will be made.

STREAMBANK REFORESTATION:

Description

Streambank Reforestation will be planted in areas designated on the plans and as directed by the Engineer. See the Reforestation Plan 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.

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.

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 Reforestation Plan Sheets and in locations as directed by the Engineer. 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 or reinforcement bars may be used as anchors in accordance with the Streambank Reforestation Detail Sheets and as directed by the Engineer. 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

CONSTRUCTION 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
Construction 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.

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 235-3(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. Organic material shall not exceed 10% of the total volume of the fill material used. No compaction shall be performed for graded areas unless directed.

Excess material shall be disposed of as shown on the plans or as directed by the Engineer.

Measurement and Payment

All work completed under this section will be measured paid for as lump sum for *Site Grading for Mitigation*.

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**
Site Grading for Mitigation	Lump Sum

DIVERSION PUMPING FOR MITIGATION

Description

The work covered by this section consists of furnishing, installing, maintaining and removing any and all pump around systems used on this project. The Contractor shall install a pump around system in locations 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 by the Engineer. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work. See example diversion pumping for mitigation detail on the plans.

Construction Methods

Install a temporary 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 diversion pumping for mitigation.

Measurement and Payment

Temporary 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 diversion pumping for mitigation.

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 diversion pumping for mitigation.

Payment will be made under:

Pay Item	**Pay Unit**
Diversion Pumping for Mitigation	Lump Sum

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 by the Engineer.

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 by the Engineer. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

Materials

Refer to Division 10

Item	Section
No. 57 Stone	1005
Riprap, Class A, B, 1, and 2	1042
Boulder	1042
Geotextile for Drainage, Type 2	1056

Boulders shall meet the requirements of Section 1042 of the *Standard Specifications*. Boulders of minimum dimension *as called out by the plans shall be individually picked for use in the structures. Boulders shall be relatively flat on either side in the same dimension, preferably the long dimension.

Construction Methods

The Contractor shall place Geotextile for Drainage, Type 2 and stone in locations and to the thickness, widths, and lengths as shown on the plans or as directed by the Engineer. 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 by the Engineer. No. 57 stone that has been stockpiled will not be measured a second time.

Riprap, Class A, B, 1 and 2 will be measured and paid for in accordance with Article 876-4 of the *Standard Specifications*.

Geotextile for Drainage, Type 2 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 by the Engineer. 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
Riprap, Class A, B, 1 and 2	Ton
Geotextile for Drainage	Square Yard

IMPERVIOUS SELECT MATERIAL:

Description

This work consists of furnishing, stockpiling, placing and maintaining impervious select material for stream plugs in locations as shown on the plans and cross-sections or as directed by the Engineer.

The quantity of Impervious Select Material to be installed will be affected by the actual conditions that occur during the construction of the project. The quantity of Impervious Select Material may be increased, decreased, or eliminated entirely as directed by the Engineer. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

Materials

Materials that will function as impervious barriers to water movement shall be a silty or clay soil material meeting the requirements of AASHTO M 145 for soil classification A-2, A-6 and A-7 provided such materials do not have a Liquid Limit (LL) greater than 50. To maintain soil workability for placement and compaction, the following criteria shall apply for Plasticity Index (PI):

Position of Borrow Material	Constraints on Plasticity Index (PI)
Below the water table	Must be greater than 7 and less than 25
Above the water table	Must be greater than 7 and less than 35

Plasticity Index shall be determined in accordance with AASHTO T90 and the Liquid Limit shall be determined in accordance with AASHTO T89. The Contractor is cautioned that soils tend to become less workable as the PI increases above 20. Although a PI of 35 may be acceptable, the Contractor should be aware that additional efforts might be necessary to work the soil in order to achieve the minimum compaction standards.

Construction Methods

Impervious Select Material for stream plugs shall be constructed at locations as shown on the plans and cross-sections or as directed by the Engineer. Impervious Select Material for stream plugs shall be used at the outlet end of uncompacted channel fills, and may be used at other locations to provide surface drainage relief from the uncompacted fills.

(A) Clearing and Grubbing

Clear and Grub the stream plug cross-section on all sides to remove all vegetation and root mat material as directed by the Engineer to an elevation at least 1 ft. below the elevation of the existing channel cross-section.

(B) Construction

Construct the stream plug using material that meets the requirements of the Materials section listed above. Construct the stream plug to the dimensions detailed on the plans.

Measurement and Payment

Impervious Select Material will be measured and paid for as the actual number of cubic yards of material, measured in their original position and computed by the average end area method, which has been acceptably excavated in accordance with the plans and specifications. Original cross-sections for the determination of the excavation quantities will be taken before any grading begins. Final cross-sections will be taken after the excavation has been completed, except that the plan typical sections will be used for the final cross-sections where, in the opinion of the Engineer, the work has been constructed in reasonably close conformity to the plan typical section. Original and final cross-sections will be taken by either ground or aerial survey methods, as determined by the Engineer.

Such price and payment will be full compensation for all work covered by this section, including but not limited to furnishing the source of the Impervious Select Material, providing and implementing a development, use and reclamation plan; building, maintaining and obliterating haul roads; clearing and grubbing the source; removal and disposition of overburden and other unsuitable material; excavation; hauling; restoration of the source and haul roads to an acceptable condition, seeding and mulching and maintaining the work.

Payment will be made under:

Pay Item	Pay Unit
Impervious Select Material	Cubic Yard

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 by the Engineer. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

Materials

Refer to Division 10

Item	Section
Boulder	1042 and SP for Structure Stone
No. 57 Stone	1005
Riprap, Class A	1042
Geotextile for Drainage, Type 2	1056

Boulders shall be used as header and footer rocks for this device.

Construction Methods

Rock cross vanes shall be constructed in accordance with the Rock Cross Vane Detail shown in the plans or as directed by the Engineer. 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 Geotextile, Type 2 and No. 57 stone. Voids between the header and footer rocks can be filled with hand-placed Class A riprap as directed by the Engineer. 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 in the Structure Stone Special Provision.

No. 57 Stone will be measured and paid for as provided in the Structure Stone Special Provision.

Riprap, Class A will be measured and paid for as provided in the Structure Stone Special Provision.

Geotextile for Drainage, Type 2 will be measured and paid for as provided in the Structure Stone Special Provision.

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.

CONSTRUCTED RIFFLE:

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 provide grade control.

The quantity of constructed riffles to be installed will be affected by the actual conditions that occur during the construction of the project. The quantity of constructed riffles may be increased,

decreased, or eliminated entirely as directed by the Engineer. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

Materials

Refer to Division 10

Item	**Section**
No. 57 Stone	Section 1005
Riprap, Class A, B, 1 and 2	Section 1042

Construction Methods

Constructed riffles shall be constructed according to the Constructed Riffle Detail shown on the plans or as directed by the Engineer.

Measurement and Payment

No. 57 Stone will be measured and paid for as provided in the Structure Stone Special Provision. *Riprap, Class A, B, 1 and 2* will be measured and paid for as provided in the Structure Stone Special Provision.

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 constructed riffles.

LOG VANE:

Description

The work covered by this section 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.

The quantity of log vanes to be installed will be affected by the actual conditions that occur during the construction of the project. The quantity of log vanes may be increased, decreased, or eliminated entirely as directed by the Engineer. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

Materials

Logs: Hardwood tree species with a minimum trunk diameter of 12". The length of each log shall be *(varies) to allow for proper construction in accordance with the Log Vane Detail. *(as called out per plan)

Refer to Division 10

Item	Section
Boulder	1042 and SP for Structure Stone
No. 57 Stone	1005
Riprap, Class A	1042
Geotextile for Drainage, Type 2	1056

Boulders shall be used as header and footer rocks for this device.

Construction Methods

Log vanes shall be constructed according to the log vane with rock J-hook detail shown on the plans or as directed by the Engineer. A vane 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 the vane will decrease from bankfull elevation toward the center of the channel at a slope of 4 to 10 percent. Install header and footer rocks and bury the upstream end of the log under the streambed according to the detail and plate the upstream side of the vane with Geotextile, Type 2 and No. 57 stone. The Geotextile shall be securely fastened to the back of the log using galvanized roofing nails on approximately 8" centers. Voids between the header and footer can be filled with hand-placed Riprap, Class A as directed by the Engineer. Footer rocks shall be placed such that the header rock is at streambed elevation. The downstream end of the log at the bankfull elevation shall be anchored by pinning with header and footer rocks. The log vane shall be keyed into the bank at the downstream end as shown on the log vane with rock J-hook detail. Native hardwood trees encountered during clearing and grubbing may be identified and stockpiled for use as logs for the log vanes.

Method of Measurement

Logs will be measured and paid for as the actual number of logs of each acceptable species and size, which have been incorporated into the work, or have been delivered to and stockpiled on the project as directed by the Engineer. Logs that have been stockpiled will not be measured a second time.

Boulders will be measured and paid for as provided in the Structure Stone Special Provision.

No. 57 Stone will be measured and paid for as provided in the Structure Stone Special Provision.

Riprap, Class A will be measured and paid for as provided in the Structure Stone Special Provision.

Geotextile for Drainage Type 2 will be measured and paid for as provided in the Structure Stone Special Provision.

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 log vanes.

Payment will be made under:

Pay Item	Pay Unit
Log	Each

STREAM PLUG:

Description

This work consists of the construction, maintenance, and removal of physical barriers placed in ditches, diversions or swales to reduce water flow.

The quantity of stream plugs to be constructed will be affected by the actual conditions that occur during the construction of the project. The quantity of stream plugs may be increased, decreased, or eliminated entirely as directed by the Engineer. Such variations in quantity will not be considered as alterations in the details of construction or a change in the character of the work.

Materials

Stream plugs shall consist of *Impervious Select Material* that shall meet the specifications as provided elsewhere in this contract.

Refer to Division 10

Construction Methods

Stream plugs shall be constructed at locations as shown on the plans or as directed by the Engineer. Clear and grub all side slopes of the channel. Place stream plug in channel ensuring that there is at least 5 ft. of embankment material between the plug and the face of the restored stream bank. Construct the stream plug across the entire width of the channel and to an elevation of 1.5 ft below the proposed fill elevation as shown on the plans. The length of the stream plug is to be a minimum of *(varies) and a maximum of *(varies). *(as called out per plan)

Measurement and Payment

Stream plugs will not be measured for payment under this article. *Impervious Select Material* will be measured and paid for as provided elsewhere in this contract.

This payment shall be considered full compensation for all materials, labor, equipment, and incidentals necessary to construct the stream plug.

The removal and disposal of silt accumulations will be measured and paid for as *Silt Excavation* in accordance with Article 1630-3 of the *Standard Specifications*.

BRUSH TOE:

Description

Brush Toe treatments are intended to provide natural armoring to the toe of slopes in areas of high shear stress. This work consists of preparing and installing Brush Toe in areas as specified in the plans. This includes placement of footer logs, limbs, and brush fill to create a stable interlocking mix. It also includes coir fiber matting and the finishing of banks as specified in the Brush Toe Detail in the plans.

Materials

Item	Section
Coir Fiber Mat	1060-14

Anchors: 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.

Brush Fill

The brush fill shall be different lengths interlocking together. Brush fill shall consist of a mixture of hardwood or softwood harvested from within the approved on-site clearing limits or otherwise furnished from off-site, pending Engineer approval that all other material requirements are met. The material shall be free of invasive species. Composition of brush fill shall have an even distribution of different lengths and diameters of large branches (3”–6” in diameter). All brush fill material shall be free of rot/decay and/or disease. The Engineer shall inspect and approve all brush fill material, prior to installation.

Logs

Footer logs for this item shall be from trees free of rot and/or disease with a minimum diameter as specified in the Brush Toe Detail in the construction drawings. Logs shall be straight with limbs trimmed flush. The Contractor shall use suitable logs harvested on-site from within the approved limits of clearing. The Contractor shall furnish additional logs as needed.

Construction Methods

Construct Brush Toe by first shaping the bankfull channel to the approximate grades specified, including scour pools and placement of other stream structures in the bed that overlaps proposed Brush Toe. Next, excavate enough bank and bed material to place the woody debris for the structure.

Excavate the outer meander bend down to maximum depth of the pool (thalweg). Construct the Brush Toe and backfill matrix\ as shown on the Brush Toe Detail in the plans. The Brush Toe shall be constructed with the largest material placed first (footer logs). No logs are to be placed parallel to the proposed flow of water. Small/finer woody debris shall be placed above the coarse woody debris with the largest material being placed first and the smallest last, followed with filler material. All woody debris shall be compacted with the excavator bucket to reduce the presence of voids in the small/fine woody debris layer. The woody debris and backfill matrix will cover the outer bank from the bottom (maximum depth) of the pool up to 6" above the head of the downstream riffle. The upstream and downstream ends of the brush toe shall smoothly transition vertically (along the bank for approximately 10 linear feet longitudinally) to tie into other in-stream structures such as adjacent constructed riffles, per the plans. Coir Fiber Matting shall be placed on top of the woody debris matrix before the finish grading of the upper bank takes place. Final soil shall be seeded and mulched and then wrapped with the Coir Fiber Matting.

Final grades should be within +/- 0.1 feet of those indicated on the construction drawings.

Coir Fiber Matting will be placed along the channel side slopes as shown in the Brush Toe Detail.

Some excavation/undercutting of channel material may be necessary to achieve the correct grades. This shall be considered incidental to construction of Brush toe.

In locations where exposed bedrock and/or other existing feature extends to and/or within the limits of the proposed work, the Brush Toe installation shall be field adjusted to incorporate the bedrock/existing feature, into the finished work. The Engineer shall be contacted as soon as the presence of bedrock and/or other existing feature is field identified, to determine the appropriate method of incorporation. Site conditions may require slight deviation from the plan and shall be approved by the Engineer.

Measurement and Payment

The quantity of Brush Toe to be paid for will be the actual number of linear feet of bank installed measured along the stream as shown in the plans or as directed by the Engineer.

The unit price per linear foot for Brush Toe shall include full compensation for all labor, equipment, and materials associated with installing the wood toe components inclusive of those required to achieve "top of wood": footer logs, coarse woody debris, filler material woody debris, and associated salvage channel sand and gravel. This includes harvesting of trees from within the project boundary or for harvest or purchase of trees from offsite locations.

Payment will be made under:

Pay Item	**Pay Unit**
Brush Toe	Linear Foot

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Project Special Provisions

Structures, Culverts, Walls

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DocuSigned by:
Joe Kelvington
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5/15/2023

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MAINTENANCE AND PROTECTION OF TRAFFIC BENEATH PROPOSED STRUCTURE AT STATION 13+08.49 -Y42- **(08-13-04)**

1.0 GENERAL

Maintain traffic on -L- as shown in Traffic Control Plans and as directed by the Engineer.

Provide a minimum temporary vertical clearance of 17'-1" 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.

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CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS AT STATION 849+00 (LT.) -L- **(02-21-23)**

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 involve the use of a rock causeway [workpad], a work bridge, or other methods; however, all types of temporary access are required to meet the requirements of all permits, the plans, the Standard Specifications, and this Special Provision.

2.0 TEMPORARY ROCK CAUSEWAY [WORKPAD]

At the contractor's option, construction of a temporary rock causeway [workpad] within the limits shown on the plans is acceptable, provided the causeway [workpad] impacts are in compliance with all permits. Build the causeway [workpad] with Class II riprap topped by a layer of Class B riprap or as otherwise designated on the plans or approved by the Engineer. If desired, recycle the Class II riprap used in the causeway [workpad] for placement in the final riprap slope protection as directed by the Engineer. No payment will be made for recycled riprap as this material is considered incidental to the causeway [workpad] placement and removal. If this option is exercised, no adjustment in contract bid price will be allowed due to an underrun in the quantity of "Rip Rap Class II (2'-0" Thick)".

Completely remove all causeway [workpad] material including pipes and return the entire causeway [workpad] footprint to the original contours and elevations within 90 days of the completion of the deck slab or as otherwise required by permits.

For sites affected by moratoriums or restrictions on in-stream work: Do not construct or remove causeway [workpad] during the moratorium period shown on the permit. If the completion of the deck slab falls within the prohibitive dates for causeway [workpad] construction or removal, begin causeway [workpad] removal immediately following the prohibitive dates.

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.

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4.0 BASIS OF PAYMENT

The lump sum price bid for "Construction, Maintenance and Removal of Temporary Access at Station 849+00 (LT.) -L-" 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.

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CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS AT STATION 849+00 (RT.) -L- **(02-21-23)**

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 involve the use of a rock causeway [workpad], a work bridge, or other methods; however, all types of temporary access are required to meet the requirements of all permits, the plans, the Standard Specifications, and this Special Provision.

2.0 TEMPORARY ROCK CAUSEWAY [WORKPAD]

At the contractor's option, construction of a temporary rock causeway [workpad] within the limits shown on the plans is acceptable, provided the causeway [workpad] impacts are in compliance with all permits. Build the causeway [workpad] with Class II riprap topped by a layer of Class B riprap or as otherwise designated on the plans or approved by the Engineer. If desired, recycle the Class II riprap used in the causeway [workpad] for placement in the final riprap slope protection as directed by the Engineer. No payment will be made for recycled riprap as this material is considered incidental to the causeway [workpad] placement and removal. If this option is exercised, no adjustment in contract bid price will be allowed due to an underrun in the quantity of "Rip Rap Class II (2'-0" Thick)".

Completely remove all causeway [workpad] material including pipes and return the entire causeway [workpad] footprint to the original contours and elevations within 90 days of the completion of the deck slab or as otherwise required by permits.

For sites affected by moratoriums or restrictions on in-stream work: Do not construct or remove causeway [workpad] during the moratorium period shown on the permit. If the completion of the deck slab falls within the prohibitive dates for causeway [workpad] construction or removal, begin causeway [workpad] removal immediately following the prohibitive dates.

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.

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4.0 BASIS OF PAYMENT

The lump sum price bid for "Construction, Maintenance and Removal of Temporary Access at Station 849+00 (RT.) -L-" 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.

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STEEL REINFORCED ELASTOMERIC BEARINGS **(06-22-16)**

The 2018 Standard Specifications shall be revised as follows:
In Section 1079-2(A) – Elastomeric Bearings 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.

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THERMAL SPRAYED COATINGS (METALLIZATION) (12-01-2017)

1.0 DESCRIPTION

Apply a thermal sprayed coating (TSC) and sealer to metal surfaces in accordance with the Thermal Sprayed Coatings (Metallization) Program and as specified herein when called for on the plans or by other Special Provisions. Use only Arc Sprayed application methods to apply TSC. The Engineer must approve other methods of application.

The Thermal Sprayed Coatings (Metallization) Program is available on the Materials and Tests Unit website.

2.0 QUALIFICATIONS

Only use NCDOT approved TSC Contractors meeting the requirements outlined in the Thermal Sprayed Coatings (Metallization) Program.

3.0 MATERIALS

Use only materials meeting the requirements of Section 7 of the Thermal Sprayed Coatings (Metallization) Program.

4.0 SURFACE PREPARATION AND TSC APPLICATION

Surface preparation of TSC surfaces shall meet the requirements of Section 8 of the Thermal Sprayed Coatings (Metallization) Program. Apply TSC with the alloy to the thickness specified on the plans or as required by Thermal Sprayed Coatings (Metallization) Program.

5.0 INSPECTION AND TESTING

The TSC Contractor must conduct inspections and tests listed in the Thermal Sprayed Coatings (Metallization) Program.

6.0 REPAIRS

Perform all shop repairs in accordance with the procedures outlined in the Thermal Sprayed Coatings (Metallization) Program.

Repairs associated with field welding shall be made by removing the existing metallizing by blast or power tool cleaning. Affected areas shall be addressed as follows:

- For Marine Environments, incorporate a minimum surface preparation in accordance with SSPC SP-11 (Power Tool Cleaning to Bare Metal) and require an approved epoxy mastic coating applied in accordance with the manufacturer's recommendation. Apply a minimum of two (2) coats at a rate of 5-7 (WFT) per coat to the affected area.

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- For Non-Marine Environments, incorporate a minimum surface preparation in accordance with SSPC SP-11 (Power Tool Cleaning to Bare Metal) and require an approved organic zinc-rich coating applied in accordance with the manufacturer's recommendation. Apply a minimum of two (2) coats at a rate of 5-7 (WFT) per coat to the affected area.

    1. Minor localized areas less than or equal to 0.1 ft2 with exposed substrate shall be repaired as outlined above for marine and non-marine environments.

    2. Large localized areas greater than 0.1 ft2 with exposed substrate shall require the Contractor to submit a detailed repair procedure to the Engineer for review and approval.

- Repair methods for areas where the substrate has not been exposed shall be mutually agreed upon between the Contractor and TSC Contractor as approved by the Engineer.

7.0 TWELVE MONTH OBSERVATION PERIOD

All TSC materials applied under the Thermal Sprayed Coatings (Metallization) Program shall be evaluated twelve (12) months after project acceptance for defective materials and workmanship.

8.0 BASIS OF PAYMENT

The contract price bid for the metal component to which the TSC is applied will be full compensation for the thermal sprayed coating.

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ELASTOMERIC CONCRETE (02-11-19)

1.0 DESCRIPTION

Elastomeric concrete is a mixture of a two-part polymer consisting of polyurethane and/or epoxy and kiln-dried aggregate. Provide an elastomeric concrete and binder system that is preapproved. Use the concrete in the blocked out areas on both sides of the bridge deck joints as indicated on the plans.

2.0 MATERIALS

Provide materials that comply with the following minimum requirements at 14 days (or at the end of the specified curing time).

ELASTOMERIC CONCRETE PROPERTIES	TEST METHOD	MINIMUM REQUIREMENT
Compressive Strength, psi	ASTM D695	2000
5% Deflection Resilience	ASTM D695	95
Splitting Tensile Strength, psi	ASTM D3967	625
Bond Strength to Concrete, psi	ASTM C882 (C882M)	450
Durometer Hardness	ASTM D2240	50

BINDER PROPERTIES (without aggregate)	TEST METHOD	MINIMUM REQUIREMENT
Tensile Strength, psi	ASTM D638	1000
Ultimate Elongation	ASTM D638	150%
Tear Resistance, lb/in	ASTM D624	200

In addition to the requirements above, the elastomeric concrete must be resistant to water, chemical, UV and ozone exposure and withstand temperature extremes. Elastomeric concrete systems requiring preheated aggregates are not allowed.

3.0 PREQUALIFICATION

Manufacturers of elastomeric concrete materials shall submit samples (including aggregate, primer and binder materials) and a Type 3 certification in accordance with Article 106-3 of the *Standard Specifications* for prequalification to:

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North Carolina Department of Transportation
Materials and Tests Unit
1801 Blue Ridge Road
Raleigh, NC 27607

Prequalification will be determined for the system. Individual components will not be evaluated, nor will individual components of previously evaluated systems be deemed prequalified for use.

The submitted binder (a minimum volume of 1 gallon) and corresponding aggregate samples will be evaluated for compliance with the Materials requirements specified above. Systems satisfying all of the Materials requirements will be prequalified for a one year period. Before the end of this period new product samples shall be resubmitted for prequalification evaluation.

If, at any time, any formulation or component modifications are made to a prequalified system that system will no longer be approved for use.

4.0 INSTALLATION

The elastomeric concrete shall not be placed until the reinforced concrete deck slab has cured for seven (7) full days and reached a minimum strength of 3,000 psi.

Provide a manufacturer's representative at the bridge site during the installation of the elastomeric concrete to ensure that all steps being performed comply with all manufacturer installation requirements including, but not limited to weather conditions (ambient temperature, relative humidity, precipitation, wind, etc.), concrete deck surface preparation, binder and aggregate mixing, primer application, elastomeric concrete placement, curing conditions and minimum curing time before joint exposure to traffic. Do not place elastomeric concrete if the ambient air or surface temperature is below 45°F.

Prepare the concrete surface within 48 hours prior to placing the elastomeric concrete. Before placing the elastomeric concrete, all concrete surfaces shall be thoroughly cleaned and dry. Sandblast the concrete surface in the blockout and clear the surface of all loose debris. Do not place the elastomeric concrete until the surface preparation is completed and approved.

Prepare and apply a primer, as per manufacturer's recommendations, to all concrete faces to be in contact with elastomeric concrete, and to areas specified by the manufacturer.

Prepare, batch, and place the elastomeric concrete in accordance with the manufacturer's instructions. Place the elastomeric concrete in the areas specified on the plans while the primer is still tacky and within two (2) hours after applying the primer. Trowel the elastomeric concrete to a smooth finish.

The joint opening in the elastomeric concrete shall match the formed opening in the concrete deck prior to sawing the joint.

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5.0 FIELD SAMPLING

Provide additional production material to allow freshly mixed elastomeric concrete to be sampled for acceptance. A minimum of six (6) 2-inch cube molds and three (3) 3-inch diameter x 6-inch cylinders will be taken by the Department for each day's production. Compression, splitting tensile, and durometer hardness testing will be performed by the Department to determine acceptance. Materials failing to meet the requirements listed above are subject to removal and replacement at no cost to the Department.

6.0 BASIS OF PAYMENT

No separate payment will be made for elastomeric concrete. The lump sum contract price bid for "Foam Joint Seals" or "Preformed Silicone Expansion Joint Seal" will be full compensation for furnishing and placing the Elastomeric Concrete.

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FOAM JOINT SEALS (09-27-12)

1.0 SEALS

Use preformed seals compatible with concrete and resistant to abrasion, oxidation, oils, gasoline, salt and other materials that are spilled on or applied to the surface. Use a resilient, UV stable, preformed, impermeable, flexible, expansion joint seal. The joint seal shall consist of low-density, closed cell, cross-linked polyethylene non-extrudable, foam. The joint seal shall contain no EVA (Ethylene Vinyl Acetate). Cell generation shall be achieved by being physically blown using nitrogen. No chemical blowing agents shall be used in the cell generation process.

Use seals manufactured with grooves 1/8"± wide by 1/8"± deep and spaced between 1/4" and 1/2" apart along the bond surface running the length of the joint. Use seals with a depth that meets the manufacturer's recommendation, but is not less than 70% of the uncompressed width. Provide a seal designed so that, when compressed, the center portion of the top does not extend upward above the original height of the seal by more than 1/4". Provide a seal that has a working range of 30% tension and 60% compression and meets the requirements given below.

TEST	TEST METHOD	REQUIREMENT
Tensile strength	ASTM D3575-08, Suffix T	110 – 130 psi
Compression Set	ASTM D1056 Suffix B, 2 hr recovery	10% - 16%
Water Absorption	ASTM D3575	< 0.03 lb/ft^2
Elongation at Break	ASTM D3575	180% - 210%
Tear Strength	ASTM D624 (D3575-08, Suffix G)	14 – 20 pli
Density	ASTM D3575-08, Suffix W, Method A	1.8 – 2.2 lb/ft^3
Toxicity	ISO-10993.5	Pass (not cytotoxic)

Have the top of the joint seal clearly shop marked. Inspect the joint seals upon receipt to ensure that the marks are clearly visible before installation.

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2.0 BONDING ADHESIVE

Use a two component, 100% solid, modified epoxy adhesive supplied by the joint seal manufacturer that meets the requirements given below.

TEST	TEST METHOD	REQUIREMENT
Tensile strength	ASTM D638	3000 psi (min.)
Compressive strength	ASTM D695	7000 psi (min.)
Hardness	Shore D Scale	75-85 psi
Water Absorption	ASTM D570	0.25% by weight max.
Elongation to Break	ASTM D638	5% (max.)
Bond Strength	ASTM C882	2000 psi (min.)

Use an adhesive that is workable to 40°F. When installing in ambient air or surface temperatures below 40°F or for application on moist, difficult to dry concrete surfaces, use an adhesive specified by the manufacturer of the joint seal.

3.0 SAWING THE JOINT

The joint opening shall be initially formed to the width shown on the plans including the blockout for the elastomeric concrete.

The elastomeric concrete shall have sufficient time to cure such that no damage can occur to the elastomeric concrete prior to sawing to the final width and depth as specified in the plans.

When sawing the joint to receive the foam seal, always use a rigid guide to control the saw in the desired direction. To control the saw and to produce a straight line as indicated on the plans, anchor and positively connect a template or a track to the bridge deck. Do not saw the joint by visual means such as a chalk line. Fill the holes used for holding the template or track to the deck with an approved, flowable non-shrink, non-metallic grout.

Saw cut to the desired width and depth in one or two passes of the saw by placing and spacing two metal blades on the saw shaft to the desired width for the joint opening.

The desired depth is the depth of the seal plus 1/4” above the top of the seal plus approximately 1” below the bottom of the seal. An irregular bottom of sawed joint is permitted as indicated on the plans. Grind exposed corners on saw cut edges to a 1/4” chamfer.

Saw cut a straight joint, centered over the formed opening and to the desired width specified in the plans. Prevent any chipping or damage to the sawed edges of the joint.

Remove any staining or deposited material resulting from sawing with a wet blade to the satisfaction of the Engineer.

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4.0 PREPARATION OF SAWED JOINT FOR SEAL INSTALLATION

The elastomeric concrete shall cure a minimum of 24 hours prior to seal installation.

After sawing the joint, the Engineer will thoroughly inspect the sawed joint opening for spalls, popouts, cracks, etc. All necessary repairs will be made by the Contractor prior to blast cleaning and installing the seal.

Clean the joints by sandblasting with clean dry sand immediately before placing the bonding agent. Sandblast the joint opening to provide a firm, clean joint surface free of curing compound, loose material and any foreign matter. Sandblast the joint opening without causing pitting or uneven surfaces. The aggregate in the elastomeric concrete may be exposed after sandblasting.

After blasting, either brush the surface with clean brushes made of hair, bristle or fiber, blow the surface with compressed air, or vacuum the surface until all traces of blast products and abrasives are removed from the surface, pockets, and corners.

If nozzle blasting is used to clean the joint opening, use compressed air that does not contain detrimental amounts of water or oil.

Examine the blast cleaned surface and remove any traces of oil, grease or smudge deposited in the cleaning operations.

Bond the seal to the blast cleaned surface on the same day the surface is blast cleaned.

5.0 SEAL INSTALLATION

Install the joint seal according to the manufacturer's procedures and recommendations and as recommended below. Do not install the joint seal if the ambient air or surface temperature is below 45°F. Have a manufacturer's certified trained factory representative present during the installation of the first seal of the project.

Before installing the joint seal, check the uninstalled seal length to insure the seal is the same length as the deck opening. When the joint seal requires splicing, use the heat welding method by placing the joint material ends against a teflon heating iron of 425-475°F for 7 - 10 seconds, then pressing the ends together tightly. Do not test the welding until the material has completely cooled.

Begin installation by protecting the top edges of the concrete deck adjacent to the vertical walls of the joint as a means to minimize clean up. After opening both cans of the bonding agent, stir each can using separate stirring rods for each component to prevent premature curing of the bonding agent. Pour the two components, at the specified mixing ratio, into a clean mixing bucket. Mix the components with a low speed drill (400 rpm max.) until a uniform gray color is achieved without visible marbling. Apply bonding agent to both sides of the elastomeric concrete as well as both sides of the joint seal, making certain to completely fill the grooves with epoxy. With gloved hands, compress the joint seal and with the help of a blunt probe, push the seal into the joint opening until the seal is recessed

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approximately 1/4" below the surface. When pushing down on the joint seal, apply pressure only in a downward direction. Do not push the joint seal into the joint opening at an angle that would stretch the material. Seals that are stretched during installation shall be removed and rejected. Once work on placing a seal begins, do not stop until it is completed. Clean the excess epoxy from the top of the joint seal immediately with a trowel. Do not use solvents or any cleaners to remove the excess epoxy from the top of the seal. Remove the protective cover at the joint edges and check for any excess epoxy on the surface. Remove excess epoxy with a trowel, the use of solvents or any cleaners will not be allowed.

The installed system shall be watertight and will be monitored until final inspection and approval. Do not place pavement markings on top of foam joint seals.

6.0 BASIS OF PAYMENT

Payment for all foam joint seals will be at the lump sum contract price bid for "Foam Joint Seals". Prices and payment will be full compensation for furnishing all material, including elastomeric concrete, labor, tools and equipment necessary for installing these units in place and accepted.

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EXPANSION JOINT SEALS (09-30-11)

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"

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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).

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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.

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- 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.

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SOUND BARRIER WALL **(08-29-19)**

1.0 DESCRIPTION

This work consists of furnishing precast panels with an architectural surface treatment, structural steel, concrete, handling, transporting, fabricating, galvanizing, storing materials, furnishing erection drawings, pile excavation, backfilling, erecting and installing the sound barrier wall members and all other materials as required by the plans, Standard Specifications and this Special Provision.

Precast panels with an architectural surface treatment shall be constructed using form lining materials and patterns to match the appearance (size, shape, color, texture, pattern, and relief) of the textured finish as specified on the plans and approved by the Engineer.

The contractor is required to use the same form liner and coloration contractor to construct the precast panels with an architectural surface treatment.

The Standard Plans allow pile spacing of 10, 15 or 20 feet. Pile spacing greater than 15 feet will not be allowed for the precast concrete panels detailed in the standard plans. Provide consistent pile spacing for the entire length of the wall. Use odd pile spacing, if necessary, only at the ends of the wall and at turning points as approved by the Engineer. Architectural surface treatment shall not be applied to piles. Piles shall have a smooth, non-textured finish, and remain unstained in their natural color.

A maximum one foot drop or rise in elevation between wall sections is permitted. Elevation changes greater than one foot, if necessary, will be allowed only at the end of the wall. Top of wall elevation changes that result in a jagged appearance will not be allowed.

2.0 QUALIFICATIONS

Prior to beginning work the contractor shall submit the following qualifications to the Engineer for approval:

A. Architectural Surface Treatment Construction

The Contractor shall have a minimum of three years of experience in architectural concrete surface treatment construction on similar types of projects. The Contractor shall furnish to the Engineer 3 references who were responsible for supervision of similar projects. Include name, address, telephone number, and specific type of application.

B. Form Liners and Coloring System

The manufacturer of form liners for the standard textured finishes and coloring system shall have at least five years of experience making molds and color stains to create formed concrete surfaces to match the specified textured finish and colors. The Contractor shall schedule a pre-installation conference with a form liner manufacturer representative and the Engineer to assure understanding of simulated textured finish form liner use, color

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application, requirements for construction of sample panel(s), and to coordinate the work. The Contractor shall be required to disclose their source of form liner manufacturer and final coloration contractor prior to the Preconstruction Conference.

3.0 ALTERNATE PILE SPACING FOR STANDARD PRECAST PANELS

As an alternate, the Contractor may submit plans for pile spacings greater than 10 feet and less than 15 feet for review and approval. The pile excavation diameter, excavation depth and reinforcing steel shall be equal to the amount shown on the existing plans for the 15 feet pile spacing. A variance in the reinforcing steel will be allowed for the length of horizontal and number of vertical reinforcement bars in the precast panel for the alternate pile spacing.

Submit two sets of detailed plans for review. Include all details in the plans, including the size and spacing of required reinforcement necessary to fabricate the precast panels. Have a North Carolina registered Professional Engineer check, seal and date the plans. After the plans are reviewed and, if necessary, corrections made, submit one set of reproducible tracings on 22" x 34" sheets to become part of the contract plans.

4.0 ALTERNATE WALL TYPE

Walls that have been assigned "Approved" or "Approved for Provisional Use" status by the Product Evaluation Program will be considered for substitution to the detailed Standard Sound Barrier Wall only when noted on the plans. Alternate wall types, piles and pile spacing must meet the design and construction requirements of the project. Pile spacing greater than 20 feet will not be permitted. Alternate pile and wall structural stability and connection details shall conform to the current edition of the AASHTO LRFD Bridge Design Specifications.

Prior to submittal of Working Drawings, as described herein, submit a copy of the signed NCDOT Product Status Notification Letter and two sets of preliminary plans for review and approval. Include material specifications for all components. Once preliminary plans are approved, submit Working Drawings in accordance with all applicable portions of the requirements herein, including details necessary to fabricate and construct the proposed alternate.

Have a North Carolina registered Professional Engineer check, seal and date the plans and, when requested, provide calculations. After the plans are reviewed and, if necessary, corrections made, submit one set of reproducible tracings on 22" x 34" sheets to become part of the contract plans.

5.0 WORKING DRAWINGS

Submit precast panel casting drawings in accordance with Article 1077-2 of the Standard Specifications prior to casting. Show the inserts, method of handling, and support details used for transportation on the casting drawings. Submit fabrication drawings for approval prior to fabrication of wall components. Submit an erection plan and precast panel placing

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plan, including location of various heights of panels, for review and acceptance prior to fabrication of forms. Submit five sets of detail drawings on 22" x 34" sheets.
Submit for review and acceptance, wall plan and elevation views and details showing overall simulated textured pattern, joint locations, and end, edge or other special conditions. The drawings should include typical cross sections of precast panels, joints, corners, texture relief, texture size, pitch/working line, mortar joint and bed depths. If necessary, the Contractor shall revise the working drawings until the proposed form liner patterns and arrangement have been accepted by the Engineer. Working drawings should be of sufficient scale to show the detail of all textured finishes and joint patterns. Shop drawings shall be reviewed and approved prior to fabrication of form liners.

6.0 MATERIALS AND FABRICATION OF STANDARD PRECAST PANELS

Provide materials and fabricate members in accordance with the requirements of Division 10 of the Standard Specifications for Roads and Structures. Provide precast panels 4 inches ± ¼ inch thick, excluding relief for a textured finish. Architectural surface treatment shall consist of a standard textured finish and a single color of stain applied to both faces of the precast panels as specified on the plans and approved by the Engineer. Relief of any texture is not to exceed an average depth of 1 inch. No textured finish or stain shall be applied on the uppermost foot of each wall segment and along the vertical edges of the panels. These areas shall have a smooth, non-textured finish, and remain in its natural concrete color.

Furnish three 12" x 12" samples for approval which establish the acceptable variations in color, texture, and uniformity. After the color, texture, and uniformity of the furnished samples are approved, produce a full scale panel unit meeting design requirements. This mock-up and the furnished samples establish the standard quality for determining acceptance of the panels. When producing the final installed panels, use fine and coarse aggregate, retarder, and cement from the same source as those used in the approved sample panels. The standard textured finish shall be constructed using form lining materials. The form liner shall be a high quality, re-useable product manufactured of high strength urethane rubber or other approved material which attaches easily to the form work system, and shall not compress more than ¼ inch when concrete is poured at a rate of 10 vertical feet per hour. The form liners shall be removable without causing deterioration of the surface or underlying concrete.

The form liner shall be patterned such that long continuous horizontal or vertical lines do not occur on the finished exposed surface. The line pattern shall be random in nature and shall conceal construction joint lines.

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Prior to each concrete pour, the form liners shall be clean and free of build-up. Each liner shall be visually inspected for blemishes and tears. Repairs shall be made in accordance with the manufacturer's recommendations. Repairs shall be accepted by the Engineer before being used. Form liner panels that do not perform as intended or are no longer repairable shall be replaced.

Form liners shall be securely attached to forms in accordance with the manufacturer's recommendations, with less than a ¼ inch seam. Blend form liner butt joints into the textured surface pattern and finish off the final concrete surface. Create no visible vertical or horizontal seams or conspicuous form liner butt joint marks. At locations where the form liners are joined, carefully blend to match the balance of the textured finish.

Form liners shall be installed to withstand anticipated concrete placement pressures without leakage and without causing physical or visual defects.

When the approved textured finish requires simulated grout pattern joints, construct grout pattern joints to simulate the appearance of mortared joints produced in laid up masonry work. Grout pattern joints shall be produced in accordance with the form liner / concrete color system manufacturer.

The Contractor shall have a technical representative from the form liner manufacturer on site for technical supervision during the installation and removal of form liners. Unless directed by the Engineer, installation and removal of form liners shall not be permitted if the technical representative is not present.

Form release agent shall be a non-staining petroleum distillate free from water, asphaltic, and other insoluble residue, or an equivalent product and shall be applied in accordance with the manufacturer's recommendations. The form release agent shall be compatible with the form liner material, the concrete coloring system, any special surface finish and in accordance with this Special Provision. Form release agent should be worked into all areas, especially pattern recesses.

All form defects in finished uncolored surface shall be filled or repaired within 48 hours of form removal. Use patching materials and procedures in accordance with the manufacturer's recommendations.

Precast concrete shall be finished in accordance with the Standard Specifications, except that curing of concrete should been done to accommodate the application of coloring and surface finish treatment.

7.0 SURFACE COLORING

All surfaces that are to receive coloring agent application shall be free of all laitance, dirt, dust, grease, efflorescence, paint or any other foreign material prior to the application of coloring agent. Cleaning of surfaces to be accomplished by pressure washing with water set at 3,000 psi to remove laitance. The fan nozzle shall be held perpendicular to the surface at a distance of 1 to 2 feet. Sandblasting will not be permitted.

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Surface coloring shall be achieved using an approved stain suitable for the purpose intended and applied in a manner consistent with the design intent of the project. Color system shall be a single color of stain in brown or gray tones as specified on the plans and approved by the Engineer. The approved sample panel shall be the basis for determining the appropriate stain application.

The coloring agent shall be a penetrating stain mix or other approved coloring system designed for exterior application on old or new concrete with field evidence of resistance to moisture, acid or alkali, mildew, mold or fungus discoloration or degradation. The coloring agent shall be breathable, allowing moisture and vapor transmission. Final coloring system and color of stain are subject to approval by the Engineer.

Application of coloring/staining agent to finished precast concrete and patches shall occur at a minimum of 30 days after form liners are removed. Maintain the concrete temperature between 40°F and 85°F during color/stain application and for 48 hours after color/stain application. Consult the manufacturer's recommendations for preparation, application, curing, and storage of coloring agents/stains. The contractor shall provide a Color Application Artist who is experienced in producing realistic surface appearances. Treated surfaces located adjacent to exposed soil or pavement shall be temporarily covered to prevent dirt or soil splatter from rain.

Final surface shall be free of blemishes, discolorations, surface voids, and other irregularities. All patterns should be continuous without visual disruption. Linear butt joints shall be carefully blended into the approved pattern and finished off the final concrete surface. No visible vertical or horizontal seams or conspicuous form marks created by butt joining will be permitted.

Following the completion of all work, repairs of any damage made by other construction operations shall be made to the form lined and colored surfaces as directed by the Engineer.

8.0 CONSTRUCTION METHODS

Complete the final survey of existing ground profile after clearing the wall area but prior to submitting any working drawings. Submit the final groundline survey with the working drawings.

If the Department is responsible for the survey, the Engineer field verifies the existing ground profile along the sound barrier wall. Contact the Engineer to obtain the survey information. Otherwise, complete the existing ground survey prior to submittal of working drawings.

Excavate holes with the diameters shown on the plans. Perform pile excavation to the depths shown on the plans and install piles as shown on the plans or in the accepted submittals with a tolerance of ½ inch per foot from vertical. Backfill excavations with concrete after placing piles.

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A. Pile Excavation

Use equipment of adequate capacity and capable of drilling through soil and non-soil including rock, boulders, debris, man-made objects and any other materials encountered. Blasting is not permitted to advance the excavation. Blasting for core removal is only permitted when approved by the Engineer. Dispose of drilling spoils in accordance with Section 802 of the Standard Specifications and as directed by the Engineer. Drilling spoils consist of all excavated material including water removed from the excavation either by pumping or drilling tools.

If unstable, caving or sloughing soils are anticipated or encountered, stabilize excavations with either slurry or steel casing. When using slurry, submit slurry details including product information, manufacturer's recommendations for use, slurry equipment information and written approval from the slurry supplier that the mixing water is acceptable before beginning drilling. When using steel casing, use either the sectional type or one continuous corrugated or non-corrugated piece. Steel casings should consist of clean watertight steel of ample strength to withstand handling and driving stresses and the pressures imposed by concrete, earth or backfill. Use steel casings with an outside diameter equal to the hole size and a minimum wall thickness of ¼ inch.

B. Concrete Placement

Before placing concrete, center and support the pile in the excavation and check the water inflow rate in the excavation after any pumps have been removed. If the inflow rate is less than 6 inches per half hour, remove any water and free fall the concrete into the excavation. Ensure that concrete flows completely around the pile. If the water inflow rate is greater than 6 inches per half hour, propose a concrete placement procedure to the Engineer. The Engineer shall approve the concrete placement procedure before placing concrete.

Fill the excavation with Class A concrete in accordance with Section 1000 of the Standard Specifications except as modified herein. Provide concrete with a slump of 6 to 8 inches. Use an approved high-range water reducer to achieve this slump. Place concrete in a continuous manner and remove all casings.

9.0 MAINTENANCE GAP IN SOUND BARRIER WALL

A gap for maintenance personnel and vehicles shall be provided at the location specified in the Contract Drawings (approximate Station 713+50.00 -L- LT.). The maintenance gap provided shall be flanked by overlapping sound barrier wall sections at least four times the maintenance gap width in length. The sound barrier wall top profile elevations shall be maintained on both sides of the opening, and the overlapping panels shall be oriented as parallel to the roadway as possible to minimize potential for roadway traffic noise reflections. The maintenance gap shall provide a minimum horizontal clearance envelope of 10 feet.

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10.0 METHOD OF MEASUREMENT

The quantity of form liner textured finish and coloring stain to be paid for will be the actual square feet of architectural surface treatment that has been incorporated into the completed and accepted work. The area of architectural surface treatment will be measured by the area of treated panels. Do not include the uppermost foot of each wall segment, panel vertical edges without architectural surface treatment, or piles in the measurement. Area of sample panels shall not be included in the measurement of architectural surface treatment.

The quantity of sound barrier wall to be paid for will be the actual square feet of completed and accepted wall. In any individual section of sound barrier wall or in comparably dimensioned sections, the wall height is from the bottom of the bottom panel to the top of the top panel and the width is the distance between the centerline of the piles at the ends of the section. Include the full width of the piles at the ends of the wall.

11.0 BASIS OF PAYMENT

The quantity of sound barrier wall and architectural surface treatment, measured as provided above, will be paid for at the contract unit price bid per square foot.

The unit price bid per square foot for "Sound Barrier Wall" will be full compensation for work covered by this Special Provision including, but not limited to, furnishing precast panels, steel or concrete piles, miscellaneous structural steel, concrete, and all other materials; handling, transporting, fabricating, galvanizing, and storing materials; furnishing erection drawings, backfilling, pile excavation including any casing or slurry, and erecting and installing the sound barrier wall members. All materials, resources, and labor associated with installation of the 4" thick concrete cap, expansion joint material with sealer, and #57 stone backfill shall be incidental to the unit price for the "Sound Barrier Wall" and shall be required at the locations specified in the Contract Drawings. The 4" thick concrete cap, expansion joint material with sealer, and #57 stone backfill material and installation method shall be approved by the Engineer.

The unit price bid per square foot for "Architectural Surface Treatment" will be full compensation for the architectural treatment covered by this Special Provision including, but not limited to, furnishing architectural detail drawings, sample panels; the construction, finishing, and removal of all equipment, materials, labor, and incidentals necessary for furnishing and use of all form liners to produce approved textured finish and application of approved surface coloring.

Payment will be made under:

Sound Barrier Wall No. NW10A ……..…….. Square Foot

Sound Barrier Wall No. NW3A …….. Square Foot

Architectural Surface Treatment (Sound Barrier Wall) ……... Square Foot

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FALSEWORK AND FORMWORK (02-14-22)

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.

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When required, have the drawings and calculations prepared under the guidance of, and sealed by, a North Carolina Registered Professional Engineer who is knowledgeable in temporary works design.

If requested by the Engineer, submit with the working drawings manufacturer's catalog data listing the weight of all construction equipment that will be supported on the temporary work. Show anticipated total settlements and/or deflections of falsework and forms on the working drawings. Include falsework footing settlements, joint take-up, and deflection of beams or girders.

As an option for the Contractor, overhang falsework hangers may be uniformly spaced, at a maximum of 36 inches, provided the following conditions are met:

Member Type (PCG)	Member Depth, (inches)	Max. Overhang Width, (inches)	Max. Slab Edge Thickness, (inches)	Max. Screed Wheel Weight, (lbs.)	Bracket Min. Vertical Leg Extension, (inches)
II	36	39	14	2000	26
III	45	42	14	2000	35
IV	54	45	14	2000	44
MBT	63	51	12	2000	50
MBT	72	55	12	1700	48

Overhang width is measured from the centerline of the girder to the edge of the deck slab. For Type II, III & IV prestressed concrete girders (PCG), 45-degree cast-in-place half hangers and rods must have a minimum safe working load of 6,000 lbs.

For MBT prestressed concrete girders, 45-degree angle holes for falsework hanger rods shall be cast through the girder top flange and located, measuring along the top of the member, 1'-2 ½" from the edge of the top flange. Hanger hardware and rods must have a minimum safe working load of 6,000 lbs.

For links slabs, the tops of girders directly beneath the link slab shall be free of overhang falsework attachments or other hardware. Submit calculations and working drawings for overhang falsework in the link slab region.

The overhang bracket provided for the diagonal leg shall have a minimum safe working load of 3,750 lbs. The vertical leg of the bracket shall extend to the point that the heel bears on the girder bottom flange, no closer than 4 inches from the bottom of the member. However, for 72-inch members, the heel of the bracket shall bear on the web, near the bottom flange transition.

Provide adequate overhang falsework and determine the appropriate adjustments for deck geometry, equipment, casting procedures and casting conditions.

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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.

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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.

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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		

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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.

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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.

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SUBMITTAL OF WORKING DRAWINGS (02-14-22)

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 Engineer. Either the Structures Management Unit or the Geotechnical Engineering Unit or both units will jointly review submittals.

If a submittal contains variations from plan details or specifications or significantly affects project cost, field construction or operations, discuss the submittal with and submit all copies to the Engineer. State the reason for the proposed variation in the submittal. To minimize review time, make sure all submittals are complete when initially submitted. Provide a contact name and information with each submittal. Direct any questions regarding submittal requirements to the Engineer, Structures Management Unit contacts or the Geotechnical Engineering Unit contacts noted below.

To facilitate in-plant inspection by NCDOT and approval of working drawings, provide the name, address and telephone number of the facility where fabrication will actually be done if different than shown on the title block of the submitted working drawings. This includes, but is not limited to, precast concrete items, prestressed concrete items and fabricated steel or aluminum items.

2.0 ADDRESSES AND CONTACTS

For submittals to the Structures Management Unit, use the following addresses:

Via Email: SMU-wdr@ncdot.gov (do not cc SMU Working Drawings staff)

Via US mail:

Mr. B. C. Hanks, P. E.
State Structures Engineer
North Carolina Department
of Transportation
Structures Management Unit
1581 Mail Service Center
Raleigh, NC 27699-1581

Attention: Mr. J. L. Bolden, P. E.

Via other delivery service:

Mr. B. C. Hanks, P. E.
State Structures Engineer
North Carolina Department
of Transportation
Structures Management Unit
1000 Birch Ridge Drive
Raleigh, NC 27610

Attention: Mr. J. L. Bolden, P. E.

For submittals to the Geotechnical Engineering Unit, use the following addresses:

For projects in Divisions 1-7, use the following Eastern Regional Office addresses:

Via Email: EastGeotechnicalSubmittal@ncdot.gov

DocuSign Envelope ID: B3935E4C-6543-4159-8AE4-985C3841368A

Via US mail:

Mr. David Hering, L.G., P. E.
Assistant State Geotechnical
Engineer – Eastern Region
North Carolina Department
of Transportation
Geotechnical Engineering Unit
Eastern Regional Office
1570 Mail Service Center
Raleigh, NC 27699-1570

Via other delivery service:

Mr. David Hering, L.G., P. E.
Assistant State Geotechnical
Engineer – Eastern Region
North Carolina Department
of Transportation
Geotechnical Engineering Unit
Eastern Regional Office
3301 Jones Sausage Road, Suite 100
Garner, NC 27529

For projects in Divisions 8-14, use the following Western Regional Office addresses:

Via Email: WestGeotechnicalSubmittal@ncdot.gov

Via US mail or other delivery service:

Mr. Eric Williams, P. E.
Assistant State Geotechnical
Engineer – Western Region
North Carolina Department
of Transportation
Geotechnical Engineering Unit
Western Regional Office
5253 Z Max Boulevard
Harrisburg, NC 28075

The status of the review of structure-related submittals sent to the Structures Management Unit can be viewed from the Unit's website, via the "Drawing Submittal Status" link. The status of the review of geotechnical-related submittals sent to the Geotechnical Engineering Unit can be viewed from the Unit's website, via the "Geotechnical Construction Submittals" link.

Direct any questions concerning submittal review status, review comments or drawing markups to the following contacts:

Primary Structures Contact:	James Bolden (919) 707 – 6408 jlbolden@ncdot.gov
Secondary Structures Contacts:	Emmanuel Omile (919) 707 – 6451 eomile@ncdot.gov
	Madonna Rorie (919) 707 – 6508 mrorie@ncdot.gov

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Eastern Regional Geotechnical Contact (Divisions 1-7):

David Hering (919) 662 – 4710

dthering@ncdot.gov

Western Regional Geotechnical Contact (Divisions 8-14):

Eric Williams (704) 455 – 8902

ewilliams3@ncdot.gov

3.0 SUBMITTAL COPIES

Furnish one complete copy of each submittal, including all attachments, to the Engineer. At the same time, submit a copy of the same complete submittal directly to the Structures Management Unit and/or the Geotechnical Engineering Unit as specified in the tables below.

The first table below covers "Structure Submittals." The Engineer will receive review comments and drawing markups for these submittals from the Structures Management Unit. The second table in this section covers "Geotechnical Submittals." The Engineer will receive review comments and drawing markups for these submittals from the Geotechnical Engineering Unit.

Unless otherwise required, submit one set of supporting calculations to either the Structures Management Unit or the Geotechnical Engineering Unit unless both units require submittal copies in which case submit a set of supporting calculations to each unit. Provide additional copies of any submittal as directed.

STRUCTURE SUBMITTALS

Submittal	Submittal Required by Structures Management Unit?	Submittal Required by Geotechnical Engineering Unit?	Contract Reference Requiring Submittal [1]
Arch Culvert Falsework	Y	N	Plan Note, SN Sheet & "Falsework and Formwork"
Box Culvert Falsework [7]	Y	N	Plan Note, SN Sheet & "Falsework and Formwork"
Cofferdams	Y	Y	Article 410-4
Foam Joint Seals [6]	Y	N	"Foam Joint Seals"
Expansion Joint Seals (hold down plate type with base angle)	Y	N	"Expansion Joint Seals"

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Expansion Joint Seals (modular)	Y	N	"Modular Expansion Joint Seals"
Expansion Joint Seals (strip seals)	Y	N	"Strip Seal Expansion Joints"
Falsework & Forms [2] (substructure)	Y	N	Article 420-3 & "Falsework and Formwork"
Falsework & Forms (superstructure)	Y	N	Article 420-3 & "Falsework and Formwork"
Girder Erection over Railroad	Y	N	Railroad Provisions
Maintenance and Protection of Traffic Beneath Proposed Structure	Y	N	"Maintenance and Protection of Traffic Beneath Proposed Structure at Station ___"
Metal Bridge Railing	Y	N	Plan Note
Metal Stay-in-Place Forms	Y	N	Article 420-3
Metalwork for Elastomeric Bearings [4,5]	Y	N	Article 1072-8
Miscellaneous Metalwork [4,5]	Y	N	Article 1072-8
Disc Bearings [4]	Y	N	"Disc Bearings"
Overhead and Digital Message Signs (DMS) (metalwork and foundations)	Y	N	Applicable Provisions
Placement of Equipment on Structures (cranes, etc.)	Y	N	Article 420-20
Prestressed Concrete Box Beam (detensioning sequences) [3]	Y	N	Article 1078-11
Precast Concrete Box Culverts	Y	N	"Optional Precast Reinforced Concrete Box Culvert at Station ___"
Prestressed Concrete Cored Slab (detensioning sequences) [3]	Y	N	Article 1078-11
Prestressed Concrete Deck Panels	Y	N	Article 420-3

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Prestressed Concrete Girder (strand elongation and detensioning sequences)	Y	N	Articles 1078-8 and 1078-11
Removal of Existing Structure over Railroad	Y	N	Railroad Provisions
Revised Bridge Deck Plans (adaptation to prestressed deck panels)	Y	N	Article 420-3
Revised Bridge Deck Plans (adaptation to modular expansion joint seals)	Y	N	"Modular Expansion Joint Seals"
Sound Barrier Wall (precast items)	Y	N	Article 1077-2 & "Sound Barrier Wall"
Sound Barrier Wall Steel Fabrication Plans [5]	Y	N	Article 1072-8 & "Sound Barrier Wall"
Structural Steel [4]	Y	N	Article 1072-8
Temporary Detour Structures	Y	Y	Article 400-3 & "Construction, Maintenance and Removal of Temporary Structure at Station ____"
TFE Expansion Bearings [4]	Y	N	Article 1072-8

FOOTNOTES

1. References are provided to help locate the part of the contract where the submittals are required. References in quotes refer to the provision by that name. Articles refer to the *Standard Specifications*.
2. Submittals for these items are necessary only when required by a note on plans.
3. Submittals for these items may not be required. A list of pre-approved sequences is available from the producer or the Materials & Tests Unit.
4. The fabricator may submit these items directly to the Structures Management Unit.
5. The two sets of preliminary submittals required by Article 1072-8 of the *Standard Specifications* are not required for these items.
6. Submittals for Fabrication Drawings are not required. Submittals for Catalogue Cuts of Proposed Material are required. See Section 5.A of the referenced provision.
7. Submittals are necessary only when the top slab thickness is 18" or greater.

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GEOTECHNICAL SUBMITTALS

Submittal	Submittals Required by Geotechnical Engineering Unit	Submittals Required by Structures Management Unit	Contract Reference Requiring Submittal [1]
Drilled Pier Construction Plans [2]	Y	N	Subarticle 411-3(A)
Crosshole Sonic Logging (CSL) Reports [2]	Y	N	Subarticle 411-5(A)(2)
Pile Driving Equipment Data Forms [2,3]	Y	N	Subarticle 450-3(D)(2)
Pile Driving Analyzer (PDA) Reports [2]	Y	N	Subarticle 450-3(F)(3)
Retaining Walls [4]	Y; drawings and calculations	Y; drawings	Applicable Provisions
Temporary Shoring [4]	Y; drawings and calculations	Y; drawings	"Temporary Shoring" & "Temporary Soil Nail Walls"

FOOTNOTES

1. References are provided to help locate the part of the contract where the submittals are required. References in quotes refer to the provision by that name. Subarticles refer to the *Standard Specifications*.

2. Submit one hard copy of submittal to the Engineer. Submit a second copy of submittal electronically (PDF via email), US mail or other delivery service to the appropriate Geotechnical Engineering Unit regional office. Electronic submission is preferred.

3. The Pile Driving Equipment Data Form is available from:
   https://connect.ncdot.gov/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.

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CRANE SAFETY (06-20-19)

Comply with the manufacturer specifications and limitations applicable to the operation of any and all cranes and derricks. Prime contractors, sub-contractors, and fully operated rental companies shall comply with the current Occupational Safety and Health Administration (OSHA) regulations.

Submit all items listed below to the Engineer prior to beginning crane operations. Changes in personnel or equipment must be reported to the Engineer and all applicable items listed below must be updated and submitted prior to continuing with crane operations.

CRANE SAFETY SUBMITTAL LIST

A. **Competent Person:** Provide the name and qualifications of the "Competent Person" responsible for crane safety and lifting operations. The named competent person will have the responsibility and authority to stop any work activity due to safety concerns.

B. **Riggers:** Provide the qualifications and experience of the persons responsible for rigging operations. Qualifications and experience should include, but not be limited to, weight calculations, center of gravity determinations, selection and inspection of sling and rigging equipment, and safe rigging practices.

C. **Crane Inspections:** Inspection records for all cranes shall be current and readily accessible for review upon request.

D. **Certifications:** Crane operators shall be certified by the National Commission for the Certification of Crane Operators (NCCCO) or the National Center for Construction Education and Research (NCCER). Other approved nationally accredited programs will be considered upon request. In addition, crane operators shall have a current CDL medical card. Submit a list of crane operator(s) and include current certification for each type of crane operated (small hydraulic, large hydraulic, small lattice, large lattice) and medical evaluations for each operator.

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GROUT FOR STRUCTURES (12-01-17)

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, decks, end bent caps, or bent caps. Mix and place grout in accordance with the manufacturer's recommendations, the applicable sections of the Standard Specifications and this provision.

2.0 MATERIAL REQUIREMENTS

Unless otherwise noted on the plans, use a Type 3 Grout in accordance with Section 1003 of the Standard Specifications.

Initial setting time shall not be less than 10 minutes when tested in accordance with ASTM C266.

Construction loading and traffic loading shall not be allowed until the 3-day compressive strength is achieved.

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.

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.

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ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES **(12-30-15)**

1.0 INSPECTION FOR ASBESTOS CONTAINING MATERIAL

Prior to conducting bridge demolition or renovation activities, the Contractor shall thoroughly inspect the bridge or affected components for the presence of asbestos containing material (ACM) using a firm prequalified by NCDOT to perform asbestos surveys. The inspection must be performed by a N.C. accredited asbestos inspector with experience inspecting bridges or other industrial structures. The N.C. accredited asbestos inspector must conduct a thorough inspection, identifying all asbestos-containing material as required by the Environmental Protection Agency National Emission Standards for Hazardous Air Pollutants (NESHAP) Code of Federal Regulations (CFR) 40 CFR, Part 61, Subpart M.

The Contractor shall submit an inspection report to the Engineer, which at a minimum must include information required in 40 CFR 763.85 (a)(4) vi)(A)-(E), as well as a project location map, photos of existing structure, the date of inspection and the name, N.C. accreditation number, and signature of the N.C. accredited asbestos inspector who performed the inspection and completed the report. The cover sheet of the report shall include project identification information. Place the following notes on the cover sheet of the report and check the appropriate box:

___ ACM was found
___ ACM was not found

2.0 REMOVAL AND DISPOSAL OF ASBESTOS CONTAINING MATERIAL

If ACM is found, notify the Engineer. Compensation for removal and disposal of ACM is considered extra work in accordance with Article 104-7 of the Standard Specifications.

An Asbestos Removal Permit must be obtained from the Health Hazards Control Unit (HHCU) of the N.C. Department of Health & Human Services, Division of Public Health, if more than 35 cubic feet, 160 square feet, or 260 linear feet of regulated ACM (RACM) is to be removed from a structure and this work must be completed by a contractor prequalified by NCDOT to perform asbestos abatement. RACM is defined in 40 CFR, Part 61, Subpart M. Note: 40 CFR 763.85 (a)(4) vi)(D) defines ACM as surfacing, TSI and Miscellaneous which does not meet the NESHAP RACM.

3.0 DEMOLITION NOTIFICATION

Even if no ACM is found (or if quantities are less than those required for a permit), a Demolition Notification (DHHS-3768) must be submitted to the HHCU. Notifications and Asbestos Permit applications require an original signature and must be submitted to the HHCU 10 working days prior to beginning demolition activities. The 10 working day period starts based on the post-marked date or date of hand delivery. Demolition that does not begin as originally notified requires submission of a separate revision form HHCU 3768-R to HHCU. Reference the North Carolina Administrative Code, Chapter 10A, Subchapter 41C, Article .0605 for directives on revision submissions.

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Contact Information
Health Hazards Control Unit (HHCU)
N.C. Department of Health and Human Services
1912 Mail Service Center
Raleigh, NC 27699-1912
Telephone: (919) 707-5950
Fax: (919) 870-4808

4.0 SPECIAL CONSIDERATIONS

Buncombe, Forsyth, and Mecklenburg counties also have asbestos permitting and NESHAP requirements must be followed. For projects involving permitted RACM removals, both the applicable county and the state (HHCU) must be notified.

For demolitions with no RACM, only the local environmental agencies must be notified. Contact information is as follows:

Buncombe County
WNC Regional Air Pollution Control Agency
49 Mt. Carmel Road
Asheville, NC 28806
(828) 250-6777

Forsyth County
Environmental Affairs Department
537 N. Spruce Street
Winston-Salem, NC 27101
(336) 703-2440

Mecklenburg County
Land Use and Environmental Services Agency
Mecklenburg Air Quality
700 N. Tryon Street
Charlotte, NC 28202
(704) 336-5430

5.0 ADDITIONAL INFORMATION

Additional information may be found on N.C. asbestos rules, regulations, procedures and N.C. accredited inspectors, as well as associated forms for demolition notifications and asbestos permit applications at the N.C. Asbestos Hazard Management Program website:

https://epi.dph.ncdhhs.gov/asbestos/ahmp.html

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6.0 BASIS OF PAYMENT

Payment for the work required in this provision will be at the lump sum contract unit price for "Asbestos Assessment". Such payment will be full compensation for all asbestos inspections, reports, permitting and notifications.

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MODIFIED 54" PRESTRESSED CONCRETE GIRDERS **(SPECIAL)**

Material requirements, fabrication, and tolerance requirements shall be in accordance with section 1078 of the Standard Specifications.

Girder handling and storage, methods and equipment, bearings and anchorages, and erection and installation shall be in accordance with section 430 of the Standard Specifications.

Modified 54" Prestressed Concrete Girders will be measured and paid as the number of linear feet of prestressed concrete girders estimated in the plans as being necessary to complete the project.

Payment will be made under:

Modified 54" Prestressed Concrete Girders ..... Linear Feet

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54" PRESTRESSED CONCRETE FLORIDA I-BEAMS **(SPECIAL)**

Material requirements, fabrication, and tolerance requirements shall be in accordance with section 1078 of the Standard Specifications.

54" Prestressed Concrete Florida I-beam handling and storage, methods and equipment, bearings and anchorages, and erection and installation shall be in accordance with section 430 of the Standard Specifications.

54" Prestressed Concrete Florida I-Beams will be measured and paid as the number of linear feet of prestressed concrete I-beams estimated in the plans as being necessary to complete the project.

Payment will be made under:

54" Prestressed Concrete Florida I-Beams..... Linear Feet

PROJECT SPECIAL PROVISION

(10-18-95) (Rev. 3-21-17) Z-1a

PERMITS

The Contractor's attention is directed to the following permits, which have been issued to the Department of Transportation by the authority granting the permit.

PERMIT	AUTHORITY GRANTING THE PERMIT
Dredge and Fill and/or Work in Navigable Waters (404)	U. S. Army Corps of Engineers
Water Quality (401)	Division of Environmental Management, DEQ State of North Carolina

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 *2018 Standard Specifications* and the following:

Should the Contractor propose to utilize construction methods (such as temporary structures or fill in waters and/or wetlands for haul roads, work platforms, cofferdams, etc.) not specifically identified in the permit (individual, general, or nationwide) authorizing the project it shall be the Contractor's responsibility to coordinate with the Engineer to determine what, if any, additional permit action is required. The Contractor shall also be responsible for initiating the request for the authorization of such construction method by the permitting agency. The request shall be submitted through the Engineer. The Contractor shall not utilize the construction method until it is approved by the permitting agency. The request normally takes approximately 60 days to process; however, no extensions of time or additional compensation will be granted for delays resulting from the Contractor's request for approval of construction methods not specifically identified in the permit.

Where construction moratoriums are contained in a permit condition which restricts the Contractor's activities to certain times of the year, those moratoriums will apply only to the portions of the work taking place in the restricted waters, wetlands or buffer zones, provided that activities outside those areas is done in such a manner as to not affect the restricted waters, wetlands or buffer zones.

P-2

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
69 DARLINGTON AVENUE
WILMINGTON, NORTH CAROLINA 28403-1343

February 8, 2023

Regulatory Division

Action ID: SAW-2009-01449

North Carolina Department of Transportation
Division of Highways
Mr. Jeffrey Wyatt
Division Environmental Officer
P.O. Box 47
Shelby, NC 28151

Dear Mr. Wyatt:

Please reference the Department of the Army (DA) permit issued on April 12, 2013, for the Shelby Bypass Project R2707, located along an approximate 19-mile corridor, from 0.6-miles west of SR 1162 to west of Buffalo Creek where the roadway would tie into existing US Highway 74. This project is a combination of improve existing and new location. The April 12, 2013, permit authorized final impacts for R-2707A, R-2707B and preliminary impacts for R-2707C, R-2707D and R-2707E. Please additionally reference the permit modification issued on March 31, 2017, authorizing the final design impacts for R-2707C and the modification issued on December 16, 2020, authorizing the extension of the permit expiration date to December 31, 2029.

Furthermore, please reference your October 22, 2022, letter requesting to modify your DA permit to authorize Section D and E of the R2707 project, which begins where Section C terminates just east of the NC 150 Interchange and extends southeast to terminate west of Stony Point Road (SR 1001). Specifically, your letter requests authorization for 10,062 linear feet of permanent impacts to streams, 1.28 acres of impacts to wetlands (permanent fill, excavation and mechanized clearing), 0.10 acres of temporary stream impacts and 0.87 acres of impact to surface water (pond) associated with Section D. Also included are 1,464 permanent impacts to streams, 0.3 acres of impacts to wetlands (permanent fill, excavation and mechanized clearing), 0.01 acres of temporary stream water impacts and 0.06 acres of permanent and 0.87 acres of temporary surface water impacts to a pond associated with Section E.

This modification request included permit drawings and details for each proposed impact site in Sections D and E, the updated mitigation acceptance letter for Sections D and E and a stream restoration plan for stream relocation impacts.

Several changes in the project and/or the design led to an increase or decrease in impacts as noted below:

1. Changes to jurisdictional waters based on a reverification conducted in 2017 and 2019, including the expansion of Wetland 54-AB to encompass an additional 0.6 acres of wetland (previously unidentified) within the project corridor. The Corps issued a revised preliminary jurisdictional determination verifying the boundaries of Wetland 54-AB on February 2, 2023.

Changes led to:

a. Decrease in impacts due to new stream origin at R-2707D Site 10
b. Impacts resulting from addition of Wetland 54-AB at R-2707D Site 12 and 12A
c. Impacts resulting from addition of stream at R-2707D Site 16
d. Impacts resulting from new stream origin at R-2707E Site 4B

2. Addition of two service roads not included in the preliminary design led to an increase in impacts at R-2707D Sites 11A and 11B (stream and pond impacts).

3. Bank stabilization impacts not included in preliminary design were added to seven sites on R-2707D including bridges over Buffalo Creek.

4. Inlet and/or outlet channel impacts associated with culverts not included in preliminary design were added to seven sites on R-2707D and three sites on R-2707E.

5. Interchange relocated from Bethlehem Rd approximately 1,100 feet west led to decrease of impacts at R-2707E Site 3 and 4. The original Site 5 impact was eliminated. New interchange location impacts a pond labeled as R-2707E Site 5.

6. Channel relocation was identified for R-2707D Sites 3-6. Preliminary design only noted impact areas and did not include the impacts associated with reconnecting the channel pieces and providing a stable channel based on natural channel design principles. This led to an increase in stream impacts. A relocation plan for this area provides information on impacts and ecological uplift of the stream and its tributaries.

Overall, the final design for Sections D and E resulted in a decrease of overall permanent impacts to wetlands by 0.2 acres, an increase of wetland excavation by 0.15 acres, an increase in mechanized clearing of wetlands by 0.15 acres, an increase of permanent pond impacts by 0.06 acres, and increase of temporary pond impacts by 1.74 acres, an increase of permanent stream impacts by 2,766 lf and the increase of temporary stream impacts by 585 lf. After review of the file and the modification request, it was determined that the proposed modification to the permit would warrant the issuance of a supplemental public notice, issued on December 12, 2022.

For clarity, preliminary impacts authorized with the April 12, 2013, compared with impacts requested in the October 22, 2022, modification request are shown in the two tables below:

Final Impacts for Sections A/B/C- Preliminary Impacts for Sections D and E

Section	Wetlands (ac)			Ponds Perm/ Temp (ac)	Streams (lf)	
	Perm Fill	Excavation	Mech Clearing		Perm	Temp (lf)/(ac)
R-2707A/B/C	4.63	0.04	0.32	2.43	12,931	1,008 / 0.13
R-2707D	0.38	--	0.02		5,916	0.07
R-2707E	0.66	--	<0.01		2,844	0.01
Total	5.67	0.04	0.35	2.43	21,691	1,008/0.21

Final Impacts for Sections A/B/C- Final Impacts for Sections D and E

Section	Wetlands (ac)			Ponds Perm/ Temp (ac)	Streams (lf)	
	Perm Fill	Excavation	Mech Clearing		Perm	Temp (lf)/(ac)
R-2707A/B/C	4.63	0.04	0.32	2.43	12,931	1,008 / 0.13
R-2707D	1.11	<0.01	0.17	0.00/0.87	10,062*	493 / 0.10
R-2707E	0.13	0.14	0.03	0.06 / 0.87	1,464	92 / 0.01
Total	5.87	0.19	0.52	2.49/1.74	24,457	1,593/0.24

- The 10,062 lf of impacts includes impacts to 3,411 lf of stream channel that will be relocated into a new 2,678 lf natural design stream channel

After review of the file and the modification request, the Corps has determined, per Special Condition b). of the April 12, 2013, permit, that the proposed final plans for Sections D and E have been minimized to the maximum extent practicable and that the final compensatory mitigation plan adequately compensates for the proposed impacts for these Sections. In addition, it has also been determined that the modification is not contrary to the public interest and that all comments received from the public notice have been adequately resolved.

Accordingly, your permit is hereby modified to authorize the impacts, as descried above and associated with Section D and E of the Shelby Bypass Project TIP R2707 with the inclusion of the following additional Special Conditions (SC):

2023 Modification SC.1

All work authorized by this permit modification must be performed in strict compliance with the attached plans dated 12/18/2018 (R-2707D) and 2/20/2018 (R-2707E), which are a part of this permit. Any modification to these plans must be approved by the US Army Corps of Engineers (USACE) prior to implementation.

2023 Modification SC.2

In order to compensate for impacts associated with this permit modification, mitigation shall be provided in accordance with the provisions outlined on the most recent version of the attached Compensatory Mitigation Responsibility Transfer Form. The requirements of this form, including any special conditions listed on this form, are hereby incorporated as special conditions of this permit authorization.

2023 Modification SC.3

This permit verification authorizes the relocation of a tributary of Buffalo Creek (sites 4A, 4B, 5A, 5B, 6A and 6B). This relocation will be constructed and monitored in accordance with the enclosed document titled “RELOCATION PLAN R2707D CLEVELAND COUNTY SEPTEMBER 20, 2022.”

It is understood that all other conditions of the original permit and subsequent modifications remain applicable. If you have questions, please contact Crystal Amschler at the Asheville Regulatory Field Office, telephone 828-271-7980, extension 4231.

FOR THE DISTRICT COMMANDER

Tommy Fennel
Chief, Regulatory Division
Wilmington District

Enclosures

Plans
401 Certification
Mitigation Transfer Form
“RELOCATION PLAN R2707D CLEVELAND COUNTY SEPTEMBER 20, 2022.”

cc

Project Development and Environmental Analysis Unit,
Attn: Mr. Michael Turchy.,
1548 Mail Service Center
Raleigh, NC 27699-1598

NOAA/National Ocean Service
1315 East-west Hwy., Rm 7316
Silver Spring, Maryland 20910-3282

Mr. Fritz Rohde
National Marine Fisheries Service
101 Pivers Island Road
Beaufort, North Carolina 28516

Mr. Todd Bowers
Wetlands Protection Section – Region IV
Water Management Division
U.S. Environmental Protection Agency
61 Forsyth Street, SW
Atlanta, Georgia 30303

Mr. Doug Huggett
Division of Coastal Management

N.C. Department of Environment
and Natural Resources
400 Commerce Avenue
Morehead City, North Carolina 28557

Dr. Pace Wilber
National Marine Fisheries Service
219 Fort Johnson Road
Charleston, South Carolina 29412-9110

Mr. John Sullivan, III, PE
Division Administrator
FHWA – NC Division
310 New Bern Avenue, Suite 410
Raleigh, NC 27601

Ms. Amy S. Chapman
Transportation Permitting Unit
NC Division of Water Quality
1617 Mail Service Center
Raleigh, NC 27699-1617

Mr. David McHenry
Western Region Highway Project Coordinator
NCWRC
1721 Mail Service Center
Raleigh, NC 27699

US Fish and Wildlife Service
Asheville Ecological Services Field Office
Attn: Lauren Wilson
160 Zillicoa Street
Asheville, NC 28801-1082

Ms. Renee Gledhill-Early
Environmental Review Coordinator
NC State Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 27699-4617

BCC (without enclosures) (via Email):

CESAW-RG-A/Crystal Amschler
CESAW-RG-R/Matthews
CESAW-RG/Fennel
CESAW-OC/Pruitt

SUSPENSE
CESAW-RG

DocuSign Envelope ID: BD2E7DE8-7E13-432C-98DA-C4379DC101B6

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
RICHARD E. ROGERS, JR.
Director

NORTH CAROLINA
Environmental Quality

January 23, 2023

Jeffery Wyatt, Environmental Supervisor
NCDOT, Division 12
P.O. Box 47
Shelby, NC 28151-0047

Subject: Modification to the Section 401 Water Quality Certification for Section D and E of the proposed US 74 Shelby Bypass in Cleveland County from just east of the NC 150 Interchange to west of SR 1001. WBS Number 34497.1.F56; TIP Nos. R-2707D and R-2707E. DWR Project No. 20120673v4; WQC No. 003941.

Reference: Original 401 WQC 003941 issued on September 18, 2012; subsequent modifications issued on April 9, 2013, and April 4, 2017.

Dear Mr. Wyatt:

Attached hereto is a copy of Certification No. 003941 issued to The North Carolina Department of Transportation (NCDOT) dated January 23, 2023.

This approval is for the purpose and design described in your reissuance application received on October 19, 2022. The plans and specifications for this project are incorporated by reference as part of this Water Quality Certification. If you change your project, you must notify the Division and you may be required to submit a new application package with the appropriate fee. If the property is sold, the new owner must be given a copy of this Certification and is responsible for complying with all conditions. [15A NCAC 02H .0507(d)(2)]. This Certification does not relieve the permittee of the responsibility to obtain all other required Federal, State, or Local approvals before proceeding with the project, including those required by, but not limited to, Sediment and Erosion Control, Non-Discharge, Water Supply Watershed, and Trout Buffer regulations.

This letter completes the review of the Division under section 401 of the Clean Water Act and 15A NCAC 02H .0500. Please contact Dave Wanucha at 336-403-5655 or dave.wanucha@ncdenr.gov if you have any questions or concerns.

Sincerely,

DocuSigned by:
Amy Chapman
1ace8863121c4a7...

Richard E. Rogers Jr., Director
Division of Water Resources

Electronic copy only distribution:
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Individual 401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act with ADDITIONAL CONDITIONS

THIS CERTIFICATION is issued in conformity with the requirements of Section 401 Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Division of Water Resources (NCDWR) Regulations in 15 NCAC 2H .0500. This certification authorizes the NC Department of Transportation (NCDOT) the following impacts at the D Section: 10,062 permanent and 493 temporary linear feet of jurisdictional streams; 1.28 acres of wetlands; and, 0.87 acres of open water (pond). At the E Section, NCDOT is authorized 1,464 permanent and 92 temporary linear feet of jurisdictional stream impacts; 0.30 acres of wetland impacts; and, 0.89 acres of open water (pond) impacts. The project shall be constructed pursuant to the modification application dated October 19, 2022. The authorized impacts are as described below:

Table 1. R-2707 Section D. Wetland Impacts in the Broad River Basin (Riverine).

Site	Fill (ac)	Excavation (ac)	Mechanized Clearing (ac)	Hand Clearing (ac)	Wetland Impacts Requiring Mitigation (linear ft)
2	0.045	--	--	--	0.045
7	0.017	--	0.005	--	0.022
8	0.005	--	--	--	0.005
10	0.049	0.004	0.021	--	0.074
11A	0.223	--	--	--	0.223
12A	0.121	--	0.012	--	0.133
12B	0.646	--	0.130	--	0.776
Totals	**1.106**	**0.004**	**0.168**	--	**1.278**

Total wetland impact for this Section: 1.280 acres (rounded)

Table 2. R-2707 Section E. Wetland Impacts in the Broad River Basin (Riverine).

Site	Fill (ac)	Excavation (ac)	Mechanized Clearing (ac)	Hand Clearing (ac)	Wetland Impacts Requiring Mitigation (linear ft)
1B	--	0.015	--	--	0.015
2	0.009	--	--	--	0.009
3A	0.022	--	--	--	0.022
3B	0.083	0.117	--	--	0.200
3E	0.013	0.005	0.022	0.033	0.040
4A	--	0.002	0.010	--	0.012
Totals	**0.127**	**0.139**	**0.032**	**0.033**	**0.300**

Total wetland impact for this Section: 0.300 acres (rounded)

Table 3. R-2707 Sections D and E. Open Water (Ponds) Impacts in the Broad River Basin

Site	Permanent Fill in Open Waters (ac)	Temporary Fill in Open Waters (ac)	Total Fill in Open Waters (ac)
11A	0.923	0.003	0.926
5	0.062	0.866	0.928
Totals	**0.985**	**0.869**	**1.854**

Notes: Site 11A is on D Section; Site 5 is on E Section.

Total Open Water Impact for Project: 1.854 acres.

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Table 4. R-2707D Stream impacts in the Broad River Basin

Site	Permanent Impacts in Perennial Stream (linear ft)			Temporary Impacts in Perennial Stream (linear ft)	Permanent Impacts in Intermittent Stream (linear ft)	Temporary Impacts in Intermittent Stream (linear ft)	Stream Impacts Requiring Mitigation (linear ft)
	Fill	Culvert	Bank Stabilization	Fill	Fill		
1	47	572	--	20	--	--	619
2	--	308	--	10	262	10	308
3	--	646	--	52	37	--	646
4A	806	--	--	20	--	--	--**
4B	109	--	--	15	--	--	--**
5A	664	--	--	40	--	--	--**
5B	--	--	--	--	186	15	--
6A	1178	--	--	56	--	--	--**
6B	468	--	--	--	--	--	--**
6C	--	597	50	40	--	--	597
7	20	268	20	20	--	--	288
8	32	483	20	20	--	--	515
9	--	323	100	85	--	--	323
11A	--	438	20	29	--	--	438
11B	25	134	--	17	--	--	159
12A	--	--	--	--	682	14	--
13	534	308	--	--	--	--	842
14A	--	--	35	--	--	--	--

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Table 4. R-2707D Stream impacts in the Broad River Basin

Site	Permanent Impacts in Perennial Stream (linear ft)			Temporary Impacts in Perennial Stream (linear ft)	Permanent Impacts in Intermittent Stream (linear ft)	Temporary Impacts in Intermittent Stream (linear ft)	Stream Impacts Requiring Mitigation (linear ft)
	Fill	Culvert	Bank Stabilization	Fill	Fill		
14B	--	--	250	653*	250	--	--
14C	--	--	15	--	--	--	--
15	--	--	--	15	--	--	--
16	--	--	--	--	425	15	--
Total	**3,883**	**4,077**	**510**	**1,092**	**1,842**	**54**	**+ 4,735**

* Temporary Workpad estimated in linear feet. **Mitigation offset by natural channel design. + Stream Mitigation required by DWR. **Total Stream Impacts (Permanent and Temporary) for this Section: 11,458 linear ft.**

Table 5. R-2707E Stream impacts in the Broad River Basin.

Site	Permanent Impacts in Perennial Stream (linear ft)		Temporary Impacts in Perennial Stream (linear ft)	Permanent Impacts in Intermittent Stream (linear ft)			Temporary Impacts in Intermittent Stream (linear ft)	Stream Impacts Requiring Mitigation (linear ft)
	Fill	Culvert	Fill	Bank Stabilization	Fill	Culvert	Fill	
1A	--		--	--	--	336	28	--
2	--		--	--	--	253	10	--
3A	--		--	20	--	193	14	--
3B	--		--	--	7	191	19	--
3C	--		--	--	43	--	--	--
3D	--		--	--	159	--	--	--
3E	24	9	10	--	--	--	--	--
4A	--		--	--	21	192	11	--

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Table 5. R-2707E Stream impacts in the Broad River Basin.

Site	Permanent Impacts in Perennial Stream (linear ft)		Temporary Impacts in Perennial Stream (linear ft)	Permanent Impacts in Intermittent Stream (linear ft)			Temporary Impacts in Intermittent Stream (linear ft)	Stream Impacts Requiring Mitigation (linear ft)
	Fill	Culvert	Fill	Bank Stabilization	Fill	Culvert	Fill	
4B	--		--	--	--	16	--	--
Total	**24**	**9**	**10**	**20**	**230**	**1,181**	**82**	**--**

Total Stream Impacts (Permanent and Temporary) for this Section: 1,556 linear ft.

The application provides adequate assurance that the discharge of fill material into the waters of the 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 valid solely for the purpose and design described in your application (unless modified below). Should your project change, you must notify the NCDWR and submit a new application. If the property is sold, the new owner must be given a copy of this Certification and approval letter and is thereby responsible for complying with all the conditions. If total wetland fills for this project (now or in the future) exceed one acre, or of total impacts to streams (now or in the future) exceed 300 linear feet, compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h) (6) and (7). For this approval to remain valid, you must adhere to the conditions listed in the attached certification(s) and any additional conditions listed below.

This Water Quality Certification neither grants nor affirms any property right, license, or privilege in any lands or waters, or any right of use in any waters. This Water Quality Certification does not authorize any person to interfere with the riparian rights, littoral rights, or water use rights of any other person and does not create any prescriptive right or any right of priority regarding any usage of water. This Water Quality Certification shall not be interposed as a defense in any action respecting the determination of riparian or littoral rights or other rights to water use. No consumptive user is deemed by virtue of this Water Quality Certification to possess any prescriptive or other right of priority with respect to any other consumptive user regardless of the quantity of the withdrawal or the date on which the withdrawal was initiated or expanded. Upon the presentation of proper credentials, the Division may inspect the property.

Condition(s) of Certification:

Project Specific Conditions

1. This modification is applicable only to the additional proposed activities and design that you submitted in your request for modification dated October 19, 2022. [15A NCAC 02H.0506(b) (1, 2)]

2. All authorized activities and conditions associated with the original Water Quality Certification dated September 18, 2012, and subsequently modified on April 9, 2013, and on April 4, 2017, still apply except where superseded by this certification. [15A NCAC 02H.0506(b) (1, 2)]

3. All work in or adjacent to stream waters shall be conducted per approved BMP measures from the most current version of NCDOT Construction and Maintenance Activities manual. [15A NCAC 02H.0506(b)(3) and (c)(3)]

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4. At locations where ponds will be drained, proper measures will be taken to drain the pond with limited impact to upstream and downstream channel stability as well as to native aquatic species. Proper measures will be taken to avoid sediment release and/or sediment accumulation downstream because of pond draining. If typical pond draining techniques will create significant disturbance to native aquatic species, additional measures such as collection and relocation may be necessary to prevent a significant fish kill. NCDOT shall consult with NC Wildlife Resources staff to determine if there are any sensitive species, and the most appropriate measures to limit impacts to these species. The permittee shall observe any natural channel re-establishment, or utilize natural channel construction techniques, to ensure that the jurisdictional stream channel above and below the drained pond remain stable, and that no additional impacts occur within the natural stream channel because of draining the pond. [15A NCAC 2H.0506(b)(3)

∗ 5. The Permittee shall ensure that the final design drawings adhere to the permit and to the permit drawings submitted for approval, including those provided in the Relocation Plan dated September 20, 2022. [15A NCAC 02H .0507(c) and 15A NCAC 02H .0506 (b)(2) and (c)(2)]

6. Compensatory mitigation for impacts to riverine wetlands is required (1.28 acres on D-Section; 0.30 acres on E-Section). We understand that you have chosen to perform compensatory mitigation for impacts to wetlands through the North Carolina Division of Mitigation Services (DMS) (formerly NCEEP), and that the DMS has agreed to implement the mitigation for the project. DMS has indicated in a letter dated October 18, 2022, that they will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for the above-referenced project, in accordance with DMS's Mitigation Banking Instrument signed July 28, 2010.

7. Compensatory mitigation for impact to streams is required (4,735 linear feet on D-Section). We understand that you have chosen to perform compensatory mitigation for impacts to streams through DMS (formerly NCEEP), and that the DMS has agreed to implement the mitigation for the project. The DMS has indicated in a letter dated October 18, 2022 that they will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for the above-referenced project, in accordance with the DMS Mitigation Banking Instrument signed July 28, 2010.

General Conditions

1. Placement of culverts and other structures in open waters and streams, shall be placed below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20 percent of the culvert diameter for culverts having a diameter less than 48 inches, to allow low flow passage of water and aquatic life. Design and placement of culverts and other structures including temporary erosion control measures shall not be conducted in a manner that may result in dis-equilibrium of wetlands or streambeds or banks, adjacent to or upstream and downstream of the above structures. The applicant is required to provide evidence that the equilibrium is being maintained if requested in writing by the NCDWR. If this condition is unable to be met due to bedrock or other limiting features encountered during construction, please contact the NCDWR for guidance on how to proceed and to determine whether a permit modification will be required. [15A NCAC 02H.0506(b)(2)]

2. The use of rip-rap above the Normal High Water Mark shall be minimized. Any rip-rap placed for stream stabilization shall be placed in stream channels in such a manner that it does not impede aquatic life passage. [15A NCAC 02H.0506(b)(2)]

3. No rock, sand or other materials shall be dredged from the stream channel except where authorized by this certification. [15A NCAC 02H.0506(b)(3)]

4. Discharging hydroseed mixtures and washing out hydroseeders and other equipment in or adjacent to surface waters is prohibited. [15A NCAC 02H.0506(b)(3)]

5. 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

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are not being met (including the failure to sustain a designated or achieved use) or that State or federal law is being violated, or that further conditions are necessary to assure compliance, the NCDWR may reevaluate and modify this certification. [15A NCAC 02B.0200]

6. All fill slopes located in jurisdictional wetlands shall be placed at slopes no flatter than 3:1, unless otherwise authorized by this certification. [15A NCAC 02H.0506(b)(2)]

7. A copy of this Water Quality Certification shall be maintained on the construction site at all times. In addition, the Water Quality Certification and all subsequent modifications, if any, shall be maintained with the Division Engineer and the on-site project manager. [15A NCAC 02H .0507(c) and 15A NCAC 02H .0506 (b)(2) and (c)(2)]

8. The outside buffer, wetland or water boundary located within the construction corridor approved by this authorization shall be clearly marked by highly visible fencing or flagging prior to any land disturbing activities. Impacts to areas within the fencing are prohibited unless otherwise authorized by this certification. [15A NCAC 02H.0501 and .0502]

9. 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.

10. The Permittee shall report any violations of this certification to the Division of Water Resources within 24 hours of discovery. [15A NCAC 02B.0506(b)(2)]

∗ 11. Upon completion of the project (including any impacts at associated borrow or waste sites), the NCDOT Division Engineer (or appointee) shall complete and return the enclosed "Certification of Completion Form" to notify the NCDWR when all work included in the 401 Certification has been completed. [15A NCAC 02H.0502(f)]

12. Native riparian vegetation must be reestablished in the riparian areas within the construction limits of the project by the end of the growing season following completion of construction. [15A NCAC 02H.0506(b)(3) and (c)(3)]

13. There shall be no excavation from, or waste disposal into, jurisdictional wetlands or waters associated with this permit without appropriate modification. Should waste or borrow sites, or access roads to waste or borrow sites, be located in wetlands or streams, compensatory mitigation will be required since that is a direct impact from road construction activities. [15A NCAC 02H.0506(b)(3) and (c)(3)]

14. Erosion and sediment control practices must be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices in order to protect surface waters standards [15A NCAC 02H.0506(b)(3) and (c)(3)]:

    a. The erosion and sediment control measures for the project must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Sediment and Erosion Control Planning and Design Manual*.

    b. The design, installation, operation, and maintenance of the sediment and erosion control measures must be such that they equal, or exceed, the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual*. The devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) projects, including contractor-owned or leased borrow pits associated with the project.

    c. For borrow pit sites, the erosion and sediment control measures must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual*.

    d. The reclamation measures and implementation must comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act.

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15. Where placement of sediment and erosion control devices in wetlands and/or waters is unavoidable, they shall be removed, and the natural grade restored upon completion of the project. [15A NCAC 02H.0506(b)(3) and (c)(3)]

This Certification shall become null and void unless the above conditions are made conditions of the Federal 404 and/or Coastal Area Management Act Permit. This Certification shall expire upon the expiration of the 404 or CAMA permit. Please be aware that impacting waters without first applying for and securing the issuance of a 401 Water Quality Certification violates Title 15A of the North Carolina Administrative Code (NCAC) 2H .0500. Title 15A NCAC 2H .0500 requires certifications pursuant to Section 401 of the Clean Water Act whenever construction or operation of facilities will result in a discharge into navigable waters, including wetlands, as described in 33 Code of Federal Regulations (CFR) Part 323. It also states any person desiring issuance of the State certification or coverage under a general certification required by Section 401 of the Federal Water Pollution Control Act shall file with the Director of the North Carolina Division of Water Quality. Violations of any condition herein set forth may result in revocation of this Certification and may result in criminal and/or civil penalties. Pursuant to G.S. 143-215.6A, these violations and any future violations are subject to a civil penalty assessment of up to a maximum of $25,000.00 per day for each violation.

This approval and its conditions are final and binding unless contested [G.S. 143-215.5]. Please be aware that impacting waters without first applying for and securing the issuance of a 401 Water Quality Certification violates Title 15A of the North Carolina Administrative Code (NCAC) 2H .0500. Title 15A NCAC 2H .0500 requires certifications pursuant to Section 401 of the Clean Water Act whenever construction or operation of facilities will result in a discharge into navigable waters, including wetlands, as described in 33 Code of Federal Regulations (CFR) Part 323. It also states any person desiring issuance of the State certification or coverage under a general certification required by Section 401 of the Federal Water Pollution Control Act shall file with the Director of the North Carolina Division of Water Quality. Pursuant to G.S. 143-215.6A, these violations and any future violations are subject to a civil penalty assessment of up to a maximum of $25,000.00 per day for each violation.

This Certification can be contested as provided in Chapter 150B of the North Carolina General Statutes by filing a Petition for a Contested Case Hearing (Petition) with the North Carolina Office of Administrative Hearings (OAH) within sixty (60) calendar days. Requirements for filing a Petition are set forth in Chapter 150B of the North Carolina General Statutes and Title 26 of the North Carolina Administrative Code. Additional information regarding requirements for filing a Petition and Petition forms may be accessed at http://www.ncoah.com/ or by calling the OAH Clerk's Office at (919) 431-3000.

A party filing a Petition must serve a copy of the Petition on:

William F. Lane, General Counsel
Department of Environmental Quality
1601 Mail Service Center
Raleigh, NC 27699-1601

If the party filing the Petition is not the permittee, then the party must also serve the recipient of the Certification in accordance with N.C.G.S 150B-23(a).

This the 23d of January 2023

DIVISION OF WATER RESOURCES

DocuSigned by:
Amy Chapman
3C9888230200474...

Richard D. Rogers Jr., Director

WQC No. 003941

RELOCATION PLAN
R2707D CLEVELAND COUNTY
SEPTEMBER 20, 2022

The Shelby Bypass (R2707) individual 404/401 permit was issued in 2012. One of the project commitments is to use bioengineering techniques to relocate the tributary of Buffalo Creek between SR 2063 (Kemper Road) and the Light Oak community. The result would be meandering stream with riffles and pools and banks stabilized with native vegetation and root wads instead of rip-rap as appropriate.

The tributary to Buffalo Creek flows parallel to the proposed D section of the Bypass (R2707D) and construction will result in impacts to various sections of the tributary. Site visits were conducted with regulatory agencies in 2018 to determine if the identified tributary was suitable for relocation using bioengineering techniques. Areas were identified for relocation if they would be buried by the road fill. Adjacent areas were identified as well as connections to tributaries in order to create a more stable system. Relocating the tributaries in place of burying them or creating rip-rap lined channels minimizes the impacts from the proposed roadway. In addition, the relocation will result in functional uplift to a degraded system. The tributary is identified as stream 7-1 in the permit document and impact figures. The connecting tributaries are mapped as 7-3, 7-4, and 7-5. The below table summarizes the stream and connecting tributary impacts as presented in the permit application and impact drawings:

Surface Water Impact Summary							
Impact Site No.	Station (From/To)	Structure Size/Type	Permanent SW Impacts (ac)	Temp. SW Impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design(ft)
4A	720+05 TO 725+00-L-LT	CHANNEL	0.15	< 0.01	806	20	621
4B	720+52 TO 721+60-L-LT	CHANNEL	< 0.01	< 0.01	109	15	199
5A	727+99 TO 732+97-L-LT	CHANNEL	0.16	< 0.01	664	40	530
5B	730+88 TO 732+24-L-LT	CHANNEL	0.01	< 0.01	186	15	134
6A	734+37 TO 740+78-L-LT	CHANNEL	0.30	0.02	1,178	56	878
6B	739+73 TO 742+83-L-LT	CHANNEL	0.12		468		316

This mitigation plan includes information on the existing and proposed conditions as well as monitoring standards.

1.0 BASELINE INFORMATION

The R2707D Channel Relocation is located east of Shelby in Light Oak, Cleveland County. The channel relocation initiates north of Kemper Road and continues downstream past Kellom Dr.

Watershed Designations	
River Basin	Broad River
DWR Sub-basin	03-08-05
Watershed	Beason Creek – Buffalo Creek
Hydrologic Unit Code	030501050804
NCDWR Classification	C
EPA 303(d) List	Not Listed
Physiographic Region	Piedmont
EPA Level IV Ecoregion	Southern Outer Piedmont

Site Watershed Characteristics				
Site Watershed size	1.14 sq mi (730 acres)			
Historic Land Use	An historic aerial from 1947 shows the watershed is mostly agricultural land with some wooded areas along streams and the county fairgrounds. By 1993 the fairgrounds have expanded, parking lots and a bus depot off of Kemper Road were built, and residential development has occurred in the Oak Grove neighborhood and along roadways in the headwaters.			
Site Watershed Land Use	Forested	24.5%	Residential	23.1%
	Open Space/Grass	22.1%	Impervious	15.2%
	Agriculture	15.2%		
Zoning/Future Land Use	Impervious surfaces will increase to 19% with construction of the bypass. In addition, 11% of undeveloped portions of the watershed are zoned for future commercial development. However, a quarter of this will be protected in NCDOT ROW purchased for the stream relocation and protection of the dwarf flowered heartleaf. The remainder of the undeveloped portions of the watershed are zoned for low density residential development.			

Stream Existing Conditions

Historically managed to support generations of silviculture and agriculture, the existing streams are now flanked on each side of the valley by residential/light industrial development. Throughout this land use

history, the streams themselves have experienced a range of human modifications including damming, ditching, channelizing, and/or armoring.

The following table provides a summary of existing conditions (length, characteristics and classification) for each reach: 7-1, 7-3, 7-4, 7-5.

Reach Classification									
Surface Waters ID	Impact ID	Cross Reference: *"Plan for Channel Relocation"* Drawings	Length (ft)	Reach Properties (average)					**Rosgen Classification**
				Width To Depth Ratio	Entrenchment Ratio	Sinuosity	Slope (%)	Substrate	
7-1	4A	Site 1 / Reach 1A	806	9.90	1.38	1.86	1.26	Gravel	B4c
	5A	Site 2 / Reach 1B	664	11.08	1.47	1.26	1.10	Gravel	B4c
	6A	Site 3 / Reach 2A Site 3 / Reach 2C	1178	32.34 37.56	2.66 3.06	1.18 1.49	3.30 0.53	Cobble/Bedrock Gravel	B3/1 C4
7-3	4B	Site 1 / Reach 1A	109	13.00	2.5	1.02	2.6	Cobble/Gravel	Bc3/4
7-4	5B	Site 2 / Reach 1B	186	15.04	2.27	1.02	1.69	Gravel	B4
7-5	6B	Site 3 / Reach 2B	468	32.34	2.66	1.66	0.65	Gravel	C4

NOTE: In general, the data presented above serves as "representative", meaning that some variations/departures within reaches may exist. Data were analyzed by reach and then adapted to impact sites

Beginning in the upper reaches of the project (upstream including stream 7-1, Impact 4A; reference Figure 1), the channel is steeper, interacting with bedrock to behave as a gravel/bedrock step-pool system (classification: Rosgen B). These upper reaches, though somewhat armored by bedrock, have still degraded as observed in the channel downcutting, lateral instability, fair bedform, and fair riparian zone (vegetative width and composition). Further downstream (middle portion of Reach 7-1, Impact 5A), the valley broadens and where there is potential to transition (through a bedrock armored section, Impact 5A) to a sinuous riffle-pool sand bed complex (Classification: Rosgen C), the disturbed existing channels become further incised and resemble confined F-channels, characterized by poor horizontal stability, disconnection with active floodplain, poor bedform (indistinguishable facets), and poor riparian zone. Approaching the downstream extents of the stream project (lower Reach 7-1, Impact 6A), further valley widening and sediment contribution from tributaries and surrounding land results in aggradation and sediment imbalance. Throughout Stream 7-1, the channel predominantly classes out as a Bc/C type channel attempting to establish a stable form (downstream of Reach 7-5).

Detailed field data was collected at seven locations along Reaches 7-1 and 7-5 (reference "Plan for Channel Relocation") within the project area and compiled/evaluated to develop this summary of existing stream conditions. At each location, the thalweg profile and multiple cross sections were surveyed by engineers with a total station. The reach locations were predominantly where the proposed relocated stream will tie-in to the existing channel. Profile and cross section data were used to classify the Rosgen stream type and for consideration of hydraulic geometry in support of overall functional assessment.

The geomorphic data, in addition to visual investigation (Pfankuch Stability, consistently "Fair"), was used to determine the Bank Erosion Hazard Index (BEHI, mostly "High" to "High-Moderate") and Near-Bank Stress (NBS, also mostly "High" to "High-Moderate") for both stream banks along the impact sites. A summary of BEHI/NBS approximation and weighted average is provided in the below table:

BEHI/NBS Summary														
Impact Site No.	% Very Low		% Low		Moderate		High		Very High		Extreme		Weighted Average	
	BEHI	NBS	BEHI	NBS	BEHI	NBS	BEHI	NBS	BEHI	NBS	BEHI	NBS	BEHI	NBS
4A	5	10	20	30	40	35	15	10	15	10	5		M-H	M-H
4B	5	5	30	25	50	65	10	5	5				M	M-H
5A	10	40	40	50	45	10	5						M-L	L
5B	30	55	60	40	10	5							L	L
6A			5	15	15	15	60	40	15	25	5	5	H-VH	H-VH
6B			5	15	15	15	65	50	10	15	5	5	H-VH	H-VH

These metrics can be used to predict the magnitude of erosion from the banks at the current condition via the Bank Assessment for Non-point Source Consequences of Sediment (BANCS) method. In this case, the BEHI and NBS data collected were used to qualitatively assess the stability of the banks. Additionally, the North Carolina Stream Assessment Method (NC SAM) was used to determine the level of function of the streams at the impact sites. Cumulatively, this data was used to evaluate the function, form, and stability of the existing channel that will be relocated.

2.0 MITIGATION WORK PLAN

The goal of the project is to minimize impacts to the Buffalo Creek tributary and provide functional uplift by relocating the channel using bioengineering techniques and natural channel design methods. The stream design allowed for lower gradient culverts located at the upstream and downstream ends of the relocation area.

The existing, manipulated stream struggles to convey the hydrologic and sediment loading regimes of a modified (developed) watershed, resulting in a dysfunctional, degraded stream. With or without the proposed roadway project, this existing stream will persist in disequilibrium util it receives active management imposing a balance between form and process.

The proposed improvements aim to pair proposed channel form and hydraulic geometry (reference "Plan for Channel Relocation" for geomorphic table) with the current/future hydrologic and sediment loading regimes resulting in an appropriate natural form that corresponds to modified watershed processes. A Proposed channel hydraulics build upon existing function, reducing or eliminating issues associated with lateral bank stability, bedform diversity, access to active floodplain and riparian zone functions. By crafting channels in select locations and leaving other portions undisturbed, this plan proposes to improve stream and floodplain functionality throughout the project length. In addition to detailed grading (channel-floodplain geometry), this plan proposes in-stream bedform treatments (Vanes, J-Hook, Riffles) and bank bioengineering treatments (wood toe, live staking) that both promote vertical/horizontal stability, while also contributing to bedform diversity and associated aquatic habitat.

Thirdly, this plan proposes a robust reforestation plan that provides for stable establishment of buffer/bank vegetation following construction. Reforestation plans are included in the "Plan for Channel Relocation" on sheets RF-1 to RF-4.

4.0 SUCCESS CRITERIA

The stream relocation site shall be monitored for five years or until success criteria are satisfied. NCDOT will evaluate the success of the stream relocation project based on guidance provided by the April 2003 Stream Mitigation Guidelines, Monitoring Level I protocol disseminated by the United States Army Corps of Engineers-Wilmington District. The survey of channel dimension will consist of permanent cross sections placed at six (6) cross sections (three riffles and three pools). Annual photographs showing both banks and upstream and downstream views will be taken from permanent, mapped photo points. The survey of the longitudinal profile will cover a cumulative total of approximately 2,678 linear feet of channel (2,029' of 7-1, 199'et of 7-3, 134' of 7-4 and 316'of 7-5). The entire restored length of stream will be investigated for channel stability and in-stream structure functionality. Any evidence of channel instability will be identified, mapped and photographed. Pebble counts shall not be conducted. In the event that success criteria are not being met, remedial measures will be coordinated with resource agencies. The monitoring shall be conducted annually for a minimum of five (5) years after final planting. The monitoring results shall be submitted to resource agencies in a final report within sixty (60) days after completing monitoring. After 5 years, the NCDOT shall contact resource agencies to schedule a site visit to "close out" the mitigation site if the site has met success criteria. If success is not met, NCDOT will make necessary adjustments to the site or provide alternative mitigation credits to cover the impacts.

Vegetation Success

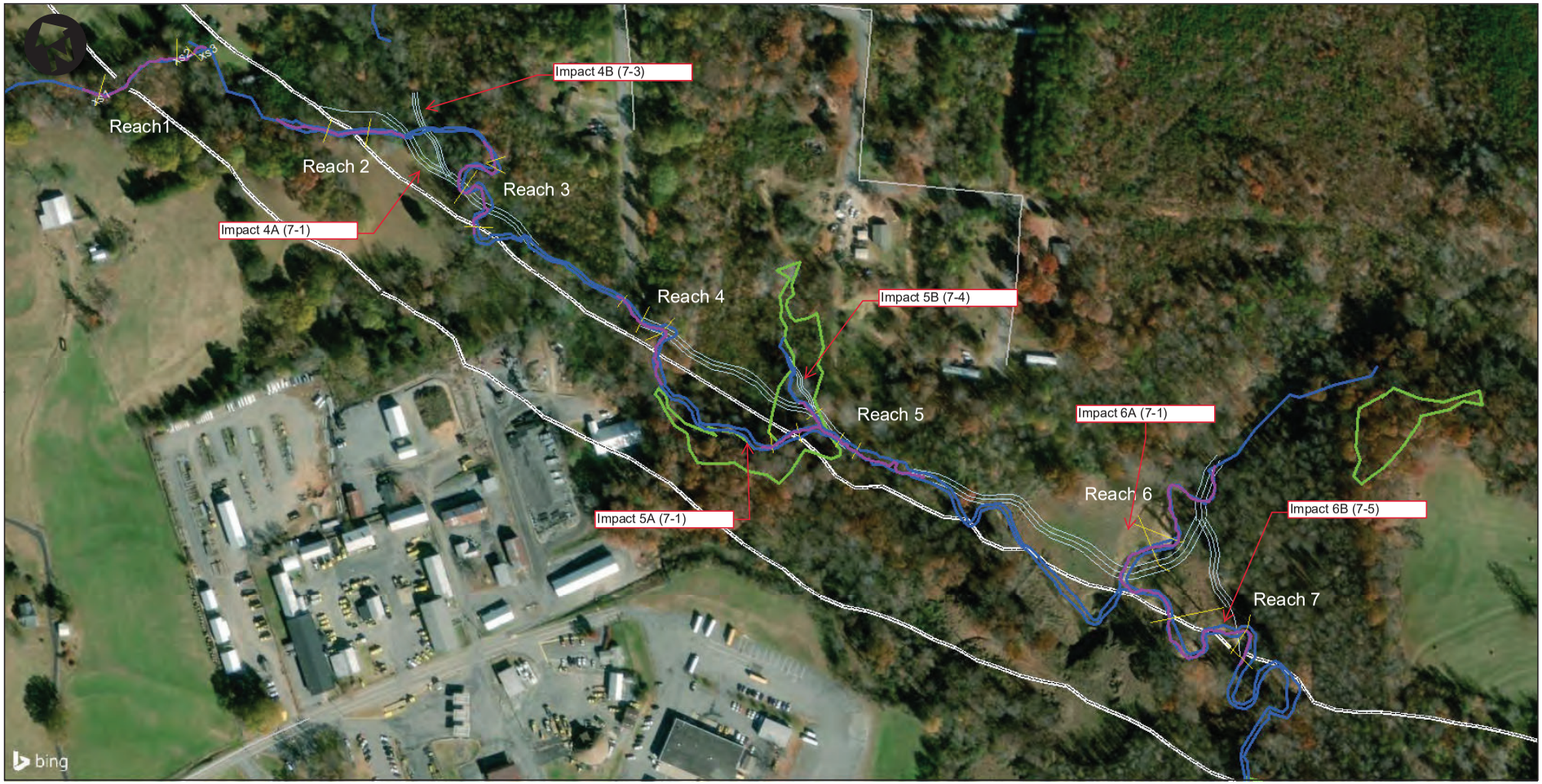
The success of vegetation and plantings will be measured through stem counts. Permanent quadrants will be used to sample the riparian buffer. Survival of the live stakes will be determined by visual observation throughout the five-year monitoring period. Bare root vegetation will be evaluated using three (3) staked survival plots. Plots will be 50ft. by 50ft. If site conditions prevent a 50ft. by 50ft. plot, then the plot will have varying dimensions to encompass an area of 2,500 ft2. All flagged stems will be counted in those plots. Success will be defined as 320 stems per acre after three years and 260 stems per acre after five years. All vegetation monitoring will be conducted during the growing season. Appropriate measures will be taken to control nuisance vegetation during the monitoring period if it affects the success of the planted vegetation.

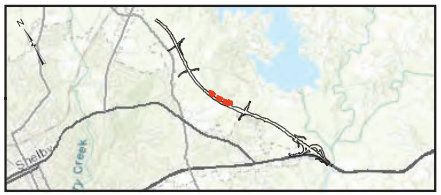
Functional Assessment: Pre and Post construction

NCSAM forms were completed for seven locations along the proposed stream relocation. The main channel was split into 4 reaches. The forms have been attached to this Stream Relocation plan and are labeled Appendix 1. See table below for scores by relocation area. A NCSAM form will be completed after the monitoring period in order to compare the potential functional uplift to pre-project conditions.

SAM Scores		
Stream	Impact Site	SAM Score
7-1 (upstream 1)	4A	Low
7-1 (upstream 2)	4A	Medium
7-3	4B	Medium
7-1 (middle)	5A	High*
7-4	5B	High*
7-1 (lower above confluence with 7-5))	6A	Low
7-1 (lower below confluence with 7-5)	6A	Low
7-5	6B	Low

*These reaches scored high due to the wooded riparian buffers and streamside vegetation. Both reaches have considerable bank instability.





0 200 400 Feet

Stantec

Project Location
Cleveland County

Client/Project
NCDOT Division 12
STIP Project R-2707D/E
2017 Merger Team Update

Figure No.
2B

Title
Stream Relocation

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

CONTRACT:

TIP PROJECT: R-2707D

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

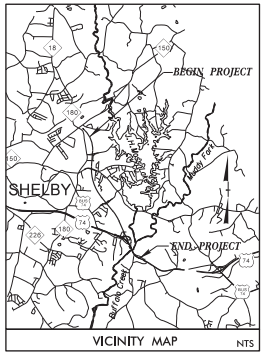
PLAN FOR CHANNEL RELOCATION
CLEVELAND COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707D	OSM-1	

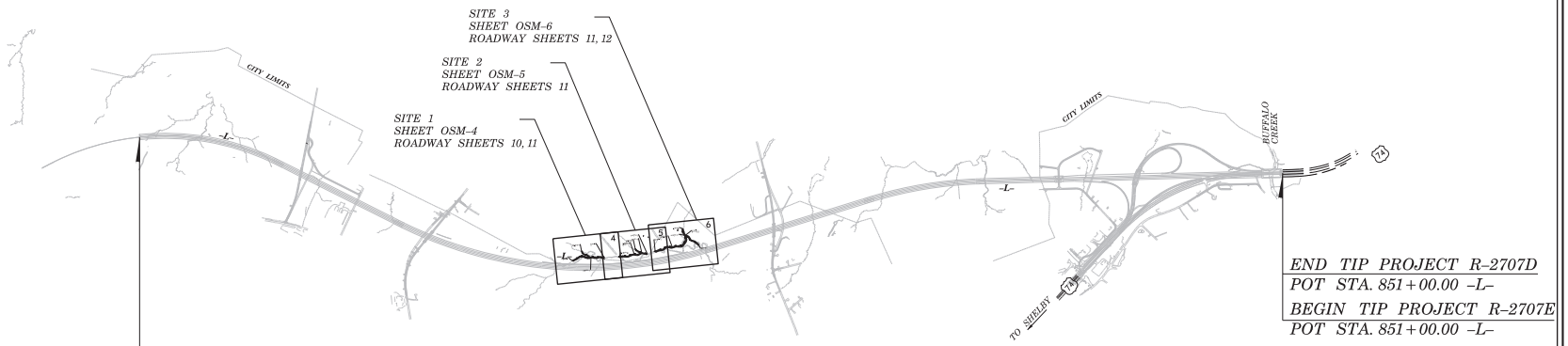
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34497.1.F56	N/A	P.E.
34497.1.F56	N/A	R/W & UTIL

LOCATION: US 74, SHELBY BYPASS FROM EAST OF NC 150 TO EXISTING US 74, WEST OF SR 2238 (LONG BRANCH ROAD)

TYPE OF WORK: STREAM RELOCATION



NAD 83



END TIP PROJECT R-2707C
POC STA. 635+00.00 -L-

BEGIN TIP PROJECT R-2707D
POC STA. 635+00.00 -L-

END TIP PROJECT R-2707D
POT STA. 851+00.00 -L-

BEGIN TIP PROJECT R-2707E
POT STA. 851+00.00 -L-

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

PLANS: 40 20 0 40 80

PROFILE (HORIZONTAL): 40 20 0 40 80

PROFILE (VERTICAL): 4 2 0 4 8

DESIGN DATA

PROJECT LENGTH

MITIGATION SITE	MITIGATION TYPE	LENGTH
SITE 1	RELOCATION	812LF
SITE 2	RELOCATION	664LF
SITE 3	RELOCATION	1195LF

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FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: JULY 2018

LETTING DATE: AUGUST 2019

PROJECT ENGINEER

PROJECT DESIGN ENGINEER
THAD DUNCAN, P.E.
NCDOT DIVISON 12

DESIGN ENGINEER

SIGNATURE: *P.E.*

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION ·

8/24/2018
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lstarnes

03/08/99

P-23

GENERAL NOTES

ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING STANDARDS:

A) NORTH CAROLINA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES, DATED JANUARY 2018, AND ANY SUPPLEMENTS THERETO ISSUED PRIOR TO THE DATE OF RECEIPT OF BIDS.

B) NORTH CAROLINA DEPARTMENT OF TRANSPORTATION "ROADWAY STANDARD DRAWINGS, ENGLISH" DATED JANUARY 2018, AND ANY SUPPLEMENTS ISSUED THERETO PRIOR TO THE DATE OF RECEIPT OF BIDS.

ALL RIGHT OF WAY CORNER MARKERS OR FENCING SHALL BE PLACED BY OTHERS AS NECESSARY.

THE CONTRACTOR IS RESPONSIBLE FOR AVOIDING ANY DISTURBANCE OR DAMAGE TO EXISTING UTILITIES AND SHALL BE RESPONSIBLE FOR IMMEDIATELY REPAIRING ANY DAMAGES AT A COST INCIDENT TO THIS CONTRACT.

ABANDONED SECTIONS OF THE EXISTING CHANNEL SHALL BE FILLED TO THE MAXIMUM EXTENT FEASIBLE WITH MATERIAL EXCAVATED ON-SITE. THIS EXCAVATED MATERIAL SHALL BE STOCKPILED ADJACENT TO THE REACHES OF CHANNEL OR DITCHES TO BE BACKFILLED.

THE PROPOSED STREAM RELOCATION SHALL BE CONSTRUCTED IN ACCORDANCE TO THE PROPOSED TYPICAL SECTIONS AND PROFILES, IN CONFORMANCE WITH THE PLANS.

SUBSURFACE PLANS: NO SUBSURFACE PLANS ARE AVAILABLE ON THE PROJECT. THE CONTRACTOR SHOULD MAKE HIS OWN INVESTIGATION AS TO THE SUBSURFACE CONDITIONS.

ROADWAY STANDARD DRAWINGS

(REV. JANUARY 2018)

THE FOLLOWING ROADWAY STANDARDS AS APPEAR IN "ROADWAY STANDARD DRAWINGS" - ROADWAY DESIGN UNIT - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 2018 AND THE LATEST REVISION THERETO ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

CONSTRUCTION SEQUENCING

THIS STREAM RELOCATION PROJECT CONSISTS OF TWO REACHES (1 & 2) INCLUSIVE OF MULTIPLE DESIGNED SUB REACHES(1A,1B,1ATRIB,1BTRIB,2A,2B,2C). ONCE WORK BEGINS ON A STREAM REACH, THE CONTRACTOR MUST COMPLETE THAT REACH BEFORE MOVING WORK CREWS AND EQUIPMENT TO A DIFFERENT REACH, UNLESS APPROVED TO DO SO BY THE ENGINEER.

PERFORM STAKEOUT SURVEY FOR THE PROPOSED STREAM CHANNEL, CONSTRUCTION EASEMENT LIMITS, AND GRADE STAKES. THE ENGINEER MUST INSPECT AND APPROVE ALL STAKEOUT WORK BEFORE CONSTRUCTION MAY BEGIN.

MOBILIZE EQUIPMENT AND MATERIALS TO THE SITE.

INSTALL CONSTRUCTION ENTRANCE PER EROSION CONTROL PLAN.(REFER TO ROADWAY CONSTRUCTION DRAWINGS)

ESTABLISH STAGING AREAS AND MARK CONSTRUCTION EQUIPMENT ACCESS LOCATIONS WITH VISIBLE MARKERS. CONSTRUCTION EQUIPMENT SHALL BE CONTAINED WITHIN THE LIMITS OF CONSTRUCTION AS DEPICTED IN THE PLANS OR SPECIFIED BY THE ENGINEER.

INSTALL TEMPORARY EROSION CONTROL MEASURES.

BEGIN FLOODPLAIN GRADING, INCLUDING EXCAVATION OF BANKFULL BENCHES AT LOCATIONS DEPICTED IN THE PLANS AND AS DIRECTED BY THE ENGINEER. STOCKPILE MATERIALS ONLY WITHIN APPROVED LIMITS OF DISTURBANCE AS DESIGNATED ON THE EROSION CONTROL PLANS(REFER TO ROADWAY CONSTRUCTION DRAWINGS). KEEP TOPSOIL SEPARATE FROM OTHER STOCKPILE MATERIAL FOR LATER USE IN FLOODPLAIN. FINISH GRADING AND REVEGETATION PREPARATION.

TOPSOIL SHALL BE EXCAVATED AND STOCKPILED SEPARATELY FROM THE WASTE MATERIAL SO THAT IT CAN BE PLACED BACK ON THE FLOODPLAIN ONCE GRADING IS COMPLETE. NO DIRECT PAYMENT WILL BE MADE FOR THIS EXCAVATION. OVER-EXCAVATE FLOODPLAIN AND FLOODPLAIN SLOPES TO A DEPTH OF 6" BELOW FINAL GRADE AND PLACE 6" OF TOPSOIL TO FILL TO FINAL GRADE. OVER-EXCAVATION SHOULD BEGIN 3' FROM TOP OF BANK AND EXTEND TO EXCAVATION LIMITS. SEE TYPICAL SECTIONS FOR DETAIL.
INSTALL IMPERVIOUS DIKES AND PUMP AROUND SYSTEM TO PUMP STREAM DISCHARGE AROUND THE IMMEDIATE WORK AREA AS NECESSARY.

CONSTRUCTION SHALL PROCEED IN SUCCESSIVE REACHES WITH THE UPSTREAM REACH BEING COMPLETED PRIOR TO INITIATING CONSTRUCTION OF THE ADJACENT DOWNSTREAM REACH. EACH REACH SHALL BE LIMITED IN LENGTH TO WORK THAT CAN BE COMPLETED BEFORE ALLOWING WATER TO FLOW THROUGH THAT REACH. COMPLETION OF A REACH SHALL CONSIST OF CHANNEL CONSTRUCTION, FLOODPLAIN GRADING, IN-STREAM STRUCTURE INSTALLATION, BED MATERIAL INSTALLATION, AND EROSION CONTROL MEASURES. CONSTRUCTION SHALL BE DONE IN THE DRY, WITH THE CHANNEL FLOW PUMPED AROUND THE DEWATERED REACH UNDER CONSTRUCTION AS NECESSARY.

AT THE END OF EACH DAY'S CONSTRUCTION WORK, THE CONTRACTOR SHALL SEED ALL DISTURBED AREAS AND COVER THE STREAM BANKS AND BANKFULL BENCHES WITH COIR FIBER MATTING TO THE EXTENT AS SHOWN ON PLANS. IN ADDITION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL TEMPORARY EROSION CONTROL MEASURES ON A DAILY BASIS THROUGHOUT THE CONSTRUCTION PROCESS.

ONCE NEW CHANNEL CONSTRUCTION IS COMPLETE, THE CONTRACTOR SHALL INSTALL STREAM PLUGS TO DIRECT STREAM FLOW INTO THE NEW CHANNEL. THE CONTRACTOR SHALL THEN FILL IN THE ABANDONED SECTIONS OF THE EXISTING CHANNEL TO THE EXTENT FEASIBLE AND AS DIRECTED BY THE ENGINEER. CONTRACTOR WILL ENSURE THAT EITHER:1) VEGETATION HAS BEEN ESTABLISHED ALONG THE BANKS OF THE NEW STREAM CHANNEL OR 2)BANKS HAVE BEEN FULLY MATTED,STEAKED AND PLANTED PER VEGETATION PLAN. FOR NEW STREAM CHANNEL REACHES WHERE THIS IS NOT POSSIBLE, THE CONTRACTOR SHOULD GET APPROVAL FROM THE ENGINEER BEFORE DIRECTING FLOW INTO THE NEW STREAM CHANNEL.

AFTER ALL IN-STREAM WORK IS COMPLETED, THE CONTRACTOR SHALL REMOVE TEMPORARY EROSION CONTROL MEASURES AND TEMPORARY STREAM ACCESS PER EROSION CONTROL PLAN (REFER TO ROADWAY CONSTRUCTION DRAWINGS). SCARIFY ANY COMPACTED AREAS AS DIRECTED BY THE ENGINEER. ALL PORTIONS OF THE SITE SHALL BE STABILIZED WITH TEMPORARY EROSION CONTROL MEASURES.

REVISIONS 8/17/99

8/24/2018
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lstarnes

R-2707D
ON-SITE MITIGATION
CLEVELAND COUNTY

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www.stantec.com
License No. F-0672

PROJECT REFERENCE NO.	SHEET NO.
R2707D	OSM-1A

PROJECT ENGINEER

APPROVED BY:

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DATE:

INDEX OF SHEETS

OSM-1	TITLE SHEET
OSM-1A	INDEX OF SHEETS, CONSTRUCTION SEQUENCING, GENERAL NOTES
OSM-1B	CONVENTIONAL PLAN SHEET SYMBOLS
OSM-2 - OSM-2A	CHANNEL TYPICAL DETAIL
OSM-2B	DETAILS -COIR FIBER MATTING -ROCK CROSS VANE
OSM-2C	-CONSTRUCTED RIFFLE -WOOD TOE PROTECTION -ROCK ENERGY DISSIPATOR BASIN
OSM-2D	-STREAM PLUG -ROCK J-HOOK VANE -LOG VANE WITH ROCK J-HOOK
OSM-2E - OSM-2F	-MORPHOLOGICAL TABLES
OSM-3	SUMMARY OF QUANTITIES EARTHWORK SUMMARY
OSM-4 - OSM-6	PLAN SHEETS
OSM-7 - OSM-10	PROFILE SHEETS
OSM-11 - OSM-31	CROSS SECTIONS
RF-1	PLANTING DETAILS
RF-2 - RF-4	PLANTING PLAN SHEETS

STREAM SYMBOLS

PLAN VIEW SYMBOLS

LOG VANE WITH ROCK J-HOOK

ROCK ENERGY DISSIPATOR BASIN

WOOD TOE

CONSTRUCTED RIFFLE

STREAM PLUG

BACKFILL EXISTING CHANNEL

ROCK J-HOOK VANE

ROCK CROSS VANE

FLOODPLAIN LINE

PROFILE SYMBOLS

EXISTING GROUND ELEVATION

PROPOSED GROUND ELEVATION

PROPOSED BANKFULL

LOG VANE WITH ROCK J-HOOK

CONSTRUCTED RIFFLE

ROCK CROSS VANE

ROCK J-HOOK VANE

PLANTING SYMBOLS

TYPE I

TYPE II

P-24

PROJECT REFERENCE NO.	SHEET NO.
U-2525B	OSM-1B

Note: Not to Scale

**S.U.E. = Subsurface Utility Engineering*

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 123
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB

BUILDINGS AND OTHER CULTURE:

- Gas Pump Vent or U/G Tank Cap
- Sign — S
- Well
- Small Mine
- Foundation
- Area Outline
- Cemetery
- Building
- School
- Church
- Dam

HYDROLOGY:

- Stream or Body of Water
- Hydro, Pool or Reservoir
- Jurisdictional Stream — JS
- Buffer Zone 1 — BZ 1
- Buffer Zone 2 — BZ 2
- Flow Arrow
- Disappearing Stream
- Spring
- Wetland
- Proposed Lateral, Tail, Head Ditch — FLOW
- False Sump

RAILROADS:

- Standard Gauge — CSX TRANSPORTATION
- RR Signal Milepost — MILEPOST 35
- Switch — SWITCH
- RR Abandoned
- RR Dismantled

RIGHT OF WAY:

- Baseline Control Point
- Existing Right of Way Marker
- Existing Right of Way Line
- Proposed Right of Way Line — RW
- Proposed Right of Way Line with Iron Pin and Cap Marker — RW
- Proposed Right of Way Line with Concrete or Granite Marker — RW
- Existing Control of Access — CA
- Proposed Control of Access — CA
- Existing Easement Line — E
- Proposed Temporary Construction Easement — E
- Proposed Temporary Drainage Easement — TDE
- Proposed Permanent Drainage Easement — PDE
- Proposed Permanent Utility Easement — PUE

ROADS AND RELATED FEATURES:

- Existing Edge of Pavement
- Existing Curb
- Proposed Slope Stakes Cut — C
- Proposed Slope Stakes Fill — F
- Proposed Wheel Chair Ramp — WCR
- Existing Metal Guardrail
- Proposed Guardrail
- Existing Cable Guiderail
- Proposed Cable Guiderail
- Equality Symbol
- Pavement Removal

VEGETATION:

- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard — Vineyard

EXISTING STRUCTURES:

MAJOR:

- Bridge, Tunnel or Box Culvert — CONC
- Bridge Wing Wall, Head Wall and End Wall — CONC WW

MINOR:

- Head and End Wall — CONC HW
- Pipe Culvert
- Footbridge
- Drainage Box: Catch Basin, DI or JB — CB
- Paved Ditch Gutter
- Storm Sewer Manhole — S
- Storm Sewer — S

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — P
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole — HH
- H-Frame Pole
- Recorded U/G Power Line — P
- Designated U/G Power Line (S.U.E.*) — P

TELEPHONE:

- Existing Telephone Pole
- Proposed Telephone Pole
- Telephone Manhole — T
- Telephone Booth
- Telephone Pedestal — T
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole — HH
- Recorded U/G Telephone Cable — T
- Designated U/G Telephone Cable (S.U.E.*) — T
- Recorded U/G Telephone Conduit — TC
- Designated U/G Telephone Conduit (S.U.E.*) — TC
- Recorded U/G Fiber Optics Cable — T FO
- Designated U/G Fiber Optics Cable (S.U.E.*) — T FO

WATER:

- Water Manhole — W
- Water Meter
- Water Valve
- Water Hydrant
- Recorded U/G Water Line — W
- Designated U/G Water Line (S.U.E.*) — W
- Above Ground Water Line — A/G Water

TV:

- TV Satellite Dish
- TV Pedestal — TV
- TV Tower
- U/G TV Cable Hand Hole — HH
- Recorded U/G TV Cable — TV
- Designated U/G TV Cable (S.U.E.*) — TV
- Recorded U/G Fiber Optic Cable — TV FO
- Designated U/G Fiber Optic Cable (S.U.E.*) — TV FO

GAS:

- Gas Valve
- Gas Meter
- Recorded U/G Gas Line — G
- Designated U/G Gas Line (S.U.E.*) — G
- Above Ground Gas Line — A/G Gas

SANITARY SEWER:

- Sanitary Sewer Manhole — SS
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line — SS
- Above Ground Sanitary Sewer — A/G Sanitary Sewer
- Recorded SS Forced Main Line — FSS
- Designated SS Forced Main Line (S.U.E.*) — FSS

MISCELLANEOUS:

- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box — S
- Utility Unknown U/G Line — ?UTL
- U/G Tank; Water, Gas, Oil
- A/G Tank; Water, Gas, Oil
- U/G Test Hole (S.U.E.*)
- Abandoned According to Utility Records — AATUR
- End of Information — E.O.I.

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R2707D
CHANNEL RELOCATION
CLEVELAND COUNTY

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PROJECT REFERENCE NO. R2707D | SHEET NO. OSM-2
PROJECT ENGINEER
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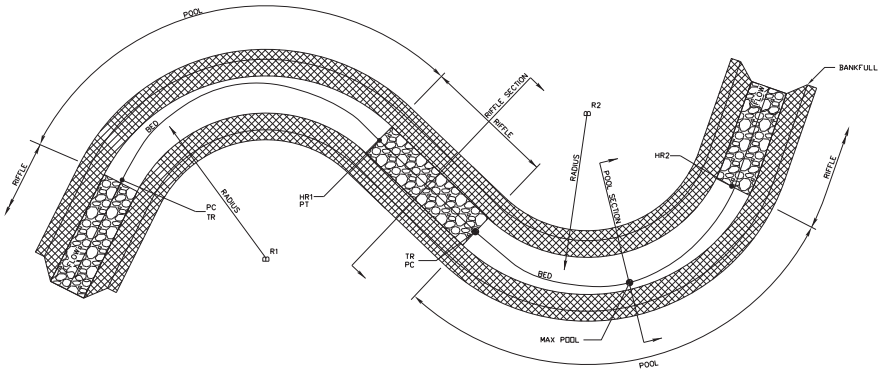
DATE:

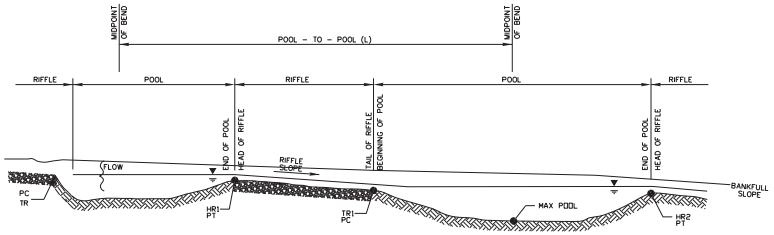


TYPICAL PLAN

NOTE:
1. TYPICAL PLAN NOT REFLECTIVE OF ACTUAL DESIGN.
2. REFER TO PLAN SHEETS FOR SPECIFIC PROPOSED TREATMENTS, GEOMETRY DATA, AND HORIZONTAL PLACEMENT.
3. REFER TO PROFILE SHEETS FOR VERTICAL PLACEMENT.

NOTE:
PC: POINT OF CURVATURE
TR: TAIL OF RIFFLE
PT: POINT OF TANGENCY
HR: HEAD OF RIFFLE

REFER TO CHANNEL TYPICAL DETAIL SECTIONS FOR ADDITIONAL INFORMATION



TYPICAL PROFILE

CHANNEL TYPICAL DETAIL-PLAN & PROFILE

NOT TO SCALE

P-26

R2707D
CHANNEL RELOCATION
CLEVELAND COUNTY

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PROJECT REFERENCE NO. R2707D | SHEET NO. 05M-2A
PROJECT ENGINEER
APPROVED BY:
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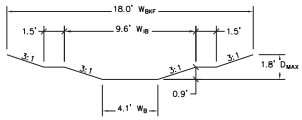
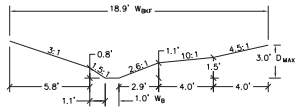
DATE:

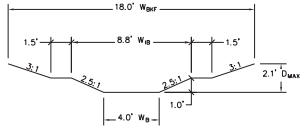


TYPICAL RIFFLE

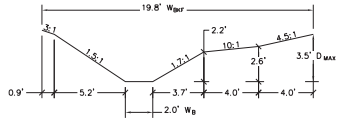


TYPICAL POOL

REACH 1A: STA 10+00 – 16+21.34

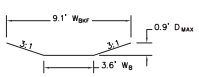


TYPICAL RIFFLE

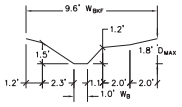


TYPICAL POOL

REACH 1B UPPER: STA 30+00 – 32+83.34

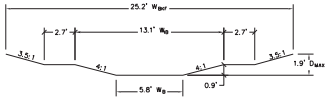


TYPICAL RIFFLE

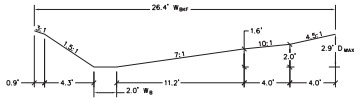


TYPICAL POOL

REACH 1B TRIBUTARY: STA 40+00 – 41+33.89

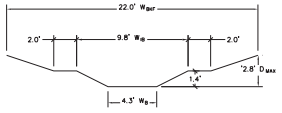


TYPICAL RIFFLE

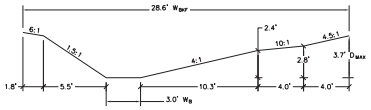


TYPICAL POOL

REACH 2A LOWER: STA 53+38.09 – 57+41.00

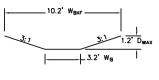


TYPICAL RIFFLE

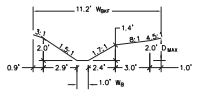


TYPICAL POOL

REACH 2C: STA 63+23.20 – 64+60.02

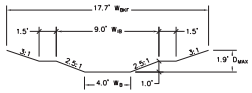


TYPICAL RIFFLE

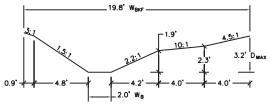


TYPICAL POOL

REACH 1A TRIBUTARY: STA 20+00 – 21+98.90

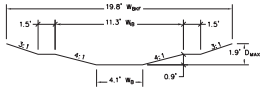


TYPICAL RIFFLE

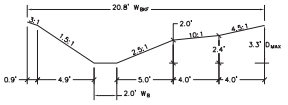


TYPICAL POOL

REACH 1B LOWER: STA 32+83.34 – 35+30.28

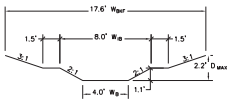


TYPICAL RIFFLE

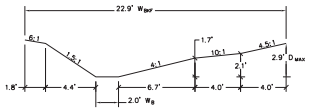


TYPICAL POOL

REACH 2A UPPER: STA 50+00 – 53+38.09



TYPICAL RIFFLE



TYPICAL POOL

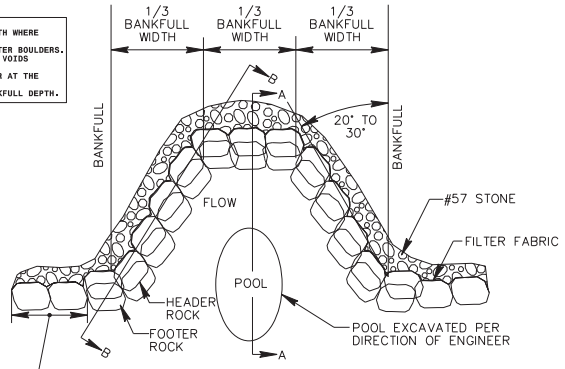
REACH 2B: STA 60+00 – 63+23.20

CHANNEL TYPICAL DETAIL SECTIONS

NOT TO SCALE

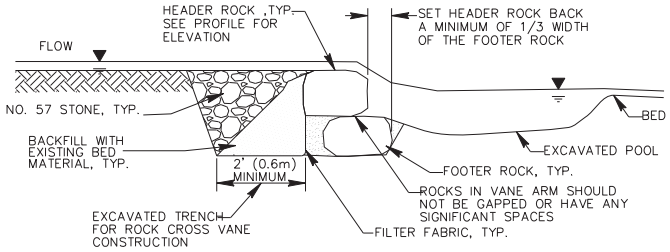
P-27

NOTES:
1. DEEPEST PART OF POOL TO BE IN LINE WITH WHERE VANE ARM TIES INTO BANKFULL.
2. DO NOT EXCAVATE POOL TOO CLOSE TO FOOTER BOULDERS.
3. CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
4. COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
5. POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.

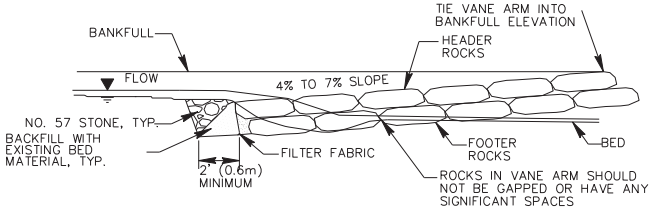


NOTE: REFER TO CONSTRUCTED RIFFLE DETAIL FOR BOULDER SIZES

PLAN VIEW



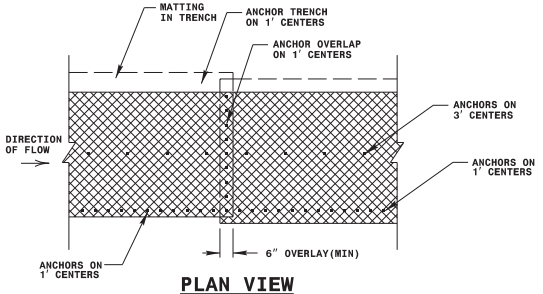
SECTION A-A



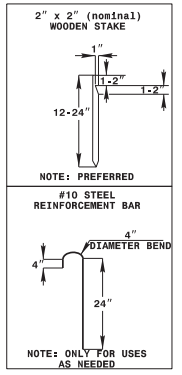
SECTION B-B

ROCK CROSS VANE DETAIL (MODIFIED)

NOT TO SCALE

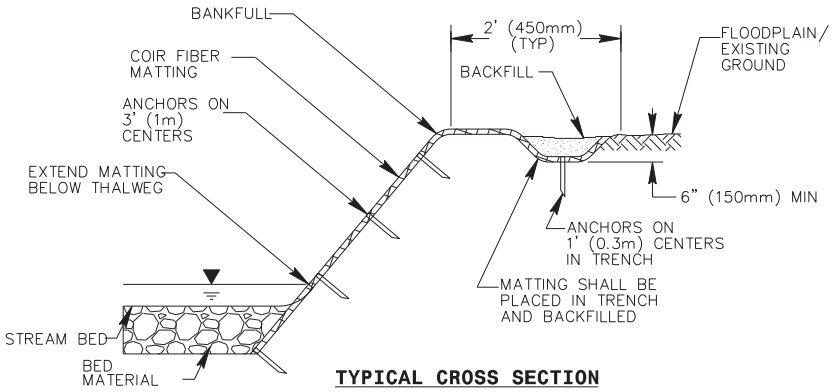


PLAN VIEW



ANCHOR OPTIONS

NOTES:
1. IN AREAS TO BE MATTED, ALL SEEDING, SOIL AMENDMENTS, AND SOIL PREPARATION MUST BE COMPLETED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS PRIOR TO PLACEMENT OF COIR FIBER MATTING.
2. REBAR OR STAPLES MAY BE USED IN PLACE OF WOODEN STAKES AS DIRECTED BY THE ENGINEER.



TYPICAL CROSS SECTION

COIR FIBER MATTING DETAIL (MODIFIED)

NOT TO SCALE

NOTE: REFER TO CONSTRUCTED RIFFLE DETAIL FOR BOULDER SIZES

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PROJECT REFERENCE NO.: R2707D
SHEET NO.: 05M-28
PROJECT ENGINEER
APPROVED BY:
DATE:

INCOMPLETE PLANS
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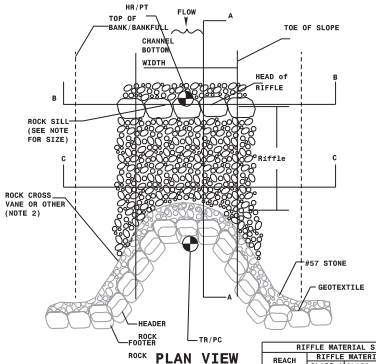
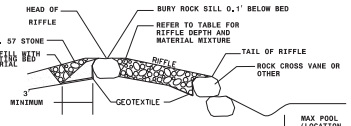
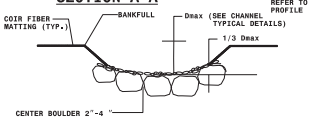


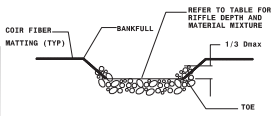
PLAN VIEW



SECTION A-A



SECTION B-B



SECTION C-C

BOULDER SIZE DATA CHART

REACH	BOULDER DIMENSIONS HEIGHT	WIDTH	LENGTH
1A	2'	3'	4'
1A TRIB	1'	2'	3'
1B-UPPER	1'	2'	3'
1B-LOWER	2'	3'	4'
1B TRIB	1'	2'	3'
2A-UPPER	2'	3'	4'
2A-LOWER	1'	2'	3'
2B	2'	3'	4'
2C	2'	3'	4'

NOTE: THESE DIMENSIONS SPECIFY THE MINIMUM BOULDER SIZE

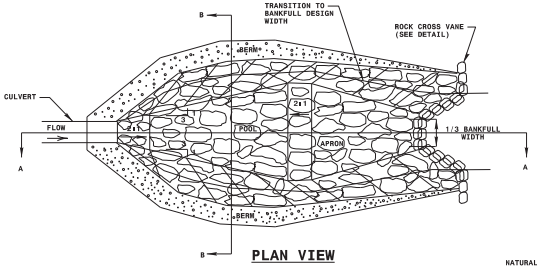
RIFFLE MATERIAL SIZE DATA CHART

REACH	RIFFLE MATERIAL MIXTURE NOMINAL CLASS A	CLASS 1	CLASS 2	THICKNESS
1A	10	45	45	3'
1A TRIB	10	90	-	2'
1B-UPPER	10	90	-	2'
1B-LOWER	10	45	45	3'
1B TRIB	10	90	-	2'
2A-UPPER	10	45	45	3'
2A-LOWER	10	90	-	2'
2B	10	45	45	3'
2C	10	45	45	3'

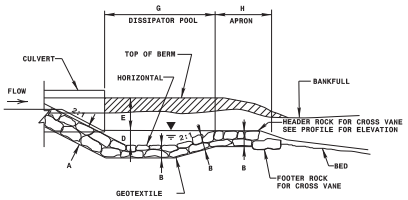
NOTE:
1. BOULDER ROCK SILL SHOULD BE NATIVE STONES OR SHOT ROCK, ANGULAR AND OBLONG, WITH AN AXIS APPROXIMATELY 4'Lx3'Wx2'D
2. REFER TO PLAN SHEET AND PROFILE FOR SPECIFIC STRUCTURE AND CORRESPONDING DETAIL.

CONSTRUCTED RIFFLE DETAIL (MODIFIED)

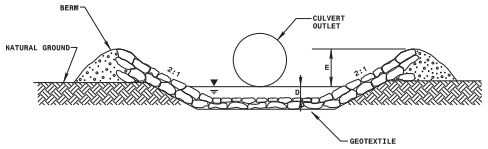
NOT TO SCALE



PLAN VIEW



SECTION A-A



SECTION B-B

ROCK ENERGY DISSIPATOR BASIN DETAIL

NOT TO SCALE

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PROJECT REFERENCE NO. R2707D | SHEET NO. 05M-2C
PROJECT ENGINEER
APPROVED BY:
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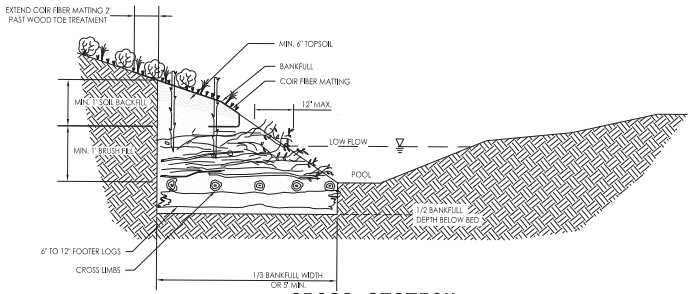
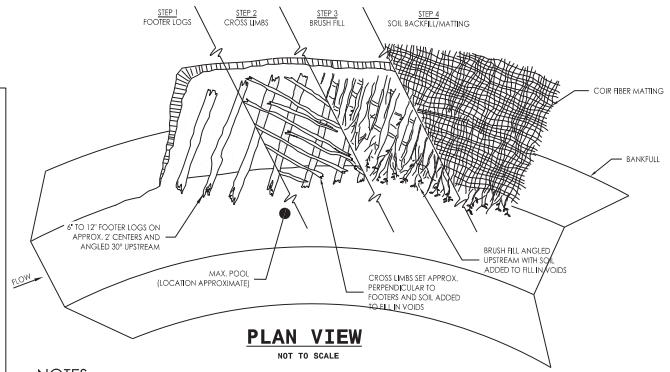
DATE:



CROSS SECTION

NOT TO SCALE



PLAN VIEW

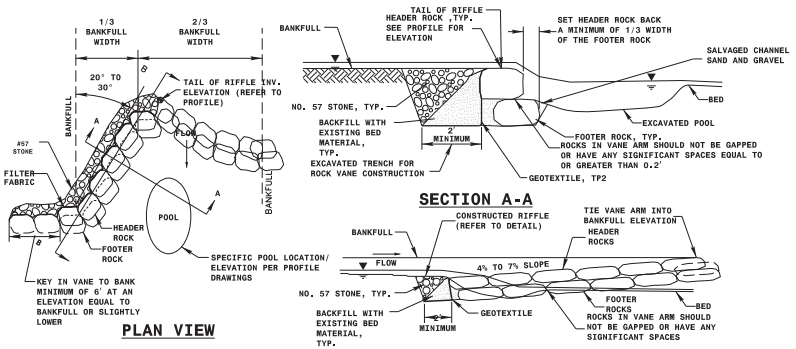
NOT TO SCALE

NOTES:

1. MIX LAYERS OF SOIL WITH COARSE WOODY DEBRIS. (30% TO BE FROM LIVE MATERIAL OF NON-INVASIVE SPECIES). THIS SHALL EXTEND TO A DEPTH OF 1/2 BANKFULL, BELOW THE BOTTOM OF THE BED.
2. WRAP SOIL BACKFILL/TOPSOIL WITH COIR FIBER MATTING AND PLANT WITH LIVE STAKES PER THE PLANTING PLAN.
3. WOODY DEBRIS SHALL NOT EXTEND INTO THE PROPOSED CHANNEL MORE THAN 12" MAXIMUM.
4. NO WOOD MATERIALS SHALL BE DEAD OR ROTTING.
5. ALL MATERIALS ARE TO BE APPROVED BY ENGINEER OR ENGINEER'S ONSITE CONSTRUCTION MANAGER.
6. EXTEND WOOD TOE TREATMENT DOWNSTREAM BEYOND HEAD OF RIFFLE PER PLAN.

WOOD TOE PROTECTION

NOT TO SCALE



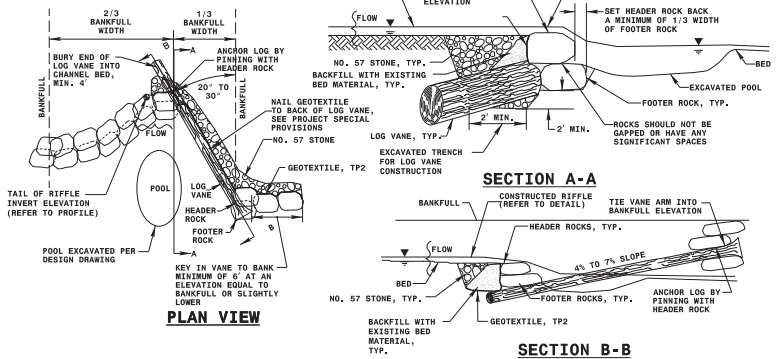
NOTES:
1. DEEPEST PART OF POOL (MAX POOL).
2. DO NOT EXCAVATE POOL TOO CLOSE TO FOOTER BOULDERS.
3. CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
4. COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
5. POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.

NOTE: NUMBER OF STONES VARY DEPENDING ON ½ BANFULL WIDTH

REFER TO CONSTRUCTED RIFFLE DETAIL FOR BOULDER SIZES

ROCK J-HOOK VANE DETAIL (MODIFIED)

NOT TO SCALE



#57 STONE	
1.5"	100
1"	85-100
0.5"	25-60
#4	0-10
#8	0-5

REFER TO CONSTRUCTED RIFFLE DETAIL FOR BOULDER SIZES

NOTES:
1. DEEPEST PART OF POOL (MAX POOL).
2. DO NOT EXCAVATE POOL TOO CLOSE TO FOOTER BOULDERS.
3. CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
4. COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
5. POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.

NOTE: NUMBER OF STONES VARY DEPENDING ON ½ BANFULL WIDTH

LOG VANE WITH ROCK J-HOOK DETAIL (MODIFIED)

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PROJECT REFERENCE NO.	SHEET NO.
R2707D	05M-2D

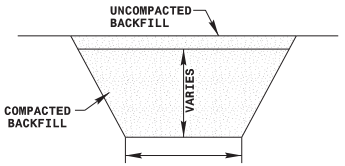
PROJECT ENGINEER

APPROVED BY:

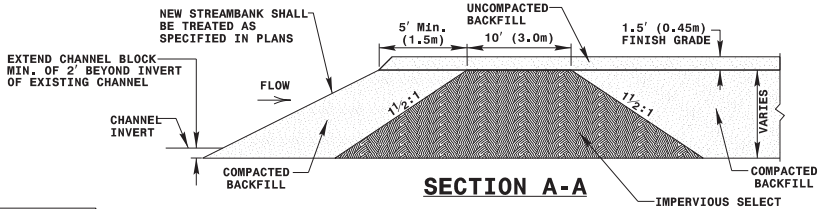
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DATE:

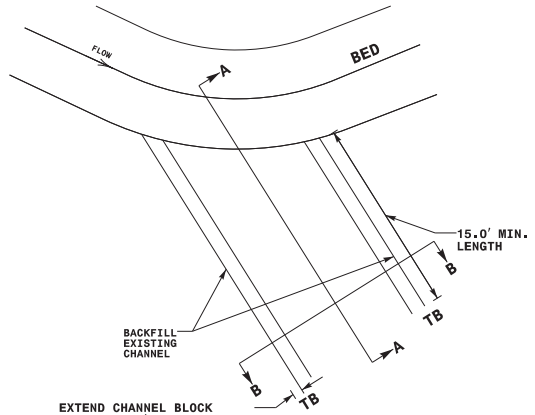
NOTES:
1) STREAM PLUG SHALL BE INSTALLED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS AND AS SHOWN ON PLANS.
3) BOTTOM OF BLOCK SHOULD BE A MINIMUM OF 2.0' BELOW THE INVERT OF THE EXISTING CHANNEL.
4) BLOCK SHOULD EXTEND A MINIMUM OF 2.0' BEYOND THE LIMITS OF THE EXISTING STREAM CHANNEL.
5) INSTALL EROSION CONTROL MATTING AND SEED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS IMMEDIATELY AFTER GRADING.
6) COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.



SECTION B-B



SECTION A-A



PLAN VIEW

STREAM PLUG

NOT TO SCALE

P-30

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PROJECT REFERENCE NO.: R2707D
SHEET NO.: OSM-2E
PROJECT ENGINEER
APPROVED BY:
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DATE:

VARIABLES	Reference Reach	Reference Reach	Reference Reach	Existing Reach 1A	Design Reach 1A	Design Reach 1A Tributary	Existing Reach 1B	Design Reach 1B Upper	Design Reach 1B Lower	Design Reach 1B Tributary
STATION	-	-	-	-	-	-	-	-	-	-
1. Stream Type (Rosgen)	C4	B 4/1c	B 4	B 4c	B4/1	B/Bc	B 4c	Bc	Bc	B
2. Drainage Area [mi2]	0.21	0.19	0.81	0.42	0.42	0.09	0.46	0.53	C.53	0.05
Riffle Dimensions										
3. Bankfull Width	Mean: 7.55	Mean: 7.37	Mean: 13.14	Mean: 12.31	Mean: 17.98	Mean: 10.20	Mean: 15.67	Mean: 18.00	Mean: 17.73	Mean: 9.13
(Wbkf) [ft]	Range: 7.03 8.06	Range: 6.58 8.16	Range: 12.12 14.16	Range: 10.57 14.04	Range:	Range:	Range: 15.4 15.94	Range:	Range:	Range:
4. Mean Riffle Depth	Mean: 0.90	Mean: 1.04	Mean: 0.86	Mean: 1.31	Mean: 1.20	Mean: 0.78	Mean: 1.49	Mean: 1.20	Mean: 1.27	Mean: 0.61
(dbkf) [ft]	Range: 0.82 0.97	Range: 0.94 1.13	Range: 0.82 0.89	Range: 1.09 1.53	Range:	Range:	Range: 1.15 1.82	Range:	Range:	Range:
5. Maximum Riffle Depth	Mean: 1.29	Mean: 1.53	Mean: 1.22	Mean: 1.7	Mean: 1.80	Mean: 1.20	Mean: 2.20	Mean: 2.10	Mean: 1.90	Mean: 0.91
(dmax) [ft]	Range: 1.19 1.39	Range: 1.38 1.67	Range: 1.16 1.27	Range: 1.44 1.96	Range:	Range:	Range: 1.77 2.62	Range:	Range:	Range:
6. Width of Flood-Prone Area	Mean: 31	Mean: 20	Mean: 21	Mean: 17	Mean:	Mean:	Mean: 23	Mean:	Mean:	Mean:
(Wfpa) [ft]	Range: 27 34	Range: 19 22	Range: 18 25	Range: 14 20	Range:	Range:	Range: 22 24	Range:	Range:	Range:
7. Riffle Inner Berm Width	Mean: -	Mean: -	Mean: -	Mean: -	Mean: 9.60	Mean: -	Mean: -	Mean: 8.8	Mean: 9.0	Mean: -
(Wib) [ft]	Range: - -	Range: - -	Range: - -	Range: - -	Range:	Range: - -	Range: - -	Range:	Range:	Range: - -
8. Riffle Inner Berm Depth	Mean: -	Mean: -	Mean: -	Mean: -	Mean: 0.90	Mean: -	Mean: -	Mean: 1.0	Mean: 1.0	Mean: -
(dib) [ft]	Range: - -	Range: - -	Range: - -	Range: - -	Range:	Range: - -	Range: - -	Range:	Range:	Range: - -
9. Riffle Inner Berm Area	Mean: -	Mean: -	Mean: -	Mean: -	Mean: 6.14	Mean: -	Mean: -	Mean: 6.7	Mean: 6.2	Mean: -
(Aib) [ft2]	Range: - -	Range: - -	Range: - -	Range: - -	Range:	Range: - -	Range: - -	Range:	Range:	Range: - -
10. Riffle Cross-Sectional Area	Mean: 6.78	Mean: 7.55	Mean: 11.25	Mean: 15.77	Mean: 21.56	Mean: 8.00	Mean: 23.33	Mean: 24.96	Mean: 22.47	Mean: 5.56
(Abkf) [ft2]	Range: 5.76 7.80	Range: 7.42 7.68	Range: 10.85 11.65	Range: 15.37 16.16	Range:	Range:	Range: 17.66 28.99	Range:	Range:	Range:
11. Riffle Width/Depth Ratio	Mean: 8.44	Mean: 7.25	Mean: 15.44	Mean: 9.90	Mean: 15.00	Mean: 15.00	Mean: 11.08	Mean: 13.00	Mean: 14.00	Mean: 15.00
(Wbkf/dbkf)	Range: 8.31 8.57	Range: 5.82 8.68	Range: 13.62 17.27	Range: 6.91 12.88	Range:	Range:	Range: 8.76 13.39	Range:	Range:	Range:
12. Max Riffle Depth to Mean Riffle Depth	Mean: 1.44	Mean: 1.47	Mean: 1.43	Mean: 1.30	Mean: 1.50	Mean: 1.50	Mean: 1.49	Mean: 1.50	Mean: 1.50	Mean: 1.50
(dmax/dbkf)	Range: 1.43 1.45	Range: 1.47 1.48	Range: 1.30 1.55	Range: 1.28 1.32	Range:	Range:	Range: 1.44 1.54	Range:	Range:	Range:
13. Entrenchment Ratio	Mean: 4.03	Mean: 2.33	Mean: 1.62	Mean: 1.38	Mean: 1.60	Mean: 1.60	Mean: 1.47	Mean: 2.50	Mean: 1.90	Mean: 1.60
(Wfpa/Wbkf)	Range: 3.85 4.21	Range: 2.29 3.36	Range: 1.47 1.77	Range: 1.37 1.40	Range:	Range:	Range: 1.42 1.51	Range:	Range:	Range:
14. Bankfull Mean Velocity	Mean:	Mean:	Mean:	Mean: 4.4	Mean: 4.9	Mean: 4.0	Mean:	Mean: 4.9	Mean: 4.8	Mean: 4.9	Mean: 3.5
(Vbkf) [ft/s]	Range:	Range:	Range:	Range:	Range: 4.7 5.1	Range: 3.8 4.2	Range: 4.6 5.2	Range: 4.6 4.9	Range: 4.7 5.1	Range: 3.3 3.7
15. Bankfull discharge	Mean:	Mean:	Mean:	Mean: 67.1	Mean: 97.0	Mean: 29.2	Mean: 125.7	Mean: 105.8	Mean: 98.2	Mean: 17.4
(Qbkf) [ft3/s]	Range:	Range:	Range:	Range:	Range: 92.0 102.0	Range: 27.7 30.6	Range: 118.6 132.7	Range: 102.2 109.3	Range: 93.8 102.5	Range: 16.5 18.3
Pool Dimensions										
16. Pool Width	Mean: 9.72	Mean: 10.6	Mean: 10.37	Mean: 18.36	Mean: 18.88	Mean: 11.22	Mean: 27.75	Mean: 19.82	Mean: 19.82	Mean: 9.59
(Wbkfp) [ft]	Range: 8.87 10.57	Range: 10.55 10.65	Range: 9.27 11.46	Range: 18.14 18.57	Range:	Range:	Range:	Range:	Range:	Range:
17. Mean Pool Depth	Mean: 1.25	Mean: 1.43	Mean: 1.22	Mean: 1.71	Mean: 1.68	Mean: 1.18	Mean: 2.64	Mean: 2.08	Mean: 2.08	Mean: 0.85
(dbkfp)	Range: 0.84 1.65	Range: 1.4 1.45	Range: 0.85 1.58	Range: 1.45 1.96	Range:	Range:	Range:	Range:	Range:	Range:
18. Pool Cross-Sectional Area	Mean: 11.75	Mean: 15.07	Mean: 13.02	Mean: 31.26	Mean: 34.50	Mean: 34.50	Mean: 73.33	Mean: 49.93	Mean: 49.93	Mean: 8.90
(Abkfp) [ft2]	Range: 8.9 14.6	Range: 14.73 15.41	Range: 7.87 18.16	Range: 26.92 35.59	Range:	Range:	Range:	Range:	Range:	Range:
19. Maximum Pool Depth	Mean: 1.93	Mean: 2.17	Mean: 1.68	Mean: 3.3	Mean: 3.00	Mean: 2.00	Mean: 4.54	Mean: 3.46	Mean: 3.17	Mean: 1.83
(dmaxp)	Range: 1.59 2.26	Range: 1.99 2.35	Range: 1.33 2.02	Range: 3.17 3.43	Range:	Range:	Range:	Range:	Range:	Range:
20. Pool Width to Riffle Width	Mean: 1.29	Mean: 1.44	Mean: 0.79	Mean: 1.49	Mean: 1.05	Mean: 1.05	Mean: 1.77	Mean: 1.10	Mean: 1.10	Mean: 1.05
(Wbkfp/Wbkf)	Range: 1.17 1.40	Range: 1.43 1.45	Range: 0.71 0.87	Range: 1.47 1.51	Range:	Range:	Range:	Range:	Range:	Range:
21. Mean Pool Depth to Mean Riffle Depth	Mean: 1.39	Mean: 1.38	Mean: 1.42	Mean: 1.31	Mean: 1.40	Mean: 1.40	Mean: 1.77	Mean: 1.50	Mean: 1.50	Mean: 1.40
(dbkfp/dbkf)	Range: 0.93 1.83	Range: 1.35 1.39	Range: 0.99 1.84	Range: 1.11 1.50	Range:	Range:	Range:	Range:	Range:	Range:
22. Pool Area to Riffle Area	Mean: 1.73	Mean: 2.00	Mean: 1.16	Mean: 1.98	Mean: 1.60	Mean: 1.60	Mean: 3.14	Mean: 2.00	Mean: 2.00	Mean: 1.60
(Abkfp/Abkf)	Range: 1.31 2.15	Range: 1.95 2.04	Range: 0.70 1.61	Range: 1.71 2.26	Range:	Range:	Range:	Range:	Range:	Range:
23. Max Pool Depth to Mean Riffle Depth	Mean: 2.14	Mean: 2.09	Mean: 1.95	Mean: 2.52	Mean: 2.50	Mean: 2.50	Mean: 3.05	Mean: 2.50	Mean: 2.50	Mean: 3.00
(dbkfp/dbkf)	Range: 1.77 2.51	Range: 1.91 2.26	Range: 1.55 2.35	Range: 2.42 2.62	Range:	Range:	Range:	Range:	Range:	Range:
Channel Pattern										
24. Stream Meander Length	Mean: 87.0	Mean: 87.0	Mean: 136.3	Mean:	Mean: 147.3	Mean: 89.3	Mean:	Mean: 197.9	Mean: 166.4	Mean: 42.7
(Lm)	Range: 57.0 117.0	Range: 57.0 117.0	Range: 69.2 197.7	Range:	Range: 140.4 156.0	Range: 88.0 90.5	Range:	Range: 196.9 199.0	Range: 141.1 171.7	Range: 41.1 44.4
25. Stream Meander Length Ratio	Mean: 11.5	Mean: 11.8	Mean: 10.4	Mean:	Mean: 8.2	Mean: 8.8	Mean:	Mean: 19.4	Mean: 9.4	Mean: 4.7
(Lm/Wbkf)	Range: 7.5 15.5	Range: 7.7 15.9	Range: 5.3 15.0	Range:	Range: 7.8 8.7	Range: 8.6 8.9	Range:	Range: 19.3 19.5	Range: 9.1 9.7	Range: 4.5 4.9
26. Radius of Curvature	Mean: 12.9	Mean: 61.7	Mean: 85.0	Mean:	Mean: 87.2	Mean: 53.5	Mean:	Mean: 95.3	Mean: 80.3	Mean: 27.3
(Rc)	Range: 7.6 17.3	Range: 45.0 80.0	Range: 41.0 132.0	Range:	Range: 35.0 215.0	Range: 40.0 72.0	Range:	Range: 76.0 110.0	Range: 55.0 123.0	Range: 18.0 57.0
27. Radius of Curvature to Riffle Width	Mean: 1.7	Mean: 8.4	Mean: 6.5	Mean:	Mean: 4.8	Mean: 5.2	Mean:	Mean: 5.3	Mean: 4.5	Mean: 3.0
(Rc/Wbkf)	Range: 1.0 2.3	Range: 6.1 10.9	Range: 3.1 10.0	Range:	Range: 1.9 119.5	Range: 3.9 7.1	Range:	Range: 7.5 10.8	Range: 1.1 6.9	Range: 2.0 6.2
28. Belt Width	Mean: 40.7	Mean:	Mean: 22.3	Mean:	Mean: 31.4	Mean: 21.2	Mean:	Mean: 36.4	Mean: 38.4	Mean: 15.9
(Wblt)	Range: 31.8 49.6	Range: - -	Range: 19.8 28.7	Range:	Range: 25.1 37.5	Range: 19.8 22.7	Range:	Range: 37.0 41.3	Range: 37.0 41.3	Range: 13.9 17.2
29. Meander Width Ratio	Mean: 5.4	Mean:	Mean: 1.7	Mean:	Mean: 1.7	Mean: 2.1	Mean:	Mean: 3.6	Mean: 2.2	Mean: 1.7
(Wblt/Wbkf)	Range: 4.2 6.6	Range: - -	Range: 1.5 2.2	Range:	Range: 1.4 3.9	Range: 1.9 2.2	Range:	Range: 3.6 4.0	Range: 2.1 2.3	Range: 1.5 1.9
30. Riffle Length	Mean: 12.1	Mean: 11.0	Mean: 10.8	Mean:	Mean: 43.5	Mean: 24.4	Mean:	Mean: 47.3	Mean: 40.9	Mean: 11.1
(Lr)	Range: 7.0 17.2	Range: 9.1 17.0	Range: 9.0 12.9	Range:	Range: 39.3 46.4	Range: 21.6 26.5	Range:	Range: 41.7 50.8	Range: 39.3 44.1	Range: 10.1 12.4
31. Riffle Length to Riffle Width	Mean: 1.6	Mean: 1.6	Mean: 0.8	Mean:	Mean: 2.4	Mean: 2.4	Mean:	Mean: 4.6	Mean: 2.3	Mean: 1.2
(Lr/Wbkf)	Range: 0.9 2.3	Range: 0.9 2.3	Range: 0.7 1.0	Range:	Range: 2.2 7.6	Range: 2.1 2.6	Range:	Range: 4.1 5.0	Range: 2.2 2.5	Range: 1.1 1.4
32. Individual Pool Length	Mean: 19.6	Mean: 18.6	Mean: 13.6	Mean:	Mean: 30.4	Mean: 19.2	Mean:	Mean: 47.2	Mean: 48.2	Mean: 11.0
(Lp)	Range: 10.1 33.1	Range: 6.8 32.4	Range: 6.9 29.3	Range:	Range: 23.8 40.5	Range: 17.6 20.4	Range:	Range: 29.9 56.3	Range: 39.9 56.3	Range: 10.0 13.8
33. Individual Pool Length to Riffle Width	Mean: 2.6	Mean: 2.5	Mean: 1.0	Mean:	Mean: 1.7	Mean: 1.9	Mean:	Mean: 4.6	Mean: 2.7	Mean: 1.2
(Lp/Wbkf)	Range: 1.3 4.4	Range: 0.9 4.4	Range: 0.5 2.2	Range:	Range: 1.3 2.7	Range: 1.7 2.0	Range:	Range: 2.9 5.5	Range: 2.2 3.2	Range: 1.1 1.5
34. Pool to Pool Spacing	Mean: 51.6	Mean: 31.2	Mean: 26.8	Mean:	Mean: 73.6	Mean: 44.7	Mean:	Mean: 99.5	Mean: 84.3	Mean: 21.6
(Ps)	Range: 30.5 69.3	Range: 25.2 36.4	Range: 20.7 34.4	Range:	Range: 69.3 79.0	Range: 43.6 46.1	Range:	Range: 93.9 105.2	Range: 80.0 91.7	Range: 20.1 22.6
35. Pool to Pool Spacing to Riffle Width	Mean: 6.8	Mean: 4.2	Mean: 2.0	Mean:	Mean: 4.1	Mean: 4.4	Mean:	Mean: 9.8	Mean: 4.8	Mean: 2.4
(Ps/Wbkf)	Range: 4.0 9.2	Range: 3.4 4.9	Range: 1.6 2.6	Range:	Range: 3.9 49.4	Range: 4.3 4.5	Range:	Range: 9.2 10.3	Range: 4.5 5.2	Range: 2.2 2.5
Channel Profile										
36. Valley Slope	Mean: 0.022	Mean: 0.020	Mean: 0.04	Mean: 0.0234	Mean: 0.027	Mean: 0.027	Mean: 0.014	Mean: 0.011	Mean: 0.023	Mean: 0.032
(Svalley) [ft/ft]	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:
37. Average Water Surface Slope	Mean: 0.016	Mean: 0.018	Mean: 0.022	Mean: 0.0126	Mean: 0.026	Mean: 0.026	Mean: 0.011	Mean: 0.011	Mean: 0.022	Mean: 0.031
(S)	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:
38. Sinuosity (k)	Mean: 1.36	Mean: 1.10	Mean: 1.12	Mean: 1.86	Mean: 1.04	Mean: 1.02	Mean: 1.26	Mean: 1.03	Mean: 1.03	Mean: 1.03
(Svalley/S)	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:

R2707D
CHANNEL RELOCATION
CLEVELAND COUNTY

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PROJECT REFERENCE NO.: R2707D
SHEET NO.: 05M-2F
PROJECT ENGINEER:
APPROVED By:
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DATE:

VARIABLES	Reference Reach	Reference Reach	Reference Reach	Existing Reach 2A	Design Reach 2A Upper	Design Reach 2A Lower	Existing Reach 2B	Design Reach 2B	Existing Reach 2C	Design Reach 2C
STATION	-	-	-	-	-	-	-	-	-	-
1. Stream Type (Rosgen)	C4	B 4/1c	B 4	B 3/1	B3/1	B3/1c	C 4	C4	C4	C
2. Drainage Area [mi2]	0.21	0.19	0.81	0.55	0.57	0.57	0.56	0.56	1.14	1.14
Riffle Dimensions										
3. Bankfull Width	Mean: 7.55	Mean: 7.37	Mean: 13.14	Mean: 19.81	Mean: 19.80	Mean: 25.19	Mean: 26.58	Mean: 17.61	Mean: 35.68	Mean: 22.03
(Wbkf) [ft]	Range: 7.03 8.06	Range: 6.58 8.16	Range: 12.12 14.16	Range: 17.99 21.63	Range:	Range:	Range: 16.07 37.08	Range:	Range:	Range:
4. Mean Riffle Depth	Mean: 0.90	Mean: 1.04	Mean: 0.86	Mean: 1.14	Mean: 1.32	Mean: 1.15	Mean: 1.00	Mean: 1.47	Mean: 0.95	Mean: 1.84
(dbkf) [ft]	Range: 0.82 0.97	Range: 0.94 1.13	Range: 0.82 0.89	Range: 0.71 1.29	Range:	Range:	Range: 0.71 1.29	Range:	Range:	Range:
5. Maximum Riffle Depth	Mean: 1.29	Mean: 1.53	Mean: 1.22	Mean: 1.76	Mean: 1.85	Mean: 1.85	Mean: 1.76	Mean: 2.20	Mean: 2.05	Mean: 2.75
(dmax) [ft]	Range: 1.19 1.39	Range: 1.38 1.67	Range: 1.16 1.27	Range: 1.21 2.31	Range:	Range:	Range: 1.21 2.31	Range:	Range:	Range:
6. Width of Flood-Prone Area	Mean: 31	Mean: 20	Mean: 21	Mean: 55	Mean:	Mean:	Mean:	Mean:	Mean: 109	Mean:
(Wfpa) [ft]	Range: 27 34	Range: 19 22	Range: 18 25	Range: 45 66	Range:	Range:	Range:	Range:	Range:	Range:
7. Riffle Inner Berm Width	Mean: -	Mean: -	Mean: -	Mean: -	Mean: 11.3	Mean: 13.1	Mean: -	Mean: 8.0	Mean: -	Mean: 3.8
(Wib) [ft]	Range: - -	Range: - -	Range: - -	Range: - -	Range:	Range:	Range: - -	Range:	Range: - -	Range:
8. Riffle Inner Berm Depth	Mean: -	Mean: -	Mean: -	Mean: -	Mean: 0.9	Mean: 0.9	Mean: -	Mean: 1.1	Mean: -	Mean: 1.4
(dib) [ft]	Range: - -	Range: - -	Range: - -	Range: - -	Range:	Range:	Range: - -	Range:	Range: - -	Range:
9. Riffle Inner Berm Area	Mean: -	Mean: -	Mean: -	Mean: -	Mean: 7.1	Mean: 8.7	Mean: -	Mean: 6.6	Mean: -	Mean: 3.7
(Aib) [ft2]	Range: - -	Range: - -	Range: - -	Range: - -	Range:	Range:	Range: - -	Range:	Range: - -	Range:
10. Riffle Cross-Sectional Area	Mean: 6.78	Mean: 7.55	Mean: 11.25	Mean: 23.46	Mean: 26.13	Mean: 26.13	Mean: 23.46	Mean: 25.84	Mean: 33.82	Mean: 40.43
(Abkf) [ft2]	Range: 5.76 7.80	Range: 7.42 7.68	Range: 10.85 11.65	Range: 20.72 26.19	Range:	Range:	Range: 20.72 26.19	Range:	Range:	Range:
11. Riffle Width/Depth Ratio	Mean: 8.44	Mean: 7.25	Mean: 15.44	Mean: 32.34	Mean: 15.00	Mean: 15.00	Mean: 32.34	Mean: 12.00	Mean: 37.56	Mean: 12.00
(Wbkf/dbkf)	Range: 8.31 8.57	Range: 5.82 8.68	Range: 13.62 17.27	Range: 12.46 52.23	Range:	Range:	Range: 12.46 52.23	Range:	Range:	Range:
12. Max Riffle Depth to Mean Riffle Depth	Mean: 1.44	Mean: 1.47	Mean: 1.43	Mean: 1.75	Mean: 1.40	Mean: 1.40	Mean: 1.75	Mean: 1.50	Mean: 2.16	Mean: 1.50
(dmax/dbkf)	Range: 1.43 1.45	Range: 1.47 1.48	Range: 1.30 1.55	Range: 1.70 1.79	Range:	Range:	Range: 1.70 1.79	Range:	Range:	Range:
13. Entrenchment Ratio	Mean: 4.03	Mean: 2.83	Mean: 1.62	Mean: 2.66	Mean: 1.60	Mean: 1.60	Mean: 2.66	Mean: 4.00	Mean: 3.06	Mean: 4.00
(Wfpa/Wbkf)	Range: 3.85 4.21	Range: 2.29 3.36	Range: 1.47 1.77	Range: 1.21 4.11	Range:	Range:	Range: 1.21 4.11	Range:	Range:	Range:
14. Bankfull Mean Velocity	Mean:	Mean:	Mean:	Mean: 4.6	Mean: 5.0	Mean: 3.5	Mean: 4.3	Mean: 5.2	Mean: 2.9	Mean: 3.6
(Vbkf) [ft/s]	Range:	Range:	Range:	Range:	Range: 4.8 5.2	Range: 3.4 3.7	Range: 4.19 4.44	Range: 5.0 5.5	Range: 2.54 3.19	Range: 3.4 5.8
15. Bankfull discharge	Mean:	Mean:	Mean:	Mean: 97.4	Mean: 112.9	Mean: 102.3	Mean: 89.4	Mean: 117.6	Mean: 96.9	Mean: 151.9
(Qbkf) [ft3/s]	Range:	Range:	Range:	Range:	Range: 108.1 117.6	Range: 98.6 106.1	Range: 86.87 91.95	Range: 111.9 123.3	Range: 86.03 107.75	Range: 119.4 204.5
Pool Dimensions										
16. Pool Width	Mean: 9.72	Mean: 10.6	Mean: 10.37	Mean: 16.67	Mean: 20.79	Mean: 26.45	Mean: 40.97	Mean: 22.89	Mean: 58.72	Mean: 28.63
(Wbkfp) [ft]	Range: 8.87 10.57	Range: 10.55 10.65	Range: 9.27 11.46	Range: 14.93 18.4	Range:	Range:	Range:	Range:	Range:	Range:
17. Mean Pool Depth	Mean: 1.25	Mean: 1.43	Mean: 1.22	Mean: 1.79	Mean: 1.85	Mean: 1.61	Mean: 1.03	Mean: 2.20	Mean: 1.03	Mean: 2.20
(dbkfp)	Range: 0.84 1.65	Range: 1.4 1.45	Range: 0.85 1.58	Range: 1.05 2.53	Range:	Range:	Range:	Range:	Range:	Range:
18. Pool Cross-Sectional Area	Mean: 11.75	Mean: 15.07	Mean: 13.02	Mean: 28.62	Mean: 41.81	Mean: 46.18	Mean: 42.14	Mean: 46.52	Mean: 60.37	Mean: 77.77
(Abkfp) [ft2]	Range: 8.9 14.6	Range: 14.73 15.41	Range: 7.87 18.16	Range: 19.4 37.84	Range:	Range:	Range:	Range:	Range:	Range:
19. Maximum Pool Depth	Mean: 1.93	Mean: 2.17	Mean: 1.68	Mean: 2.73	Mean: 3.30	Mean: 2.88	Mean: 3.27	Mean: 2.94	Mean: 2.77	Mean: 3.67
(dmaxp)	Range: 1.59 2.26	Range: 1.99 2.35	Range: 1.33 2.02	Range: 1.8 3.65	Range:	Range:	Range:	Range:	Range:	Range:
20. Pool Width to Riffle Width	Mean: 1.29	Mean: 1.44	Mean: 0.79	Mean: 0.84	Mean: 1.05	Mean: 1.05	Mean: 1.54	Mean: 1.30	Mean: 1.65	Mean: 1.30
(Wbkfp/Wbkf)	Range: 1.17 1.40	Range: 1.43 1.45	Range: 0.71 0.87	Range: 0.75 0.93	Range:	Range:	Range:	Range:	Range:	Range:
21. Mean Pool Depth to Mean Riffle Depth	Mean: 1.39	Mean: 1.38	Mean: 1.42	Mean: 1.57	Mean: 1.40	Mean: 1.40	Mean: 1.03	Mean: 1.50	Mean: 1.08	Mean: 1.50
(dbkfp/dbkf)	Range: 0.93 1.83	Range: 1.35 1.39	Range: 0.99 1.84	Range: 0.92 2.22	Range:	Range:	Range:	Range:	Range:	Range:
22. Pool Area to Riffle Area	Mean: 1.73	Mean: 2.00	Mean: 1.19	Mean: 1.27	Mean: 1.60	Mean: 1.60	Mean: 1.60	Mean: 1.60	Mean: 1.73	Mean: 1.60
(Abkfp/Abkf)	Range: 1.31 2.15	Range: 1.95 2.04	Range: 0.70 1.61	Range: 0.86 1.68	Range:	Range:	Range:	Range:	Range:	Range:
23. Max Pool Depth to Mean Riffle Depth	Mean: 2.14	Mean: 2.09	Mean: 1.95	Mean: 2.39	Mean: 2.50	Mean: 2.50	Mean: 3.27	Mean: 2.00	Mean: 2.92	Mean: 2.00
(dbkfp/dbkf)	Range: 1.77 2.51	Range: 1.91 2.26	Range: 1.55 2.35	Range: 1.58 3.20	Range:	Range:	Range:	Range:	Range:	Range:
Channel Pattern										
24. Stream Meander Length	Mean: 87.0	Mean: 87.0	Mean: 136.3	Mean:	Mean: 173.2	Mean: 212.8	Mean:	Mean: 183.3	Mean:	Mean: 183.3
(Lm)	Range: 57.0 117.0	Range: 57.0 117.0	Range: 69.2 197.7	Range:	Range: 168.0 175.8	Range: 193.5 232.2	Range:	Range:	Range:	Range:
25. Stream Meander Length Ratio	Mean: 11.5	Mean: 11.8	Mean: 10.4	Mean:	Mean: 8.7	Mean: 8.4	Mean:	Mean: 10.4	Mean:	Mean: 8.3
(Lm/Wbkf)	Range: 7.5 15.5	Range: 7.7 15.9	Range: 5.3 15.0	Range:	Range: 8.5 8.9	Range: 7.7 9.2	Range:	Range:	Range:	Range:
26. Radius of Curvature	Mean: 12.9	Mean: 11.7	Mean: 85.0	Mean:	Mean: 55.5	Mean: 82.7	Mean:	Mean: 116.8	Mean:	Mean: 72.5
(Rc)	Range: 7.6 17.3	Range: 45.0 80.0	Range: 41.0 132.0	Range:	Range: 32.0 80.0	Range: 68.0 95.0	Range:	Range: 45.0 296.0	Range:	Range: 50.0 95.0
27. Radius of Curvature to Riffle Width	Mean: 1.7	Mean: 3.4	Mean: 6.5	Mean:	Mean: 2.8	Mean: 3.3	Mean:	Mean: 6.6	Mean:	Mean: 3.3
(Rc/Wbkf)	Range: 1.0 2.3	Range: 6.1 10.9	Range: 3.1 10.0	Range:	Range: 1.6 4.0	Range: 2.7 3.8	Range:	Range: 2.6 16.8	Range:	Range: 2.3 4.3
28. Belt Width	Mean: 40.7	Mean: -	Mean: 22.3	Mean:	Mean: 40.0	Mean: 59.3	Mean:	Mean: 36.9	Mean:	Mean: 45.5
(Wblt)	Range: 31.8 49.6	Range: - -	Range: 19.8 28.7	Range:	Range: 29.6 52.7	Range: 32.2 86.5	Range:	Range: 33.9 40.9	Range:	Range:
29. Meander Width Ratio	Mean: 5.4	Mean: -	Mean: 1.7	Mean:	Mean: 2.0	Mean: 2.4	Mean:	Mean: 2.1	Mean:	Mean: 2.1
(Wblt/Wbkf)	Range: 4.2 6.6	Range: - -	Range: 1.5 2.2	Range:	Range: 1.5 2.7	Range:	Range:	Range: 1.9 2.3	Range:	Range: 0.0 0.0
30. Riffle Length	Mean: 12.1	Mean: 13.0	Mean: 10.8	Mean:	Mean: 56.3	Mean: 59.0	Mean:	Mean: 44.2	Mean:	Mean: 50.3
(Lr)	Range: 7.0 17.2	Range: 9.1 17.0	Range: 9.0 12.9	Range:	Range: 52.3 59.3	Range: 57.0 63.0	Range:	Range: 40.8 46.8	Range:	Range: 39.8 60.9
31. Riffle Length to Riffle Width	Mean: 1.6	Mean: 1.6	Mean: 0.8	Mean:	Mean: 2.8	Mean: 2.3	Mean:	Mean: 2.5	Mean:	Mean: 2.3
(Lr/Wbkf)	Range: 0.9 2.3	Range: 0.9 2.3	Range: 0.7 1.0	Range:	Range: 2.6 3.0	Range: 2.3 2.5	Range:	Range: 2.3 2.7	Range:	Range: 1.8 2.8
32. Individual Pool Length	Mean: 19.6	Mean: 18.6	Mean: 13.6	Mean:	Mean: 28.5	Mean: 55.7	Mean:	Mean: 36.6	Mean:	Mean: 36.0
(Lp)	Range: 10.1 33.1	Range: 6.8 32.4	Range: 6.9 29.3	Range:	Range: 26.2 30.0	Range: 31.6 69.4	Range:	Range: 34.6 40.8	Range:	Range: 32.2 39.8
33. Individual Pool Length to Riffle Width	Mean: 2.6	Mean: 1.5	Mean: 1.0	Mean:	Mean: 1.4	Mean: 2.2	Mean:	Mean: 2.1	Mean:	Mean: 1.6
(Lp/Wbkf)	Range: 1.3 4.4	Range: 0.9 4.4	Range: 0.5 2.2	Range:	Range: 1.3 1.5	Range: 1.3 2.8	Range:	Range: 2.0 2.3	Range:	Range: 1.5 1.8
34. Pool to Pool Spacing	Mean: 51.6	Mean: 11.1	Mean: 26.8	Mean:	Mean: 86.0	Mean: 106.6	Mean:	Mean: 80.9	Mean:	Mean: 57.4
(Ps)	Range: 30.5 69.3	Range: 25.2 36.4	Range: 20.7 34.4	Range:	Range: 80.5 88.2	Range: 87.6 126.4	Range:	Range: 76.2 85.9	Range:	Range:
35. Pool to Pool Spacing to Riffle Width	Mean: 6.8	Mean: 4.2	Mean: 2.0	Mean:	Mean: 4.3	Mean: 4.2	Mean:	Mean: 4.6	Mean:	Mean: 3.4
(Ps/Wbkf)	Range: 4.0 9.2	Range: 3.4 4.9	Range: 1.6 2.6	Range:	Range: 4.1 4.5	Range: 3.5 5.0	Range:	Range: 4.3 4.9	Range:	Range:
Channel Profile										
36. Valley Slope	Mean: 0.022	Mean: 0.020	Mean: 0.04	Mean: 0.039	Mean: 0.020	Mean: 0.010	Mean: 0.011	Mean: 0.024	Mean: 0.008	Mean: 0.024
(Svalley) [ft/ft]	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:
37. Average Water Surface Slope	Mean: 0.016	Mean: 0.018	Mean: 0.022	Mean: 0.033	Mean: 0.019	Mean: 0.009	Mean: 0.0065	Mean: 0.023	Mean: 0.0053	Mean: 0.023
(S)	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:
38. Sinuosity (k)	Mean: 1.36	Mean: 1.10	Mean: 1.12	Mean: 1.18	Mean: 1.04	Mean: 1.07	Mean: 1.66	Mean: 1.04	Mean: 1.49	Mean: 1.04
(Svalley/S)	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:	Range:

R2707D
CHANNEL RELOCATION
CLEVELAND COUNTY

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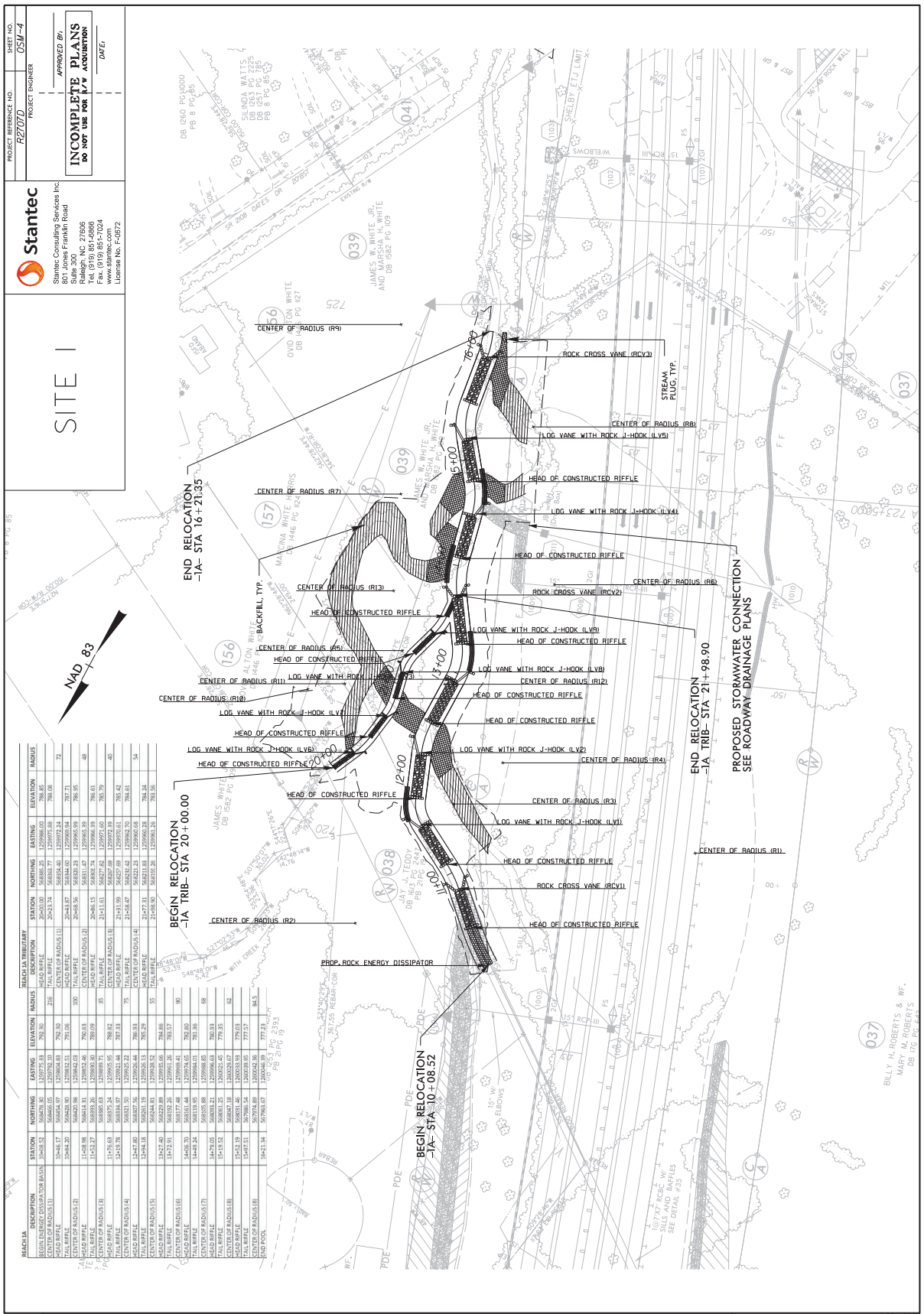
SUMMARY OF QUANTITIES

SECTION	QUANTITIY	UNIT	ITEM DESCRIPTION
225	1	LS	UNCLASSIFIED EXCAVATION (CUT)
SP, 226	1	LS	GRADING FOR STREAM RELOCATION
230	1	LS	BORROW EXCAVATION (FILL)
876	957	SY	GEOTEXTILE
876, 1042	213	TON	PLAIN RIP RAP, CLASS A
876, 1042	1,490	TON	PLAIN RIP RAP, CLASS 1
876, 1042	729	TON	PLAIN RIP RAP, CLASS 2
876, 1042	10	TON	PLAIN RIP RAP, CLASS B
1005	576	TON	#57 STONE
1060, 14	7241	SY	COIR FIBER MATTING
1060	4.8	AC	STREAMBANK REFORESTATION
SP	20	EA	LOGS
SP	629	LF	WOOD TOE
SP	719	TON	BOULDER
SP	1488	CY	IMPERVIOUS SELECT MATERIAL

SUMMARY OF APPROXIMATE EARTHWORK FOR STREAM RELOCATION

LOCATION	RELOCATION UNCLASSIFIED EXCAV. (CU.YD.)	RELOCATION EMBANKMENT	RELOCATION BORROW (CU.YD.)	RELOCATION WASTE (CU.YD.)
1A COMBINED	2339	1928		411
1B COMBINED	2253	864		1389
2ABC COMBINED	7272	11266	3994	

APPROXIMATE QUANTITIES ONLY, RELOCATION UNCLASSIFIED EXCAVATION, RELOCATION BORROW EXCAVATION, RELOCATION FINE GRADING AND RELOCATION CLEARING AND GRUBBING WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR "GRADING FOR RELOCATION".



DESCRIPTION	STATION	NORTHING	EASTING	ELEVATION	RADIUS
BEGIN RELOCATION -1A TRIB- STA 20+00.00	20+00.00	568180.32	1259782.31	792.760	
TAIL RIFFLE	20+23.74	568180.77	1259775.88	792.68	
CENTER OF RADIUS (1)		568154.40	1259772.24		72
HEAD RIFFLE	20+43.87	568144.60	1259769.64	787.71	
TAIL RIFFLE	20+68.56	568130.23	1259765.99	786.95	
CENTER OF RADIUS (2)		568121.46	1259763.59		48
HEAD RIFFLE	20+86.15	568102.74	1259766.39	786.61	
TAIL RIFFLE	21+11.61	568077.82	1259771.60	785.79	
CENTER OF RADIUS (3)		568067.69	1259772.89		40
HEAD RIFFLE	21+31.99	568057.69	1259770.61	785.42	
TAIL RIFFLE	21+58.42	568033.23	1259770.73	784.61	
CENTER OF RADIUS (4)		568021.23	1259767.08		54
HEAD RIFFLE	21+77.31	568011.83	1259760.28	784.24	
TAIL RIFFLE	21+98.90	568010.20	1259761.26	783.56	
BEGIN RELOCATION -1A- STA 10+08.52	10+08.52	568244.81	1259928.52		
HEAD RIFFLE	10+22.40	568229.89	1259935.06	784.89	
TAIL RIFFLE	10+72.93	568181.36	1259950.36	784.37	
CENTER OF RADIUS (6)		568177.48	1259969.41		90
HEAD RIFFLE	14+05.70	568151.44	1259974.65	782.80	
TAIL RIFFLE	14+49.24	568119.95	1259984.01	781.36	
CENTER OF RADIUS (7)		568105.88	1259986.65		68
HEAD RIFFLE	14+79.05	568090.83	1259988.68	780.93	
TAIL RIFFLE	15+15.52	568061.25	1260021.45	779.35	
CENTER OF RADIUS (8)		568047.18	1260029.67		62
HEAD RIFFLE	15+43.19	568031.46	1260038.59	779.03	
TAIL RIFFLE	15+91.51	567980.34	1260039.95	777.37	
CENTER OF RADIUS (9)		567974.38	1260042.36		84.5
END POOL	16+21.34	567963.67	1260046.39	777.23	

DESCRIPTION	STATION	NORTHING	EASTING	ELEVATION	RADIUS
HEAD RIFFLE	20+00.00	568180.32	1259782.31	792.760	
TAIL RIFFLE	20+23.74	568180.77	1259775.88	792.68	
CENTER OF RADIUS (1)		568154.40	1259772.24		72
HEAD RIFFLE	20+43.87	568144.60	1259769.64	787.71	
TAIL RIFFLE	20+68.56	568130.23	1259765.99	786.95	
CENTER OF RADIUS (2)		568121.46	1259763.59		48
HEAD RIFFLE	20+86.15	568102.74	1259766.39	786.61	
TAIL RIFFLE	21+11.61	568077.82	1259771.60	785.79	
CENTER OF RADIUS (3)		568067.69	1259772.89		40
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TAIL RIFFLE	21+58.42	568033.23	1259770.73	784.61	
CENTER OF RADIUS (4)		568021.23	1259767.08		54
HEAD RIFFLE	21+77.31	568011.83	1259760.28	784.24	
TAIL RIFFLE	21+98.90	568010.20	1259761.26	783.56	
BEGIN RELOCATION -1A- STA 10+08.52	10+08.52	568244.81	1259928.52		
HEAD RIFFLE	10+22.40	568229.89	1259935.06	784.89	
TAIL RIFFLE	10+72.93	568181.36	1259950.36	784.37	
CENTER OF RADIUS (6)		568177.48	1259969.41		90
HEAD RIFFLE	14+05.70	568151.44	1259974.65	782.80	
TAIL RIFFLE	14+49.24	568119.95	1259984.01	781.36	
CENTER OF RADIUS (7)		568105.88	1259986.65		68
HEAD RIFFLE	14+79.05	568090.83	1259988.68	780.93	
TAIL RIFFLE	15+15.52	568061.25	1260021.45	779.35	
CENTER OF RADIUS (8)		568047.18	1260029.67		62
HEAD RIFFLE	15+43.19	568031.46	1260038.59	779.03	
TAIL RIFFLE	15+91.51	567980.34	1260039.95	777.37	
CENTER OF RADIUS (9)		567974.38	1260042.36		84.5
END POOL	16+21.34	567963.67	1260046.39	777.23	

REVISIONS

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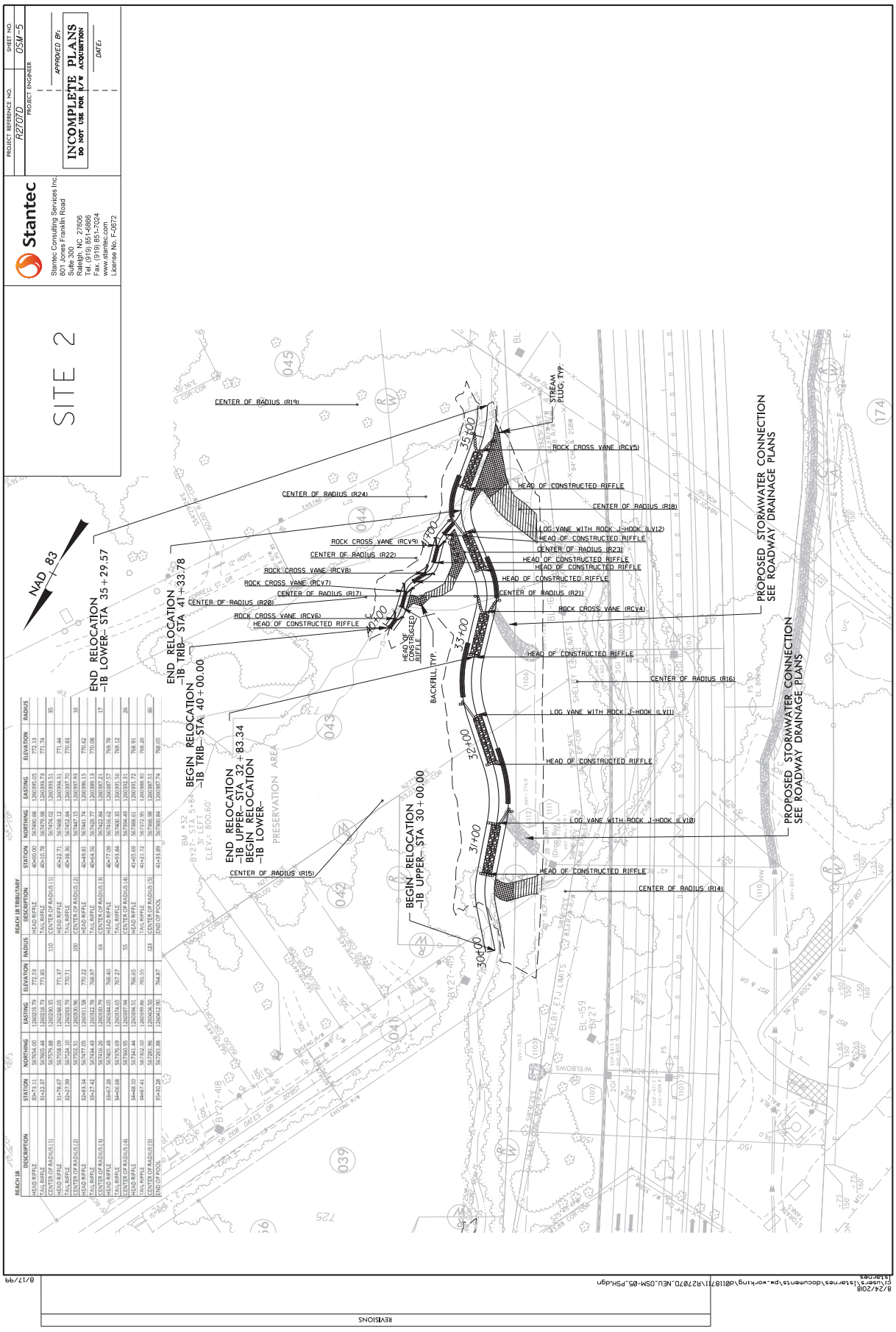

REACH 1B	STATION	NORTHING	EASTING	ELEVATION	RADIUS	REACH 1B TRIBUTARY	STATION	NORTHING	EASTING	ELEVATION	RADIUS
HEAD RIFFLE	35+73.10	567470.10	1260318.15	773.13		HEAD RIFFLE	40+00.00	567480.38	1260393.05	771.73	
TAIL RIFFLE	31+22.87	567605.44	1260218.73	771.85		TAIL RIFFLE	40+10.79	567479.98	1260393.73	771.74	
CENTER OF RADIUS (1)		567579.88	1260283.55		110	CENTER OF RADIUS (11)		567474.02	1260393.51		85
HEAD RIFFLE	31+78.67	567568.09	1260268.05	771.97		HEAD RIFFLE	40+24.71	567468.12	1260394.31	771.44	
TAIL RIFFLE	32+27.99	567524.10	1260283.79	770.71		TAIL RIFFLE	40+38.86	567452.34	1260397.70	770.83	
CENTER OF RADIUS (2)		567524.35	1260283.96		100	CENTER OF RADIUS (12)		567452.35	1260397.88		16
HEAD RIFFLE	32+83.34	567477.05	1260311.58	770.22		HEAD RIFFLE	40+49.81	567441.74	1260398.15	770.62	
TAIL RIFFLE	33+27.42	567434.43	1260342.78	768.97		TAIL RIFFLE	40+64.56	567428.77	1260399.13	770.08	
CENTER OF RADIUS (3)		567416.35	1260330.79		68	CENTER OF RADIUS (13)		567422.84	1260387.21		17
HEAD RIFFLE	33+67.28	567402.49	1260340.05	768.40		HEAD RIFFLE	40+77.09	567416.62	1260381.57	769.78	
TAIL RIFFLE	34+06.68	567381.68	1260367.65	767.27		TAIL RIFFLE	40+90.84	567403.35	1260382.55	769.12	
CENTER OF RADIUS (4)		567360.95	1260387.94		35	CENTER OF RADIUS (14)		567394.49	1260392.31		26
HEAD RIFFLE	34+48.10	567341.44	1260394.51	766.65		HEAD RIFFLE	41+05.69	567388.61	1260391.72	768.91	
TAIL RIFFLE	34+67.41	567322.50	1260399.86	765.55		TAIL RIFFLE	41+21.72	567372.95	1260386.90	768.20	
CENTER OF RADIUS (5)		567281.96	1260424.30		123	CENTER OF RADIUS (15)		567366.38	1260387.23		86
END OF ROW	35+01.28	567261.88	1260441.67	764.87		END OF ROW	41+33.80	567366.44	1260387.24	768.05	

REVISIONS

8/24/2018
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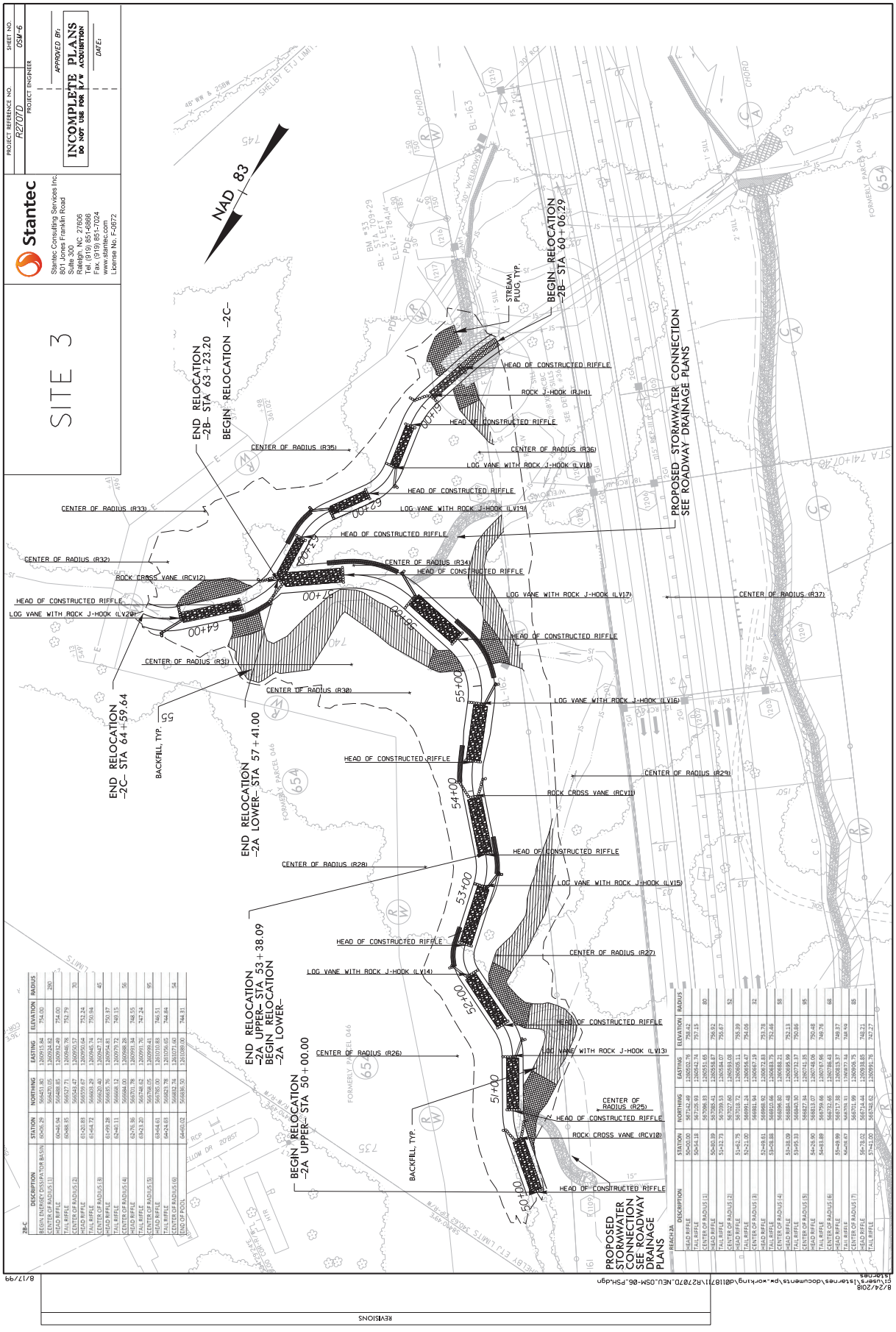
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Stantec
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PROJECT ENGINEER
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NAD 83
BEGIN RELOCATION -2B- STA 60+06.29
END RELOCATION -2B- STA 63+23.20
BEGIN RELOCATION -2C-
END RELOCATION -2C- STA 64+59.64
BACKFILL, TYP.
END RELOCATION -2A LOWER- STA 57+41.00
BEGIN RELOCATION -2A UPPER- STA 53+38.09
END RELOCATION -2A UPPER- STA 50+00.00
BEGIN RELOCATION -2A LOWER-
PROPOSED STORMWATER CONNECTION SEE ROADWAY DRAINAGE PLANS
STREAM PLUG, TYP.
HEAD OF CONSTRUCTED RIFFLE
ROCK J-HOOK (RJH1)
LOG VANE WITH ROCK J-HOOK (LV18)
LOG VANE WITH ROCK J-HOOK (LV19)
ROCK CROSS VANE (RCV12)
LOG VANE WITH ROCK J-HOOK (LV20)
LOG VANE WITH ROCK J-HOOK (LV17)
LOG VANE WITH ROCK J-HOOK (LV16)
ROCK CROSS VANE (RCV11)
LOG VANE WITH ROCK J-HOOK (LV15)
LOG VANE WITH ROCK J-HOOK (LV14)
LOG VANE WITH ROCK J-HOOK (LV13)
ROCK CROSS VANE (RCV10)
CENTER OF RADIUS (R25)
CENTER OF RADIUS (R26)
CENTER OF RADIUS (R27)
CENTER OF RADIUS (R28)
CENTER OF RADIUS (R29)
CENTER OF RADIUS (R30)
CENTER OF RADIUS (R31)
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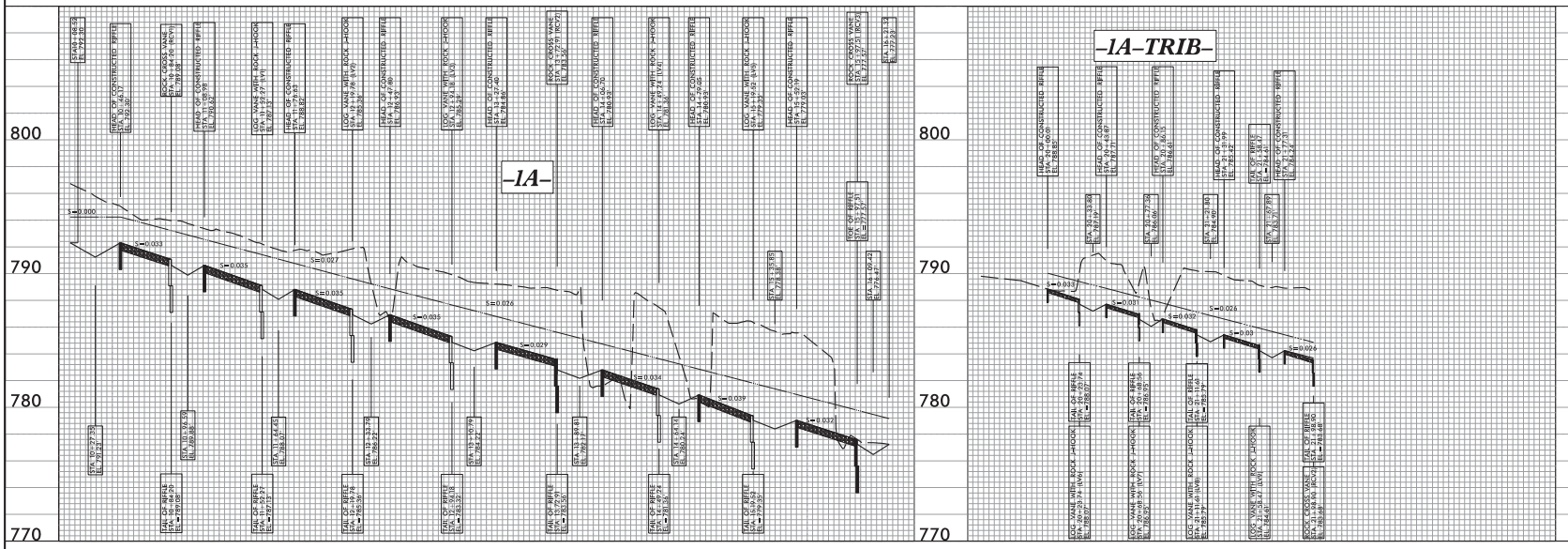

LEGEND

EXISTING GROUND ELEVATION

PROPOSED GROUND ELEVATION

PROPOSED BANKFULL

ROCK J-HOOK VANE

ROCK CROSS VANE

CONSTRUCTED RIFFLE

LOG VANE WITH ROCK J-HOOK

SITE 2
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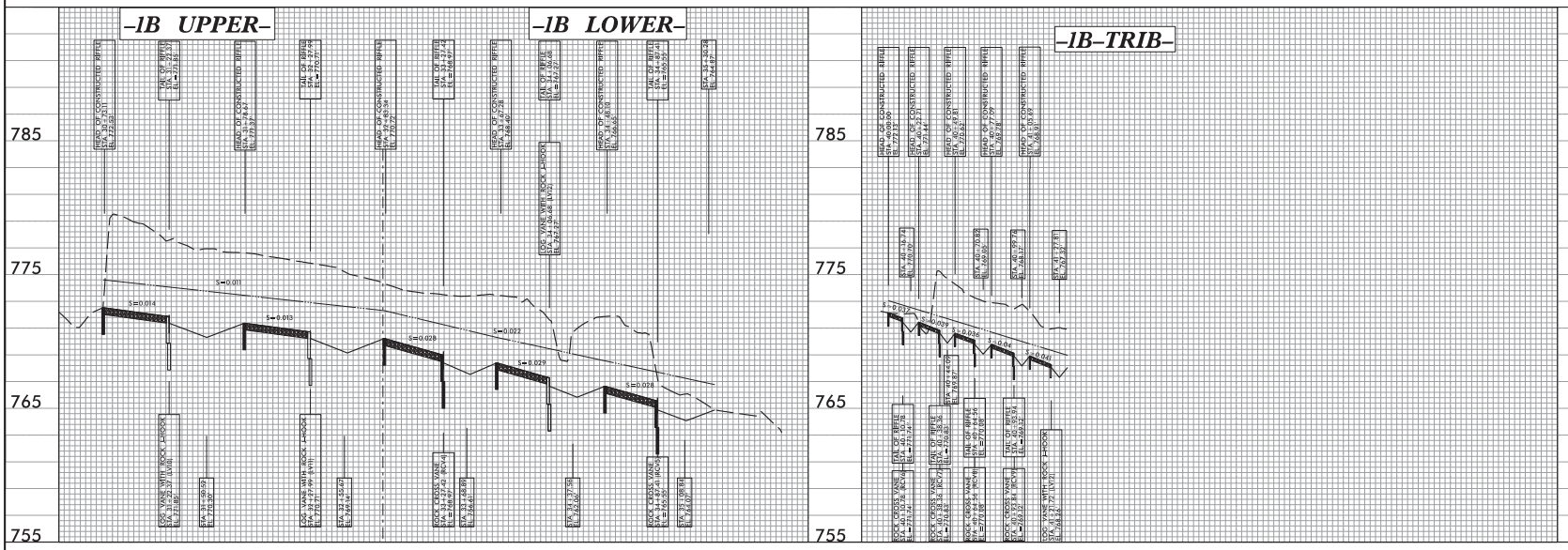
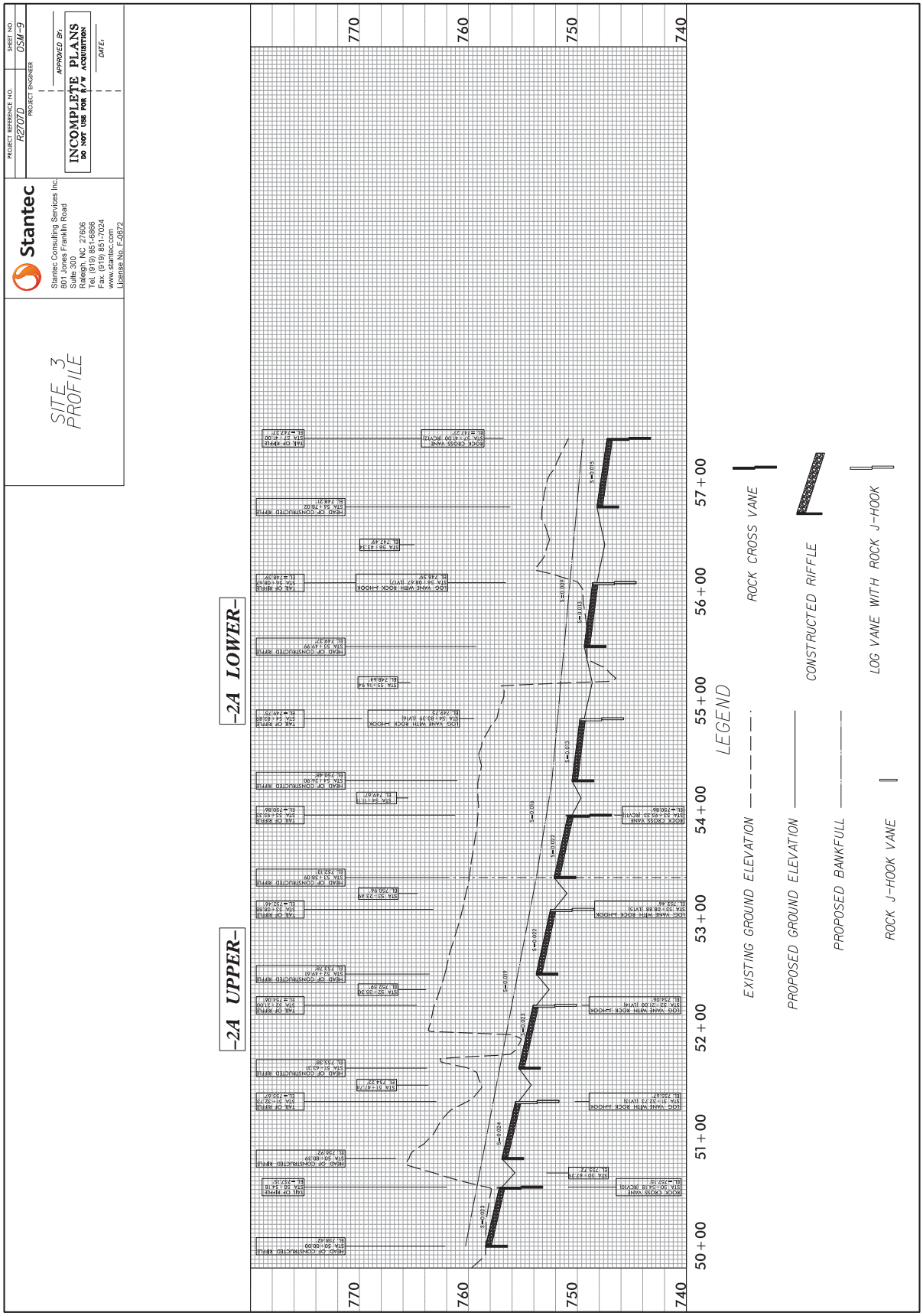


LEGEND

EXISTING GROUND ELEVATION
PROPOSED GROUND ELEVATION
PROPOSED BANKFULL
ROCK J-HOOK VANE
ROCK CROSS VANE
CONSTRUCTED RIFFLE
LOG VANE WITH ROCK J-HOOK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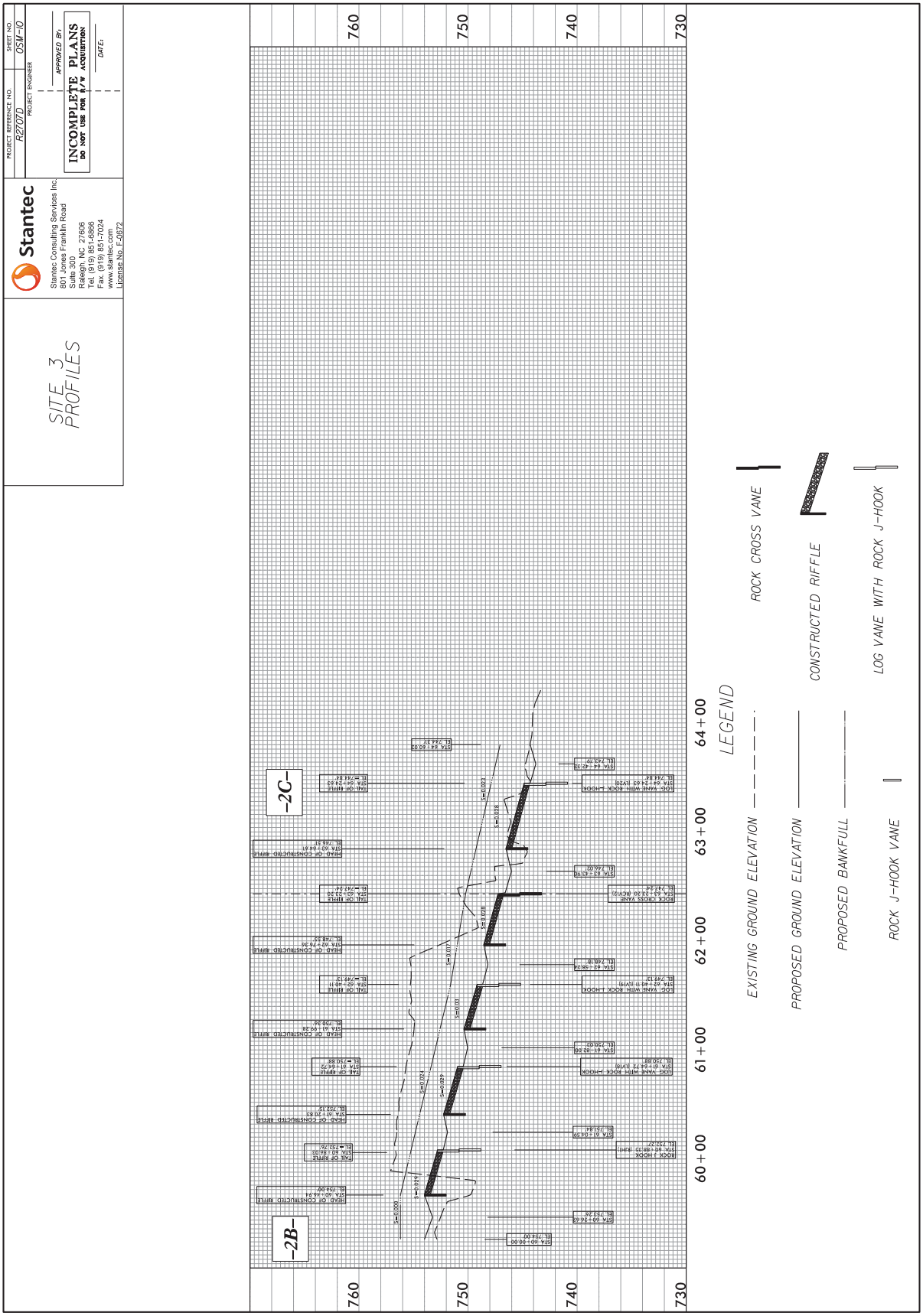
DO NOT USE FOR R/W ACQUISITION
-2A UPPER-
-2A LOWER-
770
760
750
740
50+00
51+00
52+00
53+00
54+00
55+00
56+00
57+00
LEGEND
EXISTING GROUND ELEVATION
PROPOSED GROUND ELEVATION
PROPOSED BANKFULL
ROCK J-HOOK VANE
ROCK CROSS VANE
CONSTRUCTED RIFFLE
LOG VANE WITH ROCK J-HOOK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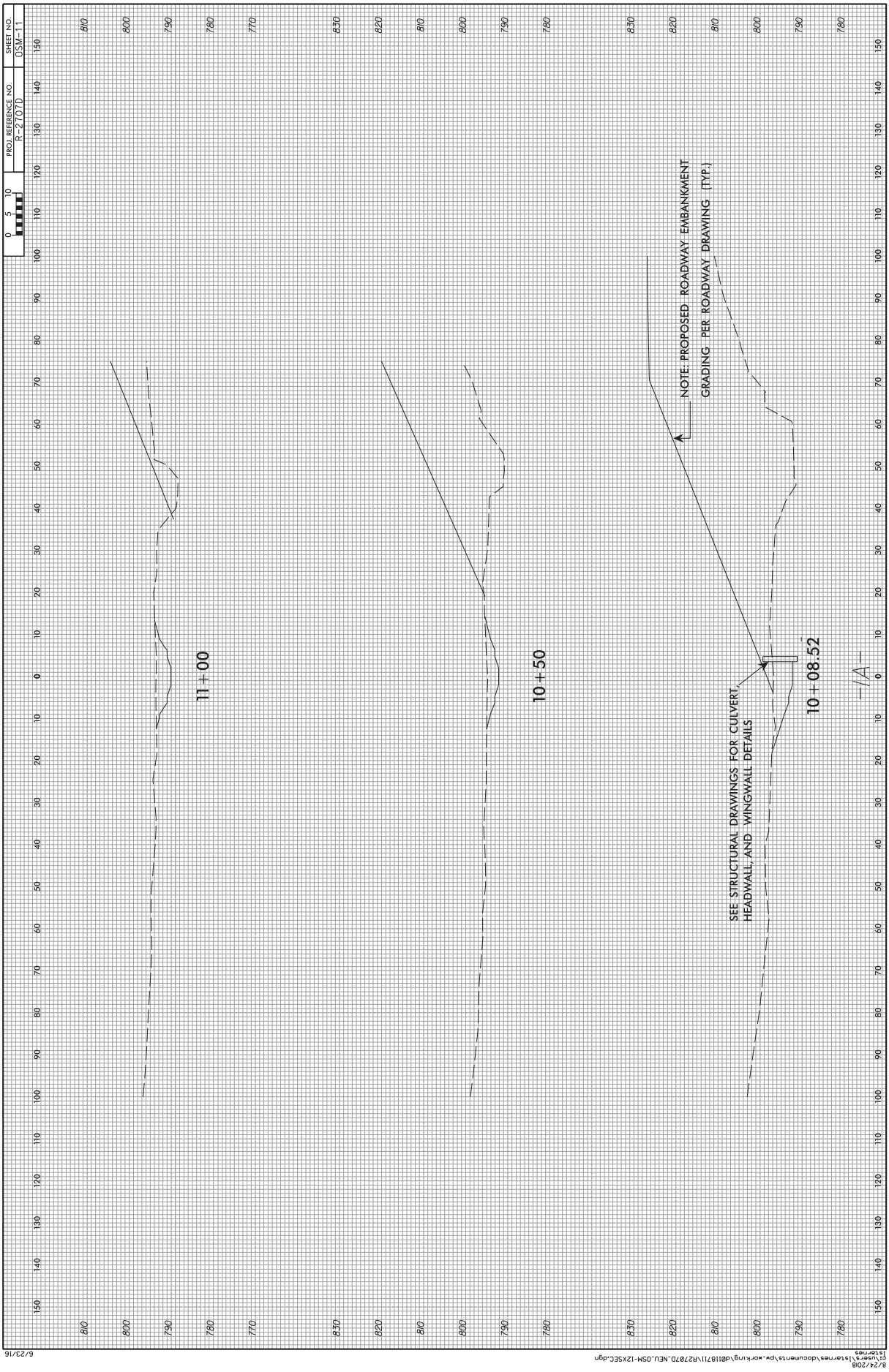
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
-2B-
-2C-
760
750
740
730
60+00
61+00
62+00
63+00
64+00
LEGEND
EXISTING GROUND ELEVATION
PROPOSED GROUND ELEVATION
PROPOSED BANKFULL
ROCK J-HOOK VANE
ROCK CROSS VANE
CONSTRUCTED RIFFLE
LOG VANE WITH ROCK J-HOOK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R-27070
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11+00
10+50
10+08.52
NOTE: PROPOSED ROADWAY EMBANKMENT GRADING PER ROADWAY DRAWING (TYP.)
SEE STRUCTURAL DRAWINGS FOR CULVERT, HEADWALL, AND WINGWALL DETAILS
A
A
8/24/2018
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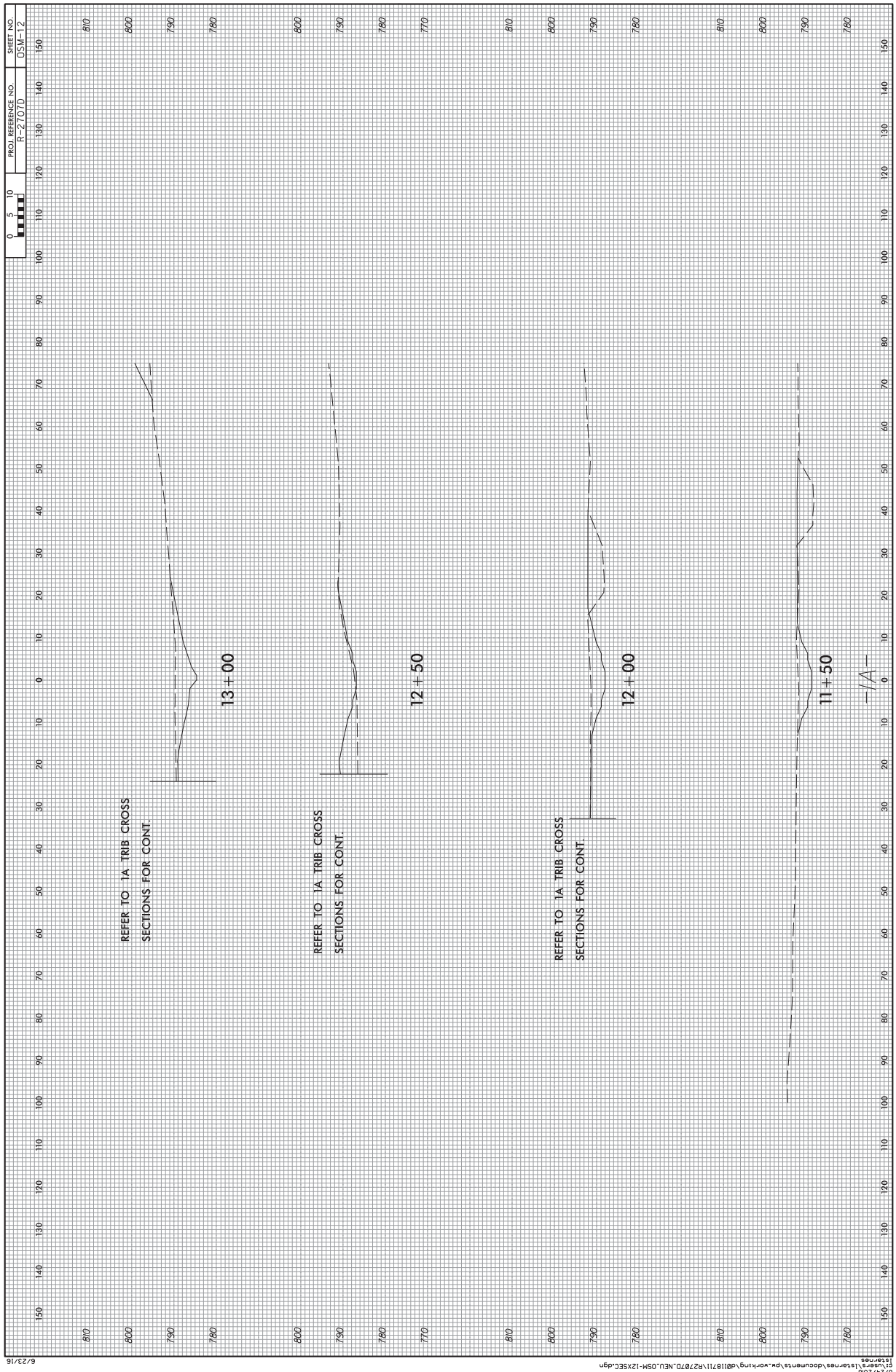
1staarnes
6/23/16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REFER TO 1A TRIB CROSS
SECTIONS FOR CONT.
12+50
REFER TO 1A TRIB CROSS
SECTIONS FOR CONT.
12+00
11+50
6/23/16
8/24/2018
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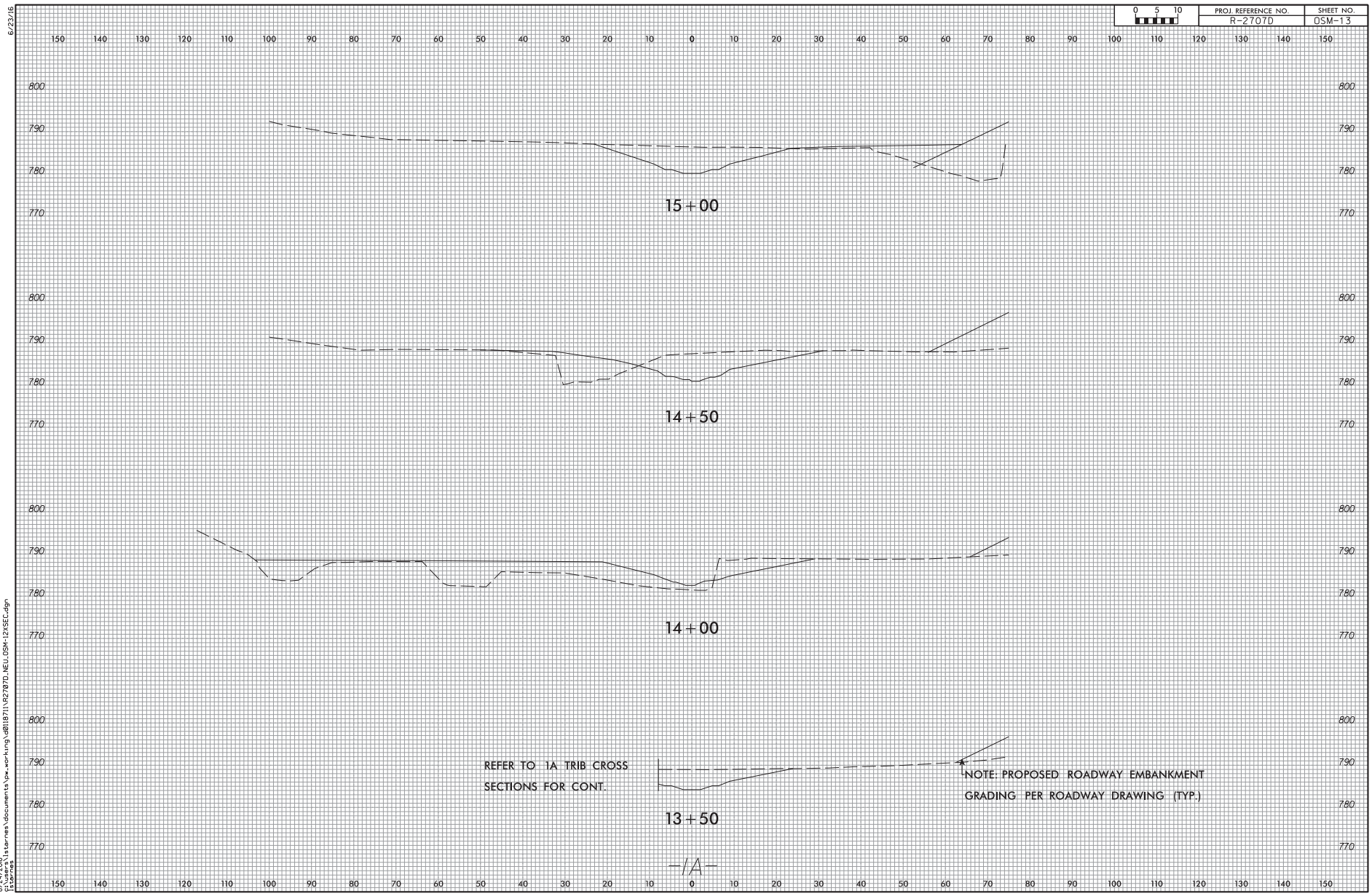
tarnas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800
790
780
770
15+00
14+50
14+00
13+50
REFER TO 1A TRIB CROSS SECTIONS FOR CONT.
NOTE: PROPOSED ROADWAY EMBANKMENT GRADING PER ROADWAY DRAWING (TYP.)
-/A-
6/23/16
8/24/2018
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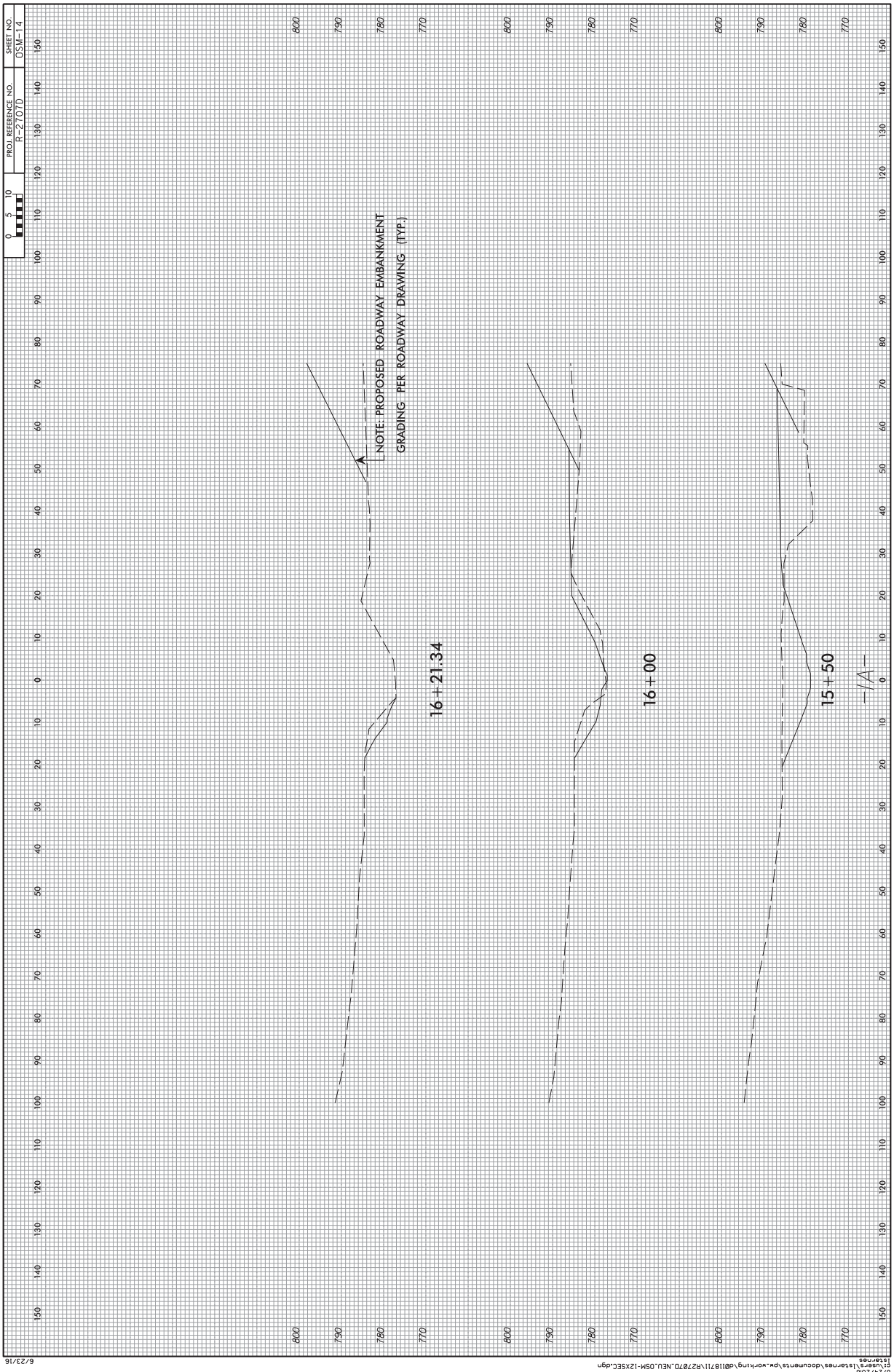
P-43



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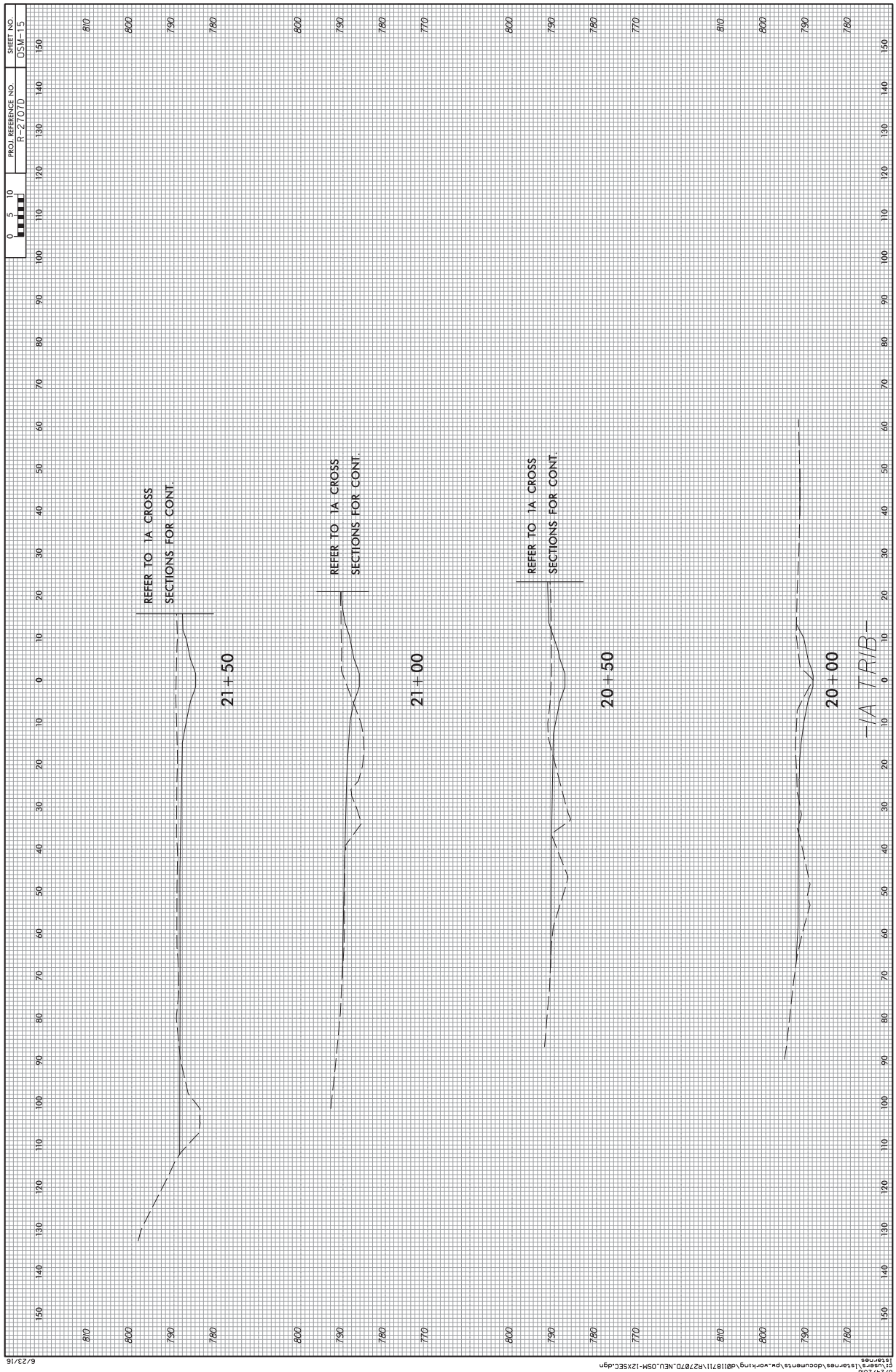
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21+50
REFER TO 1A CROSS
SECTIONS FOR CONT.
21+00
REFER TO 1A CROSS
SECTIONS FOR CONT.
20+50
20+00
-1A TRIB-
6/23/16
8/24/2018
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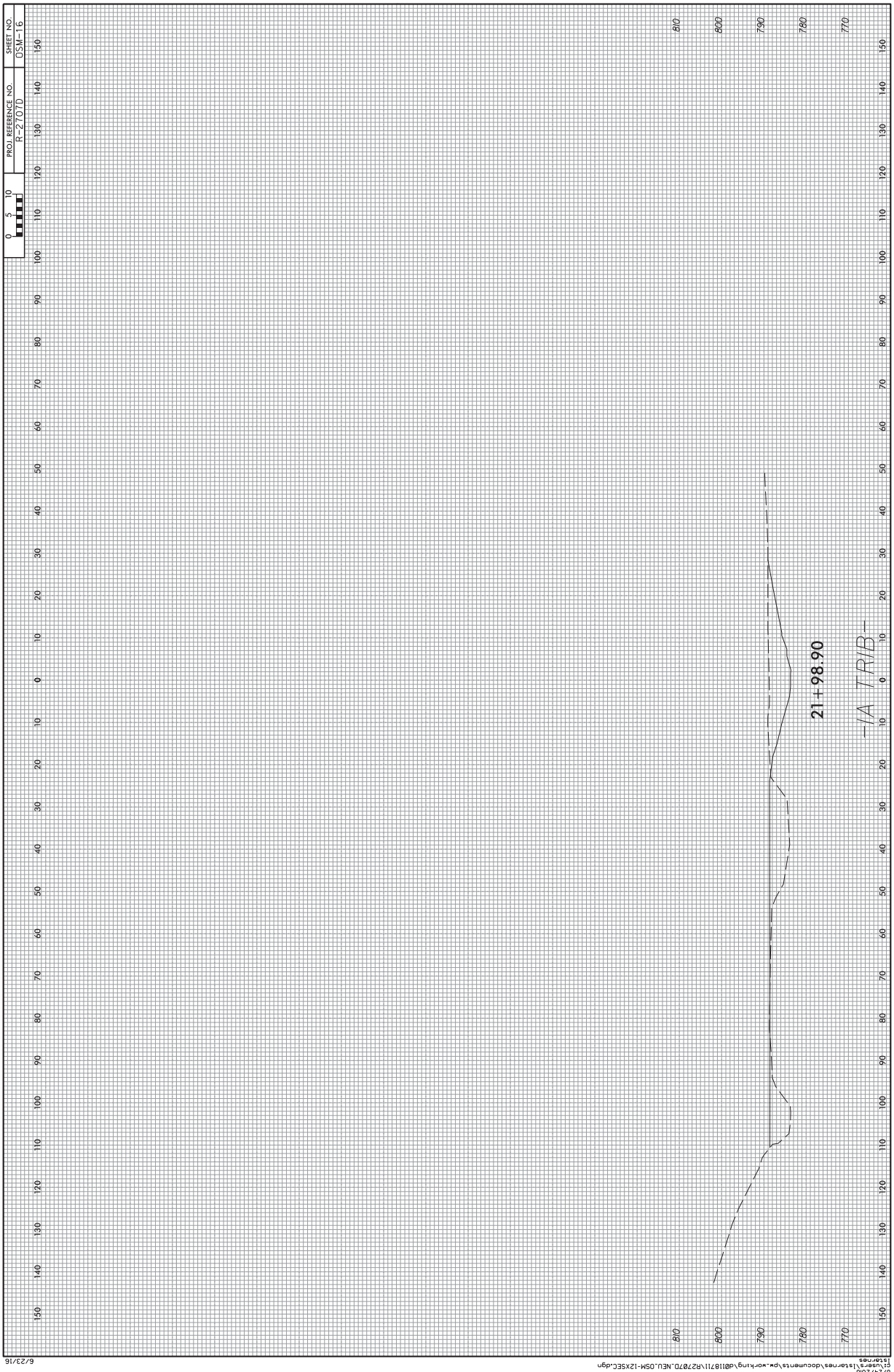

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8/24/2018
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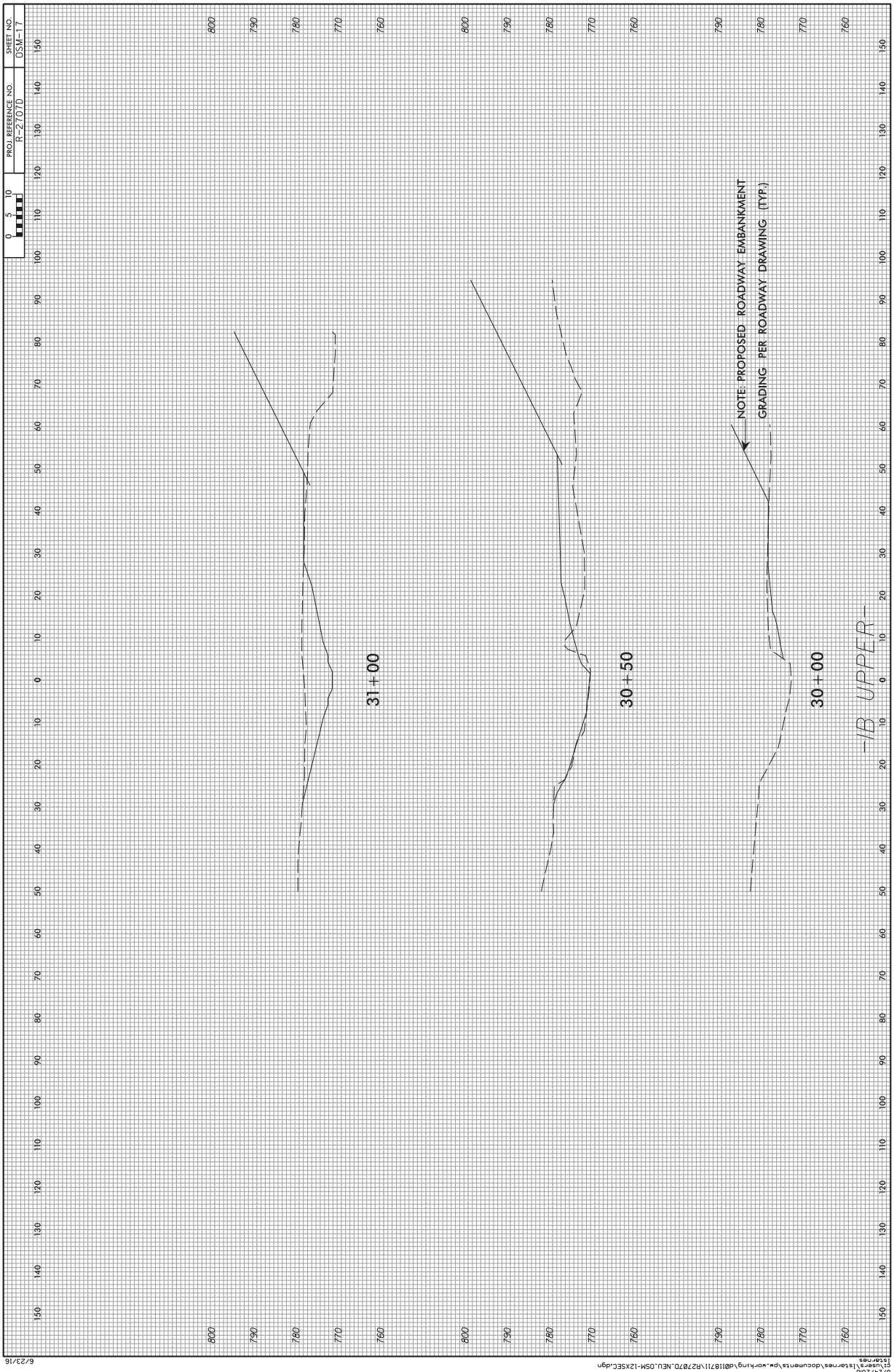

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8/24/2018
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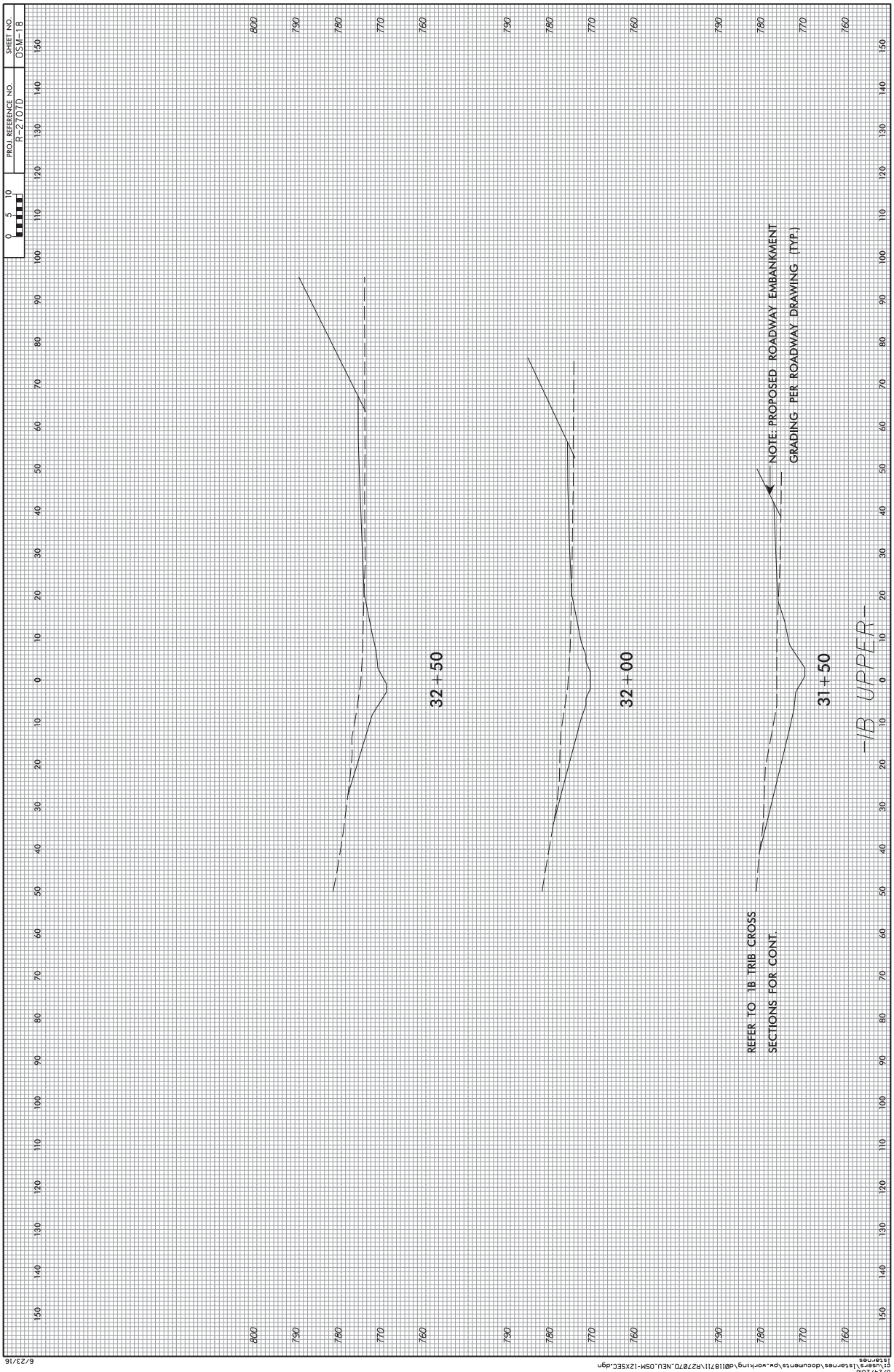
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OSM-18
PROJ. REFERENCE NO.
R-2707D
0 5 10
32+50
32+00
31+50
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NOTE: PROPOSED ROADWAY EMBANKMENT
GRADING PER ROADWAY DRAWING (TYP.)
REFER TO 1B TRIB CROSS
SECTIONS FOR CONT.
6/23/16
8/24/2018
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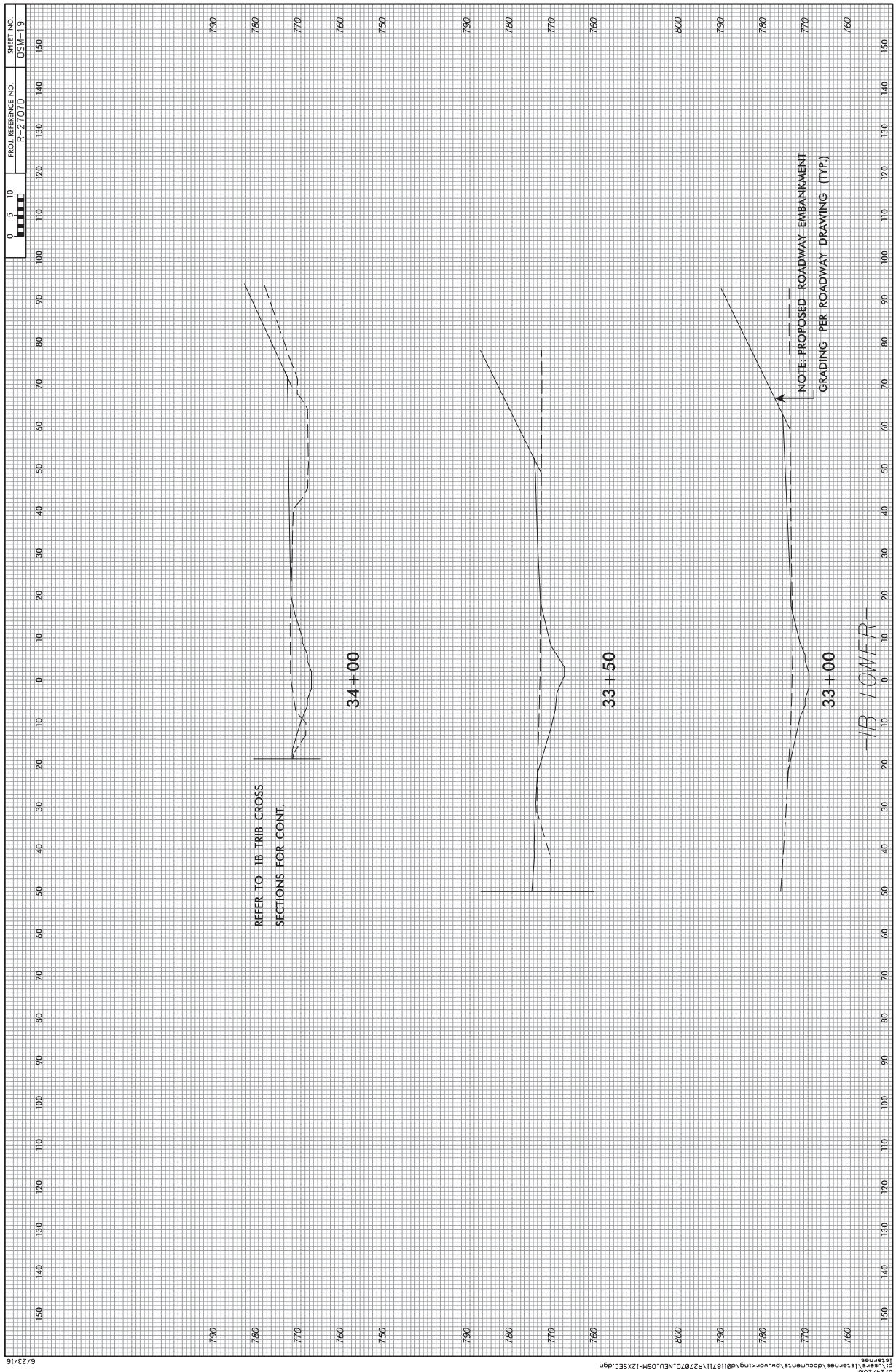
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34+00
33+50
33+00
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REFER TO 1B TRIB. CROSS
SECTIONS FOR CONT.
NOTE: PROPOSED ROADWAY EMBANKMENT
GRADING PER ROADWAY DRAWING (TYP.)
6/23/16
8/24/2018
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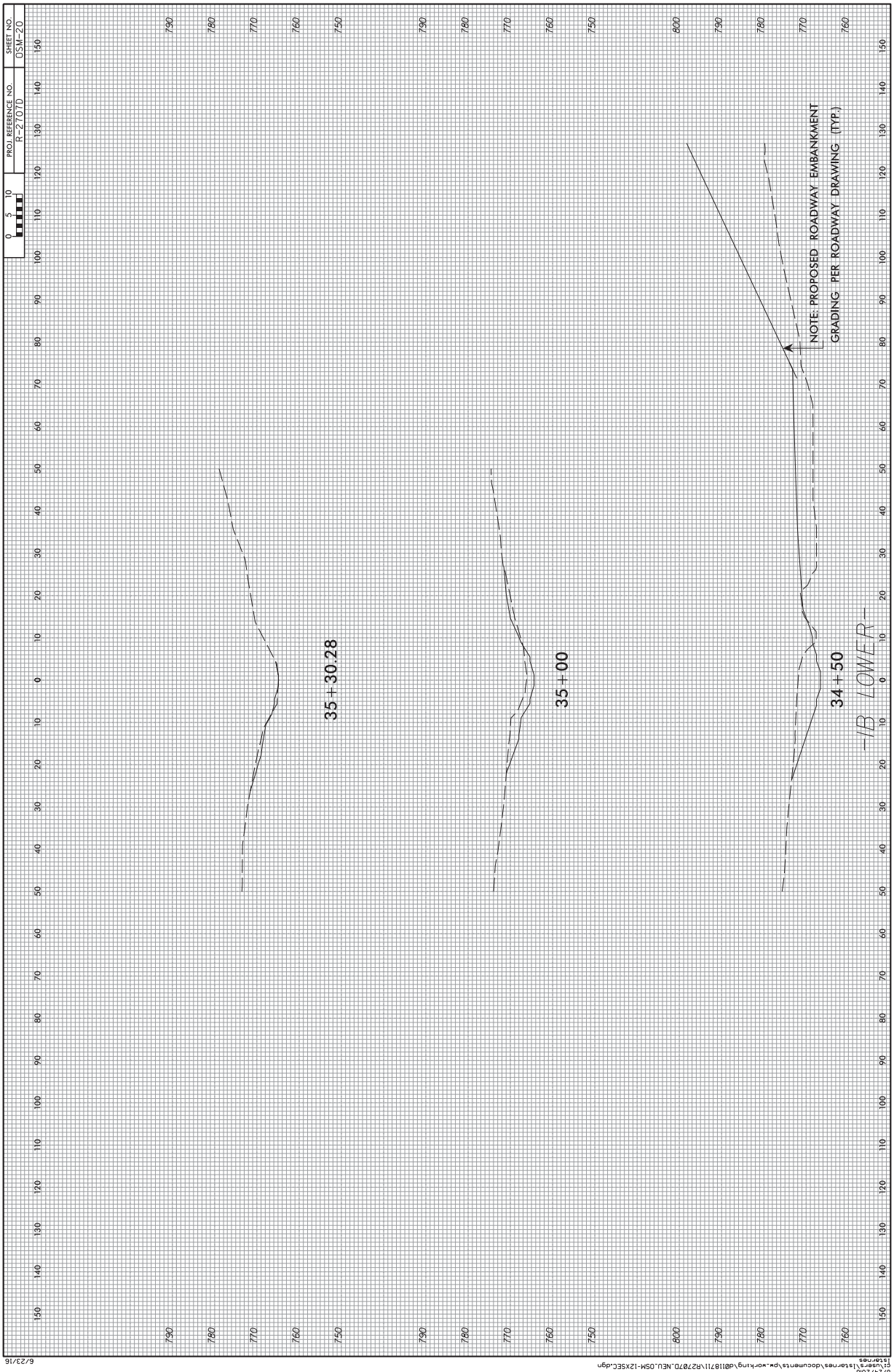
P-50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OSM-20
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35+30.28
35+00
34+50
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NOTE: PROPOSED ROADWAY EMBANKMENT
GRADING PER ROADWAY DRAWING (TYP.)
6/23/16
8/24/2018
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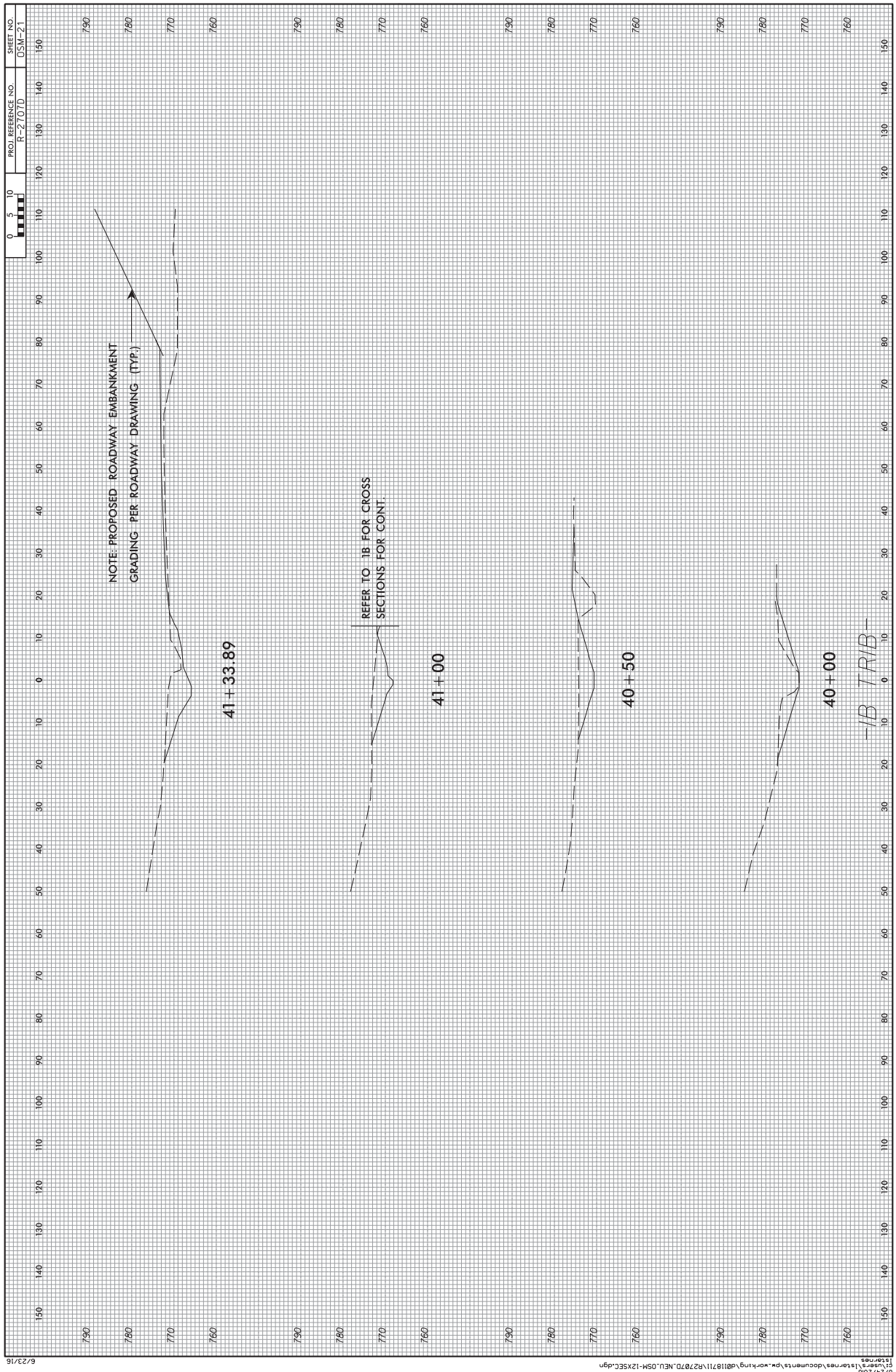

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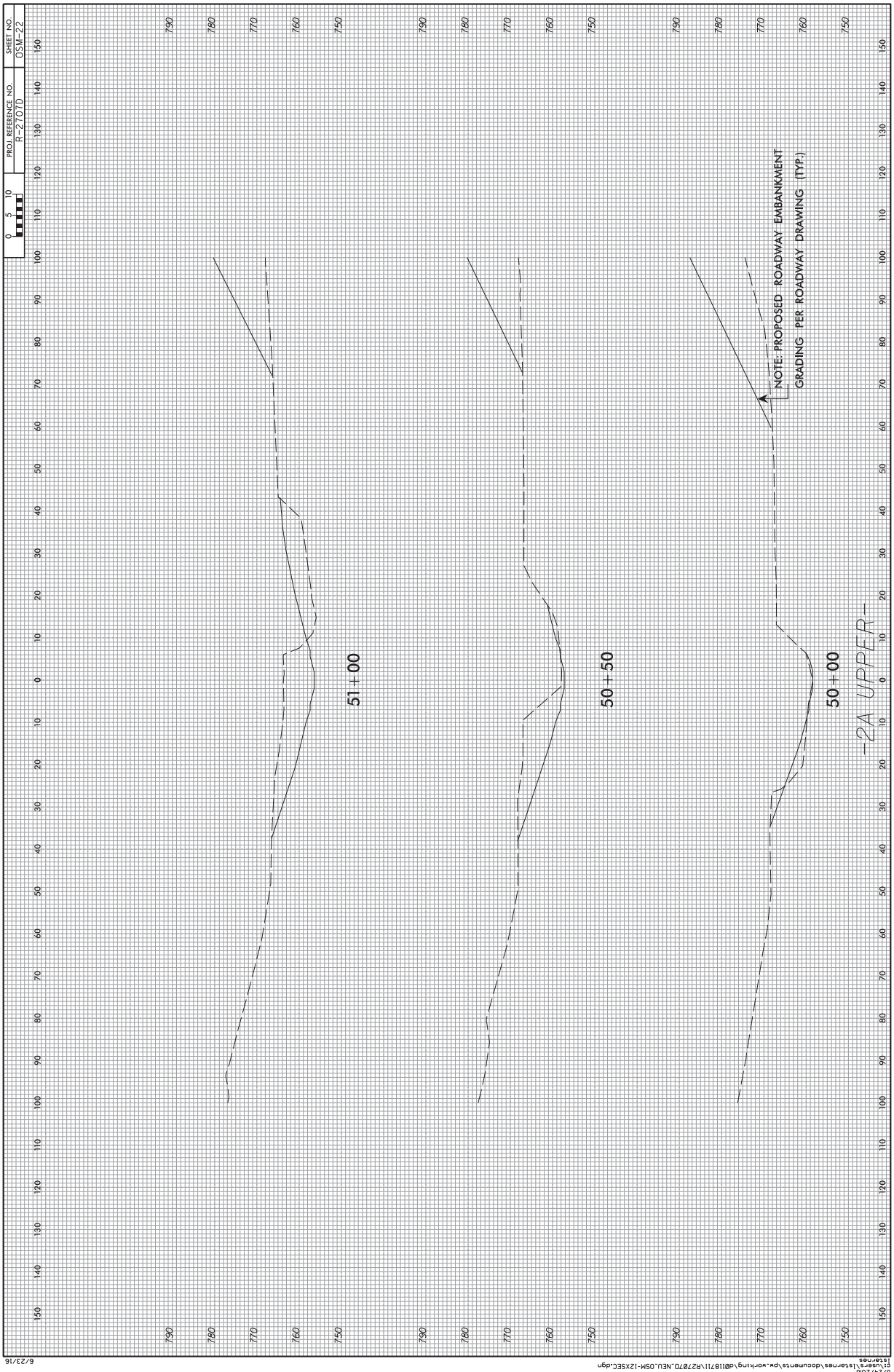
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R-2707D
0 5 10
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GRADING PER ROADWAY DRAWING (TYP.)
51+00
50+50
50+00
-2A UPPER-
6/23/16
8/24/2018
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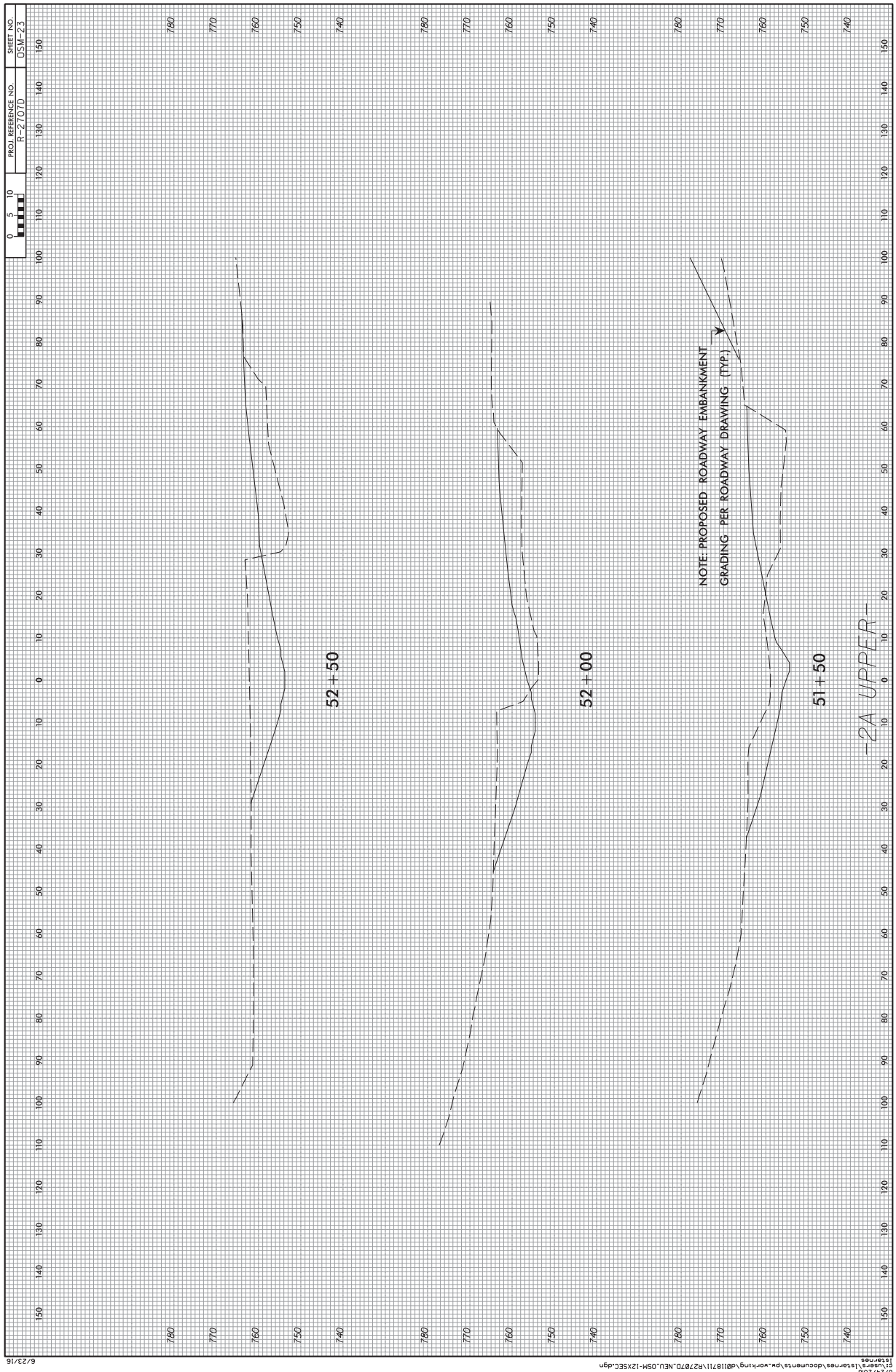
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OSM-23
PROJ. REFERENCE NO.
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52+50
52+00
51+50
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GRADING PER ROADWAY DRAWING (TYP.)
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8/24/2018
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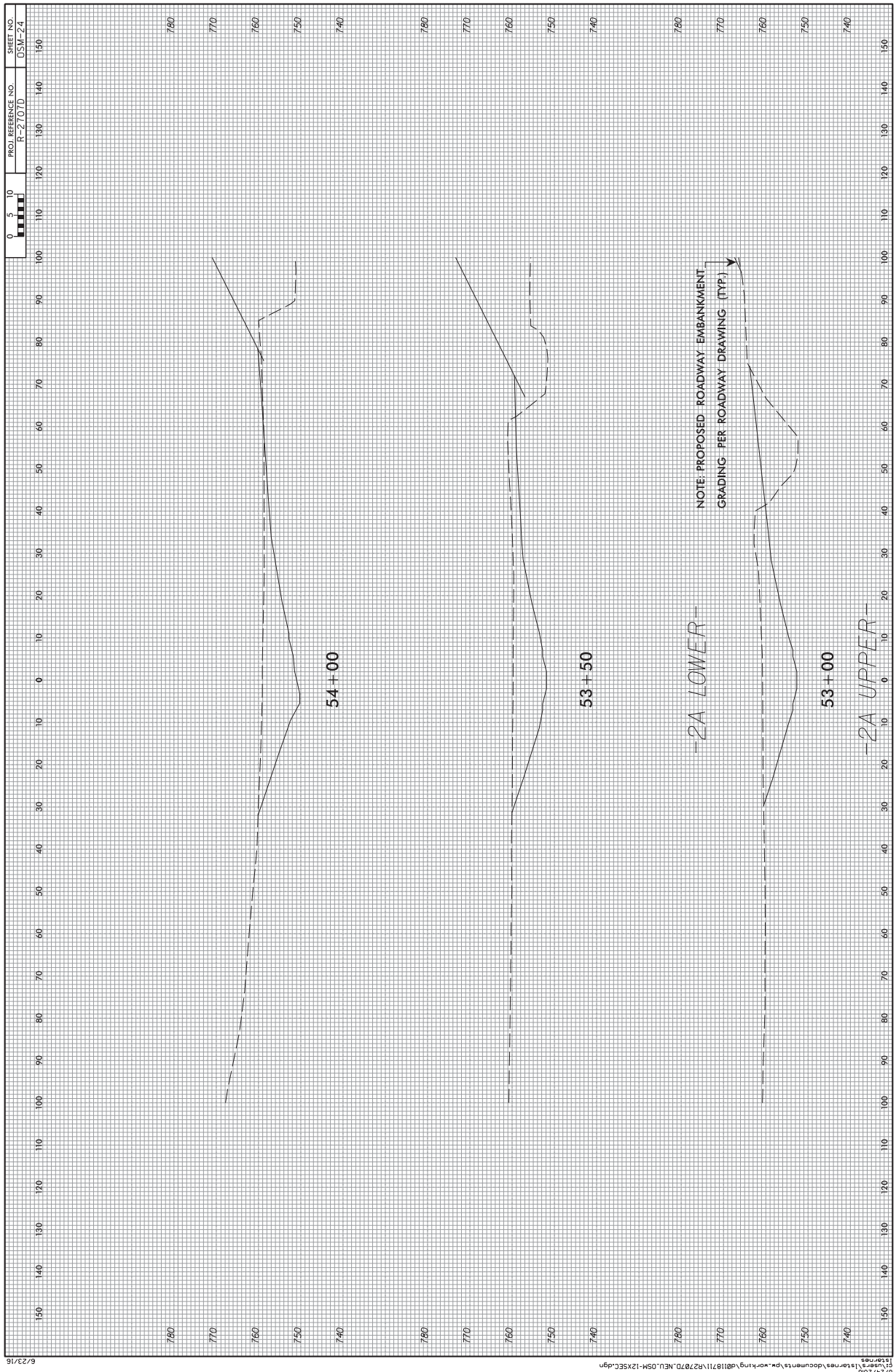
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NOTE: PROPOSED ROADWAY EMBANKMENT
GRADING PER ROADWAY DRAWING (TYP.)
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-2A UPPER-
54+00
53+50
53+00
780
770
760
750
740
6/23/16
8/24/2018
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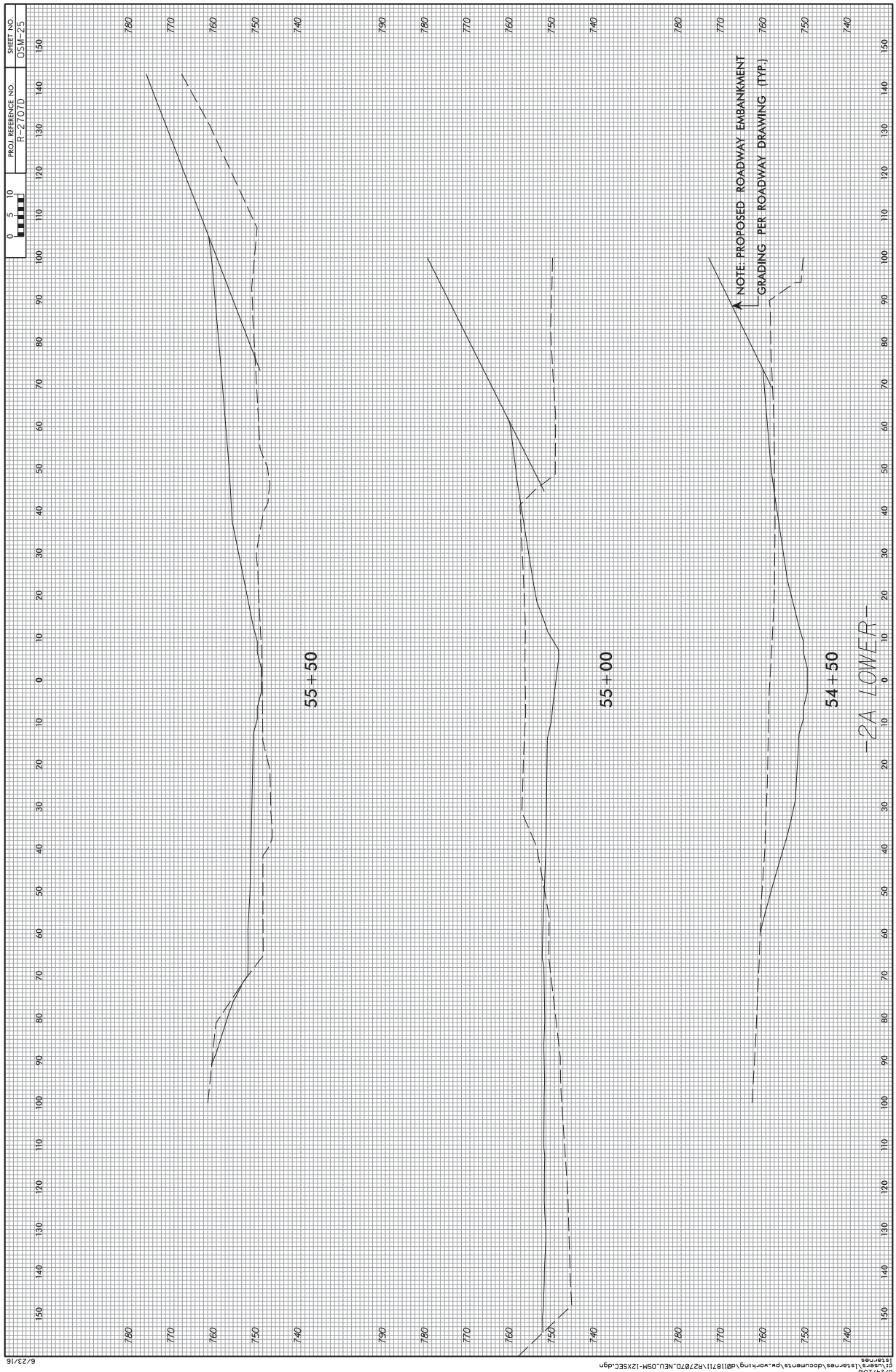
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PROJ. REFERENCE NO.
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55+50
55+00
54+50
-2A LOWER-
NOTE: PROPOSED ROADWAY EMBANKMENT
GRADING PER ROADWAY DRAWING (TYP.)
6/23/16
8/24/2018
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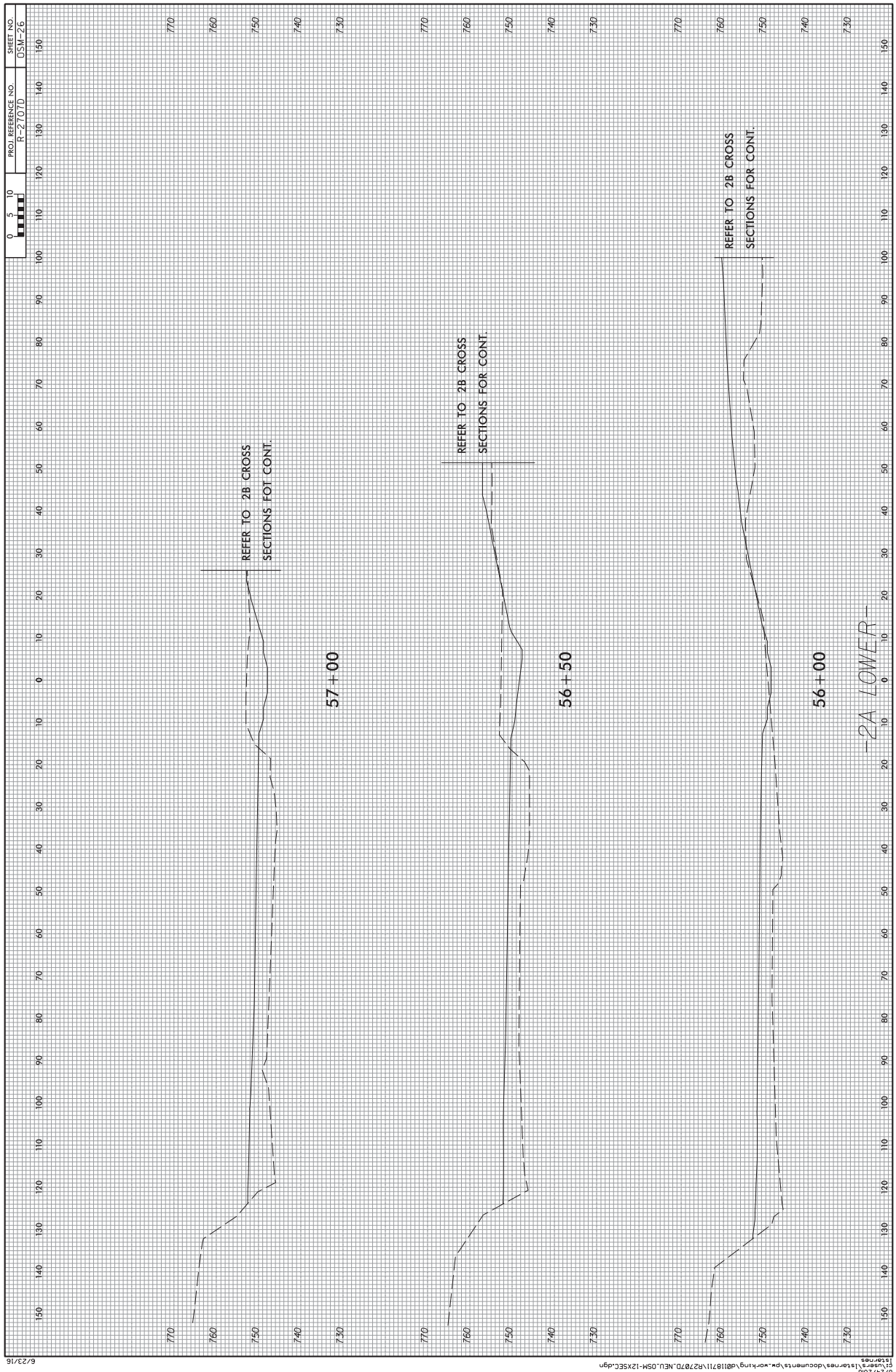
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57+00
REFER TO 2B CROSS SECTIONS FOR CONT.
56+50
REFER TO 2B CROSS SECTIONS FOR CONT.
56+00
-2A LOWER-
6/23/16
8/24/2018
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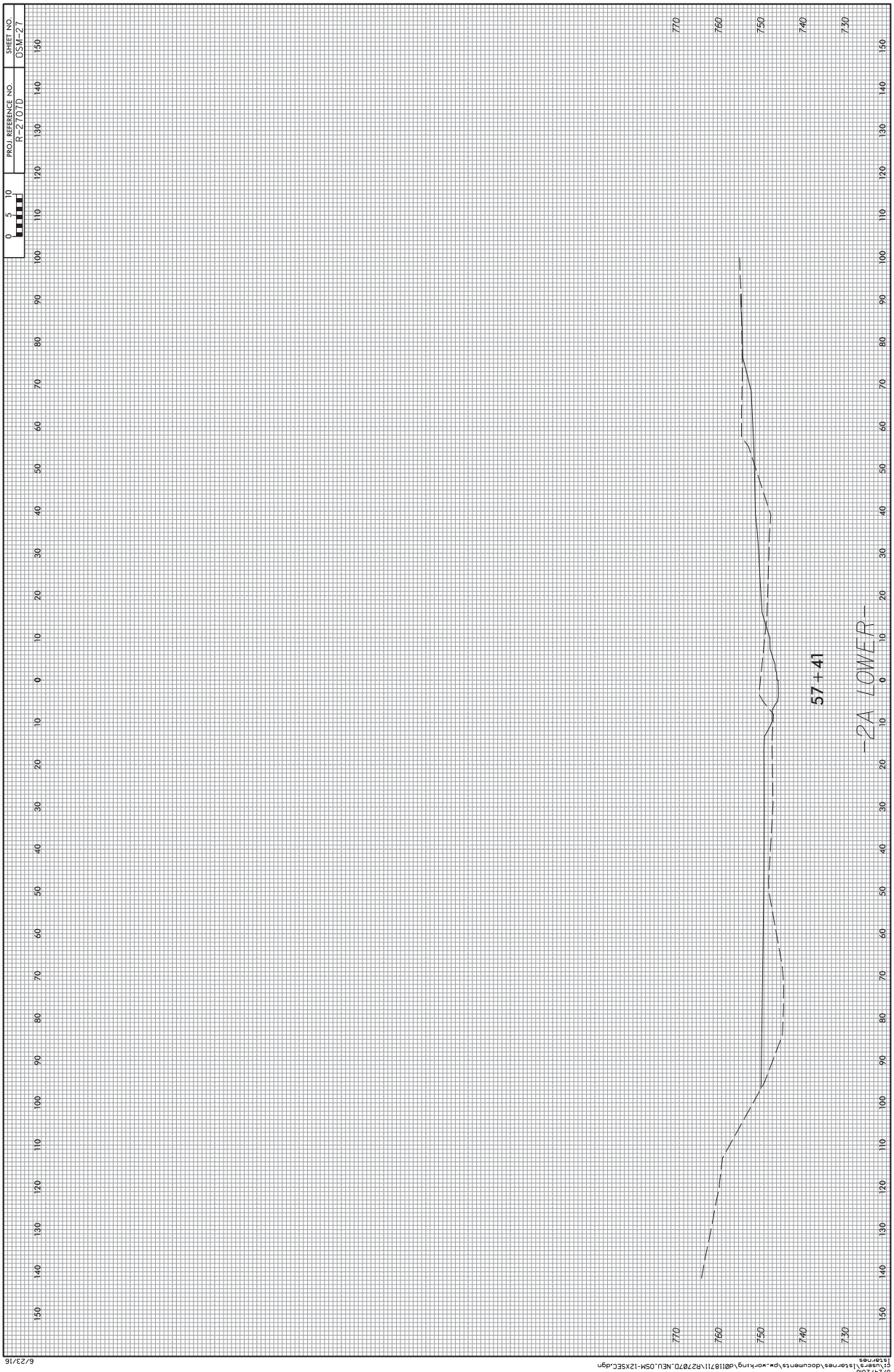
tarnas

P-57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760
750
740
730
57+41
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8/24/2018
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61+00
60+50
60+06.29
NOTE: PROPOSED ROADWAY EMBANKMENT
GRADING PER ROADWAY DRAWING (TYP.)
SEE STRUCTURAL DRAWINGS FOR CULVERT, HEADWALL, AND WINGWALL DETAILS
-2B-
6/23/16
8/24/2018
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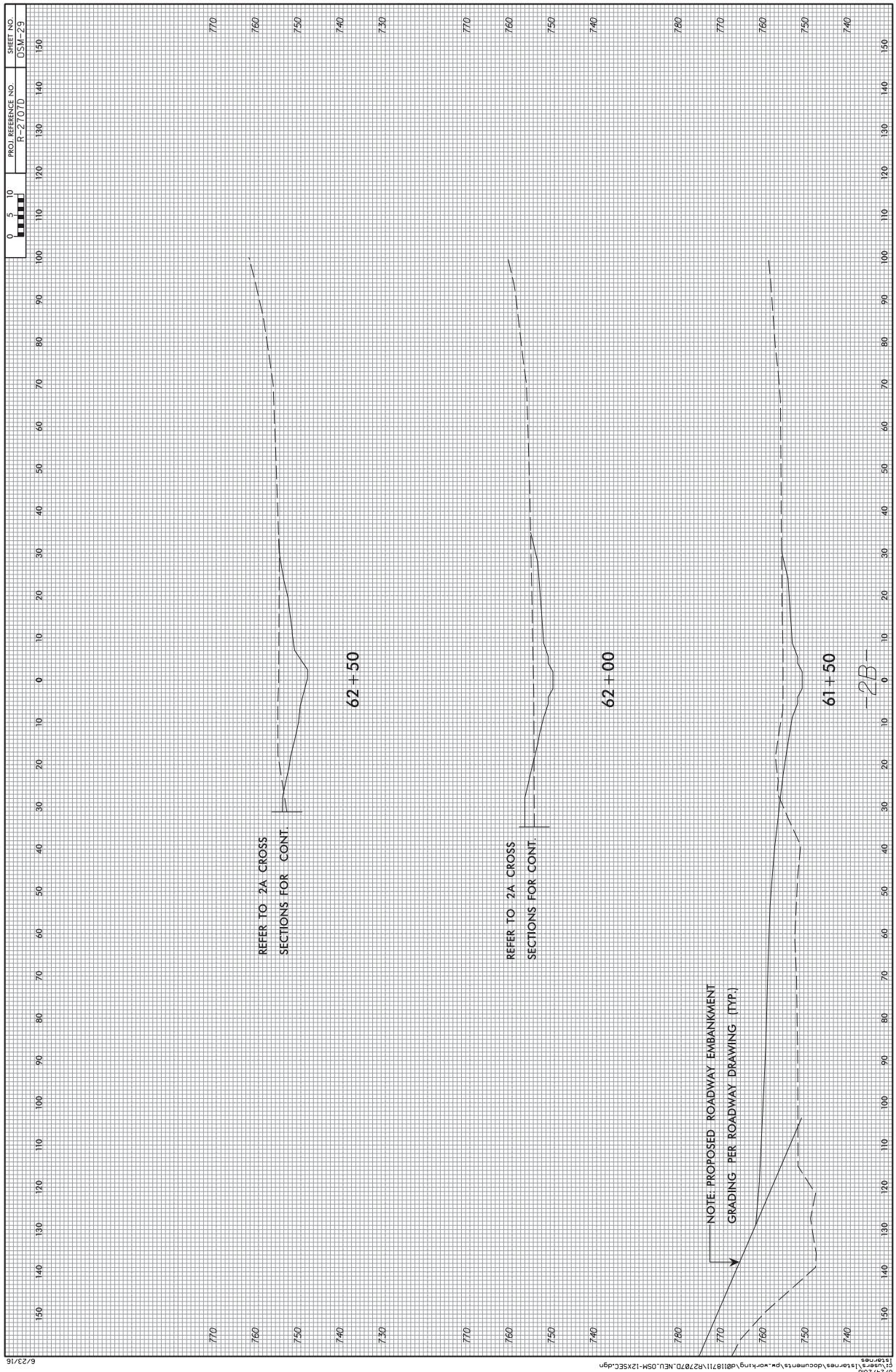
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SECTIONS FOR CONT.
62+50
REFER TO 2A CROSS
SECTIONS FOR CONT.
62+00
61+50
-2B-
NOTE: PROPOSED ROADWAY EMBANKMENT
GRADING PER ROADWAY DRAWING (TYP.)
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8/24/2018
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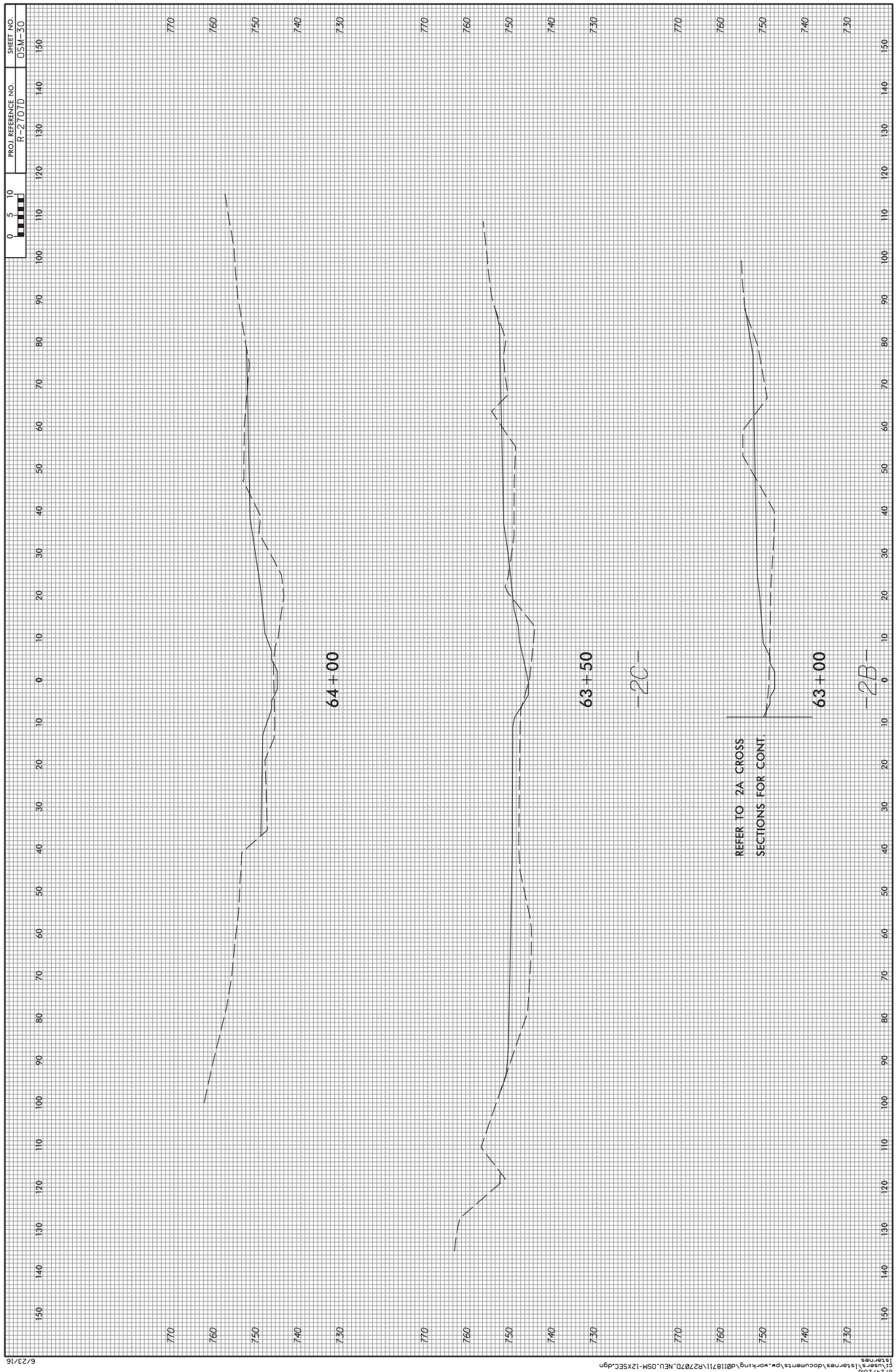

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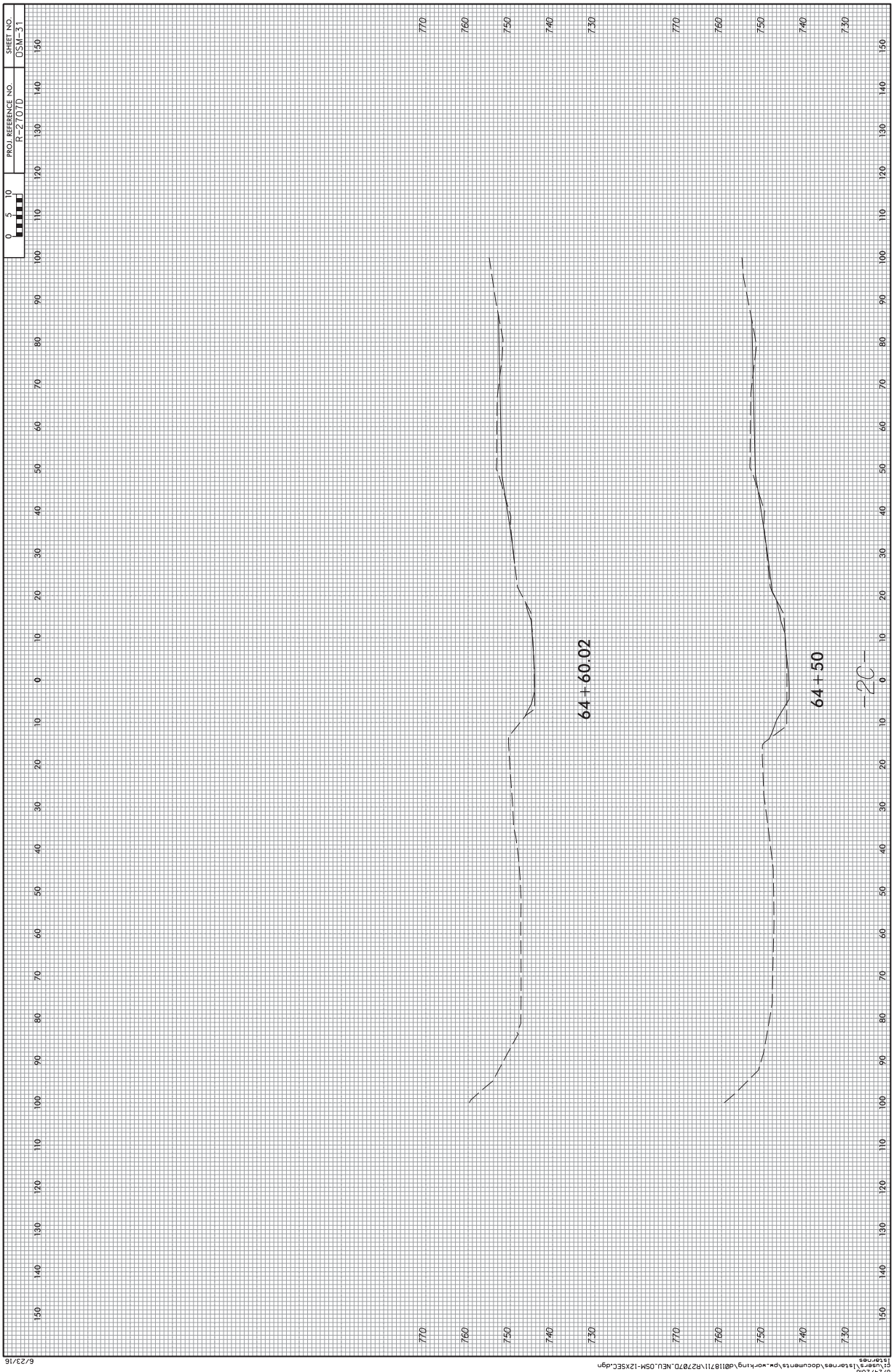
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OSM-31
PROJ. REFERENCE NO.
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64+50
-20-
6/23/16
8/24/2018
c:\users\1starnes\documents\pw_working\d0118711\R2707D_NEU_OSM-12XSEC.dgn
1starnes

PLANTING DETAILS

Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672

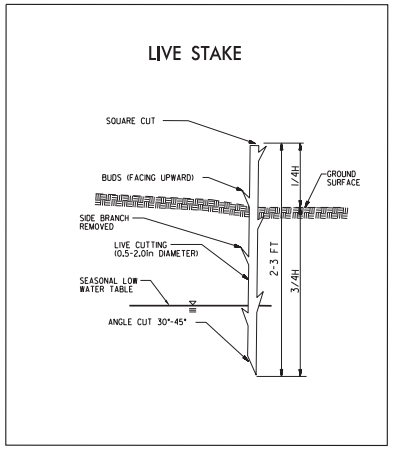
PROJECT REFERENCE NO.	SHEET NO.
R2707D	RF-1

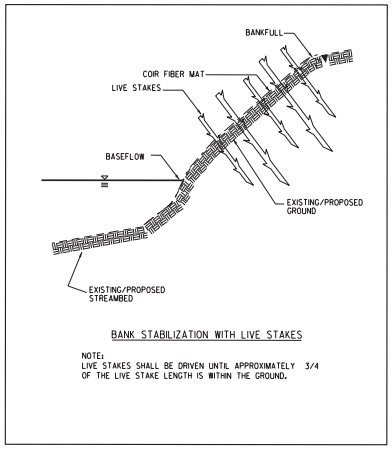
PROJECT ENGINEER

APPROVED BY:

DATE:

LIVE STAKES PLANTING DETAIL

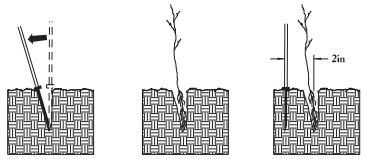




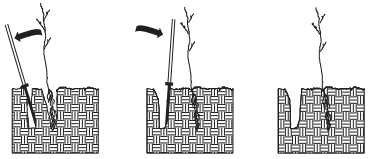
BANK STABILIZATION WITH LIVE STAKES

NOTE:
LIVE STAKES SHALL BE DRIVEN UNTIL APPROXIMATELY 3/4 OF THE LIVE STAKE LENGTH IS WITHIN THE 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 2in toward planter from 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 12in long, 4in wide and 1in thick at center.

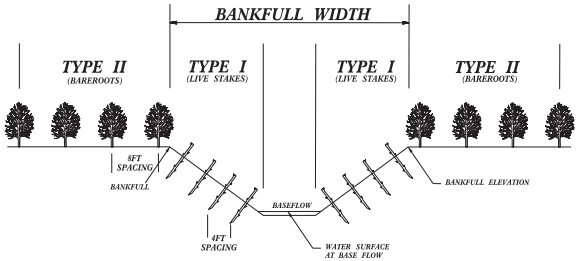
ROOT PRUNING
All seedlings shall be root pruned, if necessary, so that no roots extend more than 10in below the root collar.

☐ *TYPE 1 STREAM REFORESTATION SHALL INCLUDE PLANTING LIVE STAKES ALONG THE STREAMBANK FOR BASE FLOW TO BANKFULL ELEVATION AND BE PLANTED 3FT TO 5FT ON CENTER, RANDOM SPACING, AVERAGING 4FT ON CENTER, APPROXIMATELY 2,723 PLANTS PER ACRE.*

☐ *TYPE 2 STREAM REFORESTATION SHALL INCLUDE PLANTING BAREROOTS IN THE RIPARIAN ZONE ABOVE BANKFULL ELEVATION AND BE PLANTED 6FT TO 10FT ON CENTER, RANDOM SPACING, AVERAGING 8FT 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:

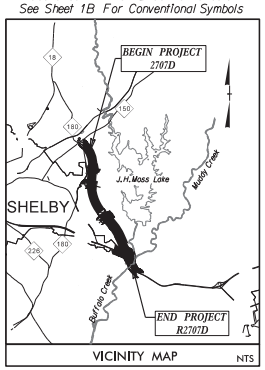
TYPE 1			
50%	*CEPHALANTHUS OCCIDENTALIS*	*BUTTONBUSH*	*2FT to 3FT LIVE STAKES*
50%	*CORNUS AMOMUM*	*SILKY DOGWOOD*	*2FT to 3FT LIVE STAKES*
TYPE 2			
20%	*LIRIODENDRON TULIPIFERA*	*TULIP POPLAR*	*12in – 18in BAREROOTS*
20%	*PLATANUS OCCIDENTALIS*	*SYCAMORE*	*12in – 18in BAREROOTS*
20%	*FRAXINUS PENNSYLVANICA*	*GREEN ASH*	*12in – 18in BAREROOTS*
20%	*QUERCUS PHELLOS*	*WILLOW OAK*	*12in – 18in BAREROOTS*
20%	*BETULA NIGRA*	*RIVER BIRCH*	*12in – 18in BAREROOTS*

☐ *SEE STREAM REFORESTATION PLAN SHEETS FOR AREAS TO BE PLANTED*

CONTRACT:

TIP PROJECT: R–2707D

See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Symbols



75% APPROVED PLANS

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PERMIT DRAWING
SHEET 1 OF 50

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R–2707D	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34497.1.F56	N/A	P.E.
34497.1.F56	N/A	R/W & UTIL

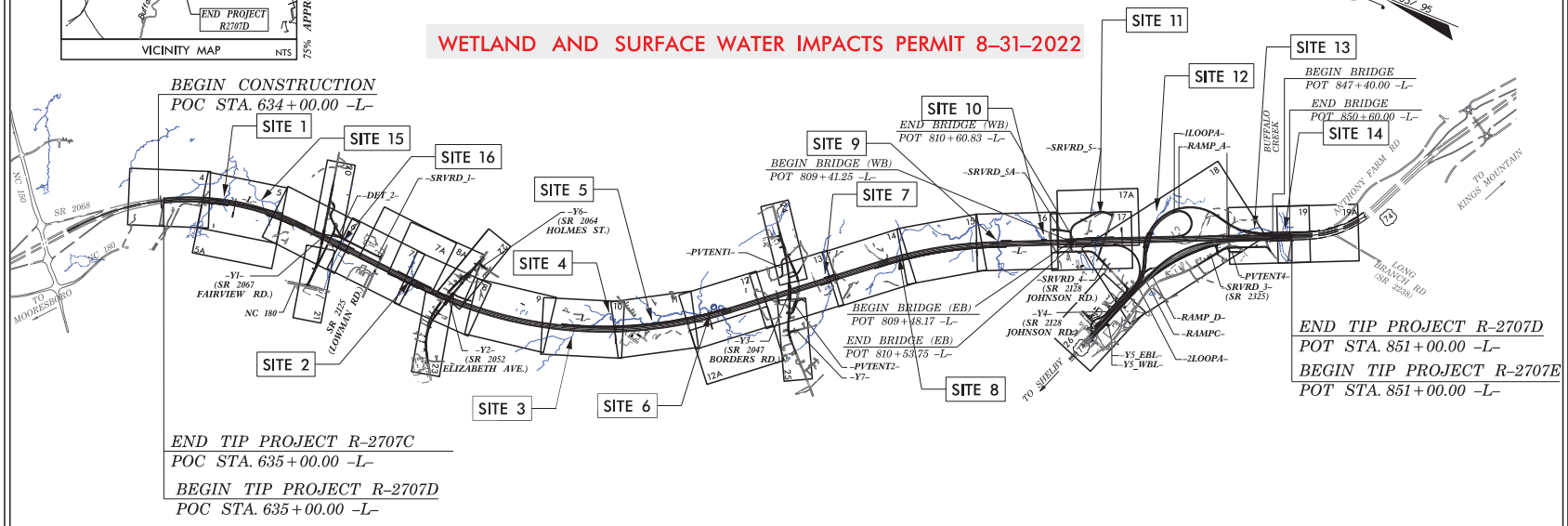
PART 1

CLEVELAND COUNTY

LOCATION: US 74, SHELBY BYPASS FROM EAST OF NC 150 TO EXISTING US 74, WEST OF SR 2238 (LONG BRANCH ROAD)

TYPE OF WORK: GRADING, DRAINAGE, PAVING, SIGNING & STRUCTURES

WETLAND AND SURFACE WATER IMPACTS PERMIT 8–31–2022



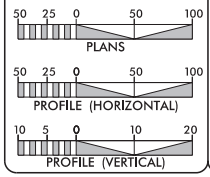
THIS PROJECT IS NOT WITHIN ANY CITY LIMITS

THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES

CLEARING FOR THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES



DESIGN DATA

ADT 2019 = 41,600
ADT 2040 = 59,200
K = 11 %
D = 55 %
T = 15 % *
V = 70 MPH
* TTST = 10% DUAL 5%

FUNC CLASS = FREEWAY

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT R–2707D	= 4.008 MI.
LENGTH OF STRUCTURE TIP PROJECT R–2707D	= 0.083 MI.
TOTAL LENGTH OF TIP PROJECT R–2707D	= 4.091 MI.

STRUCTURE LENGTHS BASED ON WB LANES

PREPARED IN THE OFFICE OF:
Stantec Consulting Services Inc. Tel. (919) 851-6666
801 Jones Franklin Road Fax. (919) 851-7024
Suite 300 www.stantec.com
Raleigh, NC 27606 License No. F-0672

SUNGATE DESIGN GROUP, P.A.
900 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
PH. (919) 851-2000
ENG FIRM LICENSE NO. C-2490

FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: 01 /10 /2019

LETTING DATE: 07 /18 /2023

JOSEPH T. KELVINGTON, P.E.
PROJECT ENGINEER

MICHAEL LINDGREN, P.E.
PROJECT DESIGN ENGINEER

THAD DUNCAN, P.E.
NCDOT DIVISON 12

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION ·

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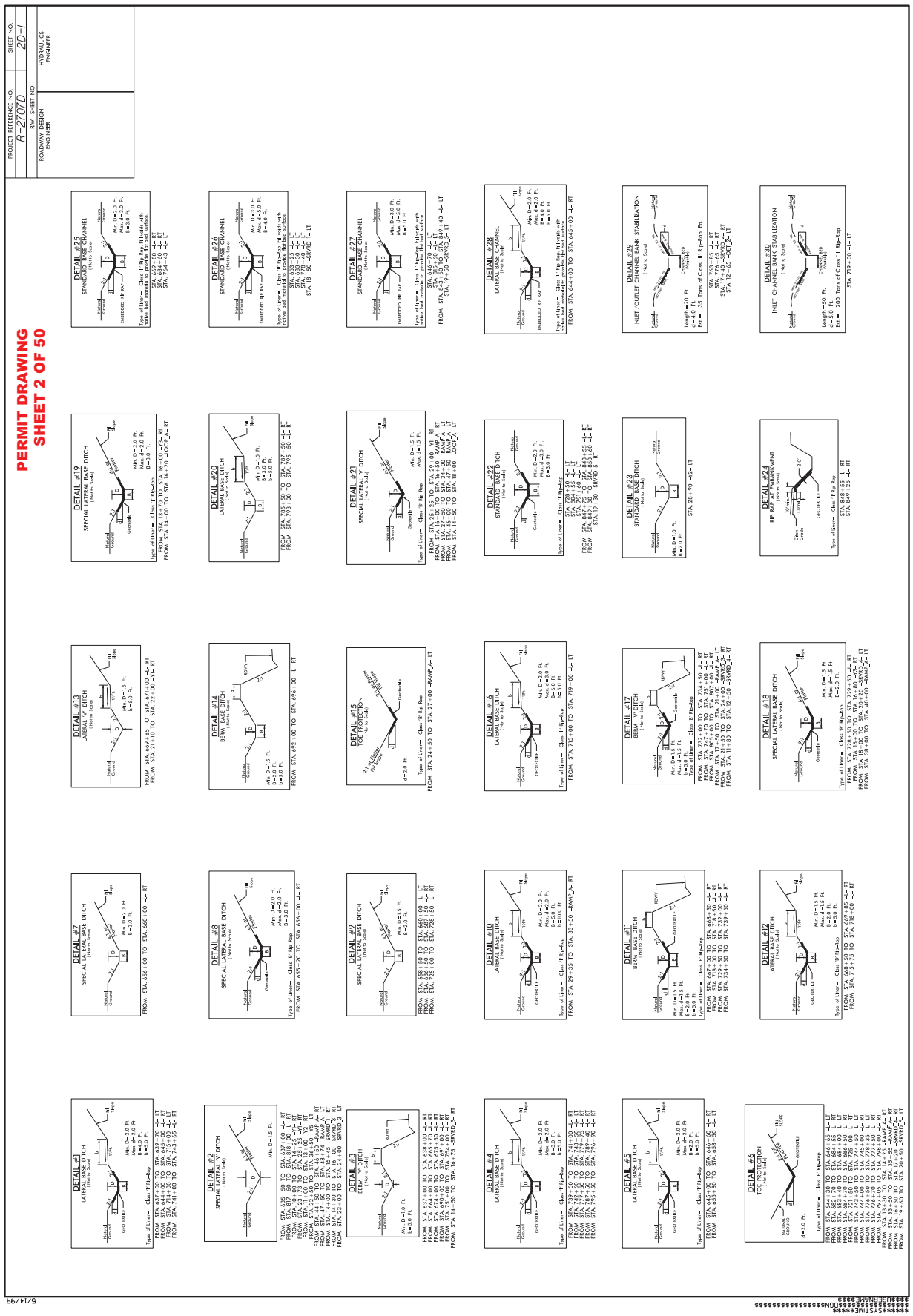
03/08/99
SYS TIME$$$


PERMIT DRAWING
SHEET 2 OF 50
PROJECT REFERENCE NO.
R-2707D
SHEET NO.
2D-1
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DETAIL #1
LATERAL BASE DITCH
DETAIL #2
SPECIAL LATERAL "V" DITCH
DETAIL #3
BERM "V" DITCH
DETAIL #4
LATERAL BASE DITCH
DETAIL #5
LATERAL BASE DITCH
DETAIL #6
TOE PROTECTION
DETAIL #7
SPECIAL LATERAL BASE DITCH
DETAIL #8
SPECIAL LATERAL BASE DITCH
DETAIL #9
SPECIAL LATERAL BASE DITCH
DETAIL #10
LATERAL BASE DITCH
DETAIL #11
BERM BASE DITCH
DETAIL #12
LATERAL BASE DITCH
DETAIL #13
LATERAL "V" DITCH
DETAIL #14
BERM BASE DITCH
DETAIL #15
TOE PROTECTION
DETAIL #16
LATERAL BASE DITCH
DETAIL #17
BERM "V" DITCH
DETAIL #18
LATERAL BASE DITCH
DETAIL #19
SPECIAL LATERAL BASE DITCH
DETAIL #20
LATERAL BASE DITCH
DETAIL #21
SPECIAL LATERAL "V" DITCH
DETAIL #22
STANDARD BASE DITCH
DETAIL #23
STANDARD BASE DITCH
DETAIL #24
RIP RAP AT EMBANKMENT
DETAIL #25
STANDARD BASE CHANNEL
DETAIL #26
STANDARD BASE CHANNEL
DETAIL #27
STANDARD BASE CHANNEL
DETAIL #28
LATERAL BASE CHANNEL
DETAIL #29
INLET / OUTLET CHANNEL BANK STABILIZATION
DETAIL #30
INLET CHANNEL BANK STABILIZATION

5/14/99

5/14/99

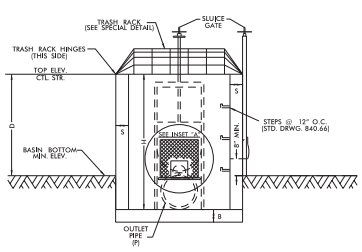
PERMIT DRAWING
SHEET 3 OF 50

PROJECT REFERENCE NO.	SHEET NO.
R-2707D	2D-2
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DETAIL #31

DRY DETENTION/HAZARDOUS SPILL BASIN
DRAWDOWN STRUCTURE

NOT TO SCALE



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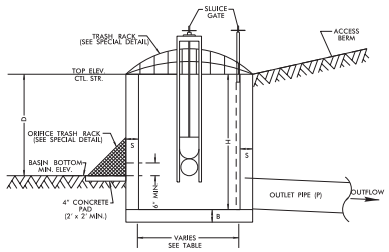
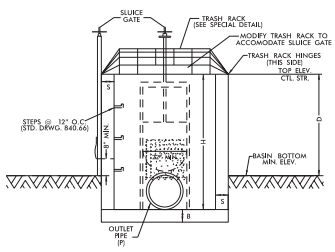


SIDE 2



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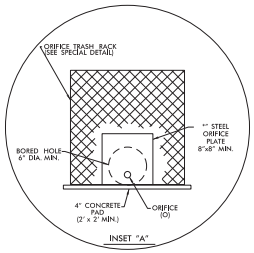

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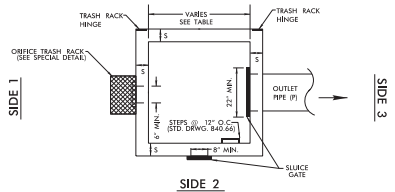

SIDE 2

PLAN VIEW
TRASH RACK NOT SHOWN FOR CLARITY

NOTES:
1. THE BASIN SHOULD BE DESIGNED TO HOLD THE HAZARDOUS SPILL VOLUME ABOVE THE WATER QUALITY VOLUME (WQv) ELEVATION.
2. TOP ELEVATION OF CONTROL STRUCTURE (WEIR ELEVATION) SHOULD BE SET AT THE WQv ELEVATION.
3. 15" MINIMUM DIAMETER FOR OUTLET PIPE.
4. 2" MINIMUM DIAMETER ORIFICE. IF ORIFICE IS GREATER THAN 6", A STEEL PLATE IS NOT REQUIRED.
5. NO BEDDING MATERIAL TO BE USED. THEREFORE, DO NOT FOLLOW STANDARD DRAWINGS FOR METHOD OF PIPE INSTALLATION FOR OUTLET PIPE THROUGH EMBANKMENT.
6. 8" MIN. SLUICE GATE IS FOR MAINTENANCE AND SHOULD REMAIN CLOSED DURING NORMAL OPERATION. A GATE VALVE MAY BE USED IN LIEU OF THE 8" SLUICE GATE.
7. 22" MIN. SLUICE GATE AT THE OUTLET PIPE IS FOR SPILL CONTAINMENT AND SHOULD REMAIN OPEN DURING NORMAL OPERATION.
8. SLUICE GATE SHALL PROVIDE WATERTIGHT SEAL. PROVIDE ADEQUATE CLEARANCE FOR GATE OPERATION AND FOR PROPER SEATING OF GATE OVER PIPE.
9. SELECT BOX STANDARD AS REQUIRED TO ACCOMMODATE SLUICE GATE AND ORIFICE TRASH RACK WIDTH.
10. ENSURE TRASH RACK OPENS FREELY AND WITHOUT INTERFERENCE WITH SLUICE GATES.
11. ADJUST FOOTER DIMENSIONS AS NEEDED FOR ANTI-FLOTATION.
12. PAYMENT OF TRASH RACKS ARE INCIDENTAL TO BASIN DRAWDOWN STRUCTURE.

MINIMUM DIMENSIONS FOR DRY DETENTION BASIN DRAWDOWN STRUCTURE

STATION	STRUCTURE NUMBER	S (INCHES) 6" MIN.	B (INCHES) 6" MIN.	BASIN BOTTOM MINIMUM ELEV.	TOP ELEVATION CONTROL STRUCTURE	MAX. STORAGE DEPTH(D) FEET	INV. ELEV. CTL. STR.	CTL. STR. DIMENSIONS (W x L x H)	ORIFICE DIAMETER (O) INCHES	ORIFICE INV. ELEV.	OUTLET PIPE DIAMETER(P) INCHES
641+74 -L- LT	0406	6"	18"	854.0	858.0	4.0'	852.0	5.0' X 5.0' X 6.0'	2.5"	854.0	30"
668+44 -L- LT	0615	6"	18"	867.0	870.0	3.0'	865.0	5.0' X 5.0' X 5.0'	2.0"	867.0	24"

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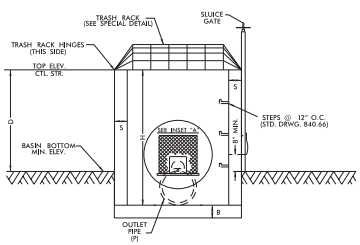
PERMIT DRAWING
SHEET 4 OF 50

PROJECT REFERENCE NO.	SHEET NO.
R-2707D	2D-3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

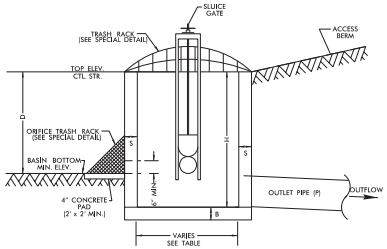
DETAIL #32

DRY DETENTION BASIN DRAWDOWN STRUCTURE

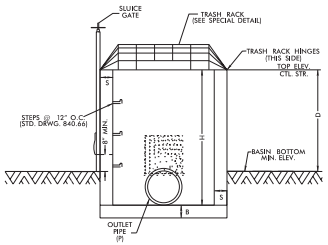
NOT TO SCALE



SIDE 1



SIDE 2



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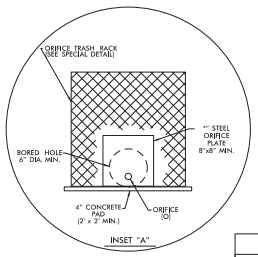

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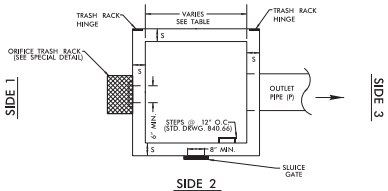

SIDE 2

PLAN VIEW

TRASH RACK NOT SHOWN FOR CLARITY

NOTES:
1. TOP ELEVATION OF CONTROL STRUCTURE (WEIR ELEVATION) SHOULD BE SET AT THE WQv ELEVATION.
2. 15" MINIMUM DIAMETER FOR OUTLET PIPE.
3. 2" MINIMUM DIAMETER ORIFICE. IF ORIFICE IS GREATER THAN 6", A STEEL PLATE IS NOT REQUIRED.
4. NO BEDDING MATERIAL TO BE USED. THEREFORE, DO NOT FOLLOW STANDARD DRAWINGS FOR METHOD OF PIPE INSTALLATION FOR OUTLET PIPE THROUGH EMBANKMENT.
5. SLUICE GATE IS FOR MAINTENANCE AND SHOULD REMAIN CLOSED DURING NORMAL OPERATION. A GATE VALVE MAY BE USED IN LIEU OF THE 8" SLUICE GATE.
6. SLUICE GATE SHALL PROVIDE WATERTIGHT SEAL. PROVIDE ADEQUATE CLEARANCE FOR GATE OPERATION AND FOR PROPER SEATING OF GATE OVER PIPE.
7. SELECT BOX STANDARD AS REQUIRED TO ACCOMMODATE SLUICE GATE AND ORIFICE TRASH RACK WIDTH.
8. ENSURE TRASH RACK OPENS FREELY AND WITHOUT INTERFERENCE WITH SLUICE GATE.
9. ADJUST FOOTER DIMENSIONS AS NEEDED FOR ANTI-FLOTATION.
10. PAYMENT OF TRASH RACKS ARE INCIDENTAL TO BASIN DRAWDOWN STRUCTURE.

MINIMUM DIMENSIONS FOR DRY DETENTION BASIN DRAWDOWN STRUCTURE

STATION	STRUCTURE NUMBER	S (INCHES) 6" MIN.	B (INCHES) 6" MIN.	BASIN BOTTOM MINIMUM ELEV.	TOP ELEVATION CONTROL STRUCTURE	MAX. STORAGE DEPTH(D) FEET	INV. ELEV. CTL. STR.	CTL. STR. DIMENSIONS (W x L x H)	ORIFICE DIAMETER (O) INCHES	ORIFICE INV. ELEV.	OUTLET PIPE DIAMETER(P) INCHES
780+44 -L- RT	1511	6"	18"	726.0	730.0	4.0'	724.0	5.0' X 5.0' X 6.0'	2.5"	726.0	30"
813+94 -L- LT	1728	6"	18"	714.0	719.0	5.0'	712.0	5.0' X 5.0' X 7.0'	3.0"	714.0	36"

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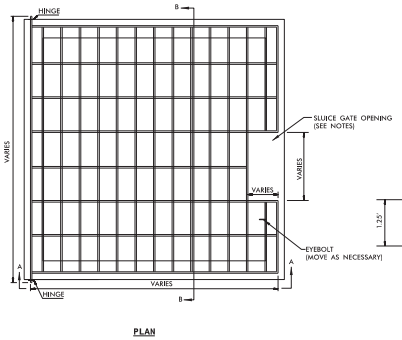
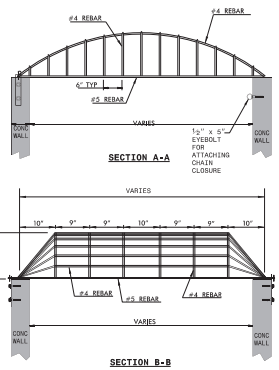
PERMIT DRAWING
SHEET 5 OF 50

PROJECT REFERENCE NO.	SHEET NO.
R-2707D	2D-4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

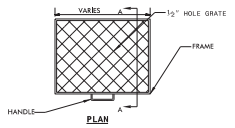
DETAIL #33
REMOVABLE ORIFICE TRASH RACK
NOT TO SCALE

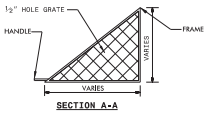




REBAR TRASH RACK
NOT TO SCALE

RISER TRASH RACK NOTES:
1. ALL JOINTS SHALL BE FULLY WELDED AROUND JOINT WITH A MINIMUM OF A 1/4" BEAD.
2. IF BOLTS ARE ANCHORED IN CONCRETE, FOLLOW STD. DWG. 862.03 AND 862.04 FOR ANCHORING PROCEDURE.
3. EYEBOLT FOR CHAIN CLOSURE SHALL BE INSTALLED BY THE SAME METHOD AS THE HINGE PLATE BOLTS.
4. RACK AND HARDWARE SHALL BE ALUMINUM OR REBAR AND GALVANIZED IN ACCORDANCE WITH ASTM A-153.
5. PROVIDE OPENING IN TRASH RACK TO ACCOMODATE SLUICE GATE ON THE OUTLET PIPE. ENSURE TRASH RACK OPENS FREELY AND WITHOUT INTERFERENCE WITH SLUICE GATES.



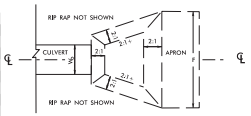


ORIFICE TRASH RACK NOTES:
1. ALL JOINTS SHALL BE FULLY WELDED AROUND JOINT WITH A MINIMUM OF A "" BEAD.
2. IF BOLTS ARE ANCHORED IN CONCRETE, FOLLOW STD. DWG. 862.03 AND 862.04 FOR ANCHORING PROCEDURE.
3. REMOVEABLE ORIFICE TRASH RACK SHALL BE ATTACHED TO CONCRETE BOX BY HINGE OR SLIDE RAIL SYSTEM.
4. RACK AND HARDWARE SHALL BE ALUMINUM OR GALVANIZED IN ACCORDANCE WITH ASTM A-153.

DETAIL #34
RIP-RAPPED ENERGY DISSIPATOR BASIN
(OUTLET TO NATURAL GROUND)

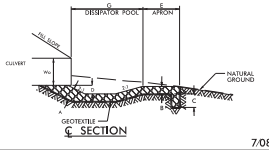
DIM. (ft)	RIP RAP BASIN # 1	2	3	4	5
A	2.0'				
B	1.5'				
C	1.5'				
D	1.0'				
E	4.0'				
F	12.0'				
G	10.0'				

ALL DIMENSIONS APPROXIMATE



BASIN #	LOCATION (AT OUTLET)
1	726+50 -L- LT

BASIN(S) #1
CLASS 1 RIP RAP
EST. 30 TONS
EST. 30 SY GF
EST. 20 CY DDE



7.08

DETAIL #35
(NOT TO SCALE)

SINGLE BARREL CULVERT
SKEWED W/SILLS AND BAFFLES

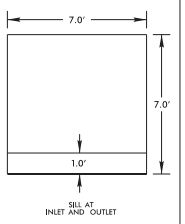
*NOTES:

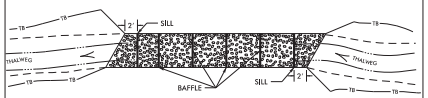
1) NATIVE MATERIAL BETWEEN SILLS&BAFFLES IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE THE STREAM OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE CULVERT BARREL. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

2) SILLS/BAFFLES ARE TO BE 1.0 FT. WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.

3) TOP OF LOW FLOW SILLS&BAFFLES SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

4) NUMBER OF SILL/BAFFLES DETERMINED BY THE ENGINEER.





NUMBER OF BAFFLES=30
ON 12 FT CENTERS FROM DOWNSTREAM SILL
(SEE STRUCTURE PLANS)

PLAN VIEW

913

1@7' X 7' RCBC AT STA. 717+13 -L-

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5/14/99

PERMIT DRAWING
SHEET 6 OF 50

PROJECT REFERENCE NO.	SHEET NO.
R-2707D	2D-5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DETAIL #36
(NOT TO SCALE)

SKEWED MULTI–BARREL CULVERT LOW FLOW CHANNEL,SILLS AND FLOOD PLAIN

*NOTES:

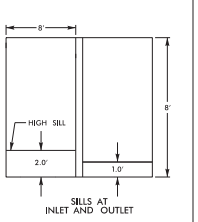
1) NATIVE MATERIAL BETWEEN SILLS/BAFFLES IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE THE STREAM OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE LOW FLOW CULVERT BARREL. RIP–RAP MAY BE USED TO SUPPLEMENT THE NATIVE MATERIAL IN THE HIGH FLOW CULVERT BARREL(S). IF RIP–RAP IS USED TO LINE THE HIGH FLOW CULVERT BARREL(S), NATIVE MATERIAL SHOULD BE PLACED ON TOP TO FILL VOIDS AND PROVIDE A FLAT SURFACE FOR ANIMAL PASSAGE. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

2) SILLS/BAFFLES ARE TO BE 1.0 FT. WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.

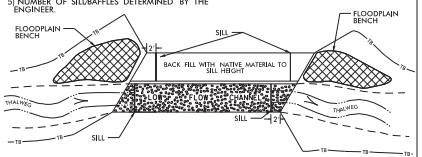
3) TOP OF LOW FLOW SILLS/BAFFLES SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

4) DO NOT SET ELEVATION OF HIGH SILL/BAFFLES ABOVE BANK FULL.

5) NUMBER OF SILL/BAFFLES DETERMINED BY THE ENGINEER.



SILLS AT INLET AND OUTLET



PLAN VIEW

2@8' X 8' RCBC AT STA. 743+19 –L–

DETAIL #38
(NOT TO SCALE)

SINGLE BARREL CULVERT LOW FLOW CHANNEL AND SILLS

*NOTES:

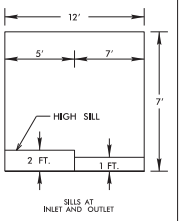
1) NATIVE MATERIAL BETWEEN SILLS/BAFFLES IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED AT THE PROJECT SITE DURING CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

2) SILLS/BAFFLES ARE TO BE 1.0 FT. WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.

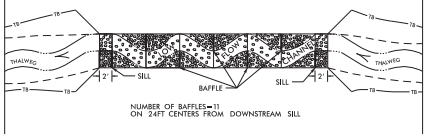
3) TOP OF LOW FLOW SILLS/BAFFLES SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)

4) DO NOT SET ELEVATION OF HIGH SILL/BAFFLES ABOVE BANK FULL.

5) NUMBER OF SILL/BAFFLES DETERMINED BY THE ENGINEER.



SILLS AT INLET AND OUTLET

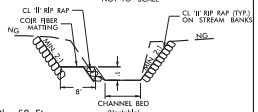


NUMBER OF BAFFLES=11
ON 24FT CENTERS FROM DOWNSTREAM SILL

PLAN VIEW

1@12' X 7' RCBC AT STA. 796+86 –L–

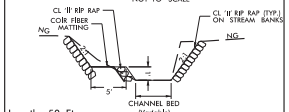
DETAIL #37
INLET /OUTLET CHANNEL DETAIL
NOT TO SCALE



Length = 50 Ft.
Est. = 110 Tons of Class **'II'** Rip–Rap

STA. 742+50 –L– LT
STA. 743+50 –L– RT

DETAIL #39
INLET /OUTLET CHANNEL DETAIL
NOT TO SCALE



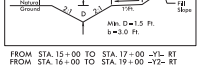
Length = 50 Ft.
Est. = 110 Tons of Class **'I'** Rip–Rap

STA. 796+75 –L– LT
STA. 796+95 –L– RT

DETAIL #40
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

FROM STA. 10+00 TO STA. 12+75 –Y1– LT
FROM STA. 20+00 TO STA. 23+00 –SRVRD_1– LT
FROM STA. 18+50 TO STA. 20+20 –SRVRD_4– RT

DETAIL #41
LATERAL 'V' DITCH
(Not to Scale)

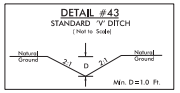


FROM STA. 15+00 TO STA. 17+00 –Y1– RT
FROM STA. 16+00 TO STA. 19+00 –Y2– RT

DETAIL #42
LATERAL 'V' DITCH
(Not to Scale)

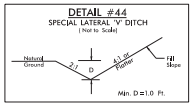
FROM STA. 17+00 TO STA. 18+50 –Y1– RT
FROM STA. 23+00 TO STA. 25+20 –SRVRD_1– LT
FROM STA. 21+35 TO STA. 22+50 –Y2– LT

DETAIL #43
STANDARD 'V' DITCH
(Not to Scale)



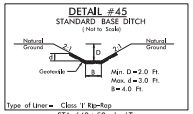
STA. 16+70 –Y1– LT

DETAIL #44
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



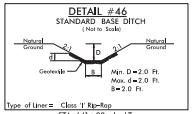
FROM STA. 26+50 TO STA. 29+00 –Y1– LT
FROM STA. 24+50 TO STA. 26+30 –Y2– RT
FROM STA. 26+60 TO STA. 29+25 –Y2– RT
FROM STA. 26+60 TO STA. 29+00 –Y2– LT
FROM STA. 28+00 TO STA. 30+00 –Y3– LT
FROM STA. 28+00 TO STA. 32+00 –Y3– RT
FROM STA. 9+90 TO STA. 13+00 –Y4– RT
FROM STA. 20+00 TO STA. 21+00 –SRVRD_1– RT

DETAIL #45
STANDARD BASE DITCH
(Not to Scale)



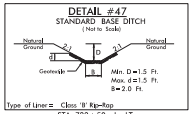
STA. 640+50 –L– LT

DETAIL #46
STANDARD BASE DITCH
(Not to Scale)



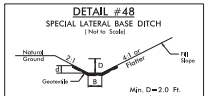
STA. 641+00 –L– LT

DETAIL #47
STANDARD BASE DITCH
(Not to Scale)



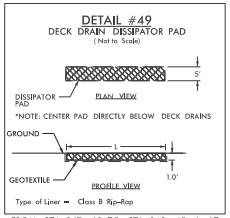
STA. 722+50 –L– LT
STA. 16+80 –Y3– LT
STA. 18+00 –SRVRD_4– LT
STA. 10+60 –SRVRD_5A– RT

DETAIL #48
SPECIAL LATERAL BASE DITCH
(Not to Scale)



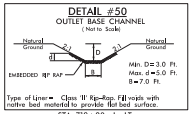
FROM STA. 14+00 TO STA. 16+20 –LOOP_A– RT

DETAIL #49
DECK DRAIN DISSIPATOR PAD
(Not to Scale)



FROM STA. 847+60 TO STA. 848+45 –L– LT
FROM STA. 847+60 TO STA. 848+45 –L– RT
FROM STA. 847+97 TO STA. 848+33 –L– MED LT
FROM STA. 847+97 TO STA. 848+33 –L– MED RT
FROM STA. 850+11 TO STA. 850+37 –L– MED LT
FROM STA. 850+11 TO STA. 850+37 –L– MED RT
FROM STA. 850+11 TO STA. 850+37 –L– LT
FROM STA. 850+11 TO STA. 850+37 –L– RT

DETAIL #50
OUTLET BASE CHANNEL
(Not to Scale)



STA. 719+20 –L– LT

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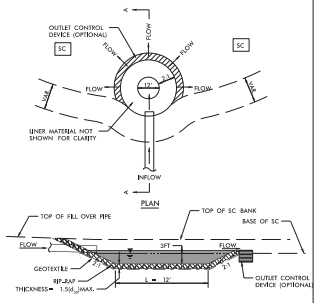
PROJECT REFERENCE NO.	SHEET NO.
R-2707D	2D-6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PERMIT DRAWING
SHEET 7 OF 50

DETAIL #51
CIRCULAR FOREBAY

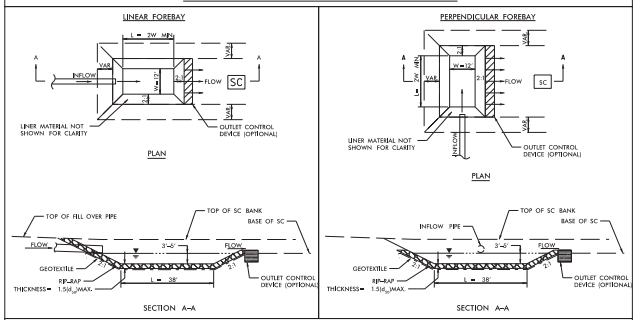


NOTES:
1) LINER MATERIAL TO BE SPECIFIED BY ENGINEER.
2) CIRCULAR FOREBAYS TO BE USED ONLY WITH PIPE INLETS, UNLESS OTHERWISE DIRECTED BY ENGINEER.
3) MODIFICATIONS MAY BE NEEDED, AS APPROVED BY ENGINEER.

Type of Liner= Class 'I' Rip–Rap

STA. 642+95 –L– LT
STA. 667+62 –L– LT

DETAIL #52
RECTANGULAR FOREBAYS WITH PIPE

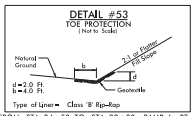


NOTES:
1) LINER MATERIAL TO BE SPECIFIED BY ENGINEER.
2) CIRCULAR FOREBAYS TO BE USED ONLY WITH PIPE INLETS, UNLESS OTHERWISE DIRECTED BY ENGINEER.
3) MODIFICATIONS MAY BE NEEDED, AS APPROVED BY ENGINEER.

Type of Liner= Class 'I' Rip–Rap

STA. 782+40 –L– RT
STA. 813+00 –L– LT

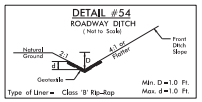
DETAIL #53
TOE PROTECTION
(Not to Scale)



Type of Liner= Class 'B' Rip–Rap

FROM STA. 24+50 TO STA. 28+00 –RAMP_A– RT

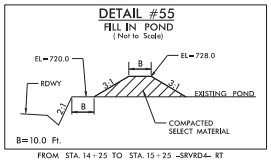
DETAIL #54
ROADWAY DITCH
(Not to Scale)



Type of Liner= Class 'B' Rip–Rap

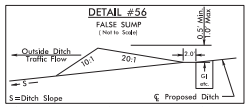
FROM STA. 10+00 TO STA. 12+00 –SRVRD4– RT
FROM STA. 10+00 TO STA. 12+40 –SRVRD4– LT
FROM STA. 10+23 TO STA. 10+95 –SRVRD5– LT

DETAIL #55
FILL IN POND
(Not to Scale)



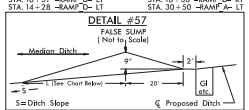
FROM STA. 14+25 TO STA. 15+25 –SRVRD4– RT

DETAIL #56
FALSE SUMP
(Not to Scale)



STA. 641+13 –L– RT
STA. 677+37 –L– LT
STA. 705+13 –L– RT
STA. 744+88 –L– LT
STA. 821+33 –L– RT
STA. 839+13 –L– RT
STA. 651+13 –L– RT
STA. 696+13 –L– RT
STA. 709+63 –L– RT
STA. 749+88 –L– LT
STA. 828+13 –L– RT
STA. 673+17 –L– LT
STA. 700+63 –L– RT
STA. 739+13 –L– RT
STA. 798+38 –L– LT
STA. 832+13 –L– RT
STA. 20+14 –SRVRD_I– LT
STA. 25+17 –RAMP_D– LT
STA. 21+87 –RAMP_D– LT
STA. 18+37 –RAMP_D– LT
STA. 14+28 –RAMP_D– LT
STA. 23+74 –Y1– RT
STA. 24+88 –Y3–LT
STA. 11+88 –SRVRD_A– RT
STA. 25+17 –RAMP_D– RT
STA. 21+88 –RAMP_D– RT
STA. 18+38 –RAMP_D– RT
STA. 30+50 –RAMP_A– LT

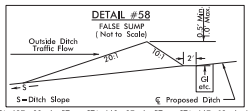
DETAIL #57
FALSE SUMP
(Not to Scale)



Ditch Grade	L	Ditch Grade	L
0.0% To 2.0%	20'	Over 4.0% To 6.0%	40'
Over 2.0% To 4.0%	30'	Over 6.0%	50'

STA. 637+63 –L– MED
STA. 647+18 –L– MED
STA. 660+37 –L– MED
STA. 677+37 –L– MED
STA. 696+13 –L– MED
STA. 709+63 –L– MED
STA. 722+63 –L– MED
STA. 734+63 –L– MED
STA. 745+38 –L– MED
STA. 764+58 –L– MED
STA. 777+63 –L– MED
STA. 792+98 –L– MED
STA. 801+88 –L– MED
STA. 810+88 –L– MED
STA. 821+33 –L– MED
STA. 641+13 –L– MED
STA. 650+88 –L– MED
STA. 668+43 –L– MED
STA. 681+87 –L– MED
STA. 700+63 –L– MED
STA. 713+13 –L– MED
STA. 726+63 –L– MED
STA. 739+13 –L– MED
STA. 749+88 –L– MED
STA. 768+63 –L– MED
STA. 782+63 –L– MED
STA. 796+93 –L– MED
STA. 804+48 –L– MED
STA. 812+88 –L– MED
STA. 828+13 –L– MED
STA. 643+08 –L– MED
STA. 655+88 –L– MED
STA. 673+17 –L– MED
STA. 688+08 –L– MED
STA. 705+13 –L– MED
STA. 718+63 –L– MED
STA. 730+63 –L– MED
STA. 741+88 –L– MED
STA. 761+13 –L– MED
STA. 772+63 –L– MED
STA. 787+63 –L– MED
STA. 798+38 –L– MED
STA. 805+38 –L– MED
STA. 817+38 –L– MED
STA. 832+13 –L– MED
STA. 835+13 –L– MED
STA. 839+13 –L– MED

DETAIL #58
FALSE SUMP
(Not to Scale)



STA. 637+00 –L– RT
STA. 696+13 –L– LT
STA. 709+63 –L– LT
STA. 745+38 –L– RT
STA. 768+63 –L– LT
STA. 801+88 –L– RT
STA. 828+13 –L– LT
STA. 660+37 –L– RT
STA. 700+63 –L– LT
STA. 713+13 –L– LT
STA. 749+88 –L– RT
STA. 772+63 –L– LT
STA. 805+38 –L– RT
STA. 835+13 –L– LT
STA. 667+13 –L– LT
STA. 705+13 –L– LT
STA. 730+00 –L– RT
STA. 762+63 –L– LT
STA. 798+38 –L– RT
STA. 808+93 –L– LT
STA. 839+13 –L– LT
STA. 25+13 –Y3– RT
STA. 19+82 –SRVRD_I– RT
STA. 11+88 –SRVRD_A– LT
STA. 16+63 –RAMPC– LT
STA. 20+36 –RAMPC– RT
STA. 17+38 –RAMP_A– LT
STA. 10+79 –SRVRD_5A– RT
STA. 16+61 –RAMPC– RT
STA. 18+36 –RAMPC– RT
STA. 22+20 –RAMPC– RT

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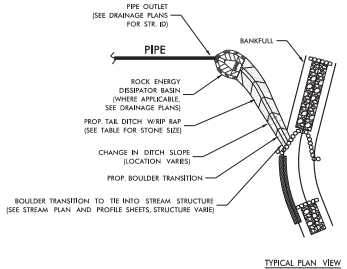
PERMIT DRAWING
SHEET 8 OF 50

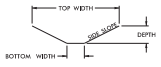
PROJECT REFERENCE NO.	SHEET NO.
R-2707D	2D-7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DETAIL #60

STORMWATER TIE IN TO STREAM STRUCTURE



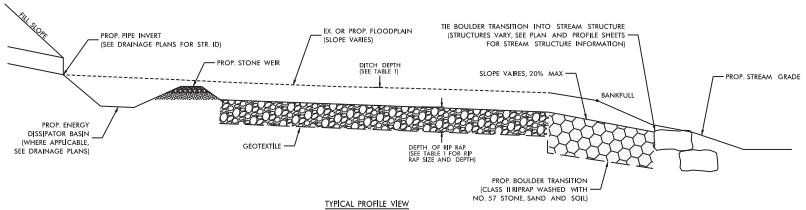
TYPICAL PLAN VIEW
N.T.S.



TYPICAL STORMWATER DITCH CROSS SECTION
N.T.S

Table 1: Stormwater Ditch Cross Section Data

Structure ID	Bottom Width	Side Slopes	Top Width	Depth	Riprap Size	Depth of Riprap	Average Slope of Ditch in Floodplain (ft/ft)
1009	2'	2:1	6'	1'	Class 'B'	16"	0.044
1012	3'	2:1	13'	2.5'	Class 'I'	20"	0.038
1112	3'	2:1	11'	2'	Class 'I'	20"	0.029
1106	2'	2:1	6'	1'	Class 'I'	20"	0.043
1109	2'	2:1	6'	1'	Class 'B'	16"	0.032
1299	2'	2:1	6'	1'	Class 'B'	16"	0.06 – 0.09



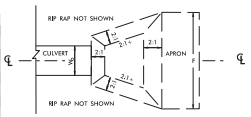
TYPICAL PROFILE VIEW
N.T.S.

DETAIL #59

RIP-RAPPED ENERGY DISSIPATOR BASIN (OUTLET TO TAIL DITCH)

DIM. (ft)	RIP RAP BASIN # 2	3	4	5	
A	2.0'	2.0'	2.0'	2.0'	
B	1.5'	1.5'	1.5'	1.5'	
C	1.5'	1.5'	1.5'	1.5'	
D	1.0'	1.0'	1.0'	1.0'	
E	4.0'	4.0'	4.0'	4.0'	
F	12.0'	12.0'	12.0'	12.0'	
G	10.0'	10.0'	10.0'	10.0'	

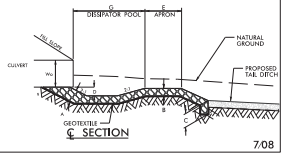
ALL DIMENSIONS APPROXIMATE



PLAN

BASIN #	LOCATION (AT OUTLET)
2	722+50 -L- LT
3	730+50 -L- LT
4	734+50 -L- LT
5	741+08 -L- LT

BASIN(S) #2-5
CLASS 'I' RIP RAP
EST. 30 TONS
EST. 50 SY GF
EST. 20 CY DDE

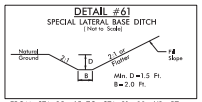


℄ SECTION

7.08

DETAIL #61

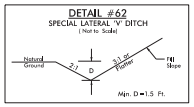
SPECIAL LATERAL BASE DITCH
(Not to Scale)



FROM STA. 29+65 TO STA. 31+00 -Y2- RT

DETAIL #62

SPECIAL LATERAL "V" DITCH
(Not to Scale)



FROM STA. 31+00 TO STA. 32+00 -Y2- RT

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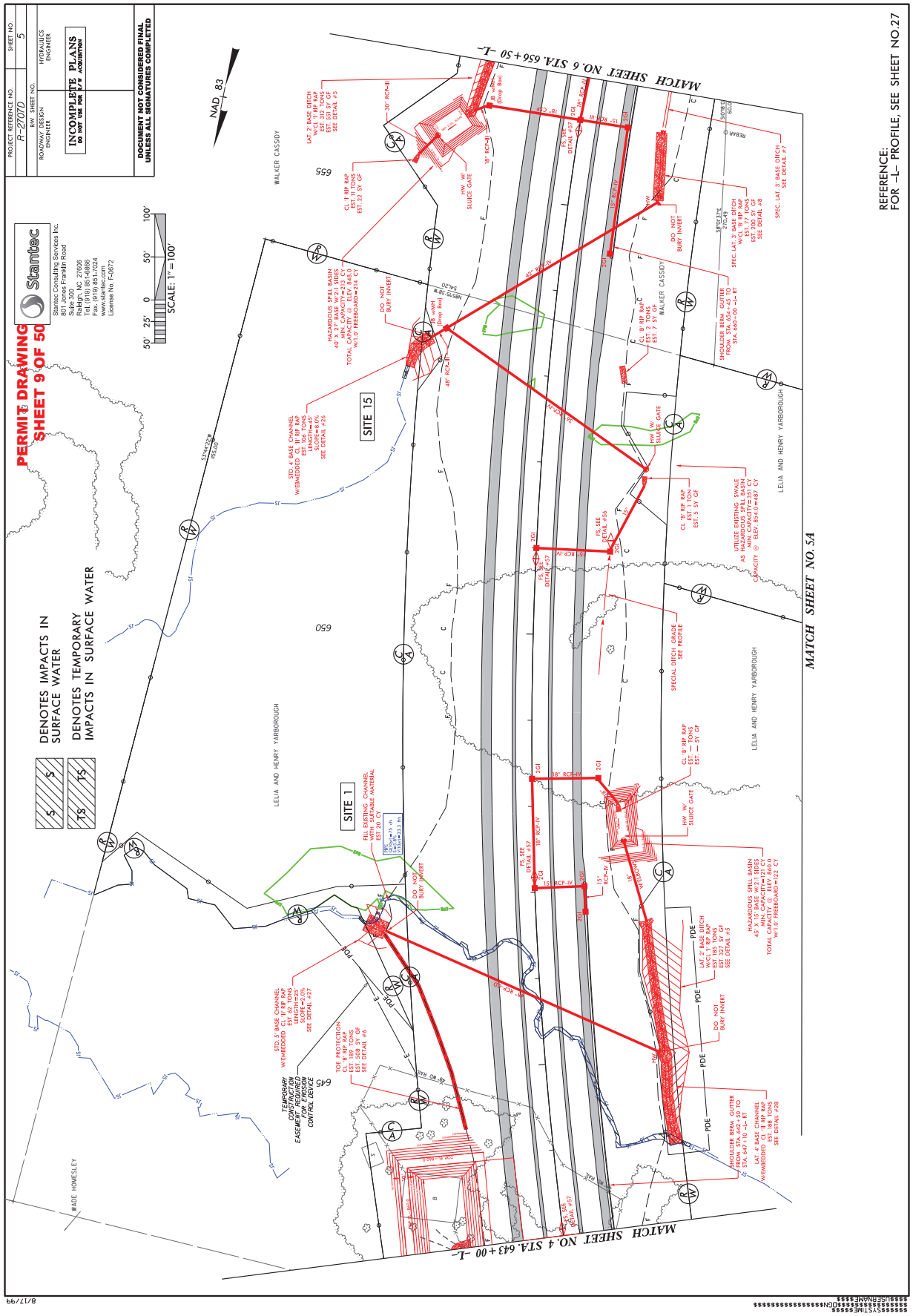
PROJECT REFERENCE NO. R-2707D
SHEET NO. 5
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
PERMIT DRAWING
SHEET 9 OF 50
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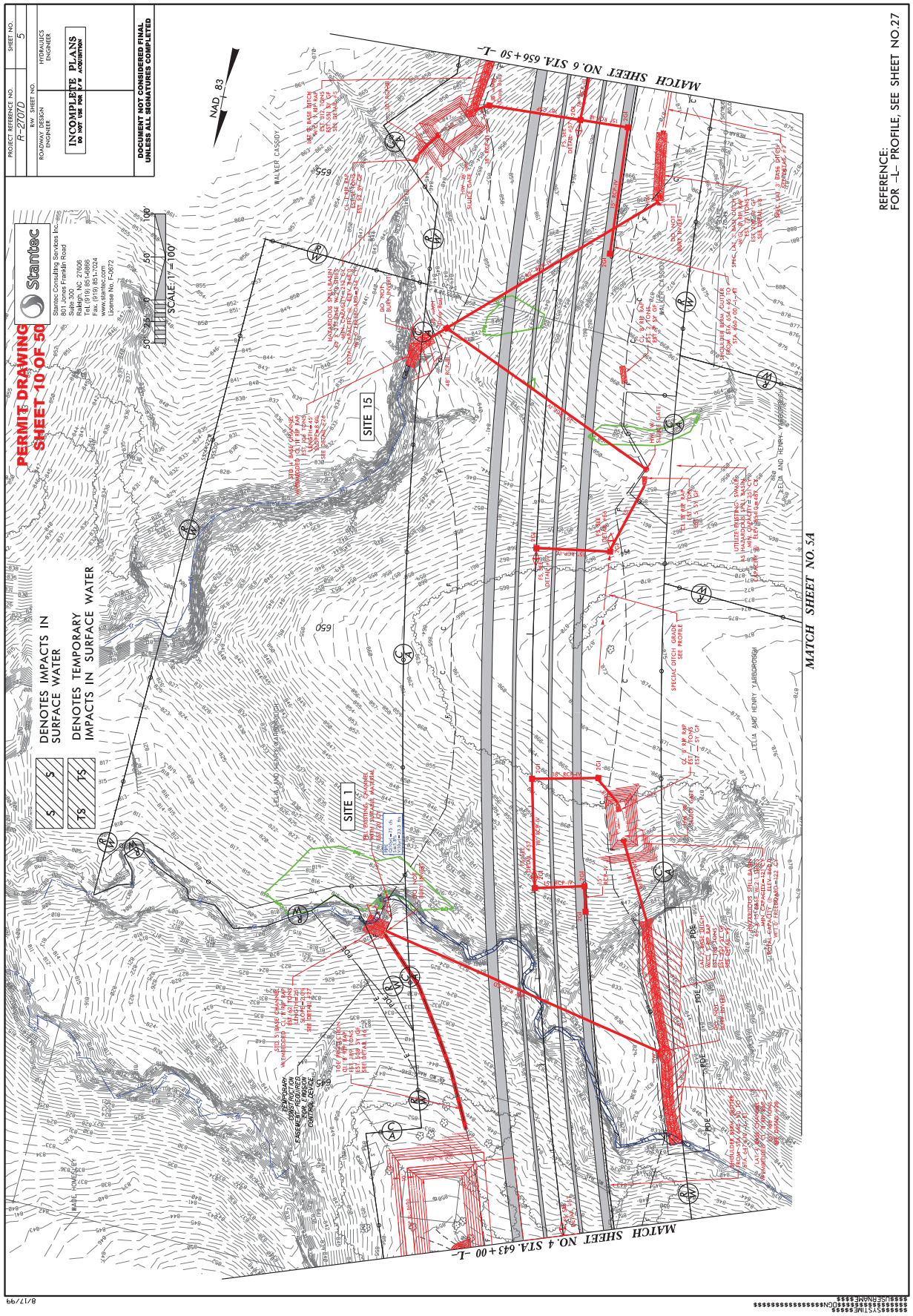
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672
SCALE: 1"=100'
NAD 83
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
MATCH SHEET NO. 6 STA. 656+50 -L-
MATCH SHEET NO. 4 STA. 643+00 -L-
MATCH SHEET NO. 5A
SITE 1
SITE 15
WALKER CASSIDY
LELIA AND HENRY YARBOROUGH
WADE HOMESLEY
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO.27


PROJECT REFERENCE NO.
R-2707D
SHEET NO.
5
R/W SHEET NO.
HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER
INCOMPLETE PLANS
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SHEET 10 OF 50
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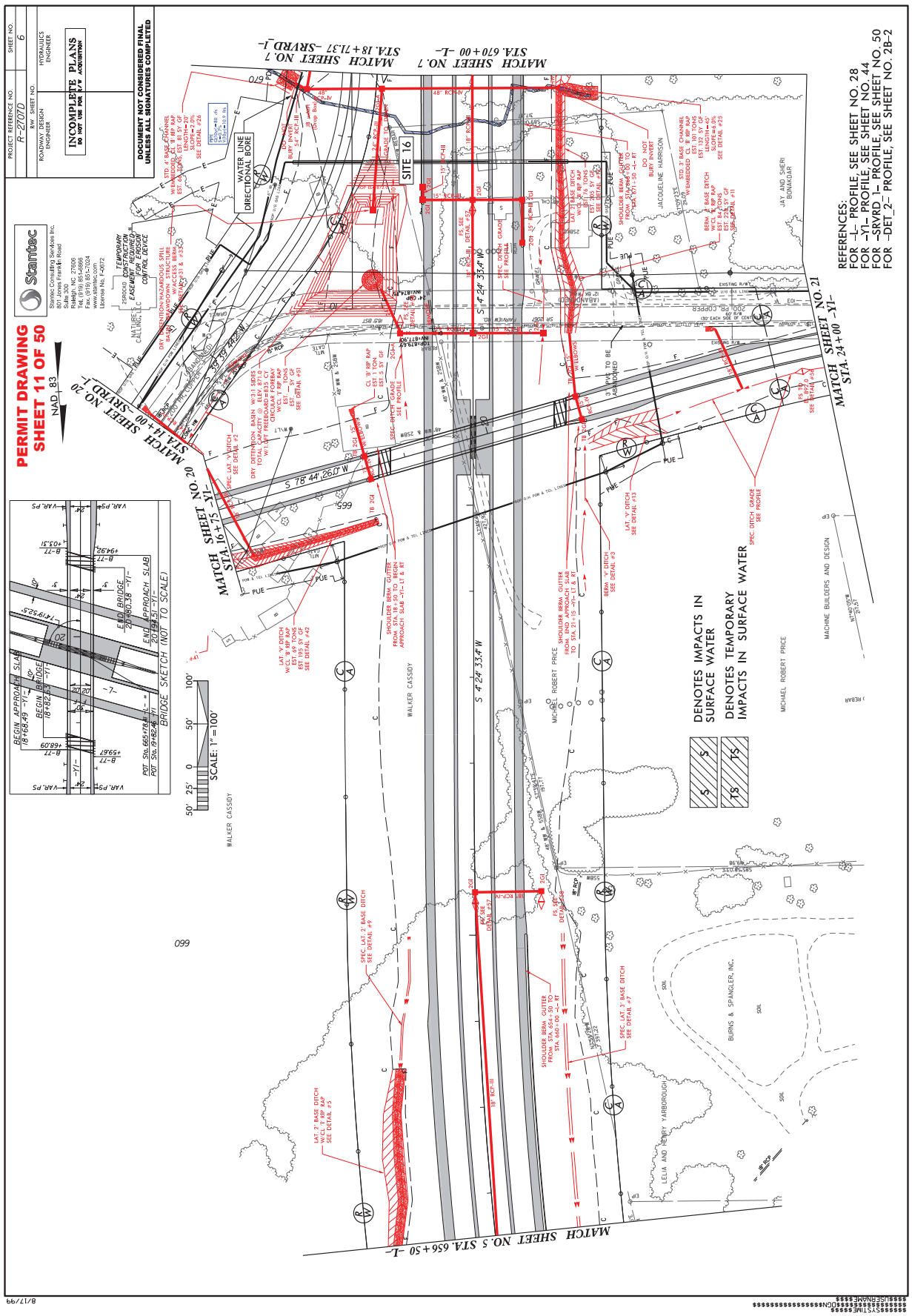
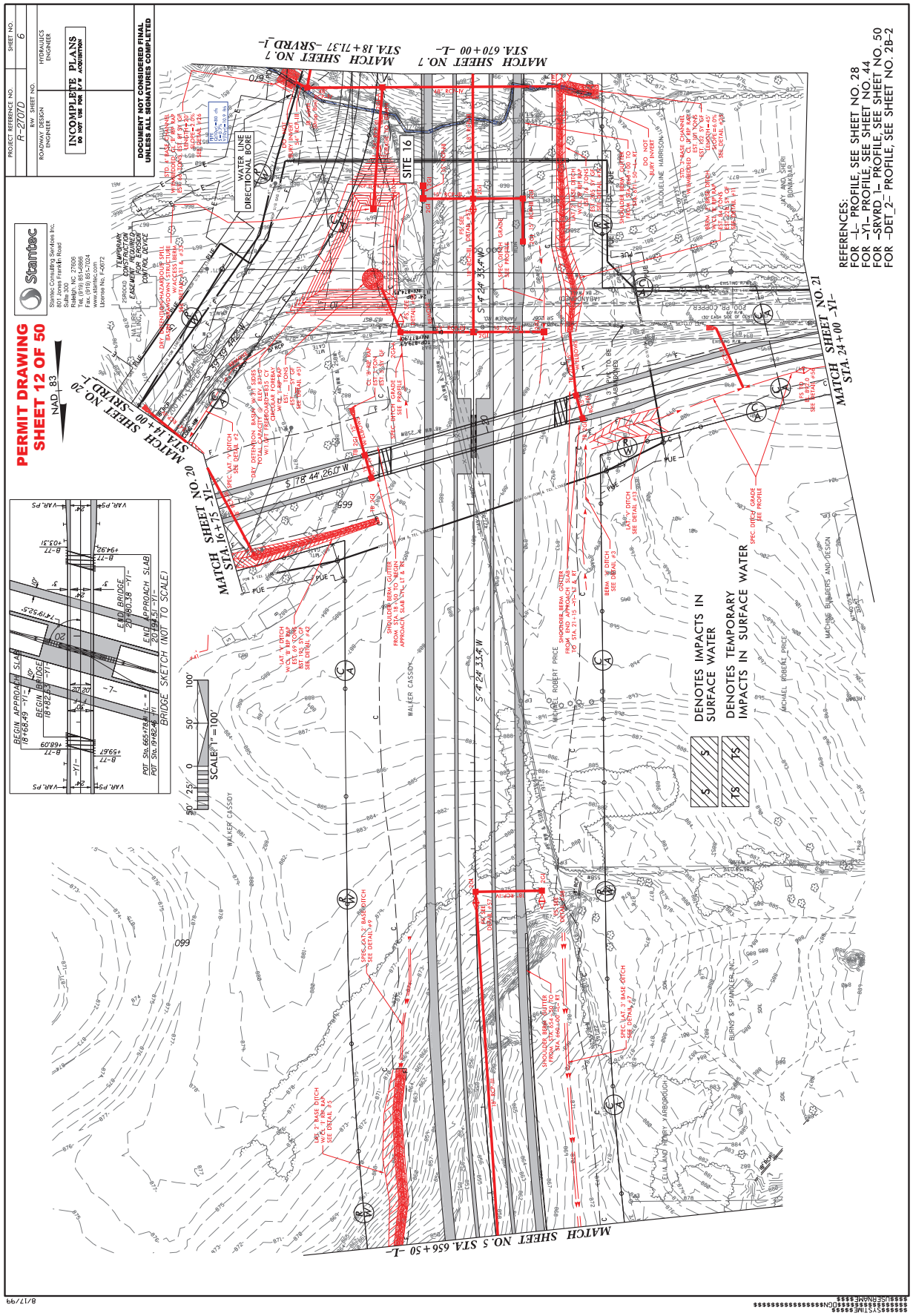
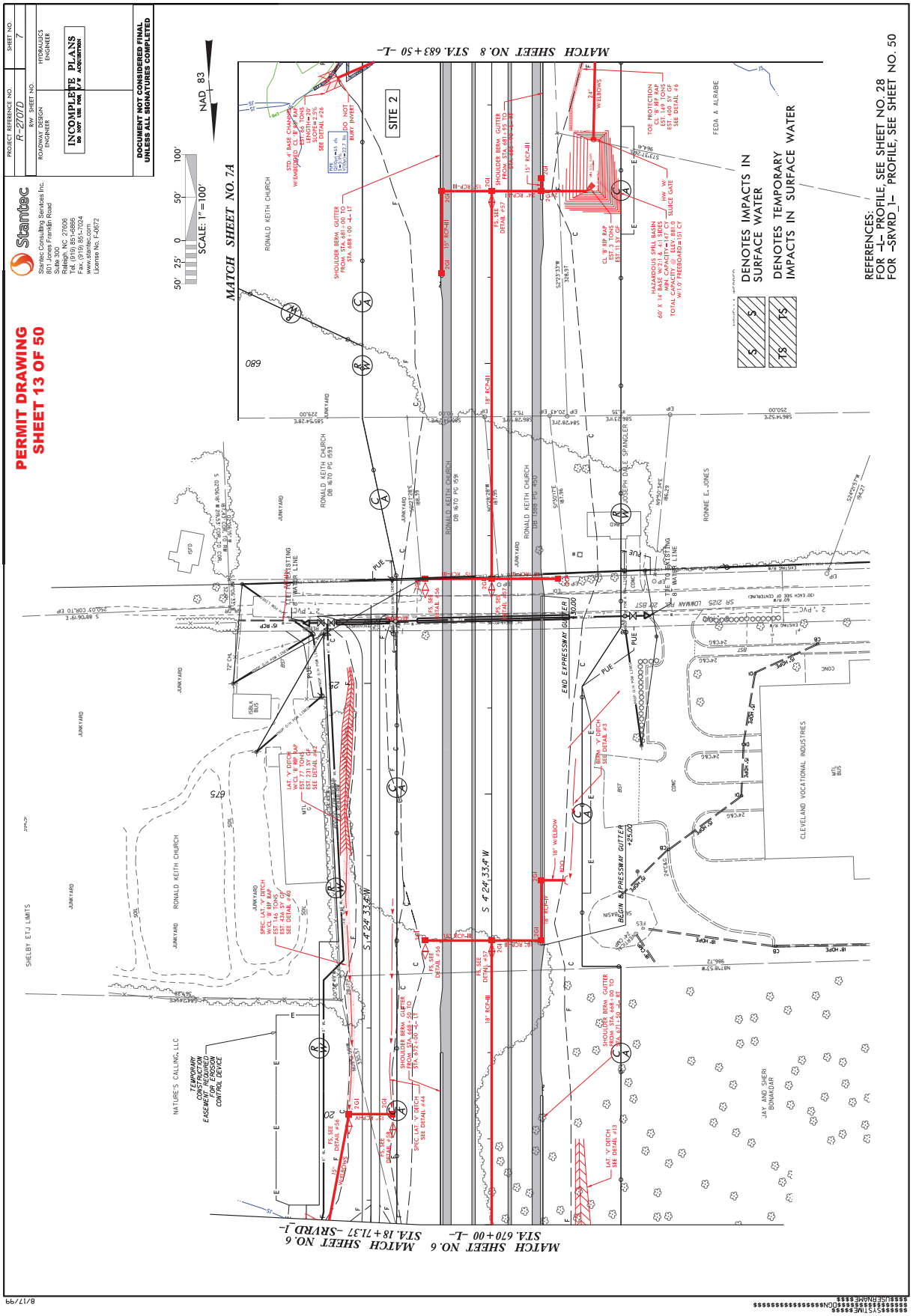
SCALE: 1" = 100'
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
NAD 83
SITE 1
SITE 15
MATCH SHEET NO. 6 STA. 656+50 -L-
MATCH SHEET NO. 4 STA. 643+00 -L-
MATCH SHEET NO. 5A
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO.27


PROJECT REFERENCE NO.
R-2707D
SHEET NO.
6
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
PERMIT DRAWING
SHEET 11 OF 50
NAD 83
SITE 16
WATER LINE DIRECTIONAL BORE
MATCH SHEET NO. 7 STA. 670+00 -L-
MATCH SHEET NO. 7 STA. 18+71.37 -SRVRD_1-
MATCH SHEET NO. 20 STA. 14+00 -SRVRD_1-
MATCH SHEET NO. 20 STA. 16+15 -Y1-
MATCH SHEET NO. 21 STA. 24+00 -Y1-
MATCH SHEET NO. 5 STA. 656+50 -L-
S 4° 24' 33.4" W
S 18° 44' 26.0" W
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
REFERENCES:
FOR -L- PROFILE, SEE SHEET NO. 28
FOR -Y1- PROFILE, SEE SHEET NO. 44
FOR -SRVRD_1- PROFILE, SEE SHEET NO. 50
FOR -DET_2- PROFILE, SEE SHEET NO. 2B-2
Stantec
Stantec Consulting Services Inc.
801 Corporate Center Drive
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6666
Fax. (919) 851-7024
www.stantec.com
License No. F-0672
TEMPORARY CONSTRUCTION ENTRANCE FOR EROSION CONTROL DEVICE
DRY DETENTION/HAZARDOUS SPILL BASIN
WALKER CASSIDY
MICHAEL ROBERT PRICE
JACQUELINE HARRISON
JAY AND SHERI BONAKDAR
MACHINE BUILDERS AND DESIGN
BURNS & SPANGLER, INC.
LELIA AND HENRY YARBOROUGH
BRIDGE SKETCH (NOT TO SCALE)
SCALE: 1"=100'
8/17/99


PROJECT REFERENCE NO.
R-2707D
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
SHEET NO.
6
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
PERMIT DRAWING
SHEET 12 OF 50
NAD 83
Stantec
Stantec Consulting Services Inc.
801 Corporate Center Drive
Suite 300
Raleigh, NC 27607
Tel. (919) 851-6666
Fax (919) 851-7004
www.stantec.com
License No. F-0672
SITE 16
WATER LINE DIRECTIONAL BORE
MATCH SHEET NO. 7 STA. 670+00 -L-
MATCH SHEET NO. 7 STA. 18+71.37 -SRVRD_1-
MATCH SHEET NO. 20 STA. 14+00 -SRVRD_1-
MATCH SHEET NO. 20 STA. 16+75 -Y1-
MATCH SHEET NO. 21 STA. 24+00 -Y1-
MATCH SHEET NO. 5 STA. 656+50 -L-
S 18° 44' 26.0" W
S 4° 24' 35.4" W
S 4° 24' 33.4" W
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
REFERENCES:
FOR -L- PROFILE, SEE SHEET NO. 28
FOR -Y1- PROFILE, SEE SHEET NO. 44
FOR -SRVRD_1- PROFILE, SEE SHEET NO. 50
FOR -DET_2- PROFILE, SEE SHEET NO. 2B-2
BRIDGE SKETCH (NOT TO SCALE)
BEGIN APPROACH SLAB
END APPROACH SLAB
END BRIDGE
BEGIN BRIDGE
SCALE: 1" = 100'
8/17/99


PROJECT REFERENCE NO. R-2707D
SHEET NO. 7
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
Stantec
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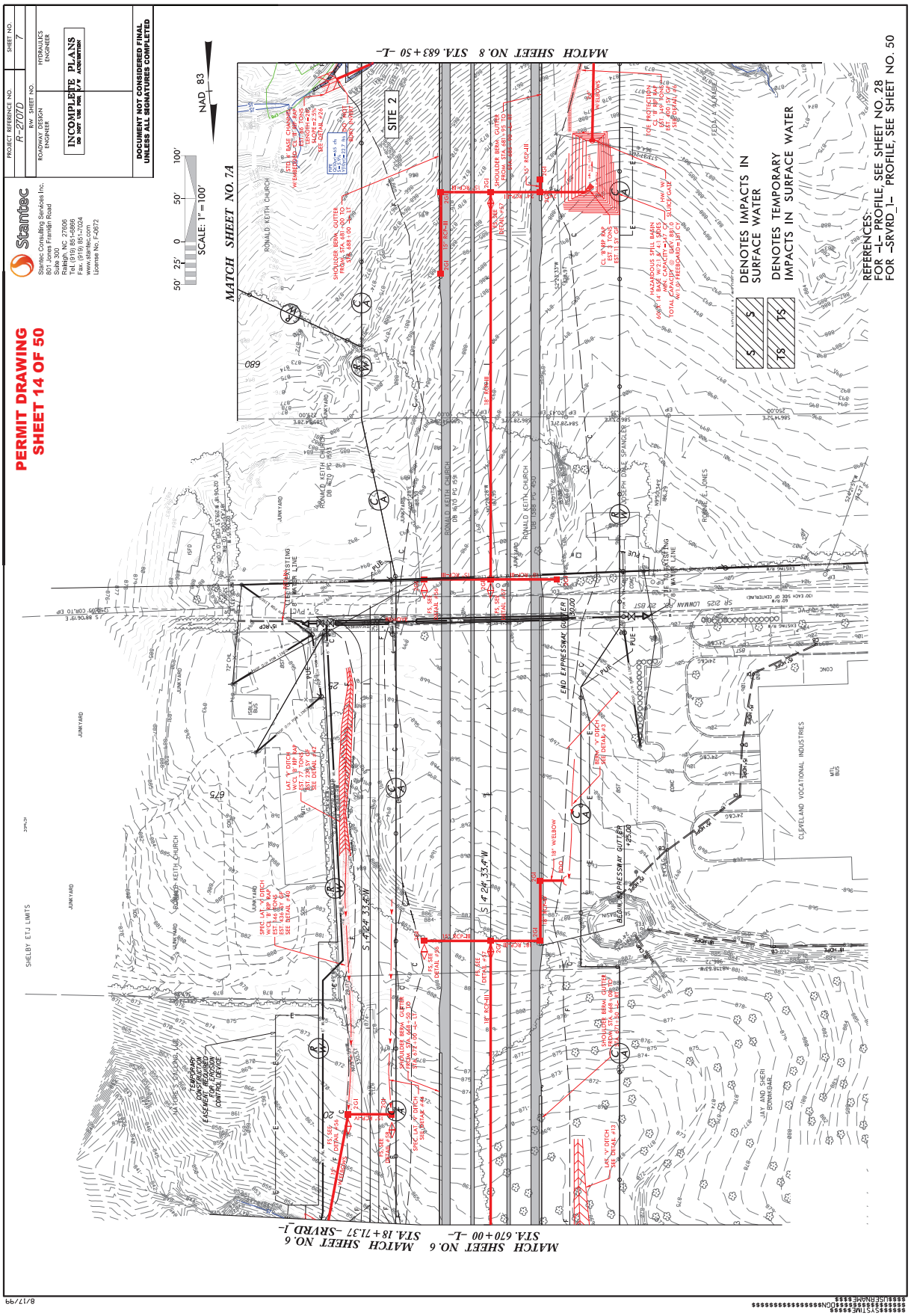
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672
PERMIT DRAWING
SHEET 13 OF 50
NAD 83
SCALE: 1"=100'
MATCH SHEET NO. 7A
MATCH SHEET NO. 8 STA. 683+50 -L-
SITE 2
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
REFERENCES:
FOR -L- PROFILE, SEE SHEET NO. 28
FOR -SRVRD_1- PROFILE, SEE SHEET NO. 50
MATCH SHEET NO. 6 STA. 670+00 -L-
MATCH SHEET NO. 6 STA. 18+71.37 -SRVRD_1-
RONALD KEITH CHURCH
JOSEPH DALE SPANGLER
RONNIE E. JONES
CLEVELAND VOCATIONAL INDUSTRIES
JAY AND SHERI BONADAR
NATURE'S CALLING, LLC
SHELBY ETJ LIMITS
JUNKYARD
END EXPRESSWAY GUTTER
BEGIN EXPRESSWAY GUTTER
TEMPORARY CONSTRUCTION EASEMENT REQUIRED FOR SEDIMENT CONTROL DEVICE
S 4°24'33.4" W
8/17/99


PROJECT REFERENCE NO.
R-2707D
SHEET NO.
7
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
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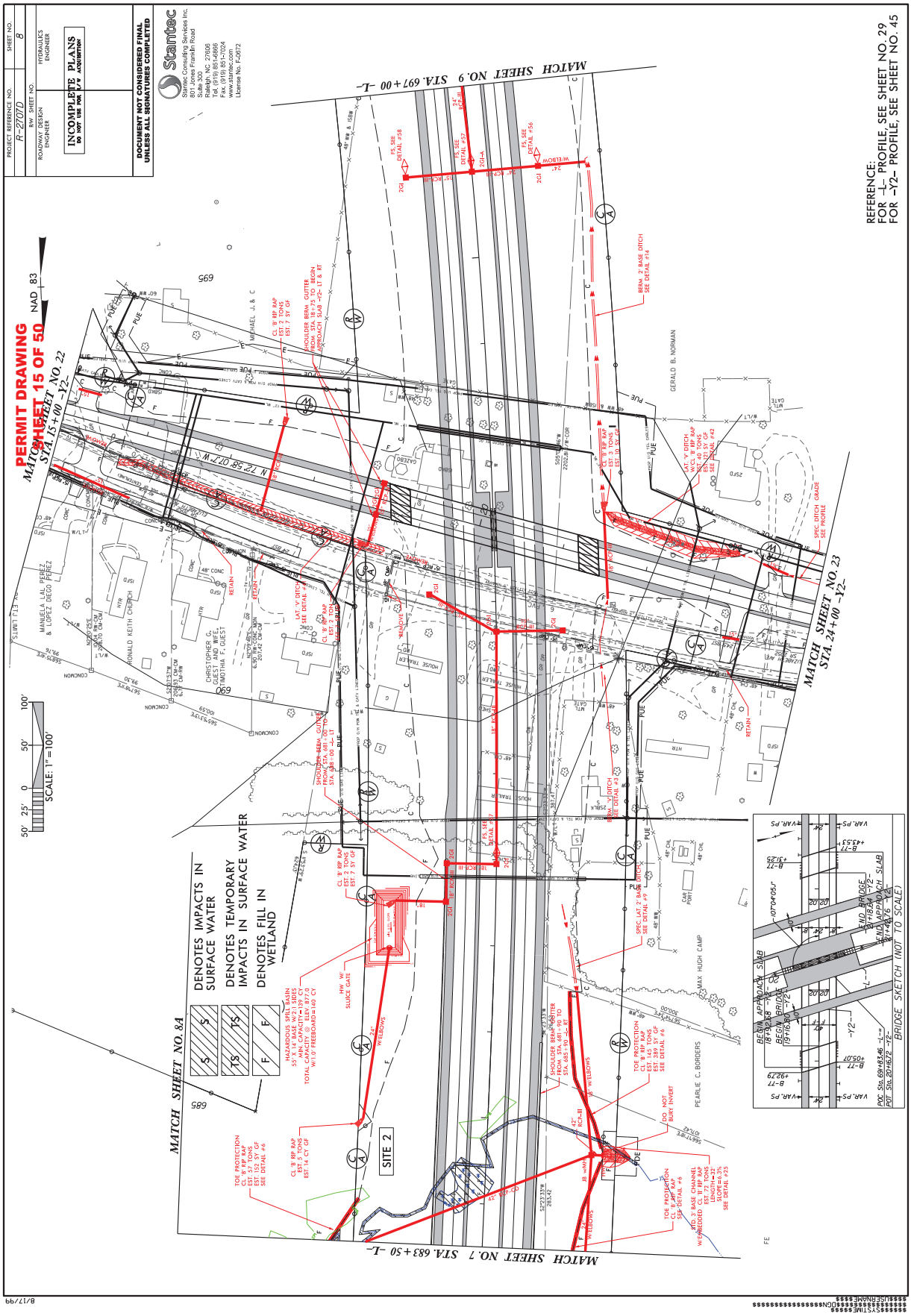
Fax. (919) 851-7024
www.stantec.com
License No. F-0672
PERMIT DRAWING
SHEET 14 OF 50
SCALE: 1"=100'
NAD 83
MATCH SHEET NO. 7A
MATCH SHEET NO. 8 STA. 683+50 -L-
MATCH SHEET NO. 6 STA. 670+00 -L-
MATCH SHEET NO. 6 STA. 18+71.37 -SRVRD_1-
SITE 2
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
REFERENCES:
FOR -L- PROFILE, SEE SHEET NO. 28
FOR -SRVRD_1- PROFILE, SEE SHEET NO. 50
RONALD KEITH CHURCH
JOSEPH DALE SPANGLER
CLEVELAND VOCATIONAL INDUSTRIES
JAY AND SHERI BOWMAN
SHELBY ETJ LIMITS
JUNKYARD
END EXPRESSWAY GUTTER
8/17/99


PERMIT DRAWING
MATCH SHEET 15 OF 50
MATCH SHEET NO. 22
STA. 15+00 -Y2-
MATCH SHEET NO. 9 STA. 697+00 -L-
MATCH SHEET NO. 23
STA. 24+00 -Y2-
MATCH SHEET NO. 84
MATCH SHEET NO. 7 STA. 683+50 -L-
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO. 29
FOR -Y2- PROFILE, SEE SHEET NO. 45
NAD 83
SCALE: 1"=100'
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
SITE 2
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
PROJECT REFERENCE NO. R-2707D
SHEET NO. 8
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
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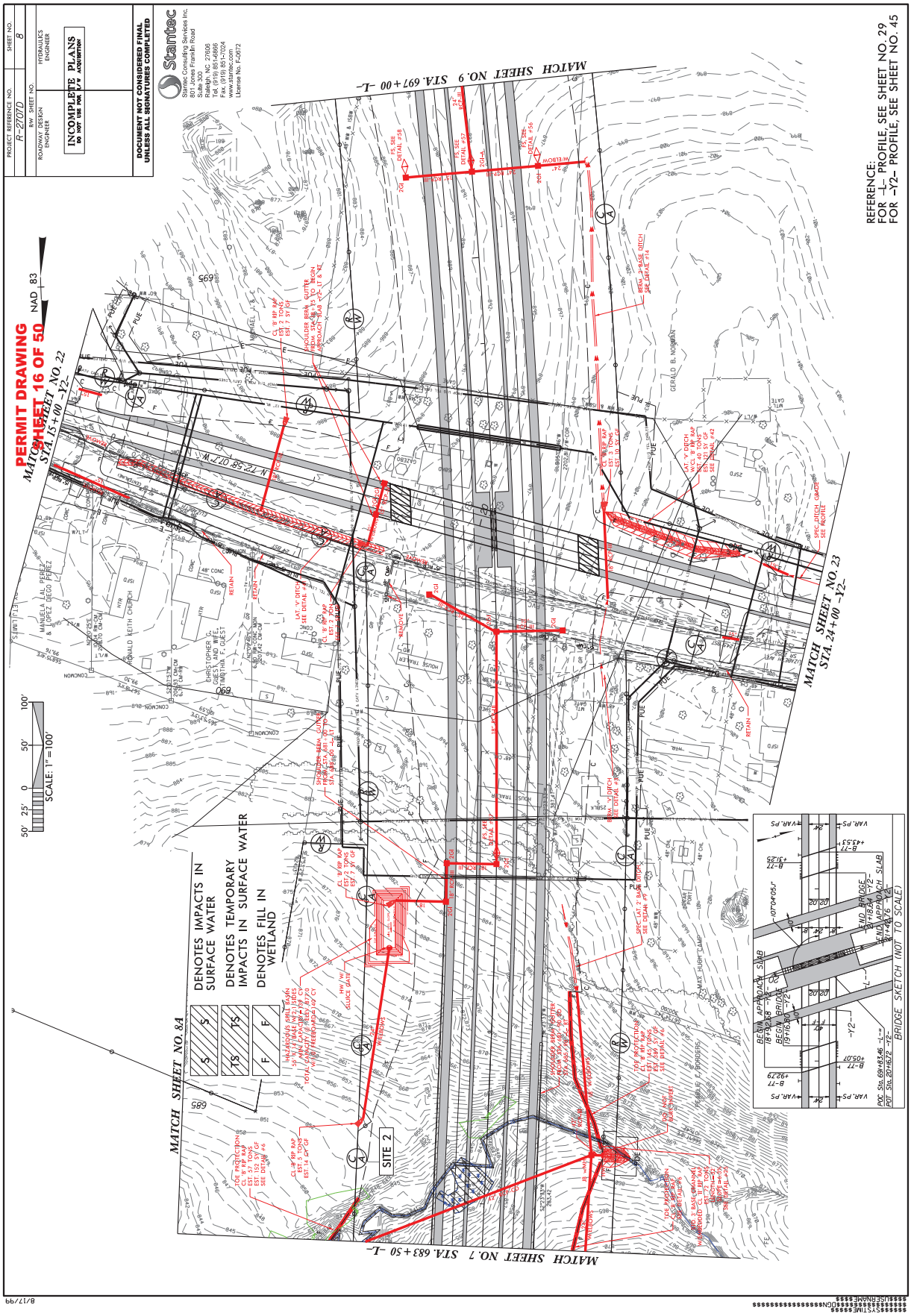
Raleigh, NC 27606
Tel. (919) 851-6866
Fax (919) 851-7024
www.stantec.com
License No. F-0672
BRIDGE SKETCH (NOT TO SCALE)
8/17/99


PROJECT REFERENCE NO.
R-2707D
SHEET NO.
8
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
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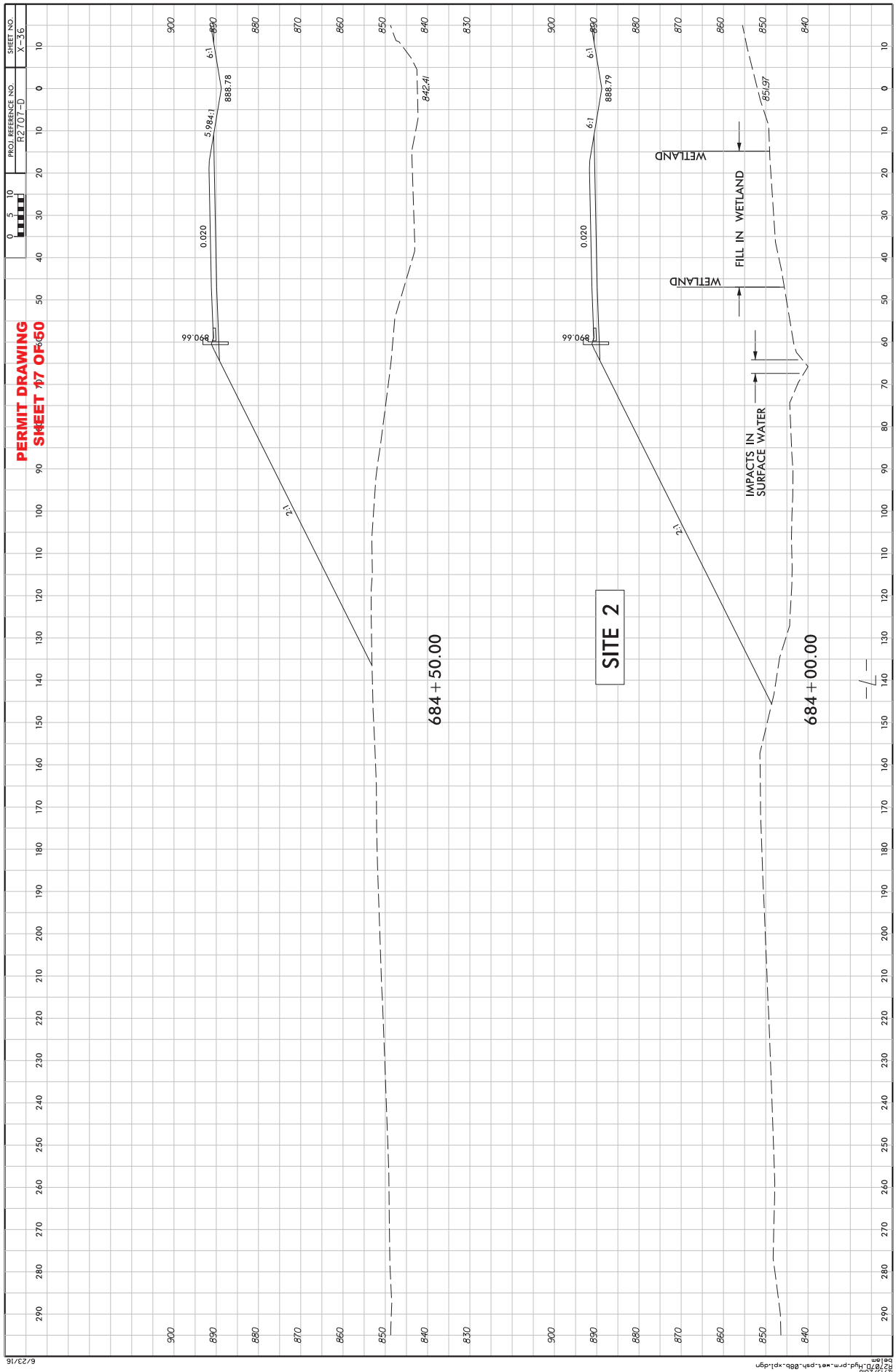
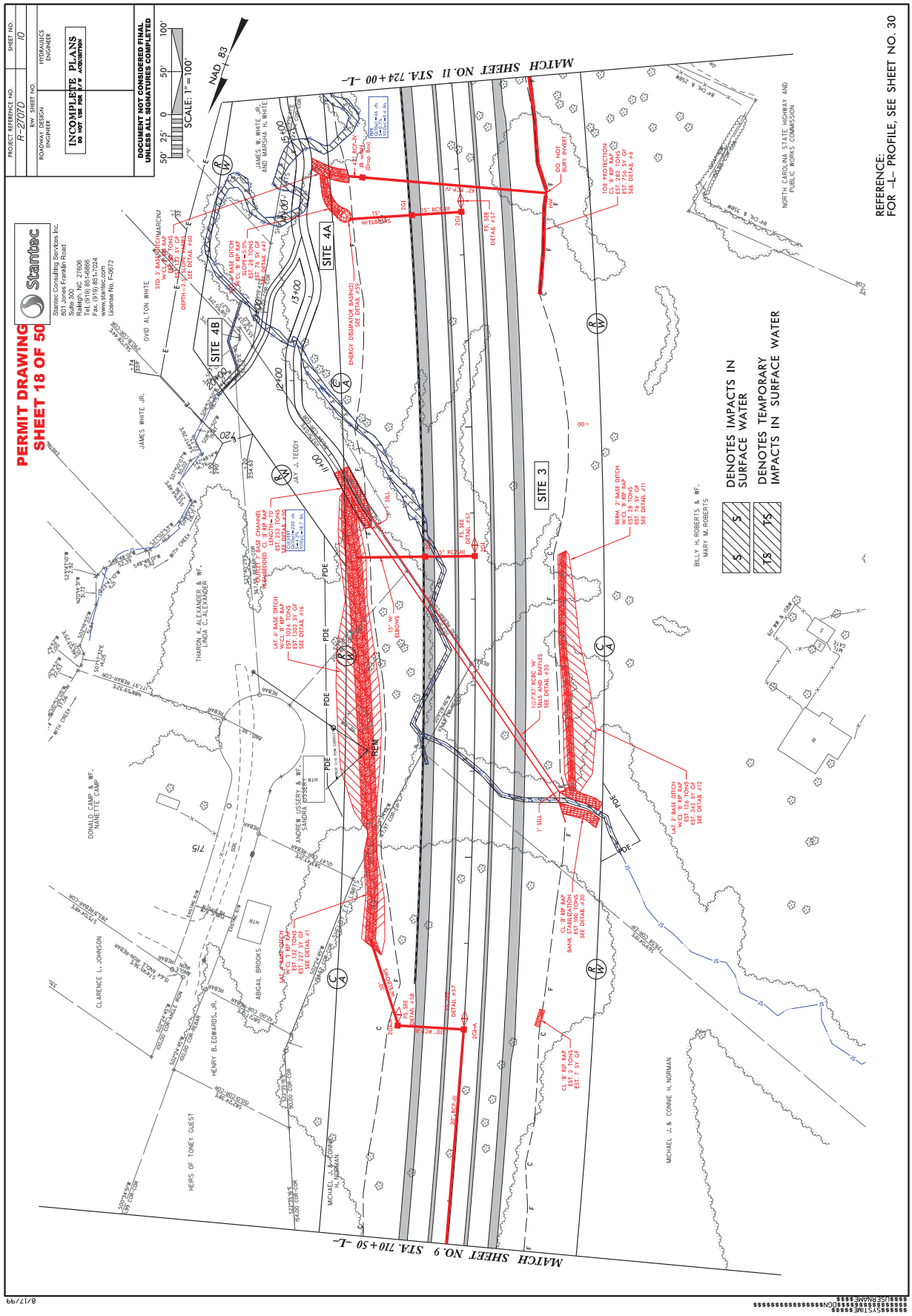
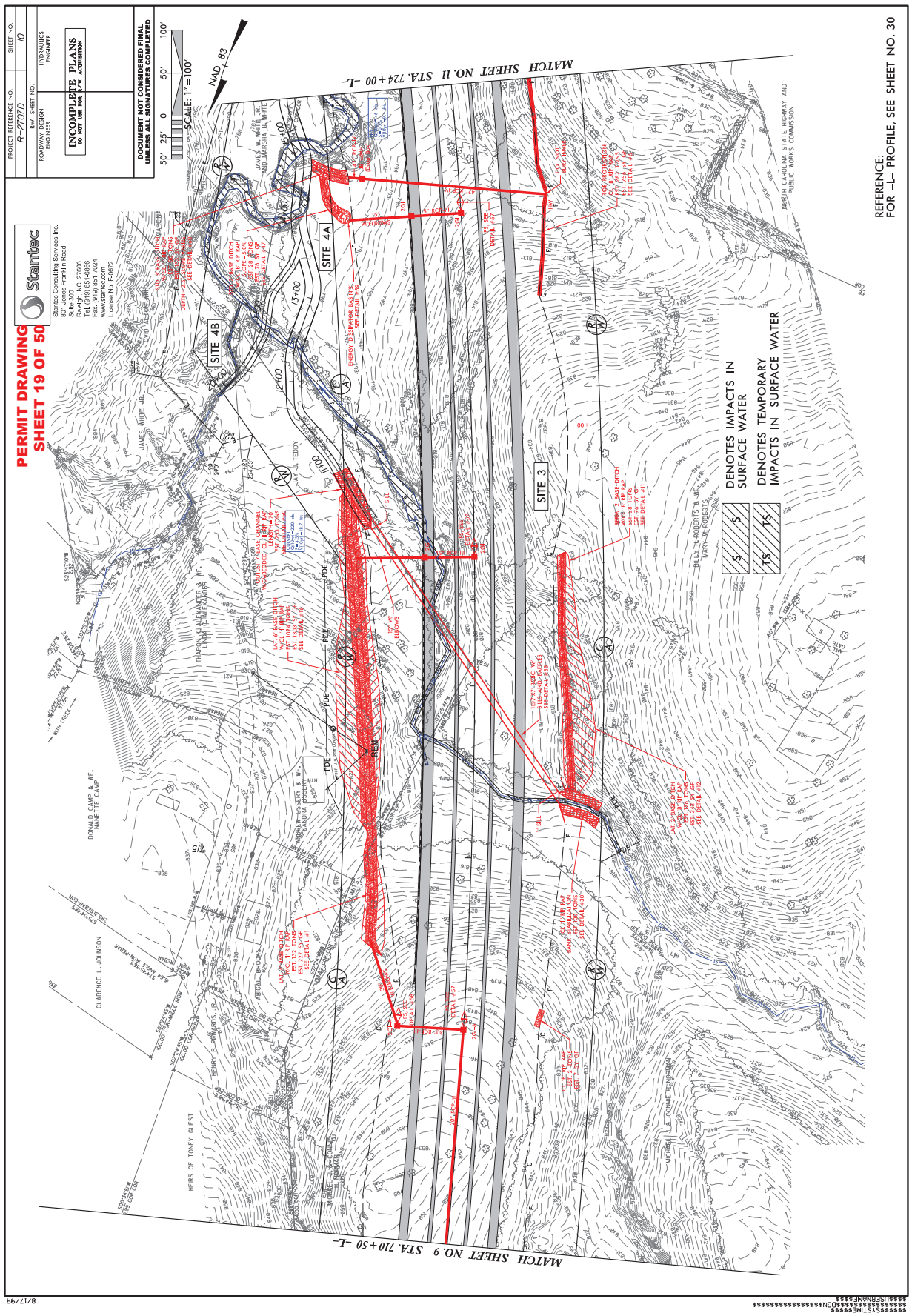
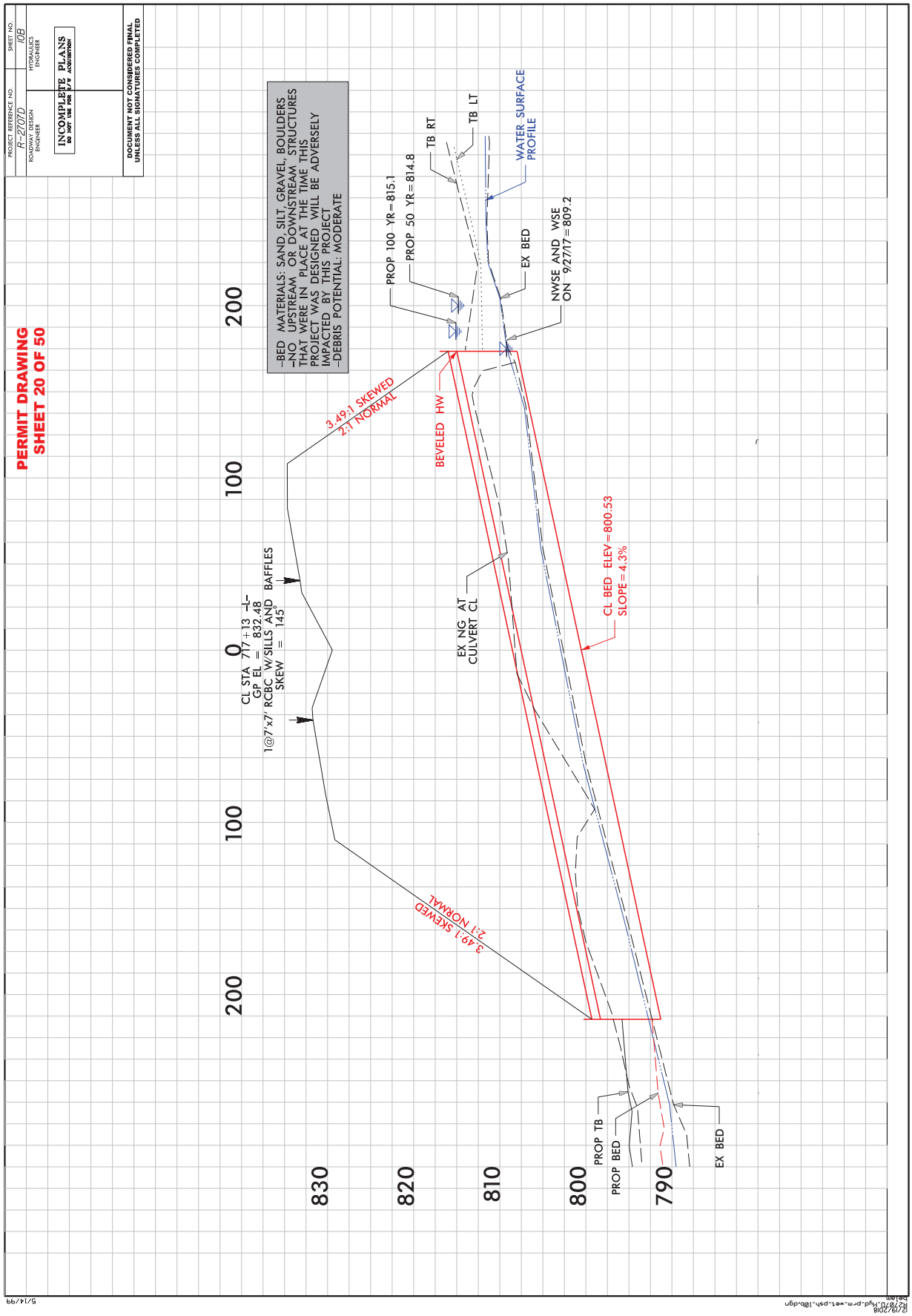
Fax (919) 851-7024
www.stantec.com
License No. F-0672
PERMIT DRAWING
SHEET 16 OF 50
MATCH SHEET NO. 22
STA. 15+00 -Y2-
NAD 83
MATCH SHEET NO. 9 STA. 697+00 -L-
MATCH SHEET NO. 23
STA. 24+00 -Y2-
MATCH SHEET NO. 8A
MATCH SHEET NO. 7 STA. 683+50 -L-
SCALE: 1"=100'
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
SITE 2
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO. 29
FOR -Y2- PROFILE, SEE SHEET NO. 45
BRIDGE SKETCH (NOT TO SCALE)
8/17/99

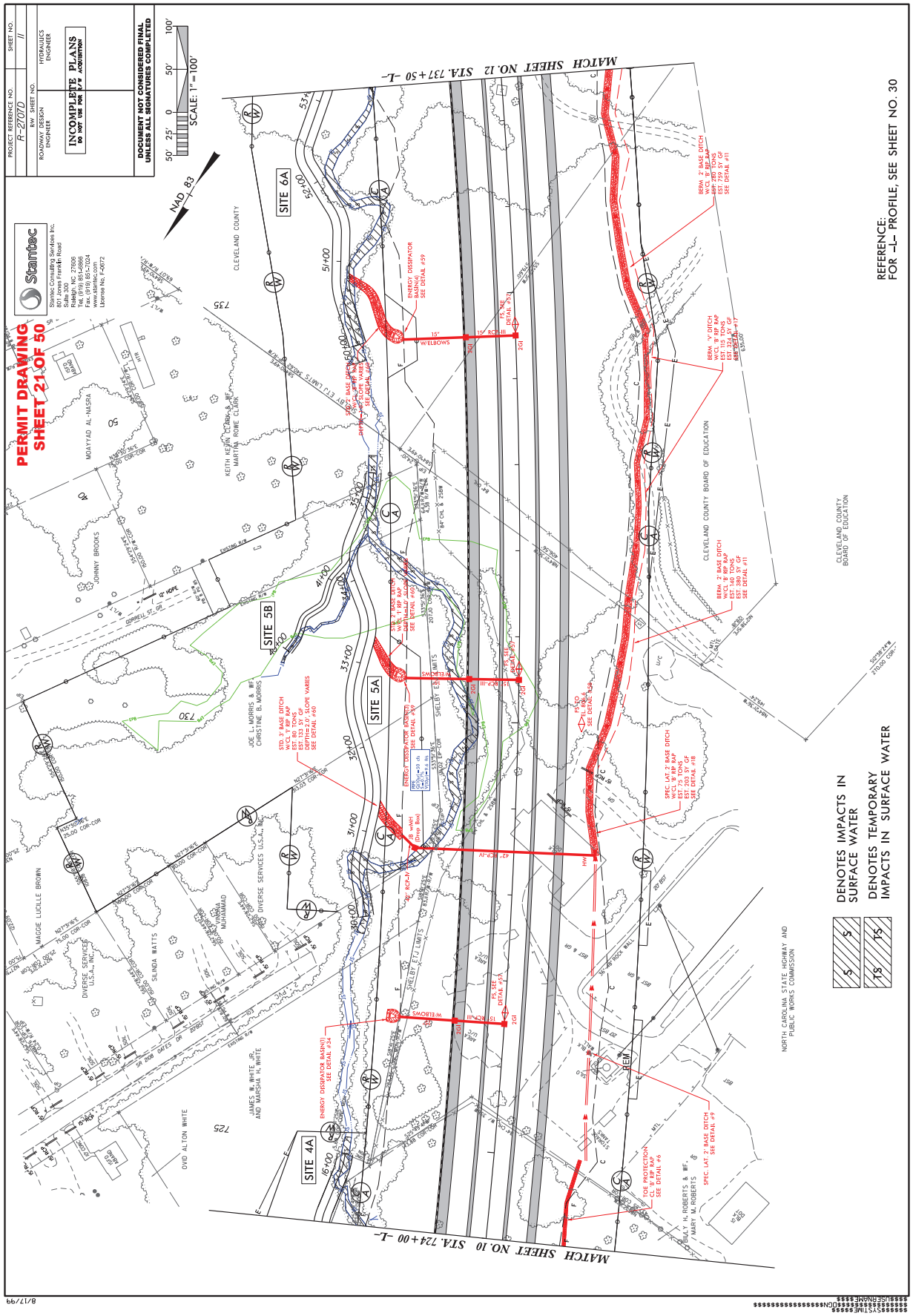

PERMIT DRAWING
SHEET 17 OF 60
SHEET NO. X-36
PROJ. REFERENCE NO. R2707-D
0 5 10
SITE 2
684+50.00
684+00.00
890.66
888.78
888.79
842.41
851.97
6:1
5.984:1
0.020
2:1
WETLAND
FILL IN WETLAND
WETLAND
IMPACTS IN SURFACE WATER
6/23/16
R2707D_Hyd-prm-wet-psh_08b-xpl.dgn
12/19/2018

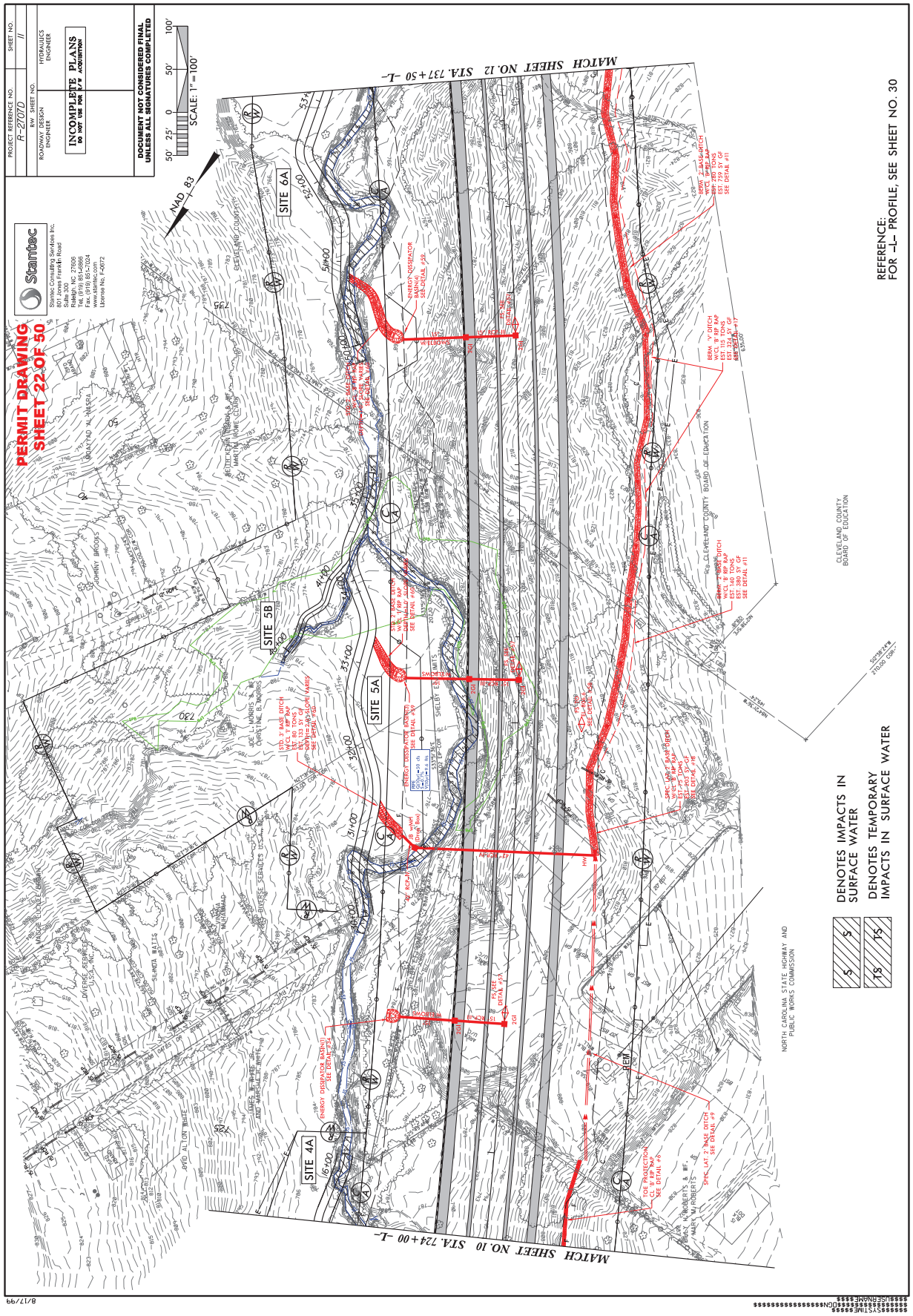


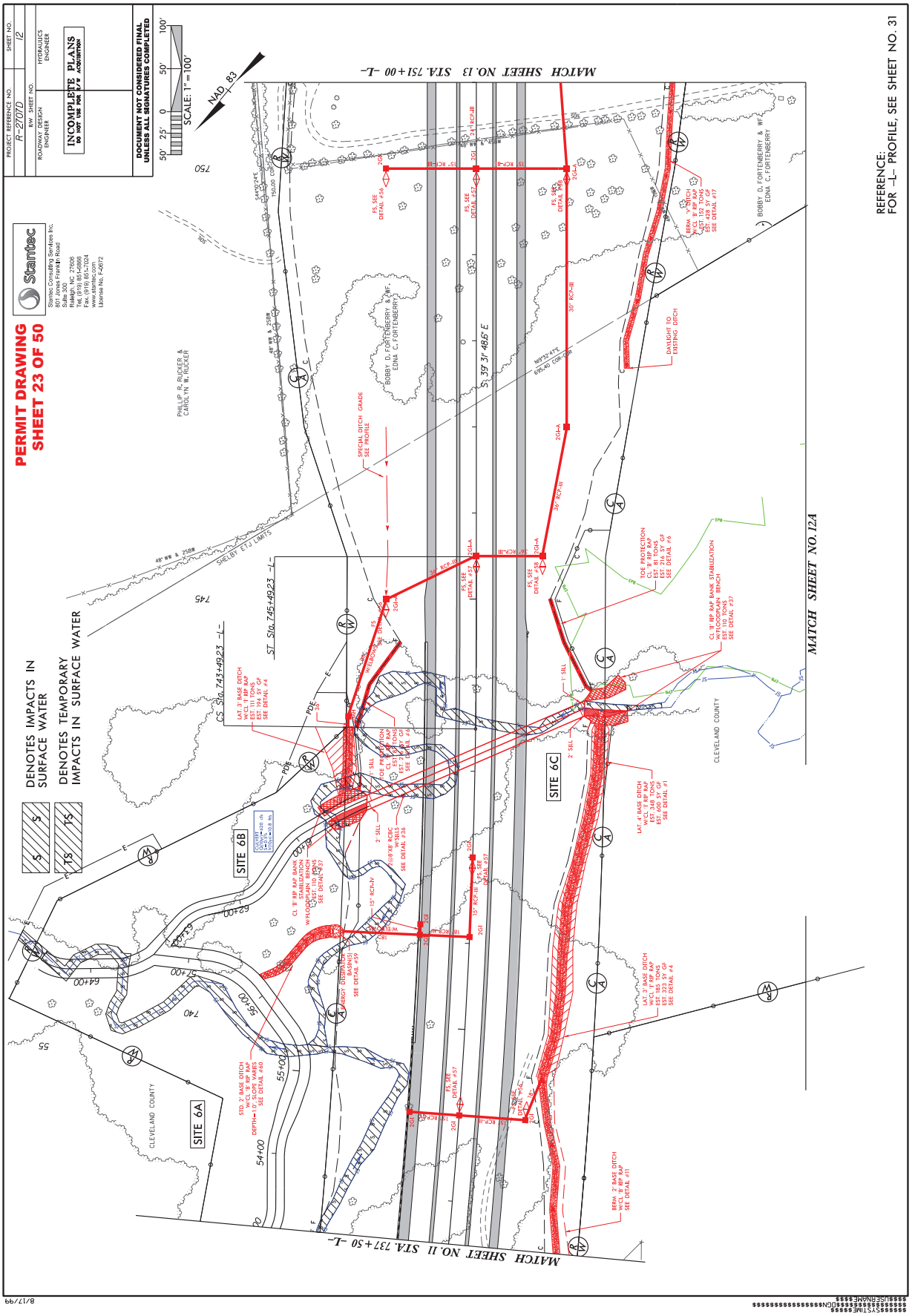
8/17/99
$$$$$SYSTIME$$$$$
$$$$$


PROJECT REFERENCE NO.
R-2707D
SHEET NO.
10
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1" = 100'
50' 25' 0 50' 100'
NAD 83
PERMIT DRAWING
SHEET 19 OF 50
Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. C-0672
MATCH SHEET NO. 11 STA. 724+00 -L-
MATCH SHEET NO. 9 STA. 710+50 -L-
SITE 4A
SITE 4B
SITE 3
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO. 30
8/17/99


PROJECT REFERENCE NO.
A-2707D
SHEET NO.
10B
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
PERMIT DRAWING
SHEET 20 OF 50
-BED MATERIALS: SAND, SILT, GRAVEL, BOULDERS
-NO UPSTREAM OR DOWNSTREAM STRUCTURES THAT WERE IN PLACE AT THE TIME THIS PROJECT WAS DESIGNED WILL BE ADVERSELY IMPACTED BY THIS PROJECT
-DEBRIS POTENTIAL: MODERATE
CL STA 717+13 -L-
GP EL = 832.48
1@7'x7' RCBC W/SILLS AND BAFFLES
SKEW = 145°
3.49:1 SKEWED
2:1 NORMAL
BEVELED HW
EX NG AT CULVERT CL
CL BED ELEV=800.53
SLOPE=4.3%
PROP 100 YR=815.1
PROP 50 YR=814.8
TB RT
TB LT
WATER SURFACE PROFILE
EX BED
NWSE AND WSE ON 9/27/17=809.2
PROP TB
PROP BED
EX BED
0
100
200
100
200
830
820
810
800
790
5/14/99
12/19/2018
RE7/0/0_hyd-p-m-wet-psh-18b.dgn
58.9m


PROJECT REFERENCE NO.
R-2707D
SHEET NO.
11
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1"=100'
NAD 83
Stantec
PERMIT DRAWING
SHEET 21 OF 50
MATCH SHEET NO. 12 STA. 737+50 -L-
MATCH SHEET NO. 10 STA. 724+00 -L-
SITE 4A
SITE 5A
SITE 5B
SITE 6A
CLEVELAND COUNTY
CLEVELAND COUNTY BOARD OF EDUCATION
NORTH CAROLINA STATE HIGHWAY AND PUBLIC WORKS COMMISSION
SHELBY E.T.J. LIMITS
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO. 30


PERMIT DRAWING
SHEET 22 OF 50
PROJECT REFERENCE NO. R-2707D
SHEET NO. 11
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1"= 100'
NAD 83
Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 854-6866
Fax (919) 851-7024
www.stantec.com
License No. F-0672
MATCH SHEET NO. 12 STA. 737+50 -L-
MATCH SHEET NO. 10 STA. 724+00 -L-
SITE 6A
SITE 5B
SITE 5A
SITE 4A
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO. 30
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
NORTH CAROLINA STATE HIGHWAY AND PUBLIC WORKS COMMISSION
CLEVELAND COUNTY BOARD OF EDUCATION
8/17/99


PROJECT REFERENCE NO.
R-2707D
SHEET NO.
12
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1" = 100'
NAD 83
PERMIT DRAWING
SHEET 23 OF 50
Stantec
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
MATCH SHEET NO. 13 STA. 751+00 -L-
MATCH SHEET NO. 11 STA. 737+50 -L-
MATCH SHEET NO. 12A
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO. 31
SITE 6A
SITE 6B
SITE 6C
CLEVELAND COUNTY
PHILLIP R. RUCKER & CAROLYN W. RUCKER
BOBBY D. FORTENBERRY & WF. EDNA C. FORTENBERRY
SHELBY ETJ LIMITS
CS Sta. 743+49.23 -L-
ST Sta. 745+49.23 -L-
S 39° 31' 48.7" E
DAYLIGHT TO EXISTING DITCH
SPECIAL DITCH GRADE SEE PROFILE
TOE PROTECTION CL II RIP RAP EST. 81 TONS EST. 216 SY GF SEE DETAIL #6
CL II RIP RAP BANK STABILIZATION W/FLOODPLAIN BENCH EST. 110 TONS SEE DETAIL #37
LAT. 3' BASE DITCH W/CL II RIP RAP EST. 111 TONS EST. 194 SY GF SEE DETAIL #4
LAT. 4' BASE DITCH W/CL 1' RIP RAP EST. 348 TONS EST. 660 SY GF SEE DETAIL #1
LAT. 3' BASE DITCH W/CL 1' RIP RAP EST. 180 TONS EST. 323 SY GF SEE DETAIL #4
STD. 2' BASE DITCH W/CL II RIP RAP SEE DETAIL #40
BERM 2' BASE DITCH W/CL II RIP RAP SEE DETAIL #11
BERM V-DITCH W/CL II RIP RAP EST. 157 TONS EST. 428 SY GF SEE DETAIL #17
AGRICULTURAL DITCH TO BE RELOCATED SEE DETAIL #39
FS. SEE DETAIL #36
FS. SEE DETAIL #37
FS. SEE DETAIL #40
FS. SEE DETAIL #39
FS. SEE DETAIL #38
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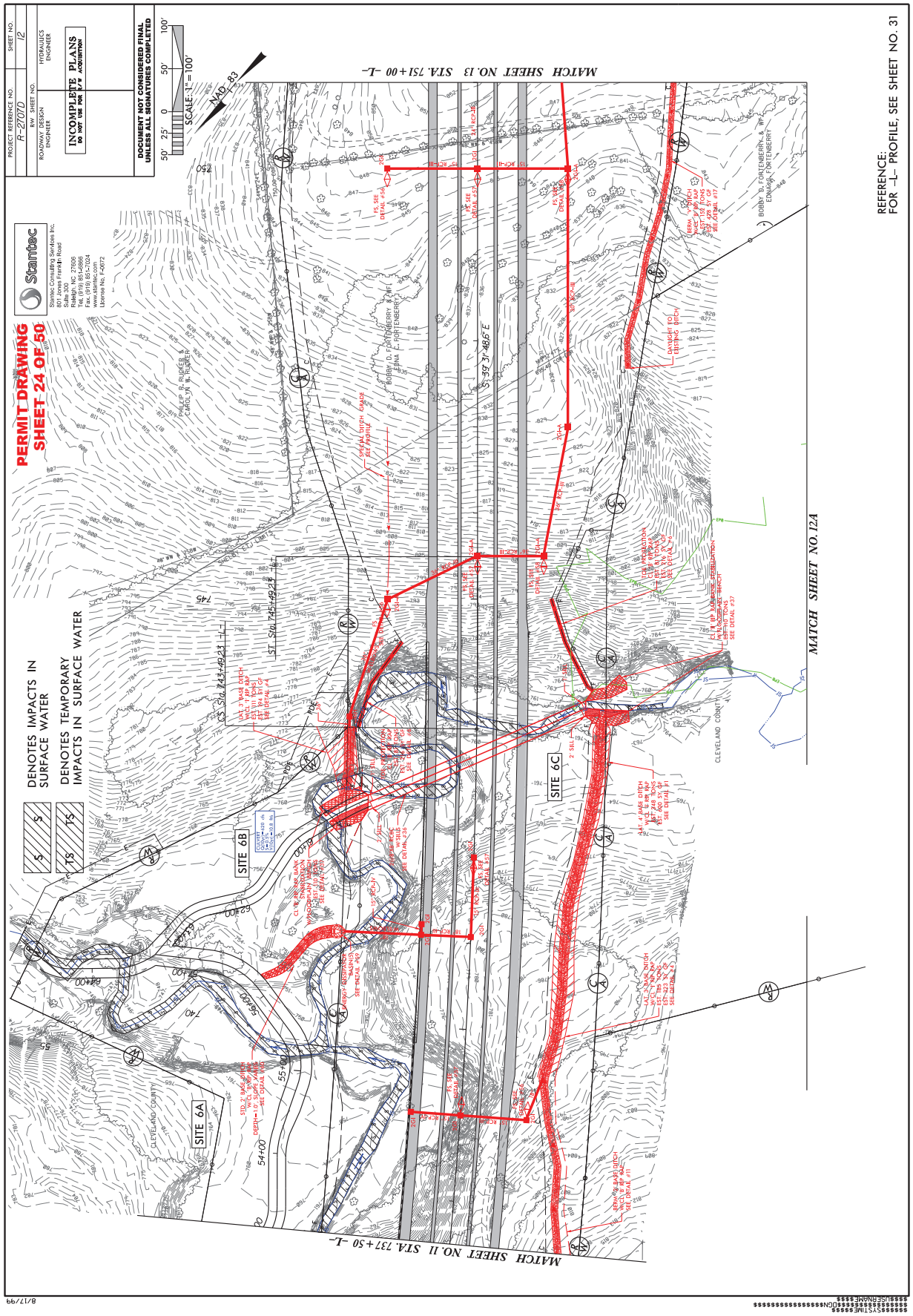
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R-2707D
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R/W SHEET NO.
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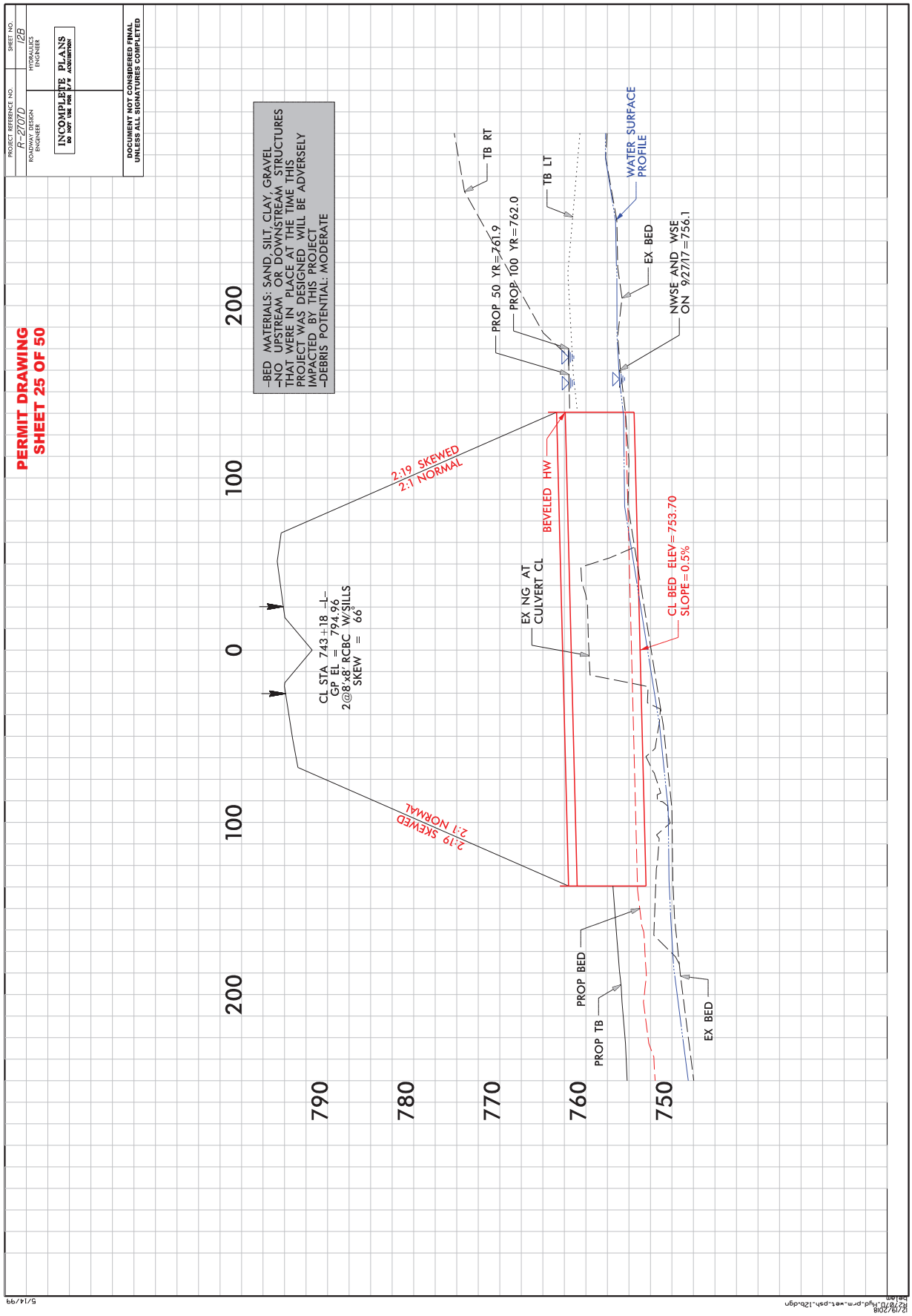
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1" = 100'
NAD 83
PERMIT DRAWING
SHEET 24 OF 50
Stantec
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
MATCH SHEET NO. 13 STA. 751+00 -L-
MATCH SHEET NO. 11 STA. 737+50 -L-
MATCH SHEET NO. 12A
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO. 31
SITE 6A
SITE 6B
SITE 6C
CLEVELAND COUNTY
PHILLIP R. RUDDER
CAROLYN W. RUDDER
BOBBY D. FORTENBERRY & WIFE
DONNA C. FORTENBERRY
Bobby D. FORTENBERRY, & WIFE
EDNA M. FORTENBERRY
S 39° 31' 48" E
ST. STA. 745+49.23 -L-
CS STA. 743+49.23 -L-
54+00
55+00
56+00
64+00
740
745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SHEET NO.
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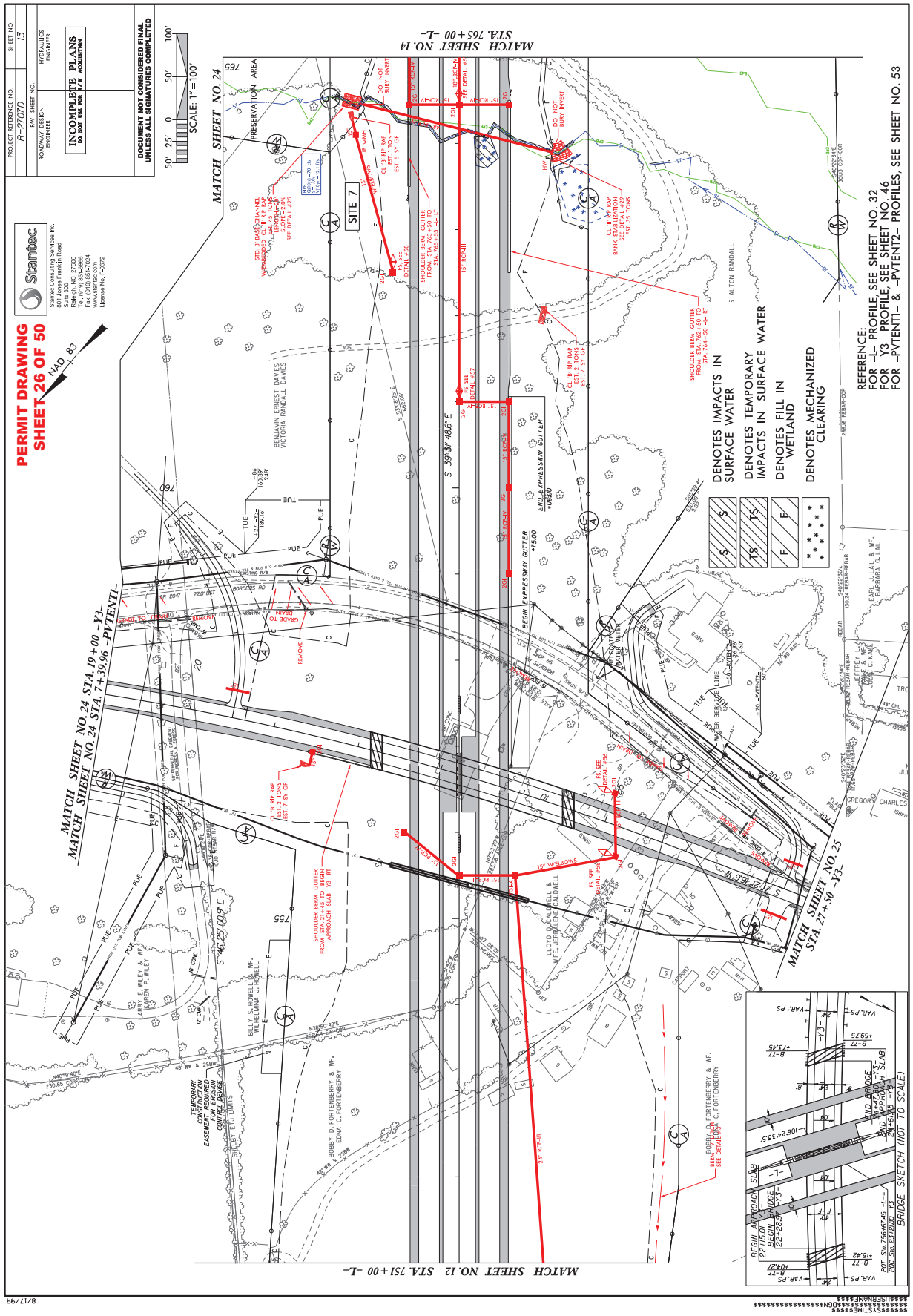
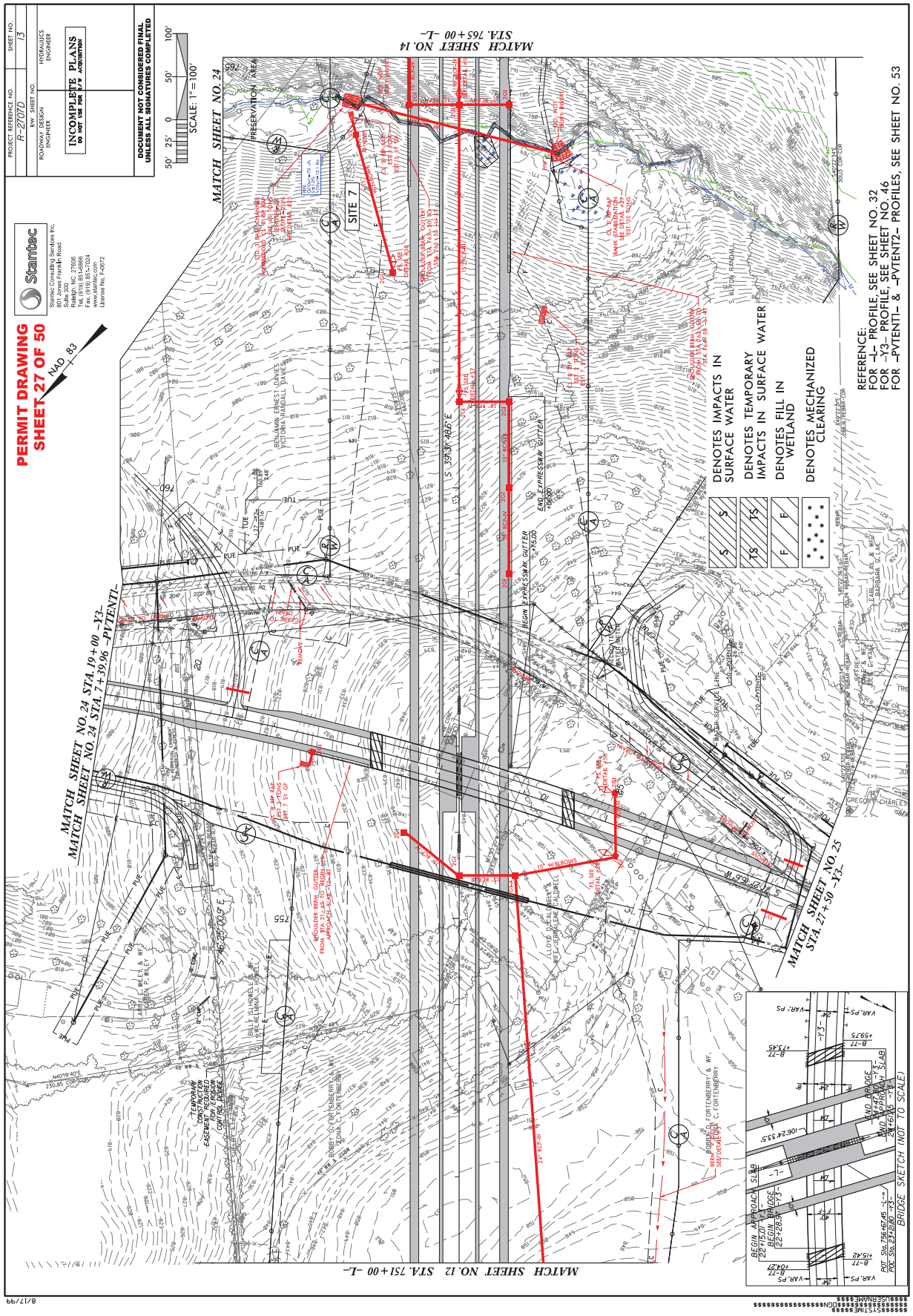
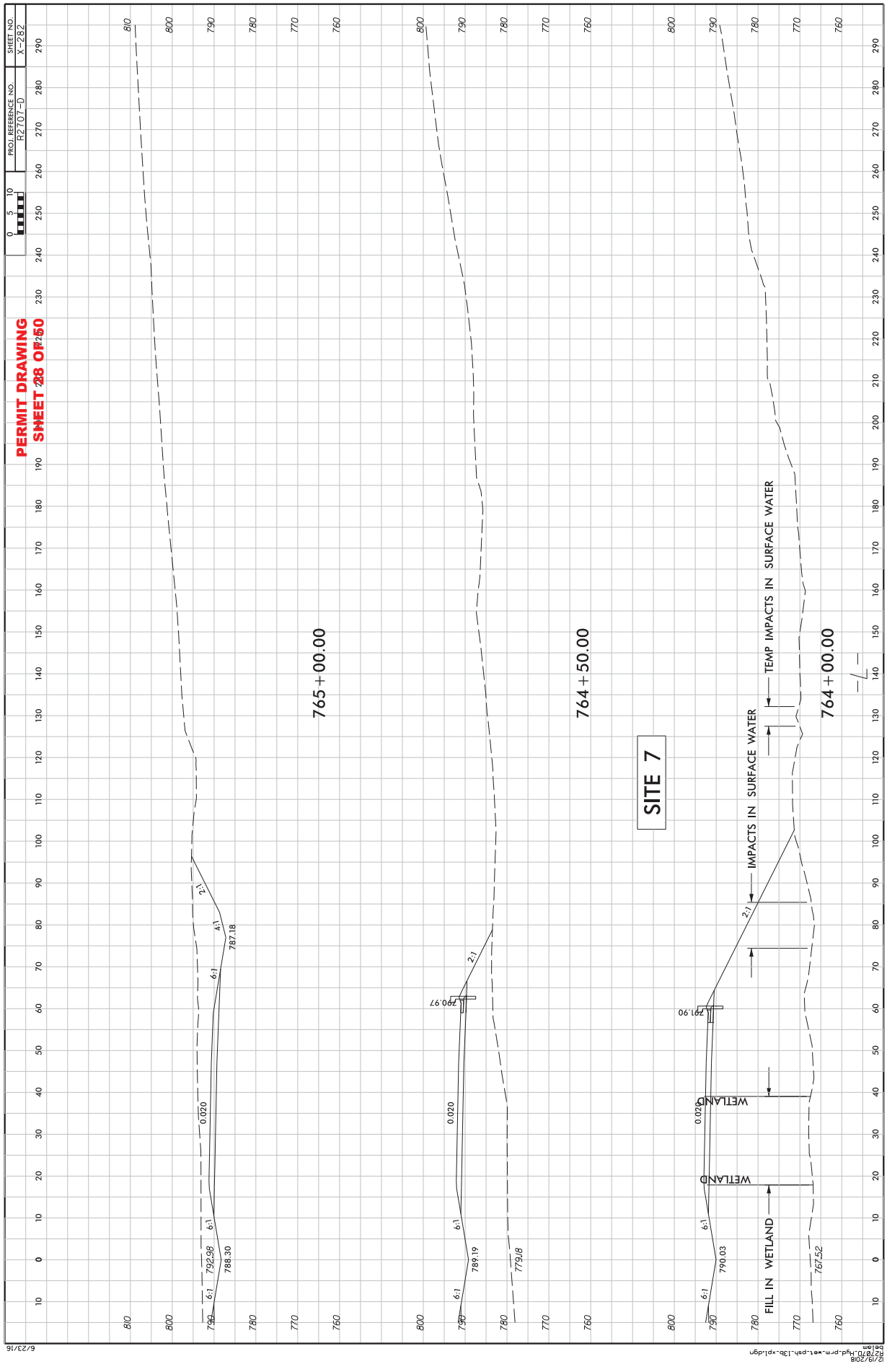
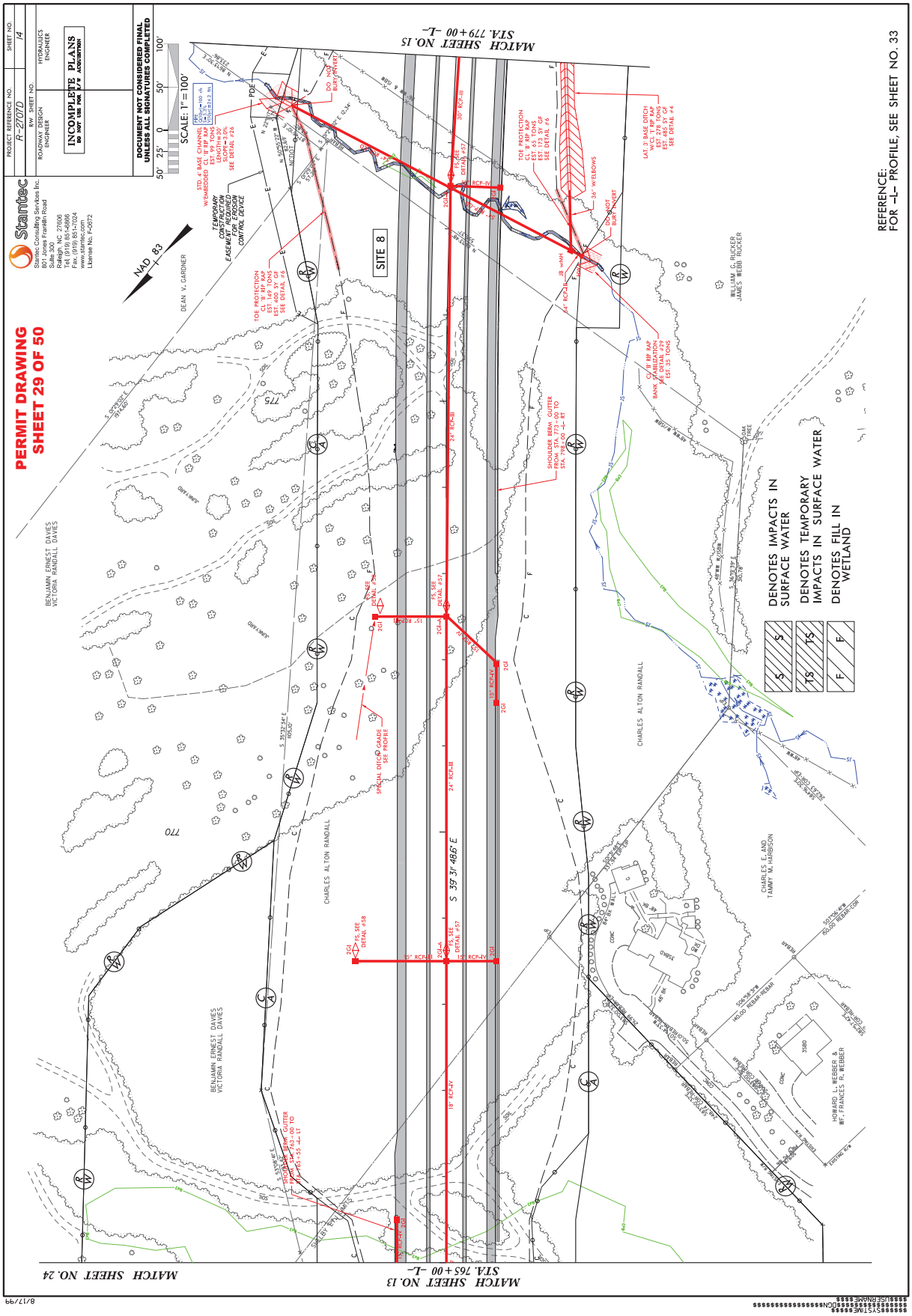
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
PERMIT DRAWING
SHEET 25 OF 50
-BED MATERIALS: SAND, SILT, CLAY, GRAVEL
-NO UPSTREAM OR DOWNSTREAM STRUCTURES THAT WERE IN PLACE AT THE TIME THIS PROJECT WAS DESIGNED WILL BE ADVERSELY IMPACTED BY THIS PROJECT
-DEBRIS POTENTIAL: MODERATE
CL STA 743+18 -L-
GP EL = 794.96
2@8'x8' RCBC W/SILLS
SKEW = 66°
2:19 SKEWED
2:1 NORMAL
2:19 SKEWED
2:1 NORMAL
EX NG AT CULVERT CL
BEVELED HW
CL BED ELEV=753.70
SLOPE=0.5%
PROP 50 YR=761.9
PROP 100 YR=762.0
TB RT
TB LT
WATER SURFACE PROFILE
EX BED
NWSE AND WSE ON 9/27/17=756.1
PROP BED
PROP TB
EX BED
790
780
770
760
750
200
100
0
100
200
5/14/99
12/19/2018
RE7/0/0.hyd-p.m.-wet-psh.-12b.dgn

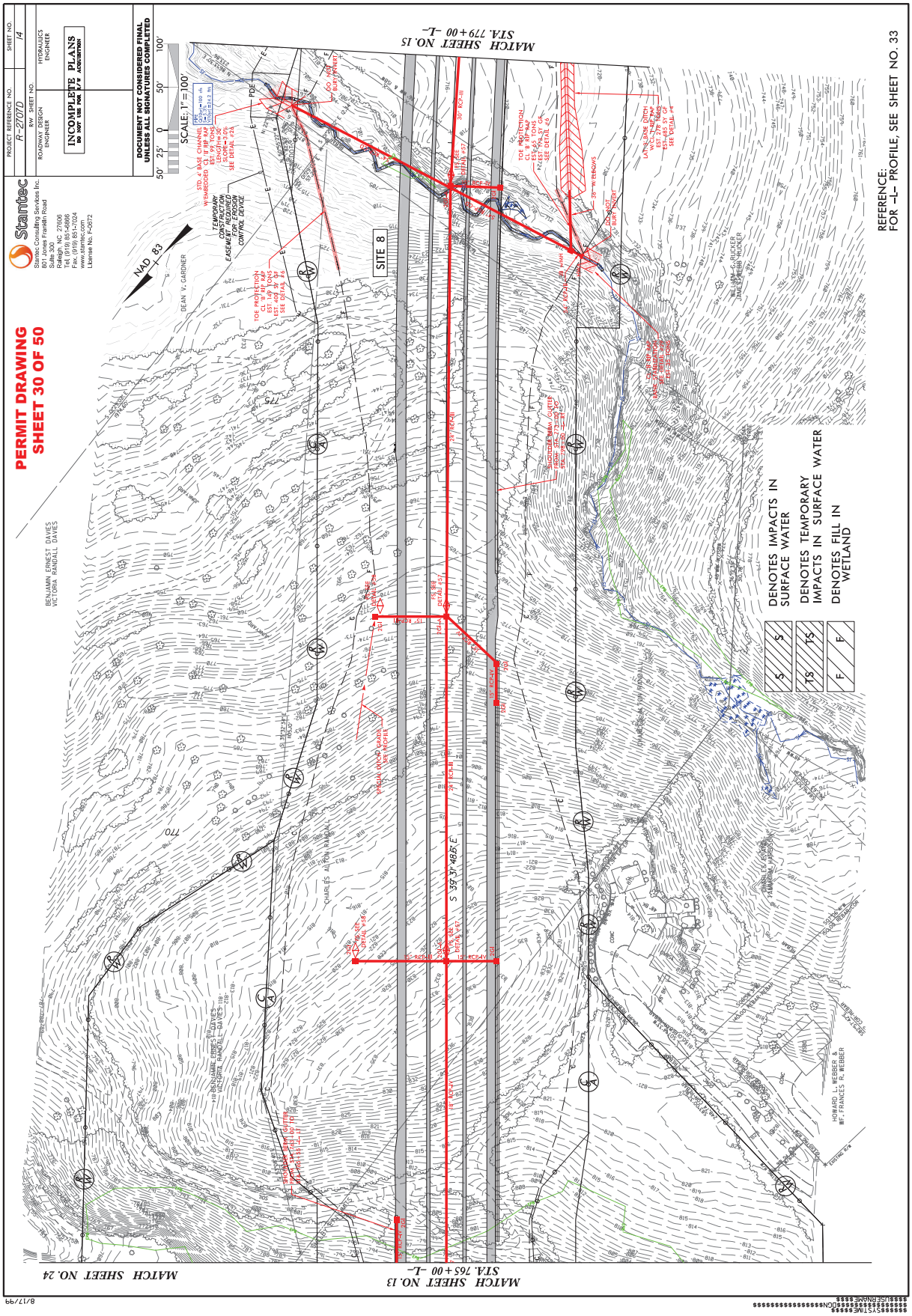

PROJECT REFERENCE NO. R-2707D
SHEET NO. 13
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1"=100'
PERMIT DRAWING
SHEET 26 OF 50
NAD 83
Stantec
MATCH SHEET NO. 24
MATCH SHEET NO. 14
STA. 765+00 -L-
MATCH SHEET NO. 12
STA. 751+00 -L-
MATCH SHEET NO. 25
STA. 27+50 -Y3-
SITE 7
PRESERVATION AREA
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO. 32
FOR -Y3- PROFILE, SEE SHEET NO. 46
FOR -PVTENT1- & -PVTENT2- PROFILES, SEE SHEET NO. 53
BRIDGE SKETCH (NOT TO SCALE)


PROJECT REFERENCE NO. R-2707D
SHEET NO. 13
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1"=100'
PERMIT DRAWING SHEET 27 OF 50
NAD 83
Stantec
MATCH SHEET NO. 24
MATCH SHEET NO. 14 STA. 765+00 -L-
MATCH SHEET NO. 12 STA. 751+00 -L-
MATCH SHEET NO. 25 STA. 27+50 -Y3-
MATCH SHEET NO. 24 STA. 19+00 -Y3-
MATCH SHEET NO. 24 STA. 7+39.96 -PVTENTI-
SITE 7
PRESERVATION AREA
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO. 32
FOR -Y3- PROFILE, SEE SHEET NO. 46
FOR -PVTENTI- & -PVTENT2- PROFILES, SEE SHEET NO. 53
BRIDGE SKETCH (NOT TO SCALE)

P-90


PERMIT DRAWING
SHEET 28 OF 250
SHEET NO. X-282
PROJ. REFERENCE NO. R2707-D
0 5 10
765+00.00
764+50.00
764+00.00
SITE 7
FILL IN WETLAND
WETLAND
WETLAND
IMPACTS IN SURFACE WATER
TEMP IMPACTS IN SURFACE WATER
787.18
788.30
792.98
790.97
789.19
779.18
791.90
790.03
767.52
0.020
2:1
4:1
6:1


PROJECT REFERENCE NO. R-2707D
SHEET NO. 14
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1"= 100'
Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6666
Fax. (919) 851-7024
www.stantec.com
License No. F-0672
NAD 83
PERMIT DRAWING
SHEET 29 OF 50
SITE 8
TEMPORARY CONSTRUCTION EASEMENT REQUIRED FOR EROSION CONTROL DEVICE
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO. 33
MATCH SHEET NO. 15
STA. 779+00 -L-
MATCH SHEET NO. 13
STA. 765+00 -L-
MATCH SHEET NO. 24
BENJAMIN ERNEST DAVIES
VICTORIA RANDALL DAVIES
CHARLES ALTON RANDALL
DEAN V. GARDNER
WILLIAM G. RUCKER
JAMES WEBB RUCKER
CHARLES E. AND TAMMY M. HARRISON
HOWARD L. WEBBER & WF. FRANCES N. WEBBER
S 39° 31' 48" E
24" RCP-III
18" RCP-IV
30" RCP-III
36" ELBOWS
DO NOT BURY INVERT
SPECIAL DITCH GRADE SEE PROFILE
TOE PROTECTION CL. II RIP RAP
EST. 65 TONS
EST. 31 SY
SEE DETAIL #5
LAT. 3 BASE DITCH W/CL. II RIP RAP
EST. 279 TONS
EST. 186 SY
SEE DETAIL #4
CL. II RIP RAP BANK GRADE CONTROL
SEE DETAIL #29
EST. 35 TONS
SHOULDER BERM GUTTER
FROM STA. 773+00 TO STA. 769+00 -L- RT
STD. 4' BASE CHANNEL W/EMBEDDED CL. II RIP RAP
DD
LENGTH=30'
SEE DETAIL #26
TOE PROTECTION CL. II RIP RAP
EST. 149 TONS
EST. 60 SY
SEE DETAIL #6
FS, SEE DETAIL #28
FS, SEE DETAIL #27
FS, SEE DETAIL #29
2GI
2GI-A
3GI
DO NOT BURY INVERT
DRIVEWAY
CONC
GAZEBO
POOL
3580
OAK TREE
GRAVEL
GUARD RAIL
REBAR
SOLID REBAR REBAR
CONC MONUMENT
CONC R/W MONUMENT
SOLID REBAR REBAR
SOLID REBAR REBAR
SOLID REBAR REBAR


PROJECT REFERENCE NO.
R-2707D
SHEET NO.
14
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1"= 100'
50' 25' 0 50' 100'
Stantec
Stantec Consulting Services Inc.
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Fax. (919) 851-7024
www.stantec.com
License No. F-0672
NAD 83
DEAN V. GARDNER
PERMIT DRAWING
SHEET 30 OF 50
BENJAMIN ERNEST DAVIES
VELONIA RANDALL DAVIES
MATCH SHEET NO. 15
STA. 779+00 -L-
MATCH SHEET NO. 13
STA. 765+00 -L-
MATCH SHEET NO. 24
SITE 8
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO. 33
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
S
TS
F
HOWARD L. WEBBER &
WF. FRANCES N. WEBBER
WILLIAM G. RUCKER
JANET FREEMAN RUCKER
CHARLES ALTON RANDALL
S 39° 37' 48" E
770
775
780
785
790
795
800
805
810
815
820
825
830
835
840
845
850
855
860
865
870
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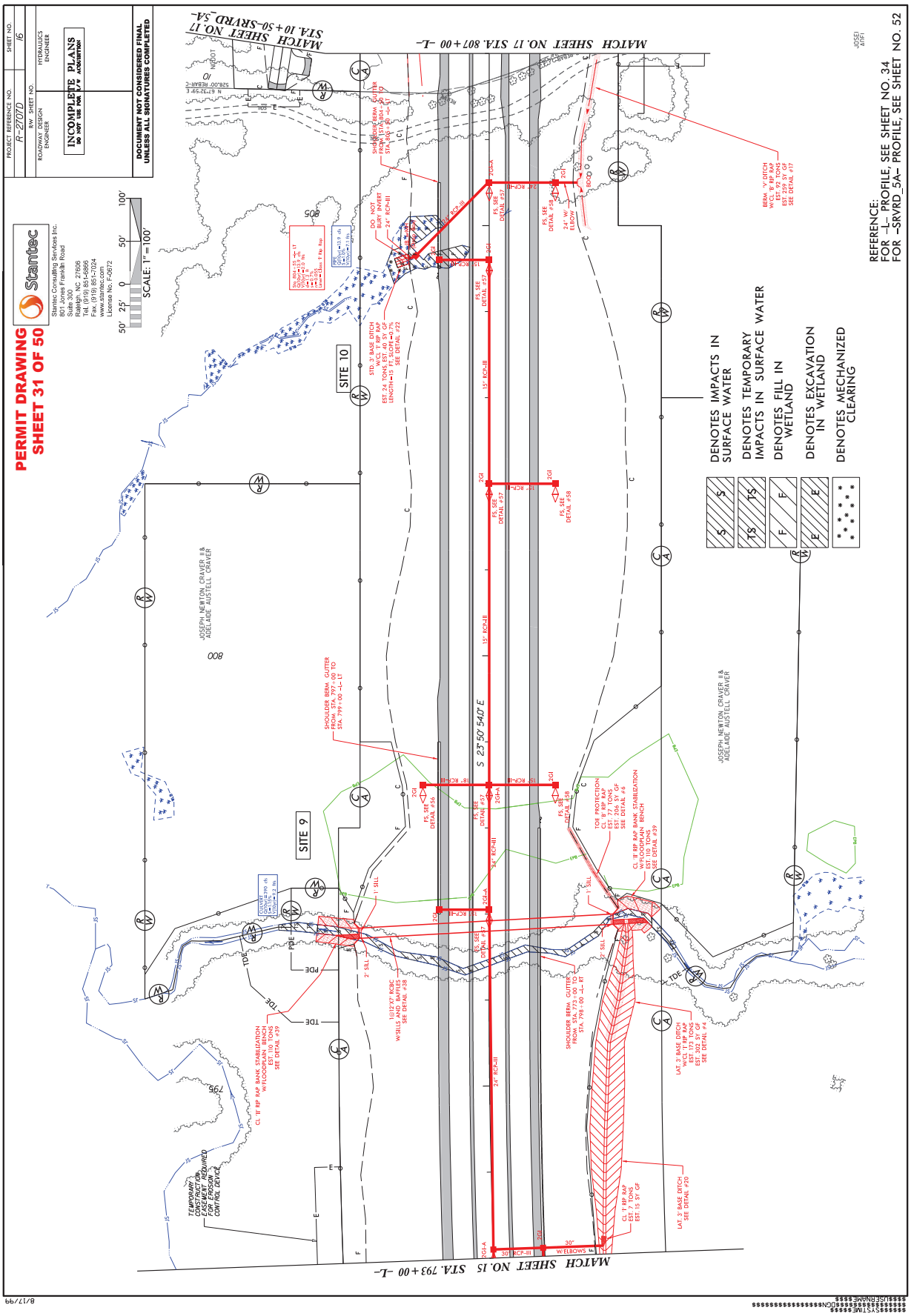
950
955
960
965


PERMIT DRAWING
SHEET 31 OF 50
Stantec
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Suite 300
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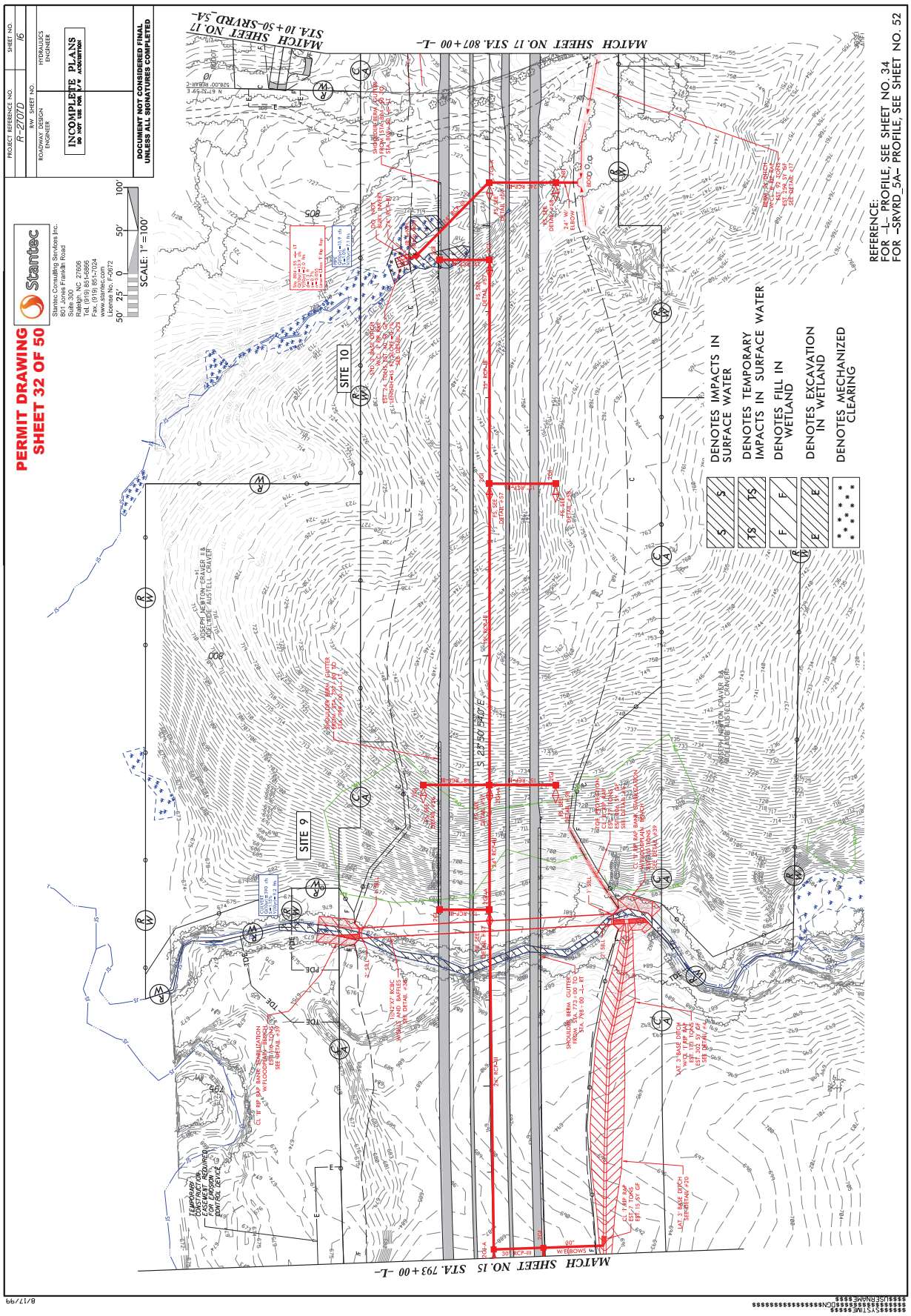
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. C-2512
SCALE: 1" = 100'
PROJECT REFERENCE NO.
R-2707D
SHEET NO.
16
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR CONSTRUCTION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
MATCH SHEET NO. 17 STA. 807+00 -L-
MATCH SHEET NO. 15 STA. 793+00 -L-
STA. 10+50-SRVRD_5A-
SITE 10
SITE 9
S 23° 50' 540" E
JOSEPH NEWTON CRAVER II & ADELAIDE AUSTELL CRAVER
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
DENOTES EXCAVATION IN WETLAND
DENOTES MECHANIZED CLEARING
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO. 34
FOR -SRVRD_5A- PROFILE, SEE SHEET NO. 52

P-94


PROJECT REFERENCE NO.
R-2707D
SHEET NO.
16
ROADWAY DESIGN ENGINEER
R.W. SHEET NO.
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR CONSTRUCTION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
PERMIT DRAWING
SHEET 32 OF 50
Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
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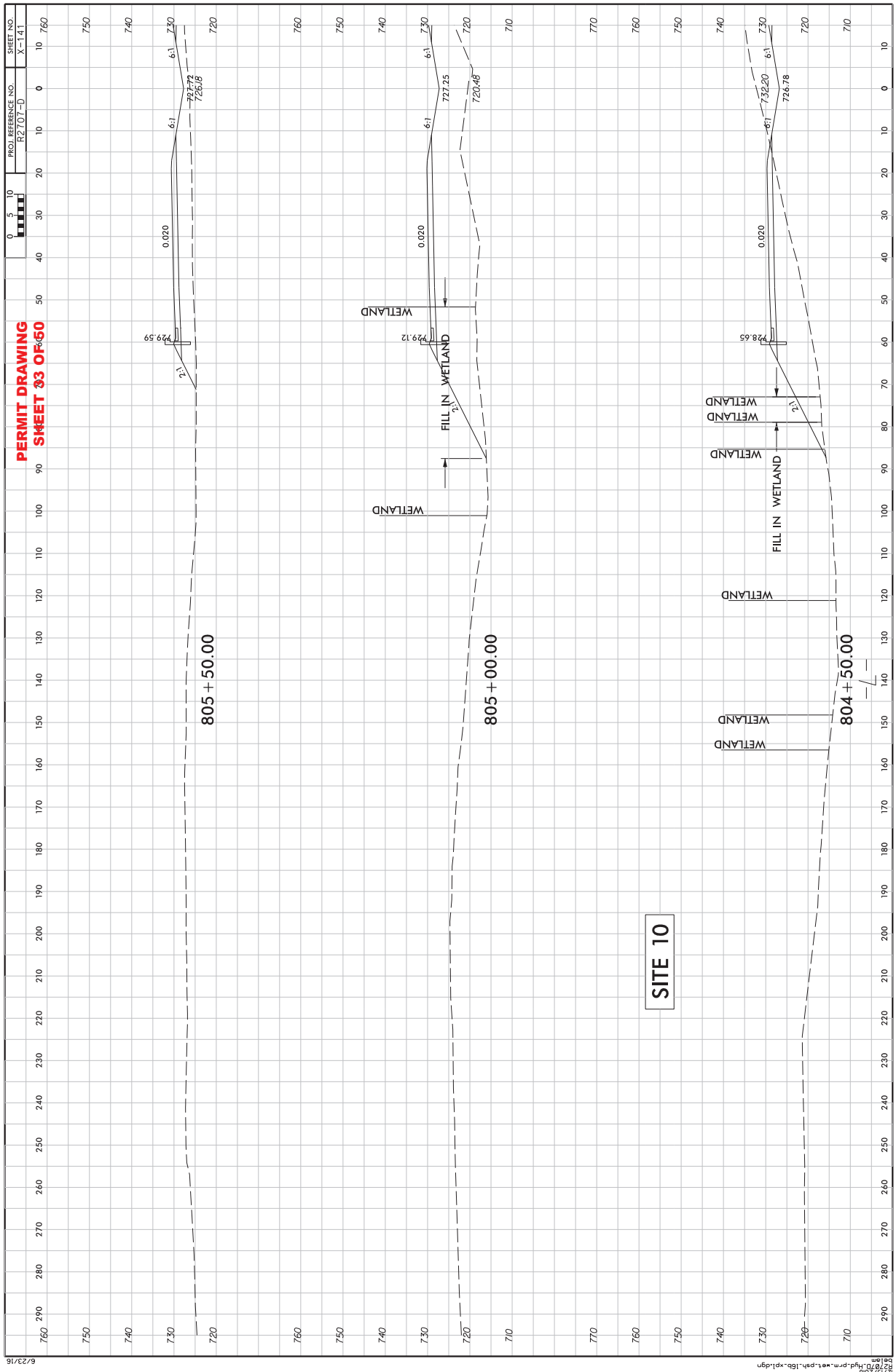
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. C-0782
SCALE: 1" = 100'
MATCH SHEET NO. 17 STA. 807+00 -L-
MATCH SHEET NO. 15 STA. 793+00 -L-
MATCH SHEET NO. 17 STA. 10+50-SRVRD_5A-
SITE 10
SITE 9
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
DENOTES EXCAVATION IN WETLAND
DENOTES MECHANIZED CLEARING
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO. 34
FOR -SRVRD_5A- PROFILE, SEE SHEET NO. 52

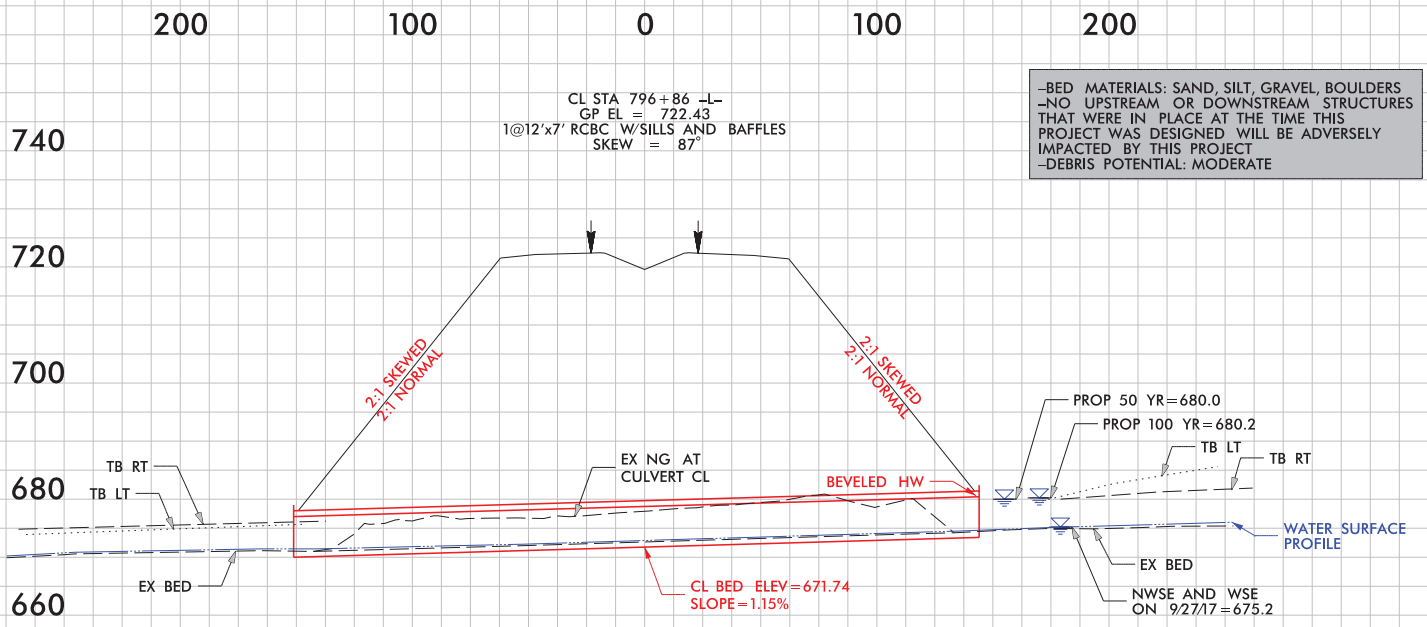

PERMIT DRAWING
SHEET 33 OF 60
PROJ. REFERENCE NO.
R2707-D
SHEET NO.
X-141
0 5 10
SITE 10
805+50.00
805+00.00
804+50.00
WETLAND
FILL IN WETLAND
729.59
729.12
728.65
727.72
726.8
727.25
720.48
732.20
726.78
0.020
6:1
2:1

PERMIT DRAWING
SHEET 34 OF 50

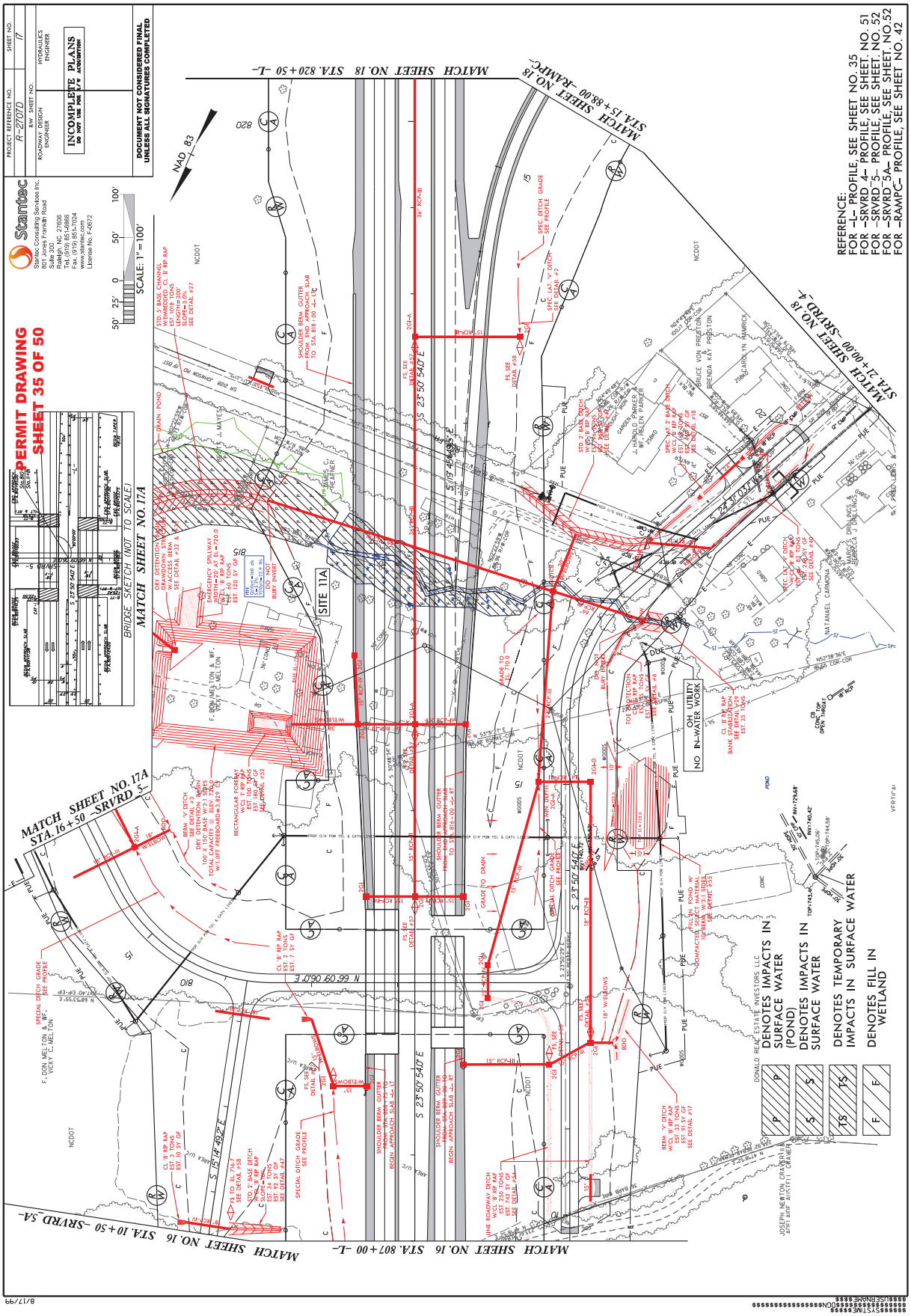
PROJECT REFERENCE NO.	SHEET NO.
R-2707D	16C
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

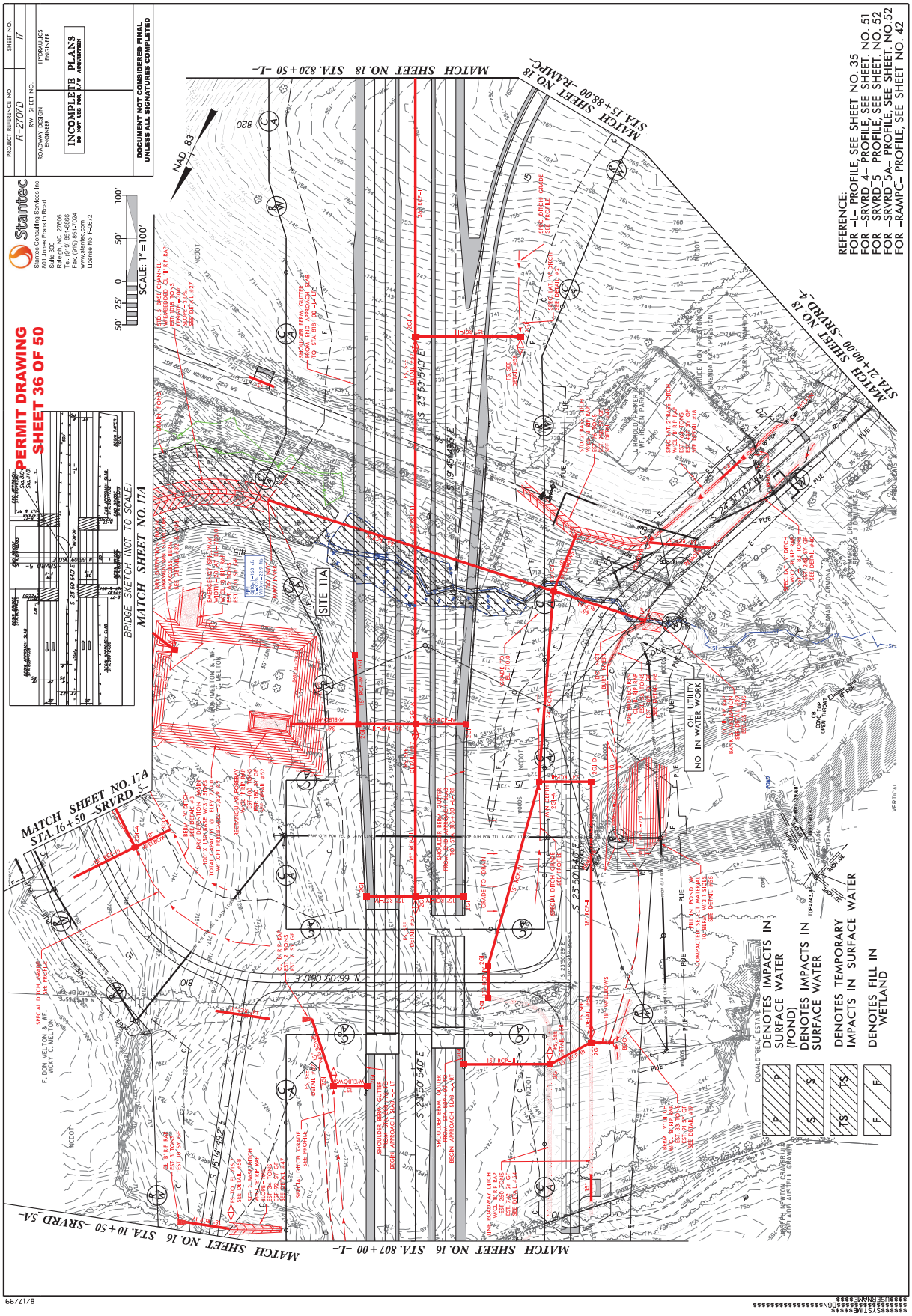
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



-BED MATERIALS: SAND, SILT, GRAVEL, BOULDERS
-NO UPSTREAM OR DOWNSTREAM STRUCTURES THAT WERE IN PLACE AT THE TIME THIS PROJECT WAS DESIGNED WILL BE ADVERSELY IMPACTED BY THIS PROJECT
-DEBRIS POTENTIAL: MODERATE


PERMIT DRAWING
SHEET 35 OF 50
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
PROJECT REFERENCE NO. R-2707D
SHEET NO. 17
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel: (919) 851-6666
Fax: (919) 851-7024
www.stantec.com
License No. F-0672
SCALE: 1"=100'
NAD 83
BRIDGE SKETCH (NOT TO SCALE)
MATCH SHEET NO. 17A
SITE 11A
MATCH SHEET NO. 17A STA. 16+50 -SRVRD 5-
MATCH SHEET NO. 16 STA. 10+50 -SRVRD 5A-
MATCH SHEET NO. 16 STA. 807+00 -L-
MATCH SHEET NO. 18 STA. 820+50 -L-
MATCH SHEET NO. 18 STA. 15+88.00 -RAMP C-
MATCH SHEET NO. 18 STA. 21+00.00 -SRVRD 4-
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO. 35
FOR -SRVRD 4- PROFILE, SEE SHEET. NO. 51
FOR -SRVRD 5- PROFILE, SEE SHEET. NO. 52
FOR -SRVRD 5A- PROFILE, SEE SHEET. NO.52
FOR -RAMP C- PROFILE, SEE SHEET NO. 42
DENOTES IMPACTS IN SURFACE WATER (POND)
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
NO IN-WATER WORK
OH UTILITY
F. DON MELTON & WF. VICKY C. MELTON
J. MAYES
C. HEATNER
DONALD REAL ESTATE INVESTORS LLC
JOSEPH, NEWTON, CRAVEN &
JEFFREY ALEXITT, GRANTEE
NCDOT


PROJECT REFERENCE NO. R-2707D
SHEET NO. 17
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
Stantec
Stantec Consulting Services Inc.
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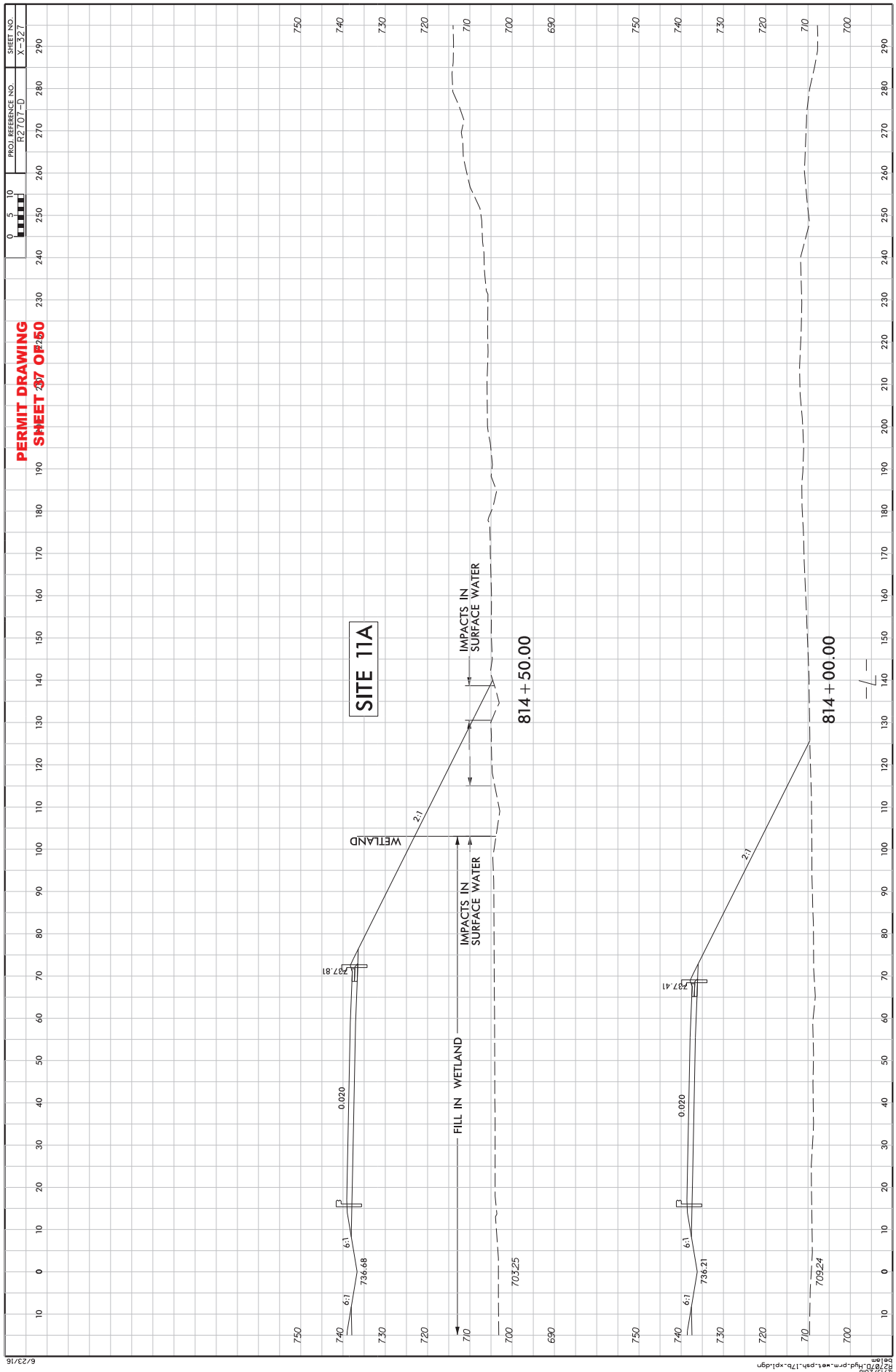
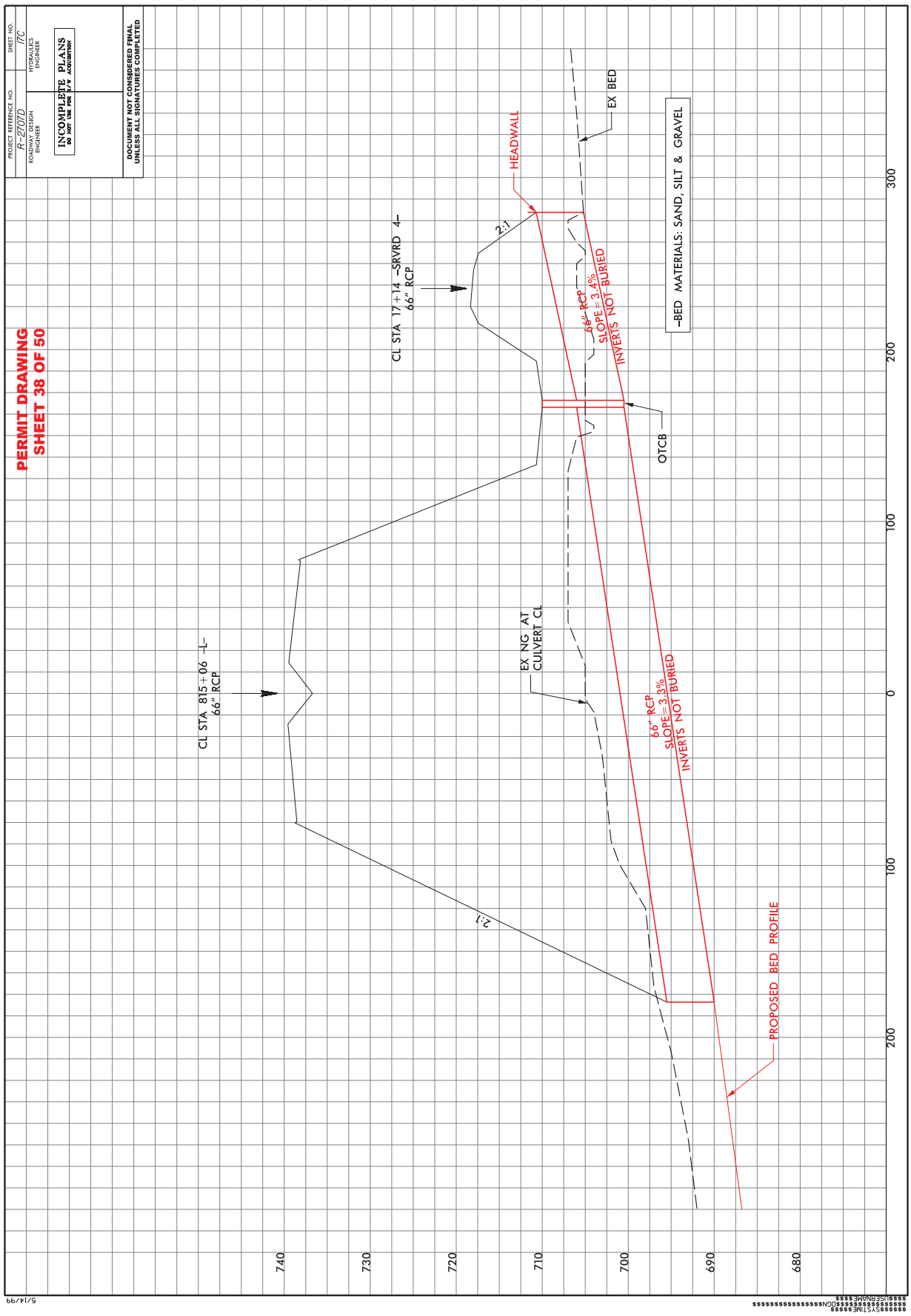
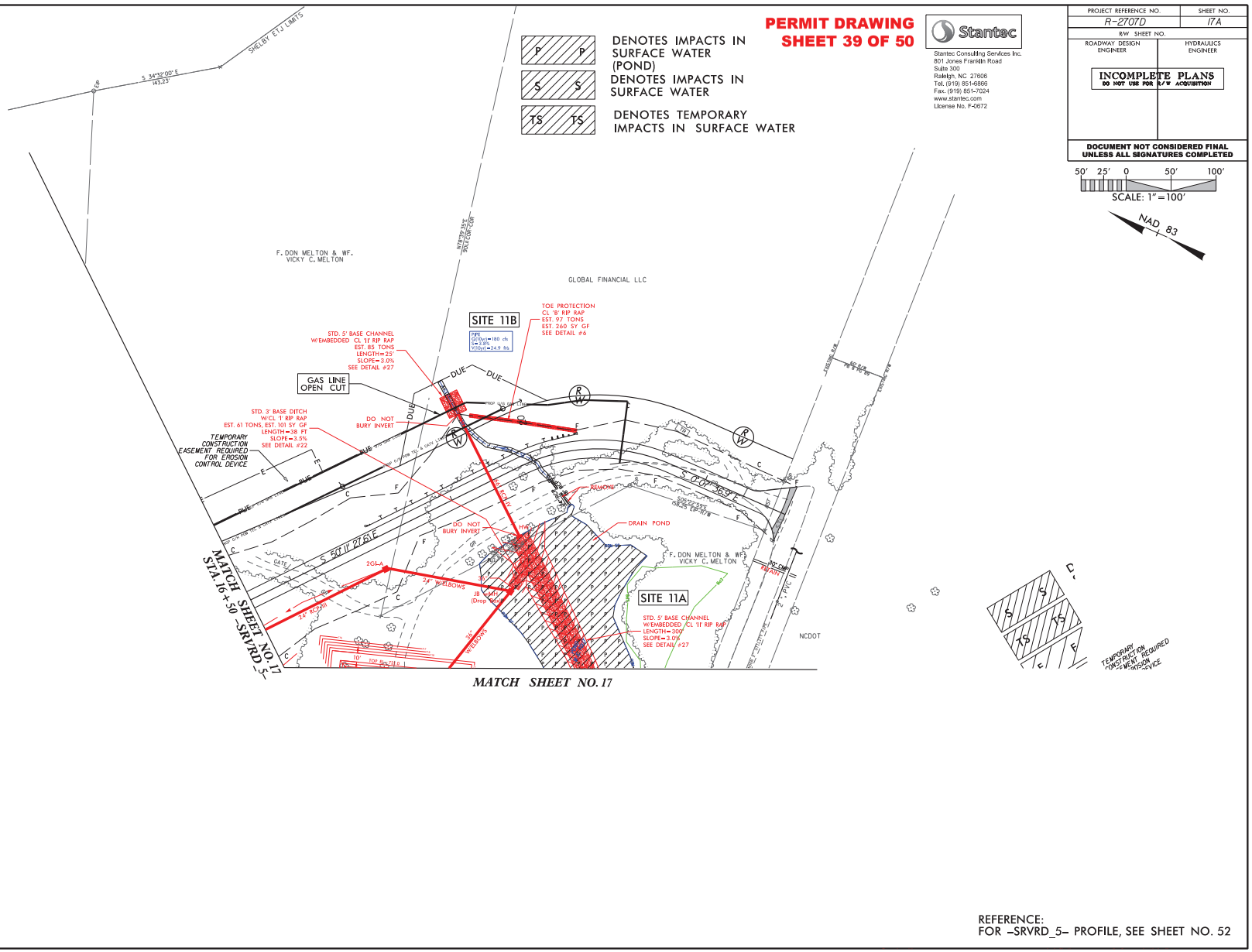
Raleigh, NC 27606
Tel. (919) 851-6666
Fax. (919) 851-7024
www.stantec.com
License No. F-0672
SCALE: 1" = 100'
PERMIT DRAWING
SHEET 36 OF 50
BRIDGE SKETCH (NOT TO SCALE)
MATCH SHEET NO. 17A
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO. 35
FOR -SRVRD_4- PROFILE, SEE SHEET. NO. 51
FOR -SRVRD_5- PROFILE, SEE SHEET. NO. 52
FOR -SRVRD 5A- PROFILE, SEE SHEET. NO.52
FOR -RAMPC- PROFILE, SEE SHEET NO. 42
MATCH SHEET NO. 18 STA. 820+50 -L-
MATCH SHEET NO. 18 STA. 15+88.00 -RAMPC-
MATCH SHEET NO. 18 STA. 21+00.00 -SRVRD 4-
MATCH SHEET NO. 16 STA. 807+00 -L-
MATCH SHEET NO. 16 STA. 10+50 -SRVRD 5A-
MATCH SHEET NO. 17A STA. 16+50 -SRVRD 5-
SITE 11A
DENOTES IMPACTS IN SURFACE WATER (POND)
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
NO IN-WATER WORK
OH UTILITY
8/17/99

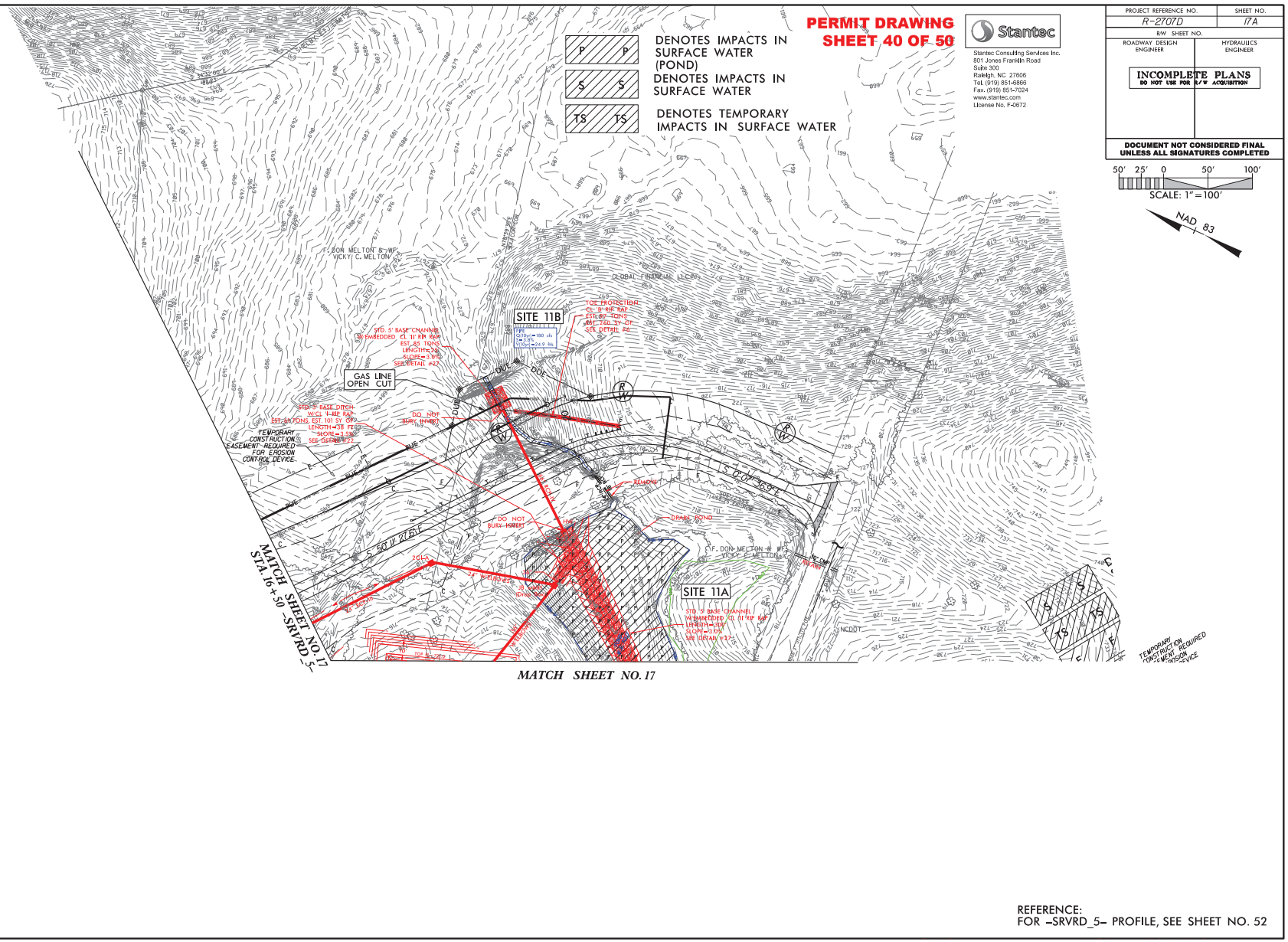

SHEET NO.
X-327
PROJ. REFERENCE NO.
R2707-D
0 5 10
PERMIT DRAWING
SHEET 27 OF 250
SITE 11A
814+50.00
814+00.00
IMPACTS IN SURFACE WATER
IMPACTS IN SURFACE WATER
FILL IN WETLAND
WETLAND
2:1
2:1
6:1
6:1
6:1
6:1
0.020
0.020
737.81
737.41
736.68
736.21
703.25
709.24
6/23/16
R2707D_hyd-prm-wet-psh-17b-xpl.dgn
12/19/2018

P-100


PROJECT REFERENCE NO.
A-2707D
SHEET NO.
17C
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
PERMIT DRAWING
SHEET 38 OF 50
CL STA 815+06 -L-
66" RCP
CL STA 17+14 -SRVRD 4-
66" RCP
HEADWALL
2:1
EX NG AT CULVERT CL
EX BED
66" RCP
SLOPE=3.4%
INVERTS NOT BURIED
OTCB
-BED MATERIALS: SAND, SILT & GRAVEL
66" RCP
SLOPE=3.3%
INVERTS NOT BURIED
PROPOSED BED PROFILE
740
730
720
710
700
690
680
300
200
100
0
100
200
5/14/99


PERMIT DRAWING
SHEET 39 OF 50
P P DENOTES IMPACTS IN SURFACE WATER (POND)
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672
PROJECT REFERENCE NO. R-2707D
SHEET NO. 17A
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
50' 25' 0 50' 100'
SCALE: 1"=100'
NAD 83
SHELBY ETJ LIMITS
S 34°32'00" E
145.23'
F. DON MELTON & WF.
VICKY C. MELTON
GLOBAL FINANCIAL LLC
SITE 11B
TOE PROTECTION
CL 'B' RIP RAP
EST. 97 TONS
EST. 260 SY GF
SEE DETAIL #6
STD. 5' BASE CHANNEL
W/EMBEDDED CL 'I' RIP RAP
EST. 85 TONS
LENGTH= 25'
SLOPE= 3.0%
SEE DETAIL #27
GAS LINE
OPEN CUT
STD. 3' BASE DITCH
W/CL 'I' RIP RAP
EST. 61 TONS, EST. 101 SY GF
LENGTH= 38 FT
SLOPE= 3.5%
SEE DETAIL #22
TEMPORARY
CONSTRUCTION
EASEMENT REQUIRED
FOR EROSION
CONTROL DEVICE
DO NOT
BURY INVERT
DRAIN POND
F. DON MELTON & WF.
VICKY C. MELTON
SITE 11A
STD. 5' BASE CHANNEL
W/EMBEDDED CL 'I' RIP RAP
LENGTH= 300'
SLOPE= 3.0%
SEE DETAIL #27
NCDOT
MATCH SHEET NO. 17
STA. 16+50 -SRVRD_5-
MATCH SHEET NO. 17
REFERENCE:
FOR -SRVRD_5- PROFILE, SEE SHEET NO. 52
TEMPORARY CONSTRUCTION EASEMENT REQUIRED FOR EROSION CONTROL DEVICE

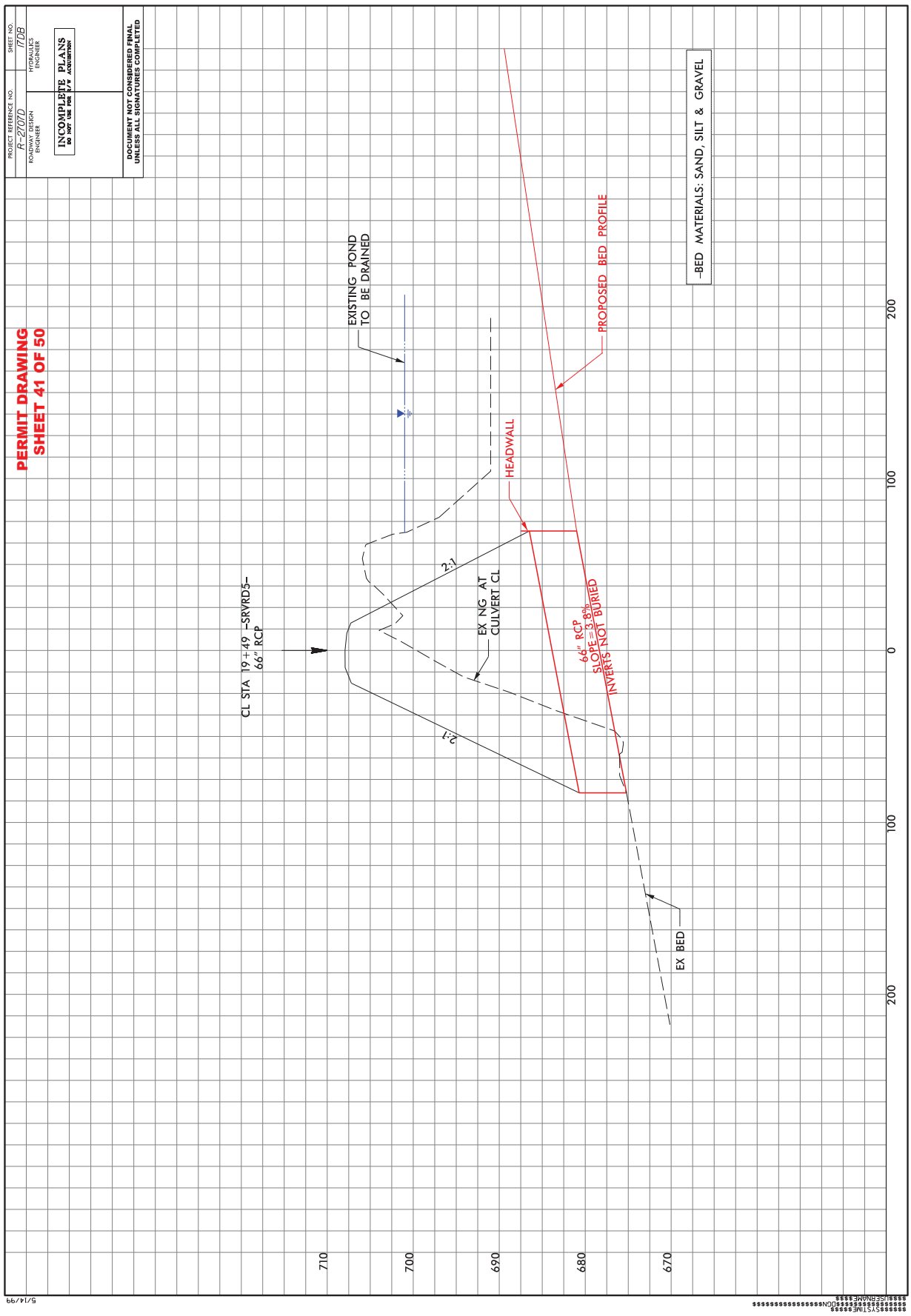
P-101



MATCH SHEET NO. 17

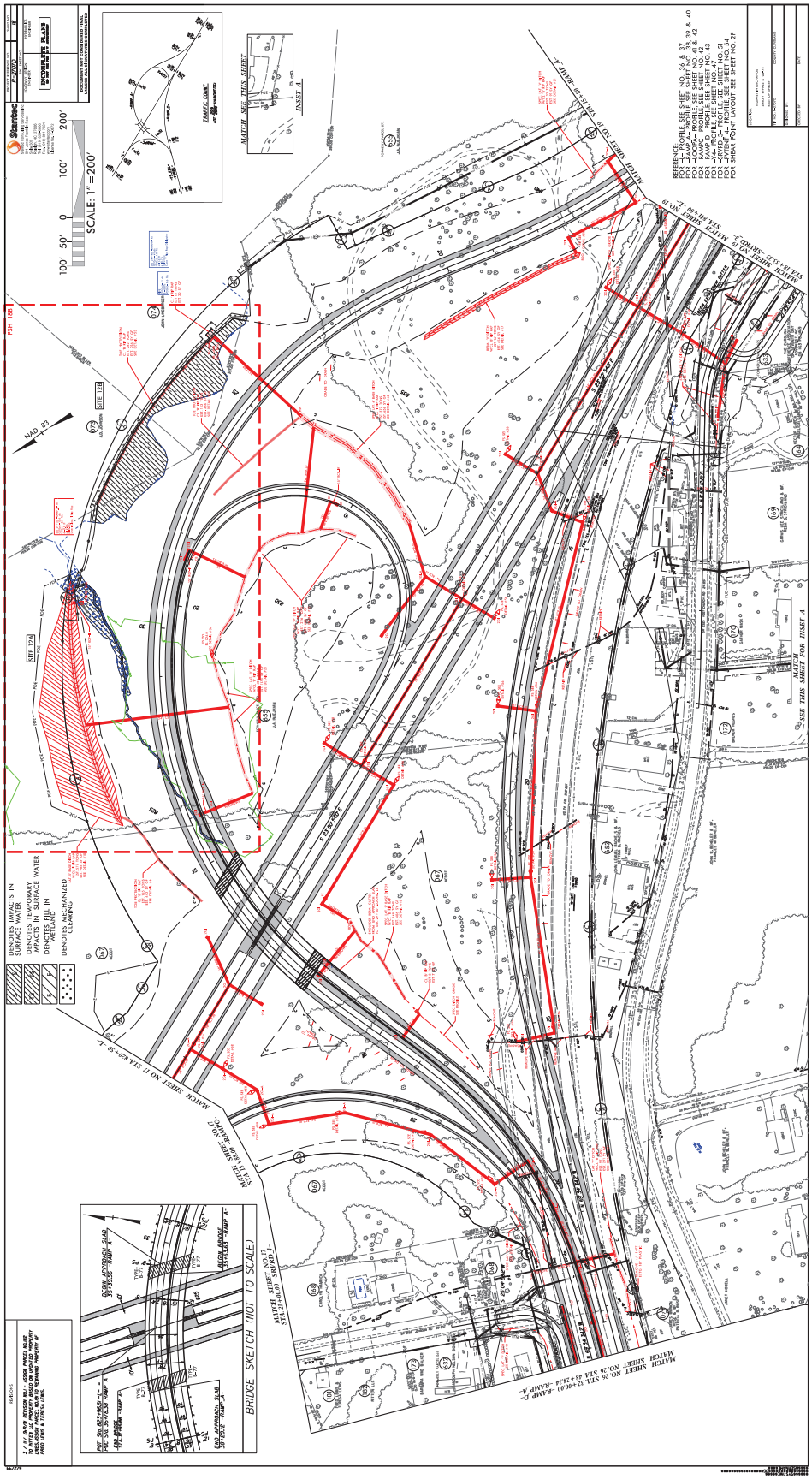
P-102

P-103


PROJECT REFERENCE NO.
A-2707D
SHEET NO.
17DB
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
PERMIT DRAWING
SHEET 41 OF 50
CL STA 19+49 -SRVRD5-
66" RCP
EXISTING POND
TO BE DRAINED
2:1
2:1
EX NG AT
CULVERT CL
HEADWALL
PROPOSED BED PROFILE
66" RCP
SLOPE = 3.8%
INVERTS NOT BURIED
-BED MATERIALS: SAND, SILT & GRAVEL
EX BED
710
700
690
680
670
200
100
0
100
200
5/14/99

P-104

PERMIT DRAWING
SHEET 42 OF 50

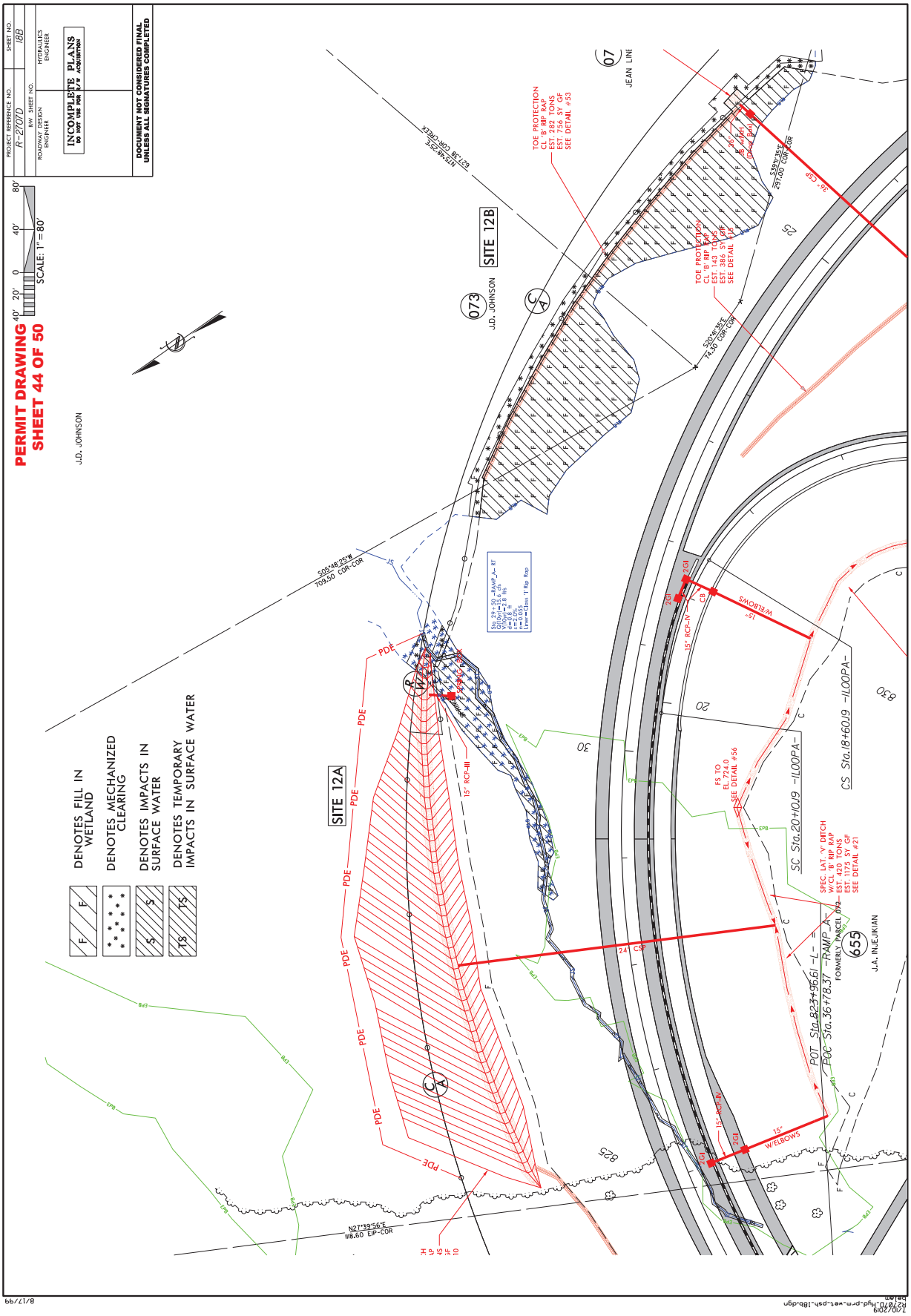


P-105

PERMIT DRAWING
SHEET 43 OF 50

SCALE: 1"=200'
MATCH SHEET NO.38 STA 22+00.00 -RAMP D-
MATCH SHEET NO.36 STA 18+24.38 -RAMP A-
MATCH SHEET NO.37 STA 19+80.00 -SR 1128-
MATCH SHEET NO.1 STA 63+49.49 -L-
MATCH SHEET NO.19 STA 51+49.98 -L-
MATCH SHEET NO.20 STA 51+53.53 -SR 1128-
SEE THIS SHEET FOR INSET A
BRIDGE SKETCH (NOT TO SCALE)
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
NAD 83
SR 1128
SR 1124
PSH 188
PROPERTY LINE
PROPERTY LINE
PROPERTY LINE

P-106


PROJECT REFERENCE NO.
R-2707D
SHEET NO.
18B
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
PERMIT DRAWING
SHEET 44 OF 50
SCALE: 1" = 80'
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
SITE 12A
SITE 12B
J.D. JOHNSON
J.A. INUEJIKIAN
JEAN LINE
TOE PROTECTION
CL 'B' RIP RAP
EST. 282 TONS
EST. 756 SY GF
SEE DETAIL #53
TOE PROTECTION
CL 'B' RIP RAP
EST. 143 TONS
EST. 384 SY GF
SEE DETAIL #53
SPEC. LAT. 'V' DITCH
W/CL 'B' RIP RAP
EST. 420 TONS
EST. 775 SY GF
SEE DETAIL #21
FS TO EL. 724.0
SEE DETAIL #56
15" RCP-III
15" RCP-IV
15" W/ELBOWS
24" CSP
CS Sta.18+60.9 -ILOOPA-
SC Sta.20+10.9 -ILOOPA-
POT Sta.823+96.1 -L-
POC Sta.36+78.37 -RAMP_A-
FORMERLY PARCEL 072
PDE
EPB
F
S
TS
655
073
07
825
830
20
25
30

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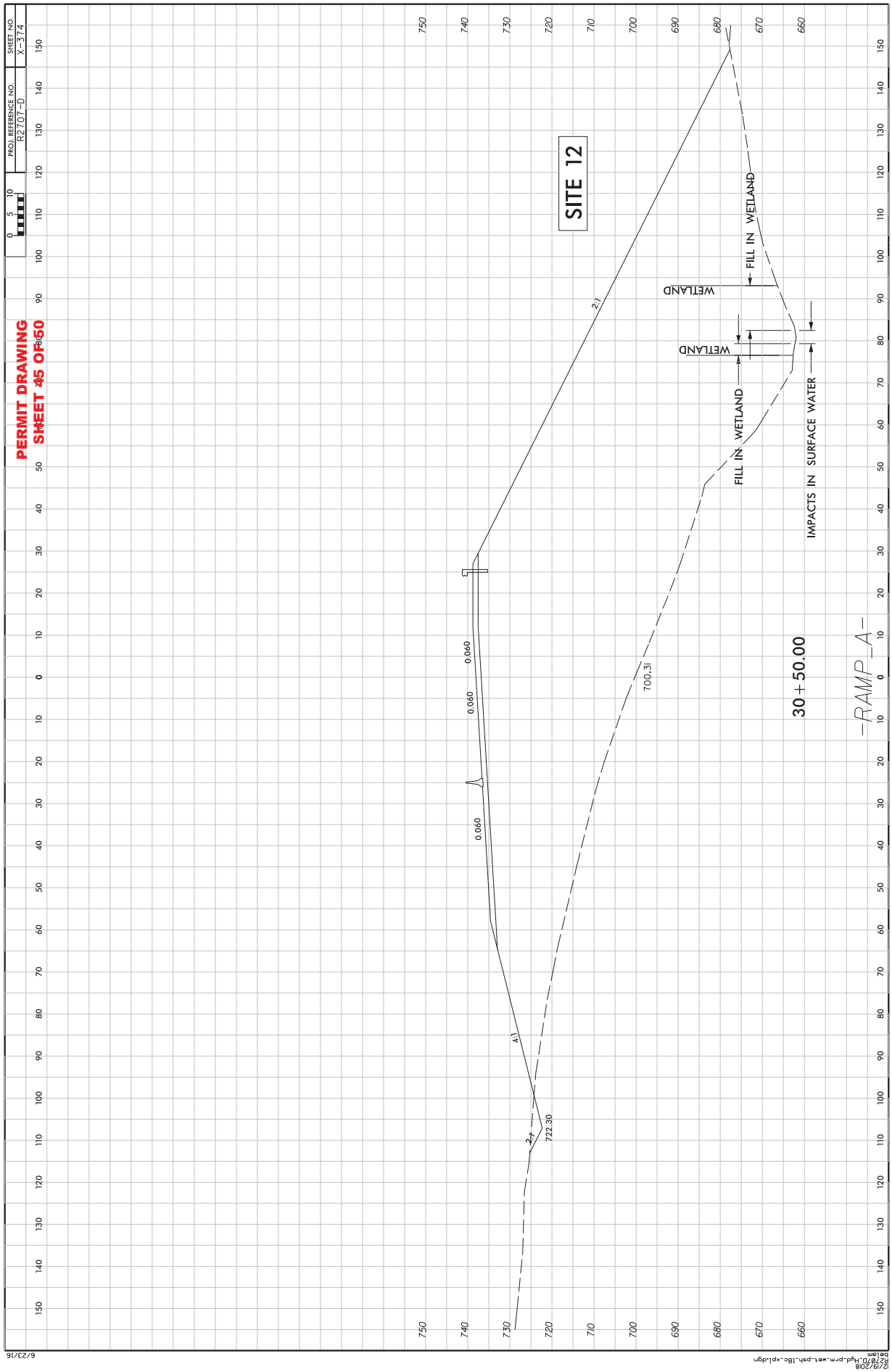
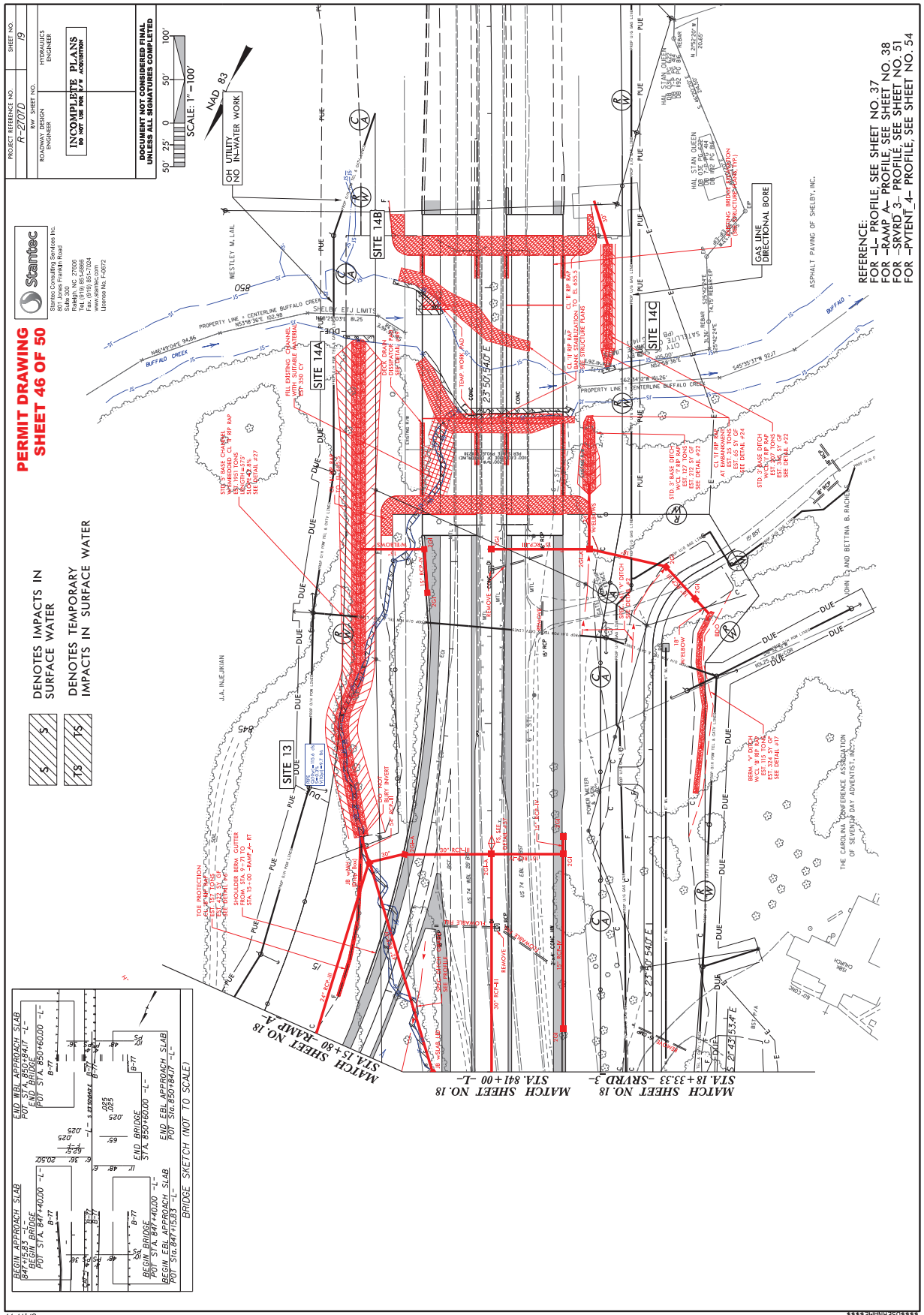
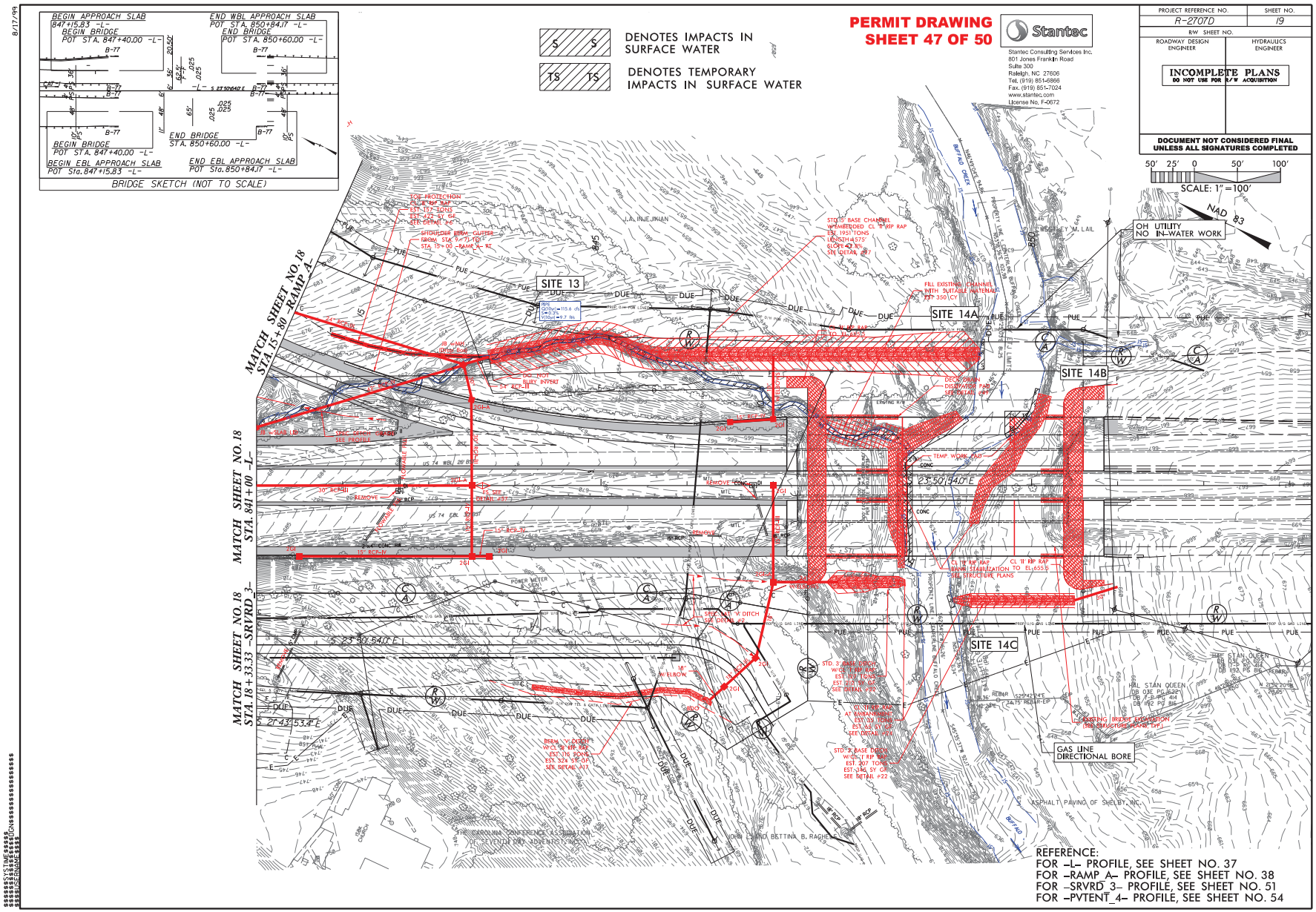

SHEET NO.
X-374
PROJ. REFERENCE NO.
R2707-D
0 5 10
PERMIT DRAWING
SHEET 45 OF 60
SITE 12
WETLAND
FILL IN WETLAND
WETLAND
FILL IN WETLAND
IMPACTS IN SURFACE WATER
2:1
4:1
2:1
0.060
0.060
0.060
700.31
722.30
30+50.00
-RAMP_A-
6/23/16
12/19/2018
r2707d_hyd-prm-wet-psh_ldc-xpl.dgn

P-108


PROJECT REFERENCE NO.
R-2707D
SHEET NO.
19
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1" = 100'
PERMIT DRAWING
SHEET 46 OF 50
Stantec
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
REFERENCE:
FOR -L- PROFILE, SEE SHEET NO. 37
FOR -RAMP A- PROFILE, SEE SHEET NO. 38
FOR -SRVRD 3- PROFILE, SEE SHEET NO. 51
FOR -PVTENT_4- PROFILE, SEE SHEET NO. 54
SITE 13
SITE 14A
SITE 14B
SITE 14C
GAS LINE DIRECTIONAL BORE
MATCH SHEET NO. 18 -RAMP A- STA. 15+80
MATCH SHEET NO. 18 STA. 841+00 -L-
MATCH SHEET NO. 18 -SRVRD 3- STA. 18+33.33
BRIDGE SKETCH (NOT TO SCALE)


PERMIT DRAWING
SHEET 47 OF 50
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672
PROJECT REFERENCE NO. R-2707D
SHEET NO. 19
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1" = 100'
NAD 83
OH UTILITY NO IN-WATER WORK
BEGIN APPROACH SLAB
BEGIN BRIDGE
END WBL APPROACH SLAB
END BRIDGE
END EBL APPROACH SLAB
BRIDGE SKETCH (NOT TO SCALE)
MATCH SHEET NO.18 STA.15+80 –RAMP_A–
MATCH SHEET NO.18 STA.841+00 –L–
MATCH SHEET NO.18 STA.18+33.33 –SRVRD_3–
SITE 13
SITE 14A
SITE 14B
SITE 14C
GAS LINE DIRECTIONAL BORE
REFERENCE:
FOR –L– PROFILE, SEE SHEET NO. 37
FOR –RAMP_A– PROFILE, SEE SHEET NO. 38
FOR –SRVRD_3– PROFILE, SEE SHEET NO. 51
FOR –PVTENT_4– PROFILE, SEE SHEET NO. 54

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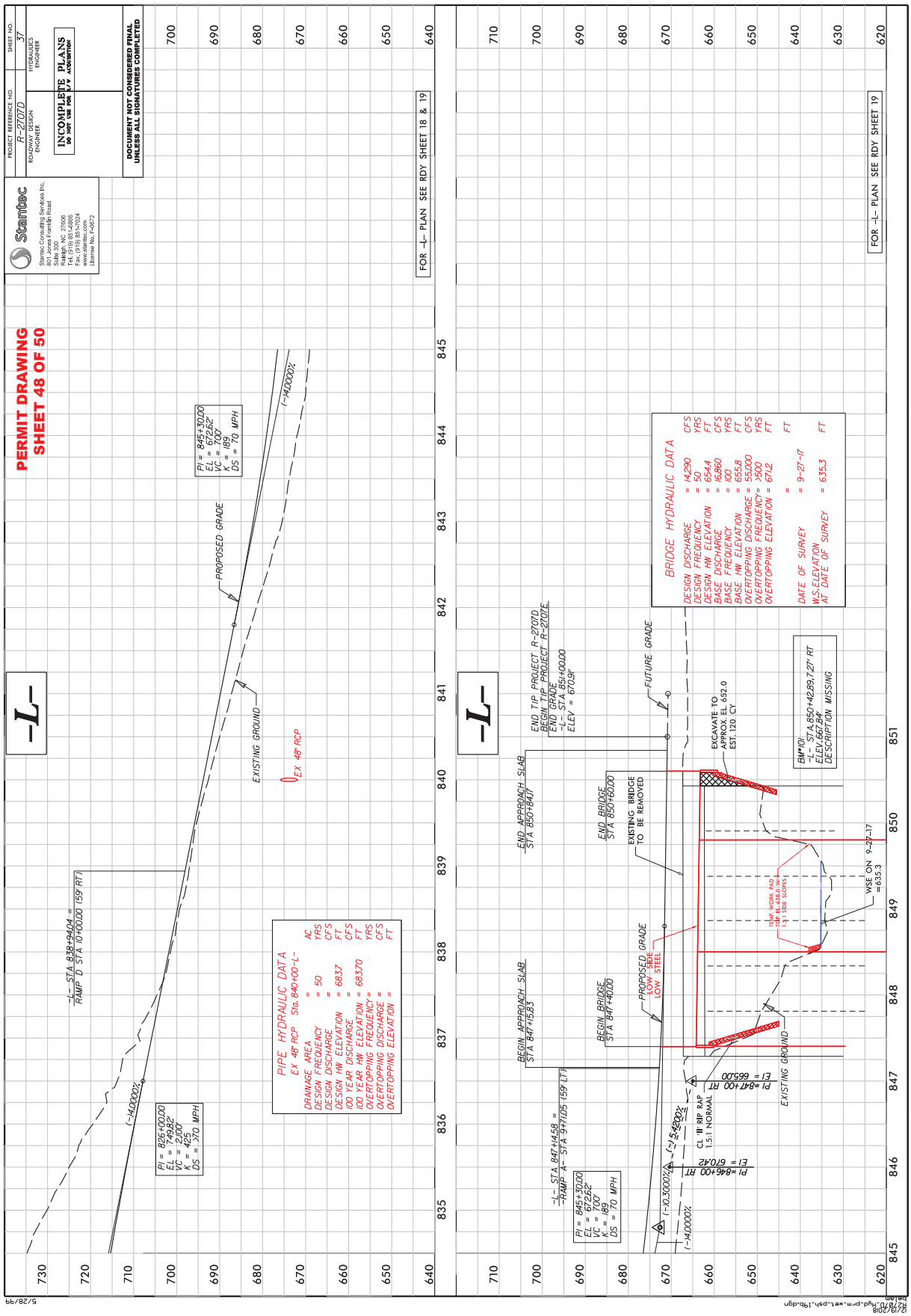
PERMIT DRAWING
SHEET 48 OF 50
PROJECT REFERENCE NO. R-2707D
SHEET NO. 37
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax (919) 851-7024
www.stantec.com
License No. F-0672
-L- STA. 838+94.04 = RAMP D STA 10+00.00 (59' RT)
PI = 826+00.00
EL = 749.82'
VC = 200'
K = 425
DS = 70 MPH
(-)4.00002
EXISTING GROUND
EX 48" RCP
PROPOSED GRADE
PI = 845+30.00
EL = 672.62'
VC = 700'
K = 189
DS = 70 MPH
(-)4.00002
FOR -L- PLAN SEE RDY SHEET 18 & 19
PIPE HYDRAULIC DATA
EX 48" RCP Sta. 840+00-L-
DRAINAGE AREA = AC
DESIGN FREQUENCY = 50 YRS
DESIGN DISCHARGE = CFS
DESIGN HW ELEVATION = 683.7 FT
50 YEAR DISCHARGE = CFS
100 YEAR HW ELEVATION = 683.70 FT
OVERTOPPING FREQUENCY = YRS
OVERTOPPING DISCHARGE = CFS
OVERTOPPING ELEVATION = FT
-L- STA 847+14.58 = RAMP A- STA 9+71.05 (59' LT)
PI = 845+30.00
EL = 672.62'
VC = 700'
K = 189
DS = 70 MPH
(-)10.30002
(-)3.45002
(-)4.00002
CL 1" RIP RAP
1.5:1 NORMAL
PI = 846+00 RT
EL = 670.42
PI = 847+00 RT
EL = 665.00
BEGIN APPROACH SLAB
STA 847+15.83
BEGIN BRIDGE
STA 847+60.00
PROPOSED GRADE
LOW SIDE
LOW STEEL
EXISTING GROUND
-L-
END APPROACH SLAB
STA 850+84.17
END BRIDGE
STA 850+16.00
EXISTING BRIDGE TO BE REMOVED
END TIP PROJECT R-2707D
BEGIN TIP PROJECT R-2707E
END GRADE
-L- STA. 851+40.00
ELEV = 670.91'
FUTURE GRADE
EXCAVATE TO APPROX. EL 652.0
EST. 120 CY
TEMP WORK PAD TOP ELEV 664.84
1.5:1 SIDE SLOPES
WSE ON 9-27-17 =635.3
BM#01
STA 850+42.83, 7.27' RT
ELEV. 667.84'
DESCRIPTION MISSING
BRIDGE HYDRAULIC DATA
DESIGN DISCHARGE = 14290 CFS
DESIGN FREQUENCY = 50 YRS
DESIGN HW ELEVATION = 654.4 FT
BASE DISCHARGE = 16860 CFS
BASE FREQUENCY = 100 YRS
BASE HW ELEVATION = 655.8 FT
OVERTOPPING DISCHARGE = 55000 CFS
OVERTOPPING FREQUENCY = >500 YRS
OVERTOPPING ELEVATION = 671.2 FT
DATE OF SURVEY = 9-27-17
WS ELEVATION = FT
AT DATE OF SURVEY = 635.3 FT
FOR -L- PLAN SEE RDY SHEET 19
5/28/99
12/19/2018
r2707d_hyd-prm-xet-psh-19b.dgn
bellm

WETLAND AND SURACE WATER IMPACTS SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	643+78 to 647+11-L-	48" RCP						0.05		572		
		INLET/OUTLET CHANNEL						< 0.01	< 0.01	47	20	
2	683+16 to 685+09-L-	42" RCP	0.05					0.04		507		
		INLET/OUTLET CHANNEL						< 0.01	< 0.01	63	20	
3	715+09 to 720+05-L-	1@7'x7' RCBC						0.09	< 0.01	633	52	
		BANK STABILIZATION						< 0.01		50		
4A	720+05 to 725+00-L-LT	CHANNEL RELOCATION						0.15	< 0.01	806	20	621
4B	720+52 to 721+60-L-LT	CHANNEL RELOCATION						< 0.01	< 0.01	109	15	199
5A	727+99 to 732+97-L-LT	CHANNEL RELOCATION						0.16	< 0.01	664	40	530
5B	730+88 to 732+24-L-LT	CHANNEL RELOCATION						0.01	< 0.01	186	15	134
6A	734+37 to 740+78-L-LT	CHANNEL RELOCATION						0.30	0.02	1178	56	878
6B	739+73 to 742+83-L-LT	CHANNEL RELOCATION						0.12		468		316
6C	742+83 to 744+14-L-	2@8'x8' RCBC						0.17	< 0.01	597	40	
		BANK STABILIZATION						0.01		50		
7	763+53 to 764+51-L-	48" RCP	0.02			< 0.01		0.02	< 0.01	268	10	
		OUTLET CHANNEL						< 0.01	< 0.01	20	10	
		BANK STABILIZATION						< 0.01		20		
8	776+56 to 778+61-L-	54" RCP	< 0.01					0.03	< 0.01	483	10	
		OUTLET CHANNEL						< 0.01	< 0.01	32	10	
		BANK STABILIZATION						< 0.01		20		
9	796+29 to 797+06-L-	1@12'x7' RCBC						0.05	0.02	323	85	
		BANK STABILIZATION						0.02		100		
SHEET 1 SUBTOTALS*:			0.07			< 0.01		1.24	0.06	7196	403	2678

*Rounded totals are sum of actual impacts

NOTES:
Site 4A: 1@7'x7' RCBC Outlet Channel Stabilization = 70ft
Site 6B: 2@8'x8' RCBC Outlet Bank Stabilization = 50ft

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
8-31-22
CLEVELAND
R-2707D
34497.1.F56
SHEET 49 OF 50

Revised 2018 Feb

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WETLAND AND SURACE WATER IMPACTS SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
10	804+32 to 805+12-L-LT	ROADWAY FILL / 24" RCP	0.05		< 0.01	0.02						
11A	814+26 to 816+25-L-	66" RCP	0.22					0.05	< 0.01	438	29	
		POND						0.87				
		BANK STABILIZATION						< 0.01		20		
11B	19+48 to 20+13-SRVRD5-	66" RCP						0.02		134		
		OUTLET CHANNEL						< 0.01	< 0.01	25	17	
12A	29+17 to 34+77-RAMPA-	ROADWAY FILL	0.12			0.01		0.05	< 0.01	682	14	
12B	23+80 to29+35-RAMPA-RT	ROADWAY FILL	0.65			0.13						
13	841+05 to 848+66-L-LT	42" RCP						0.04		308		
		OUTLET CHANNEL						0.06		534		
14A	849+42-L-LT	BANK STABILIZATION						< 0.01		35		
14B	848+50 to 850+05-L-	BANK STABILIZATION						0.03		250		
		TEMP. WORKPAD							0.03			
14C	849+06-L-RT	BANK STABILIZATION						< 0.01		15		
15	652+82 to 652+98-L-LT	OUTLET CHANNEL							< 0.01		15	
16	669+32 to 670+07-L-	48" RCP						0.03		367		
		INLET/OUTLET CHANNEL						< 0.01	< 0.01	58	15	
SHEET 1 SUBTOTALS*:			0.07			< 0.01		1.24	0.06	7196	403	2678
SHEET 2 SUBTOTALS*:			1.04		< 0.01	0.16		1.15	0.04	2866	90	
GRAND TOTALS*:			1.11		< 0.01	0.17		2.40	0.10	10062	493	2678

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
8-31-22
CLEVELAND
R-2707D
34497.1.F56
SHEET 50 OF 50

Revised 2018 Feb

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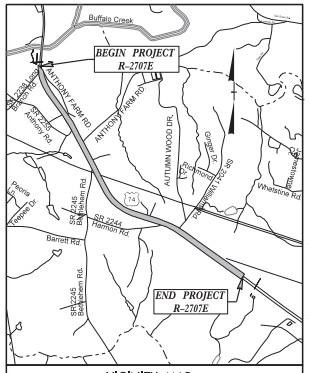
CONTRACT: TIP PROJECT: R-2707E

PERMIT DRAWING SHEET 1 OF 22

See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Symbols



VICINITY MAP NTS

75% APPROVED PLANS

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CLEVELAND COUNTY

WAD 83 / 96

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707E	1	

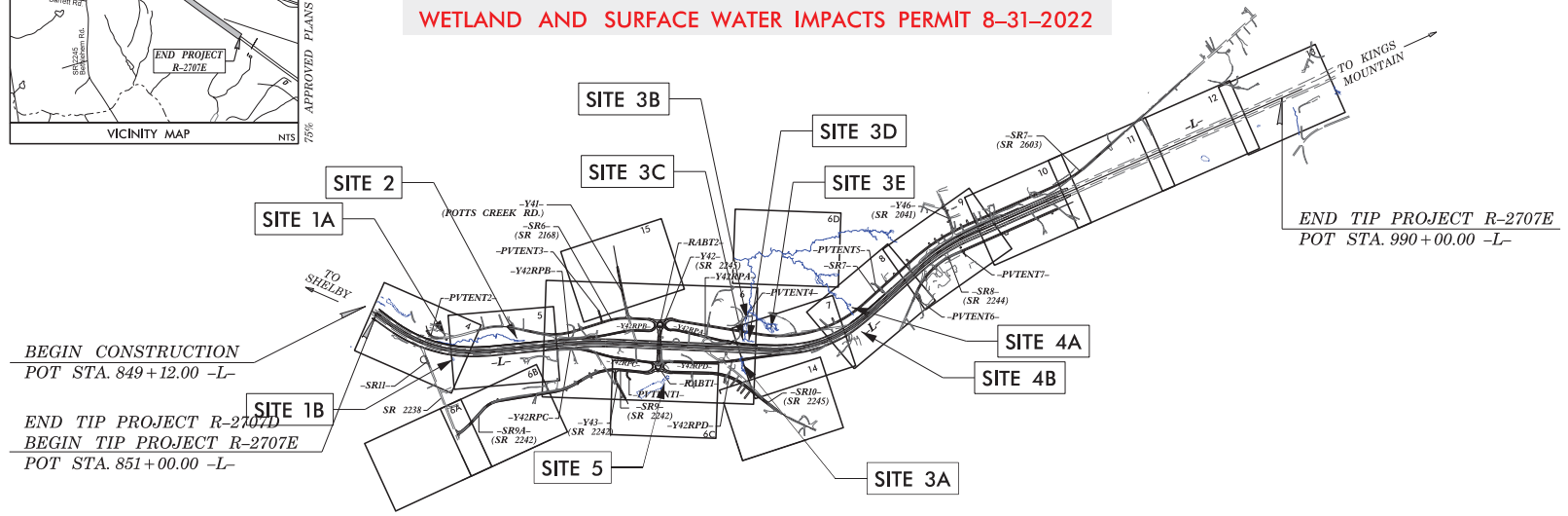
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34497.1.F56	N/A	P.E.
34497.1.F56	N/A	R/W
34497.1.F56	N/A	UTIL.

PART 2

LOCATION: US 74 FROM EXISTING US 74 WEST OF SR 2238 (LONG BRANCH RD) TO WEST OF SR 1001 (STONEY POINT RD)

TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURE, & SIGNING

WETLAND AND SURFACE WATER IMPACTS PERMIT 8-31-2022



BEGIN CONSTRUCTION
POT STA. 849+12.00 -L-

END TIP PROJECT R-2707D
BEGIN TIP PROJECT R-2707E
POT STA. 851+00.00 -L-

END TIP PROJECT R-2707E
POT STA. 990+00.00 -L-

THIS PROJECT IS NOT WITHIN ANY CITY LIMITS

THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES

CLEARING FOR THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

PLANS: 50 25 0 50 100
PROFILE (HORIZONTAL): 50 25 0 50 100
PROFILE (VERTICAL): 50 25 0 50 100

DESIGN DATA

ADT 2019 = 41,600
ADT 2040 = 59,200
K = 11 %
D = 55 %
T = 15 % *
V = 70 MPH

* TTST =10% DUAL 5%

FUNC CLASS = FREEWAY

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT R-2707E = 2.63 MI.
TOTAL LENGTH OF TIP PROJECT R-2707E = 2.63 MI.

PREPARED IN THE OFFICE OF:
Stantec
Stantec Consulting Services Inc. Tel. (919) 851-6666
801 Jones Franklin Road Fax. (919) 851-7024
Suite 300 www.stantec.com
Raleigh, NC 27606 License No. F-0672

SUNGATE DESIGN GROUP, P.A.
900 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
PH: (919) 851-2000
ENG FIRM LICENSE NO. C-990

FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: 01 /10 /2019

LETTING DATE: 07 /18 /2023

JOSEPH T. KELVINGTON, P.E.
PROJECT ENGINEER

MICHAEL LINDGREN, P.E.
PROJECT DESIGN ENGINEER

THAD DUNCAN, P.E.
NCDOT DIVISON 12

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION

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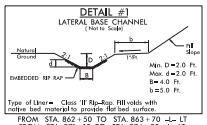
5/14/99

PERMIT DRAWING SHEET 2 OF 22

PROJECT REFERENCE NO.	SHEET NO.
R-2707E	2D-1
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

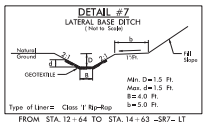
DETAIL #1
LATERAL BASE CHANNEL
(Not to Scale)



Type of Liner = Class 'II' Rip-Rap. Fill voids with native bed material to provide flat bed surface.

FROM STA. 862+50 TO STA. 863+70 -L- LT
FROM STA. 871+15 TO STA. 874+00 -L- LT

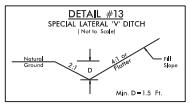
DETAIL #7
LATERAL BASE DITCH
(Not to Scale)



Type of Liner = Class 'I' Rip-Rap

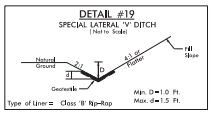
FROM STA. 12+64 TO STA. 14+63 -SR7- LT

DETAIL #13
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM STA. 922+00 TO STA. 924+00 -L- RT
FROM STA. 33+20 TO STA. 36+50 -SR7- LT
FROM STA. 37+00 TO STA. 39+00 -SR7- RT
FROM STA. 41+75 TO STA. 42+90 -SR7- RT
FROM STA. 43+60 TO STA. 44+50 -SR7- RT
FROM STA. 19+50 TO STA. 21+00 -Y42RPD- LT

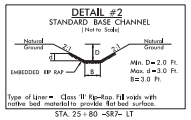
DETAIL #19
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



Type of Liner = Class 'B' Rip-Rap

FROM STA. 12+00 TO STA. 17+00 -SR6- LT
FROM STA. 19+50 TO STA. 25+00 -SR7- RT
FROM STA. 43+35 TO STA. 44+25 -SR7- LT
FROM STA. 22+70 TO STA. 24+50 -SR10- LT
FROM STA. 22+80 TO STA. 28+50 -SR10- RT
FROM STA. 14+30 TO STA. 15+90 -Y42RPA- RT
FROM STA. 16+30 TO STA. 18+00 -Y42RPD- LT
FROM STA. 11+50 TO STA. 12+50 -PVTENT_7- RT

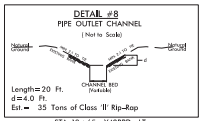
DETAIL #2
STANDARD BASE CHANNEL
(Not to Scale)



Type of Liner = Class 'II' Rip-Rap. Fill voids with native bed material to provide flat bed surface.

STA. 25+80 -SR7- LT

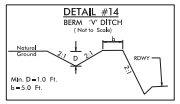
DETAIL #8
PIPE OUTLET CHANNEL
(Not to Scale)



Length = 20 Ft.
d = 4.0 Ft.
Est. = 35 Tons of Class 'II' Rip-Rap

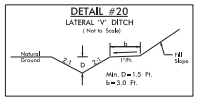
STA. 18+65 -Y42RPD- LT
STA. 921+00 -L- RT

DETAIL #14
BERM 'V' DITCH
(Not to Scale)



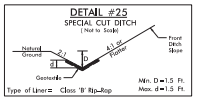
FROM STA. 926+00 TO STA. 929+00 -L- RT

DETAIL #20
LATERAL 'V' DITCH
(Not to Scale)



FROM STA. 69+50 TO STA. 72+50 -SR7- RT

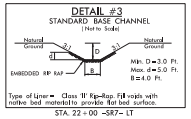
DETAIL #25
SPECIAL CUT DITCH
(Not to Scale)



Type of Liner = Class 'B' Rip-Rap

FROM STA. 10+15 TO STA. 14+50 -SR9A- RT
FROM STA. 10+50 TO STA. 14+50 -SR9A- LT

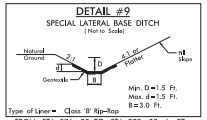
DETAIL #3
STANDARD BASE CHANNEL
(Not to Scale)



Type of Liner = Class 'II' Rip-Rap. Fill voids with native bed material to provide flat bed surface.

STA. 22+00 -SR7- LT

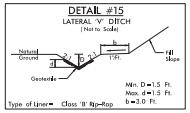
DETAIL #9
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Type of Liner = Class 'B' Rip-Rap

FROM STA. 876+00 TO STA. 879+00 -L- RT

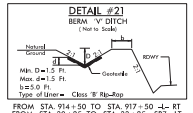
DETAIL #15
LATERAL 'V' DITCH
(Not to Scale)



Type of Liner = Class 'B' Rip-Rap

FROM STA. 36+50 TO STA. 37+00 -SR7- LT

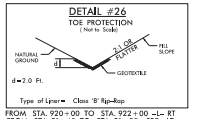
DETAIL #21
BERM 'V' DITCH
(Not to Scale)



Type of Liner = Class 'B' Rip-Rap

FROM STA. 914+50 TO STA. 917+50 -L- RT
FROM STA. 30+25 TO STA. 33+25 -SR7- LT

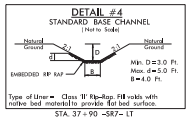
DETAIL #26
TOE PROTECTION
(Not to Scale)



Type of Liner = Class 'B' Rip-Rap

FROM STA. 920+00 TO STA. 922+00 -L- RT
FROM STA. 21+45 TO STA. 21+95 -SR7- LT
FROM STA. 37+00 TO STA. 37+88 -SR7- LT
FROM STA. 18+15 TO STA. 19+25 -Y42RPD- LT

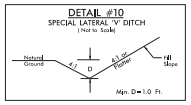
DETAIL #4
STANDARD BASE CHANNEL
(Not to Scale)



Type of Liner = Class 'II' Rip-Rap. Fill voids with native bed material to provide flat bed surface.

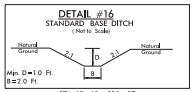
STA. 37+90 -SR7- LT

DETAIL #10
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



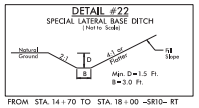
FROM STA. 899+00 TO STA. 901+00 -L- RT
FROM STA. 18+50 TO STA. 23+00 -Y42RPC- LT

DETAIL #16
STANDARD BASE DITCH
(Not to Scale)



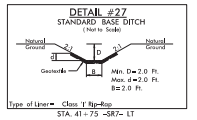
STA. 17+12 -SR8- RT
STA. 22+60 -SR8- RT
STA. 35+75 -SR8- RT

DETAIL #22
SPECIAL LATERAL BASE DITCH
(Not to Scale)



FROM STA. 14+70 TO STA. 18+00 -SR10- RT

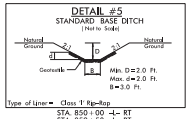
DETAIL #27
STANDARD BASE DITCH
(Not to Scale)



Type of Liner = Class 'I' Rip-Rap

STA. 41+75 -SR7- LT

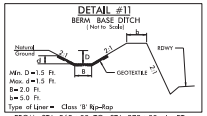
DETAIL #5
STANDARD BASE DITCH
(Not to Scale)



Type of Liner = Class 'I' Rip-Rap

STA. 850+00 -L- RT
STA. 859+50 -L- RT

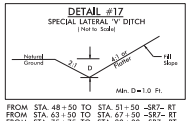
DETAIL #11
BERM BASE DITCH
(Not to Scale)



Type of Liner = Class 'B' Rip-Rap

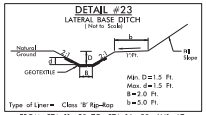
FROM STA. 868+00 TO STA. 873+00 -L- RT

DETAIL #17
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM STA. 48+50 TO STA. 51+50 -SR7- RT
FROM STA. 63+50 TO STA. 67+50 -SR7- RT
FROM STA. 73+75 TO STA. 80+00 -SR7- RT
FROM STA. 21+80 TO STA. 22+60 -SR8- LT
FROM STA. 34+00 TO STA. 35+75 -SR8- RT
FROM STA. 10+50 TO STA. 14+00 -SR9- LT
FROM STA. 19+50 TO STA. 22+00 -SR9A- RT
FROM STA. 16+90 TO STA. 19+00 -SR10- LT
FROM STA. 13+13 TO STA. 13+50 -Y46- LT

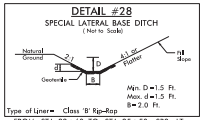
DETAIL #23
LATERAL BASE DITCH
(Not to Scale)



Type of Liner = Class 'B' Rip-Rap

FROM STA. 11+50 TO STA. 16+90 -Y41- LT

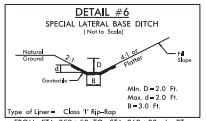
DETAIL #28
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Type of Liner = Class 'B' Rip-Rap

FROM STA. 22+60 TO STA. 25+50 -SR8- LT
FROM STA. 12+90 TO STA. 14+30 -Y42RPA- RT

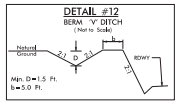
DETAIL #6
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Type of Liner = Class 'I' Rip-Rap

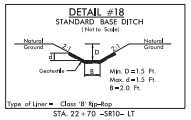
FROM STA. 859+50 TO STA. 868+00 -L- RT
FROM STA. 815+00 TO STA. 817+00 -L- LT
FROM STA. 26+00 TO STA. 31+80 -SR7- RT

DETAIL #12
BERM 'V' DITCH
(Not to Scale)



FROM STA. 873+00 TO STA. 876+00 -L- RT

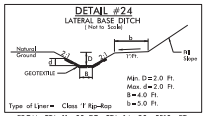
DETAIL #18
STANDARD BASE DITCH
(Not to Scale)



Type of Liner = Class 'B' Rip-Rap

STA. 22+70 -SR10- LT

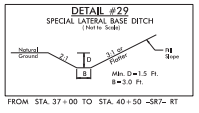
DETAIL #24
LATERAL BASE DITCH
(Not to Scale)



Type of Liner = Class 'I' Rip-Rap

FROM STA. 11+00 TO STA. 14+20 -SR10- RT

DETAIL #29
SPECIAL LATERAL BASE DITCH
(Not to Scale)



FROM STA. 37+00 TO STA. 40+50 -SR7- RT

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$$$

PERMIT DRAWING SHEET 3 OF 22

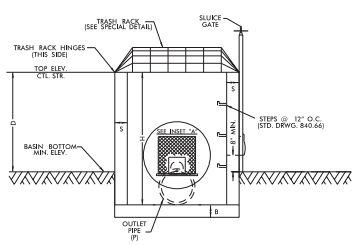
PROJECT REFERENCE NO.	SHEET NO.
R-2707E	2D-2
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

5/14/99

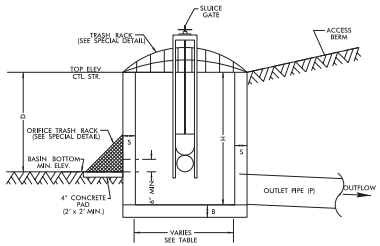
DETAIL #30

DRY DETENTION BASIN DRAWDOWN STRUCTURE

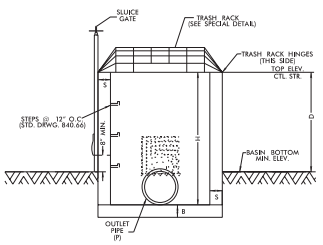
NOT TO SCALE



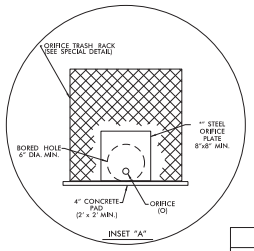
SIDE 1



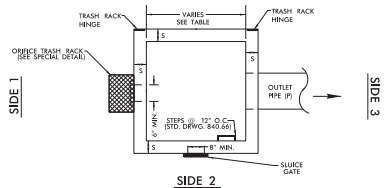
SIDE 2



SIDE 3



INSET "A"



SIDE 2

PLAN VIEW

TRASH RACK NOT SHOWN FOR CLARITY

NOTES:
1. TOP ELEVATION OF CONTROL STRUCTURE (WEIR ELEVATION) SHOULD BE SET AT THE WQ_v ELEVATION.
2. 15" MINIMUM DIAMETER FOR OUTLET PIPE.
3. 2" MINIMUM DIAMETER ORIFICE. IF ORIFICE IS GREATER THAN 6", A STEEL PLATE IS NOT REQUIRED.
4. NO BEDDING MATERIAL TO BE USED. THEREFORE, DO NOT FOLLOW STANDARD DRAWINGS FOR METHOD OF PIPE INSTALLATION FOR OUTLET PIPE THROUGH EMBANKMENT.
5. SLUICE GATE IS FOR MAINTENANCE AND SHOULD REMAIN CLOSED DURING NORMAL OPERATION. A GATE VALVE MAY BE USED IN LIEU OF THE 8" SLUICE GATE.
6. SLUICE GATE SHALL PROVIDE WATERTIGHT SEAL. PROVIDE ADEQUATE CLEARANCE FOR GATE OPERATION AND FOR PROPER SEATING OF GATE OVER PIPE.
7. SELECT BOX STANDARD AS REQUIRED TO ACCOMMODATE SLUICE GATE AND ORIFICE TRASH RACK WIDTH.
8. ENSURE TRASH RACK OPENS FREELY AND WITHOUT INTERFERENCE WITH SLUICE GATE.
9. ADJUST FOOTER DIMENSIONS AS NEEDED FOR ANTI-FLOTATION.
10. PAYMENT OF TRASH RACKS ARE INCIDENTAL TO BASIN DRAWDOWN STRUCTURE.

MINIMUM DIMENSIONS FOR DRY DETENTION BASIN DRAWDOWN STRUCTURE

STATION	STRUCTURE NUMBER	S (INCHES) 6" MIN.	B (INCHES) 6" MIN.	BASIN BOTTOM MINIMUM ELEV.	TOP ELEVATION CONTROL STRUCTURE	MAX. STORAGE DEPTH(D) FEET	INV. ELEV. CTL. STR.	CTL. STR. DIMENSIONS (W x L x H)	ORIFICE DIAMETER (O) INCHES	ORIFICE INV. ELEV.	OUTLET PIPE DIAMETER(P) INCHES
896+75 –L– RT	0630	6"	18"	772.0	775.0	3.0'	770.0	5.0' X 5.0' X 5.0'	2.0"	772.0	24"
19+22 –Y42RPB– LT	0619	6"	18"	764.0	768.0	4.0'	762.0	5.0' X 5.0' X 6.0'	2.0"	724.0	24"
20+25 –Y42RPC– RT	0635	6"	18"	773.0	775.0	2.0'	770.0	5.0' X 5.0' X 5.0'	2.0"	773.0	24"

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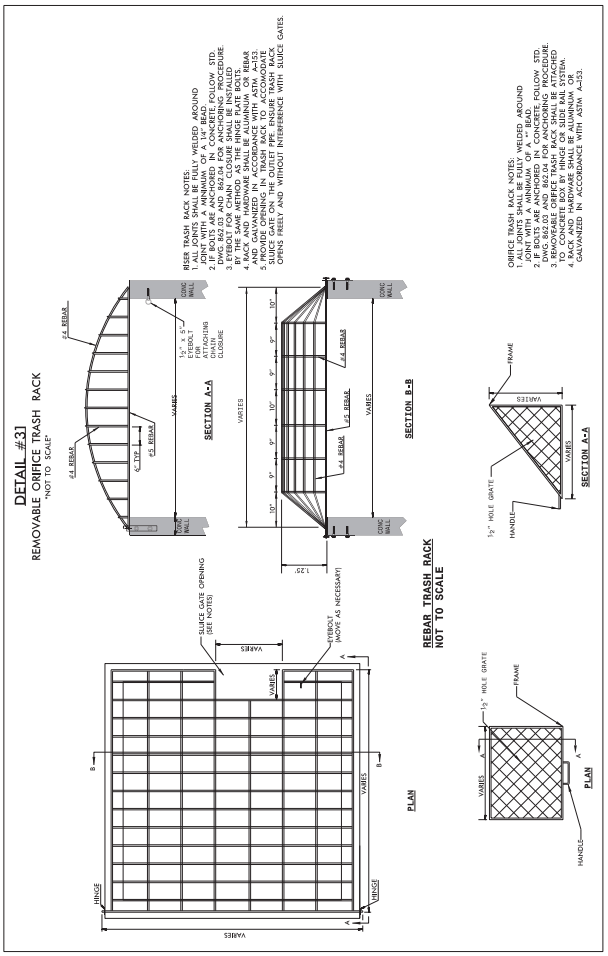
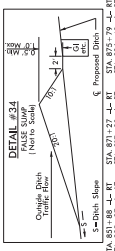
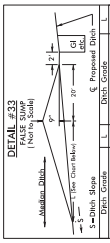
PERMIT DRAWING SHEET 4 OF 22

PROJECT REFERENCE NO.	SHEET NO.
A-2707E	20-3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



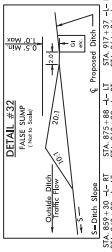


STA. 831+88 -L- RT	STA. 871+27 -L- RT
STA. 907+18 -L- RT	STA. 944+24 -L- RT
STA. 930+19 -L- RT	STA. 960+20 -L- LT
STA. 968+93 -L- LT	STA. 982+73 -L- LT
	STA. 992+23 -L- LT
STA. 27+82 -SRV- RT	STA. 29+72 -SRT- RT
STA. 29+66 -SRT- RT	STA. 37+13 -SRT- LT
STA. 13+33 -Y45PPC- RT	STA. 14+44 -Y45PPC- LT
	STA. 14+77 -Y45PPC- RT
	STA. 11+96 -Y45PPC- LT



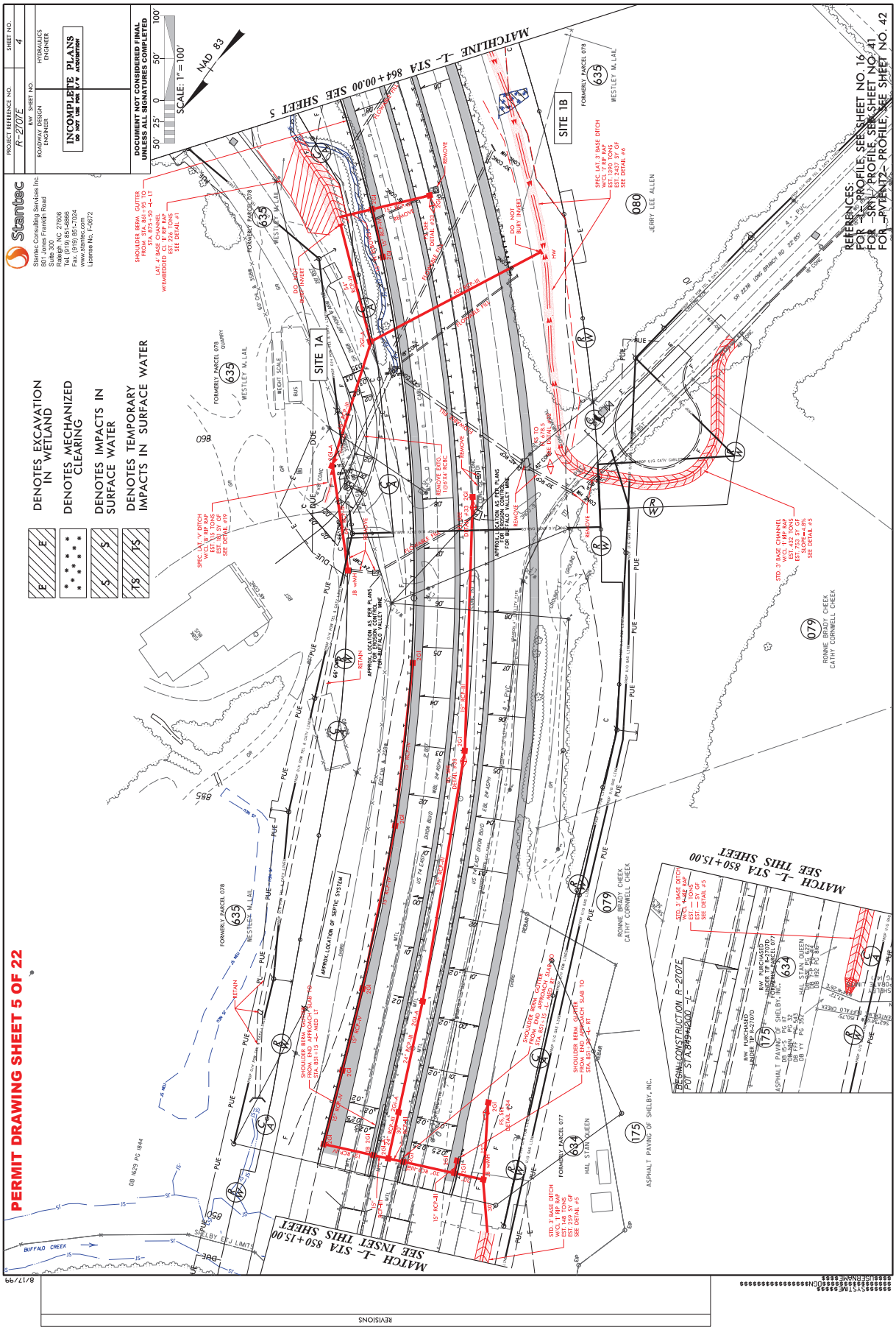
S=Ditch Slope	L	Ditch
0.0% to 2.0%	20'	Over 4.0% thru 6.0% 40'
Over 2.0% to 4.0%	30'	Over 6.0% 50'

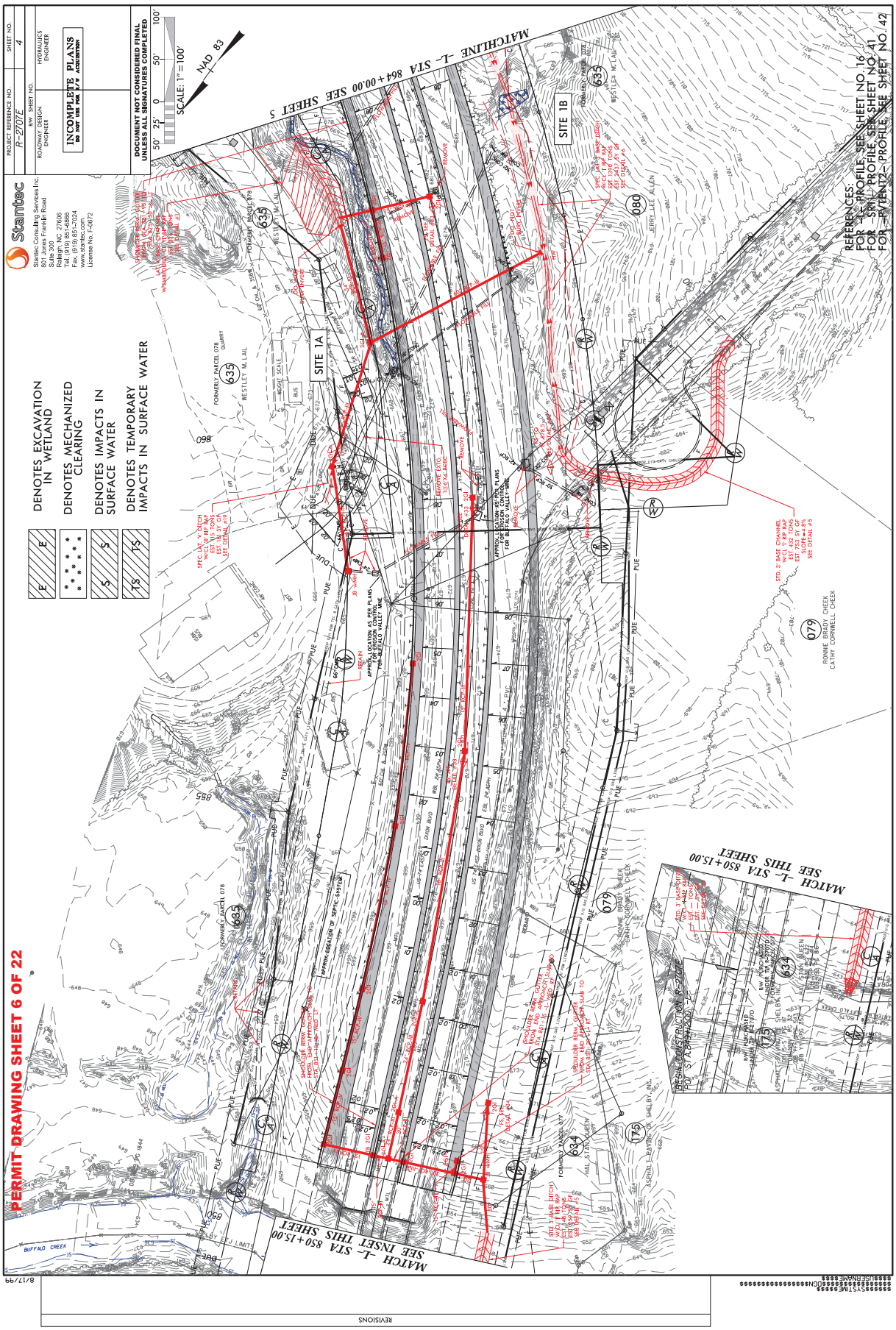
STA. 859+87 -L- MED	STA. 862+68 -L- MED
STA. 881+35 -L- MED	STA. 901+99 -L- MED
STA. 911+39 -L- MED	STA. 917+57 -L- MED
STA. 920+22 -L- MED	STA. 923+44 -L- MED
STA. 937+28 -L- MED	STA. 938+93 -L- MED
STA. 942+70 -L- MED	STA. 953+52 -L- MED
STA. 964+15 -L- MED	STA. 966+56 -L- MED
STA. 978+04 -L- MED	STA. 983+08 -L- MED



STA. 839+80 -L- LT	STA. 873+37 -L- RT
STA. 888+69 -L- RT	STA. 908+23 -L- RT
STA. 968+69 -L- RT	STA. 983+23 -L- RT
STA. 12+72 -SRT- RT	STA. 14+64 -SRT- LT
STA. 19+37 -Y45PPC- LT	

5/14/99
$$$$$$$$SYSTEM$$$$$$$$
$$$$$$$$


PROJECT REFERENCE NO. R-2707E
SHEET NO. 4
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1" = 100'
NAD 83
Stantec
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606
(919) 854-6200
Fax (919) 851-7024
www.stantec.com
License No. F-0672
DENOTES EXCAVATION IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
PERMIT DRAWING SHEET 5 OF 22
MATCHLINE -L- STA 844+00.00 SEE SHEET 5
MATCH -L- STA 850+15.00 SEE INSET THIS SHEET
MATCH -L- STA 850+15.00 SEE THIS SHEET
SITE 1A
SITE 1B
REFERENCES:
FOR -L- PROFILE, SEE SHEET NO. 16
FOR -SR1- PROFILE, SEE SHEET NO. 41
FOR -PVEMNT2- PROFILE, SEE SHEET NO. 42
BEGIN CONSTRUCTION R-2707E -L- STA 849+42.00
FORMERLY PARCEL 078
FORMERLY PARCEL 077
WESTLEY M. LAIL
HAL STAN QUEEN
JERRY LEE ALLEN
RONNIE BRADY CHEEK
CATHY CORNWELL CHEEK
ASPHALT PAVING OF SHELBY, INC.
BUFFALO CREEK
SHELBY CITY LIMITS
REVISIONS
8/17/99


PROJECT REFERENCE NO. R-2707E
SHEET NO. 4
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1" = 100'
NAD 83
Stantec
DENOTES EXCAVATION IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
SITE 1A
SITE 1B
MATCHLINE -L- STA 844+00.00 SEE SHEET 5
MATCH -L- STA 850+15.00 SEE INSET THIS SHEET
MATCH -L- STA 850+15.00 SEE THIS SHEET
REFERENCES:
FOR -L- PROFILE, SEE SHEET NO. 16
FOR -SKL- PROFILE, SEE SHEET NO. 41
FOR -PVEN12- PROFILE, SEE SHEET NO. 42
PERMIT DRAWING SHEET 6 OF 22
BUFFALO CREEK
RONNIE BRADY CHEEK
CATHY CORNWELL CHEEK
JERRY LEE ALLEN
WESTLEY M. LAIL
SHELBY INC.
REVISIONS
8/17/99

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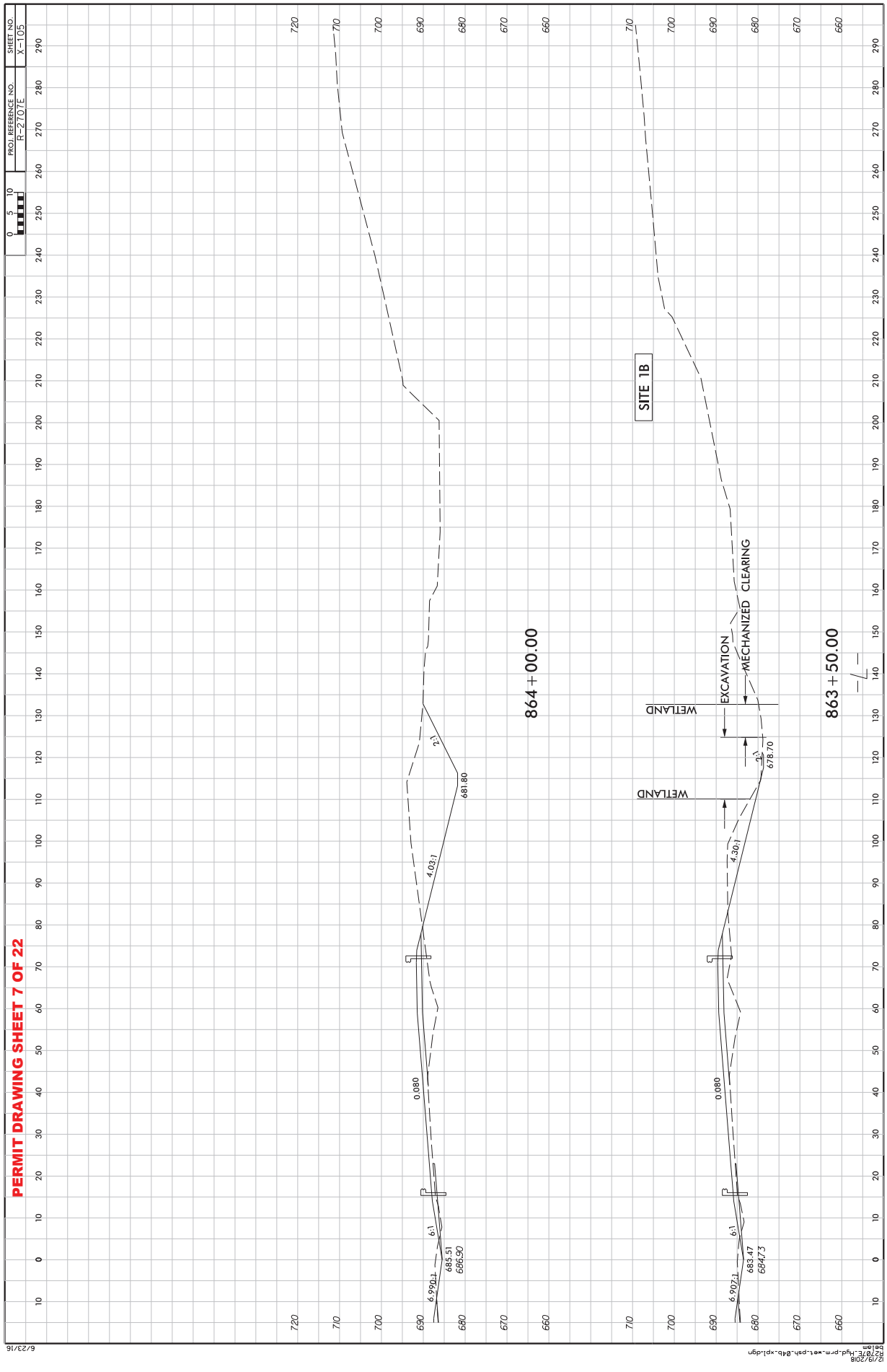
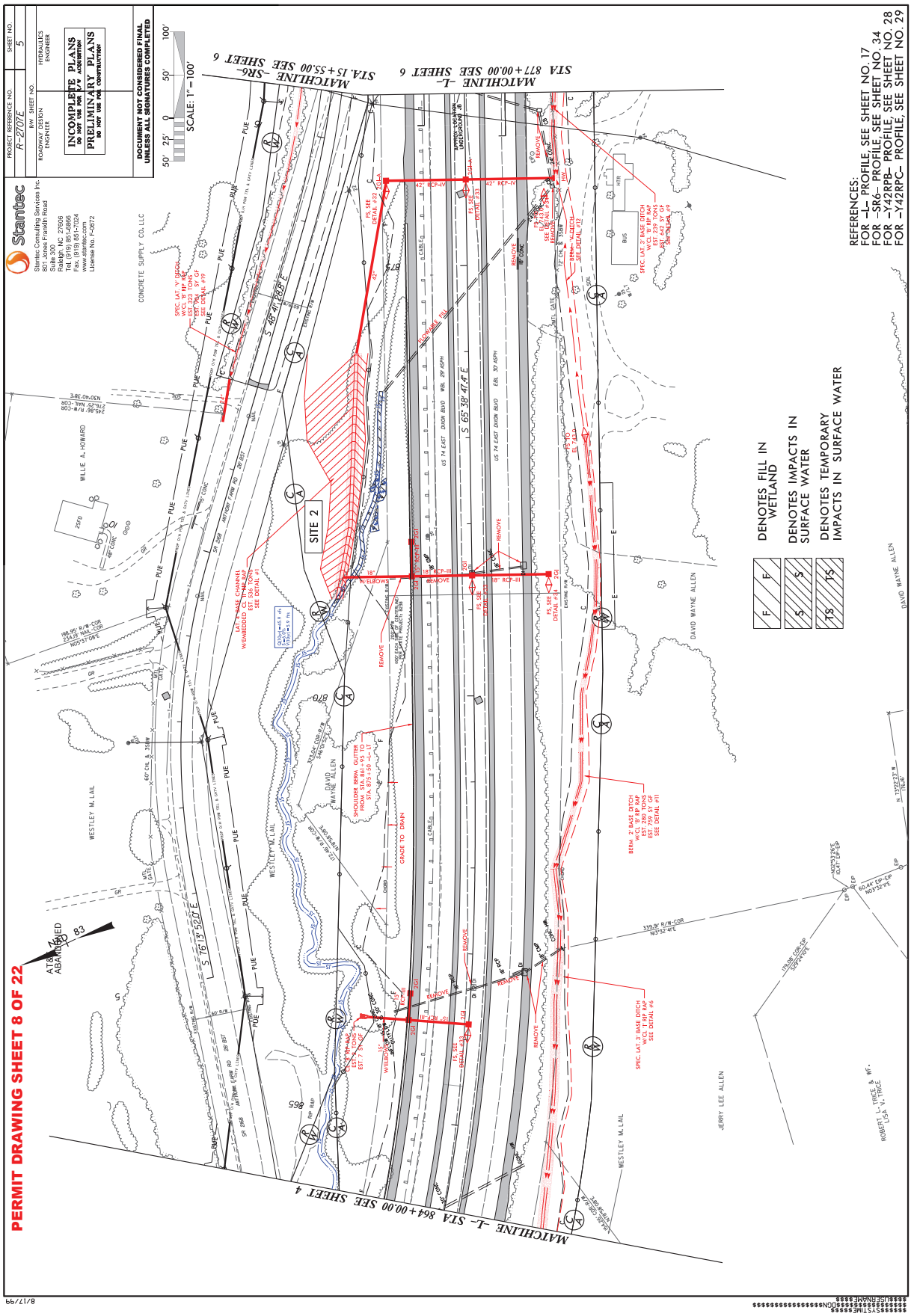

PERMIT DRAWING SHEET 7 OF 22
SHEET NO. X-105
PROJ. REFERENCE NO. R-2707E
0 5 10
SITE 1B
WETLAND
WETLAND
EXCAVATION
MECHANIZED CLEARING
2:1
4.03:1
4.30:1
6:1
6:1
6.990:1
6.907:1
0.080
0.080
681.80
678.70
685.51
686.90
683.47
684.73
864+00.00
863+50.00
720
710
700
690
680
670
660
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

P-120


PERMIT DRAWING SHEET 8 OF 22
PROJECT REFERENCE NO. R-2707E
SHEET NO. 5
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
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1" = 100'
Stantec
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Suite 300
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No. F-0672
MATCHLINE -L- STA 877+00.00 SEE SHEET 6
MATCHLINE -SR6- STA. 15+55.00 SEE SHEET 6
MATCHLINE -L- STA 864+00.00 SEE SHEET 4
SITE 2
DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
REFERENCES:
FOR -L- PROFILE, SEE SHEET NO. 17
FOR -SR6- PROFILE, SEE SHEET NO. 34
FOR -Y42RPB- PROFILE, SEE SHEET NO. 28
FOR -Y42RPC- PROFILE, SEE SHEET NO. 29
CONCRETE SUPPLY CO, LLC
WILLIE A. HOWARD
DAVID WAYNE ALLEN
WESTLEY M. LAIL
JERRY LEE ALLEN
ROBERT L. TRICE & WF. LISA W. TRICE
US 74 EAST DIXON BLVD
AT&T ABANDONED
8/17/99

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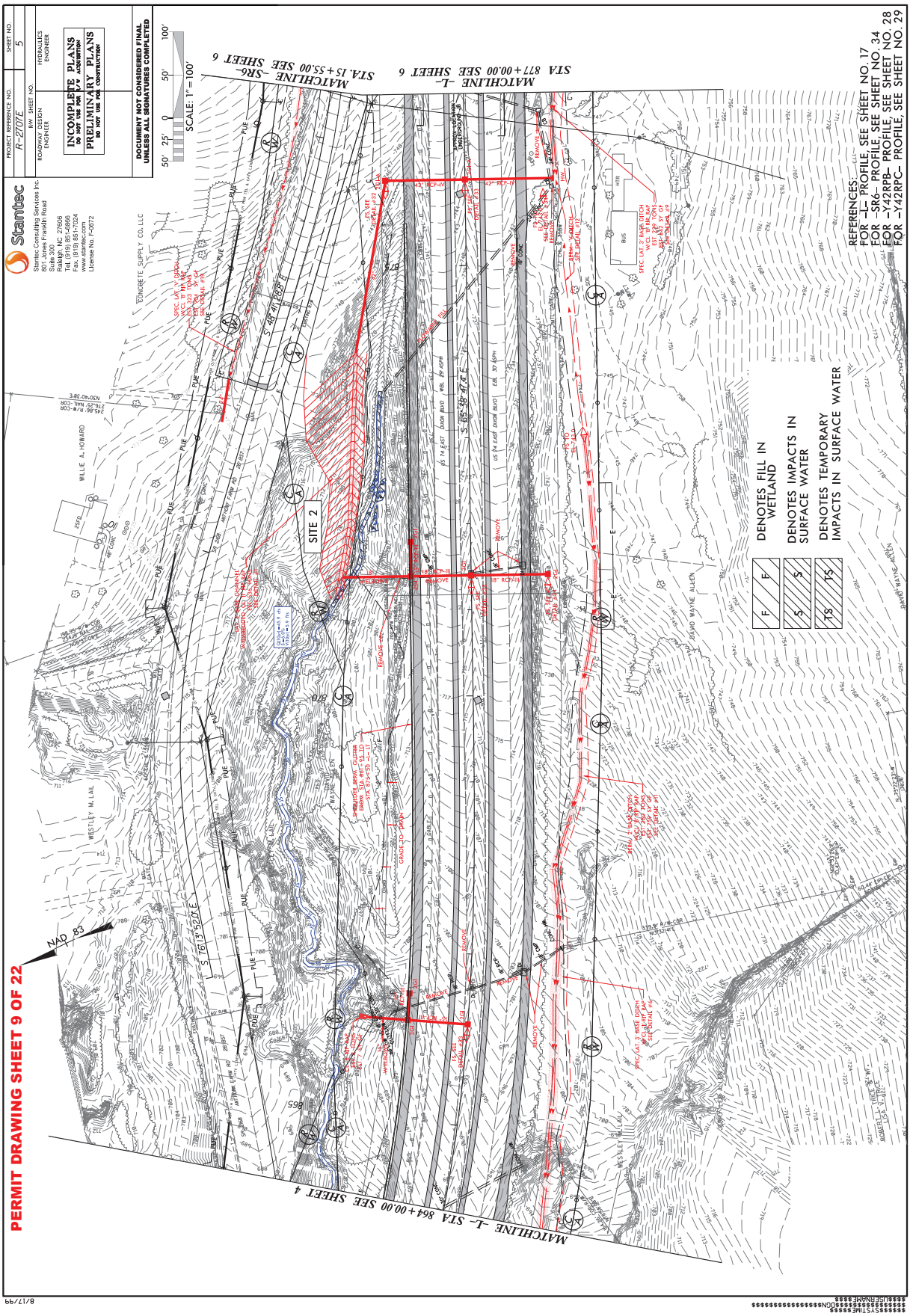
PERMIT DRAWING SHEET 9 OF 22
PROJECT REFERENCE NO. R-2707E
SHEET NO. 5
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION
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Stantec
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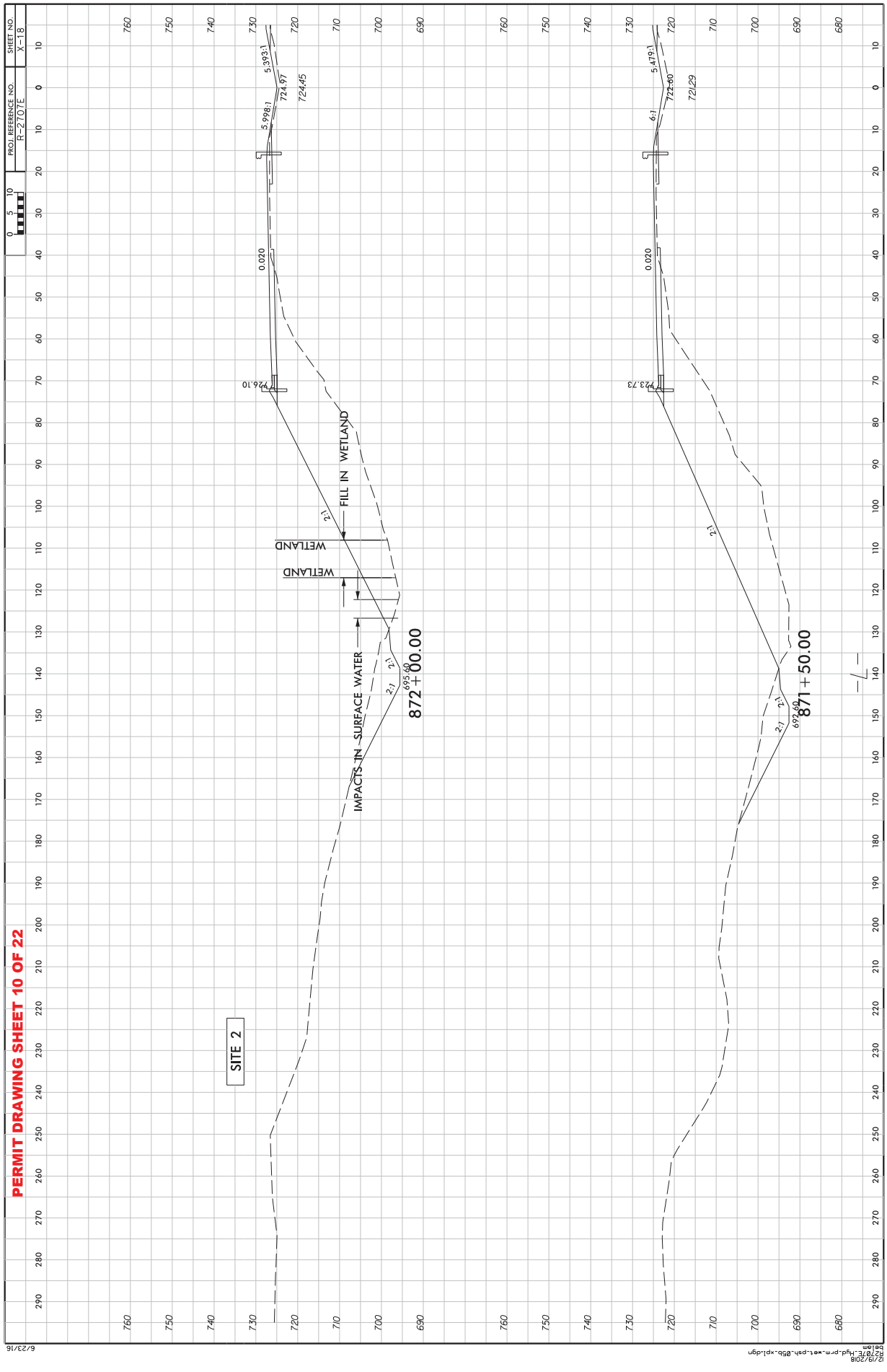
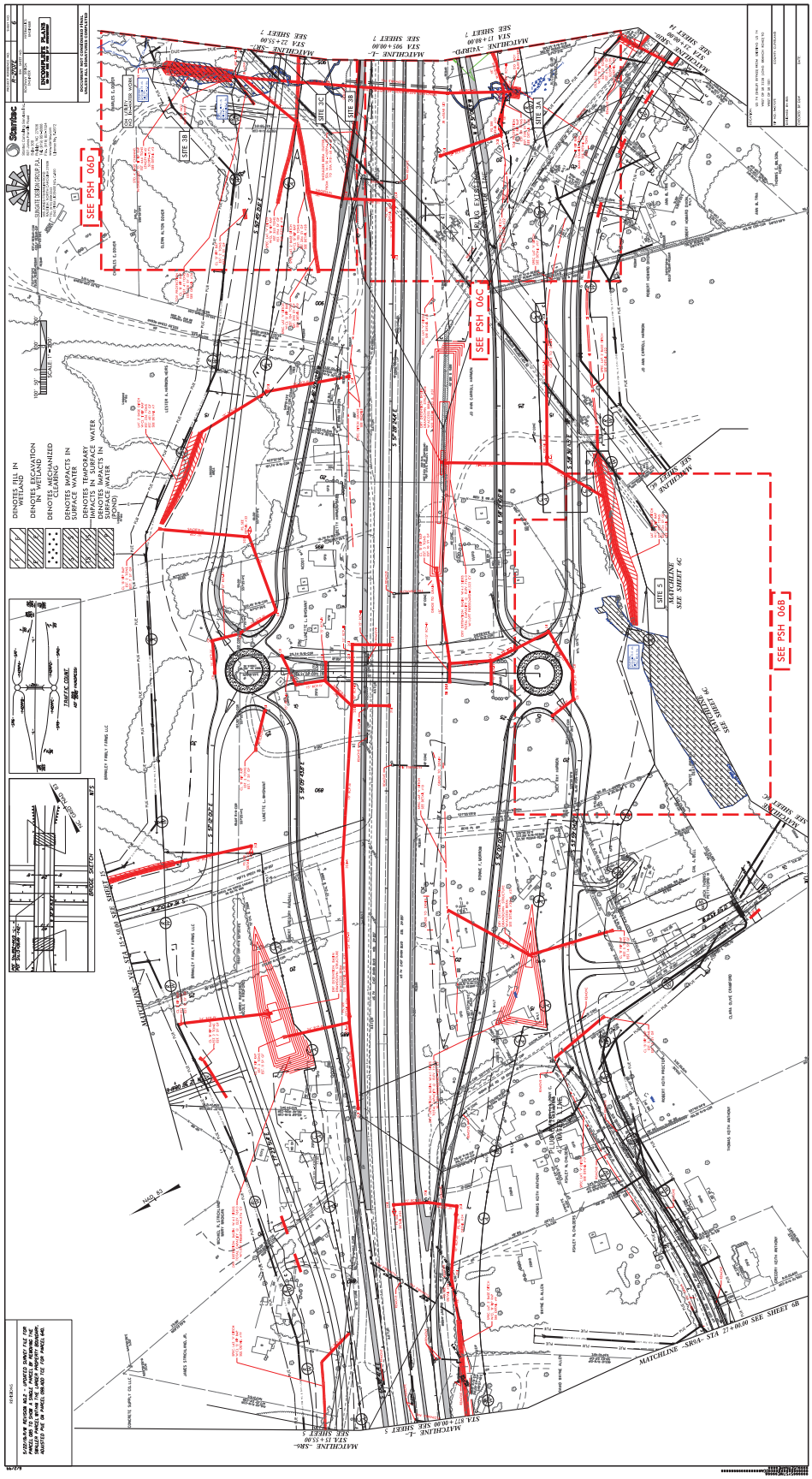
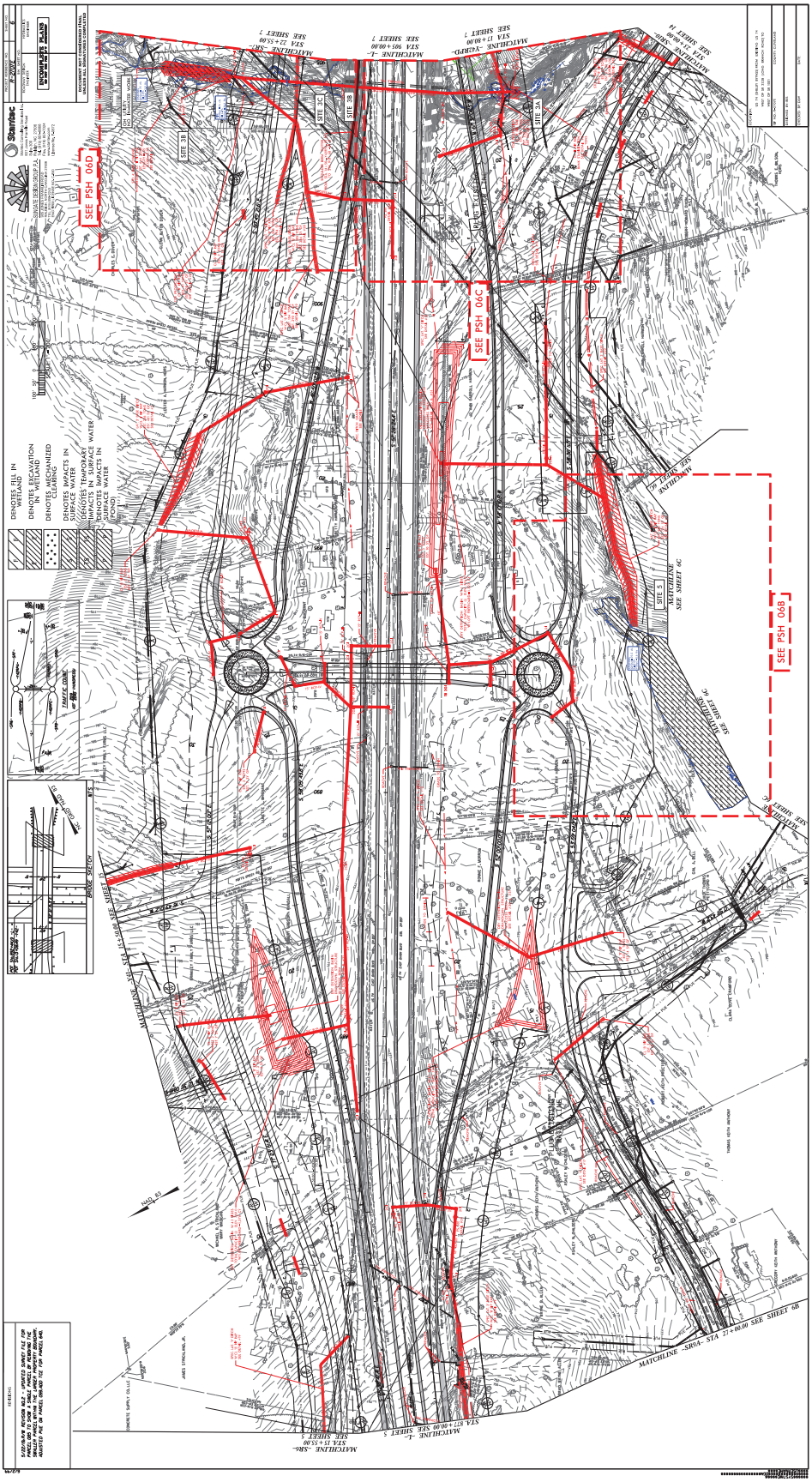
Fax. (919) 851-7024
www.stantec.com
License No. F-0672
SCALE: 1" = 100'
MATCHLINE -L- STA 877+00.00 SEE SHEET 6
MATCHLINE -SR6- STA. 15+55.00 SEE SHEET 6
MATCHLINE -L- STA 864+00.00 SEE SHEET 4
NAD 83
SITE 2
DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
REFERENCES:
FOR -L- PROFILE, SEE SHEET NO. 17
FOR -SR6- PROFILE, SEE SHEET NO. 34
FOR -Y42RPB- PROFILE, SEE SHEET NO. 28
FOR -Y42RPC- PROFILE, SEE SHEET NO. 29
8/17/99

P-122

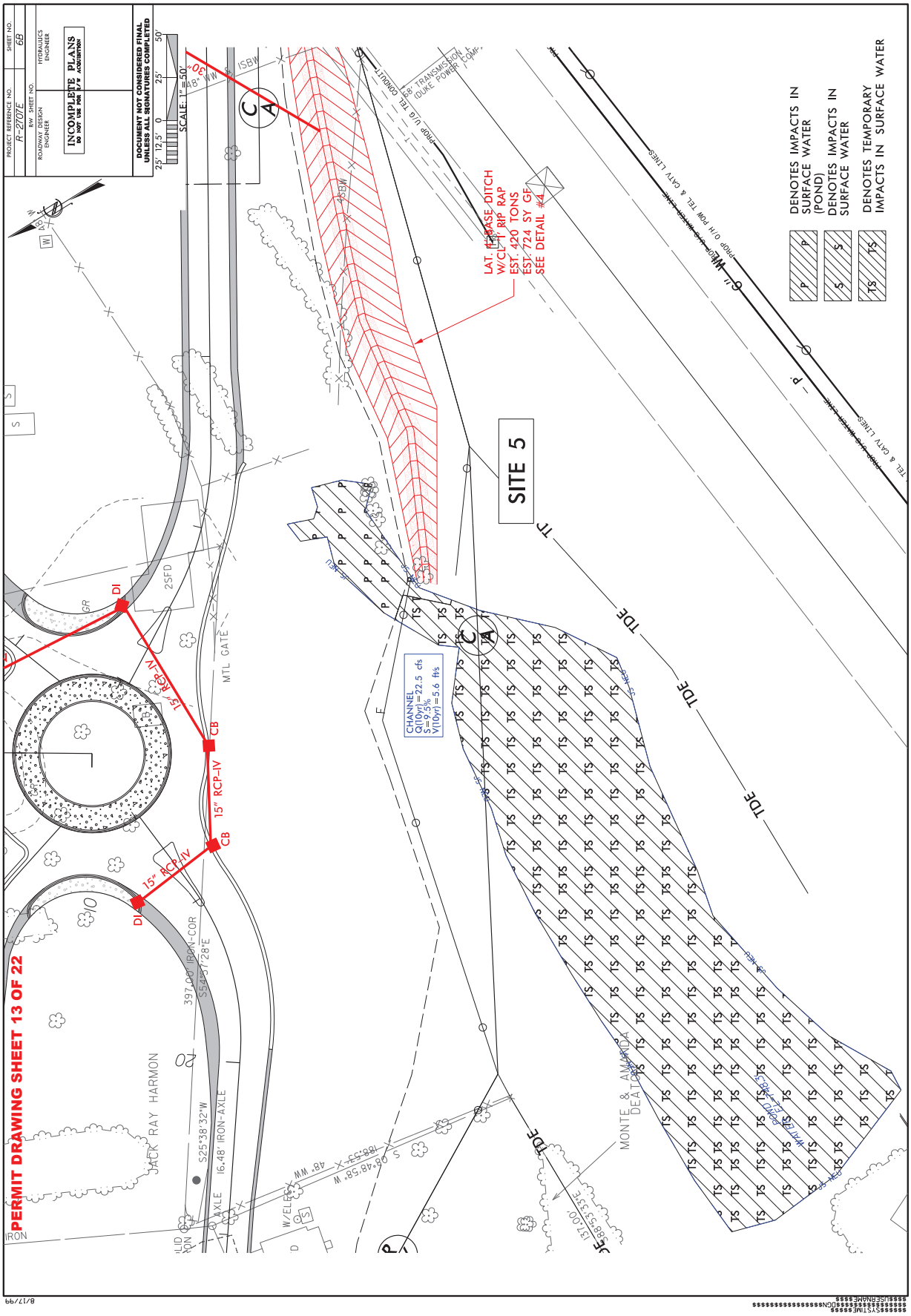

PERMIT DRAWING SHEET 10 OF 22
SHEET NO. X-18
PROJ. REFERENCE NO. R-2707E
0 5 10
SITE 2
WETLAND
WETLAND
FILL IN WETLAND
IMPACTS IN SURFACE WATER
872+00.00
871+50.00
5.393:1
5.998:1
5.479:1
6:1
0.020
724.97
724.45
722.90
721.29
726.10
723.73
695.60
692.60
2:1
6/23/16
12/19/2018
R2707E_Hyd_prm_wet_psh_05b_xpl.dgn



PERMIT DRAWING SHEET 11 OF 22



PERMIT DRAWING SHEET 12 OF 22


PROJECT REFERENCE NO.
R-2107E
SHEET NO.
6B
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1" = 50'
PERMIT DRAWING SHEET 13 OF 22
SITE 5
LAT. EROSION DITCH
W/CL. 1' RIP RAP
EST. 420 TONS
EST. 724 SY GF
SEE DETAIL #4
DENOTES IMPACTS IN SURFACE WATER (POND)
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
CHANNEL
Q(10yr)=22.5 cfs
S=9.3%
V(10yr)=5.6 ft/s
15" RCP-IV
CB
DI
MTL GATE
2SFD
JACK RAY HARMON
MONTE & AMANDA DEATON
TDE
TL
PROP U/G TEL CONDUIT
PROP O/H POW TEL & CATV LINES
EX. R/R TRANSMISSION (DUKE POWER) CO.
ISBW
WETLAND FLAG
397.00' IRON-COR
S54°37'28"E
S25°38'32"W
16.48' IRON-AXLE
W/ELEV.
S08°48'58"W
157.00'
S88°53'33"E

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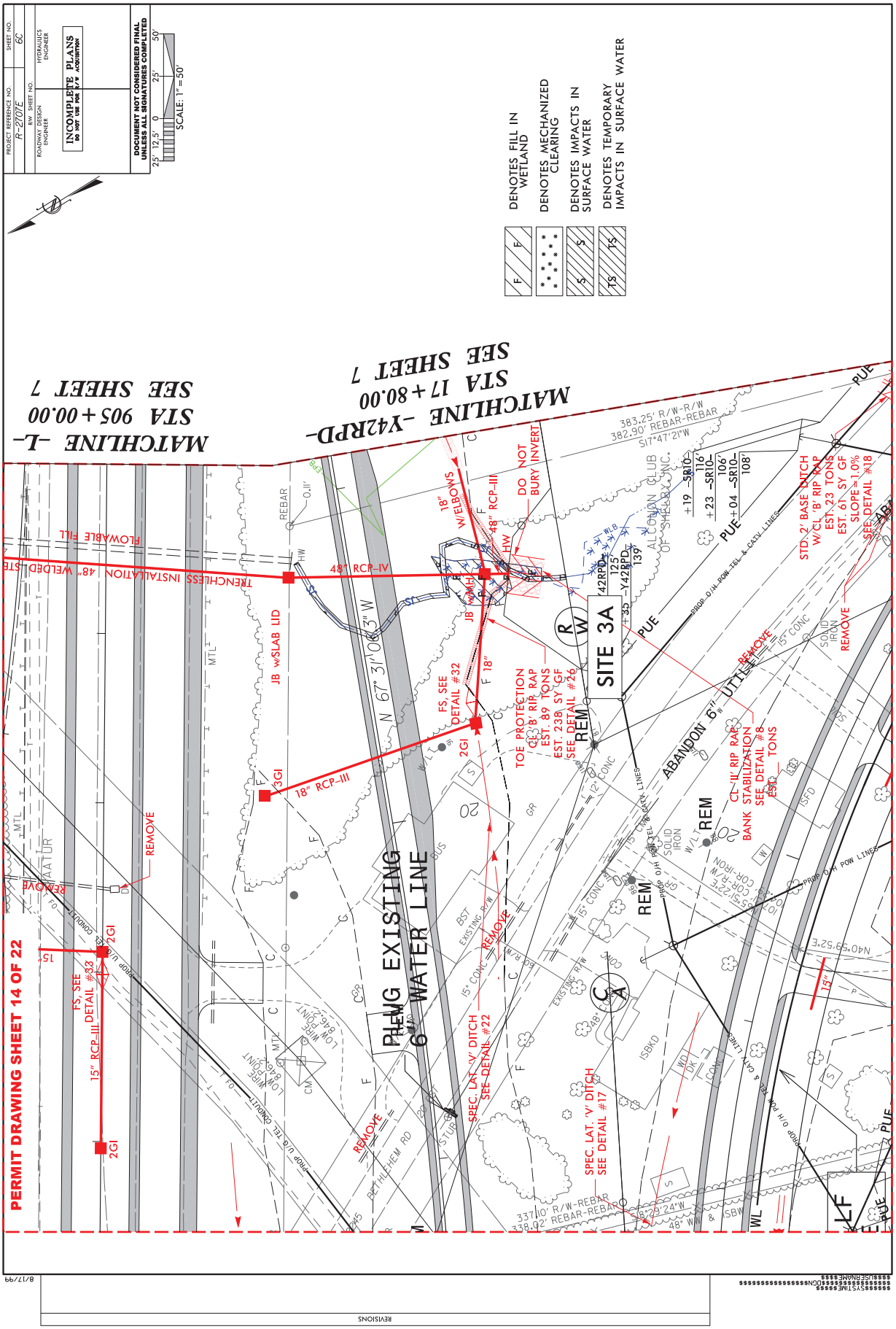
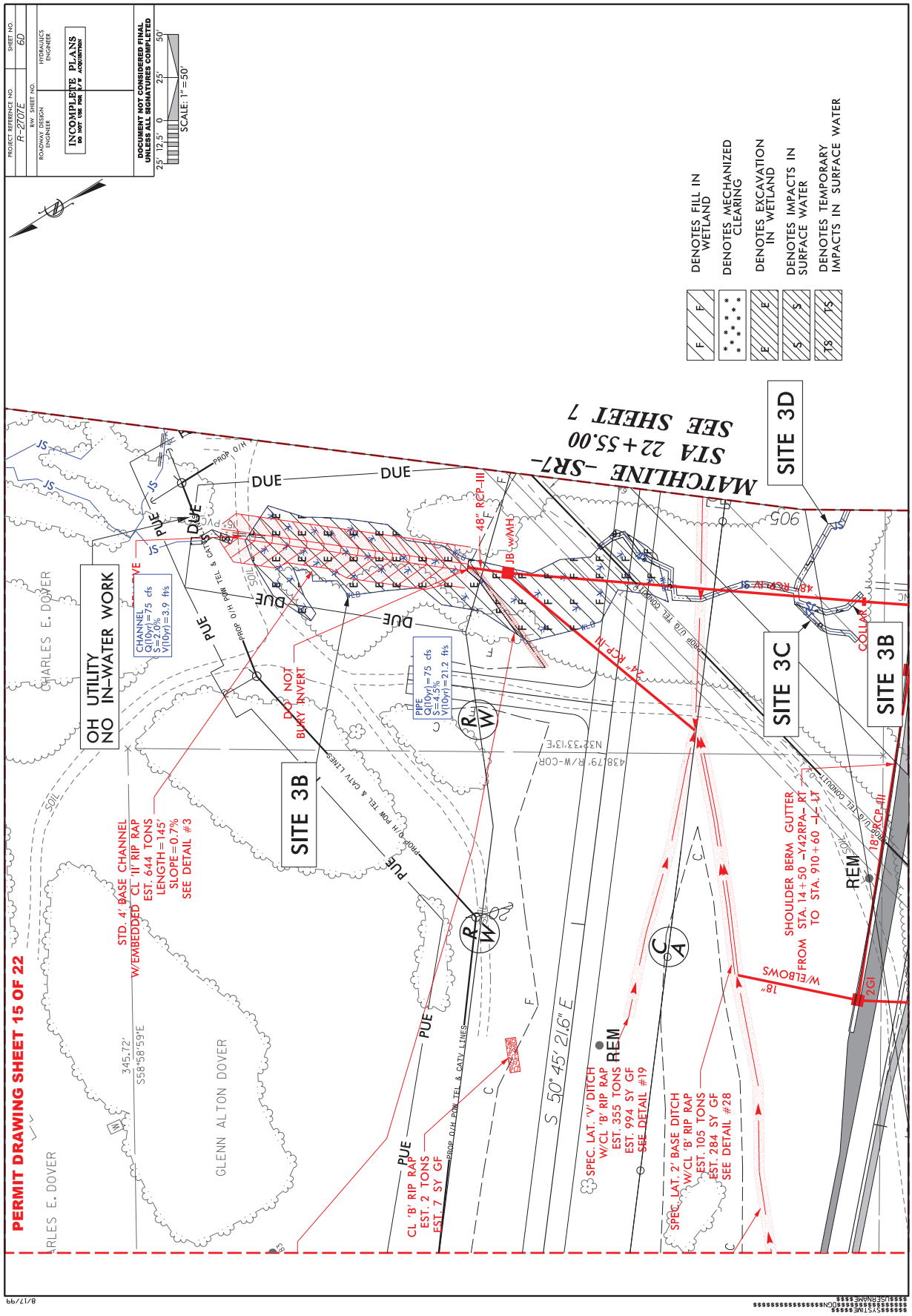

PROJECT REFERENCE NO.
R-2707E
SHEET NO.
66
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1" = 50'
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
MATCHLINE -L- STA 905+00.00 SEE SHEET 7
MATCHLINE -Y42RPD- STA 17+80.00 SEE SHEET 7
PERMIT DRAWING SHEET 14 OF 22
PLENG EXISTING 6" WATER LINE
SITE 3A
ALCOVIAN CLUB OF SHELBY, INC.
383.25' R/W-R/W
382.90' REBAR-REBAR
S17°47'21"W
N 67° 31' 08" W
337.10' R/W-REBAR
338.02' REBAR-REBAR
S8°29'24"W
N40°59'52"E
48" RCP-IV
18" RCP-III
15" RCP-III
TRENCHLESS INSTALLATION | 48" WELDED STEEL
FLOWABLE FILL
JB w/SLAB LID
FS, SEE DETAIL #32
FS, SEE DETAIL #33
DO NOT BURY I/INVERT
18" W/ELBOWS
TOE PROTECTION CL 'B' RIP RAP EST. 89 TONS EST. 238 SY GF SEE DETAIL #26
STD. 2' BASE DITCH W/CL 'B' RIP RAP EST. 23 TONS EST. 61 SY GF SLOPE=1.0% SEE DETAIL #18
CL II RIP RAP BANK STABILIZATION SEE DETAIL #8 EST. TONS
SPEC. LAT. 'V' DITCH SEE DETAIL #22
SPEC. LAT. 'V' DITCH SEE DETAIL #17
ABANDON 6" UTILITY
REMOVE
PROP. O/H POW. TEL. & CATV. LINES
PROP. U/G TEL. CONDUIT
PROP. O/H POW. LINES
EXISTING R/W
BETHLEHEM RD
SR1005
SR1010
SR1016
SR1021
SR1025
42RPD
Y42RPD
REVISIONS
8/17/99


PROJECT REFERENCE NO.
R-2707E
SHEET NO.
60
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1" = 50'
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES EXCAVATION IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
PERMIT DRAWING SHEET 15 OF 22
MATCHLINE -SR7- STA 22+55.00 SEE SHEET 7
SITE 3D
SITE 3C
SITE 3B
SITE 3B
OH UTILITY NO IN-WATER WORK
CHARLES E. DOVER
GLENN ALTON DOVER
DUE
PUE
PROP O/H POW TEL & CATV LINES
DO NOT BURY INVERT
CHANNEL Q(10yr)=75 cfs S=2.0% V(10yr)=3.9 ft/s
PIPE Q(10yr)=75 cfs S=4.5% V(10yr)=21.2 ft/s
STD. 4' BASE CHANNEL W/EMBEDDED CL 'II' RIP RAP EST. 644 TONS LENGTH=145' SLOPE=0.7% SEE DETAIL #3
CL 'B' RIP RAP EST. 2 TONS EST. 7 SY GF
SPEC. LAT. 'V' DITCH W/CL 'B' RIP RAP EST. 355 TONS EST. 994 SY GF SEE DETAIL #19
SPEC. LAT. 2' BASE DITCH W/CL 'B' RIP RAP EST. 105 TONS EST. 284 SY GF SEE DETAIL #28
SHOULDER BERM GUTTER FROM STA. 14+50 -Y42RPA- RT TO STA. 910+60 -L- LT
48" RCP-III
24" RCP-IN
18" RCP-III
18" W/ELBOWS
2 GI
JB w/MH
COLLAR
REM
S 50° 45' 21.6" E
N32°33'13"E
438.79' R/W-CORD
345.72'
S58°58'59"E
8/17/99

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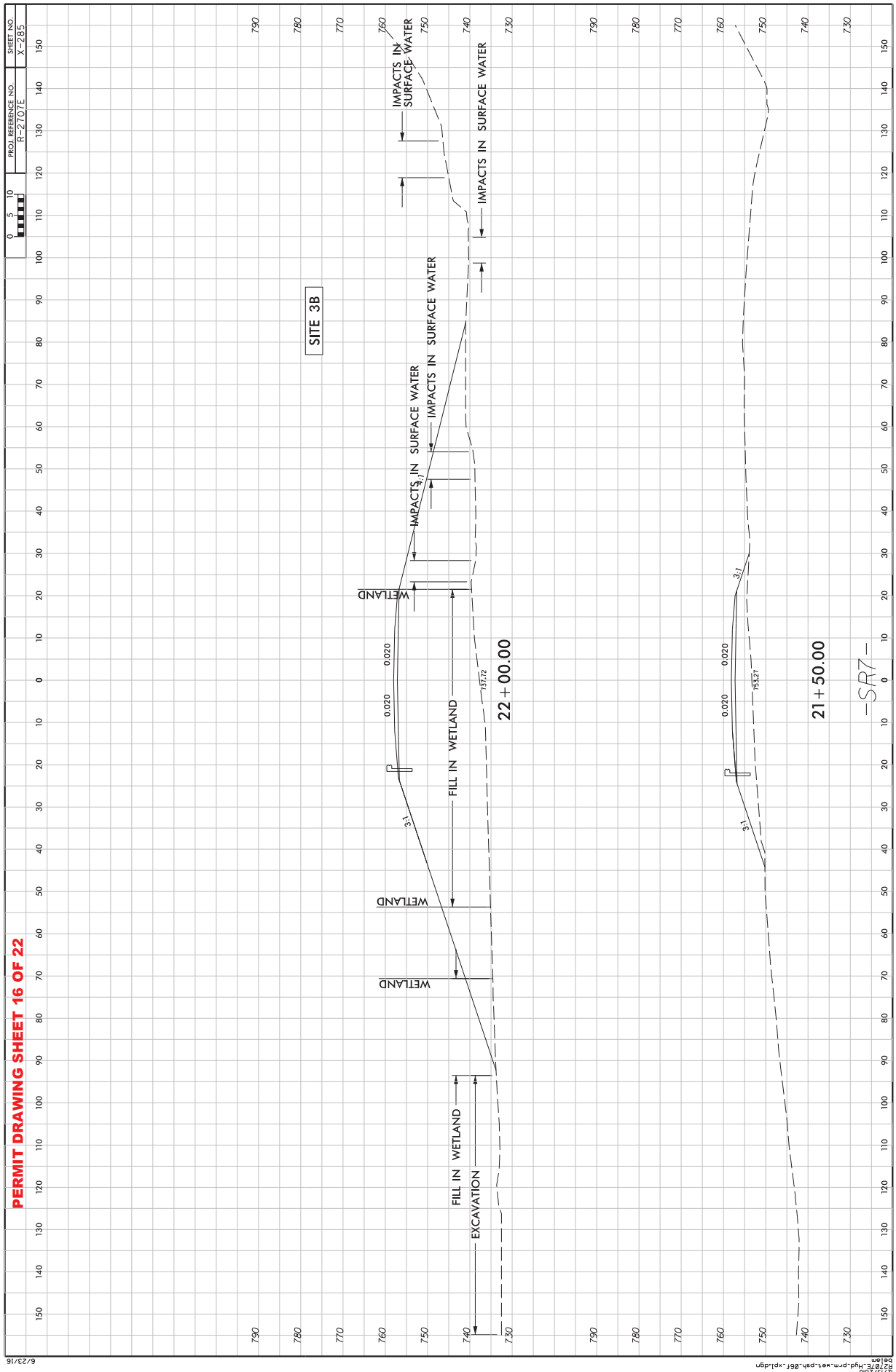
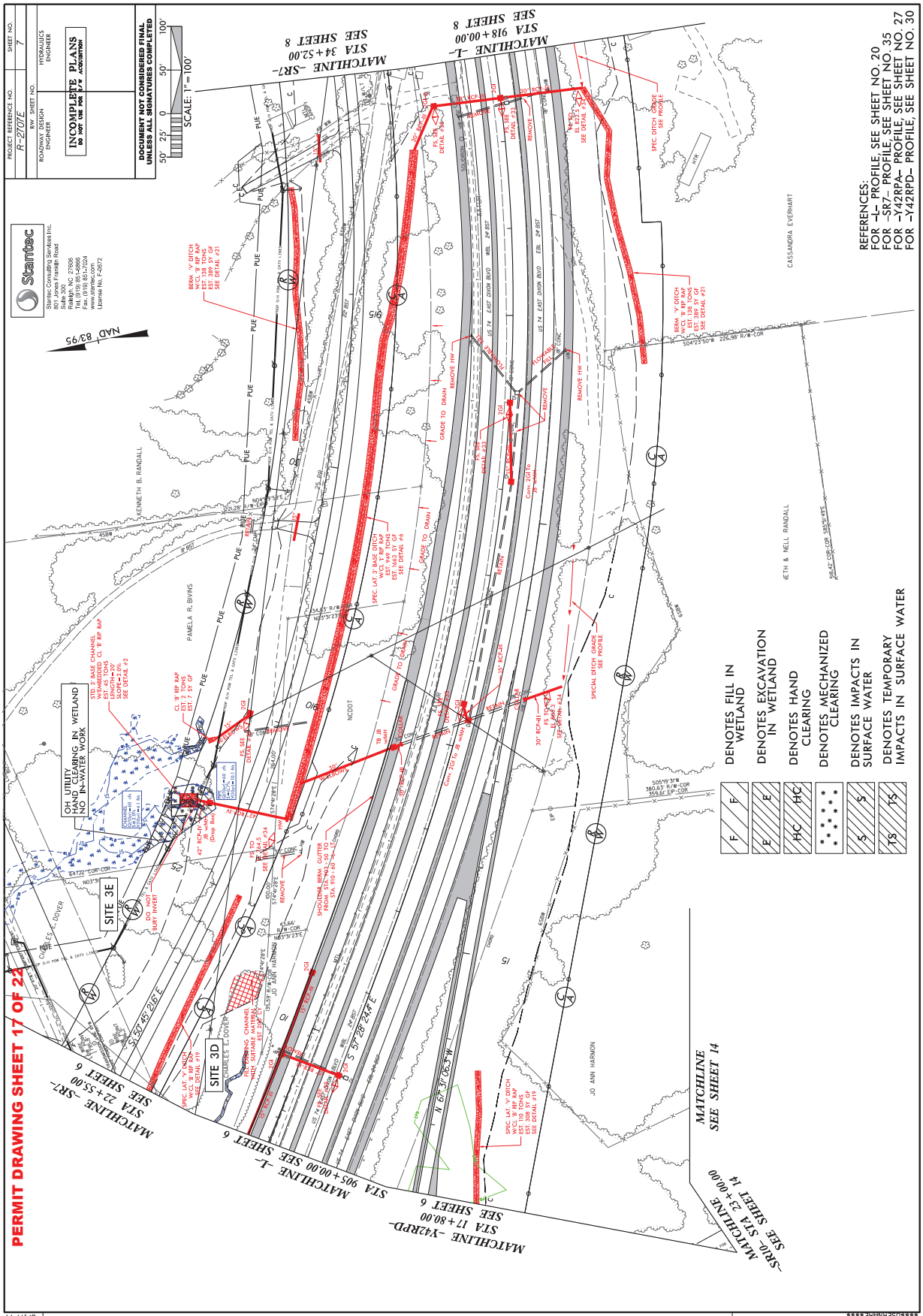

PERMIT DRAWING SHEET 16 OF 22
SHEET NO. X-285
PROJ. REFERENCE NO. R-2707E
0 5 10
SITE 3B
IMPACTS IN SURFACE WATER
IMPACTS IN SURFACE WATER
IMPACTS IN SURFACE WATER
IMPACTS IN SURFACE WATER
WETLAND
WETLAND
WETLAND
FILL IN WETLAND
FILL IN WETLAND
EXCAVATION
0.020
0.020
0.020
0.020
3:1
3:1
3:1
3:1
157.72
153.27
22+00.00
21+50.00
-SR7-
6/23/16
12/19/2018
R2707E_Hyd-prm-wet-psh_06f_xpl.dgn

P-129



8/17/99

REVISIONS

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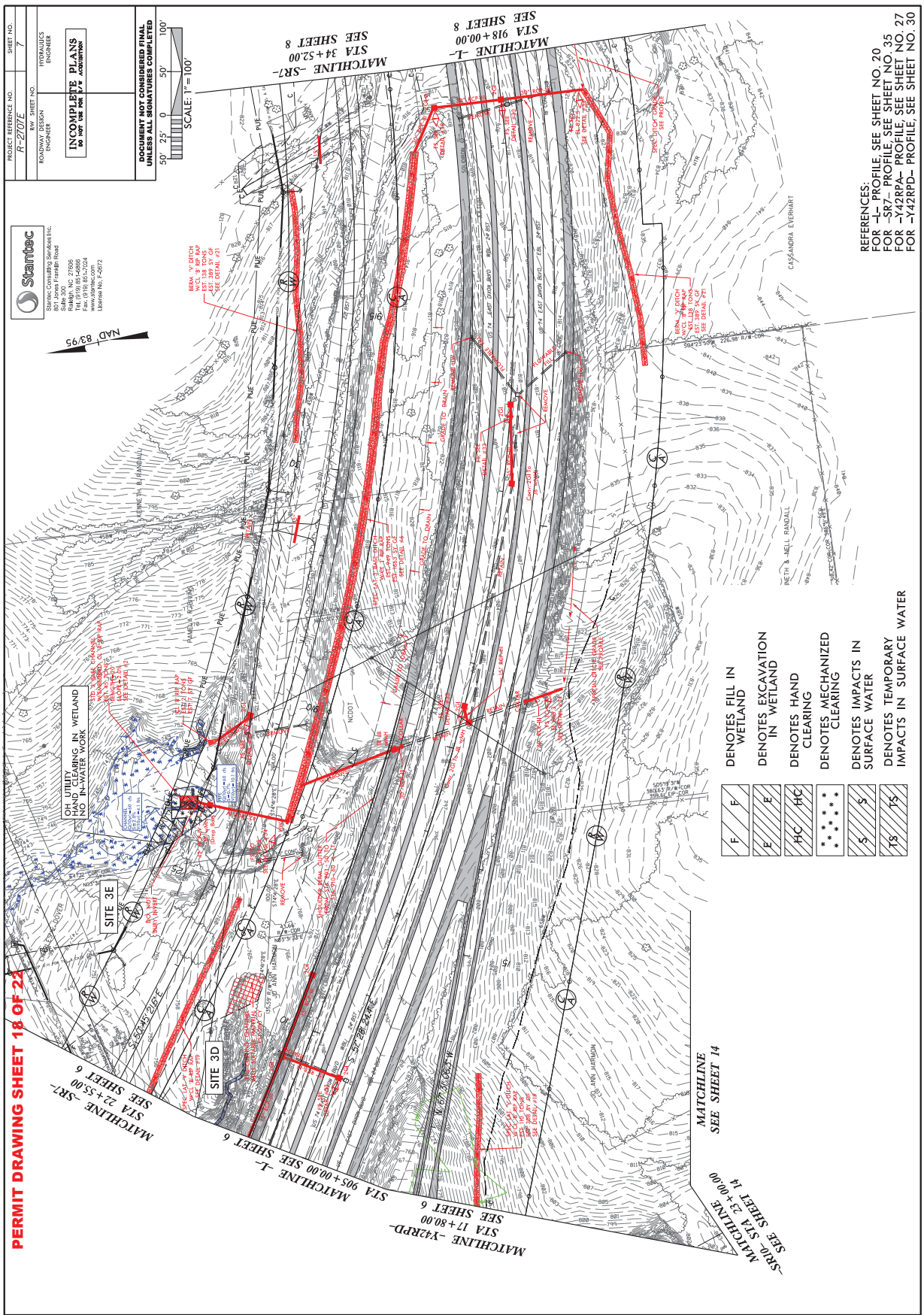
SSSSSSSSSSSSSSSSSDGNSSSSSSSSSSSSSSSSSS
SSSSSUSERNAMESSSS

P-130


PROJECT REFERENCE NO.
R-2707E
SHEET NO.
7
R/W SHEET NO.
HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1"= 100'
Stantec
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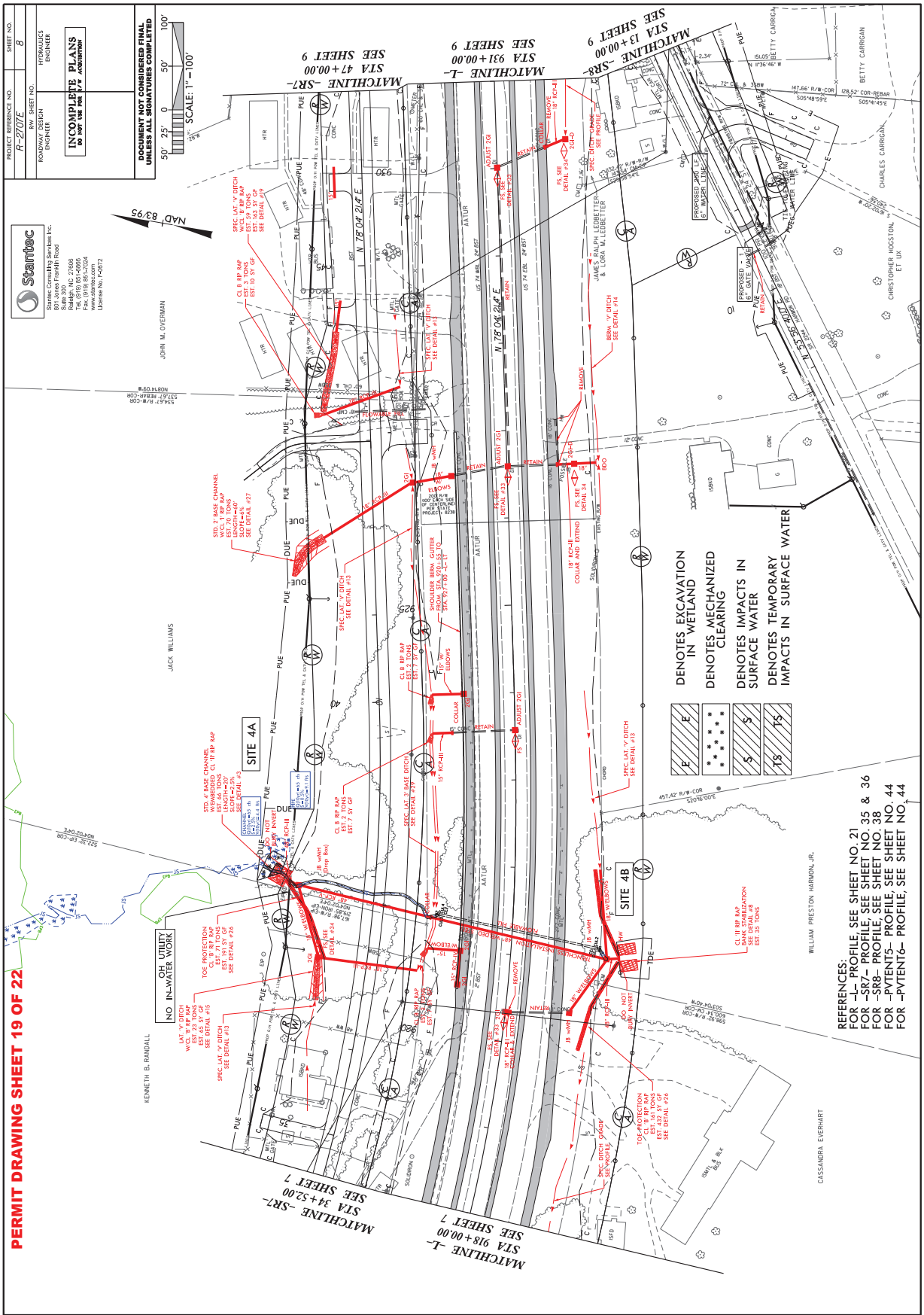
Raleigh, NC 27606
Tel. (919) 851-6866
Fax. (919) 851-7024
www.stantec.com
License No.: F-0672
NAD 83/95
PERMIT DRAWING SHEET 18 OF 22
MATCHLINE -SR7- STA 34+52.00 SEE SHEET 8
MATCHLINE -L- STA 918+00.00 SEE SHEET 8
MATCHLINE -SR7- STA 22+55.00 SEE SHEET 6
MATCHLINE -L- STA 905+00.00 SEE SHEET 6
MATCHLINE -Y42RPD- STA 17+80.00 SEE SHEET 6
MATCHLINE -SR10- STA 23+00.00 SEE SHEET 14
MATCHLINE SEE SHEET 14
SITE 3E
SITE 3D
OH UTILITY HAND CLEARING IN WETLAND NO IN-WATER WORK
DENOTES FILL IN WETLAND
DENOTES EXCAVATION IN WETLAND
DENOTES HAND CLEARING
DENOTES MECHANIZED CLEARING
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
REFERENCES:
FOR -L- PROFILE, SEE SHEET NO. 20
FOR -SR7- PROFILE, SEE SHEET NO. 35
FOR -Y42RPA- PROFILE, SEE SHEET NO. 27
FOR -Y42RPD- PROFILE, SEE SHEET NO. 30
CASSANDRA EVERHART
NCDOT
REVISIONS
8/17/99


PERMIT DRAWING SHEET 19 OF 22
PROJECT REFERENCE NO. R-2707E
SHEET NO. 8
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR CONSTRUCTION
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www.stantec.com
License No.: F-0672
NAD 83/95
MATCHLINE -SR7- STA 47+00.00 SEE SHEET 9
MATCHLINE -L- STA 931+00.00 SEE SHEET 9
MATCHLINE -SR8- STA 13+00.00 SEE SHEET 9
MATCHLINE -SR7- STA 34+52.00 SEE SHEET 7
MATCHLINE -L- STA 918+00.00 SEE SHEET 7
N 78° 04' 21.4" E
N 78° 04' 21.4" E
N 57° 55' 38.6" W
SITE 4A
SITE 4B
OH UTILITY NO IN-WATER WORK
DENOTES EXCAVATION IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
REFERENCES:
FOR -L- PROFILE, SEE SHEET NO. 21
FOR -SR7- PROFILE, SEE SHEET NO. 35 & 36
FOR -SR8- PROFILE, SEE SHEET NO. 38
FOR -PVTENT5- PROFILE, SEE SHEET NO. 44
FOR -PVTENT6- PROFILE, SEE SHEET NO. 44
JOHN M. OVERMAN
JACK WILLIAMS
KENNETH B. RANDALL
JAMES RALPH LEDBETTER & LORA M. LEDBETTER
BETTY CARRIGAN
CHARLES CARRIGAN
CHRISTOPHER HOGSTON ET UX
WILLIAM PRESTON HARMON, JR.
CASSANDRA EVERHART
REVISIONS
8/17/99

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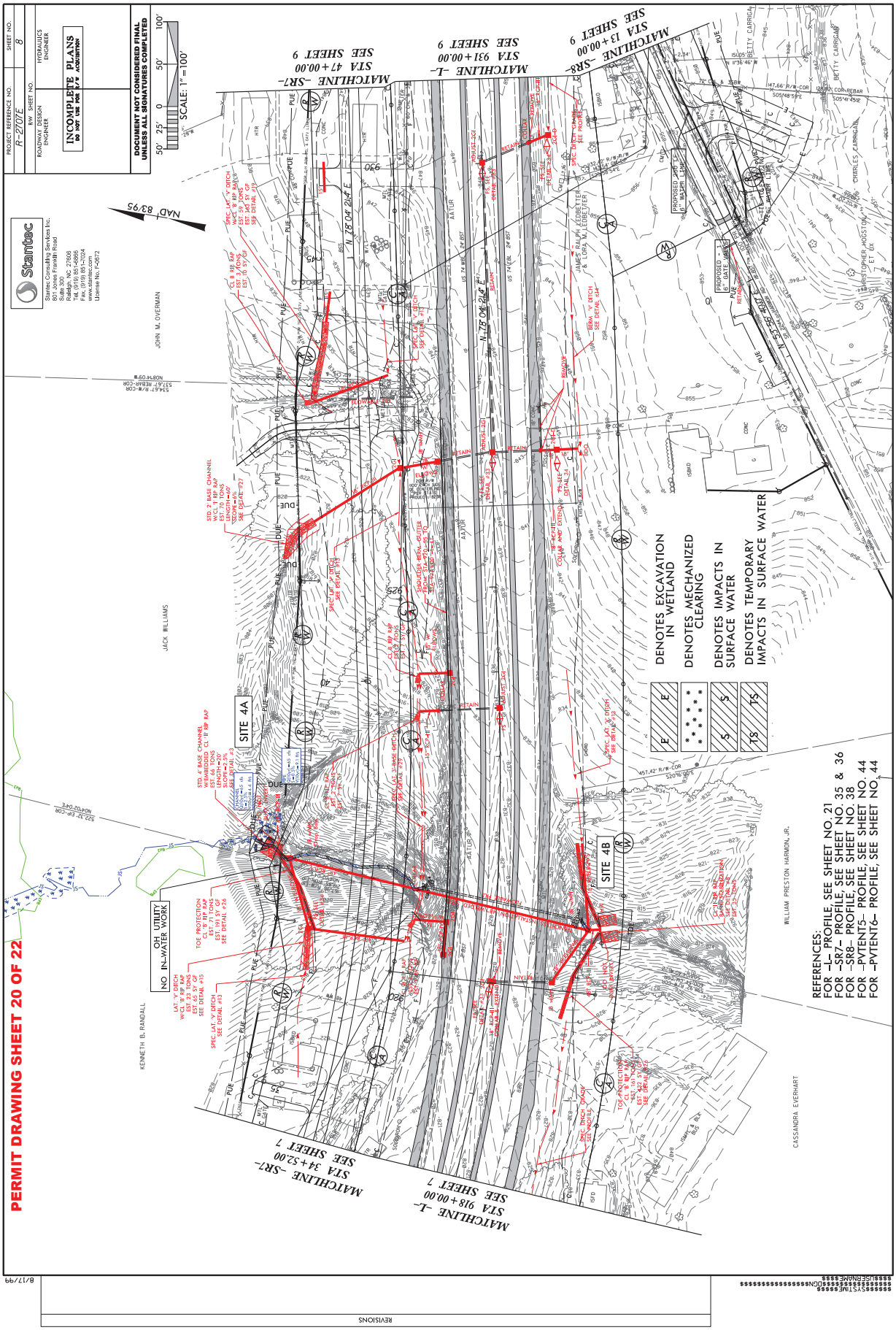
PERMIT DRAWING SHEET 20 OF 22
PROJECT REFERENCE NO. R-2707E
SHEET NO. 8
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR CONSTRUCTION OR ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
SCALE: 1" = 100'
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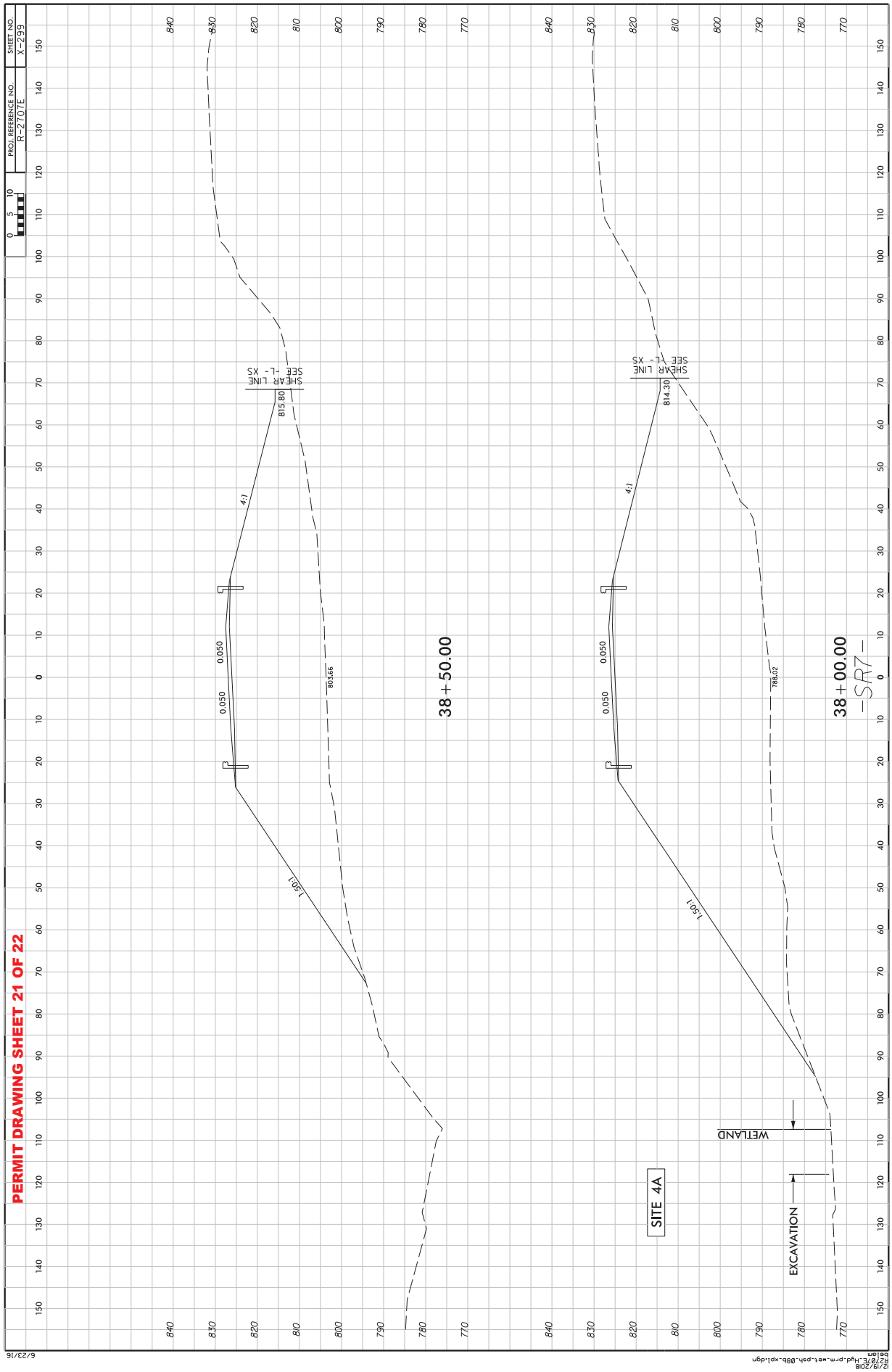
Fax. (919) 851-7024
www.stantec.com
License No.: F-0672
NAD 83/95
MATCHLINE -L- STA 931+00.00 SEE SHEET 9
MATCHLINE -SR8- STA 13+00.00 SEE SHEET 9
MATCHLINE -SR7- STA 47+00.00 SEE SHEET 9
MATCHLINE -L- STA 918+00.00 SEE SHEET 7
MATCHLINE -SR7- STA 34+52.00 SEE SHEET 7
N 78° 04' 24" E
N 78° 04' 24" E
S 77° 55' 36" E
SITE 4A
SITE 4B
OH UTILITY NO IN-WATER WORK
DENOTES EXCAVATION IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
REFERENCES:
FOR -L- PROFILE, SEE SHEET NO. 21
FOR -SR7- PROFILE, SEE SHEET NO. 35 & 36
FOR -SR8- PROFILE, SEE SHEET NO. 38
FOR -PVTENT5- PROFILE, SEE SHEET NO. 44
FOR -PVTENT6- PROFILE, SEE SHEET NO. 44
JOHN M. OVERMAN
JACK WILLIAMS
KENNETH B. RANDALL
CASSANDRA EVERHART
WILLIAM PRESTON HARMON, JR.
JAMES RALPH & LORA M. LEDBETTER
BETTY CARRIGAN
CHARLES CARRIGAN
CHRISTOPHER HOGSTON ET UX
REVISIONS
8/17/99

P-133


PERMIT DRAWING SHEET 21 OF 22
SHEET NO.
X-299
PROJ. REFERENCE NO.
R-2707E
0 5 10
6/23/16
SHEAR LINE
SEE -L- XS
815.80
803.66
814.30
788.02
4:1
0.050
0.050
1.5D:1
38+50.00
38+00.00
-SR7-
SITE 4A
WETLAND
EXCAVATION

WETLAND AND SURACE WATER IMPACTS SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1A	860+55 to 863+90-L-LT	54" RCP						0.03	< 0.01	336	28	
1B	863+28 to 863+51-L-RT	LATERAL DITCH			0.02							
2	871+05 to 873+50-L-LT	ROADWAY FILL	< 0.01					0.02	< 0.01	253	10	
3A	18+36 to 18+98-Y42RPD-	48" RCP	0.02					0.01	< 0.01	193	14	
		BANK STABILIZATION						< 0.01		20		
3B	21+58 to 23+47-SR7-	48" RCP	0.08					0.01		191		
		OUTLET CHANNEL			0.12			< 0.01	< 0.01	7	19	
3C	21+82 to 22+00-SR7-RT	ROADWAY FILL						< 0.01		43		
3D	22+00 to 22+12-SR7-RT	ROADWAY FILL						0.01		159		
3E	25+39 to 26+00-SR7-LT	42" RCP	0.01					< 0.01		9		
		OUTLET CHANNEL			< 0.01	0.02		< 0.01	< 0.01	24	10	
		OH UTILITY					0.03					
4A	37+54 to 38+18-SR7-	48" RCP						0.01		192		
		OUTLET CHANNEL			< 0.01	0.01		< 0.01	< 0.01	21	11	
4B	921+00 to 921+15-L-LT	48" RCP						< 0.01		16		
5	10+86 to 11+33-SR10-RT	ROADWAY FILL (POND)						0.06	0.87			
SHEET TOTALS*:			0.13		0.14	0.03	0.03	0.18	0.88	1464	92	0

*Rounded totals are sum of actual impacts

NOTES:
Site 1B: Total Take Wetland
Site 3B: Total Take Wetland
Site 5: JS Non-Mitigable Pond.

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
8-31-22
CLEVELAND
R-2707E
34497.1.F56
SHEET 22 OF 22

Revised 2018 Feb

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County: CLEVELAND

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
			ROADWAY ITEMS			
0001	0000100000-N	800	MOBILIZATION	Lump Sum	L.S.	
0002	0000400000-N	801	CONSTRUCTION SURVEYING	Lump Sum	L.S.	
0003	0000700000-N	SP	FIELD OFFICE	Lump Sum	L.S.	
0004	0001000000-E	200	CLEARING & GRUBBING .. ACRE(S)	Lump Sum	L.S.	
0005	0008000000-E	200	SUPPLEMENTARY CLEARING & GRUBBING	5 ACR		
0006	0015000000-N	205	SEALING ABANDONED WELLS	18 EA		
0007	0022000000-E	225	UNCLASSIFIED EXCAVATION	2,310,000 CY		
0008	0028000000-N	SP	TYPE I STANDARD APPROACH FILL STATION ********** (13+08.49 -Y42-)	Lump Sum	L.S.	
0009	0028000000-N	SP	TYPE I STANDARD APPROACH FILL STATION ********** (20+16.72 -Y2-)	Lump Sum	L.S.	
0010	0028000000-N	SP	TYPE I STANDARD APPROACH FILL STATION ********** (23+21.80 -Y3-)	Lump Sum	L.S.	
0011	0028000000-N	SP	TYPE I STANDARD APPROACH FILL STATION ********** (36+78.38 -RAMP A-)	Lump Sum	L.S.	
0012	0028000000-N	SP	TYPE I STANDARD APPROACH FILL STATION ********** (810+00.00 -L- LT)	Lump Sum	L.S.	
0013	0028000000-N	SP	TYPE I STANDARD APPROACH FILL STATION ********** (810+00.00 -L- RT)	Lump Sum	L.S.	
0014	0028000000-N	SP	TYPE I STANDARD APPROACH FILL STATION ********** (849+00.00 -L- LT)	Lump Sum	L.S.	
0015	0028000000-N	SP	TYPE I STANDARD APPROACH FILL STATION ********** (849+00.00 -L- RT)	Lump Sum	L.S.	

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0016	0030000000-N	SP	TYPE II MODIFIED APPROACH FILL, STATION ******* (19+82.46 -Y1-)	Lump Sum	L.S.	
0017	0036000000-E	225	UNDERCUT EXCAVATION	28,750 CY		
0019	0106000000-E	230	BORROW EXCAVATION	590,000 CY		
0020	0127000000-N	235	EMBANKMENT SETTLEMENT GAUGES	3 EA		
0021	0134000000-E	240	DRAINAGE DITCH EXCAVATION	40,680 CY		
0022	0141000000-E	240	BERM DITCH CONSTRUCTION	5,500 LF		
0023	0156000000-E	250	REMOVAL OF EXISTING ASPHALT PAVEMENT	56,900 SY		
0024	0192000000-N	260	PROOF ROLLING	90 HR		
0025	0194000000-E	265	SELECT GRANULAR MATERIAL, CLASS III	21,800 CY		
0026	0196000000-E	270	GEOTEXTILE FOR SOIL STABILIZATION	37,700 SY		
0027	0199000000-E	SP	TEMPORARY SHORING	14,780 SF		
0028	0225000000-E	SP	REINFORCED SOIL SLOPES	4,655 SY		
0029	0248000000-N	SP	GENERIC GRADING ITEM EARTHWORK FOR DRY DETENTION BASIN @ 641+74 -L- LT	Lump Sum	L.S.	
0030	0248000000-N	SP	GENERIC GRADING ITEM EARTHWORK FOR DRY DETENTION BASIN @ 668+45 -L- LT	Lump Sum	L.S.	
0031	0248000000-N	SP	GENERIC GRADING ITEM EARTHWORK FOR DRY DETENTION BASIN @ 780+45 -L- LT	Lump Sum	L.S.	
0032	0248000000-N	SP	GENERIC GRADING ITEM EARTHWORK FOR DRY DETENTION BASIN @ 813+87 -L- LT	Lump Sum	L.S.	

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0033	0248000000-N	SP	GENERIC GRADING ITEM EARTHWORK FOR DRY DETENTION BASIN @ 885+44 -L- LT	Lump Sum	L.S.	
0034	0248000000-N	SP	GENERIC GRADING ITEM EARTHWORK FOR DRY DETENTION BASIN @ 886+66 -L- RT	Lump Sum	L.S.	
0035	0248000000-N	SP	GENERIC GRADING ITEM EARTHWORK FOR DRY DETENTION BASIN @ 896+75 -L- RT	Lump Sum	L.S.	
0036	0248000000-N	SP	GENERIC GRADING ITEM EARTHWORK FOR HAZARDOUS SPILL BASIN @ 647+57 -L- RT	Lump Sum	L.S.	
0037	0248000000-N	SP	GENERIC GRADING ITEM EARTHWORK FOR HAZARDOUS SPILL BASIN @ 655+58 -L- LT	Lump Sum	L.S.	
0038	0248000000-N	SP	GENERIC GRADING ITEM EARTHWORK FOR HAZARDOUS SPILL BASIN @ 682+60 -L- RT	Lump Sum	L.S.	
0039	0248000000-N	SP	GENERIC GRADING ITEM EARTHWORK FOR HAZARDOUS SPILL BASIN @ 686+94 -L- LT	Lump Sum	L.S.	
0040	0255000000-E	SP	GENERIC GRADING ITEM HAULING AND DISPOSAL OF PETROLEUM CONTAMINATED SOIL	300 TON		
0041	0318000000-E	300	FOUNDATION CONDITIONING MATERIAL, MINOR STRUCTURES	7,780 TON		
0042	0320000000-E	300	FOUNDATION CONDITIONING GEOTEXTILE	22,470 SY		
0043	0342000000-E	310	**" SIDE DRAIN PIPE (30")	608 LF		
0044	0342000000-E	310	**" SIDE DRAIN PIPE (36")	472 LF		
0045	0342000000-E	310	**" SIDE DRAIN PIPE (42")	332 LF		
0046	0343000000-E	310	15" SIDE DRAIN PIPE	3,924 LF		
0047	0344000000-E	310	18" SIDE DRAIN PIPE	1,984 LF		

County: **CLEVELAND**

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0048	0345000000-E	310	24" SIDE DRAIN PIPE	984 LF		
0049	0348000000-E	310	**" SIDE DRAIN PIPE ELBOWS (15")	52 EA		
0050	0348000000-E	310	**" SIDE DRAIN PIPE ELBOWS (18")	28 EA		
0051	0348000000-E	310	**" SIDE DRAIN PIPE ELBOWS (24")	10 EA		
0052	0348000000-E	310	**" SIDE DRAIN PIPE ELBOWS (30")	8 EA		
0053	0348000000-E	310	**" SIDE DRAIN PIPE ELBOWS (36")	8 EA		
0054	0350000000-E	SP	***" RC PIPE CULVERTS, CONTRACTOR DESIGN (42")	332 LF		
0055	0350000000-E	SP	***" RC PIPE CULVERTS, CONTRACTOR DESIGN (48")	348 LF		
0056	0350000000-E	SP	***" RC PIPE CULVERTS, CONTRACTOR DESIGN (54")	368 LF		
0057	0354000000-E	310	***" RC PIPE CULVERTS, CLASS ***** (30", V)	248 LF		
0058	0354000000-E	310	***" RC PIPE CULVERTS, CLASS ***** (48", V)	156 LF		
0059	0354000000-E	310	***" RC PIPE CULVERTS, CLASS ***** (66", V)	348 LF		
0060	0366000000-E	310	15" RC PIPE CULVERTS, CLASS III	9,192 LF		
0061	0372000000-E	310	18" RC PIPE CULVERTS, CLASS III	7,640 LF		
0062	0378000000-E	310	24" RC PIPE CULVERTS, CLASS III	7,096 LF		
0063	0384000000-E	310	30" RC PIPE CULVERTS, CLASS III	4,284 LF		
0064	0390000000-E	310	36" RC PIPE CULVERTS, CLASS III	1,472 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0065	0396000000-E	310	42" RC PIPE CULVERTS, CLASS III	16 LF		
0066	0402000000-E	310	48" RC PIPE CULVERTS, CLASS III	112 LF		
0067	0408000000-E	310	54" RC PIPE CULVERTS, CLASS III	204 LF		
0068	0420000000-E	310	66" RC PIPE CULVERTS, CLASS III	388 LF		
0069	0448000000-E	310	****" RC PIPE CULVERTS, CLASS IV (48")	852 LF		
0070	0448000000-E	310	****" RC PIPE CULVERTS, CLASS IV (66")	156 LF		
0071	0448200000-E	310	15" RC PIPE CULVERTS, CLASS IV	4,110 LF		
0072	0448300000-E	310	18" RC PIPE CULVERTS, CLASS IV	1,628 LF		
0073	0448400000-E	310	24" RC PIPE CULVERTS, CLASS IV	1,196 LF		
0074	0448500000-E	310	30" RC PIPE CULVERTS, CLASS IV	136 LF		
0075	0448600000-E	310	36" RC PIPE CULVERTS, CLASS IV	284 LF		
0076	0448700000-E	310	42" RC PIPE CULVERTS, CLASS IV	1,436 LF		
0077	0576000000-E	310	**" CS PIPE CULVERTS, *****" THICK (36", 0.079")	228 LF		
0078	0582000000-E	310	15" CS PIPE CULVERTS, 0.064" THICK	176 LF		
0079	0588000000-E	310	18" CS PIPE CULVERTS, 0.064" THICK	224 LF		
0080	0594000000-E	310	24" CS PIPE CULVERTS, 0.064" THICK	300 LF		
0081	0973100000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B IN SOIL (16", 0.281")	178 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0082	0973100000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B IN SOIL (18", 0.312")	78 LF		
0083	0973100000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B IN SOIL (30", 0.500")	86 LF		
0084	0973100000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B IN SOIL (42", 0.625")	98 LF		
0085	0973100000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B IN SOIL (48", 0.688")	210 LF		
0086	0973100000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B IN SOIL (60", 0.875")	114 LF		
0087	0973300000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B NOT IN SOIL (16", 0.281")	178 LF		
0088	0973300000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B NOT IN SOIL (18", 0.312")	78 LF		
0089	0973300000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B NOT IN SOIL (30", 0.500")	86 LF		
0090	0973300000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B NOT IN SOIL (42", 0.625")	98 LF		
0091	0973300000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B NOT IN SOIL (48", 0.688")	210 LF		
0092	0973300000-E	330	**" WELDED STEEL PIPE, ****" THICK, GRADE B NOT IN SOIL (60", 0.875")	114 LF		
0093	0995000000-E	340	PIPE REMOVAL	5,626 LF		
0094	1000000000-E	462	6" SLOPE PROTECTION	1,620 SY		
0095	1004500000-E	505	GENERIC GRADING ITEM GEOTEXTILE FOR SUBGRADE STABILIZATION	151,515 SY		
0096	1011000000-N	500	FINE GRADING	Lump Sum	L.S.	

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0097	1044000000-E	501	LIME TREATED SOIL (SLURRY METHOD)	153,820 SY		
0098	1066000000-E	501	LIME FOR LIME TREATED SOIL	1,860 TON		
0099	1077000000-E	SP	#57 STONE	570 TON		
0100	1099500000-E	505	SHALLOW UNDERCUT	3,600 CY		
0101	1099700000-E	505	CLASS IV SUBGRADE STABILIZATION	7,200 TON		
0102	1110000000-E	510	STABILIZER AGGREGATE	1,000 TON		
0103	1121000000-E	520	AGGREGATE BASE COURSE	153,300 TON		
0104	1176000000-E	542	SOIL CEMENT BASE	153,820 SY		
0105	1187000000-E	542	PORTLAND CEMENT FOR SOIL CEMENT BASE	4,320 TON		
0106	1198000000-E	542	AGGREGATE FOR SOIL CEMENT BASE	3,440 TON		
0107	1220000000-E	545	INCIDENTAL STONE BASE	2,000 TON		
0108	1275000000-E	600	PRIME COAT	26,300 GAL		
0109	1297000000-E	607	MILLING ASPHALT PAVEMENT, ***" DEPTH (1-1/2")	60,360 SY		
0110	1330000000-E	607	INCIDENTAL MILLING	3,400 SY		
0111	1491000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0C	39,530 TON		
0112	1503000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C	83,370 TON		
0113	1519000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5B	18,530 TON		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0114	1523000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5C	64,680 TON		
0115	1575000000-E	620	ASPHALT BINDER FOR PLANT MIX	10,810 TON		
0116	1693000000-E	654	ASPHALT PLANT MIX, PAVEMENT REPAIR	1,130 TON		
0117	1840000000-E	665	MILLED RUMBLE STRIPS (ASPHALT CONCRETE)	125,500 LF		
0118	1869000000-E	710	*****" PORT CEM CONC PAVEMENT, MISCELLANEOUS (WITHOUT DOWELS) (12")	1,000 SY		
0119	2022000000-E	815	SUBDRAIN EXCAVATION	1,243.2 CY		
0120	2026000000-E	815	GEOTEXTILE FOR SUBSURFACE DRAINS	2,700 SY		
0121	2033000000-E	815	SUBDRAIN FINE AGGREGATE	168 CY		
0122	2036000000-E	815	SUBDRAIN COARSE AGGREGATE	453.6 CY		
0123	2044000000-E	815	6" PERFORATED SUBDRAIN PIPE	2,700 LF		
0124	2070000000-N	815	SUBDRAIN PIPE OUTLET	8 EA		
0125	2077000000-E	815	6" OUTLET PIPE	48 LF		
0126	2099000000-E	816	SHOULDER DRAIN	39,360 LF		
0127	2110000000-E	816	4" SHOULDER DRAIN PIPE	39,360 LF		
0128	2121000000-E	816	4" OUTLET PIPE FOR SHOULDER DRAINS	3,200 LF		
0129	2132000000-N	816	CONCRETE PAD FOR SHOULDER DRAIN PIPE OUTLET	60 EA		
0130	2143000000-E	818	BLOTTING SAND	30 TON		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0131	2190000000-N	828	TEMPORARY STEEL PLATE COVERS FOR MASONRY DRAINAGE STRUCTURE	20 EA		
0132	2209000000-E	838	ENDWALLS	78.4 CY		
0133	2220000000-E	838	REINFORCED ENDWALLS	28.2 CY		
0134	2253000000-E	840	PIPE COLLARS	5.921 CY		
0135	2264000000-E	840	PIPE PLUGS	0.342 CY		
0136	2275000000-E	SP	FLOWABLE FILL	403 CY		
0137	2286000000-N	840	MASONRY DRAINAGE STRUCTURES	367 EA		
0138	2297000000-E	840	MASONRY DRAINAGE STRUCTURES	38.394 CY		
0139	2308000000-E	840	MASONRY DRAINAGE STRUCTURES	201 LF		
0140	2352000000-N	840	FRAME WITH GRATE, STD 840.**** (840.20)	2 EA		
0141	2354000000-N	840	FRAME WITH GRATE, STD 840.22	7 EA		
0142	2364000000-N	840	FRAME WITH TWO GRATES, STD 840.16	13 EA		
0143	2364200000-N	840	FRAME WITH TWO GRATES, STD 840.20	96 EA		
0144	2365000000-N	840	FRAME WITH TWO GRATES, STD 840.22	182 EA		
0145	2366000000-N	840	FRAME WITH TWO GRATES, STD 840.24	22 EA		
0146	2367000000-N	840	FRAME WITH TWO GRATES, STD 840.29	15 EA		
0147	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (E)	6 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0148	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (F)	1 EA		
0149	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (G)	3 EA		
0150	2396000000-N	840	FRAME WITH COVER, STD 840.54	32 EA		
0151	2462000000-E	836	**" SLUICE GATE (18")	1 EA		
0152	2462000000-E	836	**" SLUICE GATE (24")	2 EA		
0153	2462000000-E	836	**" SLUICE GATE (30")	1 EA		
0154	2535000000-E	846	**" X **" CONCRETE CURB (8" X 18")	400 LF		
0155	2542000000-E	846	1'-6" CONCRETE CURB & GUTTER	950 LF		
0156	2549000000-E	846	2'-6" CONCRETE CURB & GUTTER	2,960 LF		
0157	2556000000-E	846	SHOULDER BERM GUTTER	12,750 LF		
0158	2577000000-E	846	CONCRETE EXPRESSWAY GUTTER	1,940 LF		
0159	2612000000-E	848	6" CONCRETE DRIVEWAY	445 SY		
0160	2619000000-E	850	4" CONCRETE PAVED DITCH	130 SY		
0161	2655000000-E	852	5" MONOLITHIC CONCRETE ISLANDS (KEYED IN)	1,180 SY		
0162	2703000000-E	854	CONCRETE BARRIER, TYPE ******* (T)	1,100 LF		
0163	2703000000-E	854	CONCRETE BARRIER, TYPE ******* (T1)	1,000 LF		
0164	2703000000-E	854	CONCRETE BARRIER, TYPE ******* (T2 MODIFIED)	525 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0165	2703000000-E	854	CONCRETE BARRIER, TYPE ******* (T2)	600 LF		
0166	2724000000-E	857	PRECAST REINFORCED CONCRETE BARRIER, SINGLE FACED	4,750 LF		
0167	2815000000-N	858	ADJUSTMENT OF DROP INLETS	7 EA		
0168	2905000000-N	859	CONVERT EXISTING DROP INLET TO JUNCTION BOX	4 EA		
0169	3001000000-N	SP	IMPACT ATTENUATOR UNITS, TYPE TL-3	9 EA		
0170	3030000000-E	862	STEEL BEAM GUARDRAIL	55,950 LF		
0171	3045000000-E	862	STEEL BEAM GUARDRAIL, SHOP CURVED	250 LF		
0172	3105000000-N	862	STEEL BEAM GUARDRAIL TERMINAL SECTIONS	12 EA		
0173	3150000000-N	862	ADDITIONAL GUARDRAIL POSTS	20 EA		
0174	3210000000-N	862	GUARDRAIL END UNITS, TYPE CAT-1	29 EA		
0175	3287000000-N	SP	GUARDRAIL END UNITS, TYPE TL-3	71 EA		
0176	3288000000-N	SP	GUARDRAIL END UNITS, TYPE TL-2	22 EA		
0177	3317000000-N	SP	GUARDRAIL ANCHOR UNITS, TYPE B-77	53 EA		
0178	3360000000-E	863	REMOVE EXISTING GUARDRAIL	5,768 LF		
0179	3380000000-E	862	TEMPORARY STEEL BEAM GUARDRAIL	1,050 LF		
0180	3387000000-N	SP	TEMPORARY GUARDRAIL ANCHOR UNITS, TYPE ********* (W-TR)	4 EA		
0181	3389150000-N	SP	TEMPORARY GUARDRAIL END UNITS, TYPE ***** (TL-3)	3 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0182	3389400000-E	865	DOUBLE FACED CABLE GUIDERAIL	21,200 LF		
0183	3389500000-N	865	ADDITIONAL GUIDERAIL POSTS	20 EA		
0184	3389600000-N	865	CABLE GUIDERAIL ANCHOR UNITS	28 EA		
0185	3436000000-N	862	GENERIC GUARDRAIL ITEM (CAT-1)	1 EA		
0186	3503000000-E	866	WOVEN WIRE FENCE, 47" FABRIC	80,230 LF		
0187	3509000000-E	866	4" TIMBER FENCE POSTS, 7'-6" LONG	4,896 EA		
0188	3515000000-E	866	5" TIMBER FENCE POSTS, 8'-0" LONG	1,529 EA		
0189	3536000000-E	866	CHAIN LINK FENCE, 48" FABRIC	1,280 LF		
0190	3542000000-E	866	METAL LINE POSTS FOR 48" CHAIN LINK FENCE	107 EA		
0191	3548000000-E	866	METAL TERMINAL POSTS FOR 48" CHAIN LINK FENCE	8 EA		
0192	3557000000-E	866	ADDITIONAL BARBED WIRE	200 LF		
0193	3564000000-E	866	SINGLE GATES, **" HIGH, **' WIDE, **' OPENING (48",12',12')	9 EA		
0194	3628000000-E	876	RIP RAP, CLASS I	9,790 TON		
0195	3635000000-E	876	RIP RAP, CLASS II	9,120 TON		
0196	3642000000-E	876	RIP RAP, CLASS A	220 TON		
0197	3649000000-E	876	RIP RAP, CLASS B	10,760 TON		
0198	3651000000-E	SP	BOULDERS	720 TON		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0199	3656000000-E	876	GEOTEXTILE FOR DRAINAGE	61,880 SY		
0200	4048000000-E	902	REINFORCED CONCRETE SIGN FOUNDATIONS	31 CY		
0201	4054000000-E	902	PLAIN CONCRETE SIGN FOUNDATIONS	4 CY		
0202	4057000000-E	SP	OVERHEAD FOOTING	172 CY		
0203	4060000000-E	903	SUPPORTS, BREAKAWAY STEEL BEAM	19,640 LB		
0204	4066000000-E	903	SUPPORTS, SIMPLE STEEL BEAM	14,604 LB		
0205	4072000000-E	903	SUPPORTS, 3-LB STEEL U-CHANNEL	7,300 LF		
0206	4082100000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ****** (29+50 -L- RAMP D)	Lump Sum	L.S.	
0207	4082100000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ****** (815+20 -L-)	Lump Sum	L.S.	
0208	4082100000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ****** (845+35 -L-)	Lump Sum	L.S.	
0209	4082100000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ****** (846+85 -L-)	Lump Sum	L.S.	
0210	4082100000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ****** (864+00 -L-)	Lump Sum	L.S.	
0211	4082100000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ****** (871+00 -L-)	Lump Sum	L.S.	
0212	4082100000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ****** (878+00 -L-)	Lump Sum	L.S.	
0213	4082100000-N	906	SUPPORTS, OVERHEAD SIGN STRUCTURE AT STA ****** (905+00 -L-)	Lump Sum	L.S.	

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0214	4096000000-N	904	SIGN ERECTION, TYPE D	37 EA		
0215	4102000000-N	904	SIGN ERECTION, TYPE E	273 EA		
0216	4108000000-N	904	SIGN ERECTION, TYPE F	48 EA		
0217	4109000000-N	904	SIGN ERECTION, TYPE *** (OVERHEAD) (A)	6 EA		
0218	4109000000-N	904	SIGN ERECTION, TYPE *** (OVERHEAD) (B)	5 EA		
0219	4110000000-N	904	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (A)	46 EA		
0220	4110000000-N	904	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (B)	13 EA		
0221	4114000000-N	904	SIGN ERECTION, MILEMARKERS	18 EA		
0222	4116000000-N	904	SIGN ERECTION, OVERLAY (GROUNDMOUNTED)	6 EA		
0223	4116100000-N	904	SIGN ERECTION, RELOCATE TYPE **** (GROUND MOUNTED) (B)	1 EA		
0224	4116100000-N	904	SIGN ERECTION, RELOCATE TYPE **** (GROUND MOUNTED) (D)	2 EA		
0225	4116100000-N	904	SIGN ERECTION, RELOCATE TYPE **** (GROUND MOUNTED) (E)	1 EA		
0226	4116200000-N	904	SIGN ERECTION, REPOSITION OVERHEAD	4 EA		
0227	4138000000-N	907	DISPOSAL OF SUPPORT, STEEL BEAM	11 EA		
0228	4141000000-N	907	DISPOSAL OF SUPPORT, WOOD	1 EA		
0229	4152000000-N	907	DISPOSAL OF SIGN SYSTEM, STEEL BEAM	11 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0230	4155000000-N	907	DISPOSAL OF SIGN SYSTEM, U-CHANNEL	235 EA		
0231	4158000000-N	907	DISPOSAL OF SIGN SYSTEM, WOOD	2 EA		
0232	4192000000-N	907	DISPOSAL OF SUPPORT, U-CHANNEL	3 EA		
0233	4234000000-N	907	DISPOSAL OF SIGN, A OR B (OVERHEAD)	6 EA		
0234	4236000000-N	907	DISPOSAL OF SIGN, A & B (GROUND MOUNTED)	1 EA		
0235	4238000000-N	907	DISPOSAL OF SIGN, D, E OR F	1 EA		
0236	4370000000-N	SP	GENERIC SIGNING ITEM DISPOSAL OF FLASHER SYSTEM	Lump Sum	L.S.	
0237	4400000000-E	1110	WORK ZONE SIGNS (STATIONARY)	1,106 SF		
0238	4405000000-E	1110	WORK ZONE SIGNS (PORTABLE)	672 SF		
0239	4410000000-E	1110	WORK ZONE SIGNS (BARRICADE MOUNTED)	313 SF		
0240	4415000000-N	1115	FLASHING ARROW BOARD	4 EA		
0241	4420000000-N	1120	PORTABLE CHANGEABLE MESSAGE SIGN	4 EA		
0242	4430000000-N	1130	DRUMS	1,255 EA		
0243	4445000000-E	1145	BARRICADES (TYPE III)	720 LF		
0244	4455000000-N	1150	FLAGGER	275 DAY		
0245	4465000000-N	1160	TEMPORARY CRASH CUSHIONS	8 EA		
0246	4470000000-N	1160	REMOVE & RESET TEMPORARY CRASH CUSHION	5 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0247	4480000000-N	1165	TMA	3 EA		
0248	4485000000-E	1170	PORTABLE CONCRETE BARRIER	8,550 LF		
0249	4500000000-E	1170	REMOVE AND RESET PORTABLE CONCRETE BARRIER	5,770 LF		
0250	4510000000-N	1190	LAW ENFORCEMENT	96 HR		
0251	4650000000-N	1251	TEMPORARY RAISED PAVEMENT MARKERS	396 EA		
0252	4685000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (4", 90 MILS)	118,500 LF		
0253	4695000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (8", 90 MILS)	750 LF		
0254	4700000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (12", 90 MILS)	200 LF		
0255	4709000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (24", 90 MILS)	90 LF		
0256	4725000000-E	1205	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)	63 EA		
0257	4770000000-E	1205	COLD APPLIED PLASTIC PAVEMENT MARKING LINES, TYPE ** (4") (II)	3,200 LF		
0258	4770000000-E	1205	COLD APPLIED PLASTIC PAVEMENT MARKING LINES, TYPE ** (4") (IV)	3,330 LF		
0259	4785000000-E	1205	COLD APPLIED PLASTIC PAVEMENT MARKING LINES, TYPE ** (12") (II)	1,300 LF		
0260	4800000000-N	1205	COLD APPLIED PLASTIC PAVEMENT MARKING CHARACTER, TYPE ** (II)	32 EA		
0261	4805000000-N	1205	COLD APPLIED PLASTIC PAVEMENT MARKING SYMBOL, TYPE ** (II)	43 EA		
0262	4810000000-E	1205	PAINT PAVEMENT MARKING LINES (4")	347,898 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0263	4820000000-E	1205	PAINT PAVEMENT MARKING LINES (8")	17,200 LF		
0264	4835000000-E	1205	PAINT PAVEMENT MARKING LINES (24")	60 LF		
0265	4840000000-N	1205	PAINT PAVEMENT MARKING CHARACTER	8 EA		
0266	4845000000-N	1205	PAINT PAVEMENT MARKING SYMBOL	6 EA		
0267	4847096000-E	SP	POLYUREA PAVEMENT MARKING LINES, **", ** MILS (STANDARD GLASS BEADS) (12", 20 MILS)	15,600 LF		
0268	4847096000-E	SP	POLYUREA PAVEMENT MARKING LINES, **", ** MILS (STANDARD GLASS BEADS) (6", 20 MILS)	228,500 LF		
0269	4847096000-E	SP	POLYUREA PAVEMENT MARKING LINES, **", ** MILS (STANDARD GLASS BEADS) (8", 20 MILS)	50 LF		
0270	4850000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (4")	100 LF		
0271	4855000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (6")	1,000 LF		
0272	4865000000-E	1205	REMOVAL OF PAVEMENT MARKING LINES (12")	400 LF		
0273	4875000000-N	1205	REMOVAL OF PAVEMENT MARKING SYMBOLS & CHARACTERS	5 EA		
0274	4900000000-N	1251	PERMANENT RAISED PAVEMENT MARKERS	10 EA		
0275	4905100000-N	SP	NON-CAST IRON SNOWPLOWABLE PAVEMENT MARKER	3,185 EA		
0276	4915000000-E	1264	7' U-CHANNEL POSTS	18 EA		
0277	4955000000-N	1264	OBJECT MARKERS (END OF ROAD)	18 EA		
0278	5255000000-N	1413	PORTABLE LIGHTING	Lump Sum	L.S.	

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0279	5325400000-E	1510	4" WATER LINE	640 LF		
0280	5325600000-E	1510	6" WATER LINE	9,681 LF		
0281	5325800000-E	1510	8" WATER LINE	2,174 LF		
0282	5326200000-E	1510	12" WATER LINE	5,029 LF		
0283	5329000000-E	1510	DUCTILE IRON WATER PIPE FITTINGS	30,750 LB		
0284	5538000000-E	1515	4" VALVE	2 EA		
0285	5540000000-E	1515	6" VALVE	16 EA		
0286	5546000000-E	1515	8" VALVE	5 EA		
0287	5558000000-E	1515	12" VALVE	17 EA		
0288	5589100000-E	1515	1" AIR RELEASE VALVE	5 EA		
0289	5606400000-E	1515	4" BLOW OFF	2 EA		
0290	5643100000-E	1515	3/4" WATER METER	1 EA		
0291	5648000000-N	1515	RELOCATE WATER METER	24 EA		
0292	5649000000-N	1515	RECONNECT WATER METER	7 EA		
0293	5666000000-N	1515	FIRE HYDRANT	3 EA		
0294	5672000000-N	1515	RELOCATE FIRE HYDRANT	2 EA		
0295	5673000000-E	1515	FIRE HYDRANT LEG	95 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0296	5686500000-E	1515	WATER SERVICE LINE	2,955 LF		
0297	5709600000-E	1520	12" FORCE MAIN SEWER	2,312 LF		
0298	5768000000-N	1520	SANITARY SEWER CLEAN-OUT	1 EA		
0299	5768500000-E	1520	SEWER SERVICE LINE	10 LF		
0300	5769000000-E	1520	DUCTILE IRON SEWER PIPE FITTINGS	3,460 LB		
0301	5798000000-E	1530	ABANDON **" UTILITY PIPE (2")	500 LF		
0302	5801000000-E	1530	ABANDON 8" UTILITY PIPE	210 LF		
0303	5804000000-E	1530	ABANDON 12" UTILITY PIPE	1,102 LF		
0304	5815000000-N	1530	REMOVE WATER METER	25 EA		
0305	5815500000-N	1530	REMOVE FIRE HYDRANT	3 EA		
0306	5835600000-E	1540	12" ENCASEMENT PIPE	210 LF		
0307	5836000000-E	1540	24" ENCASEMENT PIPE	1,195 LF		
0309	5872500000-E	1550	BORE AND JACK OF **" (24")	575 LF		
0310	5888000000-E	SP	GENERIC UTILITY ITEM POLYETHYLENE ENCASEMENT	230 LF		
0311	6000000000-E	1605	TEMPORARY SILT FENCE	169,330 LF		
0312	6006000000-E	1610	STONE FOR EROSION CONTROL, CLASS A	6,060 TON		
0313	6009000000-E	1610	STONE FOR EROSION CONTROL, CLASS B	39,755 TON		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0314	6012000000-E	1610	SEDIMENT CONTROL STONE	18,890 TON		
0315	6015000000-E	1615	TEMPORARY MULCHING	307.5 ACR		
0316	6018000000-E	1620	SEED FOR TEMPORARY SEEDING	16,600 LB		
0317	6021000000-E	1620	FERTILIZER FOR TEMPORARY SEEDING	86 TON		
0318	6024000000-E	1622	TEMPORARY SLOPE DRAINS	20,830 LF		
0319	6029000000-E	SP	SAFETY FENCE	3,560 LF		
0320	6030000000-E	1630	SILT EXCAVATION	180,510 CY		
0321	6036000000-E	1631	MATTING FOR EROSION CONTROL	409,000 SY		
0322	6037000000-E	SP	COIR FIBER MAT	6,655 SY		
0323	6038000000-E	SP	PERMANENT SOIL REINFORCEMENT MAT	6,700 SY		
0324	6042000000-E	1632	1/4" HARDWARE CLOTH	21,990 LF		
0325	6048000000-E	SP	FLOATING TURBIDITY CURTAIN	1,380 SY		
0326	6069000000-E	1638	STILLING BASINS	240 CY		
0327	6070000000-N	1639	SPECIAL STILLING BASINS	58 EA		
0328	6071012000-E	SP	COIR FIBER WATTLE	12,180 LF		
0329	6071014000-E	SP	COIR FIBER WATTLE BARRIER	1,010 LF		
0330	6071020000-E	SP	POLYACRYLAMIDE (PAM)	15,520 LB		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0331	6071030000-E	1640	COIR FIBER BAFFLE	26,185 LF		
0332	6071050000-E	SP	**" SKIMMER (1-1/2")	29 EA		
0333	6071050000-E	SP	**" SKIMMER (2")	33 EA		
0334	6071050000-E	SP	**" SKIMMER (2-1/2")	9 EA		
0335	6071050000-E	SP	**" SKIMMER (3")	1 EA		
0336	6071050000-E	SP	**" SKIMMER (4")	7 EA		
0337	6084000000-E	1660	SEEDING & MULCHING	282 ACR		
0338	6087000000-E	1660	MOWING	178 ACR		
0339	6090000000-E	1661	SEED FOR REPAIR SEEDING	3,450 LB		
0340	6093000000-E	1661	FERTILIZER FOR REPAIR SEEDING	10.25 TON		
0341	6096000000-E	1662	SEED FOR SUPPLEMENTAL SEEDING	6,300 LB		
0342	6108000000-E	1665	FERTILIZER TOPDRESSING	188.75 TON		
0343	6111000000-E	SP	IMPERVIOUS DIKE	600 LF		
0344	6114500000-N	1667	SPECIALIZED HAND MOWING	220 MHR		
0345	6114800000-N	SP	MANUAL LITTER REMOVAL	100 MHR		
0346	6114900000-E	SP	LITTER DISPOSAL	10 TON		
0347	6117000000-N	SP	RESPONSE FOR EROSION CONTROL	200 EA		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0348	6117500000-N	SP	CONCRETE WASHOUT STRUCTURE	20 EA		
0349	6120000000-E	SP	CULVERT DIVERSION CHANNEL	2,100 CY		
0350	6123000000-E	1670	REFORESTATION	3.3 ACR		
0351	6126000000-E	SP	STREAMBANK REFORESTATION	1.5 ACR		
0352	6132000000-N	SP	GENERIC EROSION CONTROL ITEM LOG	21 EA		
0353	6133000000-N	SP	GENERIC EROSION CONTROL ITEM CONSTRUCTION SURVEYING FOR MITIGATION	Lump Sum	L.S.	
0354	6133000000-N	SP	GENERIC EROSION CONTROL ITEM DIVERSION PUMPING FOR MITIGATION	Lump Sum	L.S.	
0355	6133000000-N	SP	GENERIC EROSION CONTROL ITEM SITE GRADING FOR MITIGATION	Lump Sum	L.S.	
0356	6138000000-E	SP	GENERIC EROSION CONTROL ITEM IMPERVIOUS SELECT MATERIAL	1,500 CY		
0357	6147000000-E	SP	GENERIC EROSION CONTROL ITEM BRUSH TOE	630 LF		
0420	5606000000-E	1515	2" BLOW OFF	1 EA		

CULVERT ITEMS

0358	8126000000-N	414	CULVERT EXCAVATION, STA ****** (717+13.00 -L-)	Lump Sum	L.S.	
0359	8126000000-N	414	CULVERT EXCAVATION, STA ****** (743+18.00 -L-)	Lump Sum	L.S.	
0360	8126000000-N	414	CULVERT EXCAVATION, STA ****** (796+86.00 -L-)	Lump Sum	L.S.	
0361	8133000000-E	414	FOUNDATION CONDITIONING MATERIAL, BOX CULVERT	1,995 TON		
0362	8196000000-E	420	CLASS A CONCRETE (CULVERT)	1,974.8 CY		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0363	8245000000-E	425	REINFORCING STEEL (CULVERT)	311,704 LB		
			WALL ITEMS			
0364	8504000000-E	460	CONCRETE BARRIER RAIL WITH MOMENT SLAB	290 LF		
0365	8801000000-E	SP	MSE RETAINING WALL NO **** (1)	1,750 SF		
0366	8847000000-E	SP	GENERIC RETAINING WALL ITEM ARCHITECTURAL SURFACE TREATMENT (SOUND BARRIER WALL)	169,000 SF		
0367	8847000000-E	SP	GENERIC RETAINING WALL ITEM SOUND BARRIER WALL NO. NW10A	16,487 SF		
0368	8847000000-E	SP	GENERIC RETAINING WALL ITEM SOUND BARRIER WALL NO. NW3A	87,214 SF		
			STRUCTURE ITEMS			
0369	8017000000-N	SP	CONSTRUCTION, MAINTENANCE, & REMOVAL OF TEMP ACCESS AT STA ********** (849+00.00 -L- LT)	Lump Sum	L.S.	
0370	8017000000-N	SP	CONSTRUCTION, MAINTENANCE, & REMOVAL OF TEMP ACCESS AT STA ********** (849+00.00 -L- RT)	Lump Sum	L.S.	
0371	8035000000-N	402	REMOVAL OF EXISTING STRUCTURE AT STATION ********** (849+00.00 -L- LT)	Lump Sum	L.S.	
0372	8035000000-N	402	REMOVAL OF EXISTING STRUCTURE AT STATION ********** (849+00.00 -L- RT)	Lump Sum	L.S.	
0373	8065000000-N	SP	ASBESTOS ASSESSMENT	Lump Sum	L.S.	
0374	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ********** (1, 13+08.49 -Y42-)	Lump Sum	L.S.	
0375	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ********** (1, 19+82.46 -Y1-)	Lump Sum	L.S.	

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0376	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ********** (1, 20+16.72 -Y2-)	Lump Sum	L.S.	
0377	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ********** (1, 23+21.80 -Y3-)	Lump Sum	L.S.	
0378	8091000000-N	410	FOUNDATION EXCAVATION FOR BENT ** AT STATION ********** (1, 36+78.38 -RAMP A-)	Lump Sum	L.S.	
0379	8096000000-E	450	PILE EXCAVATION IN SOIL	251 LF		
0380	8097000000-E	450	PILE EXCAVATION NOT IN SOIL	218 LF		
0381	8105560000-E	411	4'-0" DIA DRILLED PIERS IN SOIL	199.2 LF		
0382	8105660000-E	411	4'-0" DIA DRILLED PIERS NOT IN SOIL	183.4 LF		
0383	8111600000-E	411	PERMANENT STEEL CASING FOR 4'-0" DIA DRILLED PIER	186.8 LF		
0384	8112730000-N	450	PDA TESTING	4 EA		
0385	8113000000-N	411	SID INSPECTIONS	2 EA		
0386	8115000000-N	411	CSL TESTING	2 EA		
0387	8121000000-N	412	UNCLASSIFIED STRUCTURE EXCAVATION AT STATION ******** (849+00.00 -L- LT)	Lump Sum	L.S.	
0388	8121000000-N	412	UNCLASSIFIED STRUCTURE EXCAVATION AT STATION ******** (849+00.00 -L- RT)	Lump Sum	L.S.	
0389	8147000000-E	420	REINFORCED CONCRETE DECK SLAB	103,381 SF		
0390	8161000000-E	420	GROOVING BRIDGE FLOORS	107,943 SF		
0391	8182000000-E	420	CLASS A CONCRETE (BRIDGE)	1,824.9 CY		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0392	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (13+08.49 -Y42-)	Lump Sum	L.S.	
0393	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (19+82.46 -Y1-)	Lump Sum	L.S.	
0394	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (20+16.72 -Y2-)	Lump Sum	L.S.	
0395	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (23+21.80 -Y3-)	Lump Sum	L.S.	
0396	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (36+78.38 -RAMP A-)	Lump Sum	L.S.	
0397	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (810+00.00 -L- LT)	Lump Sum	L.S.	
0398	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (810+00.00 -L- RT)	Lump Sum	L.S.	
0399	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (849+00.00 -L- LT)	Lump Sum	L.S.	
0400	8210000000-N	422	BRIDGE APPROACH SLABS, STATION ********** (849+00.00 -L- RT)	Lump Sum	L.S.	
0401	8217000000-E	425	REINFORCING STEEL (BRIDGE)	348,669 LB		
0402	8238000000-E	425	SPIRAL COLUMN REINFORCING STEEL (BRIDGE)	24,421 LB		
0403	8277000000-E	430	MODIFIED 72" PRESTRESSED CONC GIRDERS	5,940 LF		
0404	8328200000-E	450	PILE DRIVING EQUIPMENT SETUP FOR *** STEEL PILES (HP 12 X 53)	141 EA		
0405	8328200000-E	450	PILE DRIVING EQUIPMENT SETUP FOR *** STEEL PILES (HP 14 X 73)	144 EA		
0406	8364000000-E	450	HP 12 X 53 STEEL PILES	7,065 LF		

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0407	8384000000-E	450	HP 14 X 73 STEEL PILES	5,145 LF		
0408	8391000000-N	450	STEEL PILE POINTS	23 EA		
0409	8392500000-E	450	PREDRILLING FOR PILES	105 LF		
0410	8503000000-E	460	CONCRETE BARRIER RAIL	3,801.92 LF		
0411	8510000000-E	460	CONCRETE MEDIAN BARRIER	280.7 LF		
0412	8531000000-E	462	4" SLOPE PROTECTION	3,446 SY		
0413	8608000000-E	876	RIP RAP CLASS II (2'-0" THICK)	1,223 TON		
0414	8622000000-E	876	GEOTEXTILE FOR DRAINAGE	1,370 SY		
0415	8657000000-N	430	ELASTOMERIC BEARINGS	Lump Sum	L.S.	
0416	8692000000-N	SP	FOAM JOINT SEALS	Lump Sum	L.S.	
0417	8706000000-N	SP	EXPANSION JOINT SEALS	Lump Sum	L.S.	
0418	8867000000-E	SP	GENERIC STRUCTURE ITEM 54" PRESTRESSED CONCRETE FLORIDA I-BEAMS	3,116.3 LF		
0419	8867000000-E	SP	GENERIC STRUCTURE ITEM MODIFIED 54" PRESTRESSED CONCRETE GIRDERS	2,472.47 LF		