



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

August 2, 2017

U. S. Army Corps of Engineers
Regulatory Field Office
151 Patton Avenue, Room 208
Asheville, NC 28801-5006

ATTN: Ms. Crystal Amschler
NCDOT Coordinator

Subject: **Application for Section 404 Nationwide Permit 13, 23, 33, and 401 Water Quality Certification** for the proposed replacement of Bridge No. 448 over Buffalo Creek on SR 2154 (Gulledge Parker Road) in Union County, Federal Aid Project No. BRZ-2154(1), Division 10, TIP No. B-5374.
Debit \$240 from WBS 46089.1.1.

Dear Madam:

The North Carolina Department of Transportation (NCDOT) proposes to replace Bridge No. 448 over Buffalo Creek on SR 2154, Gulledge Parker Road. Bridge No 448, built in 1965 is 40-foot long two-span bridge considered structurally deficient and functionally obsolete. The replacement structure will be a 42-foot long triple barrel box culvert. Traffic will be maintained on-site using phased construction to minimize impacts to jurisdictional resources as Gulledge Parker Road is a dead end facility.

There will be 118 linear feet of permanent stream impact (42' for the culvert and 76' of bank stabilization), and 0.02 acre (52 feet) of temporary impacts necessary for the dewatering of the site during construction.

The edge of a wetland will also be filled for wider roadway approach slopes resulting in 0.02 acre of permanent fill in wetlands.

Please see enclosed copies of the Pre-Construction Notification (PCN), DMS Acceptance Letter, stormwater management plan, permit drawings and design plans for the above-referenced project. The Categorical Exclusion (CE) was completed in January 2016 and distributed shortly thereafter. Additional copies are available upon request.

This project calls for a letting date of February 20, 2018 and a review date of January 2, 2018.

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL ANALYSIS UNIT
1598 MAIL SERVICE CENTER
RALEIGH NC 27699-1598

Telephone: (919) 707-6000
Fax: (919) 212-5785
Customer Service: 1-877-368-4968
Website: www.ncdot.gov

Location:
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

A copy of this permit application and its distribution list will be posted on the NCDOT Website at: <http://connect.ncdot.gov/resources/Environmental>. If you have any questions or need additional information, please contact Michael Turchy at maturchy@ncdot.gov or (919) 707-6157.

Sincerely,

A handwritten signature in black ink, appearing to read 'PHS', with a long horizontal flourish extending to the right.

for Philip S. Harris III, P.E., C.P.M.
Environmental Analysis Unit



Pre-Construction Notification (PCN) Form

For Nationwide Permits and Regional General Permits

(along with corresponding Water Quality Certifications)

June 28, 2017 Ver 1.8

*Please note: fields marked with a red asterisk * below are required. You will not be able to submit the form until all mandatory questions are answered.*

Below is a link to the DRAFT online help file.

<http://edocs.deq.nc.gov/WaterResources/0/doc/549884/Page1.aspx>

A. Processing Information

County (or Counties) where the project is located: *

Union

Is this project a public transportation project? *

Yes No

Is this a NCDOT Project? *

Yes No

(NCDOT only) T.I.P. or state project number:

B-5374

WBS #

46089.1.1

(for NCDOT use only)

1a. Type(s) of approval sought from the Corps: *

- Section 404 Permit (wetlands, streams and waters, Clean Water Act)
 Section 10 Permit (navigable waters, tidal waters, Rivers and Harbors Act)

1b. What type(s) of permit(s) do you wish to seek authorization? *

- Nationwide Permit (NWP)
 Regional General Permit (RGP)

Nationwide Permit (NWP) Number: 13 - Bank Stabilization

Nationwide Permit (NWP) Number: 23 - Categorical Exclusions

Nationwide Permit (NWP) Number: 33 - Temporary Construction

NWP Number Other:

List all NW numbers you are applying for not on the drop down list.

1c. Type(s) of approval sought from the DWR: *

check all that apply

- 401 Water Quality Certification - Regular
 Non-404 Jurisdictional General Permit

- 401 Water Quality Certification - Express
 Riparian Buffer Authorization

1d. Is this notification solely for the record because written approval is not required?

For the record only for DWR 401 Certification: Yes No

For the record only for Corps Permit: Yes No

1e. Is payment into a mitigation bank or in-lieu fee program proposed for mitigation of impacts?

If so, attach the acceptance letter from mitigation bank or in-lieu fee program.

Yes No

Acceptance Letter Attachment

Click the upload button or drag and drop files here to attach document

B-5374 DMS Acceptance 2017-06-01.pdf

136.21KB

FILE TYPE MUST BE PDF

1f. Is the project located in any of NC's twenty coastal counties? *

Yes No

B. Applicant Information

1a. Who is the Primary Contact? *

NCDOT

1b. Primary Contact Email: *

maturchy@mcdot.gov

1c. Primary Contact Phone: *

(xxx)xxx-xxxx

(919)707-6157

1d. Who is applying for the permit?

Owner Applicant (other than owner) Agent/Consultant

(Check all that apply)

2. Owner Information

2a. Name(s) on recorded deed:

2b. Deed book and page no.:

2c. Responsible party:

(for Corporations)

2d. Address

Street Address

Address Line 2

City

State / Province / Region

Postal / Zip Code

Country

2e. Telephone Number:

(xxx)xxx-xxxx

2f. Fax Number:

(xxx)xxx-xxxx

2g. Email Address: *

pharris@ncdot.gov

C. Project Information and Prior Project History

1. Project Information

1a. Name of project: *

B-5374 Replacement of Bridge 448 over Buffalo Creek on SR 2154
(Gulledge Parker Road)

1b. Subdivision name:

(if appropriate)

1c. Nearest municipality / town: *

Alton

1d. Driving directions *

If it is a new project and can not easily be found in a GPS mapping system. Please provide directions.

GPS Mapping

2. Project Identification

2a. Property Identification Number:

(tax PIN or parcel ID)

2b. Property size:

(in acres)

2c. Project Address

Street Address

Address Line 2

City

State / Province / Region

Postal / Zip Code

Country

2d. Site coordinates in decimal degrees

Please collect site coordinates in decimal degrees. Use between 4-6 digits (unless you are using a survey-grade GPS device) after the decimal place as appropriate, based on how the location was determined. (For example, most mobile phones with GPS provide locational precision in decimal degrees to map coordinates to 5 or 6 digits after the decimal place.)

Latitude: *

35.844574

ex: 34.208504

Longitude: *

-80.532757

-77.796371

3. Surface Waters

3a. Name of the nearest body of water to proposed project: *

Buffalo Creek

3b. Water Resources Classification of nearest receiving water: *

C

3c. What river basin(s) is your project located in? *

Yadkin-PeeDee

[River Basin Lookup](#)

4. Project Description

4a. Describe the existing conditions on the site and the general land use in the vicinity of the project at the time of this application: *

The land use is farmland with maintained disturbed dispersed throughout.

4b. Attach an 8 1/2 X 11 excerpt from the most recent version of the USGS topographic map indicating the location of the project site. (for DWR)

Click the upload button or drag and drop files here to attach document

File type must be pdf

4c. Attach an 8 1/2 X 11 excerpt from the most recent version of the published County NRCS Soil Survey map depicting the project site. (for DWR)

Click the upload button or drag and drop files here to attach document

File type must be pdf

4d. List the total estimated acreage of all existing wetlands on the property:

0.18

4e. List the total estimated linear feet of all existing streams on the property:

(intermittent and perennial)

190

4f. Explain the purpose of the proposed project:

The purpose of the project is to replace a structurally deficient and functionally obsolete bridge, built in 1965 that is approaching the end of its useful life.

4g. Describe the overall project in detail, including the type of equipment to be used:

The project involves replacing a 40-foot long, two span bridge with a 40-foot, triple barrel box culvert structure at the same location. Traffic will be maintained on site (as Gulledege Parker Road is a dead-end facility) using phased construction.

Standard bridge and road building equipment, such as trucks, dozers, and cranes will be used.

4h. Please upload project drawings for the proposed project.

Click the upload button or drag and drop files here to attach document

B-5374 All Drawings for PCN.pdf

2.94MB

File type must be pdf

5. Jurisdictional Determinations

5a. Have the wetlands or streams been delineated on the property or proposed impact areas? *

Yes

No

Unknown

Comments:

5b. If the Corps made a jurisdictional determination, what type of determination was made? *

Preliminary

Approved

Unknown

Corps AID Number:

Example: SAW-2017-99999

5c. If 5a is yes, who delineated the jurisdictional areas?

Name (if known):

Agency/Consultant Company:

Other:

5d. If yes, list the dates of the Corps jurisdictional determinations or State determinations and attach documentation.

5d1. Jurisdictional determination upload

Click the upload button or drag and drop files here to attach document

File type must be PDF

6. Project History

6a. Have permits or certifications been requested or obtained for this project (including all prior phases) in the past? *

Yes

No

Unknown

7. Future Project Plans

7a. Is this a phased project? *

Yes

No

Are any other NWP(s), regional general permit(s), or individual permits(s) used, or intended to be used, to authorize any part of the proposed project or related activity? This includes other separate and distant crossing for linear projects that require Department of the Army authorization but don't require pre-construction notification.

D. Proposed Impacts Inventory

1. Impacts Summary

1a. Where are the impacts associated with your project? (check all that apply):

Wetlands

Streams-tributaries

Buffers

Open Waters

Pond Construction

2. Wetland Impacts

If there are wetland impacts proposed on the site, then complete this question for each wetland area impacted.

2a. Site # - Reason for impact	2b. Impact type *	2c. Type of wetland	2d. Wetland name	2e. Forested	2f. Jurisdiction type	2g. Impact area
Site 1 - Fill Map label (e.g. Road Crossing 1)	P Permanent (P) or Temporary (T)	Non-Tidal Freshwater Marsh		No	Corps (404, 10) or DWR (401, other)	0.020 (acres)

2g. Temporary Wetland Impact

0.000

2g. Permanent Wetland Impact

0.020

2g. Total Wetland Impact

0.020

2h. Comments:

3. Stream Impacts

If there are perennial or intermittent stream impacts (including temporary impacts) proposed on the site, then complete this question for all stream sites impacted.

3a. Site # - Reason for impact	3b. Impact type	3c. Type of impact	3d. Stream name	3e. Stream Type	3f. Jurisdiction type	3g. Stream width	3h. Impact length
Site 2 - Fill Map label (e.g. Road Crossing 1)	P Permanent (P) or Temporary (T)	Culvert	Buffalo Creek	Perennial Perennial (PER) or intermittent (INT)	Corps	Average 10 (feet)	42 (linear feet)
Site 2 Map label (e.g. Road Crossing 1)	P Permanent (P) or Temporary (T)	Bank Stabilization	Buffalo Creek	Perennial Perennial (PER) or intermittent (INT)	Corps	Average 10 (feet)	76 (linear feet)
Site 2 dewatering Map label (e.g. Road Crossing 1)	T Permanent (P) or Temporary (T)	Dewatering	Buffalo Creek	Perennial Perennial (PER) or intermittent (INT)	Corps	Average 10 (feet)	52 (linear feet)

** All Perennial or Intermittent streams must be verified by DWR or delegated local government.

3i. Total jurisdictional ditch impact in square feet:

0

3i. Total permanent stream impacts:

118

3i. Total temporary stream impacts:

52

3i. Total stream and tributary impacts:

170

3j. Comments:

4. Open Water Impacts

If there are proposed impacts to lakes, ponds, estuaries, tributaries, sounds, the Atlantic Ocean, or any other open water of the U.S. then individually list all open water impacts below.

5. Pond or Lake Construction

If pond or lake construction is proposed, then complete the chart below.

6. Buffer Impacts (for DWR)

If project will impact a protected riparian buffer, then complete the chart below. Individually list all buffer impacts below.

E. Impact Justification and Mitigation

1. Avoidance and Minimization

1a. Specifically describe measures taken to avoid or minimize the proposed impacts in designing the project:*

A culvert was selected as the replacement structure due to the small size of the watershed (3.7 square miles), and long term maintenance cost.

The stream is unnaturally widened through the farm area at the project location. The new culvert will maintain Buffalo Creek more natural stream width through the crossing by way of sills in the outer two barrels.

Gulledge Parker Road is a dead end road, so no off-site detour is possible.

Culvert will be constructed as close to the existing bridge as possible (almost touching) to minimize the project footprint as much as practicable.

Traffic will be reduced to a one-lane pattern to minimize the project footprint. In the event that construction equipment blocks "line of sight" a temporary signal may be used.

Construction will be phased so that half of the culvert will be built while traffic is maintained on the existing bridge, then once half of the culvert is completed, traffic will be phased onto the culvert, the old bridge will be removed, and the remaining part of the culvert will be constructed. Traffic will be reduced to a one lane pattern.

The wetland to the south has been completely avoided, but the wetland to the north was clipped due to roadway slopes/ approaches to the new structure.

The culvert will have three barrels, two of which (outside barrels) will be high flow barrels with sills and bench work.

1b. Specifically describe measures taken to avoid or minimize the proposed impacts through construction techniques: *

Best Management Practices (BMPs) will be utilized during construction to attempt to reduce the stormwater impacts to the receiving streams due to erosion and runoff.

During culvert construction when dewatering is necessary, the watercourse will be maintained by the use of a temporary pipe, NOT a bypass pump.

2. Compensatory Mitigation for Impacts to Waters of the U.S. or Waters of the State

2a. Does the project require Compensatory Mitigation for impacts to Waters of the U.S. or Waters of the State?

Yes No

2c. If yes, mitigation is required by (check all that apply):

DWR Corps

2d. If yes, which mitigation option(s) will be used for this project?

Mitigation bank Payment to in-lieu fee program Permittee Responsible Mitigation

4. Complete if Making a Payment to In-lieu Fee Program

4a. Approval letter from in-lieu fee program is attached.

Yes

4b. Stream mitigation requested:

(linear feet)

42

4c. If using stream mitigation, stream temperature:

warm

4d. Buffer mitigation requested (DWR only):

(square feet)

4e. Riparian wetland mitigation requested:

(acres)

0.02

4f. Non-riparian wetland mitigation requested:

(acres)

4g. Coastal (tidal) wetland mitigation requested:

(acres)

4h. Comments

F. Stormwater Management and Diffuse Flow Plan (required by DWR)

1a. Does this project require a Stormwater Management Plan?

Yes No

1b. If this project DOES require a Stormwater Management Plan, then provide a brief, narrative description of the plan:

See attached Permit Drawings

1c. What is the overall percent imperviousness of this project?

%

1d. Who will be responsible for the review of the Stormwater Management Plan? *

Certified Local Government DEMLR Stormwater Review
 DWR 401 & Buffer Permitting Branch DWR Transportation Permitting Branch

2. Diffuse Flow Plan

2a. Does the project include or is it adjacent to protected riparian buffers identified within one of the NC Riparian Buffer Protection Rules?

Yes No

5. DWR 401 Stormwater Review

5a. Is the Stormwater Management Plan (including BMP Supplemental Forms and Operation and Maintenance Agreements) attached?

Yes No

Stormwater Management Plan Upload

Click the upload button or drag and drop files here to attach document

file type must be pdf

G. Supplementary Information

1. Environmental Documentation

1a. Does the project involve an expenditure of public (federal/state/local) funds or the use of public (federal/state) land? *

Yes No

1b. If you answered "yes" to the above, does the project require preparation of an environmental document pursuant to the requirements of the National or State (North Carolina) Environmental Policy Act (NEPA/SEPA)? *

Yes No

1c. If you answered "yes" to the above, has the document review been finalized by the State Clearing House? (If so, attach a copy of the NEPA or SEPA final approval letter.) *

Yes No

NEPA or SEPA Final Approval Letter

Click the upload button or drag and drop files here to attach document

FILE TYPE MUST BE PDF

2. Violations (DWR Requirement)

2a. Is the site in violation of DWR Water Quality Certification Rules (15A NCAC 2H .0500), Isolated Wetland Rules (15A NCAC 2H .1300), or DWR Surface Water or Wetland Standards or Riparian Buffer Rules (15A NCAC 2B .0200)? *

Yes No

2b. Is this an after-the-fact permit application? *

Yes No

2c. If you answered "yes" to one or both of the above questions, provide an explanation of the violation(s):

3. Cumulative Impacts (DWR Requirement)

3a. Will this project (based on past and reasonably anticipated future impacts) result in additional development, which could impact nearby downstream water quality? *

Yes No

3b. If you answered "no," provide a short narrative description.

Due to the minimal transportation impact resulting from this bridge replacement, this project will neither influence nearby land uses nor stimulate growth. Therefore, a detailed indirect or cumulative effects study will not be necessary.

4. Sewage Disposal (DWR Requirement)

4a. Describe, in detail, the treatment methods and dispositions (non-discharge or discharge) of wastewater generated from the proposed project. If the wastewater will be treated at a treatment plant, list the capacity available at that plant.

5. Endangered Species and Designated Critical Habitat (Corps Requirement)

5a. Will this project occur in or near an area with federally protected species or habitat? *

Yes No

5b. Have you checked with the USFWS concerning Endangered Species Act impacts? *

Yes No

5c. If yes, indicate the USFWS Field Office you have contacted.

5d. Is this a DOT project located within Division's 1-8? *

Yes

No

5e. Will you cut any trees in order to conduct the work in waters of the U.S.? *

Yes No

5f. Does this project involve bridge maintenance or removal? *

Yes No

5f(1). If yes, have you inspected the bridge for signs of bat use such as staining, guano, bats, etc.? Representative photos of signs of bat use can be found in the NLEB SLOPES, Appendix F, pages 3-7.

Yes No

Link to the NLEB SLOPES document: http://saw-reg.usace.army.mil/NLEB/1-30-17-signed_NLEB-SLOPES&apps.pdf

If you answered "Yes" to 5f(1), did you discover any signs of bat use? *

Yes No Unknown

If yes, please show the location of the bridge on the permit drawings/project plans.

Click the upload button or drag and drop files here to attach document

File must be PDF

5g. Does this project involve the construction/installation of a wind turbine(s)?*

Yes No

If yes, please show the location of the wind turbine(s) on the permit drawings/project plans.

Click the upload button or drag and drop files here to attach document

File must be PDF

5h. Does this project involve (1) blasting, and/or (2) other percussive activities that will be conducted by machines, such as jackhammers, mechanized pile drivers, etc.?

Yes No

If yes to either, please provide details to include type of percussive activity, purpose, duration, and specific location of this activity on the property.

Click the upload button or drag and drop files here to attach document

File must be PDF

5i. What data sources did you use to determine whether your site would impact Endangered Species or Designated Critical Habitat?*

USFWS website:

Schweinitz's sunflower- No Effect, habitat present, last survey: 10/20/2015

Michaux's sumac – No Effect, habitat present, last survey: 10/20/2015

Carolina heelsplitter – No Effect due to “habitat quality, lack of any native mussel taxa, and the isolation of this surveyed stream from known species occurrences.”

6. Essential Fish Habitat (Corps Requirement)

6a. Will this project occur in or near an area designated as an Essential Fish Habitat?*

Yes No

6b. What data sources did you use to determine whether your site would impact an Essential Fish Habitat?*

NMFS County Index

7. Historic or Prehistoric Cultural Resources (Corps Requirement)

Link to the State Historic Preservation Office Historic Properties Map (does not include archaeological data: <http://gis.ncdcr.gov/hpoweb/>)

7a. Will this project occur in or near an area that the state, federal or tribal governments have designated as having historic or cultural preservation status (e.g., National Historic Trust designation or properties significant in North Carolina history and archaeology)?*

Yes No

7b. What data sources did you use to determine whether your site would impact historic or archeological resources?*

NEPA Documentation

7c. Historic or Prehistoric Information Upload

Click the upload button or drag and drop files here to attach document

File must be PDF

8. Flood Zone Designation (Corps Requirement)

Link to the FEMA Floodplain Maps: <https://msc.fema.gov/portal/search>

8a. Will this project occur in a FEMA-designated 100-year floodplain?*

Yes No

8b. If yes, explain how project meets FEMA requirements:

NCDOT Hydraulics Unit coordination with FEMA

8c. What source(s) did you use to make the floodplain determination?*

FEMA Maps

Miscellaneous attachments not previously requested.

Click the upload button or drag and drop files here to attach document

Cover Letter.pdf

251.12KB

File must be PDF

Signature

*

By checking the box and signing below, I certify that:

- I have given true, accurate, and complete information on this form;
- I agree that submission of this PCN form is a "transaction" subject to Chapter 66, Article 40 of the NC General Statutes (the "Uniform Electronic Transactions Act");
- I agree to conduct this transaction by electronic means pursuant to Chapter 66, Article 40 of the NC General Statutes (the "Uniform Electronic Transactions Act");
- I understand that an electronic signature has the same legal effect and can be enforced in the same way as a written signature; AND
- I intend to electronically sign and submit the PCN form.

Full Name: *

Colin Mellor

Signature

Colin Mellor



ROY COOPER
Governor

June 1, 2017

Mr. Philip S. Harris, III, P.E., CPM
Project Development and Environmental Analysis Unit
North Carolina Department of Transportation
1598 Mail Service Center
Raleigh, North Carolina 27699-1598

Dear Mr. Harris:

Subject: Mitigation Acceptance Letter:

B-5374, Replace Bridge Number 448 over Buffalo Creek on SR 2154 (Gulledge Parker Road), Union County

The purpose of this letter is to notify you that the Division of Mitigation Services (DMS) will provide the compensatory stream and riparian wetland mitigation for the subject project. Based on the information supplied by you on May 31, 2017, the impacts are located in CU 03040202 of the Yadkin River basin in the Southern Piedmont (SP) Eco-Region, and are as follows:

Yadkin 03040202 SP	Stream			Wetlands			Buffer (Sq. Ft.)	
	Cold	Cool	Warm	Riparian	Non-Riparian	Coastal Marsh	Zone 1	Zone 2
Impacts (feet/acres)	0	0	42.0	0.02	0	0	0	0

*Some of the stream and/or wetland impacts may be proposed to be mitigated at a 1:1 mitigation ratio. See permit application for details.

The impacts and associated mitigation needs for this project were not projected by the NCDOT in the 2017 impact data. Currently NCDEQ-DMS does not have mitigation credits available in this CU. NCDEQ-DMS will commit to implement sufficient compensatory mitigation credits to offset the impacts associated with this project as determined by the regulatory agencies using the delivery timeline listed in Section F.3.c.iii of the In-Lieu Fee Instrument dated July 28, 2010 in **Yadkin 03040201**. DMS will commit to implement sufficient compensatory stream and riparian wetland mitigation credits to offset the impacts associated with this project as determined by the regulatory agencies using the delivery timeline listed in Section F.3.c.iii of the In-Lieu Fee Instrument dated July 28, 2010. If the above referenced impact amounts are revised, then this mitigation acceptance letter will no longer be valid and a new mitigation acceptance letter will be required from DMS.

If you have any questions or need additional information, please contact Beth Harmon at 919-707-8420.

Sincerely,

James B. Stanfill
Credit Management Supervisor

cc: Ms. Crystal Amschler, USACE – Asheville Regulatory Field Office
Ms. Amy Chapman, NCDWR
File: B-5374 (SIP Yadkin 03040201)





North Carolina Department of Transportation

Highway Stormwater Program
STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS



(Version 2.07; Released October 2016)

WBS Element: 46089.1.1 TIP No.: B-5374 County(ies): Union Page 1 of 10

General Project Information

WBS Element:	46089.1.1	TIP Number:	B-5374	Project Type:	Bridge Replacement	Date:	3/23/2017
NCDOT Contact:	WILLIAM G. (GALEN) CAIL, P.E.		Contractor / Designer:	JEFF RECK, P.E.			
Address:	HYDRAULICS UNIT 1590 MAIL SERVICE CENTER RALEIGH, NC 27699		Address:	MOFFATT & NICHOL 4700 FALLS OF NEUSE RD, SUITE 300 RALEIGH, NC 27609			
	Phone: (919) 707-6711			Phone: (919) 781-4626			
	Email: gcail@ncdot.gov			Email: jreck@moffattnichol.com			
City/Town:	Monroe		County(ies):	Union			
River Basin(s):	Yadkin-Pee Dee		CAMA County?	No			
Wetlands within Project Limits?	Yes						

Project Description

Project Length (lin. miles or feet):	0.174 miles	Surrounding Land Use:	Rural/Agricultural
	Proposed Project		Existing Site
Project Built-Upon Area (ac.)	0.5 ac.	0.4 ac.	
Typical Cross Section Description:	10' TRAVEL LANES WITH A TWO WAY ALIGNMENT LOCATED JUST UPSTREAM OF THE EXISTING ALIGNMENT. PROPOSED ROADWAY DRAINS ACROSS SHOULDERS INTO GRASSED DITCHES PRIOR TO DISCHARGING TO BUFFALO CREEK. ALL PROPOSED DITCHES WILL BE GRASSED.		10' TRAVEL LANES WITH A TWO WAY ALIGNMENT. NO PAVED SHOULDER ON SIDE OF ROADWAY. 20' BRIDGE OUT TO OUT. EXISTING ROADWAY DRAINS ACROSS GRASSED SHOULDERS INTO GRASSED DITCHES PRIOR TO DISCHARGING TO BUFFALO CREEK. ALL EXISTING DITCHES ARE STABLE.
Annual Avg Daily Traffic (veh/hr/day):	Design/Future: 617	Year: 2018	Existing: 916 Year: 2038
General Project Narrative: (Description of Minimization of Water Quality Impacts)	<p>Project consists of the replacement of Bridge #448 in Union County with a culvert. The existing bridge carries SR 2154 (Gulledge Parker Road) over Buffalo Creek between NC 207 and the end of the road. The proposed structure is a 42.2 LF (measured along C/L) 3@ 11'x10' RCBC. The culvert will be buried 1' below the existing stream bed and will utilize variable height sills to create an arrangement with (1) low flow barrell at the existing stream bed and (2) high flow barrell set above NWSEL, but below bank full height. The proposed alignment is just upstream of the existing bridge alignment and minimizes impacts to adjacent properties. The proposed structure is located on a dead end road and will be constructed via stage construction methods.</p> <p>There are wetlands located within the project limits. There will be an estimated 118 LF of permanent stream impact associated with the proposed culvert and channel improvements.</p> <p>STORMWATER CONTROLS The proposed culvert does not utilize deck drains. Runoff from the roadway drains across shoulders into grassed ditches prior to discharging to Buffalo Creek. All proposed ditches will be grassed.</p> <p>BRIDGE TO CULVERT JUSTIFICATION The proposed culvert is expected to have a much greater service life than a cored slab bridge, thus reducing potential impact to the stream from a structure remediation/replacement over the useful life of the culvert. Culvert will provide safer passage for farm equipment transversing the crossing, as the guardrail for the culvert will be consistent in width and lower in height than a standard bridge rail. Please see also the attached Bridge to Culvert Avoidance and Minimization sheet on page 2.</p>		

Waterbody Information

Surface Water Body (1):	Buffalo Creek		NCDWR Stream Index No.:	13-49-2			
NCDWR Surface Water Classification for Water Body	Primary Classification:		Class C				
	Supplemental Classification:		None				
Other Stream Classification:	None						
Impairments:	None						
Aquatic T&E Species?	No	Comments:					
NRTR Stream ID:			Buffer Rules in Effect:	N/A			
Project Includes Bridge Spanning Water Body?	Yes	Deck Drains Discharge Over Buffer?	No	Dissipator Pads Provided in Buffer?			
Deck Drains Discharge Over Water Body?	No	(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)			
(If yes, provide justification in the General Project Narrative)							



North Carolina Department of Transportation
Highway Stormwater Program
STORMWATER MANAGEMENT PLAN
FOR NCDOT PROJECTS



(Version 2.07; Released October 2016)

WBS Element: 46089.1.1 **TIP No.:** B-5374 **County(ies):** Union **Page** 2 **of** 10

Bridge to Culvert Avoidance and Minimization

Proposed Structure Summary

Sheet No. & Station	Sheet No.: 4	Station: -L- 15+22.45 to 15+57.59	Number of Barrels:	3
Drainage Area (ac or sq mi):	3.68 Sq. Miles		Barrel Width/Diameter (ft):	11'
Surface Water Body:	(1) Buffalo Creek		Barrel Height (ft):	10'
Culvert Type:	Reinforced Concrete Box Culvert		Culvert Length (ft)	42.2'

Avoidance and Minimization Efforts: (Bridge to Culvert)
 The structure alternative selected for final design utilized the minimum culvert footprint size possible while maintaining compliance with FEMA restrictions and providing sufficient hydraulic conveyance capacity. The proposed culvert footprint reduced the impacts to Buffalo Creek to the maximum extent practicable.

Stream Slope

Existing Average Stream Slope (%):	0.59 %
Proposed Culvert Slope (%):	0.60 %

Fish and/or Aquatic Life Passage

Existing Low Flow Channel Dimensions in the Stream: 8-12' wide, ~1' deep upstream of the bridge. Stream widens out at and just downstream of the existing bridge. The widened out stream is not typical of the average 8-12' low flow width of the stream away from the bridge crossing.

Culvert Burial

Proposed Culvert Burial Depth (ft):	1
--	---

Proposed Low Flow Dimensions Through the Culvert: 11' (1 low flow barrell @ 11'W)

Existing Streambed Material: Silt & Sand

Proposed Sills/Baffles:
 There is a 1' high sill located 1' inside the inlet and outlet end of the (1) low flow barrells @ 1' depth of bury (top of sill at existing channel bed elevation). There is a 3' high sill located 1' inside the inlet and outlet end of the (2) high flow barrells @ 1' depth of bury (top of high flow sill is just above normal water surface elevation).

Existing Low Flow Velocities in the Stream (ft/s): > 1 ft/s

Proposed Low Flow Velocities Through the Culvert (ft/s): > 1 ft/s

Alternating Low Flow Sills/Baffles: No alternating sills/baffles are proposed.

Culvert/Stream Alignment

Stream Patterns Upstream and Downstream of the Culvert that Could Affect Fish Passage and Bank Stability: Moderately straight reach with some bending/meandering.

Bed Forms Impacted by Culvert (riffles, pools, glides, etc.): No features impacted.

Low Flow Floodplain Bench Required? (provide justification) Yes Low flow floodplain bench has been provided.

Bends at Inlet/Outlet? (describe culvert alignment with stream) No No sharp bends are present at inlet or outlet.

Stream Realignment Necessary? (provide justification) No Proposed culvert is parallel to existing stream.

Bank Stabilization: Class II riprap has been provided at the inlet and outlet ends of the proposed culvert for bank stabilization.

Outlet Velocities

Natural Stream Channel 2-yr Velocity (ft/s):	3	Natural Stream Channel 10-yr Velocity (ft/s):	4.3
Proposed Culvert 2-yr Outlet Velocity (ft/s):	3.8	Proposed Culvert 10-yr Outlet Velocity (ft/s):	4.8

Roadway Geometric Considerations

Evaluate/Describe Roadway Geometric Constraints:
 None.

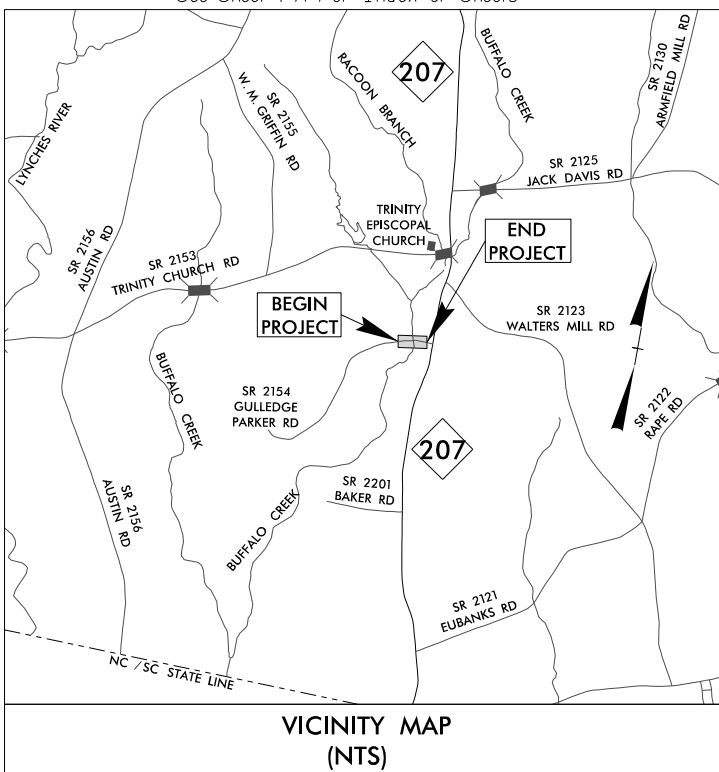
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TIP PROJECT: B-5374

CONTRACT:

See Sheet 1-A For Index of Sheets



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

UNION COUNTY

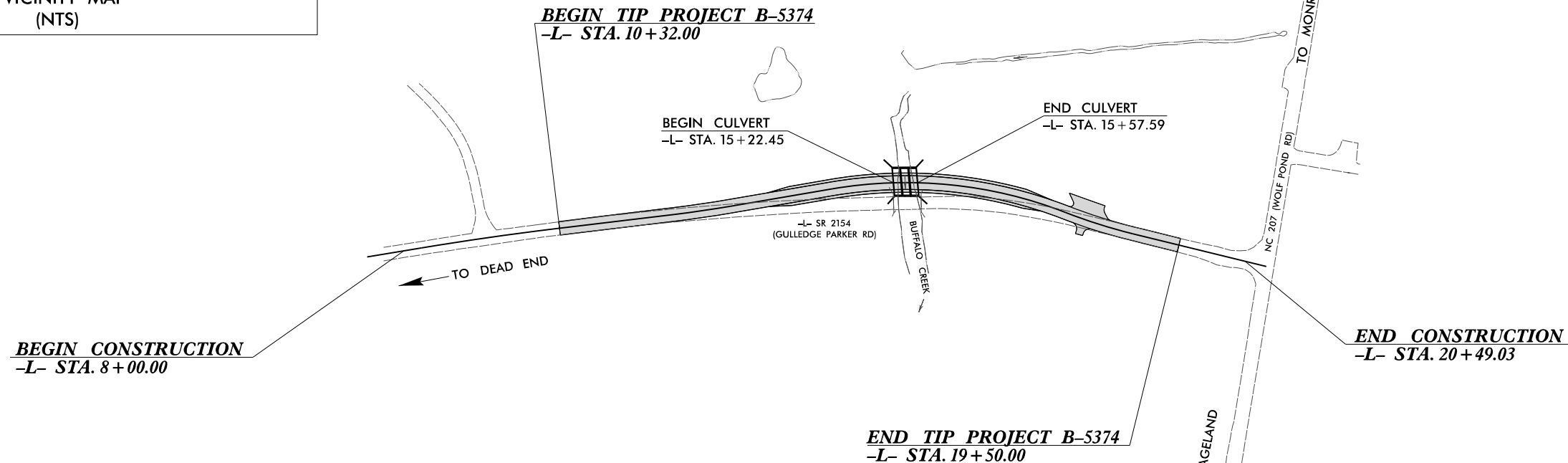
**LOCATION: BRIDGE NO. 448 OVER BUFFALO CREEK
ON SR 2154 (GULLEDGE PARKER RD)**

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND CULVERT

WETLAND AND SURFACE WATER IMPACTS PERMIT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5374	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
46089.1.1	BRZ-2154(1)	P.E.	
46089.2.1	BRZ-2154(1)	RW & UTL	

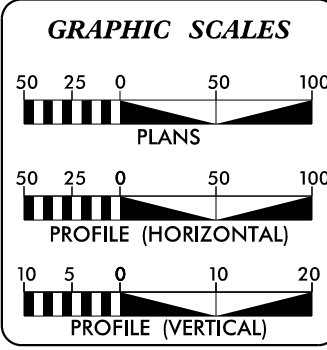
**PERMIT DRAWING
SHEET 3 OF 10**



THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.

NCDOT CONTACT: GALEN CAIL, PE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED



DESIGN DATA

ADT 2018 =	617
ADT 2038 =	916
K =	10 %
D =	60 %
T =	5 % *
V =	40 MPH
* TTST =	2% DUAL 3%
FUNC CLASS =	LOCAL RURAL
SUB-REGIONAL TIER	

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT B-5374 =	0.174 MILES
TOTAL LENGTH OF TIP PROJECT B-5374 =	0.174 MILES

Prepared for NCDOT in the Office of:

moffatt & nichol
4700 FALLS OF NEUSE ROAD, SUITE 300
RALEIGH, NORTH CAROLINA 27609
(919) 781-4626 VOICE (919) 781-4869 FAX
NC License NO.: F-0105

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: FEBRUARY 24, 2017	TIM R. REID, P.E. PROJECT ENGINEER
LETTING DATE: FEBRUARY 20, 2018	TRENT E. HUFFMAN, P.E. PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

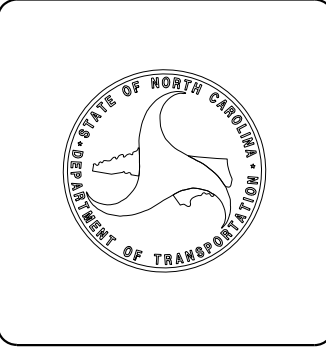
moffatt & nichol

SIGNATURE: _____ P.E.

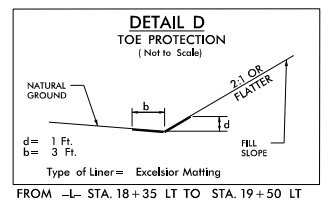
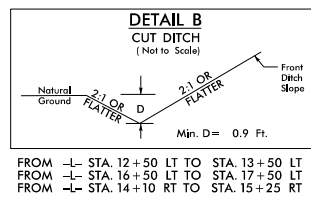
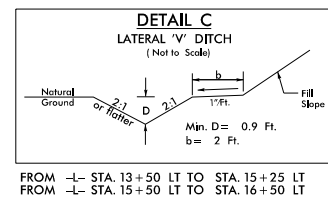
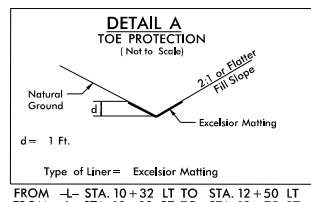
ROADWAY DESIGN ENGINEER

moffatt & nichol

SIGNATURE: _____ P.E.



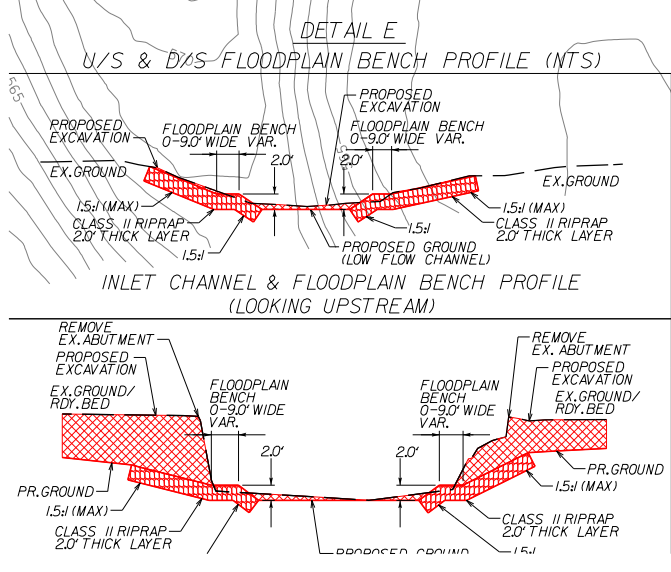
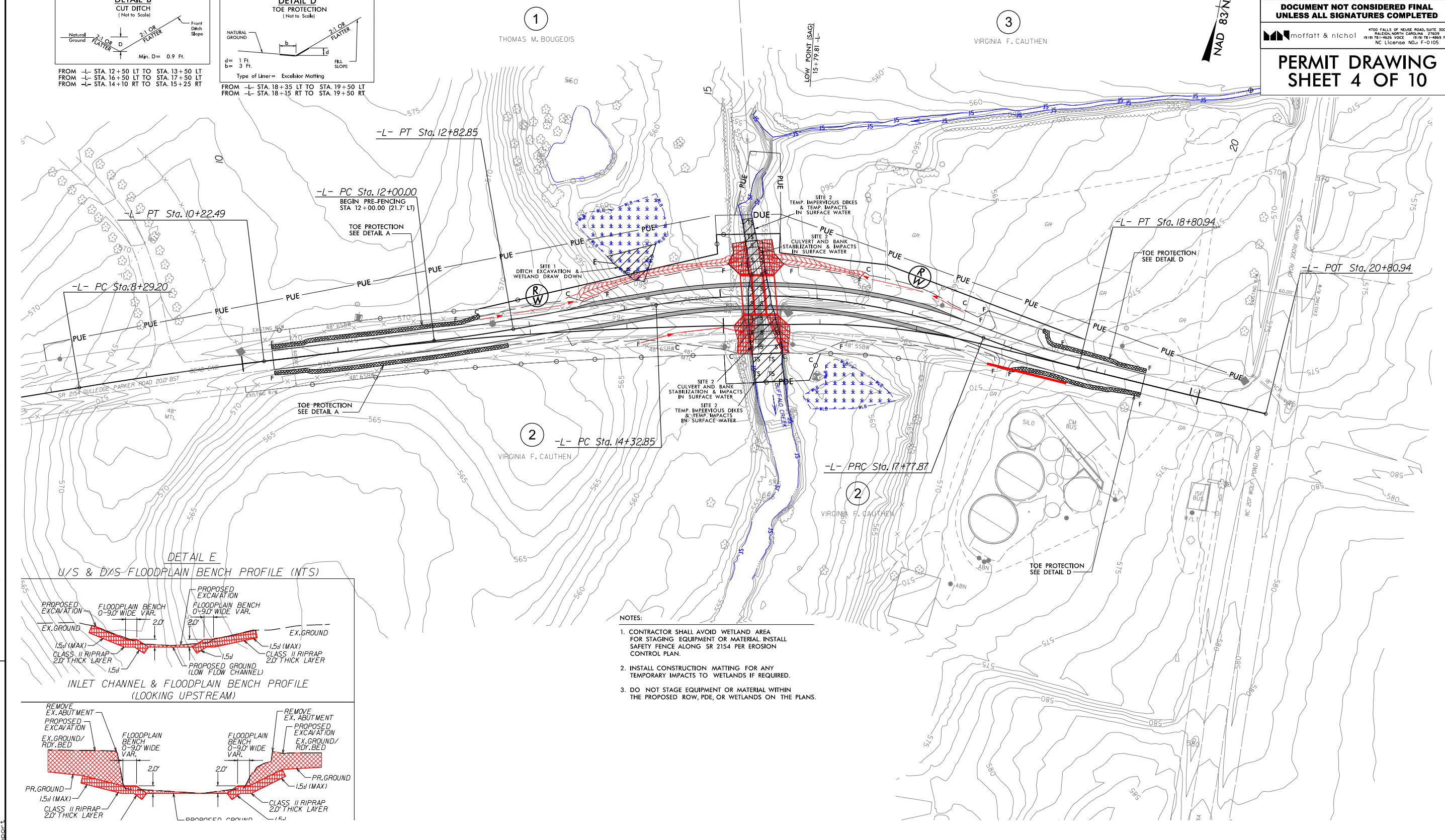
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 7/23/2017
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- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- DENOTES EXCAVATION IN WETLAND



PROJECT REFERENCE NO. B-5374	SHEET NO. PRM-2
RW SHEET NO. 4	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
PERMIT DRAWING SHEET 4 OF 10	

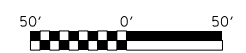
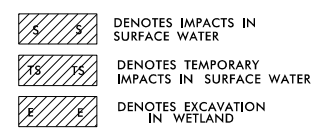
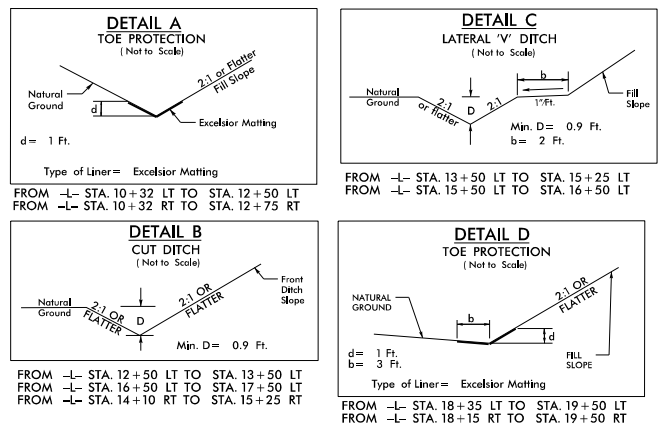


- NOTES:**
- CONTRACTOR SHALL AVOID WETLAND AREA FOR STAGING EQUIPMENT OR MATERIAL. INSTALL SAFETY FENCE ALONG SR 2154 PER EROSION CONTROL PLAN.
 - INSTALL CONSTRUCTION MATTING FOR ANY TEMPORARY IMPACTS TO WETLANDS IF REQUIRED.
 - DO NOT STAGE EQUIPMENT OR MATERIAL WITHIN THE PROPOSED ROW, PDE, OR WETLANDS ON THE PLANS.

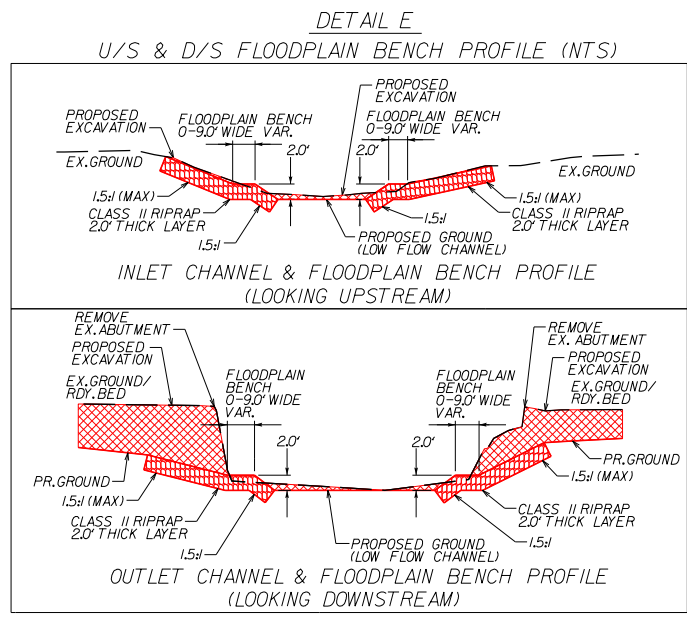
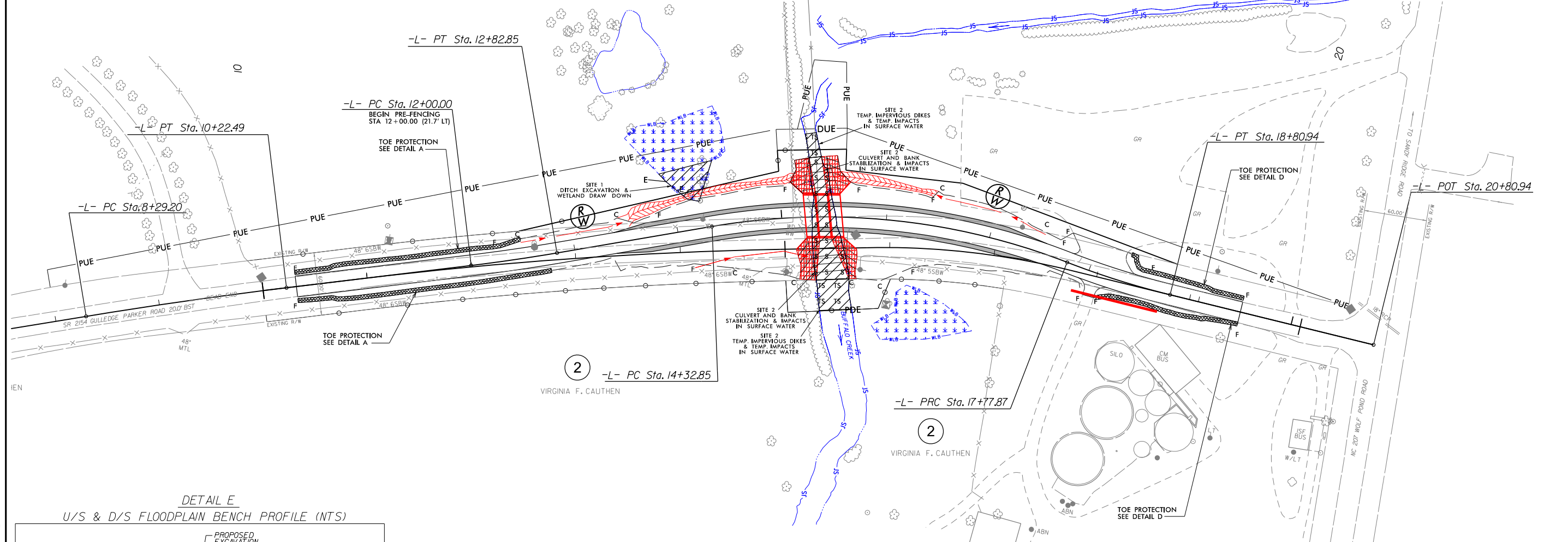
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REVISIONS

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PROJECT REFERENCE NO. B-5374	SHEET NO. PRM-3
RW SHEET NO. 4	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
<small>4700 FALLS OF NEUSE ROAD, SUITE 300 DALEBORO, NORTH CAROLINA 27829 (919) 781-4626 VOIC (919) 781-4669 FAX NC License NO.: F-0105</small>	
PERMIT DRAWING SHEET 5 OF 10	

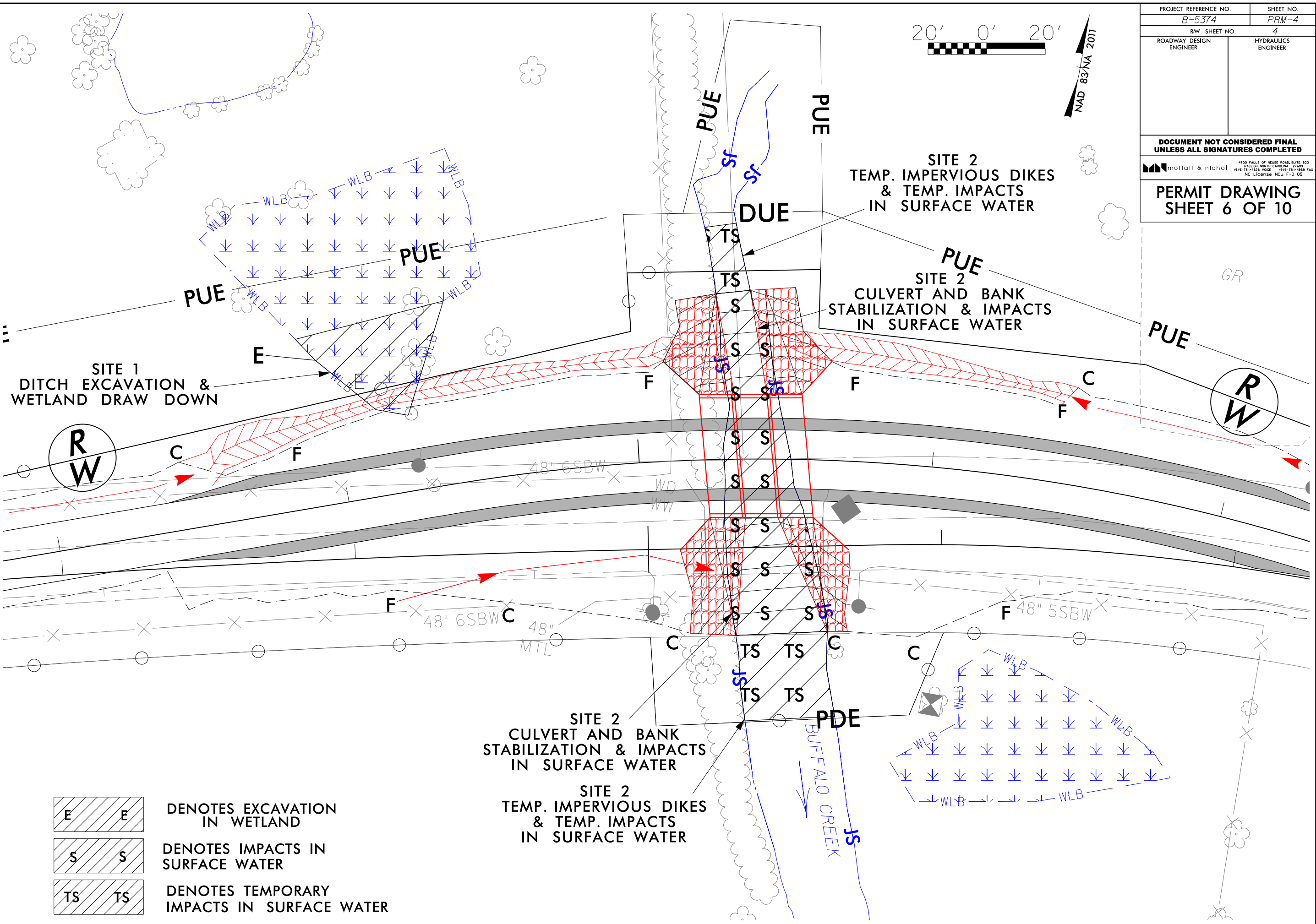


- NOTES:
1. CONTRACTOR SHALL AVOID WETLAND AREA FOR STAGING EQUIPMENT OR MATERIAL INSTALL SAFETY FENCE ALONG SR 2154 PER EROSION CONTROL PLAN.
 2. INSTALL CONSTRUCTION MATTING FOR ANY TEMPORARY IMPACTS TO WETLANDS IF REQUIRED.
 3. DO NOT STAGE EQUIPMENT OR MATERIAL WITHIN THE PROPOSED ROW, PDE, OR WETLANDS ON THE PLANS.

8/17/99
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PROJECT REFERENCE NO. B-5374	SHEET NO. PRM-4
RW SHEET NO. 4	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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PERMIT DRAWING SHEET 6 OF 10	



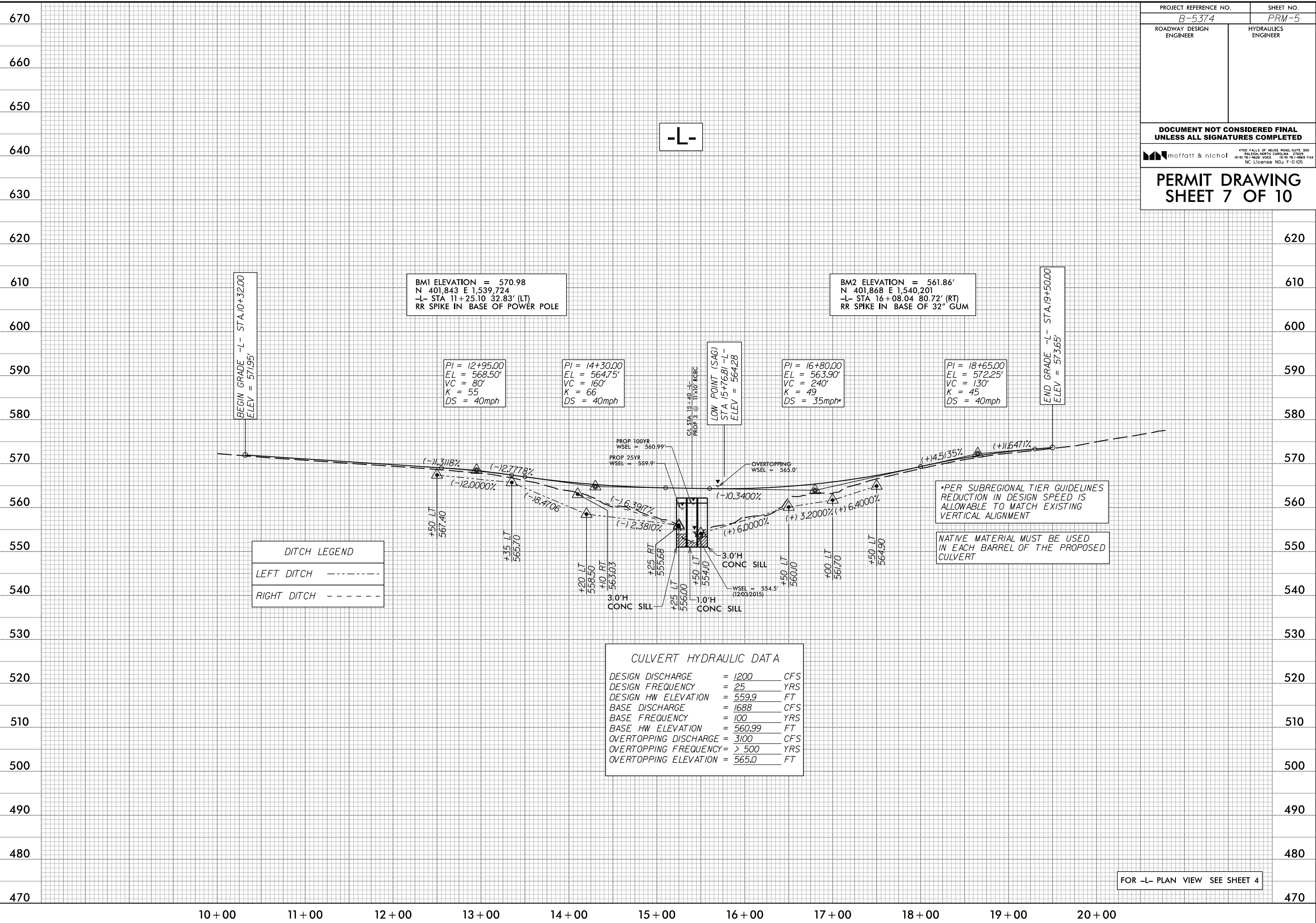
- DENOTES EXCAVATION IN WETLAND
- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER

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NC License NO.: F-0 105

**PERMIT DRAWING
SHEET 7 OF 10**

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FOR -L- PLAN VIEW SEE SHEET 4

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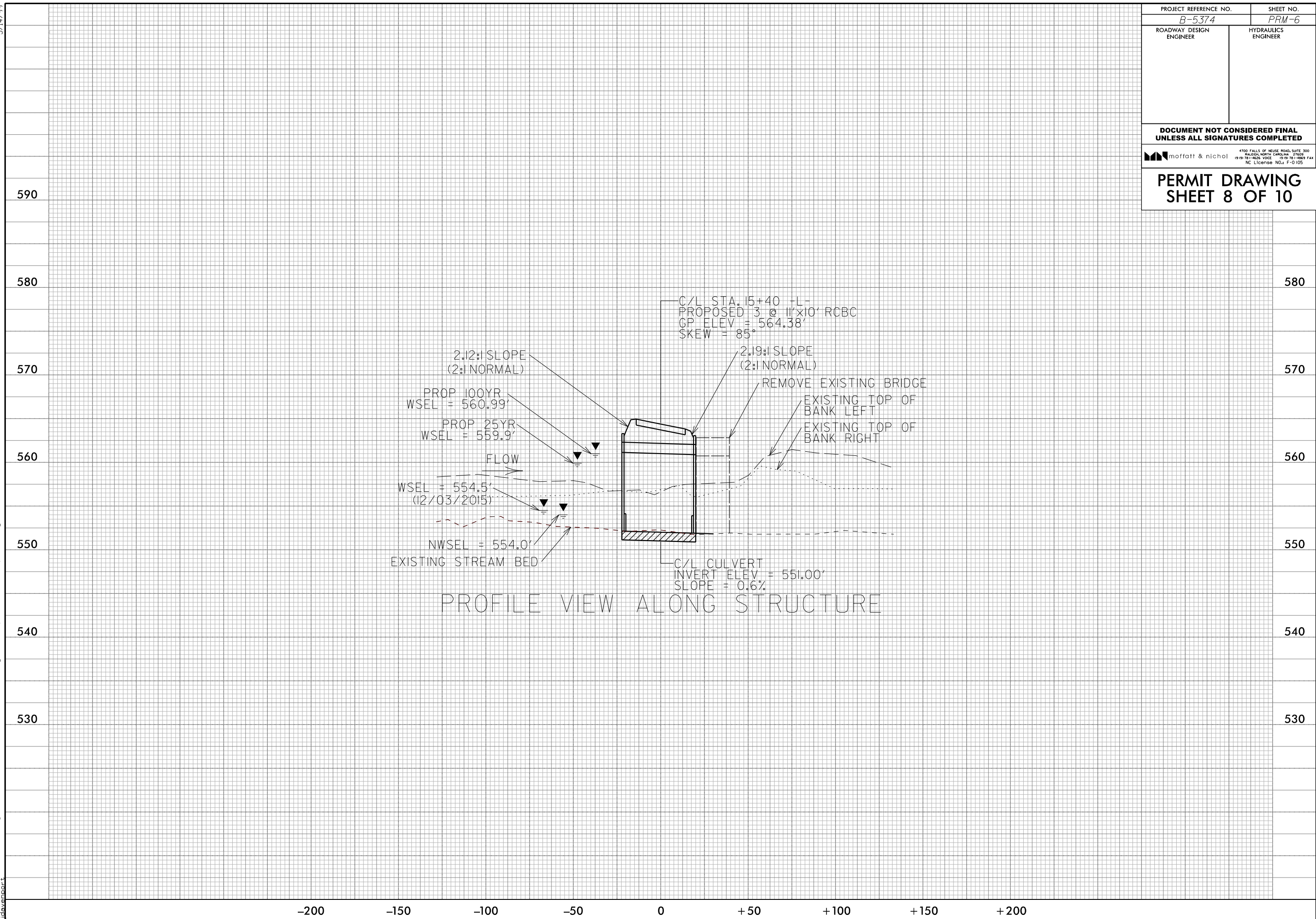
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ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL
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 (919) 781-4200 VOICE (919) 781-4889 FAX
 NC LICENSE NO. F-0105

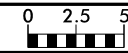
PERMIT DRAWING
SHEET 8 OF 10

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PROFILE VIEW ALONG STRUCTURE

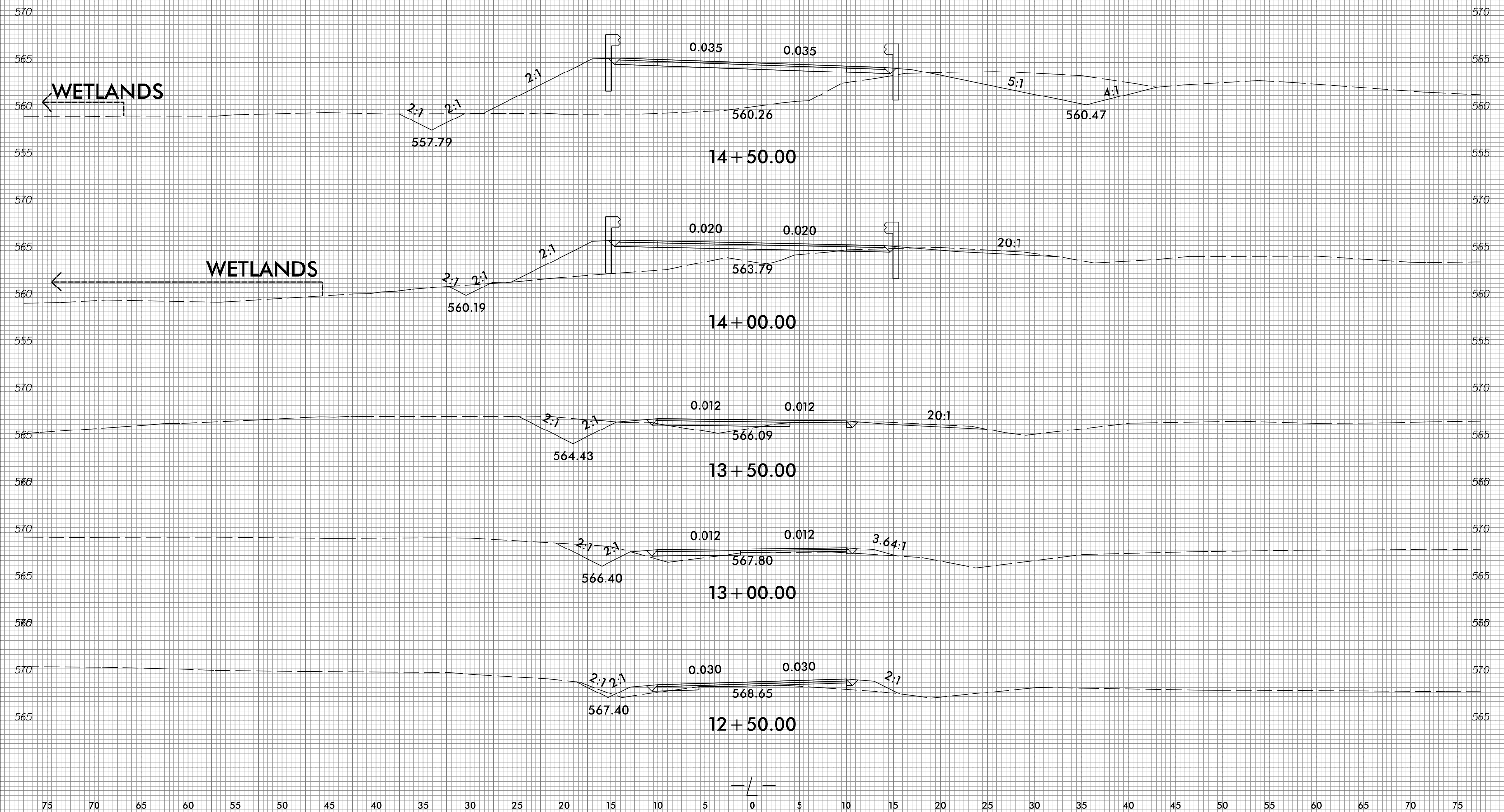
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PROJ. REFERENCE NO. B-5374	SHEET NO. PRM-7
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**PERMIT DRAWING
SHEET 9 OF 10**



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WETLAND AND SURFACE WATER IMPACTS SUMMARY

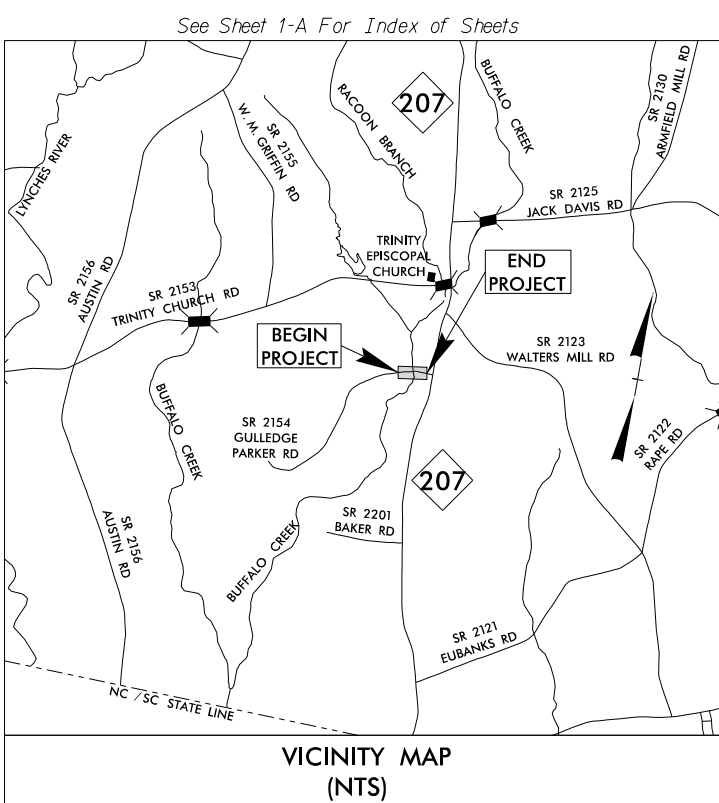
Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS					SURFACE WATER IMPACTS					
			Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)	
1	-L- 13+88 LT to 14+55 LT	Ditch Excavation Draw Down			0.02								
2	-L- 15+24 LT to 15+27 LT	Temporary Impervious Dikes							< 0.01		23		
2	-L- 15+31 LT to 15+29 RT	Culvert						0.02		42			
2	-L- 15+27 RT to 15+32 RT	Bank Stabilization						0.04		76			
2	-L- 15+32 RT to 15+36 RT	Temporary Impervious Dikes							0.02		29		
TOTALS*:					0.02			0.06	0.03	118	52		0

*Rounded totals are sum of actual impacts

NC DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 03/23/2017
 UNION COUNTY
 B-5374
 46089.1.1
 SHEET 10 OF 10

09.08/99

TIP PROJECT: B-5374



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

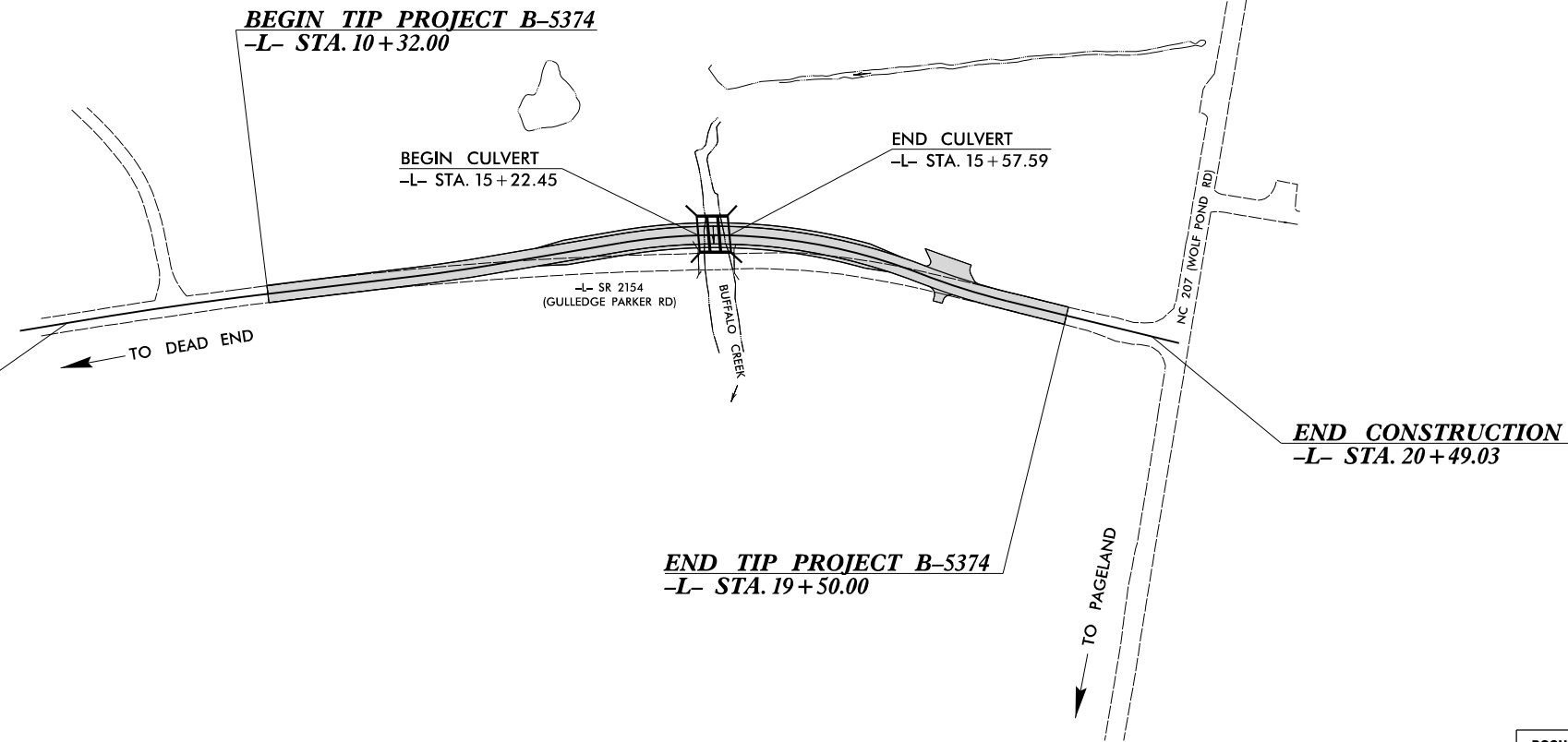
UNION COUNTY

**LOCATION: BRIDGE NO. 448 OVER BUFFALO CREEK
ON SR 2154 (GULLEDGE PARKER RD)**

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND CULVERT

RIGHT OF WAY PLANS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5374	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
46089.1.1	BRZ-2154(1)	P.E.	
46089.2.1	BRZ-2154(1)	RW & UTL	

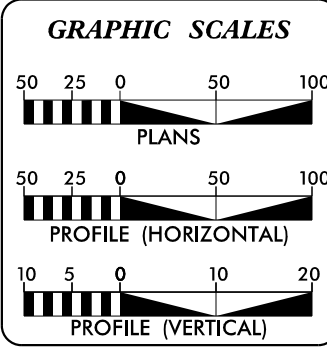


NCDOT CONTACT: THAD DUNCAN, PE

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DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

CONTRACT:



DESIGN DATA

ADT 2018 =	617
ADT 2038 =	916
K =	10 %
D =	60 %
T =	5 % *
V =	40 MPH
* TTST = 2% DUAL 3%	
FUNC CLASS =	LOCAL RURAL
SUB-REGIONAL TIER	

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT B-5374 =	0.174 MILES
TOTAL LENGTH OF TIP PROJECT B-5374 =	0.174 MILES

Prepared for NCDOT in the Office of:

moffatt & nichol
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(919) 781-4626 VOICE (919) 781-4869 FAX
NC License NO.: F-0105

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
FEBRUARY 24, 2017

LETTING DATE:
FEBRUARY 20, 2018

TIM R. REID, P.E.
PROJECT ENGINEER

TRENT E. HUFFMAN, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

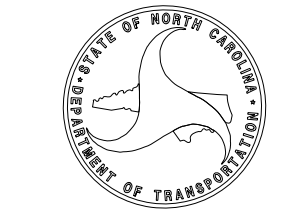
moffatt & nichol

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

moffatt & nichol

SIGNATURE: _____ P.E.



2/28/2017
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T.Huffman

STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS CONVENTIONAL PLAN SHEET SYMBOLS

12/2/2016

BOUNDARIES AND PROPERTY:

State Line	-----
County Line	-----
Township Line	-----
City Line	-----
Reservation Line	-----
Property Line	-----
Existing Iron Pin	○ EIP
Computed Property Corner	-----
Property Monument	□ EGM
Parcel/Sequence Number	①23
Existing Fence Line	-x-x-x-
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
Existing Historic Property Boundary	----- HPB
Known Contamination Area: Soil	☠ S ☠
Potential Contamination Area: Soil	☠ S ☠
Known Contamination Area: Water	☠ W ☠
Potential Contamination Area: Water	☠ W ☠
Contaminated Site: Known or Potential	☠ ?

BUILDINGS AND OTHER CULTURE:

Gas Pump Vent or U/G Tank Cap	○
Sign	○ S
Well	○ W
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	-----
False Sump	-----

RAILROADS:

Standard Gauge	-----
RR Signal Milepost	○ MILEPOST 35
Switch	□ SWITCH
RR Abandoned	-----
RR Dismantled	-----

RIGHT OF WAY & PROJECT CONTROL:

Secondary Horiz and Vert Control Point	◆
Primary Horiz Control Point	○
Primary Horiz and Vert Control Point	●
Exist Permanent Easement Pin and Cap	◇
New Permanent Easement Pin and Cap	◆
Vertical Benchmark	⊠
Existing Right of Way Marker	△
Existing Right of Way Line	-----
New Right of Way Line	○ R W
New Right of Way Line with Pin and Cap	○ R W ▲
New Right of Way Line with Concrete or Granite R/W Marker	▲ R W
New Control of Access Line with Concrete C/A Marker	△ C/A
Existing Control of Access	△ C/A
New Control of Access	△ C/A
Existing Easement Line	----- E
New Temporary Construction Easement	----- E
New Temporary Drainage Easement	----- TDE
New Permanent Drainage Easement	----- PDE
New Permanent Drainage / Utility Easement	----- DUE
New Permanent Utility Easement	----- PUE
New Temporary Utility Easement	----- TUE
New Aerial Utility Easement	----- AUE

ROADS AND RELATED FEATURES:

Existing Edge of Pavement	-----
Existing Curb	-----
Proposed Slope Stakes Cut	----- C
Proposed Slope Stakes Fill	----- F
Proposed Curb Ramp	----- CR
Existing Metal Guardrail	-----
Proposed Guardrail	-----
Existing Cable Guiderail	-----
Proposed Cable Guiderail	-----
Equality Symbol	⊕
Pavement Removal	⊗

VEGETATION:

Single Tree	☼
Single Shrub	☼

Note: Not to Scale *S.U.E. = *Subsurface Utility Engineering*

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	⊕
Power Line Tower	⊠
Power Transformer	⊠
U/G Power Cable Hand Hole	○
H-Frame Pole	●
U/G Power Line LOS B (S.U.E.*)	----- P
U/G Power Line LOS C (S.U.E.*)	----- P
U/G Power Line LOS D (S.U.E.*)	----- P

TELEPHONE:

Existing Telephone Pole	●
Proposed Telephone Pole	○
Telephone Manhole	⊕
Telephone Pedestal	⊠
Telephone Cell Tower	⊠
U/G Telephone Cable Hand Hole	○
U/G Telephone Cable LOS B (S.U.E.*)	----- T
U/G Telephone Cable LOS C (S.U.E.*)	----- T
U/G Telephone Cable LOS D (S.U.E.*)	----- T
U/G Telephone Conduit LOS B (S.U.E.*)	----- TC
U/G Telephone Conduit LOS C (S.U.E.*)	----- TC
U/G Telephone Conduit LOS D (S.U.E.*)	----- TC
U/G Fiber Optics Cable LOS B (S.U.E.*)	----- T FO
U/G Fiber Optics Cable LOS C (S.U.E.*)	----- T FO
U/G Fiber Optics Cable LOS D (S.U.E.*)	----- T FO

WATER:

Water Manhole	⊕
Water Meter	○
Water Valve	⊗
Water Hydrant	⊕
U/G Water Line LOS B (S.U.E.*)	----- W
U/G Water Line LOS C (S.U.E.*)	----- W
U/G Water Line LOS D (S.U.E.*)	----- W
Above Ground Water Line	----- A/G Water

TV:

TV Pedestal	⊕
TV Tower	⊗
U/G TV Cable Hand Hole	○
U/G TV Cable LOS B (S.U.E.*)	----- TV
U/G TV Cable LOS C (S.U.E.*)	----- TV
U/G TV Cable LOS D (S.U.E.*)	----- TV
U/G Fiber Optic Cable LOS B (S.U.E.*)	----- TV FO
U/G Fiber Optic Cable LOS C (S.U.E.*)	----- TV FO
U/G Fiber Optic Cable LOS D (S.U.E.*)	----- TV FO

GAS:

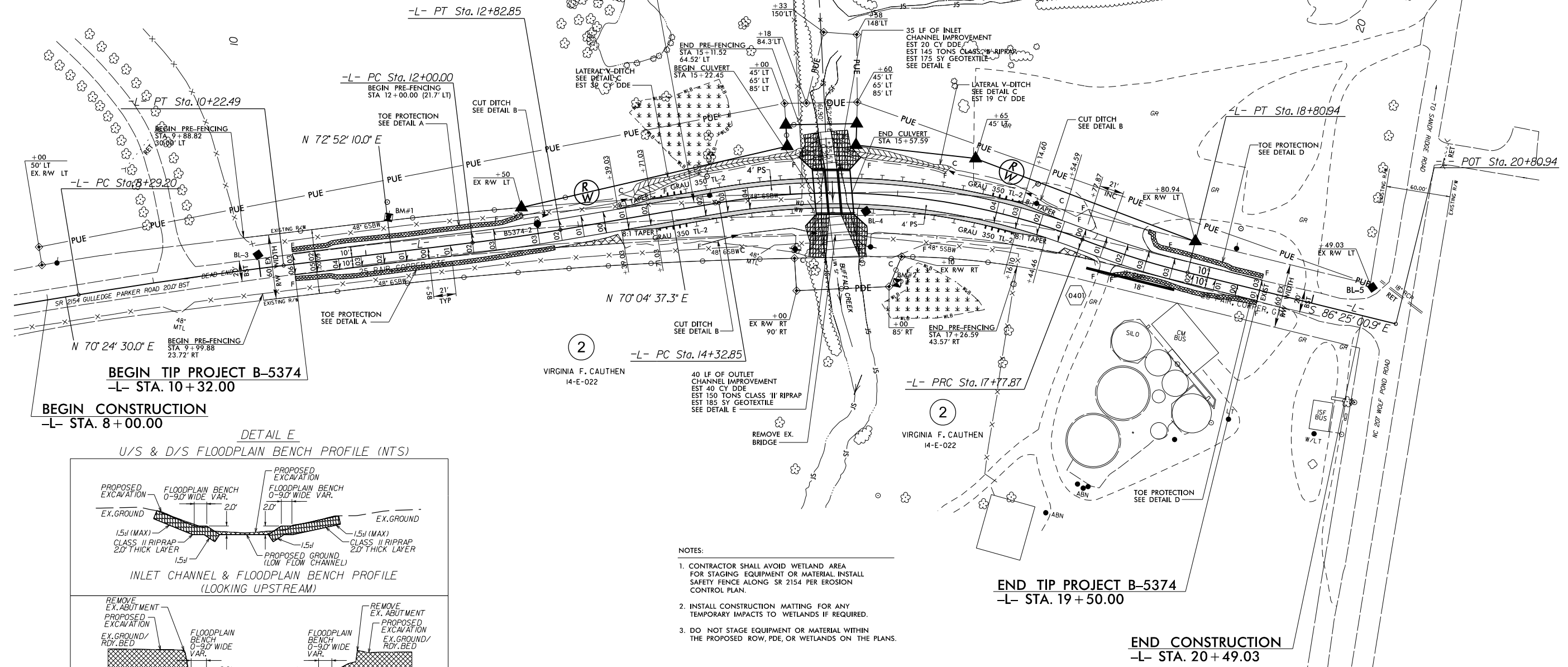
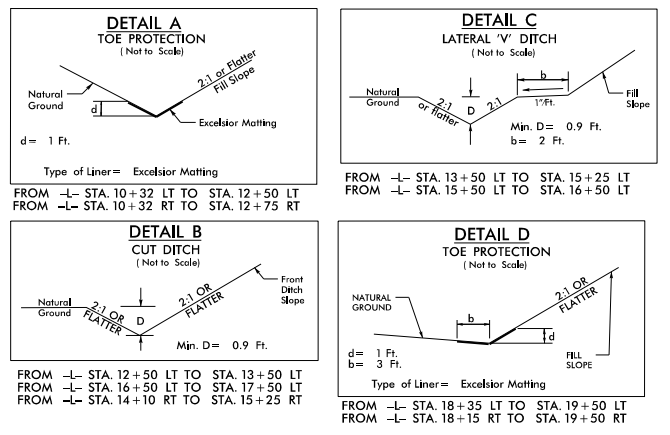
Gas Valve	◇
Gas Meter	⊕
U/G Gas Line LOS B (S.U.E.*)	----- G
U/G Gas Line LOS C (S.U.E.*)	----- G
U/G Gas Line LOS D (S.U.E.*)	----- G
Above Ground Gas Line	----- A/G Gas

SANITARY SEWER:

Sanitary Sewer Manhole	⊕
Sanitary Sewer Cleanout	⊕
U/G Sanitary Sewer Line	----- SS
Above Ground Sanitary Sewer	----- A/G Sanitary Sewer
SS Forced Main Line LOS B (S.U.E.*)	----- FSS
SS Forced Main Line LOS C (S.U.E.*)	----- FSS
SS Forced Main Line LOS D (S.U.E.*)	----- FSS

MISCELLANEOUS:

Utility Pole	●
Utility Pole with Base	⊕
Utility Located Object	○
Utility Traffic Signal Box	⊠
Utility Unknown U/G Line LOS B (S.U.E.*)	----- U/TL
U/G Tank; Water, Gas, Oil	□
Underground Storage Tank, Approx. Loc.	⊕
A/G Tank; Water, Gas, Oil	□
Geoenvironmental Boring	⊕
U/G Test Hole LOS A (S.U.E.*)	○
Abandoned According to Utility Records	AATUR
End of Information	E.O.I.

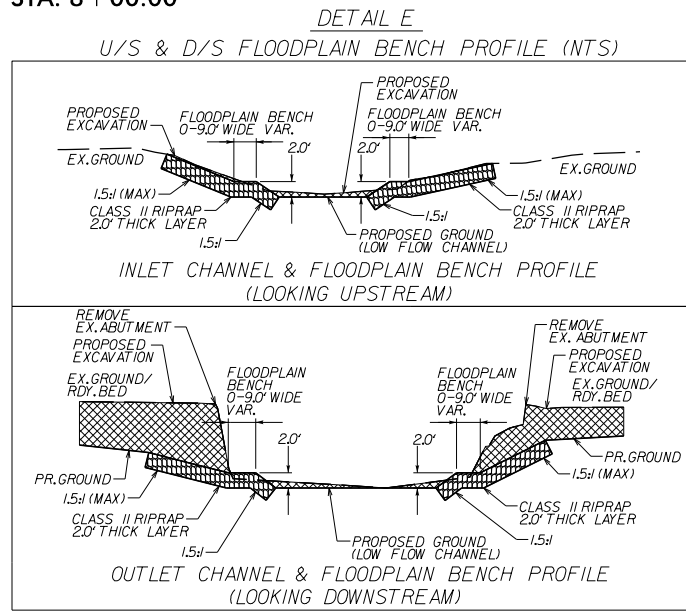


BEGIN TIP PROJECT B-5374
-L- STA. 10 + 32.00

BEGIN CONSTRUCTION
-L- STA. 8 + 00.00

END TIP PROJECT B-5374
-L- STA. 19 + 50.00

END CONSTRUCTION
-L- STA. 20 + 49.03



- NOTES:
- CONTRACTOR SHALL AVOID WETLAND AREA FOR STAGING EQUIPMENT OR MATERIAL. INSTALL SAFETY FENCE ALONG SR 2154 PER EROSION CONTROL PLAN.
 - INSTALL CONSTRUCTION MATTING FOR ANY TEMPORARY IMPACTS TO WETLANDS IF REQUIRED.
 - DO NOT STAGE EQUIPMENT OR MATERIAL WITHIN THE PROPOSED ROW, PDE, OR WETLANDS ON THE PLANS.


PI Sta 9+25.86 Δ = 2° 27' 40.0" (RT) D = 1'16" 23.7" L = 193.30' T = 96.66' R = 4,500.00'	PI Sta 12+41.43 Δ = 2° 47' 32.7" (LT) D = 3' 22' 13.2" L = 82.85' T = 41.43' R = 1,700.00' SE = 03 Runoff = 63'	PI Sta 16+09.67 Δ = 30° 53' 15.8" (RT) D = 8' 57' 08.9" L = 345.02' T = 176.81' R = 640.00' SE = 04 Runoff = 84'	PI Sta 18+29.48 Δ = 7° 22' 54.0" (LT) D = 7' 09' 43.1" L = 103.07' T = 51.61' R = 800.00' SE = 03 Runoff = 63'
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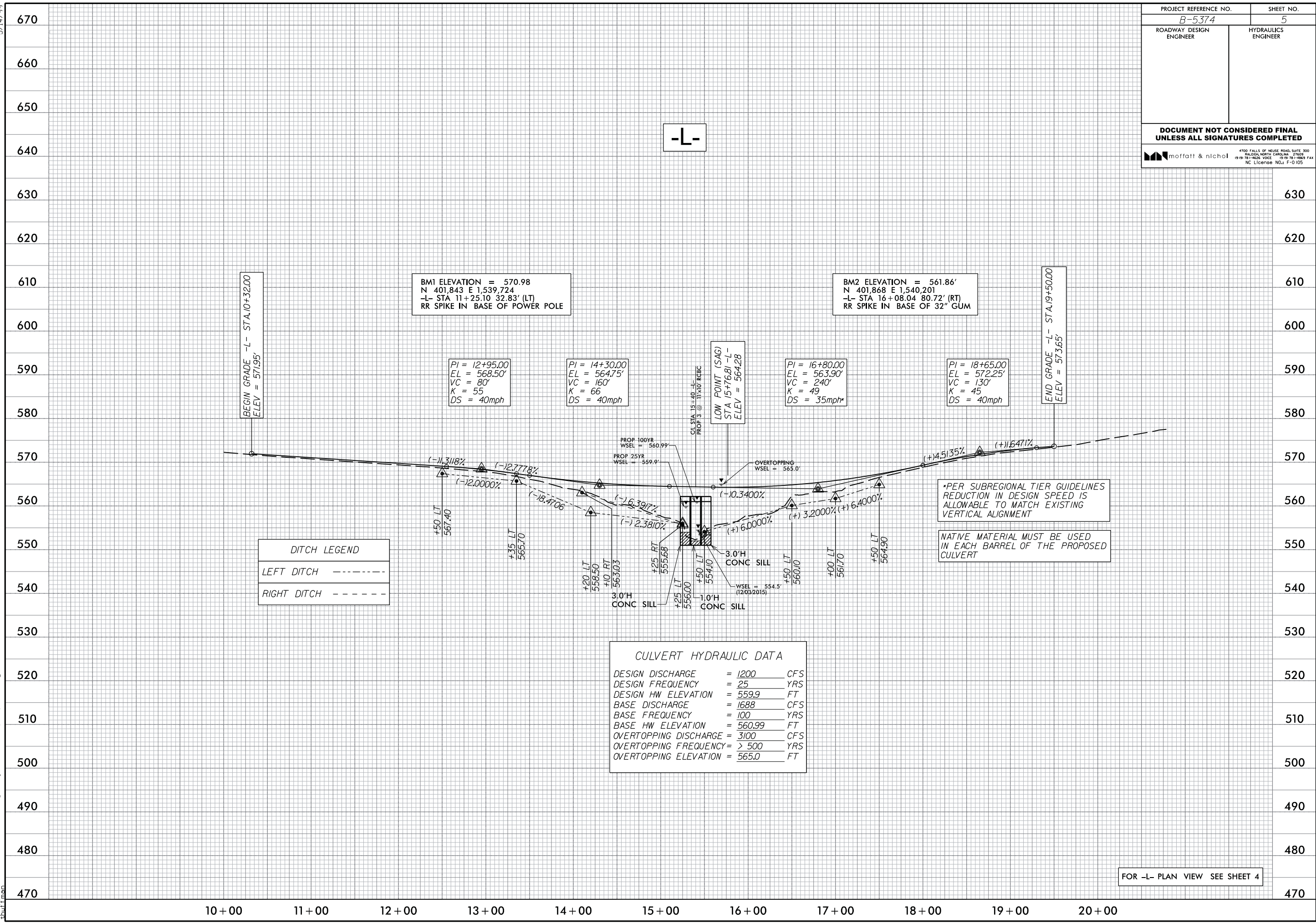


FOR PROFILE SEE SHEET 5
SEE SHEETS C-1 TO C- FOR CULVERT PLANS

REVISIONS
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5/14/99
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PROJECT REFERENCE NO. B-5374	SHEET NO. 5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
 <small>4700 FALLS OF NEUSE ROAD, SUITE 300 RALEIGH, NORTH CAROLINA 27608 (919) 781-4400 FAX (919) 781-4405 NC License No. F-0 105</small>	



-L-

BM1 ELEVATION = 570.98
 N 401,843 E 1,539,724
 -L- STA 11+25.10 32.83' (LT)
 RR SPIKE IN BASE OF POWER POLE

BM2 ELEVATION = 561.86'
 N 401,868 E 1,540,201
 -L- STA 16+08.04 80.72' (RT)
 RR SPIKE IN BASE OF 32" GUM

PI = 12+95.00
 EL = 568.50'
 VC = 80'
 K = 55
 DS = 40mph

PI = 14+30.00
 EL = 564.75'
 VC = 160'
 K = 66
 DS = 40mph

LOW POINT (SAG)
 STA 15+76.81 -L-
 ELEV = 564.28

PI = 16+80.00
 EL = 563.90'
 VC = 240'
 K = 49
 DS = 35mph

PI = 18+65.00
 EL = 572.25'
 VC = 130'
 K = 45
 DS = 40mph

END GRADE -L- STA.19+50.00
 ELEV = 573.65'

BEGIN GRADE -L- STA.10+32.00
 ELEV = 571.95'

DITCH LEGEND

LEFT DITCH	-----
RIGHT DITCH	-----

*PER SUBREGIONAL TIER GUIDELINES
 REDUCTION IN DESIGN SPEED IS
 ALLOWABLE TO MATCH EXISTING
 VERTICAL ALIGNMENT

NATIVE MATERIAL MUST BE USED
 IN EACH BARREL OF THE PROPOSED
 CULVERT

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 1200	CFS
DESIGN FREQUENCY	= 25	YRS
DESIGN HW ELEVATION	= 559.9	FT
BASE DISCHARGE	= 1688	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 560.99	FT
OVERTOPPING DISCHARGE	= 3100	CFS
OVERTOPPING FREQUENCY	= > 500	YRS
OVERTOPPING ELEVATION	= 565.0	FT

FOR -L- PLAN VIEW SEE SHEET 4