STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

April 6, 2017

U.S. Army Corps of Engineers
Raleigh Regulatory Field Office
3331 Heritage Trade Drive, Suite 105
Wake Forest, NC 27587

ATTN: Mr. Eric Alsmeyer
NCDOT Regulatory Coordinator

Subject: **Application for Section 404 Nationwide Permits 13, 23, and 33, Section 401 Water Quality Certification, and Neuse River Riparian Buffer Authorization** for the proposed replacement of Bridge No. 20 over Dial Creek (Lake Michie) on SR1616 (Bahama Road) in Durham County, North Carolina; TIP No. B-4943; Federal Aid Project No. BRZ-1616(10). Debit $270 from WBS 40110.1.1

Dear Sir:

The North Carolina Department of Transportation (NCDOT) proposes to replace the existing 27-foot, single-span bridge No. 20 with an 89-foot, single-span bridge on a new alignment. Traffic will be maintained on the existing bridge during construction of the replacement structure. The replacement of Bridge No. 20 will result in 0.15 acre of fill in surface water, due predominately to the shift in the causeway. An additional 0.01 acre of fill and mechanized clearing in a wetland will be impacted due to the causeway realignment. There will be 57 linear feet of bank stabilization to the jurisdictional stream portion of Dial Creek for the bridge replacement. Impacts to Neuse River Riparian buffers will result in disturbance of 10,101 square feet in zone 1 and 4,836 square feet in zone 2.

Please see enclosed copies of the Pre-Construction Notification (PCN), permit drawings, stormwater management plan and design plans for the above referenced project. A Programmatic Categorical Exclusion (PCE) was completed in April 2016, and distributed shortly after. Additional copies are available at the NCDOT website: http://207.4.62.65/PDEA/EnvironmentalDocs/

This project calls for a letting date of July 18, 2017 and a review date of May 30, 2017.

Regulatory Approvals

Section 404 Permit: We anticipate that the bridge replacement, including all approach work will be authorized under Section 404 Nationwide Permits 13, 23, and 33 in accordance with Section 404 of the Clean Water Act (33 U.S.C. 1344).

Section 401 Permit: We anticipate 401 General Certification numbers 4087, 4093, and 4094 will apply to this project. NCDOT is requesting written concurrence from the North Carolina Department of

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
NATURAL ENVIRONMENT SECTION
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

Environmental Quality, Division of Water Resources. NCDOT also requests the issuance of a Neuse River Riparian Buffer Authorization for this project.

A copy of this permit application will be posted on the NCDOT Website at https://connect.ncdot.gov/resources/Environmental/Pages/default.aspx, under *Quick Links > Permit Applications*. Should you have any questions regarding this information, please contact Jason Dilday at (919) 707-6111 or jldilday@ncdot.gov.

Sincerely,

for Philip S. Harris III, P.E., C.P.M.
Natural Environment Section Head

cc: NCDOT Permit Application Standard Distribution List

Office Use Only:
Corps action ID no. _____
DWQ project no. _____
Form Version 1.3 Dec 10 2008

Pre-Construction Notification (PCN) Form

A. Applicant Information

1. Processing

1a. Type(s) of approval sought from the Corps:	☒ Section 404 Permit	☐ Section 10 Permit
1b. Specify Nationwide Permit (NWP) number: 13 23 33 or General Permit (GP) number:		
1c. Has the NWP or GP number been verified by the Corps?	☐ Yes	☒ No

1d. Type(s) of approval sought from the DWQ (check all that apply):

☒ 401 Water Quality Certification – Regular ☐ Non-404 Jurisdictional General Permit

☐ 401 Water Quality Certification – Express ☒ Riparian Buffer Authorization

1e. Is this notification solely for the record because written approval is not required?	For the record only for DWQ 401 Certification: ☐ Yes ☒ No	For the record only for Corps Permit: ☐ Yes ☒ No
1f. 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
1g. Is the project located in any of NC's twenty coastal counties. If yes, answer 1h below.		☐ Yes ☒ No
1h. Is the project located within a NC DCM Area of Environmental Concern (AEC)?		☐ Yes ☒ No

2. Project Information

2a. Name of project:	Replace Bridge No. 20 on SR 1616 (Bahama Rd.) over Dial Creek (Lake Michie)
2b. County:	Durham
2c. Nearest municipality / town:	Bahama
2d. Subdivision name:	*not applicable*
2e. NCDOT only, T.I.P. or state project no:	B-4943

3. Owner Information

3a. Name(s) on Recorded Deed:	North Carolina Department of Transportation
3b. Deed Book and Page No.	*not applicable*
3c. Responsible Party (for LLC if applicable):	*not applicable*
3d. Street address:	1598 Mail Service Center
3e. City, state, zip:	Raleigh, NC 27699-1598
3f. Telephone no.:	(919) 707-6111
3g. Fax no.:	(919) 212-5785
3h. Email address:	jldilday@ncdot.gov

4. Applicant Information (if different from owner)	
4a. Applicant is:	☐ Agent ☐ Other, specify:
4b. Name:	*not applicable*
4c. Business name (if applicable):	
4d. Street address:	
4e. City, state, zip:	
4f. Telephone no.:	
4g. Fax no.:	
4h. Email address:	
5. Agent/Consultant Information (if applicable)	
5a. Name:	*not applicable*
5b. Business name (if applicable):	
5c. Street address:	
5d. City, state, zip:	
5e. Telephone no.:	
5f. Fax no.:	
5g. Email address:	

B. Project Information and Prior Project History	
1. Property Identification	
1a. Property identification no. (tax PIN or parcel ID):	*not applicable*
1b. Site coordinates (in decimal degrees):	Latitude: 36.1726 (DD.DDDDDD) Longitude: -78.8584 (-DD.DDDDDD)
1c. Property size:	3.0 acres
2. Surface Waters	
2a. Name of nearest body of water (stream, river, etc.) to proposed project:	Dial Creek (Lake Michie)
2b. Water Quality Classification of nearest receiving water:	WS-III; NSW, CA
2c. River basin:	Neuse
3. Project Description	
3a. Describe the existing conditions on the site and the general land use in the vicinity of the project at the time of this application: Land use is primarily residential development, forested land and lake front recreation areas.	
3b. List the total estimated acreage of all existing wetlands on the property: 0.3	
3c. List the total estimated linear feet of all existing streams (intermittent and perennial) on the property: 250	
3d. Explain the purpose of the proposed project: To replace a structurally deficient and functionally obsolete bridge.	
3e. Describe the overall project in detail, including the type of equipment to be used: The project involves replacing the existing single span, 27-foot bridge with a single span, 89-foot bridge on a slightly shifted alignment. Traffic will be maintained on the existing bridge during construction of the new structure. Standard road building equipment, such as trucks, dozers, and cranes will be used.	
4. Jurisdictional Determinations	
4a. Have jurisdictional wetland or stream determinations by the Corps or State been requested or obtained for this property / project (including all prior phases) in the past? Comments:	☒ Yes ☐ No ☐ Unknown
4b. If the Corps made the jurisdictional determination, what type of determination was made?	☐ Preliminary ☒ Final
4c. If yes, who delineated the jurisdictional areas? Name (if known): James Pflaum	Agency/Consultant Company: NCDOT Other:
4d. If yes, list the dates of the Corps jurisdictional determinations or State determinations and attach documentation. Action ID 2009-01510 issued August 13, 2009, expired August 13, 2014	
5. Project History	
5a. Have permits or certifications been requested or obtained for this project (including all prior phases) in the past?	☐ Yes ☒ No ☐ Unknown
5b. If yes, explain in detail according to “help file” instructions.	
6. Future Project Plans	
6a. Is this a phased project?	☐ Yes ☒ No
6b. If yes, explain.	

C. Proposed Impacts Inventory

1. Impacts Summary

1a. Which sections were completed below for 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. Wetland impact number – Permanent (P) or Temporary (T)	2b. Type of impact	2c. Type of wetland (if known)	2d. Forested	2e. Type of jurisdiction (Corps - 404, 10 DWQ – non-404, other)	2f. Area of impact (acres)
Site 1 ☒ P ☐ T	Fill in Wetland	Riparian	☐ Yes ☒ No	☒ Corps ☐ DWQ	<0.01
Site 1 ☒ P ☐ T	Mechanized Clearing	Riparian	☐ Yes ☒ No	☒ Corps ☐ DWQ	0.01
Site 1 ☐ P ☐ T			☐ Yes ☐ No	☐ Corps ☐ DWQ	
Site 1 ☐ P ☐ T			☐ Yes ☐ No	☐ Corps ☐ DWQ	
Site 1 ☐ P ☐ T			☐ Yes ☐ No	☐ Corps ☐ DWQ	
Site 1 ☐ P ☐ T			☐ Yes ☐ No	☐ Corps ☐ DWQ	
				2g. **Total wetland impacts**	0.01 Permanent 0 Temporary

2h. Comments: See Wetland Permit Impact Summary sheet for details.

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. Stream impact number - Permanent (P) or Temporary (T)	3b. Type of impact	3c. Stream name	3d. Perennial (PER) or intermittent (INT)?	3e. Type of jurisdiction (Corps - 404, 10 DWQ – non-404, other)	3f. Average stream width (feet)	3g. Impact length (linear feet)
Site 1 ☒ P ☐ T	Bank Stabilization	Dial Creek	☒ PER ☐ INT	☒ Corps ☒ DWQ	30	57
Site 1 ☐ P ☐ T			☐ PER ☐ INT	☐ Corps ☐ DWQ		
Site 1 ☐ P ☐ T			☐ PER ☐ INT	☐ Corps ☐ DWQ		
Site 1 ☐ P ☐ T			☐ PER ☐ INT	☐ Corps ☐ DWQ		
Site 1 ☐ P ☐ T			☐ PER ☐ INT	☐ Corps ☐ DWQ		
Site 1 ☐ P ☐ T			☐ PER ☐ INT	☐ Corps ☐ DWQ		
					3h. **Total stream and tributary impacts**	57 lf permanent (<0.01 ac)

3i. Comments: The channelized portion of the lake where the existing causeway and bridge are located was determined to be the jurisdictional portion of Dial Creek, all other areas were deemed an open water feature.

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.

4a. Open water impact number – Permanent (P) or Temporary (T)	4b. Name of waterbody (if applicable)	4c. Type of impact	4d. Waterbody type	4e. Area of impact (acres)
O1 ☒ P ☐ T	Dial Creek	Fill in Surface Water	Lake	<0.01
O1 ☐ P ☒ T	Dial Creek	Fill in Surface Water	Lake	<0.01
O1 ☒ P ☐ T	Dial Creek	Roadway embankment	Lake	0.15
O1 ☐ P ☒ T	Dial Creek	Roadway embankment	Lake	0.02
			4f. Total open water impacts	0.15 ac. Permanent 0.02 ac. Temporary

4g. Comments:

5. Pond or Lake Construction

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

5a. Pond ID number	5b. Proposed use or purpose of pond	5c. Wetland Impacts (acres)			5d. Stream Impacts (feet)			5e. Upland (acres)
		Flooded	Filled	Excavated	Flooded	Filled	Excavated	Flooded
P1								
P2								
	5f. Total							

5g. Comments:

5h. Is a dam high hazard permit required?	☐ Yes ☐ No If yes, permit ID no:
5i. Expected pond surface area (acres):	
5j. Size of pond watershed (acres):	
5k. Method of construction:	

6. Buffer Impacts (for DWQ)

If project will impact a protected riparian buffer, then complete the chart below. If yes, then individually list all buffer impacts below. If any impacts require mitigation, then you **MUST** fill out Section D of this form.

6a. Project is in which protected basin?			☒ Neuse ☐ Catawba ☐ Tar-Pamlico ☐ Randleman ☐ Other: Jordan		
6b. Buffer impact number – Permanent (P) or Temporary (T)	6c. Reason for impact	6d. Stream name	6e. Buffer mitigation required?	6f. Zone 1 impact (square feet)	6g. Zone 2 impact (square feet)
B1 ☒ P ☐ T	Roadway embankment	Dial Creek	☐ Yes ☒ No	7,321	4,465
B1 ☒ P ☐ T	Bridge	Dial Creek	☐ Yes ☒ No	2,680	371
B3 ☐ P ☐ T			☐ Yes ☐ No		
			6h. **Total buffer impacts**	10,101	4,836
6i. Comments: Impacts to wetlands in buffers total 612 sq ft. in zone 1 and 94 sq ft in zone 2.					

D. Impact Justification and Mitigation

1. Avoidance and Minimization

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

NCDOT Design Standards in Sensitive Watersheds will be employed. See Stormwater Management Plans for additional measures.

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

The proposed bridge is 62 feet longer than the existing bridge; the replacement bridge will be a single span, so no bents in the water; the new bridge will have no deck drains or direct discharge to Dial Creek. Fill slopes of 1.5:1 will be utilized in most of the jurisdictional areas. Traffic will be maintained on the existing bridge during construction.

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 If no, explain: Compensatory mitigation is not proposed due to minimal jurisdictional impacts.
2b. If yes, mitigation is required by (check all that apply):	☐ DWQ ☐ Corps
2c. If yes, which mitigation option will be used for this project?	☐ Mitigation bank ☐ Payment to in-lieu fee program ☐ Permittee Responsible Mitigation

3. Complete if Using a Mitigation Bank

3a. Name of Mitigation Bank: not applicable

3b. Credits Purchased (attach receipt and letter)	Type	Quantity

3c. Comments:	
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
4c. If using stream mitigation, stream temperature:	☐ warm ☐ cool ☐ cold
4d. Buffer mitigation requested (DWQ only):	square feet
4e. Riparian wetland mitigation requested:	acres
4f. Non-riparian wetland mitigation requested:	acres
4g. Coastal (tidal) wetland mitigation requested:	acres
4h. Comments:	
5. Complete if Using a Permittee Responsible Mitigation Plan	
5a. If using a permittee responsible mitigation plan, provide a description of the proposed mitigation plan.	
6. Buffer Mitigation (State Regulated Riparian Buffer Rules) – required by DWQ	
6a. Will the project result in an impact within a protected riparian buffer that requires buffer mitigation?	☐ Yes ☒ No
6b. If yes, then identify the square feet of impact to each zone of the riparian buffer that requires mitigation. Calculate the amount of mitigation required.	

Zone	6c. Reason for impact	6d. Total impact (square feet)	Multiplier	6e. Required mitigation (square feet)
Zone 1			3 (2 for Catawba)	
Zone 2			1.5	
	6f. **Total buffer mitigation required:**			

6g. If buffer mitigation is required, discuss what type of mitigation is proposed (e.g., payment to private mitigation bank, permittee responsible riparian buffer restoration, payment into an approved in-lieu fee fund).
6h. Comments:

E. Stormwater Management and Diffuse Flow Plan (required by DWQ)	
1. Diffuse Flow Plan	
1a. Does the project include or is it adjacent to protected riparian buffers identified within one of the NC Riparian Buffer Protection Rules?	☒ Yes ☐ No
1b. If yes, then is a diffuse flow plan included? If no, explain why. Comments: See attached permit drawings.	☒ Yes ☐ No
2. Stormwater Management Plan	
2a. What is the overall percent imperviousness of this project?	N/A
2b. Does this project require a Stormwater Management Plan?	☒ Yes ☐ No
2c. If this project DOES NOT require a Stormwater Management Plan, explain why:	
2d. If this project DOES require a Stormwater Management Plan, then provide a brief, narrative description of the plan: See attached permit drawings.	
2e. Who will be responsible for the review of the Stormwater Management Plan?	☐ Certified Local Government ☐ DWQ Stormwater Program ☒ DWQ 401 Unit
3. Certified Local Government Stormwater Review	
3a. In which local government's jurisdiction is this project?	not applicable
3b. Which of the following locally-implemented stormwater management programs apply (check all that apply):	☐ Phase II ☐ NSW ☐ USMP ☐ Water Supply Watershed ☐ Other:
3c. Has the approved Stormwater Management Plan with proof of approval been attached?	☐ Yes ☐ No
4. DWQ Stormwater Program Review	
4a. Which of the following state-implemented stormwater management programs apply (check all that apply):	☐ Coastal counties ☐ HQW ☐ ORW ☐ Session Law 2006-246 ☐ Other:
4b. Has the approved Stormwater Management Plan with proof of approval been attached?	☐ Yes ☐ No N/A
5. DWQ 401 Unit Stormwater Review	
5a. Does the Stormwater Management Plan meet the appropriate requirements?	☐ Yes ☐ No N/A
5b. Have all of the 401 Unit submittal requirements been met?	☐ Yes ☐ No N/A

F. Supplementary Information		
1. Environmental Documentation (DWQ Requirement)		
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.) Comments:	☒ Yes	☐ No
2. Violations (DWQ Requirement)		
2a. Is the site in violation of DWQ Wetland Rules (15A NCAC 2H .0500), Isolated Wetland Rules (15A NCAC 2H .1300), DWQ 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 (DWQ 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 "yes" to the above, submit a qualitative or quantitative cumulative impact analysis in accordance with the most recent DWQ policy. 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 (DWQ Requirement)		
4a. Clearly detail the ultimate treatment methods and disposition (non-discharge or discharge) of wastewater generated from the proposed project, or available capacity of the subject facility. not applicable		

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.	☒ Raleigh ☐ Asheville	
5d. What data sources did you use to determine whether your site would impact Endangered Species or Designated Critical Habitat? N.C. Natural Heritage Heritage Program database; USFWS-Raleigh Field Office website; biological surveys for protected species listed for Durham County, which includes smooth coneflower and Michaux's sumac. The species received a Biological Conclusions of "No Effect", however habitat was present. Surveys for the species were conducted on 5/27/15 resulted in no specimens being found. No nesting habitat for bald eagle is present in the vicinity of the project. A programmatic biological opinion (PBO) has been issued for the northern long-eared bat for North Carolina. The PBO covers projects in Divisions 1-8. The programmatic determination for NLEB for this project is "May Affect, Likely to Adversely Affect".		
6. Essential Fish Habitat (Corps Requirement)		
6a. Will this project occur in or near an area designated as essential fish habitat?	☐ Yes	☒ No
6b. What data sources did you use to determine whether your site would impact Essential Fish Habitat? NMFS County Index		
7. Historic or Prehistoric Cultural Resources (Corps Requirement)		
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		
8. Flood Zone Designation (Corps Requirement)		
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		

for Philip S. Harris III, P.E., C.P.M. Applicant/Agent's Printed Name	Colin Mellor Digitally signed by Colin Mellor DN: cn=Colin Mellor, o=NCDOT, ou=NES, email=cmellor@ncdot.gov, c=US Date: 2017.04.06 12:00:34 -04'00' Applicant/Agent's Signature (Agent's signature is valid only if an authorization letter from the applicant is provided.)	04-06-2017 Date

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.05; Released April 2016)

WBS Element: 40110.1.1 **TIP No.:** B-4943 **County(ies):** Durham

General Project Information

WBS Element:	40110.1.1	**TIP Number:**	B-4943	**Project Type:**	Bridge Replacement	**Date:**	5/11/2016
NCDOT Contact:	William Elam			**Contractor / Designer:**	Brandon Barham, PE - Ecological Engineering		
Address:	1020 Birch Ridge Dr Raleigh, NC 27610			**Address:**	1151 SE Cary Parkway Suite 101 Cary, NC 27518		
Phone:	919-707-6718			**Phone:**	919-557-0929		
Email:	belam@ncdot.gov			**Email:**	bbarham@ecologicaleng.com		
City/Town:	Durham			**County(ies):**	Durham		
River Basin(s):	Neuse			**CAMA County?**	No		
Wetlands within Project Limits?	Yes						

Project Description

Project Length (lin. miles or feet):	0.164 Miles	**Surrounding Land Use:**	Residential development, forested land and lake front recreational areas

	Proposed Project	**Existing Site**
Project Built-Upon Area (ac.)	0.7 ac.	0.5 ac.
Typical Cross Section Description:	2 - 11 ft lanes, with variable shoulders (minimum of 4 ft and 9 ft shoulders at guardrail sections)	2 - 12' ft lanes with 1' shoulders
Annual Avg Daily Traffic (veh/hr/day):	Design/Future: 3585 Year: 2037	Existing: 2738 Year: 2017

General Project Narrative: (Description of Minimization of Water Quality Impacts)

State Project B-4943 involves the replacement of existing NCDOT Bridge #310020 on SR 1616 over Dial Creek. Bridge #310020 consists of 1@25.7' timber floor on I-beams with RC vertical abutments. The proposed bridge at #310020 will be 1@85' 33" box beam with 4'-0" caps and sloping abutments. The roadway will be realigned for the placement of the proposed bridge. The proposed bridge will provide more hydraulic opening that the existing bridge. One stormwater outfall is proposed with Rip Rap pad to dissipate energy. No deck drains are required for this bridge. Minimization and avoidance measures incorporated into the design include elimination of direct discharge, increased buffer treatment of discharges, retention of existing bridge abutments to minimize stream impacts and retain stability. Utilized open shoulder design for vegetative shoulder section to obtain water treatment.

Waterbody Information

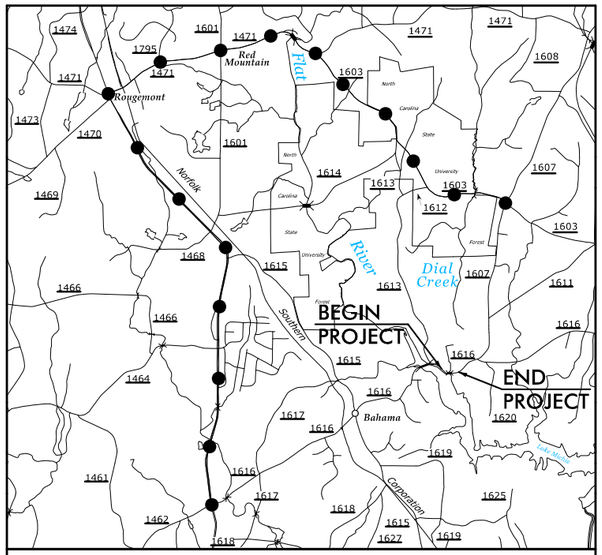
Surface Water Body (1):	Dial Creek	**NCDWR Stream Index No.:**	27-3-6-(2)
NCDWR Surface Water Classification for Water Body	**Primary Classification:**	Water Supply III (WS-III)	
	Supplemental Classification:	Nutrient Sensitive Waters (NSW)	
Other Stream Classification:	CA		
Impairments:	NA		
Aquatic T&E Species?	NA	Comments:	
NRTR Stream ID:		**Buffer Rules in Effect:**	Neuse

Project Includes Bridge Spanning Water Body?	Yes	**Deck Drains Discharge Over Buffer?**	No	**Dissipator Pads Provided in Buffer?**	Yes
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)					

09/08/99

T.I.P PROJECT: B-4943

CONTRACT: 203987



See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Symbols

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

DURHAM COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4943	1	

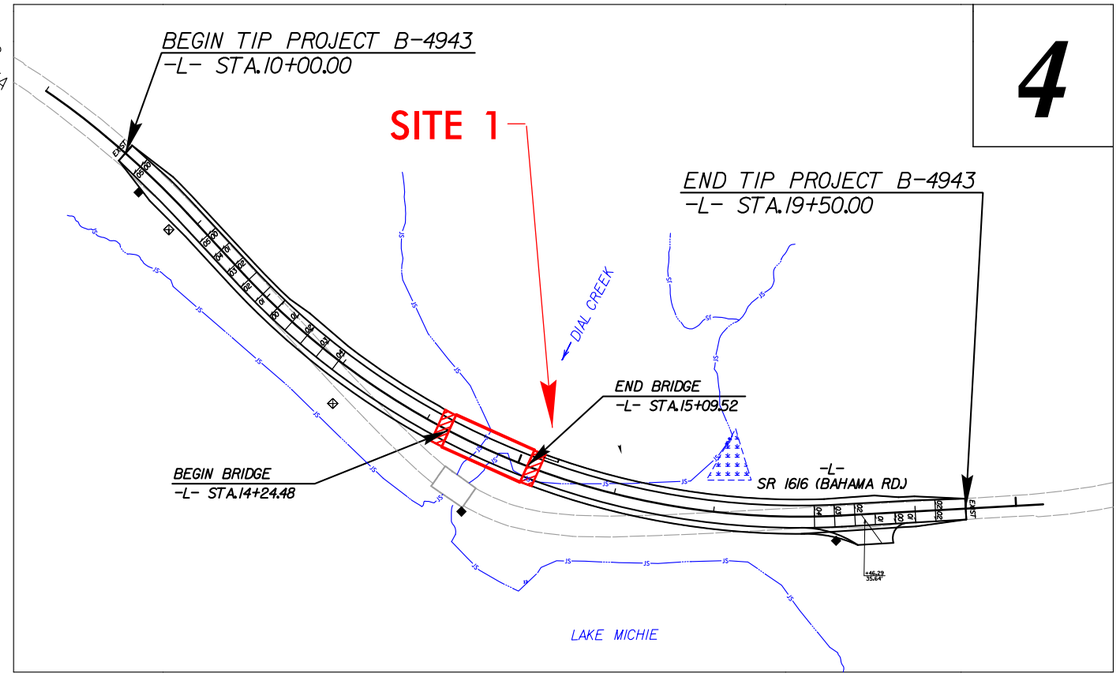
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
40110.1.1	BRZ-1616(10)	PE
40110.2.1	BRZ-1616(10)	ROW & UTILITY
40110.3.1	BRZ-1616(10)	CONSTRUCTION

PERMIT DRAWING
SHEET 1 OF 10

LOCATION: ***BRIDGE NO. 20 OVER DIAL CREEK ON SR 1616 (BAHAMA RD.)***

TYPE OF WORK: ***GRADING, DRAINAGE, PAVING, AND STRUCTURE***

WETLAND AND SURFACE WATER IMPACTS PERMIT



NAD 83/NSRS 2007

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): 10 5 0 10 20

DESIGN DATA

2017 ADT = 2738 VPD
2037 ADT = 3585 VPD
K = 10%
D = 85%
T = 6% *
V = 40 MPH
* (TTST 1% + DUAL 5%)
FUNC. CLASS. = RURAL MINOR COLLECTOR
SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4943	=	0.164 mi.
LENGTH STRUCTURES TIP PROJECT B-4943	=	0.016 mi.
TOTAL LENGTH TIP PROJECT B-4943	=	0.180 mi.

Prepared in the Offices of:

STEWART ECOLOGICAL ENGINEERING
421 FAYETTEVILLE ST, STE 400 RALEIGH, NC 27601 T 919.380.8750
firm License # C-1051 www.stewartinc.com PROJECT # 2015512.00
NC FIRM LICENSE No: F-1148 1151 SW Cary Parkway, Suite 101 Cary, NC 27518 (919) 557-0929

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
DECEMBER 9, 2016

LETTING DATE:
JULY 18, 2017

ANDY YOUNG, PE
PROJECT ENGINEER

MICHAEL BURNS, EI
PROJECT DESIGN ENGINEER

GARY R. LOVERING, PE
NCDOT CONTACT

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION

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brandonbarham

PROJECT REFERENCE NO.	SHEET NO.
B-4943	4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART

ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

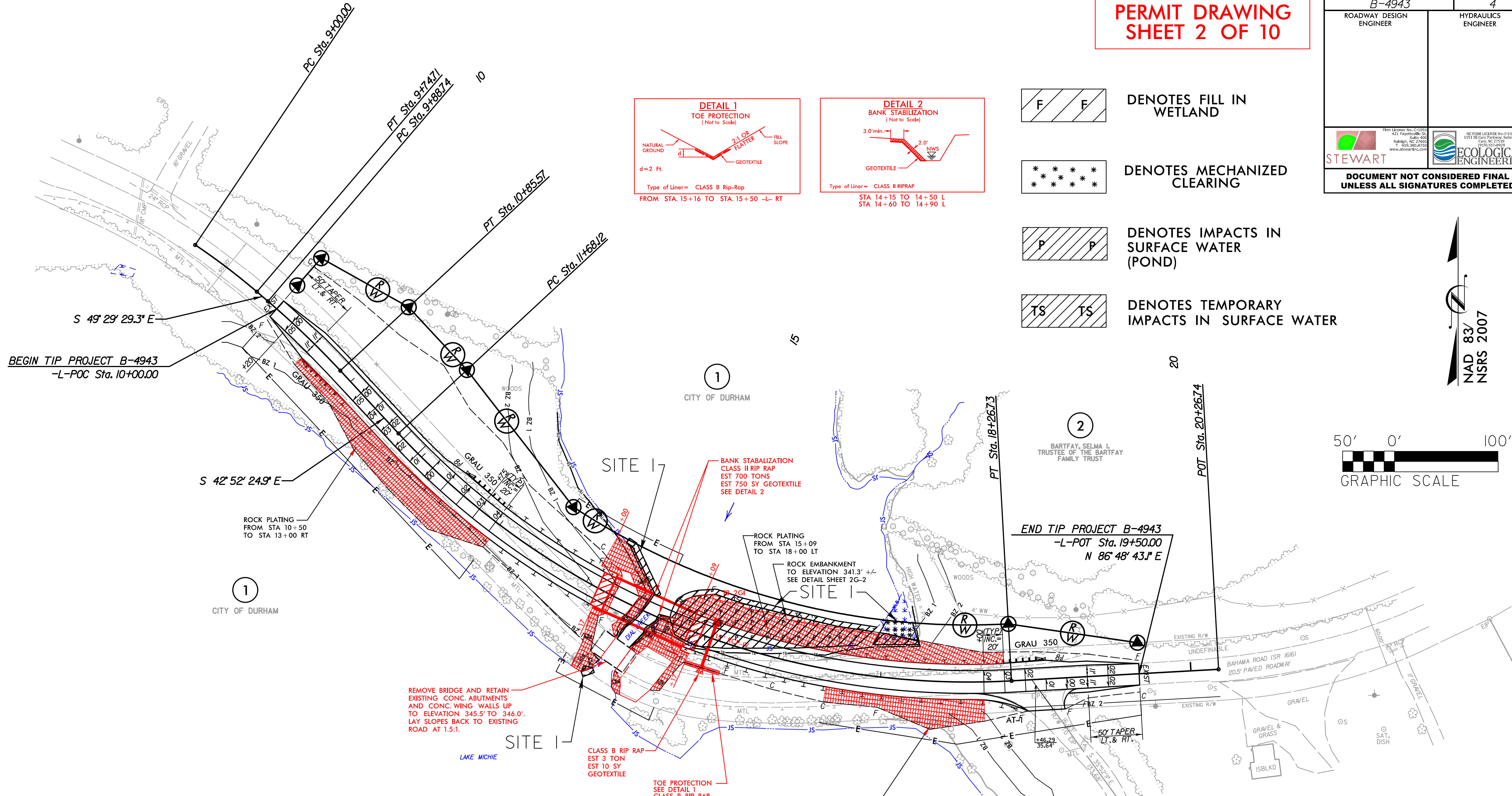
PERMIT DRAWING SHEET 2 OF 10

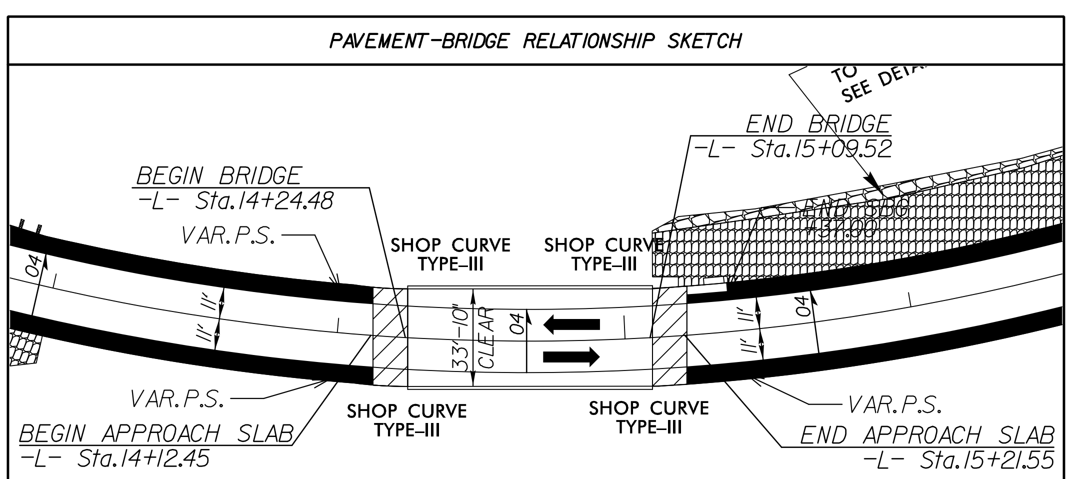
F F — DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

P P — DENOTES IMPACTS IN SURFACE WATER (POND)

TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER





FOR -L- PROFILE, SEE SHEET 5

FOR STRUCTURE PLANS, SEE SHEETS S-1 THRU S-?

REVISIONS

8/17/99

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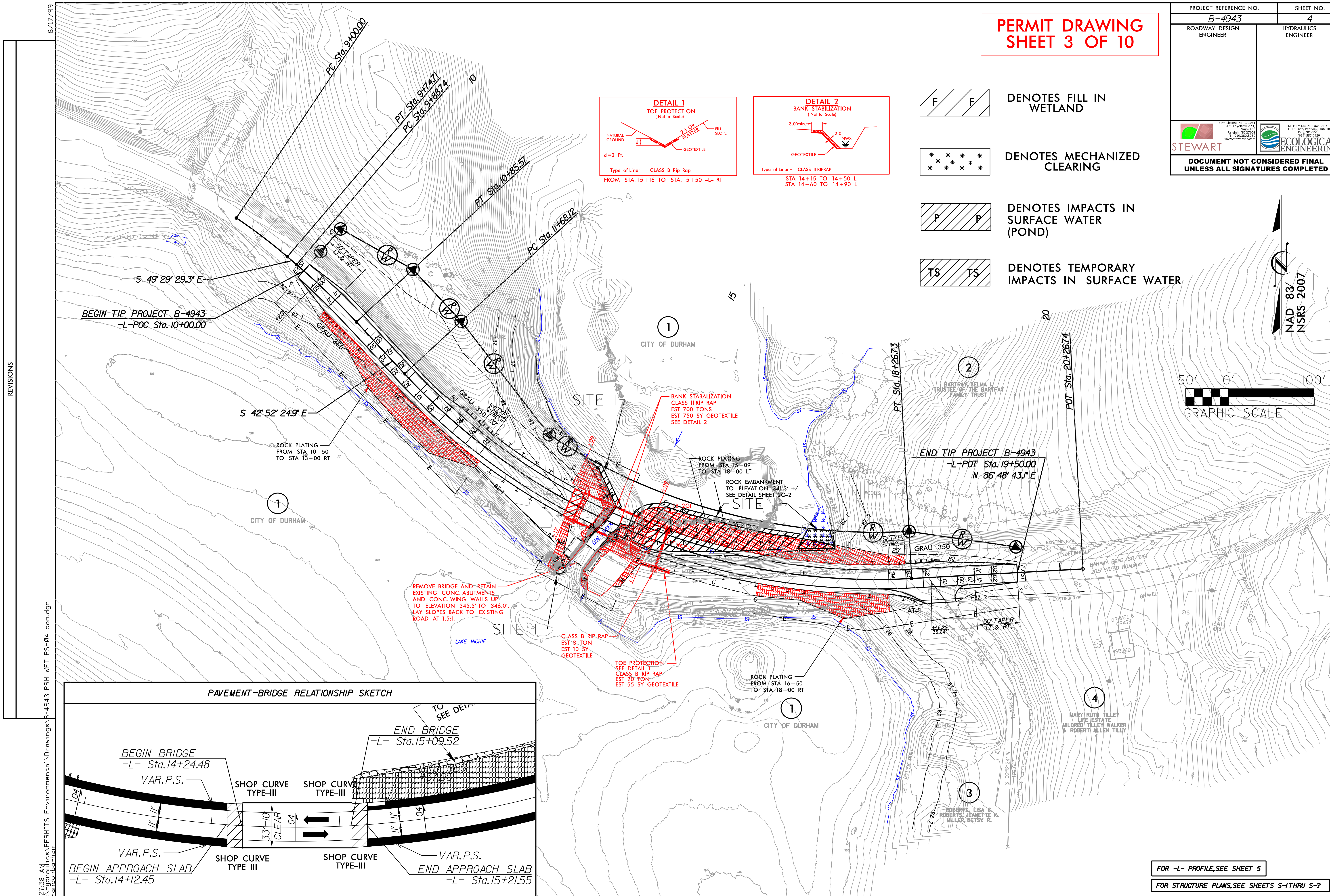
PERMIT DRAWING
SHEET 3 OF 10
PROJECT REFERENCE NO. B-4943
SHEET NO. 4
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
STEWART
ECOLOGICAL ENGINEERING
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
DETAIL 1
TOE PROTECTION
(Not to Scale)
NATURAL GROUND
2:1 OR FLATTER
FILL SLOPE
GEOTEXTILE
d=2 Ft.
Type of Liner= CLASS B Rip-Rap
FROM STA. 15+16 TO STA. 15+50 -L- RT
DETAIL 2
BANK STABILIZATION
(Not to Scale)
3.0' min.
2.0'
NWS
GEOTEXTILE
Type of Liner= CLASS II RIPRAP
STA 14+15 TO 14+50 L
STA 14+60 TO 14+90 L
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES IMPACTS IN SURFACE WATER (POND)
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
NAD 83/ NSRS 2007
50' 0' 100'
GRAPHIC SCALE
PC Sta. 9+00.00
PT Sta. 9+74.71
PC Sta. 9+88.74
PT Sta. 10+85.57
PC Sta. 11+68.12
PT Sta. 18+26.73
POT Sta. 20+26.74
S 49° 29' 29.3" E
BEGIN TIP PROJECT B-4943
-L-POC Sta. 10+00.00
S 42° 52' 24.9" E
ROCK PLATING FROM STA 10+50 TO STA 13+00 RT
CITY OF DURHAM
SITE 1
BANK STABALIZATION CLASS II RIP RAP EST 700 TONS EST 750 SY GEOTEXTILE SEE DETAIL 2
ROCK PLATING FROM STA 15+09 TO STA 18+00 LT
ROCK EMBANKMENT TO ELEVATION 341.3' +/- SEE DETAIL SHEET 2G-2
END TIP PROJECT B-4943
-L-POT Sta. 19+50.00
N 86° 48' 43.1" E
BARTFAY, SELMA L TRUSTEE OF THE BARTFAY FAMILY TRUST
GRAU 350
REMOVE BRIDGE AND RETAIN EXISTING CONC. ABUTMENTS AND CONC. WING WALLS UP TO ELEVATION 345.5' TO 346.0'. LAY SLOPES BACK TO EXISTING ROAD AT 1.5:1.
LAKE MICHIE
CLASS B RIP RAP EST 3 TON EST 10 SY GEOTEXTILE
TOE PROTECTION SEE DETAIL 1 CLASS B RIP RAP EST 20 TON EST 55 SY GEOTEXTILE
ROCK PLATING FROM STA 16+50 TO STA 18+00 RT
BAHAMA ROAD (SR 1616)
50' TAPER LT. & RT.
MARY RUTH TILLEY LIFE ESTATE MILDRED TILLEY WALKER & ROBERT ALLEN TILLY
ROBERTS, LISA G. ROBERTS, JEANETTE K. MILLER, BETSY R.
PAVEMENT-BRIDGE RELATIONSHIP SKETCH
BEGIN BRIDGE -L- Sta.14+24.48
END BRIDGE -L- Sta.15+09.52
VAR.P.S.
SHOP CURVE TYPE-III
33'-10" CLEAR
BEGIN APPROACH SLAB -L- Sta.14+12.45
END APPROACH SLAB -L- Sta.15+21.55
FOR -L- PROFILE, SEE SHEET 5
FOR STRUCTURE PLANS, SEE SHEETS S-1 THRU S-?
REVISIONS
8/17/99
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PROJECT REFERENCE NO.	SHEET NO.
B-4943	5

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

STEWART — Firm License No. C-1051, 421 Fayetteville St, Suite 400, Raleigh, NC 27601, T 919.380.8750, www.stewartinc.com

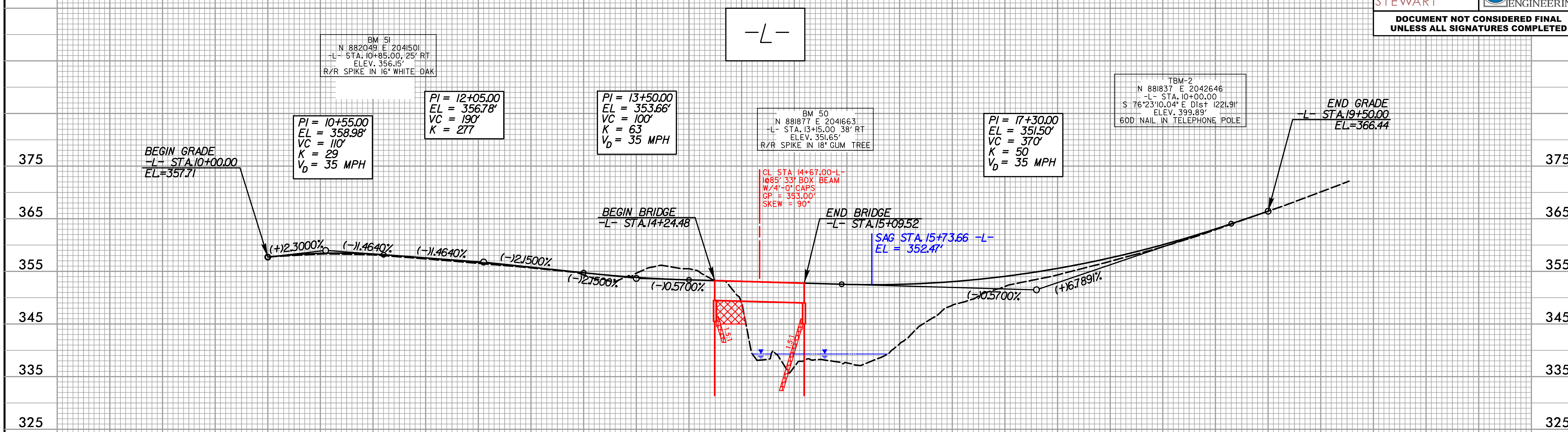
ECOLOGICAL ENGINEERING — NC FIRM LICENSE No: F-1148, 1151 SE Cary Parkway, Suite 101, Cary, NC 27518, (919) 557-0929

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 4 OF 10

5/28/99

REVISIONS



9 10 11 12 13 14 15 16 17 18 19 20 21

BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	= 1400	CFS
DESIGN FREQUENCY	= 25	YR
DESIGN HW ELEVATION	= 346.7	FT
BASE DISCHARGE	= 2000	CFS
BASE FREQUENCY	= 100	YR
BASE HW ELEVATION	= 348.67	FT
OVERTOPPING DISCHARGE	= 4349	CFS
OVERTOPPING FREQUENCY	= 500+	YR
OVERTOPPING ELEVATION	= 352.91	FT
DATE OF SURVEY	= 6/2/2015	
W.S. ELEVATION AT DATE OF SURVEY	= 339.3	FT

FOR -L- PLAN VIEW, SEE SHEET 4

FOR STRUCTURE PLANS, SEE S-1 THRU S-?

9:27:43 AM
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brandonbarham

PROJECT REFERENCE NO.	SHEET NO.
B-4943	4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART

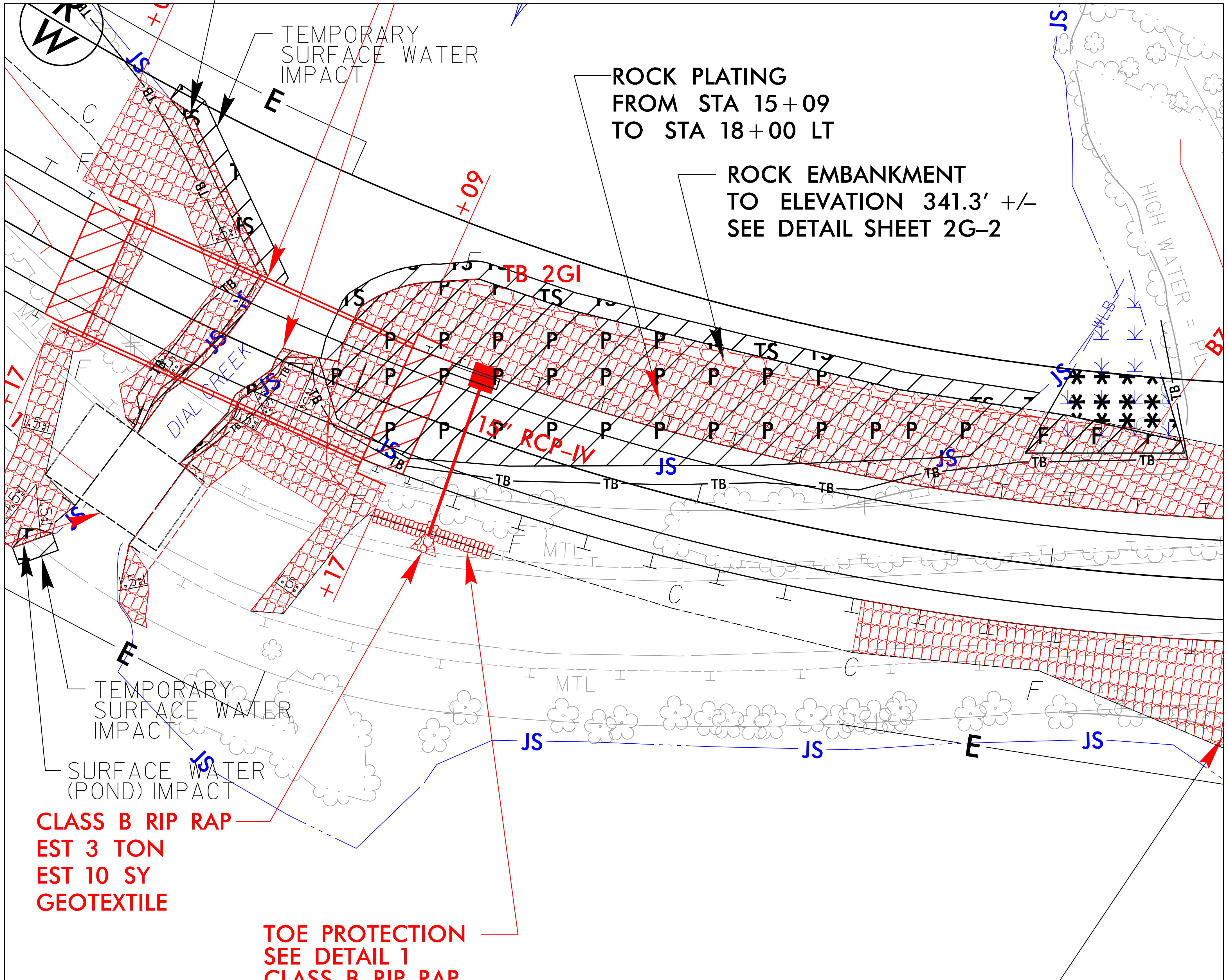
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 5 OF 10

SITE 1

SURFACE WATER (POND) IMPACT



15' 0' 30'
GRAPHIC SCALE

NAD 83/NSRS 2007

Symbol	Meaning
F / F	DENOTES FILL IN WETLAND
* * *	DENOTES MECHANIZED CLEARING
P / P	DENOTES IMPACTS IN SURFACE WATER (POND)
TS / TS	DENOTES TEMPORARY IMPACTS IN SURFACE WATER

REVISIONS

8/17/99

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brandonbarham

PROJECT REFERENCE NO. B-4943 | SHEET NO. 4

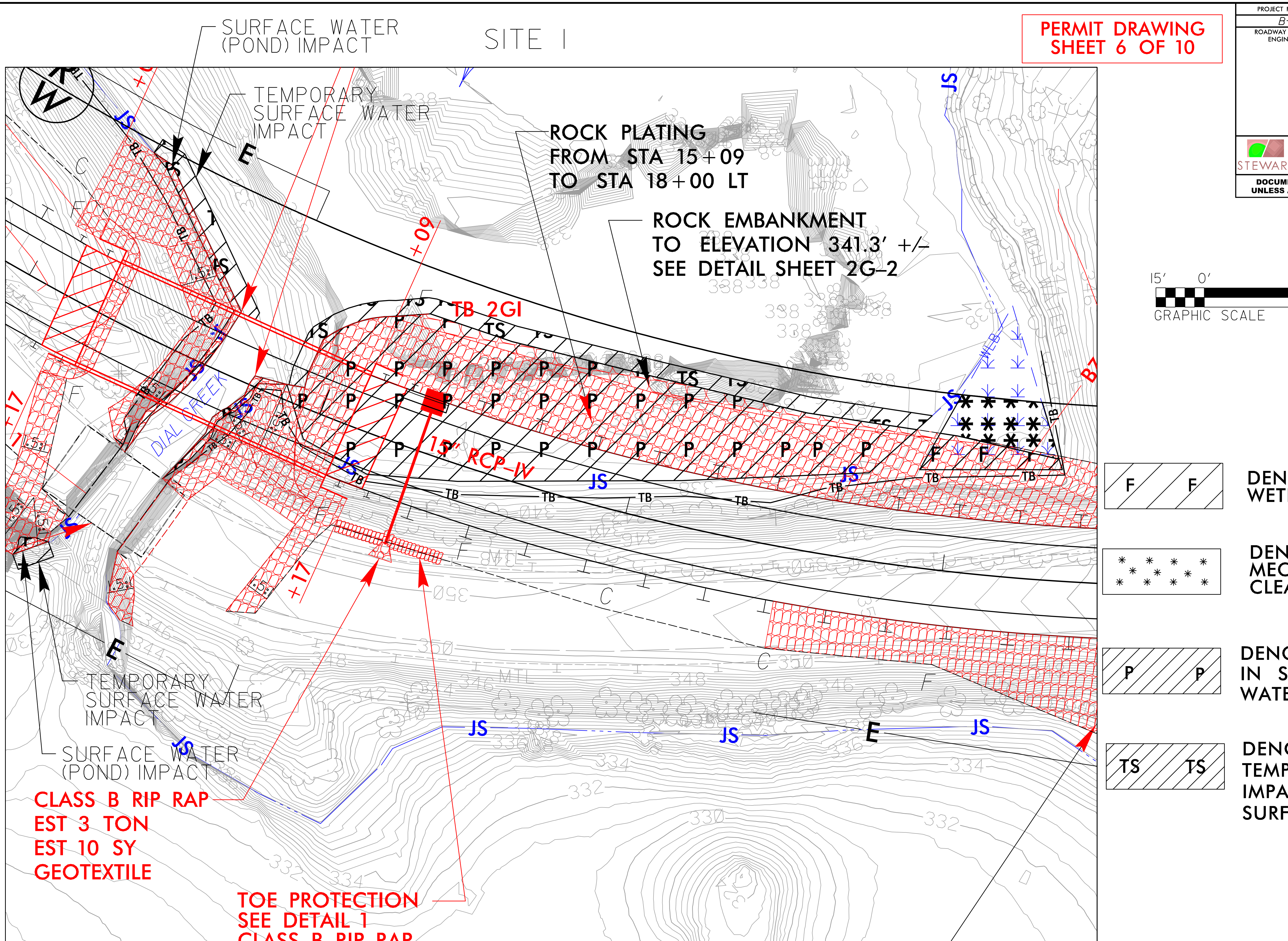
ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

STEWART | ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 6 OF 10

SITE 1



SURFACE WATER
(POND) IMPACT
TEMPORARY
SURFACE WATER
IMPACT
ROCK PLATING
FROM STA 15+09
TO STA 18+00 LT
ROCK EMBANKMENT
TO ELEVATION 341.3' +/-
SEE DETAIL SHEET 2G-2
TB 2GI
15" RCP-IV
DIAL CREEK
TEMPORARY
SURFACE WATER
IMPACT
SURFACE WATER
(POND) IMPACT
CLASS B RIP RAP
EST 3 TON
EST 10 SY
GEOTEXTILE
TOE PROTECTION
SEE DETAIL 1
CLASS B RIP RAP
ROCK PLATING
15' 0' 30'
GRAPHIC SCALE
NAD 83/
NSRS 2007

DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

DENOTES IMPACTS IN SURFACE WATER (POND)

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

REVISIONS

8/17/99

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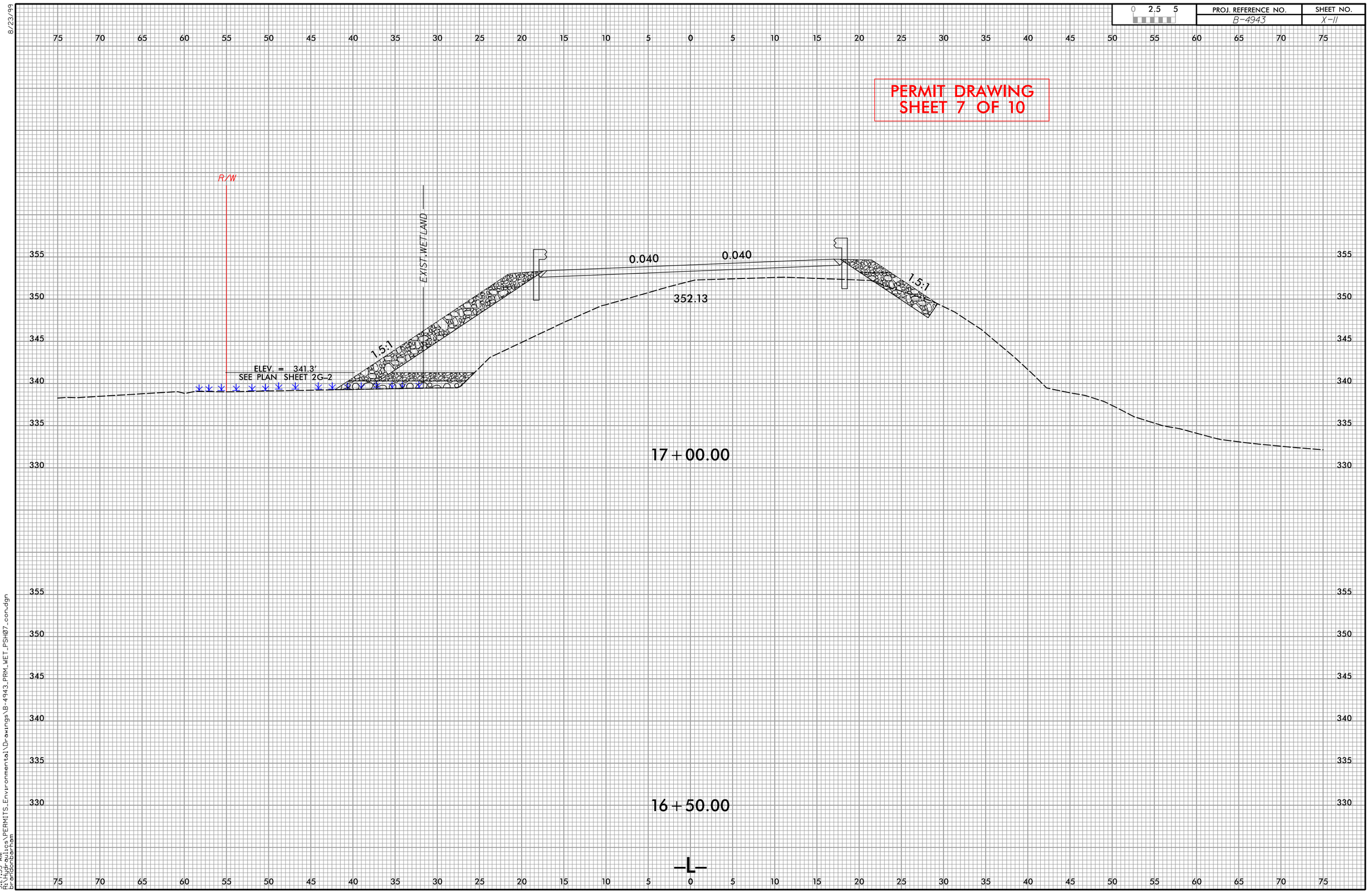
brandonbarham

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	B-4943	X-11

PERMIT DRAWING
SHEET 7 OF 10



PROJECT REFERENCE NO.	SHEET NO.
B-4943	2G-1

GEOTECHNICAL ENGINEER

SEAL 030943 — NORTH CAROLINA PROFESSIONAL ENGINEER — THEIN TUN ZAN

DocuSigned by: Thein Tun Zan 1/10/2017

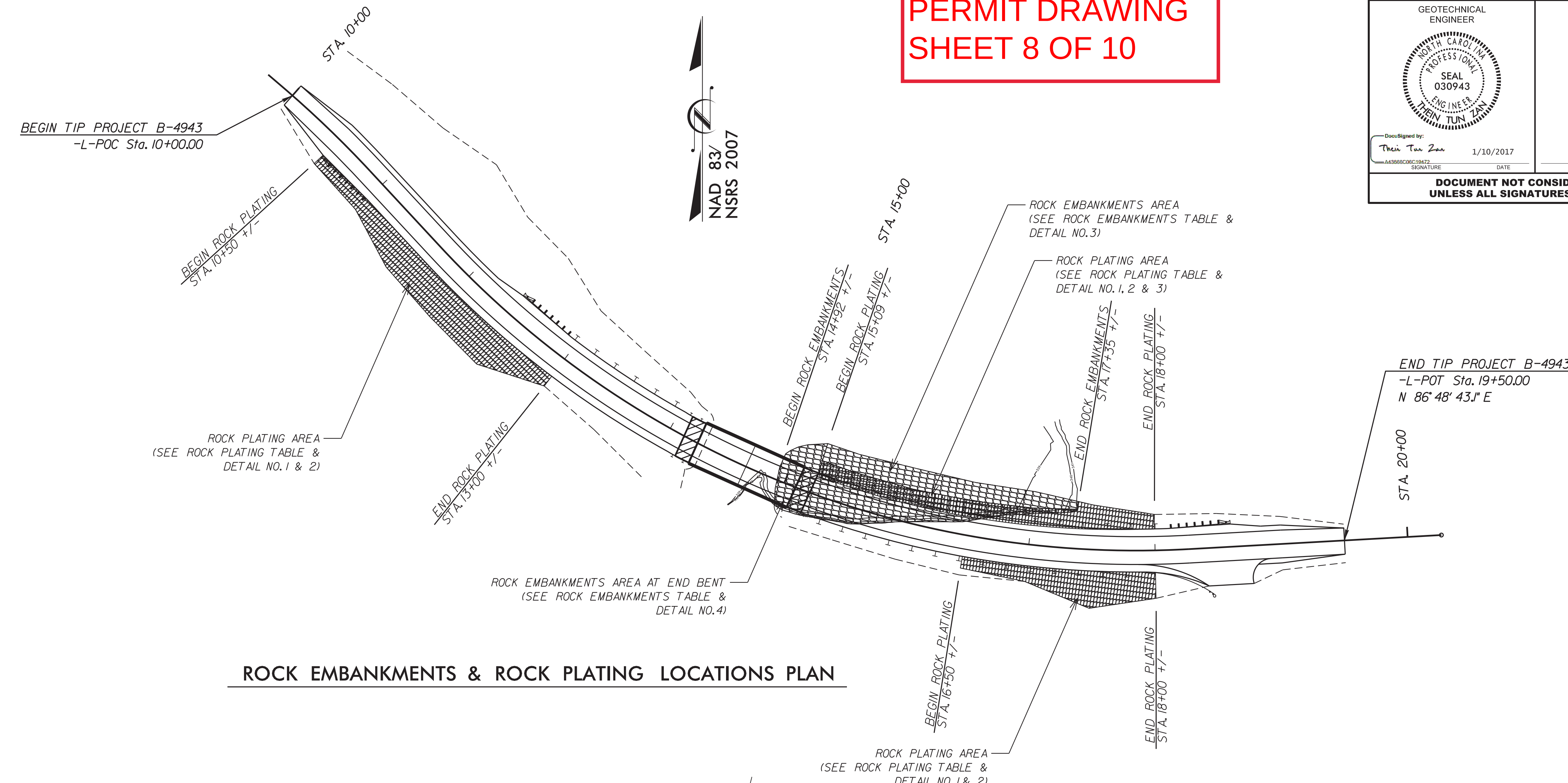
SIGNATURE DATE

ENGINEER

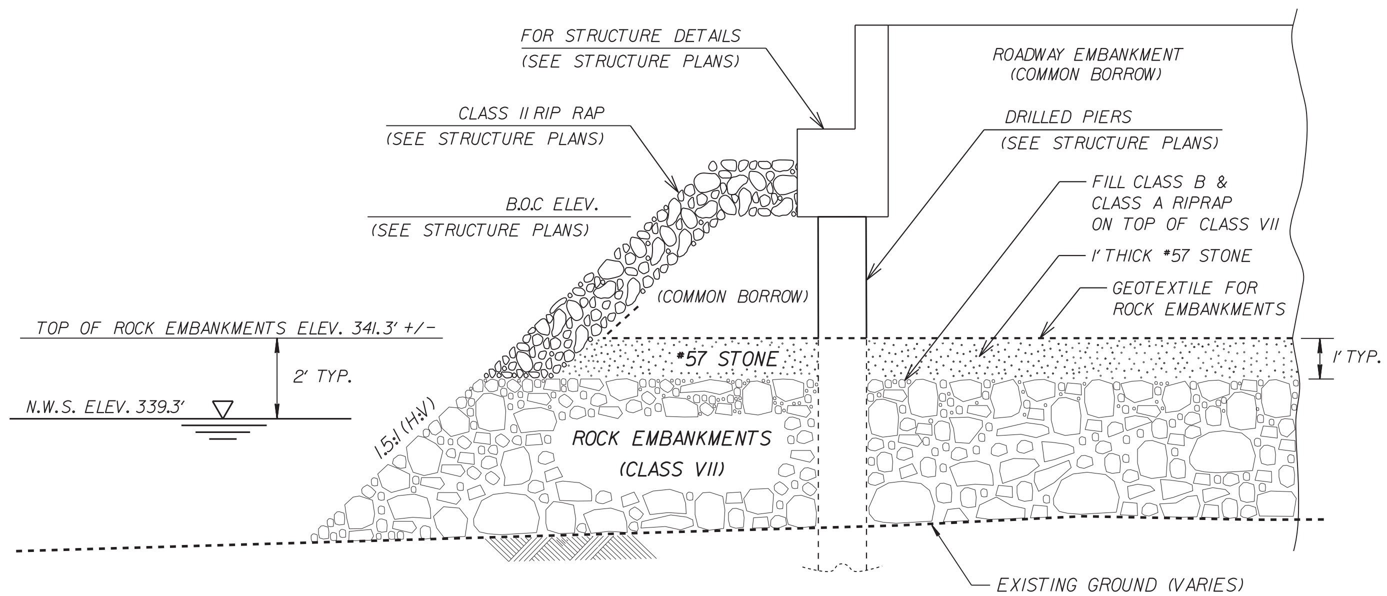
SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 8 OF 10



ROCK EMBANKMENTS & ROCK PLATING LOCATIONS PLAN



ROCK EMBANKMENTS DETAIL NO. 4 – TYPICAL SECTION ALONG -L-

PREPARED BY: THEIN T. ZAN	DATE: 01-2017
REVIEWED BY: JAMES R. BATTS	DATE: 01-2017

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

ROCK EMBANKMENTS & ROCK PLATING

PLAN & DETAILS

REVISIONS

NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

PROJECT REFERENCE NO.	SHEET NO.
B-4943	2G-2

GEOTECHNICAL ENGINEER

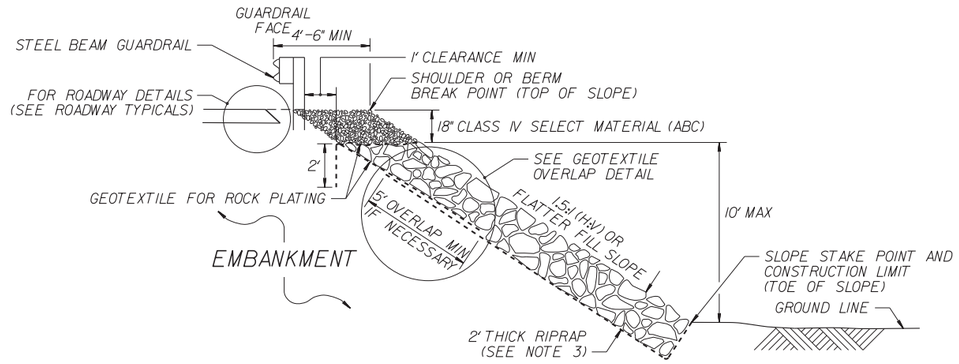
NORTH CAROLINA PROFESSIONAL SEAL 030943 ENGINEER THEIN TUN ZAN

DocuSigned by: Thein Tun Zan 1/10/2017
SIGNATURE DATE

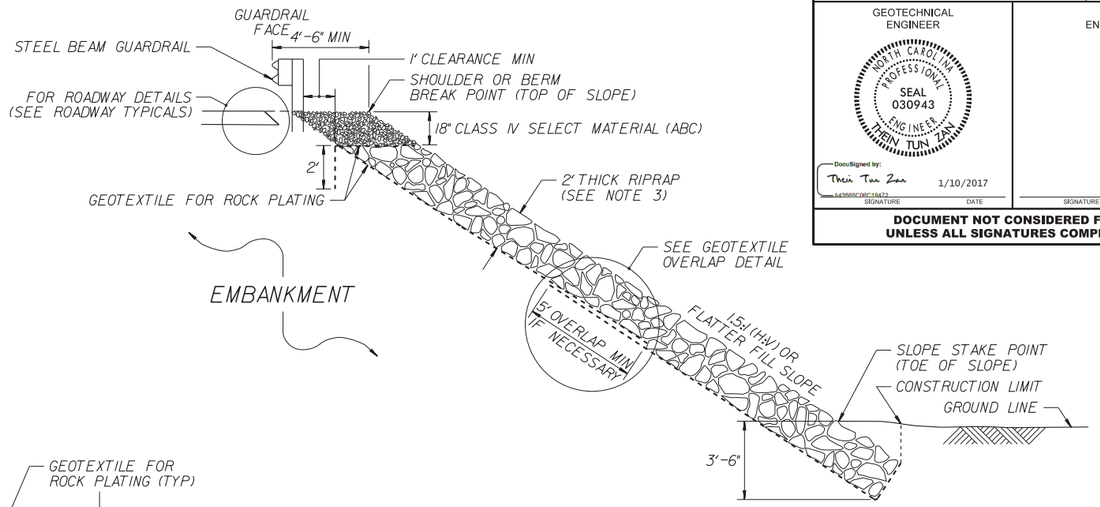
ENGINEER

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



ROCK PLATING DETAIL NO. 1 – TYPICAL SECTION



ROCK PLATING DETAIL NO. 2 – TYPICAL SECTION

PERMIT DRAWING
SHEET 9 OF 10

<u>ROCK PLATING</u>

FOR ROCK PLATING, SEE SECTION 275 OF THE STANDARD SPECIFICATIONS.

USE ROCK PLATING AT FOLLOWING LOCATIONS:

LINES	BEGINNING SLOPE	APPROX. STATION	ENDING SLOPE	APPROX. STATION	LOCATION LT/RT	ROCK PLATING DETAIL NO. 1/2/3	RIPRAP CLASS* 1/2/B	SY
-L-	2:1	10+50	1.5:1	11+25	RT	1	*	80
-L-	1.5:1	11+25	1.75:1	12+75	RT	2	*	435
-L-	1.75:1	12+75	2:1	13+00	RT	1	*	35
-L-	1.5:1	15+09	1.5:1	17+00	LT	3	*	445
-L-	1.5:1	17+00	1.75:1	17+75	LT	2	*	150
-L-	1.75:1	17+75	2:1	18+00	LT	1	*	30
-L-	2:1	16+50	1.75:1	17+25	RT	1	*	85
-L-	1.75:1	17+25	2:1	18+00	RT	2	*	210

USE CLASS 1,2 OR B RIPRAP FOR ROCK PLATING LOCATIONS.

ESTIMATED TOTAL QUANTITY OF ROCK PLATING = 1,470 SY

<u>ROCK EMBANKMENTS</u>

FOR ROCK EMBANKMENTS, SEE ROCK EMBANKMENTS SPECIAL PROVISION.

USE ROCK EMBANKMENTS AT FOLLOWING LOCATIONS:

-LINE-	APPROX. BEGINNING STATION	APPROX. ENDING STATION	LOCATION LT/RT
-L-	14+92 +/- -L-	17+35 +/- -L-	LEFT

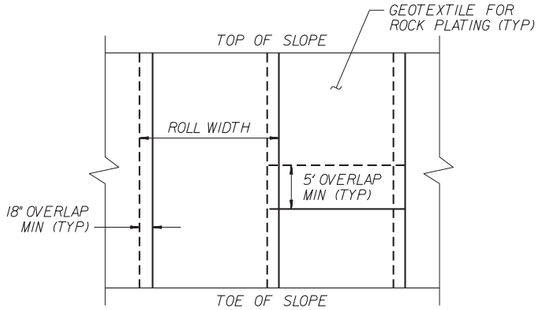
CONSTRUCT ROCK EMBANKMENTS TO THE ELEVATION SHOWN IN THE ROCK EMBANKMENTS & ROCK PLATING DETAIL NO.3 AND DETAIL NO.4 OR 2 FT.ABOVE THE NORMAL WATER SURFACE AND ACCORDING TO THE ROCK EMBANKMENTS SPECIAL PROVISION.

FILL VOIDS IN THE TOP OF ROCK EMBANKMENTS WITH CLASS B AND CLASS A RIP RAP.

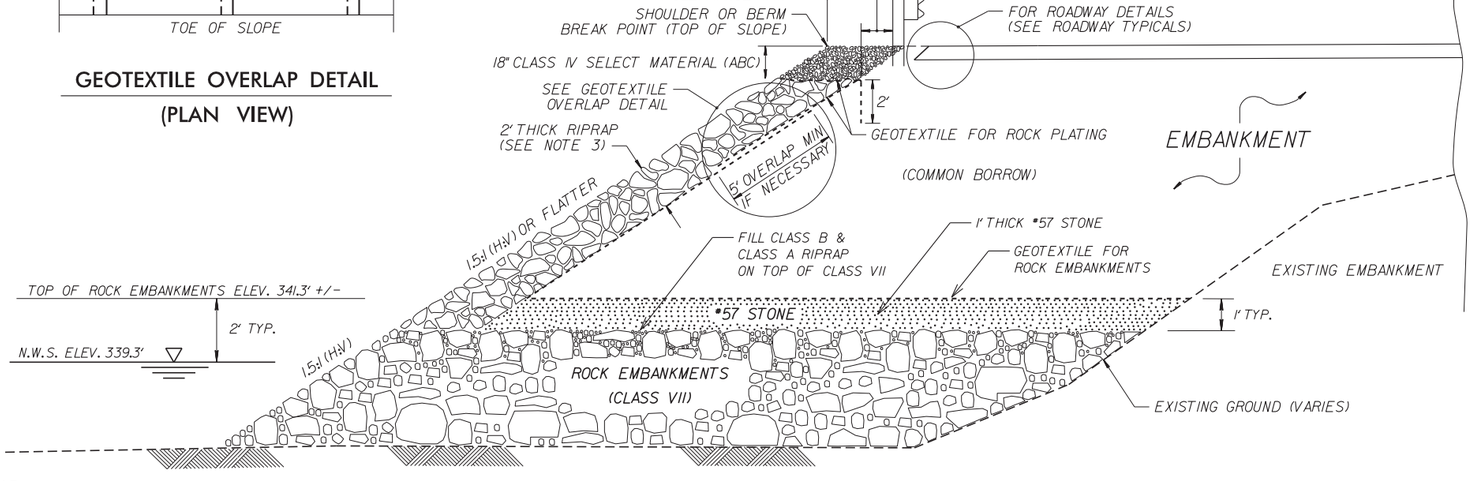
PLACE *57 STONE (SELECT MATERIAL, CLASS VI) UP TO 1 FT. ABOVE ROCK EMBANKMENTS AS SHOWN IN THIS PLAN.

CONSTRUCT ROCK PLATING ABOVE ROCK EMBANKMENTS FROM ELEVATION SHOWN IN THE ROCK EMBANKMENTS & ROCK PLATING DETAIL NO.3 OR 2 FT.ABOVE THE NORMAL WATER SURFACE TO THE SHOULDER HINGE POINT AND ACCORDING TO THE SECTION 275 OF THE STANDARD SPECIFICATIONS..

INSTALL GEOTEXTILE ON TOP OF NO.57 STONE IN ACCORDANCE WITH THE ARTICLE 270-3 OF THE STANDARD SPECIFICATIONS.



GEOTEXTILE OVERLAP DETAIL (PLAN VIEW)



ROCK EMBANKMENTS & ROCK PLATING DETAIL NO. 3 – TYPICAL SECTION

<u>ESTIMATED MATERIAL QUANTITIES FOR ROCK EMBANKMENTS</u>

ROCK EMBANKMENTS (SELECT MATERIAL, CLASS VII) = 3,030 TONS

RIP RAP CLASS A = 480 TONS

RIP RAP CLASS B = 480 TONS

*57 STONE (SELECT MATERIAL, CLASS VI) = 590 TONS

GEOTEXTILE FOR ROCK EMBANKMENTS = 950 SY

PREPARED BY: THEIN T. ZAN	DATE: 01-2017
REVIEWED BY: JAMES R. BATTS	DATE: 01-2017

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

ROCK EMBANKMENTS & ROCK PLATING

NOTES & DETAILS

REVISIONS

NO.	BY	DATE	NO.	BY	DATE
1	-	-	3	-	-
2	-	-	4	-	-

WETLAND PERMIT IMPACT SUMMARY

Surface and Wetland Package:

Site No.	Station (From/To)	Structure Size / Type	WETLAND 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)	SURFACE WATER IMPACTS: Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	14+16 to 14+70 -L-	Fill in Surface Water						<0.01	<0.01			
1	14+34 to 14+45 -L- RT	Fill in Surface Water						<0.01	<0.01			
1	14+64 to 17+35 -L-	Roadway Embankement	<0.01			0.01		0.15	0.02			
1	14+50 to 14+65 -L-	Bank Stabalization						<0.01		57		
TOTALS:			<0.01			0.01		0.15	0.02	57.0		

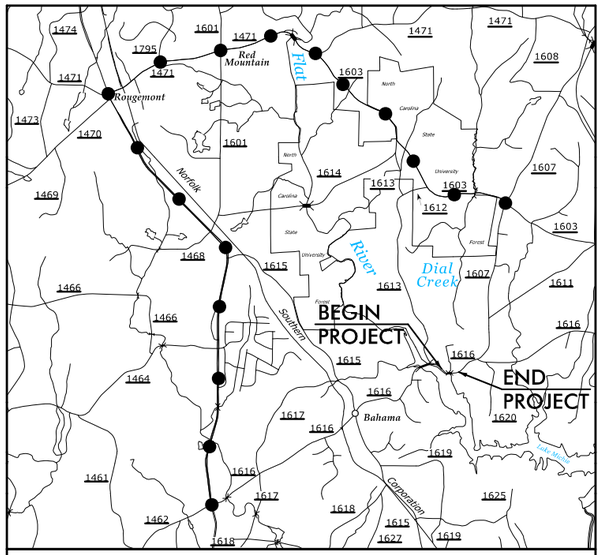
NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
02/22/2017
Durham County
B4943
40110.1.1
SHEET 10 OF 10

ATN Revised 3/31/05

09/08/99

T.I.P PROJECT: B-4943

CONTRACT: 203987



See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Symbols

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

DURHAM COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4943	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
40110.1.1	BRZ-1616(10)	PE
40110.2.1	BRZ-1616(10)	ROW & UTILITY
40110.3.1	BRZ-1616(10)	CONSTRUCTION

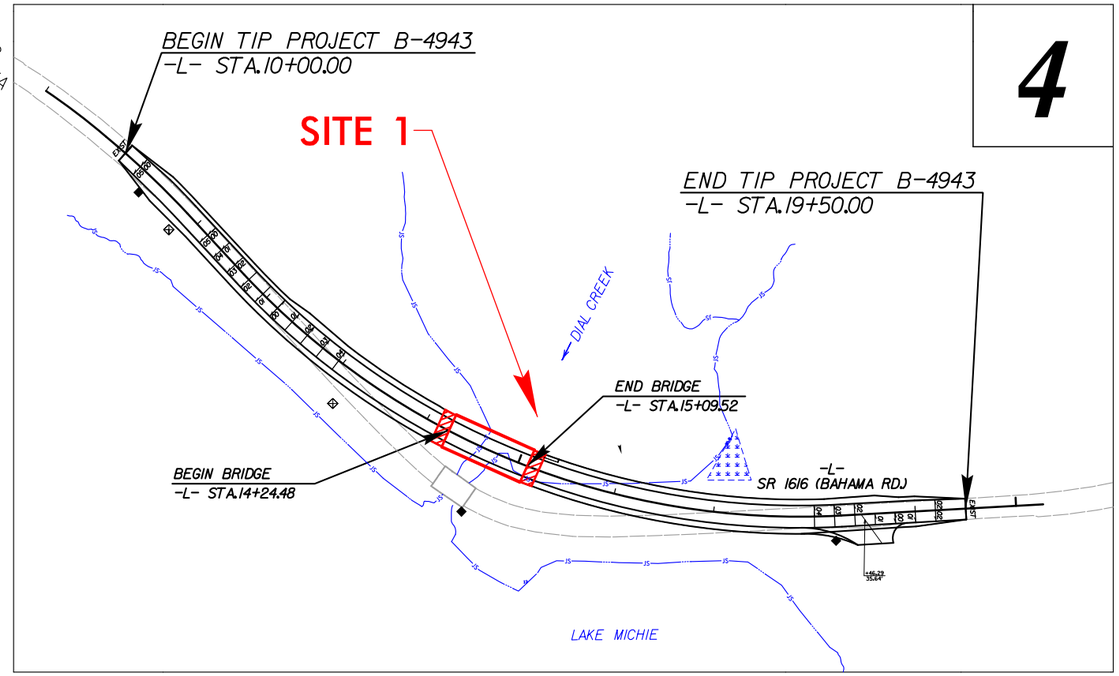
BUFFER DRAWING
SHEET 1 OF 5

LOCATION: ***BRIDGE NO. 20 OVER DIAL CREEK ON SR 1616 (BAHAMA RD.)***

TYPE OF WORK: ***GRADING, DRAINAGE, PAVING, AND STRUCTURE***

BUFFER IMPACTS PERMIT

NAD 83/NSRS 2007



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GRAPHIC SCALES

PLANS: 50 25 0 50 100

PROFILE (HORIZONTAL): 50 25 0 50 100

PROFILE (VERTICAL): 10 5 0 10 20

DESIGN DATA

2017 ADT = 2738 VPD
2037 ADT = 3585 VPD
K = 10%
D = 85%
T = 6% *
V = 40 MPH
* (TTST 1% + DUAL 5%)
FUNC. CLASS. = RURAL MINOR COLLECTOR
SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4943	=	0.164 mi.
LENGTH STRUCTURES TIP PROJECT B-4943	=	0.016 mi.
TOTAL LENGTH TIP PROJECT B-4943	=	0.180 mi.

Prepared in the Offices of:

STEWART ECOLOGICAL ENGINEERING
421 FAYETTEVILLE ST, STE 400 RALEIGH, NC 27601 T 919.380.8750
firm License # C-1051 www.stewartinc.com PROJECT # 2015512.00
NC FIRM LICENSE No: F-1148 1151 SW Cary Parkway, Suite 101 Cary, NC 27518 (919) 557-0929

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
DECEMBER 9, 2016

LETTING DATE:
JULY 18, 2017

ANDY YOUNG, PE
PROJECT ENGINEER

MICHAEL BURNS, EI
PROJECT DESIGN ENGINEER

GARY R. LOVERING, PE
NCDOT CONTACT

HYDRAULICS ENGINEER

SIGNATURE: _____ *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ *P.E.*

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION

10:42:21 AM
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brandonbarham

BUFFER DRAWING SHEET 2 OF 5

PROJECT REFERENCE NO.	SHEET NO.
B-4943	4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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ECOLOGICAL ENGINEERING — NC FIRM LICENSE No. P-1448, 1151 SE Cary Parkway, Suite 101, Cary, NC 27518, P: 919.760.0750

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

8/17/99

REVISIONS

50′ 0′ 100′
GRAPHIC SCALE

PC Sta. 9+00.00
PT Sta. 9+74.71
PC Sta. 9+88.74
PT Sta. 10+85.57
PC Sta. 11+68.12

S 49° 29′ 29.3″ E

BEGIN TIP PROJECT B-4943
-L-POC Sta. 10+00.00

ROCK PLATING FROM STA 10+50 TO STA 13+00 RT

BANK STABALIZATION CLASS II RIP RAP EST 700 TONS EST 750 SY GEOTEXTILE SEE DETAIL 2

ROCK PLATING FROM STA 15+09 TO STA 18+00 LT

ROCK EMBANKMENT TO ELEVATION 341.3′ +/- SEE DETAIL SHEET 2G-2

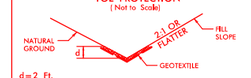
REMOVE BRIDGE AND RETAIN EXISTING CONC. ABUTMENTS AND CONC. WING WALLS UP TO ELEVATION 345.5′ TO 346.0′. LAY SLOPES BACK TO EXISTING ROAD AT 1.5:1.

CLASS B RIP RAP EST 3 TON EST 10 SY GEOTEXTILE

TOE PROTECTION SEE DETAIL 1 CLASS B RIP RAP EST 20 TON EST 55 SY GEOTEXTILE

ROCK PLATING FROM STA 16+50 TO STA 18+00 RT

DETAIL 1
TOE PROTECTION
(Not to Scale)



d = 2 Ft.
Type of Liner = CLASS B Rip-Rap
FROM STA. 15+16 TO STA. 15+50 -L- RT

DETAIL 2
BANK STABILIZATION
(Not to Scale)

Type of Liner = CLASS II RIPRAP
STA 14+15 TO 14+50 L
STA 14+60 TO 14+90 L

SITE I

1 CITY OF DURHAM

2 BARTFAY, SELMA L. TRUSTEE OF THE BARTFAY FAMILY TRUST

3 ROBERTS, LISA G. ROBERTS, JEANETTE K. MILLER, BETSY R.

END TIP PROJECT B-4943
-L-POT Sta. 19+50.00
N 86° 48′ 43.1″ E

PT Sta. 18+26.73

POT Sta. 20+26.74

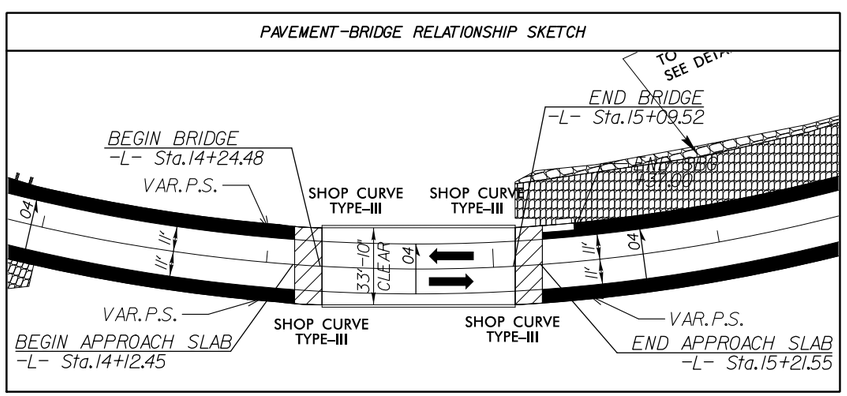
30′ 0′ 60′
GRAPHIC INSET SCALE

NAD 83/ NSRS 2007

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

PAVEMENT-BRIDGE RELATIONSHIP SKETCH



FOR -L- PROFILE, SEE SHEET 5

FOR STRUCTURE PLANS, SEE SHEETS S-1 THRU S-?

3:07:45 PM
R:\Projects\PERMITS_Environmental\Drawings\B-4943_PRM_BUF_PSH04.dgn
brandonbarham

PROJECT REFERENCE NO.	SHEET NO.
B-4943	2G-1

GEOTECHNICAL ENGINEER

SEAL 030943 NORTH CAROLINA PROFESSIONAL ENGINEER THEIN TUN ZAN

DocuSigned by: Thein Tun Zan 1/10/2017

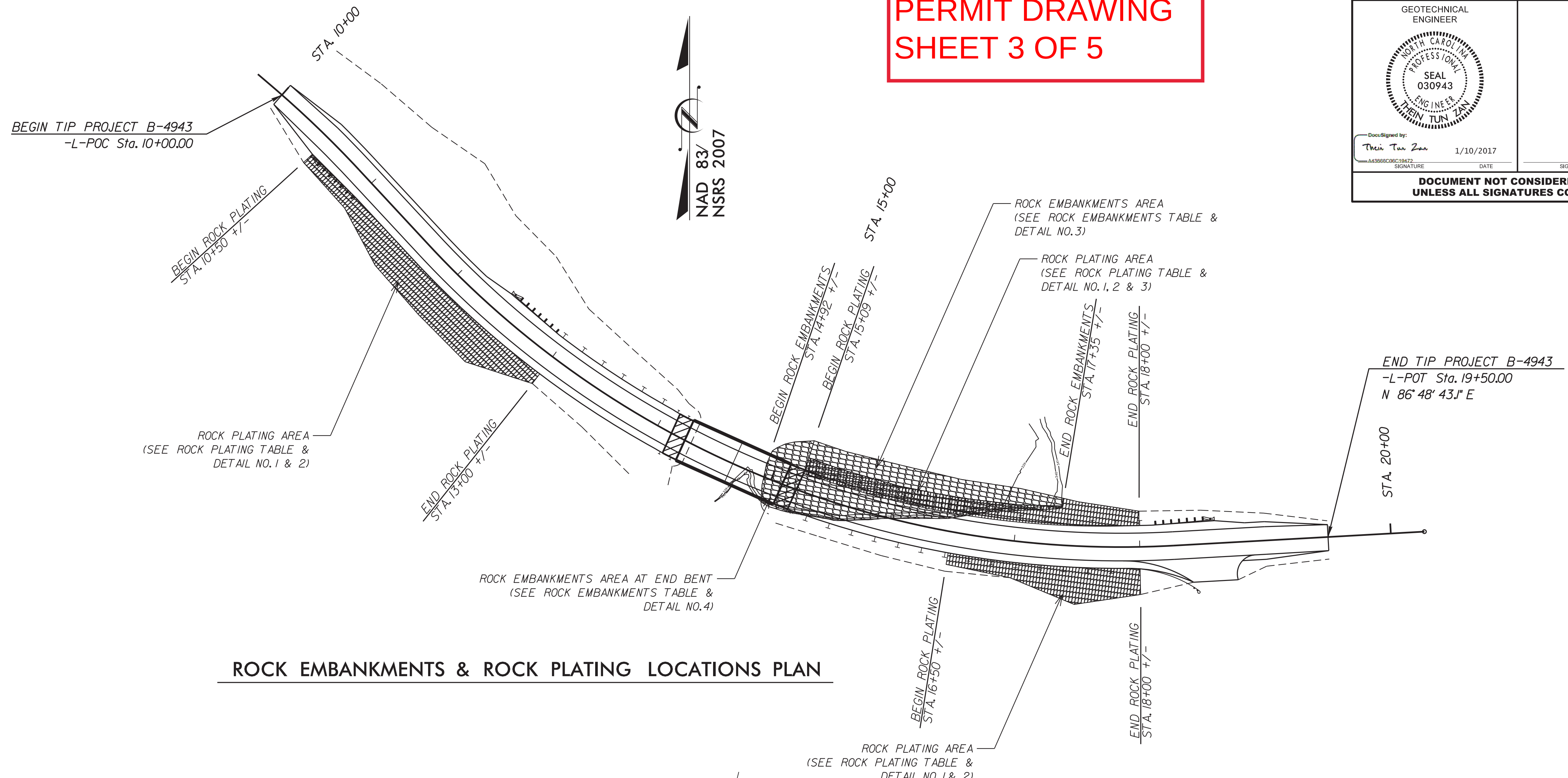
SIGNATURE DATE

ENGINEER

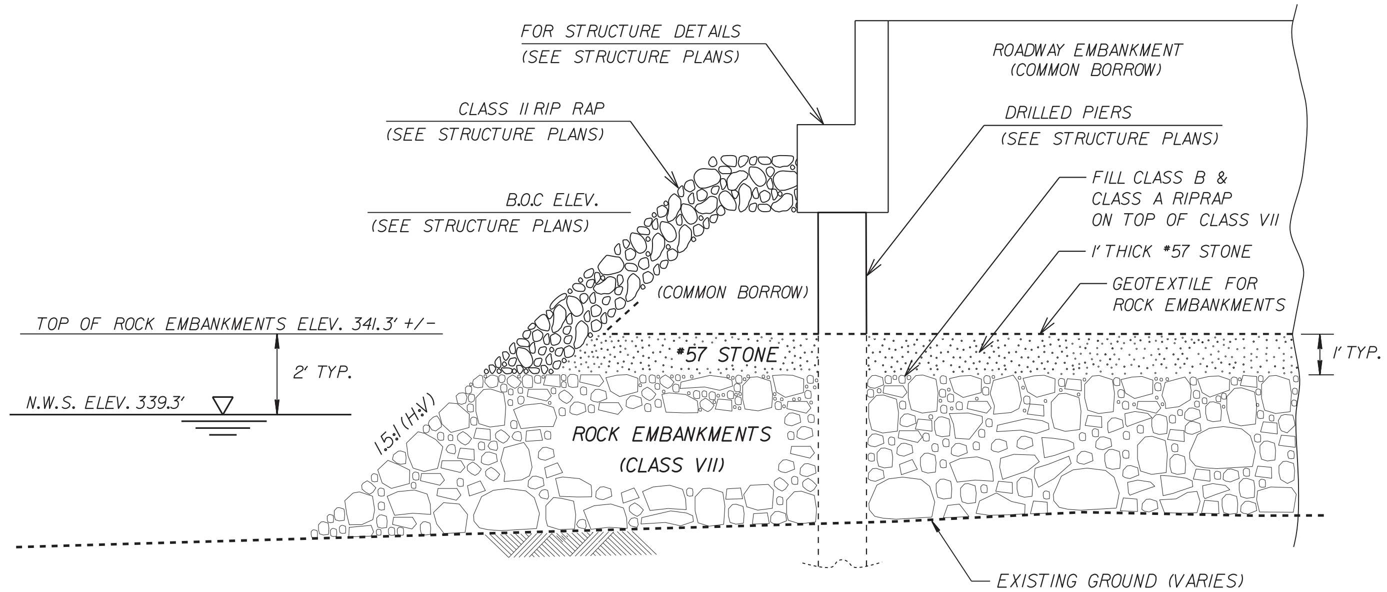
SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 3 OF 5



ROCK EMBANKMENTS & ROCK PLATING LOCATIONS PLAN



ROCK EMBANKMENTS DETAIL NO. 4 – TYPICAL SECTION ALONG -L-

PREPARED BY: THEIN T. ZAN	DATE: 01-2017
REVIEWED BY: JAMES R. BATTS	DATE: 01-2017

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

ROCK EMBANKMENTS & ROCK PLATING

PLAN & DETAILS

REVISIONS

NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

PROJECT REFERENCE NO.	SHEET NO.
B-4943	2G-2

GEOTECHNICAL ENGINEER

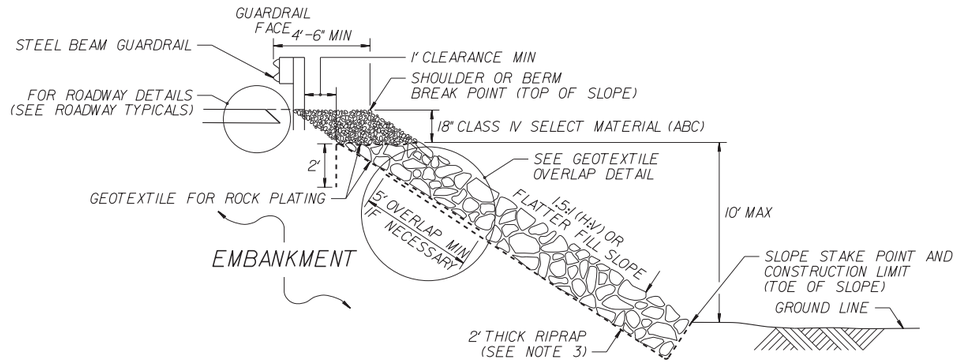
NORTH CAROLINA PROFESSIONAL SEAL 030943 ENGINEER THEIN TUN ZAN

DocuSigned by: Thein Tun Zan 1/10/2017
SIGNATURE DATE

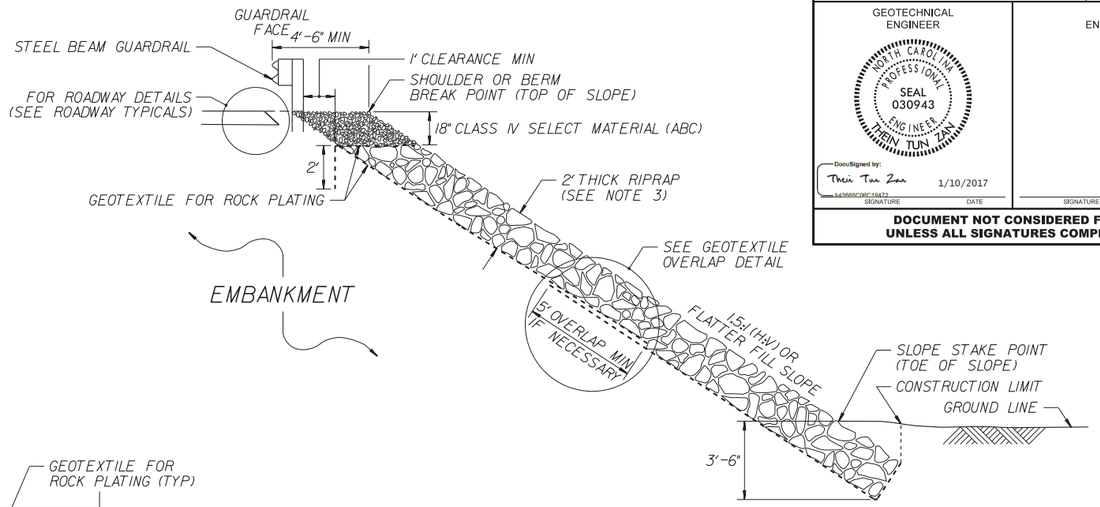
ENGINEER

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



ROCK PLATING DETAIL NO. 1 – TYPICAL SECTION



ROCK PLATING DETAIL NO. 2 – TYPICAL SECTION

PERMIT DRAWING
SHEET 4 OF 5

ROCK PLATING

FOR ROCK PLATING, SEE SECTION 275 OF THE STANDARD SPECIFICATIONS.

USE ROCK PLATING AT FOLLOWING LOCATIONS:

LINES	BEGINNING SLOPE	APPROX. STATION	ENDING SLOPE	APPROX. STATION	LOCATION LT/RT	ROCK PLATING DETAIL NO. 1/2/3	RIPRAP CLASS* 1/2/B	SY
-L-	2:1	10+50	1.5:1	11+25	RT	1	*	80
-L-	1.5:1	11+25	1.75:1	12+75	RT	2	*	435
-L-	1.75:1	12+75	2:1	13+00	RT	1	*	35
-L-	1.5:1	15+09	1.5:1	17+00	LT	3	*	445
-L-	1.5:1	17+00	1.75:1	17+75	LT	2	*	150
-L-	1.75:1	17+75	2:1	18+00	LT	1	*	30
-L-	2:1	16+50	1.75:1	17+25	RT	1	*	85
-L-	1.75:1	17+25	2:1	18+00	RT	2	*	210

USE CLASS 1,2 OR B RIPRAP FOR ROCK PLATING LOCATIONS.

ESTIMATED TOTAL QUANTITY OF ROCK PLATING = 1,470 SY

ROCK EMBANKMENTS

FOR ROCK EMBANKMENTS, SEE ROCK EMBANKMENTS SPECIAL PROVISION.

USE ROCK EMBANKMENTS AT FOLLOWING LOCATIONS:

-LINE-	APPROX. BEGINNING STATION	APPROX. ENDING STATION	LOCATION LT/RT
-L-	14+92 +/- -L-	17+35 +/- -L-	LEFT

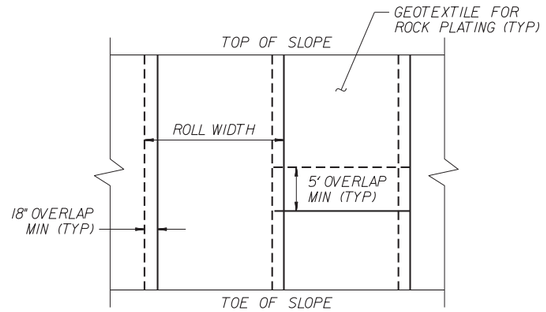
CONSTRUCT ROCK EMBANKMENTS TO THE ELEVATION SHOWN IN THE ROCK EMBANKMENTS & ROCK PLATING DETAIL NO.3 AND DETAIL NO.4 OR 2 FT.ABOVE THE NORMAL WATER SURFACE AND ACCORDING TO THE ROCK EMBANKMENTS SPECIAL PROVISION.

FILL VOIDS IN THE TOP OF ROCK EMBANKMENTS WITH CLASS B AND CLASS A RIP RAP.

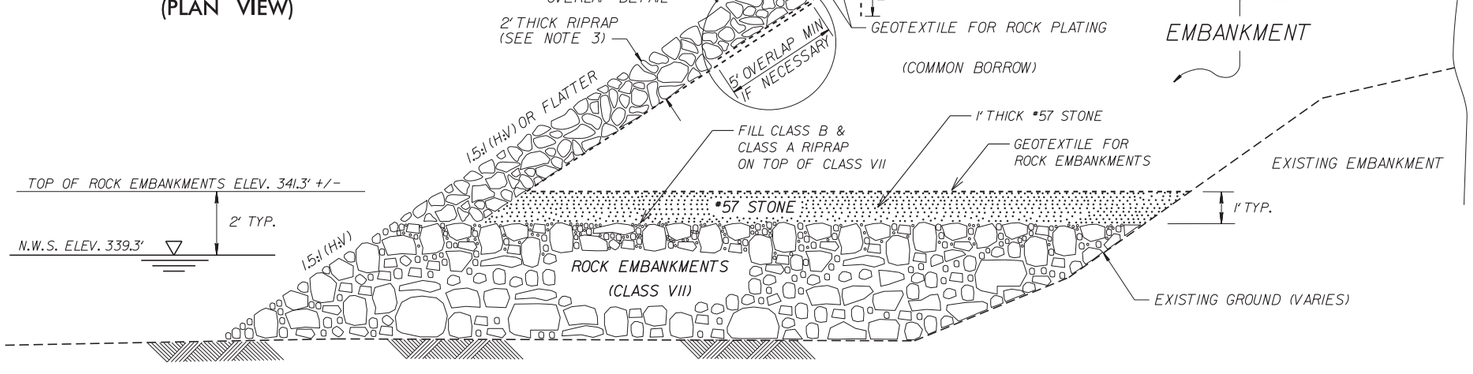
PLACE *57 STONE (SELECT MATERIAL, CLASS VI) UP TO 1 FT. ABOVE ROCK EMBANKMENTS AS SHOWN IN THIS PLAN.

CONSTRUCT ROCK PLATING ABOVE ROCK EMBANKMENTS FROM ELEVATION SHOWN IN THE ROCK EMBANKMENTS & ROCK PLATING DETAIL NO.3 OR 2 FT.ABOVE THE NORMAL WATER SURFACE TO THE SHOULDER HINGE POINT AND ACCORDING TO THE SECTION 275 OF THE STANDARD SPECIFICATIONS..

INSTALL GEOTEXTILE ON TOP OF NO.57 STONE IN ACCORDANCE WITH THE ARTICLE 270-3 OF THE STANDARD SPECIFICATIONS.



GEOTEXTILE OVERLAP DETAIL (PLAN VIEW)



ROCK EMBANKMENTS & ROCK PLATING DETAIL NO. 3 – TYPICAL SECTION

ESTIMATED MATERIAL QUANTITIES FOR ROCK EMBANKMENTS

ROCK EMBANKMENTS (SELECT MATERIAL, CLASS VII) = 3,030 TONS

RIP RAP CLASS A = 480 TONS

RIP RAP CLASS B = 480 TONS

*57 STONE (SELECT MATERIAL, CLASS VI) = 590 TONS

GEOTEXTILE FOR ROCK EMBANKMENTS = 950 SY

PREPARED BY: THEIN T. ZAN	DATE: 01-2017
REVIEWED BY: JAMES R. BATTS	DATE: 01-2017

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

ROCK EMBANKMENTS & ROCK PLATING

NOTES & DETAILS

REVISIONS

NO.	BY	DATE	NO.	BY	DATE
1	-	-	3	-	-
2	-	-	4	-	-

BUFFER IMPACTS SUMMARY

			IMPACT									BUFFER REPLACEMENT	
			TYPE			ALLOWABLE			MITIGABLE				
SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
1	ROADWAY EMBANKMENT	12+41 TO 14+12 -L- LT	X			2037.0	3201.0	5238.0					
1	1@85' 33" BOX BEAM W/ 4' CAPS	14+12 TO 14+56 -L- LT		X		2340.0	371.0	2711.0					
1	ROADWAY EMBANKMENT	16+80 TO 17+62 -L- LT	X			765.0	535.0	1300.0					
1	ROADWAY EMBANKMENT	17+07 TO 18+16 -L- RT	X			1762.0	729.0	2491.0					
1	ROADWAY EMBANKMENT	11+00 TO 12+84 -L- RT	X			2757.0	0.0	2757.0					
1	1@85' 33" BOX BEAM W/ 4' CAPS	14+06 TO 14+41 -L- RT		X		440.0	0.0	440.0					
TOTAL:						10101.0	4836.0	14937.0	0.0	0.0	0.0		

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

DURHAM COUNTY
PROJECT: 40110.1.1 (B-4943)
DIAL CREEK

2/22/2017
SHEET 5 OF 5

Rev. May 2006

WETLANDS IN BUFFER IMPACTS SUMMARY

SITE NO.	STATION (FROM/TO)		WETLANDS IN BUFFERS ZONE 1 (ft^2)	WETLANDS IN BUFFERS ZONE 2 (ft^2)
Site 1	16+91 TO 17+35 -L- LT		612.0	94.0
TOTAL:			612.0	94.0

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

DURHAM COUNTY
PROJECT: 40110.1.1 (B-4943)
DIAL CREEK

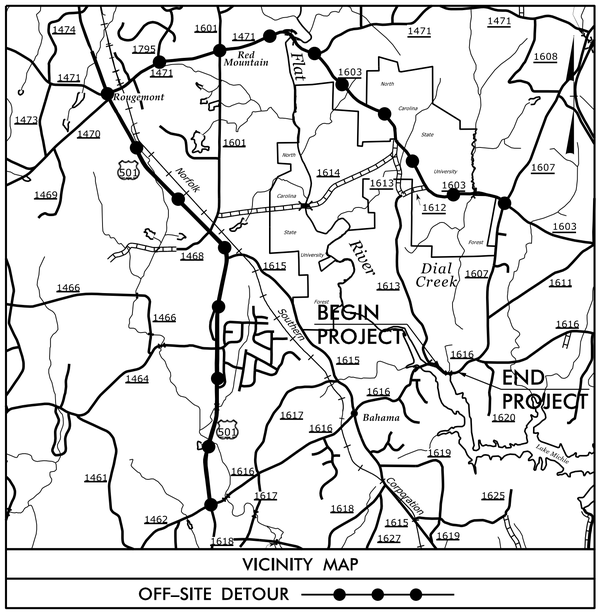
2/22/2017
SHEET 5A OF 5

Rev. Jan 2009

09/08/49

T.I.P PROJECT: B–4943

CONTRACT: 203987



See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Symbols

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

DURHAM COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B–4943	1	

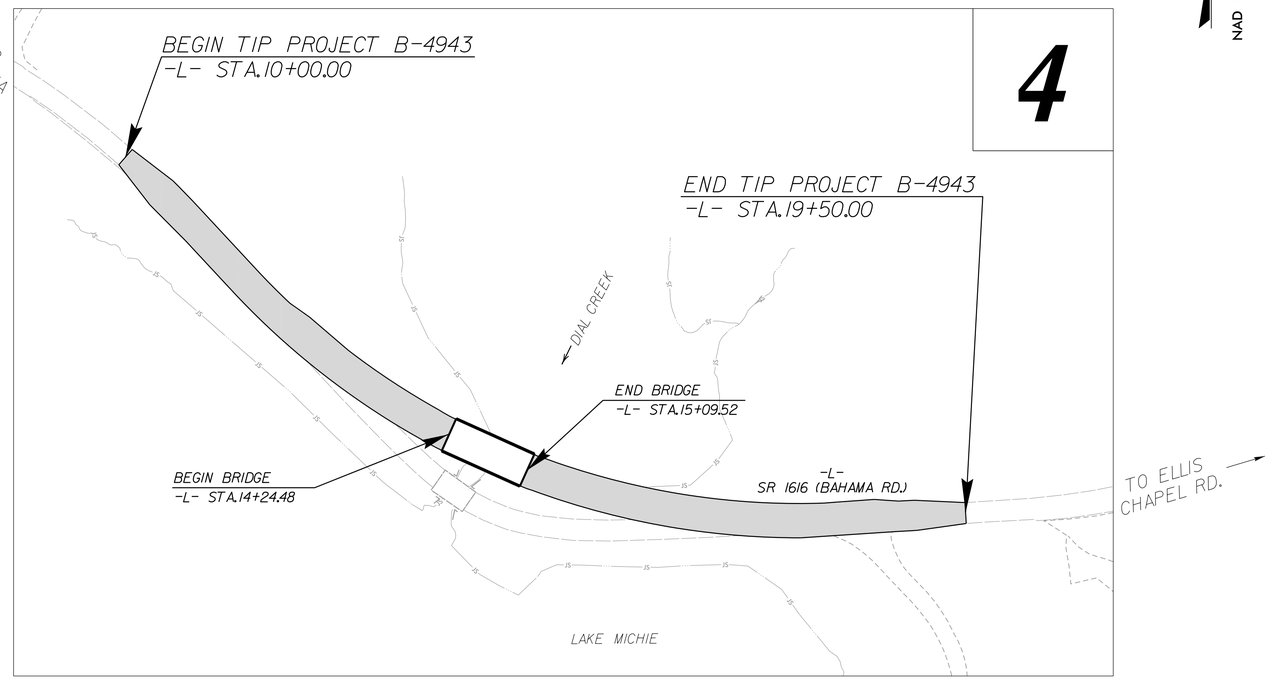
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
40110.1.1	BRZ–1616(10)	PE
40110.2.1	BRZ–1616(10)	ROW & UTILITY
40110.3.1	BRZ–1616(10)	CONSTRUCTION

90% REVIEW SUBMITTAL

LOCATION: ***BRIDGE NO. 20 OVER DIAL CREEK ON SR 1616 (BAHAMA RD.)***

TYPE OF WORK: ***GRADING, DRAINAGE, PAVING, AND STRUCTURE***

NAD 83/NSRS 2007



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

2017 ADT = 2738 VPD
2037 ADT = 3585 VPD
K = 10%
D = 85%
T = 6% *
V = 40 MPH
* (TTST 1% + DUAL 5%)
FUNC. CLASS. = RURAL MINOR COLLECTOR
SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B–4943	=	0.164 mi.
LENGTH STRUCTURES TIP PROJECT B–4943	=	0.016 mi.
TOTAL LENGTH TIP PROJECT B–4943	=	0.180 mi.

Prepared in the Offices of:

STEWART ECOLOGICAL ENGINEERING
421 FAYETTEVILLE ST, STE 400 RALEIGH, NC 27601 T 919.380.8750
Firm License #: C-1051 www.stewartinc.com PROJECT #:19152.3.00
NC FIRM LICENSE No: F-1148 1151 SE Cary Parkway, Suite 101 Cary, NC 27518 (919) 557-9929

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
DECEMBER 9, 2016

LETTING DATE:
JULY 18, 2017

ANDY YOUNG, PE
PROJECT ENGINEER

MICHAEL BURNS, EI
PROJECT DESIGN ENGINEER

GARY R. LOVERING, PE
NCDOT CONTACT

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

1/25/2017
...\Roadway\Proj\B4943_RDY_TSH.dgn
USER:Keys

04/06/15

PROJECT REFERENCE NO.	SHEET NO.
B-4943	1B

STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

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

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)
- 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 (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
- Proposed Right of Way Line with Iron Pin and Cap Marker
- Proposed Right of Way Line with Concrete or Granite R/W Marker
- Proposed Control of Access Line with Concrete C/A Marker
- Existing Control of Access
- Proposed Control of Access
- Existing Easement Line (E)
- Proposed Temporary Construction Easement (E)
- Proposed Temporary Drainage Easement (TDE)
- Proposed Permanent Drainage Easement (PDE)
- Proposed Permanent Drainage / Utility Easement (DUE)
- Proposed Permanent Utility Easement (PUE)
- Proposed Temporary Utility Easement (TUE)
- Proposed Aerial Utility Easement (AUE)
- Proposed Permanent Easement with Iron Pin and Cap Marker

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
- 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
- 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 (T)
- Telephone Pedestal (T)
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole (HH)
- 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 (W)
- 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 (C)
- TV Tower
- U/G TV Cable Hand Hole (HH)
- 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:

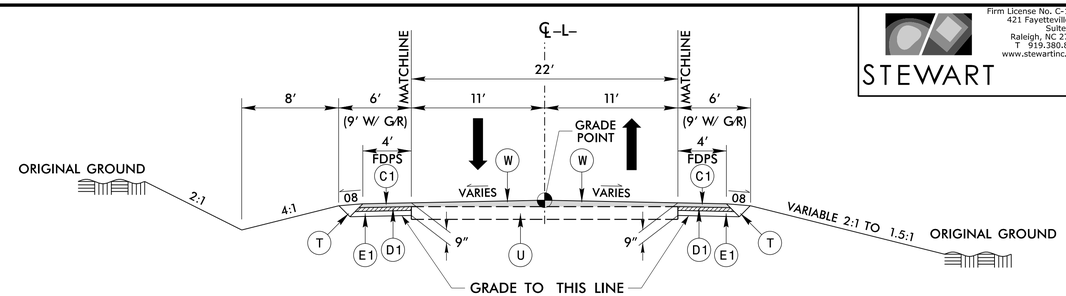
- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box (S)
- Utility Unknown U/G Line LOS B (S.U.E.*) (?UTL)
- U/G Tank; Water, Gas, Oil
- Underground Storage Tank, Approx. Loc. (UST)
- A/G Tank; Water, Gas, Oil
- Geoenvironmental Boring
- U/G Test Hole LOS A (S.U.E.*)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

8/17/99

REVISIONS

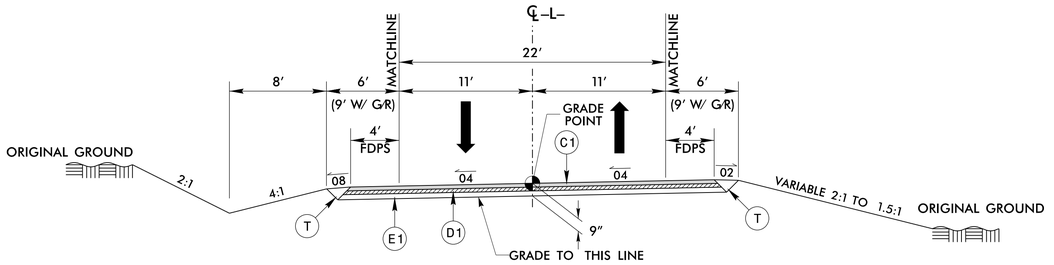
FINAL PAVEMENT SCHEDULE	
C1	PROP. APPROX. 1½" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 165 LBS. PER SQ. YD.
C2	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 110 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT TO EXCEED 1½" IN DEPTH.
D1	PROP. APPROX. 3½" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 399 LBS. PER SQ. YD.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 2½" IN DEPTH OR GREATER THAN 4" IN DEPTH.
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
E2	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5½" IN DEPTH.
R	SHOULDER BERM GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	ASPHALT WEDGING (SEE DETAIL)

NOTE: PAVEMENT EDGE SLOPES ARE 1:1, UNLESS SHOWN OTHERWISE



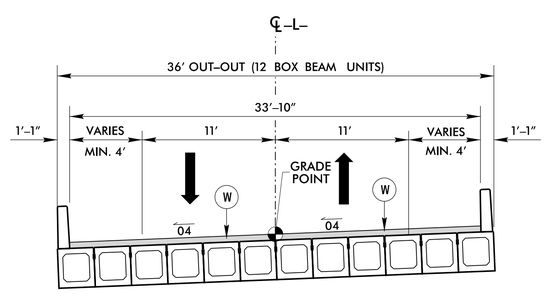
TYPICAL SECTION NO. 1

–L– STA. 10+00.00 TO –L– STA. 13+50.00
–L– STA. 18+00.00 TO –L– STA. 19+50.00



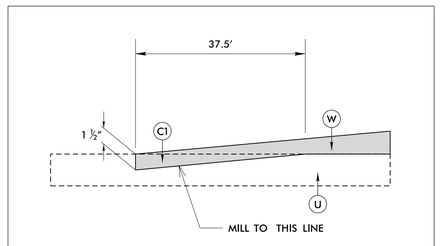
TYPICAL SECTION NO. 2

–L– STA. 13+50.00 TO –L– STA. 14+24.48 (BEGIN BRIDGE)
–L– STA. 15+09.52 (END BRIDGE) TO –L– STA. 18+00.00

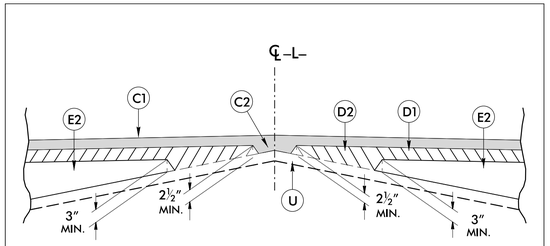


TYPICAL SECTION NO. 3

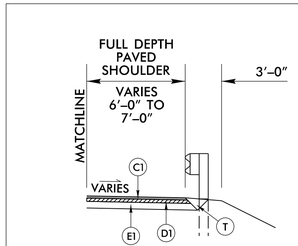
–L– STA. 14+24.48 (BEGIN BRIDGE) TO –L– STA. 15+09.52 (END BRIDGE)



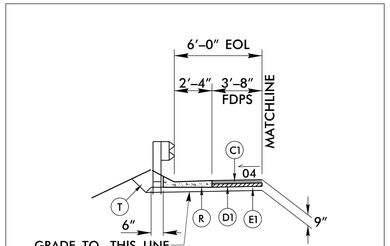
DETAIL SHOWING MILLED PAVEMENT PROFILE TIE–IN



DETAIL SHOWING METHOD OF WEDGING



DETAIL SHOWING PAVING TO THE FACE OF GUARDRAIL



DETAIL SHOWING GUARDRAIL WITH SHOULDER BERM GUTTER

USE SHOULDER BERM GUTTER AT THE FOLLOWING LOCATIONS:
–L– STA. 15+21.55 (END APPROACH SLAB) TO –L– STA. 15+37.00 (LEFT)

STEWART
Firm License No. C-1051
421 Fayetteville St.
Suite 400
Raleigh, NC 27601
T 919.380.8750
www.stewartinc.com

PROJECT REFERENCE NO.	SHEET NO.
B-4943	2A-1
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
B-4943	2G-1

GEOTECHNICAL ENGINEER

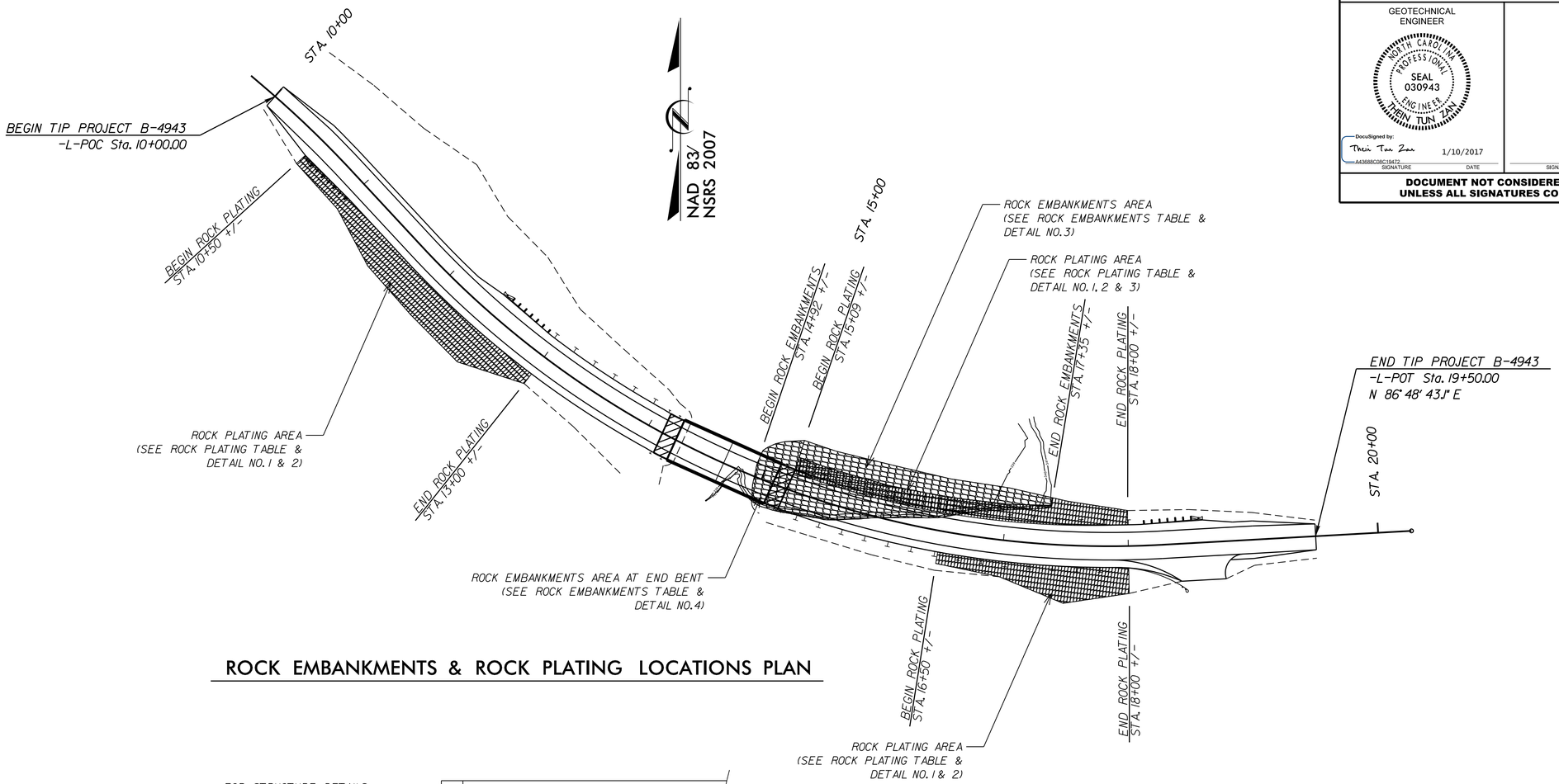
NORTH CAROLINA PROFESSIONAL SEAL 030943 ENGINEER THEIN TUN ZAN

DocuSigned by: Thein Tun Zan 1/10/2017
A43688C08C19472... SIGNATURE DATE

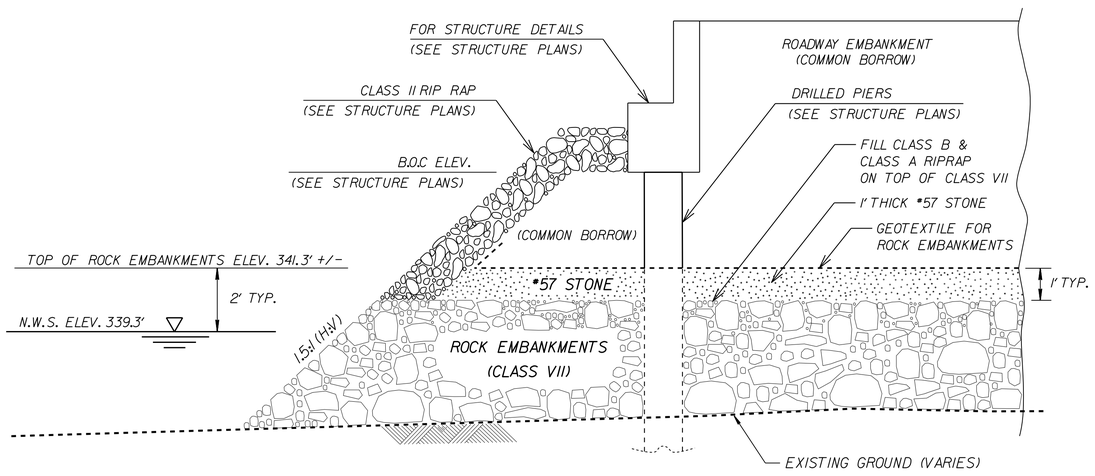
ENGINEER

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



ROCK EMBANKMENTS & ROCK PLATING LOCATIONS PLAN



ROCK EMBANKMENTS DETAIL NO. 4 – TYPICAL SECTION ALONG –L–

PREPARED BY: THEIN T. ZAN	DATE: 01-2017
REVIEWED BY: JAMES R. BATTS	DATE: 01-2017

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

ROCK EMBANKMENTS & ROCK PLATING

PLAN & DETAILS

REVISIONS

NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

PROJECT REFERENCE NO.	SHEET NO.
B-4943	2G-2

GEOTECHNICAL ENGINEER

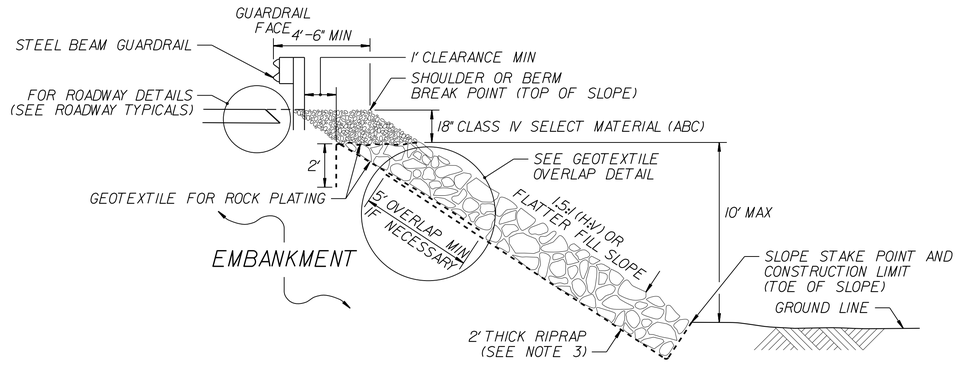
NORTH CAROLINA PROFESSIONAL SEAL 030943 ENGINEER THEIN TUN ZAN

DocuSigned by: Thein Tun Zan 1/10/2017 A43688C08C19472... SIGNATURE DATE

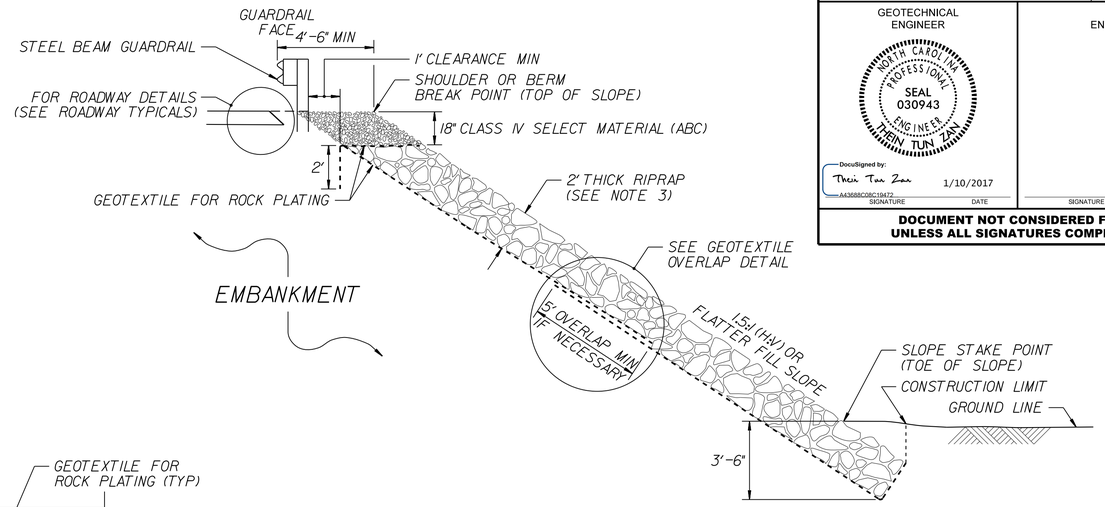
ENGINEER

SIGNATURE DATE

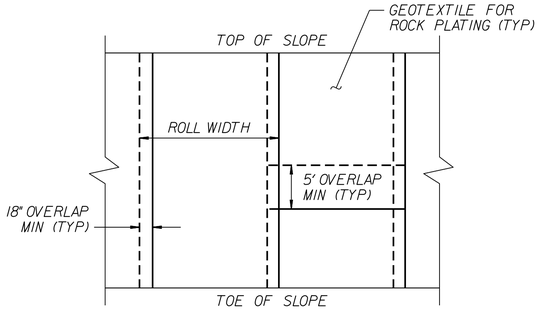
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



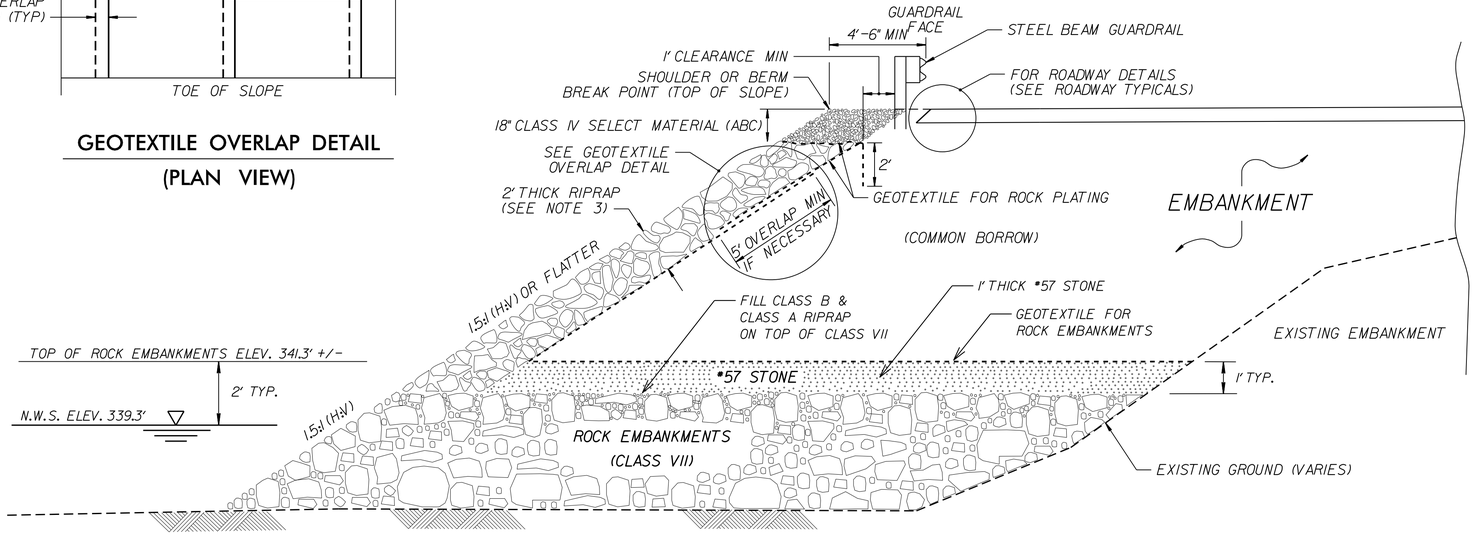
ROCK PLATING DETAIL NO. 1 – TYPICAL SECTION



ROCK PLATING DETAIL NO. 2 – TYPICAL SECTION



GEOTEXTILE OVERLAP DETAIL (PLAN VIEW)



ROCK EMBANKMENTS & ROCK PLATING DETAIL NO. 3 – TYPICAL SECTION

ROCK PLATING

FOR ROCK PLATING, SEE SECTION 275 OF THE STANDARD SPECIFICATIONS.

USE ROCK PLATING AT FOLLOWING LOCATIONS:

LINES	BEGINNING SLOPE	APPROX. STATION	ENDING SLOPE	APPROX. STATION	LOCATION LT/RT	ROCK PLATING DETAIL NO. 1/2/3	RIPRAP CLASS* 1/2/B	SY
-L-	2:1	10+50	1.5:1	11+25	RT	1	*	80
-L-	1.5:1	11+25	1.75:1	12+75	RT	2	*	435
-L-	1.75:1	12+75	2:1	13+00	RT	1	*	35
-L-	1.5:1	15+09	1.5:1	17+00	LT	3	*	445
-L-	1.5:1	17+00	1.75:1	17+75	LT	2	*	150
-L-	1.75:1	17+75	2:1	18+00	LT	1	*	30
-L-	2:1	16+50	1.75:1	17+25	RT	1	*	85
-L-	1.75:1	17+25	2:1	18+00	RT	2	*	210

USE CLASS 1,2 OR B RIPRAP FOR ROCK PLATING LOCATIONS.

ESTIMATED TOTAL QUANTITY OF ROCK PLATING = 1,470 SY

ROCK EMBANKMENTS

FOR ROCK EMBANKMENTS, SEE ROCK EMBANKMENTS SPECIAL PROVISION.

USE ROCK EMBANKMENTS AT FOLLOWING LOCATIONS:

-LINE-	APPROX. BEGINNING STATION	APPROX. ENDING STATION	LOCATION LT/RT
-L-	14+92 +/- -L-	17+35 +/- -L-	LEFT

CONSTRUCT ROCK EMBANKMENTS TO THE ELEVATION SHOWN IN THE ROCK EMBANKMENTS & ROCK PLATING DETAIL NO.3 AND DETAIL NO.4 OR 2 FT.ABOVE THE NORMAL WATER SURFACE AND ACCORDING TO THE ROCK EMBANKMENTS SPECIAL PROVISION.

FILL VOIDS IN THE TOP OF ROCK EMBANKMENTS WITH CLASS B AND CLASS A RIP RAP.

PLACE #57 STONE (SELECT MATERIAL, CLASS VI) UP TO 1 FT. ABOVE ROCK EMBANKMENTS AS SHOWN IN THIS PLAN.

CONSTRUCT ROCK PLATING ABOVE ROCK EMBANKMENTS FROM ELEVATION SHOWN IN THE ROCK EMBANKMENTS & ROCK PLATING DETAIL NO.3 OR 2 FT.ABOVE THE NORMAL WATER SURFACE TO THE SHOULDER HINGE POINT AND ACCORDING TO THE SECTION 275 OF THE STANDARD SPECIFICATIONS..

INSTALL GEOTEXTILE ON TOP OF NO.57 STONE IN ACCORDANCE WITH THE ARTICLE 270-3 OF THE STANDARD SPECIFICATIONS.

ESTIMATED MATERIAL QUANTITIES FOR ROCK EMBANKMENTS

ROCK EMBANKMENTS (SELECT MATERIAL,CLASS VII) = 3,030 TONS

RIP RAP CLASS A = 480 TONS

RIP RAP CLASS B = 480 TONS

#57 STONE (SELECT MATERIAL,CLASS VI) = 590 TONS

GEOTEXTILE FOR ROCK EMBANKMENTS = 950 SY

PREPARED BY: THEIN T. ZAN	DATE: 01-2017
REVIEWED BY: JAMES R. BATTS	DATE: 01-2017

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

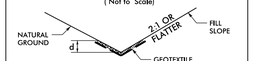
GEOTECHNICAL ENGINEERING UNIT

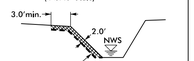
ROCK EMBANKMENTS & ROCK PLATING

NOTES & DETAILS

REVISIONS

NO.	BY	DATE	NO.	BY	DATE
1	-	-	3	-	-
2	-	-	4	-	-





PROJECT REFERENCE NO.	SHEET NO.
B-4943	4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART
Firm License No. C-1051
421 Fayetteville St,
Suite 400
Raleigh, NC 27601
T 919.380.8750
www.stewartinc.com

NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0929
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

8/17/99

REVISIONS

PI Sta 9+37.40
△ = 6° 40′ 35.9″ (RT)
D = 8° 56′ 13.8″
L = 74.71′
T = 37.40′
R = 641.10′

PI Sta 10+37.21
△ = 6° 37′ 04.4″ (RT)
D = 6° 50′ 03.9″
L = 96.83′
T = 48.47′
R = 838.34′
Runoff = Exist.

PI Sta 15+20.36
△ = 50° 18′ 52.0″ (LT)
D = 7° 38′ 22.0″
L = 658.61′
T = 352.24′
R = 750.00′
Runoff = 80′
S_e = 4%

DETAIL 1
TOE PROTECTION
(Not to Scale)

d=2 Ft.

Type of Liner= CLASS B Rip-Rap

FROM STA. 15+16 TO STA. 15+50 -L- RT

DETAIL 2
BANK STABILIZATION
(Not to Scale)

Type of Liner= CLASS II RIPRAP

STA 14+15 TO 14+50 L
STA 14+60 TO 14+90 L

PAVEMENT-BRIDGE RELATIONSHIP SKETCH

▨ EMBANKMENT EXCAVATION

FOR -L- PROFILE,SEE SHEET 5

FOR STRUCTURE PLANS,SEE SHEETS S-1THRU S-?

1/25/2017
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PROJ. REFERENCE NO.	SHEET NO.
B-4943	X-1A

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CROSS-SECTION SUMMARY

NOTE: EMBANKMENT COLUMN DOES NOT INCLUDE BACKFILL FOR UNDERCUT

Station -L- (Phase I)	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
14+00.00	0	0
14+24.48	49	23

Station -L- (Phase I)	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
15+09.52	0	0
15+50.00	0	809

Station -L- (Phase II)	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
10+00.00	0	0
10+50.00	333	2
11+00.00	460	4
11+50.00	621	26
12+00.00	620	54
12+50.00	643	35
13+00.00	675	5
13+50.00	496	11
14+00.00 RT	207	27
14+24.48 RT	0	20

Station -L- (Phase II)	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
15+50.00	0	0
16+00.00	2	836
16+50.00	9	623
17+00.00	15	417
17+50.00	17	275
18+00.00	18	150
18+50.00	8	62
19+00.00	2	31
19+50.00	4	4

APPROXIMATE QUANTITIES ONLY. UNCLASSIFIED EXCAVATION, FINE GRADING, CLEARING AND GRUBBING, AND REMOVAL OF EXISTING PAVEMENT WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR "GRADING"

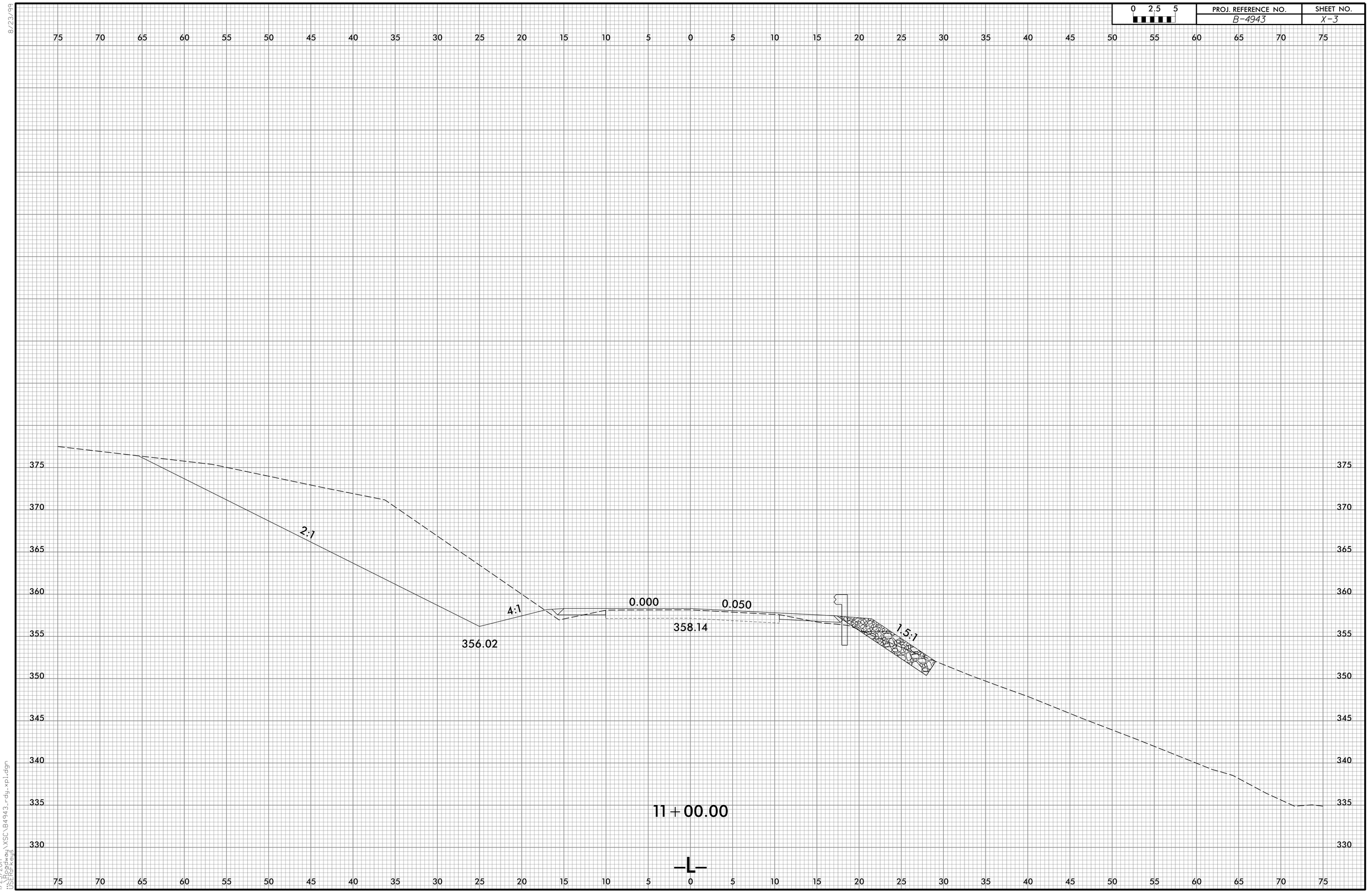
REVISIONS

8/17/99

1/25/2017 ...\Roadway\XSC\B4943_xpl_x1a.dgn

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	B-4943	X-3



1/25/2017
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8/23/99

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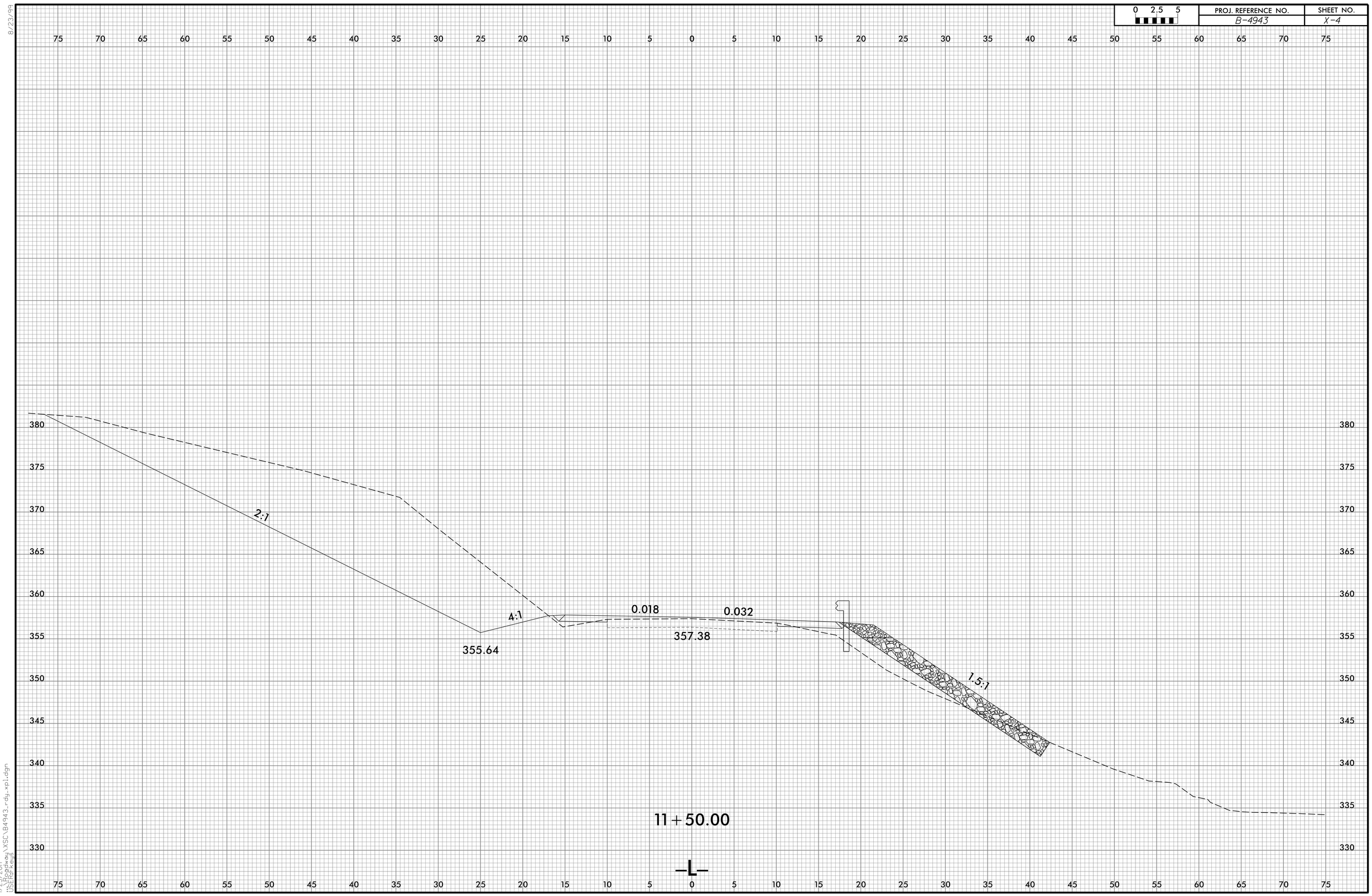

1/25/2017
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USERPKeys

8/23/99

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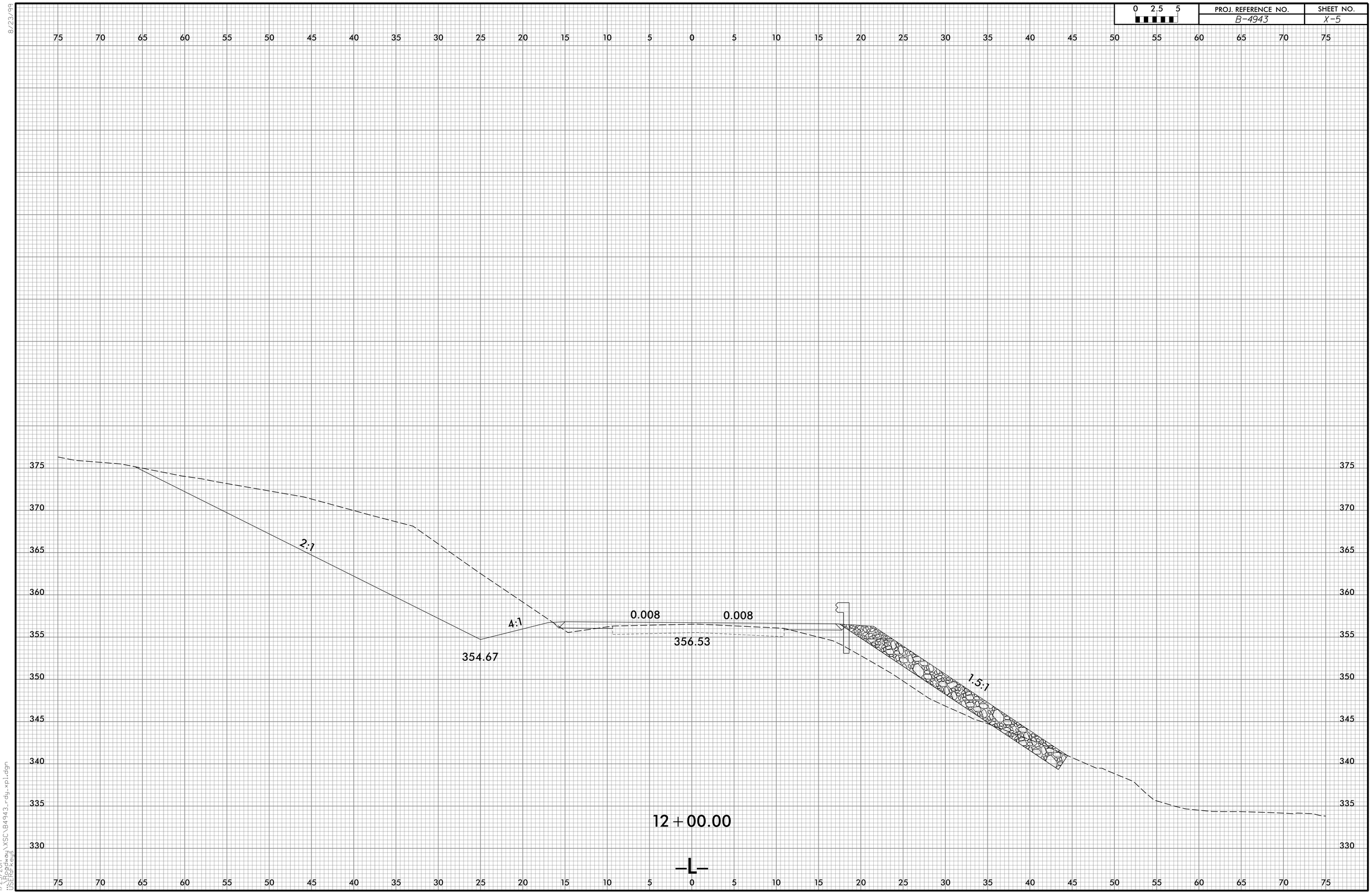

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	B-4943	X-6

8/23/99

1/25/2017
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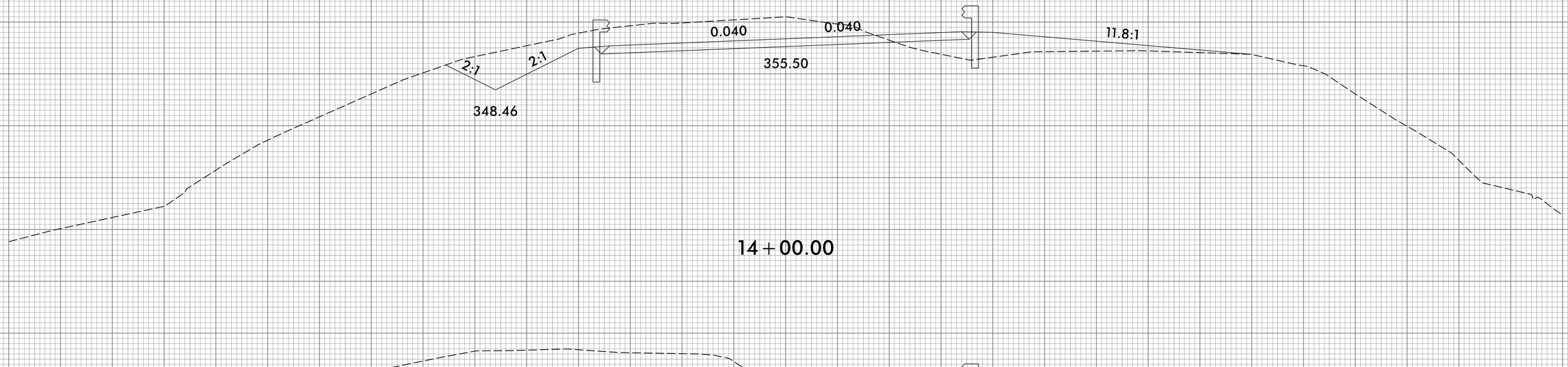
USER:Fkeys

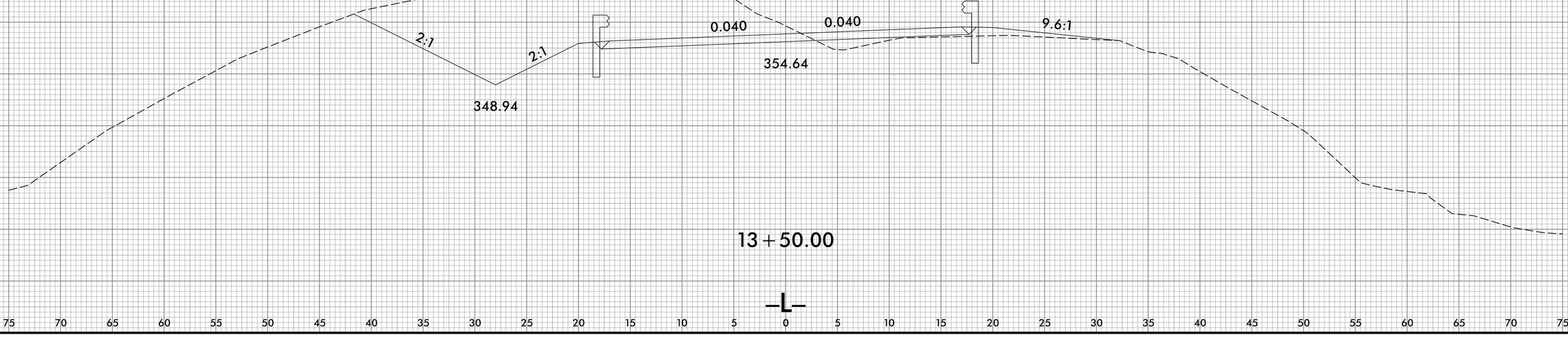
8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	B-4943	X-7

14+00.00



13+50.00



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8/23/99

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	B-4943	X-8

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345
340
335
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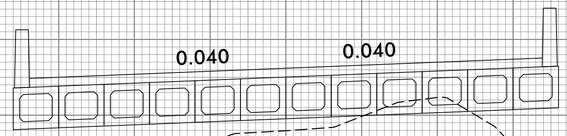

348.97

14+50.00

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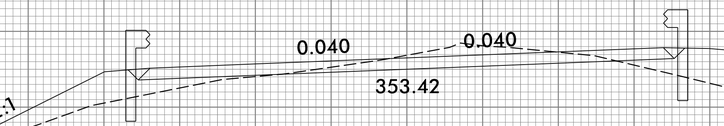

353.42

14+23.00

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8/23/99

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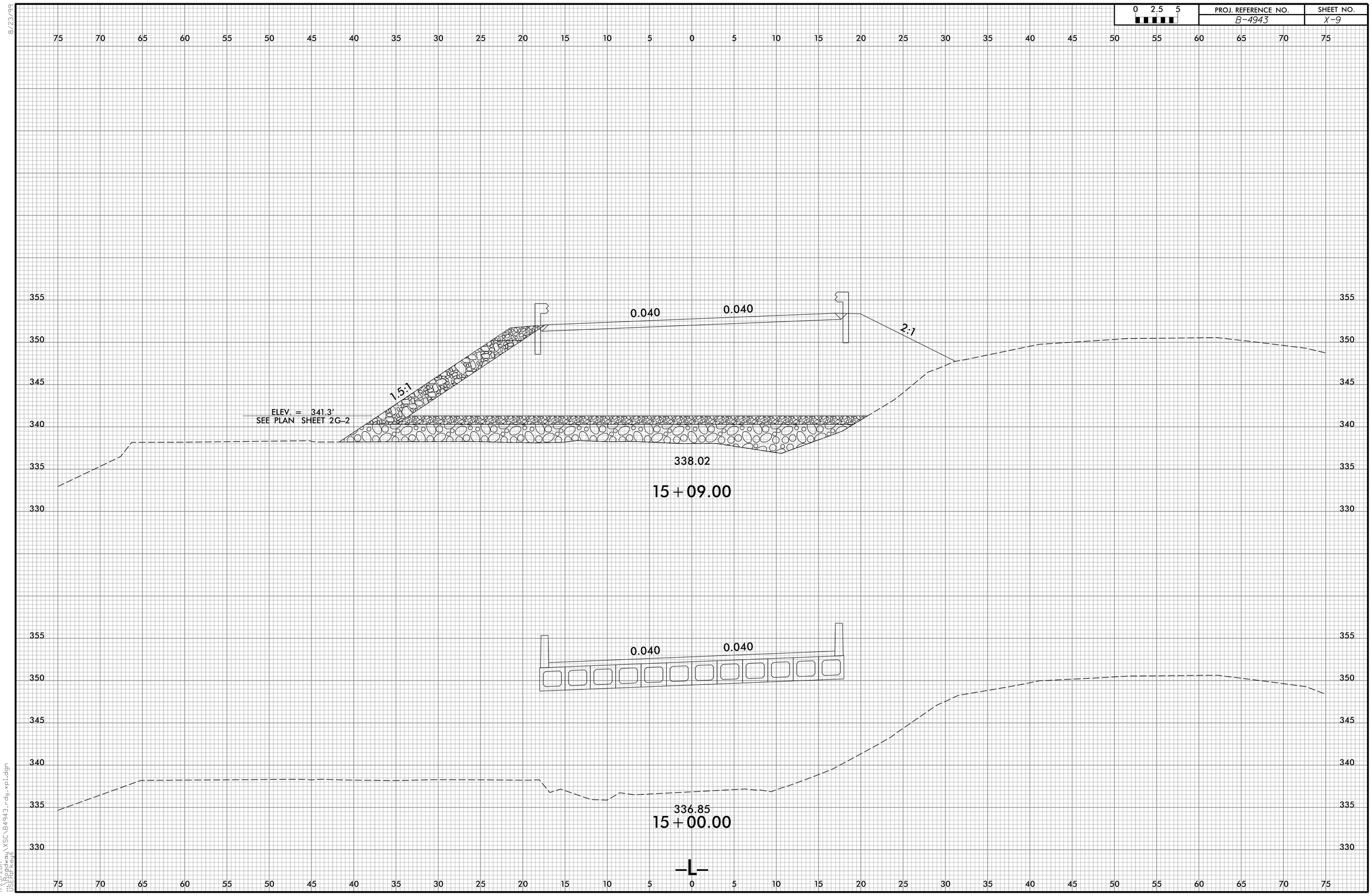
	B-4943	X-9



PROJ. REFERENCE NO.	SHEET NO.
B-4943	X-10

8/23/99

1/25/2017

8/23/99

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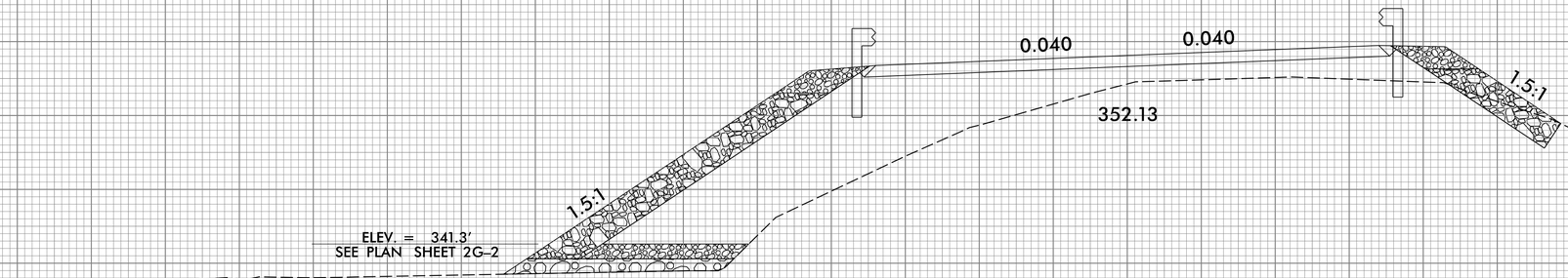
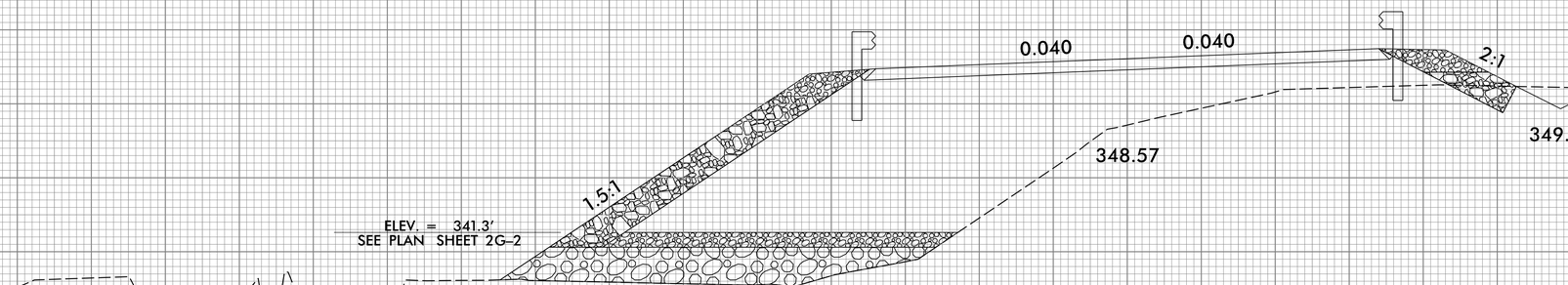


17+00.00



16+50.00

-L-

1/25/2017
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USERPKeys

8/23/99

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	B-4943	X-12

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

360 355 350

2:1 0.020 0.015 3:1

359.69

18+50.00

360 355 350

2:1 0.040 0.040 2:1

356.91

18+00.00

345 340 355 350 345 340 335 330

1.67:1 0.040 0.040 1.5:1

354.33

17+50.00

—L—

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

1/25/2017
C:\Projects\Highway\XSC\B4943_rdy_xpl.dgn
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