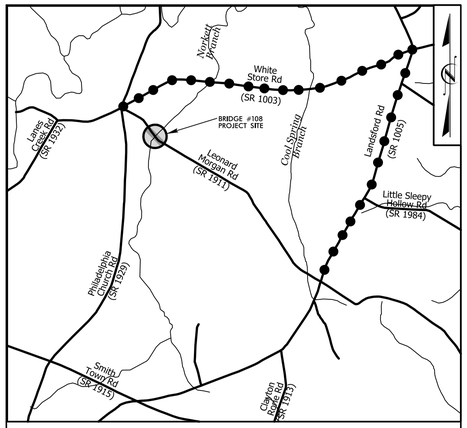
PROJECT WBS: BP10.R054.3

CONTRACT: DJ00509

See Sheet 1A For Index of Sheets
See Sheet 1B For Standard Symbology Sheet



FINAL PLANS

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

UNION COUNTY

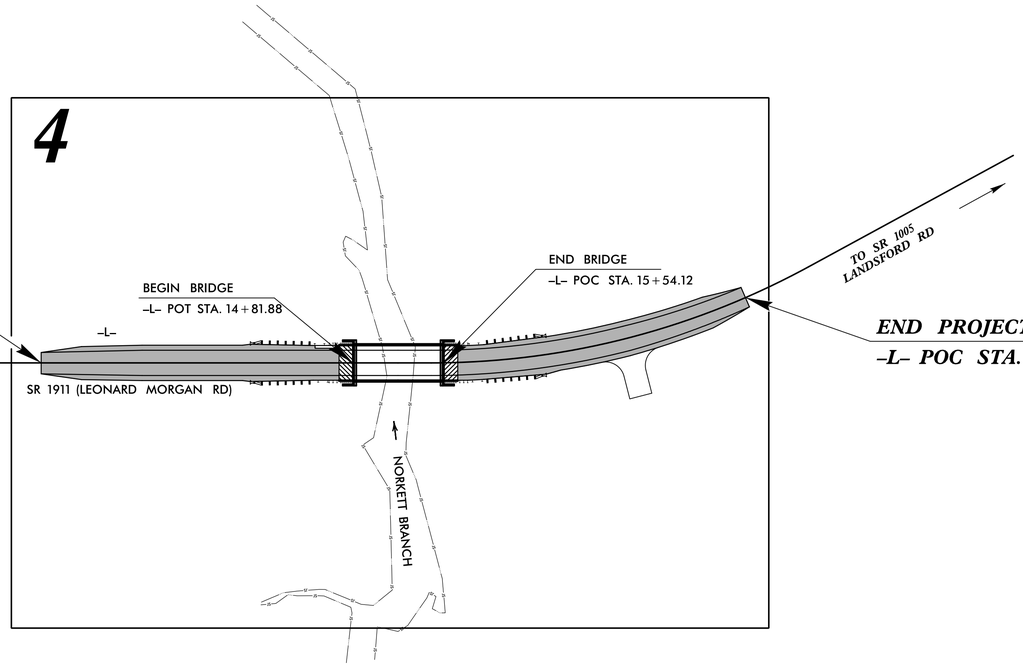
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BP10.R054.3	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
BP10.R054.1		P.E.
BP10.R054.2		ROW
BP10.R054.3		CONSTRUCTION

LOCATION: BRIDGE #108 OVER NORKETT BRANCH ON SR 1911 (LEONARD MORGAN RD)

TYPE OF WORK: GRADING, PAVING, DRAINAGE, & STRUCTURE

NAD 83 / NA 2011



GRAPHIC SCALES

PLANS: 20 10 0 20 40

PROFILE (HORIZONTAL): 20 10 0 20 40

PROFILE (VERTICAL): 4 2 0 4 8

DESIGN DATA

ADT 2012 = 240
ADT 2045 = 480
K = N/A
D = N/A
T = 6%
V = 45 MPH
FUNC. CLASSIFICATION: LOCAL
SUB REGIONAL TIER

PROJECT LENGTH

LENGTH OF ROADWAY PROJECT WBS BP10.R054.3 = 0.093 MILES

LENGTH OF STRUCTURE PROJECT WBS BP10.R054.3 = 0.014 MILES

TOTAL LENGTH OF PROJECT WBS BP10.R054.3 = 0.107 MILES

NCDOT CONTACT: YANWEI MA, PE
Division Bridge Manager

PLANS PREPARED FOR THE NCDOT BY:

STV Engineers, Inc.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
JUNE 20, 2023

LETTING DATE:
FEBRUARY 7, 2024

NIKKI T. HONEYCUTT, PE
PROJECT ENGINEER

STEPHEN L. SAUCIER
PROJECT DESIGNER

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 038053 DAVIN C. MORRISON P.E.

1/5/2024
SIGNATURE:

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039234 NIKKI T. HONEYCUTT P.E.

1/5/2024
SIGNATURE:

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

1/5/2024
R:\Roadway\Proj\SHT\R054_rdy_psh01_tsh.dgn
SaucieSL

STV Engineers, Inc.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

PROJECT REFERENCE NO.	SHEET NO.
BP10.R054.3	1A
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039234 ENGINEER NANCY T. HONEYCUTT
1/5/2024

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

INDEX OF SHEETS

SHEET NUMBER	SHEET
1	TITLE SHEET
1A	INDEX OF SHEETS, GENERAL NOTES, AND LIST OF STANDARD DRAWINGS
1B	CONVENTIONAL SYMBOLS
2A-1	TYPICAL SECTIONS SHEET
3B-1	SUMMARIES SHEET
3G-1	SUMMARY OF SUBSURFACE DRAINAGE
3P-1	PARCEL DATA SHEET
4	PLAN SHEET
5	PROFILE SHEET
RW2C-1 THRU RW2C-2	SURVEY CONTROL SHEETS
TMP-1 THRU TMP-2	TRANSPORTATION MANAGEMENT PLANS
PMP-1 THRU PMP-2	PAVEMENT MARKING PLANS
EC-1 THRU EC-5	EROSION CONTROL PLANS
X-1 THRU X-6	CROSS-SECTIONS
S-1 THRU S-18	STRUCTURE PLANS
SN	STRUCTURE NOTES

GENERAL NOTES

GENERAL NOTES: 2024 SPECIFICATIONS
EFFECTIVE: 01-01-2024

GRADE LINE:
GRADING AND SURFACING:

THE GRADE LINES SHOWN DENOTE THE FINISHED ELEVATION OF THE PROPOSED SURFACING AT GRADE POINTS SHOWN ON THE TYPICAL SECTIONS. GRADE LINES MAY BE ADJUSTED AT THEIR BEGINNING AND ENDING AND AT STRUCTURES AS DIRECTED BY THE ENGINEER IN ORDER TO SECURE A PROPER TIE-IN.

CLEARING:

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.

SUPERELEVATION:

ALL CURVES ON THIS PROJECT SHALL BE SUPERELEVATED IN ACCORDANCE WITH STD. NO. 225.04 USING THE RATE OF SUPERELEVATION AND RUNOFF SHOWN ON THE PLANS. SUPERELEVATION IS TO BE REVOLVED ABOUT THE GRADE POINTS SHOWN ON THE TYPICAL SECTIONS.

SHOULDER CONSTRUCTION:

ASPHALT, EARTH, AND CONCRETE SHOULDER CONSTRUCTION ON THE HIGH SIDE OF SUPERELEVATED CURVES SHALL BE IN ACCORDANCE WITH STD. NO. 560.01.

SUBSURFACE DRAINS:

SUBSURFACE DRAINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. NO. 815.02 AT LOCATIONS DIRECTED BY THE ENGINEER.

GUARDRAIL:

THE GUARDRAIL LOCATIONS SHOWN ON THE PLANS MAY BE ADJUSTED DURING CONSTRUCTION AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHOULD CONSULT WITH THE ENGINEER PRIOR TO ORDERING GUARDRAIL MATERIAL.

END BENTS:

THE ENGINEER SHALL CHECK THE STRUCTURE END BENT PLANS, DETAILS, AND CROSS-SECTION PRIOR TO SETTING OF THE SLOPE STAKES FOR THE EMBANKMENT OR EXCAVATION APPROACHING A BRIDGE.

RIGHT-OF-WAY MARKERS:

ALL RIGHT-OF-WAY MARKERS ON THIS PROJECT SHALL BE PLACED BY OTHERS.

STANDARD DRAWINGS

2024 ROADWAY ENGLISH STANDARD DRAWINGS EFF. January, 2024

The following Roadway Standards as appear in "Roadway Standard Drawings" Highway Design Branch - N. C. Department of Transportation - Raleigh, N. C., Dated January, 2024 are applicable to this project and by reference hereby are considered a part of these plans:

STD.NO.	TITLE
DIVISION 2 - EARTHWORK	
200.02	Method of Clearing - Method II
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superelevation - Two Lane Pavement
DIVISION 3 - PIPE CULVERTS	
300.01	Method of Pipe Installation - Flexible Pipe
310.10	Driveway Pipe Construction - Using No Special End Sections
DIVISION 4 - MAJOR STRUCTURES	
423.03	Bridge Approach Fills - Type 2 Approach Fill
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
DIVISION 8 - INCIDENTALS	
815.02	Subsurface Drain
840.00	Concrete Base Pad for Drainage Structures
840.25	Anchorage for Frames - Brick/Concrete/Precast Concrete
840.29	Frame and Narrow Slot Flat Grates
840.35	Traffic Bearing Grated Drop Inlet
840.46	Traffic Bearing Precast Drainage Structure
840.66	Drainage Structure Steps
846.01	Concrete Curb, Gutter, and Curb & Gutter
846.04	Drop Inlet Installation in Shoulder Berm Gutter
862.01	Guardrail Placement
862.02	Guardrail Installation
862.03	Structure Anchor Units
876.01	Rip Rap in Channels and Ditches
876.04	Drainage Ditches With Class 'B' Rip Rap
DIVISION 11 - WORK ZONE TRAFFIC CONTROL	
1101.03	Temporary Road Closures
1110.01	Stationary Work Zone Signs - Mounting Height & Lateral Clearance
1145.01	Barricades - Type III

9/10/2021

PROJECT REFERENCE NO.	SHEET NO.
BP10.R054.3	1B

STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

Note: Not to Scale

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin (EIP) — EIP
- Computed Property Corner
- Existing Concrete Monument (ECM) — 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 & PROJECT CONTROL:

- Primary Horiz Control Point
- Primary Horiz and Vert Control Point
- Secondary Horiz and Vert Control Point
- Vertical Benchmark
- Existing Right of Way Monument
- Proposed Right of Way Monument (Rebar and Cap)
- Proposed Right of Way Monument (Concrete)
- Existing Permanent Easement Monument
- Proposed Permanent Easement Monument (Rebar and Cap)
- Existing C/A Monument
- Proposed C/A Monument (Rebar and Cap)
- Proposed C/A Monument (Concrete)
- Existing Right of Way Line
- Proposed Right of Way Line — RW
- Existing Control of Access Line — CA
- Proposed Control of Access Line — CA
- Proposed ROW and CA Line — RW CA
- 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

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:

** SUE – Subsurface Utility Engineering*
LOS – Level of Service – A,B,C or D (Accuracy)

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — P
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole — HH
- H–Frame Pole
- U/G Power Line Test Hole (SUE – LOS A)*
- U/G Power Line (SUE – LOS B)* — P
- U/G Power Line (SUE – LOS C)* — P
- U/G Power Line (SUE – LOS D)* — 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 Test Hole (SUE – LOS A)*
- U/G Telephone Cable (SUE – LOS B)* — T
- U/G Telephone Cable (SUE – LOS C)* — T
- U/G Telephone Cable (SUE – LOS D)* — T
- U/G Telephone Conduit (SUE – LOS B)* — TC
- U/G Telephone Conduit (SUE – LOS C)* — TC
- U/G Telephone Conduit (SUE – LOS D)* — TC
- U/G Fiber Optics Cable (SUE – LOS B)* — T FO
- U/G Fiber Optics Cable (SUE – LOS C)* — T FO
- U/G Fiber Optics Cable (SUE – LOS D)* — T FO

WATER:

- Water Manhole — W
- Water Meter
- Water Valve
- Water Hydrant
- U/G Water Line Test Hole (SUE – LOS A)*
- U/G Water Line (SUE – LOS B)* — W
- U/G Water Line (SUE – LOS C)* — W
- U/G Water Line (SUE – LOS D)* — W
- Above Ground Water Line — A/G Water

TV:

- TV Pedestal — C
- TV Tower
- U/G TV Cable Hand Hole — HH
- U/G TV Test Hole (SUE – LOS A)*
- U/G TV Cable (SUE – LOS B)* — TV
- U/G TV Cable (SUE – LOS C)* — TV
- U/G TV Cable (SUE – LOS D)* — TV
- U/G Fiber Optic Cable (SUE – LOS B)* — TV FO
- U/G Fiber Optic Cable (SUE – LOS C)* — TV FO
- U/G Fiber Optic Cable (SUE – LOS D)* — TV FO

GAS:

- Gas Valve
- Gas Meter
- U/G Gas Line Test Hole (SUE – LOS A)*
- U/G Gas Line (SUE – LOS B)* — G
- U/G Gas Line (SUE – LOS C)* — G
- U/G Gas Line (SUE – LOS D)* — 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 Force Main Line Test Hole (SUE – LOS A)*
- SS Force Main Line (SUE – LOS B)* — FSS
- SS Force Main Line (SUE – LOS C)* — FSS
- SS Force Main Line (SUE – LOS D)* — FSS

MISCELLANEOUS:

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

1/5/2024
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DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STV Engineers, Inc.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

PROJECT REFERENCE NO.	SHEET NO.
BP10.R054.3	2A-1
R/W SHEET NO.	

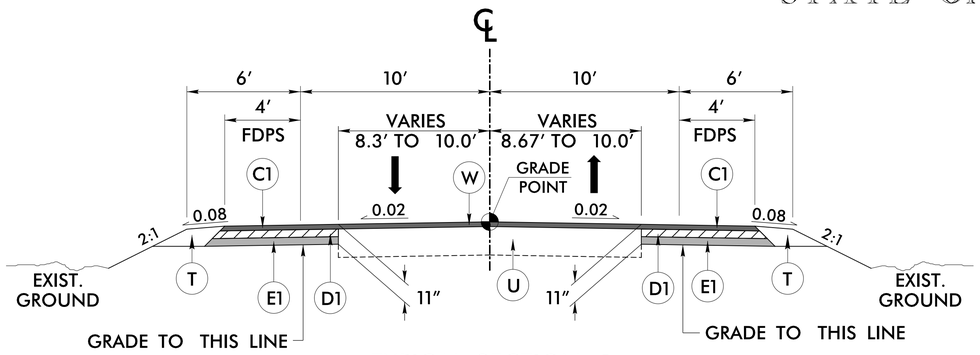
ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039214 ENGINEER MICHAEL T. HONEYCUTT
1/5/2024

PAVEMENT DESIGN ENGINEER

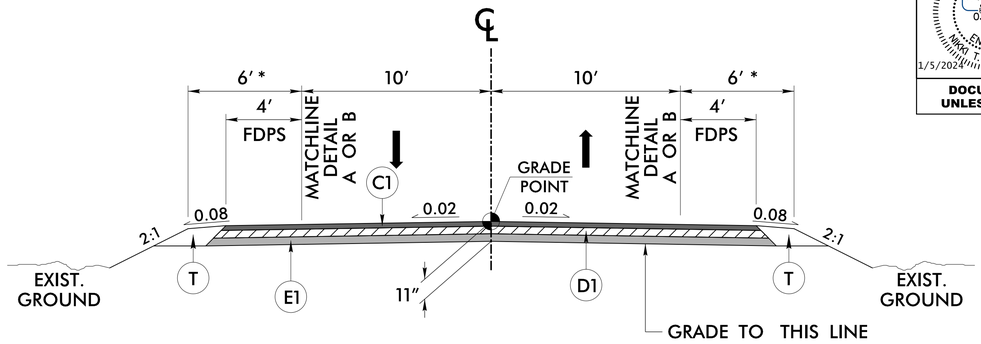
PAVEMENT DESIGN PROVIDED BY NCDOT

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



TYPICAL SECTION 1

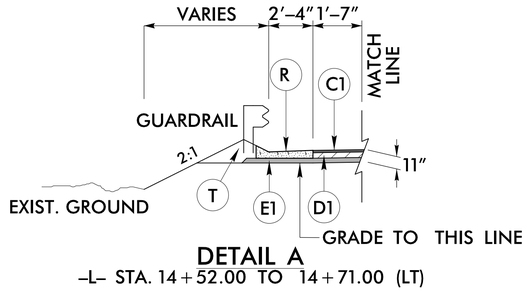
–L– STA. 12+35.00 TO 14+00.00
–L– STA. 17+00.00 TO 18+00.00



TYPICAL SECTION 2

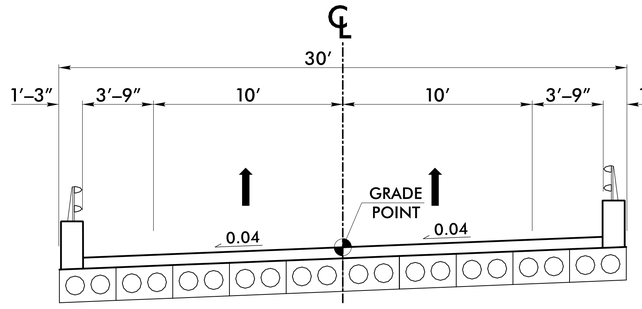
*9′ W/GUARDRAIL

–L– STA. 14+00.00 TO 14+81.88 (BEGIN BRIDGE)
–L– STA. 15+54.12 (END BRIDGE) TO 17+00.00



DETAIL A

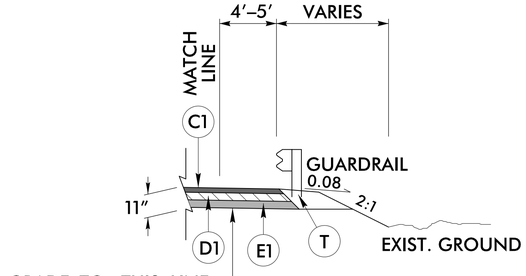
–L– STA. 14+52.00 TO 14+71.00 (LT)



TYPICAL SECTION 3

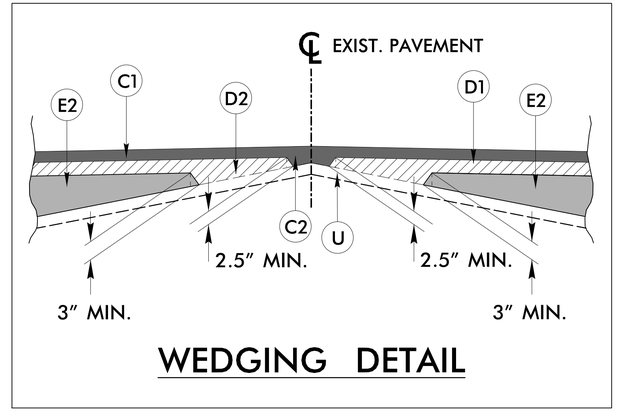
–L– STA. 14+81.88 (BEGIN BRIDGE) TO 15+54.12 (END BRIDGE)

PAVEMENT SCHEDULE	
C1	PROP. APPROX. 3.0″ ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
C2	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1″ DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 1.5″ IN DEPTH OR GREATER THAN 2.0″ IN DEPTH.
D1	PROP. APPROX. 4.0″ ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1″ DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 2.5″ IN DEPTH OR GREATER THAN 4″ IN DEPTH.
E1	PROP. APPROX. 4.0″ ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
E2	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1″ DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 3.0″ IN DEPTH OR GREATER THAN 5.5″ IN DEPTH.
R	SHOULDER BERM GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE WEDGING DETAIL)



DETAIL B

–L– STA. 14+00.63 TO 14+52.00 (LT)
–L– STA. 14+71.00 TO 14+81.88 (LT)
–L– STA. 14+00.63 TO 14+81.88 (RT)
–L– STA. 15+53.91 TO 16+33.27 (RT)
–L– STA. 15+54.35 TO 16+37.41 (LT)



WEDGING DETAIL

COMPUTED BY: SLS DATE: 11/28/22
CHECKED BY: GHM DATE: 11/29/22

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STV Engineers, Inc.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

PROJECT REFERENCE NO.	SHEET NO.
BP10.R054.3	3B-1

EARTHWORK SUMMARY (IN CUBIC YARDS)

CHAIN	FROM STATION	TO STATION	SIDE	UNCL. EXCAVATION	UNDERCUT	EMBT + %	BORROW	WASTE
–L–	12+35.00	14+81.88 (BR)	LT & RT	71		427	356	
–L–	15+54.12 (BR)	18+00.00	LT & RT	132		619	487	
TOTAL				203		1046	843	
MATERIAL FOR SHOULDER CONSTRUCTION						88	88	
ADDITIONAL UNDERCUT					450	540	540	
PROJECT TOTAL				203		1134	931	
ESTIMATE 5% FOR TOPSOIL ON BORROW PITS							47	
GRAND TOTAL				203	450	1674	1518	
SAY				210			1520	

EST DDE 120 CY

NOTE: Approximate quantities only. Unclassified Excavation, Borrow Excavation, Fine Grading, Clearing and Grubbing, Breaking of Existing Pavement, and Removal of Existing Pavement will be paid for at the contract lump sum price for "Grading."

LIST OF PIPES, ENDWALLS, ETC. (FOR PIPES 48" & UNDER)

STATION	SIZE / THICKNESS OR GAUGE	LOCATION (LT,RT, OR CL)	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	DRAINAGE PIPE (RCP, CSP, CAAP, HDPE, PVC, OR PP PIPE) 12"	15"	18"	24"	30"	36"	42"	48"	DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE	DO NOT USE PVC	DO NOT USE PP PIPE
–L– STA. 14+57		LT	0401	0400	455.1	452.4	449.0			40												
–L– STA. 17+15		RT	0403	0402	460.9	458.9	457.0					32										
TOTAL										40		32										

STATION	CLASS IV R.C. PIPE (UNLESS NOTED OTHERWISE) 12"	15"	18"	24"	30"	36"	42"	CLASS III R.C. PIPE OR ALUMINIZED C.S. PIPE, TYPE IR OR HDPE PIPE, TYPE S OR D 12"	15"	18"	24"	30"	36"	42"	48"	15" SIDE DRAIN PIPE	18" SIDE DRAIN PIPE	24" SIDE DRAIN PIPE
–L– STA. 14+57																		
–L– STA. 17+15																		
TOTAL																		

STATION	ENDWALLS STD. 838.01, STD. 838.11 OR STD. 838.80 (UNLESS NOTED OTHERWISE) CU. YDS. R.C.P.	C.S.P.	QUANTITIES FOR DRAINAGE STRUCTURES * TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. "A" + (1.3 X COL."B") LIN. *FT. PER EACH (0 THRU 5.0')	A 5.0' THRU 10.0'	B 10.0' AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME AND GRATE STD. 840.16	G.D.I. TYPE "A" STD. 840.17 OR 840.26	G.D.I. TYPE "B" STD. 840.18 OR 840.27	G.D.I. TYPE "D" STD. 840.19 OR 840.28	T.B.DI. STD. 840.35	G.D.I. FRAME WITH GRATE STD. 840.20	G.D.I. FRAME WITH TWO GRATES STD. 840.20	G.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.29	G.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	J.B. STD. 840.31 OR 840.32	15" C.S. ELBOW	CONC. COLLARS CL. "B" C.Y. STD 840.72	CONC. & BRICK PIPE PLUG, C.Y. STD. 840.71	PIPE REMOVAL LIN.FT.	REMARKS
–L– STA. 14+57			1											1			1			2				
–L– STA. 17+15																							17	
TOTAL			1											1			1			2			17	

ABBREVIATIONS

C.B.	CATCH BASIN
N.D.I.	NARROW DROP INLET
D.I.	DROP INLET
G.D.I.	GRATED DROP INLET
G.D.I. (N.S.)	GRATED DROP INLET (NARROW SLOT)
J.B.	JUNCTION BOX
M.H.	MANHOLE
T.B.D.I.	TRAFFIC BEARING DROP INLET
T.B.J.B.	TRAFFIC BEARING JUNCTION BOX

* W MEASURED FROM "N" AT THE BEGINNING OF THE ANCHOR TO "N" AT THE END OF THE ANCHOR.
"N" = DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL.
TOTAL SHOULDER WIDTH = DISTANCE FROM EDGE OF TRAVEL LANE TO SHOULDER BREAK POINT.
FLARE LENGTH = DISTANCE FROM LAST SECTION OF PARALLEL GUARDRAIL TO END OF GUARDRAIL.
W = TOTAL WIDTH OF FLARE FROM BEGINNING OF TAPER TO END OF GUARDRAIL.
G = GATING IMPACT ATTENUATOR TYPE 350
NG = NON-GATING IMPACT ATTENUATOR TYPE 350

GUARDRAIL SUMMARY

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH STRAIGHT	LENGTH SHOP CURVED	LENGTH DOUBLE FACED	WARRANT POINT APPROACH END	WARRANT POINT TRAILING END	"N" DIST. FROM E.O.L.	TOTAL SHOUL. WIDTH	FLARE LENGTH APPROACH END	FLARE LENGTH TRAILING END	W* APPROACH END	W* TRAILING END	ANCHORS XI MOD	B-77	GREU TL-3	M-350	TYPE III	CAT-1	VI MOD	BIC	AT-1	IMPACT ATTENUATOR TYPE 350 EA	G	NG	SINGLE FACED GUARDRAIL	REMOVE EXISTING GUARDRAIL	REMOVE AND STOCKPILE EXISTING GUARDRAIL	REMARKS
–L–	14+00.63	14+81.88 (BR)	LT	81.25				14+00.63	3.9 – 4.9	6.9 – 7.9		50		1			1		1										
–L–	14+00.63	14+81.88 (BR)	RT	81.25			14+00.63		3.9 – 4.9	6.9 – 7.9	50		1				1		1										
–L–	15+53.91 (BR)	16+33.27	RT	81.25				15+53.91	4.0 – 5.6	7.0 – 8.6		50		1			1		1										
–L–	15+54.35 (BR)	16+37.41	LT	81.25			15+54.35		3.8 – 4.2	6.8 – 7.2	50		1				1		1										
TOTAL:				325													4 EA		4 EA										
TOTAL ANCHOR LENGTH:				275																									
TOTAL GUARDRAIL LENGTH:				50			5 ADDITIONAL GUARDRAIL POSTS																						
SAY:				62.5 LF																									

1/5/2024
R:\Roadway\Proj\SHT\R054_rdy_psh03B-1.dgn
SaucierSL

COMPUTED BY: Eddie Beverly DATE: November 7, 2023
CHECKED BY: Shiping Yang

(5-15-18)

PROJECT NO.	SHEET NO.
BP10.R054.3 (SF-890108)	3G-1

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

SUMMARY OF SUBSURFACE DRAINAGE

LINE	Station	Station	Location LT/RT/CL	Drain Type* UD/BD/SD	LF
CONTINGENCY				SD	200
				TOTAL LF:	200

*UD = Underdrain
*BD = Blind Drain
*SD = Subsurface Drain

6/2/99

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT REFERENCE NO.	SHEET NO.
BP10.R054.3	3P-1

STV Engineers, Inc.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

PARCEL INDEX SHEET

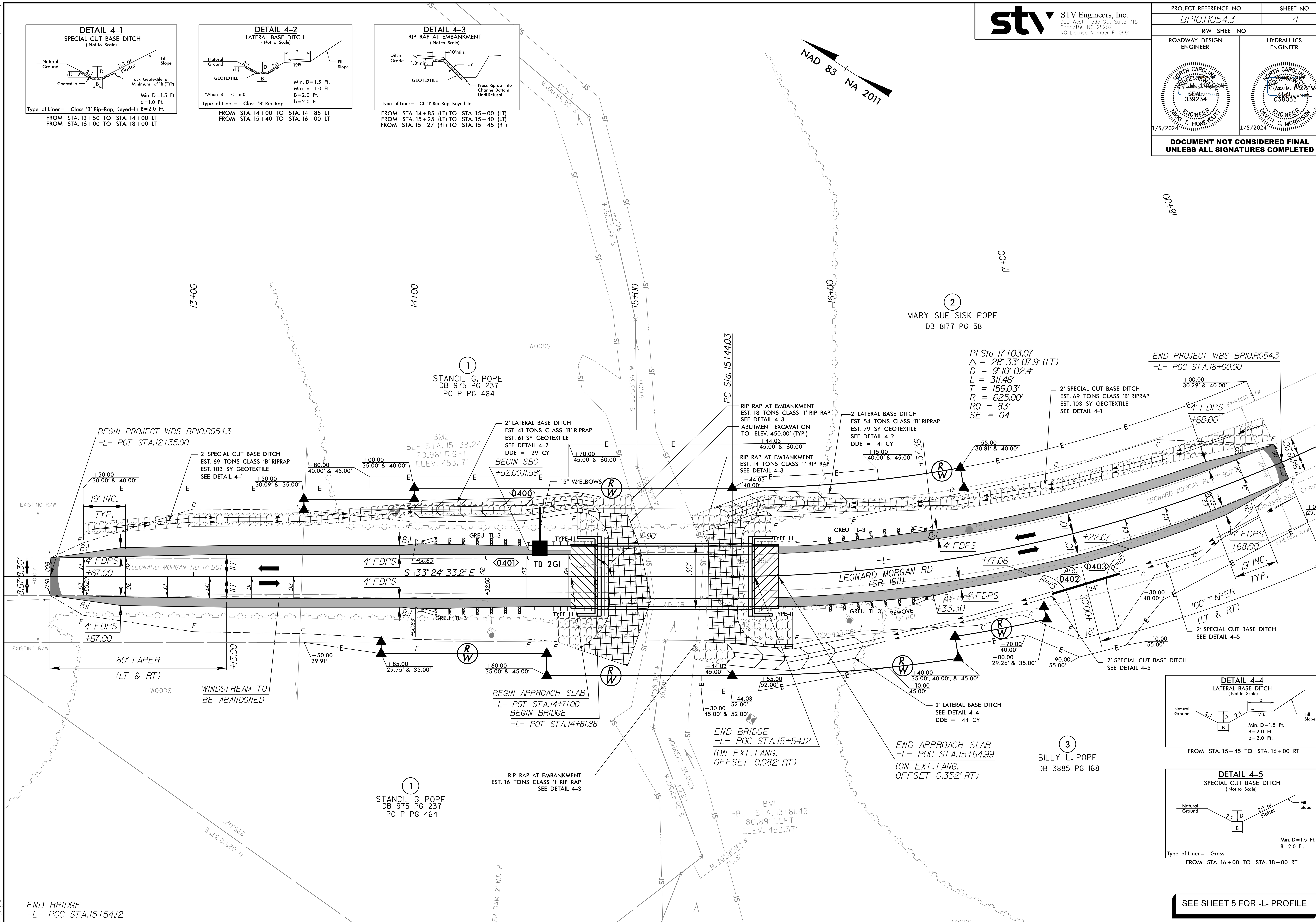
PARCEL NO.	SHEET NO.	PROPERTY OWNER NAME	AREA TAKEN	
			ROW (SF)	TCE (SF)
1	4	STANCIL G. POPE	2475	2426
2	4	MARY SUE SISK POPE	1297	2466
3	4	BILLY L. POPE	2362	2107

PROJECT REFERENCE NO.	SHEET NO.
BPI0.R054.3	4
R/W SHEET NO.	

STV Engineers, Inc.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

ROADWAY DESIGN ENGINEER — HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



DETAIL 4-1
SPECIAL CUT BASE DITCH
(Not to Scale)
Type of Liner= Class 'B' Rip-Rap, Keyed-In
Min. D=1.5 Ft.
d=1.0 Ft.
B=2.0 Ft.
FROM STA. 12+50 TO STA. 14+00 LT
FROM STA. 16+00 TO STA. 18+00 LT
DETAIL 4-2
LATERAL BASE DITCH
(Not to Scale)
Min. D=1.5 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
b=2.0 Ft.
Type of Liner= Class 'B' Rip-Rap
FROM STA. 14+00 TO STA. 14+85 LT
FROM STA. 15+40 TO STA. 16+00 LT
DETAIL 4-3
RIP RAP AT EMBANKMENT
(Not to Scale)
Press Riprap into Channel Bottom Until Refusal
Type of Liner= CL 'I' Rip-Rap, Keyed-In
FROM STA. 14+85 (LT) TO STA. 15+00 (LT)
FROM STA. 15+25 (LT) TO STA. 15+40 (LT)
FROM STA. 15+27 (RT) TO STA. 15+45 (RT)
NAD 83 NA 2011
BEGIN PROJECT WBS BPI0.R054.3
-L- POT STA.12+35.00
END PROJECT WBS BPI0.R054.3
-L- POC STA.18+00.00
STANCIL G. POPE
DB 975 PG 237
PC P PG 464
MARY SUE SISK POPE
DB 8177 PG 58
BILLY L. POPE
DB 3885 PG 168
PI Sta 17+03.07
Δ = 28° 33' 07.9" (LT)
D = 9° 10' 02.4"
L = 311.46'
T = 159.03'
R = 625.00'
RO = 83'
SE = 04
LEONARD MORGAN RD
(SR 1911)
S 33° 24' 33.2" E
BM2
-BL- STA. 15+38.24
20.96' RIGHT
ELEV. 453.17'
BM1
-BL- STA. 13+81.49
80.89' LEFT
ELEV. 452.37'
PC Sta. 15+44.03
BEGIN APPROACH SLAB
-L- POT STA.14+71.00
BEGIN BRIDGE
-L- POT STA.14+81.88
END BRIDGE
-L- POC STA.15+54.12
(ON EXT.TANG. OFFSET 0.082' RT)
END APPROACH SLAB
-L- POC STA.15+64.99
(ON EXT.TANG. OFFSET 0.352' RT)
80' TAPER (LT & RT)
100' TAPER (LT & RT)
WINDSTREAM TO BE ABANDONED
TB 2GI
2' SPECIAL CUT BASE DITCH
EST. 69 TONS CLASS 'B' RIPRAP
EST. 103 SY GEOTEXTILE
SEE DETAIL 4-1
2' LATERAL BASE DITCH
EST. 41 TONS CLASS 'B' RIPRAP
EST. 61 SY GEOTEXTILE
SEE DETAIL 4-2
DDE = 29 CY
RIP RAP AT EMBANKMENT
EST. 18 TONS CLASS 'I' RIP RAP
SEE DETAIL 4-3
ABUTMENT EXCAVATION TO ELEV. 450.00' (TYP.)
RIP RAP AT EMBANKMENT
EST. 14 TONS CLASS 'I' RIP RAP
SEE DETAIL 4-3
2' LATERAL BASE DITCH
EST. 54 TONS CLASS 'B' RIPRAP
EST. 79 SY GEOTEXTILE
SEE DETAIL 4-2
DDE = 41 CY
RIP RAP AT EMBANKMENT
EST. 16 TONS CLASS 'I' RIP RAP
SEE DETAIL 4-3
2' LATERAL BASE DITCH
SEE DETAIL 4-4
DDE = 44 CY
2' SPECIAL CUT BASE DITCH
SEE DETAIL 4-5
DETAIL 4-4
LATERAL BASE DITCH
(Not to Scale)
Min. D=1.5 Ft.
B=2.0 Ft.
b=2.0 Ft.
FROM STA. 15+45 TO STA. 16+00 RT
DETAIL 4-5
SPECIAL CUT BASE DITCH
(Not to Scale)
Min. D=1.5 Ft.
B=2.0 Ft.
Type of Liner= Grass
FROM STA. 16+00 TO STA. 18+00 RT
WOODS
GREU TL-3
TYPE-III
4' FDPS
19' INC. TYP.
BEGIN SBG
END BRIDGE
-L- POC STA.15+54.12

SEE SHEET 5 FOR -L- PROFILE

5/28/99

STV Engineers, Inc.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

PROJECT REFERENCE NO.	SHEET NO.
BP10.R054.3	5

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039234 ENGINEER NIKKI T. HONEYCUTT
1/5/2024

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 038053 ENGINEER DAVID C. MORRISON
1/5/2024

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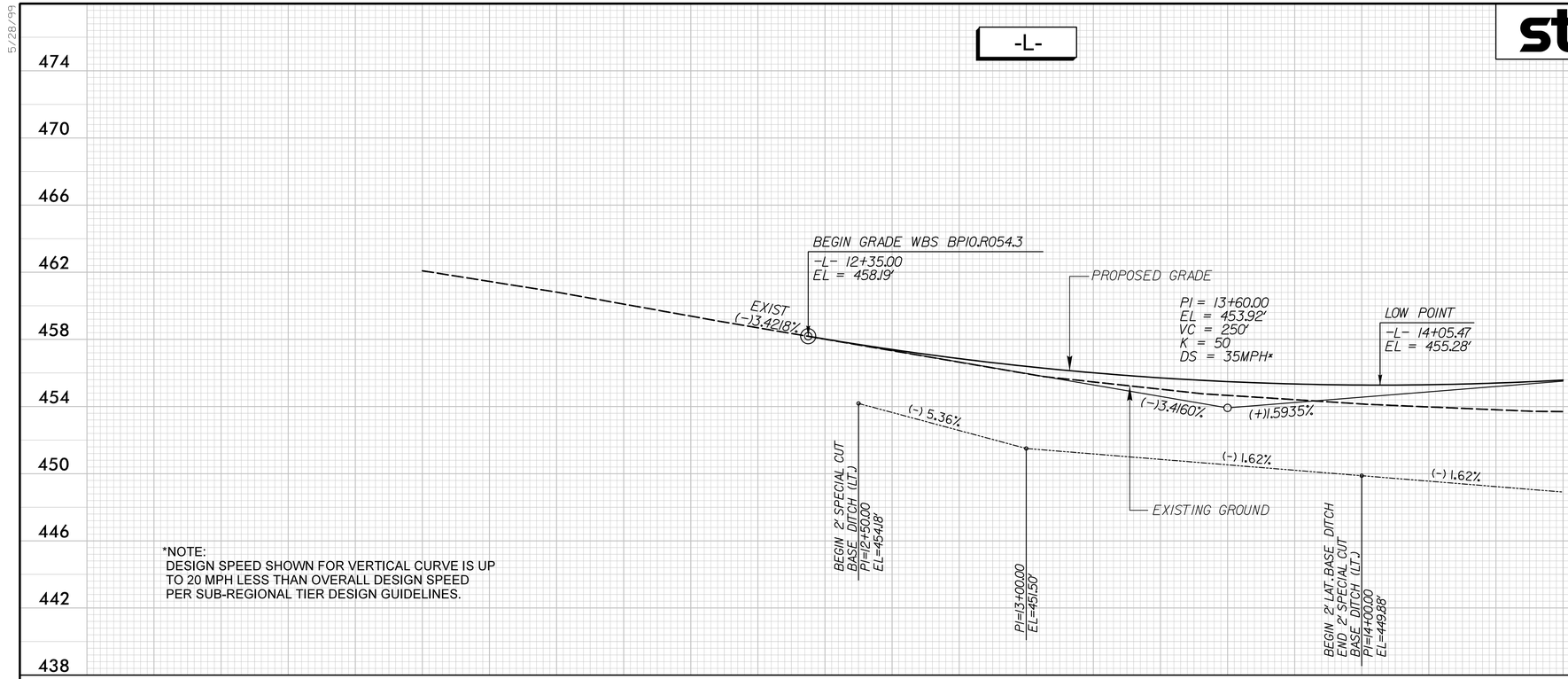
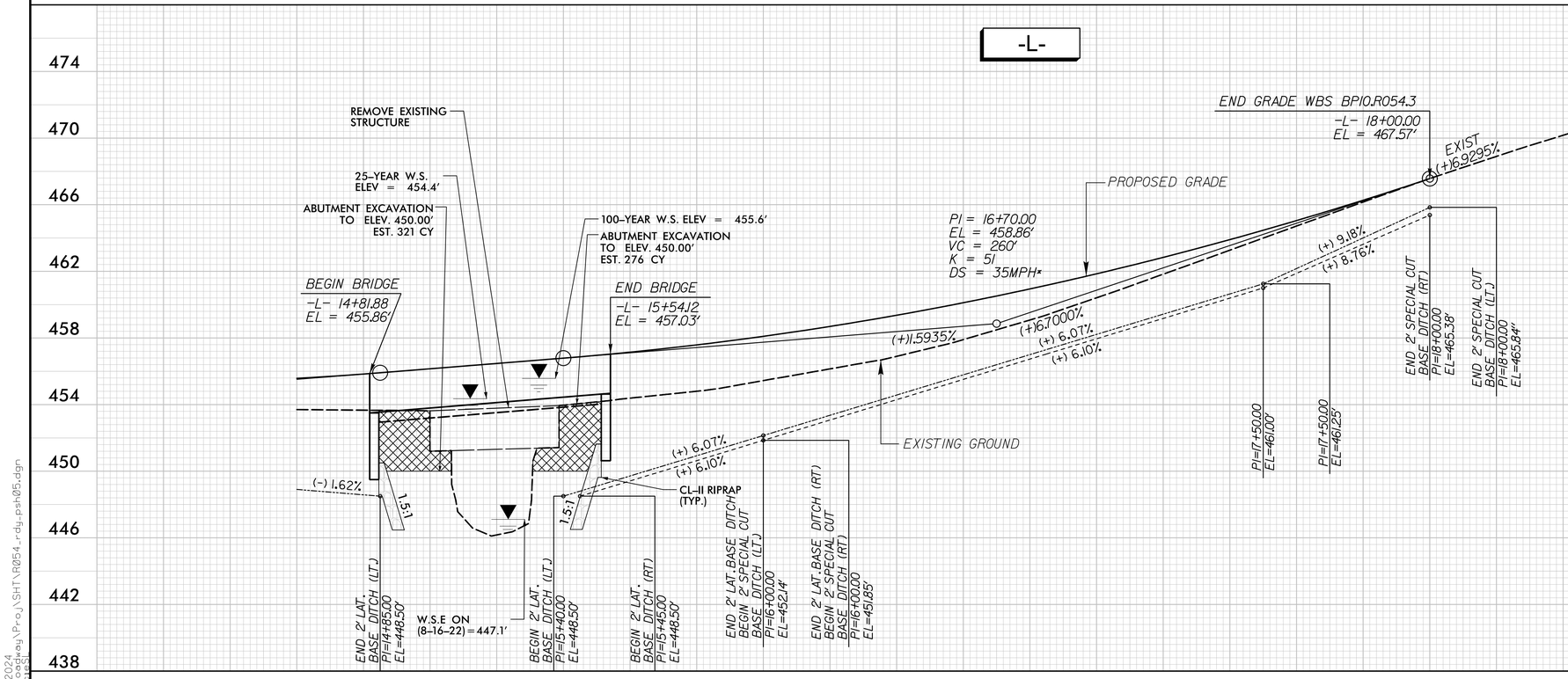


SEE SHEET 4 FOR -L- PLAN



BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	=	1200	CFS
DESIGN FREQUENCY	=	25	YRS
DESIGN HW ELEVATION	=	454.4	FT
BASE DISCHARGE	=	1720	CFS
BASE FREQUENCY	=	100	YRS
BASE HW ELEVATION	=	455.6	FT
OVERTOPPING DISCHARGE	=	1720	CFS
OVERTOPPING FREQUENCY	=	100	YRS
OVERTOPPING ELEVATION	=	455.3	FT
DATE OF SURVEY	=	8/16/2022	
W.S. ELEVATION AT DATE OF SURVEY	=	447.1	FT

*NOTE:
DESIGN SPEED SHOWN FOR VERTICAL CURVE IS UP TO 20 MPH LESS THAN OVERALL DESIGN SPEED PER SUB-REGIONAL TIER DESIGN GUIDELINES.

SEE SHEET 4 FOR -L- PLAN

KRS 2024
K:\Raleigh\Proj\SHT\R054_rdy_pshb05.dgn
Standard

SURVEY CONTROL SHEET

W/ EXISTING CENTERLINE ALIGNMENTS PRIOR TO CONSTRUCTION

PROJECT REFERENCE NO.	SHEET NO.
BP10.R054.3	RW2C-1

Location and Surveys

DRMP

NORTH CAROLINA PROFESSIONAL SEAL L-5373 LAND SURVEYOR AUGUST A. THICK II

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

I, AUGUST A. THICK II, a Professional Land Surveyor in the state of North Carolina hereby certify to the best of my knowledge and belief that the following work item(s) (Base map Compilation, Property, DTMs) performed under my responsible charge meet NCDOT Survey Standards as directed in the NCDOT Location & Surveys guidelines and procedures.

I further certify that the data compiled came from available surveys/mapping performed by others and provided to me by NCDOT and do not certify to the accuracy or quality of the individual data sources.

I further certify that the property lines shown were compiled under my responsible charge from deeds and plats of record, and limited field surveys; that the existing property related markers as shown were field surveyed from existing survey control by others (see notes on control sheets); that the property lines compiled do not represent a boundary survey; that the parcels shown were compiled without the benefit of title reports and may be subject to or encumbered by easements, rights of way and other title matters not shown herein.

Witness my original signature, registration number and seal this 20th day of January, 2022.

DocuSigned by:

91FF97CDED8946E...

Professional Land Surveyor — L-5373 PLS # — Seal

NORTH CAROLINA PROFESSIONAL SEAL L-5373 LAND SURVEYOR AUGUST A. THICK II

NAD 83 NA 2011 NC GRID

6/2/99

REVISIONS

05-JAN-2024 12:45
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CChambliss AT CAR-CCHAMBLISS

POT Sta. 20+39.96

BL-2

N 33° 24' 33.2" W
195.99'

BL-1

N 33° 40' 33.0" W
795.50'

POT Sta. 10+00.00

N 6° 57' 41" W
151.41'

PT Sta. 17+29.00

PC Sta. 16+87.59

PT Sta. 14+92.43

PC Sta. 11+81.41

BM1
-BL- STA. 13+81.49
80.89' LEFT
ELEV. 452.37'

BM2
-BL- STA. 15+38.24
20.96' RIGHT
ELEV. 453.17'

890108-1

890108-2

STANCIL G. POPE
DB 975 PG 237
PC P PG 464

MARY SUE SISK POPE
DB 877 PG 58

BILLY L. & NANCY R. POPE
DB 6206 PG 747

BILLY L. POPE
DB 3885 PG 168

JOSEPH M. GORDON
DB 5238 PG 361

Windstream Communications Inc.

20' INGRESS EGRESS EASEMENT SEE PC P PG 464

EXISTING R/W

WOODS

DB 975 PG 245

NOTES:

1. PROJECT CONTROL WAS ESTABLISHED USING GNSS, THE GLOBAL NAVIGATION SATELLITE SYSTEM.
2. THE SURVEY CONTROL DATA FOR THIS PROJECT HAS BEEN COMPILED FROM VARIOUS SOURCES. IF FURTHER INFORMATION REGARDING PROJECT CONTROL IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.

6/2/99

REVISIONS

SURVEY CONTROL SHEET

W/ EXISTING CENTERLINE ALIGNMENTS PRIOR TO CONSTRUCTION

PROJECT REFERENCE NO.	SHEET NO.
BP10.R054.3	RW2C-2

Location and Surveys

DRMP

PROJECT SURVEYOR

NORTH CAROLINA PROFESSIONAL SEAL L-5373 LAND SURVEYOR AUGUST A. THICK II

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BL

POINT	N	E	BEARING	DIST
POT	419229.605	1591758.538		
LINE			N 58°24'50.7" W	487.24
POT	419484.811	1591343.478		
LINE			N 59°47'29.9" W	291.54
POT	419631.498	1591091.529		
LINE			N 36°09'54.7" W	656.16
POT	420161.231	1590704.317		

EL

POINT	N	E	BEARING	DIST	DELTA	D	L	T	R
POT	419415.081	1591405.853							
LINE			N 61°57'41.1" W	181.41					
PC	419500.357	1591245.733							
CURVE			N 47°49'07.0" W	307.87	28°17'08.1"(RT)	09°05'40.4"	311.02	158.75	630.00
PT	419707.084	159107.596							
LINE			N 33°40'33.0" W	195.16					
PC	419869.492	1590909.382							
CURVE			N 33°32'33.1" W	41.41	00°15'59.8"(RT)	00°38'37.6"	41.41	20.71	8900.00
PT	419904.007	1590886.500							
LINE			N 33°24'33.2" W	310.96					
POT	420163.583	1590715.282							

BL

POINT	DESC.	NORTH	EAST	ELEVATION	EL STATION	OFFSET
8901081	SET 5/8 IR W/ N	419229.6050	1591758.5380	496.48	OUTSIDE PROJECT LIMITS	
8901082	SET 5/8 IR W/ N	419484.8110	1591343.4780	479.75	10+87.83	32.23 RT
BL1	SET 5/8 IR W/ N	419631.4980	1591091.5290	456.63	13+86.21	10.84 RT
BL2	SET 5/8 IR W/ N	420161.2310	1590704.3170	465.23	OUTSIDE PROJECT LIMITS	

```
**************************************
BM1       ELEVATION = 452.37'
N 419666.6880      E 1590965.6160
BL STATION 13+81.00 80.89' LEFT
BRIDGE SPIKE SET IN 12" OAK
**************************************

**************************************
BM2       ELEVATION = 453.17'
N 419853.3270      E 1590955.3380
BL STATION 15+38.00 20.96' RIGHT
BRIDGE SPIKE SET IN 8" OAK
**************************************
```

I, AUGUST A. THICK II, a Professional Land Surveyor in the state of North Carolina hereby certify to the best of my knowledge and belief that the following work item(s) (Base map Compilation, Property, DTMs) performed under my responsible charge meet NCDOT Survey Standards as directed in the NCDOT Location & Surveys guidelines and procedures.

I further certify that the data compiled came from available surveys/mapping performed by others and provided to me by NCDOT and do not certify to the accuracy or quality of the individual data sources.

I further certify that the property lines shown were compiled under my responsible charge from deeds and plats of record, and limited field surveys; that the existing property related markers as shown were field surveyed from existing survey control by others (see notes on control sheets); that the property lines compiled do not represent a boundary survey; that the parcels shown were compiled without the benefit of title reports and may be subject to or encumbered by easements, rights of way and other title matters not shown herein.

Witness my original signature, registration number and seal this 20th day of January, 2022.

DocuSigned by:

91FEF97CDED8946E...

Professional Land Surveyor — PLS # L-5373 — Seal

NORTH CAROLINA PROFESSIONAL SEAL L-5373 LAND SURVEYOR AUGUST A. THICK II

NOTES:

1. PROJECT CONTROL WAS ESTABLISHED USING GNSS, THE GLOBAL NAVIGATION SATELLITE SYSTEM.
2. THE SURVEY CONTROL DATA FOR THIS PROJECT HAS BEEN COMPILED FROM VARIOUS SOURCES. IF FURTHER INFORMATION REGARDING PROJECT CONTROL IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.

12/2/2016

OFF-SITE DETOUR SIGNING AND ROAD CLOSURE SIGNING

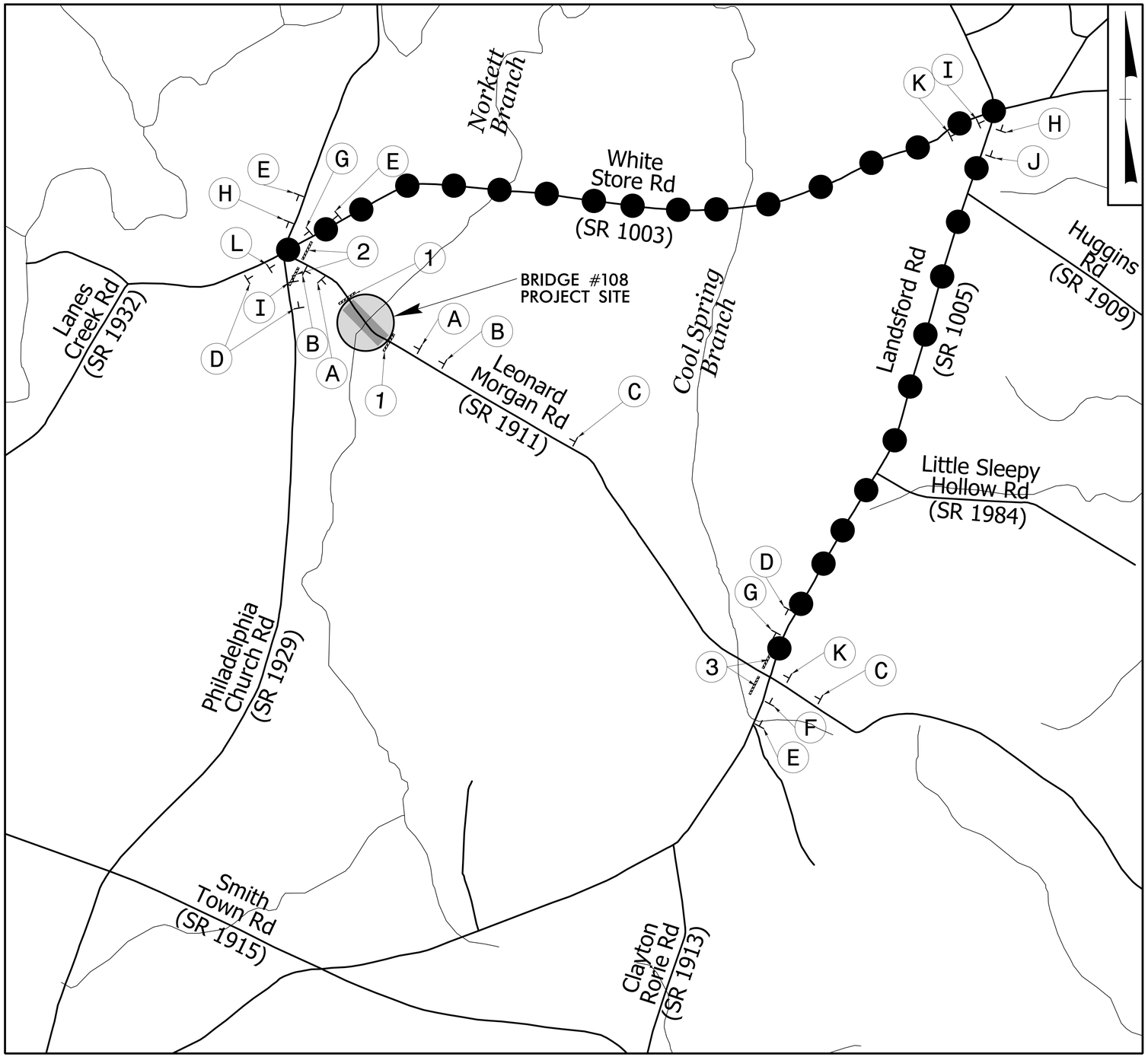
PROJECT REFERENCE NO.	SHEET NO.
BP10R054.3	TMP-1
R/W SHEET NO.	

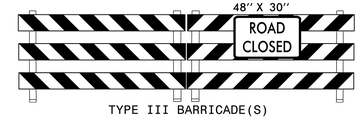
STV Engineers, Inc.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039234 ENGINEER MARK T. HONEYCUTT
1/5/2024





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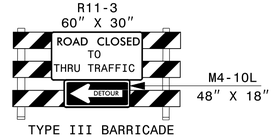

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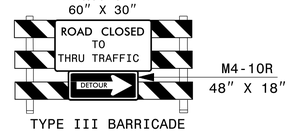


3

A

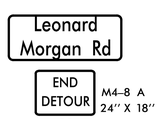
B

C

D

E

F



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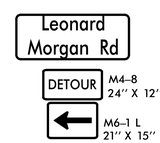

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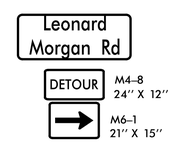

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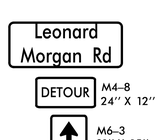

L

SEE ROADWAY STD DWG 1101.03, SHEET 1 OF 9 FOR ADVANCE WARNING AND BARRICADE PLACEMENT.

1000 500 0 1000 2000
Scale: 1" = 1000'

1/5/2024
R:\Traffic\TrafficControl\TCP\R054_RDY_TMP01.dgn
SaucieSL

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
BP10.R054.3	TMP-2
R/W SHEET NO.	

STV Engineers, Inc.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

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ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039234 NIKKI T. HONEYCUTT
1/5/2024

BRIDGE #108

SIGN NUMBER: I-1
TYPE: D
QUANTITY: See Plans

SIGN WIDTH: 48″
HEIGHT: 24″
TOTAL AREA: 8.0 Sq.Ft.

BORDER TYPE: FLUSH
RECESS: 0.47″
WIDTH: 0.63″
RADII: 1.5″

NO. Z BARS:
LENGTH:

BACKG COLOR: Orange
COPY COLOR: Black

SYMBOL	X	Y	WID	HT

MAT'L: 0.080″ (2.0 mm) ALUMINUM

USE NOTES: 1,2
1. Legend and border shall be direct applied encapsulated lens reflective sheeting.
2. Background shall be NC Grade B fluorescent.

DESIGN BY: SLS
CHECKED BY: GHM
PROJECT ID: BP10.R054.3
DIV: 10
DATE: Jul 15, 2022

Spacing Factor is 1 unless specified otherwise

LETTER POSITIONS

Letter positions are to the lower left corners

																										Series/Size Text Length
	L	E	O	N	A	R	D																			C 2000 / 6
	9.4	13.3	17.3	22	26.2	30.9	35.3																			29.2
	M	O	R	G	A	N		R	D																	C 2000 / 6
	4.7	9.9	14.6	18.9	23	27.7	31	35.5	39.9																	38.5

NORTH CAROLINA D.O.T. SIGN DETAIL

8/17/99

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKING PLAN
UNION COUNTY
LOCATION: BRIDGE #108 OVER NORKETT BRANCH ON SR 1911 (LENOARD MORGAN ROAD)

STV Engineers, Inc.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

PROJECT REFERENCE NO.	SHEET NO.
BP10.R054.3	PMP-1
R/W SHEET NO.	

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039234 ENGINEER NIKKI T. HONEYCUTT

1/5/2024

INDEX

ROADWAY STANDARD DRAWINGS

THE FOLLOWING ROADWAY STANDARDS AS SHOWN IN "ROADWAY STANDARD DRAWINGS" - PROJECT SERVICES UNIT - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 2024 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD. NO.	TITLE
1205.01	PAVEMENT MARKINGS - LINE TYPES AND OFFSETS
1205.02	PAVEMENT MARKINGS - TWO-LANE AND MULTILANE ROADWAYS
1205.04	PAVEMENT MARKINGS - INTERSECTIONS
1205.09	PAVEMENT MARKINGS - PAINTED ISLANDS
1205.12	PAVEMENT MARKINGS - BRIDGES
1261.01	GUARDRAIL AND BARRIER DELINEATORS - INSTALLATION SPACING
1261.02	GUARDRAIL AND BARRIER DELINEATORS - TYPES AND MOUNTING
1262.01	GUARDRAIL END DELINEATION

GENERAL NOTES

THE FOLLOWING GENERAL NOTES APPLY AT ALL TIMES FOR THE DURATION OF THE CONSTRUCTION PROJECT, EXCEPT WHEN OTHERWISE NOTED IN THE PLAN, OR DIRECTED BY THE ENGINEER.

A) INSTALL PAVEMENT MARKINGS ON THE FINAL SURFACE.

ROAD NAME	MARKING	MARKERS
SR 1911 (LEONARD MORGAN ROAD)	THERMO PLASTIC	NONE

B) TIE PROPOSED PAVEMENT MARKING LINES TO EXISTING PAVEMENT MARKING LINES.
C) REMOVE/REPLACE ANY CONFLICTING/DAMAGED PAVEMENT MARKINGS AND MARKERS.
D) PASSING ZONES WILL BE DETERMINED IN THE FIELD AND MUST BE APPROVED BY THE ENGINEER.
E) REPLACE ANY PAVEMENT MARKINGS BEYOND THE PROJECT LIMITS DAMAGED BY THE CONTRACTORS' OPERATIONS DURING CONSTRUCTION.

PLAN PREPARED BY:
STV Engineers, Inc.

NIKKI T. HONEYCUTT, PE TRAFFIC ENGINEER
STEPHEN L. SAUCIER TRANSPORTATION DESIGNER

STV Engineers, Inc.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

1/5/2024
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8/17/99

PAVEMENT MARKING PLAN

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NC License Number F-0991

PROJECT REFERENCE NO.	SHEET NO.
BP10.R054.3	PMP-2
R/W SHEET NO.	

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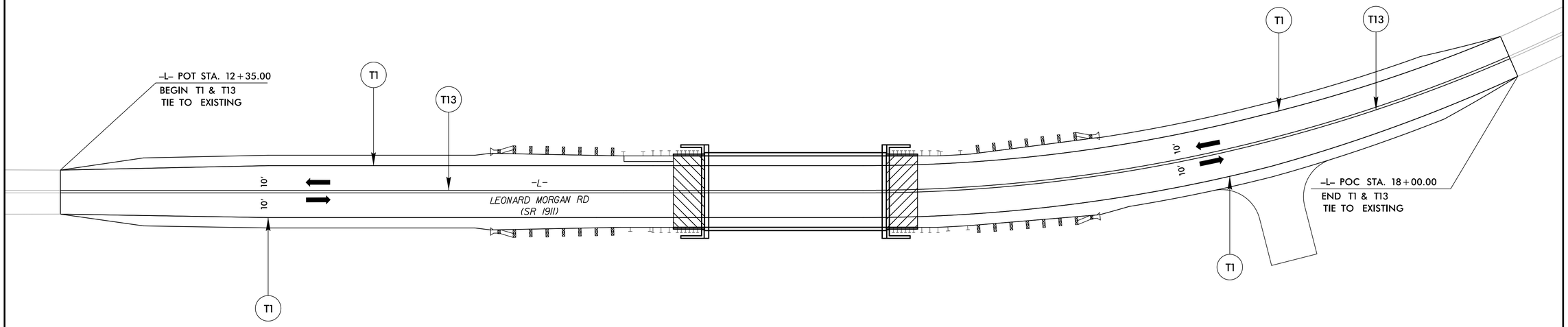
ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039234 ENGINEER NIKKI T. HONEYCUTT

1/5/2024

NAD 83 NA 2011



PAVEMENT MARKING SCHEDULE	
T1 - THERMOPLASTIC	WHITE EDGELINE (4", 90MIL)
T13 - THERMOPLASTIC	YELLOW DOUBLE CENTER (4", 90MIL)

1/5/2024
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TIP PROJECT: BP10.R054.3

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BP10.R054.3	EC-1	9

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
BP10.R054.1		P.E.
BP10.R054.2		ROW & UTILITY
BP10.R054.3		CONSTRUCTION

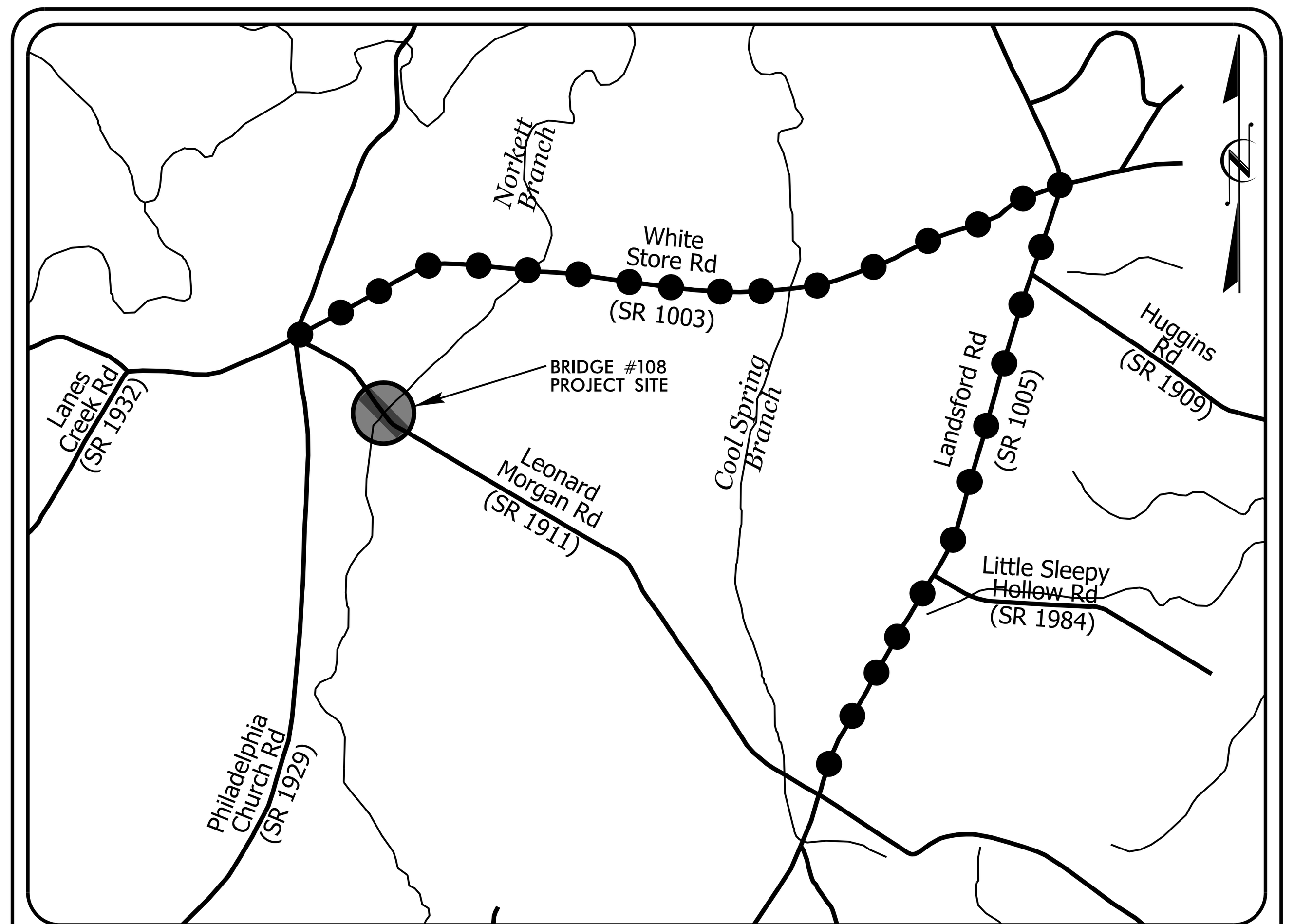
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PLAN FOR PROPOSED
HIGHWAY EROSION CONTROL

UNION COUNTY

LOCATION: BRIDGE #108 OVER NORKETT BRANCH ON SR 1911 (LEONARD MORGAN RD)

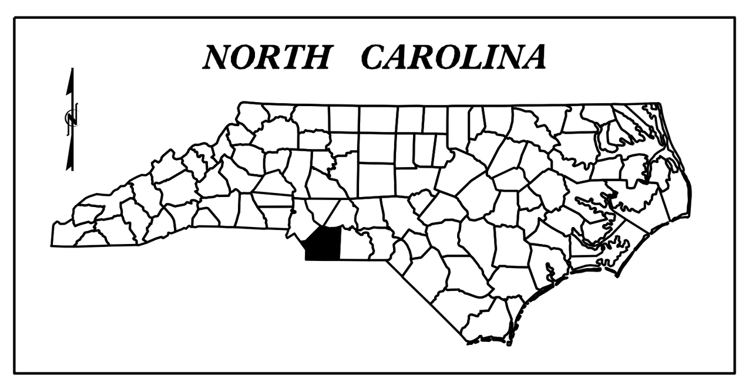
TYPE OF WORK: GRADING, PAVING, DRAINAGE, & STRUCTURE

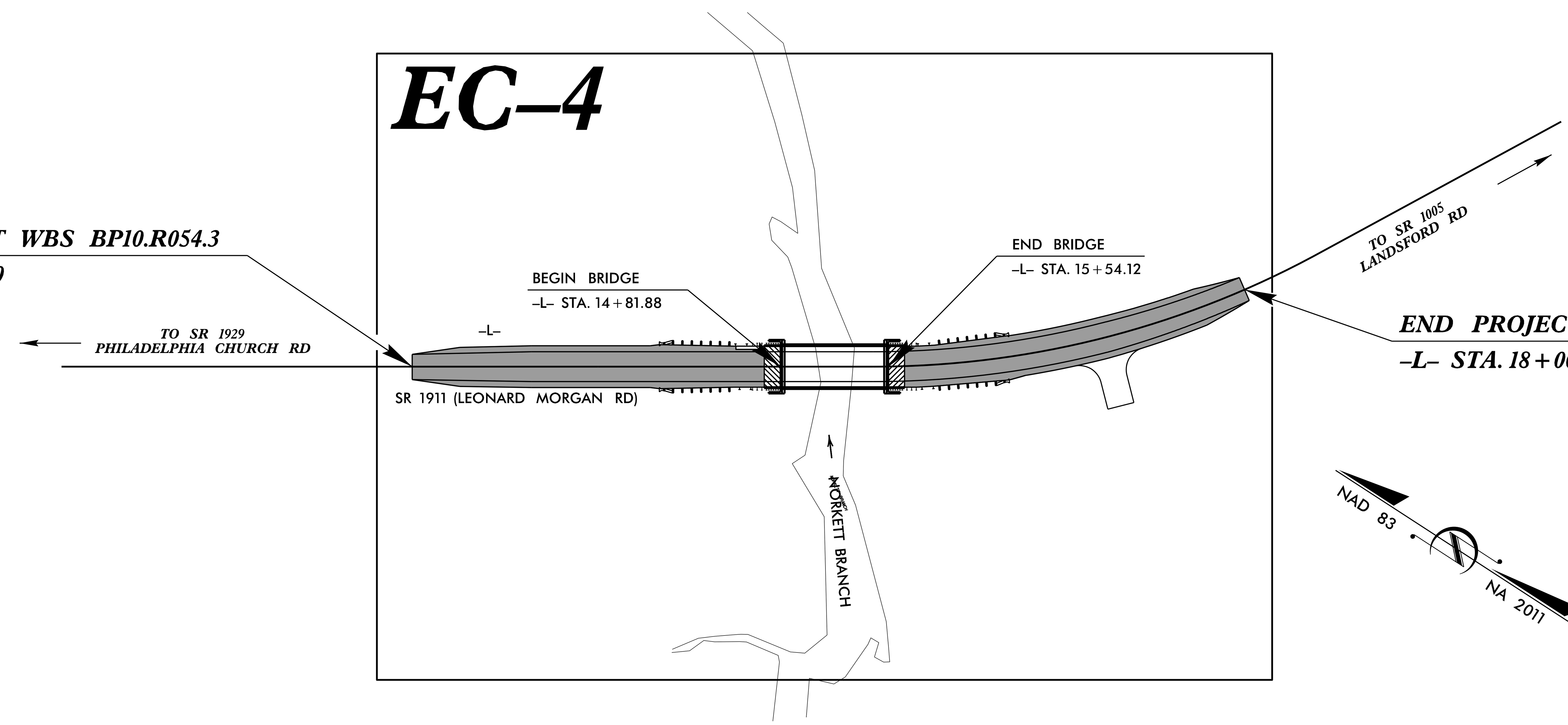


VICINITY MAP

DETOUR

NOT TO SCALE





THIS PROJECT CONTAINS EROSION CONTROL PLANS FOR CLEARING AND GRUBBING PHASE OF CONSTRUCTION.

GRAPHIC SCALE

50 25 0 50 100

PLANS

THESE EROSION AND SEDIMENT CONTROL PLANS COMPLY WITH THE APPLICABLE REGULATIONS SET FORTH BY THE NCG-010000 GENERAL CONSTRUCTION PERMIT EFFECTIVE APRIL 1, 2019 AND ISSUED BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION OF WATER RESOURCES.

stv STV Engineers, Inc.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

Prepared In the Office of:

STV ENGINEERS, INC.

900 WEST TRADE STREET, SUITE 715
CHARLOTTE NC, 28202

Designed by:

HALEY SMITH, EIT	*4688*
NAME	*LEVEL III CERTIFICATION NO.*

Roadway Standard Drawings

The "Roadway Standard Drawings"- Roadway Design Unit - N. C. Department of Transportation - Raleigh, N. C., dated January 2024 and the latest revision thereto are applicable to this project and by reference hereby are considered a part of these plans.

PROJECT REFERENCE NO.	SHEET NO.
BP10.R054.3	EC-1A

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DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

EROSION & SEDIMENT CONTROL LEGEND

Std. #	Description	Symbol
1605.01	Temporary Silt Fence	
1606.01	Special Sediment Control Fence	
1622.01	Temporary Berms and Slope Drains	
1630.02	Silt Basin Type B	
1630.03	Temporary Silt Ditch	TSD
1630.04	Stilling Basin	
1630.05	Temporary Diversion	TD
1630.06	Special Stilling Basin	
1630.07	Skimmer Basin	
1630.08	Tiered Skimmer Basin	
1630.09	Earthen Dam with Skimmer	
	Infiltration Basin	
	Rock Inlet Sediment Trap:	
1632.01	Type A	A
1632.02	Type B	B
1632.03	Type C	C

Std. #	Description	Symbol
1633.01	Temporary Rock Silt Check Type A	
1633.02	Temporary Rock Silt Check Type B	
1633.03	Temporary Rock Silt Check Type A with Excelsior Matting and Flocculant	
1634.01	Temporary Rock Sediment Dam Type A	
1634.02	Temporary Rock Sediment Dam Type B	
1635.01	Rock Pipe Inlet Sediment Trap Type A	A
1635.02	Rock Pipe Inlet Sediment Trap Type B	B
1636.01	Excelsior Wattle Check	
1636.01	Excelsior Wattle Check with Flocculant	
1636.01	Coir Fiber Wattle Check	
1636.01	Coir Fiber Wattle Check with Flocculant	
1636.02	Silt Fence Excelsior Wattle Break	EW
	Silt Fence Coir Fiber Wattle Break	CFW
1636.03	Excelsior Wattle Barrier	—EW—EW—EW—
1636.03	Coir Fiber Wattle Barrier	—CFW—CFW—CFW—

PROJECT REFERENCE NO.	SHEET NO.
BPI0.R054.3	EC-2

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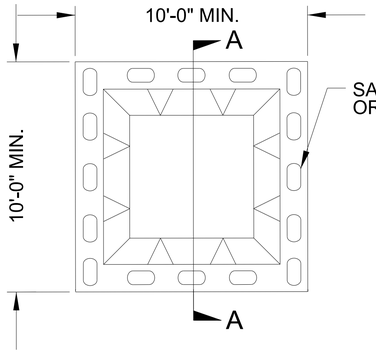
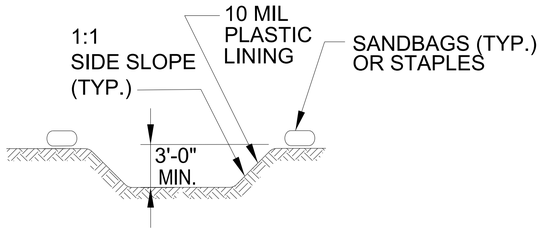
NC License Number F-0991

ONSITE CONCRETE WASHOUT STRUCTURE WITH LINER



PLAN



SECTION A-A

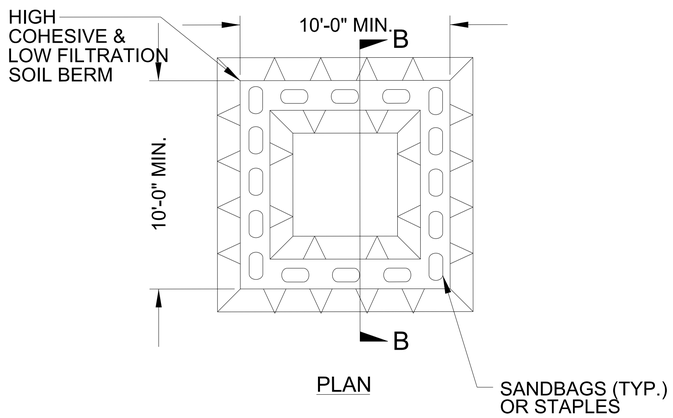
NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD

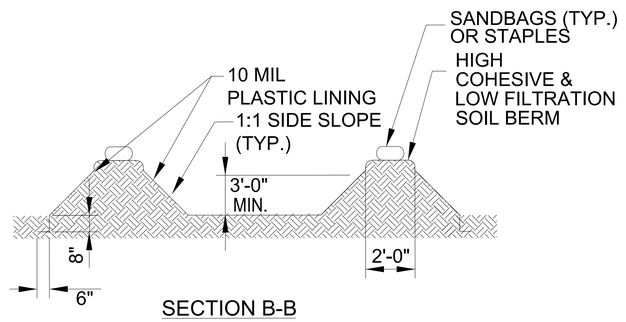
2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.

3.CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARY MARKED WITH SIGNAGE NOTING DEVICE.

BELOW GRADE WASHOUT STRUCTURE

NOT TO SCALE





SECTION B-B

NOTES:
1. ACTUAL LOCATION DETERMINED IN FIELD

2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.

3.CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARY MARKED WITH SIGNAGE NOTING DEVICE.

ABOVE GRADE WASHOUT STRUCTURE

NOT TO SCALE

PROJECT REFERENCE NO.	SHEET NO.
BP10.R054.3	EC-3

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NC License Number F-0991

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

SOIL STABILIZATION SUMMARY SHEET

MATTING FOR EROSION CONTROL

CONST SHEET NO.	LINE	FROM STATION	TO STATION	SIDE	ESTIMATE (SY)
4	L	15+45	16+85	RT	300
4	L	17+15	18+00	RT	190
				SUBTOTAL	490
MATTING FOR EROSION CONTROL – SLOPES					
	(STRAW OR EXCELSIOR MATTING)				
4	L	14+00	14+74	RT	825
4	L	13+00	14+65	LT	1815
4	L	15+63	16+50	RT	1470
4	L	15+71	16+50	LT	1150
				SUBTOTAL	5260
				DITCH SUBTOTAL	490
MISCELLANEOUS MATTING TO BE INSTALLED AS DIRECTED BY THE ENGINEER					1000
				TOTAL	6,750
				SAY	7,000

COIR FIBER MATTING

CONST SHEET NO.	LINE	FROM STATION	TO STATION	SIDE	ESTIMATE (SY)
5	UNDER BRIDGE	14+74	15+07	-	127
5	UNDER BRIDGE	15+31	15+70	-	95
				TOTAL	222
				SAY	250

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PROJECT REFERENCE NO.	SHEET NO.
BP10.R054.3	EC-3A

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DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

SOIL STABILIZATION TIMEFRAMES

SITE DESCRIPTION	STABILIZATION TIME	TIMEFRAME EXCEPTIONS
PERIMETER DIKES, SWALES, DITCHES AND SLOPES	7 DAYS	NONE
HIGH QUALITY WATER (HQW) ZONES	7 DAYS	NONE
SLOPES STEEPER THAN 3:1	7 DAYS	IF SLOPES ARE 10' OR LESS IN LENGTH AND ARE NOT STEEPER THAN 2:1, 14 DAYS ARE ALLOWED.
SLOPES 3:1 TO 4:1	14 DAYS	7 DAYS FOR SLOPES GREATER THAN 50' IN LENGTH WITH SLOPES STEEPER THAN 4:1. 7 DAYS FOR PERIMETER DIKES, SWALES, DITCHES PERIMETER SLOPES, AND HQW ZONES
ALL OTHER AREAS WITH SLOPES FLATTER THAN 4:1	14 DAYS	7 DAYS FOR PERIMETER DIKES, SWALES, DITCHES PERIMETER SLOPES, AND HQW ZONES

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
BP10.R054.3	EC-4/CONST 4

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Charlotte, NC 28202
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NAD 83 NA 2011

BEGIN PROJECT WBS BP10.R054.3
-L- POT STA.12+35.00

END PROJECT WBS BP10.R054.3
-L- POC STA.18+00.00

1 STANCIL G. POPE
DB 975 PG 237
PC P PG 464

2 MARY SUE SISK POPE
DB 8177 PG 58

3 BILLY L. POPE
DB 3885 PG 168

LEONARD MORGAN RD (SR 1911)

PC Sta. 15+44.03

IMPERVIOUS DIKE

ABUTMENT EXCAVATION TO ELEV. 450.00' (TYP.)

2' SPECIAL CUT BASE DITCH
EST. 69 TONS CLASS 'B' RIPRAP
EST. 103 SY GEOTEXTILE
SEE DETAIL 4-1

2' LATERAL BASE DITCH
EST. 41 TONS CLASS 'B' RIPRAP
EST. 61 SY GEOTEXTILE
SEE DETAIL 4-2
DDE = 29 CY

2' LATERAL BASE DITCH
EST. 54 TONS CLASS 'B' RIPRAP
EST. 79 SY GEOTEXTILE
SEE DETAIL 4-2
DDE = 41 CY

2' SPECIAL CUT BASE DITCH
SEE DETAIL 4-5

2' LATERAL BASE DITCH
SEE DETAIL 4-4
DDE = 44 CY

REMOVE 15" RCP

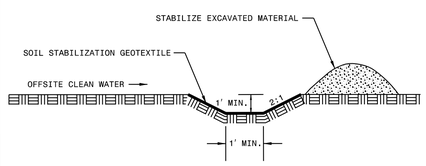
EXISTING R/W

WOODS

CLEAN WATER DIVERSION

CWD

(Not to Scale)



CLEARING AND GRUBBING
EROSION CONTROL FOR
CONSTRUCTION SHEET 4

NOTE:
PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE – B AND TEMPORARY ROCK SILT CHECKS TYPE – A AT DRAINAGE OUTLETS.

NOTE:
FOLLOW NCDOT BMP MANUAL FOR CONSTRUCTION ACTIVITES FOR THE BRIDGE DEMOLITION AND CONSTRUCTION

PROJECT REFERENCE NO.	SHEET NO.
BP10.R054.3	EC-5/CONST 4

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NC License Number F-0991

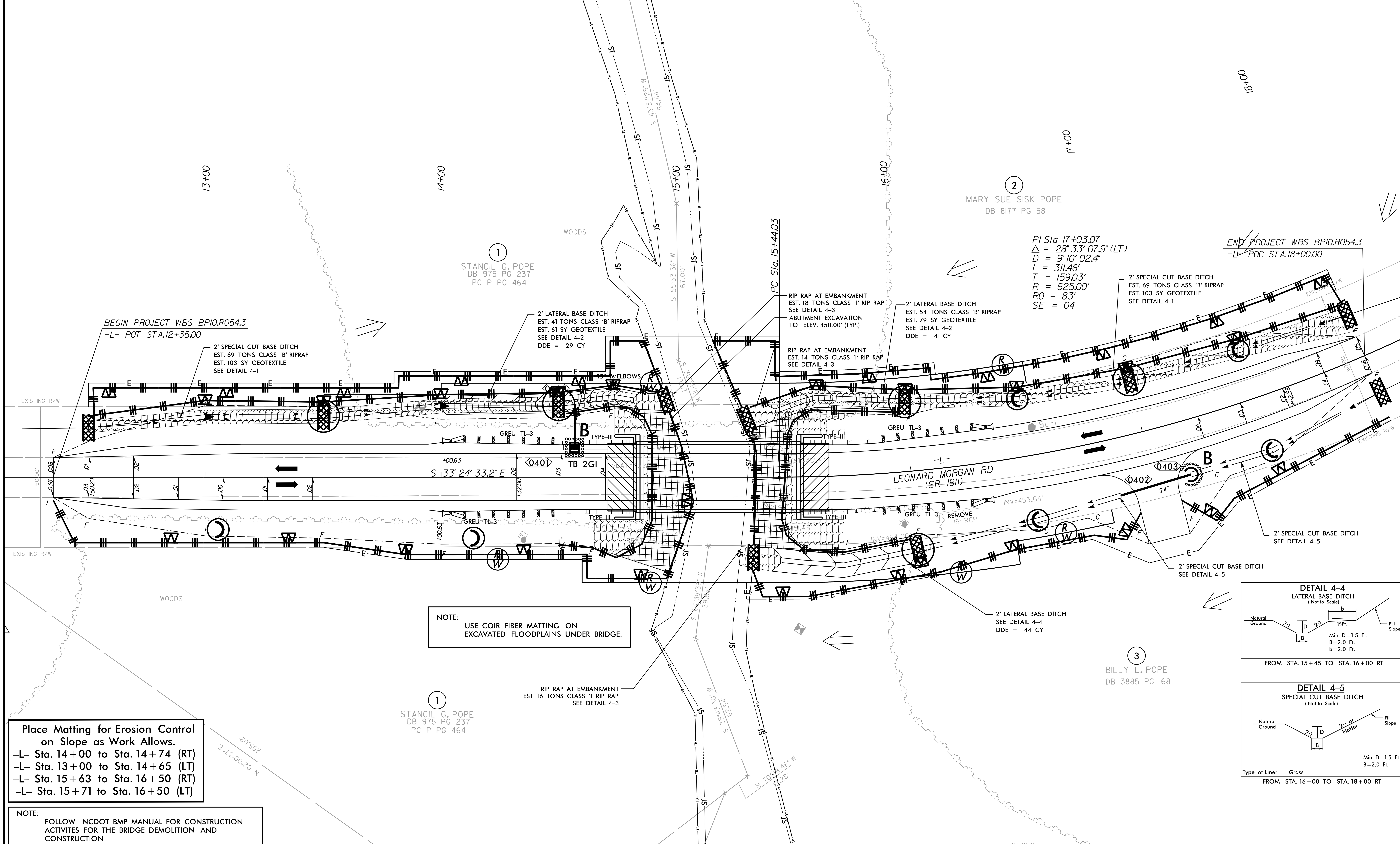
FINAL GRADING
EROSION CONTROL FOR
CONSTRUCTION SHEET 4

8/17/99

DETAIL 4-1
SPECIAL CUT BASE DITCH
(Not to Scale)
Natural Ground; Fill Slope; 2:1 or Flatter; Geotextile; Tuck Geotextile a Minimum of 1ft (TYP)
Min. D=1.5 Ft.
d=1.0 Ft.
B=2.0 Ft.
Type of Liner= Class 'B' Rip-Rap, Keyed-In
FROM STA. 12+50 TO STA. 14+00 LT
FROM STA. 16+00 TO STA. 18+00 LT

DETAIL 4-2
LATERAL BASE DITCH
(Not to Scale)
Natural Ground; GEOTEXTILE; Fill Slope
Min. D=1.5 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
b=2.0 Ft.
*When B is < 6.0'
Type of Liner= Class 'B' Rip-Rap
FROM STA. 14+00 TO STA. 14+85 LT
FROM STA. 15+40 TO STA. 16+00 LT

DETAIL 4-3
RIP RAP AT EMBANKMENT
(Not to Scale)
Ditch Grade; 1.0'min.; 10'min.; 1.5'; GEOTEXTILE; Press Riprap into Channel Bottom Until Refusal
Type of Liner= CL 'I' Rip-Rap, Keyed-In
FROM STA. 14+85 (LT) TO STA. 15+00 (LT)
FROM STA. 15+25 (LT) TO STA. 15+40 (LT)
FROM STA. 15+27 (RT) TO STA. 15+45 (RT)



DETAIL 4-4
LATERAL BASE DITCH
(Not to Scale)
Natural Ground; Fill Slope
Min. D=1.5 Ft.
B=2.0 Ft.
b=2.0 Ft.
FROM STA. 15+45 TO STA. 16+00 RT

DETAIL 4-5
SPECIAL CUT BASE DITCH
(Not to Scale)
Natural Ground; 2:1 or Flatter; Fill Slope
Min. D=1.5 Ft.
B=2.0 Ft.
Type of Liner= Grass
FROM STA. 16+00 TO STA. 18+00 RT

Place Matting for Erosion Control
on Slope as Work Allows.
-L- Sta. 14+00 to Sta. 14+74 (RT)
-L- Sta. 13+00 to Sta. 14+65 (LT)
-L- Sta. 15+63 to Sta. 16+50 (RT)
-L- Sta. 15+71 to Sta. 16+50 (LT)

NOTE:
FOLLOW NCDOT BMP MANUAL FOR CONSTRUCTION ACTIVITES FOR THE BRIDGE DEMOLITION AND CONSTRUCTION

PROJ. REFERENCE NO.	SHEET NO.
BP10.R054.3	X-1

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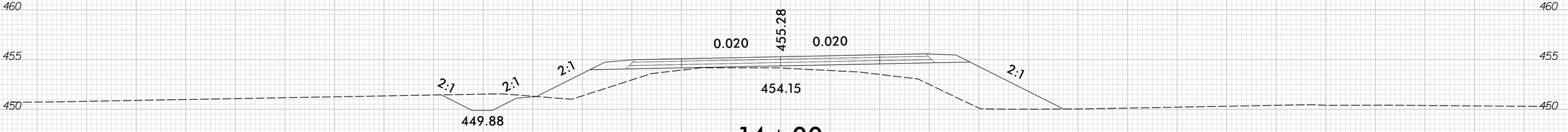
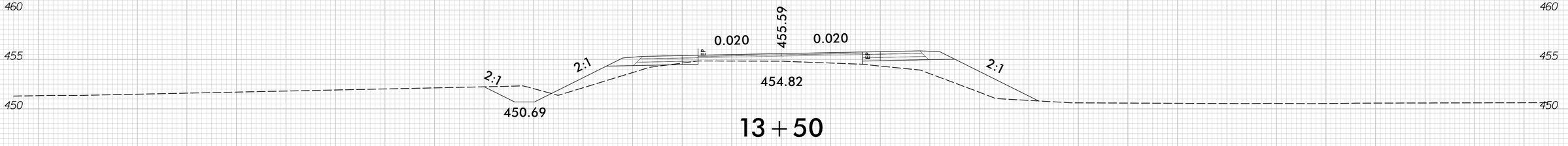
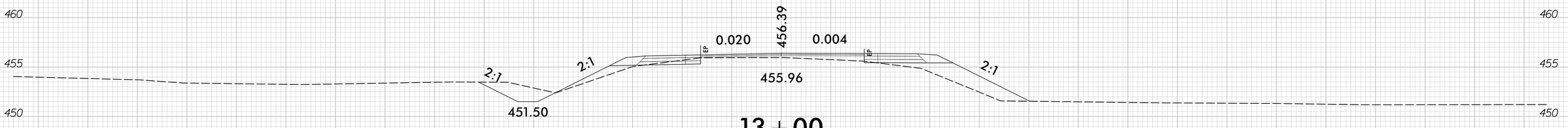


14 + 00



13 + 50



13 + 00

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6/23/16

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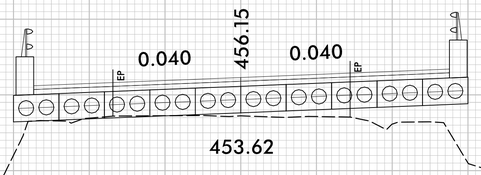
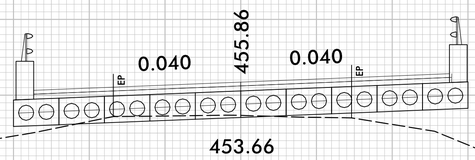


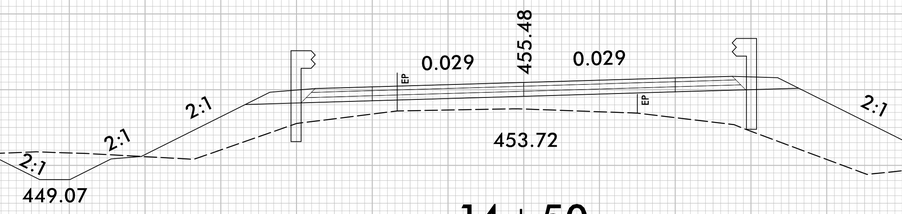
15 + 00

465 460 455 450 445



14 + 81.88
BEGIN BRIDGE

465 460 455 450 445



14 + 50

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PROJ. REFERENCE NO.	SHEET NO.
BP10.R054.3	X-5

6/23/16

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	BP10.R054.3	X-6

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480
475
470
465

EP
470.78
18+50

EP
EP
0.050
467.57
0.008
467.57
18+00
END PROJECT

480
475
470
465
460

—⌊—

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-890108	1	

REFERENCE: SF-890108

PROJECT: BP10.R054

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY UNION

PROJECT DESCRIPTION BRIDGE NO. 890108 ON SR 1911 OVER NORKETT BRANCH

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO PERFORM INDEPENDENT SUBSURFACE INVESTIGATIONS AND MAKE INTERPRETATIONS AS NECESSARY TO CONFIRM CONDITIONS ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

R. MAFFIA

CG2

INVESTIGATED BY J. HOLLAND

DRAWN BY J. HOLLAND

CHECKED BY J. CRENSHAW

SUBMITTED BY SCHNABEL ENG.

DATE NOVEMBER 2023

Schnabel ENGINEERING

NORTH CAROLINA LICENSED SEAL 2818 GEOLOGIST JASON A. HOLLAND

DocuSigned by: Jason Holland 11/08/2023

DF15142D0C818A... SIGNATURE DATE

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PROJECT REFERENCE NO.	SHEET NO.
SF-890108	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] D-50
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [X] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [X] CORE BIT
- [X] 2 1/4" HOLLOW AUGERS

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [X] -N Q

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM-1: BRIDGE SPIKE SET IN 12" OAK TREE
-L- STA. 15+51.82, 64.68' RT
N: 419667 E: 1590966 ELEVATION: 452.37 FEET

NOTES:

BORING LOCATIONS AND COLLAR ELEVATIONS OBTAINED USING CONVENTIONAL SURVEY EQUIPMENT

FIAD: FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
SF-890108	2A

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)

From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.

STRUCTURE

- INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities
- BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets
- VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets
- BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity
- DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces
- LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes

DECREASING INTERLOCKING OF ROCK PIECES ⇩

SURFACE CONDITIONS

VERY GOOD	GOOD	FAIR	POOR	VERY POOR
Very rough, fresh unweathered surfaces	Rough, slightly weathered, iron stained surfaces	Smooth, moderately weathered and altered surfaces	Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments	Slickensided, highly weathered surfaces with soft clay coatings or fillings

DECREASING SURFACE QUALITY ⇨

90			N/A	N/A
80				
70				
60				
50				
40				
30				
20				
10				
N/A	N/A			

AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos. P and Hoek E., 2000)

From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.

COMPOSITION AND STRUCTURE

A. *Thick bedded, very blocky sandstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.*

B. *Sandstone with thin interlayers of siltstone*

C. *Sandstone and siltstone in similar amounts*

D. *Siltstone or silty shale with sandstone layers*

E. *Weak siltstone or clayey shale with sandstone layers*

C, D, E, and **G** - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to **F** and **H.**

F. *Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure*

G. *Undisturbed silty or clayey shale with or without a few very thin sandstone layers* → **H.** *Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.*

→ Means deformation after tectonic disturbance

SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)

VERY GOOD - Very Rough, fresh unweathered surfaces	GOOD - Rough, slightly weathered surfaces	FAIR - Smooth, moderately weathered and altered surfaces	POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments	VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings
70				
60	A			
50		B	C	D E
40				
30				F
20				
		G		H 10

DATE: 8-19-16

PROJECT REFERENCE NO.	SHEET NO.
SF-890108	3

SITE PLAN

0 20 40
FEET

SKEW=90°

14+00

15+00

16+00

BM2
-BL- STA. 15+38.24
20.96' RIGHT
ELEV. 453.17'

NORKETT BRANCH

JS

EB1–A

EB1–B

EB2–A

EB2–B

BRIDGE #108

-L-

LEONARD MORGAN RD
(SR 1911)

TO TICE RD

TO WHITE STORE RD

BEGIN APPROACH SLAB
-L- POT STA. 14+71.00

BEGIN BRIDGE
-L- POT STA. 14+81.88

BMI
-BL- STA. 13+81.49
80.89' LEFT
ELEV. 452.37'

END BRIDGE
-L- POC STA. 15+54.12

END APPROACH SLAB
-L- POC STA. 15+64.99

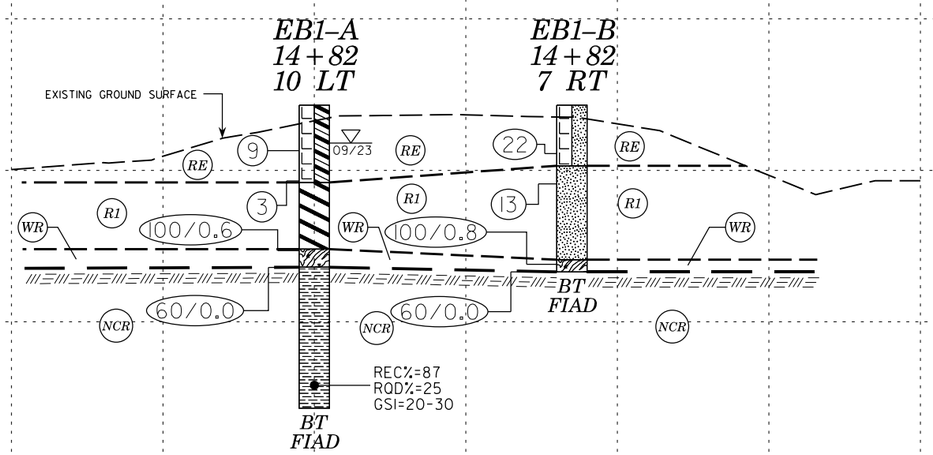
PROJECT REFERENCE NO.	SHEET NO.
SF-890108	4

(RE) **ROADWAY EMBANKMENT:** STIFF TO VERY STIFF, BROWN, ORANGE, AND RED, SANDY SILT AND SANDY CLAY (A-4, A-6), WITH TRACE GRAVEL, MOIST

(R1) **RESIDUAL:** SOFT TO STIFF, BROWN AND GRAY, SANDY SILT AND SILTY CLAY (A-4, A-7-6), MOIST

(WR) **WEATHERED ROCK:** GRAY AND BROWN, META-ARGILLITE

(NCR) **NON-CRYSTALLINE ROCK:** GRAY, META-ARGILLITE



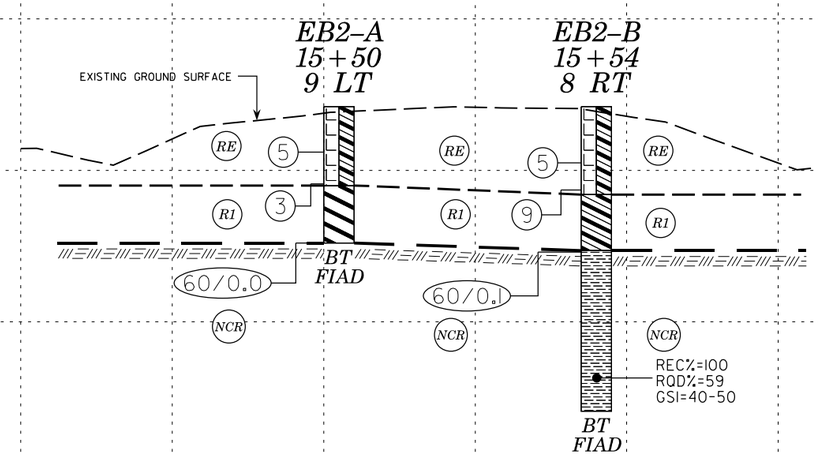
1. BORINGS AND INFERRED STRATIGRAPHY ARE PROJECTED ONTO THE SECTIONS
2. CROSS SECTIONS CREATED FROM 89-0108_ls_tin.tin FILE DATED 04-22-2022.

HORIZ. SCALE (FEET) 0 10 20 | VE = N/A | **CROSS SECTION – END BENT 1 –L– STA. 14+81.88 – 90^ SKEW**

(RE) **ROADWAY EMBANKMENT:** MEDIUM STIFF, RED, BROWN, AND ORANGE, SANDY CLAY (A-6), WITH TRACE GRAVEL, MOIST

(R1) **RESIDUAL:** SOFT TO STIFF, RED, BROWN, AND GRAY, SANDY AND SILTY CLAY (A-6, A-7), MOIST

(NCR) **NON-CRYSTALLINE ROCK:** GRAY, META-ARGILLITE



1. BORINGS AND INFERRED STRATIGRAPHY ARE PROJECTED ONTO THE SECTIONS
2. CROSS SECTIONS CREATED FROM 89-0108_ls_tin.tin FILE DATED 04-22-2022.

HORIZ. SCALE (FEET) 0 10 20 | VE = N/A | **CROSS SECTION – END BENT 2 –L– STA. 15+50.00 – 90^ SKEW**

GEOTECHNICAL BORING REPORT
BORE LOG

WBS BP10.R054.1	**TIP** SF-890108	**COUNTY** UNION	**GEOLOGIST** R. Maffia	
SITE DESCRIPTION Bridge No. 890108 On SR 1911 Over Norkett Branch				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 14+82	**OFFSET** 10 ft LT	**ALIGNMENT** -L-	**0 HR.** 2.5
COLLAR ELEV. 454.3 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 419,766	**EASTING** 1,590,990	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/17/2022		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Oden, C.	**START DATE** 09/28/23	**COMP. DATE** 09/28/23	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
455										454.3 GROUND SURFACE	0.0
	452.3	2.0	4	5	4	9		M		**ROADWAY EMBANKMENT** Stiff, orange and red, sandy CLAY (A-6), with trace gravel	
450	450.3	4.0	2	2	1	3				449.2	5.1
445	445.3	9.0						M		**RESIDUAL** Soft, gray and brown, silty CLAY (A-7-6), with trace sand	
	443.6	10.7	7	93/0.1		100/0.6				444.8	9.5
440			60/0.0			60/0.0				443.6 **WEATHERED ROCK** Gray and brown, (META-ARGILLITE)	10.7
										NON-CRYSTALLINE ROCK Gray, META-ARGILLITE, very slight to slightly weathered, moderately hard, very close to moderately close fracture spacing. REC = 87% (8.1') RQD = 25% (2.3') GSI = 20-30	
435										434.3	20.0
										Boring Terminated at Elevation 434.3 ft In Non-Crystalline Rock (Meta-Argillite)	

WBS BP10.R054.1	**TIP** SF-890108	**COUNTY** UNION	**GEOLOGIST** R. Maffia	
SITE DESCRIPTION Bridge No. 890108 On SR 1911 Over Norkett Branch				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 14+82	**OFFSET** 10 ft LT	**ALIGNMENT** -L-	**0 HR.** 2.5
COLLAR ELEV. 454.3 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 419,766	**EASTING** 1,590,990	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/17/2022		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Oden, C.	**START DATE** 09/28/23	**COMP. DATE** 09/28/23	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 9.3 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
443.59											Begin Coring @ 10.7 ft	
	443.6	10.7	0.3	1:12/0.3	(0.3)	(0.0)		(8.1)	(2.3)		443.6 **NON-CRYSTALLINE ROCK**	10.7
	443.3	11.0	4.0	2:46/1.0	100%	0%		87%	25%		Gray META-ARGILLITE, very slight to slightly weathered, moderately hard, very close to moderately close fracture spacing.	
440				10:34/1.0								
	439.3	15.0		6:15/1.0	(3.7)	(0.6)					GSI = 20-30	
			5.0	5:03/1.0	93%	15%						
				4:41/1.0								
				4:38/1.0	(4.1)	(1.7)						
435				2:59/1.0	82%	34%						
				5:52/1.0								
	434.3	20.0		5:40/1.0							434.3	20.0
											Boring Terminated at Elevation 434.3 ft In Non-Crystalline Rock (Meta-Argillite)	

CORE PHOTOGRAPH
BRIDGE NO. 890108 ON SR 1911 OVER NORKETT BRANCH

EB1-A
BOX 1 OF 1: 10.7 - 20.0 FEET

APPROXIMATE SCALE IN FEET

GEOTECHNICAL BORING REPORT
BORE LOG

WBS BP10.R054.1	**TIP** SF-890108	**COUNTY** UNION	**GEOLOGIST** R. Maffia	
SITE DESCRIPTION Bridge No. 890108 On SR 1911 Over Norkett Branch				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 14+82	**OFFSET** 7 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 454.3 ft	**TOTAL DEPTH** 11.0 ft	**NORTHING** 419,758	**EASTING** 1,590,972	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/17/2022		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Oden, C.	**START DATE** 09/28/23	**COMP. DATE** 09/28/23	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
455										ELEV. (ft) DEPTH (ft)
										454.3 GROUND SURFACE 0.0
	452.1	2.2	8	11	11	22		M		**ROADWAY EMBANKMENT** Very stiff, brown and orange, sandy SILT (A-4), with trace gravel
450	450.1	4.2	6	6	7	13		M		450.3 4.0 **RESIDUAL** Stiff, brown, sandy SILT (A-4).
445	445.1	9.2	6	8	92/0.3	100/0.8				444.1 10.2
	443.3	11.0	60/0.0			60/0.0				443.3 11.0 **WEATHERED ROCK** Gray and brown, (META-ARGILLITE) Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 443.3 ft On Non-Crystalline Rock (Meta-Argillite)

WBS BP10.R054.1	**TIP** SF-890108	**COUNTY** UNION	**GEOLOGIST** R. Maffia	
SITE DESCRIPTION Bridge No. 890108 On SR 1911 Over Norkett Branch				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 15+50	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 454.2 ft	**TOTAL DEPTH** 9.0 ft	**NORTHING** 419,709	**EASTING** 1,591,028	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/17/2022		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Oden, C.	**START DATE** 09/28/23	**COMP. DATE** 09/28/23	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
455										
										454.2 GROUND SURFACE 0.0
	452.2	2.0	2	2	3	5		M		**ROADWAY EMBANKMENT** Medium stiff, orange and red, sandy CLAY (A-6), with trace gravel
450	450.1	4.1	2	2	1	3		M		449.0 5.2 **RESIDUAL** Soft, gray, silty CLAY (A-7-6), with trace sand
	445.2	9.0	60/0.0			60/0.0				445.2 9.0 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 445.2 ft In Non-Crystalline Rock (Meta-Argillite)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS BP10.R054.1	**TIP** SF-890108	**COUNTY** UNION	**GEOLOGIST** R. Maffia	
SITE DESCRIPTION Bridge No. 890108 On SR 1911 Over Norkett Branch				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 15+54	**OFFSET** 8 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 454.2 ft	**TOTAL DEPTH** 20.1 ft	**NORTHING** 419,698	**EASTING** 1,591,013	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/17/2022		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Oden, C.	**START DATE** 09/28/23	**COMP. DATE** 09/28/23	**SURFACE WATER DEPTH** N/A	

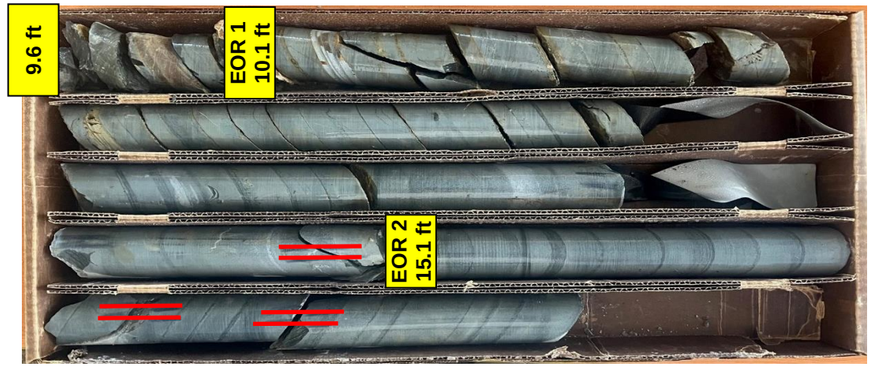
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
455										454.2 0.0 GROUND SURFACE
	451.5	2.7	2	2	3	5		M		**ROADWAY EMBANKMENT** Medium stiff, red and brown, sandy CLAY (A-6)
450	449.7	4.5	4	4	5	9				448.4 5.8
	444.7	9.5	60/0.1			60/0.1		M		**RESIDUAL** Stiff, red, brown, and gray, sandy CLAY (A-6)
445										444.7 9.5
440										**NON-CRYSTALLINE ROCK** Gray, META-ARGILLITE, very slight to slightly weathered, medium to moderately hard, very close to moderately close fracture spacing. REC = 100% (10.5') RQD = 59% (6.2') GSI = 40-50
435										434.1 20.1 Boring Terminated at Elevation 434.1 ft In Non-Crystalline Rock (Meta-Argillite)

WBS BP10.R054.1	**TIP** SF-890108	**COUNTY** UNION	**GEOLOGIST** R. Maffia	
SITE DESCRIPTION Bridge No. 890108 On SR 1911 Over Norkett Branch				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 15+54	**OFFSET** 8 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 454.2 ft	**TOTAL DEPTH** 20.1 ft	**NORTHING** 419,698	**EASTING** 1,591,013	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/17/2022		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Oden, C.	**START DATE** 09/28/23	**COMP. DATE** 09/28/23	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 10.5 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
444.56											Begin Coring @ 9.6 ft
	444.6	9.6	0.5	2:41/0.5	(0.5)	(0.0)		(10.5)	(6.2)		**NON-CRYSTALLINE ROCK** Gray, META-ARGILLITE, very slight to slightly weathered, medium to moderately hard, very close to moderately close fracture spacing. GSI = 40-50
	444.1	10.1	5.0	2:58/1.0 2:49/1.0	100%	0%		100%	59%		
				3:13/1.0	(5.0)	(2.2)					
440				2:41/1.0	100%	44%					
	439.1	15.1		2:45/1.0							
			5.0	2:51/1.0	(5.0)	(4.0)					
				2:24/1.0	100%	80%					
435				3:22/1.0							
				2:40/1.0							
	434.1	20.1		2:32/1.0							434.1 20.1 Boring Terminated at Elevation 434.1 ft In Non-Crystalline Rock (Meta-Argillite)

CORE PHOTOGRAPH
BRIDGE NO. 890108 ON SR 1911 OVER NORKETT BRANCH

EB2-B
BOX 1 OF 2: 9.6 - 17.2 FEET



0 1 2

APPROXIMATE SCALE IN FEET

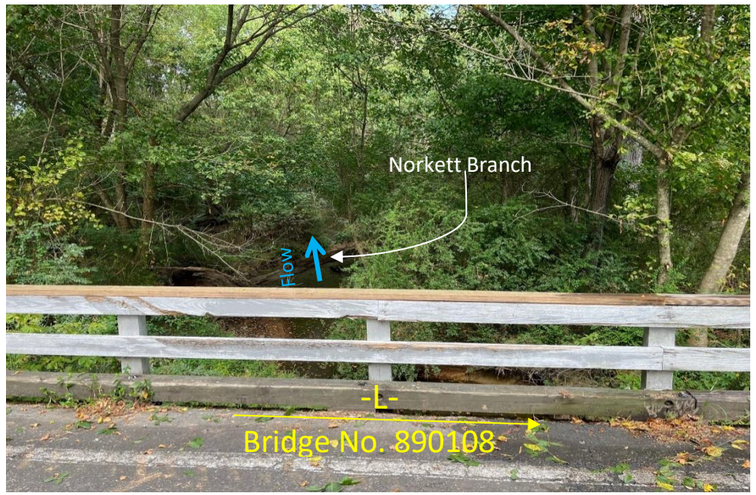
EB2-B
BOX 2 OF 2: 17.2 - 20.1 FEET

0 1 2

APPROXIMATE SCALE IN FEET

SITE PHOTOGRAPH
BRIDGE NO. 890108 ON SR 1911 OVER NORKETT BRANCH

Upstream Norkett Branch (Facing NE Direction)



Bridge No. 890108 (Looking Southeast)

Downstream Norkett Branch (Facing SW Direction)

Bridge No. 890108 (Looking Northwest)