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This file or an individual page shall not be considered a certified document.

09/08/99

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BP5.R108	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
BP5.R108.1	N/A	PE
BP5.R108.2	N/A	R/W
BP5.R108.3	N/A	CONST

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

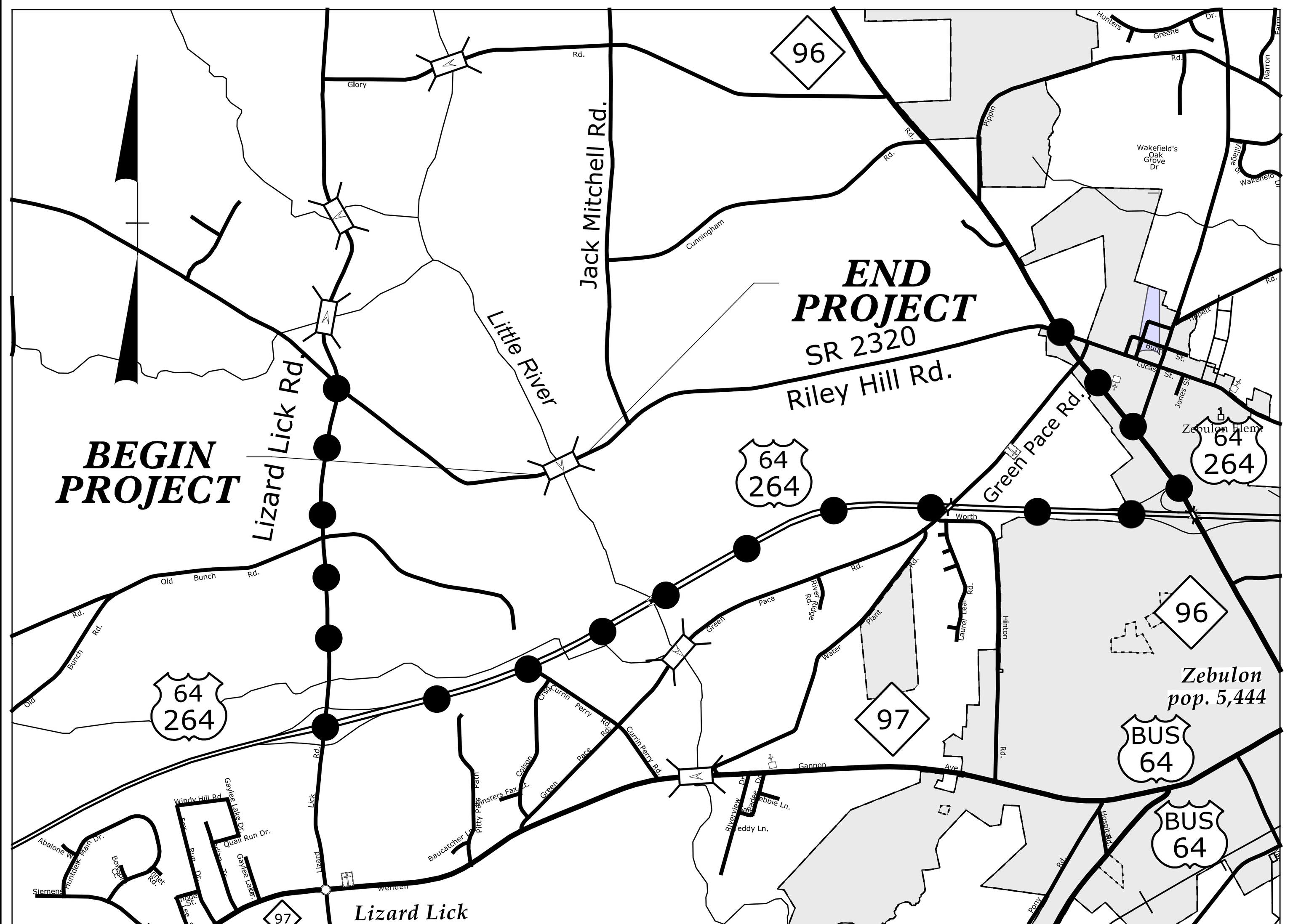
WAKE COUNTY

LOCATION: BRIDGE NO. 180 OVER LITTLE RIVER ON SR 2320 (RILEY HILL ROAD)

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

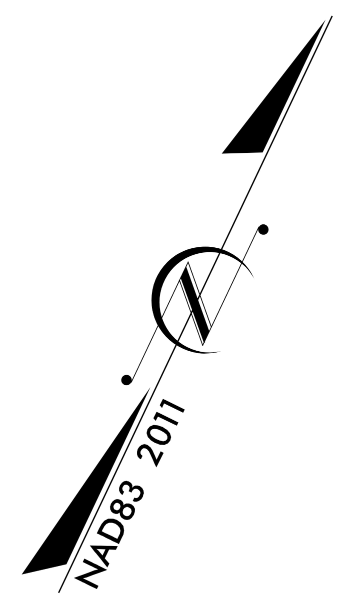
PROJECT: BP5.R108

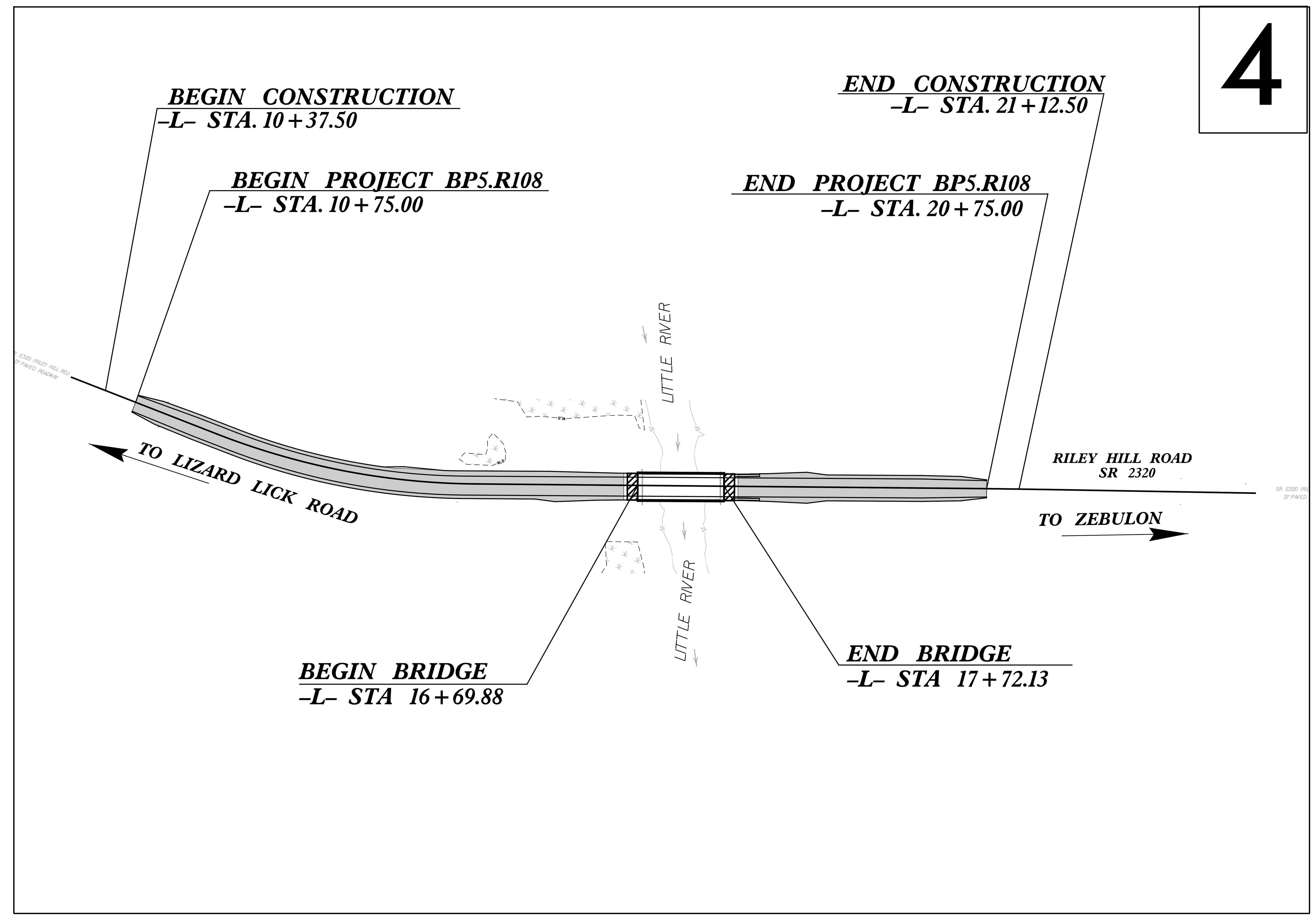
100% PLANS



VICINITY MAP

●●●●● OFF–SITE DETOUR





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CONTRACT:

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2023 = 2,200
ADT 2043 = 2,600

V = 50 MPH
FUNC CLASS = MINOR COLLECTOR
SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY PROJECT BP5.R108 = 0.170 Miles

LENGTH STRUCTURE PROJECT BP5.R108 = 0.019 Miles

TOTAL LENGTH OF PROJECT BP5.R108 = 0.189 Miles

Prepared In the Office of:

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
(919) 571-7111
NC License Number F-0159

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
JULY 21, 2022

LETTING DATE:
SEPTEMBER 13, 2023

CHRISTINA YOKELEY, PE
PROJECT ENGINEER

REID CROSSER, EI
PROJECT DESIGN ENGINEER

LISA B. GILCHRIST, EI
NCDOT CONTACT

HYDRAULICS ENGINEER

DocuSigned by:
Miranda Salzler
SIGNATURE: P.E.

NORTH CAROLINA PROFESSIONAL SEAL 033180 ENGINEER MIRANDA LOUISE SALZLER

ROADWAY DESIGN ENGINEER

DocuSigned by:
Christina Yokeley
SIGNATURE: P.E.

NORTH CAROLINA PROFESSIONAL SEAL 048043 ENGINEER CHRISTINA L. YOKELEY

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

7/28/2023
BP5-R108_RDY_TSH.dgn
RCROSSER

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
BP5.R108	1-A

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 048043 ENGINEER CHRISTINA L. YOKELEY

DocuSigned by: Christina Yokeley F82E4CDDA40643E...

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INDEX OF SHEETS

SHEET NUMBER	SHEET
1	TITLE SHEET
1-A	INDEX OF SHEETS
1-B	CONVENTIONAL SYMBOLS
2A-1	PAVEMENT SCHEDULE, TYPICAL SECTIONS, and WEDGING DETAILS
2C-1	GUARDRAIL INSTALLATION DETAIL
2C-2	DETAIL FOR STRUCTURE ANCHOR UNITS
3B	GUARDRAIL, SHOULDER BERM GUTTER, PAVEMENT REMOVAL, BREAKING OF PAVEMENT, AND EARTHWORK SUMMARY
3D	DRAINAGE SUMMARY
3G	SUMMARY OF AGGREGATE SUBGRADE / STABILIZATION AND SUBSURFACE DRAINAGE
4	PLAN SHEET
5	PROFILE SHEET
RW02C1 thru RW04	SURVEY CONTROL SHEETS
TMP-1 thru TMP-4	TRAFFIC MANAGEMENT PLANS
EC-1 thru EC-5	EROSION CONTROL PLANS
SIGN-1 thru SIGN-3	SIGNING PLANS
UO-1 thru UO-2	UTILITIES BY OTHERS PLANS
X-1	CROSS-SECTION SUMMARY
X-2 thru X-6	CROSS-SECTIONS
S-1 thru S-16	STRUCTURE PLANS

GENERAL NOTES:

2018 SPECIFICATIONS
EFFECTIVE: 01-16-2018
REVISED:

GRADING AND SURFACING OR RESURFACING AND WIDENING:

THE GRADE LINES SHOWN DENOTE THE FINISHED ELEVATION OF THE PROPOSED SURFACING AT GRADE POINTS SHOWN ON THE TYPICAL SECTIONS. WHERE NO GRADE LINES ARE SHOWN, THE PROFILES SHOWN DENOTE THE TOP ELEVATION OF THE EXISTING PAVEMENT ALONG THE CENTER LINE OF SURVEY ON WHICH THE PROPOSED RESURFACING WILL BE PLACED. GRADE LINES MAY BE ADJUSTED 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 III.

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

SIDE ROADS:

THE CONTRACTOR WILL BE REQUIRED TO DO ALL NECESSARY WORK TO PROVIDE SUITABLE CONNECTIONS WITH ALL ROADS, STREETS, AND DRIVES ENTERING THIS PROJECT. THIS WORK WILL BE PAID FOR AT THE CONTRACT UNIT PRICE FOR THE PARTICULAR ITEMS INVOLVED.

SUBSURFACE DRAINS:

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

DRIVEWAYS:

DRIVEWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. 848.02 USING 3 FOOT RADII OR RADII AS SHOWN ON THE PLANS. LOCATIONS OF DRIVES WILL BE AS SHOWN ON THE PLANS OR AS 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.

SUBSURFACE PLANS:

NO SUBSURFACE PLANS ARE AVAILABLE ON THIS PROJECT. THE CONTRACTOR SHOULD MAKE HIS OWN INVESTIGATION AS TO THE SUBSURFACE CONDITIONS.

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE DUKE ENERGY DISTRIBUTION,

AT&T COMMUNICATIONS: LOCAL SERVICE, AT&T COMMUNICATIONS: LONG DISTANCE,

GOOGLE FIBER, SPECTRUM/CHARTER CATV, DOMINION ENERGY GAS, AND

WINDSTREAM COMMUNICATIONS

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

RIGHT-OF-WAY MARKERS:

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

CURB RAMPS

CURB RAMPS ARE SHOWN ON THE PLANS AT APPROXIMATE LOCATIONS.
CONSTRUCT ALL CURB RAMPS ACCORDANCE WITH STD 848.05 and/or 848.06.

EFF. 01-16-2018
REV.

2018 ROADWAY ENGLISH STANDARD DRAWINGS

The following Roadway Standards as appear in "Roadway Standard Drawings" Highway Design Branch - N. C. Department of Transportation - Raleigh, N. C., Dated January, 2018 are applicable to this project and by reference hereby are considered a part of these plans:

STD.NO.	TITLE
DIVISION 2 - EARTHWORK	
200.03	Method of Clearing - Method III
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
310.10	Driveway Pipe Construction
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
DIVISION 8 - INCIDENTALS	
806.01	Concrete Right-of-Way Marker
815.02	Subsurface Drain
840.02	Concrete Catch Basin - 12" thru 54" Pipe
840.03	Frame, Grates and Hood - for Use on Standard Catch Basin
840.14	Concrete Drop Inlet - 12" thru 30" Pipe
840.16	Drop Inlet Frame and Grates - for use with Std. Dwg 840.14 and 840.15
840.31	Concrete Junction Box - 12" thru 66" Pipe
840.51	Brick Manhole - 12" thru 36" Pipe
840.53	Precast Manhole with Masonry Base - 12" thru 42" Pipe
840.54	Manhole Frame and Cover
840.71	Concrete and Brick Pipe Plug
840.72	Pipe Collar
848.01	Concrete Sidewalk
848.02	Driveway Turnout - Radius Type
848.05	Curb Ramp - Proposed Curb & Gutter
852.01	Concrete Islands
852.05	Median Curb for Catch Basin - for Use with 1'-6" Curb and Gutter
852.06	Method for Placement of Drop Inlets in Concrete Islands
852.10	Median Construction - with Curb and Gutter
862.01	Guardrail Placement
862.02	Guardrail Installation
876.01	Rip Rap in Channels
876.02	Guide for Rip Rap at Pipe Outlets

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9/10/2021

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 — R/W
- Existing Control of Access Line — C/A
- Proposed Control of Access Line — C/A
- 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.

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
BP5.R108	2A-1
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 048043 CHRISTINA L. YOKELEY	NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022896 CLARK S. MORRISON

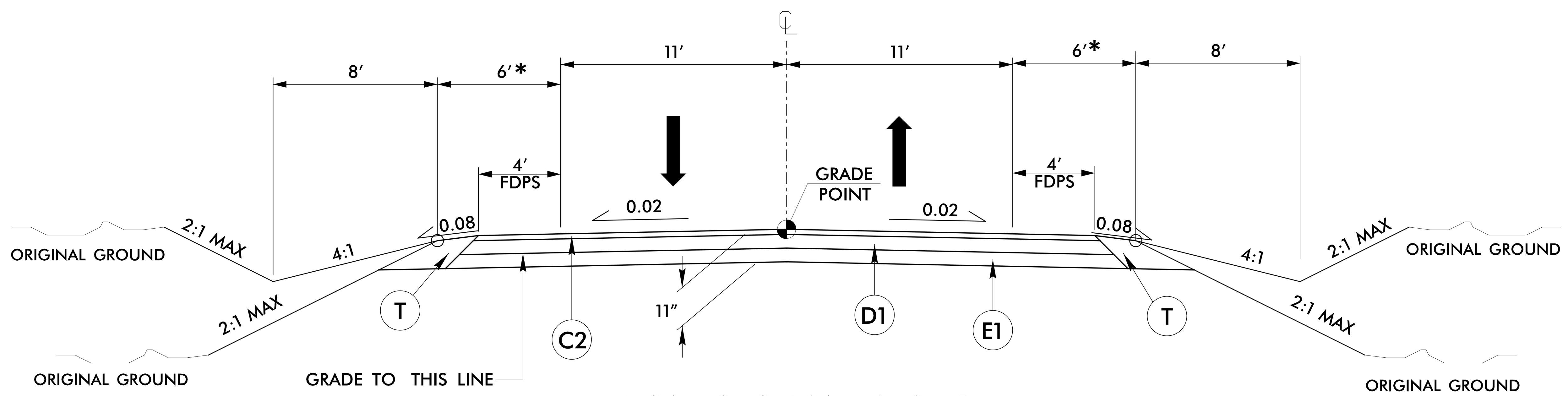
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
(919) 571-7111
NC License Number F-0159

FINAL PAVEMENT SCHEDULE

C1	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 110 LBS PER SQ YD PER 1" DEPTH TO BE PLACED IN LAYERS NOT TO EXCEED 1 1/2" IN DEPTH	E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.	V	VARIABLE DEPTH MILLING
C2	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 165 LBS. PER SQ. YD. IN EACH OF THE TWO LAYERS	R1	SHOULDER BERM GUTTER		
C3	PROP. APPROX. 1 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 165 LBS. PER SQ. YD.	T	EARTH MATERIAL.		
D1	PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.	U	EXISTING PAVEMENT.		

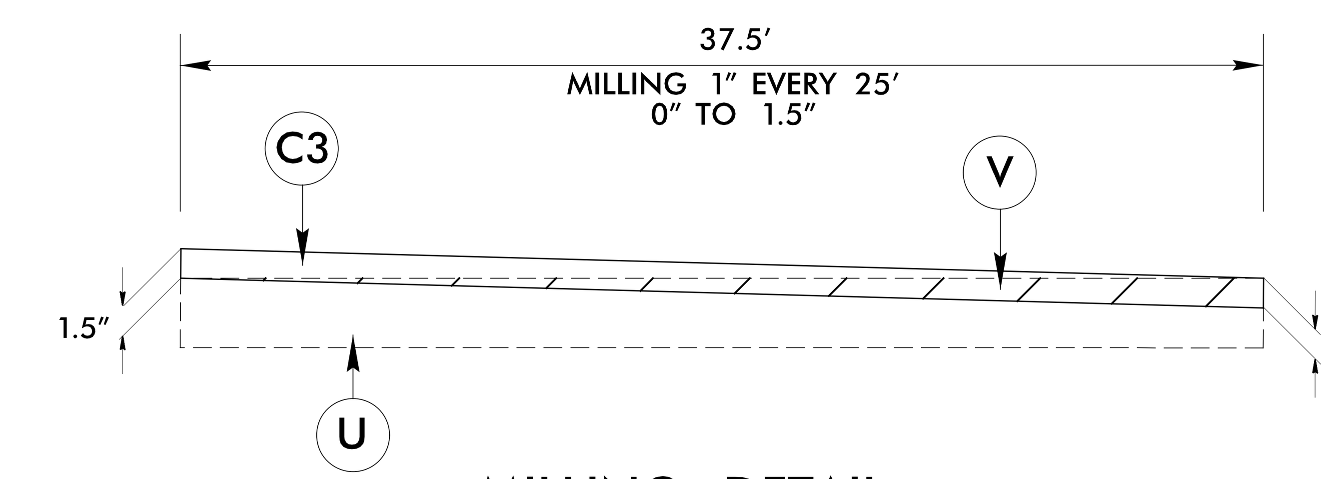
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE



TYPICAL SECTION NO. 1

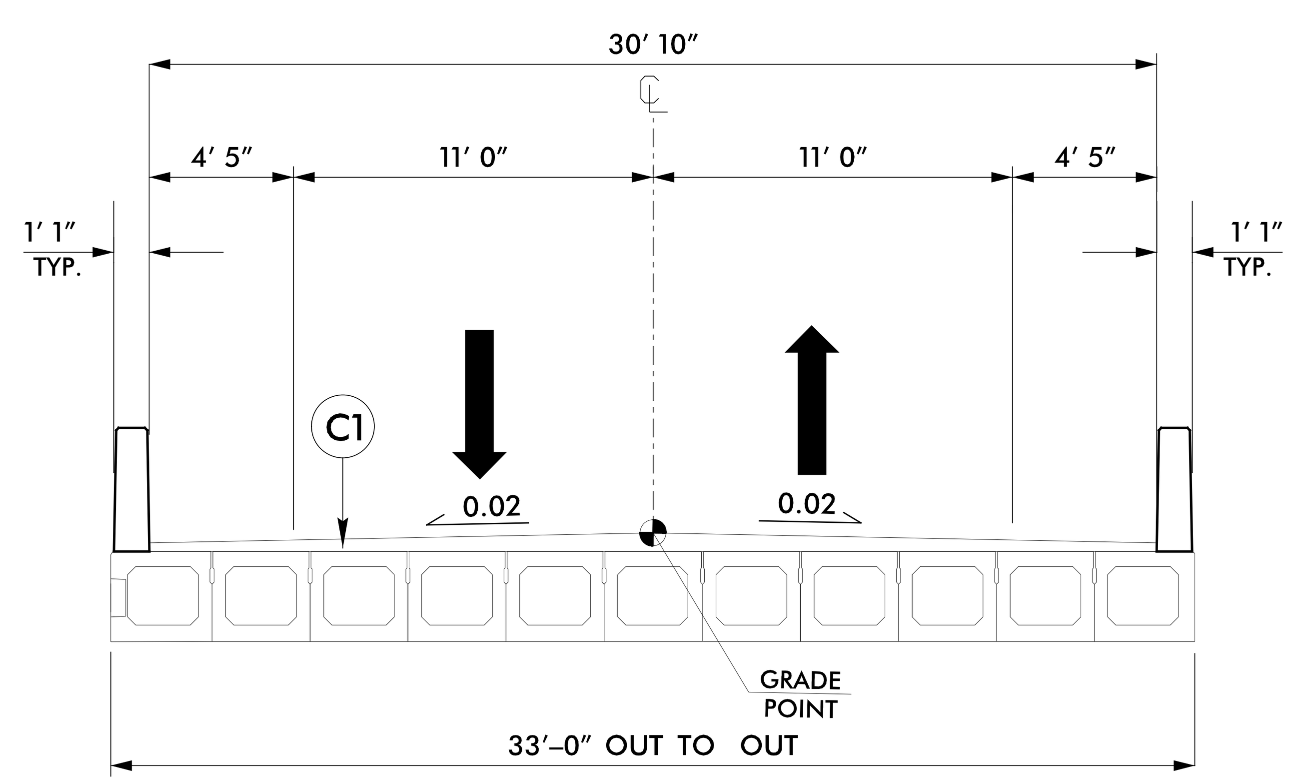
-L- STA. 10+75.00 TO STA. 16+69.88 (BEGIN BRIDGE)
-L- STA. 17+72.13 (END BRIDGE) TO STA. 20+75.00

* USE 9' WITH GUARDRAIL



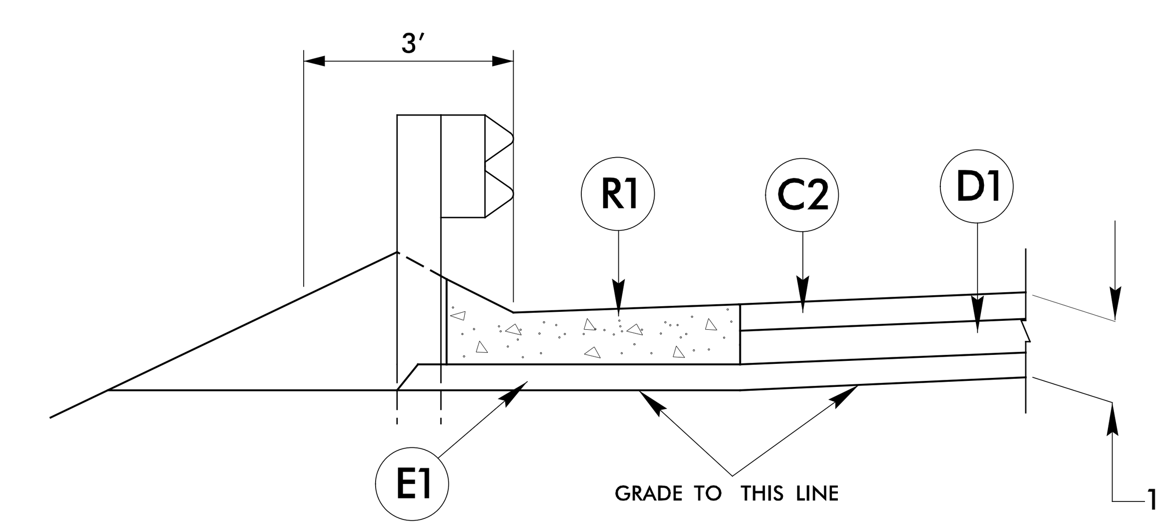
MILLING DETAIL

USE MILLING DETAIL AT RESURFACING TIES



TYPICAL SECTION NO. 2

-L- STA. 16+69.88 (BEGIN BRIDGE) TO STA. 17+72.13 (END BRIDGE)



SHOULDER BERM GUTTER DETAIL

-L- STA. 17+83.00 (END APPROACH SLAB) TO -L- STA. 18+12 (LT & RT)

5/26/2023
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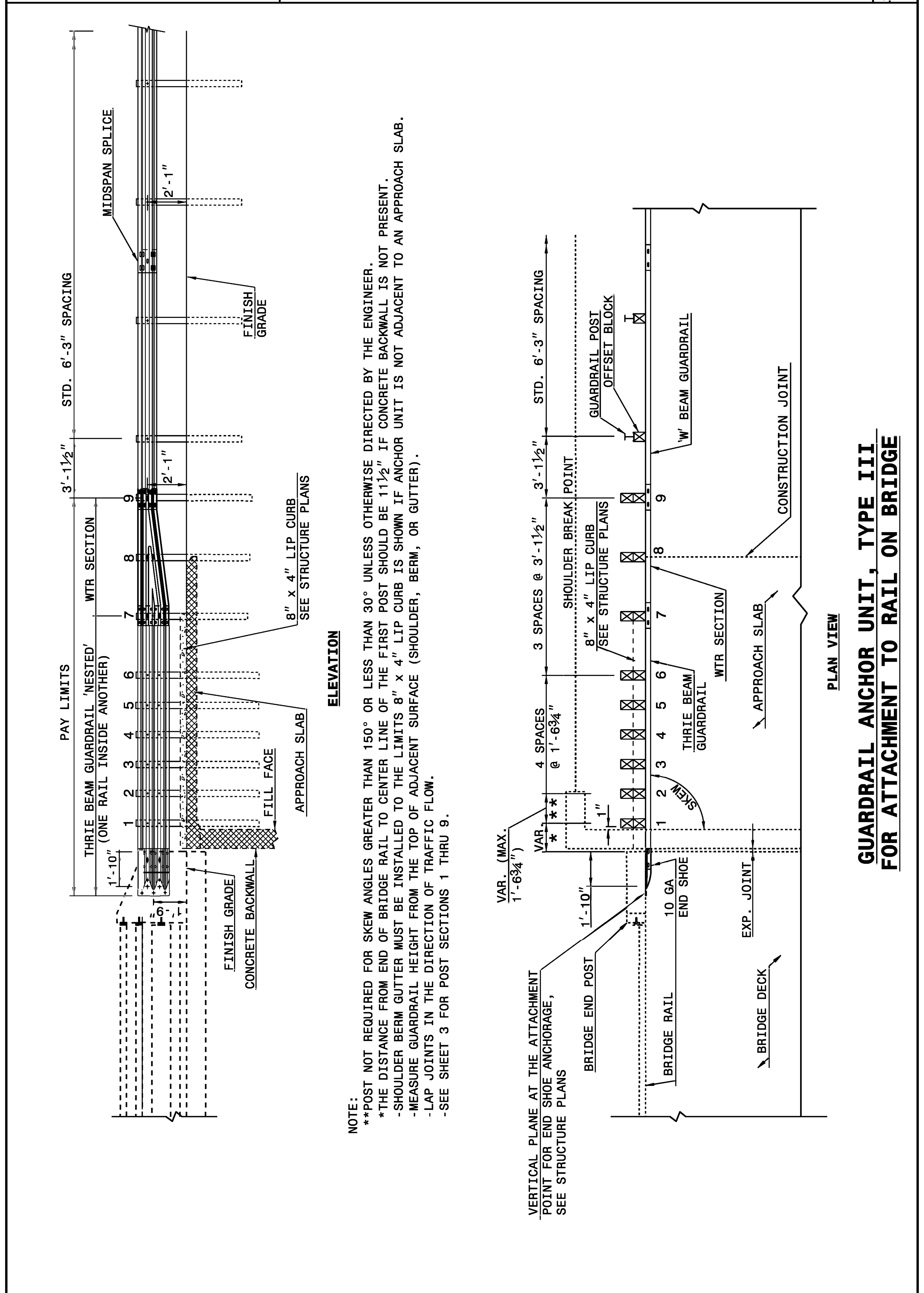
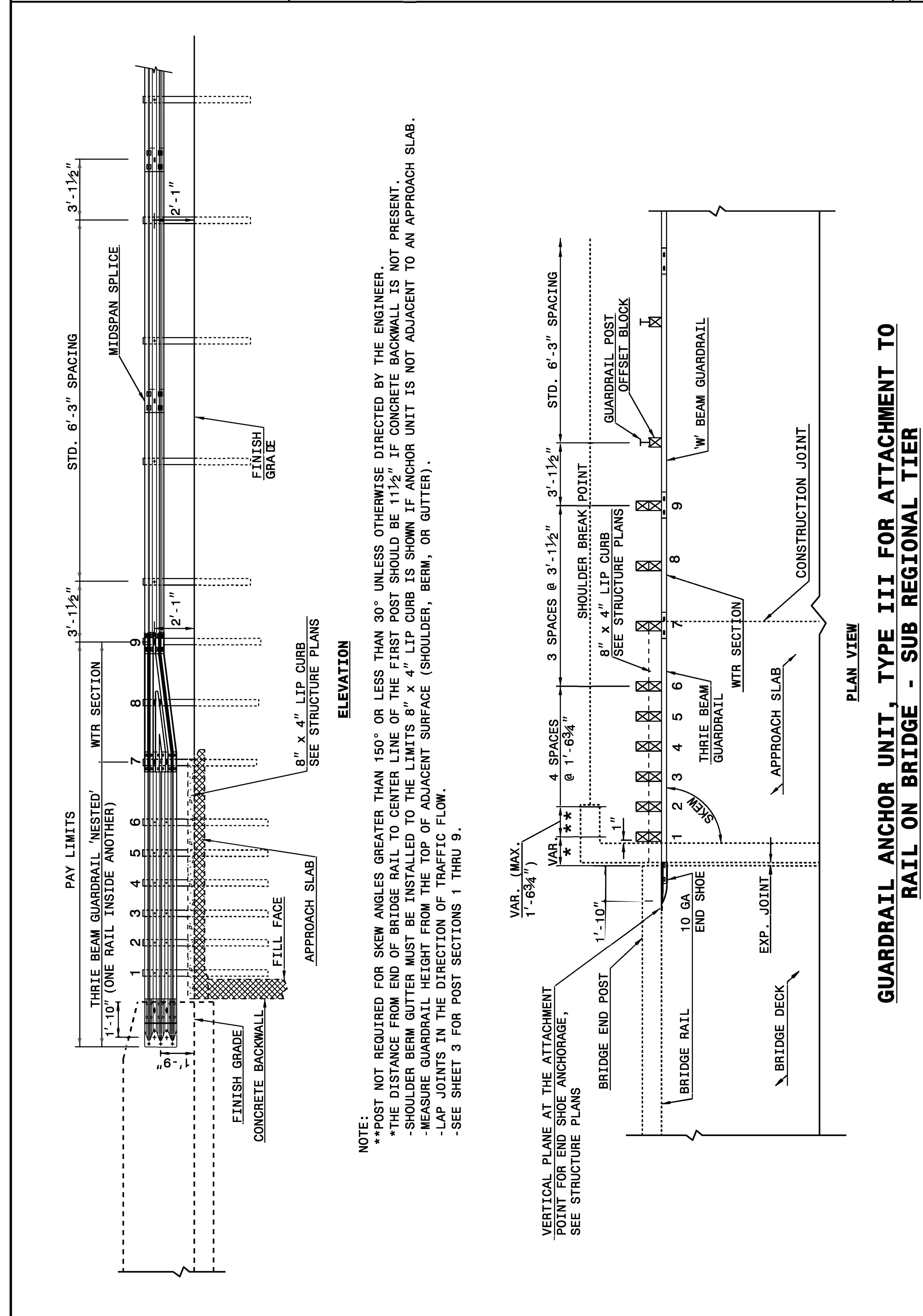
RCROSER

PROJECT REFERENCE NO.	SHEET NO.
BP5.R108	2C-1





STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

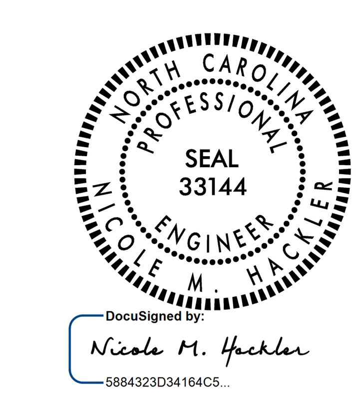
ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III
FOR ATTACHMENT TO RAIL ON BRIDGE

SHEET 1 OF 7 **862D03**

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO
RAIL ON BRIDGE - SUB REGIONAL TIER

SHEET 2 OF 7 **862D03**



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CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

ORIGINAL BY: J HOWERTON DATE: 06-22-12
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.:

14-DEC-2017 10:36
S:\Contracts\Contracts\Special Details\jhowerton\Standard Drawings\2018 Standard Drawings\Details in Lieu of Standards\Division 8\0862d0301.dgn
jhowerton AT CSU-272915

PROJECT REFERENCE NO.	SHEET NO.
BP5.R108	2C-2

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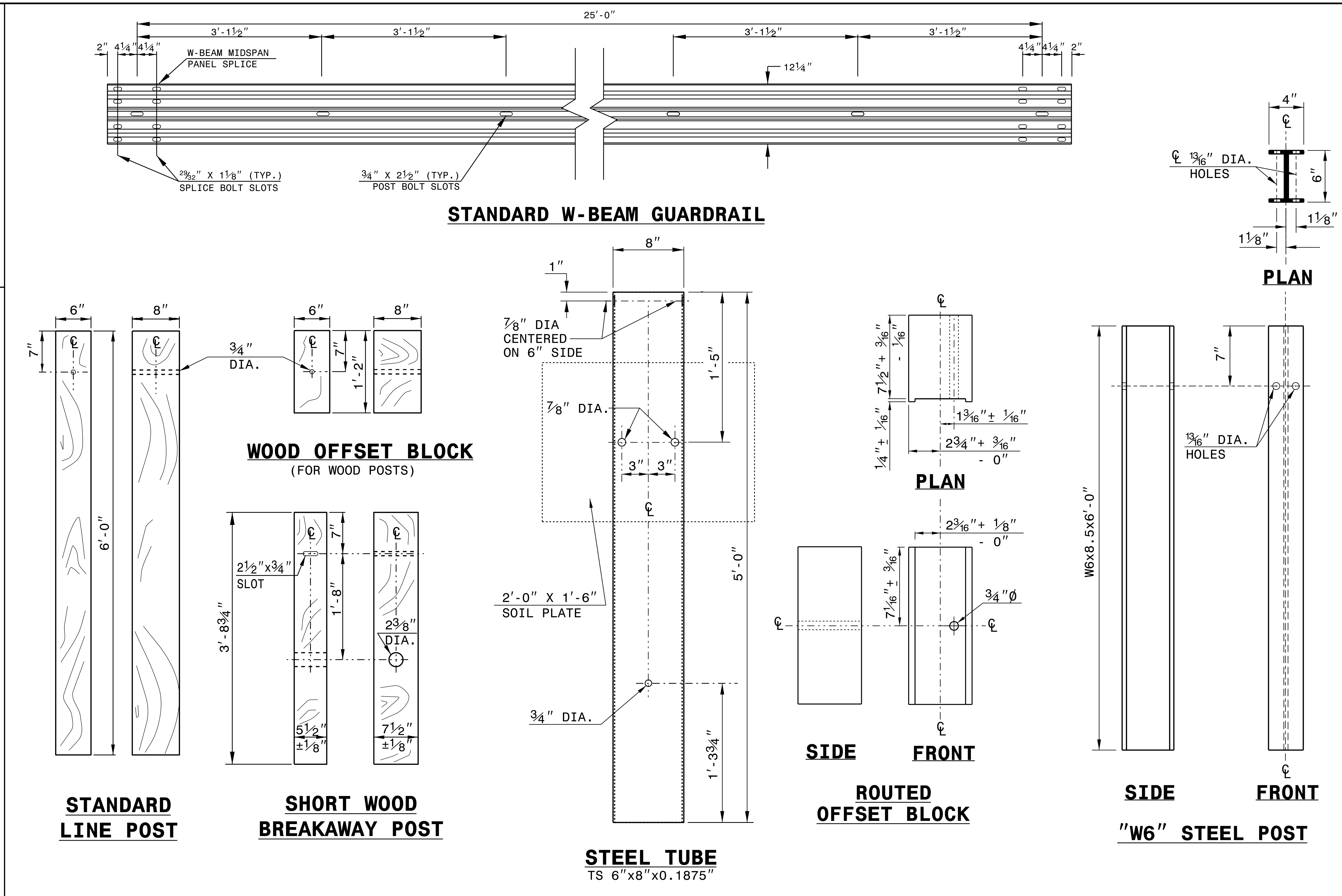
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION



SYSTEM PARTS

SHEET 6 OF 8
862D02

STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 6 OF 8
862D02

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 33144 NICOLE M. HACKLER

DocuSigned by: Nicole M. Hackler

CONTRACTS STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

ORIGINAL BY: J.HOWERTON DATE: 3-7-2018
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.:

6/21/00

COMPUTED BY:	RUC	DATE:	2/8/23
CHECKED BY:	CLY	DATE:	2/8/23

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
(919)571-7111
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
BP5.R108	3B

SUMMARY OF EARTHWORK IN CUBIC YARDS

LOCATION	EXCAVATION				EMBANKMENT	BORROW	WASTE		
	TOTAL UNCLASS.	UNDERCUT	UNSUITABLE UNCLASS.	SUITABLE UNCLASS.	EMBANK. +20%		TOTAL WASTE	SUITABLE	UNSUITABLE
SUMMARY #1									
-L- 10+50 TO 16+69.88	463	--	--	463	2,272	1,809	--	--	--
-L- 17+72.13 TO 20+75	97	--	--	97	305	208	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
TOTAL SUMMARY #1	560	--	--	560	2,576	2,016	--	--	--
TOTAL	560	--	--	560	2,576	2,016	--	--	--
LOSS DUE TO CLEARING & GRUBBING	-200	--	--	-200	--	200	--	--	--
ADDITIONAL UNDERCUT	--	--	--	--	--	--	--	--	--
ROCK WASTE TO REPLACE BORROW	--	--	--	--	--	--	--	--	--
ADJUST FOR ROCK WASTE	--	--	--	--	--	--	--	--	--
WASTE IN LIEU OF BORROW	--	--	--	--	--	--	--	--	--
EST.5% TO REPLACE TOP SOIL ON BORROW PIT						111			
GRAND TOTAL	360	--	--	360	2,576	2,326	--	--	--
SAY	400					2,400			

NOTE: EARTHWORK QUANTITIES ARE CALCULATED BY LOCHNER. THESE EARTHWORK QUANTITIES ARE BASED, IN PART, ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.

PER GEOTECH RECOMMENDATION, ESTIMATED 200 CUBIC YARDS OF UNDERCUT TO BE USED IN THE DISCRETION OF THE RESIDENT ENGINEER.

EST. SHALLOW UNDERCUT CONTINGENCY = 100 CY

SHOULDER BORROW = 170 CY

THE PAVEMENT STRUCTURE AREA VOLUME = 932 CY

PAVEMENT REMOVAL SUMMARY

SURVEY LINE	STATION	STATION	LOCATION LT/RT/CL	YD^2
-L-	10+75.00	13+40.00	CL	623.69
-L-	16+71.00	16+76.33	CL	16.09
-L-	17+66.96	17+71.00	CL	12.67
-L-	19+60.00	20+75.00	CL	266.45
			TOTAL:	918.9
			SAY:	1,000.0

SUMMARY OF BREAKING EXISTING ASPHALT PAVEMENT

SURVEY LINE	STATION	STATION	LOCATION LT/RT/CL	YD^2
-L-	13+40.00	16+71.00	CL	828.82
-L-	17+71.00	19+60.00	CL	448.52
			TOTAL:	1,277.34
			SAY:	1,300.0

SHOULDER BERM GUTTER SUMMARY

SURVEY LINE	STATION	STATION	LENGTH
-L-	17+83.00	18+12.00	29.0
-L-	17+83.00	18+12.00	29.0
		TOTAL:	58.0
		SAY:	60

"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			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOUL. WIDTH	FLARE LENGTH		W		ANCHORS			IMPACT ATTENUATOR TYPE 350			SINGLE FACED GUARDRAIL	REMOVE EXISTING GUARDRAIL	REMOVE AND STOCKPILE EXISTING GUARDRAIL	REMARKS
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	AT-1	TYPE III	GREU TL-3	EA	G	NG				
-L-	13+94.60	16+71.00	LT	268.75'				16+71.00 (BRIDGE)	6'	9'						1	1							
-L-	15+72.04	16+71.00	RT	93.75'			16+71.00 (BRIDGE)		6'	9'						1	1							
-L-	17+71.00	18+68.84	LT	93.75'				17+71.00 (BRIDGE)	6'	9'						1	1							
-L-	17+71.00	18+68.84	RT	93.75'			17+71.00 (BRIDGE)		6'	9'						1	1							
		SUBTOTAL		550.0'																				
		LESS ANCHOR DEDUCTIONS																						
		GREU TL-3	4 x 50.00' =	-200.0'																				
		TYPE III	4 x 18.75' =	-75.0'																				
		TOTAL		275.0'																				

7/31/2023
BP5-R108_RDY_PSH_03B.dgn
RCROSSER

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

NOTE: Invert Elevations are for Bid Purposes only and shall not be used for project construction stakeout. See "Standard Specifications For Roads and Structures, Section 300-5".

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, or PVC) 12"	15"	18"	DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE	DO NOT USE PVC	CLASS IV R.C. PIPE (UNLESS OTHERWISE NOTED) 12"	15"	18"	24"	30"	36"	42"	48"	15" SIDE DRAIN PIPE	18" SIDE DRAIN PIPE	24" SIDE DRAIN PIPE	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') PER EACH (0' THRU 5.0')	LIN. *FT. 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		G.D.I. FRAME (N.S. FLAT) W/2 GRATES STD. 840.29	T.B.D.I. STD. 840.35 OR STD. 840.46		MODIFIED CONC. FLUME	15" SIDE DRAIN PIPE ELBOWS		REMARKS
18+08 L	RT	0401	0402	244.57	241.32	239.80			12		X			X	X														1								1	1			2		
18+08 L	LT	0403	0404	244.57	241.32	238.90			14		X			X	X														1								1	1			2		
TOTALS									26																				2								2	2			4		

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

COMPUTED BY: Hunsberger, W. S.	DATE: 6/3/22
CHECKED BY: Hamm, J. R.	DATE: 6/3/22

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT REFERENCE NO.	SHEET NO.
BP5.R108	3G

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

SUMMARY OF AGGREGATE SUBGRADE/STABILIZATION

LINE	STATION	STATION	AGGREGATE TYPE* ASU (1/2)/ AST	AGGREGATE THICKNESS INCHES [8" FOR ASU(2)]	SHALLOW UNDERCUT CY	CLASS IV SUBGRADE STABILIZATION TONS	GEOTEXTILE FOR SOIL STABILIZATION SY	STABILIZER AGGREGATE TONS	CLASS IV AGGREGATE STABILIZATION TONS
	CONTINGENCY		ASU (1)	12	100	200	200		
			TOTAL CY/TONS/SY		100	200**	200**		

*ASU = Aggregate Subgrade
*ATU = Aggregate Stabilization
**Total square yards of "Geotextile for Soil Stabilization" is only the estimated quantity for ASU/AST and may only represent a portion of the geotextile quantity shown in the Item Sheets of the Proposal.

6/21/00

7/28/2023
BP5-R108_RDY_PSH_03G.dgn
BCROSSER

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
(919) 571-7111
NC License Number F-0159

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

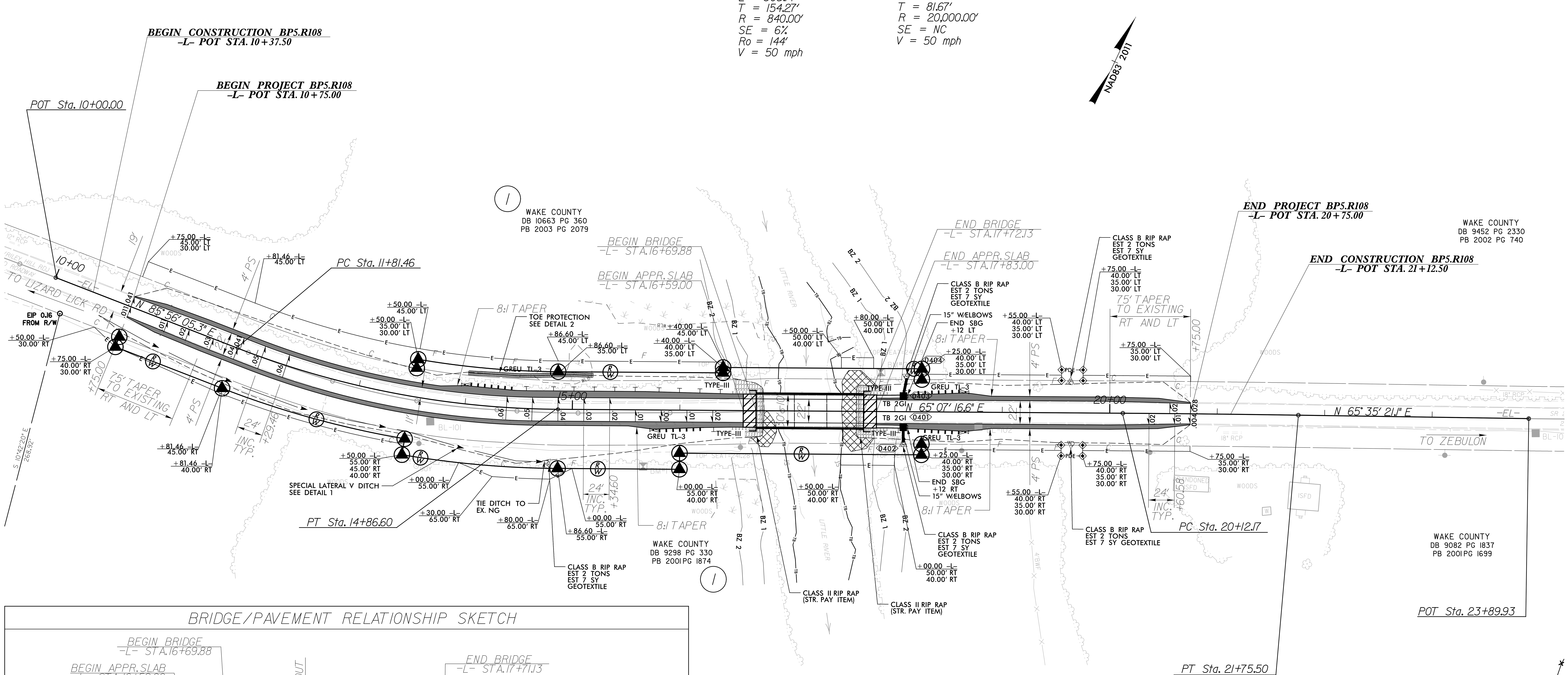
PROJECT REFERENCE NO.	SHEET NO.
BP5.R108	04
R/W SHEET NO.	

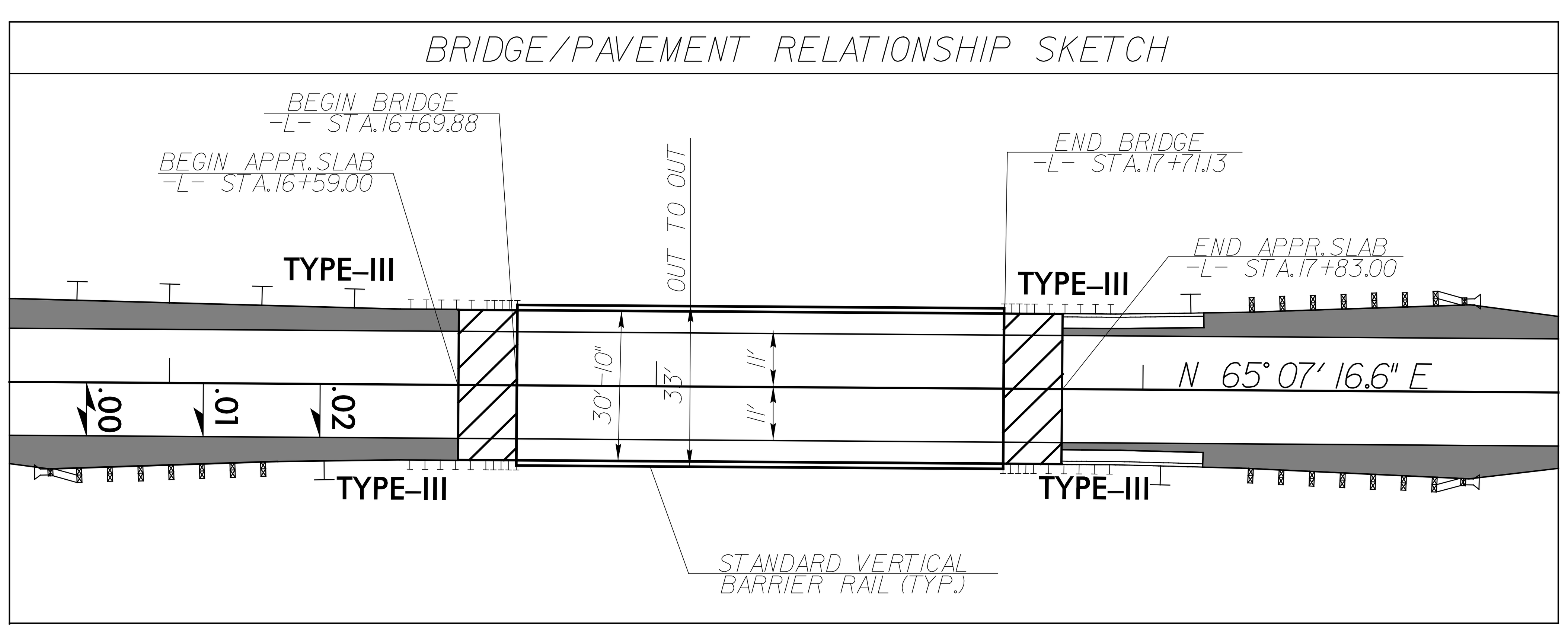
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 048043 CHRISTINA L. YOKELEY	NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 033180 MIRANDA LOUISE SALZLER
Christina Yokeley	Miranda Salzler

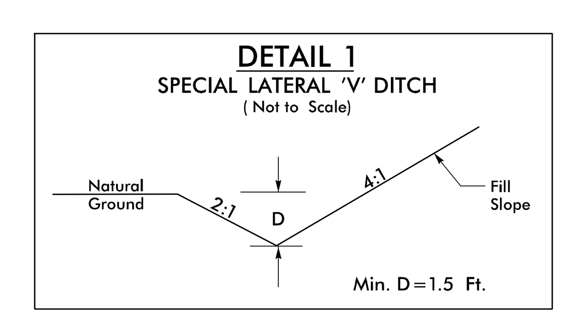
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L-

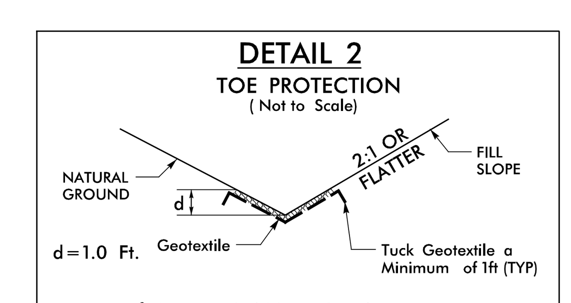
PI Sta 13+35.73	PI Sta 20+93.84
Δ = 20° 48' 48.6" (LT)	Δ = 0° 28' 04.5" (RT)
D = 6° 49' 15.3"	D = 0° 17' 11.3"
L = 305.14'	L = 163.33'
T = 154.27'	T = 81.67'
R = 840.00'	R = 20,000.00'
SE = 6%	SE = NC
Ro = 144'	V = 50 mph
V = 50 mph	







FROM STA. 10+50 TO STA. 14+75 -L- RT



FROM STA. 14+00 TO STA. 15+20 -L- LT

NOTE: ALL DRIVE RADII ARE 10' UNLESS OTHERWISE NOTED

FOR STRUCTURE PLANS, SEE SHEETS S-1 THRU S-16

SEE SHEET 5 FOR -L- PROFILE

PAVED SHOULDER

5/26/2023 R108_RDY_PSH04.dgn

5/14/99

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
(919) 571-7111
NC License Number F-0159

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

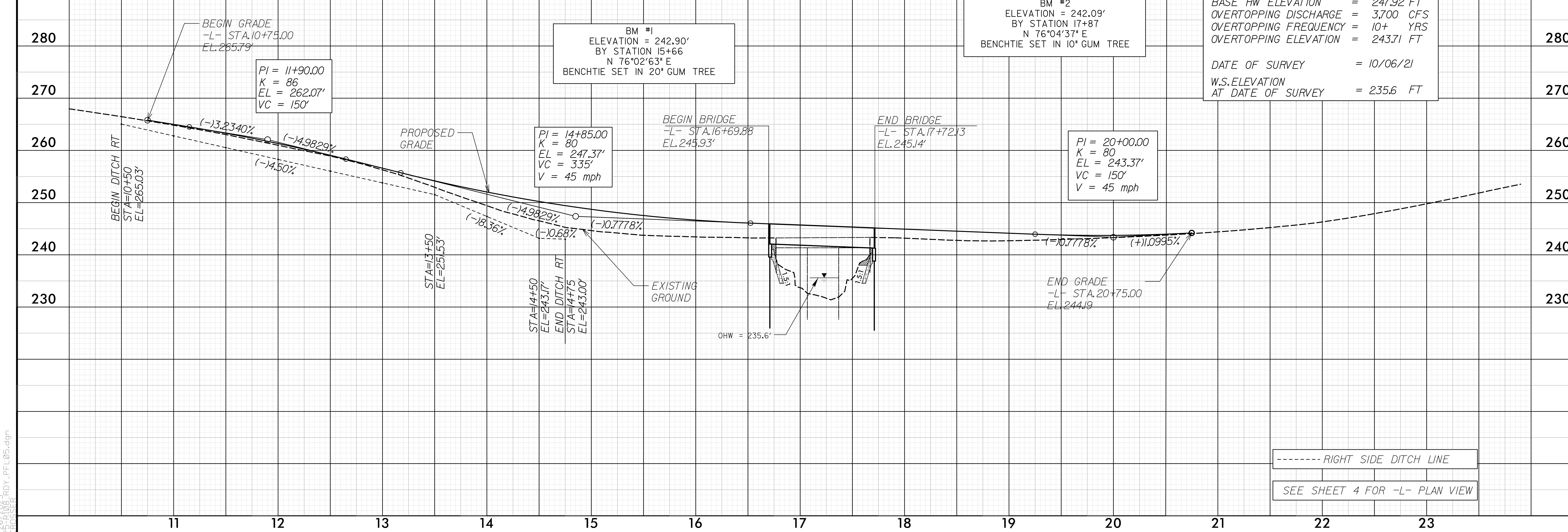
PROJECT REFERENCE NO.	SHEET NO.
BP5.R108	05

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 048043 ENGINEER CHRISTINA L. YOKELEY
Christina Yokeley

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 033180 ENGINEER MIRANDA LOUISE SALZLER
Miranda Salzler

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L-
RILEY HILL RD. (SR 2320)



BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	=	6,300	CFS
DESIGN FREQUENCY	=	25	YRS
DESIGN HW ELEVATION	=	246.0	FT
BASE DISCHARGE	=	9,330	CFS
BASE FREQUENCY	=	100	YRS
BASE HW ELEVATION	=	247.92	FT
OVERTOPPING DISCHARGE	=	3,700	CFS
OVERTOPPING FREQUENCY	=	10+	YRS
OVERTOPPING ELEVATION	=	243.71	FT
DATE OF SURVEY	=	10/06/21	
W.S. ELEVATION AT DATE OF SURVEY	=	235.6	FT

SEE SHEET 4 FOR -L- PLAN VIEW

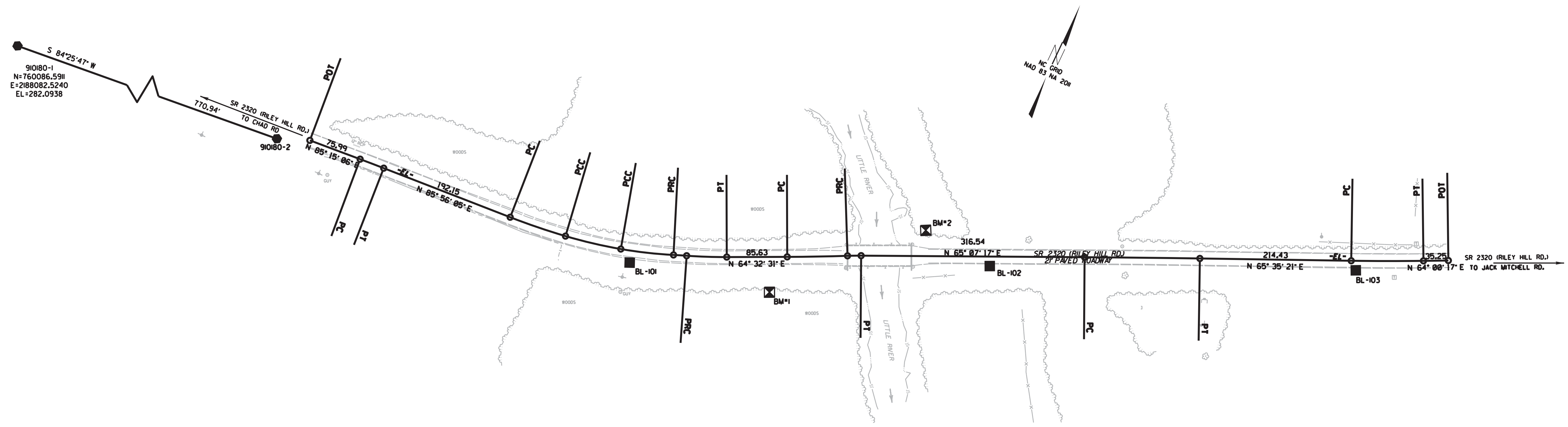
5/26/2023
R108_RDY_PFL_05.dgn

KCI ASSOCIATES OF NC
ENGINEERS | PLANNERS | SCIENTISTS | CONSTRUCTION MANAGERS

PROJECT SURVEYOR

SURVEY CONTROL SHEET

W/ EXISTING CENTERLINE ALIGNMENTS PRIOR TO CONSTRUCTION



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.

SURVEY CONTROL SHEET

W/ EXISTING CENTERLINE ALIGNMENTS PRIOR TO CONSTRUCTION

PROJECT REFERENCE NO.	SHEET NO.
910180	RW02C-2

Location and Surveys

KCI ASSOCIATES OF NC
ENGINEERS | PLANNERS | SCIENTISTS | CONSTRUCTION MANAGERS

PROJECT SURVEYOR

NORTH CAROLINA PROFESSIONAL SEAL L-3860 LAND SURVEYOR JAMES M. GELLENTHIN

BL

POINT	DESC.	NORTH	EAST	ELEVATION
1	910180-1	760086.5911	2188082.5240	282.09
2	910180-2	760161.4230	2188849.8230	271.28
101	BL-101	760216.0966	2189376.6110	251.76
102	BL-102	760429.4247	2189839.9580	242.05
103	BL-103	760645.3620	2190311.3960	253.79

BM1 ELEVATION - 242.89
N 760263 E 2189574
BM1-20IN 2BULB GUM TREE

BM2 ELEVATION - 242.13
N 760437 E 2189736
BM2-10IN GUM TREE

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.

REVISIONS

6/2/99

11-FEB-2019 15:49
M:\2018\351800284 NCDOT\S Wake County 5 Bridges Package - Div 5\Bridge 180 - Riley Hill Rd\DRAWINGS\910180_ls_rw02c-2.dgn
matthew.koss AT 12-F07DEC2

Location and Surveys

KCI ASSOCIATES OF NC
ENGINEERS | PLANNERS | SCIENTISTS | CONSTRUCTION MANAGERS

PROJECT SURVEYOR

NORTH CAROLINA PROFESSIONAL SEAL L-3860 LAND SURVEYOR JAMES M. GELLENTHIN

SURVEY CONTROL SHEET

W/ EXISTING CENTERLINE ALIGNMENTS PRIOR TO CONSTRUCTION

EL

POINT	N	E	BEARING	DIST	DELTA	D	L	T	R
POT	760179.279	2188893.083							
LINE			N 85°15′05.8" E	75.99					
PC	760185.569	2188968.812							
CURVE			N 85°35′35.5" E	35.77	00°40′59.4"(RT)	01°54′35.5"	35.77	17.89	3000.00
PT	760188.318	2189004.477							
LINE			N 85°56′05.3" E	192.15					
PC	760201.940	2189196.143							
CURVE			N 83°33′42.5" E	82.81	04°44′45.4"(LT)	05°43′46.5"	82.83	41.44	1000.00
PCC	760211.225	2189278.429							
CURVE			N 77°53′38.8" E	80.46	06°35′22.1"(LT)	08°11′06.4"	80.51	40.30	700.00
PCC	760228.099	2189357.101							
CURVE			N 71°07′31.6" E	75.14	06°56′52.3"(LT)	09°14′28.5"	75.18	37.64	620.00
PCC	760252.406	2189428.198							
CURVE			N 68°11′07.2" E	18.63	01°04′03.5"(RT)	05°43′46.5"	18.63	9.32	1000.00
PCC	760259.330	2189445.497							
CURVE			N 66°37′49.8" E	56.86	04°10′38.3"(LT)	07°20′44.2"	56.87	28.45	780.00
PT	760281.882	2189497.688							
LINE			N 64°32′30.7" E	85.63					
PC	760318.689	2189575.002							
CURVE			N 63°43′33.6" E	85.43	01°37′54.2"(LT)	01°54′35.5"	85.44	42.72	3000.00
PCC	760356.508	2189651.609							
CURVE			N 64°00′56.6" E	19.29	02°12′40.1"(RT)	11°27′33.0"	19.30	9.65	500.00
PT	760364.961	2189668.953							
LINE			N 65°07′16.6" E	316.54					
PC	760498.128	2189956.116							
CURVE			N 65°21′18.9" E	163.33	00°28′04.5"(RT)	00°17′11.3"	163.33	81.67	20000.00
PT	760566.235	2190104.568							
LINE			N 65°35′21.1" E	214.43					
PC	760654.853	2190299.827							
CURVE			N 64°47′48.8" E	102.33	01°35′04.6"(LT)	01°32′54.7"	102.33	51.17	3700.00
PT	760698.426	2190392.412							
LINE			N 64°00′16.5" E	35.25					
POT	760713.876	2190424.095							

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.

REVISIONS

6/2/99

11-FEB-2019 15:51
M:\2018\35180284 NCDOT\5 Wake County 5 Bridges Package - Div 5\Bridge 180 - Riley Hill Rd\DRAWINGS\910180_ls_rw02c-3.dgn

PROPOSED ALIGNMENT CONTROL SHEET

PROJECT REFERENCE NO.	SHEET NO.
BP5-R108	RW02D-1

Location and Surveys

KCI

http://www.kci.com

KCI Associates of N.C., P.A.
4505 Falls of Neuse Rd, Suite 400
Raleigh, NC 27609
Phone (919) 783-9214

PROJECT SURVEYOR

NORTH CAROLINA PROFESSIONAL SEAL L-3860 LAND SURVEYOR JAMES M. GELLENTHIN

James M. Gellenthin

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

I, James M. Gellenthin, PLS, 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.

This 2nd day of September, 2022.

James M. Gellenthin

Professional Land Surveyor L-3860

L

POINT	N	E	BEARING	DIST	DELTA	D	L	T	R
POT	760188.318	2189004.477							
LINE			N 85°56'05.3" E	181.46					
PC	760201.181	2189185.477							
CURVE			N 75°31'40.9" E	303.47	20°48'48.6"(LT)	06°49'15.3"	305.14	154.27	840.00
PT	760277.020	2189479.315							
LINE			N 65°07'16.6" E	525.57					
PC	760498.128	2189956.116							
CURVE			N 65°21'18.9" E	163.33	00°28'04.5"(RT)	00°17'11.3"	163.33	81.67	20000.00
PT	760566.235	2190104.568							
LINE			N 65°35'21.1" E	214.43					
POT	760654.853	2190299.827							

NOTES:

1. PROJECT CONTROL WAS ESTABLISHED USING GNSS, THE GLOBAL NAVIGATION SATELLITE SYSTEM.

2. THE PROPOSED ALIGNMENT 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.

REVISIONS

6/2/99

RIGHT OF WAY CONTROL SHEET

PROJECT REFERENCE NO.	SHEET NO.
BP5.R108	RW03E-1

Location and Surveys

KCI

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4505 Falls of Neuse Rd, Suite 400
Raleigh, NC 27609
Phone (919) 783-9214

http://www.kci.com

PROJECT SURVEYOR

NORTH CAROLINA PROFESSIONAL SEAL L-3860 LAND SURVEYOR JAMES M. GELLENTHIN

James M. Gellenthin

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

I , James M. Gellenthin , certify that the right of way and permanent easement monumentation for this project shown herein was completed under my direct and responsible charge from an actual survey made under my supervision; that all horizontal closures had a minimum ratio of precision of 1:10,000 (Class A). Field work was performed from August 23 2022 to August 25 2022, and all coordinates are based on NAD83/2011; That this survey was performed to meet the requirements of 21NCAC 56.1600 as applicable.

This 2nd day of September, 2022.

James M. Gellenthin
Professional Land Surveyor L-3860

ROW MARKER IRON PIN AND CAP-E

ALIGN	STATION	OFFSET	NORTH	EAST
L	10+75.00	40.00	760153.7352	2189082.1240
L	10+75.00	30.00	760163.7101	2189081.4151
L	11+81.98	40.22	760161.1047	2189188.8719
L	13+50.00	55.00	760176.8758	2189366.0309
L	13+50.00	40.00	760191.3260	2189362.0069
L	13+50.00	-26.78	760255.6552	2189344.0944
L	13+50.00	-35.00	760263.5775	2189341.8882
L	14+86.60	-35.00	760308.7725	2189464.5919
L	14+86.60	55.00	760227.1245	2189502.4548
L	16+00.00	55.00	760274.8318	2189605.3313
L	16+00.00	40.00	760288.4398	2189599.0208
L	16+40.00	-40.00	760377.8445	2189601.6546
L	16+40.00	-35.00	760373.3085	2189603.7581
L	18+25.00	40.00	760383.0970	2189803.1409
L	18+25.00	-40.00	760455.6730	2189769.4850
L	18+25.00	-30.00	760446.6010	2189773.6920
L	18+25.00	30.00	760392.1690	2189798.9339

NOTES:

1. IF FURTHER INFORMATION REGARDING PROJECT CONTROL IS NEEDED PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.
2. PROJECT CONTROL WAS ESTABLISHED USING GNSS, THE GLOBAL NAVIGATION SATELLITE SYSTEM.
3. RIGHT OF WAY MONUMENTATION ESTABLISHED AUGUST 23 2022 TO AUGUST 25 2022.

REVISIONS

6/2/99

02-SEP-2022 15:08
M:\2022\35220016 NCDOT Survey\E BP5R108 RW Staking\DRAWINGS\bp5-r108_ls_rw03e-1.dgn
matthew.koss AT KCI-J9IFRG3

PERMANENT EASEMENT CONTROL SHEET

PROJECT REFERENCE NO.	SHEET NO.
BP5.R108	RW03E-2

Location and Surveys

KCI Associates of N.C., P.A.
4505 Falls of Neuse Rd, Suite 400
Raleigh, NC 27609
Phone (919) 783-9214
http://www.kci.com

PROJECT SURVEYOR

NORTH CAROLINA PROFESSIONAL SEAL L-3860 LAND SURVEYOR JAMES M. GELLENTHIN

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

I , James M. Gellenthin , certify that the right of way and permanent easement monumentation for this project shown herein was completed under my direct and responsible charge from an actual survey made under my supervision; that all horizontal closures had a minimum ratio of precision of 1:10,000 (Class A). Field work was performed from August 23 2022 to August 25 2022, and all coordinates are based on NAD83/2011; That this survey was performed to meet the requirements of 21NCAC 56.1600 as applicable.

This 2nd day of September, 2022.

James M. Gellenthin
Professional Land Surveyor L-3860

ROW MARKER PERMANENT EASEMENT-E

ALIGN	STATION	OFFSET	NORTH	EAST
L	19+55.00	40.00	760437.7879	2189921.0769
L	19+55.00	-30.00	760501.2919	2189891.6280
L	19+55.00	30.00	760446.8599	2189916.8699
L	19+55.04	-40.00	760510.3817	2189887.4594
L	19+75.00	40.00	760446.2018	2189939.2209
L	19+75.00	-40.00	760518.7778	2189905.5650
L	19+75.00	-30.00	760509.7058	2189909.7720
L	19+75.00	30.00	760455.2738	2189935.0139

NOTES:

1. IF FURTHER INFORMATION REGARDING PROJECT CONTROL IS NEEDED PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.
2. PROJECT CONTROL WAS ESTABLISHED USING GNSS, THE GLOBAL NAVIGATION SATELLITE SYSTEM.
3. RIGHT OF WAY MONUMENTATION ESTABLISHED AUGUST 23 2022 TO AUGUST 25 2022 .

REVISIONS

6/2/99

02-SEP-2022 15:06
M:\2022\352200166 NCDOT Survey\E BP5R108 RW Staking\DRAWINGS\bp5-r108_ls_rw03e-2.dgn
matthew.koss AT KCI-J9JFRG3

09/08/99

TIP PROJECT: BP5-R108

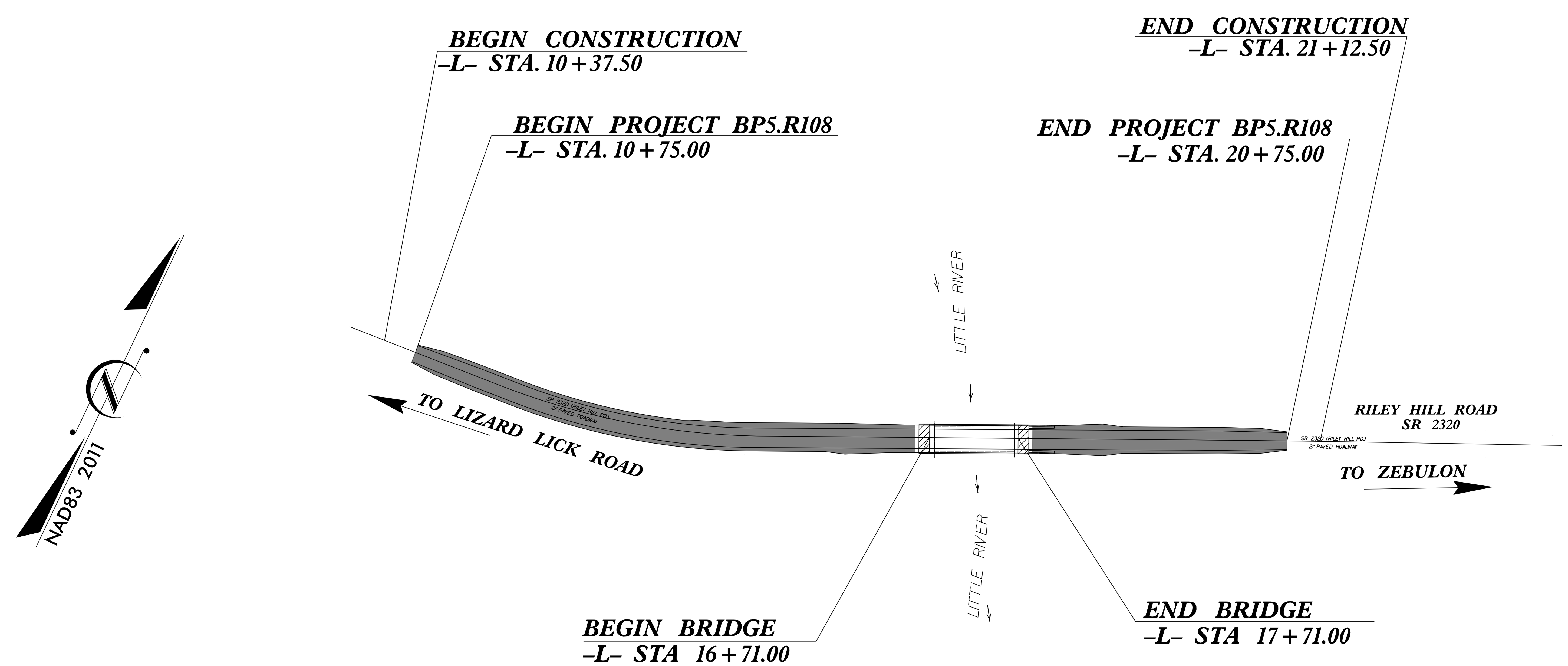
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BP5.R108.1	RW01	XX

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

SURVEY CONTROL, EXISTING CENTERLINES, RIGHT OF WAY, EASEMENTS AND PROPERTY TIES

WAKE COUNTY

LOCATION: BRIDGE NO. 180 OVER LITTLE RIVER ON SR 2320 (RILEY HILL ROAD)



GRAPHIC SCALE

50 25 0 50 100

PLANS

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "910180-1"
WITH NAD 83/NSRS XXXX STATE PLANE GRID COORDINATES OF NORTHING: 760,086.5911(ft) EASTING: 2,188,849.7592(ft)
ELEVATION: 282.094(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99991673
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "910180-1" TO -L- STATION 10+75.00 IS
N 51-32'20" E 1002.68(ft)
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

Prepared In the Office of:

KCI
http://www.kci.com

KCI Associates of N.C., P.A.
4505 Falls of Neuse Rd, Suite 400
Raleigh, NC 27609
Phone (919) 783-9214

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:	LETTING DATE:
08/23/2022	XX/XX/XXXX

PROFESSIONAL LAND SURVEYOR

NORTH CAROLINA PROFESSIONAL SEAL L-3860 LAND SURVEYOR JAMES M. GELLENTHIN

James M. Gellenthin 09/02/2022
SIGNATURE: Date:

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

PROJECT REFERENCE NO.	SHEET NO.
BP5-R108	RW04

Location and Surveys

KCI Associates of N.C., P.A.
4505 Falls of Neuse Rd, Suite 400
Raleigh, NC 27609
Phone (919) 783-9214
http://www.kci.com

PROJECT SURVEYOR

NORTH CAROLINA PROFESSIONAL SEAL L-3860 LAND SURVEYOR JAMES M. GELLENTHIN

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L-

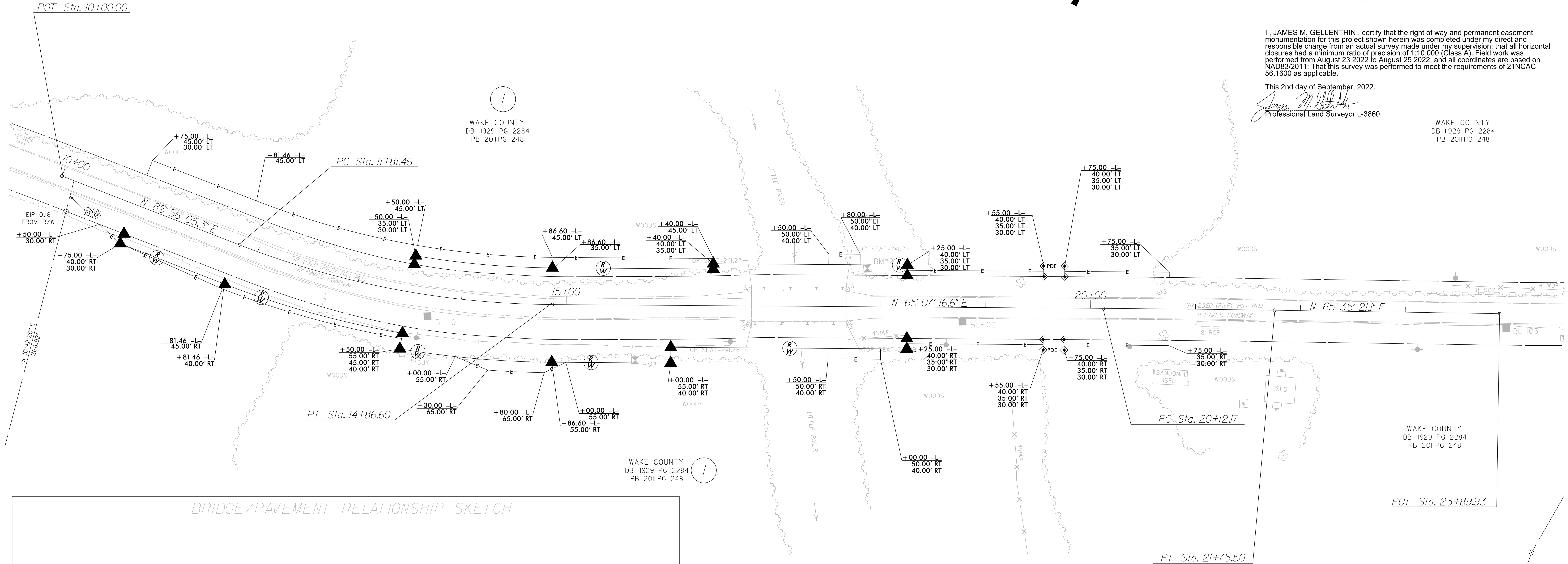
PI Sta 13+35.73
△ = 20° 48' 48.6" (LT)
D = 6° 49' 15.3"
L = 305.14'
T = 154.27'
R = 840.00'
SE = 6%
Ro = 144'
V = 50 mph

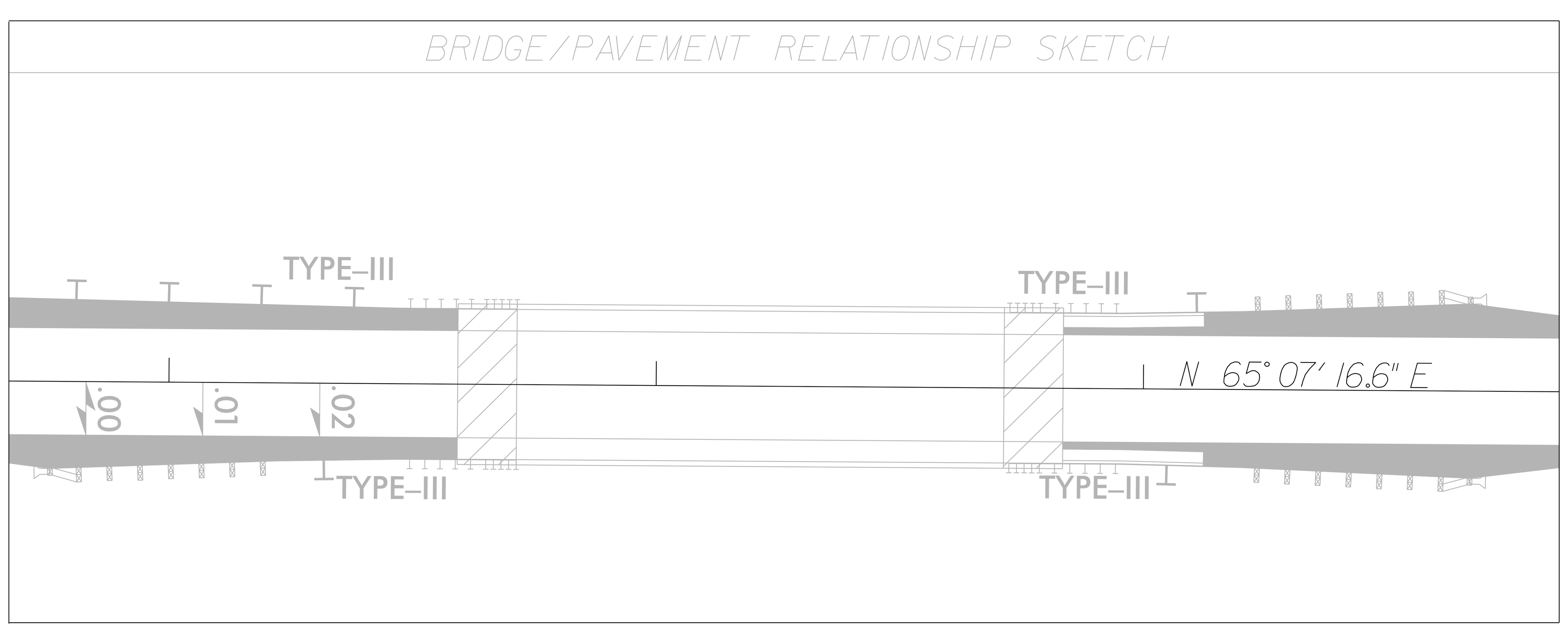
PI Sta 20+93.84
△ = 0° 28' 04.5" (RT)
D = 0° 17' 11.3"
L = 163.33'
T = 81.67'
R = 20,000.00'
SE = NC
V = 50 mph

I , JAMES M. GELLENTHIN , certify that the right of way and permanent easement monumentation for this project shown herein was completed under my direct and responsible charge from an actual survey made under my supervision; that all horizontal closures had a minimum ratio of precision of 1:10,000 (Class A). Field work was performed from August 23 2022 to August 25 2022, and all coordinates are based on NAD83/2011; That this survey was performed to meet the requirements of 21NCAC 56.1600 as applicable.

This 2nd day of September, 2022.

Professional Land Surveyor L-3860





NOTES:

1. IF FURTHER INFORMATION REGARDING PROJECT CONTROL IS NEEDED PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.
2. PROJECT CONTROL WAS ESTABLISHED USING GNSS, THE GLOBAL NAVIGATION SATELLITE SYSTEM.
3. RIGHT OF WAY MONUMENTATION ESTABLISHED AUGUST 23 2002 TO AUGUST 25 2022.

REVISIONS

6/2/99

02-SEP-2022 16:28
M:\2022\35220166 NCDOT Survey\E BP5R108 RW Staking\DRAWINGS\bp5-r108_ls_rw04.dgn
matthew.koss AT KCI-J91FRG3

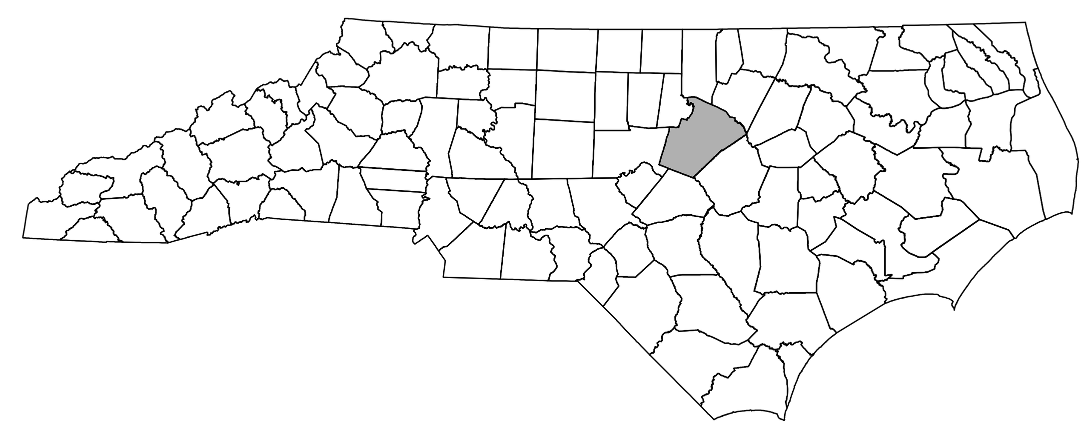
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

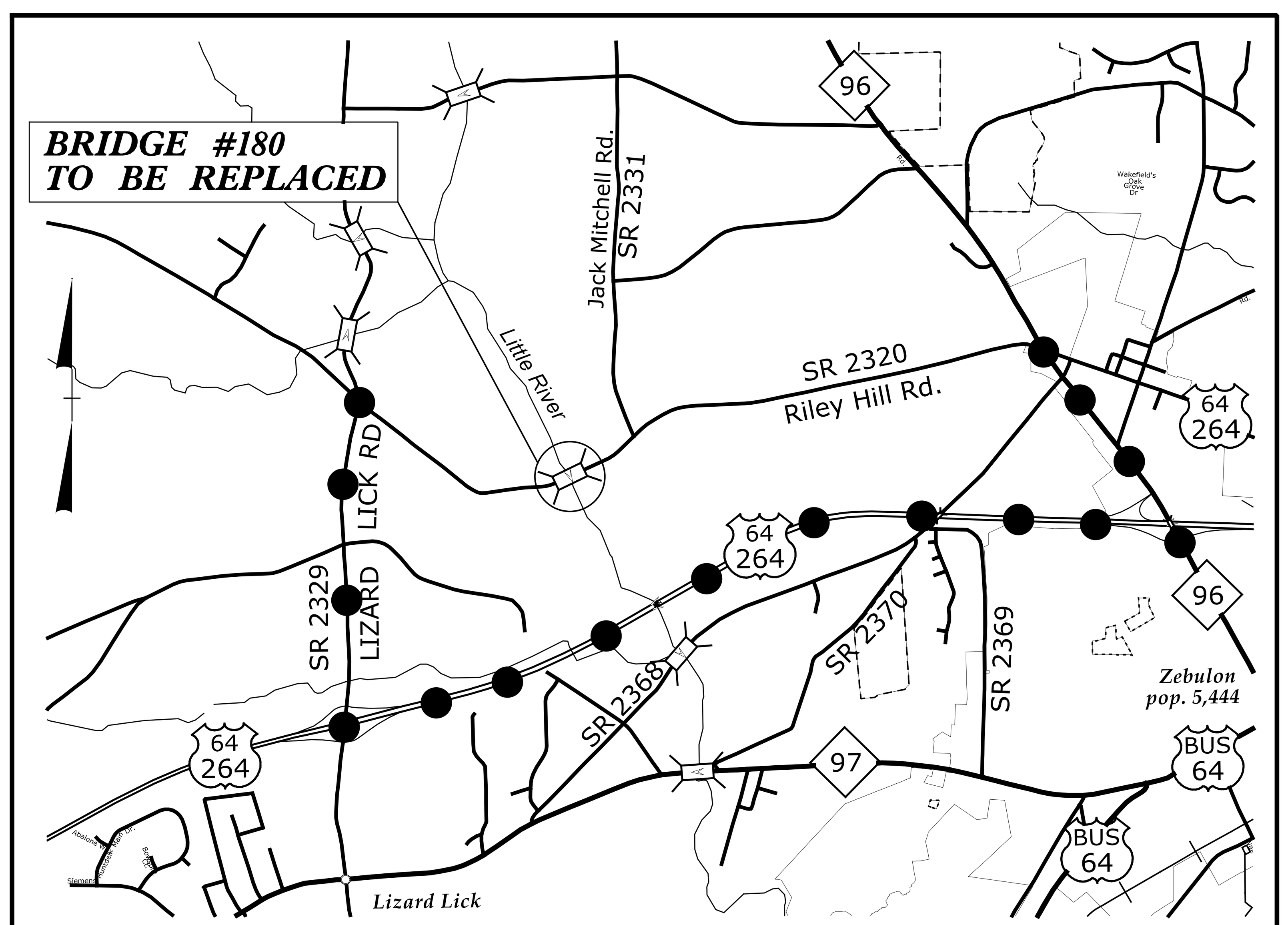
TRANSPORTATION MANAGEMENT PLAN

WAKE COUNTY

LOCATION: BRIDGE NO. 180 OVER LITTLE RIVER ON SR 2320 (RILEY HILL ROAD)

FINAL SUBMITTAL





DETOUR ROUTE

WORK ZONE SAFETY & MOBILITY
"from the MOUNTAINS to the COAST"

PREPARED IN THE OFFICE OF H. W. LOCHNER FOR NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

BRIAN K. EASON, PE	TRAFFIC CONTROL PROJECT ENGINEER
REID CROSSER, EI	TRAFFIC CONTROL PROJECT DESIGNER

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION WORK ZONE TRAFFIC CONTROL

INDEX OF SHEETS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
(919) 571-7111
NC License Number F-0159

APPROVED: DocuSigned by: Brian K. Eason 9AF015AD7ACC48F...

DATE: 7/31/2023

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 25523 ENGINEER BRIAN K. EASON

SHEET NO.
TMP-1

BP5.R108

TIP PROJECT:

7/31/2023
BP5.R108_TMP_01.dgn
BEASON

PROJ. REFERENCE NO.	SHEET NO.
BP5.108	TMP-2

TRAFFIC MANAGEMENT PLAN

GENERAL NOTES

CHANGES MAY BE REQUIRED WHEN PHYSICAL DIMENSIONS IN THE DETAIL DRAWINGS, STANDARD DETAILS, AND ROADWAY DETAILS ARE NOT ATTAINABLE TO MEET FIELD CONDITIONS OR RESULT IN DUPLICATE OR UNDESIRED OVERLAPPING OF DEVICES. MODIFICATION MAY INCLUDE: MOVING, SUPPLEMENTING, COVERING, OR REMOVAL OF DEVICES AS DIRECTED BY THE ENGINEER.

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.

TRAFFIC PATTERN ALTERATIONS

A) NOTIFY THE ENGINEER, LOCAL EMS AND WCPSS THIRTY (30) CALENDAR DAYS PRIOR TO ANY TRAFFIC PATTERN ALTERATION.

SIGNING

B) INSTALL ADVANCE WORK ZONE WARNING SIGNS WHEN WORK IS WITHIN 40 FT FROM THE EDGE OF TRAVEL LANE AND NO MORE THAN THREE (3) DAYS PRIOR TO THE BEGINNING OF CONSTRUCTION.

C) PROVIDE SIGNING AND DEVICES REQUIRED TO CLOSE THE ROAD ACCORDING TO THE ROADWAY STANDARD DRAWINGS AND TRAFFIC CONTROL PLANS.

PROVIDE SIGNING REQUIRED FOR THE OFF-SITE DETOUR ROUTE AS SHOWN ON SHEET TMP-3.

D) COVER OR REMOVE ALL SIGNS AND DEVICES REQUIRED TO CLOSE THE ROAD WHEN ROAD CLOSURE IS NOT IN OPERATION.

COVER OR REMOVE ALL SIGNS REQUIRED FOR THE OFF-SITE DETOUR WHEN THE DETOUR IS NOT IN OPERATION.

E) ENSURE ALL NECESSARY SIGNING IS IN PLACE PRIOR TO ALTERING ANY TRAFFIC PATTERN.

TRAFFIC CONTROL DEVICES

F) PLACE TYPE III BARRICADES, WITH "ROAD CLOSED" SIGN R11-2 ATTACHED, OF SUFFICIENT LENGTH TO CLOSE ENTIRE ROADWAY.

PAVEMENT MARKINGS AND MARKERS

G) INSTALL PAVEMENT MARKINGS AND AND MARKERS ON THE FINAL SURFACE ACCORDING TO THE ROADWAY STANDARD DRAWINGS.

H) TIE PROPOSED PAVEMENT MARKING LINES TO EXISTING PAVEMENT MARKING LINES.

NCDOT ROADWAY STANDARD DRAWINGS

THE FOLLOWING ROADWAY STANDARD DRAWINGS AS APPEAR IN "ROADWAY STANDARD DRAWINGS" - HIGHWAY DESIGN BRANCH - NC DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 2018 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED PART OF THESE PLANS:

STD. NO.	TITLE
1101.03	TEMPORARY ROAD CLOSURES
1101.11	TRAFFIC CONTROL DESIGN TABLES
1110.01	STATIONARY WORK ZONE SIGNS
1110.02	PORTABLE WORK ZONE SIGNS
1135.01	CONES
1145.01	BARRICADES
1205.01	PAVEMENT MARKERS - LINE TYPES AND OFFSETS
1205.02	PAVEMENT MARKINGS - TWO-LANE AND MULTI-LANE ROADWAYS
1205.12	PAVEMENT MARKINGS - BRIDGES
1250.01	RAISED PAVEMENT MARKERS - INSTALLATION SPACING
1251.01	RAISED PAVEMENTS MARKERS - PERMANENT AND TEMPORARY
1261.01	GUARDRAIL AND BARRIER DELINEATORS - INSTALLATION SPACING
1261.02	GUARDRAIL AND BARRIER DELINEATORS - TYPES AND MOUNTING
1262.01	GUARDRAIL END DELINEATION

PHASING

STEP 1 INSTALL ADVANCED WARNING SIGNS IN ACCORDANCE WITH ROADWAY STANDARD DRAWING NUMBERS 1101.03, SHEET 1 OF 9. INSTALL AND COVER DETOUR SIGNING AS SHOWN ON TMP-3.

STEP 2: UNCOVER DETOUR SIGNING AND INSTALL TYPE III BARRICADES TO CLOSE SR 2320 (RILEY HILL RD) TO THRU TRAFFIC. INSTALL CHANGEABLE MESSAGE SIGNS IN LOCATIONS DIRECTED BY ENGINEER.

STEP 3: PLACE TRAFFIC ONTO OFF-SITE DETOUR. PERFORM PROPOSED ROADWAY AND BRIDGE CONSTRUCTION. INSTALL FINAL PAVEMENT MARKINGS AND MARKERS.

STEP 4: REMOVE TYPE III BARRICADES FROM SR 2320 (RILEY HILL RD) AND REOPEN ROADWAY TO TRAFFIC. REMOVE ALL DETOUR SIGNING.

FINAL PAVEMENT MARKING SCHEDULE

DESCRIPTION	QUANTITY
THERMOPLASTIC PAVEMENT MARKING LINES (4", 90 MILS)	4,000 LF
PERMANENT RAISED PAVEMENT MARKERS (YELLOW & YELLOW)	13 EA

LOCHNER
H. W. LOCHNER, INC.
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(919)571-7111
NC License Number F-0159

APPROVED: DocuSigned by: Brian K. Eason 9AF015AD7ACC48F...
DATE: 7/31/2023
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 25523 ENGINEER BRIAN K. EASON

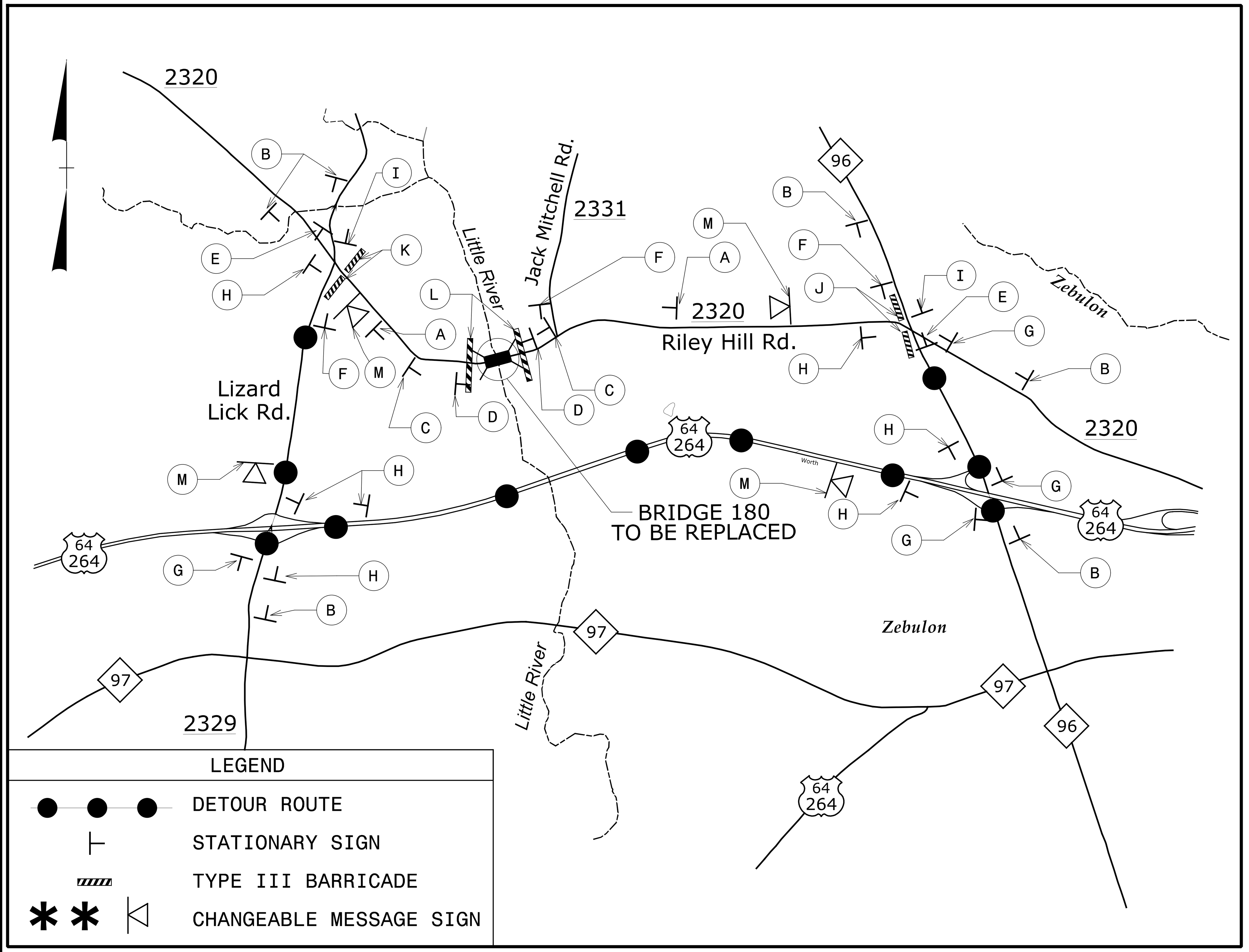
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION WORK ZONE TRAFFIC CONTROL

GENERAL NOTES
ROADWAY STANDARD DRAWINGS
PHASING
PAVEMENT MARKING SCHEDULE

7/31/2023
BP5-R108_TMP_02.dgn
RCROSSER

PROJ. REFERENCE NO.	SHEET NO.
BP5.108	TMP-3

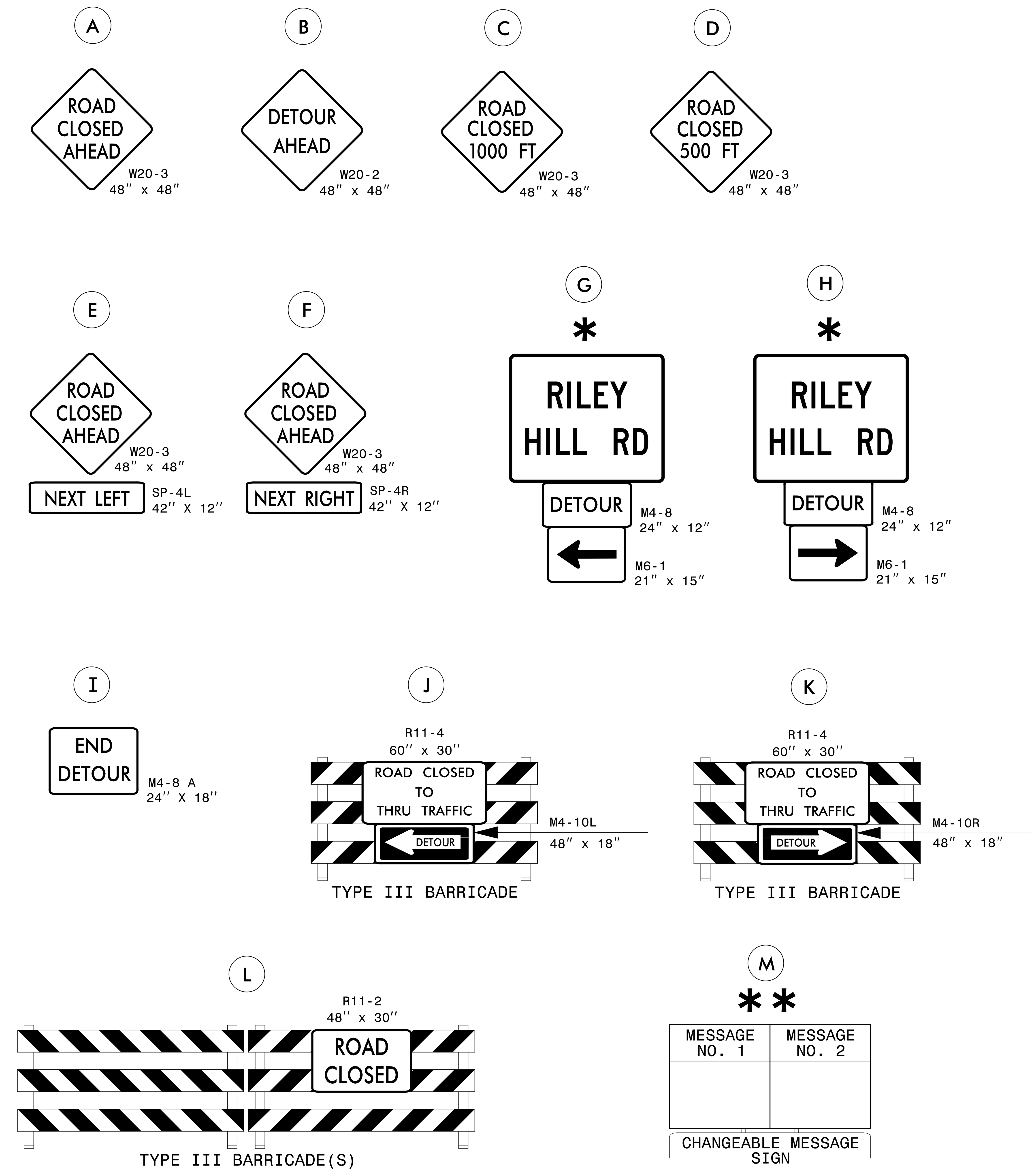


NOTES: ALL SIGN LOCATIONS ARE APPROXIMATE. REFER TO (2018) NCDOT ROADWAY STANDARD DRAWING 1101.03 FOR SPACING REQUIREMENTS.

✱ SEE SHEET TMP-4 FOR SPECIAL SIGN DESIGNS.

✱✱ CHANGEABLE MESSAGE SIGN LOCATIONS DIRECTED BY THE ENGINEER

TRAFFIC CONTROL TEMPORARY SIGNING AND DEVICES



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DATE: 7/31/2023
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 25523 ENGINEER BRIAN K. EASON
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DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION WORK ZONE TRAFFIC CONTROL

RILEY HILL RD
OFF-SITE DETOUR

TRAFFIC CONTROL
TEMPORARY
SIGNING AND DEVICES

7/31/2023
BP5_RI08_TMP_03.dgn
RCROSSER

PROJ. REFERENCE NO.	SHEET NO.
BP5.108	TMP-4

SIGN NUMBER: SP1
TYPE: D
QUANTITY: 10

SIGN WIDTH: 3'-0"
HEIGHT: 2'-6"
TOTAL AREA: 7.5 Sq.Ft.

BORDER TYPE: FLUSH
RECESS: 0.5"
WIDTH: 0.75"
RADII: 1.38"

NO. Z BARS:
LENGTH:

BACKG COLOR: Flourescent Orange
COPY COLOR: Black

SYMBOL	X	Y	WID	HT

MAT'L: 0.080" (2.0 mm) ALUMINUM

DESIGN BY: R. KNIGHT
CHECKED BY: B. EASON
Sep 14, 2022
PROJECT ID: BP5.108
LOCATION:
DIV: 5

Spacing Factor is 1 unless specified otherwise

USE NOTES:

1. Legend and border shall be direct applied black non-reflective sheeting.
2. Background shall be NC Grade B flouresent orange retro-reflective sheeting.

LETTER POSITIONS

Letter spacings are to start of next letter

										Series/Size Text Length
	R	I	L	E	Y					C 2000
9.2	4.4	2.2	3.9	3.6	3.8	8.9				17.9
	H	I	L	L		R	D			C 2000
4.2	4.7	2.2	3.9	3.1	6	4.4	3.4	4.2		27.5

FILENAME: BP5.108_SIGN_SP-1.dgn

NORTH CAROLINA D.O.T. SIGN DETAIL

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DATE: 7/31/2023
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 25523 ENGINEER BRIAN K. EASON

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DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION WORK ZONE TRAFFIC CONTROL

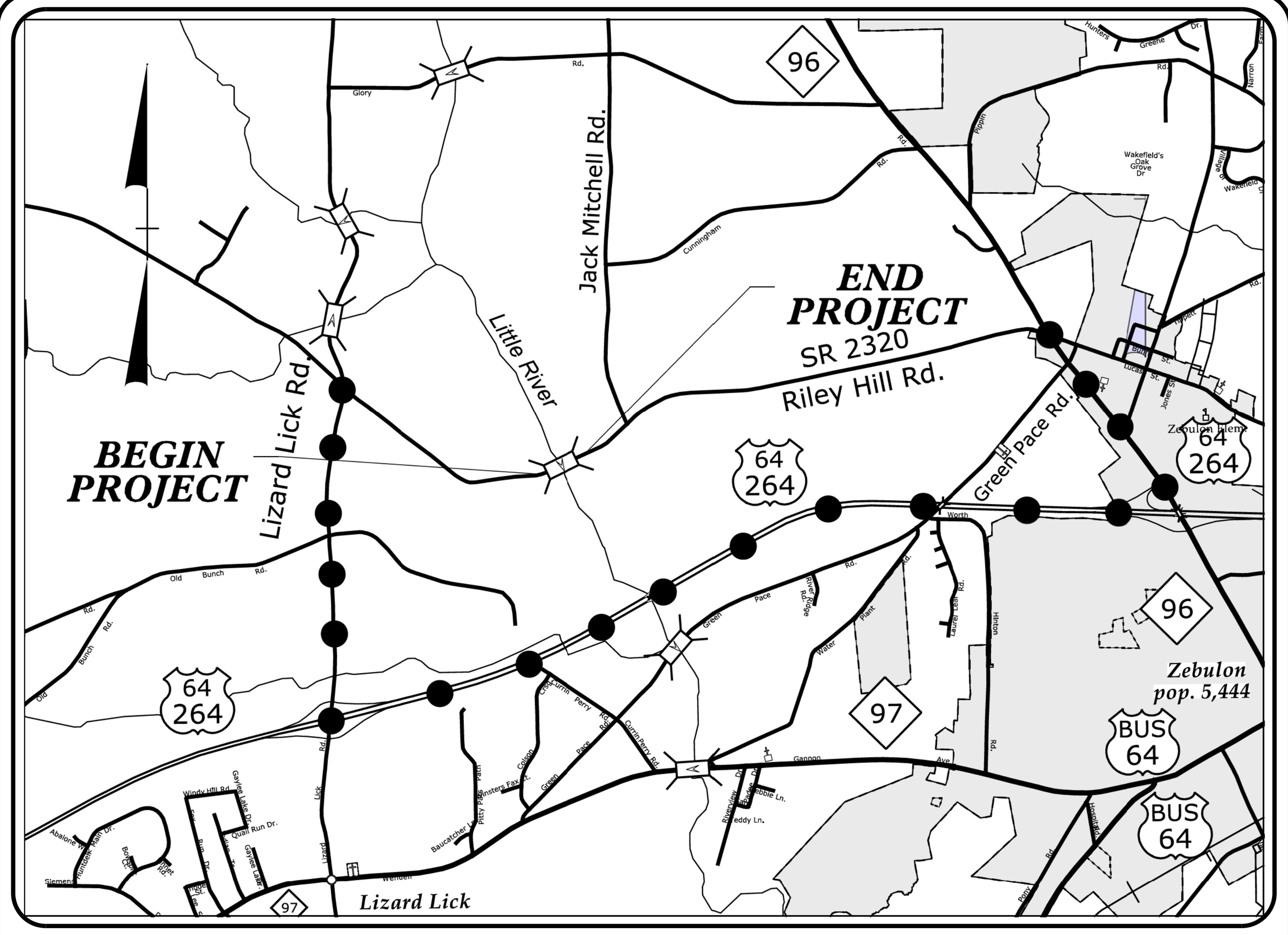
SIGN DESIGN

7/31/2023
BP5_R108_TMP_04.dgn
RCROSSER

TIP PROJECT: BP5-R108

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BP5-R108	EC-1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
BP5.R108.1	N/A	PE
BP5.R108.2	N/A	R/W
BP5.R108.3	N/A	CONST



VICINITY MAP
NOT TO SCALE

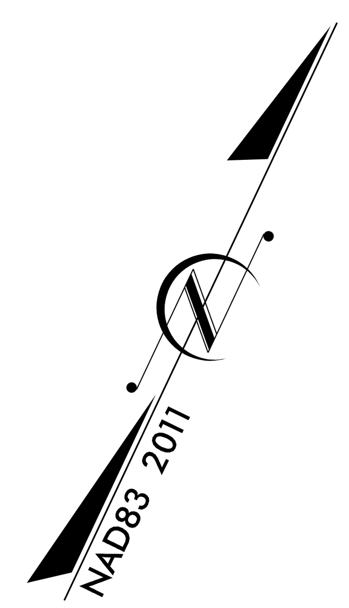
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

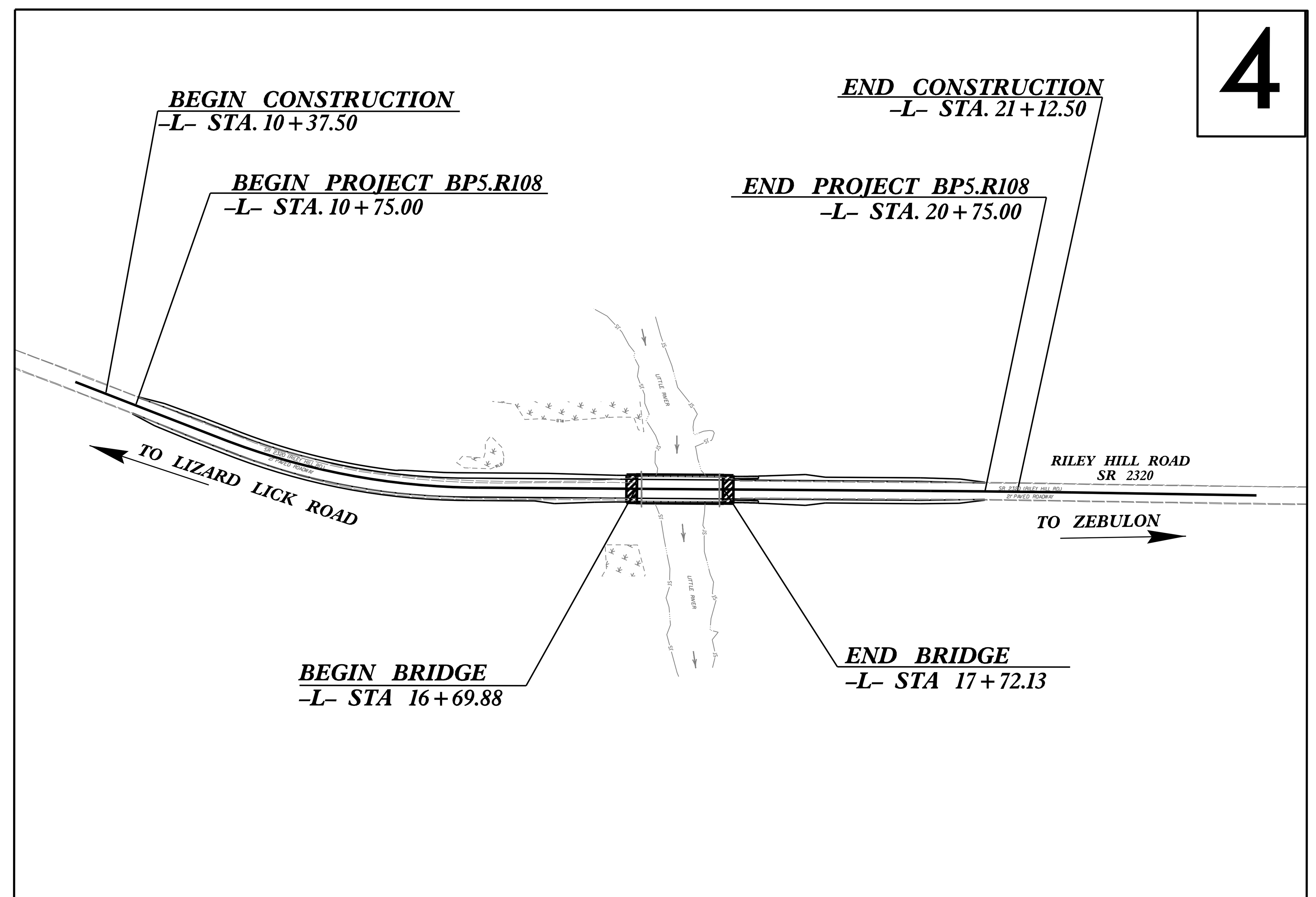
PLAN FOR PROPOSED
HIGHWAY EROSION CONTROL

WAKE COUNTY

LOCATION: BRIDGE NO. 180 OVER LITTLE RIVER ON SR 2320 (RILEY HILL ROAD)

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





EROSION AND SEDIMENT CONTROL MEASURES

Std. #	Description	Symbol
1630.03	Temporary Silt Ditch	
1630.05	Temporary Diversion	
1605.01	Temporary Silt Fence	
1606.01	Special Sediment Control Fence	
1622.01	Temporary Berms and Slope Drains	
1630.02	Silt Basin Type B	
1633.01	Temporary Rock Silt Check Type-A	
	Temporary Rock Silt Check Type-A with Matting and Polyacrylamide (PAM)	
1633.02	Temporary Rock Silt Check Type-B	
	Wattle / Coir Fiber Wattle	
	Wattle / Coir Fiber Wattle with Polyacrylamide (PAM)	
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	
1635.02	Rock Pipe Inlet Sediment Trap Type-B	
1630.04	Stilling Basin	
1630.06	Special Stilling Basin	
	Rock Inlet Sediment Trap:	
1632.01	Type A	A
1632.02	Type B	B
1632.03	Type C	C
	Skimmer Basin	
	Tiered Skimmer Basin	
	Infiltration Basin	

303(d) IMPAIRED WATER(S) EXIST ON THIS PROJECT

303(d) Impaired Water Zone(s) Exist
From Sta. 10+75.00 -L-
to Sta. 20+75.00 -L-
Refer To E. C. Special Provisions for Special Considerations.

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

THIS PROJECT HAS BEEN DESIGNED TO SENSITIVE WATERSHED STANDARDS.

ENVIRONMENTALLY SENSITIVE AREA(S) EXIST ON THIS PROJECT

Refer To E. C. Special Provisions for Special Considerations.

HIGH QUALITY WATER(S) EXIST ON THIS PROJECT

High Quality Water Zone(s) Exist
From Sta. 10+75.00 -L-
to Sta. 20+75.00 -L-
Refer To E. C. Special Provisions for Special Considerations.

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.

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

Prepared In the Office of:

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

Designed by:

ERIC BERGER, PE — *4036*
NAME — *LEVEL III CERTIFICATION NO.*

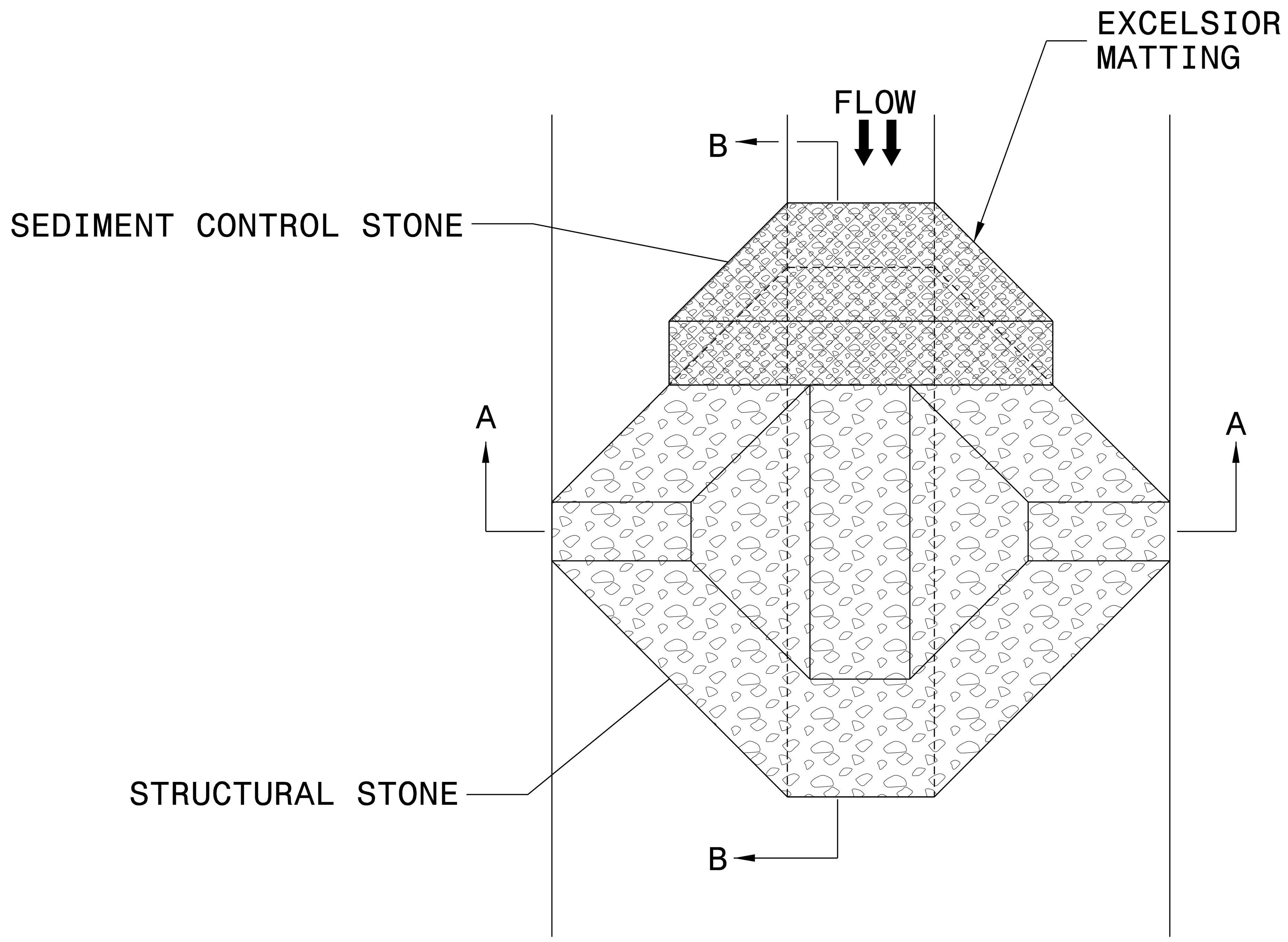
Roadway Standard Drawings

The following roadway english standards as appear in "Roadway Standard Drawings"- Roadway Design Unit - N. C. Department of Transportation - Raleigh, N. C., dated January 2018 and the latest revison thereto are applicable to this project and by reference hereby are considered a part of these plans.

1604.01	Railroad Erosion Control Detail	1632.01	Rock Inlet Sediment Trap Type A
1605.01	Temporary Silt Fence	1632.02	Rock Inlet Sediment Trap Type B
1606.01	Special Sediment Control Fence	1632.03	Rock Inlet Sediment Trap Type C
1607.01	Gravel Construction Entrance	1633.01	Temporary Rock Silt Check Type A
1622.01	Temporary Berms and Slope Drains	1633.02	Temporary Rock Silt Check Type B
1630.01	Riser Basin	1634.01	Temporary Rock Sediment Dam Type A
1630.02	Silt Basin Type B	1634.02	Temporary Rock Sediment Dam Type B
1630.03	Temporary Silt Ditch	1635.01	Rock Pipe Inlet Sediment Trap Type A
1630.04	Stilling Basin	1635.02	Rock Pipe Inlet Sediment Trap Type B
1630.05	Temporary Diversion	1640.01	Coir Fiber Baffle
1630.06	Special Stilling Basin	1645.01	Temporary Stream Crossing
1631.01	Matting Installation		

PROJECT REFERENCE NO.	SHEET NO.
BP5-R108	EC-2A
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

TEMPORARY ROCK SILT CHECK TYPE 'A' WITH EXCELSIOR MATTING AND POLYACRYLAMIDE (PAM)



PLAN

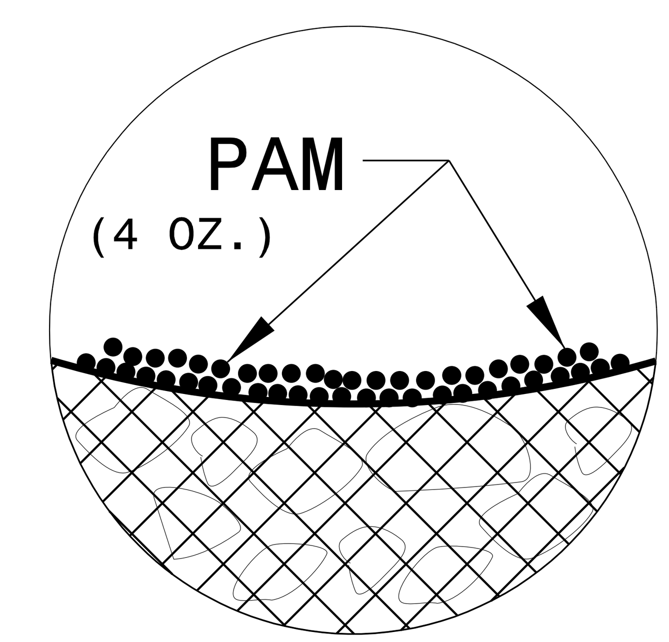
NOTES:

INSTALL TEMPORARY ROCK SILT CHECK TYPE A IN ACCORDANCE WITH ROADWAY STANDARD DRAWING NO. 1633.01.

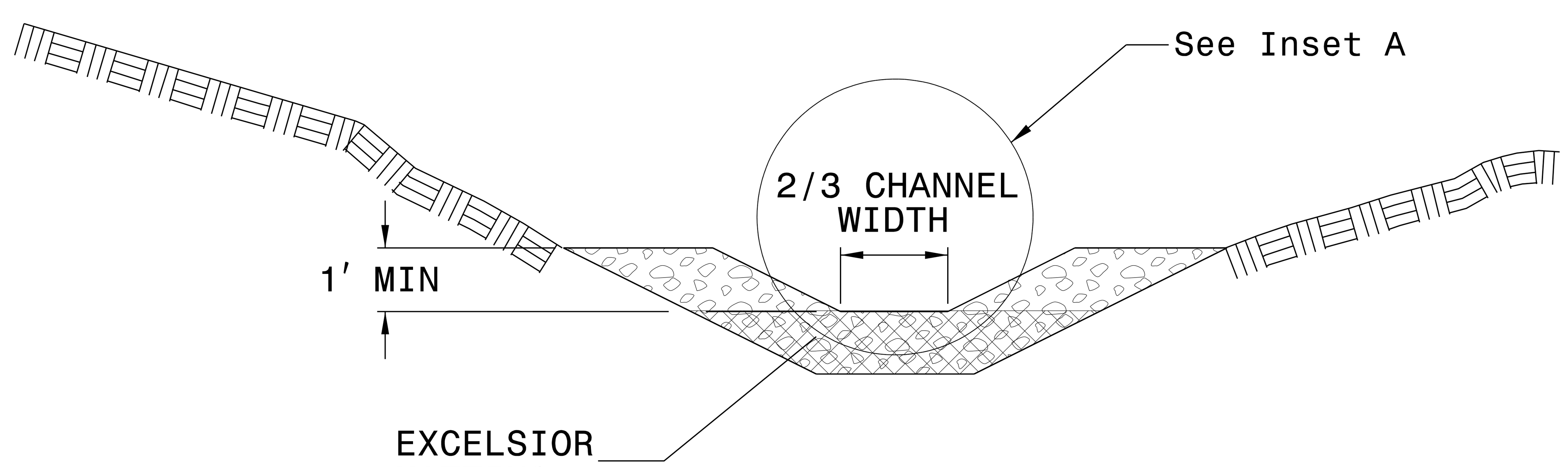
USE EXCELSIOR FOR MATTING MATERIAL AND ANCHOR MATTING SECTION AT TOP AND BOTTOM WITH CLASS B STONE.

PRIOR TO POLYACRYLAMIDE (PAM) APPLICATION, OBTAIN A SOIL SAMPLE FROM PROJECT LOCATION, AND FROM OFFSITE MATERIAL, AND ANALYZE FOR APPROPRIATE PAM FLOCCULANT TO BE APPLIED TO EACH ROCK SILT CHECK.

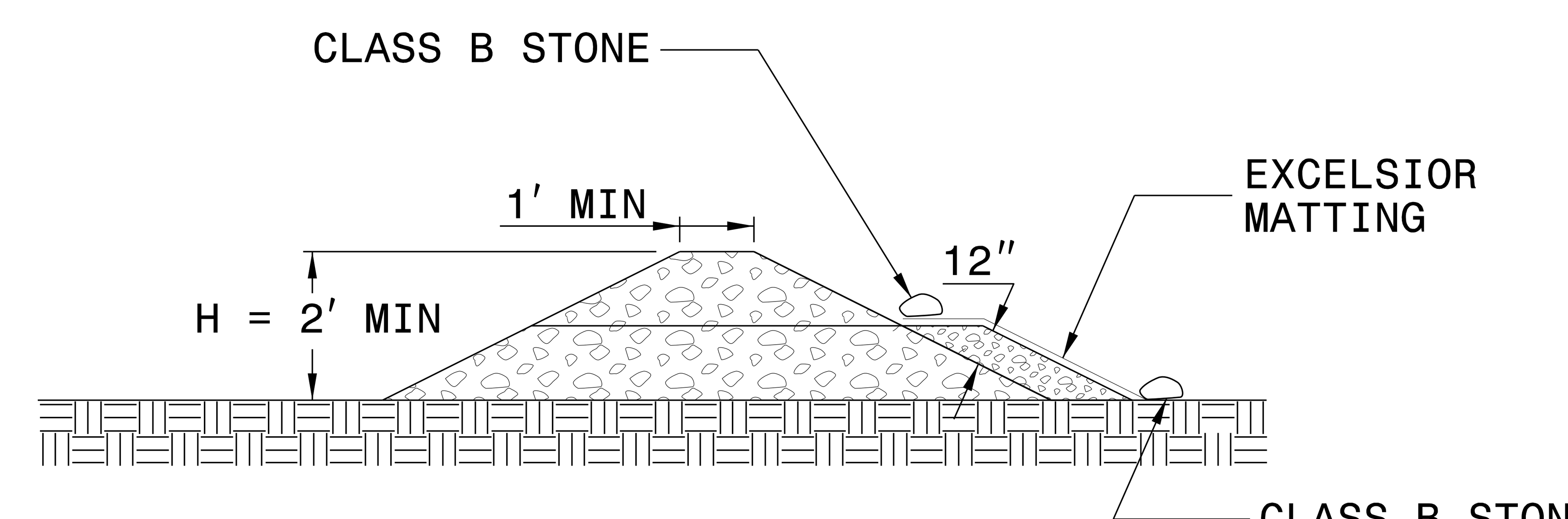
INITIALLY APPLY 4 OUNCES OF POLYACRYLAMIDE (PAM) TO TOP OF MATTING SECTION AND AFTER EVERY RAINFALL EVENT THAT EQUALS OR EXCEEDS 0.50 INCHES.



INSET A



SECTION A-A

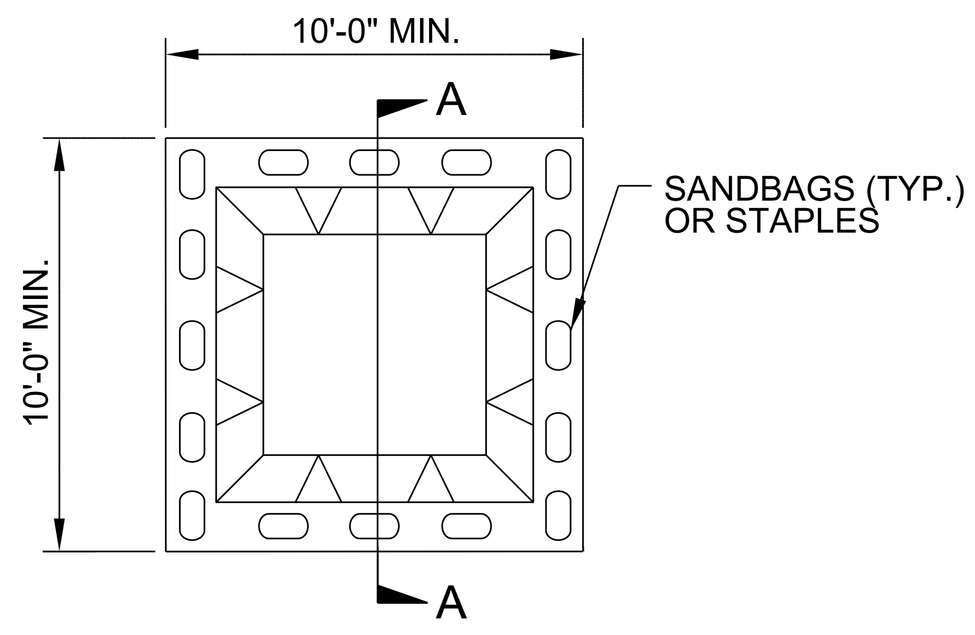


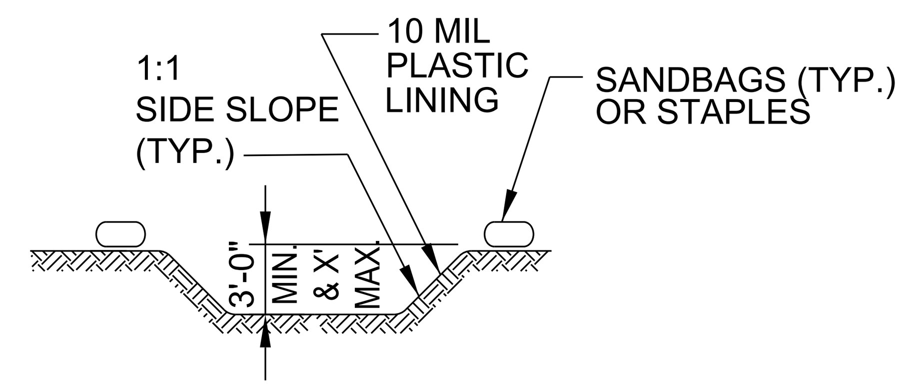
SECTION B-B

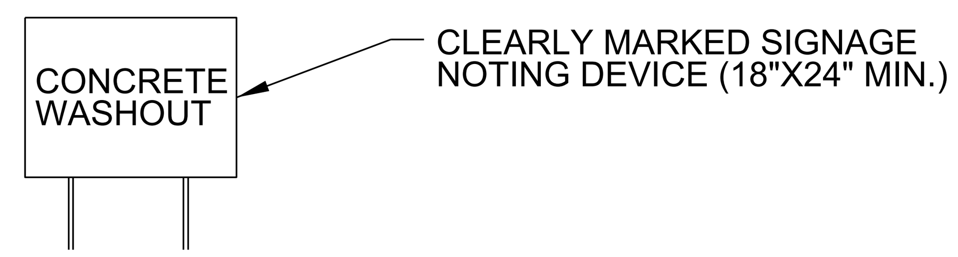
NOT TO SCALE

PROJECT REFERENCE NO.	SHEET NO.
BP5-R108	EC- 2B
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

ONSITE CONCRETE WASHOUT STRUCTURE WITH LINER







SECTION A-A

NOTES:

1. ACTUAL LOCATION DETERMINED IN FIELD

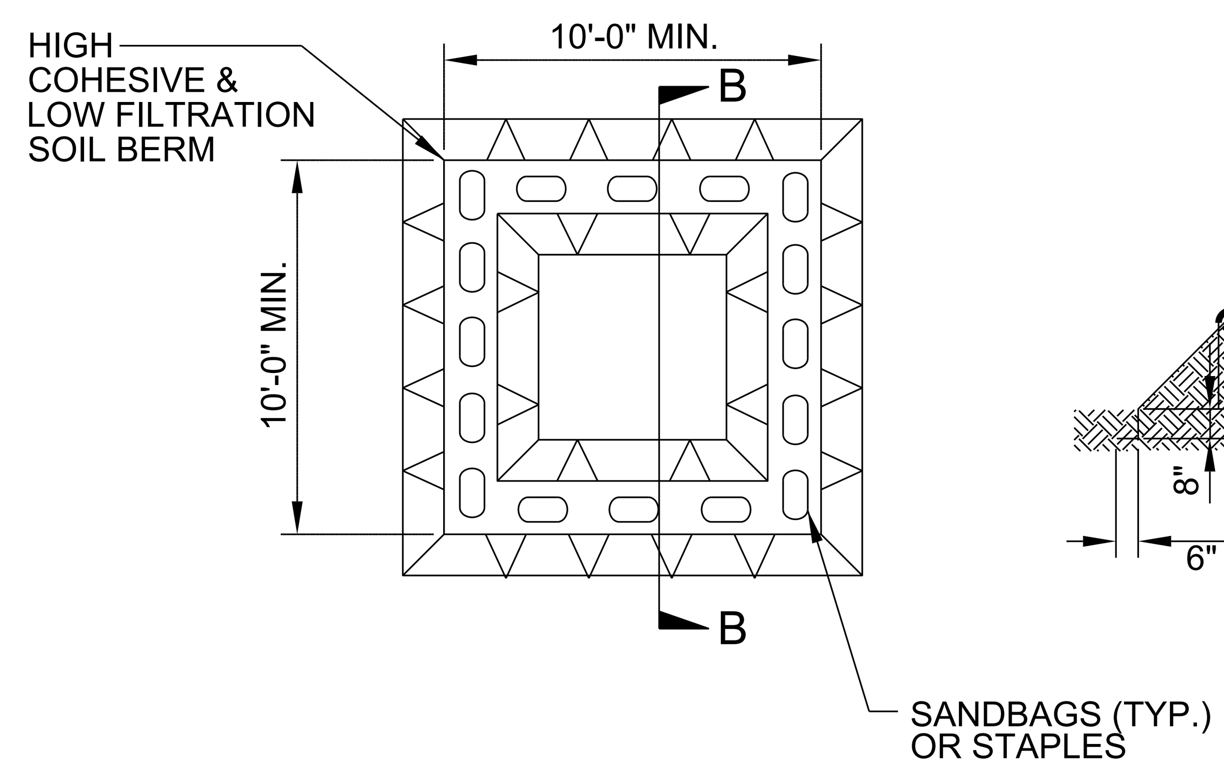
2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY.

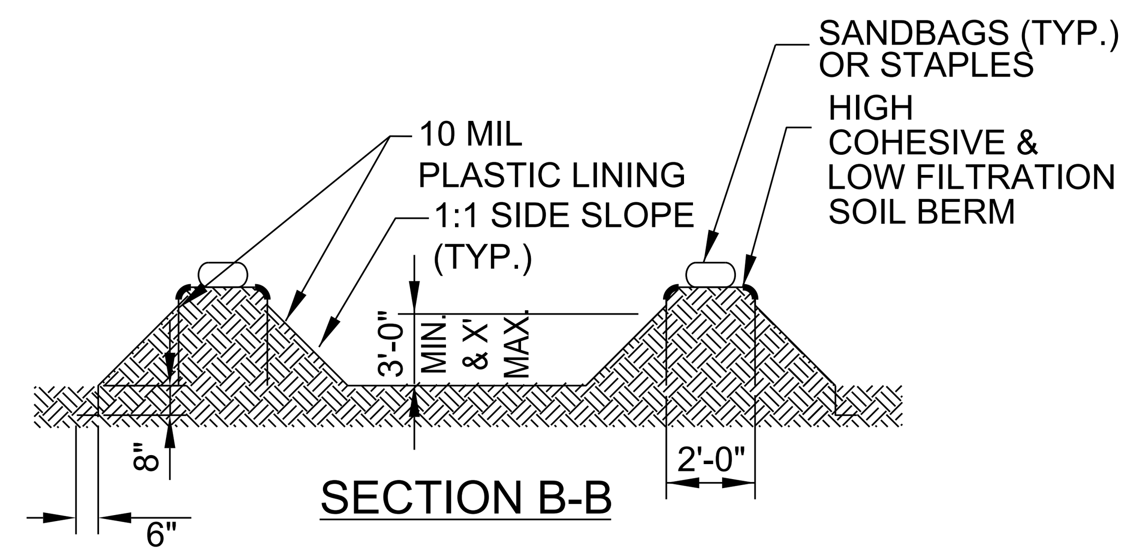
3.CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARY MARKED WITH SIGNAGE NOTING DEVICE.

PLAN

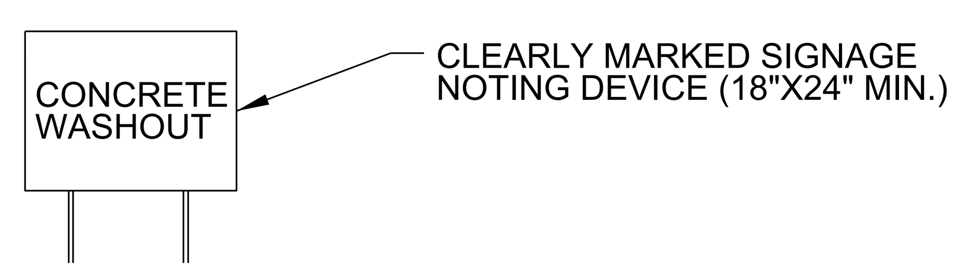
BELOW GRADE WASHOUT STRUCTURE

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.

PLAN

ABOVE GRADE WASHOUT STRUCTURE

NOT TO SCALE

PROJECT REFERENCE NO.	SHEET NO.
BP5-R108	EC-3A
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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	19+50	20+75	RT	140
4	L	19+50	20+75	LT	140
				SUBTOTAL	280
MISCELLANEOUS MATTING TO BE INSTALLED AS DIRECTED BY THE ENGINEER					6390
				TOTAL	6670
				SAY	7010

PERMANENT SOIL REINFORCEMENT MAT

CONST SHEET NO.	LINE	FROM STATION	TO STATION	SIDE	ESTIMATE (SY)
4	L	10+50	14+75	RT	465
4	L	10+75	13+50	LT	290
				SUBTOTAL	755
		ADDITIONAL PSRM TO BE INSTALLED			0
				TOTAL	755
				SAY	800

PROJECT REFERENCE NO.	SHEET NO.
BP5-R108	EC-3B

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

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 OR FLATTER	14 DAYS	7 DAYS FOR SLOPES GREATER THAN 50' IN LENGTH.
ALL OTHER AREAS WITH SLOPES FLATTER THAN 4:1	14 DAYS	NONE, EXCEPT FOR PERIMETERS AND HQW ZONES.

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
(919) 571-7111
NC License Number F-0159

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

PROJECT REFERENCE NO.	SHEET NO.
BP5.R108	EC-04/CONST.04
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

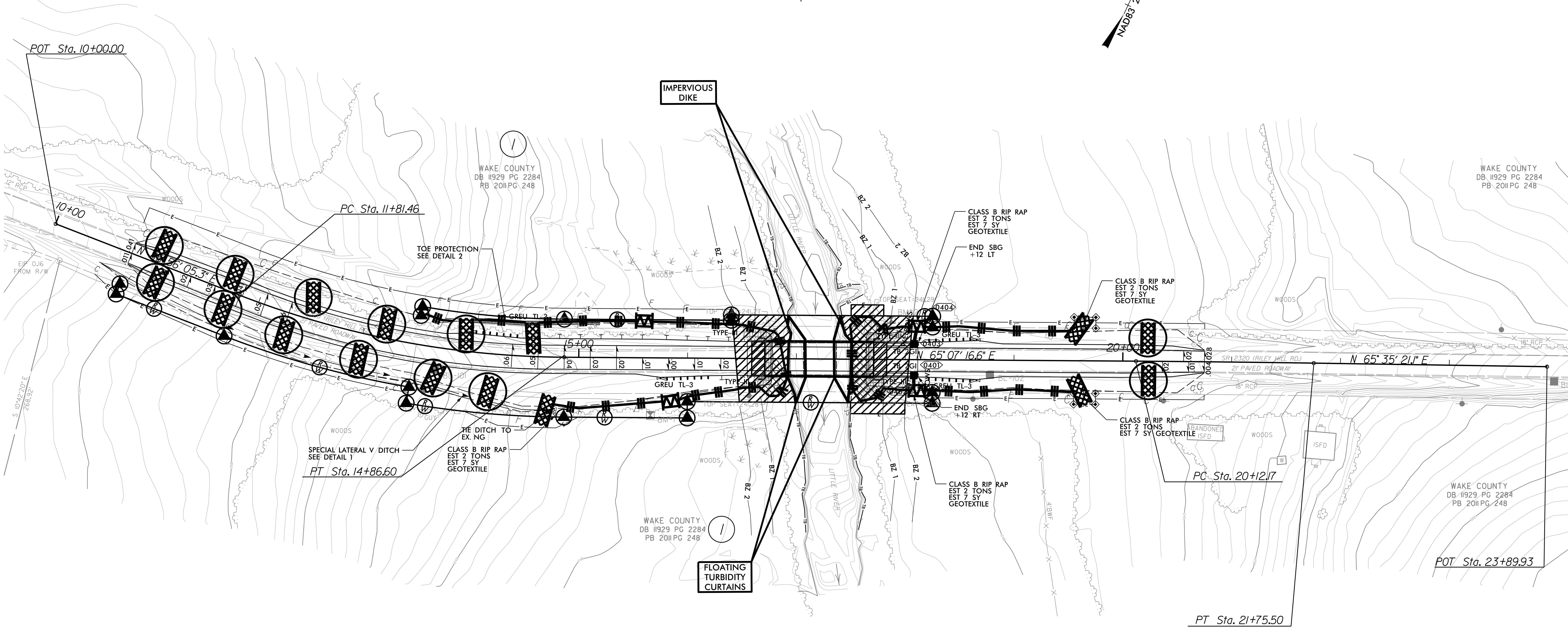
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

CLEARING AND GRUBBING
EROSION CONTROL FOR
CONSTRUCTION SHEET 4

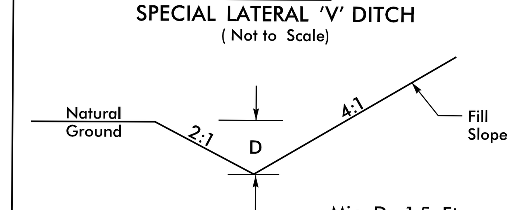
ENVIRONMENTALLY SENSITIVE AREA
SEE PROJECT SPECIAL PROVISIONS

-L-

PI Sta 13+35.73	PI Sta 20+93.84
Δ = 20° 48' 48.6" (LT)	Δ = 0° 28' 04.5" (RT)
D = 6° 49' 15.3"	D = 0° 17' 11.3"
L = 305.14'	L = 163.33'
T = 154.27'	T = 81.67'
R = 840.00'	R = 20,000.00'
SE = 6%	SE = NC
Ro = 144'	V = 50 mph
V = 50 mph	

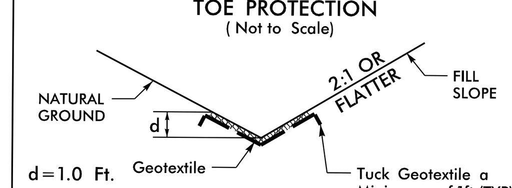


DETAIL 1
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM STA. 10+50 TO STA. 14+75 -L- RT

DETAIL 2
TOE PROTECTION
(Not to Scale)



Type of Liner= CLASS B RIP RAP
FROM STA. 14+00 TO STA. 15+20 -L- LT

5/25/2023
PSH\BP5-R108_EC_PSH04_CG.dgn

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2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
(919) 571-7111

NC License Number F-0159

vhb VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

PROJECT REFERENCE NO.	SHEET NO.
BP5.R108	EC-05/CONST.04
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L-

PI Sta 13+35.73	PI Sta 20+93.84
△ = 20° 48' 48.6" (LT)	△ = 0° 28' 04.5" (RT)
D = 6° 49' 15.3"	D = 0° 17' 11.3"
L = 305.14'	L = 163.33'
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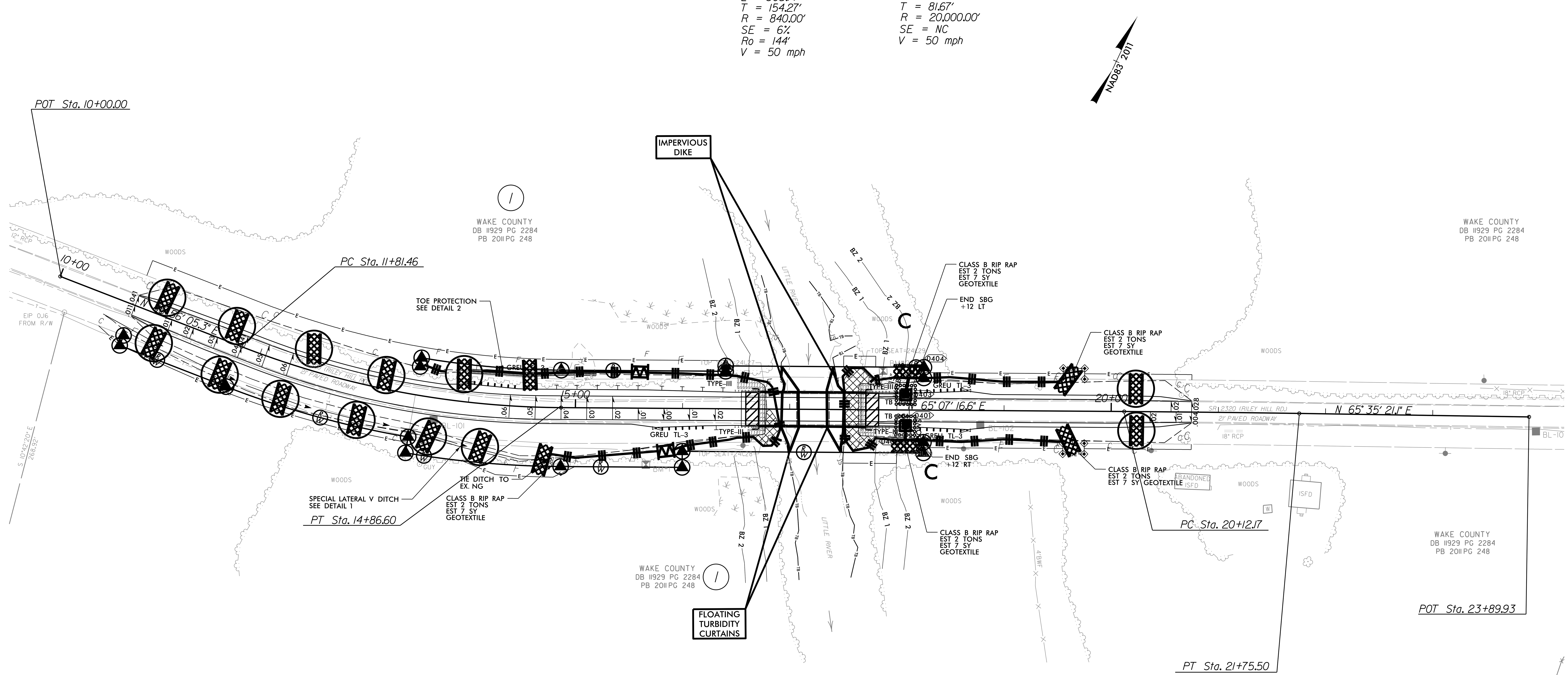
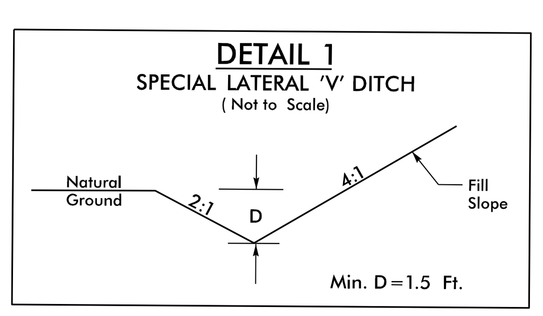
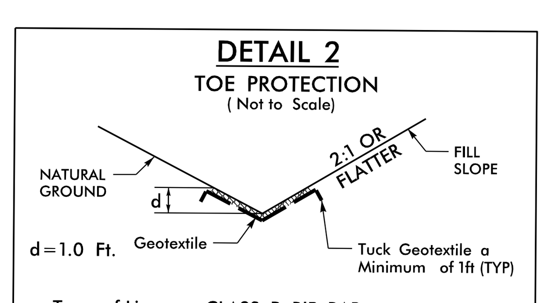
SE = 6%	SE = NC
Ro = 144'	V = 50 mph
V = 50 mph	





FROM STA. 10+50 TO STA. 14+75 -L- RT



FROM STA. 14+00 TO STA. 15+20 -L- LT

5/25/2023
BP5.R108_EC_PSH04_Final.dgn

T.I.P.: BP5.R108

CONTRACT:

TIP NO.	SHEET NO.
BP5.R108	SIGN-1

APPROVED: Brian K. Eason

DATE: 7/31/2023

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 25523 ENGINEER BRIAN K. EASON

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

SIGNING PLAN
WAKE COUNTY

LOCATION: BRIDGE NO. 180 OVER LITTLE RIVER ON SR 2320 (RILEY HILL ROAD)

ROADWAY STANDARD DRAWING

THE FOLLOWING ROADWAY STANDARDS AS APPEAR IN "ROADWAY STANDARD DRAWINGS" - PROJECT SERVICES UNIT - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 2018 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD. NO.	TITLE
903.10	GROUND MOUNTED SIGN SUPPORTS
904.10	ORIENTATION OF GROUND MOUNTED SIGNS
904.50	MOUNTING TYPE 'D', 'E', AND 'F' SIGNS ON U-CHANNEL POSTS

INDEX

SHEET NO.	DESCRIPTION
SIGN-1	SIGNING TITLE SHEET
SIGN-2	TYPE "E" SIGNS
SIGN-3	SIGN DETAIL SHEET

SUMMARY OF QUANTITIES

ITEM NO.		ITEM DESCRIPTION	QUANTITY	UNIT
DESC. NO.	SECT. NO.			
4072000000	903	SUPPORTS, 3 LBS STEEL U-CHANNEL	45	LF
4102000000	904	SIGN ERECTION, TYPE E	3	EA
4155000000	907	DISPOSAL OF SIGN SYSTEM, U-CHANNEL	3	EA

GENERAL NOTES

- SIGNS FURNISHED BY STATE
- CONFIRM IN WRITING AT LEAST 4 MONTHS IN ADVANCE, THE ACTUAL DATE THE DEPARTMENT FURNISHED SIGNS WILL BE REQUIRED.
- IF REMOVAL OR RELOCATION OF SIGNS ON PRIVATE STREET (NON-STATE MAINTAINED) IS REQUIRED DUE TO CONSTRUCTION, THE CONTRACTOR SHALL INFORM THE ENGINEER. THE WORK WILL BE COMPLETED BY OTHERS.
- WHEN NOT STATIONED OR DIMENSIONED ON PLANS, ALL 'E' AND 'F' SIGNS SHALL BE FIELD LOCATED BY THE ENGINEER
- ALL EXISTING SIGNS ON "U" CHANNEL POST WITHIN THE PROJECT LIMITS SHALL BE REMOVED AND DISPOSED OF UNLESS OTHERWISE NOTED ON PLANS.
- WHEN EXISTING SIGNS ARE REMOVED AND INSTALLED ON NEW SUPPORTS, THE RE-ERECTION SHALL IMMEDIATELY FOLLOW THE REMOVAL.
- THE BACKGROUND FOR TYPE E & F SIGNS SHALL BE TYPE C REFLECTIVE SHEETING.

PROJECT NOTES

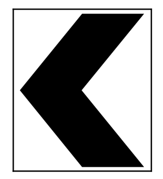
NOTE 1: DISPOSAL OF SIGN SYSTEM, U-CHANNEL

PLAN PREPARED BY:

BRIAN K. EASON, PE — SENIOR TRANSPORTATION ENGINEER
CHRISTINA YOKELEY, PE — TRANSPORTATION ENGINEER

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
(919)571-7111
NC License Number F-0159

401 QUANTITY REQ'D 3



18" x 24"
W1-8(L)

ONE "U" POST PER SIGN

TIP NO.	SHEET NO.
BP5.R108	SIGN-2

APPROVED: Brian K. Eason
DocuSigned by: 9AF015AD7ACC48F...

DATE: 7/31/2023

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 25523 ENGINEER BRIAN K. EASON

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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NC License Number F-0159

TYPE "E" SIGNS

5/26/2023
BP5-R108_SGN_psh02.dgn
RCROSSER

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2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
(919)571-7111
NC License Number F-0159

TIP NO.	SHEET NO.
BP5.R108	SGN-3

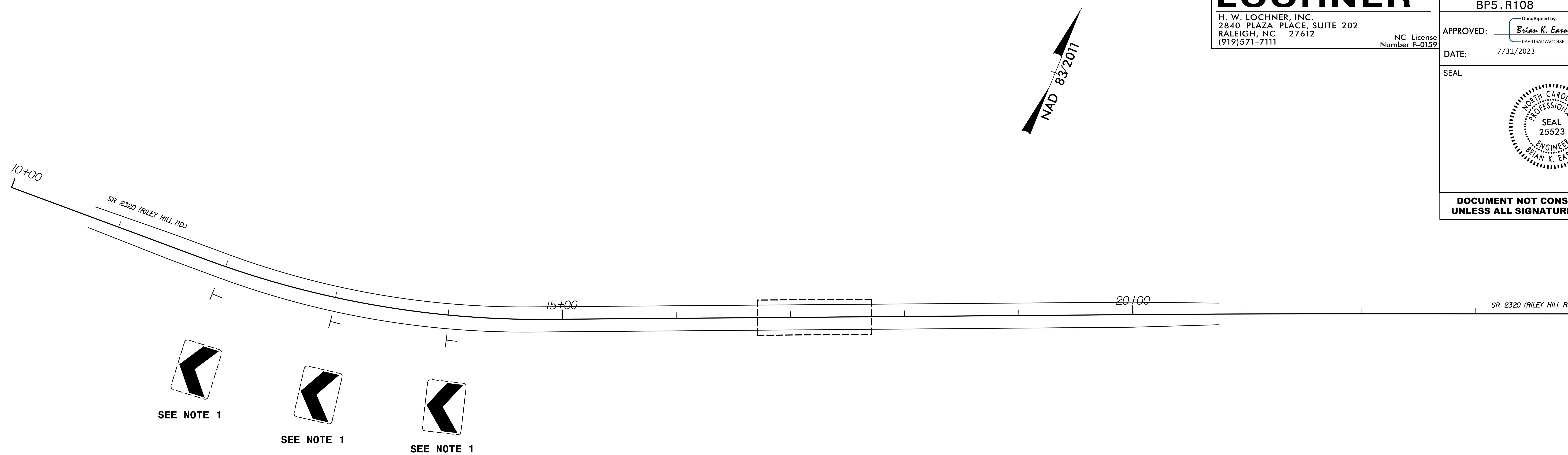
APPROVED: DocuSigned by: Brian K. Eason 9AF015AD7ACC48F...

DATE: 7/31/2023

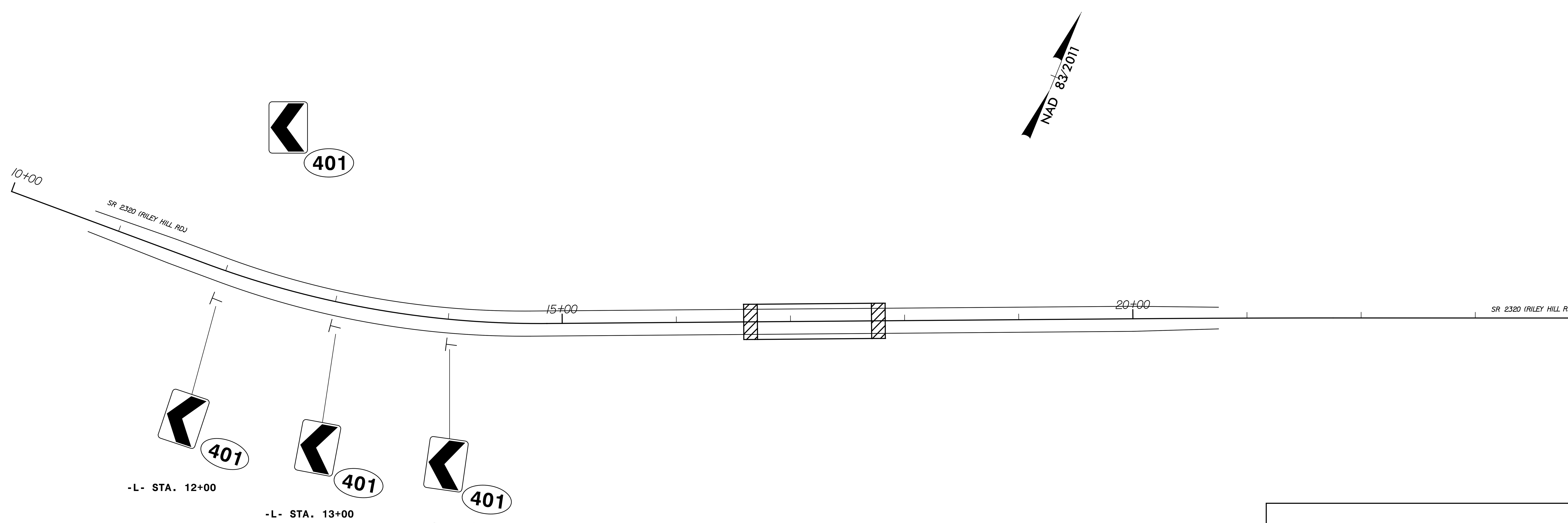
SEAL

NORTH CAROLINA PROFESSIONAL SEAL 25523 ENGINEER BRIAN K. EASON

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



EXISTING PROPOSED SIGNING



PROPOSED SIGNING

5/26/2023
BP5-R108_SGN_psh03.dgn
RCROSSER

PROJECT: BP5.R108

CONTRACT:

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

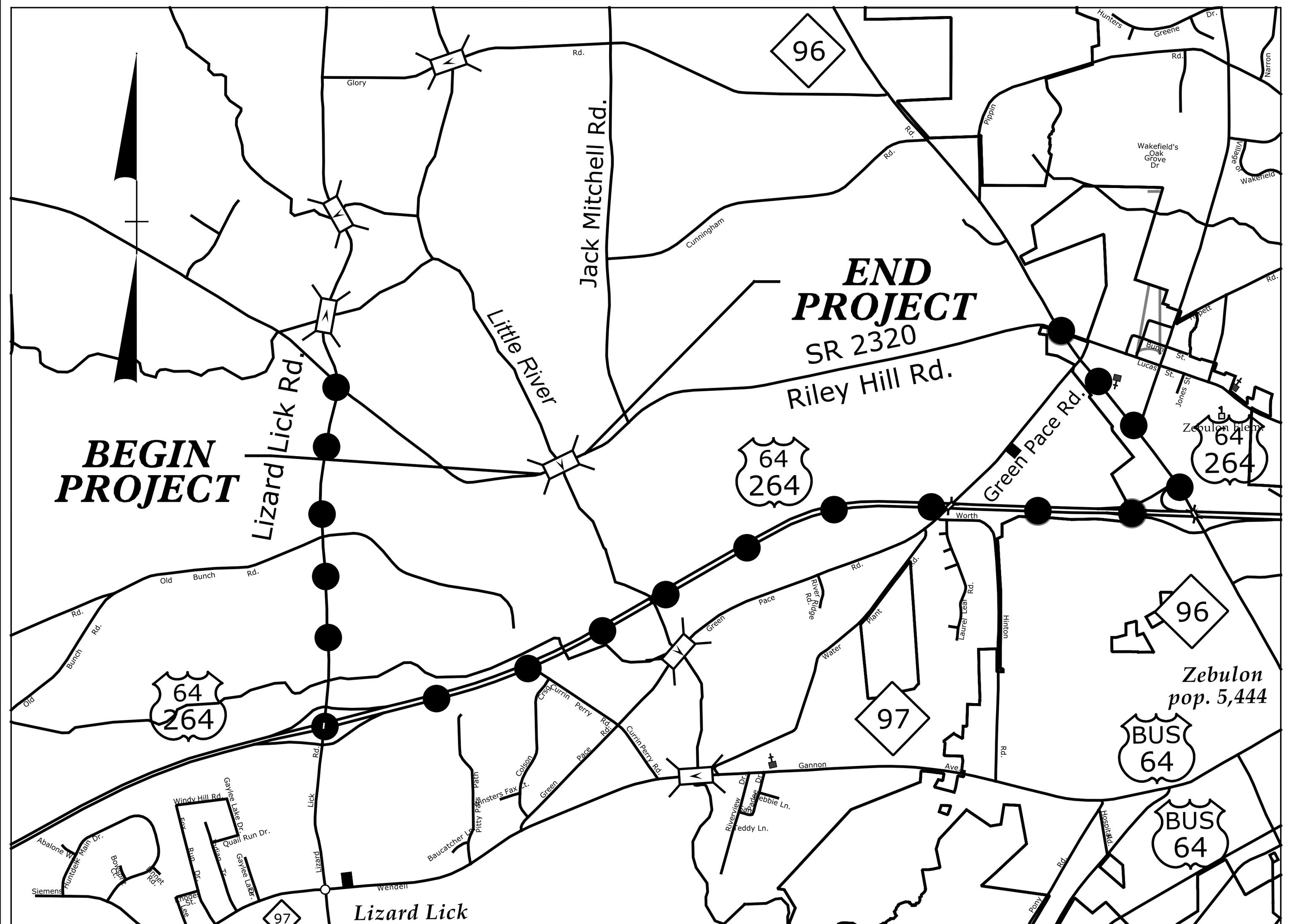
T.I.P. NO.	SHEET NO.
BP5.R108	UO-1

NOTE:
ALL UTILITY WORK SHOWN ON THIS SHEET IS DONE BY OTHERS.
NO PAYMENT WILL BE MADE TO THE CONTRACTOR FOR UTILITY WORK SHOWN ON THIS SHEET.

UTILITIES BY OTHERS
WAKE COUNTY

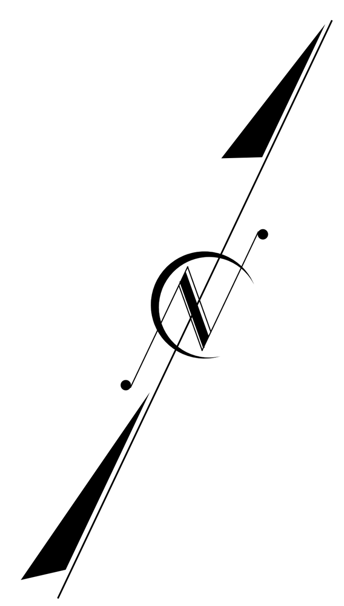
LOCATION: BRIDGE NO. 180 OVER LITTLE RIVER

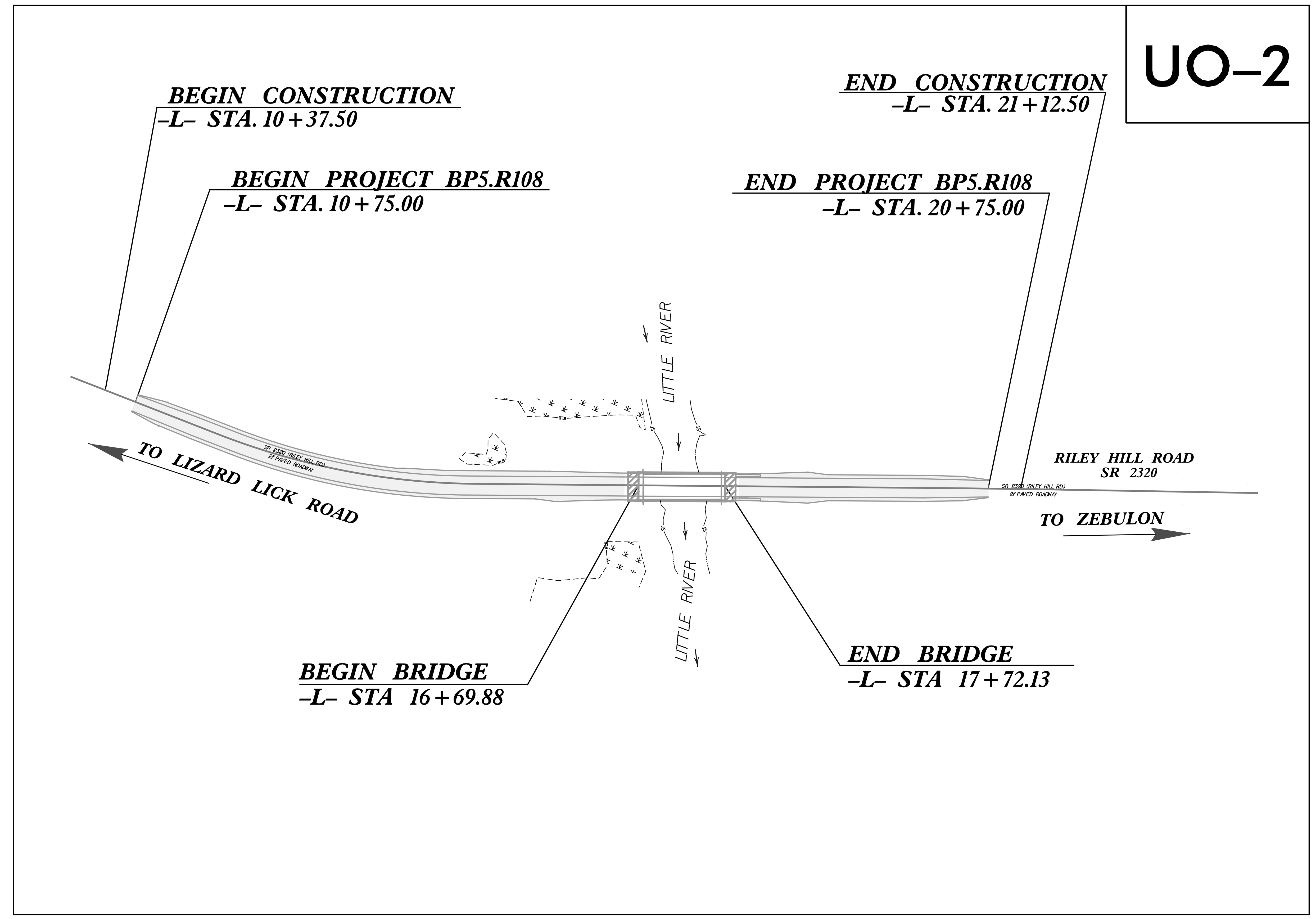
TYPE OF WORK: UTILITY BY OTHERS RELOCATION



VICINITY MAP

●●●●● OFF-SITE DETOUR





THIS IS NOT A CONTROL OF ACCESS PROJECT
THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARY
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III

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)

INDEX OF SHEETS

SHEET NO.:	DESCRIPTION:
UO-1	TITLE SHEET
UO-2	UBO PLAN SHEET

UTILITY OWNERS WITH CONFLICTS

(A) DUKE ENERGY DISTRIBUTION
(B) AT&T COMMUNICATIONS

PREPARED IN THE OFFICE OF:

Wooten
120 North Boylan Avenue • Raleigh, NC 27603-1423
(919) 828-0531 • thewootencompany.com
License Number: F-0115

WEBB WHITE — PROJECT UTILITY COORDINATOR

DIVISION OF HIGHWAYS
DIVISION 5
2612 DUKE STREET
DURHAM, NC 27704

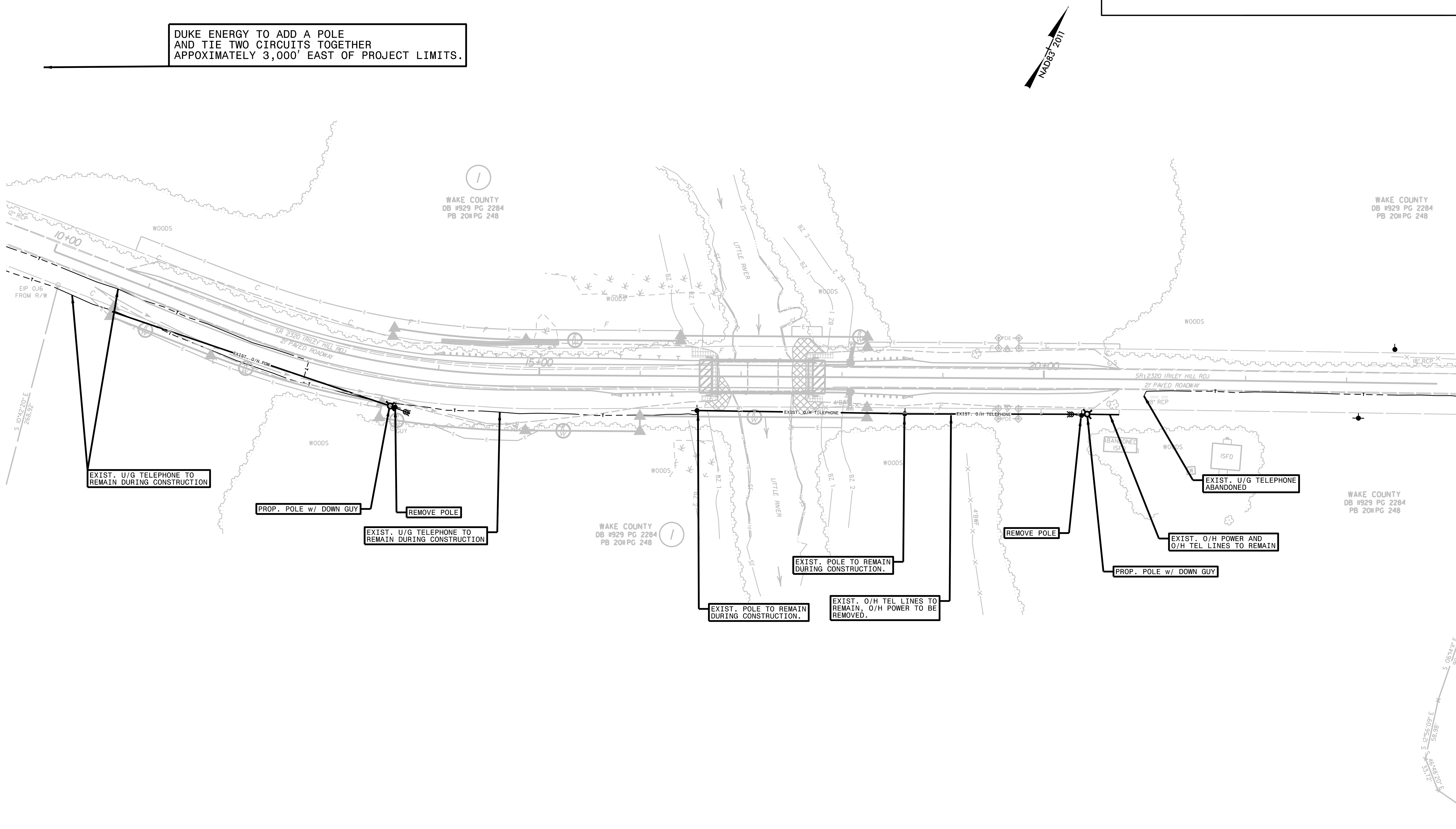
Lisa Bullard-Gilchrist — BRIDGE PROGRAM MANAGER

11:22:36 AM
T:\Projects\Lochner-3359\C-UC_UR_ServicesBridge180_CADD\BP5R108\Utilities\Engineering\Agreement\Plans\BP5-R108_ut_tsh_UO01_psh.dgn
hkeith
09/08/99

PROJECT REFERENCE NO.	SHEET NO.
BP5.R108	UO-02

UTILITIES BY OTHERS

NOTE:
ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS. NO PAYMENT WILL BE MADE TO THE CONTRACTOR FOR PROPOSED UTILITY WORK SHOWN ON THIS SHEET.



PROJ. REFERENCE NO.	SHEET NO.
BPR.R108	X-1

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CROSS-SECTION SUMMARY

NOTE: EMBANKMENT COLUMN INCLUDES BACKFILL FOR UNDERCUT

Approximate quantities only. Unclassified excavation, borrow excavation, grading, clearing and grubbing, removal of existing pavement, and breaking of existing pavement will be paid for at the lump sum price for "Grading".

Station L	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
10+50.00	0	0
11+00.00	33	5
11+50.00	67	16
12+00.00	75	25
12+50.00	103	23
13+00.00	110	14
13+50.00	57	25
14+00.00	11	136
14+50.00	5	316
15+00.00	2	416
15+50.00	0	392
16+00.00	0	305
16+50.00	0	225

Station L	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
18+00.00	0	0
18+50.00	0	109
19+00.00	0	94
19+50.00	7	39
20+00.00	30	7
20+50.00	60	5

6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	BP5.R108	X-2

5/26/2023
BP5.R108_L_XPL.dgn
RCROSSER

PROJ. REFERENCE NO.
BP5.R108
SHEET NO.
X-3
0 2.5 5
246.51
14 + 50.00
0.055
0.055
2:1
4:1
243.17
249.41
14 + 00.00
0.060
0.060
3:1
4:1
2:1
247.35
252.93
13 + 50.00
0.060
0.060
2:1
4:1
251.18
251.53
256.27
13 + 00.00
0.060
0.060
253.61
253.79
258.92
12 + 50.00
0.060
0.060
256.06
256.03
6/23/16
5/26/2023
RCROSSER

PROJ. REFERENCE NO.	SHEET NO.
BP5.R108	X-4

0 2.5 5

6/23/16

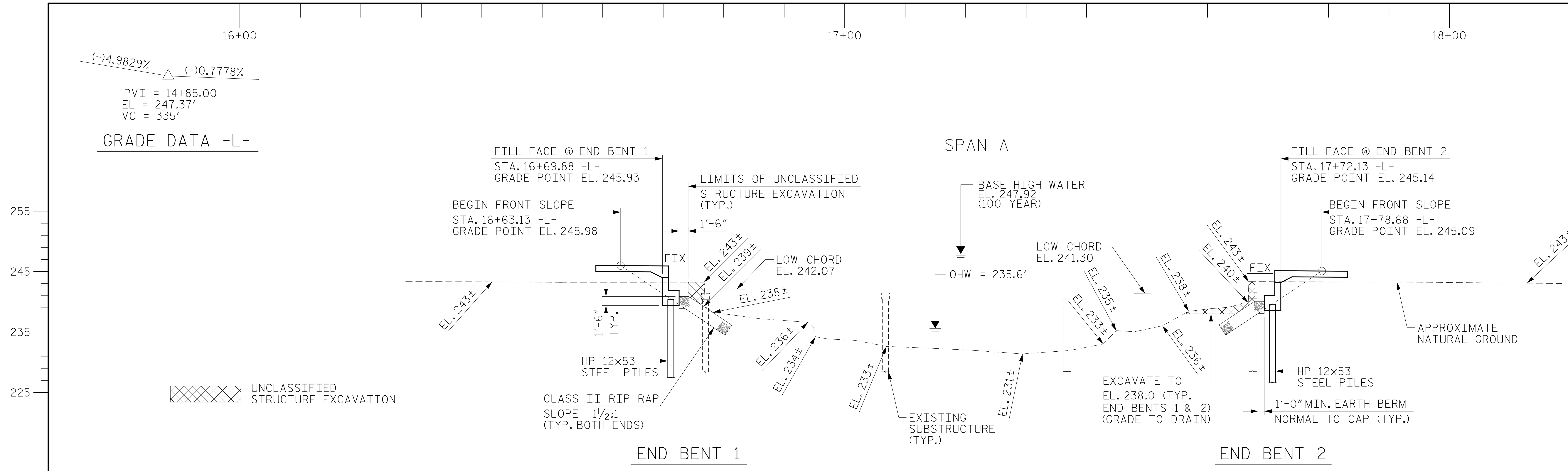
5/26/2023
BP5.R108_XPL.dgn
RCROSSER

PROJ. REFERENCE NO.	SHEET NO.
BP5.R108	X-5

6/23/16

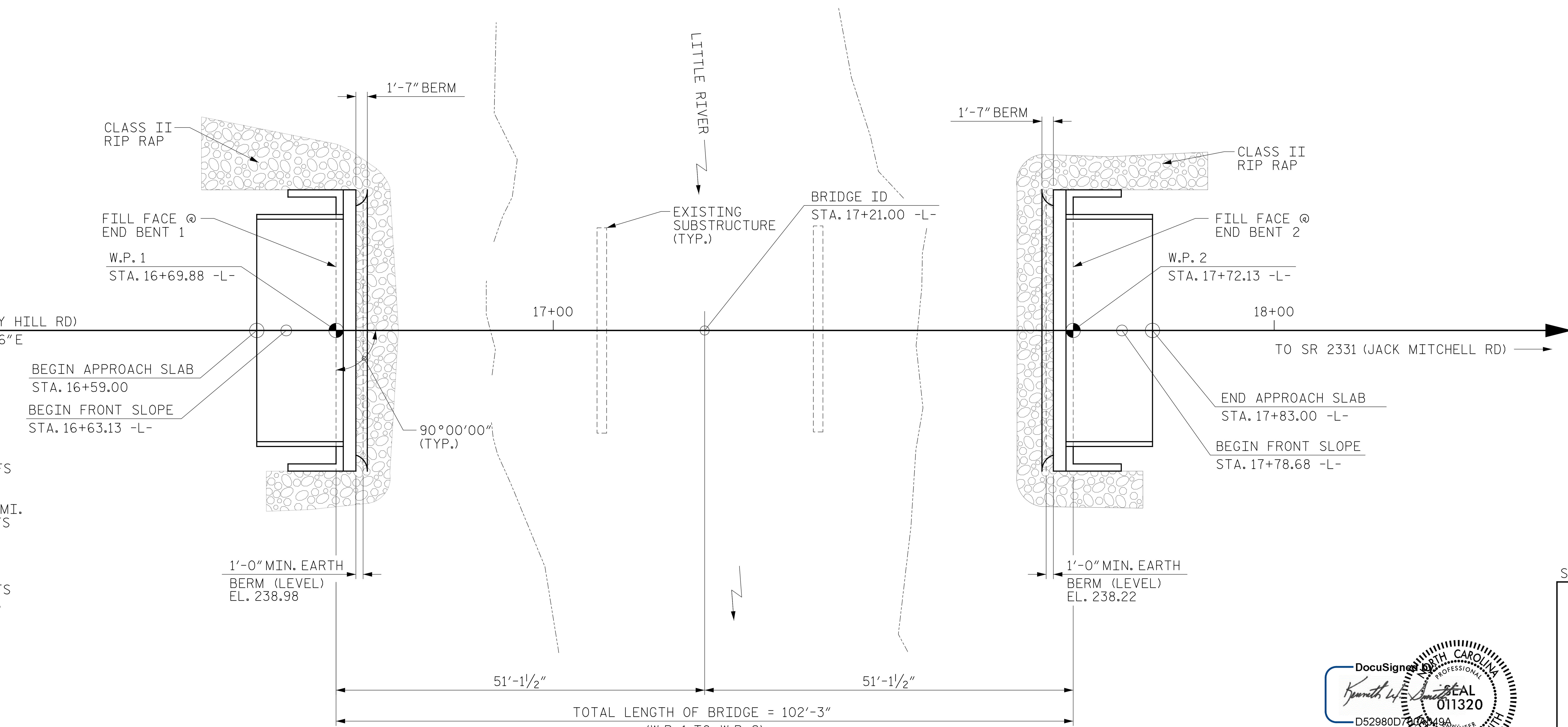
5/26/2023
BP5_R108_XPL.dgn
RCROSSER

PROJ. REFERENCE NO.	SHEET NO.
BP5.R108	X-6



SECTION ALONG -L-

NAD 83/NA 2011



PLAN

(PILES NOT SHOWN FOR CLARITY)

HYDROGRAPHIC DATA

DESIGN DISCHARGE	= 6,300 CFS
FREQUENCY OF DESIGN FLOOD	= 25 YRS.
DESIGN HIGH WATER ELEVATION	= 246.0'
DRAINAGE AREA	= 51.2 SQ. MI.
BASE DISCHARGE (Q100)	= 9,330 CFS
BASE HIGH WATER ELEVATION	= 247.92'

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 3,700 CFS
FREQUENCY OF OVERTOPPING FLOOD	= 10+ YRS.
OVERTOPPING FLOOD ELEVATION	= 243.71' *

* AT 19+87.2 -L- ℄

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. BP5.R108

WAKE COUNTY

STATION: 17+21.00 -L-

SHEET 1 OF 2 REPLACES BRIDGE No. 910180

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

BRIDGE ON SR 2320 OVER LITTLE RIVER BETWEEN SR 2329 AND SR 2331

DocuSigned by: D52980D7...49A 7/31/2023

NORTH CAROLINA PROFESSIONAL SEAL 011320 ENGINEER KENNETH W. SMITH

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
(919)571-7111
NC License Number F-0159

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

SHEET NO. S-1

TOTAL SHEETS 16

DRAWN BY :	R. KNIGHT	DATE :	8/2022
CHECKED BY :	K. SMITH	DATE :	10/2022
DESIGN ENGINEER OF RECORD:	K. SMITH	DATE :	10/2022

7/31/2023 1:18:17 PM R:\Structures\BP5.R108_SMU_GD_01.DGN
NCDOT_pdf.pltcfg NCDOT_Structures_pdf.tbl

SUMMARY OF PILE INFORMATION/INSTALLATION

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pile(s) #-# (e.g., "Bent 1, Piles 1-5")	Factored Resistance per Pile TONS	Pile Cut-Off (Top of Pile) Elevation FT	Estimated Pile Length per Pile FT	Scour Critical Elevation FT	Driven Piles			Predrilling for Piles*			Drilled-In Piles		
					Min Pile Tip (Tip No Higher Than) Elev FT	Required Driving Resistance (RDR)** per Pile TONS	Total Pile Redrives Quantity EACH	Predrilling Length per Pile Lin FT	Predrilling Elevation (Elev Not To Predrill Below) FT	Maximum Predrilling Dia INCHES	Pile Excavation (Bottom of Hole) Elev FT	Pile Exc Not In Soil per Pile Lin FT	Pile Exc In Soil per Pile Lin FT
End Bent 1, Piles 1-7	115	240.48	35			195							
End Bent 2, Piles 1-7	115	239.72	55			195							

*Predrilling for Piles is required for end bents/bents with a predrilling length and at the Contractor's option for end bents/bents with predrilling information but no predrilling length.

$$^{**}RDR = \frac{Factored\ Resistance + Factored\ Downdrag\ Load + Factored\ Dead\ Load}{Dynamic\ Resistance\ Factor} + Nominal\ Downdrag\ Resistance + \frac{Nominal\ Scour\ Resistance}{Scour\ Resistance\ Factor}$$

SUMMARY OF PDA/PILE ORDER LENGTHS

(Blank entries indicate item is not applicable to structure)

Pile Driving Analyzer (PDA)				Pile Order Lengths	
End Bent/ Bent No	PDA Testing Required? YES or MAYBE	PDA Test Pile Length FT	Total PDA Testing Quantity EACH	End Bent/ Bent No(s)	Pile Order Length Basis* EST or PDA
End Bent 1	MAYBE	40	1		
End Bent 2	MAYBE	60			

*EST = Pile order lengths from estimated pile lengths; PDA = Pile order lengths based on PDA testing. For groups of end bents/bents with pile order lengths based on PDA testing, the first end bent/bent no. listed for each group is the representative end bent/bent with the PDA.

PILE DESIGN INFORMATION

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pile(s) #-# (e.g., "Bent 1, Piles 1-5")	Factored Axial Load per Pile TONS	Factored Downdrag Load per Pile TONS	Factored Dead Load* per Pile TONS	Dynamic Resistance Factor	Nominal Downdrag Resistance per Pile TONS	Nominal Scour Resistance per Pile TONS	Scour Resistance Factor (Default = 1.00)
End Bent 1, Piles 1-7	115			0.60			
End Bent 2, Piles 1-7	115			0.60			

*Factored Dead Load is factored weight of pile above the ground line.

SUMMARY OF PILE ACCESSORIES

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pile(s) #-# (e.g., "Bent 1, Piles 1-5")	Pipe Pile Plates Required? YES or MAYBE	Steel Pile Points			Steel Pile Tips Required? YES
		Pipe Pile Cutting Shoes Required? YES	Pipe Pile Conical Points Required? YES	H-Pile Points Required? YES	
TOTAL QTY:					

PROJECT NO. BP5.R108

WAKE COUNTY

STATION: 17+21.00 -L-

NOTES:

1. The Pile Foundation Tables are based on the bridge substructure design and foundation recommendations sealed by a North Carolina Professional Engineer (W. Scott Hunsberger, 036283) on 08/04/22.
2. Total Pile Driving Equipment Setup quantity (not shown in Pile Foundation Tables) equals the number of driven piles, i.e., the number of piles with a Required Driving Resistance.
3. The Engineer will determine the need for PDA Testing when PDAs may be required.

DocuSigned by:

D52980D7... 7/31/2023

NORTH CAROLINA PROFESSIONAL SEAL 011320 ENGINEER KENNETH W. SMITH

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PILE FOUNDATION TABLES

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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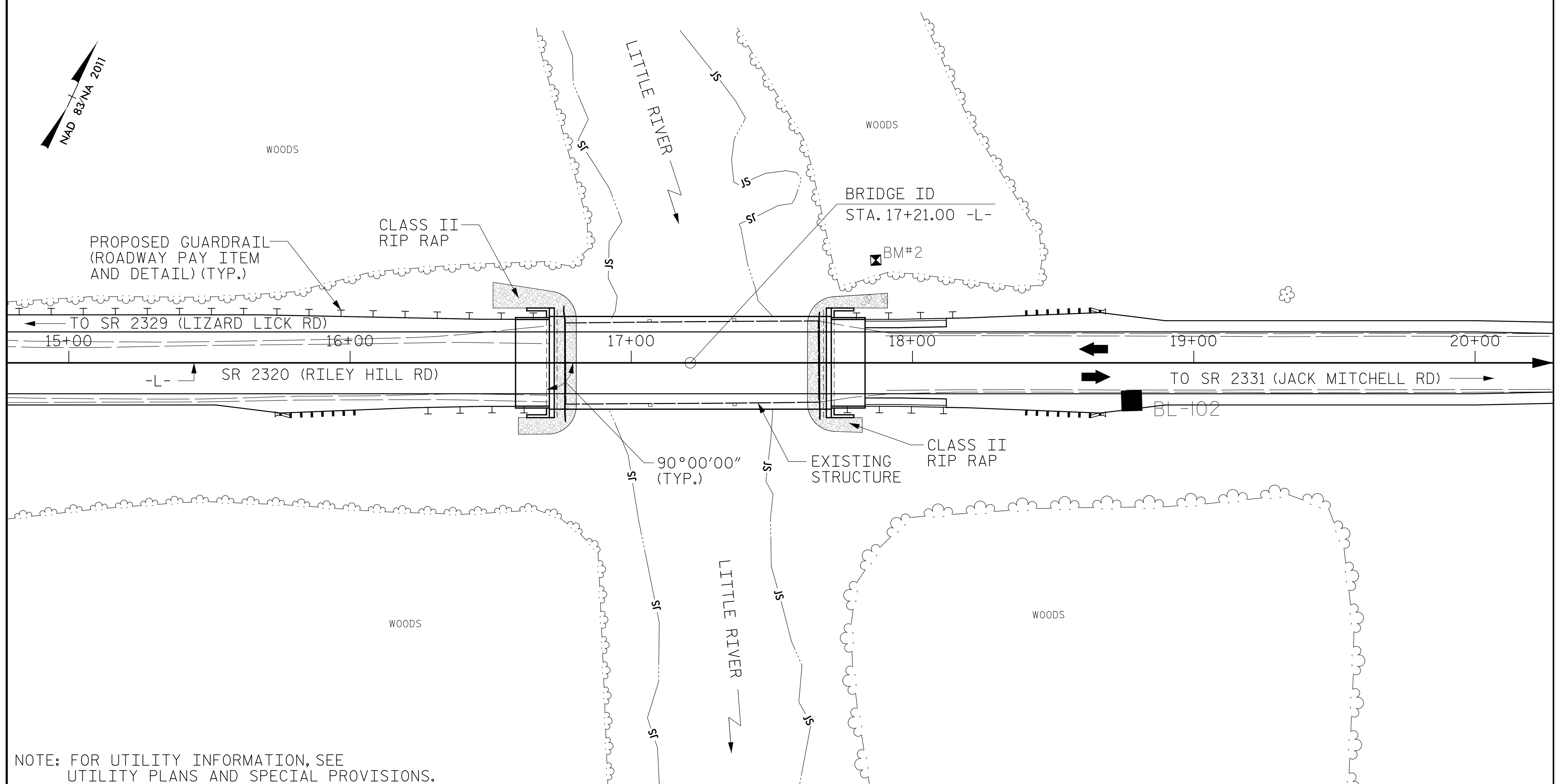
REVISIONS								SHEET NO.
NO.	BY:	DATE:		NO.	BY:	DATE:		S-2
1				3				TOTAL SHEETS
2				4				16

DRAWN BY : R. KNIGHT DATE : 8/2022
CHECKED BY : K. SMITH DATE : 10/2022
DESIGN ENGINEER OF RECORD: K. SMITH DATE : 10/2022

BM #2 - BENCHTIE SET IN 10″ GUM TREE 36.5′ LT OF STA. 17+87 ELEVATION = 242.09′ NORTHING 760263 EASTING 2189736



NOTE: FOR UTILITY INFORMATION, SEE
UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE EXISTING STRUCTURE CONSISTING OF 3 SPANS (3 @ 30′-0″) WITH ASPHALT WEARING SURFACE ON PRECAST CONCRETE CHANNELS AND A CLEAR ROADWAY WIDTH OF 29′-0″ ON REINFORCED CONCRETE CAPS ON TIMBER PILES AT END BENTS AND INTERIOR BENTS AND LOCATED AT THE SITE OF THE PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING BRIDGE SUBSTRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED IN A MANNER THAT PREVENTS DEBRIS FROM FALLING INTO THE WATER. THE CONTRACTOR SHALL SUBMIT DEMOLITION PLANS FOR REVIEW AND REMOVE THE BRIDGE IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA SHALL BE EXCAVATED FOR A DISTANCE OF 45 FT. EACH SIDE OF THE CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPRCIFICATIONS.

THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18-EVALUATING SCOUR AT BRIDGES."

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

ASPHALT WEARING SURFACE IS INCLUDED IN ROADWAY QUANTITY ON ROADWAY PLANS.

FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.

FOUNTATION NOTES

FOR PILES, SEE PILES PROVISION AND SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT 1 AND END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 115 TONS PER PILE.

DRIVE PILES AT END BENT 1 AND END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 195 TONS PER PILE.

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE	ASBESTOS ASSESMENT	PDA TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	PILE DRIVING EQUIPMMENT SETUP FOR HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES		VERTICAL CONCRETE BARRIER RAIL	RIP RAP CLASS II (2′-0″ THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3′-0″ X 3′-3″ PRESTRESSED CONCRETE BOX BEAMS	
	LUMP SUM	LUMP SUM	EACH	LUMP SUM	CU. YDS.	LUMP SUM	LBS.	EACH	NO.	LIN. FT.	LIN. FT.	TON	SQ. YDS.	LUMP SUM	NO.	LIN. FT.
SUPERSTRUCTURE						LUMP SUM					200.00			LUMP SUM	11	1100.00
END BENT 1				LUMP SUM	18.0		2934	7	7	245		90	100			
END BENT 2				LUMP SUM	18.0		2934	7	7	385		117	130			
TOTAL	LUMP SUM	LUMP SUM	1	LUMP SUM	36.0	LUMP SUM	5868	14	14	630	200.00	207	230	LUMP SUM	11	1100.00

PROJECT NO. BP5.R108
WAKE COUNTY
STATION: 17+21.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

BRIDGE ON SR 2320 OVER LITTLE RIVER BETWEEN SR 2329 AND SR 2331

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D52980D70A249A...
7/31/2023

NORTH CAROLINA PROFESSIONAL SEAL 011320 ENGINEER KENNETH W. SMITH

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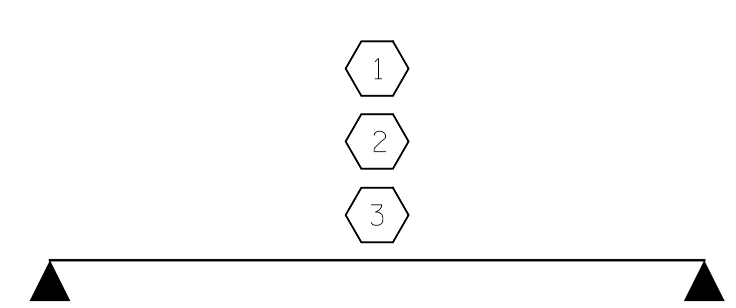
1				3				TOTAL SHEETS
2				4				16

DRAWN BY : R. KNIGHT DATE : 8/2022
CHECKED BY : K. SMITH DATE : 10/2022
DESIGN ENGINEER OF RECORD: K. SMITH DATE : 10/2022

LOAD AND RESISTANCE FACTOR RATING (LRFD) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE: LIVELOAD FACTORS	STRENGTH I MOMENT: DISTRIBUTION FACTORS (DF)	STRENGTH I MOMENT: RATING FACTOR	STRENGTH I MOMENT: SPAN	STRENGTH I MOMENT: GIRDER LOCATION	STRENGTH I MOMENT: DISTANCE FROM LEFT END OF SPAN (ft)	STRENGTH I SHEAR: DISTRIBUTION FACTORS (DF)	STRENGTH I SHEAR: RATING FACTOR	STRENGTH I SHEAR: SPAN	STRENGTH I SHEAR: GIRDER LOCATION	STRENGTH I SHEAR: DISTANCE FROM LEFT END OF SPAN (ft)	SERVICE III LIMIT STATE: LIVELOAD FACTORS	SERVICE III MOMENT: DISTRIBUTION FACTORS (DF)	SERVICE III MOMENT: RATING FACTOR	SERVICE III MOMENT: SPAN	SERVICE III MOMENT: GIRDER LOCATION	SERVICE III MOMENT: DISTANCE FROM LEFT END OF SPAN (ft)	COMMENT NUMBER
DESIGN LOAD RATING		HL-93(Inv)	N/A	1	1.035	--	1.75	0.272	1.26	A	EL	49.25	0.489	1.34	A	EL	4.925	0.80	0.272	1.04	A	EL	49.25	
		HL-93(Opr)	N/A	--	1.633	--	1.35	0.272	1.63	A	EL	49.25	0.489	1.73	A	EL	4.925	N/A	--	--	--	--	--	
		HS-20(Inv)	36.000	2	1.44	51.84	1.75	0.272	1.75	A	EL	49.25	0.489	1.81	A	EL	4.925	0.80	0.272	1.44	A	EL	49.25	
		HS-20(Opr)	36.000	--	2.271	81.756	1.35	0.272	2.27	A	EL	49.25	0.489	2.35	A	EL	4.925	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SV	SNSH	13.500	--	3.413	46.079	1.4	0.272	5.19	A	EL	49.25	0.489	5.59	A	EL	4.925	0.80	0.272	3.41	A	EL	49.25	
	SV	SNGARBS2	20.000	--	2.473	49.452	1.4	0.272	3.76	A	EL	49.25	0.489	3.91	A	EL	4.925	0.80	0.272	2.47	A	EL	49.25	
	SV	SNAGRIS2	22.000	--	2.313	50.885	1.4	0.272	3.52	A	EL	49.25	0.489	3.6	A	EL	4.925	0.80	0.272	2.31	A	EL	49.25	
	SV	SNCOTTS3	27.250	--	1.696	46.228	1.4	0.272	2.58	A	EL	49.25	0.489	2.78	A	EL	4.925	0.80	0.272	1.70	A	EL	49.25	
	SV	SNAGGRS4	34.925	--	1.39	48.556	1.4	0.272	2.11	A	EL	49.25	0.489	2.26	A	EL	4.925	0.80	0.272	1.39	A	EL	49.25	
	SV	SNS5A	35.550	--	1.361	48.398	1.4	0.272	2.07	A	EL	49.25	0.489	2.27	A	EL	4.925	0.80	0.272	1.36	A	EL	49.25	
	SV	SNS6A	39.950	--	1.238	49.456	1.4	0.272	1.88	A	EL	49.25	0.489	2.05	A	EL	4.925	0.80	0.272	1.24	A	EL	49.25	
	SV	SNS7B	42.000	--	1.178	49.496	1.4	0.272	1.79	A	EL	49.25	0.489	2	A	EL	4.925	0.80	0.272	1.18	A	EL	49.25	
	TTST	TNAGRIT3	33.000	--	1.506	49.709	1.4	0.272	2.29	A	EL	49.25	0.489	2.46	A	EL	4.925	0.80	0.272	1.51	A	EL	49.25	
	TTST	TNT4A	33.075	--	1.51	49.942	1.4	0.272	2.3	A	EL	49.25	0.489	2.41	A	EL	4.925	0.80	0.272	1.51	A	EL	49.25	
	TTST	TNT6A	41.600	--	1.224	50.926	1.4	0.272	1.86	A	EL	49.25	0.489	2.09	A	EL	4.925	0.80	0.272	1.22	A	EL	49.25	
	TTST	TNT7A	42.000	--	1.225	51.442	1.4	0.272	1.86	A	EL	49.25	0.489	2.05	A	EL	4.925	0.80	0.272	1.22	A	EL	49.25	
	TTST	TNT7B	42.000	--	1.254	52.657	1.4	0.272	1.91	A	EL	49.25	0.489	1.96	A	EL	4.925	0.80	0.272	1.25	A	EL	49.25	
	TTST	TNAGRIT4	43.000	--	1.203	51.711	1.4	0.272	1.83	A	EL	49.25	0.489	1.91	A	EL	4.925	0.80	0.272	1.20	A	EL	49.25	
	TTST	TNAGT5A	45.000	--	1.139	51.236	1.4	0.272	1.73	A	EL	49.25	0.489	1.87	A	EL	4.925	0.80	0.272	1.14	A	EL	49.25	
	TTST	TNAGT5B	45.000	3	1.129	50.805	1.4	0.272	1.72	A	EL	49.25	0.489	1.82	A	EL	4.925	0.80	0.272	1.13	A	EL	49.25	



LRFR SUMMARY

LOAD FACTORS:

DESIGN LOAD RATING FACTORS	LIMIT STATE	γ_{DC}	γ_{DW}
	STRENGTH I	1.25	1.50
	SERVICE III	1.00	1.00

NOTES:

MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

COMMENTS:

1.
2.
3.
4.

CONTROLLING LOAD RATING

1 DESIGN LOAD RATING (HL-93)

2 DESIGN LOAD RATING (HS-20)

3 LEGAL LOAD RATING ✱✱

✱✱ SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
EL - EXTERIOR LEFT GIRDER
ER - EXTERIOR RIGHT GIRDER

PROJECT NO. BP5.R108
WAKE COUNTY
STATION: 17+21.00 -L-

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7/31/2023

NORTH CAROLINA PROFESSIONAL SEAL 011320 ENGINEER KENNETH W. SMITH

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
LRFR SUMMARY FOR 100' BOX BEAM UNIT 90° SKEW
(NON-INTERSTATE TRAFFIC)

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

SHEET NO. S-4
TOTAL SHEETS 16

ASSEMBLED BY : R. KNIGHT DATE : JUNE 2022
CHECKED BY : K. SMITH DATE : JUNE 2022
DRAWN BY : TMG 11/11
CHECKED BY : AAC 11/11

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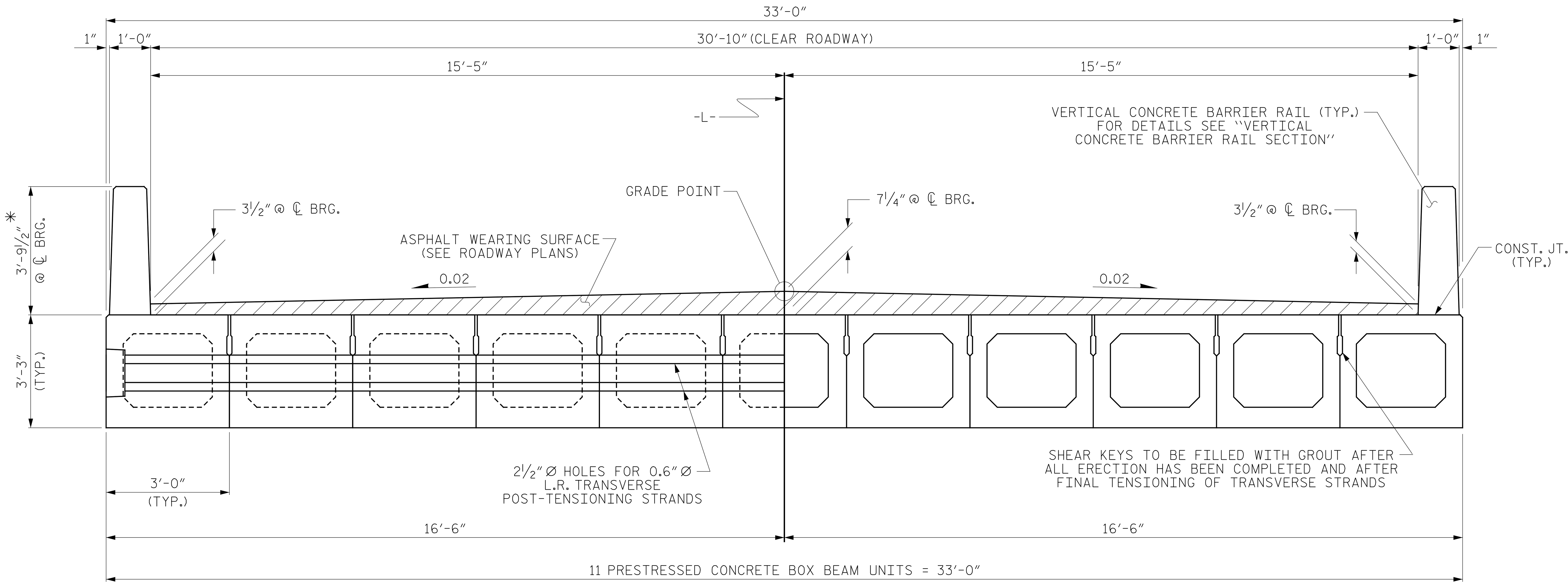
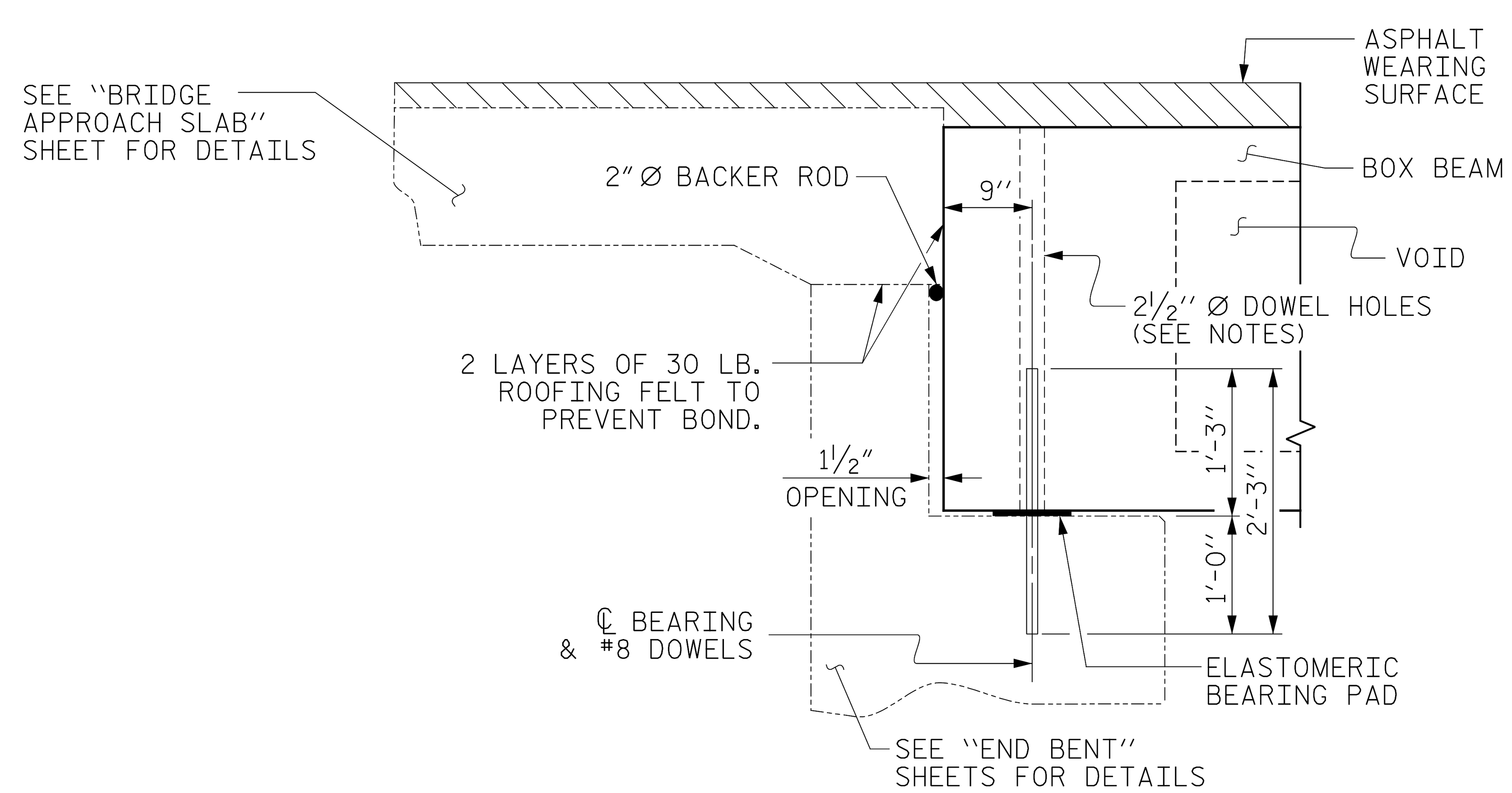


HALF SECTION
AT INTERMEDIATE DIAPHRAGMS

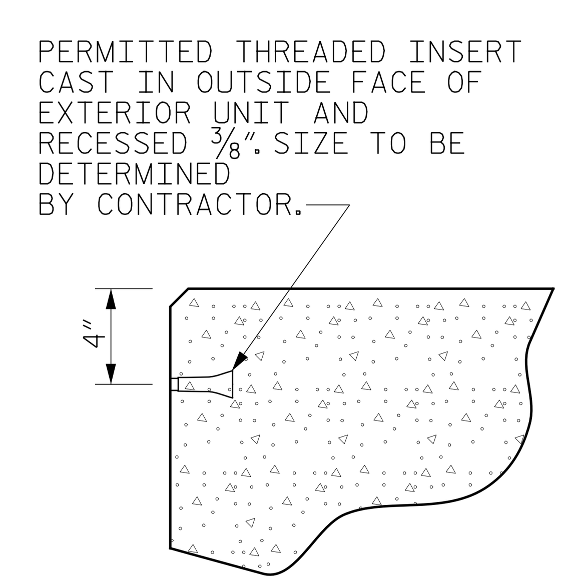
HALF SECTION
THROUGH VOIDS

TYPICAL SECTION

* THE MAXIMUM BARRIER RAIL HEIGHT AND ASPHALT THICKNESS IS SHOWN. THE HEIGHT OF THE BARRIER RAIL AND ASPHALT THICKNESS VARIES WHILE THE TOP OF THE BARRIER RAIL FOLLOWS THE PROFILE OF THE GUTTERLINE. FOR RAIL HEIGHT DETAILS AND ASPHALT THICKNESS, SEE THE "VERTICAL CONCRETE BARRIER RAIL SECTION" DETAIL.



SECTION AT END BENT



THREADED INSERT DETAIL

NOTES

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW RELAXATION GRADE 270 STRANDS AND SHALL CONFORM TO AASHTO M203 EXCEPT FOR SAMPLING REQUIREMENTS WHICH SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ALL REINFORCING STEEL CAST WITH THE BOX BEAM SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE BOX BEAMS.

FLAME CUTTING OF THE TRANSVERSE POST-TENSIONING STRAND IS NOT ALLOWED.

RECESSES FOR TRANSVERSE STRANDS SHALL BE GROUTED AFTER THE TENSIONING OF THE STRANDS.

THE 2½" Ø DOWEL HOLES AT FIXED ENDS OF BOX BEAM SECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT.

THE BACKER RODS SHALL CONFORM TO THE REQUIREMENTS OF TYPE M BOND BREAKER. SEE SECTION 1028 OF THE STANDARD SPECIFICATIONS.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE BOX BEAM UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 5,500 PSI.

ALL REINFORCING STEEL IN VERTICAL CONCRETE BARRIER RAILS SHALL BE EPOXY COATED.

PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE BOX BEAM UNIT ENDS.

APPLY EPOXY PROTECTIVE COATING TO BOX BEAM UNIT ENDS.

VERTICAL GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A VERTICAL CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF BARRIER RAIL SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

THE LOCATION OF THE VOID DRAINS MAY BE SHIFTED SLIGHTLY WHERE NECESSARY TO CLEAR PRESTRESSING STRANDS OR TRANSVERSE REINFORCING STEEL.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE PERMITTED THREADED INSERTS ARE DETAILED AS AN OPTION FOR THE CONTRACTOR TO ATTACH FALSEWORK AND FORMWORK DURING CONSTRUCTION.

THE PERMITTED THREADED INSERTS IN THE EXTERIOR UNITS SHALL BE SIZED BY THE CONTRACTOR, SPACED AT 4'-0" CENTERS AND GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS. STAINLESS STEEL THREADED INSERTS MAY BE USED AS AN ALTERNATE.

THE PERMITTED THREADED INSERTS SHALL BE GROUTED BY THE CONTRACTOR IMMEDIATELY FOLLOWING REMOVAL OF THE FALSEWORK.

THE COST OF THE PERMITTED THREADED INSERTS SHALL BE INCLUDED IN THE PRICE BID FOR THE PRECAST UNITS.

PROJECT NO. BP5.R108
WAKE COUNTY
STATION: 17+21.00 -L-

SHEET 1 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
3'-0" X 3'-3"
PRESTRESSED CONCRETE
BOX BEAM UNIT

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7/31/2023

SEAL 011320 NORTH CAROLINA PROFESSIONAL ENGINEER KENNETH W. SMITH

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS
2			4			16

ASSEMBLED BY : R. KNIGHT	DATE : 8/2022
CHECKED BY : K. SMITH	DATE : 10/2022
DESIGN ENGINEER OF RECORD: K. SMITH	DATE : 10/2022
DRAWN BY : DGE 8/11 CHECKED BY : TMG 11/11	REV. 10/15 MAA/TMG

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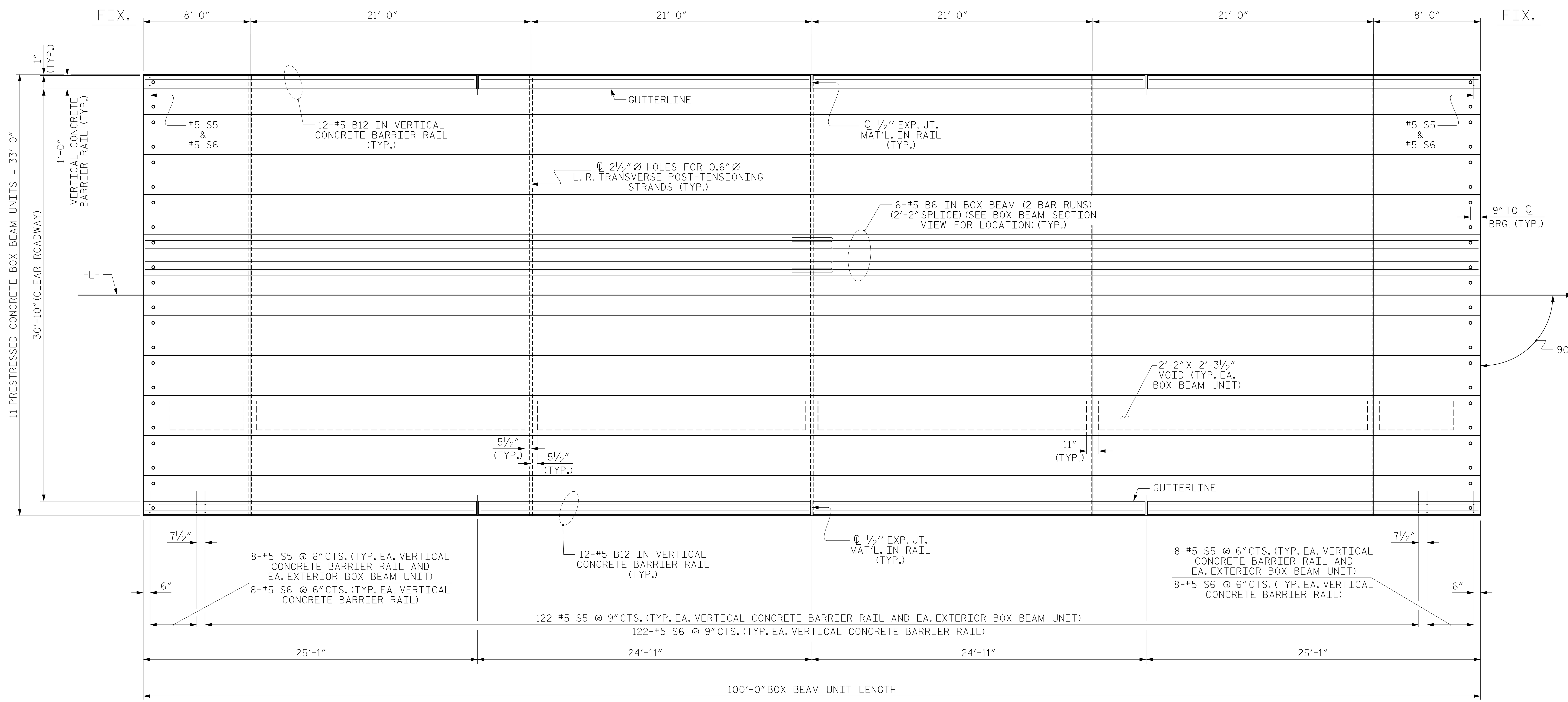
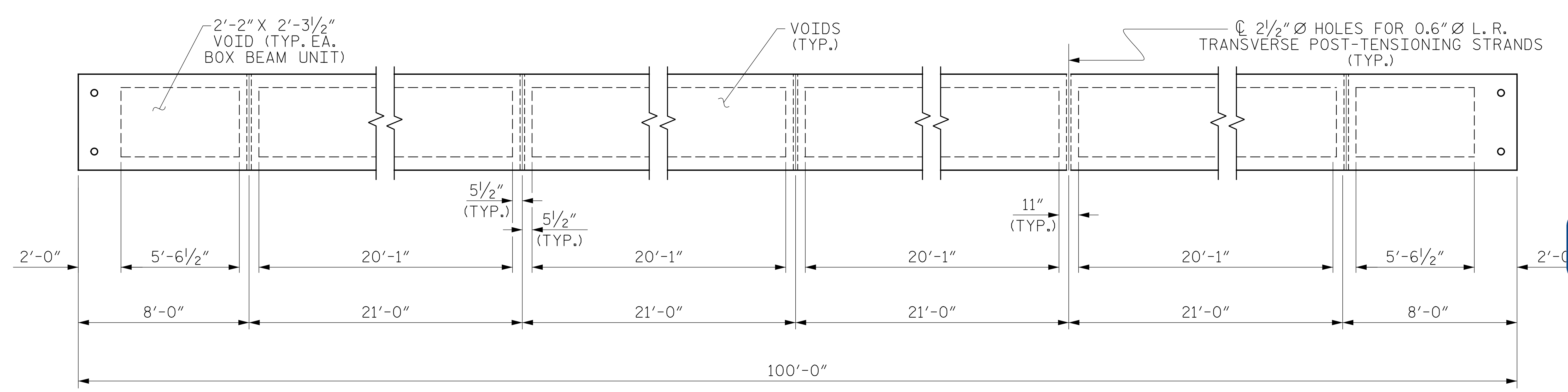


PLAN OF UNIT



DIAPHRAGM AND VOID LAYOUT

PROJECT NO. BP5.R108

WAKE COUNTY

STATION: 17+21.00 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 100' UNIT
30'-10" CLEAR ROADWAY
90° SKEW

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7/31/2023

NORTH CAROLINA PROFESSIONAL SEAL 011320 ENGINEER KENNETH W. SMITH

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

SHEET NO. S-6

TOTAL SHEETS 16

ASSEMBLED BY : R. KNIGHT	DATE : 8/2022
CHECKED BY : K. SMITH	DATE : 10/2022
DESIGN ENGINEER OF RECORD: K. SMITH	DATE : 10/2022
DRAWN BY : DGE 8/10 / CHECKED BY : TMG 11/11	REV. 8/14 MAA/TMG

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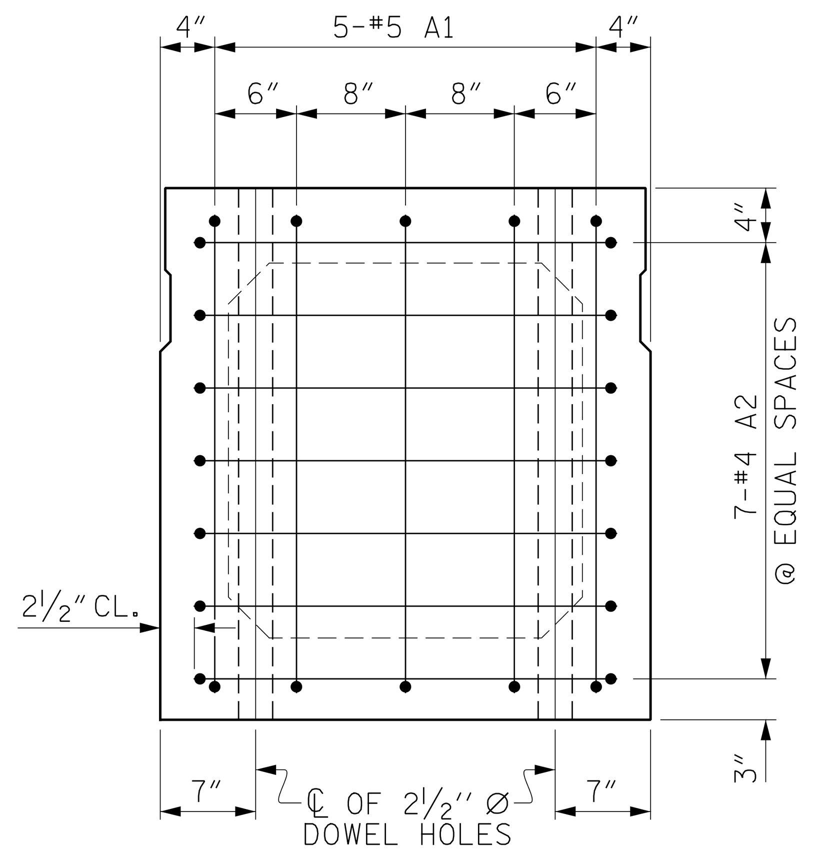
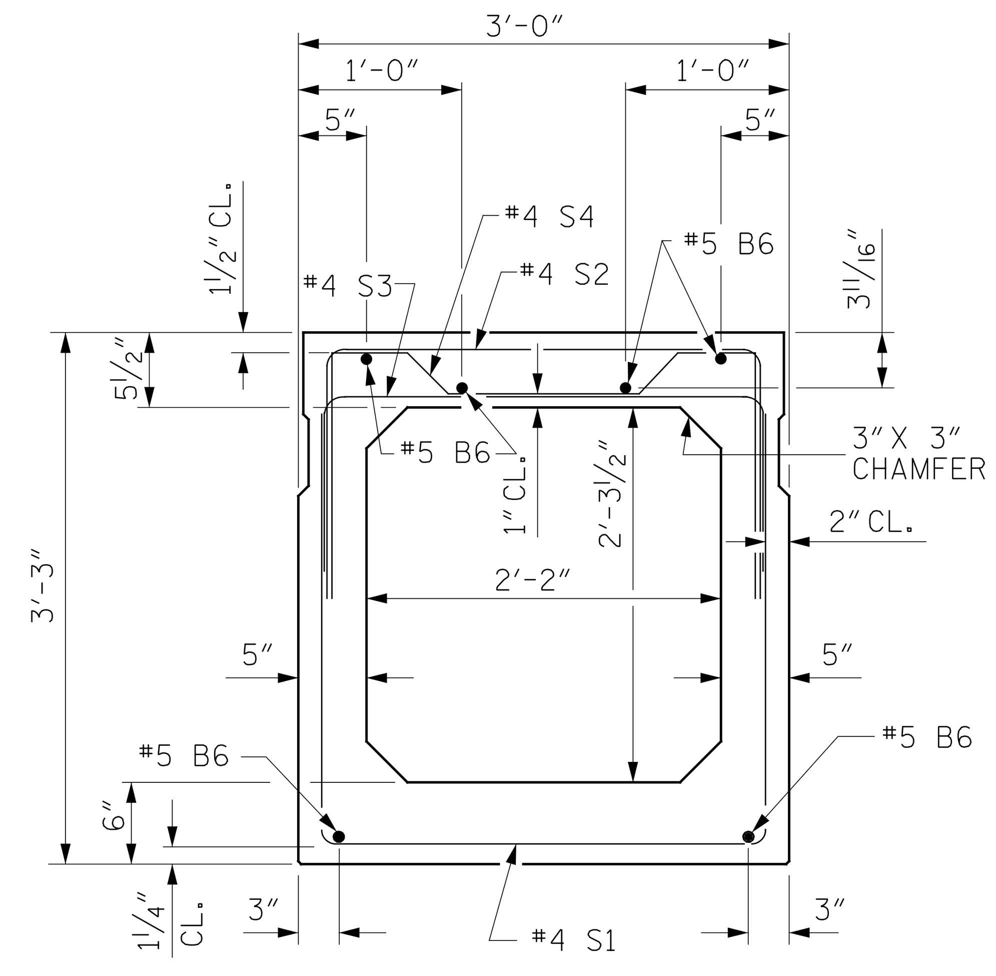


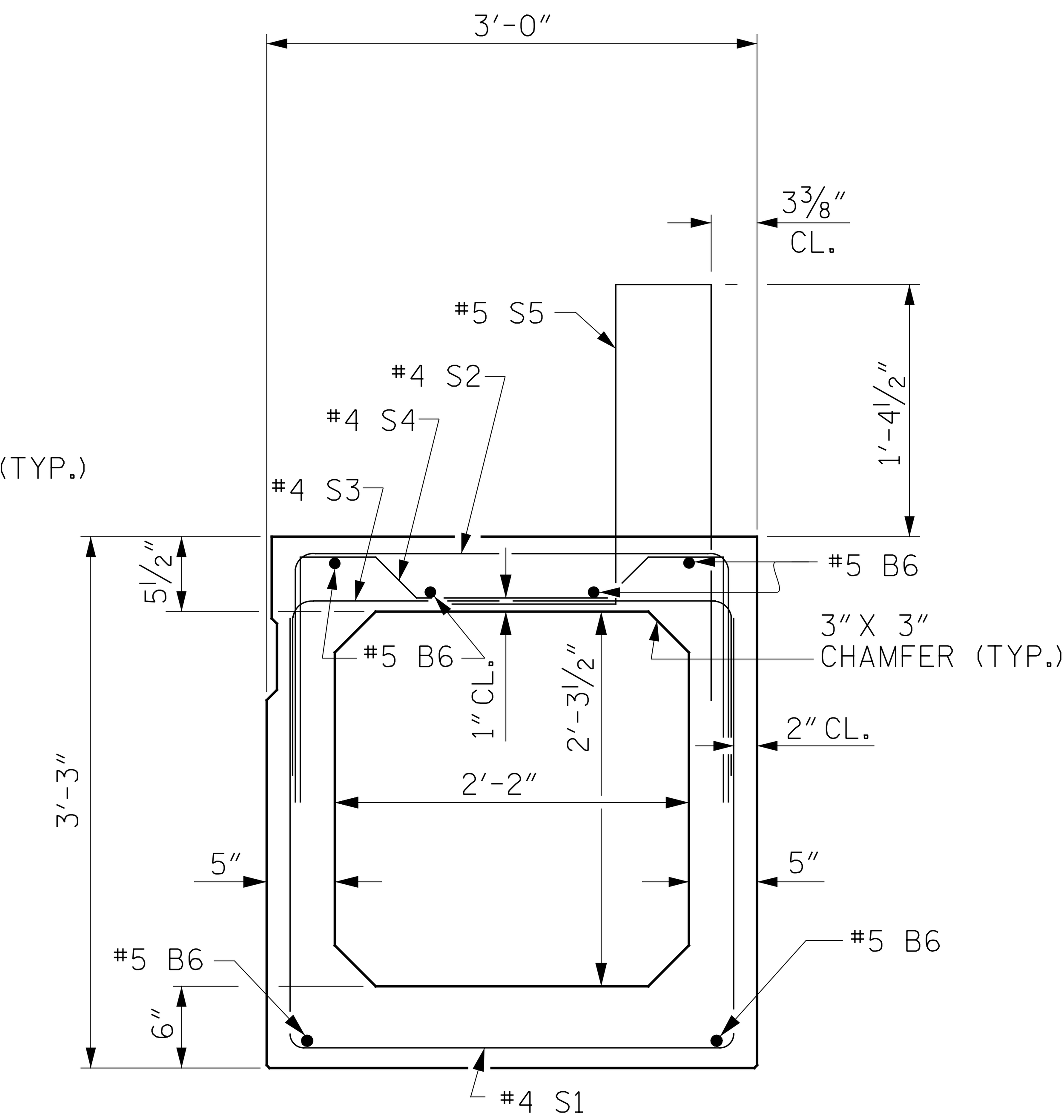
END ELEVATION

SHOWING PLACEMENT OF #5 & #4 "A" BARS AND LOCATION OF DOWEL HOLES. (INTERIOR BOX BEAM SECTION SHOWN-EXTERIOR SECTION SIMILAR EXCEPT SHEAR KEY LOCATION. STRAND LAYOUT NOT SHOWN.)



INTERIOR BOX BEAM SECTION

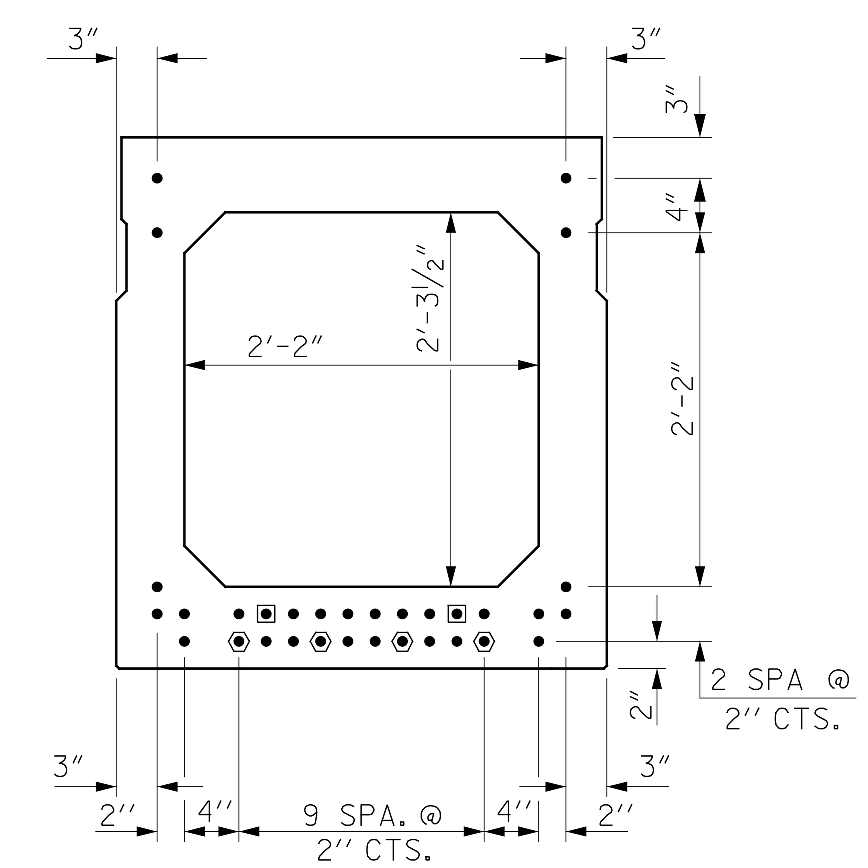
(STRAND LAYOUT NOT SHOWN)



EXTERIOR BOX BEAM SECTION

(STRAND LAYOUT NOT SHOWN)

0.6″ Ø LOW RELAXATION STRAND LAYOUT



TYPICAL STRAND LOCATION

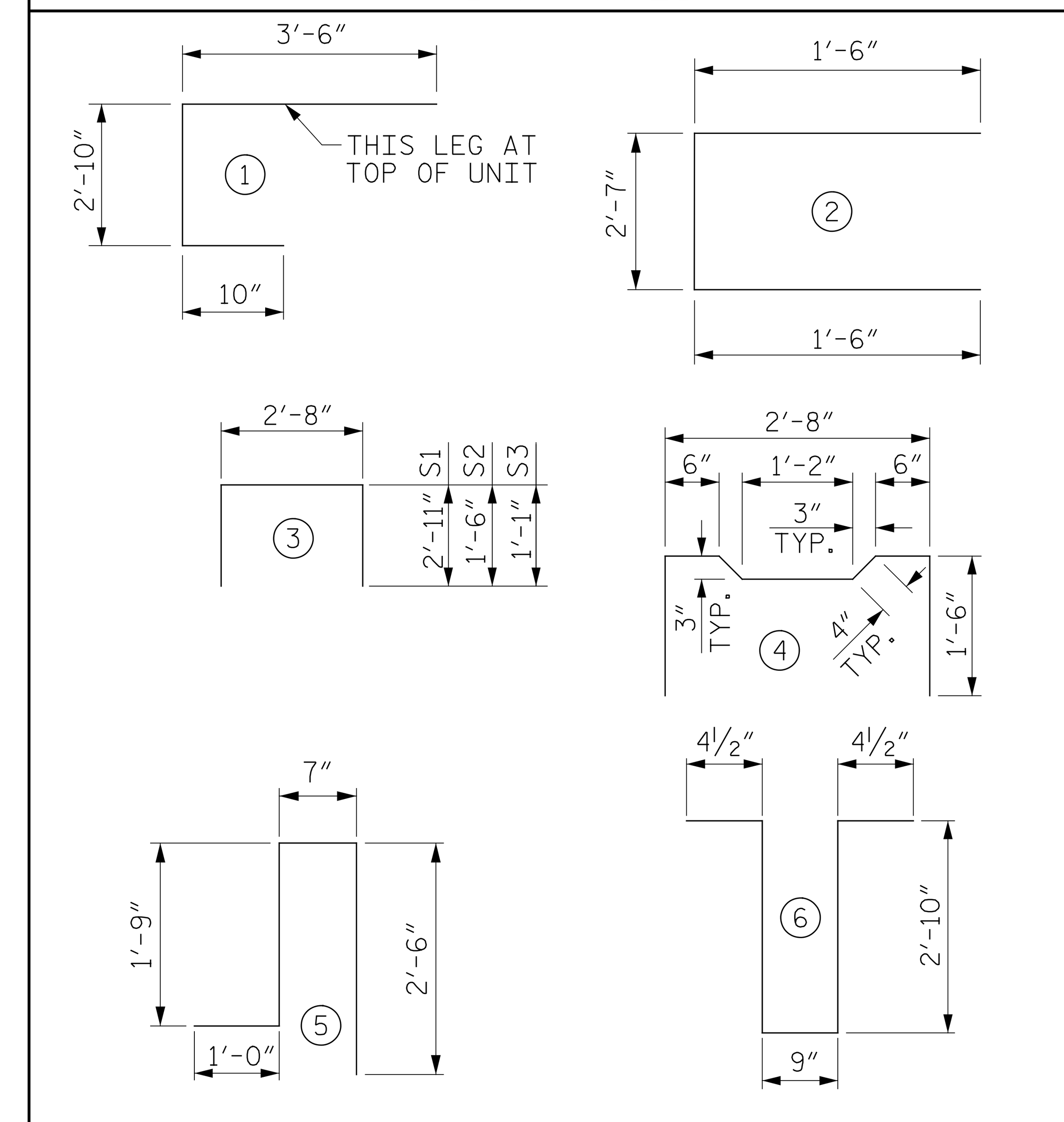
(32 STRANDS REQUIRED)

DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 4′-0″ FROM END OF GIRDER
- ⬢ STRANDS DEBONDED FOR 12′-0″ FROM END OF GIRDER

BOND SHALL BE BROKEN ON STRANDS AS SHOWN FOR THE SPECIFIED LENGTH FROM EACH END OF THE BOX BEAM. SEE STANDARD SPECIFICATIONS ARTICLE 1078-7.

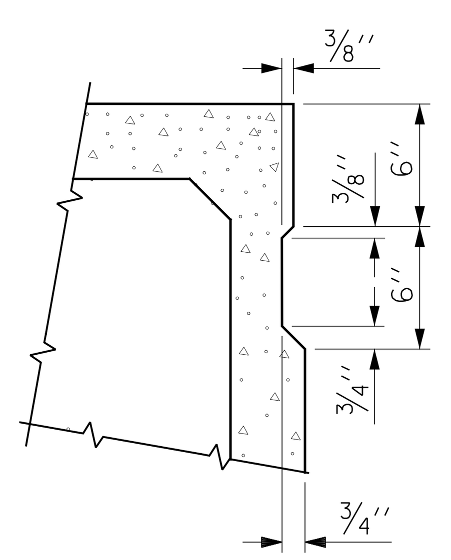
BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR ONE BOX BEAM SECTION

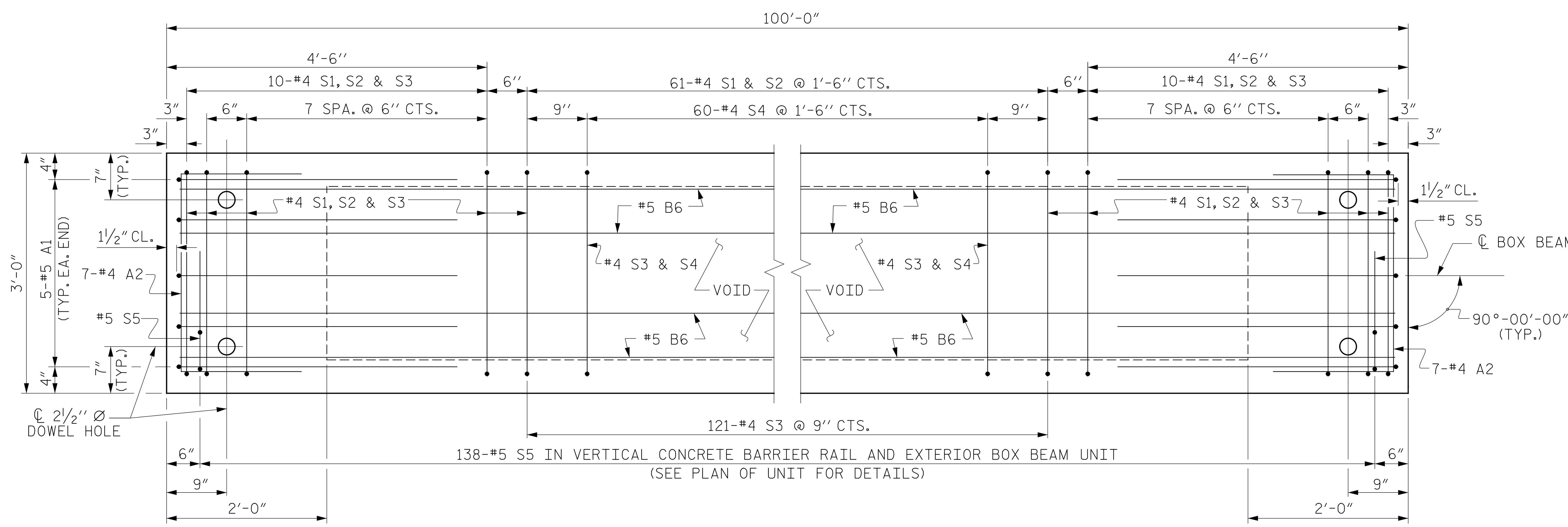
				EXTERIOR UNIT		INTERIOR UNIT	
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT
A1	10	#5	1	7′-2″	75	7′-2″	75
A2	44	#4	2	5′-7″	164	5′-7″	164
B6	12	#5	STR	50′-11″	637	50′-11″	637
K1	15	#4	6	7′-2″	72	7′-2″	72
K2	10	#4	STR	2′-7″	17	2′-7″	17
S1	81	#4	3	8′-6″	460	8′-6″	460
S2	81	#4	3	5′-8″	307	5′-8″	307
S3	141	#4	3	4′-10″	455	4′-10″	455
S4	60	#4	4	5′-10″	234	5′-10″	234
✳ S5	138	#5	5	5′-10″	840	--	--
REINFORCING STEEL				2421	LBS.	2421	LBS.
✳ EPOXY COATED REINF. STEEL				840	LBS.		
7500 P.S.I. CONCRETE				19.6	CU. YDS.	19.4	CU. YDS.
0.6″ Ø L.R. STRANDS				No. 32		No. 32	



SHEAR KEY DETAIL

NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR BOX BEAMS.

GRADE 270 STRANDS	
	0.6″ Ø L.R.
AREA (SQUARE INCHES)	0.217
ULTIMATE STRENGTH (LBS. PER STRAND)	58,600
APPLIED PRESTRESS (LBS. PER STRAND)	43,950

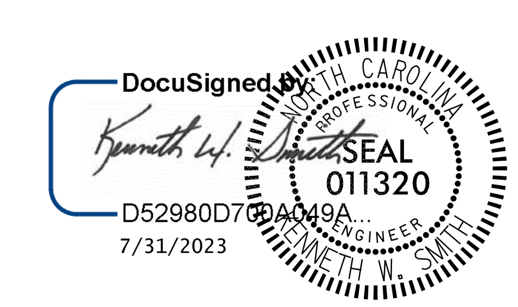


PLAN OF BOX BEAM

EXTERIOR UNIT SHOWN, INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S5 BARS.
FOR LOCATION OF DIAPHRAGMS, SEE "PLAN OF UNIT".
FOR THREADED INSERTS, SEE "THREADED INSERT DETAIL".
FOR REINFORCING STEEL IN DIAPHRAGMS, SEE "DOUBLE DIAPHRAGM DETAILS".

PROJECT NO. BP5.R108
WAKE COUNTY
STATION: 17+21.00 -L-

SHEET 3 OF 5



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
3′-0″ X 3′-3″ PRESTRESSED CONCRETE BOX BEAM UNIT

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1				3			TOTAL SHEETS
2				4			16

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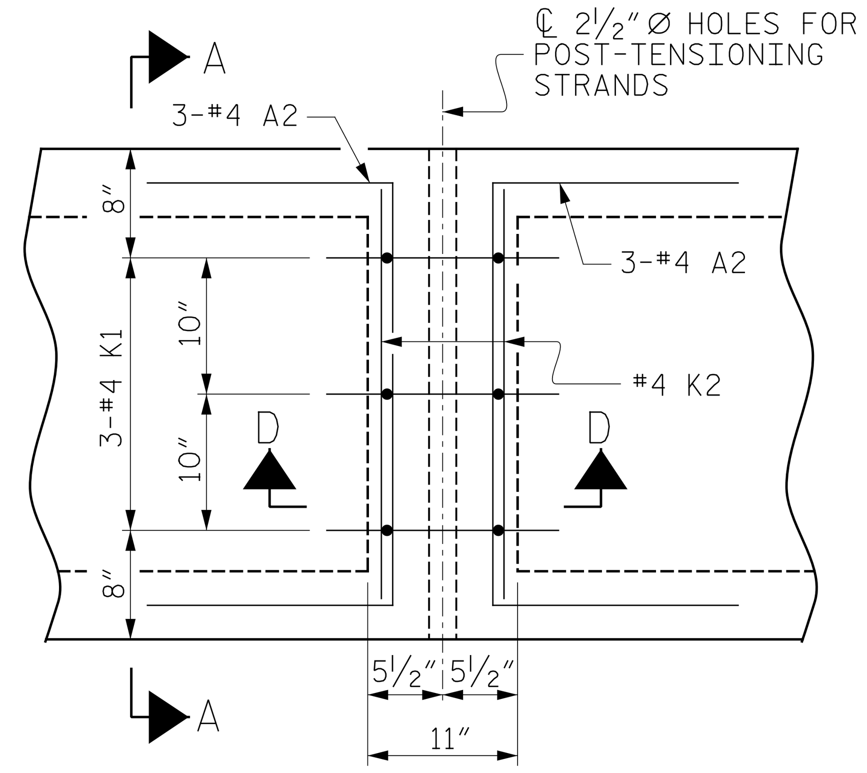
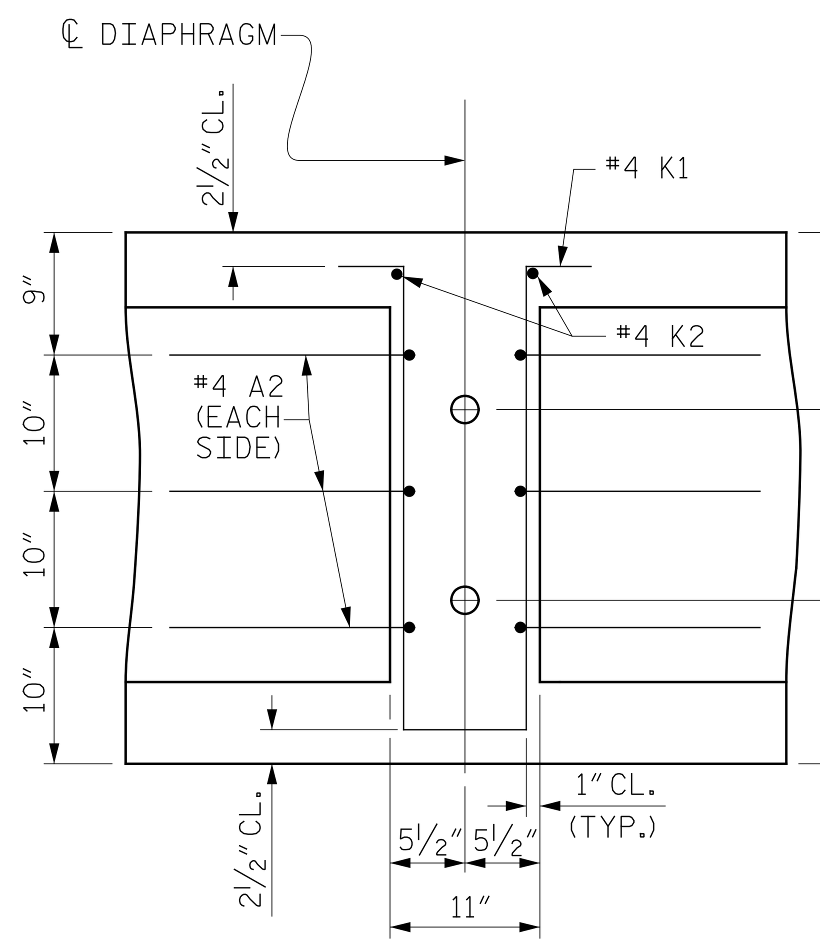
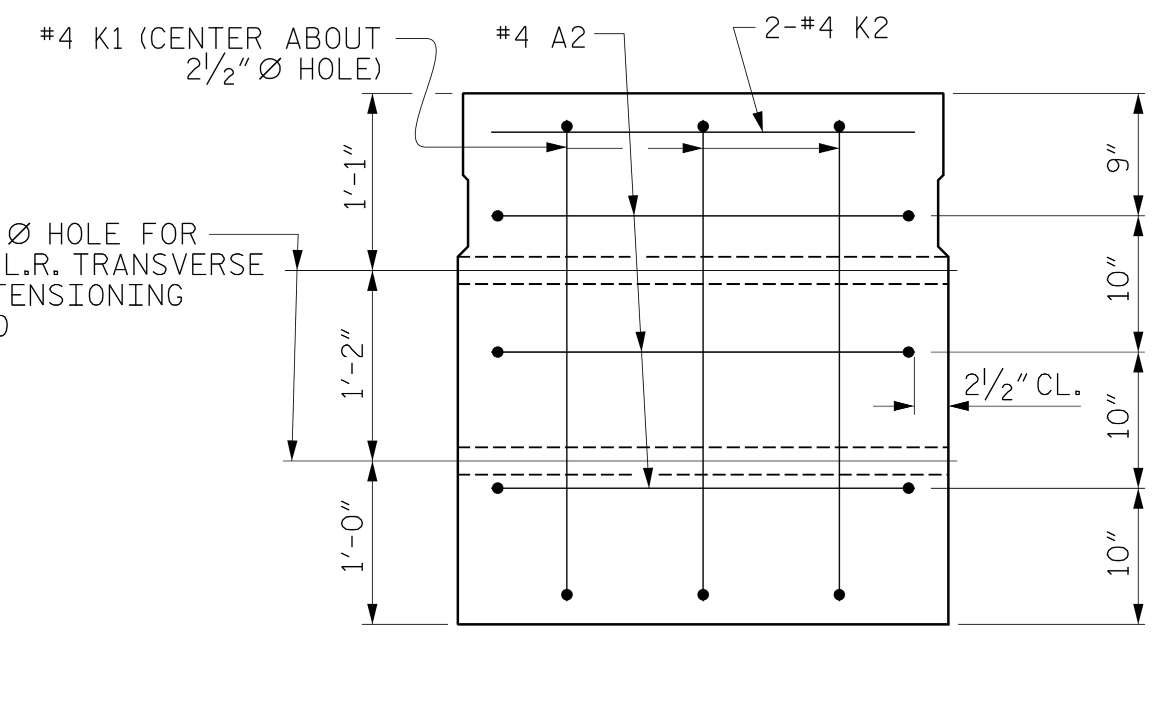
CHECKED BY : K. SMITH	DATE : 10/2022
DESIGN ENGINEER OF RECORD: K. SMITH	DATE : 10/2022
DRAWN BY : DGE 11/11 CHECKED BY : TMG 11/11	REV. 9/14 MAA/TMG



PLAN



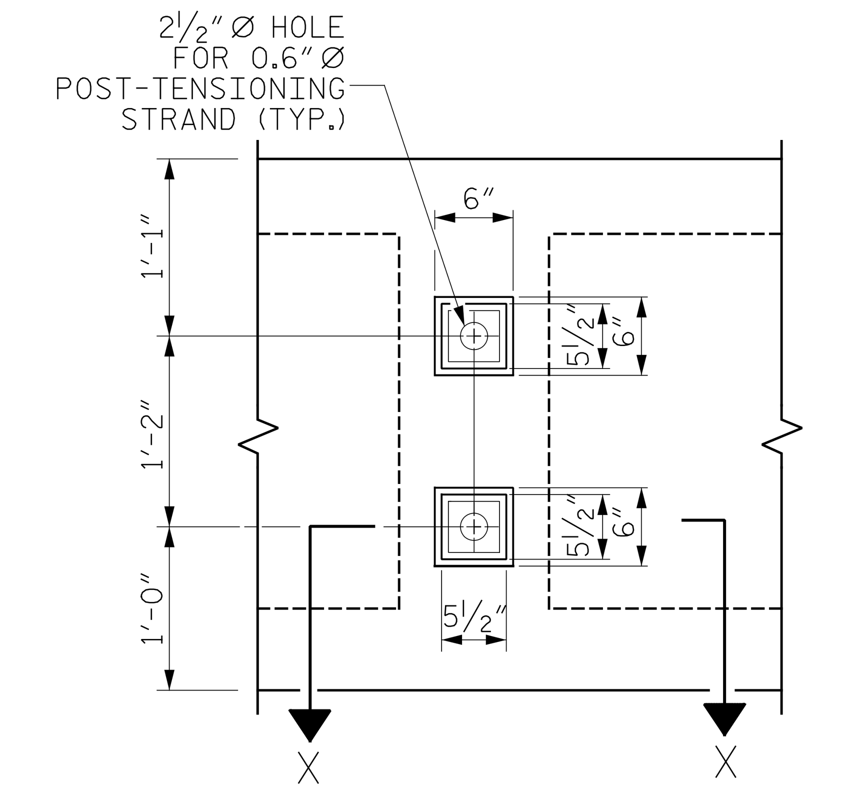
SECTION D-D



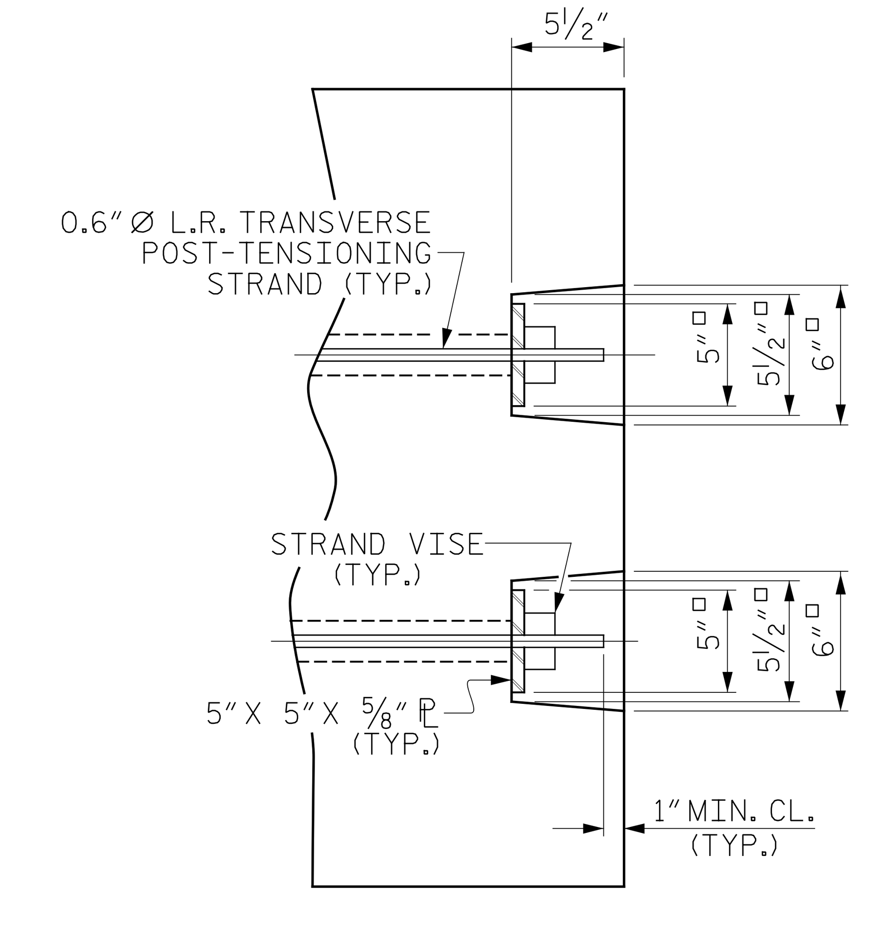
SECTION A-A
VOIDS NOT SHOWN

DOUBLE DIAPHRAGM DETAILS

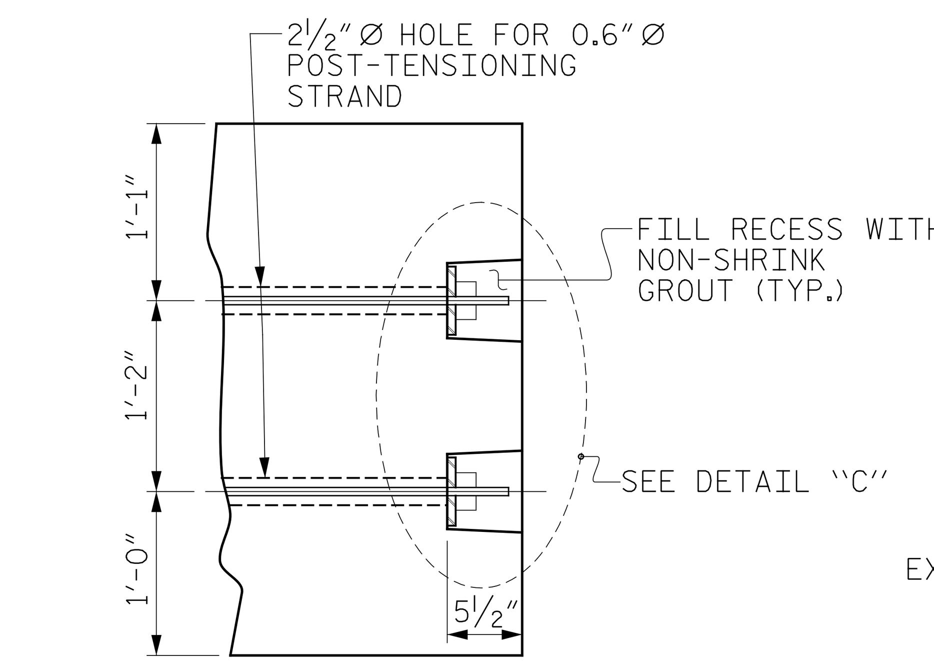
#4 "S" BARS NOT SHOWN. #4 "S" BARS MAY BE SHIFTED SLIGHTLY TO CLEAR 2½″ Ø HOLE.



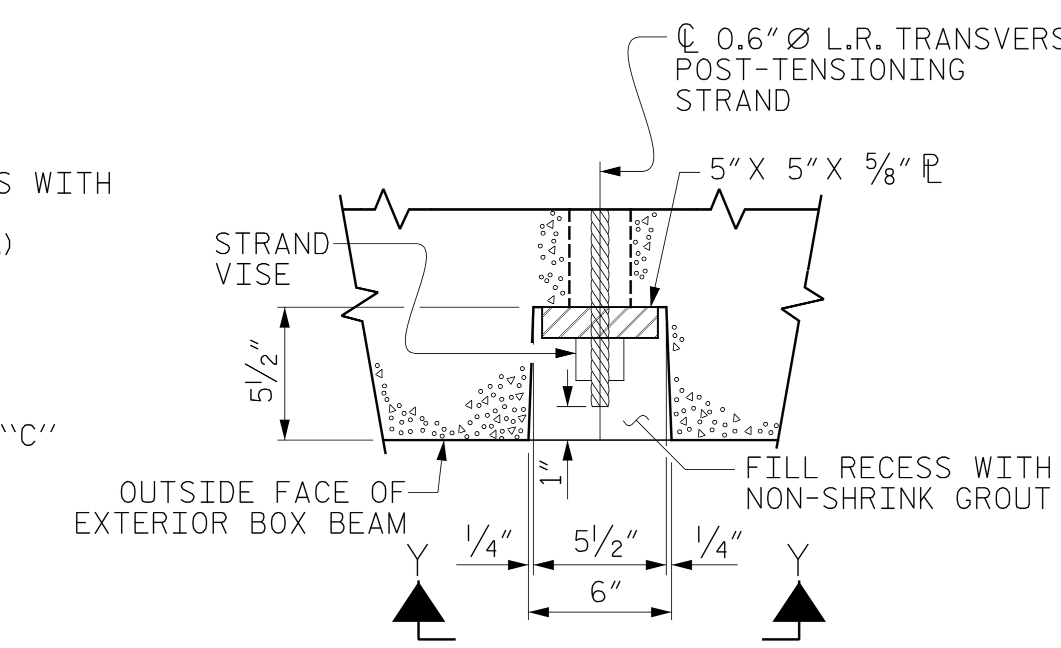
VIEW Y-Y
SHOWING ELEVATION VIEW OF GROUTED RECESS



DETAIL "C"

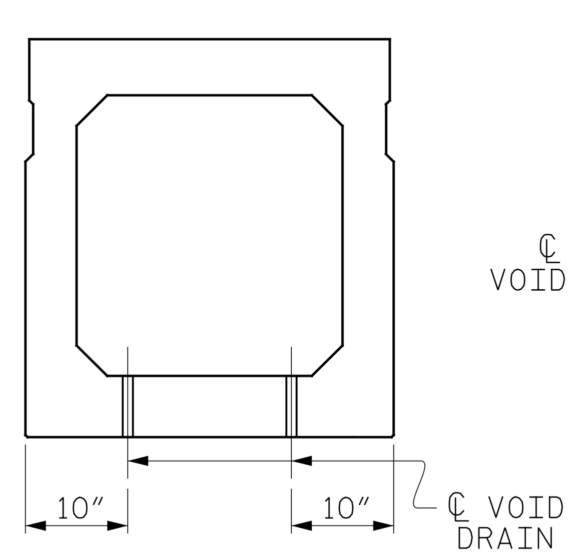


PART SECTION AT RECESS

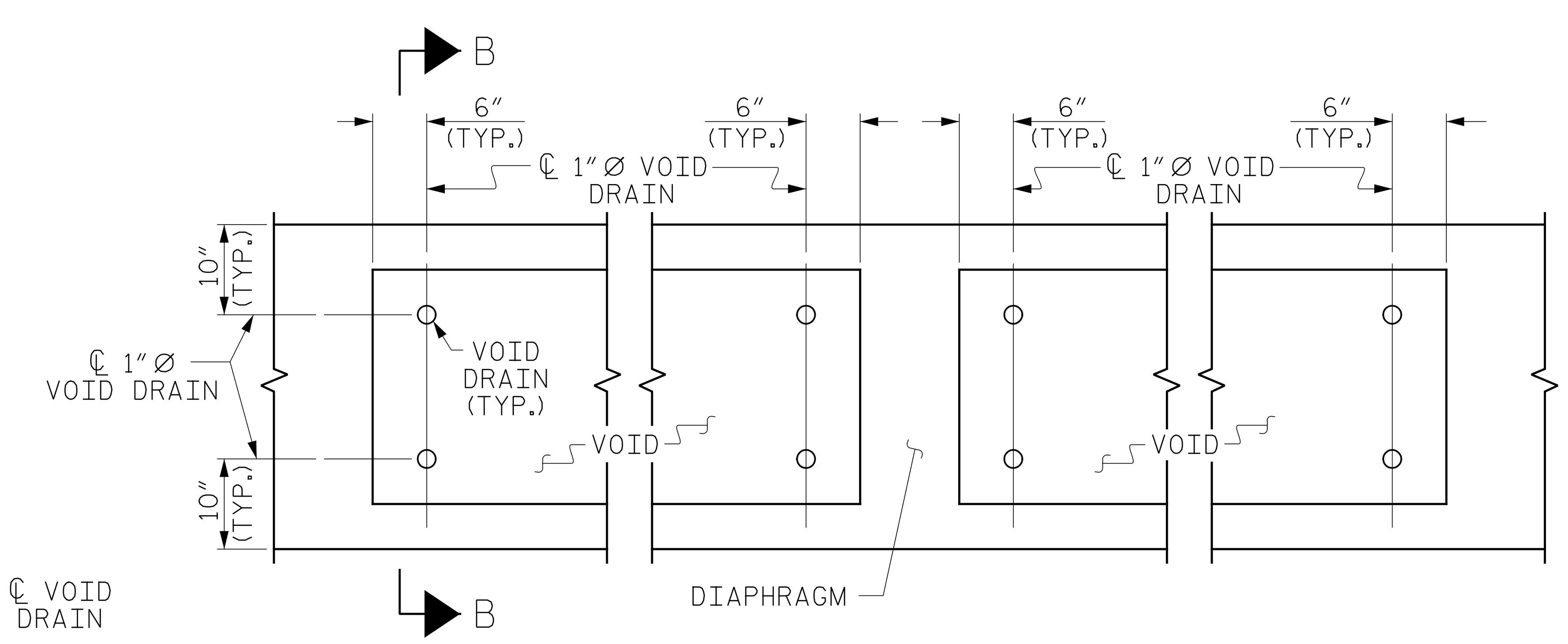


SECTION X-X
SHOWING PLAN VIEW OF GROUTED RECESS

GROUTED RECESS DETAIL AT END OF POST-TENSIONED STRANDS OF EXTERIOR BOX BEAM



SECTION B-B



PART PLAN

VOID DRAIN DETAILS

(DIMENSIONS SHOWN ARE TYPICAL FOR EACH VOID)

DEAD LOAD DEFLECTION AND CAMBER	
	3′-0″ x 3′-3″
100′ BOX BEAM UNIT	0.6″ Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	2″ ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD**	⅞″ ↓
FINAL CAMBER	1⅛″ ↑

** INCLUDES FUTURE WEARING SURFACE

PROJECT NO. BP5.R108
WAKE COUNTY
STATION: 17+21.00 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

3′-0″ X 3′-3″ PRESTRESSED CONCRETE BOX BEAM UNIT

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7/31/2023

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 011320 KENNETH W. SMITH

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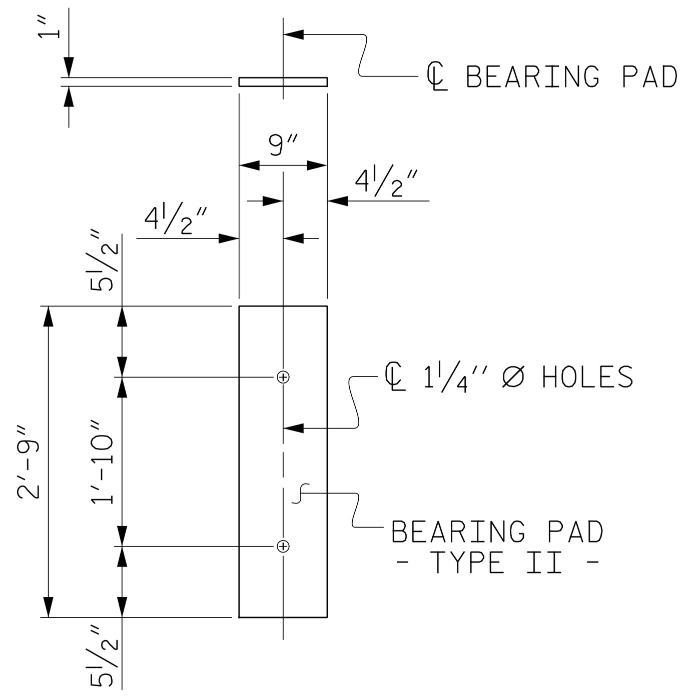
ASSEMBLED BY : R. KNIGHT DATE : 8/2022
CHECKED BY : K. SMITH DATE : 10/2022
DESIGN ENGINEER OF RECORD: K. SMITH DATE : 10/2022
DRAWN BY : DGE 11/11 REV. 8/14 MAA/TMG
CHECKED BY : TMG 11/11

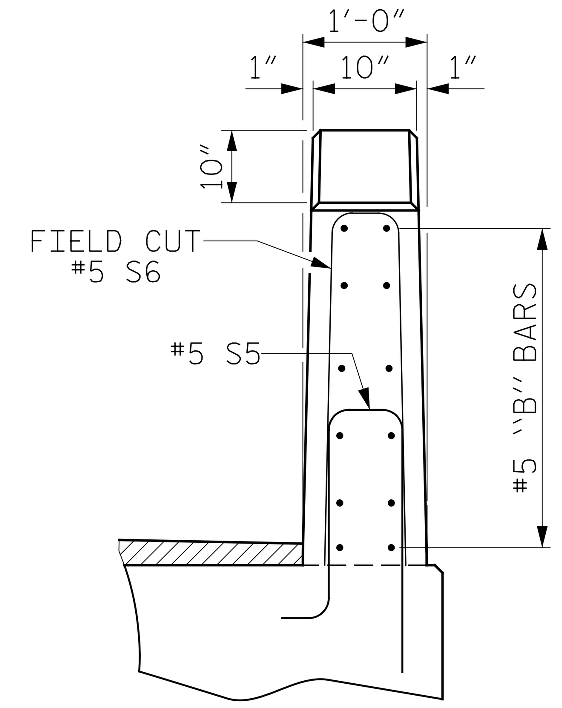


FIXED END

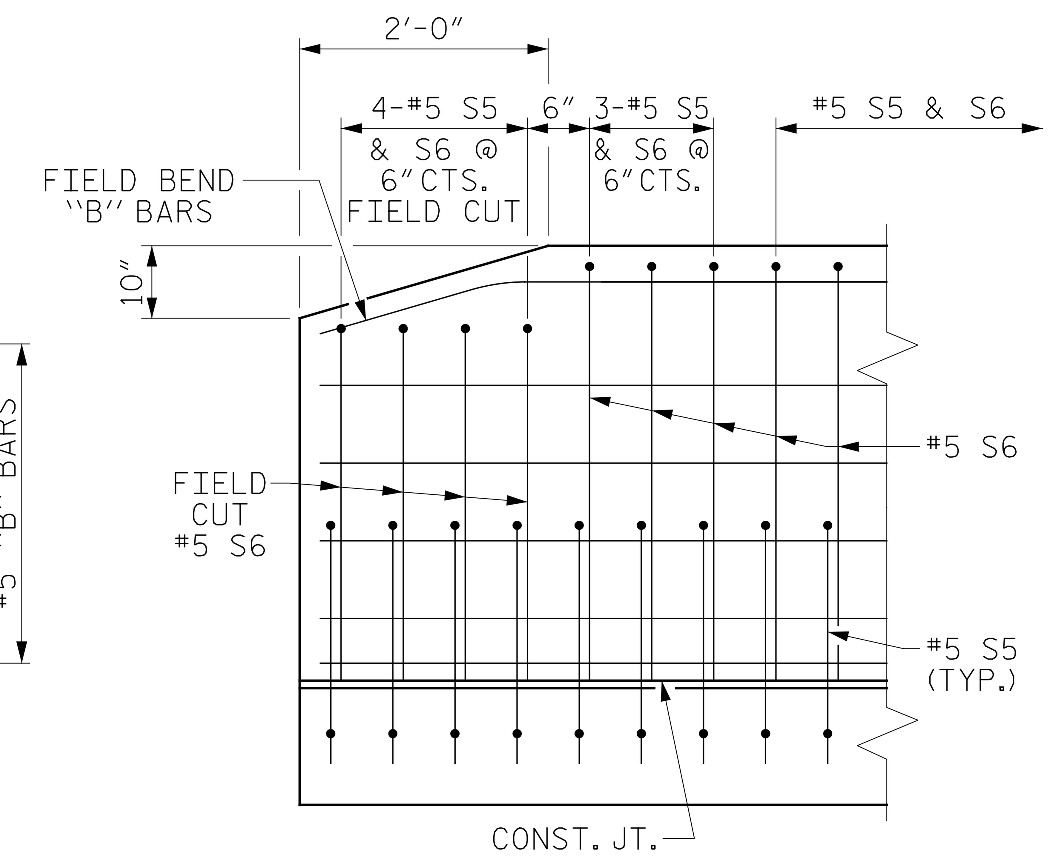
(TYPE II - 22 REQ'D)

ELASTOMERIC BEARING DETAILS

ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.



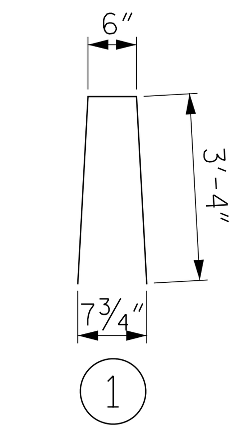
END VIEW



SIDE VIEW

END OF RAIL DETAILS

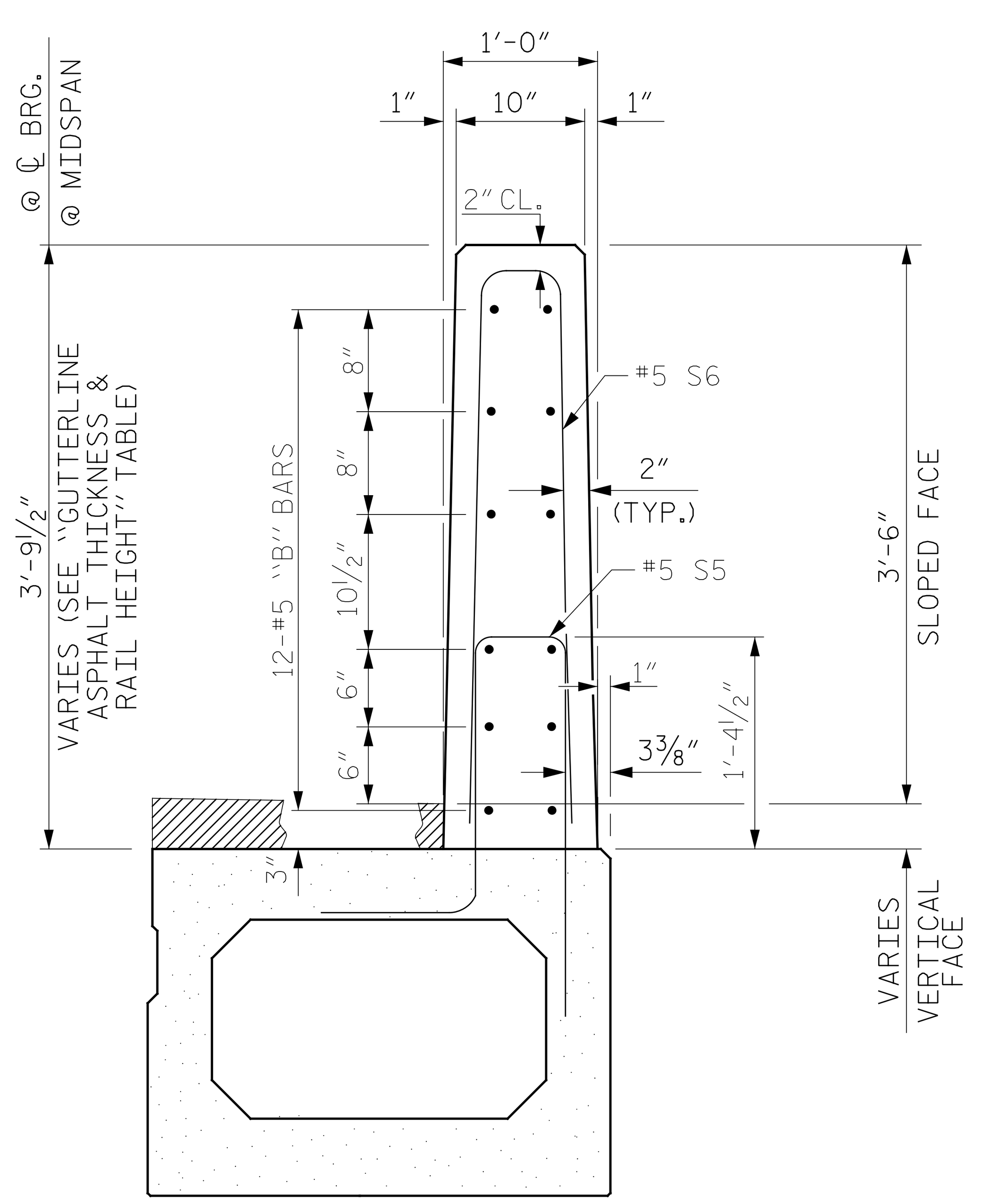
BOX BEAM UNITS REQUIRED			
	NUMBER	LENGTH	TOTAL LENGTH
EXTERIOR B.B.	2	100′-0″	200′-0″
INTERIOR B.B.	9	100′-0″	900′-0″
TOTAL	11	———	1100′-0″



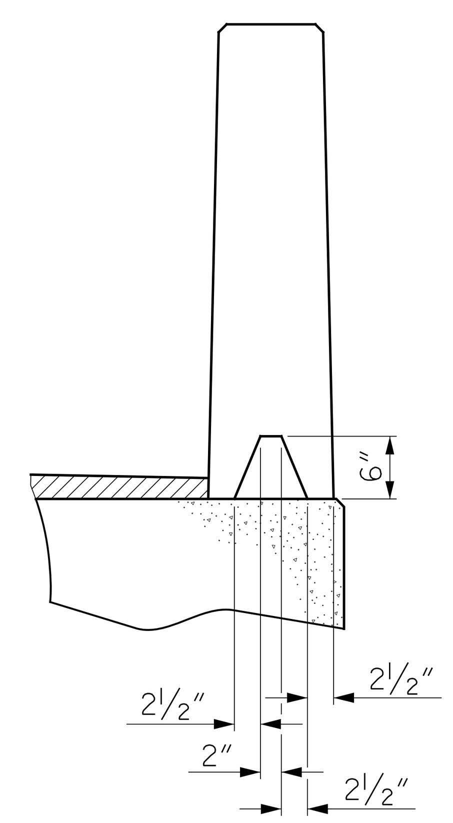
BAR TYPE

BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL					
BAR	BARS PER PAIR OF EXTERIOR UNITS 100′ UNIT	SIZE	TYPE	LENGTH	WEIGHT
✳B12	96	#5	STR	24′-7″	2461
✳ S6	276	#5	1	7′-2″	2063
✳ EPOXY COATED REINFORCING STEEL		LBS.			4524
CLASS AA CONCRETE		CU.YDS.			25.9
TOTAL VERTICAL CONCRETE BARRIER RAIL		LN. FT.			200.0

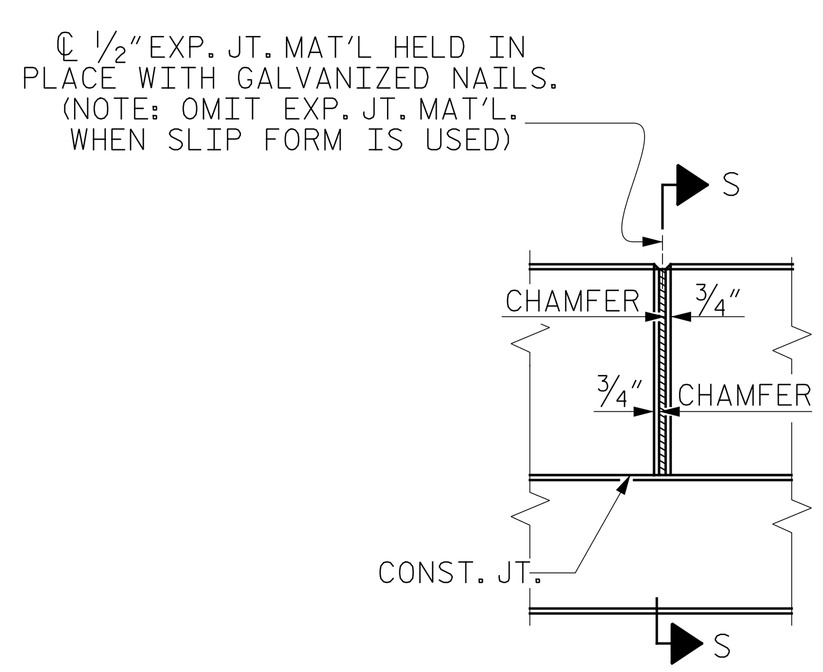


SECTION THRU RAIL



SECTION S-S

AT DAM IN OPEN JOINT (THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)



ELEVATION AT EXPANSION JOINTS

VERTICAL CONCRETE BARRIER RAIL DETAILS

GUTTERLINE ASPHALT THICKNESS & RAIL HEIGHT		
	ASPHALT OVERLAY THICKNESS @ MID-SPAN	RAIL HEIGHT @ MID-SPAN
100′ UNITS	2⅜″	3′-8⅜″

PROJECT NO. BP5.R108

WAKE COUNTY

STATION: 17+21.00 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

3′-0″ X 3′-3″ PRESTRESSED CONCRETE BOX BEAM UNIT

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SEAL 011320 NORTH CAROLINA PROFESSIONAL ENGINEER KENNETH W. SMITH

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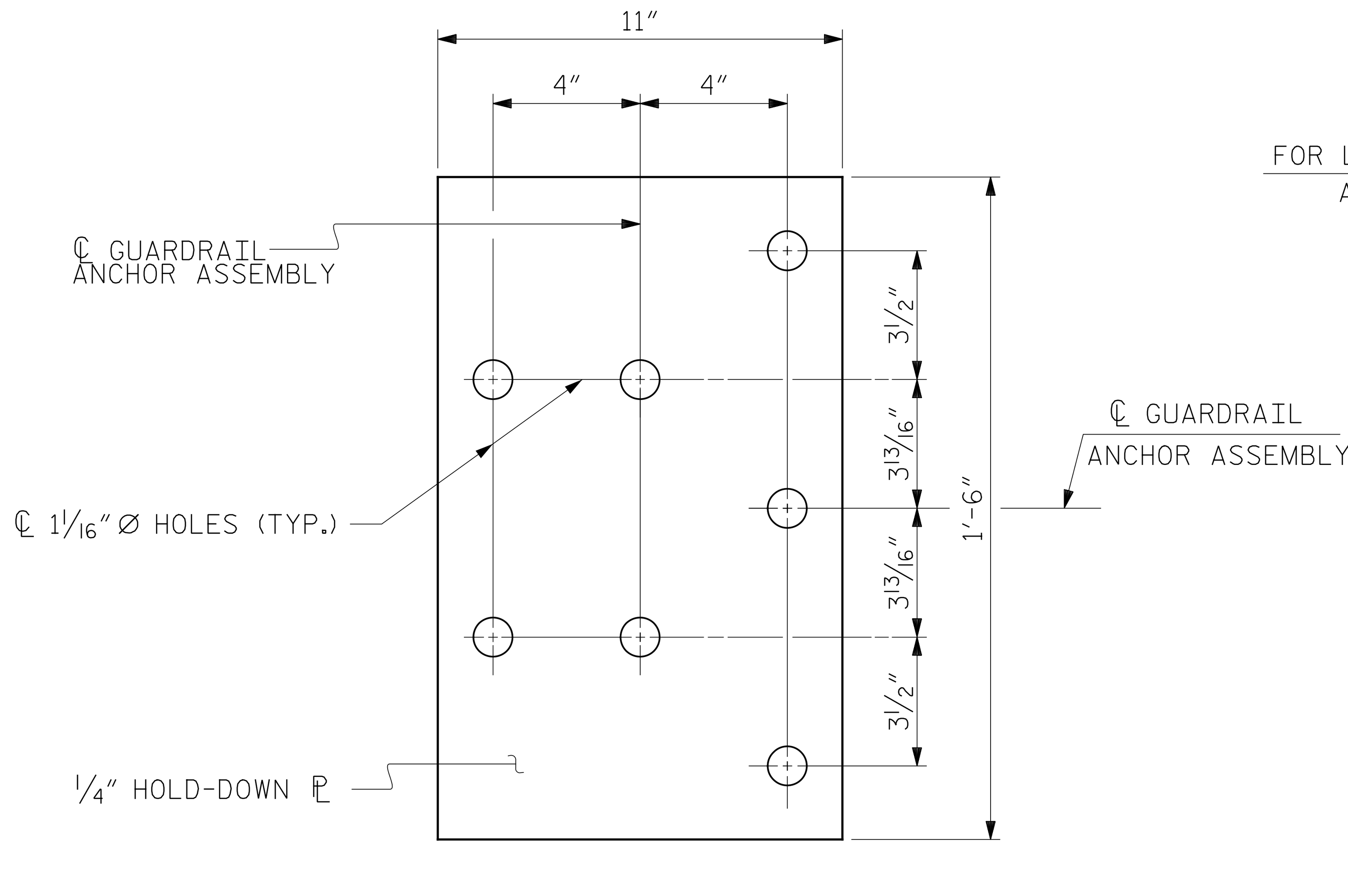
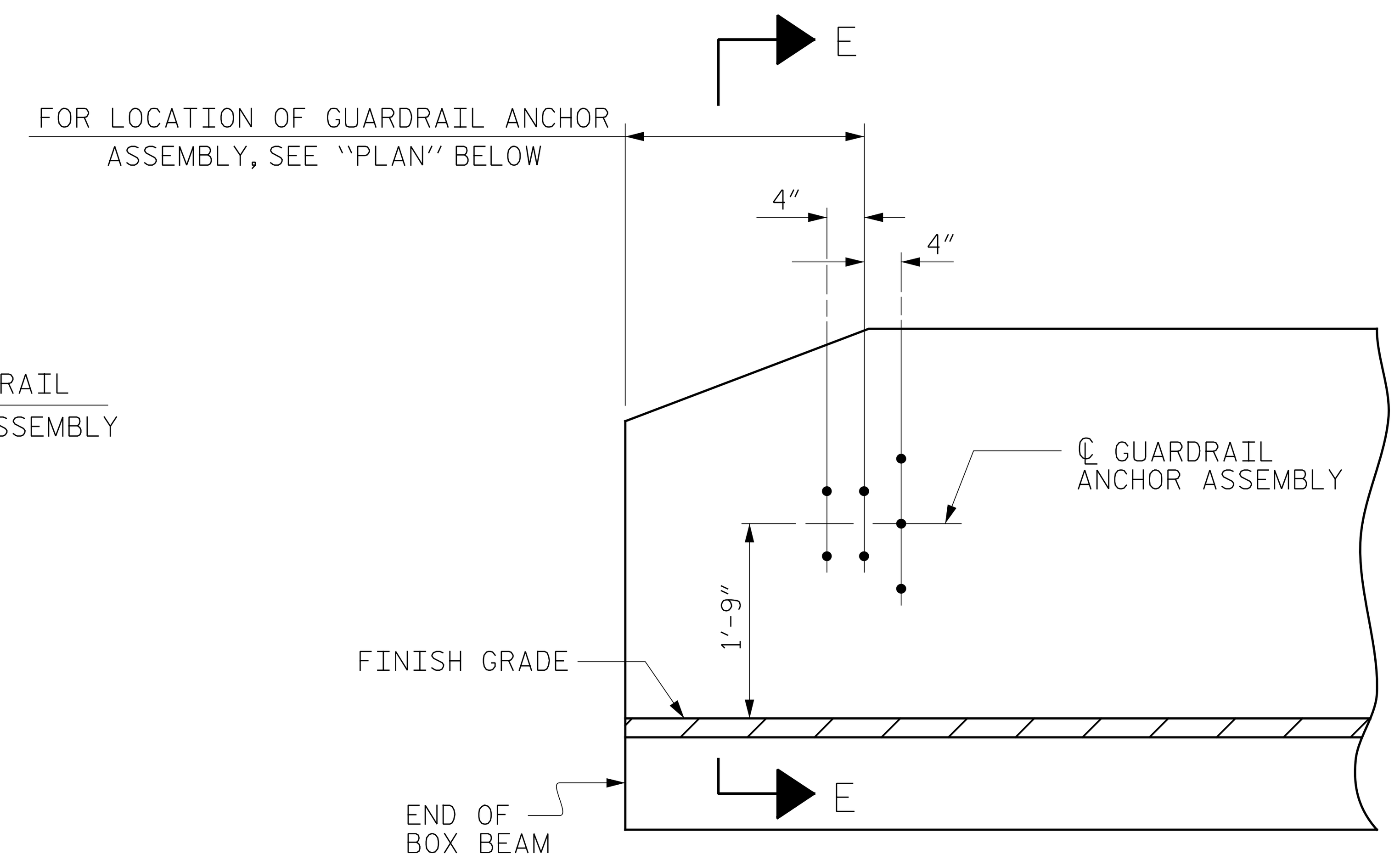
DESIGN ENGINEER OF RECORD: K. SMITH	DATE : 10/2022
DRAWN BY : DGE 10/11 CHECKED BY : TMG 11/11	REV. 5/18 MAA/THC



PLAN



ELEVATION

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A $\frac{1}{4}$″ HOLD DOWN PLATE AND 7 - $\frac{7}{8}$″ Ø BOLTS WITH NUTS AND WASHERS.

THE HOLD-DOWN PLATE SHALL CONFORM TO AASHTO M270 GRADE 36. AFTER FABRICATION, THE HOLD-DOWN PLATE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M111.

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE $\frac{7}{8}$″ Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

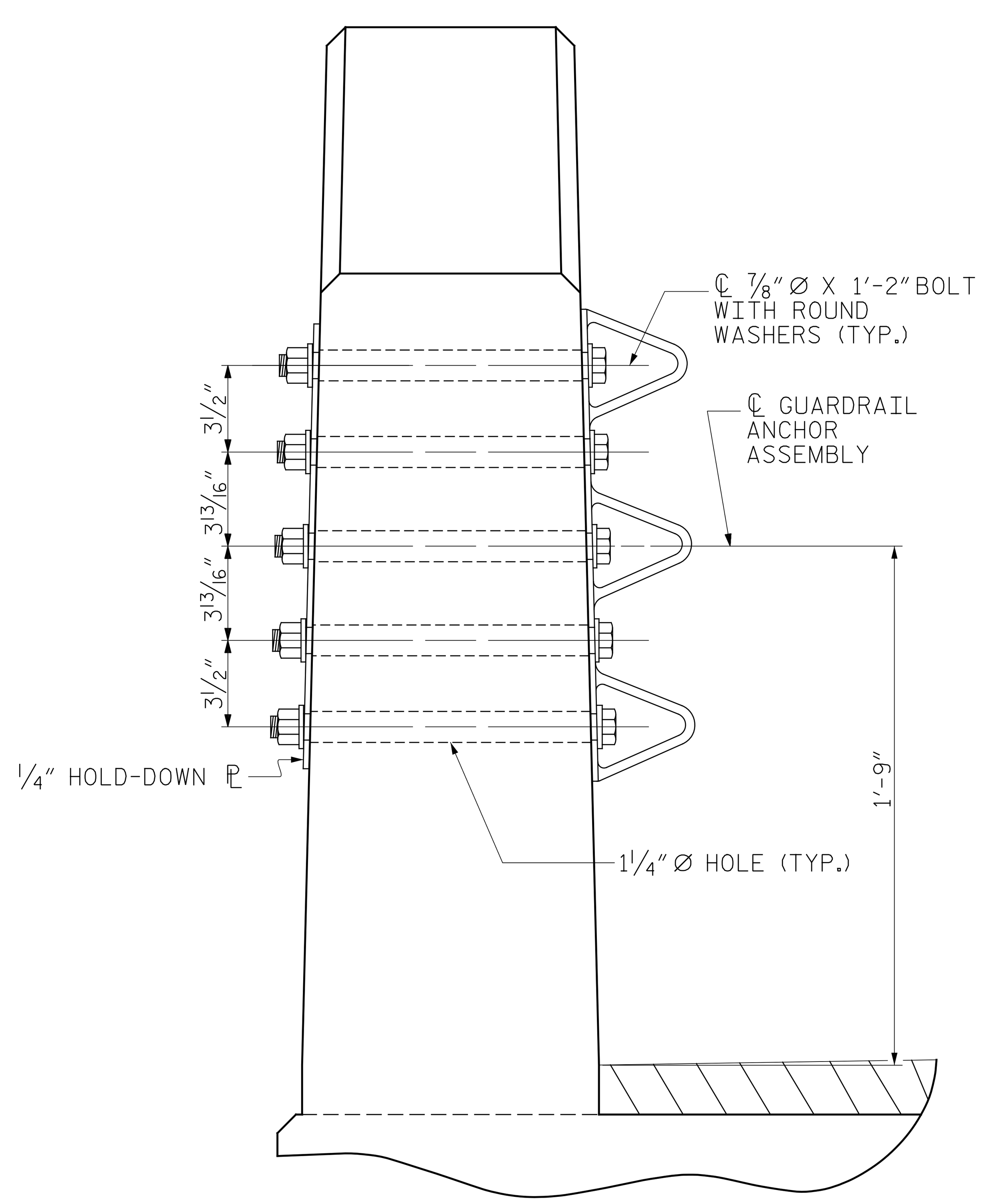
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL.

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR VERTICAL CONCRETE BARRIER RAIL.

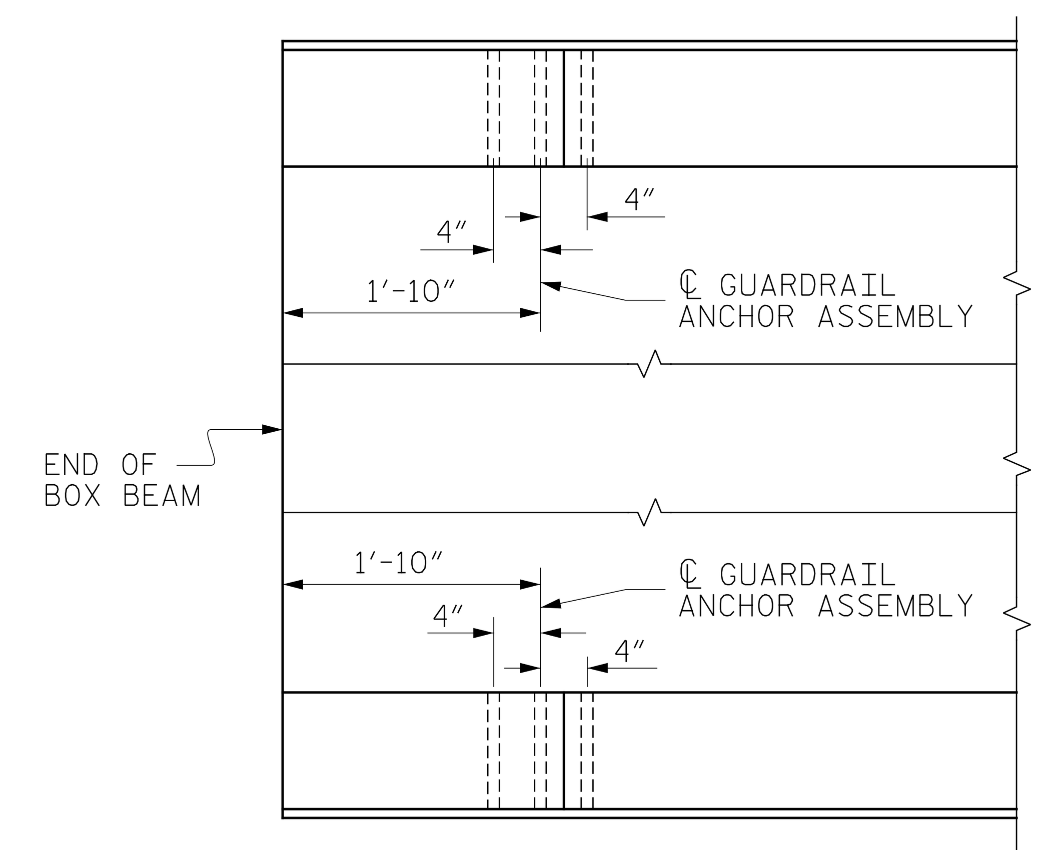
THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE VERTICAL CONCRETE BARRIER RAIL TO CLEAR ASSEMBLY BOLTS.

THE 1 $\frac{1}{4}$″ Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.



SECTION E-E

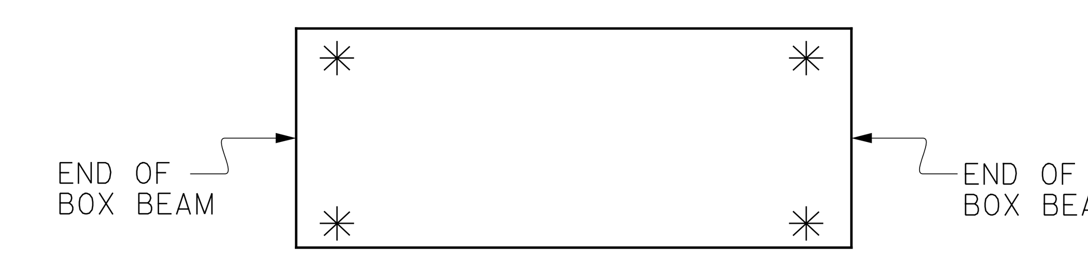
GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT #1 SHOWN, END BENT #2 SIMILAR.



SKETCH SHOWING POINTS OF ATTACHMENT

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. BP5.R108

WAKE COUNTY

STATION: 17+21.00 -L-

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NORTH CAROLINA PROFESSIONAL SEAL 011320 ENGINEER KENNETH W. SMITH

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
GUARDRAIL ANCHORAGE DETAILS FOR VERTICAL CONCRETE BARRIER RAIL

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DESIGN ENGINEER OF RECORD: K. SMITH	DATE : 10/2022

DRAWN BY : MAA 5/10	REV. 1/15	MAA/TMG
CHECKED BY : GM 5/10	REV. 12/17	MAA/THC
	REV. 5/18	MAA/THC

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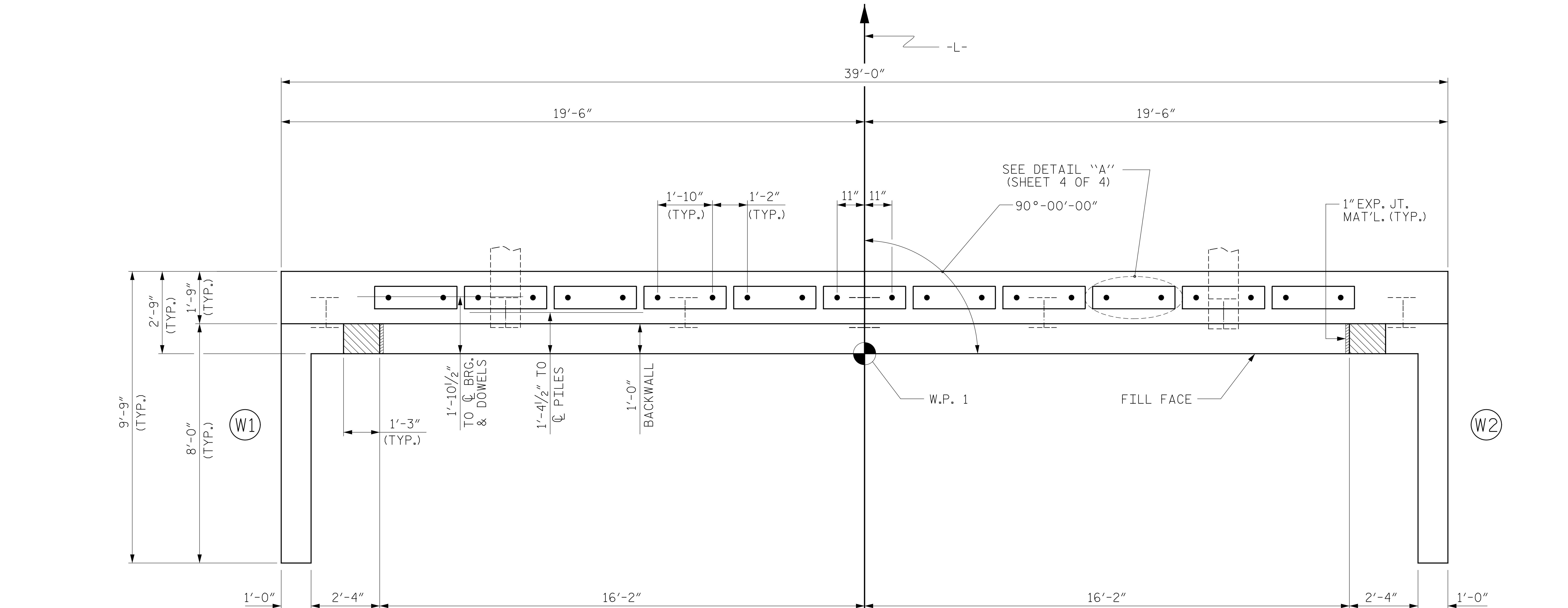
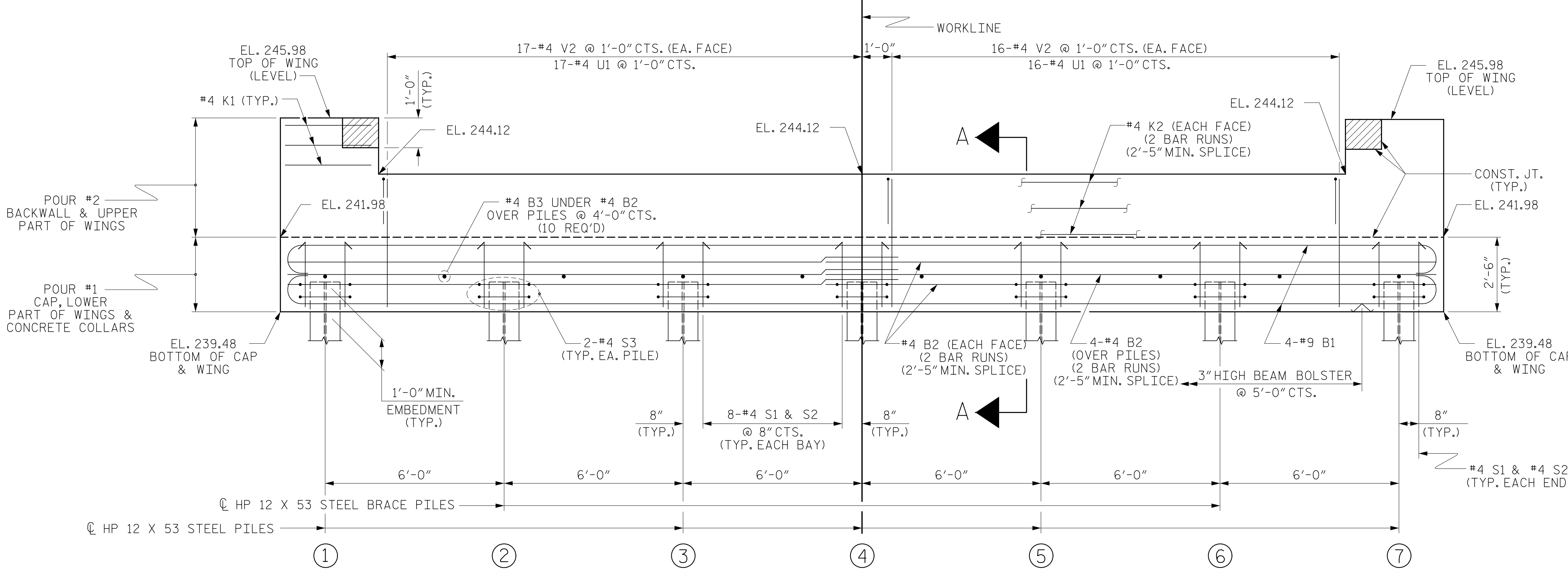


PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 4 OF 4.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.

PROJECT NO. BP5.R108
WAKE COUNTY
STATION: 17+21.00 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 1

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DESIGN ENGINEER OF RECORD: K. SMITH DATE : 10/2022

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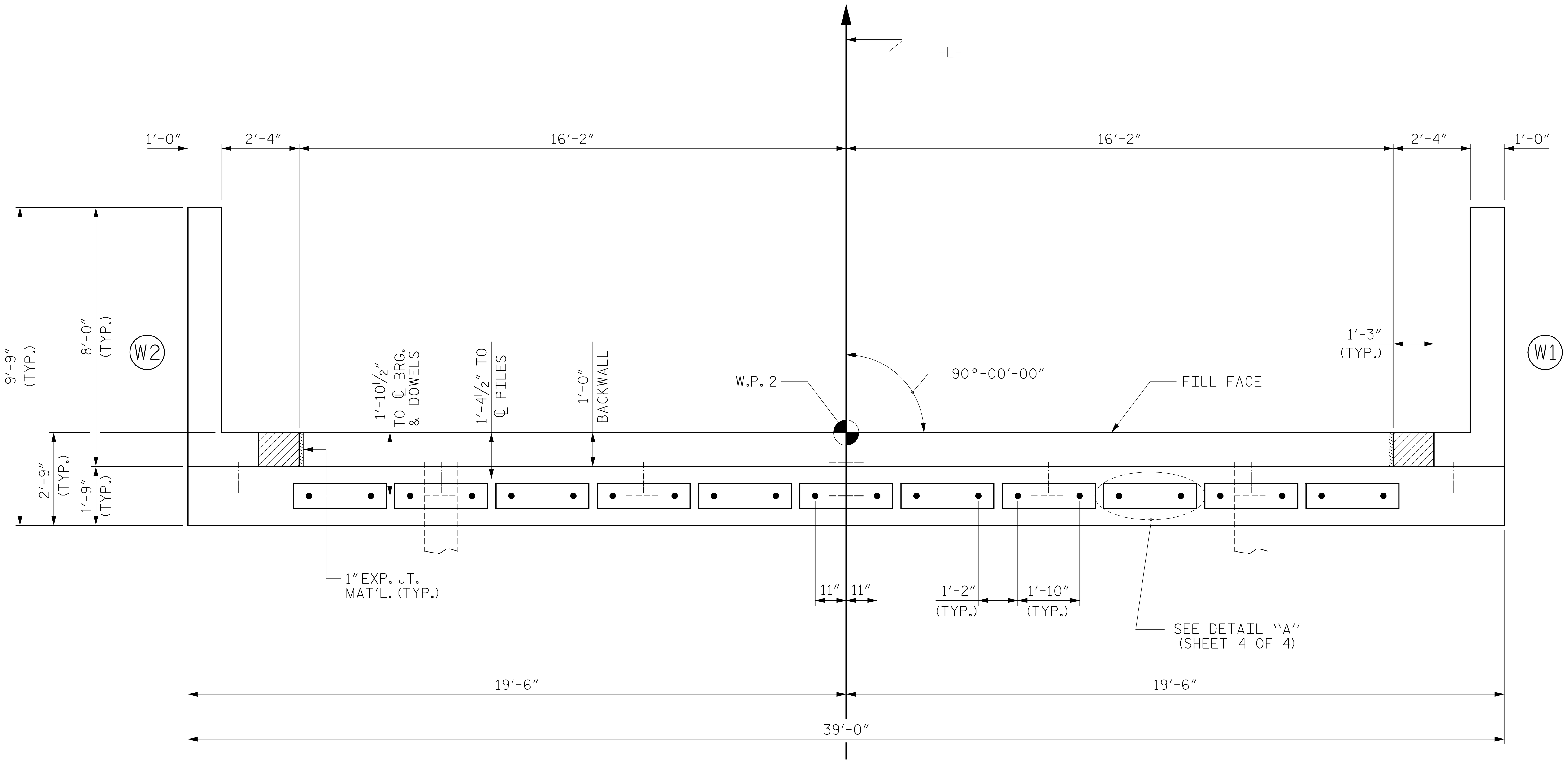
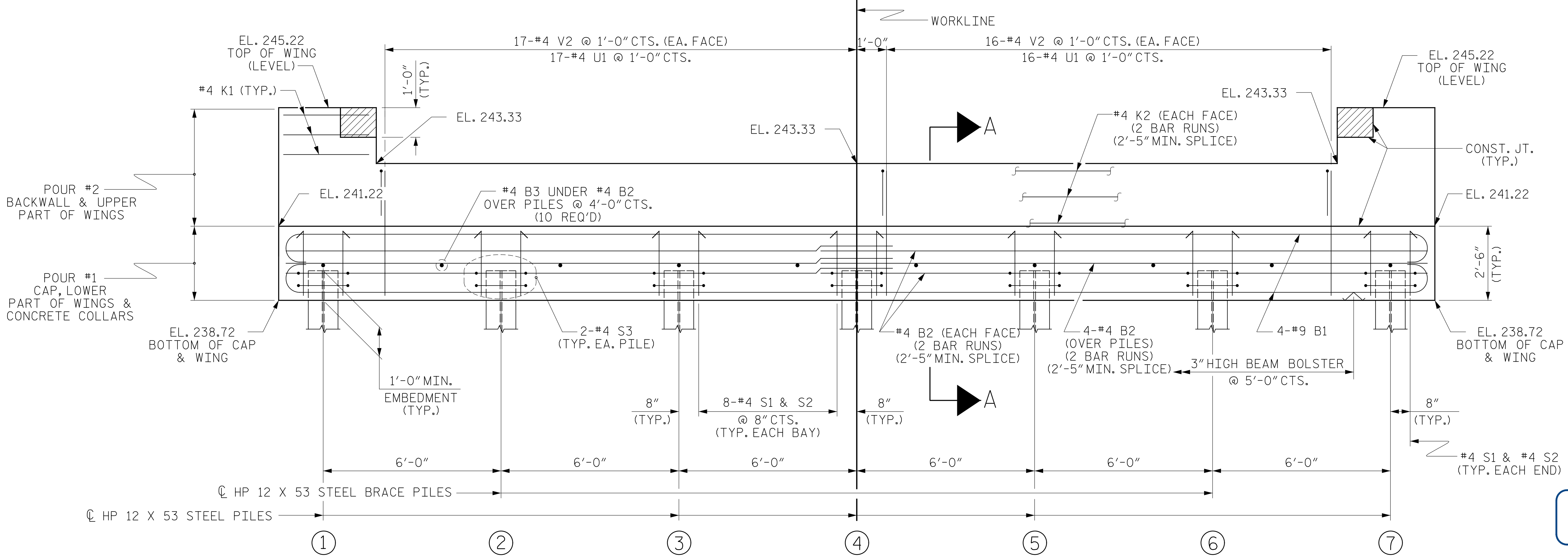


PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 4 OF 4.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

NOTES

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THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.

PROJECT NO. BP5.R108
WAKE COUNTY
STATION: 17+21.00 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 2

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CHECKED BY : K. SMITH	DATE : 10/2022
DESIGN ENGINEER OF RECORD: K. SMITH	DATE : 10/2022

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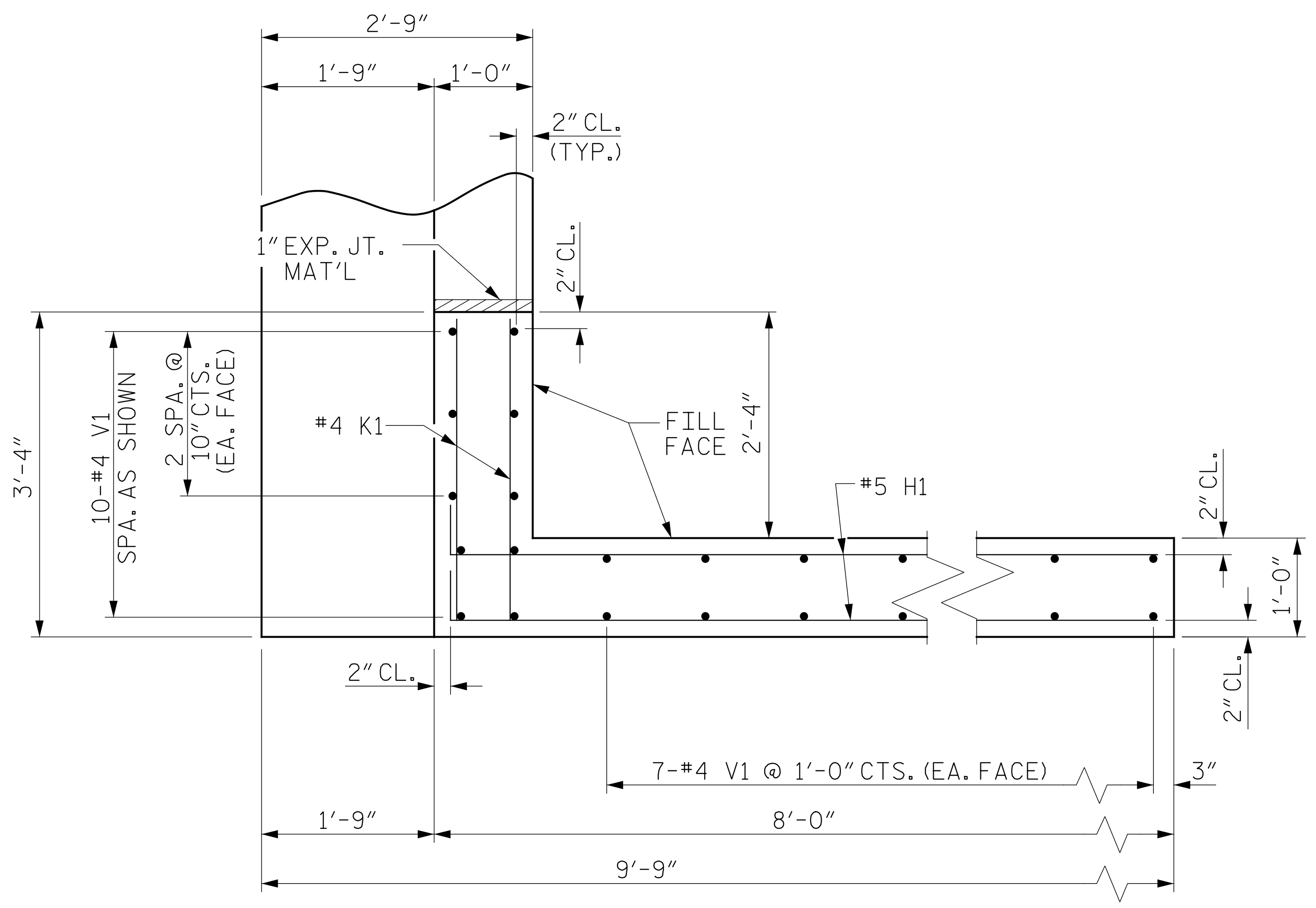
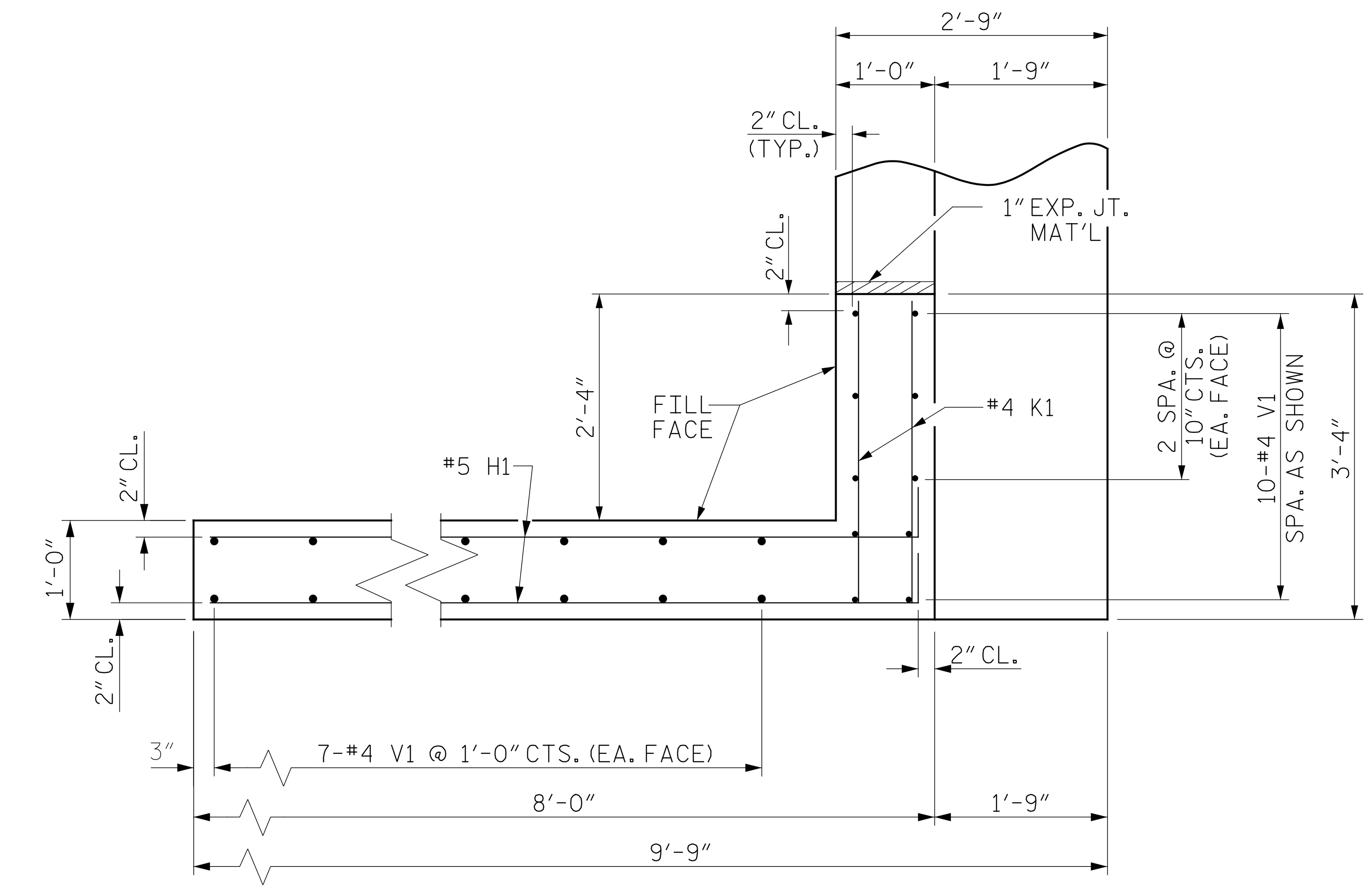
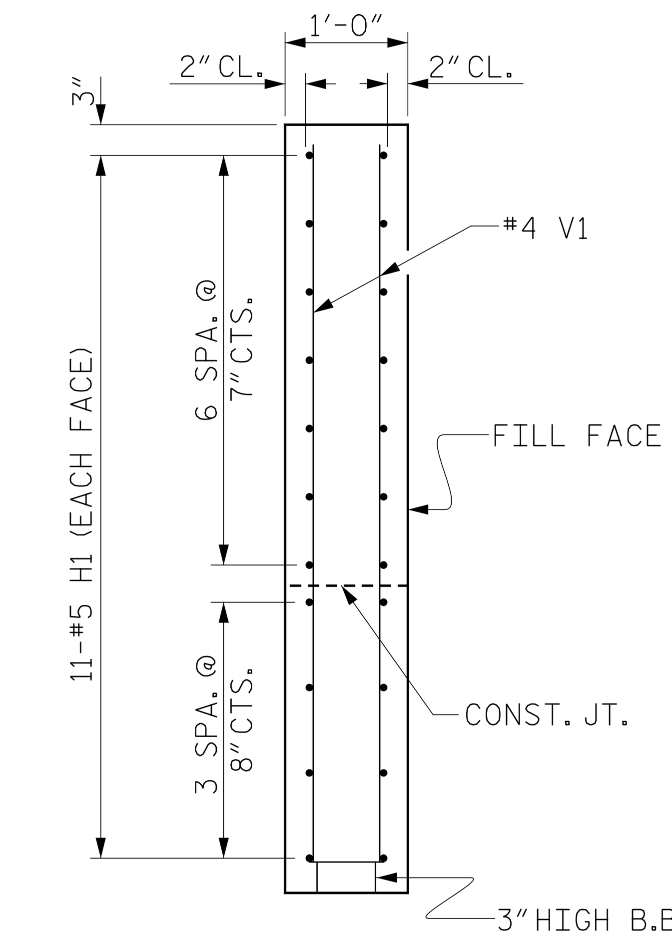


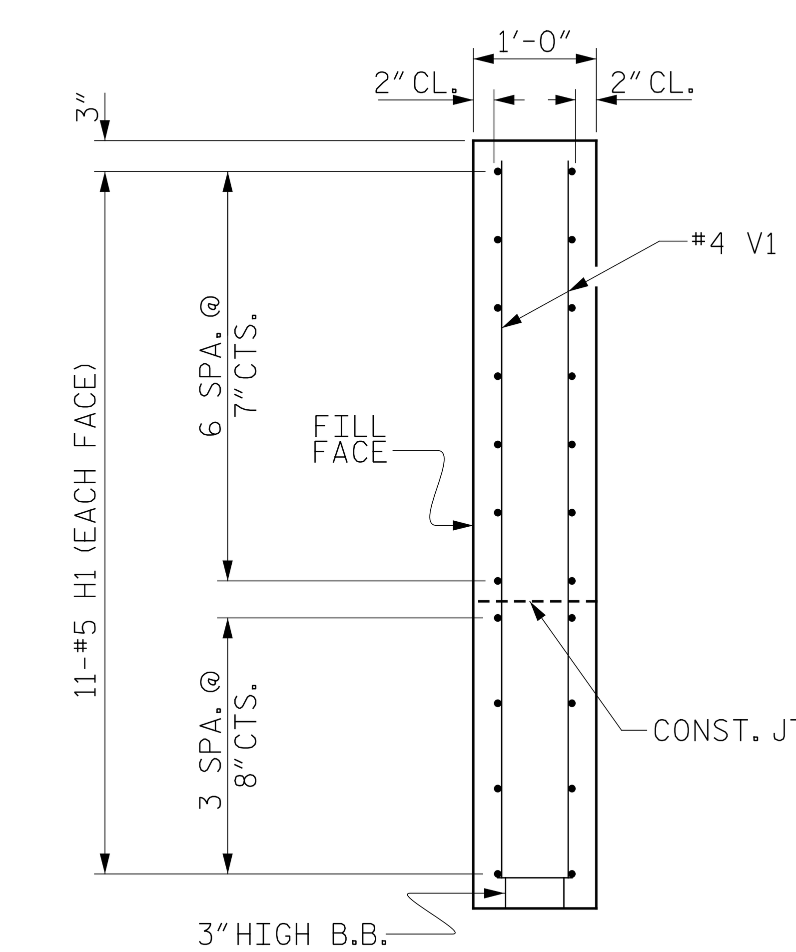
PLAN OF WING W1



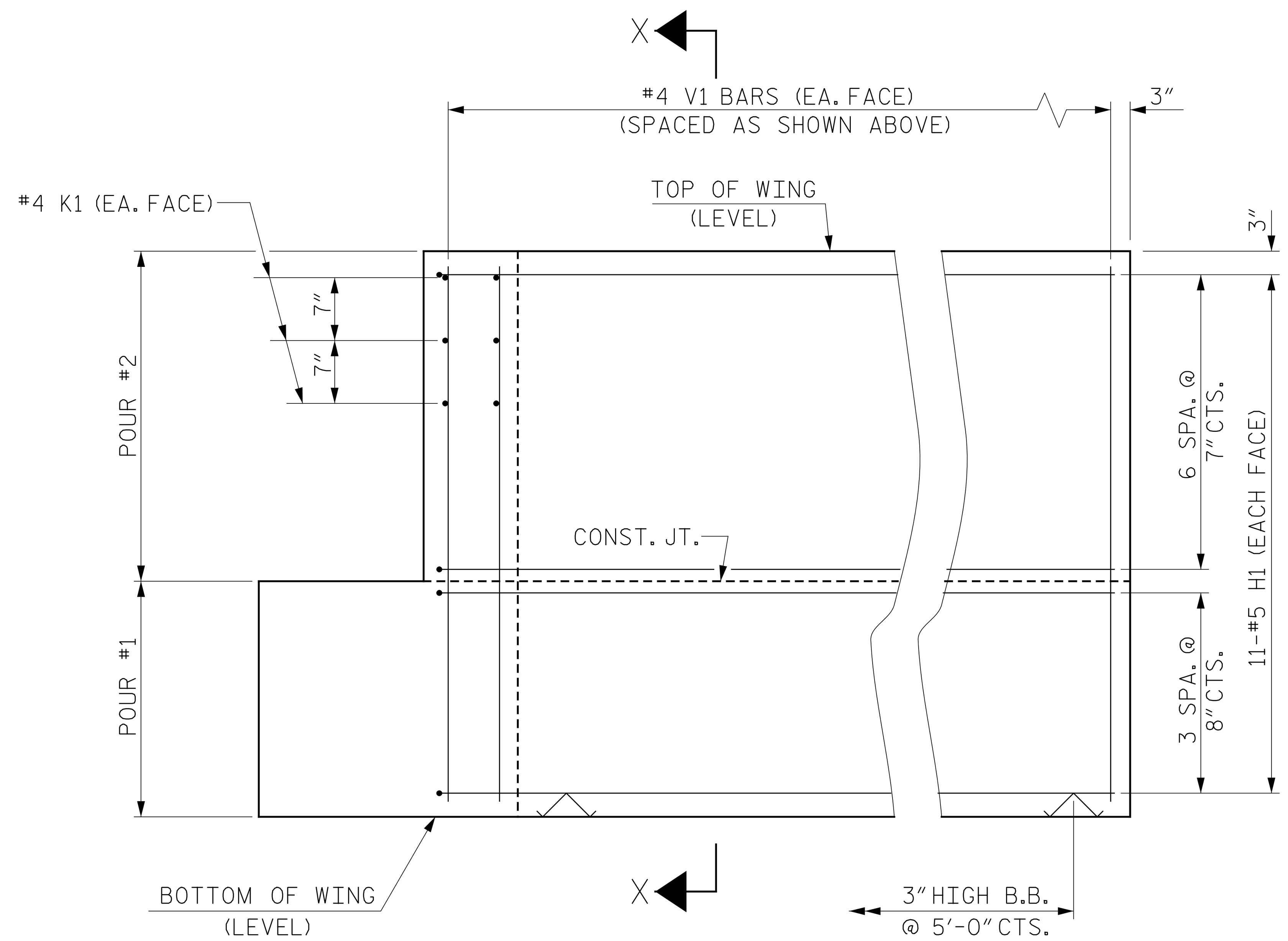
PLAN OF WING W2



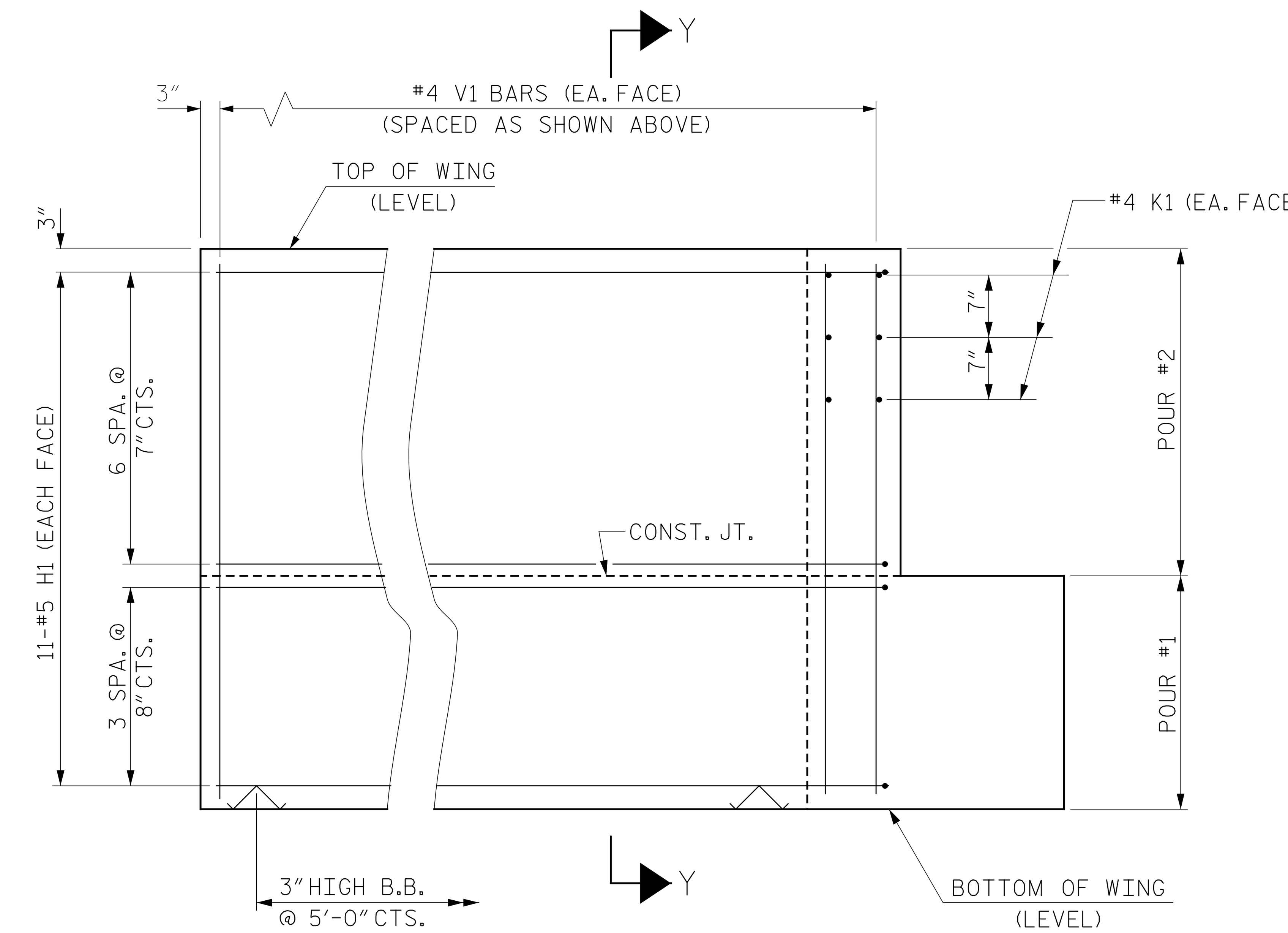
SECTION X-X



SECTION Y-Y



ELEVATION OF WING W1



ELEVATION OF WING W2

WING DETAILS

PROJECT NO. BP5.R108

WAKE COUNTY

STATION: 17+21.00 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT
WING DETAILS

DocuSigned by:
D52980D7C0A849A...
7/31/2023

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 011320 KENNETH W. SMITH

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LOCHNER
H. W. LOCHNER, INC.
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(919)571-7111
NC License Number F-0159

REVISIONS								SHEET NO.
NO.	BY:	DATE:		NO.	BY:	DATE:		S-13
1				3				TOTAL SHEETS
2				4				16

ASSEMBLED BY : R. KNIGHT DATE : 8/2022
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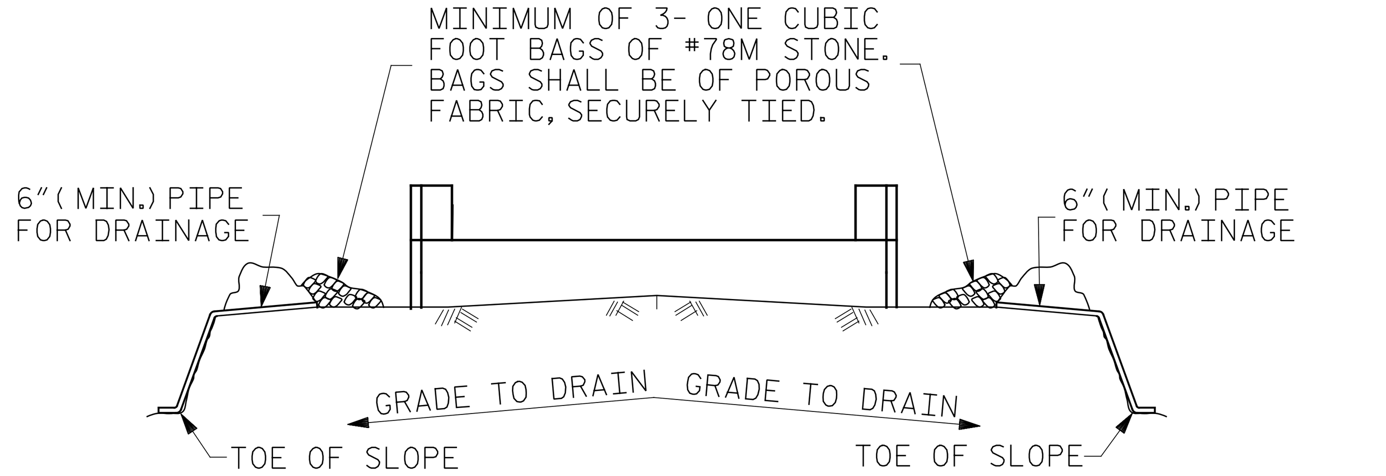
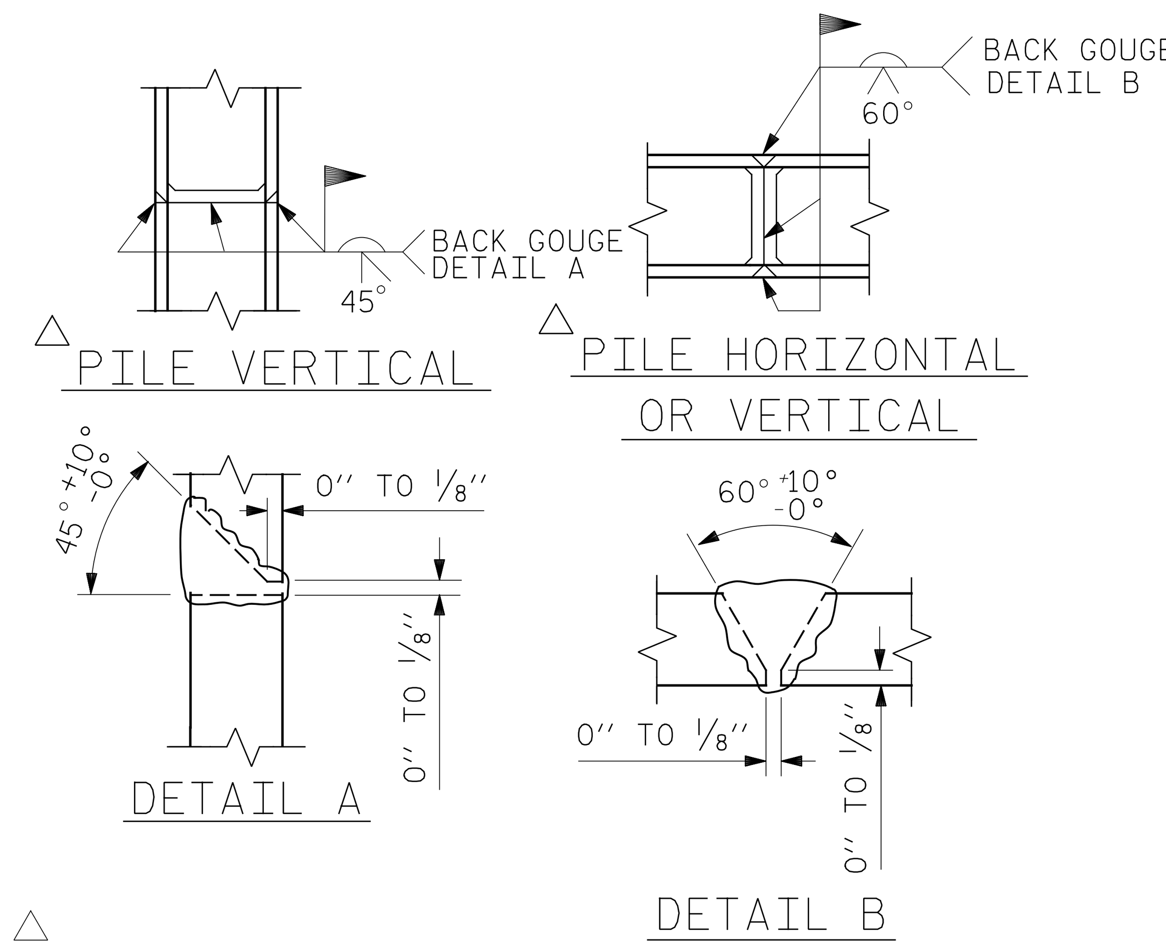


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

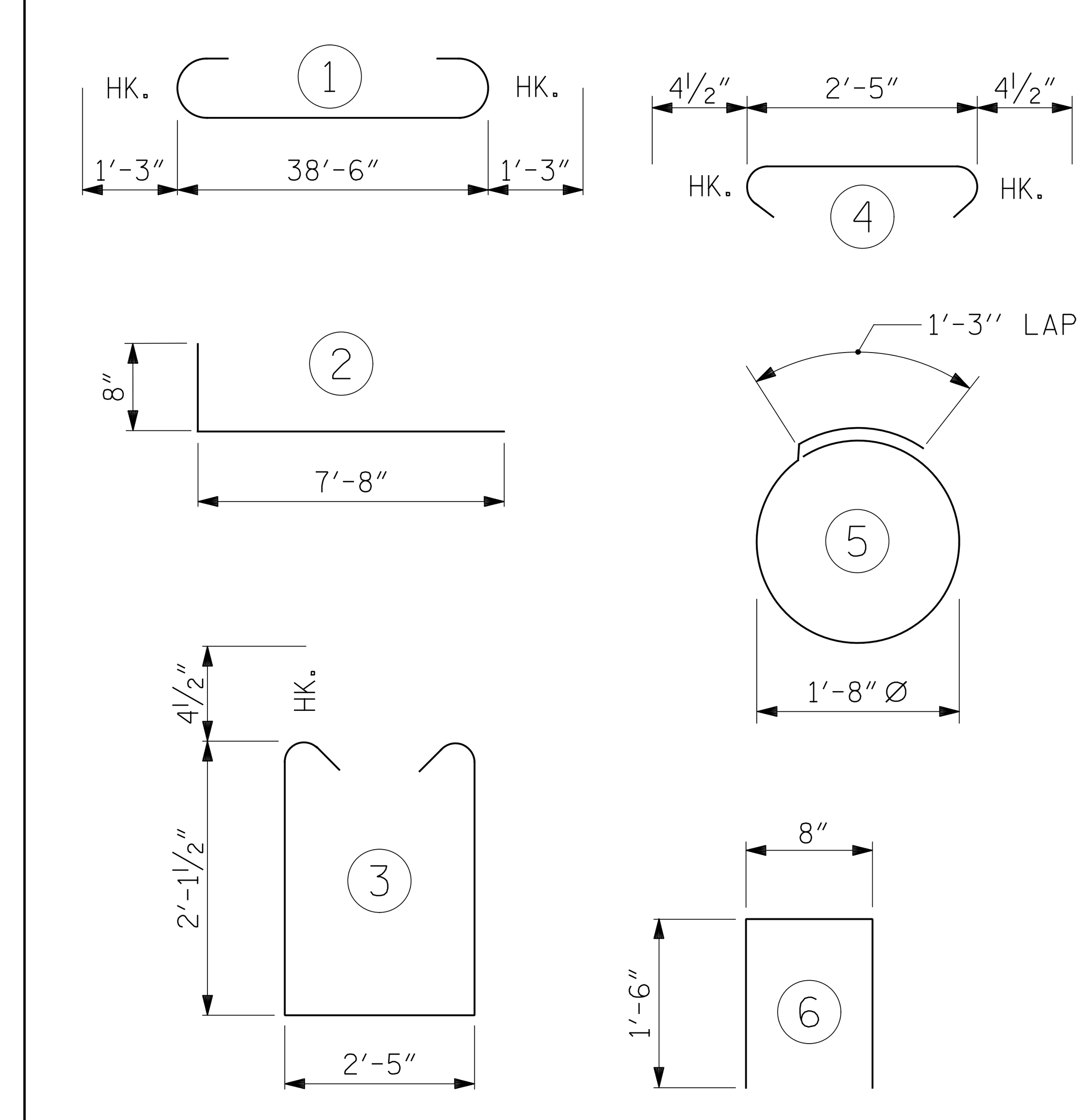
TEMPORARY DRAINAGE AT END BENT



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

END BENT No. 1	END BENT No. 2
HP 12 X 53 STEEL PILES NO: 7 LIN. FT. = 245	HP 12 X 53 STEEL PILES NO: 7 LIN. FT. = 385
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES NO: 7	PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES NO: 7

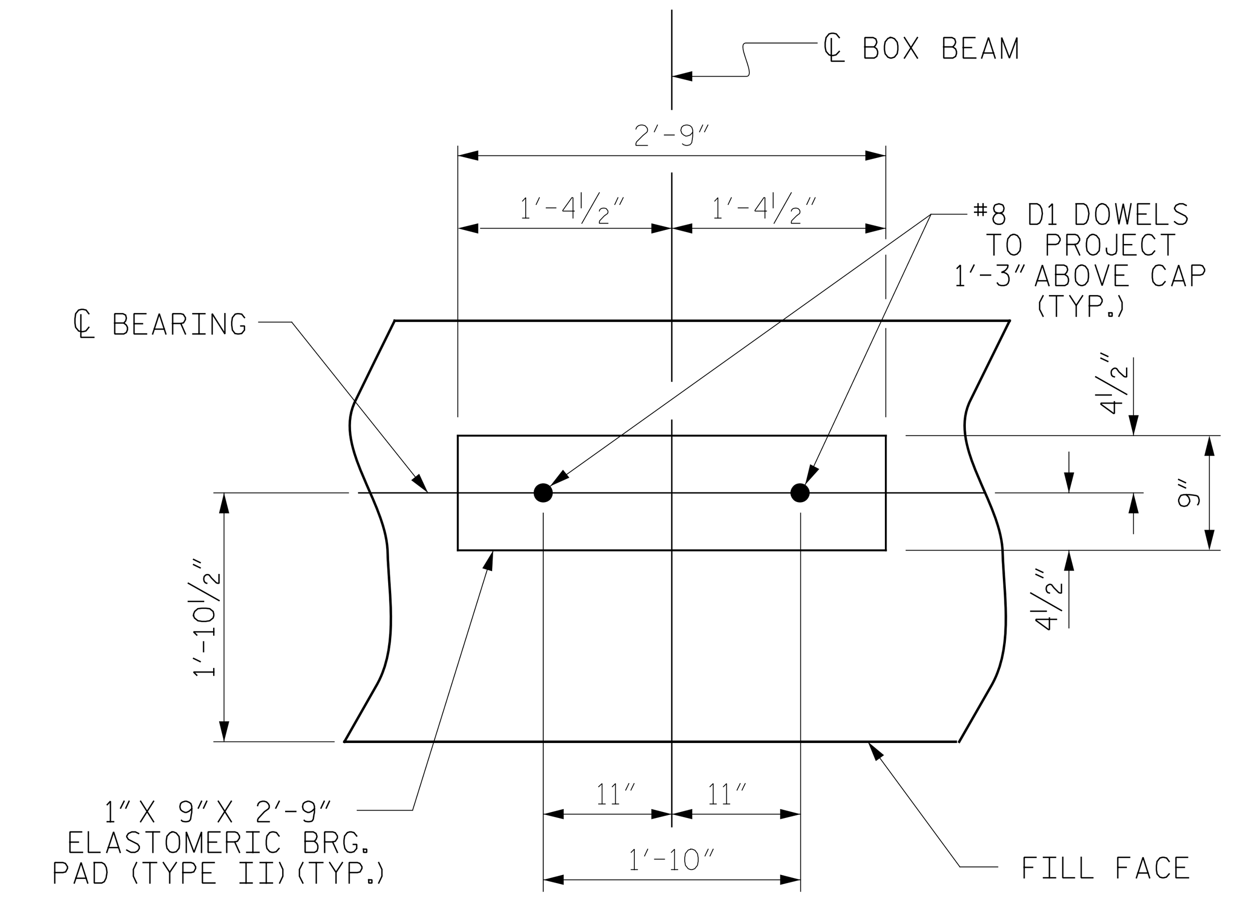
BILL OF MATERIAL
FOR ONE END BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	41'-0"	1115
B2	16	#4	STR	20'-7"	220
B3	10	#4	STR	2'-5"	16
D1	22	#8	STR	2'-3"	132
H1	44	#5	2	8'-4"	382
K1	12	#4	STR	2'-11"	23
K2	12	#4	STR	20'-7"	165
S1	50	#4	3	7'-5"	248
S2	50	#4	4	3'-2"	106
S3	14	#4	5	6'-6"	61
U1	33	#4	6	3'-8"	81
V1	48	#4	STR	6'-2"	198
V2	66	#4	STR	4'-3"	187

REINFORCING STEEL (FOR ONE END BENT) 2934 LBS.

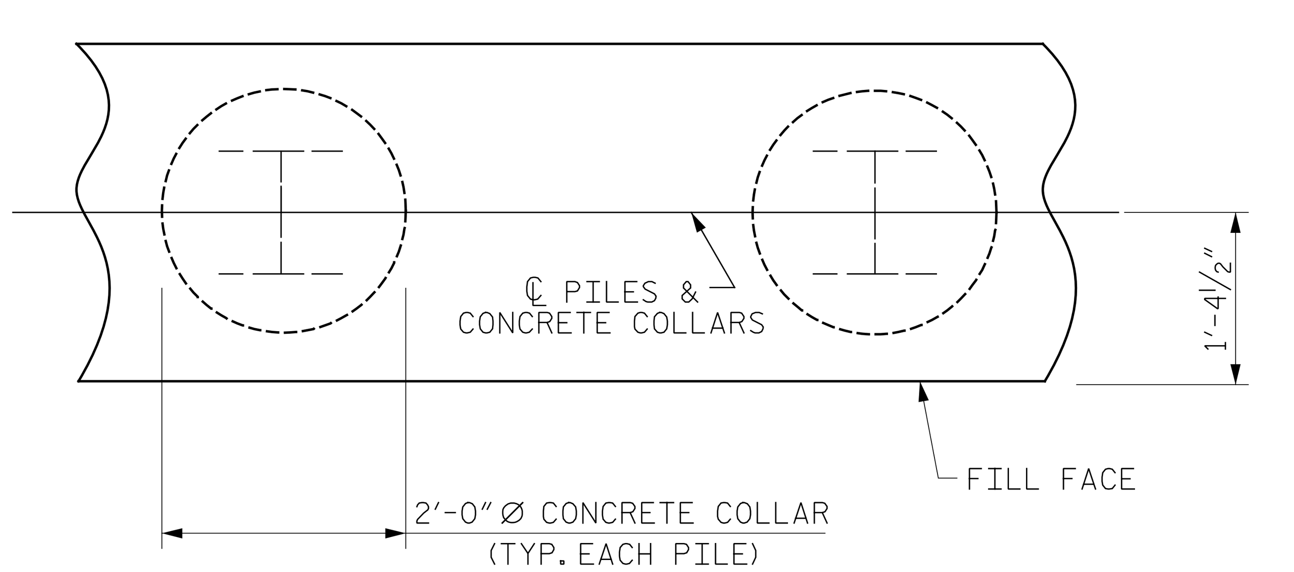
CLASS A CONCRETE BREAKDOWN (FOR ONE END BENT)

POUR #1	CAP, LOWER PART OF WINGS & COLLARS	12.4 C.Y.
POUR #2	BACKWALL & UPPER PART OF WINGS	5.6 C.Y.
TOTAL CLASS A CONCRETE		18.0 C.Y.

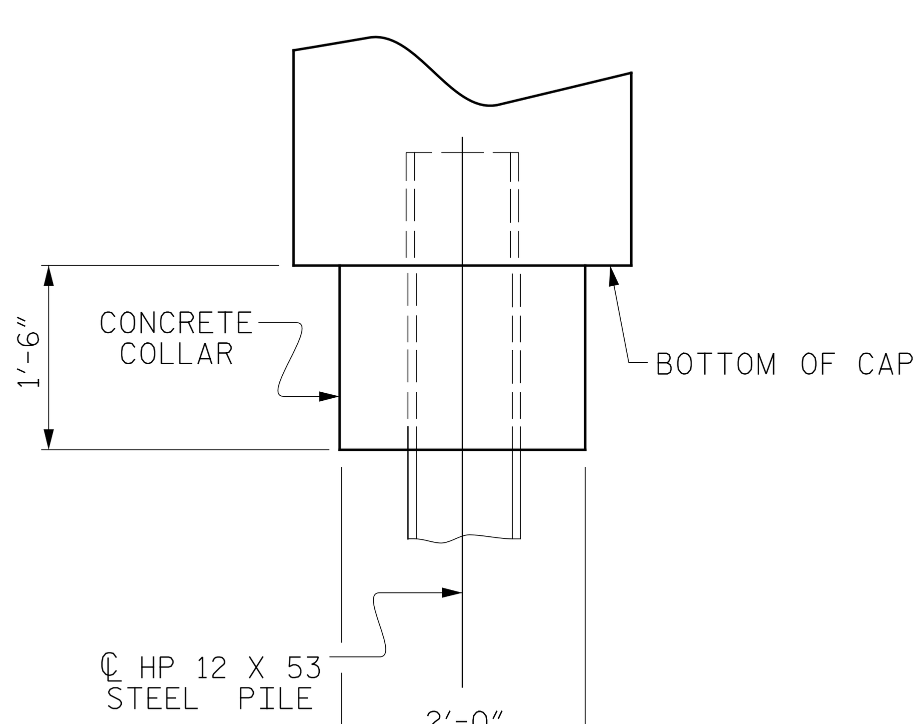


DETAIL "A"

(END BENT No. 1 SHOWN, END BENT No. 2 SIMILAR BY ROTATION)



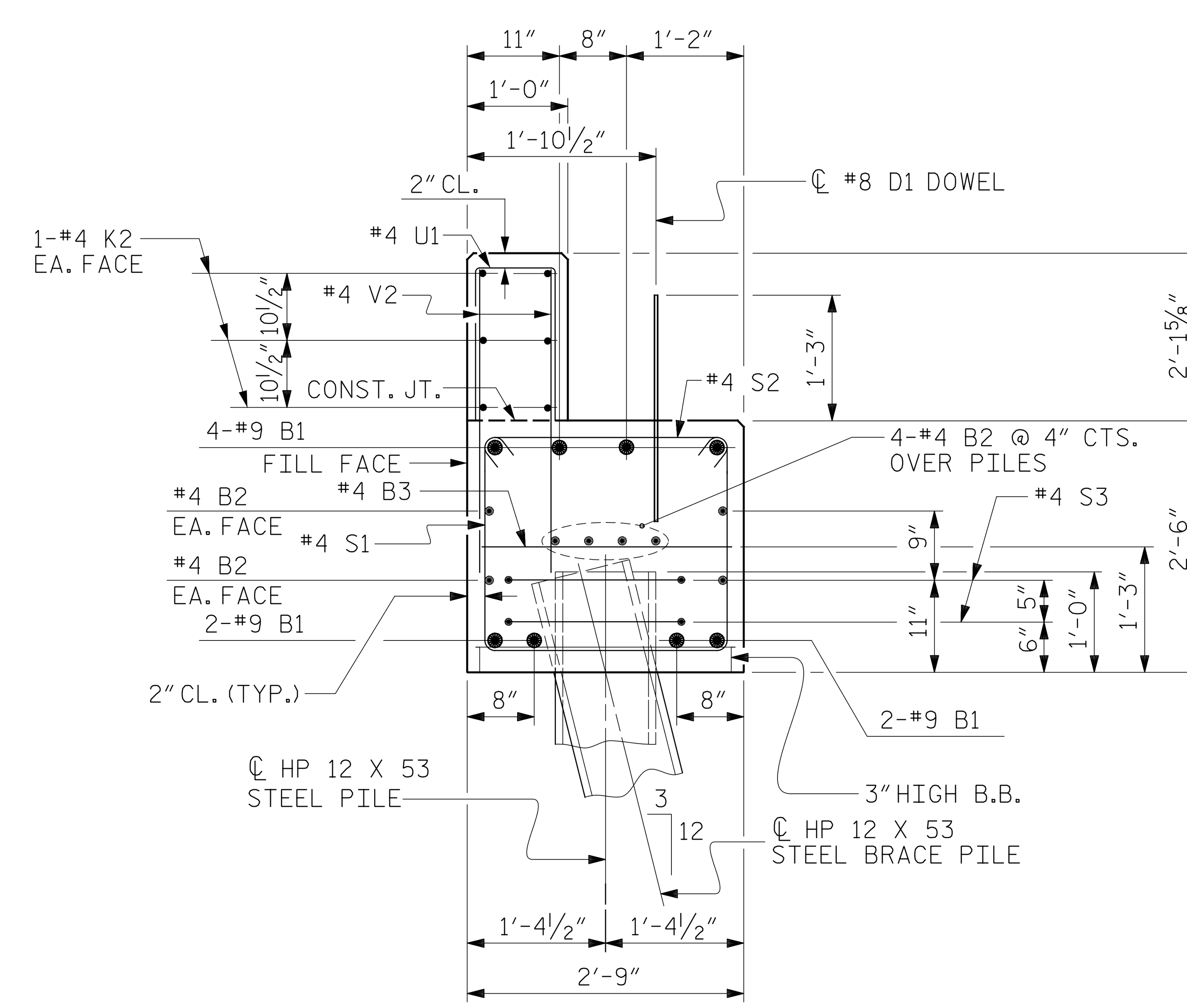
PLAN



ELEVATION

CORROSION PROTECTION FOR STEEL PILES DETAIL

(END BENT No. 1 SHOWN, END BENT No. 2 SIMILAR BY ROTATION)



SECTION A-A

(CONCRETE COLLAR NOT SHOWN FOR CLARITY. SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL.")

PROJECT NO. BP5.R108
WAKE COUNTY
STATION: 17+21.00 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 1 & 2 DETAILS

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 011320 KENNETH W. SMITH

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DESIGN ENGINEER OF RECORD: K. SMITH DATE : 10/2022

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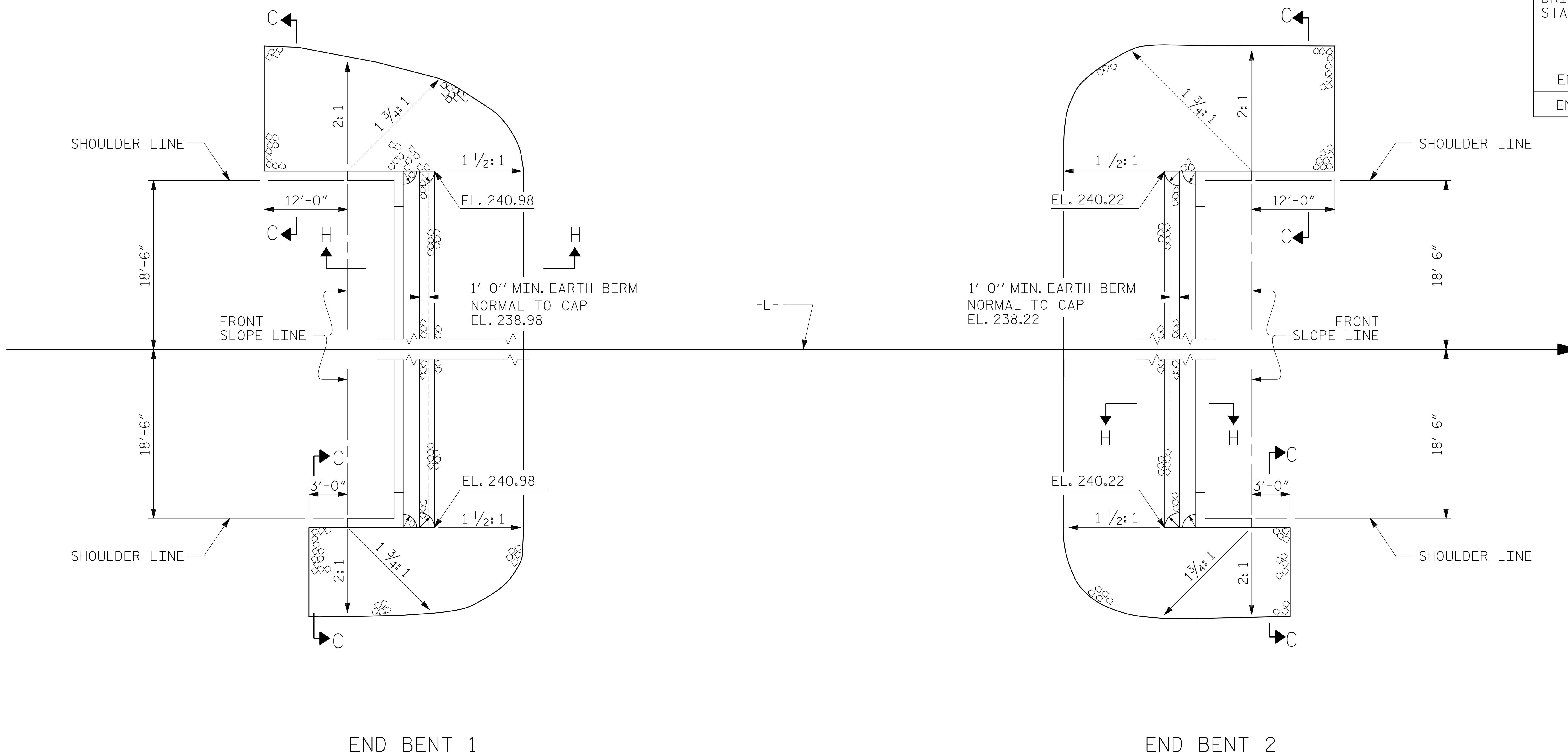
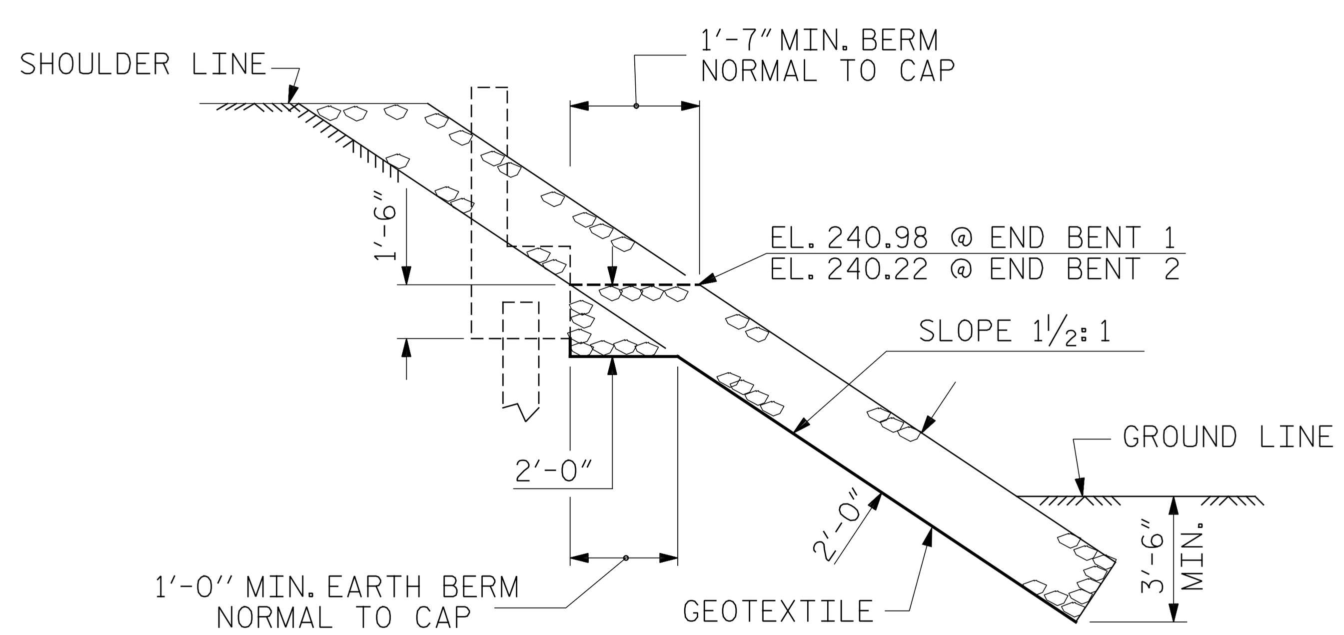
NCDOT_pdf.pltcfg $PENTBLL$

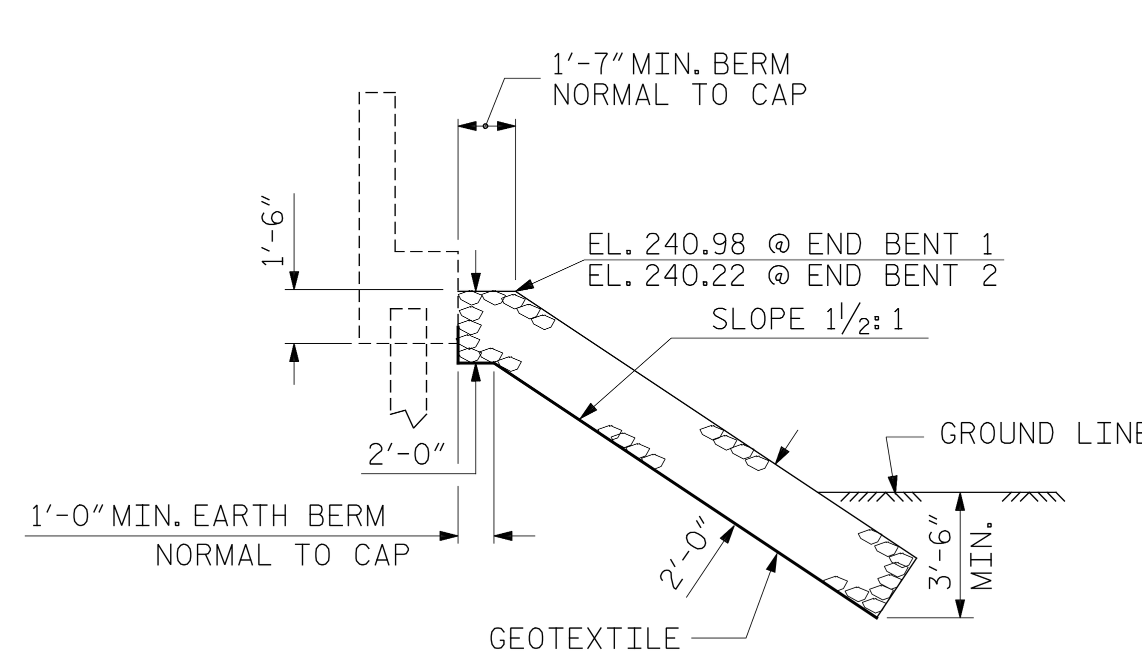
ESTIMATED QUANTITIES		
BRIDGE @ STA. 17+21.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	90	100
END BENT 2	117	130



PLAN OF RIP RAP

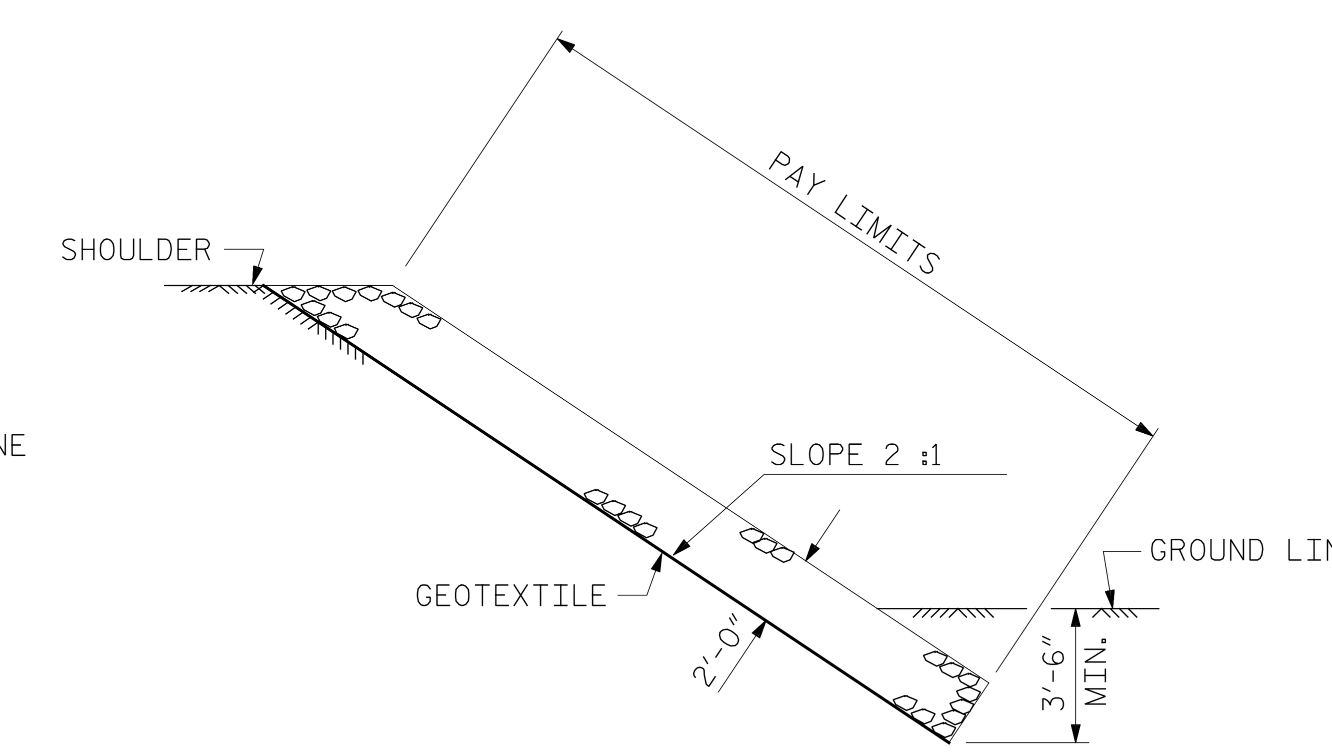


SECTION H-H



℄ SECTION

BERM RIP RAPPED



SECTION C-C

PROJECT NO. BP5.R108

WAKE COUNTY

STATION: 17+21.00 -L-

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7/31/2023

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 011320 KENNETH W. SMITH

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

RIP RAP DETAILS

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2			4			16

ASSEMBLED BY : R. KNIGHT	DATE : 8/2022
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DESIGN ENGINEER OF RECORD: K. SMITH	DATE : 10/2022

DRAWN BY : REK 1/84	REV. 10/1/11	MAA/GM
CHECKED BY : RDU 1/84	REV. 12/21/11	MAA/GM
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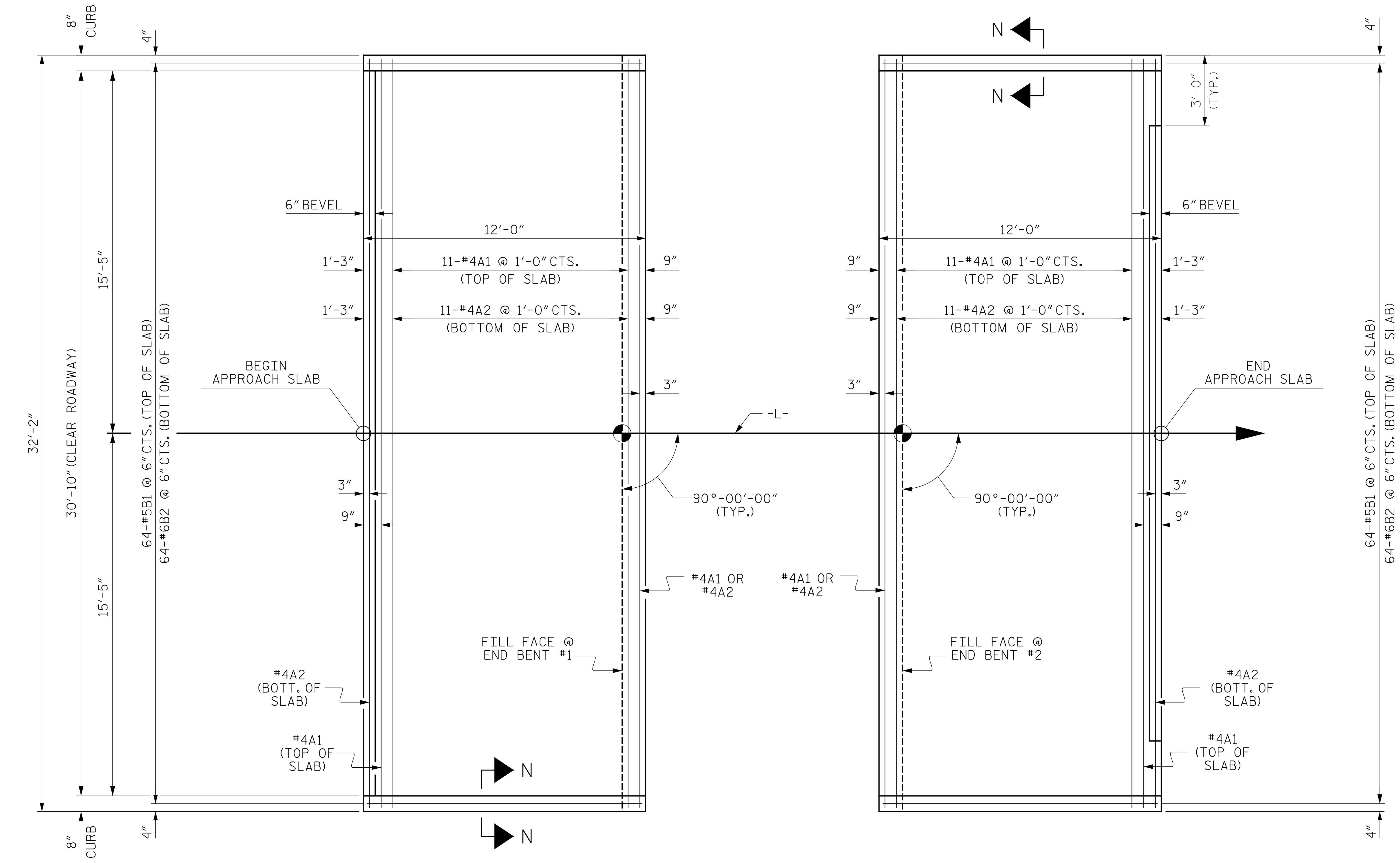
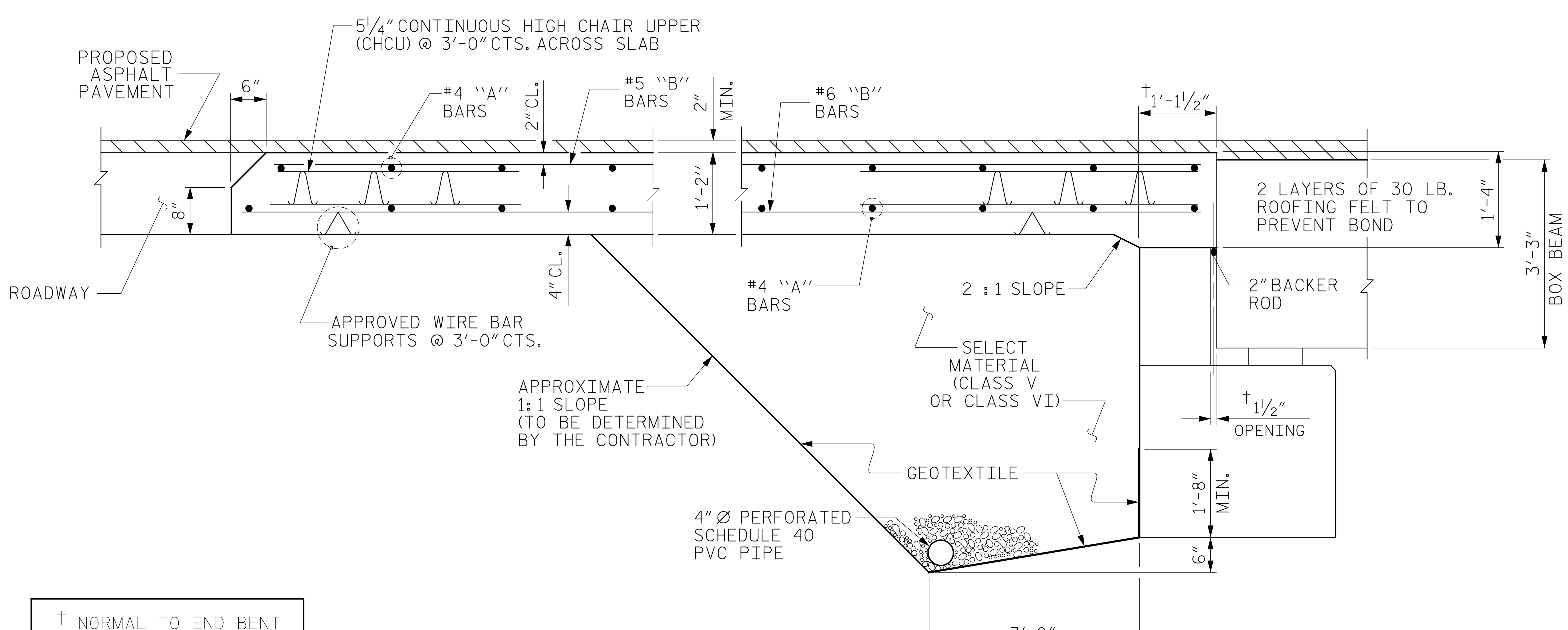


PLAN @ END BENT #1

PLAN @ END BENT #2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



† NORMAL TO END BENT

SECTION THRU SLAB

(TYPE II - MODIFIED APPROACH FILL)
(SEE ROADWAY STD. DRAWING 422.02)

NOTES

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 4" Ø DRAINAGE PIPE, AND SELECT MATERIAL BACKFILL, SEE ROADWAY PLANS.

GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

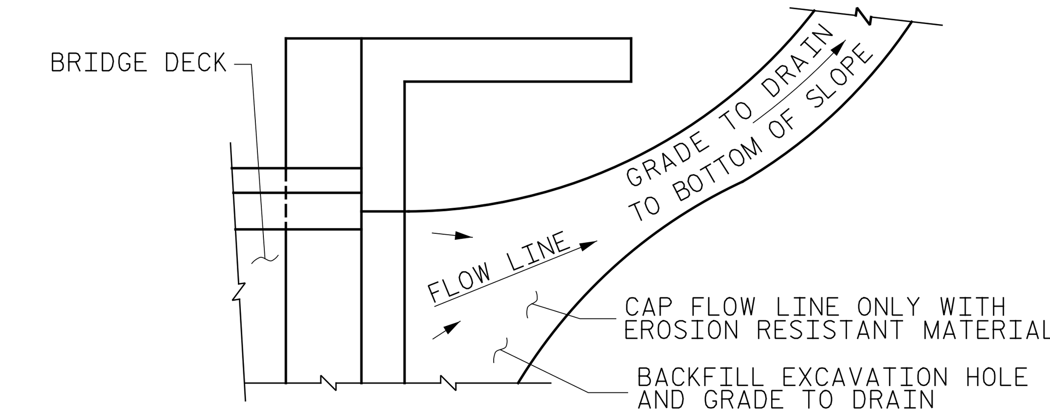
SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

FOR THE 4" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

APPROACH SLAB GROOVING IS NOT REQUIRED.



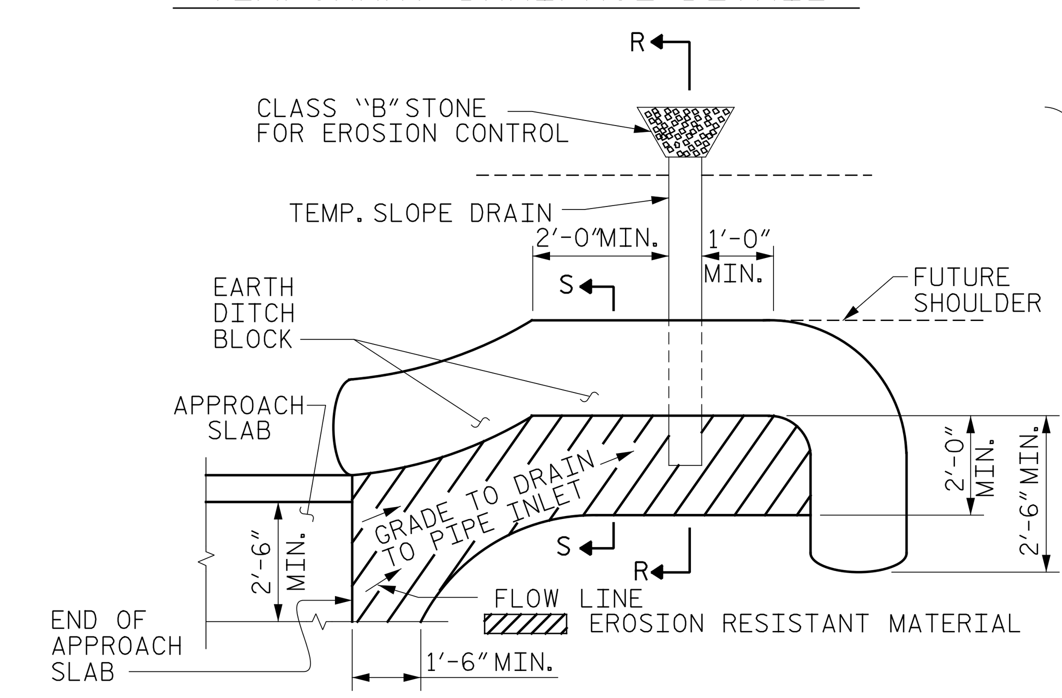
NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT TO THE STRUCTURE. THE CONTRACTOR WILL BE REQUIRED TO REMOVE THESE MATERIALS PRIOR TO CONSTRUCTION OF THE APPROACH SLAB.

TEMPORARY DRAINAGE DETAIL

BILL OF MATERIAL

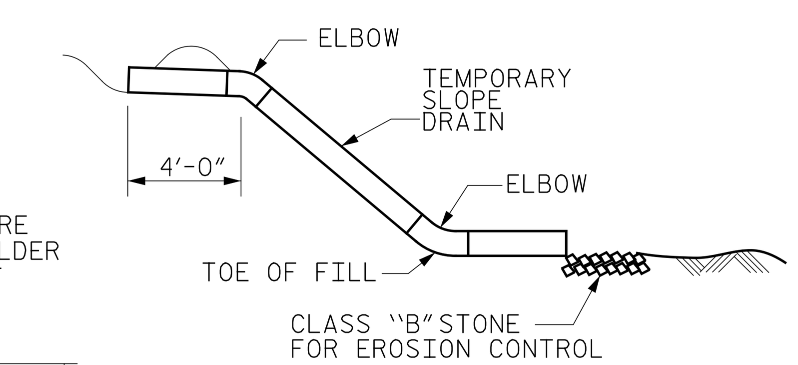
APPROACH SLAB AT EB #1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	13	#4	STR	31'-10"	276
A2	13	#4	STR	31'-10"	276
* B1	64	#5	STR	11'-2"	745
B2	64	#6	STR	11'-8"	1121
REINFORCING STEEL				LBS.	1397
* EPOXY COATED REINFORCING STEEL				LBS.	1021
CLASS AA CONCRETE				C.Y.	17.0

APPROACH SLAB AT EB #2					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	13	#4	STR	31'-10"	276
A2	13	#4	STR	31'-10"	276
* B1	64	#5	STR	11'-2"	745
B2	64	#6	STR	11'-8"	1121
REINFORCING STEEL				LBS.	1397
* EPOXY COATED REINFORCING STEEL				LBS.	1021
CLASS AA CONCRETE				C.Y.	17.0

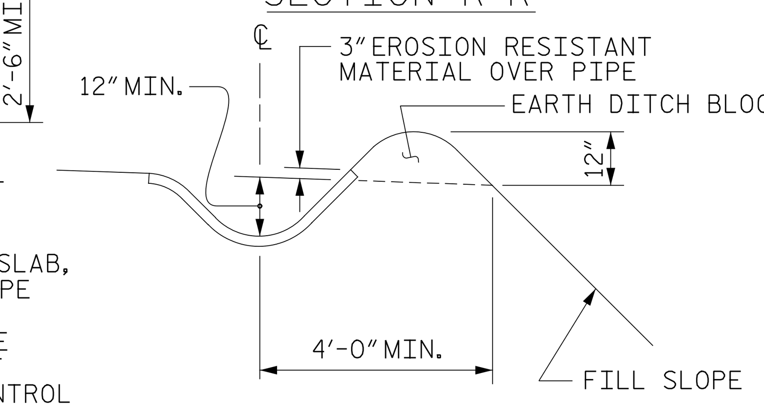


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 2" DEPTH, 2) EROSION CONTROL MAT, OR 3) CONCRETE, AS DIRECTED BY THE ENGINEER. THE SLOPE DRAIN SHALL CONSIST OF A NON-PERFORATED TEMPORARY DRAINAGE PIPE, 12 INCHES IN DIAMETER.

PLAN VIEW



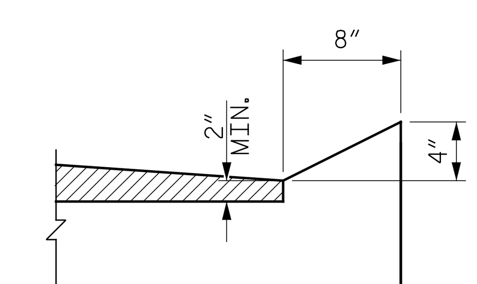
SECTION R-R



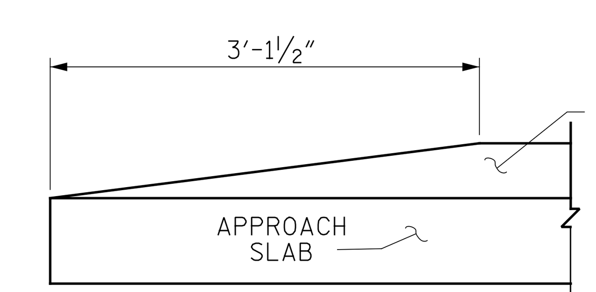
SECTION S-S

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

PROJECT NO. BP5.R108
WAKE COUNTY
STATION: 17+21.00 -L-

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SEAL 011320 NORTH CAROLINA PROFESSIONAL ENGINEER KENNETH W. SMITH

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
BRIDGE APPROACH SLAB
FOR PRESTRESSED CONCRETE
BOX BEAM UNIT
(SUB-REGIONAL TIER)
90° SKEW

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S-16
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ASSEMBLED BY : R. KNIGHT DATE : 8/2022
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DESIGN ENGINEER OF RECORD: K. SMITH DATE : 10/2022

DRAWN BY : MAA 11/11 | REV. 12-17 MAA/THC
CHECKED BY : AAC 11/11 | REV. 08-19 BNB/THC

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STANDARD NOTES

DESIGN DATA:

SPECIFICATIONS	A.A.S.H.T.O. (CURRENT)
LIVE LOAD	SEE PLANS
IMPACT ALLOWANCE	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF STRUCTURAL STEEL - AASHTO M270 GRADE 36	20,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50W	27,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION - GRADE 60	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR UNTREATED EXTREME FIBER STRESS	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	30 LBS. PER CU. FT. (MINIMUM)

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2018 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1 1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY 1/16 INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.

ENGLISH

JANUARY, 1990

REV. 6-16-95 EEM (V) RGW REV. 5-7-03 RWW (V) JTE REV. 10-1-11 MAA (V) GM
REV. 8-16-99 RWW (V) LES REV. 5-1-06 TLA (V) GM REV. 12-17 MAA (V) THC

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

TIP PROJECT: 17BP.5.R.86

CONTRACT: C204323

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.5.R.86	1	

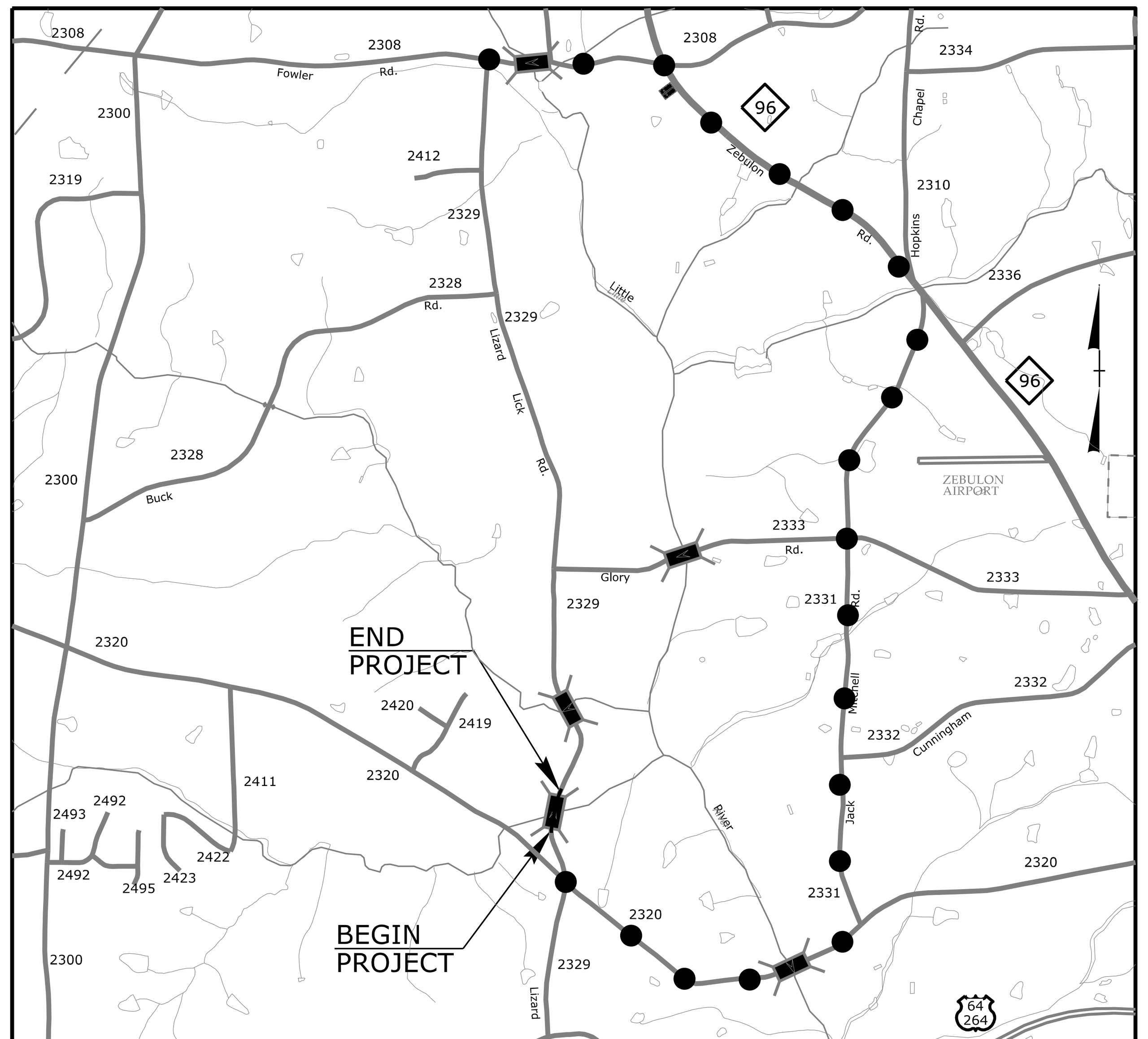
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
17BP.5.R.86	N/A	PE
17BP.5.R.86	N/A	ROW
17BP.5.R.86	N/A	UTILITITES
17BP.5.R.86	N/A	CONSTRUCTION

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE COUNTY

LOCATION: BRIDGE NO. 186 OVER ROCKY BRANCH ON SR 2329 (LIZARD LICK RD.)

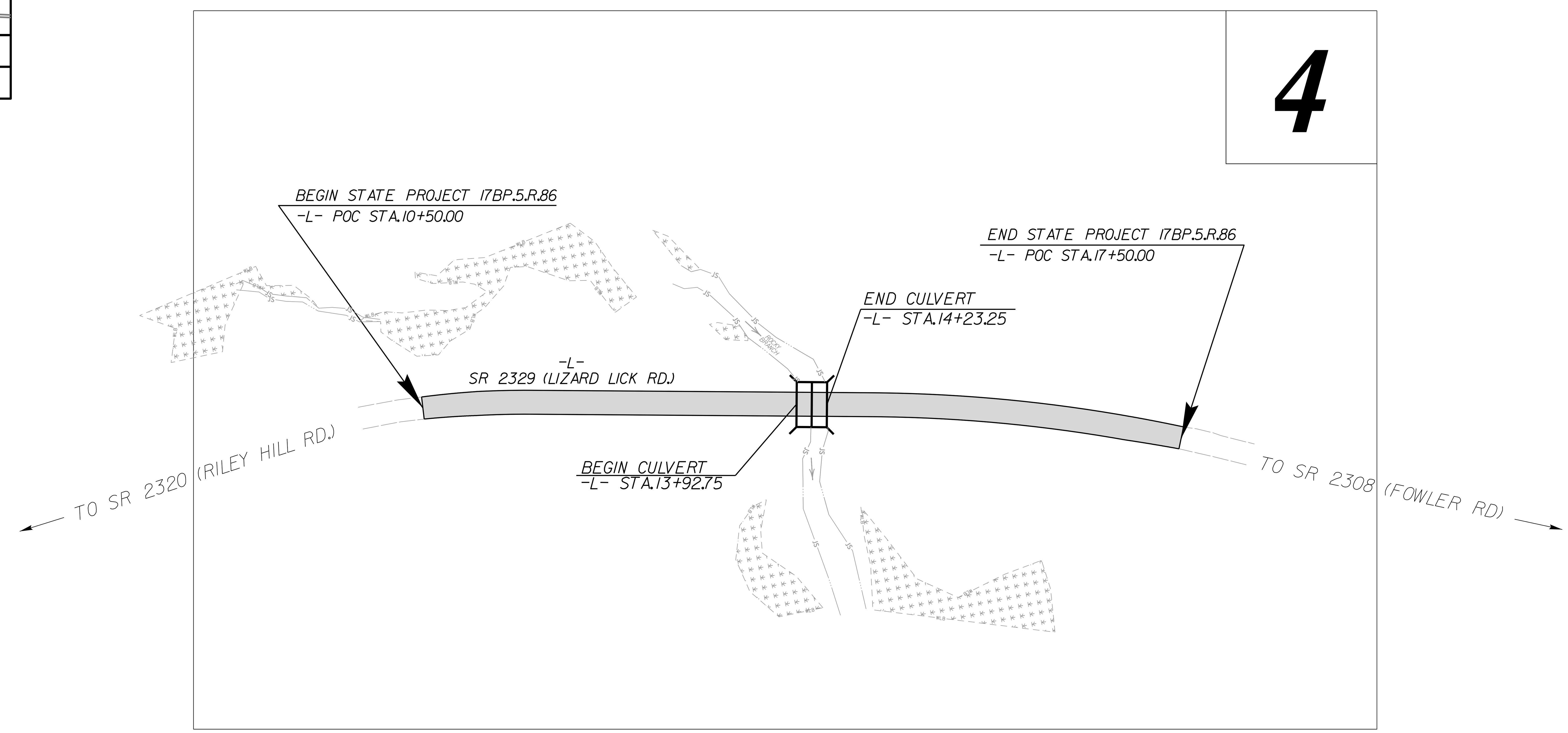
TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND CULVERT



VICINITY MAP

OFF-SITE DETOUR

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



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GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT = 890
V = 50 MPH
CLASS = RURAL LOCAL

SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY STATE PROJECT 17BP.5.R.86	=	0.127 mi.
LENGTH STRUCTURES STATE PROJECT 17BP.5.R.86	=	0.006 mi.
TOTAL LENGTH STATE PROJECT 17BP.5.R.86	=	0.133 mi.

Prepared in the Offices of:

STEWART
223 S. WEST ST, STE 1100 RALEIGH, NC 27603 T 919.380.8750
Firm License #: C-1051 www.stewartinc.com

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
APRIL 10, 2018

RIGHT OF WAY COMPLETE:
NOVEMBER 26, 2018

LETTING DATE:
SEPTEMBER 13, 2023

ANDY YOUNG, PE
PROJECT ENGINEER

MICHAEL BURNS, PE
PROJECT DESIGN ENGINEER

LISA GILCHRIST, EI
NCDOT CONTACT

HYDRAULICS ENGINEER

DocuSigned by: Reid B. Robol
7/28/2023
SIGNATURE: P.E.
NORTH CAROLINA PROFESSIONAL SEAL 043870 ENGINEER REID B. ROBOL

ROADWAY DESIGN ENGINEER

DocuSigned by: Andrew P. Young
7/28/2023
SIGNATURE: P.E.
NORTH CAROLINA PROFESSIONAL SEAL 034407 ENGINEER ANDREW P. YOUNG

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

7/27/2023
USER:mburns

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.86	1A

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 034407 ENGINEER ANDREW P. YOUNG

DocuSigned by: Andrew P. Young 7/28/2023

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INDEX OF SHEETS

SHEET NUMBER	SHEET
1	TITLE SHEET
1A	INDEX OF SHEETS, GENERAL NOTES, AND STANDARD DRAWINGS
1B	CONVENTIONAL SYMBOLS
2A-1	PAVEMENT SCHEDULE AND TYPICAL SECTIONS
2C-1	GUARDRAIL INSTALLATION DETAIL
3B-1	ROADWAY SUMMARIES
3G-1	GEOTECHNICAL SUMMARIES
4	PLAN SHEET
5	PROFILE SHEET
RW01	SURVEY CONTROL TITLE SHEET
RW02C-1	SURVEY CONTROL SHEET
RW02D-1	PROPOSED ALIGNMENT CONTROL SHEET
RW03E-1	RIGHT OF WAY CONTROL SHEET
RW03-2	PERMANENT EASEMENT CONTROL SHEET
RW04	RIGHT OF WAY SHEET
TMP-1 THRU TMP-3	TRAFFIC MANAGEMENT PLANS
PMP-1	PAVEMENT MARKING PLANS
EC-1 THRU EC-6	EROSION CONTROL PLANS
RF-1	REFORESTATION PLANS
UO-1 THRU UO-2	UTILITIES BY OTHERS PLANS
X-1A	CROSS-SECTION SUMMARY SHEET
X-1 THRU X-4	CROSS-SECTIONS
C-1 THRU C-7	CULVERT PLANS

EFF. 01-16-2018
REV.

2018 ROADWAY ENGLISH STANDARD DRAWINGS

The following Roadway Standards as appear in "Roadway Standard Drawings" Highway Design Branch - N. C. Department of Transportation - Raleigh, N. C., Dated January, 2018 are applicable to this project and by reference hereby are considered a part of these plans:

STD.NO.	TITLE
DIVISION 2 - EARTHWORK	
200.03	Method of Clearing - Method III
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superelevation - Two Lane Pavement
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
DIVISION 8 - INCIDENTALS	
806.01	Concrete Right-of-Way Marker
806.02	Granite Right-of-Way Marker
862.01	Guardrail Placement
862.02	Guardrail Installation (Use Detail Sheet 2C-1 in leiu of Sheet 6 of 8)
862.03	Structure Anchor Units
876.01	Rip Rap in Channels
876.04	Drainage Ditches with Class 'B' Rip Rap

GENERAL NOTES:

2018 SPECIFICATIONS
EFFECTIVE: 01-16-2018
REVISED:

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 III.

SUPERELEVATION:

ALL CURVES ON THIS PROJECT SHALL BE SUPERELEVATED IN ACCORDANCE WITHSTD. 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 OFSUPERELEVATED CURVES SHALL BE IN ACCORDANCE WITH STD. NO. 560.01

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.

TEMPORARY SHORING:

SHORING REQUIRED FOR THE MAINTENANCE OF TRAFFIC WILL BE PAID FOR AS "EXTRA WORK" IN ACCORDANCE WITH SECTION 104-7.

SUBSURFACE PLANS:

NO SUBSURFACE PLANS ARE AVAILABLE ON THIS PROJECT. THE CONTRACTOR SHOULD MAKE HIS OWN INVESTIGATION AS TO THE SUBSURFACE CONDITIONS.

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE
AT&T

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

RIGHT-OF-WAY MARKERS:

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

8/17/99

7/27/2023 ...\Proj\910186_RDY_PSH_01A.dgn

Note: Not to Scale

STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

BOUNDARIES AND PROPERTY:

State Line	
County Line	
Township Line	
City Line	
Reservation Line	
Property Line	
Existing Iron Pin (EIP)	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	R/W
Existing Control of Access Line	C/A
Proposed Control of Access Line	C/A
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.

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.86	2A-1

ROADWAY DESIGN ENGINEER — SEAL 034407 — Andrew P. Young — 7/27/2023

PAVEMENT DESIGN ENGINEER — SEAL 22896 — Cark S. Morrison — 7/28/2023

STEWART

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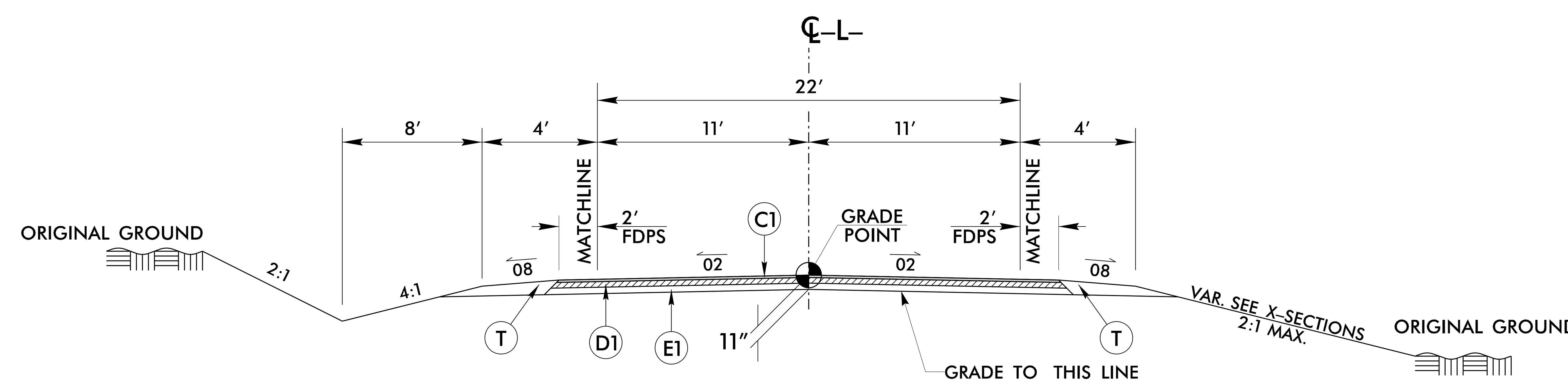
PAVEMENT SCHEDULE

(FINAL PAVEMENT DESIGN)

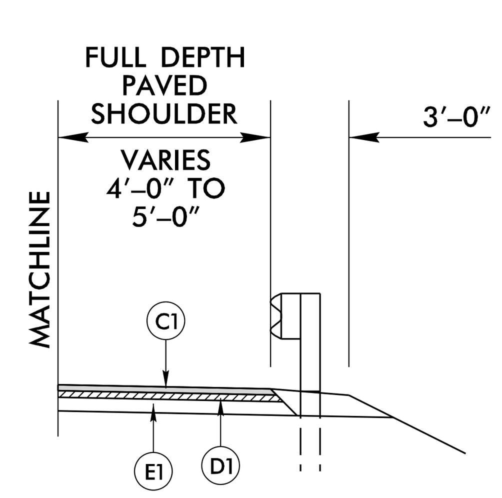
C1	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 165 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
D1	PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
T	EARTH MATERIAL

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



TYPICAL SECTION NO. 1

-L- STA. 10+50.00 TO -L- STA. 17+50.00



DETAIL SHOWING PAVING TO THE FACE OF GUARDRAIL ON -L-

REVISIONS

5/14/99

7/27/2023 ...\Proj\910186_RDY_TYP.dgn

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.86	2C-1

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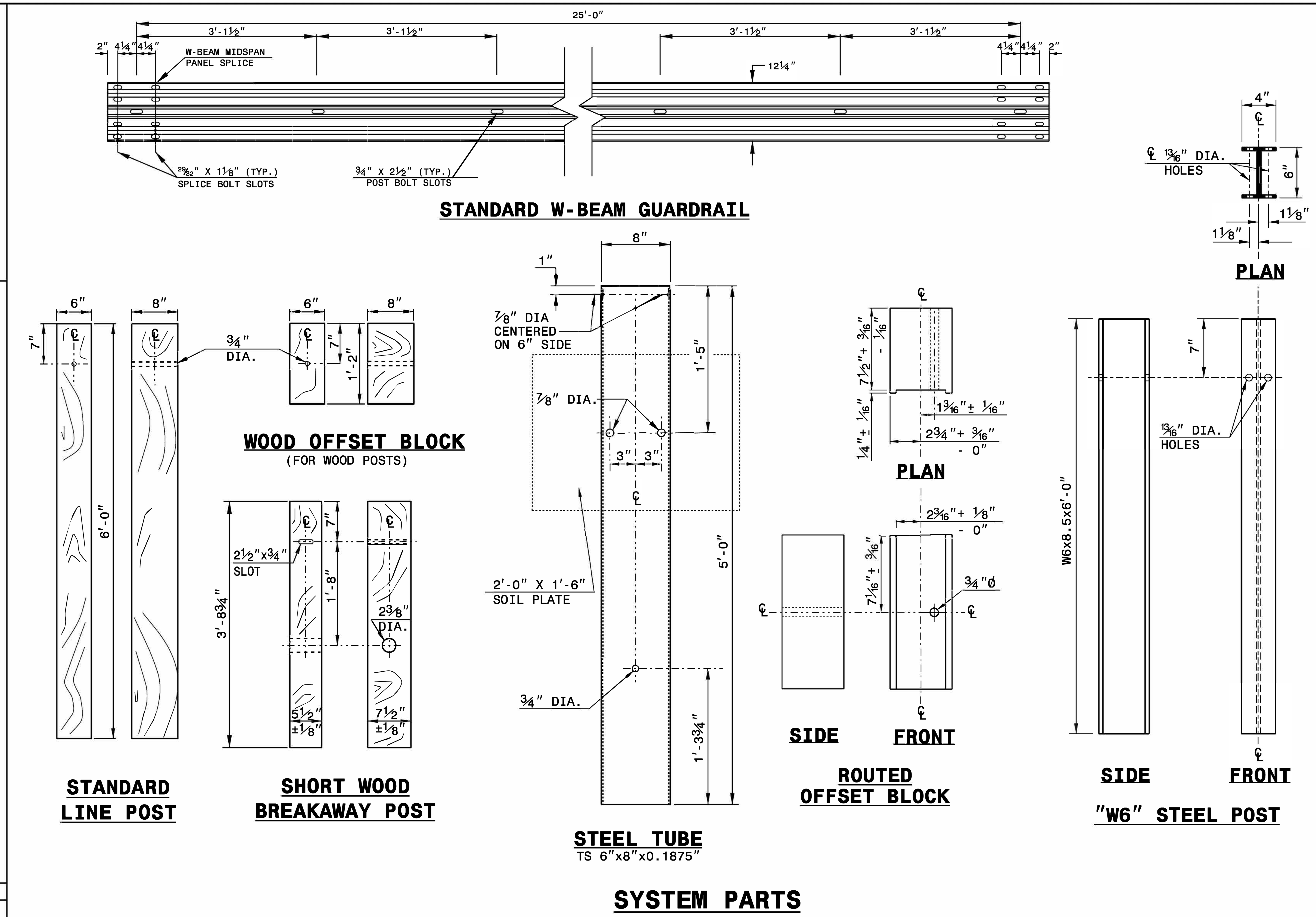
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION



SHEET 6 OF 8
862D02

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 6 OF 8
862D02

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 33144 NICOLE M. HACKLER
7/27/2023
DocuSigned by: Nicole M. Hackler

CONTRACTS STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

ORIGINAL BY: J.HOWERTON DATE: 3-7-2018
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.:

SUMMARY OF EARTHWORK

IN CUBIC YARDS

Station	Station	Uncl. Excav.	Embank. +%	Borrow	Waste
-L- Sta. 10+50.00	-L- Sta. 17+50.00	418	791	373	
SUBTOTALS:		418	791	373	
EST. SHOULDER MATERIAL			258	258	
PROJECT TOTALS		418	1,049	631	
EST. 5% REPLACE TOPSOIL ON BORROW PIT				32	
GRAND TOTALS:		418	1,049	663	
SAY:		**420**		**670**	

UNDERCUT EXCAVATION = 400 CY (Contingency)
SELECT GRANULAR MATERIAL = 400 CY (Contingency)
GEOTEXTILE FOR SOIL STABILIZATION = 400 SY (Contingency)

(Total square yards of Geotextile for Soil Stabilization is only the contingent quantity and may only represent a portion of the geotextile quantity shown in the Item Sheets of the Proposal.)

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

PAVEMENT REMOVAL SUMMARY

IN SQUARE YARDS

SURVEY LINE	Station	Station	LOCATION LT/RT/CL	ASPHALT REMOVAL	ASPHALT BREAKUP	CONCRETE REMOVAL	CONCRETE BREAKUP
-L-	10+50	13+93	CL	788.83			
-L-	14+28	17+50	CL	738.49			
		TOTAL:		1,527.32			
		SAY:		1,550			

"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

GUARDRAIL SUMMARY

G = GATING IMPACT ATTENUATOR TYPE 350
NG = NON-GATING IMPACT ATTENUATOR TYPE 350

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOUL WIDTH	FLARE LENGTH		W		ANCHORS									IMPACT ATTENUATOR TYPE 350		SINGLE FACED CONCRETE BARRIER	REMOVE EXISTING GUARDRAIL	REMOVE & STOCKPILE EXISTING GUARDRAIL	REMARKS
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	XI MOD	XI	GREU TL-3	M-350	XIII	CAT-1	VI MOD	BIC		G	NG				
-L-	12+95.50	15+20.50	LT	225'			14+70.50	13+45.50	4'	7'	1'	1'	50'	50'			2												
-L-	12+95.50	15+20.50	RT	225'			13+45.50	14+70.50	4'	7'	1'	1'	50'	50'			2												
			SUBTOTAL:	450'													4												
		LESS ANCHOR DEDUCTIONS:																											
			GREU, TL-3(4@50')	200'																									
			TOTAL:	250'													4												
			SAY:	250'													4												
		ADDITIONAL GUARDRAIL POSTS=5 EA																											

REVISIONS

SUMMARY OF AGGREGATE SUBGRADE/ STABILIZATION

LINE	Station	Station	Aggregate Type ASU/AST	Aggregate Thickness INCHES	Shallow Undercut CY	Class IV Subgrade Stabilization TONS	Geotextile for Soil Stabilization SY	Stabilizer Aggregate TONS	Class IV Aggregate Stabilization TONS
	CONTINGENCY		ASU		100	200	300		
				TOTAL CY/TONS/SY:	100	200	300*	0	0

ASU = Aggregate Subgrade, AST = Aggregate Stabilization

***Total square yards of Geotextile for Soil Stabilization is only the estimated quantity for ASU/AST and may only represent a portion of the geotextile quantity shown in the Item Sheets of the Proposal.**

REVISIONS

8/17/99

7/27/2023
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USER:mburns

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.86	4

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 034407 ANDREW P. YOUNG
DocuSigned by: Andrew P. Young 7/28/2023

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043870 REID B. ROBOL
DocuSigned by: Reid B. Robol 7/28/2023

STEWART

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

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REVISIONS

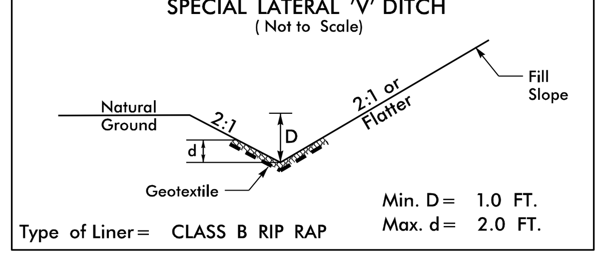
-L-

PI Sta 10+74.78
Δ = 11° 00' 32.8" (RT)
D = 7° 23' 00.5"
L = 149.10'
T = 74.78'
R = 776.00'
V_D = 45 MPH
Runoff = 100'
SE = .04

PI Sta 15+80.11
Δ = 9° 27' 36.1" (RT)
D = 4° 05' 33.2"
L = 231.15'
T = 115.84'
R = 1,400.00'
Runoff = 100'
SE = .04

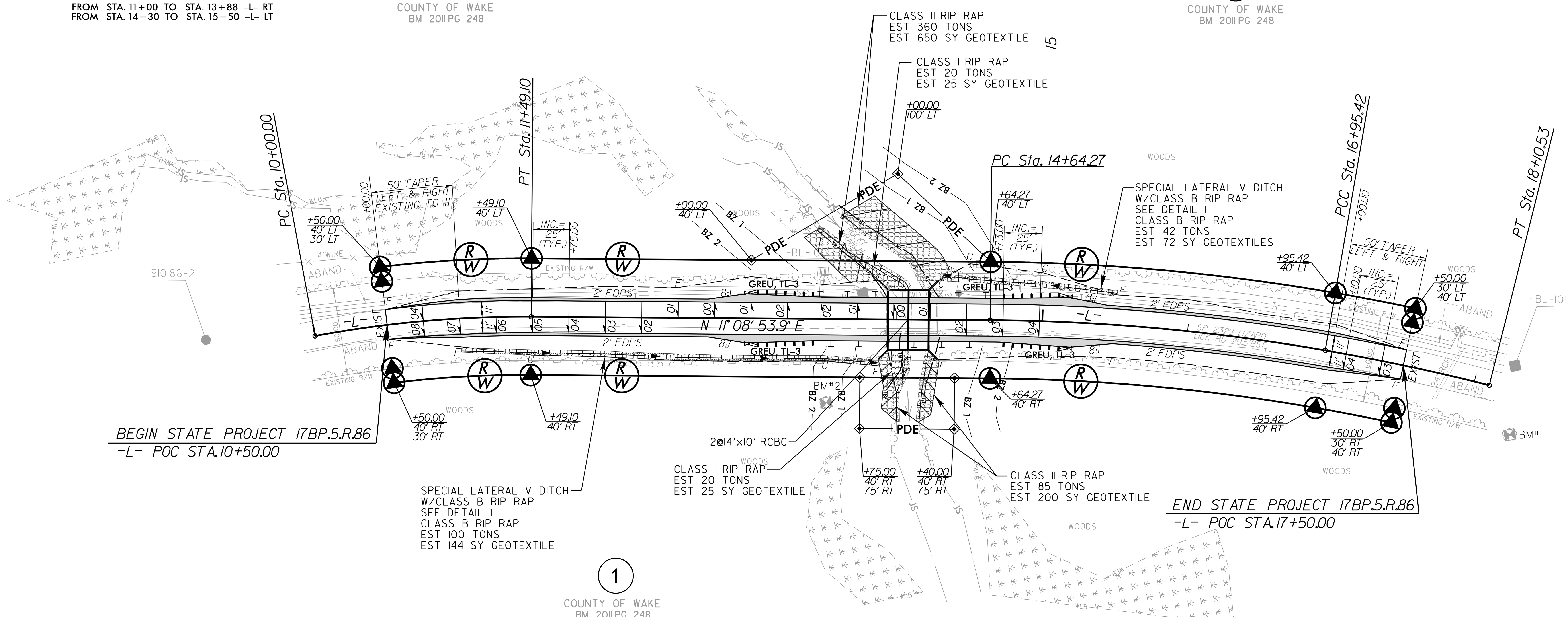
PI Sta 17+53.00
Δ = 4° 14' 28.9" (RT)
D = 3° 41' 04.6"
L = 115.11'
T = 57.58'
R = 1,555.00'
Runoff = 100'
SE = .04

DETAIL 1
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

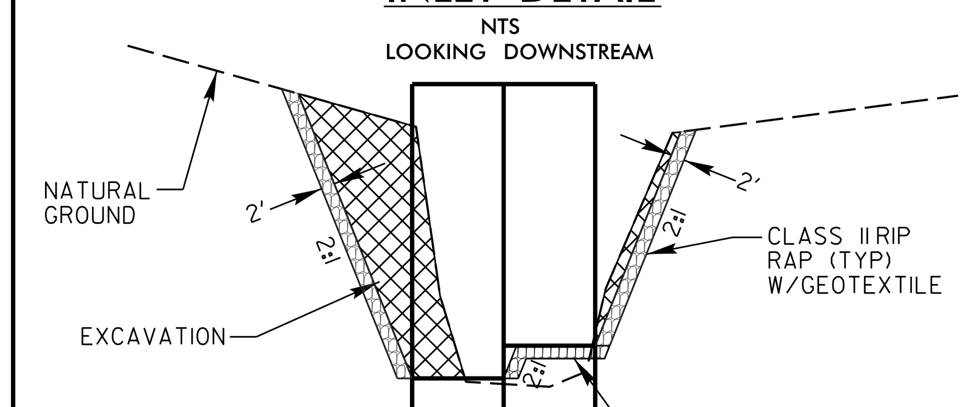


FROM STA. 11+00 TO STA. 13+88 -L- RT
FROM STA. 14+30 TO STA. 15+50 -L- LT

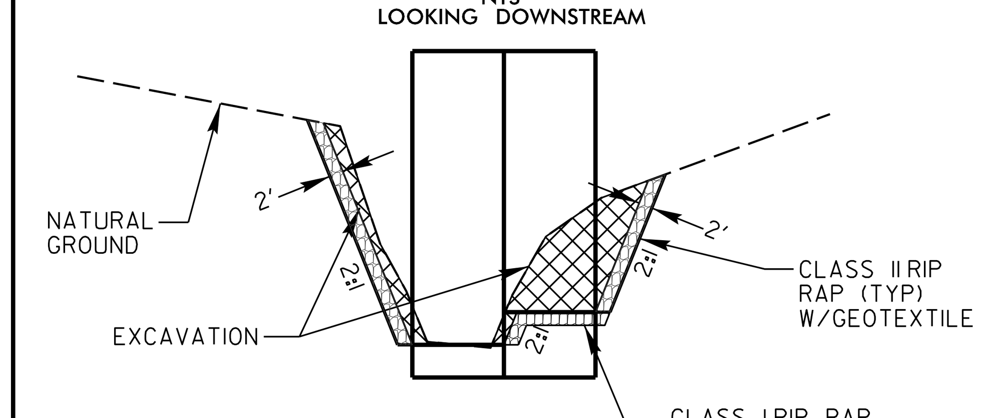
NAD 83/NA 2011



INLET DETAIL
NTS
LOOKING DOWNSTREAM



OUTLET DETAIL
NTS
LOOKING DOWNSTREAM



FOR -L- PROFILE, SEE SHEET 5

FOR CULVERT PLANS, SEE SHEETS C-1 THRU C-7

8/17/99

7/28/2023
...\Proj\910186_RDY_PSH04.dgn

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 034407 ENGINEER ANDREW P. YOUNG
DocuSigned by: Andrew P. Young 7/28/2023

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 043870 ENGINEER REID B. ROBOL
DocuSigned by: Reid B. Robol 7/28/2023

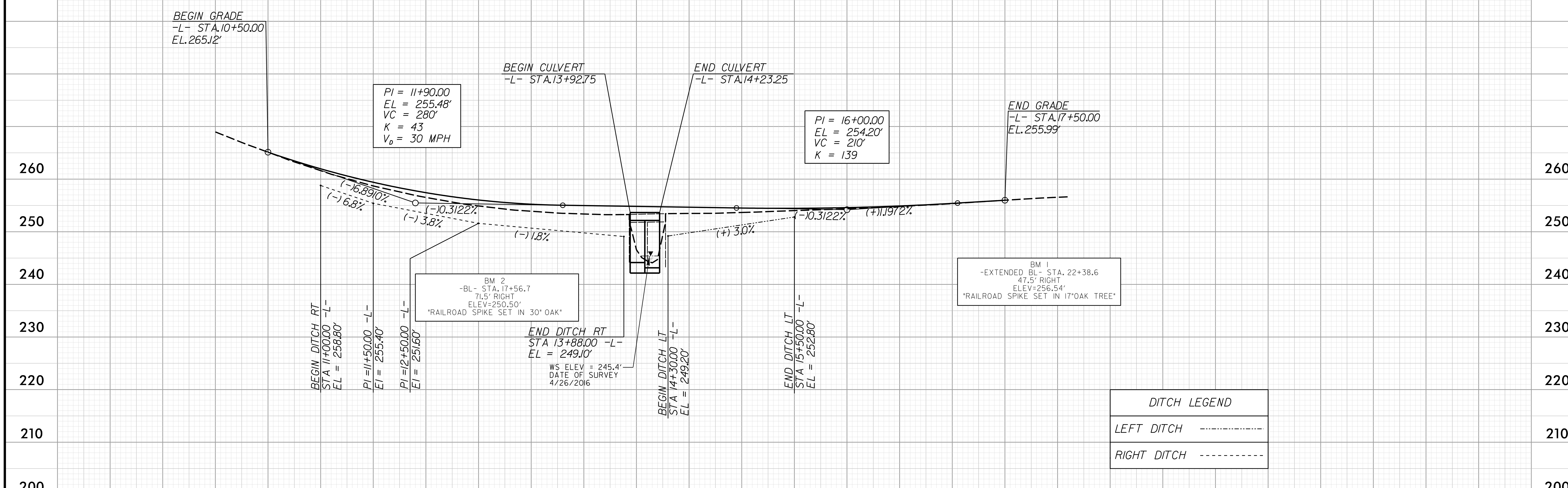
STEWART

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS

-L-



DITCH LEGEND	
LEFT DITCH	-·-·-·-·-·-
RIGHT DITCH	-----------

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	=	1361	CFS
DESIGN FREQUENCY	=	25	YR
DESIGN HW ELEVATION	=	251.5	FT
BASE DISCHARGE	=	2336	CFS
BASE FREQUENCY	=	100	YR
BASE HW ELEVATION	=	253.6	FT
OVERTOPPING DISCHARGE	=	2633	CFS
OVERTOPPING FREQUENCY	=	100+	YR
OVERTOPPING ELEVATION	=	254.8	FT

FOR -L- PLAN VIEW SEE SHEET 4

FOR CULVERT PLANS.SEE SHEETS C-1 THRU C-7

10 11 12 13 14 15 16 17 18 19 20

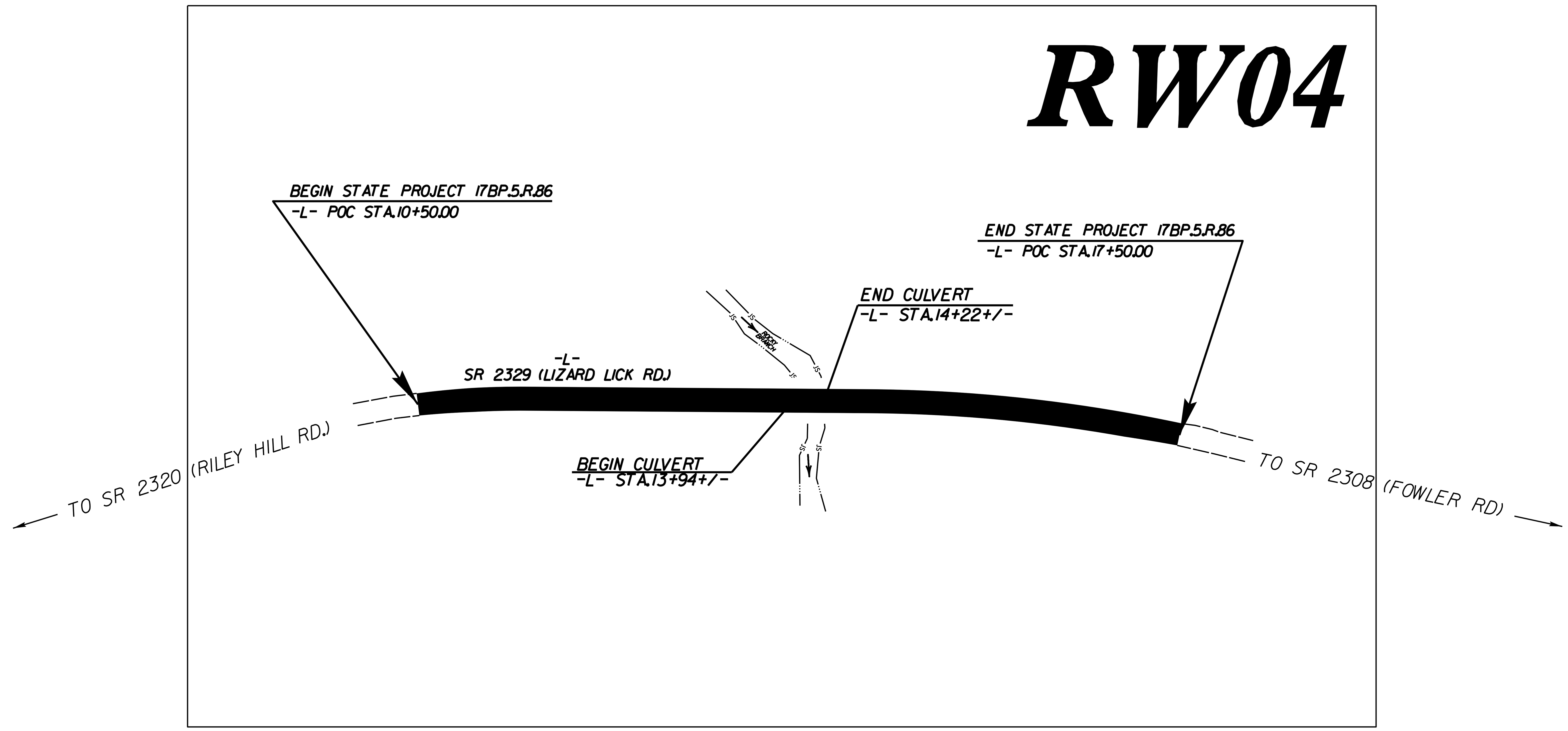
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	91-0186	RW01	

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

SURVEY CONTROL, EXISTING CENTERLINES, RIGHT OF WAY, EASEMENTS AND PROPERTY TIES

WAKE COUNTY

TIP PROJECT: 91-0186



GRAPHIC SCALE

50 25 0 50 100

PLANS

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR MONUMENT "910186-1" WITH NAD 83/NA 2011 STATE PLANE GRID COORDINATES OF NORTHING: 761,916.801 (ft) EASTING: 2,185,705.411 (ft) ELEVATION: 298.76 (ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99991732
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "910186-1" TO -L- STATION 10+00 IS N 19°29'53.7" W 900.21 (ft)
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

Prepared In the Office of:

DIVISION OF HIGHWAYS

1000 Birch Ridge Dr., Raleigh NC, 27610

2017 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

LETTING DATE:

PROFESSIONAL LAND SURVEYOR

NORTH CAROLINA PROFESSIONAL LAND SURVEYOR SEAL L-4493 STEVEN C. BAILEY

SIGNATURE:

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

09/08/99

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
910186	RW02C-1
Location and Surveys	

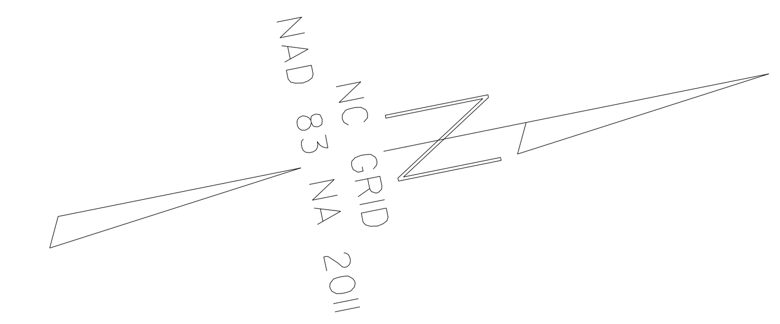
SURVEY CONTROL SHEET

W/EXISTING CENTERLINE ALIGNMENTS PRIOR TO CONSTRUCTION

REVISIONS

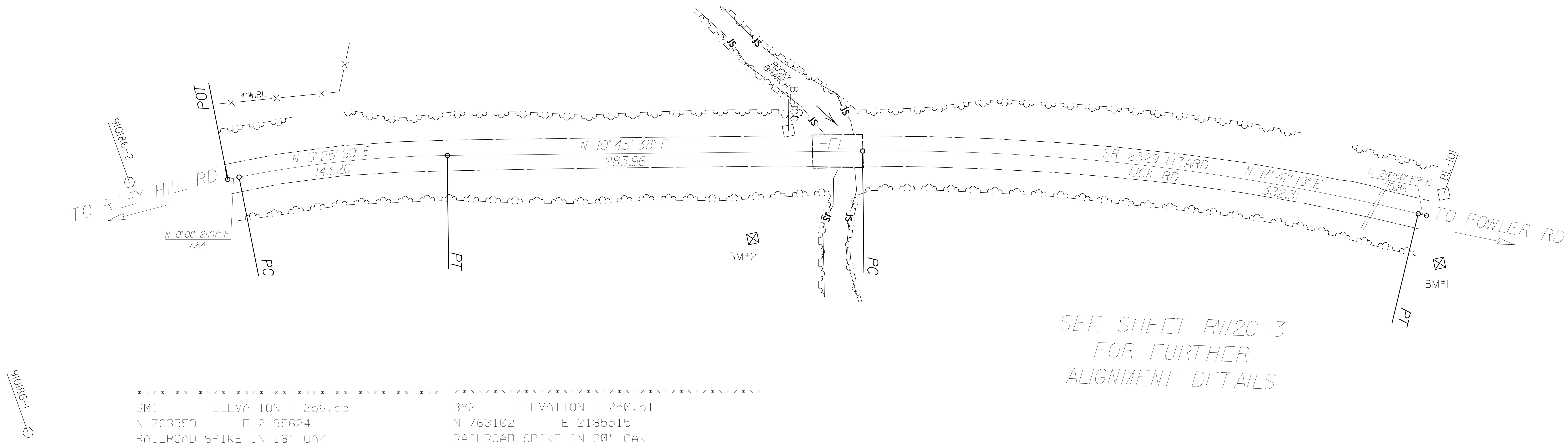
BL

POINT	DESC.	NORTH	EAST	ELEVATION
1	910186-1	761916.8010	2185705.4410	298.76
2	910186-2	762691.2170	2185393.7200	275.04
100	BL-100	763140.0240	2185447.8590	252.77
101	BL-101	763570.8000	2185578.3670	256.53



EL

POINT	N	E	BEARING	DIST	DELTA	D	L	T	R
POT	762757.542	2185404.953							
LINE			N 00°08'21.1" E	7.84					
PC	762765.382	2185404.972							
CURVE			N 05°25'59.6" E	143.20	10°35'17.0"(RT)	07°23'00.5"	143.40	71.91	776.00
PT	762907.937	2185418.531							
LINE			N 10°43'38.1" E	283.97					
PC	763186.944	2185471.387							
CURVE			N 17°47'18.5" E	382.31	14°07'20.9"(RT)	03°41'04.6"	383.28	192.62	1555.00
PT	763550.978	2185588.185							
LINE			N 24°50'58.9" E	5.85					
POT	763556.290	2185590.645							



SEE SHEET RW2C-3 FOR FURTHER ALIGNMENT DETAILS

BM1 ELEVATION = 256.55
N 763559 E 2185624
RAILROAD SPIKE IN 18" OAK

BM2 ELEVATION = 250.51
N 763102 E 2185515
RAILROAD SPIKE IN 30" OAK

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.

PROJECT REFERENCE NO.	SHEET NO.
910186	RW02D-1
Location and Surveys	

PROPOSED ALIGNMENT CONTROL SHEET

L

TYPE	STATION	NORTH	EAST
PC	10+00.00	762765.3818	2185404.9720
PT	11+49.10	762913.5358	2185419.6129
PC	14+64.27	763222.7516	2185480.5494
PCC	16+95.42	763444.8317	2185543.7198
PT	18+10.53	763550.9782	2185588.1850

REVISIONS

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.

6/20/18

PROJECT REFERENCE NO.	SHEET NO.
91-0186	RW03E-1

Location and Surveys

RIGHT OF WAY CONTROL SHEET

ROW MARKER IRON PIN AND CAP-E

	ALIGN	STATION	OFFSET	NORTH	EAST
	L	10·50.00	-30.00	762817.3475	2185376.7707
	L	10·50.00	-40.00	762818.0157	2185366.7931
	L	14·64.27	-40.00	763230.4855	2185441.3042
	L	14·64.27	40.00	763215.0176	2185519.7946
SEE NOTE •3	L	10·50.00	40.00	762812.6707	2185446.6143
SEE NOTE •3	L	10·50.00	30.00	762813.3388	2185436.6367
	L	17·50.00	30.00	763484.0332	2185591.5157
	L	17·50.00	-30.00	763507.1096	2185536.1309
	L	11·49.10	40.00	762905.8018	2185458.8581
	L	11·49.10	-40.00	762921.2698	2185380.3677
	L	17·50.00	40.00	763480.1871	2185600.7465
	L	17·50.00	-40.00	763510.9557	2185526.9001
	L	16·95.42	-40.00	763458.9108	2185506.2795
	L	16·95.42	40.00	763430.7526	2185581.1601

I, STEVEN C BAILEY, 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, R/W Staking) 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 right of way and permanent easement points shown herein and outlined in the tables shown hereon (localized coordinates, station/offset) have been checked and are accurate representations of the right of way and permanent easement points depicted on the corresponding highway plans. I also certify that the right of way and permanent easement points shown herein have been field monumented under my supervision from existing survey control provided by others; that the depicted property data shown herein were surveyed by others; and these monuments denote the right of way and easement boundaries at the time of staking which may be subject to change due to right of way revisions (See deeds for final determination).

Witness my original signature, registration number and seal this 12th day of July, 2018.

Steven Bailey

Digitally signed by Steven Bailey
Date: 2018.07.12
11:01:43 -04'00'

Professional Land Surveyor PLS * L-4493 Seal

PROJECT SURVEYOR

NORTH CAROLINA PROFESSIONAL SEAL L-4493 STEVEN C. BAILEY

Steven Bailey

Digitally signed by Steven Bailey
Date: 2018.07.12
11:02:02 -04'00'

REVISIONS

6/2/99

NOTES:

1. IF FURTHER INFORMATION REGARDING PROJECT CONTROL IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.
2. PROJECT CONTROL WAS ESTABLISHED USING GNSS, THE GLOBAL NAVIGATION SATELLITE SYSTEM.
3. RIGHT OF WAY FOR STATION 10+50 - 30' RT AND 40' RT NOT SET DUE TO LARGE BOULDER.

$$$$SYSTIME$$$$ $$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$ $$$$USERNAME$$$$

PERMANENT EASEMENT CONTROL SHEET

ROW MARKER PERMANENT EASEMENT-E

ALIGN	STATION	OFFSET	NORTH	EAST
L	13+00.00	-40.00	763069.3175	2185409.5431
L	13+75.00	75.00	763120.6671	2185536.8743
L	13+75.00	40.00	763127.4343	2185502.5347
L	14+00.00	-100.00	763179.0314	2185370.0103
L	14+40.00	75.00	763184.4405	2185549.4420
L	14+40.00	40.00	763191.2077	2185515.1024

I, STEVEN C BAILEY, 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, R/W Staking) performed under my responsible charge meet NCDOT Survey Standards as directed in the NCDOT Location & Surveys guidelines and procedures.

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I further certify that the right of way and permanent easement points shown herein and outlined in the tables shown hereon (localized coordinates, station/offset) have been checked and are accurate representations of the right of way and permanent easement points depicted on the corresponding highway plans. I also certify that the right of way and permanent easement points shown herein have been field monumented under my supervision from existing survey control provided by others; that the depicted property data shown herein were surveyed by others; and these monuments denote the right of way and easement boundaries at the time of staking which may be subject to change due to right of way revisions (See deeds for final determination).

Witness my original signature, registration number and seal this 12th day of July, 2018.

Steven Bailey — Digitally signed by Steven Bailey Date: 2018.07.12 11:02:21 -04'00'

Professional Land Surveyor PLS # L-4493 Seal

PROJECT SURVEYOR

NORTH CAROLINA PROFESSIONAL SEAL L-4493 LAND SURVEYOR

Steven Bailey — Digitally signed by Steven Bailey Date: 2018.07.12 11:03:36 -04'00'

NOTES:

1. IF FURTHER INFORMATION REGARDING PROJECT CONTROL IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.

2. PROJECT CONTROL WAS ESTABLISHED USING GNSS, THE GLOBAL NAVIGATION SATELLITE SYSTEM.

REVISIONS

6/2/99

$$$$SYSTIME$$$$ $$$$DGN$$$$ $$$$USERNAME$$$$

PROJECT SURVEYOR

SEAL L-4493 NORTH CAROLINA PROFESSIONAL STEVEN C. BAILEY

Steven Bailey Digitally signed by Steven Bailey Date: 2018.07.12 11:03:09 -04'00'

I, STEVEN C BAILEY, 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, R/W Staking) performed under my responsible charge meet NCDOT Survey Standards as directed in the NCDOT Location & Surveys guidelines and procedures.

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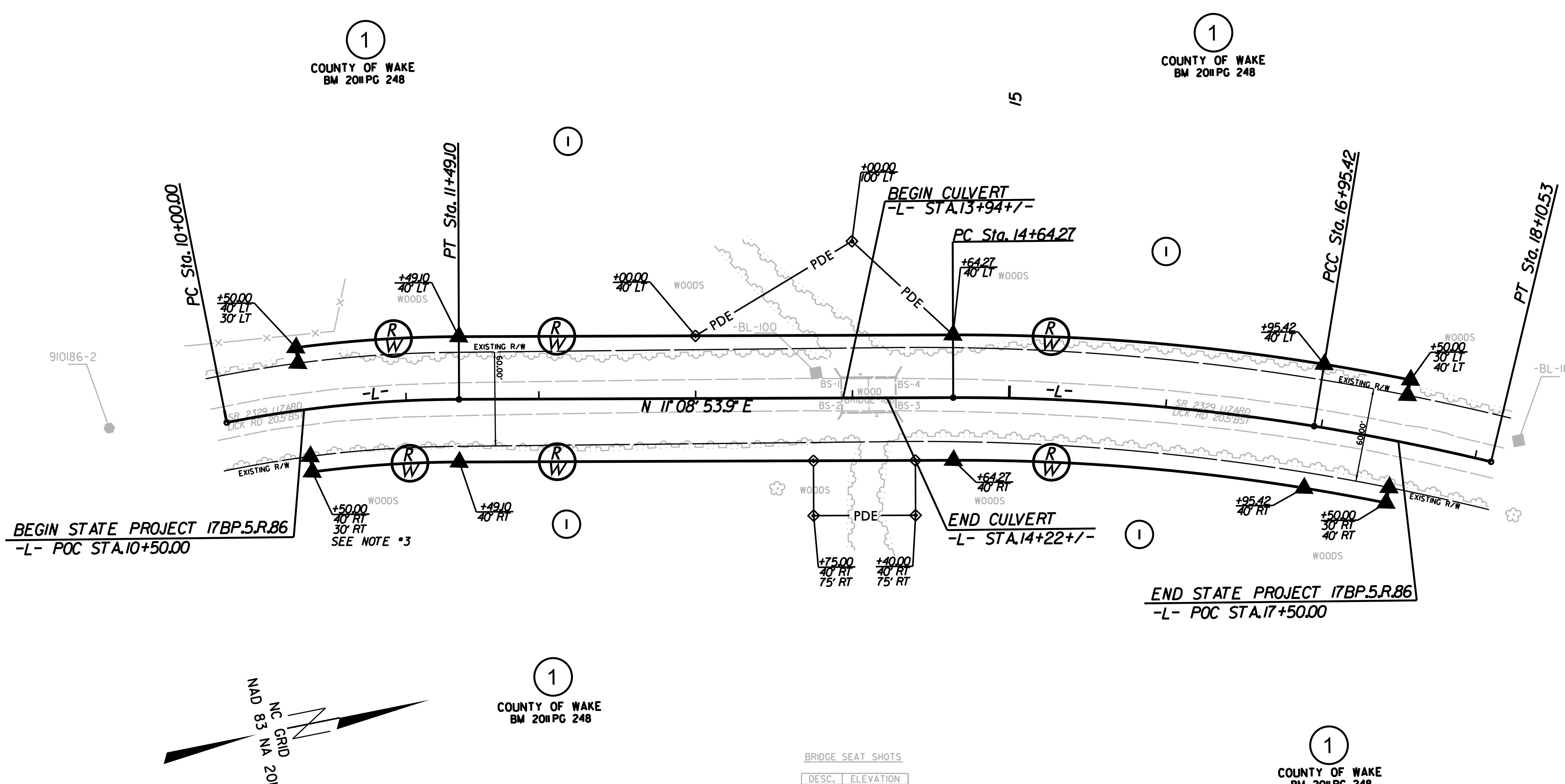
Witness my original signature, registration number and seal this 12th day of July, 2018.

Steven Bailey Digitally signed by Steven Bailey Date: 2018.07.12 11:02:53 -04'00'

Professional Land Surveyor PLS # L-4493 Seal

-L-

PI Sta 10+74.78	PI Sta 15+80.11	PI Sta 17+53.00
Δ = 11° 00' 32.8" (RT)	Δ = 9° 27' 36.1" (RT)	Δ = 4° 14' 28.9" (RT)
D = 7° 23' 00.5"	D = 4° 05' 33.2"	D = 3° 41' 04.6"
L = 149.10'	L = 231.15'	L = 115.11'
T = 74.78'	T = 115.84'	T = 57.58'
R = 776.00'	R = 1,400.00'	R = 1,555.00'
V_D = 45 MPH	Runoff = 100'	Runoff = 100'
Runoff = 100'	SE = .04	SE = .04
SE = .04		



BRIDGE SEAT SHOTS

DESC.	ELEVATION
BS-1	251.85
BS-2	251.76
BS-3	251.92
BS-4	251.88

1
COUNTY OF WAKE
BM 2011 PG 248

NOTES:

1. IF FURTHER INFORMATION REGARDING PROJECT CONTROL IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.
2. PROJECT CONTROL WAS ESTABLISHED USING GNSS, THE GLOBAL NAVIGATION SATELLITE SYSTEM.
3. RIGHT OF WAY FOR STATION 10+50 - 30' RT AND 40' RT NOT SET DUE TO LARGE BOULDER.

REVISIONS

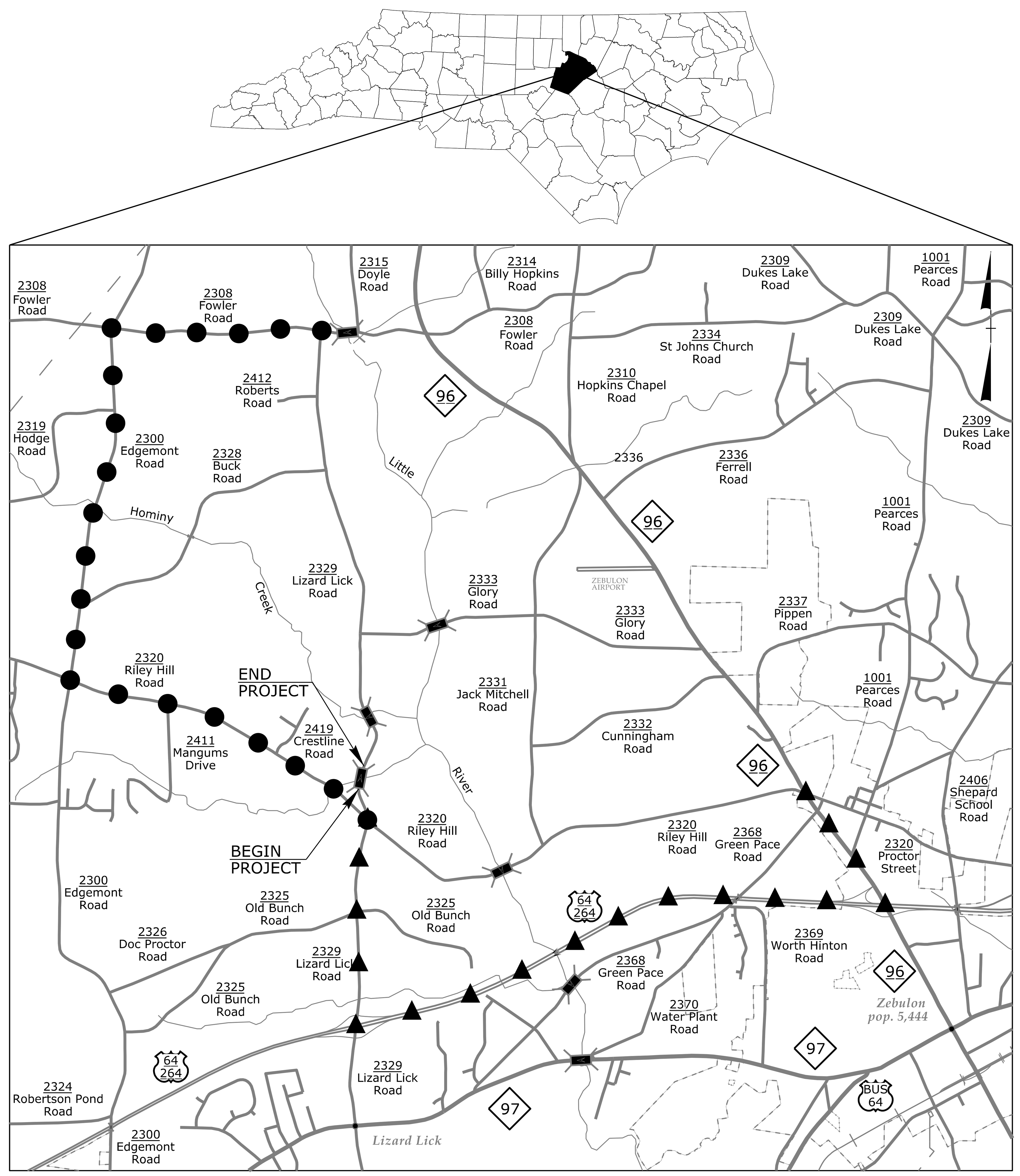
6/2/99

12-JUL-2018 09:58 R:\0186 Lizard Lick Rd\80-Drawings\910186_ls_RW04.DGN

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

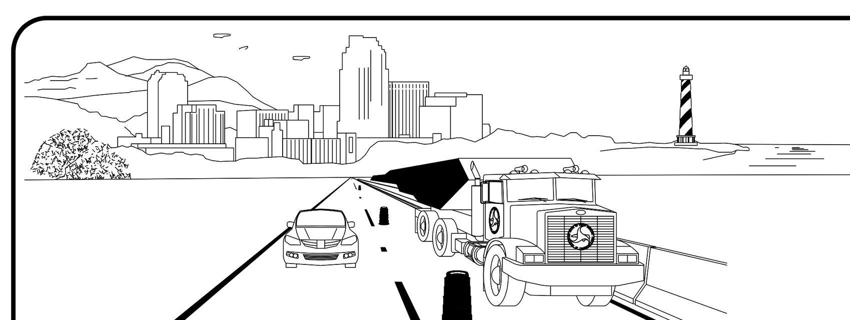
TRANSPORTATION MANAGEMENT PLAN

WAKE COUNTY



BRIDGE NO. 180 OFFSITE DETOUR ROUTE

BRIDGE NO. 186 OFFSITE DETOUR ROUTE



WORK ZONE SAFETY & MOBILITY
"from the MOUNTAINS to the COAST"

PLANS PREPARED BY:

ANDY YOUNG, PE
PROJECT ENGINEER

MICHAEL BURNS, PE
PROJECT DESIGN ENGINEER

NCDOT CONTACTS:

LISA GILCHRIST, EI
DIV. 5 BRIDGE PROGRAM MANAGER

INDEX OF SHEETS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLANS PREPARED BY:

STEWART

APPROVED: Andrew P. Young

DATE: 7/27/2023

SEAL

SHEET NO. TMP-1

17BP.5.R.86

TIP PROJECT:

ROADWAY STANDARD DRAWINGS

THE FOLLOWING ROADWAY STANDARDS AS SHOWN IN "ROADWAY STANDARD DRAWINGS" - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 2018 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD. NO.	TITLE
1101.03	TEMPORARY ROAD CLOSURES
1101.11	TRAFFIC CONTROL DESIGN TABLES
1110.01	STATIONARY WORK ZONE SIGNS
1130.01	DRUM
1145.01	BARRICADES - TYPE III

LEGEND

GENERAL

DIRECTION OF TRAFFIC FLOW
DIRECTION OF PEDESTRIAN TRAFFIC FLOW
EXIST. PVMT.
NORTH ARROW
PROPOSED PVMT.
TEMP. SHORING (LOCATION PURPOSES ONLY)
WORK AREA
REMOVAL
WEDGING

SIGNALS

EXISTING
PROPOSED
TEMP TEMPORARY

PAVEMENT MARKINGS

EXISTING LINES
TEMPORARY LINES

TRAFFIC CONTROL DEVICES

BARRICADE (TYPE III)
CONE
DRUM
SKINNY DRUM
TUBULAR MARKER
TEMPORARY CRASH CUSHION
FLASHING ARROW BOARD
FLAGGER
LAW ENFORCEMENT
TRUCK MOUNTED ATTENUATOR (TMA)
CHANGEABLE MESSAGE SIGN

TEMPORARY SIGNING

PORTABLE SIGN
STATIONARY SIGN
STATIONARY OR PORTABLE SIGN

PAVEMENT MARKERS

CRYSTAL/CRYSTAL
CRYSTAL/RED
YELLOW/YELLOW

PAVEMENT MARKING SYMBOLS

PAVEMENT MARKING SYMBOLS

STEWART
Firm License No. C-1051
223 S. West St, Suite 1100
Raleigh, NC 27603
T 919.380.8750
www.stewartinc.com

APPROVED: DocuSigned by: Andrew P. Young EF21D90DD62F4EF...
DATE: 7/27/2023
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 034407 ANDREW P. YOUNG

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
WORK ZONE TRAFFIC CONTROL

ROADWAY STANDARD DRAWINGS & LEGEND

7/27/2023
...\TCP\9086_TC_TMP_01A.dgn
USER:mburns

PROJ. REFERENCE NO.	SHEET NO.
17BP.5.R.86	TMP-1B

MANAGEMENT STRATEGIES

DURING CONSTRUCTION OF PROPOSED CULVERT OVER ROCKY BRANCH, SR 2329 (LIZARD LICK ROAD) WILL BE CLOSED TO THROUGH TRAFFIC. THROUGH TRAFFIC ON SR 2329 (LIZARD LICK ROAD) WILL BE MAINTAINED USING AN OFFSITE DETOUR.

THE OFFSITE DETOUR WILL INCLUDE SR 2320, SR 2300, AND SR 2308 (SEE SHEETS TMP-4 THRU TMP-5).

DURING CONSTRUCTION OF PROPOSED BRIDGE OVER THE LITTLE RIVER, SR 2320 (RILEY HILL ROAD) WILL BE CLOSED TO THROUGH TRAFFIC. THROUGH TRAFFIC ON SR 2320 (RILEY HILL ROAD) WILL BE MAINTAINED USING AN OFFSITE DETOUR.

THE OFFSITE DETOUR WILL INCLUDE SR 2329, US 64 /264, AND NC 96 (SEE SHEETS TMP-4 THRU TMP-7).

ACCESS TO ALL RESIDENCES AND BUSINESSES WITHIN THE PROJECT LIMITS MUST BE MAINTAINED AT ALL TIMES.

GENERAL NOTES

CHANGES MAY BE REQUIRED WHEN PHYSICAL DIMENSIONS IN THE DETAIL DRAWINGS, STANDARD DETAILS, AND ROADWAY DETAILS ARE NOT ATTAINABLE TO MEET FIELD CONDITIONS OR RESULT IN DUPLICATE OR UNDESIRED OVERLAPPING OF DEVICES. MODIFICATION MAY INCLUDE: MOVING, SUPPLEMENTING, COVERING, OR REMOVAL OF DEVICES AS DIRECTED BY THE ENGINEER.

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.

<u>SIGNING</u>

A) PROVIDE SIGNING AND DEVICES REQUIRED TO CLOSE THE ROAD ACCORDING TO THE ROADWAY STANDARD DRAWINGS AND TRAFFIC CONTROL PLANS.

   PROVIDE SIGNING REQUIRED FOR THE OFF-SITE DETOUR ROUTE AS SHOWN IN THE TRAFFIC CONTROL PLANS.

B) COVER OR REMOVE ALL SIGNS AND DEVICES REQUIRED TO CLOSE THE ROAD WHEN ROAD CLOSURE IS NOT IN OPERATION.

   COVER OR REMOVE ALL SIGNS REQUIRED FOR THE OFF-SITE DETOUR WHEN THE DETOUR IS NOT IN OPERATION.

C) ENSURE ALL NECESSARY SIGNING IS IN PLACE PRIOR TO ALTERING ANY TRAFFIC PATTERN.

LOCAL NOTES

1. NOTIFY THE ENGINEER AT LEAST 30 DAYS PRIOR TO ANY TRAFFIC PATTERN ALTERATION.

2. NOTIFY THE WAKE COUNTY SCHOOLS TRANSPORTATION DIRECTOR OF THE BRIDGE REMOVAL 30 DAYS PRIOR TO ROAD CLOSURE.

3. NOTIFY THE WAKE COUNTY EMERGENCY MANAGEMENT SERVICES DIRECTOR OF BRIDGE REMOVAL 30 DAYS PRIOR TO ROAD CLOSURE.

PHASING

<u>STEP 1:</u>

PROVIDE AND MAINTAIN CHANGEABLE MESSAGE SIGNS AT EACH END OF SR 2329 (LIZARD LICK ROAD) AND SR 2320 (RILEY HILL ROAD) FOR FOURTEEN (14) CALENDAR DAYS PRIOR TO ROAD CLOSURE, AS SHOWN ON SHEET TMP-4.

<u>STEP 2:</u>

USING RSD 1101.03, SHEET 1 OF 9, SHEETS TMP-2 THRU TMP-5, INSTALL ROAD CLOSURE AND DETOUR SIGNS, PLACE TYPE III BARRICADES TO CLOSE SR 2329 (LIZARD LICK ROAD) AND SR 2320 (RILEY HILL ROAD) TO THROUGH TRAFFIC, AND DETOUR TRAFFIC OFFSITE. REMOVE CHANGEABLE MESSAGE SIGNS ONCE DETOUR IS IN PLACE.

<u>STEP 3:</u>

REMOVE EXISTING STRUCTURES No. 180 AND No. 186.

<u>STEP 4:</u>

CONSTRUCT THE PROPOSED STRUCTURES No. 180, No. 186, AND ROADWAYS.

<u>STEP 5:</u>

UPON COMPLETION OF STRUCTURE No. 186, PLACE FINAL PAVEMENT MARKINGS ACCORDING TO THE FINAL PAVEMENT MARKING PLANS

<u>STEP 6:</u>

OPEN SR 2329 (LIZARD LICK ROAD) TO TRAFFIC AND REMOVE ALL WORK ZONE TRAFFIC CONTROL DEVICES USED TO CLOSE SR 2329 (LIZARD LICK ROAD). MAINTAIN ROAD CLOSURE FOR SR 2320 (RILEY HILL ROAD) AS SHOWN ON SHEETS TMP-6 AND TMP-7 IF STRUCTURE No. 180 IS NOT COMPLETE.

<u>STEP 7:</u>

UPON COMPLETION OF STRUCTURE No. 180 PLACE FINAL PAVEMENT MARKINGS ACCORDING TO THE FINAL PAVEMENT MARKING PLANS.

<u>STEP 8:</u>

OPEN SR 2320 (RILEY HILL ROAD) TO TRAFFIC AND REMOVE ALL WORK ZONE TRAFFIC CONTROL DEVICES.

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223 S. West St,
Suite 1100
Raleigh, NC 27603
T 919.380.8750
www.stewartinc.com

APPROVED: DocuSigned by: Andrew P. Young EF21D93DD62F4EF...

DATE: 7/27/2023

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 034407 ENGINEER ANDREW P. YOUNG

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION WORK ZONE TRAFFIC CONTROL

TRANSPORTATION OPERATIONS PLAN

7/27/2023
...\TCP\910186_TC_TMP_01B.dgn
USER:mburns

SIGN NUMBER: SP-1
TYPE: STATIONARY
QUANTITY: SEE PLANS

SIGN WIDTH: 2′-6″
HEIGHT: 2′-0″
TOTAL AREA: 5.0 Sq.Ft.

BORDER TYPE: INSET
RECESS: 0.38″
WIDTH: 0.63″
RADII: 1.5″

NO. Z BARS:
LENGTH:

BACKG COLOR: Fluorescent Orange
COPY COLOR: Yellow

SYMBOL	X	Y	WID	HT

MAT′L: 0.080″ (2.0 mm) ALUMINUM

DESIGN BY: M. BURNS, PE
CHECKED BY: A. YOUNG, PE
Jun 22, 2023
PROJECT ID: 17BP.5.R.86
DIV: 5

USE NOTES: 1,2

1. Legend and border shall be direct applied black non-reflective sheeting.
2. Background shall be NC GRADE B fluorescent orange retroreflective sheeting.

Spacing Factor is 1 unless specified otherwise

LETTER POSITIONS

Letter spacings are to start of next letter

									Series/Size Text Length
		L	I	Z	A	R	D		D 2000
	6.2	3.1	1.3	3	4	3.4	2.7	6.2	17.6
		L	I	C	K				D 2000
	9.5	3.1	1.5	3.6	2.8	9.5			11
		R	O	A	D				D 2000
	8.3	3.3	3.4	4	2.7	8.3			13.4

FILENAME: 910186_TC_TMP_02

NORTH CAROLINA D.O.T. SIGN DETAIL

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APPROVED: DocuSigned by: Andrew P. Young EF21D93DD62F4EF...
DATE: 7/27/2023
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 034407 ENGINEER ANDREW P. YOUNG

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION WORK ZONE TRAFFIC CONTROL

SPECIAL SIGN
DESIGN SP-1

7/27/2023
...\TCP\910186_TC_TMP_02.dgn
USER:mburns

PROJ. REFERENCE NO.	SHEET NO.
17BP.5.R.86	TMP-2A

SIGN NUMBER: SP-2
TYPE: STATIONARY
QUANTITY: SEE PLANS

SIGN WIDTH: 2′-6″
HEIGHT: 2′-0″
TOTAL AREA: 5.0 Sq.Ft.

BORDER TYPE: INSET
RECESS: 0.38″
WIDTH: 0.63″
RADII: 1.5″

NO. Z BARS:
LENGTH:

BACKG COLOR: Fluorescent Orange
COPY COLOR: Yellow

SYMBOL	X	Y	WID	HT

MAT′L: 0.080″ (2.0 mm) ALUMINUM

DESIGN BY: M. BURNS, PE **CHECKED BY:** A. YOUNG, PE Jun 22, 2023
PROJECT ID: 17BP.5.R.86 **DIV:** 5

USE NOTES: 1,2

1. Legend and border shall be direct applied black non-reflective sheeting.
2. Background shall be NC GRADE B fluorescent orange retroreflective sheeting.

Spacing Factor is 1 unless specified otherwise

LETTER POSITIONS

Letter spacings are to start of next letter

								Series/Size Text Length
	R	I	L	E	Y			D 2000
7.8	3.4	1.6	3.1	2.8	3.4	7.8		14.3
	H	I	L	L				D 2000
9.6	3.7	1.6	3.1	2.5	9.6			10.8
	R	O	A	D				D 2000
8.3	3.3	3.4	4	2.7	8.3			13.4

FILENAME: 910186_TC_TMP_02A

NORTH CAROLINA D.O.T. SIGN DETAIL

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APPROVED: Andrew P. Young
DATE: 7/27/2023

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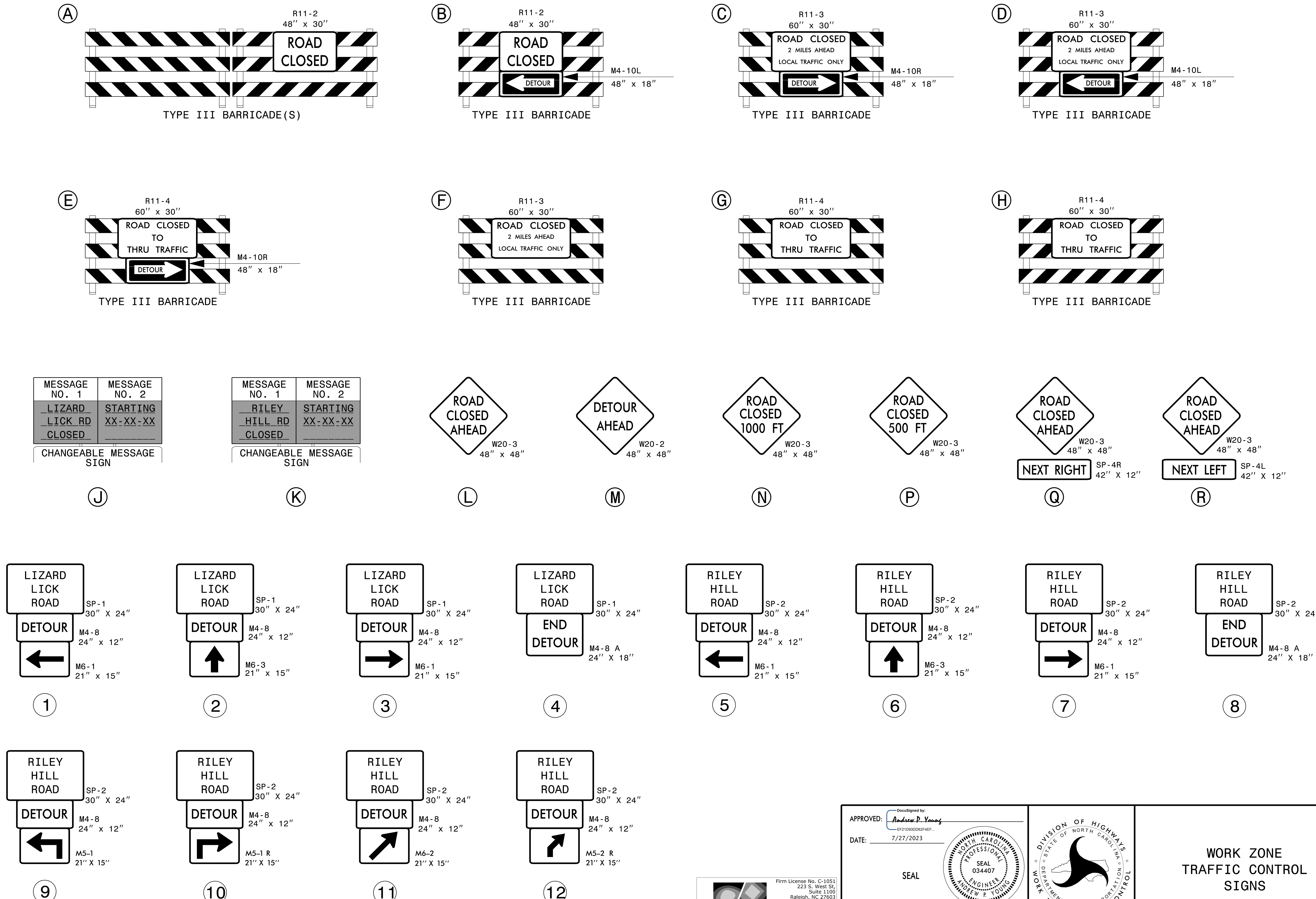
DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION WORK ZONE TRAFFIC CONTROL

SPECIAL SIGN
DESIGN SP-2

PROJ. REFERENCE NO.	SHEET NO.
17BP.5.R.86	TMP-3



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DATE: 7/27/2023
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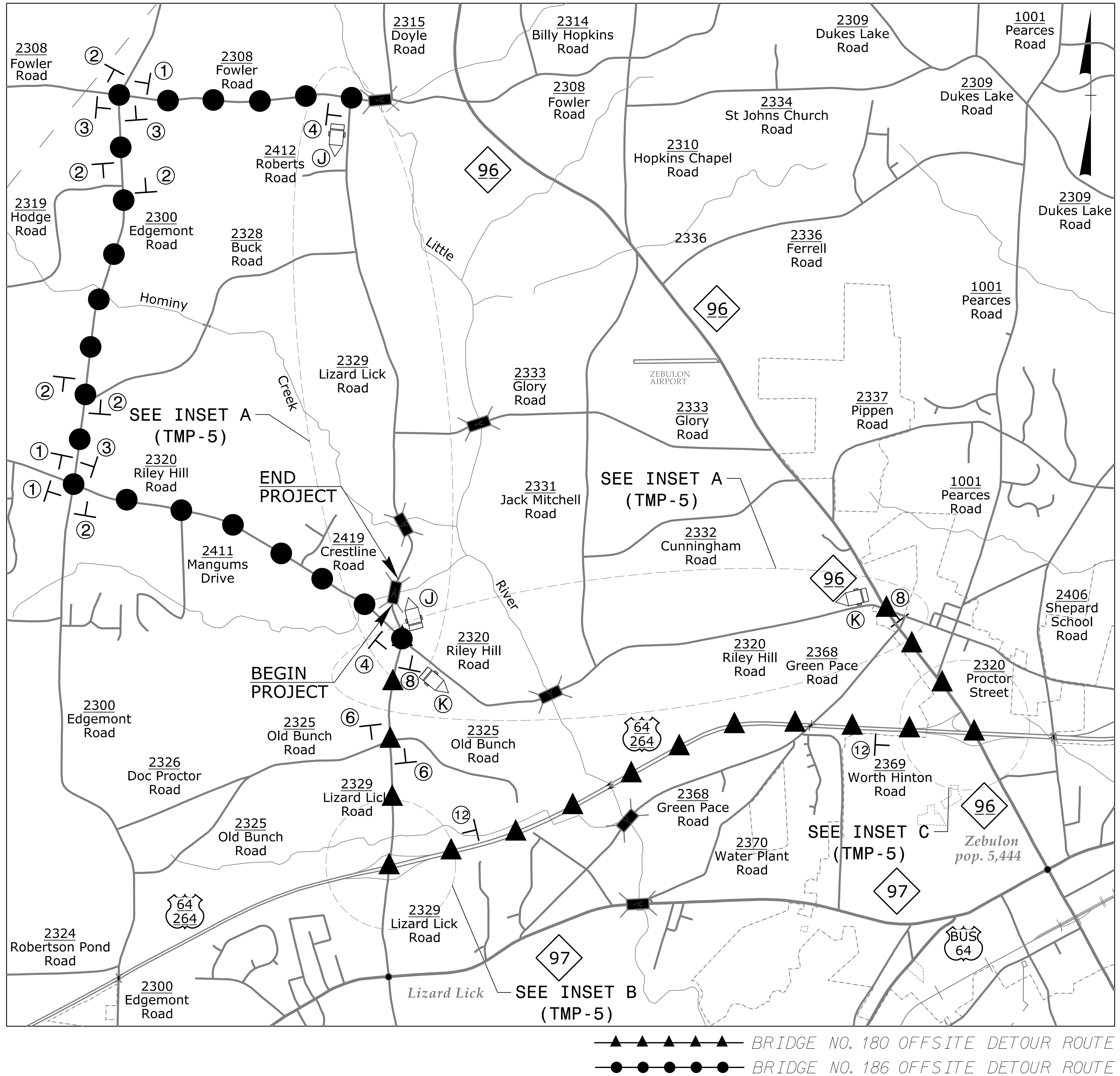
DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION WORK ZONE TRAFFIC CONTROL

WORK ZONE
TRAFFIC CONTROL
SIGNS

7/27/2023
...\TCP\9I0186_TC_TMP_03.dgn
USER:mburns

PROJ. REFERENCE NO.	SHEET NO.
17BP.5.R.86	TMP-4



APPROVED: Andrew P. Young

DATE: 7/27/2023

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 034407 ANDREW P. YOUNG

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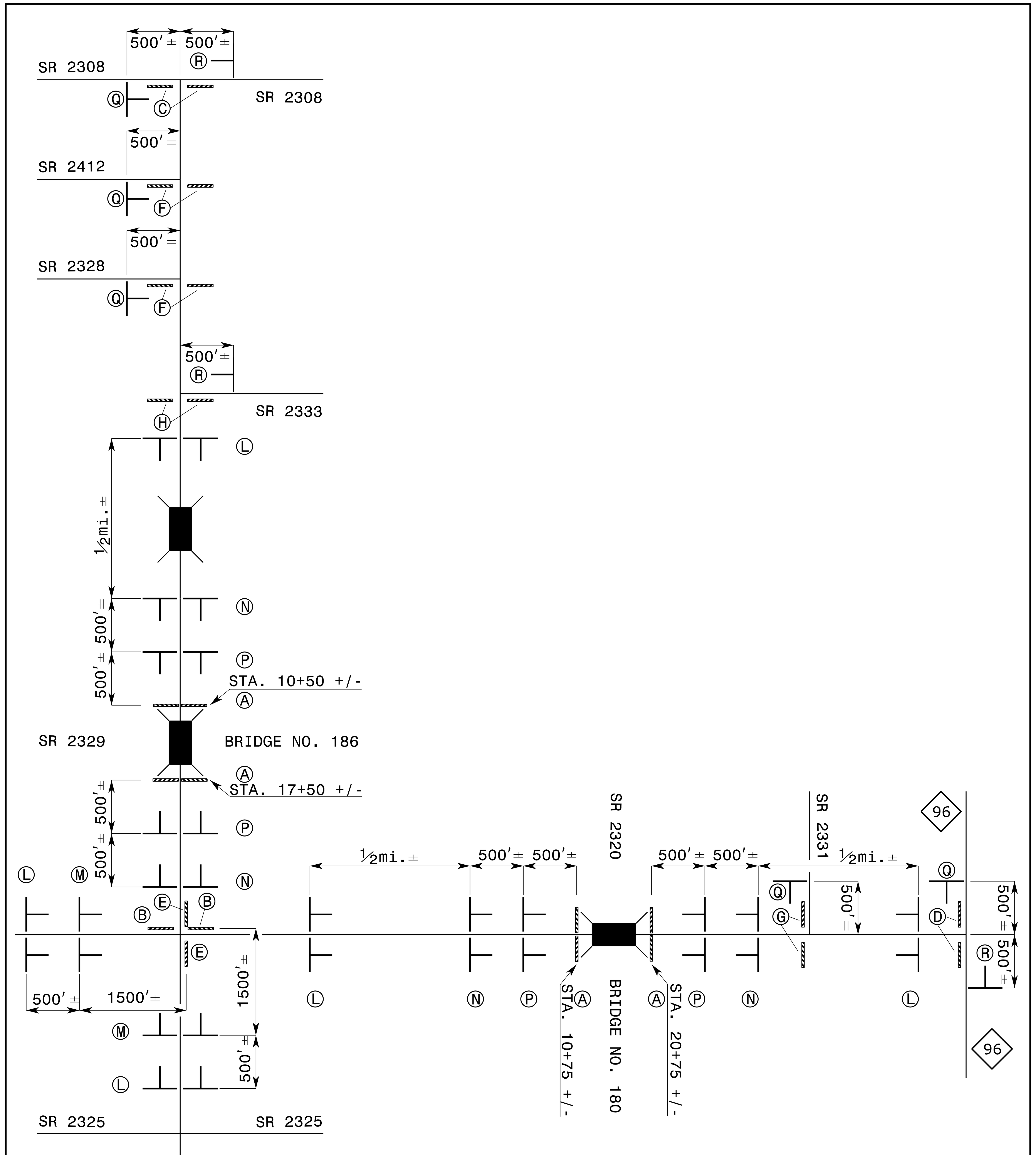
DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
WORK ZONE TRAFFIC CONTROL

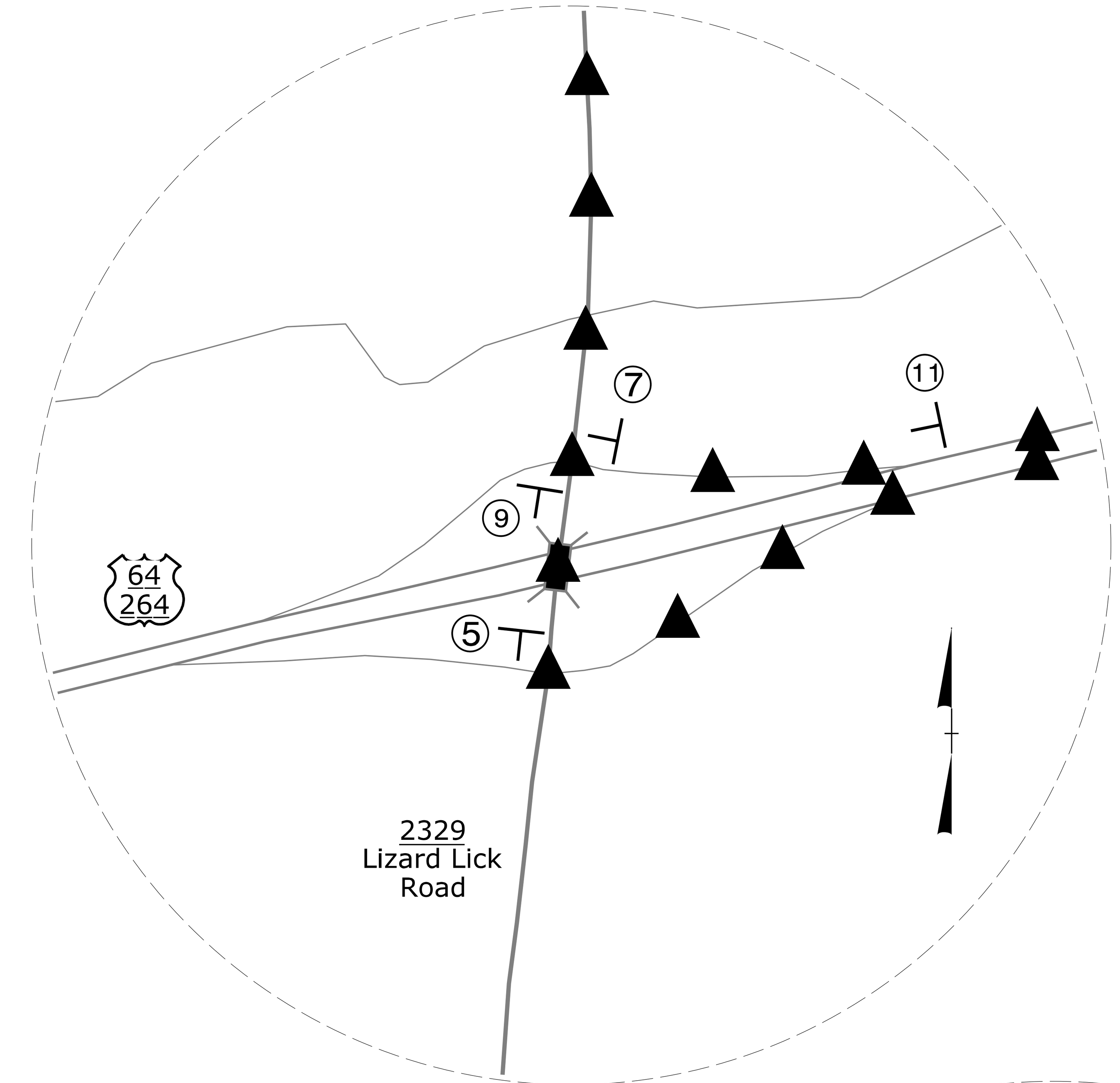
OFFSITE DETOUR
STEP 2

PROJ. REFERENCE NO.	SHEET NO.
17BP.5.R.86	TMP-5



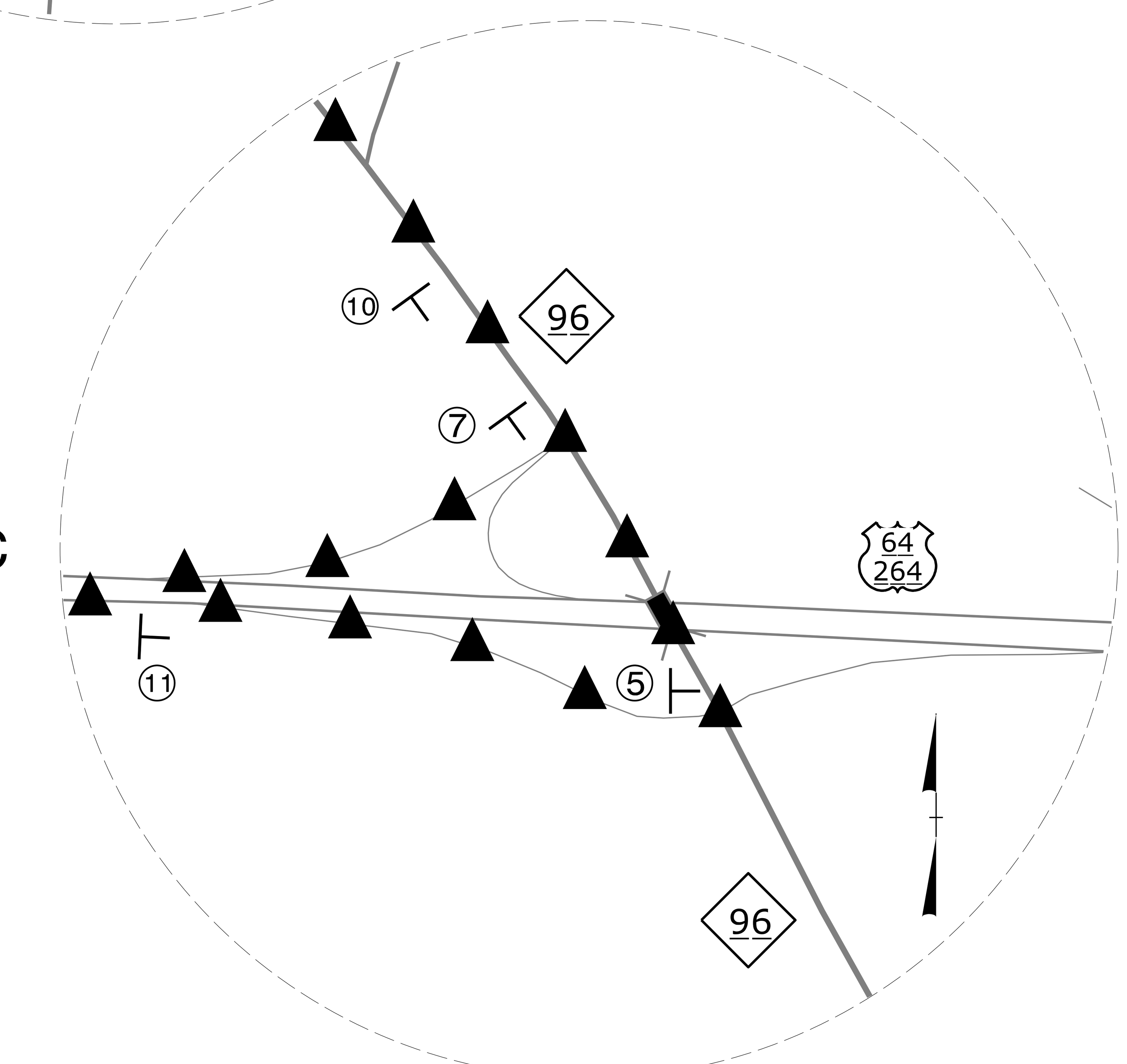
REFER TO ROADWAY STANDARD
DRAWING 1101.03, SHEET 1 OF 9
FOR APPLICABLE NOTES.

INSET A



INSET B

INSET C



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APPROVED: Andrew P. Young
DATE: 7/28/2023
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DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION WORK ZONE TRAFFIC CONTROL

OFFSITE DETOUR
STEP 2

7/27/2023
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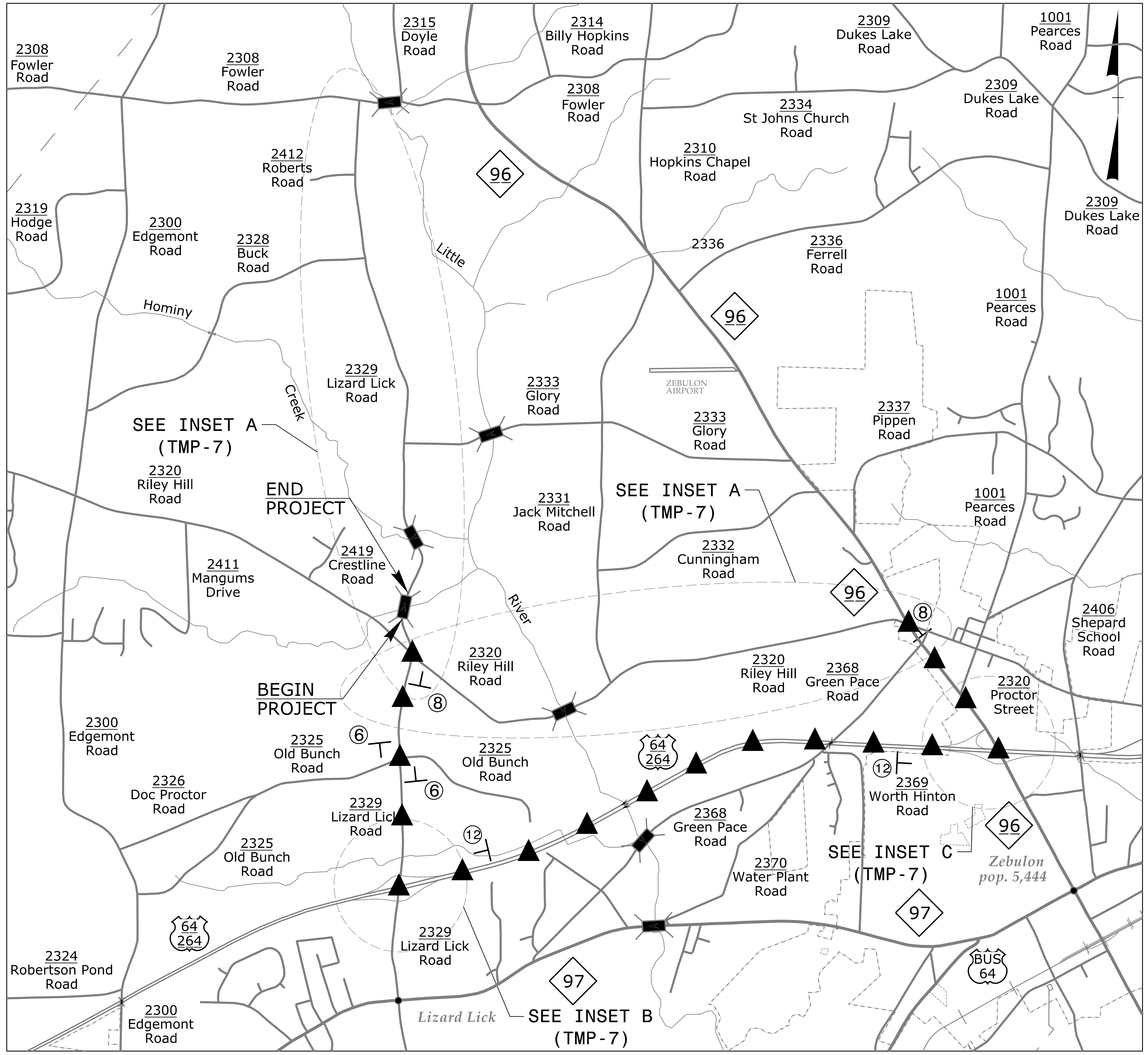
USER:mburns

PROJ. REFERENCE NO.	SHEET NO.
17BP.5.R.86	TMP-6



BRIDGE NO. 180 OFFSITE DETOUR ROUTE

APPROVED: Andrew P. Young

DATE: 7/27/2023

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 034407 ANDREW P. YOUNG

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OFFSITE DETOUR
STEP 6
(IF NEEDED)

7/27/2023
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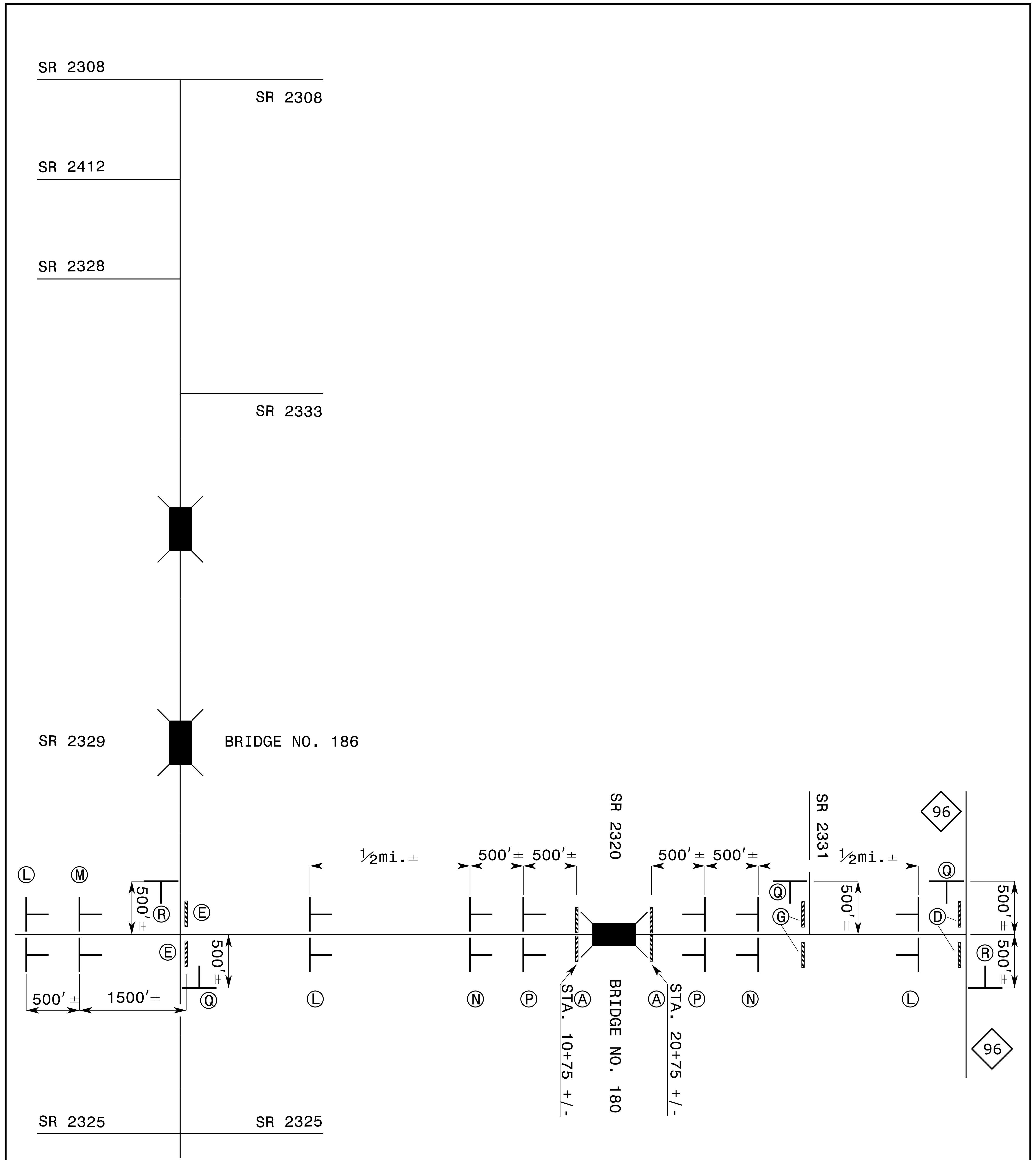
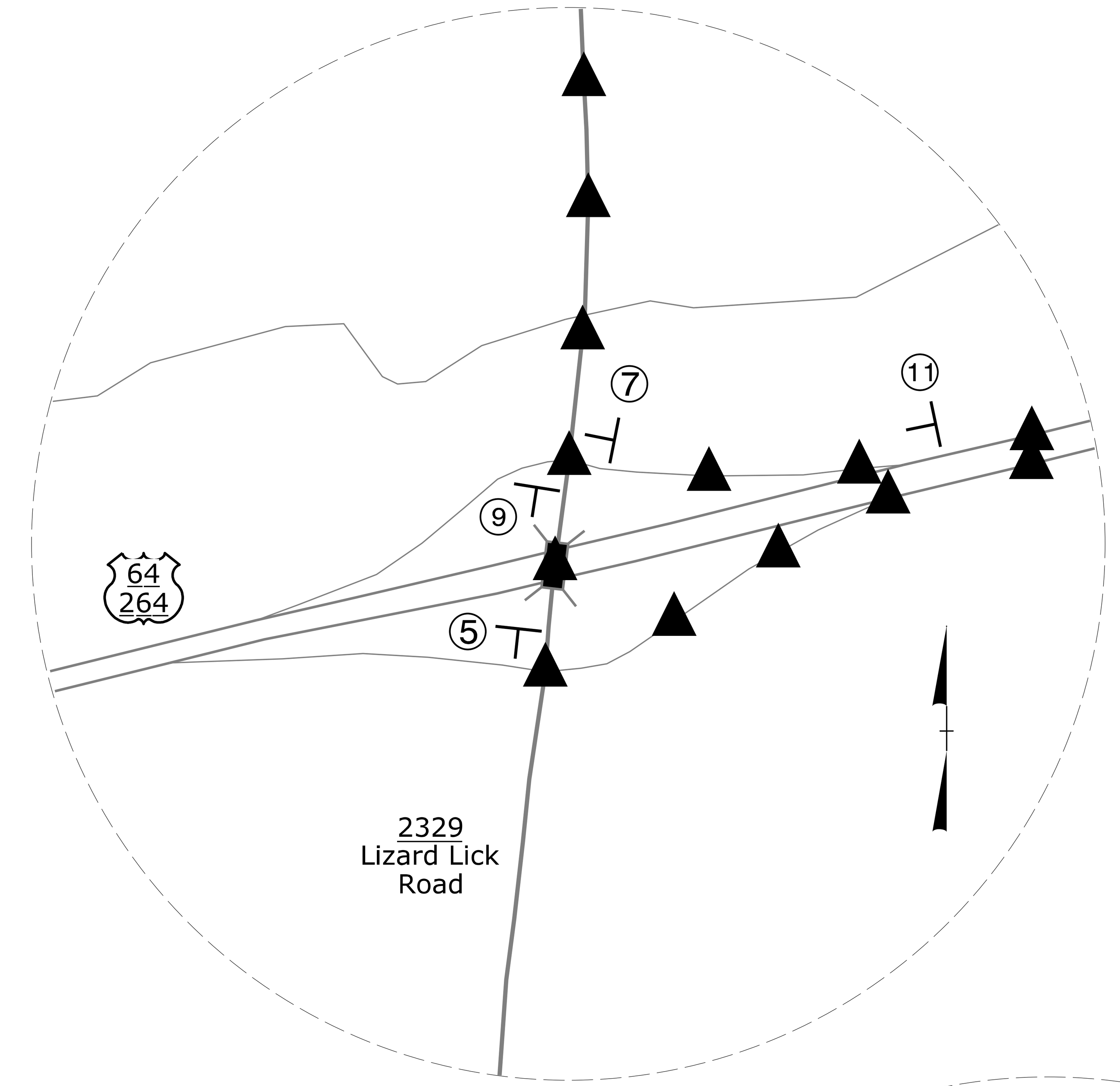
PROJ. REFERENCE NO.	SHEET NO.
17BP.5.R.86	TMP-7



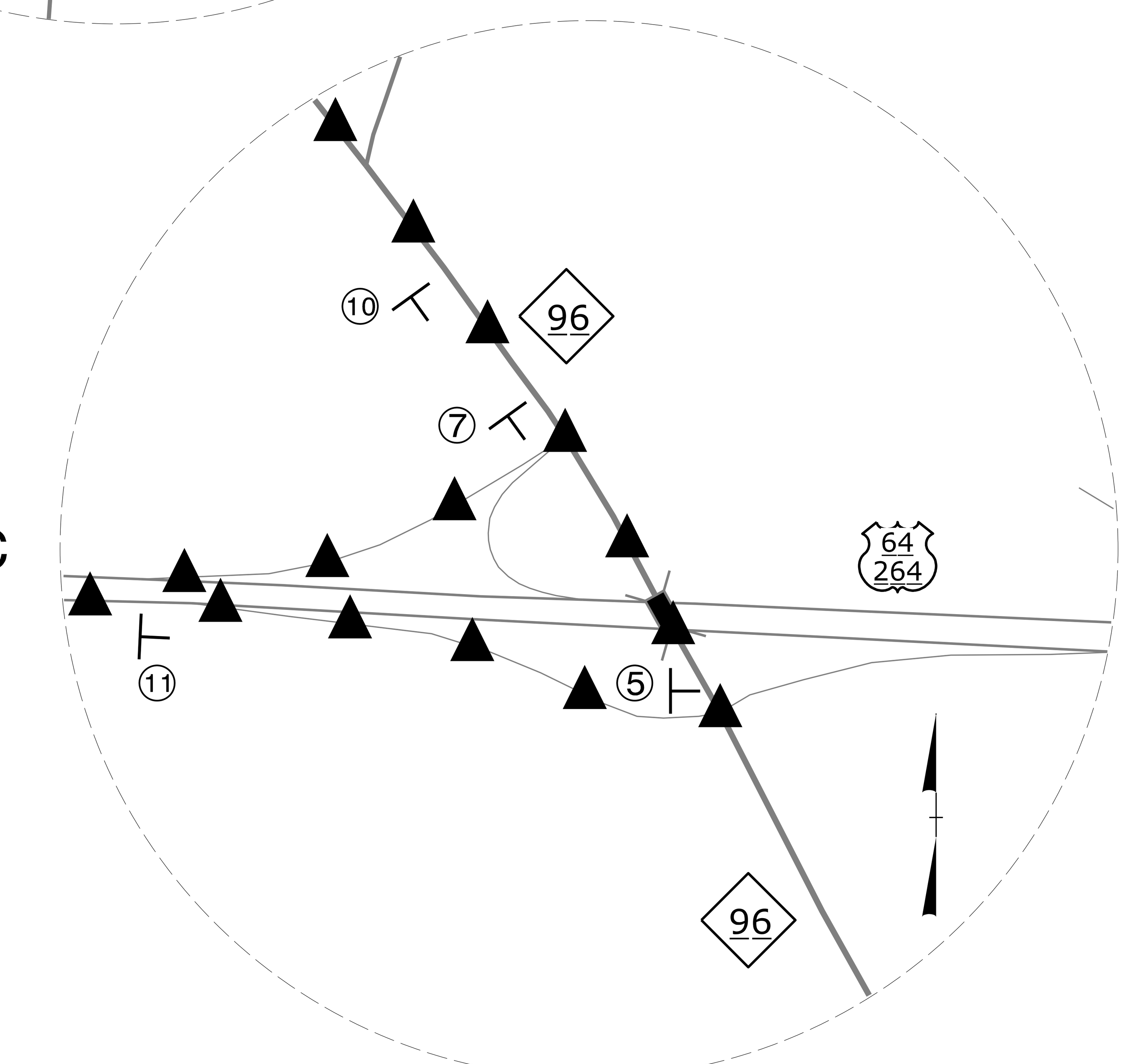
REFER TO ROADWAY STANDARD
DRAWING 1101.03, SHEET 1 OF 9
FOR APPLICABLE NOTES.

INSET A



INSET B

INSET C



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APPROVED: DocuSigned by: Andrew P. Young EF21D93DD62F4EF...

DATE: 7/27/2023

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NORTH CAROLINA PROFESSIONAL SEAL 034407 ENGINEER ANDREW P. YOUNG

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OFFSITE DETOUR
STEP 6
(IF NEEDED)

7/27/2023
...\TCP\910186_TC_TMP_07.dgn
USER:mburns

T.I.P.: 17BP.5.R.86

CONTRACT:

TIP NO.	SHEET NO.
17BP.5.R.86	PMP-1

APPROVED: DocuSigned by: Andrew P. Young EF21D93DD82F4EF...

DATE: 7/27/2023

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 034407 ENGINEER ANDREW P. YOUNG

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKING PLAN

WAKE COUNTY

LOCATION: BRIDGE NO. 186 AT ROCKY BRANCH ON SR 2329 (LIZARD LICK RD.)

ROADWAY STANDARD DRAWING

THE FOLLOWING ROADWAY STANDARDS AS APPEAR IN "ROADWAY STANDARD DRAWINGS" - PROJECT SERVICES UNIT - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 2018 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
1261.01	GUARDRAIL AND BARRIER DELINEATORS - INSTALLATION SPACING
1261.02	GUARDRAIL AND BARRIER DELINEATORS - TYPES AND MOUNTING
1262.01	GUARDRAIL END DELINEATION
1264.01	OBJECT MARKERS - TYPES
1264.02	OBJECT MARKERS - INSTALLATION

PAVEMENT MARKING SCHEDULE

SYMBOL	DESCRIPTION
TA	THERMOPLASTIC WHITE EDGELINE (4", 90 MIL)
TI	THERMOPLASTIC YELLOW DOUBLE CENTER (4", 90 MIL)

GENERAL NOTES

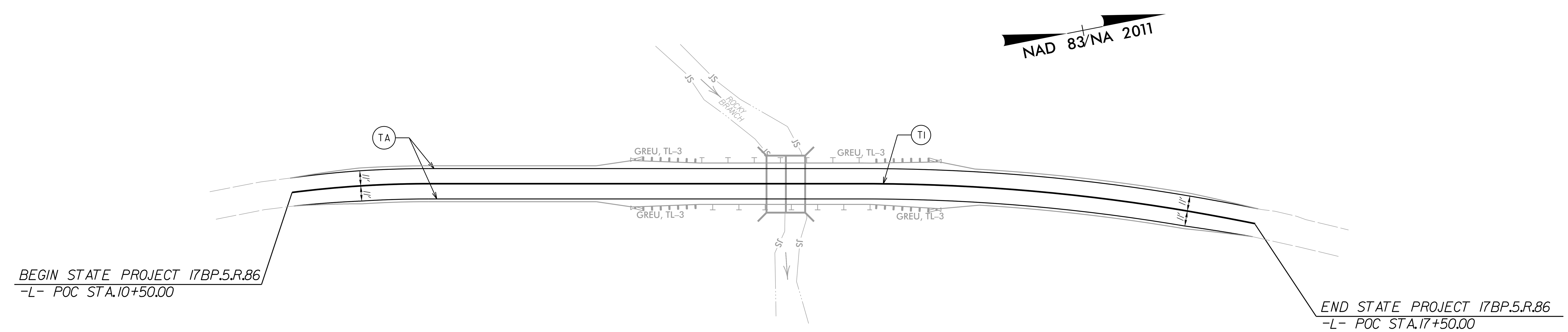
THE FOLLOWING GENERAL NOTES APPLY AT ALL TIMES FOR THE DURATION OF THE CONSTRUCTION PROJECT, EXCEPT WHEN OTHERWISE NOTED IN THE PLAN, OR DIRECTED BY THE ENGINEER.

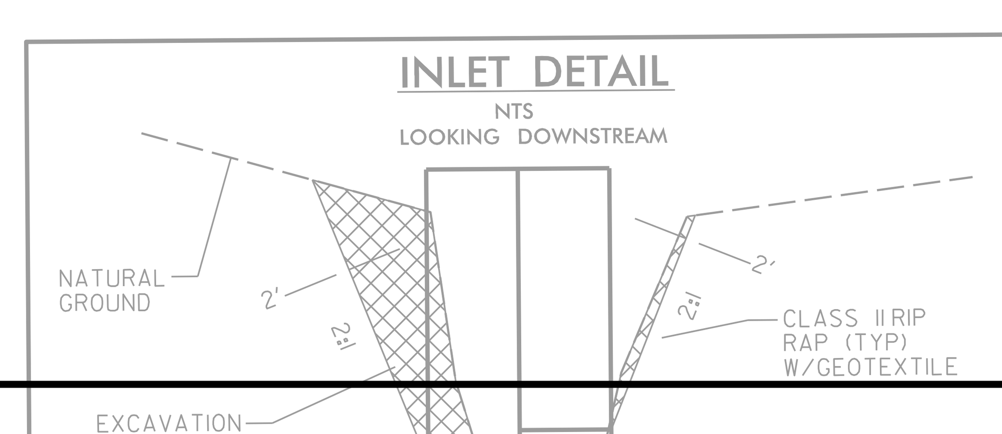
A) INSTALL PAVEMENT MARKINGS AND PAVEMENT MARKERS ON THE FINAL SURFACE AS FOLLOWS:

ROAD NAME	MARKING	MARKER
LIZARD LICK RD.	THERMOPLASTIC	NONE

B) TIE PROPOSED PAVEMENT MARKING LINES TO EXISTING PAVEMENT MARKING LINES.

C) REMOVE/REPLACE ANY CONFLICTING/DAMAGED PAVEMENT MARKINGS.





PLAN PREPARED BY: STEWART

ANDY YOUNG, PE	PROJECT ENGINEER
MICHAEL BURNS, PE	PROJECT DESIGNER

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7/27/2023

TIP PROJECT: 17BP.5.R.86

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.5.R.86	EC-1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
17BP.5.R.86	N/A	PE
17BP.5.R.86	N/A	ROW/UTILITY

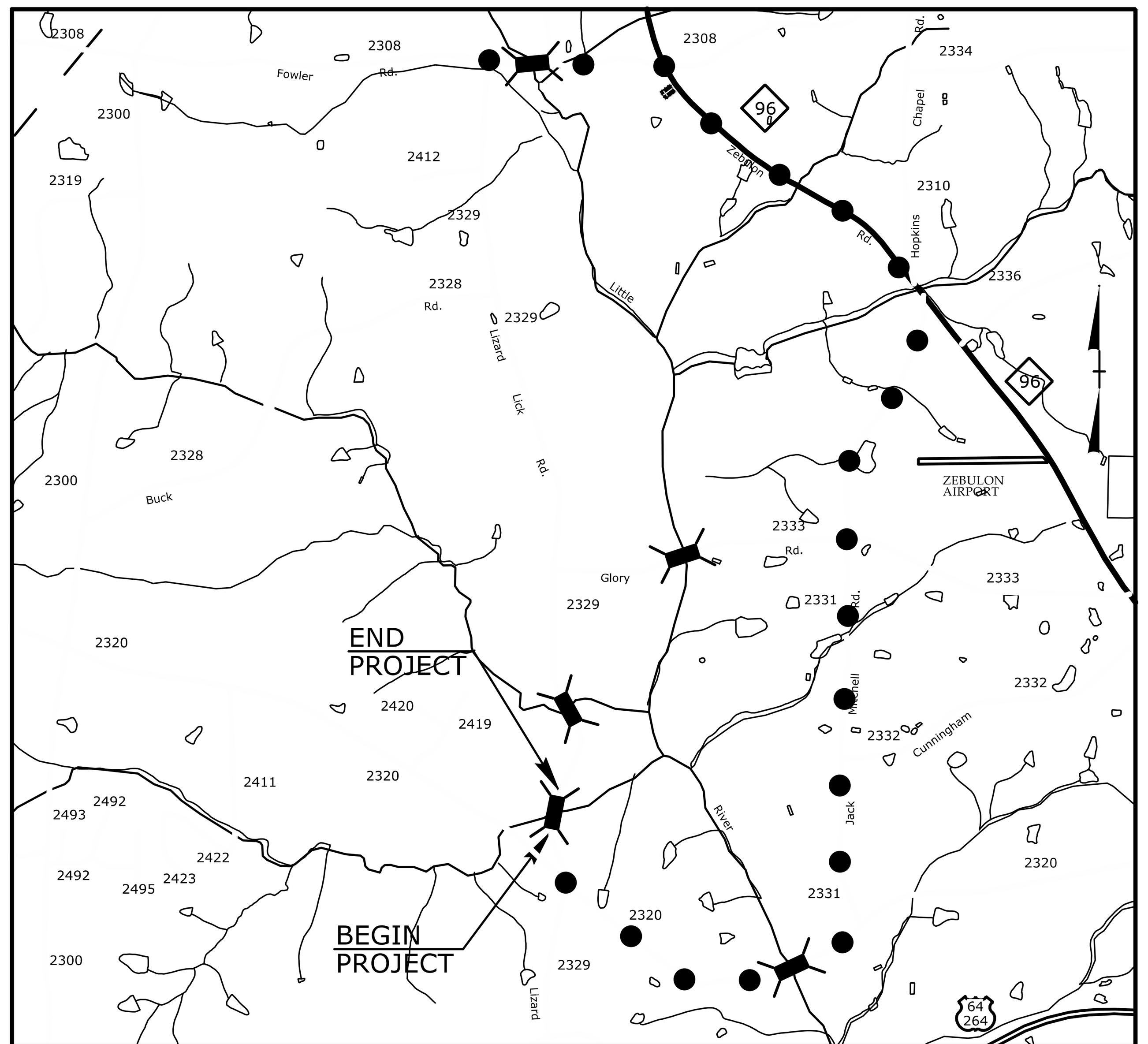
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PLAN FOR PROPOSED
HIGHWAY EROSION CONTROL

WAKE COUNTY

LOCATION: BRIDGE NO. 186 OVER ROCKY BRANCH ON SR 2329 (LIZARD LICK RD.)

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

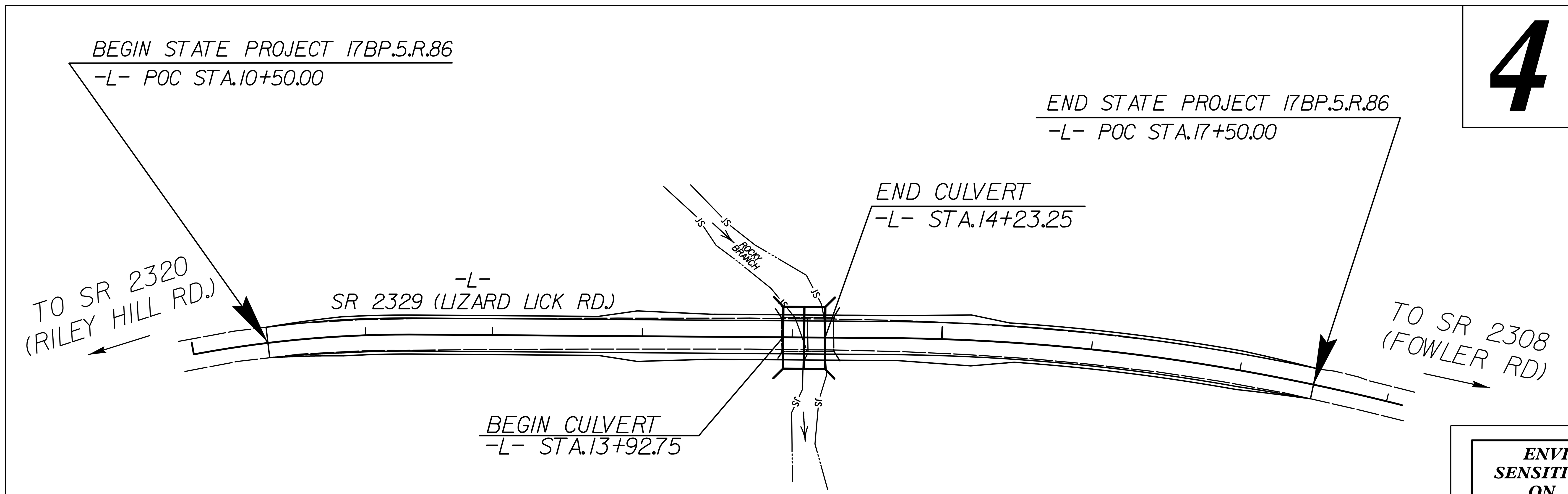


VICINITY MAP

OFF-SITE DETOUR

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

NAD 83/NA 2011



EROSION AND SEDIMENT CONTROL MEASURES

Std. #	Description	Symbol
1630.03	Temporary Silt Ditch	TSD
1630.05	Temporary Diversion	TD
1605.01	Temporary Silt Fence	
1606.01	Special Sediment Control Fence	
1622.01	Temporary Berms and Slope Drains	
1630.02	Silt Basin Type B	
1633.01	Temporary Rock Silt Check Type-A	
	Temporary Rock Silt Check Type-A with Matting and Polyacrylamide (PAM)	
1633.02	Temporary Rock Silt Check Type-B	
	Wattle / Coir Fiber Wattle	FW / CFW
	Wattle / Coir Fiber Wattle with Polyacrylamide (PAM)	
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	
1635.02	Rock Pipe Inlet Sediment Trap Type-B	
1630.04	Stilling Basin	
1630.06	Special Stilling Basin	
	Rock Inlet Sediment Trap:	
1632.01	Type A	A
1632.02	Type B	B
1632.03	Type C	C
	Skimmer Basin	
	Tiered Skimmer Basin	
	Infiltration Basin	

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

THIS PROJECT HAS BEEN DESIGNED TO SENSITIVE WATERSHED STANDARDS.

ENVIRONMENTALLY SENSITIVE AREA(S) EXIST ON THIS PROJECT

Refer To E. C. Special Provisions for Special Considerations.

HIGH QUALITY WATER(S) EXIST ON THIS PROJECT

High Quality Water Zone(s) Exist
From Sta. 12+91
to Sta. 14+79
Refer To E. C. Special Provisions for Special Considerations.

GRAPHIC SCALE

25 0 50
PLANS

25 0 50
PROFILE (HORIZONTAL)

5 0 10
PROFILE (VERTICAL)

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 ENVIRONMENT QUALITY DIVISION OF WATER RESOURCES.

Prepared In the Office of:

vhb

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

Designed by:

ERIC BERGER, PE 4036
NAME — LEVEL III CERTIFICATION NO.

Reviewed In the Office of:

ROADSIDE ENVIRONMENTAL UNIT
1 South Wilmington St.
Raleigh, NC 27611

2018 STANDARD SPECIFICATIONS

Reviewed by:

DONALD PEARSON

Roadway Standard Drawings

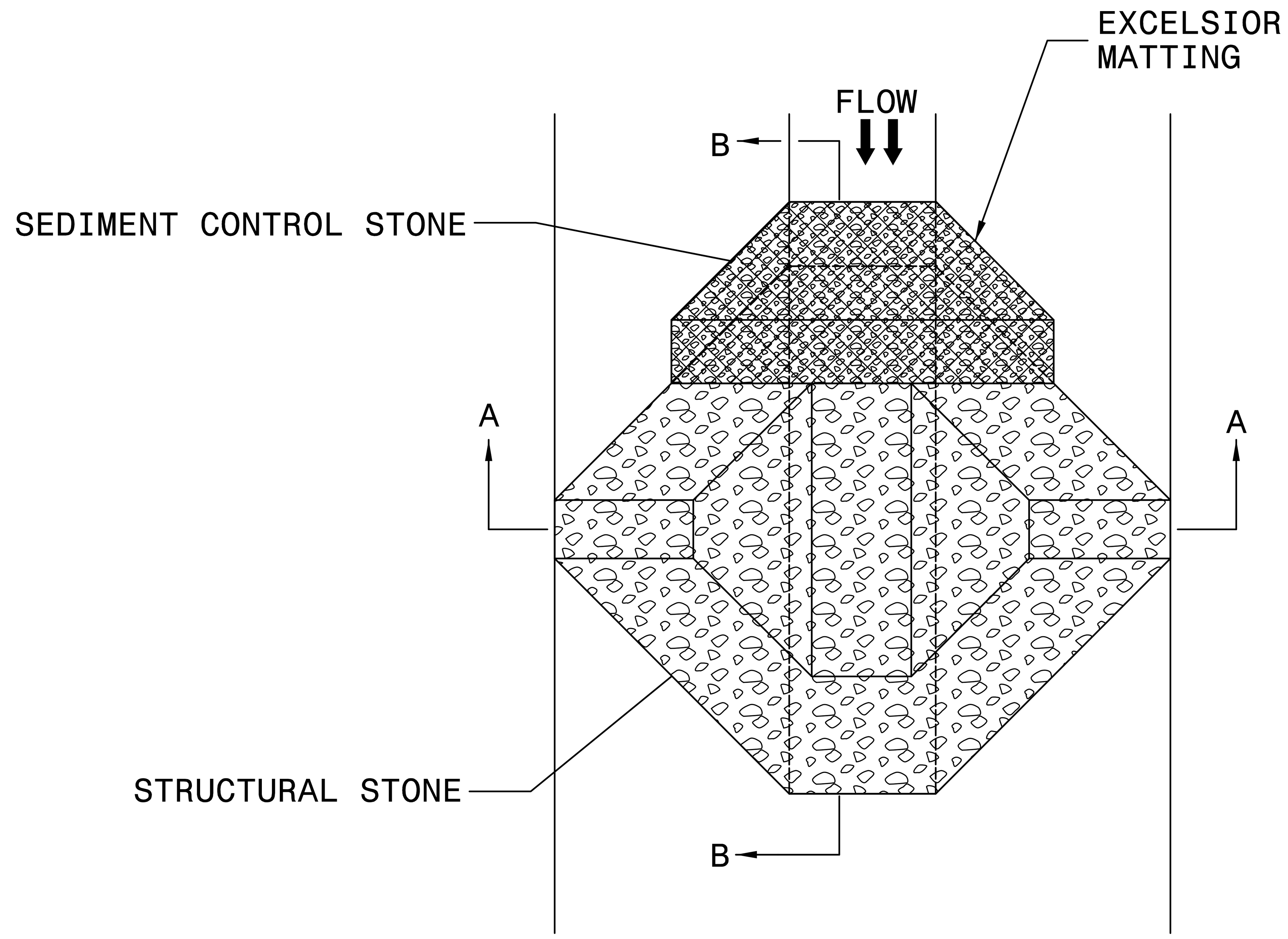
The following roadway english standards as appear in "Roadway Standard Drawings"– Roadway Design Unit – N. C. Department of Transportation – Raleigh, N. C., dated January 2018 and the latest revison thereto are applicable to this project and by reference hereby are considered a part of these plans.

1604.01	*Railroad Erosion Control Detail*	1632.01	*Rock Inlet Sediment Trap Type A*
1605.01	*Temporary Silt Fence*	1632.02	*Rock Inlet Sediment Trap Type B*
1606.01	*Special Sediment Control Fence*	1632.03	*Rock Inlet Sediment Trap Type C*
1607.01	*Gravel Construction Entrance*	1633.01	*Temporary Rock Silt Check Type A*
1622.01	*Temporary Berms and Slope Drains*	1633.02	*Temporary Rock Silt Check Type B*
1630.01	*Riser Basin*	1634.01	*Temporary Rock Sediment Dam Type A*
1630.02	*Silt Basin Type B*	1634.02	*Temporary Rock Sediment Dam Type B*
1630.03	*Temporary Silt Ditch*	1635.01	*Rock Pipe Inlet Sediment Trap Type A*
1630.04	*Stilling Basin*	1635.02	*Rock Pipe Inlet Sediment Trap Type B*
1630.05	*Temporary Diversion*	1640.01	*Coir Fiber Baffle*
1630.06	*Special Stilling Basin*	1645.01	*Temporary Stream Crossing*
1631.01	*Matting Installation*		

3/1/12 PM
R:\Environmental\Design\910186_REU_EC_TSH.dgn
rrobol

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.86	EC-02
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

TEMPORARY ROCK SILT CHECK TYPE 'A' WITH EXCELSIOR MATTING AND POLYACRYLAMIDE (PAM)



PLAN

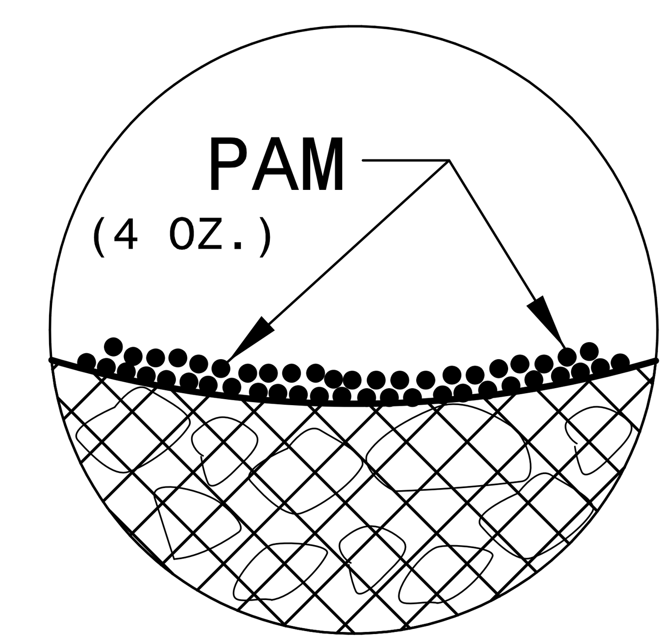
NOTES:

INSTALL TEMPORARY ROCK SILT CHECK TYPE A IN ACCORDANCE WITH ROADWAY STANDARD DRAWING NO. 1633.01.

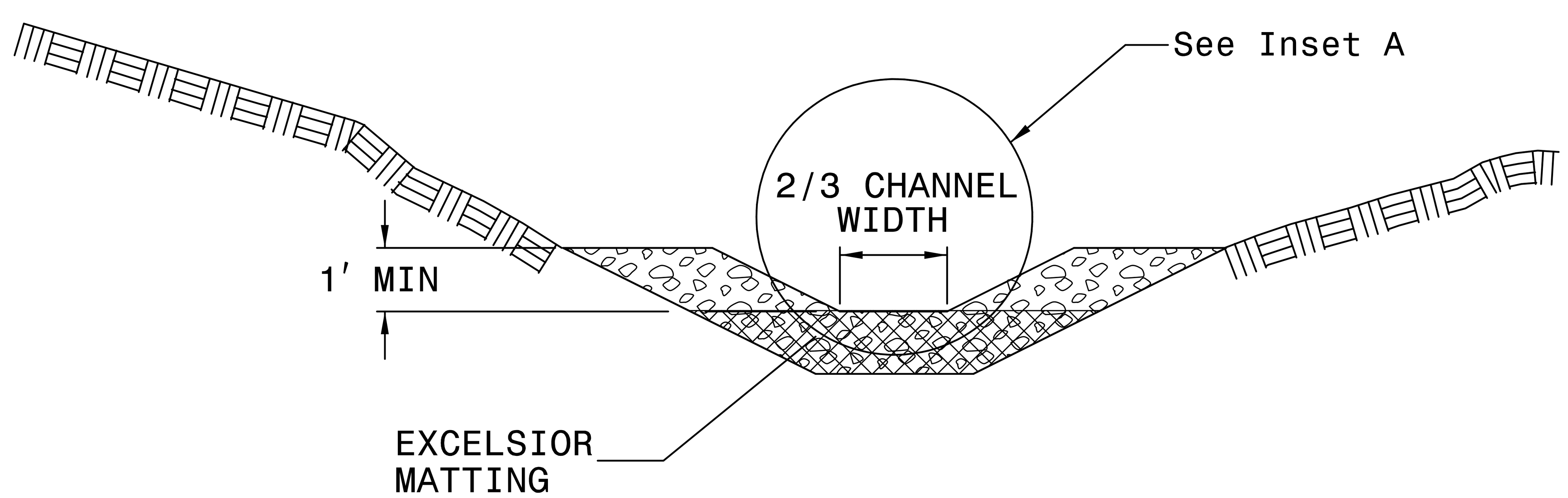
USE EXCELSIOR FOR MATTING MATERIAL AND ANCHOR MATTING SECTION AT TOP AND BOTTOM WITH CLASS B STONE.

PRIOR TO POLYACRYLAMIDE (PAM) APPLICATION, OBTAIN A SOIL SAMPLE FROM PROJECT LOCATION, AND FROM OFFSITE MATERIAL, AND ANALYZE FOR APPROPRIATE PAM FLOCCULANT TO BE APPLIED TO EACH ROCK SILT CHECK.

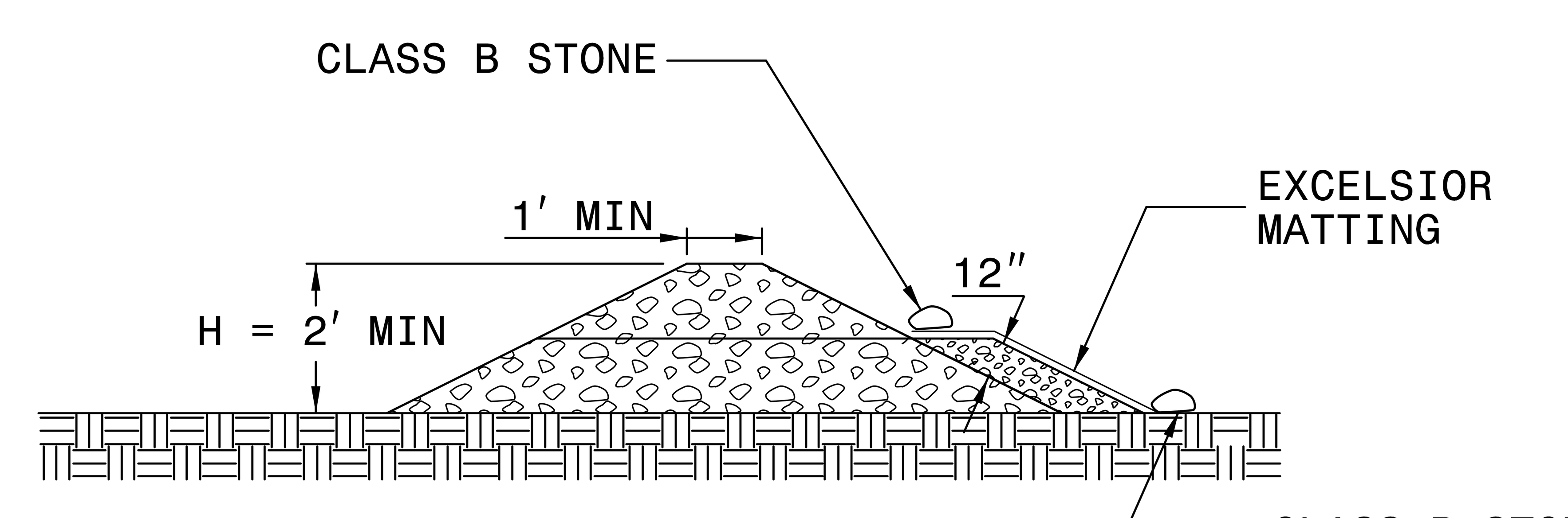
INITIALLY APPLY 4 OUNCES OF POLYACRYLAMIDE (PAM) TO TOP OF MATTING SECTION AND AFTER EVERY RAINFALL EVENT THAT EQUALS OR EXCEEDS 0.50 INCHES.



INSET A



SECTION A-A



SECTION B-B

NOT TO SCALE

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 OR FLATTER	14 DAYS	7 DAYS FOR SLOPES GREATER THAN 50' IN LENGTH.
ALL OTHER AREAS WITH SLOPES FLATTER THAN 4:1	14 DAYS	NONE, EXCEPT FOR PERIMETERS AND HQW ZONES.

PROJECT REFERENCE NO.	SHEET NO.
I7BP.5.R.86	EC-04/CONST.04

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 034407 ANDREW P. YOUNG

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043870 REID B. ROBOL

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

8/17/99

REVISIONS

-L-

PI Sta 10+74.78	PI Sta 15+80.11	PI Sta 17+53.00
Δ = 11° 00' 32.8" (RT)	Δ = 9° 27' 36.1" (RT)	Δ = 4° 14' 28.9" (RT)
D = 7° 23' 00.5"	D = 4° 05' 33.2"	D = 3° 41' 04.6"
L = 149.10'	L = 231.15'	L = 115.11'
T = 74.78'	T = 115.84'	T = 57.58'
R = 776.00'	R = 1,400.00'	R = 1,555.00'
V_D = 45 MPH	Runoff = 100'	Runoff = 100'
Runoff = 100'	SE = .04	SE = .04
SE = .04		

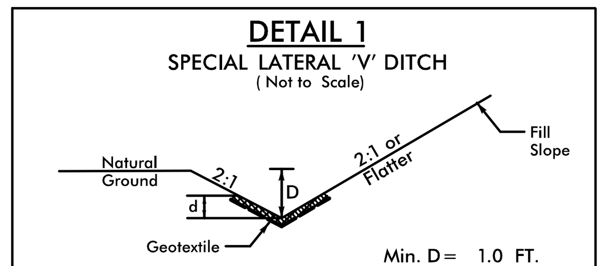
CLEARING AND GRUBBING
EROSION CONTROL FOR
CONSTRUCTION SHEET 04

NAD 83/NA 2011

ENVIRONMENTALLY SENSITIVE AREA
SEE PROJECT SPECIAL PROVISIONS

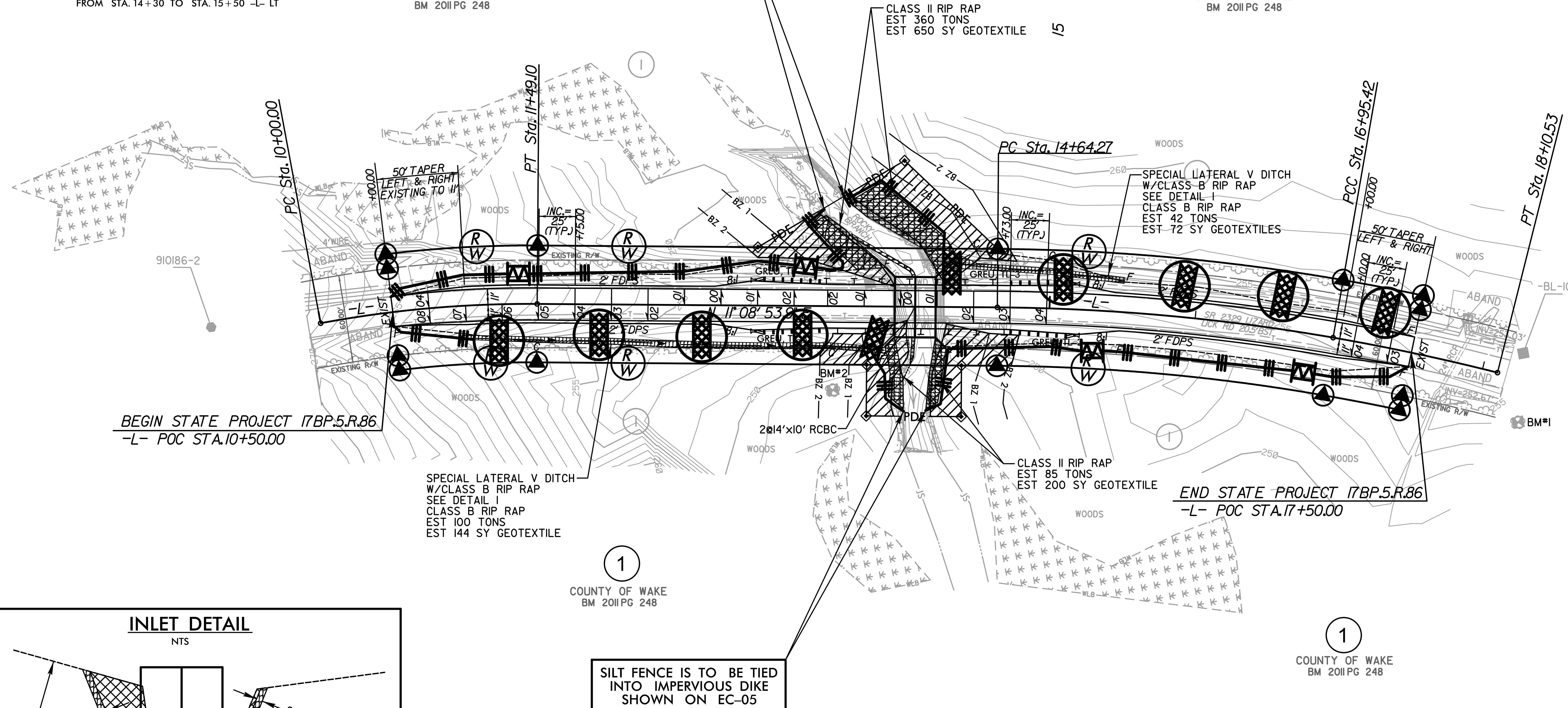
DETAIL 1

SPECIAL LATERAL 'V' DITCH
(Not to Scale)



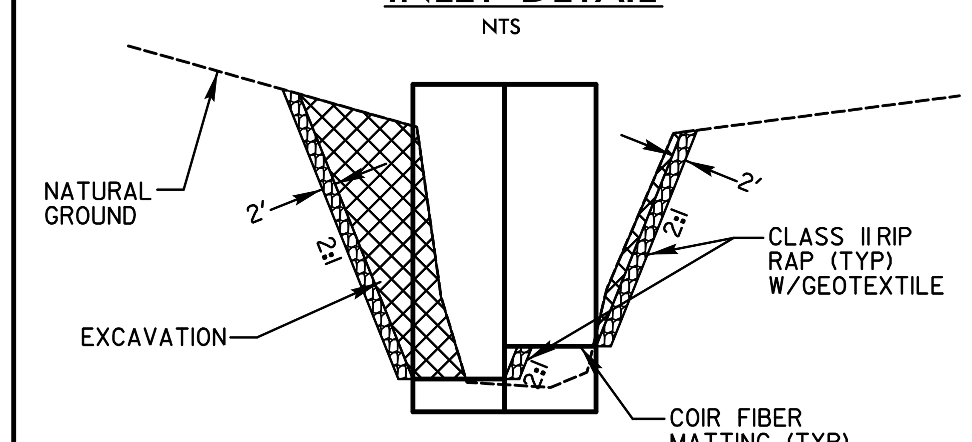
Type of Liner = CLASS B RIP RAP

FROM STA. 11+00 TO STA. 13+88 -L- RT
FROM STA. 14+30 TO STA. 15+50 -L- LT



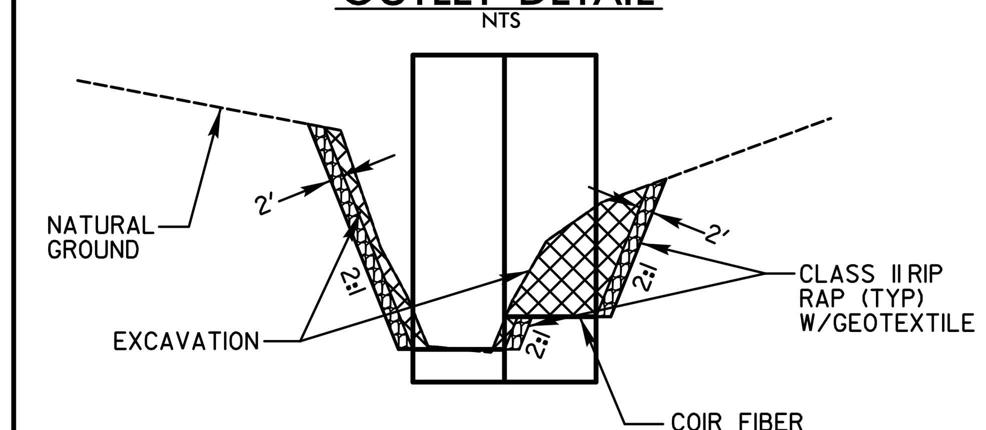
INLET DETAIL

NTS



OUTLET DETAIL

NTS



FOR -L- PROFILE, SEE SHEET 5

FOR CULVERT PLANS, SEE SHEETS C-1 THRU C-7

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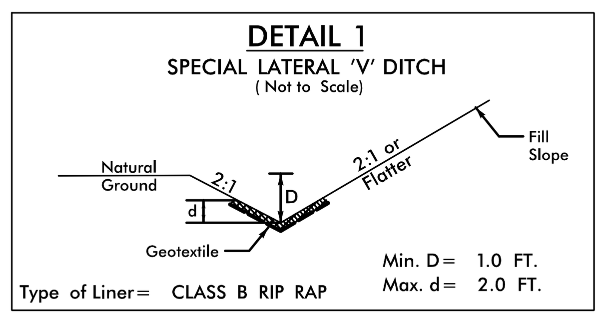
rrobol

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.86	EC-05/CONST.04
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

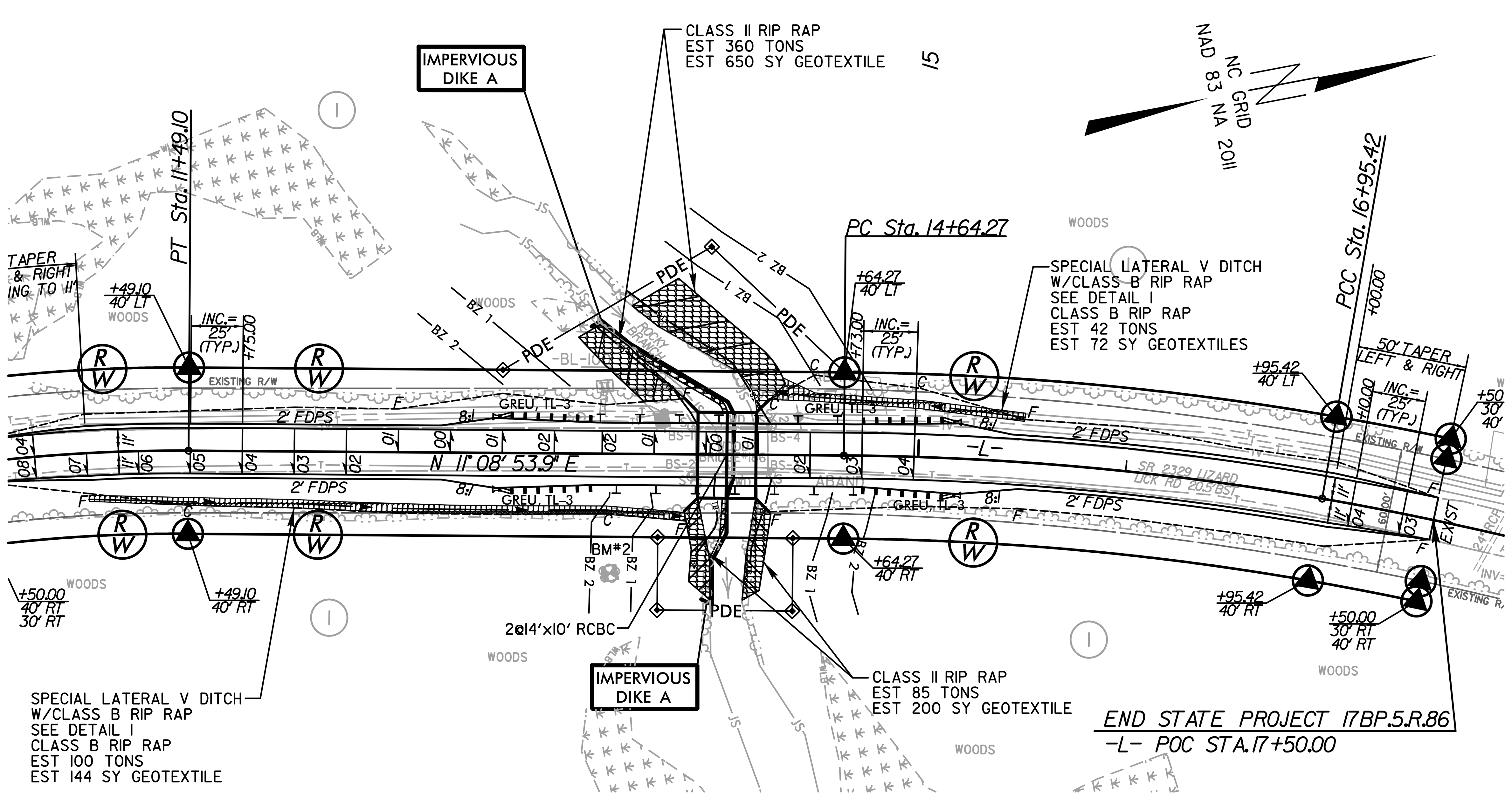
CULVERT CONSTRUCTION SEQUENCE STA. 14+08 –L–

PHASE I

1. CLOSE ROAD AND DETOUR TRAFFIC.
2. INSTALL IMPERVIOUS DIKE A AND DEWATER SITE UTILIZING A SPECIAL STILLING BASIN..
3. REMOVE BRIDGE.
4. INSTALL SOUTH BARREL AND SOUTH INLET AND OUTLET BANK WORK AND STABILIZE.
5. REMOVE IMPERVIOUS DIKE A AND SPECIAL STILLING BASIN.

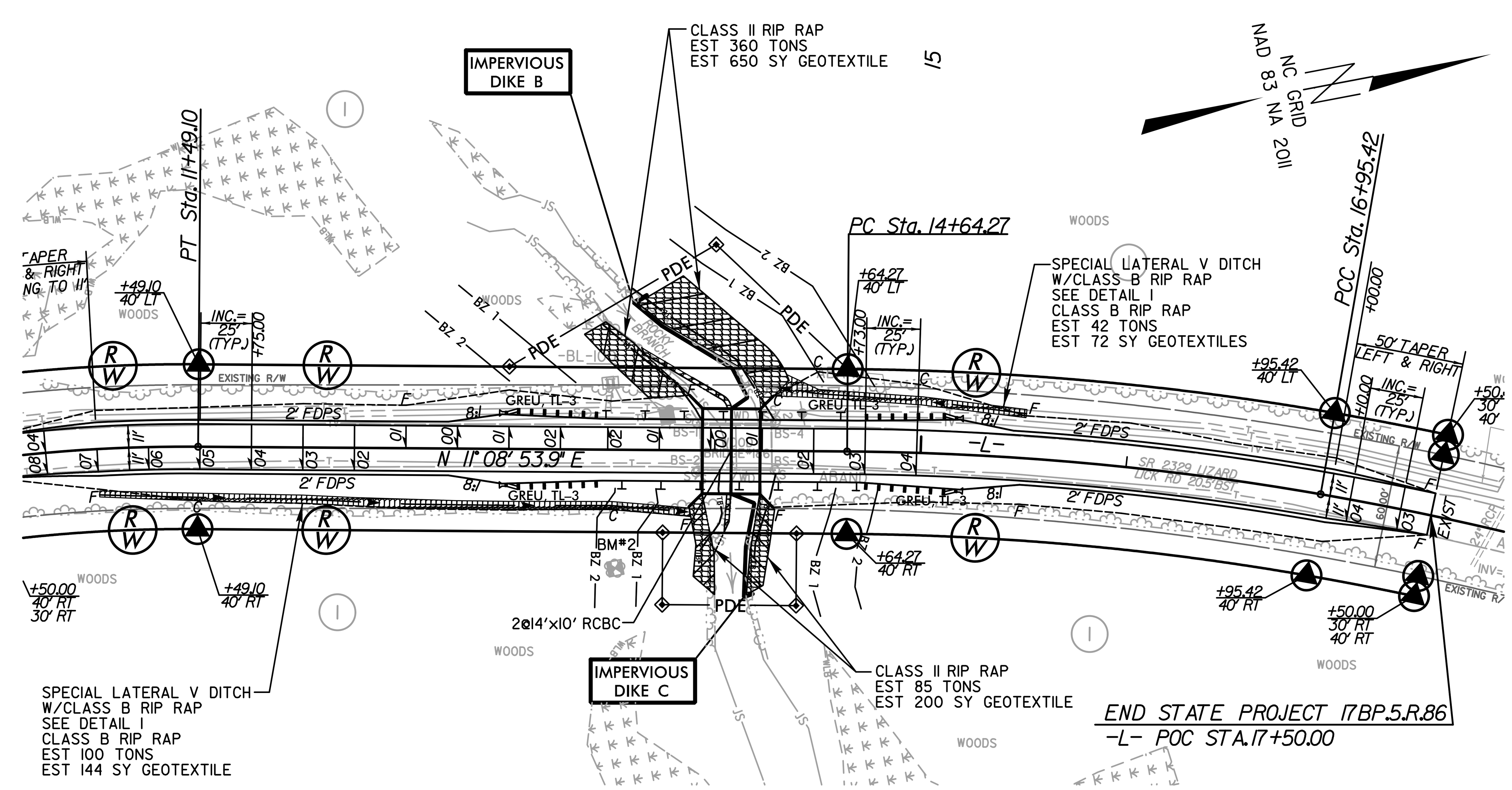


FROM STA. 11+00 TO STA. 13+88 –L– RT
FROM STA. 14+30 TO STA. 15+50 –L– LT



PHASE II

6. INSTALL IMPERVIOUS DIKES B AND C.
7. DIVERT WATER THROUGH THE SOUTH BARREL AND DEWATER SITE.
8. INSTALL NORTH BARREL AND NORTH INLET AND OUTLET BANK WORK AND STABILIZE.
9. REMOVE IMPERVIOUS DIKES B AND C.
10. COMPLETE ROADWAY.



PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.86	EC-06/CONST.04
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

8/17/99

REVISIONS

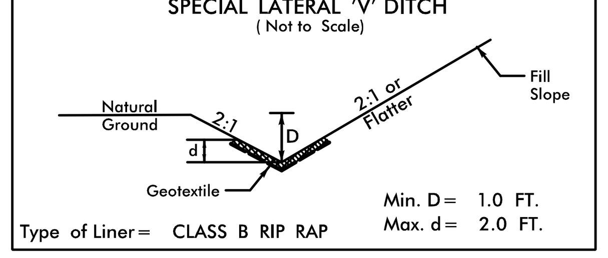
-L-

PI Sta 10+74.78	PI Sta 15+80.11	PI Sta 17+53.00
Δ = 11° 00' 32.8" (RT)	Δ = 9° 27' 36.1" (RT)	Δ = 4° 14' 28.9" (RT)
D = 7° 23' 00.5"	D = 4° 05' 33.2"	D = 3° 41' 04.6"
L = 149.10'	L = 231.15'	L = 115.11'
T = 74.78'	T = 115.84'	T = 57.58'
R = 776.00'	R = 1,400.00'	R = 1,555.00'
V_D = 45 MPH	Runoff = 100'	Runoff = 100'
Runoff = 100'	SE = .04	SE = .04
SE = .04		

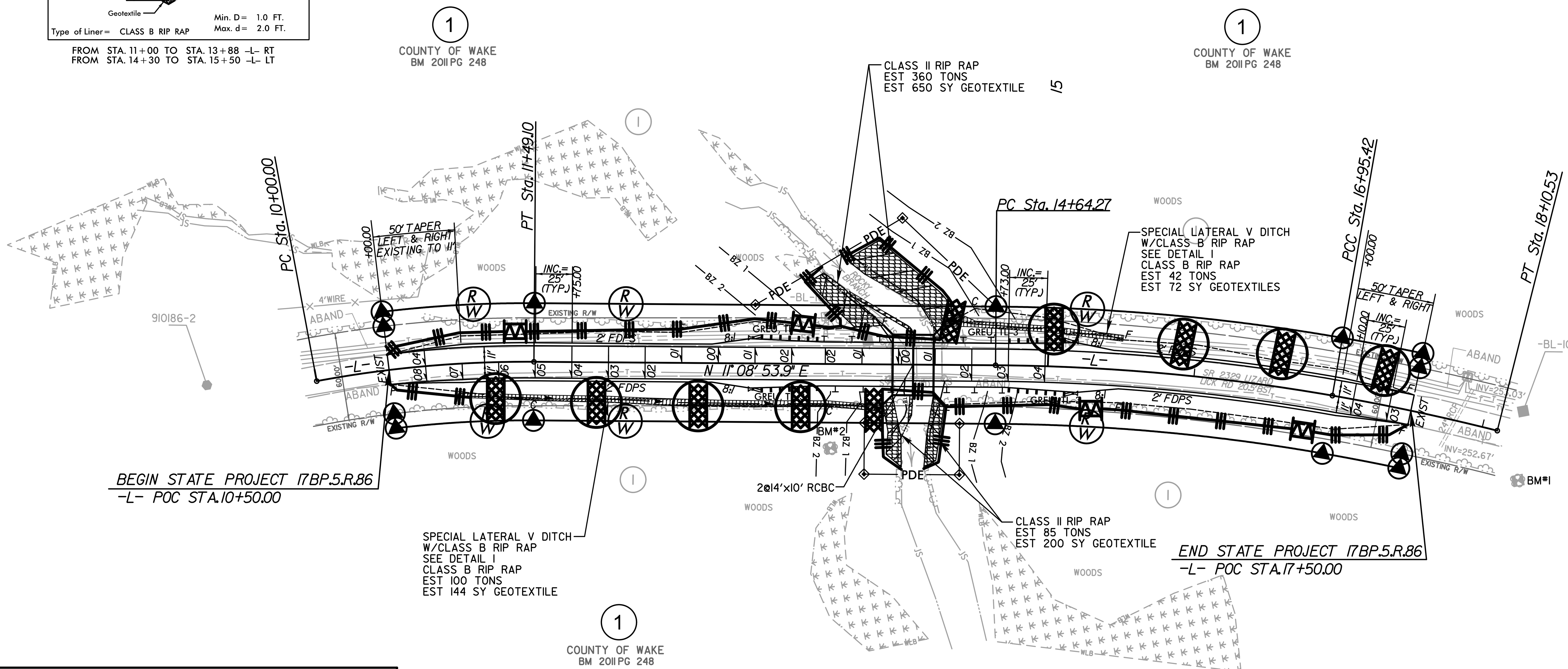
Place Matting for Erosion Control on Slope as Work Allows. Sta. 10+50 to Sta. 17+50

NAD 83/NA 2011

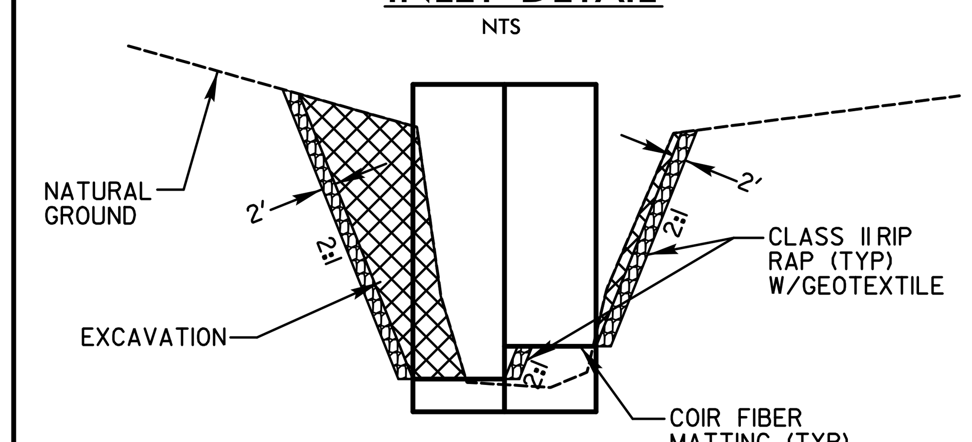
DETAIL 1
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



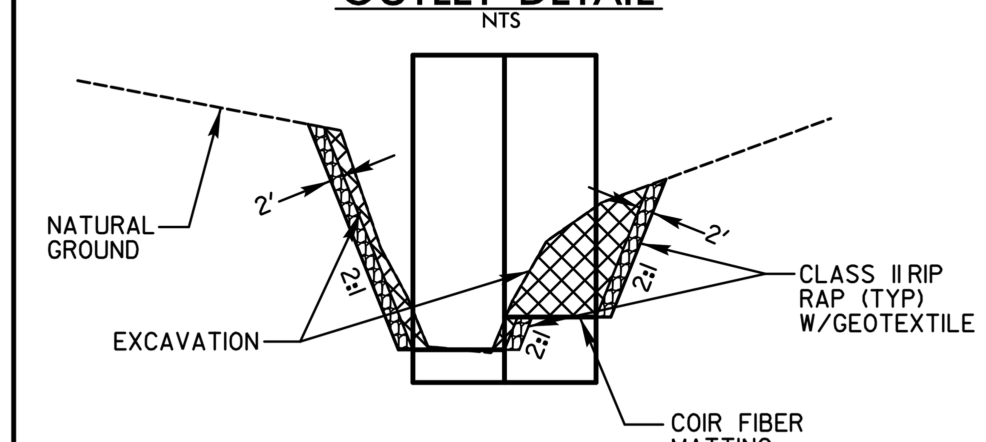
FROM STA. 11+00 TO STA. 13+88 -L- RT
FROM STA. 14+30 TO STA. 15+50 -L- LT



INLET DETAIL
NTS



OUTLET DETAIL
NTS



FOR -L- PROFILE, SEE SHEET 5

FOR CULVERT PLANS, SEE SHEETS C-1 THRU C-7

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.5.R.86	RF-1	

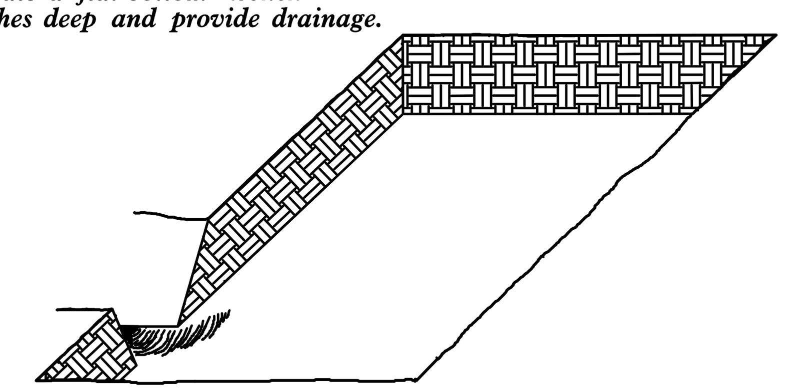
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION

PLANTING DETAILS

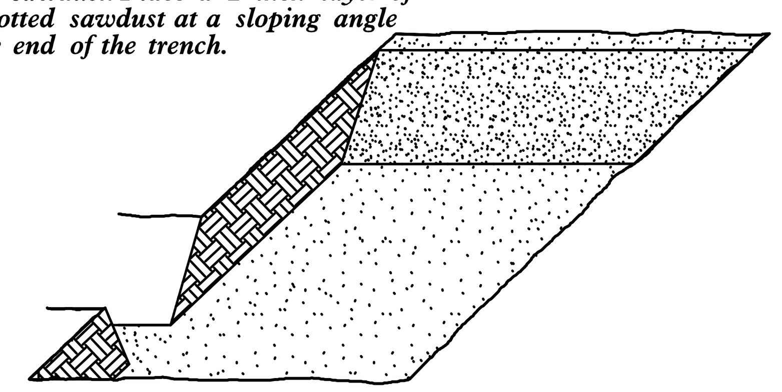
SEEDLING / LINER BAREROOT PLANTING DETAIL

HEALING IN

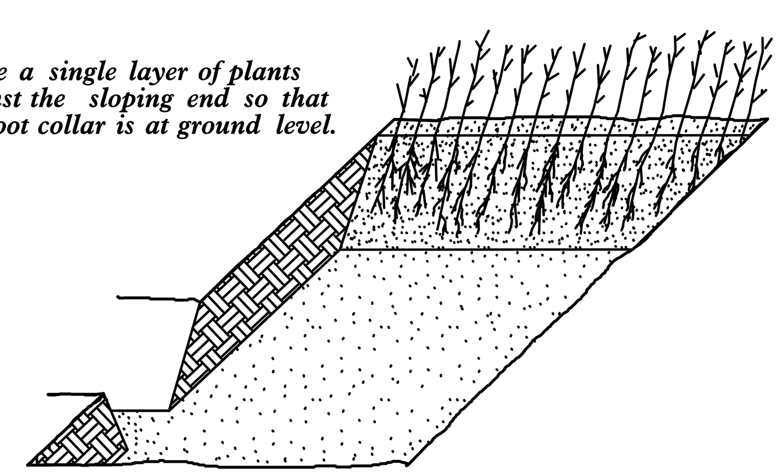
1. Locate a healing-in site in a shady, well protected area.
2. Excavate a flat bottom trench 12 inches deep and provide drainage.



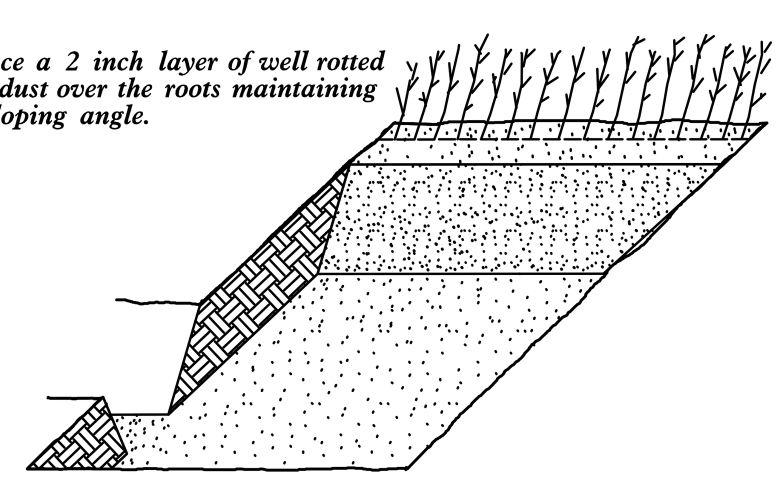
3. Backfill the trench with 2 inches well rotted sawdust. Place a 2 inch layer of well rotted sawdust at a sloping angle at one end of the trench.



4. Place a single layer of plants against the sloping end so that the root collar is at ground level.

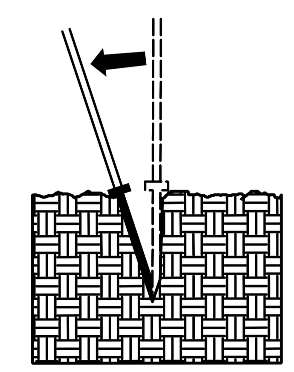


5. Place a 2 inch layer of well rotted sawdust over the roots maintaining a sloping angle.

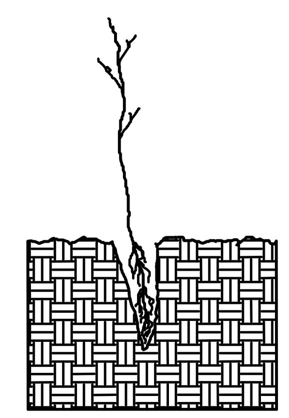


6. Repeat layers of plants and sawdust as necessary and water thoroughly.

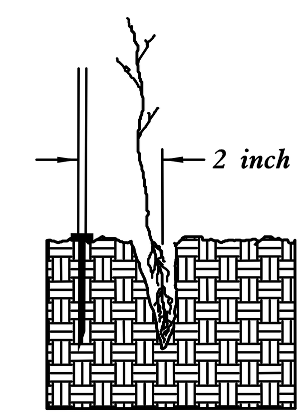
DIBBLE PLANTING METHOD
USING THE KBC PLANTING BAR



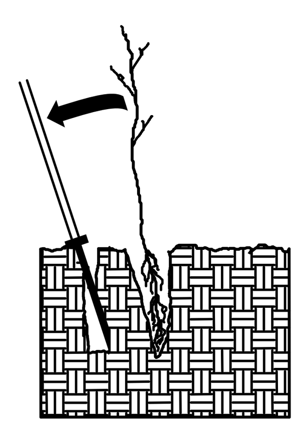
1. Insert planting bar as shown and pull handle toward planter.



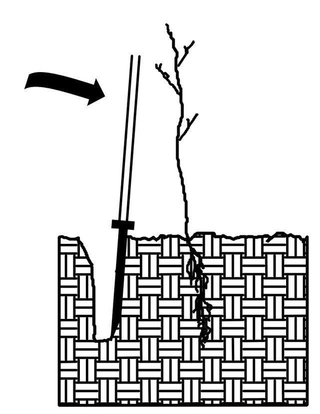
2. Remove planting bar and place seedling at correct depth.



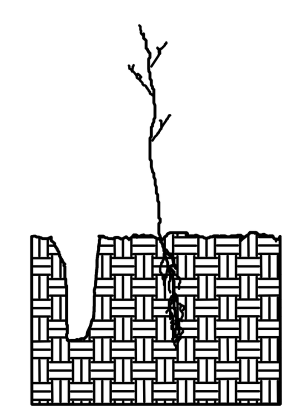
3. Insert planting bar 2 inches toward planter from seedling.



4. Pull handle of bar toward planter, firming soil at bottom.



5. Push handle forward firming soil at top.

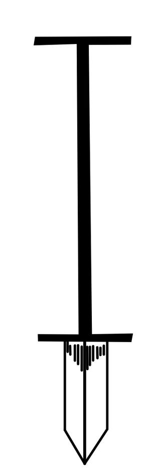


6. Leave compaction hole open. Water thoroughly.

PLANTING NOTES:

PLANTING BAG
During planting, seedlings shall be kept in a moist canvas bag or similar container to prevent the root systems from drying.

KBC PLANTING BAR
Planting bar shall have a blade with a triangular cross section, and shall be 12 inches long, 4 inches wide and 1 inch thick at center.



ROOT PRUNING
All seedlings shall be root pruned, if necessary, so that no roots extend more than 10 inches below the root collar.

REFORESTATION

☐ TREE REFORESTATION SHALL BE PLANTED 6 FT. TO 10 FT. ON CENTER, RANDOM SPACING, AVERAGING 8 FT. ON CENTER, APPROXIMATELY 680 PLANTS PER ACRE.

REFORESTATION

MIXTURE, TYPE, SIZE, AND FURNISH SHALL CONFORM TO THE FOLLOWING:

33%	LIRIODENDRON TULIPIFERA	TULIP POPLAR	12 in – 18 in BR
33%	PLATANUS OCCIDENTALIS	AMERICAN SYCAMORE	12 in – 18 in BR
34%	BETULA NIGRA	RIVER BIRCH	12 in – 18 in BR

REFORESTATION DETAIL SHEET

N.C.D.O.T. – ROADSIDE ENVIRONMENTAL UNIT

TIP PROJECT: 17BP.5.R.86

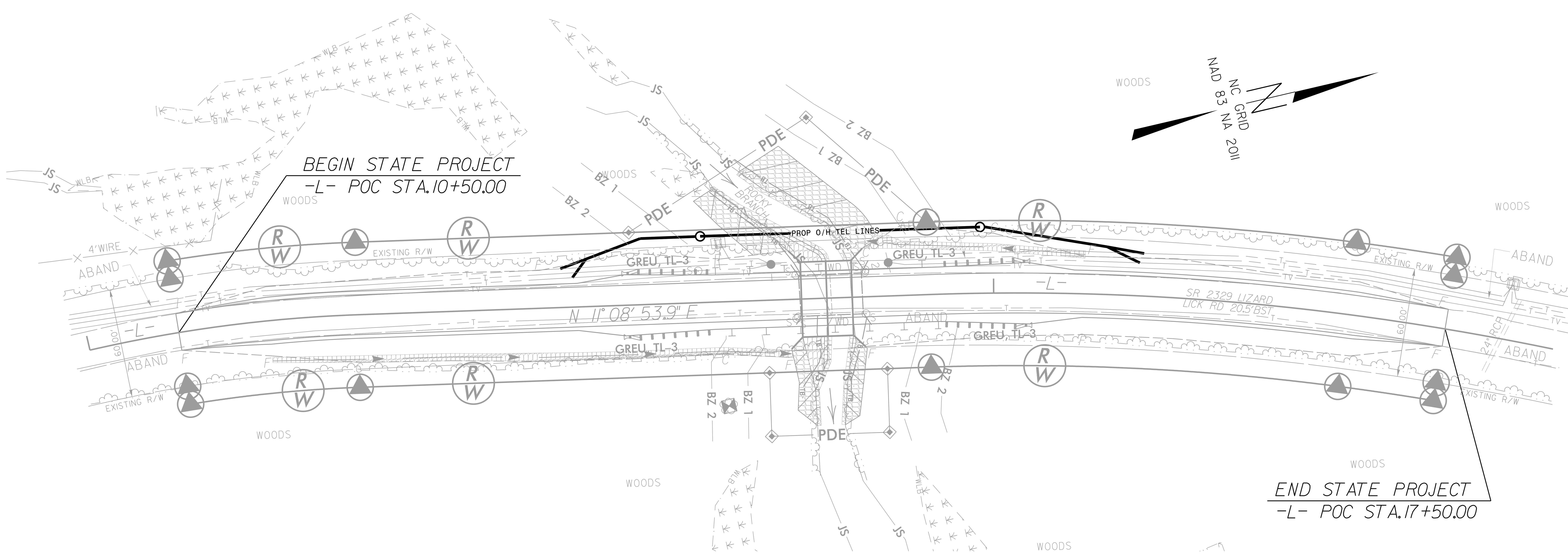
T.I.P. NO.	SHEET NO.
17BP.5.R.86	UO-1

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

UTILITIES BY OTHERS PLANS
WAKE COUNTY

LOCATION: BRIDGE NO. 186 OVER ROCKY BRANCH ON SR 2329 (LIZARD LICK RD)

TYPE OF WORK: PERMANENT TELECOMMUNICATIONS RELOCATION



GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
UO-1	TITLE SHEET
UO-2	UTILITY BY OTHERS PLAN SHEET

UTILITY OWNERS ON PROJECT

(A) AT&T – TELECOMMUNICATIONS

PREPARED IN THE OFFICE OF:

STEWART

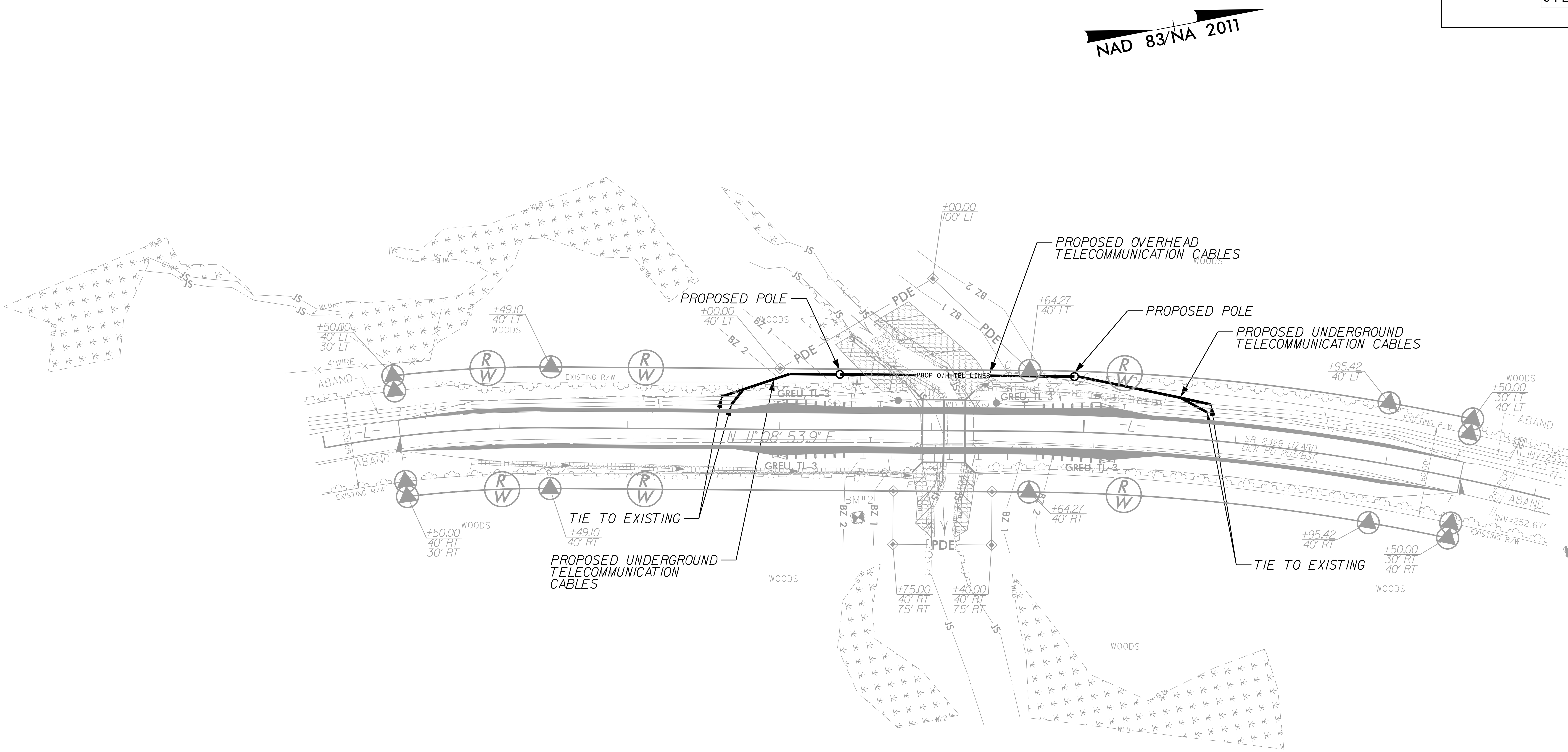
DAVID RUGGLES, PE	PROJECT ENGINEER
ELIZABETH PHELPS, EI	PROJECT DESIGN ENGINEER

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.86	UO-2

UTILITIES BY OTHERS

NOTE:
ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS

STEWART



8/17/99

2/27/2019
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PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.86	X-1A

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

NOTE: EMBANKMENT COLUMN DOES NOT INCLUDE BACKFILL FOR UNDERCUT

CROSS-SECTION SUMMARY

Station L	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
10+50.00	0	0
11+00.00	44	0
11+50.00	26	4
12+00.00	11	14
12+50.00	7	28
13+00.00	7	44
13+50.00	6	65
14+00.00	2	341
14+50.00	13	345
15+00.00	26	58
15+50.00	25	20
16+00.00	31	9
16+50.00	41	6
17+00.00	46	3
17+50.00	50	1

Approximate quantities only. Unclassified excavation, borrow excavation, fine grading, clearing and grubbing, and removal of existing pavement will be paid for at the lump sum price for "Grading".

REVISIONS

8/17/99

7/27/2023
...\186_RDY_XPL_X1A.dgn

PROJ. REFERENCE NO.	SHEET NO.
I7BP.5.R.86	X-1

6/23/16

7/27/2023

PROJ. REFERENCE NO.	SHEET NO.
I7BP.5.R.86	X-2

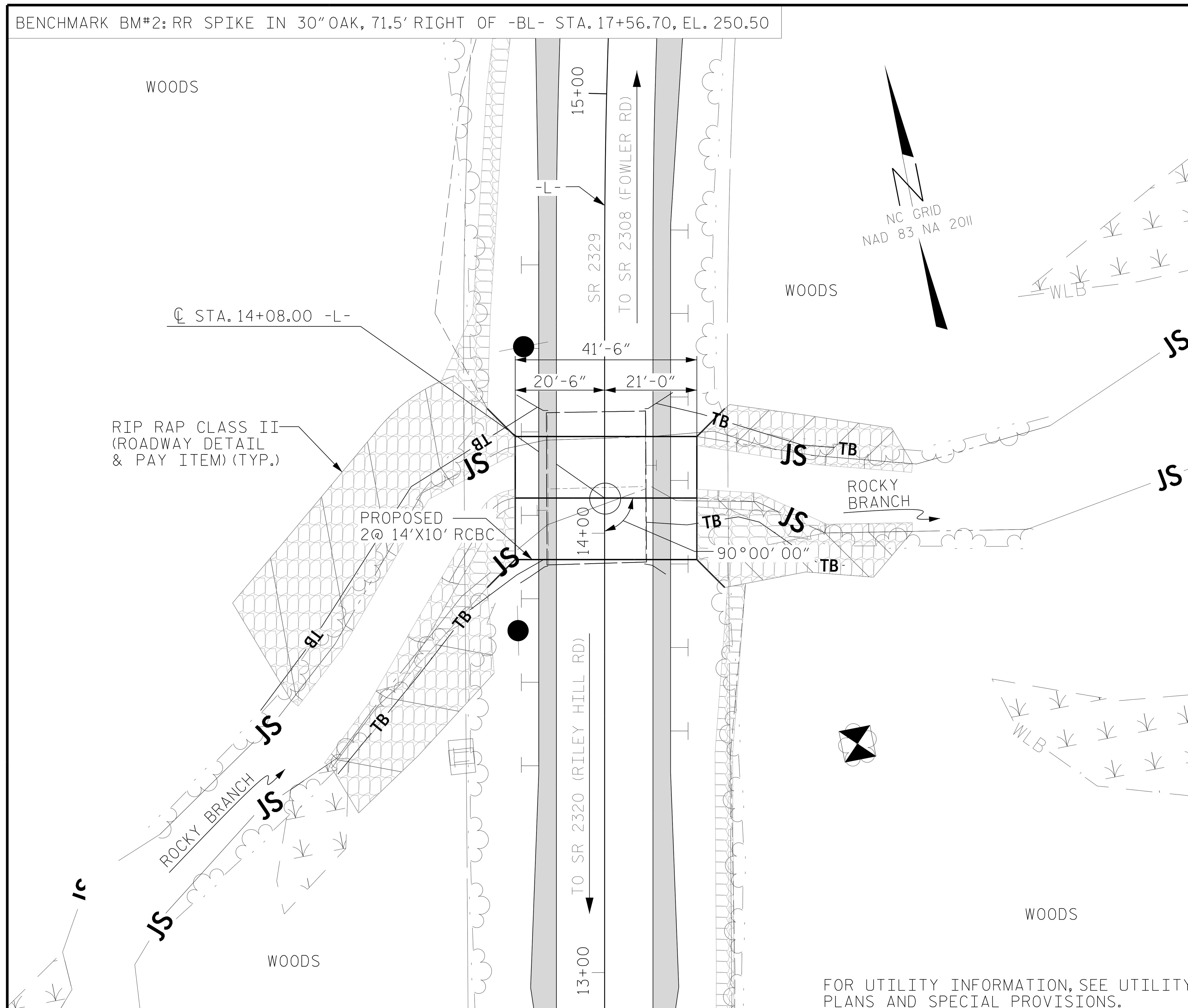
6/23/16

7/27/2023
...\Roadway\XSC\910186_RDY_XPL.dgn
USER:mburns

PROJ. REFERENCE NO.	SHEET NO.
I7BP.5.R.86	X-3

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I7BP.5.R.86	X-4

BENCHMARK BM#2: RR SPIKE IN 30" OAK, 71.5' RIGHT OF -BL- STA. 17+56.70, EL. 250.50



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

NOTES:

1. ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
2. DESIGN FILL IS 1.14 FEET.
3. FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.
4. 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
5. CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:
   1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
   2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.
6. THE SURVEYOR SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.
7. DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.
8. STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
9. AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL AND BOTH FACES OF INTERIOR WALLS ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
10. THE USE OF A PRECAST REINFORCED CONCRETE BOX CULVERT IS NOT ALLOWED.
11. FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.
12. FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
13. FOR FALSEWORK AND FRAMEWORK, SEE SPECIAL PROVISIONS.
14. FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
15. FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
16. FOR CULVERT EXCAVATION, SEE SPECIAL PROVISIONS.
17. THE EXISTING STRUCTURE #910186 CONSISTING OF TWO (2) TIMBER JOIST SPANS @ 17'-7" & 17'-7" (35'-0" TOTAL LENGTH), 21'-1" CLEAR ROADWAY WIDTH AND TIMBER FLOOR WITH AN ASPHALT WEARING SURFACE ON TIMBER CAPS & TIMBER PILES LOCATED AT THE PROPOSED STRUCTURE SHALL BE REMOVED IN ITS ENTIRETY, INCLUDING HISTORIC BRIDGE COMPONENTS CONSISTING OF CONCRETE SILLS IN CENTER OF CHANNEL. THE EXISTING BRIDGE IS PRESENTLY POSTED FOR A LOAD LIMIT OF 18 TONS FOR SINGLE VEHICLES AND 27 TONS FOR TRACTOR TRAILERS.
18. FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.

FOUNDATION NOTES:

1. THE REINFORCED CONCRETE BOX CULVERT SHALL BE PLACED ON A 1'-6" BLANKET OF FOUNDATION CONDITIONING MATERIAL, CLASS VI, SEE SECTION 414 OF THE STANDARD SPECIFICATIONS.

ROADWAY DATA

GRADE POINT ELEV. @ STATION 14+08.00 -L- = 254.80
BED ELEV. @ STATION 14+08.00 -L- = 242.15
ROADWAY SLOPES 2:1

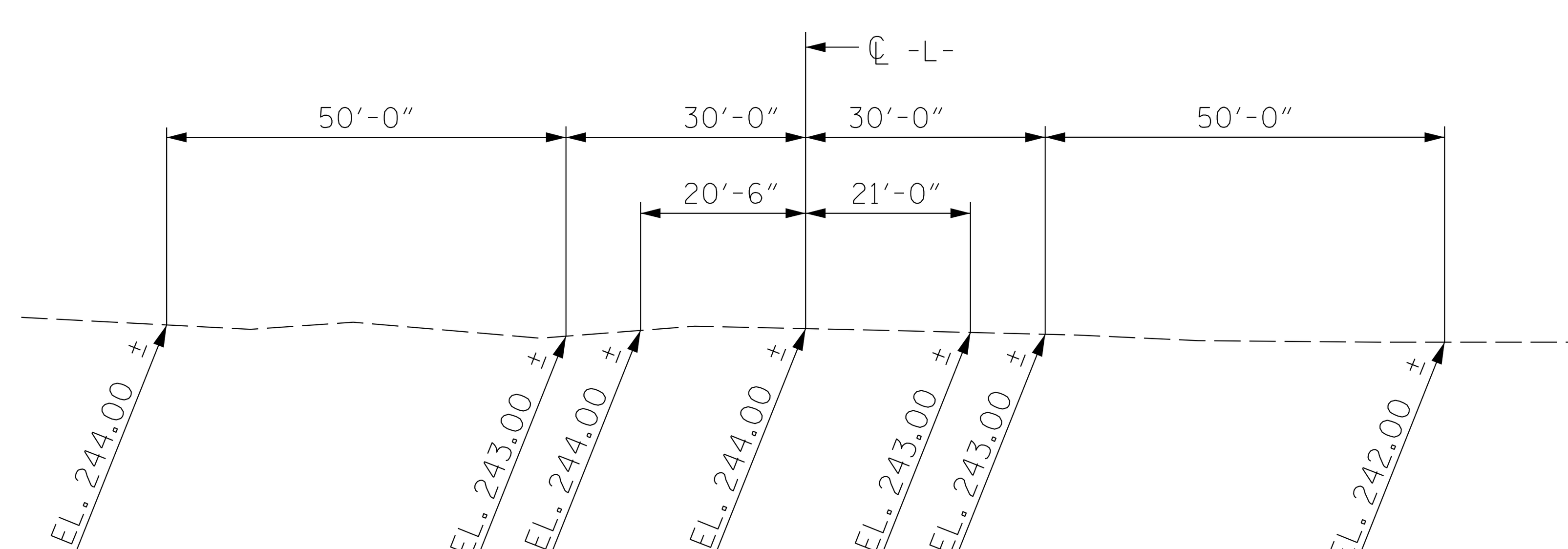
HYDRAULIC DATA

DESIGN DISCHARGE	1361 CFS
FREQUENCY OF DESIGN FLOOD	25 YR.
DESIGN HIGHWATER ELEV.	251.5 FT.
DRAINAGE AREA	2.5 SQ. MI.
BASE DISCHARGE (Q100)	2336 CFS
BASE HIGHWATER ELEV.	253.6 FT.

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	2633 CFS
FREQUENCY OF OVERTOPPING FLOOD	>100 YR.
OVERTOPPING FLOOD ELEV.	254.8 FT.✱

✱ ROAD OVERTOPS AT APPROX. STA 13+98.00 -L-



PROFILE ALONG ℄ OF CULVERT

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE		
BARREL @ 3.76 CY/FT	156.0	C.Y.
WING ETC.	38.6	C.Y.
TOTAL	194.6	C.Y.
REINFORCING STEEL		
BARREL	23,594	LBS.
WINGS ETC.	2,427	LBS.
TOTAL	26,021	LBS.
REMOVAL OF EXISTING STRUCTURE AT STATION 14+08.00 -L-	LUMP SUM	
ASBESTOS ASSESSMENT	LUMP SUM	
CULVERT EXCAVATION	LUMP SUM	
FOUNDATION COND. MAT'L.	160 TONS	

PROJECT NO. 17BP.5.R.86
WAKE COUNTY
STATION: 14+08.00 -L-

SHEET 1 OF 6 REPLACES BRIDGE #910186

NORTH CAROLINA PROFESSIONAL SEAL 11725 ENGINEER DAVID R. RUGGLES
DocuSigned by: David Ruggles C4627680F412422...
7/31/2023

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BARREL STANDARD
DOUBLE 14 FT. X 10 FT.
CONCRETE BOX CULVERT
90° SKEW

STEWART
Firm License No. C-1051
223 S. West St, Suite 1100
Raleigh, NC 27603
T 919.380.8750
www.stewartinc.com

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		C-1
1			3				TOTAL SHEETS
2			4				7

DRAWN BY: E. PHELPS	DATE: 5/18	
CHECKED BY: D. RUGGLES	DATE: 5/18	
DESIGN ENGINEER OF RECORD: D. RUGGLES	DATE: 5/18	

17BP.5.R.86
11/19/2018
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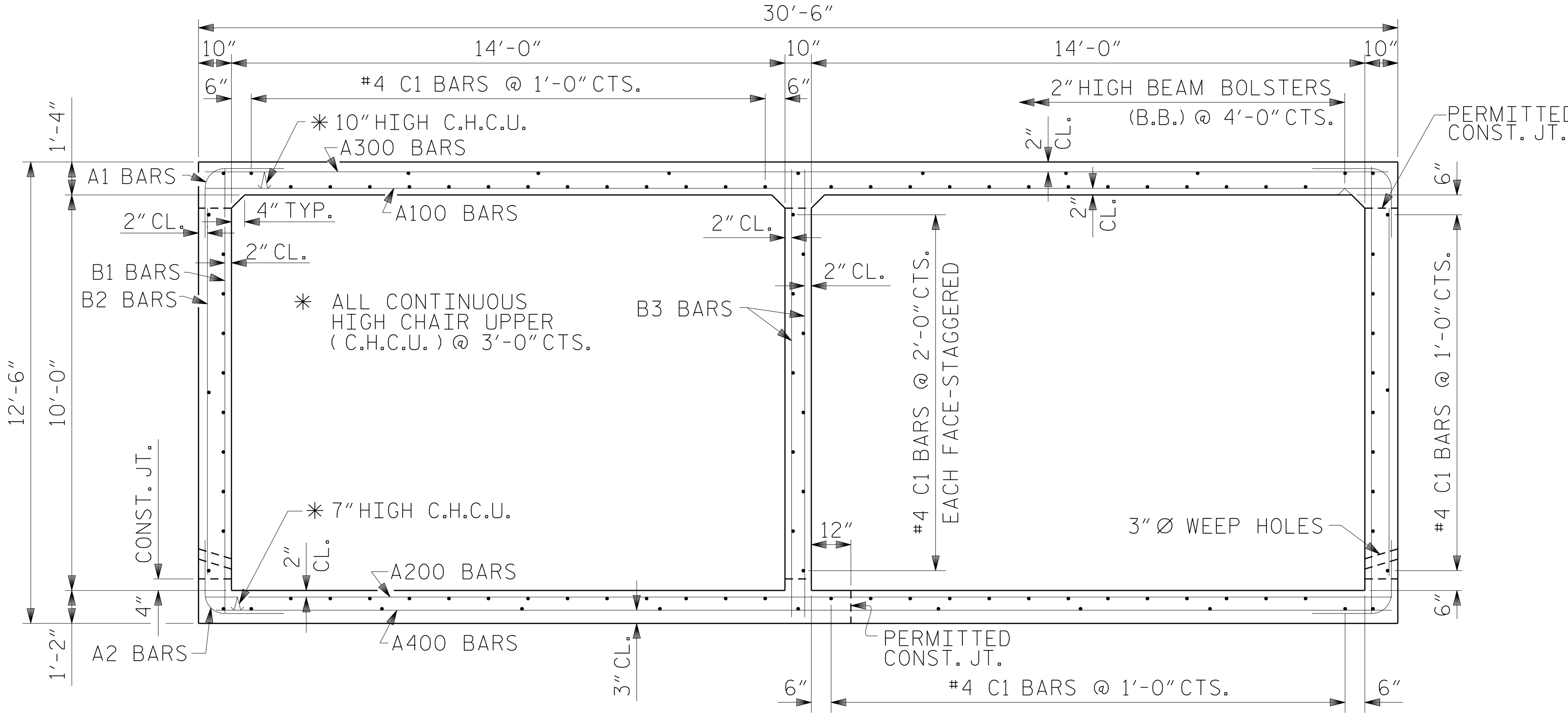
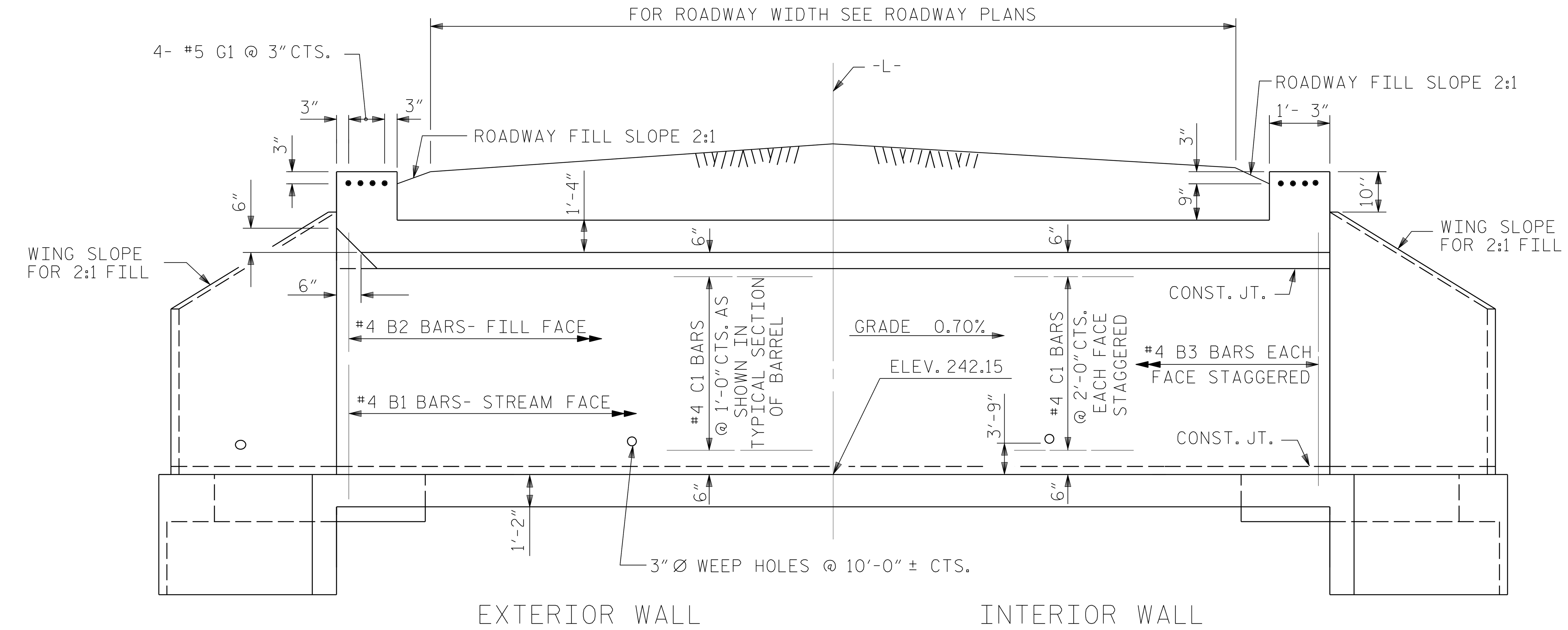
USER:ephelps

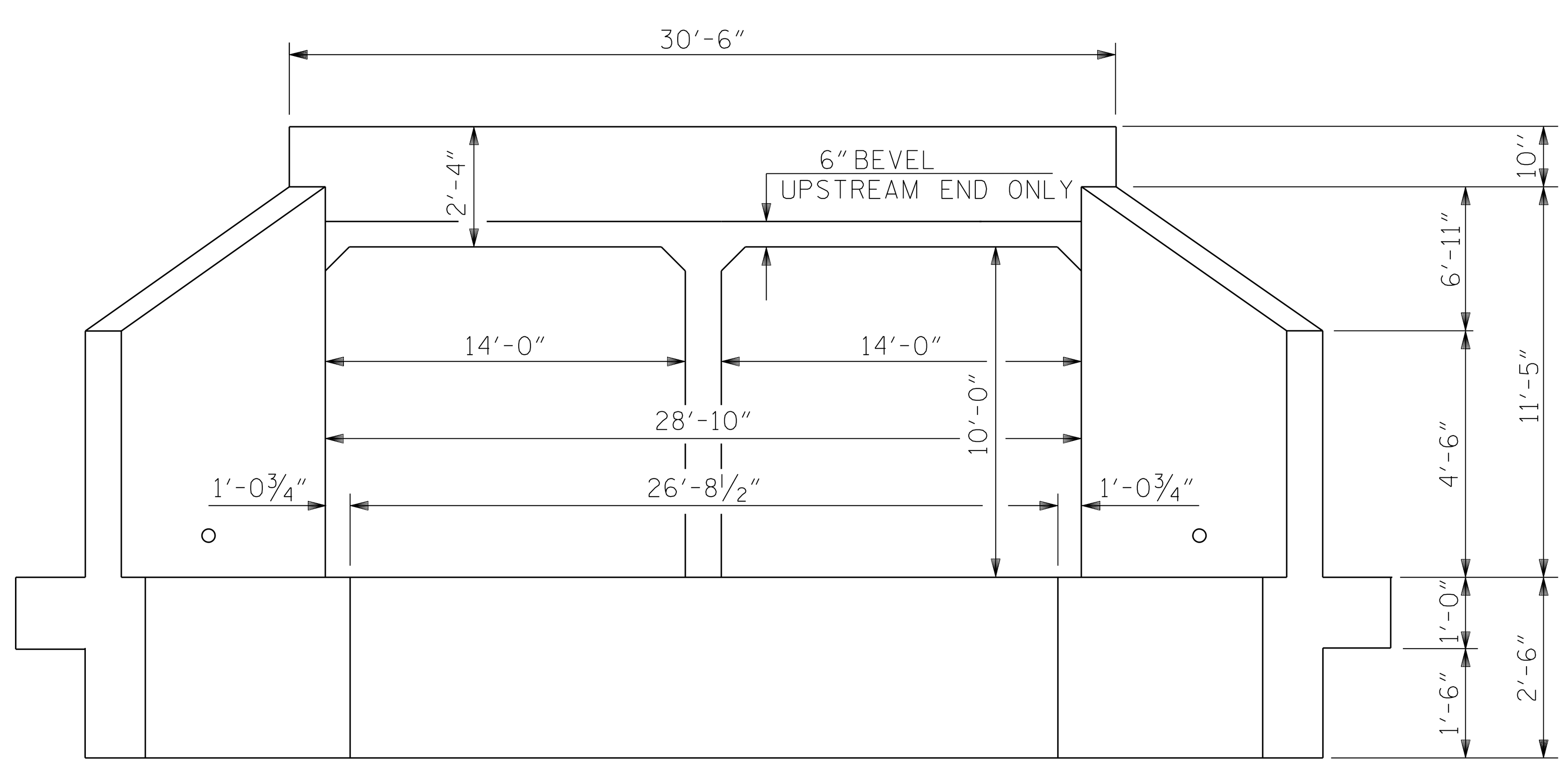


RIGHT ANGLE SECTION OF BARREL

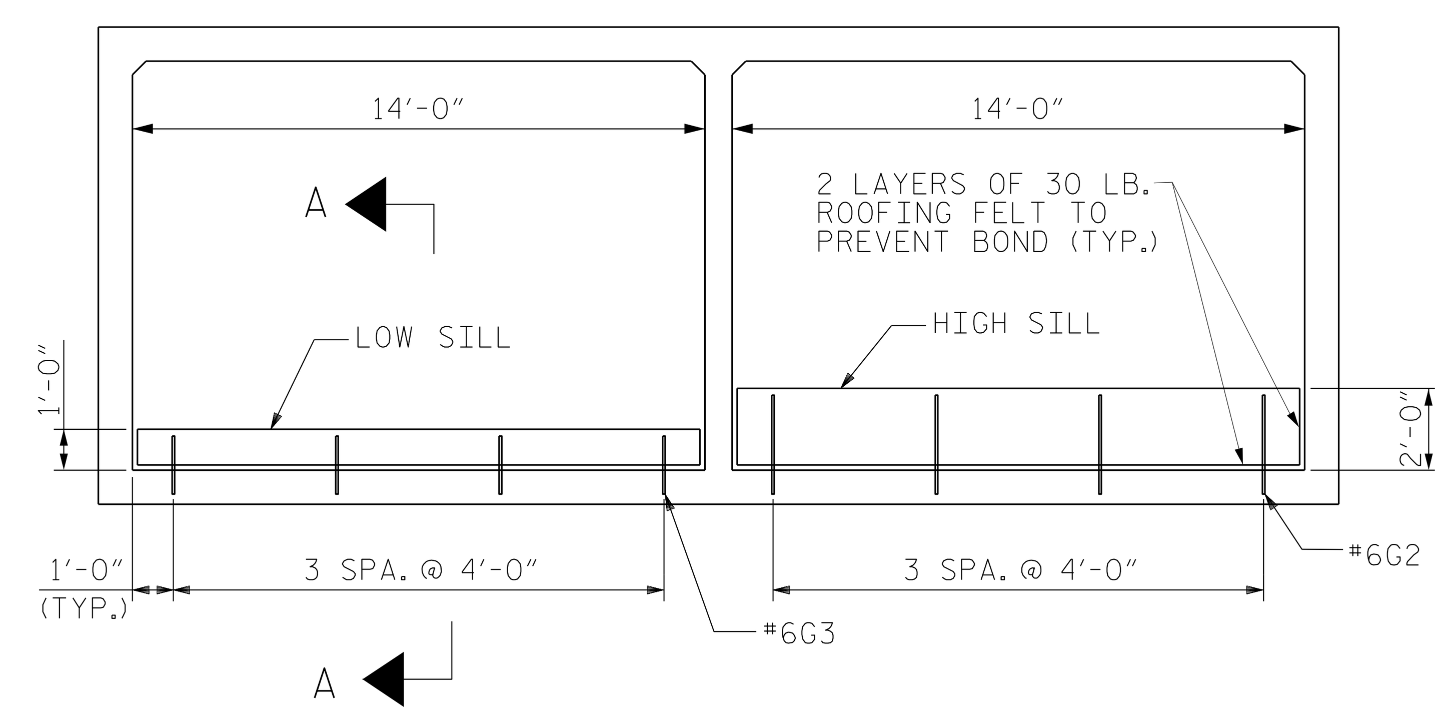
THERE ARE 106 "C" BARS IN SECTION OF BARREL.



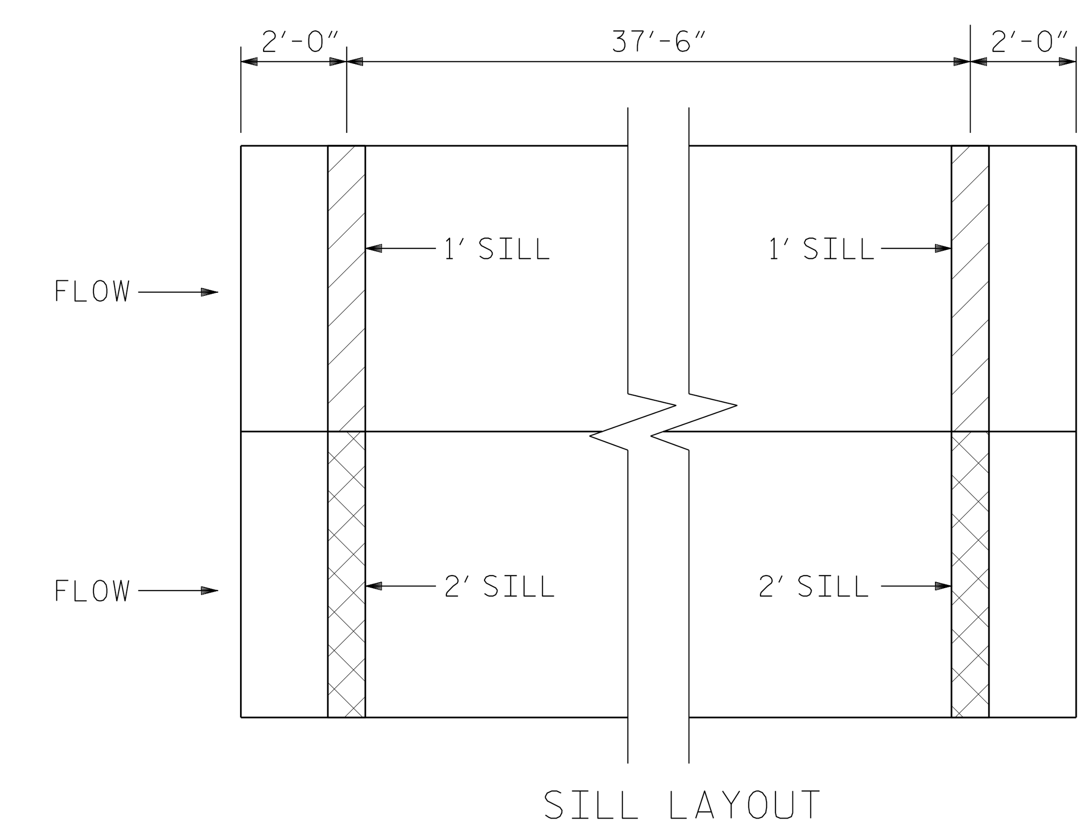
CULVERT SECTION NORMAL TO ROADWAY



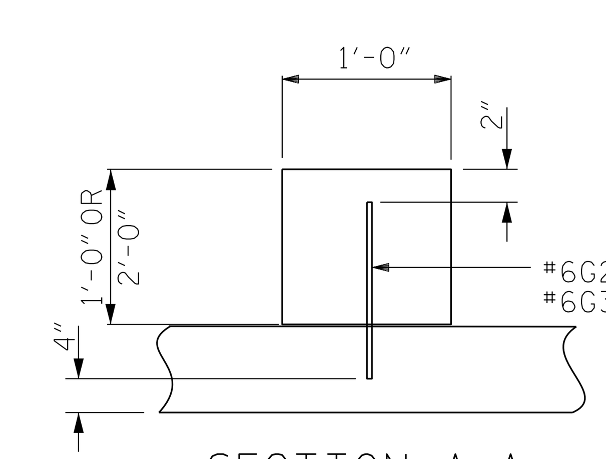
END ELEVATION



SILL DETAIL



SILL LAYOUT



SECTION A-A

✳ DOWELS MAY BE PUSHED INTO GREEN CONCRETE
AFTER SLAB HAS BEEN FLOAT FINISHED

PROJECT NO. 17BP.5.R.86

WAKE COUNTY

STATION: 14+08.00 -L-

SHEET 2 OF 6

SEAL 11725 — NORTH CAROLINA PROFESSIONAL ENGINEER — DAVID R. RUGGLES

DocuSigned by: David Ruggles
C4627680F412422...
7/31/2023

DOCUMENT NOT CONSIDERED
FINAL UNLESS ALL
SIGNATURES COMPLETED

STEWART
Firm License No. C-1051
223 S. West St,
Suite 1100
Raleigh, NC 27603
T 919.380.8750
www.stewartinc.com

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BARREL STANDARD
DOUBLE 14 FT. X 10 FT.
CONCRETE BOX CULVERT
90° SKEW

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

SHEET NO. C-2
TOTAL SHEETS 7

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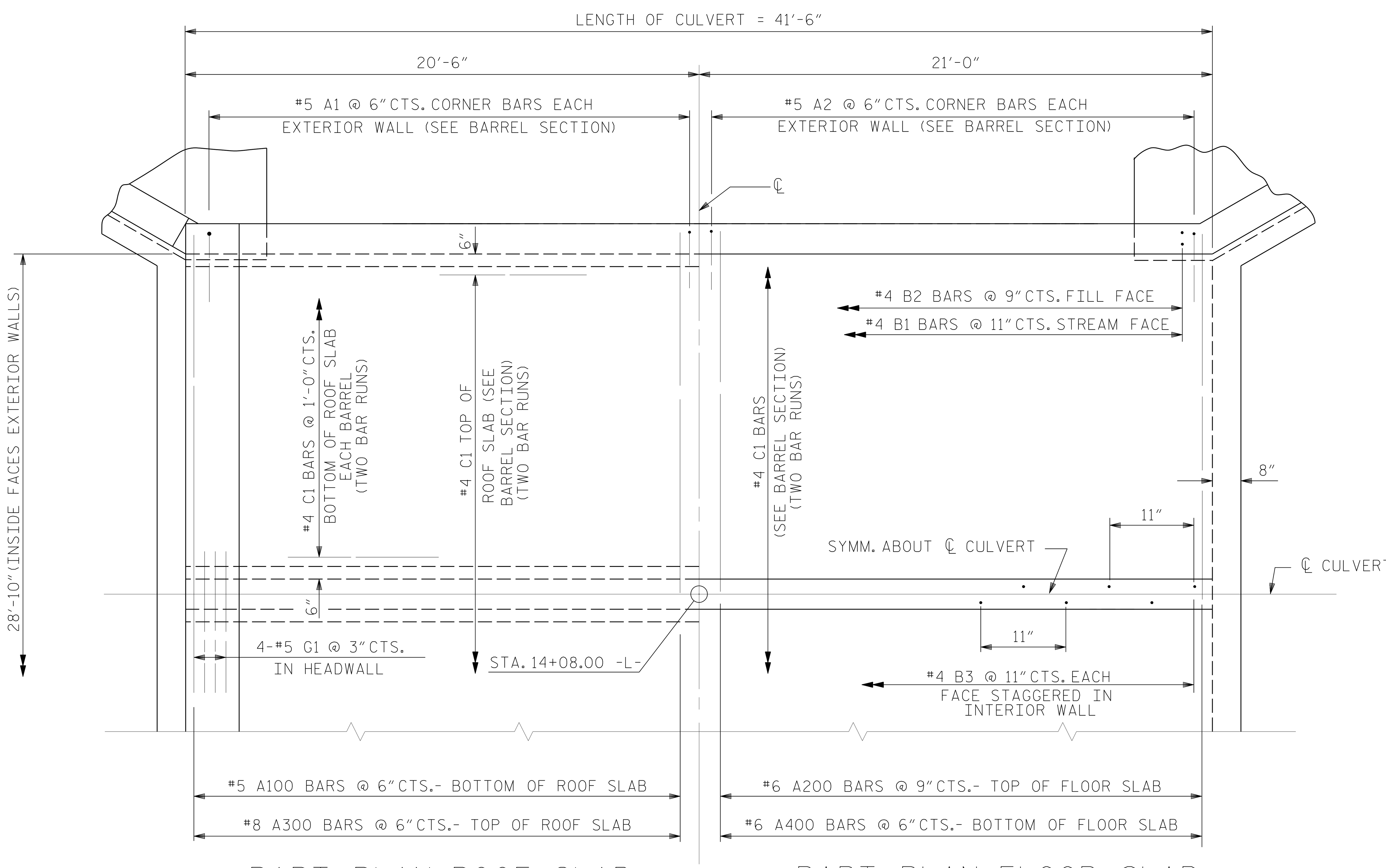
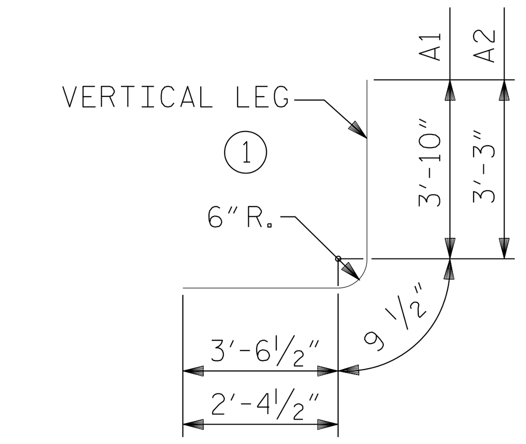


PART PLAN-ROOF SLAB

PART PLAN-FLOOR SLAB

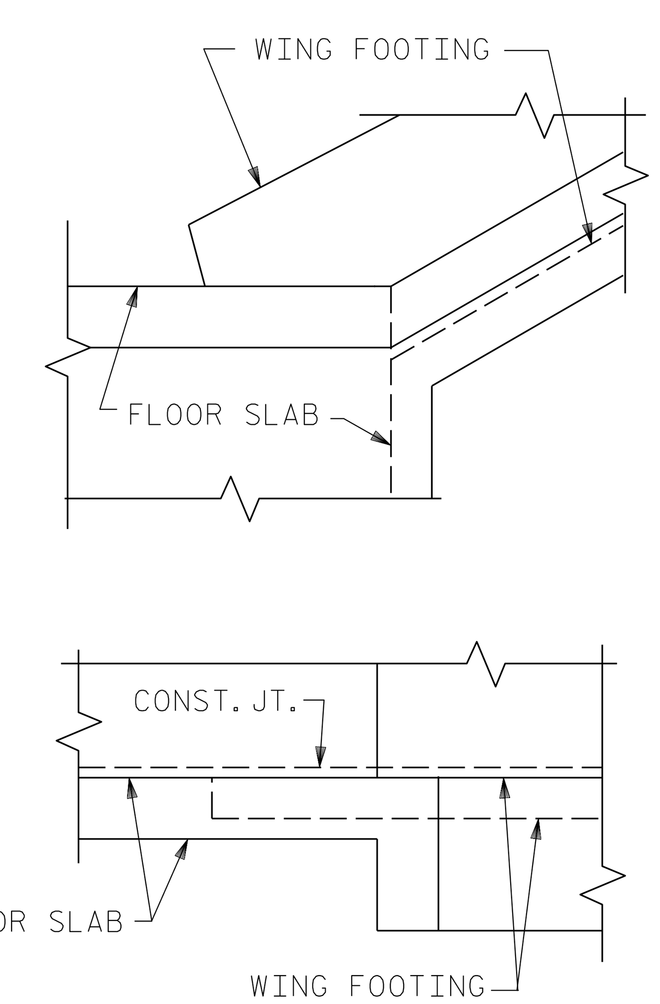
BAR TYPE



BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	166	#5	1	8'-2"	1414
A2	166	#5	1	6'-5"	1111
A100	83	#5	STR.	30'-1"	2604
A200	56	#6	STR.	30'-1"	2530
A300	83	#8	STR.	30'-1"	6667
A400	83	#6	STR.	30'-1"	3750
B1	90	#4	STR.	11'-10"	711
B2	112	#4	STR.	10'-0"	748
B3	90	#4	STR.	11'-10"	711
C1	212	#4	STR.	21'-6"	3045
G1	8	#5	STR.	30'-1"	251
G2	8	#6	STR.	2'-8"	32
G3	8	#6	STR.	1'-8"	20
REINFORCING STEEL					23,594 LBS

SPLICE CHART		
BAR	SIZE	SPLICE LENGTH
B1	#4	1'-9"
C1	#4	1'-11"



DETAIL

CONNECTION OF WING FOOTING AND FLOOR SLAB WHEN SLAB IS THICKER THAN FOOTING

PROJECT NO. 17BP.5.R.86

WAKE COUNTY

STATION: 14+08.00 -L-

SHEET 3 OF 6

SEAL 11725 NORTH CAROLINA PROFESSIONAL ENGINEER DAVID R. RUGGLES 7/31/2023

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DEPARTMENT OF TRANSPORTATION
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BARREL STANDARD
DOUBLE 14 FT. X 10 FT.
CONCRETE BOX CULVERT
90° SKEW

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2			4					7

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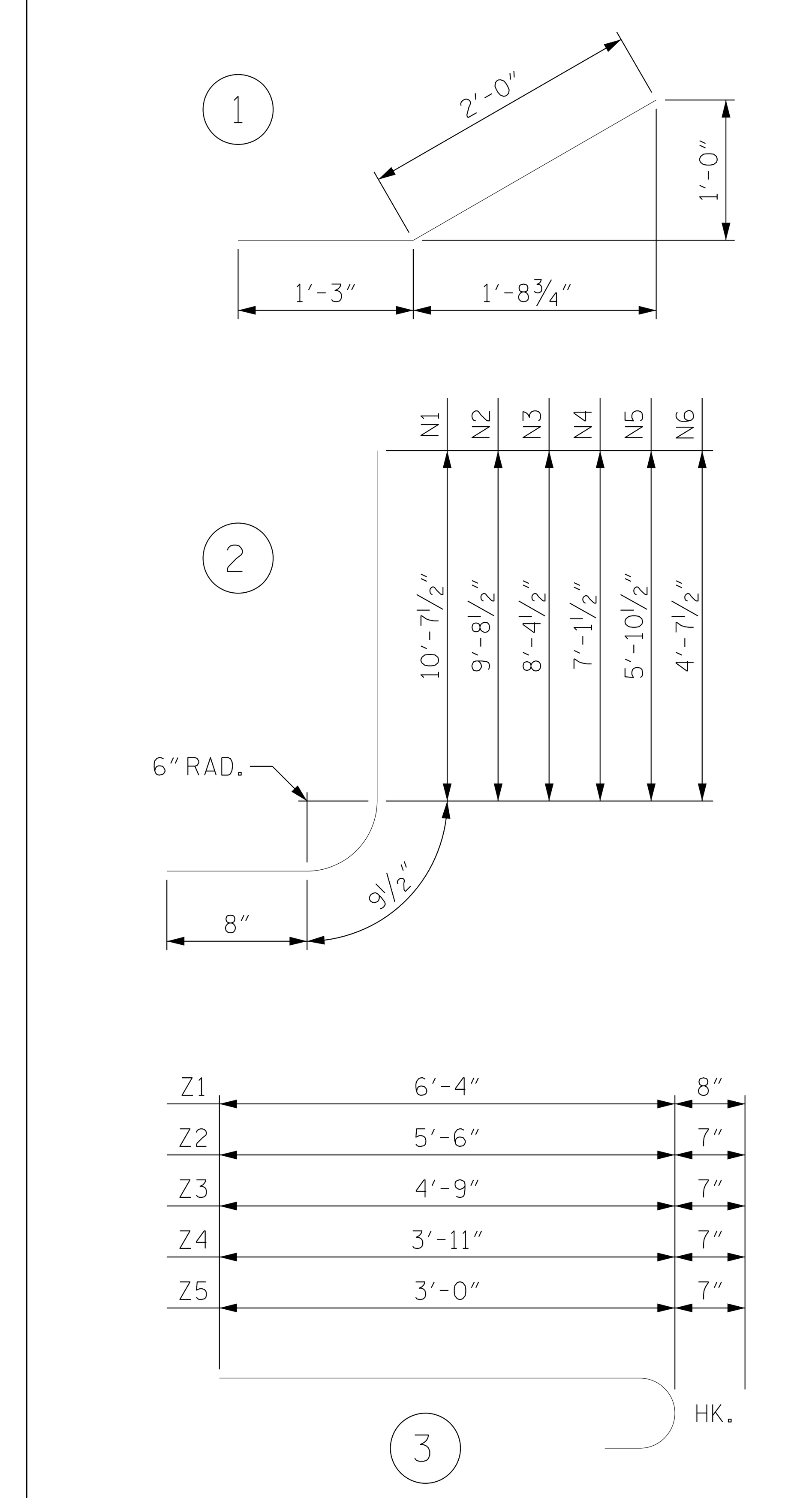
BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.

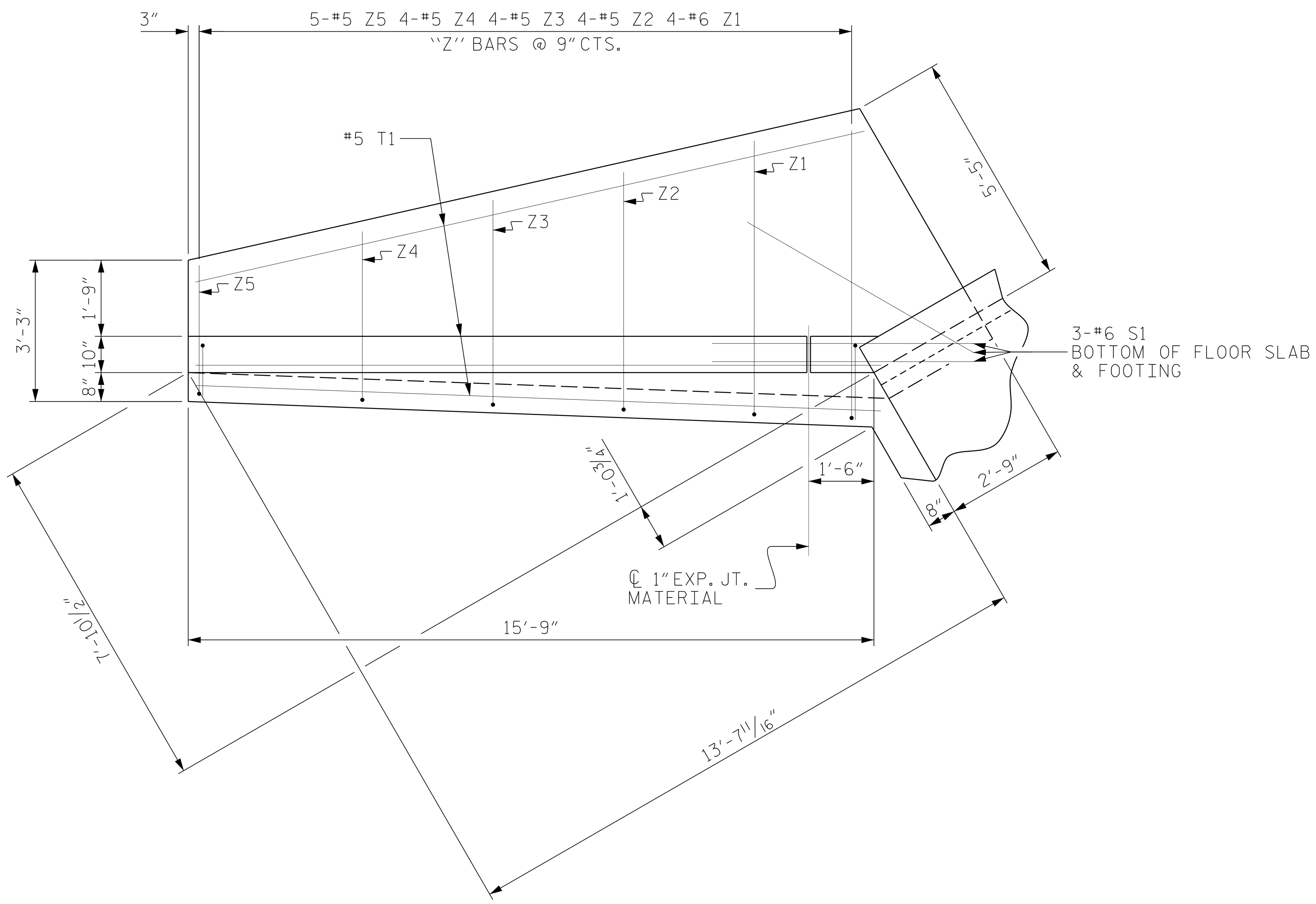


BILL OF MATERIAL

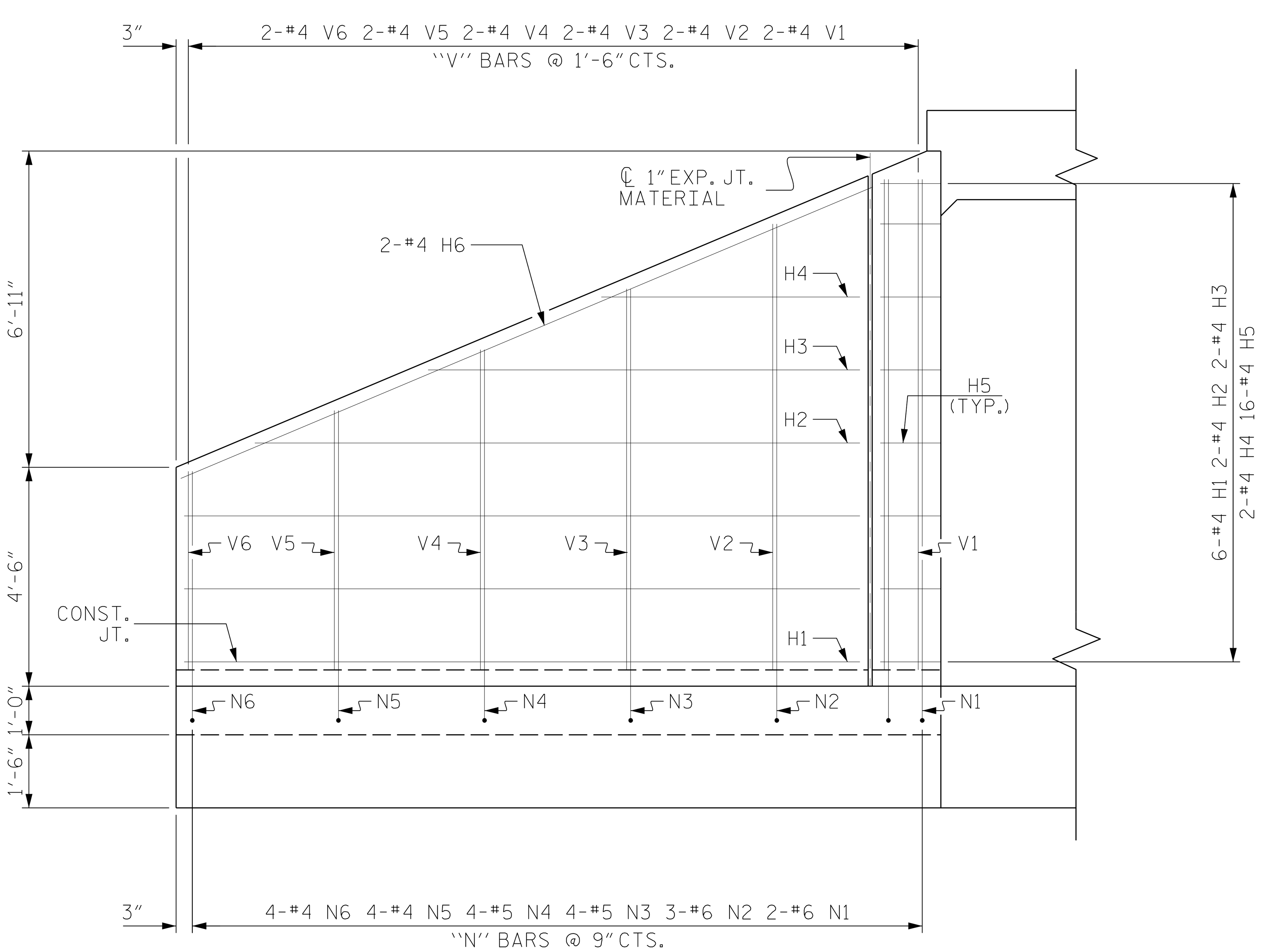
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	24	#4	STR	13'-10"	222
H2	8	#4	STR	12'-5"	66
H3	8	#4	STR	8'-10"	47
H4	8	#4	STR	5'-4"	29
H5	64	#4	1	3'-3"	139
H6	8	#4	STR	15'-5"	82
N1	8	#6	2	12'-1"	146
N2	12	#6	2	11'-2"	201
N3	16	#5	2	9'-10"	164
N4	16	#5	2	8'-7"	143
N5	16	#4	2	7'-4"	78
N6	16	#4	2	6'-1"	65
S1	12	#6	STR	6'-0"	108
T1	12	#5	STR	15'-9"	197
V1	8	#4	STR	10'-1"	54
V2	8	#4	STR	9'-2"	49
V3	8	#4	STR	7'-10"	42
V4	8	#4	STR	6'-7"	35
V5	8	#4	STR	5'-4"	29
V6	8	#4	STR	4'-1"	22
Z1	16	#6	3	7'-0"	168
Z2	16	#5	3	6'-1"	102
Z3	16	#5	3	5'-4"	89
Z4	16	#5	3	4'-6"	75
Z5	20	#5	3	3'-7"	75

REINFORCING STEEL FOR 4 WINGS 2427 LBS

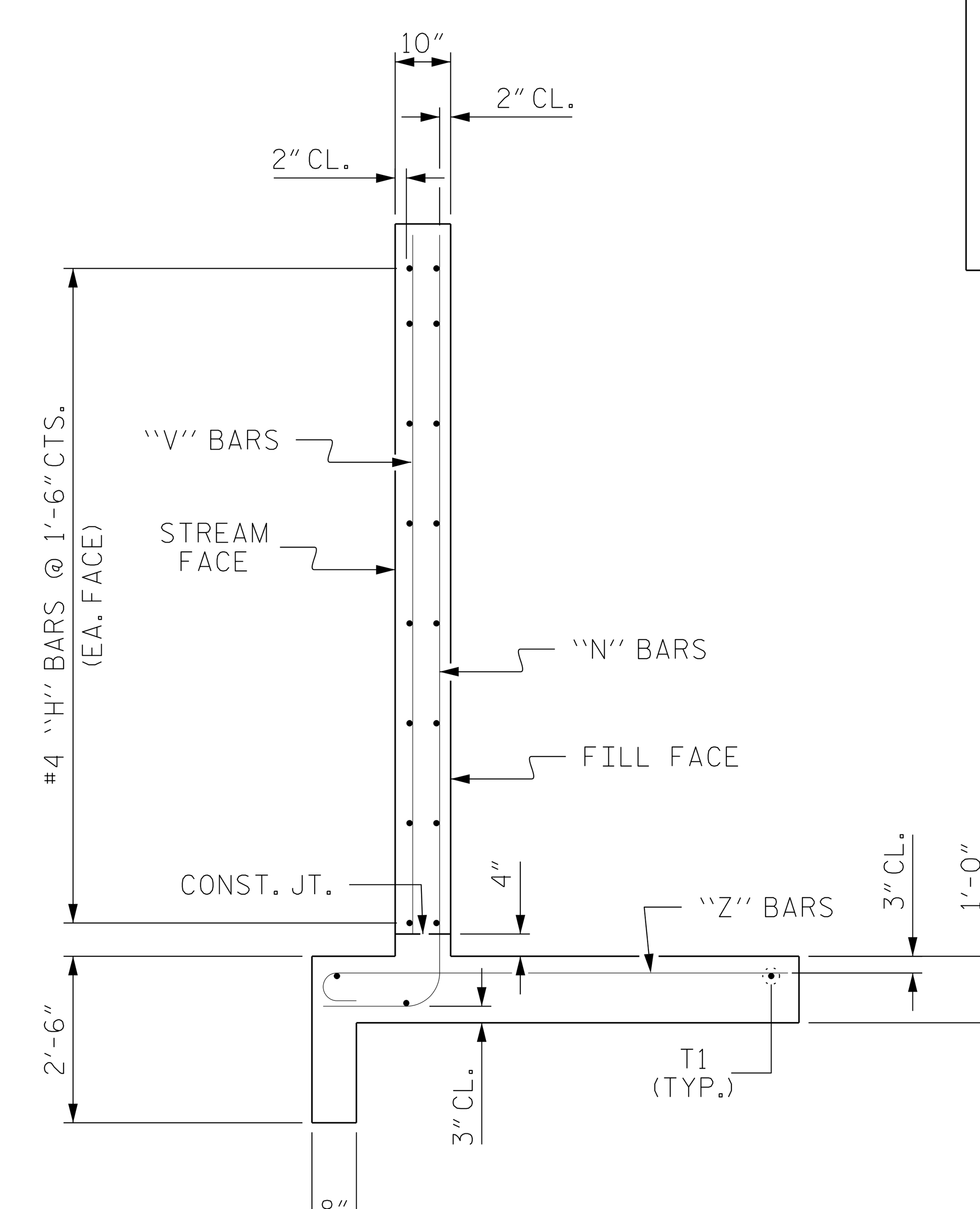
CLASS A CONCRETE
- 4 WINGS 31.2 CY
- 2 HEADWALLS 2.8 CY
- END CURTAIN WALLS 4.6 CY
- TOTAL 38.6 CY



PLAN



ELEVATION



TYPICAL WING SECTION

PROJECT NO. 17BP.5.R.86

WAKE COUNTY

STATION: 14+08.00 -L-

SHEET 4 OF 6

SEAL 11725 — NORTH CAROLINA PROFESSIONAL ENGINEER — DAVID R. RUGGLES

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DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT

H = 10'-0" SLOPE = 2:1

90° SKEW

STEWART

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223 S. West St,
Suite 1100
Raleigh, NC 27603
T 919.380.8750
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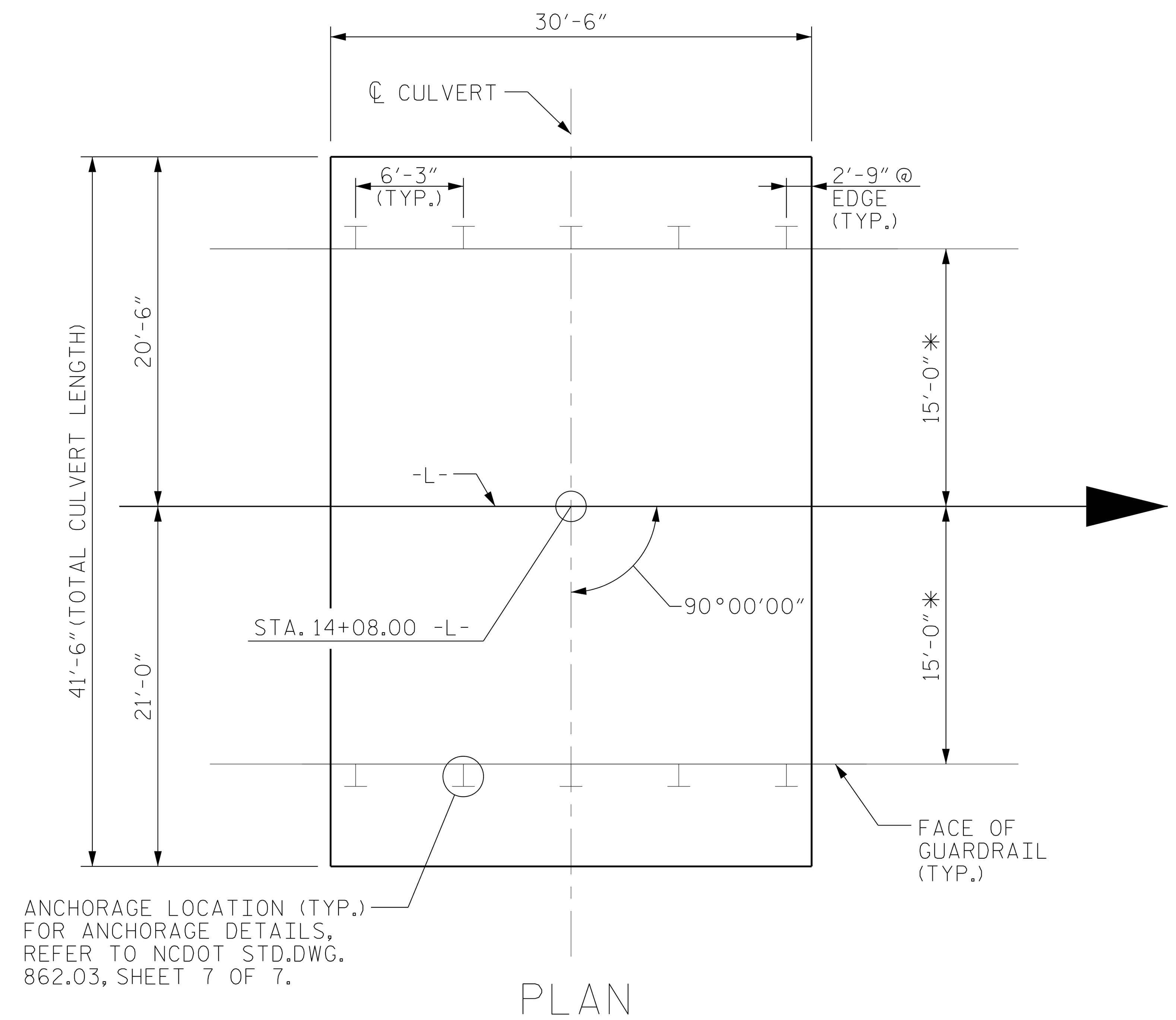


PLAN

SHOWING : GUARDRAIL ANCHOR ASSEMBLY SPACING.

✱ SEE ROADWAY PLANS. GUARDRAIL POST LOCATIONS TO BE VERIFIED BY THE ENGINEER.

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS SHALL CONSIST OF THE FOLLOWING COMPONENTS :

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2½".

B. 4 - 1" Ø X 2 ¼" BOLTS WITH WASHERS, BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 1" Ø X 2¼" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

C. WIRE STRUTS SHOWN IN THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS DETAIL ARE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 P.S.I. AS AN OPTION, A ⁵⁄₁₆" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

GUARDRAIL ANCHOR ASSEMBLY WITH BOLTS SHALL BE ASSEMBLED IN THE SHOP. BOLT THREADS MAY BE RECUT AS NECESSARY TO INSURE FIT.

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CLASS "A" CONCRETE.

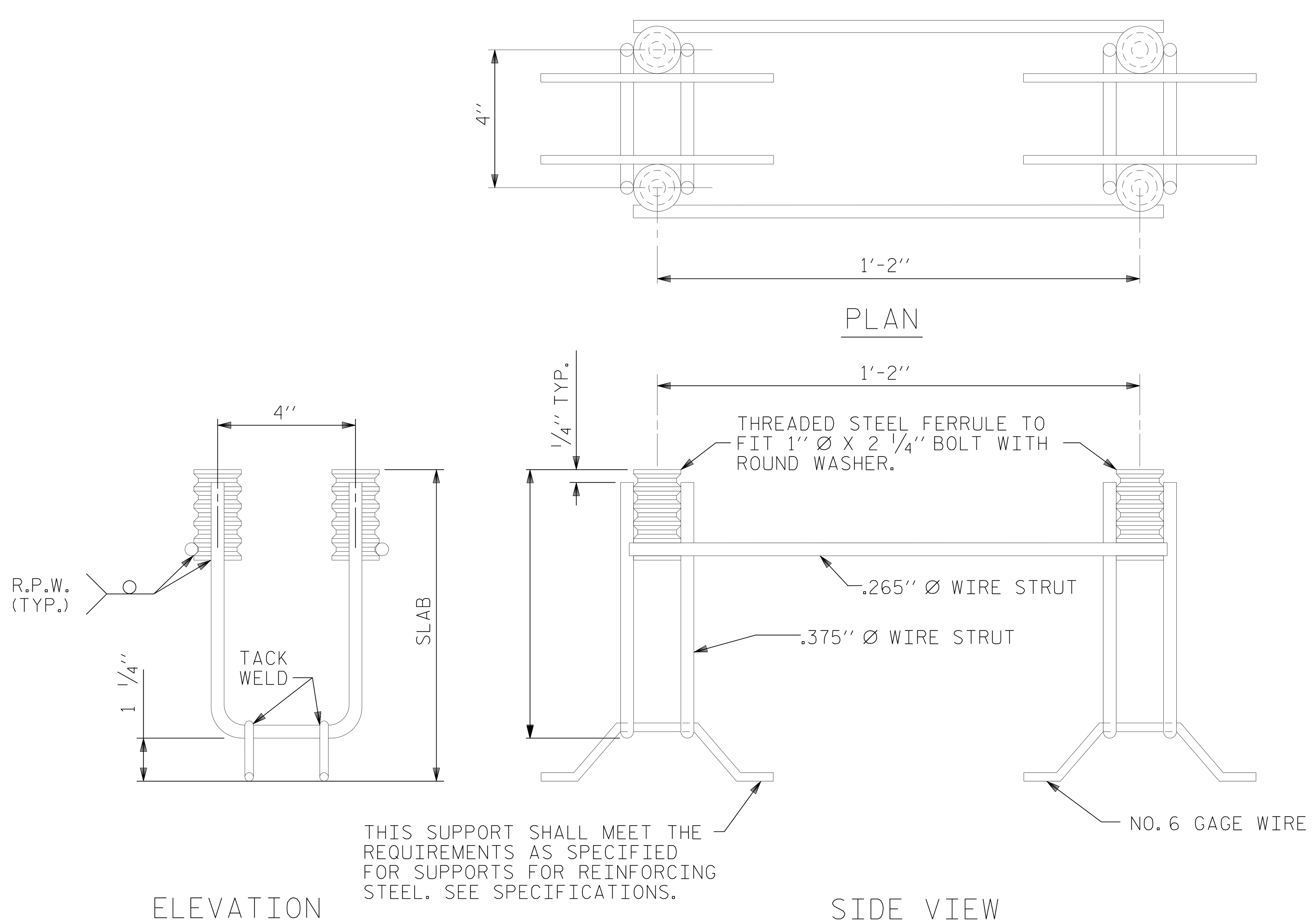
FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

AT THE CONTRACTOR'S OPTION, FERRULES WITH OPEN OR CLOSED ENDS MAY BE USED.

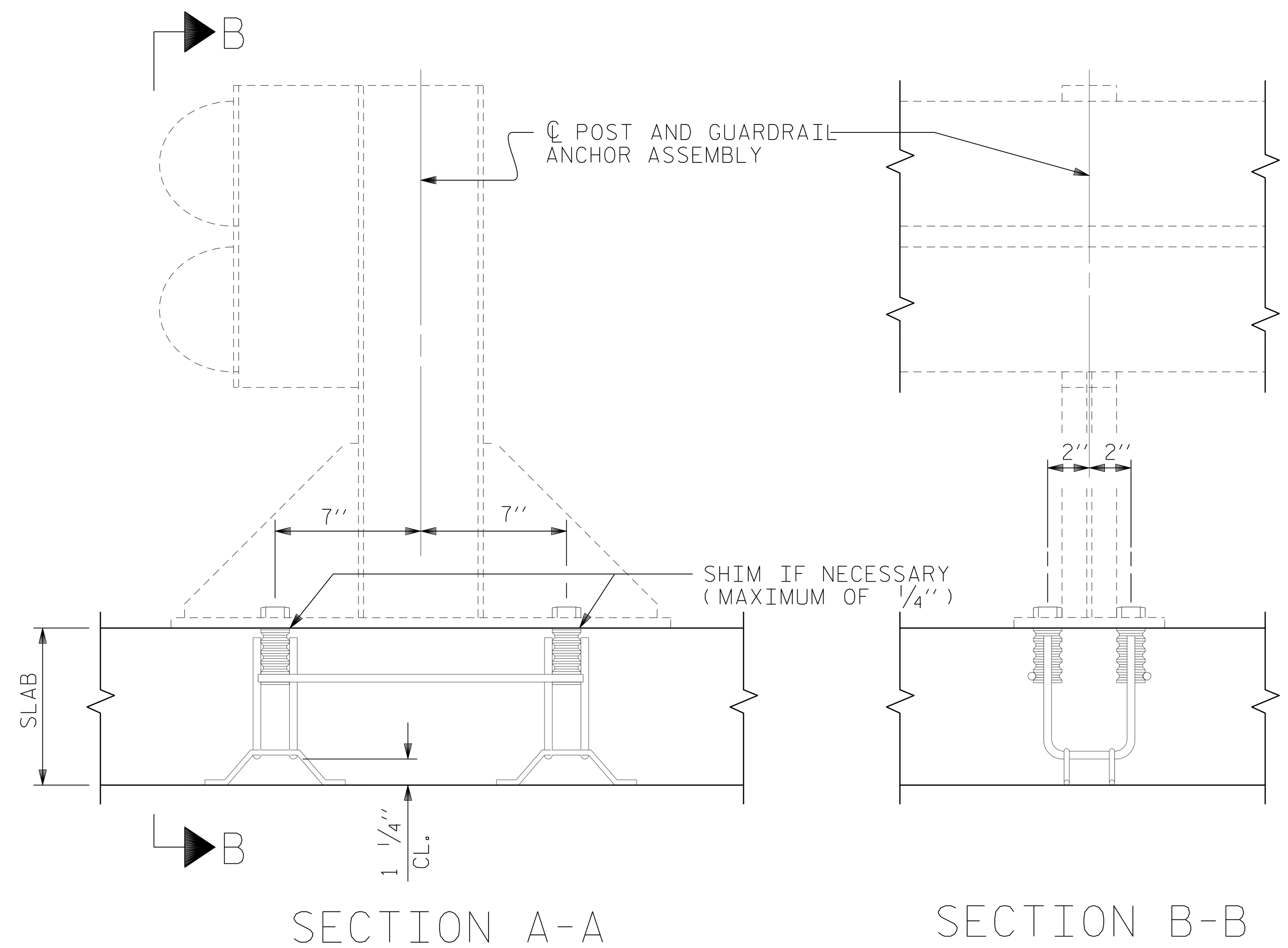
PAYMENT FOR GUARDRAIL, POSTS, AND POST BASE PLATES IS INCLUDED IN ROADWAY PAY ITEMS.

SLAB REINFORCING STEEL MAY BE SHIFTED AS NECESSARY TO CLEAR GUARDRAIL ANCHOR ASSEMBLY. CARE SHOULD BE TAKEN TO KEEP THE SHIFTING OF REINFORCING STEEL TO A MINIMUM.

THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF GUARDRAIL ANCHOR ASSEMBLY. LEVEL TWO FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 1" Ø BOLT IS 21.8 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS.



GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS



PROJECT NO. 17BP.5.R.86

WAKE COUNTY

STATION: 14+08.00 -L-

SHEET 5 OF 6

NORTH CAROLINA PROFESSIONAL SEAL 11725 ENGINEER DAVID R. RUGGLES

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7/31/2023

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

ANCHORAGE DETAILS FOR GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

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223 S. West St, Suite 1100
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T 919.380.8750
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STD. NO. GRA1

17BP.5.R.86

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LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE: LIVE-LOAD FACTORS (γ_{LL})	MOMENT: RATING FACTOR	MOMENT: BOX NO.	MOMENT: ELEMENT TYPE	MOMENT: DISTANCE FROM LEFT END OF ELEMENT (ft)	SHEAR: RATING FACTOR	SHEAR: BOX NO.	SHEAR: ELEMENT TYPE	SHEAR: DISTANCE FROM LEFT END OF ELEMENT (ft)	COMMENT NUMBER
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.13	--	1.75	1.16	1	TOP SLAB	5.93	1.13	1	TOP SLAB	12.57	
		HL-93 (OPERATING)	N/A		1.46	--	1.35	1.50	1	TOP SLAB	5.93	1.46	1	TOP SLAB	12.57	
		HS-20 (INVENTORY)	36.000	2	1.18	42.5	1.75	1.20	1	TOP SLAB	5.93	1.18	1	TOP SLAB	12.57	
		HS-20 (OPERATING)	36.000		1.53	55.1	1.35	1.56	1	TOP SLAB	5.93	1.53	1	TOP SLAB	12.57	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.35	31.7	1.40	2.35	1	TOP SLAB	5.93	3.42	1	TOP SLAB	12.57	
		SNGARBS2	20.000		2.19	43.8	1.40	2.19	1	TOP SLAB	5.93	2.95	1	BOTTOM SLAB	12.74	
		SNAGRIS2	22.000		2.34	51.5	1.40	2.34	1	TOP SLAB	5.93	2.69	1	BOTTOM SLAB	12.74	
		SNCOTTS3	27.250		1.43	39.0	1.40	1.44	1	TOP SLAB	5.93	1.43	1	TOP SLAB	12.57	
		SNAGGRS4	34.925		1.51	52.7	1.40	1.62	1	TOP SLAB	5.93	1.51	1	TOP SLAB	12.57	
		SNS5A	35.550		1.47	52.3	1.40	1.56	1	TOP SLAB	5.93	1.47	1	TOP SLAB	12.57	
		SNS6A	39.950		1.46	58.3	1.40	1.56	1	TOP SLAB	5.93	1.46	1	TOP SLAB	12.57	
		SNS7B	42.000		1.43	60.1	1.40	1.60	1	TOP SLAB	5.93	1.43	1	BOTTOM SLAB	12.74	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.81	59.7	1.40	2.32	1	TOP SLAB	5.93	1.81	1	BOTTOM SLAB	12.74	
		TNT4A	33.075		1.65	54.6	1.40	1.72	1	TOP SLAB	5.93	1.65	1	TOP SLAB	12.57	
		TNT6A	41.600		1.43	59.5	1.40	1.72	1	TOP SLAB	5.93	1.43	1	TOP SLAB	12.57	
		TNT7A	42.000		1.48	62.2	1.40	1.73	1	TOP SLAB	5.93	1.48	1	BOTTOM SLAB	12.74	
		TNT7B	42.000		1.48	62.2	1.40	1.59	1	TOP SLAB	5.93	1.48	1	BOTTOM SLAB	12.74	
		TNAGRIT4	43.000		1.38	59.3	1.40	1.72	1	TOP SLAB	5.93	1.38	1	BOTTOM SLAB	12.74	
		TNAGT5A	45.000		1.33	59.9	1.40	1.81	1	BOTTOM SLAB	13.58	1.33	1	BOTTOM SLAB	12.74	
		TNAGT5B	45.000	3	1.32	59.4	1.40	1.72	1	TOP SLAB	5.93	1.32	1	BOTTOM SLAB	12.74	

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

NOTE:

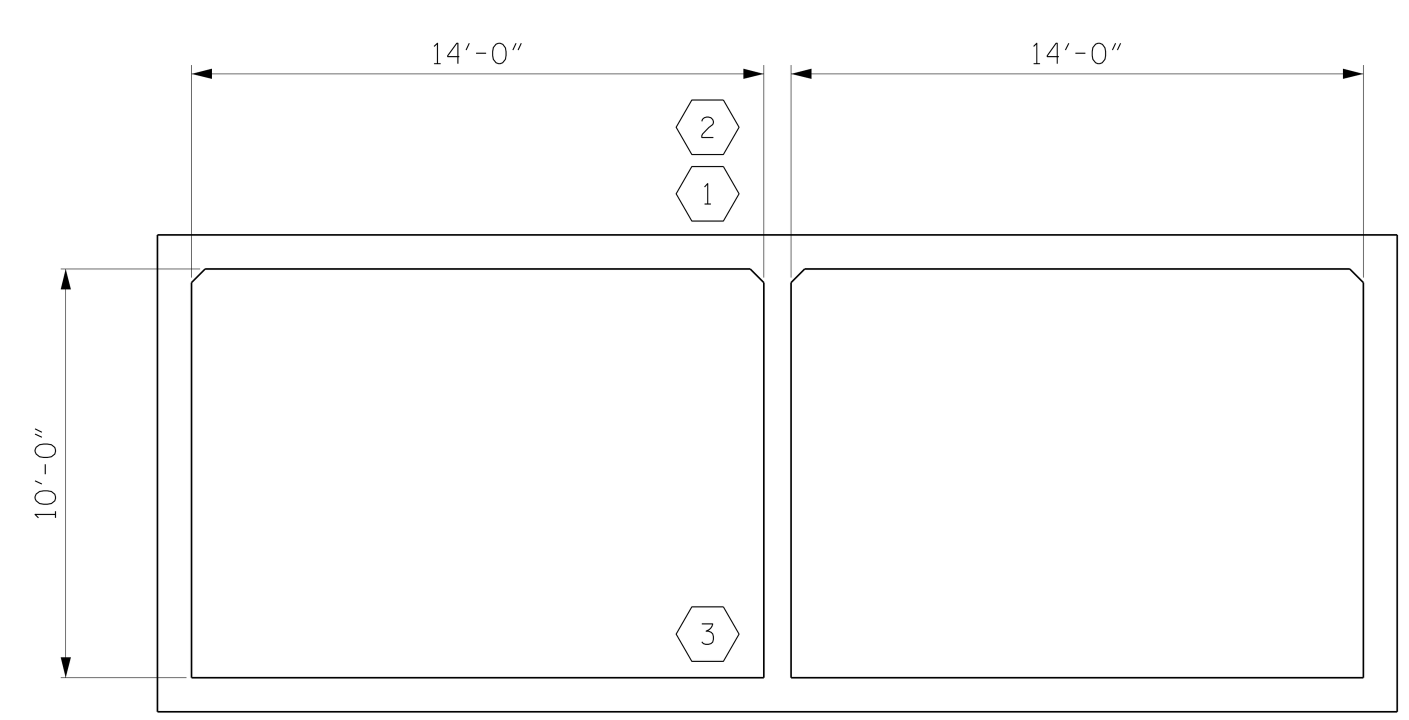
RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

EACH CELL IS CONSIDERED AN INDIVIDUAL ELEMENT.

CELLS ARE COUNTED LEFT TO RIGHT.

#	CONTROLLING LOAD RATING
1	DESIGN LOAD RATING (HL-93)
2	DESIGN LOAD RATING (HS-20)
3	LEGAL LOAD RATING ∗∗

∗∗ SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. 17BP.5.R.86

WAKE COUNTY

STATION: 14+08.00 -L-

SHEET 6 OF 6

NORTH CAROLINA PROFESSIONAL SEAL 11725 ENGINEER DAVID R. RUGGLES

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STATE OF NORTH CAROLINA
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BARREL STANDARD
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11/19/2018
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USER:ephelps

STANDARD NOTES

DESIGN DATA:

SPECIFICATIONS - - - - - - - - - - - - - - - - -	A.A.S.H.T.O. (CURRENT)
LIVE LOAD -	SEE PLANS
IMPACT ALLOWANCE - - - - - - - - - - - - - - - -	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF STRUCTURAL STEEL - AASHTO M270 GRADE 36 - -	20,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50W - -	27,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50 - -	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION - GRADE 60 - - -	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION - - - - - - - - - - - -	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR - - - - - - - - - - - - - - - -	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR UNTREATED EXTREME FIBER STRESS - - -	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER - - - - -	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH - - - - -	30 LBS. PER CU. FT. (MINIMUM)

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2018 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED ¾" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1½" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A ¼" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A ¼" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE ⅞" Ø SHEAR STUDS FOR THE ¾" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF ⅞" Ø STUDS ALONG THE BEAM AS SHOWN FOR ¾" Ø STUDS BASED ON THE RATIO OF 3 - ⅞" Ø STUDS FOR 4 - ¾" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY 1/16 INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.

PROJECT NO. 17BP.5.R.86

WAKE COUNTY

STATION: 14+08.00 -L-

ENGLISH

JANUARY, 1990

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD NOTES

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-7
1			3			TOTAL SHEETS
2			4			7

REV. 6-16-95 EEM (✓) RGW REV. 5-7-03 RWW (✓) JTE REV. 10-1-11 MAA (✓) GM
REV. 8-16-99 RWW (✓) LES REV. 5-1-06 TLA (✓) GM REV. 12-17 MAA (✓) THC

STD. NO. SN