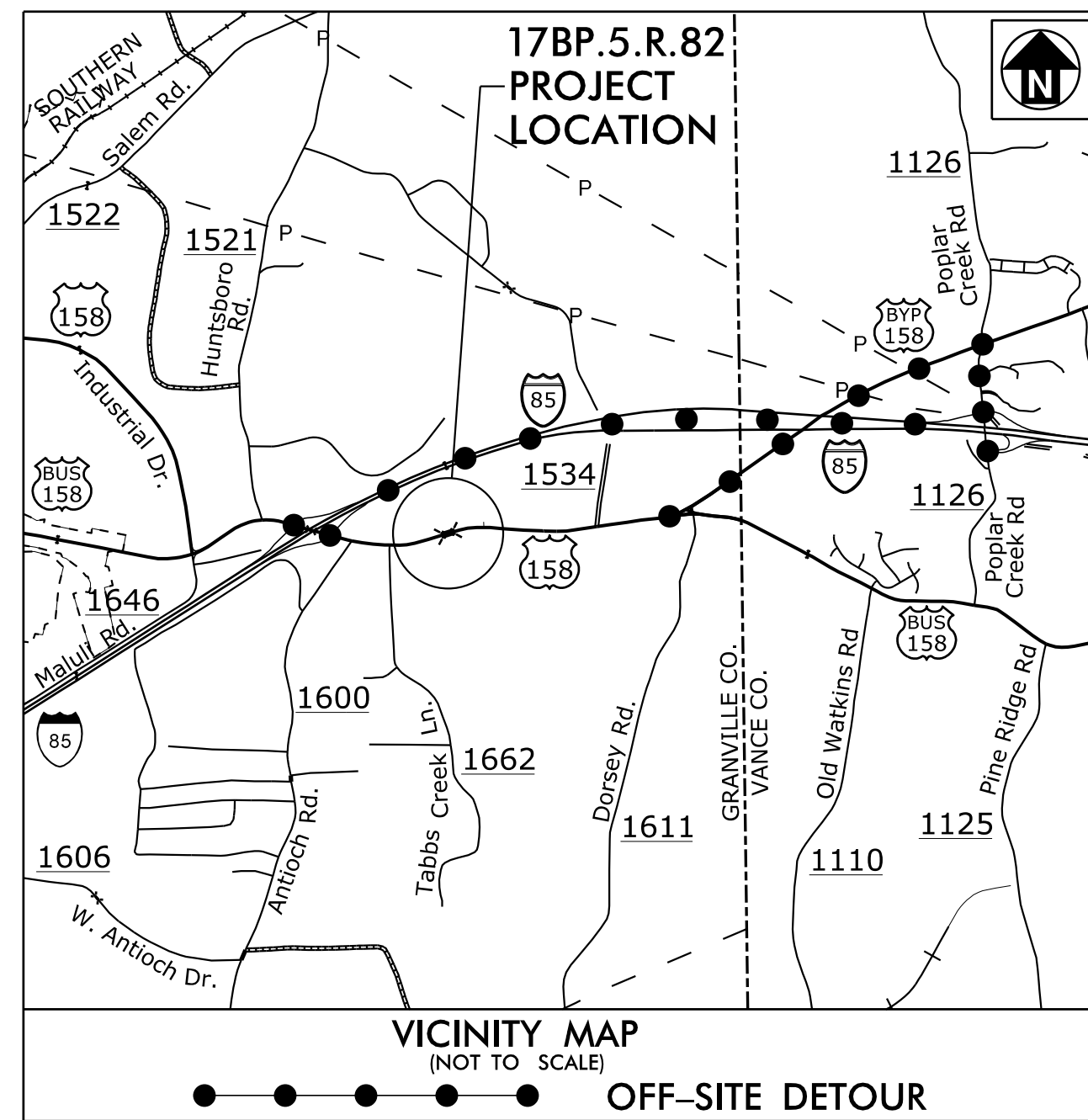


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CONTRACT: C204317 TIP PROJECT: 17BP.5.R.82

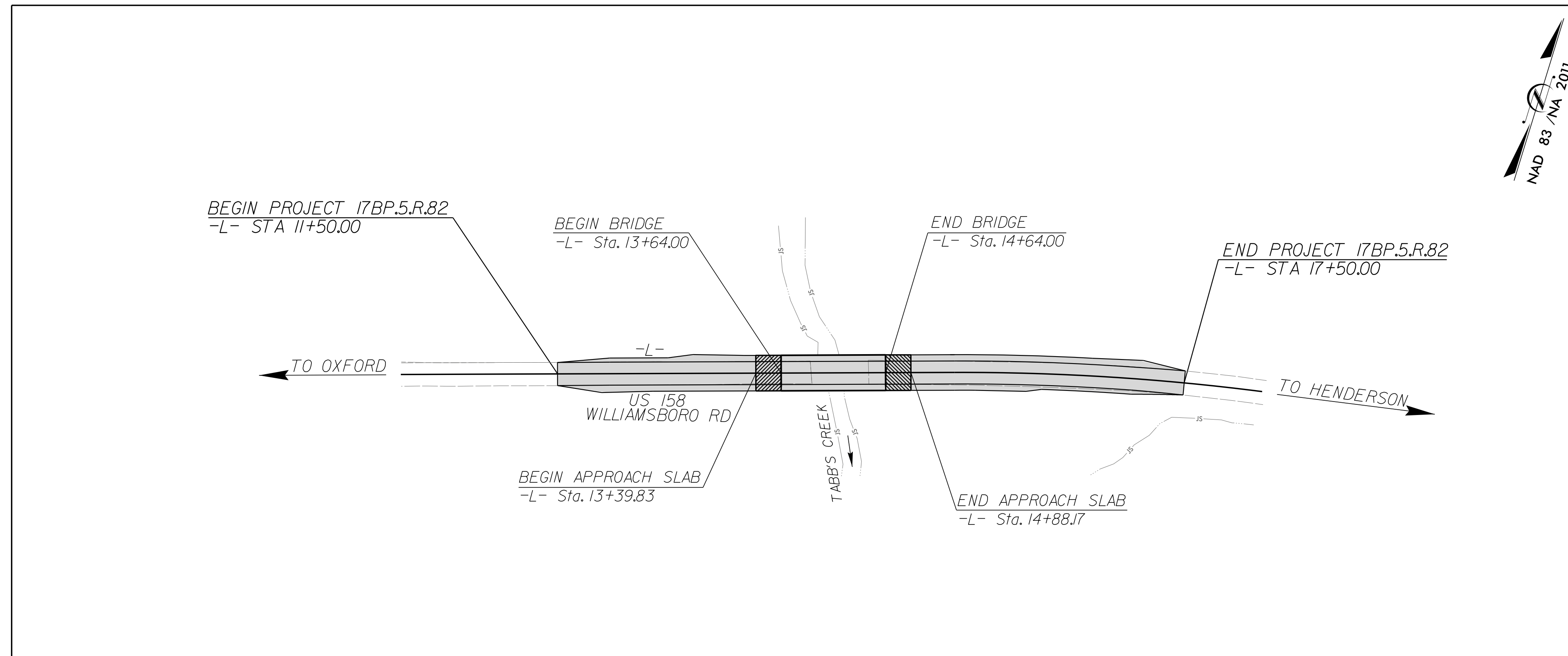


STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
GRANVILLE COUNTY

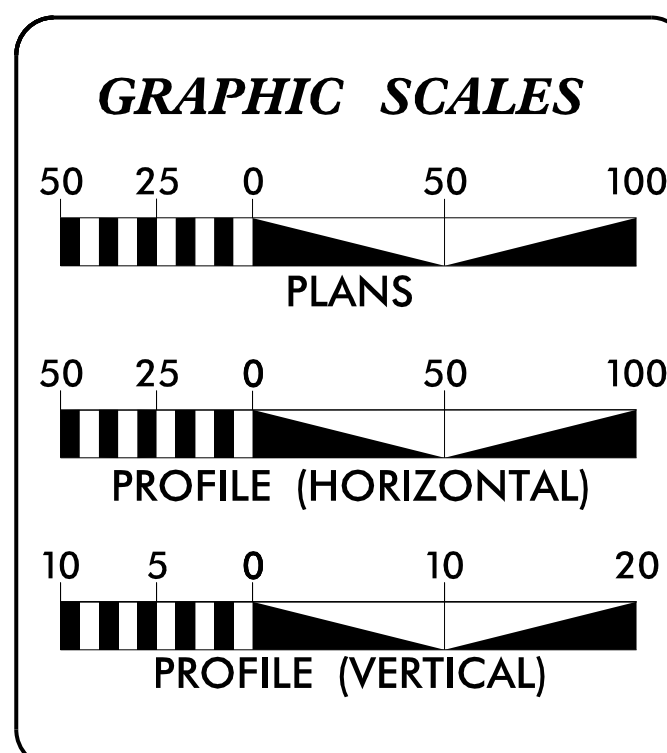
LOCATION: BRIDGE NO. 40 OVER TABB'S CREEK ON US 158 (WILLIAMSBORO ROAD)

TYPE OF WORK: GRADING, PAVING, DRAINAGE AND STRUCTURE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.5.R.82	1	
STATE PROJECT NO.	F.A. PROJ. NO.	DESCRIPTION	
17BP.5.R.82		PE	
17BP.5.R.82		UTL	
17BP.5.R.82		CONST	



**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**



DESIGN DATA

ADT (2020) = 12,800

ADT (2040) = 25,000

V = 55 MPH

CLASS = MAJOR COLLECTOR SUB REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT = 0.095 MILES

LENGTH STRUCTURE TIP PROJECT = 0.019 MILES

TOTAL LENGTH TIP PROJECT = 0.114 MILES

Prepared in the Office of Matt MacDonald for
DIVISION 5
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: TIM JORDAN, PE
PROJECT ENGINEER

LETTING DATE: MARCH 19, 2019

HYDRAULICS ENGINEER: DAVID FUH, PE
HYDRAULICS ENGINEER

NCDOT CONTACT: LISA GILCHRIST, EI

ROADWAY DESIGN ENGINEER

James Tim Jordan
Professional Engineer
SEAL 21102
1/17/2019
P.E.

HYDRAULICS ENGINEER

David FuH
Professional Engineer
SEAL 19732
1/17/2019
P.E.

PLANS PREPARED BY:

M M
MOTT MACDONALD
PO Box 700
Fuquay-Varina, NC 27526
(919) 552-2253
(919) 552-2254 (Fax)
www.mottmac.com/americas
LICENSE NO. F-0669

HDR HDR Engineering, Inc. of the Carolinas
555 Fayetteville St., Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

PROJECT REFERENCE	SHEET NO.
17BP.5.R.82 – GRANVILLE 40	1A
ROADWAY DESIGN ENGINEER	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
Prepared in the Office of:	
	MOTT MACDONALD PO Box 700 Fuquay-Varina, NC 27526 www.mottmac.com/americas

GENERAL NOTES

GENERAL NOTES: 2018 SPECIFICATIONS EFFECTIVE: 01-16-18

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 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.

GUARDRAIL:

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

END BENTS:

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

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE MCNC AND CENTURYLINK.
ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

LIST OF ROADWAY STANDARD DRAWINGS

EFF. 01-16-2018

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
DIVISION 4 – MAJOR STRUCTURES	
422.01	Bridge Approach Fills – Type I Standard Approach Fill
422.03	Reinforced Bridge Approach Fills – Type A Alternate Approach Fill for Integral Abutment
DIVISION 5 – SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction – High Side of Superelevated Curve – Method I
DIVISION 8 – INCIDENTALS	
840.00	Concrete Base Pad for Drainage Structures
840.25	Anchorage for Frames – Brick or Concrete or Precast
840.29	Frames and Narrow Slot Flat Grates
840.35	Traffic Bearing Grated Drop Inlet – for Cast Iron Double Frame and Grates
840.37	Steel Grate and Frame
840.46	Traffic Bearing Precast Drainage Structure
846.01	Concrete Curb, Gutter and Curb & Gutter
846.04	Drop Inlet Installation in Shoulder Berm Gutter
862.01	Guardrail Placement
862.02	Guardrail Installation
862.03	Structure Anchor Units
876.01	Rip Rap in Channels
876.02	Guide for Rip Rap at Pipe Outlets

INDEX OF SHEETS

SHEET NUMBER	DESCRIPTION
1	TITLE SHEET
1A	INDEX OF SHEETS, GENERAL NOTES, AND LIST OF STANDARD DRAWINGS
1B	CONVENTIONAL SYMBOLS
RW2C-1 THRU RW2C-3	SURVEY CONTROL SHEET
RW2D-1	SURVEY CONTROL SHEET
2A-1	PAVEMENT SCHEDULE AND TYPICAL SECTIONS
2C-1	GUARDRAIL INSTALLATION DETAIL
3B-1	GUARDRAIL, SHOULDER BERM GUTTER AND EARTHWORK SUMMARY
3D-1	DRAINAGE SUMMARY
4	PLAN SHEET
5	PROFILE SHEET
TMP-1 THRU TMP-7	TRAFFIC MANAGEMENT PLANS
EC-1 THRU EC-5	EROSION CONTROL PLANS
RF-1	REFORESTATION DETAIL SHEET
UO-1 THRU UO-2	UTILITIES BY OTHERS PLANS
X-1A	CROSS-SECTIONS SUMMARY
X-1 THRU X-4	CROSS-SECTIONS
S-1 THRU S-24	STRUCTURE PLANS
SN	STANDARD STRUCTURE NOTES

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
Computed Property Corner	-----
Property Monument	□ ECM
Parcel/Sequence Number	①23
Existing Fence Line	-x-x-x-
Proposed Woven Wire Fence	○
Proposed Chain Link Fence	□
Proposed Barbed Wire Fence	◇
Existing Wetland Boundary	--- WLB ---
Proposed Wetland Boundary	--- WLB ---
Existing Endangered Animal Boundary	--- EAB ---
Existing Endangered Plant Boundary	--- EPB ---
Existing Historic Property Boundary	--- HPB ---
Known Contamination Area: Soil	☠ s ☠
Potential Contamination Area: Soil	☠ s ☠
Known Contamination Area: Water	☠ w ☠
Potential Contamination Area: Water	☠ w ☠
Contaminated Site: Known or Potential	☠ ? ☠

BUILDINGS AND OTHER CULTURE:

Gas Pump Vent or U/G Tank Cap	○
Sign	○ S
Well	○ W
Small Mine	✕
Foundation	□
Area Outline	□
Cemetery	□
Building	□
School	□
Church	□
Dam	□

HYDROLOGY:

Stream or Body of Water	-----
Hydro, Pool or Reservoir	□
Jurisdictional Stream	--- JS ---
Buffer Zone 1	--- BZ 1 ---
Buffer Zone 2	--- BZ 2 ---
Flow Arrow	←
Disappearing Stream	→
Spring	○
Wetland	--- WLB ---
Proposed Lateral, Tail, Head Ditch	--- FLOW ---
False Sump	▽

RAILROADS:

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

RIGHT OF WAY & PROJECT CONTROL:

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

ROADS AND RELATED FEATURES:

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

VEGETATION:

Single Tree	○
Single Shrub	○

Note: Not to Scale

*S.U.E. = Subsurface Utility Engineering

Hedge	-----
Woods Line	-----
Orchard	○
Vineyard	□ Vineyard

EXISTING STRUCTURES:

MAJOR:	
Bridge, Tunnel or Box Culvert	--- CONC ---
Bridge Wing Wall, Head Wall and End Wall	--- CONC WW ---
MINOR:	
Head and End Wall	--- CONC HW ---
Pipe Culvert	-----
Footbridge	--- ---
Drainage Box: Catch Basin, DI or JB	□ CB
Paved Ditch Gutter	-----
Storm Sewer Manhole	○ S
Storm Sewer	--- S ---

UTILITIES:

POWER:	
Existing Power Pole	●
Proposed Power Pole	○
Existing Joint Use Pole	●
Proposed Joint Use Pole	○
Power Manhole	○ P
Power Line Tower	⊠
Power Transformer	⊠
U/G Power Cable Hand Hole	○
H-Frame Pole	●
U/G Power Line LOS B (S.U.E.*)	--- P ---
U/G Power Line LOS C (S.U.E.*)	--- P ---
U/G Power Line LOS D (S.U.E.*)	--- P ---

TELEPHONE:

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

WATER:

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

TV:

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

GAS:

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

SANITARY SEWER:

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

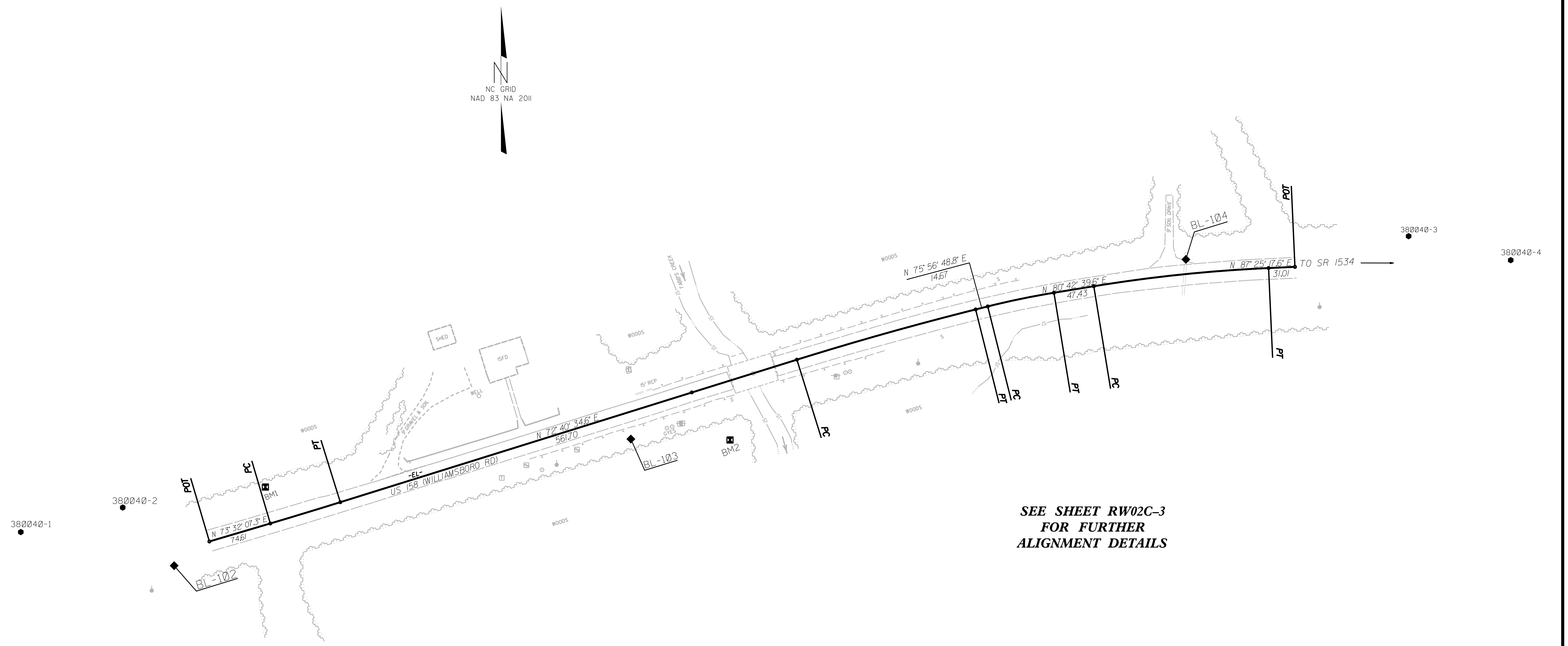
MISCELLANEOUS:

Utility Pole	●
Utility Pole with Base	□
Utility Located Object	○
Utility Traffic Signal Box	⊠
Utility Unknown U/G Line LOS B (S.U.E.*)	--- 70TL ---
U/G Tank; Water, Gas, Oil	□
Underground Storage Tank, Approx. Loc.	⊠ UST
A/G Tank; Water, Gas, Oil	□
Geoenvironmental Boring	⊕
U/G Test Hole LOS A (S.U.E.*)	○
Abandoned According to Utility Records	AATUR
End of Information	E.O.I.

PROJECT REFERENCE NO.	SHEET NO.
38-0040	RW02C-1
Location and Surveys	

SURVEY CONTROL SHEET

W/EXISTING CENTERLINE ALIGNMENTS PRIOR TO CONSTRUCTION



**SEE SHEET RW02C-3
FOR FURTHER
ALIGNMENT DETAILS**

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

22-JAN-2019 10:15A L154_Bridges_2017-2020\GRANVILLE\38-0040\05-17-005 (ADD SURVEYS)\FINAL\38-0040-L.S.-rw2.cadgn
 1/18/19
 bttreslar

SURVEY CONTROL SHEET

W/EXISTING CENTERLINE ALIGNMENTS PRIOR TO CONSTRUCTION

BL	POINT	DESC.	NORTH	EAST	ELEVATION
102		BL 102	933512.8780	2136990.3510	423.86
103		BL 103	933661.5070	2137526.7240	401.94
104		BL 104	933872.3350	2138178.4980	416.15

 BM1 ELEVATION = 415.10
 N 933605 E 2137098
 YELLOW BENCH TIE IN 22" OAK

 BM2 ELEVATION = 391.08
 N 933660 E 2137643
 YELLOW BENCH TIE IN 24" GUM

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

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 btreslar AT L505-279843

SURVEY CONTROL SHEET

W/EXISTING CENTERLINE ALIGNMENTS PRIOR TO CONSTRUCTION

EL POINT	N	E	BEARING	DIST	DELTA	D	L	T	R
POT	933541.308	2137031.762							
LINE			N 73°32'07.3" E	74.61					
PC	933562.453	2137103.310							
CURVE			N 73°06'20.9" E	85.91	00°51'32.7"(LT)	01°00'00.0"	85.91	42.96	5729.58
PT	933587.419	2137185.510							
LINE			N 72°40'34.6" E	561.69					
PC	933754.675	2137721.725							
CURVE			N 74°18'41.7" E	218.01	03°16'14.2"(RT)	01°30'00.0"	218.04	109.05	3819.72
PT	933813.626	2137931.614							
LINE			N 75°56'48.8" E	14.67					
PC	933817.189	2137945.846							
CURVE			N 78°19'44.2" E	79.38	04°45'50.8"(RT)	06°00'00.0"	79.40	39.72	954.93
PT	933833.246	2138023.584							
LINE			N 80°42'39.6" E	47.43					
PC	933840.902	2138070.390							
CURVE			N 84°03'58.6" E	206.36	06°42'38.0"(RT)	03°15'00.0"	206.48	103.36	1762.95
PT	933862.235	2138275.645							
LINE			N 87°25'17.6" E	31.01					
POT	933863.630	2138306.621							

REVISIONS

22-JAN-2019 10:43
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 btreslar AT L505-279843

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

TYPE	STATION	NORTH	EAST
POT	10+00.00	933613.1844	2137268.6952
PC	15+30.00	933770.6250	2137774.7708
PT	18+25.00	933839.5668	2138061.3846

L

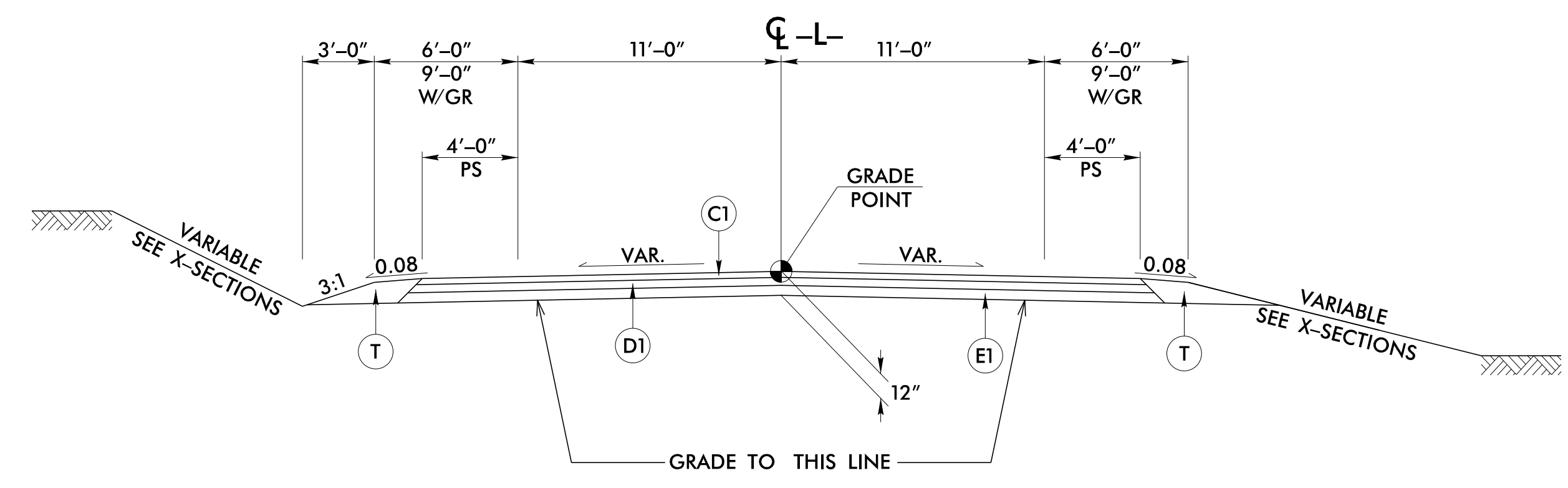
REVISIONS

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 btreslor AT L505-279843

NOTES:

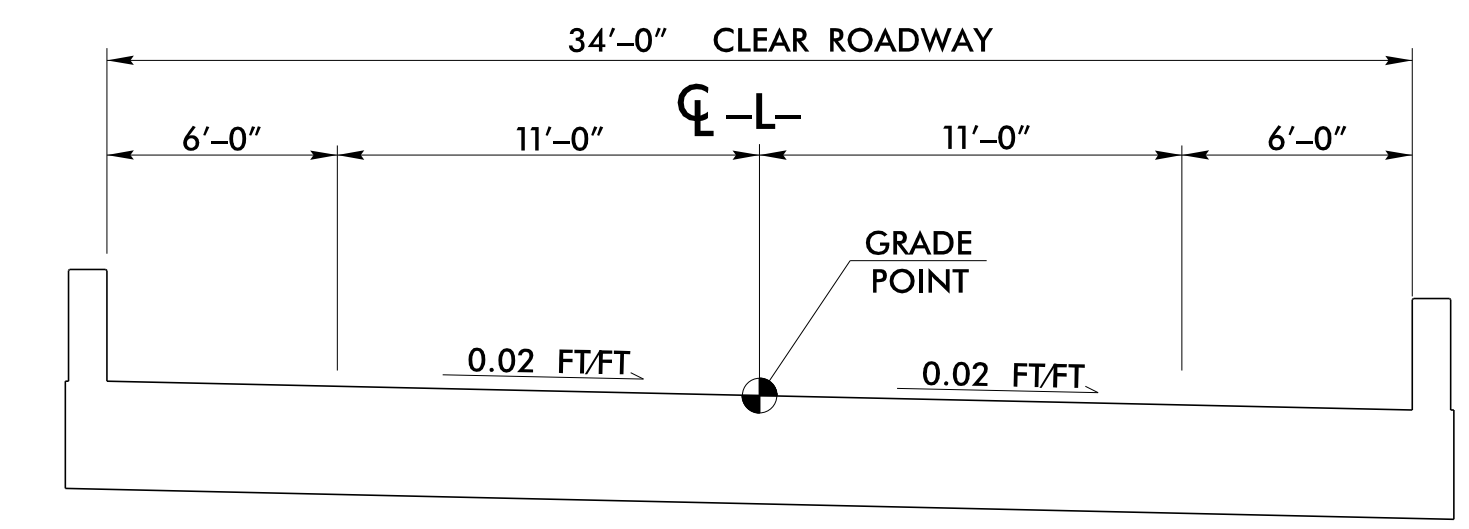
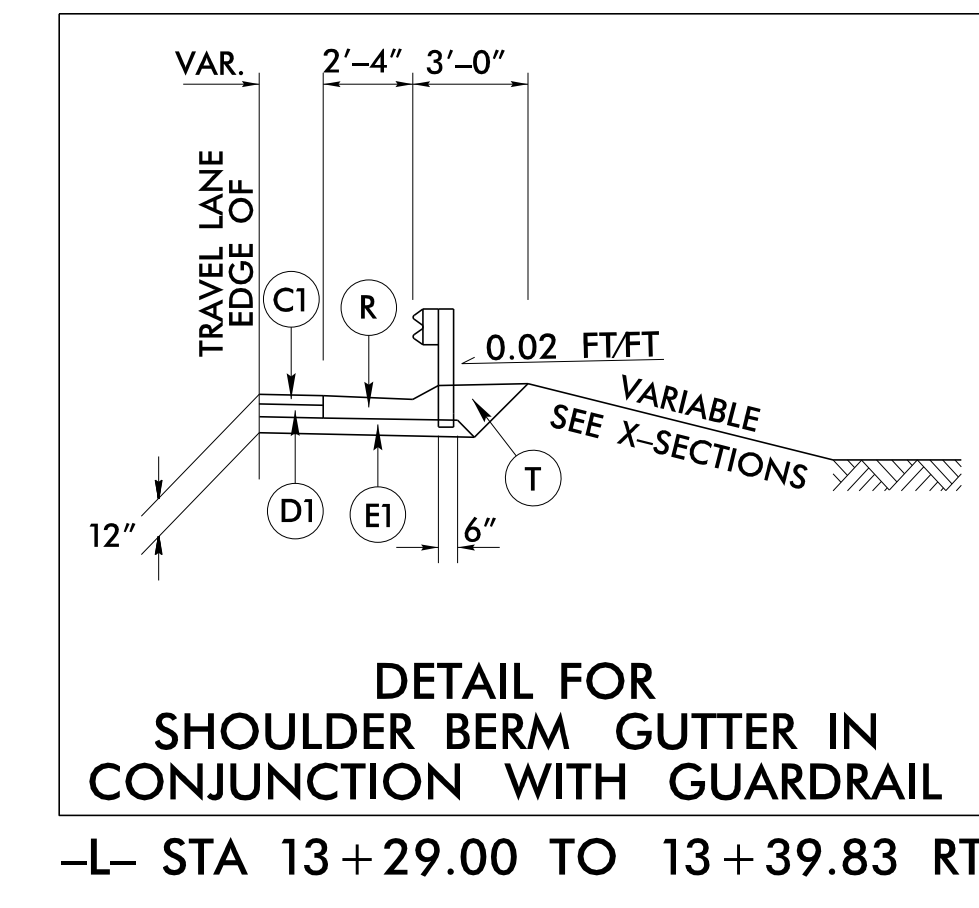
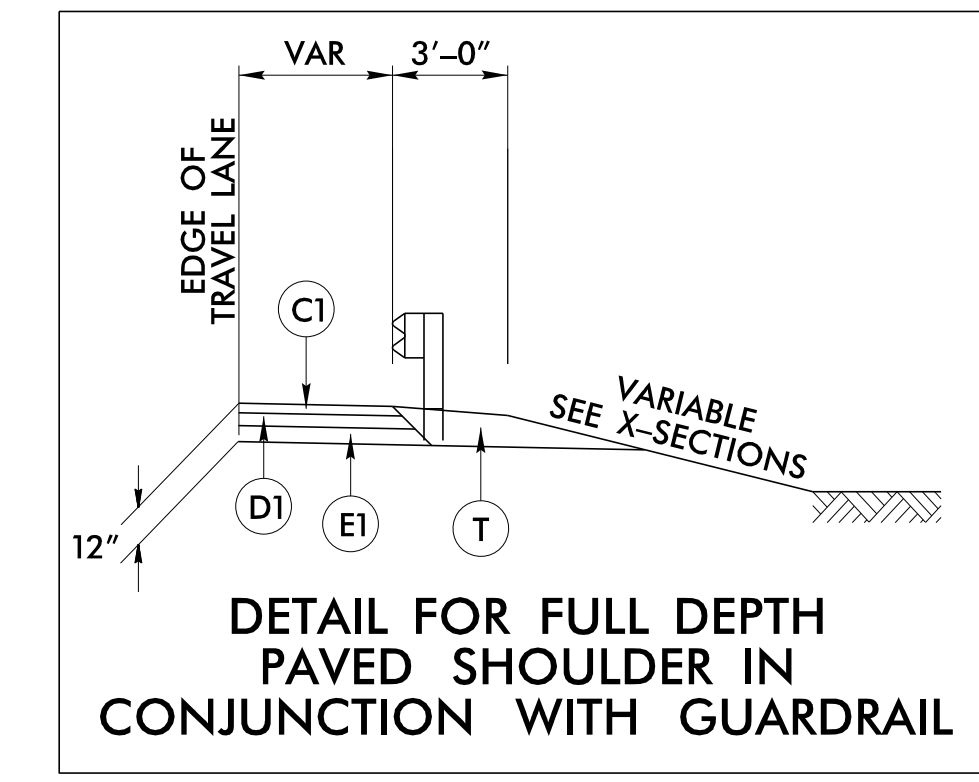
1. PROJECT CONTROL WAS ESTABLISHED USING GNSS, THE GLOBAL NAVIGATION SATELLITE SYSTEM.
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PROJECT REFERENCE	SHEET NO.
17BP.5.R.82 - GRANVILLE 40	2A-1
ROADWAY DESIGN ENGINEER	
<p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p>	
Prepared in the Office of:	
<p>M MOTT MACDONALD 1 & E, LLC Fuquay-Varina, NC 27526 www.mottmac.com/americas</p>	



TYPICAL SECTION NO. 1

- TRANSITION FROM EXISTING TO TYPICAL SECTION NO. 1:**
 -L- STA 11+50.00 TO 12+00.00
- USE TYPICAL SECTION NO. 1:**
 -L- STA 12+00.00 TO 13+64.00 (BEGIN BRIDGE)
 -L- STA 14+64.00 (END BRIDGE) TO 17+00.00
- TRANSITION FROM TYPICAL SECTION NO. 1 TO EXISTING:**
 -L- STA 17+00.00 TO 17+50.00



TYPICAL SECTION NO. 2

- USE TYPICAL SECTION NO. 2:**
 -L- STA 13+64.00 (BEGIN BRIDGE) TO 14+64.00 (END BRIDGE)

NOTE: SEE STRUCTURE PLANS FOR PAVEMENT DEPTHS ON STRUCTURE

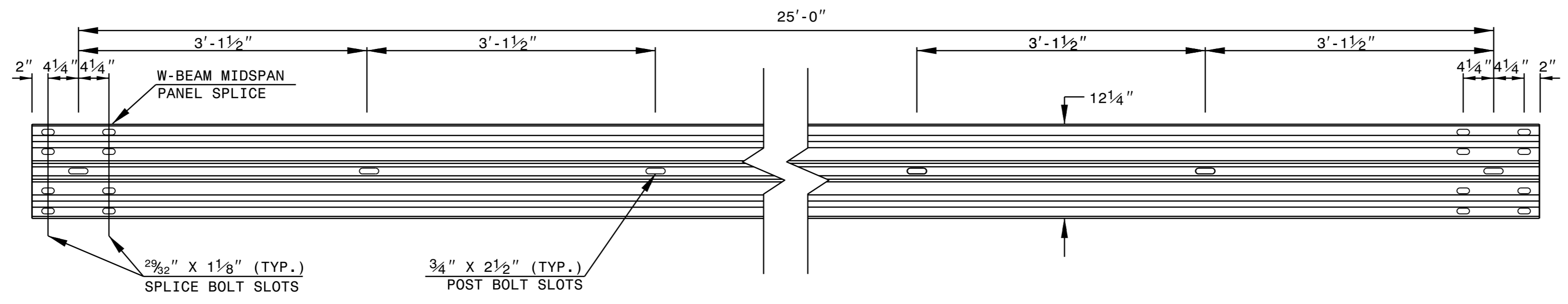
PAVEMENT SCHEDULE	
C1	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
D1	PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
E1	PROP. APPROX. 5" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 570 LBS. PER SQ. YD.
R	SHOULDER BERM GUTTER.
T	EARTH MATERIAL.

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

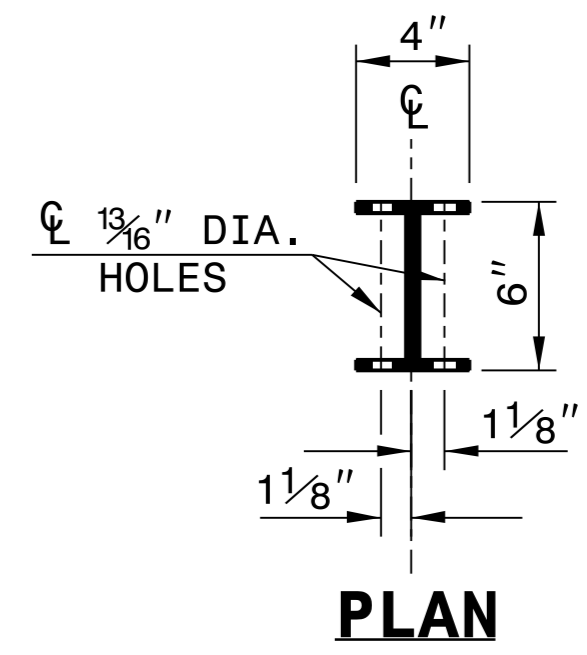
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

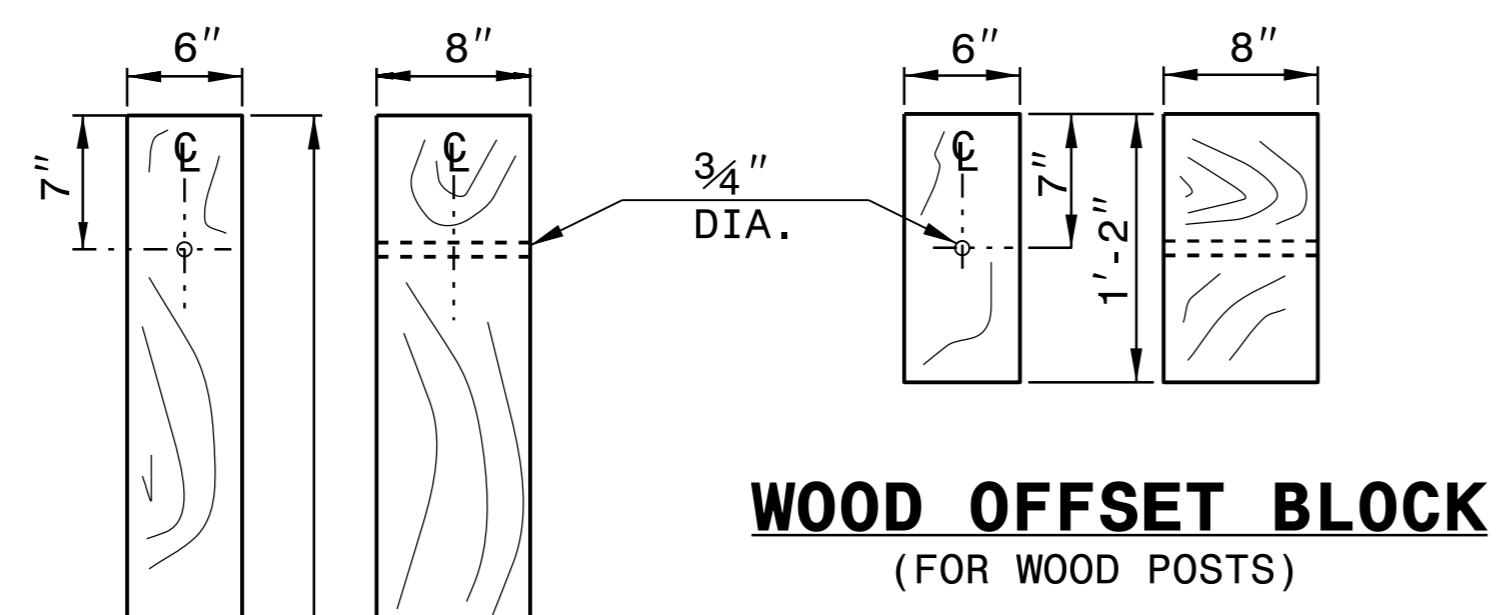
SHEET 6 OF 8
862D02



STANDARD W-BEAM GUARDRAIL



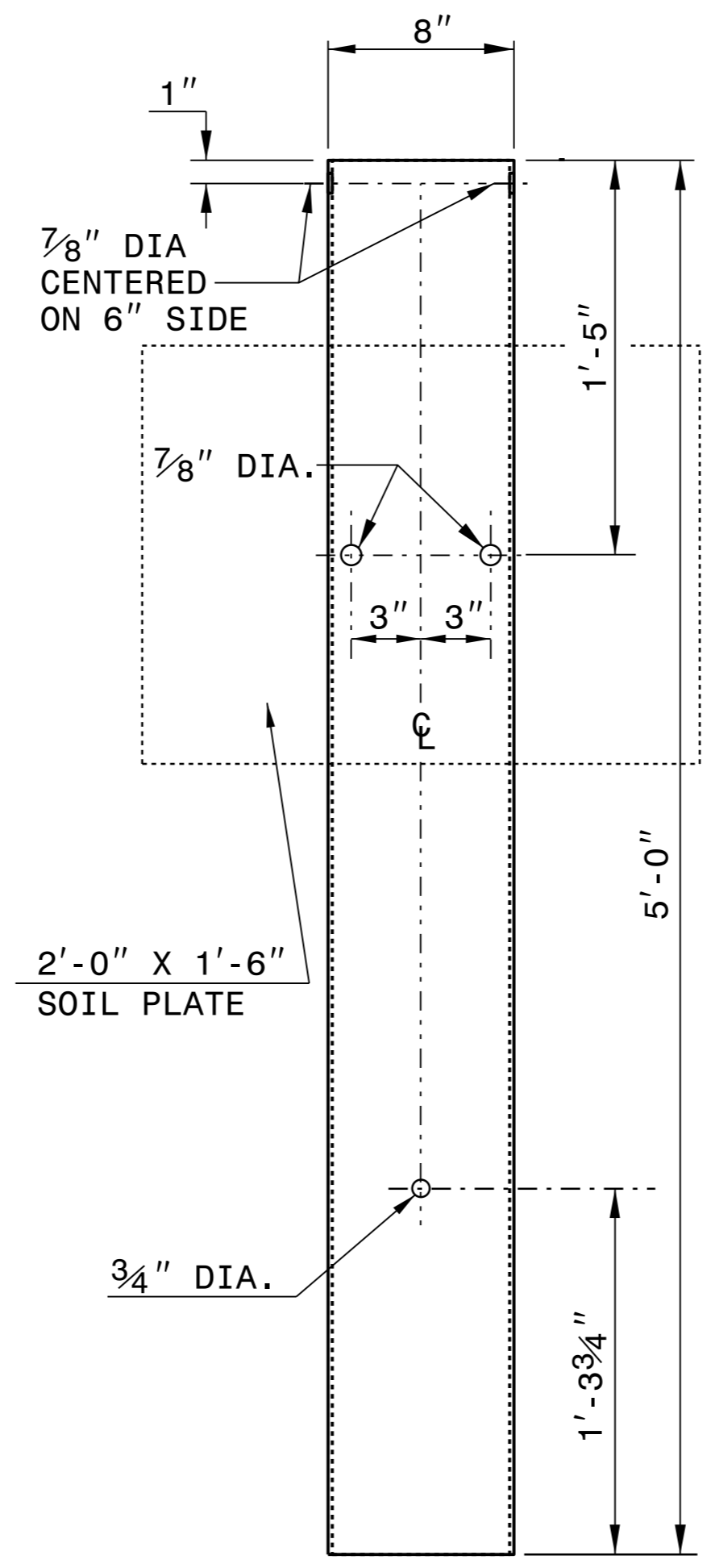
PLAN



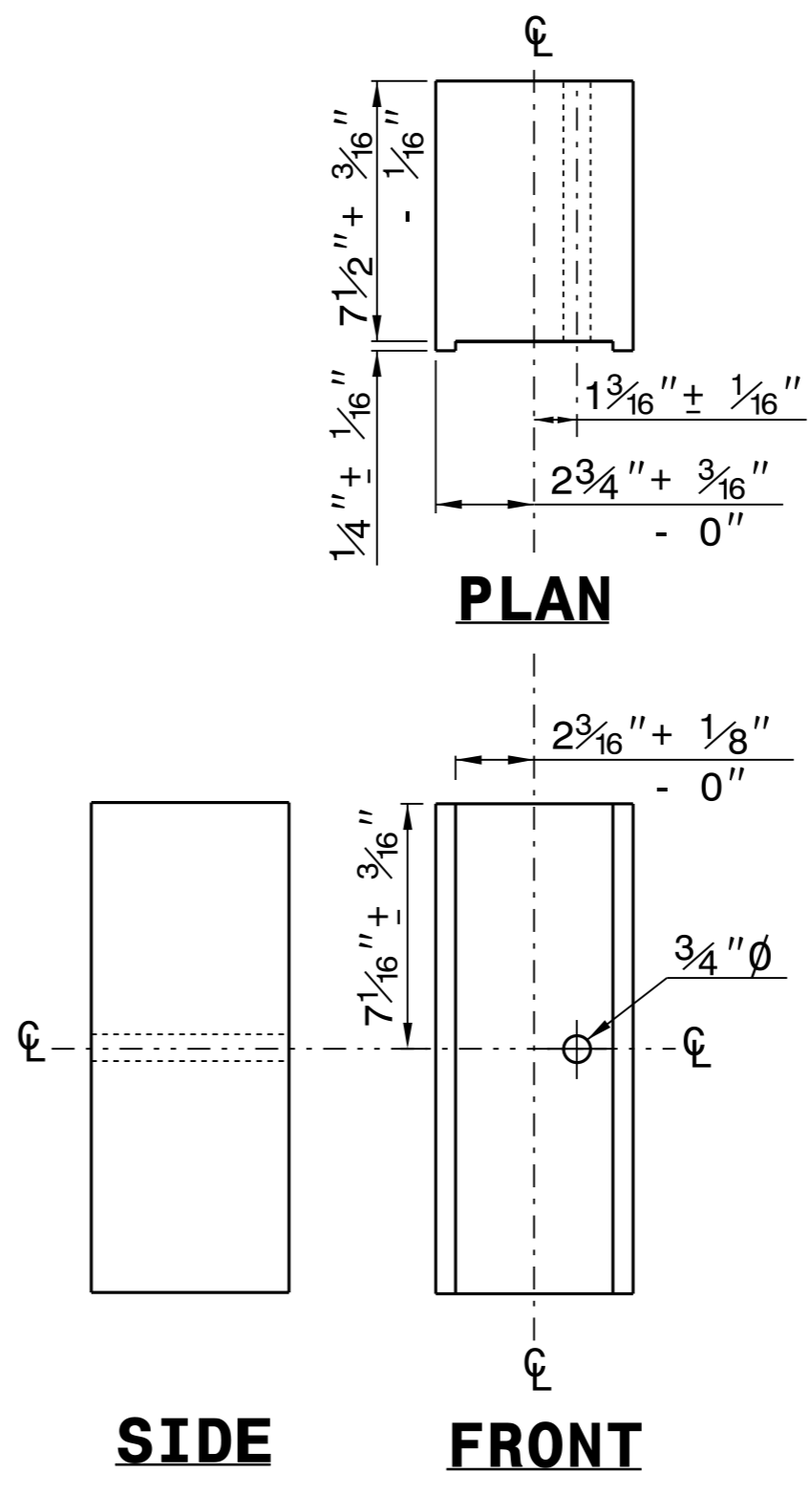
**WOOD OFFSET BLOCK
(FOR WOOD POSTS)**

**STANDARD
LINE POST**

**SHORT WOOD
BREAKAWAY POST**



**STEEL TUBE
TS 6"x8"x0.1875"**

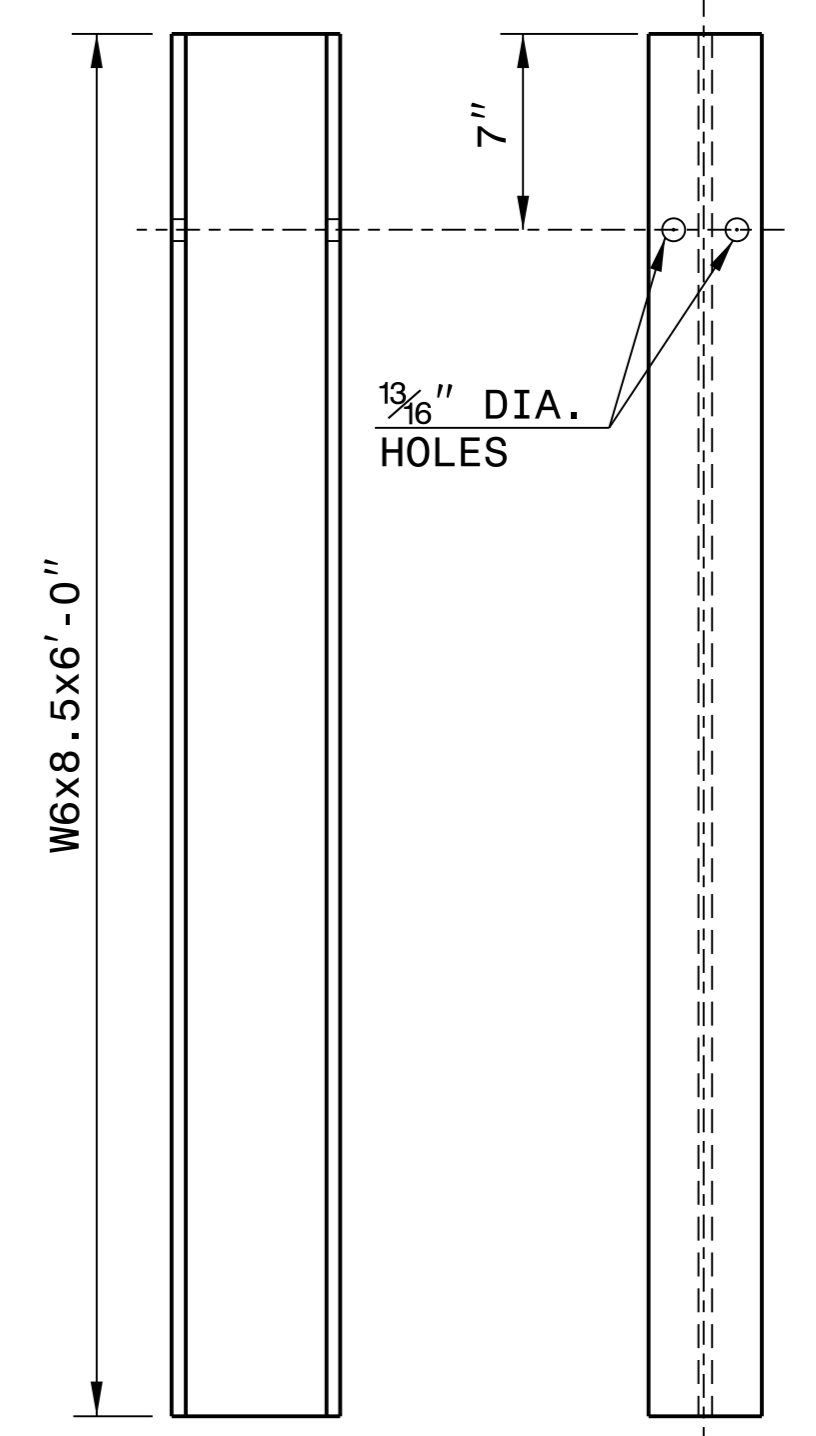


PLAN

SIDE

FRONT

**ROUTED
OFFSET BLOCK**



SIDE

FRONT

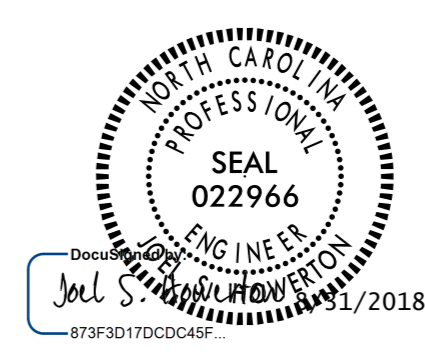
"W6" STEEL POST

SYSTEM PARTS

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 6 OF 8
862D02



**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.: _____

"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 SHOULDER WIDTH	FLARE LENGTH		W		ANCHORS							IMPACT ATTENUATOR TYPE 350			REMARKS											
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	AT-1	GREU TL3	B-77	PERMITTED																		
																		NO.	G	NG																
-L-	11+91.125	13+64.00	RT	172.875'				13+64.00	6'	9'	50'		1'								1	1														
-L-	12+78.625	13+64.00	LT	85.375'			13+64.00		6'	9'		50'		1'							1	1														
-L-	14+64.00	15+99.375	RT	135.375'			14+64.00		6'	9'											1	1														
-L-	14+64.00	17+11.875	LT	247.875'				14+64.00	6'	9'	50'		1'								1	1														
SUBTOTAL				641.50'																																
LESS ANCHOR DEDUCTIONS																																				
GREU-TL3 4 x 50.00' =				-200.00'																																
TYPE B-77 4 x 22.875' =				-91.50'																																
TOTAL				350.00'																																
																									4	4										ADDITIONAL GUARDRAIL POSTS = 5 EA

SHOULDER BERM GUTTER SUMMARY

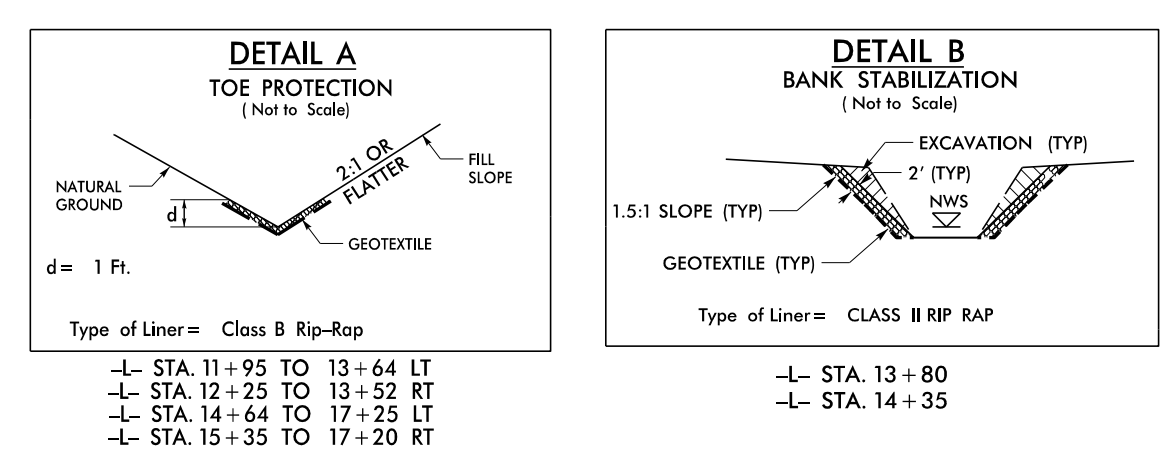
SURVEY LINE	BEG. STA.	END STA.	LENGTH
-L- RT	13+29.00	13+39.83	10.83'
TOTAL			10.83'
SAY			15.00'

SUMMARY OF EARTHWORK IN CUBIC YARDS

LOCATION	UNCLASSIFIED EXCAVATION	UNDERCUT	EMBT + %	BORROW	WASTE
-L- 11+50.00 TO 13+64.00 (BEGIN BRIDGE)	98		90		8
-L- 14+64.00 (END BRIDGE) TO 17+50.00	247		130		117
SUBTOTAL	345		220		125
WASTE IN LIEU OF BORROW					
PROJECT TOTAL	345		220		125
5% TO REPLACE BORROW					
UNSUITABLE (CONTINGENCY)	100				100
GRAND TOTAL	445		220		225
SAY	490				

EST. 150 CY SELECT GRANULAR MATERIAL (CONTINGENCY)
EST. 150 CY UNDERCUT (CONTINGENCY)
EST. 210 CY DDE (SEE PLAN SHEET 4)

NOTE: Approximate quantities only. Unclassified Excavation, Fine Grading, Clearing and Grubbing and Removal of Existing Asphalt Pavement will be paid for at the contract Lump Sum price for "Grading".

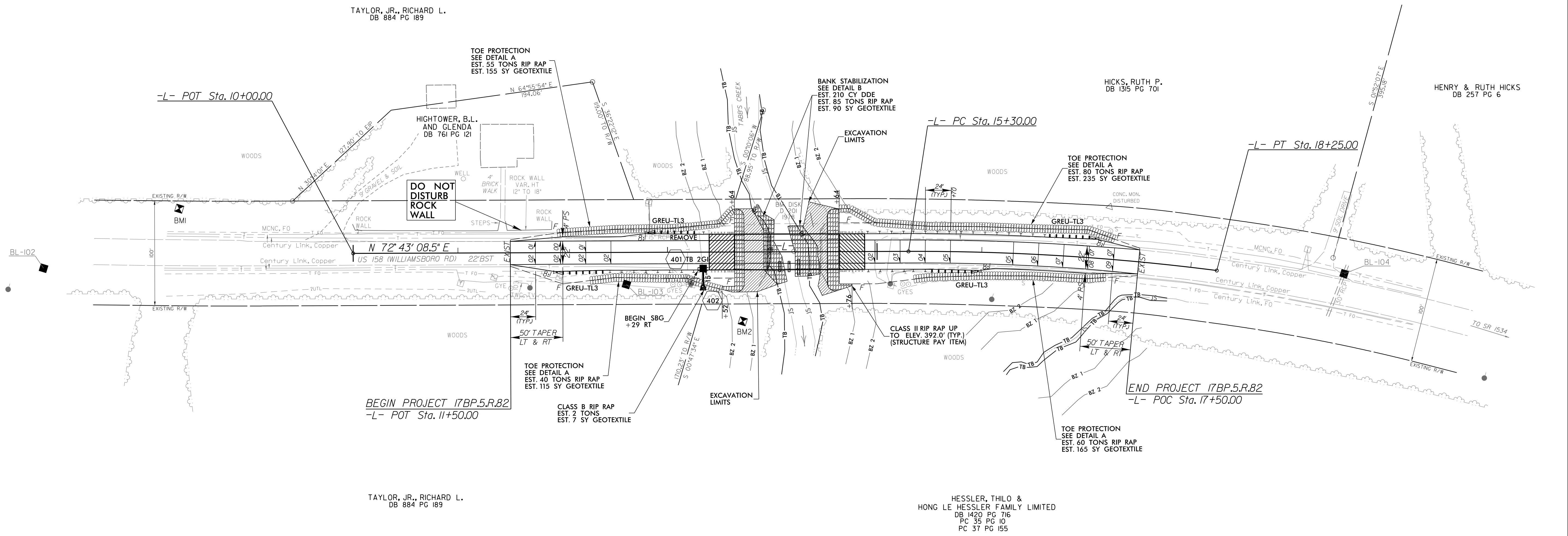


NAD 83 NA 2011

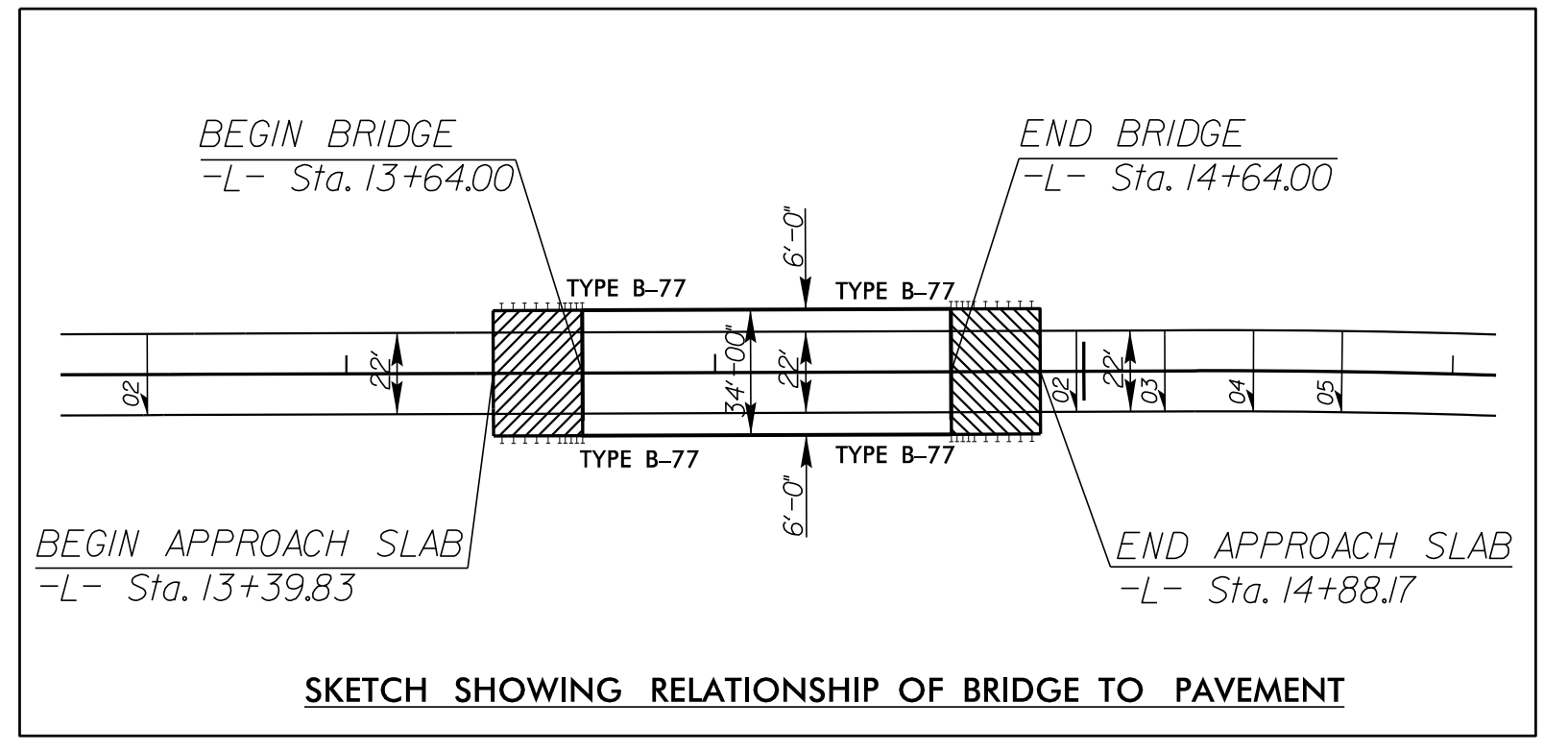
PROJECT REFERENCE		SHEET NO.	
17BP.5.R.82 - GRANVILLE 40		4	
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
MOTT MACDONALD I & E, LLC LICENSE NO. F-06697		HDR ENGINEERING LICENSE NO. F-0116	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED			
Prepared in the Office of:			
		MOTT MACDONALD PO Box 700 Fuquay-Varina, NC 27526 www.mottmac.com/america	
		HDR Engineering, Inc. of the Carolinas 555 Fayetteville St., Suite 900 Raleigh, N.C. 27601 N.C.B.E.L.S. License Number: F-0116	
FOR -L- PROFILE SEE SHEET 5			



QUANTITY FOR EXCAVATION LIMITS IS INCLUDED IN UNCLASSIFIED STRUCTURE EXCAVATION



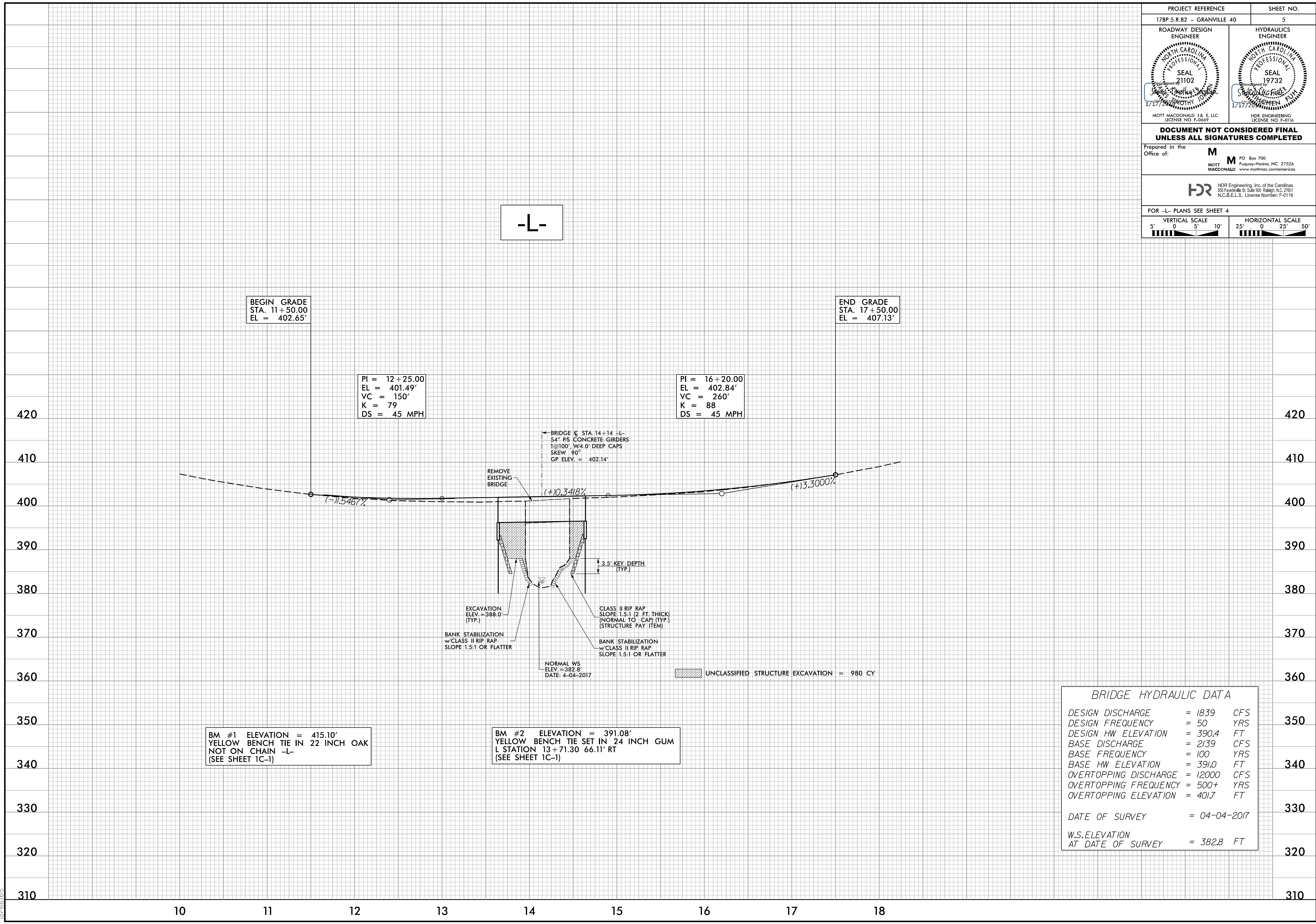
-L-
 PI Sta. 16+77.71
 $\Delta = 7^{\circ} 30' 43.6" (RT)$
 $D = 2^{\circ} 32' 47.3"$
 $L = 295.00'$
 $T = 147.71'$
 $R = 2,250.00'$



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PROJECT REFERENCE 17BP.5.R.82 - GRANVILLE 40	SHEET NO. 5
ROADWAY DESIGN ENGINEER 	HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
Prepared in the Office of: M MOTT MACDONALD	
PO Box 700 Fuquay-Varina, NC 27526 www.mottmac.com/america	
HDR Engineering, Inc. of the Carolinas 555 Fayetteville St., Suite 900 Raleigh, N.C. 27601 N.C.B.E.L.S. License Number: F-0116	
FOR -L- PLANS SEE SHEET 4	
VERTICAL SCALE 5' 0 5 10'	HORIZONTAL SCALE 25' 0 25' 50'

-L-



BEGIN GRADE
STA. 11+50.00
EL = 402.65'

END GRADE
STA. 17+50.00
EL = 407.13'

PI = 12+25.00
EL = 401.49'
VC = 150'
K = 79
DS = 45 MPH

PI = 16+20.00
EL = 402.84'
VC = 260'
K = 88
DS = 45 MPH

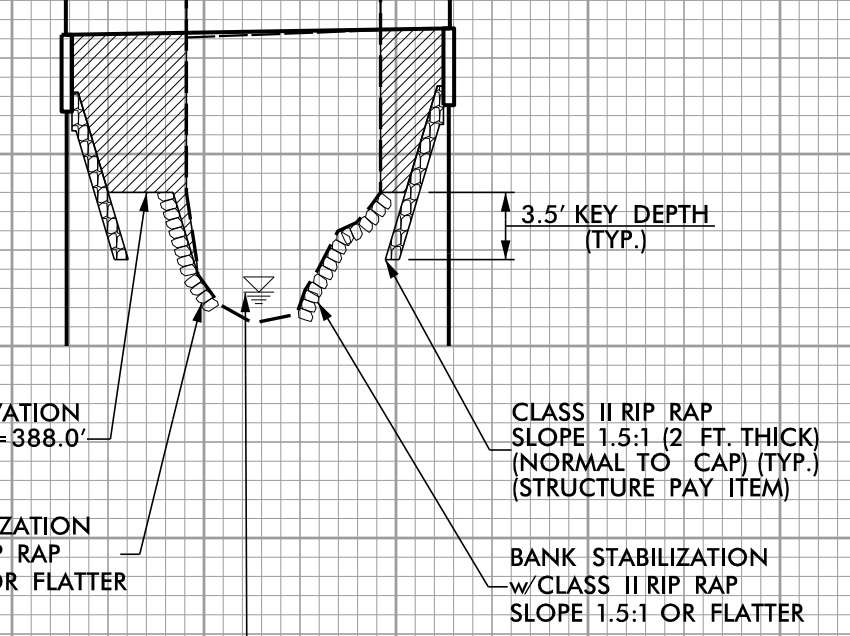
BRIDGE @ STA. 14+14 -L-
54" DS CONCRETE GIRDERS
1@100' W/4.0' DEEP CAPS
SKEW 90°
GP ELEV. = 402.14'

REMOVE EXISTING BRIDGE

(+0.3418%)

(+3.3000%)

(-1.5467%)



EXCAVATION
ELEV. = 388.0'
(TYP.)

BANK STABILIZATION
w/CLASS II RIP RAP
SLOPE 1.5:1 OR FLATTER

NORMAL WS
ELEV. = 382.8'
DATE: 4-04-2017

CLASS II RIP RAP
SLOPE 1.5:1 (2 FT. THICK)
(NORMAL TO CAP) (TYP.)
(STRUCTURE PAY ITEM)

BANK STABILIZATION
w/CLASS II RIP RAP
SLOPE 1.5:1 OR FLATTER

UNCLASSIFIED STRUCTURE EXCAVATION = 980 CY

BM #1 ELEVATION = 415.10'
YELLOW BENCH TIE IN 22 INCH OAK
NOT ON CHAIN -L-
(SEE SHEET 1C-1)

BM #2 ELEVATION = 391.08'
YELLOW BENCH TIE SET IN 24 INCH GUM
L STATION 13+71.30 66.11' RT
(SEE SHEET 1C-1)

BRIDGE HYDRAULIC DATA	
DESIGN DISCHARGE	= 1839 CFS
DESIGN FREQUENCY	= 50 YRS
DESIGN HW ELEVATION	= 390.4 FT
BASE DISCHARGE	= 2139 CFS
BASE FREQUENCY	= 100 YRS
BASE HW ELEVATION	= 391.0 FT
OVERTOPPING DISCHARGE	= 12000 CFS
OVERTOPPING FREQUENCY	= 500+ YRS
OVERTOPPING ELEVATION	= 401.7 FT
DATE OF SURVEY	= 04-04-2017
W.S. ELEVATION AT DATE OF SURVEY	= 382.8 FT

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