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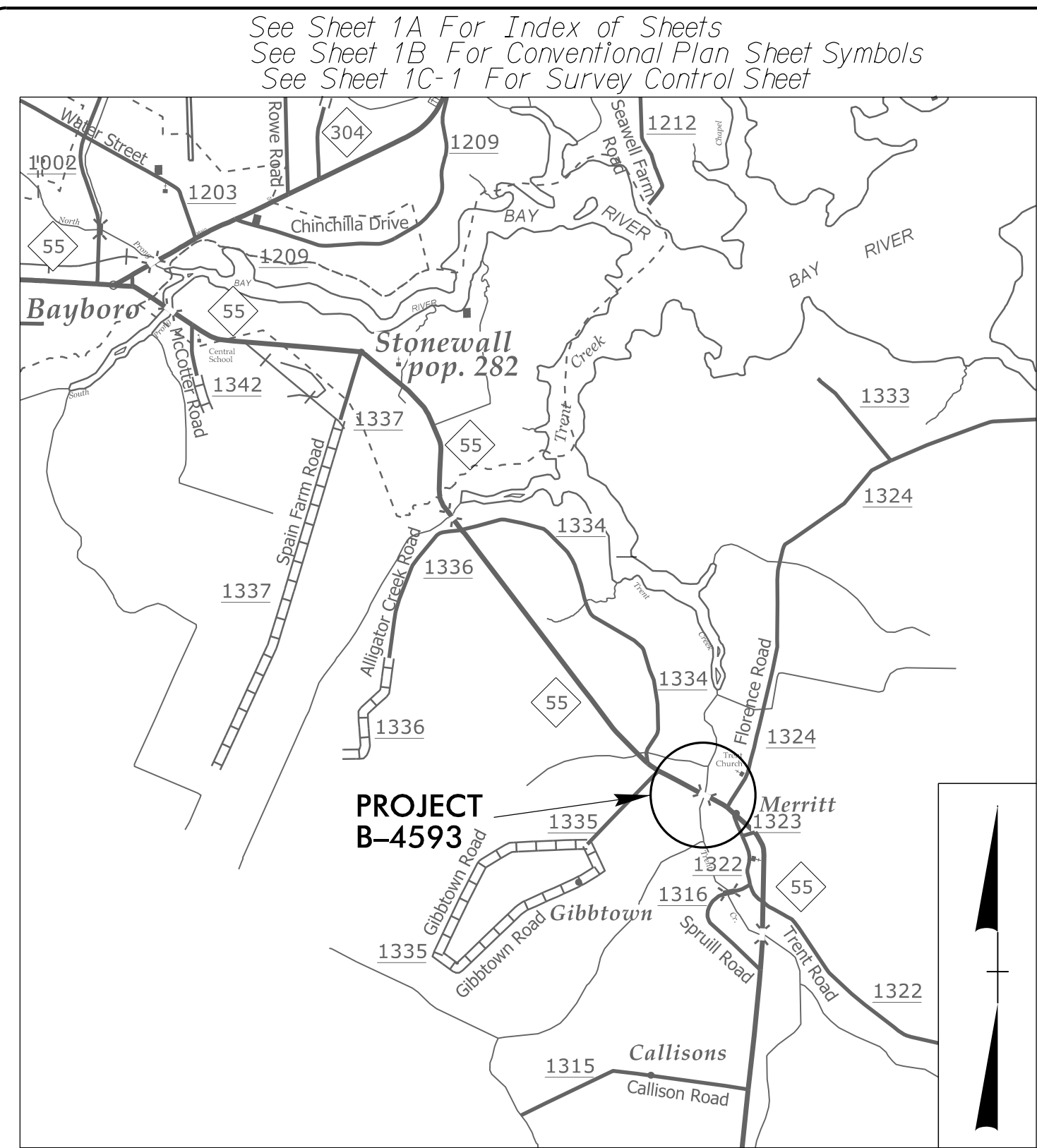
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09/28/2019

TIP PROJECT: B-4593

CONTRACT: C204217



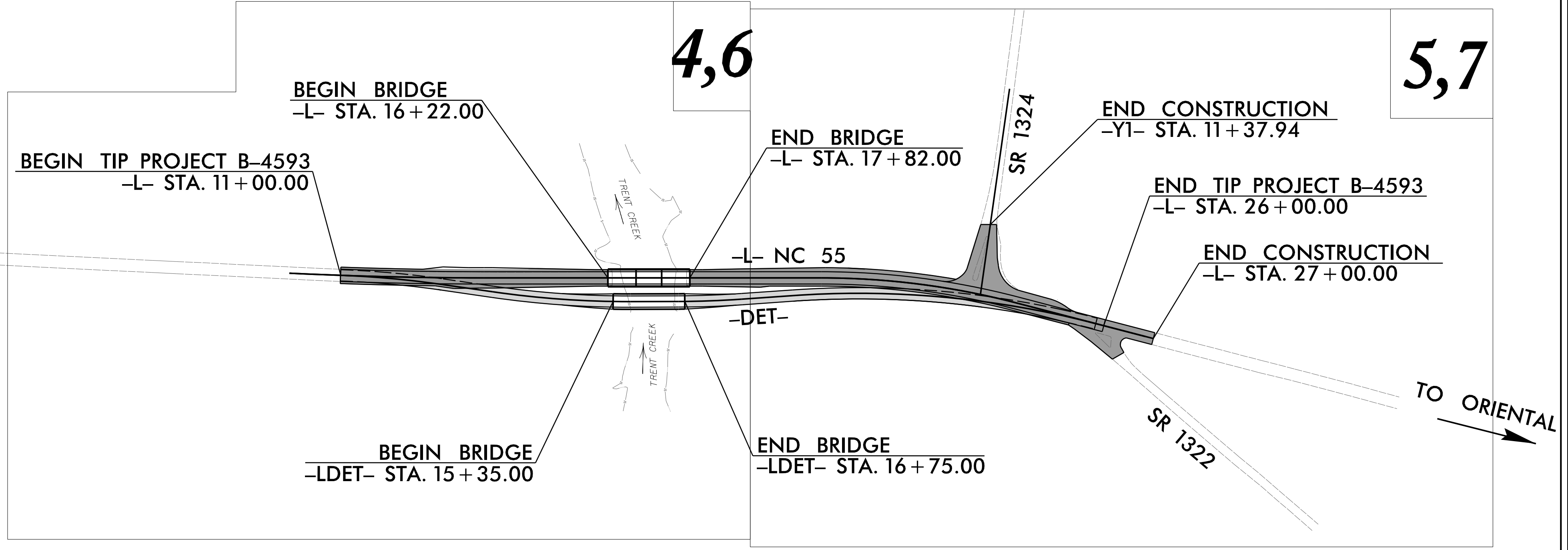
VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PAMLICO COUNTY

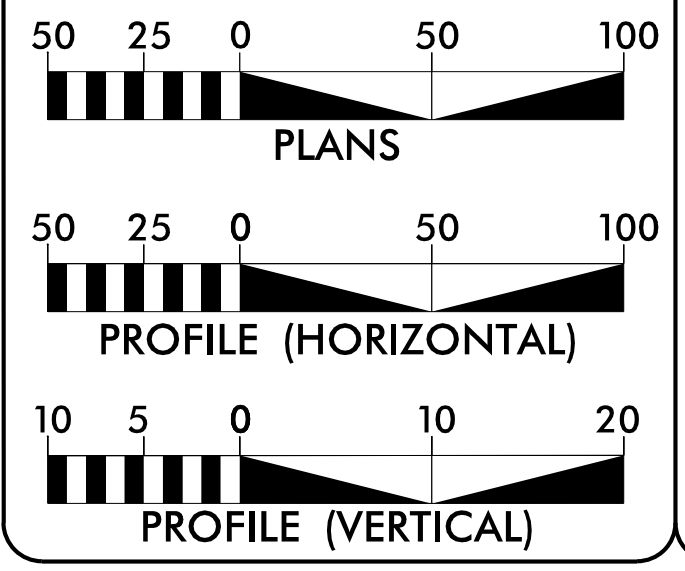
LOCATION: BRIDGE NO. 38 ON NC 55 OVER TRENT CREEK
TYPE OF WORK: GRADING, DRAINAGE, PAVING AND STRUCTURE.

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4593	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
38422.1.2	-	PE	
38422.2.1	-	RW, Utilities	
38422.3.2	0055071	CONST.	



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GRAPHIC SCALES



DESIGN DATA

ADT 2019 = 5576
ADT 2040 = 8600
K = 8 %
D = 55 %
T = 9 % *
V = 60 MPH
V_{DET} = 50 MPH
* TTST = 2% DUAL = 7%
FUNC CLASS = MAJOR COLLECTOR REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4593 = 0.254 MILES
LENGTH STRUCTURE TIP PROJECT B-4593 = 0.030 MILES
TOTAL LENGTH OF TIP PROJECT B-4593 = 0.284 MILES

NCDOT CONTACT: DAVID STUTTS, PE

Prepared in the Office of:
SUMMIT
DESIGN AND ENGINEERING SERVICES
FIRM NO. P-0339
504 Meadowland Drive
Hillsborough, NC 27278-8551
Voice: (919) 732-3883
Fax: (919) 732-6776
www.summitde.net

RIGHT OF WAY DATE: NOVEMBER 1, 2018
BRANDON W. JOHNSON, PE
PROJECT ENGINEER

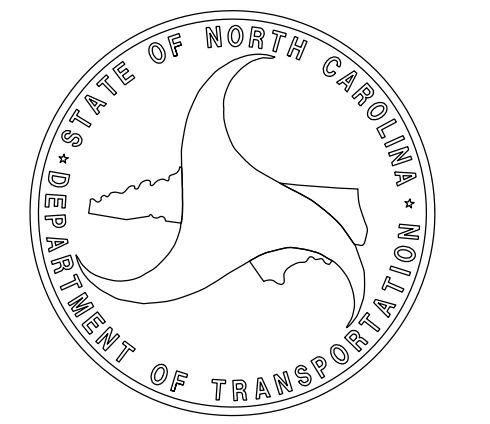
LETTING DATE: JULY 19, 2022
FAITH E. JAHNKE, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

6/3/2022
DocuSigned by:
Patrick Hostnott
SIGNATURE:
P.E.

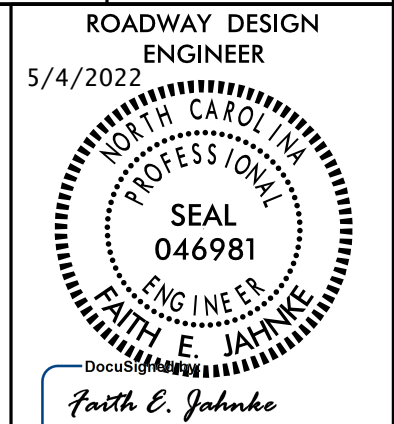
ROADWAY DESIGN ENGINEER

6/3/2022
DocuSigned by:
Faith E. Jahnke
SIGNATURE:
P.E.



8/17/99

PROJECT REFERENCE NO.	SHEET NO.
B-4593	1A



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SHEET NUMBER	INDEX OF SHEETS SHEET
1	TITLE SHEET
1A	INDEX OF SHEETS, GENERAL NOTES, AND STANDARD DRAWINGS
1B	CONVENTIONAL SYMBOLS
1C-1	SURVEY CONTROL SHEETS
2A-1 THRU 2A-2	PAVEMENT SCHEDULE AND TYPICAL SECTIONS
2C-1 THRU 2C-4	SPECIAL DETAILS
2G-1	GEOTECHNICAL DETAILS
3B-1	ROADWAY SUMMARIES
3D-1	DRAINAGE SUMMARIES
3G-1	GEOTECHNICAL SUMMARIES
4 THRU 9	PLAN AND PROFILE SHEET
TMP-1 THRU TMP-7	TRAFFIC MANAGEMENT PLANS
PMP-1 THRU PMP-2	PAVEMENT MARKING PLANS
EC-1 THRU EC-9	EROSION CONTROL PLANS
RF-1	REFORESTATION PLAN
UC-1 THRU UC-3	UTILITIES CONSTRUCTION PLANS
UD-1 THRU UD-3	UTILITIES BY OTHER PLANS
X-0	CROSS-SECTION INDEX SHEET
X-1A	CROSS-SECTION SUMMARY SHEET
X-1 THRU X-8	CROSS-SECTIONS
S-1 THRU S-42	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. 225.05 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. 560.02

SUBSURFACE DRAINS:

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

GUARDRAIL:

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

TEMPORARY SHORING:

SHORING REQUIRED FOR THE MAINTENANCE OF TRAFFIC NOT SHOWN ON THE PLANS WILL BE PAID FOR AT THE CONTRACT PRICE FOR "TEMPORARY SHORING".

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE DUKE ENERGY
PAMLICO COUNTY WATER DEPARTMENT, BAY RIVER METRO SEWER DEPARTMENT

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS, EXCEPT AS SHOWN ON THE PLANS.

RIGHT-OF-WAY MARKERS:

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

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
225.04	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	
815.02	Subsurface Drain
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
840.46	Traffic Bearing Precast Drainage Structure
840.66	Drainage Structure Steps
846.01	Concrete Curb, Gutter and Curb & Gutter
846.04	Drop Inlet Installation in Shoulder Berm Gutter
862.01	Guardrail Placement
862.02	Guardrail Installation
862.03	Structure Anchor Units
862.04	Anchoring End of Guardrail - B-77 and B-83 Anchor Units
876.02	Guide for Rip Rap at Pipe Outlets

04 MAY 2022 07:14
82583_Route1A.dgn
spencer.miller

STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

12/2/2016

BOUNDARIES AND PROPERTY:

State Line	-----
County Line	-----
Township Line	-----
City Line	-----
Reservation Line	-----
Property Line	-----
Existing Iron Pin	○ EIP
Computed Property Corner	-----
Property Monument	□ 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	-----
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	-----
New Right of Way Line with Pin and Cap	-----
New Right of Way Line with Concrete or Granite R/W Marker	-----
New Control of Access Line with Concrete C/A Marker	-----
Existing Control of Access	-----
New Control of Access	-----
Existing Easement Line	-----
New Temporary Construction Easement	-----
New Temporary Drainage Easement	-----
New Permanent Drainage Easement	-----
New Permanent Drainage / Utility Easement	-----
New Permanent Utility Easement	-----
New Temporary Utility Easement	-----
New Aerial Utility Easement	-----

ROADS AND RELATED FEATURES:

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

VEGETATION:

Single Tree	○
Single Shrub	○

Note: Not to Scale

*S.U.E. = Subsurface Utility Engineering

Hedge	-----
Woods Line	-----
Orchard	-----
Vineyard	-----

EXISTING STRUCTURES:

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

UTILITIES:

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

TELEPHONE:

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

WATER:

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

TV:

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

GAS:

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

SANITARY SEWER:

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

MISCELLANEOUS:

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

SURVEY CONTROL SHEET B-4593

W/EXISTING CENTERLINE ALIGNMENTS PRIOR TO CONSTRUCTION

EXISTING ALIGNMENTS

EL POINT	N	E	BEARING	DIST	DELTA	D	L	T	R
POT	501839.346	2680634.769							
LINE			S 45°02'49.0" E	200.35					
PC	501697.793	2680776.554							
CURVE			S 52°58'31.4" E	435.05	15°51'24.7"(LT)	03°37'59.6"	436.44	219.62	1577.00
PT	501435.824	2681123.888							
LINE			S 60°54'13.7" E	727.08					
PC	501082.263	2681759.211							
CURVE			S 62°17'59.0" E	383.01	02°47'30.5"(LT)	00°43'43.8"	383.05	191.56	7861.33
PT	500904.221	2682098.328							
LINE			S 63°41'44.2" E	658.50					
PC	500612.414	2682688.639							
CURVE			S 56°24'35.9" E	382.30	14°34'16.6"(RT)	03°48'04.3"	383.33	192.71	1507.31
PT	500400.907	2683007.103							
LINE			S 49°07'27.6" E	494.07					
POT	500077.581	2683380.682							



EY POINT	N	E	BEARING	DIST
POT	500780.432	2683181.734		
LINE			S 34°22'32.3" W	405.50
POT	500445.747	2682952.779		

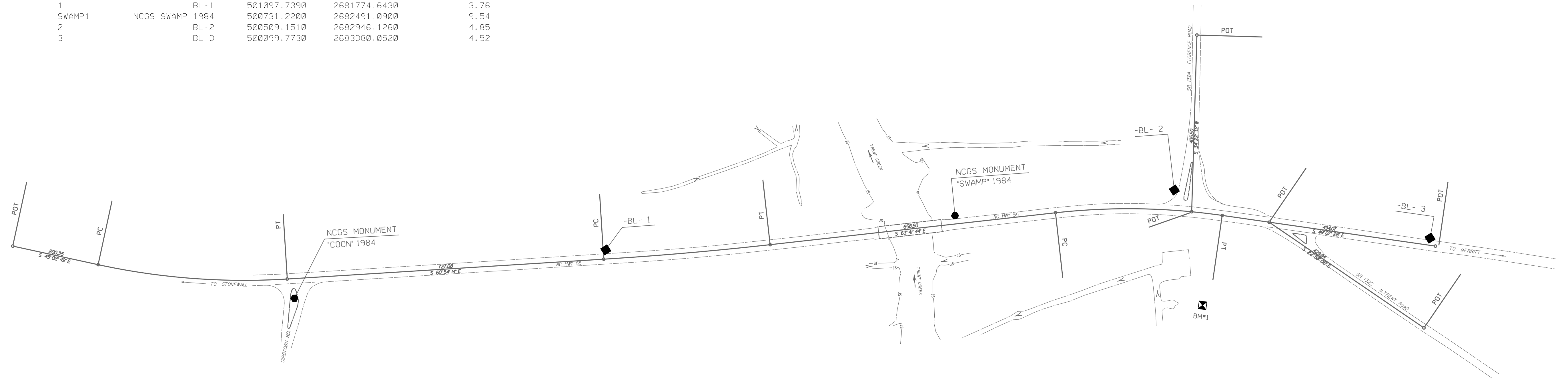
EY1 POINT	N	E	BEARING	DIST
POT	500329.698	2683089.380		
LINE			S 22°58'08.1" E	429.94
POT	499933.846	2683257.156		

BENCHMARKS

.....
 BM1 ELEVATION - 5.85
 N 500252 E 2682858
 RR SPIKE SET IN 20" HARDWOOD

BASELINE

BL POINT	DESC.	NORTH	EAST	ELEVATION
COON1	NCGS COON 1984	501389.8380	2681113.8660	6.52
1	BL-1	501097.7390	2681774.6430	3.76
SWAMP1	NCGS SWAMP 1984	500731.2200	2682491.0900	9.54
2	BL-2	500509.1510	2682946.1260	4.85
3	BL-3	500099.7730	2683380.0520	4.52



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR MONUMENT "SWAMP 1984"
 WITH NAD 83/NA 2011 STATE PLANE GRID COORDINATES OF
 NORTHING: 500731.2200(±) EASTING: 2682491.0900(±)
 ELEVATION: 9.54(±)
 THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT
 (GROUND TO GRID) IS: 0.99988128
 THE N.C. LAMBERT GRID BEARING AND
 LOCALIZED HORIZONTAL GROUND DISTANCE FROM
 "SWAMP 1984" TO -L- STATION IS
 ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
 VERTICAL DATUM USED IS NAVD 88

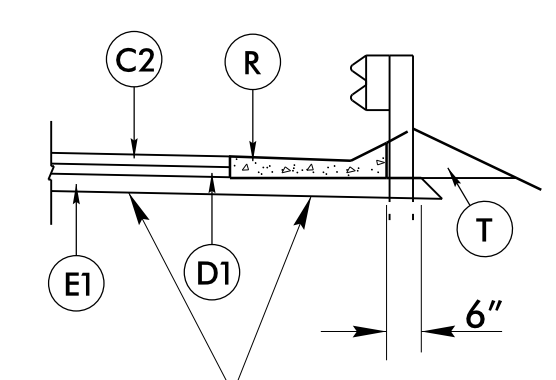
NOTES:

- IF FURTHER INFORMATION REGARDING PROJECT CONTROL IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.
- PROJECT CONTROL WAS ESTABLISHED USING GNSS, THE GLOBAL NAVIGATION SATELLITE SYSTEM.

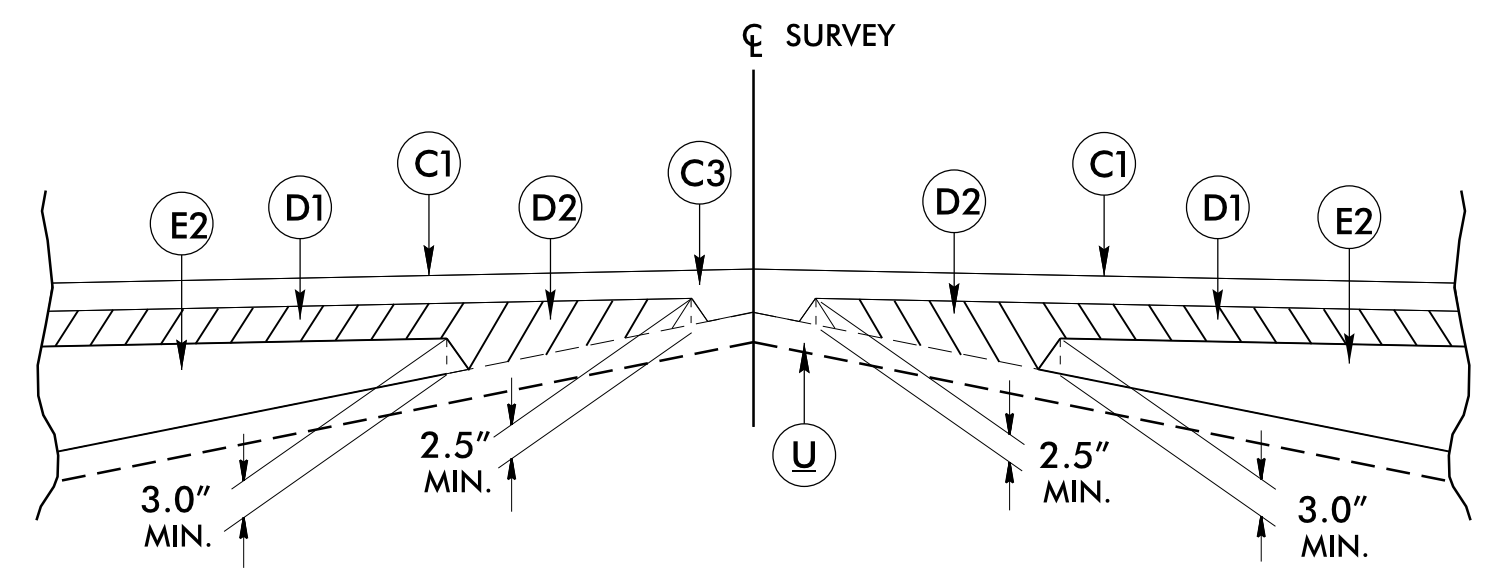
6/2/2019

PAVEMENT SCHEDULE (FINAL)	
C1	PROP. APPROX. 1½" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 165 LBS. PER SQ. YD.
C2	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.
C3	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 1½" IN DEPTH.
D1	PROP. APPROX. 2½" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 2½" IN DEPTH OR GREATER THAN 4" IN DEPTH.
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
E2	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5½" IN DEPTH.
J	PROP. 6" AGGREGATE BASE COURSE.
P	PRIME COAT AT THE RATE OF .35 GAL. PER SQ. YD.
R	SHOULDER BERM GUTTER
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
V	INCIDENTAL MILLING
W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE STANDARD WEDGING DETAIL)

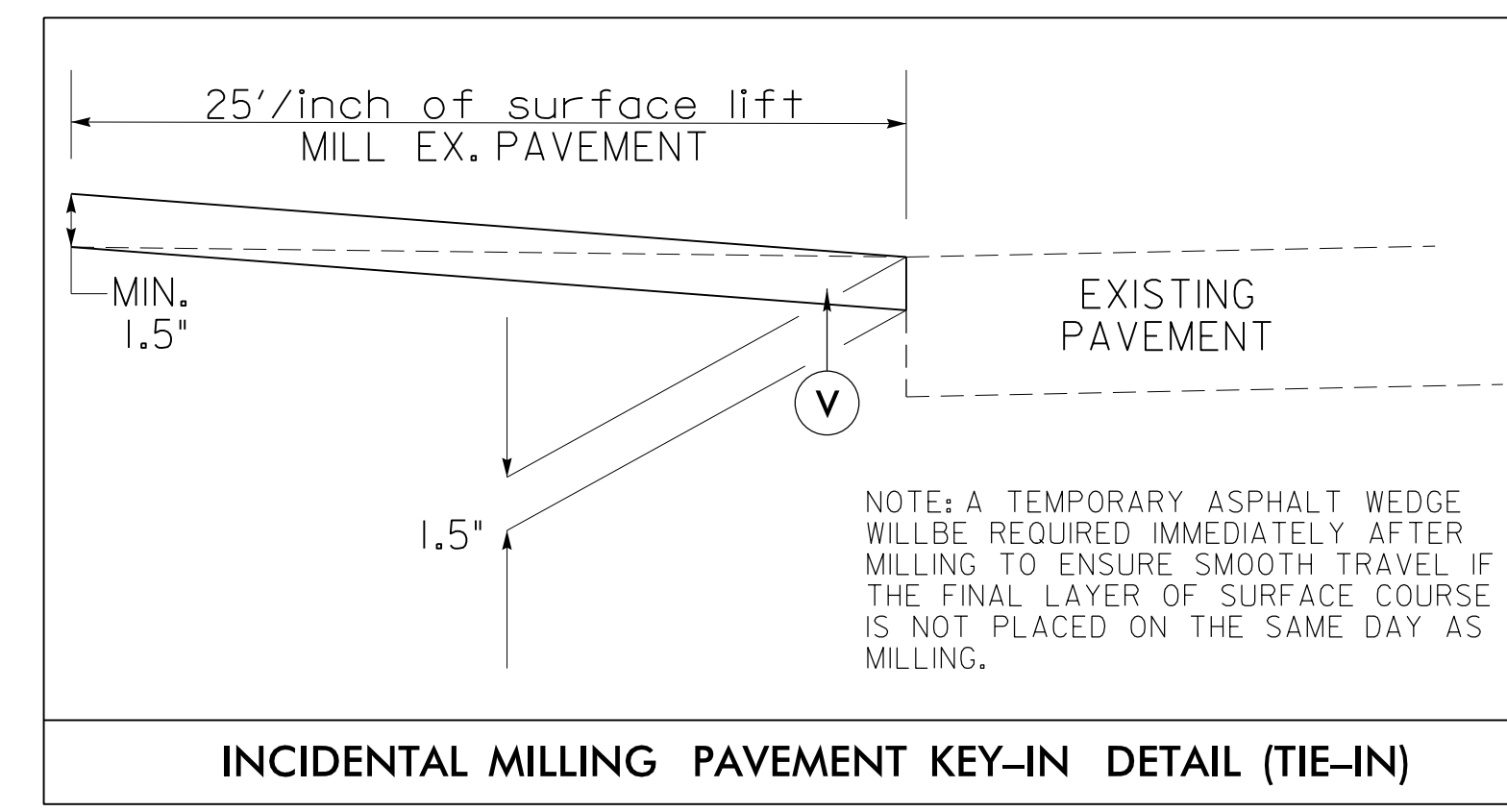
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



PARTIAL TYPICAL
 USE IN CONJUNCTION WITH TYPICAL SECTION #2
 -L- STA. 15+34.93 TO STA. 15+97.83 LT
 -L- STA. 15+80.25 TO STA. 15+97.83 RT
 -L- STA. 18+06.17 TO STA. 18+24.00 LT
 -L- STA. 18+06.17 TO STA. 18+24.00 RT

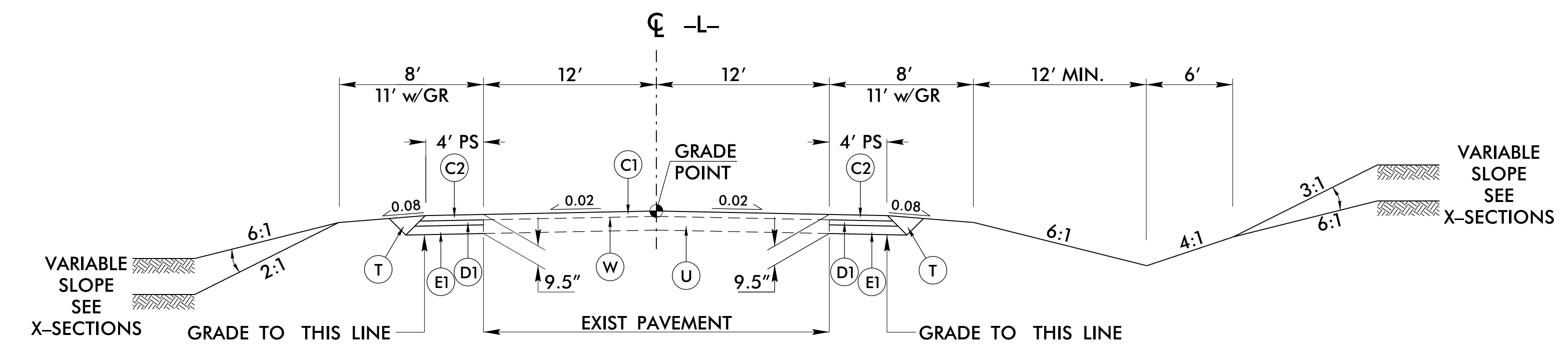


Detail Showing Method of Wedging



INCIDENTAL MILLING PAVEMENT KEY-IN DETAIL (TIE-IN)

-L- STA 11+00.00 TO 11+37.50
 -L- STA 26+62.50 TO 27+00.00
 STATION RANGES ARE APPROXIMATE ONLY.
 GRADE MAY BE ADJUSTED BY ENGINEER
 TO ENSURE A PROPER TIE-IN.

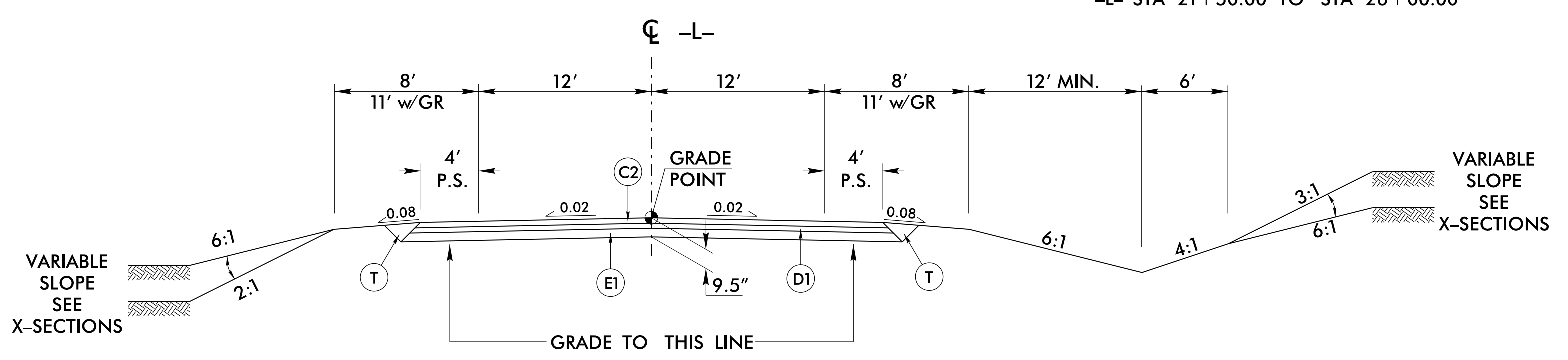


TYPICAL SECTION NO. 1

-L- (NC 55)

USE TYPICAL SECTION NO. 1

-L- STA 11+00.00 TO STA 14+50.00
 -L- STA 21+50.00 TO STA 26+00.00

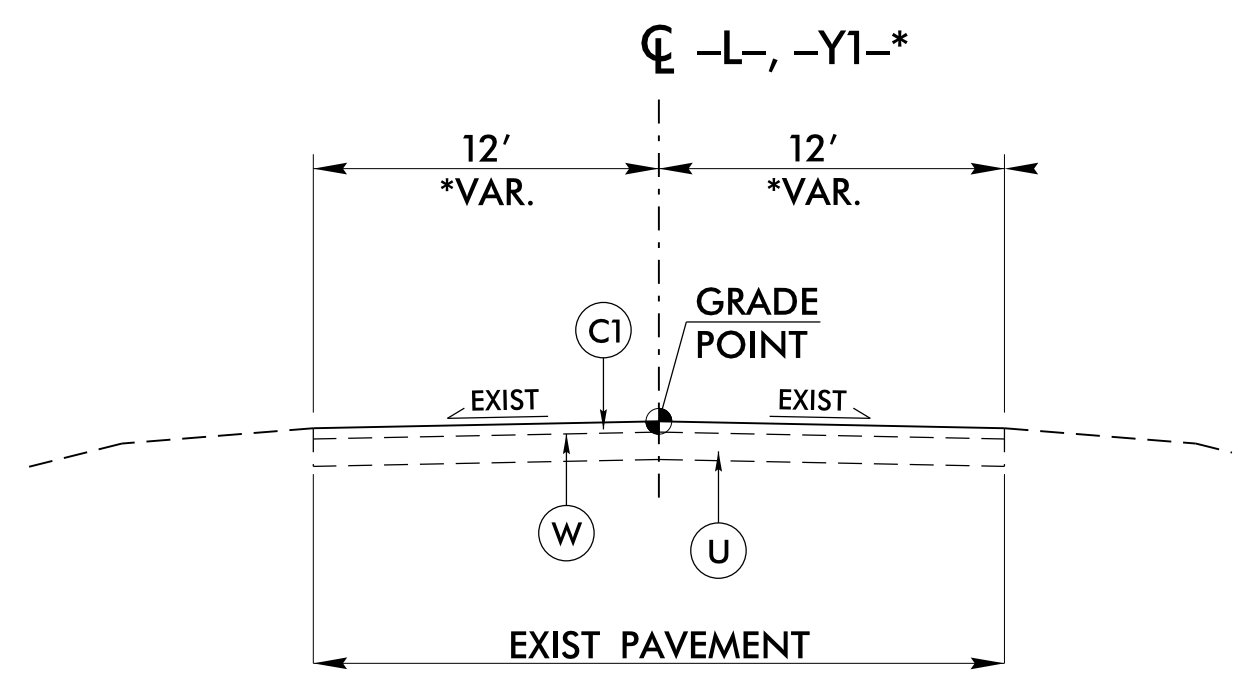


TYPICAL SECTION NO. 2

-L- (NC 55)

USE TYPICAL SECTION NO. 2

-L- STA 14+50.00 TO STA 16+22.00 (BEGIN BRIDGE)
 -L- STA 17+82.00 (END BRIDGE) TO STA 21+50.00



TYPICAL SECTION NO. 3

-L- (NC 55)
 -Y1- (SR 1324)

USE TYPICAL SECTION NO. 3

-L- STA 26+00.00 TO STA 27+00.00
 -Y1- STA 10+12.04 TO STA 11+37.94

PROJECT REFERENCE NO. B-4593	SHEET NO. 2A-1
ROADWAY DESIGN ENGINEER 5/4/2022 FAITH E. JAHNKE	PAVEMENT DESIGN ENGINEER 5/4/2022 CLARK S. MORRISON
SEAL 046981 FAITH E. JAHNKE ENGINEER	SEAL 022896 CLARK S. MORRISON ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
Prepared in the Office of: SUMMIT	NC FIRM LICENSE No. P-0339 504 Meadowslands Drive Hillsborough, NC 27278 (919) 732-2883 (919) 732-6676 (FAX)

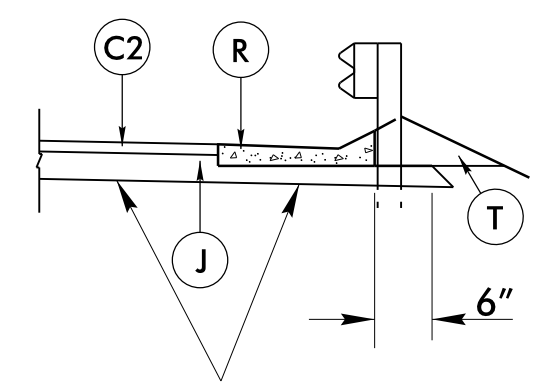
NOTE: PLACE FDPS TO FACE OF GUARDRAIL AS SHOWN ON PLANS.
 *FOR SLOPES VARYING FROM 3:1 TO 2:1, UTILIZE ROCK PLATING. NO SLOPES SHALL BE STEEPER THAN 2:1.

23 MAY 2019 15:23
 825331 R001_19.dgn
 Faith E. Jahnke

6/2/2019

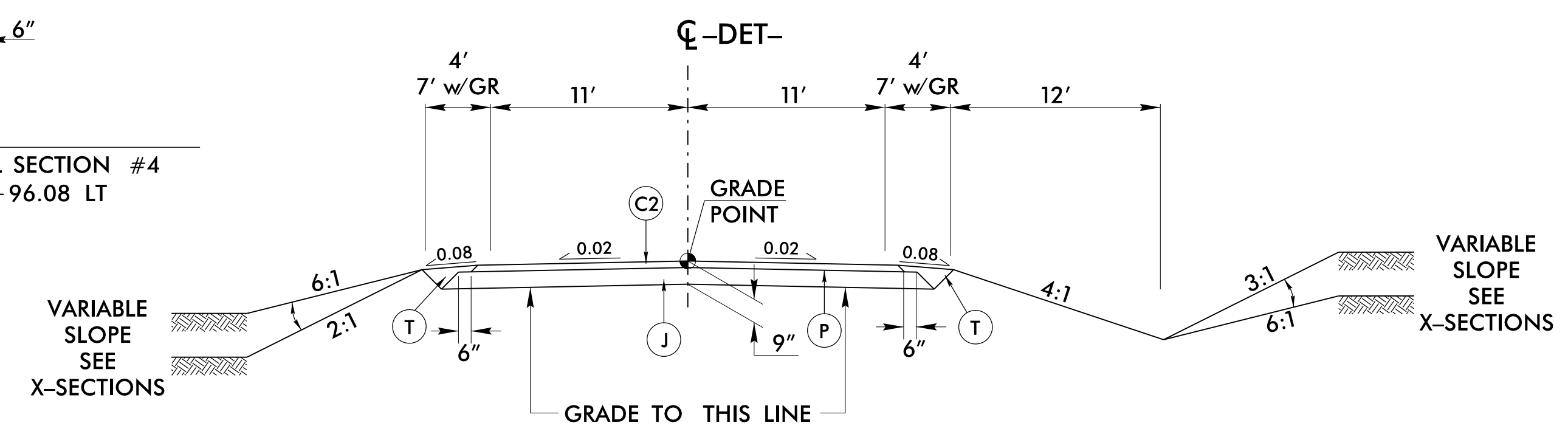
PAVEMENT SCHEDULE	
C1	1 1/2" S9.5B
C2	3" S9.5B
C3	VAR. S9.5B
D1	2 1/2" I19.0C
D1	VAR. I19.0C
E1	4" B25.0C
E2	VAR. B25.0C
J	6" ABC
P	.35 PRIME COAT
R	SHOULDER BERM GUTTER
T	EARTH MATERIAL
U	EXIST. PAVEMENT
V	INCIDENTAL MILLING
W	WEDGING

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



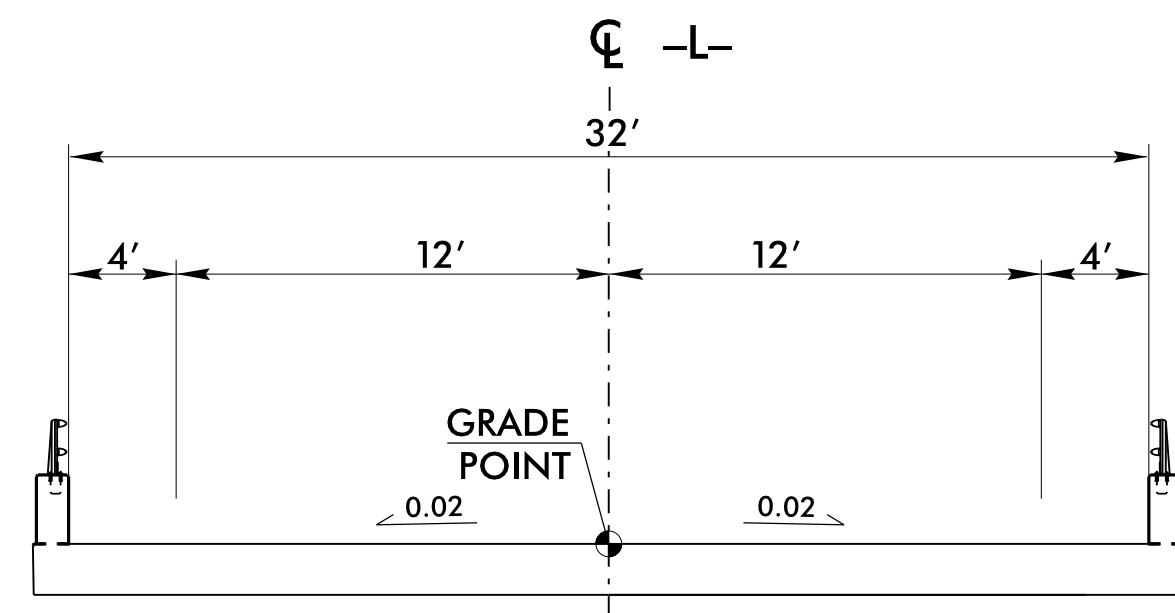
GRADE TO THIS LINE
PARTIAL TYPICAL

USE IN CONJUNCTION WITH TYPICAL SECTION #4
-DET- STA. 16+75.00 TO STA. 16+96.08 LT



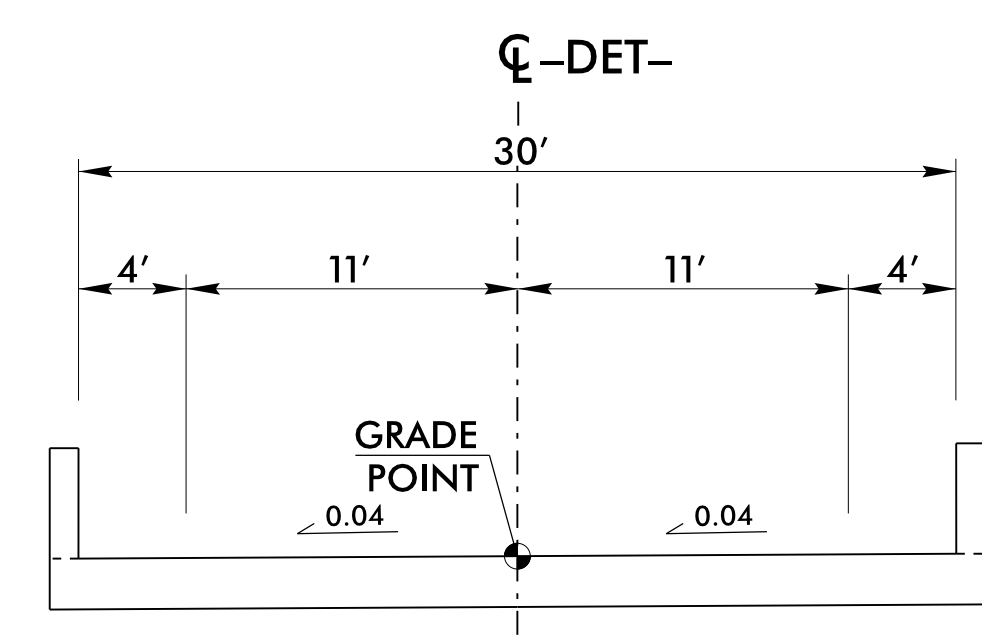
TYPICAL SECTION NO. 4
-DET- (NC 55)

USE TYPICAL SECTION NO. 4
-LDET- STA 11+92.83 TO STA 15+35.00 (BEGIN BRIDGE)
-LDET- STA 16+75.00 (END BRIDGE) TO STA 22+58.65



BRIDGE TYPICAL SECTION NO. 5
FOR BRIDGE OVER TRENT CREEK

USE TYPICAL SECTION NO. 5
-L- STA 16+22.00 (BEGIN BRIDGE)
TO STA 17+82.00 (END BRIDGE)



BRIDGE TYPICAL SECTION NO. 6
FOR TEMPORARY BRIDGE OVER TRENT CREEK

USE TYPICAL SECTION NO. 6
-LDET- STA 15+35.00 (BEGIN BRIDGE)
TO STA 16+75.00 (END BRIDGE)

PROJECT REFERENCE NO. B-4593	SHEET NO. 2A-2
ROADWAY DESIGN ENGINEER 5/4/2022 FAITH E. JAHNKE SEAL 046981 NORTH CAROLINA PROFESSIONAL ENGINEER	PAVEMENT DESIGN ENGINEER 5/4/2022 CLARK S. MORRISON SEAL 022896 NORTH CAROLINA PROFESSIONAL ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
Prepared in the Office of: SUMMIT DESIGN AND ENGINEERING SERVICES	NC FIRM LICENSE No. P-0339 504 Meadowslands Drive Hillsborough, NC 27278 (919) 732-2883 (919) 732-6676 (FAX)

*FOR SLOPES VARYING FROM 3:1 TO 2:1, UTILIZE ROCK PLATING. NO SLOPES SHALL BE STEEPER THAN 2:1.

23 MAY 2019 15:23
B25N31_R01_15p-2A.dgn
Faith.E.Jahnke

I4-DEC-2017 10:36 S:\Contracts\2018\Standard Drawings\Special Details\Jhowerton\Standard Drawings\Details in Lieu of Standards\Division 8\0862d0301.dgn
 Jhowerton AT CSU-212855

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

SHEET 1 OF 7
862D03

ELEVATION

NOTE:

- **POST NOT REQUIRED FOR SKEW ANGLES GREATER THAN 150° OR LESS THAN 30° UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- *THE DISTANCE FROM END OF BRIDGE RAIL TO CENTER LINE OF THE FIRST POST SHOULD BE 11½" IF CONCRETE BACKWALL IS NOT PRESENT.
- SHOULDER BERM GUTTER MUST BE INSTALLED TO THE LIMITS 8" x 4" LIP CURB IS SHOWN IF ANCHOR UNIT IS NOT ADJACENT TO AN APPROACH SLAB.
- MEASURE GUARDRAIL HEIGHT FROM THE TOP OF ADJACENT SURFACE (SHOULDER, BERM, OR GUTTER).
- LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
- SEE SHEET 3 FOR POST SECTIONS 1 THRU 9.

PLAN VIEW

**GUARDRAIL ANCHOR UNIT, TYPE III
FOR ATTACHMENT TO RAIL ON BRIDGE**

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

SHEET 2 OF 7
862D03

ELEVATION

NOTE:

- **POST NOT REQUIRED FOR SKEW ANGLES GREATER THAN 150° OR LESS THAN 30° UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- *THE DISTANCE FROM END OF BRIDGE RAIL TO CENTER LINE OF THE FIRST POST SHOULD BE 11½" IF CONCRETE BACKWALL IS NOT PRESENT.
- SHOULDER BERM GUTTER MUST BE INSTALLED TO THE LIMITS 8" x 4" LIP CURB IS SHOWN IF ANCHOR UNIT IS NOT ADJACENT TO AN APPROACH SLAB.
- MEASURE GUARDRAIL HEIGHT FROM THE TOP OF ADJACENT SURFACE (SHOULDER, BERM, OR GUTTER).
- LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
- SEE SHEET 3 FOR POST SECTIONS 1 THRU 9.

PLAN VIEW

**GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO
RAIL ON BRIDGE - SUB REGIONAL TIER**

5/6/2022

DocuSigned by:
Ronald E. Davenport, Jr.
F819603847A442

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

**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.:

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

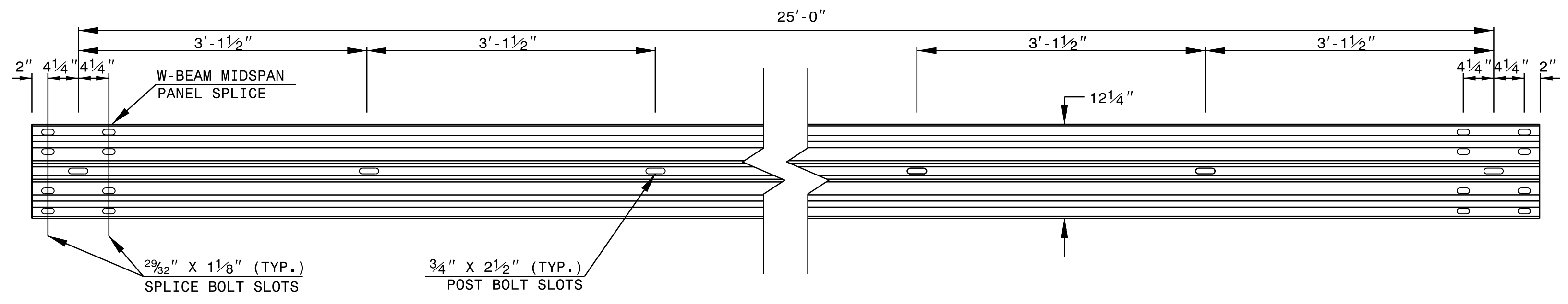
ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 6 OF 8
862D02

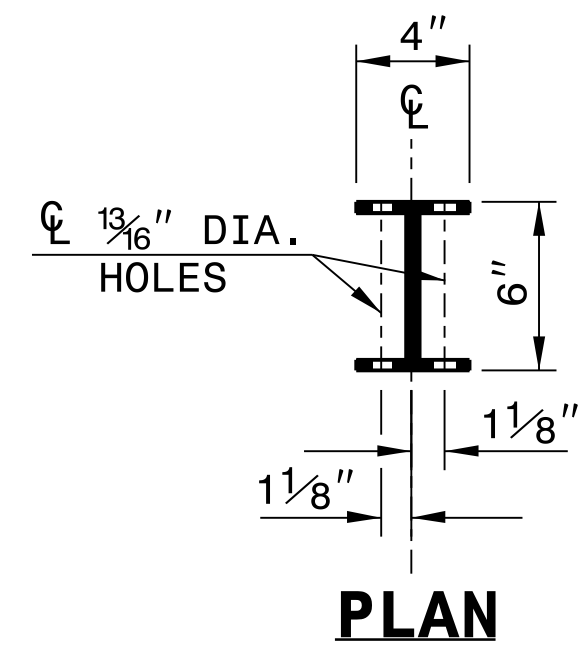
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

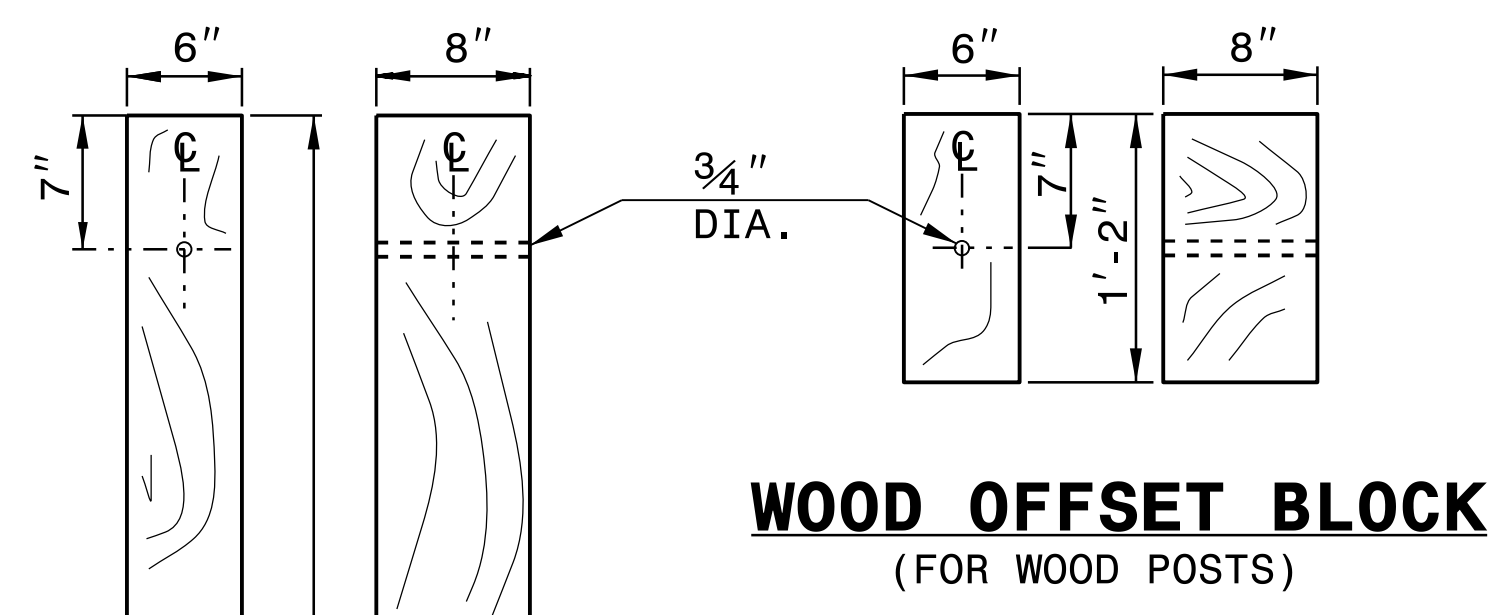
SHEET 6 OF 8
862D02



STANDARD W-BEAM GUARDRAIL



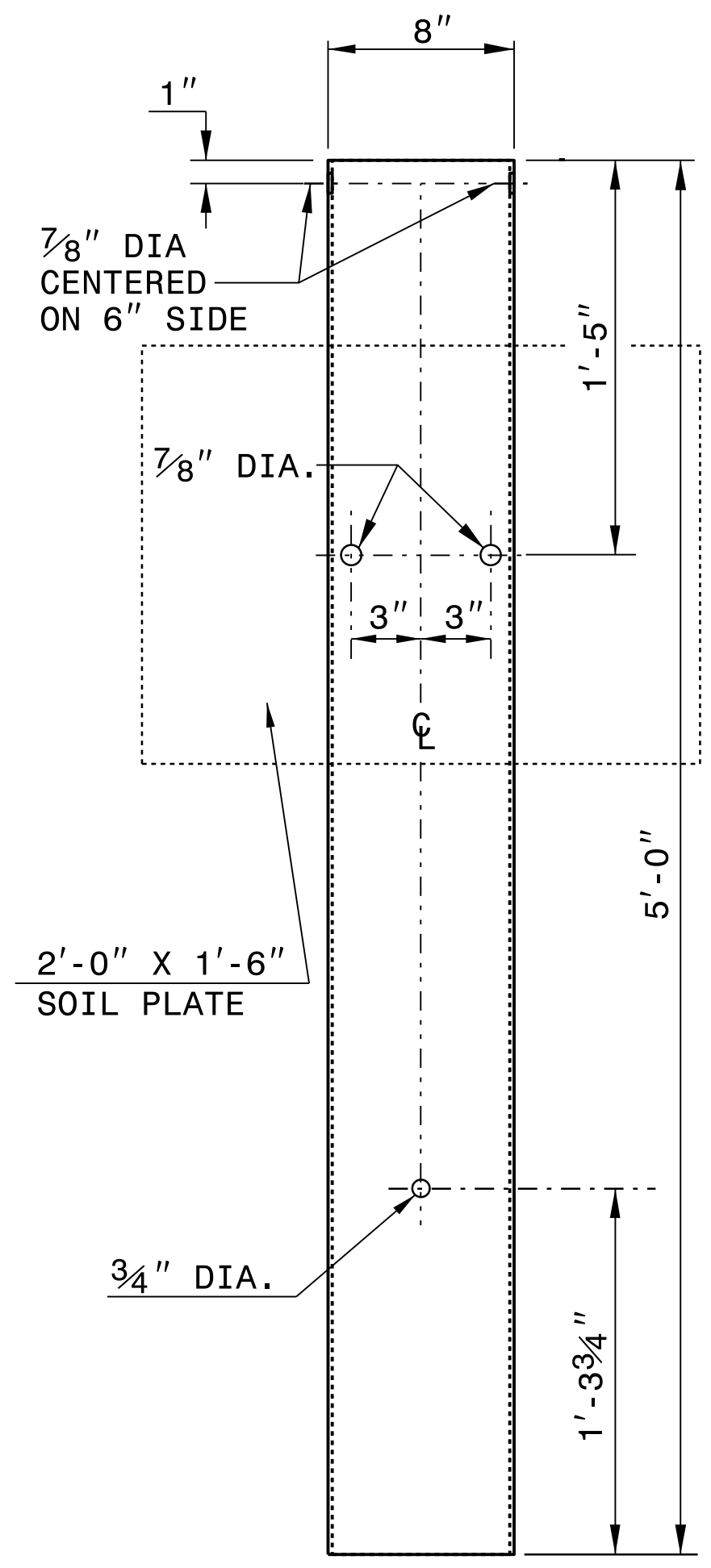
PLAN



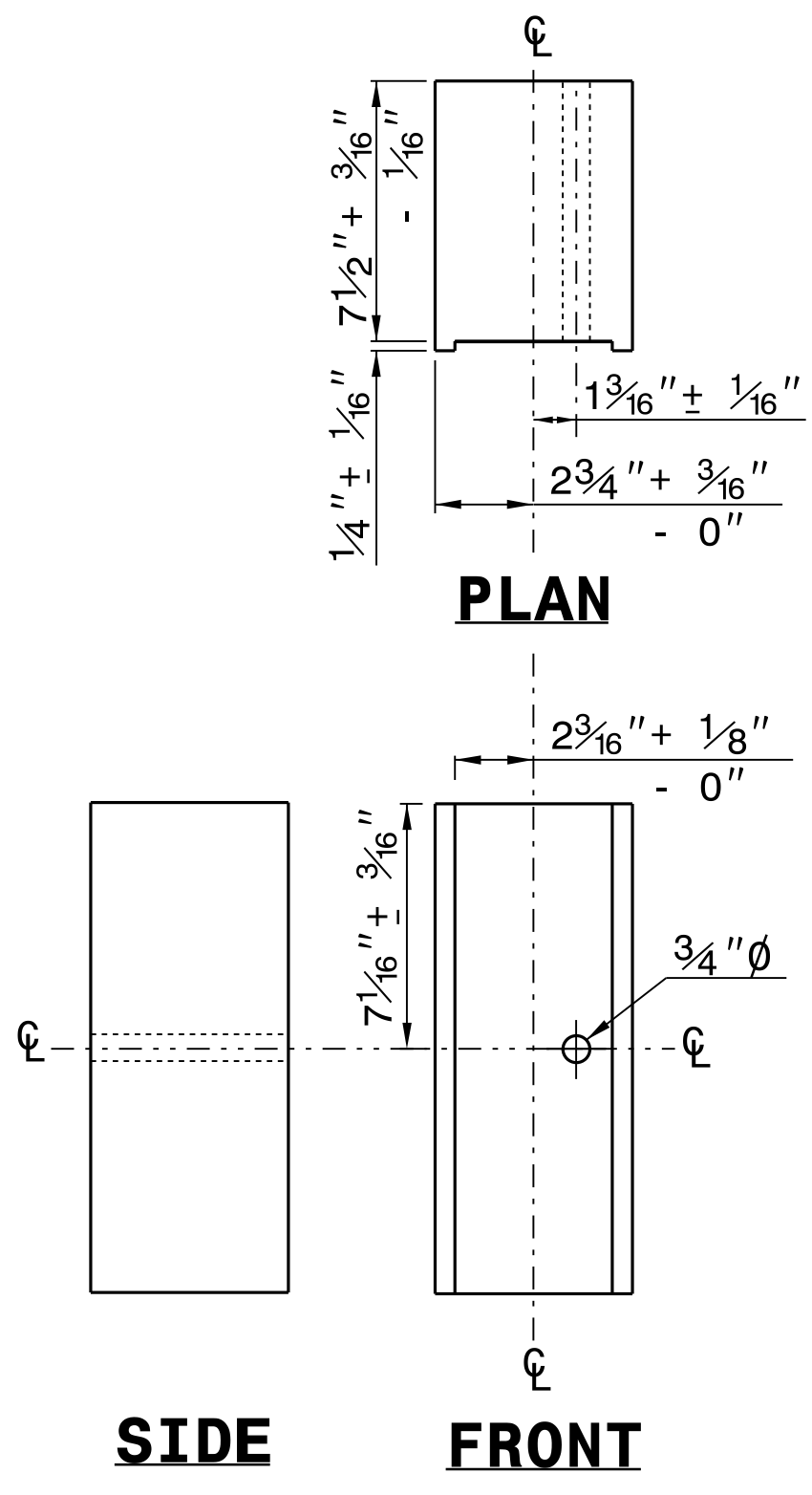
**WOOD OFFSET BLOCK
(FOR WOOD POSTS)**

**STANDARD
LINE POST**

**SHORT WOOD
BREAKAWAY POST**



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

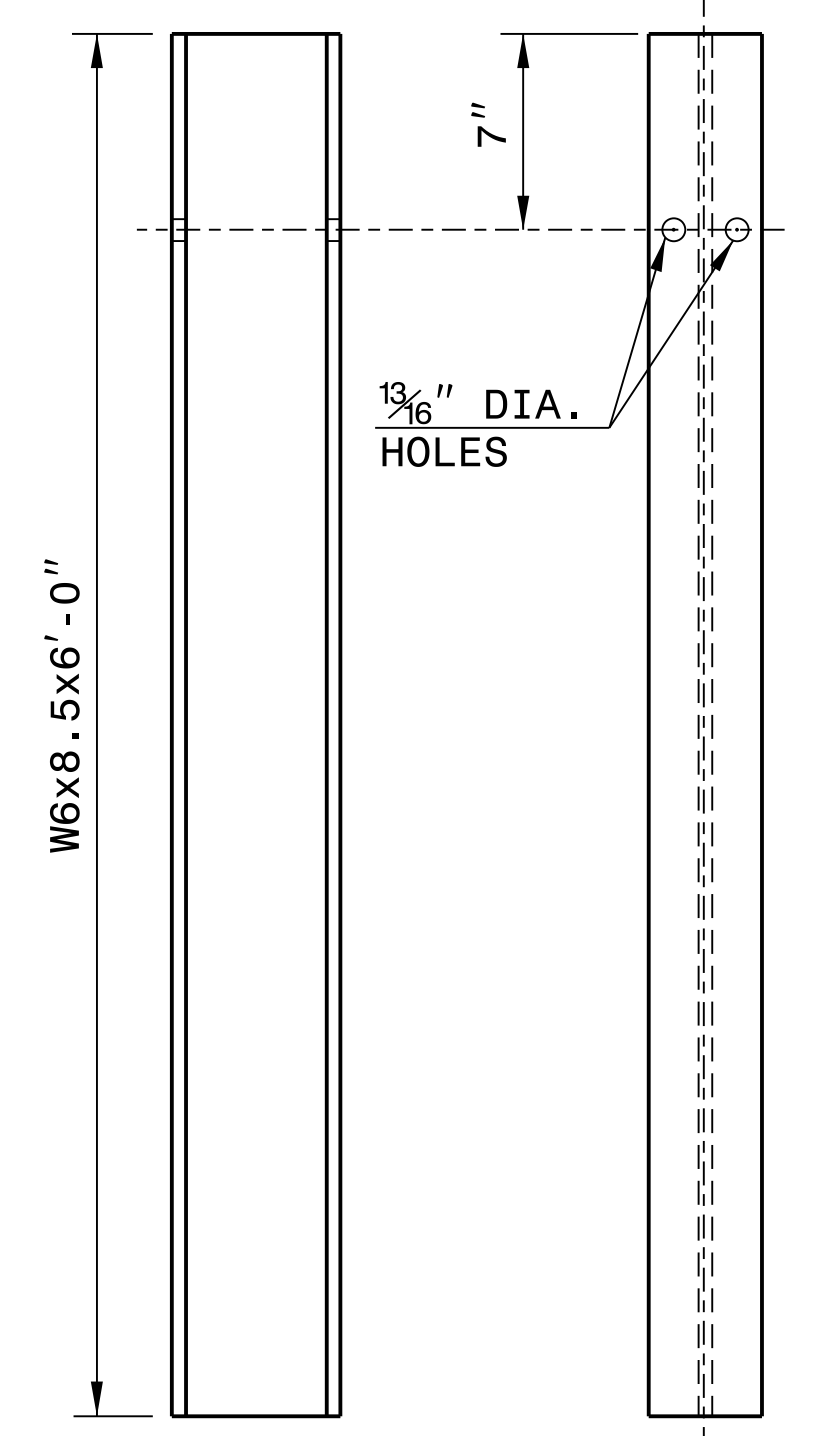


PLAN

SIDE

FRONT

**ROUTED
OFFSET BLOCK**

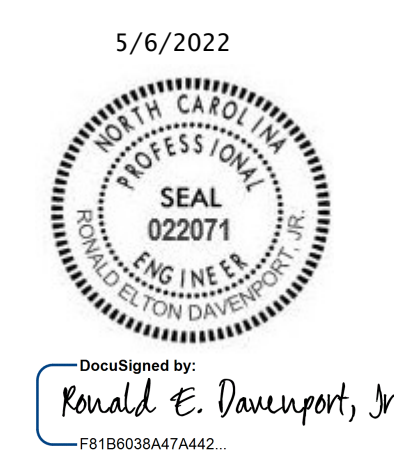


SIDE

FRONT

"W6" STEEL POST

SYSTEM PARTS



**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.:	

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

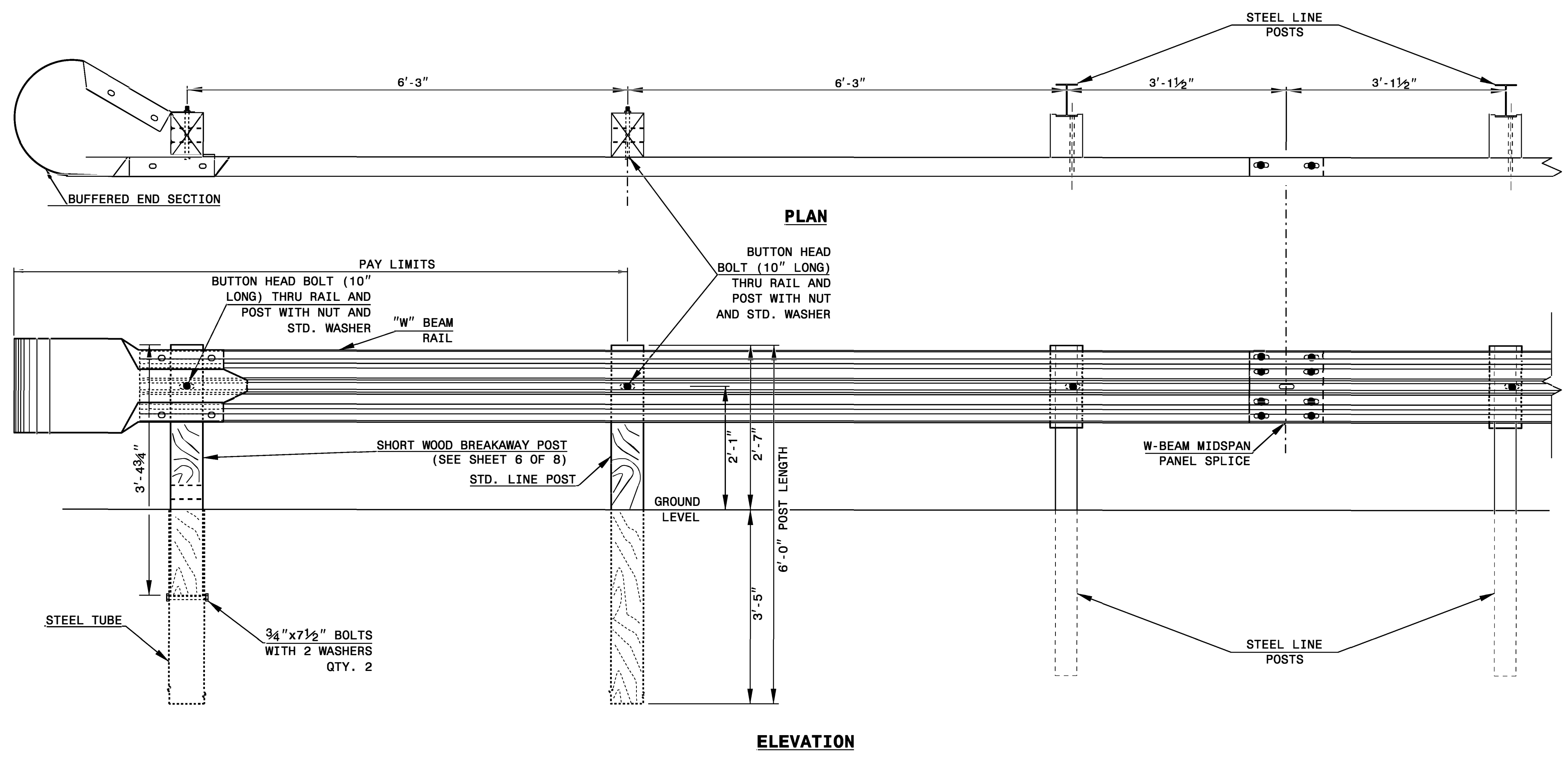
ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET OF

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET OF



TRAILING END UNIT ASSEMBLY
A.T. - 1 SYSTEM



DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

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

A.T. - 1 SYSTEM

ORIGINAL BY: _____	DATE: _____
MODIFIED BY: _____	DATE: _____
CHECKED BY: _____	DATE: _____
FILE SPEC.: _____	

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

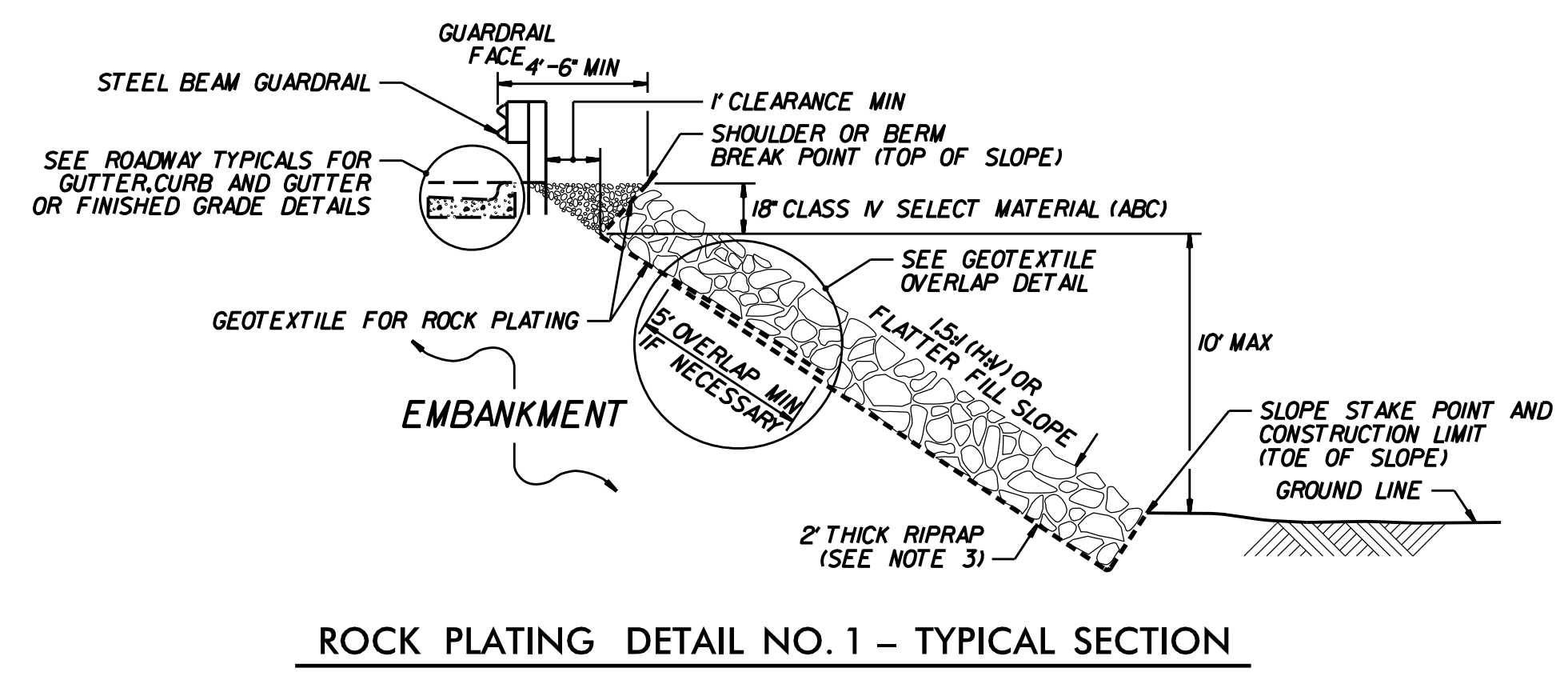
ROADWAY DETAIL DRAWING FOR
ROCK PLATING

SHEET 1 OF 1
275D01

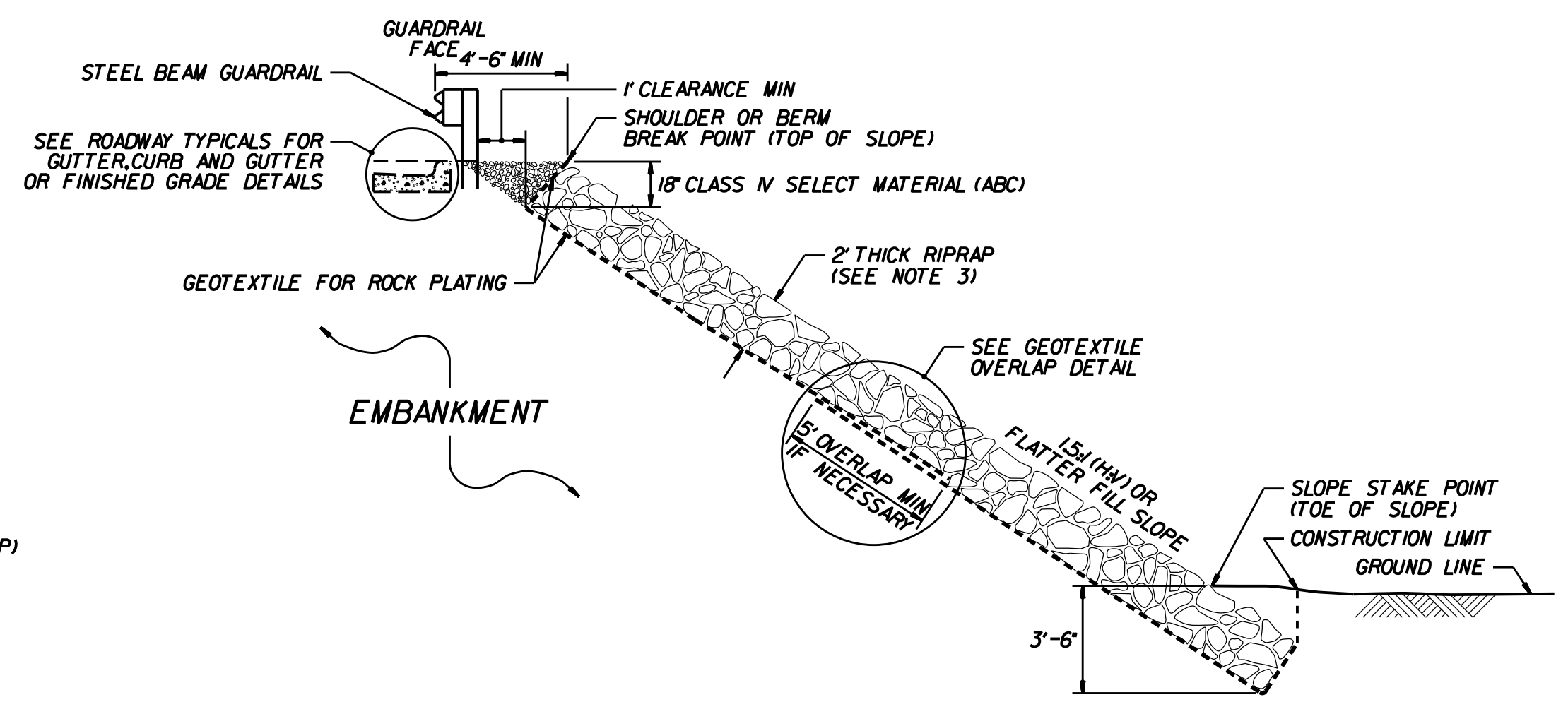
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
ROCK PLATING

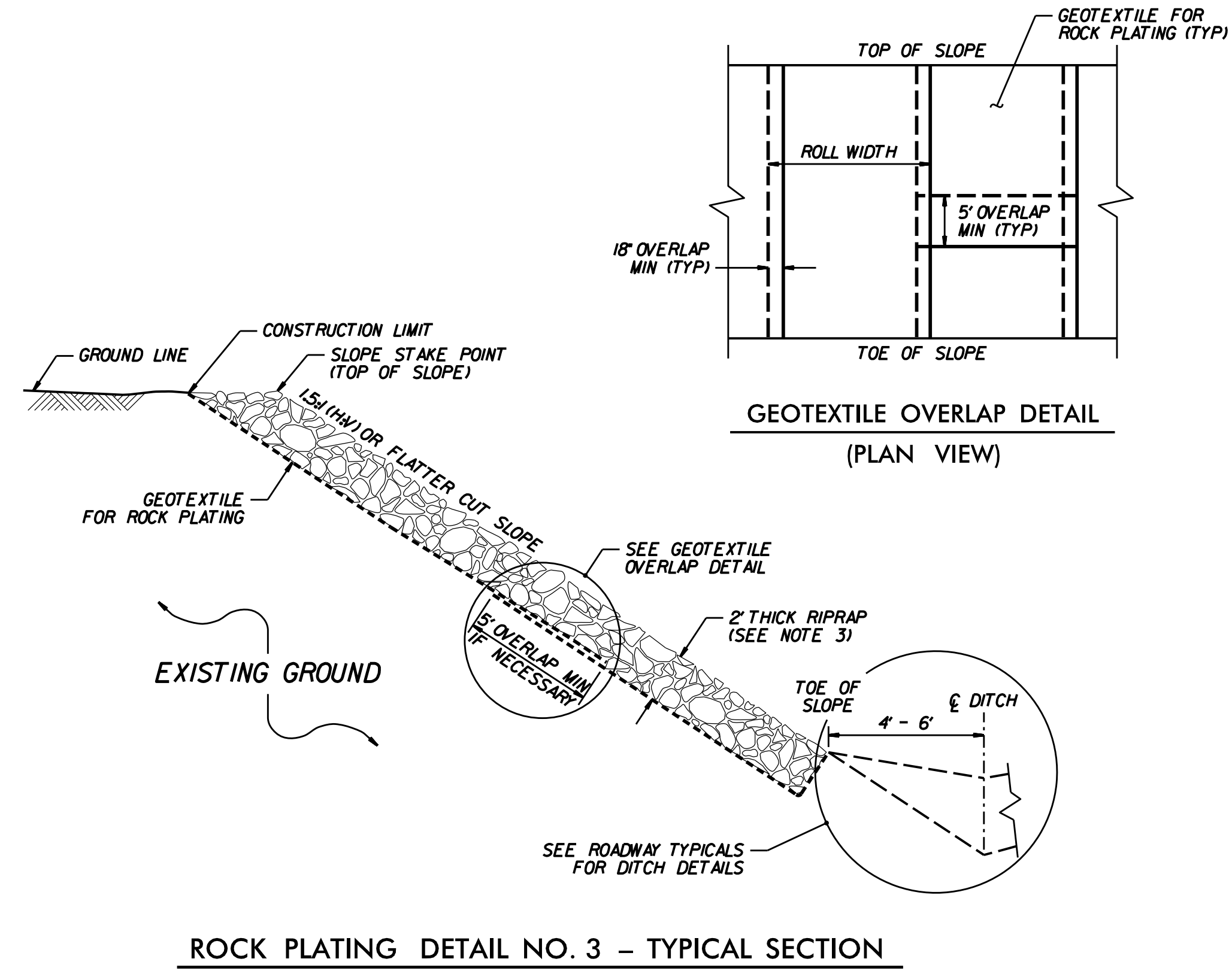
SHEET 1 OF 1
275D01



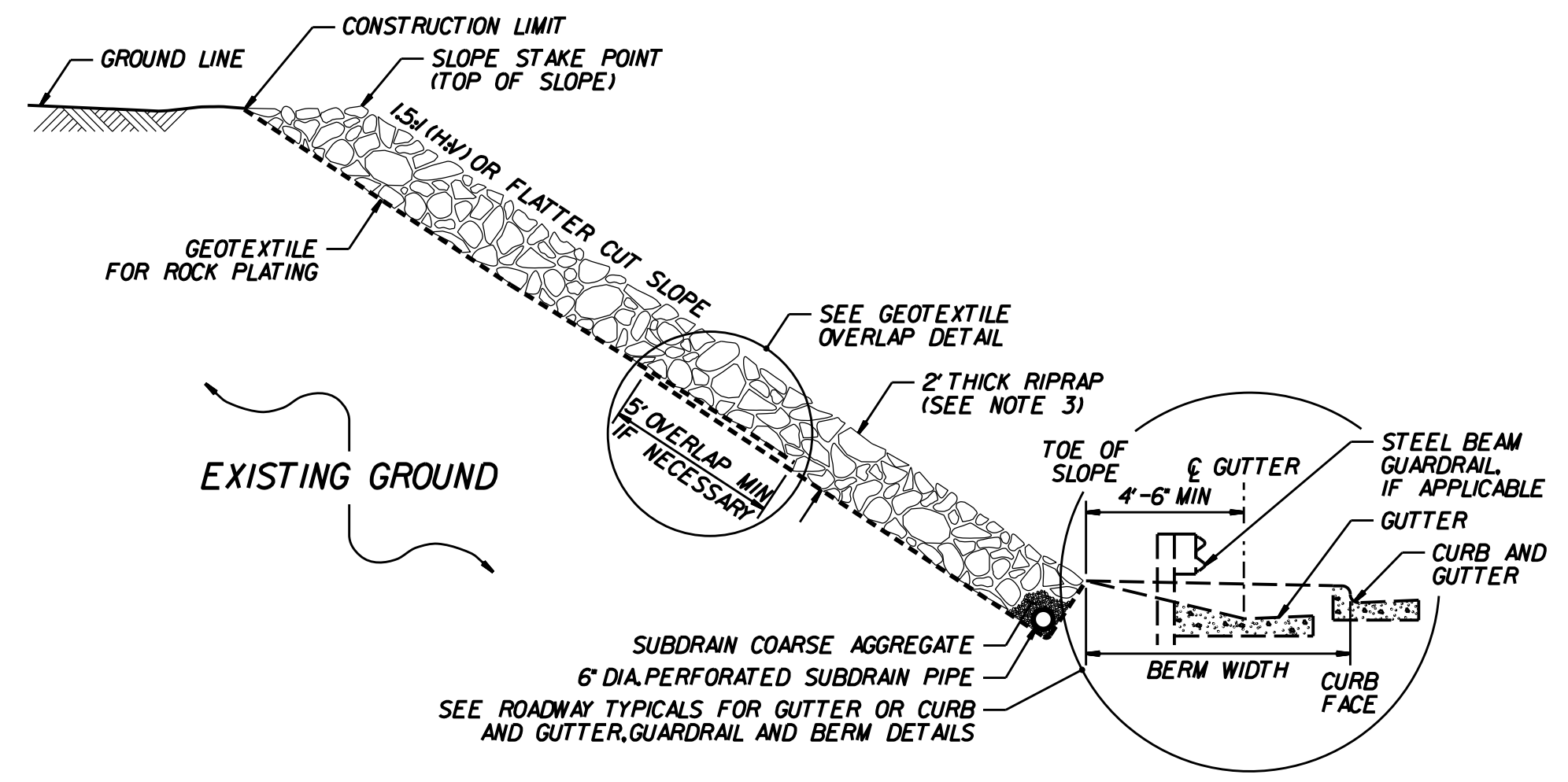
ROCK PLATING DETAIL NO. 1 - TYPICAL SECTION



ROCK PLATING DETAIL NO. 2 - TYPICAL SECTION



ROCK PLATING DETAIL NO. 3 - TYPICAL SECTION



ROCK PLATING DETAIL NO. 4 - TYPICAL SECTION

- NOTES:**
1. SEE ROADWAY PLANS AND SUMMARY SHEETS FOR ROCK PLATING LOCATIONS.
 2. FOR ROCK PLATING, SEE SECTION 275 OF THE STANDARD SPECIFICATIONS.
 3. USE CLASS 1, 2 OR B RIPRAP UNLESS REQUIRED OTHERWISE IN THE ROADWAY SUMMARY SHEETS.

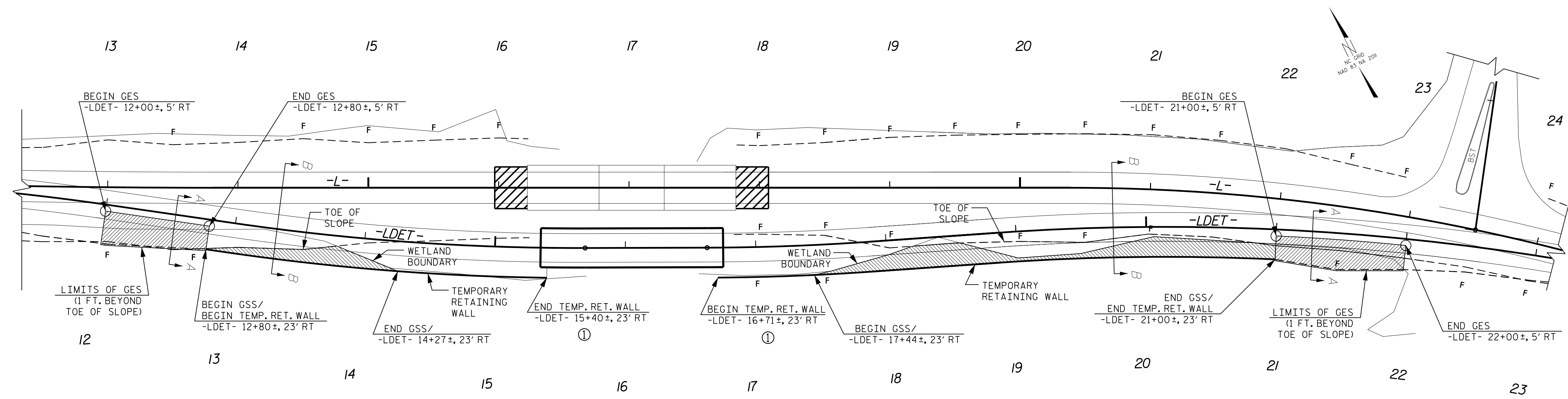


CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6900 FAX 919-250-4119



SEE TITLE BLOCK

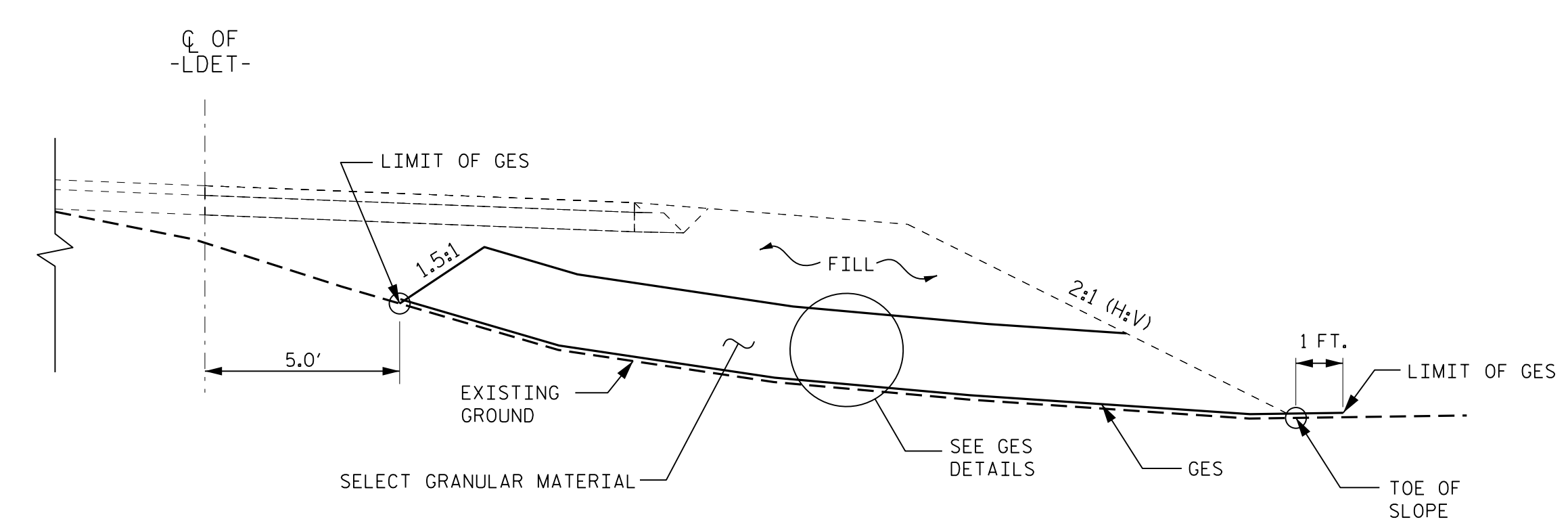
ORIGINAL BY: S. HIDDEN	DATE: 03-11-22
MODIFIED BY:	DATE:
CHECKED BY:	DATE:
FILE SPEC.:	

SYTIME\$\$\$\$\$
V09911\$\$\$\$\$
\$\$\$\$\$CJUSERNAME\$\$\$\$\$

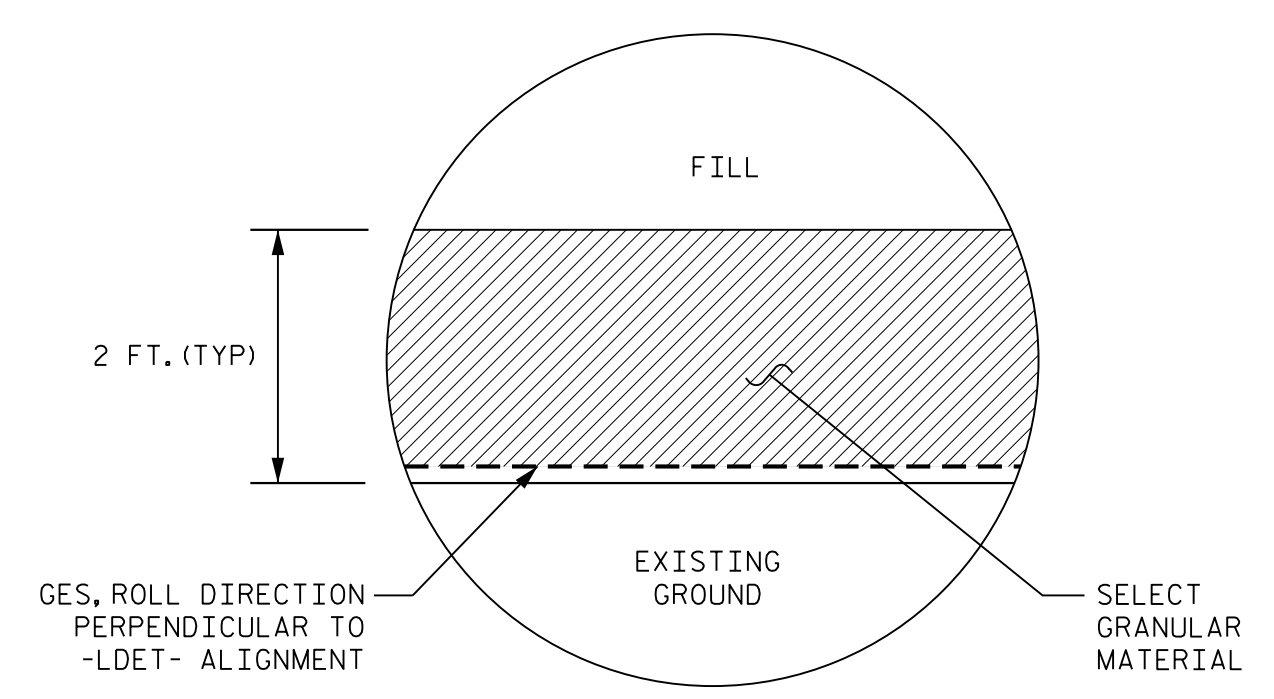


PLAN VIEW
N.T.S.

 GEOTEXTILE FOR EMBANKMENT STABILIZATION (GES)
 GEOTEXTILE FOR SOIL STABILIZATION (GSS)



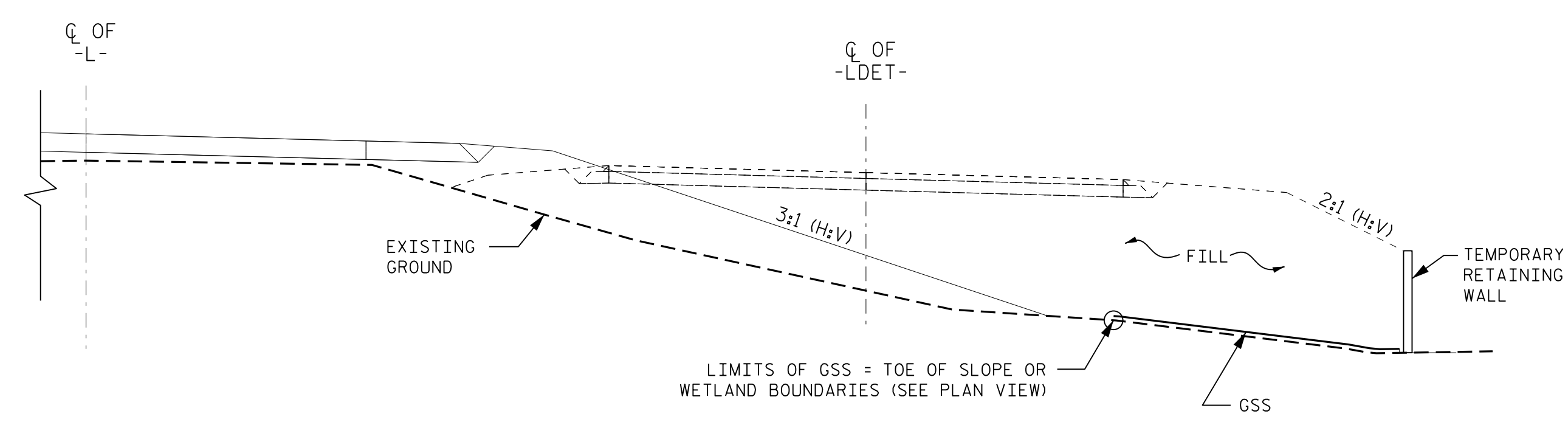
TYPICAL A-A SECTION
NOT TO SCALE



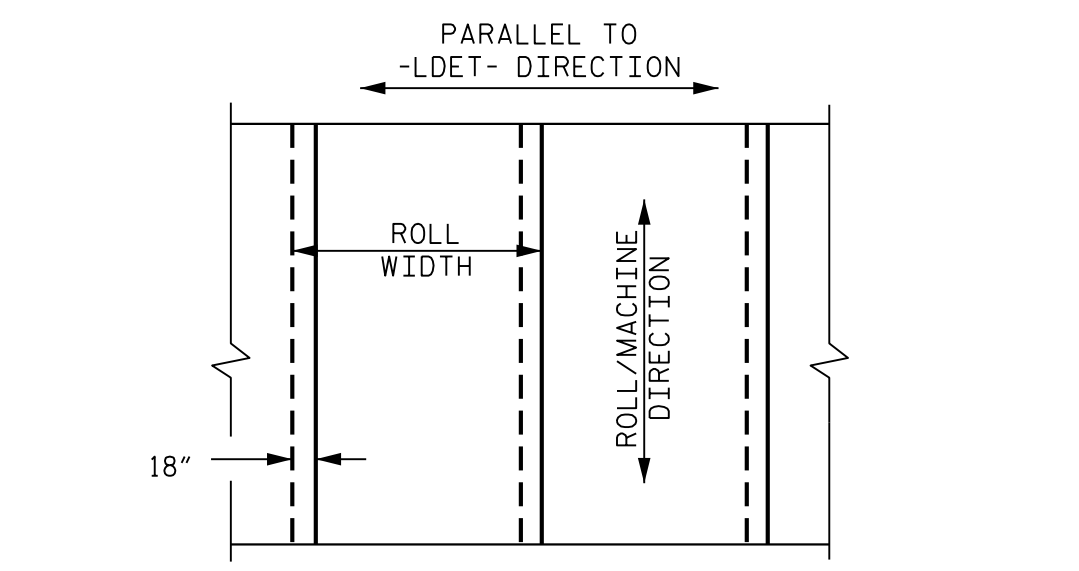
GES DETAILS
N.T.S.

NOTES

- GRUBBING MAY NOT BE REQUIRED IN AREAS WHERE GEOTEXTILE FOR EMBANKMENT STABILIZATION (GES) OR GEOTEXTILES FOR SOIL STABILIZATION (GSS) IS USED.
- CLEAR THE AREA WITHIN THE LIMITS OF GES AND GSS.
- PLACE GES AND GSS PERPENDICULAR TO -LDET- ALIGNMENT ON THE EXISTING GROUND AS SHOWN IN THE PLAN OR AS DIRECTED BY THE ENGINEER.
- PLACE THE GEOTEXTILE WITHOUT ANY WRINKLES OR CREASES.
- PLACE 2 FT. OF SELECT GRANULAR MATERIAL ON THE GES.
- THE TERMS ROLL AND MACHINE DIRECTION ARE USED INTERCHANGEABLY.
- NO SEAMS OR JOINTS ARE ALLOWED IN THE MACHINE DIRECTION OF GEOTEXTILE.
- ALL JOINTS IN THE CROSS MACHINE DIRECTION MUST BE OVERLAPPED A MINIMUM OF 18 INCHES.
- FOR GES, SEE GEOTEXTILE FOR EMBANKMENT STABILIZATION (SPECIAL) PROVISION.



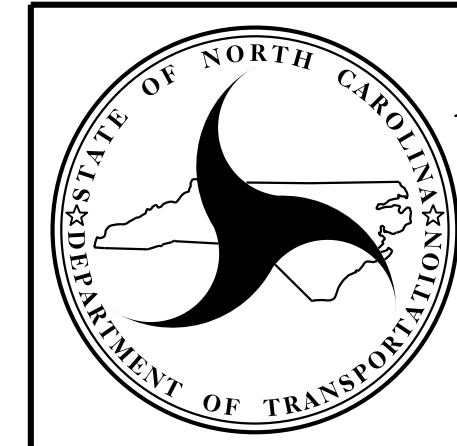
TYPICAL B-B SECTION
NOT TO SCALE



GES AND GSS OVERLAP DETAILS
(PLAN VIEW, NOT TO SCALE)

ESTIMATED QUANTITIES	
GEOTEXTILE FOR EMBANKMENT STABILIZATION	550 SY
GEOTEXTILE FOR SOIL STABILIZATION	650 SY
SELECT GRANULAR MATERIAL	350 CY

PREPARED BY: J. PARK DATE: 04/2019
 REVIEWED BY: J. BATTS DATE: 04/2019



NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL
ENGINEERING UNIT

GEOTEXTILE FOR EMBANKMENT STABILIZATION DETAILS

REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	J. PARK	06/2019	3		
2			4		

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

"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	XI MOD	TYPE-III	GREU TL-3	GREU TL-2	TEMP GREU TL-3	TEMP TYPE-III	VI MOD	TYPE B-77	AT-1	EA	G					NG									
-L-	13+22.00	16+22.00	RT	300.00'				16+22.00	8'-0"	11'-0"	269'		4'-11"																										
-L-	13+00.00	16+22.00	LT	325.00'					8'-0"	11'-0"		316'																											
-L-	17+82.00	19+19.50	RT	137.50'					8'-0"	11'-0"		115'																											
-L-	17+82.00	22+75.00	LT	500.00'	81.25'			17+82.00	8'-0"	11'-0"	265'		4'																										
SUB TOTAL				1262.50'	81.25'																																		
LESS ANCHOR DEDUCTIONS																																							
			GREU TL-3	3@50.00'	150.00'																																		
			TYPE III	4@18.75'	75.00'																																		
			AT-1	1@6.25'	6.25'																																		
PROJECT TOTAL				1037.5'	75.00'																																		

TEMPORARY GUARDRAIL SUMMARY

-LDET-	10+50.00	15+35.00	RT	485'				15+35.00	4'-0"	7'-0"	193'		1'																										
-LDET-	14+47.50	15+35.00	LT	87.50'				15+35.00	4'-0"	7'-0"		69'		1'																									
-LDET-	16+75.00	21+50.00	RT	475.00'				16+75.00	4'-0"	7'-0"		69'		1'																									
-LDET-	16+75.00	18+87.50	LT	212.50'				16+75.00	4'-0"	7'-0"	194'		1'																										
SUB TOTAL				1260'																																			
LESS ANCHOR DEDUCTIONS																																							
			GREU TL-3	4@50.00'	200.00'																																		
			TYPE III	4@18.75'	75.00'																																		
PROJECT TOTAL				985'																																			

**SUMMARY OF EARTHWORK
IN CUBIC YARDS**

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".

PHASE	LOCATION	UNCLASSIFIED EXCAVATION	UNDERCUT	EMBT + %	BORROW	WASTE
PHASE I DETOUR CONSTRUCTION	-L_DET- STA. 11+54.39 TO 16+32.21	7		3,405	3,398	
	-L_DET- STA. 17+72.21 TO 25+23.51	15		3,696	3,681	
	WASTE TO REPLACE BORROW					
	SUB TOTAL	22		7,101	7,079	
PHASE II MAINLINE CONSTRUCTION	-L- STA. 11+00.00 TO 16+22.00	29		1,076	1,047	
	-L- STA. 17+82.00 TO 26+00.00	52		1,609	1,557	
	WASTE TO REPLACE BORROW					
	SUB TOTAL	81		2,685	2,604	
PHASE III DETOUR REMOVAL	(DETRM) -L- STA. 12+00.00 TO 23+00.00	6,221				6,221
	SUB TOTAL	6,221				6,221
	TOTAL	6,324		9,786	9,683	6,221
	SELECT GRANULAR MATERIAL IN PLACE OF BORROW (SEE SHEET 2G-1)			-350	-350	
	PROJECT TOTAL	6,324		9,436	9,333	6,221
	5% TO REPLACE TOP SOIL				467	
	GRAND TOTALS	6,324		9,436	9,800	
	SAY	6,400			9,900	6,300

**SUMMARY OF ASPHALT
PAVEMENT REMOVAL**

LOCATION	AREA (SQFT)	AREA (SQYD)
-L- STA. 14+50.00 TO 16+30.00	4,318.85	479.87
-L- STA. 17+75.00 TO 21+50.00	8,993.64	999.29
-LDET- STA. 11+92.00 TO 15+35.00	8,075.82	897.31
-LDET- STA. 16+75.00 TO 22+58.00	13,238.66	1,470.96
TOTAL	34,626.97	3,847.44
SAY	34,630	3,850

SHOULDER BERM GUTTER SUMMARY

SURVEY LINE	STATION	STATION	LOCATION (L/RT/CL)	LINEAR FEET
-L-	15+34.93	15+97.83	LT	62.9
-L-	15+80.25	15+97.83	RT	16.8
-L-	18+06.17	18+24.00	LT	17.8
-L-	18+06.17	18+24.00	RT	17.8
-LDET-	16+75.00	16+96.08	LT	21.1
			TOTAL	136.4
			SAY	137

COMPUTED BY: Jinyoung Park DATE: 4/15/19
 CHECKED BY: Sara Loukili DATE: 4/26/19

(1-16-18)

PROJECT NO.
B-4593

SHEET NO.
3G-1

**STATE OF NORTH CAROLINA
 DIVISION OF HIGHWAYS**

SUMMARY OF SUBSURFACE DRAINAGE

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

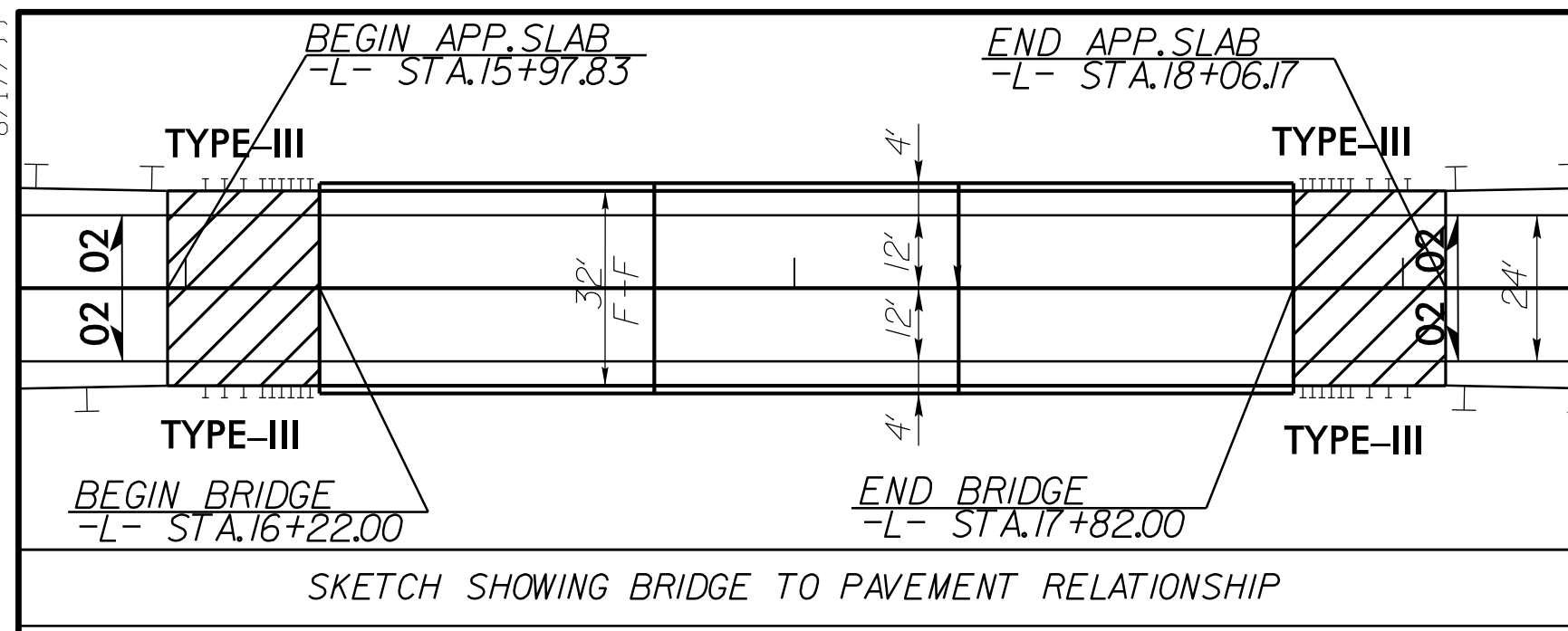
*UD = Underdrain
 *BD = Blind Drain
 *SD = Subsurface Drain

SUMMARY OF ROCK PLATING

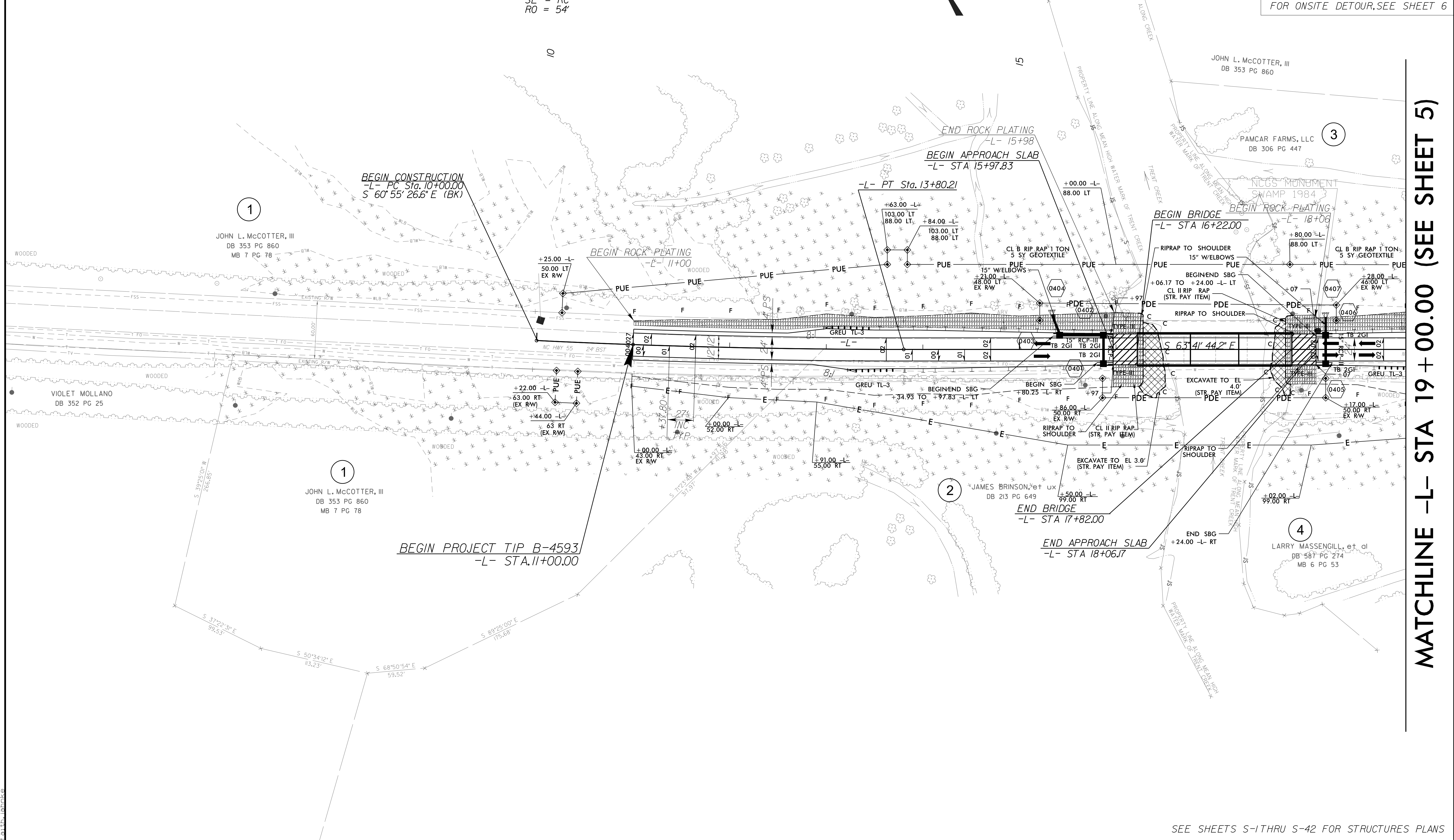
LINE	Beginning Slope (H:V)	Approx. Station	Ending Slope (H:V)	Approx. Station	Location LT/RT	Rock Plating Detail No. 1/2/3/4	Riprap Class* 1/2/B	Rock Plating SY
-L-	2.5:1	10+75 ±	2:1	15+98 ±	LT	1		780
-L-	2:1	18+06 ±	2.5:1	22+75 ±	LT	1		1070
							TOTAL SY:	1850

*Use Class 1, 2 or B riprap if riprap class is not shown for rock plating location.

PROJECT REFERENCE NO. B-4593	SHEET NO. 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER 5/4/2022	HYDRAULICS ENGINEER 5/4/2022
FOR PROFILE, SEE SHEET 8	
FOR ONSITE DETOUR, SEE SHEET 6	



-L-
 PI Sta 11+90.14
 $\Delta = 2' 46'' 17.6'' (LT)$
 $D = 0' 43'' 44.2''$
 $L = 380.21'$
 $T = 190.14'$
 $R = 7,860.00'$
 $SE = RC$
 $RO = 54'$



MATCHLINE -L- STA 19 + 00.00 (SEE SHEET 5)

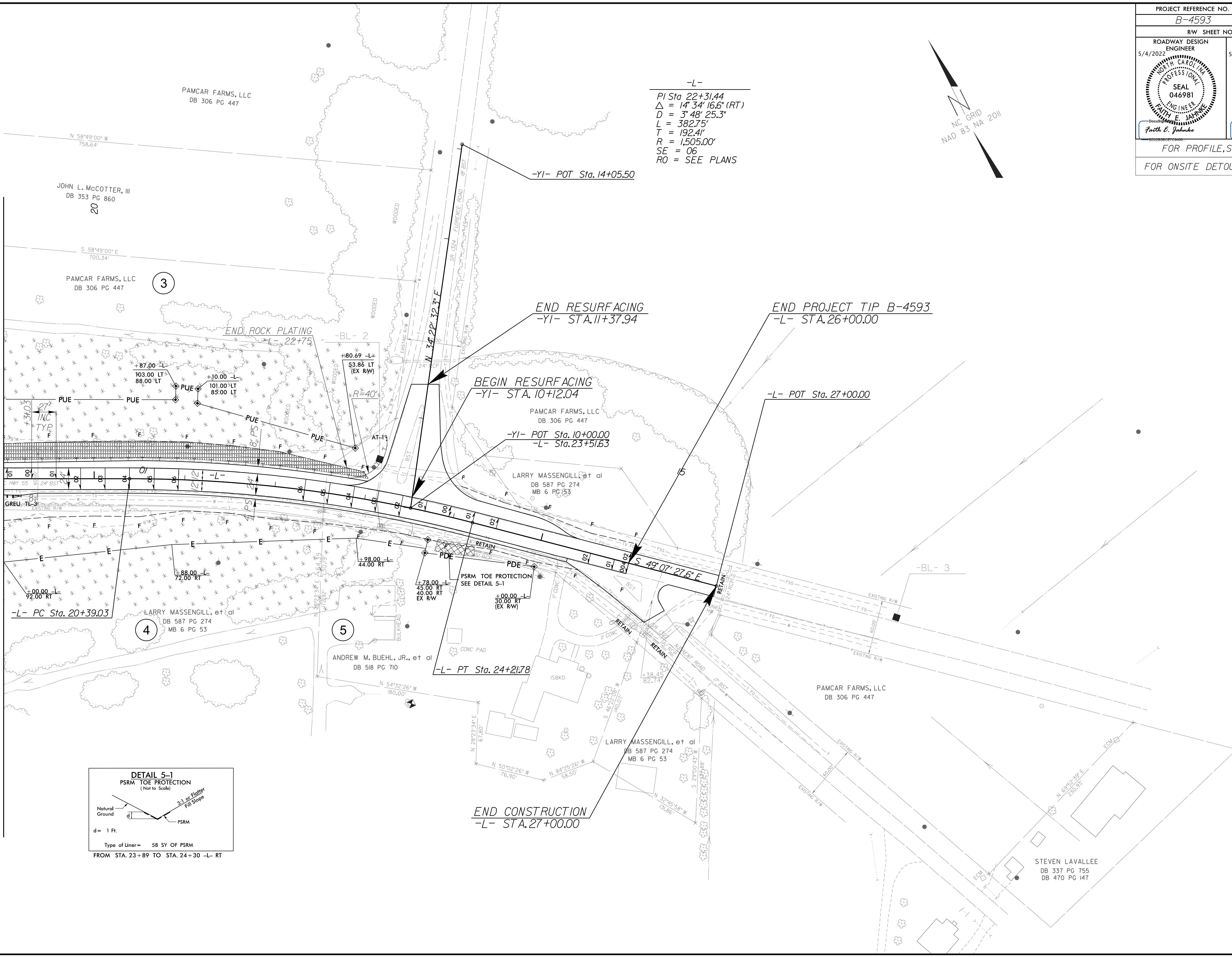
B.17/99

25-APR-2022 11:29
 Faith Jahns

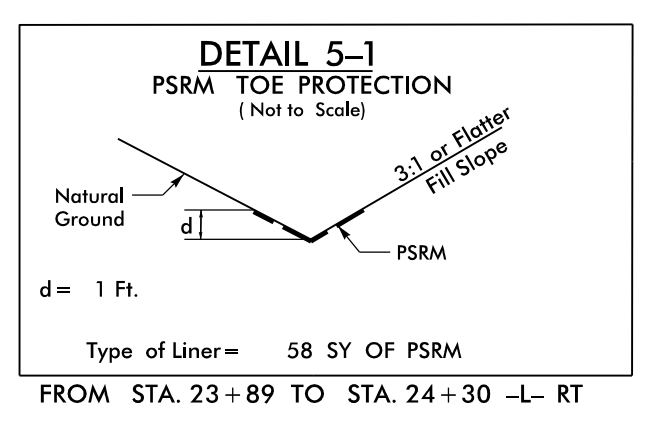
8.17/2019

PROJECT REFERENCE NO. B-4593		SHEET NO. 5	
RW SHEET NO.			
ROADWAY DESIGN ENGINEER 5/4/2022		HYDRAULICS ENGINEER 5/4/2022	
FOR PROFILE, SEE SHEET 8			
FOR ONSITE DETOUR, SEE SHEET 7			

MATCHLINE -L- STA 19+00.00 (SEE SHEET 4)


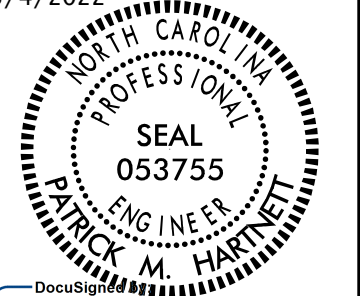


-L-
 PI Sta 22+31.44
 $\Delta = 14^{\circ} 34' 16.6''$ (RT)
 $D = 3^{\circ} 48' 25.3''$
 $L = 382.75'$
 $T = 192.41'$
 $R = 1,505.00'$
 $SE = 06$
 $RO = \text{SEE PLANS}$



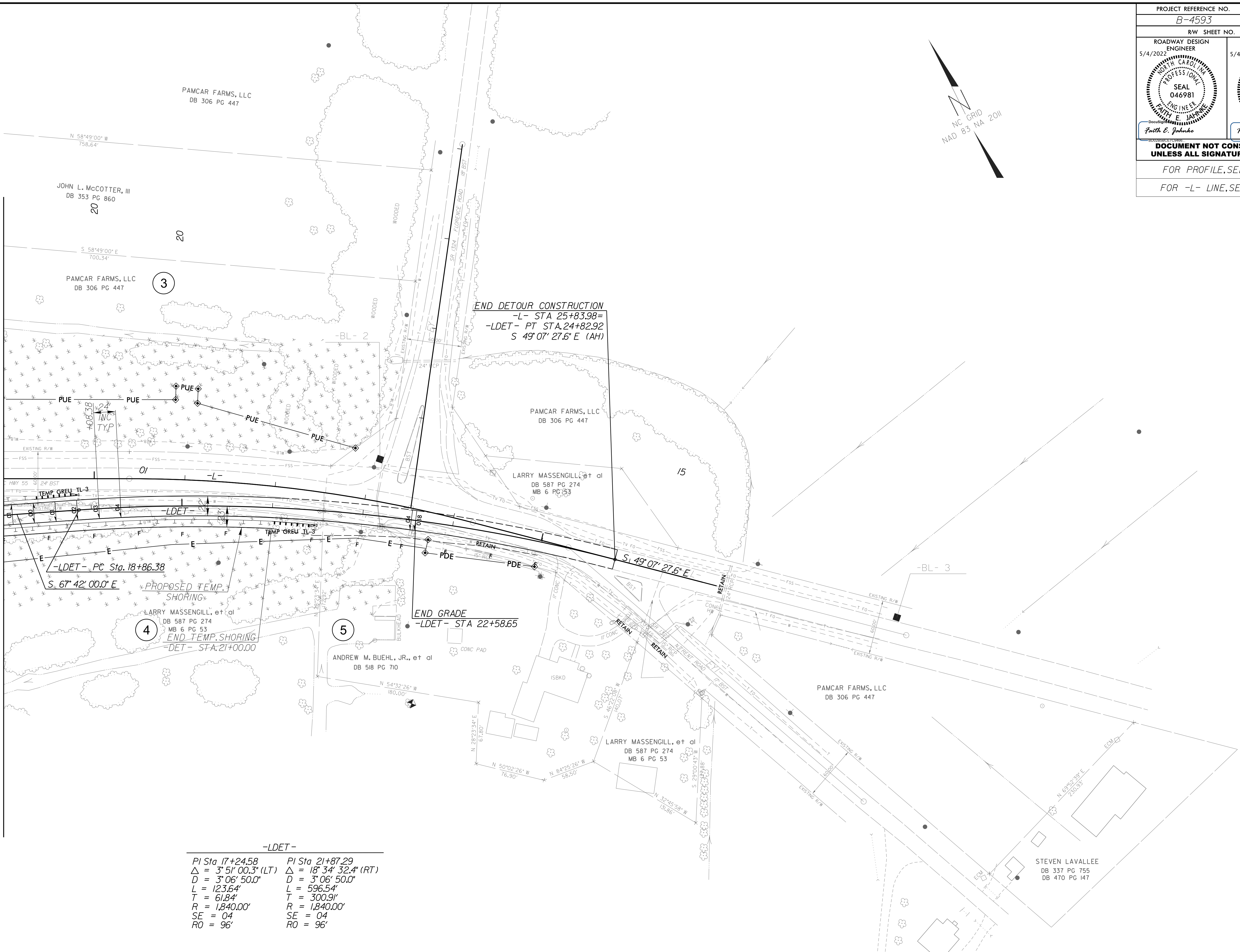
25-APR-2022 11:29
Faith E. Jahnke

8.17/7/99

PROJECT REFERENCE NO. B-4593		SHEET NO. 7	
RW SHEET NO.			
ROADWAY DESIGN ENGINEER 5/4/2022		HYDRAULICS ENGINEER 5/4/2022	
			
<p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p>			
FOR PROFILE, SEE SHEET 9			
FOR -L- LINE, SEE SHEET 5			



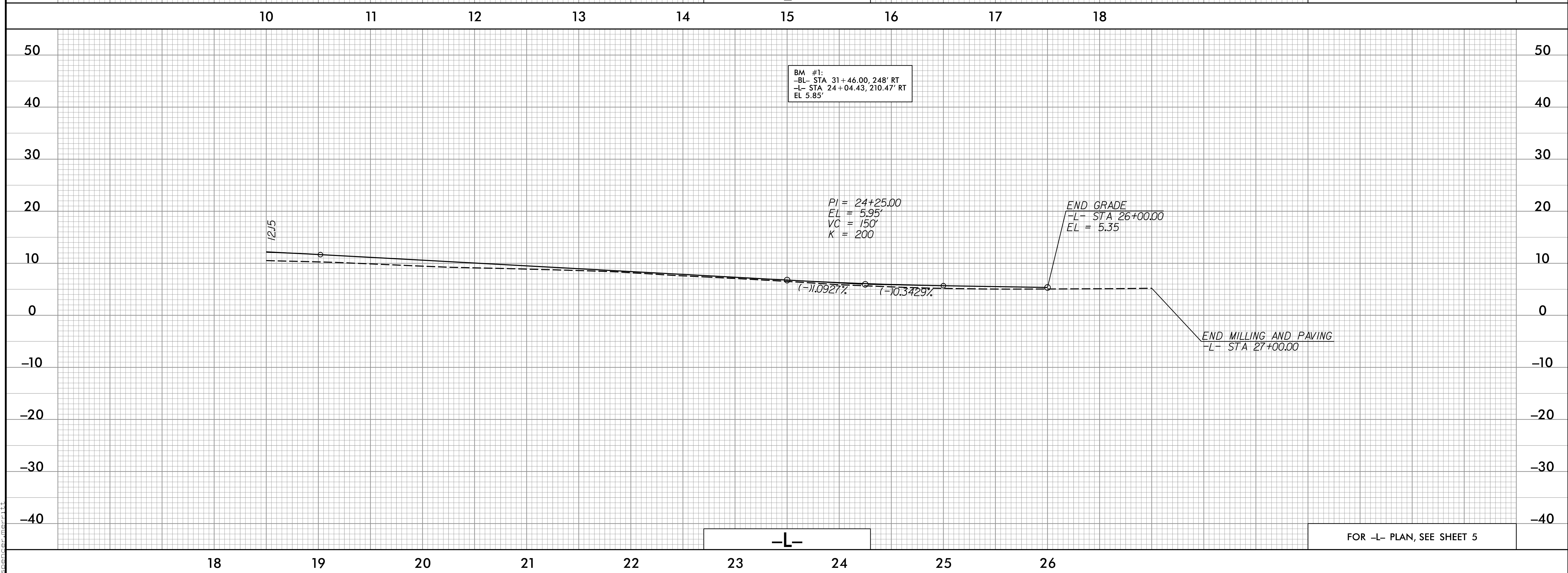
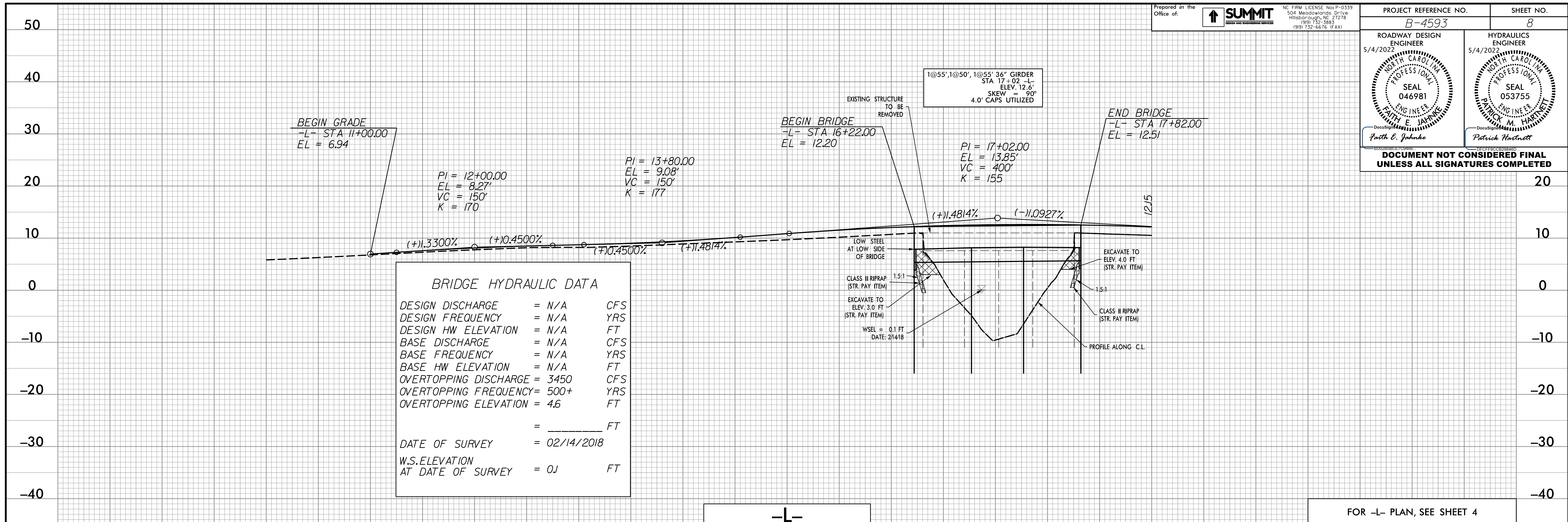
MATCHLINE -L- STA 19 + 00.00 (SEE SHEET 6)



-LDET-	
PI Sta 17+24.58	PI Sta 21+87.29
$\Delta = 3^{\circ} 51' 00.3''$ (LT)	$\Delta = 18^{\circ} 34' 32.4''$ (RT)
D = 3' 06' 50.0"	D = 3' 06' 50.0"
L = 123.64'	L = 596.54'
T = 61.84'	T = 300.91'
R = 1,840.00'	R = 1,840.00'
SE = 04	SE = 04
RO = 96'	RO = 96'

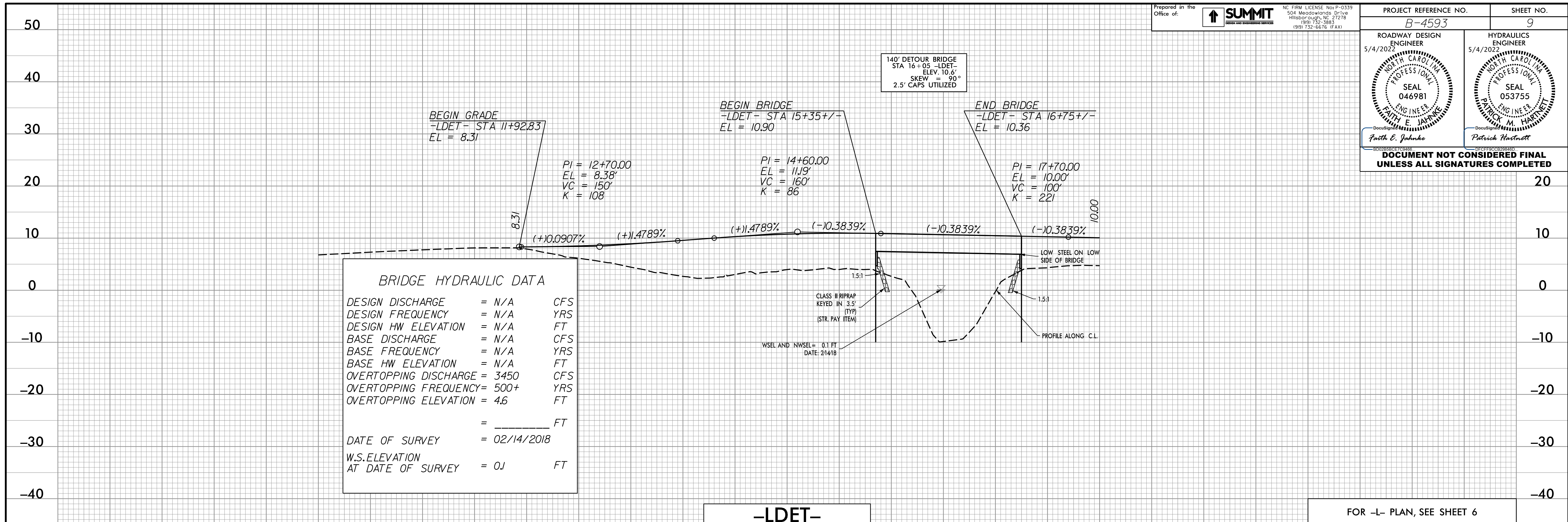
05-APR-2022 11:27 det.dgn
 32583 Rourash...
 Faith Jahnke

PROJECT REFERENCE NO. B-4593	SHEET NO. 8
ROADWAY DESIGN ENGINEER 5/4/2022 NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 046981 PATRICK M. HARTNETT	HYDRAULICS ENGINEER 5/4/2022 NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 053755 PATRICK M. HARTNETT
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



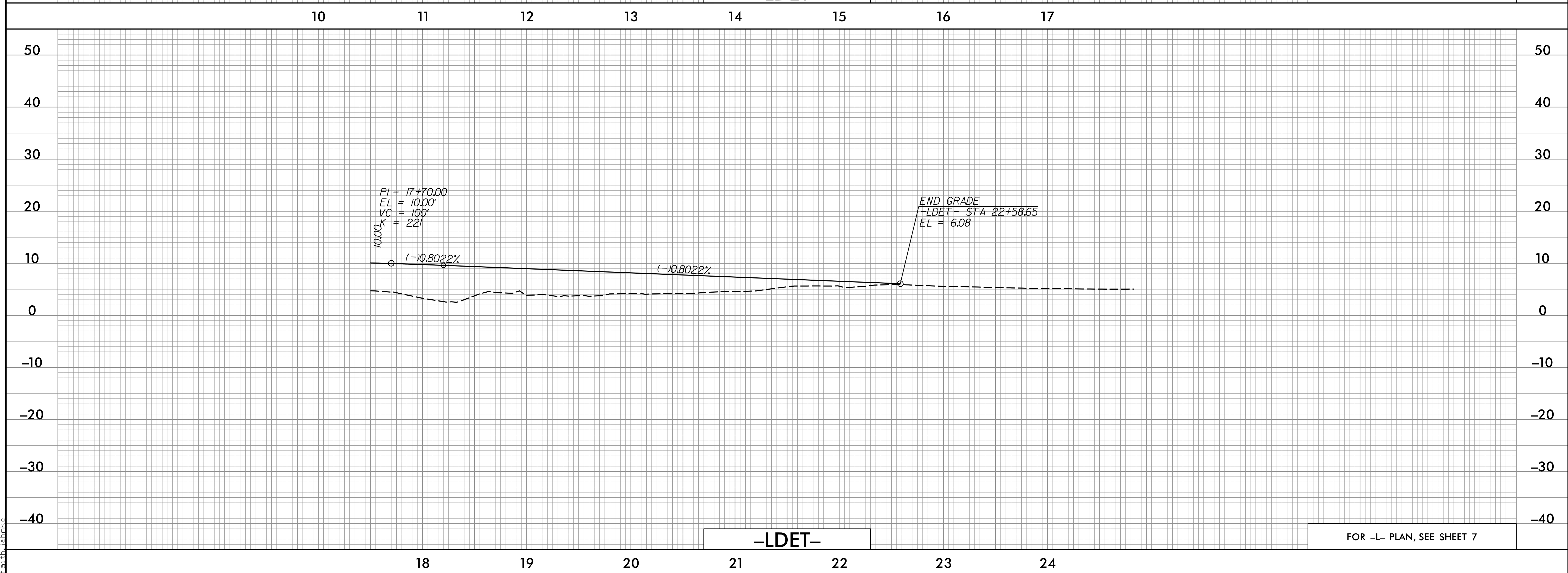
04 MAY 2022 08:24
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PROJECT REFERENCE NO. B-4593	SHEET NO. 9
ROADWAY DESIGN ENGINEER 5/4/2022 PAUL E. JAHANEK SEAL 046981 NORTH CAROLINA PROFESSIONAL ENGINEER	HYDRAULICS ENGINEER 5/4/2022 PATRICK M. HARTNETT SEAL 053755 NORTH CAROLINA PROFESSIONAL ENGINEER



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

FOR -L- PLAN, SEE SHEET 6



FOR -L- PLAN, SEE SHEET 7

25-APR-2022 11:30
 225331_RouteImp1_9.dgn
 Paul E. Jahanek