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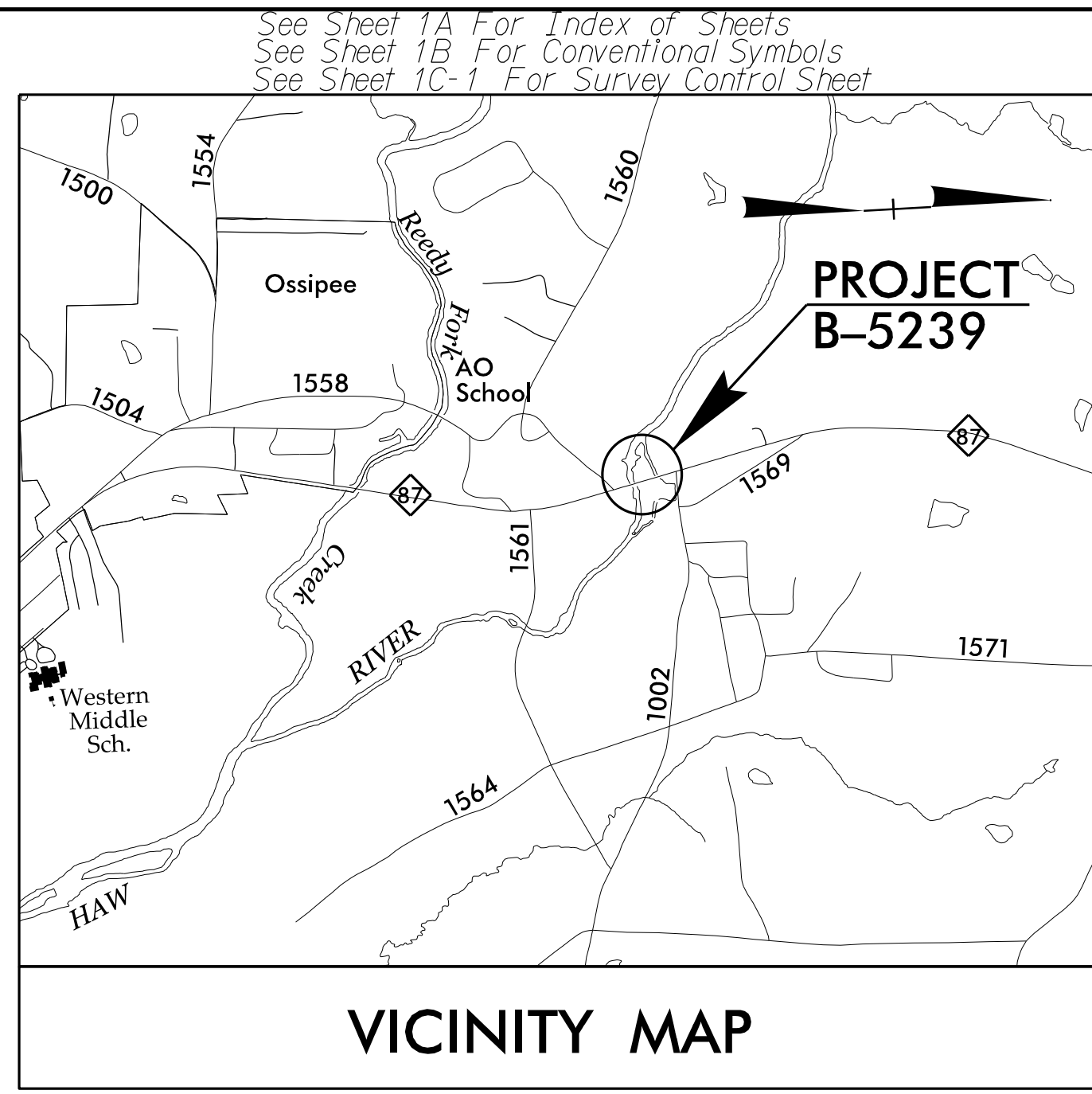
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09/28/2017

TIP PROJECT: B-5239

CONTRACT: C203676



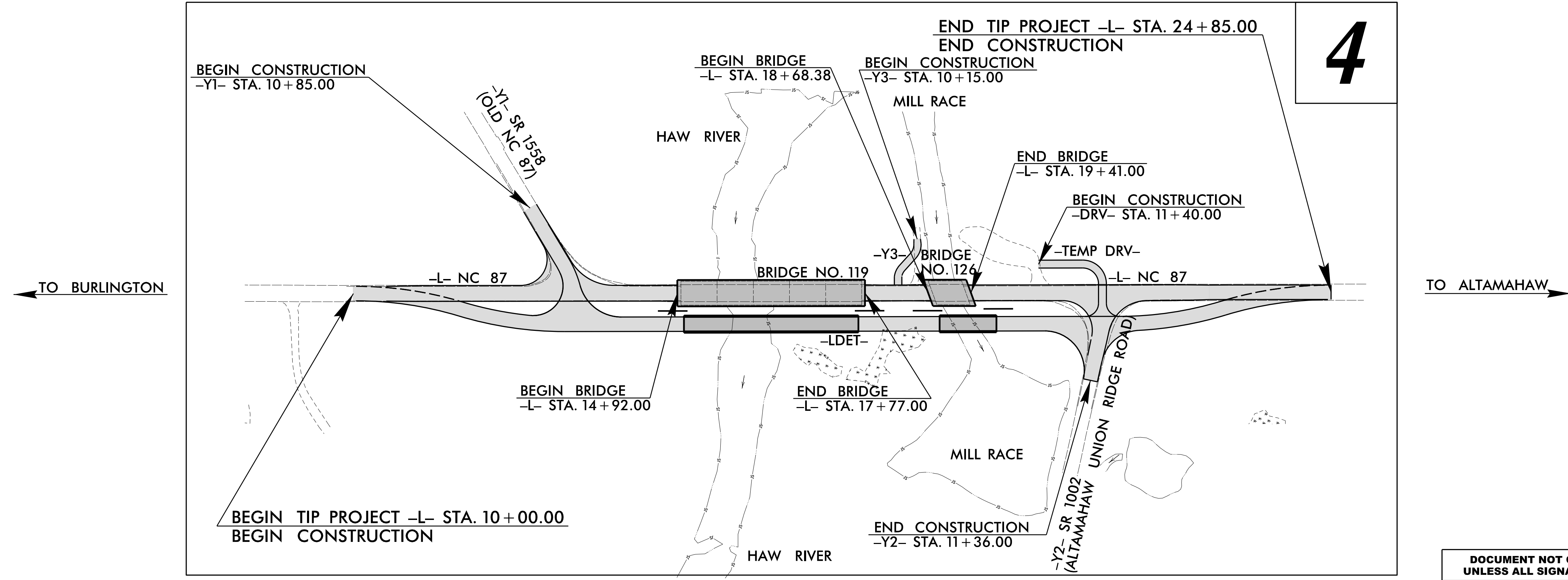
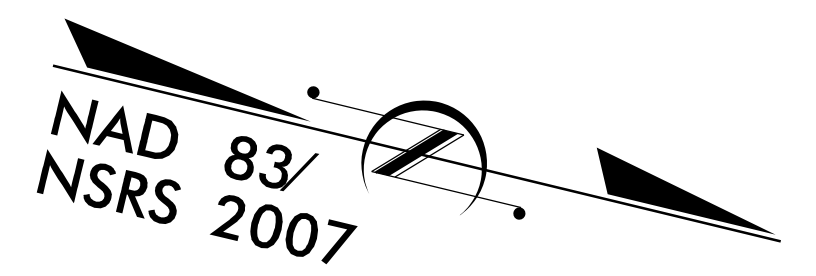
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ALAMANCE COUNTY

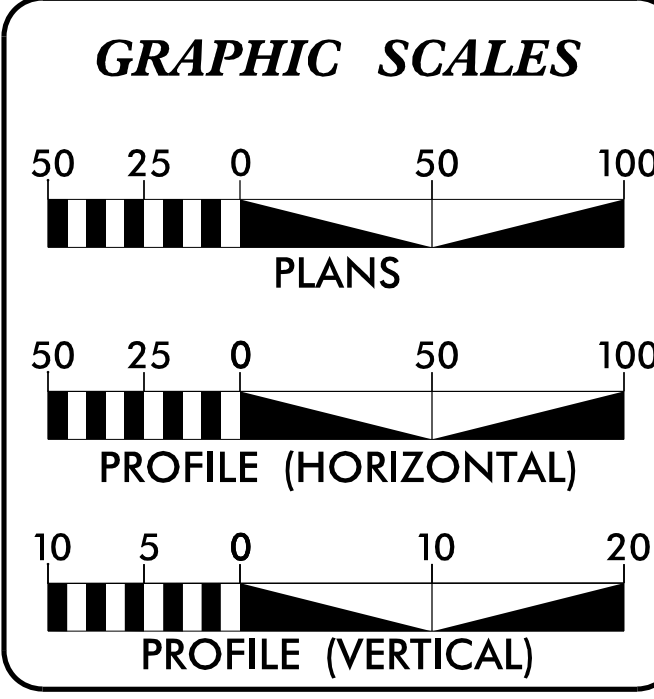
**LOCATION: BRIDGE NO. 126 OVER MILL RACE
& BRIDGE NO. 119 OVER HAW RIVER ON NC 87**

TYPE OF WORK: GRADING, PAVING, DRAINAGE AND STRUCTURES

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5239	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
42841.1.1	BRSTP-0087(29)	PE	
42841.2.2		RW & UTILITIES	
42841.3.2		CONST.	



DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED



DESIGN DATA

ADT 2017	=	7150
ADT 2037	=	8650
K	=	10 %
D	=	60 %
T	=	6 % *
V	=	50 MPH
V _{DET}	=	40 MPH

* TTST = 2% + DUAL = 4%

FUNC CLASS =
PRINCIPAL ARTERIAL
"STATEWIDE TIER"

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-5239	=	0.213 MILES
LENGTH STRUCTURE TIP PROJECT B-5239	=	0.068 MILES
TOTAL LENGTH OF TIP PROJECT B-5239	=	0.281 MILES

NCDOT POINT OF CONTACT:

GARY LOVERING, PE
PROJECT ENGINEER

JMT. Prepared in the Office of:
JOHNSON, MIRMIRAN, & THOMPSON, INC.
1130 Situs Court, Suite 200, Raleigh NC, 27606

2012 STANDARD SPECIFICATIONS

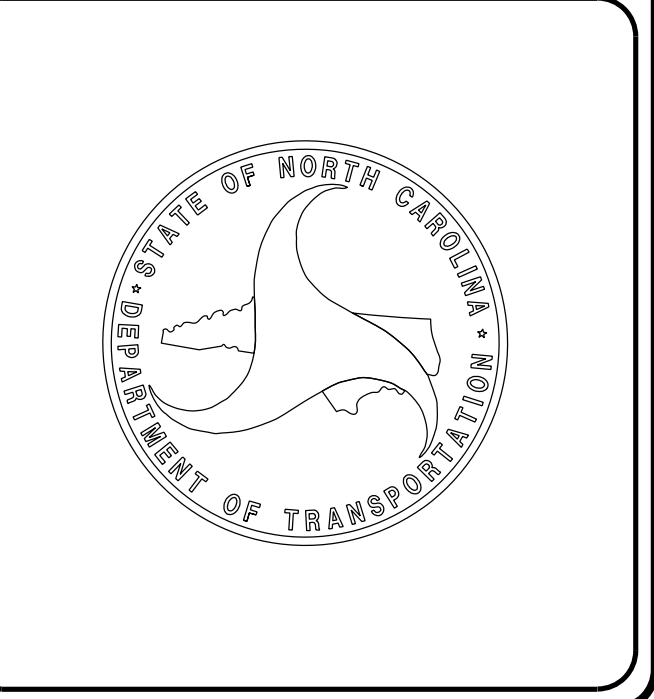
RIGHT OF WAY DATE: DECEMBER 16, 2016	JAMES W. JENKINS, PE PROJECT ENGINEER
LETTING DATE: DECEMBER 19, 2017	ENRICO A. ROQUE, PE PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

DocuSigned by:
D. Duffield 10/30/2017
SIGNATURE: DUFFIELD

ROADWAY DESIGN ENGINEER

DocuSigned by:
Enrico Roque 10/29/2017
SIGNATURE: ROQUE



10/27/2017
I:\Proj\B5239_Rdy - tsh.dgn
User: eroque

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	--- 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	-----
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	--- CR ---
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:

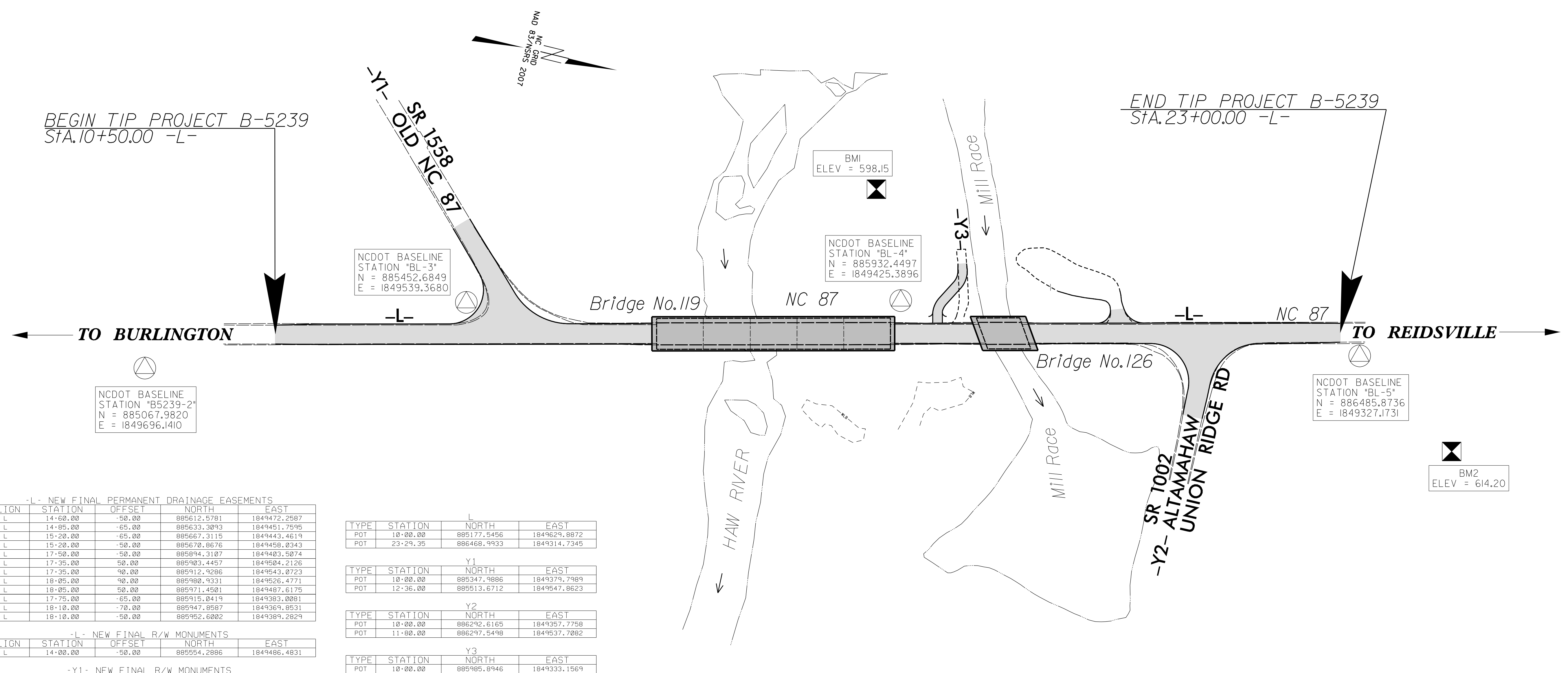
Sanitary Sewer Manhole	⊕
Sanitary Sewer Cleanout	⊕
U/G Sanitary Sewer Line	-----
Above Ground Sanitary Sewer	-----
SS Forced Main Line LOS B (S.U.E.*)	-----
SS Forced Main Line LOS C (S.U.E.*)	-----
SS Forced Main Line LOS D (S.U.E.*)	-----

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.

B-5239 SURVEY CONTROL SHEET

PROJECT REFERENCE NO.	SHEET NO.
B-5239	1-C
Location and Surveys	



-L- NEW FINAL PERMANENT DRAINAGE EASEMENTS

ALIGN	STATION	OFFSET	NORTH	EAST
L	14+60.00	-50.00	885612.5791	1849472.2587
L	14+85.00	-65.00	885633.3093	1849451.7595
L	15+20.00	-65.00	885667.3115	1849443.4619
L	15+20.00	-50.00	885670.8676	1849458.0343
L	17+50.00	-50.00	885894.3107	1849403.5074
L	17+35.00	50.00	885903.4457	1849504.2126
L	17+35.00	90.00	885912.9286	1849543.0723
L	18+05.00	90.00	885980.9331	1849526.4771
L	18+05.00	50.00	885971.4501	1849487.6175
L	17+75.00	-65.00	885915.0419	1849383.0081
L	18+10.00	-70.00	885947.8587	1849369.8531
L	18+10.00	-50.00	885952.6002	1849389.2829

-L- NEW FINAL R/W MONUMENTS

ALIGN	STATION	OFFSET	NORTH	EAST
L	14+00.00	-50.00	885554.2886	1849486.4831

-Y1- NEW FINAL R/W MONUMENTS

ALIGN	STATION	OFFSET	NORTH	EAST
Y1	11+30.00	-30.00	885460.6184	1849451.3149

-L- NEW FINAL DRAINAGE UTILITY EASEMENTS

ALIGN	STATION	OFFSET	NORTH	EAST
L	13+50.00	75.00	885535.34825	1849619.77329
L	14+00.00	50.00	885636.28549	1849569.40789
L	12+75.00	75.00	885462.48637	1849637.55381
L	12+45.00	70.00	885432.15625	1849639.80856
L	12+20.00	50.00	885403.12749	1849626.38557
L	14+60.00	70.00	885641.02696	1849588.83772

TYPE STATION NORTH EAST

POT	10+00.00	885177.5456	1849629.8872
POT	23+29.35	886468.9933	1849314.7345

TYPE STATION NORTH EAST

POT	10+00.00	885347.9886	1849379.7989
POT	12+36.00	885513.6712	1849547.8623

TYPE STATION NORTH EAST

POT	10+00.00	886292.6165	1849357.7758
POT	11+80.00	886297.5498	1849537.7082

TYPE STATION NORTH EAST

POT	10+00.00	885985.8946	1849333.1569
PC	10+21.99	885992.2293	1849354.2130
PT	10+41.78	885990.2352	1849373.3892
PC	10+66.75	885978.2763	1849395.3076
PT	10+85.22	885975.9357	1849413.2112
POT	11+06.44	885980.9693	1849433.8273

BASELINE DATA

BL	POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
1	B5239-1		884394.2350	1849774.6250	647.89	OUTSIDE PROJECT LIMITS	
2	B5239-2		885067.9820	1849696.1410	635.98	OUTSIDE PROJECT LIMITS	
3	BL-3		885452.6849	1849539.3680	611.64	12+88.76	22.71 LT
4	BL-4		885932.4497	1849425.3896	608.29	17+81.86	19.70 LT
5	BL-5		886485.8736	1849327.1731	612.69	OUTSIDE PROJECT LIMITS	

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B5239-2"

WITH NAD 83/NSRS 2007 STATE PLANE GRID COORDINATES OF NORTHING: 885067.982(±) EASTING: 1849696.141(±) ELEVATION: 635.98'(±)

THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 1.0000216323

THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B5239-2" TO -L- STATION 11+00.00 IS N 23°31'07" W 225.44'

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NAVD 88

BENCHMARK DATA

BENCHMARK DATA

BM1 ELEVATION = 598.15
N 885895 E 1849282
BL STATION 20+84.00 148 LEFT
RR SPIKE IN BASE OF 20" SYCAMORE

BM2 ELEVATION = 614.20
N 886622 E 1849420
BL STATION 26+48.91
N 09°03'21.59" W DIST 2255.61
RR SPIKE IN ROOT OF 13" WALNUT

NOTES

1. THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING NCDOT PROJECT CONTROL DATA AT:
[HTTPS://CONNECT.NCDOT.GOV/RESOURCES/LOCATION/PAGES/DEFAULT.ASPX](https://connect.ncdot.gov/resources/location/pages/default.aspx)

THE FILES TO BE FOUND ARE AS FOLLOWS:
B5239_LS_CONTROL.TXT

SITE CALIBRATION INFORMATION HAS NOT BEEN PROVIDED FOR THIS PROJECT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.

INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.

PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.
NETWORK ESTABLISHED FROM NGS ONLINE POSITIONING SERVICE (OPUS)

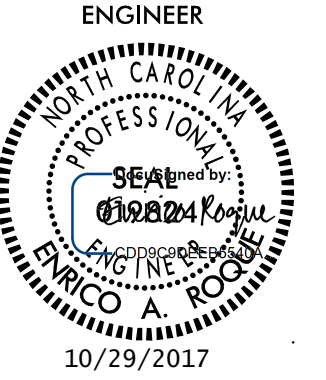
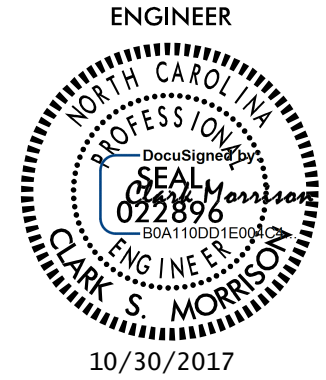
5/14/2017

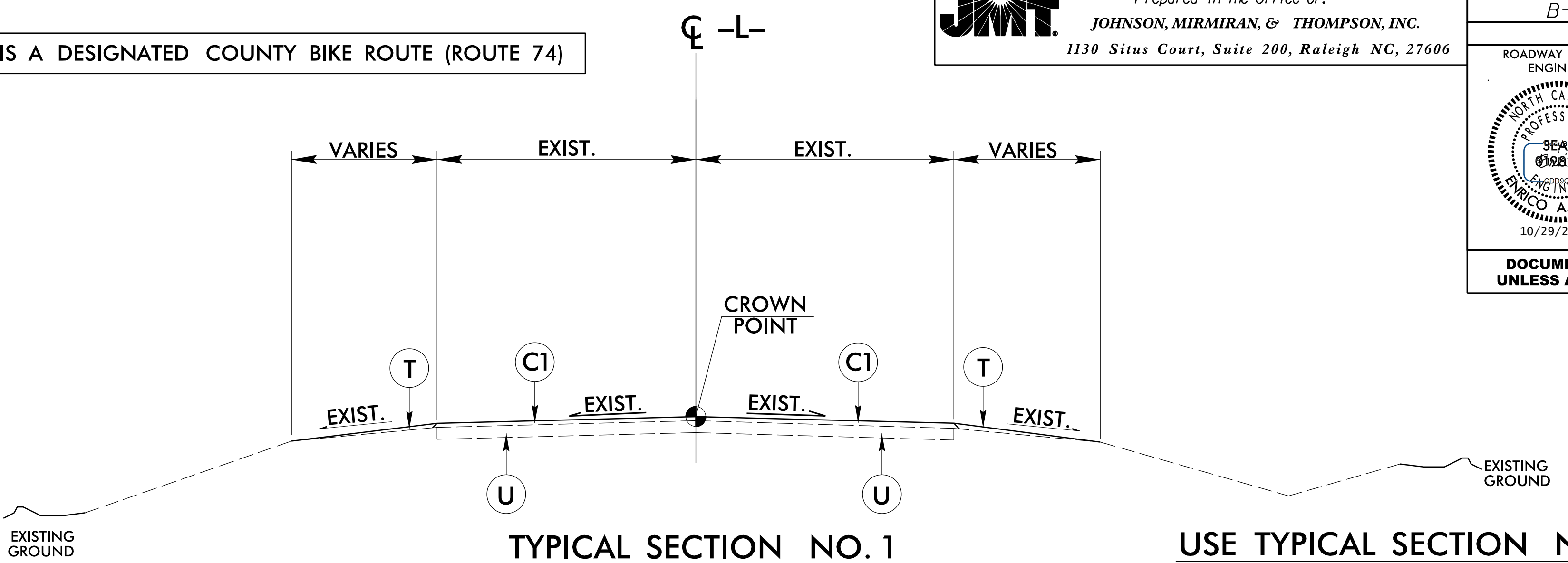
PAVEMENT SCHEDULE	
A1	8" PORTLAND CEMENT CONCRETE PAVEMENT, THROUGH LANES (JOINTED WITH DOWELS)
A2	CONCRETE SHOULDERS ADJACENT TO 8" PAVEMENT (JOINTED WITHOUT DOWELS)
C1	PROP. APPROX. 1 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.
C2	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 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 112 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 2" IN DEPTH.
D1	PROP. APPROX. 3" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YD.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2 1/2" IN DEPTH OR GREATER THAN 4" IN DEPTH.
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
E2	PROP. APPROX. 5" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 570 LBS. PER SQ. YD.
E3	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5 1/2" IN DEPTH.
J1	PROP 8" AGGREGATE BASE COURSE
J2	PROP 10" AGGREGATE BASE COURSE
P	PRIME COAT AT THE RATE OF .35 GAL. PER SQ. YD.
R1	MODIFIED SHOULDER BERM GUTTER (SEE SPECIAL DETAIL SHEET 2C-15)
R2	SHOULDER BERM GUTTER
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE STANDARD WEDGING DETAIL)

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

NOTE: NC 87 IS A DESIGNATED COUNTY BIKE ROUTE (ROUTE 74)

JMT. Prepared in the Office of:
JOHNSON, MIRMIRAN, & THOMPSON, INC.
 1130 Sitas Court, Suite 200, Raleigh NC, 27606

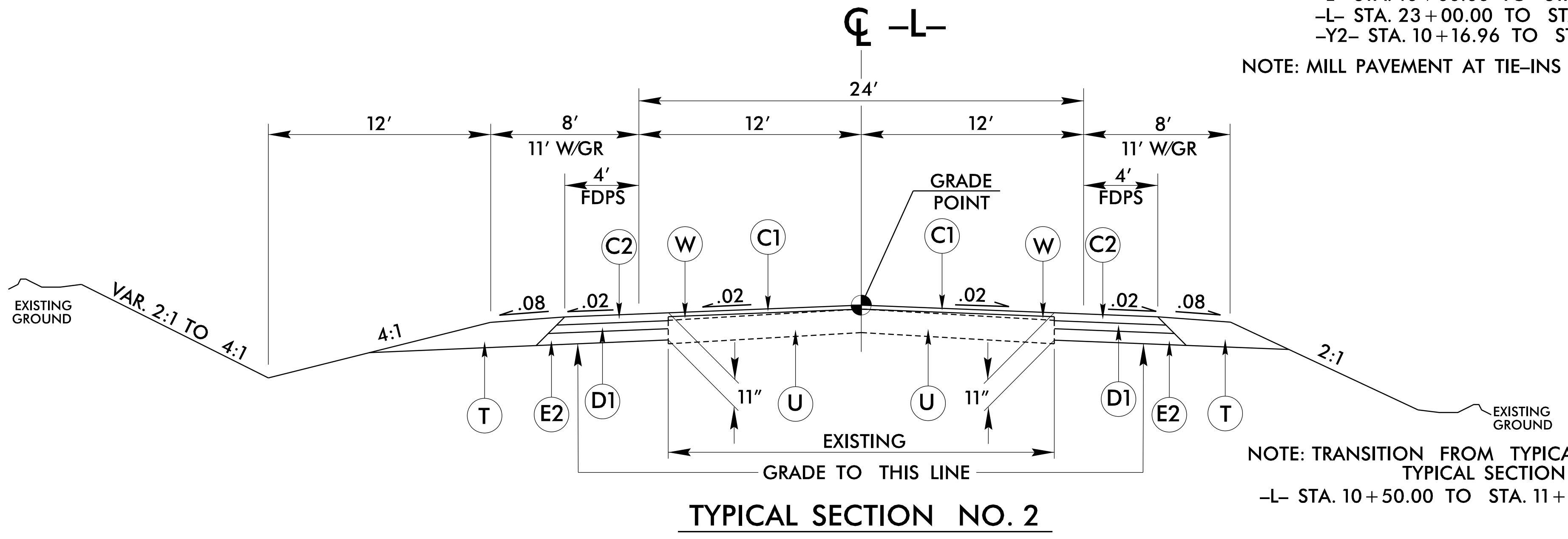
PROJECT REFERENCE NO. B-5239	SHEET NO. 2A-1
RW SHEET NO.	
ROADWAY DESIGN ENGINEER 	HYDRAULICS ENGINEER 
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



USE TYPICAL SECTION NO. 1:

- L- STA. 10+00.00 TO STA. 10+50.00
- L- STA. 23+00.00 TO STA. 24+85.00
- Y2- STA. 10+16.96 TO STA. 11+36.00

NOTE: MILL PAVEMENT AT TIE-INS (SEE DETAIL BELOW).



NOTE: TRANSITION FROM TYPICAL SECTION NO. 1 TO TYPICAL SECTION NO. 2

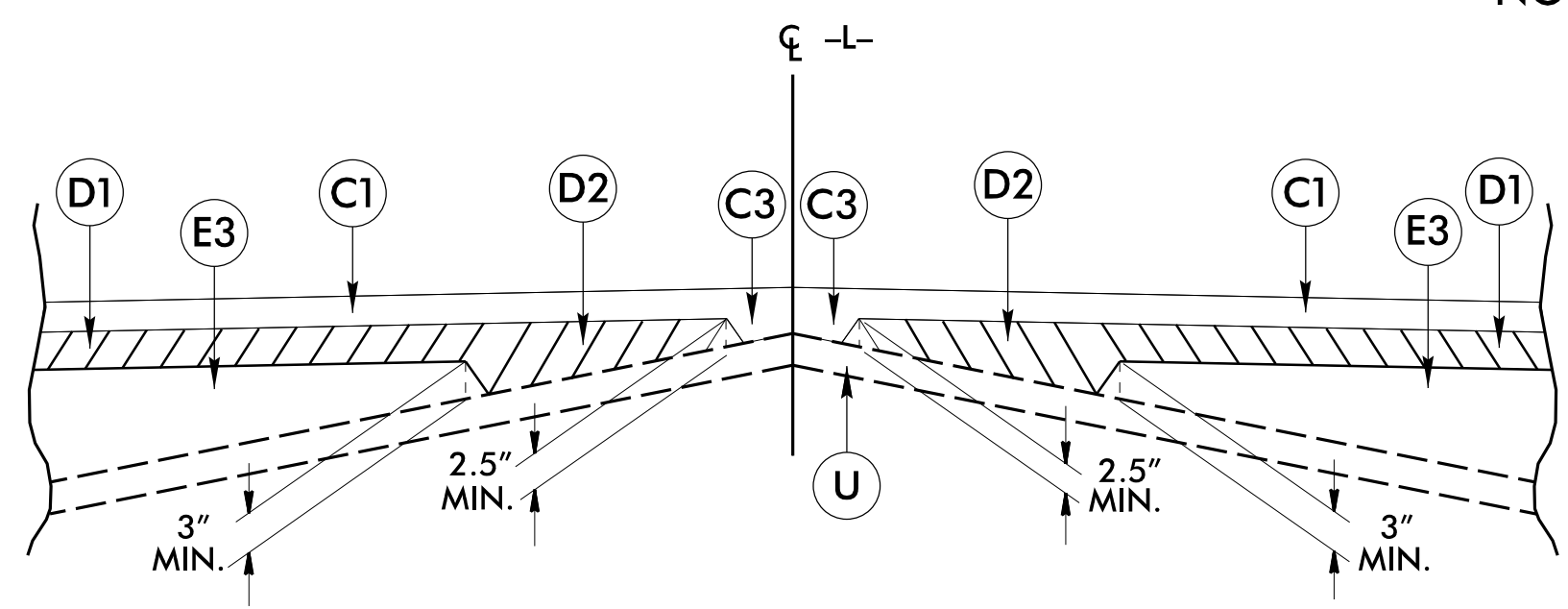
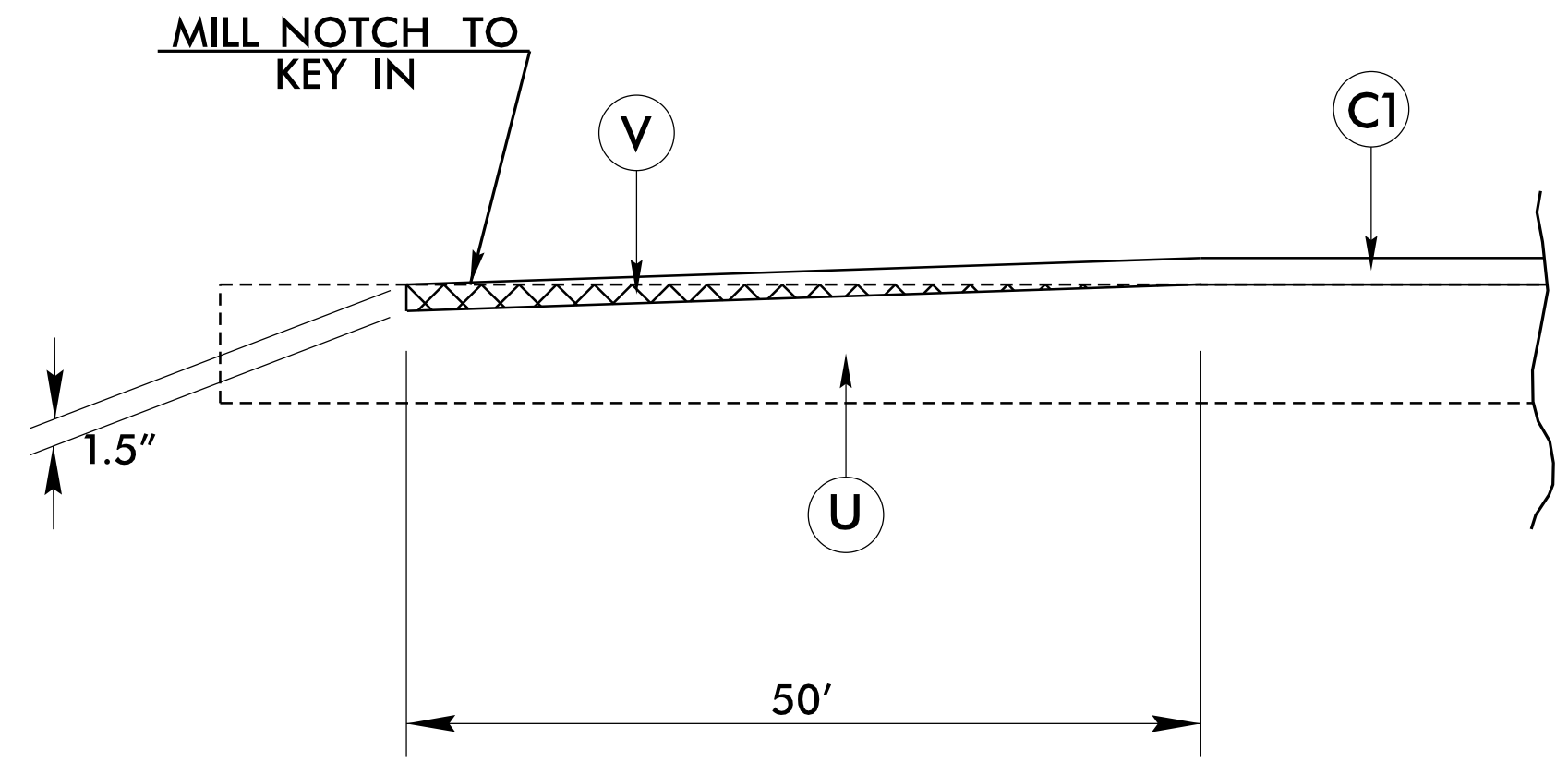
- L- STA. 10+50.00 TO STA. 11+00.00

USE TYPICAL SECTION NO. 2:

- L- STA. 11+00.00 TO STA. 11+75.00
- L- STA. 22+00.00 TO STA. 22+50.00
- L- STA. 22+50.00 TO STA. 23+00.00

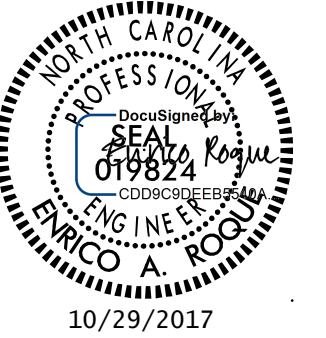
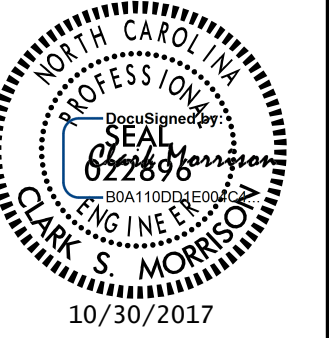
NOTE: TRANSITION FROM TYPICAL SECTION NO. 2 TO TYPICAL SECTION NO. 1

NOTE: PAVE TO THE FACE OF GUARDRAIL, SEE PLANS FOR LOCATIONS.

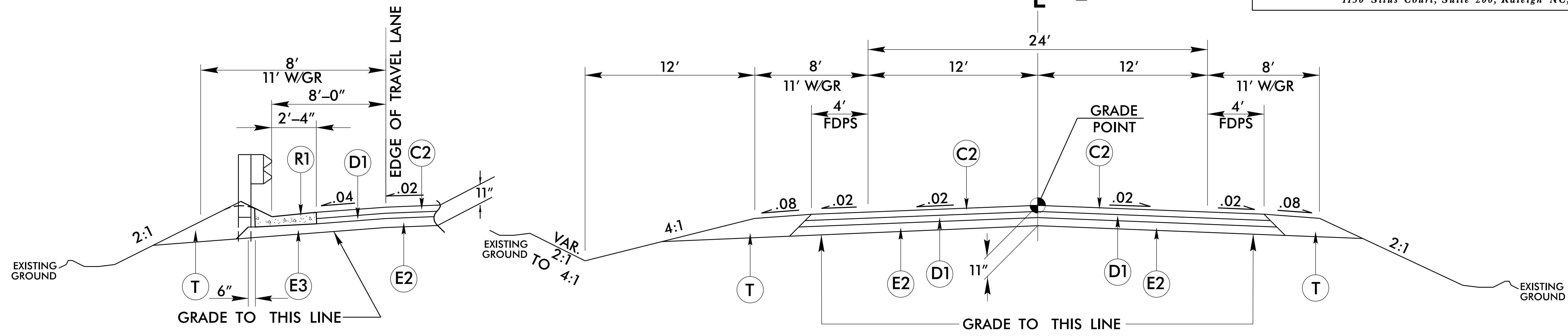


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5/14/99

PROJECT REFERENCE NO. B-5239	SHEET NO. 2A-2
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
	
10/29/2017	10/30/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



USE IN CONJUNCTION WITH TYPICAL SECTION NO. 3

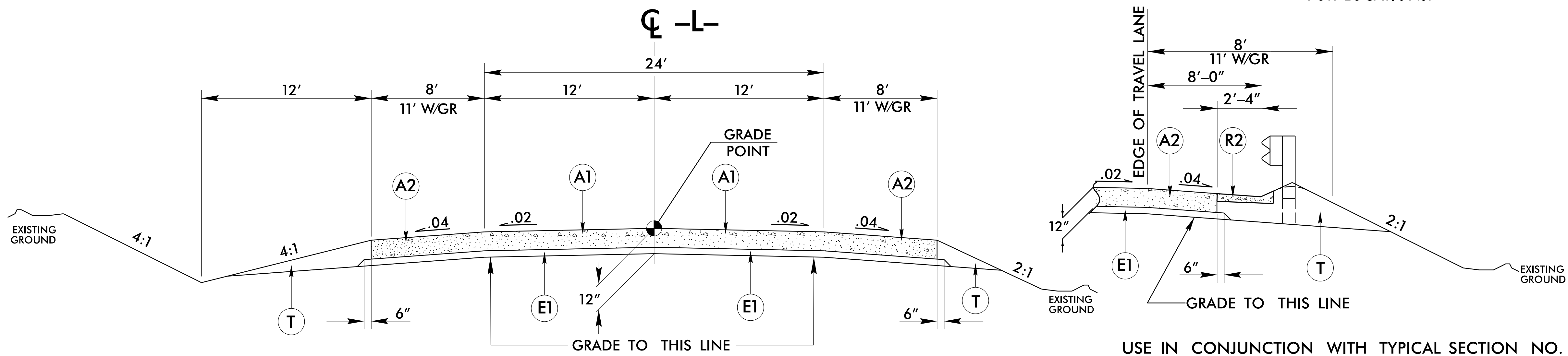
-L- STA. 19+58.00 TO STA. 19+68.00 LT.
 -L- STA. 19+73.00 TO STA. 19+83.00 RT.

TYPICAL SECTION NO. 3

USE TYPICAL SECTION NO. 3:

-L- STA. 11+75.00 TO STA. 14+92.00 (BEGIN BRIDGE)
 -L- STA. 19+41.00 (END BRIDGE) TO STA. 22+00.00

NOTE: PAVE TO THE FACE OF GUARDRAIL, SEE PLANS FOR LOCATIONS.



TYPICAL SECTION NO. 4

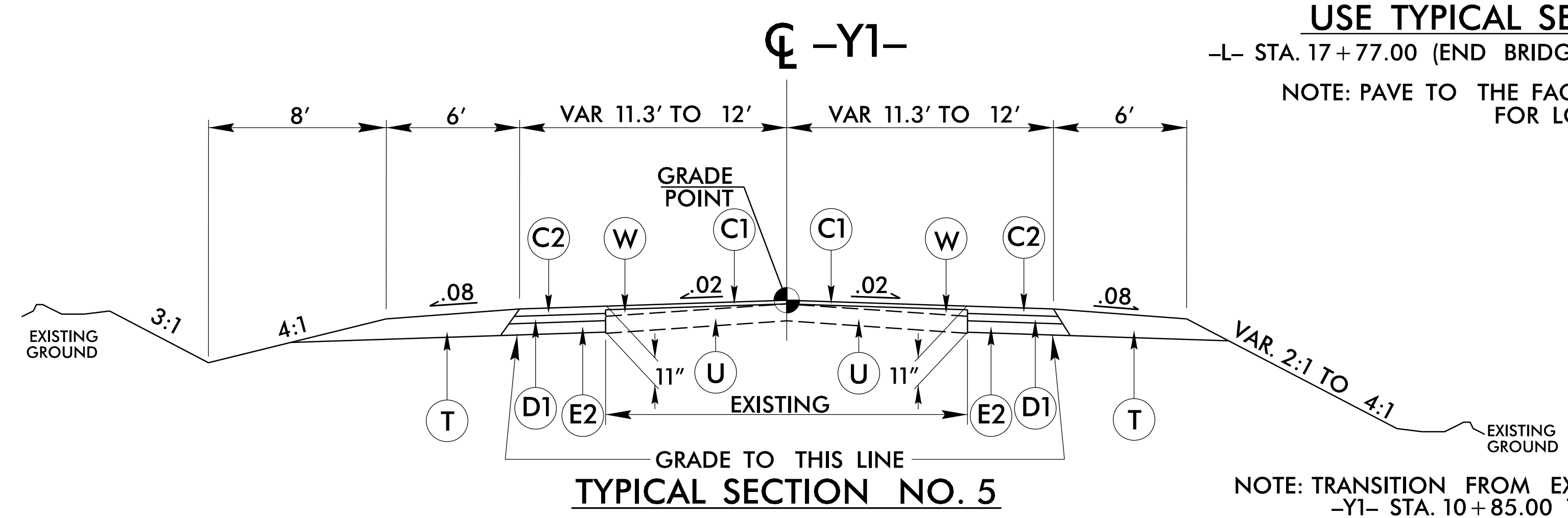
USE IN CONJUNCTION WITH TYPICAL SECTION NO. 4

-L- STA. 18+02.00 TO STA. 18+12.00 LT.
 -L- STA. 18+02.00 TO STA. 18+12.00 RT.

USE TYPICAL SECTION NO. 4:

-L- STA. 17+77.00 (END BRIDGE) TO STA. 18+68.38 (BEGIN BRIDGE)

NOTE: PAVE TO THE FACE OF GUARDRAIL, SEE PLANS FOR LOCATIONS.



TYPICAL SECTION NO. 5

NOTE: TRANSITION FROM EXISTING TO TYPICAL SECTION NO. 5
 -Y1- STA. 10+85.00 TO STA. 10+99.32

USE TYPICAL SECTION NO. 5:



-Y1- STA. 10+99.32 TO STA. 11+44.32

PAVEMENT SCHEDULE

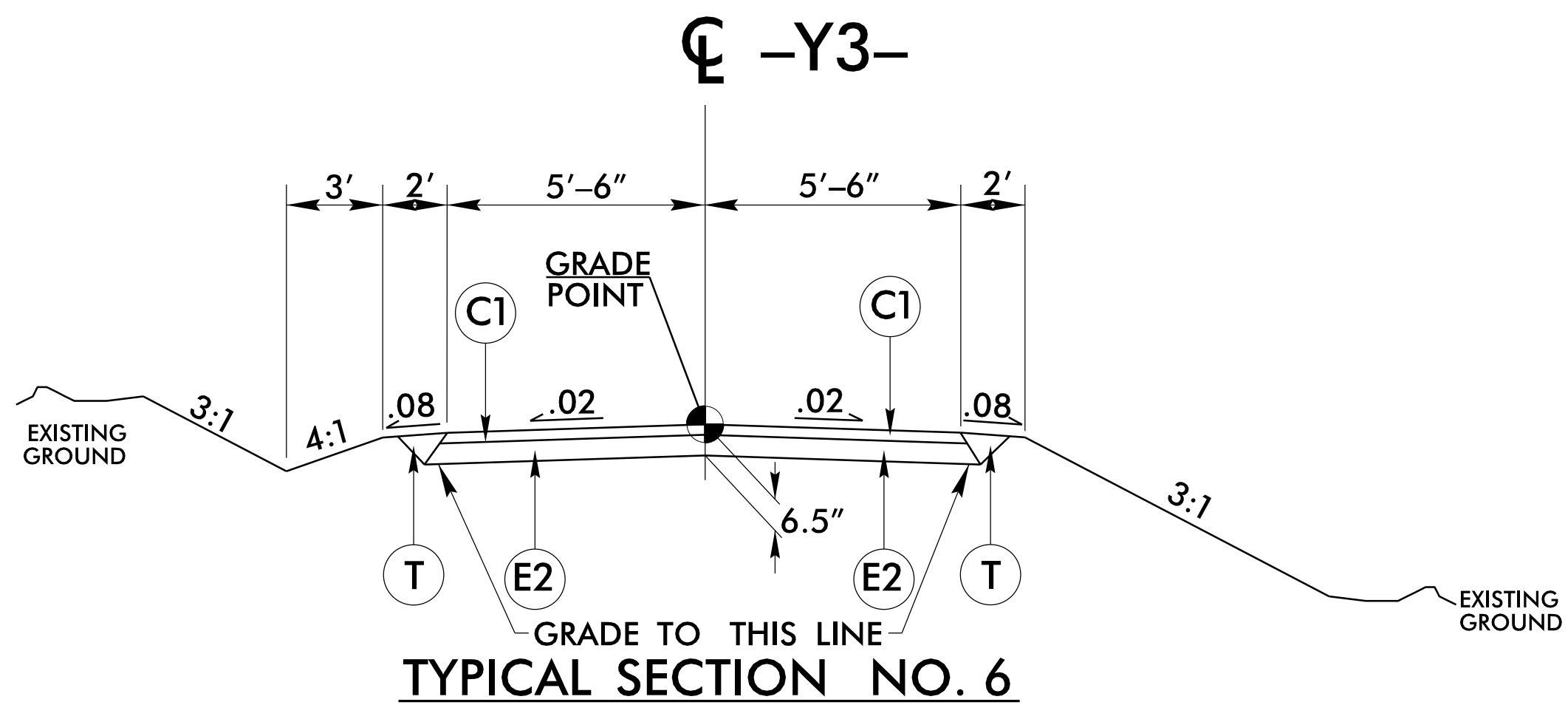
A1	8" CONC THROUGH LANES
A2	8" CONC SHOULDERS
C1	1½" S9.5B
C2	3" S9.5B
C3	VAR. DEPTH S9.5B
D1	3" I19.0B
D2	VAR. DEPTH I19.0B
E1	4" B25.0B
E2	5" B25.0B
E3	VAR. DEPTH B25.0B
J1	8" ABC
J2	10" ABC
P	PRIME COAT
R1	MODIFIED SHOULDER BERM GUTTER (SEE SHEET 2C-15)
R2	SHOULDER BERM GUTTER
T	EARTH MATERIAL
U	EXIST PAVEMENT
W	WEDGING

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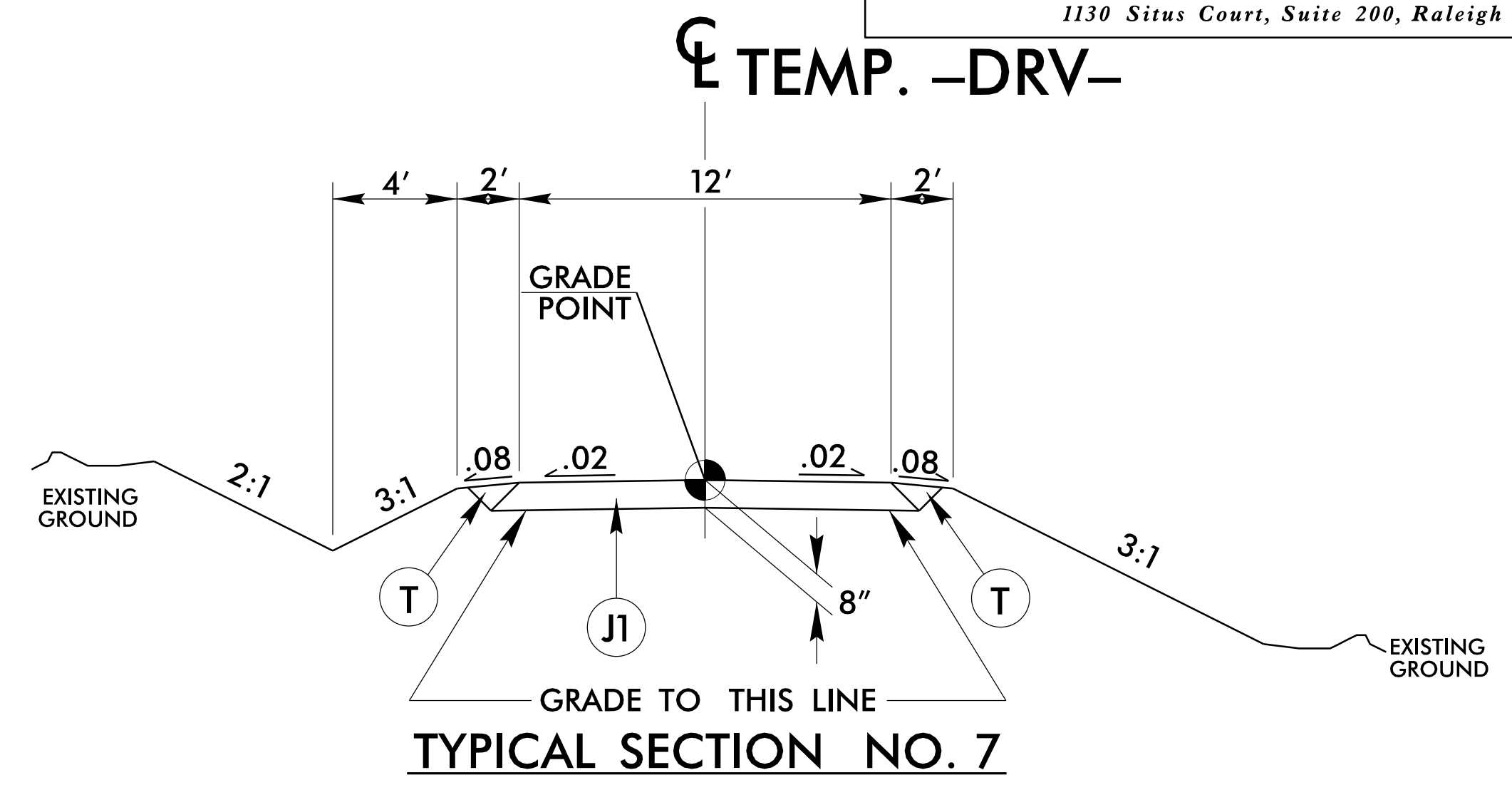
PROJECT REFERENCE NO. B-5239	SHEET NO. 2A-3
RW SHEET NO.	
ROADWAY DESIGN ENGINEER 	HYDRAULICS ENGINEER 

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



TYPICAL SECTION NO. 6

NOTE: TRANSITION FROM EXISTING TO TYPICAL SECTION NO. 6
 -Y3- STA. 10+15.00 TO STA. 10+21.99
USE TYPICAL SECTION NO. 6:
 -Y3- STA. 10+21.99 TO STA. 10+86.44

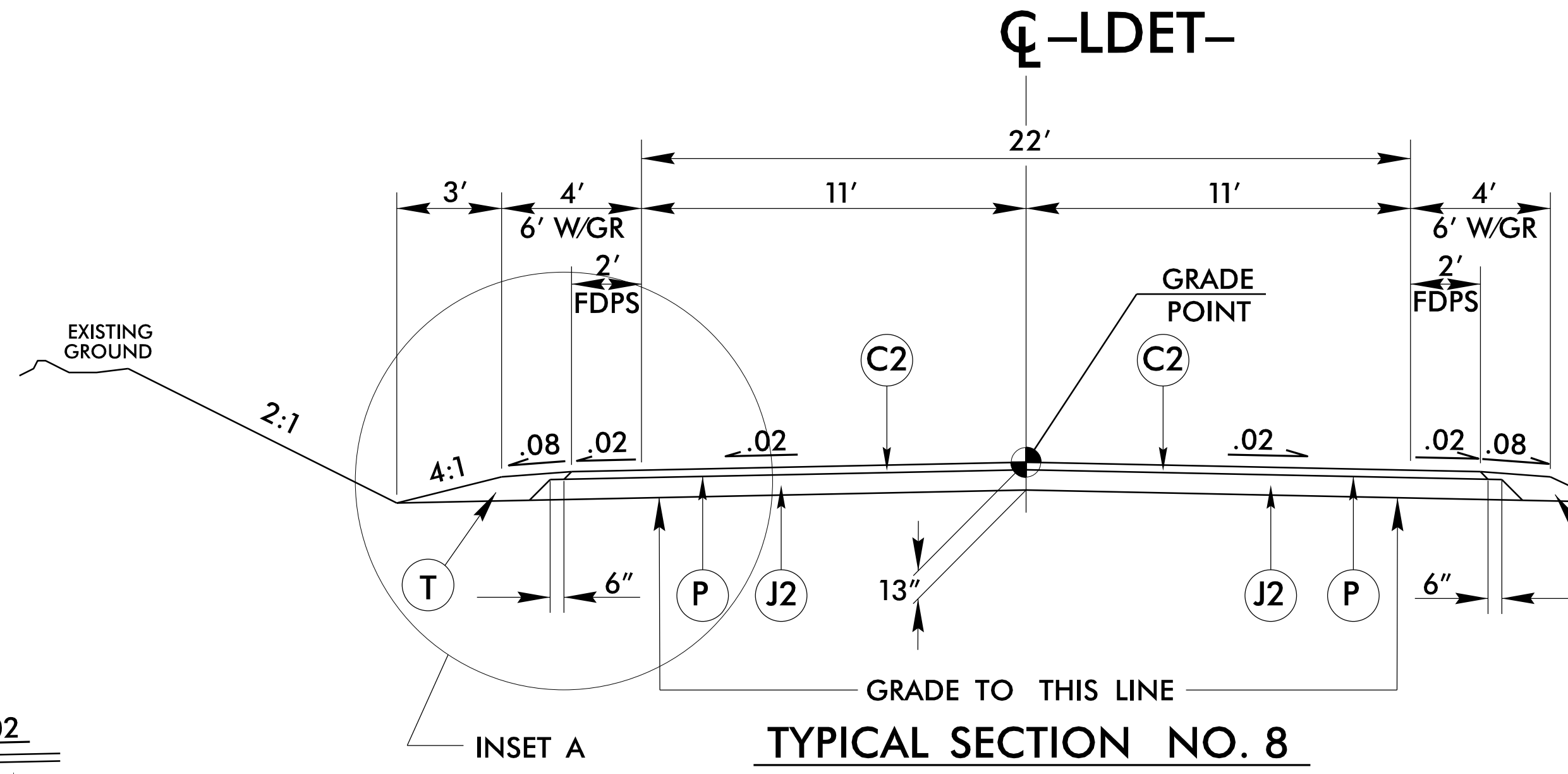


TYPICAL SECTION NO. 7

USE TYPICAL SECTION NO. 7:
 -DRV- STA. 9+76.32 TO STA. 11+40.00
 NOTE: DO NOT REMOVE EXISTING -L- PAVEMENT.

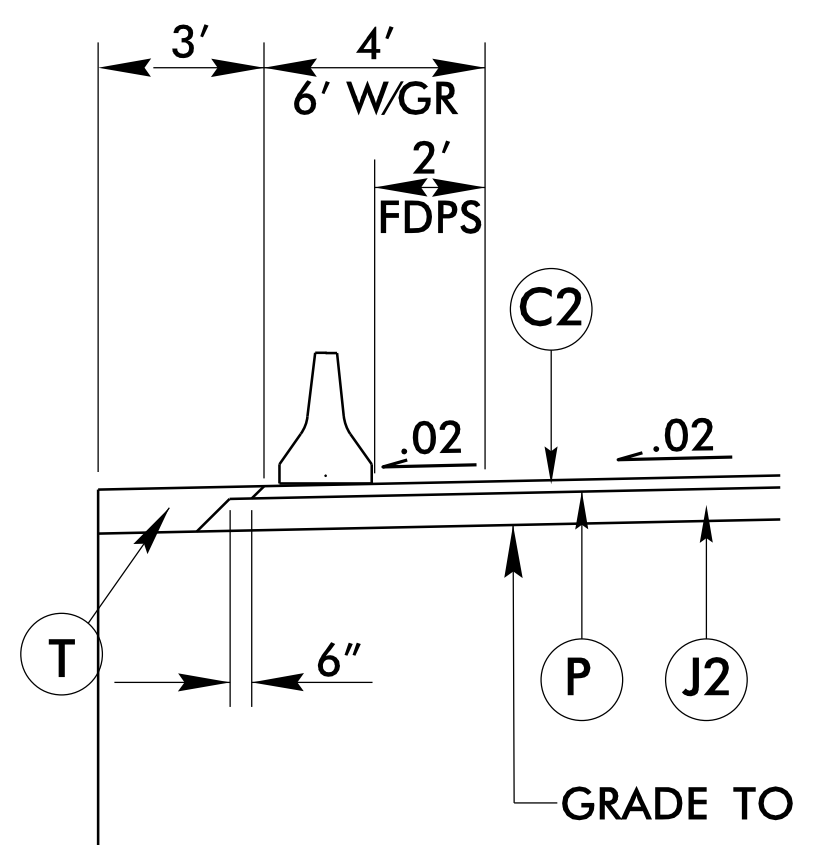
PAVEMENT SCHEDULE

A1	8" CONC THROUGH LANES
A2	8" CONC SHOULDERS
C1	1 1/2" S9.5B
C2	3" S9.5B
C3	VAR. DEPTH S9.5B
D1	3" I19.0B
D2	VAR. DEPTH I19.0B
E1	4" B25.0B
E2	5" B25.0B
E3	VAR. DEPTH B25.0B
J1	8" ABC
J2	10" ABC
P	PRIME COAT
R1	MODIFIED SHOULDER BERM GUTTER (SEE SHEET 2C-15)
R2	SHOULDER BERM GUTTER
T	EARTH MATERIAL
U	EXIST PAVEMENT
W	WEDGING



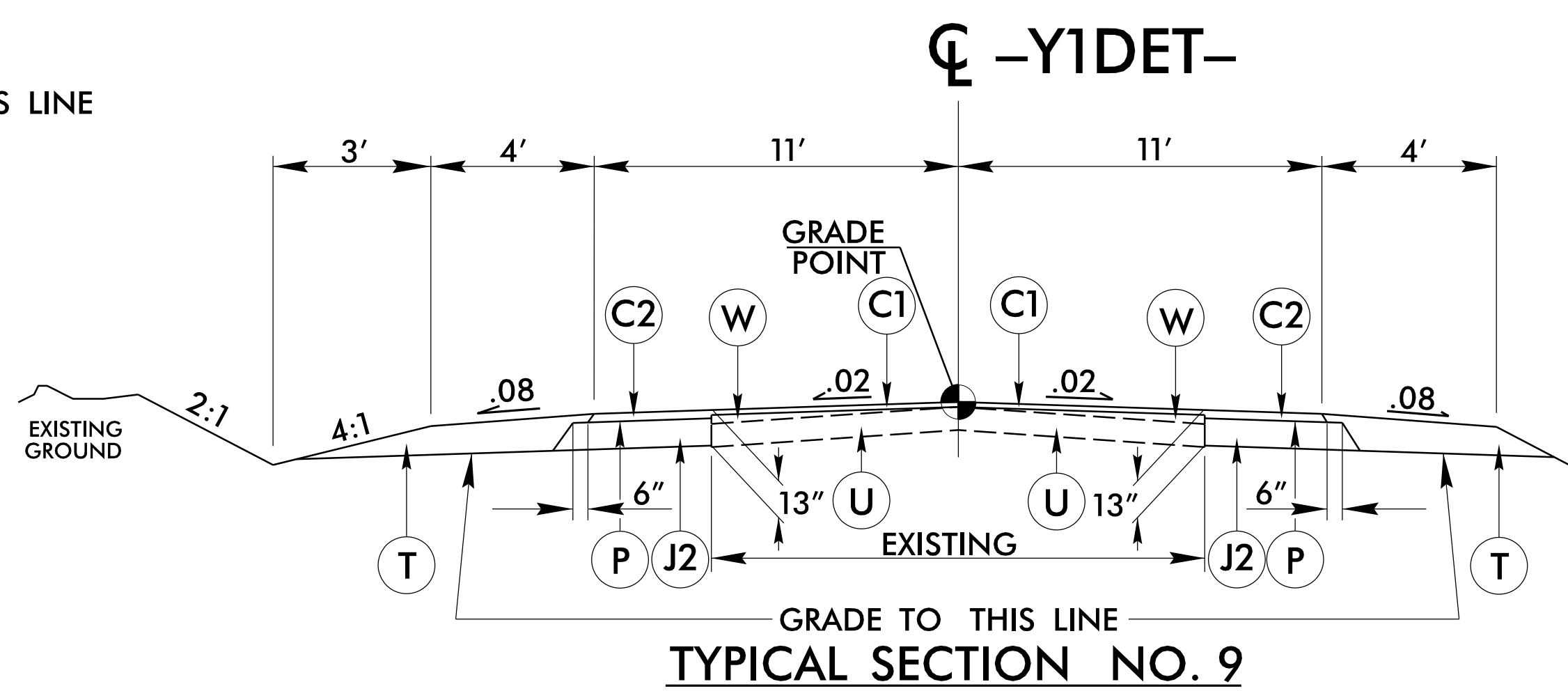
TYPICAL SECTION NO. 8

NOTE: TRANSITION FROM EXISTING TO TYPICAL SECTION NO. 8
 -LDET- STA. 10+00.00 TO STA. 11+11.74
USE TYPICAL SECTION NO. 8:
 -LDET- STA. 11+11.74 TO STA. 15+05 +/- (BEGIN BRIDGE)
 -LDET- STA. 17+65 +/- (END BRIDGE) TO STA. 18+90 +/- (BEGIN BRIDGE)
 -LDET- STA. 19+75 +/- (END BRIDGE) TO STA. 23+78.13



INSET A

-LDET- STA. 14+63 +/- TO STA. 15+08 +/-
 -LDET- STA. 17+62 +/- TO STA. 18+07 +/-
 -LDET- STA. 18+50 +/- TO STA. 18+95 +/-
 -L- STA. 19+57 +/- TO STA. 20+02 +/-

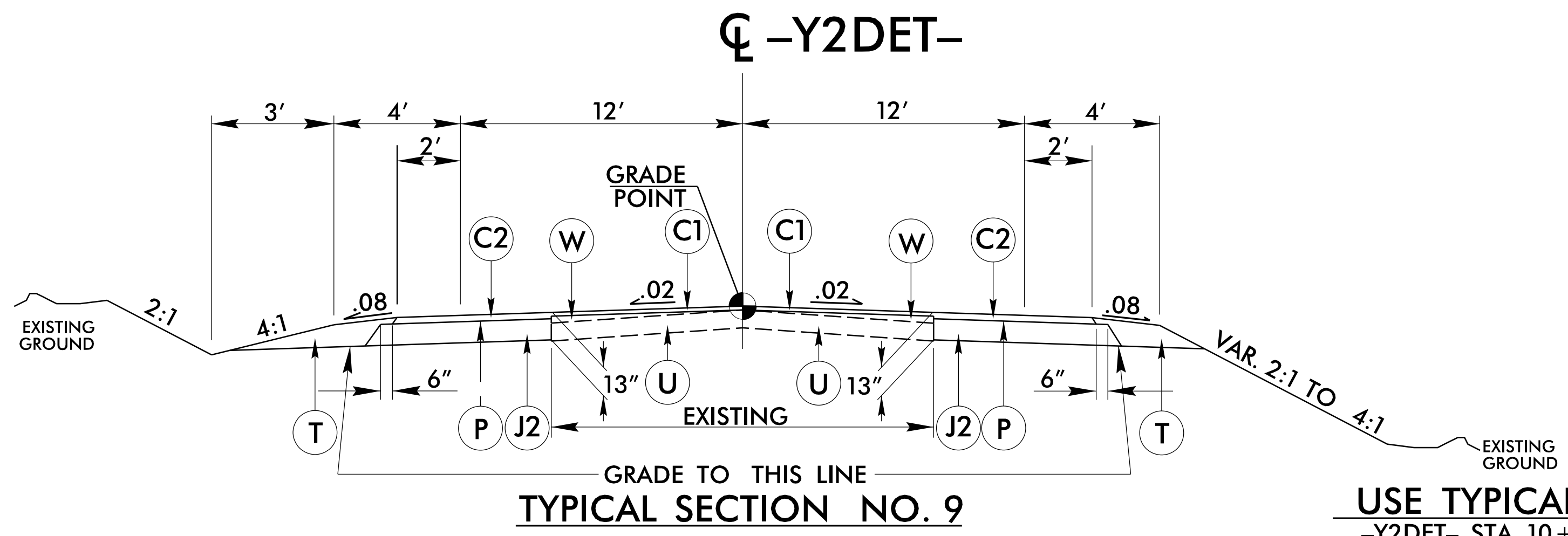


TYPICAL SECTION NO. 9

USE TYPICAL SECTION NO. 9:
 -YIDET- STA. 11+20.00 TO STA. 11+94.41

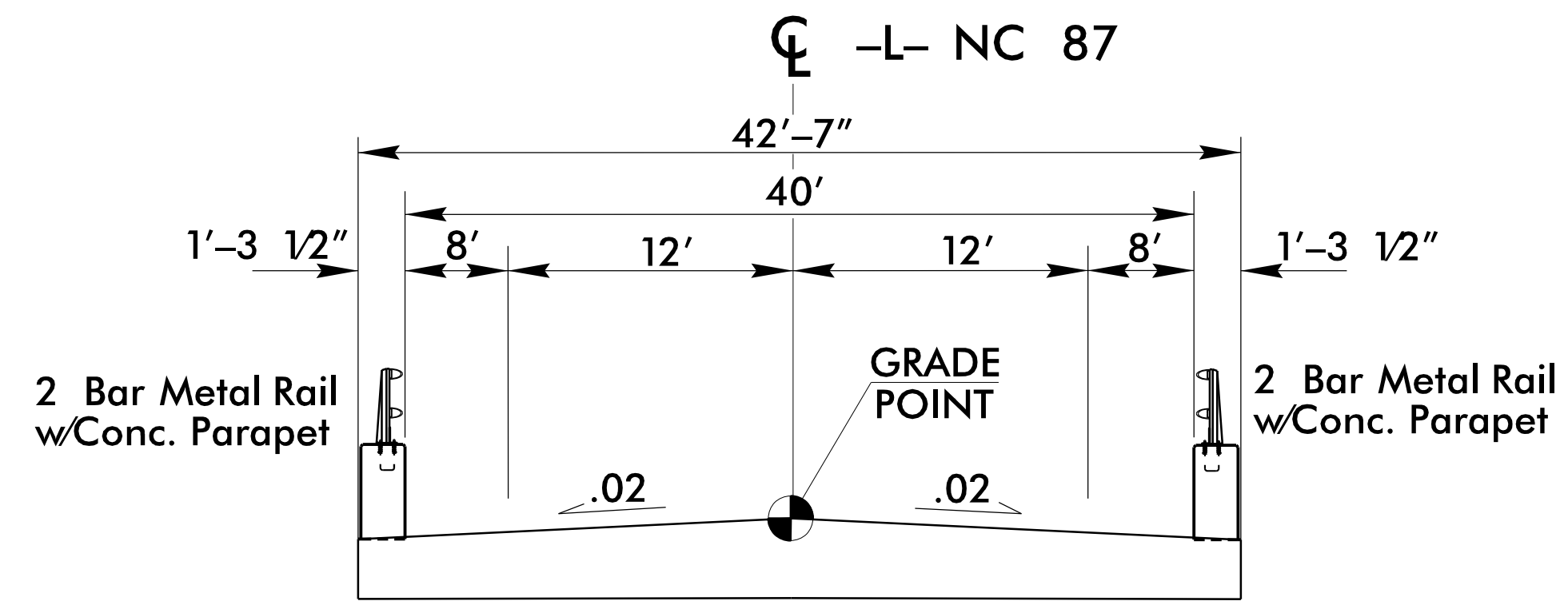
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PROJECT REFERENCE NO. B-5239	SHEET NO. 2A-4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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TYPICAL SECTION NO. 9
 GRADE TO THIS LINE

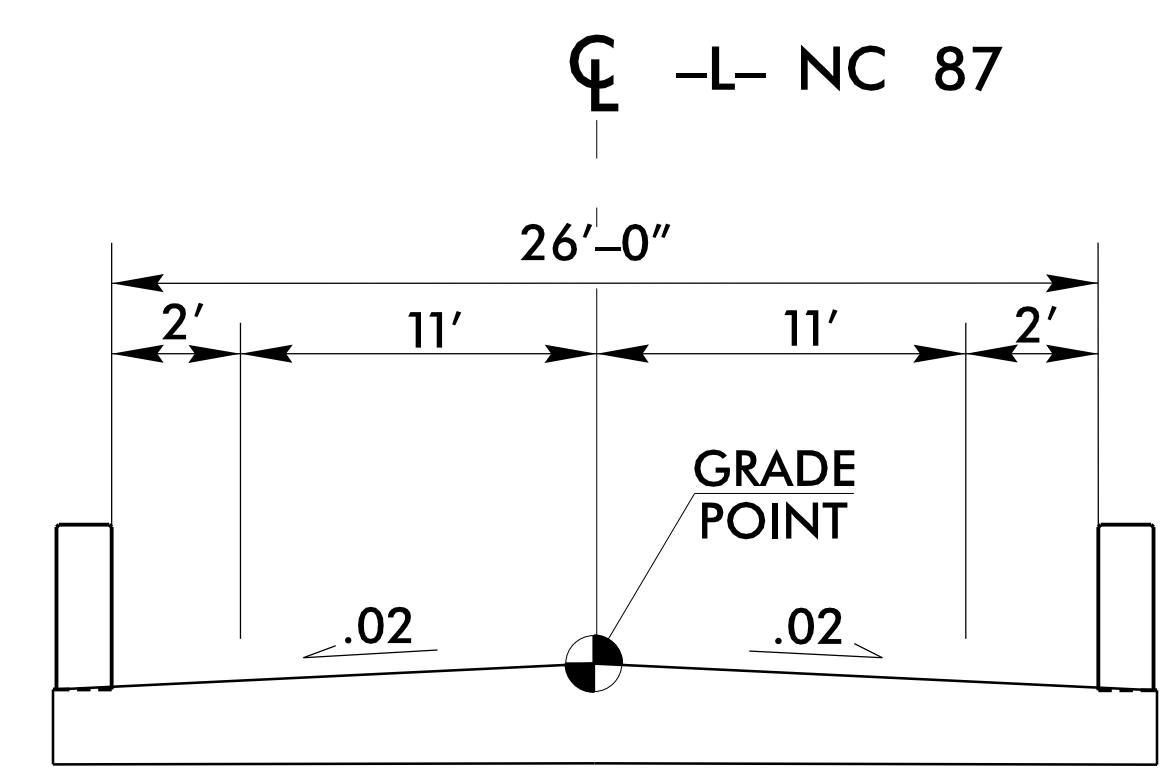
USE TYPICAL SECTION NO. 9:
 -Y2DET- STA. 10+13.08 TO STA. 10+88.00



TYPICAL SECTION ON BRIDGES

NC 87 IS A DESIGNATED COUNTY BIKE ROUTE (ROUTE 74)

TYPICAL SECTION ON BRIDGES
 NC 87 IS A DESIGNATED COUNTY BIKE ROUTE (ROUTE 74)
 -L- STA. 14+92.00 (BEGIN BRIDGE) TO STA. 17+77.00 (END BRIDGE)
 -L- STA. 18+68.38 (BEGIN BRIDGE) TO STA. 19+41.00 (END BRIDGE)



TYPICAL SECTION ON TEMPORARY BRIDGES

TYPICAL SECTION ON TEMPORARY BRIDGES
 -LDET- STA. 15+05+/- (BEGIN BRIDGE) TO STA. 17+65+/- (END BRIDGE)
 -LDET- STA. 18+90+/- (BEGIN BRIDGE) TO STA. 19+75+/- (END BRIDGE)

PAVEMENT SCHEDULE

A1	8" CONC THROUGH LANES
A2	8" CONC SHOULDERS
C1	1 1/2" S9.5B
C2	3" S9.5B
C3	VAR. DEPTH S9.5B
D1	3" I19.0B
D2	VAR. DEPTH I19.0B
E1	4" B25.0B
E2	5" B25.0B
E3	VAR. DEPTH B25.0B
J1	8" ABC
J2	10" ABC
P	PRIME COAT
R1	MODIFIED SHOULDER BERM GUTTER (SEE SHEET 2C-15)
R2	SHOULDER BERM GUTTER
T	EARTH MATERIAL
U	EXIST PAVEMENT
W	WEDGING

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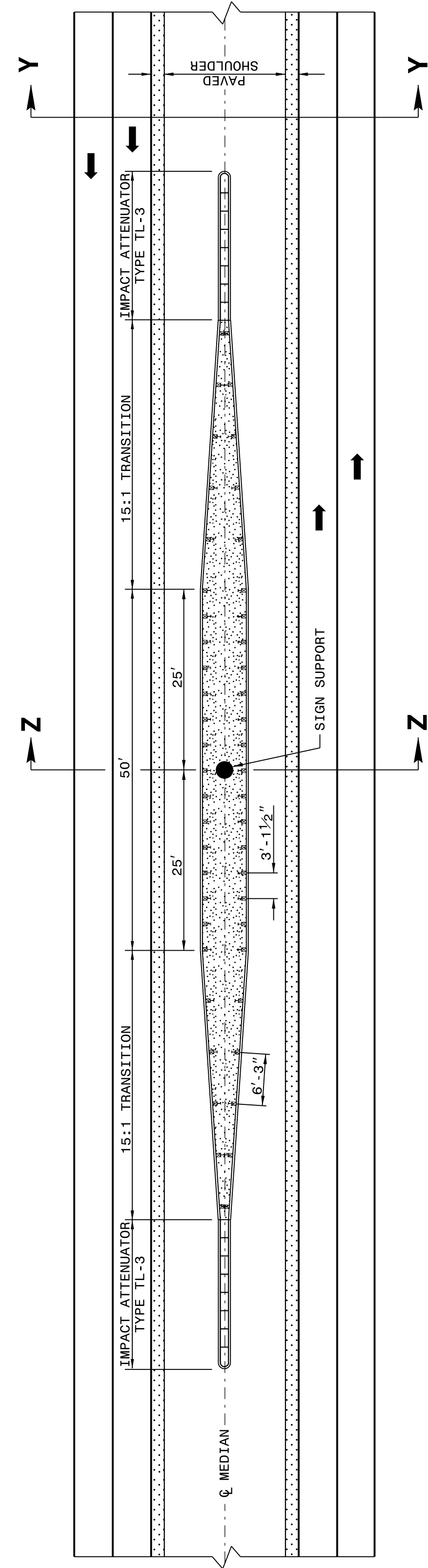
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 2 OF 11
862D01

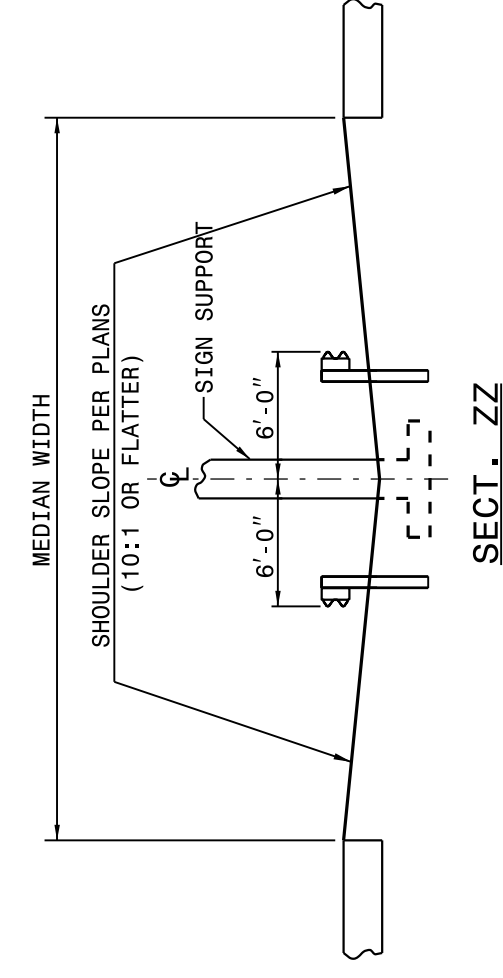
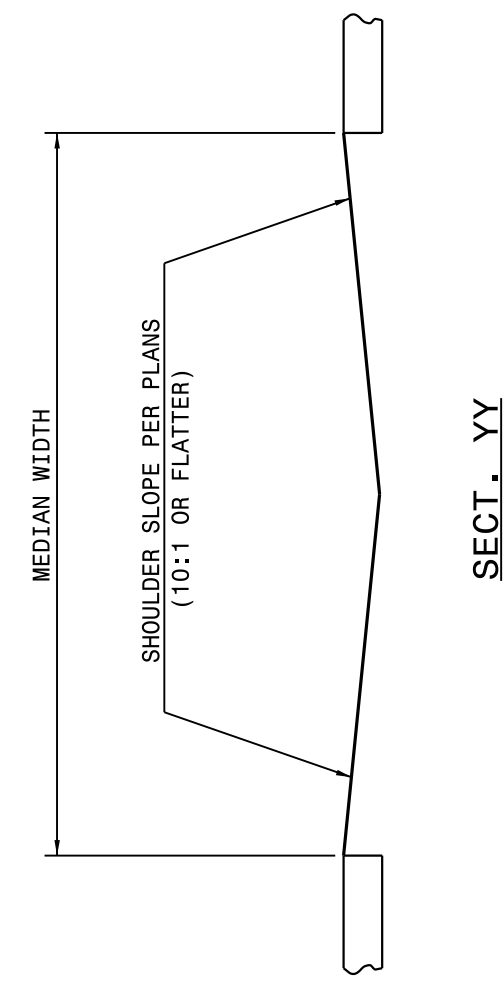
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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 2 OF 11
862D01



NOTE SPECIAL LAYER OF PAVEMENT
 USE 3'-1 1/2" POST SPACING ON THE 50' OF GUARDRAIL PARALLEL TO LANES AND 6'-3" POST SPACING ON 15:1 TRANSITION SECTIONS.
 GRADE MEDIAN IN THE VICINITY OF THE SIGN SUPPORT AS ILLUSTRATED IN THE ROADWAY STANDARD DRAWINGS (STANDARD 862D01 SHEET 1 OF 12).

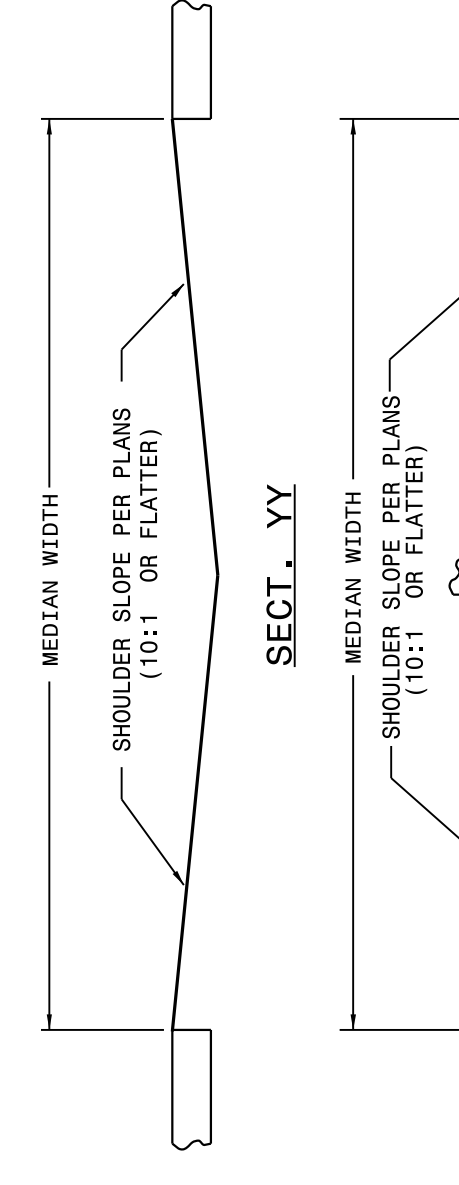
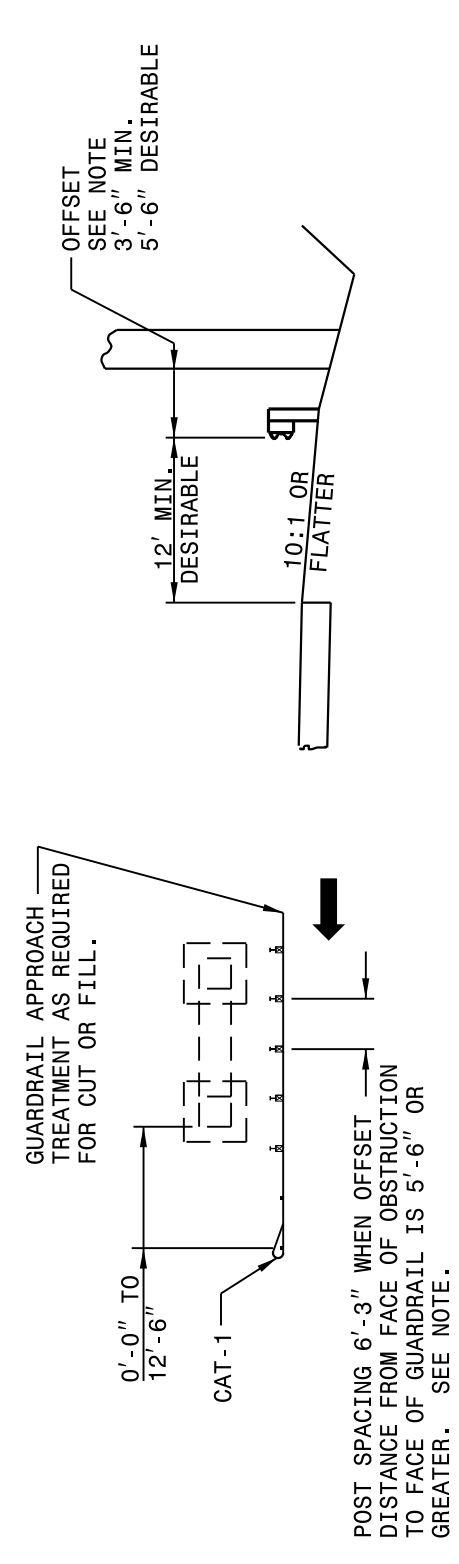
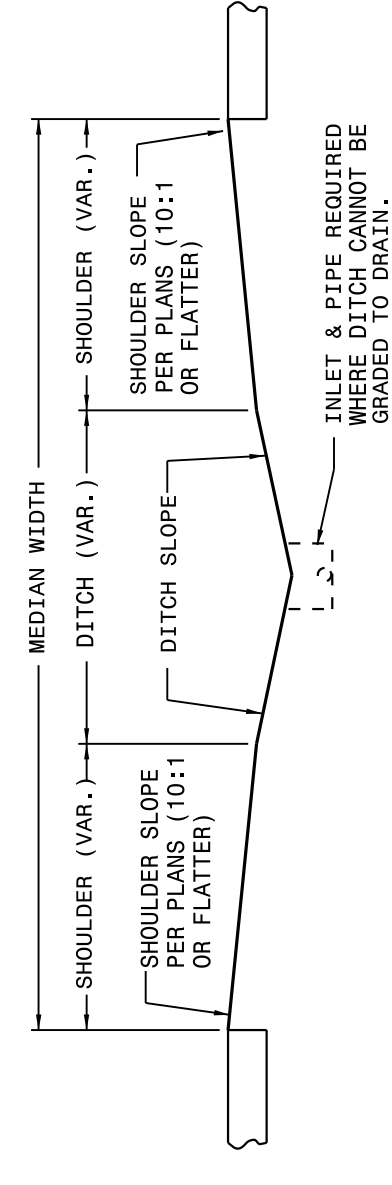
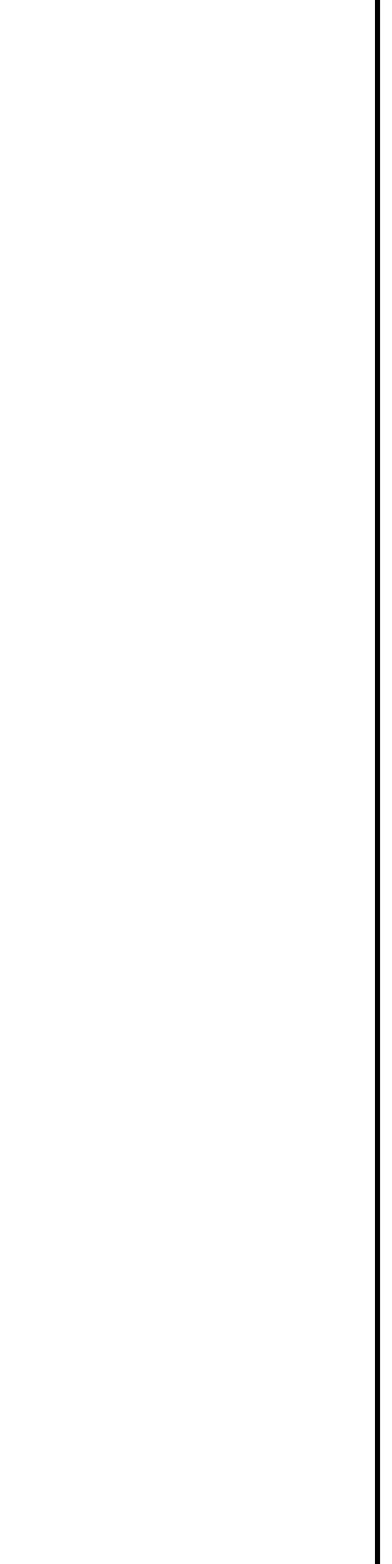
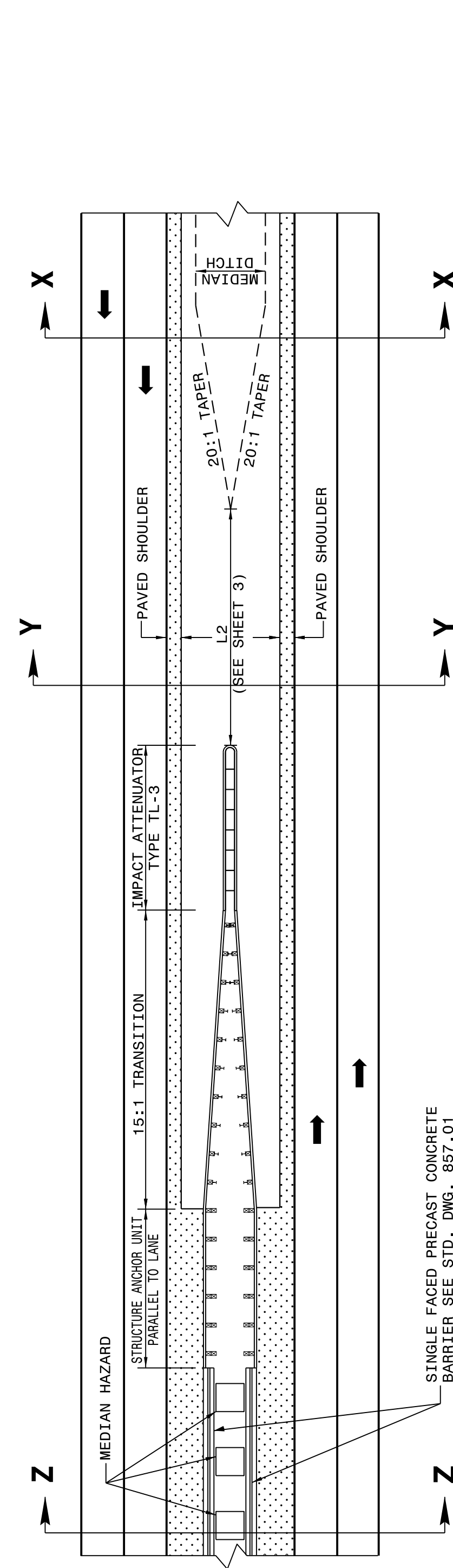


DETAIL OF GUARDRAIL AT MEDIAN SIGN SUPPORT

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

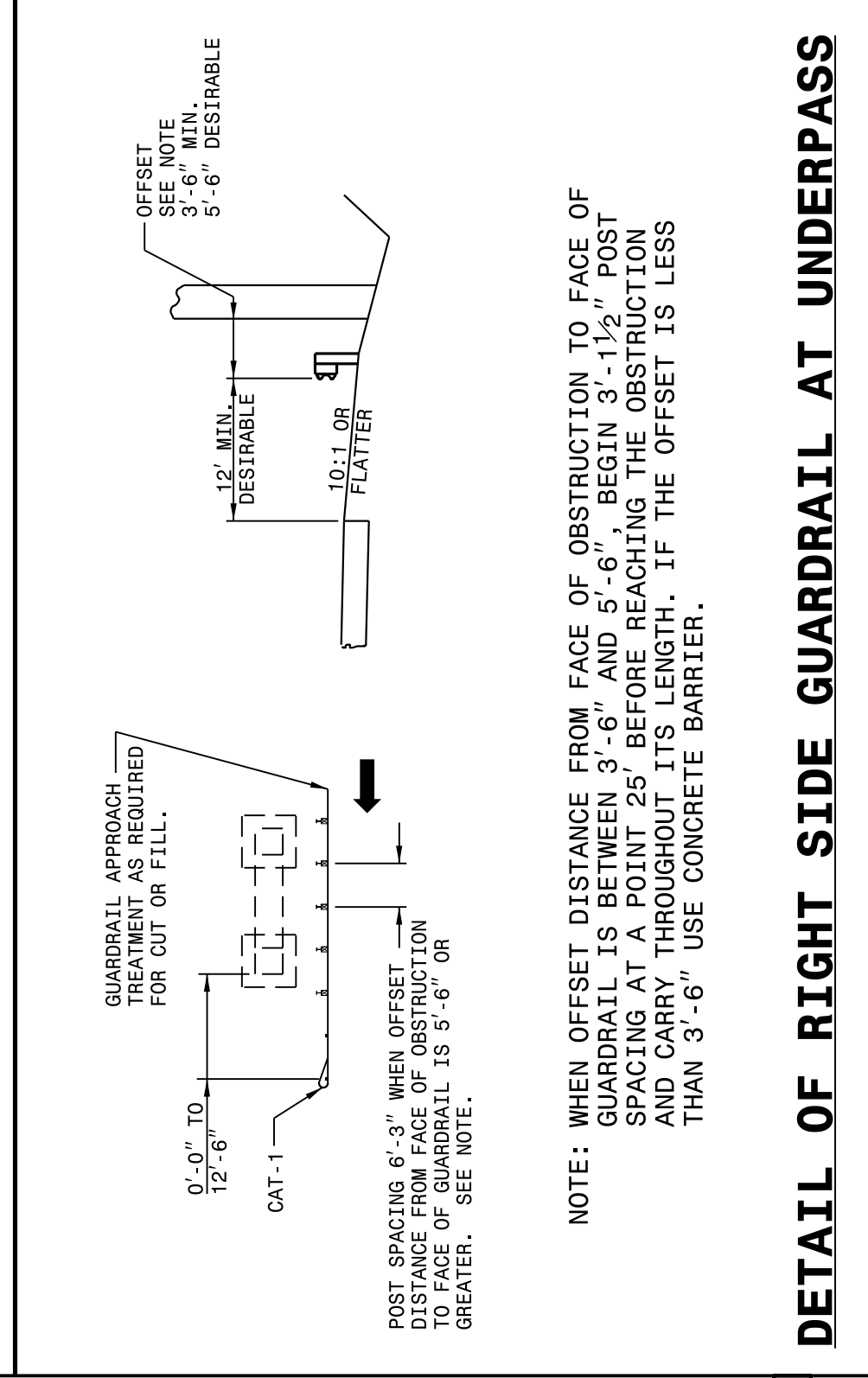
SHEET 1 OF 11
862D01



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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 1 OF 11
862D01

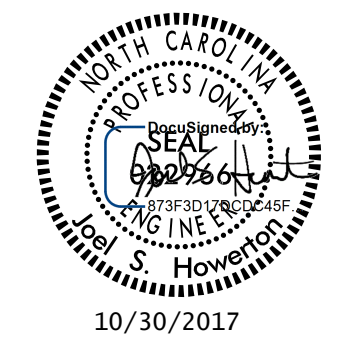


DETAIL OF MEDIAN TREATMENT AT UNDERPASS

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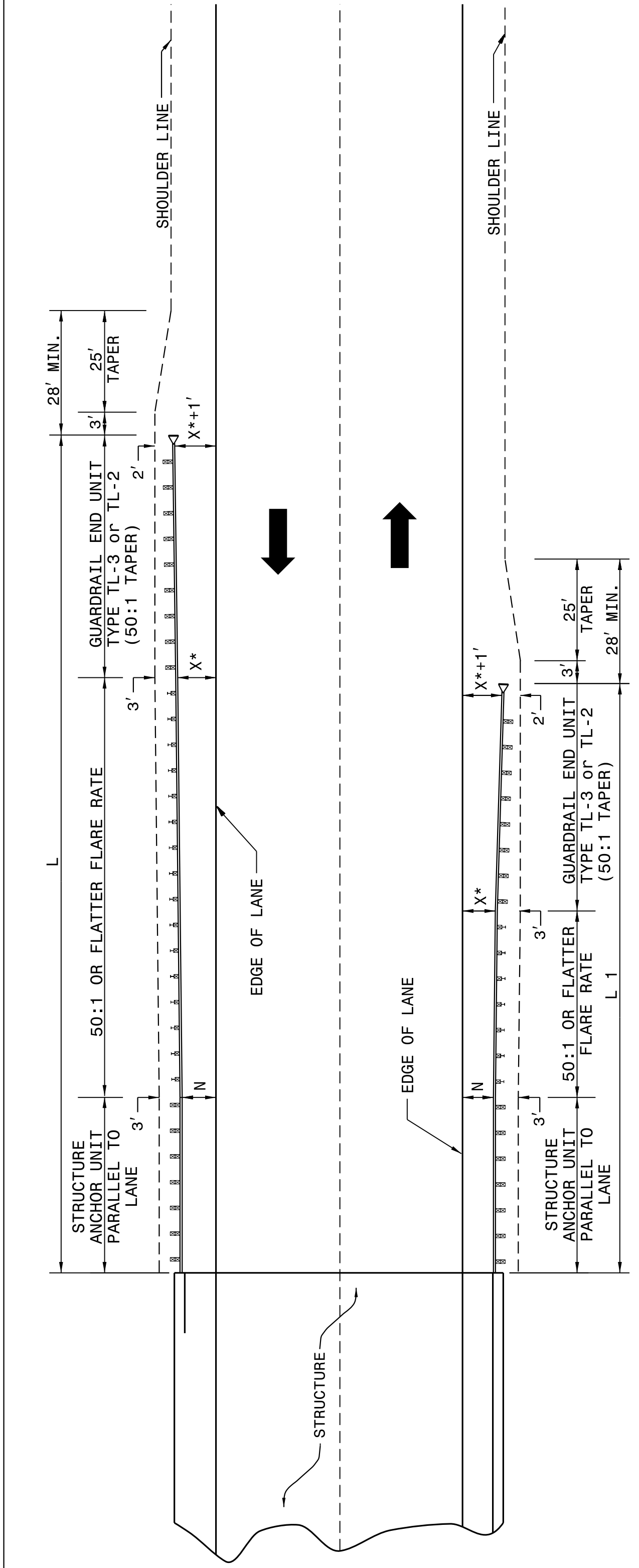
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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 4 OF 11
862D01



GUARDRAIL INSTALLATION AT BRIDGE APPROACHES FOR TWO-LANE, TWO-WAY TRAFFIC

DESIGN SPEED (MPH)	"L" APPROACH LENGTH (FT.)		"L" TRAILING LENGTH (FT.)	
	DESIGN YEAR ADT OVER 2000	CURRENT YEAR ADT 400-1000	DESIGN YEAR ADT OVER 2000	CURRENT YEAR ADT 400-1000
70	362.5'	362.5'	350.0'	287.5'
60	300.0'	287.5'	275.0'	225.0'
50	212.5'	212.5'	200.0'	162.5'
40	175.0'	150.0'	137.5'	112.5'
X*	8'	6'	4'	4'
X**	8'	6'	4'	4'

* USE FLARE RATE AS THE CONTROL IF THE "X" DISTANCE IS NOT OBTAINED. ("X" IS BASED ON SHOULDER WIDTHS IN THE HIGHWAY DESIGN BRANCH MANUAL, PART 1, 1-4B, F1).

"N" = DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL WHERE GUARDRAIL IS PARALLEL TO LANE.

SEE STD. 862.03 FOR STRUCTURE ANCHOR UNITS

FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

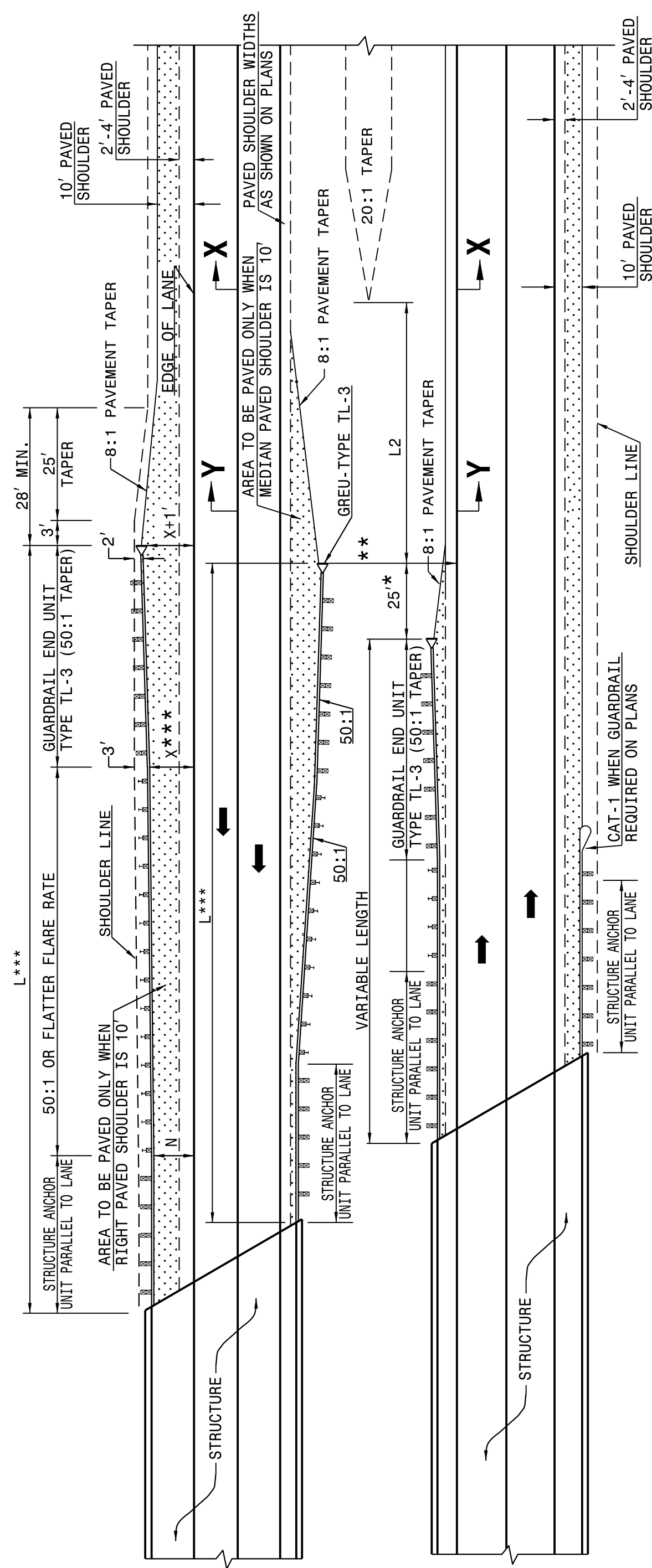
SHEET 4 OF 11
862D01

LENGTHS AND OFFSETS FOR PROPOSED GUARDRAIL AT TWO LANE - TWO WAY LOCATIONS

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 3 OF 11
862D01



FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

DIMENSIONS FOR LENGTH OF GUARDRAIL APPROACHING DUAL LANE BRIDGES

MEDIAN WIDTH	-L-***		-L2- DIM.
	60 MPH	50 MPH	
30'	300.0'	250.0'	80.0'
36'	300.0'	250.0'	60.0'
40' & ABOVE	300.0'	250.0'	40.0'

NOTES: * MINOR VARIATION TO THE 25'-0" DIMENSION IS PERMISSIBLE TO ACCOMMODATE THE 12'-6" IN GUARDRAIL LENGTHS.

** NO GUARDRAIL IS REQUIRED ON THE TRAILING END WHEN THIS DISTANCE EXCEEDS CLEAR ROADSIDE RECOVERY AREA FOR THE APPROPRIATE DESIGN SPEED.

*** BASED ON "X" OF 12' USE FLARE RATE AS THE CONTROL IF THE "X" DISTANCE IS NOT OBTAINED. ("X" IS BASED ON SHOULDER WIDTHS IN THE HIGHWAY DESIGN BRANCH MANUAL, PART 1, 1-4B, F1A).

"N" = DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL WHERE GUARDRAIL IS PARALLEL TO LANE. THE DESIGN LAYOUT FOR LENGTHS SHOWN ON THIS STANDARD ARE MINIMUM DESIGN LENGTHS. SEE SHEET 1 OF 12 FOR SECTIONS XX, YY

SEE STD. 862.03 FOR STRUCTURE ANCHOR UNITS

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 3 OF 11
862D01

DETAIL OF GUARDRAIL APPROACHING DUAL LANE BRIDGES

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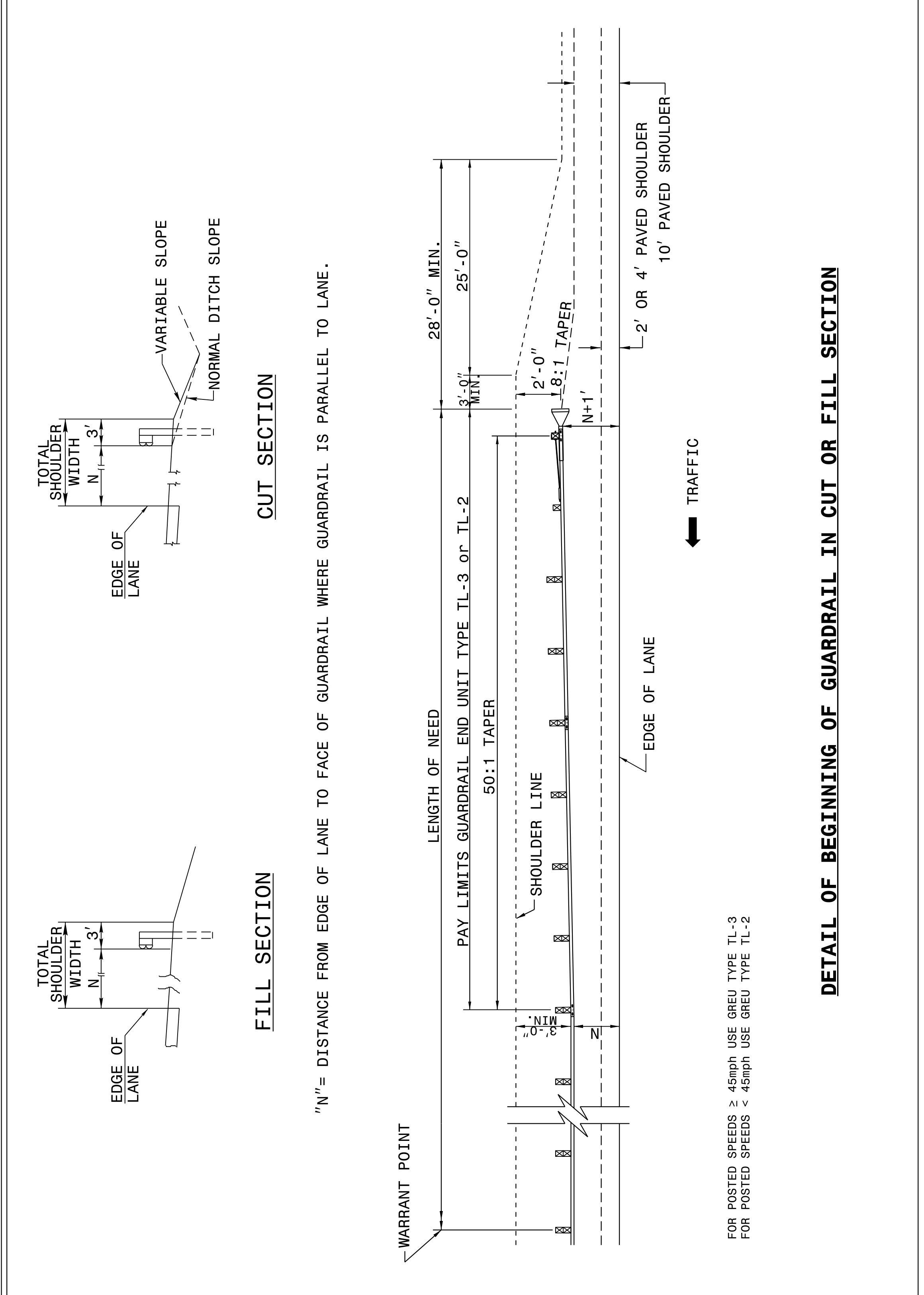


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 RALEIGH, N.C.



ROADWAY DETAIL DRAWING FOR
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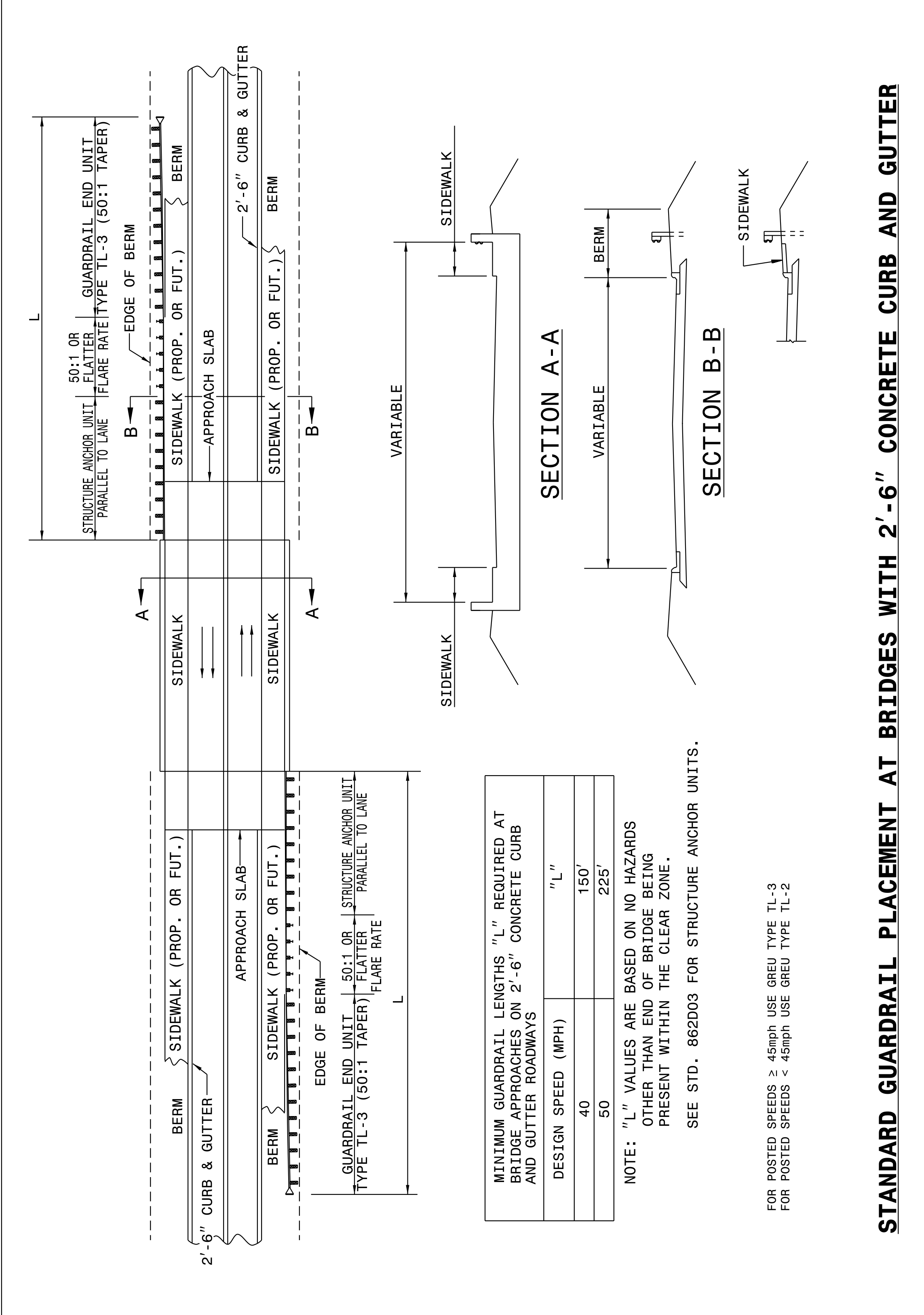
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 6 OF 11
862D01

SHEET 6 OF 11
862D01

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 5 OF 11
862D01

SHEET 5 OF 11
862D01

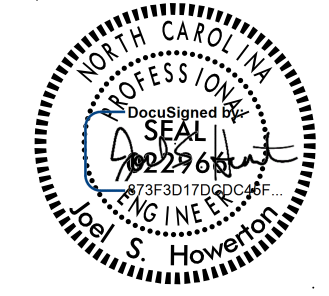
STANDARD GUARDRAIL PLACEMENT AT BRIDGES WITH 2'-6" CONCRETE CURB AND GUTTER

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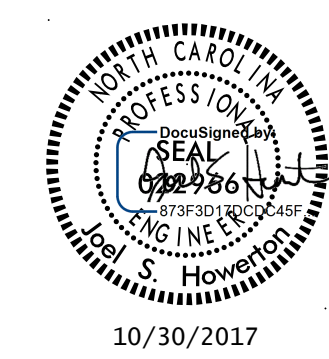
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STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ROADWAY DETAIL DRAWING FOR GUARDRAIL PLACEMENT	SHEET 8 OF 11 862D01
<p>NOTES:</p> <p>SHOP CURVED GUARDRAIL IS DEFINED AS HAVING A RADIUS OF 150' OR LESS.</p> <p>WHEN RADIUS IS LESS THAN 20' REFER TO SHEET 9.</p> <p>WHENEVER SHOP CURVED GUARDRAIL IS USED AS AN ANCHOR AND THE RADIUS IS FROM 20' TO 75', USE A MINIMUM LENGTH OF 50' OF SHOP CURVED GUARDRAIL AND FLARE WITH AN AT-1 ANCHOR UNIT. REFER TO DETAIL 1.</p> <p>WHENEVER SHOP CURVED GUARDRAIL RADIUS IS MORE THAN 75', REFER TO DETAIL 2.</p> <p>MAINTAIN CLEAR SIGHT DISTANCE.</p> <p>FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3 FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2</p>		
<p>DETAIL - 1</p> <p>'R' IS GREATER THAN 75' (SEE NOTES)</p> <p>DETAIL - 2</p>		
GUARDRAIL TREATMENT AT INTERSECTIONS		

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ROADWAY DETAIL DRAWING FOR GUARDRAIL PLACEMENT	SHEET 7 OF 11 862D01
<p>* GUARDRAIL OPENING MAY BE SPACED AS CLOSE AS 350 FT. FROM STRUCTURE IF NECESSARY TO ALLOW MOWER ACCESS TO MEDIAN</p>		
<p>FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3 FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2</p>		
GUARDRAIL BREAK INTERVALS WITH 30' - 36' MEDIANS		

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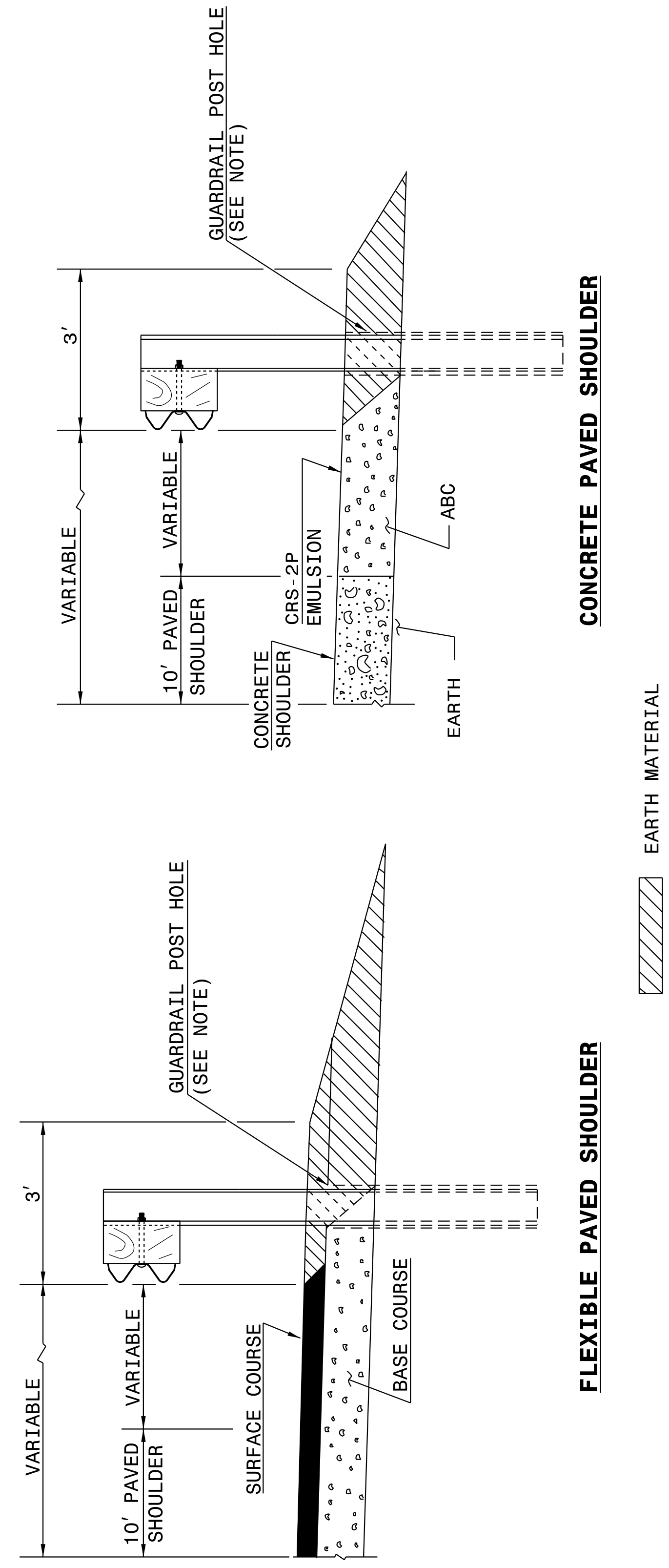
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ENGLISH DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 10 OF 11
862D01



FLEXIBLE PAVED SHOULDER

CONCRETE PAVED SHOULDER

NOTE: WHEN WOODEN GUARDRAIL POSTS ARE USED, DRILL HOLES THROUGH EARTH MATERIAL AND BASE COURSE. THE POST MAY THEN BE DRIVEN TO THE PROPER DEPTH. DRILL THE HOLE OF SUFFICIENT SIZE TO ACCOMMODATE THE PARTICULAR POST BEING USED. BACKFILL AND TAMP HOLES USING THE EXCAVATED MATERIAL.

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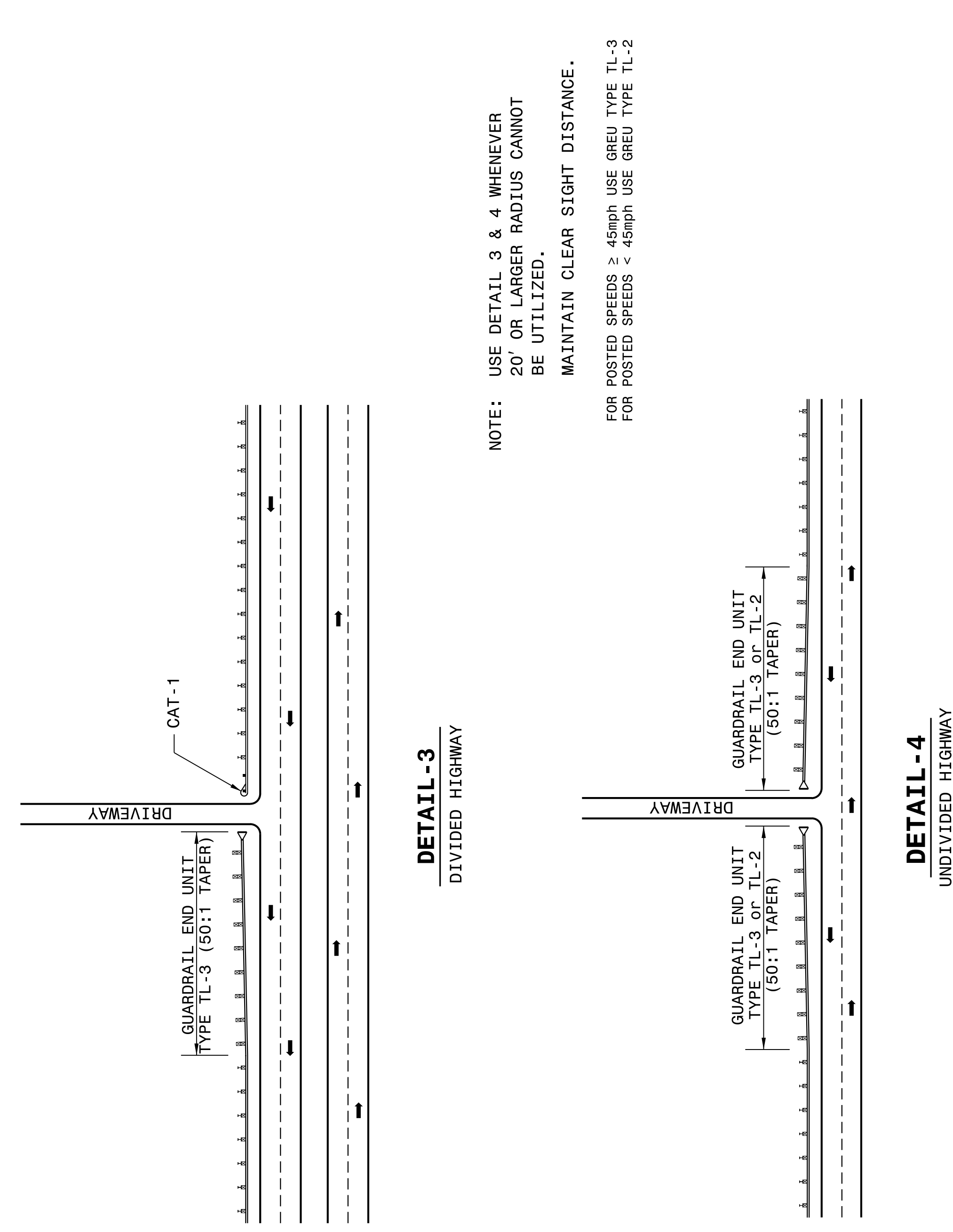
ENGLISH DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 9 OF 11
862D01

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 RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 9 OF 11
862D01



DETAIL -3
 DIVIDED HIGHWAY

DETAIL -4
 UNDIVIDED HIGHWAY

NOTE: USE DETAIL 3 & 4 WHENEVER 20' OR LARGER RADIUS CANNOT BE UTILIZED.
 MAINTAIN CLEAR SIGHT DISTANCE.

FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
 FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 10 OF 11
862D01

PROJECT REFERENCE NO. B-5239	SHEET NO. 2C-5
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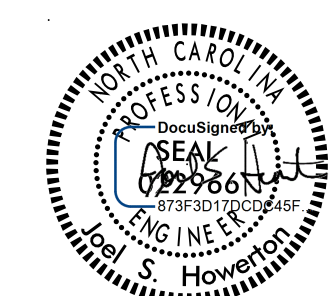
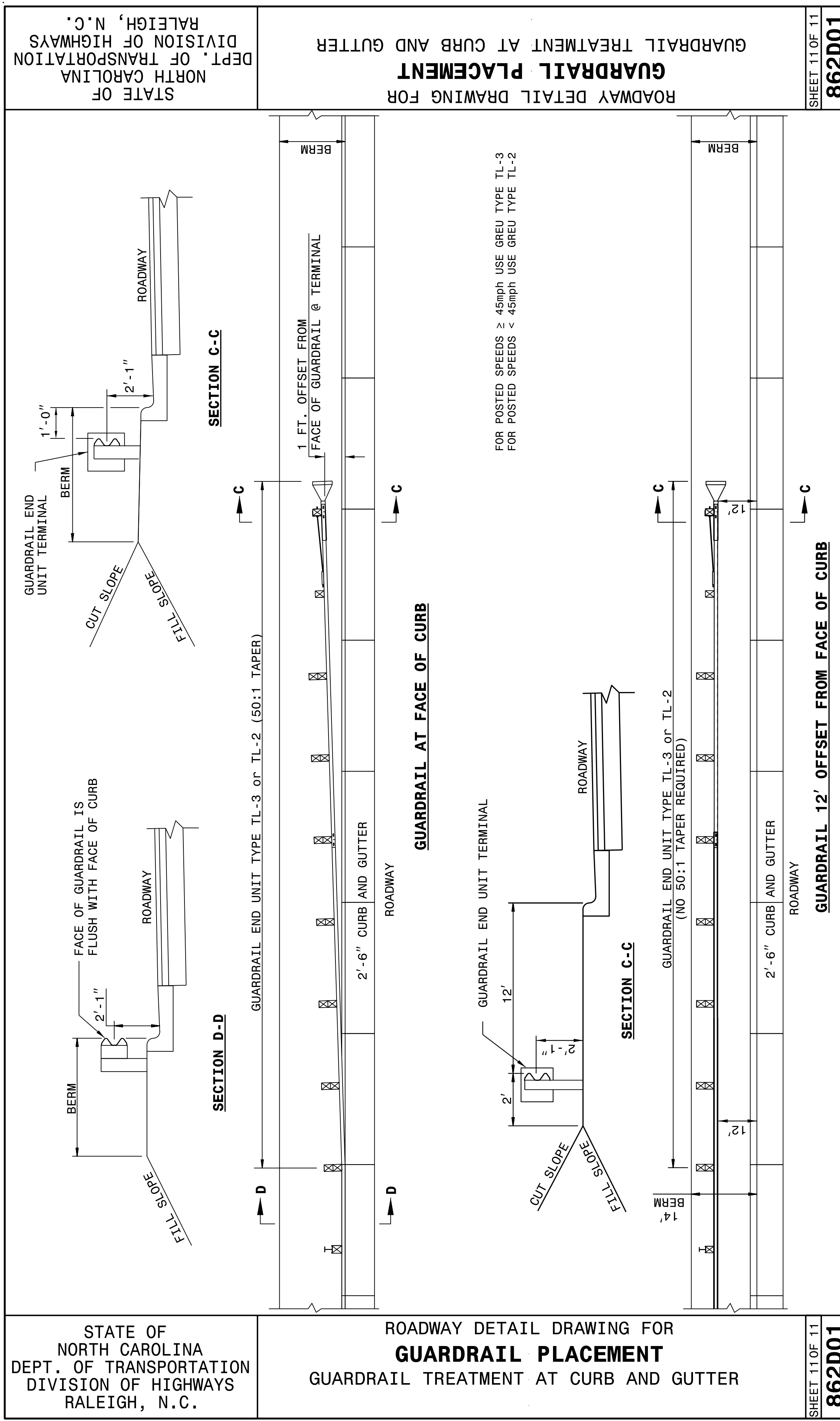
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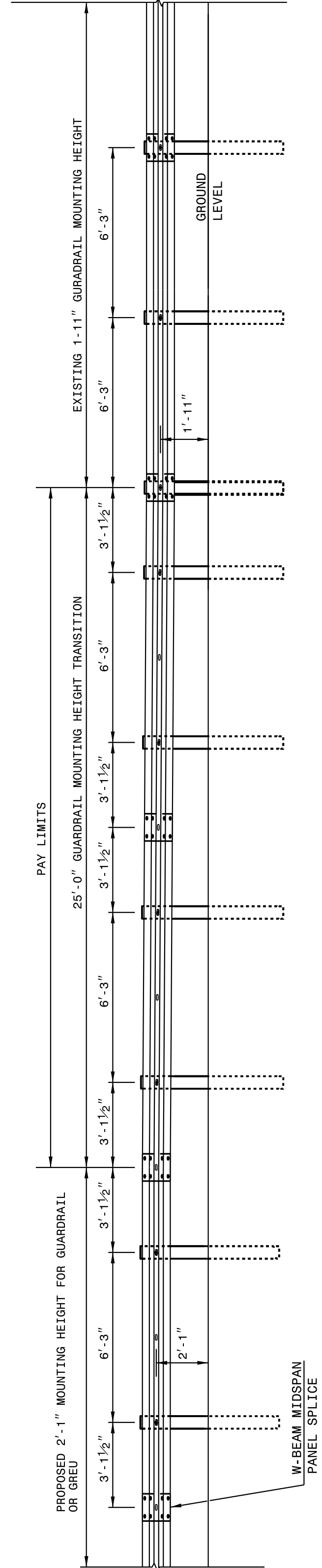
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ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 4 OF 8
862D02

NOTE: IF EXISTING GUARDRAIL IS LOWER THAN 1'-11", USE AN ADDITIONAL 12'-6" LONG SECTION OF GUARDRAIL, FOR EVERY 1" OF HEIGHT DIFFERENCE, TO TRANSITION FROM EXISTING GUARDRAIL TO PROPOSED 2'-1" GUARDRAIL.



ELEVATION VIEW

TRANSITION FROM OR 1'-11" TO 2'-1" W-BEAM GUARDRAIL MOUNTING HEIGHT

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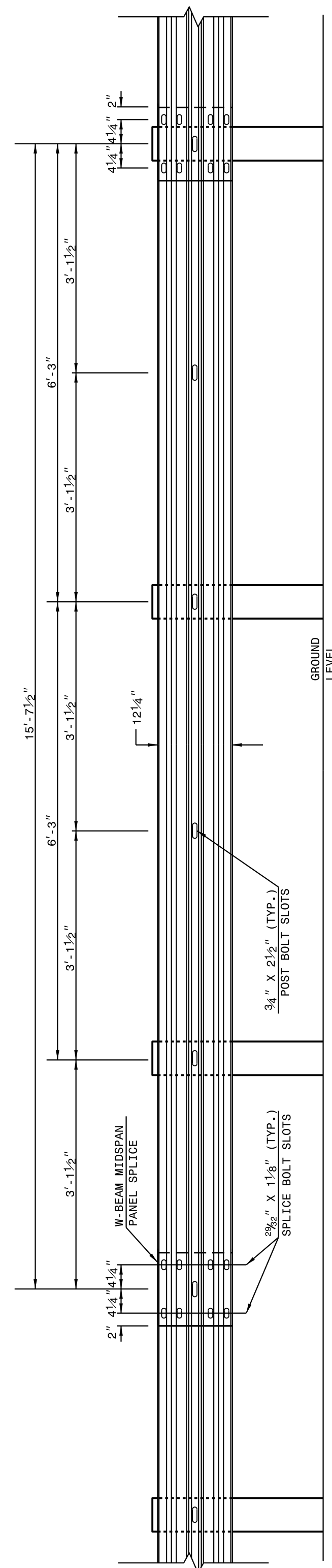
ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 4 OF 8
862D02

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 3 OF 8
862D02



15'-7 1/2" W-BEAM GUARDRAIL PANEL

NOTE: USE 5-SPACE 15'-7 1/2" W-BEAM GUARDRAIL PANEL AT THE DOWNSTREAM END OF AN END UNIT OR EXISTING GUARDRAIL THAT DOES NOT OFFSET THE W-BEAM PANEL SPLICE TO MIDSPAN

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

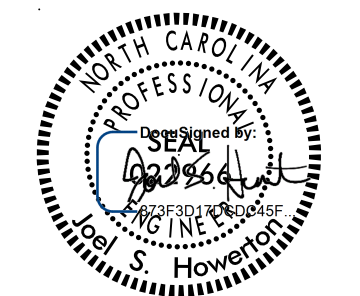
SHEET 3 OF 8
862D02

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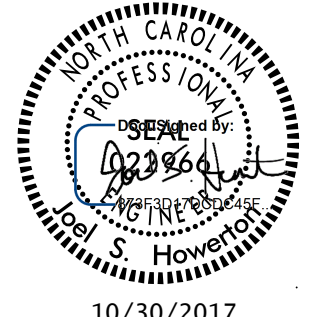
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION	SHEET 6 OF 8 862D02
SYSTEM PARTS		
ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION		
SHEET 6 OF 8 862D02		

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION	SHEET 6 OF 8 862D02
"W6" STEEL POST		
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 5 OF 8 862D02
TYPICAL GUARDRAIL AND GUARDRAIL POST ALTERNATIVES		
ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION		
SHEET 5 OF 8 862D02		

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION	SHEET 5 OF 8 862D02
FRONT - MID SPAN SPLICE		
ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION		
SHEET 5 OF 8 862D02		

NOTES:
 A - 5/8" DIA. BUTTON HEAD SPLICE BOLT 1 1/4" LONG (8 REQ. PER SPLICE JOINT).
 B - 5/8" DIA. BUTTON HEAD BOLT 7 1/2" / 9" LONG WITH NUT FOR BOLTING 6" / 8" ROUTED OFFSET BLOCK TO STEEL POSTS.
 C - FIELD PUNCHING OF HOLES INTO GUARDRAIL AS DIRECTED BY THE ENGINEER.



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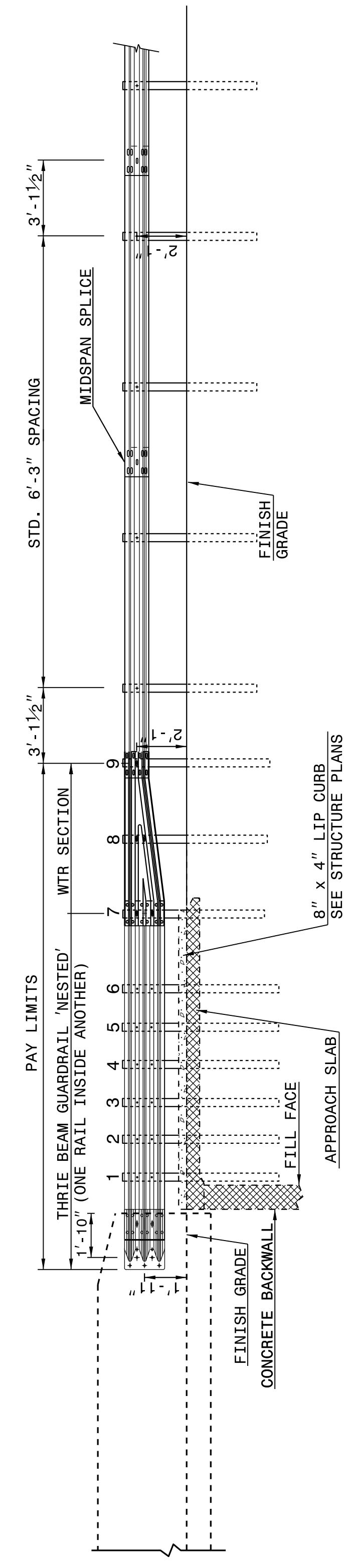
ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO
RAIL ON BRIDGE - SUB REGIONAL TIER

SHEET 2 OF 7
862D03

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RALEIGH, N.C.

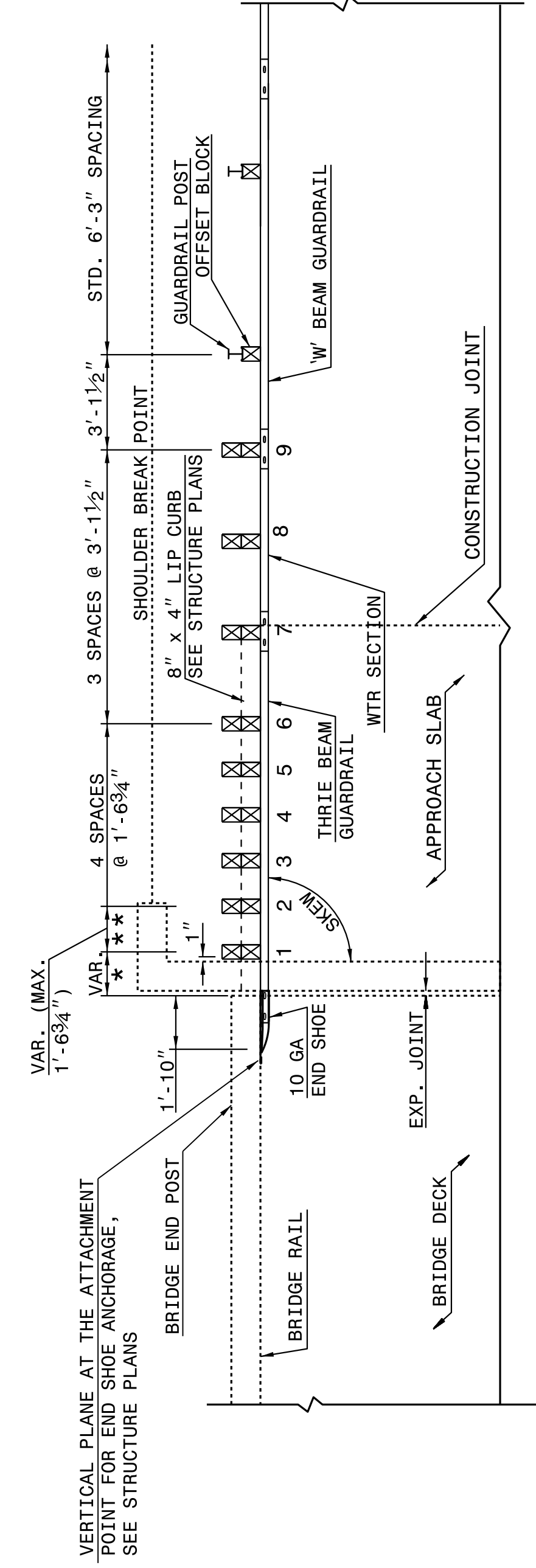
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STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO
RAIL ON BRIDGE - SUB REGIONAL TIER

SHEET 2 OF 7
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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 5 FOR POST SECTIONS 1 THRU 9.



PLAN VIEW

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

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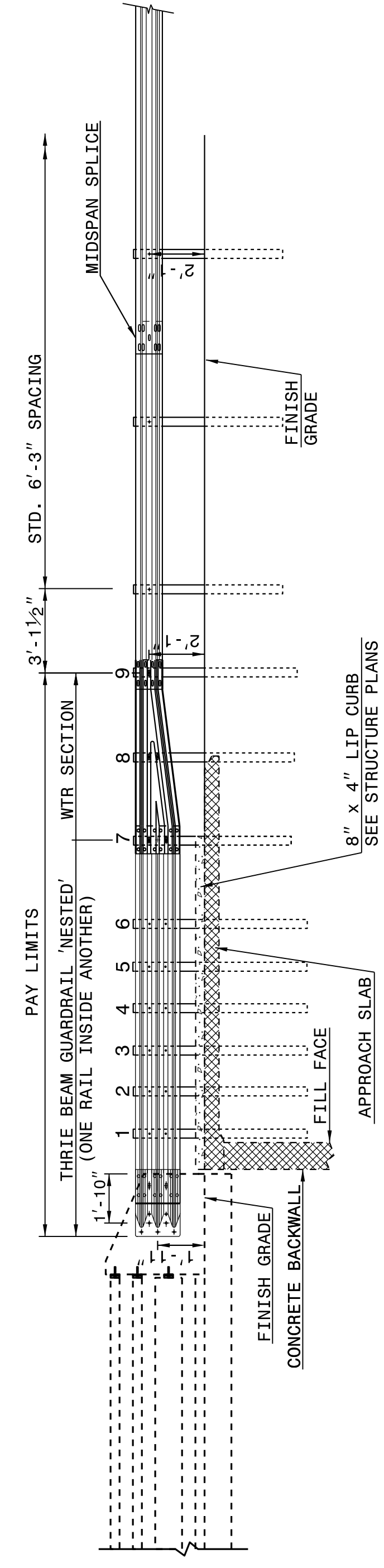
ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO RAIL ON BRIDGE

SHEET 1 OF 7
862D03

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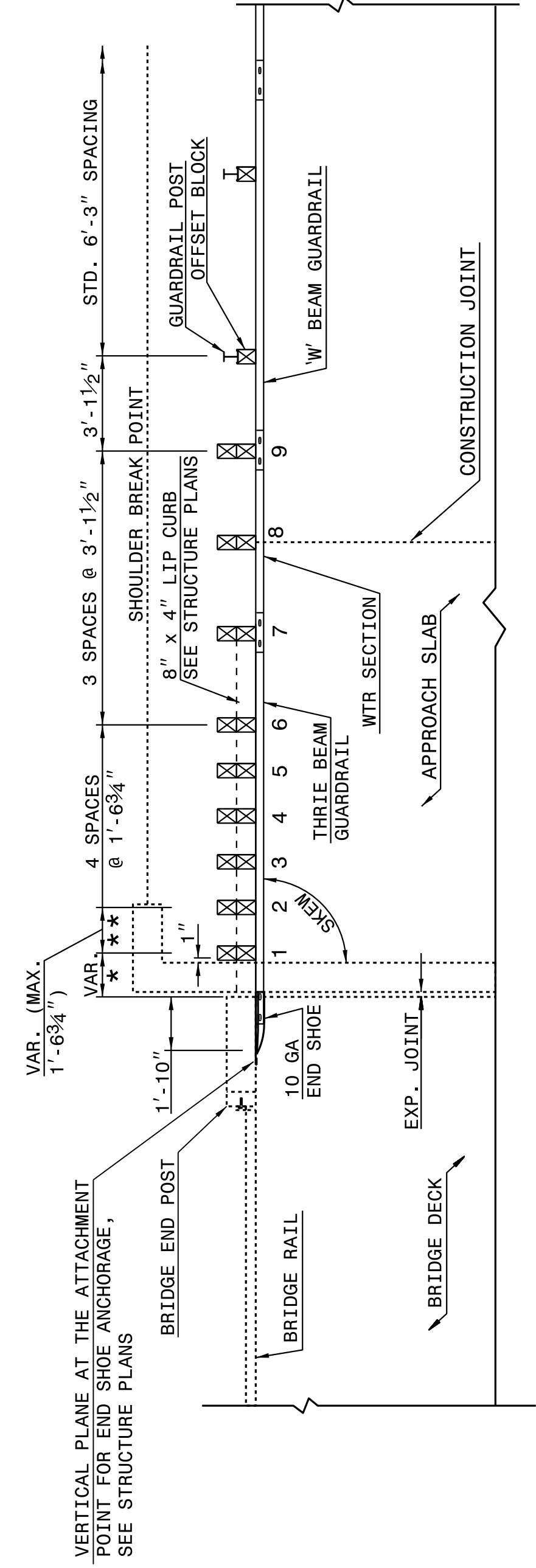
ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO RAIL ON BRIDGE

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 5 FOR POST SECTIONS 1 THRU 9.



PLAN VIEW

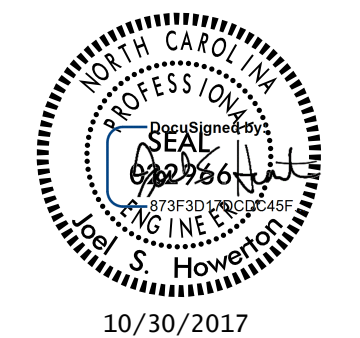
**GUARDRAIL ANCHOR UNIT, TYPE III
FOR ATTACHMENT TO RAIL ON BRIDGE**

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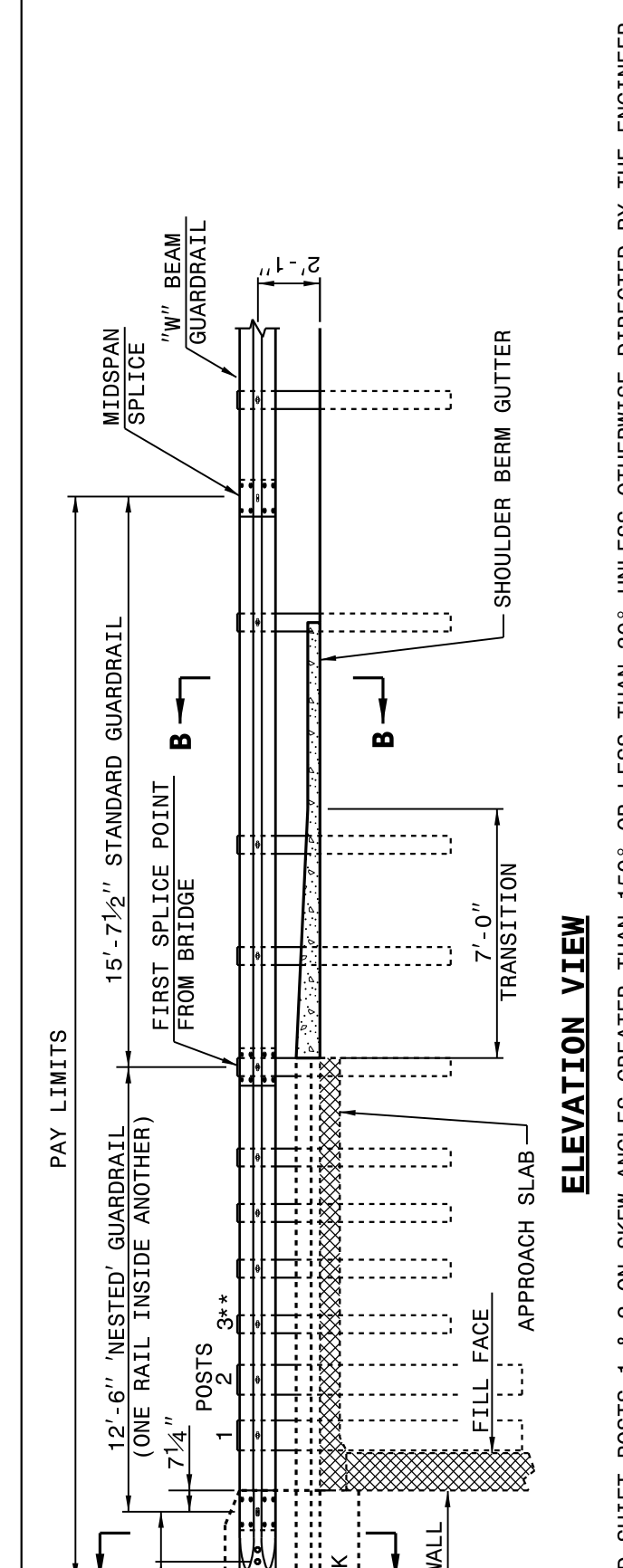
ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
 GUARDRAIL ANCHOR UNIT TYPE B-83

SHEET 6 OF 7
862D03

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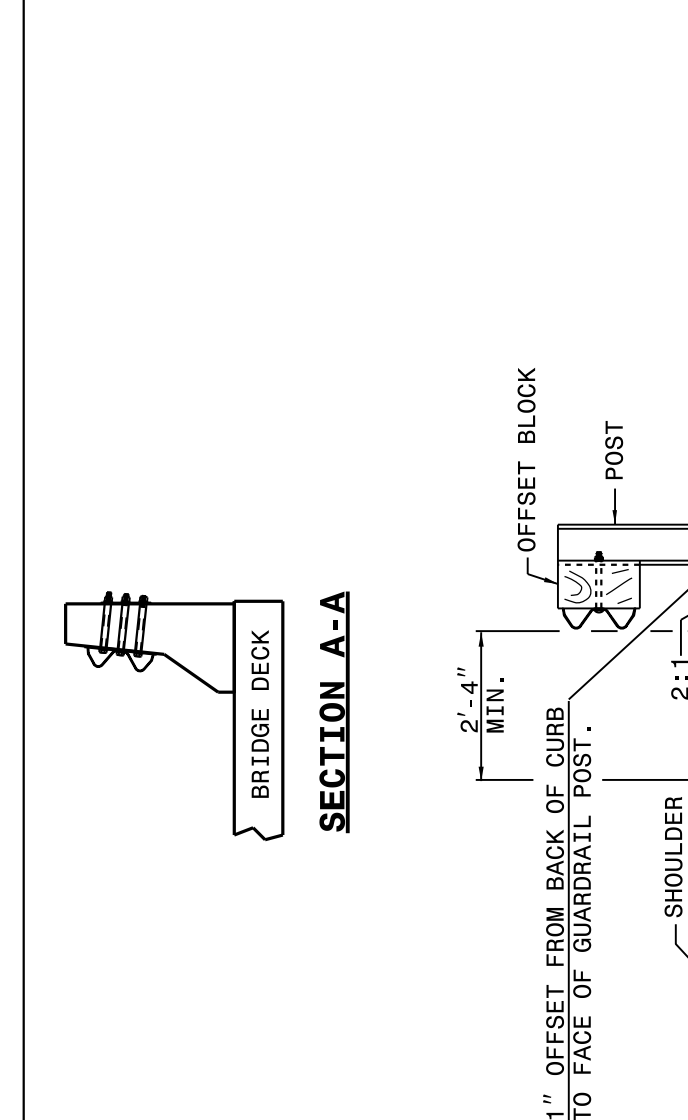
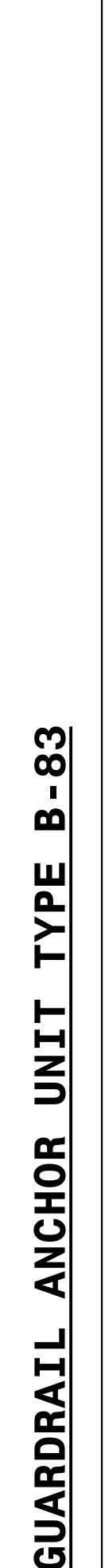
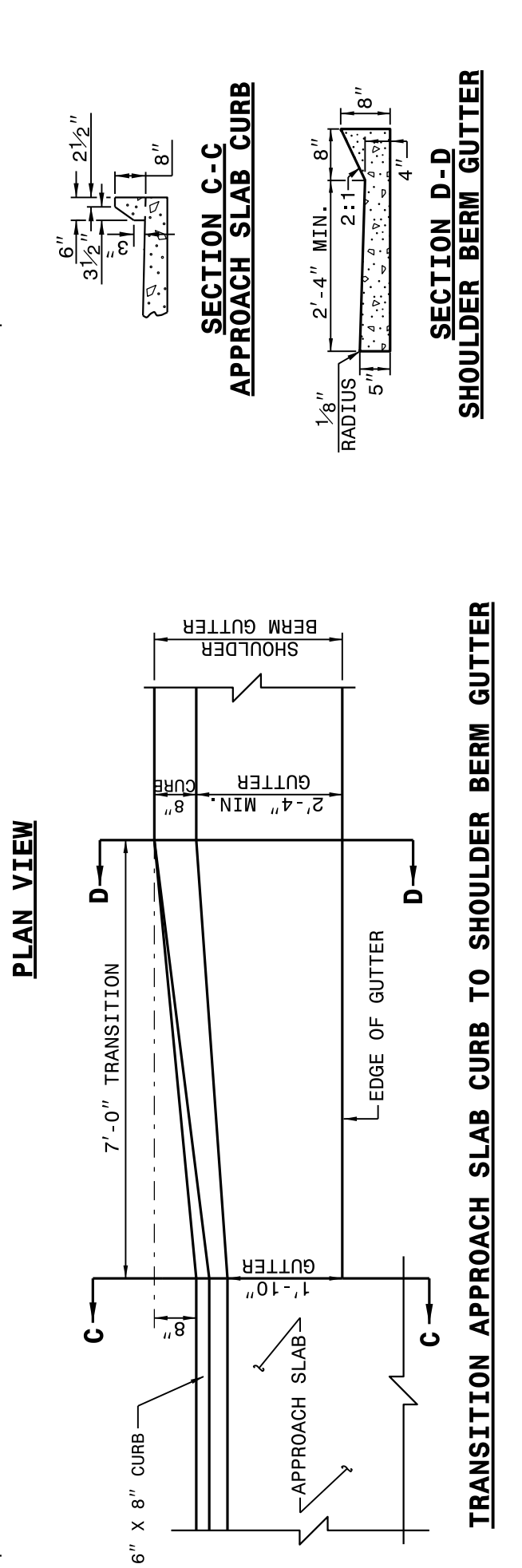
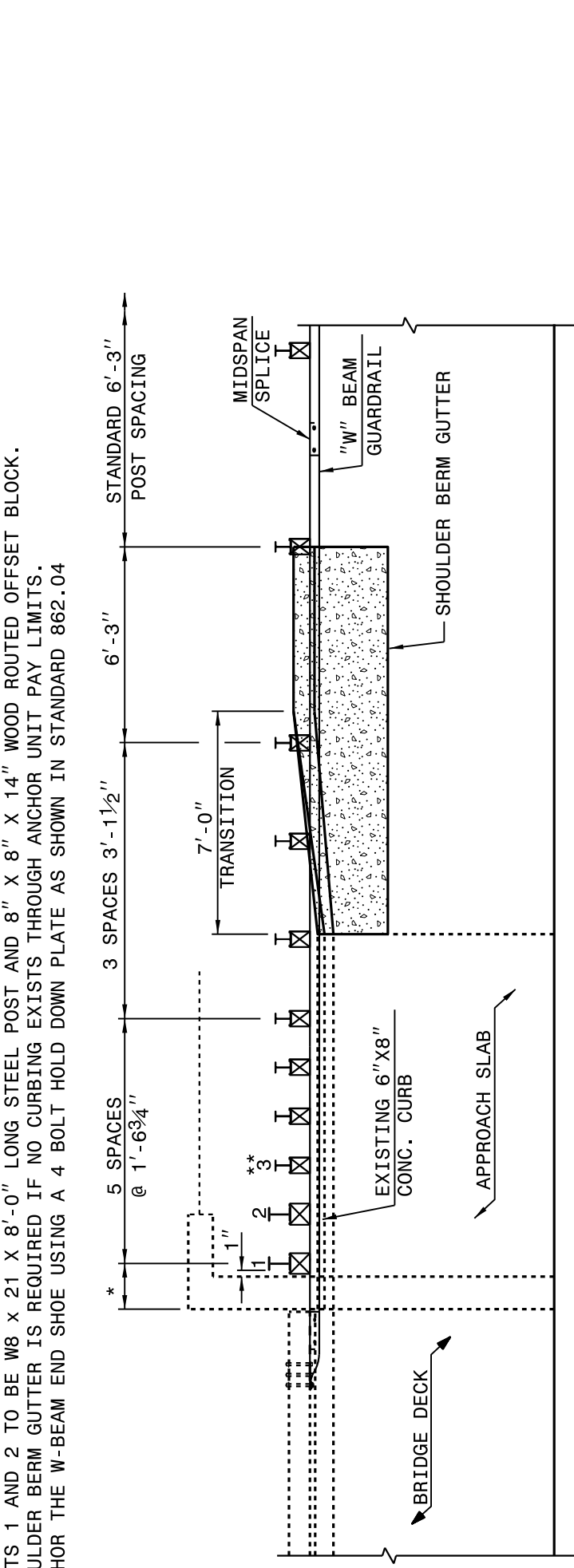
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STRUCTURE ANCHOR UNITS
 GUARDRAIL ANCHOR UNIT TYPE B-83

SHEET 6 OF 7
862D03

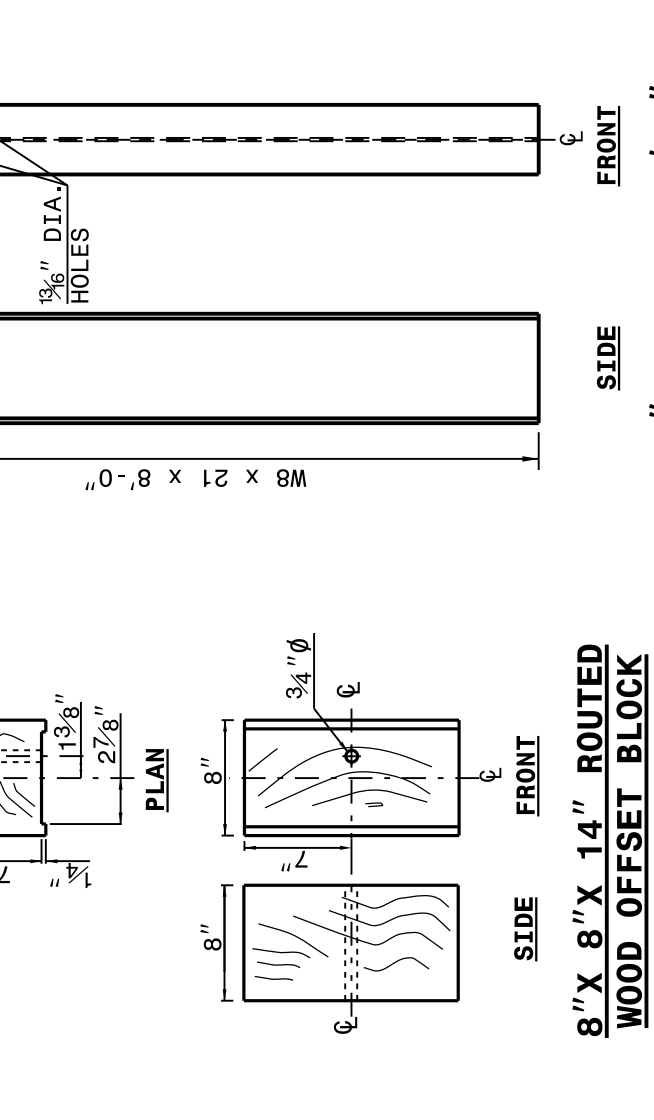
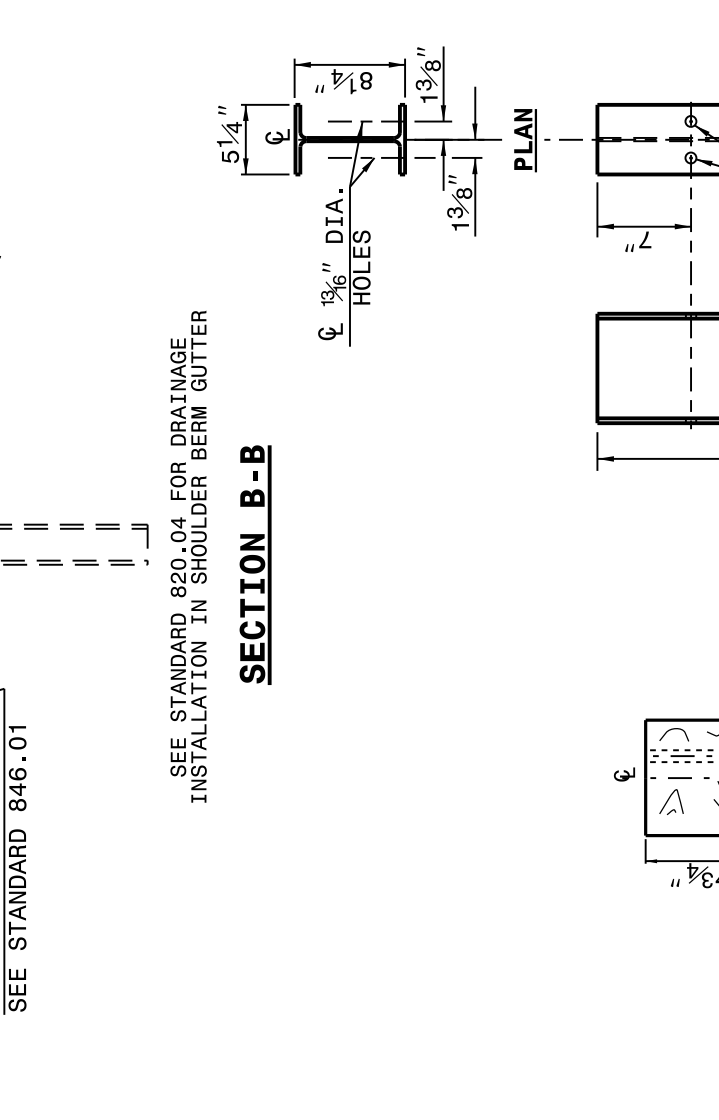


ELEVATION VIEW

NOTE:
 **ELIMINATE POST 3 AND SHIFT POSTS 1 & 2 ON SKEW ANGLES GREATER THAN 150° OR LESS THAN 30° UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
 *MEASURE GUARDRAIL HEIGHT FROM THE TOP OF ADJACENT SURFACE (SHOULDER, BERM, OR GUTTER).
 -USE NO WOOD POSTS WITHIN THE GUARDRAIL ANCHOR UNIT LIMITS.
 -POSTS 1 AND 2 ARE TO BE 21' X 8\"/>



SEE STANDARD 820.04 FOR DRAINAGE INSTALLATION IN SHOULDER BERM GUTTER



8\"/>
 WOOD OFFSET BLOCK

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ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
 GUARDRAIL ANCHOR UNIT TYPE B-83

SHEET 6 OF 7
862D03

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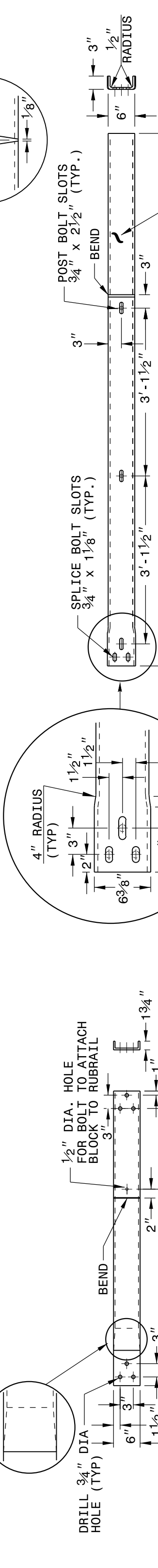
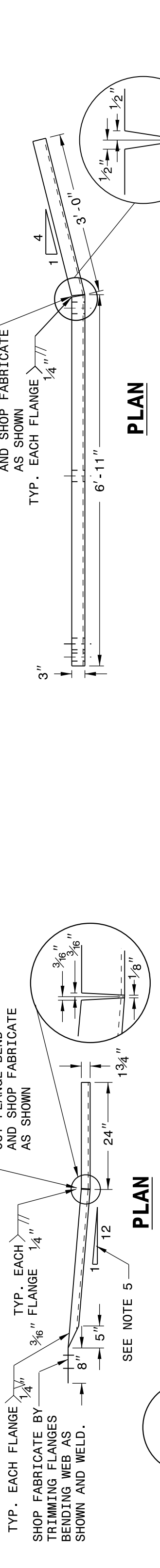
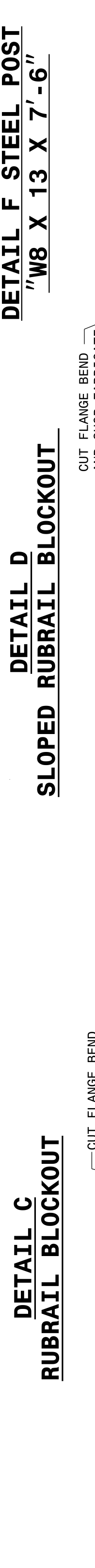
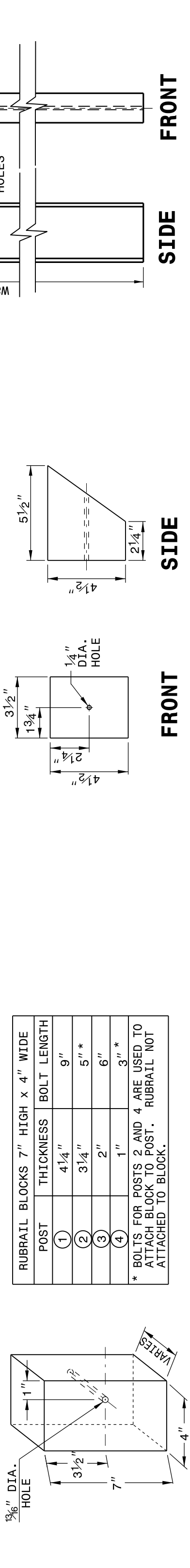
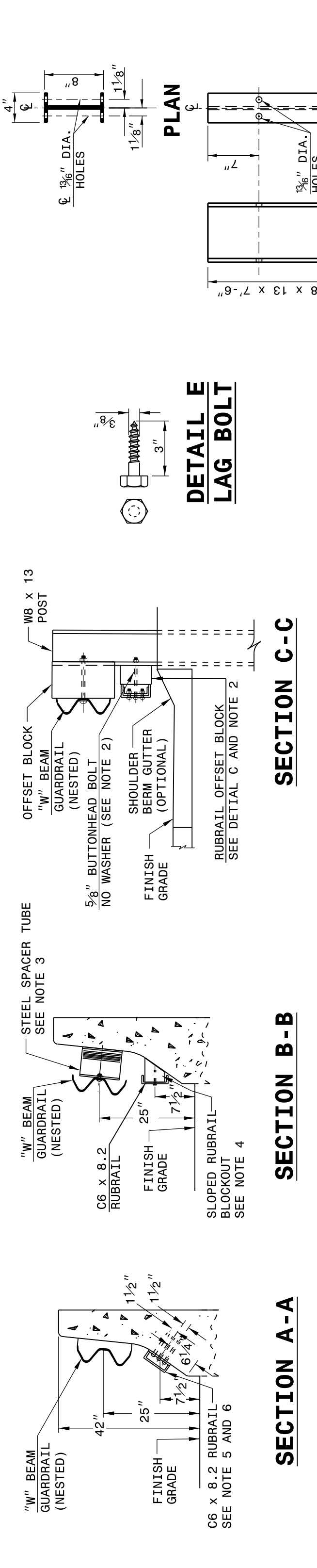
ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNIT
 GUARDRAIL ANCHOR UNIT TYPE B-77
 FOR F-SHAPE BARRIER

SHEET 5 OF 7
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ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNIT
 GUARDRAIL ANCHOR UNIT TYPE B-77
 FOR F-SHAPE BARRIER

SHEET 5 OF 7
862D03



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ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNIT
 GUARDRAIL ANCHOR UNIT TYPE B-77
 FOR F-SHAPE BARRIER

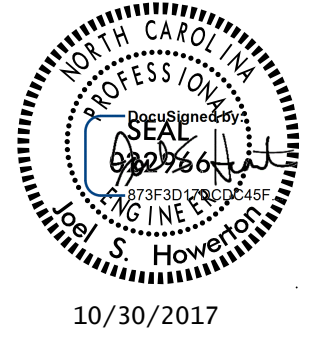
SHEET 5 OF 7
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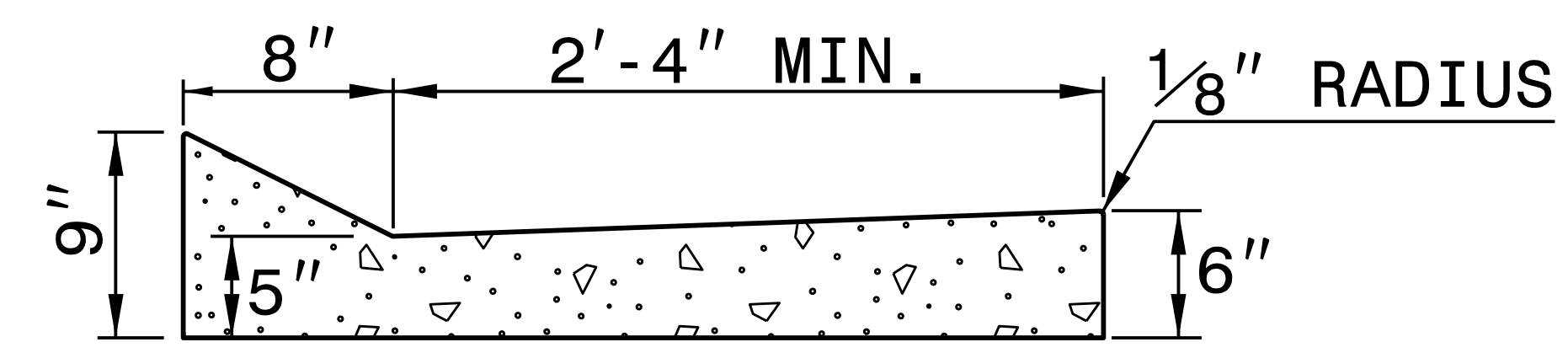
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PROJECT REFERENCE NO. B-5239	SHEET NO. 2C-13
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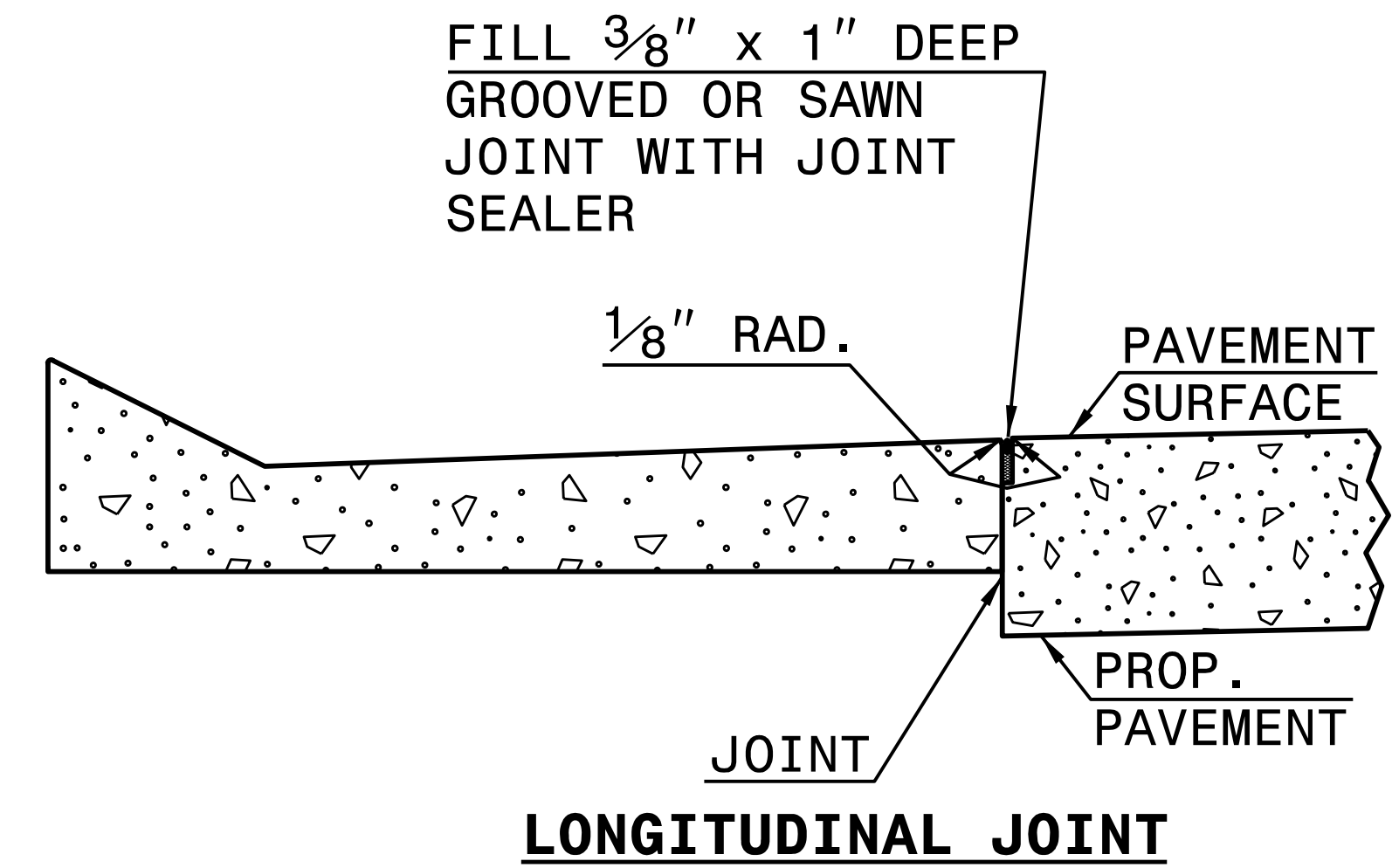
ENGLISH DETAIL DRAWING FOR
**MODIFIED SHOULDER
BERM GUTTER**

SHEET OF
846D01

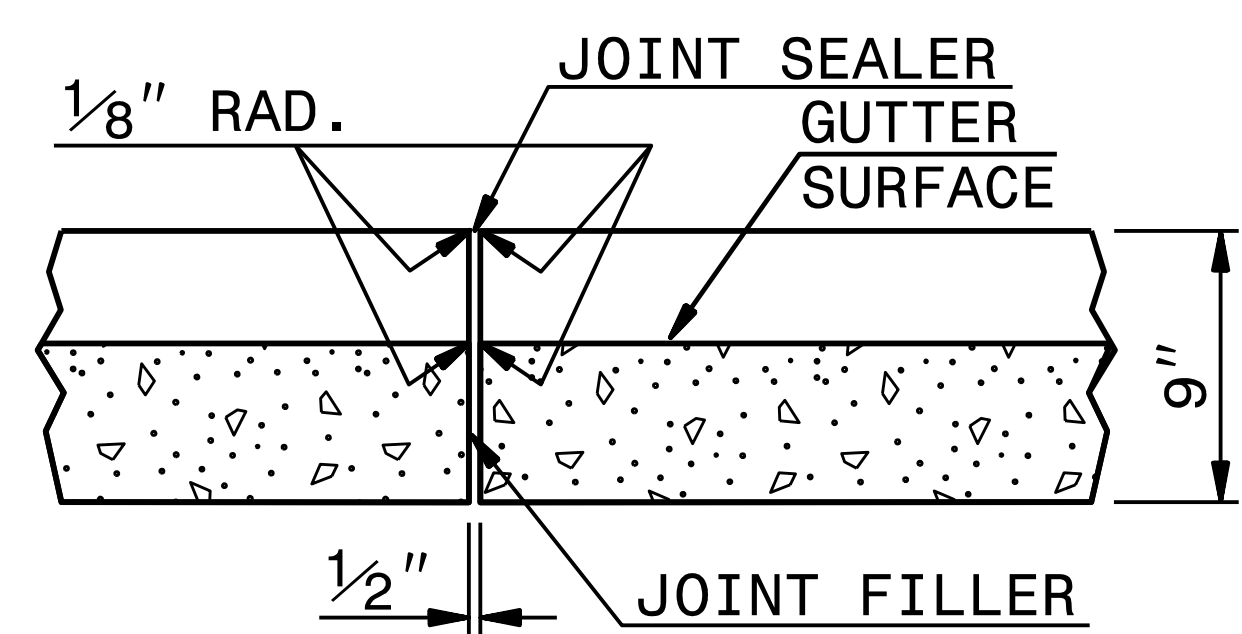


MODIFIED SHOULDER BERM GUTTER

- GENERAL NOTES:
- PLACE CONTRACTION JOINTS AT 10' INTERVALS, EXCEPT THAT A 15' SPACING MAY BE USED WHEN A MACHINE IS USED OR WHEN SATISFACTORY SUPPORT FOR THE FACE FORM CAN BE OBTAINED WITHOUT THE USE OF TEMPLATES AT 10' INTERVALS.
 - JOINT SPACING MAY BE ALTERED IF REQUIRED BY THE ENGINEER.
 - CONTRACTION JOINTS MAY BE INSTALLED WITH THE USE OF TEMPLATES OR FORMED BY OTHER APPROVED METHODS. CONSTRUCT NON-TEMPLATE FORMED JOINTS A MIN. OF 1 1/2" DEEP.
 - FILL ALL CONSTRUCTION JOINTS WITH JOINT FILLER AND SEALER.
 - SPACE EXPANSION JOINTS AT 90' INTERVALS AND ADJACENT TO ALL RIGID OBJECTS.



LONGITUDINAL JOINT



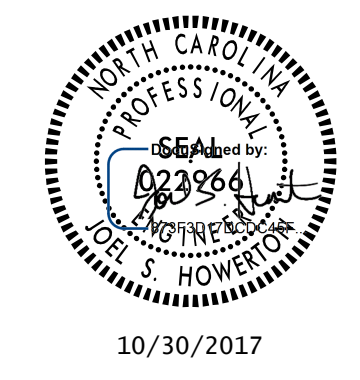
**TRANSVERSE EXPANSION JOINT
IN CURB AND GUTTER**

SECTION VIEW OF JOINTS

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ENGLISH DETAIL DRAWING FOR
**MODIFIED SHOULDER
BERM GUTTER**

SHEET OF
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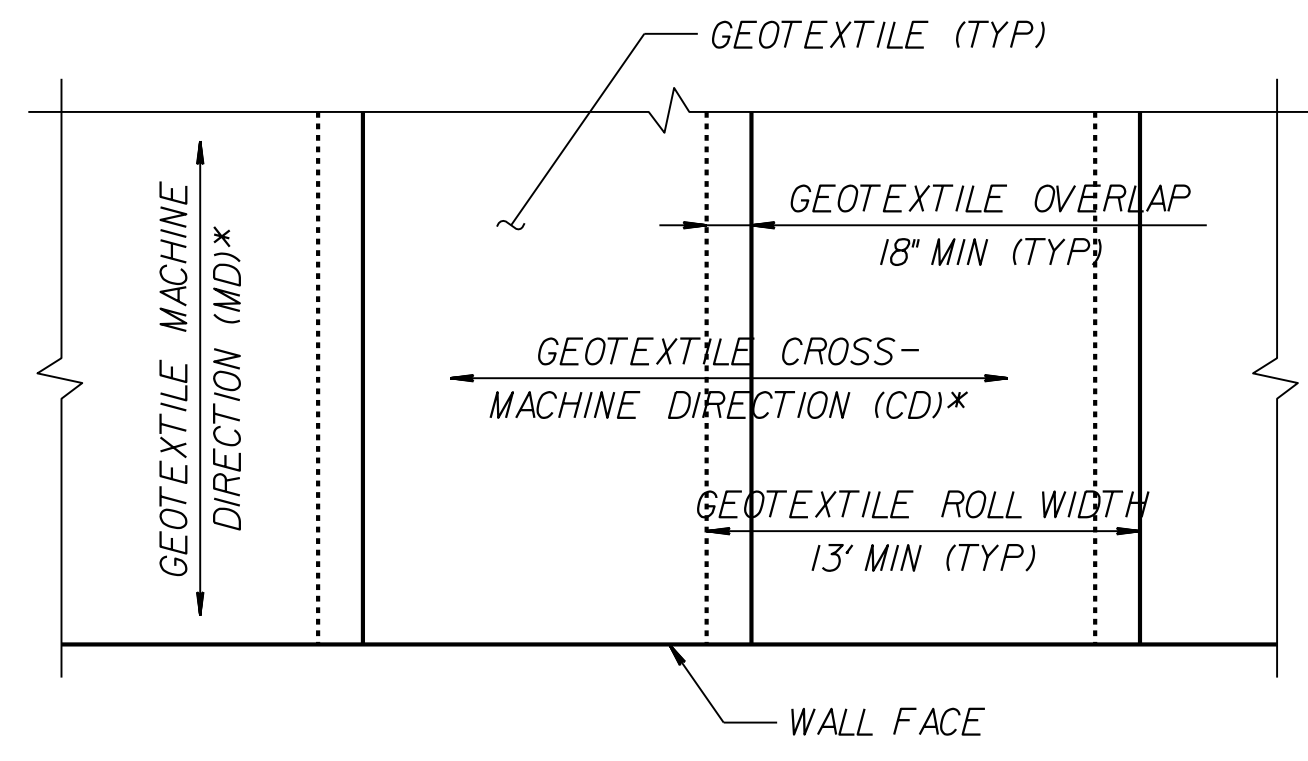
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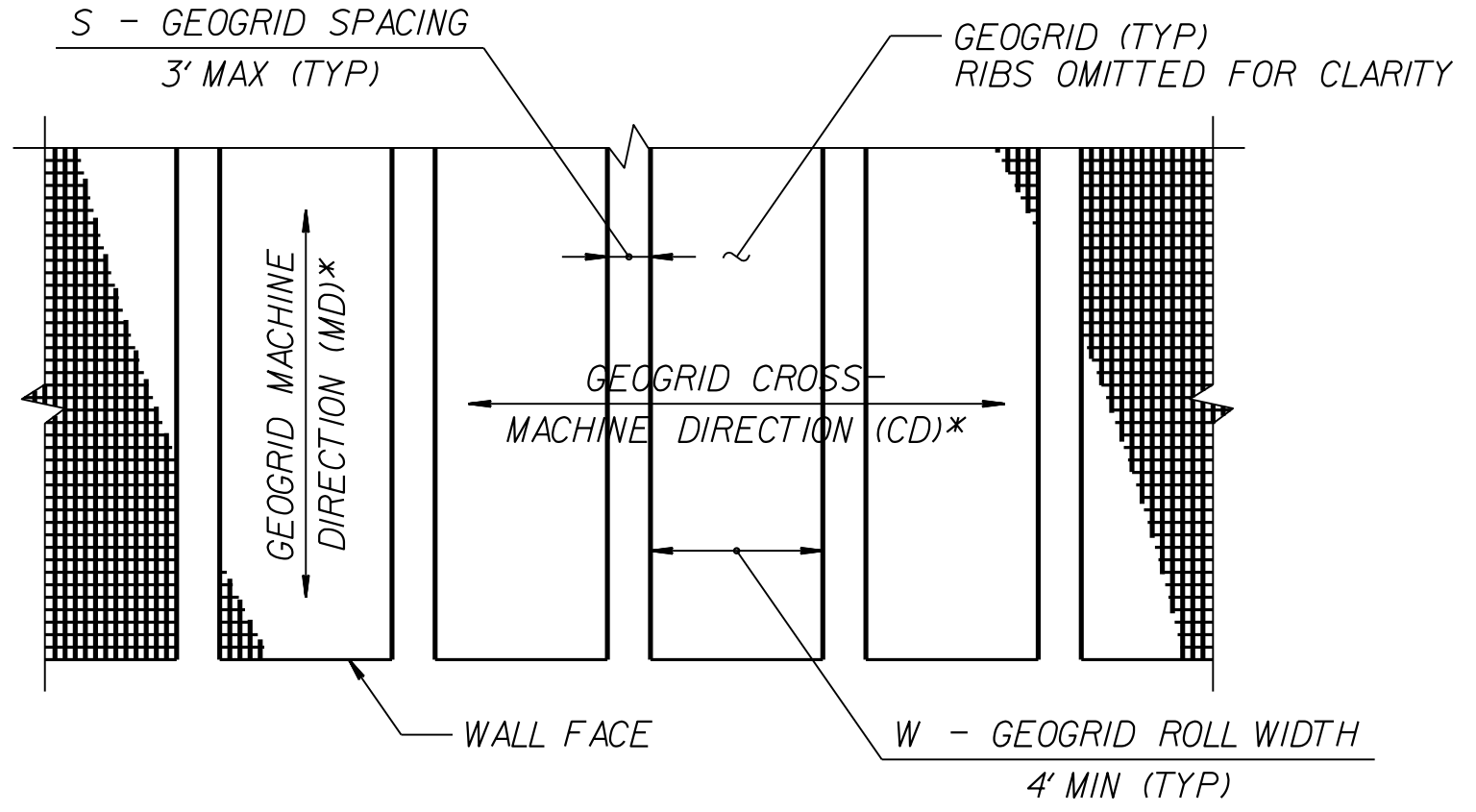
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PROJECT REFERENCE NO. B-5239		SHEET NO. 2G-2
GEOTECHNICAL ENGINEER  DocuSigned by: Scott A. Hidden 9/13/2017		ENGINEER
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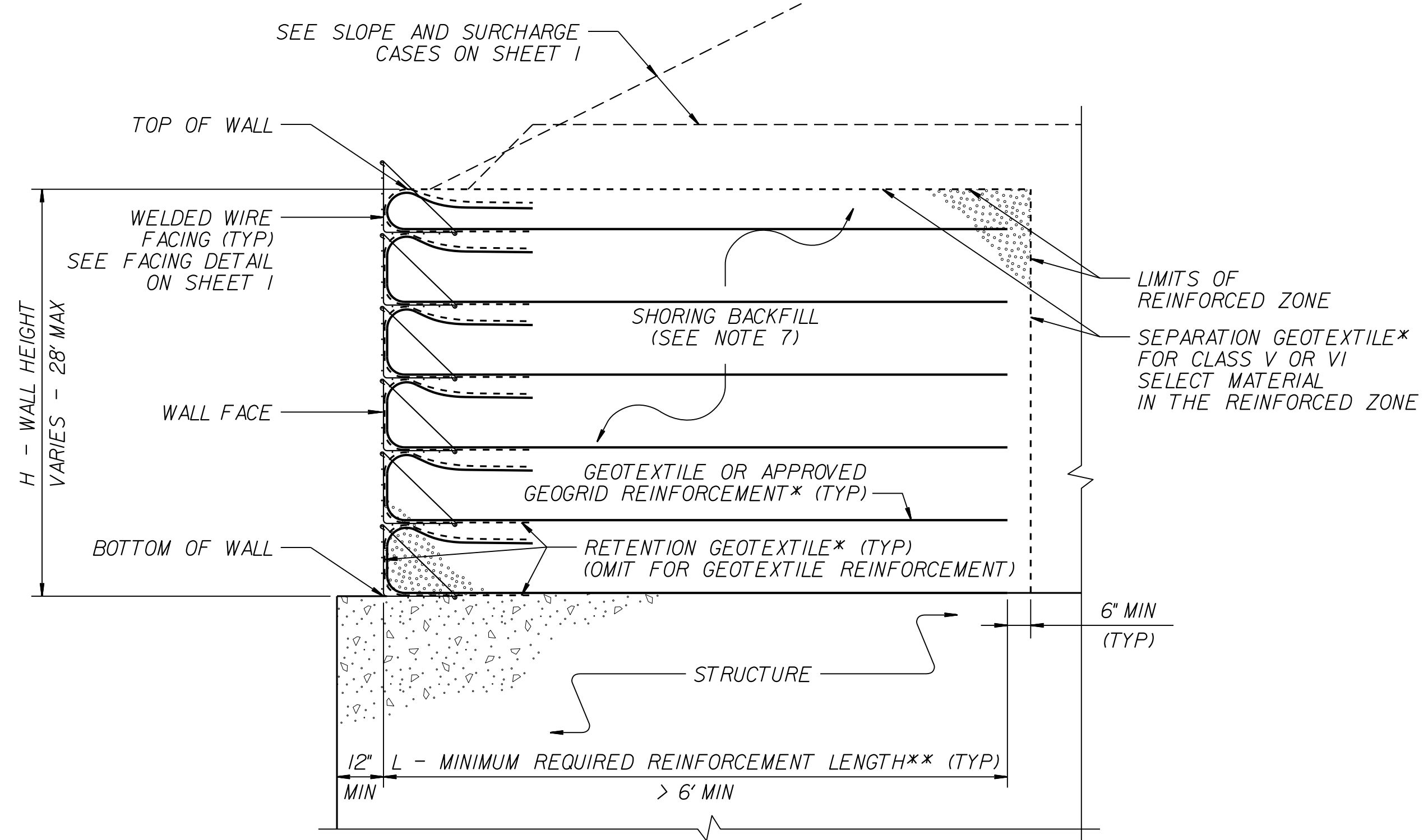


GEOTEXTILE PLACEMENT
(100% COVERAGE MIN FOR GEOTEXTILE REINFORCEMENT)



GEOGRID PLACEMENT
(80% COVERAGE MIN FOR GEOGRID REINFORCEMENT - $\frac{W}{W+S} \times 100 \geq 80\%$, SEE NOTE 11)

GEOSYNTHETIC PLACEMENT DETAILS
(PLAN VIEW)
*SEE NOTE 12.



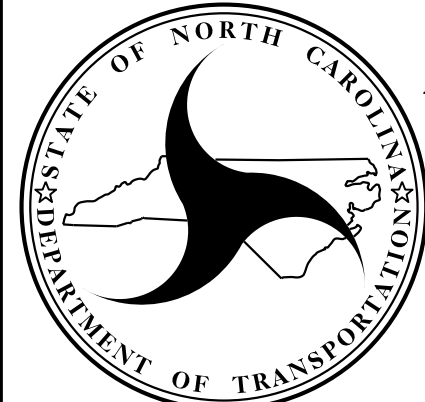
TEMPORARY WALL ON STRUCTURE DETAIL
*SEE GEOSYNTHETIC PLACEMENT DETAILS.
**SEE REINFORCEMENT TABLES ON SHEET 3.

NOTES:

- AT THE CONTRACTOR'S OPTION, USE STANDARD TEMPORARY WALLS AS NOTED IN THE PLANS.
- FOR STANDARD TEMPORARY WALLS, SEE STANDARD SHORING PROVISION.
- STANDARD TEMPORARY WALLS ARE BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:
UNIT WEIGHT, $\gamma = 120$ LB/CF
FRICTION ANGLE, $\phi = 30$ DEGREES
COHESION, $c = 0$ LB/SF
- DO NOT USE STANDARD TEMPORARY WALLS IF ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE.
- DO NOT USE STANDARD TEMPORARY WALLS WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS BELOW TEMPORARY WALLS.
- USE GROUNDWATER ELEVATION NOTED IN THE PLANS. IF NO GROUNDWATER ELEVATION IS SHOWN IN THE PLANS, ASSUME GROUNDWATER DEPTH IS LESS THAN 7' BELOW BOTTOM OF REINFORCED ZONE. DO NOT USE STANDARD TEMPORARY WALLS IF GROUNDWATER IS ABOVE BOTTOM OF REINFORCED ZONE.
- DO NOT USE A-2-4 SOIL FOR STANDARD TEMPORARY WALLS AROUND CULVERTS OR IN THE REINFORCED ZONE OF STANDARD TEMPORARY WALLS FOR SLOPE CASES. DO NOT USE CLASS VI SELECT MATERIAL IN THE REINFORCED ZONE OF STANDARD TEMPORARY WALLS WITH GEOTEXTILE REINFORCEMENT.
- EMBEDMENT IS NOT REQUIRED FOR STANDARD TEMPORARY WALLS ON STRUCTURES OR ROCK AS DETERMINED BY THE ENGINEER.
- DO NOT USE MORE THAN 4 DIFFERENT REINFORCEMENT STRENGTHS FOR EACH STANDARD TEMPORARY WALL.
- GEOGRIDS ARE TYPICALLY APPROVED FOR ULTIMATE TENSILE STRENGTHS IN THE MACHINE DIRECTION (MD) AND CROSS-MACHINE DIRECTION (CD) OR SHORT-TERM DESIGN STRENGTHS FOR A 3-YEAR DESIGN LIFE IN THE MD BASED ON MATERIAL TYPE. THE LIST OF APPROVED GEOGRIDS WITH DESIGN STRENGTHS IS AVAILABLE FROM: connect.ncdot.gov/resources/Materials/Pages/SoilsLaboratory.aspx
DEFINE MATERIAL TYPE FROM THE WEBSITE ABOVE FOR SHORING BACKFILL AS FOLLOWS:

MATERIAL TYPE	SHORING BACKFILL
BORROW	A-2-4 SOIL
FINE AGGREGATE	CLASS II, TYPE I OR CLASS III SELECT MATERIAL
COARSE AGGREGATE	CLASS V OR VI SELECT MATERIAL

- IF THE WEBSITE DOES NOT LIST A SHORT-TERM DESIGN STRENGTH FOR AN APPROVED GEOGRID, USE A SHORT-TERM DESIGN STRENGTH EQUAL TO THE ULTIMATE TENSILE STRENGTH DIVIDED BY 3.5 FOR THE GEOGRID REINFORCEMENT.
- FOR GEOGRID REINFORCEMENT WITH LESS THAN 100% COVERAGE, STAGGER REINFORCEMENT SO GEOGRIDS ARE CENTERED OVER GAPS IN THE REINFORCEMENT LAYER BELOW.
 - AT THE CONTRACTOR'S OPTION, REINFORCEMENT MAY BE INSTALLED WITH THE MD PARALLEL TO THE WALL FACE IF BOTH OF THE FOLLOWING CONDITIONS OCCUR:
- W (REINFORCEMENT ROLL WIDTH) \geq (MINIMUM REQUIRED REINFORCEMENT LENGTH) + 4.5' AND
- REINFORCEMENT STRENGTH IN CD \geq MINIMUM REQUIRED REINFORCEMENT STRENGTH IN MD.
 - SUBMIT A "STANDARD TEMPORARY WALL SELECTION FORM" AT LEAST 7 DAYS BEFORE STARTING TEMPORARY WALL CONSTRUCTION. STANDARD SHORING SELECTION FORMS ARE AVAILABLE FROM: connect.ncdot.gov/resources/Geological/Pages/Geotech_Forms_Details.aspx
 - DO NOT PLACE SHORING BACKFILL OR REINFORCEMENT UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.
 - FOR STANDARD TEMPORARY WALLS WITH PILE FOUNDATIONS IN THE REINFORCED ZONE, DRIVE PILES THROUGH REINFORCEMENT AFTER CONSTRUCTING TEMPORARY WALLS.
 - DO NOT SPLICE OR OVERLAP REINFORCEMENT SO SEAMS ARE PARALLEL TO THE WALL FACE.
 - CONTACT THE ENGINEER WHEN EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, PAVEMENTS, PIPES, INLETS OR UTILITIES WILL INTERFERE WITH REINFORCEMENT.
 - FOR STANDARD TEMPORARY WALLS WITH INTERIOR ANGLES LESS THAN 90 DEGREES, WRAP GEOSYNTHETICS AT ACUTE CORNERS AS DIRECTED BY THE ENGINEER.
 - FOR STANDARD TEMPORARY WALLS WITH TOP OF WALL WITHIN 5' OF FINISHED GRADE, REMOVE TOP FACING AND INCORPORATE TOP REINFORCEMENT LAYER INTO FILL WHEN PLACING FILL IN FRONT OF WALL.



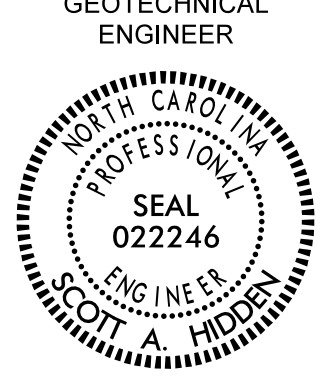
NORTH CAROLINA
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GEOTECHNICAL
ENGINEERING UNIT

STANDARD DETAIL NO. 1801.02

STANDARD
TEMPORARY WALL
SHEET 2 OF 3

DATE: 11-19-13

PROJECT REFERENCE NO. B-5239		SHEET NO. 2G-3
GEOTECHNICAL ENGINEER  ENGINEER		ENGINEER DocuSigned by: <i>Scott A. Hidden</i> 9/13/2017 <small>DATE SIGNATURE DATE</small>
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SLOPE OR SURCHARGE CASE	GROUNDWATER DEPTH BELOW BOTTOM OF REINFORCED ZONE (SEE NOTE 6 ON SHEET 2) (FT)	SHORING BACKFILL TYPE IN THE REINFORCED ZONE (SEE NOTE 7 ON SHEET 2)	H - WALL HEIGHT (FT)																									
			< 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
SLOPE CASE	> 0	CLASS II, TYPE I, CLASS III, CLASS V OR CLASS VI SELECT MATERIAL	6	6	7	8	9	11	12	13	13	14	15	16	17	18	19	20	21	22	23	24	24	25	26	27	27	
SURCHARGE CASE	> 0 TO 7 FOR H < 20' > 0 TO 10 FOR H ≥ 20'	ALL SHORING BACKFILL TYPES	6	7	7	8	8	9	9	10	11	11	12	12	13	14	14	15	16	17	17	18	19	19	20	21	22	
		A-2-4 SOIL	6	6	7	8	8	9	9	10	11	11	12	12	13	14	14	15	16	16	17	18	18	19	20	20	21	
		CLASS II, TYPE I OR CLASS III SELECT MATERIAL	6	6	7	7	8	8	9	10	10	11	11	12	12	13	14	15	15	16	16	17	17	18	18	19	20	
	> 7 FOR H < 20' > 10 FOR H ≥ 20'	CLASS V OR CLASS VI SELECT MATERIAL	6	6	7	7	7	8	8	9	9	10	10	11	12	13	13	14	14	15	15	16	17	17	18	19	19	

L - MINIMUM REQUIRED REINFORCEMENT LENGTH (FT)
(FOR ALL REINFORCEMENT TYPES)

WALL HEIGHT (H) + EMBEDMENT (FT)	NUMBER OF REINFORCEMENT LAYERS*
2.5 - 4	3
4 - 5.5	4
5.5 - 7	5
7 - 8.5	6
8.5 - 10	7
10 - 11.5	8
11.5 - 13	9
13 - 14.5	10
14.5 - 16	11
16 - 17.5	12
17.5 - 19	13
19 - 20.5	14
20.5 - 22	15
22 - 23.5	16
23.5 - 25	17
25 - 26.5	18
26.5 - 28	19
28 - 29.5	20

*BASED ON VERTICAL REINFORCEMENT SPACING SHOWN ON SHEET 1.

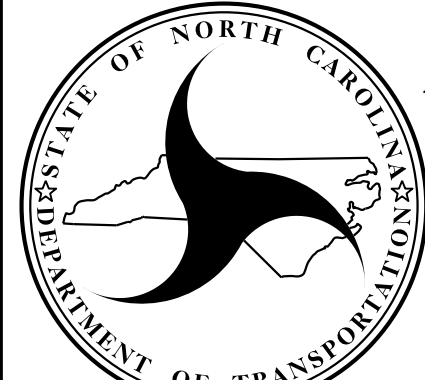
REINFORCEMENT LAYER NUMBER*	SHORING BACKFILL TYPE IN THE REINFORCED ZONE (SEE NOTE 7 ON SHEET 2)				
	SLOPE CASE		SURCHARGE CASE		
	CLASS II, TYPE I OR CLASS III SELECT MATERIAL	CLASS V SELECT MATERIAL	A-2-4 SOIL	CLASS II, TYPE I OR CLASS III SELECT MATERIAL	CLASS V SELECT MATERIAL
1	2400	2400	2400	2400	2400
2	2400	2400	2400	2400	2400
3	2400	2400	2400	2400	2400
4	2400	2400	2500	2400	2400
5	2500	2400	3000	2400	2400
6	3000	2400	3500	2800	2400
7	3500	2700	4000	3200	2600
8	4000	3100	4500	3600	2900
9	4500	3500	5000	4000	3200
10	5000	3900	5500	4400	3500
11	5500	4300	6000	4800	3800
12	6000	4700	6500	5200	4100
13	6500	5100	7000	5600	4400
14	7000	5400	7500	6000	4700
15	7500	5800	8000	6400	5000
16	8000	6200	8500	6800	5300
17	8500	6600	9000	7200	5600
18	9000	7000	9500	7600	5900
19	9500	7400	10000	8000	6200
20	10000	7800	10500	8400	6500

GEOTEXTILE REINFORCEMENT
ULTIMATE TENSILE STRENGTH (LB/FT)

REINFORCEMENT LAYER NUMBER*	SHORING BACKFILL TYPE IN THE REINFORCED ZONE (SEE NOTE 7 ON SHEET 2)				
	SLOPE CASE		SURCHARGE CASE		
	CLASS II, TYPE I OR CLASS III SELECT MATERIAL	CLASS V OR CLASS VI SELECT MATERIAL	A-2-4 SOIL	CLASS II, TYPE I OR CLASS III SELECT MATERIAL	CLASS V OR CLASS VI SELECT MATERIAL
1	240	200	340	290	240
2	380	310	520	430	350
3	530	420	700	570	460
4	690	550	870	720	570
5	860	690	1050	860	680
6	1030	830	1220	1000	790
7	1200	970	1400	1150	900
8	1370	1110	1580	1290	1010
9	1550	1240	1750	1430	1120
10	1720	1380	1930	1580	1230
11	1890	1520	2100	1720	1340
12	2060	1660	2280	1860	1450
13	2240	1800	2450	2010	1560
14	2410	1940	2630	2150	1670
15	2580	2080	2800	2290	1780
16	2750	2220	2980	2440	1890
17	2930	2360	3160	2580	2000
18	3100	2500	3330	2720	2110
19	3270	2640	3510	2860	2220
20	3440	2780	3690	3000	2330

GEOGRID REINFORCEMENT
SHORT-TERM DESIGN STRENGTH (LB/FT)
(SEE NOTE 10 ON SHEET 2.)

MINIMUM REQUIRED REINFORCEMENT STRENGTH IN MD
(SEE NOTE 9 ON SHEET 2.)
*SEE PARTIAL ELEVATION ON SHEET 1 FOR REINFORCEMENT LAYER NUMBERING.



NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL
ENGINEERING UNIT

STANDARD DETAIL NO. 1801.02

STANDARD
TEMPORARY WALL
SHEET 3 OF 3

STATE OF NORTH CAROLINA
 DIVISION OF HIGHWAYS

**SUMMARY OF EARTHWORK
 IN CUBIC YARDS**

STATION	STATION	UNCL. EXCAV.	UNDERCUT	EMBANK. +%	BORROW	WASTE
PHASE I (DETOUR)						
-L- 10+04.15	-L- 15+02.47 (BEGIN BRIDGE)	1818		854	0	964
-L- 17+66.99 (END BRIDGE)	-L- 18+90.38 (BEGIN BRIDGE)	3	950	4948	4945	950
-L- 19+76.60 (END BRIDGE)	-L- 24+80.07	267	225	355	88	225
-Y1DET- 11+20.00	-Y1DET- 12+68.06	128		14		114
-Y2DET- 10+11.25	-Y2DET- 10+88.00	43		4		39
-TEMP DRV- 9+76.32	-TEMP DRV- 10+80.65	338		26		312
-TEMP DRV- 20+40.65	-TEMP DRV- 21+00	408				408
PHASE I TOTALS:		3005	1175	6201	5033	3012
PHASE II (-L-)						
-L- 10+50.00	-L- 14+92.00 (BEGIN BRIDGE)	605		1777	1172	0
-L- 17+77.00 (END BRIDGE)	-L- 18+68.38 (BEGIN BRIDGE)			700	700	0
-L- 19+41.00 (END BRIDGE)	-L- 23+00.00	614		496	0	118
-Y1- 10+85.00	-Y1- 12+22.00	90		54	0	36
-Y2- 10+12.27	-Y2- 11+00.00	20				20
-Y3- 10+15.00	-Y3- 10+85.22	4		488	484	0
PHASE II TOTALS:		1333		3515	2356	174
PHASE III (DETOUR REMOVAL)						
-L- 10+04.15	-L- 15+01.98 (BEGIN BRIDGE)	1003		1164	161	0
-L- 17+66.99 (END BRIDGE)	-L- 18+90.86 (BEGIN BRIDGE)	2714		6	0	2708
-L- 19+76.60 (END BRIDGE)	-L- 24+80.07	161		232	71	0
-TEMP DRV- 20+40.65	-TEMP DRV- 21+00.00	55		10	0	45
PHASE III TOTALS:		3933		1412	232	2753
SUB-TOTALS		8271		11,128	7621	5939
LOSS DUE TO CLEARING & GRUBBING		-300			300	
EARTH WASTE TO REPLACE BORROW					-2243	-2243
ADDITIONAL UNDERCUT			650	780	780	650
ESTIMATE FOR SHOULDER MATERIAL				924	924	
PROJECT TOTALS:		7971	1825	12,832	7382	4346
EST. 5% TO REPLACE BORROW PIT					369	
GRAND TOTALS:		7971	1825	12,832	7751	4346
SAY:		8000			7900	
EST. DDE = 120 CY						
EST. SELECT GRANULAR MATERIAL = 675 CY						
EST. GEOTEXTILE FOR SOIL STABILIZATION = 1150 SY						
EST. SHALLOW UNDERCUT = 100 CY						
EST. CLASS IV SUBGRADE STABILIZATION = 100 TONS						
ACCEPTABLE UNCLASSIFIED EXCAVATION = 350 CY						

NOTE: The acceptable unclassified excavation material may be used in embankment construction, but not in the top 3 feet at the discretion of the Engineer.
 -DRV- Sta. 10+35 To Sta. 11+30 (10 ft. Lt. to 30 ft. Rt.)

Earthwork quantities are calculated by the Roadway Design Unit.
 These earthwork quantities are based in part on subsurface data provided by the Geotechnical Engineering Unit.

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

SUMMARY OF AGGREGATE SUBGRADE/STABILIZATION

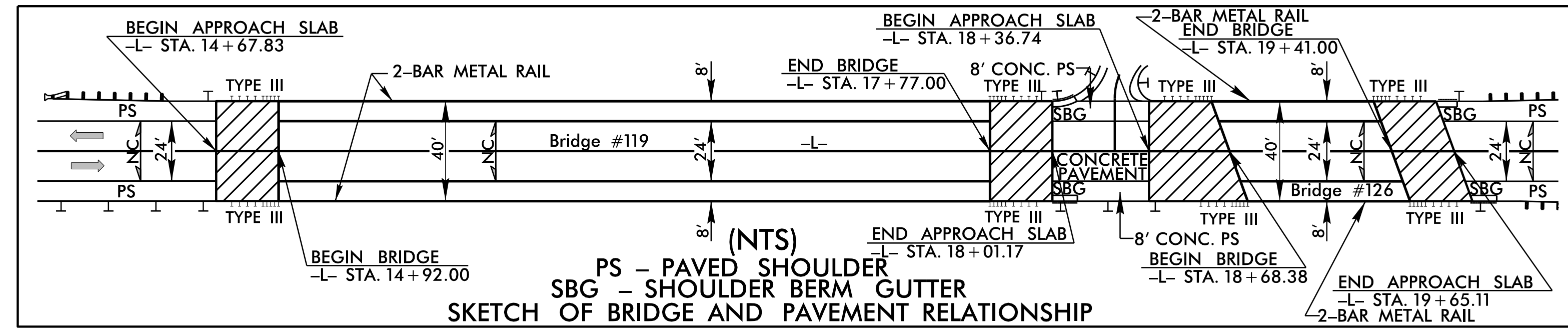
LINE	STATION	STATION	AGGREGATE TYPE ASU/AST	AGGREGATE THICKNESS INCHES	SHALLOW UNDERCUT CY	CLASS IV SUBGRADE STABILIZATION TONS	GEOTEXTILE FOR SOIL STABILIZATION SY	STABILIZER AGGREGATE TONS	CLASS IV AGGREGATE STABILIZATION TONS
-LDET-	10+90.00	12+30.00					50		
-LDET-	19+75.00	20+50.00					225		
	CONTINGENCY				100	100	200		
					TOTAL CY/TONS/SY:	100 CY	100	475 SY**	

*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.



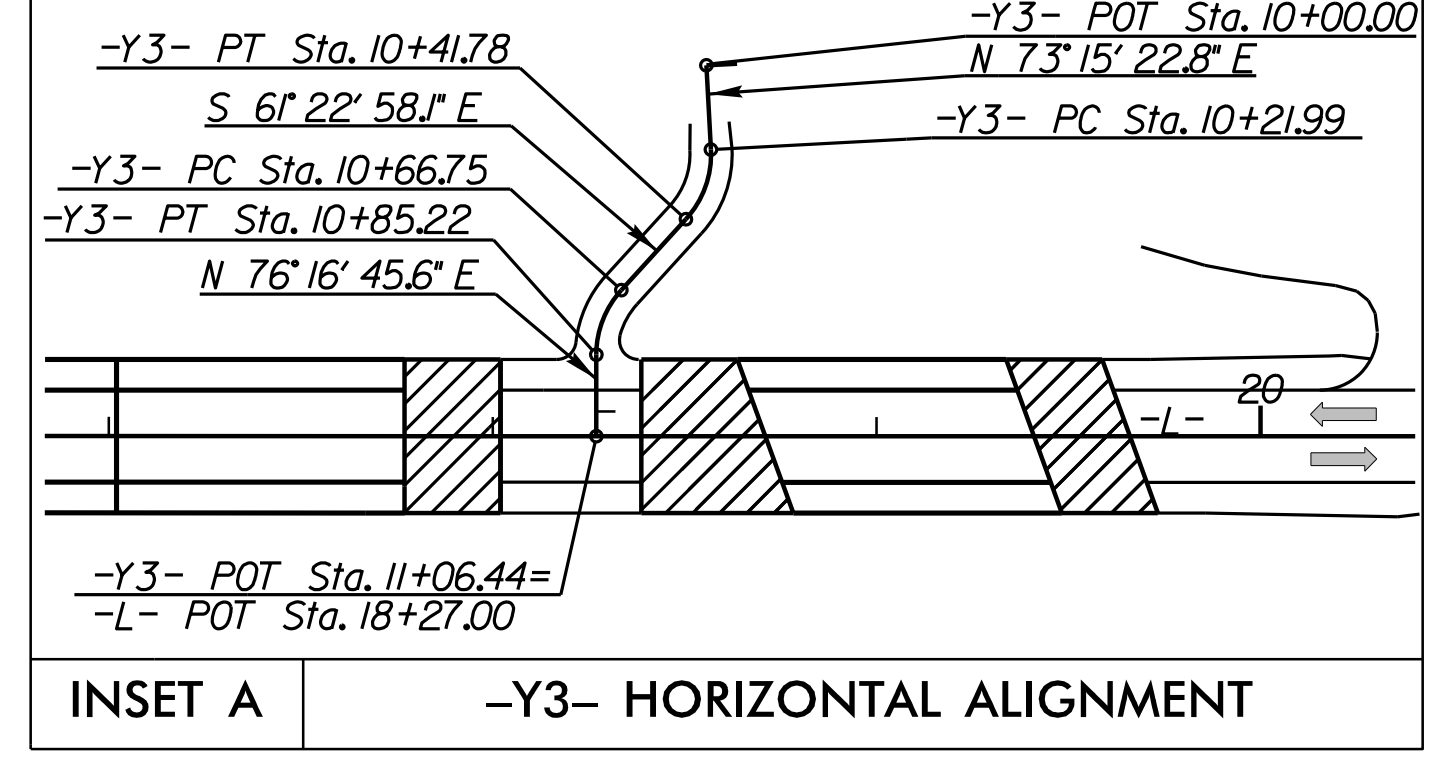
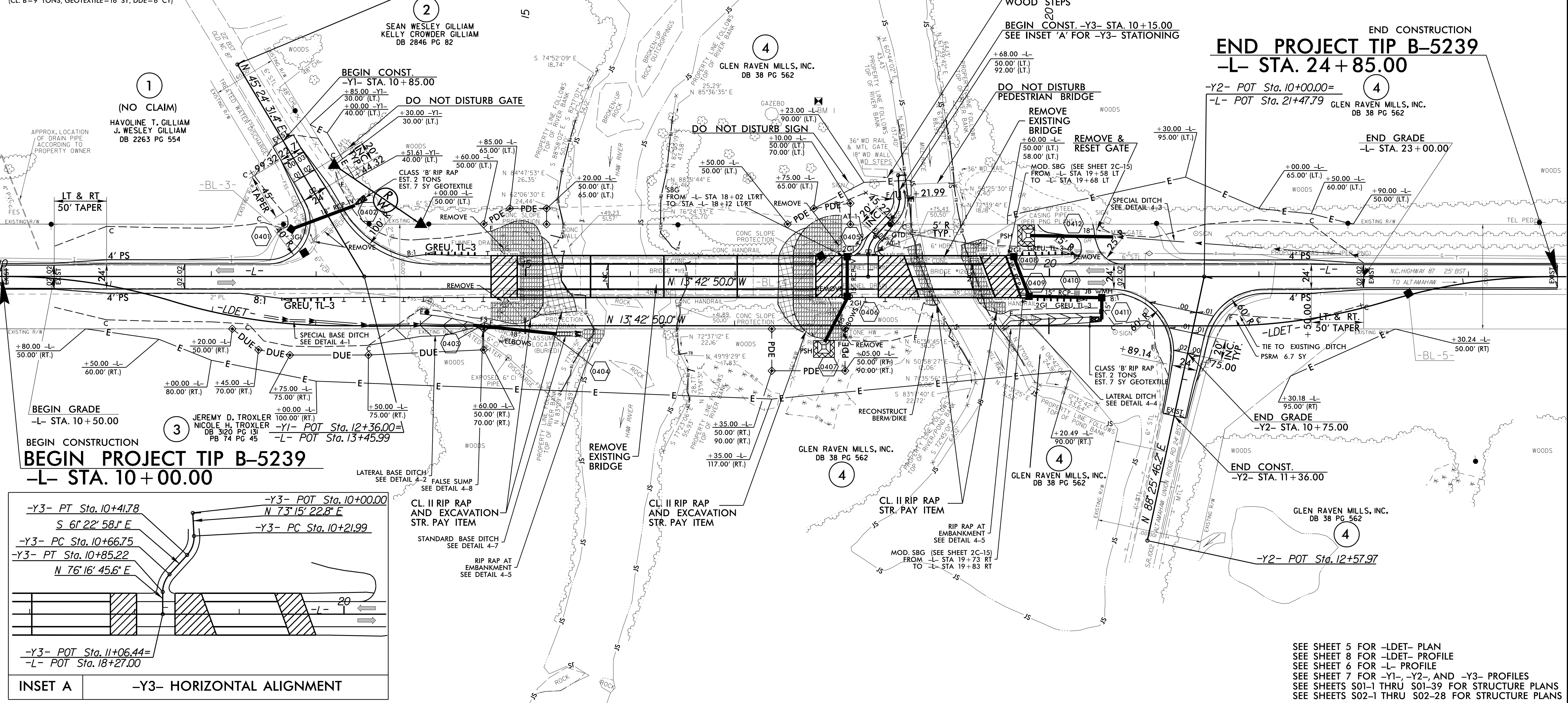
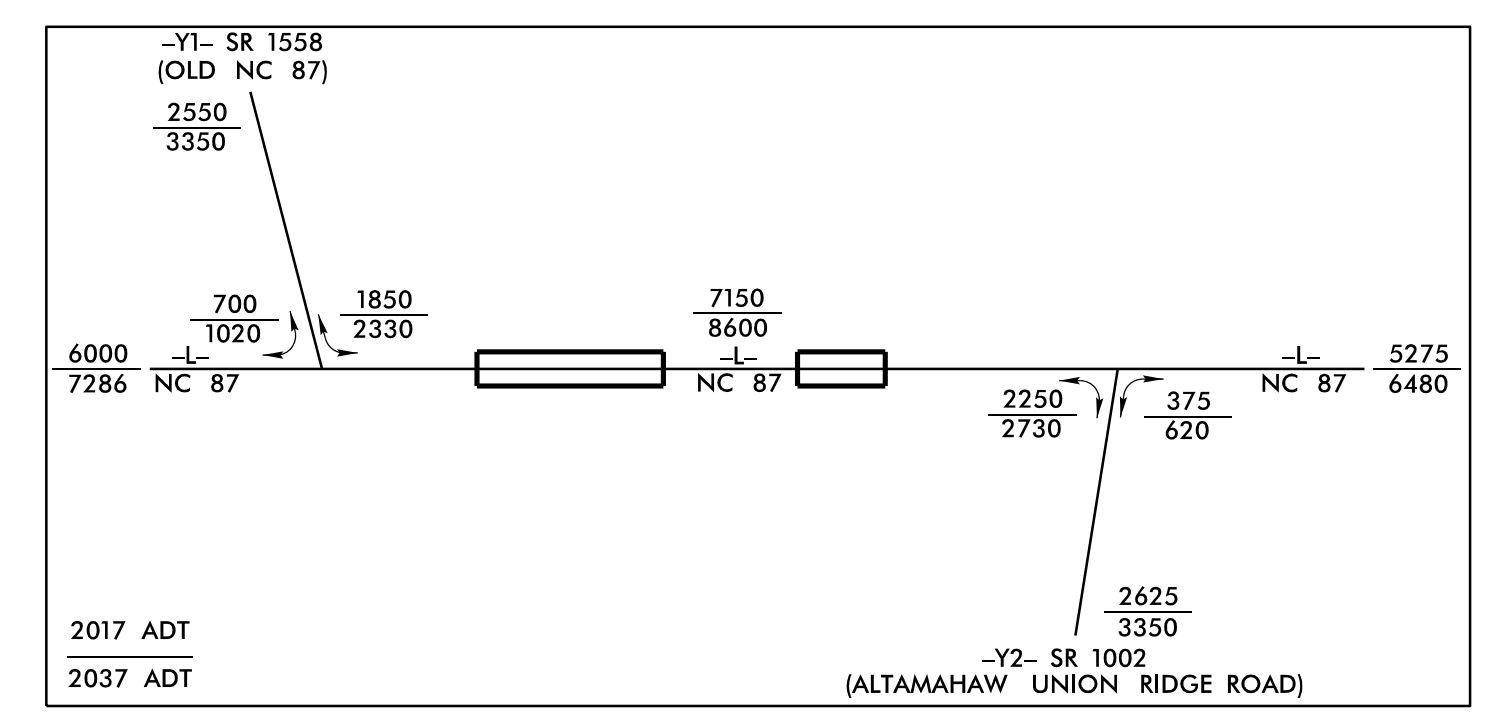
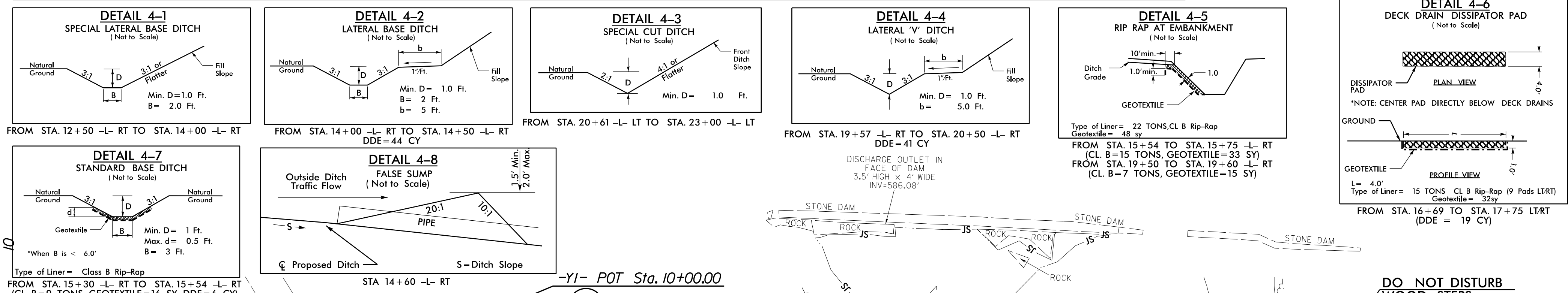
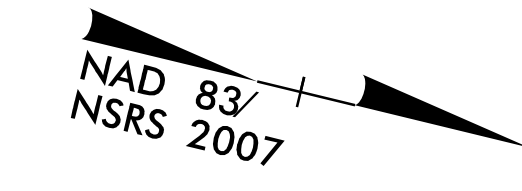
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1130 Situs Court, Suite 200, Raleigh NC, 27606

PROJECT REFERENCE NO. B-5239	SHEET NO. 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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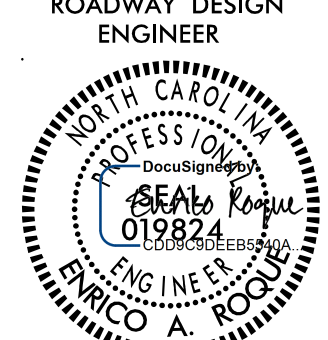
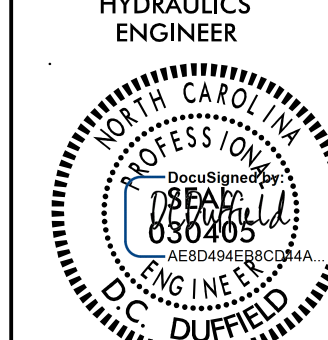
-Y3-

PI Sta 10+76.43 Δ = 42° 20' 16.3" (LT) D = 229' 10" 59.2" L = 18.47' T = 9.68' R = 25.00'	PI Sta 10+32.44 Δ = 45° 21' 39.1" (RT) D = 229' 10" 59.2" L = 19.79' T = 10.45' R = 25.00'
SE = SEE PLANS	SE = SEE PLANS



SEE SHEET 5 FOR -LDET- PLAN
SEE SHEET 8 FOR -LDET- PROFILE
SEE SHEET 6 FOR -L- PROFILE
SEE SHEET 7 FOR -Y1-, -Y2-, AND -Y3- PROFILES
SEE SHEETS S01-1 THRU S01-39 FOR STRUCTURE PLANS
SEE SHEETS S02-1 THRU S02-28 FOR STRUCTURE PLANS

5/28/19

PROJECT REFERENCE NO. B-5239	SHEET NO. 6
ROADWAY DESIGN ENGINEER 	HYDRAULICS ENGINEER 
10/29/2017	10/30/2017

BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE = 15,300 CFS
 DESIGN FREQUENCY = 50 YRS
 DESIGN HW ELEVATION = 602.6 FT
 BASE DISCHARGE = 17,400 CFS
 BASE FREQUENCY = 100 YRS
 BASE HW ELEVATION = 604.44 FT
 OVERTOPPING DISCHARGE = 22,700 CFS
 OVERTOPPING FREQUENCY = 500± YRS
 OVERTOPPING ELEVATION = 611.6 FT

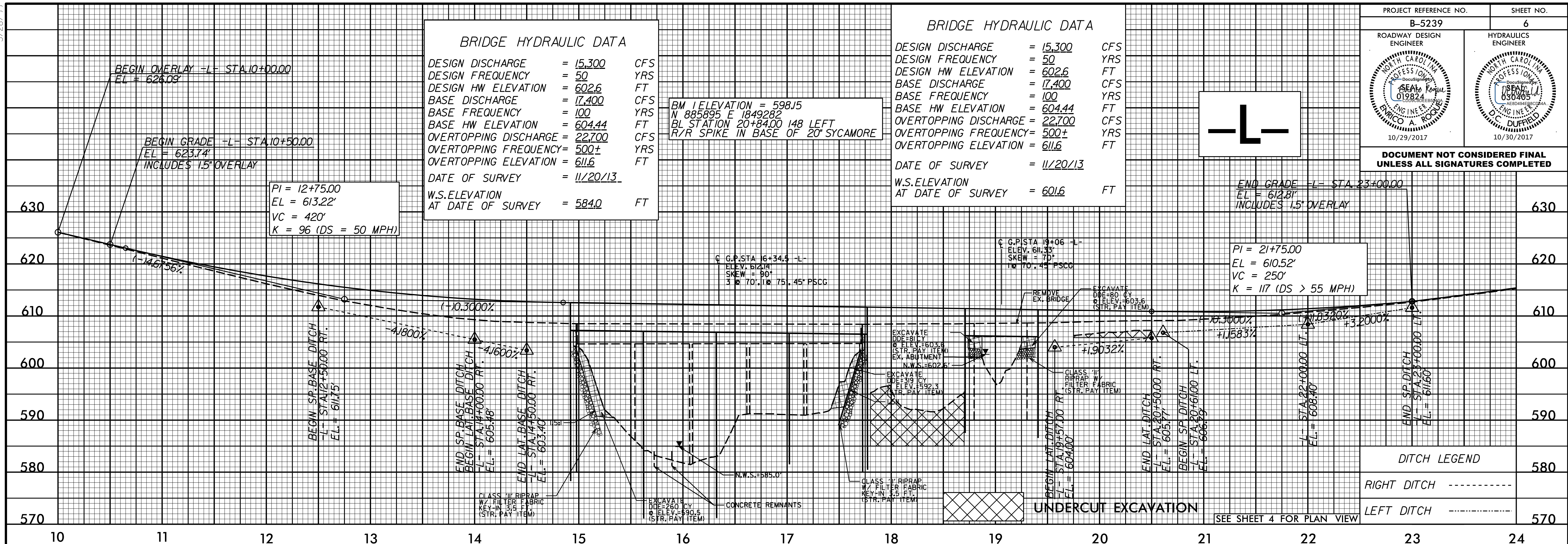
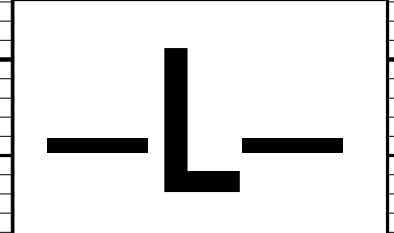
DATE OF SURVEY = 11/20/13
 W.S. ELEVATION AT DATE OF SURVEY = 584.0 FT

BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE = 15,300 CFS
 DESIGN FREQUENCY = 50 YRS
 DESIGN HW ELEVATION = 602.6 FT
 BASE DISCHARGE = 17,400 CFS
 BASE FREQUENCY = 100 YRS
 BASE HW ELEVATION = 604.44 FT
 OVERTOPPING DISCHARGE = 22,700 CFS
 OVERTOPPING FREQUENCY = 500± YRS
 OVERTOPPING ELEVATION = 611.6 FT

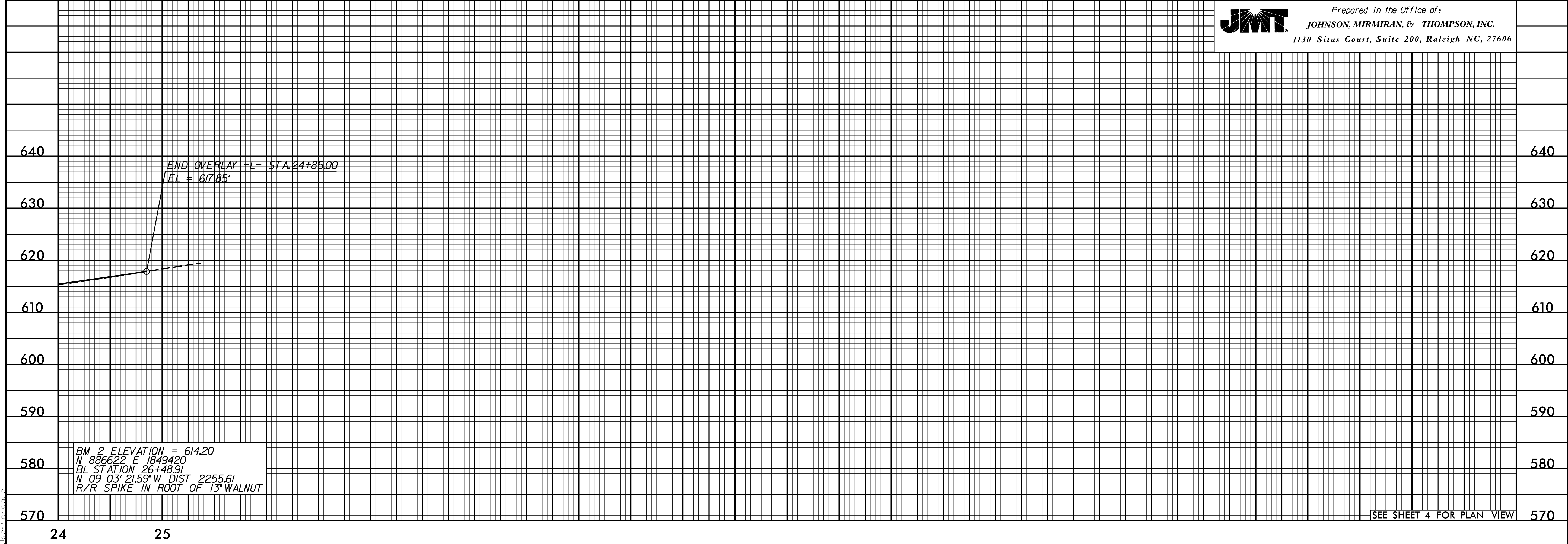
DATE OF SURVEY = 11/20/13
 W.S. ELEVATION AT DATE OF SURVEY = 601.6 FT

BM 1 ELEVATION = 598.15
 N 885895 E 1849282
 BL STATION 20+84.00 148 LEFT
 R/R SPIKE IN BASE OF 20' SYCAMORE



DITCH LEGEND

RIGHT DITCH	-----
LEFT DITCH	-----



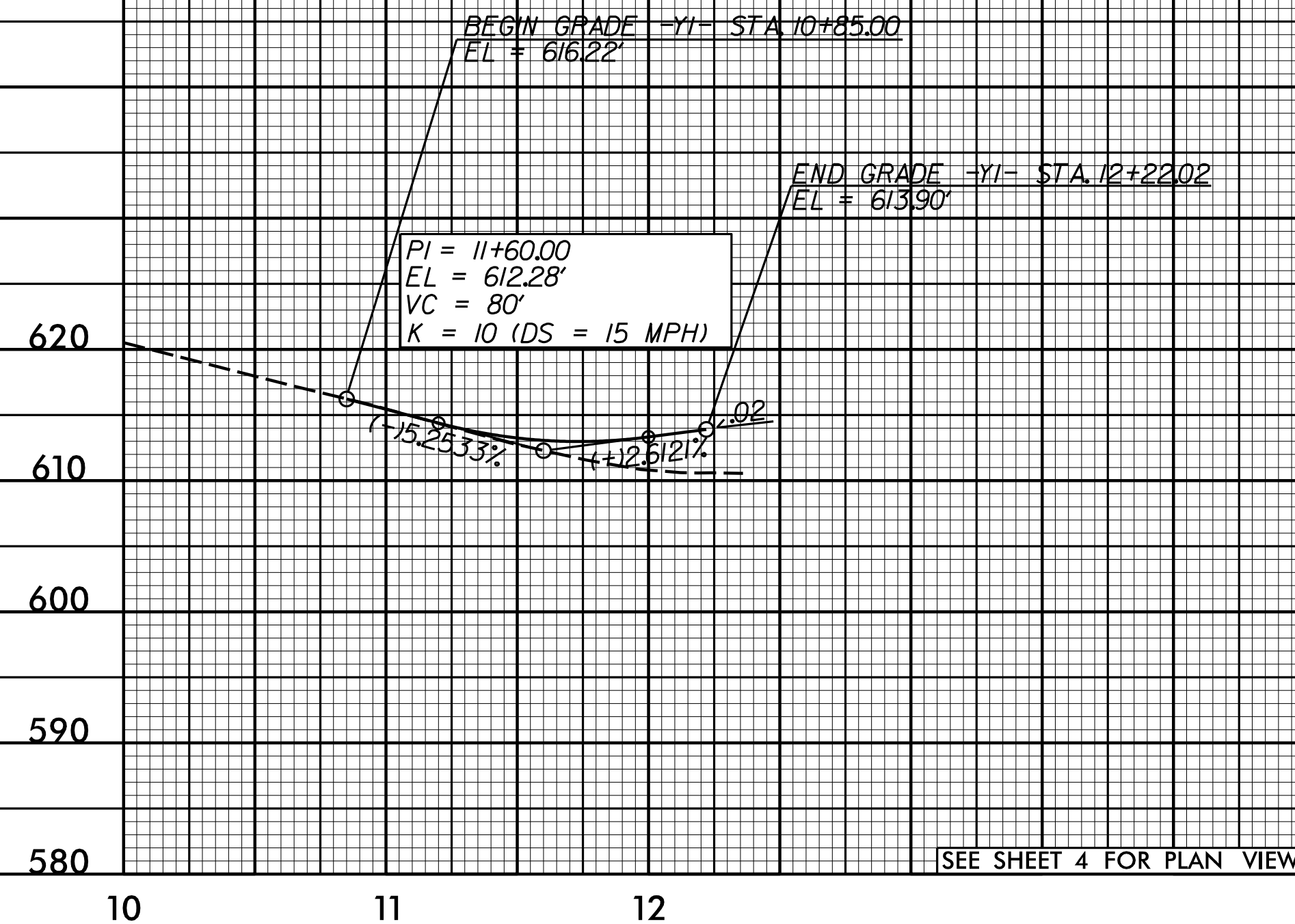
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SEE SHEET 4 FOR PLAN VIEW

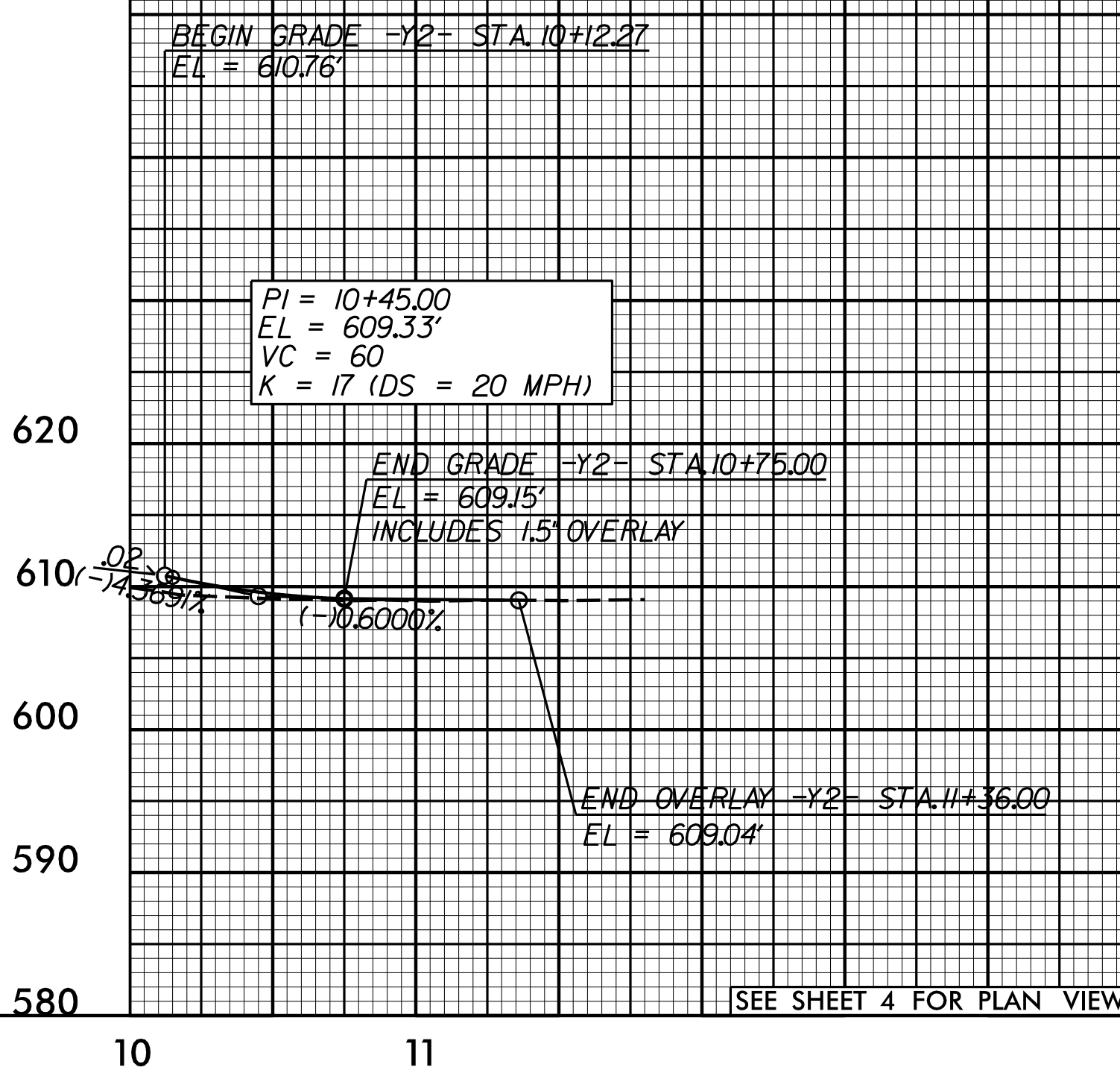
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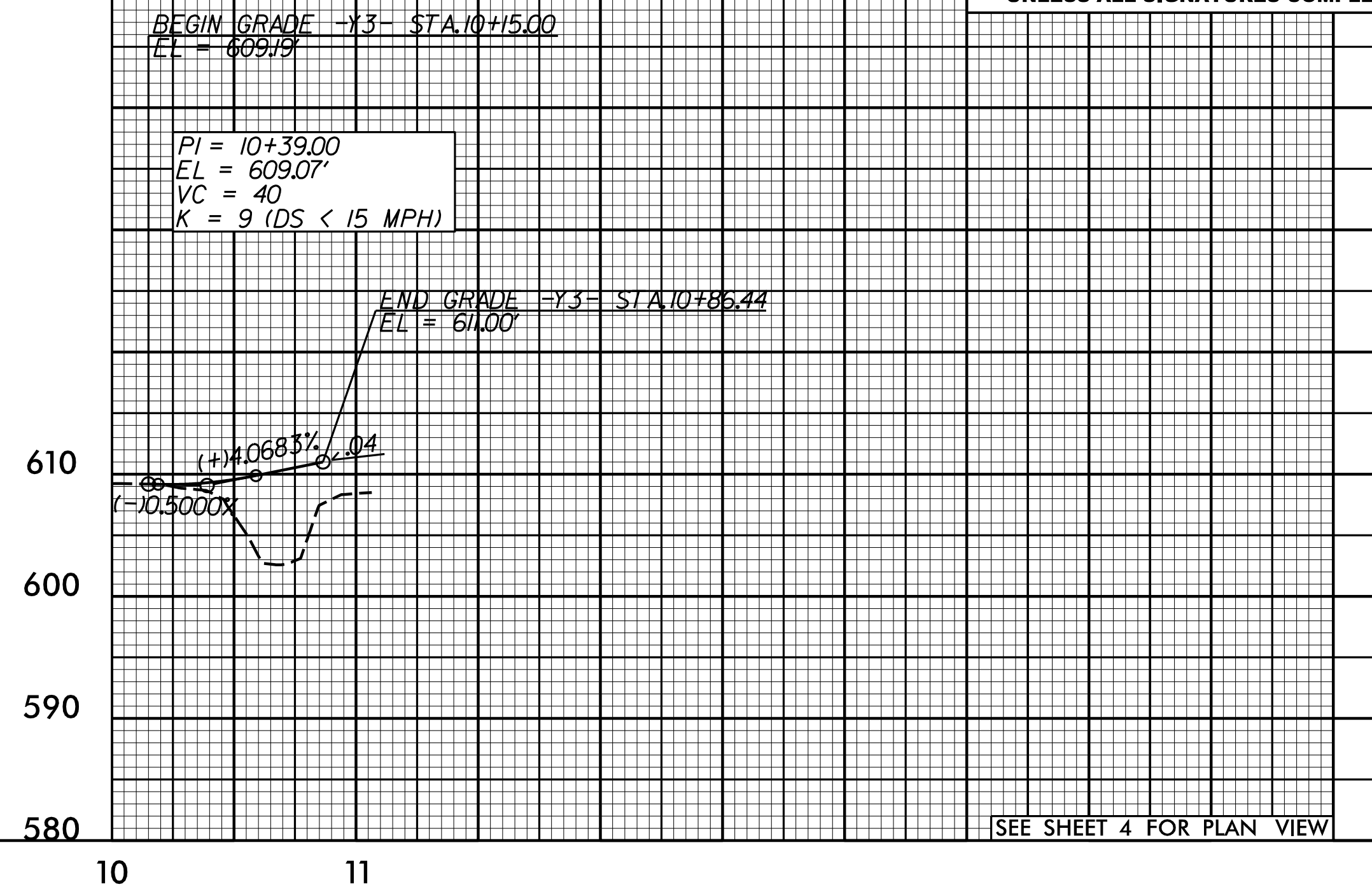
-Y1-



-Y2-



-Y3-

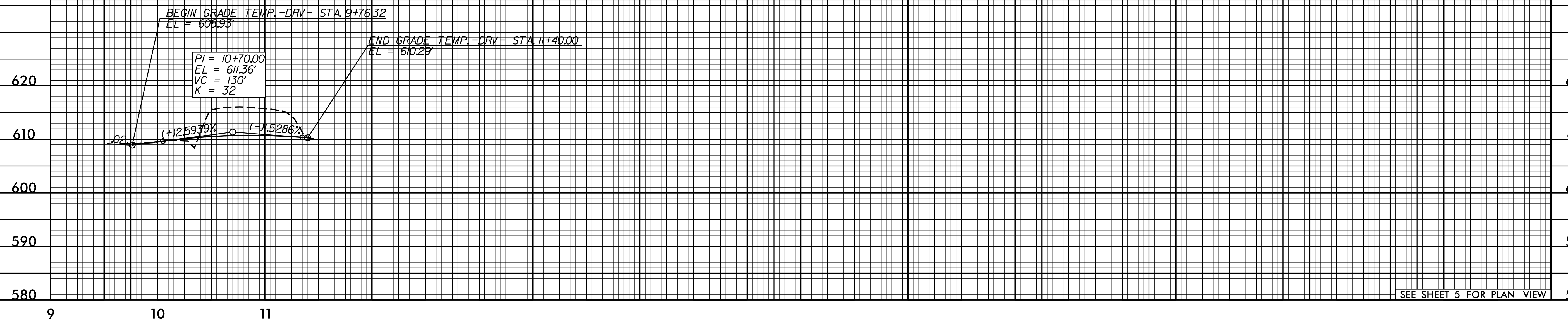


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PROJECT REFERENCE NO. B-5239	SHEET NO. 7
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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TEMP. -DRV-



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5/28/2017

BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE = 10,027/10,100 CFS
 DESIGN FREQUENCY = 10 YRS
 DESIGN HW ELEVATION = 599.3 FT
 DETOUR Q100 = 16,200/17,400 CFS
 Q100 ELEVATION = 604.50 FT
 DATE OF SURVEY = 11/20/13
 W.S. ELEVATION AT DATE OF SURVEY = 584.0 FT

BRIDGE HYDRAULIC DATA

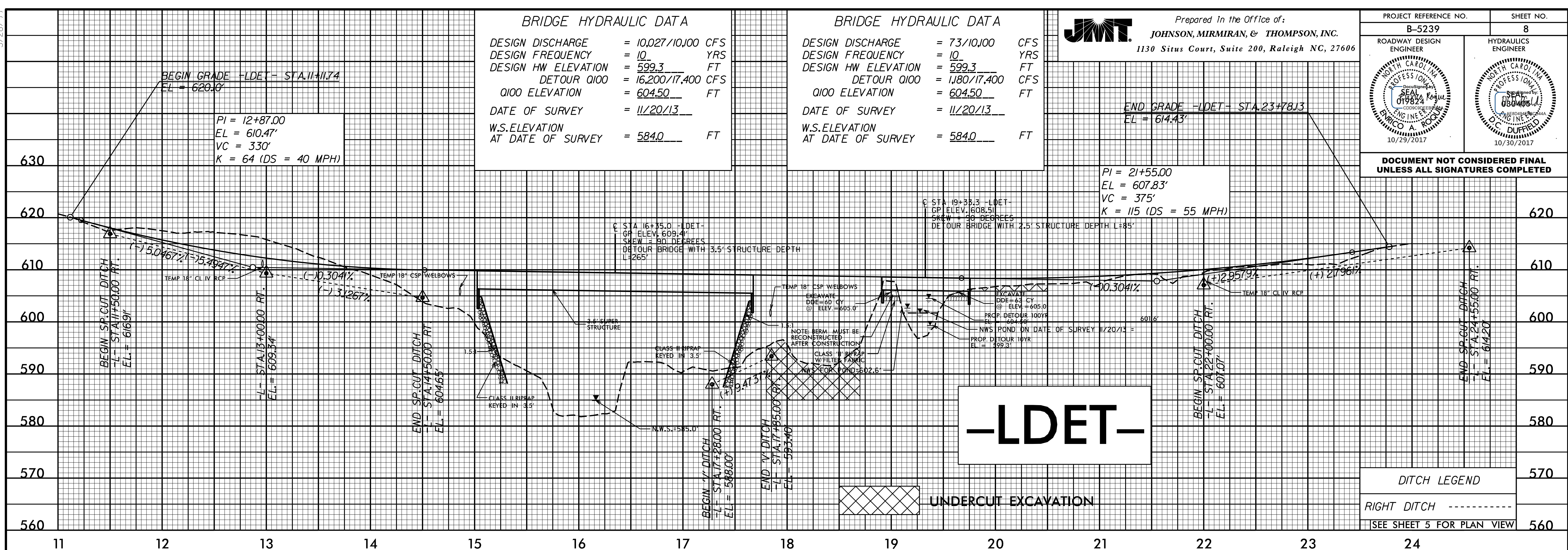
DESIGN DISCHARGE = 73/10,100 CFS
 DESIGN FREQUENCY = 10 YRS
 DESIGN HW ELEVATION = 599.3 FT
 DETOUR Q100 = 1,180/17,400 CFS
 Q100 ELEVATION = 604.50 FT
 DATE OF SURVEY = 11/20/13
 W.S. ELEVATION AT DATE OF SURVEY = 584.0 FT



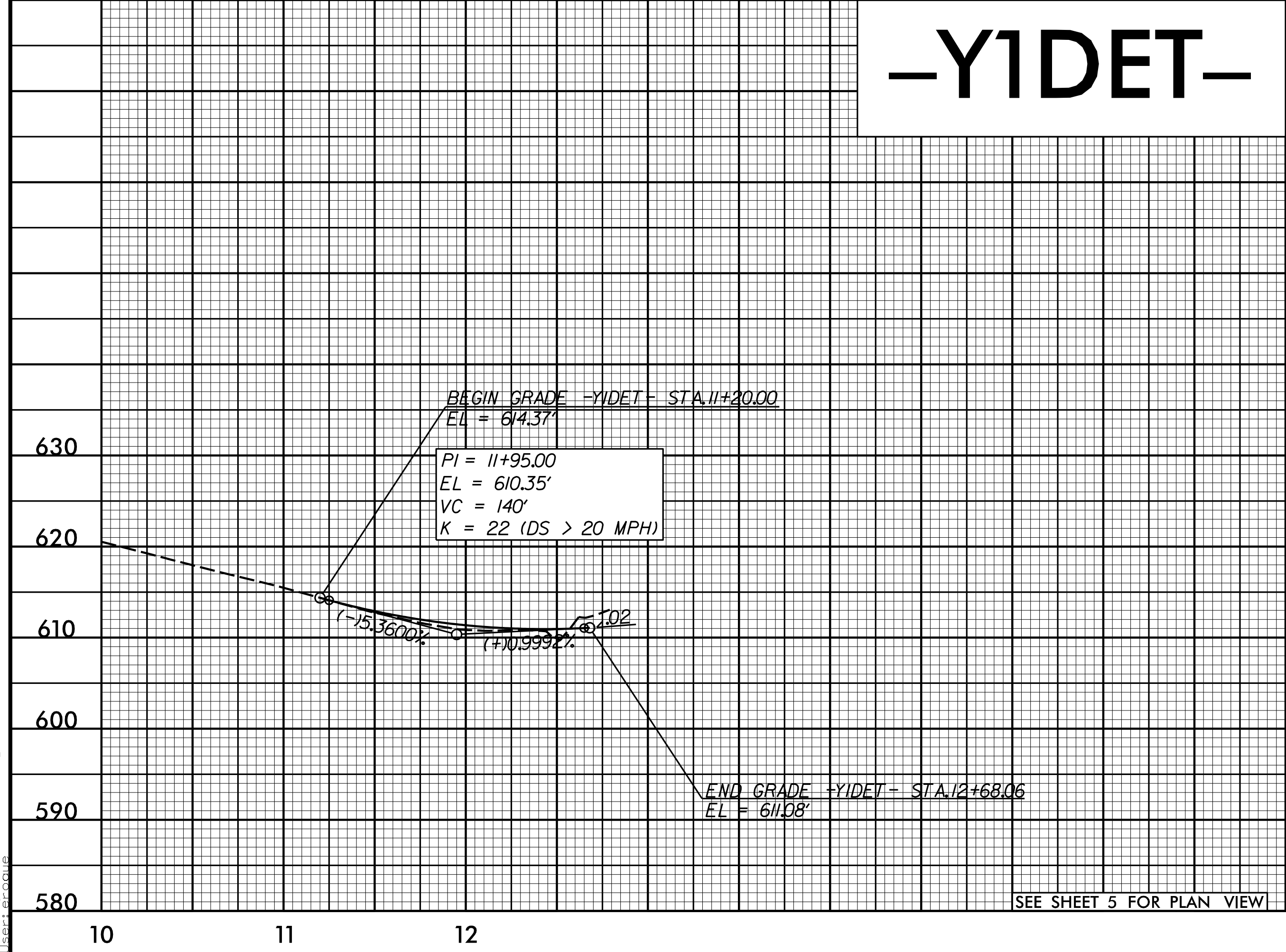
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PROJECT REFERENCE NO. B-5239	SHEET NO. 8
ROADWAY DESIGN ENGINEER 	HYDRAULICS ENGINEER

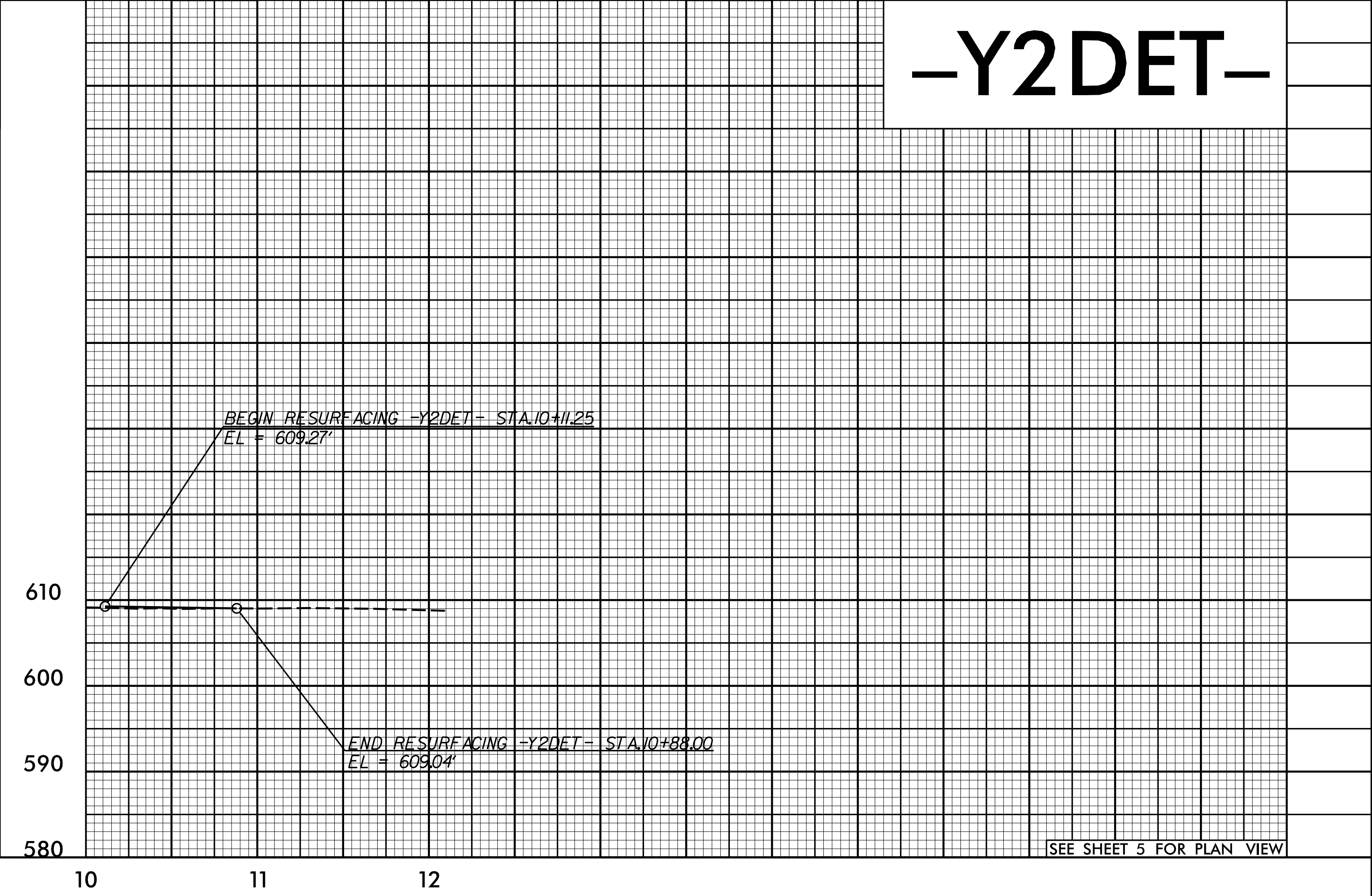
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-Y1DET-



-Y2DET-



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