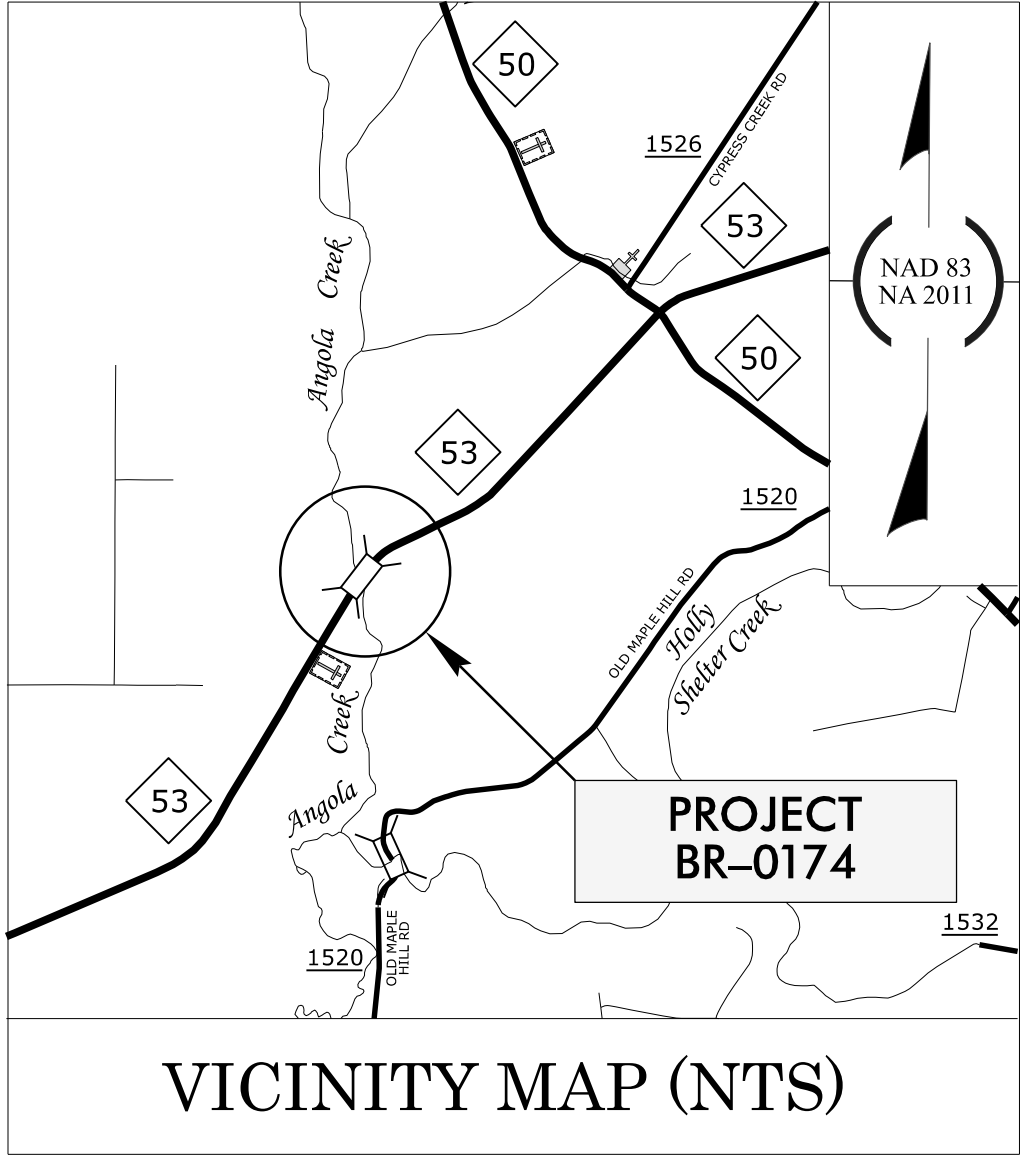


PROJECT: BR-0174

CONTRACT: C205207

See Sheet 001A For Index of Sheets
See Sheet 001B For Conventional Symbols



VICINITY MAP (NTS)

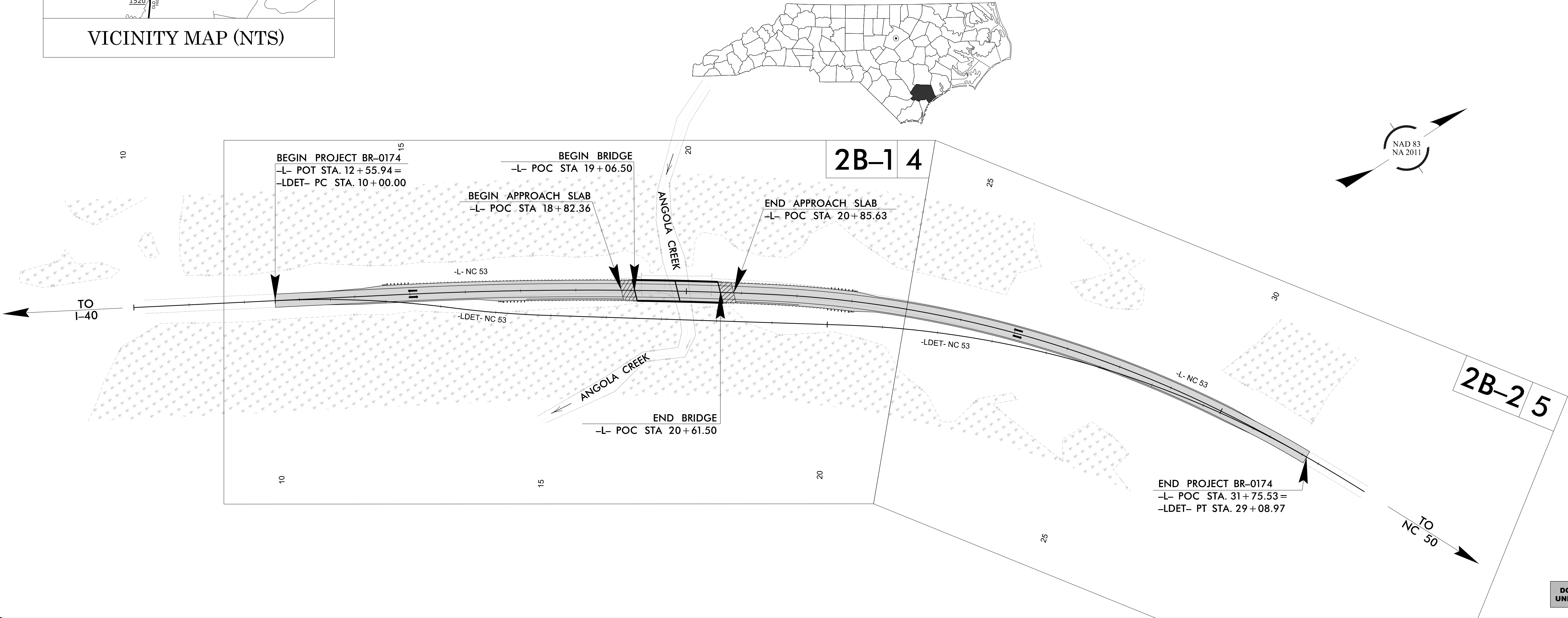
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PENDER COUNTY

LOCATION: *REPLACE BRIDGE 700037 ON NC 53
OVER ANGOLA CREEK*

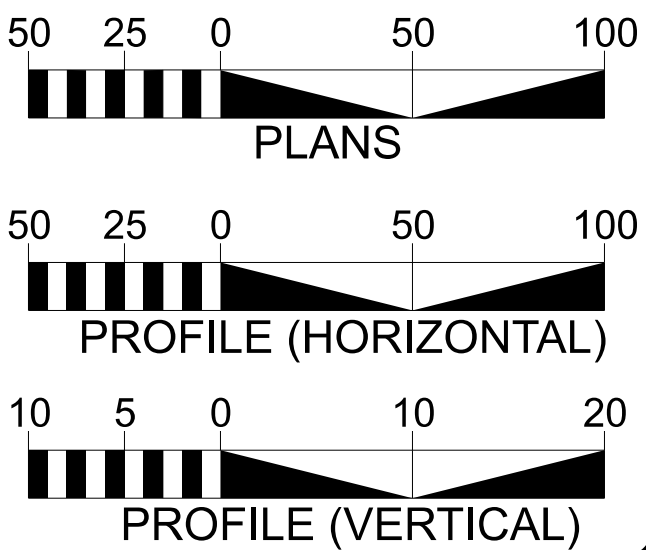
TYPE OF WORK: *GRADING, DRAINAGE, PAVING,
AND STRUCTURE*

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0174	11	
STATE PROJ. NO.		F. A. PROJ. NO.	DESCRIPTION
67174.1.1		N/A	PE
67174.2.1		N/A	UTIL.
67174.2.2		N/A	ROW
52219.3.1		5221901	CONST.



DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES



DESIGN DATA

ADT 2025 = 5,350
ADT 2045 = 5,900
K = N/A
D = N/A
T = 11 % *
V = 60 MPH
* TTST = 6% DUAL 5%
FUNC CLASS =
MAJOR COLLECTOR
REGIONAL TIER

PROJECT LENGTH

LENGTH OF ROADWAY PROJECT BR-0174 = 0.335 MILES
LENGTH OF STRUCTURE PROJECT BR-0174 = 0.029 MILES
TOTAL LENGTH OF PROJECT BR-0174 = 0.364 MILES

PREPARED IN THE
OFFICE OF:

CDM
Smith

CDM Smith Inc.
4130 Parklake Avenue
Suite 350
Raleigh, NC 27612-4461
NC COA No. F-1255

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
OCTOBER 1, 2024

LETTING DATE:
OCTOBER 20, 2026

DAVID Z. KEISER, P.E.
PROJECT ENGINEER

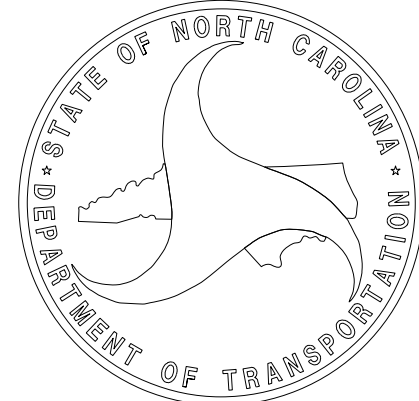
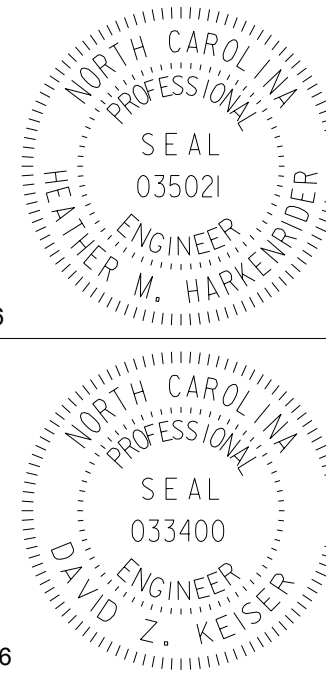
SAMUEL S. MILLER, E.I.
PROJECT DESIGN ENGINEER

ERIC C. MURRAY
NCDOT CONTACT

HYDRAULICS ENGINEER

DocuSigned by:
Heather M. Harkender
SIGNATURE: 8/4/2026
ROADWAY DESIGN ENGINEER

Signed by:
David Z. Keiser
SIGNATURE: 8/5/2026



INDEX OF SHEETS	
SHEET NUMBER	SHEET
1	TITLE SHEET
1A	INDEX OF SHEETS, GENERAL NOTES, AND LIST OF STANDARD DRAWINGS
1B	CONVENTIONAL SYMBOLS
2A-1 THRU 2A-3	PAVEMENT SCHEDULE AND TYPICAL SECTIONS
2B-1 THRU 2B-6	ROADWAY DETAILS - ON-SITE DETOUR LAYOUT PLAN/PROFILE SHEETS & RUMBLE STRIP DETAILS
2C-1 THRU 2C-6	ROADWAY SPECIAL DETAILS
2G-1 THRU 2G-4	GEOTECHNICAL DETAILS
3B-1	ROADWAY SUMMARIES
3D-1	DRAINAGE SUMMARIES
3G-1	GEOTECHNICAL SUMMARIES
3P-1	PARCEL INDEX SHEET
4 THRU 5	PLAN SHEETS
6	PROFILE SHEET
RW-01 THRU RW-05	SURVEY CONTROL, EXISTING CENTERLINES, RIGHT OF WAY, EASEMENT, AND PROPERTY TIES
TMP-1 THRU TMP-12	TRANSPORTATION MANAGEMENT PLANS
PMP-1 THRU PMP-3	PAVEMENT MARKING PLANS
EC-1 THRU EC-11	EROSION CONTROL PLANS
RF-1	REFORESTATION PLANS
SIGN-1 THRU SIGN-3	SIGNING PLANS
UO-1 THRU UO-3	UTILITIES BY OTHERS PLANS
X-1	CROSS-SECTION SHEET INDEX
X-1A	CROSS-SECTION SUMMARY SHEET
X-2 THRU X-45	CROSS-SECTIONS
S-1 THRU S-33	STRUCTURE PLANS

EFF. 01-16-2024
REV.

2024 ROADWAY ENGLISH STANDARD DRAWINGS

The following Roadway Standards as appear in "Roadway Standard Drawings" Contracts Standards and Development Unit - N. C. Department of Transportation - Raleigh, N. C., Dated January 16, 2024 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 - Modified Method III
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superelevation - Two Lane Pavement
275.01	Rock Plating
DIVISION 3 - PIPE CULVERTS	
300.01	Method of Pipe Installation (Use Details in Lieu of Standards for Sheets 1 and 2 of 2)
DIVISION 4 - MAJOR STRUCTURES	
423.01	Bridge Approach Fills - Type 1 Approach Fill for Bridge Abutment
423.02	Bridge Approach Fills - Type 1A Alternate Approach Fill for Integral Bridge Abutment
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
DIVISION 8 - INCIDENTALS	
806.01	Concrete Right-of-Way Marker
806.02	Granite Right-of-Way Marker
815.02	Subsurface Drain
840.00	Concrete Base Pad for Drainage Structures
840.25	Anchorage for Frames - Brick or Concrete or Precast
840.29	Frames and Narrow Slot Flat Grates
840.35	Traffic Bearing Grated Drop Inlet - for Cast Iron Double Frame and Grates
840.45	Precast Drainage Structures
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 (Use Details in Lieu of Standards for Sheets 4, 6, 12, and 14 of 15)
862.02	Guardrail Installation (Use Detail in Lieu of Standard for Sheet 5 of 9)
862.03	Structure Anchor Units (Use Details in Lieu of Standards for Sheets 6 and 8 of 9)
862.04	Anchoring End of Guardrail - for B-77 and B-83 Anchor Units
876.02	Guide for Rip Rap at Pipe Outlets

GENERAL NOTES: 2024 SPECIFICATIONS
EFFECTIVE: 01-16-2024
REVISED:

GRADE LINE:
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 MODIFIED METHOD III.

SEE WETLAND AND SURFACE WATER IMPACTS PERMIT FOR CLEARING RESTRICTIONS.

SUPERELEVATION:

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

SHOULDER CONSTRUCTION:

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

SUBSURFACE DRAINS:

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

GUARDRAIL:

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

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".

END BENTS:

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

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE AT&T AND CHARTER.

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

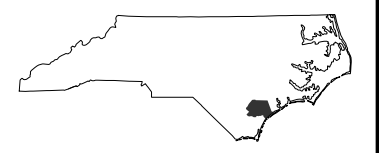
RIGHT-OF-WAY MARKERS:

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

BR-0174

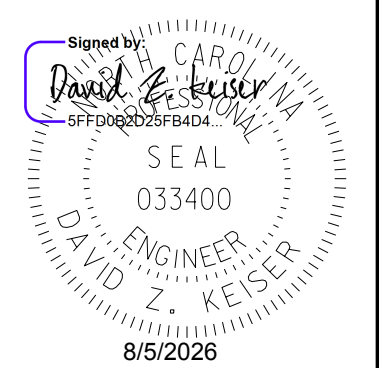
4R01 001A

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PENDER COUNTY



DIVISION 3

ROADWAY DESIGN
ENGINEER



PREPARED BY



DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

Note: Not to Scale

BOUNDARIES AND PROPERTY:

State Line	
County Line	
Township Line	
City Line	
Reservation Line	
Property Line	
Existing Iron Pin (EIP)	
Computed Property Corner	
Existing Concrete Monument (ECM)	
Parcel / Sequence Number	
Existing Fence Line	
Proposed Woven Wire Fence	
Proposed Chain Link Fence	
Proposed Barbed Wire Fence	
Existing Wetland Boundary	
Proposed Wetland Boundary	
Existing Endangered Animal Boundary	
Existing Endangered Plant Boundary	
Existing Historic Property Boundary	
Known Contamination Area: Soil	
Potential Contamination Area: Soil	
Known Contamination Area: Water	
Potential Contamination Area: Water	
Contaminated Site: Known or Potential	

BUILDINGS AND OTHER CULTURE:

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

HYDROLOGY:

Stream or Body of Water	
Hydro, Pool or Reservoir	
Jurisdictional Stream	
Buffer Zone 1	
Buffer Zone 2	
Flow Arrow	
Disappearing Stream	
Spring	
Wetland	
Proposed Lateral, Tail, Head Ditch	
False Sump	

STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

RAILROADS:

Standard Gauge	
RR Signal Milepost	
Switch	
RR Abandoned	
RR Dismantled	

RIGHT OF WAY & PROJECT CONTROL:

Primary Horiz Control Point	
Primary Horiz and Vert Control Point	
Secondary Horiz and Vert Control Point	
Vertical Benchmark	
Existing Right of Way Monument	
Proposed Right of Way Monument (Rebar and Cap)	
Proposed Right of Way Monument (Concrete)	
Existing Permanent Easement Monument	
Proposed Permanent Easement Monument (Rebar and Cap)	
Existing C/A Monument	
Proposed C/A Monument (Rebar and Cap)	
Proposed C/A Monument (Concrete)	
Existing Right of Way Line	
Proposed Right of Way Line	
Existing Control of Access Line	
Proposed Control of Access Line	
Proposed ROW and CA Line	
Existing Easement Line	
Proposed Temporary Construction Easement	
Proposed Temporary Drainage Easement	
Proposed Permanent Drainage Easement	
Proposed Permanent Drainage/Utility Easement	
Proposed Permanent Utility Easement	
Proposed Temporary Utility Easement	
Proposed Aerial Utility Easement	

ROADS AND RELATED FEATURES:

Existing Edge of Pavement	
Existing Curb	
Proposed Slope Stakes Cut	
Proposed Slope Stakes Fill	
Proposed Curb Ramp	
Existing Metal Guardrail	
Proposed Guardrail	
Existing Cable Guiderail	
Proposed Cable Guiderail	
Equality Symbol	
Pavement Removal	
Single Tree	
Single Shrub	
Hedge	

VEGETATION:

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:

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

POWER:	
Existing Power Pole	
Proposed Power Pole	
Existing Joint Use Pole	
Proposed Joint Use Pole	
Power Manhole	
Power Line Tower	
Power Transformer	
U/G Power Cable Hand Hole	
H-Frame Pole	
U/G Power Line Test Hole (SUE - LOS A)*	
U/G Power Line (SUE - LOS B)*	
U/G Power Line (SUE - LOS C)*	
U/G Power Line (SUE - LOS D)*	

TELEPHONE:

Existing Telephone Pole	
Proposed Telephone Pole	
Telephone Manhole	
Telephone Pedestal	
Telephone Cell Tower	
U/G Telephone Cable Hand Hole	
U/G Telephone Test Hole (SUE - LOS A)*	
U/G Telephone Cable (SUE - LOS B)*	
U/G Telephone Cable (SUE - LOS C)*	
U/G Telephone Cable (SUE - LOS D)*	
U/G Telephone Conduit (SUE - LOS B)*	
U/G Telephone Conduit (SUE - LOS C)*	
U/G Telephone Conduit (SUE - LOS D)*	
U/G Fiber Optics Cable (SUE - LOS B)*	
U/G Fiber Optics Cable (SUE - LOS C)*	
U/G Fiber Optics Cable (SUE - LOS D)*	

WATER:

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

TV:

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

GAS:

Gas Valve	
Gas Meter	
U/G Gas Line Test Hole (SUE - LOS A)*	
U/G Gas Line (SUE - LOS B)*	
U/G Gas Line (SUE - LOS C)*	
U/G Gas Line (SUE - LOS D)*	
Above Ground Gas Line	

SANITARY SEWER:

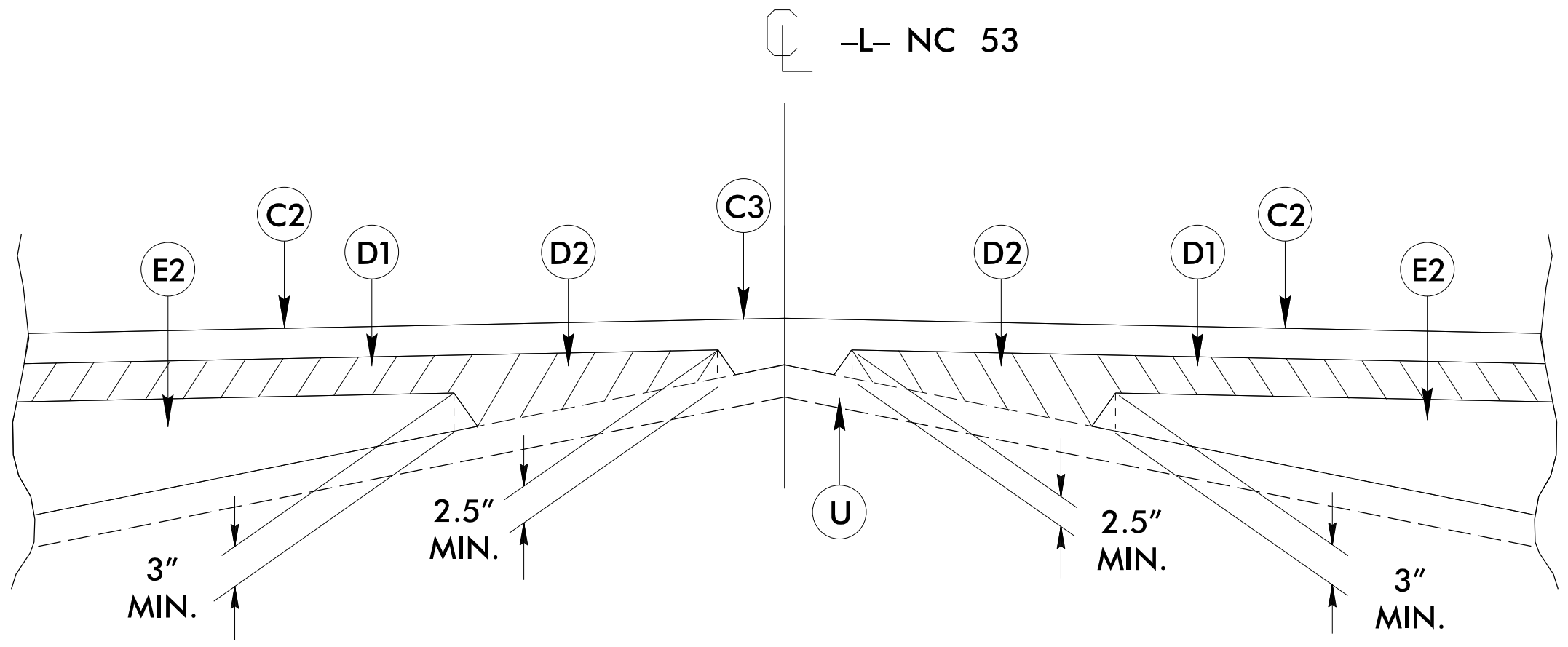
Sanitary Sewer Manhole	
Sanitary Sewer Cleanout	
U/G Sanitary Sewer Line	
Above Ground Sanitary Sewer	
SS Force Main Line Test Hole (SUE - LOS A)*	
SS Force Main Line (SUE - LOS B)*	
SS Force Main Line (SUE - LOS C)*	
SS Force Main Line (SUE - LOS D)*	

MISCELLANEOUS:

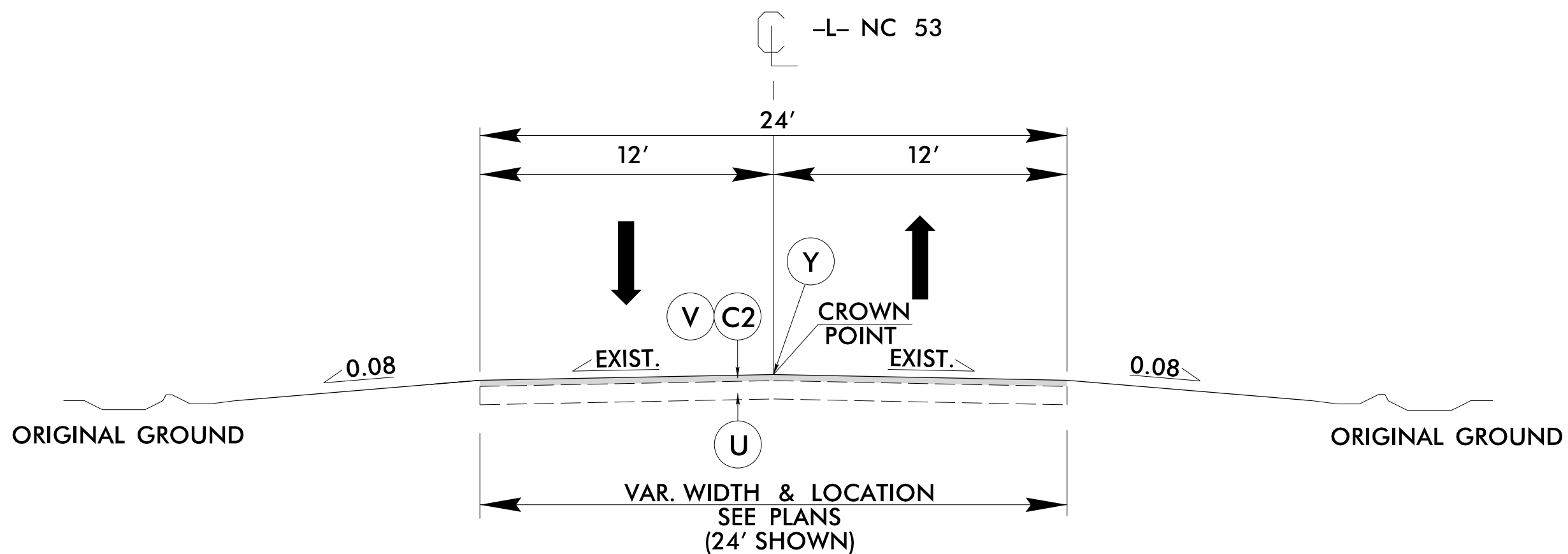
Utility Pole	
Utility Pole with Base	
Utility Located Object	
Utility Traffic Signal Box	
Utility Unknown U/G Line (SUE - LOS B)*	
U/G Tank; Water, Gas, Oil	
Underground Storage Tank, Approx. Loc.	
A/G Tank; Water, Gas, Oil	
Geoenviromental Boring	
Abandoned According to Utility Records	
End of Information	

PAVEMENT SCHEDULE	
(FINAL PAVEMENT DESIGN)	
C1	PROP. APPROX. 1.5" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.
C2	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT TO EXCEED 2" IN DEPTH.
D1	PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 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.
J1	PROP. 8" AGGREGATE BASE COURSE.
R1	SHOULDER BERM GUTTER.
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
V	2.5" MILLING.
W	WEDGING EXISTING PAVEMENT (SEE WEDGING DETAIL).
Y	SINUSOIDAL RUMBLE STRIPS (SEE ROADWAY SPECIAL DETAILS).

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

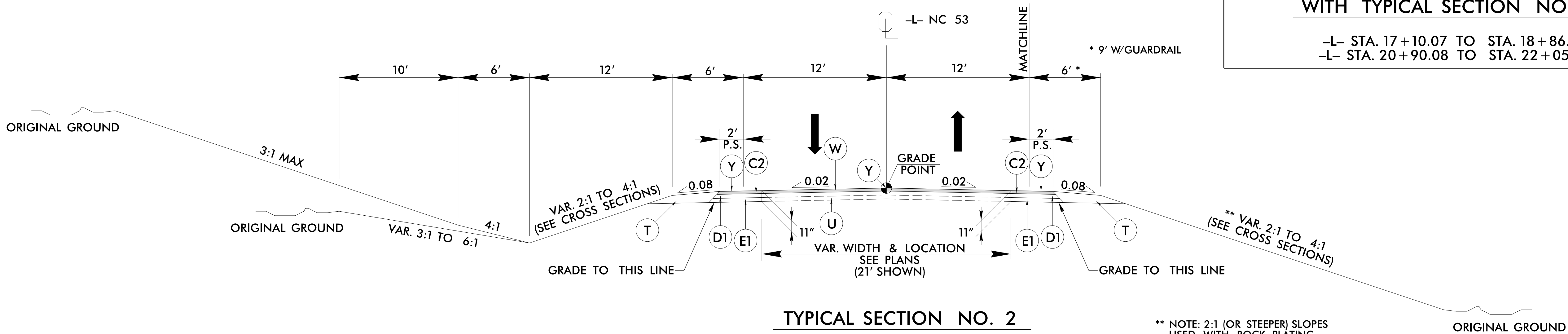


Detail Showing Method of Wedging – W



TYPICAL SECTION NO. 1

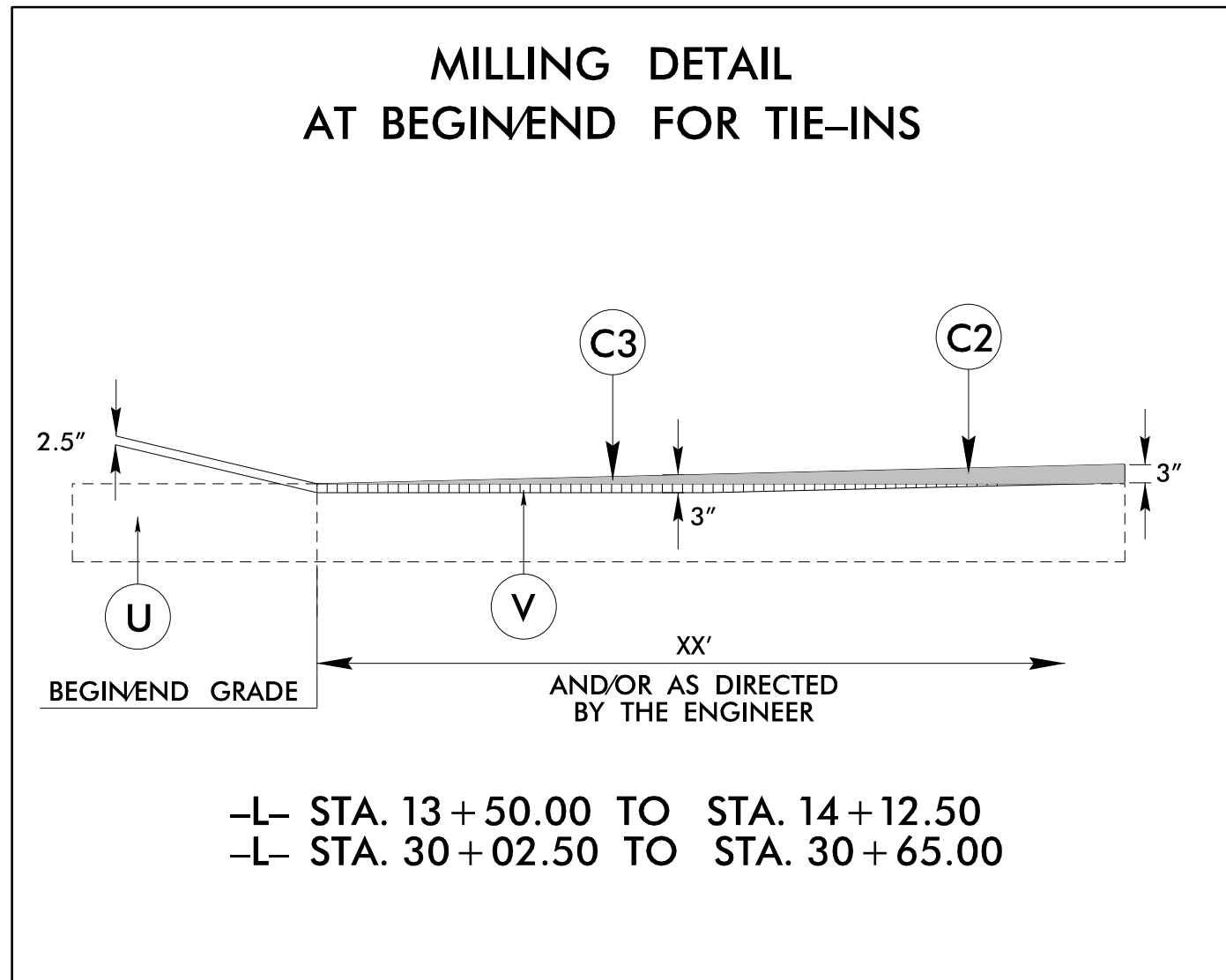
-L- STA. 12 + 55.94 TO STA. 13 + 50.00
-L- STA. 30 + 65.00 TO STA. 31 + 75.53



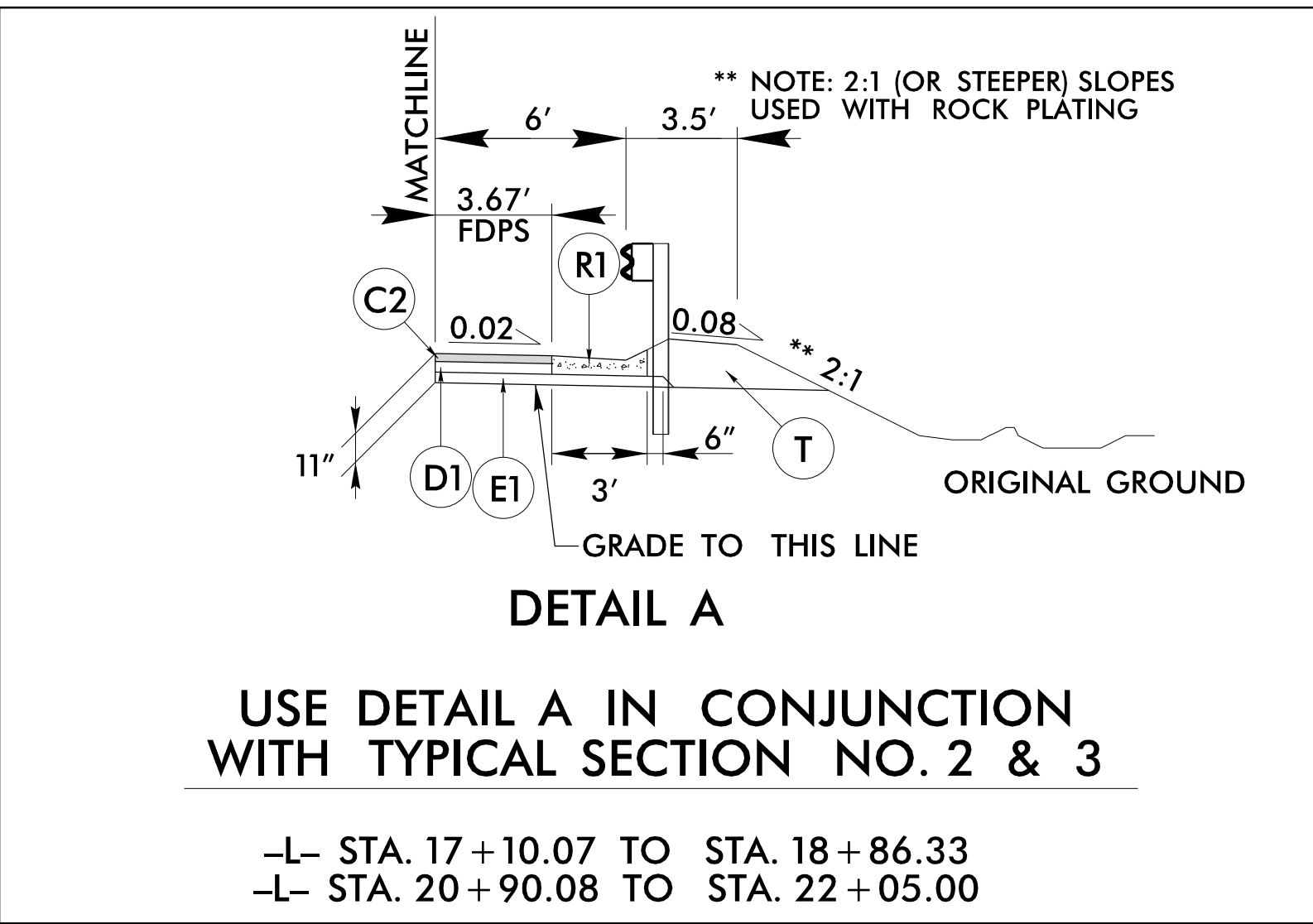
TYPICAL SECTION NO. 2

-L- STA. 13 + 50.00 TO STA. 17 + 39.28
-L- STA. 25 + 00.00 TO STA. 30 + 65.00

** NOTE: 2:1 (OR STEEPER) SLOPES
USED WITH ROCK PLATING



-L- STA. 13 + 50.00 TO STA. 14 + 12.50
-L- STA. 30 + 02.50 TO STA. 30 + 65.00



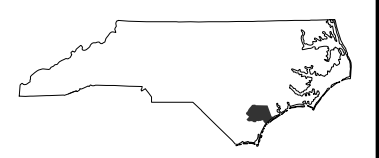
USE DETAIL A IN CONJUNCTION
WITH TYPICAL SECTION NO. 2 & 3

-L- STA. 17 + 10.07 TO STA. 18 + 86.33
-L- STA. 20 + 90.08 TO STA. 22 + 05.00

BR-0174

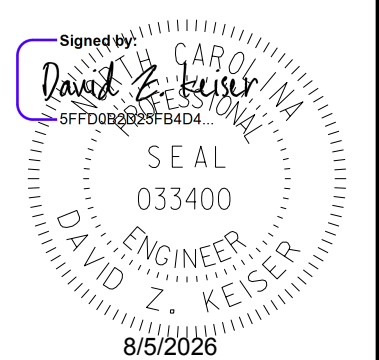
4R01 2A-I

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PENDER COUNTY

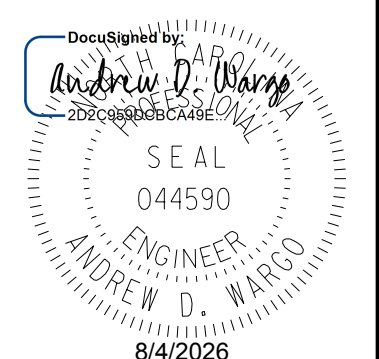


DIVISION 3

ROADWAY DESIGN
ENGINEER



PAVEMENT DESIGN
ENGINEER

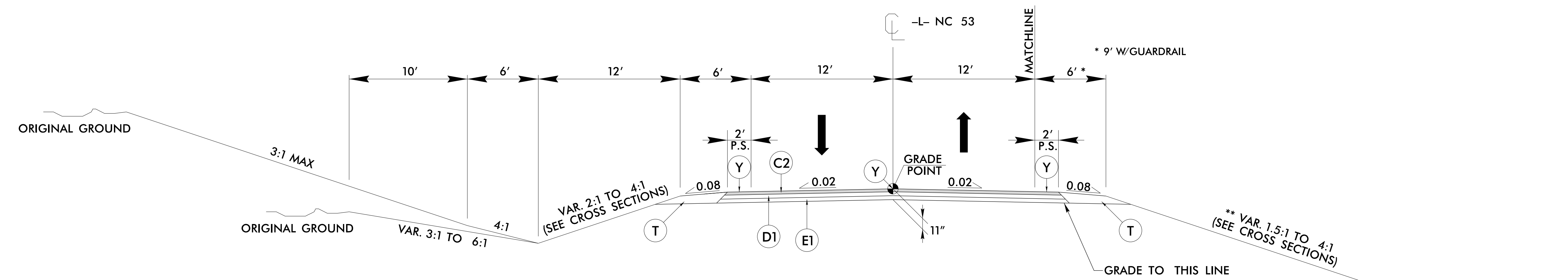


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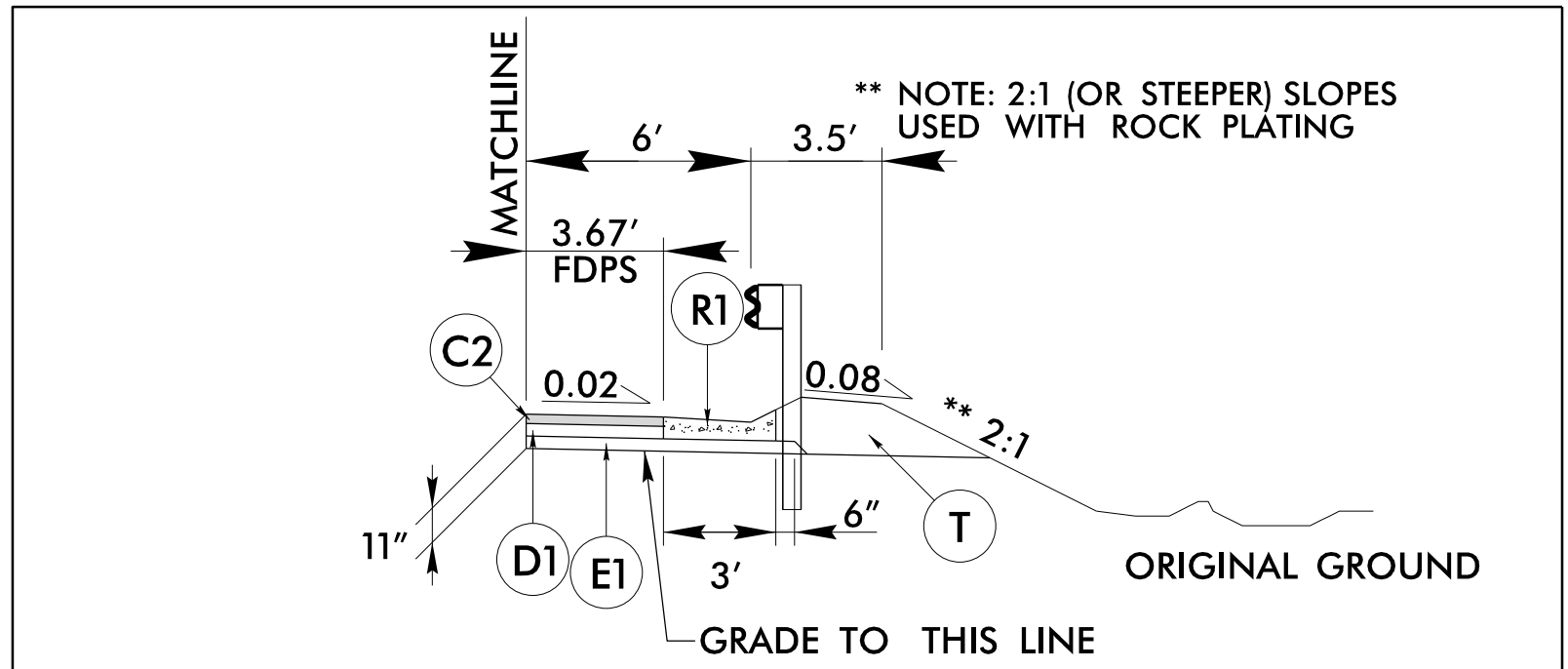
11/14/23



TYPICAL SECTION NO. 3

-L- STA. 17+39.28 TO STA. 19+06.50 (BEGIN BRIDGE)
-L- STA. 20+61.50 (END BRIDGE) TO STA. 25+00.00

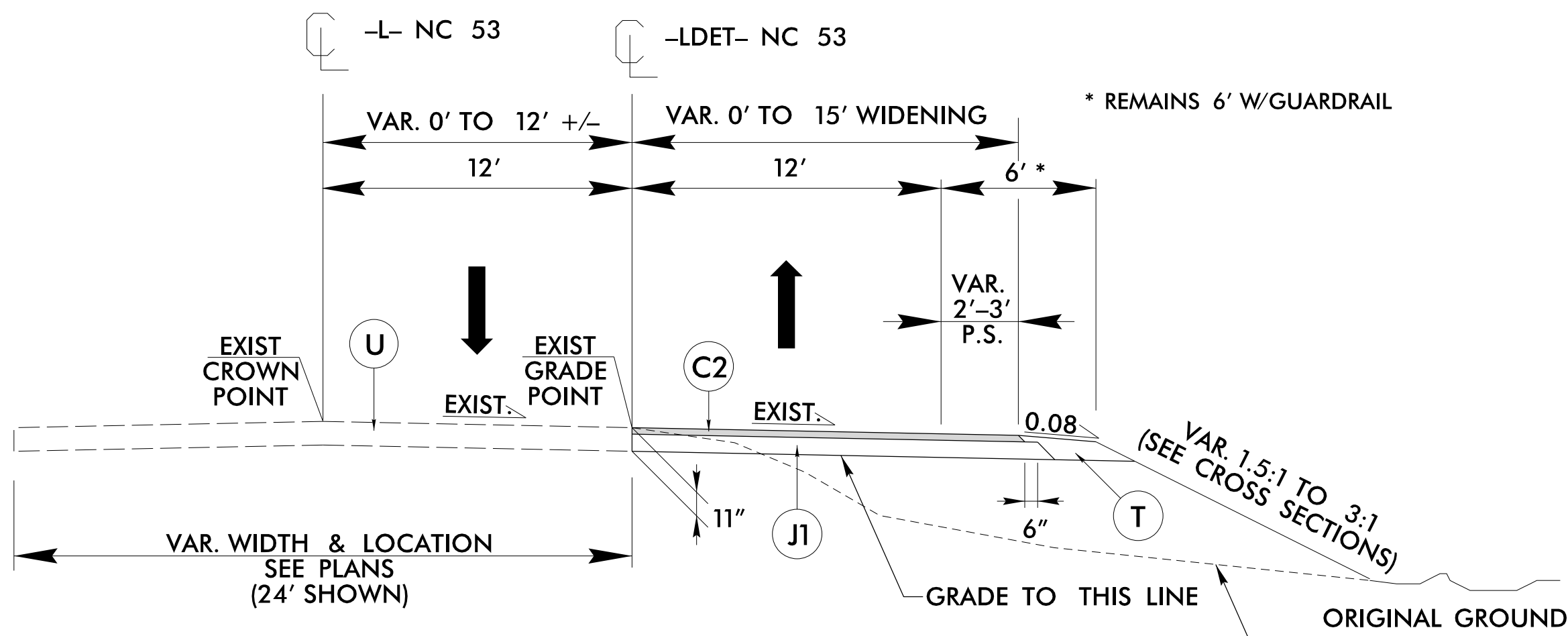
** NOTE: 2:1 (OR STEEPER) SLOPES
USED WITH ROCK PLATING



DETAIL A

USE DETAIL A IN CONJUNCTION
WITH TYPICAL SECTION NO. 2 & 3

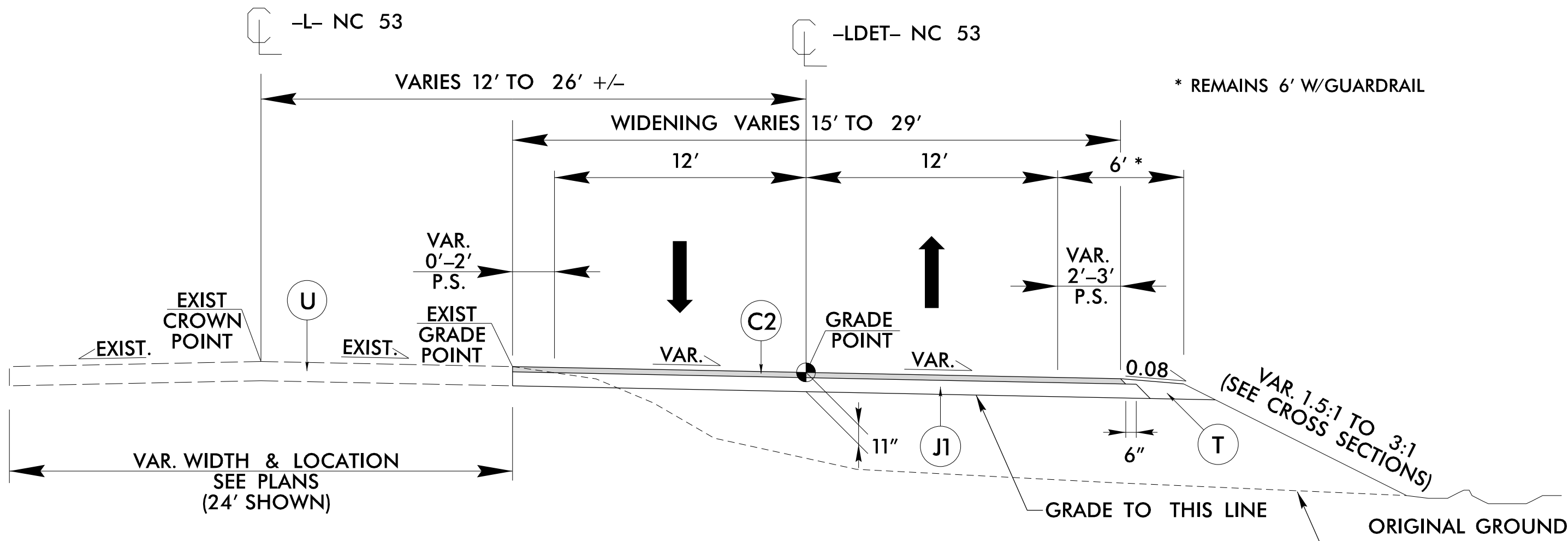
-L- STA. 17+10.07 TO STA. 18+86.33
-L- STA. 20+90.08 TO STA. 22+05.00



TYPICAL SECTION NO. 4

-LDET- STA. 10+00.00 TO STA. 12+07.78
-LDET- STA. 25+49.70 TO STA. 29+08.97

FOR FILL SLOPES 2:1 (OR STEEPER) USE
MODIFIED REINFORCED SOIL SLOPE
PER GEOTECH RECOMMENDATIONS
SHOWN ON SHEET 2G-1



TYPICAL SECTION NO. 5

-LDET- STA. 12+07.78 TO STA. 13+07.20
-LDET- STA. 22+99.00 TO STA. 25+49.70

FOR FILL SLOPES 2:1 (OR STEEPER) USE
MODIFIED REINFORCED SOIL SLOPE
PER GEOTECH RECOMMENDATIONS
SHOWN ON SHEET 2G-1

PAVEMENT SCHEDULE
(FINAL PAVEMENT DESIGN)

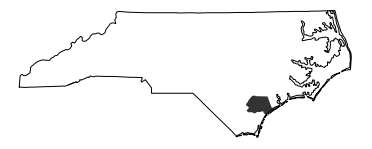
C1	1.5" S9.5C
C2	3" S9.5C
C3	VAR. S9.5C
D1	4" I19.0C
D2	VAR. I19.0C
E1	4" B25.0C
E2	VAR. B25.0C
J1	8" ABC
R1	SHOULDER BERM GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V	2.5" MILLING
W	WEDGING
Y	RUMBLE STRIPS

PAVEMENT EDGE SLOPES ARE 1:1
UNLESS SHOWN OTHERWISE.

BR-0174

4R01 2A-2

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PENDER COUNTY



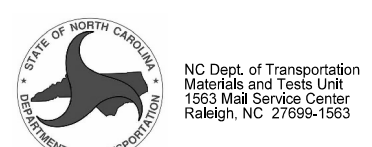
DIVISION 3
ROADWAY DESIGN
ENGINEER

Signed by:
David Z. Keiser
SEAL
033400
ENGINEER
DAVID Z. KEISER
8/5/2026

PAVEMENT DESIGN
ENGINEER
SIGNED BY:
Andrew D. Wang
SEAL
044590
ENGINEER
ANDREW D. WANG
8/4/2026

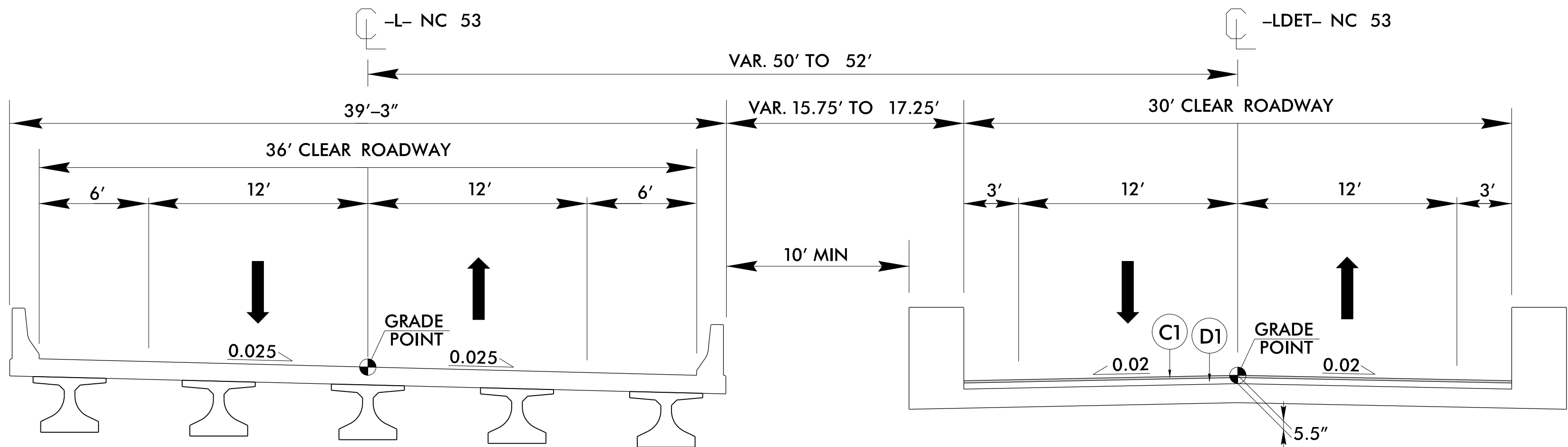
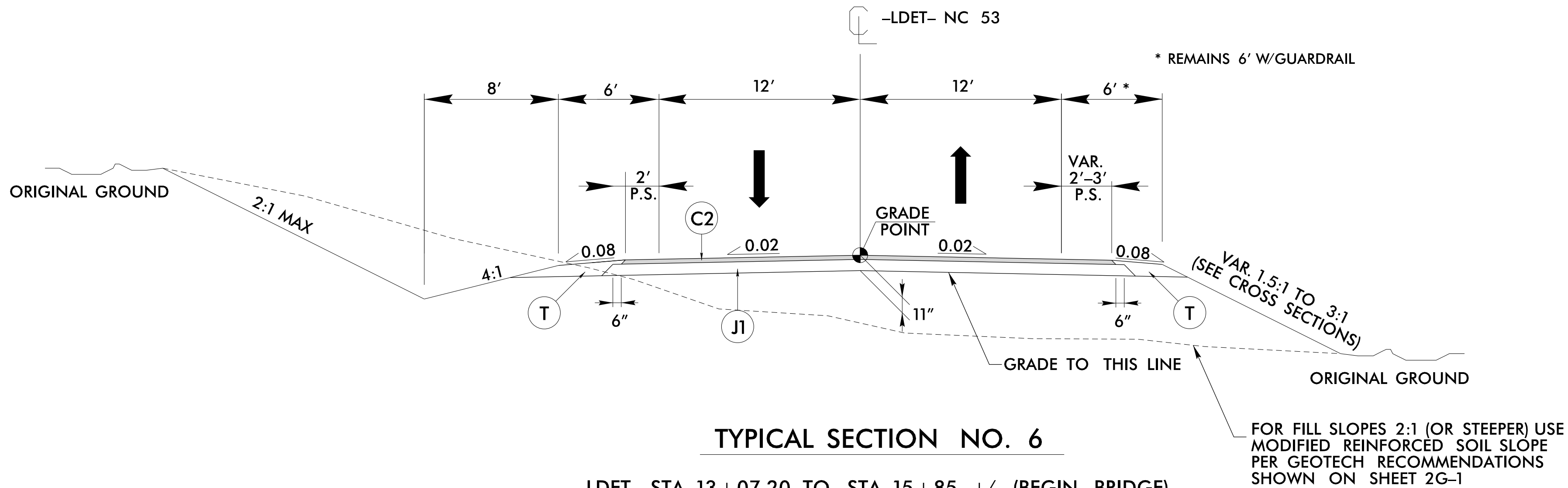
PREPARED BY

CDM Smith Inc.
1133 Franklin Avenue
Suite 300
Raleigh, NC 27603-4461
NC CDA No. F-1255



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11/14/23



TYPICAL SECTION NO. 7

-L- STA. 19+06.50 (BEGIN BRIDGE) TO STA. 20+61.50 (END BRIDGE)

-LDET- STA. 15+85 +/- (BEGIN BRIDGE) TO STA. 18+85 +/- (END BRIDGE)

NOTES: SEE STRUCTURE PLANS FOR STRUCTURE CONSTRUCTION DETAILS

PAVEMENT DESIGN ENGINEER'S SEAL DOES NOT APPLY TO TYPICAL SECTION NO. 7

PAVEMENT SCHEDULE
(FINAL PAVEMENT DESIGN)

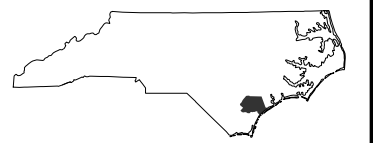
C1	1.5" S9.5C
C2	3" S9.5C
C3	VAR. S9.5C
D1	4" I19.0C
D2	VAR. I19.0C
E1	4" B25.0C
E2	VAR. B25.0C
J1	8" ABC
R1	SHOULDER BERM GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V	2.5" MILLING
W	WEDGING
Y	RUMBLE STRIPS

PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

BR-0174

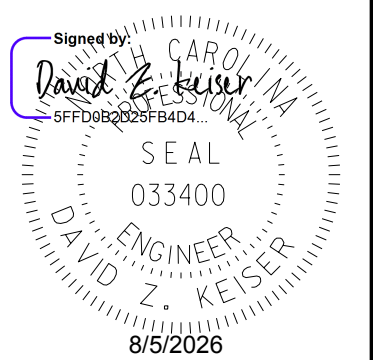
4R01 2A-3

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PENDER COUNTY

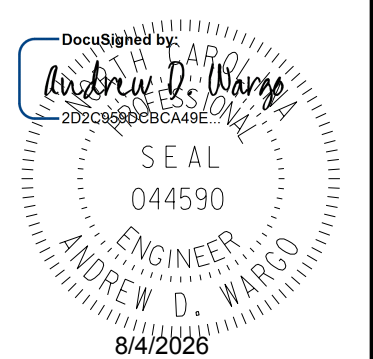


DIVISION 3

ROADWAY DESIGN
ENGINEER



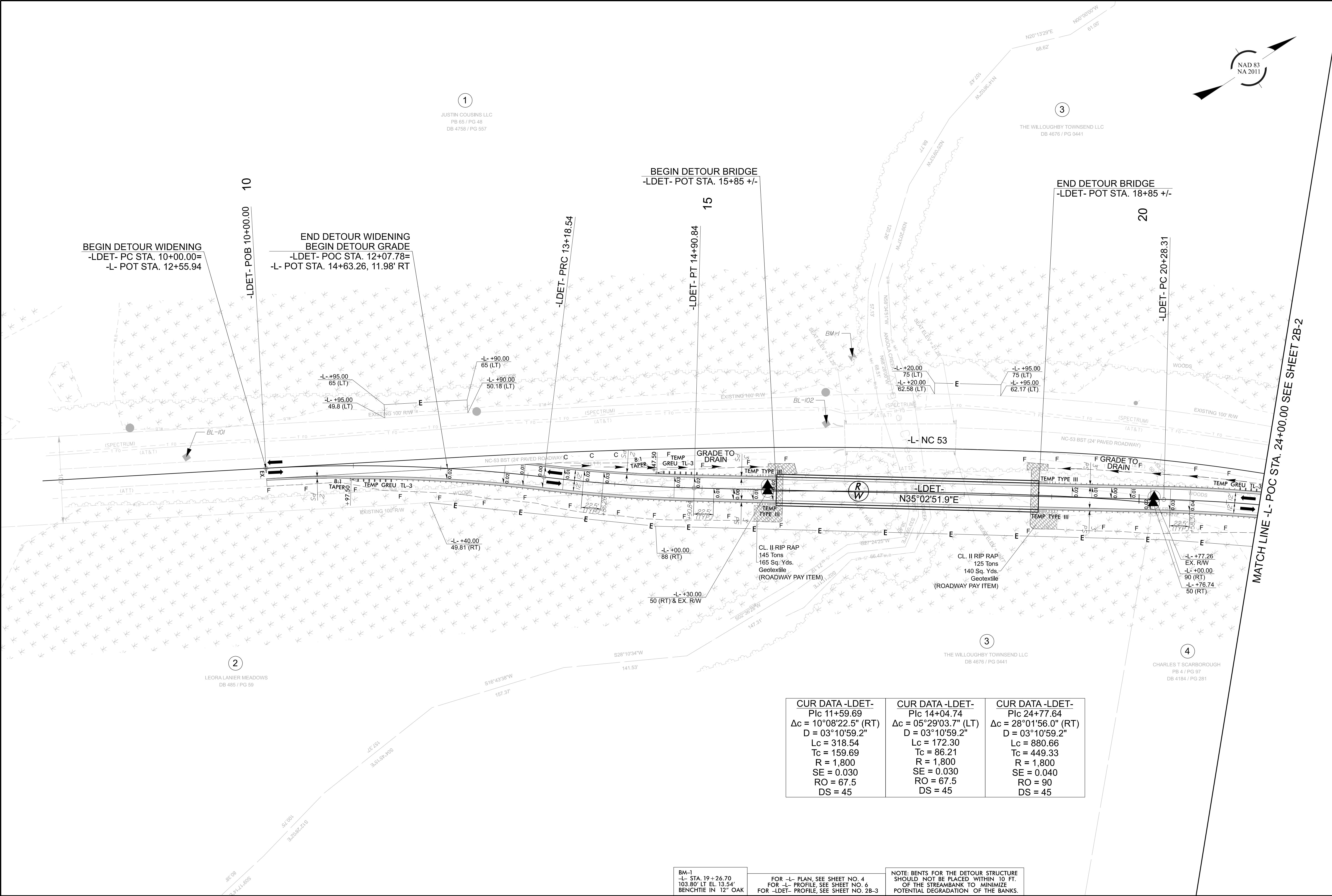
PAVEMENT DESIGN
ENGINEER



PREPARED BY



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1
JUSTIN COUSINS LLC
PB 65 / PG 48
DB 4758 / PG 557

3
THE WILLOUGHBY TOWNSEND LLC
DB 4676 / PG 0441



2
LEORA LANIER MEADOWS
DB 485 / PG 59

3
THE WILLOUGHBY TOWNSEND LLC
DB 4676 / PG 0441

4
CHARLES T SCARBOROUGH
PB 4 / PG 97
DB 4184 / PG 281

CUR DATA -LDET- P/c 11+59.69 Δc = 10°08'22.5" (RT) D = 03°10'59.2" Lc = 318.54 Tc = 159.69 R = 1,800 SE = 0.030 RO = 67.5 DS = 45	CUR DATA -LDET- P/c 14+04.74 Δc = 05°29'03.7" (LT) D = 03°10'59.2" Lc = 172.30 Tc = 86.21 R = 1,800 SE = 0.030 RO = 67.5 DS = 45	CUR DATA -LDET- P/c 24+77.64 Δc = 28°01'56.0" (RT) D = 03°10'59.2" Lc = 880.66 Tc = 449.33 R = 1,800 SE = 0.040 RO = 90 DS = 45
---	--	---

BM-1
-L- STA. 19+26.70
103.80' LT EL. 13.54'
BENCHMARK IN 12" OAK

FOR -L- PLAN, SEE SHEET NO. 4
FOR -L- PROFILE, SEE SHEET NO. 6
FOR -LDET- PROFILE, SEE SHEET NO. 2B-3

NOTE: BENTS FOR THE DETOUR STRUCTURE
SHOULD NOT BE PLACED WITHIN 10 FT.
OF THE STREAMBANK TO MINIMIZE
POTENTIAL DEGRADATION OF THE BANKS.

BR-0174

4R0128-I

NORTH CAROLINA
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PENDER COUNTY

DIVISION 3
ROADWAY DESIGN
ENGINEER

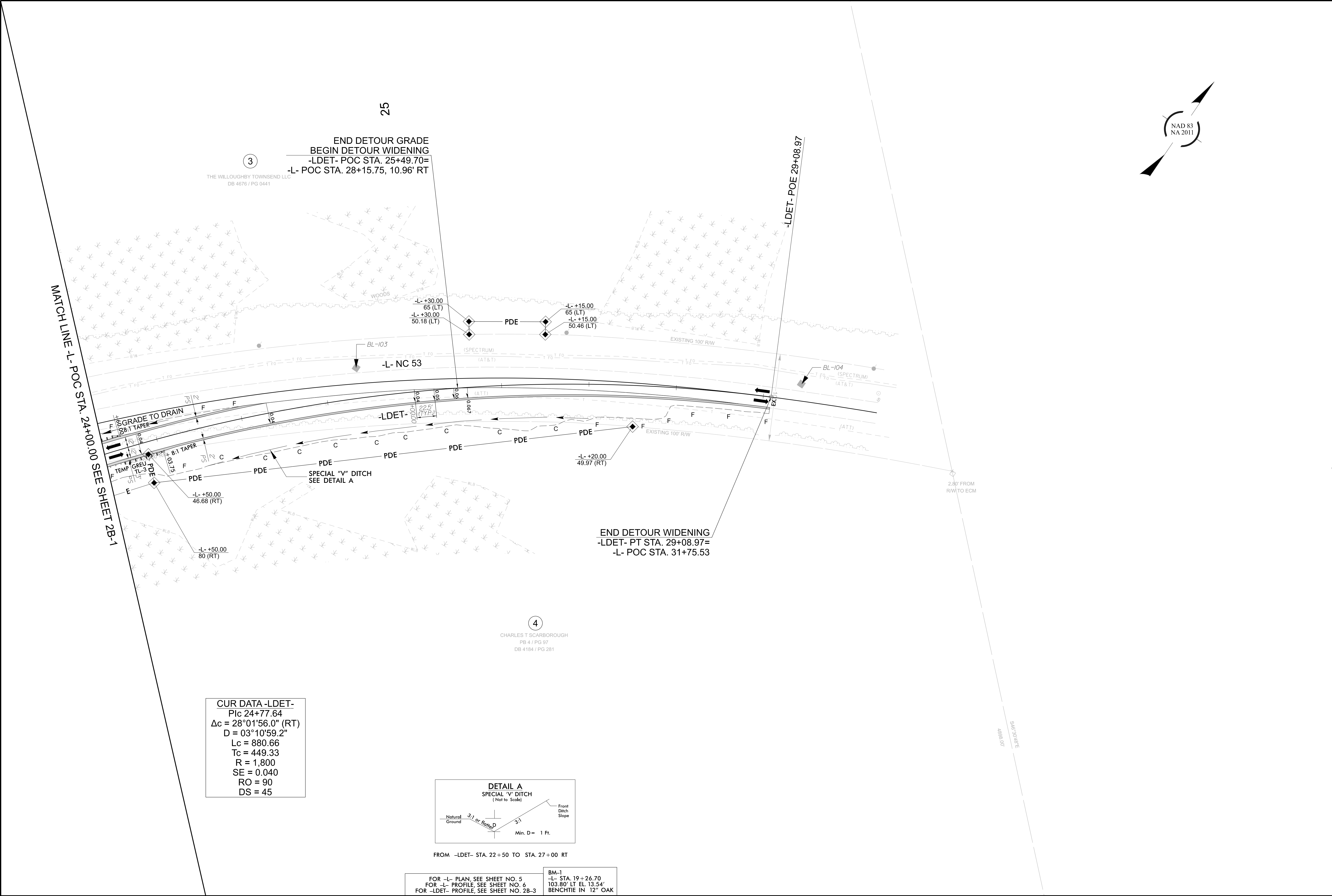
Signed by
David Z. Keiser
Professional Engineer
033400
DAVID Z. KEISER
8/5/2026

Hydraulics
ENGINEER

Signed by
M. Harknider
Professional Engineer
035021
M. HARKNIDER
8/4/2026

PREPARED BY
CDM Smith
CDM Smith Inc.
1133 Parkside Avenue
Suite 300
Farmington, NC 28731-4481
NC CDA No. F-1255

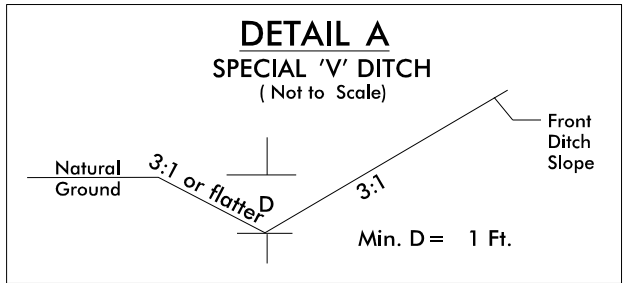
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UNLESS ALL SIGNATURES COMPLETED



3
THE WILLOUGHBY TOWNSEND LLC
DB 4676 / PG 0441

4
CHARLES T SCARBOROUGH
PB 4 / PG 97
DB 4184 / PG 281

CUR DATA -LDET-
P/c 24+77.64
 $\Delta c = 28^{\circ}01'56.0''$ (RT)
D = $03^{\circ}10'59.2''$
Lc = 880.66
Tc = 449.33
R = 1,800
SE = 0.040
RO = 90
DS = 45



FROM -LDET- STA. 22+50 TO STA. 27+00 RT

FOR -L- PLAN, SEE SHEET NO. 5
FOR -L- PROFILE, SEE SHEET NO. 6
FOR -LDET- PROFILE, SEE SHEET NO. 2B-3

BM-1
-L- STA. 19+26.70
103.80' LT EL. 13.54'
BENCHMARK IN 12" OAK

BR-0174

4R0128-2

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PENDER COUNTY

DIVISION 3

ROADWAY DESIGN
ENGINEER

Signed by

SEAL
033400
ENGINEER
DAVID Z. KEISER
8/5/2026

HYDRAULICS
ENGINEER

Documented by

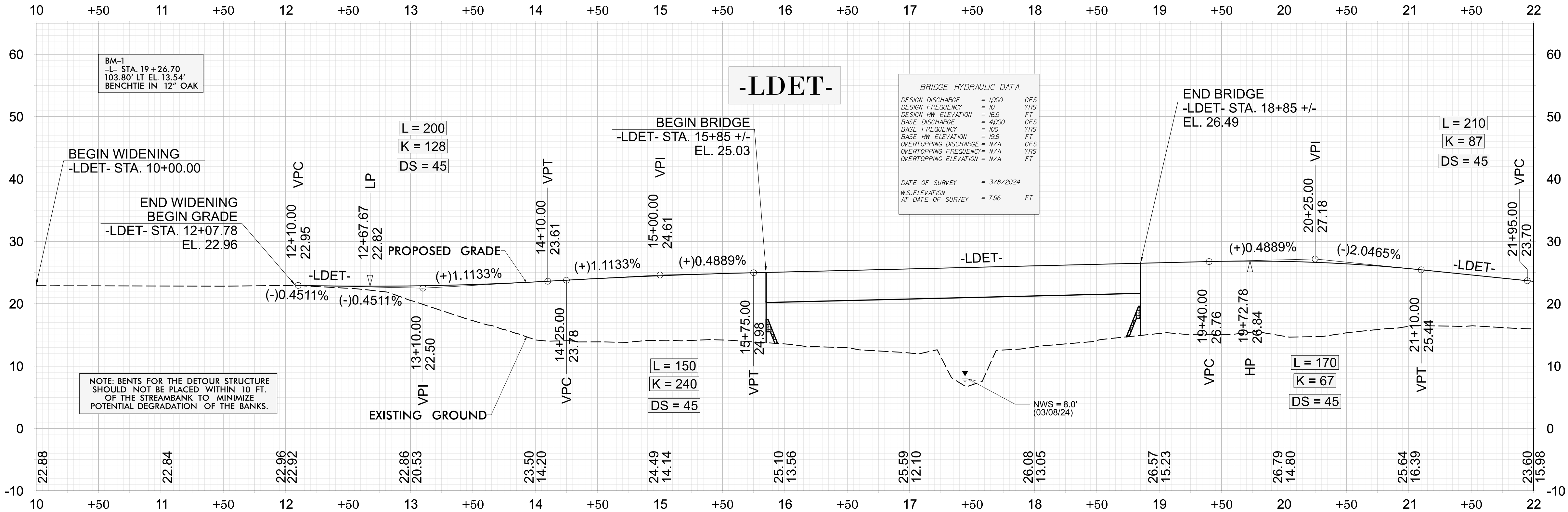
SEAL
035021
ENGINEER
HEATHER M. HARKNIDER
8/4/2026

PREPARED BY

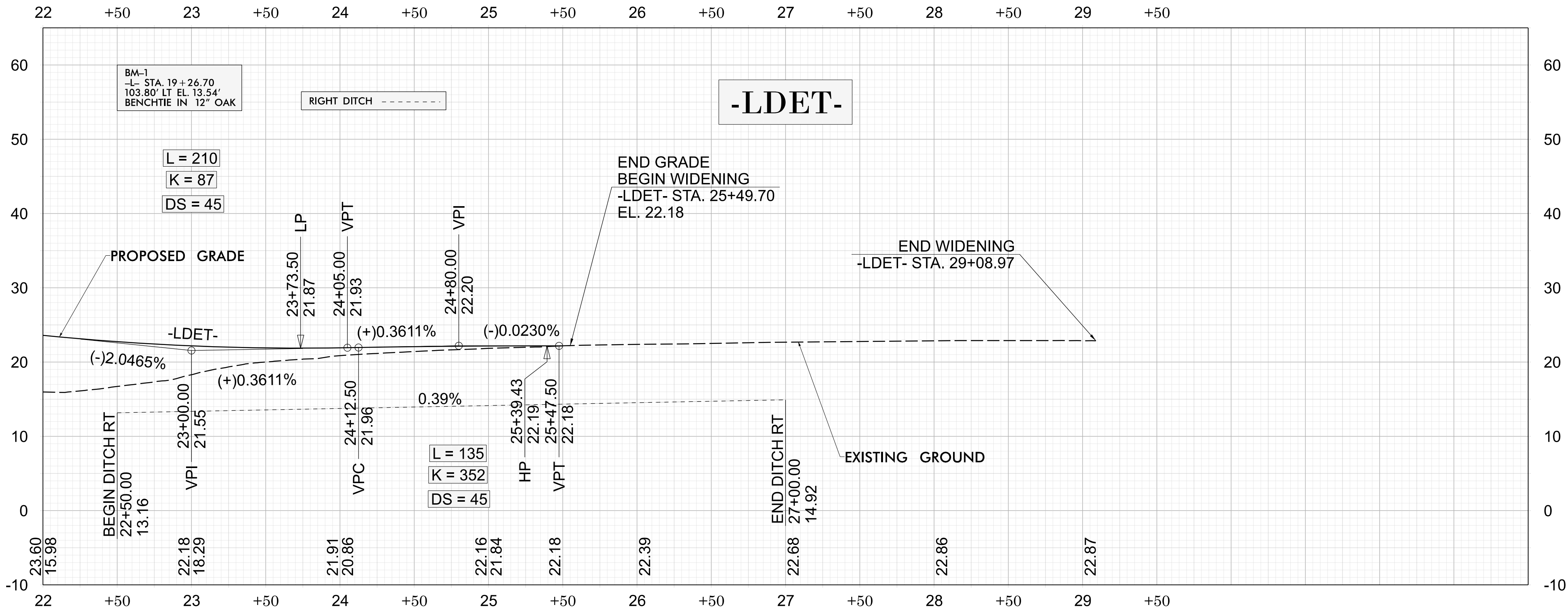
CDM Smith Inc.
1130 Parkside Avenue
Suite 300
Fayetteville, NC 28533-4481
NC CDA No. F-1255

DOCUMENT NOT CONSIDERED FINAL
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11/14/23



FOR -LDET- PLAN, SEE SHEET NO. 28-1

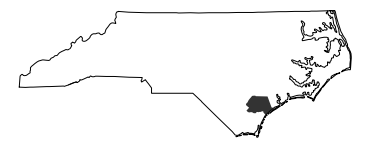


FOR -LDET- PLAN, SEE SHEET NO. 28-2

BR-0174

4R01 28-3

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PENDER COUNTY



DIVISION 3
ROADWAY DESIGN
ENGINEER

Signature: David Z. Keiser
SEAL
033400
ENGINEER
DAVID Z. KEISER
8/5/2026

HYDRAULICS
ENGINEER

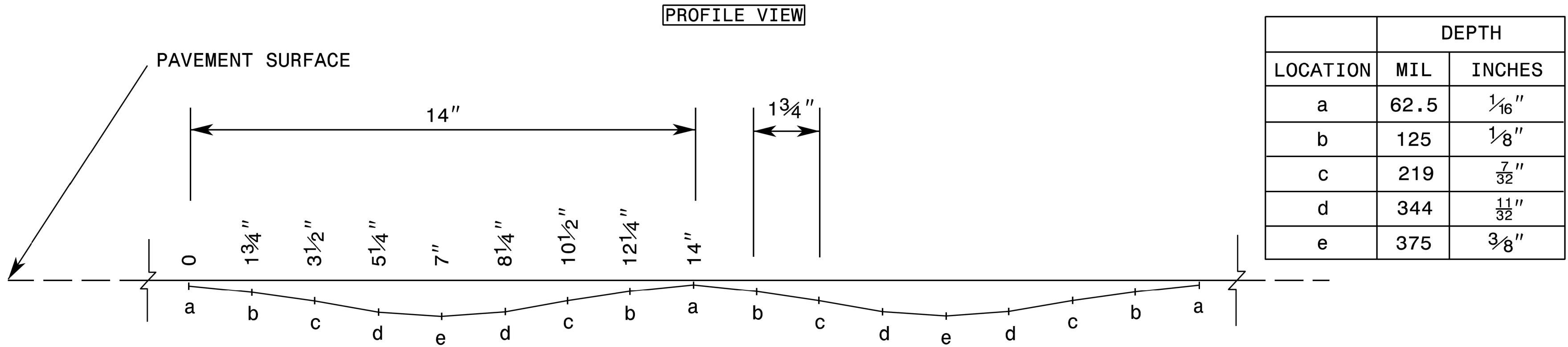
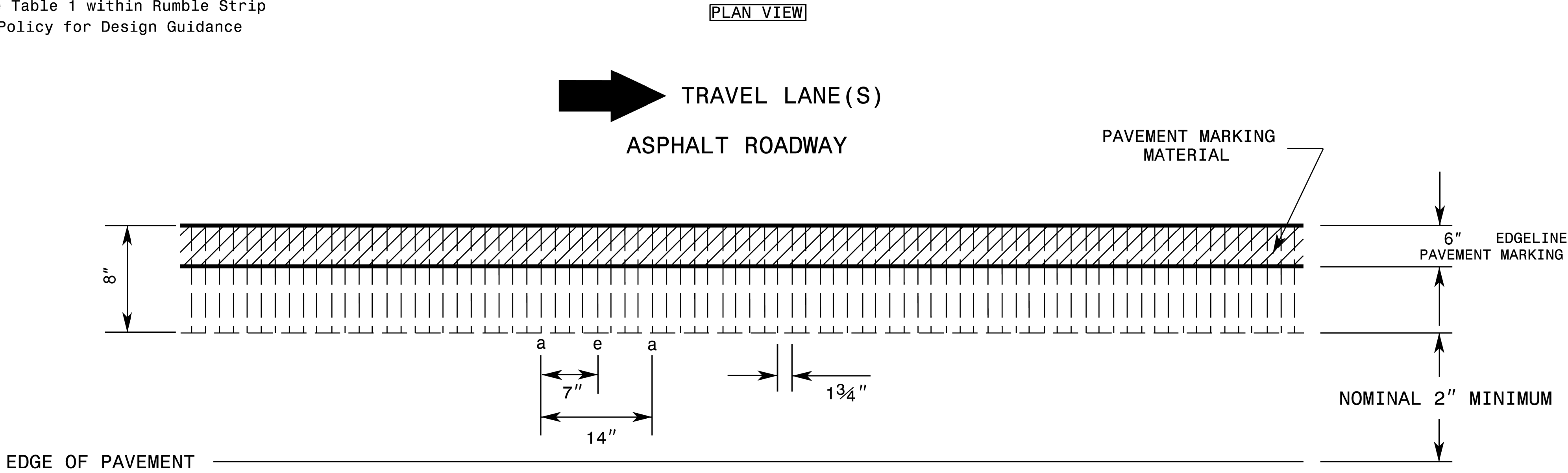
Signature: Heather M. Harkins
SEAL
035021
ENGINEER
HEATHER M. HARKINS
8/4/2026

PREPARED BY

CDM Smith Inc.
1133 Parkside Avenue
Suite 300
Fayetteville, NC 27517-4461
NC CDA No. F-1255

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See Table 1 within Rumble Strip
Policy for Design Guidance

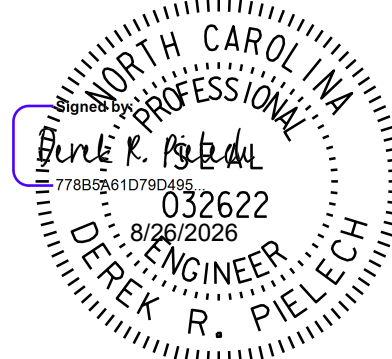


REFERENCE DRAWING ID: Sin.Stripe

NOTES:

- 1) Specification in table taken from MNDOT Research Project Final Report 2016-23: *Sinusoidal Rumble Strip Design Optimization Study By: Terhaar et. al, June 2016*
- 2) USING A VACUUM, REMOVE ALL DEBRIS FROM THE MILLINGS JUST PRIOR TO PLACING ANY PAVEMENT MARKINGS.
- 3) ENSURE GLASS BEADS ARE SPREAD UNIFORMLY OVER THE ENTIRE SURFACE OF THE PAVEMENT MARKING MATERIAL.

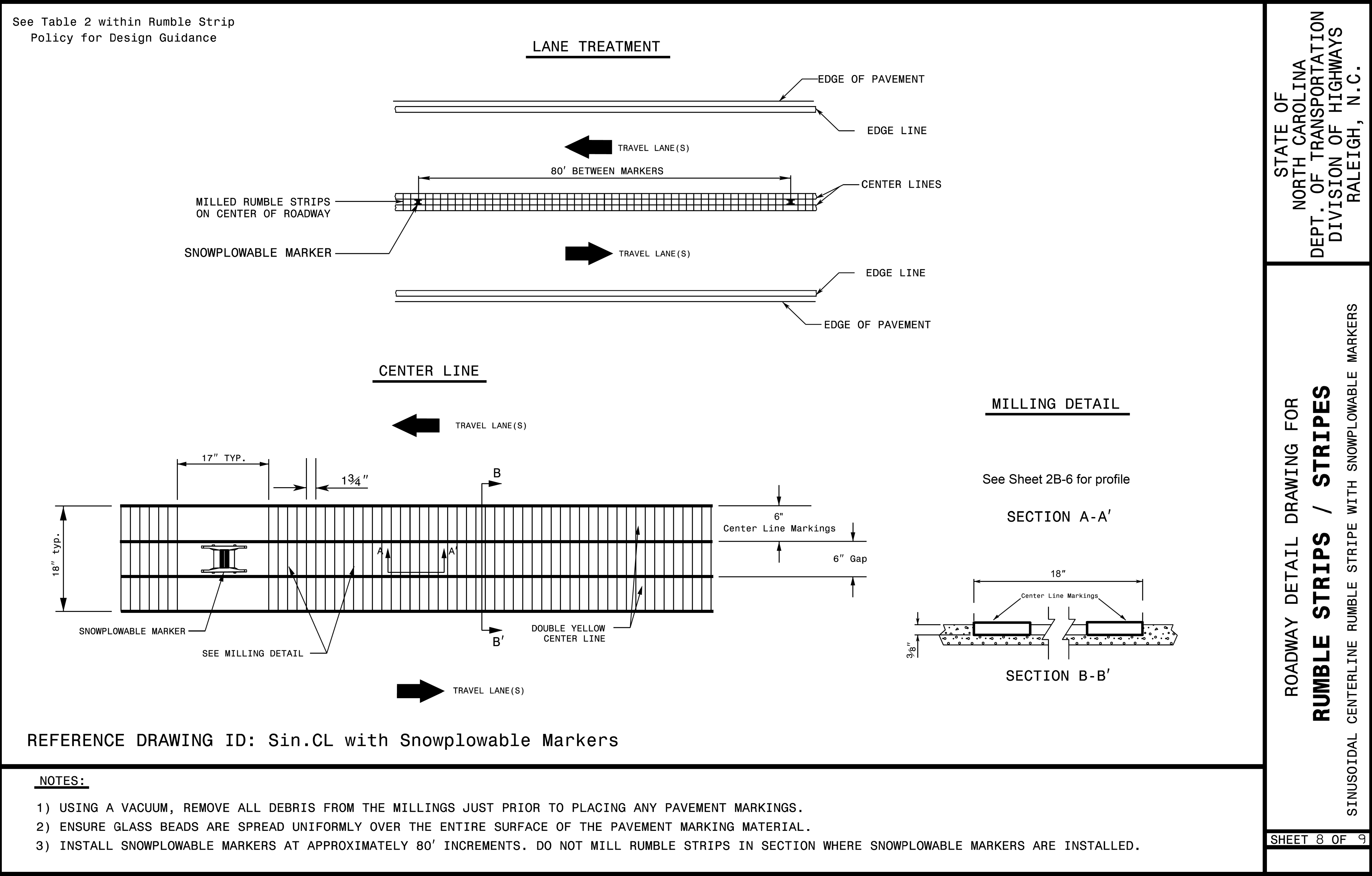
SHEET 4 OF 9



CONTRACTS STANDARDS
AND DEVELOPMENT UNIT
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SEE TITLE BLOCK

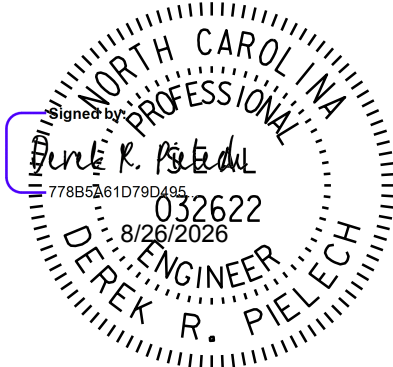
ORIGINAL BY: C. SIMPSON DATE: 04-24-2025
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.:



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DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
RUMBLE STRIPS / STRIPES
SINUSOIDAL CENTERLINE RUMBLE STRIPE WITH SNOWPLOWABLE MARKERS

SHEET 8 OF 9



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Office 919-707-8950 FAX 919-250-4119	
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CHECKED BY: _____	DATE: _____
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Rumble Dimensions

← TRAVEL LANES

DOUBLE YELLOW
CENTER LINE

Markings Dimensions

Rumble Dimensions

← TRAVEL LANE:

DOUBLE YELLOW
CENTER LINE

Markings Dimensions

PAVEMENT SURFACE

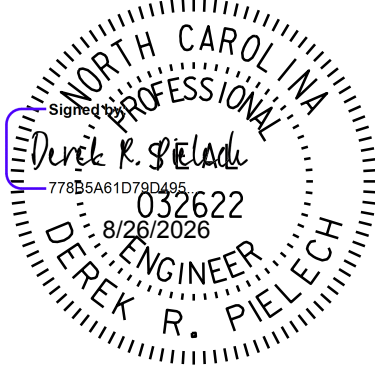
	DEPTH	
LOCATION	MIL	INCHES
a	62.5	$\frac{1}{16}$ "
b	125	$\frac{1}{8}$ "
c	219	$\frac{7}{32}$ "
d	344	$\frac{11}{32}$ "
e	375	$\frac{3}{8}$ "

NOTES:

- SHEET 6 OF 9

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DIVISION OF HIGHWAYS
RALEIGH, N.C.

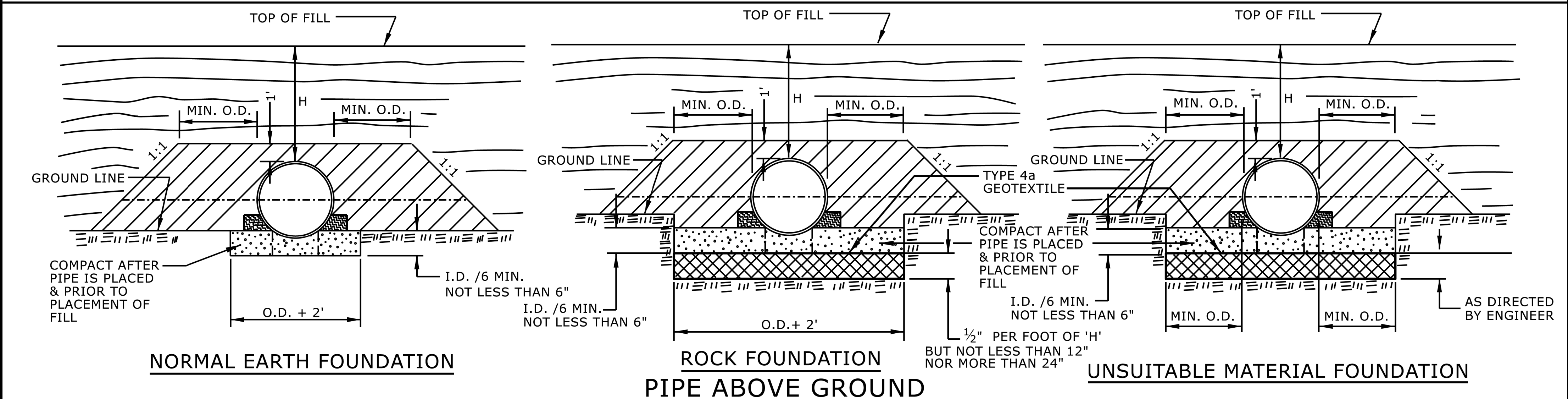
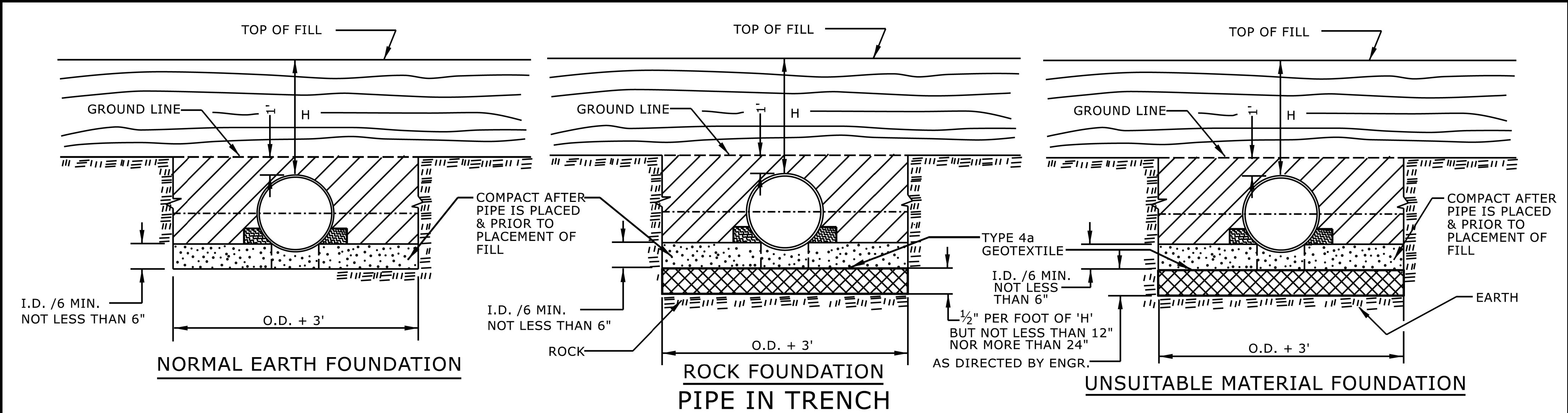
ROADWAY DETAIL DRAWING FOR
RUMBLE STRIPS / STRIPES
SINUSOIDAL CENTERLINE RUMBLE STRIPE



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AND DEVELOPMENT UNIT**
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SEE TITLE BLOCK

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



GENERAL NOTES:

I.D. = THE MAXIMUM HORIZONTAL INSIDE DIAMETER DIMENSION.

O.D. = THE MAXIMUM HORIZONTAL OUTSIDE DIAMETER DIMENSION.

H = THE FILL HEIGHT MEASURED VERTICALLY AT ANY POINT ALONG THE PIPE FROM THE TOP OF THE PIPE TO THE TOP OF THE EMBANKMENT AT THAT POINT.

APPROVED SUITABLE LOCAL MATERIAL.

TAKE CARE TO FULLY COMPACT HAUNCH ZONE OF PIPE BACKFILL.

LOOSELY PLACED SELECT MATERIAL CLASS III OR CLASS II, TYPE 1 FOR PIPE BEDDING. LEAVE SECTION DIRECTLY BENEATH PIPE UNCOMPACTED AS PIPE SEATING AND BACKFILL WILL ACCOMPLISH COMPACTION.

DO NOT OPERATE HEAVY EQUIPMENT OVER ANY PIPE CULVERT UNTIL THE PIPE CULVERT HAS BEEN PROPERLY BACKFILLED AND COVERED WITH AT LEAST 3 FEET OF APPROVED MATERIAL.

REFER TO NCDOT PIPE MATERIAL SELECTION GUIDE AND STANDARD SPECIFICATIONS FOR ALLOWABLE PIPE FILL HEIGHTS AND PIPE SPECIFICATIONS.

SPRINGLINE OF PIPE

SELECT BACKFILL MATERIAL CLASS III OR CLASS II, TYPE 1 ABOVE AND BELOW SPRINGLINE.

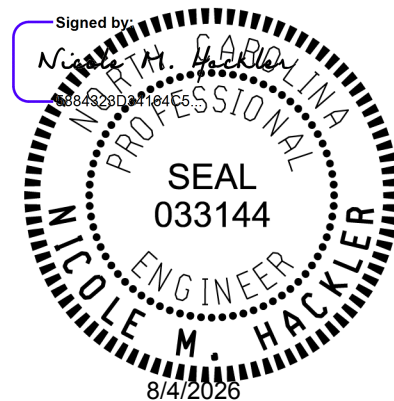
UNDISTURBED EARTH MATERIAL

SELECT MATERIAL CLASS V OR VI FOR FOUNDATION CONDITIONING. ENCAPSULATE WITH TYPE IV GEOTEXTILE AS DIRECTED BY THE ENGINEER.

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ROADWAY DETAIL DRAWING FOR
METHOD OF PIPE INSTALLATION
FLEXIBLE PIPE

SHEET 1 OF 2
300.01

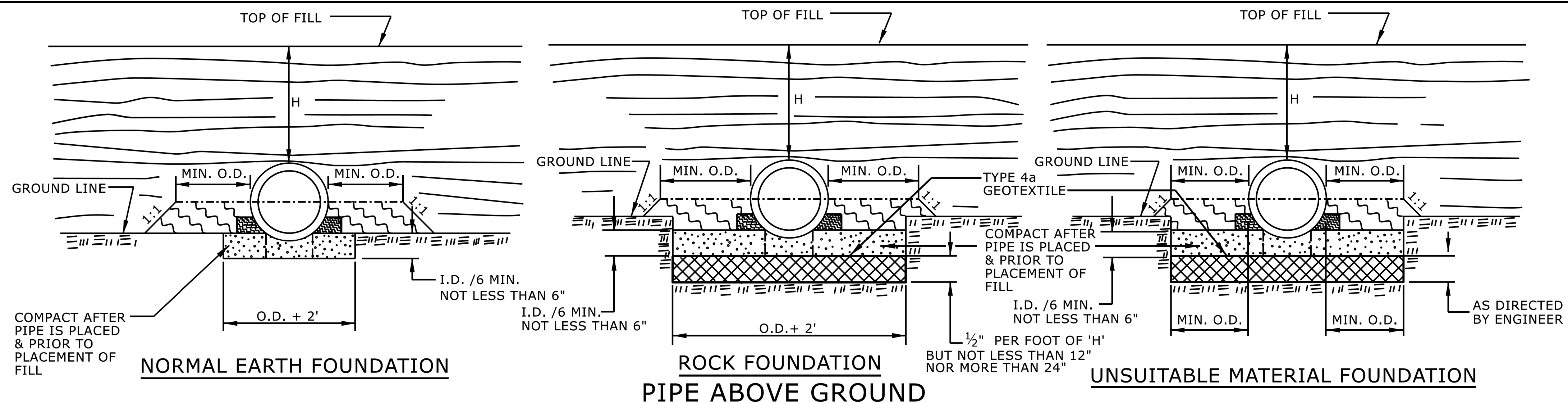
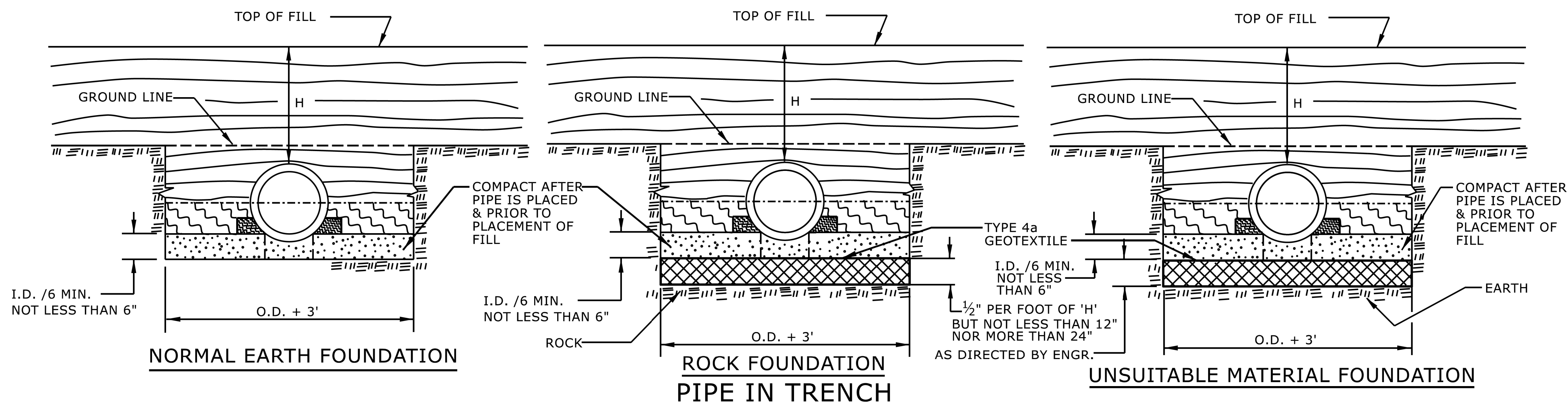


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FILE SPEC.: DATE:



GENERAL NOTES:
 I.D. = THE MAXIMUM HORIZONTAL INSIDE DIAMETER DIMENSION.
 O.D. = THE MAXIMUM HORIZONTAL OUTSIDE DIAMETER DIMENSION.
 H = THE FILL HEIGHT MEASURED VERTICALLY AT ANY POINT
 ALONG THE PIPE FROM THE TOP OF THE PIPE TO THE TOP
 OF THE EMBANKMENT AT THAT POINT.

	APPROVED SUITABLE LOCAL MATERIAL.
	TAKE CARE TO FULLY COMPACT HAUNCH ZONE OF PIPE BACKFILL.
	LOOSELY PLACED SELECT MATERIAL CLASS III OR CLASS II, TYPE 1 FOR PIPE BEDDING. LEAVE SECTION DIRECTLY BENEATH PIPE UNCOMPACTED AS PIPE SEATING AND BACKFILL WILL ACCOMPLISH COMPACTION.

DO NOT OPERATE HEAVY EQUIPMENT OVER ANY PIPE CULVERT UNTIL THE PIPE CULVERT HAS BEEN PROPERLY BACKFILLED AND COVERED WITH AT LEAST 3 FEET OF APPROVED MATERIAL.

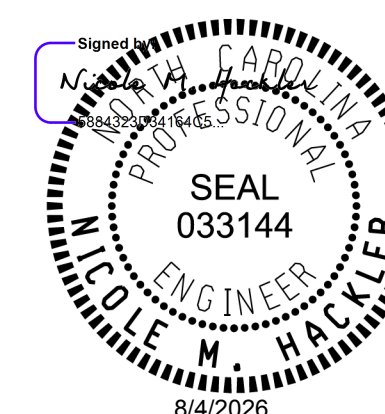
REFER TO NCDOT PIPE MATERIAL SELECTION GUIDE AND STANDARD SPECIFICATIONS
FOR ALLOWABLE PIPE FILL HEIGHTS AND PIPE SPECIFICATIONS.

	SPRINGLINE OF PIPE
	SELECT BACKFILL MATERIAL CLASS III OR CLASS II, BELOW SPRINGLINE.
	UNDISTURBED EARTH MATERIAL
	SELECT MATERIAL CLASS V OR VI FOR FOUNDATION CONDITIONING. ENCAPSULATE WITH TYPE IV GEOTEXTILE AS DIRECTED BY THE ENGINEER.

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ROADWAY DETAIL DRAWING FOR METHOD OF PIPE INSTALLATION RIGID PIPE

SHEET 2 OF 2
300.01



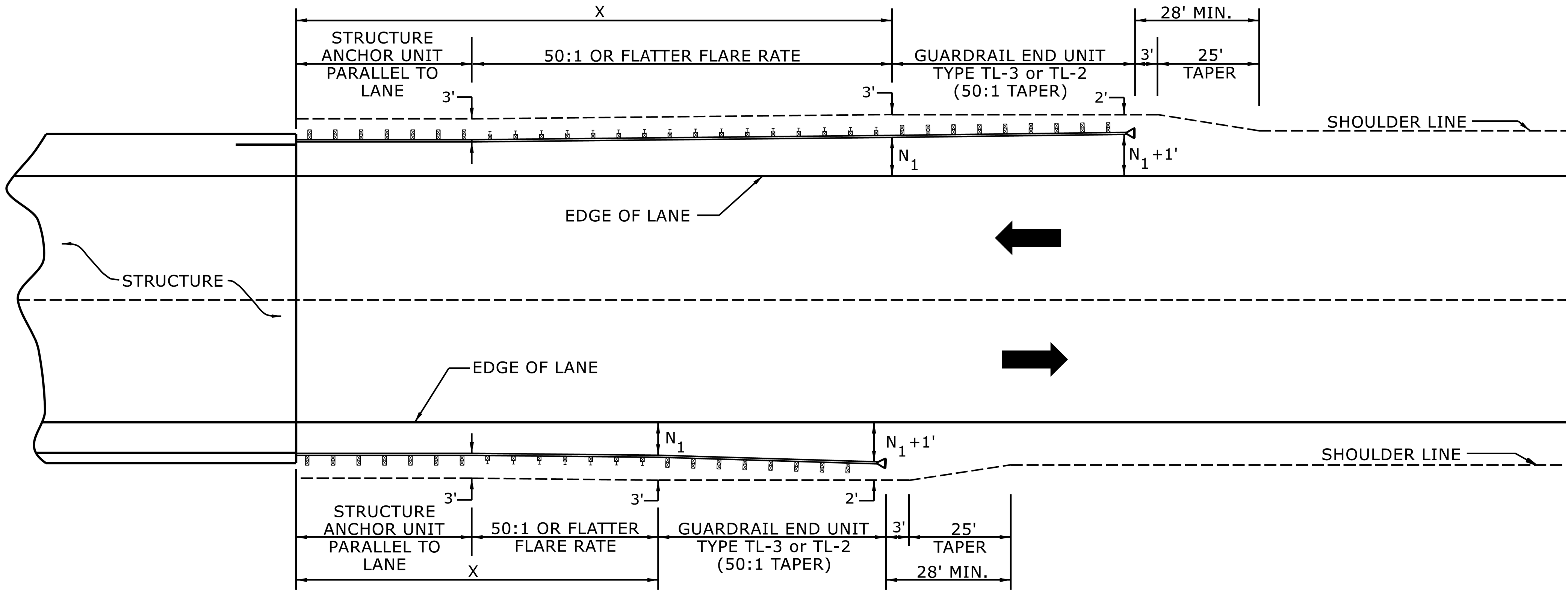
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BR-0174	2C-3



USE FLARE RATE AS THE CONTROL IF THE " N_1 " DISTANCE IS NOT OBTAINED.
(" N_1 " IS BASED ON SHOULDER WIDTHS IN THE ROADWAY DESIGN MANUAL)

SEE STD. 862.03 FOR STRUCTURE ANCHOR UNITS

FOR POSTED SPEEDS $\geq$ 45MPH USE GREU TYPE TL-3
FOR POSTED SPEEDS $<$ 45MPH USE GREU TYPE TL-2

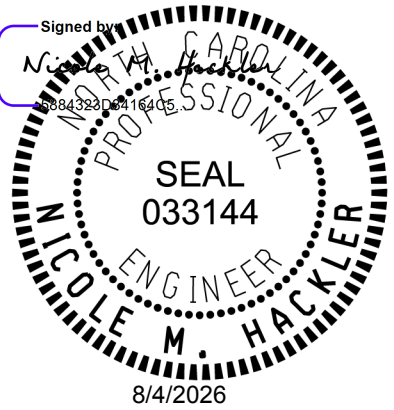
GUARDRAIL LENGTH OF NEED (X) IS CALCULATED BASED ON THE AASHTO ROADSIDE DESIGN GUIDE.

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

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 4 OF 15
862D01



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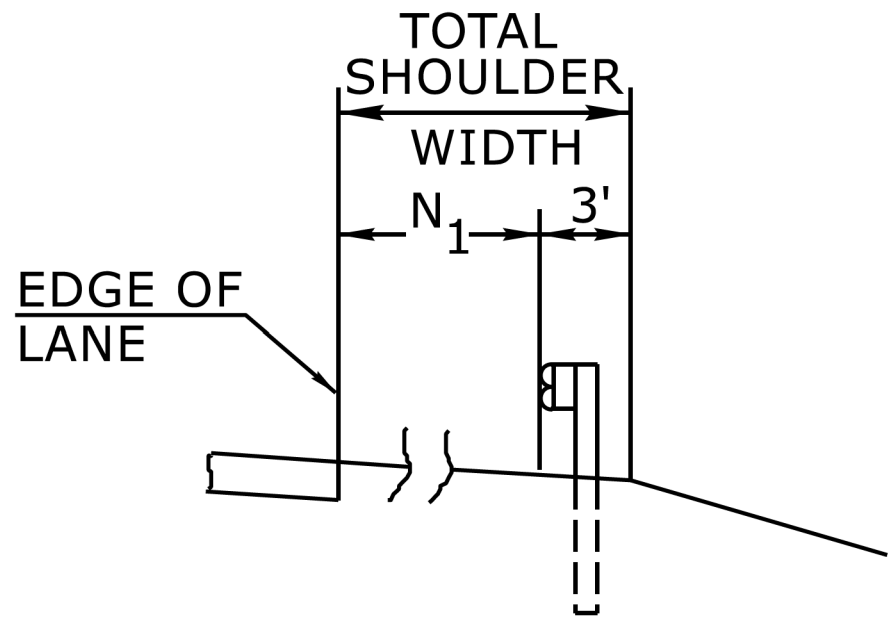
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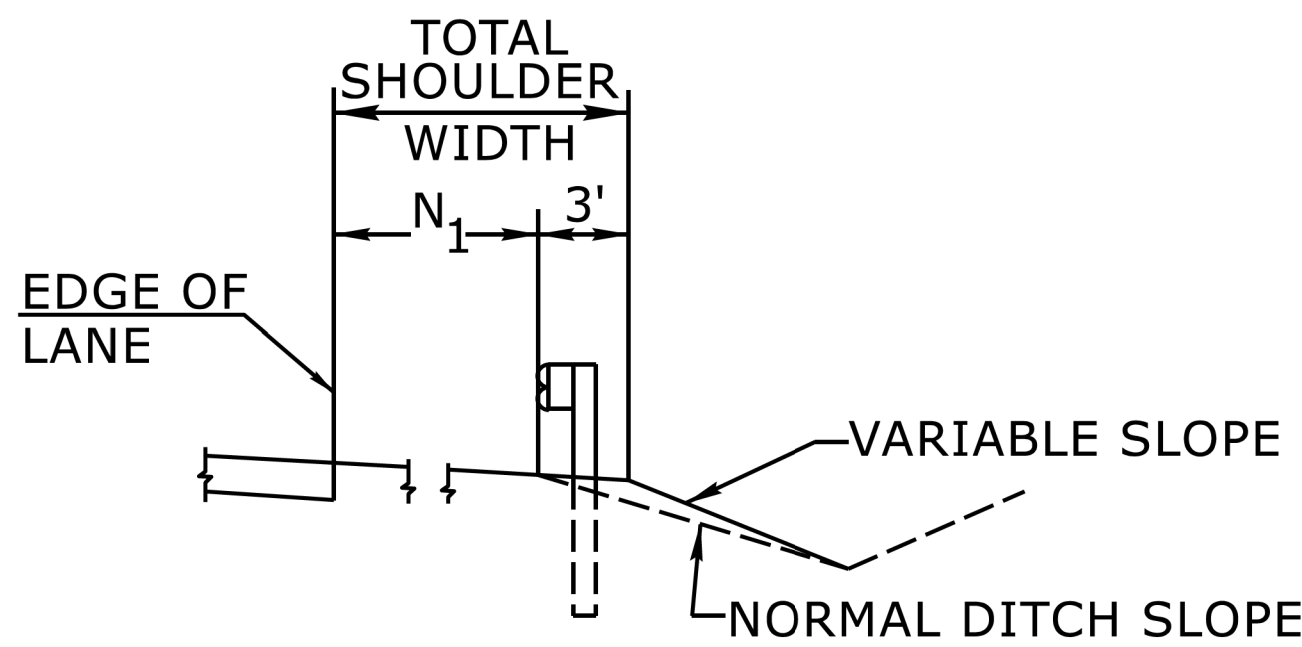
SEE TITLE BLOCK

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

PROJECT REFERENCE NO.	SHEET NO.
BR-0174	2C-4

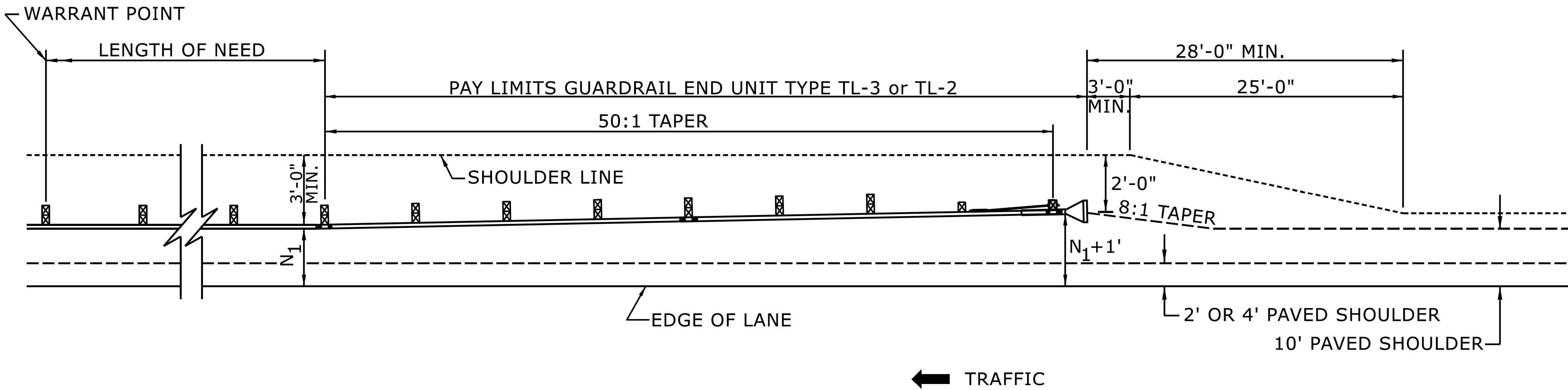


FILL SECTION



CUT SECTION

"N₁"= DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL WHERE GUARDRAIL IS PARALLEL TO LANE.

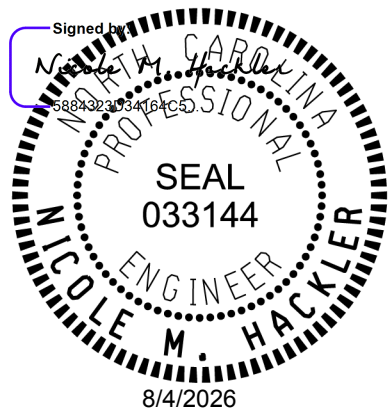


FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

DETAIL OF BEGINNING OF GUARDRAIL IN CUT OR FILL SECTION

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 6 OF 15
862D01



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AND DEVELOPMENT UNIT**

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MODIFIED BY: DATE:
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FILE SPEC.: DATE:

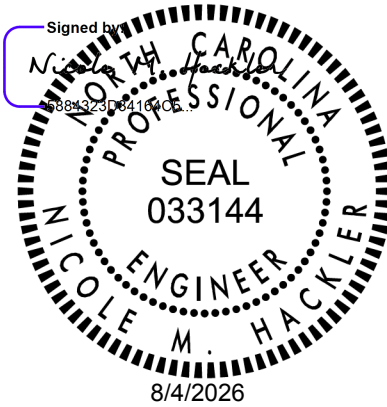
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BR-0174	2C-5

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 5 OF 9

862D02



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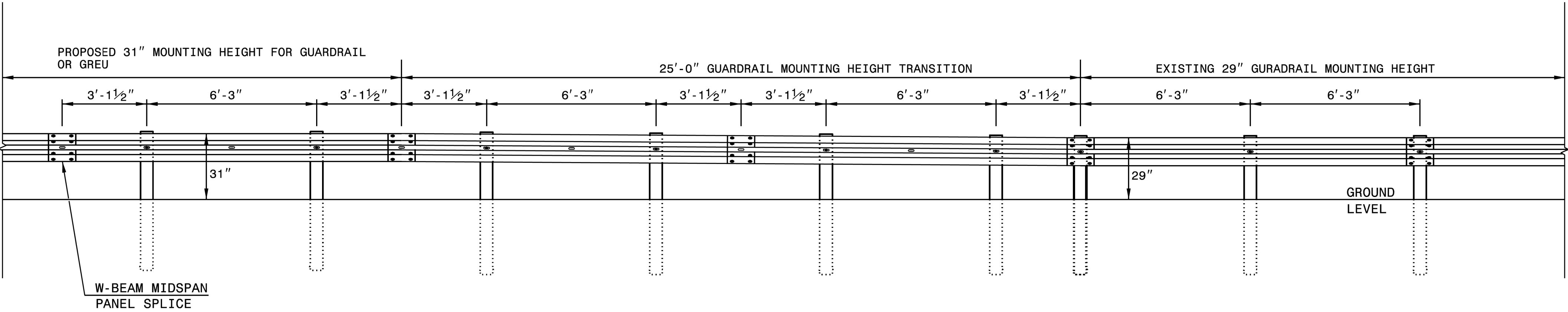
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AND DEVELOPMENT UNIT**

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SEE TITLE BLOCK

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

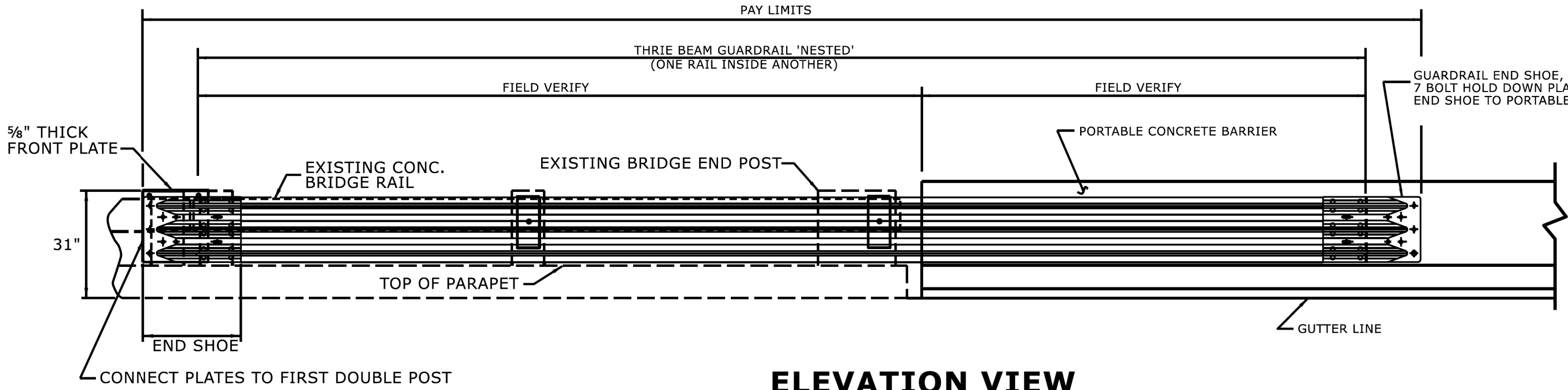
**NOTE: IF EXISTING GUARDRAIL IS LOWER THAN 29", USE AN ADDITIONAL 12'-6" LONG SECTION OF GUARDRAIL,
FOR EVERY 1" OF HEIGHT DIFFERENCE, TO TRANSITION FROM EXISTING GUARDRAIL TO PROPOSED 31" GUARDRAIL.**



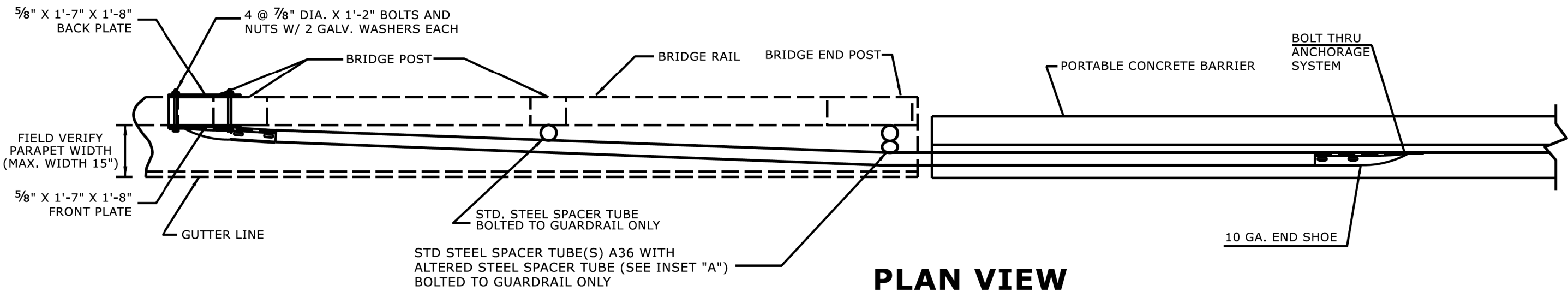
ELEVATION VIEW

TRANSITION FROM 29" TO 31" W-BEAM GUARDRAIL MOUNTING HEIGHT

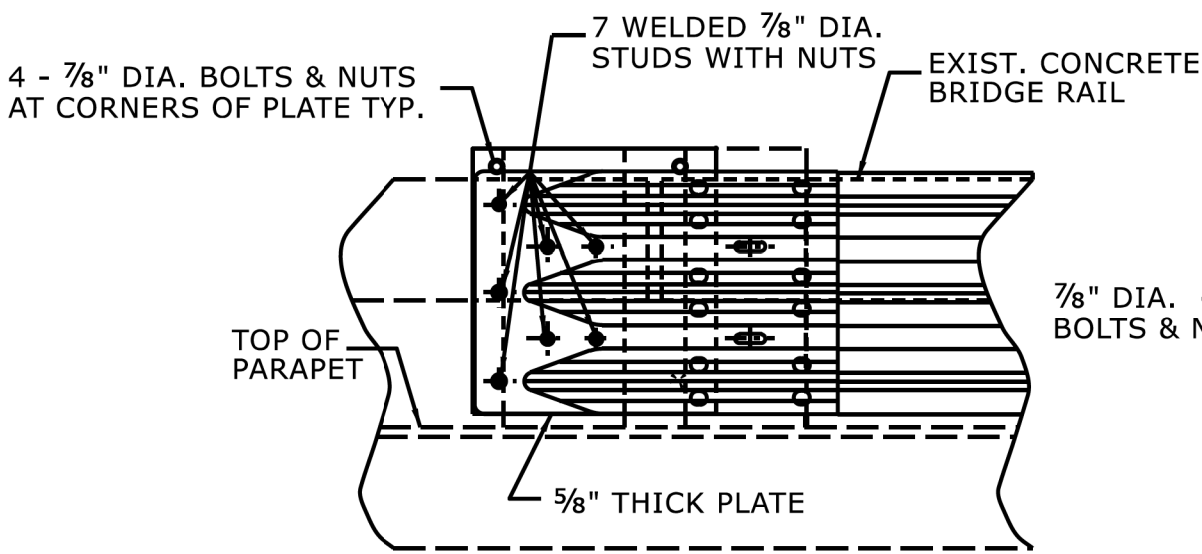
PROJECT REFERENCE NO.	SHEET NO.
BR-0174	2C-6



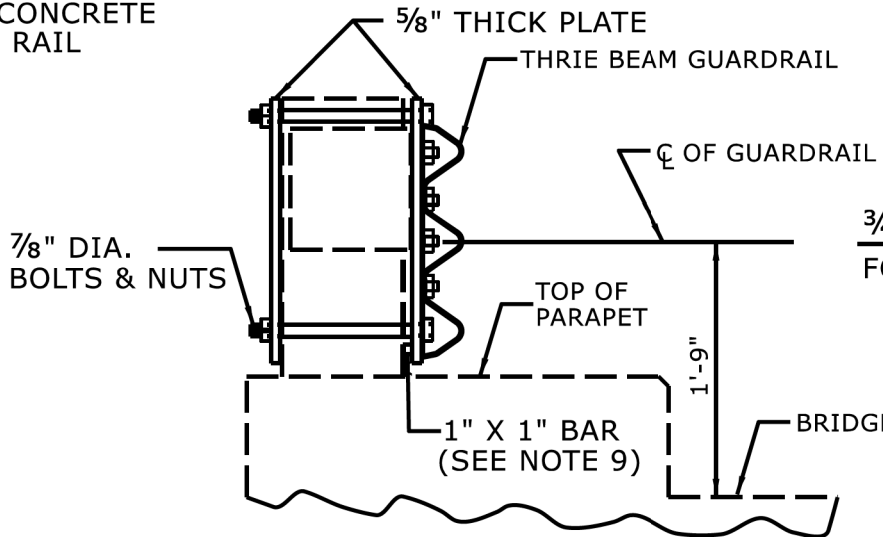
ELEVATION VIEW



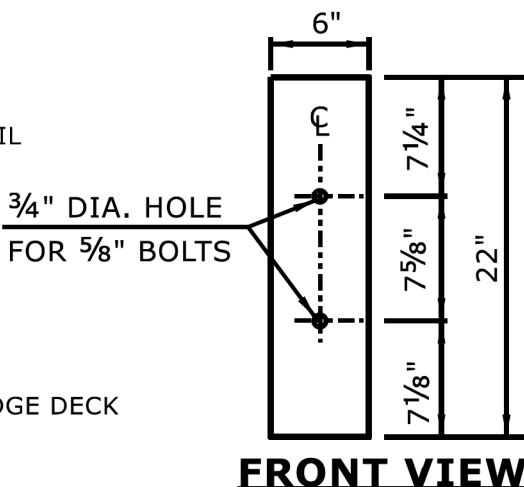
PLAN VIEW



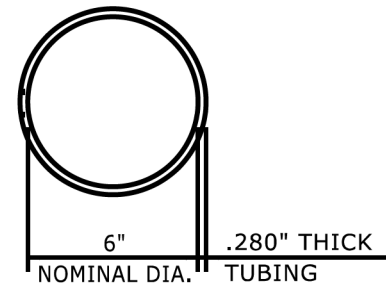
ELEVATION VIEW



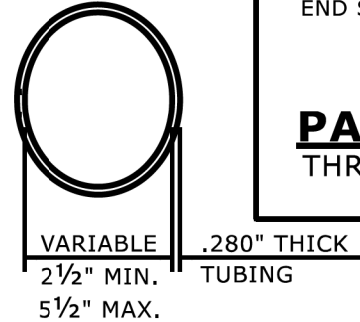
SECTION VIEW



FRONT VIEW

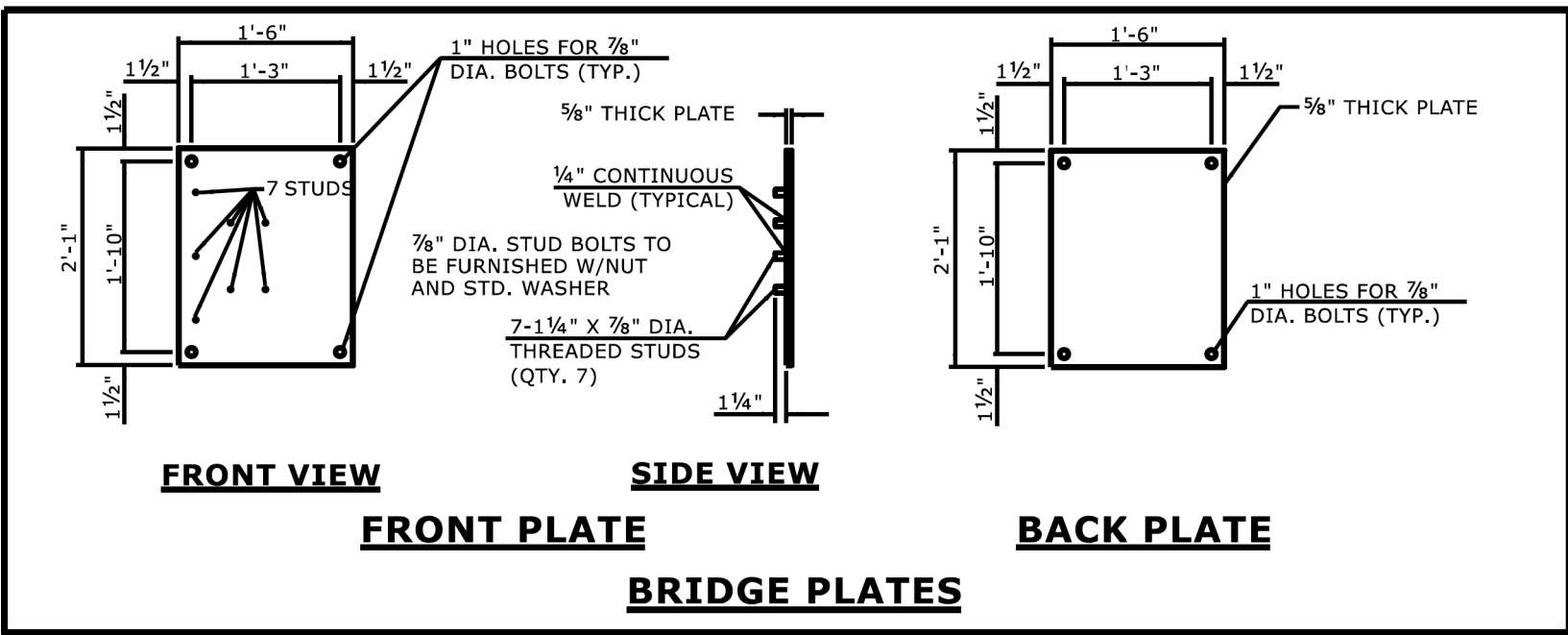


PLAN VIEW



**PLAN VIEW
INSET "A"**

STEEL SPACER TUBE



FRONT VIEW

SIDE VIEW

FRONT PLATE

BACK PLATE

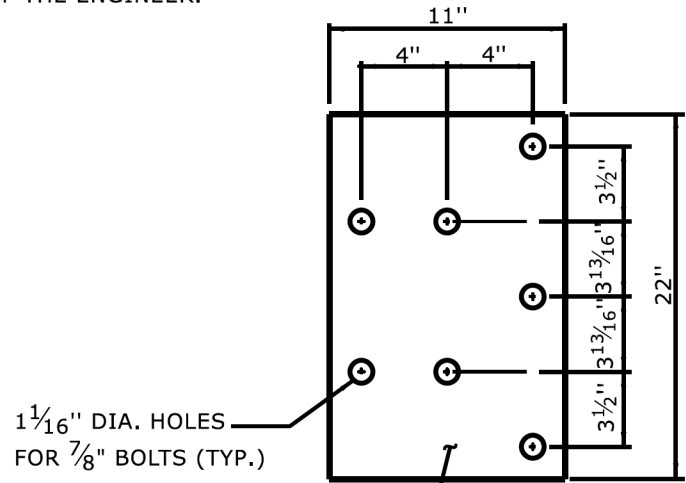
BRIDGE PLATES

NOTES FOR 7 BOLT HOLD DOWN PLATE

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4" HOLD DOWN PLATE AND 7 - 7/8" DIA. BOLTS WITH NUTS AND WASHERS.

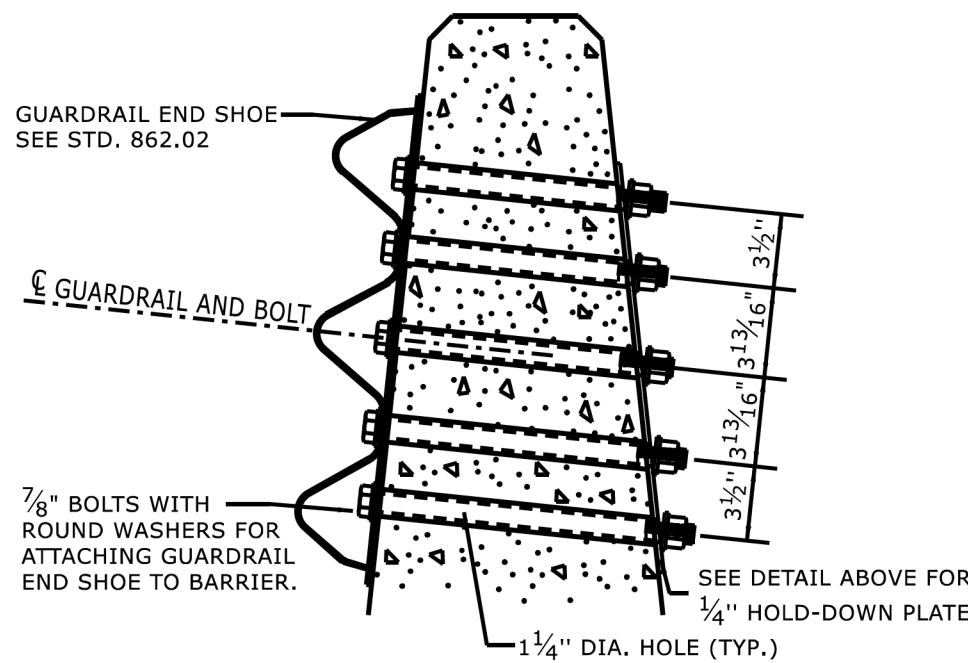
THE HOLD-DOWN PLATE SHALL CONFORM TO AASHTO M270 GRADE 36. AFTER FABRICATION, THE HOLD-DOWN PLATE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M111.

AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL. THE 1/4" DIA. HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.



1 1/16" DIA. HOLES FOR 7/8" BOLTS (TYP.)

7 BOLT HOLD DOWN PLATE



**PART SECTION OF BARRIER OR RAIL
THRU END SHOE SECTION AND 7 BOLT HOLD DOWN PLATE**

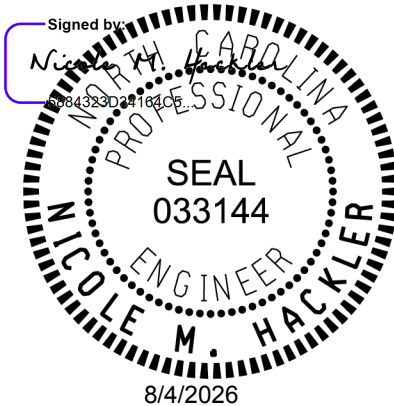
GENERAL NOTES:

1. USE NUTS, BOLTS, AND WASHERS CONFORMING TO THE REQUIREMENTS OF A.S.T.M. A-307 AND GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF STAND. SPECS.
2. TAP NUTS FOR THE 7/8" DIA. STUDS AND BOLTS AFTER GALVANIZING SEE A.S.T.M. A-563.
3. USE PLATES AND TUBES CONFORMING TO THE REQUIREMENTS OF A.S.T.M. A-36 AND GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH SECTION 1076 OF STAND. SPECS.
4. ADDITIONAL FIELD HOLES MAY BE DRILLED IN STEEL RAIL AS DIRECTED BY THE ENGINEER.
5. INSTALL FACE OF GUARDRAIL AS NEAR AS POSSIBLE TO PLUMB WITH THE PARAPET FACE AT BRIDGE END POST SPACER TUBE LOCATION BY USING STANDARD OR ALTERED SPACER TUBES OR A COMBINATION THEREOF OR AS DIRECTED BY THE ENGINEER. FOR VERY SMALL PARAPET WIDTHS, GUARDRAIL MAY BE INSTALLED AGAINST BRIDGE RAIL WITHOUT SPACER TUBES.
6. DO NOT DRILL BRIDGE RAIL IN ORDER TO INSTALL GUARDRAIL ANCHOR UNIT.
7. USE THIS DETAIL ONLY FOR BRIGES WITH POST AND BEAM TYPE RAIL.
8. ATTACH 1" X 1" BAR AND THREADED STUDS TO PLATE WITH 1/4" WELDS ALL AROUND.
9. 1" X 1" BAR MAY NOT BE NEEDED ON BRIDGE RAILS WHERE FACE OF RAIL DOES NOT PROJECT BEYOND FACE OF POST.
10. PROVIDE SHOP DRAWINGS OF THE PLATES TO THE ENGINEER FOR APPROVAL BEFORE FABRICATING THE PLATES.
11. LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
12. SEE ROADWAY STANDARD DRAWING 862.03 SHEET 3 FOR ADDITIONAL INFORMATION ON THE TYPE III ANCHOR UNIT

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DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
TEMPORARY ANCHOR UNIT TYPE THRIE-BEAM

SHEET 8 OF 9
862D03



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UNLESS ALL SIGNATURES COMPLETED

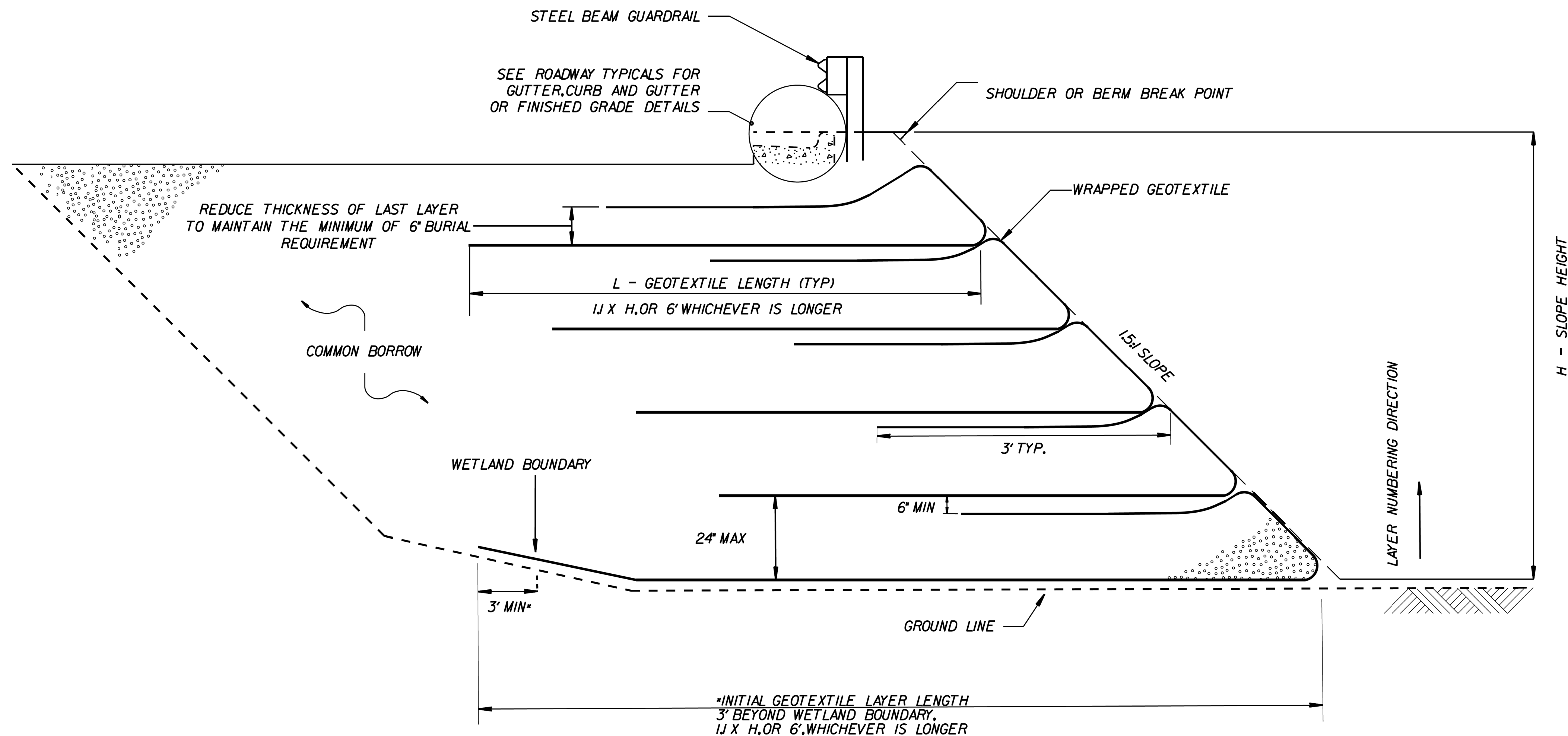
**CONTRACTS STANDARDS
AND DEVELOPMENT UNIT**

Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

ORIGINAL BY: S.CALHOUN DATE: 7-25-2024
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.: DATE:

5/26/20



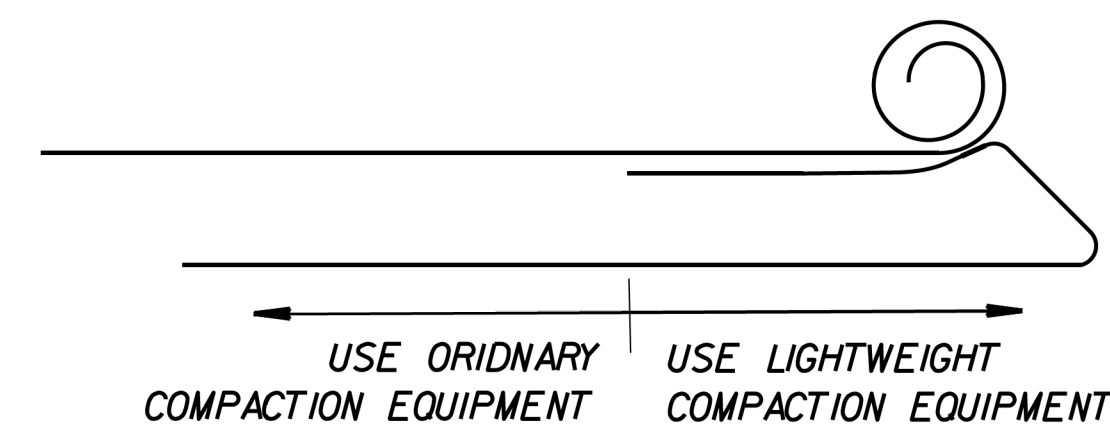
MODIFIED REINFORCED SOIL SLOPES – TYPICAL SECTION

NOTES:

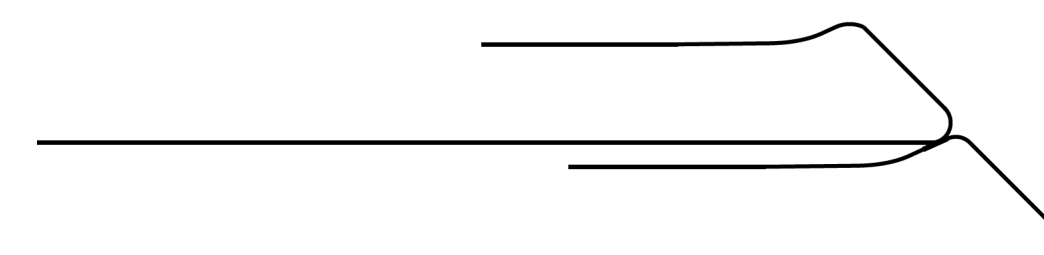
- FOR MODIFIED REINFORCED SOIL SLOPES (MRSS), SEE MODIFIED REINFORCED SOIL SLOPES PROVISION.
- DO NOT PLACE ANY GEOTEXTILE UNTIL EXCAVATION DIMENSIONS AND IN-SITU MATERIAL ARE APPROVED.
- USE TYPE 5A GEOTEXTILE FOR THE REINFORCEMENT IN MRSS.
- USE COMMON BORROW THAT MEETS COSTAL AREA CRITERIA DESCRIBED IN ARTICLE 1018-2(B) OF THE STANDARD SPECIFICATIONS.
- REINFORCEMENT SHOULD BE PLACED WITH MACHINE OR ROLL DIRECTION PERPENDICULAR TO THE SLOPE FACE.
- A MINIMUM OVERLAP OF 6' IS RECOMMENDED ALONG THE EDGES PERPENDICULAR TO THE SLOPE.
- TURN UP REINFORCEMENT AT THE FACE OF THE SLOPE AND RETURN REINFORCEMENT A MINIMUM OF 3' INTO THE EMBANKMENT AS SHOWN IN THE LAYER STAGING DETAIL.
- USE LIGHTWEIGHT COMPACTION EQUIPMENT WITHIN 3' OF THE SLOPE FACE TO HELP MAINTAIN SLOPE ALIGNMENT, AS SHOWN IN LAYER STAGING DETAIL.

SUMMARY OF QUANTITIES FOR MODIFIED REINFORCED SOIL SLOPES

LINE	STATION RANGE	OFFSET	QUANTITIES (SY)
-LDET-	11+25 ± - 15+85 ±	RT	1030
-LDET-	18+85 ± - 26+25 ±	RT	1490
			TOTAL = 2520

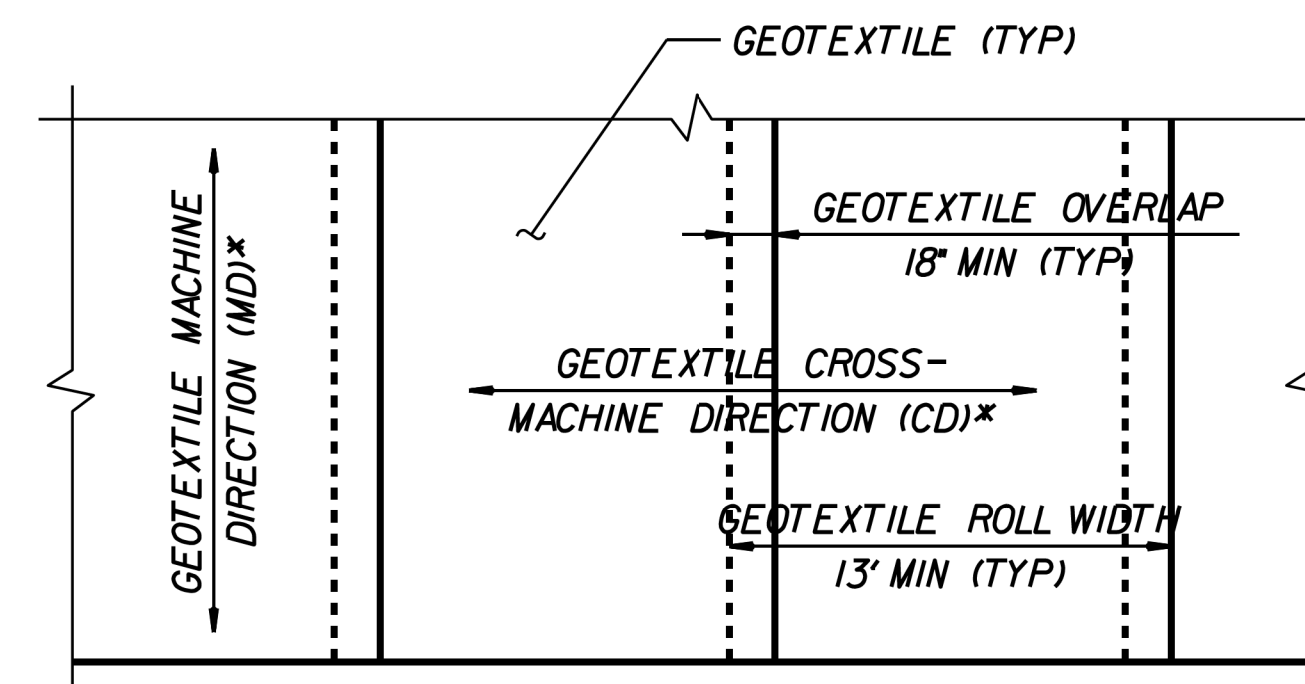


A. LAYER 1 PLUS REINFORCING FOR LAYER 2



B. LAYER 2 WITH WRAPPED FACE

LAYER STAGING



GEOTEXTILE PLACEMENT
(100% COVERAGE MIN FOR GEOTEXTILE REINFORCEMENT)

BR-0174

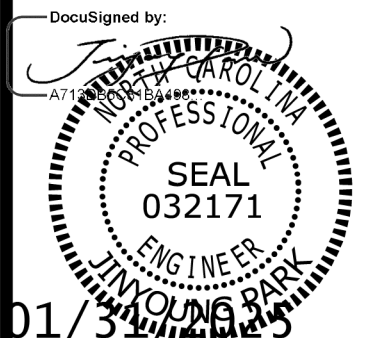
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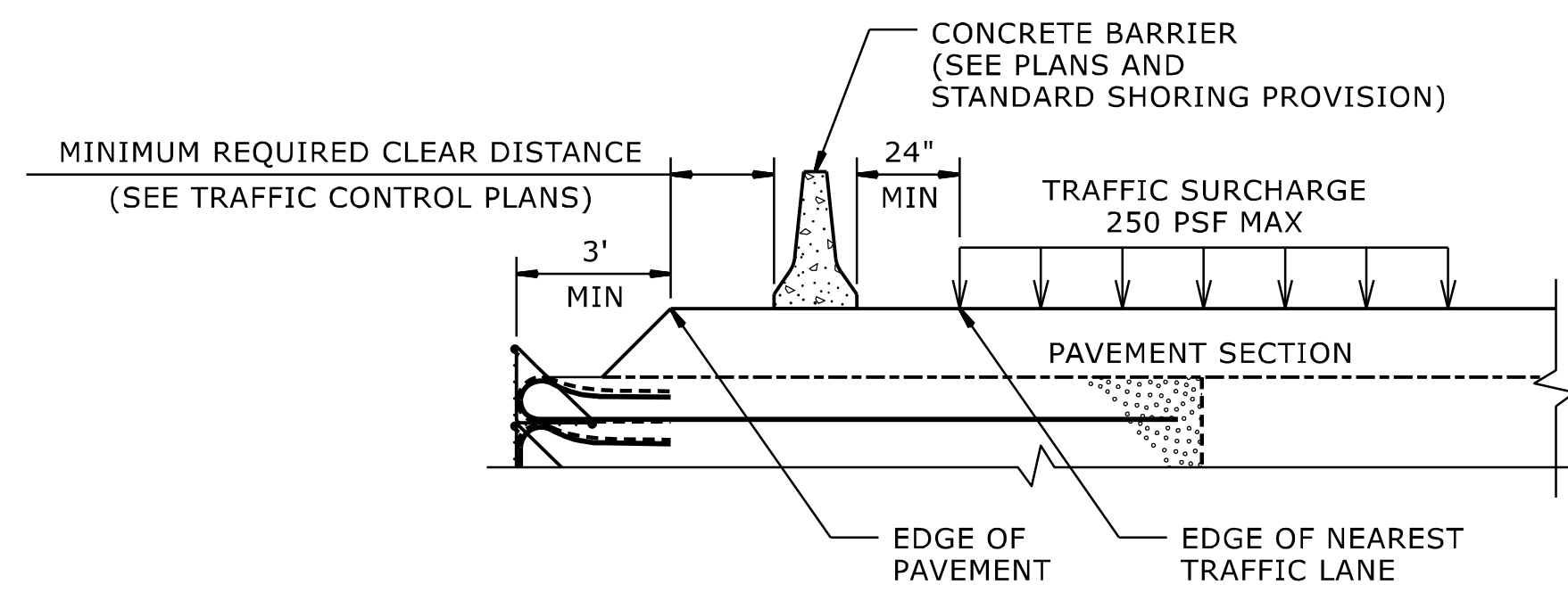
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SPECIAL DETAIL

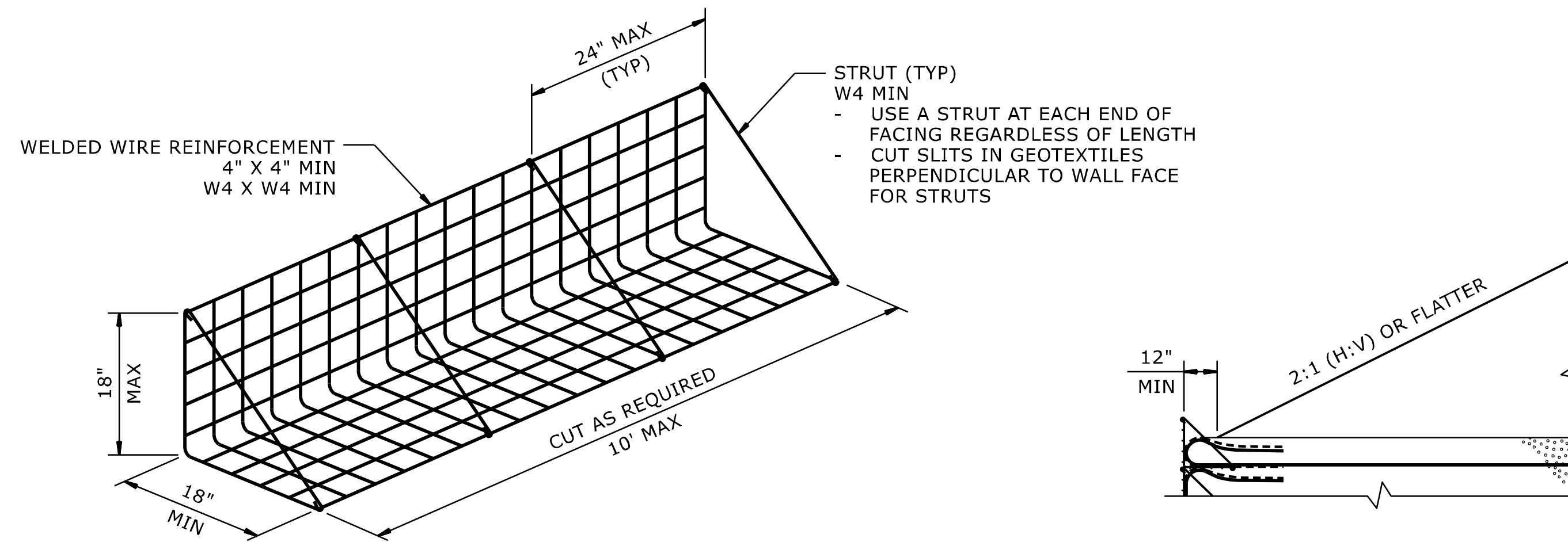
GEOTECHNICAL SPECIAL DETAIL FOR

MODIFIED REINFORCED SOIL SLOPE DETAILS

DATE: 01-31-2025

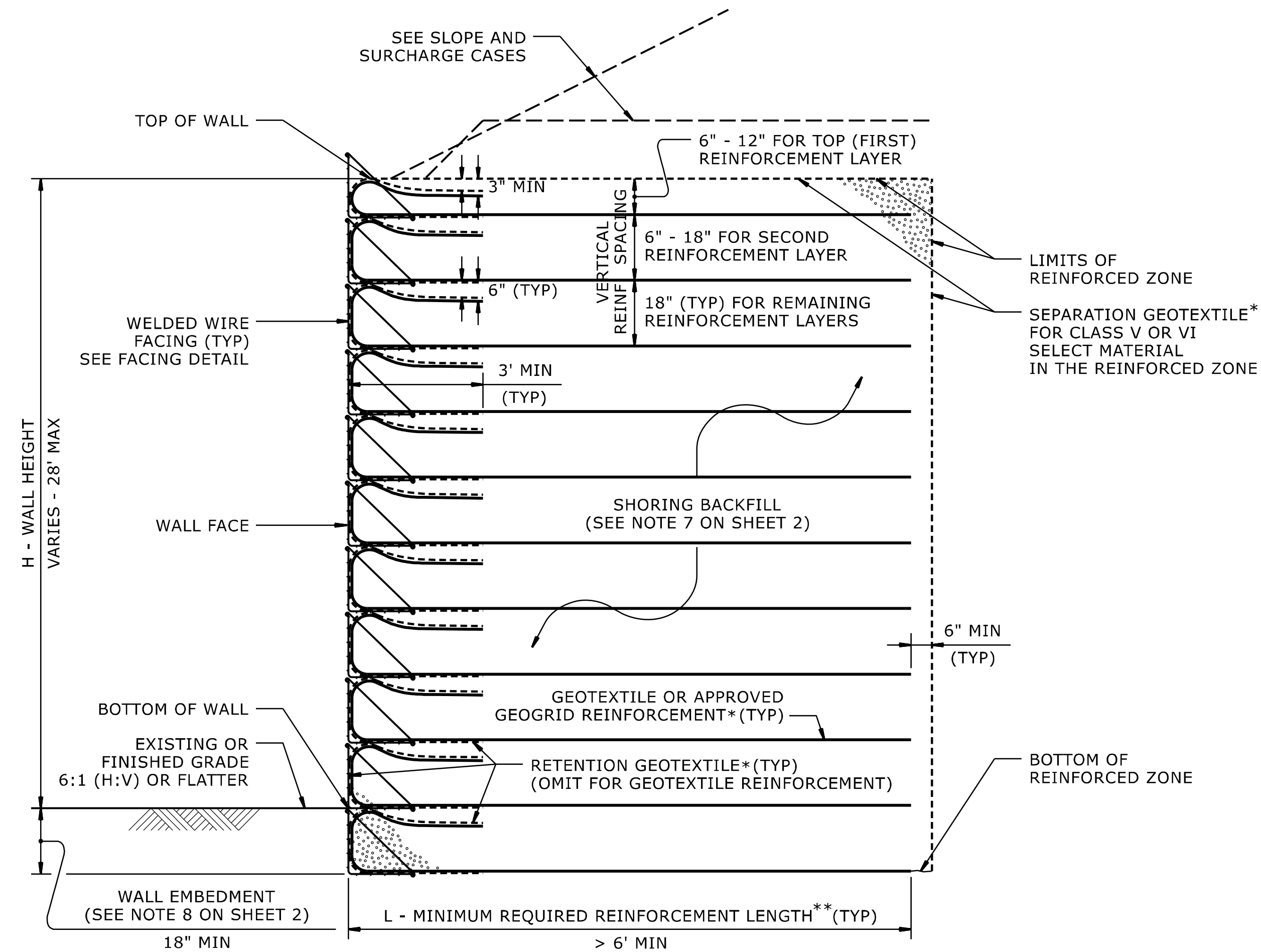


SURCHARGE CASE



FACING DETAIL

SLOPE CASE

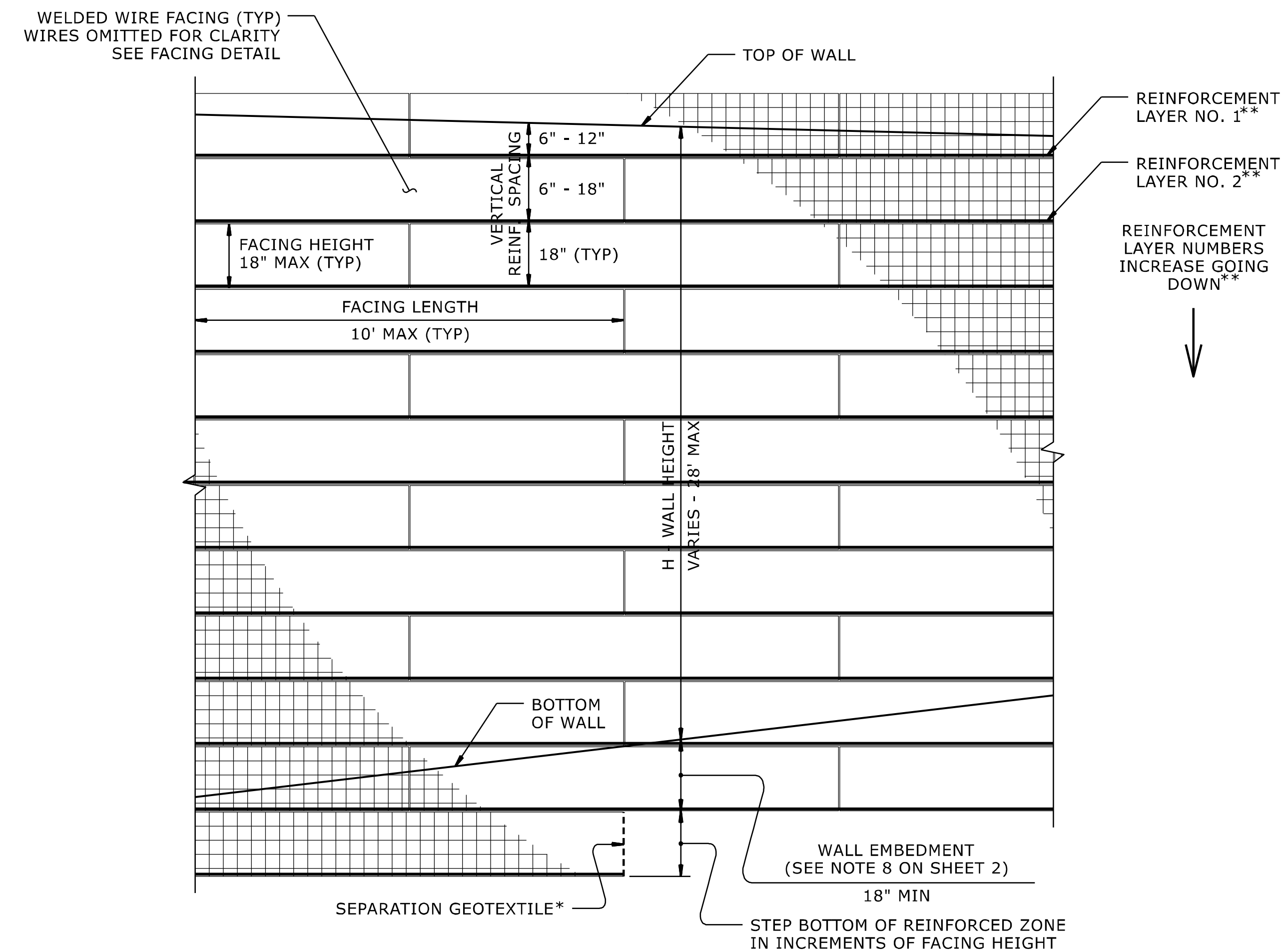


STANDARD TEMPORARY WALL

(FOR STANDARD TEMPORARY WALLS ON STRUCTURES,
SEE TEMPORARY WALL ON STRUCTURE DETAIL ON SHEET 2.)

*SEE GEOSYNTHETIC PLACEMENT DETAILS ON SHEET 2.

**SEE REINFORCEMENT TABLES ON SHEET 3.



STANDARD TEMPORARY WALL - PARTIAL ELEVATION

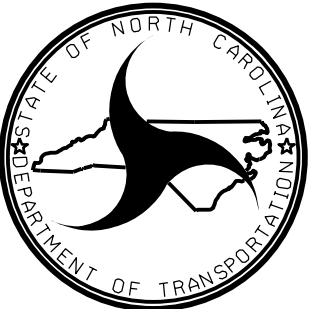
*SEE GEOSYNTHETIC PLACEMENT DETAILS ON SHEET 2.

**SEE REINFORCEMENT TABLES ON SHEET 3.

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Scott A. Hillman 7/08/2026

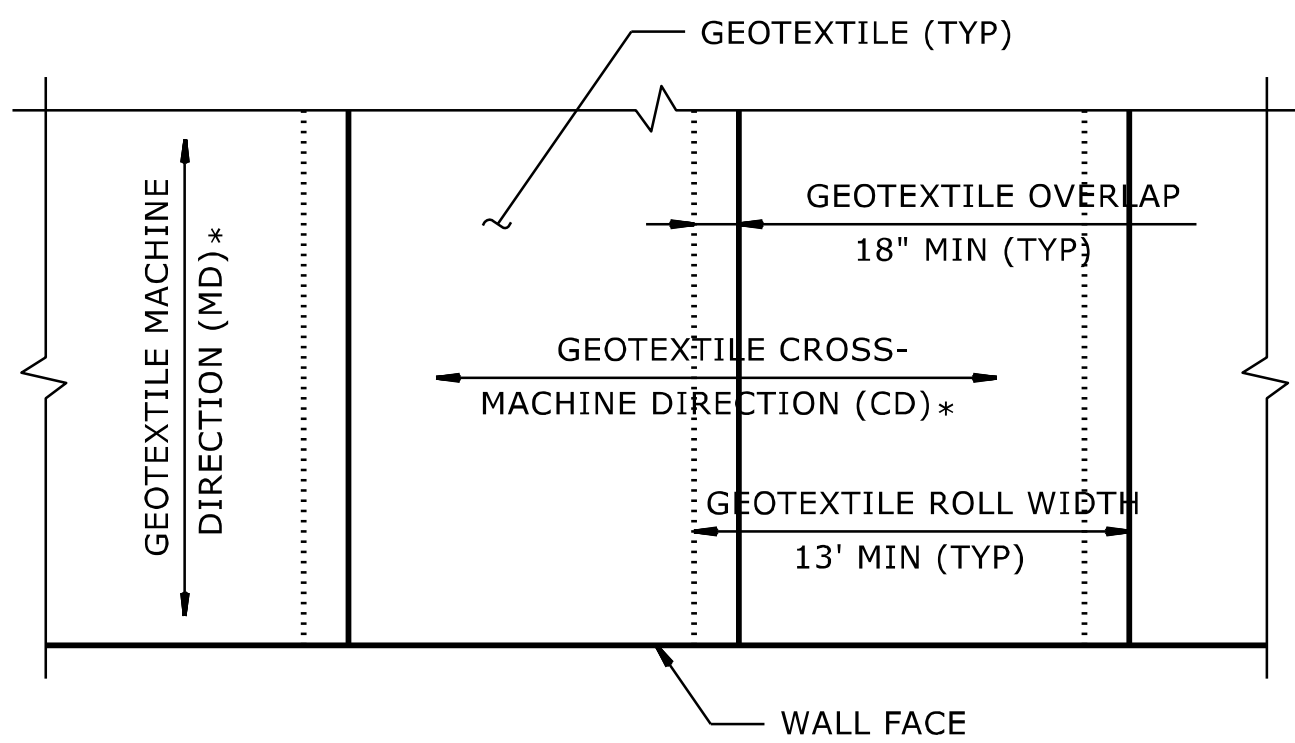


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STANDARD
DETAIL NO. 1801.02

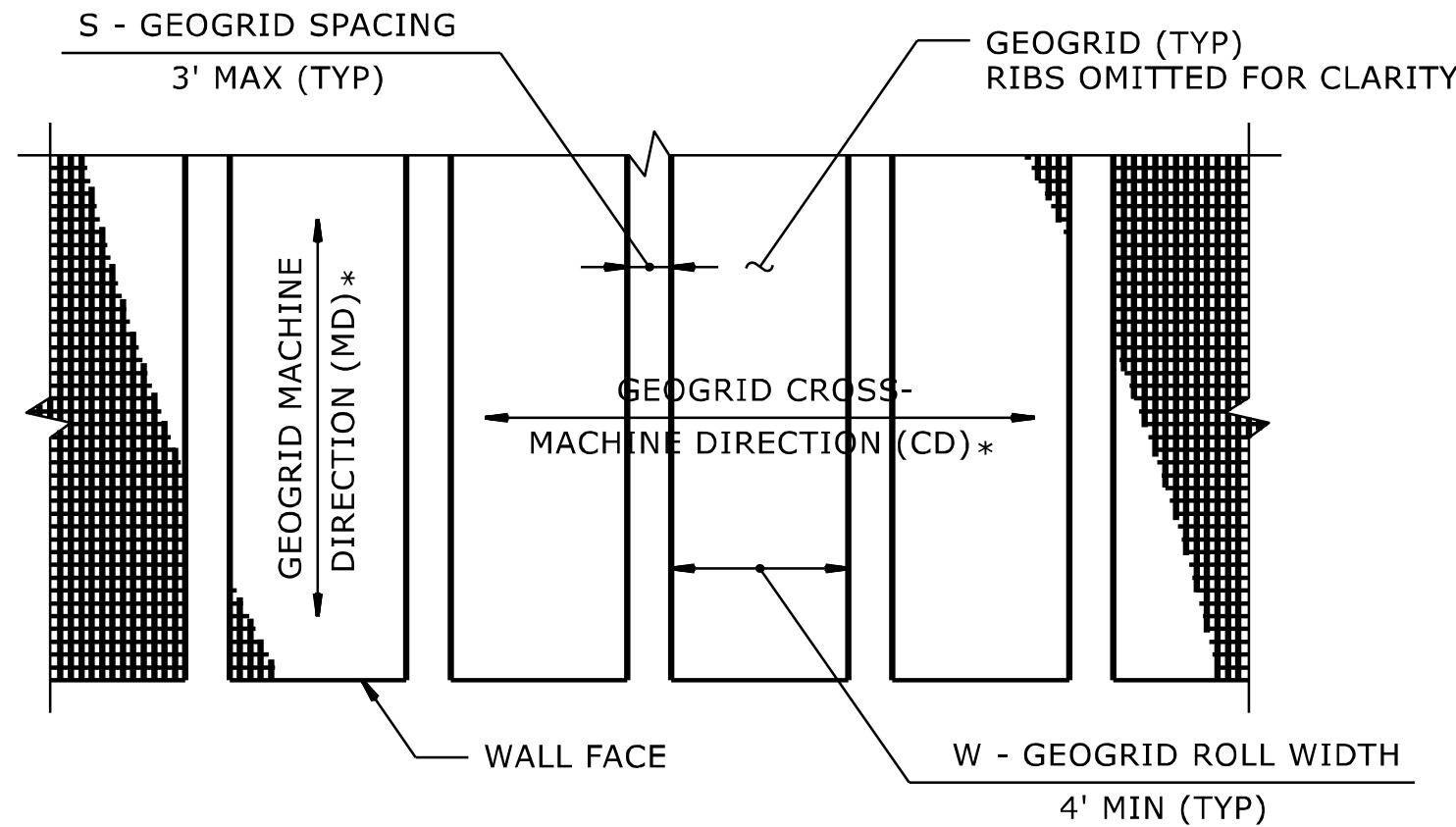
GEOTECHNICAL STANDARD DETAIL FOR
TEMPORARY WALL (SHEET 1 OF 3)

DATE: 02-18-2025



GEOTEXTILE PLACEMENT

(100% COVERAGE MIN FOR
GEOTEXTILE REINFORCEMENT)

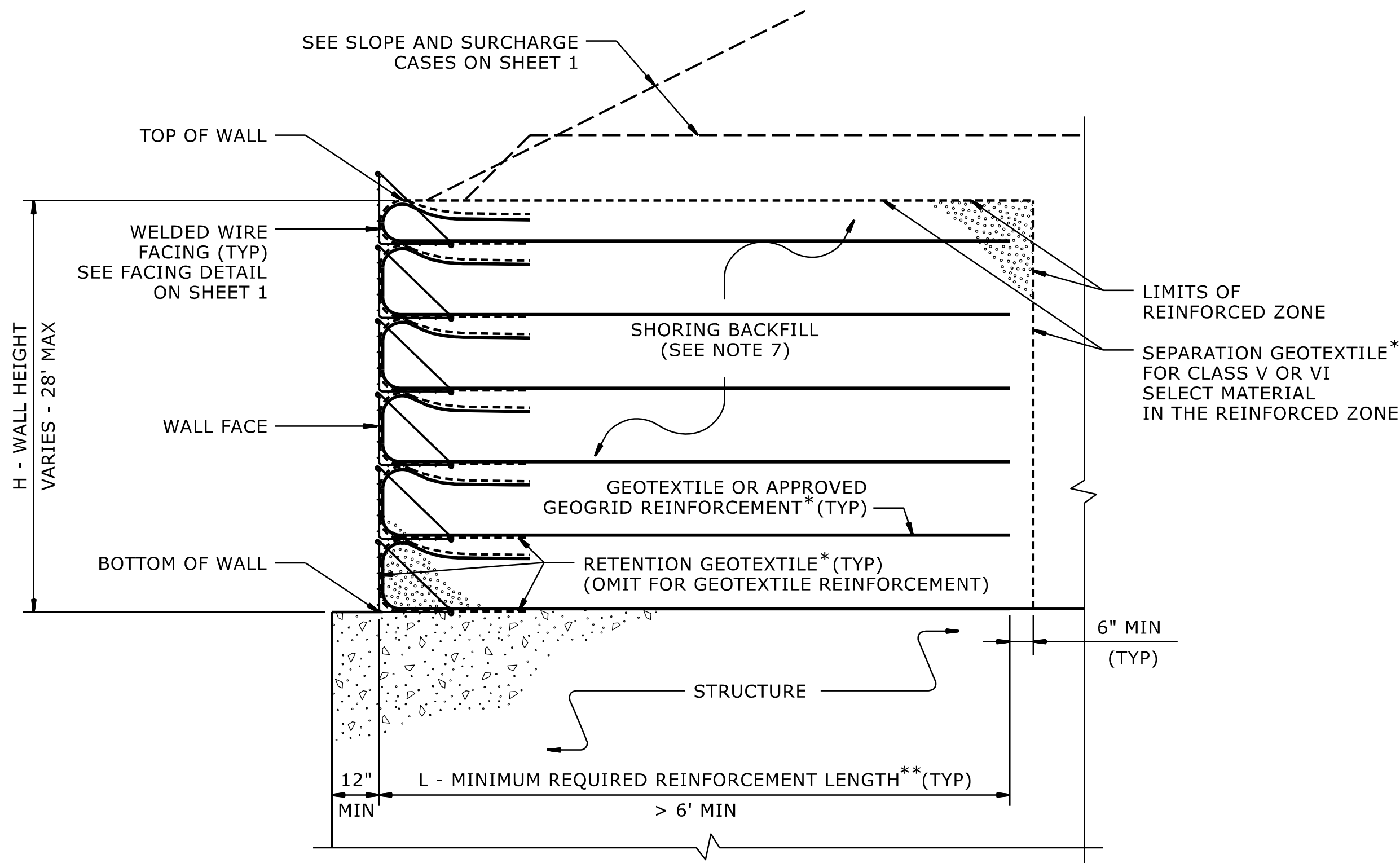


GEOGRID PLACEMENT

(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:

1. AT THE CONTRACTOR'S OPTION, USE STANDARD TEMPORARY WALLS AS NOTED IN THE PLANS.
2. FOR STANDARD TEMPORARY WALLS, SEE STANDARD SHORING PROVISION.
3. STANDARD TEMPORARY WALLS ARE BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:
UNIT WEIGHT, $\gamma = 120$ PCF
FRICTION ANGLE, $\phi = 30$ DEGREES
COHESION, $c = 0$ PSF
4. DO NOT USE STANDARD TEMPORARY WALLS IF ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE.
5. DO NOT USE STANDARD TEMPORARY WALLS WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS BELOW TEMPORARY WALLS.
6. 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 OR FLOOD ELEVATION IS ABOVE BOTTOM OF REINFORCED ZONE.
7. 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.
8. WALL EMBEDMENT IS NOT REQUIRED FOR STANDARD TEMPORARY WALLS ON STRUCTURES OR ROCK AS DETERMINED BY THE ENGINEER.
9. DO NOT USE MORE THAN 4 DIFFERENT REINFORCEMENT STRENGTHS FOR EACH STANDARD TEMPORARY WALL.
10. GEOGRIDS FOR GEOGRID REINFORCEMENT ARE APPROVED FOR SHORT TERM DESIGN STRENGTHS (3-YEAR DESIGN LIFE) IN THE MD AND CD BASED ON MATERIAL TYPE. THE LIST OF APPROVED GEOGRIDS WITH DESIGN STRENGTHS IS AVAILABLE FROM: connect.ncdot.gov/resources/Geological/Pages/Products.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 1 OR CLASS III SELECT MATERIAL
COARSE AGGREGATE	CLASS V OR VI SELECT MATERIAL

11. FOR GEOGRID REINFORCEMENT WITH LESS THAN 100% COVERAGE, STAGGER REINFORCEMENT SO GEOGRIDS ARE CENTERED OVER GAPS IN THE REINFORCEMENT LAYER BELOW.
12. 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) > (MINIMUM REQUIRED REINFORCEMENT LENGTH) + 4.5' AND
- REINFORCEMENT STRENGTH IN CD > MINIMUM REQUIRED REINFORCEMENT STRENGTH IN MD.
13. 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
14. DO NOT PLACE SHORING BACKFILL OR REINFORCEMENT UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.
15. FOR STANDARD TEMPORARY WALLS WITH PILE FOUNDATIONS IN THE REINFORCED ZONE, DRIVE PILES THROUGH REINFORCEMENT AFTER CONSTRUCTING TEMPORARY WALLS.
16. DO NOT SPLICE OR OVERLAP REINFORCEMENT SO SEAMS ARE PARALLEL TO THE WALL FACE.
17. CONTACT THE ENGINEER WHEN EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, PAVEMENTS, PIPES, INLETS OR UTILITIES WILL INTERFERE WITH REINFORCEMENT.
18. FOR STANDARD TEMPORARY WALLS WITH INTERIOR ANGLES LESS THAN 90 DEGREES, WRAP GEOSYNTHETICS AT ACUTE CORNERS AS DIRECTED BY THE ENGINEER.
19. 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.

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2G-3- -

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STANDARD
DETAIL NO. 1801.02

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 1, 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	
	> 7 FOR H < 20' > 10 FOR H > 20'	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 1 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	
		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) + WALL 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 1 OR CLASS III SELECT MATERIAL	CLASS V SELECT MATERIAL	A-2-4 SOIL	CLASS II, TYPE 1 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 1 OR CLASS III SELECT MATERIAL	CLASS V OR CLASS VI SELECT MATERIAL	A-2-4 SOIL	CLASS II, TYPE 1 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

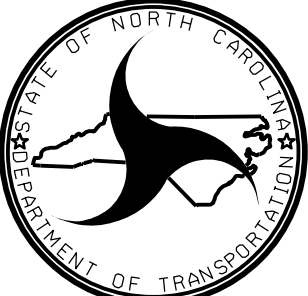
GEOGRID REINFORCEMENT
SHORT-TERM DESIGN STRENGTH (LB/FT)

(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.

BR-0174

2G-4 -

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*Scott A. Hidden*7/08/2026



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STANDARD
DETAIL NO. 1801.02

GEOTECHNICAL STANDARD DETAIL FOR
TEMPORARY WALL (SHEET 3 OF 3)

DATE: 02-18-2025

11/14/23

COMPUTED BY: K. SABO

DATE: 8/13/2025

CHECKED BY: A. CONRAD

DATE: 8/15/2025

STATE OF NORTH CAROLINA

DIVISION OF HIGHWAYS

BR-0174

4R013B-1

"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	GREU TL-3	TYPE B-77	TEMP GREU TL-3	TEMP TYPE III									EA				
-L-	16+61.12	19+11.12	RT	250.00			19+11.12		6.00	9.50	50.00		1.00		1	1													EXTRA LENGTH GUARDRAIL POST (8' STEEL) = 29 EA		
-L-	14+51.90	19+01.90	LT	450.00				19+01.90	6.00	9.50		50.00	1.00	1.00	1	1												EXTRA LENGTH GUARDRAIL POST (8' STEEL) = 61 EA			
-L-	20+56.48	23+06.48	LT	250.00			20+56.48		6.00	9.50	50.00		1.00		1	1												EXTRA LENGTH GUARDRAIL POST (8' STEEL) = 29 EA			
-L-	20+66.55	23+04.05	RT	237.50				20+66.55	6.00	9.50		50.00		1.00	1	1												EXTRA LENGTH GUARDRAIL POST (8' STEEL) = 27 EA			
			SUBTOTALS	1,187.50											4	4															
			TYPE B-77, 4@22.875'	-91.50																											
			GREU TL-3, 4@50.00'	-200.00																											
			PROJECT TOTALS	896.00											4	4												TOTAL EXTRA LENGTH GUARDRAIL POST (8' STEEL) = 146 EA			
			SAY	900.00											4	4												SAY EXTRA LENGTH GUARDRAIL POST (8' STEEL) = 150 EA			
TEMPORARY GUARDRAIL																															
-LDET-	10+97.50	15+85.00	RT	487.50			15+85.00		3.00	6.00	50.00		1.00				1	1													
-LDET-	14+47.50	15+85.00	LT	137.50				15+85.00	3.00	6.00		50.00		1.00			1	1													
-LDET-	18+85.00	21+60.00	LT	275.00			18+85.00		3.00	6.00	50.00		1.00				1	1													
-LDET-	18+85.00	22+03.75	RT	318.75				18+85.00	3.00	6.00		50.00		1.00			1	1													
			SUBTOTALS	1,218.75													4	4													
			TYPE III, 4@18.75'	-75.00																											
			GREU TL-3, 4@50.00'	-200.00																											
			PROJECT TOTALS	943.75													4	4													
			SAY	950.00													4	4													
ADDITIONAL GUARDRAIL POSTS = 5 EA																															

NOTE: GUARDRAIL POSTS IN AREAS OF ROCK PLATING SHALL BE 8'-0" LONG (SEE REMARKS ABOVE FOR QUANTITIES).

SUMMARY OF EARTHWORK (CY)

LOCATION	UNCLASSIFIED EXCAVATION	UNDERCUT	EMBT + %	BORROW	WASTE
-LDET- 10+00.00 – 15+85.00 (BEGIN BRIDGE)	82		5,360	5,278	
-LDET- 18+85.00 (END BRIDGE) – 29+08.97	263		9,412	9,149	
SUBTOTAL	345		14,772	14,427	
-L- 12+55.94 – 19+06.50 (BEGIN BRIDGE)	119		1,308	1,189	
-L- 20+61.50 (END BRIDGE) – 31+75.53	265		3,106	2,841	
SUBTOTAL	384		4,414	4,030	
-LDET- (REMOVAL) 10+00.00 – 29+08.97	10,275		2		10,273
SUBTOTAL	10,275		2		10,273
TOTAL	11,004		19,188	18,457	10,273
MATERIAL FOR SHOULDER CONSTRUCTION					
LOSS DUE TO CLEARING & GRUBBING					
ADDITIONAL UNDERCUT					
ROCK WASTE TO REPLACE BORROW					
ADJUST FOR ROCK WASTE					
WASTE IN LIEU OF BORROW					
PROJECT TOTAL	11,004		19,188	18,457	10,273
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT				923	
GRAND TOTAL	11,004		19,188	19,380	10,273
SAY	11,100			19,400	

SUMMARY OF PAVEMENT REMOVAL (SY)

LINE	STATION – STATION	LOCATION	REMOVAL (SY)
-L-	STA. 17+39.28 TO STA. 19+18.08	CL	482
-L-	STA. 20+45.68 TO STA. 25+00.00	CL	1,196
-LDET-	STA. 10+00.00 TO STA. 12+24.65	RT	156
-LDET-	STA. 12+24.65 TO STA. 15+85.00	CL	1,099
-LDET-	STA. 18+85.00 TO STA. 24+88.00	CL	1,751
-LDET-	STA. 24+88.00 TO STA. 29+08.97	RT	280
GRAND TOTAL			4,964
SAY			4,970

SUMMARY OF MILLING (2.5") (SY)

LINE	STATION – STATION	LOCATION	MILLING (SY)
-L-	STA. 12+55.94 TO STA. 14+12.50	CL	412
-L-	STA. 30+02.50 TO STA. 31+75.53	CL	453
GRAND TOTAL			865
SAY			870

SUMMARY OF SHOULDER BERM GUTTER (LF)

LINE	STATION	STATION	LENGTH (LF)
-L- RT	17+10.07	18+86.33	176
-L- RT	20+90.08	22+05.00	115
		TOTAL	291
		SAY	300

Note: Earthwork quantities are calculated by the Engineer. These earthwork quantities are based in part on subsurface data provided by the Geotechnical Engineering Unit.

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

UNDERCUT EXCAVATION (CONTINGENCY) = 300 CY
SELECT GRANULAR MATERIAL (CONTINGENCY) = 300 CY
GEOTEXTILE FOR SOIL STABILIZATION (CONTINGENCY) = 300 SY

STATE OF NORTH CAROLINA

DIVISION OF HIGHWAYS

SUMMARY OF SUBSURFACE DRAINAGE

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

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

SUMMARY OF MODIFIED REINFORCED SOIL SLOPES AND SLOPE EROSION CONTROL

LINE	Beginning Slope/ RSS (H:V)	Approx. Station	Ending Slope/ RSS (H:V)	Approx. Station	Location LT/RT	Modified Reinforced Soil Slope (RSS) SY
-LDET-	1.5:1	11+25	1.5:1	15+85	RT	1030
-LDET-	1.5:1	18+85	3:1	26+25	RT	1490
					TOTAL SY:	2520

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	14+75	2:1	18+70	LT	1	*	905
-L-	2.5:1	16+75	1.5:1	18+90	RT	1	*	575
-L-	2:1	20+85	2.5:1	22+75	LT	1	*	405
-L-	1.5:1	20+90	2.5:1	22+65	RT	1	*	560
							TOTAL SY:	2445

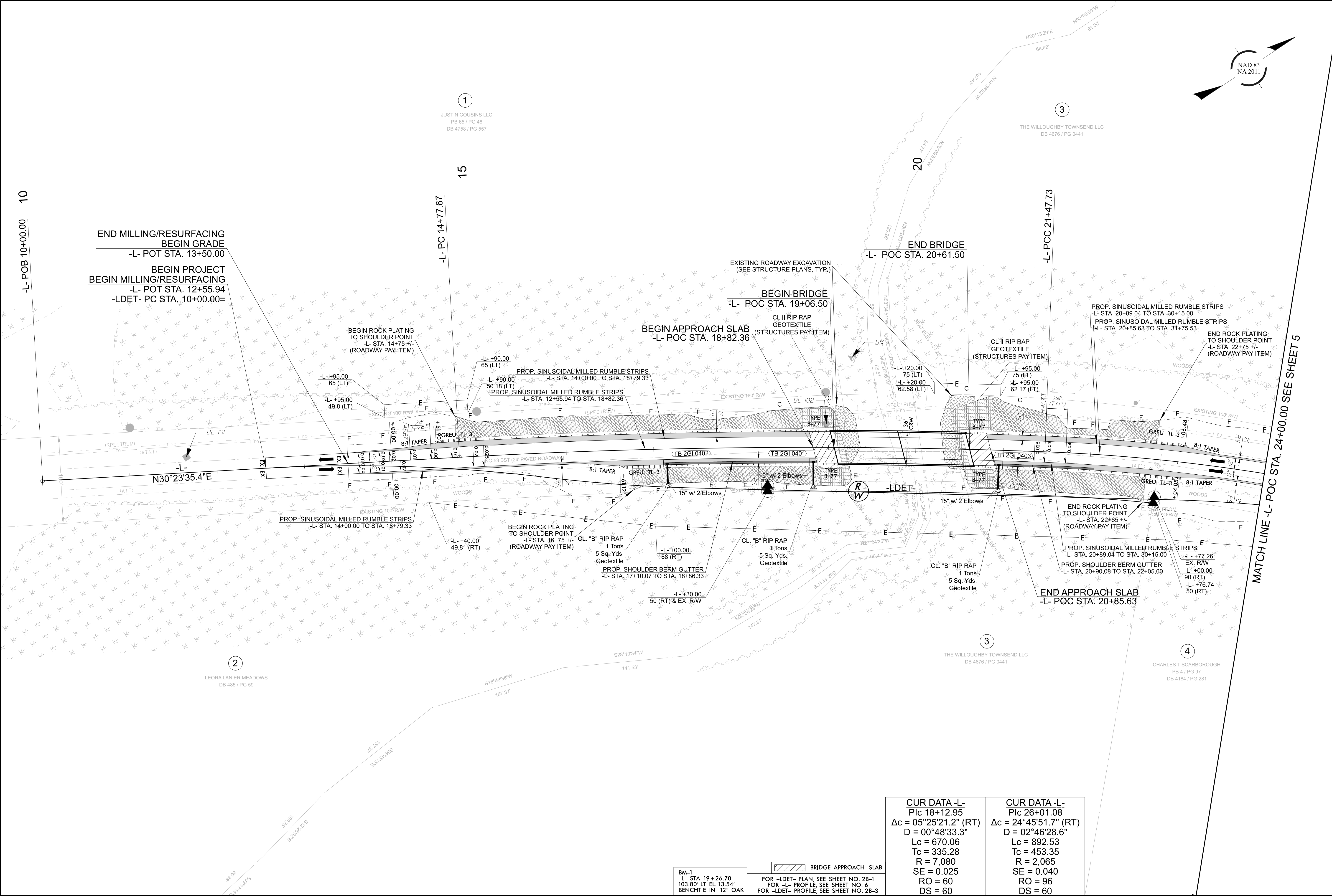
*Use Class 1, 2 or B riprap if riprap class is not shown for rock plating location.

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

PROJ. REFERENCE NO.	SHEET NO.
BR-0174	3P-1

PARCEL INDEX SHEET

[illegible][illegible]



BR-0174

4R01004

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PENDER COUNTY

DIVISION 3

ROADWAY DESIGN
ENGINEER

Signed by

David Z. Keiser

SEAL

033400

ENGINEER

DAVID Z. KEISER

8/5/2026

HYDRAULICS
ENGINEER

Designed by

Matthew M. Harknider

SEAL

035021

ENGINEER

M. HARKNIDER

8/4/2026

PREPARED BY

CDM Smith

CDM Smith Inc.
1133 Parkside Avenue
Suite 300
Farmington, NC 27834-4481
NC CDA No. F-1250

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

CUR DATA -L- P/c 18+12.95	CUR DATA -L- P/c 26+01.08
Δc = 05°25'21.2" (RT)	Δc = 24°45'51.7" (RT)
D = 00°48'33.3"	D = 02°46'28.6"
Lc = 670.06	Lc = 892.53
Tc = 335.28	Tc = 453.35
R = 7,080	R = 2,065
SE = 0.025	SE = 0.040
RO = 60	RO = 96
DS = 60	DS = 60

BM-1
-L- STA. 19+26.70
103.80' LT EL. 13.54'
BENCHMARK IN 12" OAK

BRIDGE APPROACH SLAB

FOR -LDET- PLAN, SEE SHEET NO. 2B-1
FOR -L- PROFILE, SEE SHEET NO. 6
FOR -LDET- PROFILE, SEE SHEET NO. 2B-3



4
CHARLES T SCARBOROUGH
PB 4 / PG 97
DB 4184 / PG 281

CUR DATA -L-
Plc 31+69.12
 $\Delta c = 04^{\circ}45'37.2''$ (RT)
D = $01^{\circ}50'53.7''$
Lc = 257.56
Tc = 128.85
R = 3,100
SE = EXIST.
RO = EXIST.
DS = EXIST.



BM-1
-L- STA. 19+26.70
103.80' LT EL. 13.54'
BENCHTIE IN 12" OAK

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

