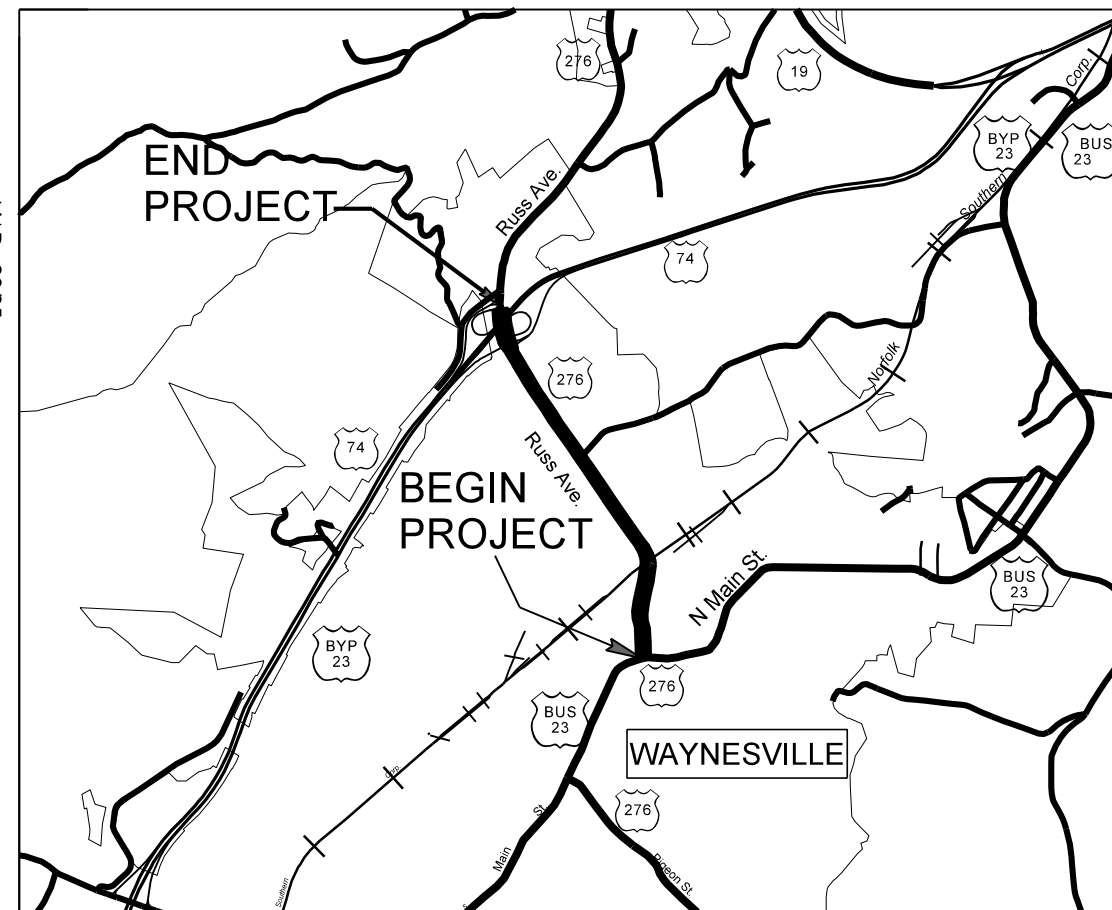


09/08/2019

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



VICINITY MAP

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**HAYWOOD COUNTY**

**LOCATION: US-276 (RUSS AVENUE) FROM US 23 /74 TO US 23  
BUSINESS (MAIN STREET) UPGRADE CORRIDOR**

**TYPE OF WORK: GRADING, DRAINAGE, PAVING, SIGNALS,  
RETAINING WALLS AND STRUCTURES**

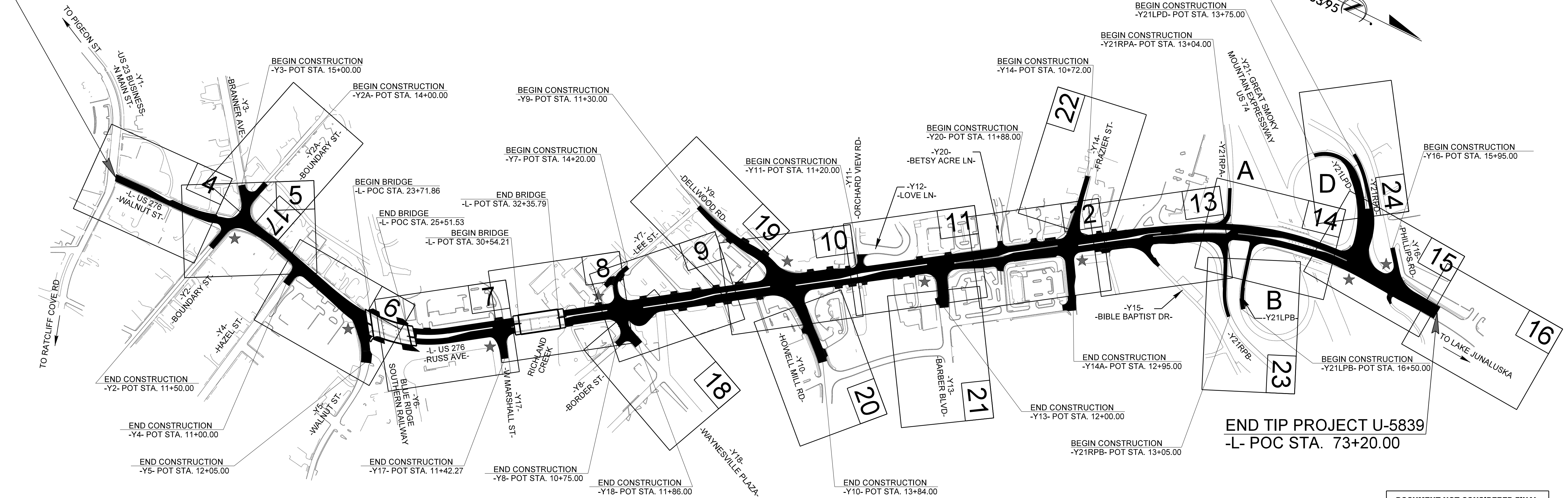
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5839	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
50230.1.1		P.E.	
50230.2.1		RW, UTL.	
50230.3.1		CONST.	

★ UPGRADE EXISTING SIGNAL

**TIP PROJECT: U-5839**

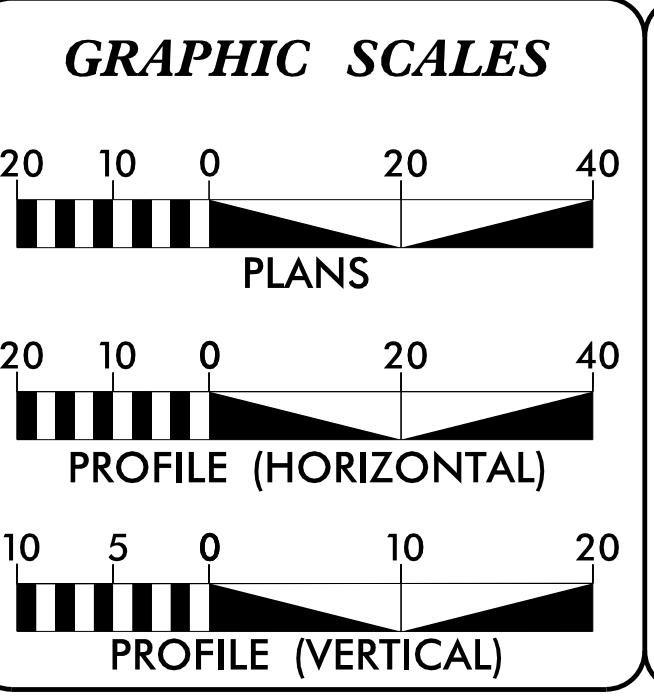
**CONTRACT: C204823**

BEGIN TIP PROJECT U-5839  
-L- POT STA. 10+19.45



THERE IS NO CONTROL OF ACCESS ON THIS PROJECT EXCEPT INTERCHANGES & U-TURN BULBS HAVE FULL CONTROL OF ACCESS. THIS PROJECT DESIGN CRITERIA IS BASED ON LOW SPEED STREETS IN URBAN AREAS.

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED



**DESIGN DATA**

ADT 2021	=	26,475
ADT 2041	=	29,975
K	=	8 %
D	=	55 %
T	=	4 % *
V	=	40 MPH
* TTST = 1% DUAL 3%		
FUNC CLASS =		
URBAN ARTERIAL		
STATEWIDE TIER		

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT U-5839	.....	1.125 Miles
LENGTH STRUCTURE TIP PROJECT U-5839	.....	0.068 Miles
TOTAL LENGTH TIP PROJECT U-5839	.....	1.193 Miles

Prepared in the Office of:

**NV5**  
NVS ENGINEERS & CONSULTANTS, INC.  
2018 STANDARD SPECIFICATIONS

FOR THE NORTH CAROLINA DEPT. OF TRANSPORTATION

RIGHT OF WAY DATE: **CHRIS ANDERSON, PE**  
JUNE 3, 2019  
PROJECT ENGINEER

LETTING DATE: **DYLAN McCANN**  
DECEMBER 19, 2023  
PROJECT DESIGN ENGINEER

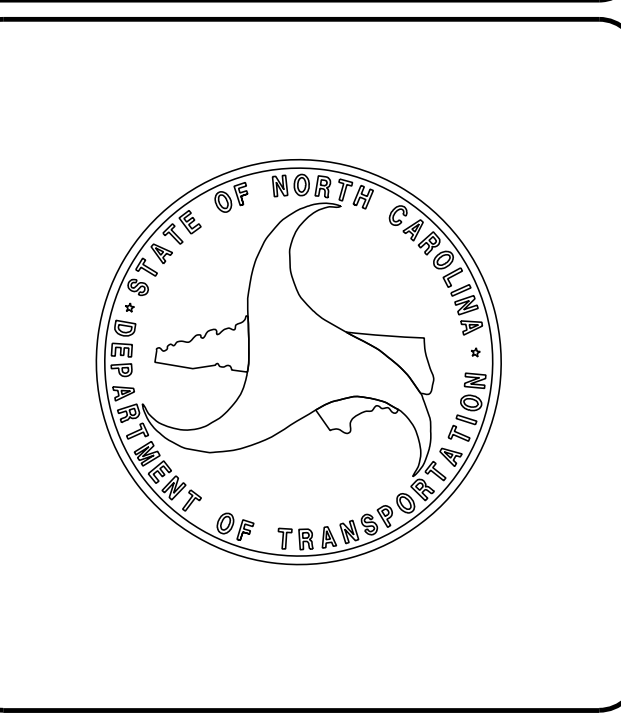
NCDOT CONTACT: **KENNETH McDOWELL**  
DIVISION PROJECT ENGINEER

**HYDRAULICS ENGINEER**

DocuSigned by:  
**David Baker**  
7231FE645474768A  
SIGNATURE: P.E. 9/11/2023

**ROADWAY DESIGN ENGINEER**

DocuSigned by:  
**Chris Anderson**  
23191F355049437  
SIGNATURE: P.E. 9/11/2023



9/11/2023 R:\Roadway\Proj\U-5839\_RDY\_TSH.dgn Chris Anderson



INDEX OF SHEETS

SHEET NUMBER	DESCRIPTION
1	TITLE SHEET
1A	INDEX OF SHEETS, GENERAL NOTES AND LIST OF STANDARD DRAWINGS
1B	CONVENTIONAL SYMBOLS
2A-1 THRU 2A-8	PAVEMENT SCHEDULE AND TYPICAL SECTIONS
2B-1 THRU 2B-2	INTERSECTION DETAIL SHEETS
2B-3	DETAIL OF BRICK PAVERS
2C-1	DETAIL OF GUARDRAIL IMPACT ATTENUATOR
2C-2	DETAIL OF STRUCTURE ANCHOR UNIT, TYPE III
2C-3	DETAIL OF GUARDRAIL AT-1 END UNIT
2C-4	DETAIL OF GUARDRAIL INSTALLATION
2C-5	DETAIL OF TEMPORARY 1" STEEL COVER OVER DRAINAGE
2C-6	DETAIL OF CONVERTING CB OR DI TO JB
2C-8	DETAIL OF HANDRAIL ON RETAINING WALL
2C-9	CURB RAMP DETAIL TYPE 1
2C-10	CURB RAMP DETAIL TYPE 2
2C-11	CURB RAMP DETAIL TYPE 3
2C-12	CURB RAMP DETAIL TYPE 4
2C-13	CURB RAMP DETAIL TYPE 6, 7, AND 8
2C-14	DETAIL OF ROCK PLATING
2C-15	DETAIL OF GUARDRAIL ANCHOR UNIT TYPE III - SHOP CURVED
2C-16 THRU 2C-18	BRIDGE APPROACH FILLS
2D-1	DETAIL OF OFFSET CATCH BASINS
2G-1 THRU 2G-4	DETAIL OF STANDARD TEMPORARY SHORING
3B-1	SUMMARY OF EARTHWORK & ROADWAY SUMMARIES
3D-1 THRU 3D-6	DRAINAGE SUMMARIES
3G-1	GEOTECHNICAL SUMMARIES
3P-1	PARCEL INDEX SHEET
4 THRU 24	PLAN SHEETS
25 THRU 40	PROFILE SHEETS
RW02C-1 THRU RW02C-11	SURVEY CONTROL SHEETS
TMP-1 THRU TMP-31	TRAFFIC MANAGEMENT PLANS
PMP-1 THRU PMP-7	PAVEMENT MARKING PLANS
EC-1 THRU EC-45	EROSION CONTROL PLANS
SIGN-1 THRU SIGN-9	SIGNING PLANS
SIG 1.0 THRU SIG 9.12	SIGNAL PLANS
SIG M1 THRU SIG M8	STANDARD METAL POLE DRAWINGS
SCP-1 THRU SCP-21	ITS PLANS
UC-1 THRU UC-54	UTILITY CONSTRUCTION PLANS
UO-1 THRU UO-20	UTILITIES BY OTHERS PLANS
TH-21 THRU TH-32	UTILITY TEST HOLE SHEETS
X-0	CROSS SECTION INDEX
X-0A THRU X-0B	CROSS SECTION SUMMARY SHEETS
X-1 THRU X-58	CROSS SECTIONS
S1-1 THRU S1-63	STRUCTURE PLANS - RUSS AVE (-L-) OVER BLUE RIDGE SOUTHER RAILWAY (-Y6-)
S2-1 THRU S2-49	STRUCTURE PLANS - RUSS AVE (-L-) OVER RICHLAND CREEK
W-1 THRU W-11	WALL PLANS

2018 ROADWAY ENGLISH STANDARD DRAWINGS

EFF. 01-16-2018  
REV.

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

STD. NO.	TITLE
DIVISION 2 - EARTHWORK	
200.02	Method of Clearing - Method II
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superelevation - Two Lane Pavement
225.05	Method of Obtaining Superelevation - Divided Highways
225.06	Method of Grading Sight Distance at Intersections
DIVISION 3 - PIPE CULVERTS	
300.01	Method of Pipe Installation
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
DIVISION 6 - ASPHALT BASES AND PAVEMENTS	
610.02	Guide for Paving Shoulders Under Bridges - Method II
654.01	Pavement Repairs
DIVISION 8 - INCIDENTALS	
815.02	Subsurface Drain
840.00	Concrete Base Pad for Drainage Structures
840.01	Brick Catch Basin - 12" thru 54" Pipe
840.02	Concrete Catch Basin - 12" thru 54" Pipe
840.03	Frame, Grates and Hood - for Use on Standard Catch Basin
840.14	Concrete Drop Inlet - 12" thru 30" Pipe
840.15	Brick Drop Inlet - 12" thru 30" Pipe
840.18	Concrete Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.24	Frames and Narrow Slot Sag Grates
840.25	Anchorage for Frames - Brick or Concrete or Precast
840.27	Brick Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.29	Frames and Narrow Slot Flat Grates
840.31	Concrete Junction Box - 12" thru 66" Pipe
840.32	Brick Junction Box - 12" thru 66" Pipe
840.34	Traffic Bearing Junction Box - for Use with Pipes 42" and Under
840.35	Traffic Bearing Grated Drop Inlet - for Cast Iron Double Frame and Grates
840.45	Precast Drainage Structure
840.54	Manhole Frame and Cover
840.66	Drainage Structure Steps
840.71	Concrete and Brick Pipe Plug
840.72	Pipe Collar
846.01	Concrete Curb, Gutter and Curb & Gutter
846.03	Funnel Drain Installation in Shoulder Berm Gutter
848.01	Concrete Sidewalk
848.02	Driveway Turnout - Radius Type
848.03	Driveway Turnout - Drop Curb Type
848.04	Street Turnout
848.05	Curb Ramp - Proposed Curb & Gutter
850.01	Concrete Paved Ditches
852.01	Concrete Islands
852.05	Median Curb for Catch Basin - for Use with 1'-6" Curb and Gutter
852.06	Method for Placement of Drop Inlets in Concrete Islands
852.10	Median Construction - with Curb and Gutter
857.01	Precast Reinforced Concrete Barrier - 41" Single Faced
862.01	Guardrail Placement
862.02	Guardrail Installation
862.03	Structure Anchor Units
862.04	Anchoring End of Guardrail - B-77 and B-83 Anchor Units
866.04	Barbed Wire Fence with Wood Posts (2 - 7 Strands)
876.01	Rip Rap in Channels
876.02	Guide for Rip Rap at Pipe Outlets
876.04	Drainage Ditches with Class 'B' Rip Rap

GENERAL NOTES:

2018 SPECIFICATIONS  
EFFECTIVE: 01-16-2018  
REVISED:

GRADING AND SURFACING OR RESURFACING AND WIDENING:

THE GRADE LINES SHOWN DENOTE THE FINISHED ELEVATION OF THE PROPOSED SURFACING AT GRADE POINTS SHOWN ON THE TYPICAL SECTIONS. WHERE NO GRADE LINES ARE SHOWN, THE PROFILES SHOWN DENOTE THE TOP ELEVATION OF THE EXISTING PAVEMENT ALONG THE CENTER LINE OF SURVEY ON WHICH THE PROPOSED RESURFACING WILL BE PLACED. GRADE LINES MAY BE ADJUSTED BY THE ENGINEER IN ORDER TO SECURE A PROPER TIE-IN.

CLEARING:

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.

SUPERELEVATION:

ALL CURVES ON THIS PROJECT SHALL BE SUPERELEVATED IN ACCORDANCE WITH STD. NO. 225.04 & STD. NO. 225.05 USING THE RATE OF SUPERELEVATION AND RUNOFF SHOWN ON THE PLANS. SUPERELEVATION IS TO BE REVOLVED ABOUT THE GRADE POINTS SHOWN ON THE TYPICAL SECTIONS.

SHOULDER CONSTRUCTION:

ASPHALT, EARTH, AND CONCRETE SHOULDER CONSTRUCTION ON THE HIGH SIDE OF SUPERELEVATED CURVES SHALL BE IN ACCORDANCE WITH STD. NO. 560.02

SIDE ROADS:

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

SUBSURFACE DRAINS:

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

DRIVEWAYS:

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

DRIVEWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. 848.03 AT LOCATIONS SHOWN ON PLANS OR AS DIRECTED BY THE ENGINEER.

STREET TURNOUT:

STREET RETURNS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. NO. 848.04 USING THE RADIUS NOTED ON PLANS.

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 DUKE ENERGY (POWER),

TOWN OF WAYNESVILLE (POWER), DOMINION ENERGY (GAS), AT&T (PHONE),

SPECTRUM (COMMUNICATIONS), NCDOT SIGNALS (COMMUNICATIONS),

HAYWOOD COUNTY (COMMUNICATIONS)

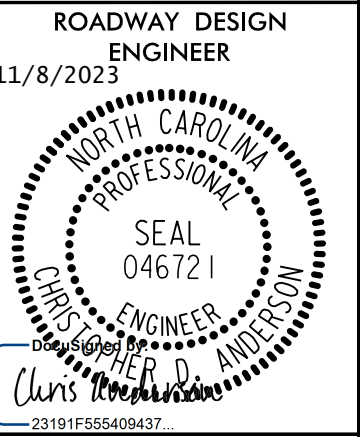
ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS, EXCEPT AS SHOWN ON THE PLANS.

RIGHT-OF-WAY MARKERS:

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

CURB RAMPS

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



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

# STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS CONVENTIONAL PLAN SHEET SYMBOLS

## BOUNDARIES AND PROPERTY:

State Line	-----
County Line	-----
Township Line	-----
City Line	-----
Reservation Line	-----
Property Line	-----
Existing Iron Pin	○ EIP
Computed Property Corner	-----
Property Monument	□ ECM
Parcel/Sequence Number	①23
Existing Fence Line	-x-x-x-
Proposed Woven Wire Fence	○
Proposed Chain Link Fence	□
Proposed Barbed Wire Fence	◇
Existing Wetland Boundary	----- WLB
Proposed Wetland Boundary	----- WLB
Existing Endangered Animal Boundary	----- EAB
Existing Endangered Plant Boundary	----- EPB
Existing Historic Property Boundary	----- HPB
Known Contamination Area: Soil	☠-S-☠
Potential Contamination Area: Soil	☠-S-☠
Known Contamination Area: Water	☠-W-☠
Potential Contamination Area: Water	☠-W-☠
Contaminated Site: Known or Potential	☠?

## BUILDINGS AND OTHER CULTURE:

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

## HYDROLOGY:

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

## RAILROADS:

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

## RIGHT OF WAY & PROJECT CONTROL:

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

## ROADS AND RELATED FEATURES:

Existing Edge of Pavement	-----
Existing Curb	-----
Proposed Slope Stakes Cut	----- C
Proposed Slope Stakes Fill	----- F
Proposed Curb Ramp	----- CR
Existing Metal Guardrail	-----
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	----- Vineyard

## EXISTING STRUCTURES:

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

## UTILITIES:

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

## TELEPHONE:

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

## WATER:

Water Manhole	⊕
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	----- A/G Water

## TV:

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

## GAS:

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

## SANITARY SEWER:

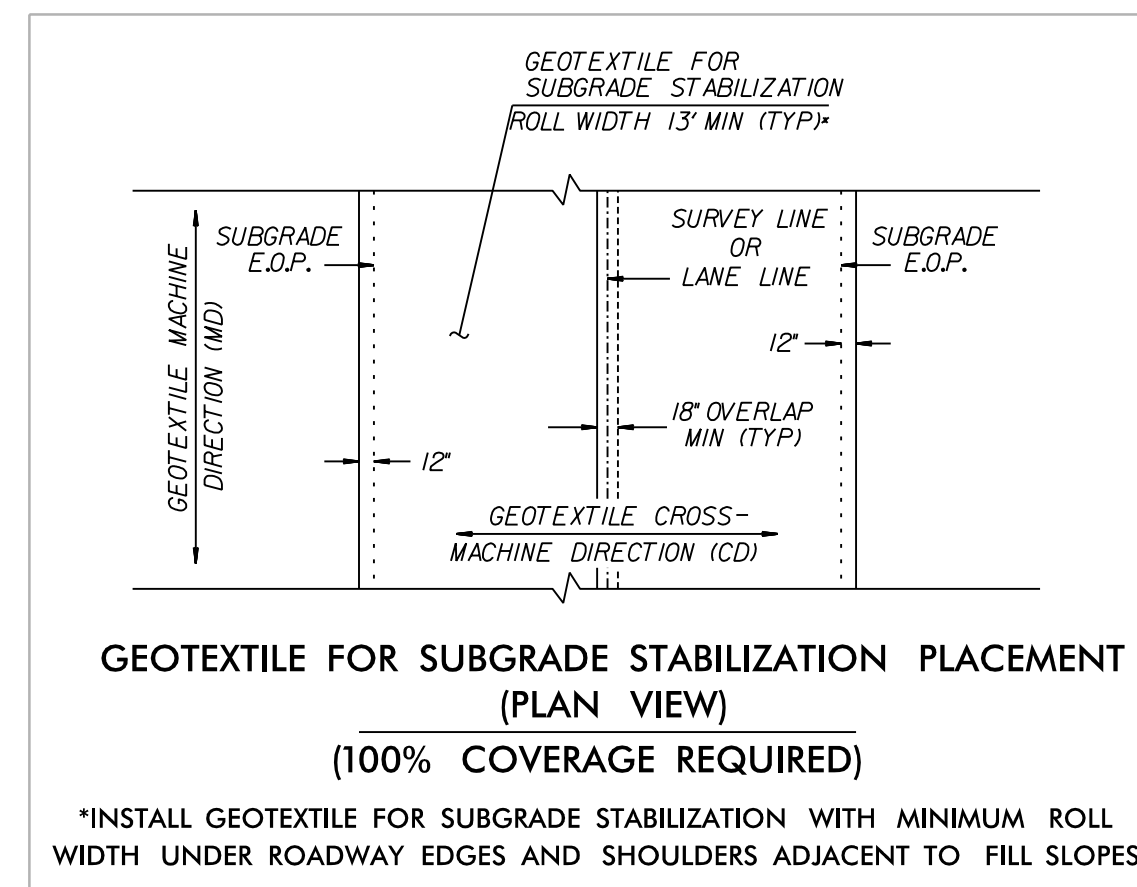
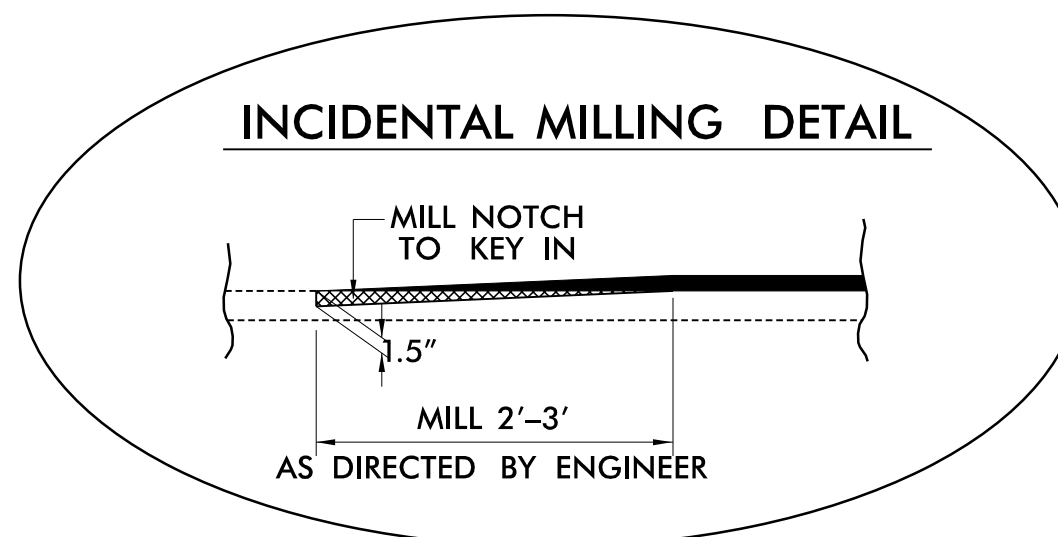
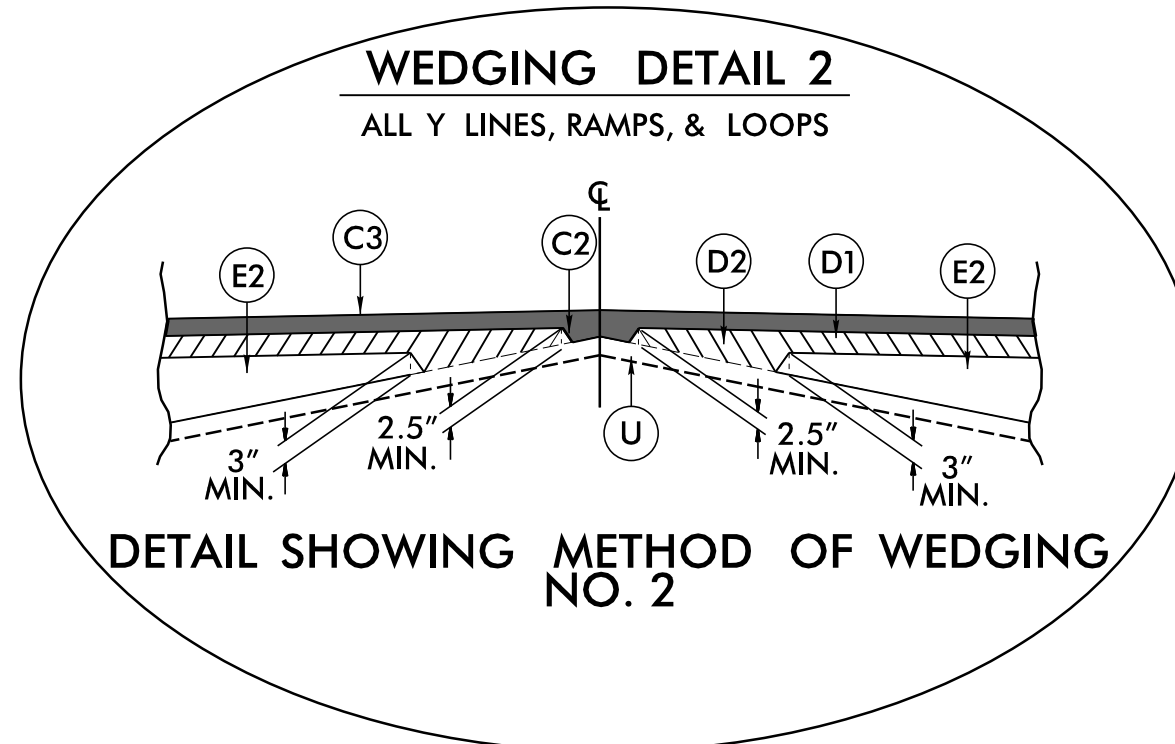
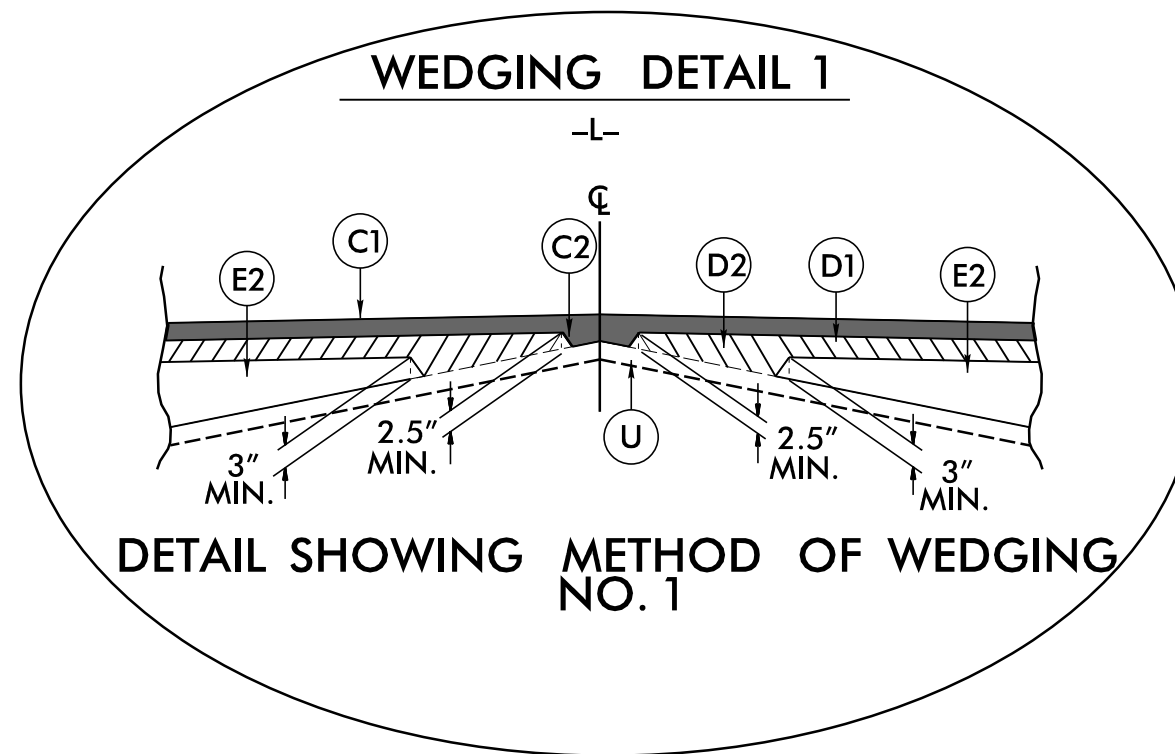
Sanitary Sewer Manhole	⊕
Sanitary Sewer Cleanout	⊕
U/G Sanitary Sewer Line	----- SS
Above Ground Sanitary Sewer	----- A/G Sanitary Sewer
SS Forced Main Line LOS B (S.U.E.*)	----- FSS
SS Forced Main Line LOS C (S.U.E.*)	----- FSS
SS Forced Main Line LOS D (S.U.E.*)	----- FSS

## MISCELLANEOUS:

Utility Pole	●
Utility Pole with Base	□
Utility Located Object	○
Utility Traffic Signal Box	⊕
Utility Unknown U/G Line LOS B (S.U.E.*)	----- 7U/L
U/G Tank; Water, Gas, Oil	-----
Underground Storage Tank, Approx. Loc.	----- UST
A/G Tank; Water, Gas, Oil	-----
Geoenvironmental Boring	⊕
U/G Test Hole LOS A (S.U.E.*)	⊕
Abandoned According to Utility Records	AATUR
End of Information	E.O.I.

PAVEMENT SCHEDULE (FINAL PAVEMENT DESIGN- JUNE 5, 2020)	
C1	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE TYPE S9.5B, AT AN AVERAGE RATE OF 165 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
C2	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 110 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 1.0" IN DEPTH OR GREATER THAN 1.5" IN DEPTH.
C3	PROP. APPROX. 1.5" ASPHALT CONCRETE SURFACE COURSE TYPE S9.5B, AT AN AVERAGE RATE OF 165 LBS. PER SQ. YD.
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 2.5" 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 5.5" IN DEPTH.
K	12" CLASS IV SUBGRADE STABILIZATION
N	GEOTEXTILE FOR SUBGRADE STABILIZATION
R	GRANITE CURB
R1	2'-6" CONCRETE CURB & GUTTER
R2	1'-6" CONCRETE CURB & GUTTER
R3	5" MONOLITHIC CONCRETE ISLAND (KEYED IN)
S	4" CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V1	MILLING ASPHALT PAVEMENT, 1.5" DEPTH
V2	INCIDENTAL MILLING
W1	VARIABLE DEPTH ASPHALT PAVEMENT (SEE WEDGING DETAIL 1)
W2	VARIABLE DEPTH ASPHALT PAVEMENT (SEE WEDGING DETAIL 2)

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



# N|V|5

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CHARLOTTE, NC 28227  
P: 704.537.7300 www.NV5.com  
NC License # F-1333  
formerly CALYX Engineers & Consultants

PROJECT REFERENCE NO. <b>U-5839</b>	SHEET NO. <b>2A-1</b>
ROADWAY DESIGN ENGINEER 11/10/2023 <i>Chris Anderson</i>	PAVEMENT DESIGN ENGINEER 11/10/2023 <i>Thomas Smith</i>
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	



5/14/23

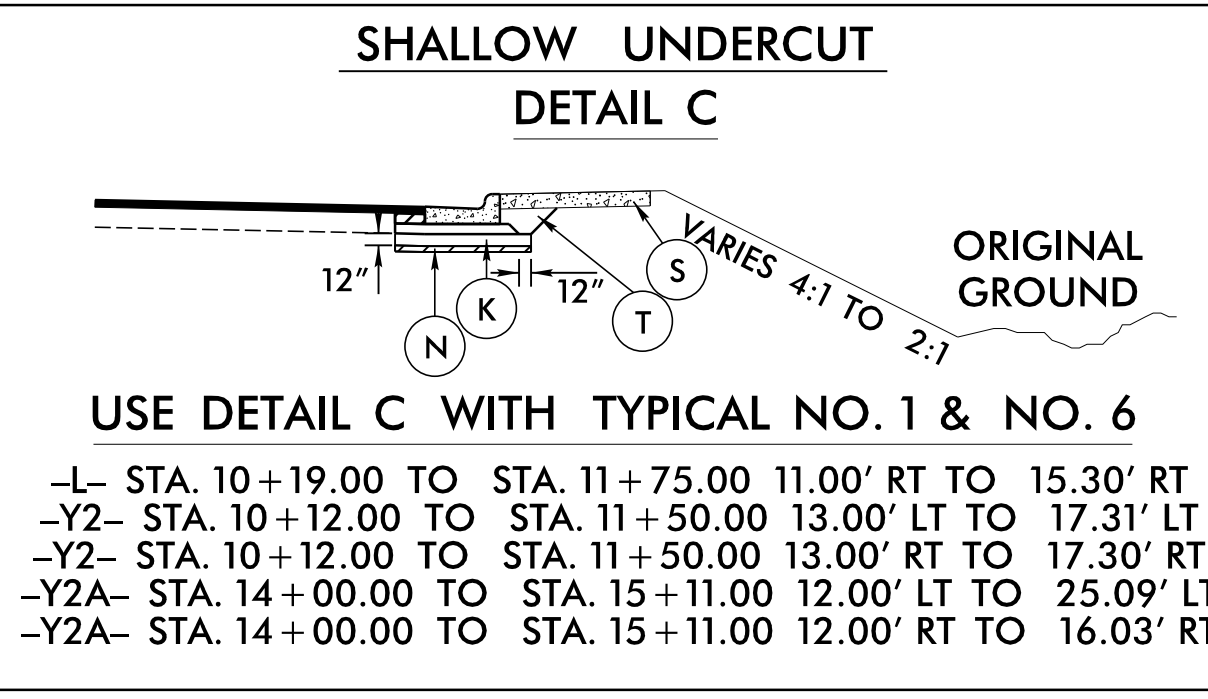
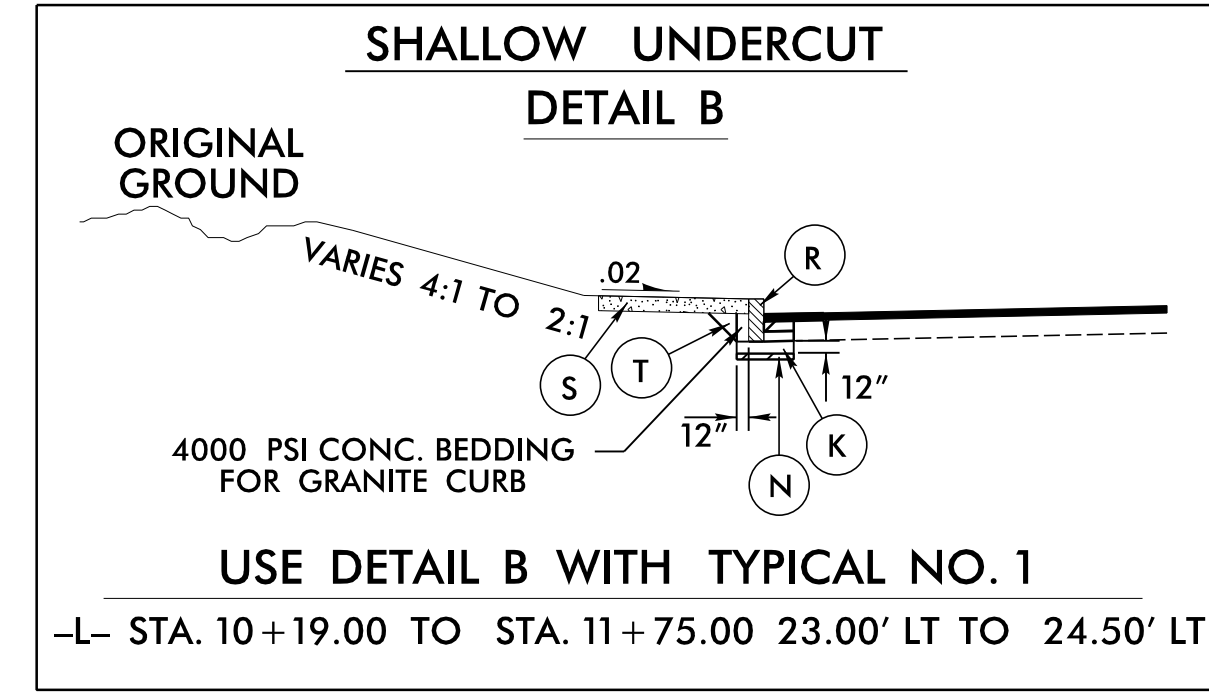
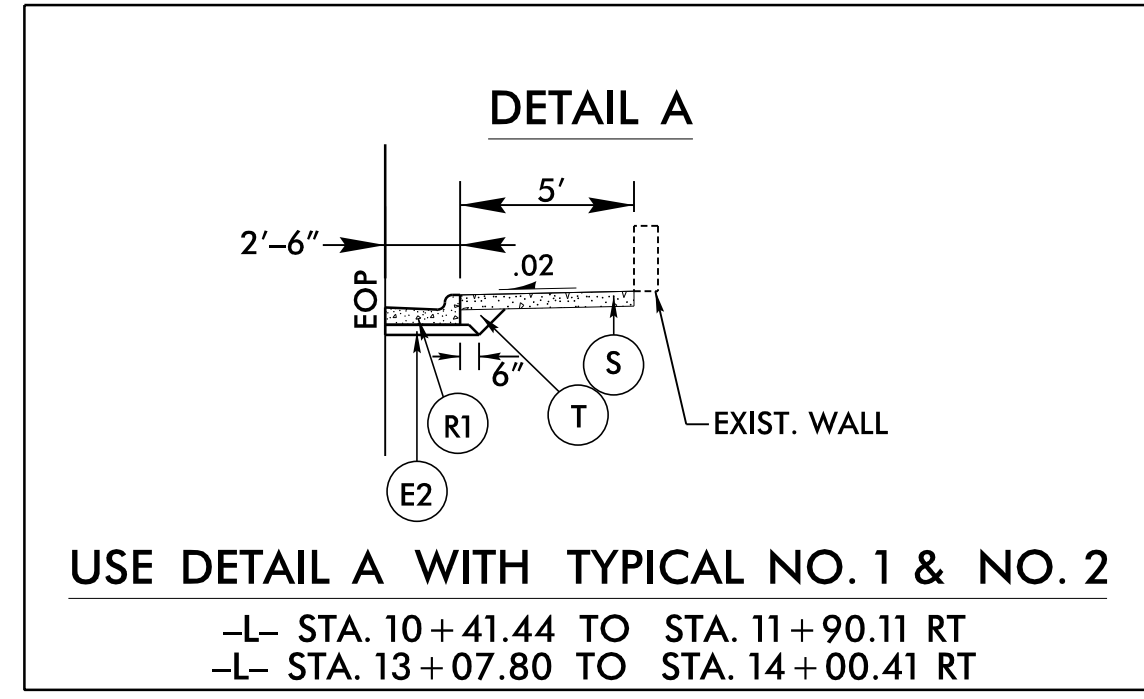
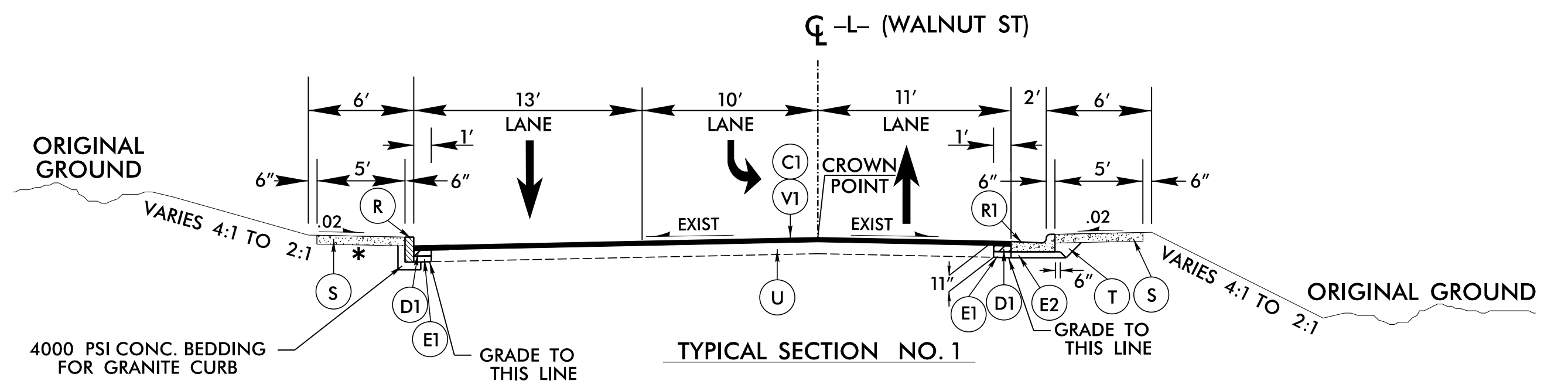
PAVEMENT SCHEDULE	
C1	3" S9.5B
C2	VAR. S9.5B
C3	1.5" S9.5B
D1	4" I19.0C
D2	VAR. I19.0C
E1	4" B25.0C
E2	VAR. B25.0C
K	12" CLASS IV STAB.
N	GEOTEXTILE
R	GRANITE CURB
R1	2'-6" CURB & GUTTER
R2	1'-6" CURB & GUTTER
R3	5" MONO. ISLAND
S	4" CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V1	1.5" MILLING
V2	INCIDENTAL MILLING
W1	SEE WEDGING DETAIL 1
W2	SEE WEDGING DETAIL 2

PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE

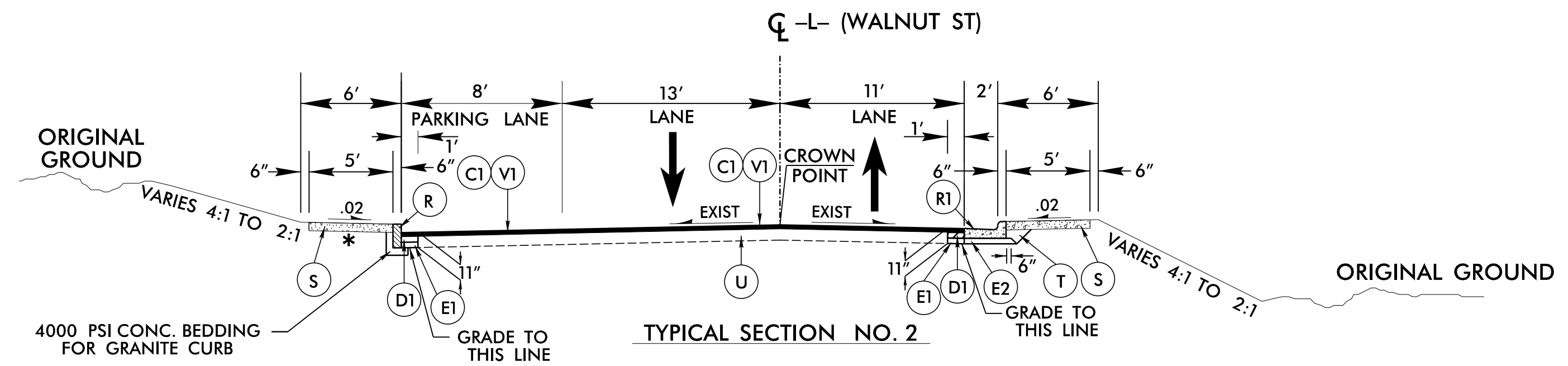
**N|V|5**  
 NV5 ENGINEERS & CONSULTANTS, INC.  
 7500 E. INDEPENDENCE BLVD, STE 100  
 CHARLOTTE, NC 28227  
 P: 704.537.7300 www.NV5.com  
 NC License # F-1333  
 formerly CALYX Engineers & Consultants

PROJECT REFERENCE NO. U-5839	SHEET NO. 2A-2
ROADWAY DESIGN ENGINEER 11/10/2023	PAVEMENT DESIGN ENGINEER 11/10/2023
SEAL 046721 Chris Anderson	SEAL 045672 Thomas W. Smith

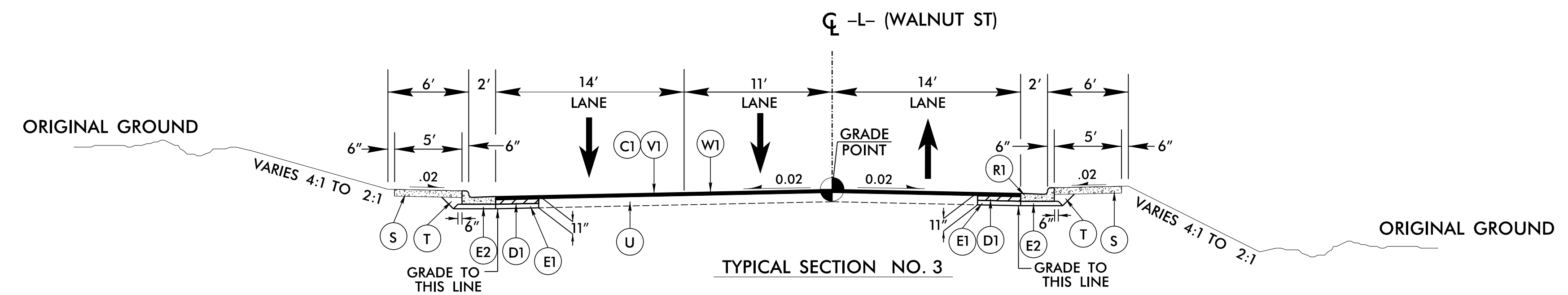
**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**



**USE TYPICAL SECTION NO. 1**  
 -L- STA. 10+19.45 TO STA. 11+70.00  
 \* BRICK SIDEWALK



**USE TYPICAL SECTION NO. 2**  
 -L- STA. 11+70.00 TO STA. 16+00.00  
 \* BRICK SIDEWALK



**USE TYPICAL SECTION NO. 3**  
 -L- STA. 16+00.00 TO STA. 19+52.24

11/10/2023 11:58:39 AM RDY\_PSH\_TYP.dgn  
 Chris Anderson

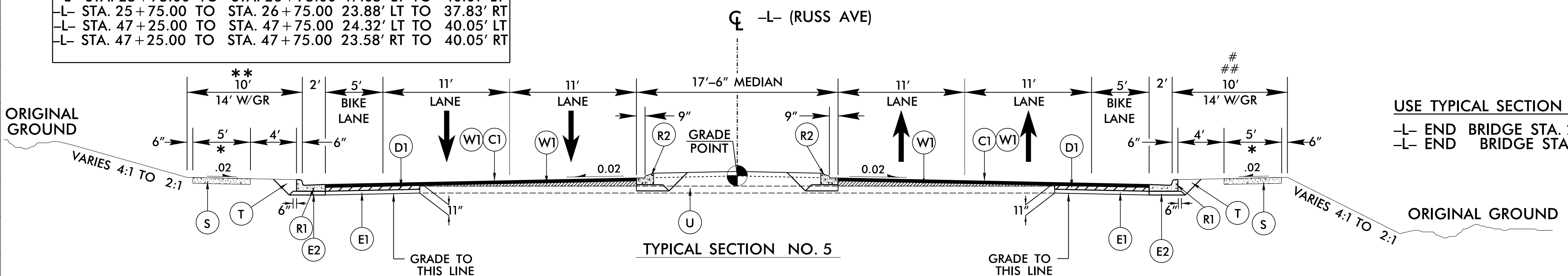
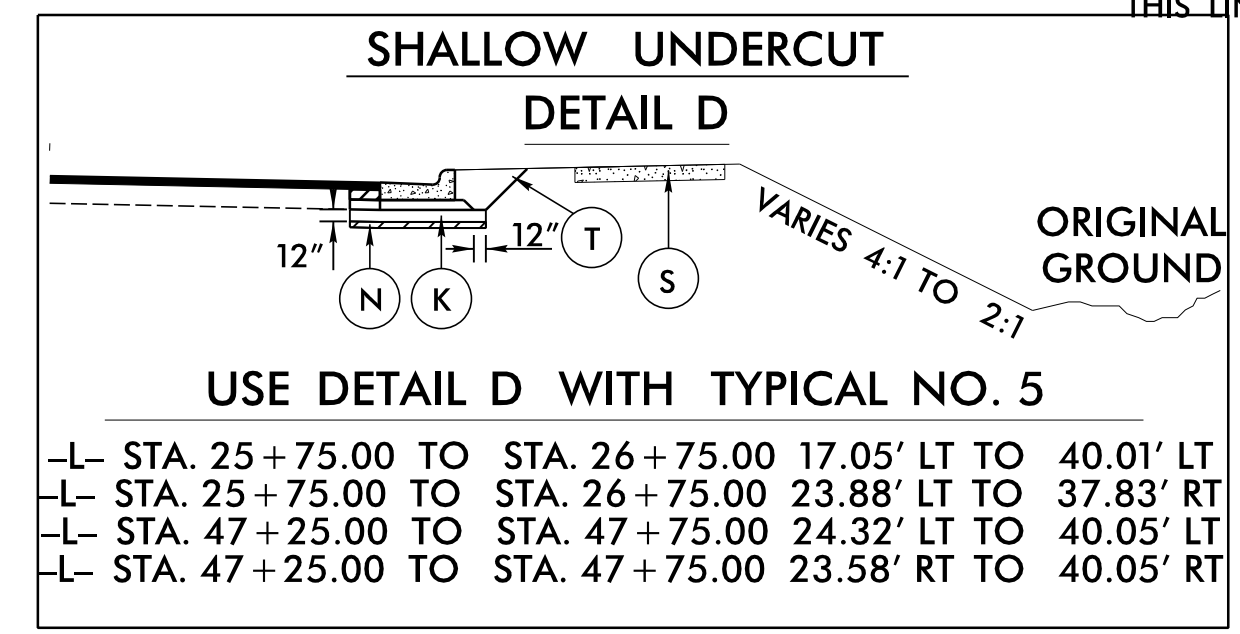
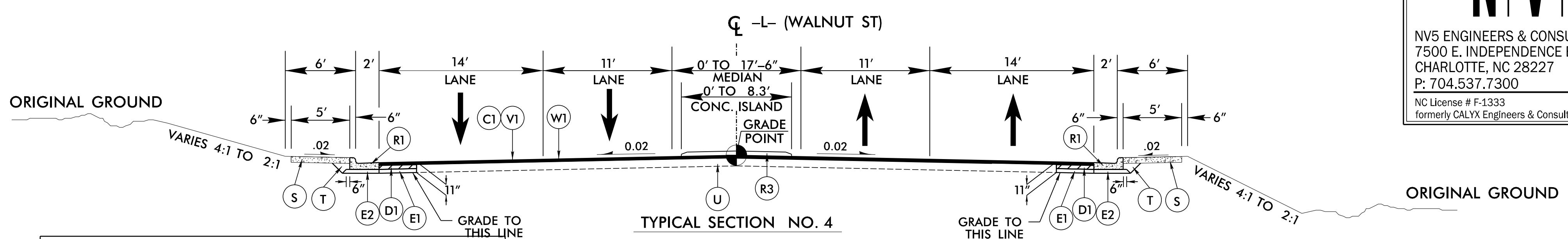
5/14/23

PAVEMENT SCHEDULE	
C1	3" S9.5B
C2	VAR. S9.5B
C3	1.5" S9.5B
D1	4" I19.0C
D2	VAR. I19.0C
E1	4" B25.0C
E2	VAR. B25.0C
K	12" CLASS IV STAB.
N	GEOTEXTILE
R	GRANITE CURB
R1	2'-6" CURB & GUTTER
R2	1'-6" CURB & GUTTER
R3	5" MONO. ISLAND
S	4" CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V1	1.5" MILLING
V2	INCIDENTAL MILLING
W1	SEE WEDGING DETAIL 1
W2	SEE WEDGING DETAIL 2

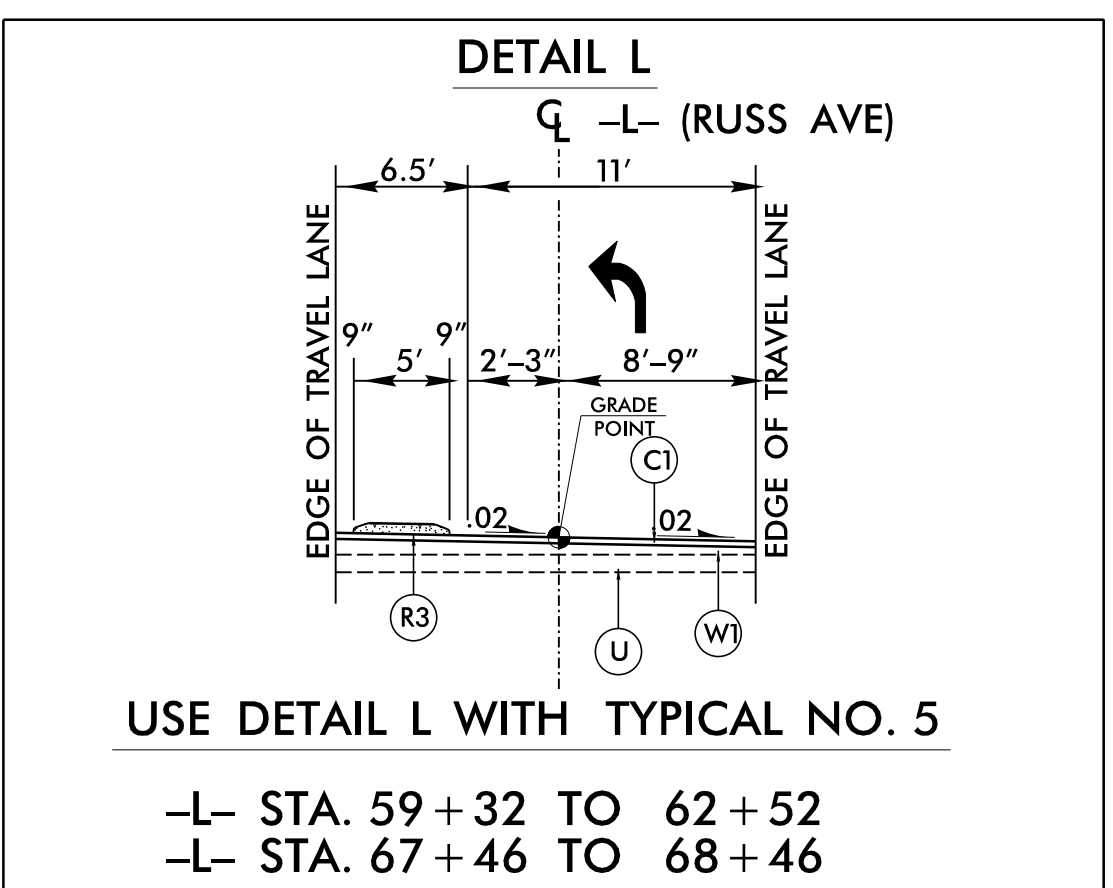
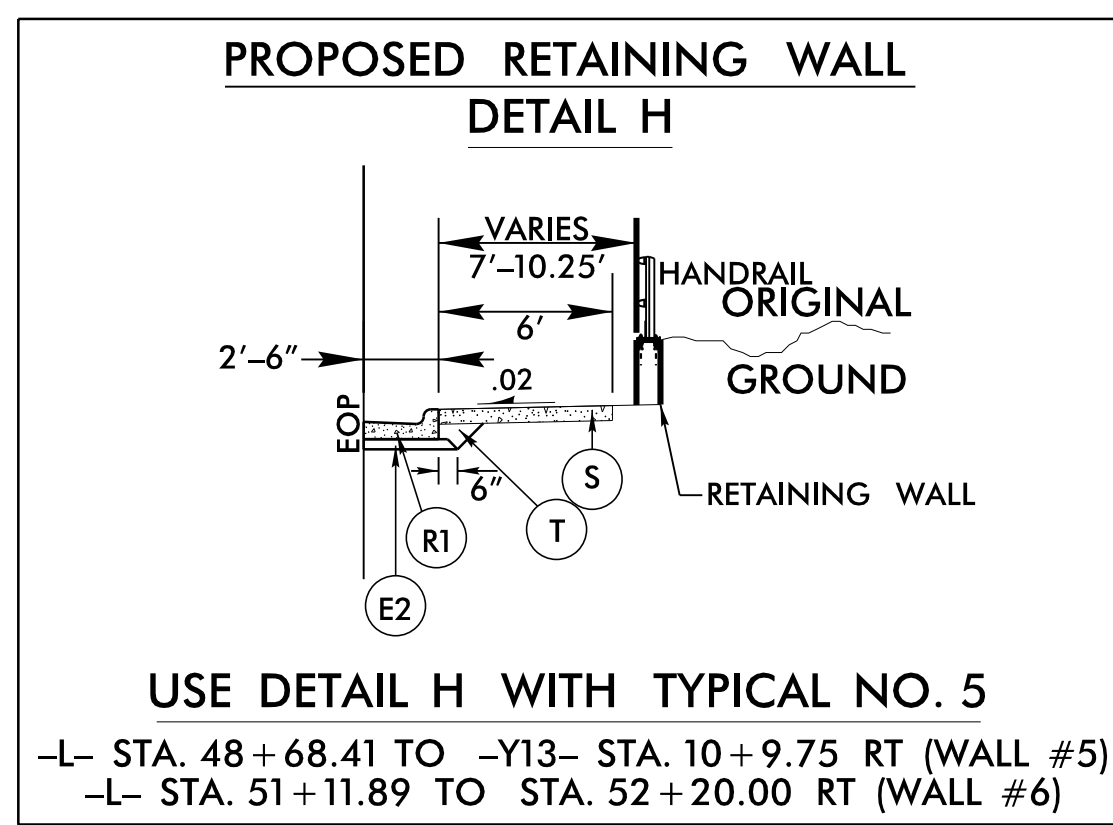
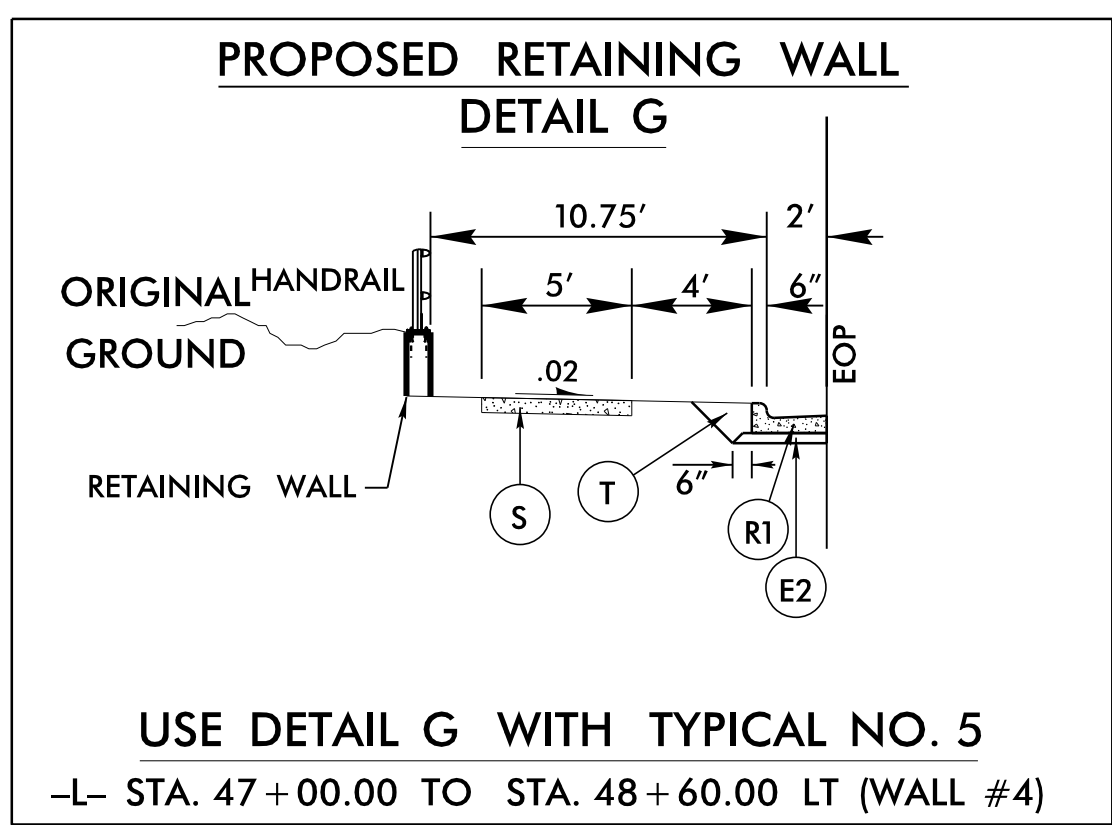
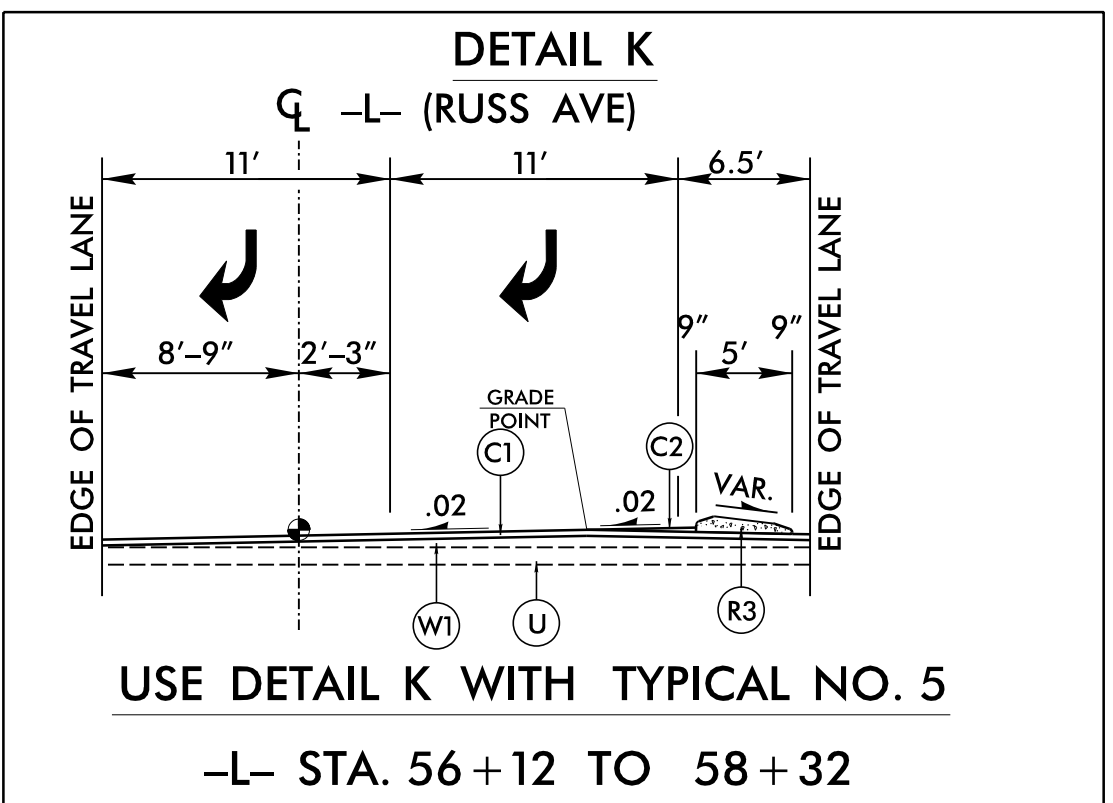
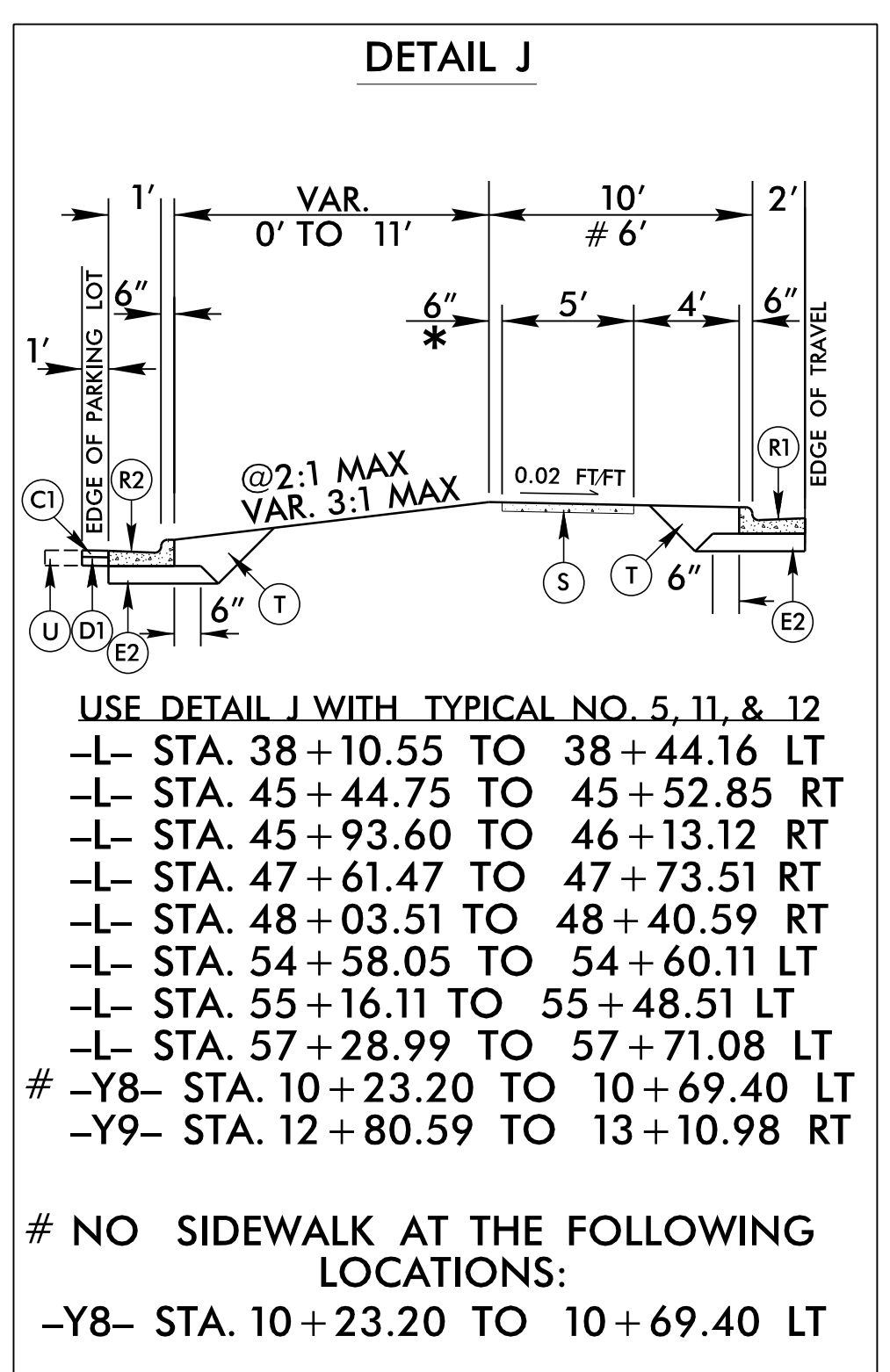
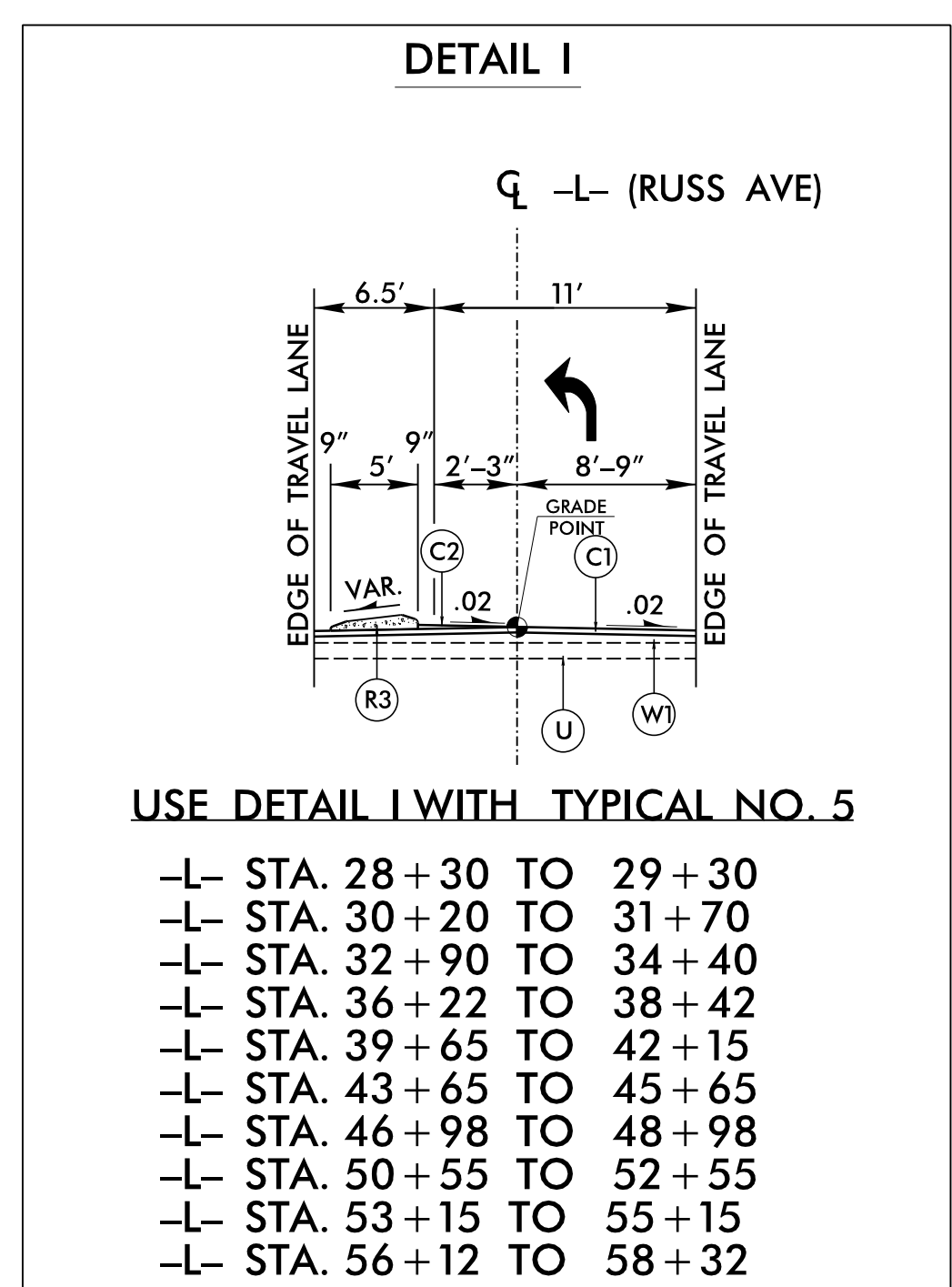
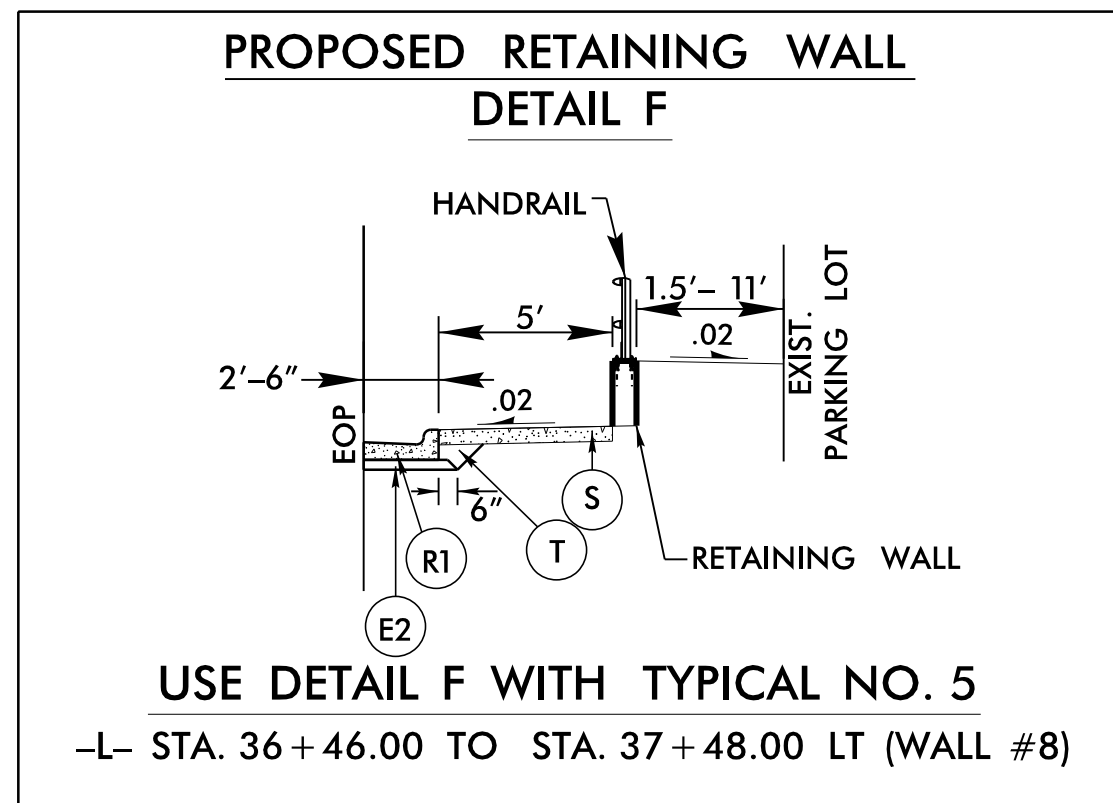
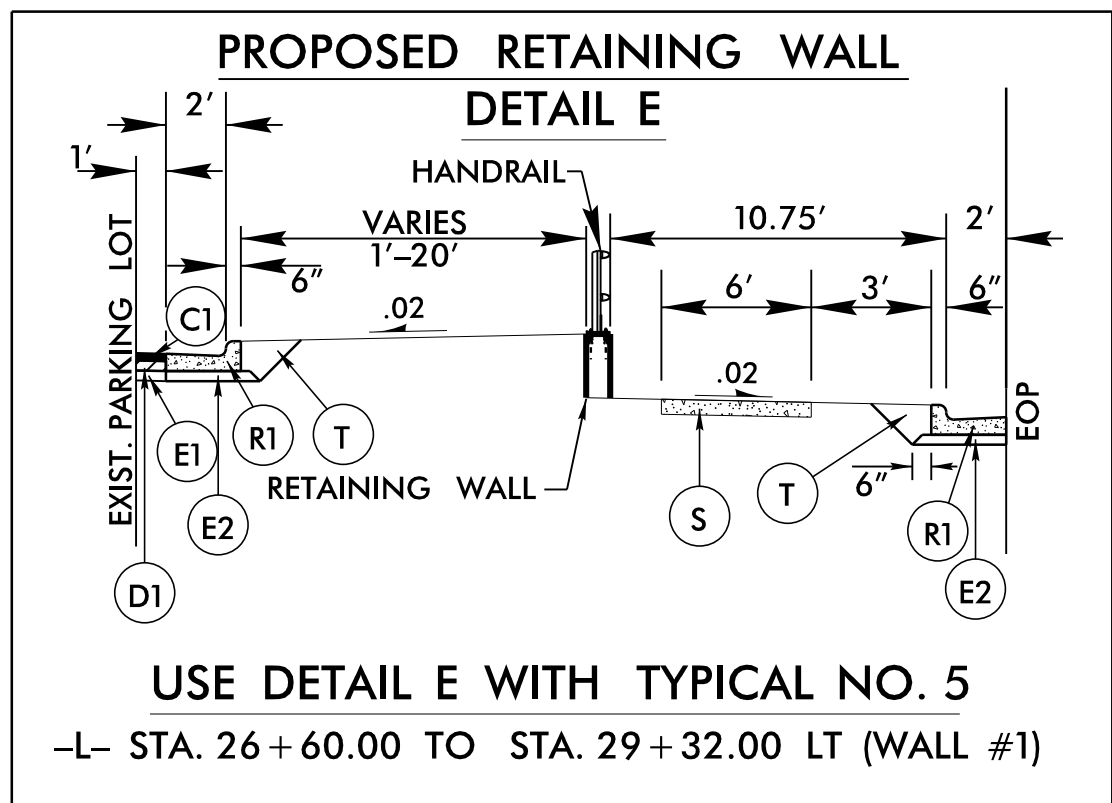
PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE

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PROJECT REFERENCE NO. U-5839	SHEET NO. 2A-3
RW SHEET NO.	
ROADWAY DESIGN ENGINEER 5/9/2023	PAVEMENT DESIGN ENGINEER 5/9/2023
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



- USE TYPICAL SECTION NO. 4  
 -L- STA. 19+52.24 TO BEGIN BRIDGE STA. 23+71.86
- NOTES:  
 SEE PLANS FOR TURN LANES AND TAPERS.  
 MILL AS NEEDED.
- USE TYPICAL SECTION NO. 5  
 -L- END BRIDGE STA. 25+51.53 TO BEGIN BRIDGE STA. 30+54.21  
 -L- END BRIDGE STA. 32+35.79 TO STA. 73+20.00
- \* 6' CONC SIDEWALK
    - L- STA. 26+60.00 TO STA. 30+00.50
    - L- STA. 47+54.31 TO STA. 49+01.84
    - L- STA. 50+41.55 TO STA. 52+12.25
  - \*\* 6' BERM
    - L- STA. 35+90.18 TO STA. 38+00.00
  - # 7' BERM
    - L- STA. 47+54.31 TO STA. 48+50.00
  - ## 7.5' BERM
    - L- STA. 50+41.55 TO STA. 52+12.25



R:\AR\4/27/2023\U5839.RDY\_PSH\_TYP.dgn



5/14/2023

PAVEMENT SCHEDULE	
C1	3" S9.5B
C2	VAR. S9.5B
C3	1.5" S9.5B
D1	4" I19.0C
D2	VAR. I19.0C
E1	4" B25.0C
E2	VAR. B25.0C
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N	GEOTEXTILE
R	GRANITE CURB
R1	2'-6" CURB & GUTTER
R2	1'-6" CURB & GUTTER
R3	5" MONO. ISLAND
S	4" CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V1	1.5" MILLING
V2	INCIDENTAL MILLING
W1	SEE WEDGING DETAIL 1
W2	SEE WEDGING DETAIL 2

PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE

# N|V|5

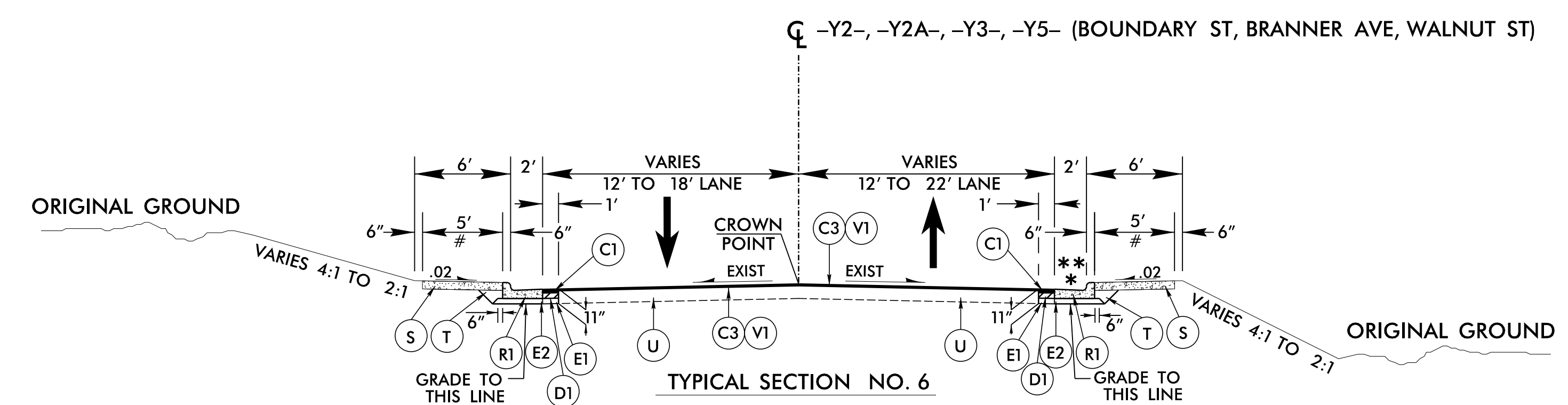
NV5 ENGINEERS & CONSULTANTS, INC.  
7500 E. INDEPENDENCE BLVD, STE 100  
CHARLOTTE, NC 28227  
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PROJECT REFERENCE NO. <b>U-5839</b>	SHEET NO. <b>2A-4</b>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER 5/9/2023	PAVEMENT DESIGN ENGINEER 5/9/2023

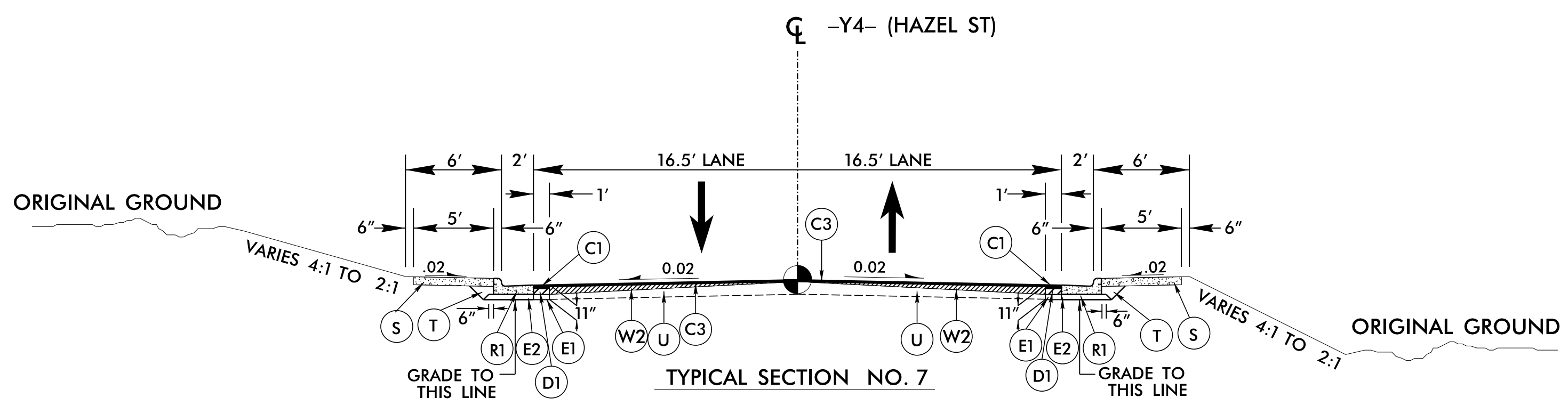
Chris Anderson  
Professional Engineer  
License # 046721

Vladimir G. Mitchev  
Professional Engineer  
License # 031484

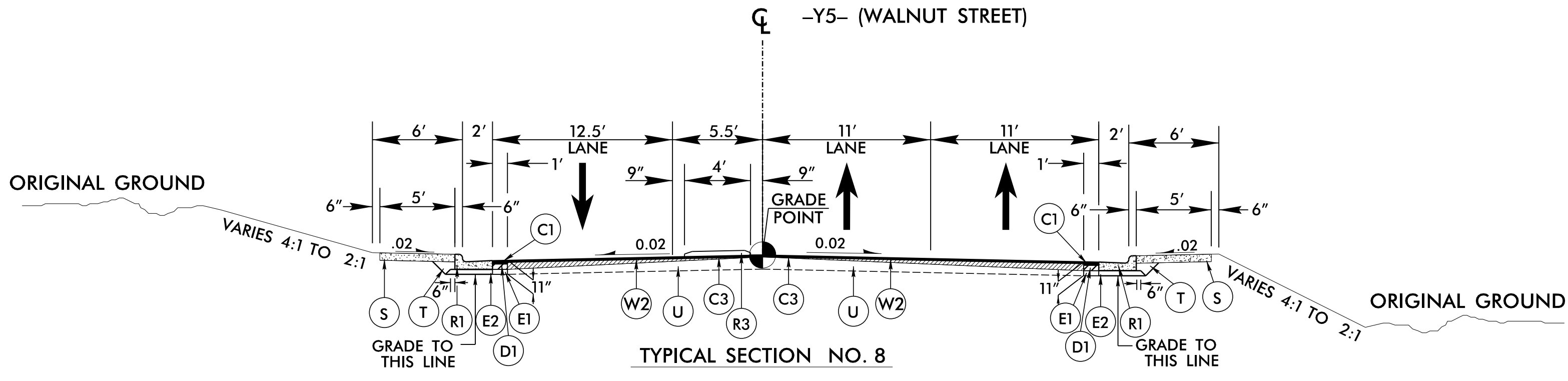
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



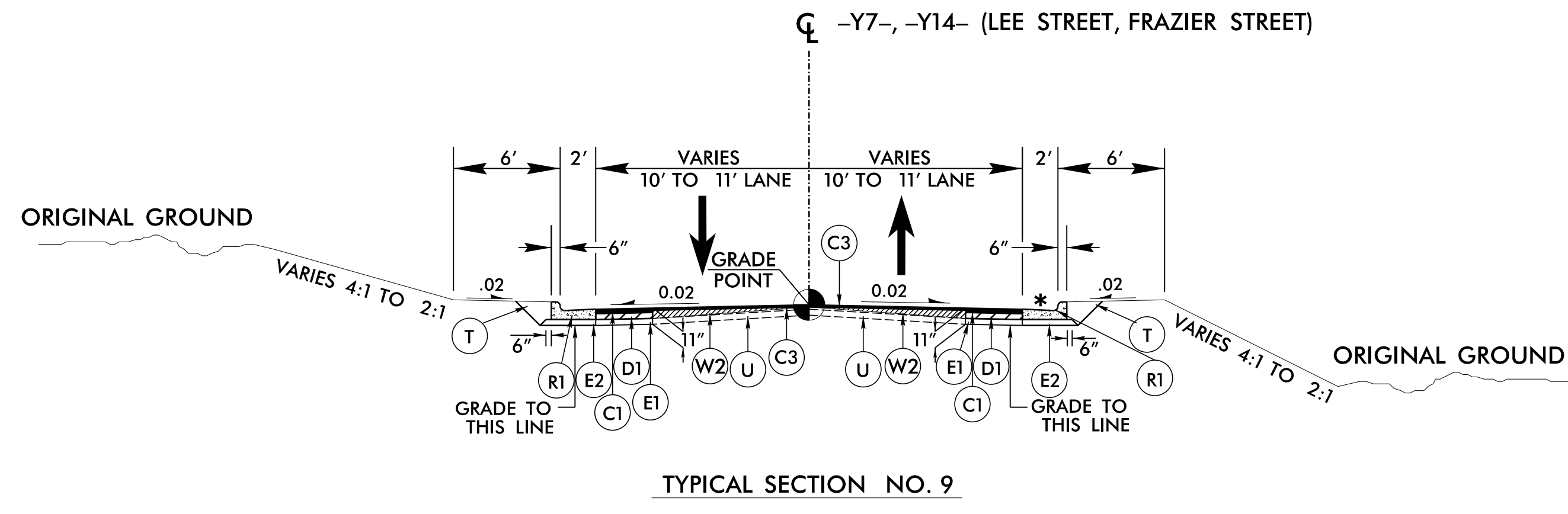
- USE TYPICAL SECTION NO. 6**
- Y2- STA. 10+12.04 TO STA. 11+50.00
  - Y2A- STA. 14+00.00 TO STA. 15+10.91
  - Y3- STA. 15+00.00 TO STA. 16+75.28
  - Y5- STA. 11+52.00 TO STA. 12+05.00
- \* USE 2' VALLEY GUTTER ON -Y2A- STA. 14+00.00 TO STA. 14+36.49 RT
  - \*\* NO PROPOSED CURB & GUTTER ON -Y3- RIGHT SIDE - RETAIN EXISTING CURB & GUTTER
  - # 5' SIDEWALK ON -Y2A- LEFT SIDE, NO SIDEWALK ON RIGHT SIDE
  - # NO SIDEWALK ON -Y3-



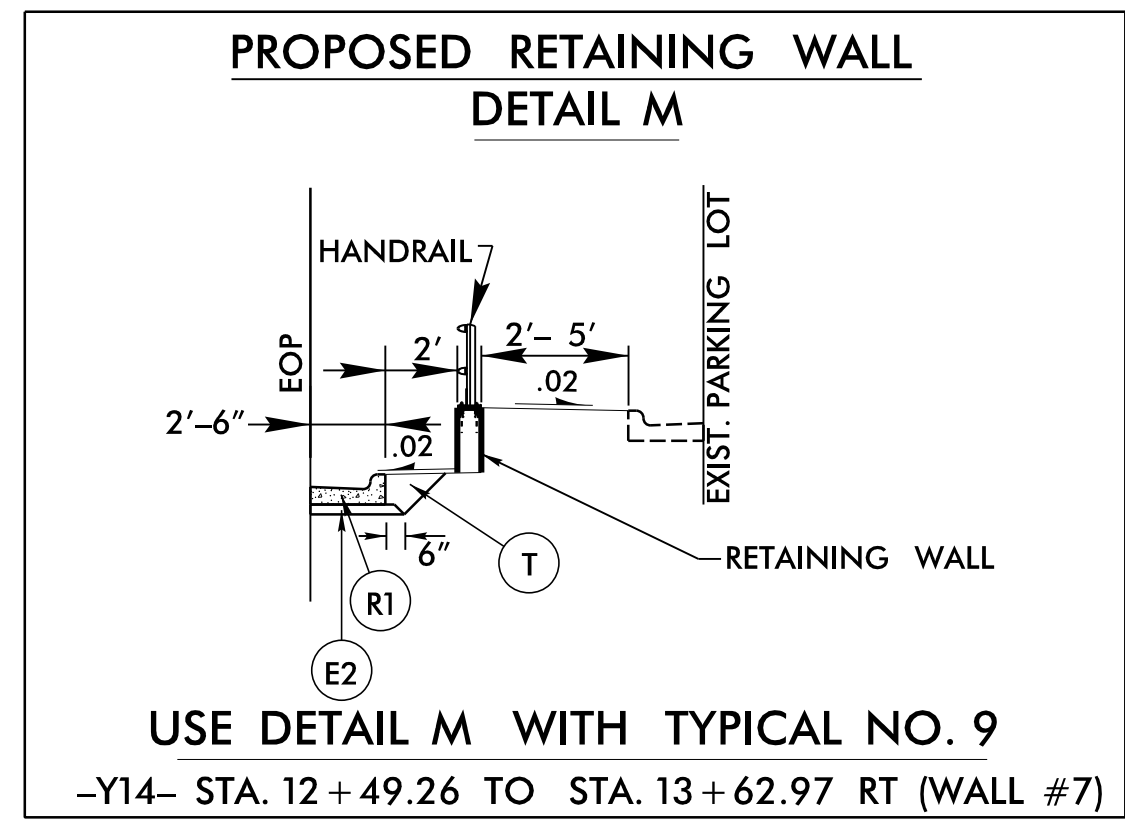
- USE TYPICAL SECTION NO. 7**
- Y4- STA. 10+14.04 TO STA. 11+00.00



- USE TYPICAL SECTION NO. 8**
- Y5- STA. 10+45.25 TO STA. 11+52.00



- USE TYPICAL SECTION NO. 9**
- Y7- STA. 14+20.00 TO STA. 15+00.00
  - Y14- STA. 10+72.00 TO STA. 13+66.02
- \* USE 2' VALLEY GUTTER ON -Y14- STA. 10+72.00 TO STA. 11+70.00 RT



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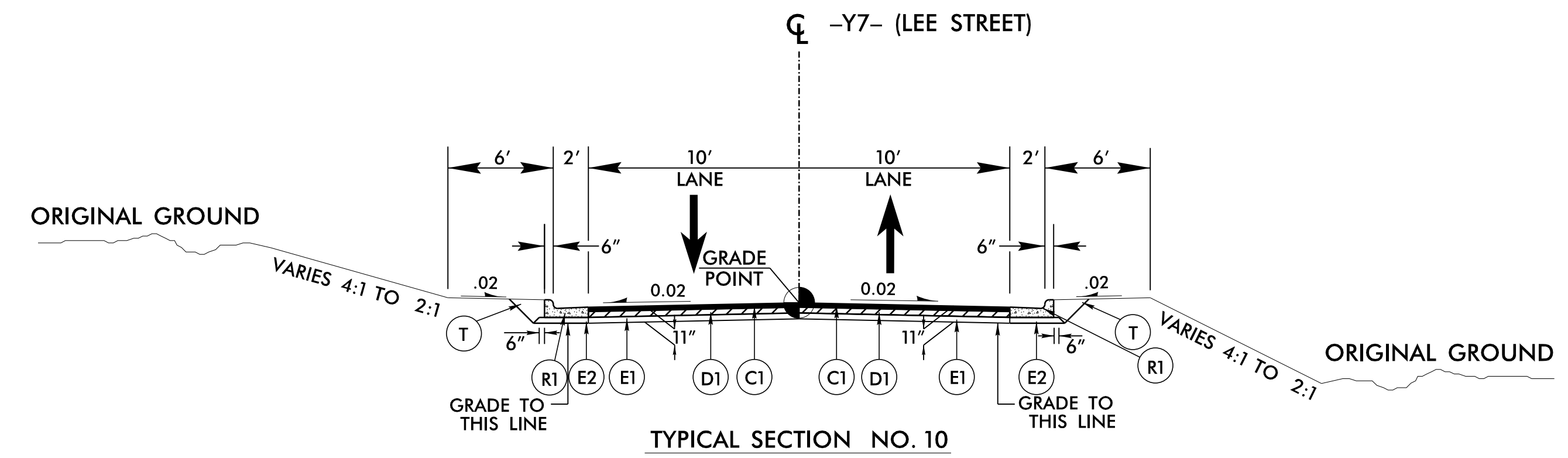
5/14/23

PAVEMENT SCHEDULE	
C1	3" S9.5B
C2	VAR. S9.5B
C3	1.5" S9.5B
D1	4" I19.0C
D2	VAR. I19.0C
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T	EARTH MATERIAL
U	EXISTING PAVEMENT
V1	1.5" MILLING
V2	INCIDENTAL MILLING
W1	SEE WEDGING DETAIL 1
W2	SEE WEDGING DETAIL 2

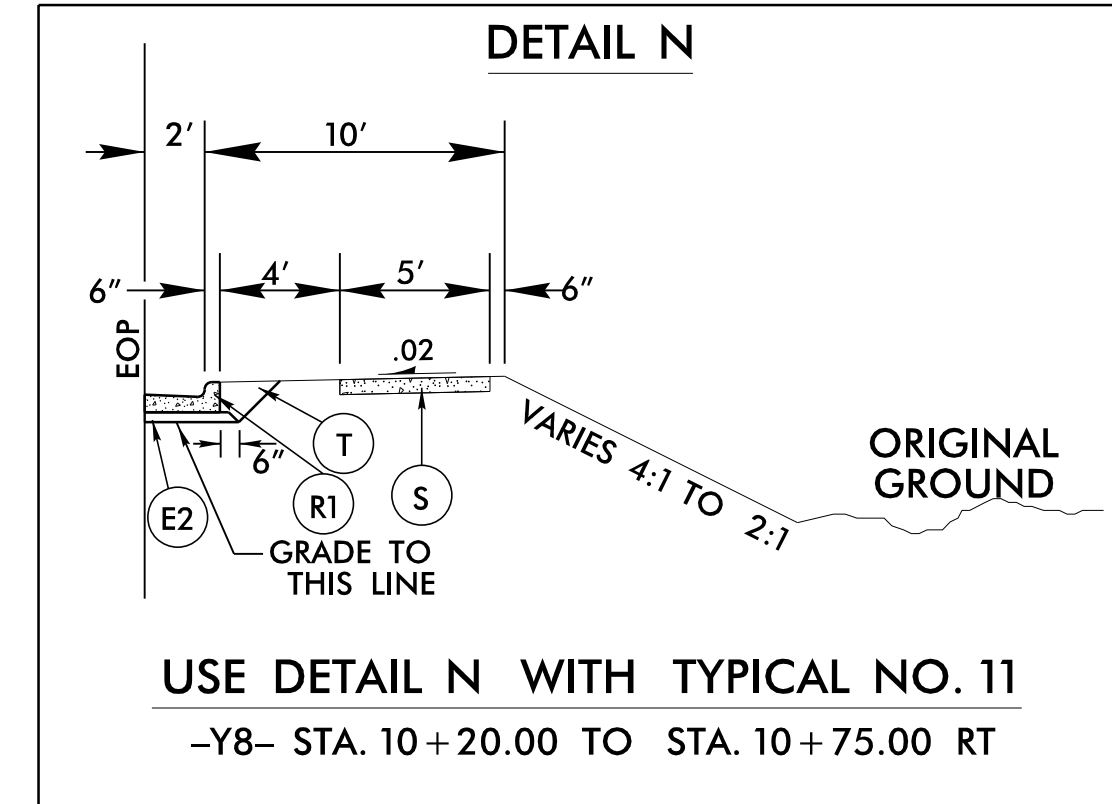
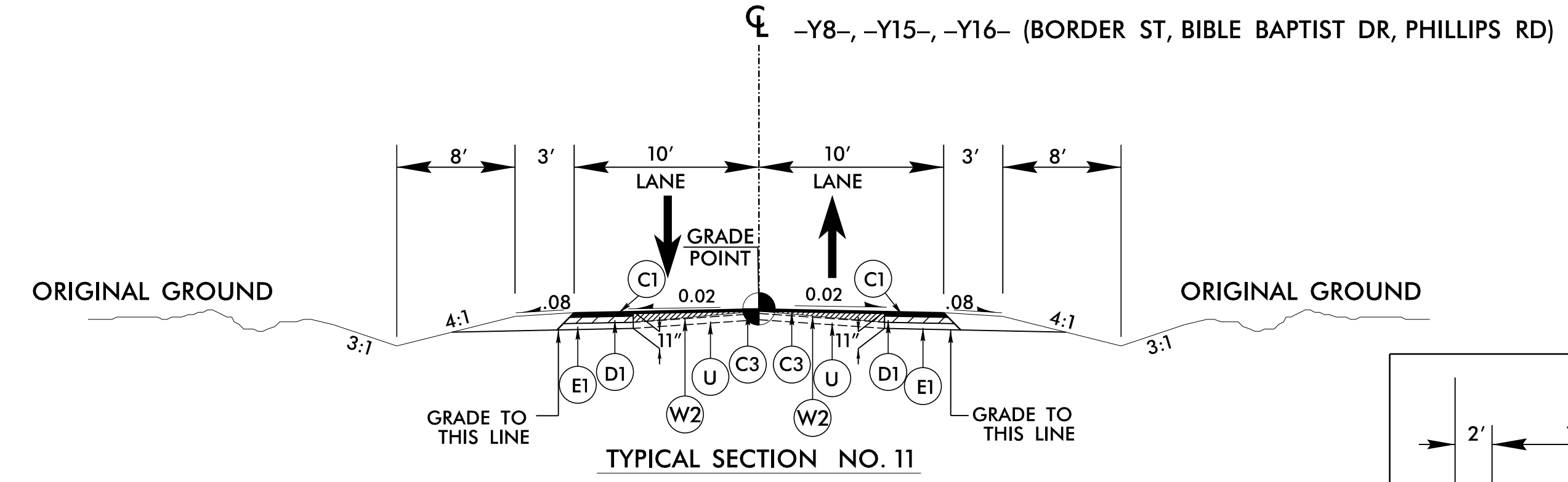
PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE

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PROJECT REFERENCE NO. U-5839	SHEET NO. 2A-5
RW SHEET NO.	
ROADWAY DESIGN ENGINEER 5/9/2023	PAVEMENT DESIGN ENGINEER 5/9/2023
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

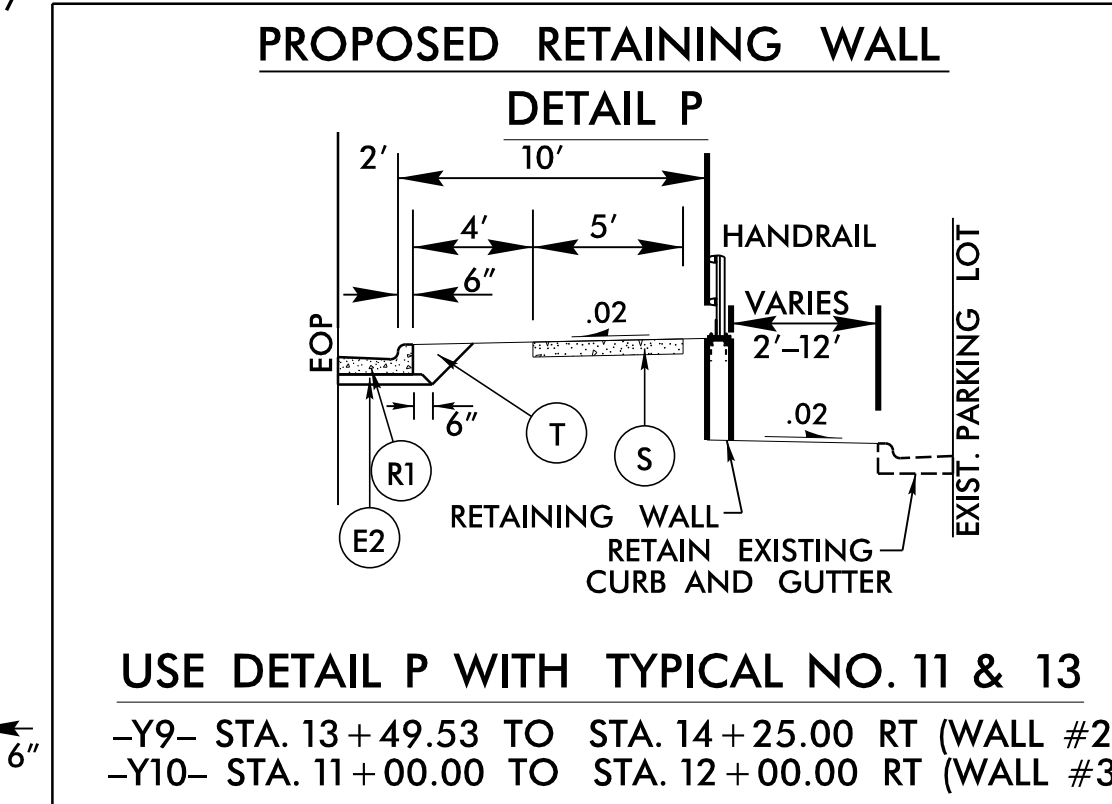
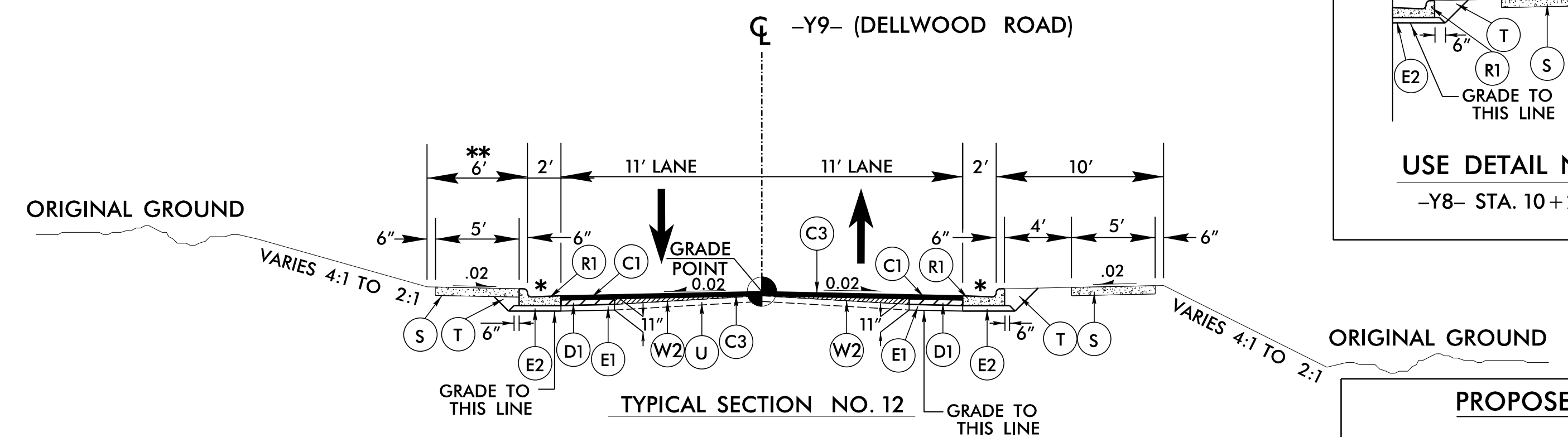


USE TYPICAL SECTION NO. 10  
 -Y7- STA. 15+00.00 TO STA. 16+00.87



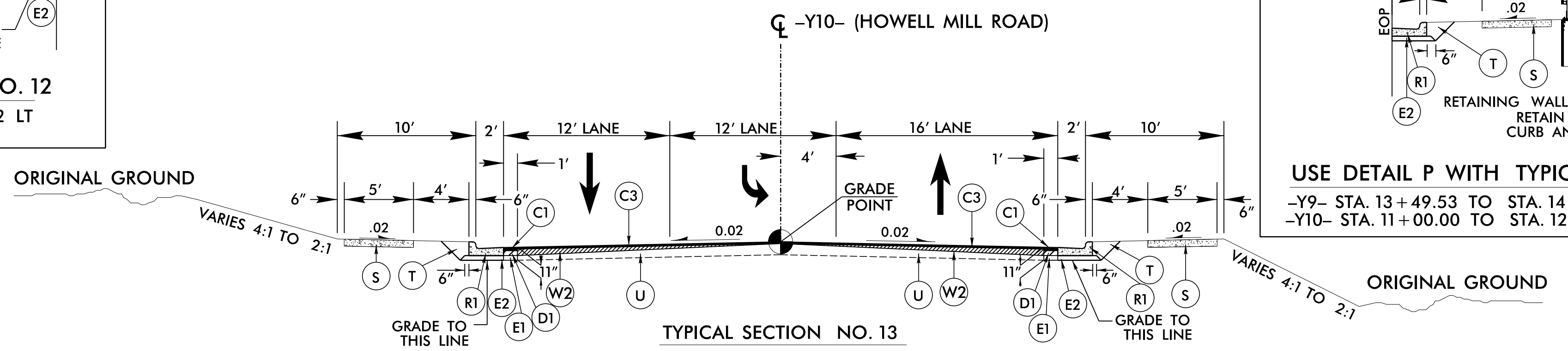
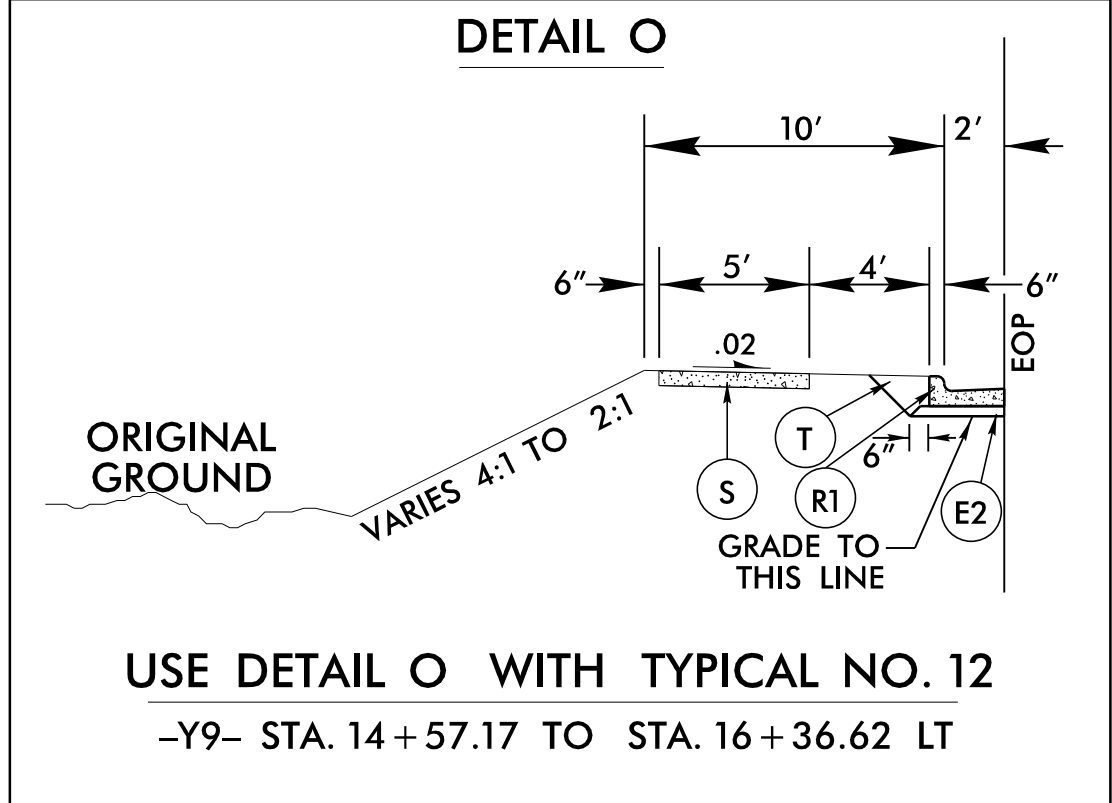
USE TYPICAL SECTION NO. 11  
 -Y8- STA. 10+20.00 TO STA. 10+75.00  
 -Y15- STA. 11+26.00 TO STA. 11+74.00  
 -Y16- STA. 15+95.00 TO STA. 16+68.20

NOTES:  
 SEE DETAIL J ON SHEET 2A-3



USE TYPICAL SECTION NO. 12  
 -Y9- STA. 11+30.00 TO STA. 16+36.62  
 \* USE 2' VALLEY GUTTER ON -Y9- STA. 11+52.70 TO STA. 12+43.57 RT  
 STA. 11+50.00 TO STA. 12+92.00 LT  
 \*\* 10' BERM STA. 14+57.17 TO STA. 16+36.62

NOTES:  
 SEE DETAIL G ON SHEET 2A-3



USE TYPICAL SECTION NO. 13  
 -Y10- STA. 10+37.92 TO STA. 13+84.00

4/27/2023 11:58:39 AM RDY\_PSH\_TYP.dgn  
 Record Number:

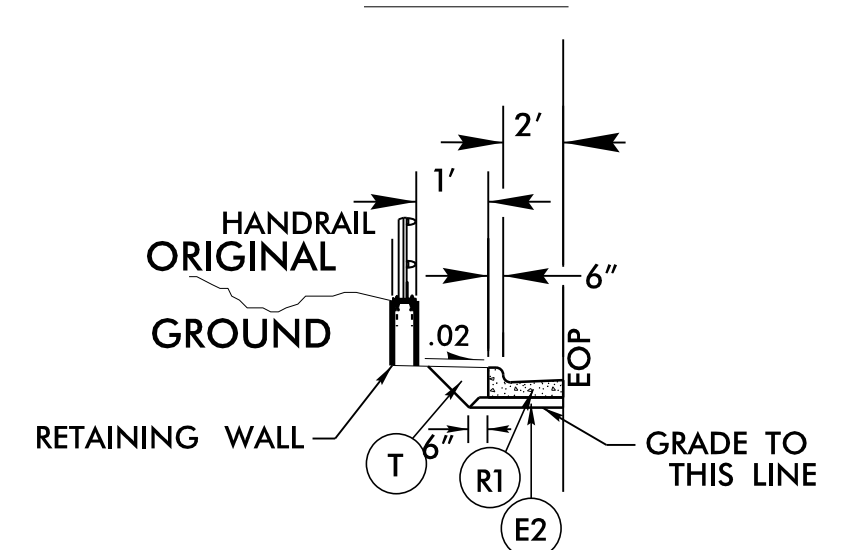


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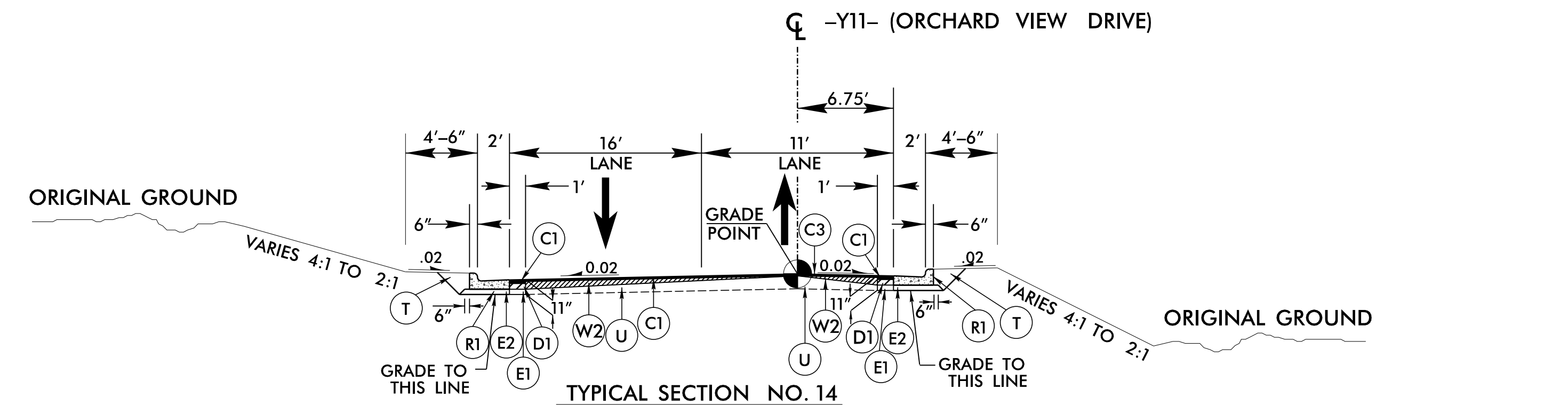
PAVEMENT SCHEDULE	
C1	3" S9.5B
C2	VAR. S9.5B
C3	1.5" S9.5B
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D2	VAR. I19.0C
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T	EARTH MATERIAL
U	EXISTING PAVEMENT
V1	1.5" MILLING
V2	INCIDENTAL MILLING
W1	SEE WEDGING DETAIL 1
W2	SEE WEDGING DETAIL 2

PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE

**PROPOSED RETAINING WALL DETAIL Q**

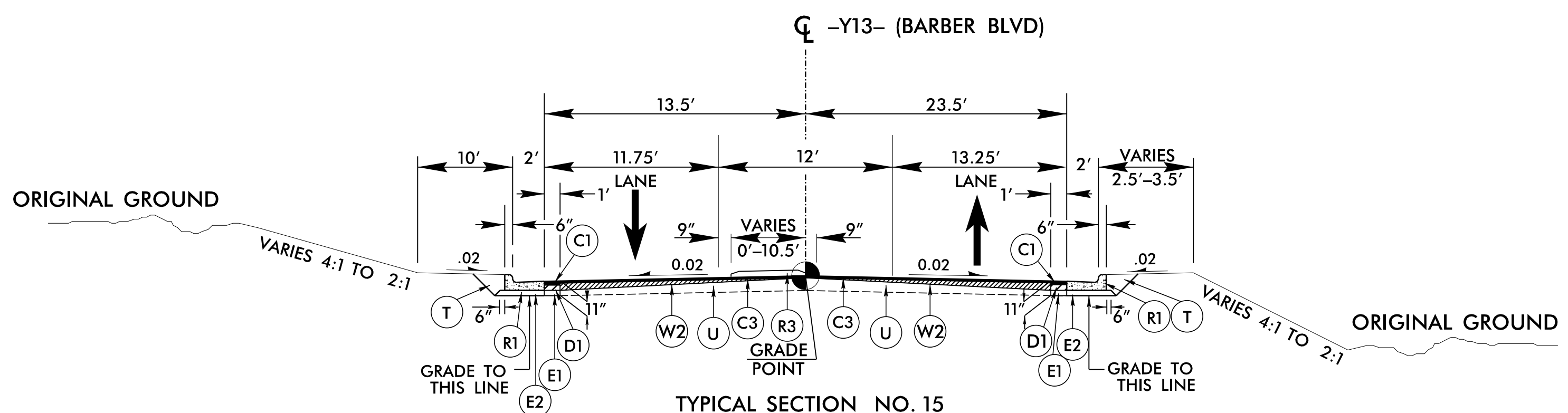


**USE DETAIL Q WITH TYPICAL NO. 16**  
-Y14A- STA. 11+90.00 TO STA. 12+66.88 LT



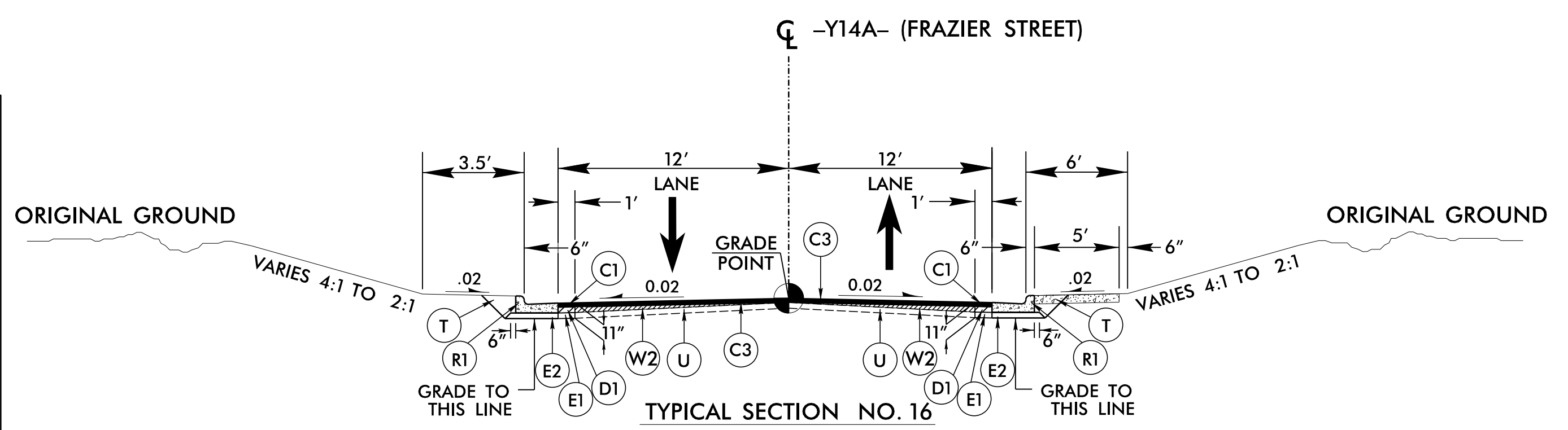
TYPICAL SECTION NO. 14

**USE TYPICAL SECTION NO. 14**  
-Y11- STA. 11+20.00 TO STA. 11+78.42



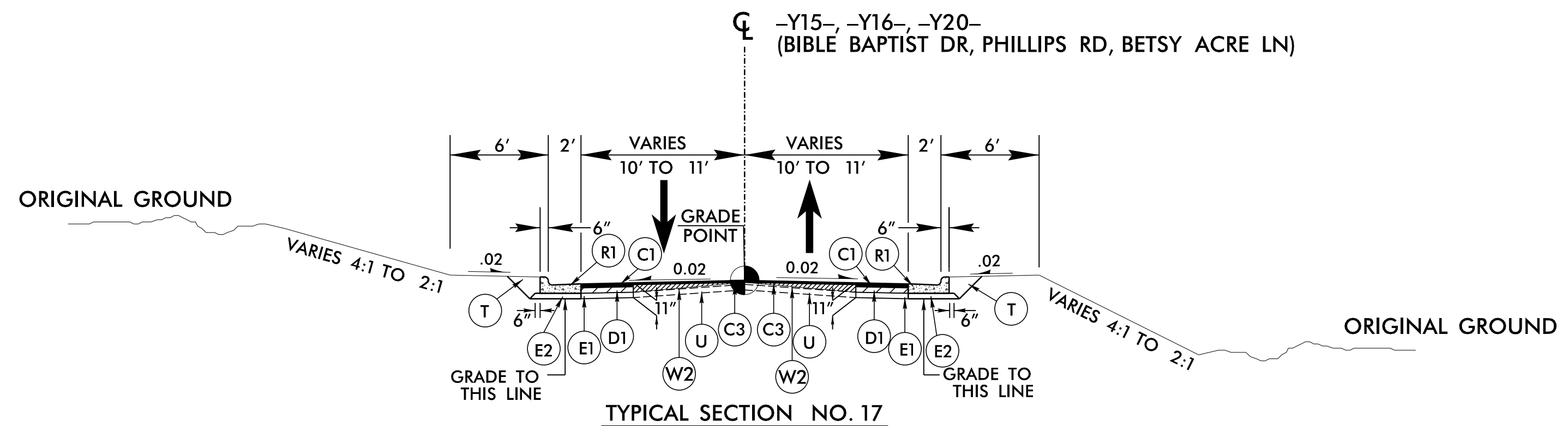
TYPICAL SECTION NO. 15

**USE TYPICAL SECTION NO. 15**  
-Y13- STA. 10+35.80 TO STA. 12+00.00



TYPICAL SECTION NO. 16

**USE TYPICAL SECTION NO. 16**  
-Y14A- STA. 10+35.78 TO STA. 12+95.00



TYPICAL SECTION NO. 17

**USE TYPICAL SECTION NO. 17**  
-Y15- STA. 10+43.05 TO STA. 11+26.00  
-Y16- STA. 16+68.20 TO STA. 17+62.40  
-Y20- STA. 11+88.00 TO STA. 12+16.44

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PROJECT REFERENCE NO. U-5839	SHEET NO. 2A-6
ROADWAY DESIGN ENGINEER 5/9/2023	PAVEMENT DESIGN ENGINEER 5/9/2023

SEAL  
046721  
Chris Anderson

SEAL  
031484  
Vladimir G. Mitchev

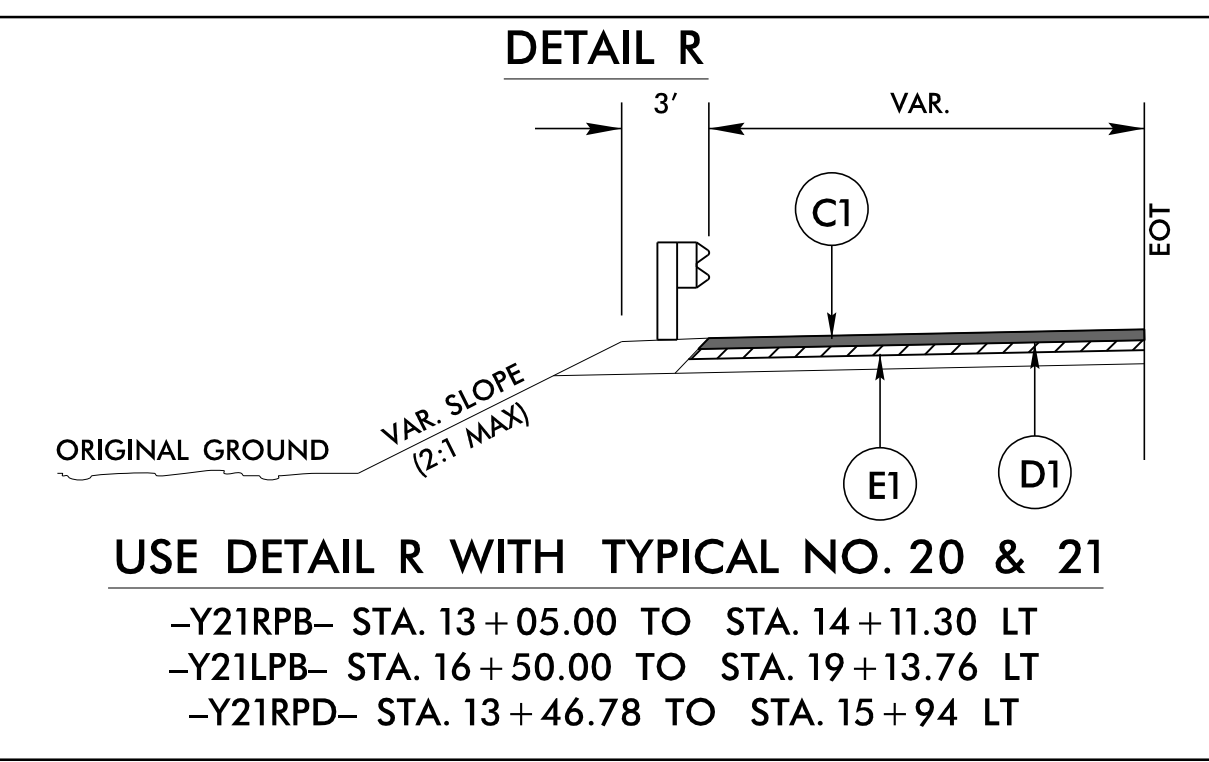
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5/14/23

PAVEMENT SCHEDULE	
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C2	VAR. S9.5B
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D1	4" I19.0C
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W1	SEE WEDGING DETAIL 1
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PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE

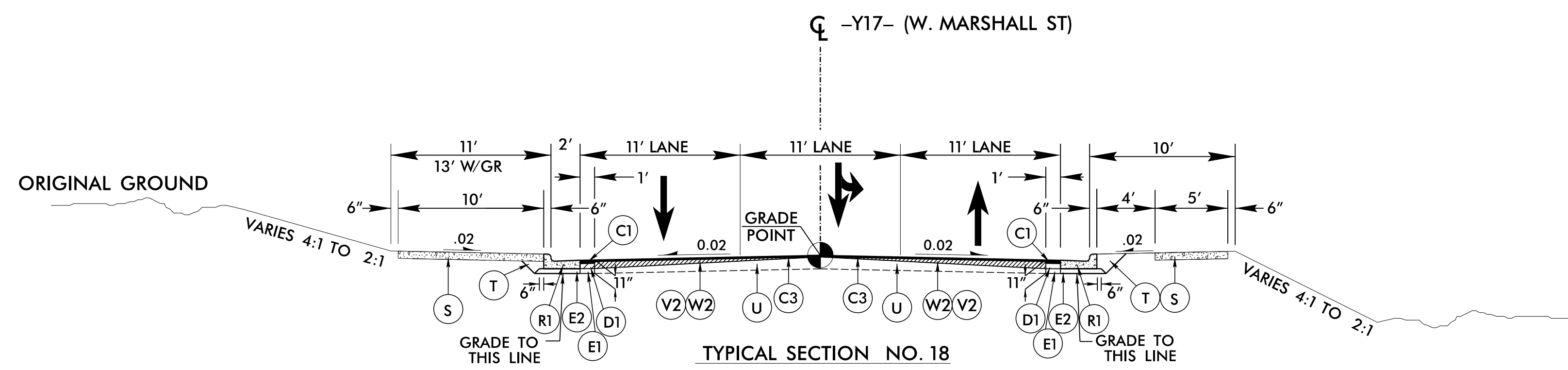


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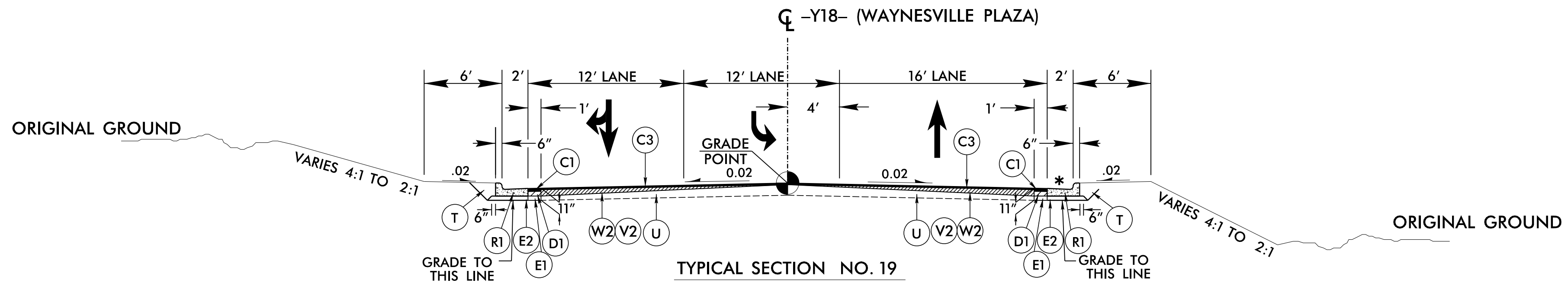
PROJECT REFERENCE NO. U-5839	SHEET NO. 2A-7
ROADWAY DESIGN ENGINEER 5/9/2023	PAVEMENT DESIGN ENGINEER 5/9/2023

Professional Engineer Seals for North Carolina:  
 Chris Anderson (Seal 046721)  
 Vladimir G. Mitchev (Seal 031484)

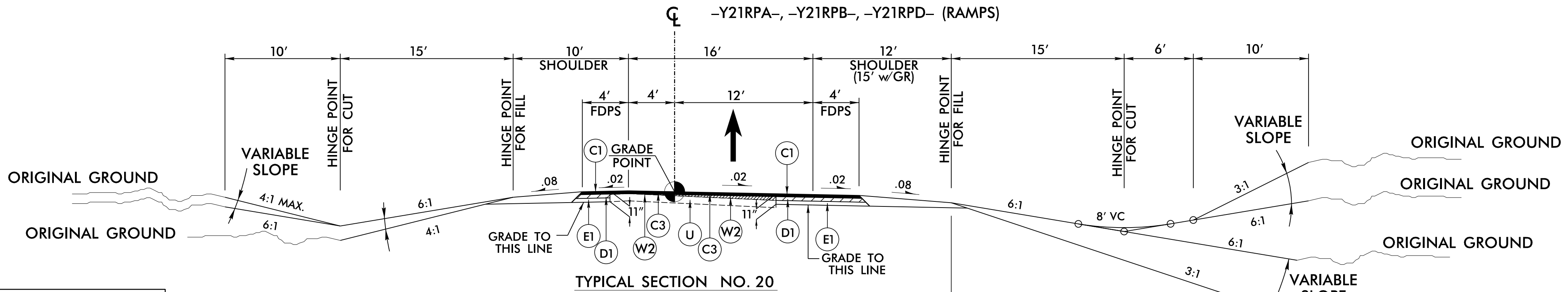
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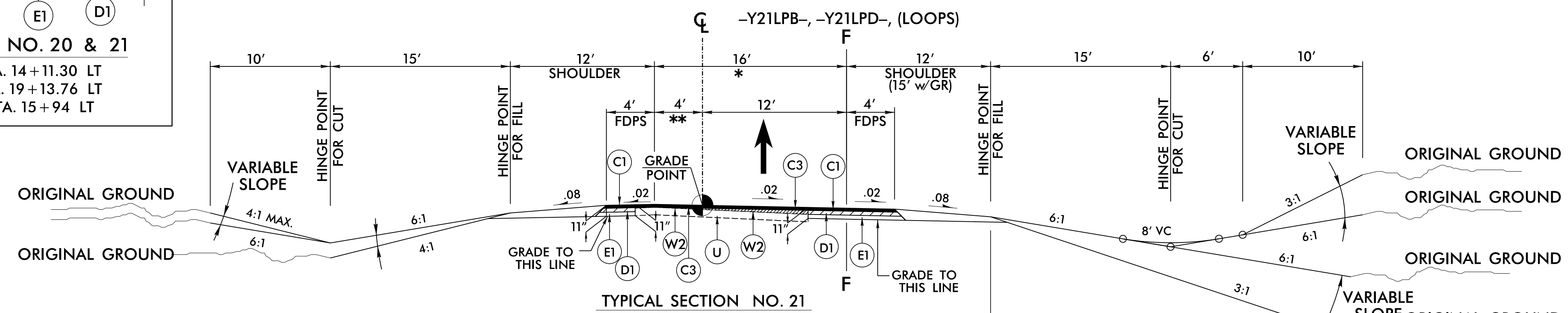
USE TYPICAL SECTION NO. 18  
 -Y17- STA. 10+35.77 TO STA. 11+42.27



USE TYPICAL SECTION NO. 19  
 -Y18- STA. 10+35.79 TO STA. 11+86.00



USE TYPICAL SECTION NO. 20  
 -Y21RPA- STA. 13+04.00 TO STA. 14+66.26  
 -Y21RPB- STA. 13+05.00 TO STA. 16+55.24  
 -Y21RPD- STA. 12+52.00 TO STA. 17+52.40



USE TYPICAL SECTION NO. 21  
 -Y21LPB- STA. 16+50.00 TO STA. 19+14.11  
 -Y21LPD- STA. 13+75.00 TO STA. 19+92.16  
 \* DIMENSION IS 18' FOR -Y21LPD-  
 \*\* DIMENSION IS 6' FOR -Y21LPD-

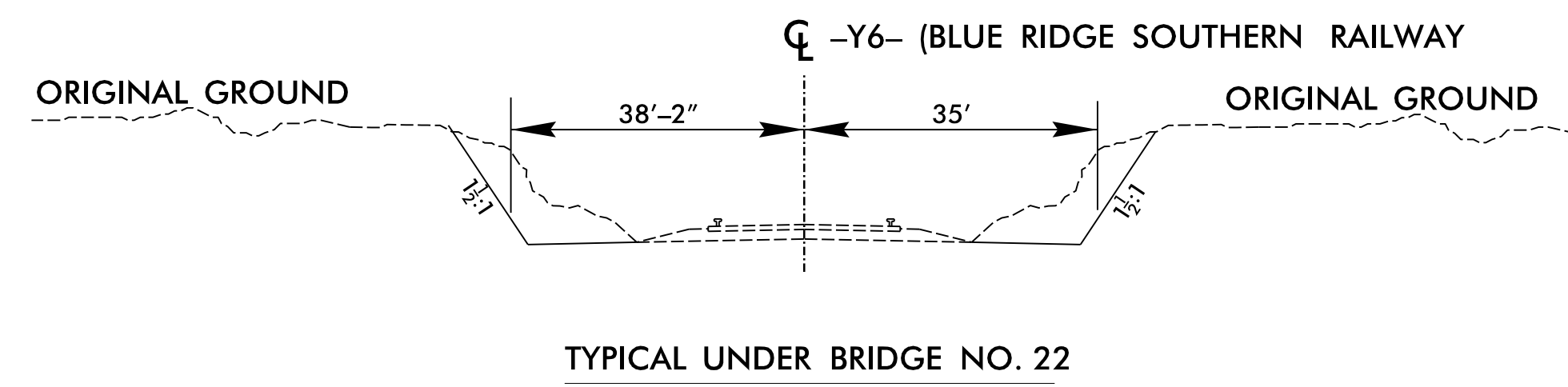
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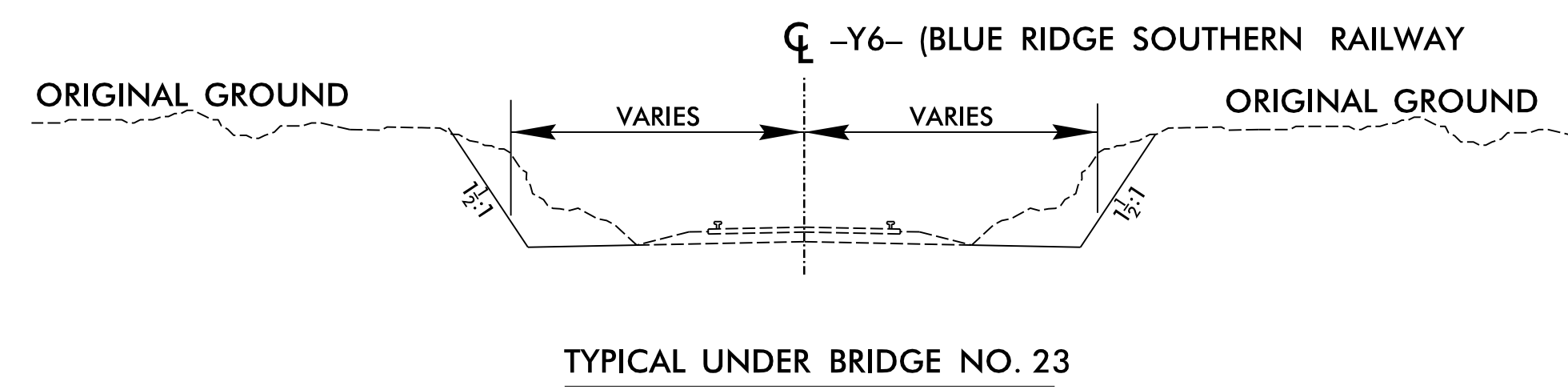
5/14/23

PAVEMENT SCHEDULE	
C1	3" S9.5B
C2	VAR. S9.5B
C3	1.5" S9.5B
D1	4" I19.0C
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R1	2'-6" CURB & GUTTER
R2	1'-6" CURB & GUTTER
R3	5" MONO. ISLAND
S	4" CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V1	1.5" MILLING
V2	INCIDENTAL MILLING
W1	SEE WEDGING DETAIL 1
W2	SEE WEDGING DETAIL 2

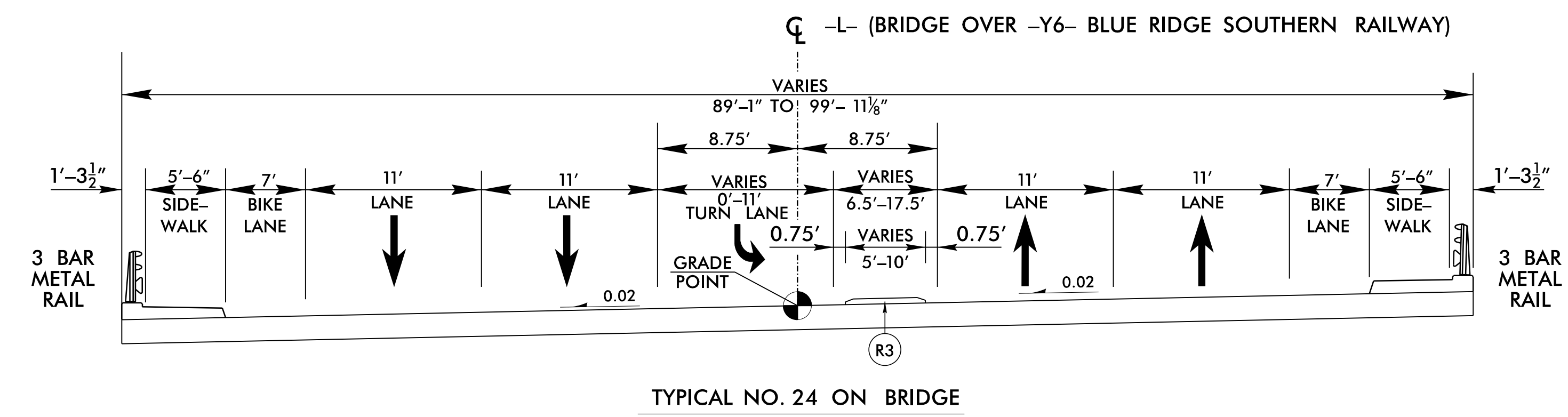
PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE



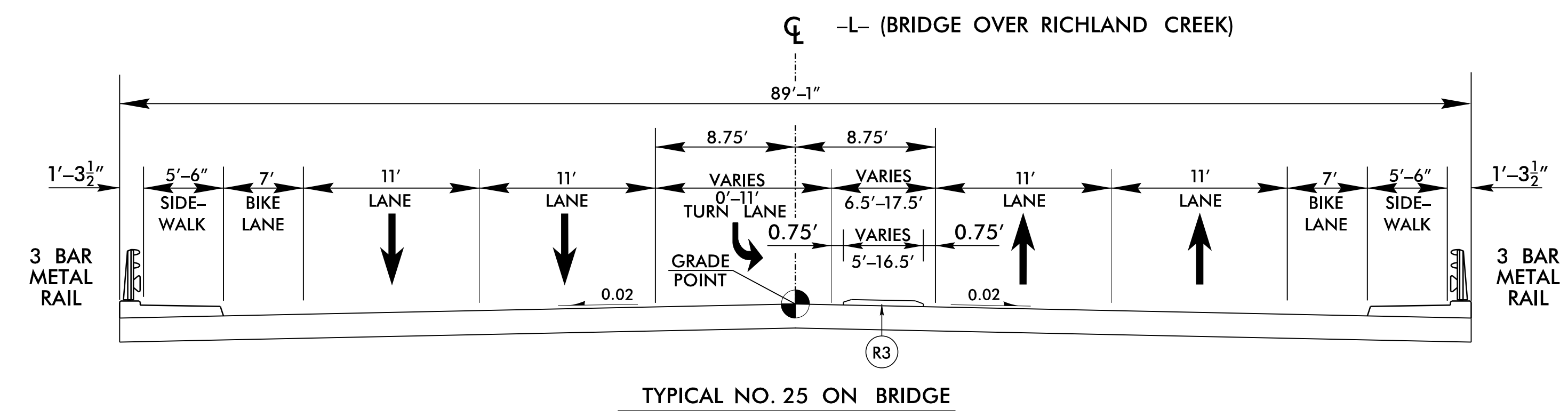
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-Y6- STA. 14+95.00 TO STA. 16+45.00



USE TYPICAL SECTION NO. 23  
-Y6- STA. 14+45.00 TO STA. 14+95.00  
-Y6- STA. 16+45.00 TO STA. 16+95.00



USE TYPICAL SECTION NO. 24  
-L- STA. 23+71.86 TO STA. 25+51.53



USE TYPICAL SECTION NO. 25  
-L- STA. 30+54.21 TO STA. 32+35.79

NOTES:  
SEE STRUCTURE PLANS SHT S1-6 & S2-5 FOR BRIDGE CONSTRUCTION STAGING SEQUENCE.

# NV5



NV5 ENGINEERS & CONSULTANTS, INC.  
7500 E. INDEPENDENCE BLVD, STE 100  
CHARLOTTE, NC 28227  
P: 704.537.7300      www.NV5.com  
NC License # F-1333  
formerly CALYX Engineers & Consultants

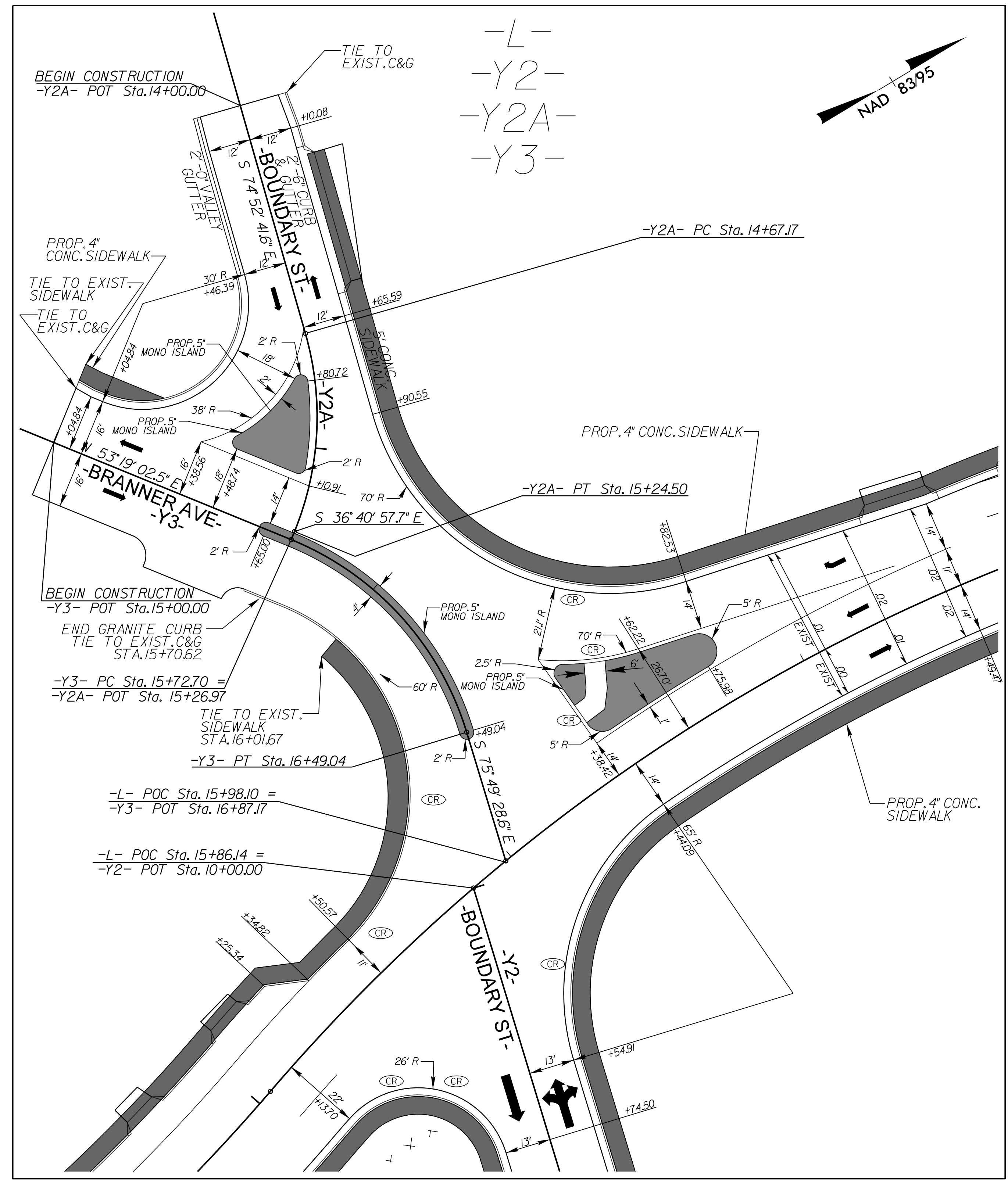
PROJECT REFERENCE NO. <i>U-5839</i>	SHEET NO. <i>2A-8</i>
RW SHEET NO.	PAVEMENT DESIGN ENGINEER
ROADWAY DESIGN ENGINEER 5/9/2023	PAVEMENT DESIGN ENGINEER 5/9/2023
<p><b>DOCUMENT NOT CONSIDERED FINAL</b> <b>UNLESS ALL SIGNATURES COMPLETED</b></p>	

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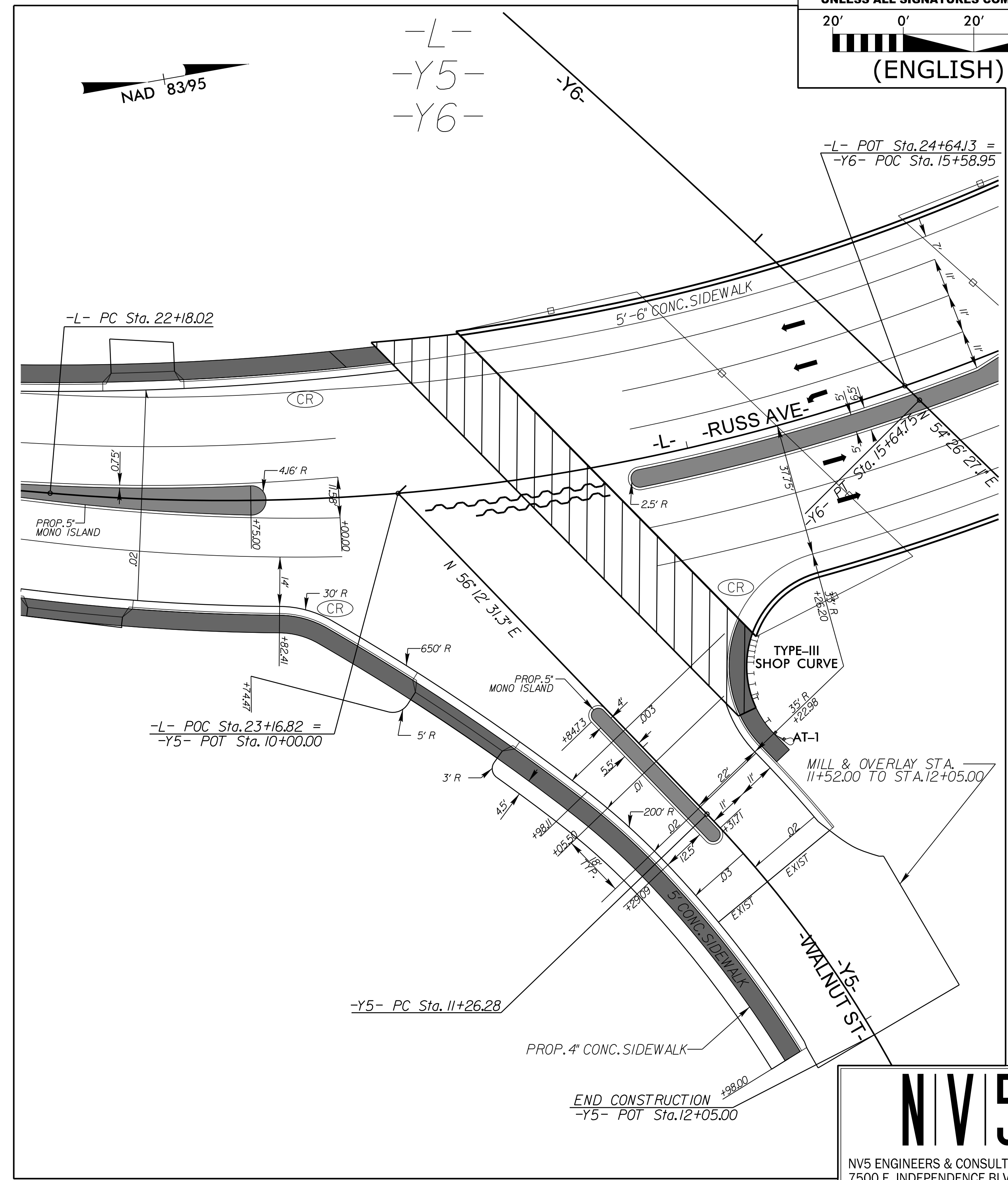
8/17/23

# INTERSECTION DETAIL SHEET

PROJECT REFERENCE NO. U-5839	SHEET NO. 2B-1
RW SHEET NO.	
ROADWAY DESIGN ENGINEER 5/9/2023	
	
<p><b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b></p>	
 <p>(ENGLISH)</p>	



SEE SHEETS 5 & 17 FOR PLAN VIEW



SEE SHEET 6 FOR PLAN VIEW

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 NV5 ENGINEERS & CONSULTANTS, INC.  
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 CHARLOTTE, NC 28227  
 P: 704.537.7300 www.NV5.com  
 NC License # F-1333  
 formerly CALYX Engineers & Consultants

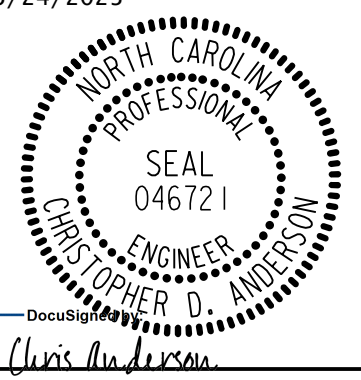
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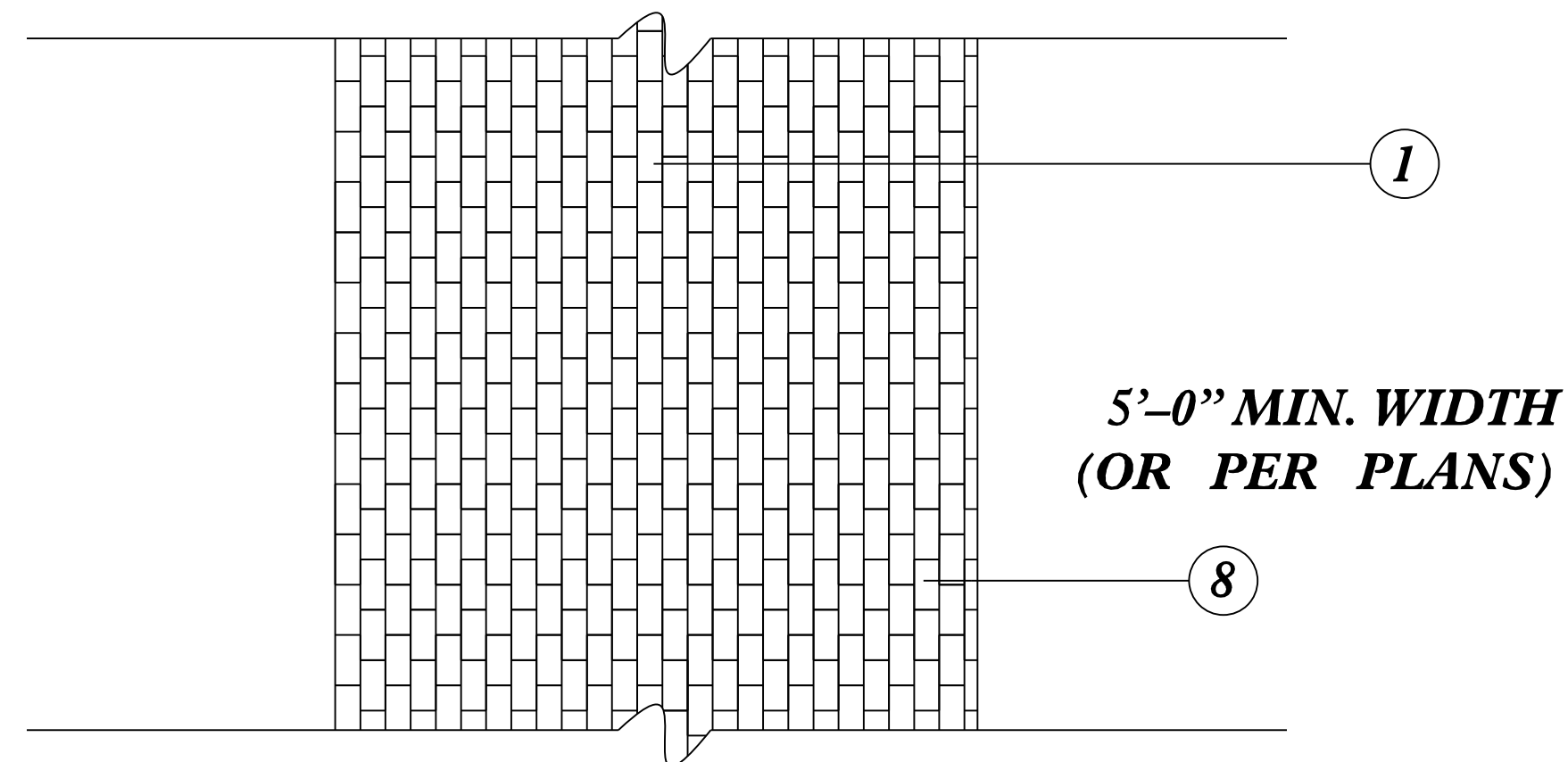


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MODIFIED BY: R. L. CAREATHERS DATE: 3/3/23  
CHECKED BY: C. D. ANDERSON DATE: 3/3/23  
FILE SPEC.: w:jhowerton\Brick Paver Detail.dgn

8/17/23

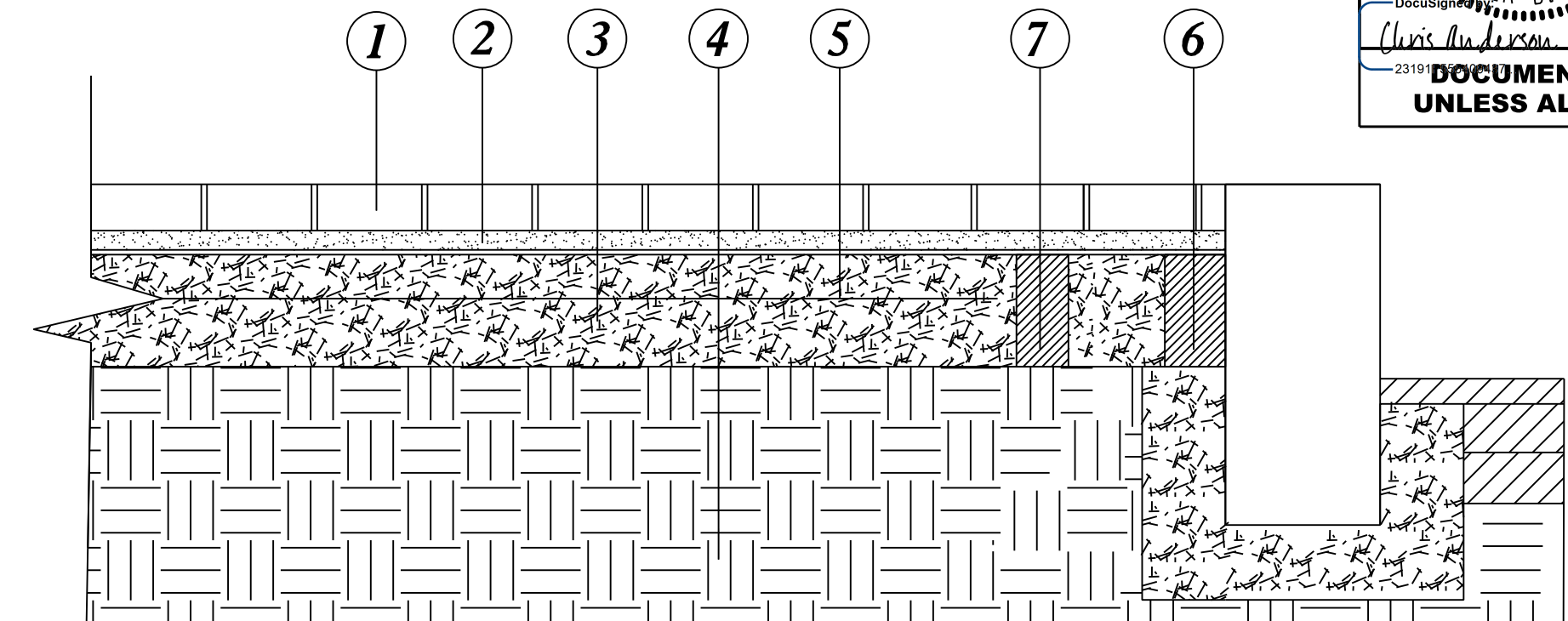
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RW SHEET NO.	
ROADWAY DESIGN ENGINEER 5/24/2023	
	
<small>DocuSign 2019</small> <b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	

# BRICK PAVER DETAIL



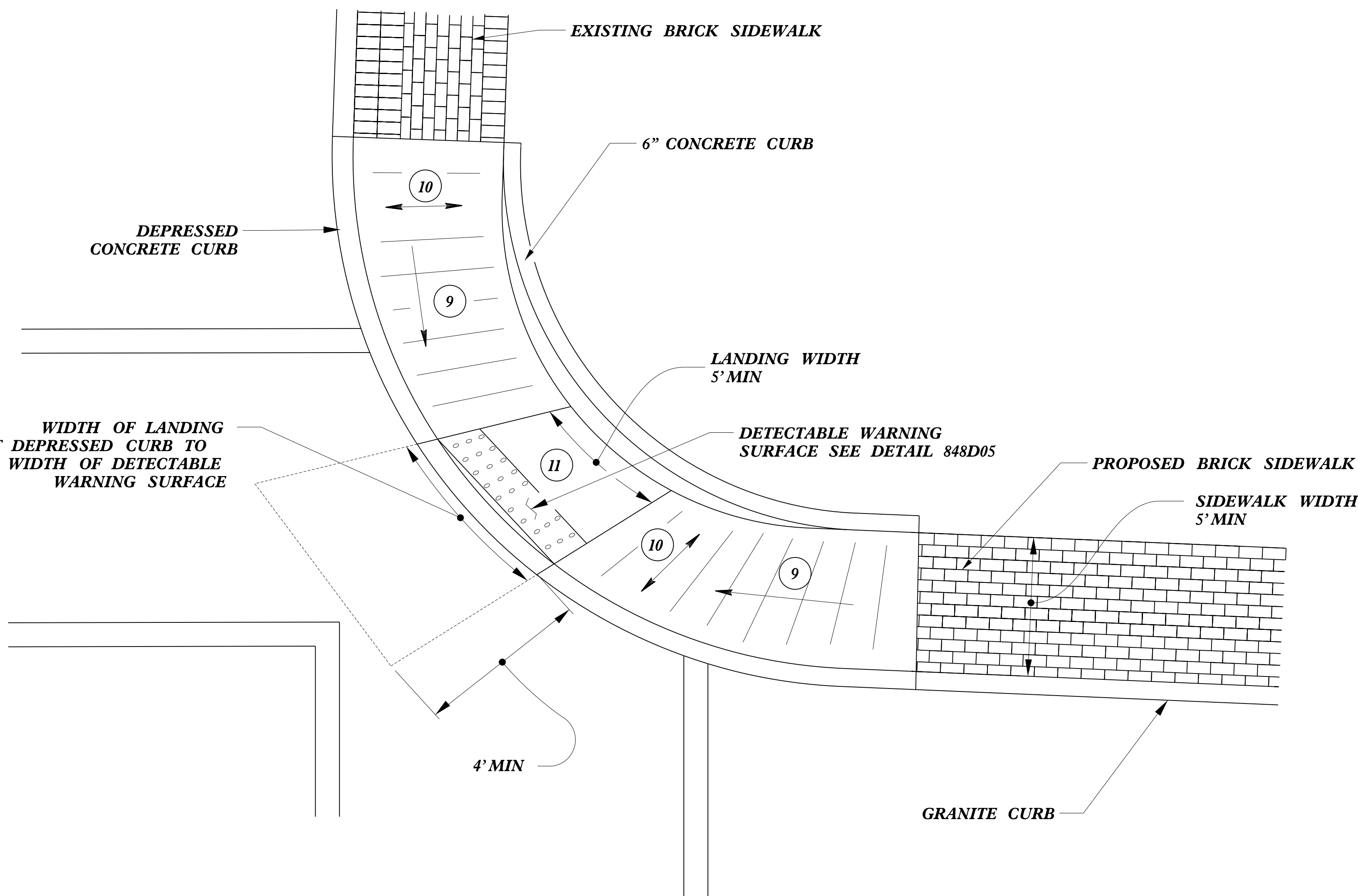
5'-0" MIN. WIDTH  
(OR PER PLANS)

**STANDARD CONDITION**



- 1 PAVER (SEE SPECIAL PROVISION FOR TYPE)
- 2 3/4" SAND SETTING BED CONFORMING TO ASTM C33 STANDARD SCREED AND COMPACTED AS REQUIRED
- 3 PROP. 4" FIBER REINFORCED CONCRETE BASE COURSE (4000 PSI) w/EXPANSION JOINT AT 25' O.C. AND AT VERTICAL WALLS.
- 4 COMPACTED ABC GRAVEL (MIN. 95% COMPACTION).
- 5 6" X 6" X W2.9 X W2.9 WELDED WIRE MESH
- 6 EXPANSION JOINT (BETWEEN CONCRETE SUB-SLAB AND CURB)
- 7 6-2" DIA. DRAIN HOLES, 12" O.C PARALLEL TO CURB - LOCATE AT LOWEST ELEV. FILL WITH PEA GRAVEL
- 8 PAVER PATTERN - RUNNING BOND, MATCH EXISTING
- 9 8.33% (12:1) MAX RAMP SLOPE
- 10 CROSS SLOPE: 2.00%
- 11 CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB.

5/24/2023  
C:\projects\2015\2015103.01\CLIENT\Roadway\Proj\Brick Paver\_2B\_Sheet\U5839\_Brick Paver Detail.dgn



**N|V|5**

NV5 ENGINEERS & CONSULTANTS, INC.  
7500 E. INDEPENDENCE BLVD, STE 100  
CHARLOTTE, NC 28227  
P: 704.537.7300 www.NV5.com

NC License # F-1333  
formerly CALYX Engineers & Consultants



04-SEP-2018 08:31 S:\Contracts\Special Details\Howerton\Standard Drawings\Details in Lieu of Standards\Division 8\862D01 Impact Attenuator Sheets 1 and 2.dgn  
Howerton AT CSU-212515

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

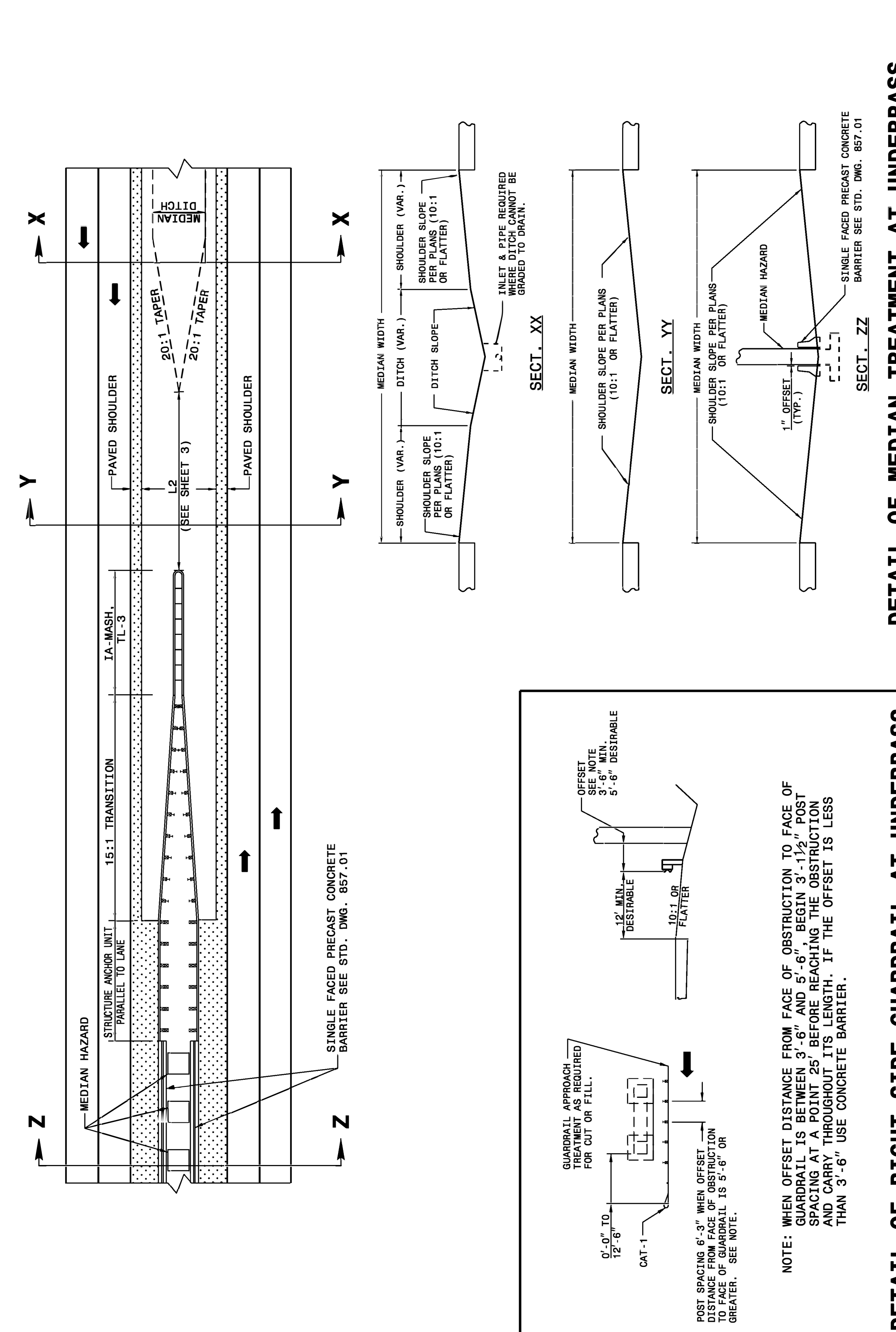
ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL PLACEMENT**

SHEET 1 OF 11  
**862D01**

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

ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL PLACEMENT**

SHEET 1 OF 11  
**862D01**



SHEET 1 OF 11  
**862D01**

DETAIL OF MEDIAN TREATMENT AT UNDERPASS

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

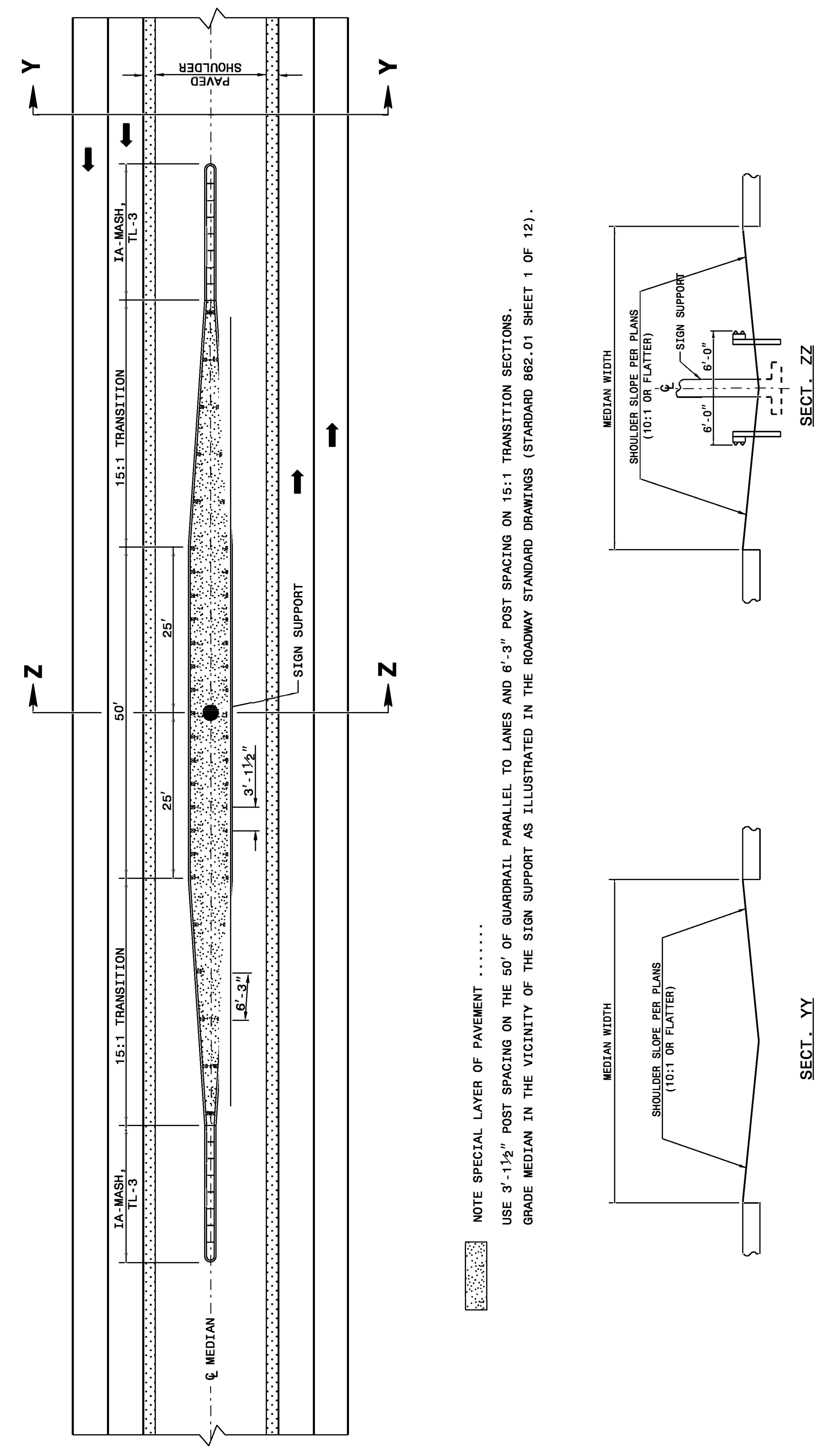
ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL PLACEMENT**

SHEET 2 OF 11  
**862D01**

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

ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL PLACEMENT**

SHEET 2 OF 11  
**862D01**



SHEET 2 OF 11  
**862D01**

DETAIL OF GUARDRAIL AT MEDIAN SIGN SUPPORT

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

**SEE TITLE BLOCK**

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

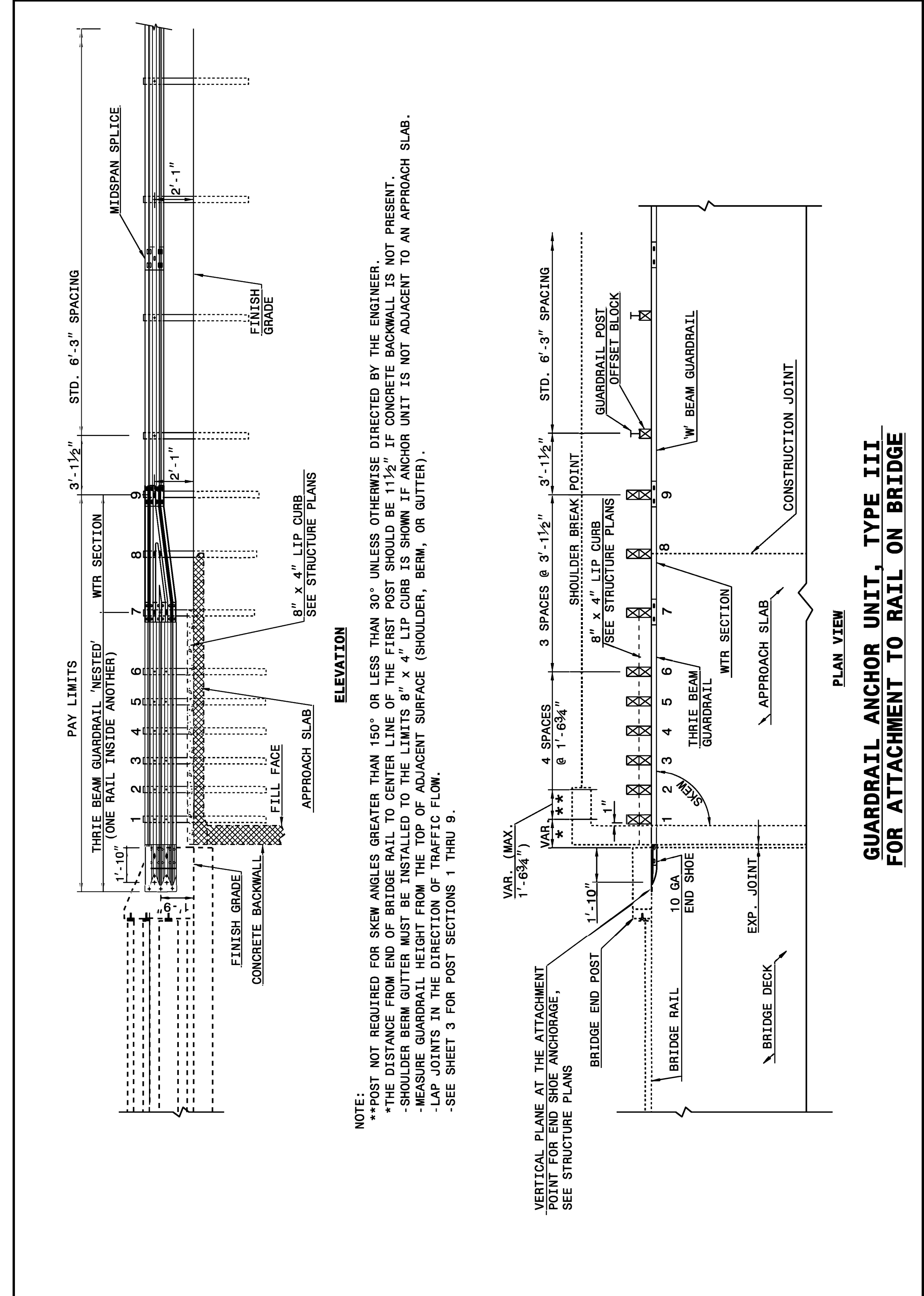


5/8/2023



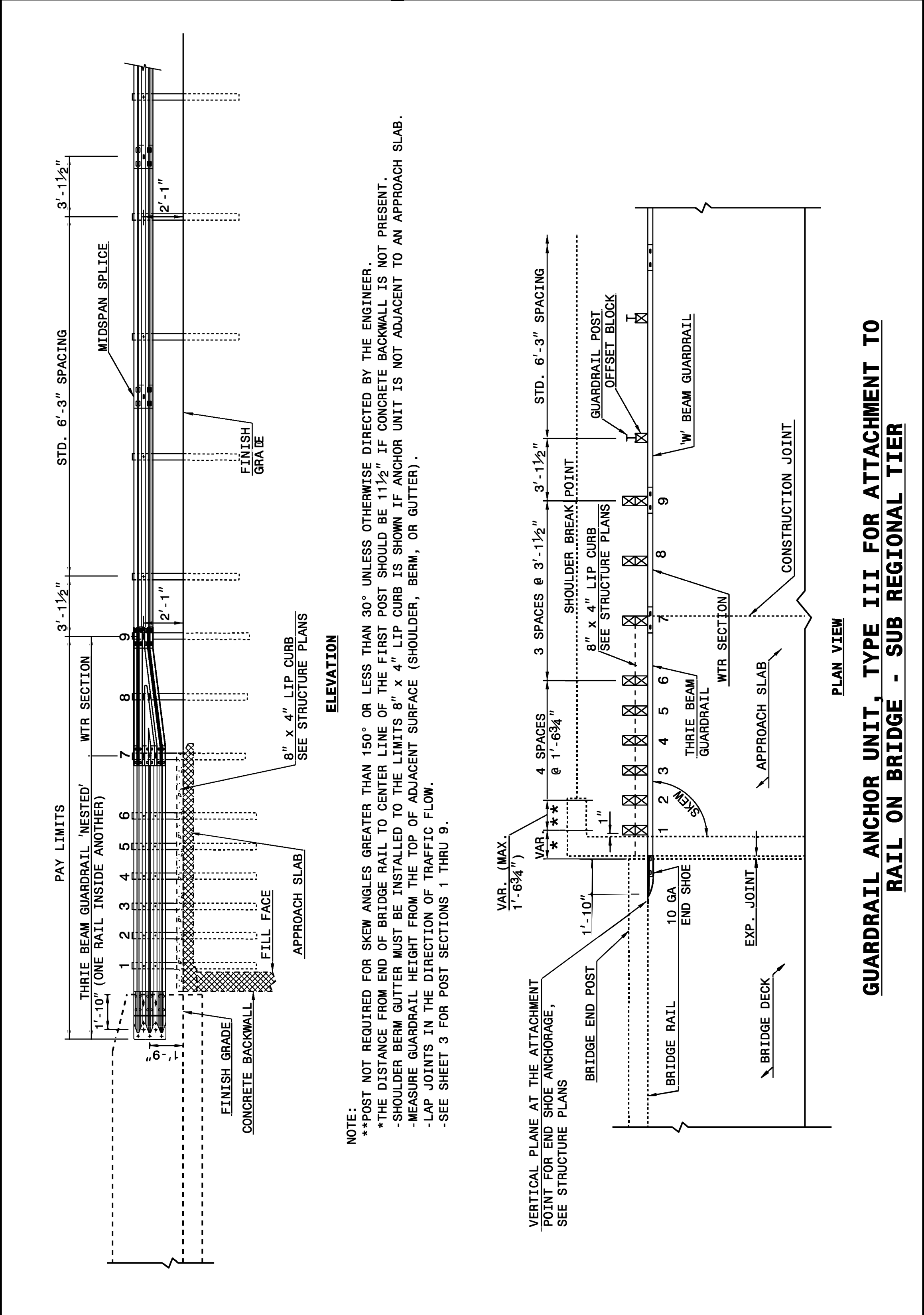
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ROADWAY DETAIL DRAWING FOR STRUCTURE ANCHOR UNITS GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO RAIL ON BRIDGE  
SHEET 1 OF 7 862D03



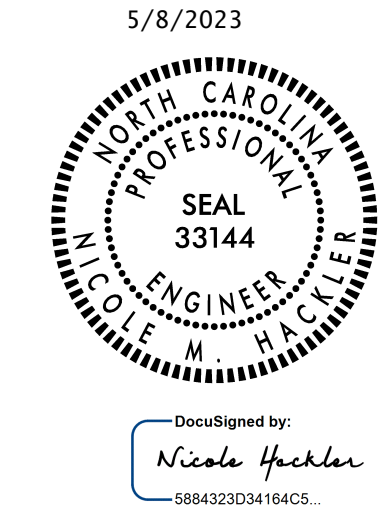
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ROADWAY DETAIL DRAWING FOR STRUCTURE ANCHOR UNITS GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO RAIL ON BRIDGE  
SHEET 1 OF 7 862D03

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.  
ROADWAY DETAIL DRAWING FOR STRUCTURE ANCHOR UNITS GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO RAIL ON BRIDGE - SUB REGIONAL TIER  
SHEET 2 OF 7 862D03



STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.  
ROADWAY DETAIL DRAWING FOR STRUCTURE ANCHOR UNITS GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO RAIL ON BRIDGE - SUB REGIONAL TIER  
SHEET 2 OF 7 862D03

CONTRACT STANDARDS AND DEVELOPMENT UNIT  
Office 919-707-6950 FAX 919-250-4119  
**SEE TITLE BLOCK**  
ORIGINAL BY: J. HOWERTON DATE: 06-22-12  
MODIFIED BY: DATE:  
CHECKED BY: DATE:  
FILE SPEC.:



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

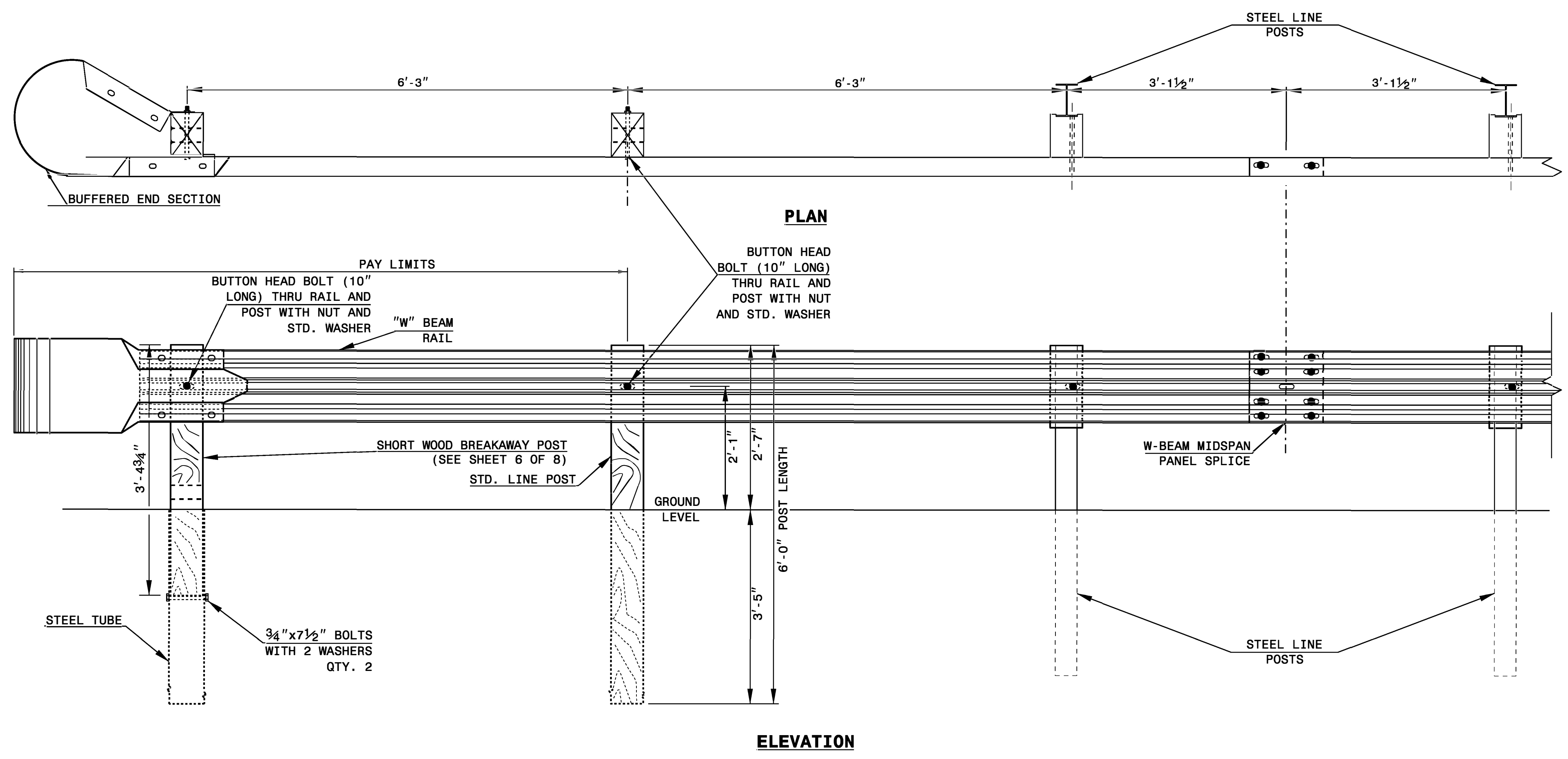
ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL INSTALLATION**

SHEET OF

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

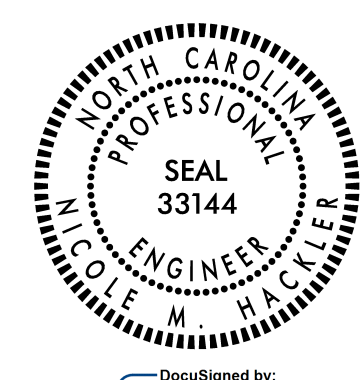
ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL INSTALLATION**

SHEET OF



**TRAILING END UNIT ASSEMBLY**  
**A.T. - 1 SYSTEM**

5/8/2023



DocuSigned by:  
*Nicole Hackler*  
5884323034164CS

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**CONTRACTS STANDARDS  
AND DEVELOPMENT UNIT**  
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**A.T. - 1 SYSTEM**

ORIGINAL BY: _____	DATE: _____
MODIFIED BY: _____	DATE: _____
CHECKED BY: _____	DATE: _____
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STATE OF NORTH CAROLINA  
DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
RALEIGH, N.C.

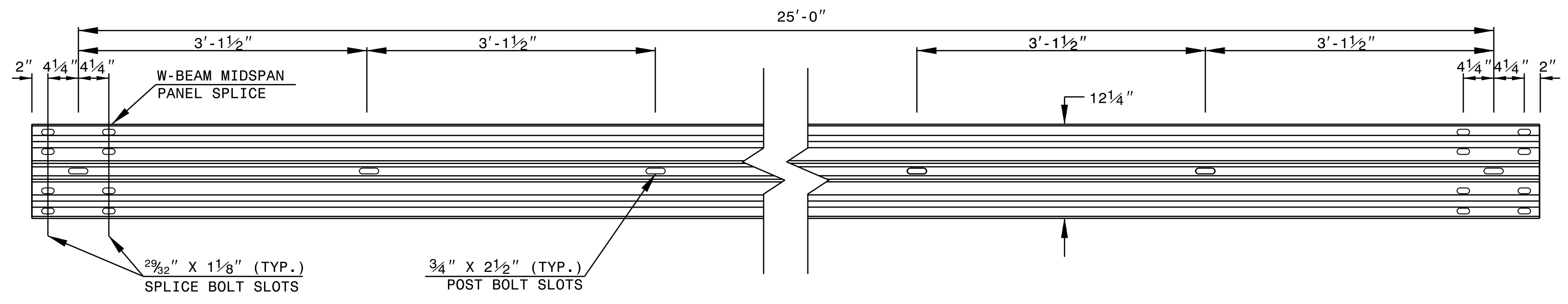
ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL INSTALLATION**

SHEET 6 OF 8  
**862D02**

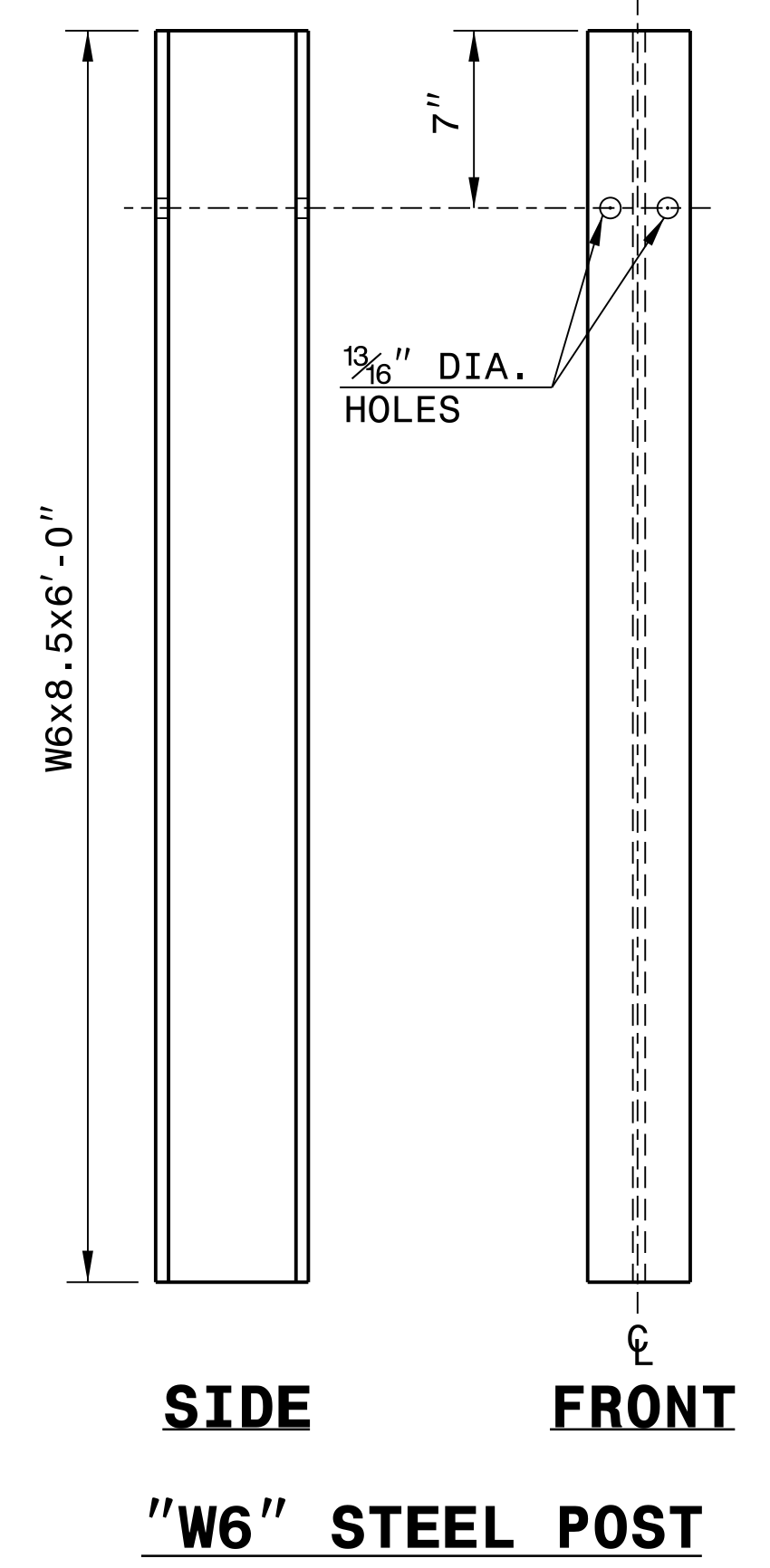
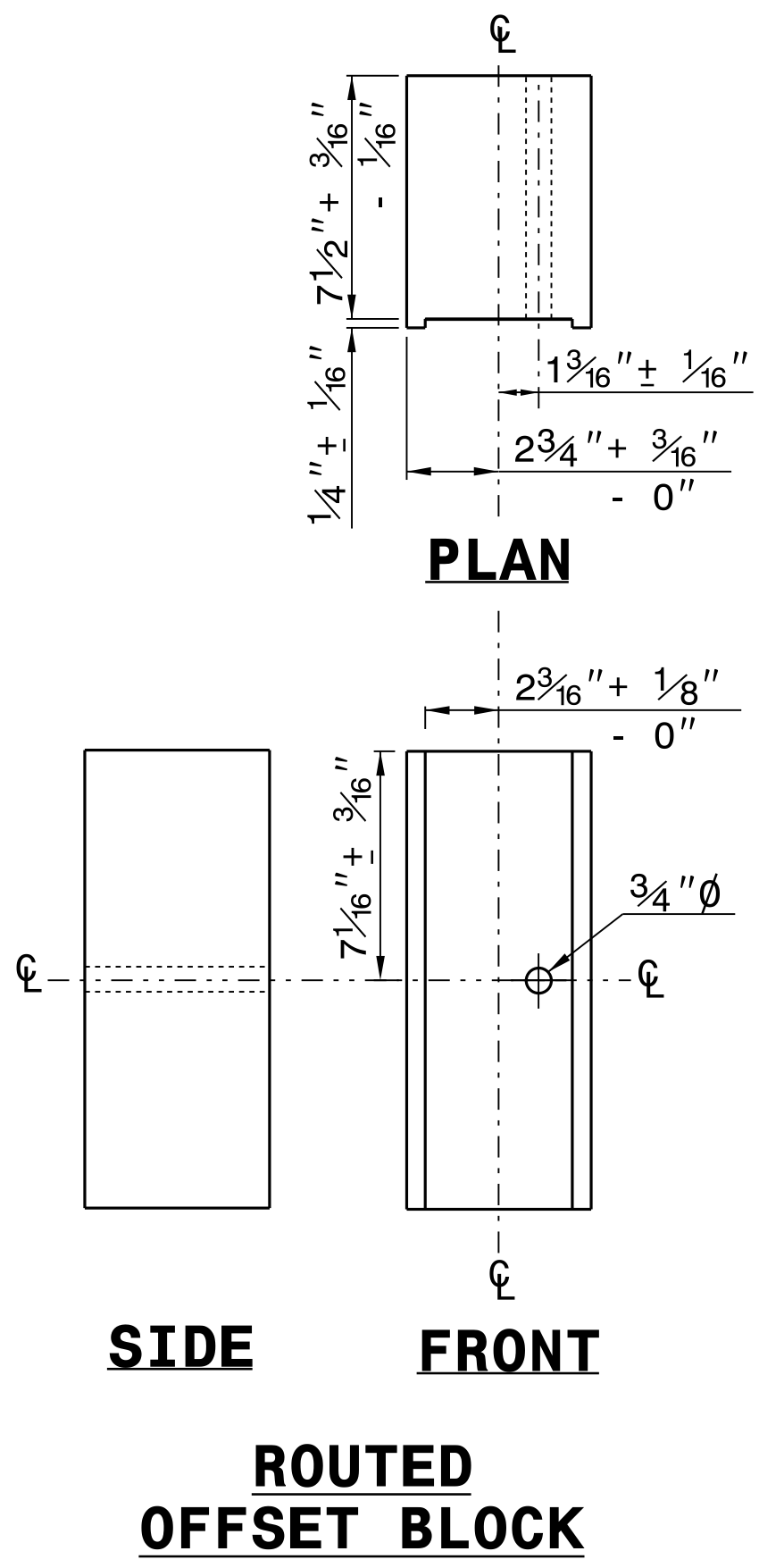
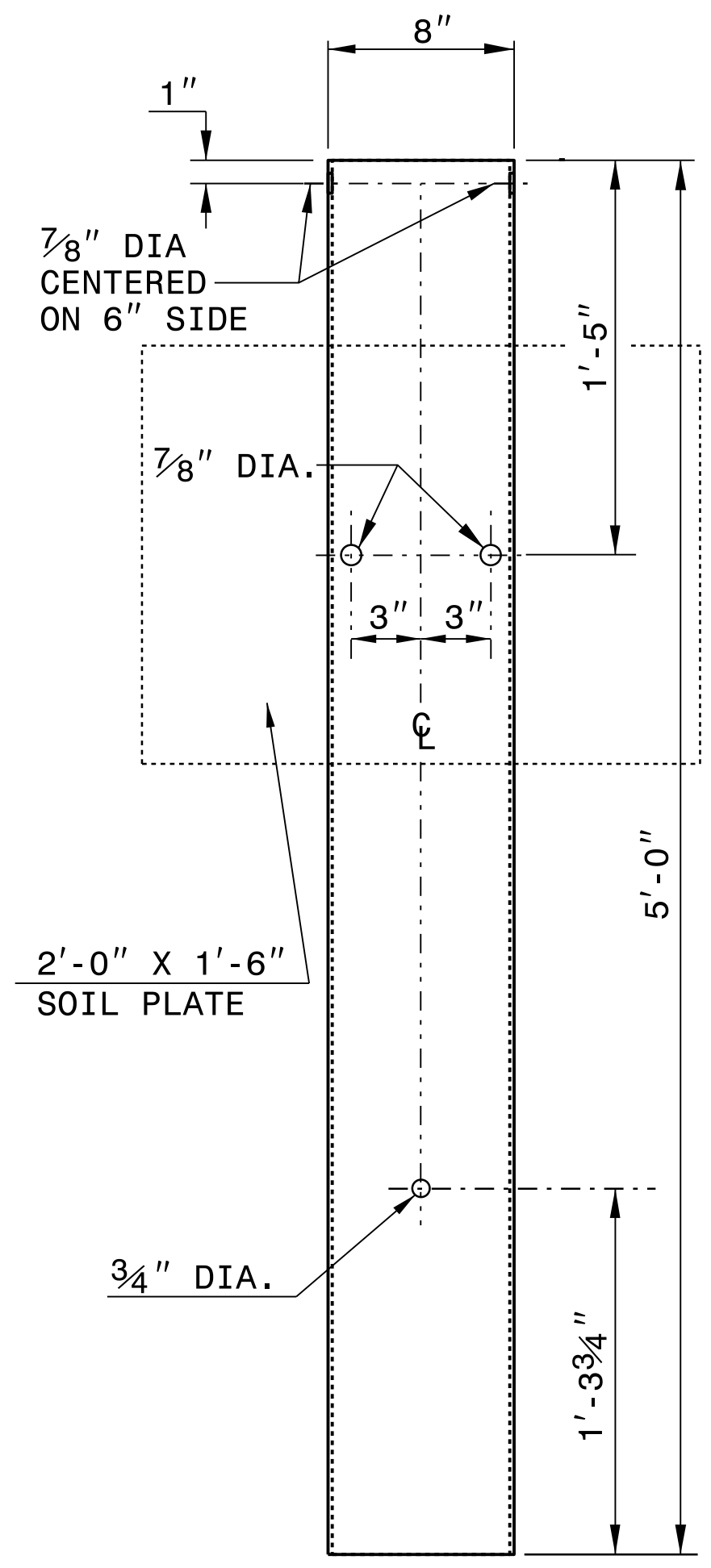
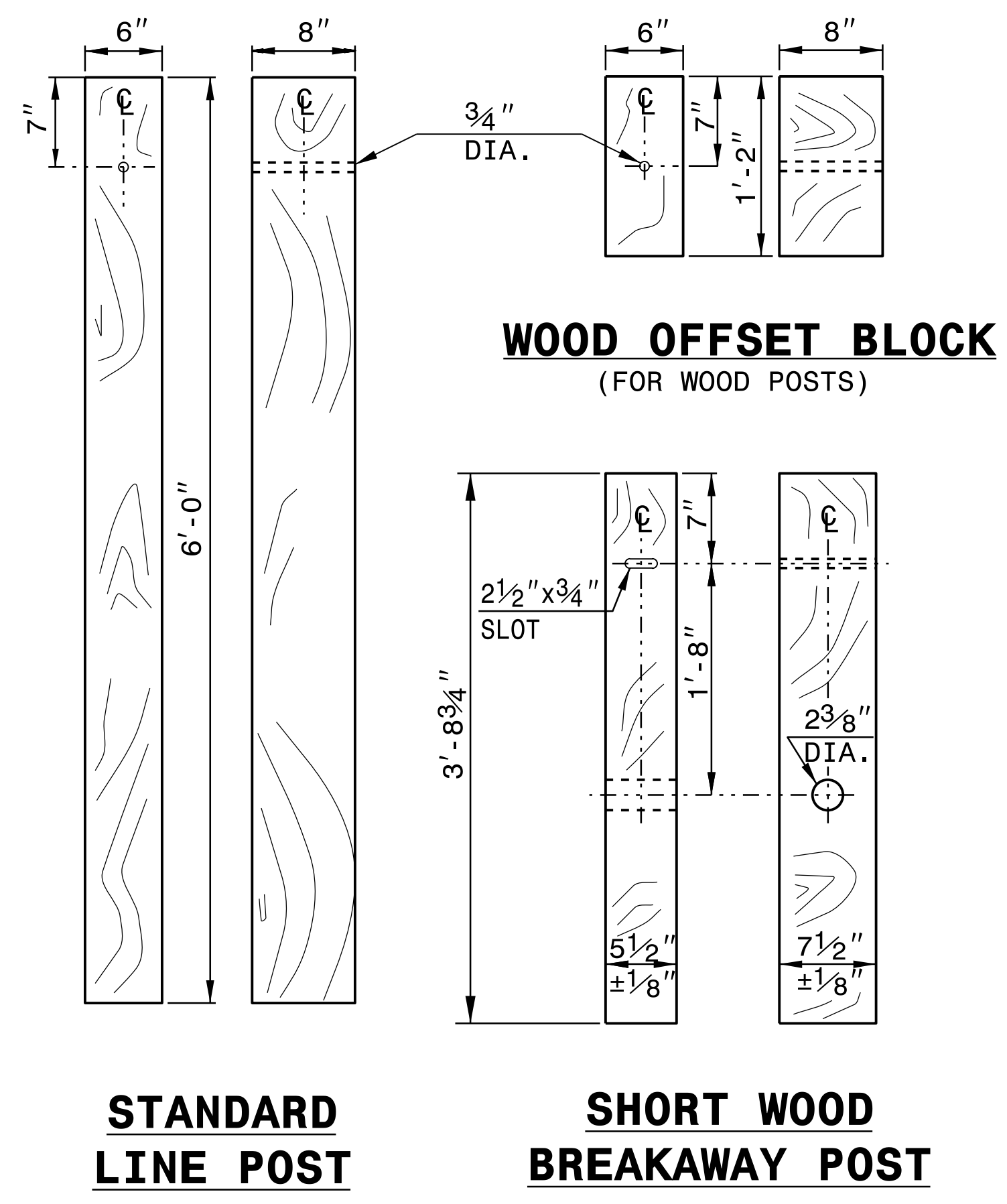
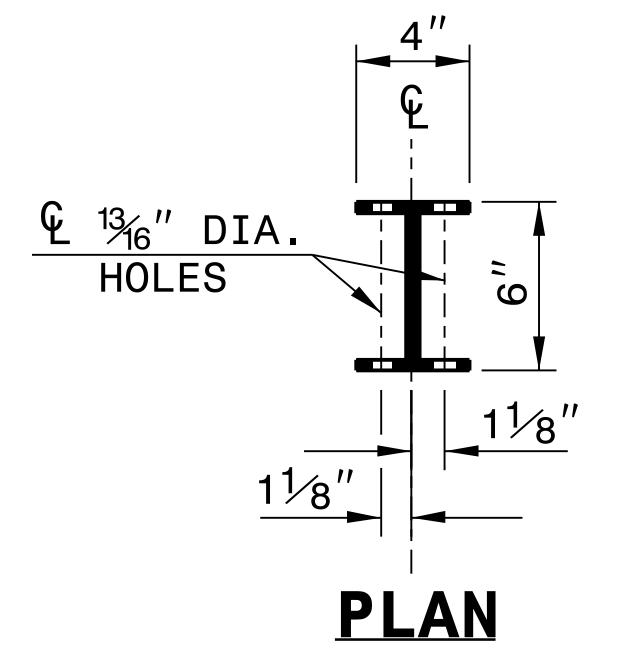
STATE OF NORTH CAROLINA  
DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL INSTALLATION**

SHEET 6 OF 8  
**862D02**



**STANDARD W-BEAM GUARDRAIL**



**SYSTEM PARTS**

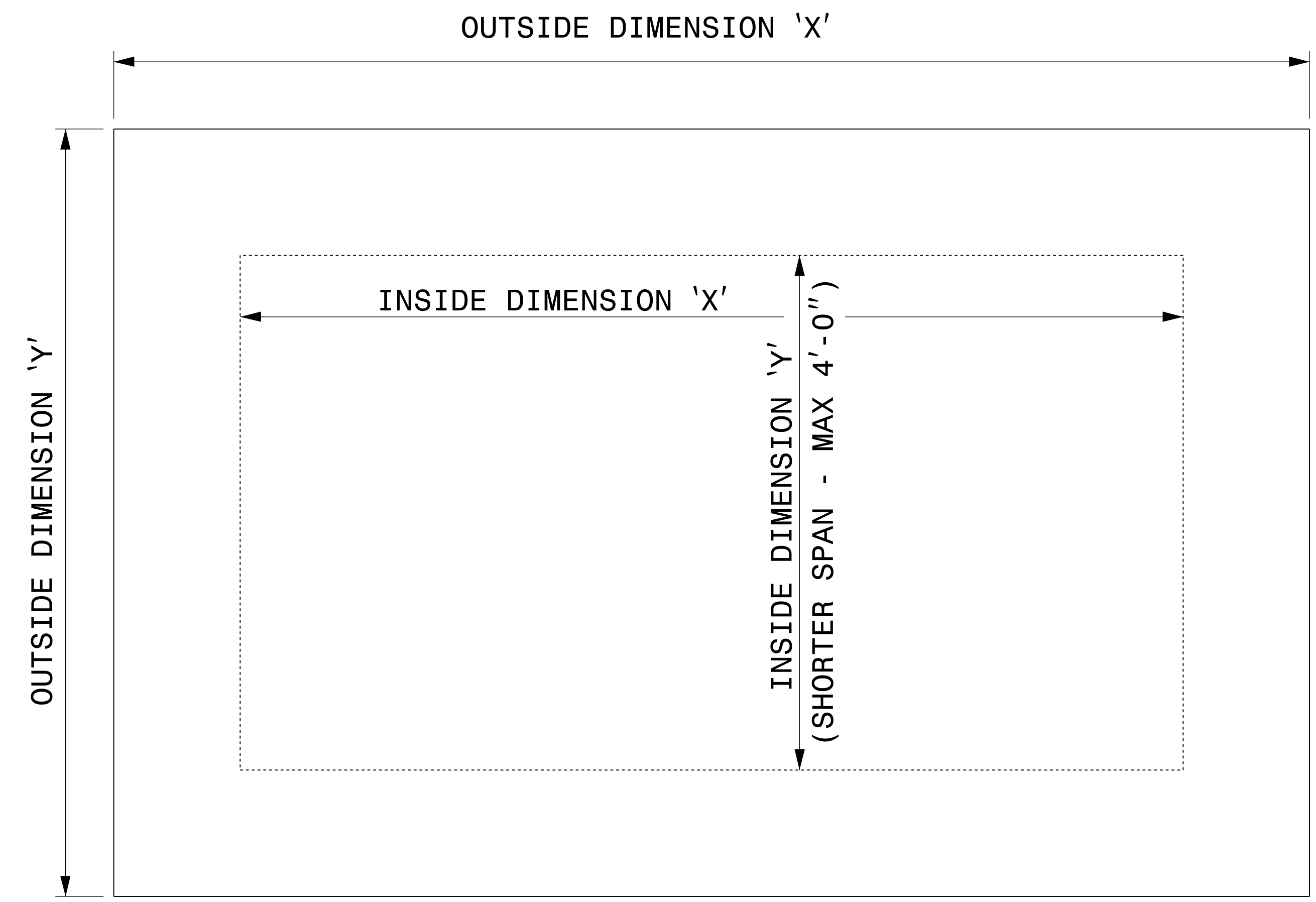


CONTRACTS STANDARDS AND DEVELOPMENT UNIT  
Office 919-707-6950 FAX 919-250-4119

**SEE TITLE BLOCK**

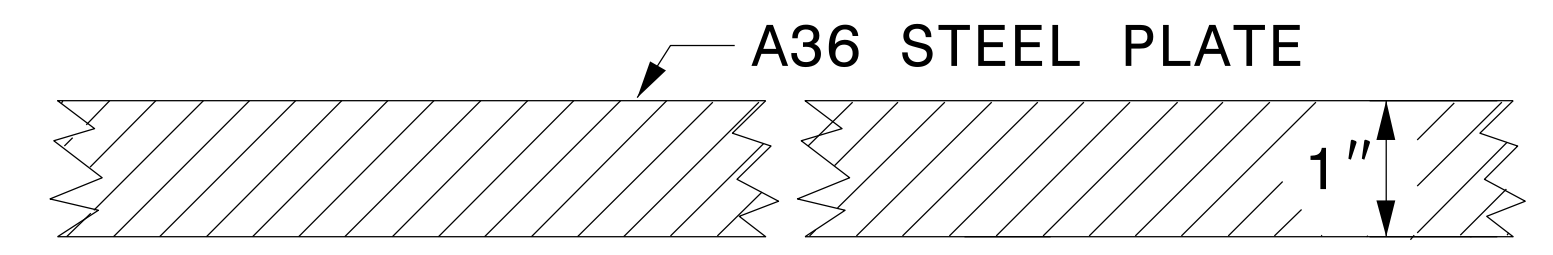
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 CHECKED BY: DATE: \_\_\_\_\_  
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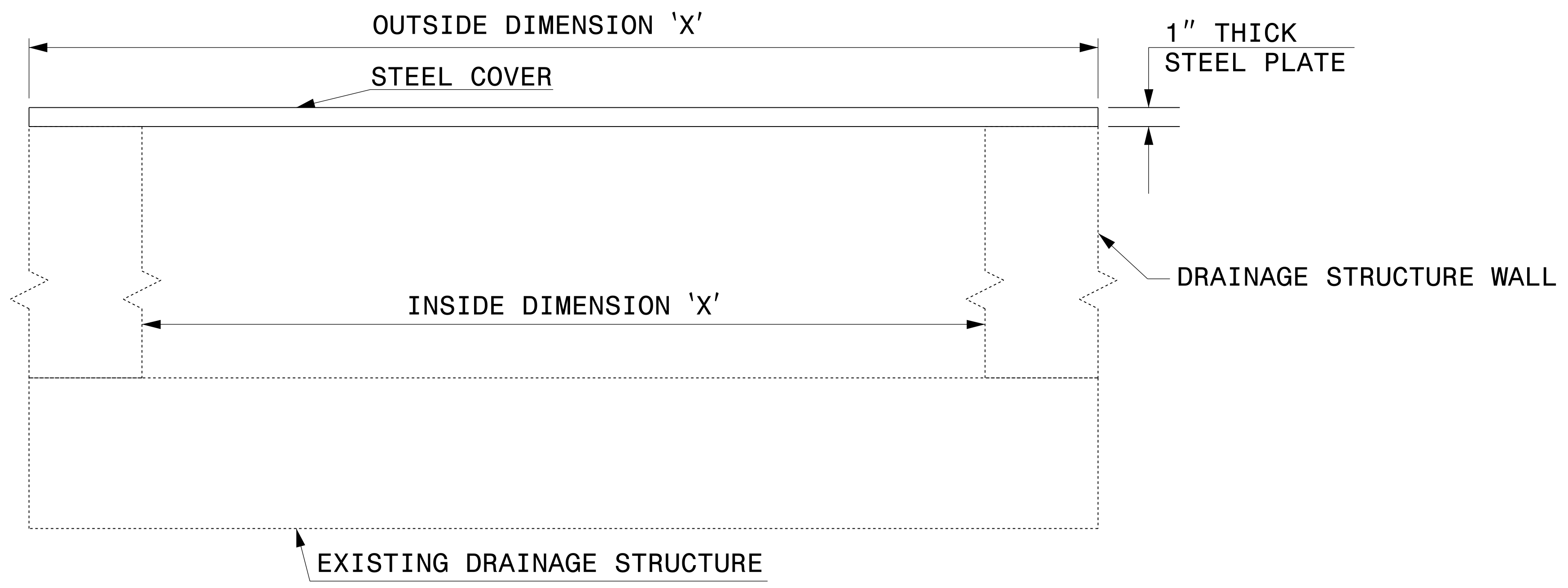
GENERAL NOTES:

- USE GRADE A36 STEEL
- STEEL COVERS ARE FOR TEMPORARY USE DURING PHASE CONSTRUCTION.
- FILL SHALL BE PLACED DIRECTLY OVER THE STEEL PLATES.
- SEE ROADWAY PLANS AND PROVISIONS FOR LOCATIONS
- QUANTITIES TO BE PAID FOR AT THE UNIT PRICE BID PER EACH.



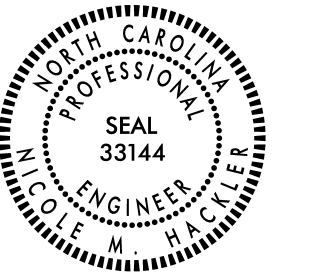
SECTION VIEW OF STEEL TOP PLATE

PLAN VIEWS



ELEVATION VIEWS

5/8/2023



DocuSigned by: Nicole Hecker

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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**DETAIL OF TEMPORARY 1" STEEL COVER OVER DRAINAGE STRUCTURE**

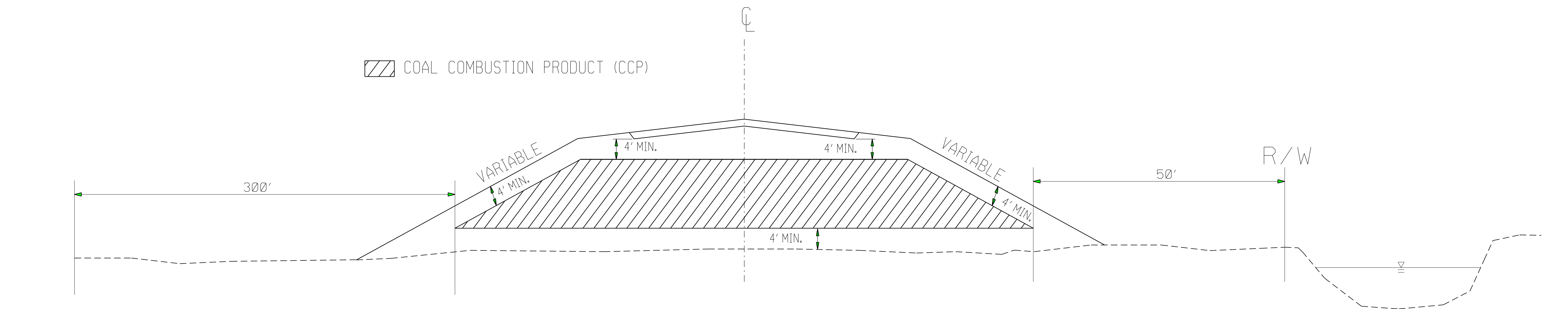
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\$\$\$\$\$CUTME\$\$\$\$\$  
\$\$\$\$\$DATE\$\$\$\$\$  
\$\$\$\$\$USER\$\$\$\$\$





# COAL COMBUSTION PRODUCT PLACEMENT



PRIVATE DWELLING  
OR WELL

PERENNIAL STREAM, OTHER SURFACE  
WATER BODY OR \*WETLAND

\*(OBTAIN PERMISSION FROM ARMY  
CORPS OF ENGINEERS)

PLACE CCP IN HATCHED AREA IN ACCORDANCE  
WITH THE PROJECT SPECIAL PROVISIONS

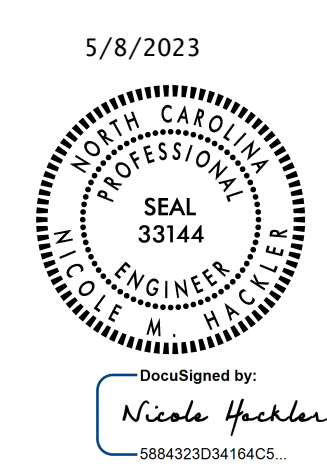
PLACE CCP A MINIMUM OF 5' ABOVE  
SEASONAL HIGH GROUND WATER

PLACE AT LOCATIONS AS APPROVED BY THE ENGINEER

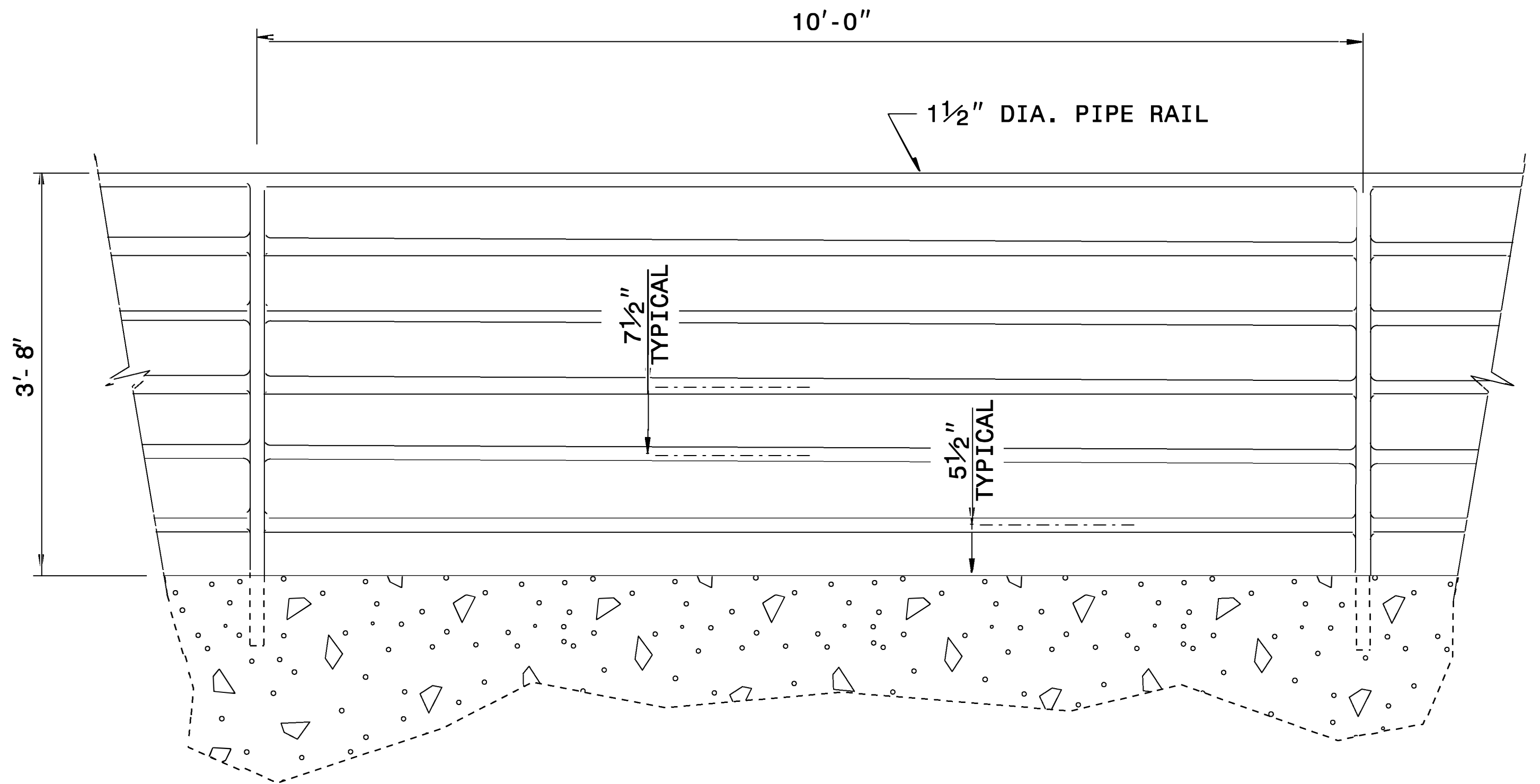
PLACE SOIL BORROW MATERIAL ON THE OUTSIDE  
OF CCP AS EACH LIFT OF CCP IS PLACED

07-SEP-2017 08:21 S:\Contracts\Projects\Special Details\Jhoverton\Coal Combustion Product Detail.dgn Jhoverton AT USD-232595

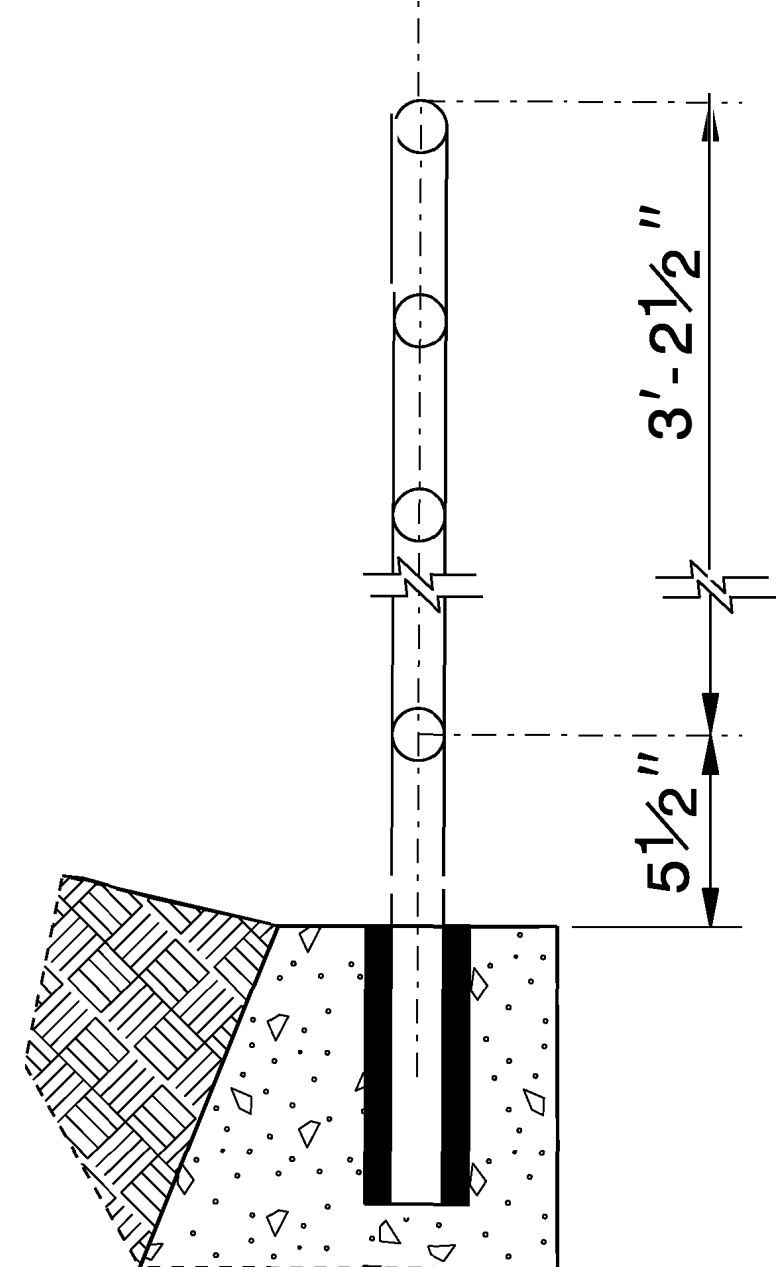
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UNLESS ALL SIGNATURES COMPLETED



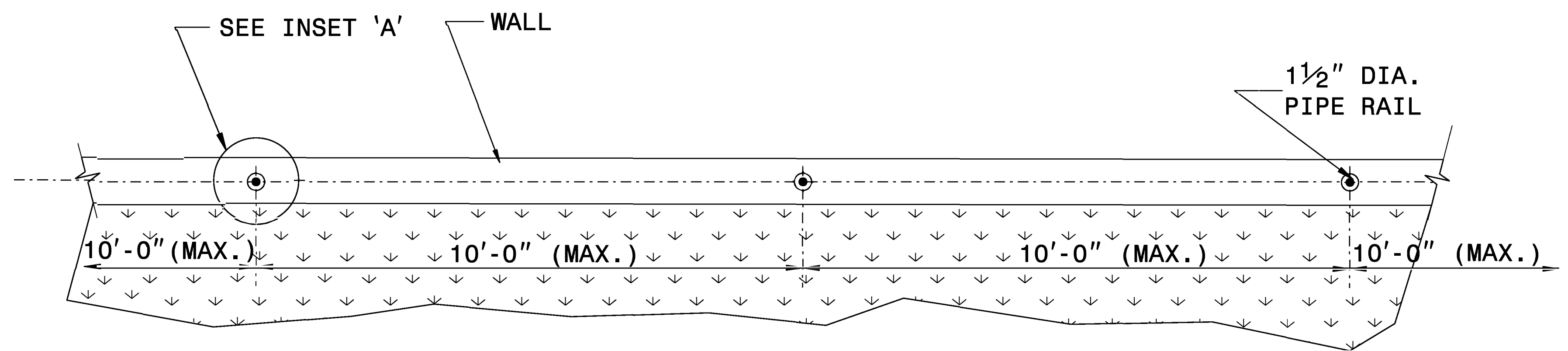
<b>CONTRACT STANDARDS AND DEVELOPMENT UNIT</b>	
Office 919-707-6950 FAX 919-250-4119	
<b>COAL COMBUSTION PRODUCT PLACEMENT DETAIL</b>	
ORIGINAL BY: J.S.H.	DATE: 3/16/15
MODIFIED BY:	DATE:
CHECKED BY:	DATE:
FILE SPEC.: joel/coal combustion material detail.dgn	



**ELEVATION OF HANDRAIL**



**INSET 'A'**



**PLAN VIEW**

**NOTES:**

CONSTRUCT PROPOSED STEEL PIPE RAIL 1 1/2" DIAMETER SCHEDULE 40 PLAIN END GALVANIZED STEEL PIPE MEETING THE REQUIREMENTS OF ASTM A53.

PAINT, IF REQUIRED BY THE ENGINEER, IN ACCORDANCE WITH SECTION 1080 OF THE STANDARD SPECIFICATIONS.

WELD IN ACCORDANCE WITH ARTICLE 1072-18 OF THE STANDARD SPECIFICATIONS.

SUBMIT THE ATTACHMENT OF THE HANDRAIL TO THE RETAINING WALL TO THE CONTRACTS AND STANDARDS OFFICE FOR APPROVAL.

I4-MAR-2019 10:43 5:\Contracts\Special Details\Howerton\Handrail on Retaining Wall.dgn Howerton AT USD-292595



DocuSigned by: Nicole Hecker

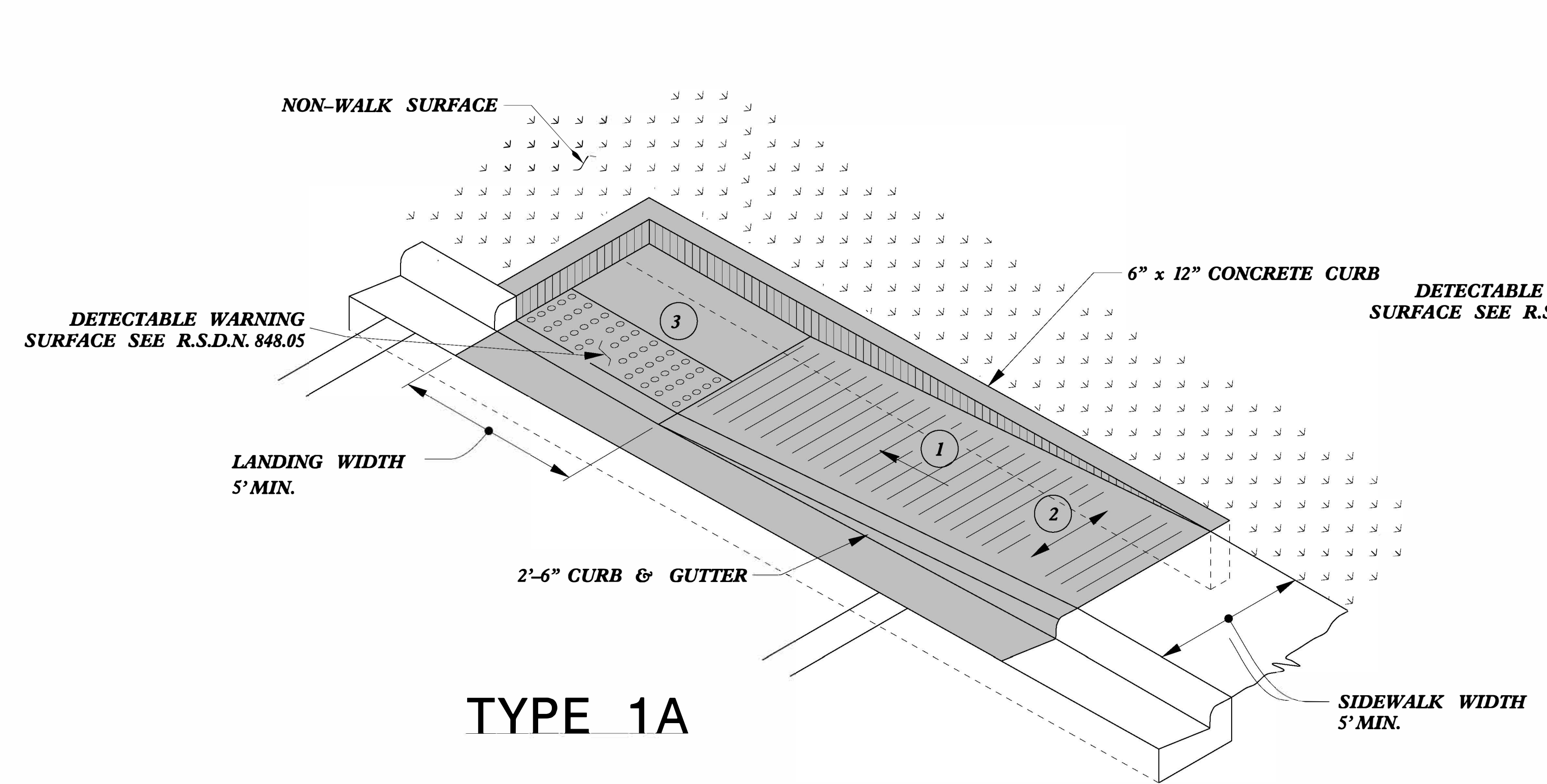
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

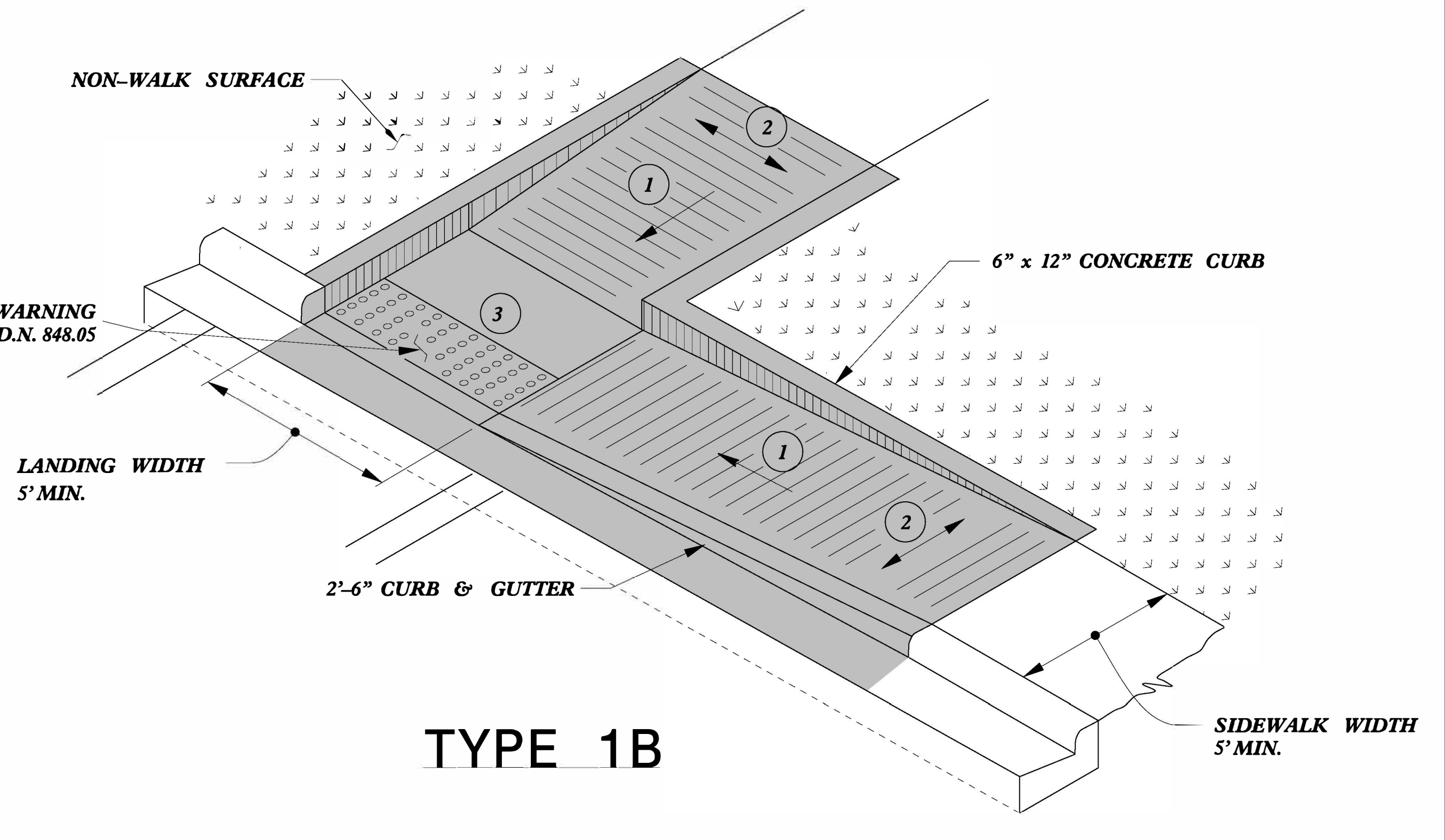
**DETAIL OF PIPE HANDRAIL MOUNTED ON A WALL**

ORIGINAL BY: E.E. WARD	DATE: 12-99
MODIFIED BY:	DATE:
CHECKED BY:	DATE:
FILE SPEC.: jhowerton/handrail_on_retaining_wall.dgn	

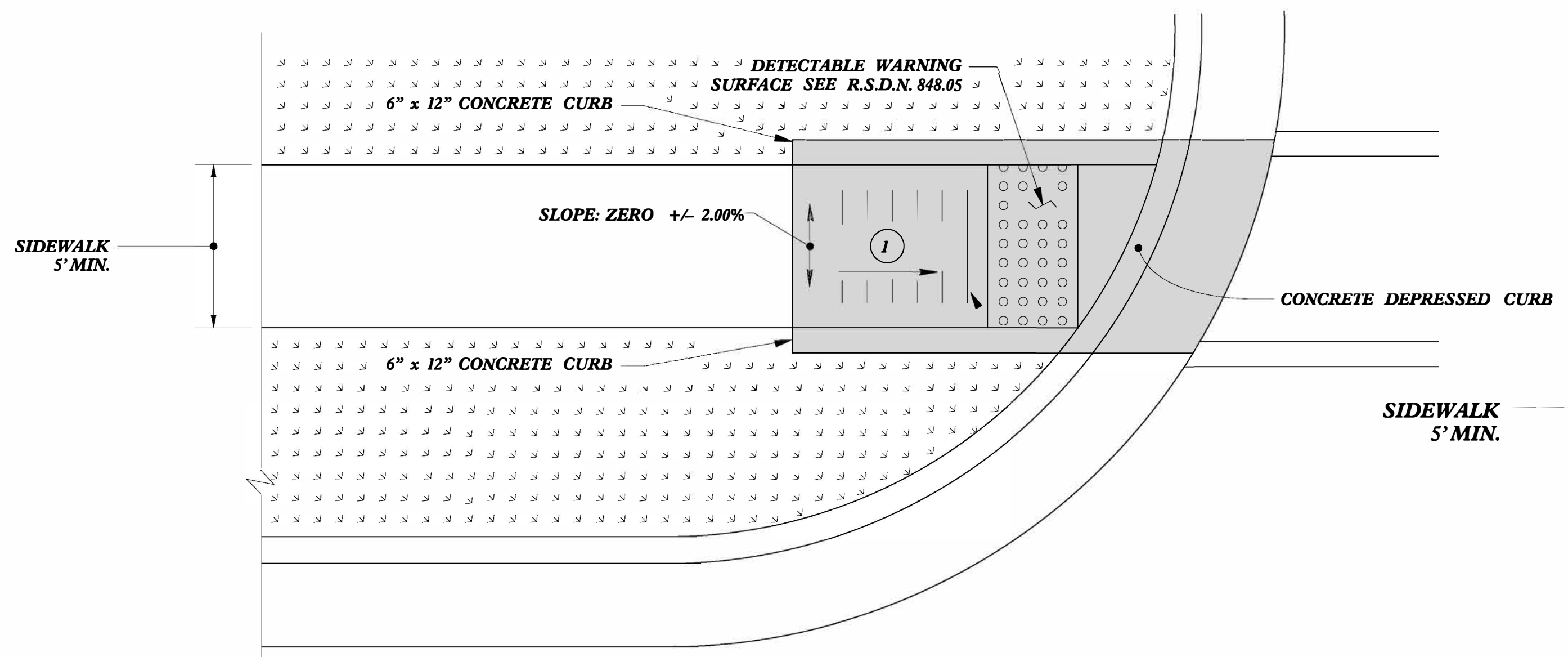




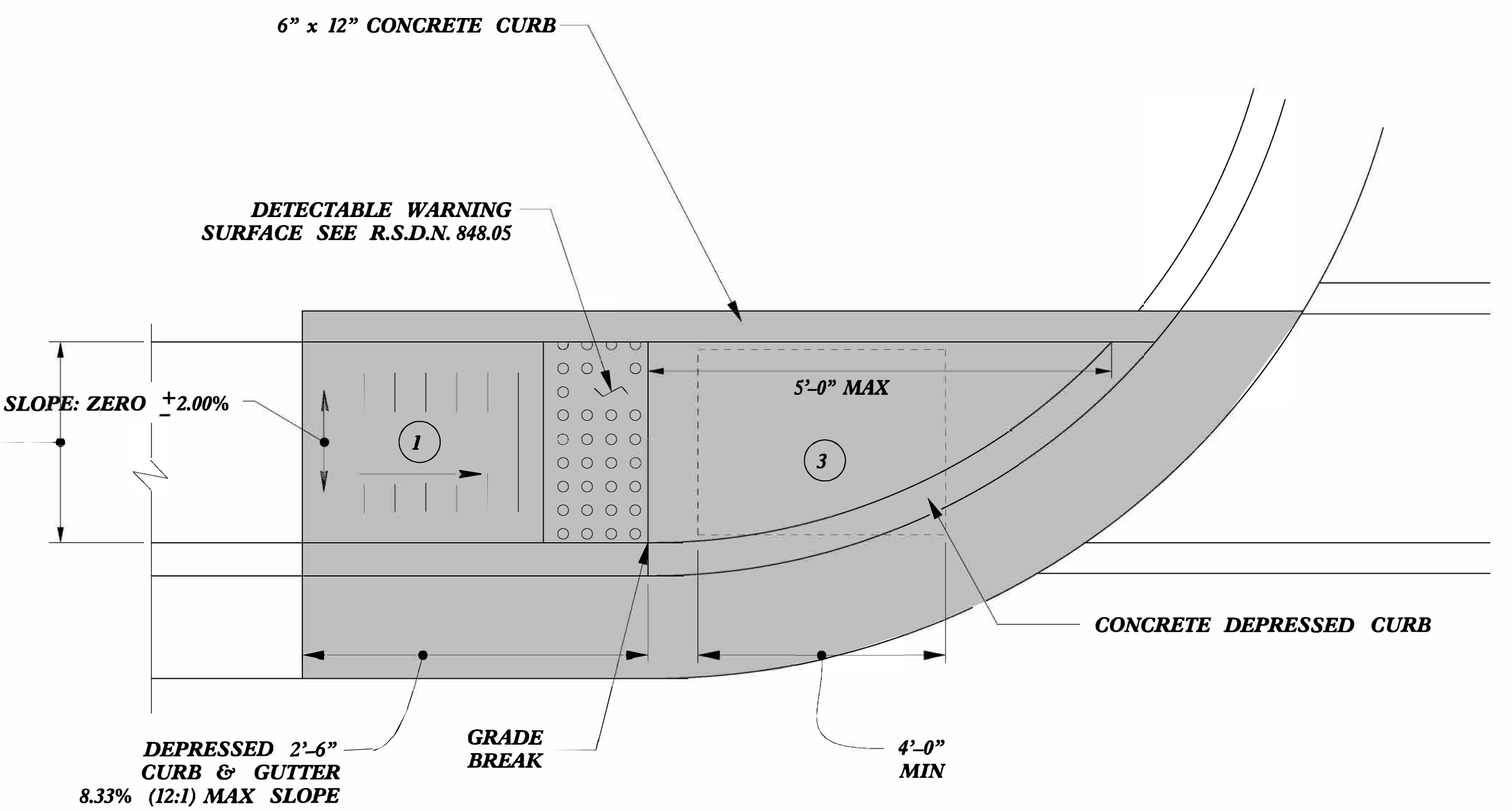
TYPE 1A



TYPE 1B



TYPE 1 Modified

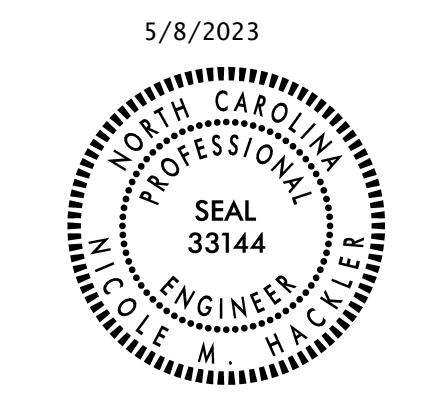


TYPE 1

- 1 8.33% (12:1) MAX RAMP SLOPE
- 2 CROSS SLOPE: 2.00%
- 3 CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB.

PAY LIMITS FOR 1 CURB RAMP

REFER TO ROADWAY STANDARD DRAWING NUMBER 848.05 SHEET 3 OF 3 FOR ALL RAMP NOTES



5/8/2023

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**CURB RAMPS**  
Directional Ramps

ORIGINAL BY: J.S. HOWERTON DATE: 7/7/11  
 MODIFIED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
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5/14/99

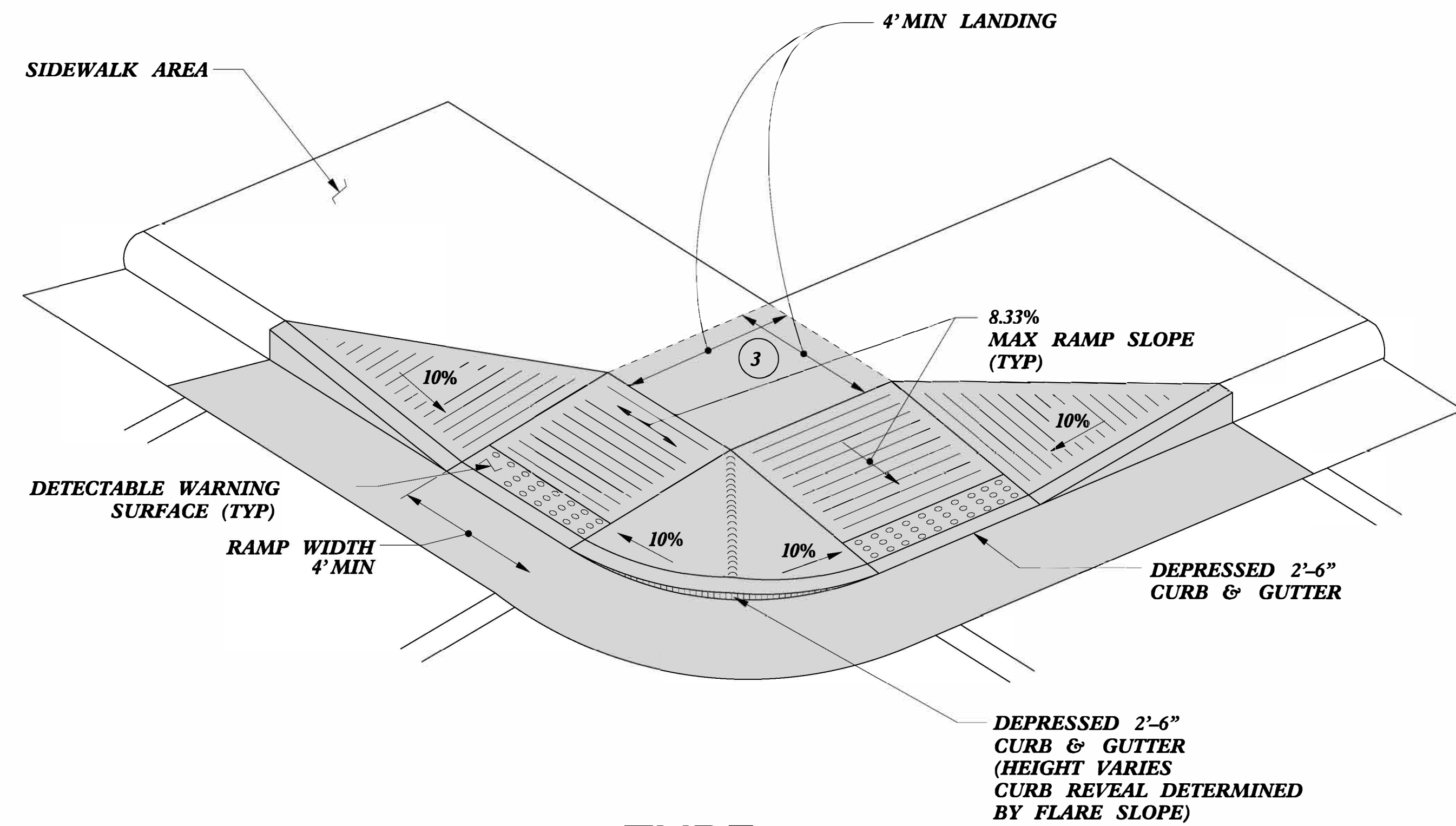




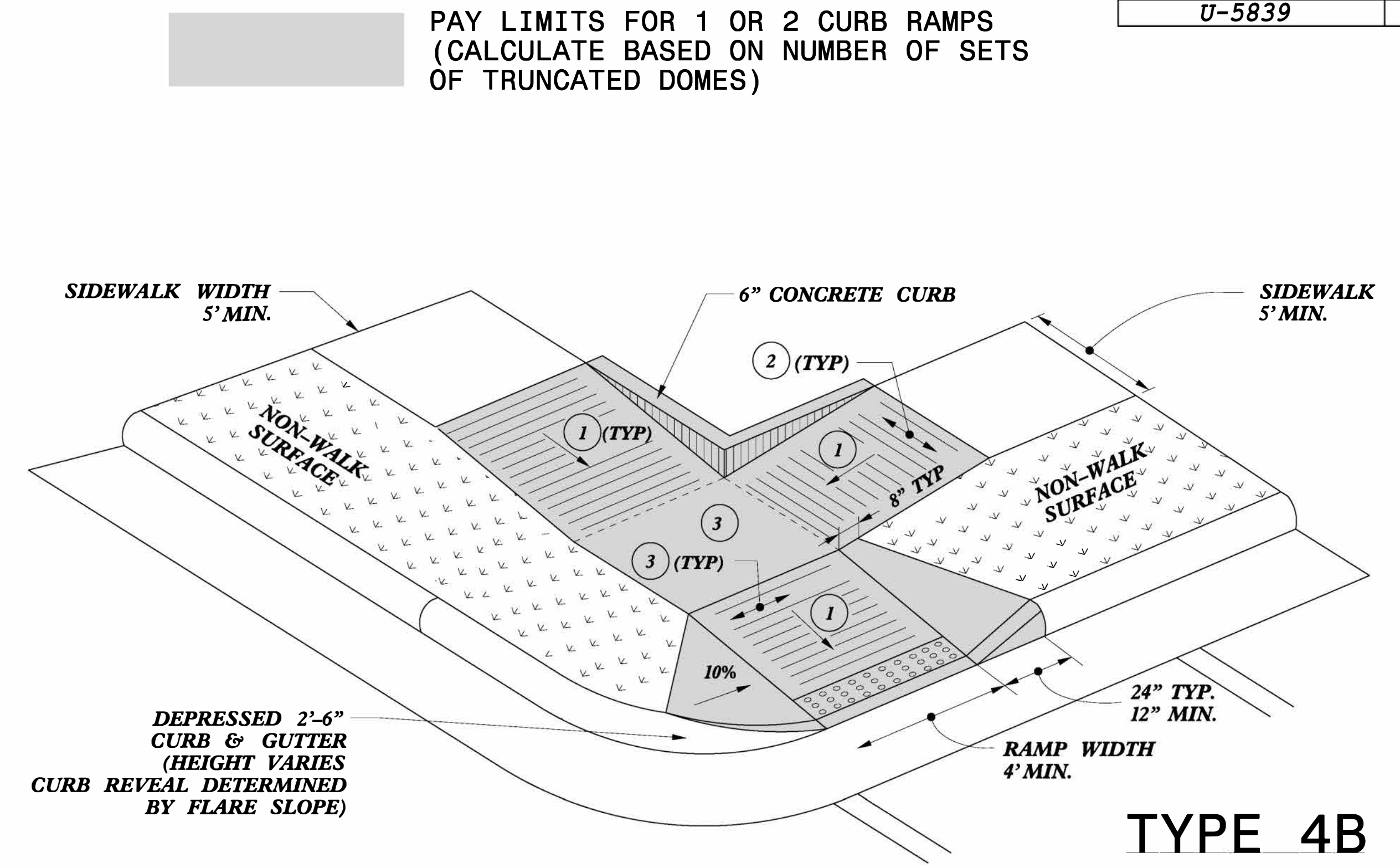




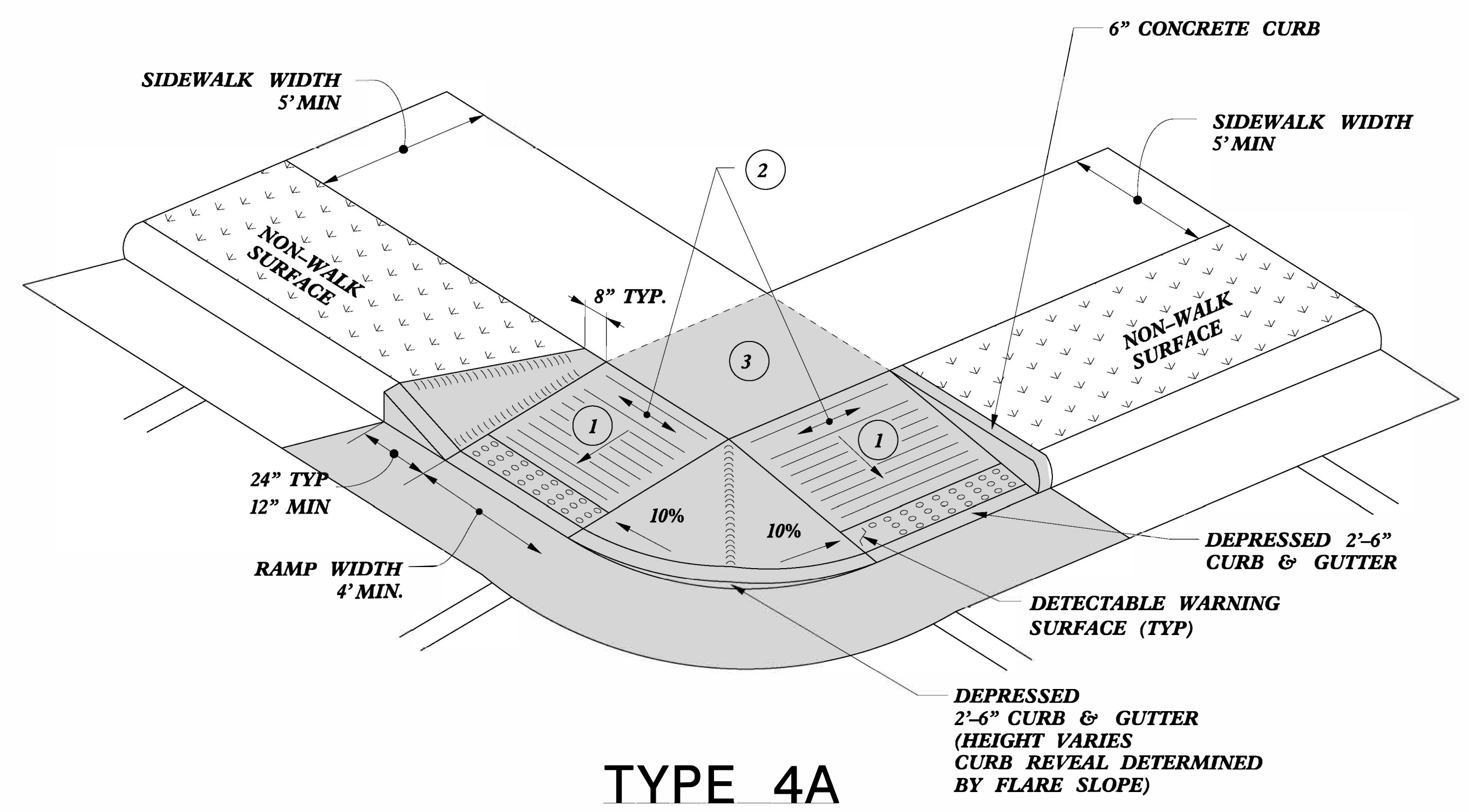




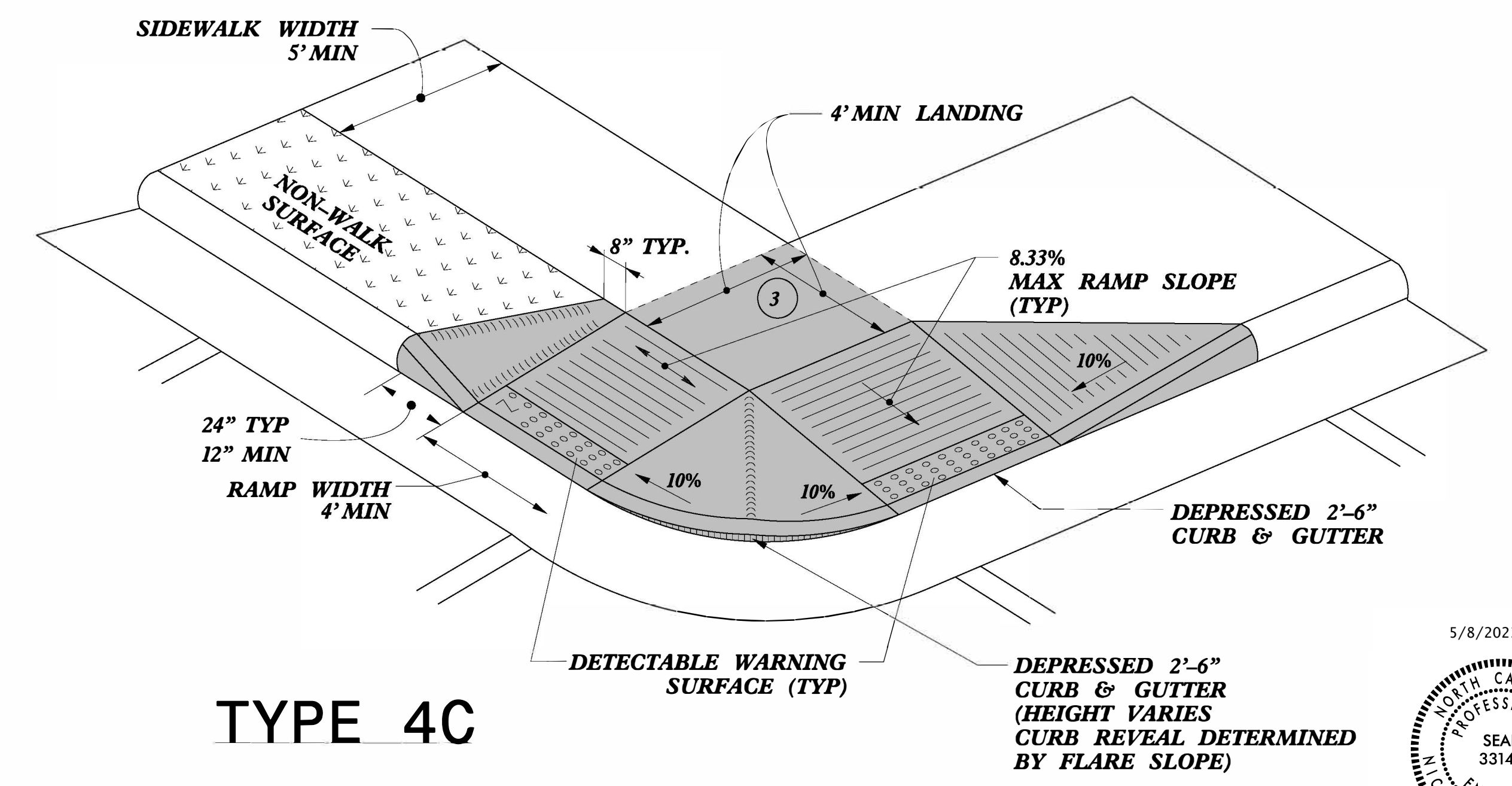
TYPE 4



TYPE 4B



TYPE 4A



TYPE 4C

- 1 8.33% (12:1) MAX RAMP SLOPE
- 2 CROSS SLOPE: 2.00%
- 3 CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB.

5/8/2023



DocuSigned by: Nicole Fischer 08843203416455

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**CURB RAMPS**

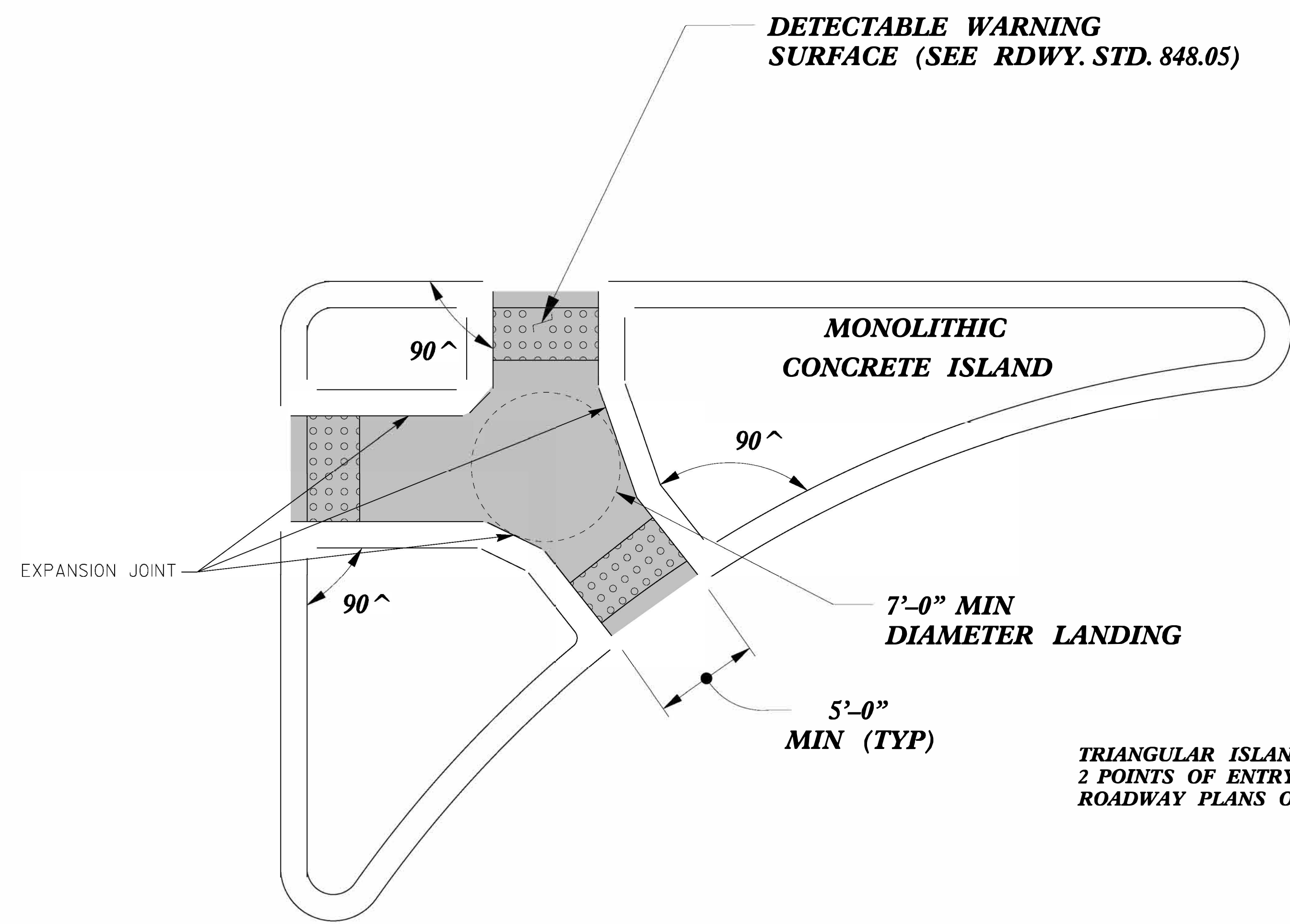
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 CHECKED BY: DATE:   
 FILE SPEC. stds/2012CurbRamp/CurbRampDetails.dgn

REFER TO ROADWAY STANDARD DRAWING NUMBER 848.05 SHEET 3 OF 3 FOR ALL RAMP NOTES

5/14/99  
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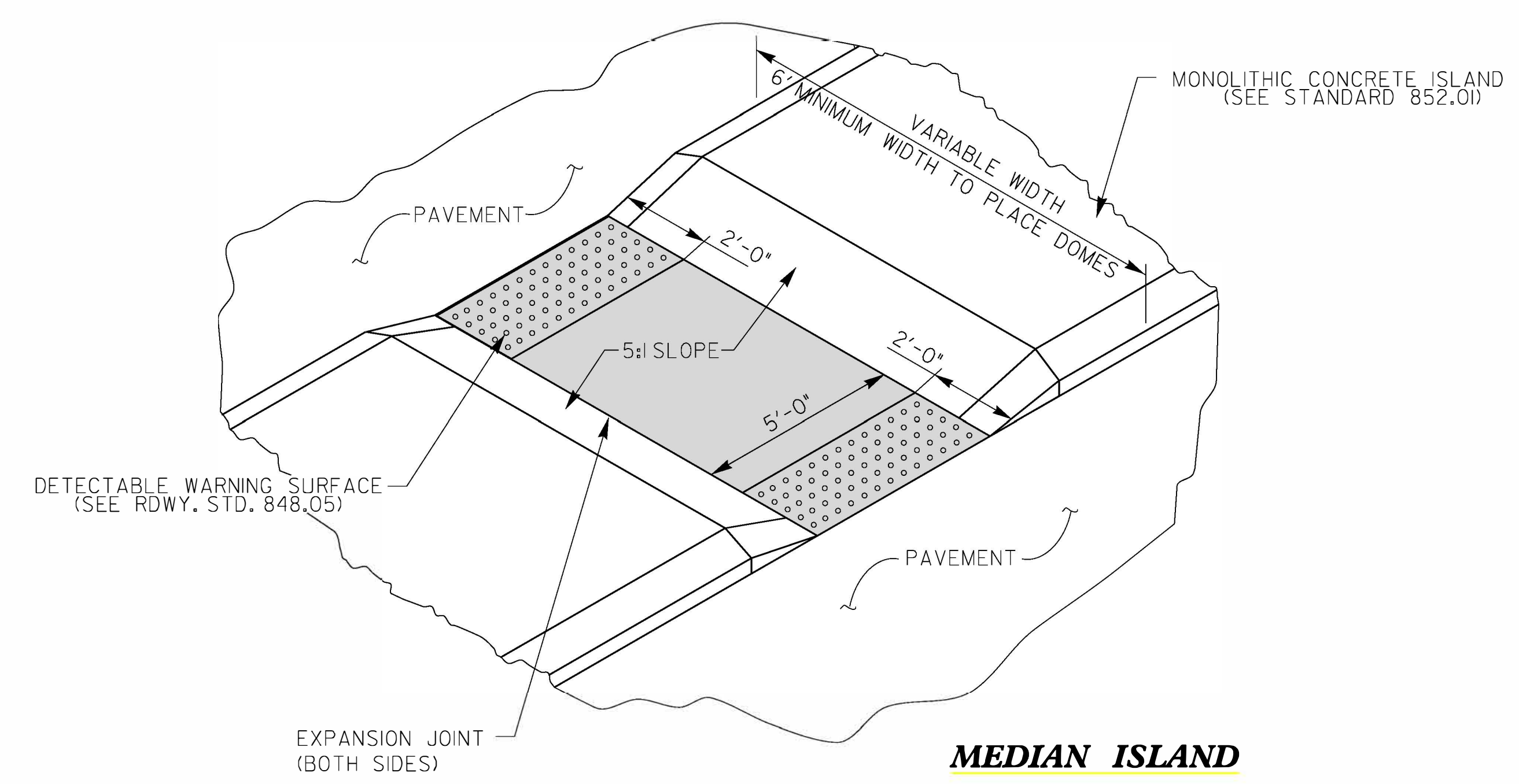


**PAY LIMITS FOR 2 OR 3 CURB RAMPS  
(CALCULATE BASED ON NUMBER OF  
SETS OF TRUNCATED DOMES)**

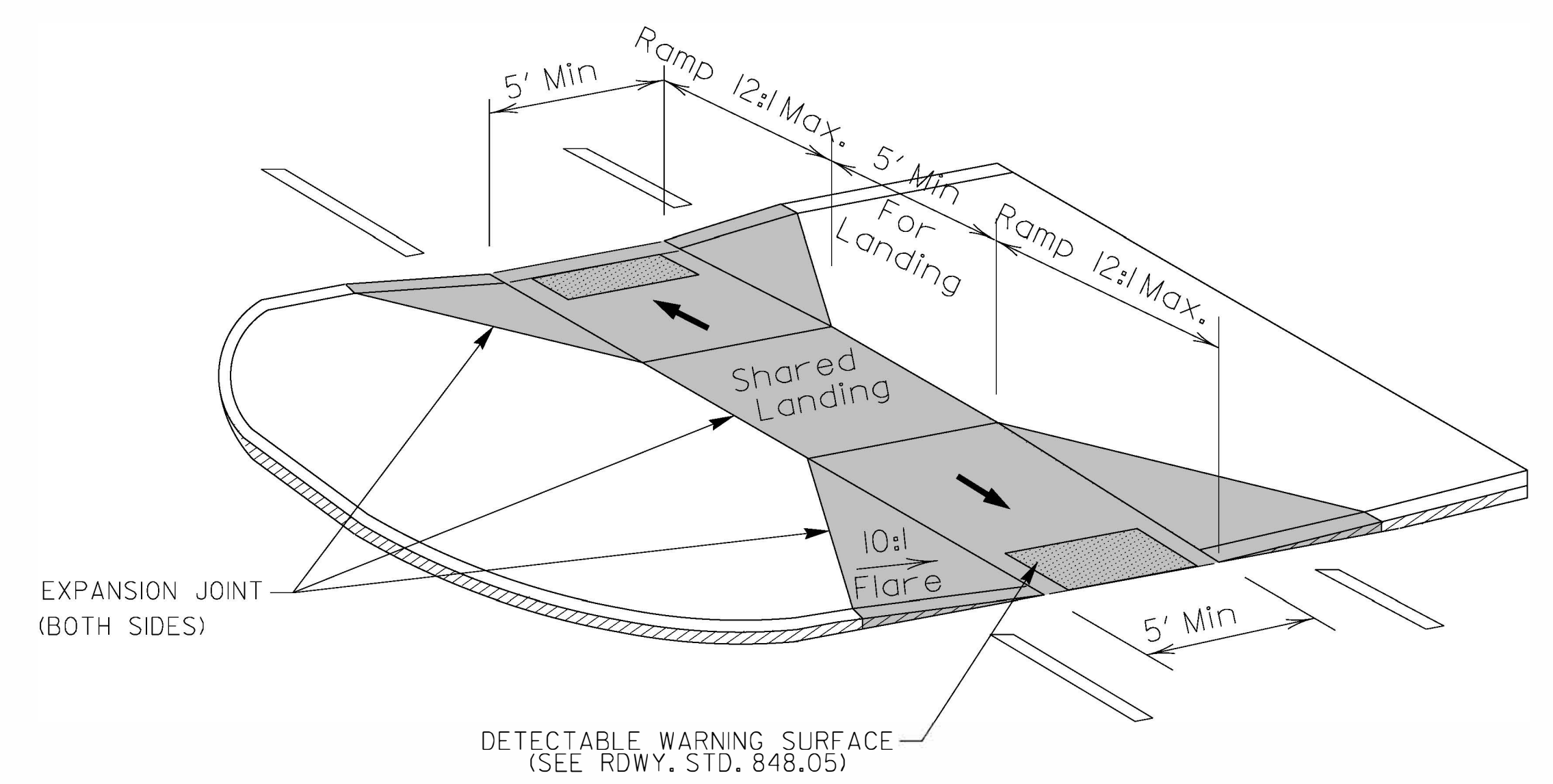


**TRIANGULAR ISLANDS MAY BE CONSTRUCTED WITH ONLY 2 POINTS OF ENTRY AND EXIT AS SHOWN IN THE ROADWAY PLANS OR AS DIRECTED BY THE ENGINEER.**

**TRIANGULAR ISLAND  
WITH CUT THROUGH  
TYPE 6**



**MEDIAN ISLAND  
WITH CUT THROUGH  
TYPE 7**



**MEDIAN ISLAND  
CURB RAMPS  
TYPE 8**

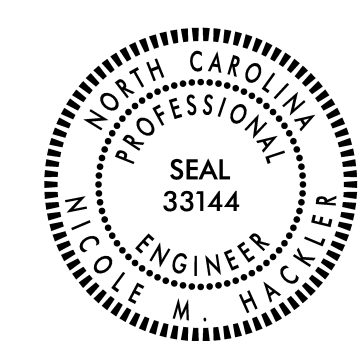
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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**CURB RAMPS**  
Median or Turn Lane Islands

ORIGINAL BY: J.S. HOWERTON DATE: 7/7/11  
MODIFIED BY: DATE:  
CHECKED BY: DATE:  
FILE SPEC: stds/2012CurbRamp/CurbRampDetails.dgn

5/8/2023



Designed by:  
*Nicole Hackler*

5/14/99  
CYCLING  
SUGGESTIONS



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

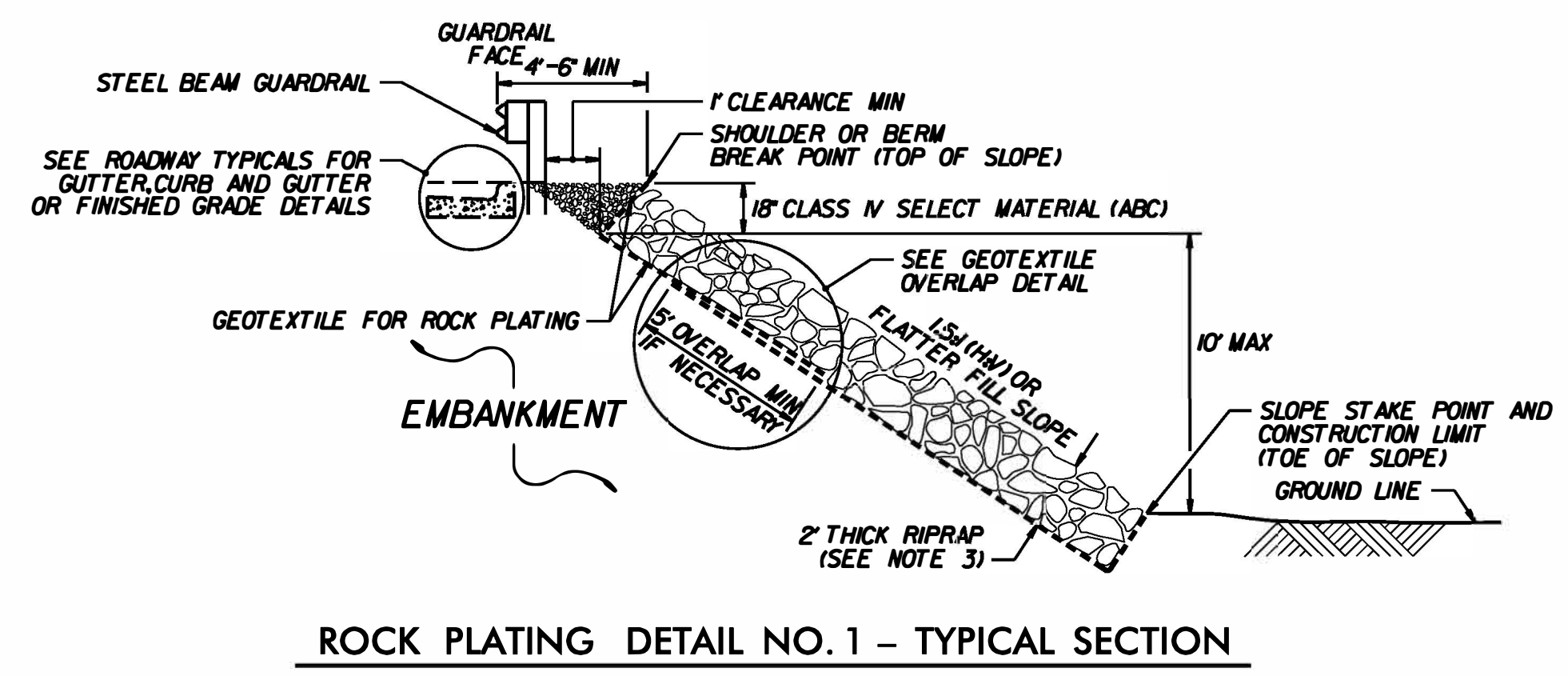
STATE OF NORTH CAROLINA  
DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR  
**ROCK PLATING**

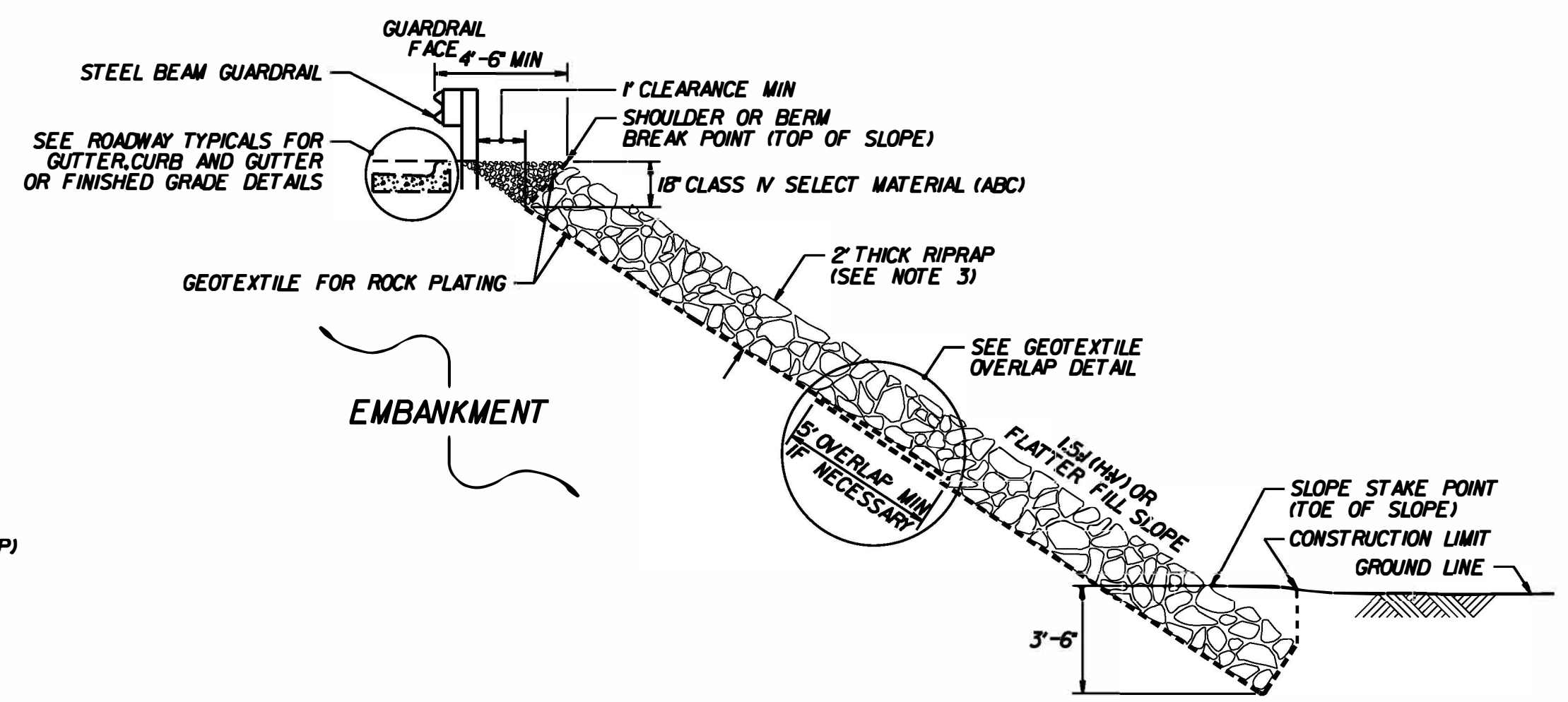
ROADWAY DETAIL DRAWING FOR  
**ROCK PLATING**

SHEET 1 OF 1  
**275D01**

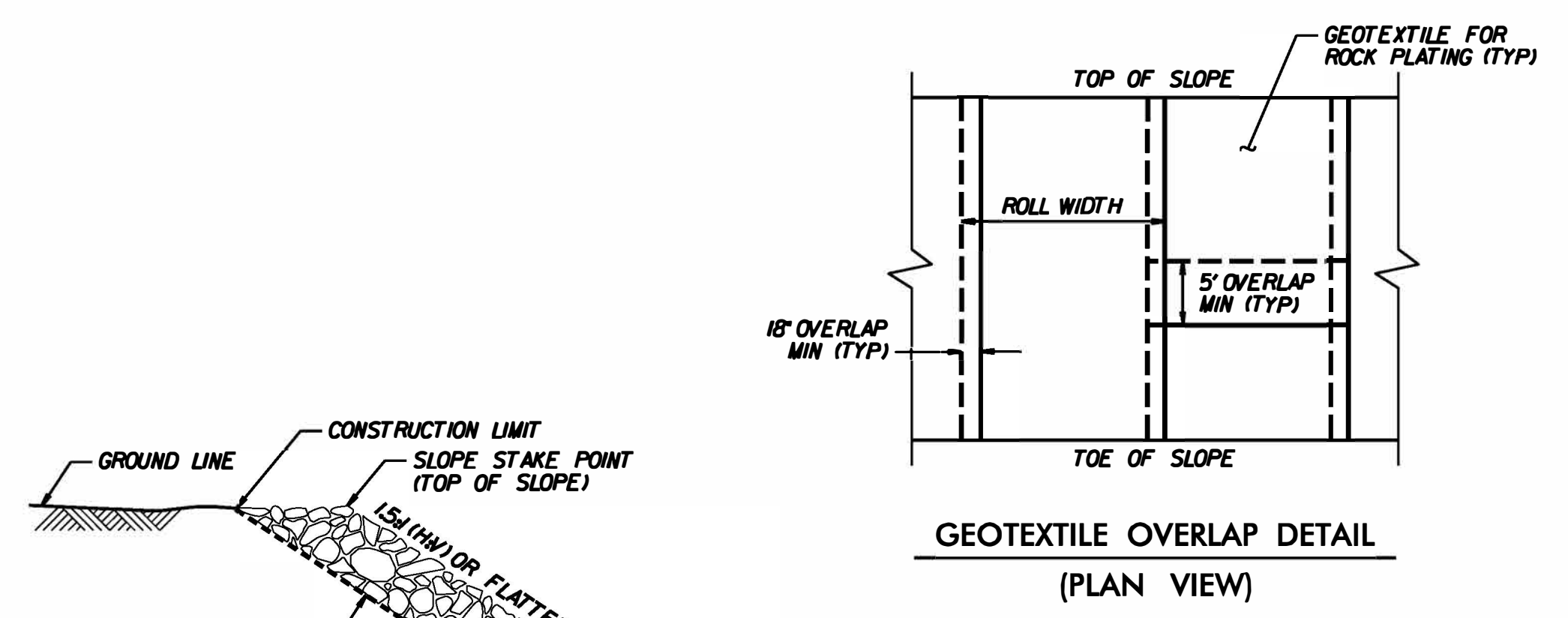
SHEET 1 OF 1  
**275D01**



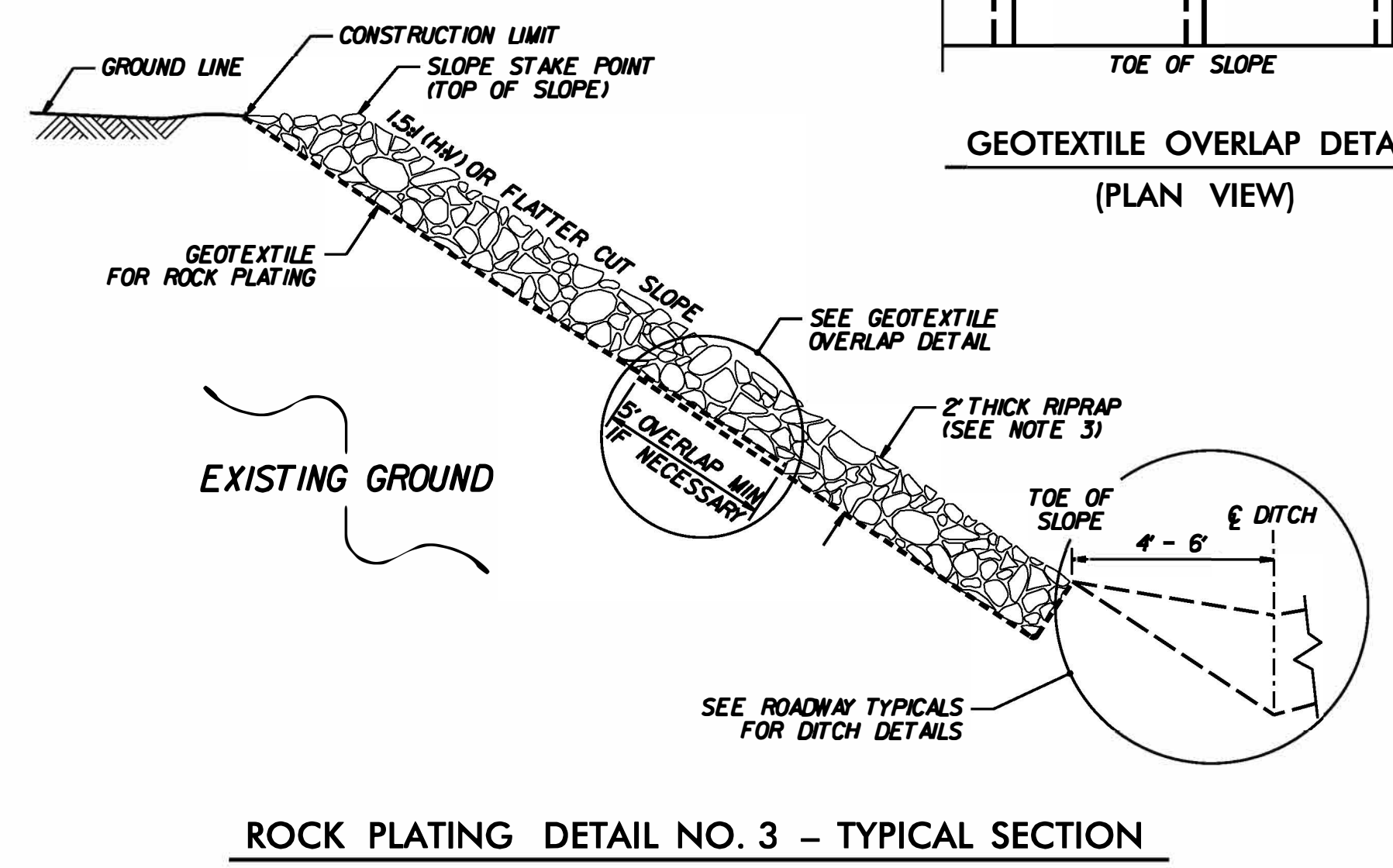
**ROCK PLATING DETAIL NO. 1 - TYPICAL SECTION**



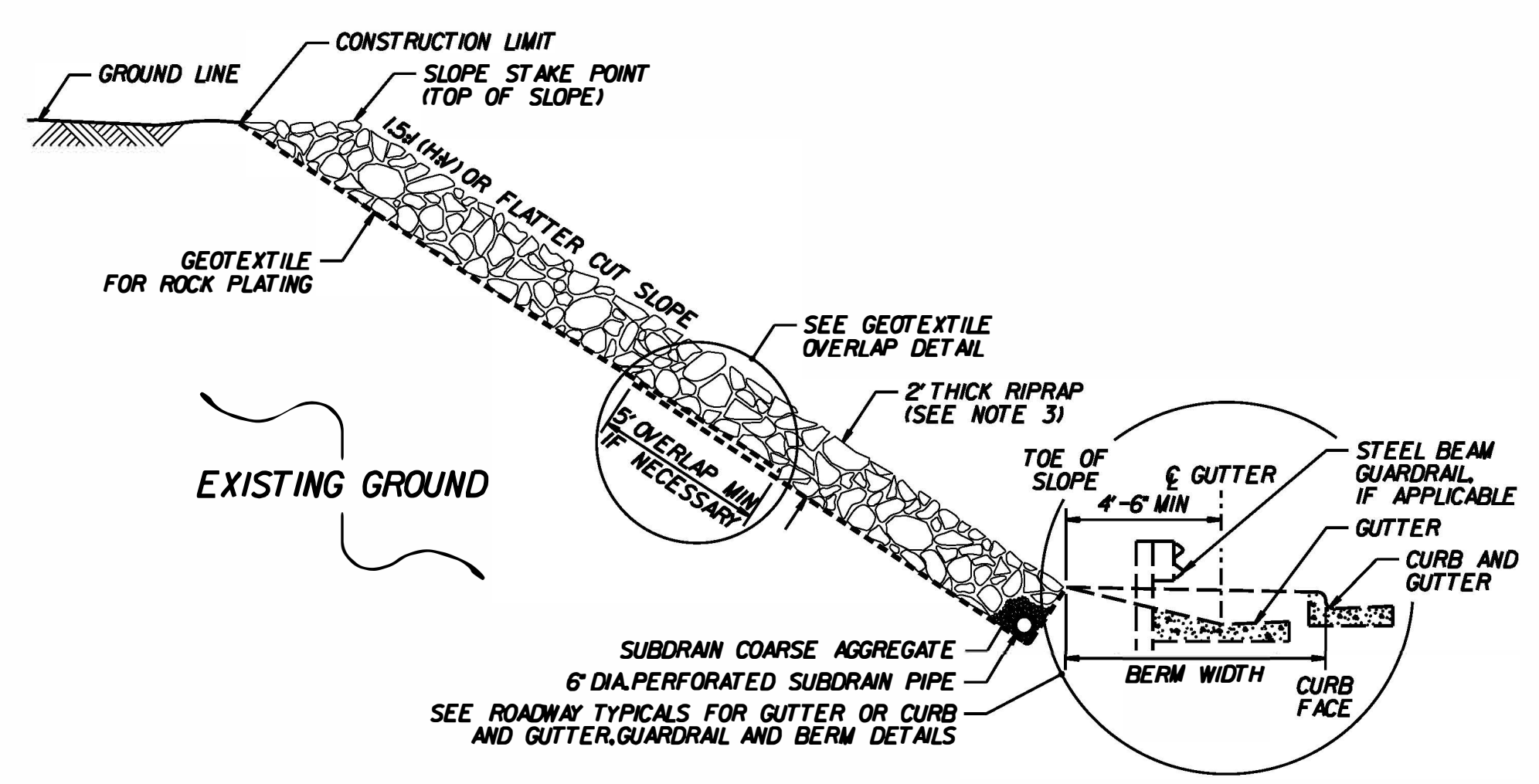
**ROCK PLATING DETAIL NO. 2 - TYPICAL SECTION**



**GEOTEXTILE OVERLAP DETAIL (PLAN VIEW)**

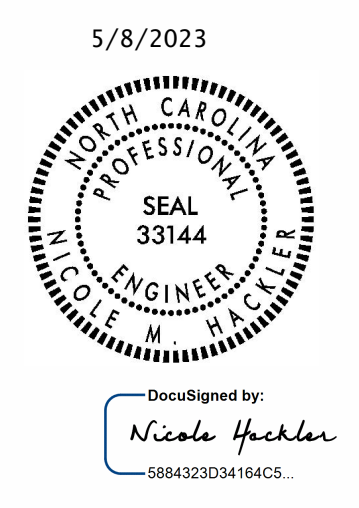


**ROCK PLATING DETAIL NO. 3 - TYPICAL SECTION**



**ROCK PLATING DETAIL NO. 4 - TYPICAL SECTION**

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



CONTRACT STANDARDS AND DEVELOPMENT UNIT Office 919-707-6900 FAX 919-250-4119	
<b>SEE TITLE BLOCK</b>	
ORIGINAL BY: S. HIDDEN	DATE: 03-11-22
MODIFIED BY:	DATE:
CHECKED BY:	DATE:
FILE SPEC.:	

SYSTEM GENERATED USER NAME



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DIVISION OF HIGHWAYS  
RALEIGH, N.C.

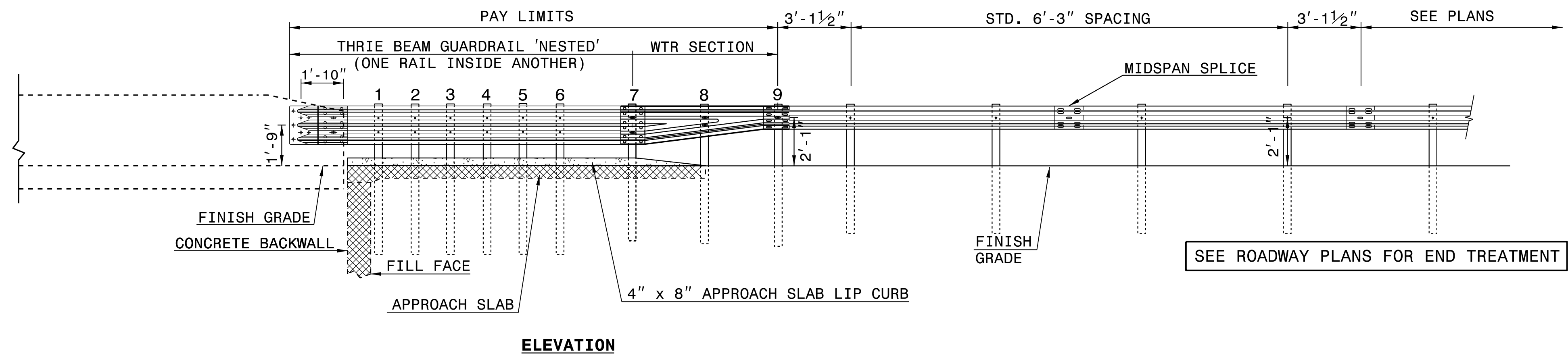
ENGLISH DETAIL DRAWING FOR  
**TYPE III - SHOP CURVED  
STRUCTURE ANCHOR UNIT**

SHEET 1 OF 1  
**TYPE III SC**

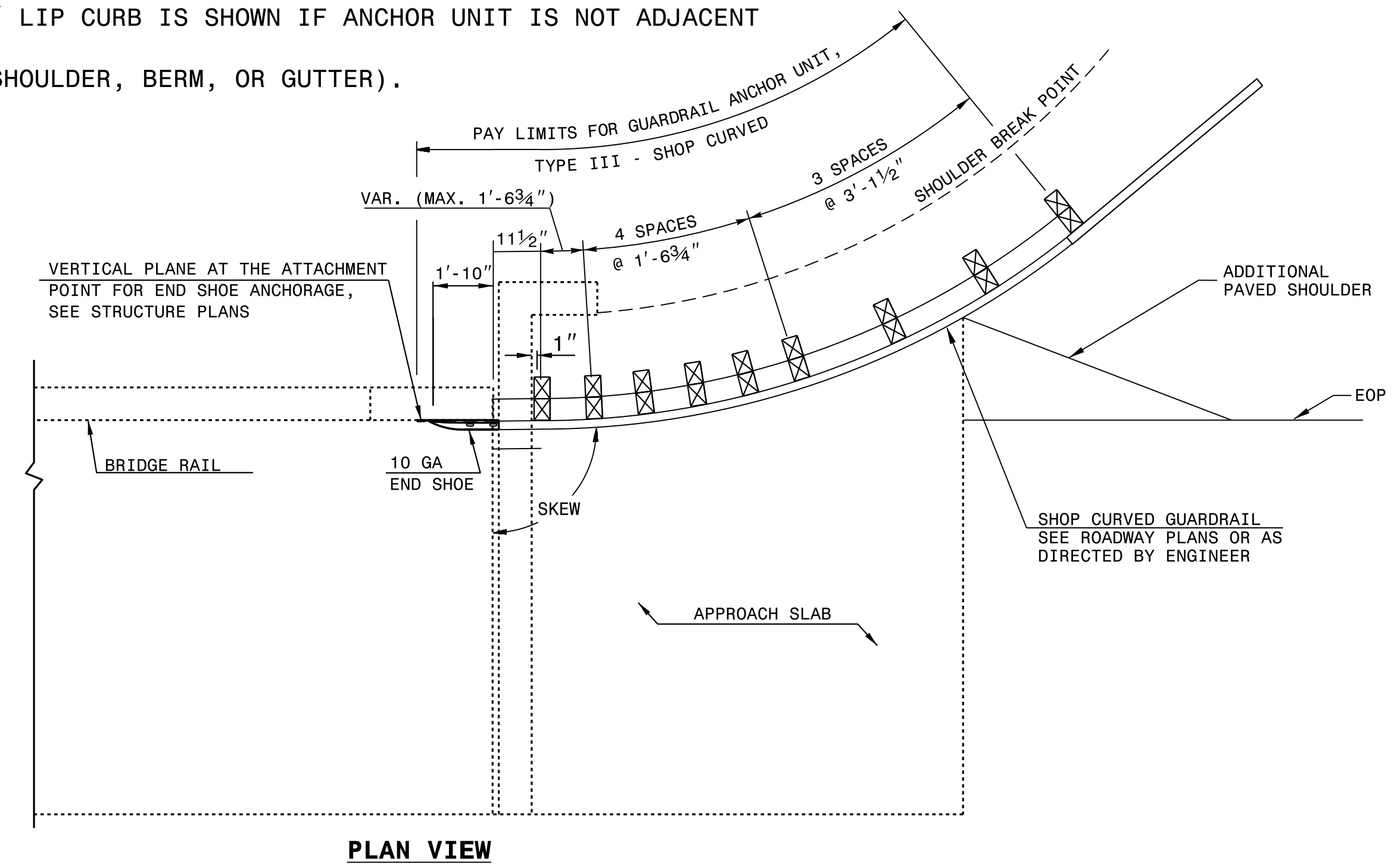
STATE OF NORTH CAROLINA  
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DIVISION OF HIGHWAYS  
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR  
**TYPE III - SHOP CURVED  
STRUCTURE ANCHOR UNIT**

SHEET 1 OF 1  
**TYPE III SC**



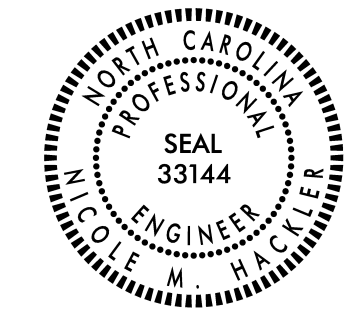
- NOTE:
- \*\*POST NOT REQUIRED FOR SKEW ANGLES GREATER THAN 150° OR LESS THAN 30° UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
  - \*THE DISTANCE FROM END OF BRIDGE RAIL TO CENTER LINE OF THE FIRST POST SHOULD BE 11 1/2" IF CONCRETE BACKWALL IS NOT PRESENT.
  - SHOULDER BERM GUTTER MUST BE INSTALLED TO 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).
  - USE NO STEEL POSTS WITHIN THE GUARDRAIL ANCHOR UNIT LIMITS.
  - LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
  - SEE STANDARD 862.03 SHEET 4 FOR POST SECTIONS 1 THRU 9.



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

01-FEB-2018 09:49 S:\Contracts\Special Details\howerton\Guardrail\31 inch Guardrail\type\_iii\_sc.dgn

5/25/2023



DocuSigned by:  
Nicole M. Hecker  
58843203416405

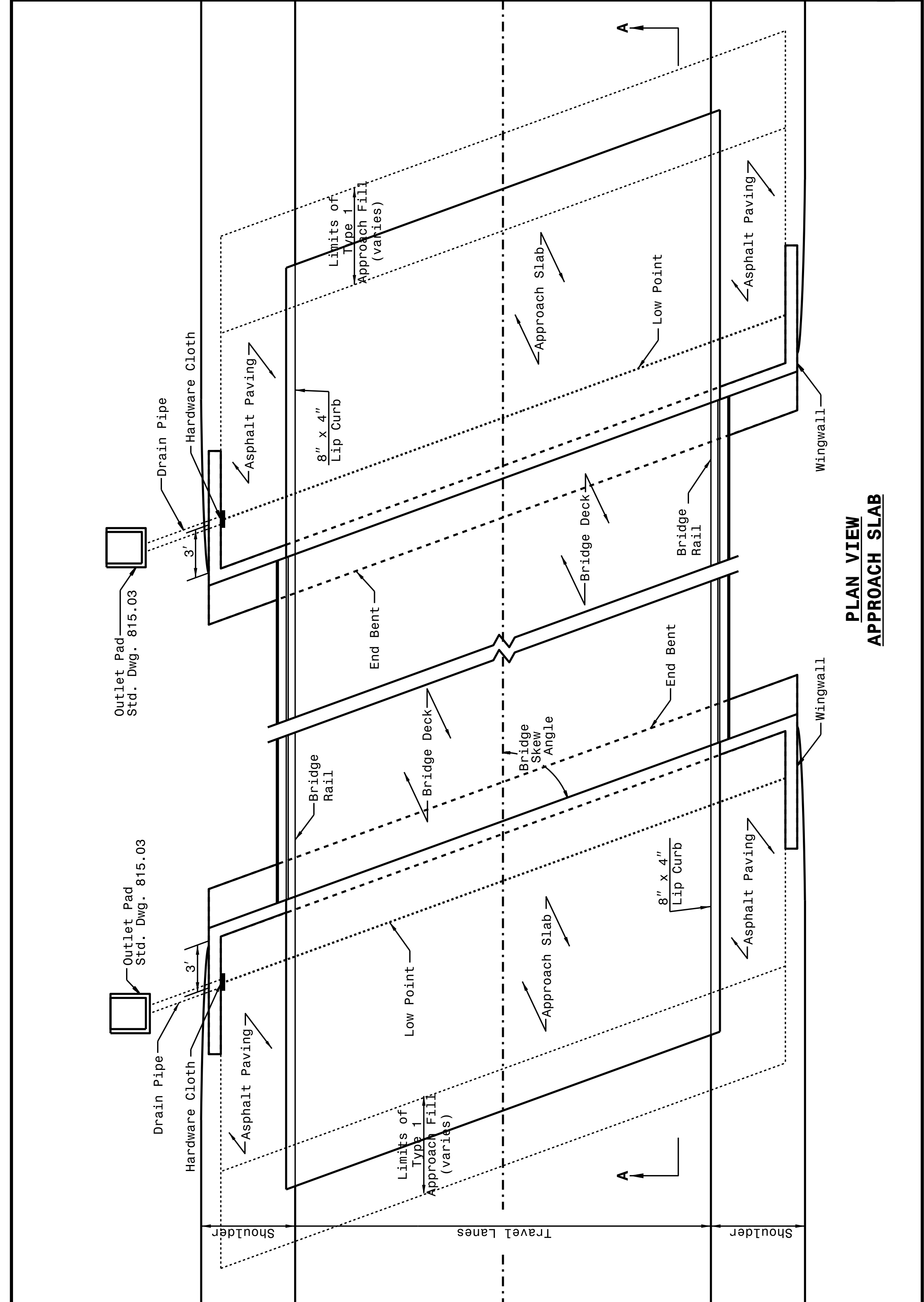
DOCUMENT NOT CONSIDERED FINAL  
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**SEE PLATE FOR TITLE**

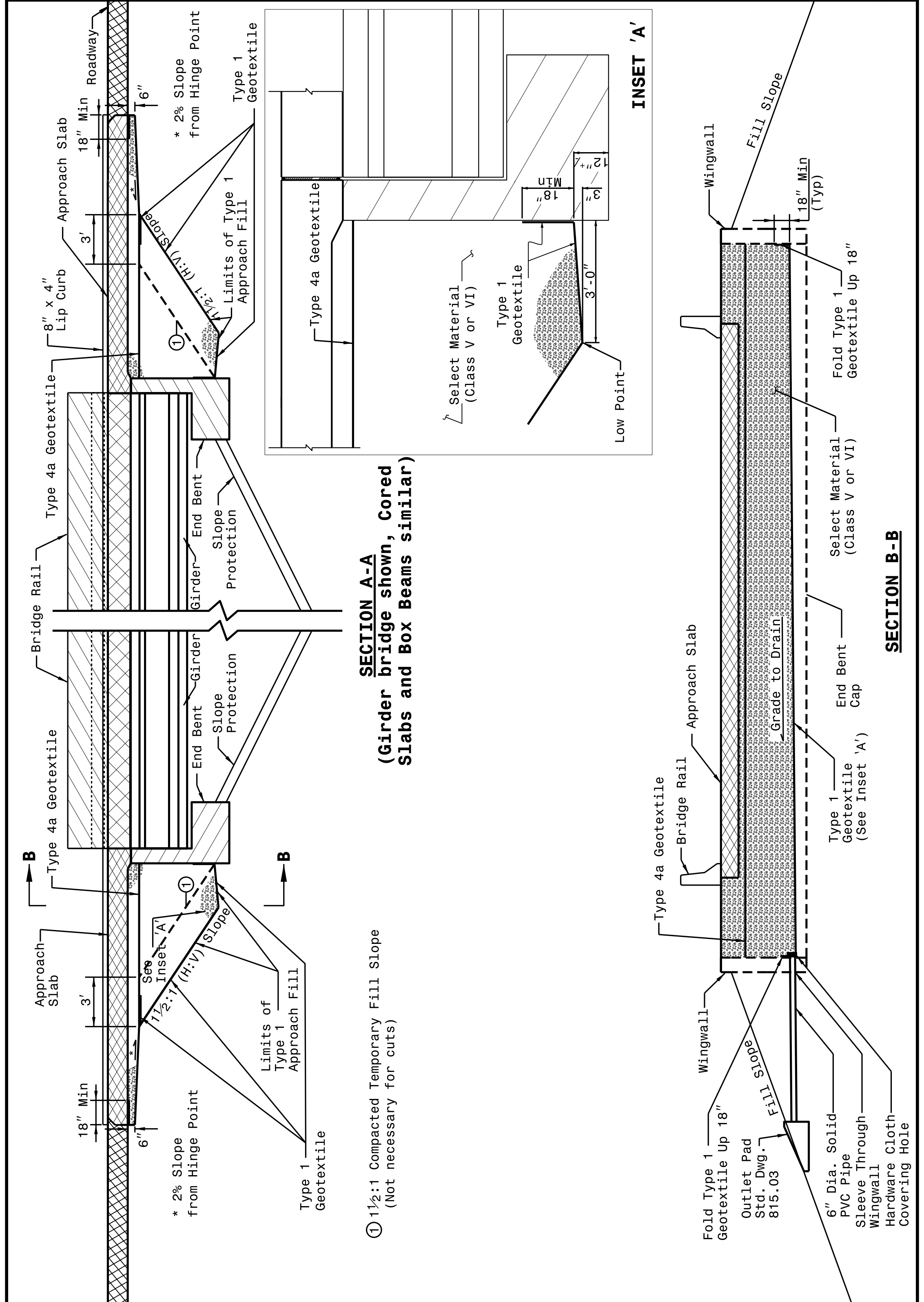
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MODIFIED BY: T.S.Spell	DATE: 2-01-18
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STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.  
ROADWAY DETAIL DRAWING FOR BRIDGE APPROACH FILLS TYPE 1 APPROACH FILL FOR BRIDGE ABUTMENT  
SHEET 1 OF 2



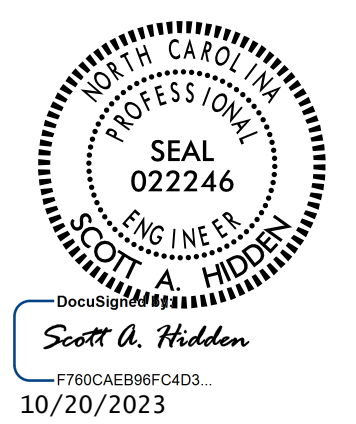
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.  
ROADWAY DETAIL DRAWING FOR BRIDGE APPROACH FILLS TYPE 1 APPROACH FILL FOR BRIDGE ABUTMENT  
SHEET 1 OF 2

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.  
ROADWAY DETAIL DRAWING FOR BRIDGE APPROACH FILLS TYPE 1 APPROACH FILL FOR BRIDGE ABUTMENT  
SHEET 2 OF 2



STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.  
ROADWAY DETAIL DRAWING FOR BRIDGE APPROACH FILLS TYPE 1 APPROACH FILL FOR BRIDGE ABUTMENT  
SHEET 2 OF 2

30-JUN-2023 12:42  
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\$\$\$\$\$USERNAME\$\$\$\$\$



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



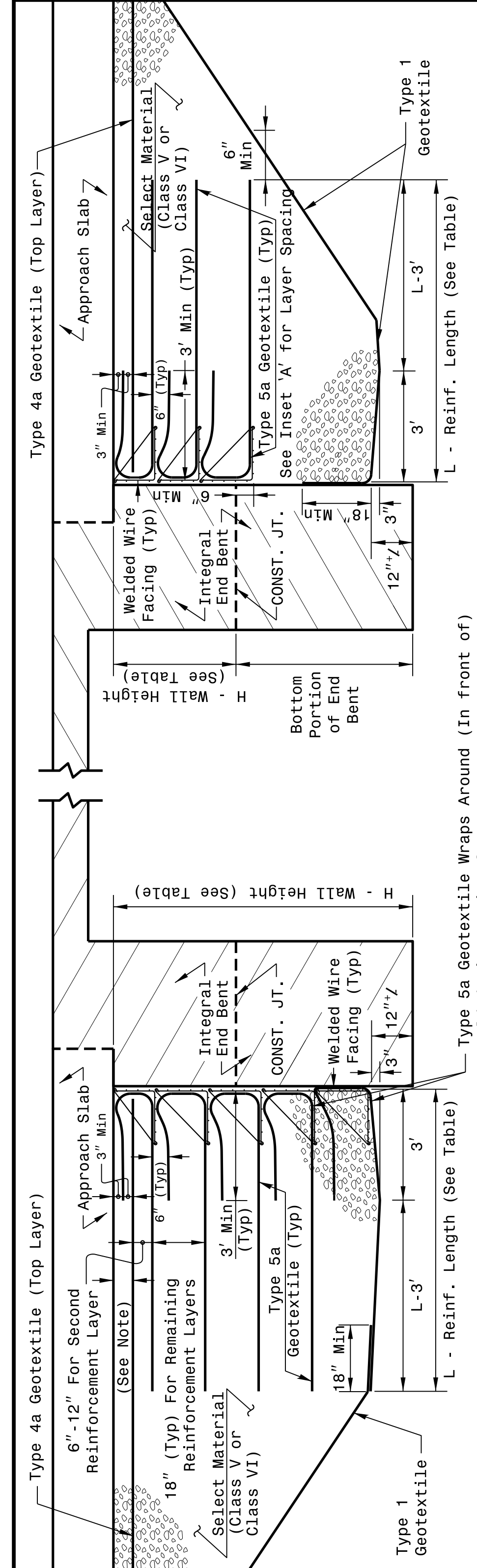




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RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR  
**BRIDGE APPROACH FILLS**  
TYPE 1A APPROACH FILL  
ALTERNATE APPROACH FILL FOR  
INTEGRAL BRIDGE ABUTMENT

SHEET 3 OF 3



**INSET 'A'**

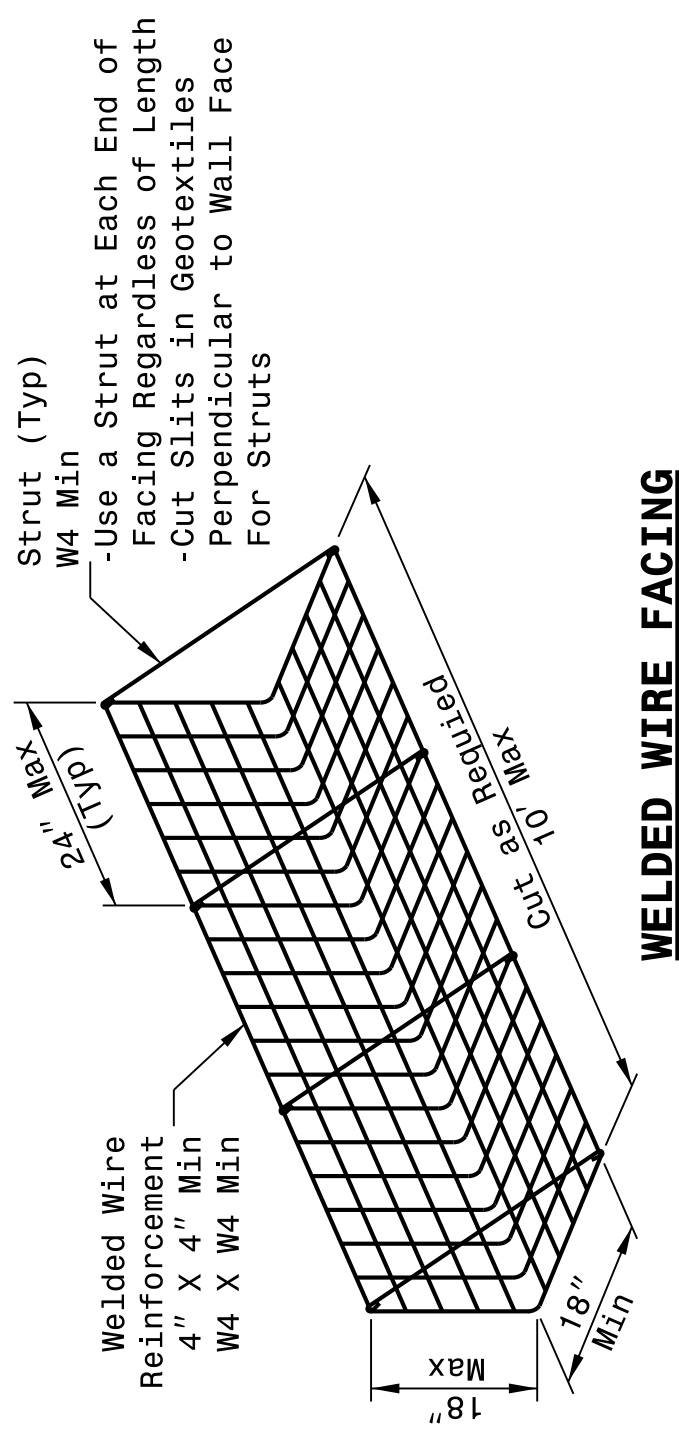
NOTE: Place top (first) reinforcement layer according to the detail shown on sheet 2 of 3 regardless of vertical spacing for underlying reinforcement layers. As shown in insets above, it is not necessary to wrap the top layer of geotextile reinforcement at the wall face.

**ALTERNATE INSET 'A'**  
(Allowed When Bottom Portion of Integral End Bent is Constructed Before Temporary Wall and End Bent Piles are at Least 25' Long or Drilled In)

**TEMPORARY GEOTEXTILE WALL DETAILS**

Type 5a Geotextile Wraps Around (In front of)  
Weided Wire Facing for Bottom Layer  
Type 5a Geotextile Wraps Inside (Behind)  
Weided Wire Facing for all Remaining Layers

TYPE 5A GEOTEXTILE REINFORCEMENT LENGTH	
WALL HEIGHT H (ft)	REINFORCEMENT LENGTH L (ft)
< 8	8
8 TO 12	= H

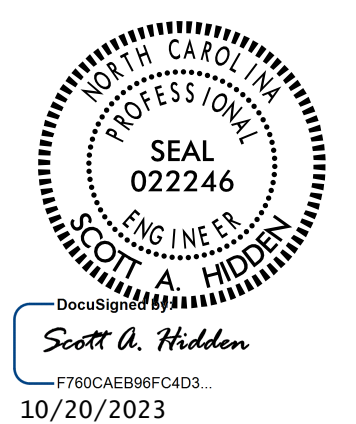


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DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR  
**BRIDGE APPROACH FILLS**  
TYPE 1A APPROACH FILL  
ALTERNATE APPROACH FILL FOR  
INTEGRAL BRIDGE ABUTMENT

SHEET 3 OF 3



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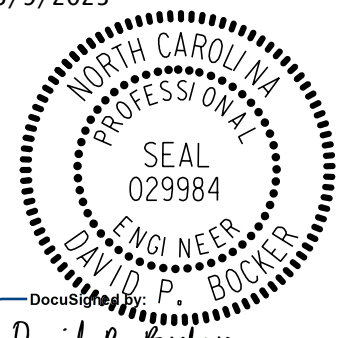
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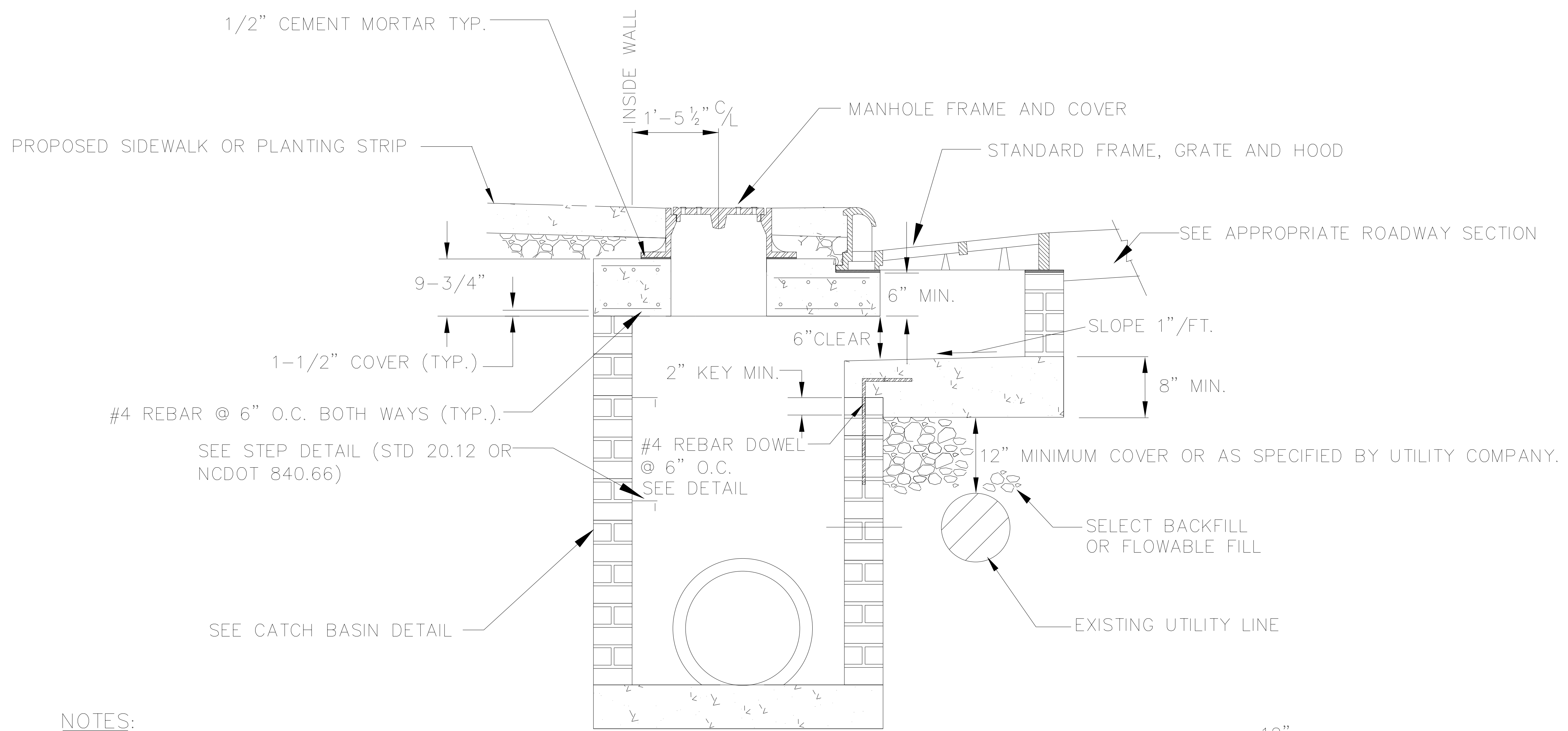


8/17/99

ORIGINAL BY: R. L. CAREATHERS	DATE: 4/27/23
MODIFIED BY:	DATE:
CHECKED BY: D. P. BOCKER	DATE: 4/27/23

PROJECT REFERENCE NO. U-5839	SHEET NO. 20-1
RW SHEET NO.	
HYDRAULICS ENGINEER 5/9/2023	
	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	

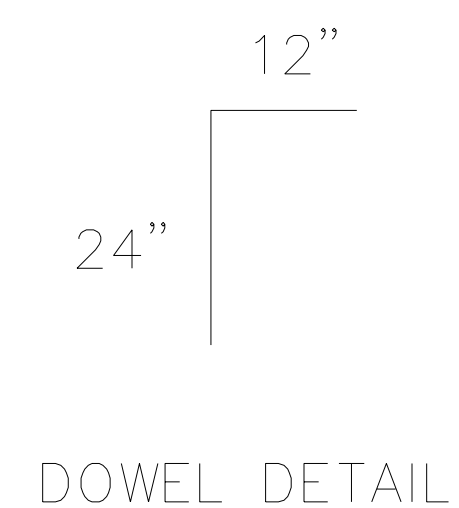
# OFFSET CATCH BASIN DETAIL



**NOTES:**

1. SEE NCDOT DETAIL 840.01 FOR MAXIMUM PIPE SIZE ALLOWABLE

OFFSET CATCH BASIN EXISTING UTILITY CONFLICT



NOT TO SCALE

**N|V|5**  
 NV5 ENGINEERS & CONSULTANTS, INC.  
 7500 E. INDEPENDENCE BLVD, STE 100  
 CHARLOTTE, NC 28227  
 P: 704.537.7300 www.NV5.com  
 NC License # F-1333  
 formerly CALYX Engineers & Consultants

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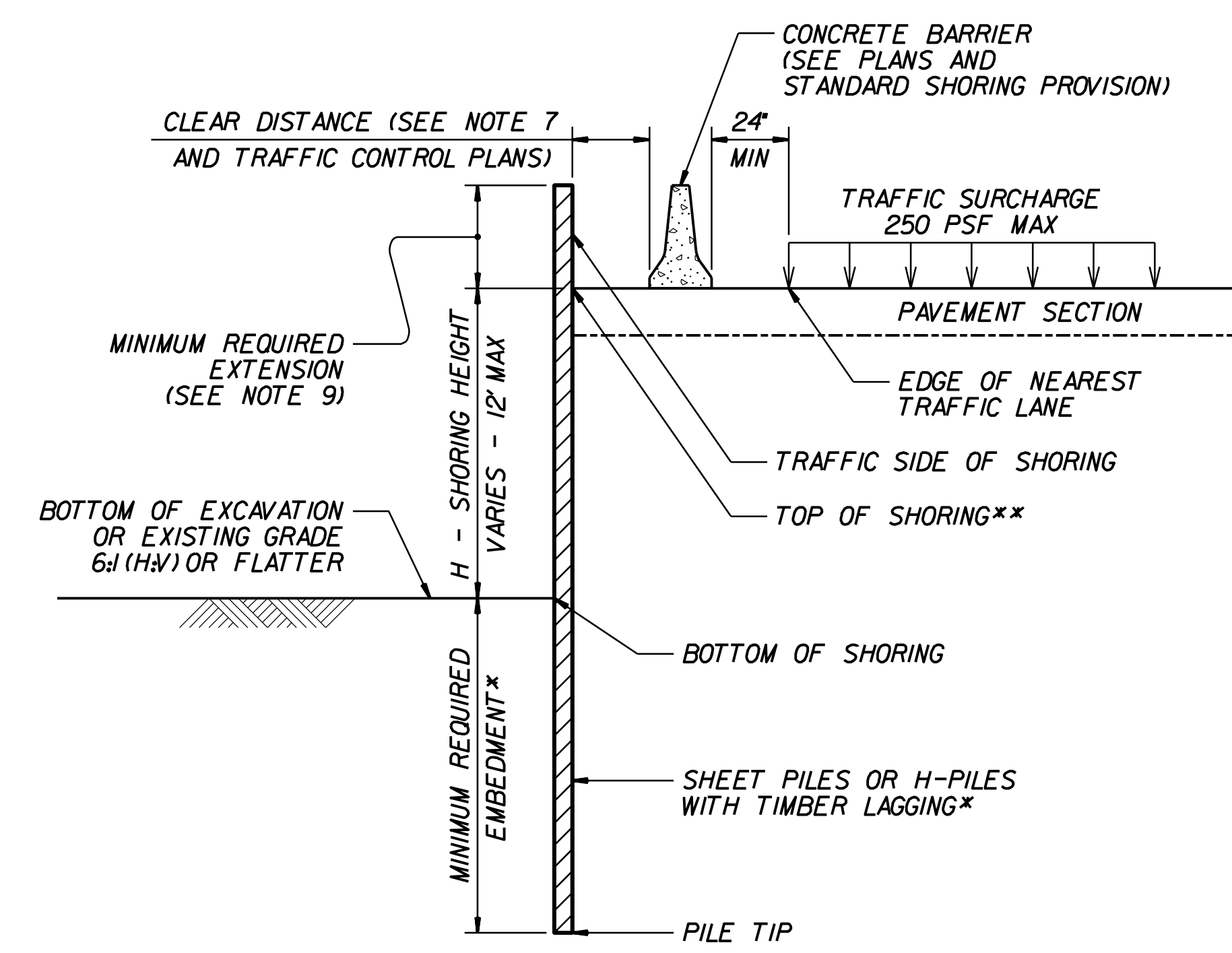
GROUNDWATER CONDITION (SEE NOTE 6)	H SHORING HEIGHT (FT)	SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT					SURCHARGE CASE WITH TRAFFIC IMPACT				
		SHEET PILES		H-PILES WITH TIMBER LAGGING			SHEET PILES		H-PILES WITH TIMBER LAGGING		
		MINIMUM REQUIRED EMBEDMENT (FT)	MINIMUM REQUIRED SECTION MODULUS (IN <sup>3</sup> /FT)	MINIMUM REQUIRED EMBEDMENT* (FT) (SEE NOTE 10)			MINIMUM REQUIRED EMBEDMENT (FT)	MINIMUM REQUIRED SECTION MODULUS (IN <sup>3</sup> /FT)	MINIMUM REQUIRED EMBEDMENT* (FT) (SEE NOTE 10)		
			HP 10x42	HP 12x53	HP 14x73			HP 10x42	HP 12x53	HP 14x73	
GROUNDWATER ELEVATION BETWEEN BOTTOM OF SHORING AND PILE TIP	< 6	11.5	4.5	11.5	11.5	11.5	16.0	12.0	13.0	13.0	13.0
	7	13.0	7.0	13.0	13.0	13.0	17.0	14.5	14.5	14.5	14.5
	8	15.0	10.0	--	15.0	15.0	18.0	17.0	--	15.5	15.5
	9	17.0	14.0	--	17.0	17.0	19.0	20.0	--	17.0	17.0
	10	18.5	19.5	--	--	18.5	20.0	23.5	--	--	18.5
	11	20.5	26.0	--	--	--	21.0	28.0	--	--	20.0
12	22.5	33.0	--	--	--	22.0	33.0	--	--	21.5	
GROUNDWATER ELEVATION BELOW PILE TIP	< 6	7.5	3.0	8.0	8.0	8.0	11.0	10.0	9.5	9.5	9.5
	7	8.5	4.5	9.5	9.5	9.5	12.0	12.0	10.5	10.5	10.5
	8	10.0	6.5	10.5	10.5	10.5	12.5	14.0	11.5	11.5	11.5
	9	11.0	9.5	--	12.0	12.0	13.5	16.5	--	12.5	12.5
	10	12.5	13.0	--	--	13.5	14.0	19.5	--	13.5	13.5
	11	13.5	17.0	--	--	14.5	15.0	22.5	--	--	14.5
12	15.0	21.5	--	--	16.0	16.0	25.5	--	--	15.5	

**MINIMUM REQUIRED EMBEDMENT AND SECTION MODULUS**

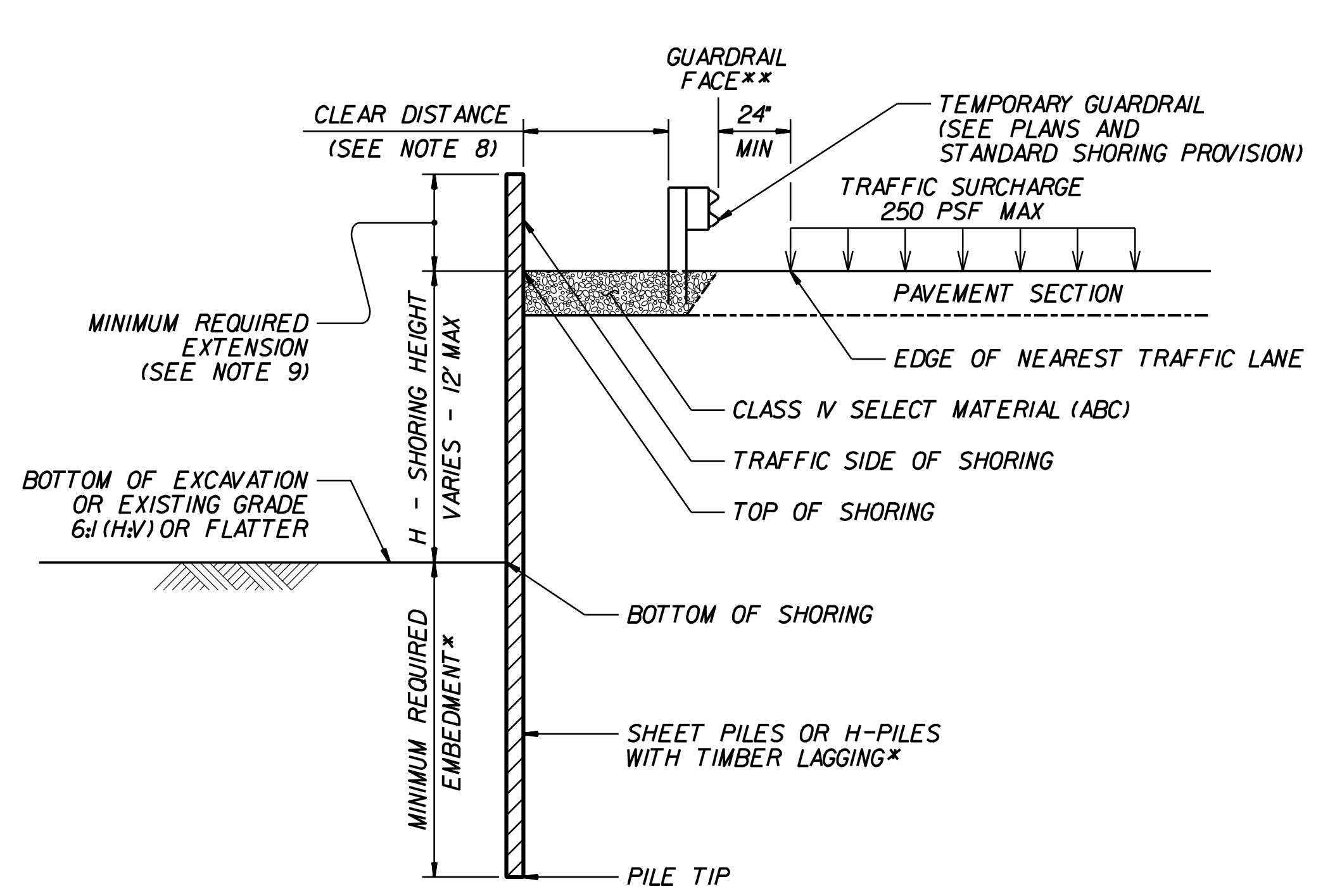
\*DO NOT USE H-PILES WITH TIMBER LAGGING FOR GROUNDWATER CONDITION, SHORING HEIGHT AND H-PILE SIZE SHOWN IF MINIMUM REQUIRED EMBEDMENT IS "--".

**NOTES:**

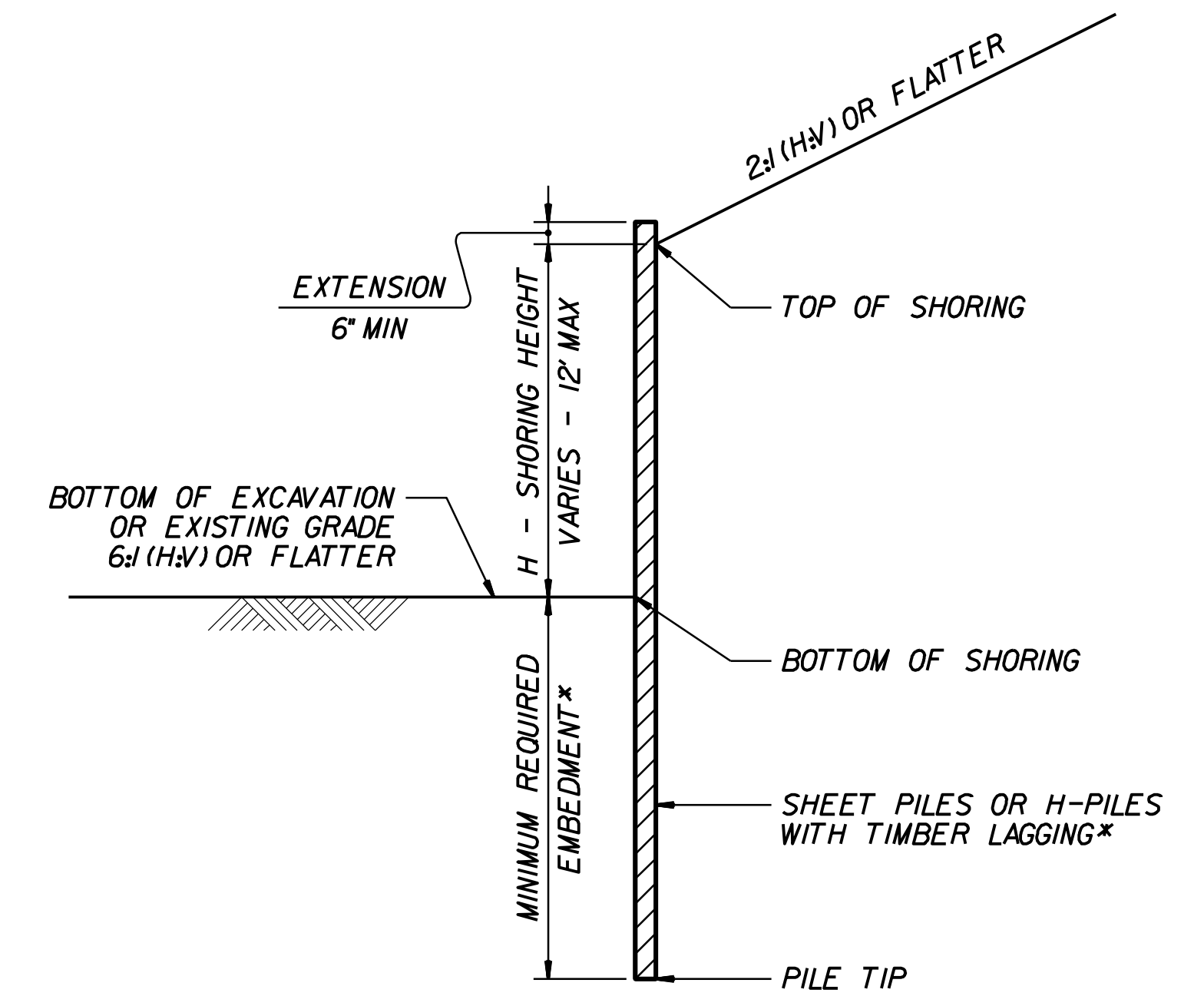
- AT THE CONTRACTOR'S OPTION, USE STANDARD TEMPORARY SHORING AS NOTED IN THE PLANS.
- FOR STANDARD TEMPORARY SHORING, SEE STANDARD SHORING PROVISION.
- STANDARD TEMPORARY SHORING IS BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:  
UNIT WEIGHT,  $\gamma = 120$  PCF  
FRICTION ANGLE,  $\phi = 30$  DEGREES  
COHESION,  $c = 0$  PSF
- DO NOT USE STANDARD TEMPORARY SHORING IF ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE.
- DO NOT USE STANDARD TEMPORARY SHORING WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS WITHIN THE EMBEDMENT DEPTH.
- USE GROUNDWATER ELEVATION NOTED IN THE PLANS. IF NO GROUNDWATER ELEVATION IS SHOWN IN THE PLANS, USE "GROUNDWATER ELEVATION BETWEEN BOTTOM OF SHORING AND PILE TIP" FOR GROUNDWATER CONDITION. DO NOT USE STANDARD TEMPORARY SHORING IF GROUNDWATER IS ABOVE BOTTOM OF SHORING.
- AT THE CONTRACTOR'S OPTION OR IF AVAILABLE CLEAR DISTANCE IS LESS THAN THE MINIMUM REQUIRED FOR CONCRETE BARRIER, SET BARRIER NEXT TO AND UP AGAINST TRAFFIC SIDE OF PILES AND USE "SURCHARGE CASE WITH TRAFFIC IMPACT".
- AT THE CONTRACTOR'S OPTION OR IF AVAILABLE CLEAR DISTANCE IS LESS THAN 4' FOR TEMPORARY GUARDRAIL, ATTACH GUARDRAIL TO TRAFFIC SIDE OF PILES AS SHOWN IN THE PLANS AND USE "SURCHARGE CASE WITH TRAFFIC IMPACT".
- MINIMUM REQUIRED EXTENSION IS 6' FOR "SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT" AND 32' FOR "SURCHARGE CASE WITH TRAFFIC IMPACT".
- MINIMUM REQUIRED EMBEDMENT FOR H-PILES WITH TIMBER LAGGING IS BASED ON DRIVEN H-PILES AT MAXIMUM 6' SPACING. AT THE CONTRACTOR'S OPTION, EMBEDMENT DEPTHS MAY BE REDUCED BY 25% FOR DRILLED-IN H-PILES.
- SUBMIT A "STANDARD TEMPORARY SHORING SELECTION FORM" AT LEAST 7 DAYS BEFORE STARTING TEMPORARY SHORING CONSTRUCTION. UP TO 3 SHORING LOCATIONS MAY BE INCLUDED ON EACH FORM. STANDARD SHORING SELECTION FORMS ARE AVAILABLE FROM:  
[connect.ncdot.gov/resources/Geological/Pages/Geotech\\_Forms\\_Details.aspx](http://connect.ncdot.gov/resources/Geological/Pages/Geotech_Forms_Details.aspx)
- CONTACT THE ENGINEER IF PILES DO NOT ATTAIN THE MINIMUM REQUIRED EMBEDMENT.



**CONCRETE BARRIER**  
\*\*TOP OF SHORING =  
EDGE OF PAVEMENT

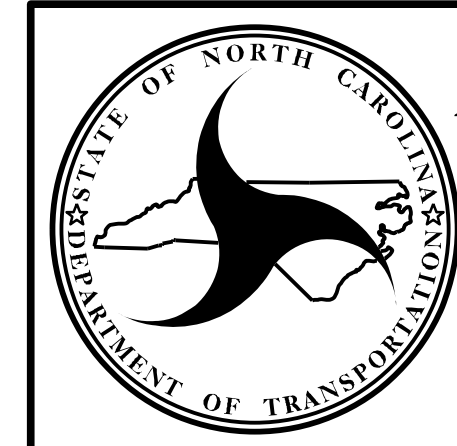


**TEMPORARY GUARDRAIL**  
\*\*GUARDRAIL FACE =  
EDGE OF PAVEMENT



**STANDARD TEMPORARY SHORING**  
(SLOPE CASE)  
\*SEE TABLE ABOVE.

**STANDARD TEMPORARY SHORING**  
(SURCHARGE CASE)  
\*SEE TABLE ABOVE.

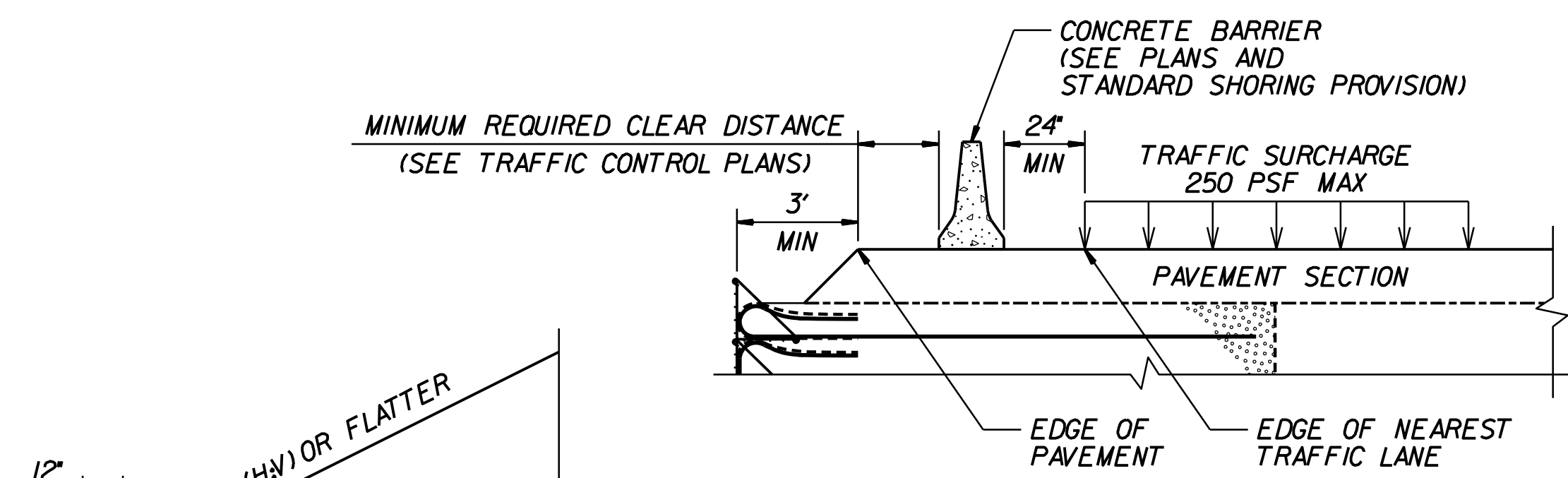


NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
  
**GEOTECHNICAL  
ENGINEERING UNIT**

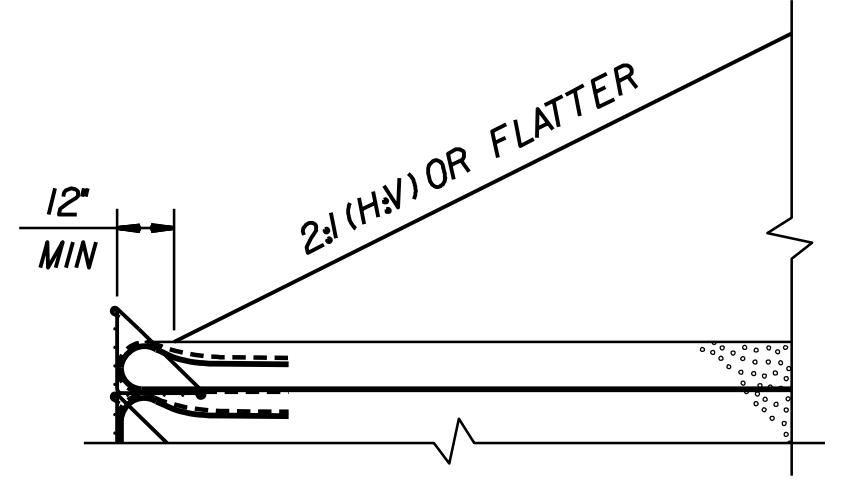
STANDARD DETAIL NO. 1801.01

STANDARD  
TEMPORARY SHORING

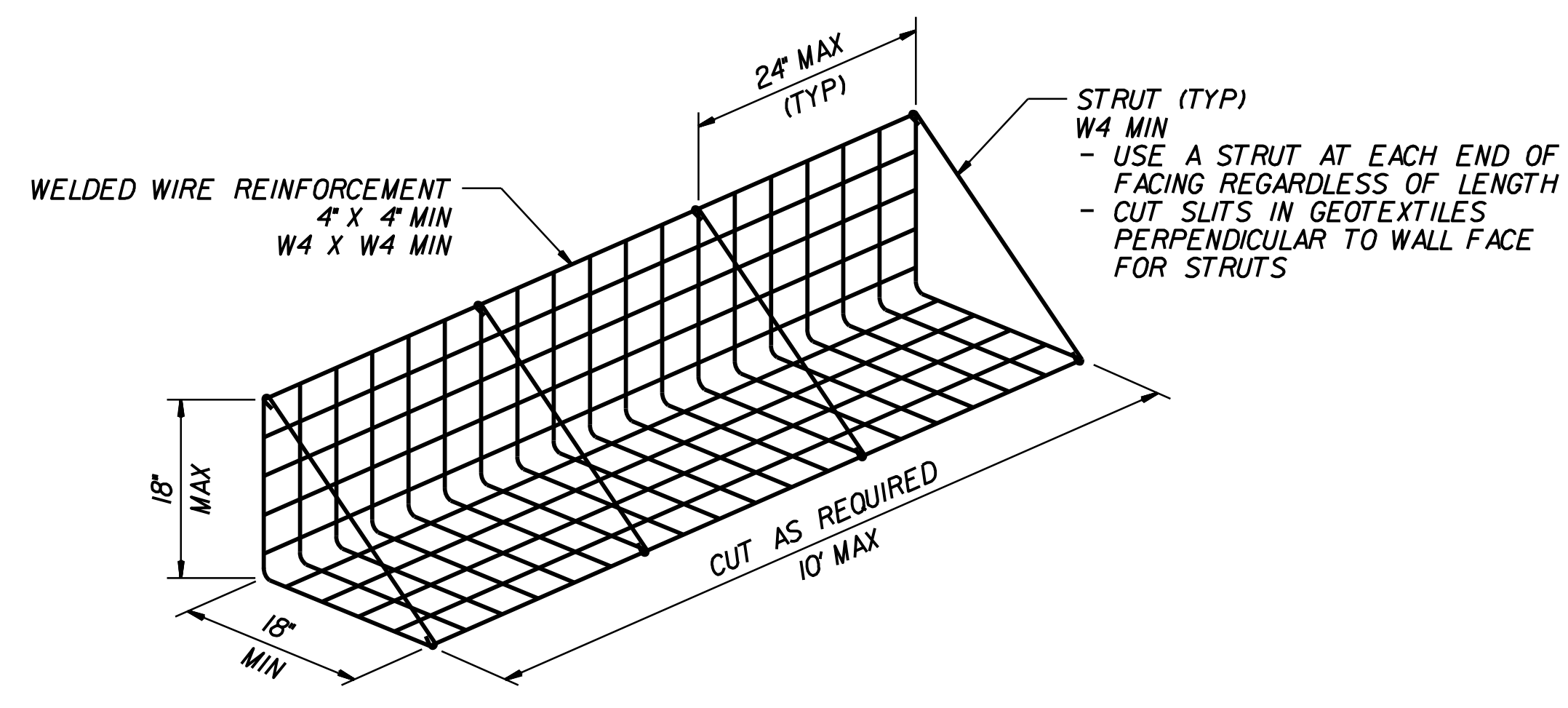




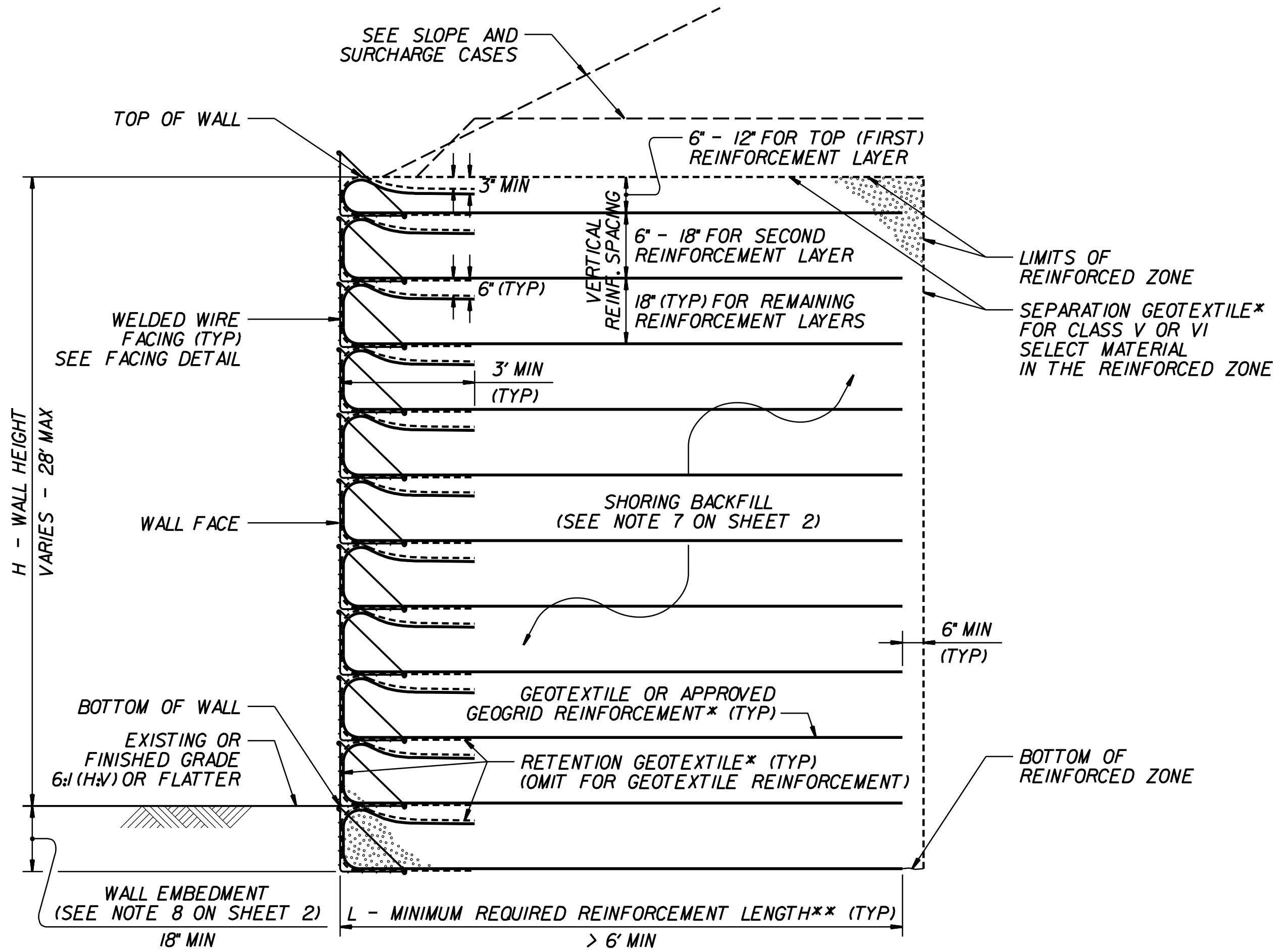
**SURCHARGE CASE**



**SLOPE CASE**

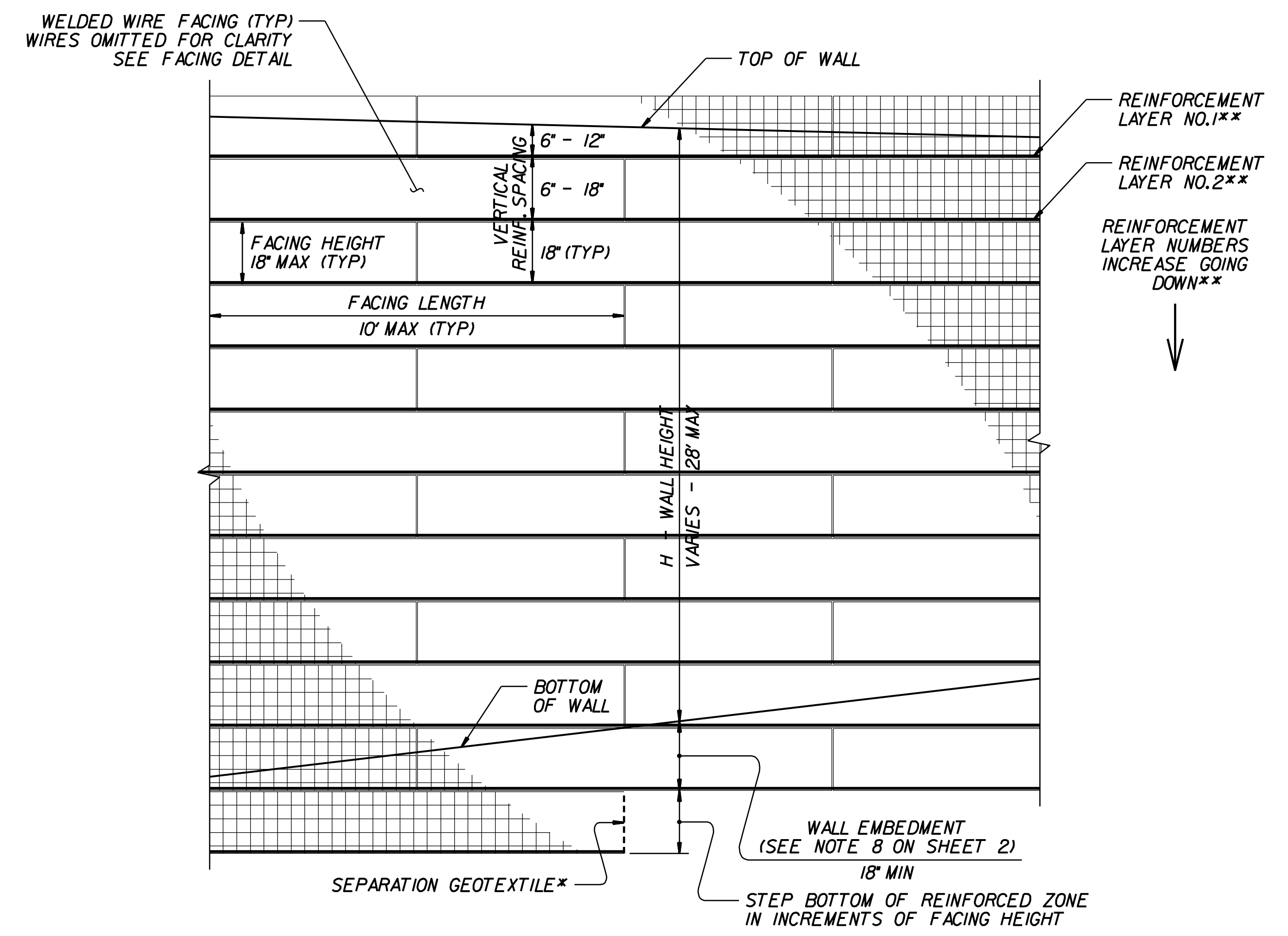


**FACING DETAIL**



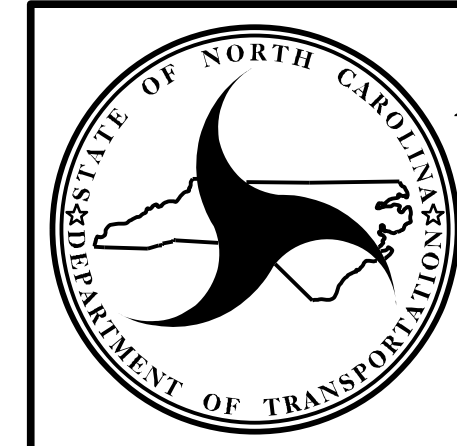
**STANDARD TEMPORARY WALL**

(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.

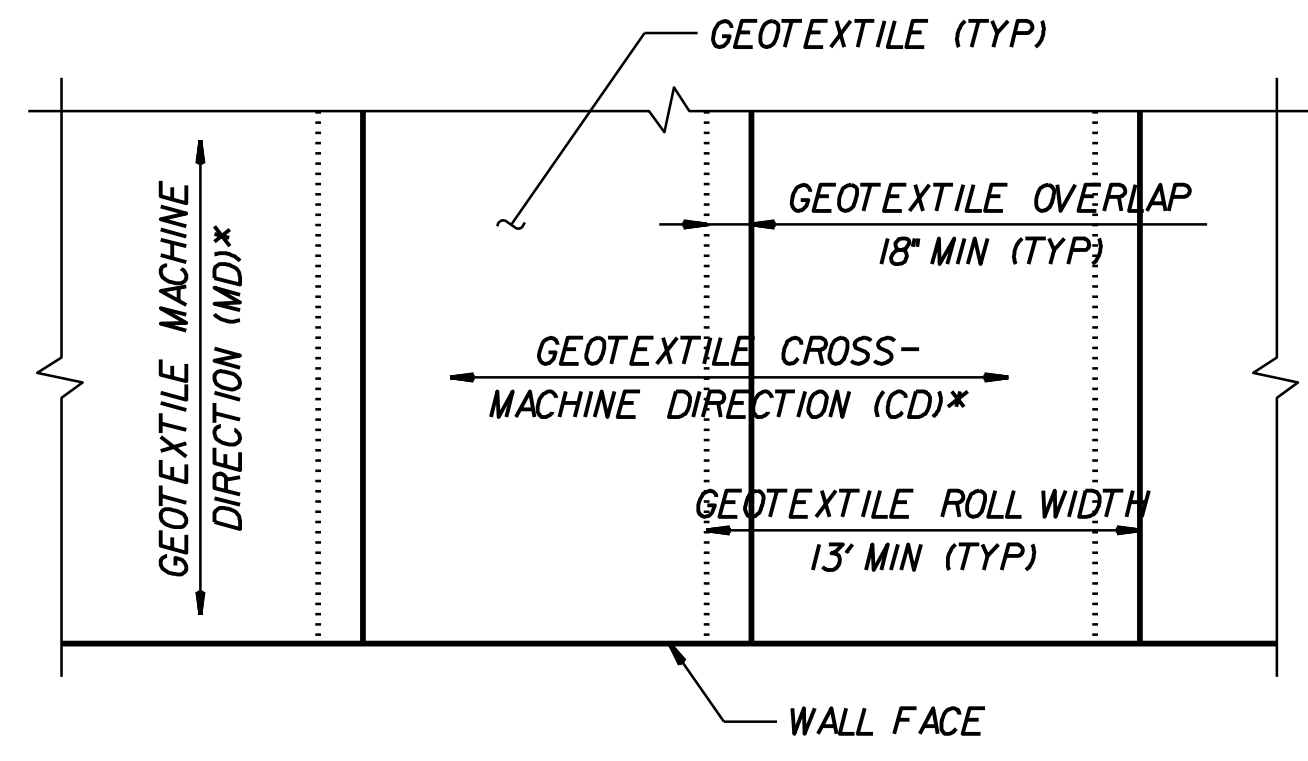


NORTH CAROLINA  
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**GEOTECHNICAL  
 ENGINEERING UNIT**

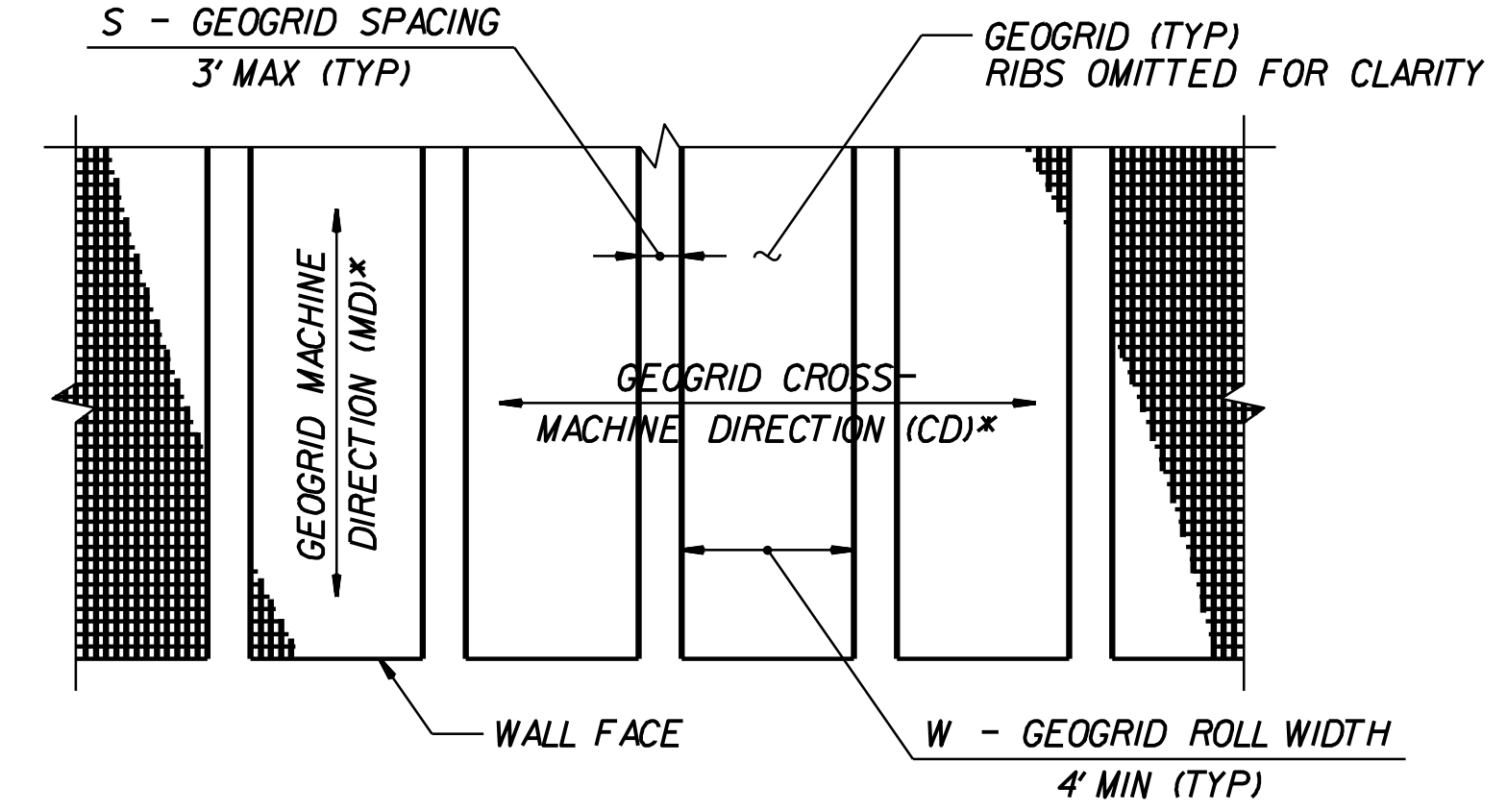
STANDARD DETAIL NO. 1801.02

STANDARD  
 TEMPORARY WALL  
 SHEET 1 OF 3



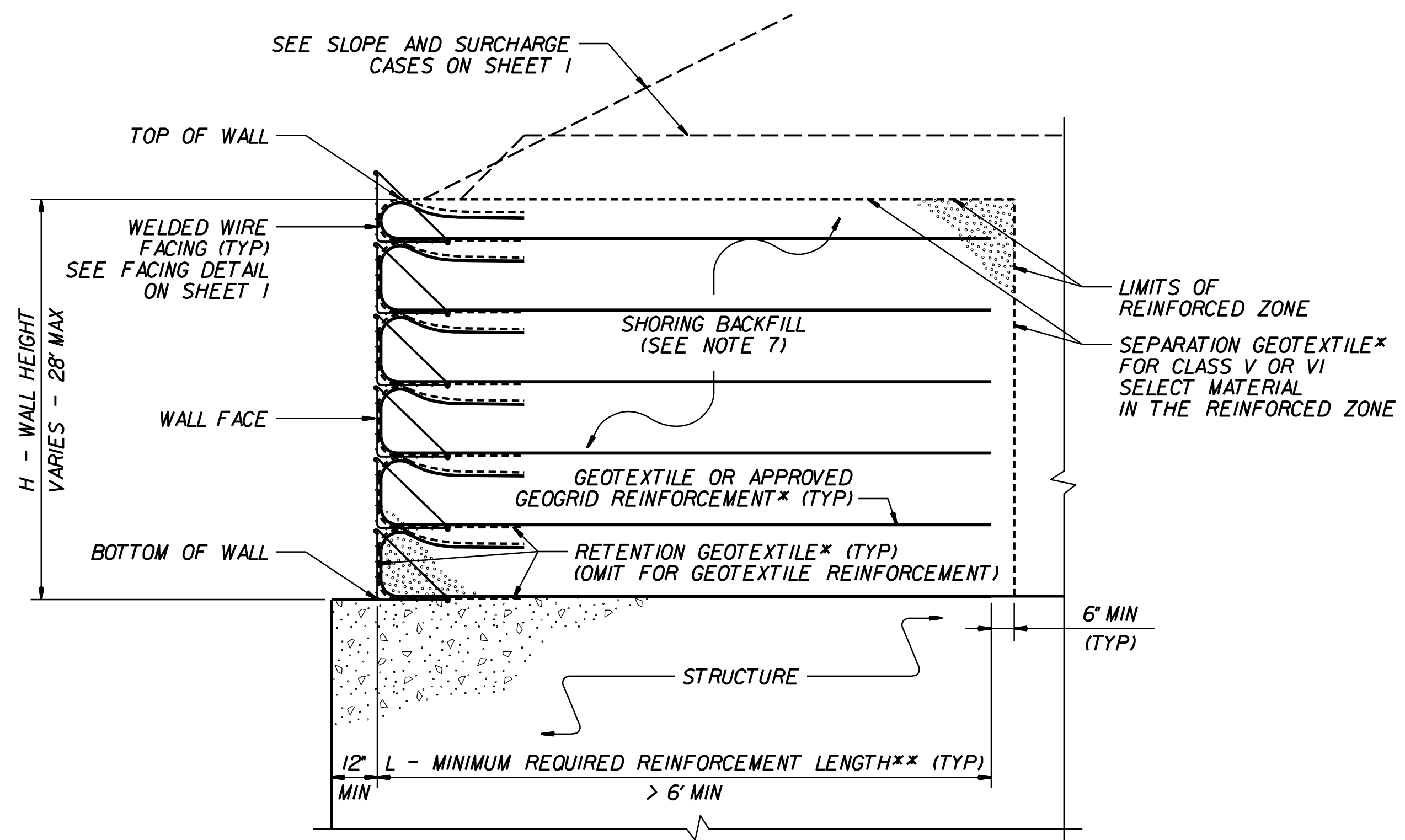


**GEOTEXTILE PLACEMENT**  
(100% COVERAGE MIN FOR GEOTEXTILE REINFORCEMENT)



**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.



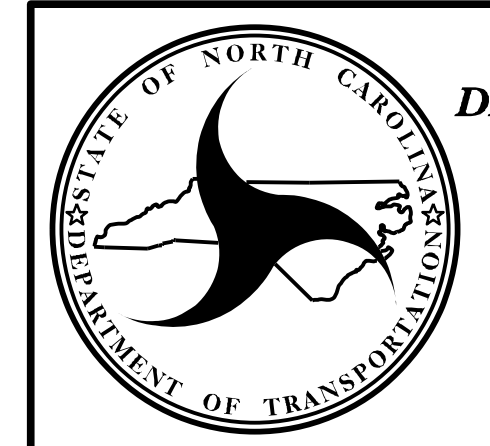
**TEMPORARY WALL ON STRUCTURE DETAIL**  
\*SEE GEOSYNTHETIC PLACEMENT DETAILS.  
\*\*SEE REINFORCEMENT TABLES ON SHEET 3.

**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](http://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 I 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)  $\geq$  (MINIMUM REQUIRED REINFORCEMENT LENGTH) + 4.5' AND  
- REINFORCEMENT STRENGTH IN CD  $\geq$  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](http://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.

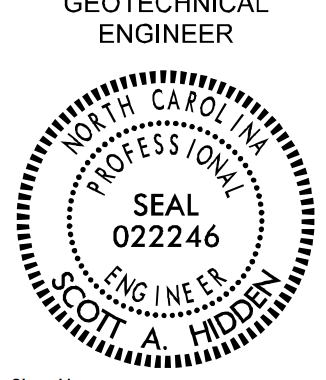


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DIVISION OF HIGHWAYS  
**GEOTECHNICAL  
ENGINEERING UNIT**

STANDARD DETAIL NO. 1801.02

STANDARD  
TEMPORARY WALL  
SHEET 2 OF 3



<b>PROJECT REFERENCE NO.</b> U-5839	<b>SHEET NO.</b> 2G-4
GEOTECHNICAL ENGINEER  SEAL 022246 SCOTT A. HADDEN ENGINEER	ENGINEER
DocuSigned by: Scott A. Hadden 03/01/2023 <small>DATE</small>	<small>SIGNATURE</small>
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	

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) + 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.

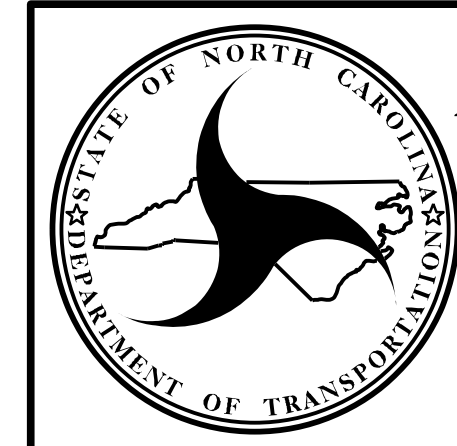
REINFORCEMENT LAYER NUMBER*	SHORING BACKFILL TYPE IN THE REINFORCED ZONE (SEE NOTE 7 ON SHEET 2)				
	SLOPE CASE		SURCHARGE CASE		
	CLASS II, TYPE I OR CLASS III SELECT MATERIAL	CLASS V SELECT MATERIAL	A-2-4 SOIL	CLASS II, TYPE I OR CLASS III SELECT MATERIAL	CLASS V SELECT MATERIAL
1	2400	2400	2400	2400	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.



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**GEOTECHNICAL  
ENGINEERING UNIT**

STANDARD DETAIL NO. 1801.02
STANDARD TEMPORARY WALL SHEET 3 OF 3
DATE: 11-19-13



