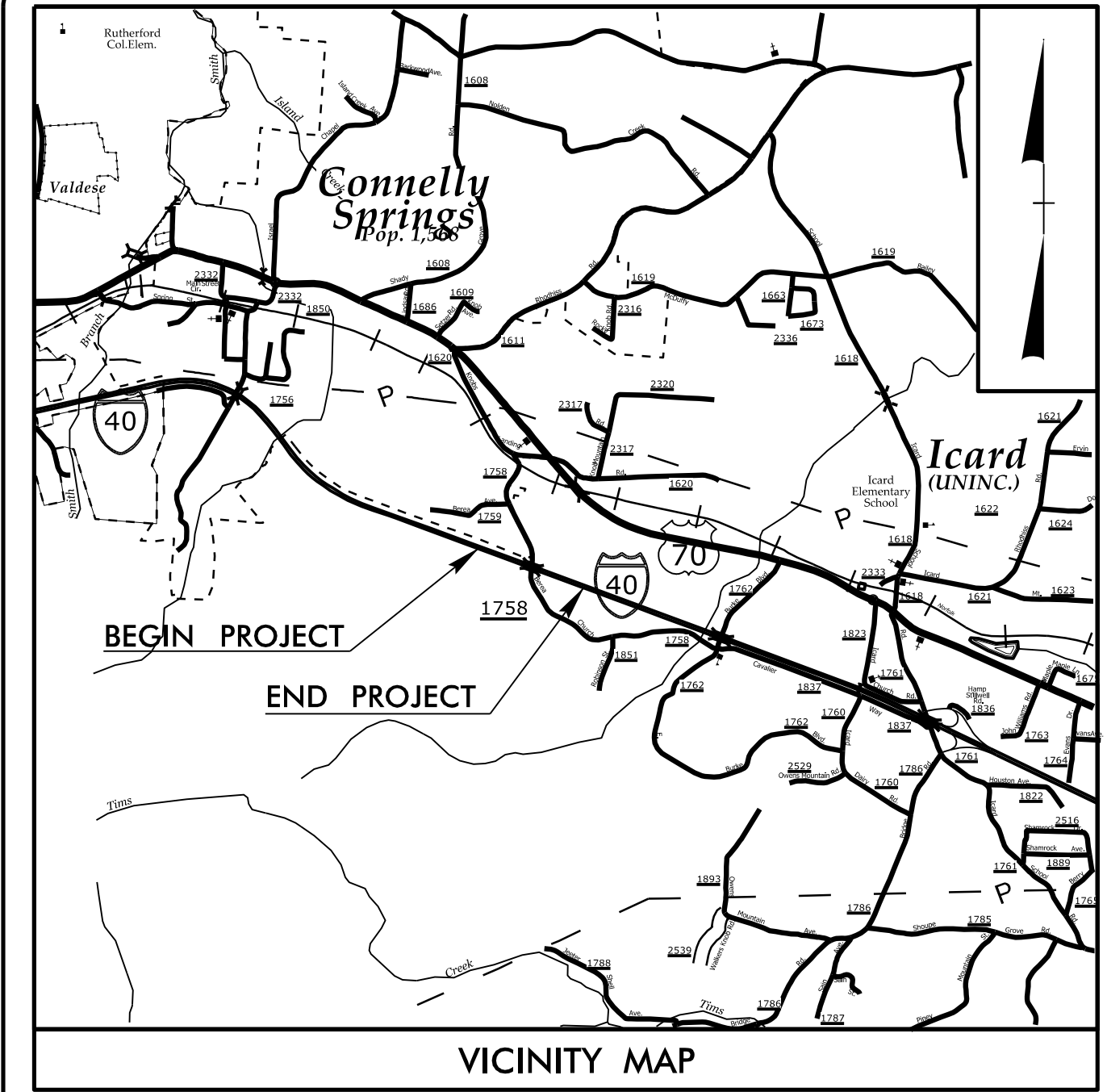


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09/08/199
T.I.P. PROJECT: B-4447



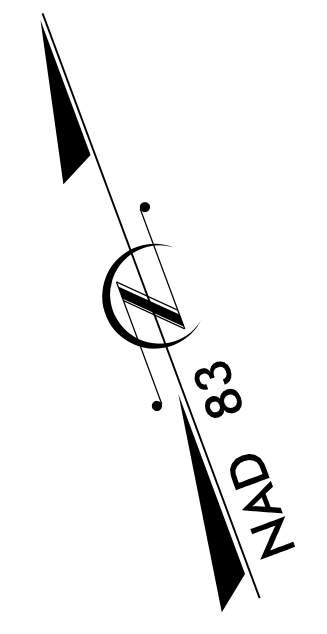
See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Symbols

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
BURKE COUNTY

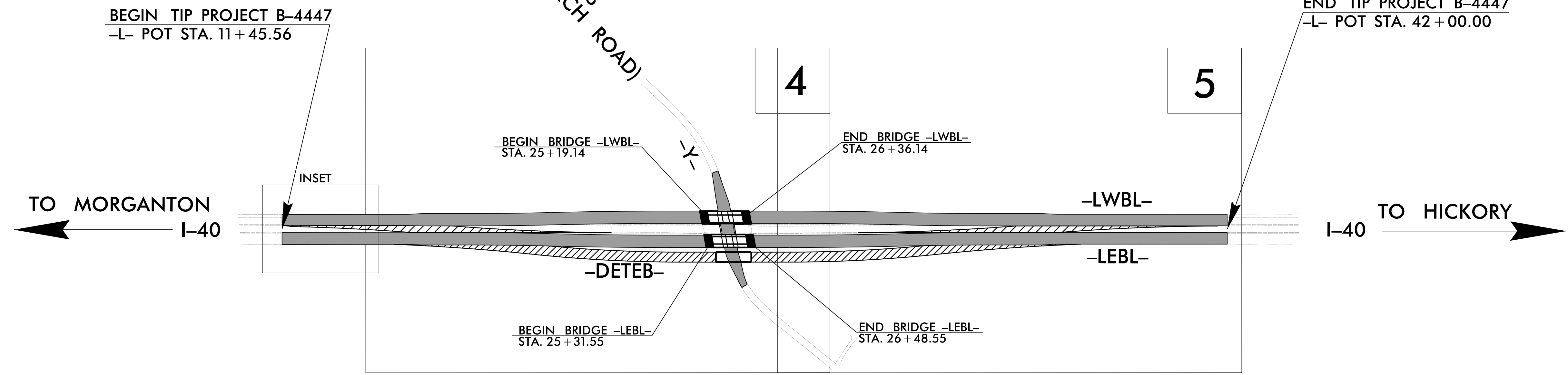
LOCATION: BRIDGE NOS. 160 & 162 ON I-40 OVER SR 1758
(BEREA CHURCH ROAD)

TYPE OF WORK: GRADING, DRAINAGE, PAVING, CULVERT, AND
STRUCTURES

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4447	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
38371.1.1	BRNHS-40-1(159)115	PE	
38371.2.1		ROW	
38371.2.2		UTILITY	
38371.3.1		CONSTRUCTION	

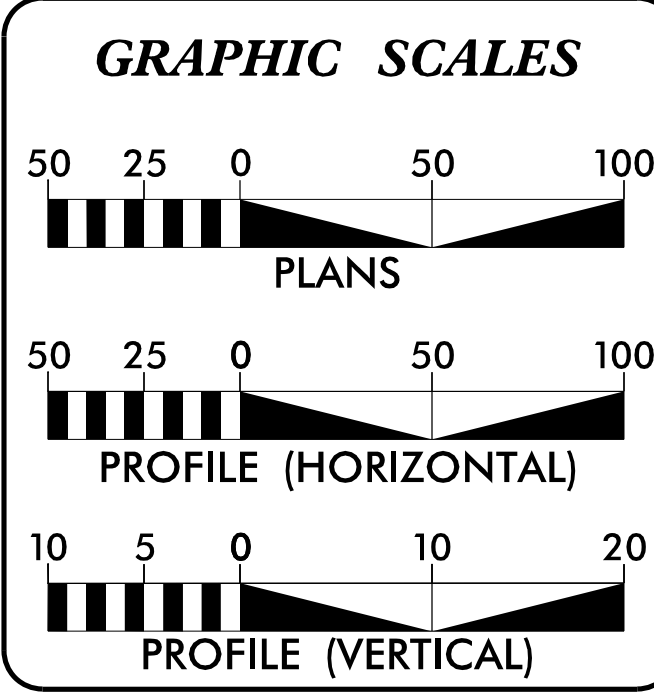


CONTRACT: C203935



THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED



DESIGN DATA

2017 ADT = 47,075
2037 ADT = 56,230
K = 55%
D = 9%
T = 15% *
V = 70 MPH
*(TTST 10% + DUAL 5%)
FUNC. CLASS. = INTERSTATE
STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4447	= 0.556 mi.
LENGTH STRUCTURES TIP PROJECT B-4447	= 0.022 mi.
TOTAL LENGTH TIP PROJECT B-4447	= 0.578 mi.
STRUCTURE LENGTH BASED ON -LEBL- BRIDGE	

Prepared in the Offices of:

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
DECEMBER 22, 2016

LETTING DATE:
JUNE 20, 2017

ANDY YOUNG, PE
PROJECT ENGINEER

MICHAEL BURNS, EI
PROJECT DESIGN ENGINEER

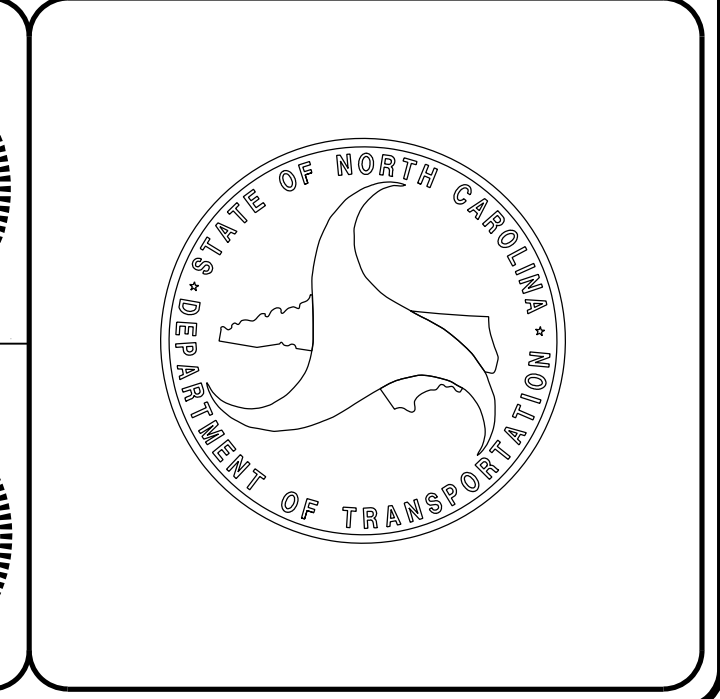
GARY R. LOVERING, PE
NCDOT CONTACT

HYDRAULICS ENGINEER

DocuSigned by: 5/18/2017
Ray D. Lovinggood
SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

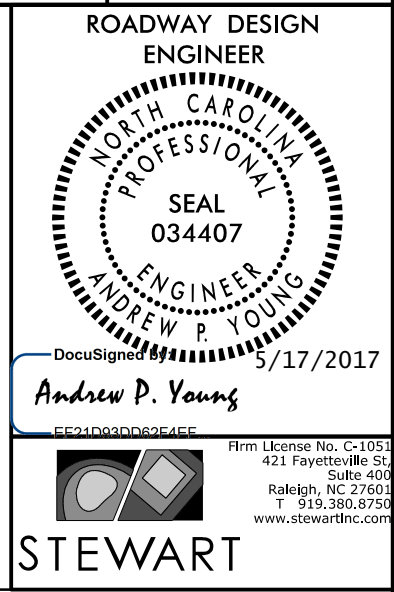
DocuSigned by: 5/17/2017
Andrew P. Young
SIGNATURE: P.E.



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

**INDEX OF SHEETS, GENERAL NOTES, AND LIST OF
STANDARD DRAWINGS**

PROJECT REFERENCE NO. B-4447	SHEET NO. 1A
---------------------------------	-----------------



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

EFF. 01-17-2012
REV. 02-29-2016

SHEET NUMBER	SHEET	2012 ROADWAY ENGLISH STANDARD DRAWINGS
1	TITLE SHEET	The following Roadway Standards as appear in "Roadway Standard Drawings" Highway Design Branch - N. C. Department of Transportation - Raleigh, N. C., Dated January, 2012 are applicable to this project and by reference hereby are considered a part of these plans:
1A	INDEX OF SHEETS, GENERAL NOTES, AND LIST OF STANDARD DRAWINGS	STD.NO. TITLE
1B	CONVENTIONAL SYMBOLS	DIVISION 2 - EARTHWORK 200.02 Method of Clearing - Method II 225.01 Guide for Grading Subgrade - Interstate and Freeway 225.02 Guide for Grading Subgrade - Secondary and Local 225.04 Method of Obtaining Super-elevation - Two Lane Pavement 225.05 Method of Obtaining Super-elevation - Divided Highways
1C-1 THRU 1C-2	SURVEY CONTROL DATA SHEETS	DIVISION 3 - PIPE CULVERTS 300.01 Method of Pipe Installation
2A-1 THRU 2A-4	PAVEMENT SCHEDULE, TYPICAL SECTIONS, AND WEDGING DETAILS	DIVISION 4 - MAJOR STRUCTURES 422.10 Reinforced Bridge Approach Fills
2B-1 THRU 2B-4	DETOUR PLAN SHEETS	DIVISION 5 - SUBGRADE, BASES AND SHOULDERS 560.01 Method of Shoulder Construction - High Side of Super-elevated Curve - Method I 560.02 Method of Shoulder Construction - High Side of Super-elevated Curve - Method II
2C-1	GUARDRAIL EXTRA LENGTH POST DETAIL	DIVISION 6 - ASPHALT BASES AND PAVEMENTS 654.01 Pavement Repairs 665.01 Asphalt Shoulders - Milled Rumble Strips
2C-2	TEMPORARY B-77 DETAIL	DIVISION 8 - INCIDENTALS 815.02 Subsurface Drain 838.01 Concrete Endwall for Single and Double Pipe Culverts - 15" thru 48" Pipe 90 Skew 838.11 Brick Endwall for Single and Double Pipe Culverts - 15" thru 48" Pipe 90 Skew 840.00 Concrete Base Pad for Drainage Structures 840.04 Concrete Open Throat Catch Basin - 12" thru 48" Pipe 840.05 Brick Open Throat Catch Basin - 12" thru 48" Pipe 840.18 Concrete Grated Drop Inlet Type 'B' - 12" thru 36" Pipe 840.20 Frames and Wide Slot Flat Grates 840.22 Frames and Wide 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 840.35 Traffic Bearing Grated Drop Inlet - for Cast Iron Double Frames and Grates 840.45 Precast Drainage Structure 840.46 Traffic Bearing Precast Drainage Structure 840.54 Manhole Frame and Cover 840.66 Drainage Structure Steps 840.72 Pipe Collar 846.01 Concrete Curb, Gutter and Curb & Gutter 846.04 Drop Inlet Installation in Shoulder Berm Gutter 862.01 Guardrail Placement 862.02 Guardrail Installation 862.03 Structure Anchor Units 862.04 Anchoring End of Guardrail - B-77 and B-83 Anchor Units 866.02 Woven Wire Fence - with Wood Post 876.01 Rip Rap in Channels 876.02 Guide for Rip Rap at Pipe Outlets
2C-3	NG 25 DETAIL	
2C-4	SLOTTED DRAIN DETAIL	
2C-5	TEMPORARY STEEL COVER DETAIL	
2C-6	GUIDE FOR PAVING SHOULDERS UNDER BRIDGES DETAIL	
2G-1 THRU 2G-4	TEMPORARY SHORING DETAILS	
3B-1	ROADWAY SUMMARIES	
3D-1 THRU 3D-2	DRAINAGE SUMMARY	
3G-1	GEOTECHNICAL SUMMARY	
3P-1	PARCEL INDEX SHEET	
4 THRU 5	PLAN SHEETS	
6 THRU 9	PROFILE SHEETS	
TMP-1 THRU TMP-14A	TRAFFIC MANAGEMENT PLANS	
PMP-1 THRU PMP-3	PAVEMENT MARKING PLANS	
EC-1 THRU EC-12	EROSION CONTROL PLANS	
RF-1	REFORESTATION PLAN	
SIGN-1 THRU SIGN-5	SIGNING PLANS	
UD-1 THRU UD-2	UTILITY BY OTHERS PLANS	
X-1A	CROSS-SECTION SUMMARY SHEET	
X-1 THRU X-36	CROSS-SECTIONS	
S01-1 THRU S01-28	STRUCTURE PLANS (-LWBL-)	
S02-1 THRU S02-28	STRUCTURE PLANS (-LEBL-)	
C-1 THRU C-6	CULVERT PLANS	

GENERAL NOTES: 2012 SPECIFICATIONS
EFFECTIVE: 01-17-2012
REVISED: 10-31-2014

GRADE LINE:
GRADING AND SURFACING:
THE GRADE LINES SHOWN DENOTE THE FINISHED ELEVATION OF THE PROPOSED SURFACING AT GRADE POINTS SHOWN ON THE TYPICAL SECTIONS. GRADE LINES MAY BE ADJUSTED AT THEIR BEGINNING AND ENDING AND AT STRUCTURES AS DIRECTED BY THE ENGINEER IN ORDER TO SECURE A PROPER TIE-IN.

CLEARING:
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD 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. 560.01 & STD. NO. 560.02.

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

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

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

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
Icard Township Water
ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

12/2/2016

BOUNDARIES AND PROPERTY:

State Line	-----
County Line	-----
Township Line	-----
City Line	-----
Reservation Line	-----
Property Line	-----
Existing Iron Pin	○ EP
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	-----
New Right of Way Line with Pin and Cap	-----
New Right of Way Line with Concrete or Granite RW Marker	-----
New Control of Access Line with Concrete CA Marker	-----
Existing Control of Access	-----
New Control of Access	-----
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.*)	----- 2UTL
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.

SURVEY CONTROL SHEET B-4447

FINAL

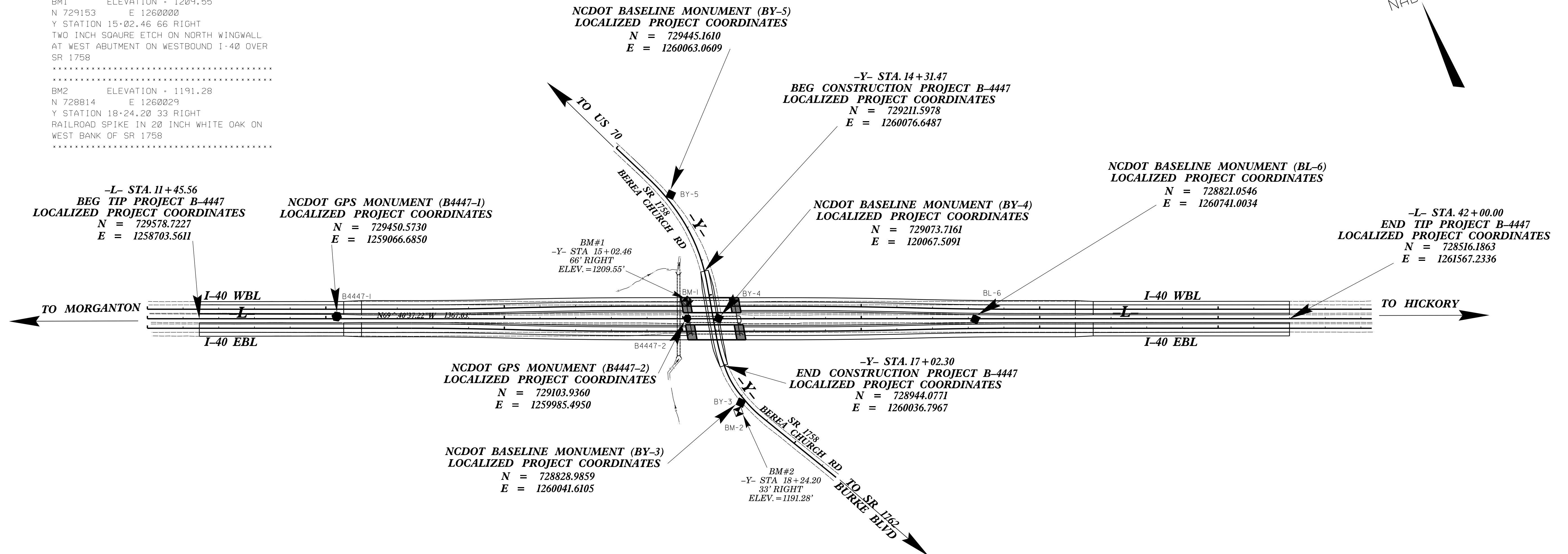
PROJECT REFERENCE NO.	SHEET NO.
B-4447	1C-1
Location and Surveys	

BL	POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
1	B4447-1		729450.5730	1259066.6850	1232.71	15+30.58	6.17 LT
2	B4447-2		729103.9360	1259985.4950	1209.43	25+12.59	0.81 LT
6	BL-6		728821.0546	1260741.0034	1203.81	33+19.32	1.59 RT

BY	POINT	DESC.	NORTH	EAST	ELEVATION	Y STATION	OFFSET
5	BY-5		729445.1610	1260063.0609	1168.48	11+99.14	14.80 LT
4	BY-4		729073.7161	1260067.5091	1183.74	15+68.79	14.55 LT
3	BY-3		728828.9859	1260041.6105	1193.32	18+14.61	15.91 RT

.....
 BM1 ELEVATION = 1209.55
 N 729153 E 1260000
 Y STATION 15+02.46 66 RIGHT
 TWO INCH SQUARE ETCH ON NORTH WINGWALL
 AT WEST ABUTMENT ON WESTBOUND I-40 OVER
 SR 1758

 BM2 ELEVATION = 1191.28
 N 728814 E 1260029
 Y STATION 18+24.20 33 RIGHT
 RAILROAD SPIKE IN 20 INCH WHITE OAK ON
 WEST BANK OF SR 1758



NOTES:

- THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:
[HTTP://WWW.DOH.DOT.STATE.NC.US/PRECONSTRUCTHIGHWAY/LOCATION/PROJECT/](http://www.doh.dot.state.nc.us/preconstructhighway/location/project/)
 THE FILES TO BE FOUND ARE AS FOLLOWS:
 B4447_LS_CONTROL.TXT
 SITE CALIBRATION INFORMATION HAS NOT BEEN PROVIDED FOR THIS PROJECT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.
- INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.
 PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.
 NETWORK ESTABLISHED FROM NGS ONLINE POSITIONING SERVICE (OPUS)

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B4447-2" WITH NAD 83 STATE PLANE GRID COORDINATES OF
 NORTHING: 729103.9360(fft) EASTING: 1259985.4950(fft)
 ELEVATION: 1209.43(fft)
 THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.999856593
 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B4447-2" TO -L- STATION 11+45.56 IS
 N69°40'37.22"W 1367.03'
 ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
 VERTICAL DATUM USED IS NAVD 88

NOTE: DRAWING NOT TO SCALE

5/8/2017 10:51:00 AM N:\Proje\B4447.LS.1C-1.dgn

SURVEY CONTROL SHEET B-4447 FINAL

PROJECT REFERENCE NO. B-4447	SHEET NO. 1C-2
Location and Surveys	

(DESIGN ALIGNMENTS)

L			
TYPE	STATION	NORTH	EAST
POT	10+00.00	729629.3581	1258567.0922
POT	44+30.21	728436.1046	1261783.0641

LEBL			
TYPE	STATION	NORTH	EAST
POT	10+00.00	729604.2788	1258557.7868
PC	17+40.23	729346.7788	1259251.7825
PRC	20+14.03	729248.2584	1259507.2378
PT	23+85.07	729114.7494	1259853.4156
PC	27+85.07	728975.6029	1260228.4333
PRC	31+56.11	728850.9950	1260577.9137
PT	34+29.91	728759.0430	1260835.8062
POT	44+30.35	728411.0247	1261773.7603

(PERMANENT EASEMENTS)

PERMANENT EASEMENTS IRON PIN AND CAP				
ALIGN	STATION	OFFSET	NORTH	EAST
L	16+60.00	130.00	729277.8857	1259140.6488
L	16+60.00	150.00	729259.1348	1259133.6915
L	17+35.00	150.00	729233.0448	1259204.0073
L	17+50.00	130.00	729246.5777	1259225.0278
L	17+50.00	140.00	729237.2023	1259221.5491
L	24+45.00	130.00	729004.8107	1259876.6210
L	24+45.00	152.13	728984.0628	1259868.9227
L	24+91.61	150.15	728969.7063	1259913.3150
L	25+15.00	130.00	728980.4601	1259942.2491
L	25+15.00	150.36	728961.3741	1259935.1674

NOTES:

1. THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:
[HTTP://WWW.DOH.DOT.STATE.NC.US/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/](http://www.doh.dot.state.nc.us/preconstruct/highway/location/project/)

THE FILES TO BE FOUND ARE AS FOLLOWS:
[B4447_LS_CONTROL.TXT](#)

SITE CALIBRATION INFORMATION HAS NOT BEEN PROVIDED FOR THIS PROJECT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.
- INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.
PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.
NETWORK ESTABLISHED FROM NGS ONLINE POSITIONING SERVICE (OPUS)

(DESIGN ALIGNMENTS)

LWBL			
TYPE	STATION	NORTH	EAST
POT	10+00.00	729654.4374	1258576.3976
PC	17+40.23	729396.9374	1259270.3934
PRC	20+14.03	729304.9854	1259528.2858
PT	23+85.07	729180.3775	1259877.7662
PC	27+85.07	729041.2310	1260252.7839
PRC	31+56.11	728907.7220	1260598.9617
PT	34+29.91	728809.2016	1260854.4170
POT	44+30.35	728461.1834	1261792.3711

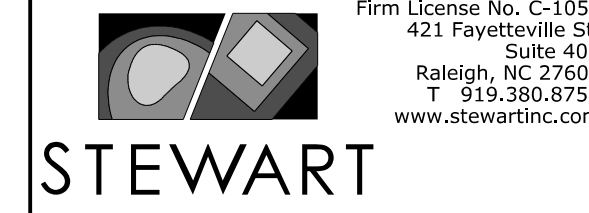
Y			
TYPE	STATION	NORTH	EAST
POT	10+00.00	729620.7057	1259965.0706
PC	11+26.19	729507.5542	1260020.9434
PT	12+76.26	729365.9978	1260069.4945
PC	12+77.50	729364.7764	1260069.7448
PT	14+64.68	729178.7481	1260071.8197
PC	16+22.08	729023.8845	1260043.6645
PT	16+97.23	728949.1509	1260036.8120
PC	17+12.88	728933.4946	1260036.7646
PT	17+99.04	728849.0128	1260051.3256
PC	18+21.27	728828.0861	1260058.8316
PT	18+81.33	728773.7916	1260084.2946
POT	21+51.39	728541.1474	1260221.4365

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B4447-2"
WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING: 729103.9360(±) EASTING: 1259985.4950(±)
ELEVATION: 1209.43(±)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.999856593
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B4447-2" TO -L- STATION 11+45.56 IS
N69°40'37.22"W 1367.03'
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

NOTE: DRAWING NOT TO SCALE

6/2/09



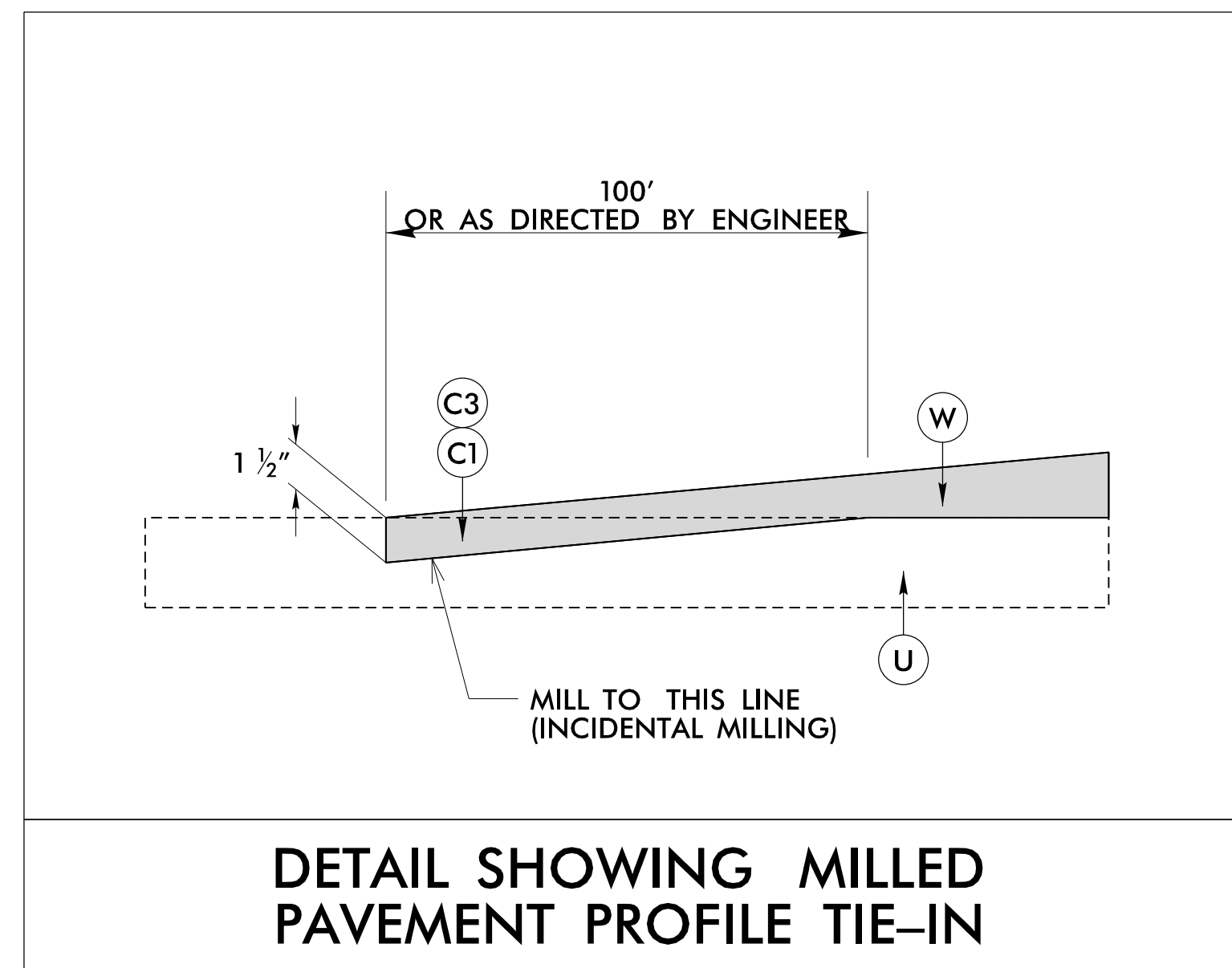
Firm License No. C-1051
421 Fayetteville St.
Suite 400
Raleigh, NC 27601
T 919.380.8750
www.stewartinc.com

PROJECT REFERENCE NO. B-4447	SHEET NO. 2A-1
ROADWAY DESIGN ENGINEER ANDREW P. YOUNG SEAL 034407 5/15/2017	PAVEMENT DESIGN ENGINEER CLARK MORRISON SEAL 22896 5/17/2017

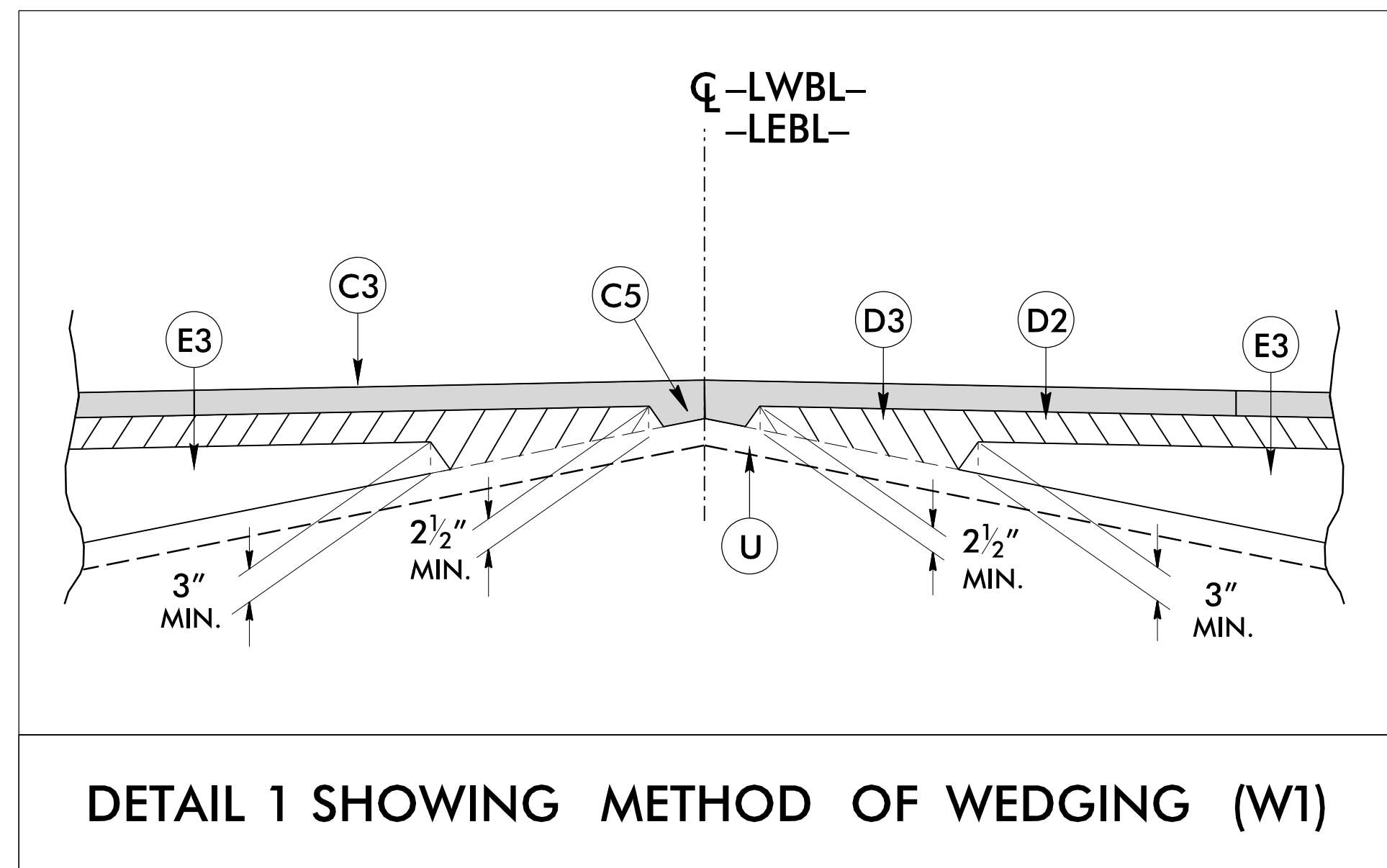
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT SCHEDULE (FINAL)			
C1	PROP. APPROX. 1 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 165 LBS. PER SQ. YD.	E3	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 1/2" IN DEPTH.
C2	PROP. APPROX. 1 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.	E4	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
C3	PROP. APPROX. 1 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5D, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.	J	PROP. 8" AGGREGATE BASE COURSE.
C4	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5D, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	M	MILLED RUMBLE STRIPS (SEE STANDARD 665.01 AND PLANS FOR LOCATIONS)
C5	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5D, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 2" IN DEPTH.	RI	SHOULDER BERM GUTTER
D1	PROP. APPROX. 3" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YD.	T	EARTH MATERIAL.
D2	PROP. APPROX. 3 1/2" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0D, AT AN AVERAGE RATE OF 399 LBS. PER SQ. YD.	U	EXISTING PAVEMENT.
D3	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0D, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2 1/2" IN DEPTH OR GREATER THAN 4" IN DEPTH.	V	MILLING BITUMINOUS PAVEMENT. 1.5" DEPTH.
E1	PROP. APPROX. 5" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 570 LBS. PER SQ. YD.	W1	VARIABLE DEPTH ASPHALT PAVEMENT (SEE STANDARD WEDGING DETAIL 1)
E2	PROP. APPROX. 15" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 570 LBS. PER SQ. YD. IN EACH OF THREE LAYERS.	W2	VARIABLE DEPTH ASPHALT PAVEMENT (SEE STANDARD WEDGING DETAIL 2)

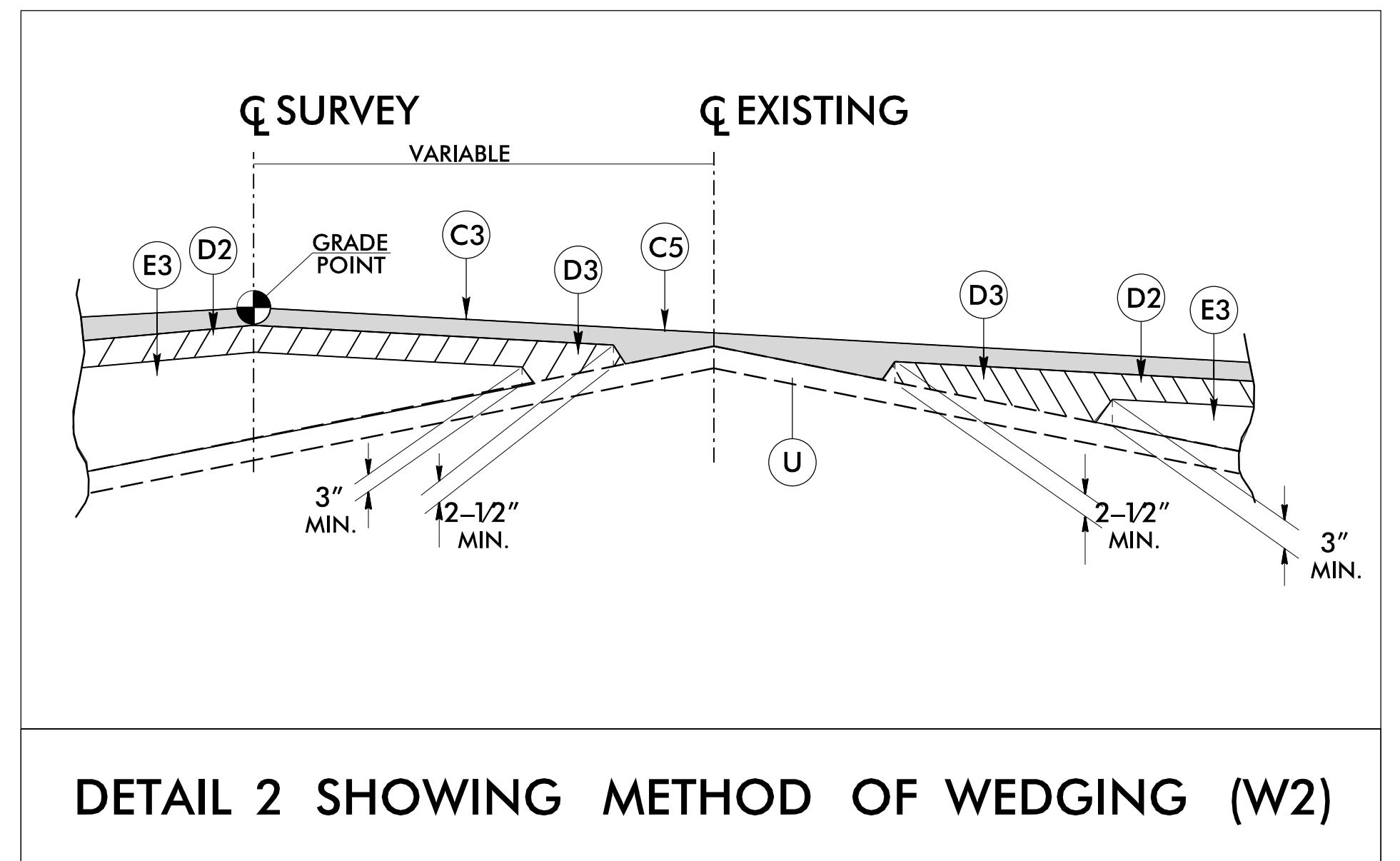
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



DETAIL SHOWING MILLED PAVEMENT PROFILE TIE-IN



DETAIL 1 SHOWING METHOD OF WEDGING (W1)



DETAIL 2 SHOWING METHOD OF WEDGING (W2)

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6/2/09

PAVEMENT SCHEDULE
(FINAL PAVEMENT DESIGN)

C3	1 1/2" S9.5D
C4	3" S9.5D
D2	3 1/2" I19.0D
E2	15" B25.0C
M	MILLED RUMBLE STRIPS
T	EARTH MATERIAL
U	EXIST. PAVEMENT
WI	WEDGING (DETAIL 1)

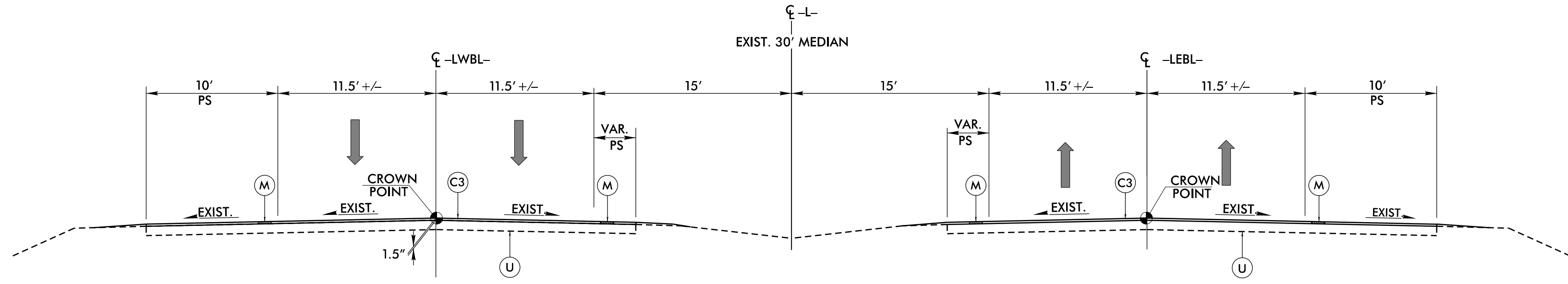
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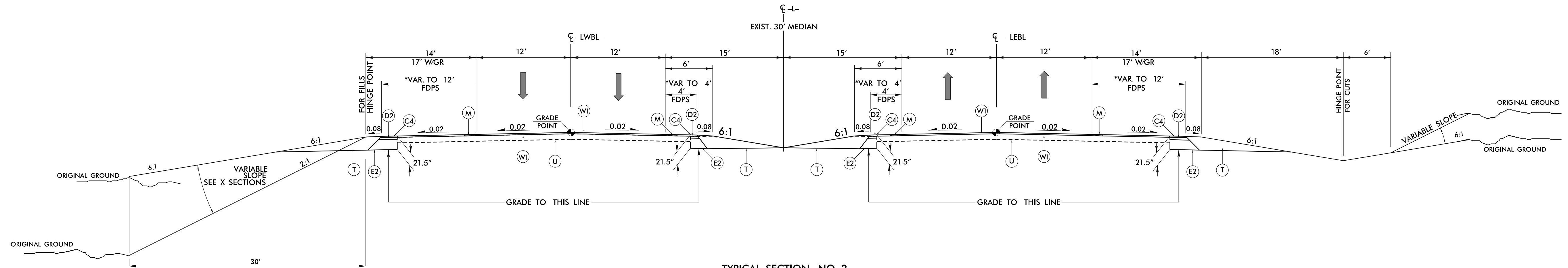
Firm License No. C-1051
421 Fayetteville St.
Suite 400
Raleigh, NC 27601
T 919.380.8750
www.stewartinc.com

PROJECT REFERENCE NO. B-4447	SHEET NO. 2A-2
ROADWAY DESIGN ENGINEER ANDREW P. YOUNG SEAL 034407 DocuSigned by: Andrew P. Young 5/15/2017	PAVEMENT DESIGN ENGINEER CLARK MORRISON SEAL 22896 DocuSigned by: Clark Morrison 5/17/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



TYPICAL SECTION NO. 1
 -LWBL- & -LEBL- STA. 11+45.56 TO 15+50.00
 -LWBL- & -LEBL- STA. 36+50.00 TO 42+00.00



TYPICAL SECTION NO. 2
 -LWBL- & -LEBL- STA. 15+50.00 TO 17+40.23
 -LWBL- & -LEBL- STA. 34+29.91 TO 36+50.00

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6/2/2017

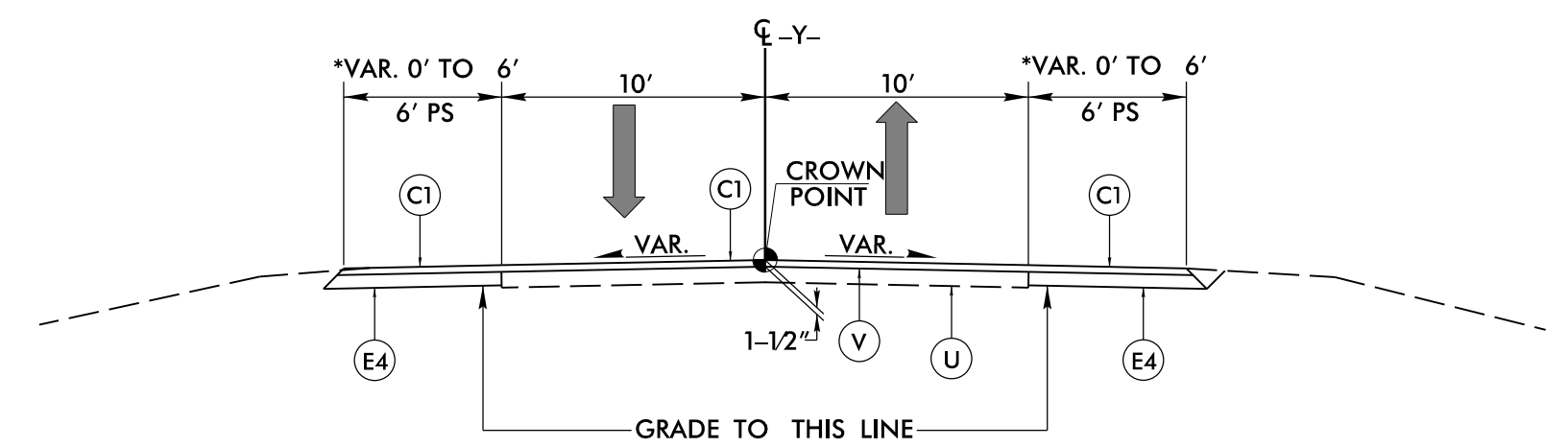
PAVEMENT SCHEDULE (FINAL PAVEMENT DESIGN)	
C1	1 1/2" SF9.5A
C2	1 1/2" S9.5C
D1	3" I19.0C
E1	5" B25.0C
E4	4" B25.0C
J	8" ABC
M	RUMBLE STRIPS
T	EARTH MATERIAL
U	EXIST. PAVEMENT
V	1 1/2" MILLING

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

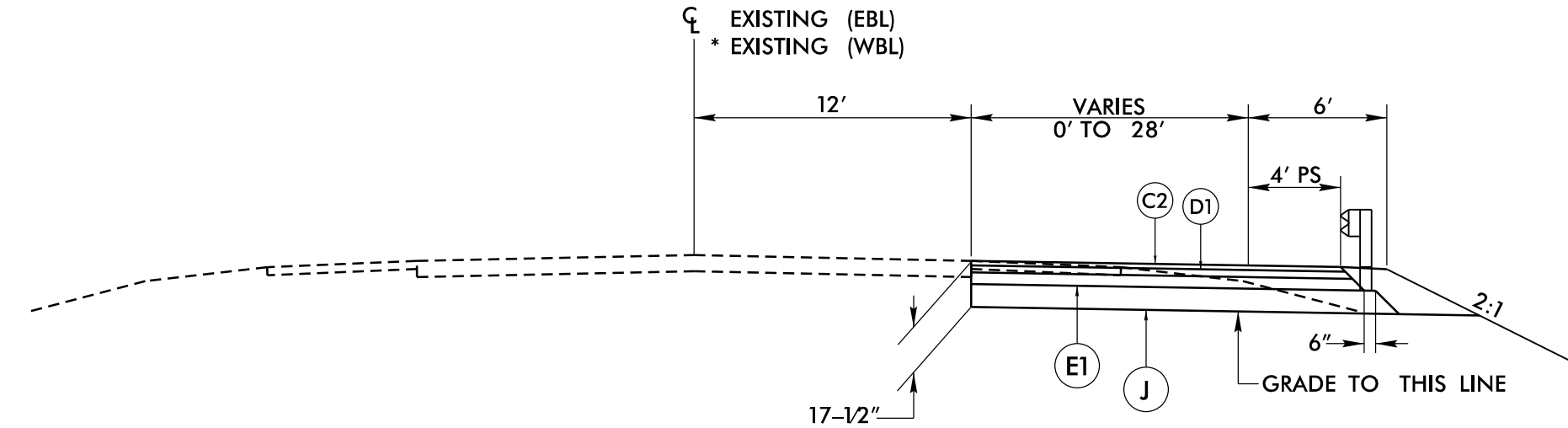


PROJECT REFERENCE NO. B-4447	SHEET NO. 2A-4
ROADWAY DESIGN ENGINEER ANDREW P. YOUNG SEAL 034407 DocuSigned by: Andrew P. Young 5/15/2017	PAVEMENT DESIGN ENGINEER CLARK MORRISON SEAL 22896 DocuSigned by: Clark Morrison 5/17/2017

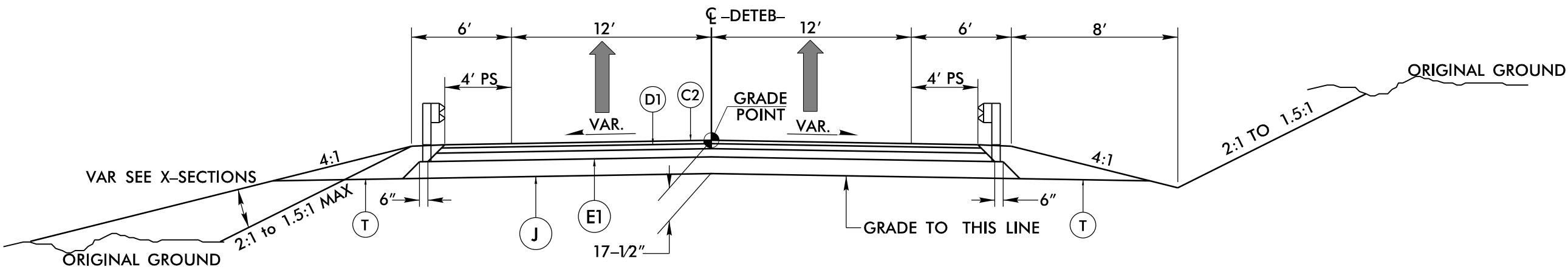
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



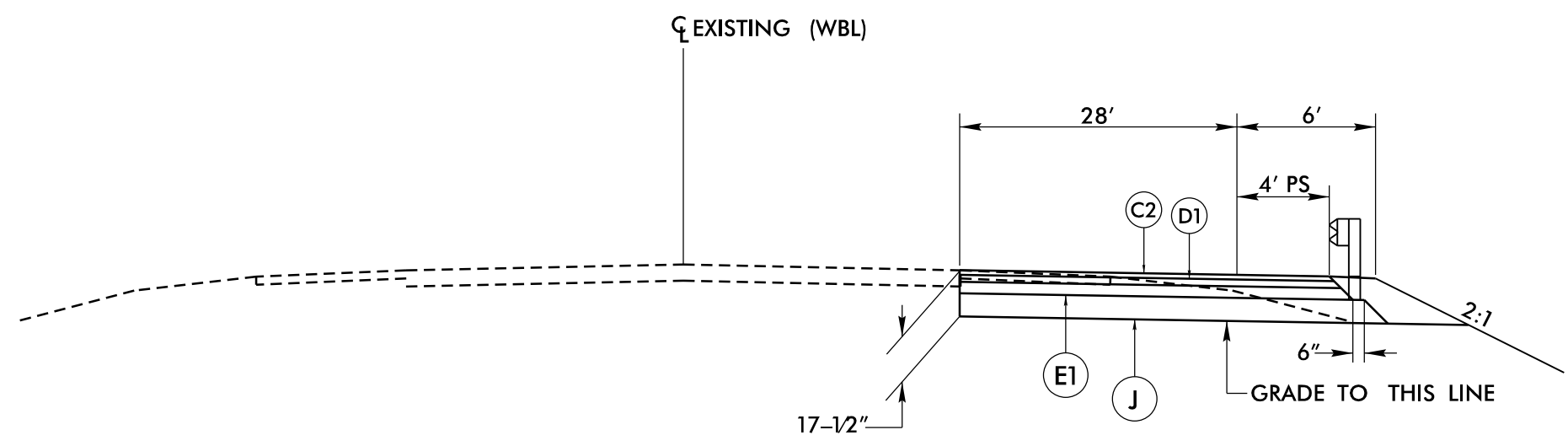
TYPICAL SECTION NO. 5
 *-Y- STA. 14+31.47 TO -Y- STA. 14+79.47
 -Y- STA. 14+79.47 TO -Y- STA. 16+54.30
 *-Y- STA. 16+54.30 TO -Y- STA. 17+02.30



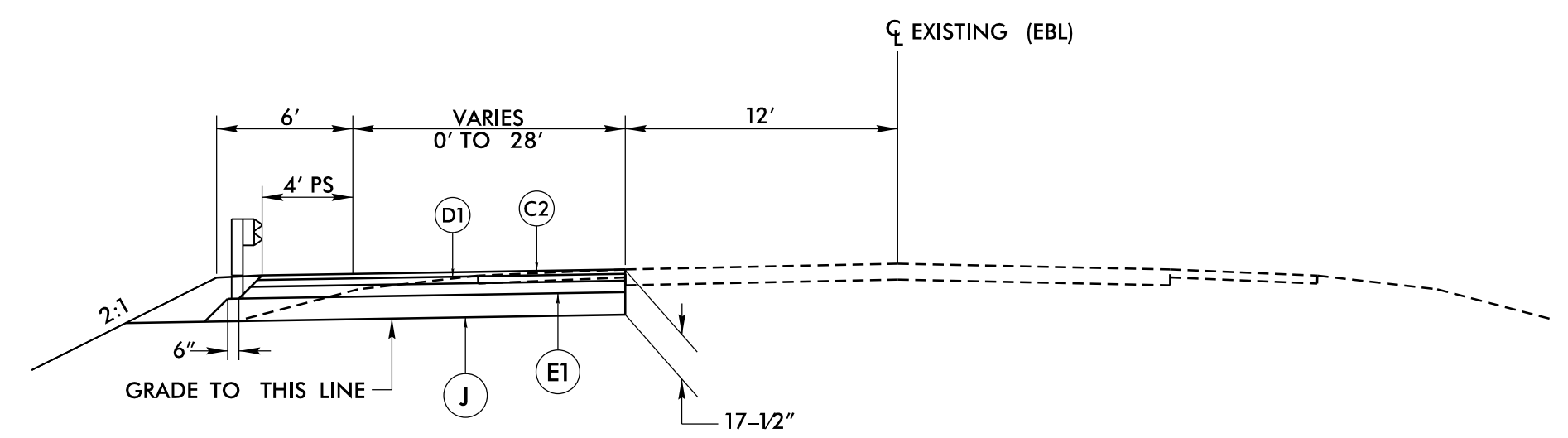
TYPICAL SECTION NO. 6
 -DETEB- STA. 12+18.44 TO -DETEB- STA. 17+99.67
 -DETEB- STA. 34+33.89 TO -DETEB- STA. 40+85.80
 * -DETWB- STA. 11+45.80 TO -DETWB- STA. 15+35.27
 * -DETWB- STA. 36+51.00 TO -DETWB- STA. 42+00.00



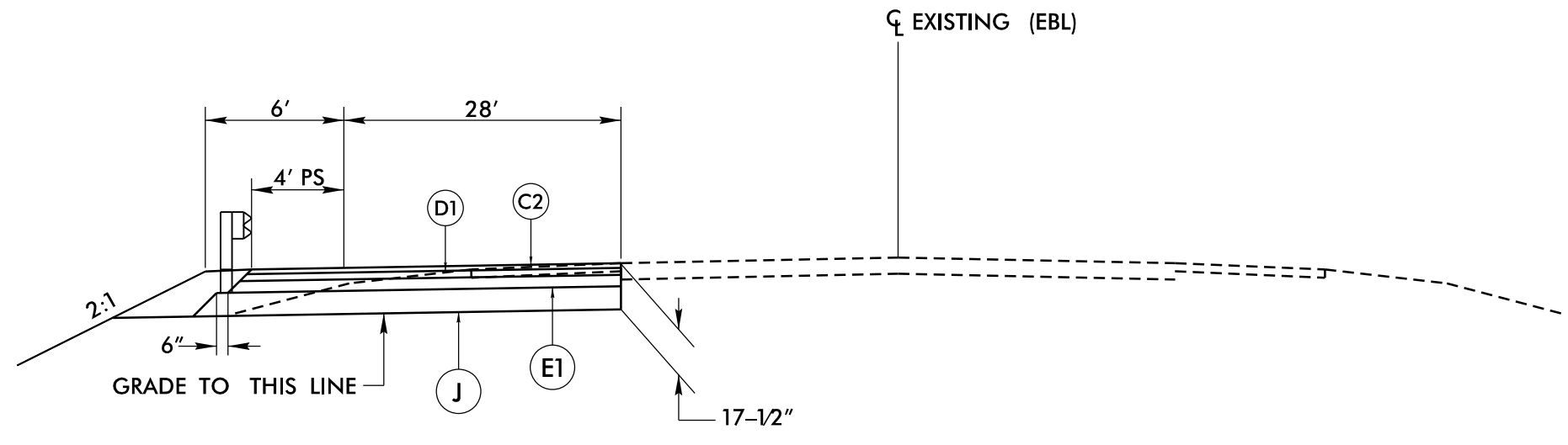
TYPICAL SECTION NO. 7
 -DETEB- STA. 17+99.67 TO -DETEB- STA. 25+52 +/- (BEGIN BRIDGE)
 -DETEB- STA. 26+57 +/- (END BRIDGE) TO -DETEB- STA. 34+33.89



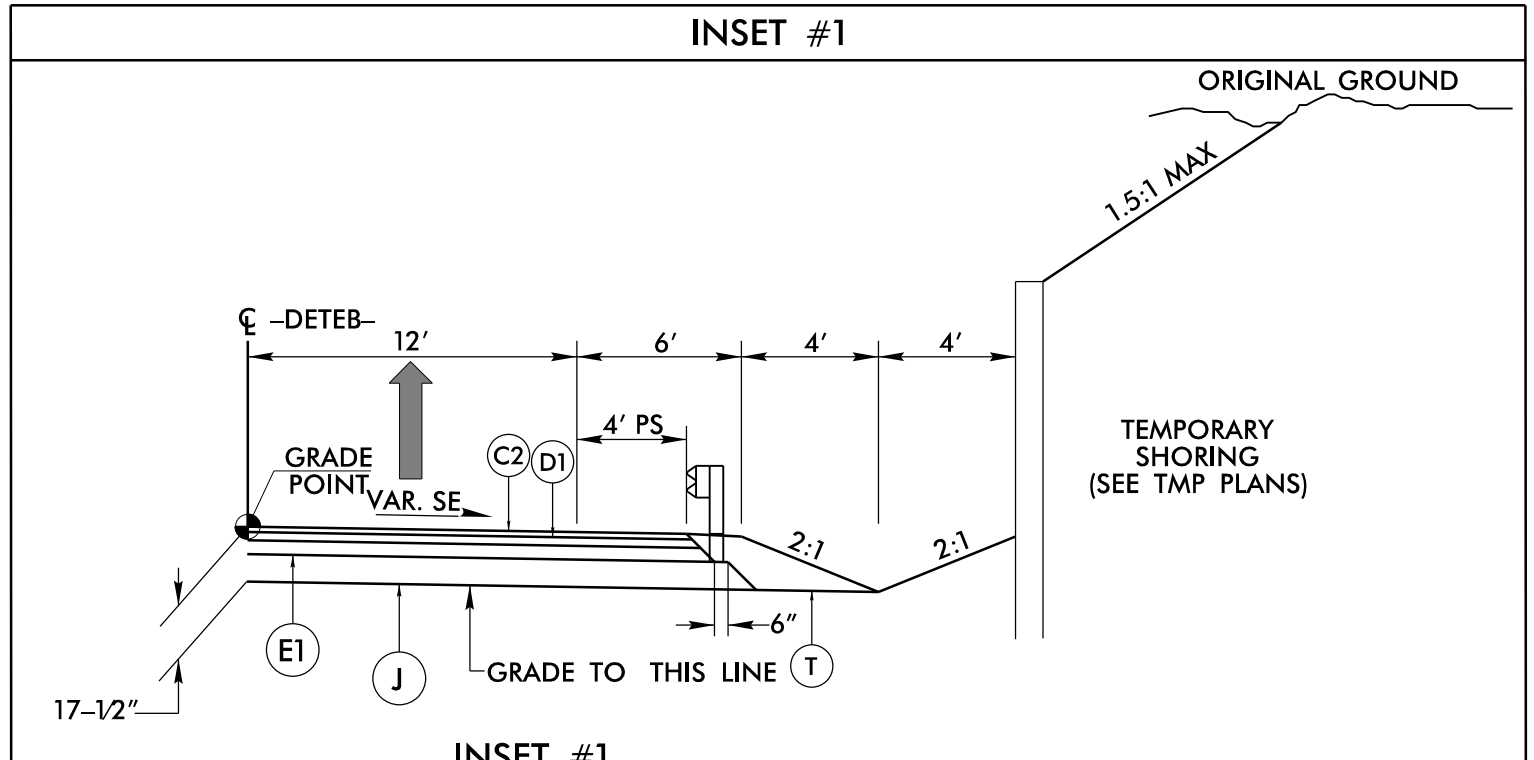
TYPICAL SECTION NO. 8
 -DETWB STA. 15+35.27 TO -DETWB STA. 16+41.19



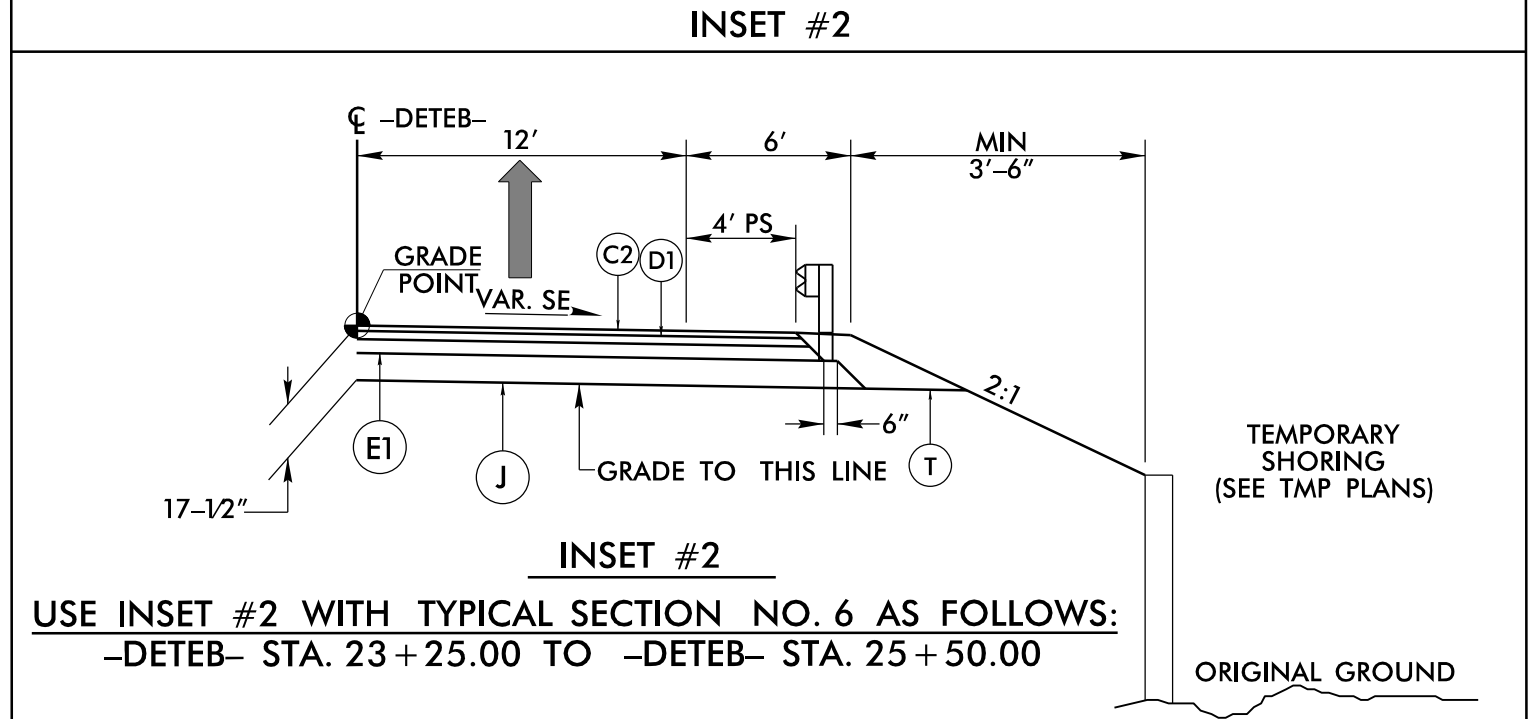
TYPICAL SECTION NO. 9
 -DETWB STA. 16+41.19 TO -DETWB STA. 22+01.45
 -DETWB- STA. 30+07.34 TO -DETWB- STA. 35+78.15



TYPICAL SECTION NO. 10
 -DETWB- STA. 35+78.15 TO -DETWB- STA. 36+51.00



INSET #1
 USE INSET #1 WITH TYPICAL SECTION NO. 6 AS FOLLOWS:
 -DETEB- STA. 19+50.00 TO -DETEB- STA. 21+50.00



INSET #2
 USE INSET #2 WITH TYPICAL SECTION NO. 6 AS FOLLOWS:
 -DETEB- STA. 23+25.00 TO -DETEB- STA. 25+50.00

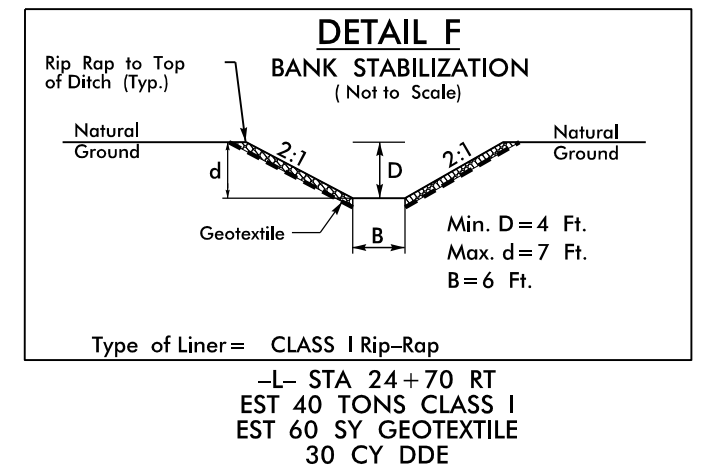
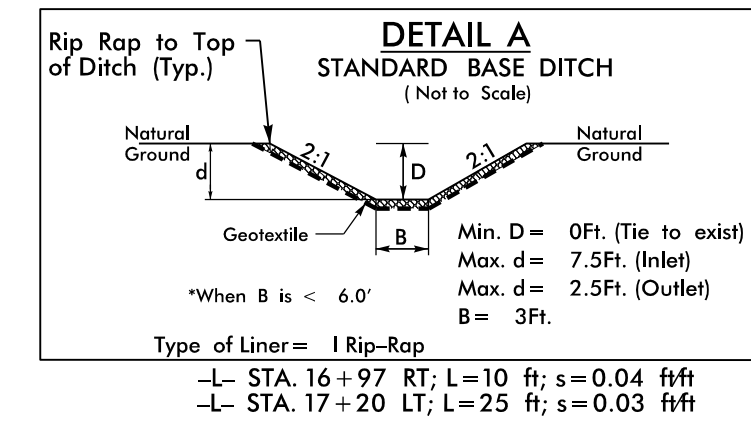
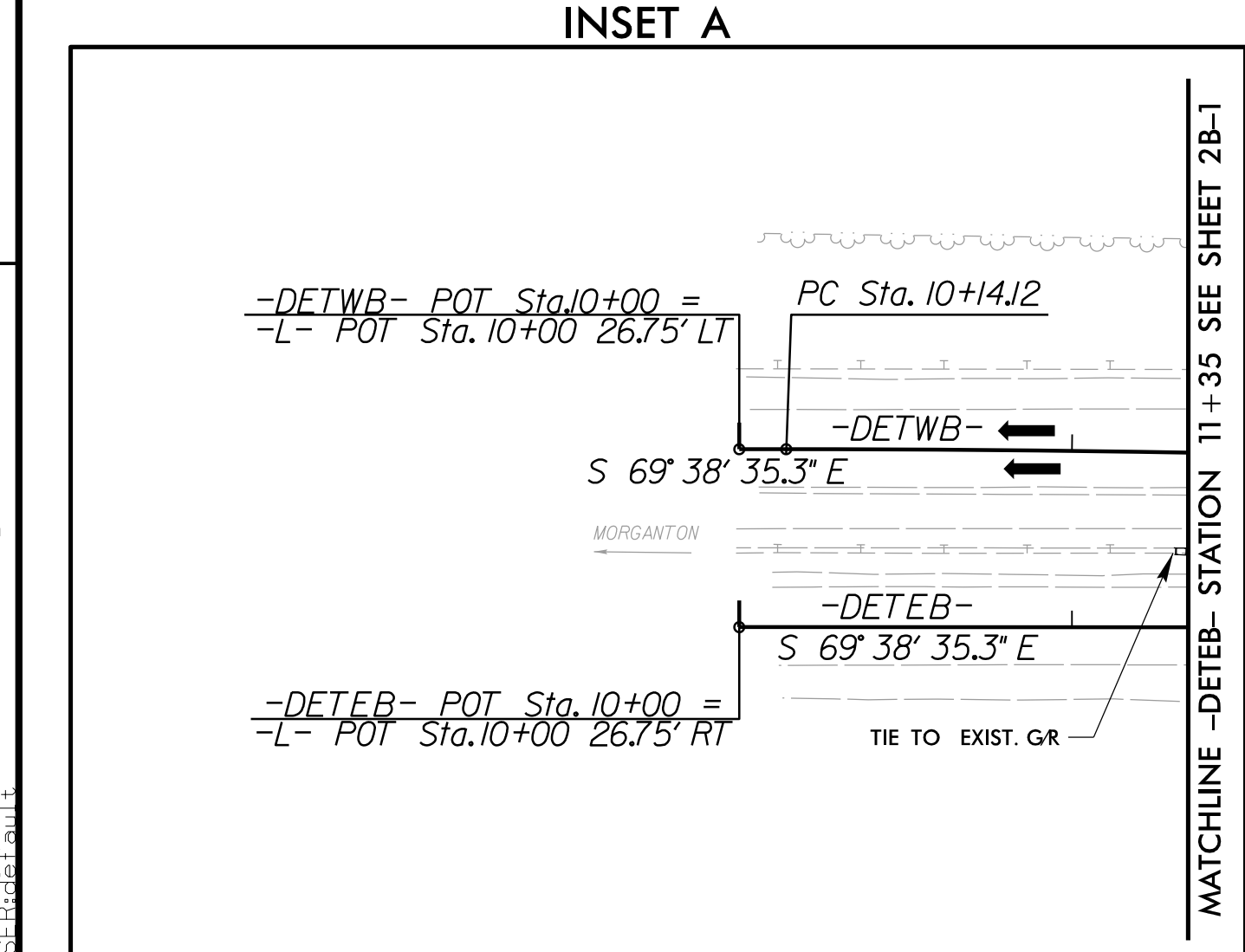
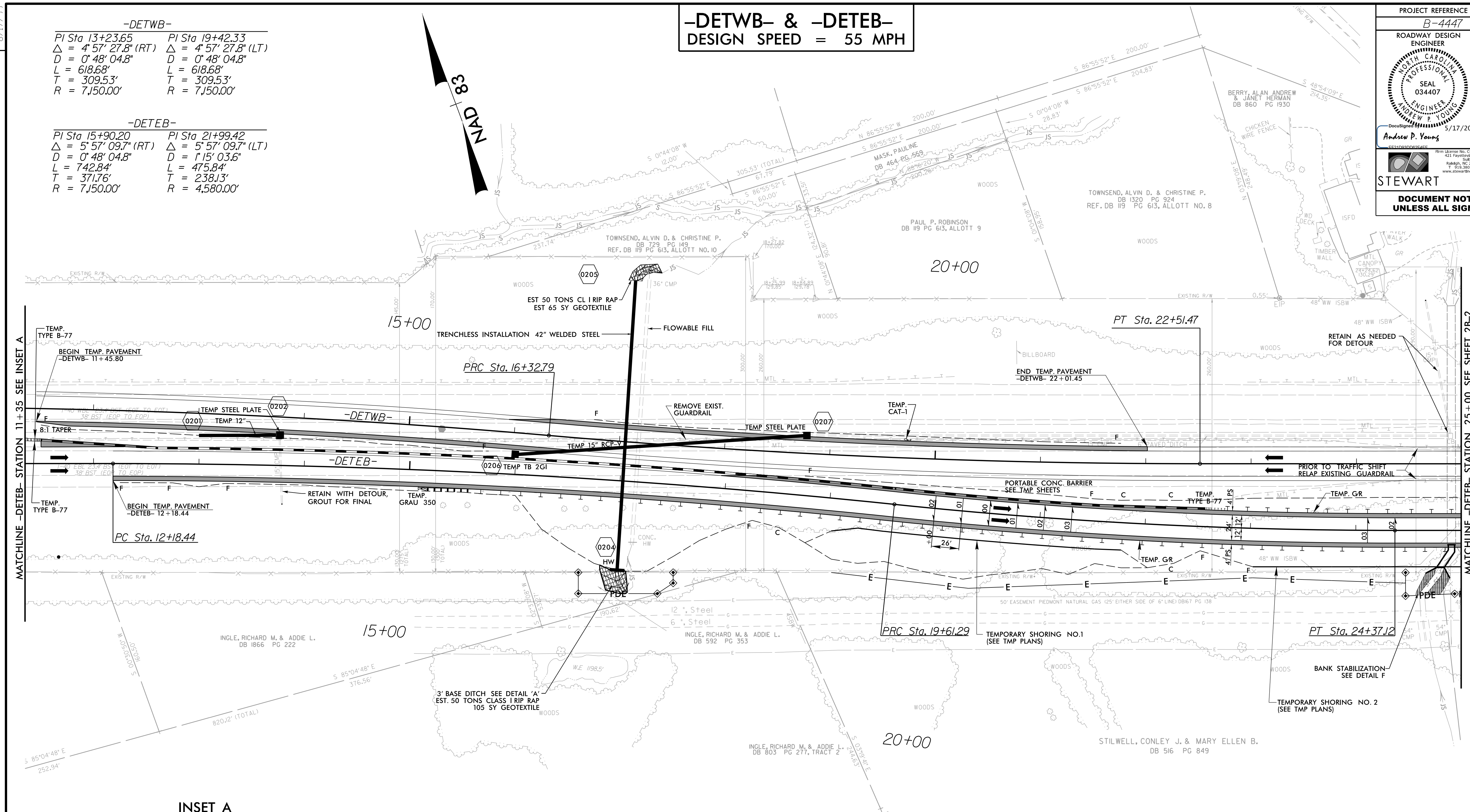
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**-DETWB- & -DETEB-
DESIGN SPEED = 55 MPH**

PROJECT REFERENCE NO. B-4447	SHEET NO. 2B-1
ROADWAY DESIGN ENGINEER ANDREW P. YOUNG SEAL 034407 5/17/2017	HYDRAULICS ENGINEER RAY D. LORINGGOOD SEAL 019775 5/18/2017
STEWART	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

-DETWB-
 PI Sta 13+23.65 PI Sta 19+42.33
 $\Delta = 4^{\circ} 57' 27.8''$ (RT) $\Delta = 4^{\circ} 57' 27.8''$ (LT)
 D = 0' 48" 04.8" D = 0' 48" 04.8"
 L = 618.68' L = 618.68'
 T = 309.53' T = 309.53'
 R = 7,150.00' R = 7,150.00'

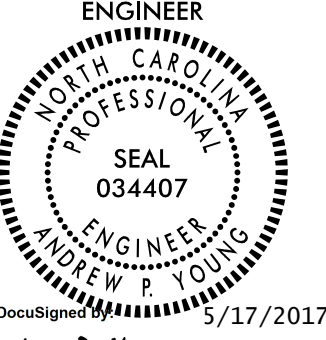
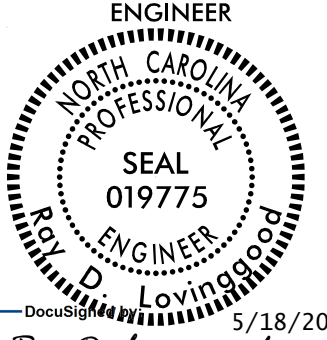

-DETEB-
 PI Sta 15+90.20 PI Sta 21+99.42
 $\Delta = 5^{\circ} 57' 09.7''$ (RT) $\Delta = 5^{\circ} 57' 09.7''$ (LT)
 D = 0' 48" 04.8" D = 1' 15" 03.6"
 L = 742.84' L = 475.84'
 T = 371.76' T = 238.13'
 R = 7,150.00' R = 4,580.00'

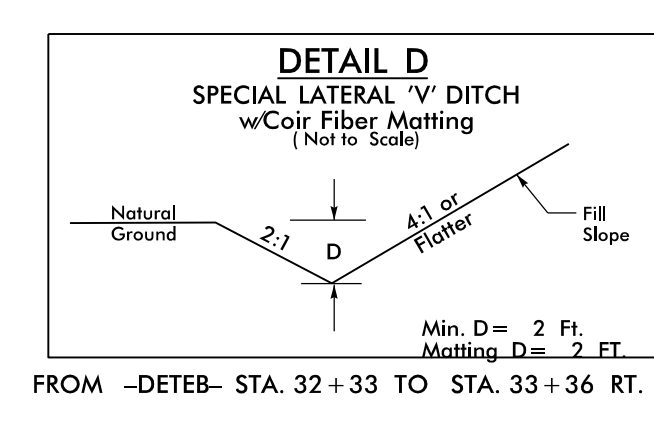
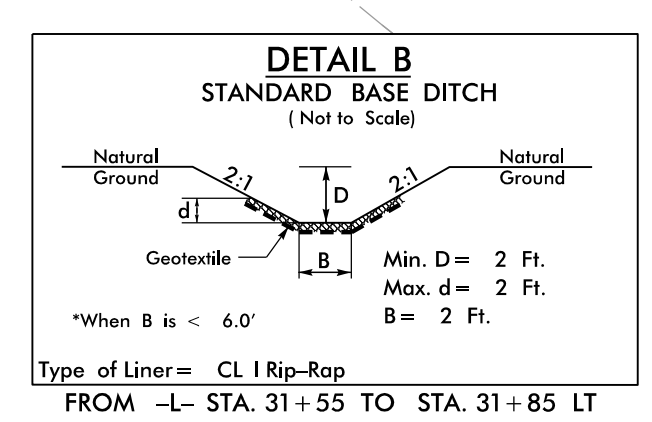
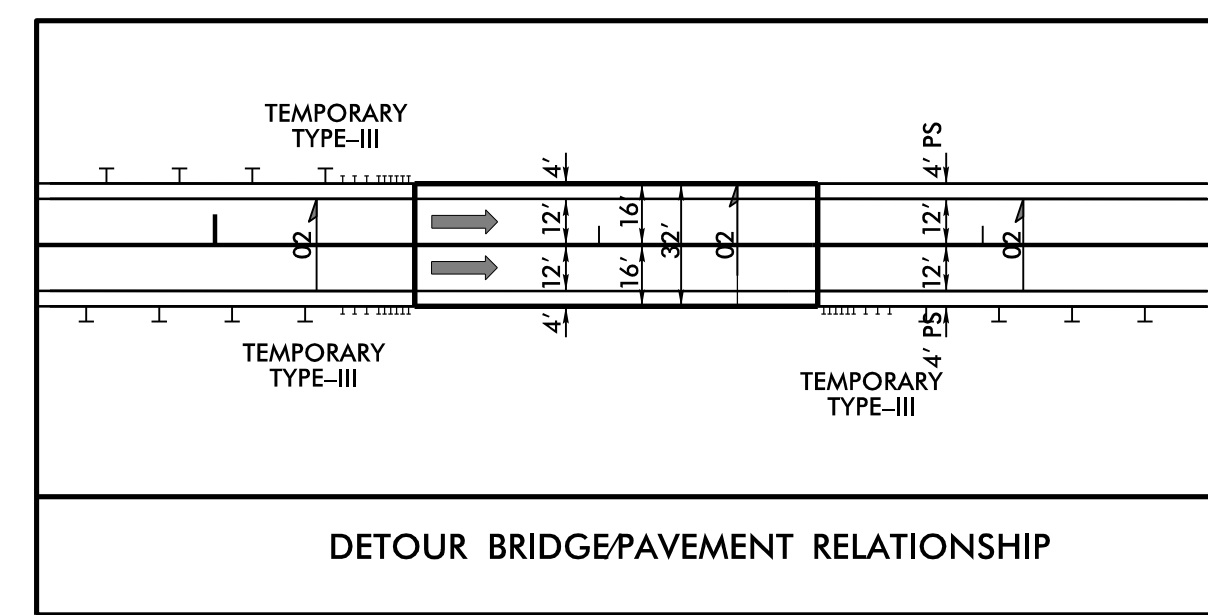
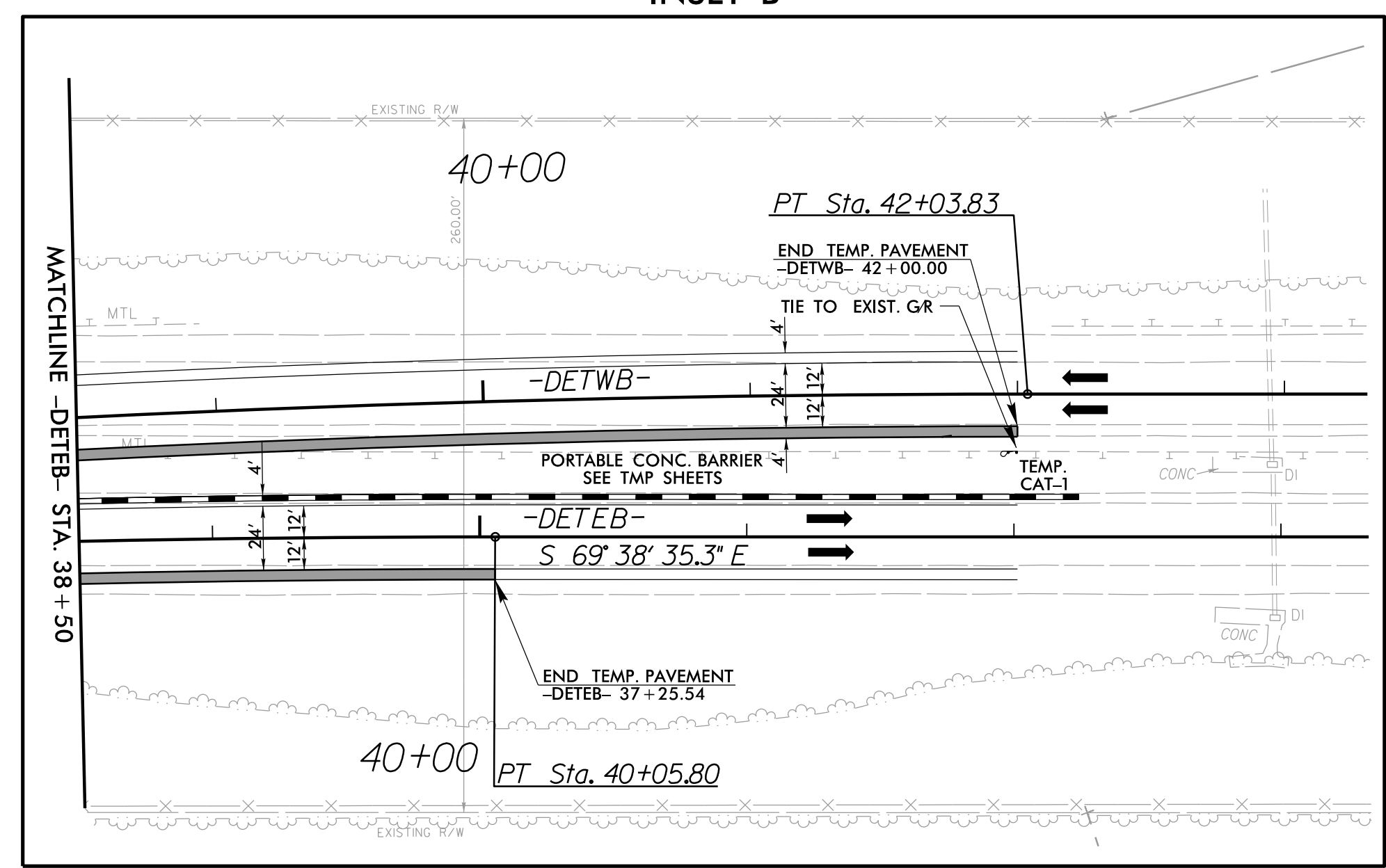
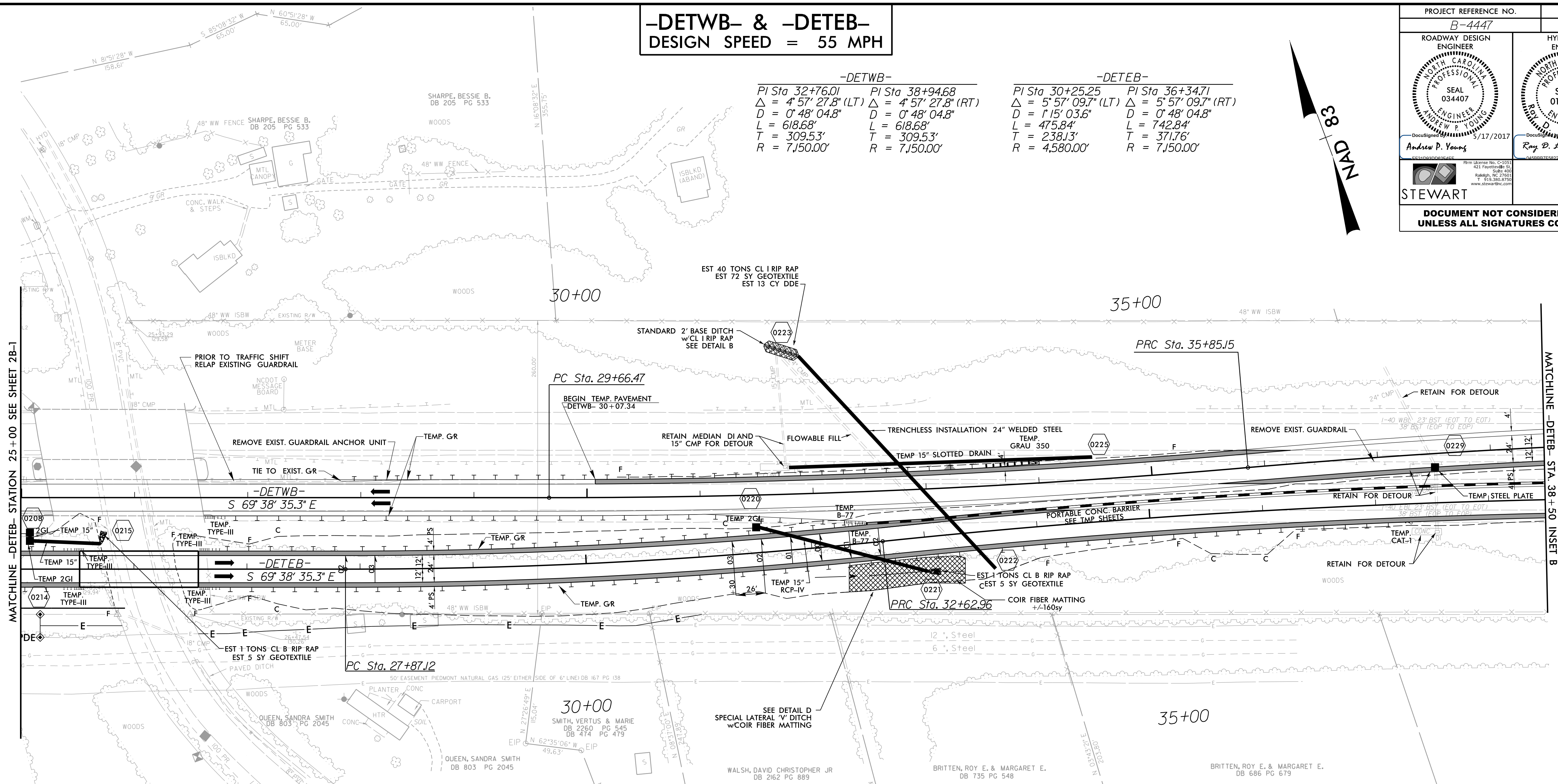


SEE SHEET 8 FOR -DETEB- PROFILE
SEE SHEET C-1 THRU C-6 FOR CULVERT PLANS

**-DETWB- & -DETEB-
DESIGN SPEED = 55 MPH**

-DETWB-		-DETEB-	
PI Sta 32+76.01	PI Sta 38+94.68	PI Sta 30+25.25	PI Sta 36+34.71
$\Delta = 4' 57" 27.8" (LT)$	$\Delta = 4' 57" 27.8" (RT)$	$\Delta = 5' 57" 09.7" (LT)$	$\Delta = 5' 57" 09.7" (RT)$
$D = 0' 48" 04.8"$	$D = 0' 48" 04.8"$	$D = 1' 15" 03.6"$	$D = 0' 48" 04.8"$
$L = 618.68'$	$L = 618.68'$	$L = 475.84'$	$L = 742.84'$
$T = 309.53'$	$T = 309.53'$	$T = 238.13'$	$T = 371.76'$
$R = 7,150.00'$	$R = 7,150.00'$	$R = 4,580.00'$	$R = 7,150.00'$

PROJECT REFERENCE NO. B-4447	SHEET NO. 2B-2
ROADWAY DESIGN ENGINEER ANDREW P. YOUNG SEAL 034407 5/17/2017	HYDRAULICS ENGINEER RAY D. LOVINGOOD SEAL 019775 5/18/2017
 	
	
<p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p>	



SEE SHEET 8 FOR -DETEB- PROFILE

REVISIONS

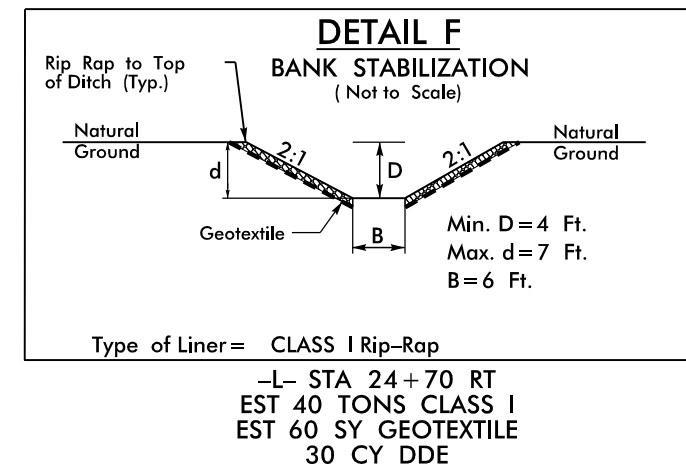
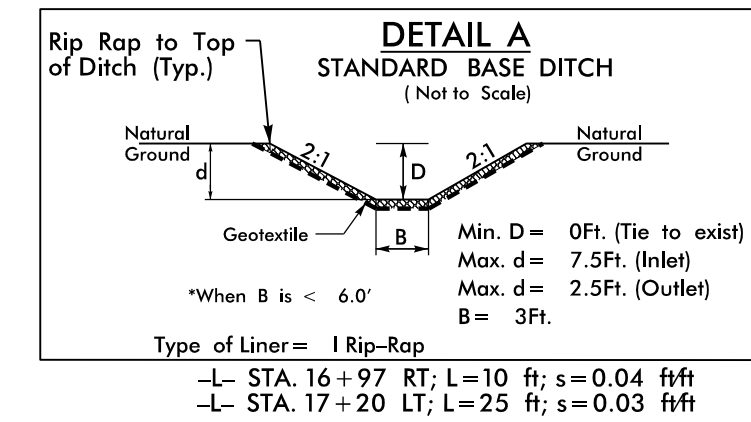
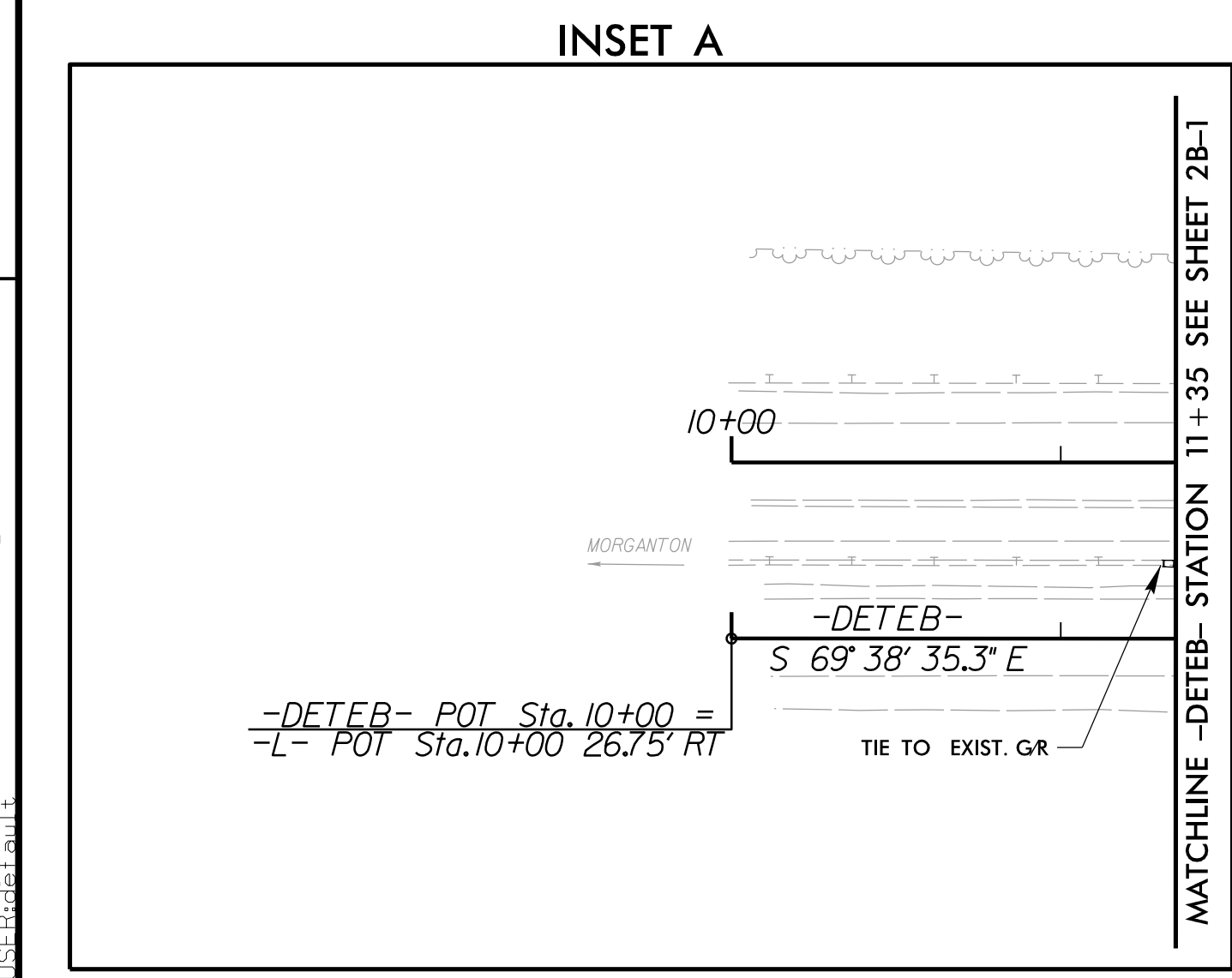
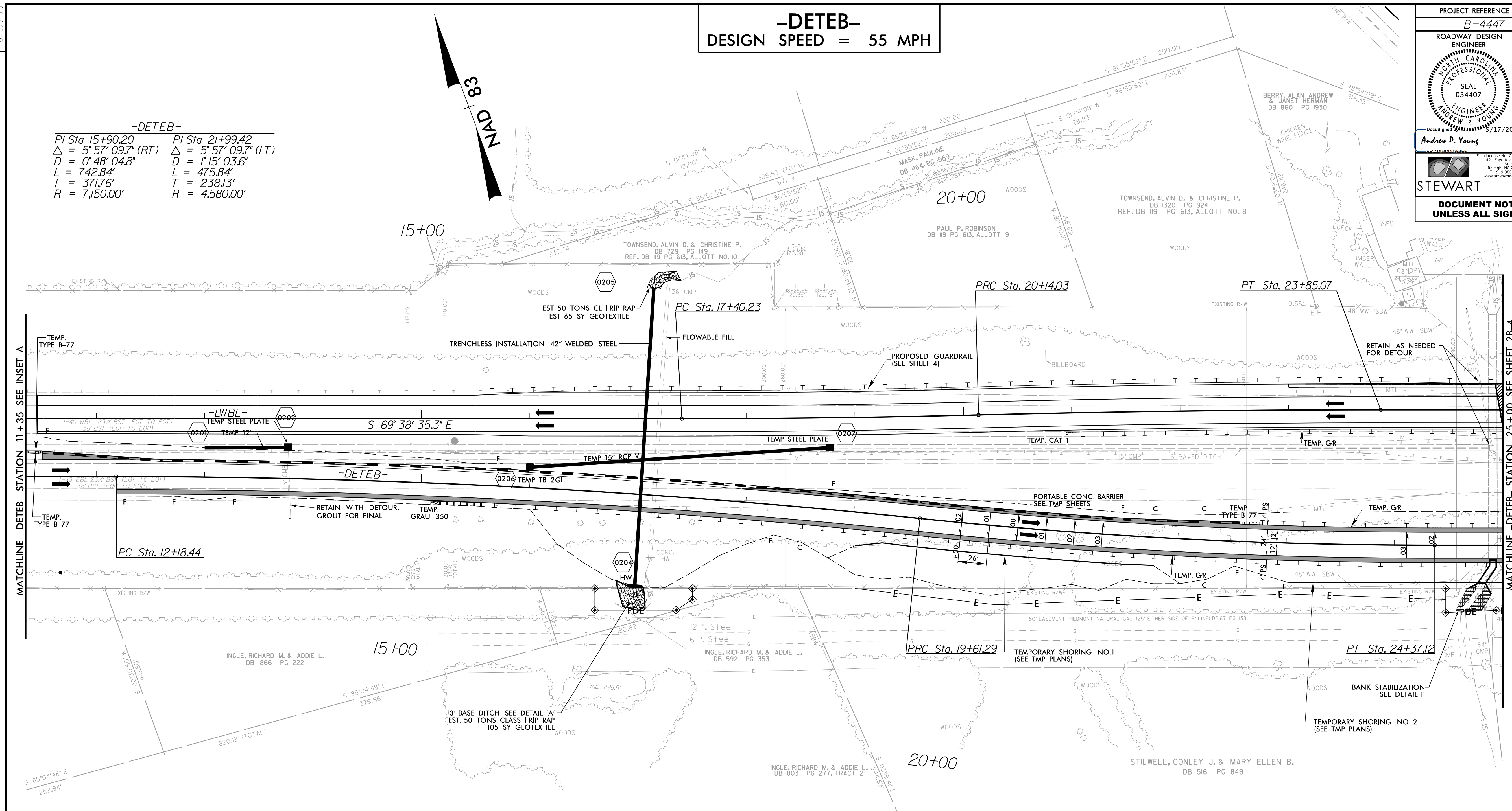
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 8/17/99

-DETEB-
DESIGN SPEED = 55 MPH

PROJECT REFERENCE NO. B-4447	SHEET NO. 2B-3
ROADWAY DESIGN ENGINEER ANDREW P. YOUNG SEAL 034407 5/17/2017	HYDRAULICS ENGINEER ROY D. LORINGGOOD SEAL 019775 5/18/2017
STEWART	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

-DETEB-

PI Sta 15+90.20 Δ = 5° 57' 09.7" (RT) D = 0' 48" 04.8" L = 742.84' T = 371.76' R = 7,150.00'	PI Sta 21+99.42 Δ = 5° 57' 09.7" (LT) D = 1' 15" 03.6" L = 475.84' T = 238.13' R = 4,580.00'
---	---



SEE SHEET 4 FOR -LWBL- PLAN VIEW
SEE SHEET 6 FOR -LWBL- PROFILE
SEE SHEET 8 FOR -DETEB- PROFILE
SEE SHEET C-1 THRU C-6 FOR CULVERT PLANS

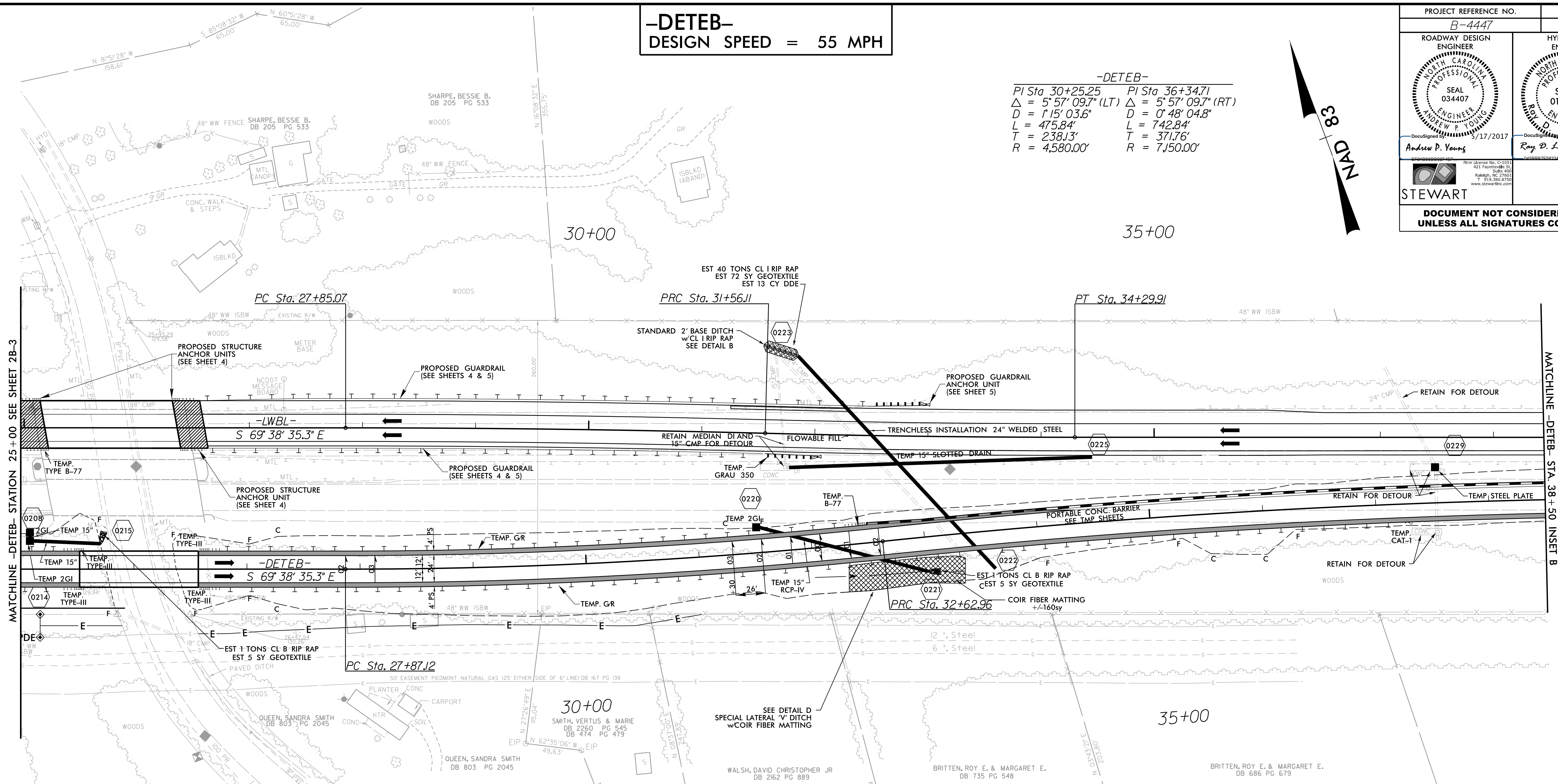
REVISIONS

5/10/2017 B4447_Rdy_det_2B-3.dgn

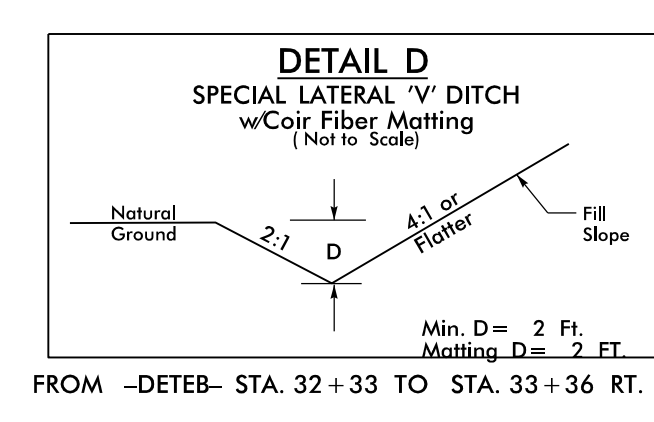
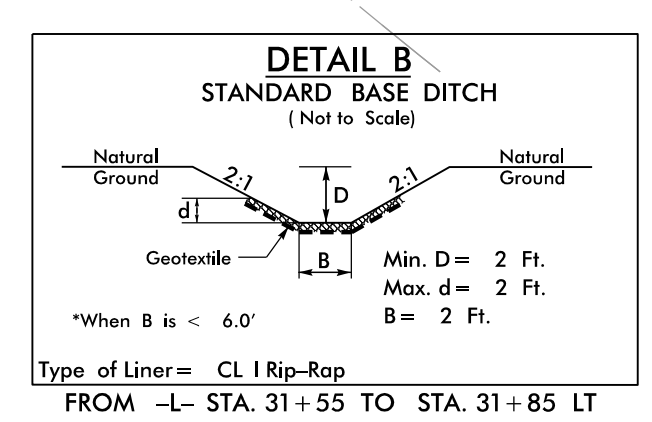
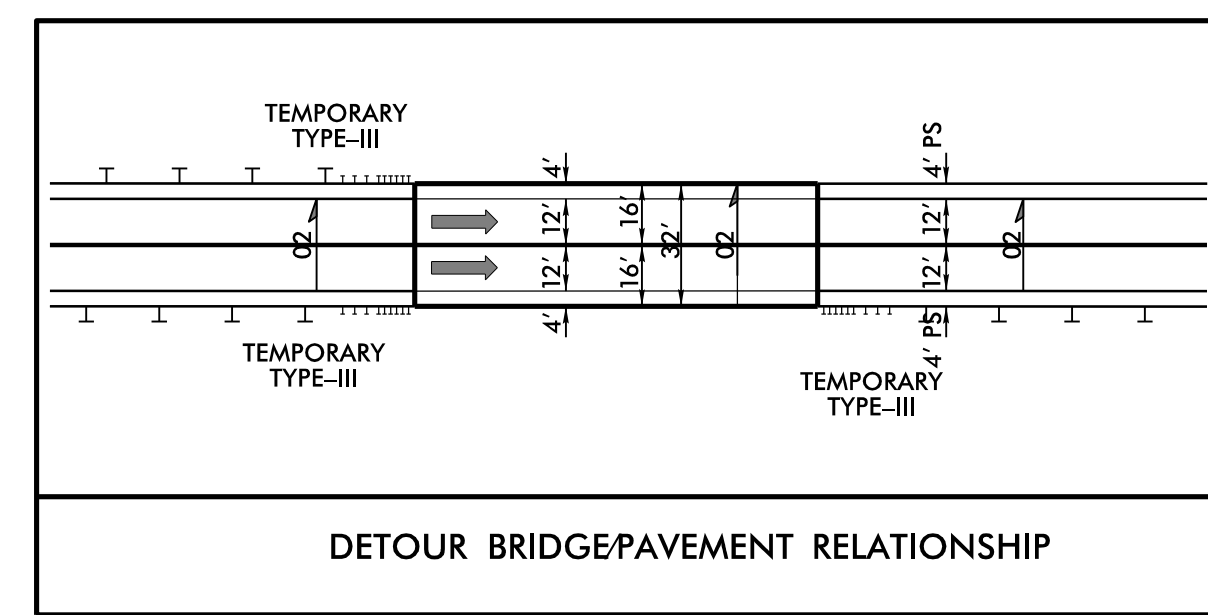
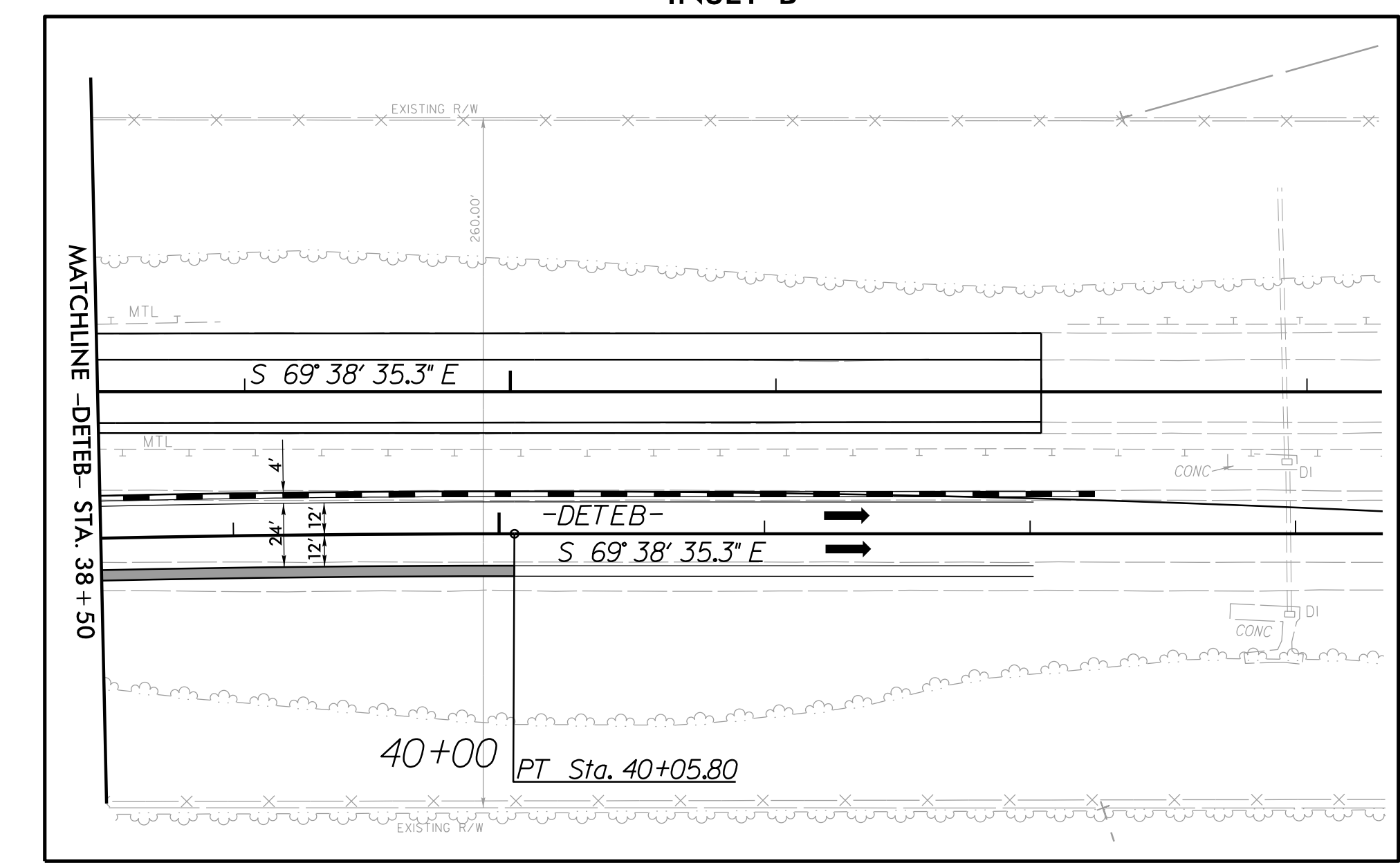
-DETEB-
DESIGN SPEED = 55 MPH

-DETEB-
 PI Sta 30+25.25 PI Sta 36+34.71
 $\Delta = 5^{\circ} 57' 09.7" (LT)$ $\Delta = 5^{\circ} 57' 09.7" (RT)$
 $D = 115' 03.6"$ $D = 0' 48' 04.8"$
 $L = 475.84'$ $L = 742.84'$
 $T = 238.13'$ $T = 371.76'$
 $R = 4,580.00'$ $R = 7,150.00'$

PROJECT REFERENCE NO. B-4447	SHEET NO. 2B-4
ROADWAY DESIGN ENGINEER ANDREW P. YOUNG SEAL 034407 NORTH CAROLINA PROFESSIONAL ENGINEER DocuSigned by: Andrew P. Young 5/17/2017	HYDRAULICS ENGINEER RAY D. LOVINGOOD SEAL 019775 NORTH CAROLINA PROFESSIONAL ENGINEER DocuSigned by: Ray D. Lovingood 5/18/2017
STEWART	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



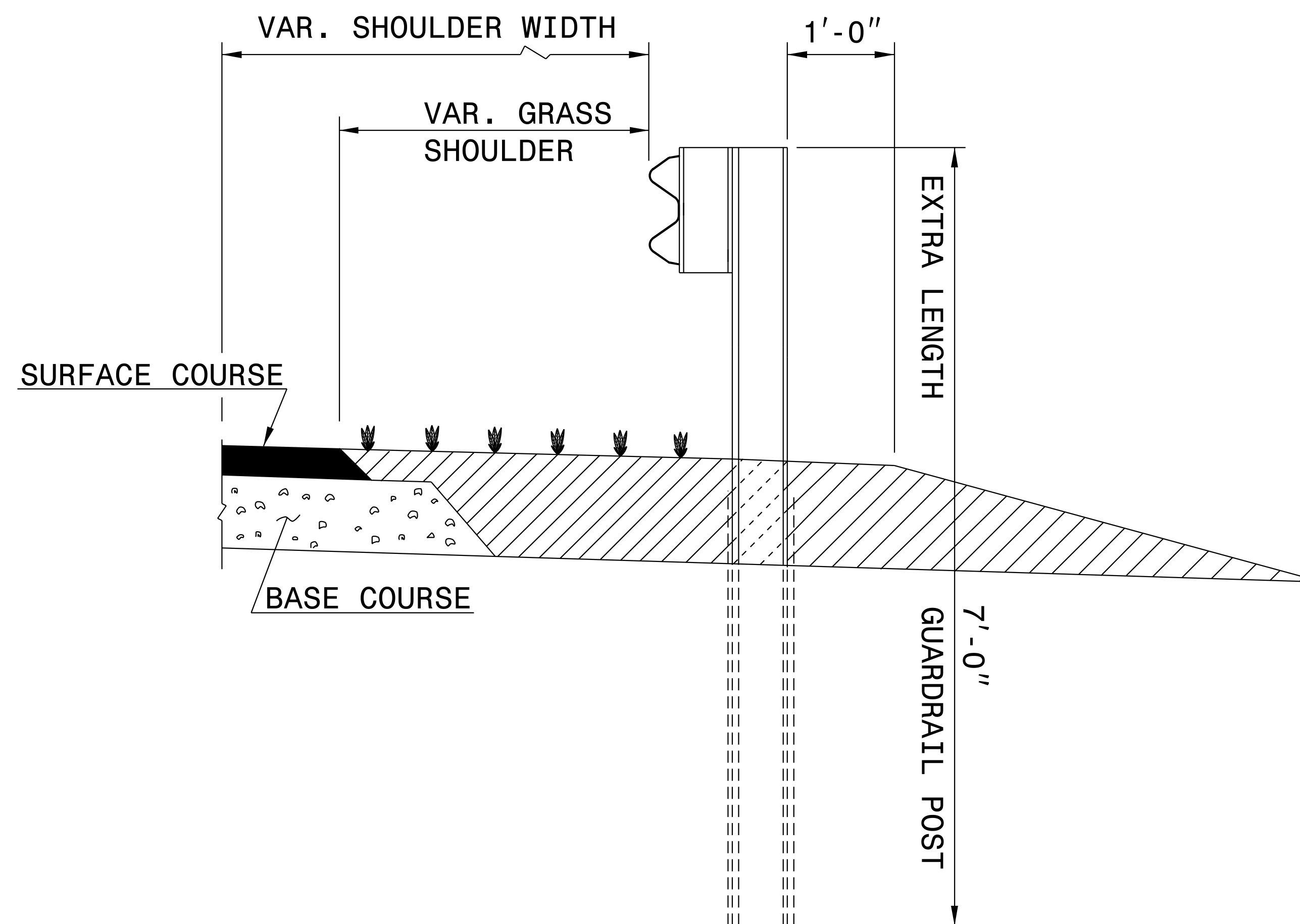
INSET B



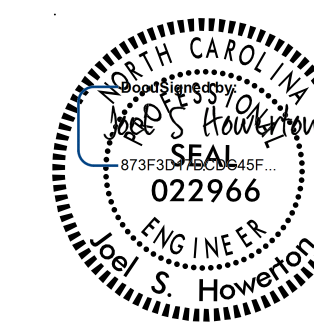
SEE SHEET 5 FOR -LWBL- PLAN VIEW
 SEE SHEET 6 FOR -LWBL- PROFILE
 SEE SHEET 8 FOR -DETEB- PROFILE
 SEE SHEET S01-1 THRU S01-28 FOR -LWBL- STRUCTURE PLANS

REVISIONS

5/8/2017 B4447_Rdy_det_2B-4.dgn
 8.17.99
 USER: jk



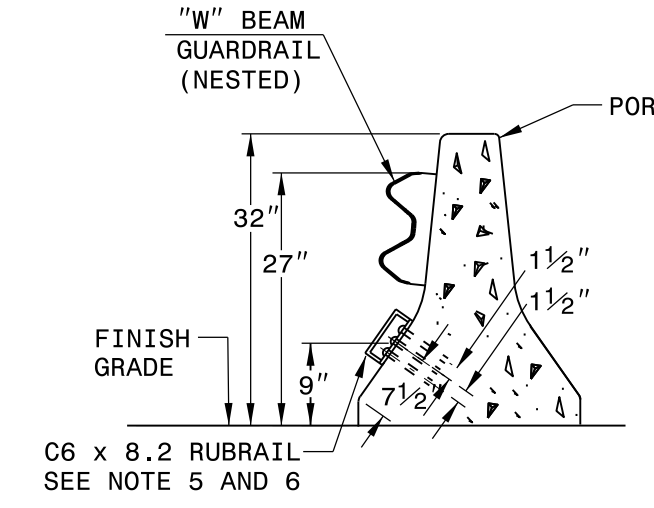
REFER TO NCDOT STANDARDS 862.01 AND 862.02 FOR PLACEMENT AND INSTALLATION.



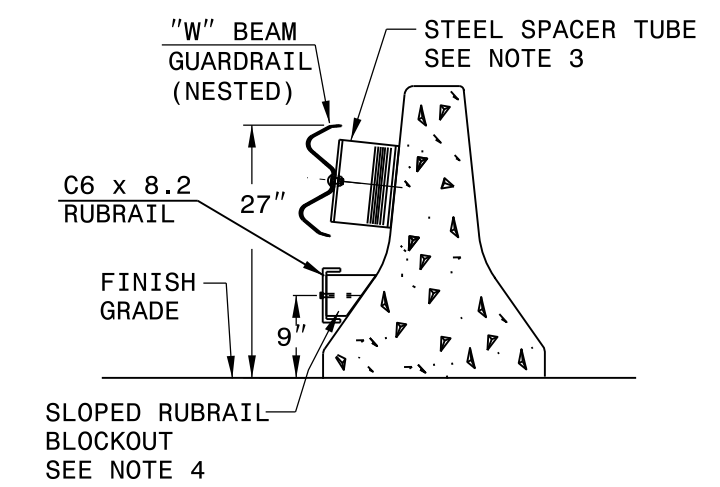
5/8/2017

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

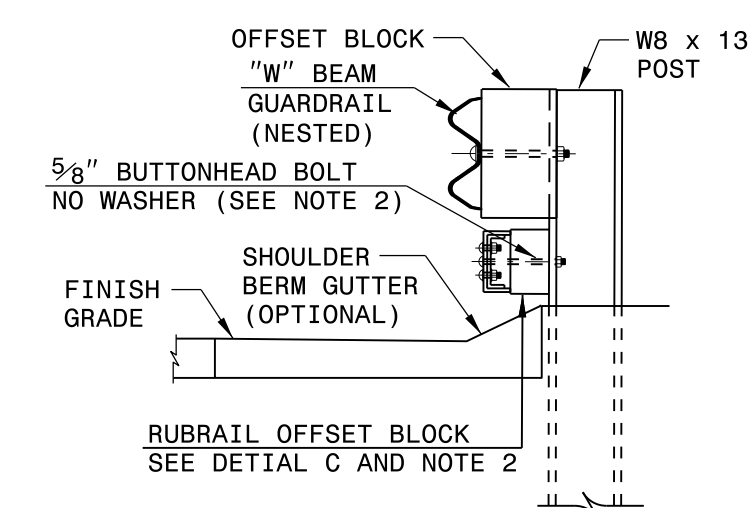
CONTRACT STANDARDS AND DEVELOPMENT UNIT	
Office 919-707-6950 FAX 919-250-4119	
7' GUARDRAIL POST	
ORIGINAL BY: L. Robinson	DATE: 1995
MODIFIED BY: L. Robinson	DATE: Feb, 1996
CHECKED BY:	DATE:
FILE SPEC.: s:7'guardrail.dgn	



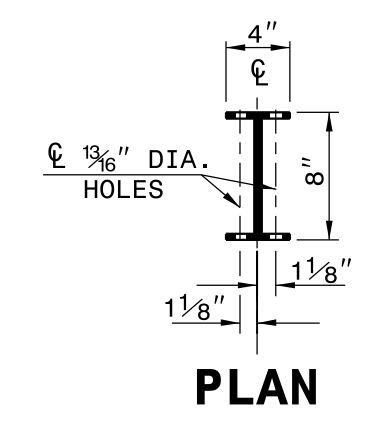
SECTION A-A



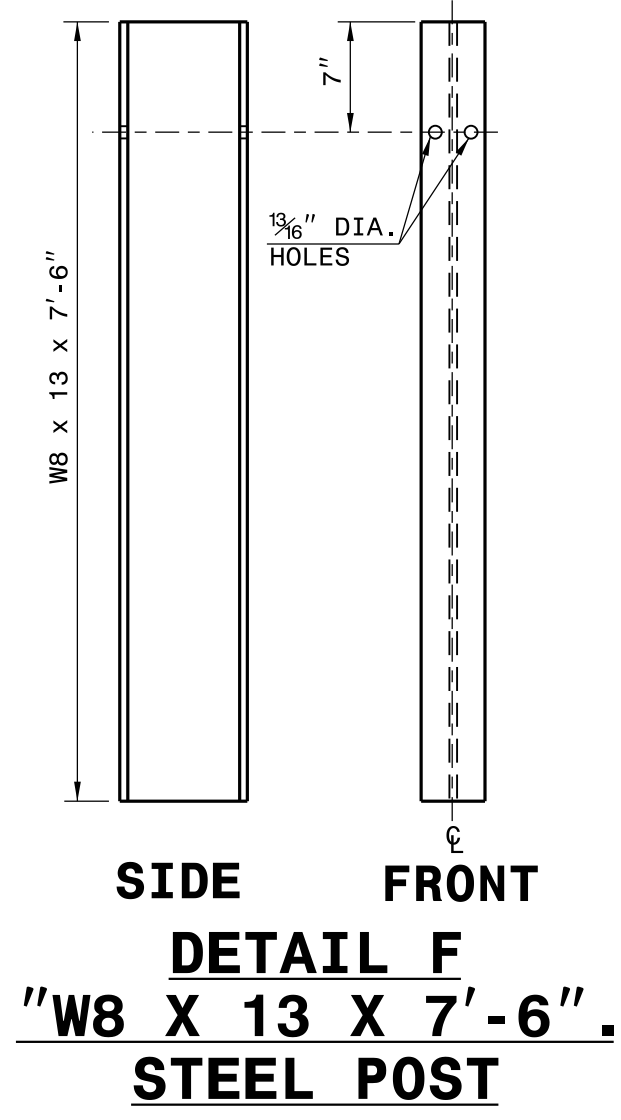
SECTION B-B



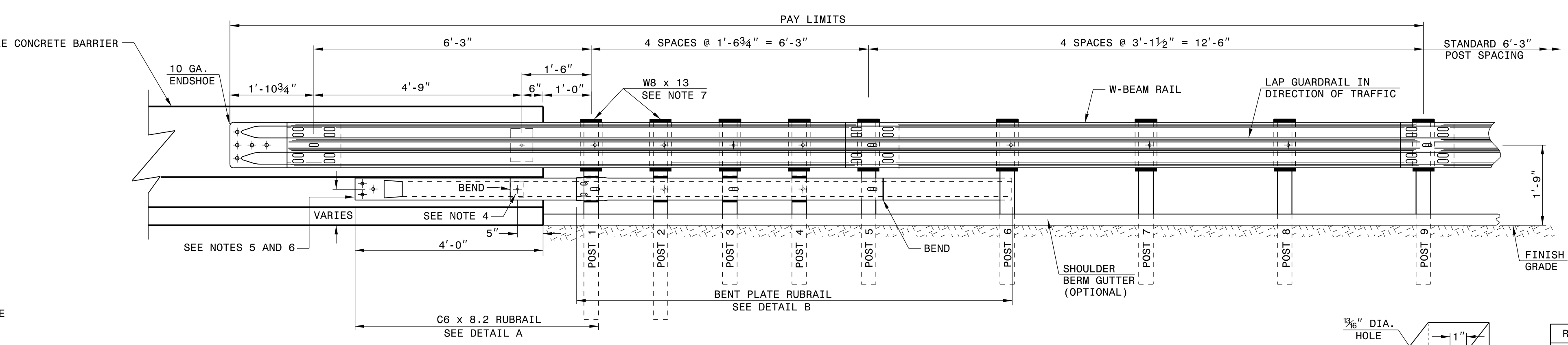
SECTION C-C



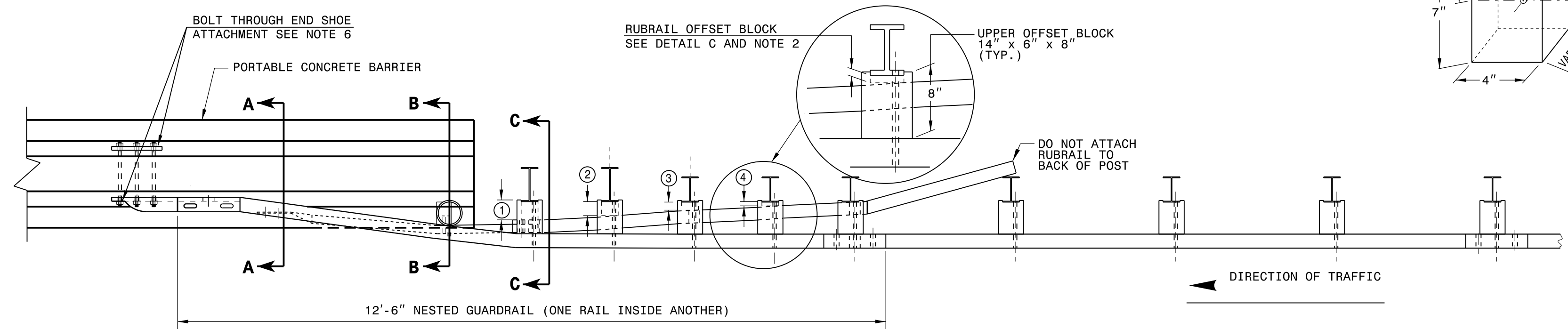
PLAN



DETAIL F
W8 X 13 X 7'-6".
STEEL POST

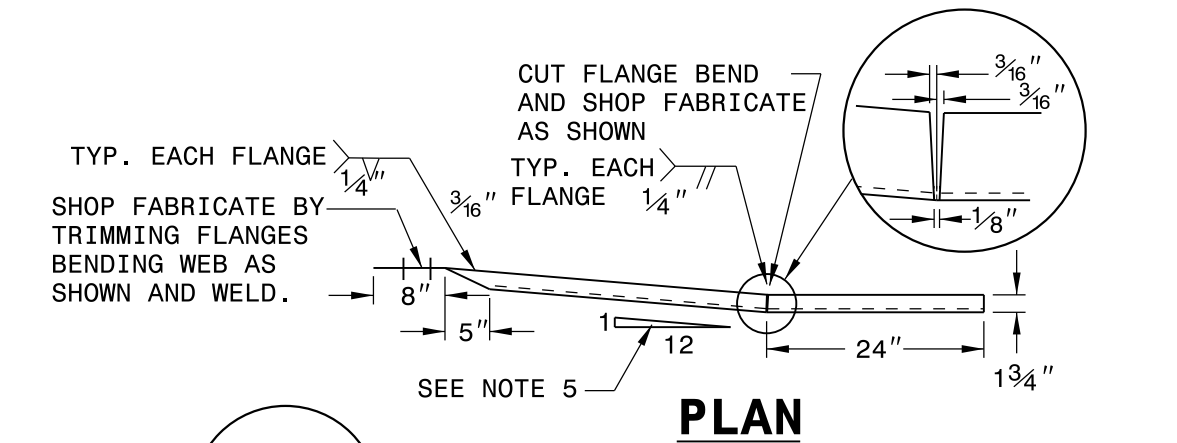


ELEVATION

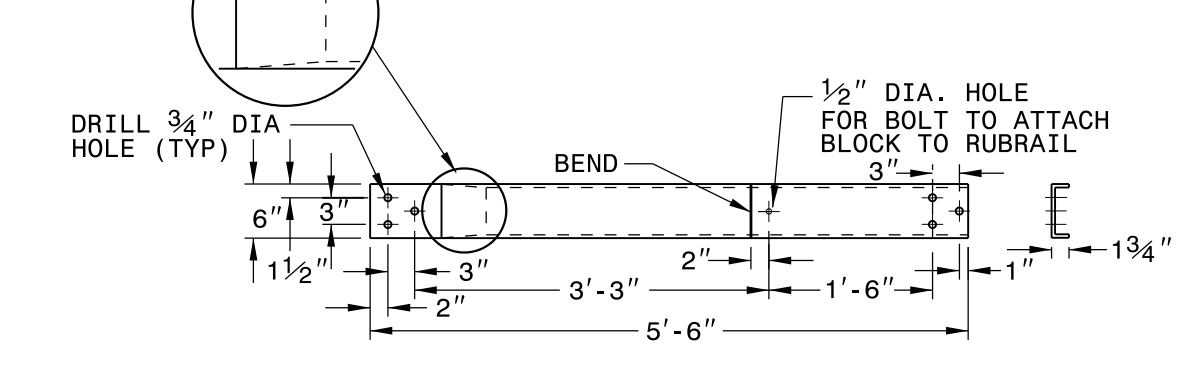


PLAN

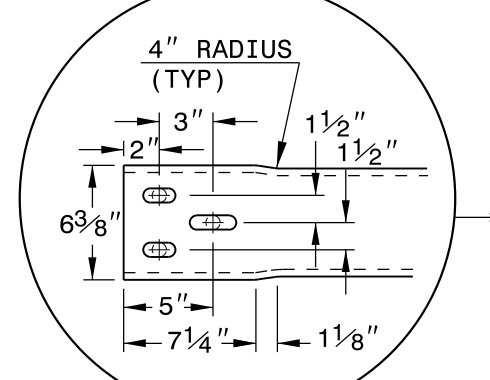
- GENERAL NOTES:**
- POSTS 1 THROUGH 5 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER BLOCKOUTS AND/OR RUBRAIL.
 - RUBRAIL BLOCKOUTS LOCATED ON POSTS 1 THROUGH 4 ARE OFFSET DRILLED AND SECURED WITH 5/8" BUTTONHEAD BOLTS (SEE CHART FOR BOLT LENGTHS). SECURE BLOCKS ONLY TO POSTS 2 AND 4. SECURE RUBRAIL AND BLOCKOUTS TO POSTS 1 AND 3. RUBRAIL IS SECURED TO POST 5 WITH A 5/8" x 4 1/2" BUTTONHEAD BOLT. RUBRAIL IS FLARED TO BACK OF POST 6 AND NOT SECURED.
 - STEEL SPACER TUBE IS A SCHEDULE 40 GALVANIZED PIPE 6" INSIDE DIAMETER x 9" LONG. ATTACH TUBE TO GUARDRAIL ONLY WITH 5/8" x 1 1/4" LONG BUTTONHEAD BOLT AND RECTANGULAR PLATE WASHER.
 - SEE DETAIL D FOR SLOPED RUBRAIL BLOCKOUT. BLOCKOUT IS ATTACHED TO RAIL ELEMENT ONLY. USE 3/8" x 3" LAG BOLT WITH FLAT WASHER.
 - SHOP FABRICATE THE C6 x 8.2 RUBRAIL END TO BE CONSISTENT WITH THE SLOPE OF THE JERSEY SHAPE AND ATTACH FLUSH WITH THE SLOPED TOE OF THE BARRIER OR BRIDGE RAIL.
 - ANCHORAGE:
 - AT PORTABLE CONCRETE BARRIER, ANCHOR RUBRAIL USING THREE 5/8" x 6" CHEMICALLY ANCHORED BOLTS WITH WASHERS.
 - AT PORTABLE CONCRETE BARRIER, ANCHOR THE W-BEAM END SHOE USING A 4 BOLT HOLD-DOWN PLATE AS SHOWN. INSTALL THE W-BEAM END SHOE BEHIND THE NESTED W-BEAM ELEMENTS.
 - POSTS 1 AND 2 ARE W8 x 13, 7'-6" LONG. ALL OTHER POSTS IN THE ANCHOR UNIT ARE W6 x 8.5.



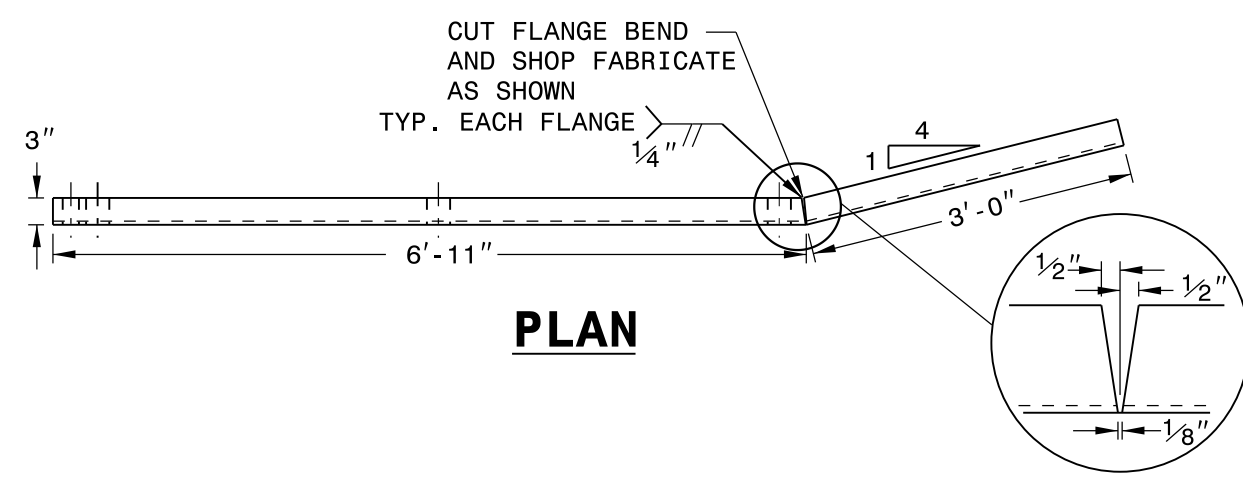
DETAIL A
C6 x 8.2 RUBRAIL



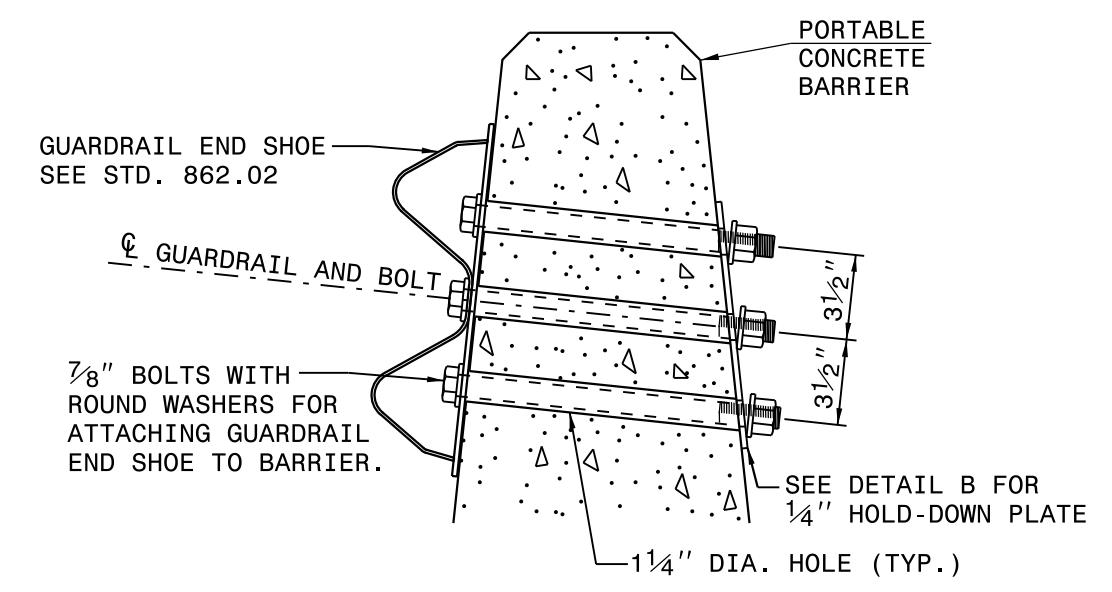
ELEVATION



DETAIL B
BENT PLATE RUBRAIL



DETAIL E
LAG BOLT

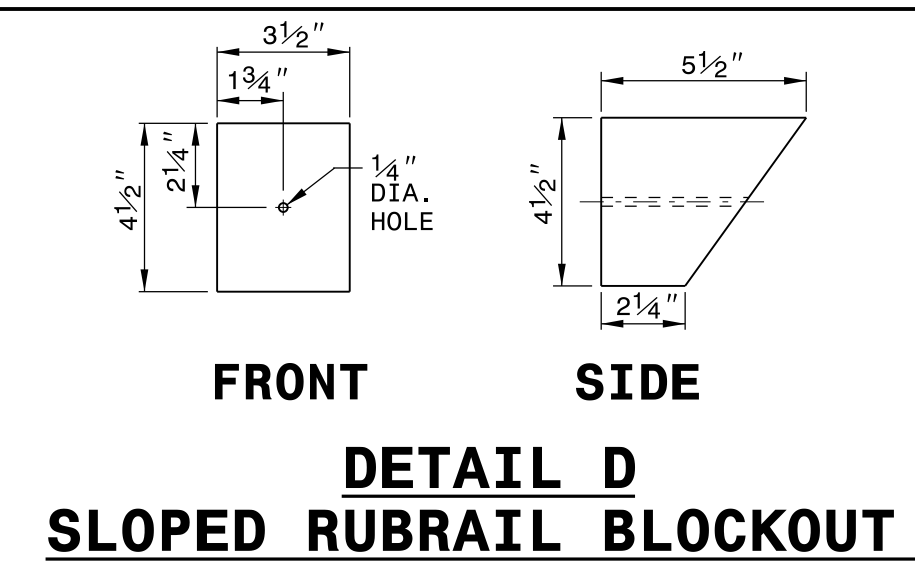


PART SECTION
OF BARRIER OR RAIL
THRU END SHOE SECTION AND
4 BOLT HOLD DOWN PLATE

NOTES FOR 4 BOLT HOLD DOWN PLATE

- THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4" HOLD DOWN PLATE AND 4 - 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 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.

4 BOLT HOLD DOWN PLATE



DETAIL D
SLOPED RUBRAIL BLOCKOUT



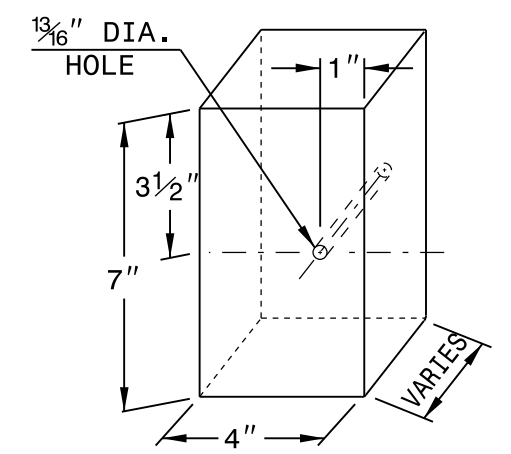
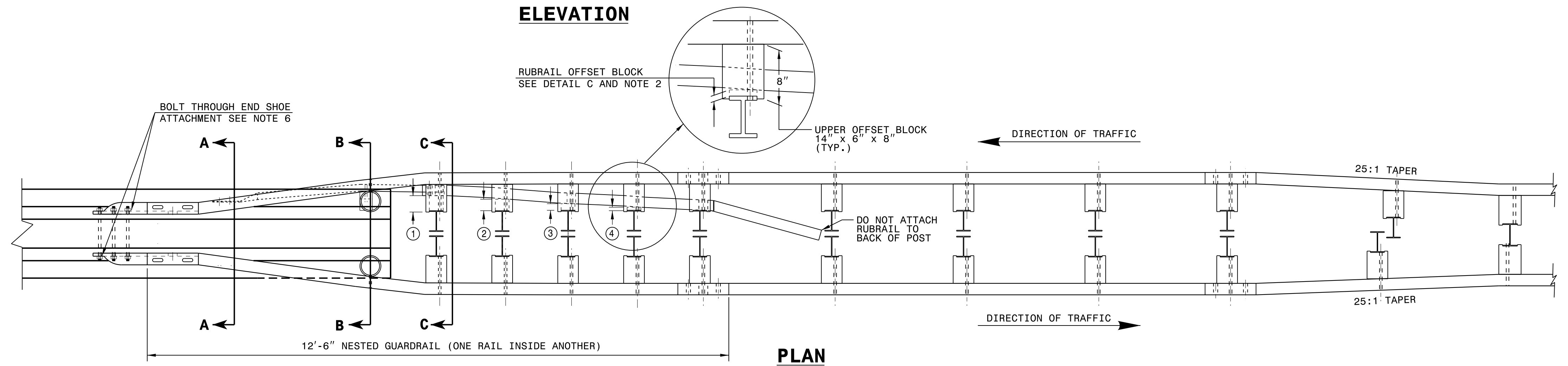
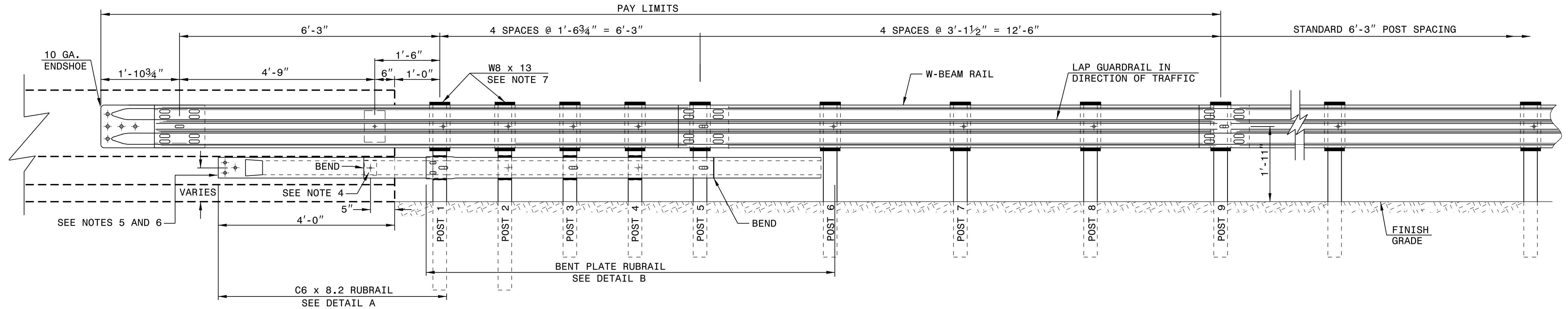
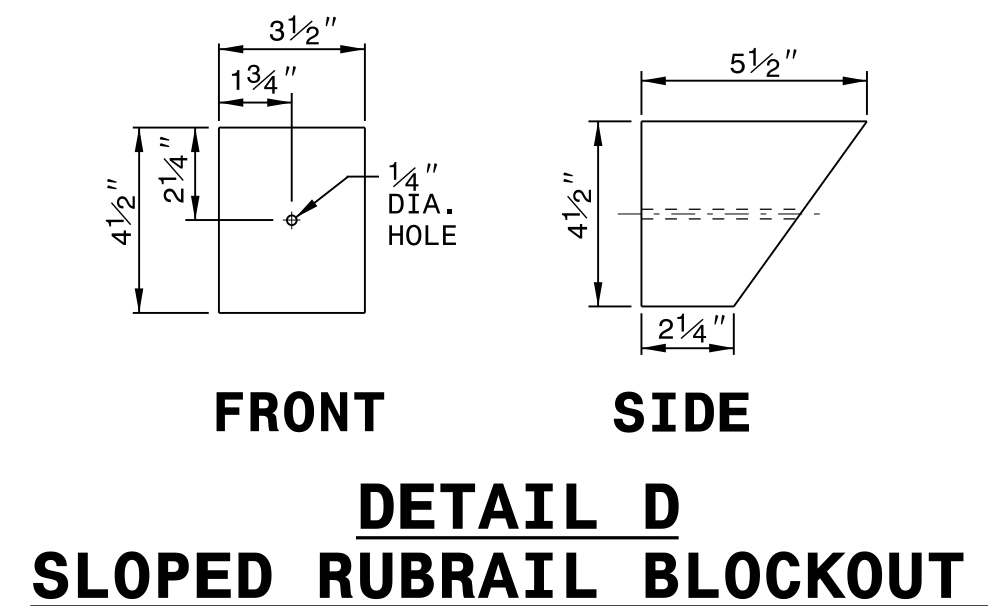
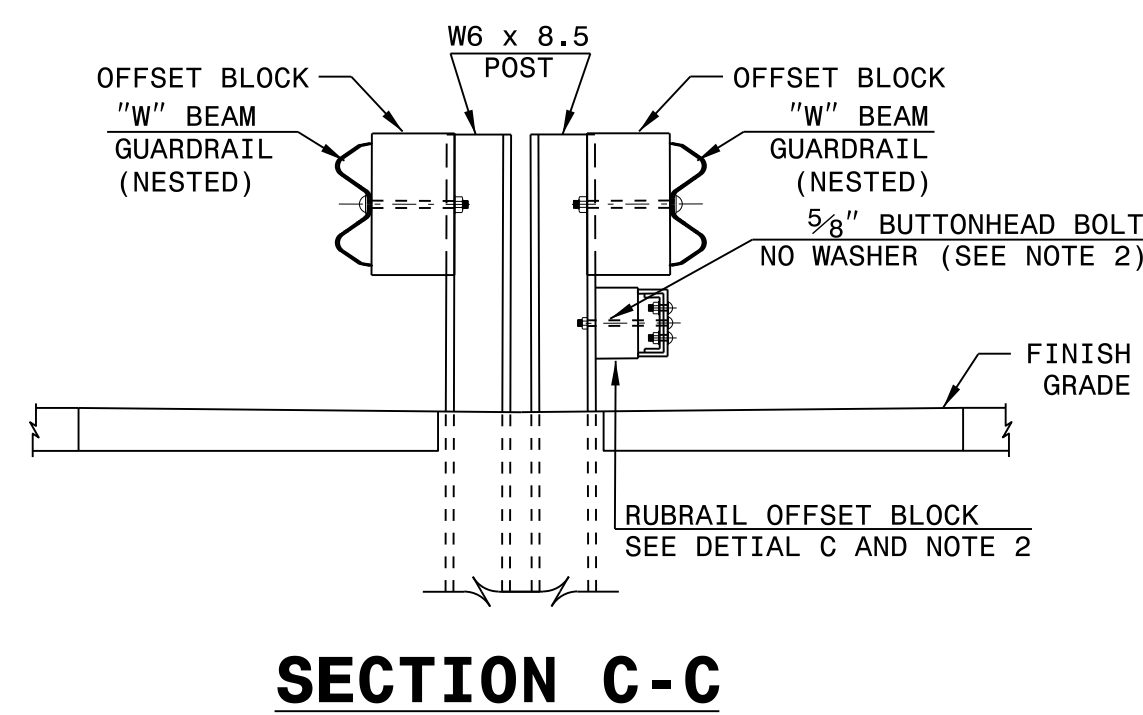
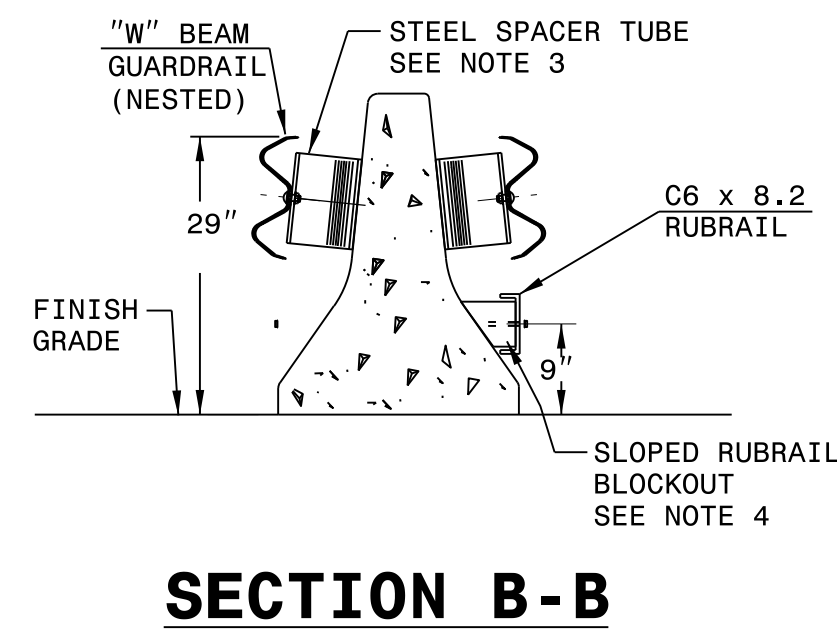
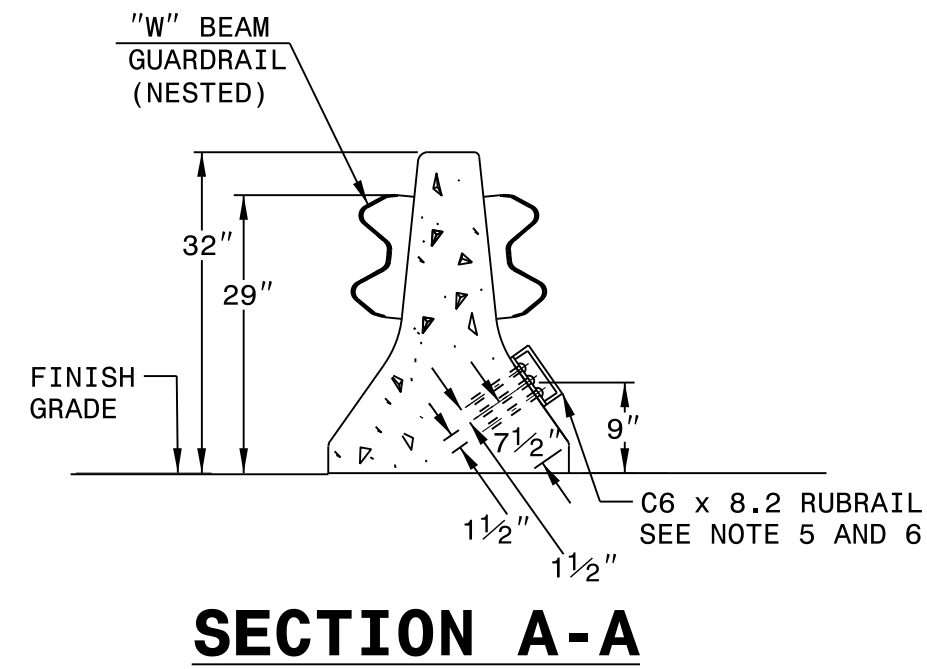
CONTRACT STANDARDS
AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

TEMPORARY GUARDRAIL
ANCHOR UNIT TYPE B-77

ORIGINAL BY: E.E. WARD DATE: 04-07-04
 MODIFIED BY: E.E. WARD DATE: 07-14-05
 CHECKED BY: DATE:
 FILE SPEC.: jhowerton/Temporary B-77 to PCB

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

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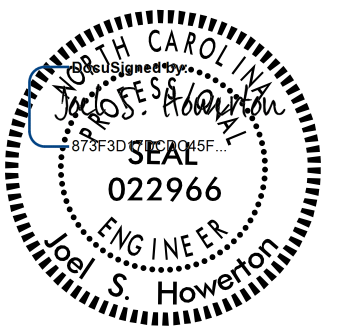
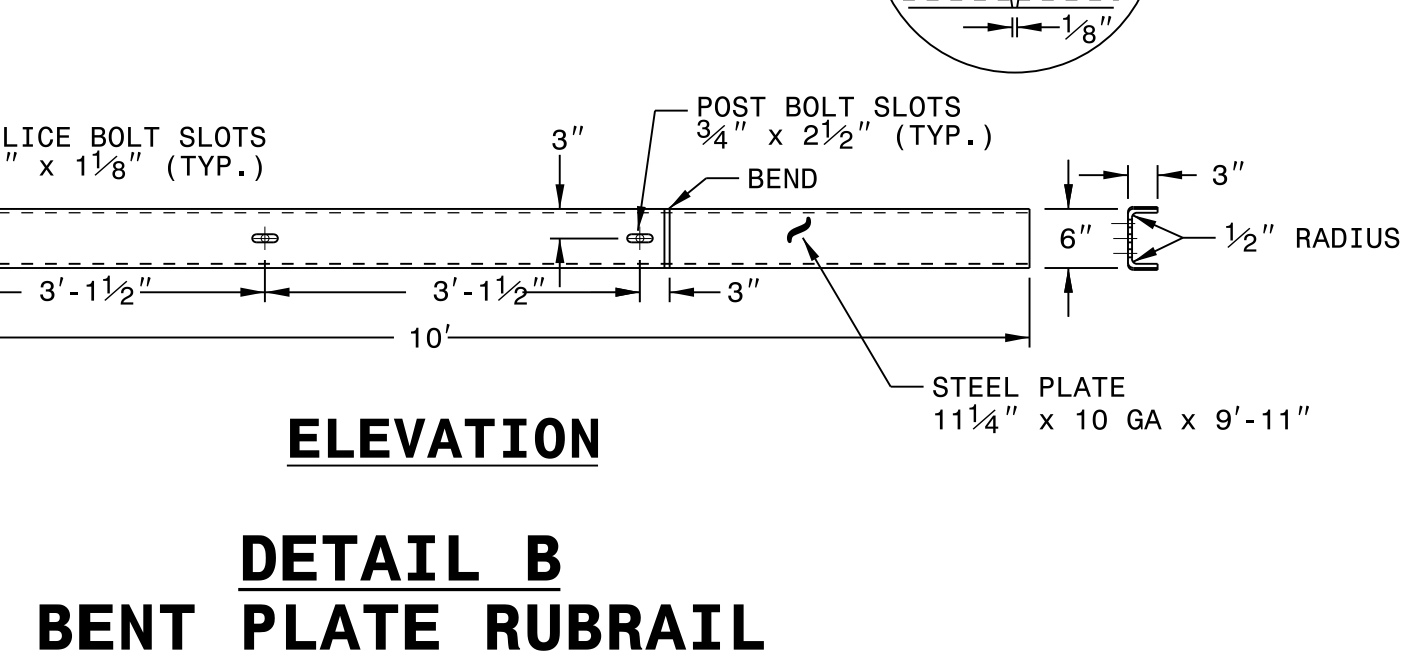
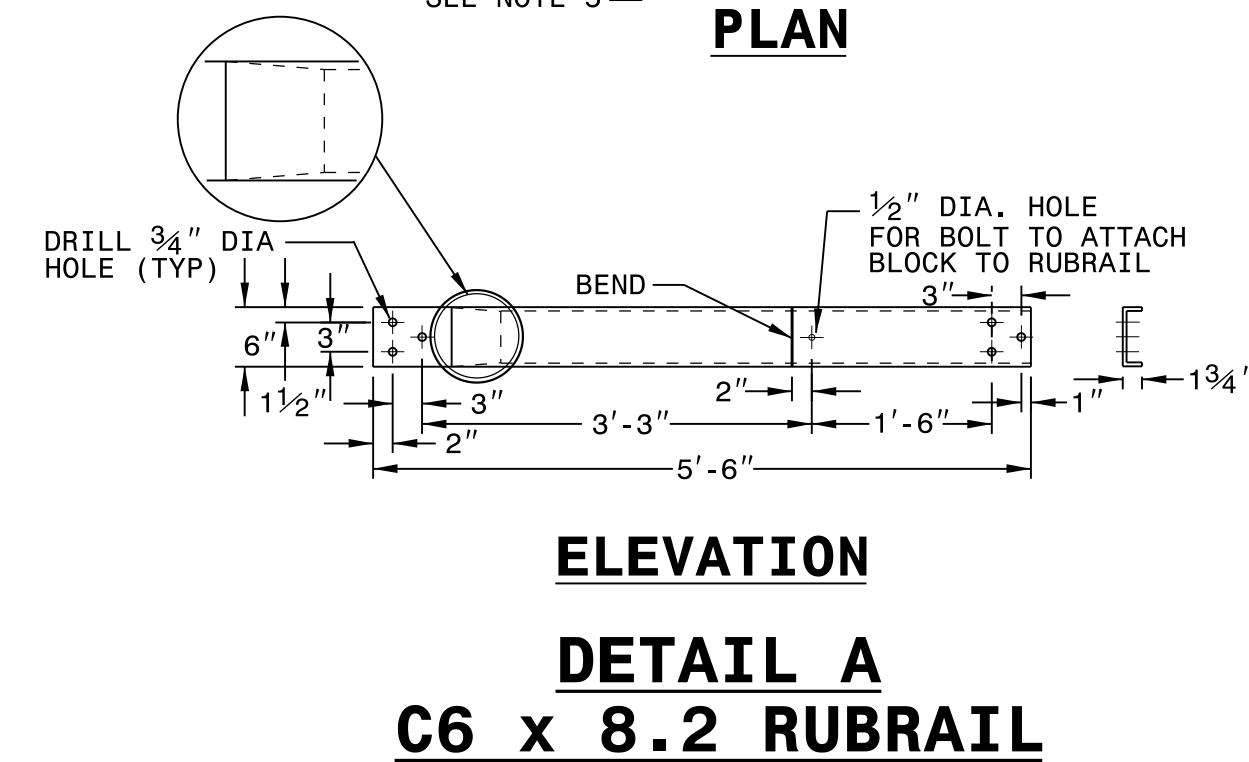
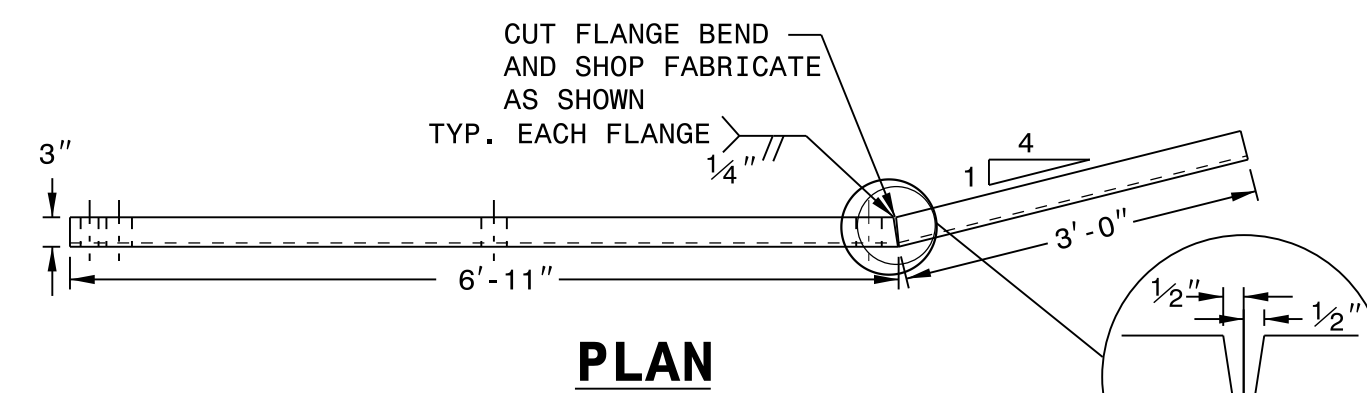
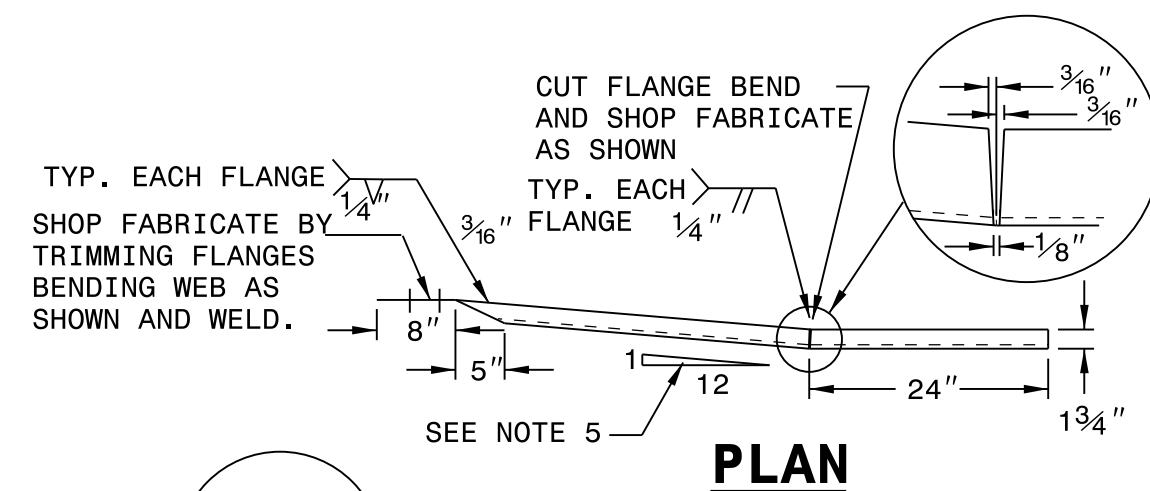


POST	THICKNESS	BOLT LENGTH
1	4 1/4"	9"
2	3 1/4"	5" *
3	2"	6"
4	1"	3" *

* BOLTS FOR POSTS 2 AND 4 ARE USED TO ATTACH BLOCK TO POST. RUBRAIL NOT ATTACHED TO BLOCK.

**DETAIL C
RUBRAIL BLOCKOUT**

- GENERAL NOTES:**
- APPROACH END OF ANCHOR UNIT HAS RUBRAIL. POSTS 1 THROUGH 5 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER BLOCKOUTS AND/OR RUBRAIL.
 - RUBRAIL BLOCKOUTS LOCATED ON POSTS 2 AND 4. SECURE RUBRAIL AND BLOCKOUTS TO POSTS 1 AND 3. RUBRAIL IS SECURED TO POST 5 WITH A 5/8" x 4 1/2" BUTTONHEAD BOLT. RUBRAIL IS FLARED TO BACK OF POST 6 AND NOT SECURED.
 - STEEL SPACER TUBE IS A SCHEDULE 40 GALVANIZED PIPE 6" INSIDE DIAMETER x 9" LONG. ATTACH TUBE TO GUARDRAIL ONLY WITH 5/8" x 1 1/4" LONG BUTTONHEAD BOLT AND RECTANGULAR PLATE WASHER.
 - SEE DETAIL D FOR SLOPED RUBRAIL BLOCKOUT. BLOCKOUT IS ATTACHED TO RAIL ELEMENT ONLY. USE 3/8" x 3" LAG BOLT WITH FLAT WASHER.
 - SHOP FABRICATE THE C6x8.2 RUBRAIL END TO BE CONSISTENT WITH THE SLOPE OF THE JERSEY SHAPE AND ATTACH FLUSH WITH THE SLOPED TOE OF THE BARRIER.
 - ANCHORAGE:
 - AT NEW OR EXISTING BARRIERS, RUBRAIL SHALL BE ANCHORED USING THREE 5/8" x 6" CHEMICALLY ANCHORED BOLTS WITH WASHERS. MAXIMUM PROJECTION FOR BOLTS SHALL BE 1/2".
 - AT NEW OR EXISTING BARRIERS, THE W-BEAM END SHOE SHALL BE ANCHORED USING FIVE 7/8" CHEMICALLY ANCHORED THREADED RODS WITH NUTS AND WASHERS. MAXIMUM PROJECTION FOR THREADED RODS SHALL BE 1/2". THE W-BEAM END SHOE SHALL BE INSTALLED BEHIND THE NESTED W-BEAM ELEMENTS.
 - POSTS 1 AND 2 ARE 7'-6" LONG. ALL OTHER POSTS IN THE ANCHOR UNIT ARE 6'-0".



5/8/2017

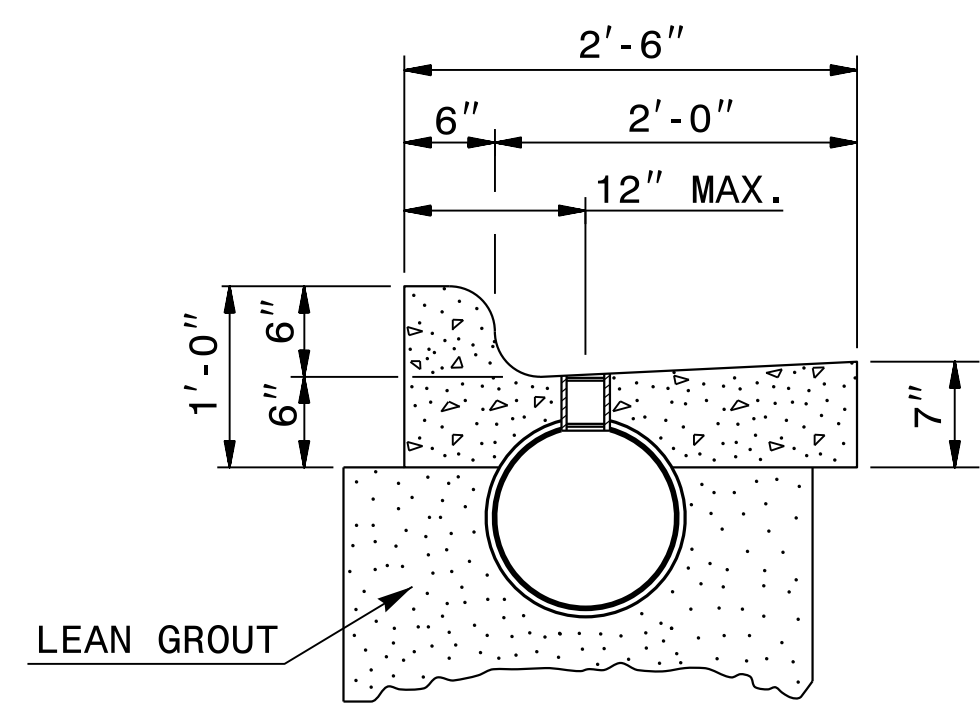
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

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

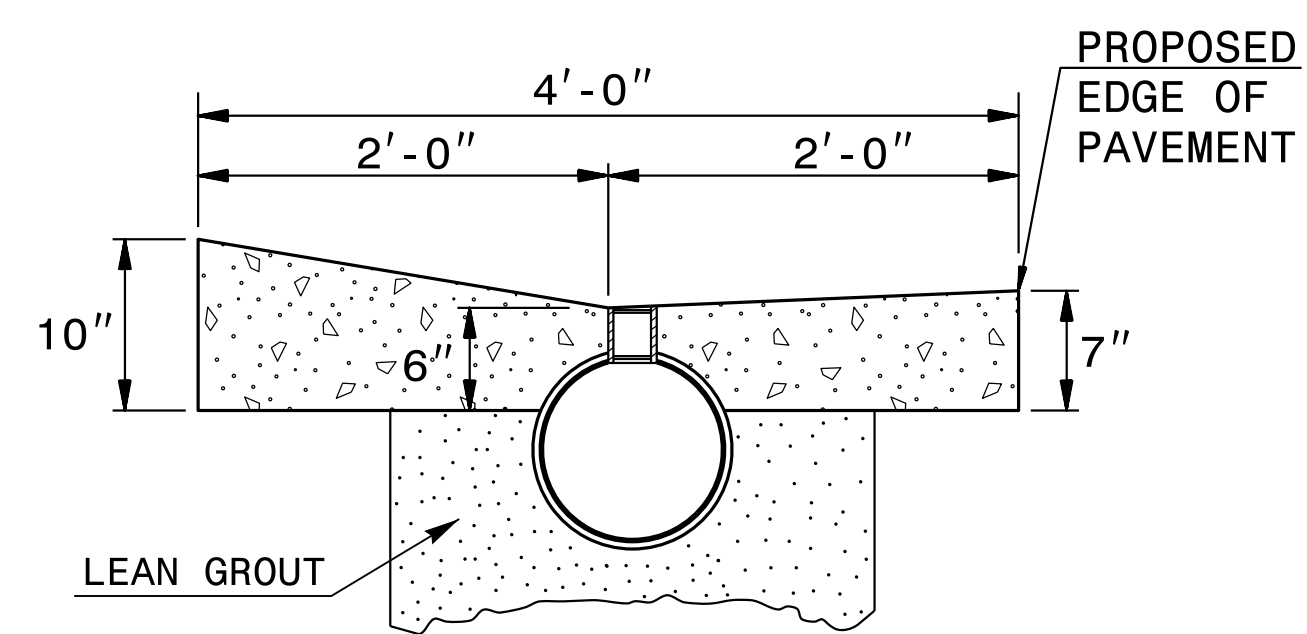
**GUARDRAIL ANCHOR UNIT
MODIFIED B-77 TYING TO
PORTABLE CONCRETE BARRIER**

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 CHECKED BY: DATE: _____
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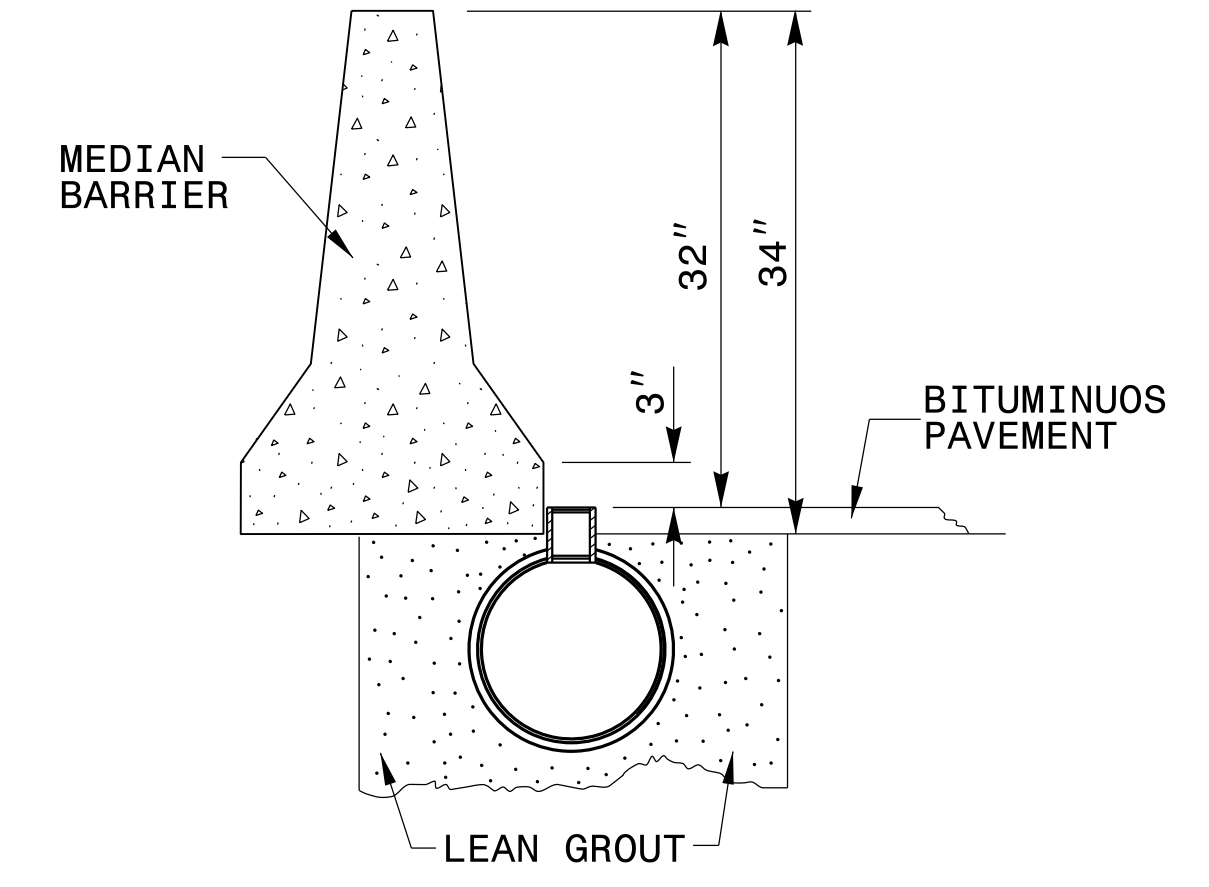
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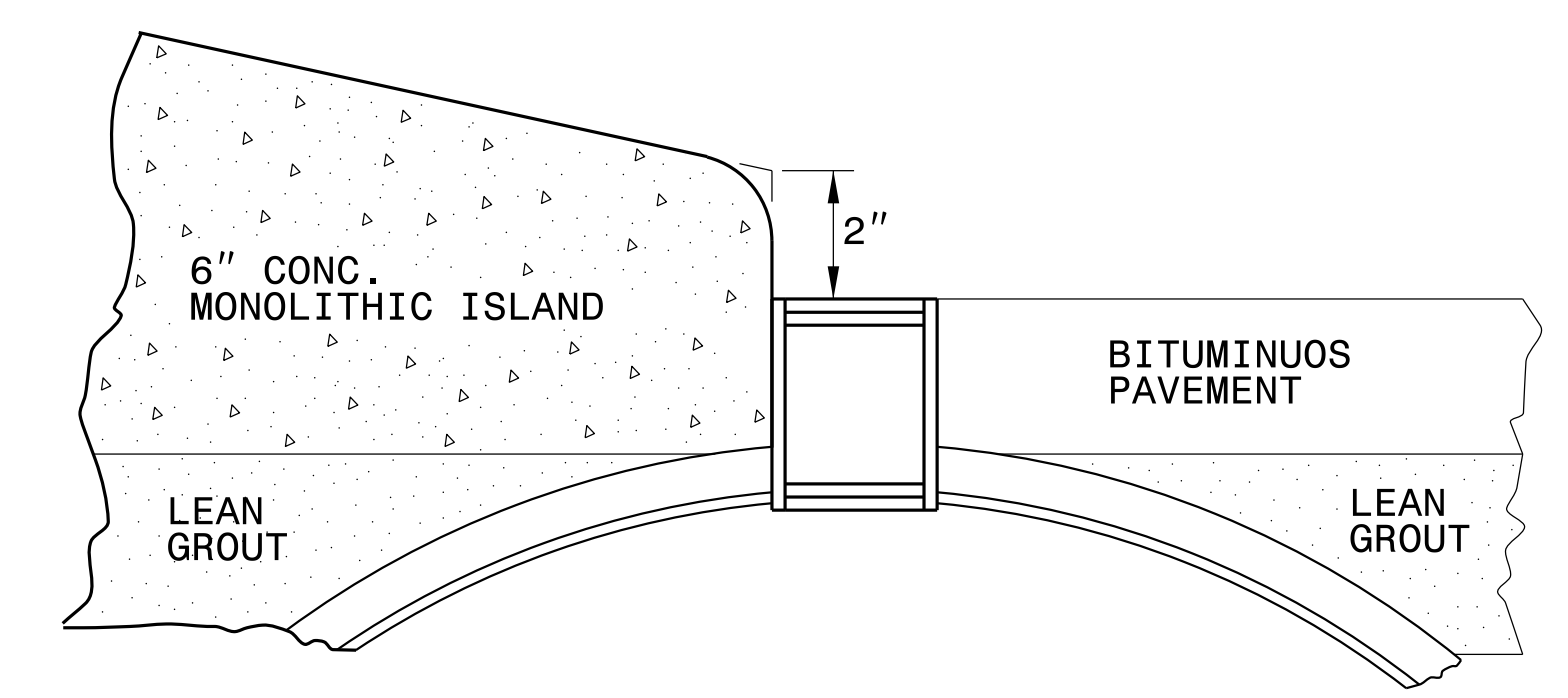
ALTERNATE NO. 1



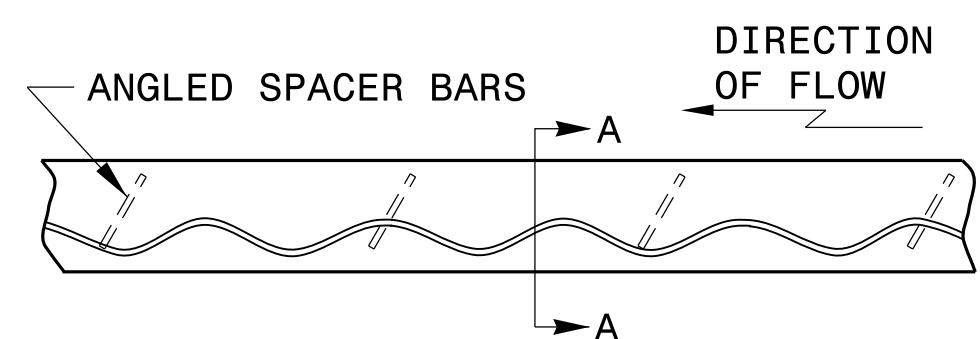
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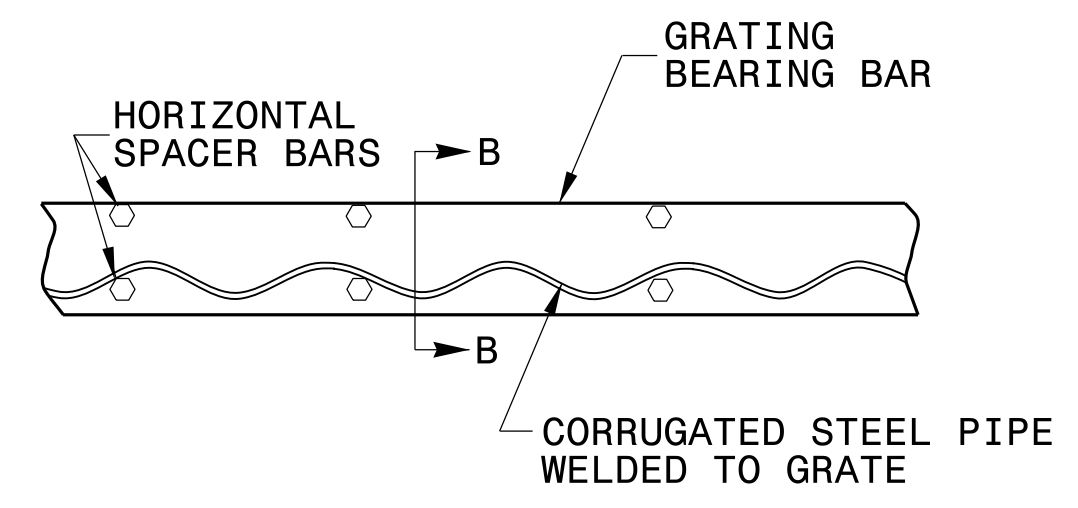
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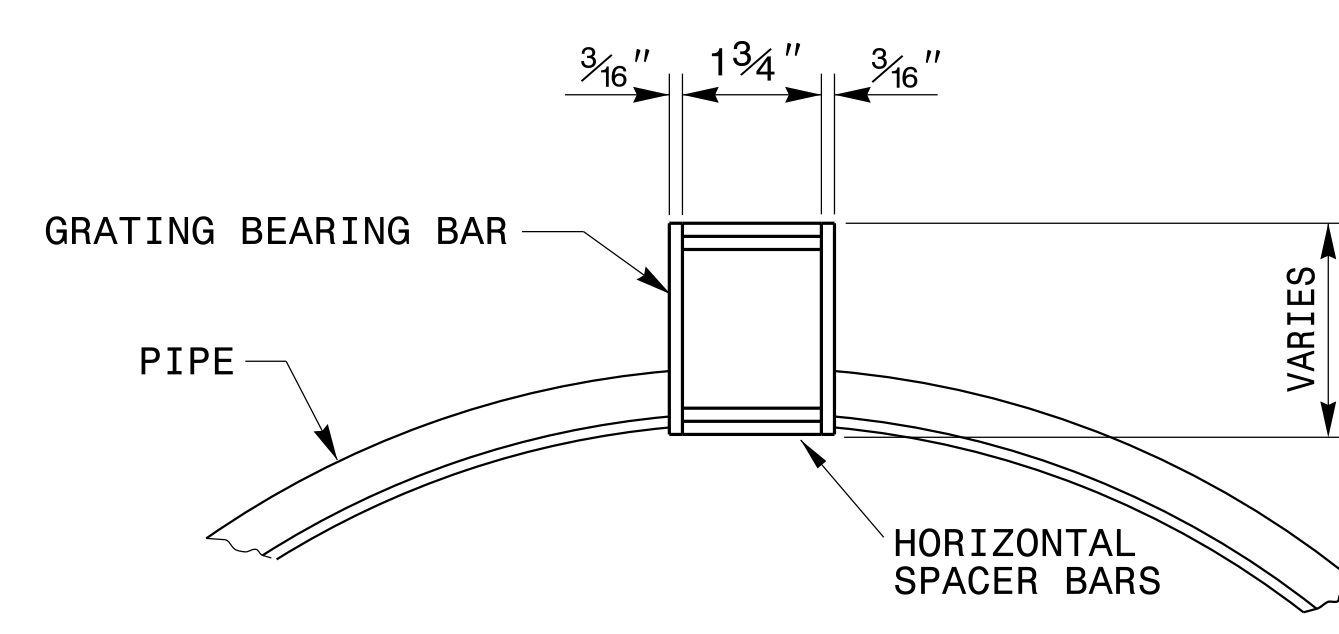
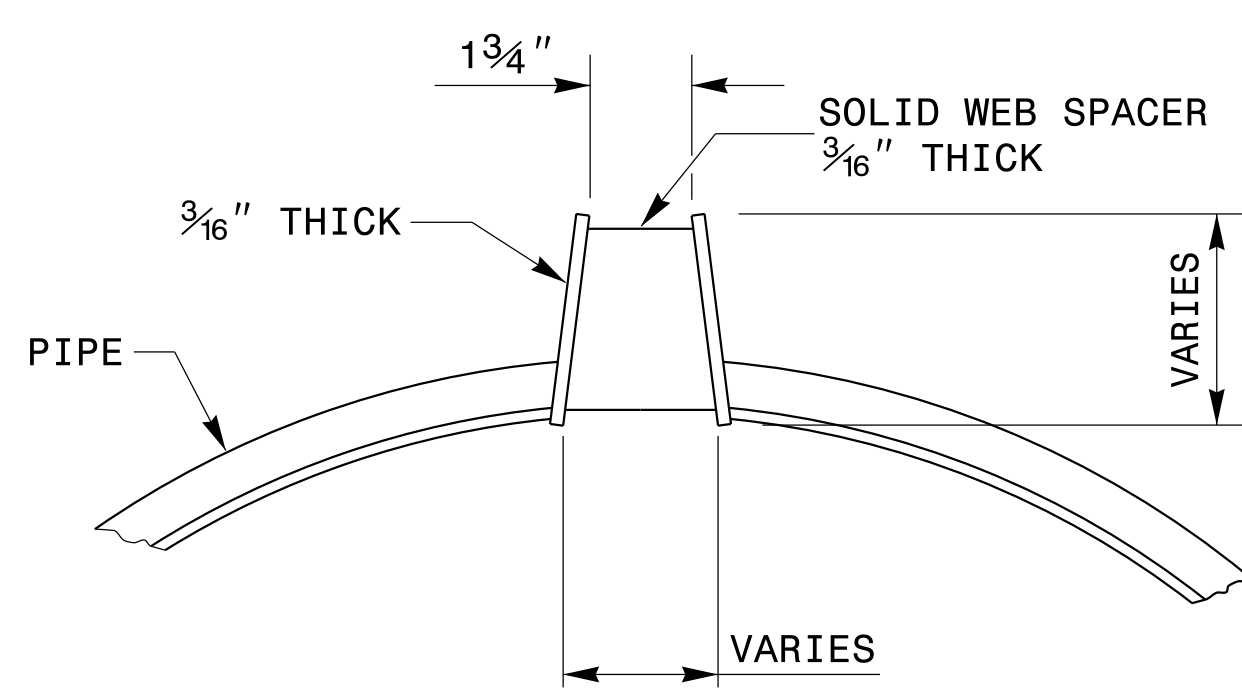
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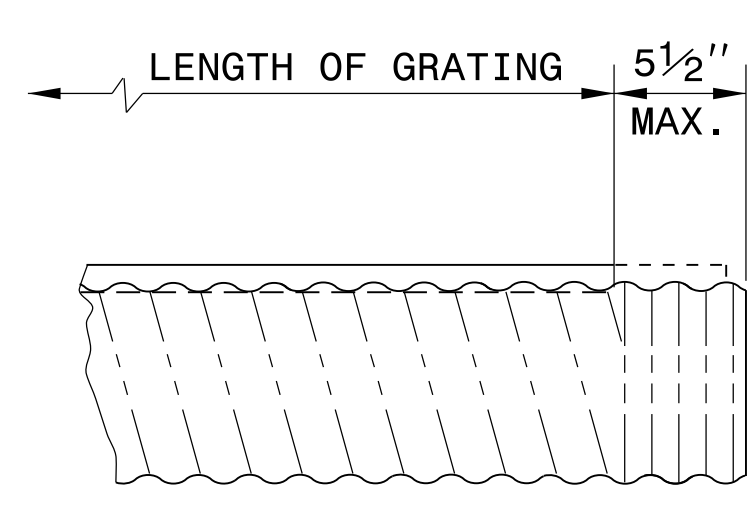
SECTION A-A



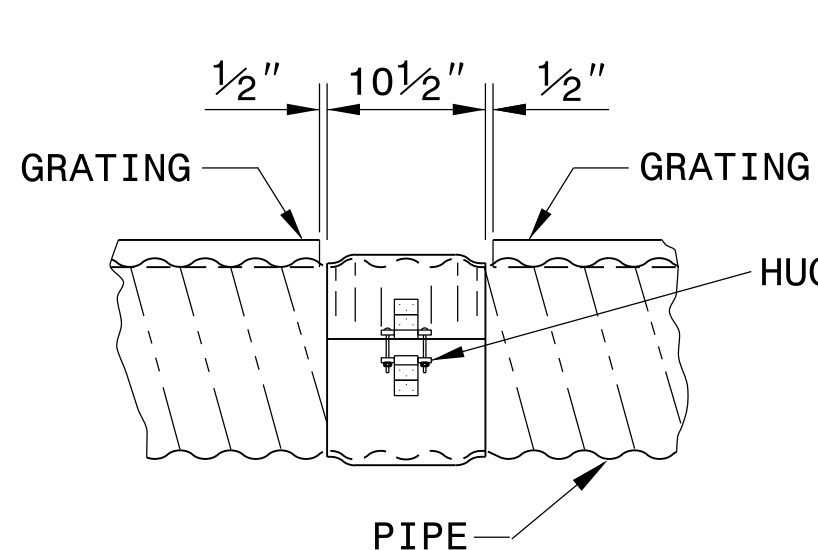
SECTION B-B



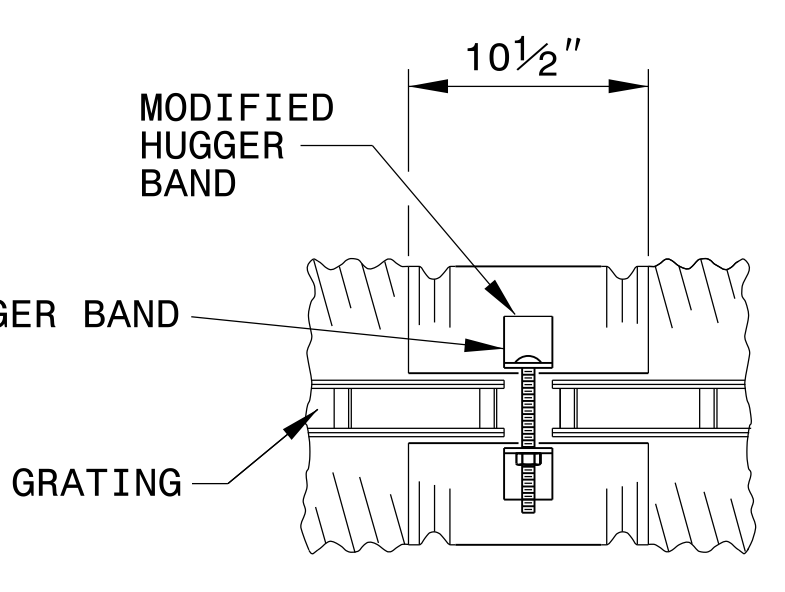
TYPICAL GRATE DETAILS



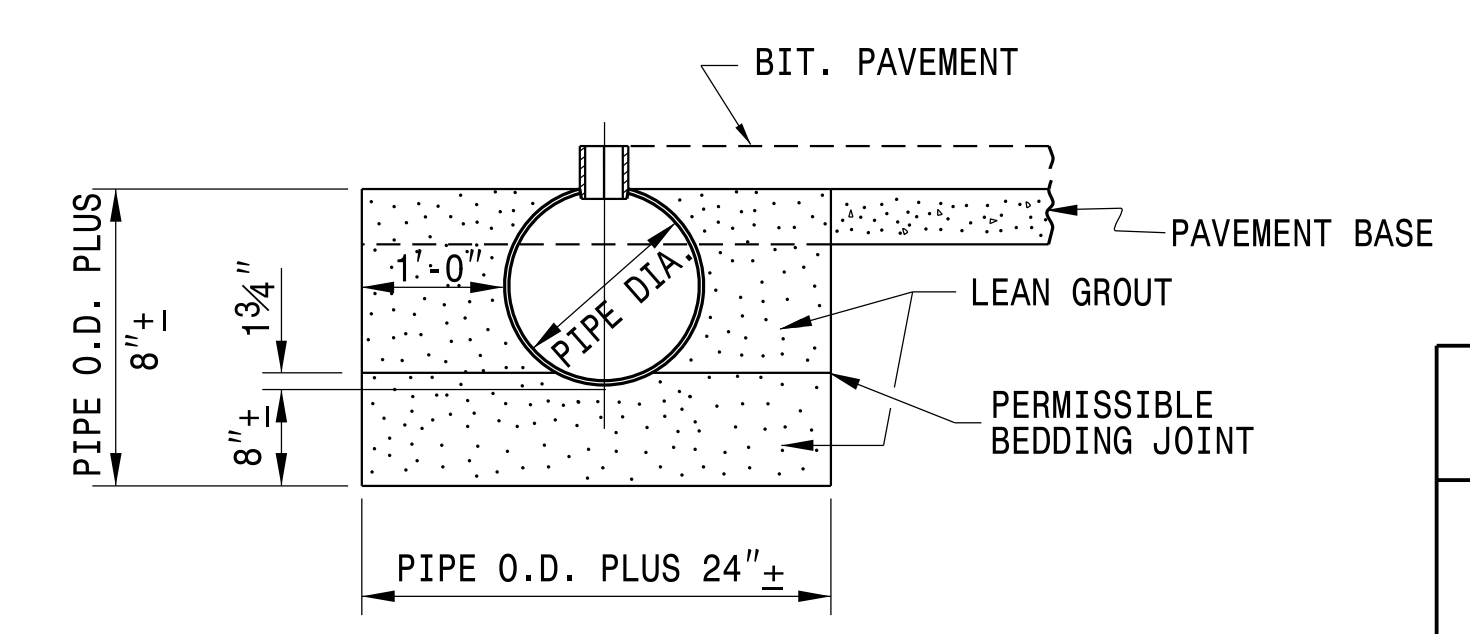
DETAIL AT END OF PIPE



TYPICAL COUPLING BAND



MODIFIED COUPLING BAND



SLOTTED DRAIN PIPE INSTALLATION

NOTES:

USE GRATE ASSEMBLIES FABRICATED FROM STRUCTURAL STEEL MEETING THE REQUIREMENTS OF ASTM A 570, GRADE 36 OR ASTM A 36.

HOT-DIP GALVANIZE GRATES AFTER FABRICATION TO MEET ASTM A123.

USE SLOTTED DRAIN PIPE THAT IS ADEQUATE FOR AASHTO H20 LOADING WHEN INSTALLED AS SHOWN.

USE SLOTTED DRAIN PIPE FABRICATED FROM ALUMINIZED CORRUGATED STEEL PIPE MEETING THE REQUIREMENTS OF AASHTO M274 TYPE 2.

NCDOT ALLOWS THE USE OF SIMILAR GRATE CONFIGURATIONS MEETING THE REQUIREMENTS OF THIS DETAIL, THE REQUIREMENTS OF THE SPECIAL PROVISIONS, AND THE APPROVAL OF THE ENGINEER.



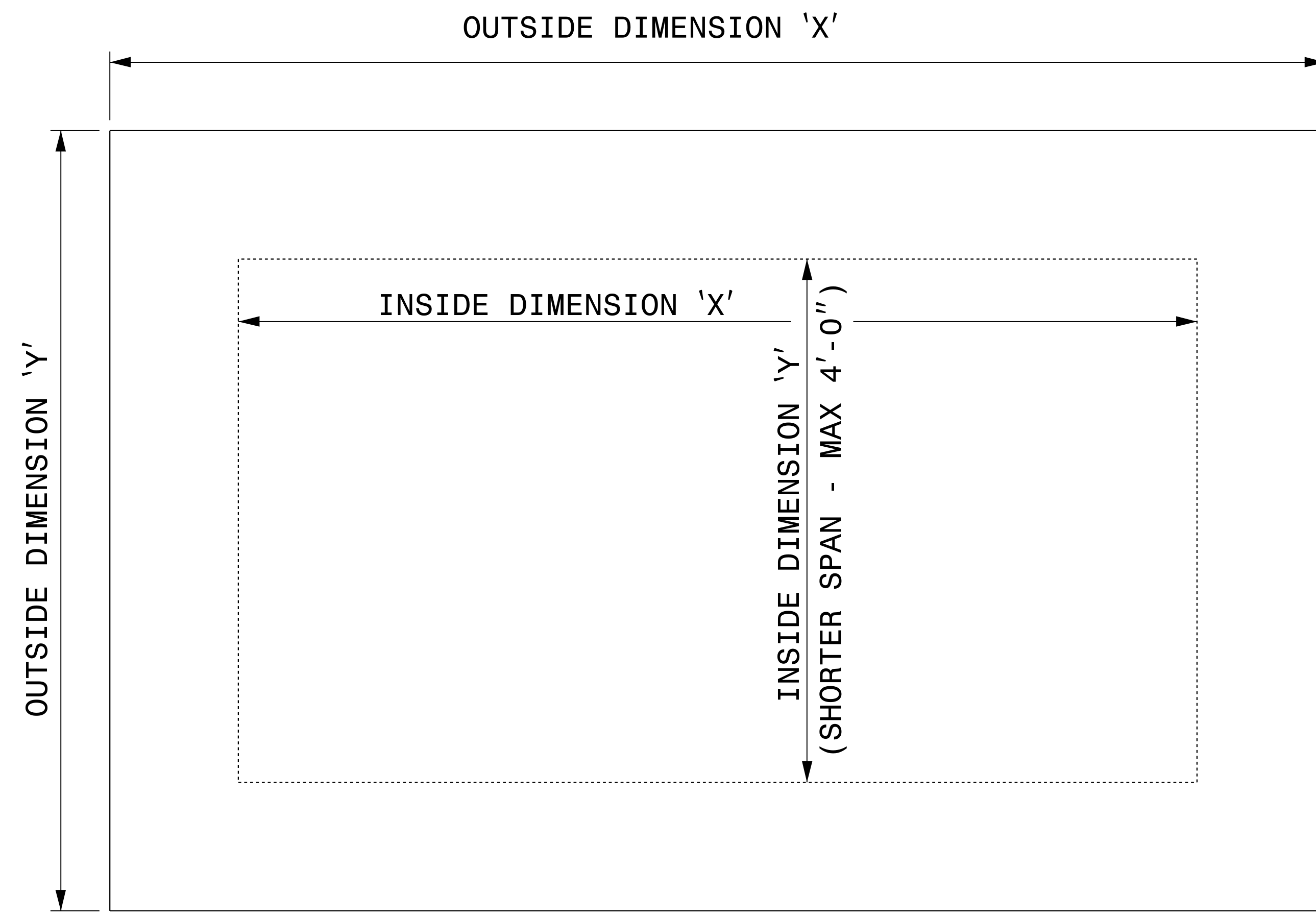
5/8/2017

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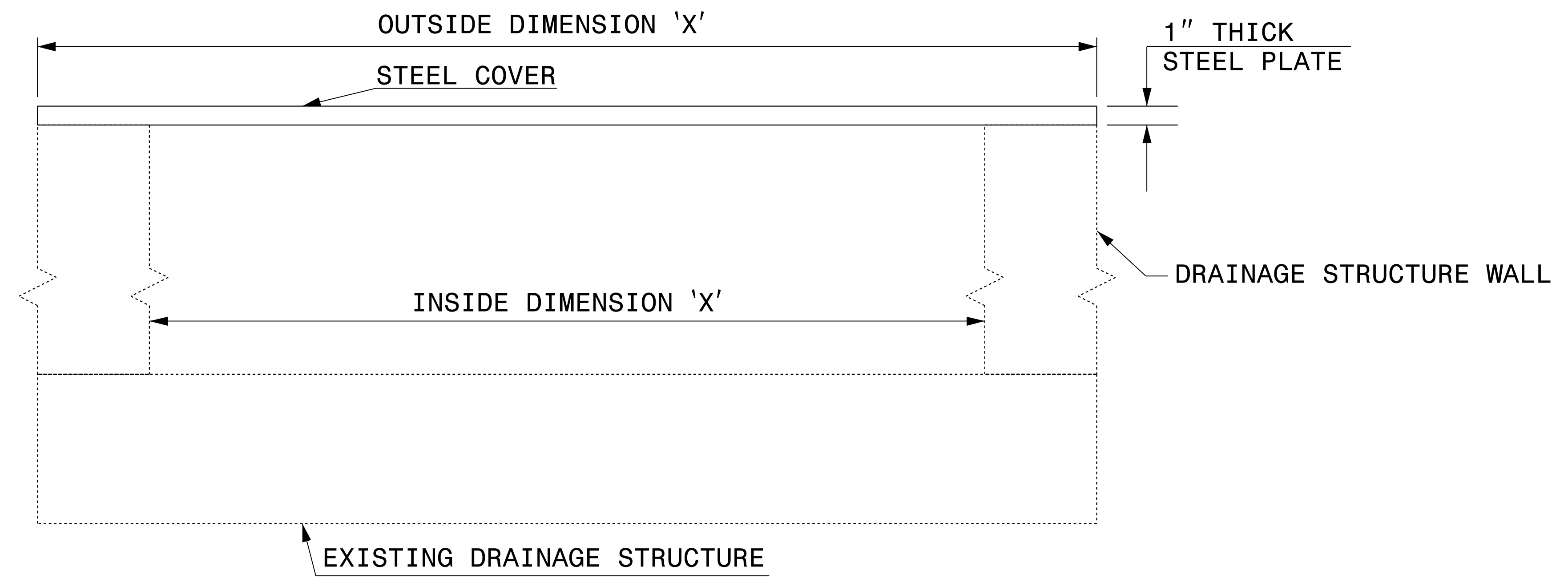
DETAILS OF SLOTTED DRAIN 12" THRU 36" DIAMETER PIPE

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MODIFIED BY: DATE: _____
CHECKED BY: DATE: _____
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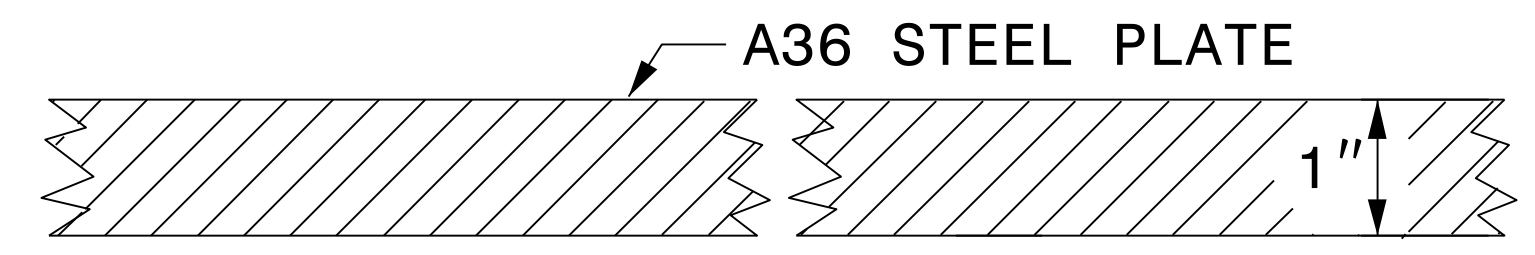
PLAN VIEWS



ELEVATION VIEWS

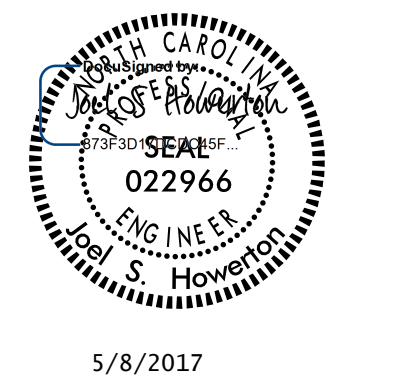
GENERAL NOTES:

- 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

21-MAR-2017 10:00 S:\Contracts\Special Details\Howerton\Steel Cover.dgn Jhowerton AT USD-252595



5/8/2017

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CONTRACT STANDARDS AND DEVELOPMENT UNIT	
Office 919-707-6950 FAX 919-250-4119	
DETAIL OF TEMPORARY 1" STEEL COVER OVER DRAINAGE STRUCTURE	
ORIGINAL BY: E.E. WARD	DATE: 2-2-98
MODIFIED BY:	DATE:
CHECKED BY:	DATE:
FILE SPEC.: eric:/usr/details/metric/stand/stlcvr2.dgn	

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

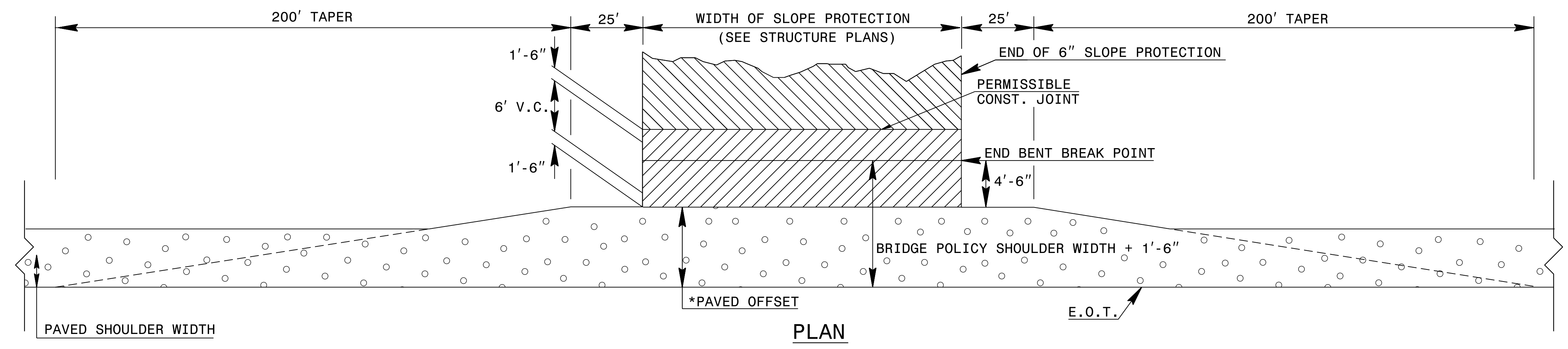
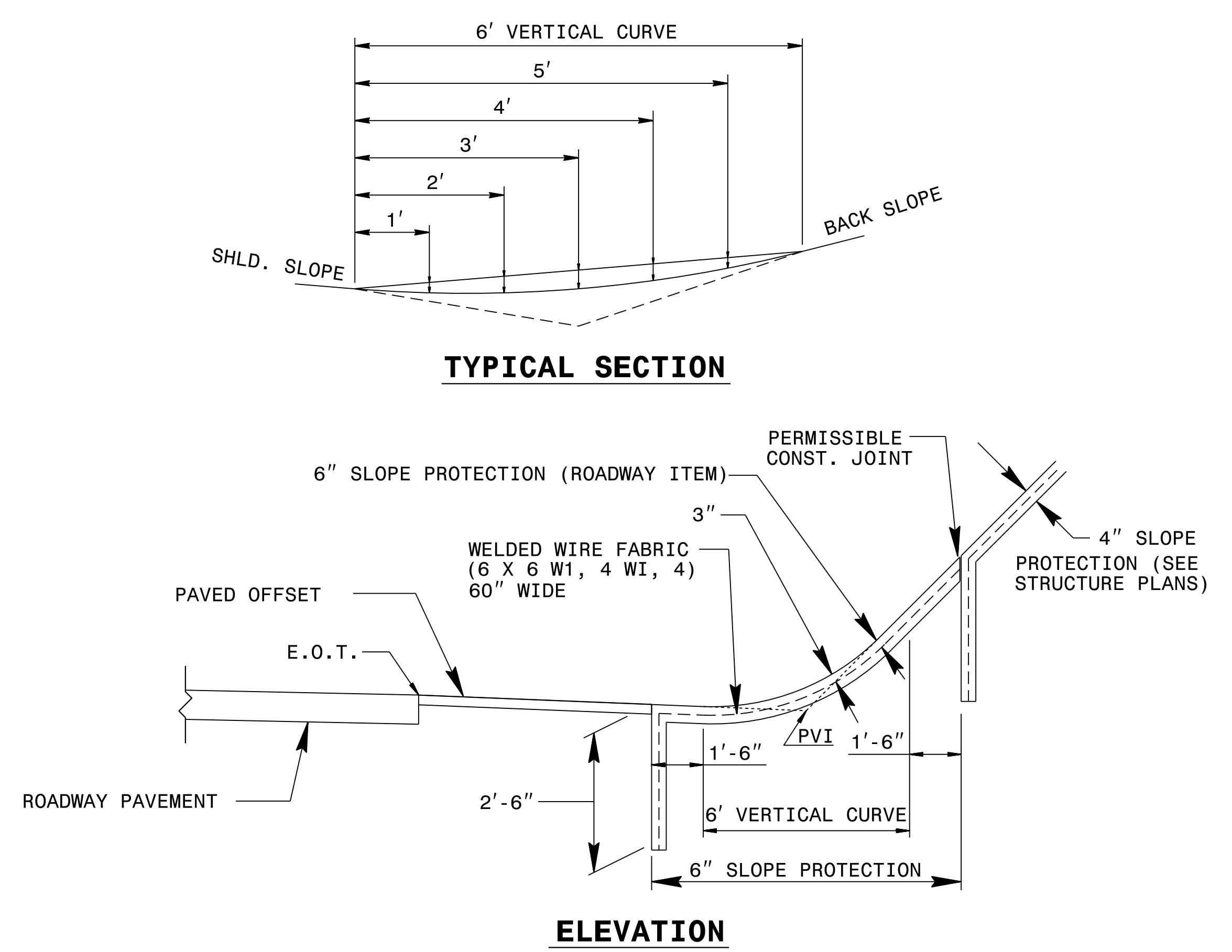
ENGLISH DETAIL DRAWING FOR
GUIDE FOR PAVING SHOULDERS UNDER BRIDGES
 METHOD III

SHEET 1 OF 1
610D03

HORZ. DIM.	1½:1 BACK SLOPE									
	SHOULDER SLOPE									
	.04	.03	.02	.01	.00	-.01	-.02	-.03	-.04	-.05
1'	0.26'	0.27'	0.27'	0.27'	0.28'	0.28'	0.28'	0.29'	0.30'	0.31'
2'	0.42'	0.42'	0.43'	0.44'	0.44'	0.45'	0.46'	0.46'	0.47'	0.48'
3'	0.47'	0.48'	0.49'	0.49'	0.50'	0.51'	0.52'	0.52'	0.53'	0.54'
4'	0.42'	0.42'	0.43'	0.44'	0.44'	0.45'	0.46'	0.46'	0.47'	0.48'
5'	0.26'	0.27'	0.27'	0.27'	0.28'	0.28'	0.28'	0.29'	0.30'	0.31'

HORZ. DIM.	2:1 BACK SLOPE									
	SHOULDER SLOPE									
	.04	.03	.02	.01	.00	-.01	-.02	-.03	-.04	-.05
1'	0.19'	0.20'	0.20'	0.20'	0.21'	0.21'	0.22'	0.22'	0.23'	0.23'
2'	0.31'	0.31'	0.32'	0.33'	0.33'	0.34'	0.35'	0.35'	0.36'	0.37'
3'	0.35'	0.35'	0.36'	0.37'	0.38'	0.38'	0.39'	0.40'	0.41'	0.41'
4'	0.31'	0.31'	0.32'	0.33'	0.33'	0.34'	0.35'	0.35'	0.36'	0.37'
5'	0.19'	0.20'	0.20'	0.20'	0.21'	0.21'	0.22'	0.22'	0.23'	0.23'

VERTICAL CURVE OFFSET
(FOR 6' V.C. AT BRIDGES)



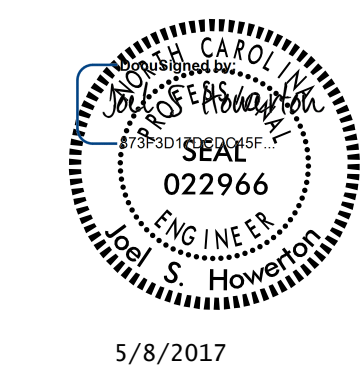
NOTES:
 PAVE THE FULL WIDTH OF THE SHOULDER AS SHOWN WITH SHOULDER PAVEMENT MATERIAL AS SHOWN ON PLANS.
 * PAVED OFFSET BASED ON BRIDGE POLICY (SEE STRUCTURE PLANS).
 PROTECT SLOPE WITH REINFORCED CONCRETE PAVING. CONCRETE BLOCK PAVING WILL NOT BE PERMITTED.
 OFFSETS FOR 6' V.C. DENOTES FINISHED GRADE OF SLOPE PROTECTION.

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

ENGLISH DETAIL DRAWING FOR
GUIDE FOR PAVING SHOULDERS UNDER BRIDGES
 METHOD III

SHEET 1 OF 1
610D03

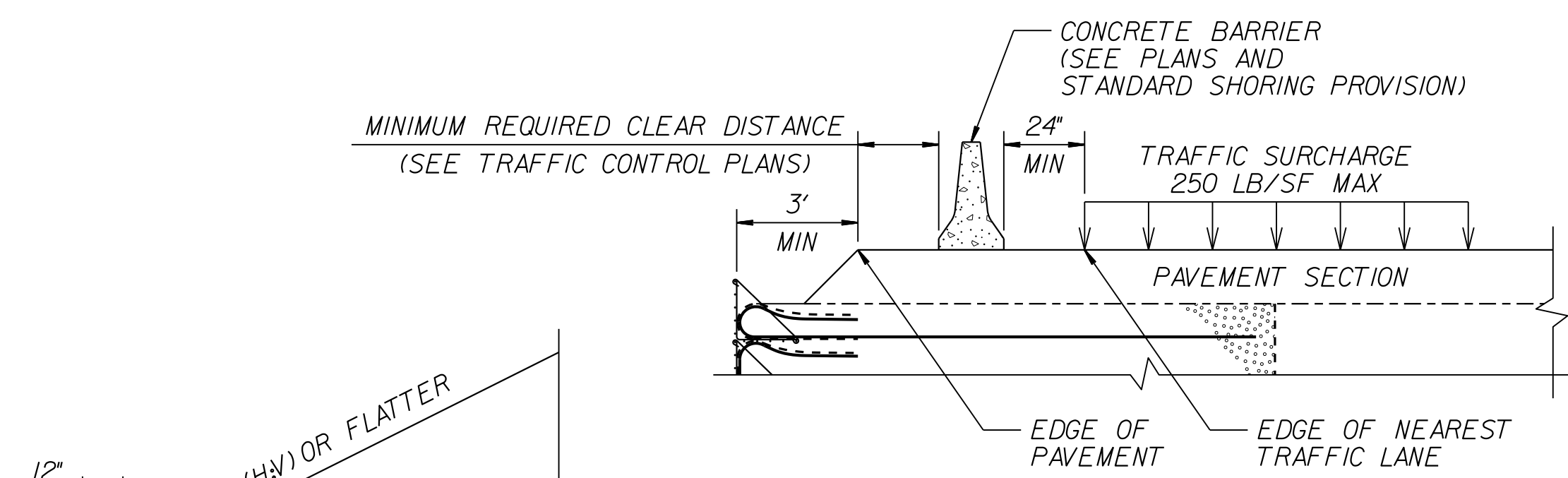
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 Jhowerton



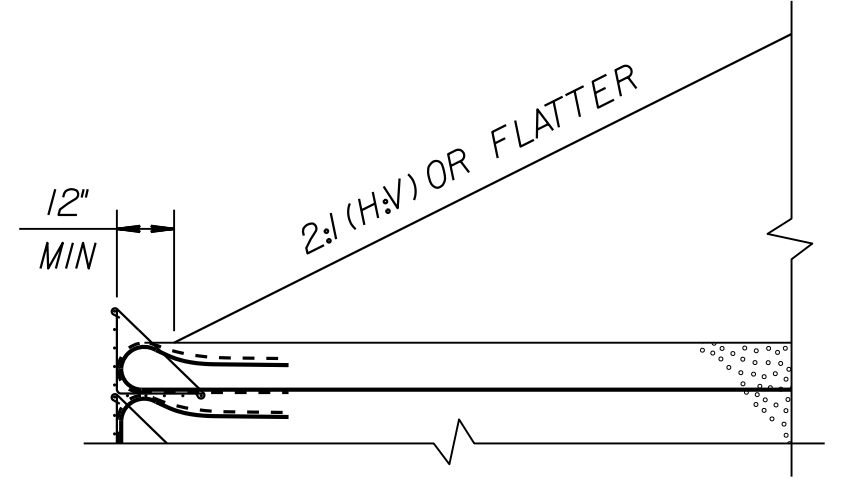
5/8/2017

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UNLESS ALL SIGNATURES COMPLETED

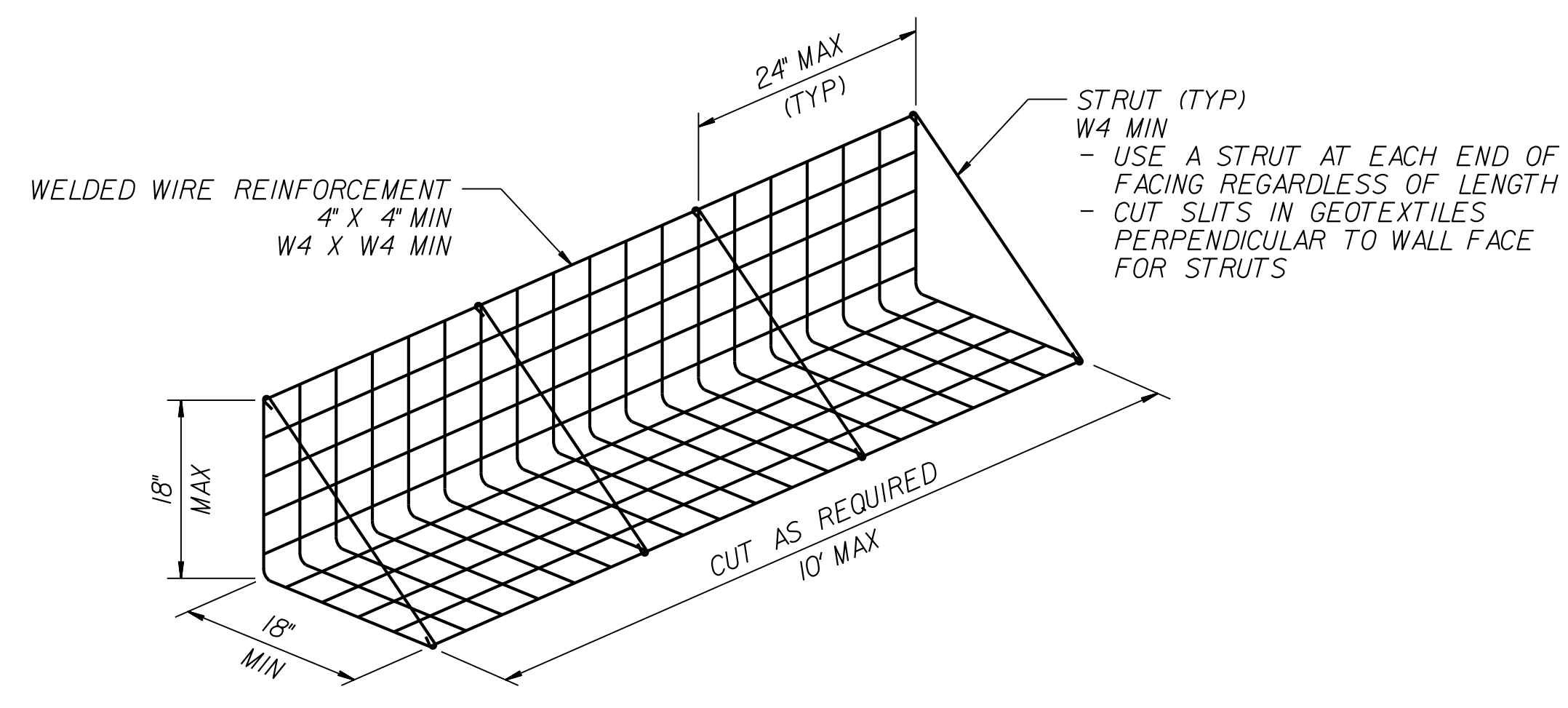
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 Office 919-707-6950 FAX 919-250-4119
SEE TITLE BLOCK
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 MODIFIED BY: DATE:
 CHECKED BY: DATE:
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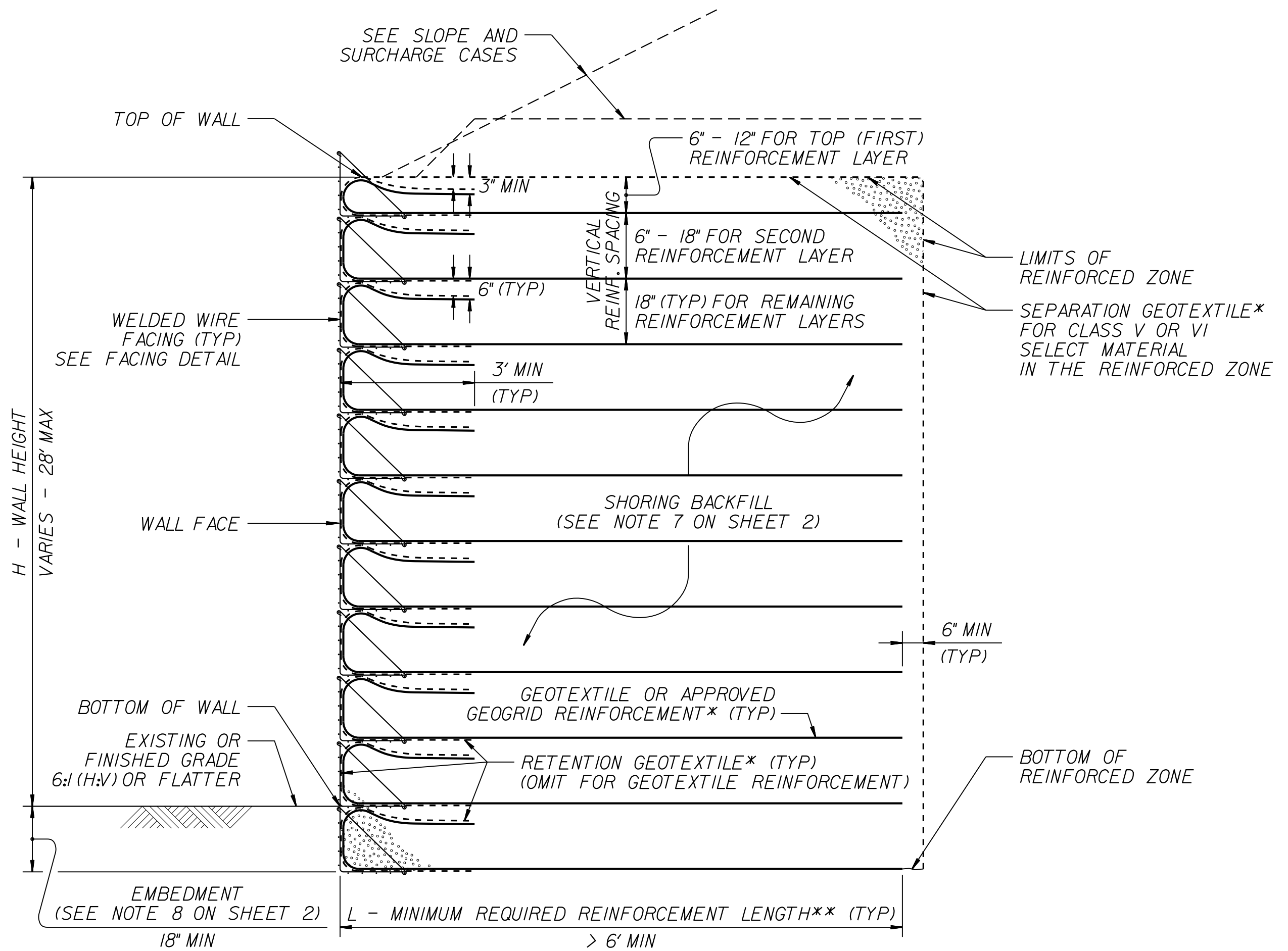
SURCHARGE CASE



SLOPE CASE

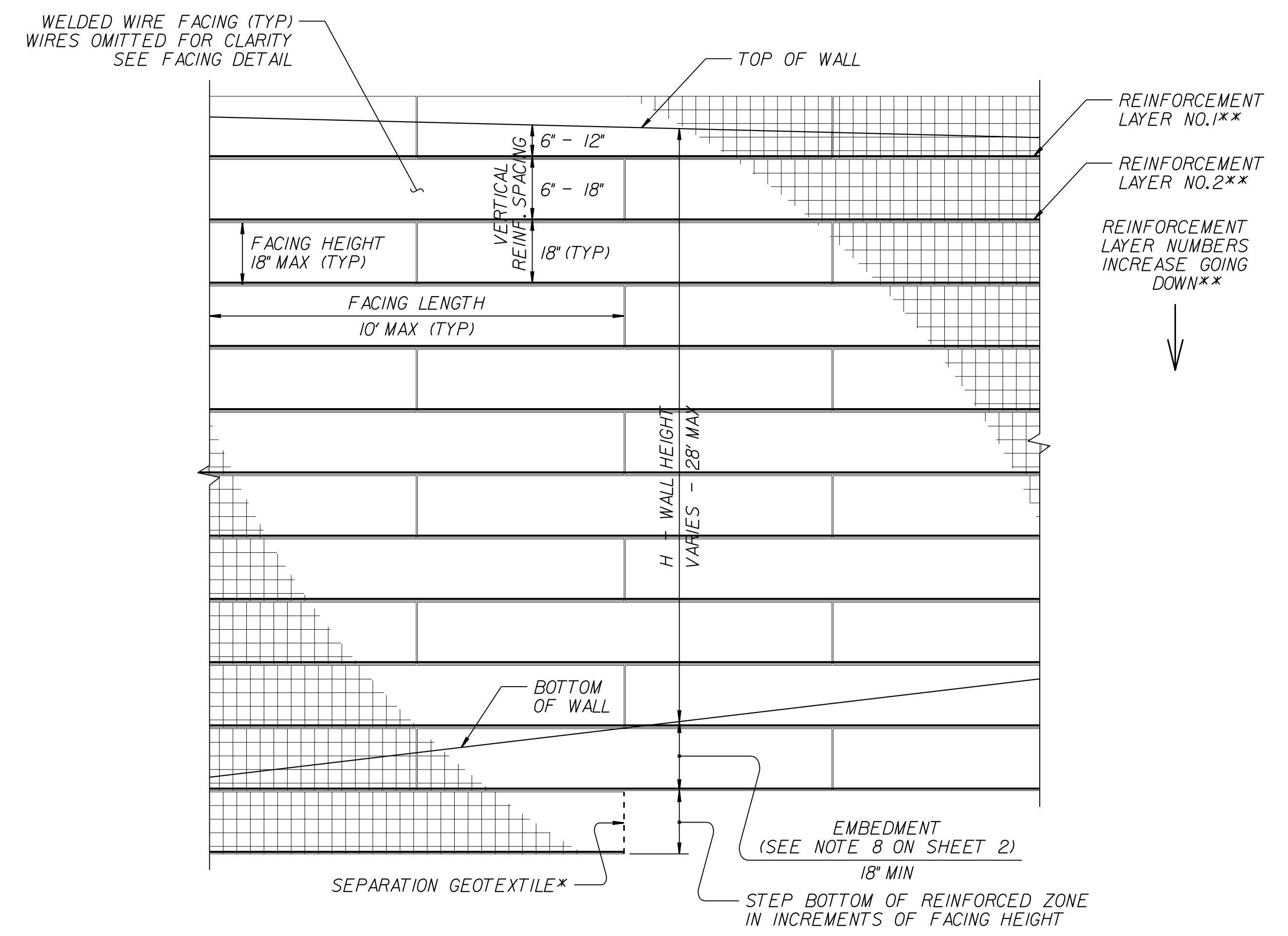


FACING DETAIL



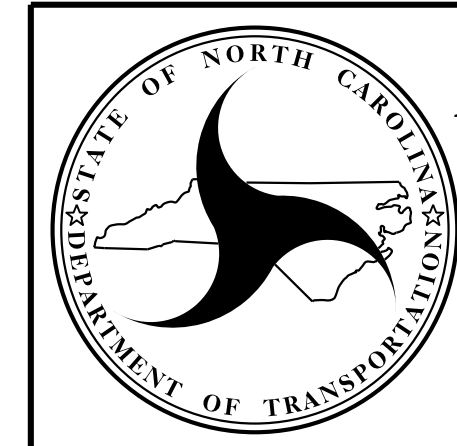
STANDARD TEMPORARY WALL

(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.

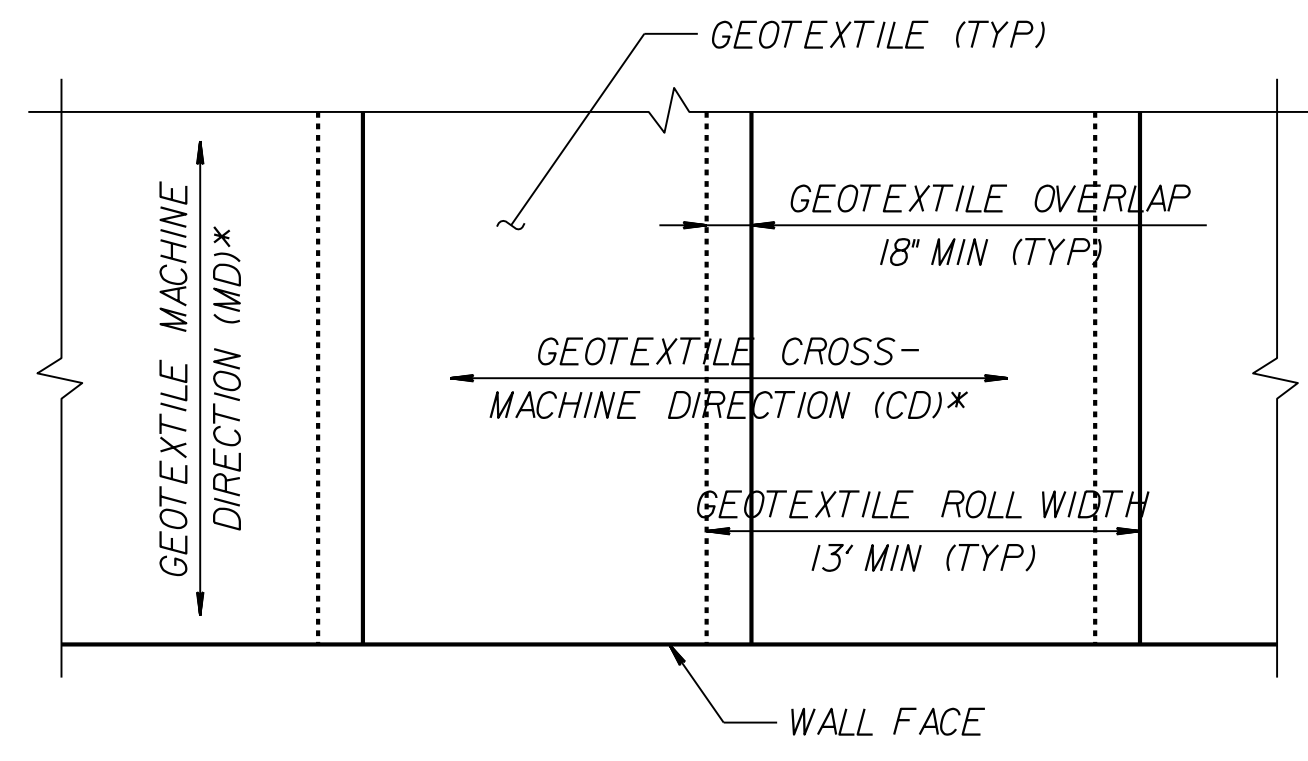


NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS

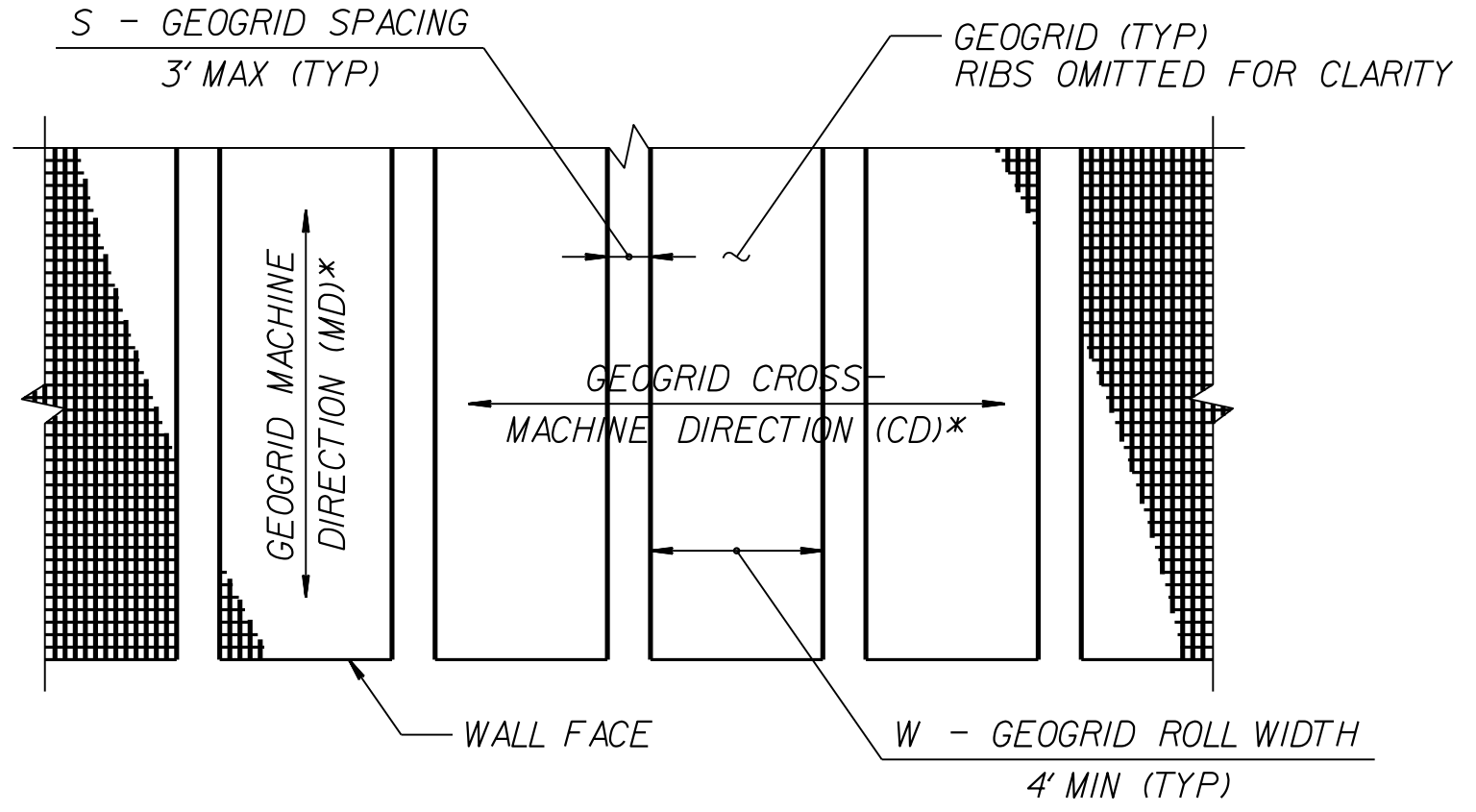
**GEOTECHNICAL
 ENGINEERING UNIT**

STANDARD DETAIL NO. 1801.02

STANDARD
 TEMPORARY WALL
 SHEET 1 OF 3

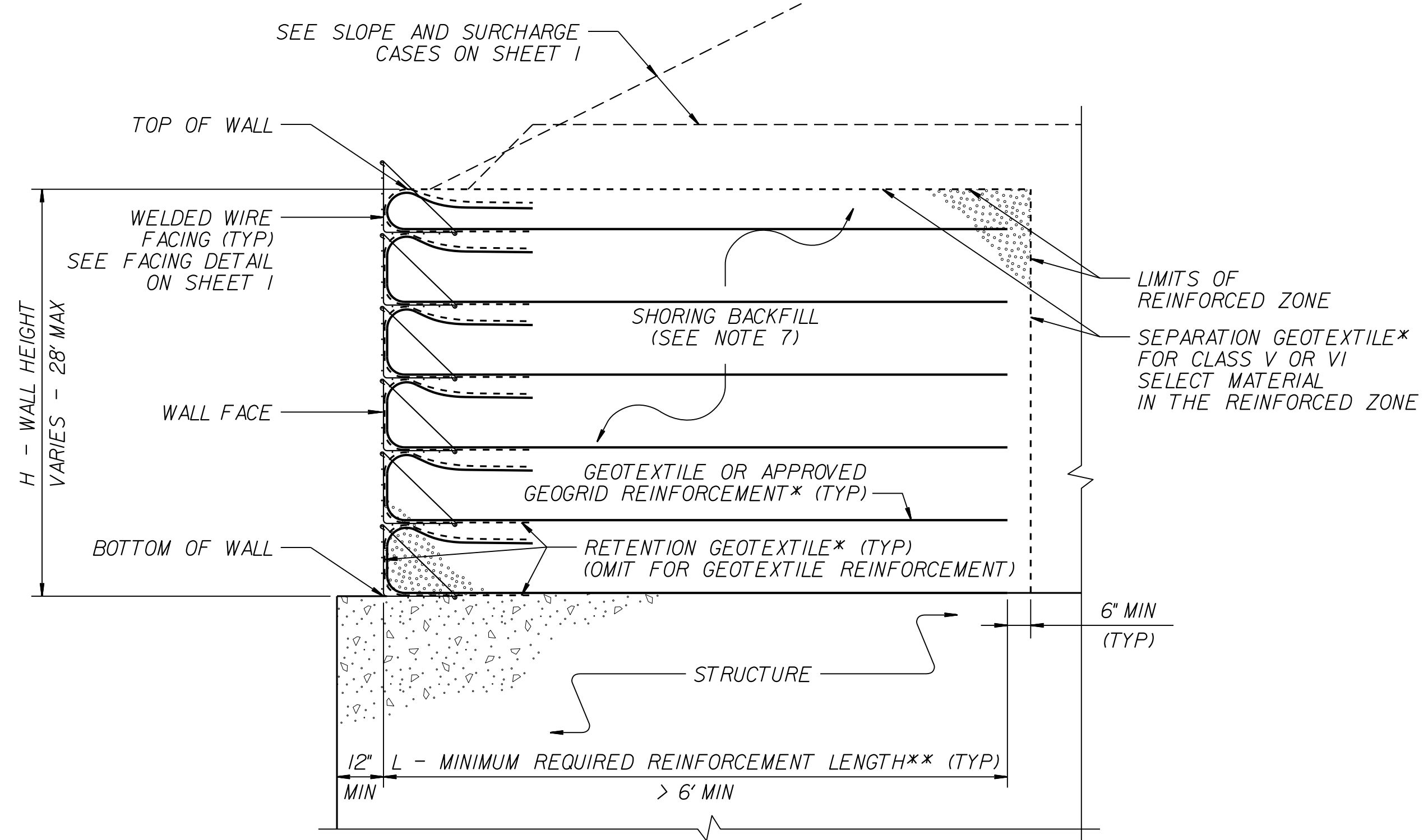


GEOTEXTILE PLACEMENT
(100% COVERAGE MIN FOR GEOTEXTILE REINFORCEMENT)



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.



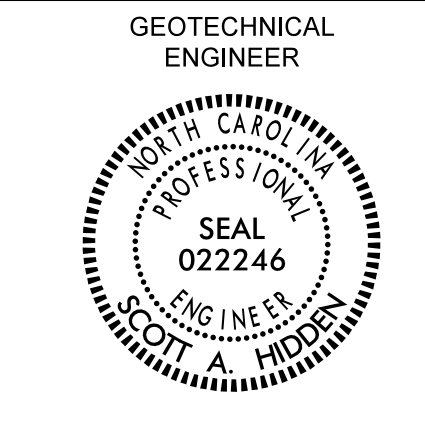
TEMPORARY WALL ON STRUCTURE DETAIL
*SEE GEOSYNTHETIC PLACEMENT DETAILS.
**SEE REINFORCEMENT TABLES ON SHEET 3.

NOTES:

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

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

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

PROJECT REFERENCE NO. B-4447	SHEET NO. 2G-3
	ENGINEER
Documented by: <i>Scott A. Hadden</i> 5/17/2017 <small>DATE</small>	<small>SIGNATURE</small> <small>DATE</small>
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

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	8	8	9	9	10	10	11	12	13	13	14	14	15	15	16	17	17	18	19	19		

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

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

*BASED ON VERTICAL REINFORCEMENT SPACING SHOWN ON SHEET 1.

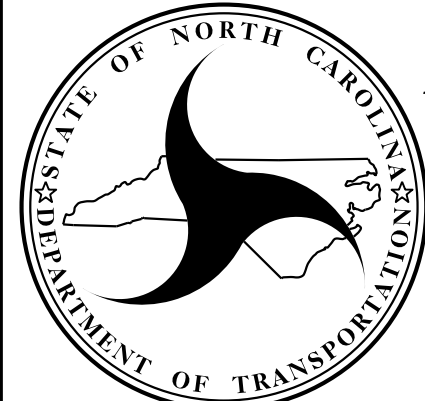
REINFORCEMENT LAYER NUMBER*	SHORING BACKFILL TYPE IN THE REINFORCED ZONE (SEE NOTE 7 ON SHEET 2)				
	SLOPE CASE		SURCHARGE CASE		
	CLASS II, TYPE I OR CLASS III SELECT MATERIAL	CLASS V SELECT MATERIAL	A-2-4 SOIL	CLASS II, TYPE I OR CLASS III SELECT MATERIAL	CLASS V SELECT MATERIAL
1	2400	2400	2400	2400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

GEOTEXTILE REINFORCEMENT
ULTIMATE TENSILE STRENGTH (LB/FT)

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

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

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



NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL
ENGINEERING UNIT

STANDARD DETAIL NO. 1801.02

STANDARD
TEMPORARY WALL
SHEET 3 OF 3

DATE: 11-19-13

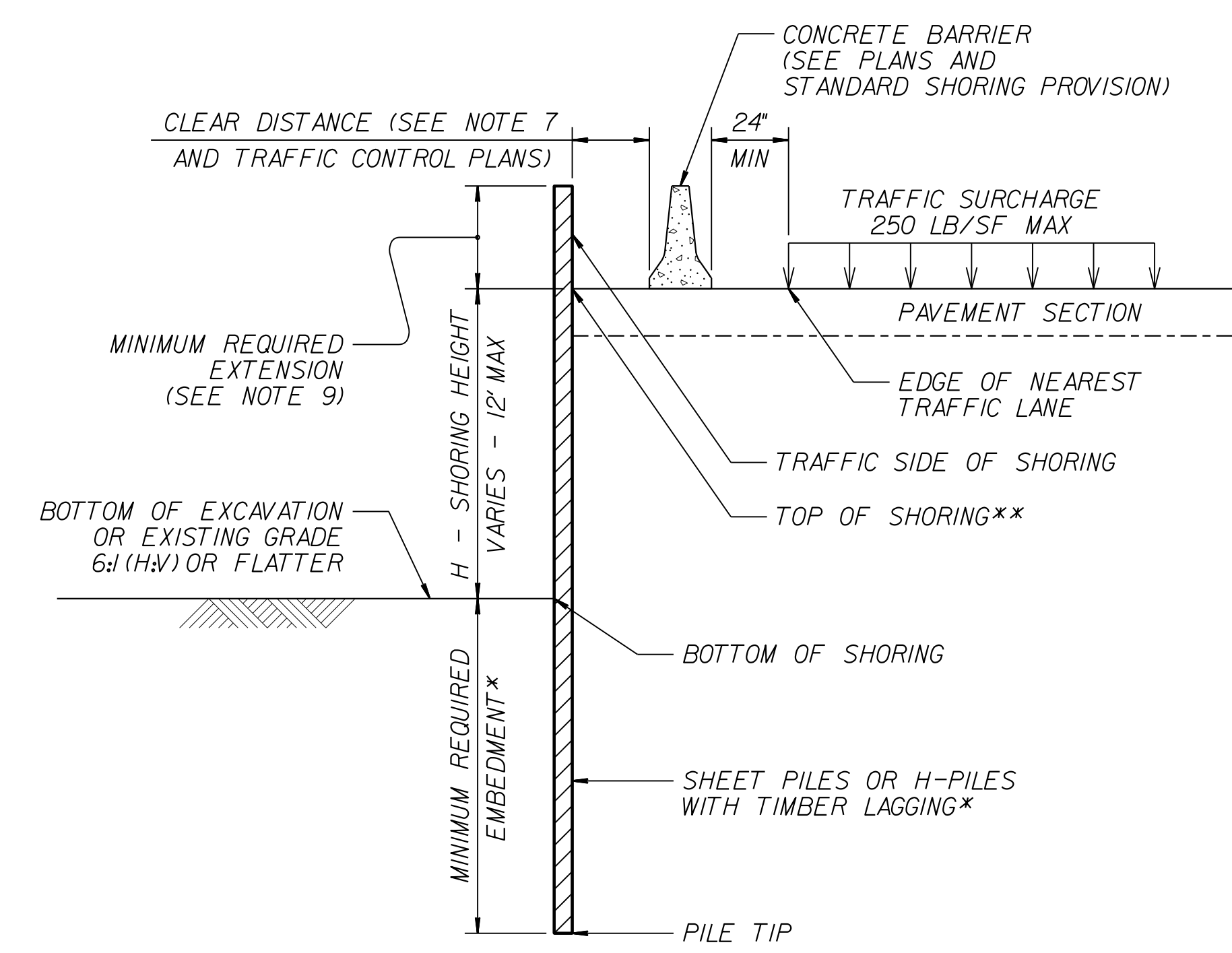
GROUNDWATER CONDITION (SEE NOTE 6)	H SHORING HEIGHT (FT)	SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT					SURCHARGE CASE WITH TRAFFIC IMPACT				
		SHEET PILES		H-PILES WITH TIMBER LAGGING			SHEET PILES		H-PILES WITH TIMBER LAGGING		
		MINIMUM REQUIRED EMBEDMENT (FT)	MINIMUM REQUIRED SECTION MODULUS (IN ³ /FT)	MINIMUM REQUIRED EMBEDMENT* (FT) (SEE NOTE 10)			MINIMUM REQUIRED EMBEDMENT (FT)	MINIMUM REQUIRED SECTION MODULUS (IN ³ /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

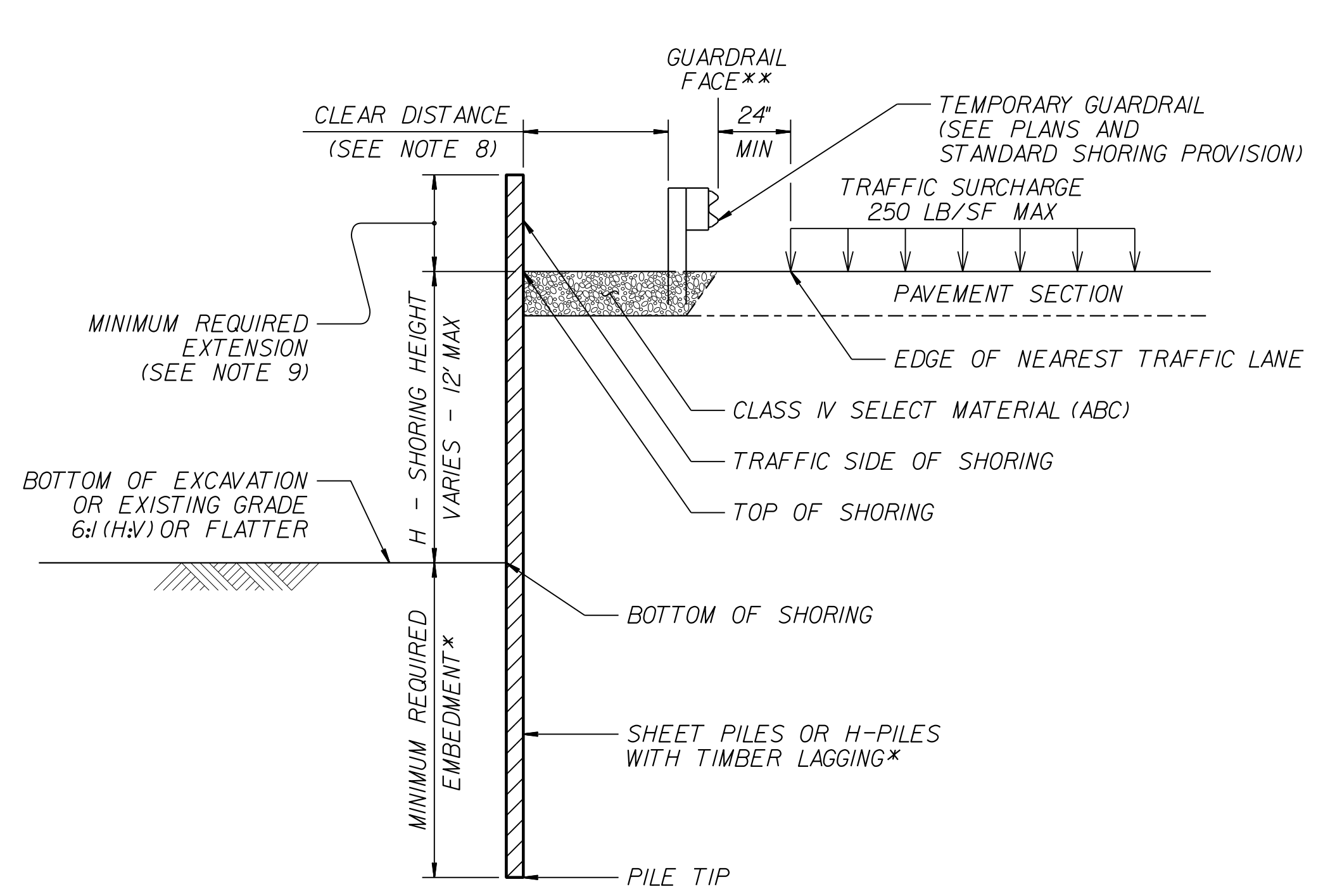
*DO NOT USE H-PILES WITH TIMBER LAGGING FOR GROUNDWATER CONDITION, SHORING HEIGHT AND H-PILE SIZE SHOWN IF MINIMUM REQUIRED EMBEDMENT IS "--".

NOTES:

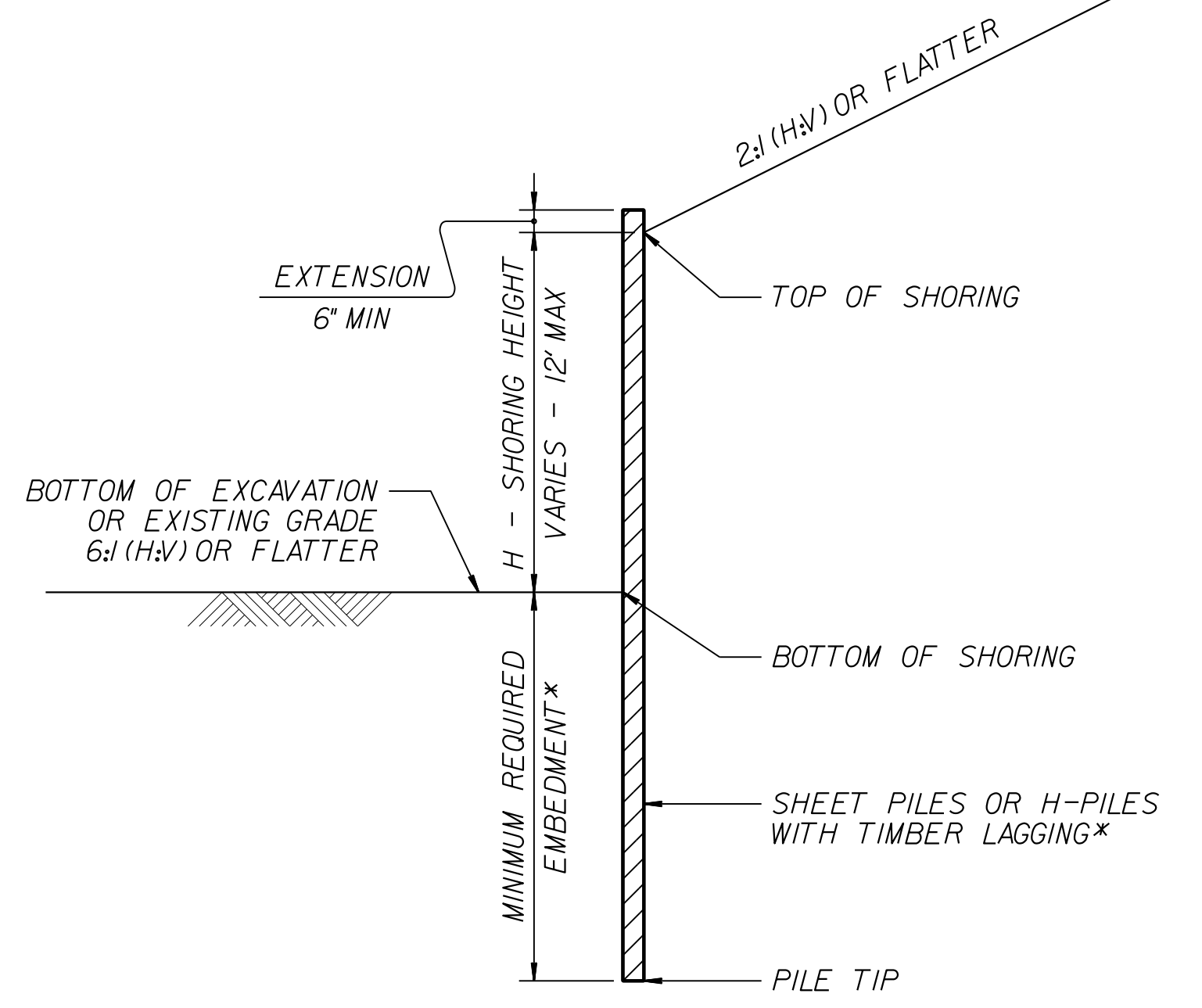
- AT THE CONTRACTOR'S OPTION, USE STANDARD TEMPORARY SHORING AS NOTED IN THE PLANS.
- FOR STANDARD TEMPORARY SHORING, SEE STANDARD SHORING PROVISION.
- STANDARD TEMPORARY SHORING IS BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:
UNIT WEIGHT, $\gamma = 120$ LB/CF
FRICTION ANGLE, $\phi = 30$ DEGREES
COHESION, $c = 0$ LB/SF
- 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
- 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

SUMMARY OF EARTHWORK

IN CUBIC YARDS

Table with columns: Station, Station, Uncl. Excav., Embank. +%, Borrow, Waste. Includes subtotals for Summary No. 1, 2, 3, 4 and a Grand Total.

UNDERCUT EXCAVATION = 400 CY (Contingency)
GRADE POINT UNDERCUT = 220 CY
TOTAL UNDERCUT = 620 CY

SELECT GRANULAR MATERIAL = 620 CY (Contingency)
GEOTEXTILE FOR SOIL STABILIZATION = 400 SY (Contingency)
UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE = 100 CY (Contingency)

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WOVEN WIRE FENCE, 47" FABRIC
IN LINEAR FEET

Table with columns: STATION TO STATION, LT. OR RT., FABRIC L.F., 4" POSTS, 5" POSTS. Includes a total row.

PAVEMENT REMOVAL SUMMARY
IN SQUARE YARDS

Table with columns: SURVEY LINE, Station, Station, LOCATION LTR/CL, ASPHALT REMOVAL, ASPHALT BREAKUP, CONCRETE REMOVAL, CONCRETE BREAKUP. Includes a total row.

SHOULDER BERM GUTTER SUMMARY
IN LINEAR FEET

Table with columns: LINE, Station, Station, LENGTH. Includes a total row.

TEMPORARY GUARDRAIL SUMMARY

Large table with columns: SURVEY LINE, BEG. STA., END STA., LOCATION, LENGTH (STRAIGHT, SHOP CURVED, DOUBLE FACED), WARRANT POINT (APPROACH END, TRAILING END), "N" DIST. FROM E.O.L., TOTAL SHOUL WIDTH, FLARE LENGTH (APPROACH END, TRAILING END), W (APPROACH END, TRAILING END), ANCHORS (TEMP GRAU 350, TEMP TYPE III, TEMP CAT-1, TEMP B-77, TYPE III, CAT-1, VI MOD, BIC, AT-1), IMPACT ATTENUATOR TYPE 350 (G, NG), SINGLE FACED CONCRETE BARRIER, REMOVE EXISTING GUARDRAIL, REMOVE & STOCKPILE EXISTING GUARDRAIL, REMARKS.

"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

GUARDRAIL SUMMARY

G = GATING IMPACT ATTENUATOR TYPE 350
NG = NON-GATING IMPACT ATTENUATOR TYPE 350

Table with columns: SURVEY LINE, BEG. STA., END STA., LOCATION, LENGTH (STRAIGHT, SHOP CURVED, DOUBLE FACED), WARRANT POINT (APPROACH END, TRAILING END), "N" DIST. FROM E.O.L., TOTAL SHOUL WIDTH, FLARE LENGTH (APPROACH END, TRAILING END), W (APPROACH END, TRAILING END), ANCHORS (XI MOD, XI, GRAU 350, M-350, TYPE III, CAT-1, B-77, BIC, AT-1), IMPACT ATTENUATOR TYPE 350 (G, NG), SINGLE FACED CONCRETE BARRIER, REMOVE EXISTING GUARDRAIL, REMOVE & STOCKPILE EXISTING GUARDRAIL, REMARKS.

ADDITIONAL GUARDRAIL POSTS = 5 EA

COMPUTED BY: RDL DATE: 4/28/17
CHECKED BY: KDA DATE: 4/28/17

PROJECT NO. SHEET NO.
B-4447 3D-1

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

Note: Invert Elevations indicated are for Bid Purposes only and shall not be used for project construction stakeout.
See "Standard Specifications For Roads and Structures, Section 300-5".

LIST OF PIPES, ENDWALLS, ETC. (FOR PIPES 48 INCHES & UNDER)

Table with columns: LINE & STATION, OFFSET, STRUCTURE NUMBER, TOP ELEVATION, INVERT ELEVATION, MINIMUM REQUIRED SLOPE, Side Drain Pipe (RCP, CSP, CAAP, HDPE, or PVC), C. S. PIPE (12-84 inch diameters), R. C. PIPE CLASS III, R. C. PIPE CLASS IV, R. C. PIPE CLASS V, ENDWALLS, QUANTITIES, and REMARKS. Includes a SHEET TOTALS row at the bottom.

SHEET TOTALS

76 796 8 352 216 328 88 260 276 3,800 14 1 11 5 5 2 1 1 3 1 6 220 107 2476

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				UD	1,000
				TOTAL LF:	1,000

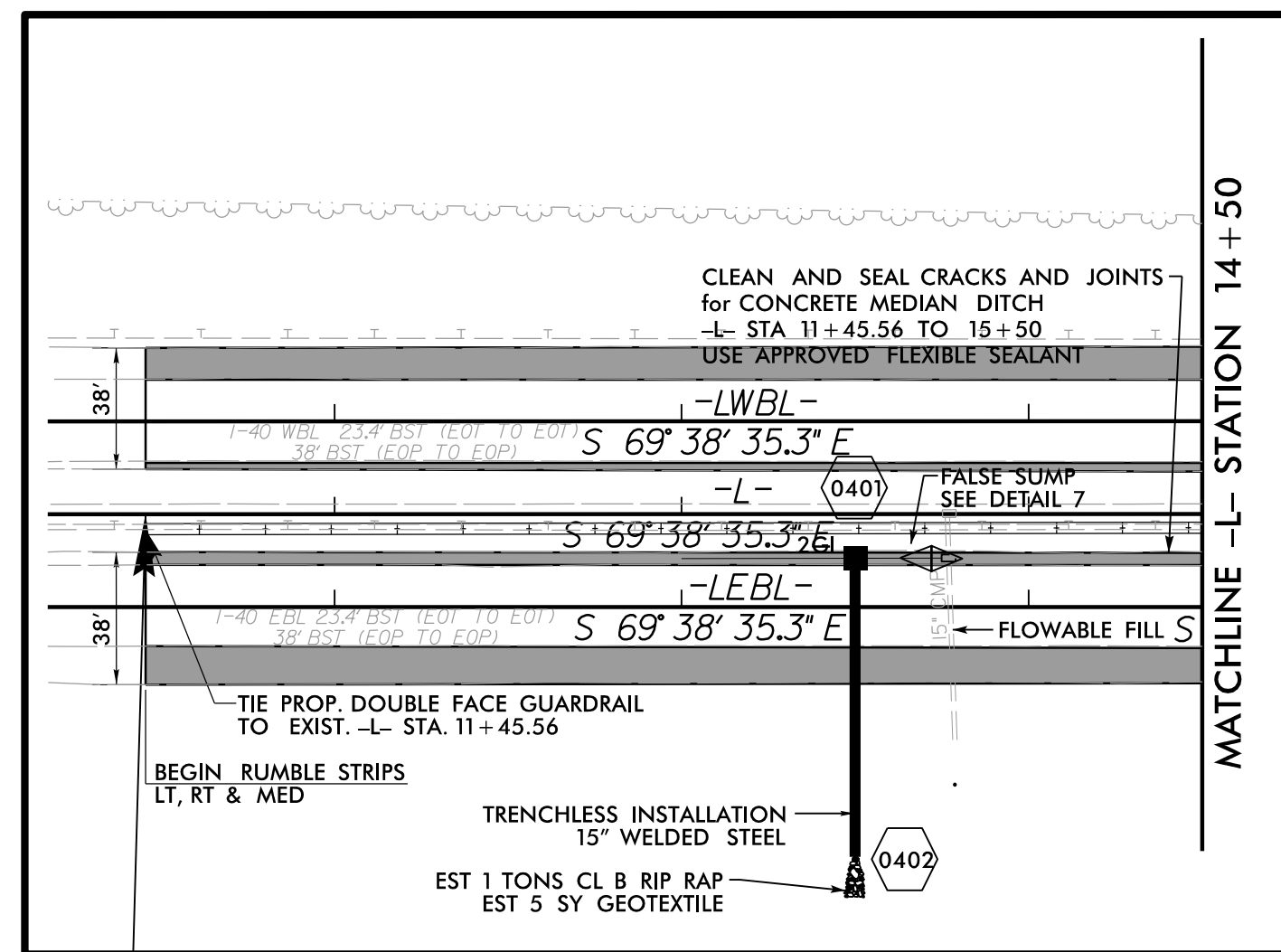
*UD = Underdrain
 *BD = Blind Drain
 *SD = Subsurface Drain

4/04/06

5/8/2017 10:44:47 AM I:\S\16447_Rdy_sum_30-1.dgn

PROJECT REFERENCE NO. B-4447	SHEET NO. 4
ROADWAY DESIGN ENGINEER ANDREW P. YOUNG SEAL 034407 5/17/2017	HYDRAULICS ENGINEER RAY D. LOVINGOOD SEAL 019775 5/18/2017
STEWART	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

INSET A

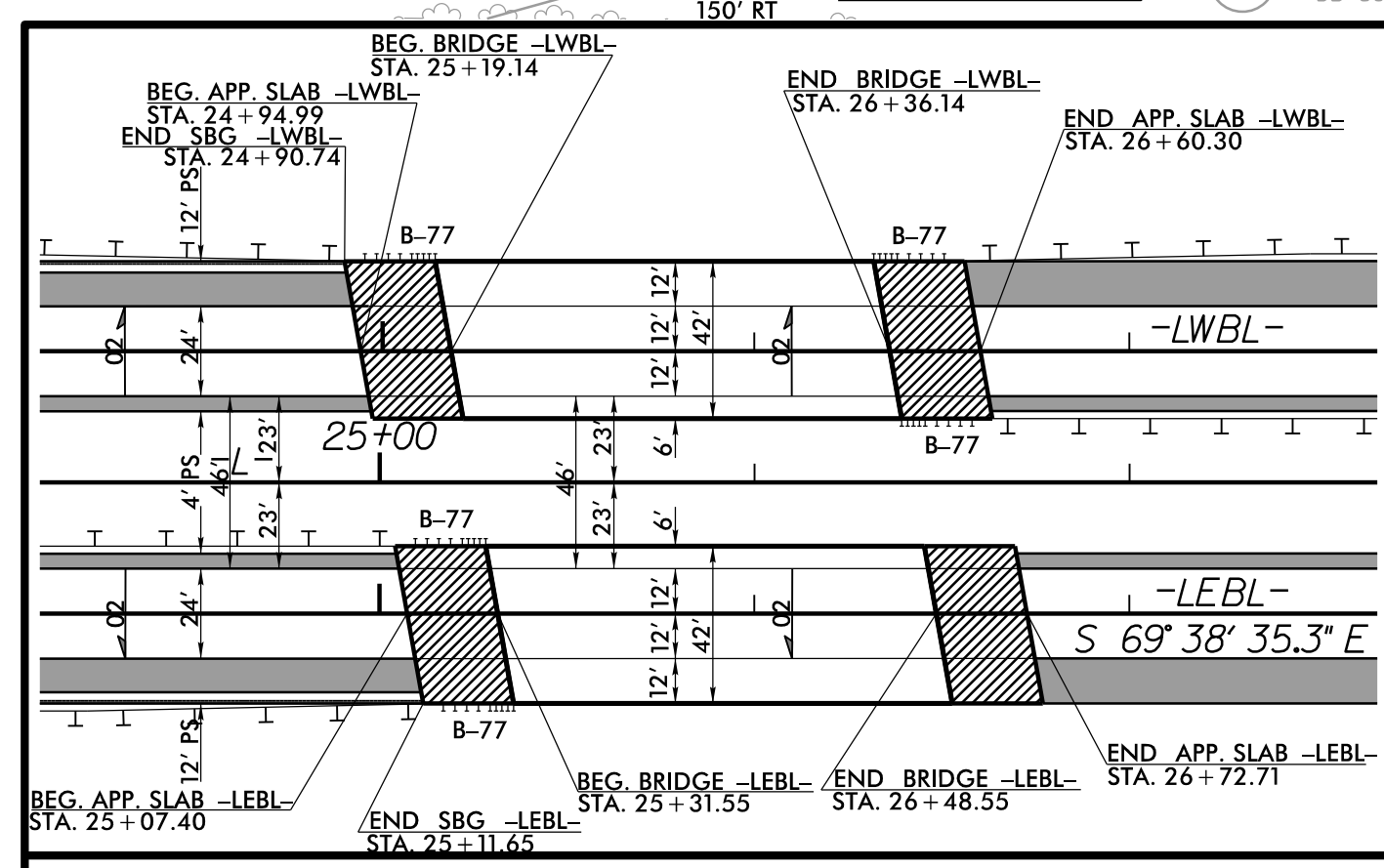
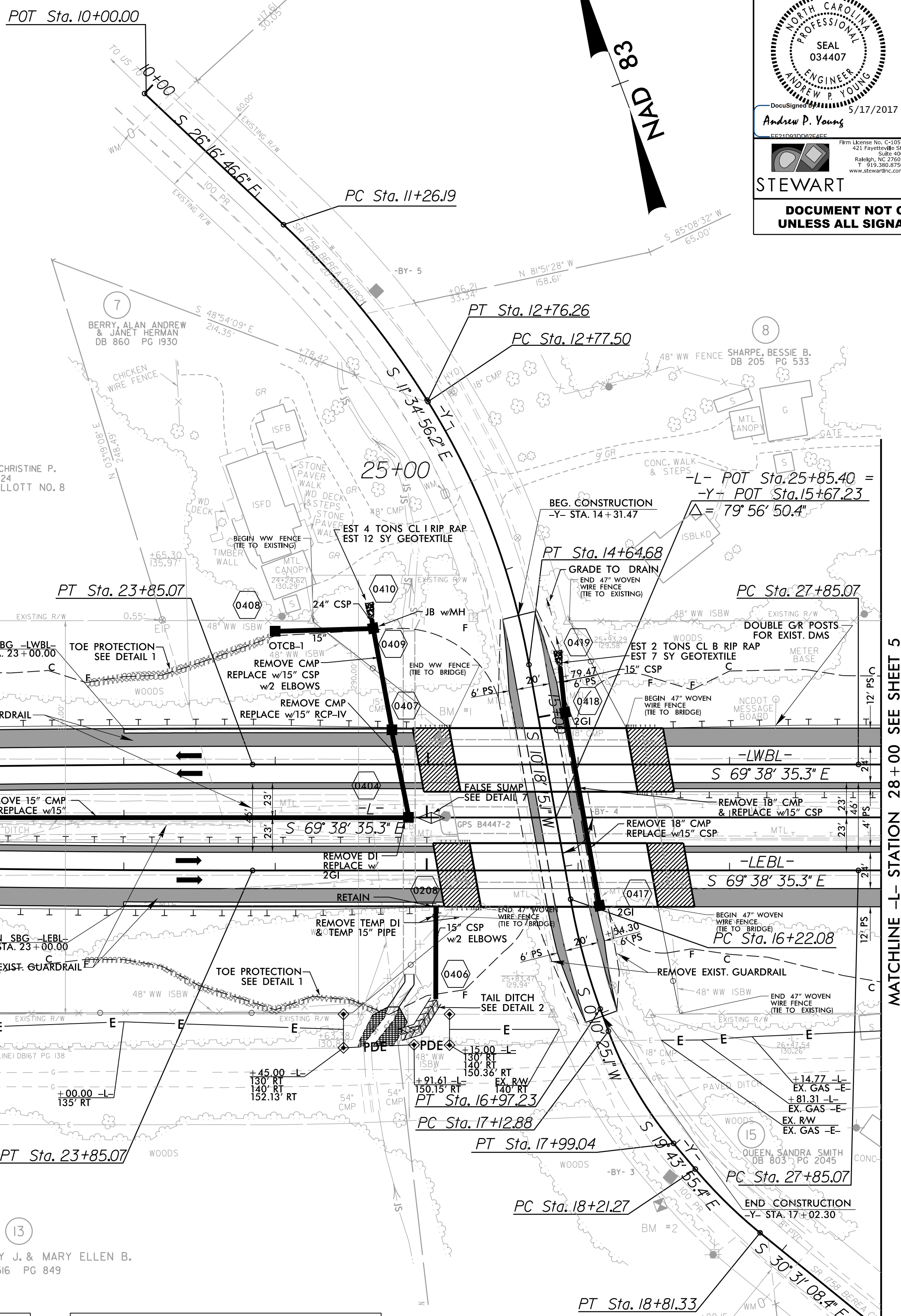


BEGIN TIP PROJECT B-4447
-L- POT STA. 11+45.56

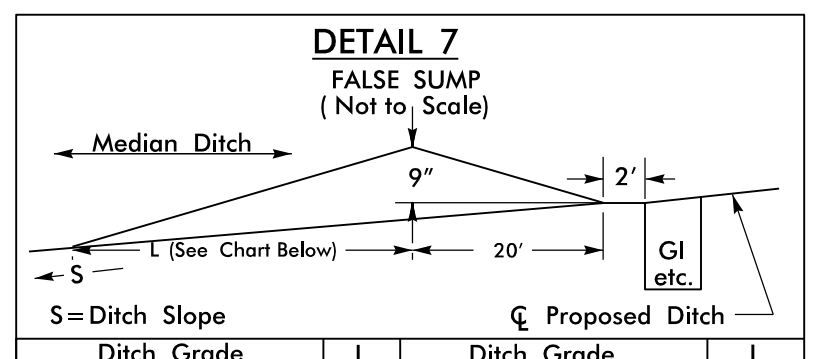
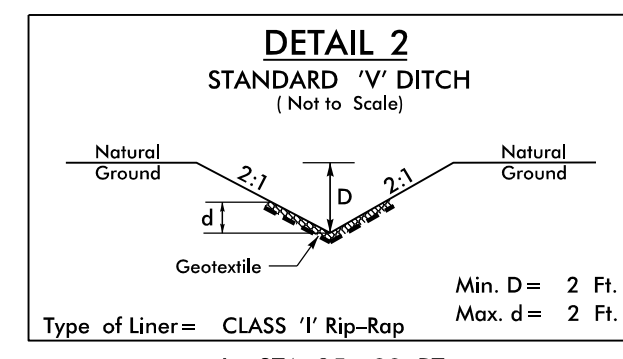
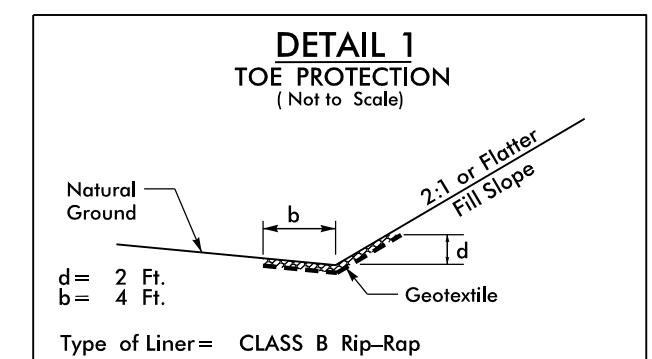
-LWBL-		-LEBL-	
PI Sta 18+77.14	PI Sta 21+99.56	PI Sta 18+77.14	PI Sta 21+99.56
$\Delta = 1' 27' 58.1''$ (LT)	$\Delta = 1' 27' 58.1''$ (RT)	$\Delta = 1' 27' 58.1''$ (LT)	$\Delta = 1' 27' 58.1''$ (RT)
D = 0' 32' 07.7"	D = 0' 23' 42.5"	D = 0' 32' 07.7"	D = 0' 23' 42.5"
L = 273.80'	L = 371.04'	L = 273.80'	L = 371.04'
T = 136.91'	T = 185.53'	T = 136.91'	T = 185.53'
R = 10,700.00'	R = 14,500.00'	R = 10,700.00'	R = 14,500.00'
SE = .02	SE = NC	SE = .02	SE = NC
RO = 60'	RO = 60'	RO = 60'	RO = 60'

-Y-			
PI Sta 12+01.64	PI Sta 13+72.25	PI Sta 17+56.40	PI Sta 16+59.75
$\Delta = 14' 41' 50.3''$ (RT)	$\Delta = 21' 53' 11.4''$ (RT)	$\Delta = 19' 54' 20.5''$ (LT)	$\Delta = 10' 07' 50.0''$ (LT)
D = 9' 47' 38.9"	D = 11' 41' 34.9"	D = 23' 06' 11.3"	D = 13' 28' 52.9"
L = 150.06'	L = 187.18'	L = 86.16'	L = 75.14'
T = 75.45'	T = 94.74'	T = 43.52'	T = 37.67'
R = 585.00'	R = 490.00'	R = 246.00'	R = 425.00'

PI Sta 18+51.39	$\Delta = 10' 47' 13.0''$ (LT)
D = 17' 57' 39.8"	L = 60.06'
L = 60.06'	T = 30.12'
T = 30.12'	R = 319.00'



PAVEMENT/BRIDGE RELATIONSHIP SKETCH (NTS)



FROM	TO	CL B RIP RAP	EST. QUANTITIES	GEOTEXTILE	DDE
FROM -L- STA. 16+25	TO STA. 18+25 RT.	60 Tons	134 SY	45 CY	
FROM -L- STA. 22+75	TO STA. 24+00 LT.	38 Tons	84 SY	285 CY	
FROM -L- STA. 22+75	TO STA. 24+68 RT.	58 Tons	129 SY	43 CY	
FROM -L- STA. 32+25	TO STA. 33+00 RT.	23 Tons	50 SY	17 CY	

SEE SHEET 2B-1 THRU 2B-4 FOR DETOUR ALIGNMENTS
SEE SHEET 6 FOR -LWBL- PROFILE
SEE SHEET 7 FOR -LEBL- PROFILE
SEE SHEET 9 FOR EXIST. -Y- PROFILE
SEE SHEET S01-1 THRU S01-28 FOR -LWBL- STRUCTURE PLANS
SEE SHEET S02-1 THRU S02-28 FOR -LEBL- STRUCTURE PLANS
SEE SHEET C-1 THRU C-6 FOR CULVERT PLANS

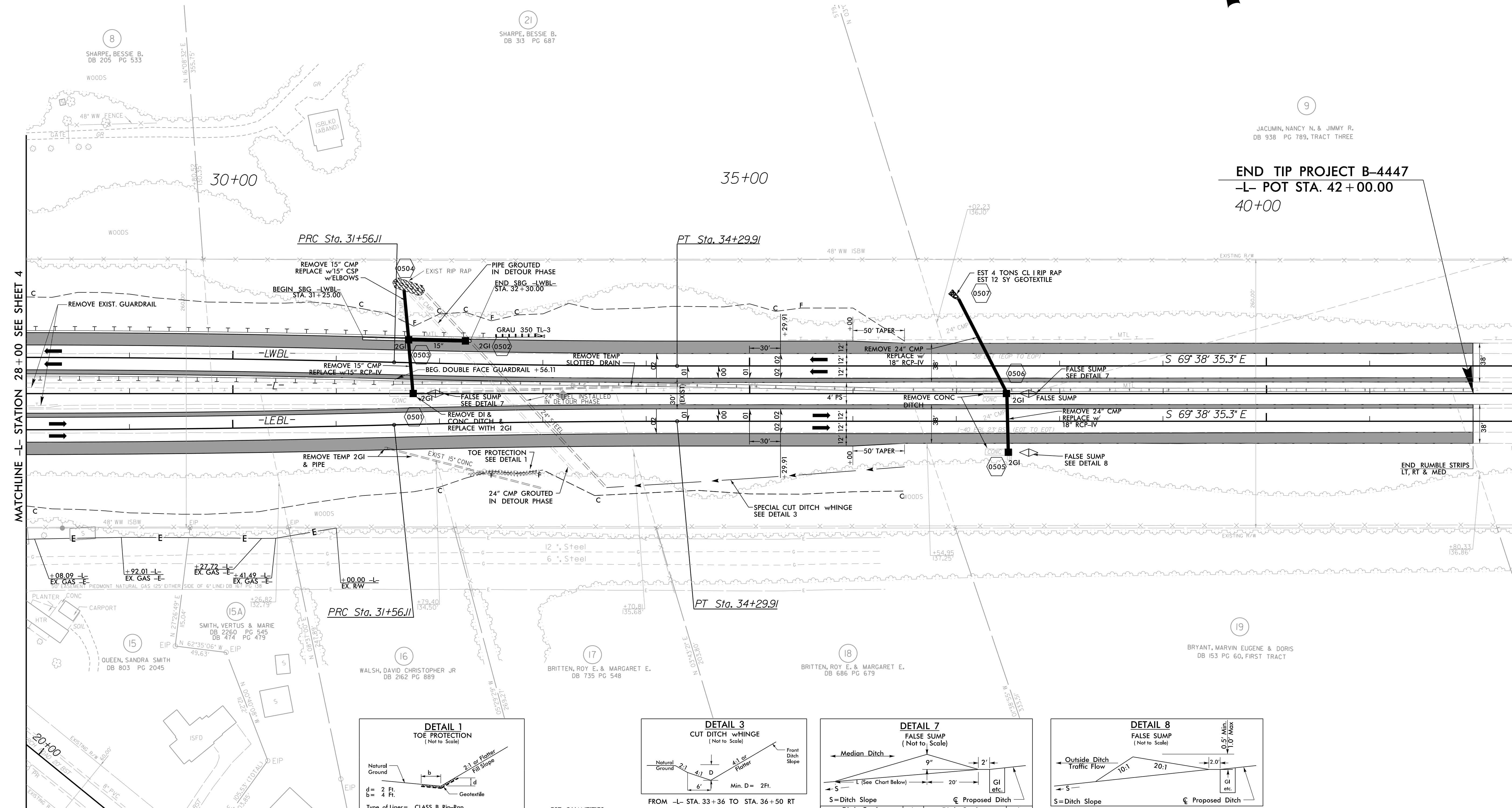
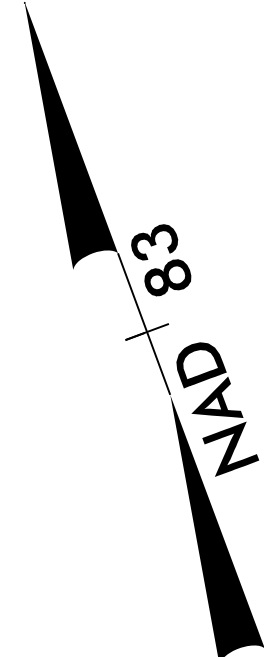
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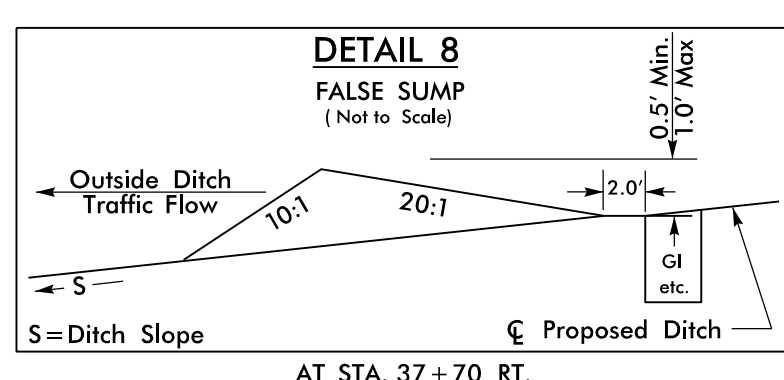
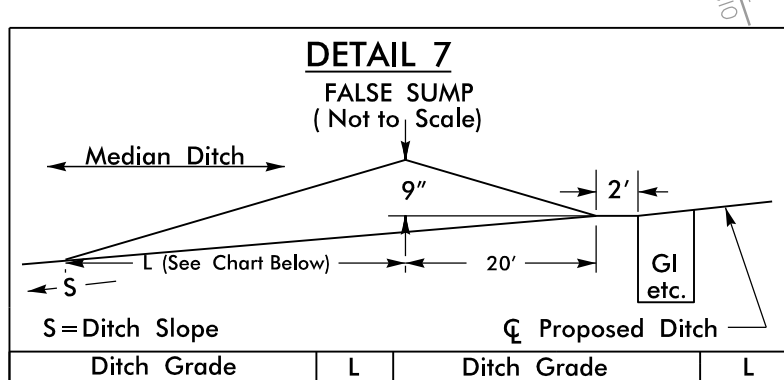
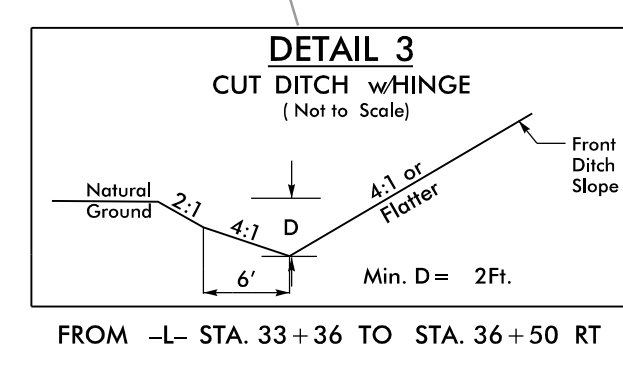
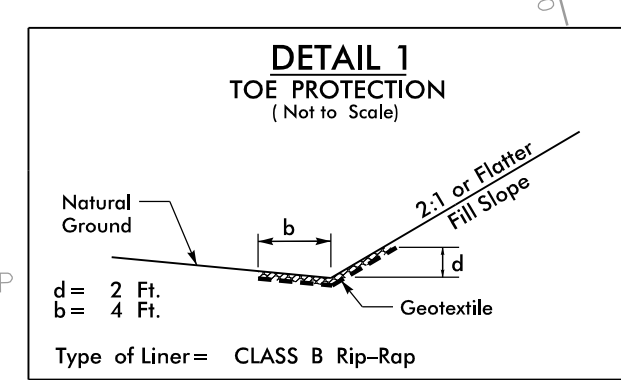
PROJECT REFERENCE NO. B-4447	SHEET NO. 5
ROADWAY DESIGN ENGINEER ANDREW P. YOUNG SEAL 034407 5/17/2017	HYDRAULICS ENGINEER ROY D. LOVINGOOD SEAL 019775 5/18/2017
STEWART	
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-LWBL-		-LEBL-	
PI Sta 29+70.60	PI Sta 32+93.02	PI Sta 29+70.60	PI Sta 32+93.02
$\Delta = 1' 27' 58.1''$ (RT)	$\Delta = 1' 27' 58.1''$ (LT)	$\Delta = 1' 27' 58.1''$ (LT)	$\Delta = 1' 27' 58.1''$ (RT)
$D = 0' 23' 42.5''$	$D = 0' 32' 07.7''$	$D = 0' 23' 42.5''$	$D = 0' 32' 07.7''$
$L = 371.04'$	$L = 273.80'$	$L = 371.04'$	$L = 273.80'$
$T = 185.53'$	$T = 136.91'$	$T = 185.53'$	$T = 136.91'$
$R = 14,500.00'$	$R = 10,700.00'$	$R = 14,500.00'$	$R = 10,700.00'$
$SE = NC$	$RO = 60'$	$SE = NC$	$RO = 60'$



MATCHLINE -L- STATION 28+00 SEE SHEET 4

END TIP PROJECT B-4447
-L- POT STA. 42+00.00
40+00



EST. QUANTITIES

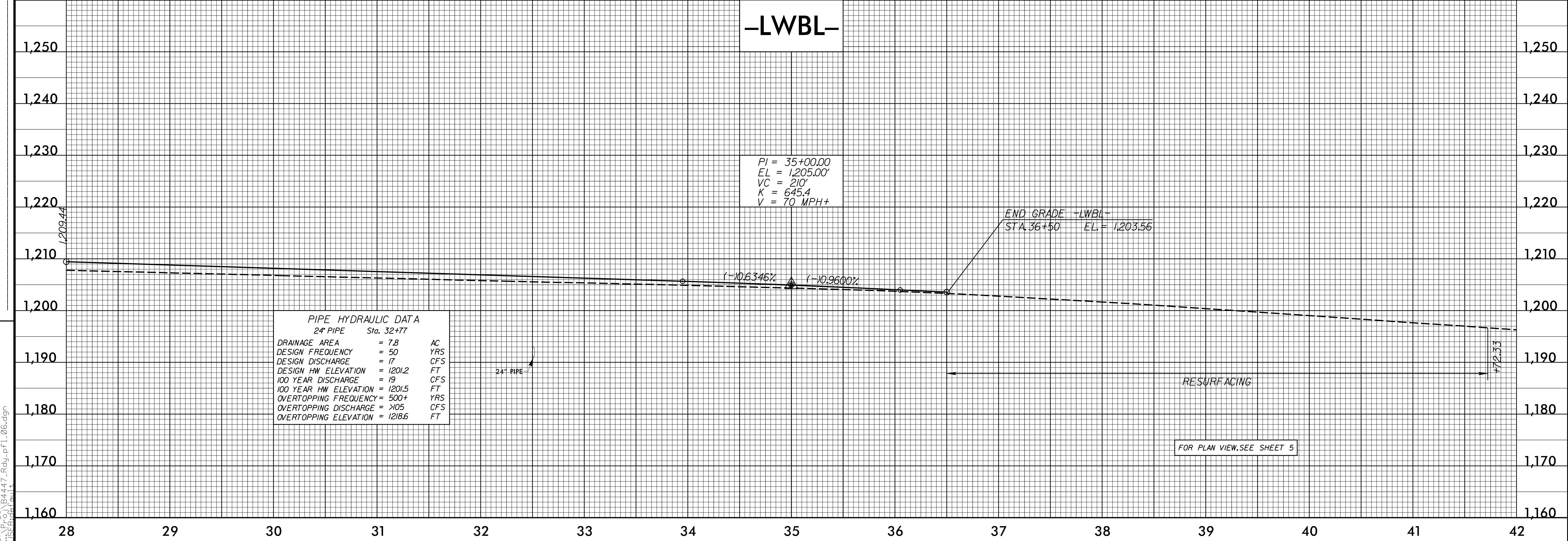
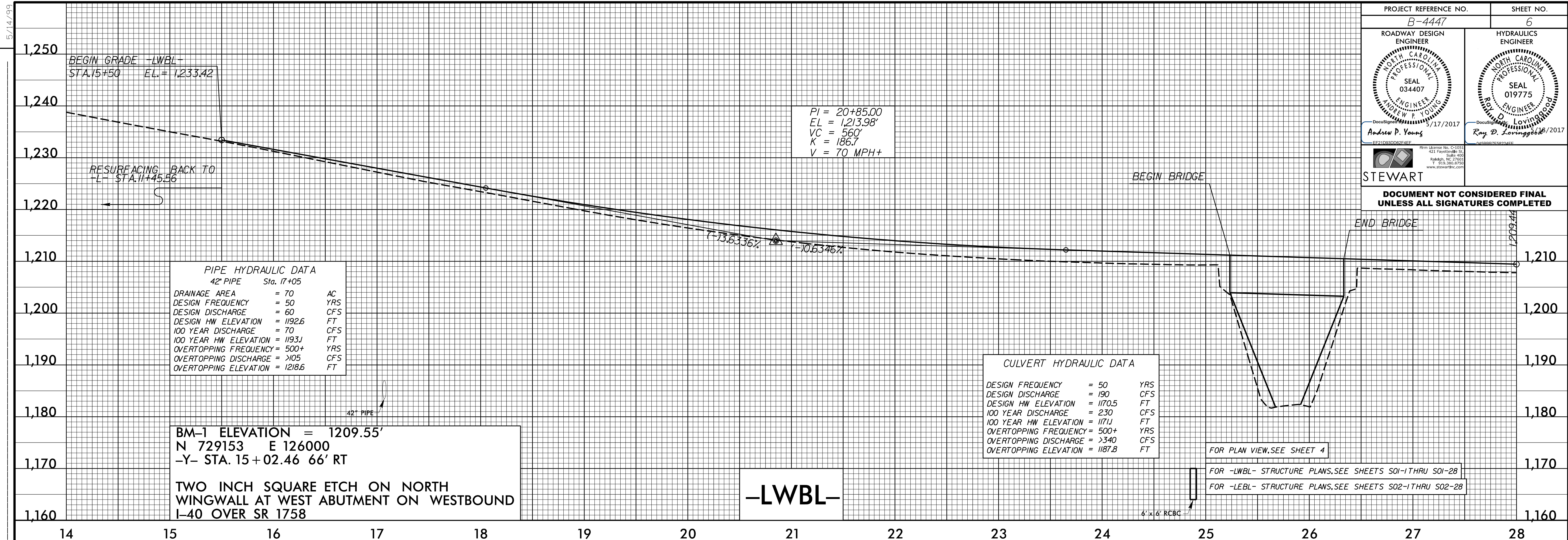
FROM -L- STA.	TO STA.	CL B RIP RAP	EST. TONS	GEOTEXTILE	DDE	EST. CY
16+25	18+25	60	134	5	45	5
18+25	24+00	38	84	5	285	5
22+75	24+68	58	129	5	43	5
32+25	33+00	23	50	5	17	5

SEE SHEET 2B-1 THRU 2B-4 FOR DETOUR ALIGNMENTS
SEE SHEET 6 FOR -LWBL- PROFILE
SEE SHEET 7 FOR -LEBL- PROFILE

REVISIONS

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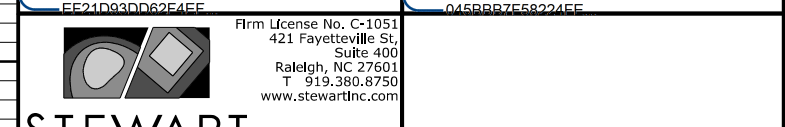
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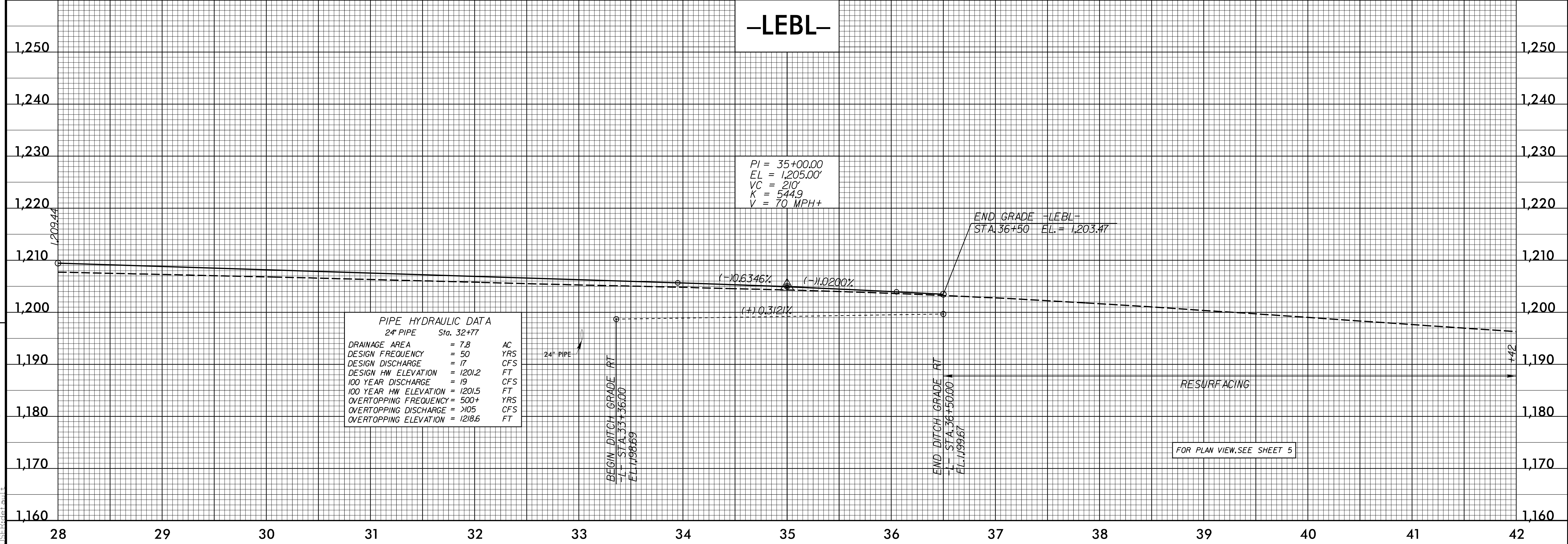
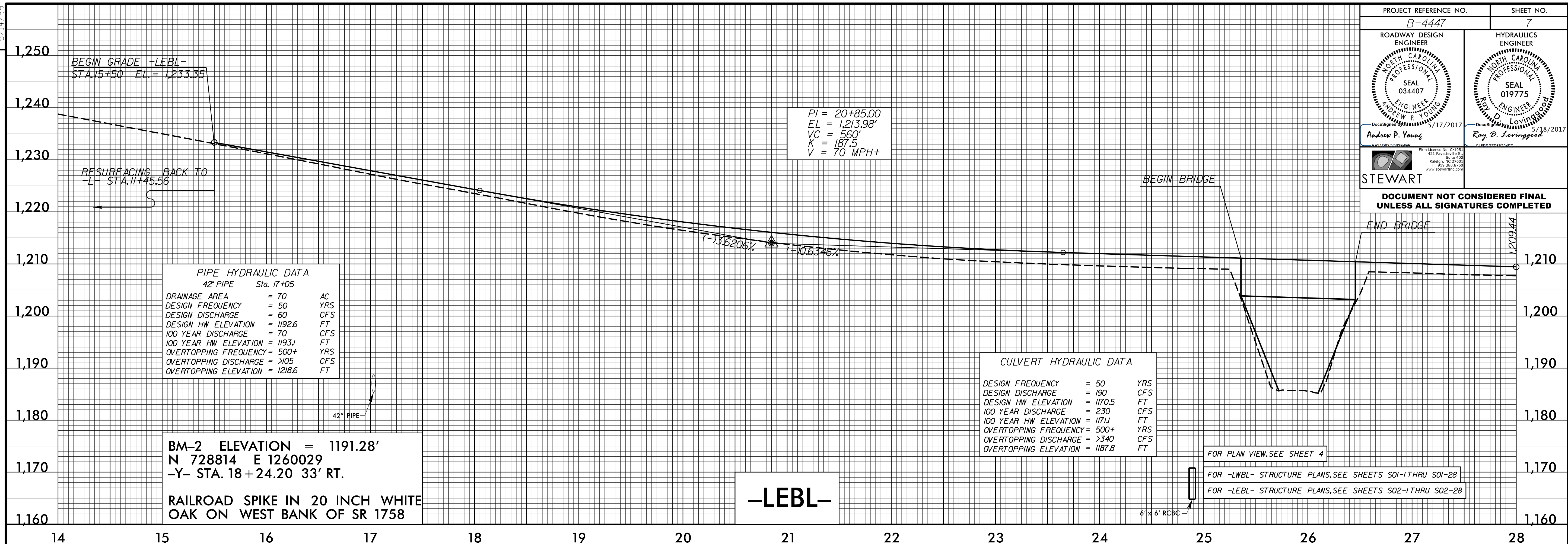
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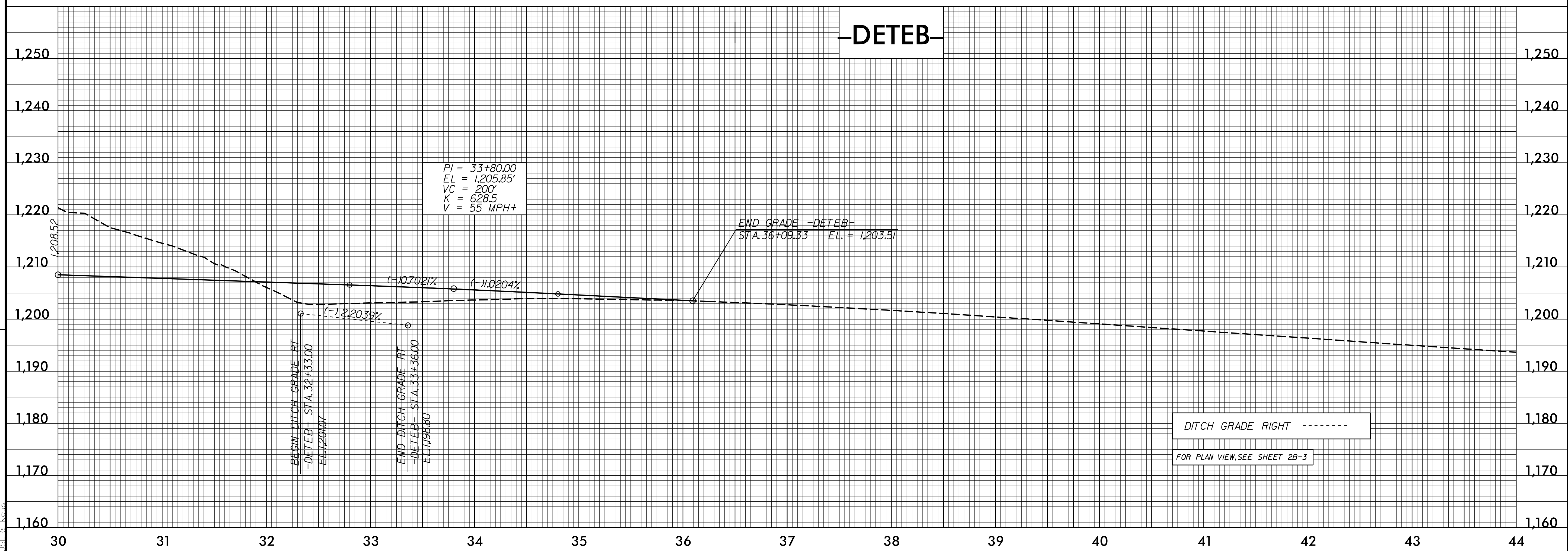
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5/17/2017 B4447_Rdy_e1_07.dgn
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5/14/99

PROJECT REFERENCE NO. B-4447	SHEET NO. 8
ROADWAY DESIGN ENGINEER ANDREW P. YOUNG SEAL 034407 5/17/2017	HYDRAULICS ENGINEER RAY D. LOVINGGOOD SEAL 019775 5/18/2017
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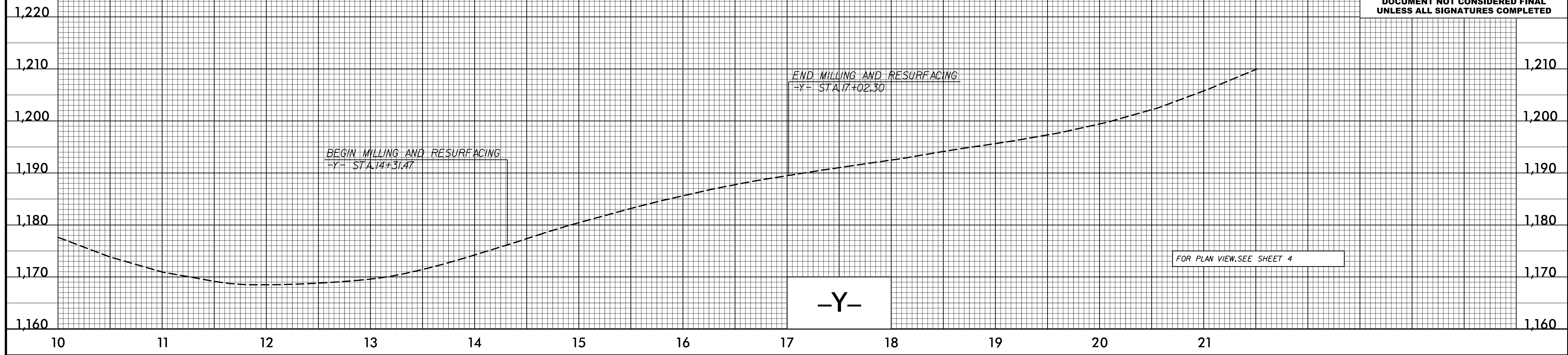
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5/14/99

PROJECT REFERENCE NO. B-4447	SHEET NO. 9
ROADWAY DESIGN ENGINEER ANDREW P. YOUNG SEAL 034407 5/17/2017	HYDRAULICS ENGINEER RAY D. LIVINGOOD SEAL 019775 5/18/2017

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USER:Rdy