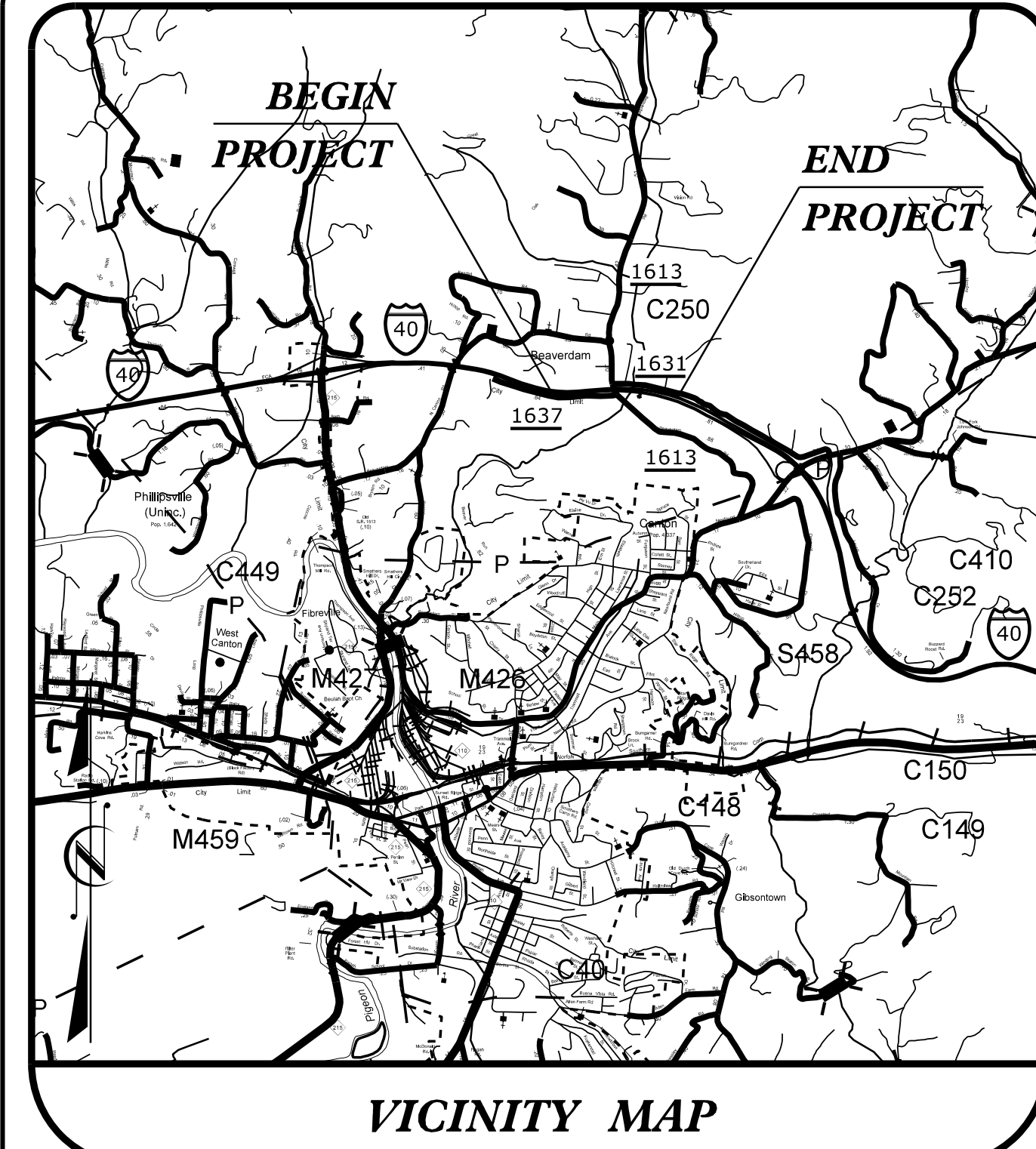


**TIP PROJECT: HB-0002**

**CONTRACT: 204796**



See Sheet 1-A For Index of Sheets

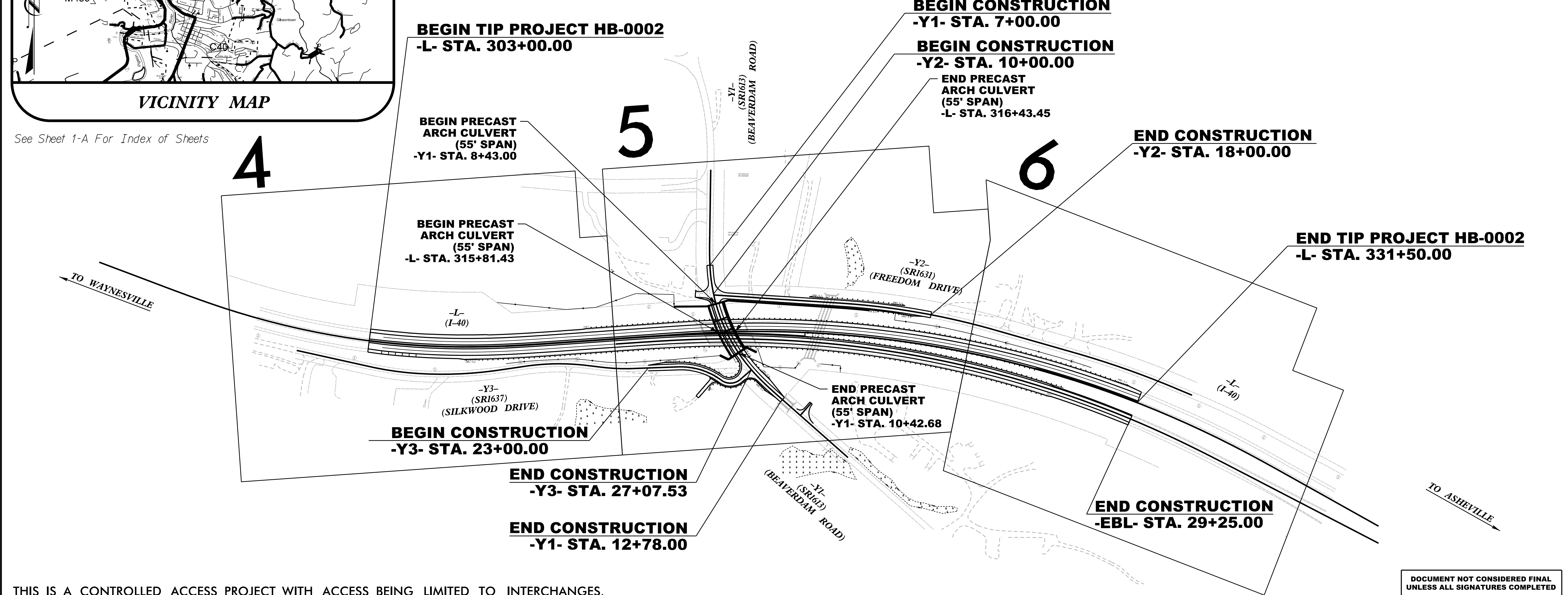
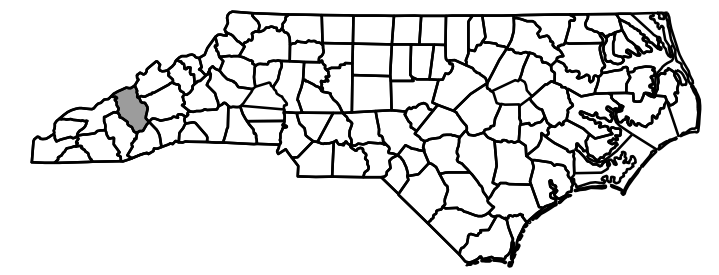
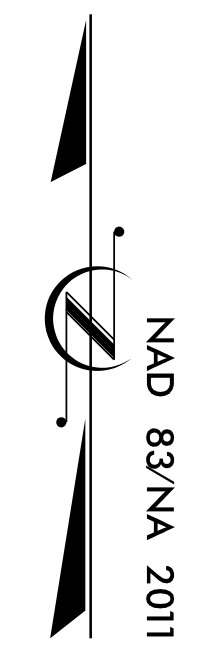
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

# HAYWOOD COUNTY

**LOCATION: BRIDGES 248 & 249 ON I-40 OVER SR 1613 (BEAVERDAM ROAD)**

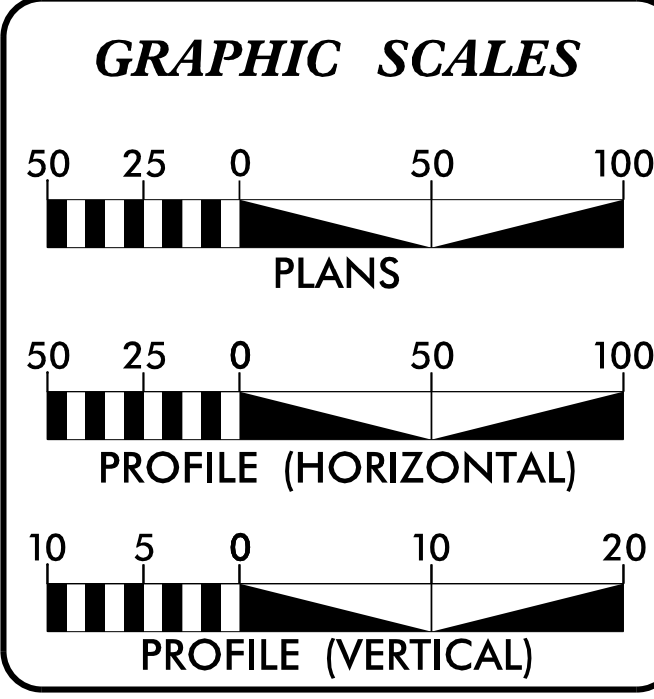
**TYPE OF WORK: GRADING, DRAINAGE, PAVING, & STRUCTURE.**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	HB-0002	1	
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
49622.1.1		PE	
49622.2.1	0040120	RW & UTIL.	
49622.3.1	0040120	CONST.	



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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



**DESIGN DATA**

ADT 2024 = 61,000
ADT 2044 = 87,400
K = 7 %
D = 55 %
T = 20 % *
V = 70 MPH
* TTST = 4% DUAL = 16%
FUNC. CLASS = INTERSTATE

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT HB-0002	= 0.53 MILES
LENGTH STRUCTURE TIP PROJECT HB-0002	= 0.01 MILES
TOTAL LENGTH TIP PROJECT HB-0002	= 0.54 MILES

Prepared in the Office of: **WETHERILL ENGINEERING**  
1223 Jones Franklin Rd. Raleigh, N.C. 27606  
License No. F-0377  
Bus: 919.851.8077 Fax: 919.851.8107

Prepared for: **DIVISION OF HIGHWAYS DIVISION 14**  
253 Webster Road  
Sylva NC, 28779

**RIGHT OF WAY DATE:** APRIL 28, 2023  
**LETTING DATE:** MAY 28, 2024

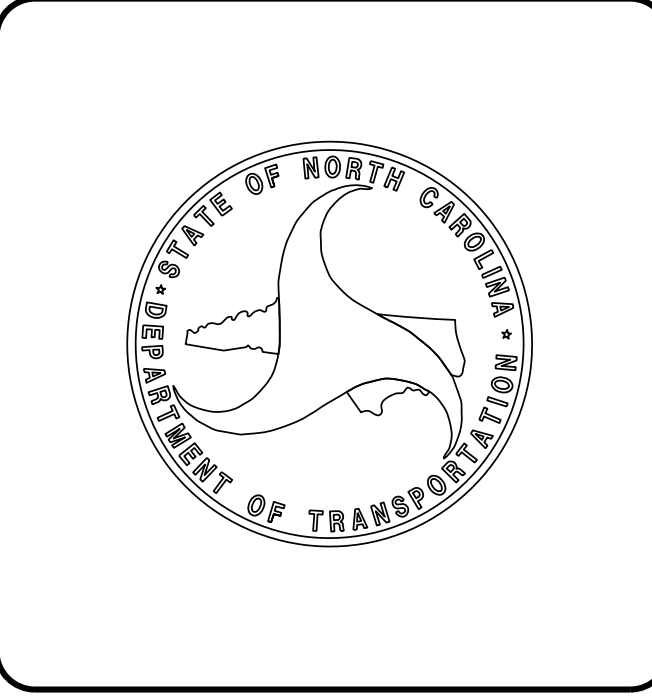
**NCDOT CONTACT:** ZACH SHULER  
BRIDGE PROGRAM MANAGER

**2024 STANDARD SPECIFICATIONS**

**PROJECT ENGINEER:** GREG PURVIS, PE  
**PROJECT DESIGN ENGINEER:** JONATHAN HEFNER, PE  
**BRIDGE PROGRAM MANAGER:** ZACH SHULER

**HYDRAULICS ENGINEER**  
DocuSigned by: *Jerry L. Lindsey* 3/18/2024  
SIGNATURE: [Signature]

**ROADWAY DESIGN ENGINEER**  
DocuSigned by: *Jonathan C. Hefner* 3/18/2024  
SIGNATURE: [Signature]



3/15/2024 11:00 AM C:\Projects\HB0002\_rdy\_psh\_01\_tsh.dgn USER: jhefner

# INDEX OF SHEETS

SHEET NUMBER	SHEET
1	TITLE SHEET
1A	INDEX OF SHEETS, GENERAL NOTES, AND LIST OF STANDARD DRAWINGS
1B	CONVENTIONAL SYMBOLS
2A-1 THRU 2A-4	TYPICAL SECTIONS, PAVEMENT SCHEDULE, & MISCELLANEOUS DETAILS
2B-1 THRU 2B-2	ROADWAY DETAILS
2C-1 THRU 2C-2	SPECIAL DETAILS
2D-1 THRU 2D-10	DRAINAGE DETAILS
2G-1 THRU 2G-13	GEOTECHNICAL DETAILS
3B-1 THRU 3B-5	ROADWAY SUMMARIES
3D-1 THRU 3D-3	DRAINAGE SUMMARIES
3G-1	GEOTECHNICAL SUMMARIES
3P-1	PARCEL INDEX SHEET
4 THRU 11	PLAN AND PROFILE SHEETS
RW-1 THRU RW-4	RIGHT OF WAY SHEETS, SURVEY CONTROL SHEETS, PROPOSED ALIGNMENT CONTROL SHEET AND PROPOSED EASEMENT CONTROL SHEET
TMP-1 THRU TMP-32	TRANSPORTATION MANAGEMENT PLAN
PMP-1 THRU PMP-4	PAVEMENT MARKING PLAN
E-1 THRU E-6	ELECTRICAL PLANS
EC-1 THRU EC-11	EROSION CONTROL PLANS
RF-1	REFORESTATION DETAIL SHEET
SIGN-1 THRU SIGN-8	SIGNING PLANS
UC-1 THRU UC-9	UTILITY CONSTRUCTION PLANS
UO-1 THRU UO-06	UTILITIES BY OTHERS PLANS
X-1	CROSS SECTION INDEX
X-1A THRU X1-B	CROSS SECTION SUMMARY SHEETS
X-2 THRU X-129	CROSS SECTIONS
S-1 THRU S-6	STRUCTURE PLANS
SN	STRUCTURE NOTES
W-1 THRU W-4	RETAINING WALL PLANS

# 2024 ROADWAY ENGLISH STANDARD DRAWINGS

STD.NO.	TITLE
2024 ROADWAY ENGLISH STANDARD DRAWINGS	
The following Roadway Standards as appear in "Roadway Standard Drawings" Contracts Standards and Development Unit - N. C. Department of Transportation - Raleigh, N. C., Dated January 16, 2024 are applicable to this project and by reference hereby are considered a part of these plans:	
DIVISION 2 - EARTHWORK	
200.03	Method of Clearing - Method III
225.01	Guide for Grading Subgrade - Interstate and Freeway
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
235.01	Embankment Monitoring
240.01	Guide for Berm Ditch Construction
DIVISION 3 - PIPE CULVERTS	
300.01	Method of Pipe Installation
310.10	Driveway Pipe Construction
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
560.02	Method of Shoulder Construction - High Side of Superelevated Curve - Method II
DIVISION 6 - ASPHALT BASES AND PAVEMENTS	
665.01	Asphalt Shoulders - Milled Rumble Strips
DIVISION 8 - INCIDENTALS	
815.02	Subsurface Drain
840.00	Concrete Base Pad for Drainage Structures
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
840.24	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
840.36	Traffic Bearing Grated Drop Inlet - for Steel (840.37) Double Frame and Grates
840.37	Steel Grate and Frame
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
850.10	Guide for Berm Drainage Outlet - 15" and 18" Pipe
854.04	Concrete Median Barrier - Precast Permanent
854.07	Single Slope Concrete Barrier
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 - for B-77 and B-83 Anchor Units
866.02	Woven Wire Fence - with Wood Post
876.01	Rip Rap in Channels and Ditches
876.02	Guide for Rip Rap at Pipe Outlets
876.04	Drainage Ditches with Class 'B' Rip Rap

# GENERAL NOTES

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

GRADE LINE:  
GRADING AND SURFACING OR RESURFACING AND WIDENING:

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

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

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

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

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.

BERM DITCHES:  
BERM DITCHES SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. NO. 240.01 AT LOCATIONS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.

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

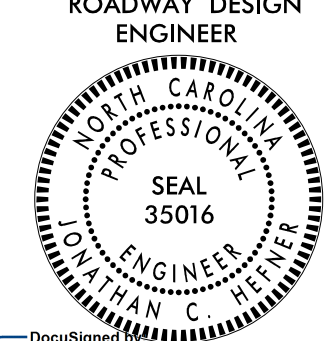

DRIVEWAYS:  
DRIVEWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. 848.03 AT LOCATIONS SHOWN ON PLANS OR AS DIRECTED BY THE ENGINEER.

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

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

UTILITIES:  
UTILITY OWNERS ON THIS PROJECT ARE  
ATT (COAX & FIBER COM), TOWN OF CANTON (SEWER & WATER),  
DUKE ENERGY (ELECTRIC), DOMINION ENERGY (GAS)  
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.

PROJECT REFERENCE NO. <i>HB-0002</i>	SHEET NO. <i>1A</i>
ROADWAY DESIGN ENGINEER 	
	1223 Jones Franklin Rd. Raleigh, N.C. 27606 License No. F-0377 Bus: 919 851 8077 Fax: 919 851 8107
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	

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

Note: Not to Scale

## BOUNDARIES AND PROPERTY:

State Line	-----
County Line	-----
Township Line	-----
City Line	-----
Reservation Line	-----
Property Line	-----
Existing Iron Pin (EIP)	○
Computed Property Corner	×
Existing Concrete Monument (ECM)	□
Parcel/Sequence Number	(23)
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-☒-s-
Potential Contamination Area: Soil	☒-s-☒-s-
Known Contamination Area: Water	☒-w-☒-w-
Potential Contamination Area: Water	☒-w-☒-w-
Contaminated Site: Known or Potential	☠ ?

## BUILDINGS AND OTHER CULTURE:

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

## HYDROLOGY:

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

## RAILROADS:

Standard Gauge	-----
RR Signal Milepost	○
Switch	□
RR Abandoned	-----
RR Dismantled	-----

## RIGHT OF WAY & PROJECT CONTROL:

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

## ROADS AND RELATED FEATURES:

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

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

## EXISTING STRUCTURES:

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

## UTILITIES:

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

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

## TELEPHONE:

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

## WATER:

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

## TV:

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

## GAS:

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

## SANITARY SEWER:




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

## MISCELLANEOUS:

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

6/2/99

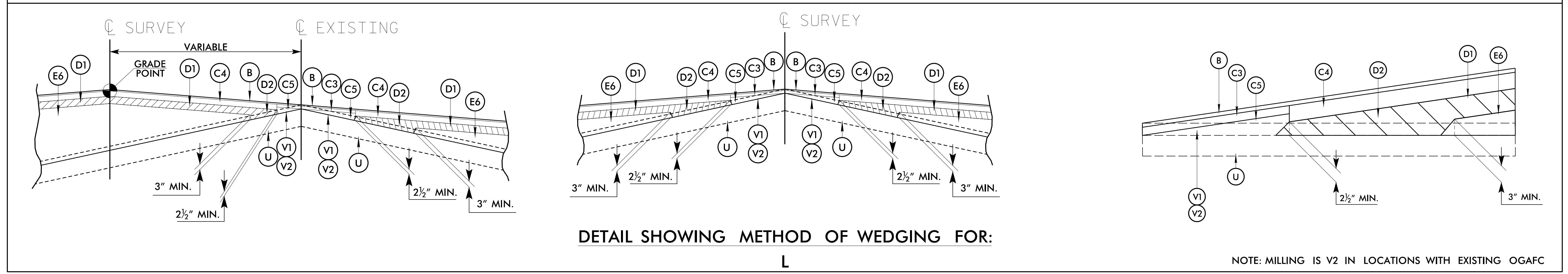
### FINAL PAVEMENT SCHEDULE

PROJECT REFERENCE NO. <i>HB-0002</i>	SHEET NO. <i>2A-1</i>
ROADWAY DESIGN ENGINEER <i>Jonathan C. Pearson</i>	PAVEMENT DESIGN ENGINEER <i>Joseph T. Holloman</i>
	
	
1223 Jones Franklin Rd. Raleigh, N.C. 27606 License No. F-03377 Bus: 919 851 9077 Fax: 919 851 8107	
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION	

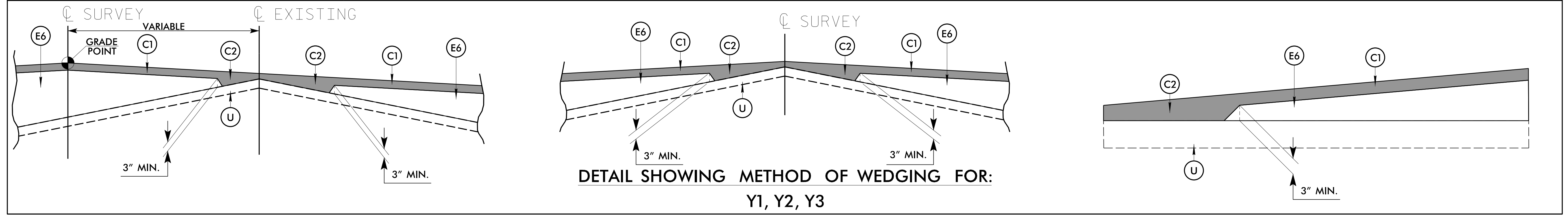
<b>B</b>	PROP. APPROX. 3/4" OPEN-GRADED ASPHALT FRICTION COURSE, TYPE FC-1 MODIFIED, AT AN AVERAGE RATE OF 90 LBS. PER SQ. YD.	<b>E1</b>	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.	<b>R3</b>	CONCRETE PAVED DITCH
<b>C1</b>	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 165 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	<b>E2</b>	PROP. APPROX. 4 1/2" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 513 LBS. PER SQ. YD.	<b>R4</b>	4" CONCRETE COVER
<b>C2</b>	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 110 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 1 1/2" IN DEPTH.	<b>E3</b>	PROP. APPROX. 5" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 570 LBS. PER SQ. YD.	<b>R5</b>	SHOULDER BERM GUTTER
<b>C3</b>	PROP. APPROX. 1 1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5D, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.	<b>E4</b>	PROP. APPROX. 9" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 513 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	<b>T</b>	EARTH MATERIAL.
<b>C4</b>	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.	<b>E5</b>	PROP. APPROX. 13" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 494 LBS. PER SQ. YD. IN EACH OF THREE LAYERS.	<b>U</b>	EXISTING PAVEMENT.
<b>C5</b>	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.	<b>E6</b>	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.	<b>V1</b>	MILLING ASPHALT PAVEMENT, 1 1/2" DEPTH.
<b>D1</b>	PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.	<b>J1</b>	8" AGGREGATE BASE COURSE.	<b>V2</b>	MILLING ASPHALT PAVEMENT, 2 1/4" DEPTH.
<b>D2</b>	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 1/2" IN DEPTH OR GREATER THAN 4" IN DEPTH.	<b>R1</b>	SINGLE SLOPE CONCRETE BARRIER.	<b>W</b>	VARIABLE DEPTH ASPHALT PAVEMENT (SEE WEDGING DETAILS)
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.		<b>R2</b>	SINGLE FACED CONCRETE BARRIER.	<b>Y</b>	PROPOSED MILLED RUBBLE STRIPS

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

### WEDGING DETAIL 1

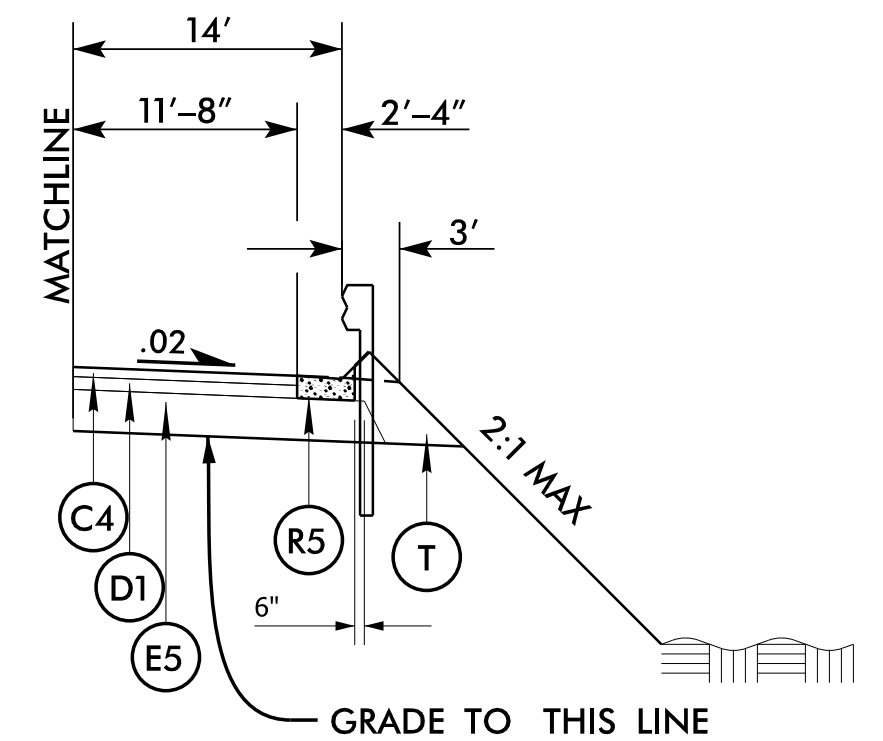


### WEDGING DETAIL 2



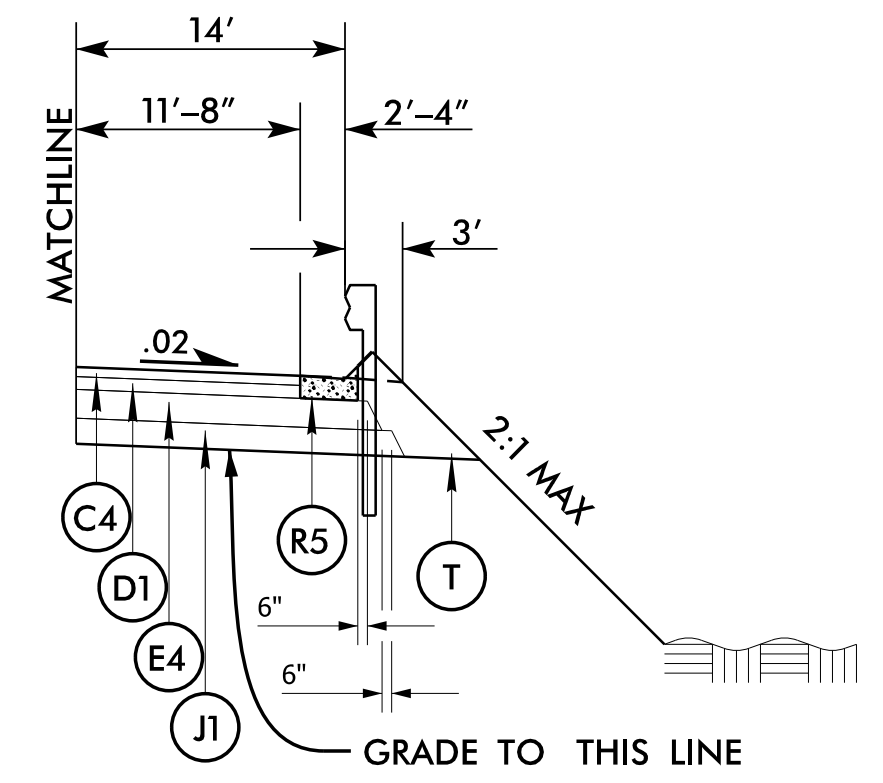
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6/22/24



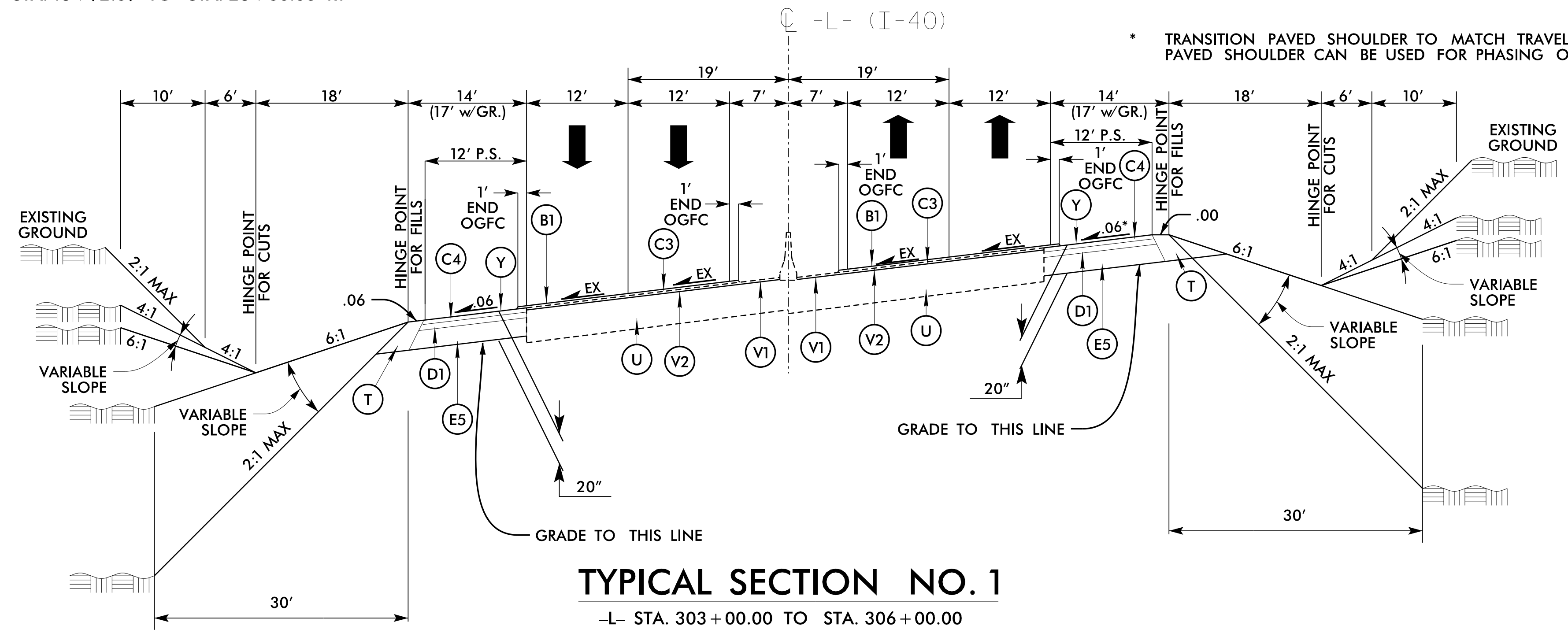
### SHOULDER BERM GUTTER DETAIL

USE WITH TYPICAL SECTIONS NO. 2  
 -L- STA. 310+15.00 TO STA. 312+05.00 RT  
 -EBL- STA. 16+92.09 TO STA. 26+00.00 RT



### SHOULDER BERM GUTTER DETAIL

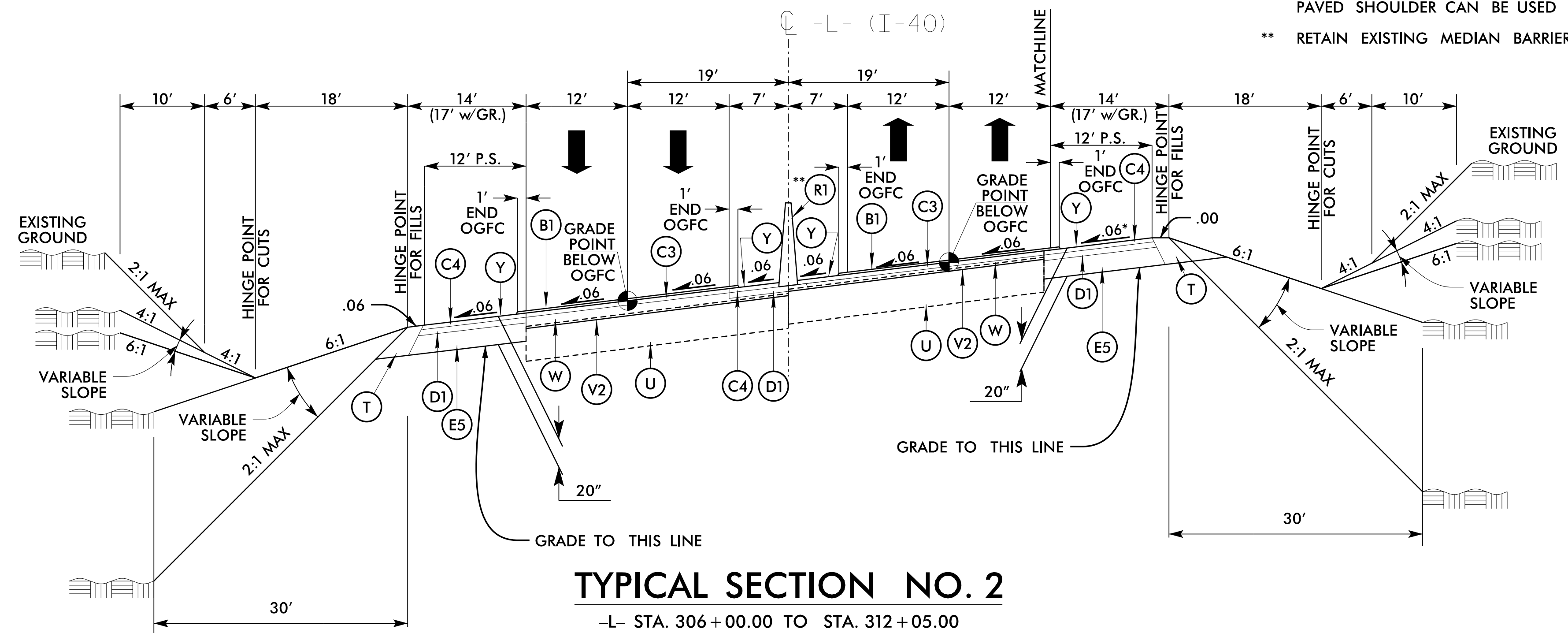
USE WITH TYPICAL SECTIONS NO. 3, 4, & 5  
 -EBL- STA. 10+00.00 TO STA. 16+92.09 RT



### TYPICAL SECTION NO. 1

-L- STA. 303+00.00 TO STA. 306+00.00

\* TRANSITION PAVED SHOULDER TO MATCH TRAVEL LANE SLOPE SO PAVED SHOULDER CAN BE USED FOR PHASING OF TRAFFIC.



### TYPICAL SECTION NO. 2

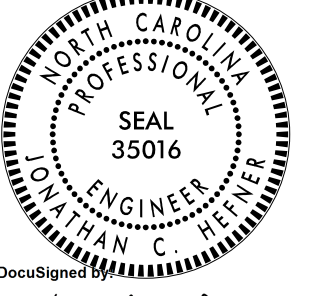
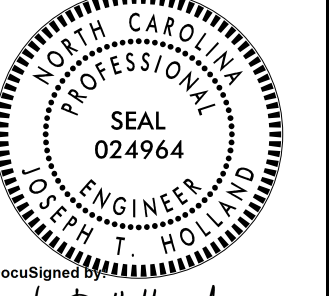

-L- STA. 306+00.00 TO STA. 312+05.00

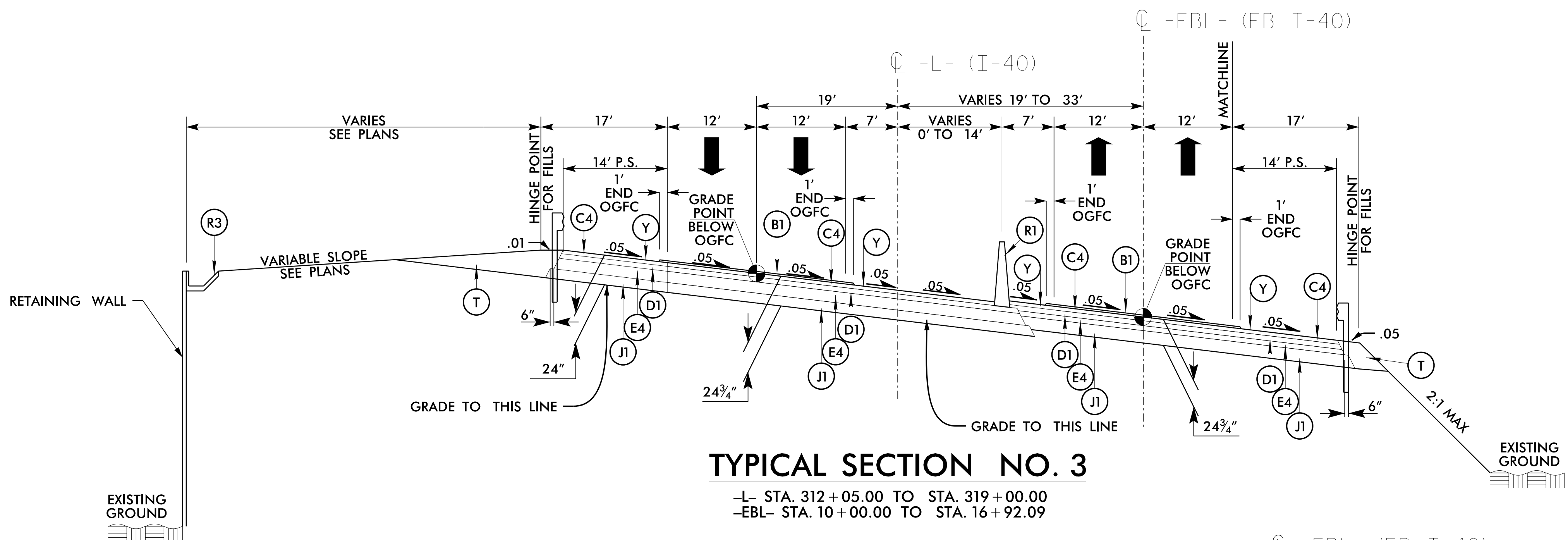
\* PAVED SHOULDER MATCHES TRAVEL LANE SLOPE ON HIGH SIDE OF SUPER SO PAVED SHOULDER CAN BE USED FOR PHASING OF TRAFFIC.  
 \*\* RETAIN EXISTING MEDIAN BARRIER FROM -L- STA. 306+00.00 TO 308+00.00

PROJECT REFERENCE NO. <b>HB-0002</b>	SHEET NO. <b>2A-2</b>
ROADWAY DESIGN ENGINEER <b>JONATHAN C. PETERSON</b>	PAVEMENT DESIGN ENGINEER <b>JOSEPH T. HOLLAND</b>
1223 Jones Franklin Rd. Raleigh, N.C. 27606 License No. F-0377 Bus: 919 851 8077 Fax: 919 851 8107	
<b>WETHERILL ENGINEERING</b>	
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	

PAVEMENT SCHEDULE	
B1	3/4" OGAFC TYPE FC-1 MOD
C1	3" S9.5B
C2	VAR. S9.5B
C3	1 1/2" S9.5D
C4	3" S9.5D
C5	VAR. S9.5D
D1	4" I19.5C
D2	VAR. I19.0C
E1	4" B25.0C
E2	4 1/2" B25.0C
E3	5" B25.0C
E4	9" B25.0C
E5	13" B25.0C
E6	VAR. B25.0C
J1	8" ABC
R1	SSCB
R2	RCB-SINGLE FACED
R3	CONC. DITCH
R4	CONC. COVER
R5	SBG
T	EARTH MATERIAL
U	EXIST. PAVEMENT
V1	1 1/2" MILLING
V2	2 1/4" MILLING
W	WEDGING
Y	MILLED RUMBLE STRIPS

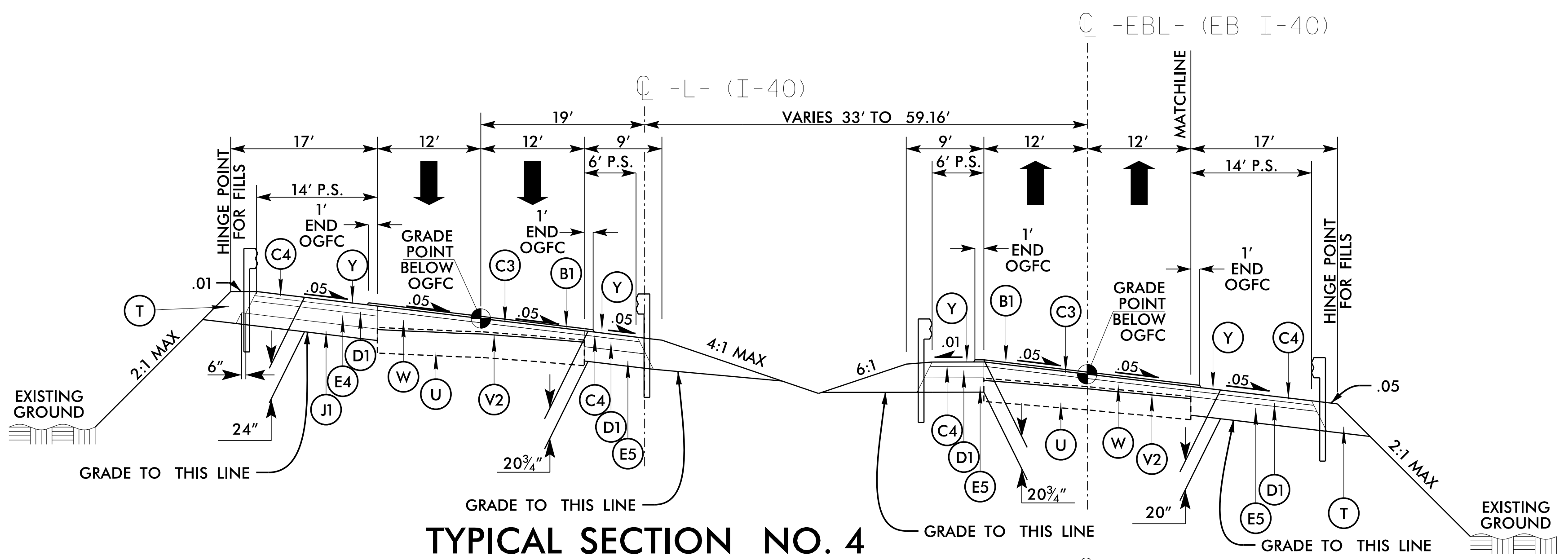
3/15/2024  
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PROJECT REFERENCE NO. <b>HB-0002</b>	SHEET NO. <b>2A-3</b>
ROADWAY DESIGN ENGINEER 	PAVEMENT DESIGN ENGINEER 
	
1223 Jones Franklin Rd. Raleigh, N.C. 27606 License No. F-0377 Bus: 919 851 8077 Fax: 919 851 8107	
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	



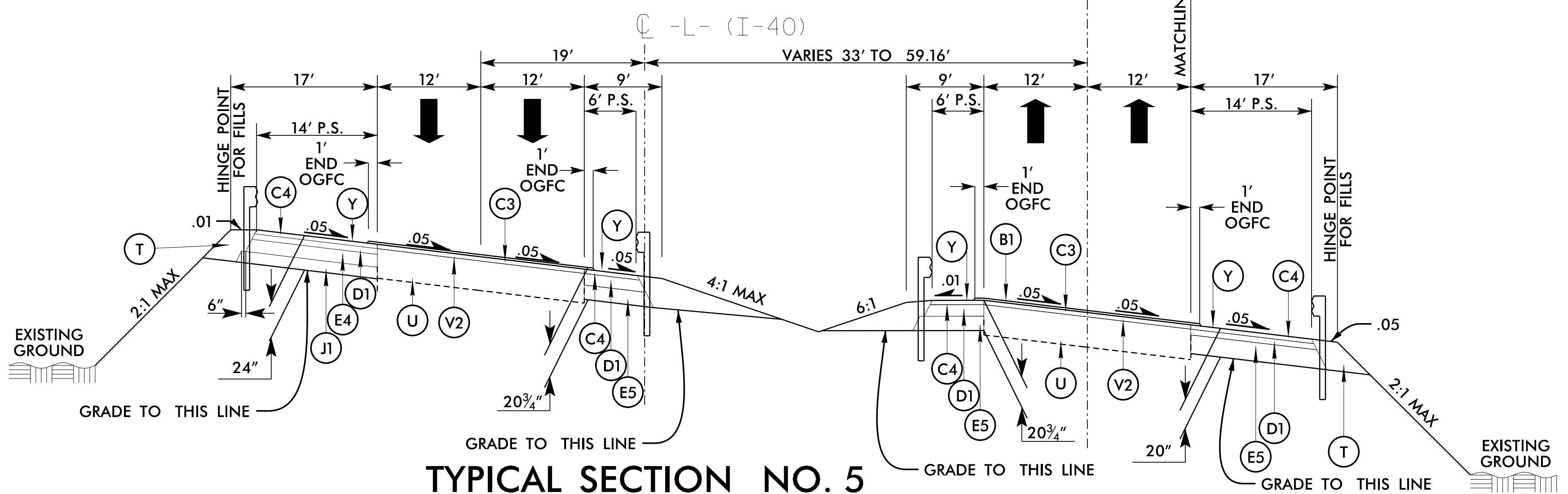
**TYPICAL SECTION NO. 3**

-L- STA. 312+05.00 TO STA. 319+00.00  
 -EBL- STA. 10+00.00 TO STA. 16+92.09



**TYPICAL SECTION NO. 4**

-L- STA. 319+00.00 TO STA. 325+60.00  
 -EBL- STA. 16+92.09 TO STA. 22+00.00



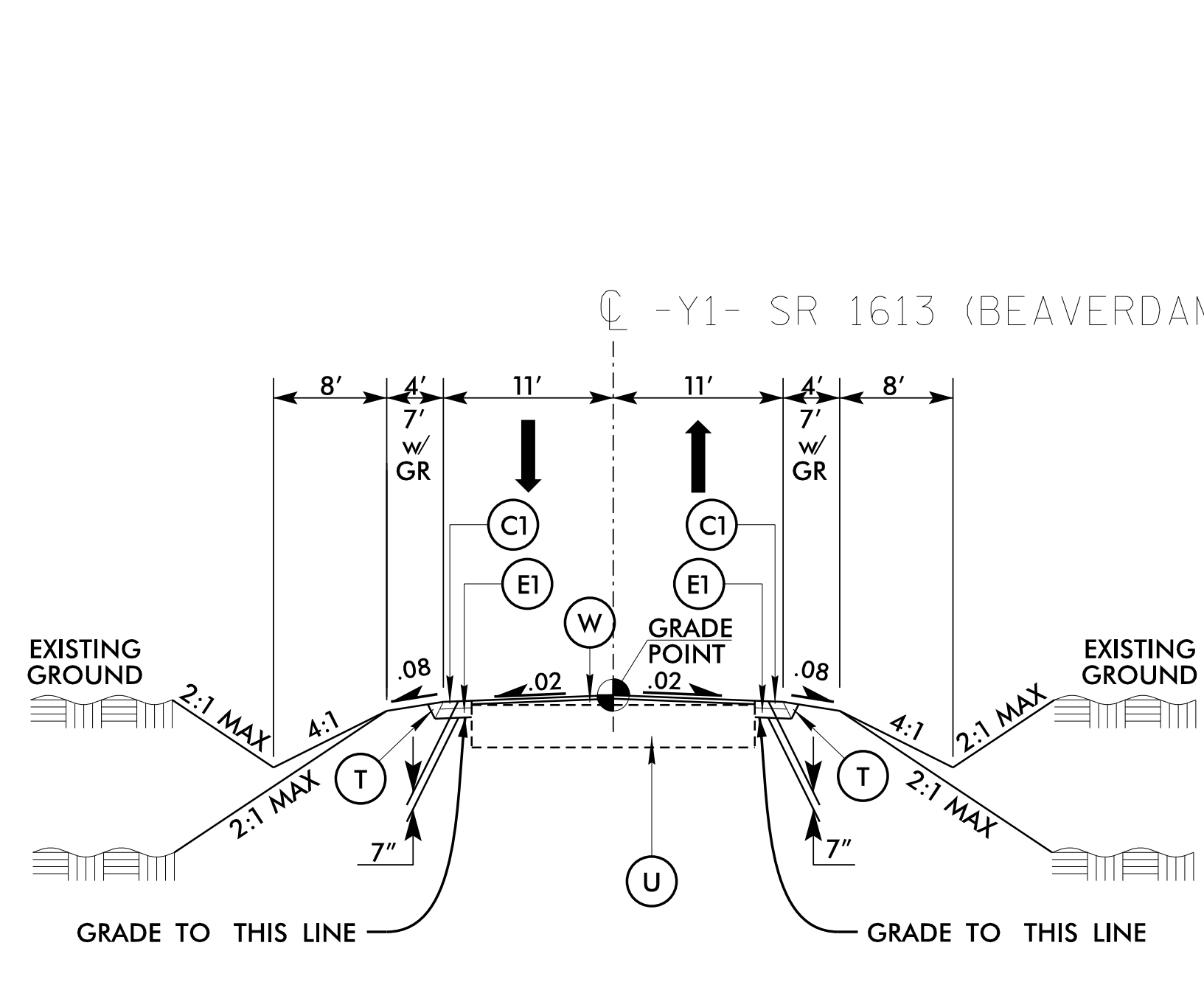
**TYPICAL SECTION NO. 5**

-L- STA. 325+60.00 TO STA. 331+50.00  
 -EBL- STA. 22+00.00 TO STA. 29+25.00

**PAVEMENT SCHEDULE**

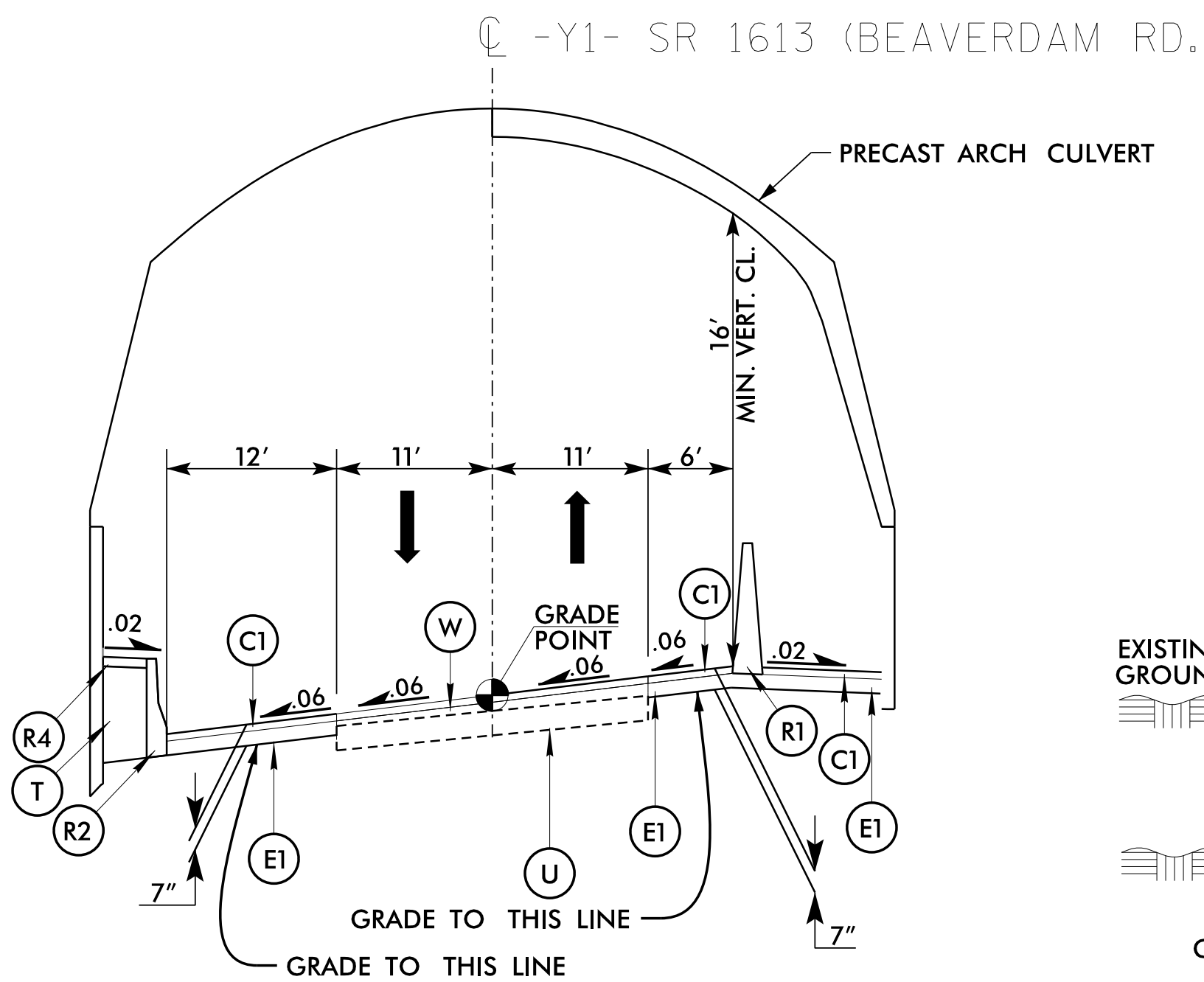
B1	3/4" OGAFC TYPE FC-1 MOD
C1	3" S9.5B
C2	VAR. S9.5B
C3	1 1/2" S9.5D
C4	3" S9.5D
C5	VAR. S9.5D
D1	4" I19.5C
D2	VAR. I19.0C
E1	4" B25.0C
E2	4 1/2" B25.0C
E3	5" B25.0C
E4	9" B25.0C
E5	13" B25.0C
E6	VAR. B25.0C
J1	8" ABC
R1	SSCB
R2	RCB-SINGLE FACED
R3	CONC. DITCH
R4	CONC. COVER
R5	SBG
T	EARTH MATERIAL
U	EXIST. PAVEMENT
V1	1 1/2" MILLING
V2	2 1/4" MILLING
W	WEDGING
Y	MILLED RUMBLE STRIPS

PROJECT REFERENCE NO. <b>HB-0002</b>	SHEET NO. <b>2A-4</b>
ROADWAY DESIGN ENGINEER <b>Jonathan C. Pifer</b>	PAVEMENT DESIGN ENGINEER <b>Joseph T. Hollands</b>
1223 Jones Franklin Rd. Raleigh, N.C. 27606 License No. F-0377 Bus: 919 851 8077 Fax: 919 851 8107 <b>WETHERILL ENGINEERING</b>	
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	



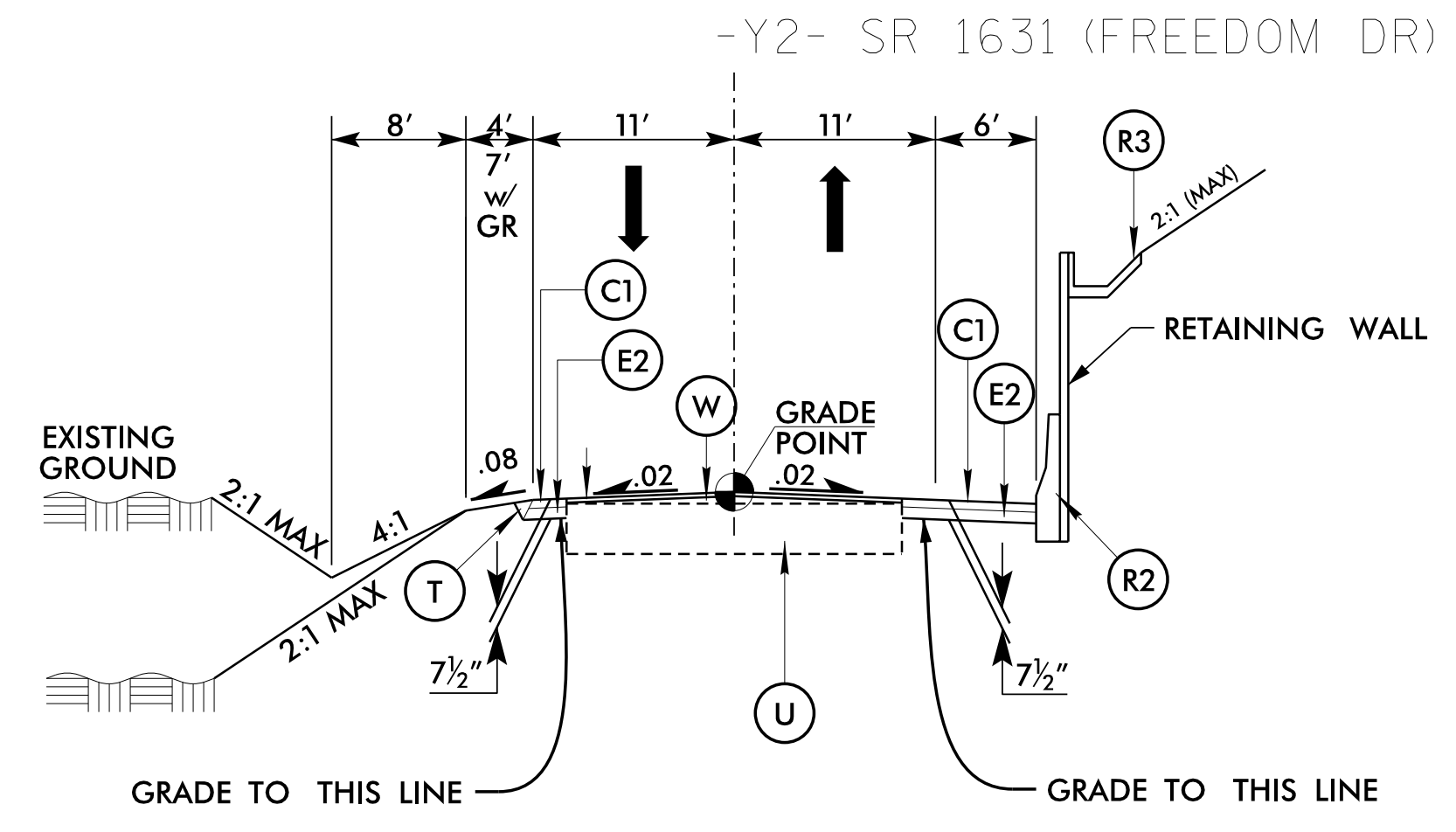
**TYPICAL SECTION NO. 6**

-Y1- STA. 7+00.00 TO STA. 8+43.00  
 -Y1- STA. 10+42.68 TO STA. 12+78.00



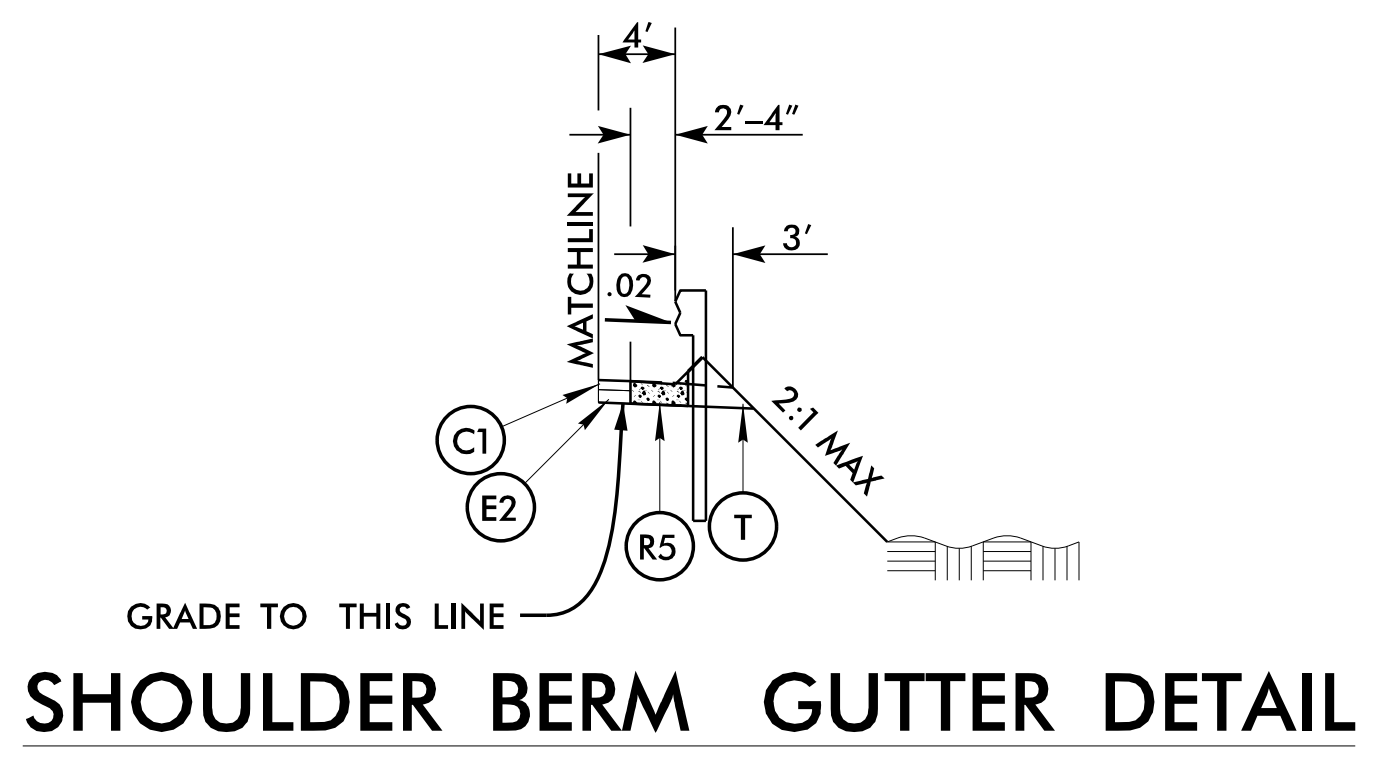
**TYPICAL SECTION NO. 7**

-Y1- STA. 8+43.00 TO STA. 10+42.68



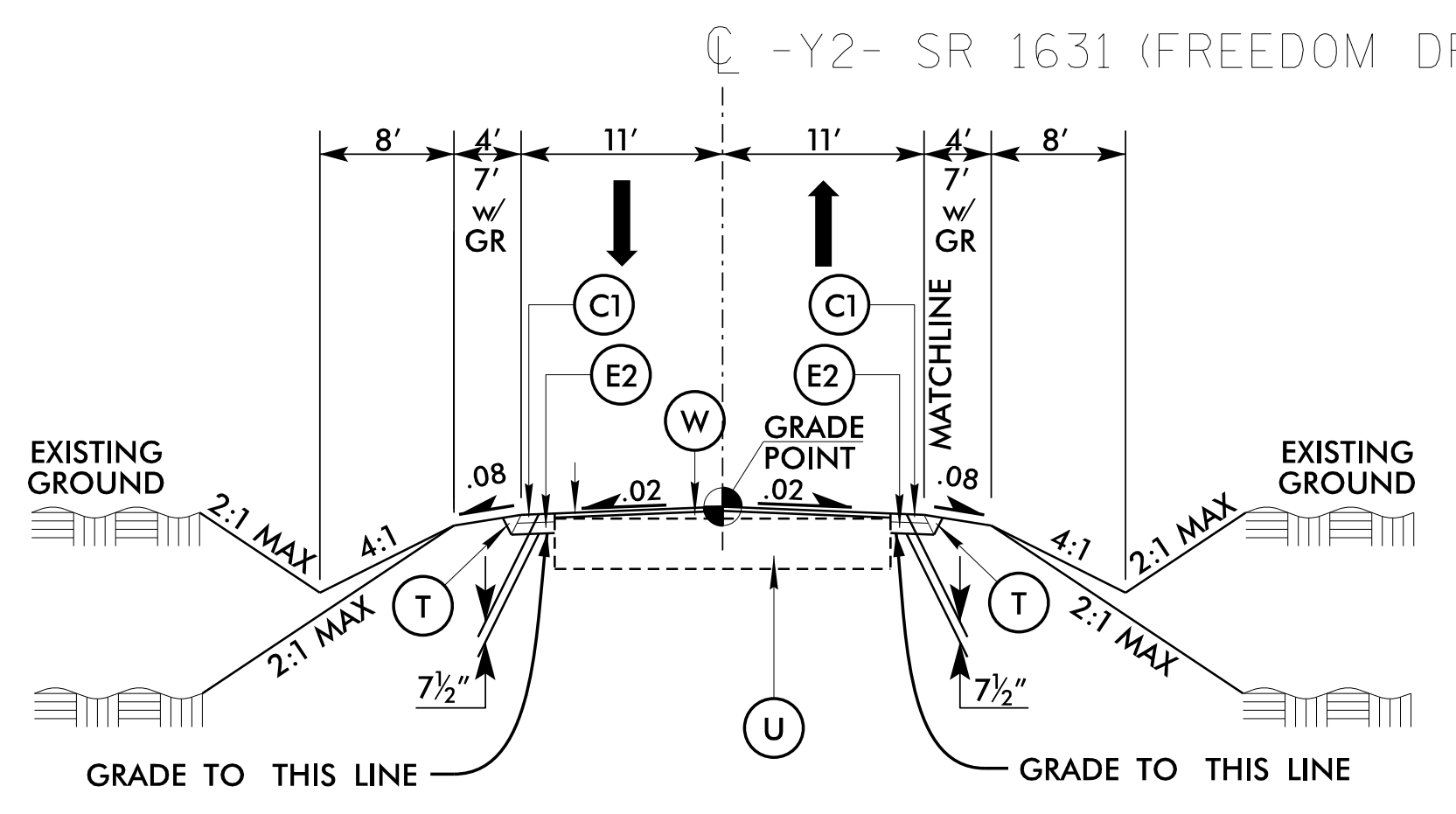
**TYPICAL SECTION NO. 8**

-Y2- STA. 10+00.00 TO STA. 16+50.00



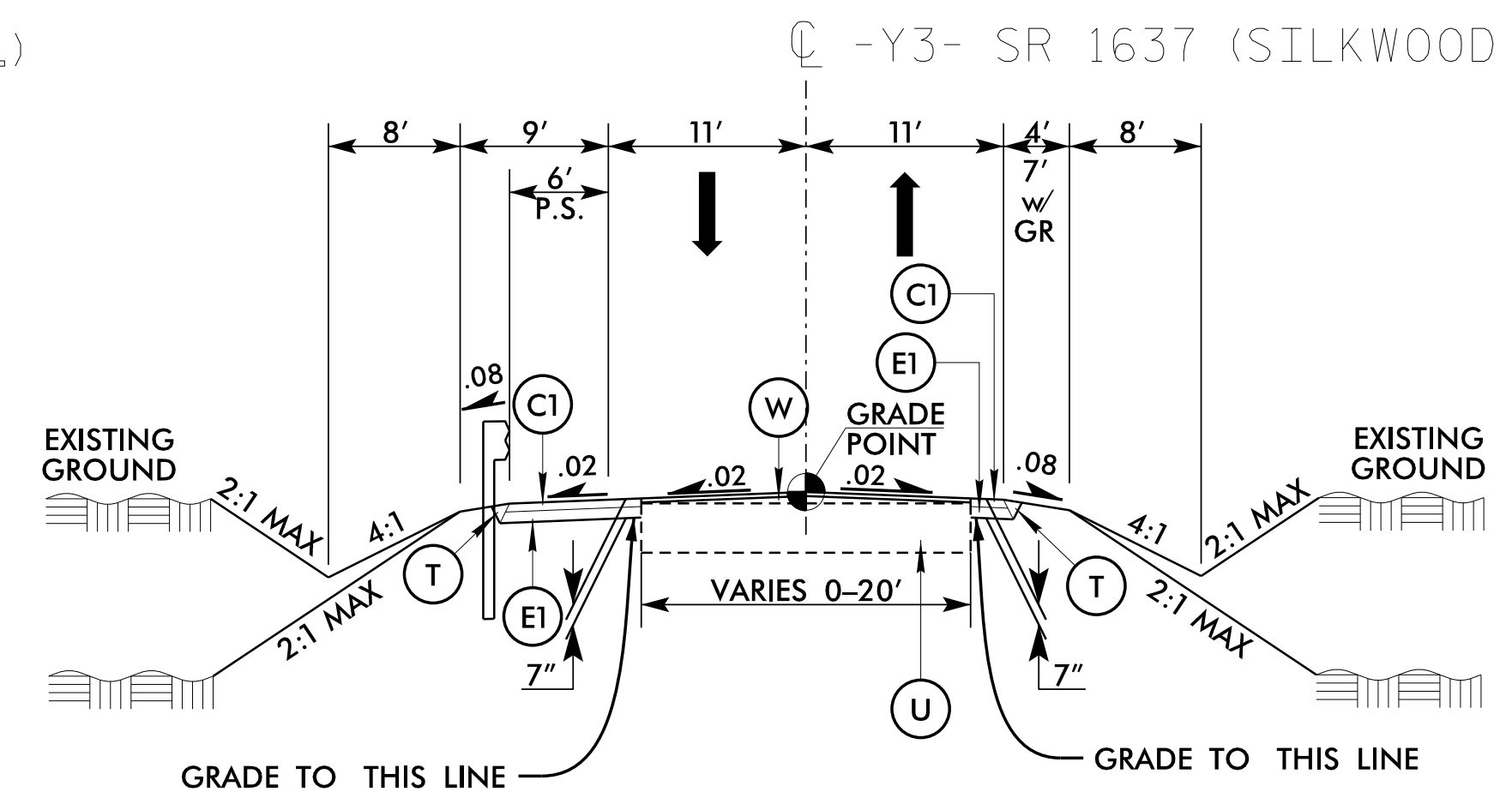
**SHOULDER BERM GUTTER DETAIL**

USE WITH TYPICAL SECTION NO. 9  
 -Y2- STA. 15+73.18 TO STA. 16+84.36 RT



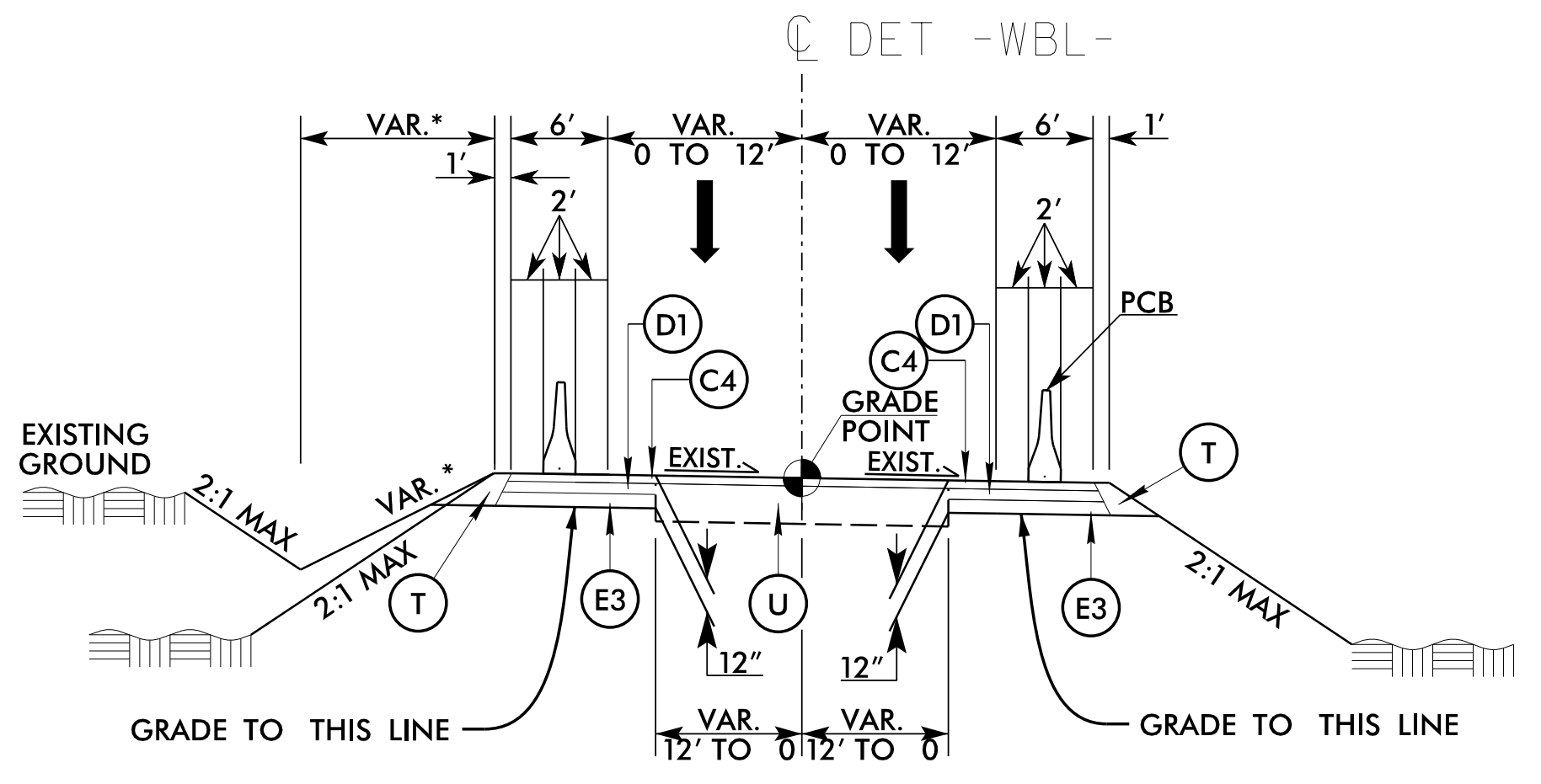
**TYPICAL SECTION NO. 9**

-Y2- STA. 16+50.00 TO STA. 18+00.00



**TYPICAL SECTION NO. 10**

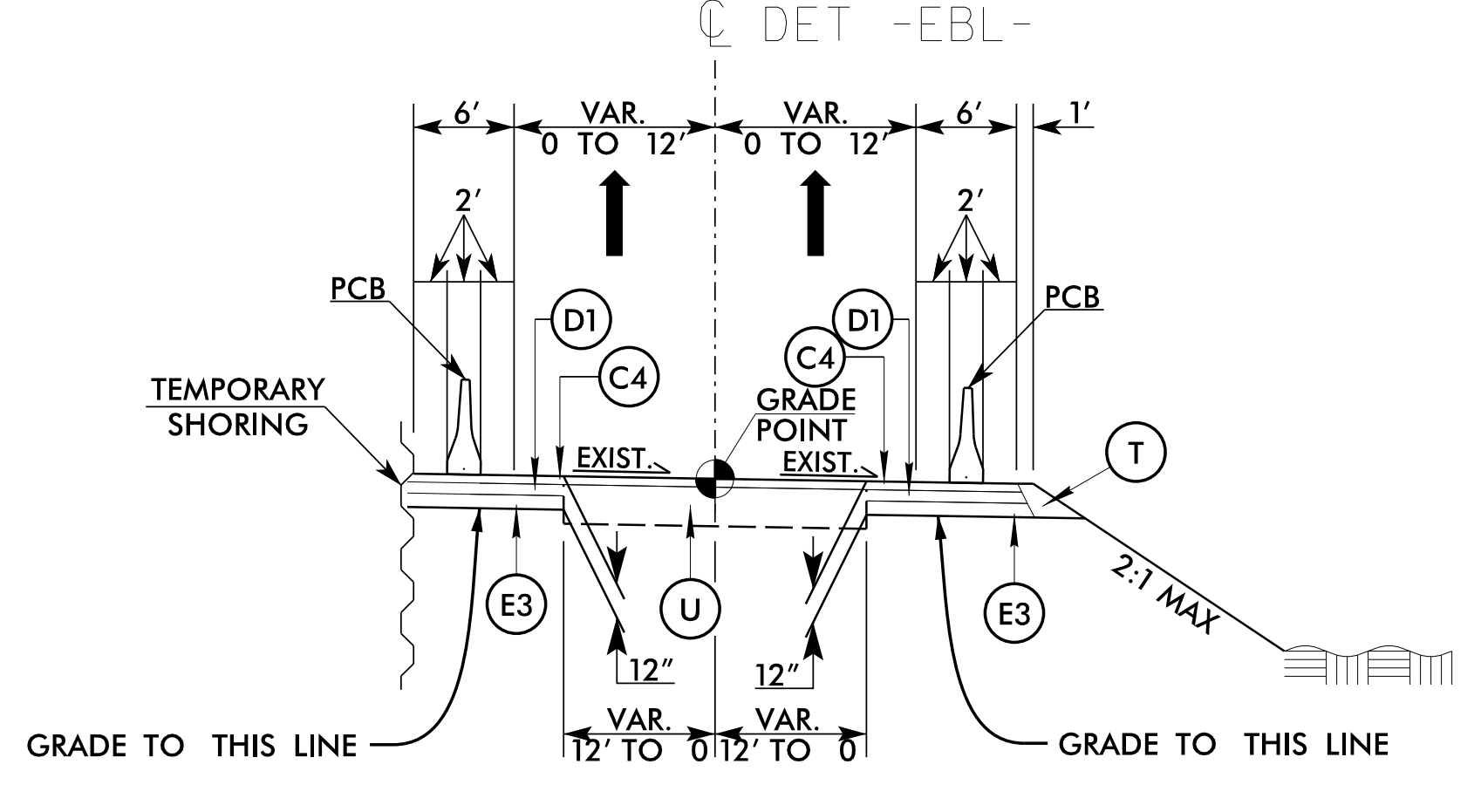
-Y3- STA. 23+00.00 TO STA. 27+07.53



**TYPICAL SECTION NO. 11**

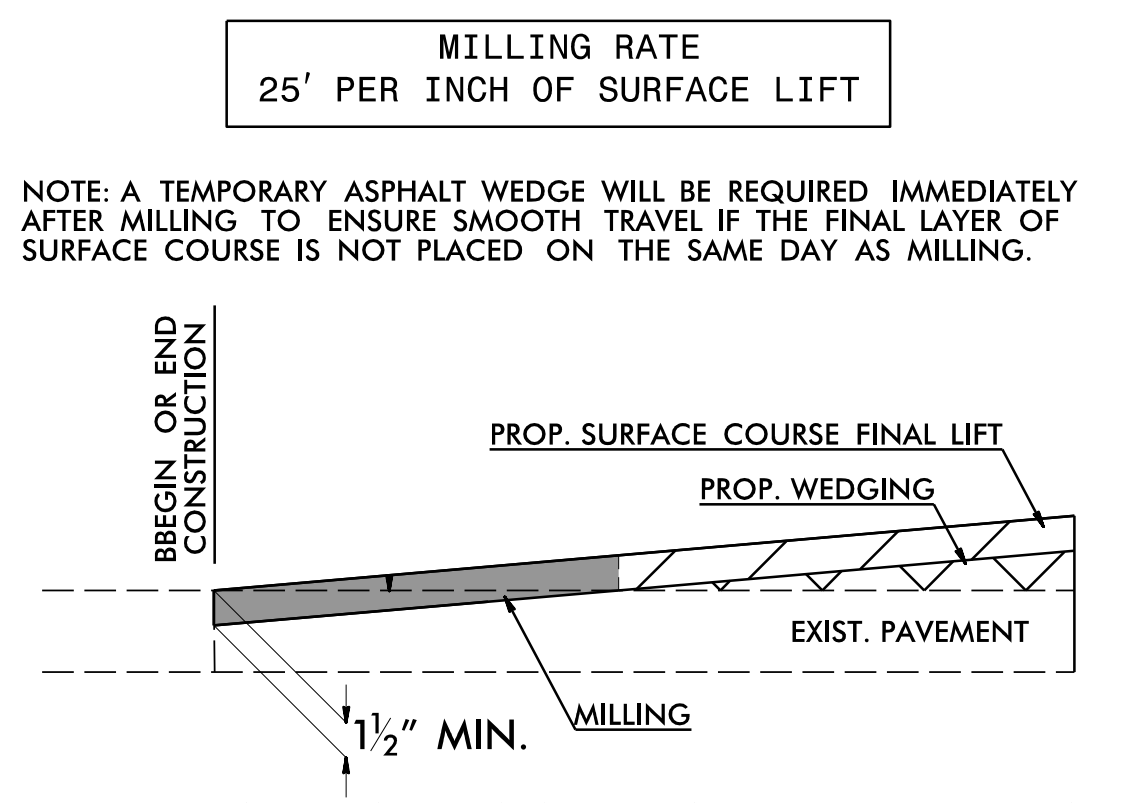
-DET-WBL- STA. 303+00.00 TO STA. 330+17.82

\* NOTE: DITCH SLOPES & WIDTHS ARE VARIABLE TO MEET FINAL CONDITIONS.



**TYPICAL SECTION NO. 12**

-DET-EBL- STA. 303+00.00 TO STA. 328+28.02



**INCIDENTAL MILLING DETAIL**

-Y1- 7+00.00 TO -Y1- 7+75.00  
 -Y1- 12+03.00 TO -Y1- 12+78.00  
 -Y2- 17+25.00 TO -Y2- 18+00.00  
 -Y3- 23+00.00 TO -Y3- 23+75.00

PAVEMENT SCHEDULE	
B1	3/4" OGAFC TYPE FC-1 MOD
C1	3" S9.5B
C2	VAR. S9.5B
C3	1 1/2" S9.5D
C4	3" S9.5D
C5	VAR. S9.5D
D1	4" I19.5C
D2	VAR. I19.0C
E1	4" B25.0C
E2	4 1/2" B25.0C
E3	5" B25.0C
E4	9" B25.0C
E5	13" B25.0C
E6	VAR. B25.0C
J1	8" ABC
R1	SSCB
R2	RCB-SINGLE FACED
R3	CONC. DITCH
R4	CONC. COVER
R5	SBG
T	EARTH MATERIAL
U	EXIST. PAVEMENT
V1	1 1/2" MILLING
V2	2 1/4" MILLING
W	WEDGING
Y	MILLED RUMBLE STRIPS

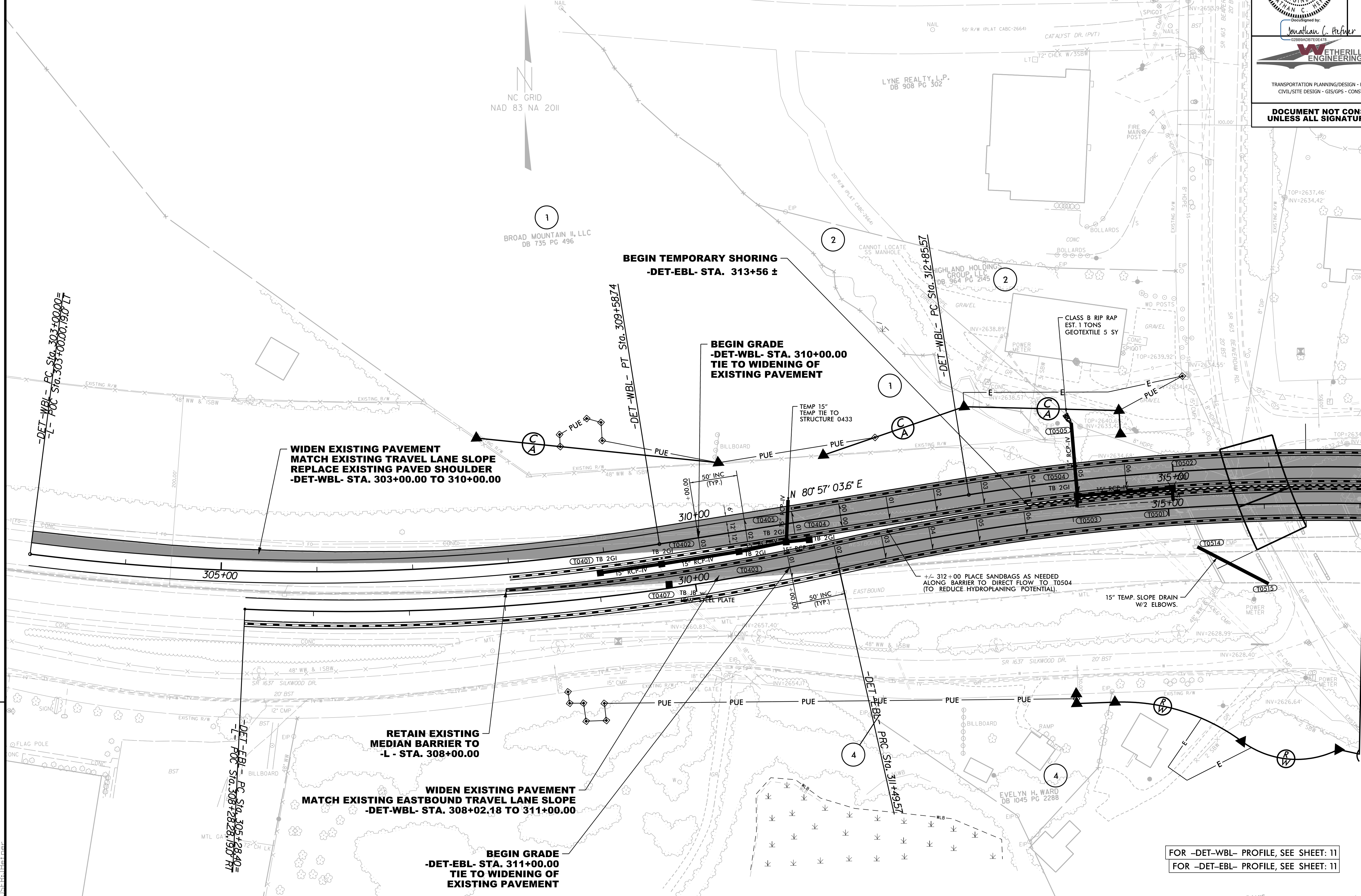
-DET-WBL- CURVE DATA		-DET-EBL- CURVE DATA	
PI Sta 306+31.60	PI Sta 316+48.00	PI Sta 308+40.85	PI Sta 317+76.32
$\Delta = 16^{\circ} 16' 06.6"$ (LT)	$\Delta = 17^{\circ} 32' 05.3"$ (RT)	$\Delta = 15^{\circ} 20' 26.5"$ (LT)	$\Delta = 30^{\circ} 20' 06.8"$ (RT)
D = 2' 28" 10.7"	D = 2' 26" 17.2"	D = 2' 28" 10.7"	D = 2' 28" 41.5"
L = 658.74'	L = 719.19'	L = 621.17'	L = 1,224.09'
T = 331.60'	T = 362.43'	T = 312.45'	T = 626.75'
R = 2,320.00'	R = 2,350.00'	R = 2,320.00'	R = 2,312.00'
SE = EXIST	SE = .06	SE = .06	SE = .06
DS = 60 MPH	DS = 60 MPH	DS = 60 MPH	DS = 60 MPH

**TEMPORARY SHORING**  
SEE TRAFFIC CONTROL PLANS FOR DESIGN PARAMETERS AND FINAL LOCATIONS.

PROJECT REFERENCE NO. <b>HB-0002</b>	SHEET NO. <b>2B-1</b>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER 5/13/2024	HYDRAULICS ENGINEER 6/13/2024
 1223 Jones Franklin Rd. Raleigh, N.C. 27606 License No. F-0377 Bus: 919 851 8077 Fax: 919 851 8107	
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	

REVISIONS

MATCHLINE -DET-WBL- STA. 317+00 SEE SHEET 2B-2



FOR -DET-WBL- PROFILE, SEE SHEET: 11  
FOR -DET-EBL- PROFILE, SEE SHEET: 11

5/13/2024  
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8/17/99

-DET-WBL- CURVE DATA		-DET-EBL- CURVE DATA	
PI Sta 316+48.00	PI Sta 325+12.73	PI Sta 317+76.32	
$\Delta = 17^{\circ} 32' 05.3" (RT)$	$\Delta = 10^{\circ} 33' 12.2" (RT)$	$\Delta = 30^{\circ} 20' 06.8" (RT)$	
D = 2' 26' 17.2"	D = 1' 02' 30.3"	D = 2' 28' 41.5"	
L = 719.19'	L = 1,013.05'	L = 1,224.09'	
T = 362.43'	T = 507.96'	T = 626.75'	
R = 2,350.00'	R = 5,500.00'	R = 2,312.00'	
SE = .06	SE = EXIST	SE = .06	
DS = 60 MPH	DS = 60 MPH	DS = 60 MPH	

PROJECT REFERENCE NO. **HB-0002** SHEET NO. **2B-2**

R/W SHEET NO.

ROADWAY DESIGN ENGINEER  
5/13/2024  
SEAL 35016  
JONATHAN C. HEFFNER

HYDRAULICS ENGINEER  
5/13/2024  
SEAL 15833  
JERRY L. LINDSEY

WETHERILL ENGINEERING  
1223 JONES FRANKLIN Rd.  
Raleigh, N.C. 27606  
License No. F-0377  
Bus: 919 851 8077  
Fax: 919 851 8107

TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN  
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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

**TEMPORARY SHORING**  
SEE TRAFFIC CONTROL PLANS FOR DESIGN PARAMETERS AND FINAL LOCATIONS.

NC GRID  
NAD 83 NA 2011

**MATCHLINE -DET-WBL- STA. 317+00 SEE SHEET 2B-1**

**WIDEN EXISTING PAVEMENT  
MATCH EXISTING TRAVEL LANE SLOPE  
REPLACE EXISTING PAVED SHOULDER  
-DET-WBL- STA. 322+50.00 TO  
-L- STA. 331+50.00**

**END GRADE  
-DET-WBL- STA. 322+50.00  
TIE TO WIDENING OF  
EXISTING PAVEMENT**

**END TEMPORARY SHORING  
-DET-EBL- STA. 322+60 ±**

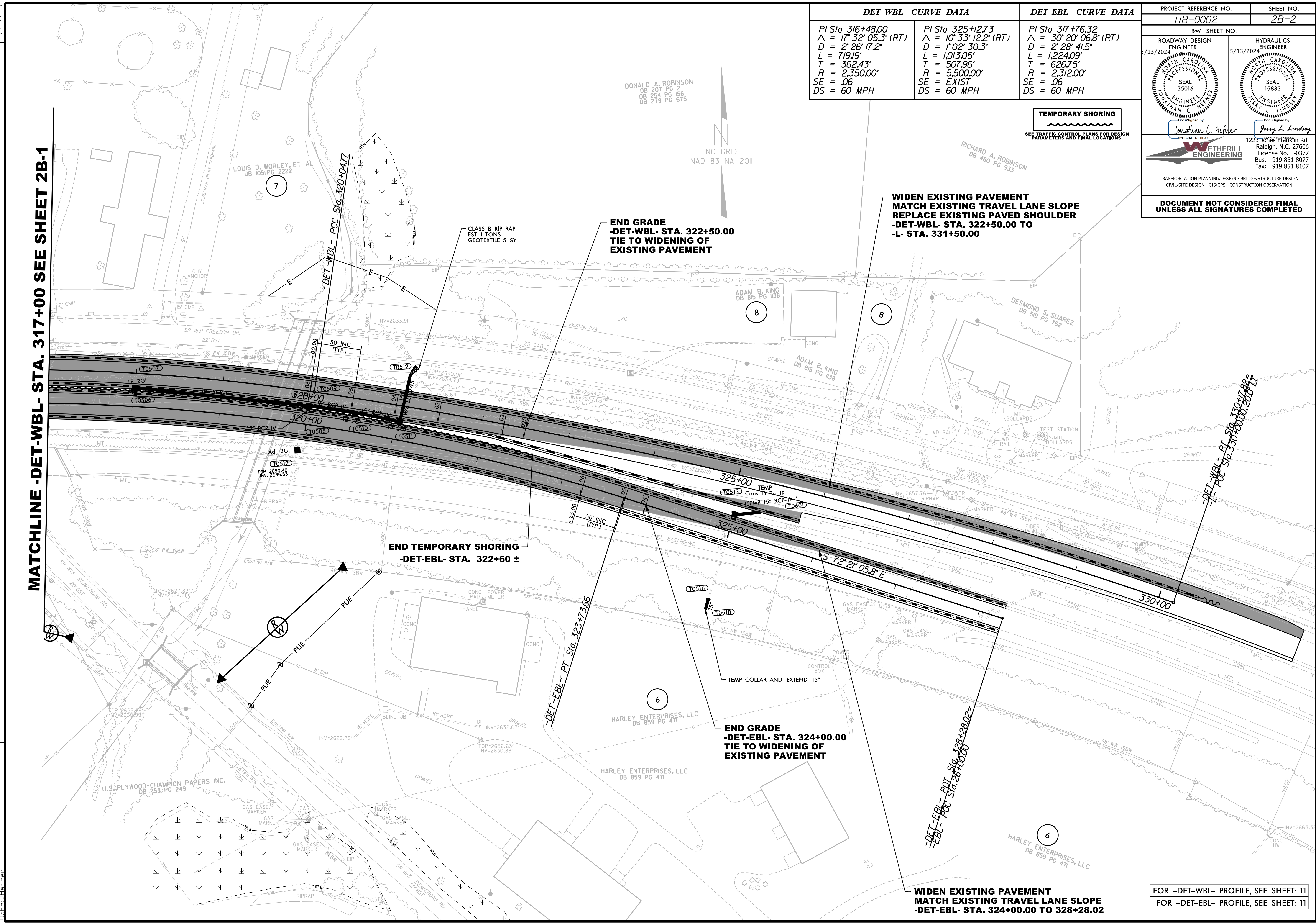
**END GRADE  
-DET-EBL- STA. 324+00.00  
TIE TO WIDENING OF  
EXISTING PAVEMENT**

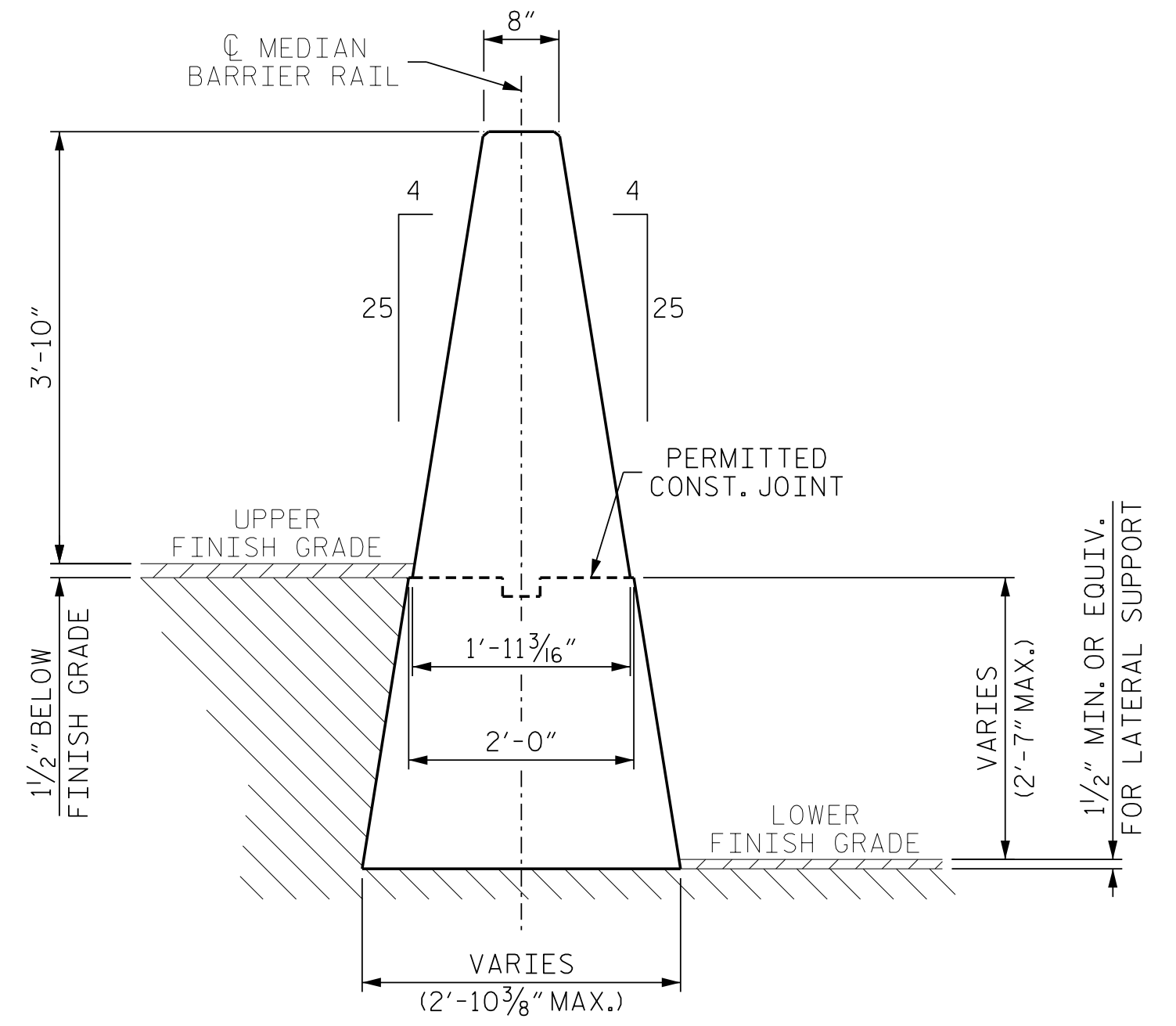
**WIDEN EXISTING PAVEMENT  
MATCH EXISTING TRAVEL LANE SLOPE  
-DET-EBL- STA. 324+00.00 TO 328+28.02**

FOR -DET-WBL- PROFILE, SEE SHEET: 11  
FOR -DET-EBL- PROFILE, SEE SHEET: 11

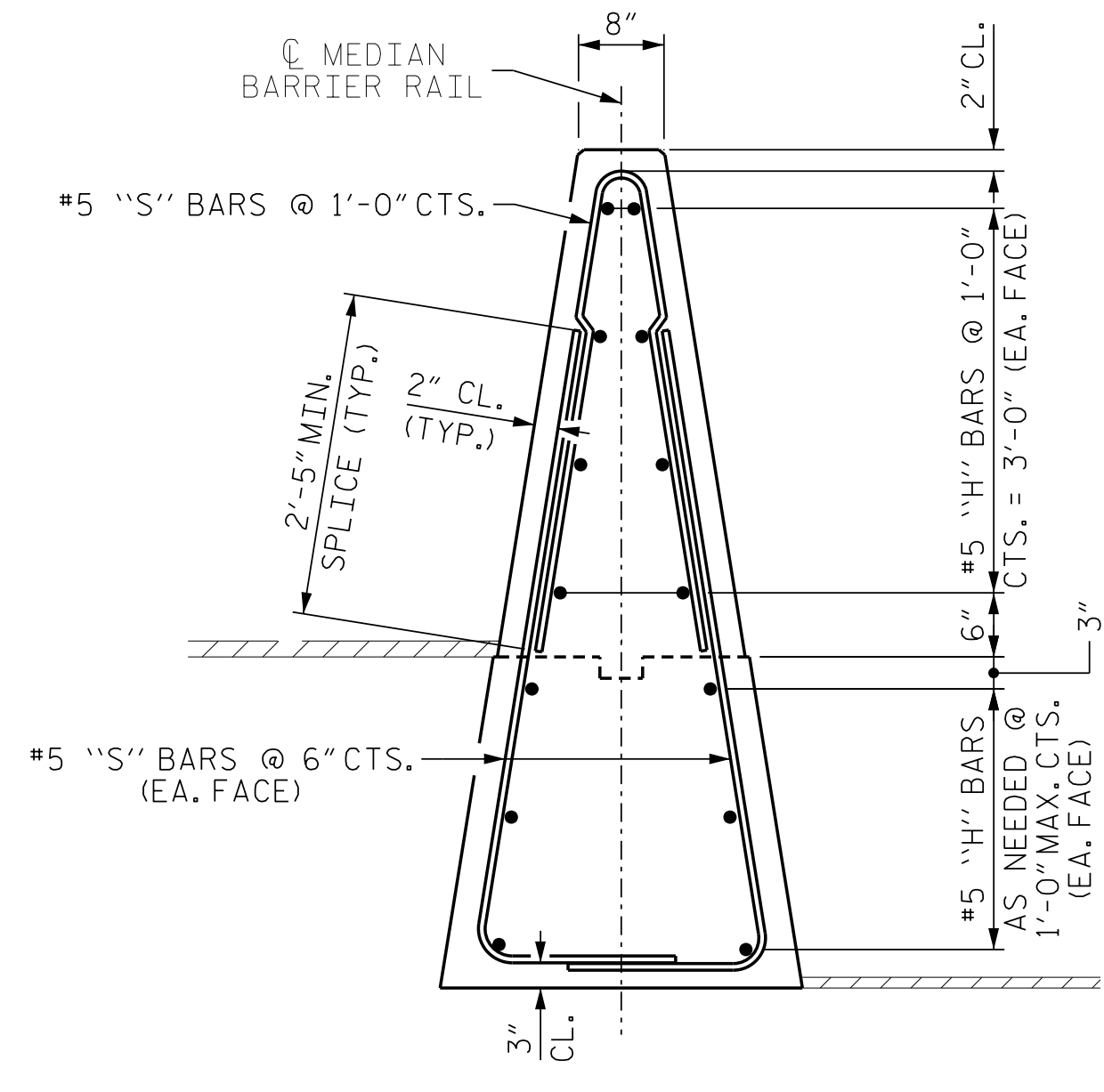
REVISIONS

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CONCRETE DETAILS



REINFORCEMENT DETAILS

**SINGLE SLOPE CONCRETE BARRIER (2'-7" MAX. BIFURCATION)**

SECTION SHOWN IS WITH RESPECT TO MAXIMUM 2'-7" BIFURCATION

**GENERAL NOTES:**

ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2024 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N.C. DEPARTMENT OF TRANSPORTATION

USE CLASS "AA" CONCRETE.

ALL EXPOSED CORNERS ON BARRIER SHALL BE CHAMFERED 3/4".

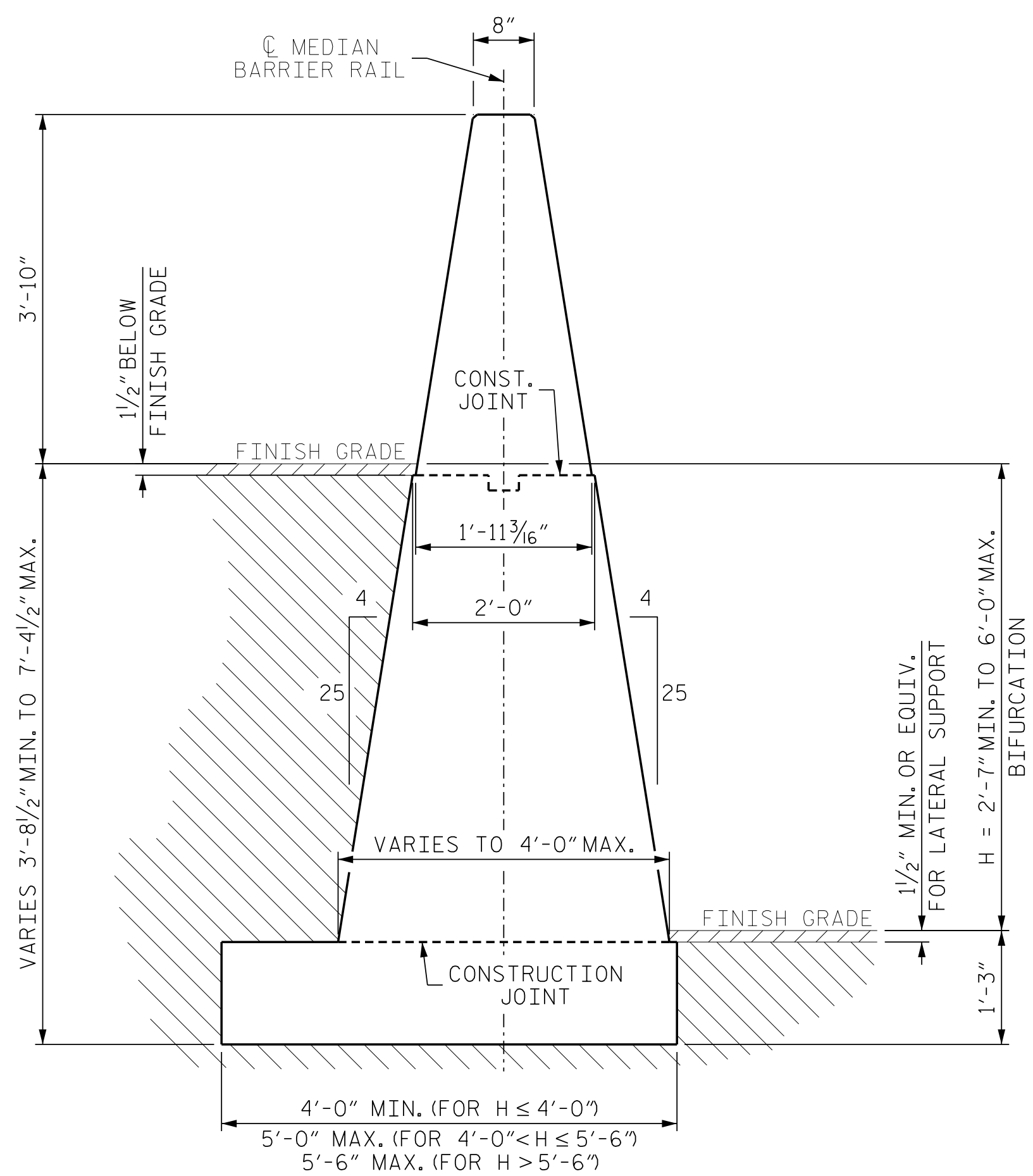
MAINTAIN 2" CLEAR COVER FOR ALL REINFORCING STEEL UNLESS NOTED OTHERWISE.

REINFORCING STEEL (REBAR) SHALL MEET THE REQUIREMENTS OF ASTM A615, GRADE 60.

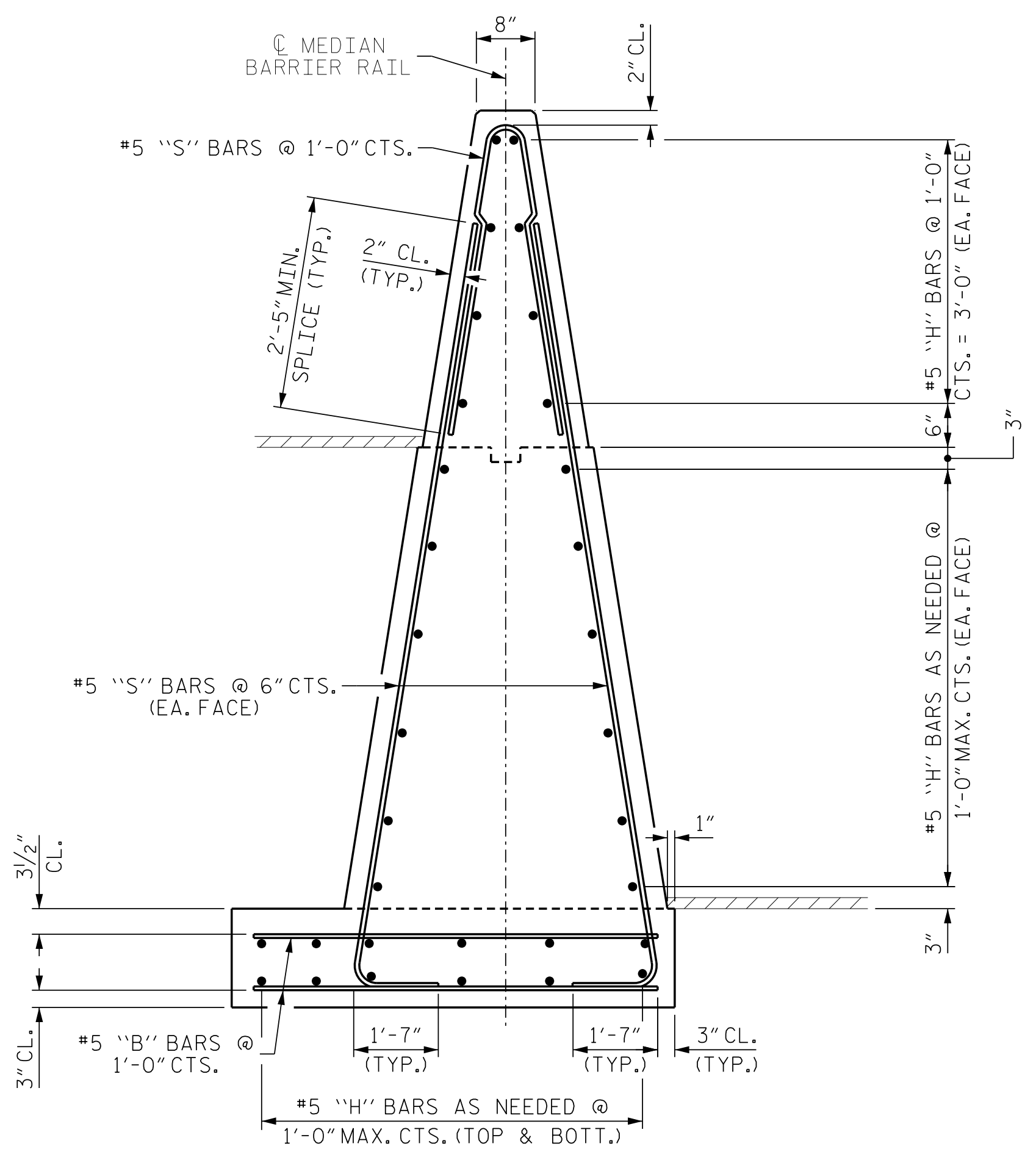
#5 "S" BAR SPLICE 2'-5"  
#5 "H" BAR SPLICE 3'-2"

ANY METHOD DEvised BY THE CONTRACTOR AND APPROVED BY THE ENGINEER THAT SHALL ASSURE THAT THE LONGITUDINAL ROADWAY STEEL WILL BE POSITIONED 1/2" ± AS DIMENSIONED ON THE PLANS WILL BE DEEMED SATISFACTORY.

REFER TO ROADWAY STANDARD DRAWING NO. 854.01 FOR EXPANSION AND CONTRACTION JOINT FILLER AND OTHER SPECIFICATIONS



CONCRETE DETAILS



REINFORCEMENT DETAILS

**SINGLE SLOPE CONCRETE BARRIER (2'-7" THRU 6'-0" BIFURCATION)**

SECTION SHOWN IS WITH RESPECT TO 2'-7" THRU 6'-0" BIFURCATION



DocuSigned by:  
John Arthur Dilworth  
62138229220438  
3/7/2024

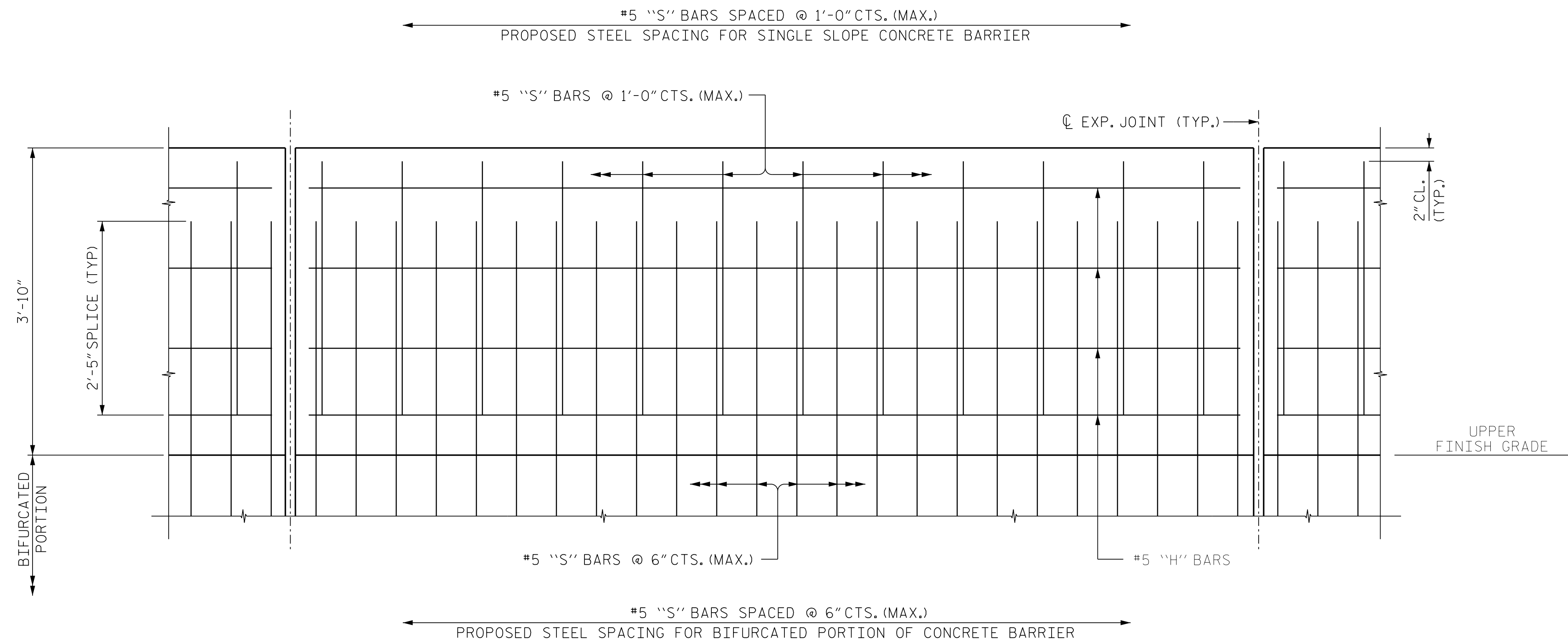
**WETHERILL ENGINEERING**  
1223 Jones Franklin Rd.  
Raleigh, N.C. 27606  
License No. F-0377  
Bus: 919 851 8077  
Fax: 919 851 8107

TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN  
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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

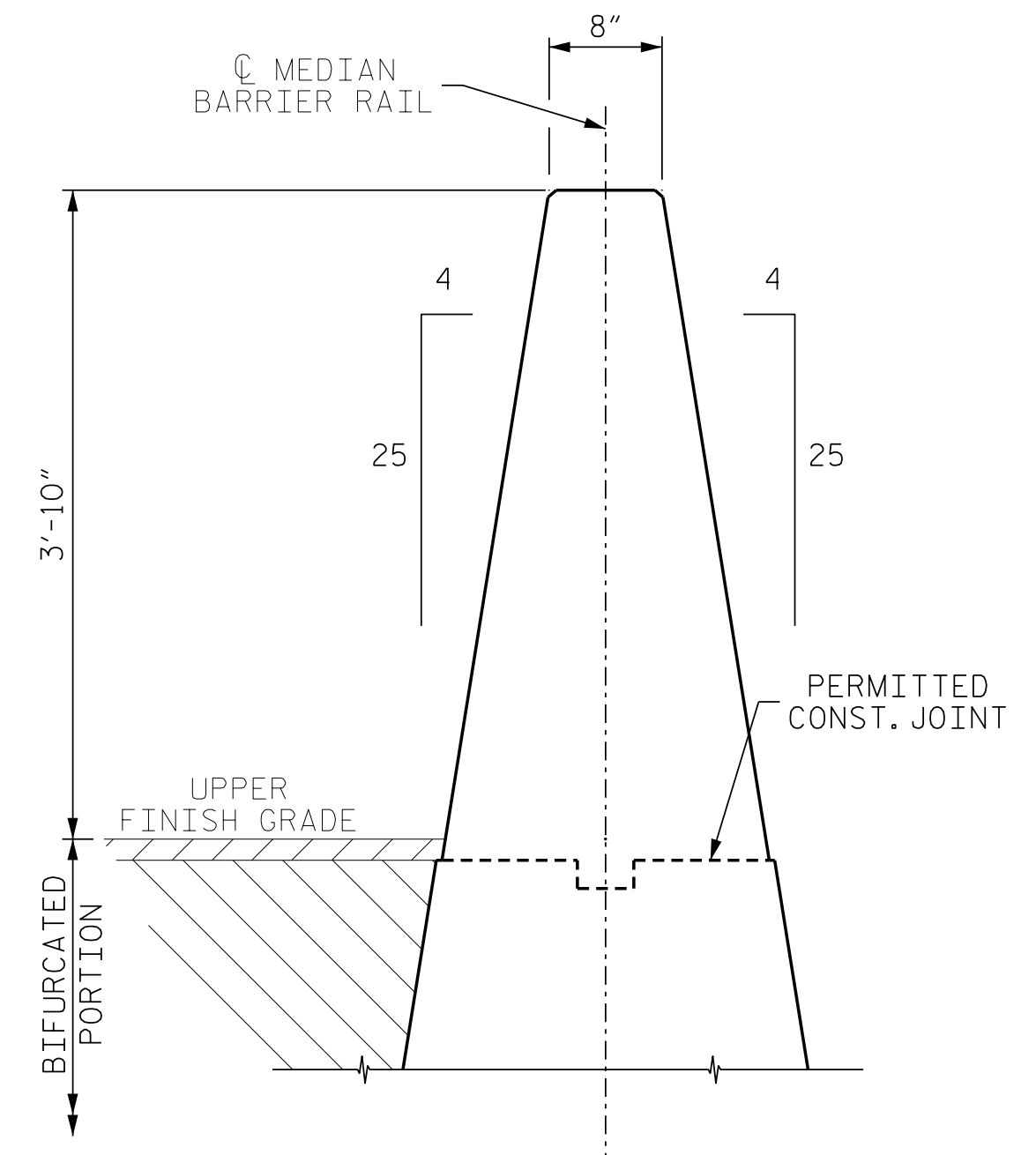
**SINGLE SLOPE CONCRETE BARRIER (46" MIN. HEIGHT)**  
**SHEET 1 OF 2**

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

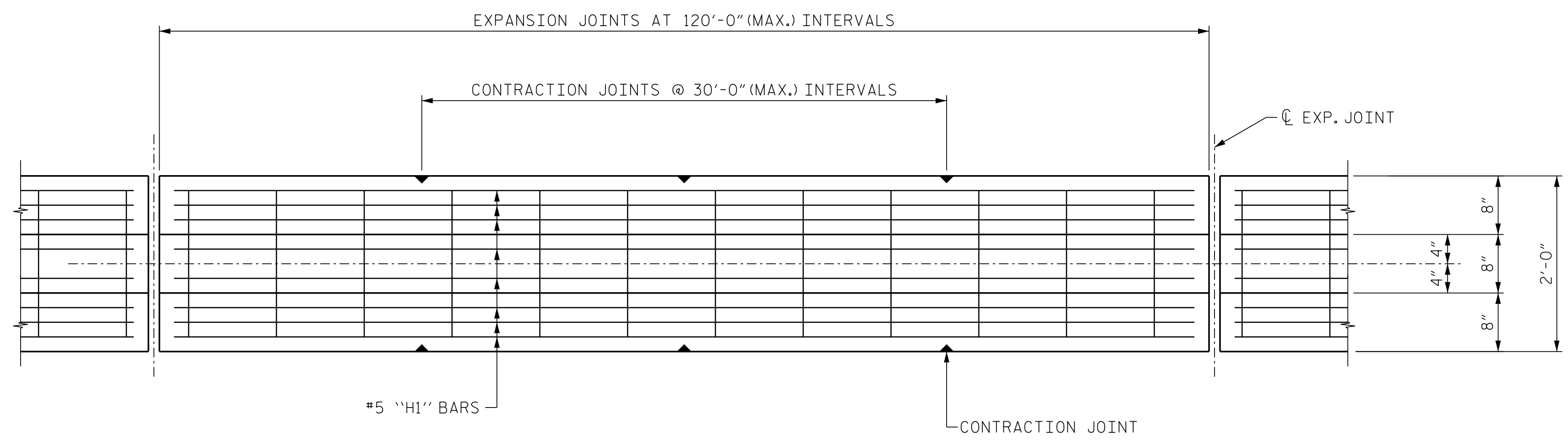


### ELEVATION

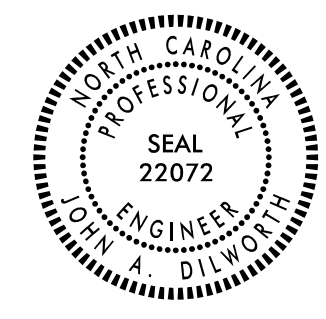
3'-10" MEDIAN BARRIER REINFORCEMENT SHOWN  
FOR REINFORCEMENT IN BIFURCATED SECTION, SEE "SINGLE SLOPE CONCRETE BARRIER DETAILS" SHEET 1 OF 2



### BARRIER SECTION



### PLAN VIEW



DocuSigned by:  
John Arthur Dilworth  
621382269228438...  
3/7/2024

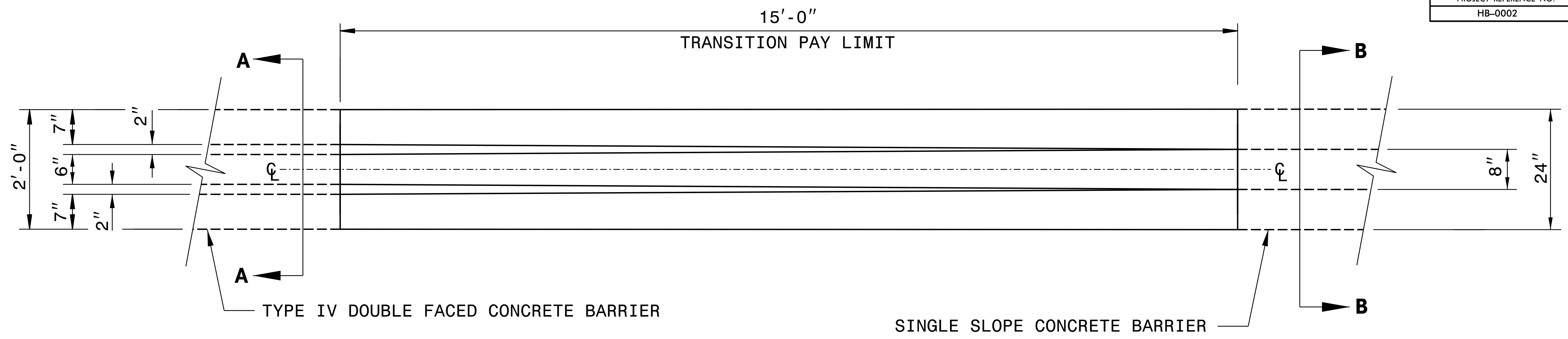
**WETHERILL ENGINEERING**  
1223 Jones Franklin Rd.  
Raleigh, N.C. 27606  
License No. F-0377  
Bus: 919 851 8077  
Fax: 919 851 8107

TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN  
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

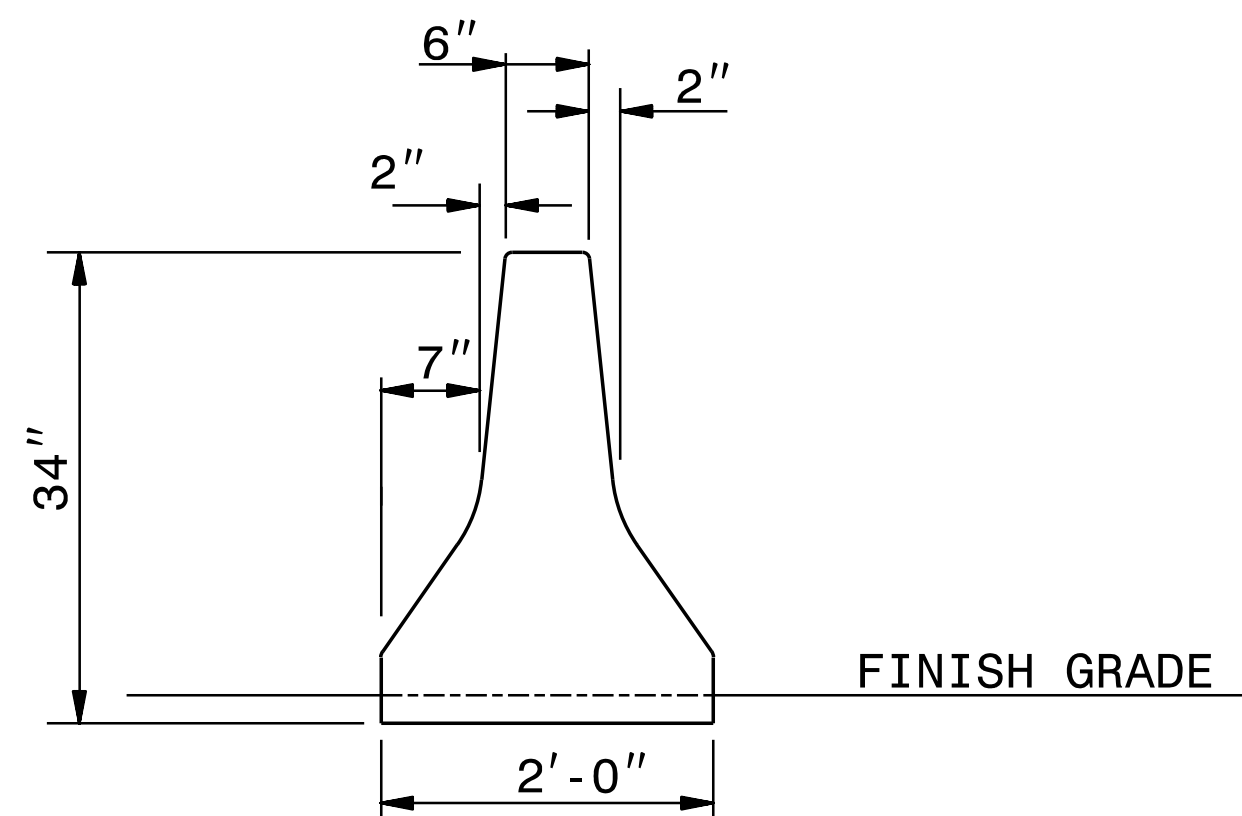
**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**

**SINGLE SLOPE  
CONCRETE BARRIER  
(46" MIN. HEIGHT)  
SHEET 2 OF 2**

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

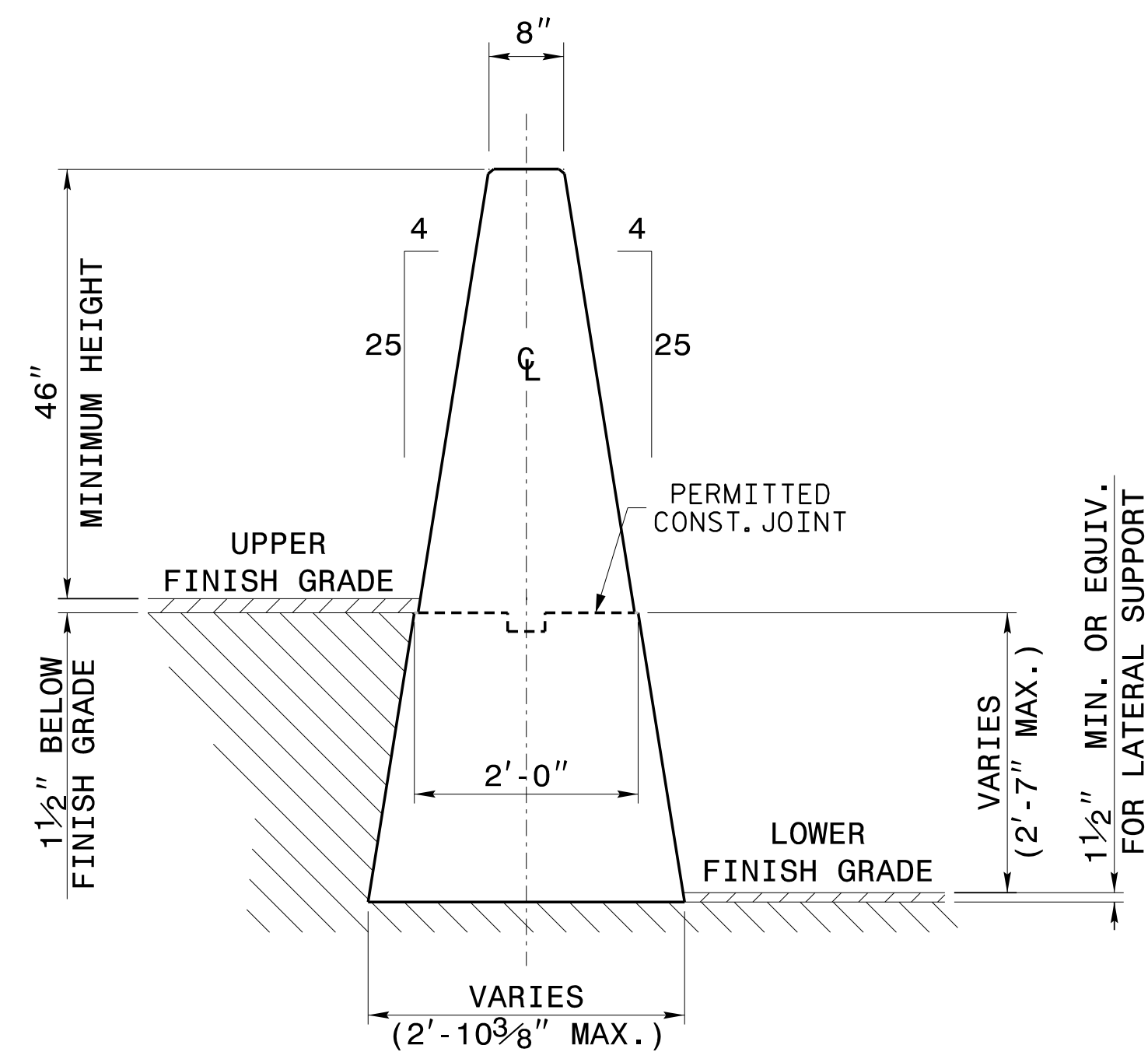


**TRANSITION FROM TYPE IV DOUBLE FACED CONCRETE BARRIER  
TO SINGLE SLOPE CONCRETE BARRIER**



**SECTION A-A**

**TYPE IV DOUBLE FACED CONCRETE BARRIER**



**SECTION B-B**

**SINGLE SLOPE CONCRETE BARRIER**

**NOTES:**  
SEE SPECIAL DETAILS PERTAINING TO SINGLE SLOPE BARRIERS FOR CONSTRUCTION METHODS AND STEEL PLACEMENT.

SEE ROADWAY DETAILS AND ROADWAY STANDARD DRAWINGS FOR TYPE IV DOUBLE FACED CONCRETE BARRIER CONSTRUCTION METHODS AND STEEL PLACEMENT.

DIMENSIONS OF TYPE IV DOUBLE FACED CONCRETE BARRIER ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED.



DocuSigned by:  
John Arthur Dilworth  
621382269228438  
3/7/2024

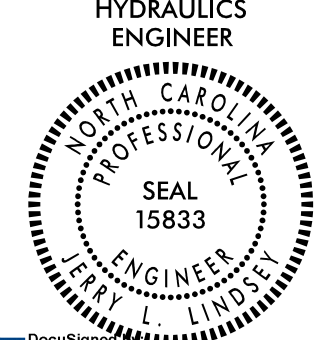
**WETHERILL ENGINEERING**  
1223 Jones Franklin Rd.  
Raleigh, N.C. 27606  
License No. F-0377  
Bus: 919 851 8077  
Fax: 919 851 8107

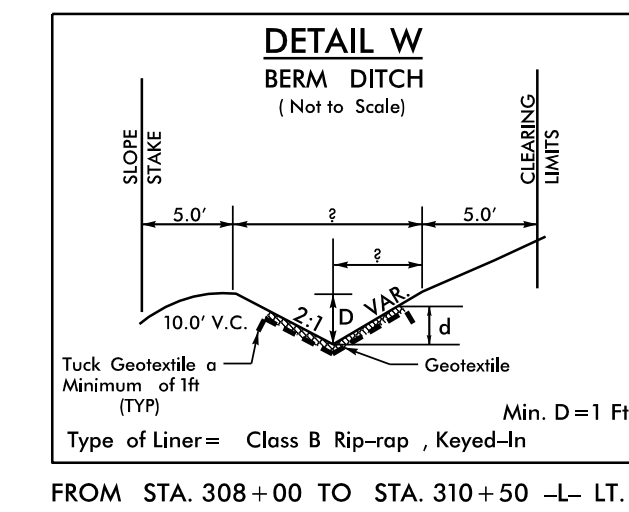
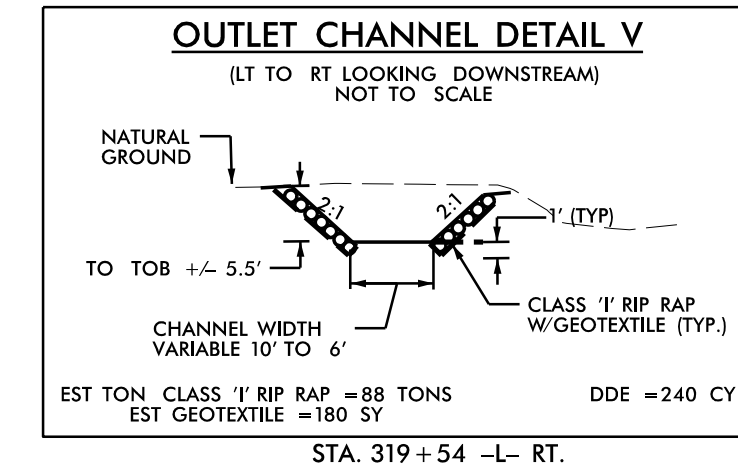
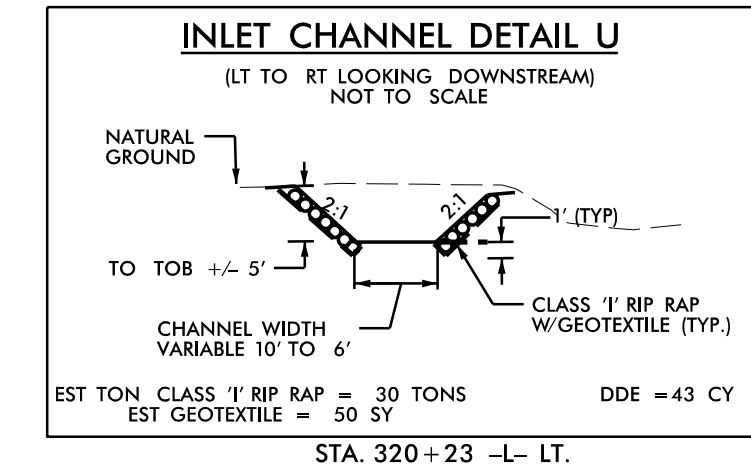
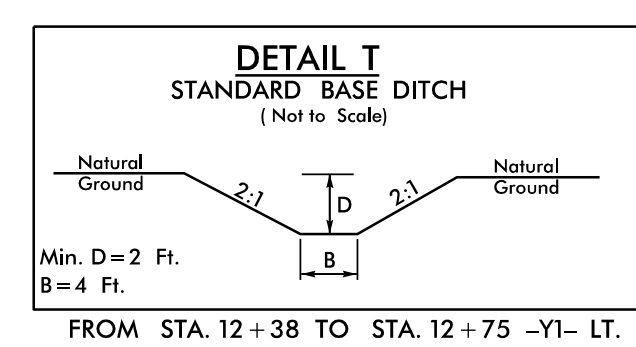
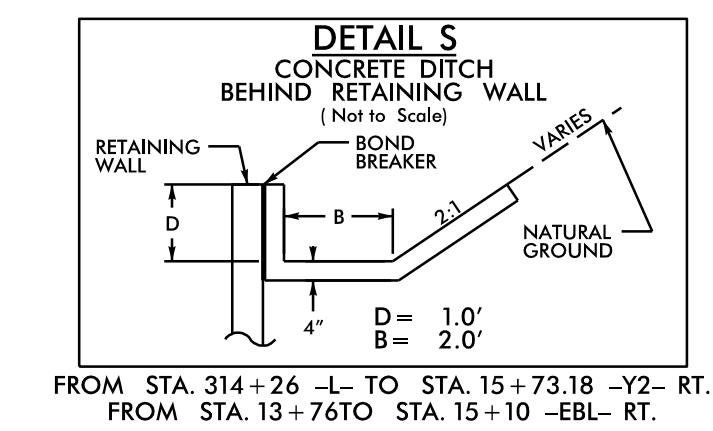
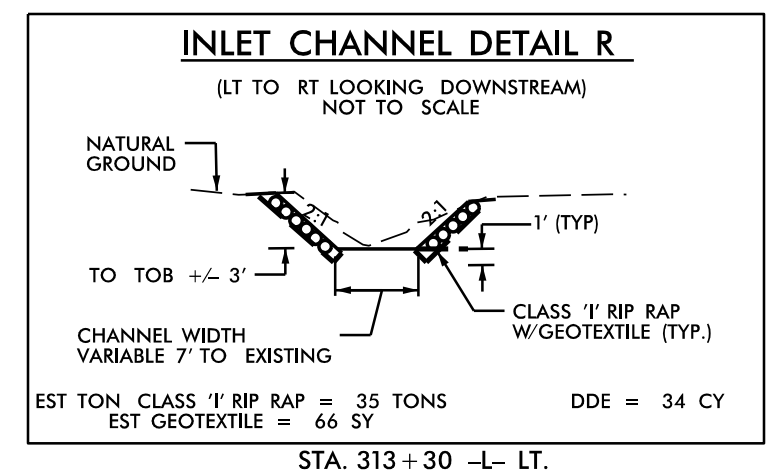
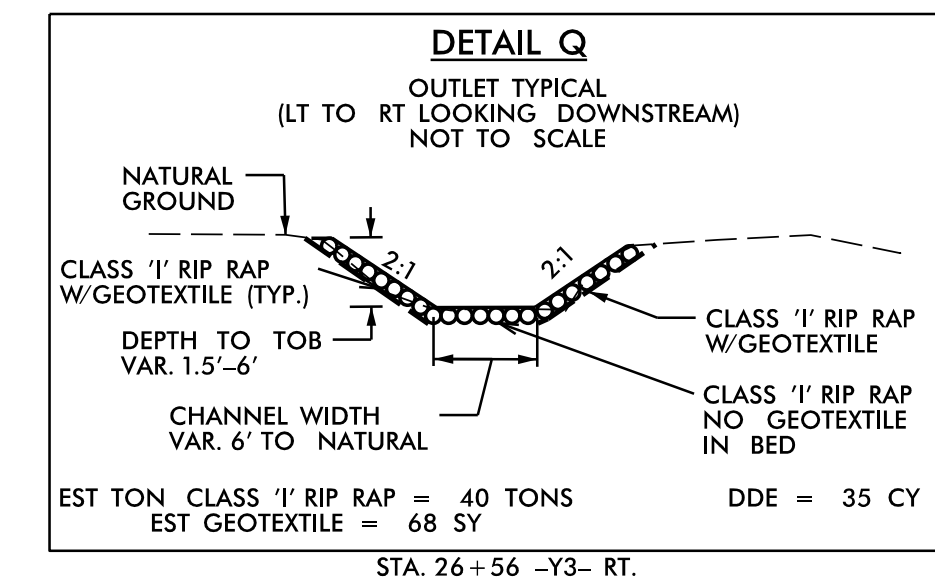
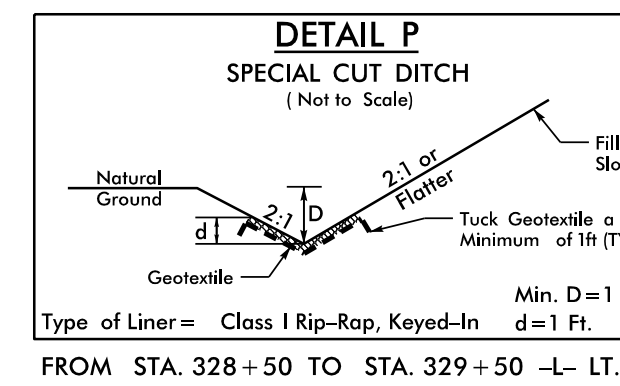
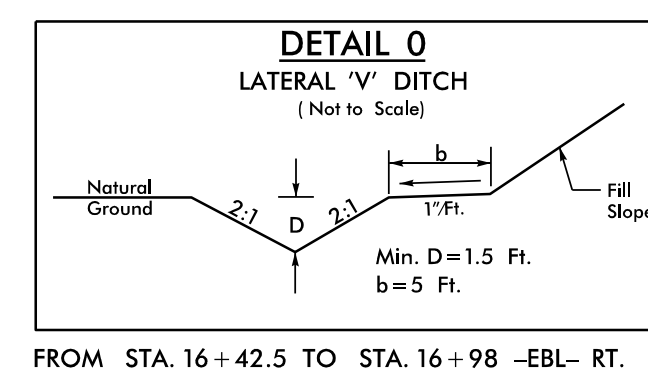
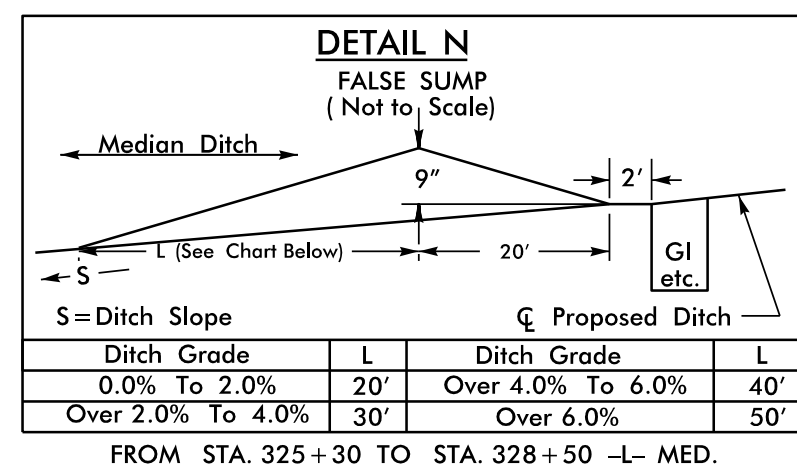
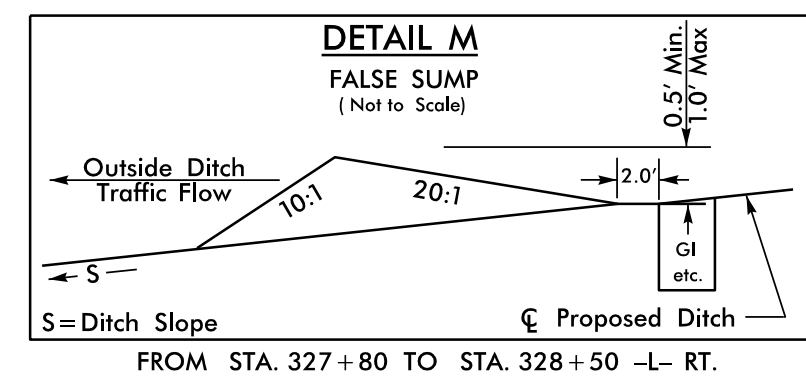
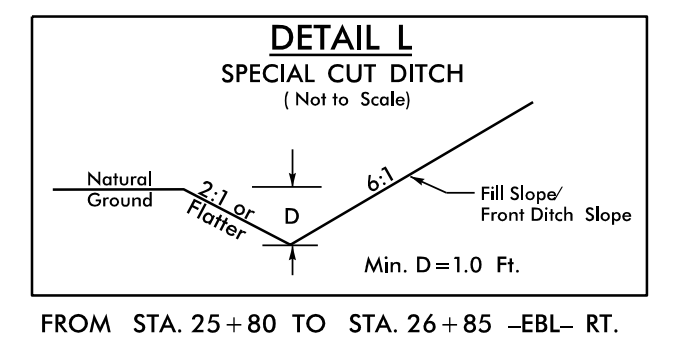
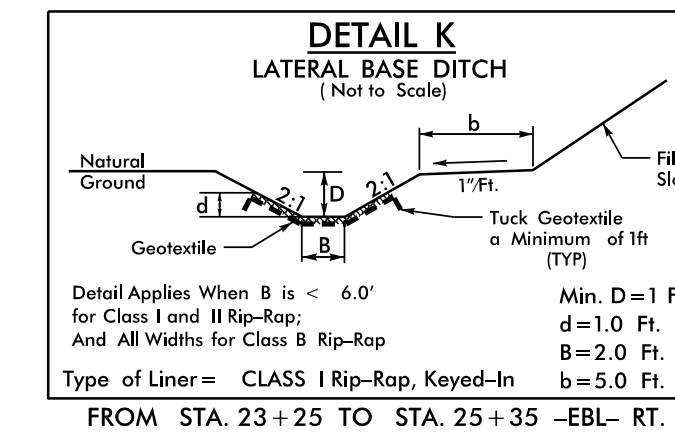
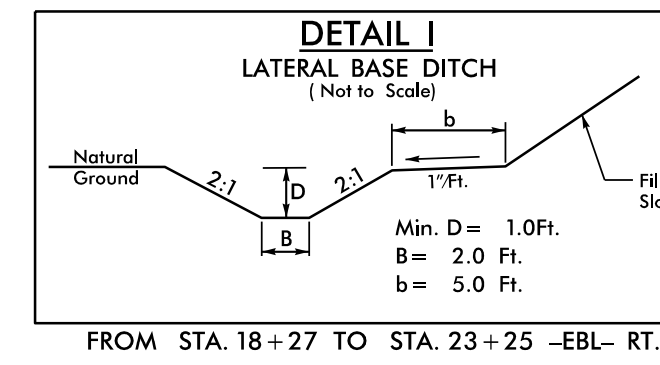
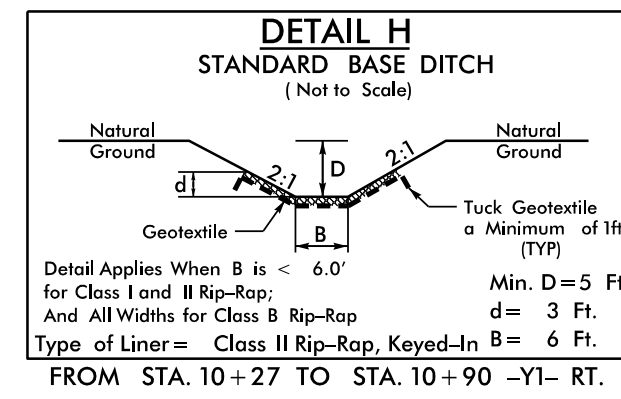
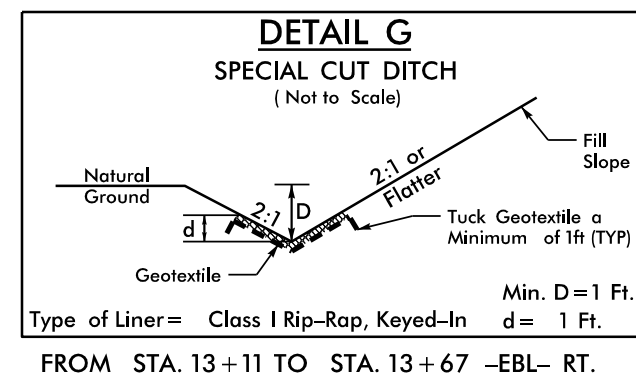
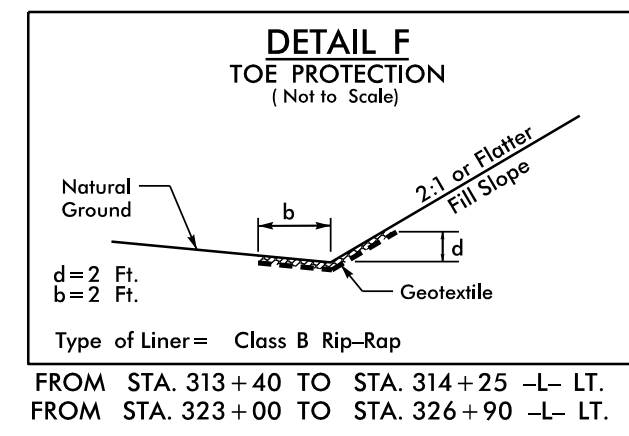
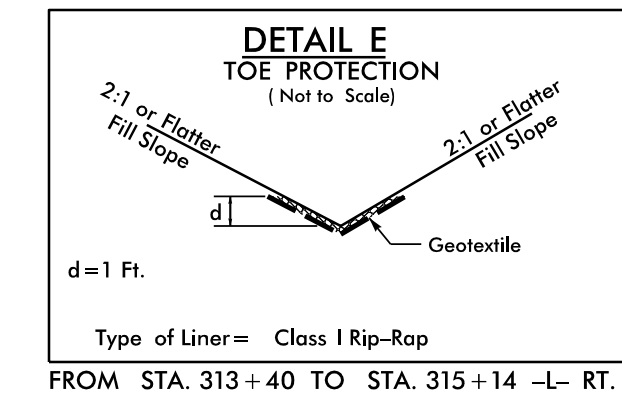
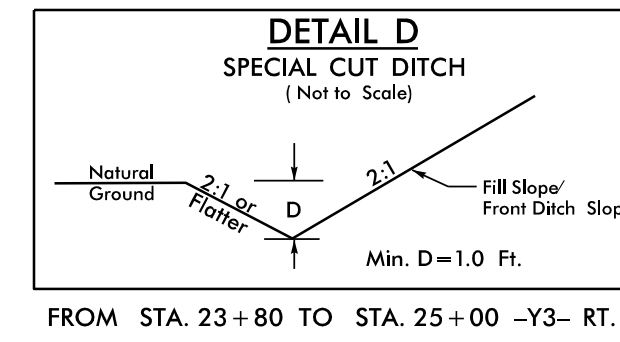
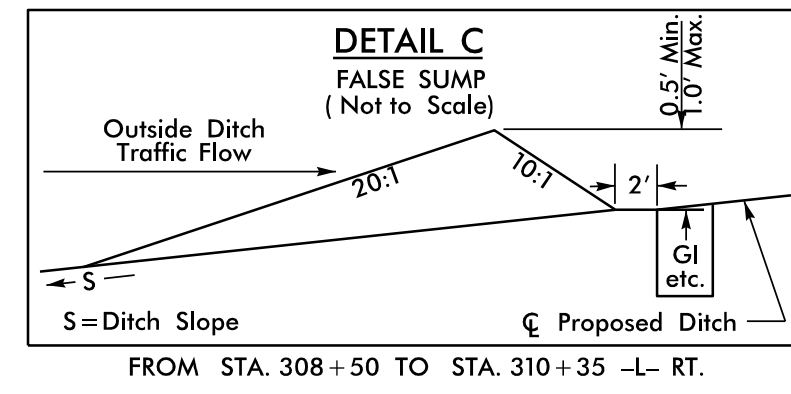
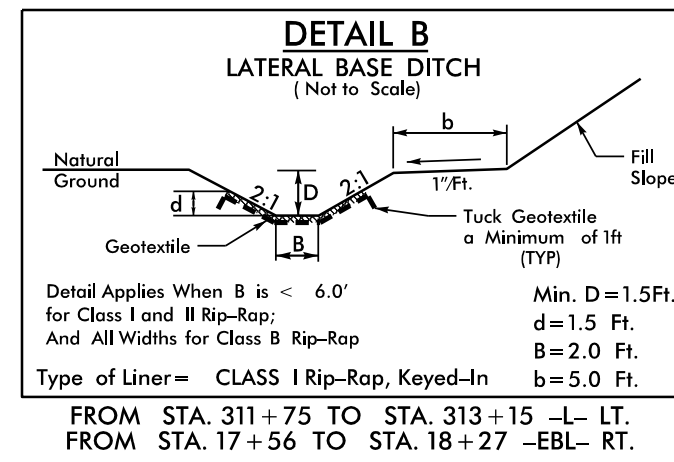
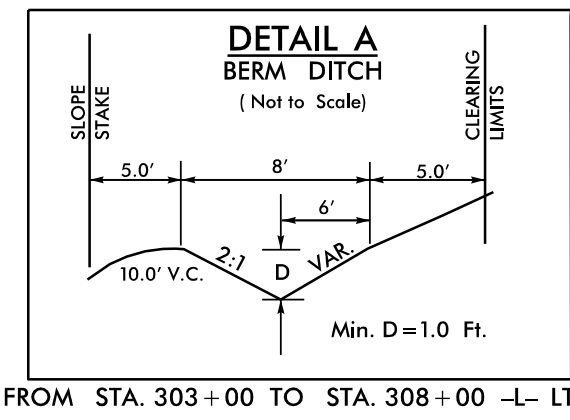
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN  
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

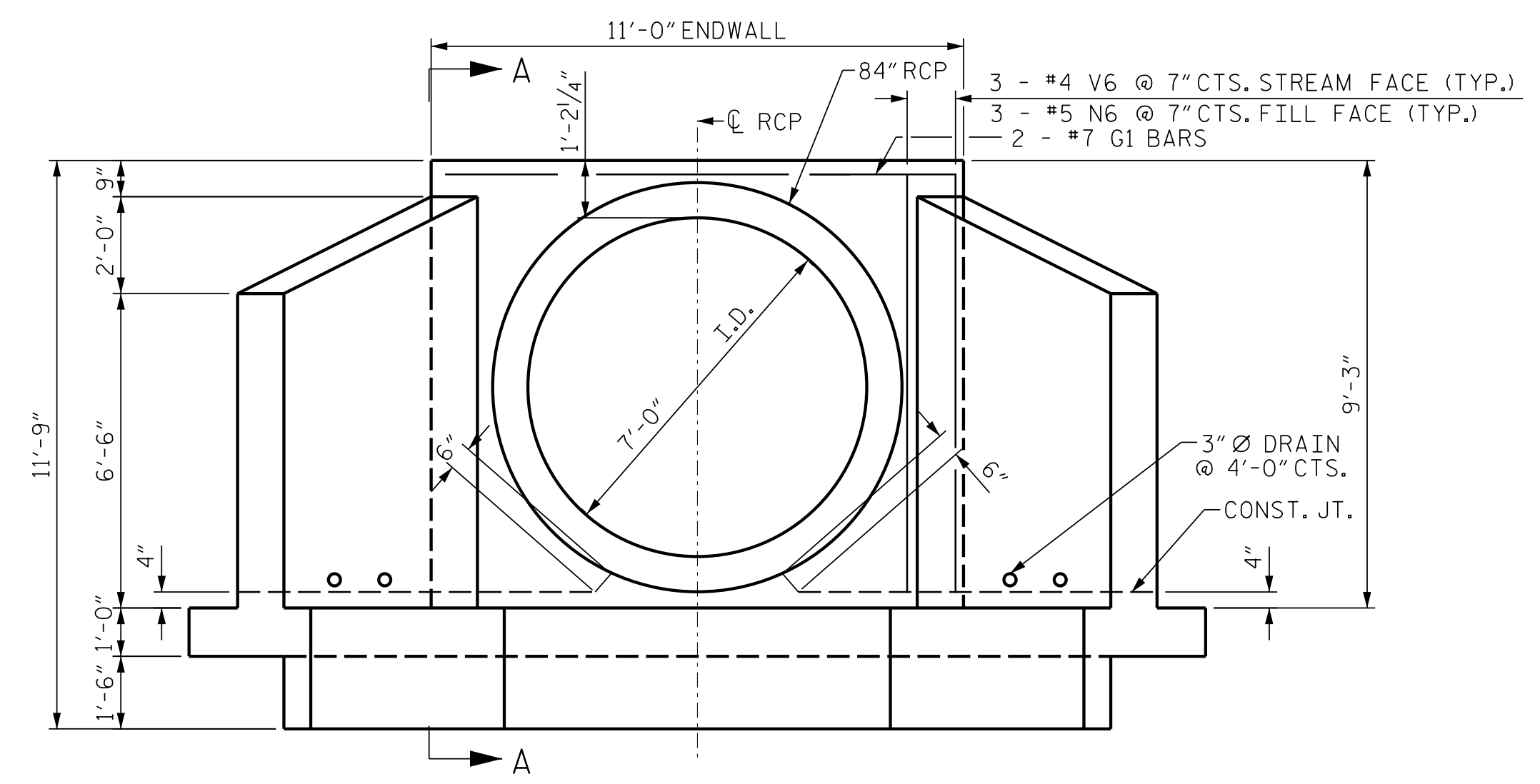
**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**

**SINGLE SLOPE  
CONCRETE BARRIER  
TRANSITION**

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

PROJECT REFERENCE NO. <i>HB-0002</i>	SHEET NO. <i>2D-1</i>
RW SHEET NO.	
HYDRAULICS ENGINEER	
	
1223 Jones Franklin Rd. Raleigh, N.C. 27606 License No. F-0377 Bus: 919 851 8077 Fax: 919 851 8107	
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	

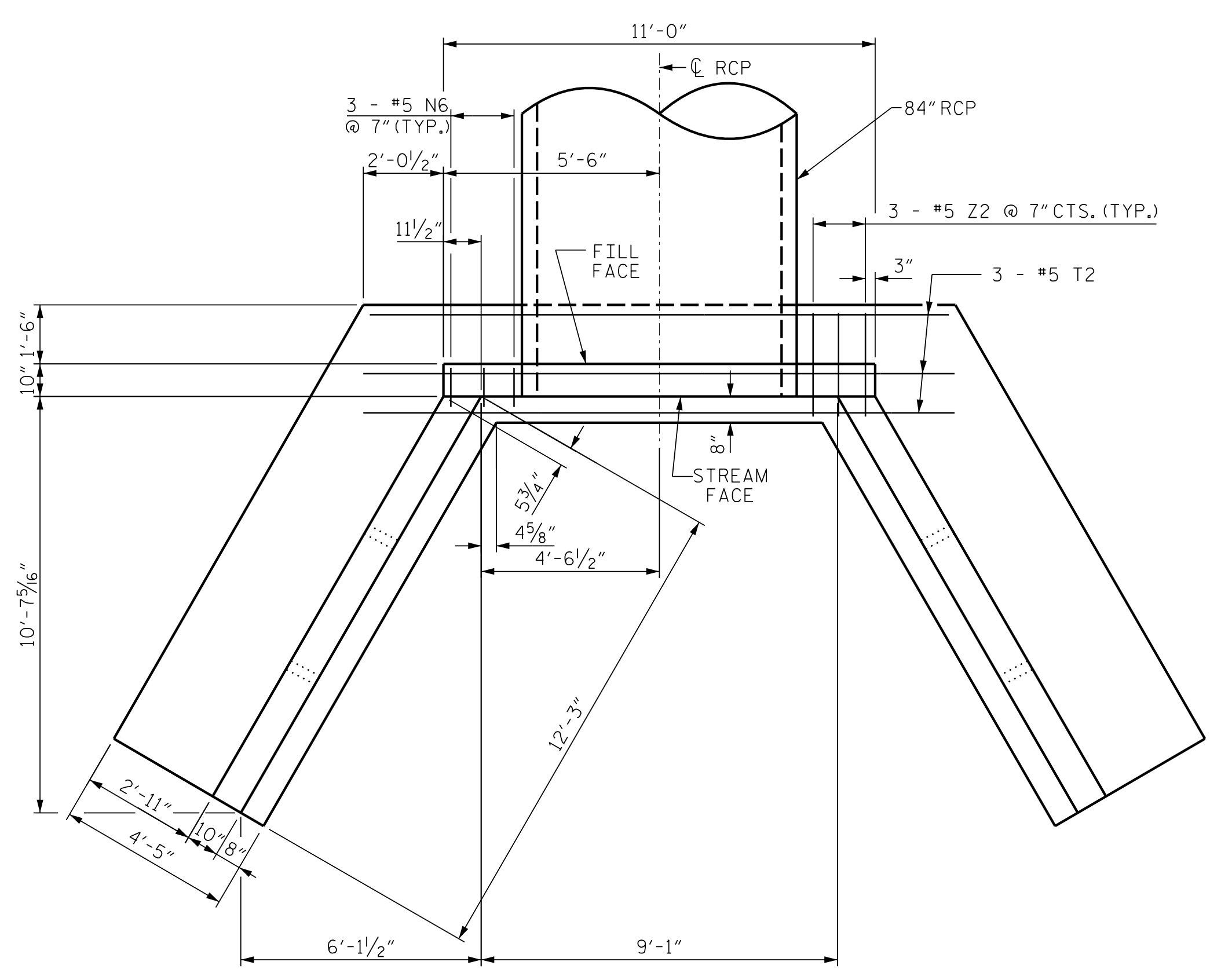




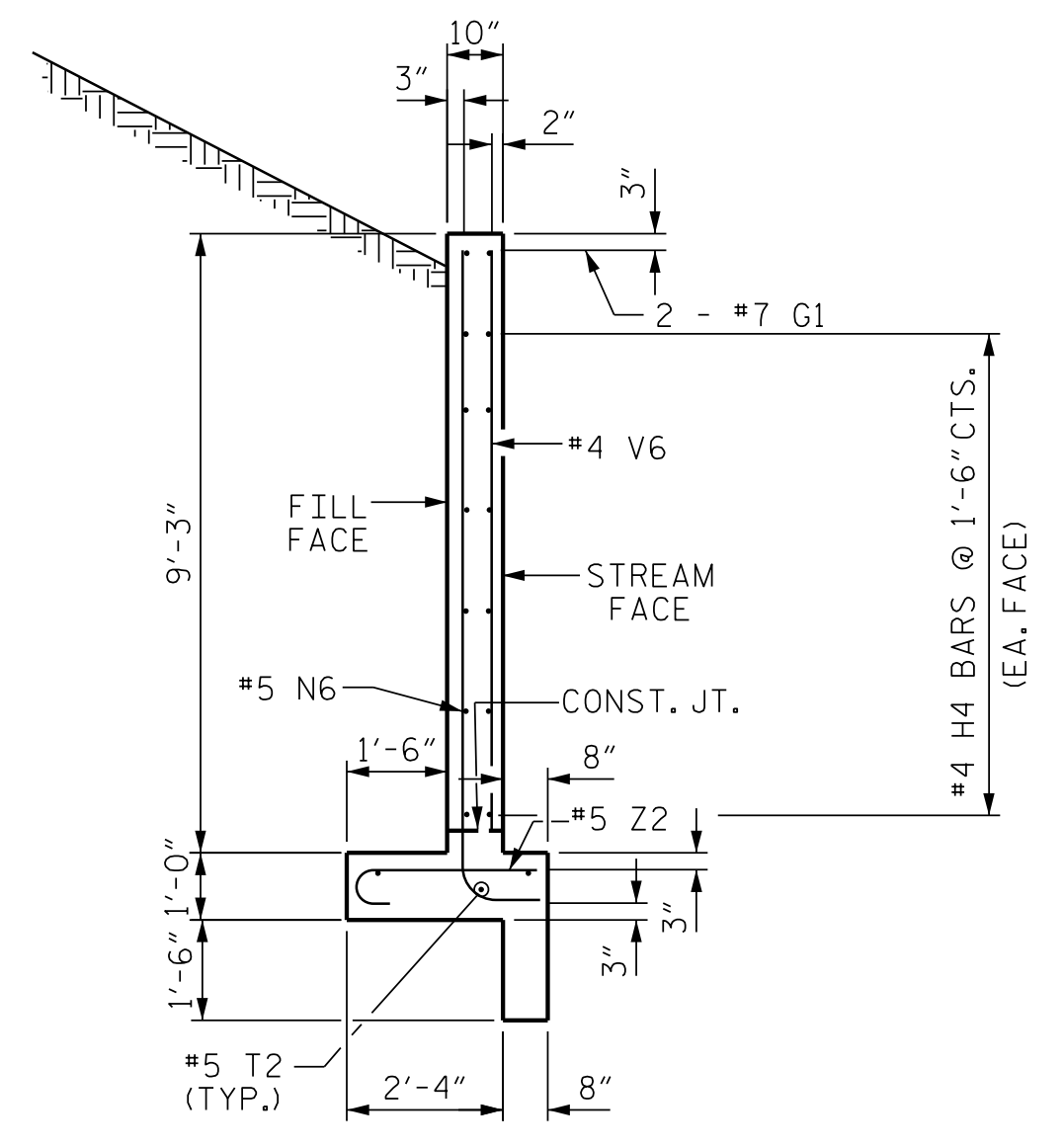
ELEVATION

NOTES:

- ALL CONCRETE TO BE CLASS "A"
- ALL REINFORCING STEEL SHALL BE ASTM A615 - GRADE 60.
- ALL REINFORCING STEEL SHALL BE DEFORMED BARS, WHERE SPLICING OF REINFORCEMENT IS NECESSARY, BARS ARE TO BE LAPPED 45 DIAMETERS. ALL DIMENSIONS RELATIVE TO REINFORCEMENT ARE TO CENTERS OF BARS.
- THE FOOTING, CURTAIN WALL AND 4" OF WALL ARE TO BE POURED IN ONE OPERATION ALLOWING NO TIME FOR INITIAL SET TO TAKE PLACE BETWEEN THEM. THE REMAINING WALL SHALL THEN BE POURED IN ONE OPERATION.
- ALL EXPOSED CORNERS ARE TO BE CHAMFERED 1".
- 3" DIAMETER DRAINS SHALL BE PLACED IN WALL AS SHOWN AND BE 6" ABOVE NORMAL FLOW LINE.
- ALL MATERIAL AND WORKMANSHIP AS PER N.C. DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS.



PLAN  
SEE SHEET 2 OF 2 FOR WING REINFORCEMENT LAYOUT



SECTION A-A  
ENDWALL



DocuSigned by:  
John Arthur Dilworth  
3/7/2024

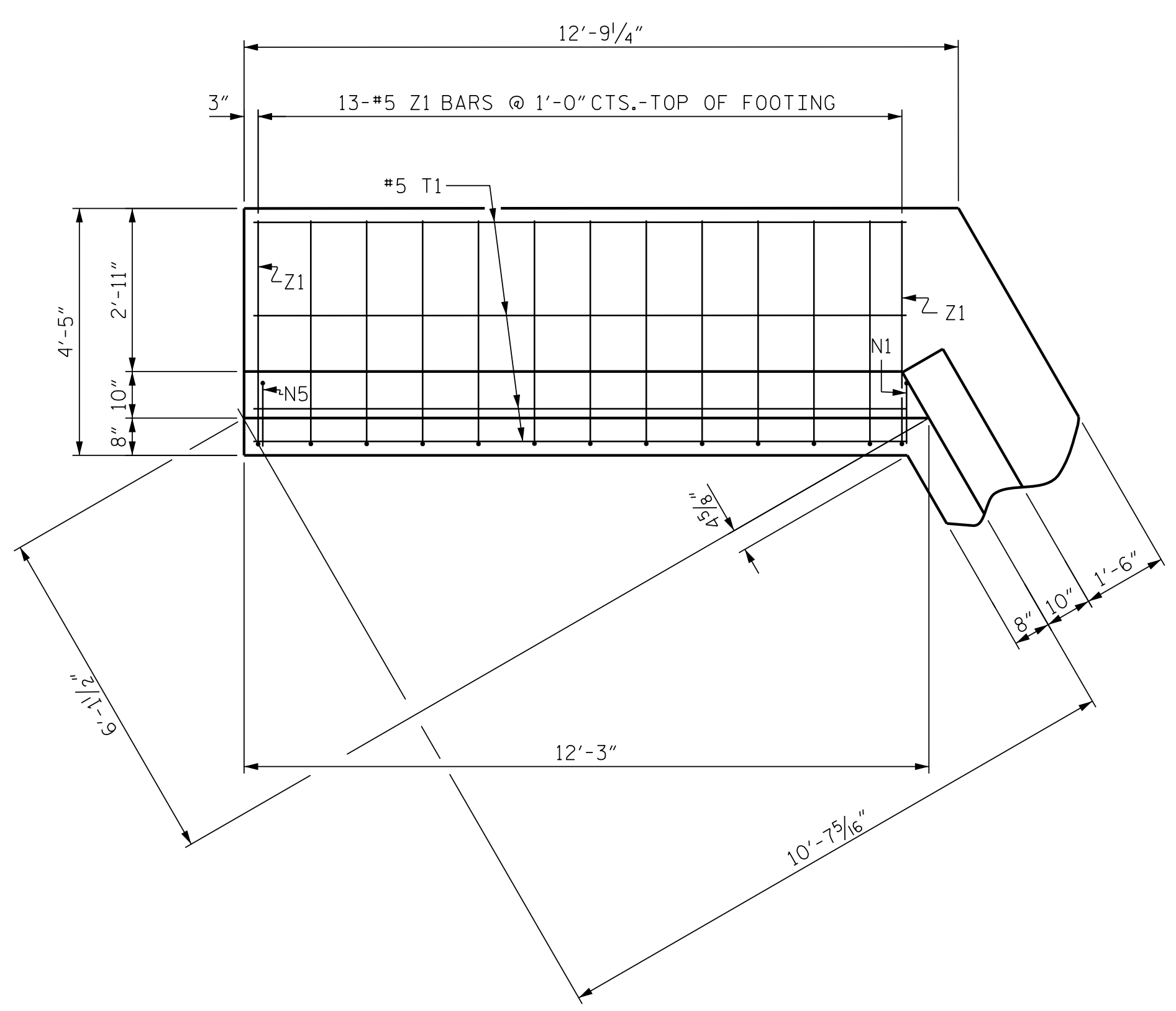
**WETHERILL ENGINEERING**  
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TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN  
 CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

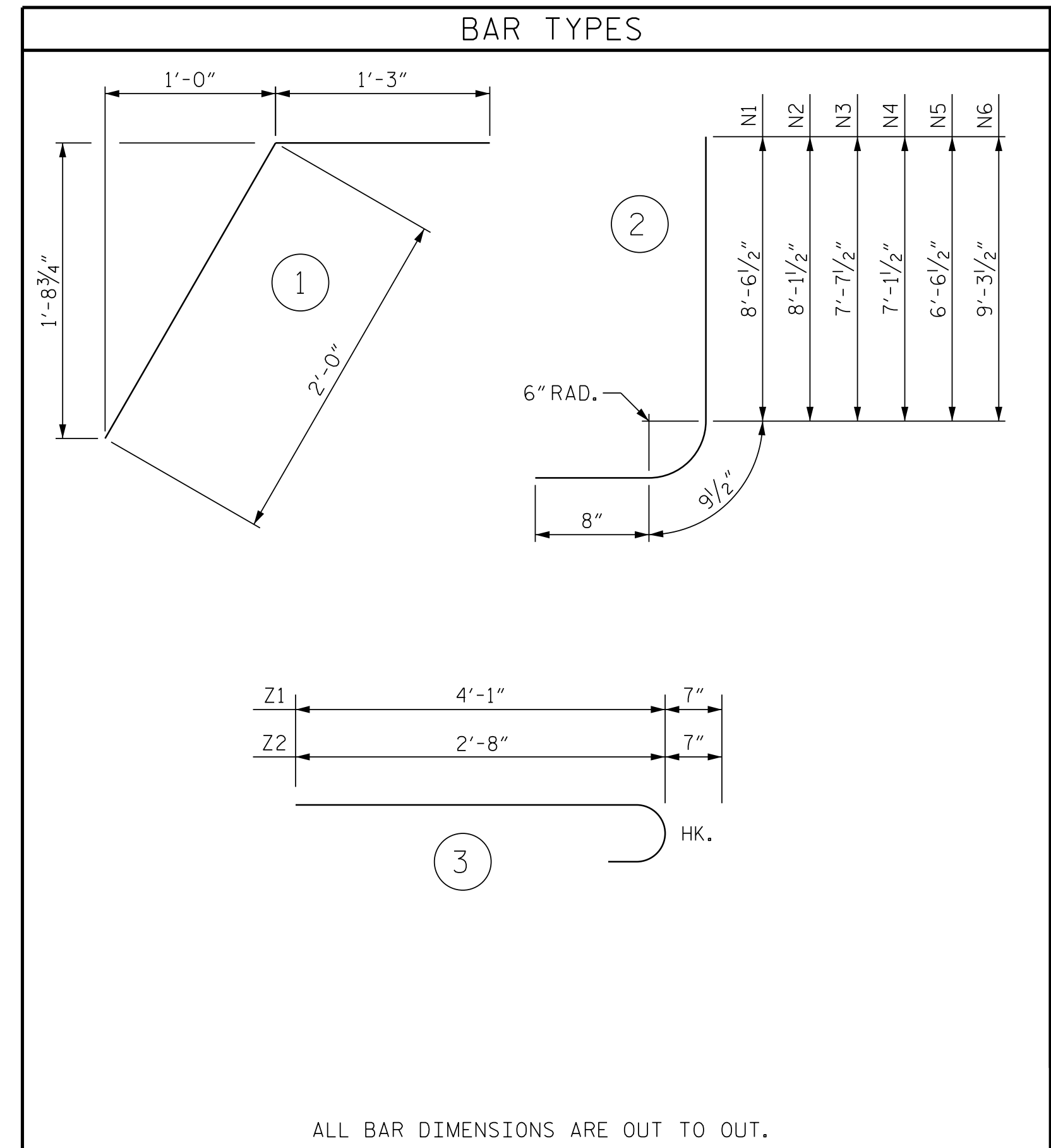
**DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED**

**REINFORCED CONCRETE ENDWALL  
 FOR SINGLE 84" DIAMETER PIPE**  
 SHEET 1 OF 2

ORIGINAL BY: J. PENDERGRAFT DATE: 8-23  
 MODIFIED BY: J. PENDERGRAFT DATE: 8-23  
 CHECKED BY: J. DILWORTH DATE: 8-23  
 FILE SPEC.:

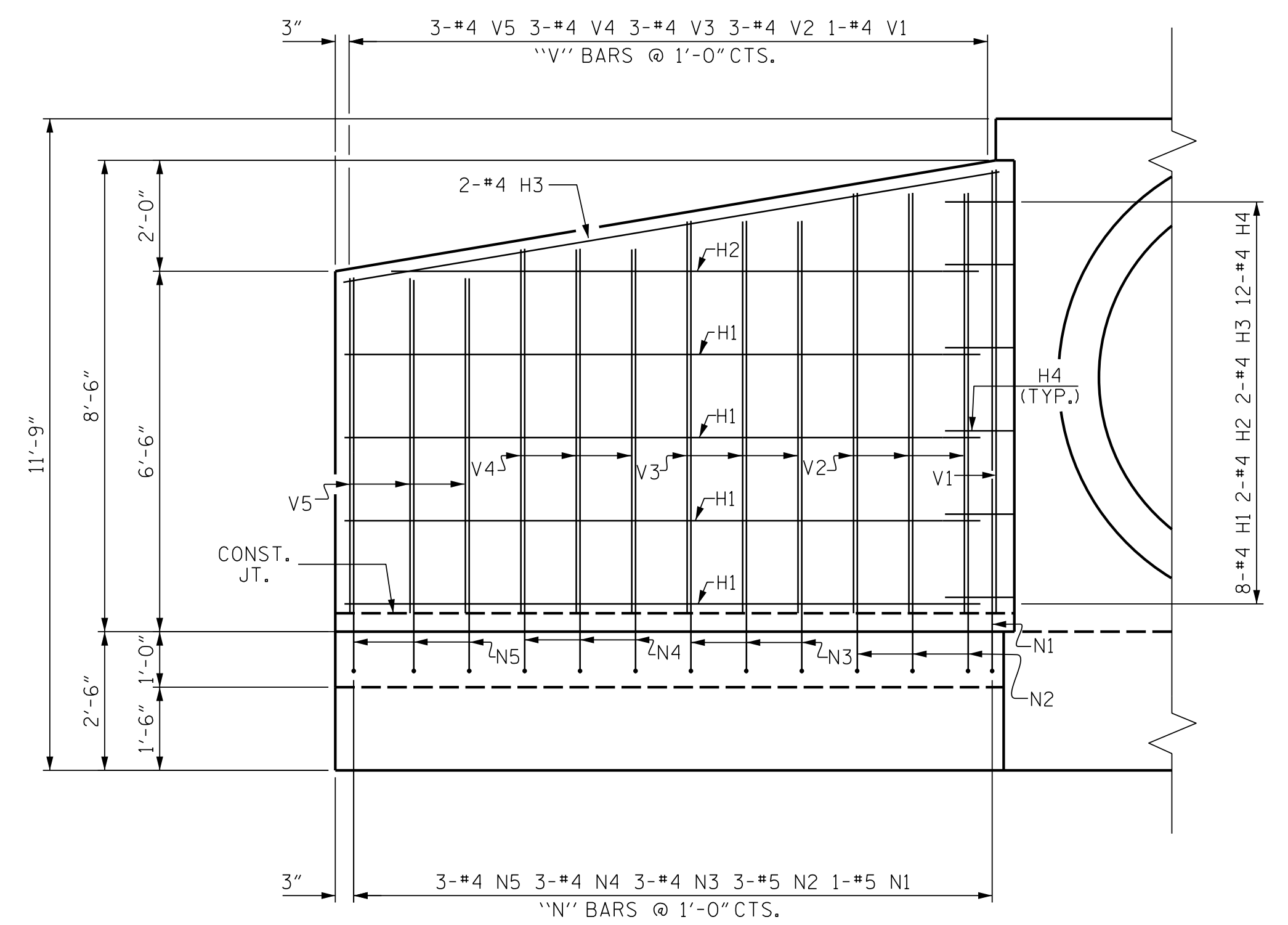


WING PLAN

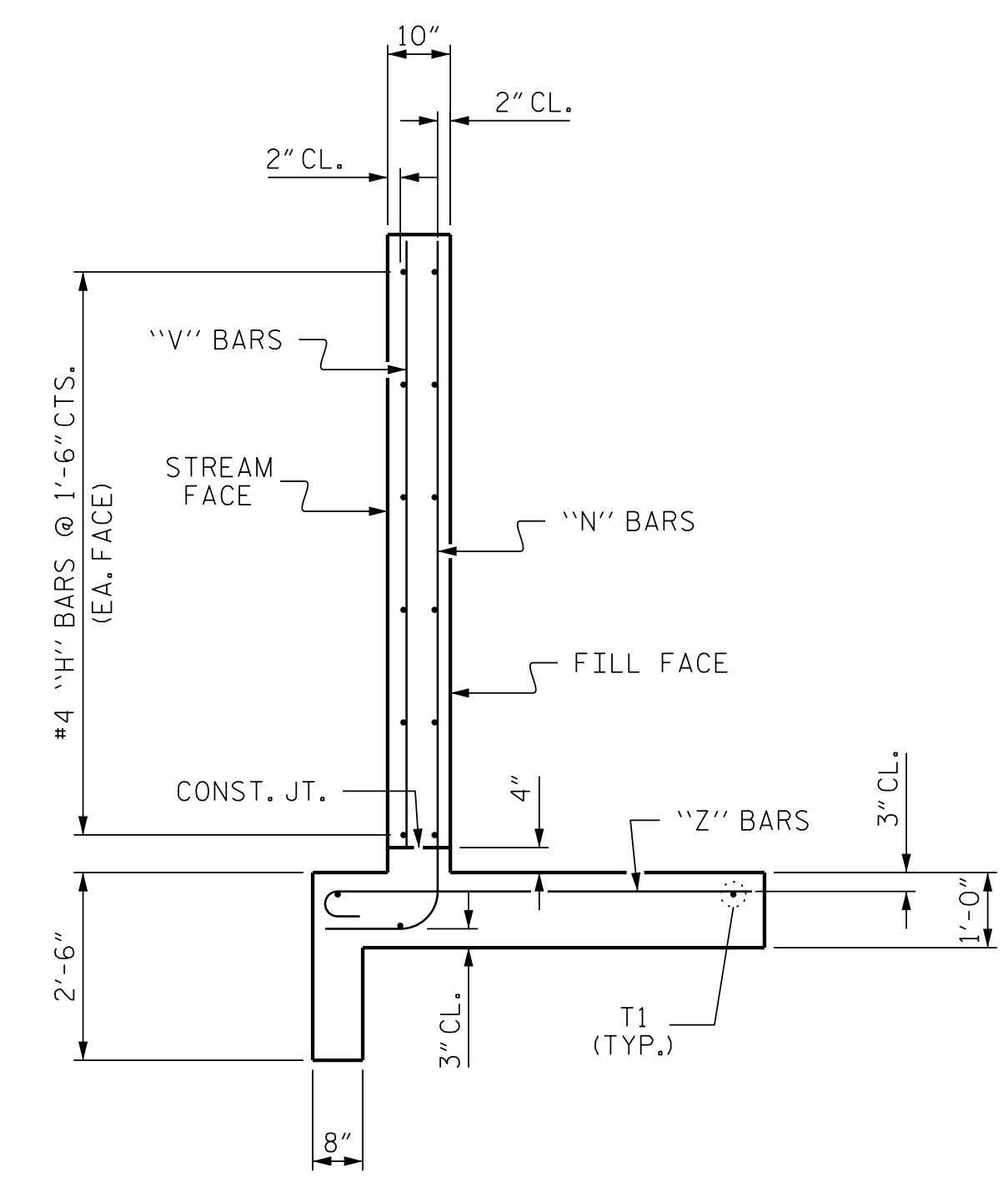


ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
G1	2	#7	STR	10'-8"	44
H1	16	#4	STR	11'-5"	122
H2	4	#4	STR	10'-7"	28
H3	4	#4	STR	12'-0"	32
H4	24	#4	1	3'-3"	52
N1	2	#5	2	10'-0"	21
N2	6	#5	2	9'-7"	60
N3	6	#5	2	9'-1"	57
N4	6	#5	2	8'-7"	54
N5	6	#5	2	8'-0"	50
N6	6	#5	2	10'-9"	67
T1	8	#5	STR	11'-8"	97
T2	3	#5	STR	14'-9"	46
V1	2	#4	STR	8'-0"	11
V2	6	#4	STR	7'-6"	30
V3	6	#4	STR	7'-0"	28
V4	6	#4	STR	6'-6"	26
V5	6	#4	STR	6'-0"	24
V6	6	#4	STR	8'-8"	35
Z1	26	#5	3	4'-8"	127
Z2	6	#5	3	3'-3"	20
REINFORCING STEEL FOR ENDWALL, 2 WINGS & FOOTING				1031	LBS
CLASS A CONCRETE					
* 1 ENDWALL				1.4	CY
2 WINGS				5.7	CY
1 END CURTAIN WALL				0.3	CY
FOOTING & TOE WALLS				6.5	CY
TOTAL				13.9	CY
* 1.7 CU. YD. DEDUCTION FOR SINGLE 84" RC PIPE					



WING ELEVATION



TYPICAL WING SECTION



DocuSigned by:  
John Arthur Dilworth  
3/7/2024

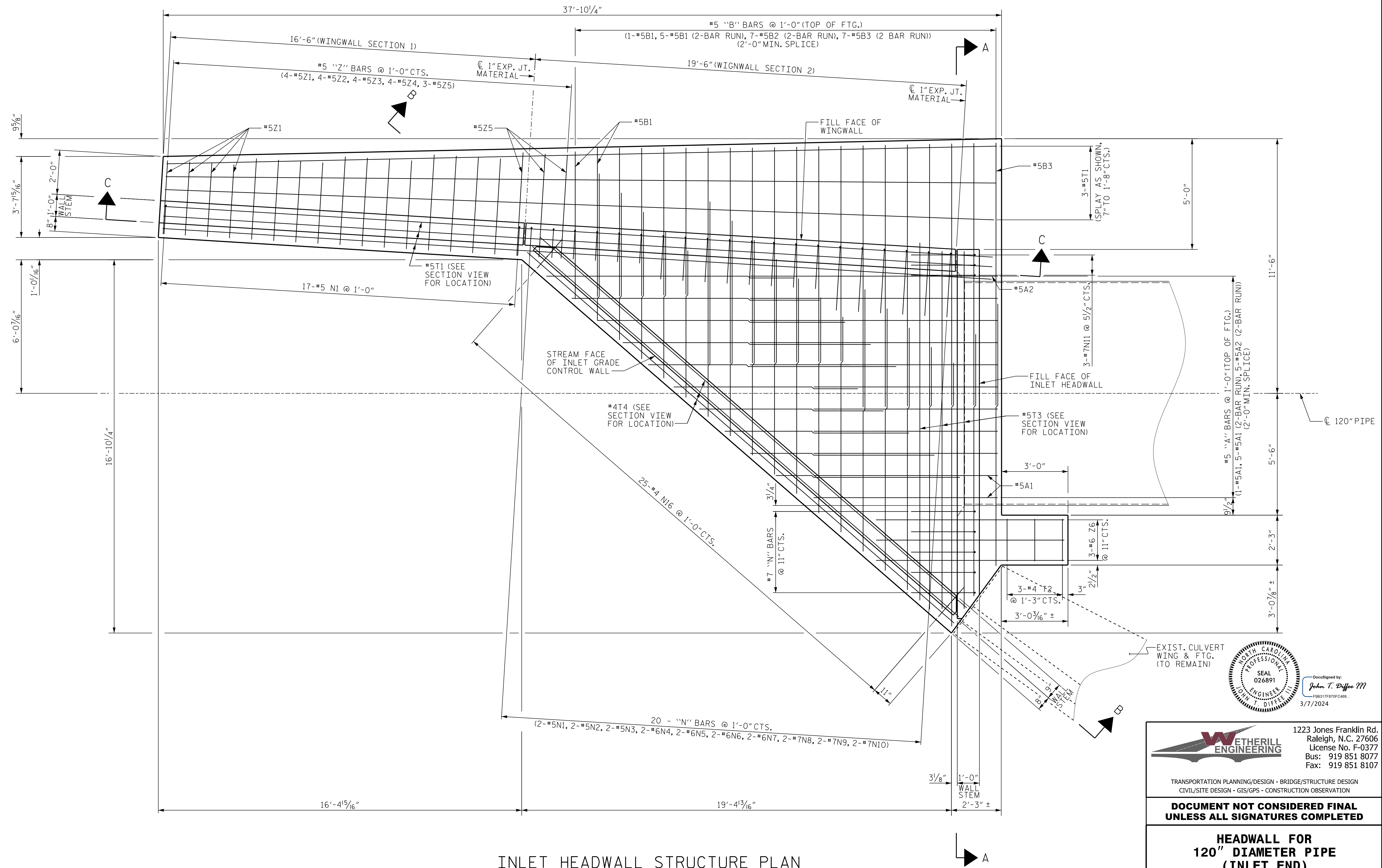
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TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN  
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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

**REINFORCED CONCRETE ENDWALL FOR SINGLE 84" DIAMETER PIPE**  
SHEET 2 OF 2

ORIGINAL BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
MODIFIED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
FILE SPEC.: \_\_\_\_\_



### INLET HEADWALL STRUCTURE PLAN

WALL STEM REINFORCING NOT SHOWN FOR CLARITY  
SEE SECTIONS FOR LOCATION OF #4 T1, T2, T3, AND T4 BARS



Designed by:  
**John T. Diffie III**  
F98317F870FC469...  
3/7/2024

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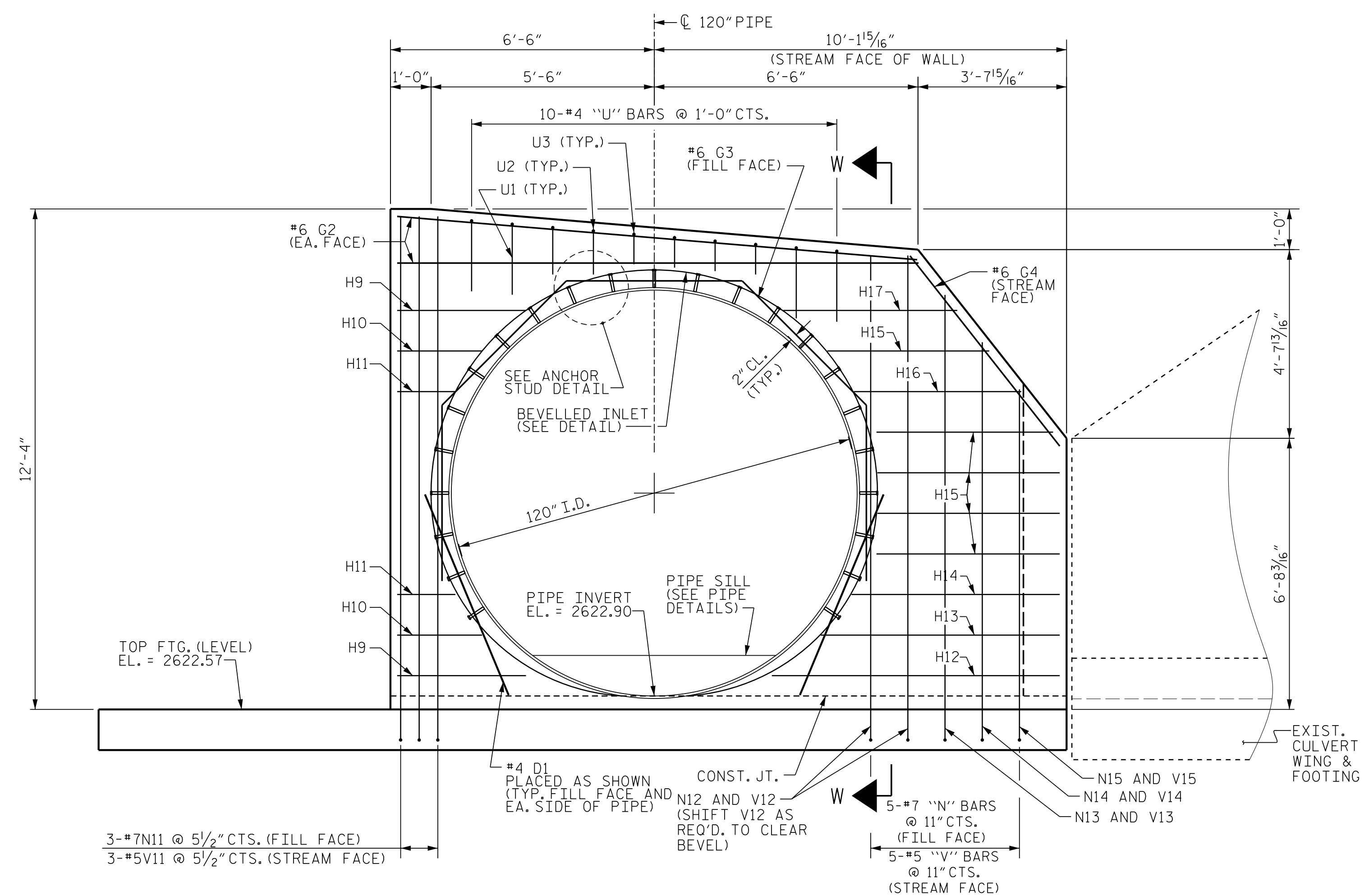
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN  
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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

**HEADWALL FOR  
120" DIAMETER PIPE  
(INLET END)** SHEET 1 OF 5

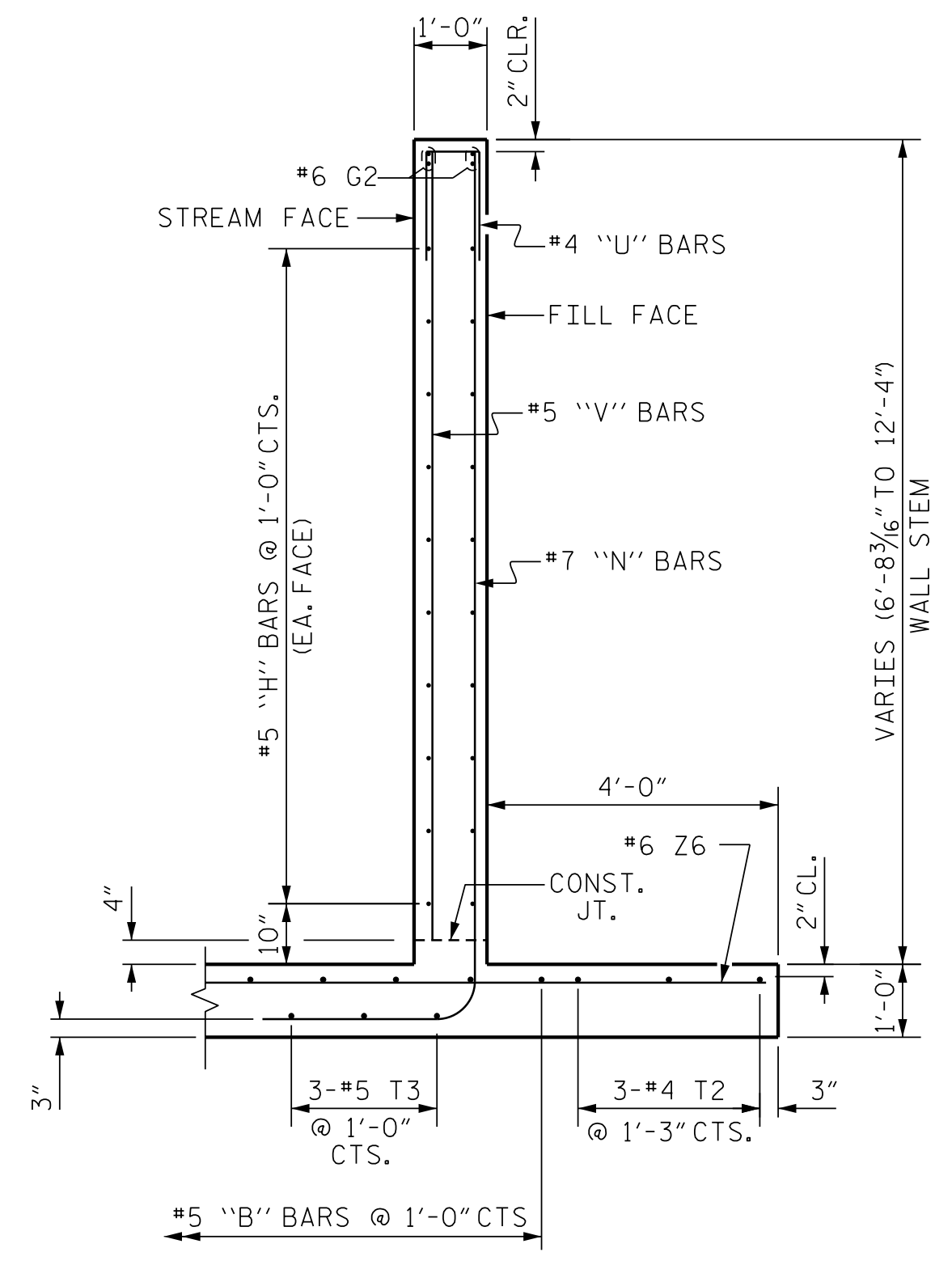
ORIGINAL BY: T. DIFFIE	DATE: 11-23
MODIFIED BY:	DATE:
CHECKED BY: J. DILWORTH	DATE: 11-23
FILE SPEC.:	



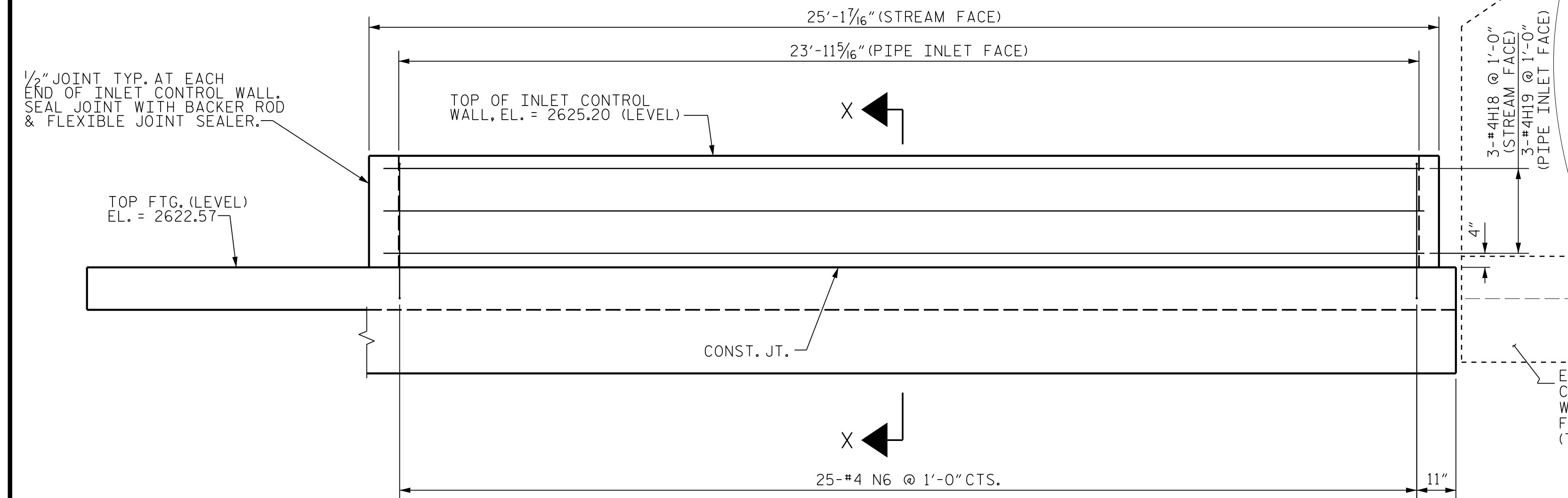


**SECTION A-A: HEADWALL ELEVATION**

WING AND INLET GRADE CONTROL WALL NOT SHOWN FOR CLARITY  
 WALL FOOTING REINFORCING NOT SHOWN FOR CLARITY  
 SHIFT #5 "V" BARS AS REQUIRED TO CLEAR PIPE INLET BEVEL

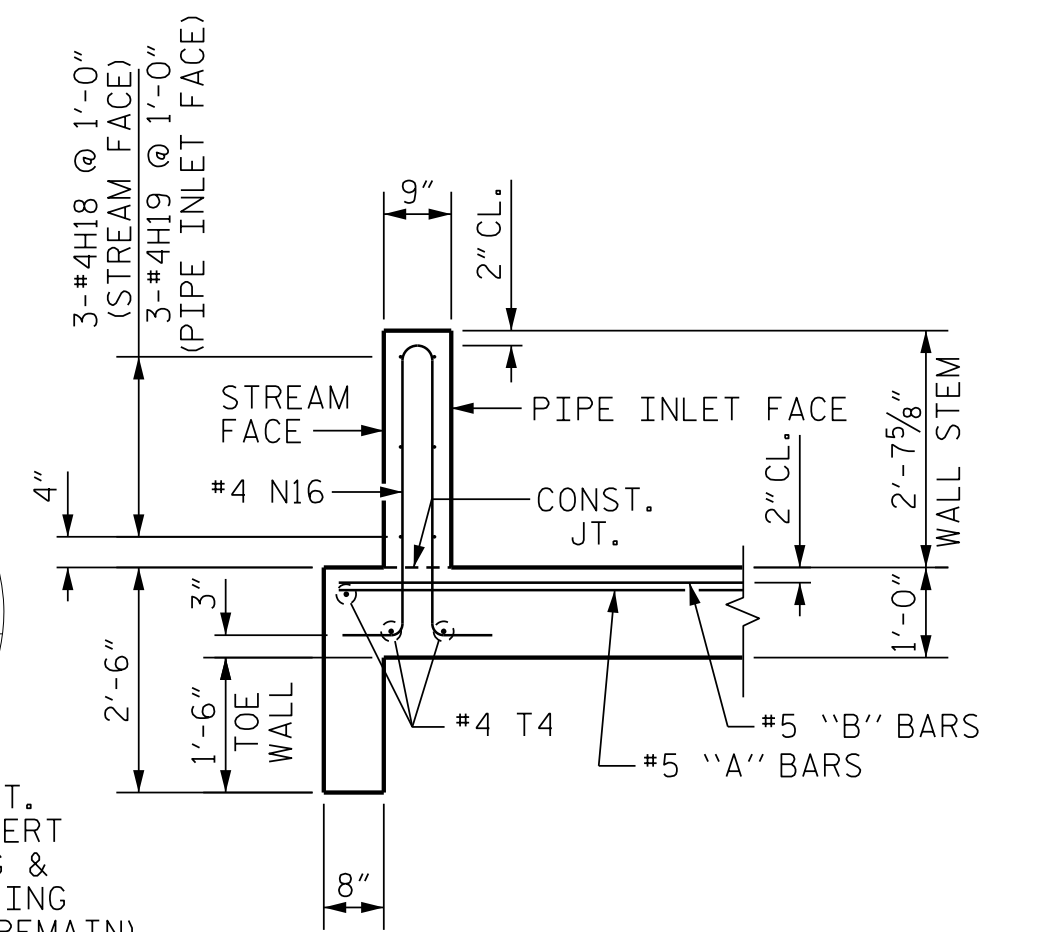


**SECTION W-W**

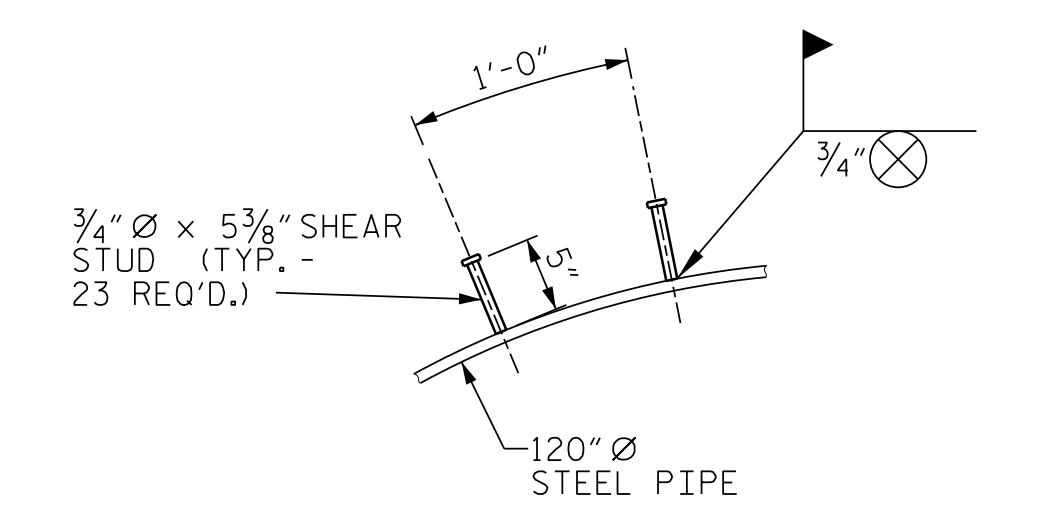


**SECTION B-B: INLET GRADE CONTROL WALL ELEVATION**

WING AND HEADWALL NOT SHOWN FOR CLARITY  
 WALL FOOTING REINFORCING NOT SHOWN FOR CLARITY

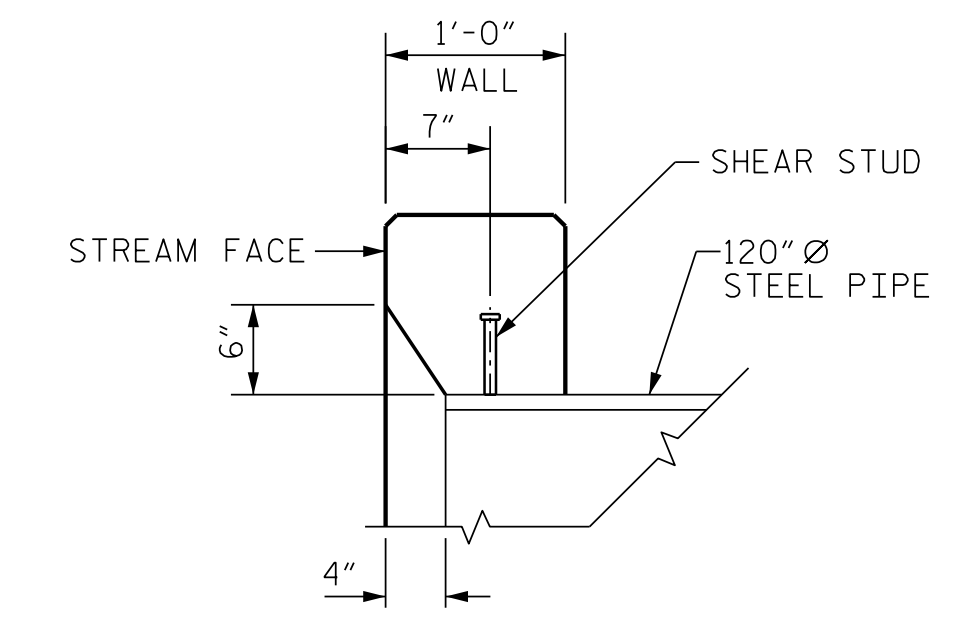


**SECTION X-X**



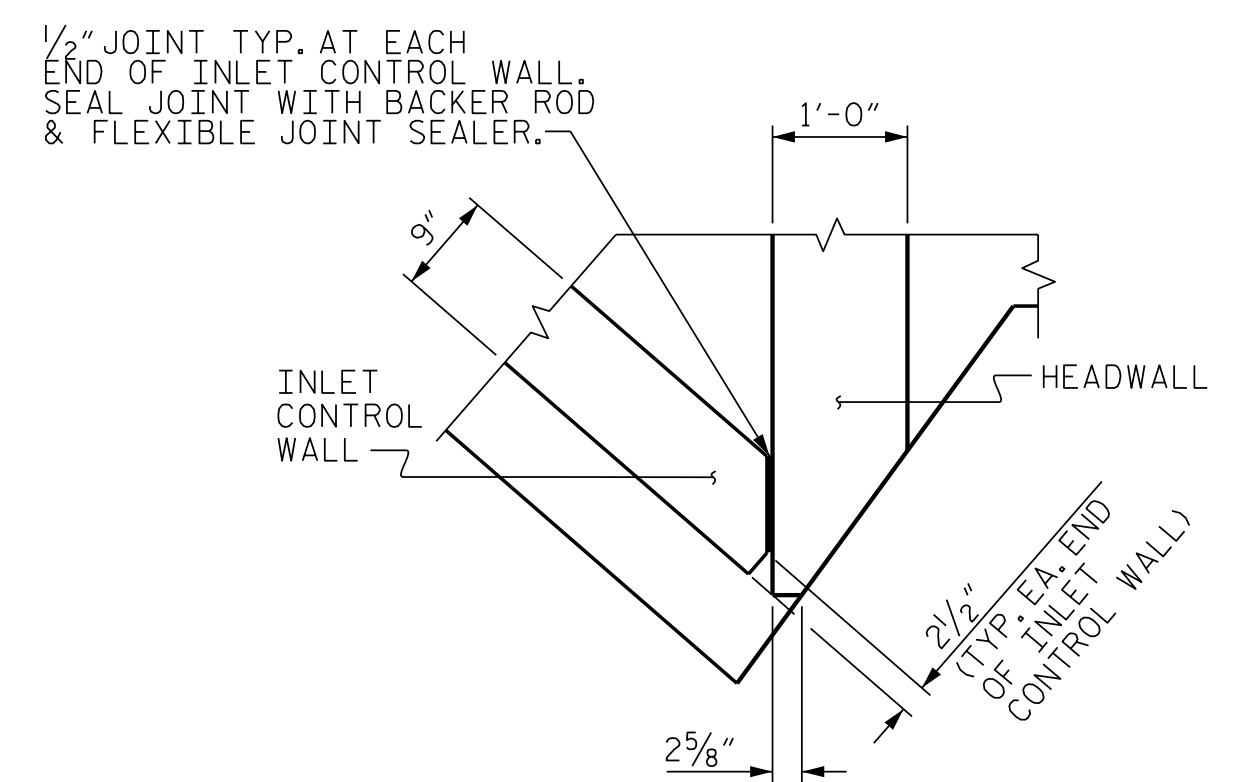
**ANCHOR STUD DETAIL**

FIELD ATTACH SHEAR STUDS TO TOP TWO-THIRDS OF PIPE. LOCATE STUDS 7" FROM STREAM FACE OF WALL.



**BEVELLED INLET DETAIL**

NO BEVEL REQUIRED AT BOTTOM OF PIPE. TAPER BEVEL WIDTH FROM 6" AT 1/2 HEIGHT OF PIPE TO NO BEVEL AT BOTTOM OF PIPE.



**WALL CHAMFER DETAIL**

USE AT ACUTE END OF INLET CONTROL WALL AND HEADWALL



Designed by:  
**John T. Diffie III**  
 F98317870P C489...  
 3/7/2024

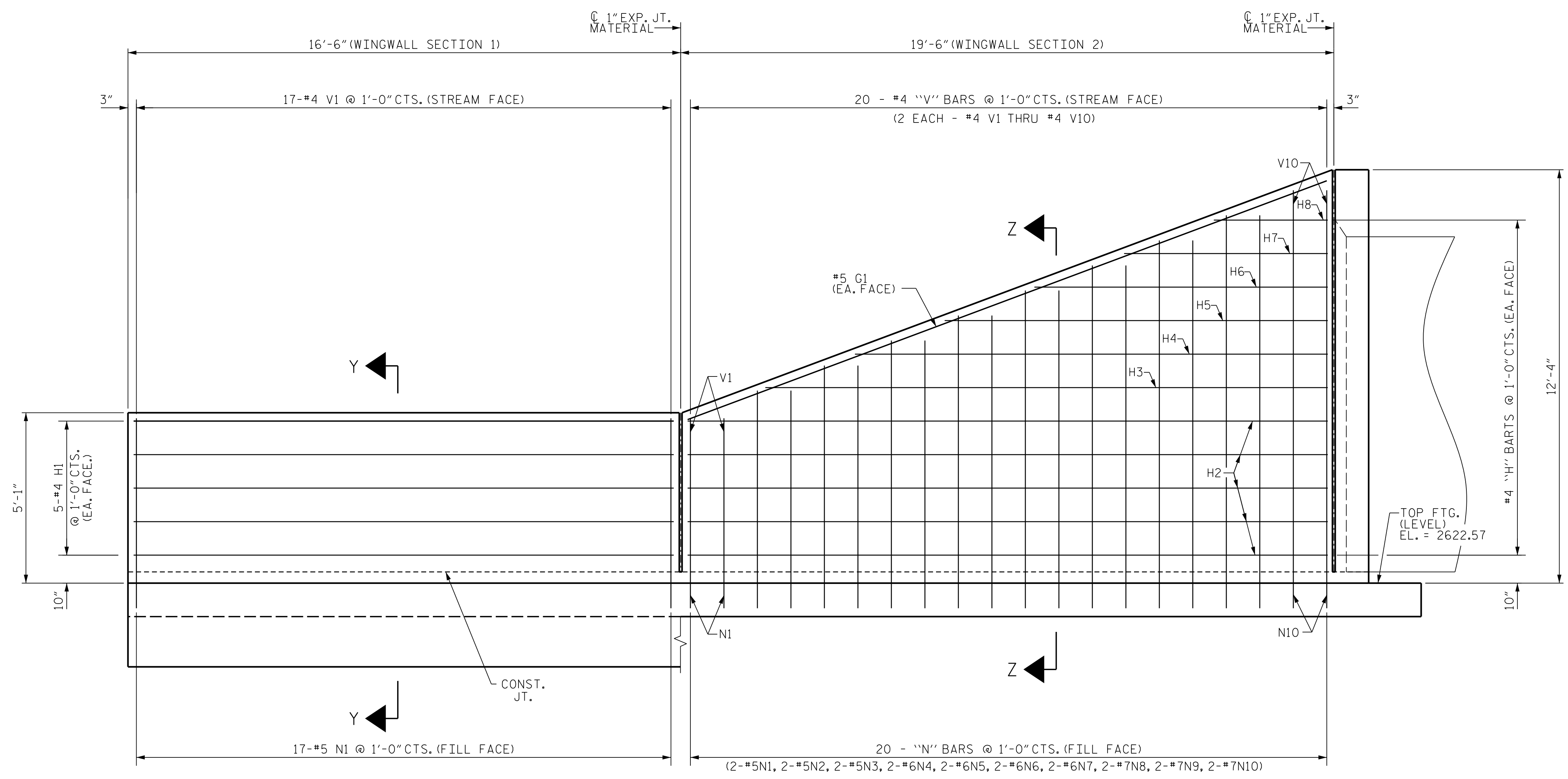
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 CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

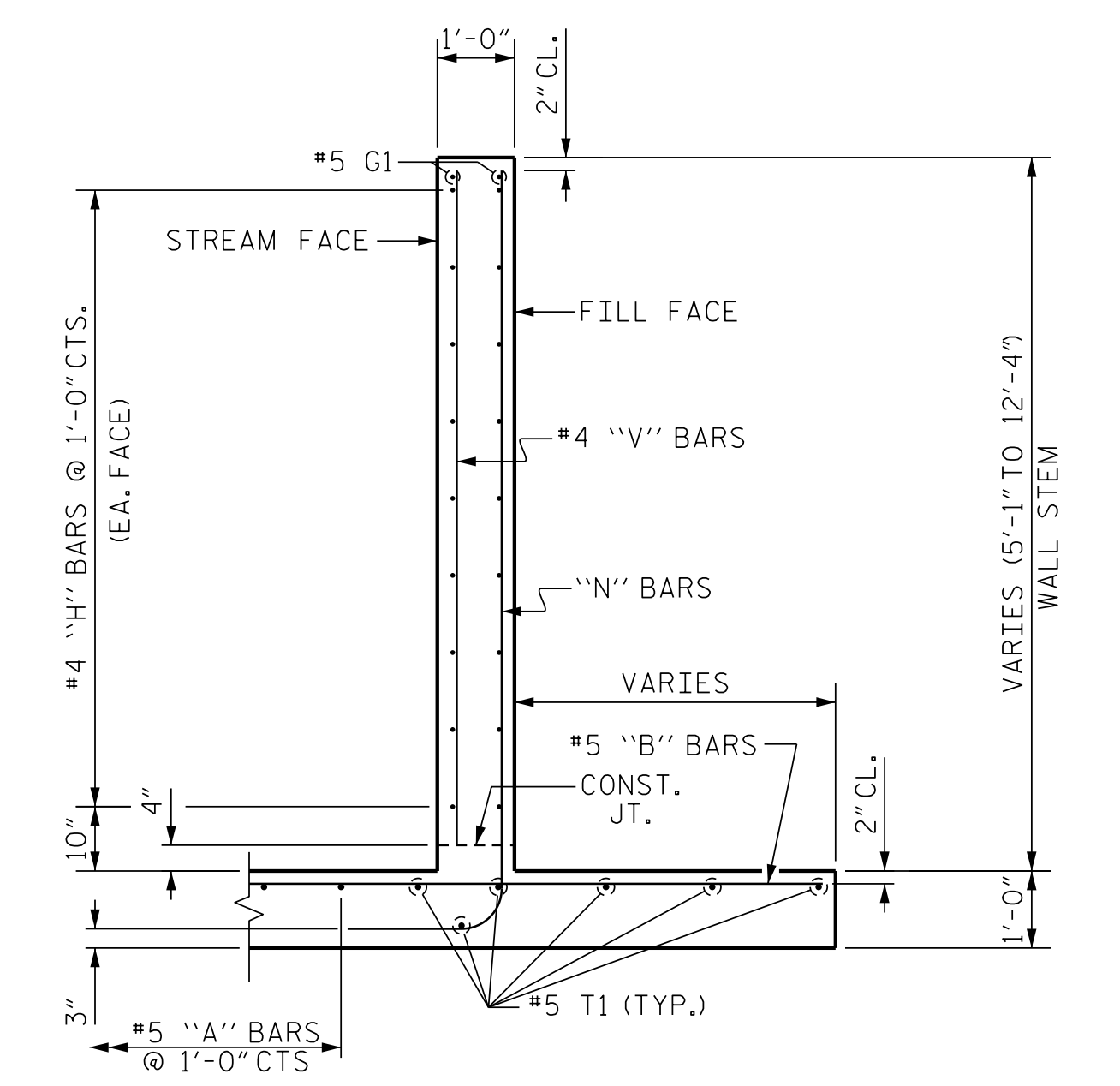
**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

**HEADWALL FOR 120" DIAMETER PIPE (INLET END)** SHEET 2 OF 5

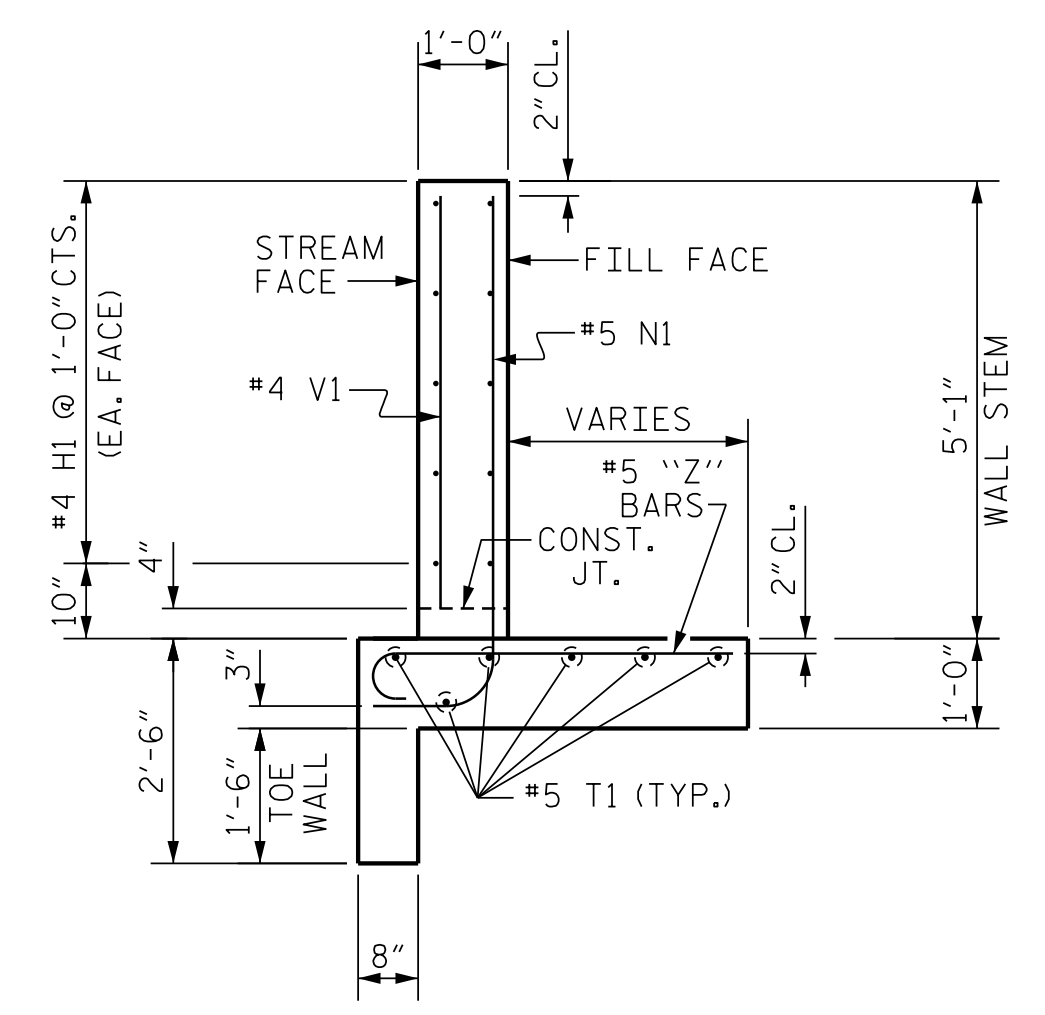
ORIGINAL BY: T. DIFFEE DATE: 11-23  
 MODIFIED BY: DATE:  
 CHECKED BY: J. DILWORTH DATE: 11-23  
 FILE SPEC.:



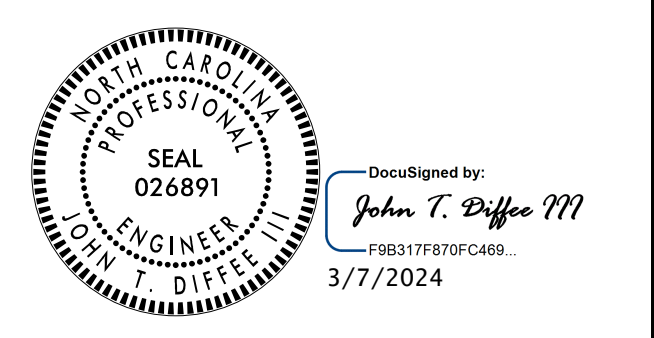
**SECTION C-C: WINGWALL ELEVATION**  
 INLET GRADE CONTROL WALL NOT SHOWN FOR CLARITY  
 WALL FOOTING REINFORCING NOT SHOWN FOR CLARITY



**SECTION Z-Z**



**SECTION Y-Y**



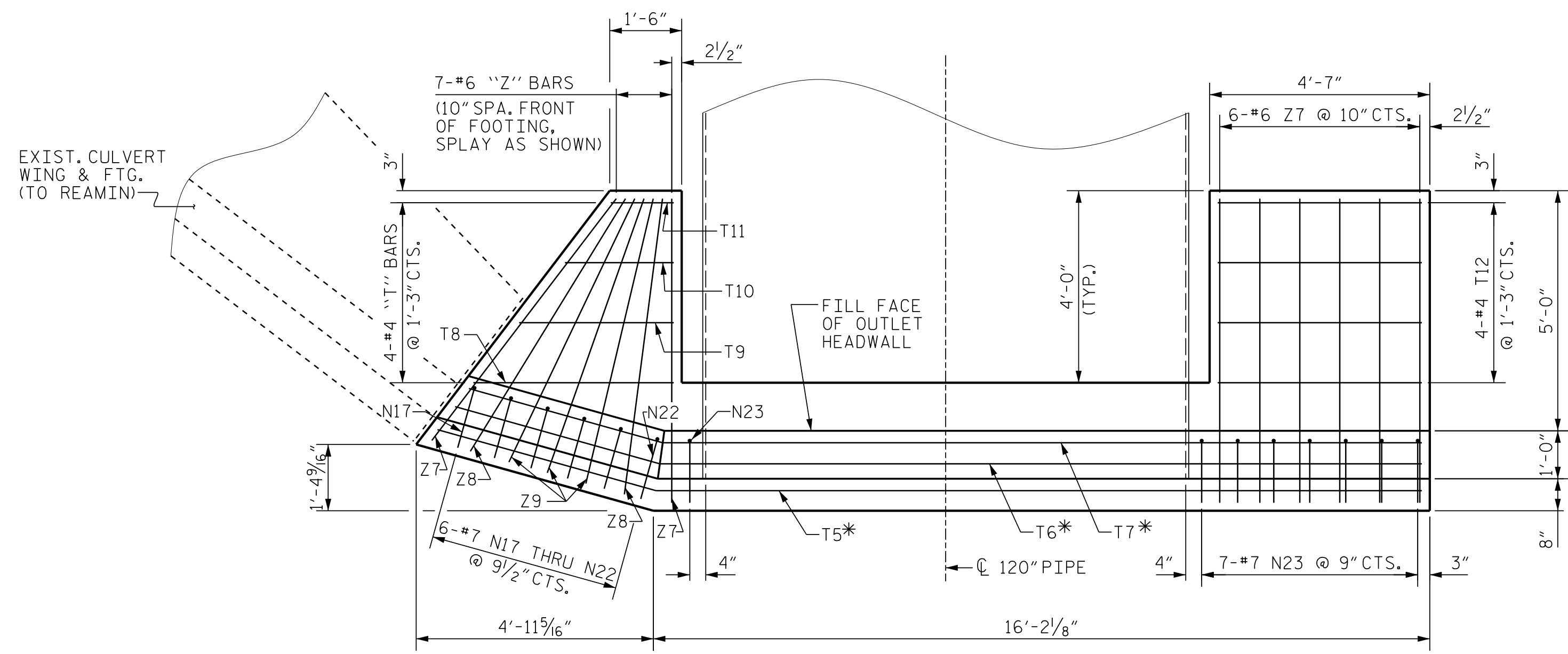
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TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN  
 CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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

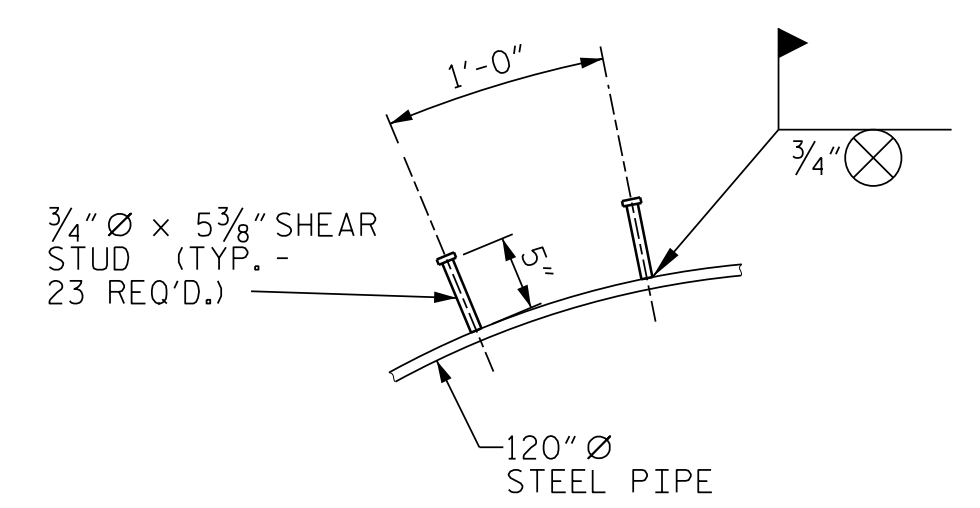
**HEADWALL FOR  
 120" DIAMETER PIPE  
 (INLET END)** SHEET 3 OF 5

ORIGINAL BY: T. DIFFEE DATE: 11-23  
 MODIFIED BY: DATE: \_\_\_\_\_  
 CHECKED BY: J. DILWORTH DATE: 11-23  
 FILE SPEC.: \_\_\_\_\_



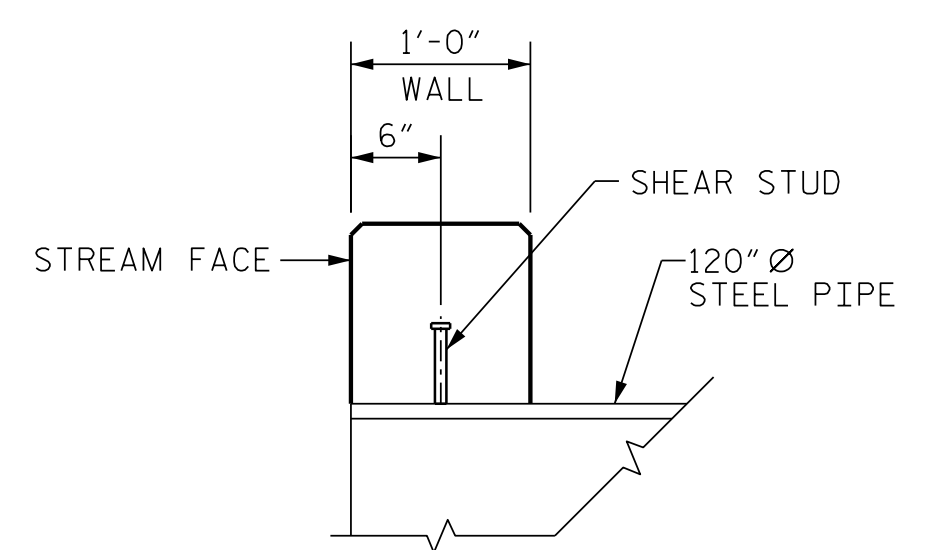
### OUTLET HEADWALL PLAN

WALL STEM REINFORCING NOT SHOWN FOR CLARITY  
\* SEE SECTION FOR LOCATION OF #4 T5, T6, AND T7 BARS FIELD BEND AS REQUIRED



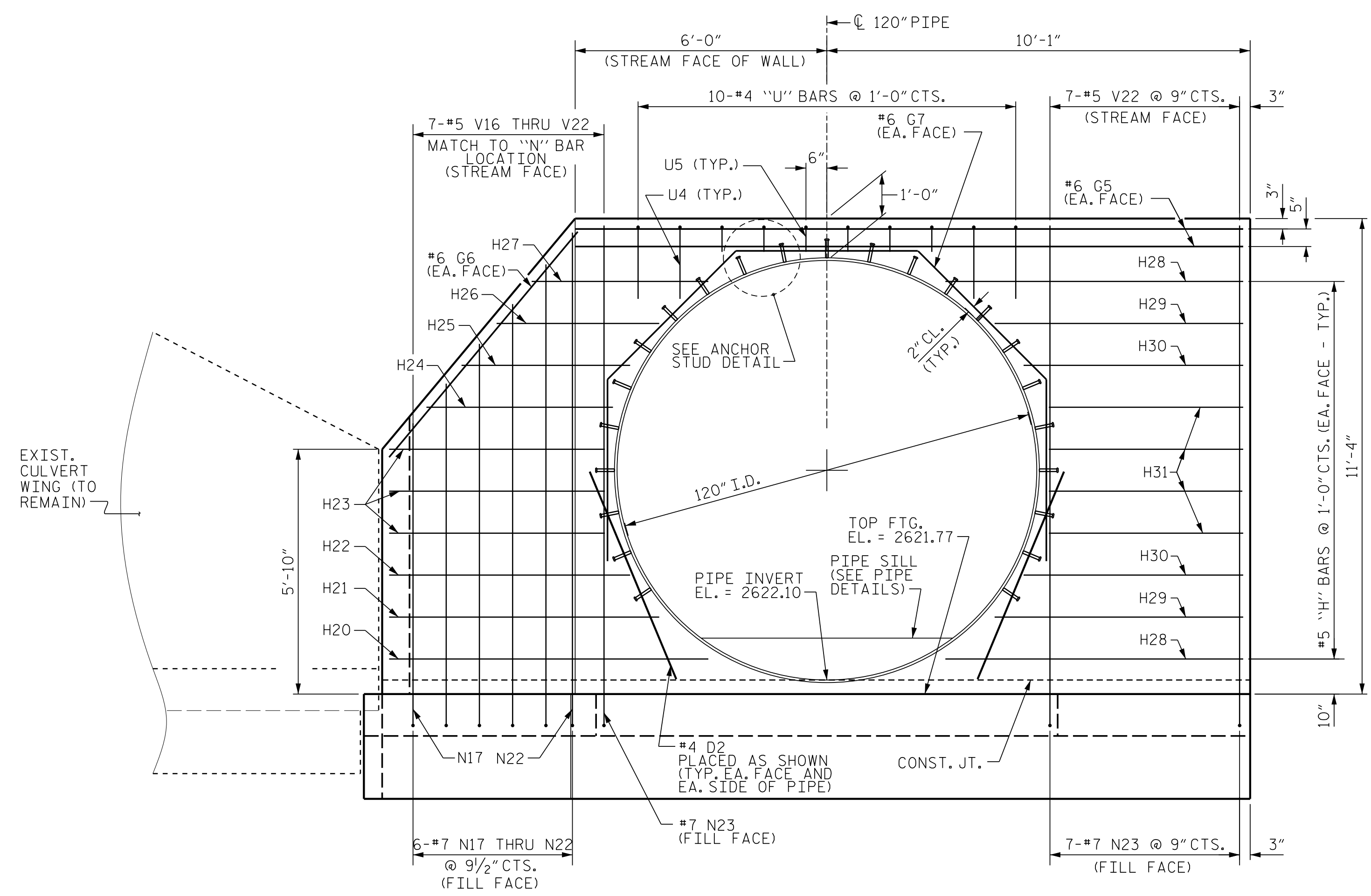
### ANCHOR STUD DETAIL

FIELD ATTACH SHEAR STUDS TO TOP TWO-THIRDS OF PIPE. LOCATE STUDS 6" FROM STREAM FACE OF WALL.



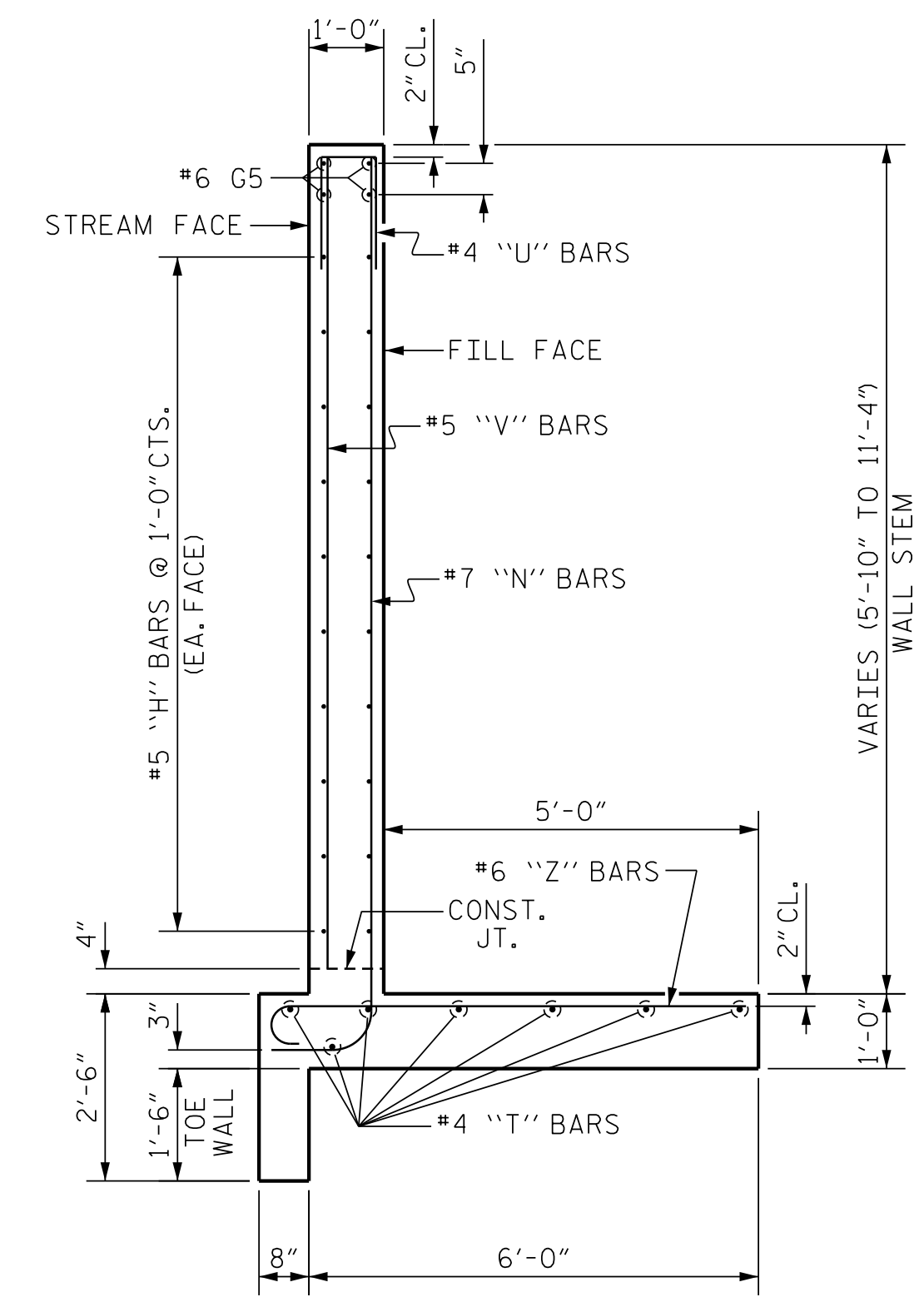
### OUTLET DETAIL

NO BEVEL REQUIRED. PIPE SHOULD EXTEND TO STREAM FACE OF WALL.



### OUTLET HEADWALL ELEVATION

WALL FOOTING REINFORCING NOT SHOWN FOR CLARITY



### SECTION



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**John T. Diffie III**  
F98317F870PC460...  
3/7/2024

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**DOCUMENT NOT CONSIDERED FINAL  
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### HEADWALL FOR 120" DIAMETER PIPE (OUTLET END)

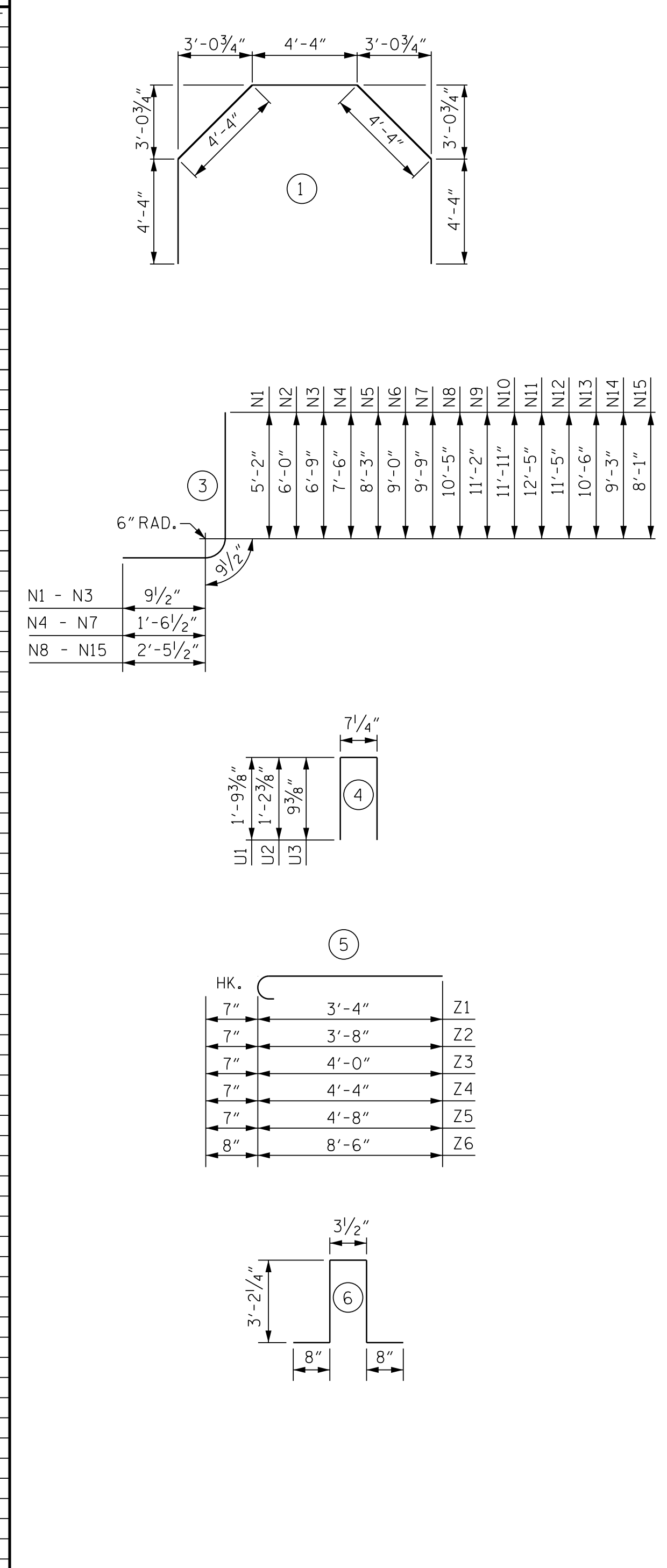
SHEET 4 OF 5

ORIGINAL BY: T. DIFFEE	DATE: 11-23
MODIFIED BY:	DATE:
CHECKED BY: J. DILWORTH	DATE: 11-23
FILE SPEC.:	

**BILL OF MATERIAL**  
DIMENSIONS ARE OUT TO OUT

BAR NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	#5	STR	8'-4"	96
A2	#5	STR	11'-3"	117
B1	#5	STR	6'-8"	77
B2	#5	STR	9'-9"	142
B3	#5	STR	11'-11"	174
D1	#4	STR	5'-4"	7
G1	#5	STR	20'-4"	42
G2	#6	STR	12'-10"	77
G3	#6	STR	21'-8"	33
G4	#6	STR	5'-10"	9
H1	#4	STR	16'-1"	107
H2	#4	STR	19'-1"	127
H3	#4	STR	16'-9"	22
H4	#4	STR	14'-1"	19
H5	#4	STR	11'-5"	15
H6	#4	STR	8'-9"	12
H7	#4	STR	6'-1"	8
H8	#4	STR	3'-4"	4
H9	#5	STR	3'-1"	13
H10	#5	STR	2'-0"	8
H11	#5	STR	1'-4"	6
H12	#5	STR	6'-8"	14
H13	#5	STR	5'-4"	11
H14	#5	STR	4'-7"	10
H15	#5	STR	4'-0"	42
H16	#5	STR	4'-1"	9
H17	#5	STR	4'-3"	9
H18	#4	STR	24'-8"	49
H19	#4	STR	24'-0"	48
N1	#5	3	6'-9"	134
N2	#5	3	7'-7"	16
N3	#5	3	8'-4"	17
N4	#6	3	9'-10"	30
N5	#6	3	10'-7"	32
N6	#6	3	11'-4"	34
N7	#6	3	12'-1"	36
N8	#7	3	13'-8"	56
N9	#7	3	14'-5"	59
N10	#7	3	15'-2"	62
N11	#7	3	15'-8"	96
N12	#7	3	14'-8"	60
N13	#7	3	13'-9"	28
N14	#7	3	12'-6"	26
N15	#7	3	11'-4"	23
N16	#4	6	8'-0"	134
T1	#5	STR	37'-6"	235
T2	#4	STR	1'-11"	4
T3	#5	STR	16'-2"	51
T4	#4	STR	25'-6"	51
U1	#4	4	4'-2"	11
U2	#4	4	3'-0"	4
U3	#4	4	2'-2"	6
V1	#4	STR	4'-7"	58
V2	#4	STR	5'-5"	7
V3	#4	STR	6'-2"	8
V4	#4	STR	6'-11"	9
V5	#4	STR	7'-8"	10
V6	#4	STR	8'-5"	11
V7	#4	STR	9'-1"	12
V8	#4	STR	9'-10"	13
V9	#4	STR	10'-7"	14
V10	#4	STR	11'-4"	15
V11	#5	STR	11'-9"	37
V12	#5	STR	10'-10"	23
V13	#5	STR	9'-10"	10
V14	#5	STR	8'-8"	9
V15	#5	STR	7'-6"	8
Z1	#5	5	3'-11"	16
Z2	#5	5	4'-3"	18
Z3	#5	5	4'-7"	19
Z4	#5	5	4'-11"	21
Z5	#5	5	5'-3"	16
Z6	#6	5	9'-2"	41

**BAR TYPES**



ALL BAR DIMENSION ARE OUT TO OUT.

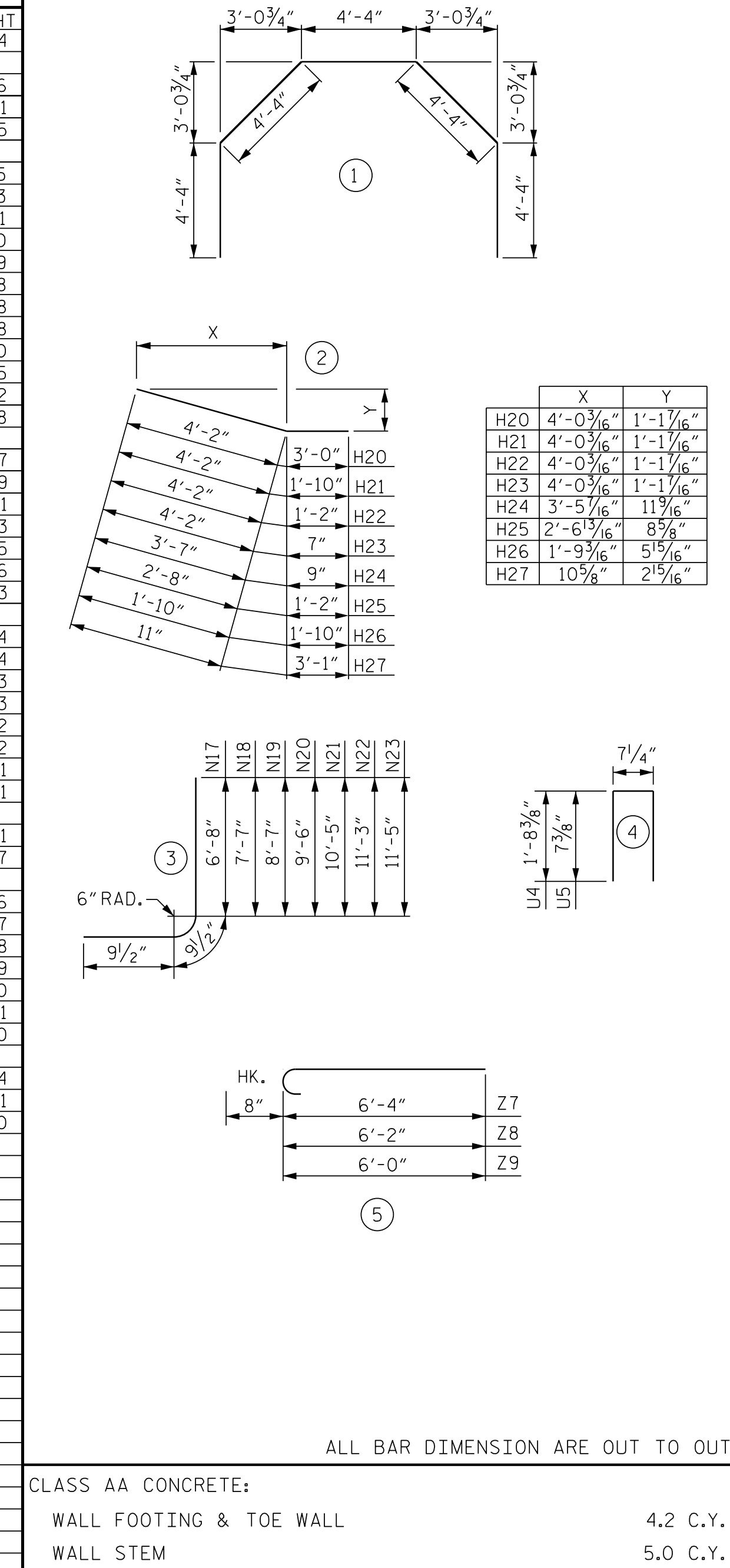
CLASS AA CONCRETE:	
WALL FOOTING, SLAB & TOE WALL	16.6 C.Y.
WINGWALL STEM - SECTION 1	2.9 C.Y.
WINGWALL STEM - SECTION 2	6.0 C.Y.
INLET HEADWALL STEM	3.6 C.Y.
INLET CONTROL WALL STEM	1.8 C.Y.
<b>TOTAL</b>	<b>30.9 C.Y.</b>

REINFORCING STEEL FOR INLET STRUCTURE 2,887 LBS.

**BILL OF MATERIAL**  
DIMENSIONS ARE OUT TO OUT

BAR NO.	SIZE	TYPE	LENGTH	WEIGHT
D2	#4	STR	5'-4"	14
G5	#6	STR	15'-11"	96
G6	#6	STR	7'-0"	21
G7	#6	STR	21'-8"	65
H20	#5	2	7'-2"	15
H21	#5	2	6'-0"	13
H22	#5	2	5'-4"	11
H23	#5	2	4'-9"	30
H24	#5	2	4'-4"	9
H25	#5	2	3'-10"	8
H26	#5	2	3'-8"	8
H27	#5	2	4'-0"	8
H28	#5	STR	7'-1"	30
H29	#5	STR	5'-11"	25
H30	#5	STR	5'-2"	22
H31	#5	STR	4'-7"	38
N17	#7	3	8'-3"	17
N18	#7	3	9'-2"	19
N19	#7	3	10'-2"	21
N20	#7	3	11'-1"	23
N21	#7	3	12'-0"	25
N22	#7	3	12'-10"	26
N23	#7	3	13'-0"	213
T5	#4	STR	20'-8"	14
T6	#4	STR	20'-3"	14
T7	#4	STR	20'-0"	13
T8	#4	STR	4'-2"	3
T9	#4	STR	3'-2"	2
T10	#4	STR	2'-3"	2
T11	#4	STR	1'-3"	1
T12	#4	STR	4'-3"	11
U4	#4	4	4'-0"	11
U5	#4	4	1'-10"	7
V16	#5	STR	6'-1"	6
V17	#5	STR	7'-0"	7
V18	#5	STR	8'-0"	8
V19	#5	STR	8'-11"	9
V20	#5	STR	9'-10"	10
V21	#5	STR	10'-8"	11
V22	#5	STR	10'-10"	90
Z7	#6	5	7'-0"	84
Z8	#6	5	6'-10"	21
Z9	#6	5	6'-8"	30

**BAR TYPES**



ALL BAR DIMENSION ARE OUT TO OUT.

CLASS AA CONCRETE:	
WALL FOOTING & TOE WALL	4.2 C.Y.
WALL STEM	5.0 C.Y.
<b>TOTAL</b>	<b>9.2 C.Y.</b>

REINFORCING STEEL FOR OUTLET HEADWALL 1,111 LBS.

**NOTES:**

STRUCTURE LAYOUT BASED ON "CULVERT SURVEY & HYDRAULIC DESIGN REPORT SEALED BY JERRY L. LINDSEY ON JUNE 5, 2023.

MINIMUM REINFORCING CLEAR COVER SHALL BE 2" UNLESS DENOTED OTHERWISE ON PLANS.

ONCE STRUCTURE IS COMPLETE, BACKFILL AREA BETWEEN INLET CONTROL WALL AND PIPE INLET HEADWALL WITH 6-INCHES OF NATIVE BED MATERIAL.

CHAMFER ACUTE WALL ENDS TO BE 2 1/2" WIDE AT TIPS TO PREVENT SPALLING.

PROVIDE 1" JOINT BETWEEN EXISTING CULVERT AND NEW WORK.

THE COST OF FURNISHING AND INSTALLING THE SHEAR STUDS SHALL BE CONSIDERED INCIDENTAL TO THE COST OF THE OTHER PAY ITEMS FOR THE HEADWALLS AND NOT PAID FOR DIRECTLY.



DocuSigned by:  
John T. Diffie III  
3/7/2024

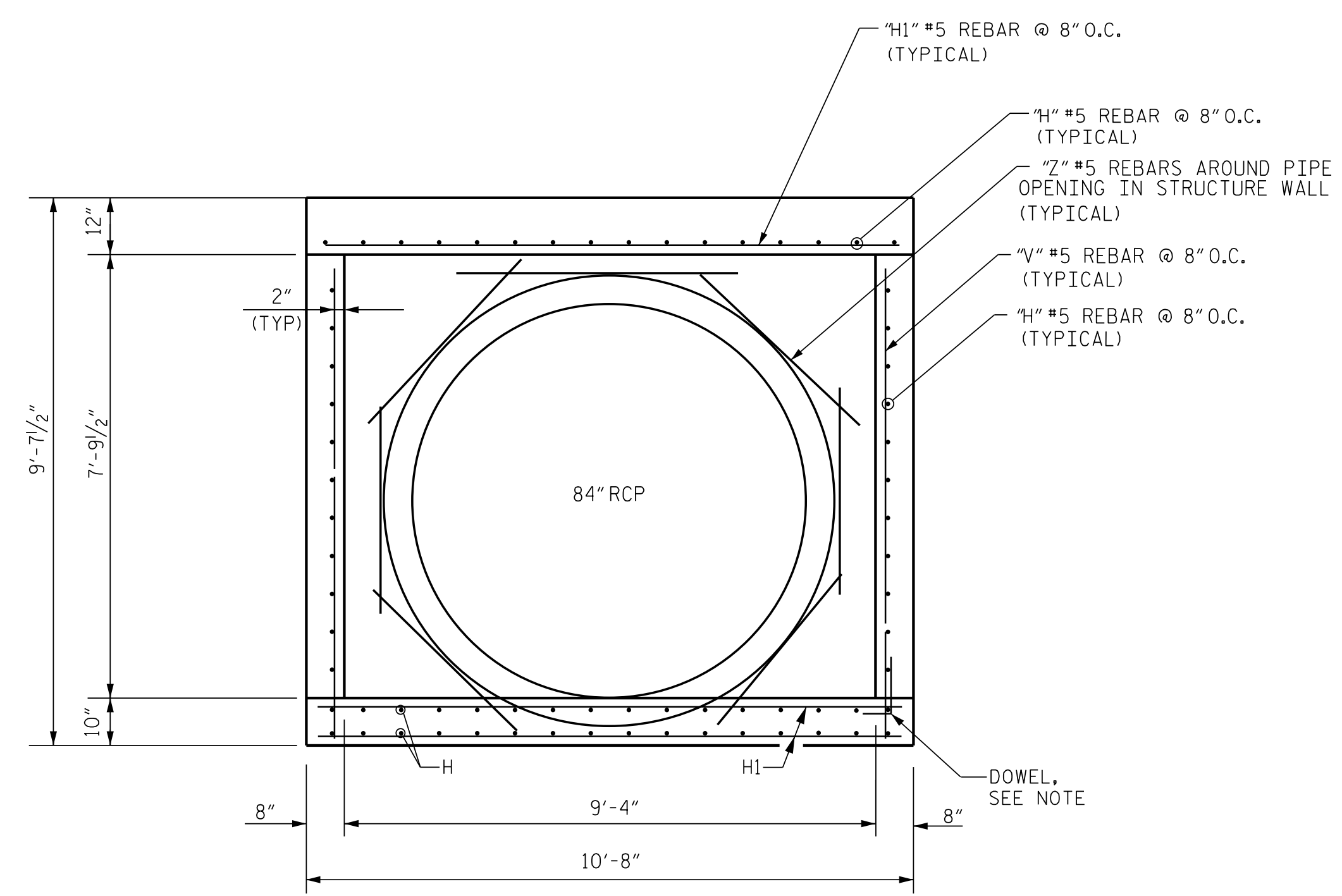
**WETHERILL ENGINEERING**  
1223 Jones Franklin Rd.  
Raleigh, N.C. 27606  
License No. F-0377  
Bus: 919 851 8077  
Fax: 919 851 8107

TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN  
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

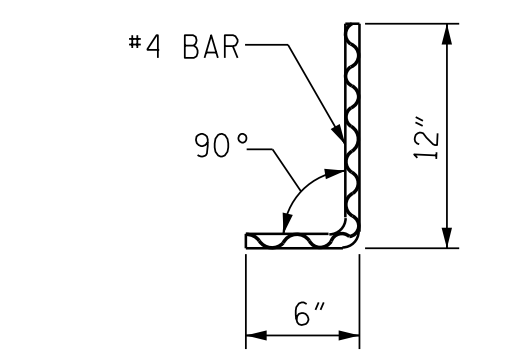
**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

**HEADWALL FOR 120" DIAMETER PIPE BILL OF MATERIALS**

ORIGINAL BY: T. DIFFIE DATE: 11-23  
MODIFIED BY: DATE:  
CHECKED BY: J. DILWORTH DATE: 11-23  
FILE SPEC.:



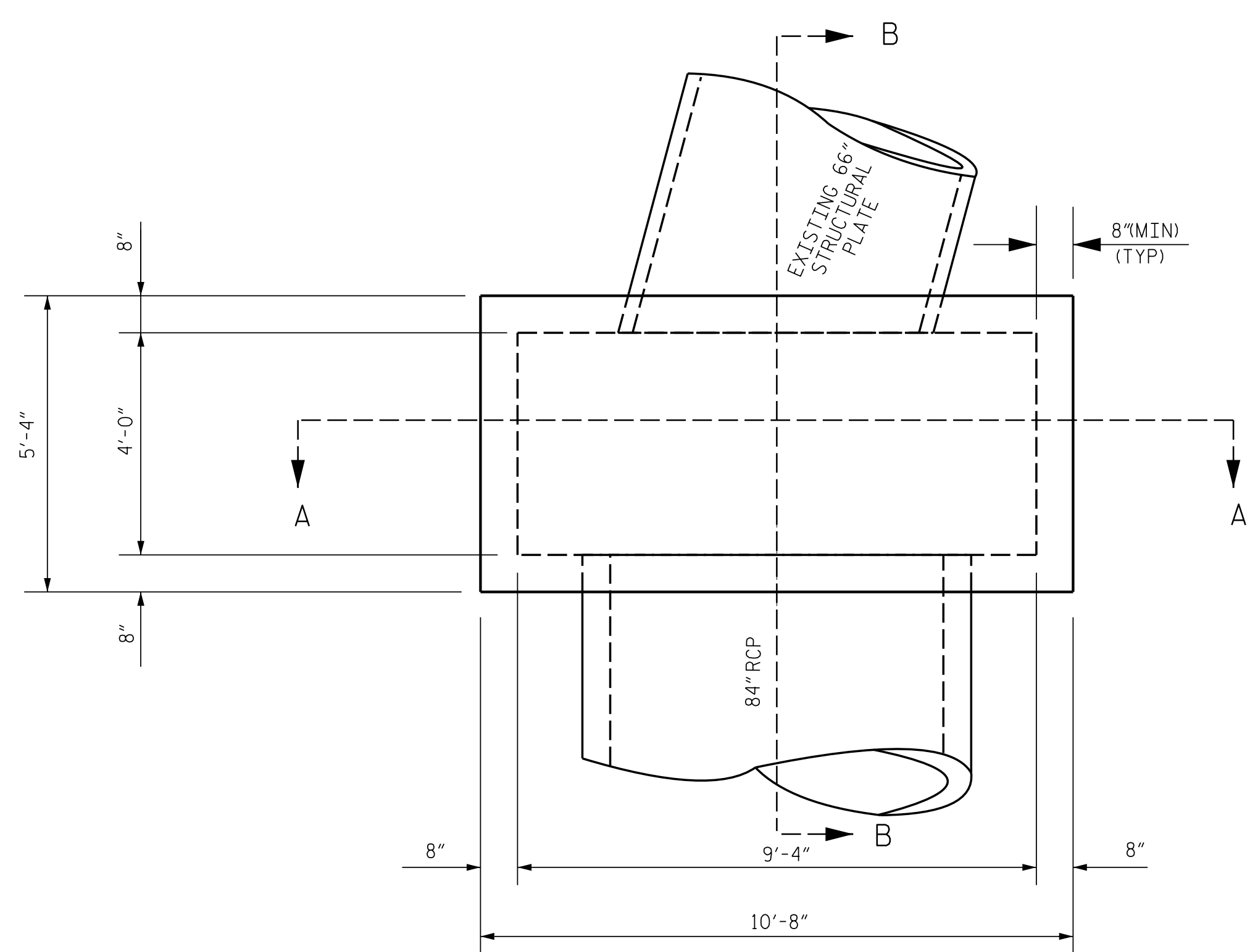
**GENERAL NOTES:**  
 USE CLASS "B" CONCRETE THROUGHOUT.  
 PROVIDE ALL JUNCTION BOXES OVER 3'-6" IN DEPTH WITH STEPS 12" ON CENTER. USE STEPS WHICH COMPLY WITH STD. DRAWING 840.66.  
 OPTIONAL CONSTRUCTION - MONOLITHIC POUR, 2" KEYWAY, OR #4 BAR DOWELS AT 12" CENTERS AS DIRECTED BY THE ENGINEER.  
 USE FORMS FOR THE CONSTRUCTION OF THE BOTTOM SLAB.  
 #2 BAR TO BE USED TO REINFORCE OPENING AROUND 84 INCH RCP.  
 CHAMFER ALL EXPOSED CORNERS 1".  
 2" MINIMUM CONCRETE COVERAGE ON ALL REBAR.  
 IF REINFORCED CONCRETE PIPE IS SET IN BOTTOM SLAB OF BOX, USE TABLE 1 WITH STD. NO. 840.00.  
 HEIGHT DIMENSIONS MAY BE ADJUSTED DOWN FOR SMALLER PIPES AS DIRECTED BY ENGINEER.



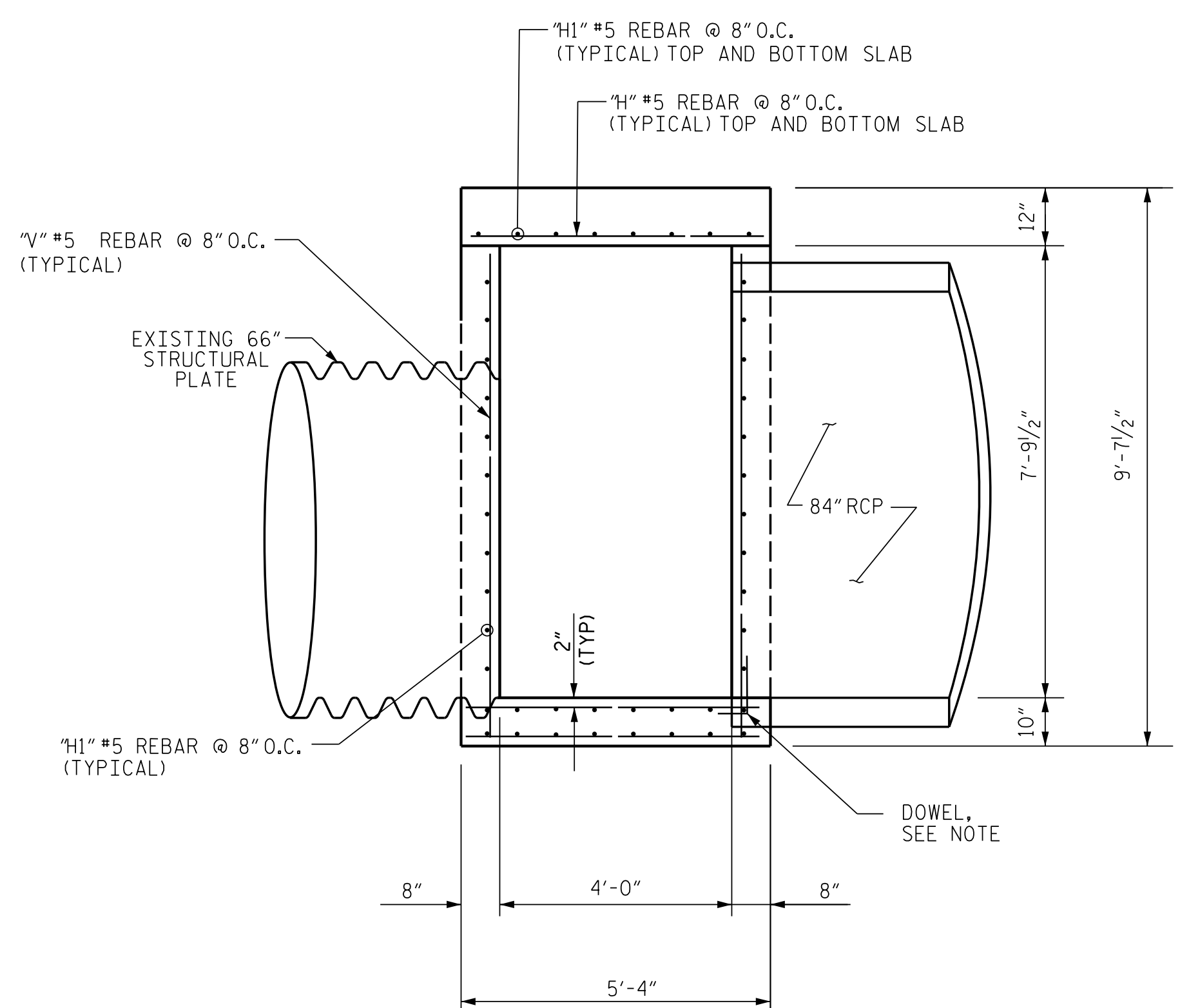
BILL OF MATERIALS				
BAR	NO.	SIZE	LENGTH	WEIGHT
H	80	#5	5'-0"	417
H1	48	#5	10'-4"	517
V	48	#5	8'-5"	421
Z	7	#5	5'-0"	29
TOTAL REINF. STEEL (LBS.)				1416
TOTAL CONC. (CU. YDS.)				* 9.2
* NO DEDUCTION HAS BEEN MADE FOR PIPES				

PIPE	C.Y. QUANTITIES WHEN 'L' IS					
	'W'	'W1'	'T'			
84"	4'-4"	2'-6"	8 1/4"	0.07	0.09	0.11

SECTION A-A



PLAN VIEW



SECTION B-B



DocuSigned by:  
 Thomas K. Koch  
 3/7/2024

**WETHERILL ENGINEERING**  
 1223 Jones Franklin Rd.  
 Raleigh, N.C. 27606  
 License No. F-0377  
 Bus: 919 851 8077  
 Fax: 919 851 8107

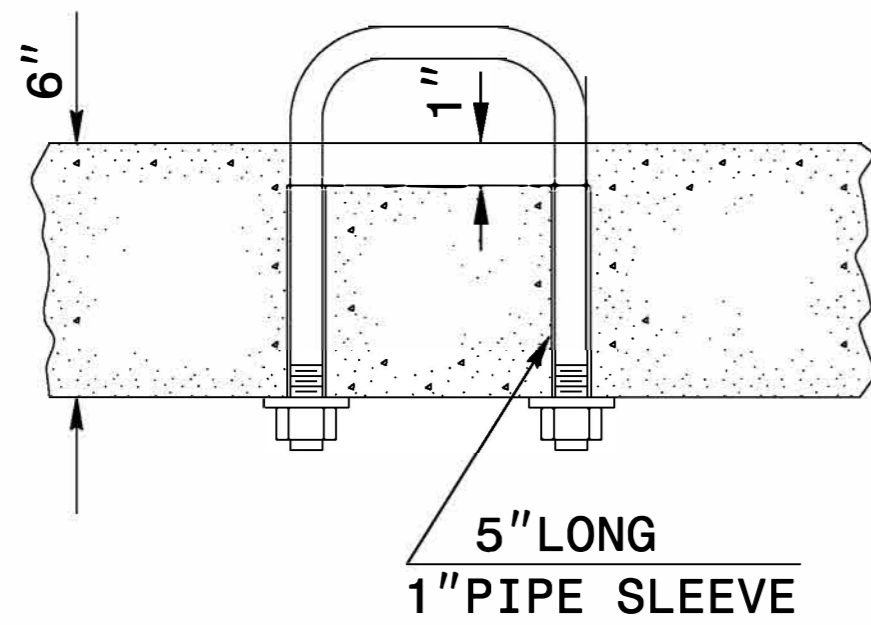
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN  
 CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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

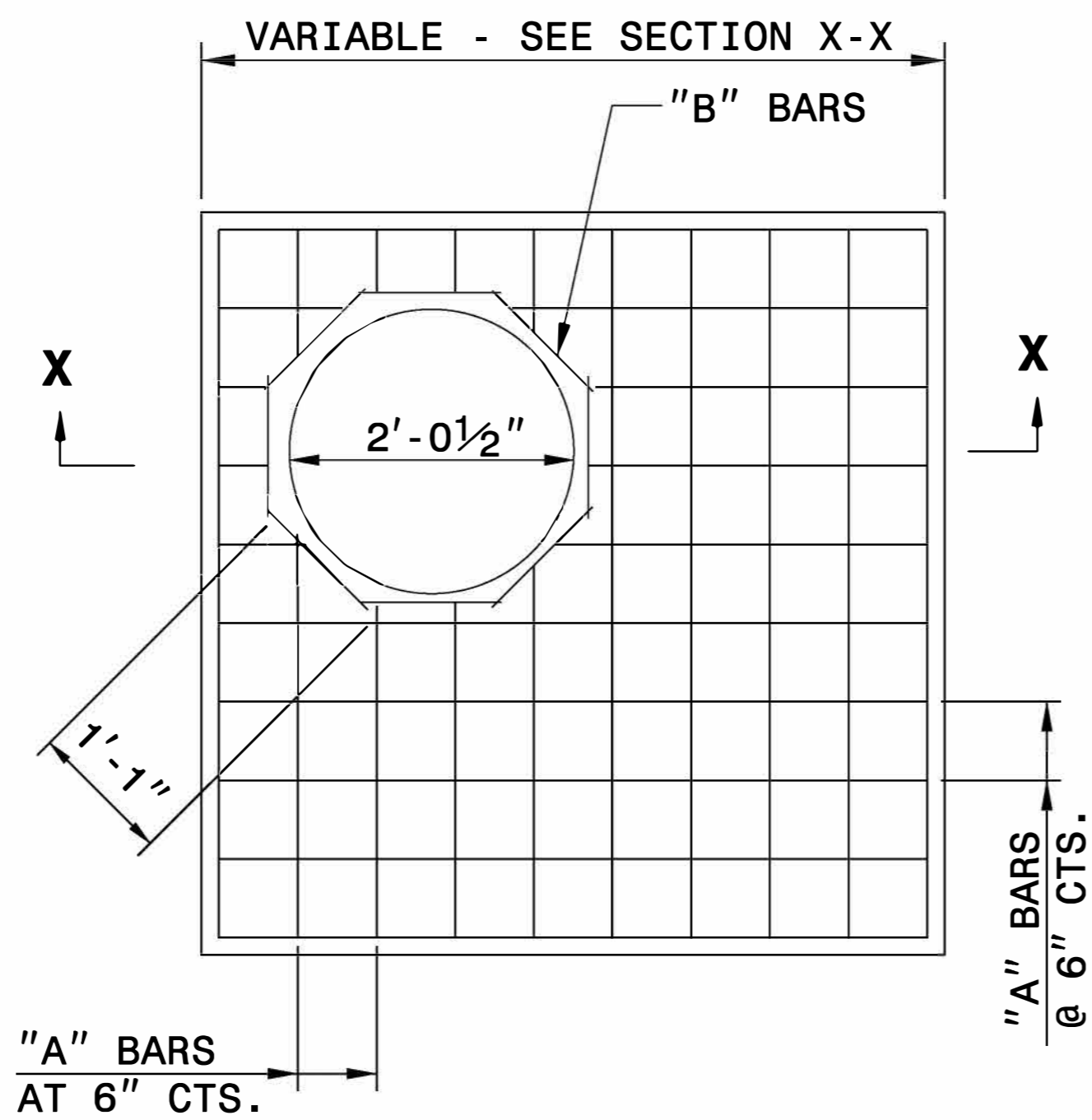
**SPECIAL  
 JUNCTION BOX  
 WITH SLAB LID**

SHEET 1 OF 1

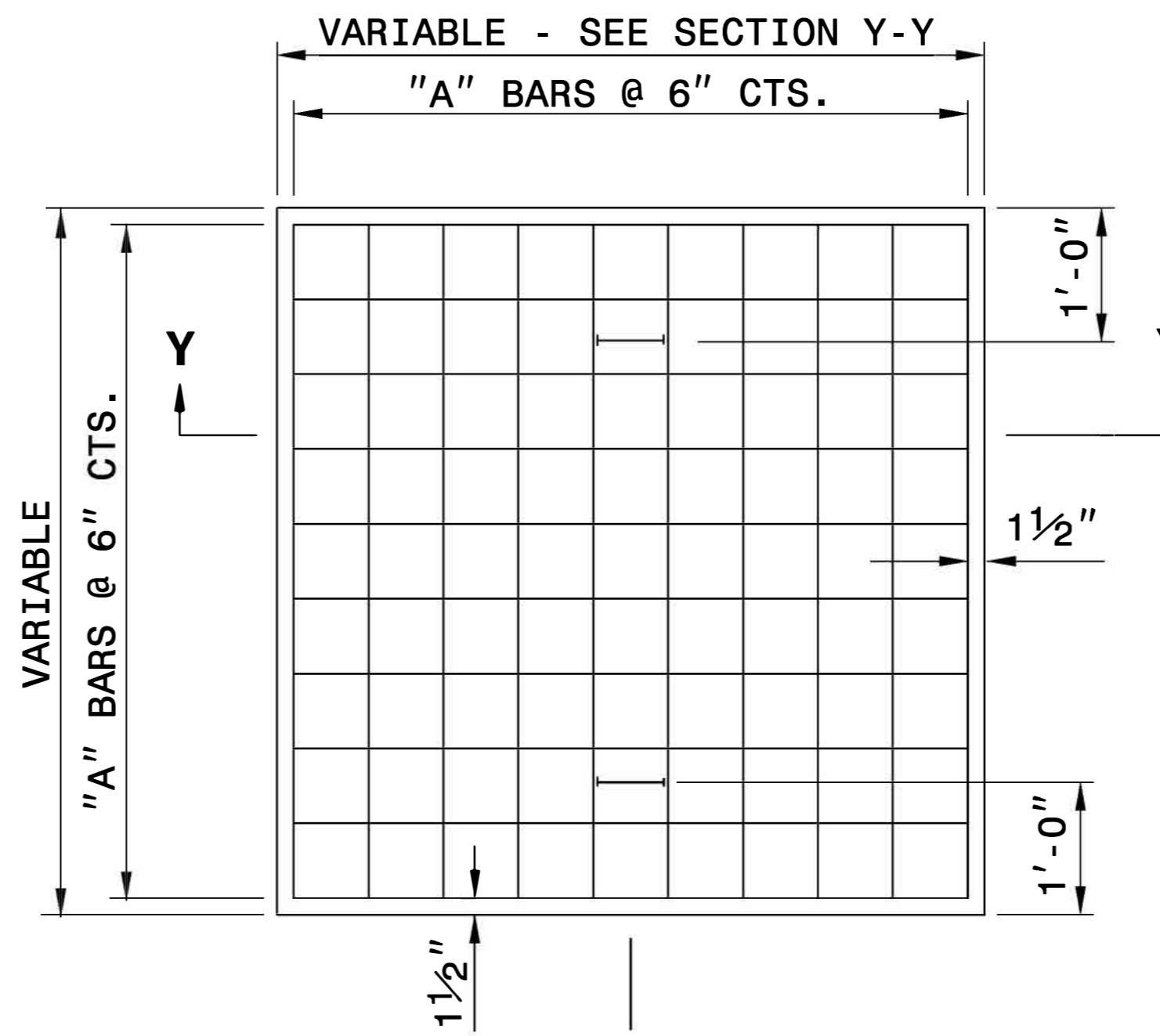
ORIGINAL BY: T. DIFFEE      DATE: 8-23  
 MODIFIED BY:                  DATE:  
 CHECKED BY: T. KOCH      DATE: 8-23  
 FILE SPEC.:



**PARTIAL SECTION**



**PLAN**



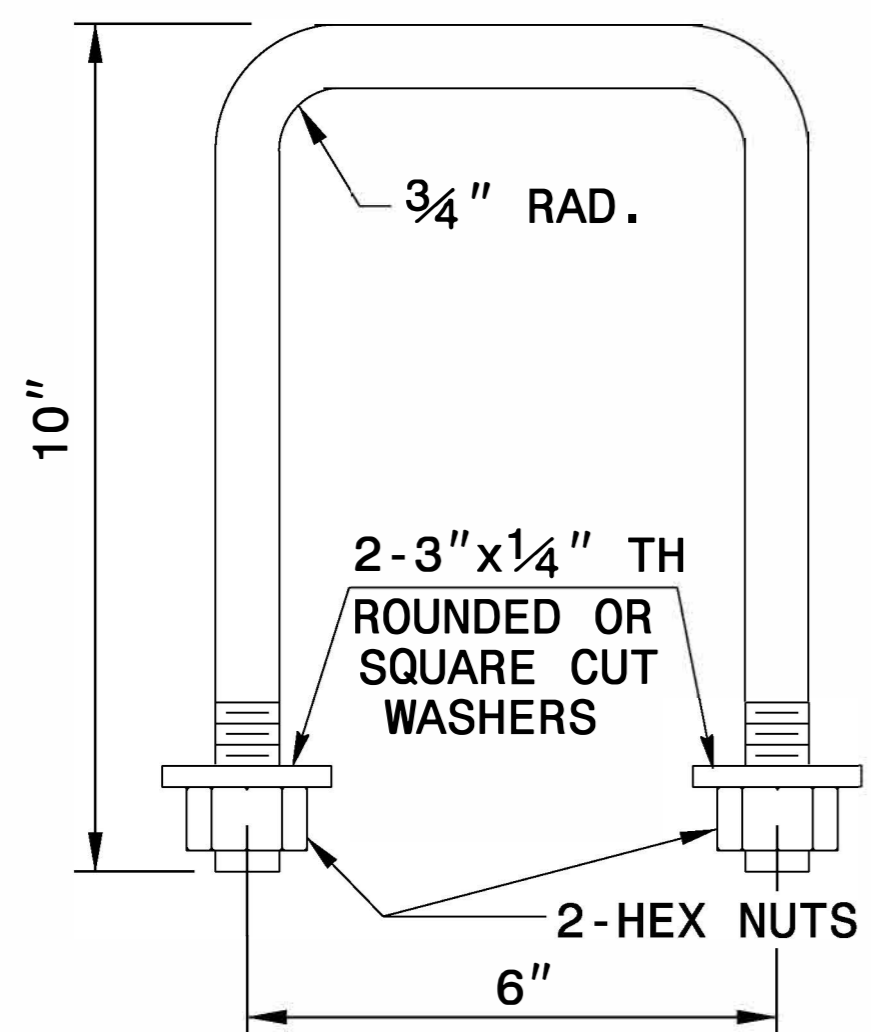
**PLAN**

**GENERAL NOTES:**

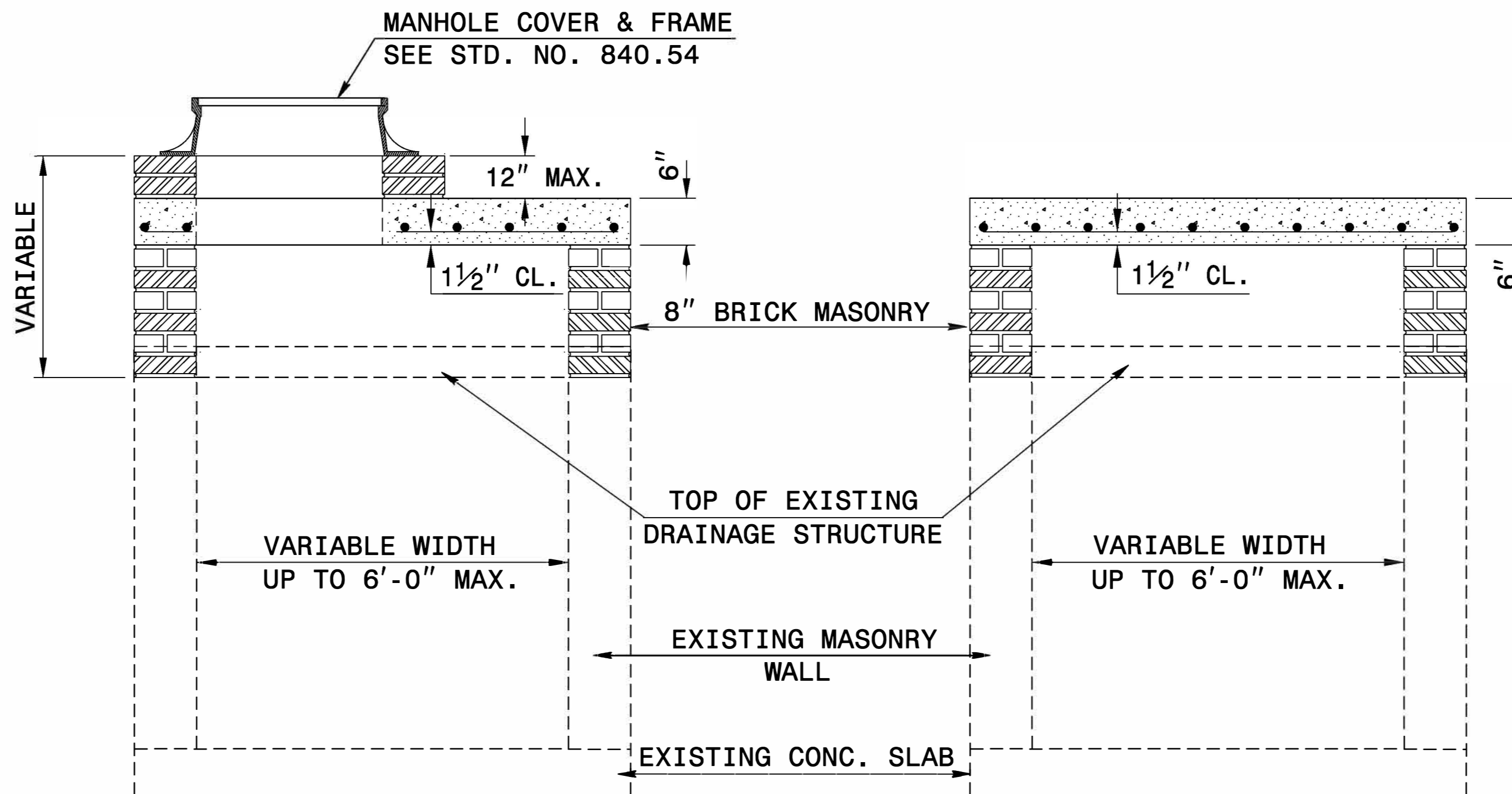
CONSTRUCT IN ACCORDANCE WITH SECTION 859 OF THE STANDARD SPECIFICATIONS.

THE DIMENSIONS FOR THE EXISTING BOXES ARE APPROXIMATE AND MAY VARY SLIGHTLY.

DETAIL INTENDED FOR NON-TRAFFIC BEARING DRAINAGE STRUCTURES.



**DETAIL OF HANDLE**



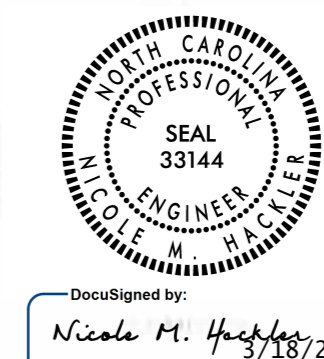
**SECTION X-X**

**SECTION Y-Y**

**BILL OF MATERIALS**

REINFORCING STEEL				
CODE	SIZE	QTY.	LENGTH	REINF. STEEL LBS.
A	#4	20	4'-6"	60.12
B	#4	8	1'-1"	5.79
<b>TOTAL</b>				<b>65.91 *</b>
MASONRY				CU YDS
TOP SLAB CONCRETE CLASS "B"				.4326 *
BRICK MASONRY PER FT HT (MIN)				.4111

**\* NOTE:**  
QUANTITIES BASED ON 3'-6" X 3'-6" DRAINAGE STRUCTURE. ADJUST QUANTITIES FOR LARGER STRUCTURES AND MANHOLE CONSTRUCTION.



DocuSigned by:  
Nicole M. Hughes  
5884323034164C5

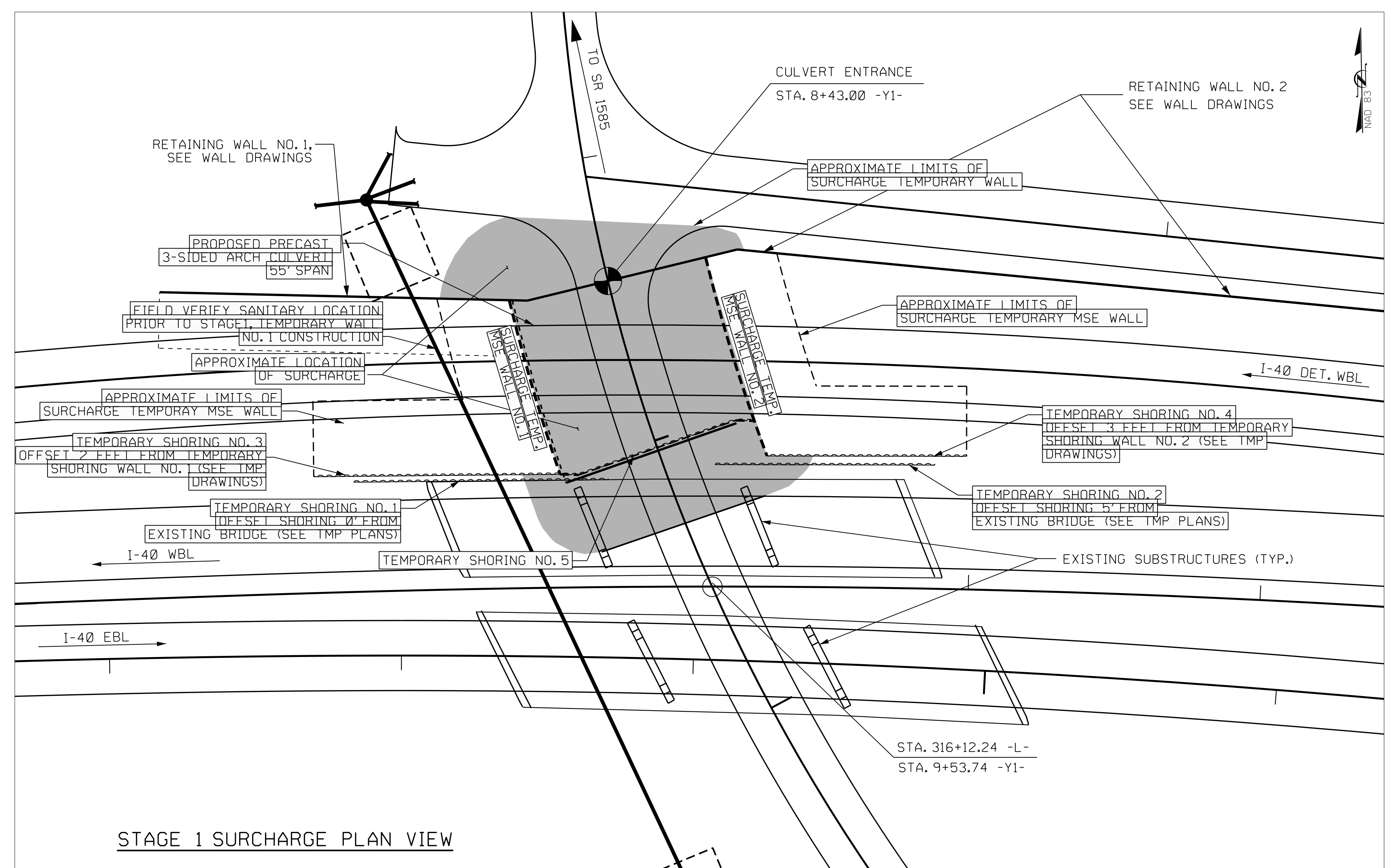
DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

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

**DETAIL TO CONVERT EXISTING DI, CB, OTCB or GI TO JUNCTION BOX (MANHOLE OPTIONAL)**

ORIGINAL BY: T.S.S. DATE: NOV. 1997  
 MODIFIED BY: T.S.S. DATE: FEB. 2000  
 CHECKED BY: DATE:  
 FILE SPEC.: ds174:/usr/details/stand/boxtojbe.dgn

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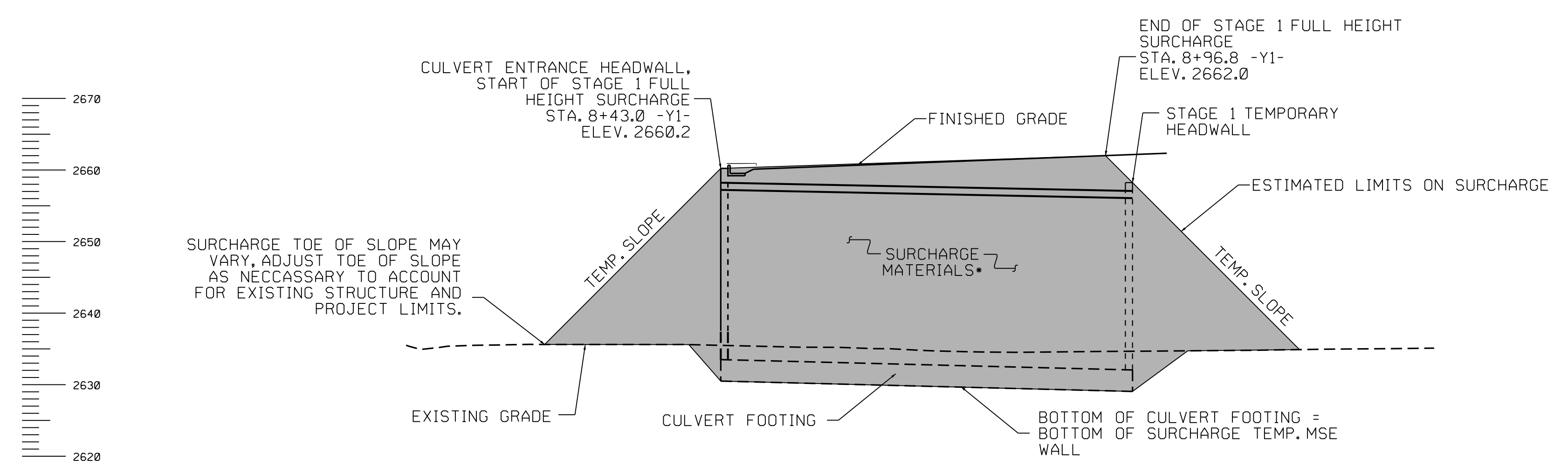


- Stage 1 Sequence:
- 1) Construct Temporary Shoring Nos.1 and 2.
  - 2) Excavate for Surcharge Temporary Wall Nos.1 and 2 and Temporary Shoring Nos.3 and 4.
  - 3) Construct Surcharge Temp. MSE Wall, Retaining Wall Nos. 1 and 2 and Temp. Shoring Nos 3 and 4. When backfill for Temporary MSE Wall fills overlaps with the reinforced zone of Permanent MSE Walls, use the Permanent MSE Walls backfill material required for retaining walls in the reinforced zone of the Temporary Walls.
  - 4) Install 4 settlement gauges to monitor surcharge settlement in accordance to NCDOT Standard 235.01. Operations Engineer and contractor to determine locations at the time of construction.
  - 5) Install settlement points at each bent of existing West bound bridge.
  - 6) Place surcharge fill to the limits shown on plans.
  - 7) Monitor settlement until a acceptable rate is observed, Operation Engineer will release the removal of Surcharge at this time. If excessive settlement or movement of the existing bridge is observed then remove surcharge fill beneath the existing structure. Provide settlement reading to the NCDOT Operations Engineer on a bi-weekly basis.
  - 8) Remove surcharge and construct Stage 1 Tunnel and Temporary Shoring No. 5, consecutively.

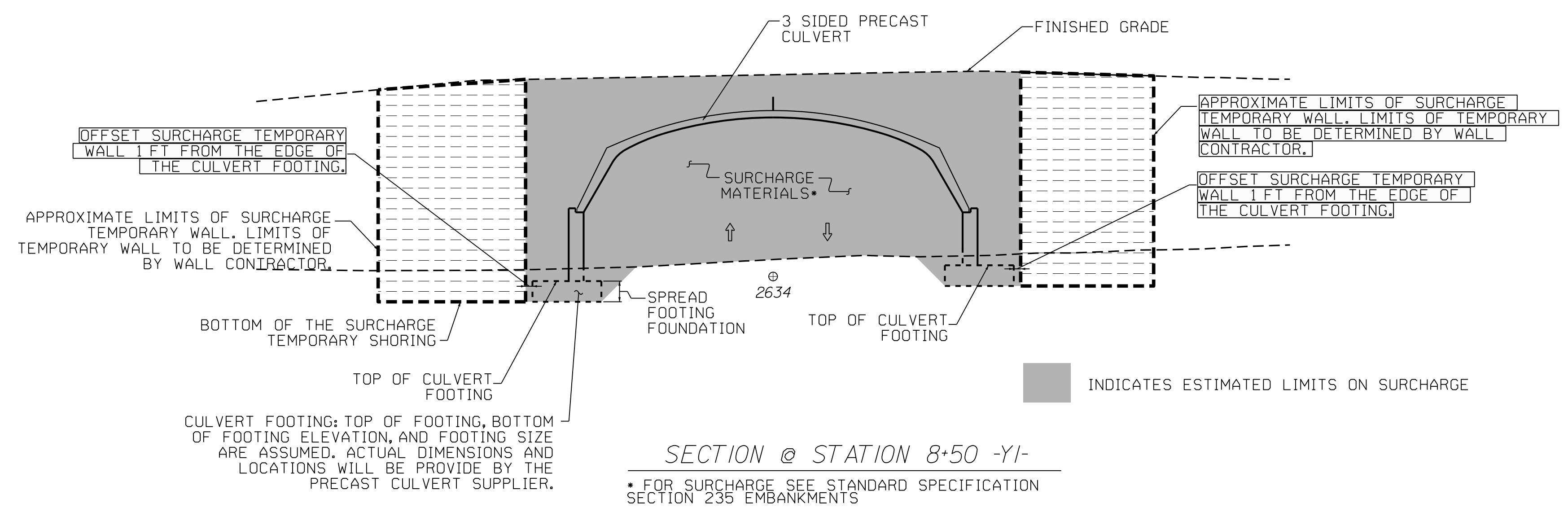
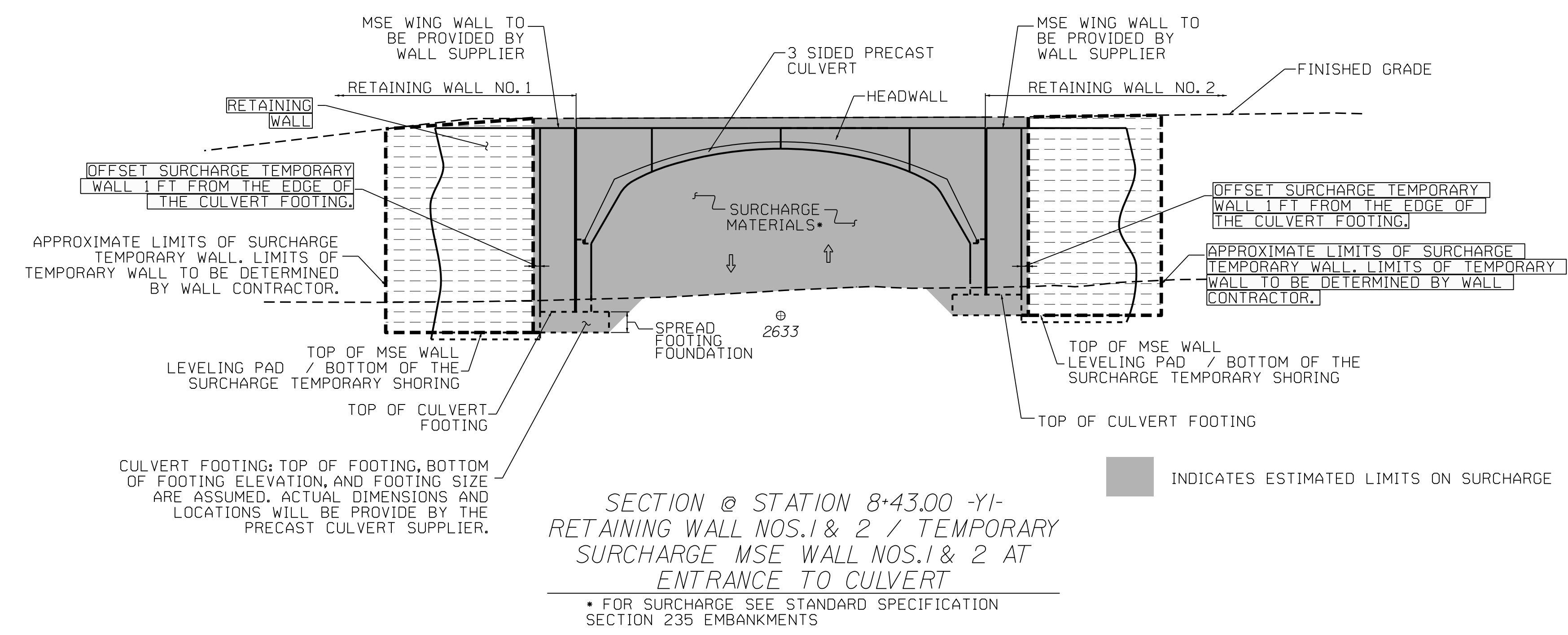
- Revisions:
- 1) Revision 1 - Includes Phase 1 termination and Temporary Shoring Location Nos.1,3, and 5 being moved closer to the existing WBL Bridge.
  - 2) Revision 2 - Note 3 correction.

STAGE 1 SURCHARGE QUANTITIES	
SURCHARGE TEMP. MSE WALL NO. 1	1,884 SF
SURCHARGE TEMP. MSE WALL NO. 2	2,290 SF
BORROW EXCAVATION	6,140 CY
UNCLASSIFIED EXCAVATION	6,140 CY
EMBANKMENT SETTLEMENT GAUGES	4 EA

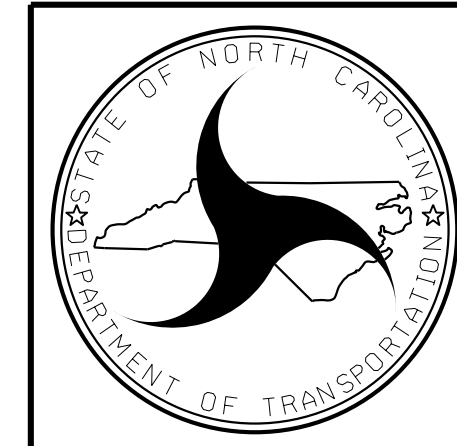
 INDICATES ESTIMATED LIMITS ON SURCHARGE



**STAGE 1 SURCHARGE PROFILE VIEW**  
 • FOR SURCHARGE SEE STANDARD SPECIFICATION SECTION 235 EMBANKMENTS



PREPARED BY: MHS	DATE: 12/23
REVIEWED BY: SCC	DATE: 12/23

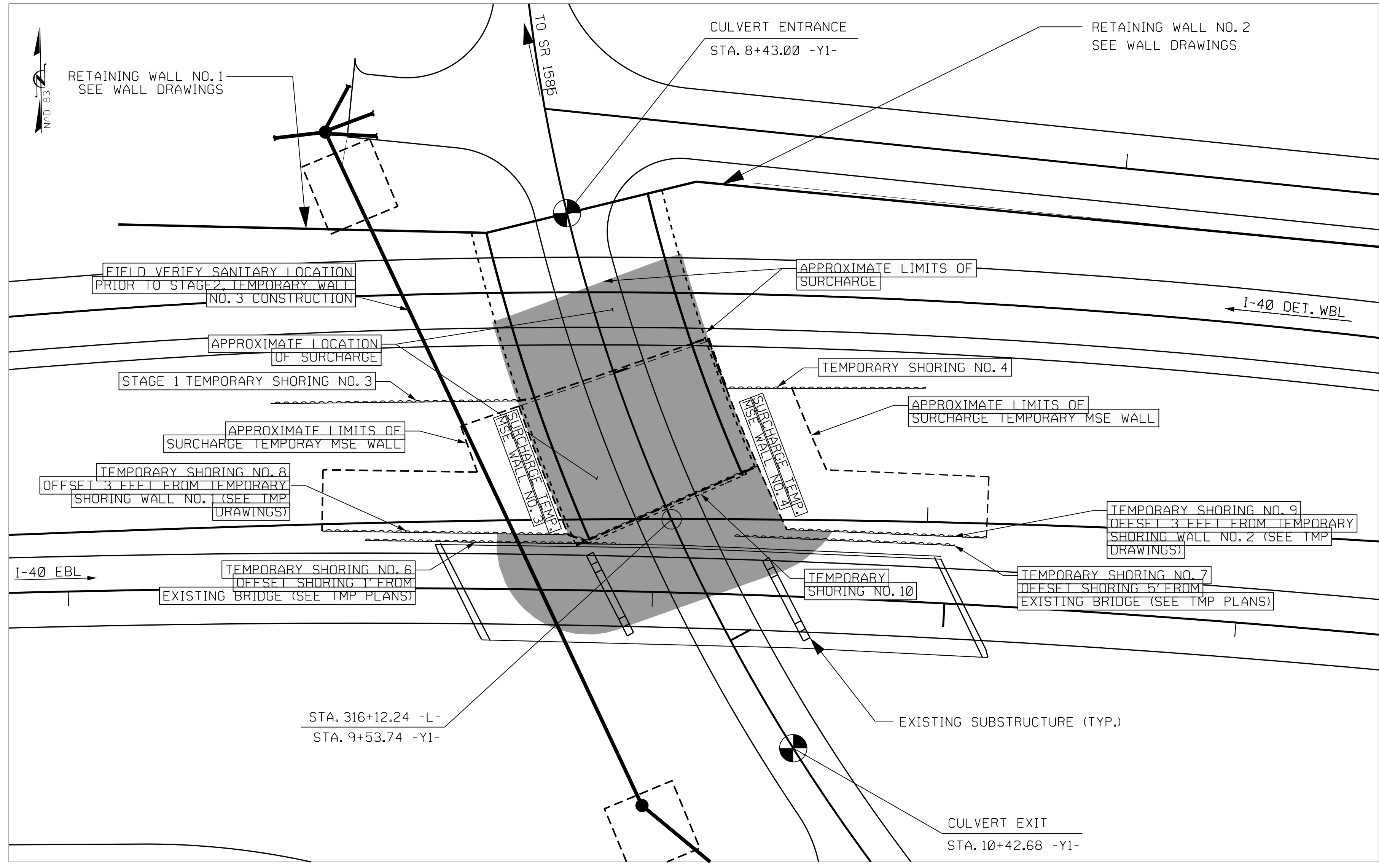


NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS

GEOTECHNICAL  
ENGINEERING UNIT

SURCHARGE CROSS SECTIONS STAGE 1				
REVISIONS				
NO.	BY	DATE	ING.	DATE
1	MHS	2/24	3	
2			4	





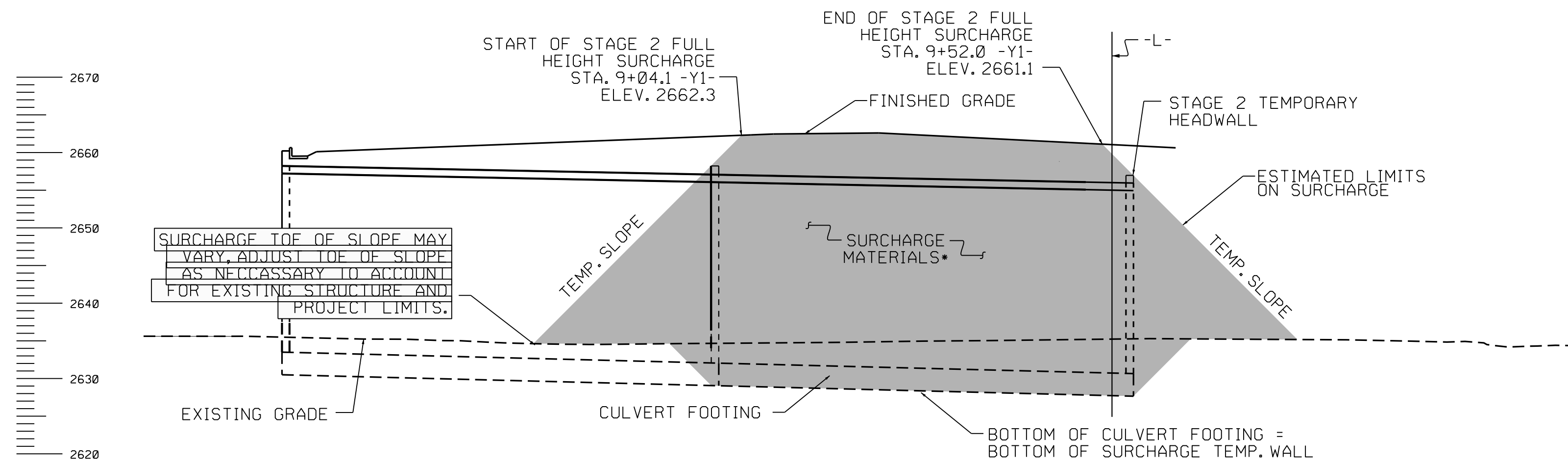
STAGE 2 SURCHARGE PLAN VIEW

- Stage 2 Sequence:
- 1) Demolish Existing West bound bridge, including removal of the existing columns and footings
  - 2) Construct Temporary Shoring Nos. 6 and 7.
  - 3) Construct Surcharge Temporary MSE Wall Nos. 3 and 4.
  - 4) Install 4 settlement gauges to monitor surcharge settlement in accordance with NCDOT Standard 235.01. Operations Engineer and contractor to determine locations at the time of construction.
  - 5) Install settlement points at each bent of existing East bound bridge.
  - 5) Place surcharge fill to the limits shown on plans.
  - 6) Monitor settlement until a acceptable rate is observed, Operation Engineer will release the removal of Surcharge at this time. If excessive settlement or movement of the existing bridge is observed then remove surcharge fill beneath the existing structure. Provide settlement reading to the NCDOT Operations Engineer on a bi-weekly basis.
  - 7) Remove surcharge and construct Stage 2 Tunnel and Temporary Shoring No. 10, consecutively.

STAGE 2 SURCHARGE QUANTITIES

SURCHARGE TEMP. MSE WALL NO. 3	1,650 SF
SURCHARGE TEMP. MSE WALL NO. 4	1,770 SF
BORROW EXCAVATION	5,800 CY
UNCLASSIFIED EXCAVATION	5,800 CY
EMBANKMENT SETTLEMENT GAUGES	4 EA

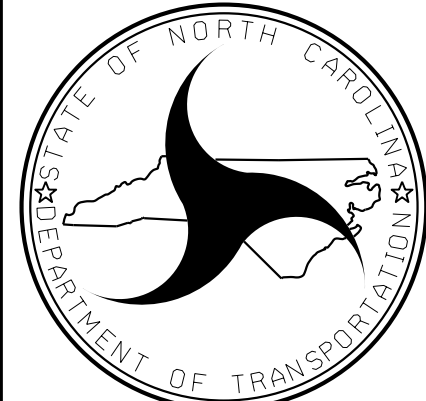
 INDICATES ESTIMATED LIMITS ON SURCHARGE



STAGE 2 SURCHARGE PROFILE

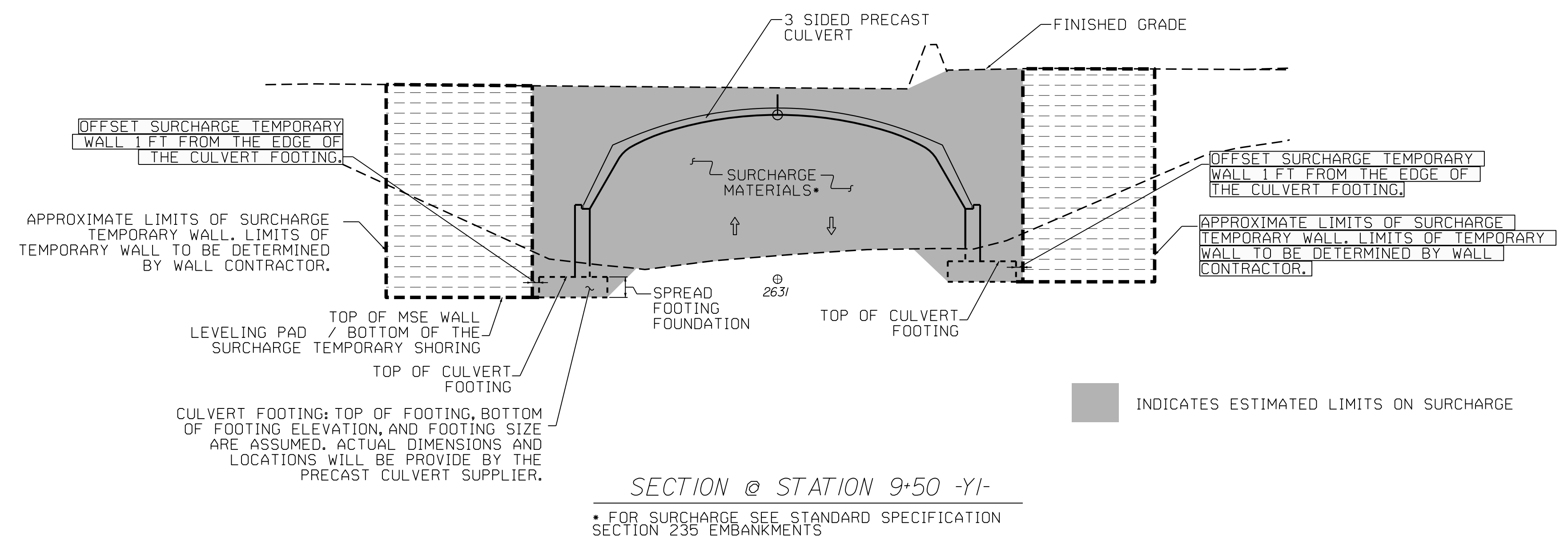
• FOR SURCHARGE SEE STANDARD SPECIFICATION SECTION 235 EMBANKMENTS

PREPARED BY: MHS      DATE: 12/23  
 REVIEWED BY: SCC      DATE: 12/23

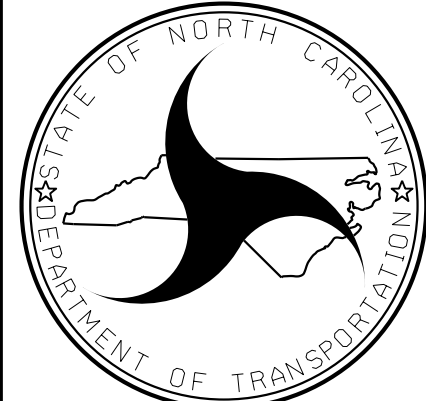

 NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
  
 GEOTECHNICAL  
 ENGINEERING UNIT

SURCHARGE  
PLAN & PROFILE VIEWS  
STAGE 2

REVISIONS				
NO.	BY	DATE	ING.	DATE
1	MHS	2/24	3	
2			4	



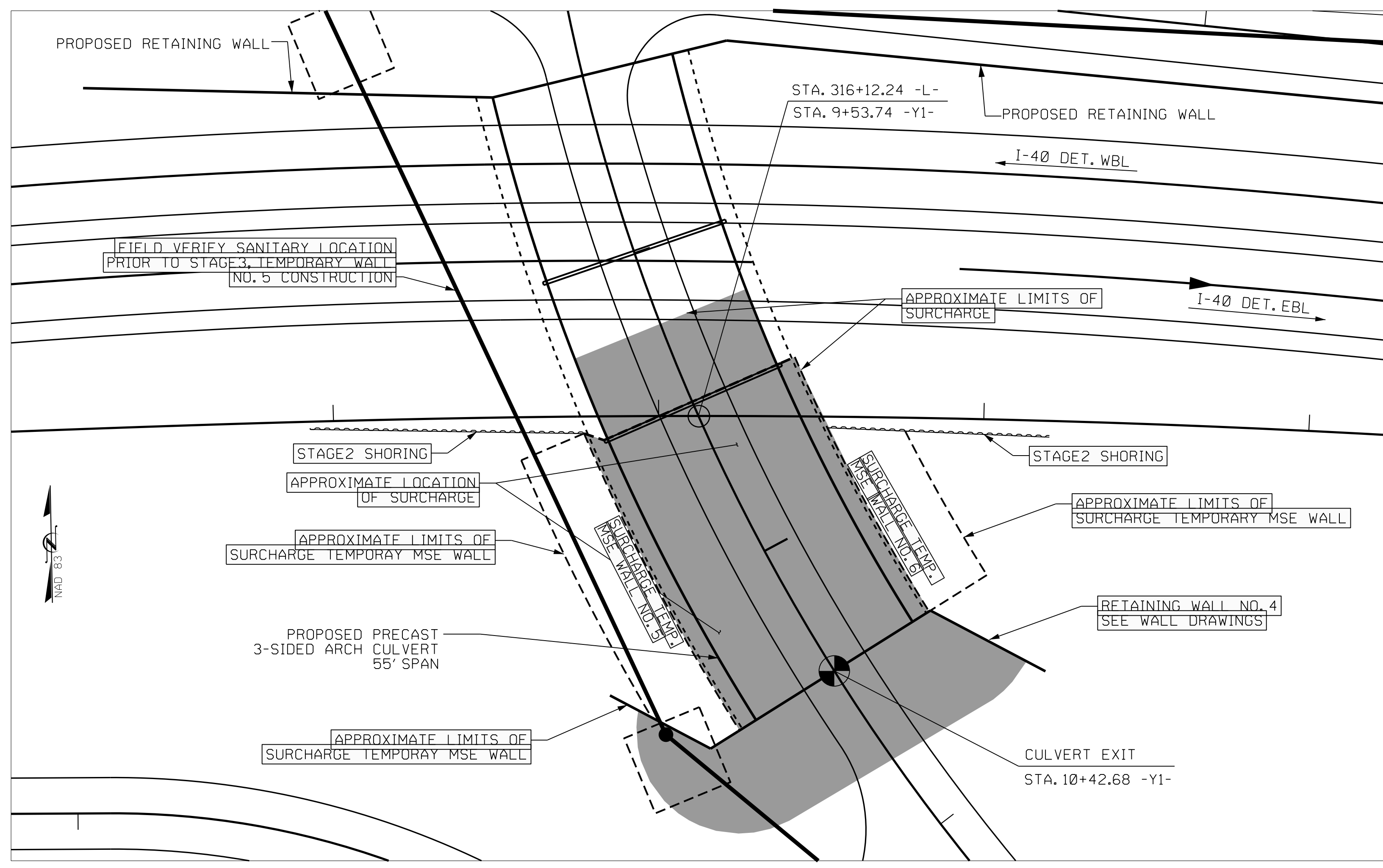
PREPARED BY: MHS	DATE: 12/23
REVIEWED BY: SCC	DATE: 12/23



NORTH CAROLINA  
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DIVISION OF HIGHWAYS

GEOTECHNICAL  
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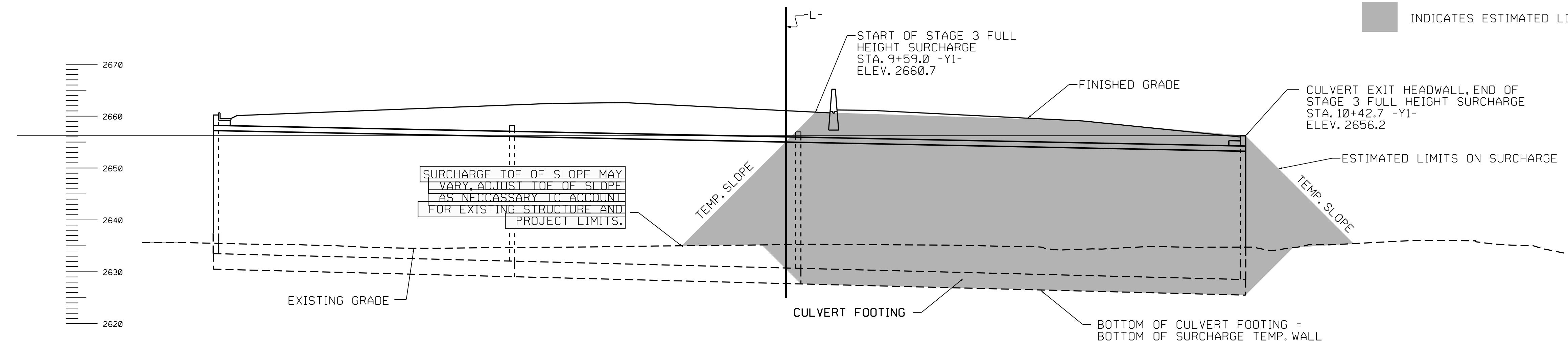
SURCHARGE CROSS SECTION STAGE 2					
REVISIONS					
NO.	BY	DATE	ING.	BY	DATE
1	MHS	2/24	3		
2			4		



STAGE 3 SURCHARGE PLAN VIEW

- Stage 3 Sequence:
- 1) Demolish Existing East bound bridge, including removal of the existing columns and footings
  - 2) Construct Surcharge MSE Temporary Wall Nos. 5 and 6 and Retaining Wall Nos. 3 and 4. When backfill for Temporary MSE Wall fills overlaps with the reinforced zone of Permanent MSE Walls, use the Permanent MSE Walls backfill material required for retaining walls in the reinforced zone of the Temporary Walls.
  - 3) Install 4 settlement gauges to monitor surcharge settlement in accordance to NCDOT Standard 235.01. Operations Engineer and contractor to determine locations at the time of construction.
  - 4) Place surcharge fill to the limits shown on plans.
  - 5) Monitor settlement until a acceptable rate is observed. Operation Engineer will release the removal of Surcharge at this time. If excessive settlement or movement of the existing bridge is observed then remove surcharge fill beneath the existing structure. Provide settlement reading to the NCDOT Operations Engineer on a bi-weekly basis.
  - 6) Remove surcharge and construct Stage 3 Tunnel.

STAGE 3 SURCHARGE QUANTITIES	
SURCHARGE TEMP. MSE WALL NO. 5	3,275 SF
SURCHARGE TEMP. MSE WALL NO. 6	2,050 SF
BORROW EXCAVATION	8,100 CY
UNCLASSIFIED EXCAVATION	8,100 CY
EMBANKMENT SETTLEMENT GAUGES	4 EA

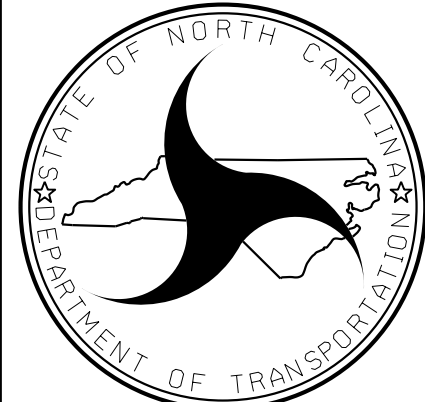


STAGE 3 SURCHARGE PROFILE VIEW

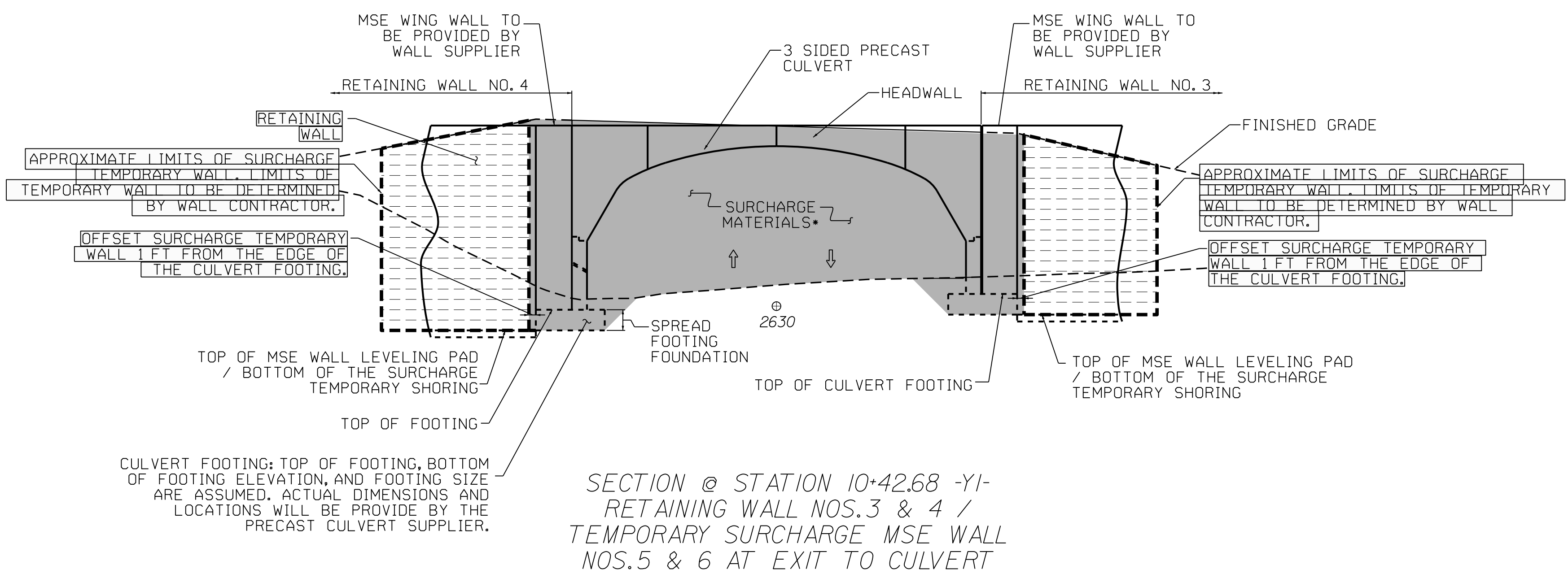
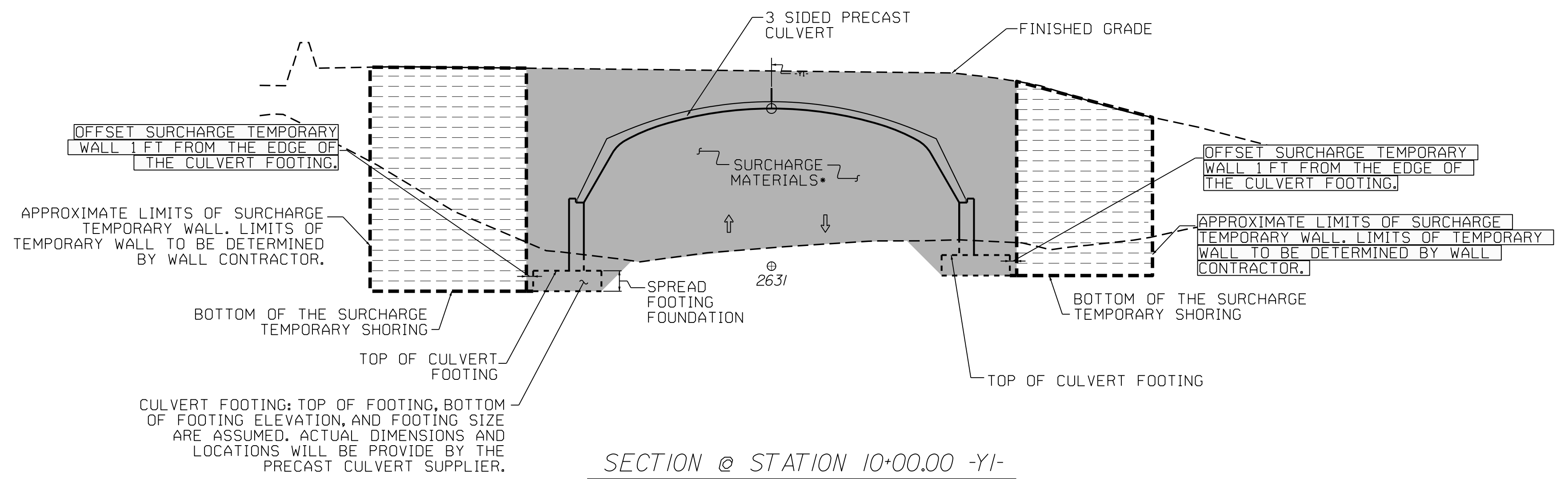
• FOR SURCHARGE SEE STANDARD SPECIFICATION SECTION 235 EMBANKMENTS

INDICATES ESTIMATED LIMITS ON SURCHARGE

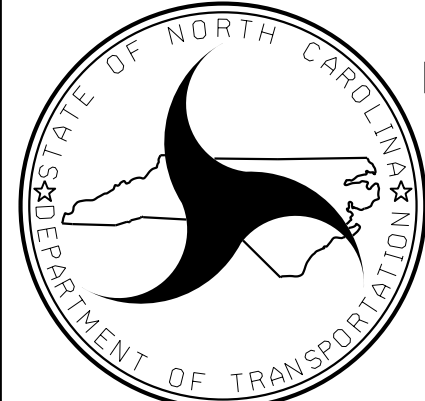
PREPARED BY: MHS	DATE: 12/23
REVIEWED BY: SCC	DATE: 12/23


  
 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 GEOTECHNICAL ENGINEERING UNIT

SURCHARGE PLAN & PROFILE VIEWS STAGE 3				
REVISIONS				
NO.	BY	DATE	ING.	DATE
1	MHS	2/24	3	
2			4	



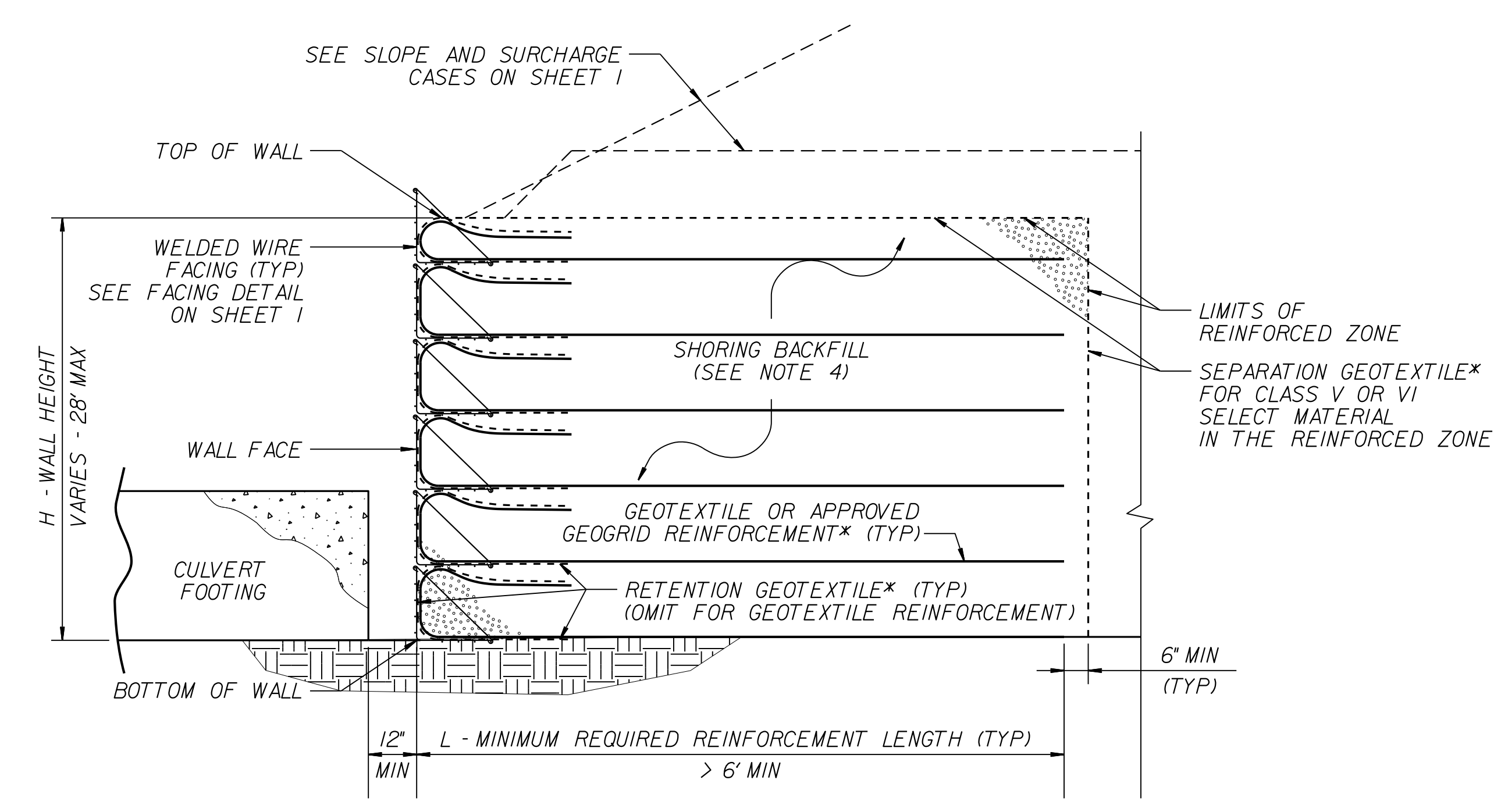
PREPARED BY: MHS	DATE: 12/23
REVIEWED BY: SCC	DATE: 12/23



NORTH CAROLINA  
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DIVISION OF HIGHWAYS

GEOTECHNICAL  
ENGINEERING UNIT

SURCHARGE CROSS SECTION VIEWS STAGE 3				
REVISIONS				
NO.	BY	DATE	ING.	DATE
1	MHS	2/24	3	
2			4	



**SURCHARGE TEMPORARY MSE WALL DETAIL**  
\*SEE GEOSYNTHETIC PLACEMENT DETAILS.

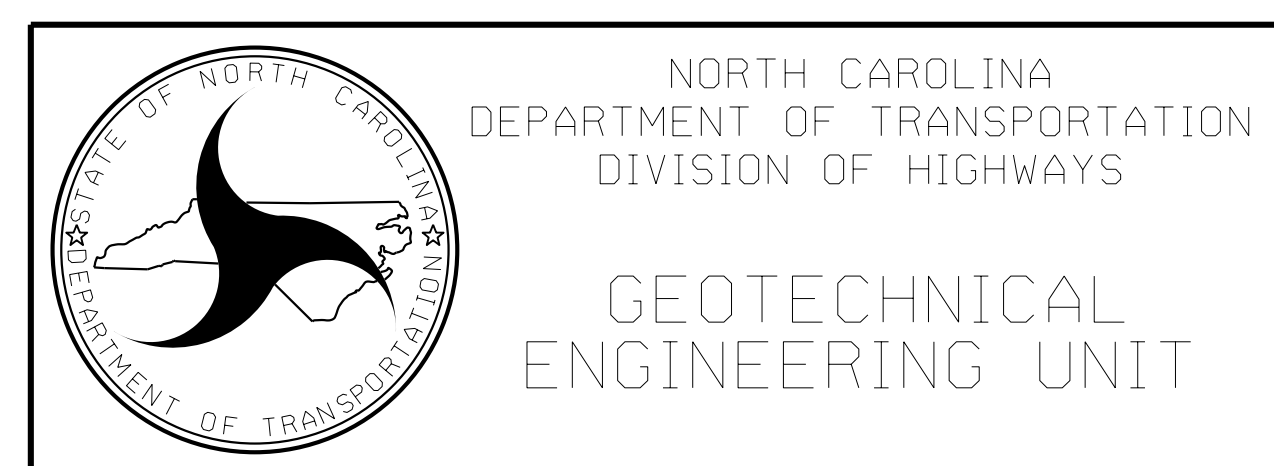
**NOTES:**

- FOR SURCHARGE TEMPORARY MECHANICALLY STABILIZED EARTH (MSE) WALLS, SEE TEMPORARY SHORING PROVISION. SURCHARGE TEMPORARY MSE WALLS TO BE PAID AS TEMPORARY SHORING.
- BEFORE BEGINNING SURCHARGE TEMPORARY MSE WALL DESIGNS SURVEY WALL LOCATIONS AND SUBMIT A REVISED WALL PROFILE VIEW (WALL ENVELOPE) FOR REVIEW. DO NOT START SURCHARGE TEMPORARY MSE WALL DESIGNS OR CONSTRUCTION UNTIL THE WALL ENVELOPE IS ACCEPTED.
- DESIGN SURCHARGE TEMPORARY MSE WALLS FOR THE FOLLOWING:
  - DESIGN HEIGHT = PROPOSED GRADE TO BOTTOM OF CULVERT FOOTING
  - BOTTOM OF SURCHARGE TEMPORARY MSE WALLS = BOTTOM OF CULVERT FOOTING
  - SURCHARGE TEMPORARY MSE WALLS ARE BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:
 

COHESION, $c$	= 0 PSF
FRICTION ANGLE, $\phi$	= 30 DEGREES
UNIT WEIGHT, $\gamma$	= 120 PCF
GROUNDWATER ELEV.	= N/A
- DO NOT USE A-2-4 SOIL FOR SURCHARGE TEMPORARY MSE WALLS AROUND CULVERTS OR IN THE REINFORCED ZONE OF TEMPORARY WALLS FOR SLOPE CASES. DO NOT USE CLASS VI SELECT MATERIAL IN THE REINFORCED ZONE OF SURCHARGE TEMPORARY MSE WALLS WITH GEOTEXTILE REINFORCEMENT.
- WHEN BACKFILL FOR SURCHARGE TEMPORARY MSE WALLS FILLS OVERLAPS WITH THE REINFORCED ZONE OF PERMANENT MSE WALLS, USE THE PERMANENT MSE WALLS BACKFILL MATERIAL REQUIRED FOR RETAINING WALLS IN THE REINFORCED ZONE OF SURCHARGE TEMPORARY MSE WALLS.
- DESIGN SURCHARGE TEMPORARY MSE WALLS FOR A LIVE LOAD (TRAFFIC) SURCHARGE.
- DO NOT USE MORE THAN 4 DIFFERENT REINFORCEMENT STRENGTHS FOR EACH SURCHARGE TEMPORARY MSE WALLS.
- 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:
 

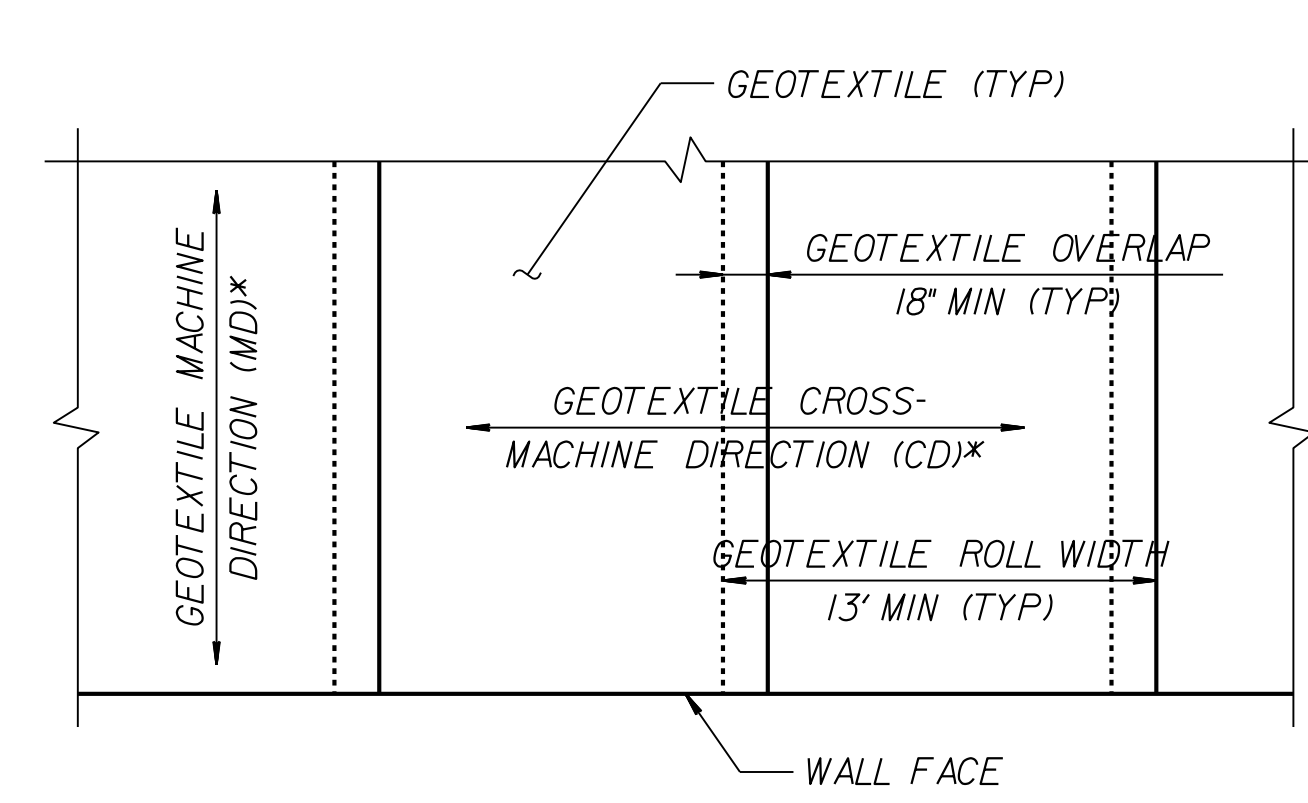
MATERIAL TYPE	SHORING BACKFILL
BORROW	A-2-4 SOIL
FINE AGGREGATE	CLASS II, TYPE I OR CLASS III SELECT MATERIAL
COARSE AGGREGATE	CLASS V OR VI SELECT MATERIAL
- FOR GEOGRID REINFORCEMENT WITH LESS THAN 100% COVERAGE, STAGGER REINFORCEMENT SO GEOGRIDS ARE CENTERED OVER GAPS IN THE REINFORCEMENT LAYER BELOW.
- 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) > (MINIMUM REQUIRED REINFORCEMENT LENGTH) + 4.5' AND
  - REINFORCEMENT STRENGTH IN CD > MINIMUM REQUIRED REINFORCEMENT STRENGTH IN MD.
- DO NOT PLACE SHORING BACKFILL OR REINFORCEMENT UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.
- 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 SURCHARGE TEMPORARY MSE WALLS WITH INTERIOR ANGLES LESS THAN 90 DEGREES, WRAP GEOSYNTHETICS AT ACUTE CORNERS AS DIRECTED BY THE ENGINEER.
- FOR SURCHARGE TEMPORARY MSE 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.

Revisions:  
1) Revision 2 - Renamed walls to 'SURCHARGE TEMPORARY MSE WALLS'.

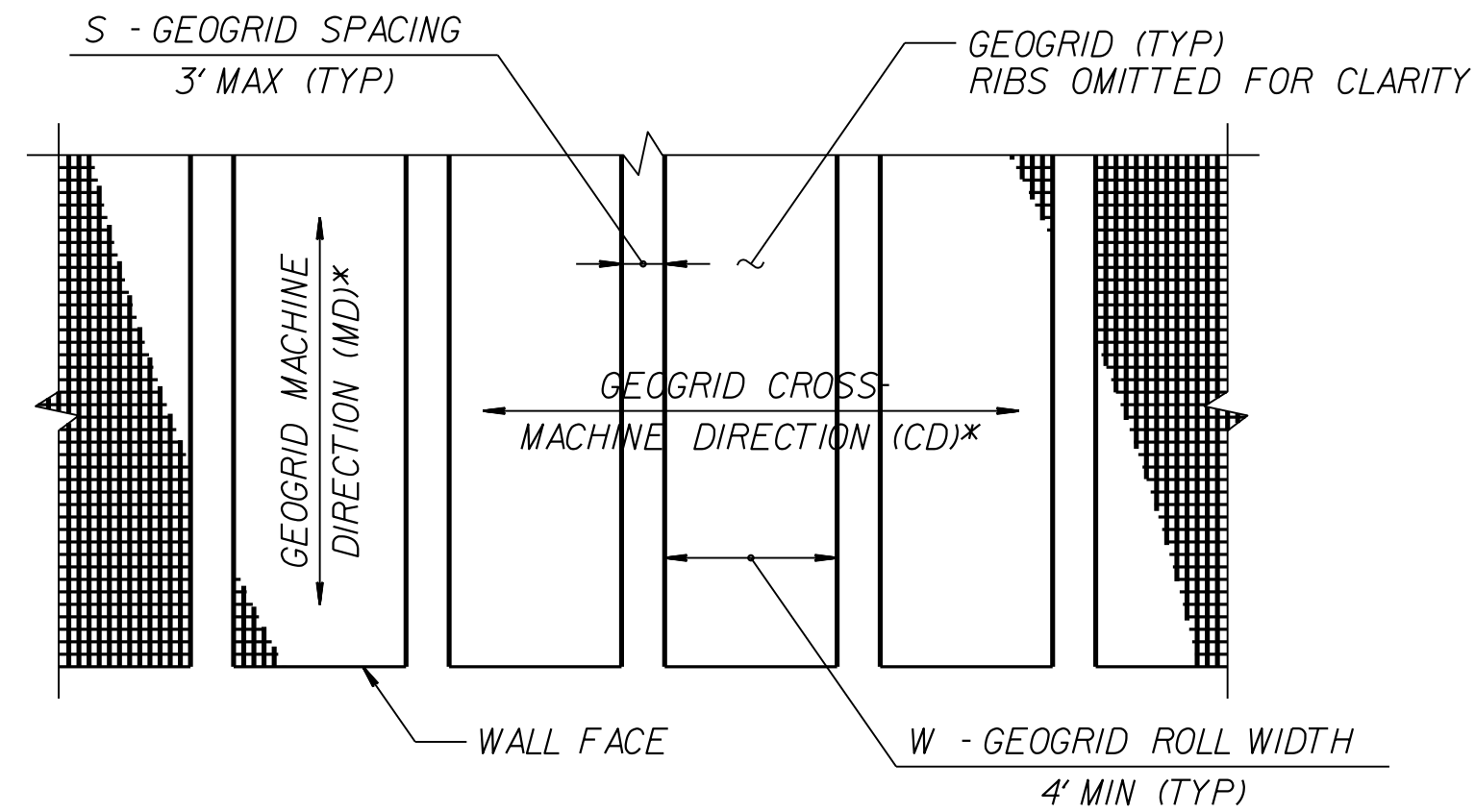


SURCHARGE NOTES AND DETAILS SURCHARGE TEMP. MSE WALL NOS. 1, 2, 3, 4, 5, AND 6				
REVISIONS				
NO.	BY	DATE	ING.	DATE
1	MHS	2/24	3	
2	MHS	2/24	4	

PREPARED BY: MHS	DATE: 12/23
REVIEWED BY: SCC	DATE: 12/23

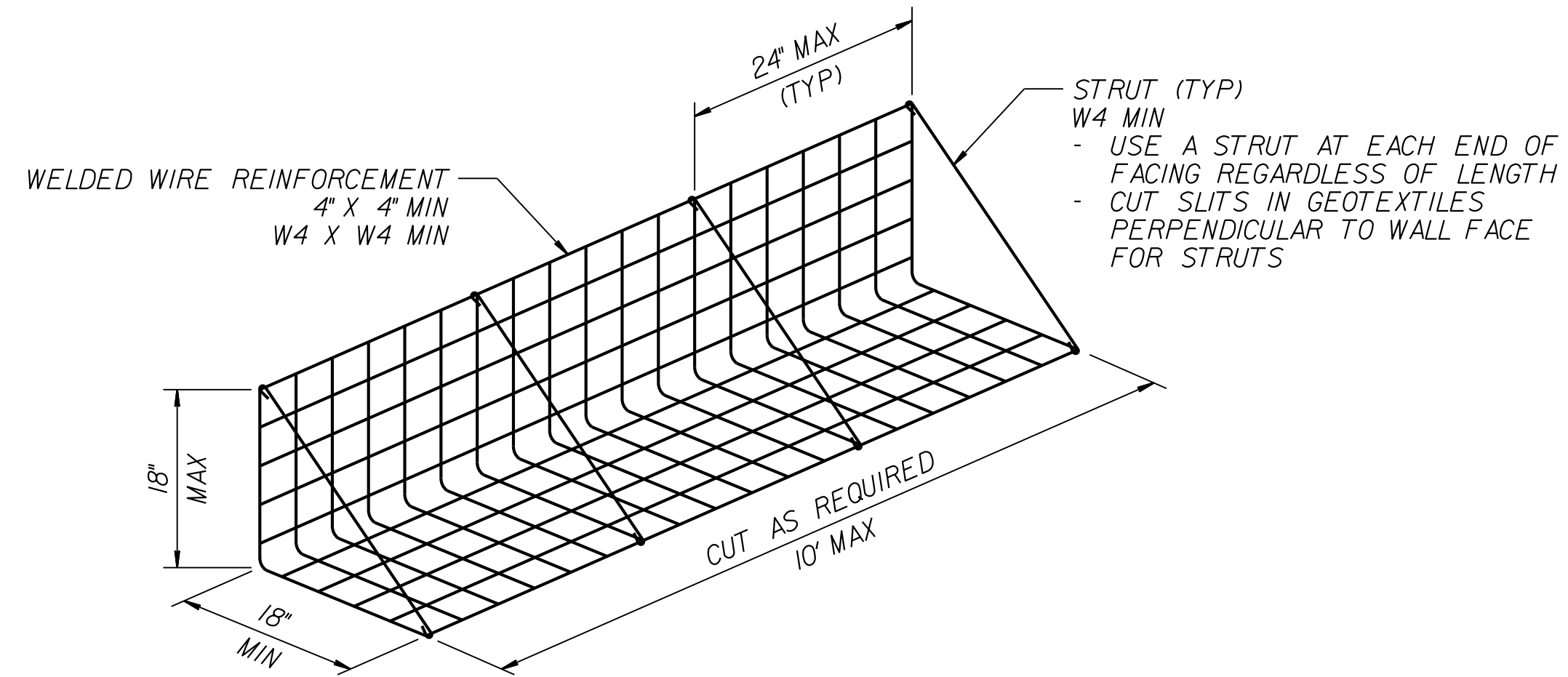


**GEOTEXTILE PLACEMENT**  
(100% COVERAGE MIN FOR GEOTEXTILE REINFORCEMENT)



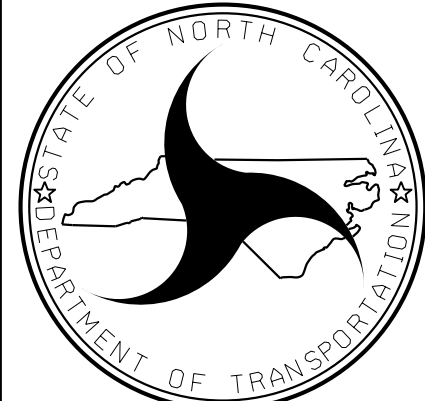
**GEOGRID PLACEMENT**  
(80% COVERAGE MIN FOR GEOGRID REINFORCEMENT -  
 $\frac{W}{W+S} \times 100 \geq 80\%$ ,  
SEE NOTE 9)

**GEOSYNTHETIC PLACEMENT DETAILS**  
(PLAN VIEW)  
\*SEE NOTE 10.



**FACING DETAIL**

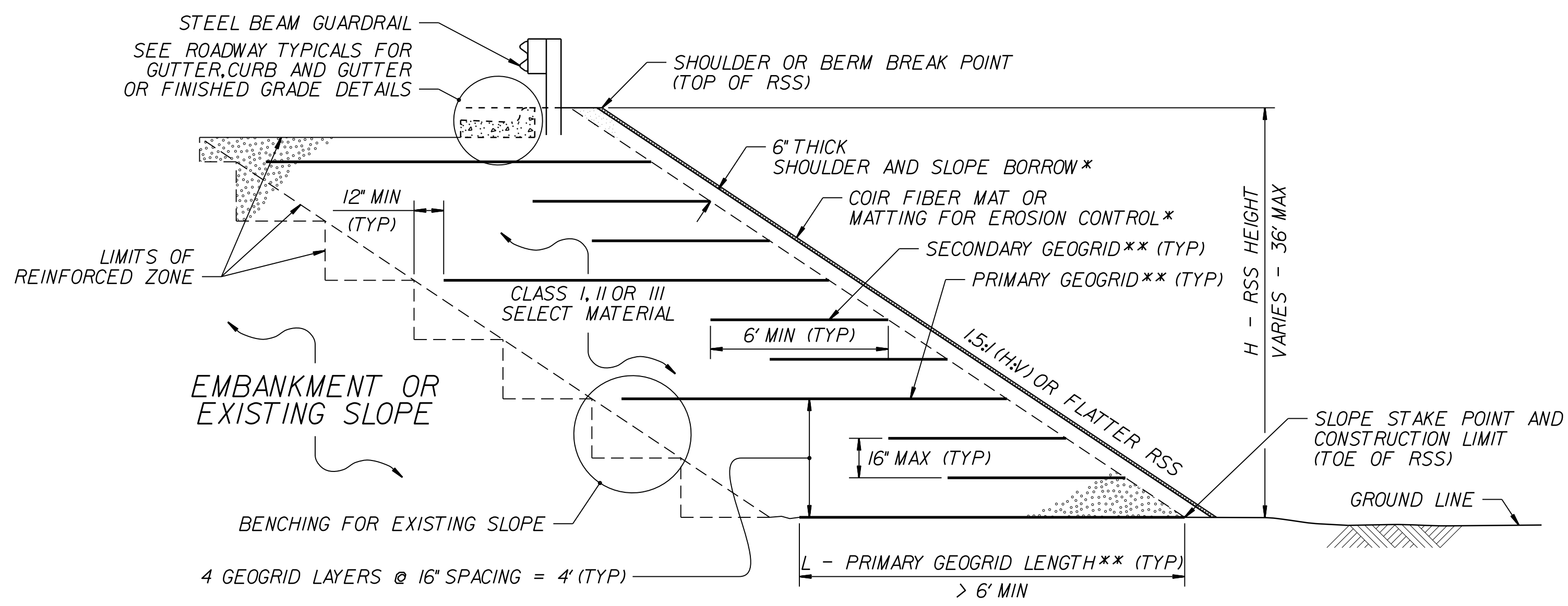
PREPARED BY: MHS	DATE: 12/23
REVIEWED BY: SCC	DATE: 12/23



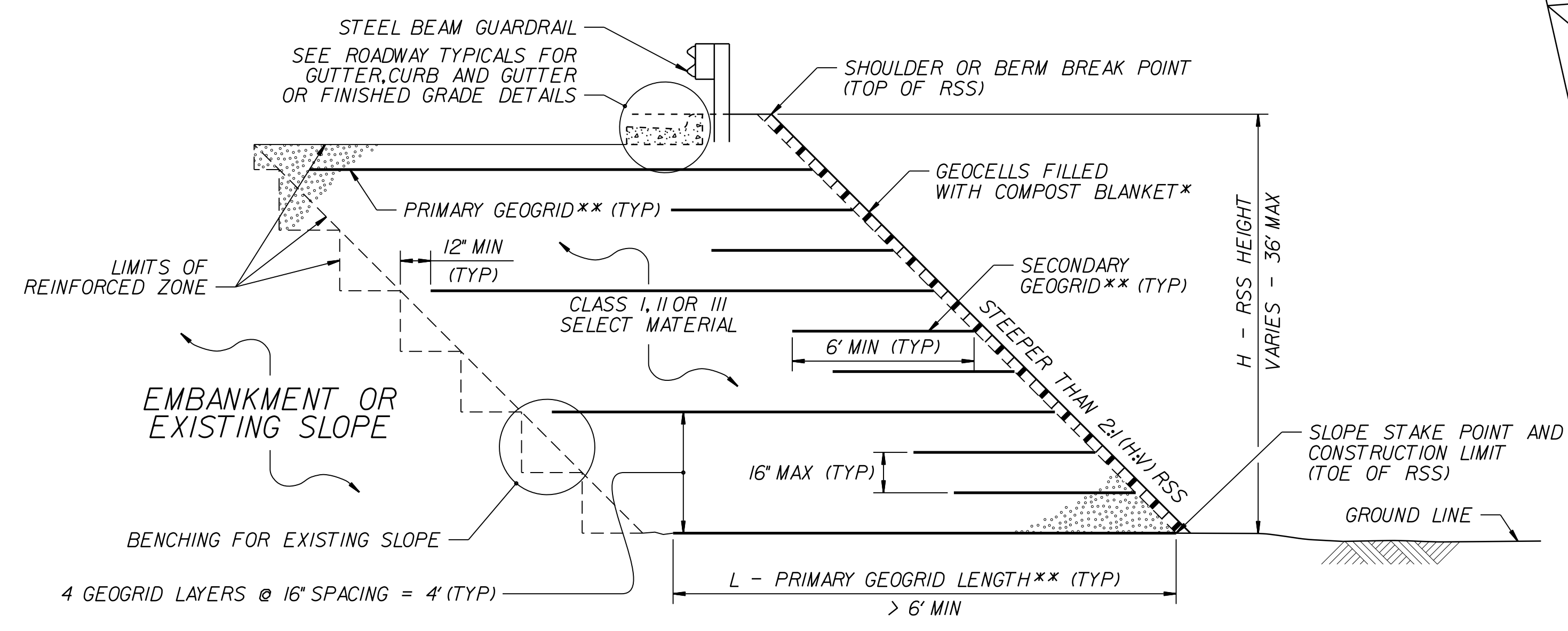
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ENGINEERING UNIT

SURCHARGE DETAILS				
REVISIONS				
NO.	BY	DATE	ING.	DATE
1	MHS	2/24	3	
2			4	

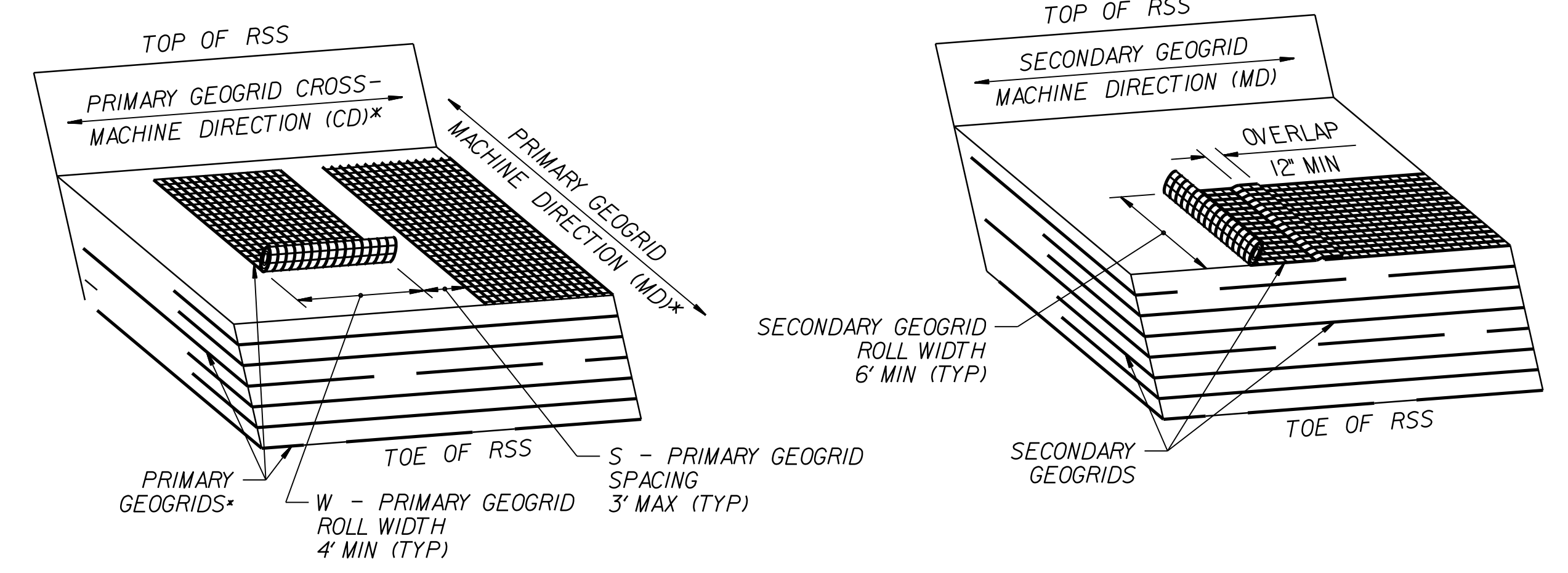


**MATTING WITH SHOULDER AND SLOPE BORROW**  
\*SEE NOTES 3 AND 10 ON SHEET 2.




**GEOCELLS WITH COMPOST BLANKET**  
\*SEE NOTES 3 AND 10 ON SHEET 2.

**STANDARD REINFORCED SOIL SLOPE (RSS)**  
\*\*SEE TABLES ON SHEET 2 AND GEOGRID PLACEMENT DETAILS.  
IF RSS ANGLE IS 2:1 (H:V) OR FLATTER, REPLACE PRIMARY GEOGRID WITH SECONDARY GEOGRID PLACED AS SHOWN IN THE GEOGRID PLACEMENT DETAILS.



**GEOGRID PLACEMENT DETAILS**  
(% COVERAGE =  $\frac{W}{W+S} \times 100 \geq 75\%$ )  
\*SEE NOTE 8 ON SHEET 2. DO NOT OVERLAP PRIMARY GEOGRIDS IN ANY DIRECTION.

<b>PROJECT REFERENCE NO.</b> HB-0002	<b>SHEET NO.</b> 2G-10
GEOTECHNICAL ENGINEER  DocuSigned by: Scott A. Hidden 01/24/2024 <small>F780C45B9F4C03</small>	ENGINEER
SIGNATURE	DATE
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	

H (FT)	0 - < 12		12 - 24		> 24 - 36	
SELECT MATERIAL CLASS	I	II OR III	I	II OR III	I	II OR III
1:1 TO < 1.5:1 (H:V) RSS	900	500	1200	900	1800	1200
1.5:1 TO 1.75:1 (H:V) RSS	500	500	900	500	1400	1000
> 1.75:1 TO < 2:1 (H:V) RSS	500	500	600	500	1000	800

**MINIMUM REQUIRED PRIMARY GEOGRID  
LONG-TERM DESIGN STRENGTH (LTDS, LB/FT) IN MACHINE DIRECTION (MD)**  
(LTDS IS BASED ON 100% COVERAGE FOR PRIMARY GEOGRID.  
SEE NOTE 8 FOR LESS THAN 100% COVERAGE.)

**NOTES:**

- SEE EROSION CONTROL AND ROADWAY PLANS AND SUMMARY SHEETS FOR REINFORCED SOIL SLOPE (RSS) AND SLOPE EROSION CONTROL LOCATIONS.
- FOR STANDARD REINFORCED SOIL SLOPES, SEE REINFORCED SOIL SLOPES PROVISION. FOR STEEL BEAM GUARDRAIL, SEE SECTION 862 OF THE STANDARD SPECIFICATIONS.
- FOR SHOULDER AND SLOPE BORROW, SEE ARTICLE 1019-2 OF THE STANDARD SPECIFICATIONS. FOR GEOCELLS, SEE CELLULAR CONFINEMENT SYSTEMS PROVISION. FOR COIR FIBER MAT MATTING FOR EROSION CONTROL AND COMPOST BLANKET, SEE EROSION CONTROL PROVISIONS, SECTION 1631 OF THE STANDARD SPECIFICATIONS AND ROADWAY STANDARD DRAWING NO. 1631.01.
- STANDARD RSS ARE 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 RSS IF ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE OR DEPTH TO GROUNDWATER IS LESS THAN 7 FT.
- DO NOT USE STANDARD RSS WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS BELOW RSS.
- PRIMARY GEOGRIDS ARE APPROVED FOR LTDS FOR A 75-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/Geological/Pages/Products.aspx](http://connect.ncdot.gov/resources/Geological/Pages/Products.aspx)  
DEFINE MATERIAL TYPE FROM THE WEBSITE ABOVE FOR SELECT MATERIAL AS FOLLOWS:

MATERIAL TYPE	SELECT MATERIAL
BORROW	CLASS I SELECT MATERIAL
FINE AGGREGATE	CLASS II OR III SELECT MATERIAL

- FOR PRIMARY GEOGRIDS WITH 100% COVERAGE, PLACE PRIMARY GEOGRIDS SO GEOGRIDS ARE ADJACENT TO EACH OTHER IN THE CD. FOR PRIMARY GEOGRIDS WITH 75% TO LESS THAN 100% COVERAGE,

$$\text{MINIMUM REQUIRED PRIMARY GEOGRID LTDS} = \text{LTDS BASED ON 100\% COVERAGE} \times (W + S) / W$$

SEE TABLE FOR LTDS BASED ON 100% COVERAGE AND GEOGRID PLACEMENT DETAILS FOR PRIMARY GEOGRID ROLL WIDTH (W) AND SPACING (S). FOR PRIMARY GEOGRIDS WITH LESS THAN 100% COVERAGE, STAGGER PRIMARY GEOGRIDS SO GEOGRIDS ARE CENTERED OVER GAPS IN THE PRIMARY GEOGRID LAYER BELOW. DO NOT USE LESS THAN 75% COVERAGE FOR PRIMARY GEOGRIDS.


- DO NOT PLACE ANY GEOGRIDS UNTIL EXCAVATION DIMENSIONS AND IN-SITU MATERIAL ARE APPROVED.
- FOR SLOPE EROSION CONTROL, USE GEOCELLS OR MATTING ON SLOPE FACES OF RSS AS FOLLOWS:

RSS ANGLE	SLOPE EROSION CONTROL
1:1 TO < 1.5:1 (H:V)	GEOCELLS WITH COMPOST BLANKET
1.5:1 TO < 2:1 (H:V)	GEOCELLS WITH COMPOST BLANKET OR COIR FIBER MAT WITH SHOULDER AND SLOPE BORROW*
2:1 (H:V) OR FLATTER	MATTING FOR EROSION CONTROL WITH SHOULDER AND SLOPE BORROW

\*SEE REINFORCED SOIL SLOPES AND SLOPE EROSION CONTROL SUMMARY TABLE IN THE ROADWAY SUMMARY SHEETS FOR SLOPE EROSION CONTROL ON SLOPE FACES OF RSS 1.5:1 (H:V) TO STEEPER THAN 2:1.

H (FT)	0 - < 12		12 - 24		> 24 - 36	
SELECT MATERIAL CLASS	I	II OR III	I	II OR III	I	II OR III
1:1 TO < 1.5:1 (H:V) RSS	1.10	1.00	0.90	0.85	0.85	0.80
1.5:1 TO 1.75:1 (H:V) RSS	0.90	0.80	0.75	0.70	0.75	0.70
> 1.75:1 TO < 2:1 (H:V) RSS	0.75	0.70	0.65	0.60	0.65	0.60

**PRIMARY GEOGRID LENGTH / RSS HEIGHT (L / H) RATIO (L > 6' MIN)**  
(IF L ≤ 6', USE SECONDARY GEOGRID INSTEAD OF PRIMARY GEOGRID.)



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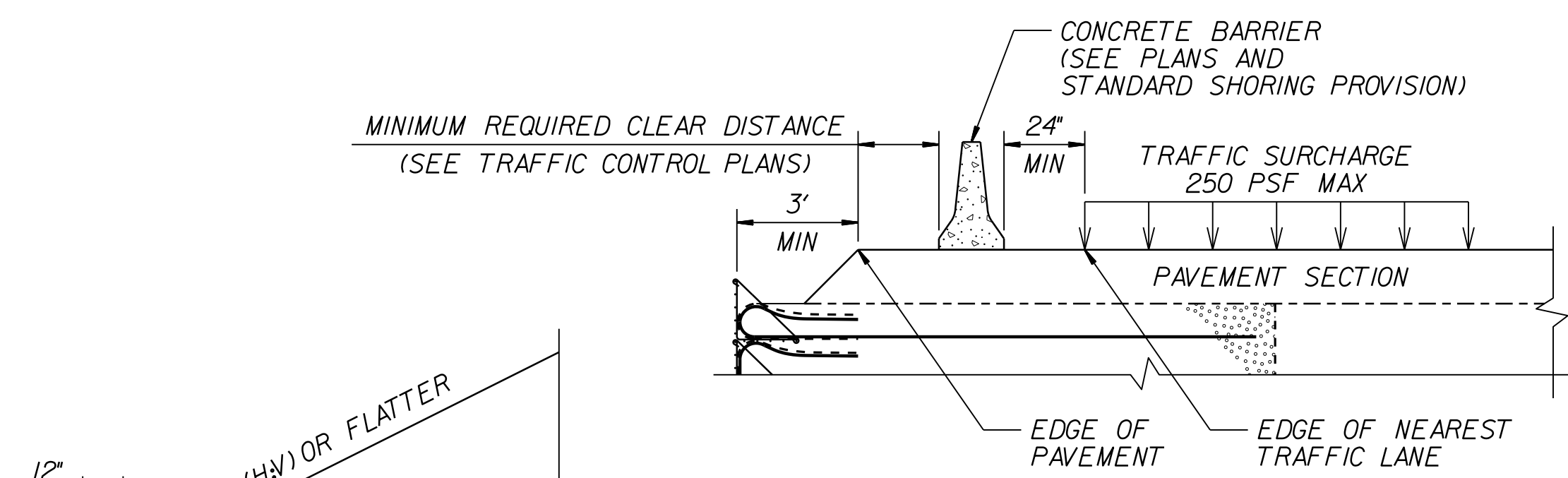
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STANDARD DETAIL NO. 1802.02

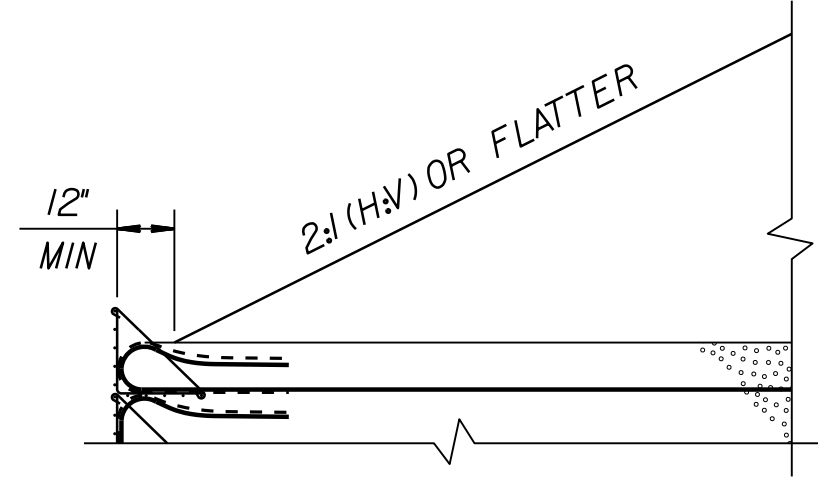
STANDARD  
REINFORCED SOIL SLOPE (RSS)  
WITH LOW GROUNDWATER  
SHEET 2 OF 2

DATE: 12-17-19

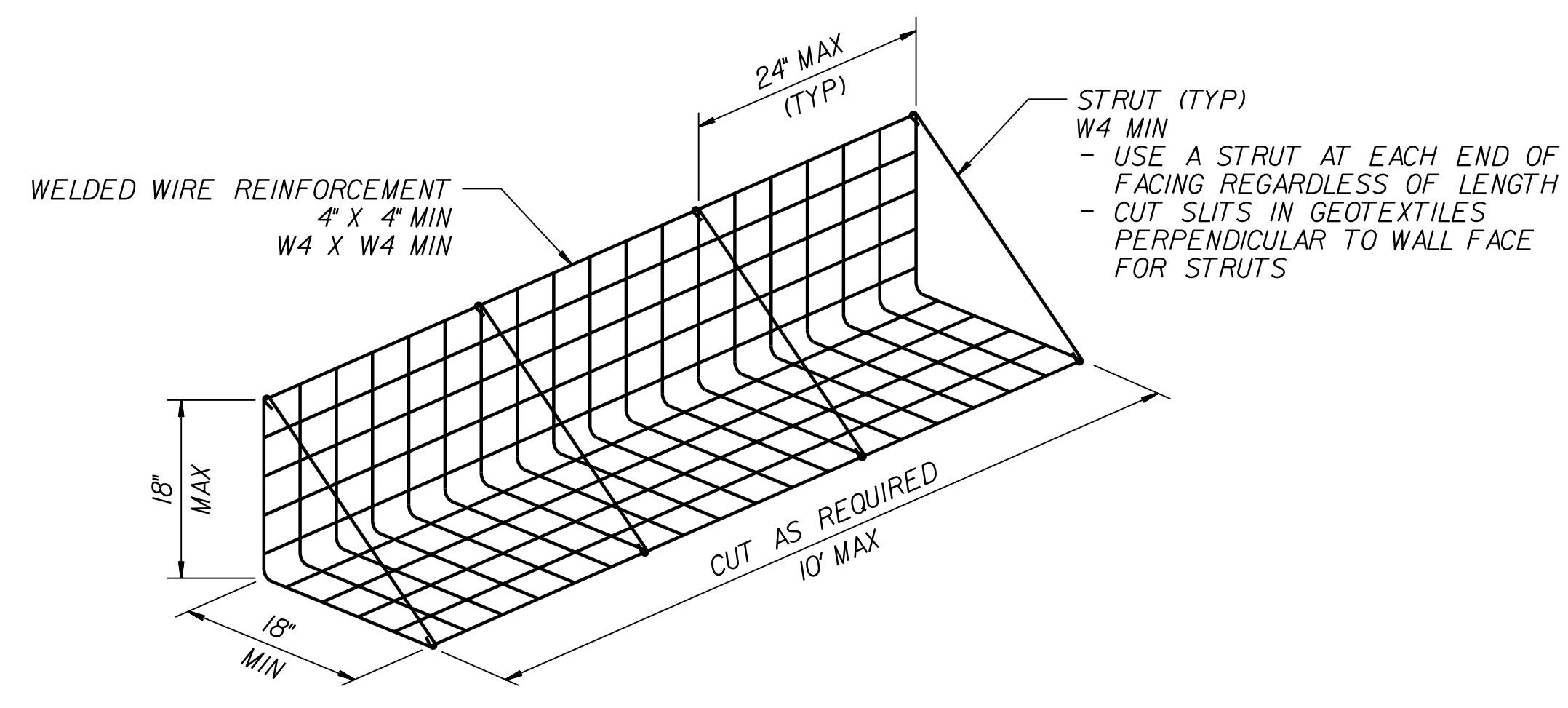




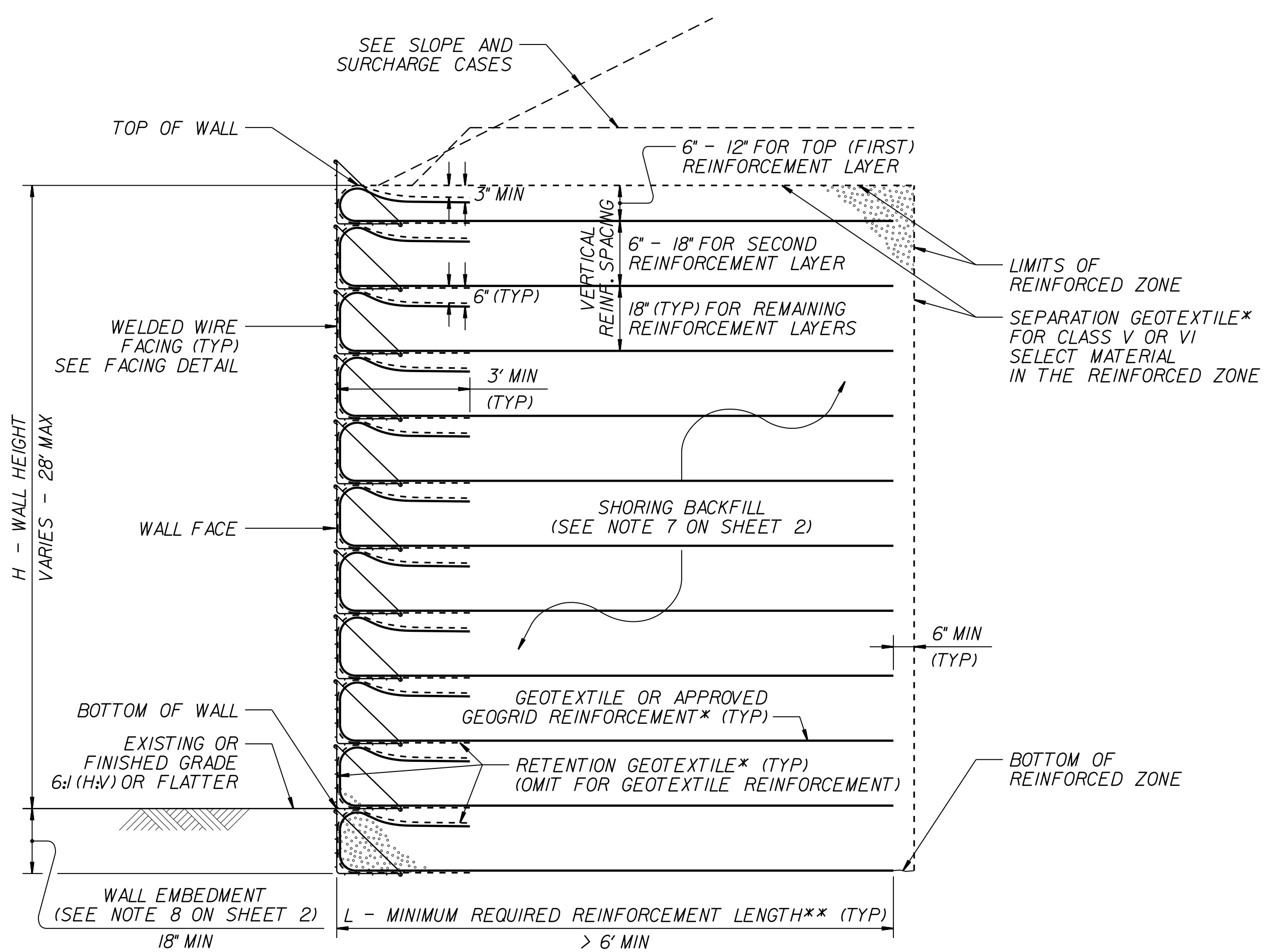
**SURCHARGE CASE**



**SLOPE CASE**

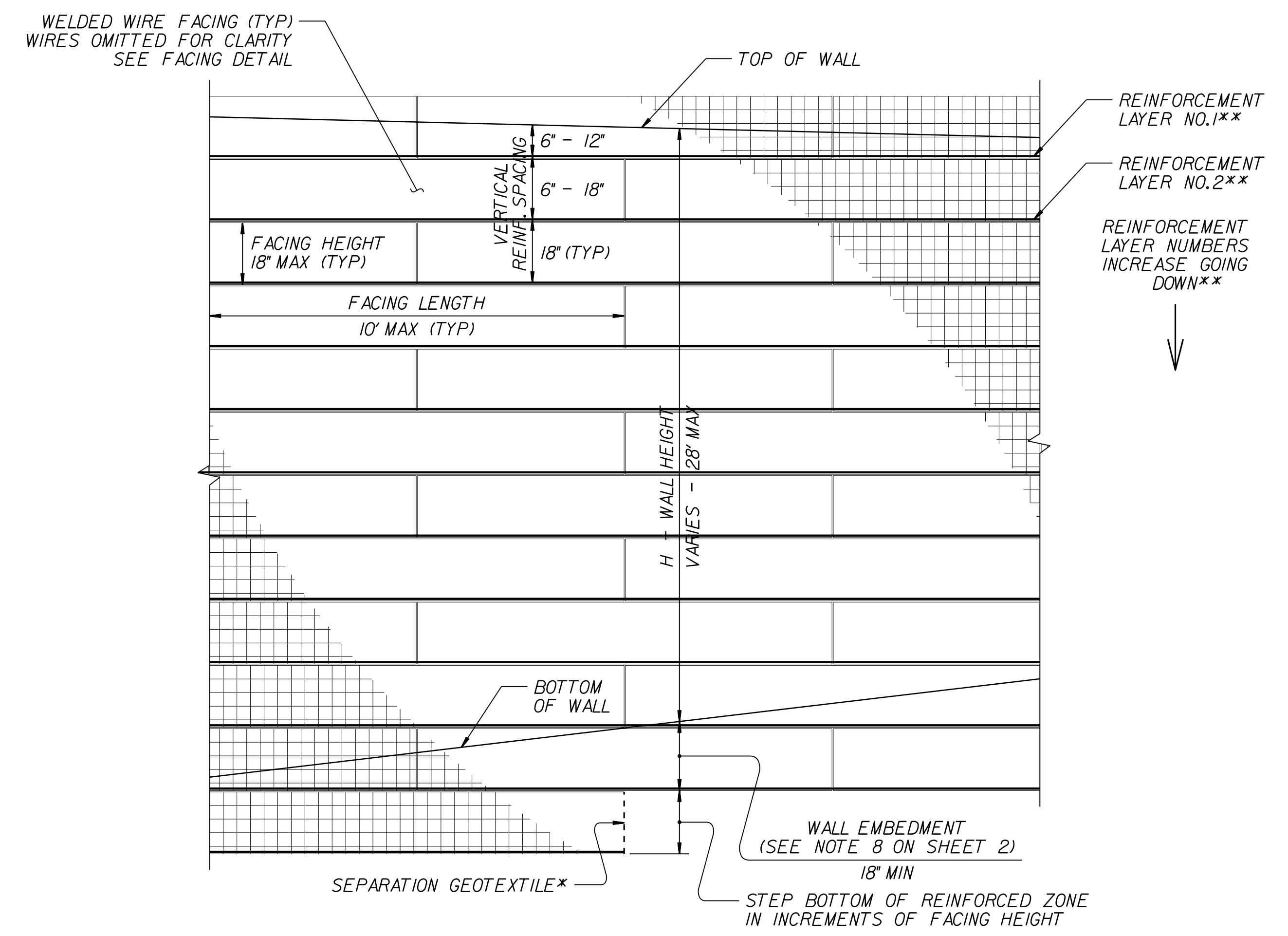


**FACING DETAIL**



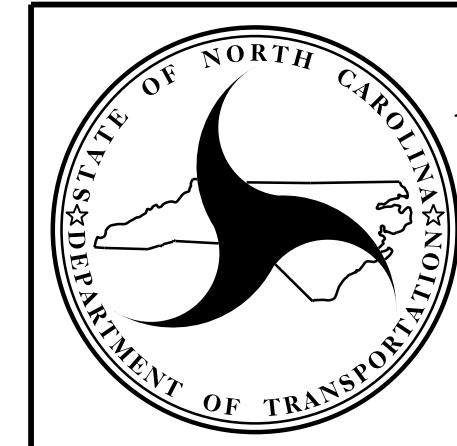
**STANDARD TEMPORARY WALL**

(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**

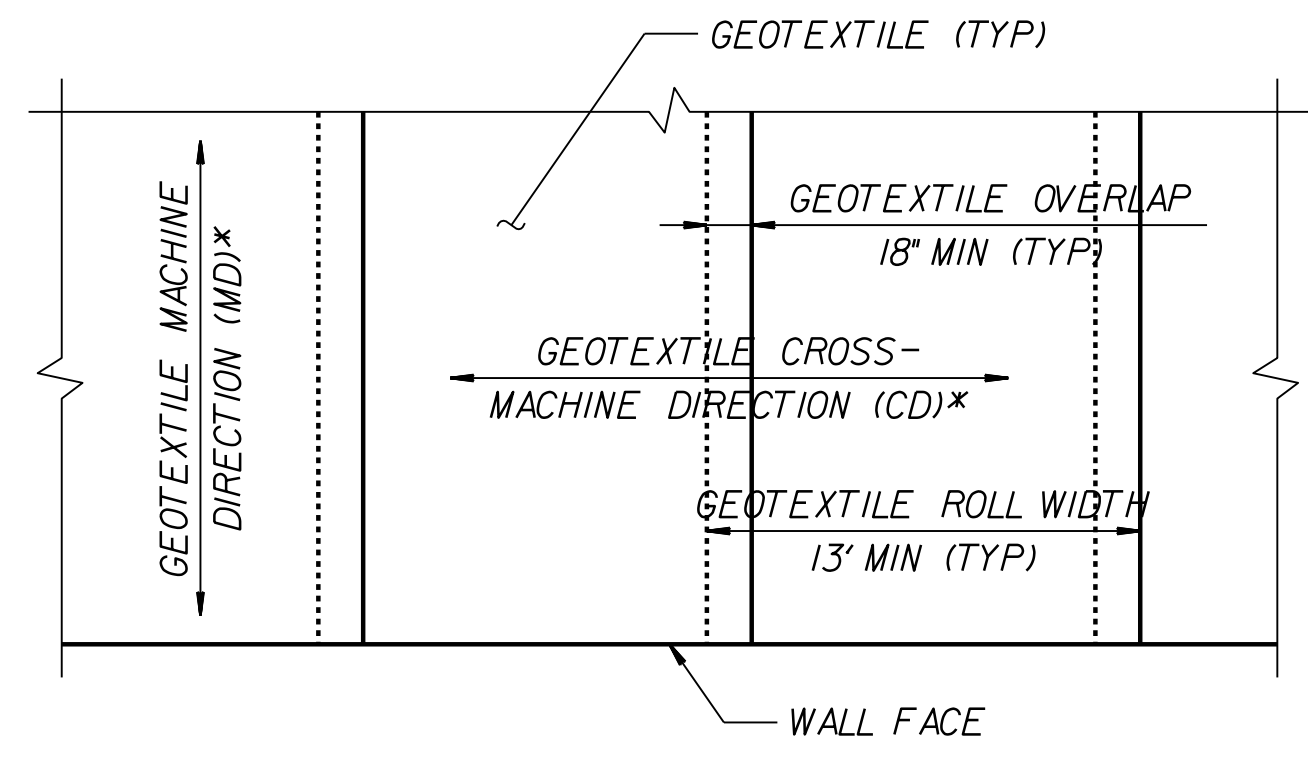
\*SEE GEOSYNTHETIC PLACEMENT DETAILS ON SHEET 2.  
 \*\*SEE REINFORCEMENT TABLES ON SHEET 3.



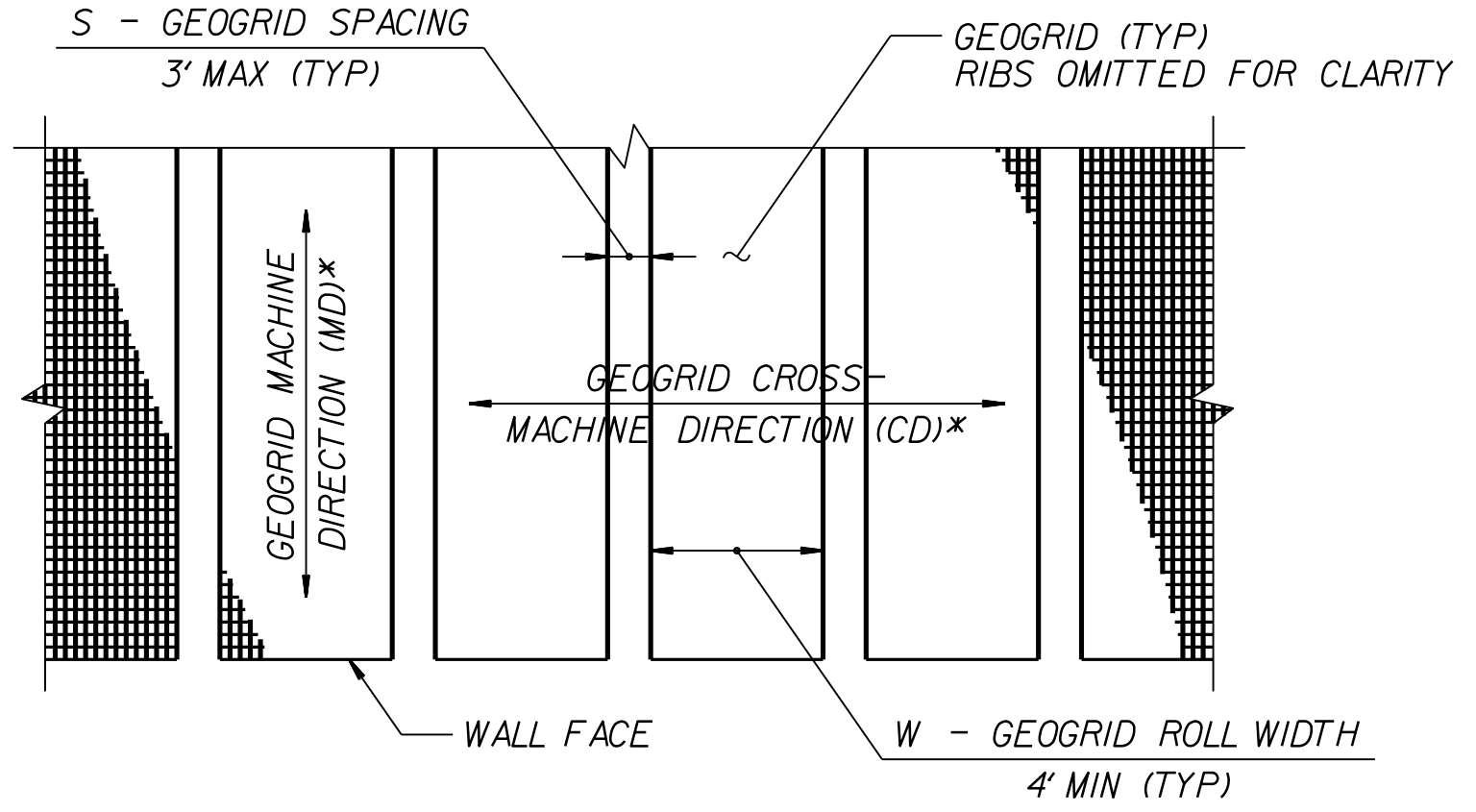
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 ENGINEERING UNIT**

STANDARD DETAIL NO. 1801.02

STANDARD  
 TEMPORARY WALL  
 SHEET 1 OF 3

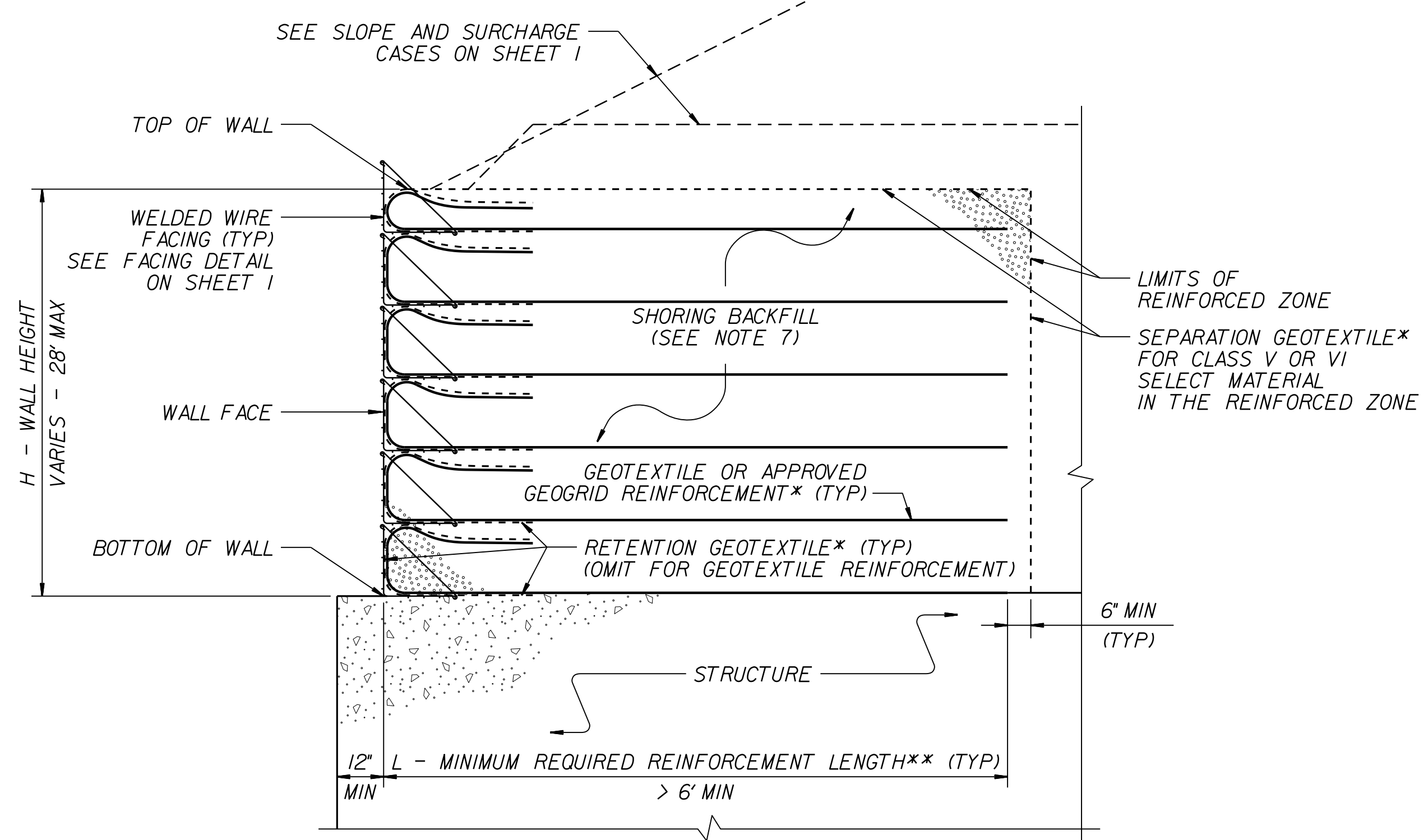


**GEOTEXTILE PLACEMENT**  
(100% COVERAGE MIN FOR GEOTEXTILE REINFORCEMENT)



**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

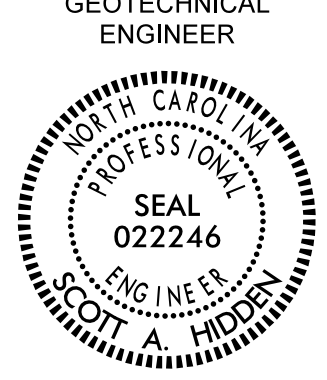
11. FOR GEOGRID REINFORCEMENT WITH LESS THAN 100% COVERAGE, STAGGER REINFORCEMENT SO GEOGRIDS ARE CENTERED OVER GAPS IN THE REINFORCEMENT LAYER BELOW.
12. AT THE CONTRACTOR'S OPTION, REINFORCEMENT MAY BE INSTALLED WITH THE MD PARALLEL TO THE WALL FACE IF BOTH OF THE FOLLOWING CONDITIONS OCCUR:  
- W (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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STANDARD DETAIL NO. 1801.02

STANDARD  
TEMPORARY WALL  
SHEET 2 OF 3

<b>PROJECT REFERENCE NO.</b> HB-0002	<b>SHEET NO.</b> 2G-13
GEOTECHNICAL ENGINEER  ENGINEER	ENGINEER
DocuSigned by: Scott A. Hidden 03/25/2024	DATE
<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	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.



NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS

**GEOTECHNICAL ENGINEERING UNIT**

STANDARD DETAIL NO. 1801.02

STANDARD  
TEMPORARY WALL  
SHEET 3 OF 3

COMPUTED BY: JAR DATE: 03/08/2024  
 CHECKED BY: JCH DATE: 03/08/2024

**STATE OF NORTH CAROLINA  
 DIVISION OF HIGHWAYS**

PROJECT REFERENCE NO. HB-0002  
 SHEET NO. 3B-1

SUMMARY OF EARTHWORK IN CUBIC YARDS						
BEGIN STATION	END STATION	TOTAL UNCLASS.	UNDERCUT	EMBANK. +%	BORROW	WASTE
<b>PHASE 1 (DET-WBL, Y2, &amp; Y3)</b>						
-L- 303+00.00 LT	-L- 316+00.00 LT	16,350		18,356	2,006	
-L- 316+00.00 LT	-L- 331+50.00 LT	641		20,256	19,615	
-Y2- 10+26.00	-Y2- 18+00.00	127		370	243	
-Y3- 23+00.00	-Y3- 26+85.00	44		1,929	1,885	
Stage 1 Culvert Surcharge Placement				6,140	6,140	
Stage 1 Culvert Surcharge Removal		6,140				6,140
<b>SUBTOTAL:</b>		<b>23,302</b>		<b>47,051</b>	<b>29,889</b>	<b>6,140</b>
<b>PHASE 2 (DET-EBL)</b>						
-L- 307+00.00	-L- 316+00.00	43		2,170	2,127	
-L- 316+00.00	-L- 328+00.00	208		4,571	4,363	
Stage 2 Culvert Surcharge Placement				5,800	5,800	
Stage 2 Culvert Surcharge Removal		5,800				5,800
<b>SUBTOTAL</b>		<b>6,051</b>		<b>12,541</b>	<b>12,290</b>	<b>5,800</b>
<b>PHASE 3 (-L- RT)</b>						
-L- 303+00.00	-L- 316+50.00	482		12,123	11,641	
-L- 316+50.00	-L- 331+50.00	970		9,038	8,068	
-Y1- 7+00.00	-Y1- 12+78.00	90		328	238	
Stage 3 Culvert Surcharge Placement				8,100	8,100	
Stage 3 Culvert Surcharge Removal		8,100				8,100
<b>SUBTOTAL</b>		<b>9,642</b>		<b>29,589</b>	<b>28,047</b>	<b>8,100</b>
<b>PHASE 4 (-L- MEDIAN)</b>						
-L- 306+50.00	-L- 316+00.00	218				218
-L- 316+00.00	-L- 328+00.00	1,481		38		1,443
<b>SUBTOTAL</b>		<b>1,699</b>		<b>38</b>		<b>1,661</b>
<b>PHASE 5 (-L- LT)</b>						
-L- 307+50.00	-L- 316+00.00	1,084				1,084
-L- 316+00.00	-L- 325+50.00	1,033				1,033
<b>SUBTOTAL</b>		<b>2,117</b>				<b>2,117</b>
<b>TOTAL</b>		<b>42,811</b>		<b>89,219</b>	<b>70,226</b>	<b>23,818</b>
MATERIAL FOR SHOULDER CONSTRUCTION				5,489	5,489	
WASTE IN LIEU OF BORROW				-19,947	-19,947	
<b>PROJECT TOTAL</b>		<b>42,811</b>		<b>94,708</b>	<b>55,768</b>	<b>3,871</b>
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT					2,788	
<b>GRAND TOTAL</b>		<b>42,811</b>		<b>94,708</b>	<b>58,556</b>	<b>3,871</b>
<b>SAY</b>		<b>45,000</b>		<b>62,000</b>		

NOTE: EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.

PAVEMENT STRUCTURE VOLUME = 16,441 CUBIC YARDS  
 EST. DDE = 1,550 CUBIC YARDS  
 EST. SHALLOW UNDERCUT = 100 CUBIC YARDS  
 EST. SHALLOW UNDERCUT BY STATIONS = 0 CUBIC YARDS  
 TOTAL SHALLOW UNDERCUT = 100 CUBIC YARDS  
 CLASS IV SUBGRADE STABILIZATION = 200 TONS  
 PER GEOTECH RECOMMENDATION, EST. 450 CY OF UNDERCUT TO BE USED IN THE DISCRETION OF THE RESIDENT ENGINEER.

SUMMARY OF WOVEN WIRE FENCE, 47" FABRIC									
$E = [A - (8B + 16C + 16D)] - (C + D + 1)$					$F = (2B + 3C + 3D)$				
14					14				
SURVEY LINE	BEGIN STATION	END STATION	LT. OR RT.	A FABRIC (LF)	B END BRACE	C CORNER BRACE	D LINE BRACE	E 4" POSTS	F 5" POSTS
-L-	307+75.00	329+50.00	LT	2,275.00	2	8	5	133	43
-L-	308+00.00	318+87.00	RT	1,150.00	2	7	2	61	31
-L-	319+65.00	320+40.00	RT	96.83	2	2		0	10
TOTAL:				3,521.83				194	84
SAY:				3,600				200	90

SUMMARY OF CONCRETE BARRIER							
LINE	BEGIN STATION	END STATION	LOCATION	SINGLE SLOPE CONCRETE BARRIER (2'-7" Max. Bifurcation) (LF)	SINGLE SLOPE CONCRETE BARRIER (2'-7" THRU 6'-0" Bifurcation) (LF)	PRECAST REINFORCED CONCRETE BARRIER (STD 857.01) (FT)	*CONC. BARRIER TRANSITION SECTION (EA)
-L-	308+00.00	314+88.73	MEDIAN	688.73			1
-L-	314+88.73	316+43.81	MEDIAN		155.08		
-L-	316+43.81	319+00.00	MEDIAN	256.19			
-Y1-	8+20.00	10+46.00	RT	240.00			
-Y1-	8+43.00	10+40.00	LT			192.00	
-Y2-	10+36.00	15+73.18	RT			540.00	
TOTAL:				1,184.92	155.08	732.00	1.00
SAY:				1,200.00	200.00	800.00	1.00

\* Transition from Existing Barrier to Single Slope Concrete Barrier, See Detail Sheet 2C-3

SUMMARY OF BREAKING EXISTING ASPHALT PAVEMENT						
LINE	STATION	STATION	LOCATION	LENGTH (FT) OR AREA (SF)	WIDTH (FT)	AREA (SY)
-L-	313+50	EX. BRIDGE	LT	6014.00		668.22
-L-	EX. BRIDGE	320+00	LT	10836.00		1204.00
-EBL-	10+00	EX. BRIDGE	LT & RT	11614.00		1290.44
-EBL-	EX. BRIDGE	18+00	LT & RT	9392.00		1043.56
<b>TOTAL</b>						4,206.22
<b>SAY</b>						4,600.00

SUMMARY OF REMOVAL EXISTING ASPHALT PAVEMENT						
LINE	STATION	STATION	LOCATION	LENGTH (FT) OR AREA (SF)	WIDTH (FT)	AREA (SY)
L	303+00	310+50	LT	7975.00		886.11
L	322+00	331+50	LT	10285.00		1142.78
L	303+00	310+50	RT	8308.00		923.11
EBL	20+40	311+50	RT	8050.00		894.44
L	314+00	319+00	-DET-EBL-	5070.00		563.33
L	320+30	328+00	-DET-EBL-	9290.00		1032.22
L	307+30	325+80	-DET-WBL-	46837.00		5204.11
Y2	10+32	11+80	RT	1019.00		113.22
Y3	24+66	26+96	LT	4175.00		463.89
<b>TOTAL</b>						11,223.22
<b>SAY</b>						11,800

SUMMARY OF SHOULDER BERM GUTTER				
LINE	LOCATION	BEGIN STATION	END STATION	LENGTH (FT)
-L-	RT	310+15.00	312+05.00	190.00
-EBL-	RT	10+00.00	26+00.00	1,591.28
-Y2-	RT	15+73.18	16+84.36	110.65
<b>TOTAL</b>				1,891.93
<b>SAY</b>				1,900.00

**SUMMARY OF GUARDRAIL**

SURVEY LINE	BEGIN STATION	END STATION	LOCATION	LENGTH			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHLD. WIDTH	FLARE LENGTH		W		ANCHORS					IMPACT ATTENUATOR MASH, TL-3		25' CLEAR SPAN GUARDRAIL SECTIONS (STD. 862.01) (SHT 10 OF 15)	REMOVE EXISTING GUARDRAIL	REMOVE & RESET EXISTING GUARDRAIL	REMARKS						
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	Type III	Type B-77	GREU TL-3	CAT-1	AT-1	NO.	PERMITTED G NG										
-L-	311+00.00	331+00.00	LT	2018.750'			328+50.00	311+25.00	14'	17'	50.000'		1.00'																		
-L/-EBL-	-L- 306+50.00	-EBL- 26+09.00	RT	2156.250'			308+50.00		14'	17'	50.000'		1.00'																		
-EBL-	16+91.66	26+55.82	MED	968.750'			16+91.66		6'	9'		62.500'		1.25'																	
-L-	319+00.00	327+56.06	MED	856.250'				319+00.00	6'	9'	125.000'		2.50'																		
-Y1-	10+40.00	11+92.90	LT	147.875'				10+40.00	12'	15'	50.000'		1.00'																		
-Y1/-Y3-	-Y1- 10+46.10	-Y3- 23+59.00	-Y1- RT/-Y3- LT	243.750'	112.50'		10+46.10	24+09.00	6'	9'		50.000'		1.00'																	
-Y3/-Y1-	-Y3- 25+55.00	-Y1- 12+14.06	RT	56.250'	200.00'		26+00.00	11+65.00	4'	7'		50.000'		1.00'																	
-Y2-	15+73.18	17+34.36	RT	160.375'				15+73.18	4'	7'	50.000'		1.00'																		
-Y2-	13+50.00	17+00.00	LT	350.000'			16+00.00	14+00.00	4'	7'	50.000'	50.000'	1.00'	1.00'																	
<b>SUBTOTAL:</b>				6958.250'	312.50'																										
<b>ANCHOR UNIT DEDUCTIONS</b>																															
Type		Quantity		Deduction																											
III		2		18.750'		37.500'																									
B-77		2		22.875'		45.750'																									
GREU-TL3		8		50.000'		400.000'																									
CAT-1		3		6.250'		18.750'																									
AT-1		1		6.250'		6.250'																									
<b>TOTAL:</b>				6450.00'	312.50'										2	2	8	3	1	0	0	0	0		0		6493'	0			
<b>SAY:</b>				6500.00'	350.00'										2	2	8	3	1	0	0	0	0		0		6500	0			

ADDITIONAL GUARDRAIL POSTS: SAY 10 EA











**(2-3-23)**  
**STATE OF NORTH CAROLINA**  
**DIVISION OF HIGHWAYS**

**SUMMARY OF SETTLEMENT GAUGES**

GAUGE No.	Stage	Offset	
		Distance FT	Direction LT/RT
1-4	1		
5-8	2	See 2G Surcharge Plans	
9-12	3		
TOTAL GAUGES (EACH):			12

**SUMMARY OF SURCHARGES AND SURCHARGE WAITING PERIODS**

LINE	Station	Station	Surcharge Elevation (Average)	MONTHS
-Y1- Stage 1	8+22	9+30	2661	2
-Y1- Stage 2	8+69	9+83	2662	2
-Y1- Stage 2	9+23	10+77	2659	2
* See 2G Surcharge Plans for addition information.				

**SUMMARY OF SUBSURFACE DRAINAGE**

LINE	STATION	STATION	LOCATION (LT/RT/CL)	DRAIN TYPE (UD/BD/SD)	LENGTH (LF)
CONTINGENCY					200
TOTAL					200

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

**SUMMARY OF AGGREGATE SUBGRADE / STABILIZATION**

LINE	STATION	STATION	Aggregate Type* ASU(1/2)/AST	Aggregate Thickness [8" for ASU(2)] (INCHES)	Shallow Undercut (CY)	Class IV Subgrade Stabilization (TONS)	Geotextile for Subgrade Stabilization (SY)	Stabilizer Aggregate (TONS)	Class IV Aggregate Stabilization (TONS)
CONTINGENCY			1		100	200	500		
TOTAL (CY/TONS/SY):					100	200**	500**		

\*ASU(1/2) = Aggregate Subgrade (Type 1 or 2)  
 \*AST = Aggregate Stabilization  
 \*\*Total tons of "Class IV Subgrade Stabilization" and total square yards of "Geotextile for Subgrade Stabilization" are only the estimated quantities for ASU(1/2)/AST and may only represent a portion of the subgrade stabilization and geotextile quantities shown in the Item Sheets of the Proposal.

**SUMMARY OF REINFORCED SOIL SLOPES AND SLOPE EROSION CONTROL**

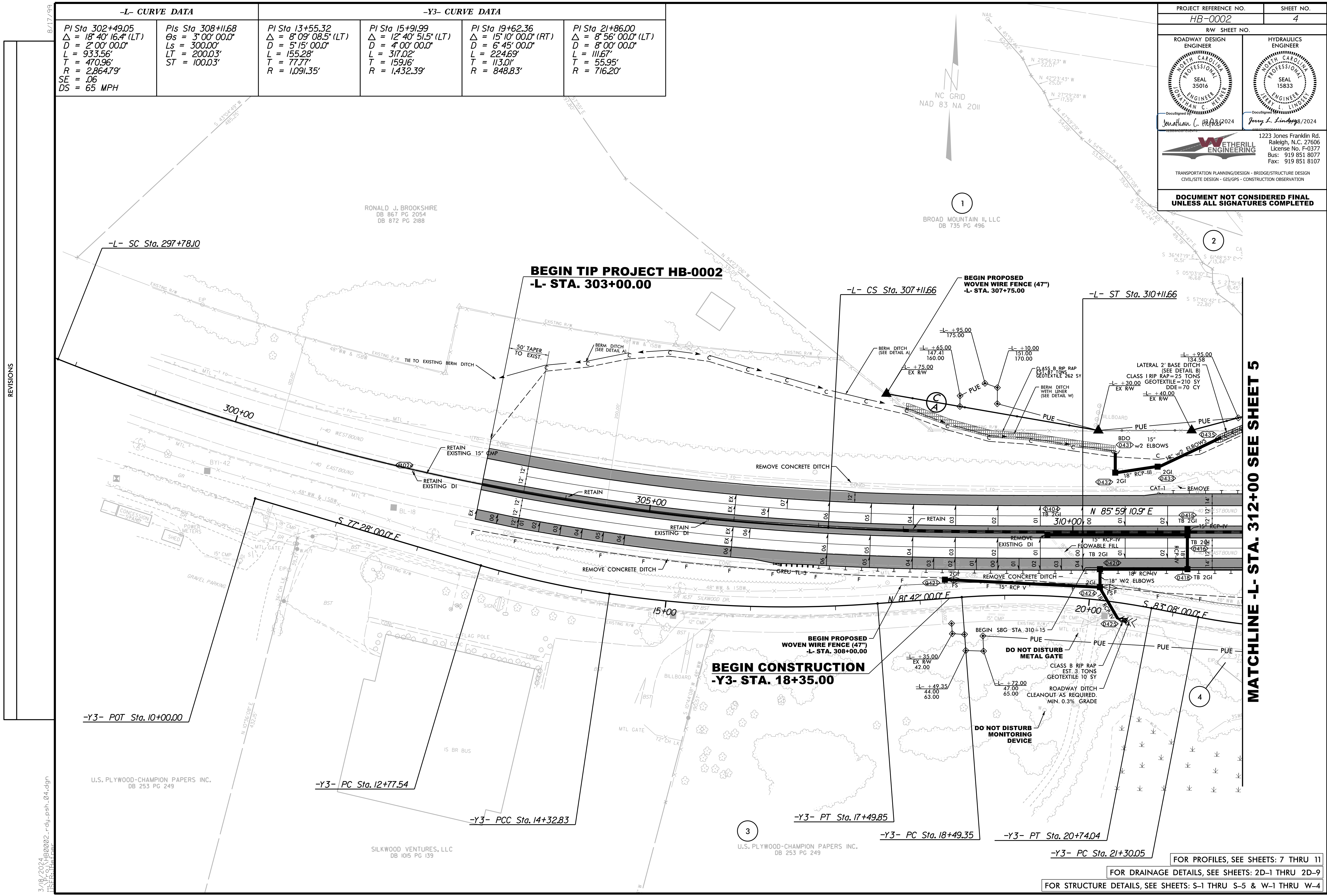
LINE	Beginning Slope/ RSS (H:V)	Approx. Station	Ending Slope/ RSS (H:V)	Approx. Station	Location LT/RT	Reinforced Soil Slope (RSS) SY	Geocells SY	Coir Fiber Mat SY	Matting for Erosion Control SY
-L-	2:1/1:1	318+50	1:1/2:1	320+00	RT	420	420		
TOTAL SY:						420	420	0*	0**

\*Total square yards of "Coir Fiber Mat" is only the estimated quantity for slopes steeper than 2:1 (H:V) and may only represent a portion of the coir fiber mat quantity shown in the Item Sheets of the Proposal.  
 \*\*Total square yards of "Matting for Erosion Control" is only the estimated quantity for RSS and may only represent a portion of the matting quantity shown in the Item Sheets of the Proposal.



-L- CURVE DATA		-Y3- CURVE DATA			
PI Sta 302+49.05 Δ = 18° 40' 16.4" (LT) D = 2' 00' 00.0" L = 933.56' T = 470.96' R = 2,864.79' SE = .06 DS = 65 MPH	PIs Sta 308+11.68 Θs = 3° 00' 00.0" Ls = 300.00' LT = 200.03' ST = 100.03'	PI Sta 13+55.32 Δ = 8° 09' 08.5" (LT) D = 5' 15' 00.0" L = 155.28' T = 77.77' R = 1,091.35'	PI Sta 15+91.99 Δ = 12° 40' 51.5" (LT) D = 4' 00' 00.0" L = 317.02' T = 159.16' R = 1,432.39'	PI Sta 19+62.36 Δ = 15° 10' 00.0" (RT) D = 6' 45' 00.0" L = 224.69' T = 113.01' R = 848.83'	PI Sta 21+86.00 Δ = 8° 56' 00.0" (LT) D = 8' 00' 00.0" L = 111.67' T = 55.95' R = 716.20'

PROJECT REFERENCE NO. <b>HB-0002</b>	SHEET NO. <b>4</b>
ROADWAY DESIGN ENGINEER <b>WETHERILL ENGINEERING</b> SEAL 35016 JONATHAN C. HEBER	HYDRAULICS ENGINEER <b>WETHERILL ENGINEERING</b> SEAL 15833 JERRY L. LINDSEY
DocuSign Jonathan C. Heber/2024	DocuSign Jerry L. Lindsey/2024
1223 Jones Franklin Rd. Raleigh, N.C. 27606 License No. F-0377 Bus: 919 851 8077 Fax: 919 851 8107	
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	



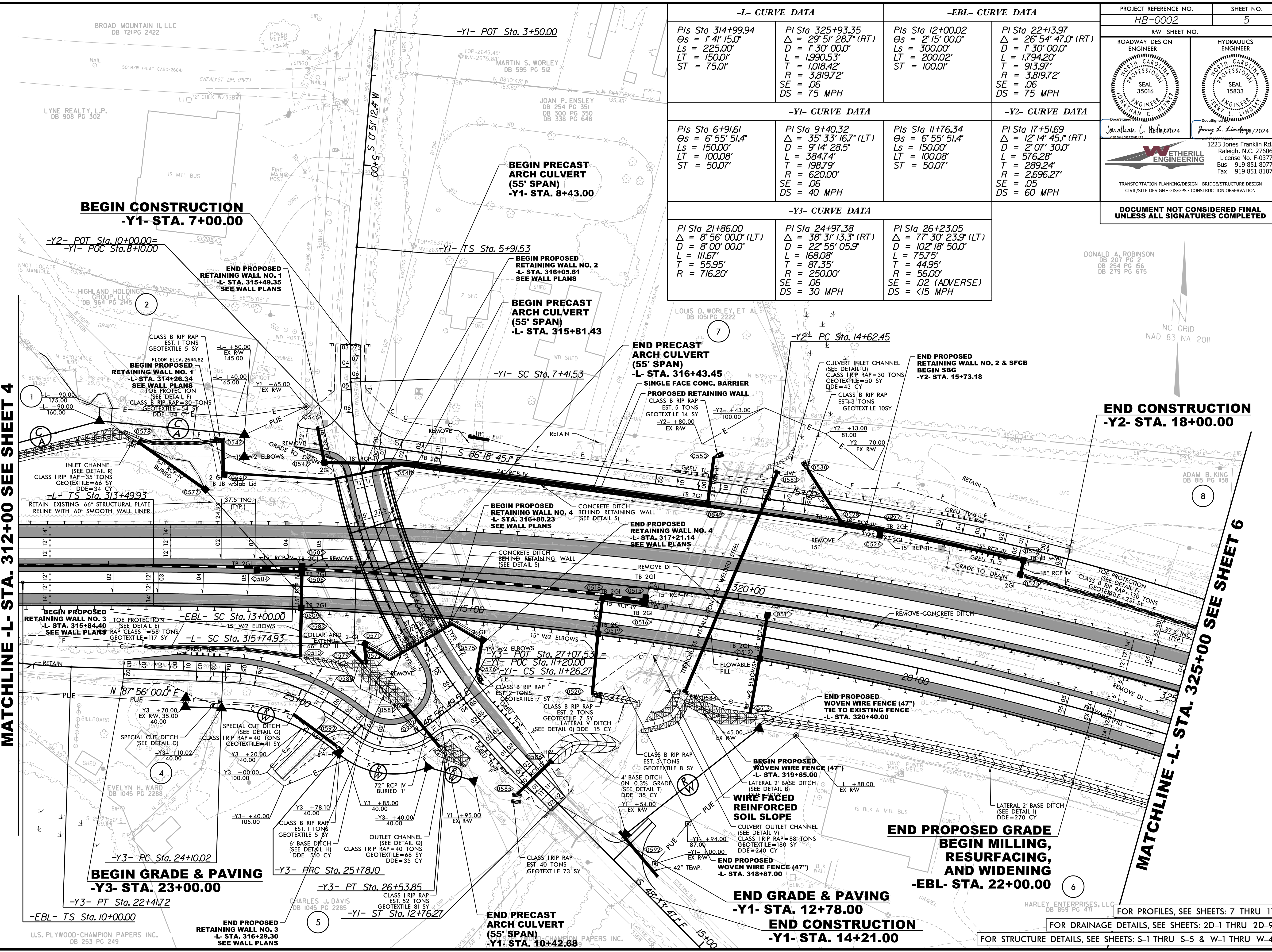
REVISIONS

MATCHLINE -L- STA. 312+00 SEE SHEET 5

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FOR PROFILES, SEE SHEETS: 7 THRU 11  
 FOR DRAINAGE DETAILS, SEE SHEETS: 2D-1 THRU 2D-9  
 FOR STRUCTURE DETAILS, SEE SHEETS: S-1 THRU S-5 & W-1 THRU W-4

8/17/2024



-L- CURVE DATA		-EBL- CURVE DATA	
PI Sta 314+99.94 Os = 1' 4" 15.0" Ls = 225.00' LT = 150.01' ST = 75.01'	PI Sta 325+93.35 Δ = 29° 51' 28.7" (RT) D = 1' 30" 00.0" L = 1,990.53' T = 1,018.42' R = 3,819.72' SE = .06 DS = 75 MPH	PI Sta 12+00.02 Os = 2' 15" 00.0" Ls = 300.00' LT = 200.02' ST = 100.01'	PI Sta 22+13.97 Δ = 26° 54' 47.0" (RT) D = 1' 30" 00.0" L = 1,794.20' T = 913.97' R = 3,819.72' SE = .06 DS = 75 MPH
-Y1- CURVE DATA		-Y2- CURVE DATA	
PI Sta 6+91.61 Os = 6° 55' 51.4" Ls = 150.00' LT = 100.08' ST = 50.07'	PI Sta 9+40.32 Δ = 35° 33' 16.7" (LT) D = 9' 14" 28.5" L = 384.74' T = 198.79' R = 620.00' SE = .06 DS = 40 MPH	PI Sta 11+76.34 Os = 6° 55' 51.4" Ls = 150.00' LT = 100.08' ST = 50.07'	PI Sta 17+51.69 Δ = 12° 14' 45.1" (RT) D = 2' 07" 30.0" L = 576.28' T = 289.24' R = 2,696.27' SE = .05 DS = 60 MPH
-Y3- CURVE DATA			
PI Sta 21+86.00 Δ = 8° 56' 00.0" (LT) D = 8' 00" 00.0" L = 111.67' T = 55.95' R = 716.20'	PI Sta 24+97.38 Δ = 38° 31' 13.3" (RT) D = 22° 55' 05.9" L = 168.08' T = 87.35' R = 250.00' SE = .06 DS = 30 MPH	PI Sta 26+23.05 Δ = 77° 30' 23.9" (LT) D = 102' 18" 50.0" L = 75.75' T = 44.95' R = 56.00' SE = .02 (ADVERSE) DS = <15 MPH	

PROJECT REFERENCE NO. **HB-0002** SHEET NO. **5**

R/W SHEET NO.

ROADWAY DESIGN ENGINEER  
  
 Jonathan C. Belfrage, 2024

HYDRAULICS ENGINEER  
  
 Jerry L. Lindgren, 2024

**WETHERILL ENGINEERING**  
 1223 Jones Franklin Rd.  
 Raleigh, N.C. 27606  
 License No. F-0377  
 Bus: 919 851 8077  
 Fax: 919 851 8107

TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN  
 CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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

DONALD A. ROBINSON  
 DB 207 PG 2  
 DB 254 PG 156  
 DB 279 PG 675

NC GRID  
 NAD 83 NA 2011

MATCHLINE -L- STA. 312+00 SEE SHEET 4

MATCHLINE -L- STA. 325+00 SEE SHEET 6

REVISIONS

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JTB:the

8/17/24

-L- CURVE DATA		-EBL- CURVE DATA		-Y2- CURVE DATA	
PI Sta 325+93.35 $\Delta = 29^\circ 51' 28.7" (RT)$ $D = 1^\circ 30' 00.0"$ $L = 1,990.53'$ $T = 1,018.42'$ $R = 3,819.72'$ $SE = .06$ $DS = 75 MPH$	PIs Sta 336+40.47 $\Theta_s = 1^\circ 41' 15.0"$ $L_s = 225.00'$ $LT = 150.01'$ $ST = 75.01'$	PI Sta 22+13.97 $\Delta = 26^\circ 54' 47.0" (RT)$ $D = 1^\circ 30' 00.0"$ $L = 1,794.20'$ $T = 913.97'$ $R = 3,819.72'$ $SE = .06$ $DS = 75 MPH$	PIs Sta 31+94.22 $\Theta_s = 2^\circ 15' 00.0"$ $L_s = 300.00'$ $LT = 200.02'$ $ST = 100.01'$	PI Sta 17+51.69 $\Delta = 12^\circ 14' 45.1" (RT)$ $D = 2^\circ 07' 30.0"$ $L = 576.28'$ $T = 289.24'$ $R = 2,696.27'$	PI Sta 25+33.97 $\Delta = 6^\circ 40' 00.0" (RT)$ $D = 1^\circ 45' 00.0"$ $L = 380.95'$ $T = 190.69'$ $R = 3,274.04'$

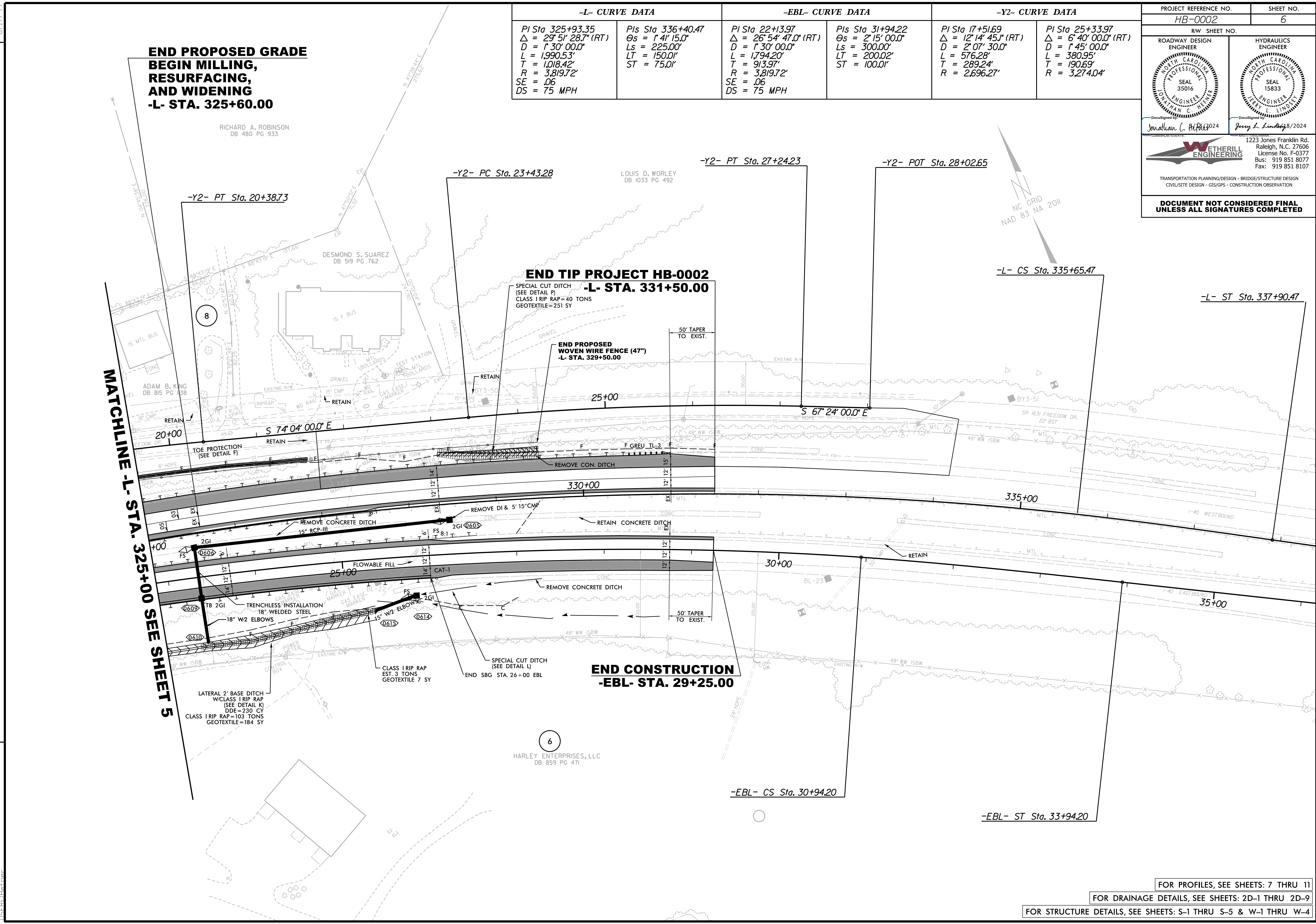
PROJECT REFERENCE NO. <b>HB-0002</b>	SHEET NO. <b>6</b>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER 	HYDRAULICS ENGINEER 
DocuSigned by <b>Jonathan C. Alfaro</b> 2024	DocuSigned by <b>Jerry L. Lindberg</b> 2024
 1223 Jones Franklin Rd. Raleigh, N.C. 27606 License No. F-0377 Bus: 919 851 8077 Fax: 919 851 8107 TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	

**END PROPOSED GRADE  
BEGIN MILLING,  
RESURFACING,  
AND WIDENING  
-L- STA. 325+60.00**

**END TIP PROJECT HB-0002  
-L- STA. 331+50.00**

**END CONSTRUCTION  
-EBL- STA. 29+25.00**

**MATCHLINE -L- STA. 325+00 SEE SHEET 5**



REVISIONS

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FOR PROFILES, SEE SHEETS: 7 THRU 11

FOR DRAINAGE DETAILS, SEE SHEETS: 2D-1 THRU 2D-9

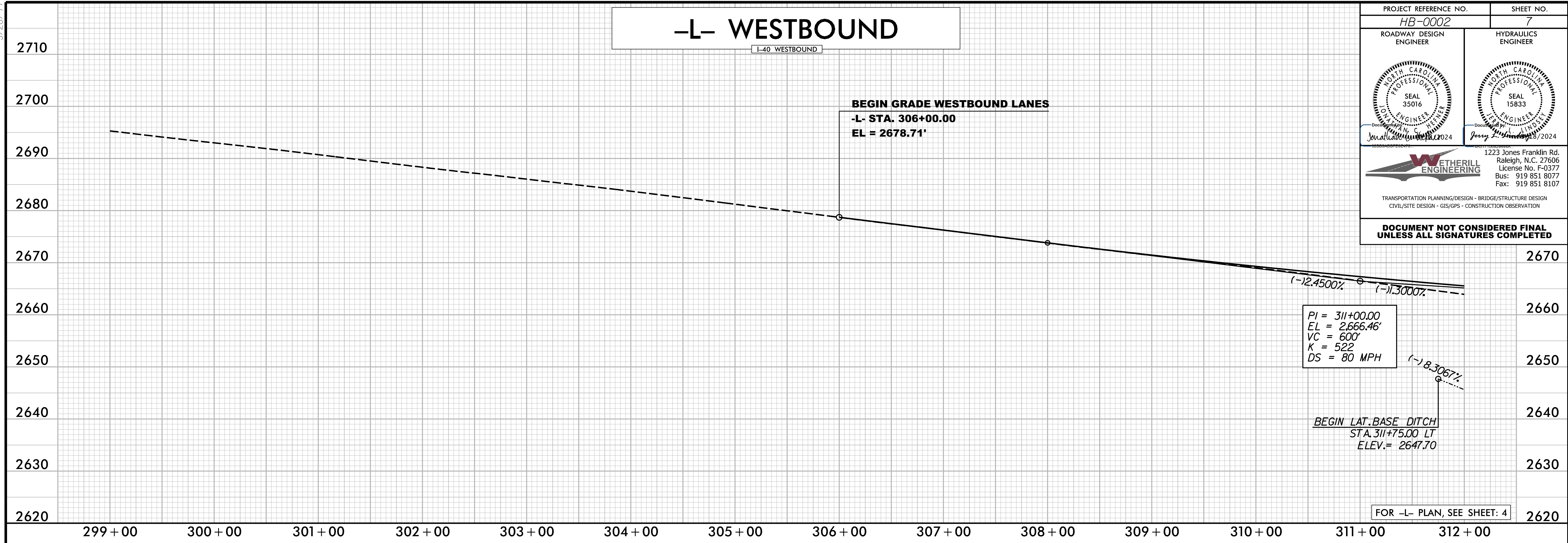
FOR STRUCTURE DETAILS, SEE SHEETS: S-1 THRU S-5 & W-1 THRU W-4

5/28/24

# -L- WESTBOUND

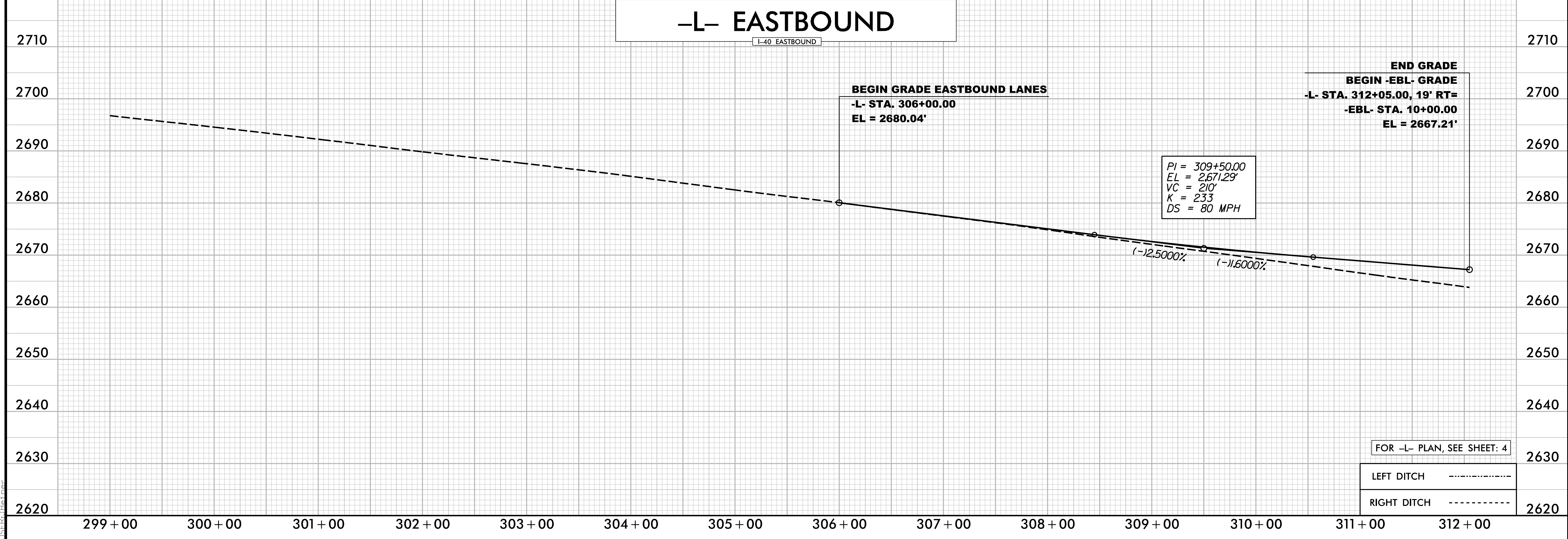
L-40 WESTBOUND

PROJECT REFERENCE NO. <i>HB-0002</i>	SHEET NO. <i>7</i>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
 1223 Jones Franklin Rd. Raleigh, N.C. 27606 License No. F-0377 Bus: 919 851 8077 Fax: 919 851 8107	
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	



# -L- EASTBOUND

L-40 EASTBOUND



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5/28/2024

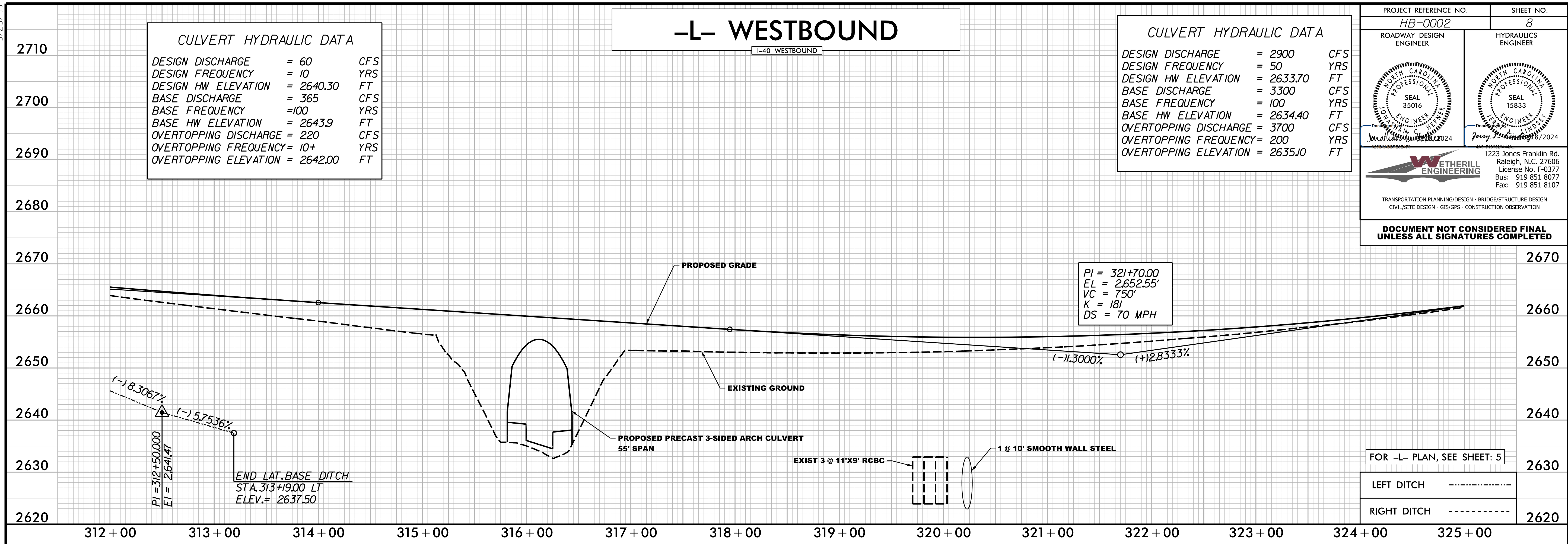
# -L- WESTBOUND

L-40 WESTBOUND

DESIGN DISCHARGE	= 60	CFS
DESIGN FREQUENCY	= 10	YRS
DESIGN HW ELEVATION	= 2640.30	FT
BASE DISCHARGE	= 365	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 2643.9	FT
OVERTOPPING DISCHARGE	= 220	CFS
OVERTOPPING FREQUENCY	= 10+	YRS
OVERTOPPING ELEVATION	= 2642.00	FT

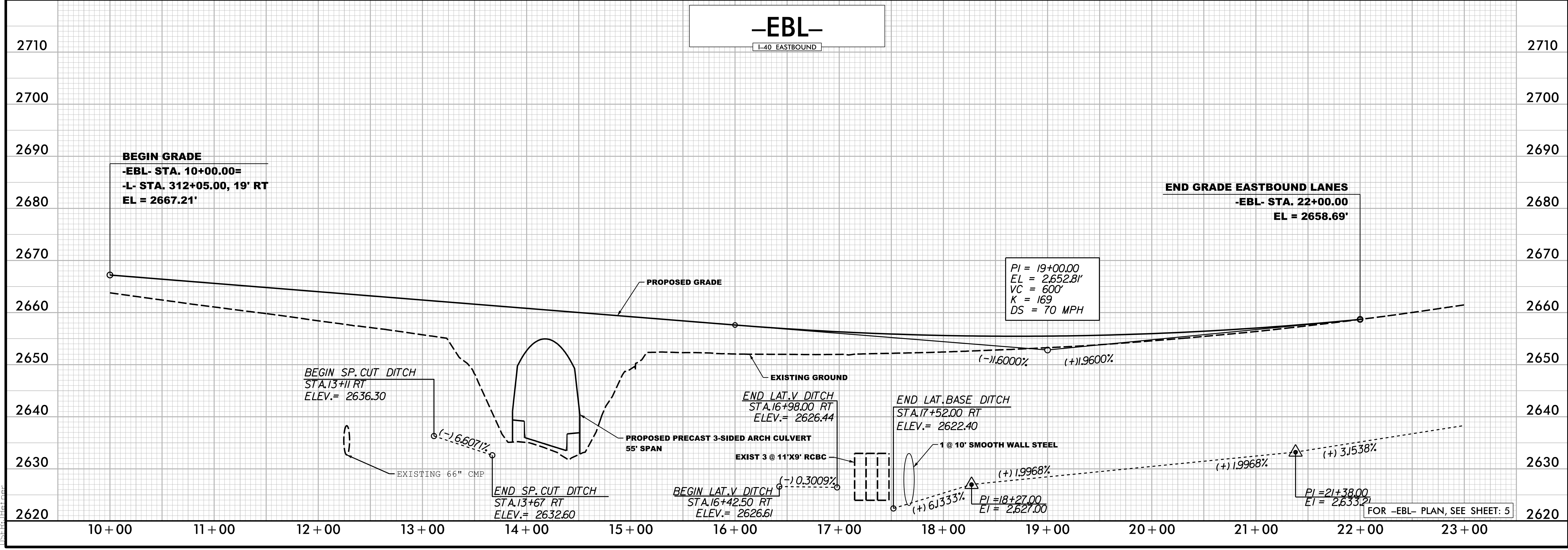
DESIGN DISCHARGE	= 2900	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 2633.70	FT
BASE DISCHARGE	= 3300	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 2634.40	FT
OVERTOPPING DISCHARGE	= 3700	CFS
OVERTOPPING FREQUENCY	= 200	YRS
OVERTOPPING ELEVATION	= 2635.0	FT

PROJECT REFERENCE NO. HB-0002	SHEET NO. 8
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
WETHERILL ENGINEERING 1223 Jones Franklin Rd. Raleigh, N.C. 27606 License No. F-0377 Bus: 919 851 8077 Fax: 919 851 8107	
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



# -EBL-

L-40 EASTBOUND

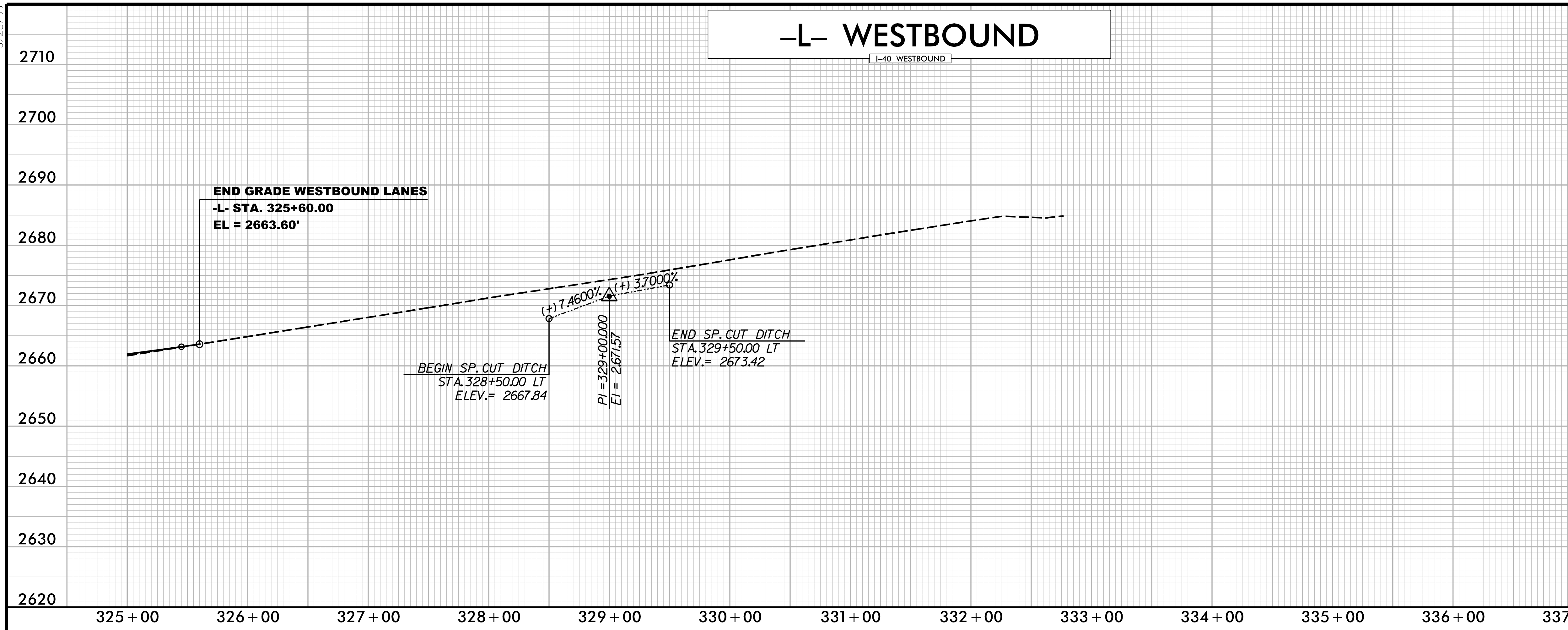


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5/28/24

# -L- WESTBOUND

L-40 WESTBOUND

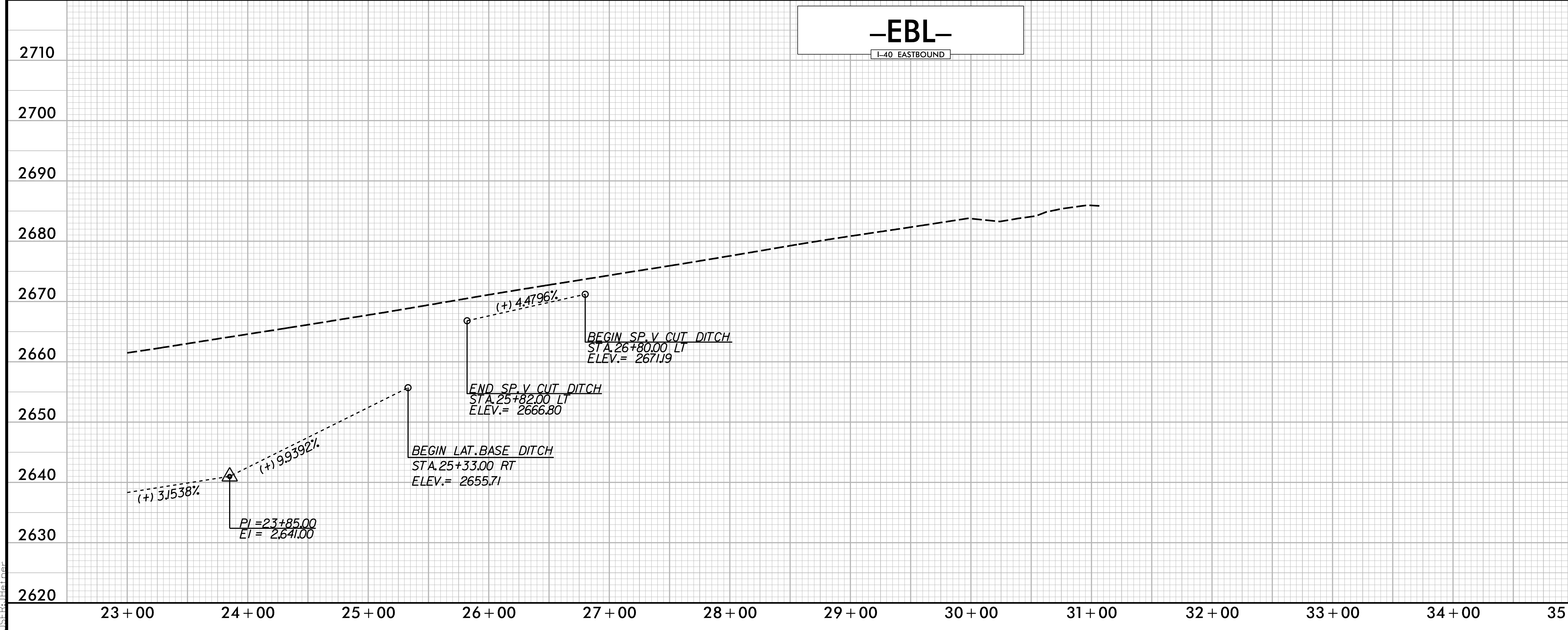


PROJECT REFERENCE NO. <i>HB-0002</i>	SHEET NO. <b>9</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<p>1223 Jones Franklin Rd. Raleigh, N.C. 27606 License No. F-0377 Bus: 919 851 8077 Fax: 919 851 8107</p> <p>TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION</p>	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	

2670
2660
2650
2640
2630
2620
FOR -L- PLAN, SEE SHEET: 6
LEFT DITCH -----
RIGHT DITCH -----
2670
2660
2650
2640
2630
2620
FOR -L- PLAN, SEE SHEET: 6
LEFT DITCH -----
RIGHT DITCH -----
2670
2660
2650
2640
2630
2620

# -EBL-

L-40 EASTBOUND



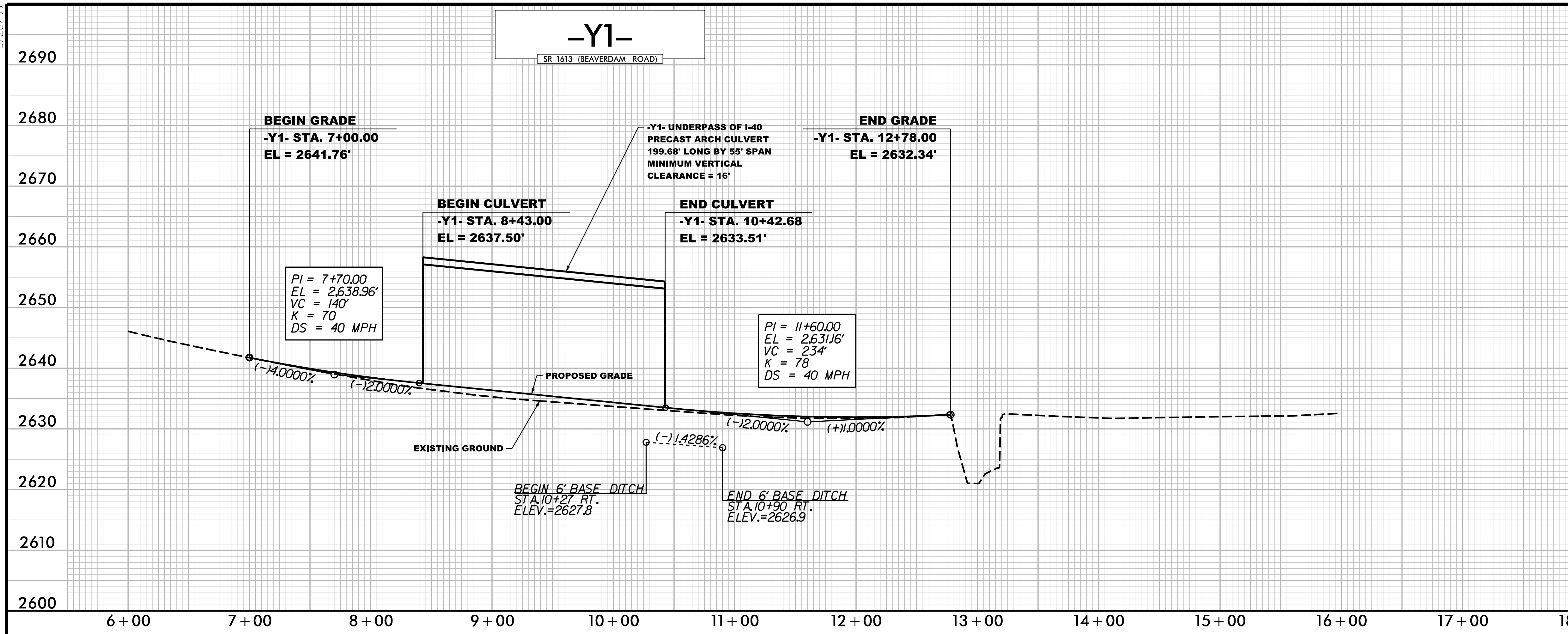
2710
2700
2690
2680
2670
2660
2650
2640
2630
2620
FOR -EBL- PLAN, SEE SHEET: 6
2710
2700
2690
2680
2670
2660
2650
2640
2630
2620
FOR -EBL- PLAN, SEE SHEET: 6
2710
2700
2690
2680
2670
2660
2650
2640
2630
2620

3/15/2024 H:\002\_rdy\_psh\_09.pfl.dgn

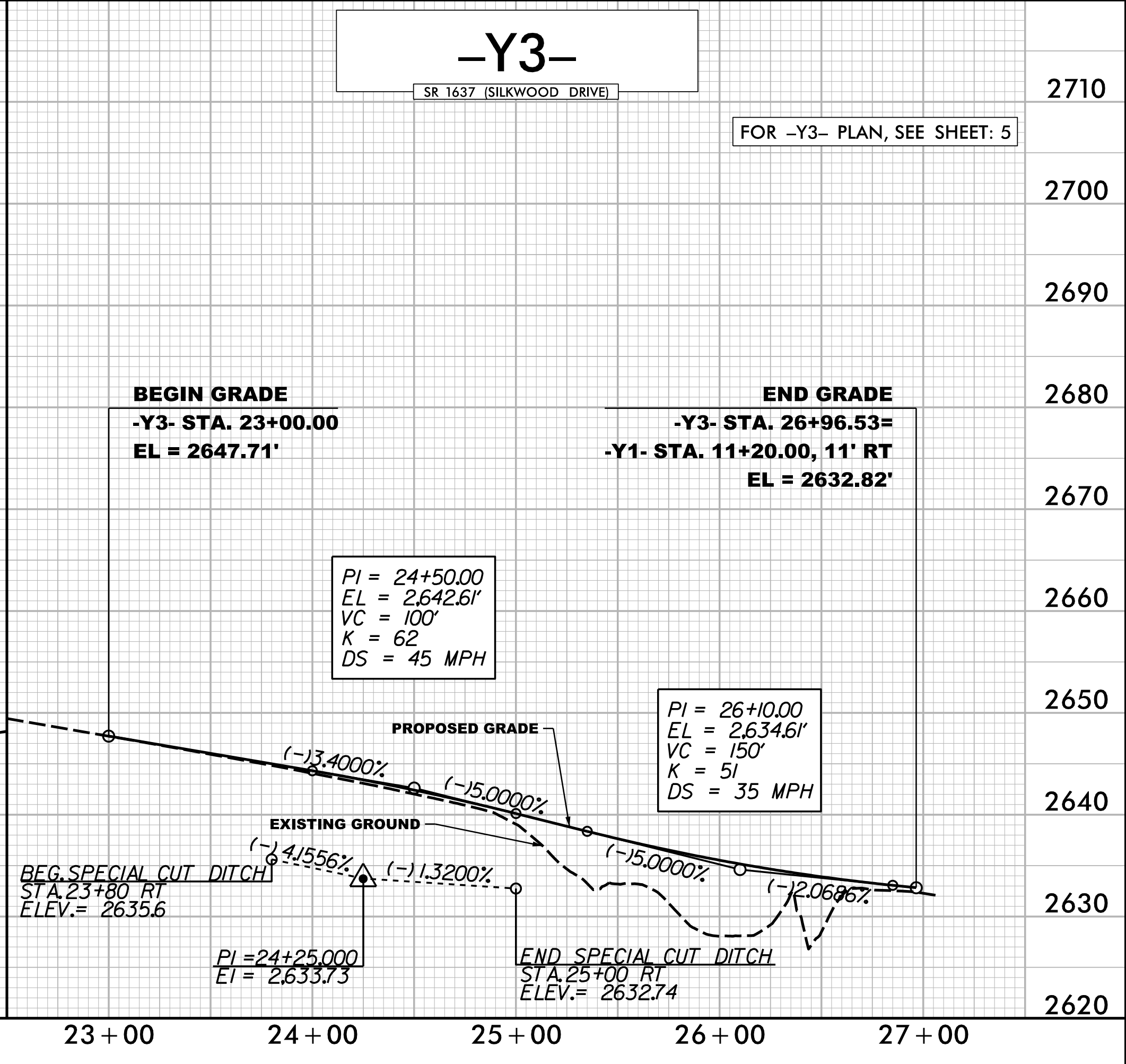
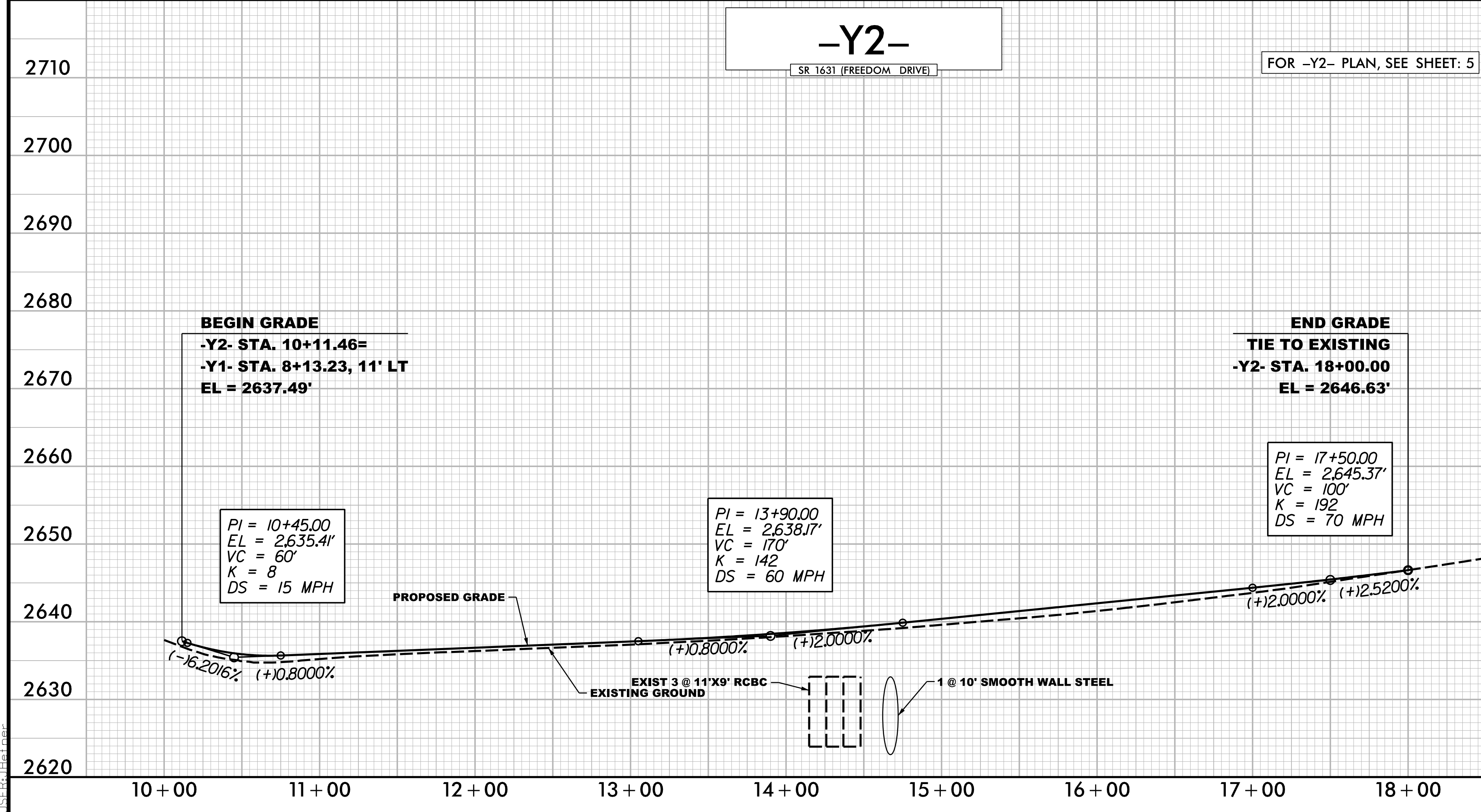


5/28/24

PROJECT REFERENCE NO. <b>HB-0002</b>	SHEET NO. <b>10</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
 1223 Jones Franklin Rd. Raleigh, N.C. 27606 License No. F-0377 Bus: 919 851 8077 Fax: 919 851 8107	
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	



2650	
2640	
2630	
2620	
2610	FOR -Y1- PLAN, SEE SHEET: 5
2600	LEFT DITCH -----
	RIGHT DITCH -----



2710	FOR -Y2- PLAN, SEE SHEET: 5
2700	FOR -Y3- PLAN, SEE SHEET: 5
2690	
2680	
2670	
2660	
2650	
2640	
2630	
2620	

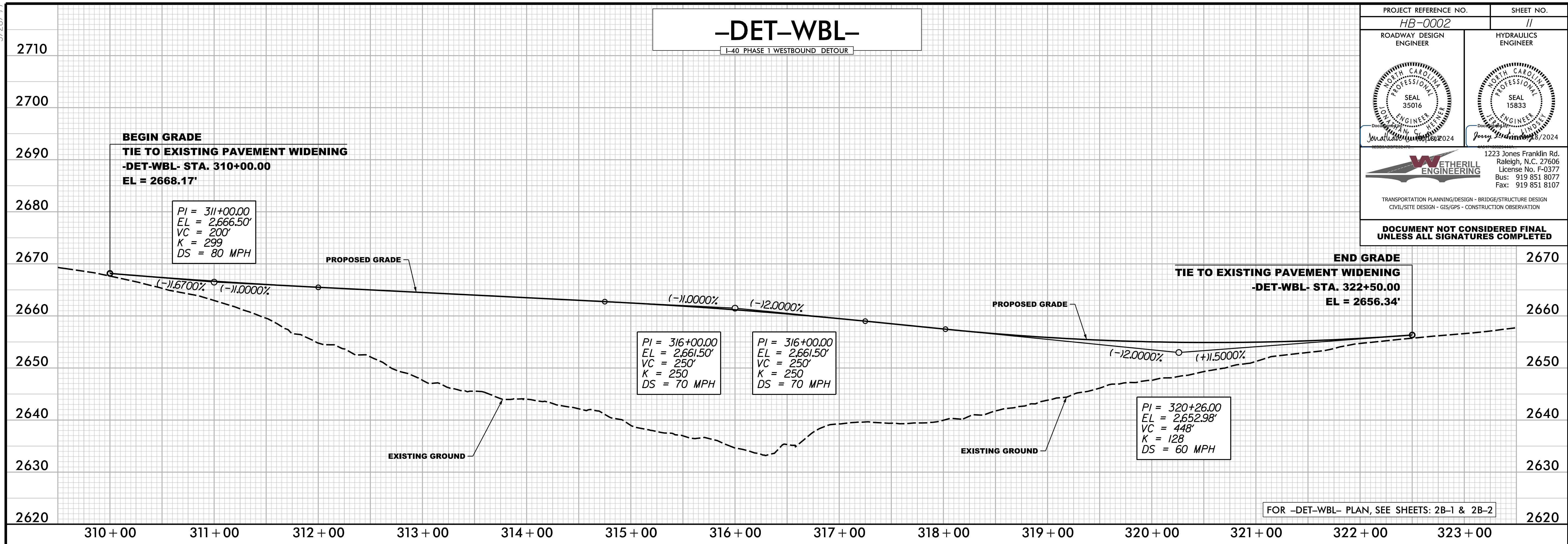
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5/28/24

# -DET-WBL-

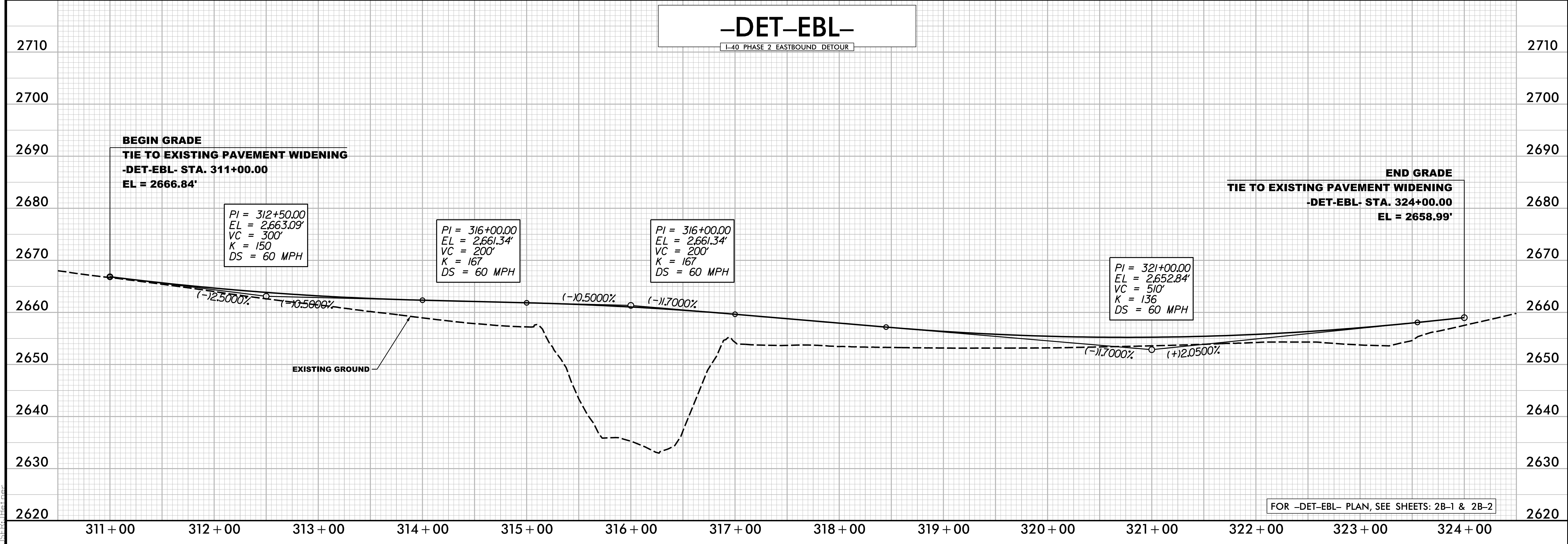
L-40 PHASE 1 WESTBOUND DETOUR

PROJECT REFERENCE NO. <b>HB-0002</b>	SHEET NO. <b>11</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
 1223 Jones Franklin Rd. Raleigh, N.C. 27606 License No. F-0377 Bus: 919 851 8077 Fax: 919 851 8107	
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	



# -DET-EBL-

L-40 PHASE 2 EASTBOUND DETOUR



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