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09/08/19

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

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

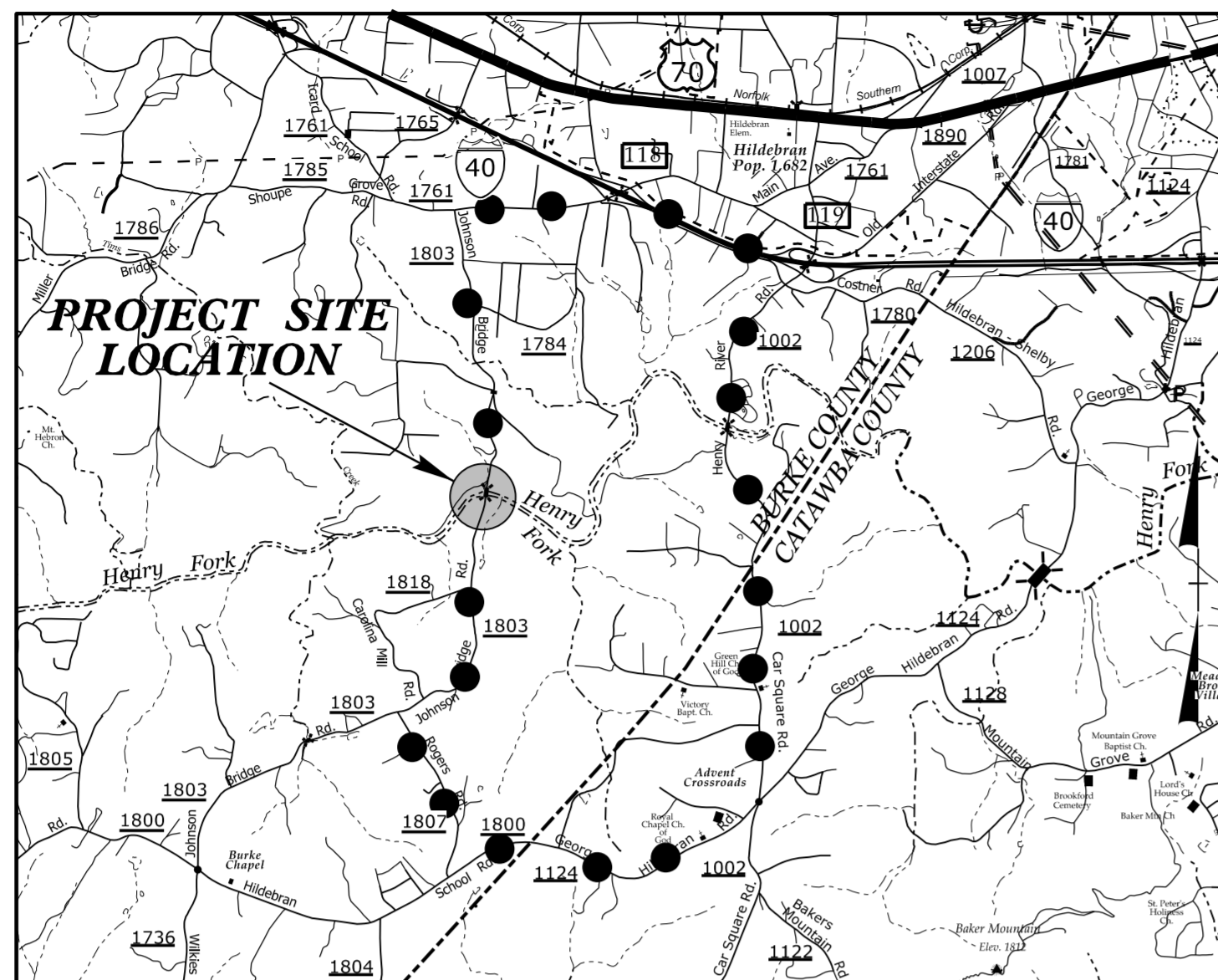
**BURKE COUNTY**

**LOCATION: BRIDGE NO. 21 OVER HENRY FORK RIVER  
ON SR 1803 (JOHNSON BRIDGE ROAD)**

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

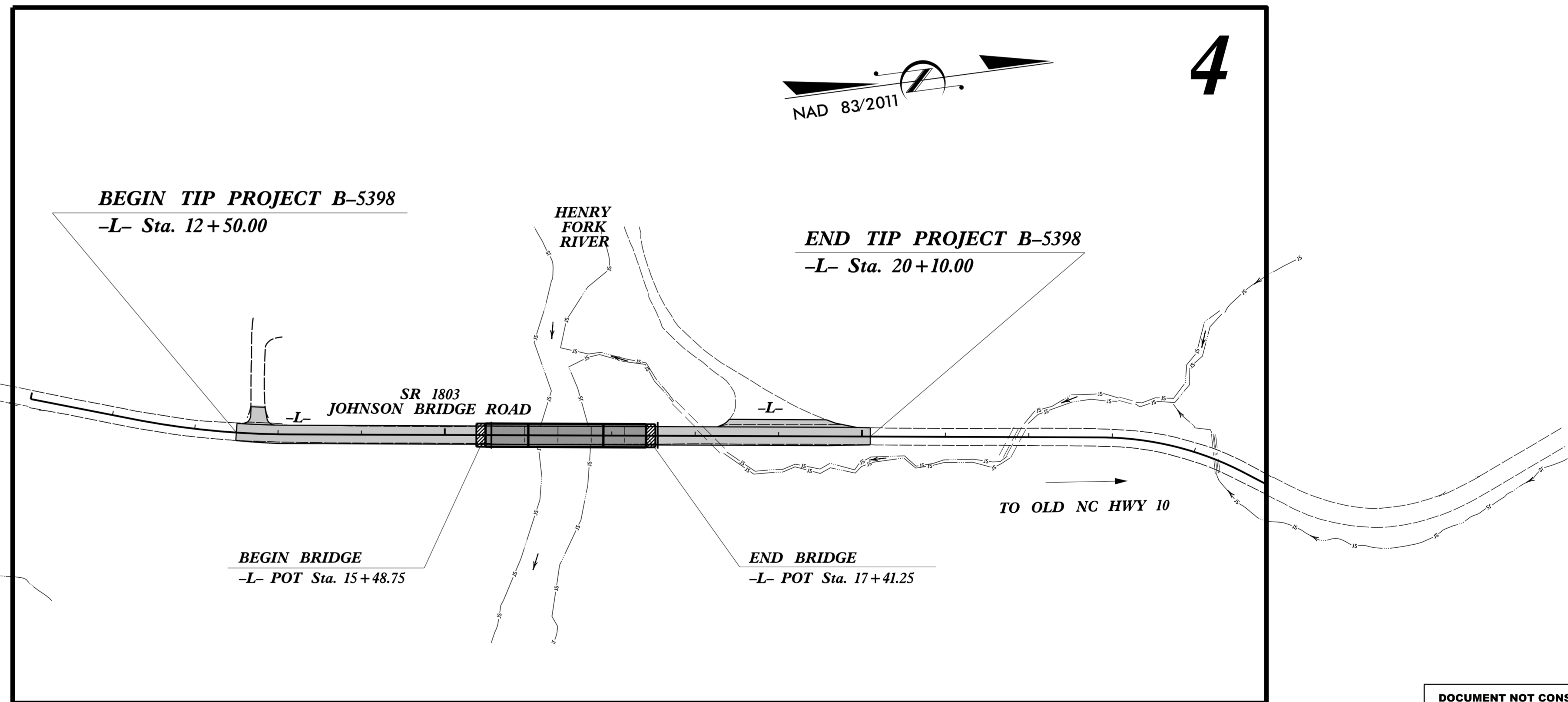
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5398	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
46113.1.1	BRZ-1803(1)	P.E.	
46113.2.1	BRZ-1803(1)	R/W	
46113.2.1	BRZ-1803(1)	UTILITIES	
46113.3.1	BRZ-1803(1)	CONST.	

**TIP PROJECT: B-5398**



**VICINITY MAP**

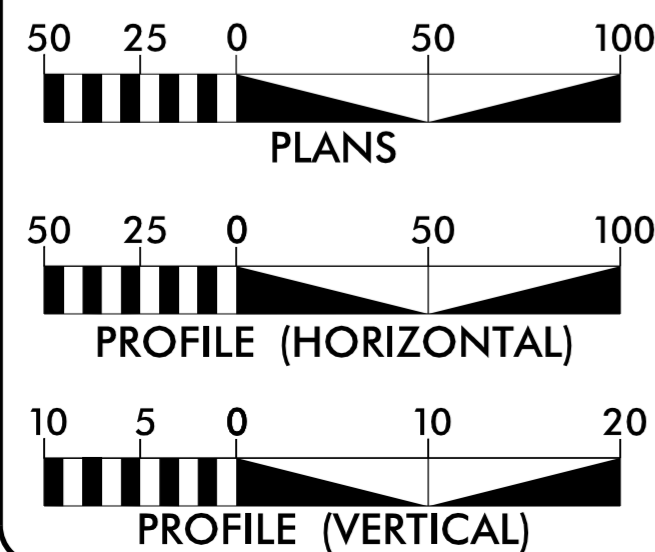
●●●● OFF-SITE DETOUR ROUTE N.T.S.



DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

**CONTRACT: C203827**

**GRAPHIC SCALES**



**DESIGN DATA**

ADT 2016 = 2,755  
ADT 2036 = 3,015  
K = 10 %  
D = 55 %  
T = 8 % \*  
V = 50 MPH  
\* TTST = 1% DUAL 7%  
FUNC CLASS =  
RURAL MINOR COLLECTOR  
SUB-REGIONAL TIER

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT B-5398 = 0.108 mi.  
LENGTH STRUCTURE TIP PROJECT B-5398 = 0.036 mi.  
TOTAL LENGTH TIP PROJECT B-5398 = 0.144 mi.

PLANS PREPARED BY:  
**CH ENGINEERING**  
3220 GLEN ROYAL RD, RALEIGH, NC 27617  
TELE 919.788.0224 FAX 919.788.0232  
NC LICENSE #P-01989

PLANS PREPARED FOR:  
DIVISION OF HIGHWAYS  
1000 Birch Ridge Dr.  
Raleigh, NC 27610

RIGHT OF WAY DATE:  
JANUARY 15, 2016

**BRIAN A. WILES, PE**  
PROJECT ENGINEER

LETTING DATE:  
DECEMBER 20, 2016

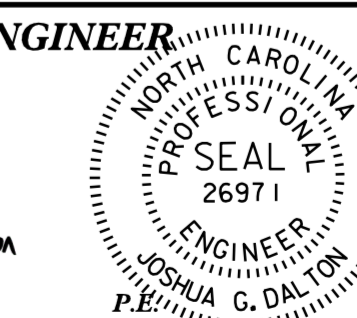
**KEVIN E. MOORE, PE**  
NCDOT CONTACT

**HYDRAULICS ENGINEER**

10/24/2016

DocuSigned by:  
**Joshua G. Dalton**  
1089AD8C14994C3...

SIGNATURE:

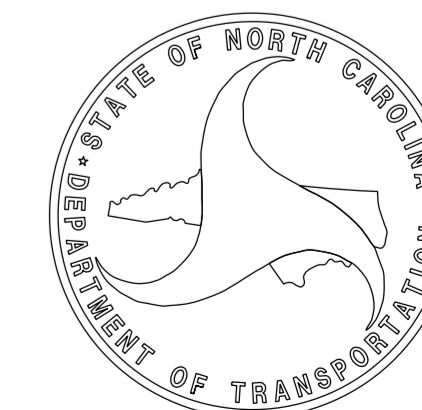
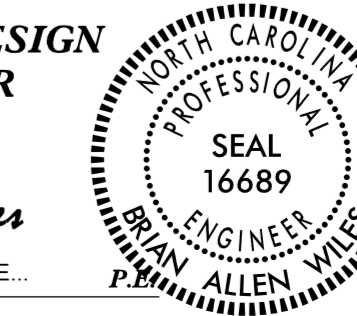


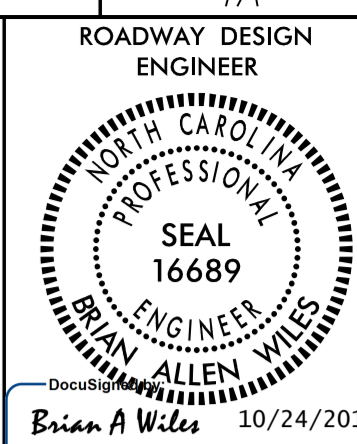
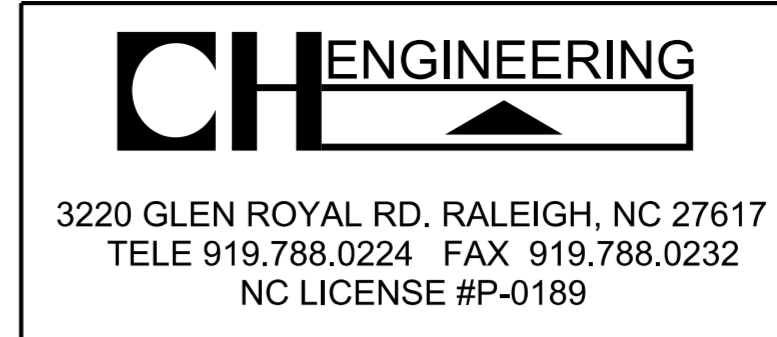
**ROADWAY DESIGN ENGINEER**

10/24/2016

DocuSigned by:  
**Brian A Wiles**  
8890D0FEA2E34DE...

SIGNATURE:





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

SHEET NUMBER	SHEET
1	TITLE SHEET
1A	INDEX OF SHEETS, GENERAL NOTES AND STANDARD DRAWINGS
1B	CONVENTIONAL SYMBOLS
1C-1 THRU 1C-2	SURVEY CONTROL SHEETS
2A-1	PAVEMENT SCHEDULE, TYPICAL SECTIONS AND WEDGING DETAILS
2C-1	DETAIL OF STRUCTURE ANCHOR UNIT, TYPE III
2C-2	REINFORCED CONCRETE ENDWALL DETAIL
3B-1	SUMMARIES OF EARTHWORK, ASPHALT PAVEMENT REMOVAL, SHOULDER BERM GUTTER, EXPRESSWAY GUTTER AND GUARDRAIL
3D-1	LIST OF PIPES, ENDWALLS, ETC. (for PIPES 48" & UNDER) LIST OF PIPE, ENDWALLS, ETC. (for PIPES 54" & OVER)
3G-1	GEOTECHNICAL SUMMARIES
4	PLAN SHEET
5	PROFILE SHEET
TMP-1 THRU TMP-4	TRAFFIC MANAGEMENT PLANS
PMP-1	PAVEMENT MARKING PLANS
EC-1 THRU EC-6	EROSION CONTROL PLANS
SIGN-1 THRU SIGN-2	SIGNING PLANS
UD-1 THRU UD-2	UTILITIES BY OTHERS PLANS
X-1A	CROSS-SECTION SUMMARY SHEET
X-1 THRU X-19	CROSS-SECTIONS
S-1 THRU S-34	STRUCTURE PLANS

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

**GRADE LINE:  
GRADING AND SURFACING:**

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

**CLEARING:**

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

**SUPERELEVATION:**

ALL CURVES ON THIS PROJECT SHALL BE SUPERELEVATED IN ACCORDANCE WITH STD. NO. 225.04 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.

**SUBSURFACE DRAINS:**

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

**GUARDRAIL:**

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

**TEMPORARY SHORING:**

SHORING REQUIRED FOR THE MAINTENANCE OF TRAFFIC WILL BE PAID FOR AS "EXTRA WORK" IN ACCORDANCE WITH SECTION 104-7.

**SUBSURFACE PLANS:**

NO SUBSURFACE PLANS ARE AVAILABLE ON THIS PROJECT. THE CONTRACTOR SHOULD MAKE HIS OWN INVESTIGATION AS TO THE SUBSURFACE CONDITIONS.

**END BENTS:**

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

**UTILITIES:**

UTILITY OWNERS ON THIS PROJECT ARE Rutherford EMC - Power, CenturyLink - Telephone, Charter Communications - CATV, Burke County General Services - Water and Burke County General Services - Sewer

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 CONTRACT.

**ROCK:**

ROCK MAY BE ENCOUNTERED ON THE PROJECT. BLASTING MAY BE REQUIRED FOR EXCAVATION ON THE PROJECT. SEE SECTION 220 OF THE STANDARD SPECIFICATIONS AND IF APPLICABLE, ROCK BLASTING PROVISION.

2012 ROADWAY ENGLISH STANDARD DRAWINGS

The following Roadway Standards as appear in "Roadway Standard Drawings" Highway Design Branch - N. C. Department of Transportation - Raleigh, N. C., Dated January, 2012 are applicable to this project and by reference hereby are considered a part of these plans:

STD.NO.	TITLE
DIVISION 2 - EARTHWORK	
200.02	Method of Clearing - Method II
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superlevation - Two Lane Pavement
DIVISION 3 - PIPE CULVERTS	
300.01	Method of Pipe Installation
DIVISION 4 - MAJOR STRUCTURES	
422.11	Bridge Approach Fills - Sub Regional Tier
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
DIVISION 6 - ASPHALT BASES AND PAVEMENTS	
654.01	Pavement Repairs
DIVISION 8 - INCIDENTALS	
806.01	Concrete Right-of-Way Marker
806.02	Granite Right-of-Way Marker
815.02	Subsurface Drain
838.33	Reinforced Concrete Endwall - for Single 66" Pipe 90 Skew
838.45	Notes for Reinforced Concrete Endwall - Std. Dwg 838.21 thru 838.40
838.63	Reinforced Brick Endwall - for Single 66" Pipe 90 Skew
838.75	Notes for Reinforced Brick Endwall - Std. Dwg 838.51 thru 838.70
838.80	Precast Endwalls - 12" thru 72" Pipe 90 Skew
840.00	Concrete Base Pad for Drainage Structures
840.18	Concrete Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.24	Frames and Narrow Slot Sag Grates
840.25	Anchorage for Frames - Brick or Concrete or Precast
840.27	Brick Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.29	Frames and Narrow Slot Flat Grates
840.35	Traffic Bearing Grated Drop Inlet - for Cast Iron Double Frame and Grates
840.45	Precast Drainage Structure
840.46	Traffic Bearing Precast Drainage Structure
840.66	Drainage Structure Steps
846.01	Concrete Curb, Gutter and Curb & Gutter
846.04	Drop Inlet Installation in Shoulder Berm Gutter
862.01	Guardrail Placement
862.02	Guardrail Installation
876.01	Rip Rap in Channels
876.02	Guide for Rip Rap at Pipe Outlets

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

# STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS

## CONVENTIONAL PLAN SHEET SYMBOLS

*Note: Not to Scale* \*S.U.E. = *Subsurface Utility Engineering*

### BOUNDARIES AND PROPERTY:

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

### BUILDINGS AND OTHER CULTURE:

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

### HYDROLOGY:

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

### RAILROADS:

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

### RIGHT OF WAY:

Baseline Control Point	◆
Existing Right of Way Marker	△
Existing Right of Way Line	-----
Proposed Right of Way Line	----- RW
Proposed Right of Way Line with Iron Pin and Cap Marker	----- RW ▲
Proposed Right of Way Line with Concrete or Granite RW Marker	----- RW ▲
Proposed Control of Access Line with Concrete CA Marker	----- CA
Existing Control of Access	----- CA
Proposed Control of Access	----- CA
Existing Easement Line	----- E
Proposed Temporary Construction Easement	----- E
Proposed Temporary Drainage Easement	----- TDE
Proposed Permanent Drainage Easement	----- PDE
Proposed Permanent Drainage / Utility Easement	----- DUE
Proposed Permanent Utility Easement	----- PUE
Proposed Temporary Utility Easement	----- TUE
Proposed Aerial Utility Easement	----- AUE
Proposed Permanent Easement with Iron Pin and Cap Marker	◆

### ROADS AND RELATED FEATURES:

Existing Edge of Pavement	-----
Existing Curb	-----
Proposed Slope Stakes Cut	----- C
Proposed Slope Stakes Fill	----- F
Proposed Curb Ramp	----- CR
Existing Metal Guardrail	-----
Proposed Guardrail	-----
Existing Cable Guiderail	-----
Proposed Cable Guiderail	-----
Equality Symbol	⊕
Pavement Removal	-----

### VEGETATION:

Single Tree	☼
Single Shrub	☼
Hedge	-----
Woods Line	-----

Orchard	☼ ☼ ☼ ☼
Vineyard	□ Vineyard

### EXISTING STRUCTURES:

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

### UTILITIES:

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

### TELEPHONE:

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

### WATER:

Water Manhole	⊕
Water Meter	○
Water Valve	⊗
Water Hydrant	⊕
U/G Water Line LOS B (S.U.E.*)	----- W
U/G Water Line LOS C (S.U.E.*)	----- W
U/G Water Line LOS D (S.U.E.*)	----- W
Above Ground Water Line	----- A/G Water

### TV:

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

### GAS:

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

### SANITARY SEWER:

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

### MISCELLANEOUS:

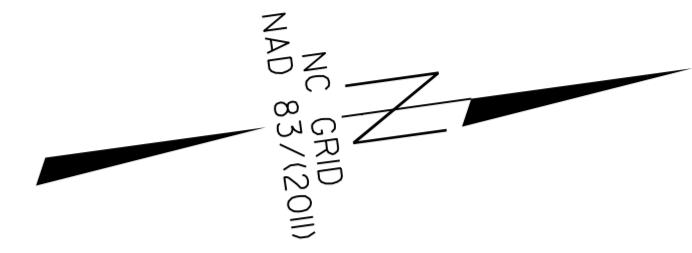
Utility Pole	●
Utility Pole with Base	□
Utility Located Object	○
Utility Traffic Signal Box	□
Utility Unknown U/G Line LOS B (S.U.E.*)	----- UTL
U/G Tank; Water, Gas, Oil	□
Underground Storage Tank, Approx. Loc.	□ UST
A/G Tank; Water, Gas, Oil	□
Geoenvironmental Boring	⊕
U/G Test Hole LOS A (S.U.E.*)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

# SURVEY CONTROL SHEET B-5398 FINAL

PROJECT REFERENCE NO.	SHEET NO.
B-5398	1C-1
Location and Surveys	

BL	POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
	1	BL-1	714339.7463	1272580.4496	1002.46	11+57.53	13.42 RT
	2	BL-2	714939.1035	1272679.0848	977.76	17+63.29	16.82 RT
	3	BL-3	715501.1480	1272724.2726	991.89	23+24.55	17.36 LT
	GPS1	B-5398-1	713521.9030	1272341.7500	1044.34	OUTSIDE PROJECT LIMITS	
	GPS2	B-5398-2	713445.9000	1272775.3630	1033.07	OUTSIDE PROJECT LIMITS	

.....  
 BM1 ELEVATION = 998.94  
 N 714382 E 1272559  
 L STATION 11+92.62 18.83' LEFT  
 BOLT ON BOTTOM FLANGE ON BACK OF FIRE  
 HYDRANT  
 .....  
 BM2 ELEVATION = 988.73  
 N 715456 E 1272715  
 L STATION 22+80.29 18.37' LEFT  
 BOLT ON BOTTOM FLANGE ON BACK OF FIRE  
 HYDRANT  
 .....

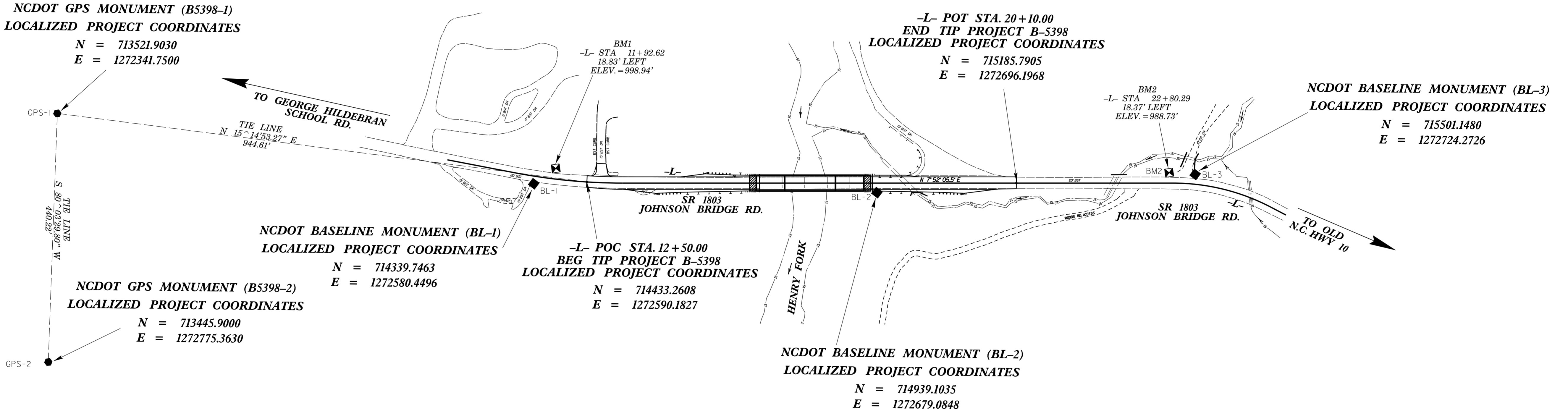


**NCDOT GPS MONUMENT (B5398-1)  
LOCALIZED PROJECT COORDINATES**

N = 713521.9030  
E = 1272341.7500

GPS-1

GPS-2



**NCDOT BASELINE MONUMENT (BL-1)  
LOCALIZED PROJECT COORDINATES**

N = 714339.7463  
E = 1272580.4496

**NCDOT GPS MONUMENT (B5398-2)  
LOCALIZED PROJECT COORDINATES**

N = 713445.9000  
E = 1272775.3630

**-L- POC STA. 12+50.00  
BEG TIP PROJECT B-5398  
LOCALIZED PROJECT COORDINATES**

N = 714433.2608  
E = 1272590.1827

**NCDOT BASELINE MONUMENT (BL-2)  
LOCALIZED PROJECT COORDINATES**

N = 714939.1035  
E = 1272679.0848

**-L- POT STA. 20+10.00  
END TIP PROJECT B-5398  
LOCALIZED PROJECT COORDINATES**

N = 715185.7905  
E = 1272696.1968

**NCDOT BASELINE MONUMENT (BL-3)  
LOCALIZED PROJECT COORDINATES**

N = 715501.1480  
E = 1272724.2726

**NOTES:**

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

THE FILES TO BE FOUND ARE AS FOLLOWS:  
 B5398\_LS\_CONTROL.TXT

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

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

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

**DATUM DESCRIPTION**

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B5398-1" WITH NAD 83/2011 STATE PLANE GRID COORDINATES OF NORTHING: 713521.9030(ft) EASTING: 1272341.7500(ft) ELEVATION: 1044.34(ft) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.999834166 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B5398-1" TO -L- STATION 12+50.00 IS N 15°14'53.27" E 944.61' ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NAVD 88

NOTE: DRAWING NOT TO SCALE

6/2/09

10/19/2016  
 H:\Roadway\Proj\B5398\_1s\_1C-1.dgn  
 USER:MMF

# SURVEY CONTROL SHEET B-5398 (FINAL)

## (DESIGN ALIGNMENTS)

TYPE	STATION	NORTH	EAST
POT	10+00.00	714194.2633	1272517.5485
PC	11+23.55	714311.2690	1272557.2353
PT	13+13.24	714495.5863	1272600.8135
PC	22+86.71	715459.8919	1272734.0764
PT	24+66.64	715625.5733	1272799.7214
POT	24+97.16	715650.4640	1272817.3841

## (ROW MARKERS)

ROW MARKER CONCRETE OR GRANITE -E				
ALIGN	STATION	OFFSET	NORTH	EAST
L	12+25.00	-30.00	714415.5363	1272555.6564
L	12+25.00	-16.56	714412.5300	1272568.7579
L	12+25.00	15.44	714405.3729	1272599.9478
L	12+25.00	51.37	714397.3373	1272634.9664
L	13+13.24	-30.00	714499.6931	1272571.0960
L	13+13.24	52.83	714488.3543	1272653.1450
L	14+17.57	59.08	714590.8547	1272673.6164
L	15+00.00	-60.00	714688.8055	1272566.9454
L	15+00.00	60.00	714672.3781	1272685.8156
L	15+00.00	-30.00	714684.6987	1272596.6629
L	18+36.19	-60.00	715021.8265	1272612.9674
L	18+75.00	60.00	715043.8477	1272737.1511
L	18+78.30	-30.00	715059.4408	1272648.4507
L	20+25.00	-16.00	715202.8396	1272682.4008
L	20+25.00	16.00	715198.4590	1272714.0995
L	20+25.00	43.28	715194.7242	1272741.1250
L	20+25.00	-30.00	715204.7561	1272668.5326

## (PERMANENT EASEMENTS)

ROW MARKER PERMANENT EASEMENT-E REBAR W/CAP				
ALIGN	STATION	OFFSET	NORTH	EAST
L	17+05.13	-270.42	714920.8058	1272386.5891
L	17+37.35	-308.71	714957.9693	1272353.0673
L	17+37.40	-130.37	714933.5993	1272529.7389
L	17+72.97	-154.14	714972.0893	1272511.0588
L	19+47.25	-30.00	715127.7381	1272657.8891

### NOTES:

- THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:  
[HTTP://WWW.DOH.DOT.STATE.NC.US/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/](http://www.doh.dot.state.nc.us/preconstruct/highway/location/project/)  
  
THE FILES TO BE FOUND ARE AS FOLLOWS:  
[B5398\\_LS\\_CONTROL.TXT](#)  
  
SITE CALIBRATION INFORMATION HAS NOT BEEN PROVIDED FOR THIS PROJECT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.
- INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.  
PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.  
NETWORK ESTABLISHED FROM NGS ONLINE POSITIONING SERVICE (OPUS)

NOTE: DRAWING NOT TO SCALE

### DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B5398-1"  
WITH NAD 83/2011 STATE PLANE GRID COORDINATES OF  
NORTHING: 713521.9030(ft) EASTING: 1272341.7500(ft)  
ELEVATION: 1044.34(ft)  
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.999834166  
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B5398-1" TO -L- STATION 12+50.00 IS  
N 15°14'53.27" E 944.61'  
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES  
VERTICAL DATUM USED IS NAVD 88

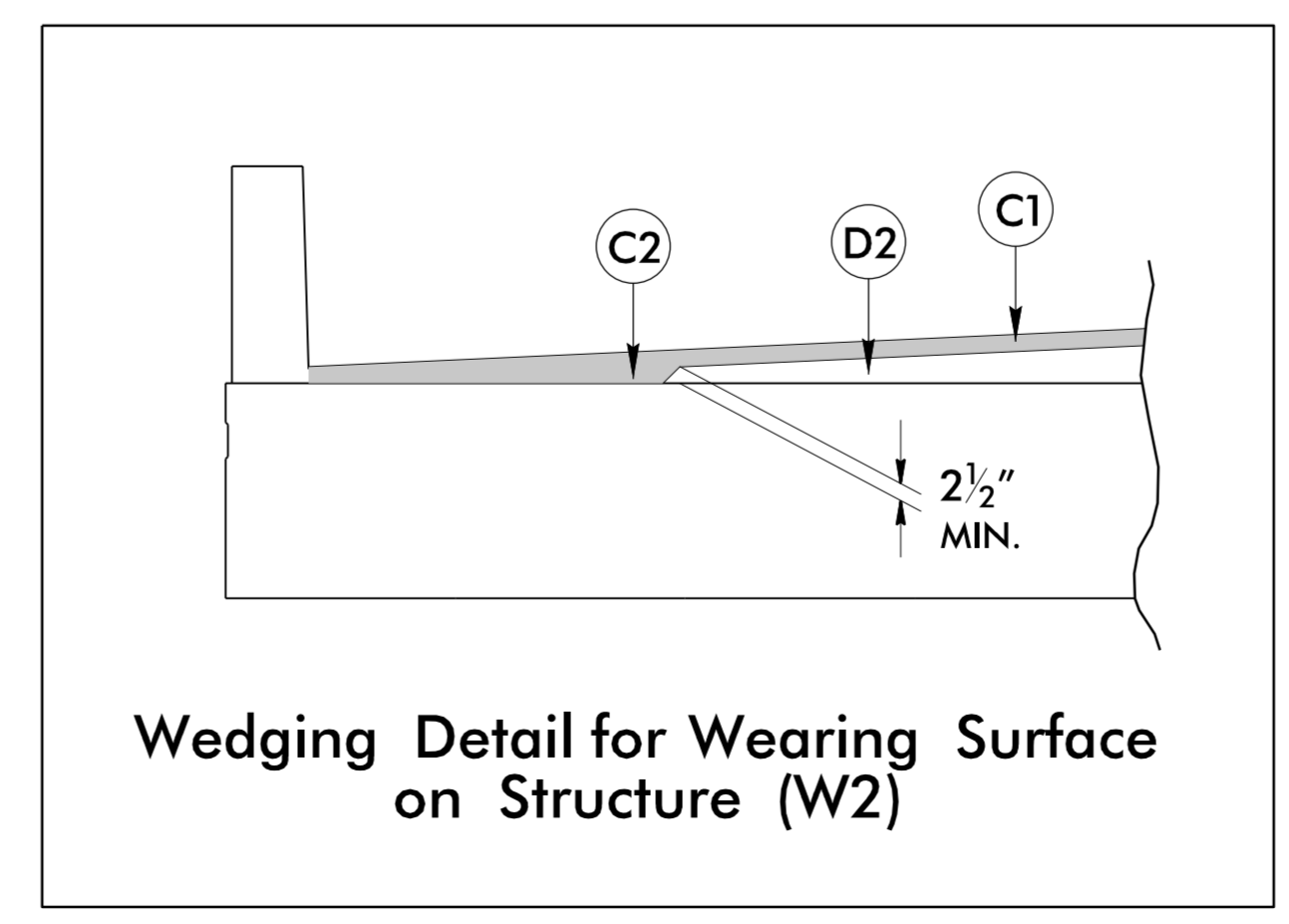
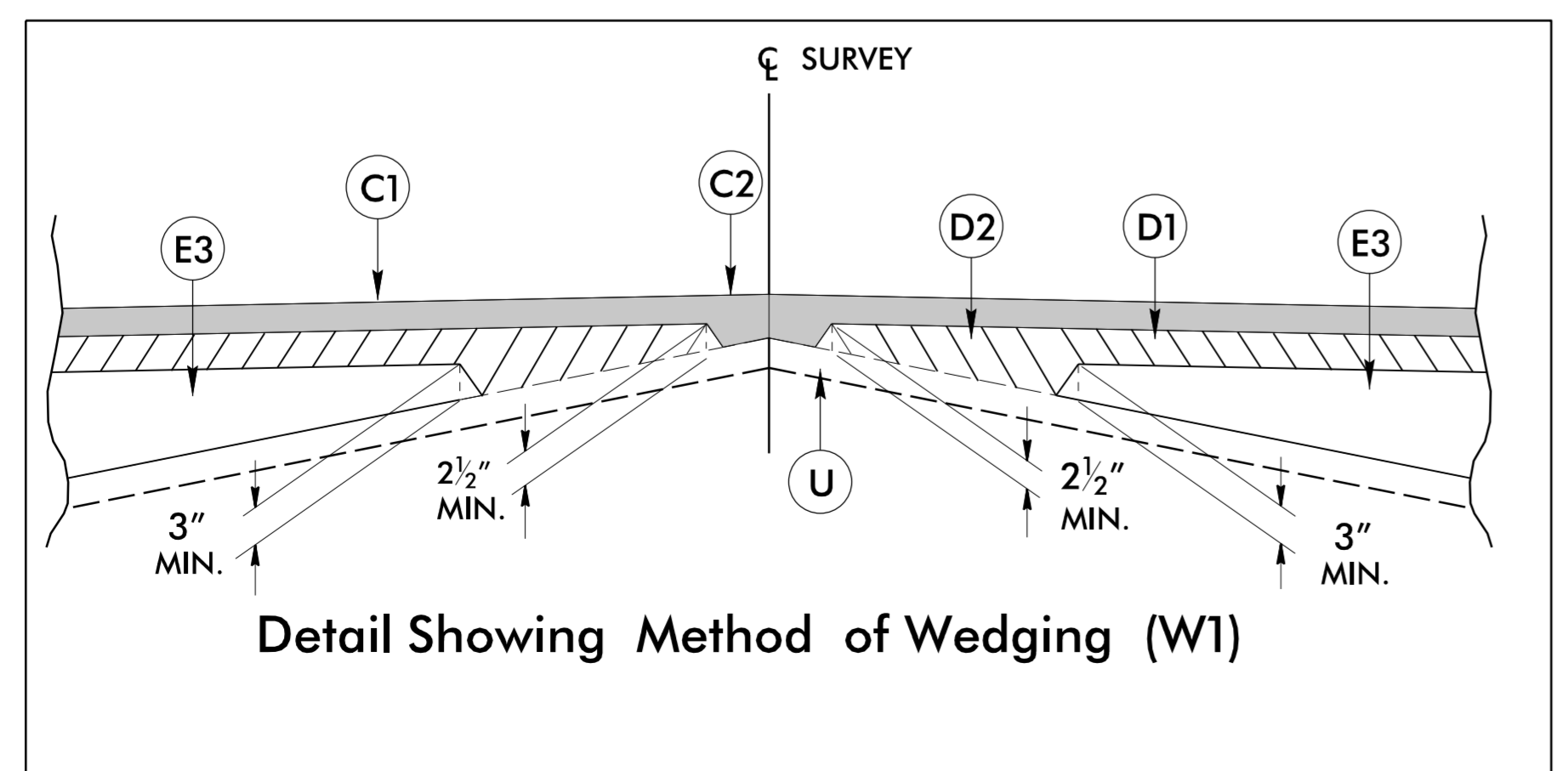
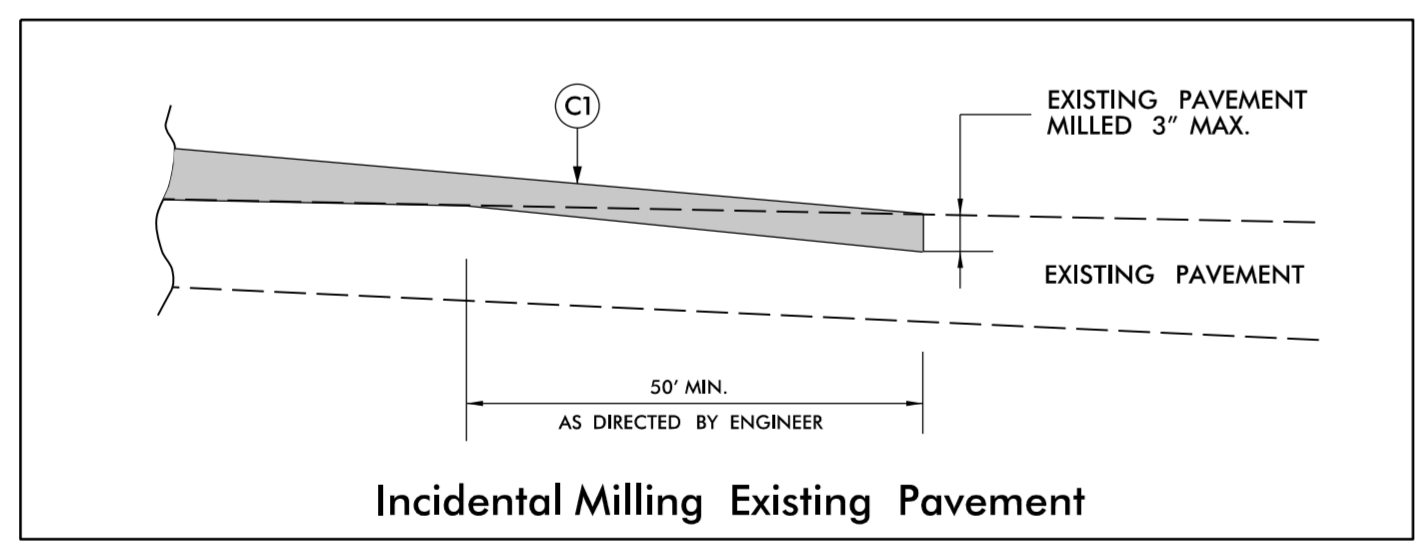
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6/2/2016

FINAL PAVEMENT DESIGN

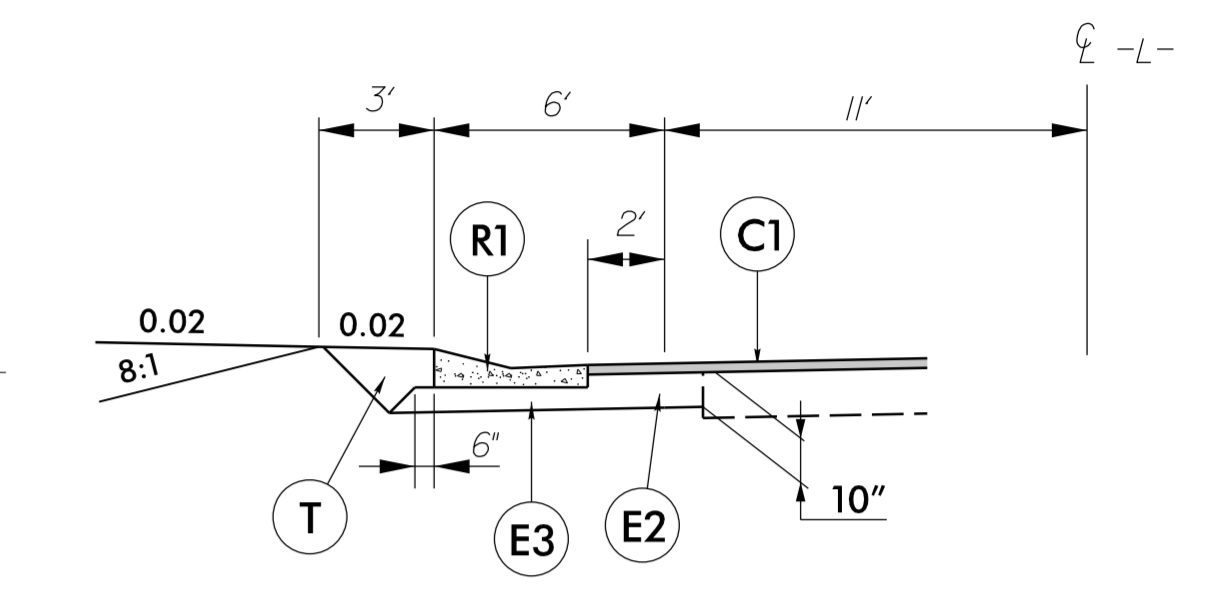
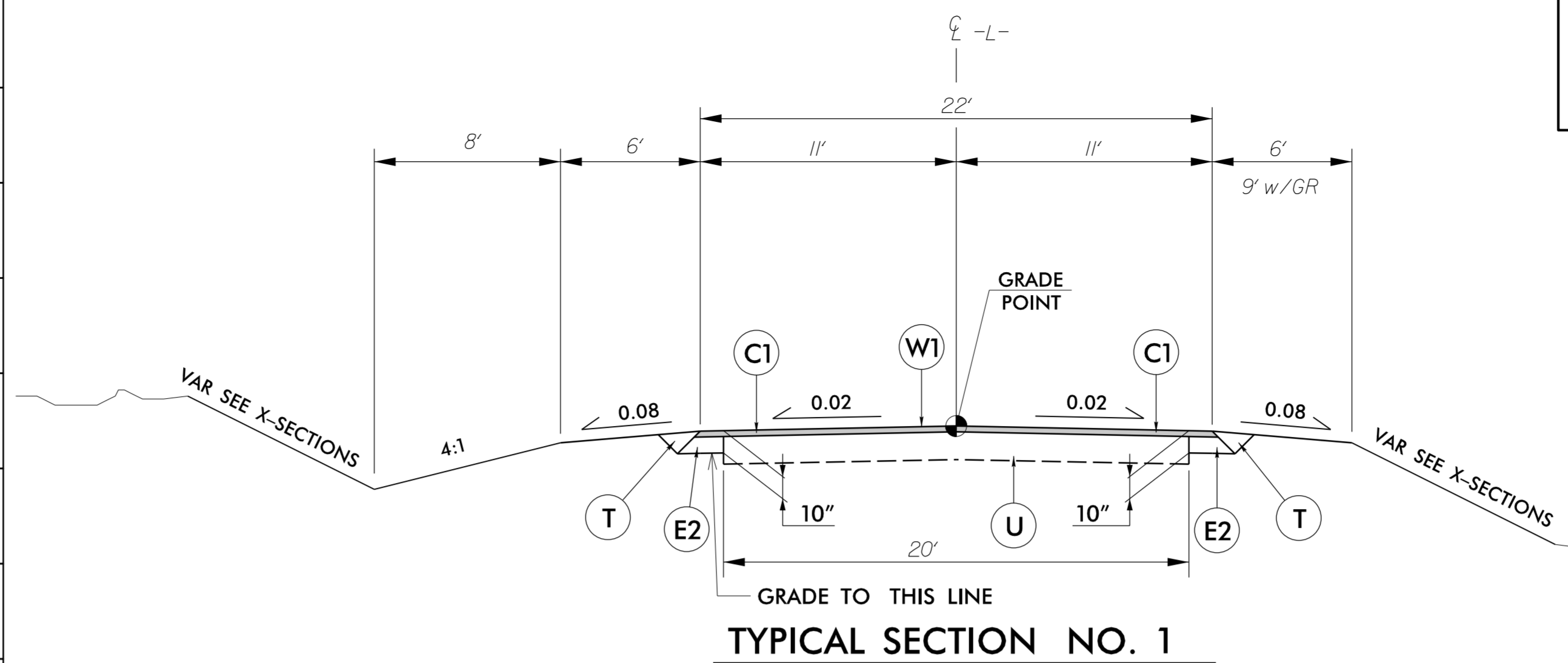
PAVEMENT SCHEDULE	
C1	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
C2	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 2" IN DEPTH.
D1	PROP. APPROX. 2 1/2" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2 1/2" IN DEPTH OR GREATER THAN 4" IN DEPTH.
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
E2	PROP. APPROX. 7" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 399 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
E3	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 4" IN DEPTH OR GREATER THAN 5 1/2" IN DEPTH.
R1	CONCRETE EXPRESSWAY GUTTER.
R2	SHOULDER BERM GUTTER.
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
W1	VARIABLE DEPTH ASPHALT PAVEMENT (SEE STANDARD WEDGING DETAIL (W1) THIS SHEET)
W2	VARIABLE DEPTH ASPHALT PAVEMENT WEDGING FOR WEARING SURFACE ON STRUCTURE (SEE DETAIL (W2) THIS SHEET)

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

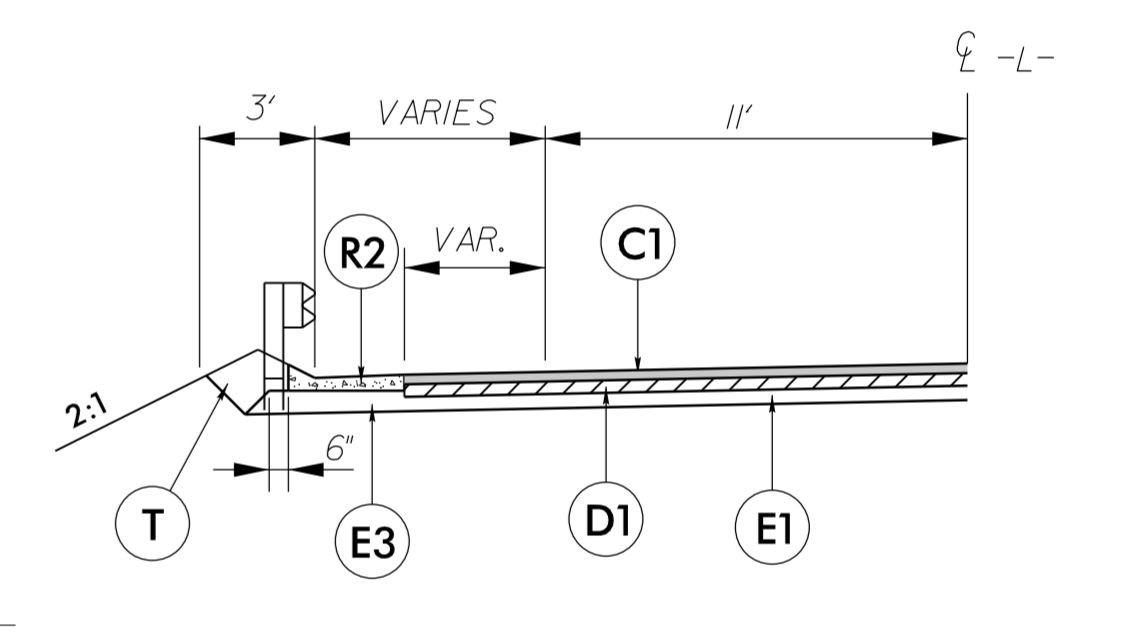
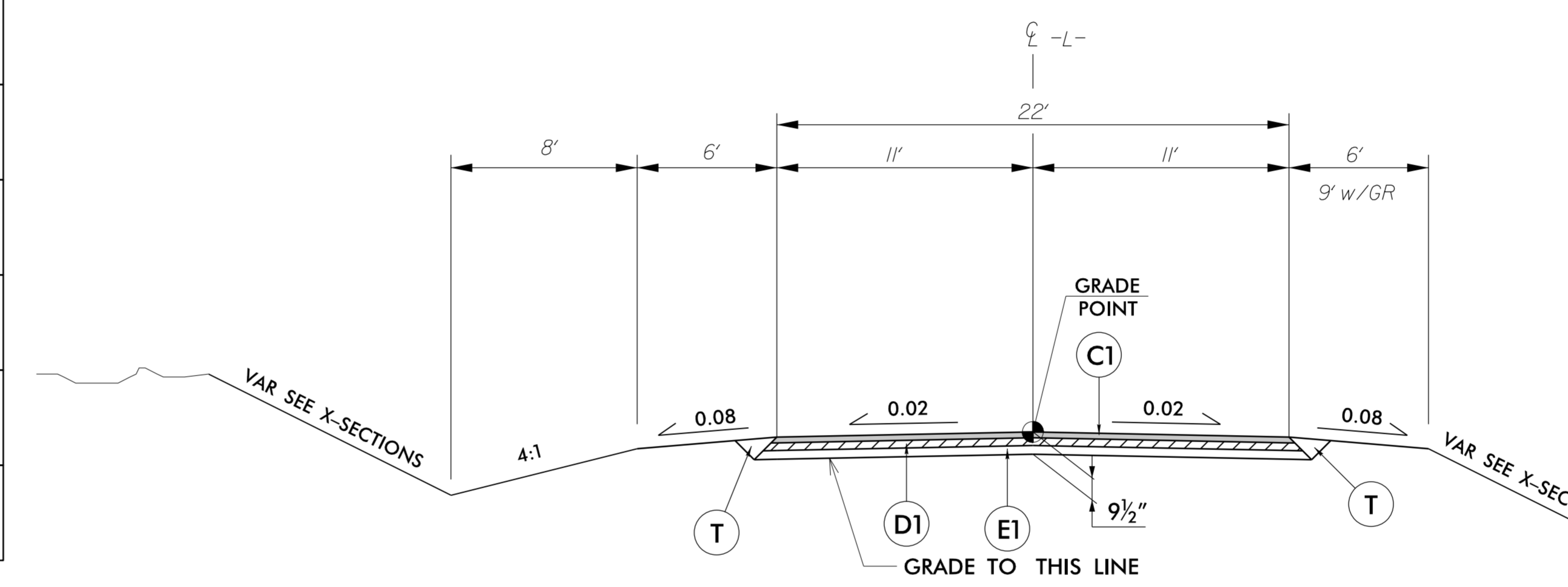


**CH ENGINEERING**  
 3220 GLEN ROYAL RD. RALEIGH, NC 27617  
 TELE 919.788.0224 FAX 919.788.0232  
 NC LICENSE #P-0189

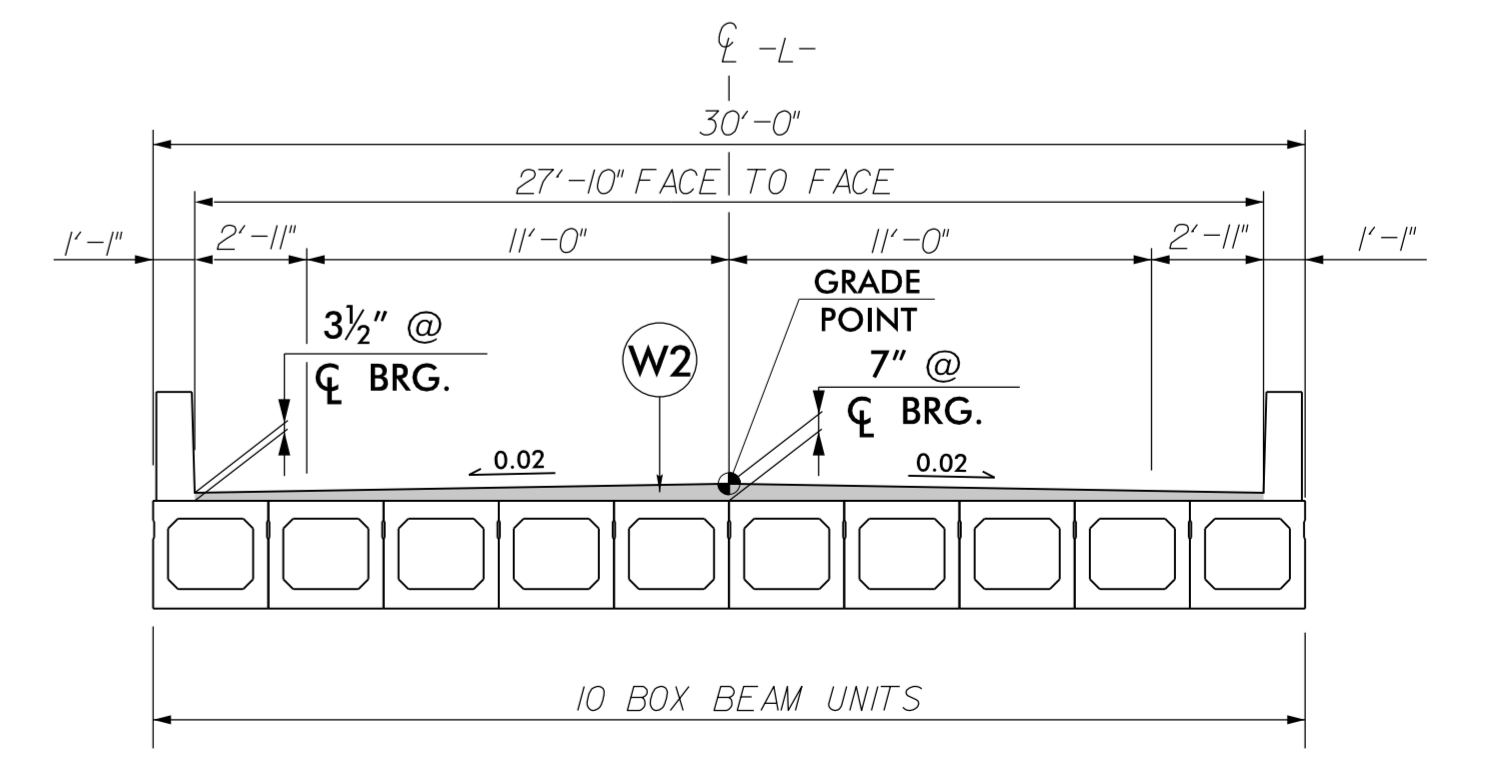
PROJECT REFERENCE NO. <b>B-5398</b>	SHEET NO. <b>2A-1</b>
ROADWAY DESIGN ENGINEER 10/25/2016 <b>Brian A. Wells</b> SEAL 16689	PAVEMENT DESIGN ENGINEER 10/25/2016 <b>Clark Morrison</b> SEAL 022896
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	



USE WITH TYPICAL SECTION NO. 1  
 -L- STA. 12+88.00 TO -L- STA. 14+30.00 LEFT



USE WITH TYPICAL SECTION NO. 2  
 -L- STA. 17+52.25 TO -L- STA. 17+65.00 LEFT  
 -L- STA. 17+52.25 TO -L- STA. 17+65.00 RIGHT

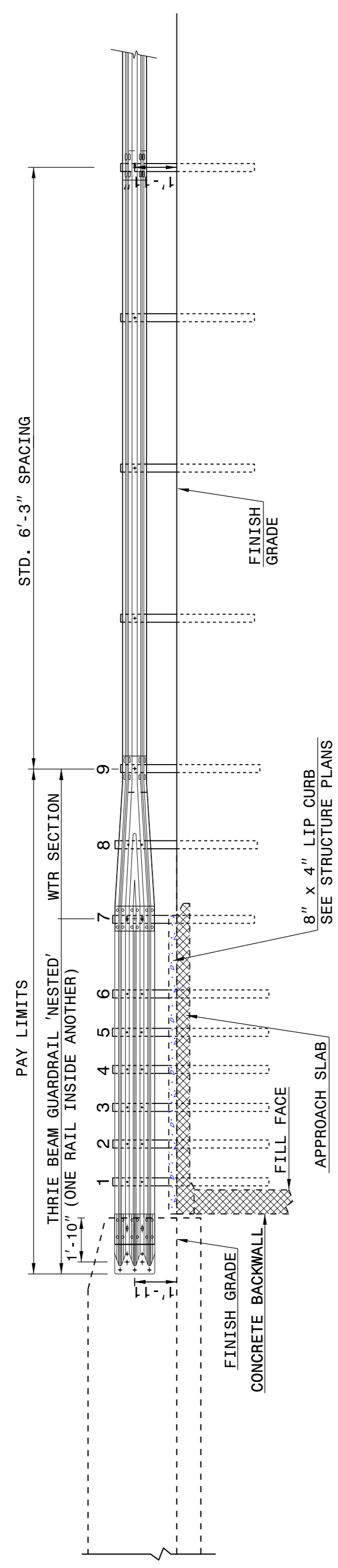


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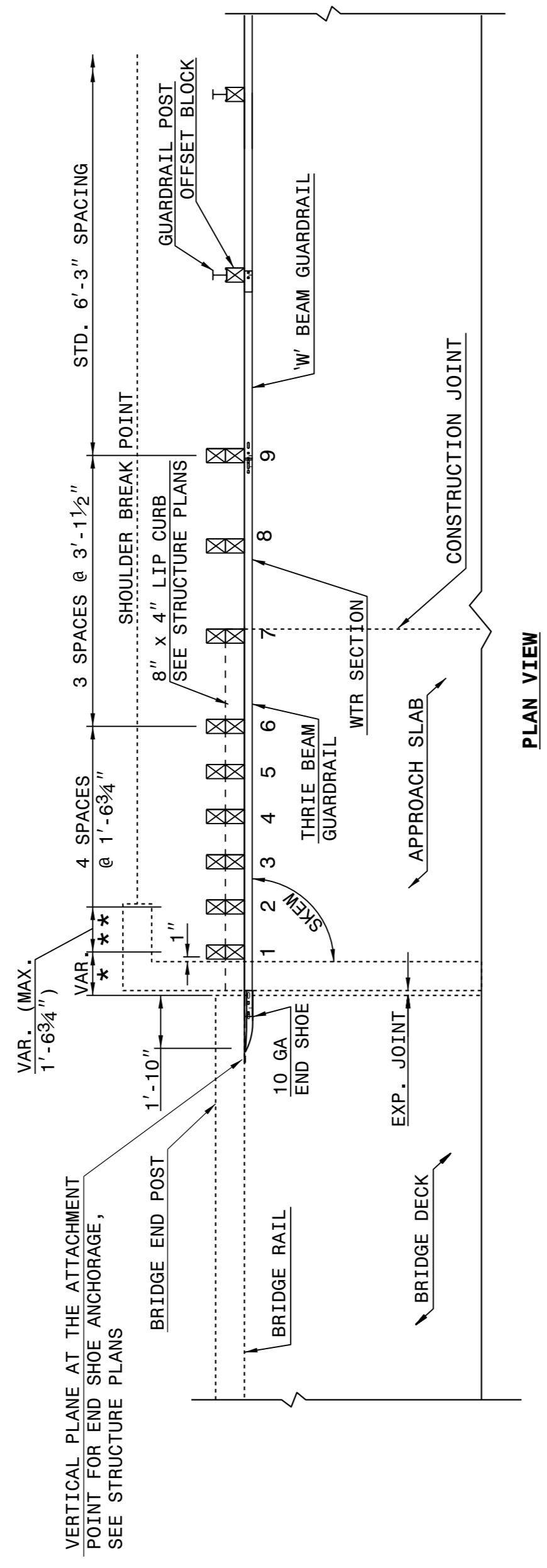
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

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

SHEET 2 OF 7 862d03



NOTE: \*\*POST NOT REQUIRED FOR SKEW ANGLES GREATER THAN 150° OR LESS THAN 30° UNLESS OTHERWISE DIRECTED BY THE ENGINEER. \*THE DISTANCE FROM END OF BRIDGE RAIL TO CENTER LINE OF THE FIRST POST SHOULD BE 11 1/2". IF CONCRETE BACKWALL IS NOT PRESENT. -SHOULDER BERM GUTTER MUST BE INSTALLED TO THE LIMITS 8" x 4" LIP CURB IS SHOWN IF ANCHOR UNIT IS NOT ADJACENT TO AN APPROACH SLAB. -MEASURE GUARDRAIL HEIGHT FROM THE TOP OF ADJACENT SURFACE (SHOULDER, BERM, OR GUTTER). -LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW. -SEE SHEET 3 FOR POST SECTIONS 1 THRU 9.



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

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

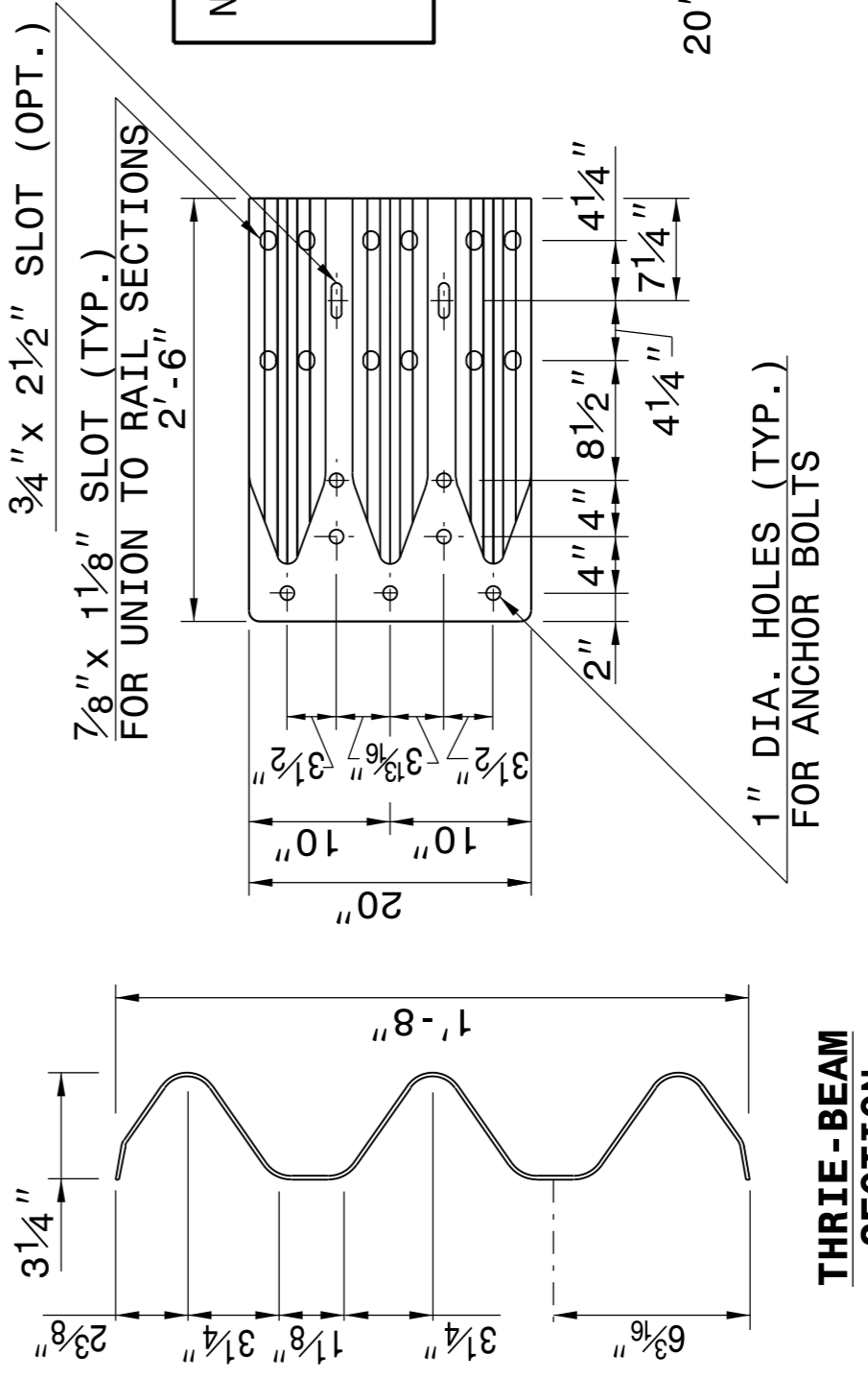
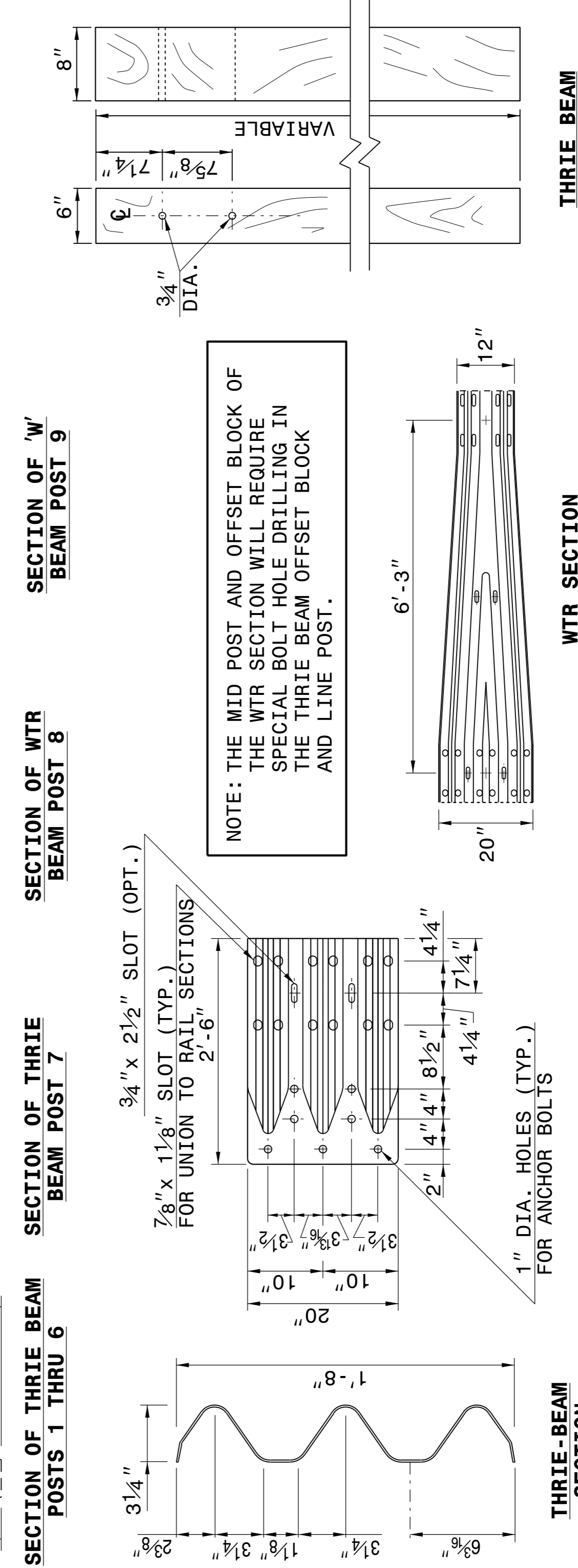
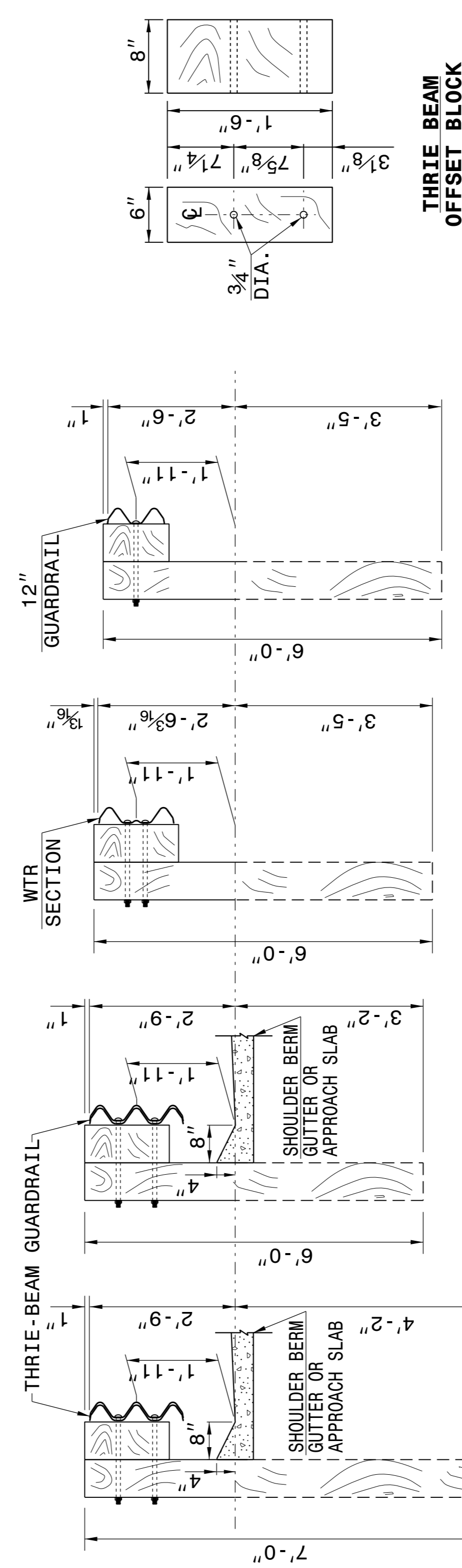
ENGLISH DETAIL DRAWING FOR STRUCTURE ANCHOR UNITS GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO RAIL ON BRIDGE - SUB REGIONAL TIER

SHEET 2 OF 7 862d03

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

ENGLISH DETAIL DRAWING FOR STRUCTURE ANCHOR UNITS GUARDRAIL ANCHOR UNIT, TYPE III

SHEET 3 OF 7 862d03



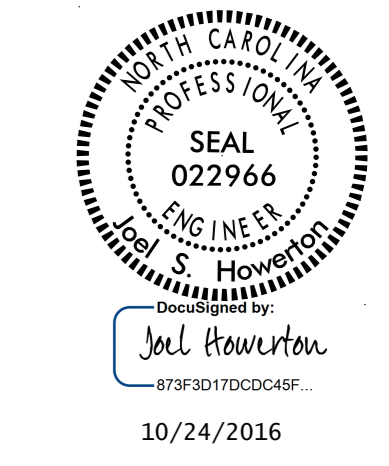
NOTE: THE MID POST AND OFFSET BLOCK OF THE WTR SECTION WILL REQUIRE SPECIAL BOLT HOLE DRILLING IN THE THRIE BEAM OFFSET BLOCK AND LINE POST.

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

ENGLISH DETAIL DRAWING FOR STRUCTURE ANCHOR UNITS GUARDRAIL ANCHOR UNIT, TYPE III

SHEET 3 OF 7 862d03

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



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SEE TITLE BLOCK

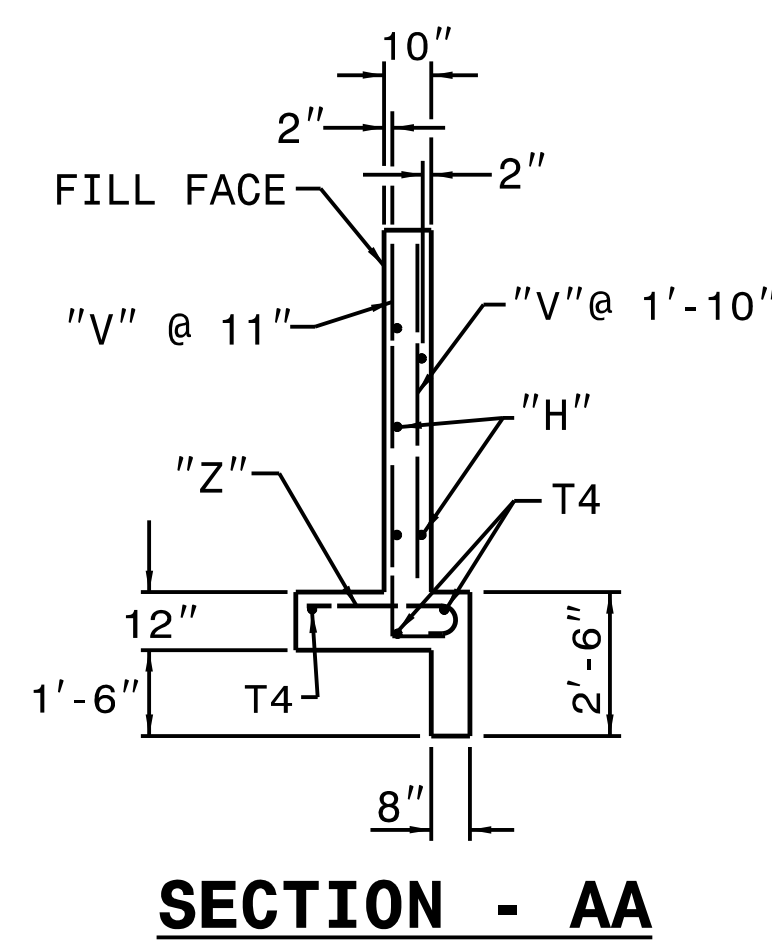
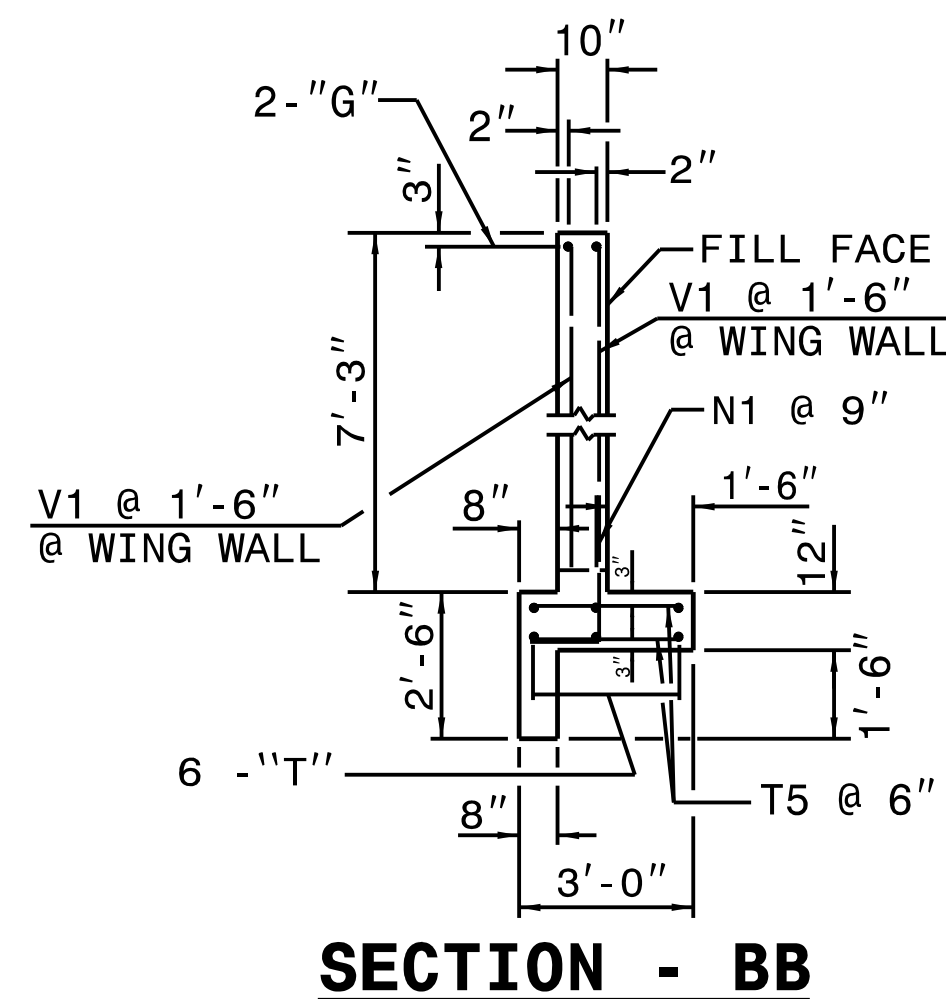
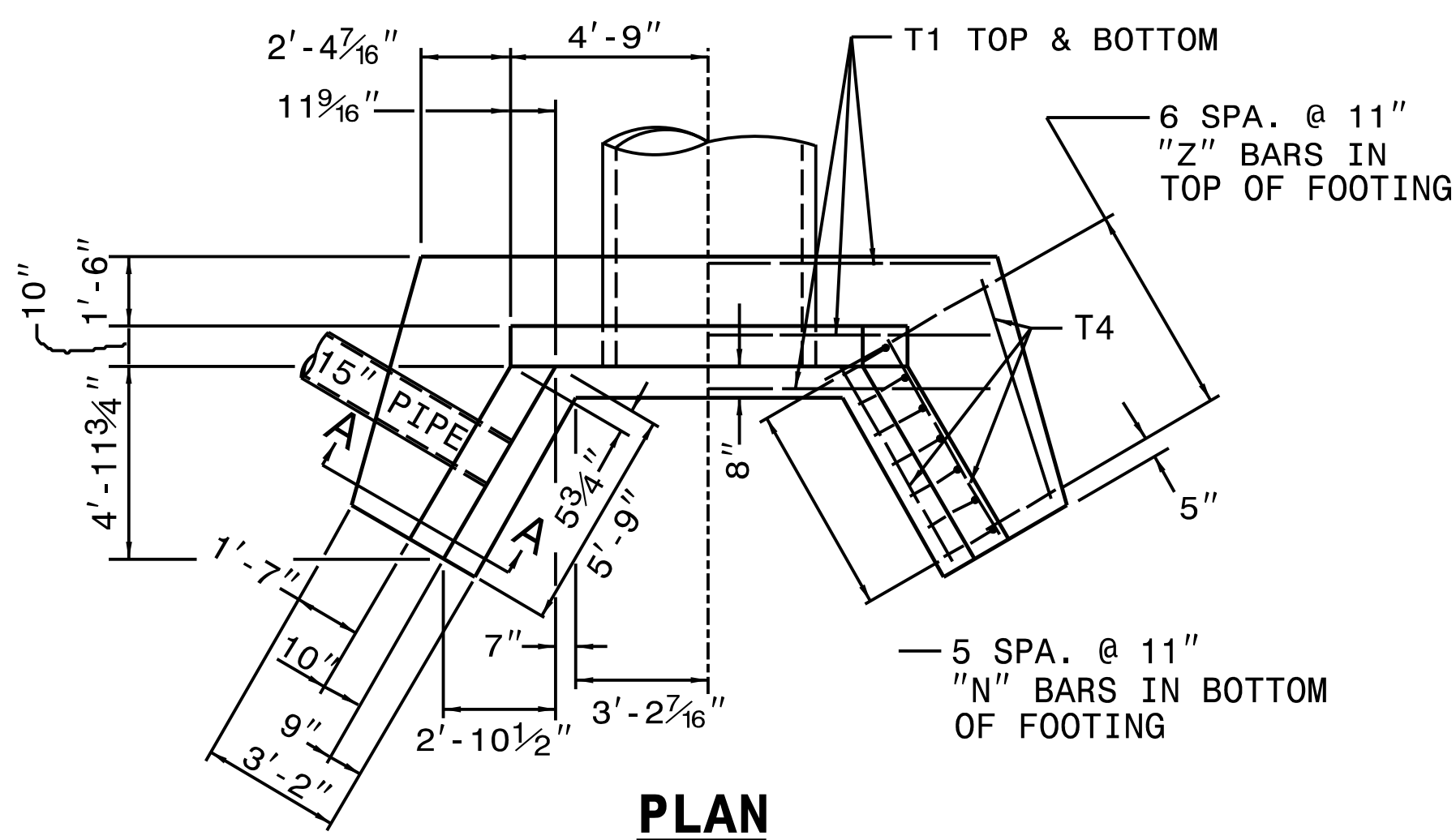
ORIGINAL BY: J HOWERTON DATE: 06-22-12 MODIFIED BY: DATE: CHECKED BY: DATE: FILE SPEC.:



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

ENGLISH DETAIL DRAWING FOR  
**REINFORCED CONCRETE ENDWALL**  
FOR SINGLE 66" PIPE 90° SKEW

SHEET OF  
**838D33**

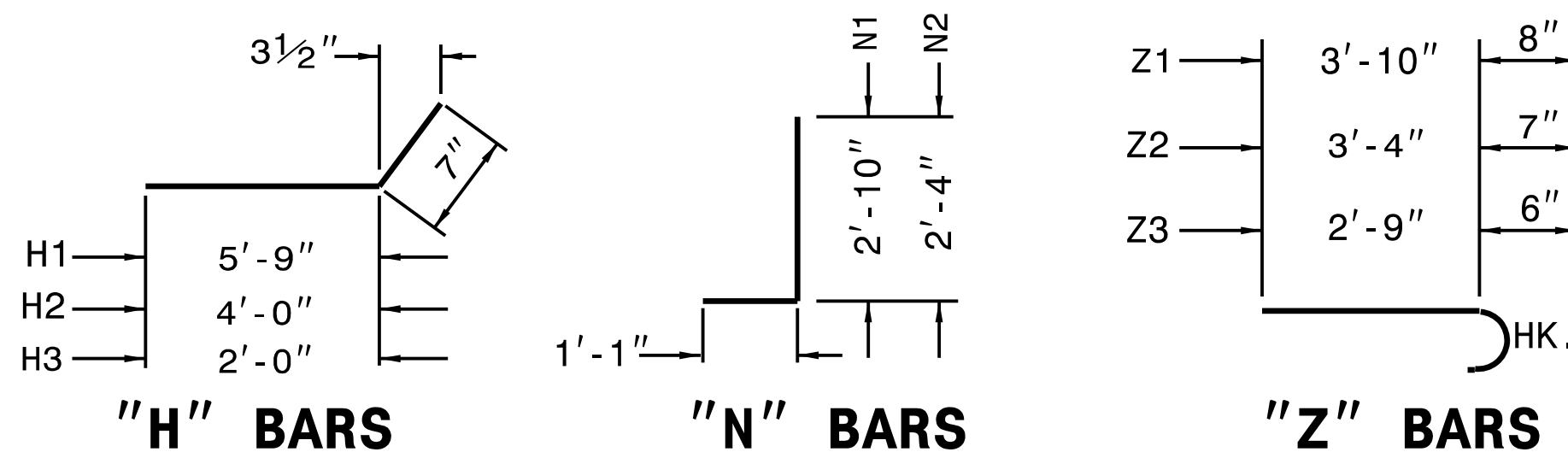
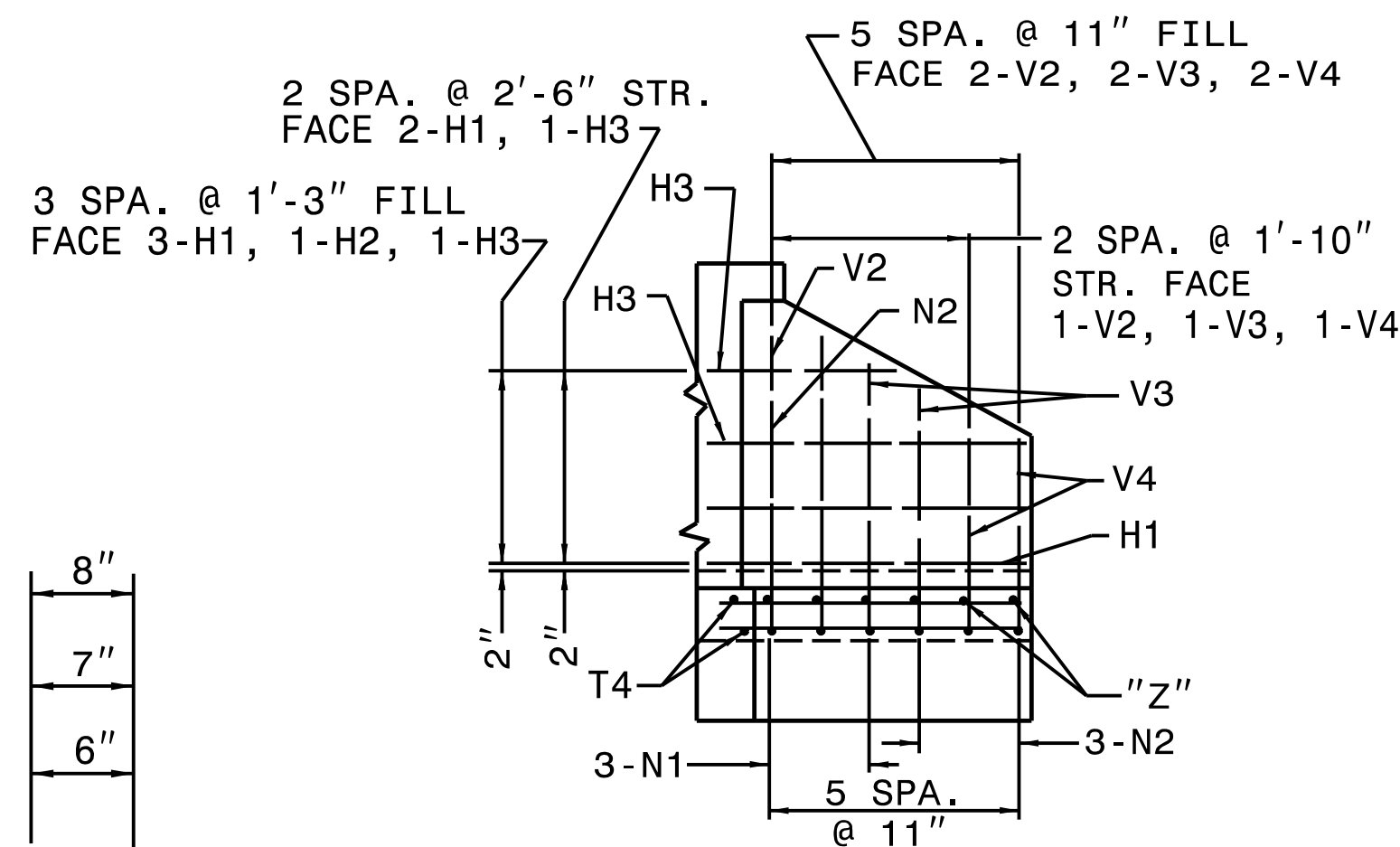
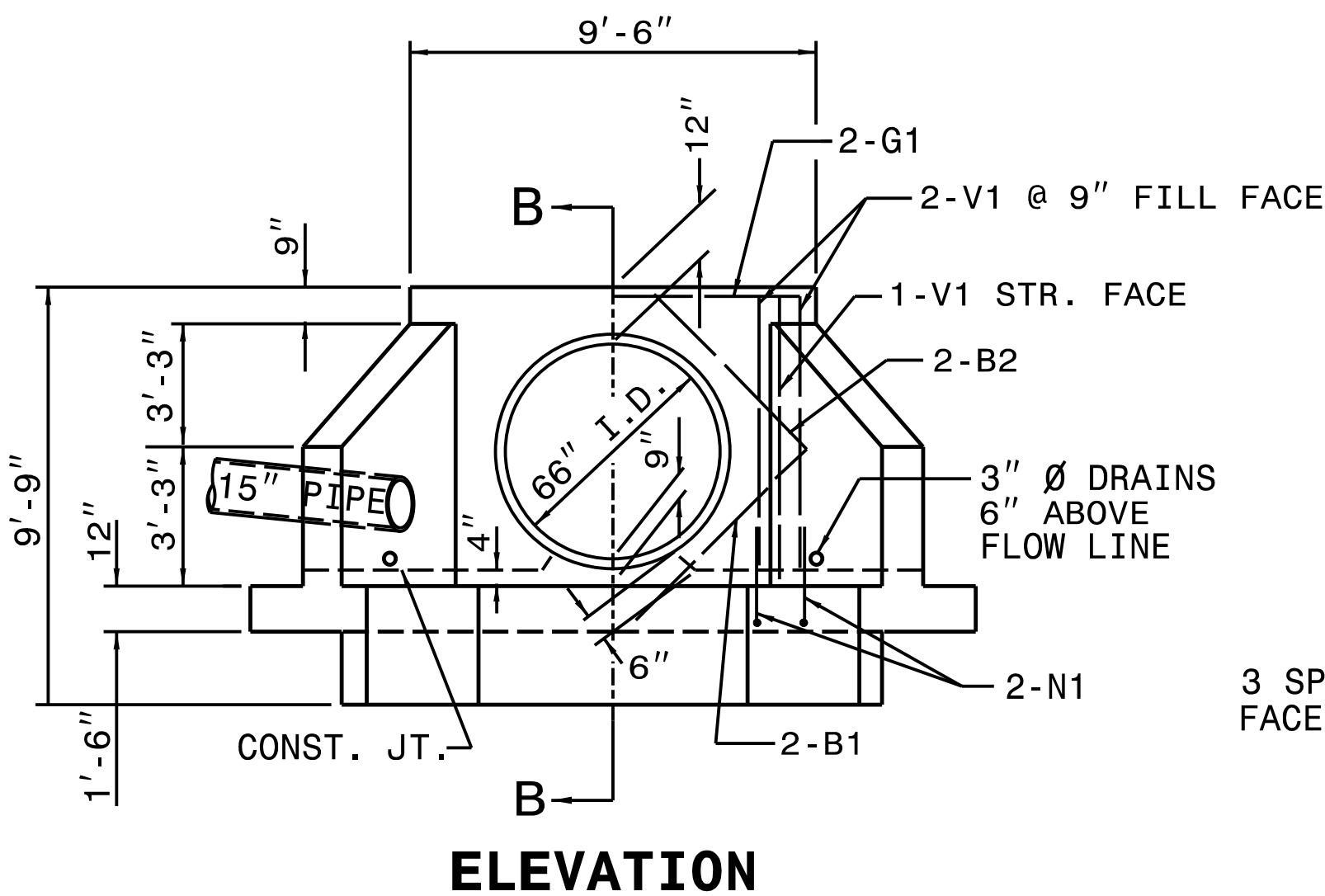


SEE STD. DWG. 838.45 FOR GENERAL NOTES.

**BILL OF MATERIAL FOR ENDWALL**

REINF. STEEL			1 PIPE	
BAR	SIZE	LENGTH	NO.	WEIGHT
B1	#4	5'-6"	4	15
B2	#4	4'-6"	4	12
G1	#7	9'-2"	2	37
H1	#4	6'-4"	10	42
H2	#4	4'-7"	2	6
H3	#4	2'-7"	4	7
N1	#5	3'-11"	10	41
N2	#4	3'-5"	6	14
T1	#4	13'-8"	6	55
T4	#4	6'-0"	6	24
T5	#4	2'-6"	38	63
V1	#4	6'-9"	6	27
V2	#4	5'-2"	6	21
V3	#4	4'-1"	6	16
V4	#4	2'-11"	6	12
Z1	#6	4'-6"	6	41
Z2	#5	3'-11"	4	16
Z3	#4	3'-3"	4	9

REINF. STEEL LBS.	458
CON./R.C. CU. YDS	6.3



"H", "N", & "Z" BAR DIMENSIONS ARE OUT TO OUT.

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

ENGLISH DETAIL DRAWING FOR  
**REINFORCED CONCRETE ENDWALL**  
FOR SINGLE 66" PIPE 90° SKEW

SHEET OF  
**838D33**

\$\$\$\$SYTIME\$\$\$\$  
\$\$\$\$CUSTNAME\$\$\$\$  
\$\$\$\$USER\$\$\$\$



DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

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

**SEE TITLE BLOCK**

ORIGINAL BY: DATE:  
MODIFIED BY: K. KEMPF DATE: 09-22-16  
CHECKED BY: DATE:  
FILE SPEC.: english18-5398\_838D3301.dgn

STATE OF NORTH CAROLINA  
 DIVISION OF HIGHWAYS

**SUMMARY OF EARTHWORK**  
 IN CUBIC YARDS

STATION	STATION	UNCL. EXCAV.	EMBANK. +%	BORROW	WASTE
12+50	15+48.75	279	93		186
	SUBTOTAL	279	93		186
17.41+25	20+10	72	561	489	
	SUBTOTAL	72	561	489	
	SUBTOTAL	351	654	489	186
	TOTAL	351	654	489	186
	LOSS DUE TO CLEARING & GRUBBING	-50			-50
	WASTE IN LIEU OF BORROW			-136	-136
	PROJECT TOTAL	301	654	353	0
	EST. 5% TO REPLACE TOP SOIL ON BORROW PIT			18	
	GRAND TOTALS:	301		371	
	SAY:	325		400	

SHALLOW UNDERCUT EXCAVATION CONTINGENCY PER GEOTECH REPORT = 50 CUBIC YARDS  
 UNDERCUT EXCAVATION CONTINGENCY PER GEOTECH REPORT = 100 CUBIC YARDS  
 SELECT GRANULAR MATERIAL CONTINGENCY PER GEOTECH REPORT = 100 CUBIC YARDS  
 CLASS IV SUBGRADE STABILIZATION CONTINGENCY PER GEOTECH REPORT = 80 TONS

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

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

**SUMMARY OF EXISTING ASPHALT PAVEMENT REMOVAL**

SURVEY LINE	STATION	STATION	LOCATION LT/RT/CL	YD <sup>3</sup>
L	15+00	15+55	CL	122
L	17+55	18+40	CL	189
TOTAL:				311
SAY:				320

**SHOULDER BERM GUTTER SUMMARY**

SURVEY LINE	STATION	STATION	LENGTH
L (LT SIDE)	17+52	17+65	13
L (RT SIDE)	17+52	17+65	13
TOTAL:			26
SAY:			30

**EXPRESSWAY GUTTER SUMMARY**

SURVEY LINE	STATION	STATION	LENGTH
L (LT SIDE)	12+88	14+30	142
TOTAL:			142
SAY:			145

"N" = DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL.  
 TOTAL SHOULDER WIDTH = DISTANCE FROM EDGE OF TRAVEL LANE TO SHOULDER BREAK POINT.  
 FLARE LENGTH = DISTANCE FROM LAST SECTION OF PARALLEL GUARDRAIL TO END OF GUARDRAIL.  
 W = TOTAL WIDTH OF FLARE FROM BEGINNING OF TAPER TO END OF GUARDRAIL.  
 G = GATING IMPACT ATTENUATOR TYPE 350  
 NG = NON-GATING IMPACT ATTENUATOR TYPE 350

**GUARDRAIL SUMMARY**

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOUL. WIDTH	FLARE LENGTH		W		ANCHORS								IMPACT ATTENUATOR TYPE 350			SINGLE FACED CONCRETE BARRIER	REMOVE EXISTING GUARDRAIL	REMOVE AND STOCKPILE EXISTING GUARDRAIL	REMARKS								
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	XI MOD	XI	GRAU 350 (TL-3)	M-350	TYPE III	CAT-1	VI MOD	BIC	AT-1	EA	G					NG							
L	14+55.00	15+48.75	LT	93.75				15+48.75	2'-11"	VARIES		75		1.5					1																		
L	13+67.50	15+48.75	RT	181.25				14+75	2'-11"	VARIES	162.5		3.25						1																		
L	17+41.25	18+42.25	LT	75.00	56.75			17+41.25	2'-11"	VARIES																											
L	17+41.25	19+22.50	RT	181.25				18+50	2'-11"	VARIES		162.5		3.25					1																		
			SUBTOTAL	531.25	56.75														3																		
			LESS ANCHOR DEDUCTIONS																																		
			GRAU-350 3 @ 50'																																		
			TYPE III 4 @ 18.75'																																		
			TOTAL	306.25	56.75															3																	
			SAY	312.50	62.50			5 ADDITIONAL GUARDRAIL POSTS												3																	



COMPUTED BY: BAW DATE: 8/3/16  
 CHECKED BY: EMT DATE: 8/3/16

PROJECT NO.  
 B-5398

SHEET NO.  
 3G-1

**STATE OF NORTH CAROLINA  
 DIVISION OF HIGHWAYS**

**SUMMARY OF SUBSURFACE DRAINAGE**

LINE	Station	Station	Location	Drain Type*	LF
				SD	250
				TOTAL LF:	250

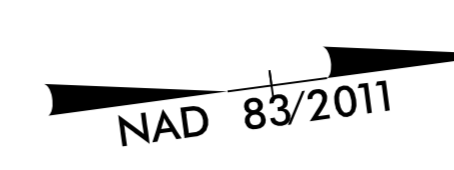
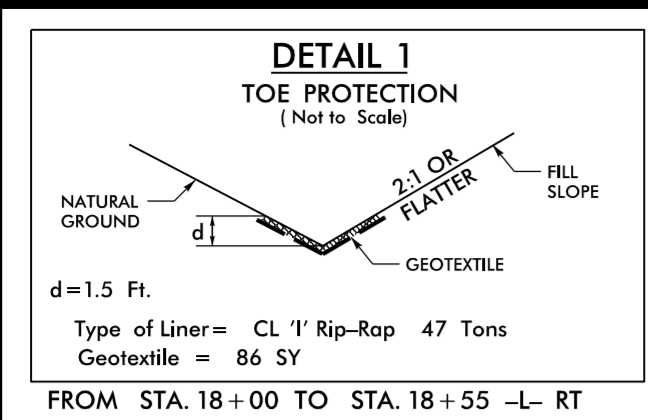
\*UD = Underdrain  
 \*BD = Blind Drain  
 \*SD = Subsurface Drain

**SUMMARY OF AGGREGATE SUBGRADE/STABILIZATION**

LINE	Station	Station	Aggregate Type ASU/AST	Aggregate Thickness INCHES	Shallow Undercut CY	Class IV Subgrade Stabilization TONS	Geotextile for Soil Stabilization SY	Stabilizer Aggregate TONS	Class IV Aggregate Stabilization TONS
			ASU		50	80	50		
			TOTAL CY/TONS/SY:		50	80	50*	0	0

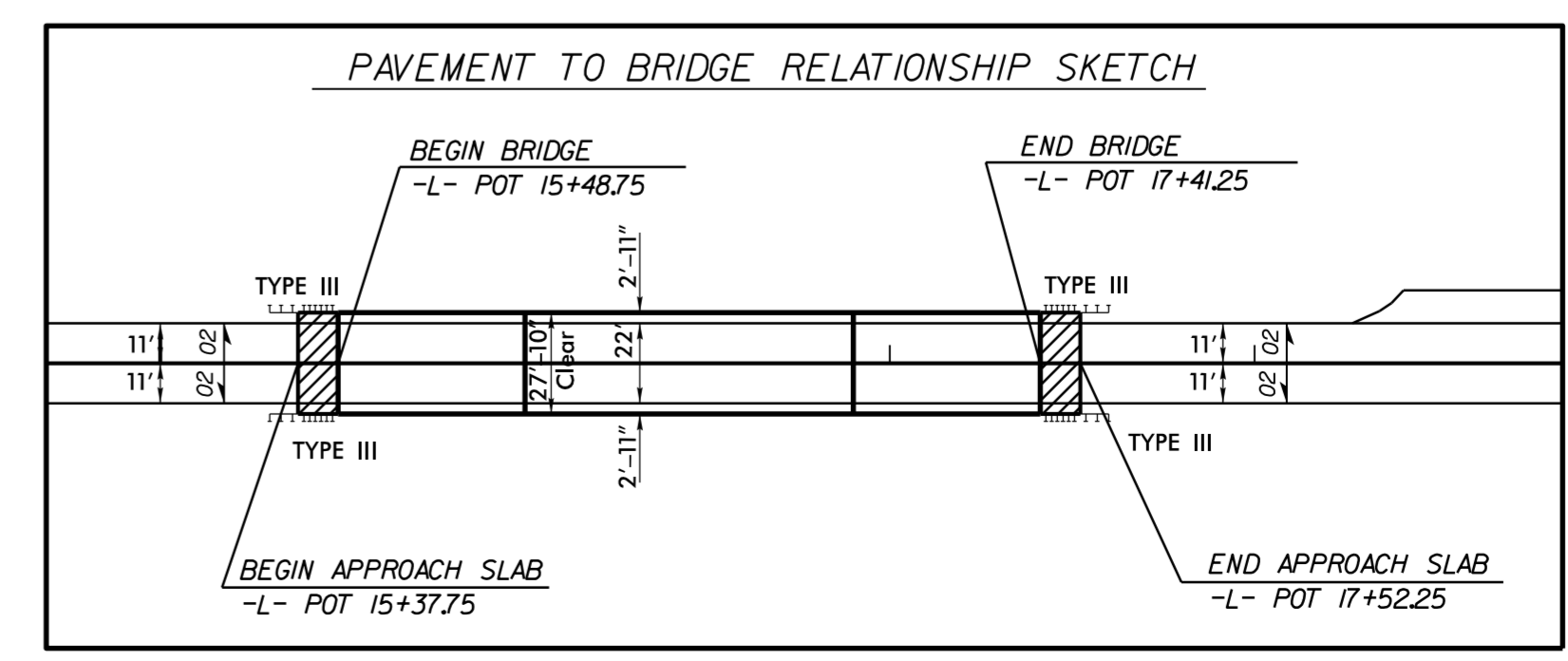
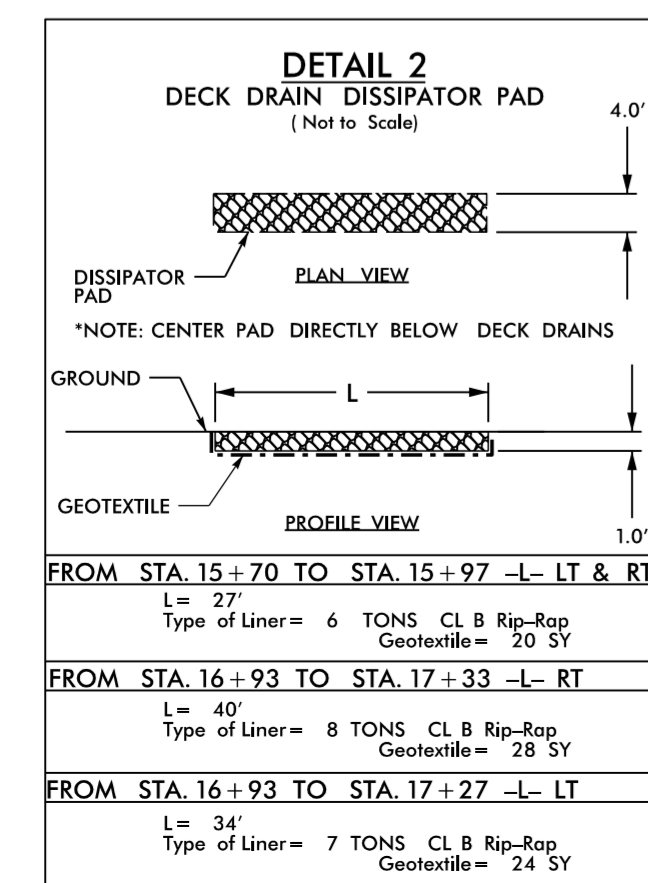
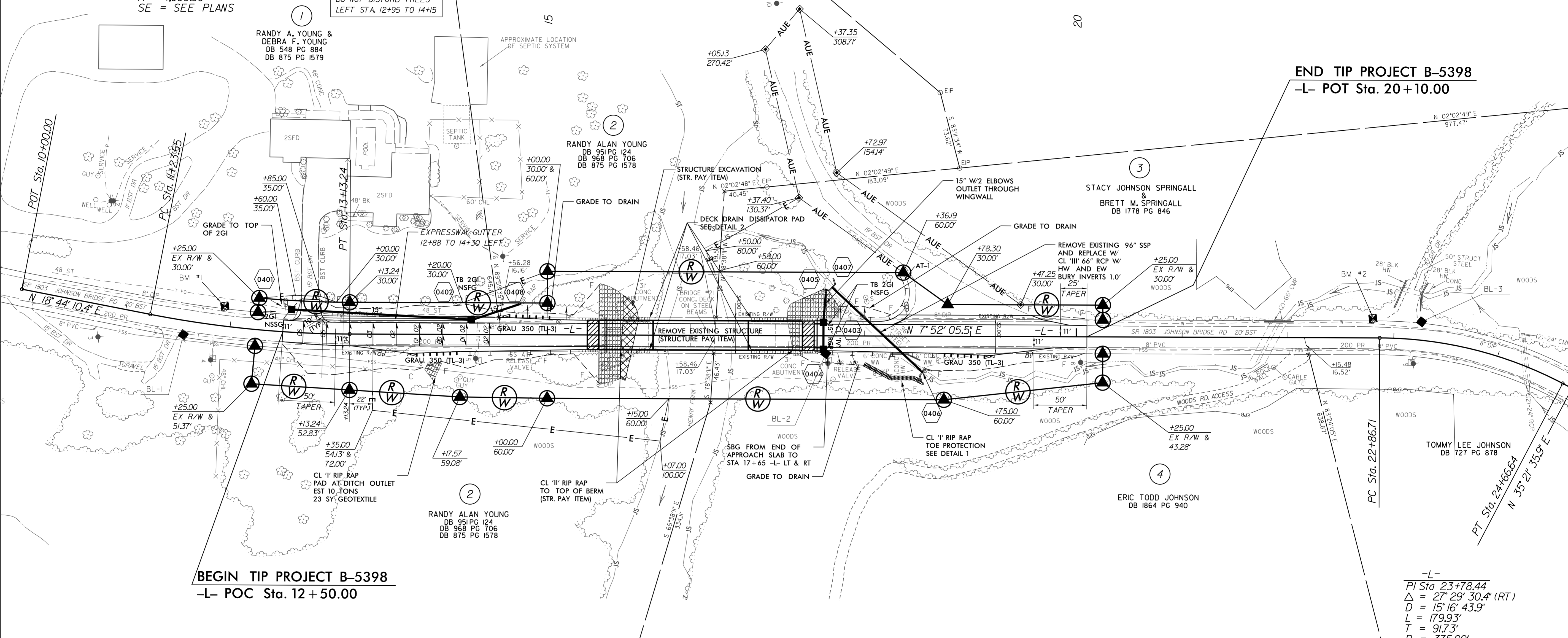
ASU = Aggregate Subgrade, AST = Aggregate Stabilization

\*Total square yards of Geotextile for Soil Stabilization is only the estimated quantity for ASU/AST and may only represent a portion of the geotextile quantity shown in the Item Sheets of the Proposal.



-L-  
PI Sta 12+18.68  
 $\Delta = 10^\circ 52' 04.9''$  (LT)  
D = 5' 43' 46.5"  
L = 189.68'  
T = 95.13'  
R = 1,000.00'  
SE = SEE PLANS

DO NOT DISTURB TREES  
LEFT STA. 12+95 TO 14+15



SEE SHEET 5 FOR PROFILE  
SEE SHEETS S-1 THRU S-34 FOR STRUCTURE DETAILS

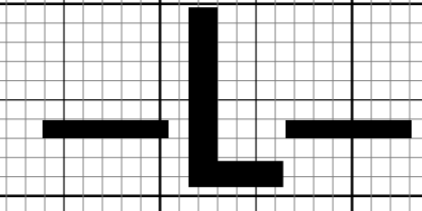
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5/14/19

**CH ENGINEERING**  
 3220 GLEN ROYAL RD. RALEIGH, NC 27617  
 TELE 919.788.0224 FAX 919.788.0232  
 NC LICENSE #P-0189

PROJECT REFERENCE NO. <i>B-5398</i>	SHEET NO. 5
ROADWAY DESIGN ENGINEER <i>Brian A. Williams</i>	HYDRAULICS ENGINEER <i>Joshua G. Dalton</i>
SEAL 16689 10/24/2016	SEAL 26971 10/24/2016

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED



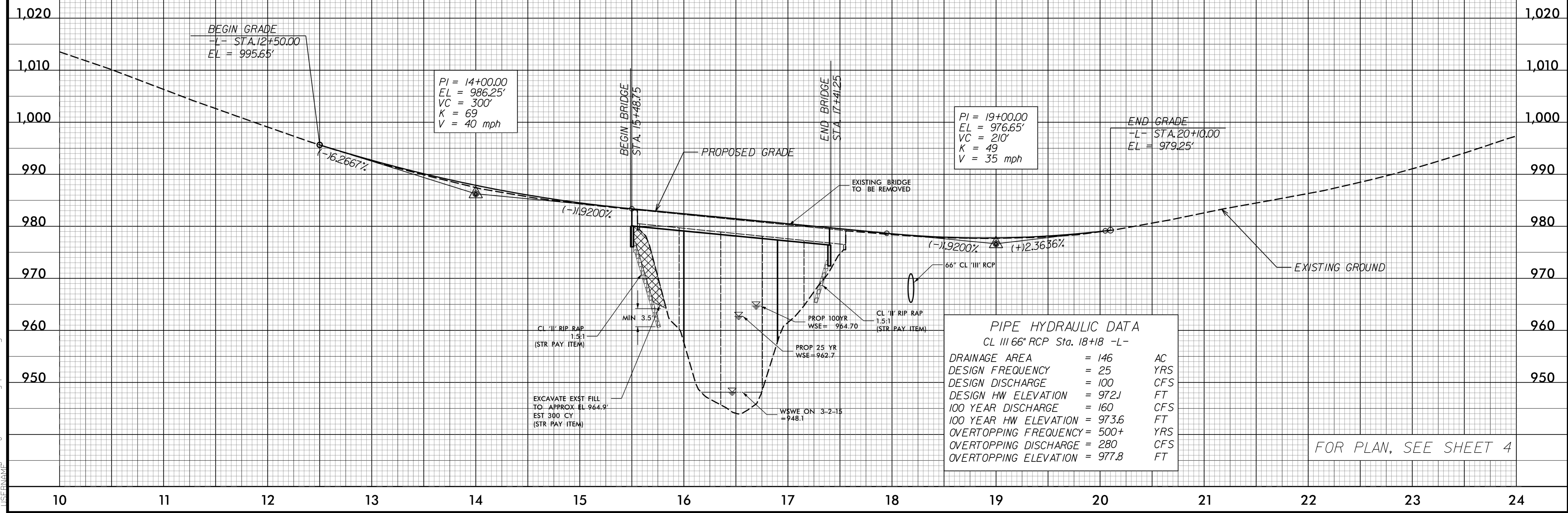
**BRIDGE HYDRAULIC DATA**

DESIGN DISCHARGE = 8,300 CFS  
 DESIGN FREQUENCY = 25 YRS  
 DESIGN HW ELEVATION = 962.7 FT  
 BASE DISCHARGE = 11,000 CFS  
 BASE FREQUENCY = 100 YRS  
 BASE HW ELEVATION = 964.70 FT  
 OVERTOPPING DISCHARGE = 40,000 CFS  
 OVERTOPPING FREQUENCY = 500+ YRS  
 OVERTOPPING ELEVATION = 977.8 FT

DATE OF SURVEY = 3-2-15  
 W.S. ELEVATION AT DATE OF SURVEY = 948.1 FT

BM 1 ELEV = 998.94'  
 N 714,382 E 1,272,559  
 -L- STA 11+92.62 18.83' LEFT  
 MARKED (WESTERN MOST) BOLT ON BOTTOM  
 FLANGE ON FIRE HYDRANT, SOUTH OF BRIDGE

BM 2 ELEV = 988.73'  
 N 715,456 E 1,272,715  
 -L- STA 22+80.29 18.37' LEFT  
 MARKED (WESTERN MOST) BOLT ON BOTTOM  
 FLANGE ON FIRE HYDRANT, NORTH OF BRIDGE



**PIPE HYDRAULIC DATA**  
 CL III 66" RCP Sta. 18+18 -L-

DRAINAGE AREA = 146 AC  
 DESIGN FREQUENCY = 25 YRS  
 DESIGN DISCHARGE = 100 CFS  
 DESIGN HW ELEVATION = 972.1 FT  
 100 YEAR DISCHARGE = 160 CFS  
 100 YEAR HW ELEVATION = 973.6 FT  
 OVERTOPPING FREQUENCY = 500+ YRS  
 OVERTOPPING DISCHARGE = 280 CFS  
 OVERTOPPING ELEVATION = 977.8 FT

FOR PLAN, SEE SHEET 4

10/19/2016  
N:\Projects\B5398\_Rdy.p1\_05.dgn