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TIP PROJECT: U-5818

CONTRACT: C204341

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5818	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
44390.1.1		PE
44390.2.1		ROW /UTIL.
44390.3.1		CONST.

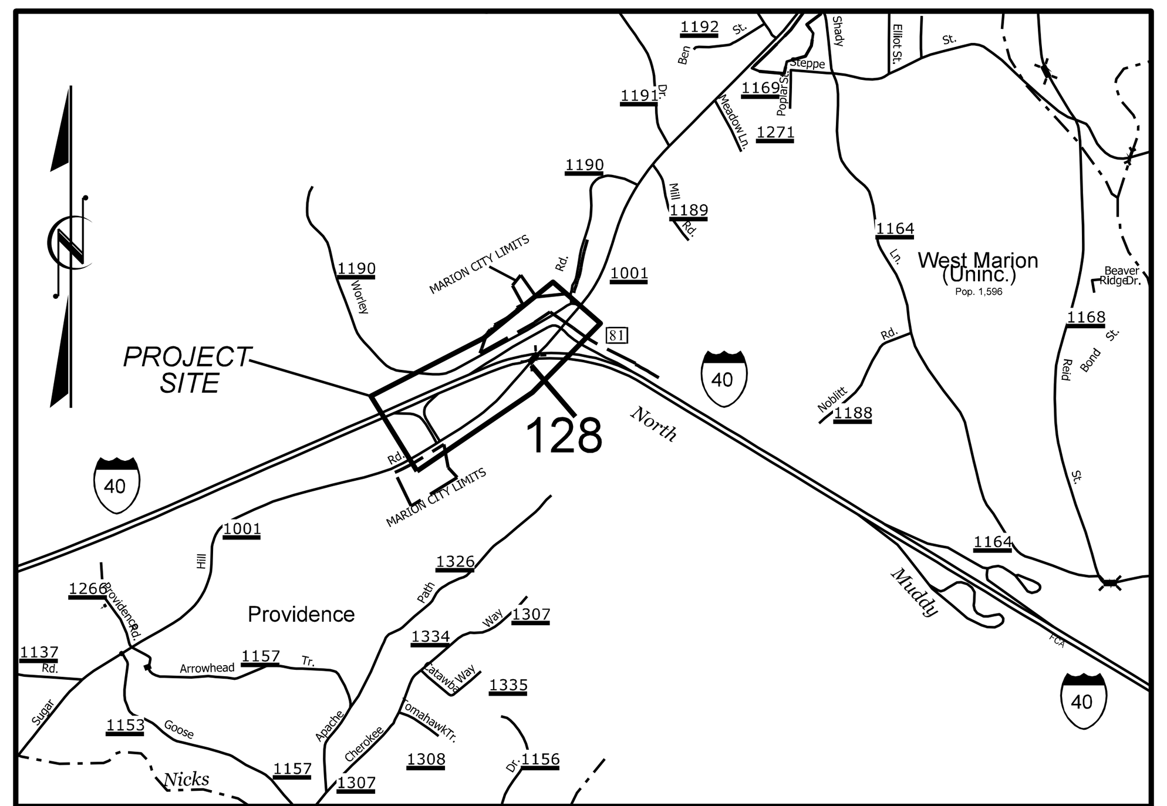
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

McDOWELL COUNTY

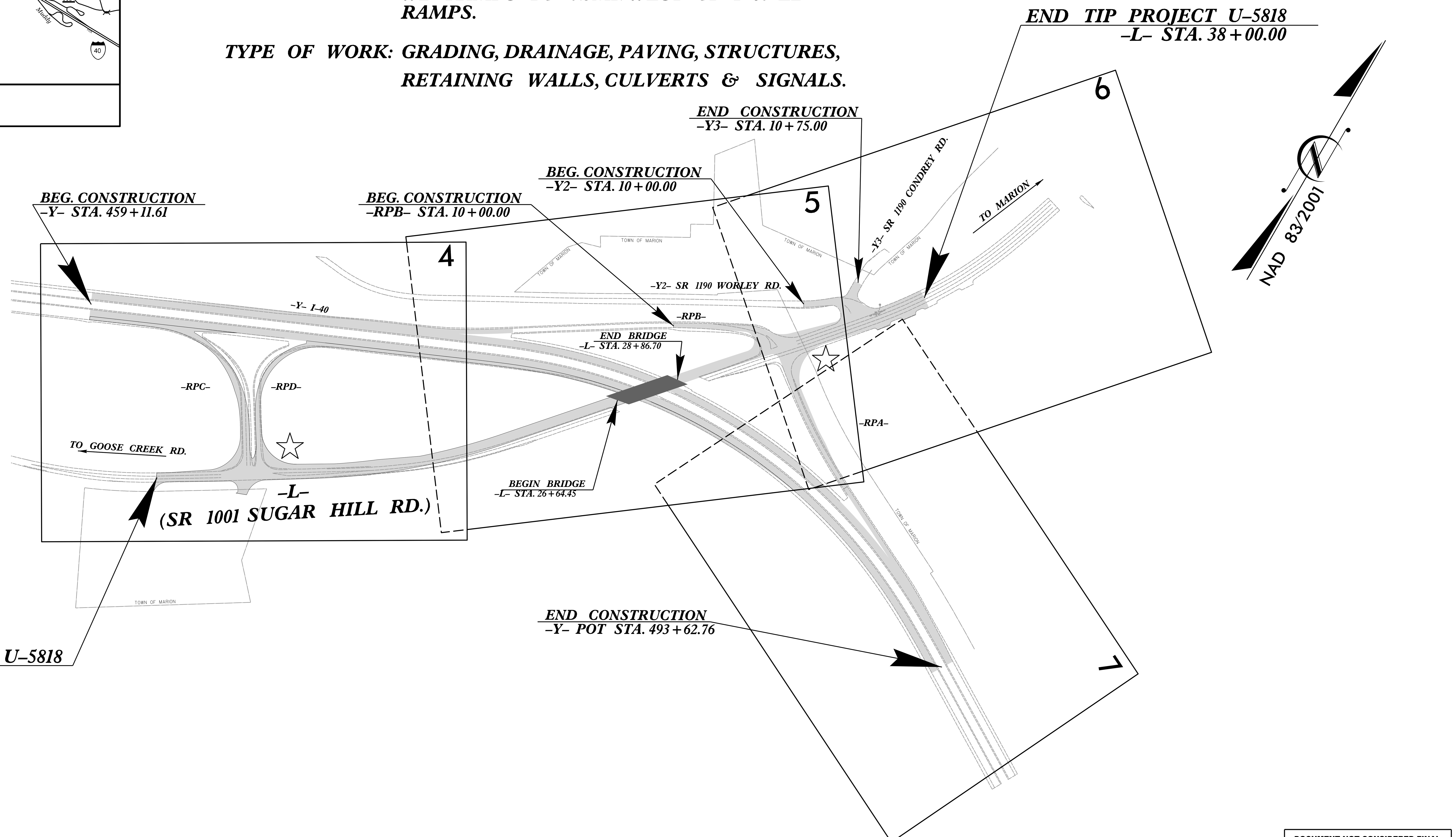
LOCATION: SR 1001 (SUGAR HILL RD.) FROM I-40 WB RAMPS TO 0.3MI. WEST OF I-40 EB RAMPS.

TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURES, RETAINING WALLS, CULVERTS & SIGNALS.

See Sheet 1-A For Index of Sheets



VICINTY MAP



REVISED SIGNALS = ☆

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2019 = 12,000
ADT 2040 = 15,600
K = 10 %
D = 55 %
T = 3 % *
V = 50 MPH
* TTST = 1% DUAL = 2%
FUNC. CLASS = URBAN MINOR COLLECTOR

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-5818	=	0.488 MILES
LENGTH STRUCTURE TIP PROJECT U-5818	=	0.042 MILES
TOTAL LENGTH TIP PROJECT U-5818	=	0.530 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 13
55 Orange Street
Asheville NC, 28801

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
JUNE 15, 2018

LETTING DATE:
JUNE 18, 2019

GREG PURVIS, PE
PROJECT ENGINEER

ROBERT O'DELL
PROJECT DESIGN ENGINEER

NCDOT CONTACT: MIKE G. CLARK
DIVISION PROJECT DEVELOPMENT ENGINEER

HYDRAULICS ENGINEER 3/21/2019
DocuSigned by: Max S. Price 82CBB0D6FEB1484...
NORTH CAROLINA PROFESSIONAL SEAL 23993 ENGINEER MAX S. PRICE

ROADWAY DESIGN ENGINEER 3/21/2019
DocuSigned by: Greg S. Purvis D1F0F7C256E3403...
NORTH CAROLINA PROFESSIONAL SEAL 22999 ENGINEER GREG S. PURVIS

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

12/2/2016

PROJECT REFERENCE NO.	SHEET NO.
U-5818	1-A

ROADWAY DESIGN ENGINEER
5/9/2019

NORTH CAROLINA PROFESSIONAL SEAL 22999 ENGINEER GREG S PURVIS

Greg S. Purvis

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

INDEX OF SHEETS

SHEET NUMBER	SHEET
1	TITLE SHEET
1A	INDEX OF SHEETS, GENERAL NOTES, AND STANDARD DRAWINGS
1B	CONVENTIONAL SYMBOLS
2A-1 THRU 2A-6	PAVEMENT SCHEDULE AND TYPICAL SECTIONS
2C-1 THRU 2C-5	SPECIAL DETAILS
2D-1	DRAINAGE DETAILS
2G-1 THRU 2G-4	GEOTECHNICAL DETAILS
3B-1 THRU 3B-3	ROADWAY SUMMARIES
3D-1 THRU 3D-4	DRAINAGE SUMMARIES
3G-1	GEOTECHNICAL SUMMARY SHEET
3P-1	PARCEL INDEX SHEET
4 THRU 12	PLAN AND PROFILE SHEET
RW-01 THRU RW-07	SURVEY CONTROL SHEETS
TMP-1 THRU TMP-36	TRAFFIC MANAGEMENT PLANS
PMP-1 THRU PMP-06	PAVEMENT MARKING PLANS
EC-1 THRU EC-11	EROSION CONTROL PLANS
RF-1	REFORESTATION PLANS
SIGN-1 THRU SIGN-8	SIGNING PLANS
SIG-1 THRU SIG-15	SIGNAL PLANS
SIG-M1THRU SIG-M8	METAL POLES PLANS
SCP-1 THRU SCP-9	SIGNAL COMMUNICATION PLANS
UC-1 THRU UC-6	UTILITIES CONSTRUCTION PLANS
UO-1 THRU UO-3	UTILITIES BY OTHERS PLANS
X-1A THRU X-1B	CROSS-SECTION SUMMARY SHEET
X-1 THRU X-57	CROSS-SECTIONS
S-1 THRU S-49	STRUCTURE PLANS
C-1 THRU C-7	CULVERT PLANS
W-1 THRU W-4	MSE WALL PLANS

GENERAL NOTES:

2018 SPECIFICATIONS
EFFECTIVE: 01-16-2018
REVISED:

GRADING AND SURFACING OR RESURFACING AND WIDENING:

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

CLEARING:

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

SUPERELEVATION:

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

SUBSURFACE DRAINS:

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

UNDERDRAINS:

UNDERDRAINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. NO. 815.03 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.

STREET TURNOUT:

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

GUARDRAIL:

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

TEMPORARY SHORING:

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

END BENTS:

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

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE City Of Marion Public Works.

Frontier, PSNC

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

CURB RAMPS

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

EFF. 01-16-2018
REV.

2018 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, 2018 are applicable to this project and by reference hereby are considered a part of these plans:

STD.NO.	TITLE
DIVISION 2 - EARTHWORK	
200.02	Method of Clearing - Method II
225.01	Guide for Grading Subgrade - Interstate and Freeway
225.02	Guide for Grading Subgrade - Secondary and Local
225.03	Deceleration and Acceleration Lanes
225.04	Method of Obtaining Superelevation - Two Lane Pavement
225.05	Method of Obtaining Superelevation - Divided Highways
225.06	Method of Grading Sight Distance at Intersections
225.07	Grading for False Cut at Grade Separations
225.09	Guide for Shoulder and Ditch Transition at Grade Separations
275.01	Rock Plating
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	
610.01	Guide for Paving Shoulders Under Bridges - Method 1
654.01	Pavement Repairs
665.01	Asphalt Shoulders - Milled Rumble Strips
DIVISION 8 - INCIDENTALS	
815.02	Subsurface Drain
815.03	Pipe Underdrain and Blind Drain
838.45	Notes for Reinforced Concrete Endwall - Std. Dwg 838.21 thru 838.40
838.51	Reinforced Brick Endwall - for Single 54" Pipe 90 Skew
840.00	Concrete Base Pad for Drainage Structures
840.01	Brick Catch Basin - 12" thru 54" Pipe
840.02	Concrete Catch Basin - 12" thru 54" Pipe
840.03	Frame, Grates and Hood - for Use on Standard Catch Basin
840.18	Concrete Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.19	Concrete Grated Drop Inlet Type 'D' - 12" thru 36" Pipe
840.20	Frames and Wide Slot Flat Grates
840.22	Frames and Wide Slot Sag Grates
840.27	Brick Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.28	Brick Grated Drop Inlet Type 'D' - 12" thru 36" Pipe
840.34	Traffic Bearing Junction Box - for Use with Pipes 42" and Under
840.35	Traffic Bearing Grated Drop Inlet - for Cast Iron Double Frame and Grates
840.45	Precast Drainage Structure
840.46	Traffic Bearing Precast Drainage Structure
840.54	Manhole Frame and Cover
840.66	Drainage Structure Steps
840.71	Concrete and Brick Pipe Plug
840.72	Pipe Collar
846.01	Concrete Curb, Gutter and Curb & Gutter
846.02	Drop Inlet Installation in Expressway Gutter
846.04	Drop Inlet Installation in Shoulder Berm Gutter
848.01	Concrete Sidewalk
848.03	Driveway Turnout - Drop Curb Type
848.04	Street Turnout
848.05	Curb Ramp - Proposed Curb & Gutter
850.01	Concrete Paved Ditches
852.01	Concrete Islands
857.01	Precast Reinforced Concrete Barrier - 41" Single Faced
862.01	Guardrail Placement
862.02	Guardrail Installation
862.03	Structure Anchor Units
862.04	Anchoring End of Guardrail - B-77 and B-83 Anchor Units
866.02	Woven Wire Fence - with Wood Post
876.01	Rip Rap in Channels
876.02	Guide for Rip Rap at Pipe Outlets
876.04	Drainage Ditches with Class 'B' Rip Rap

12/2/2016

PROJECT REFERENCE NO.	SHEET NO.
U-5818	1-B

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
- Computed Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 123
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB
- Existing Historic Property Boundary — HPB
- Known Contamination Area: Soil — S
- Potential Contamination Area: Soil — S
- Known Contamination Area: Water — W
- Potential Contamination Area: Water — W
- Contaminated Site: Known or Potential

BUILDINGS AND OTHER CULTURE:

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

HYDROLOGY:

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

RAILROADS:

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

RIGHT OF WAY & PROJECT CONTROL:

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

ROADS AND RELATED FEATURES:

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

VEGETATION:

- Single Tree
- Single Shrub
- 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 — P
- 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 — T
- Telephone Pedestal — T
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole — HH
- 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 — W
- 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 — C
- TV Tower
- U/G TV Cable Hand Hole — HH
- 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 — S
- 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.

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

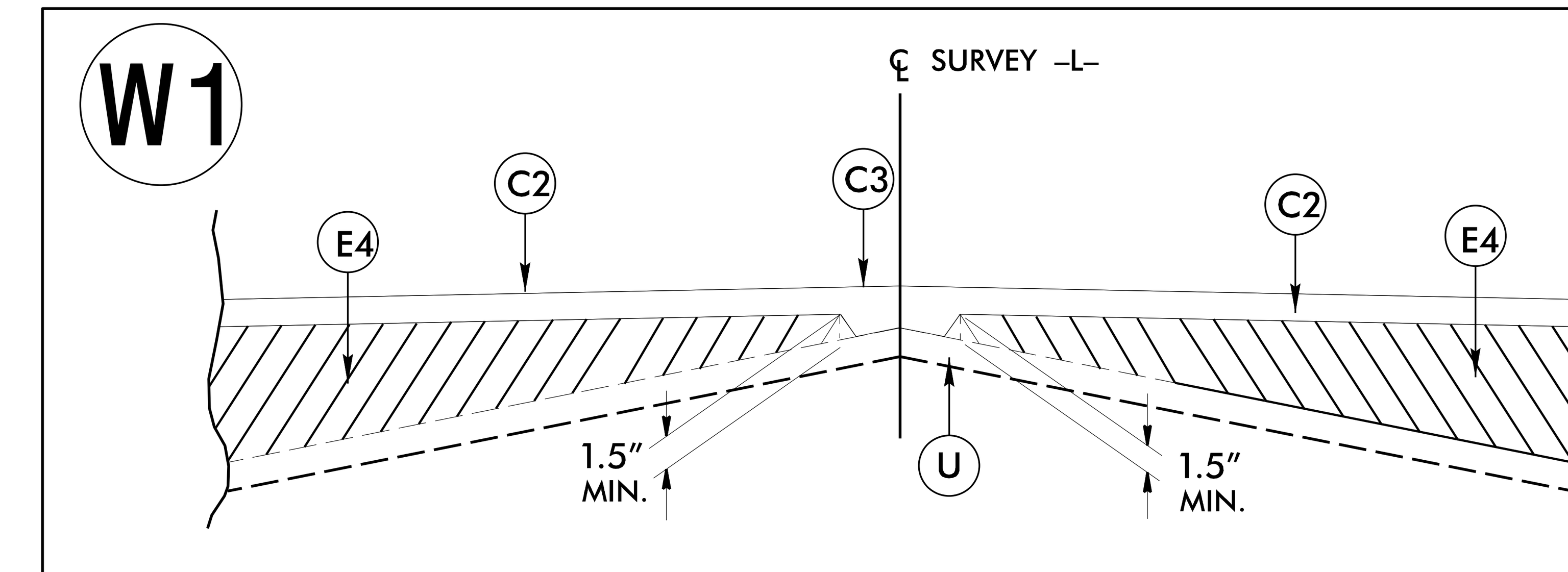
PROJECT REFERENCE NO.	SHEET NO.
U-5818	2A-1
ROADWAY DESIGN ENGINEER 3/28/2019	PAVEMENT DESIGN ENGINEER 3/29/2019
SEAL 22999 NORTH CAROLINA PROFESSIONAL ENGINEER GREG S. PURVIS	SEAL 43228 NORTH CAROLINA PROFESSIONAL ENGINEER BRENDAN W. MERITHEW

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

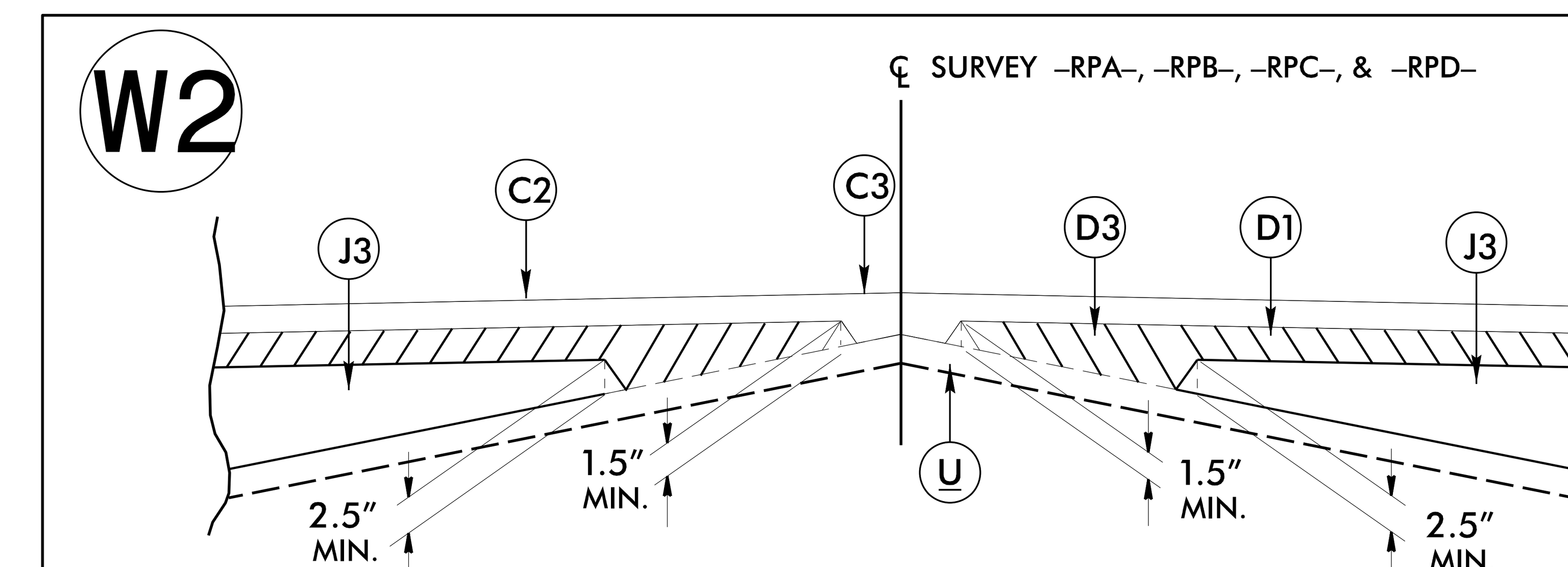
PAVEMENT SCHEDULE

(FINAL PAVEMENT DESIGN)

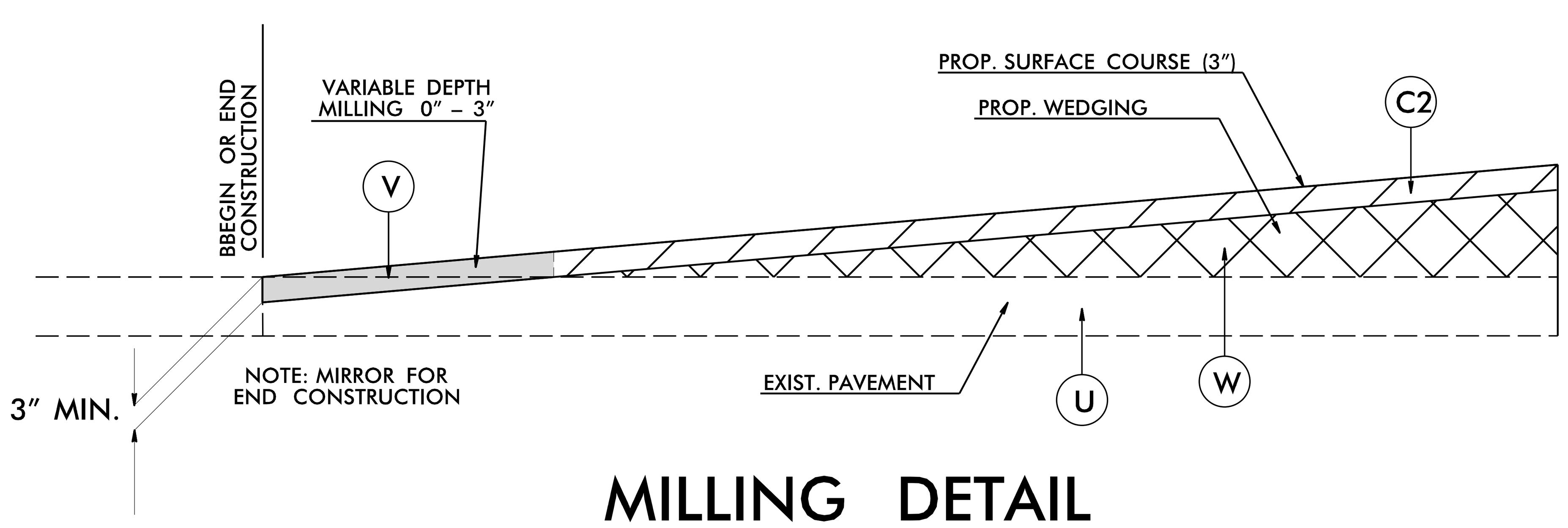
C1	PROP. APPROX. 2½" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 137.5 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	J3	VAR. AGGREGATE BASE COURSE
C2	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 165 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	K	PROP. 8" CLASS IV SUBGRADE STABILIZATION.
C3	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 1½" IN DEPTH.	N	PROP. APPROX. 5/8" ULTRATHIN HOT MIX BONDED WEARING SURFACE COURSE, TYPE B, AT AN AVERAGE RATE OF 70 LBS. PER SQ. YD.
C4	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	N1	GEOTEXTILE FOR PAVEMENT STABILIZATION.
C5	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 2" IN DEPTH.	P	PRIME COAT AT THE RATE OF .35 GAL. PER SQ. YARD.
D1	PROP. APPROX. 2½" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.	R1	2'-6" CONCRETE CURB AND GUTTER.
D2	PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 448 LBS. PER SQ. YD.	S1	4" CONCRETE SIDEWALK.
D3	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2½" IN DEPTH OR GREATER THAN 4" IN DEPTH.	T	EARTH MATERIAL.
E1	PROP. APPROX. 3" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YD.	U	EXISTING PAVEMENT.
E2	PROP. APPROX. 7" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 399 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	V	VARIABLE MILLING.
E3	PROP. APPROX. 7½" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 427.5 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	Y	MILLED RUMBLE STRIPS
E4	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5½" IN DEPTH.	W1	VARIABLE DEPTH ASPHALT PAVEMENT (SEE STANDARD WEDGING DETAIL SHEET No. 2A-1)
J1	PROP. 6" AGGREGATE BASE COURSE.	W2	VARIABLE DEPTH ASPHALT PAVEMENT (SEE STANDARD WEDGING DETAIL SHEET No. 2A-1)
J2	PROP. 8" AGGREGATE BASE COURSE		



Detail Showing Method of Wedging

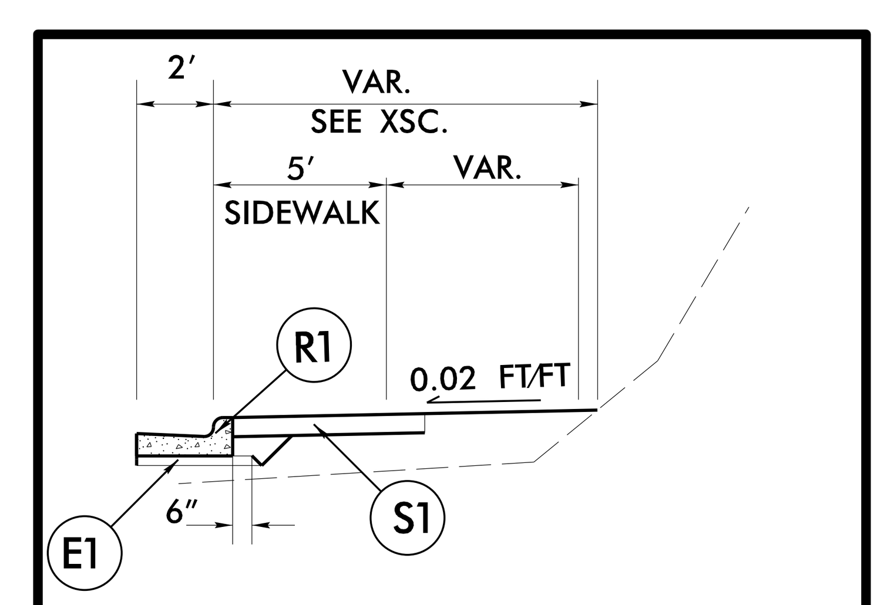


Detail Showing Method of Wedging

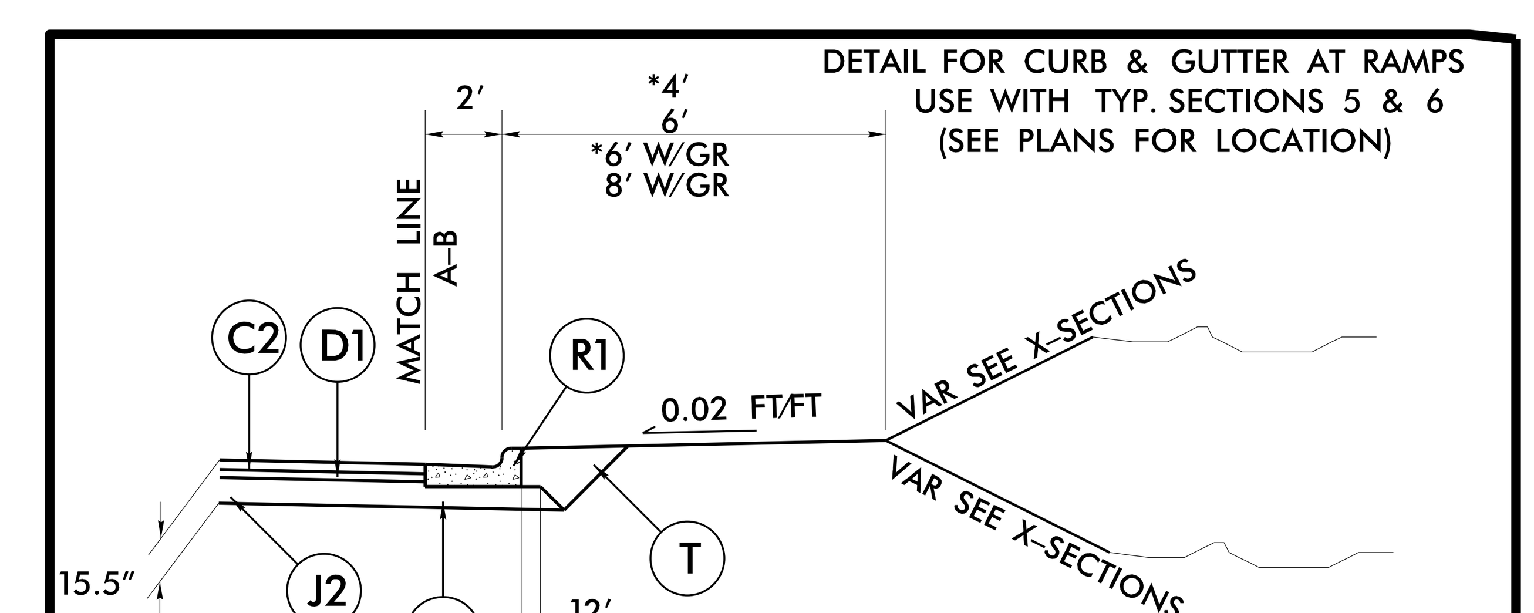


MILLING DETAIL

-L- STA. 10+00.00 TO -L- STA. 12+00.00
-L- STA. 37+00.00 TO -L- STA. 38+00.00
-Y2- STA. 10+00.00 TO -L- STA. 11+00.00
-Y3- STA. 11+50.00 TO -L- STA. 10+75.00
-RPA- STA. 11+00.00 TO -L- STA. 11+50.00
-RPB- STA. 10+00.00 TO -L- STA. 11+00.00
-RPC- STA. 10+00.00 TO -L- STA. 12+50.00
-RPD- STA. 10+00.00 TO -L- STA. 12+00.00



USE WITH TYP SECT. NO. 1
-L- RT. STA 14+75.00 - 15+25.00



-RPC- RT. STA 14+00.00 - 17+49.97
*-RPD- LT. STA 10+00.00 - 16+66.66

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Fax: 919 851 8107
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

PROJECT REFERENCE NO.	SHEET NO.
U-5818	2A-2

ROADWAY DESIGN ENGINEER 3/21/2019 — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22999 GREG S. PURVIS — Greg S. Purvis

PAVEMENT DESIGN ENGINEER 3/22/2019 — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 43228 BRENDAN W. MERITHEW — Brendan Merithew

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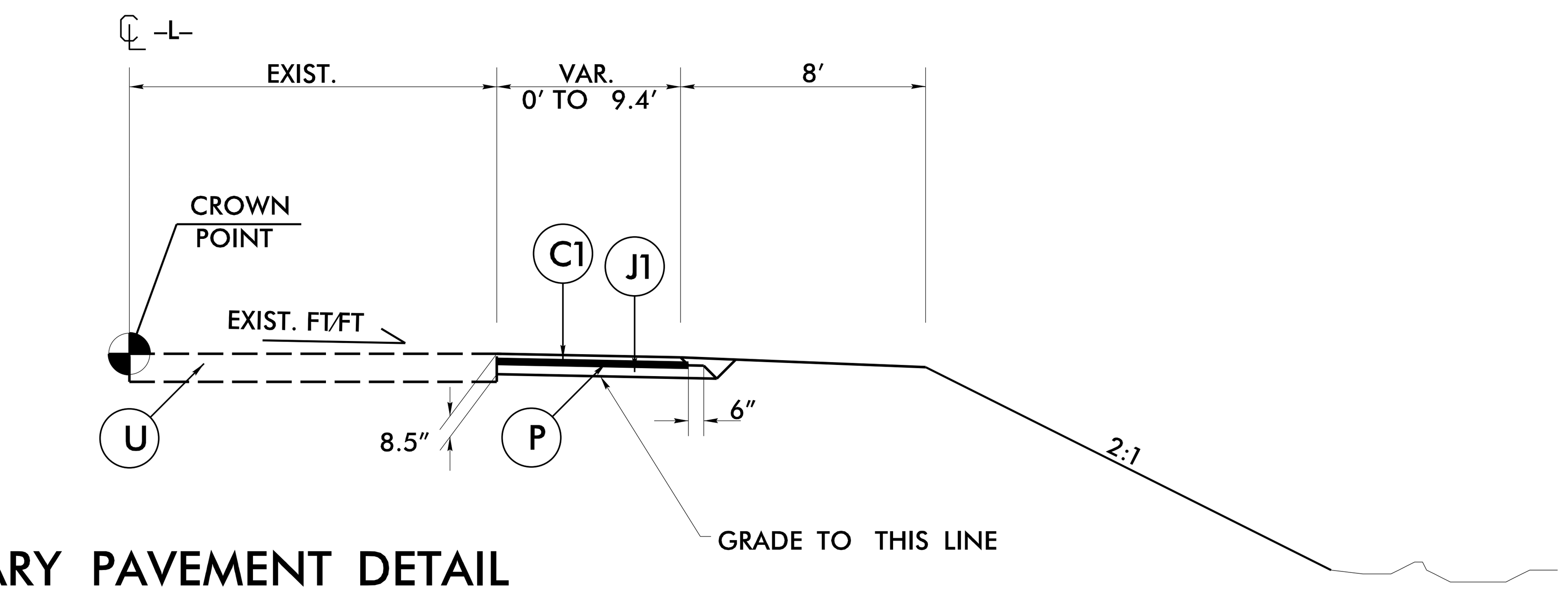
PAVEMENT SCHEDULE
(FINAL PAVEMENT DESIGN)

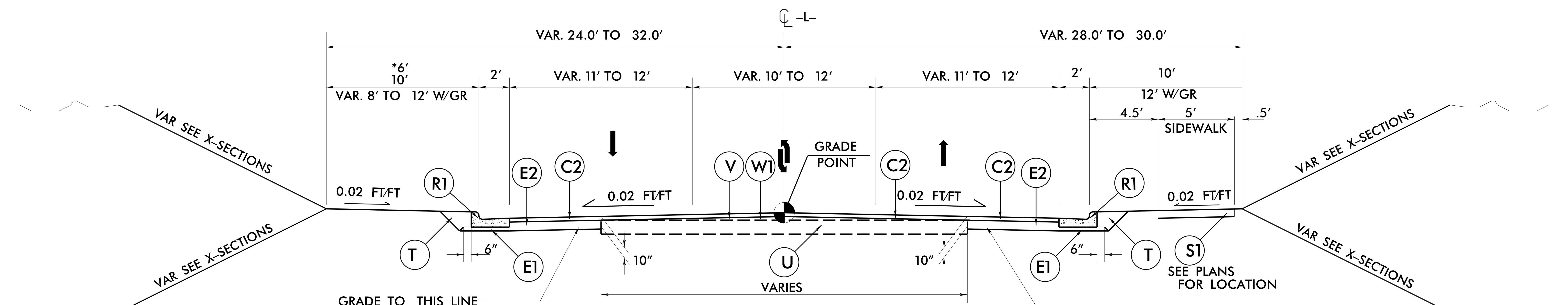
C1	2½" S9.5B
C2	3" S9.5B
C3	VAR. S9.5B
C4	3" S9.5C
C5	VAR. S9.5C
D1	2½" I19.0C
D2	4" I19.0C
D3	VAR. I19.0C
E1	3" B25.0C
E2	7" B25.0C
E3	7.5" B25.0C
E4	VAR. B25.0C
J1	6" ABC
J2	8" ABC
J3	VAR. ABC
K	STABILIZED SUBGRADE
N	5/8" UTBWS
N1	GEOTEXTILE
P	PRIME COAT
R1	2'-6" C & G
S1	4" SIDEWALK
T	EARTH MATERIAL
U	EXIST. PAVEMENT
Y	MILLED RUM. STRIPS
V	VAR. MILLING
W1	WEDGING
W2	WEDGING



TEMPORARY PAVEMENT DETAIL

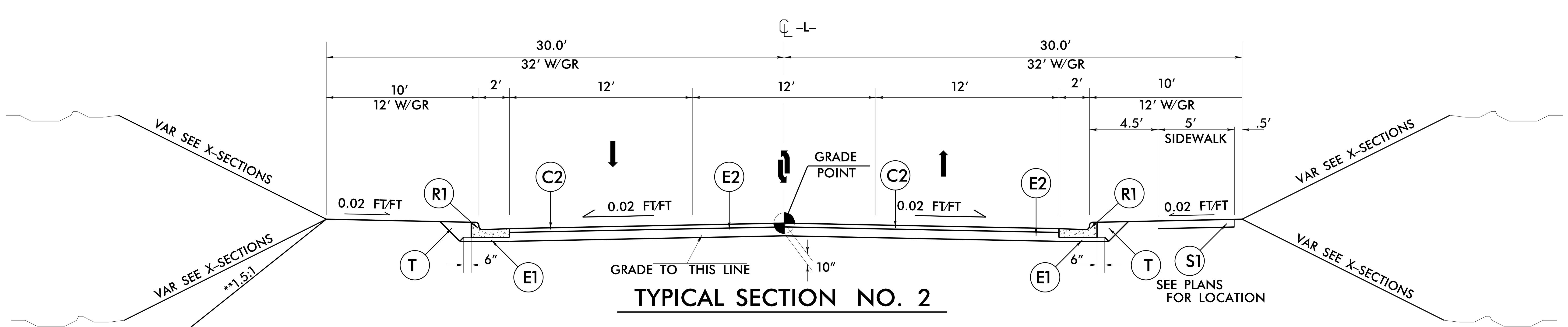
(SEE TRAFFIC CONTROL PLANS FOR ADDITIONAL INFORMATION)

(MIRROR) FROM -L- LT. STA. 28+81.00 TO -L- LT. STA. 31+50.00
(MIRROR) FROM -L- LT. STA. 23+54.00 TO -L- LT. STA. 26+11.00
FROM -L- RT. STA. 17+22.00 TO -L- RT. STA. 20+72.00



TYPICAL SECTION NO. 1

* FROM -L- STA. 10+00.00 TO -L-STA. 11+77.01
FROM -L- STA. 11+77.01 TO -L-STA. 20+50.00
FROM -L- STA. 36+00.00 TO -L- STA. 38+00.00



FROM -L- STA. 20+50.00 TO -L-STA. 24+50.00
FROM -L- STA. 24+50.00 TO -L-STA. 26+64.45 BEG. BRIDGE
FROM -L- STA. 28+86.70 END BRIDGE TO -L-STA. 36+00.00

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PROJECT REFERENCE NO.	SHEET NO.
U-5818	2A-3

ROADWAY DESIGN ENGINEER 3/21/2019 — SEAL 22999, GREG S. PURVIS, NORTH CAROLINA PROFESSIONAL ENGINEER

PAVEMENT DESIGN ENGINEER 3/22/2019 — SEAL 43228, BRENDAN W. MERITHEW, NORTH CAROLINA PROFESSIONAL ENGINEER

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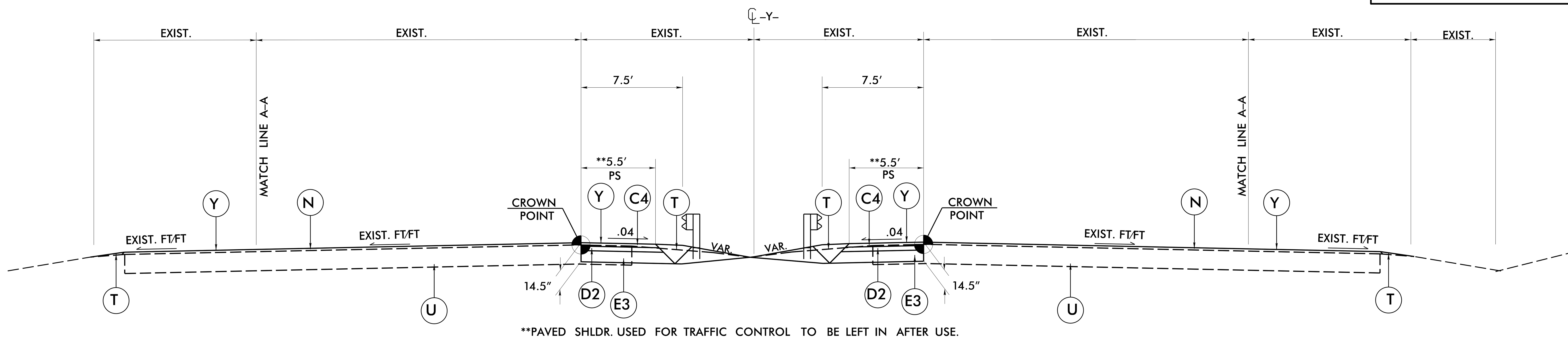
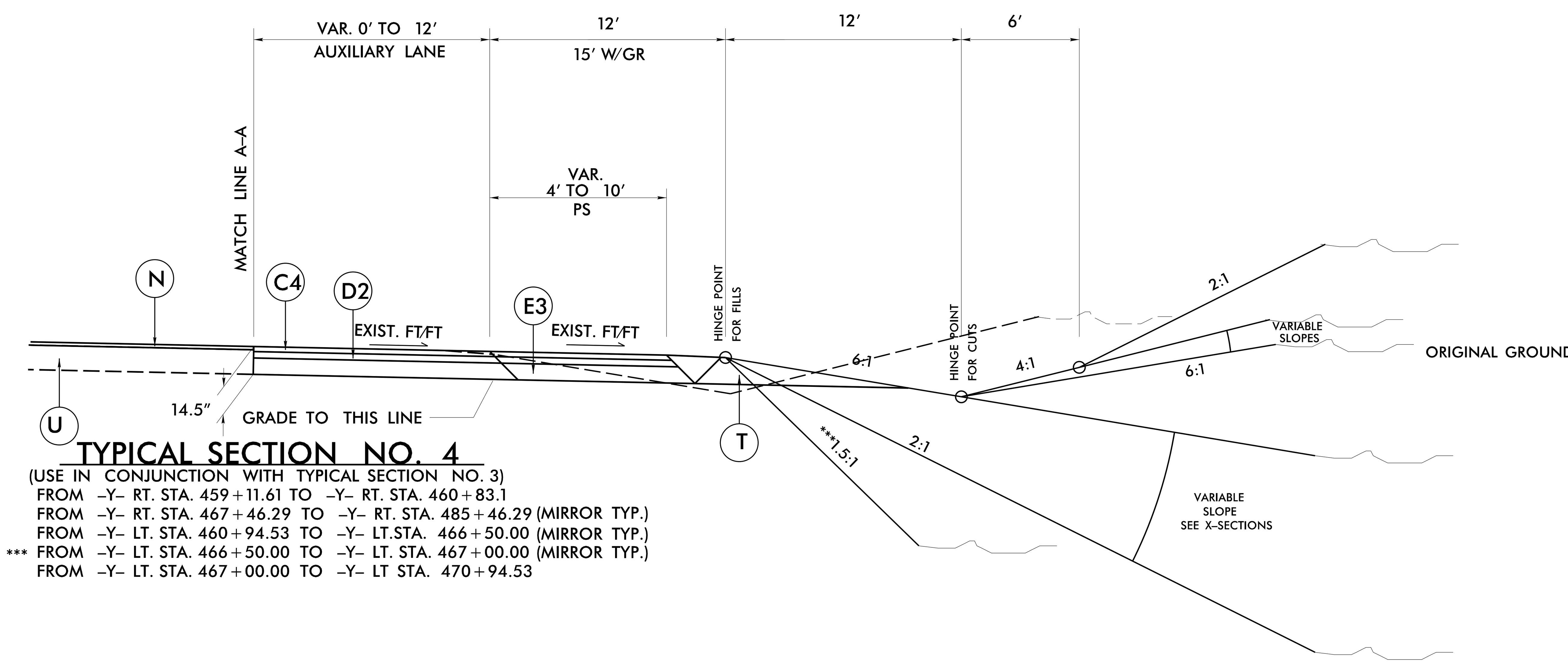


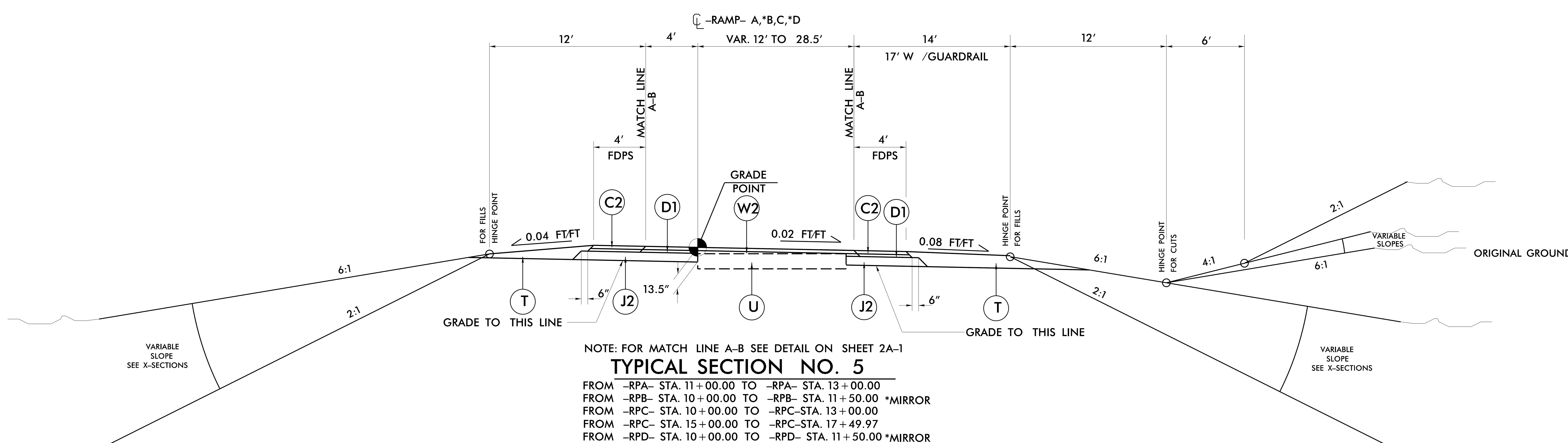
TYPICAL SECTION NO. 3

FROM -Y- STA. 459+11.61 TO -Y- RT. STA. 493+62.76



TYPICAL SECTION NO. 4

(USE IN CONJUNCTION WITH TYPICAL SECTION NO. 3)
FROM -Y- RT. STA. 459+11.61 TO -Y- RT. STA. 460+83.1
FROM -Y- RT. STA. 467+46.29 TO -Y- RT. STA. 485+46.29 (MIRROR TYP.)
FROM -Y- LT. STA. 460+94.53 TO -Y- LT.STA. 466+50.00 (MIRROR TYP.)
*** FROM -Y- LT. STA. 466+50.00 TO -Y- LT. STA. 467+00.00 (MIRROR TYP.)
FROM -Y- LT. STA. 467+00.00 TO -Y- LT STA. 470+94.53



NOTE: FOR MATCH LINE A-B SEE DETAIL ON SHEET 2A-1

TYPICAL SECTION NO. 5

FROM -RPA- STA. 11+00.00 TO -RPA- STA. 13+00.00
FROM -RPB- STA. 10+00.00 TO -RPB- STA. 11+50.00 *MIRROR
FROM -RPC- STA. 10+00.00 TO -RPC-STA. 13+00.00
FROM -RPC- STA. 15+00.00 TO -RPC-STA. 17+49.97
FROM -RPD- STA. 10+00.00 TO -RPD- STA. 11+50.00 *MIRROR
FROM -RPD- STA. 14+00.00 TO -RPD- STA. 16+66.66*MIRROR

PAVEMENT SCHEDULE
(FINAL PAVEMENT DESIGN)

C1	2½" S9.5B
C2	3" S9.5B
C3	VAR. S9.5B
C4	3" S9.5C
C5	VAR. S9.5C
D1	2½" I19.0C
D2	4" I19.0C
D3	VAR. I19.0C
E1	3" B25.0C
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E3	7.5" B25.0C
E4	VAR. B25.0C
J1	6" ABC
J2	8" ABC
J3	VAR. ABC
K	STABILIZED SUBGRADE
N	5/8" UTBWS
N1	GEOTEXTILE
P	PRIME COAT
R1	2'-6" C & G
S1	4" SIDEWALK
T	EARTH MATERIAL
U	EXIST. PAVEMENT
Y	MILLED RUM. STRIPS
V	VAR. MILLING
W1	WEDGING
W2	WEDGING

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PROJECT REFERENCE NO.	SHEET NO.
U-5818	2A-4

ROADWAY DESIGN ENGINEER 3/21/2019 — SEAL 22999, NORTH CAROLINA PROFESSIONAL ENGINEER, GREG S. PURVIS — Greg S. Purvis

PAVEMENT DESIGN ENGINEER 3/22/2019 — SEAL 43228, NORTH CAROLINA PROFESSIONAL ENGINEER, BRENDAN W. MERITHEW — Brendan Merithew

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PAVEMENT SCHEDULE (FINAL PAVEMENT DESIGN)	
C1	2½" S9.5B
C2	3" S9.5B
C3	VAR. S9.5B
C4	3" S9.5C
C5	VAR. S9.5C
D1	2½" I19.0C
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D3	VAR. I19.0C
E1	3" B25.0C
E2	7" B25.0C
E3	7.5" B25.0C
E4	VAR. B25.0C
J1	6" ABC
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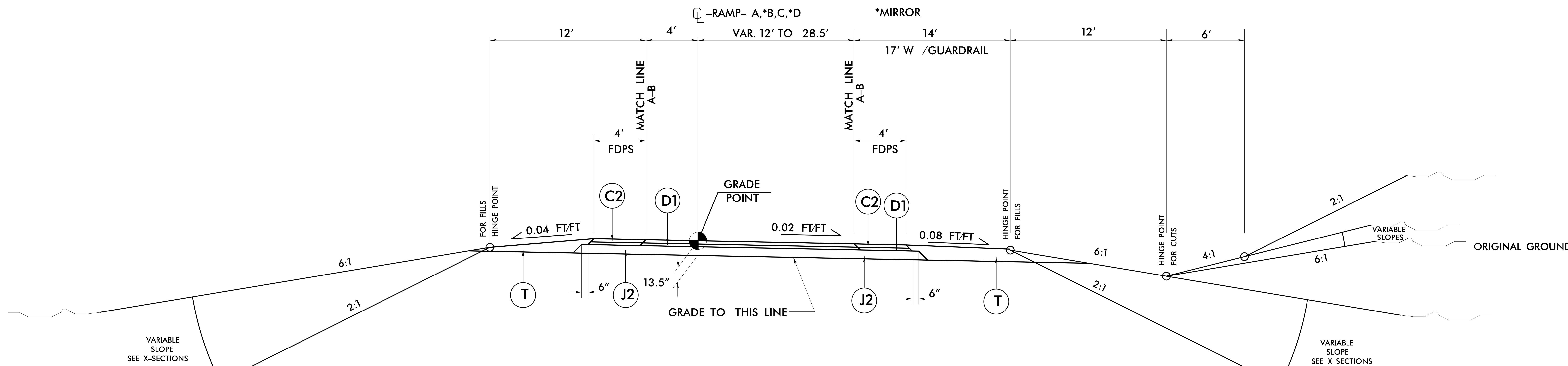
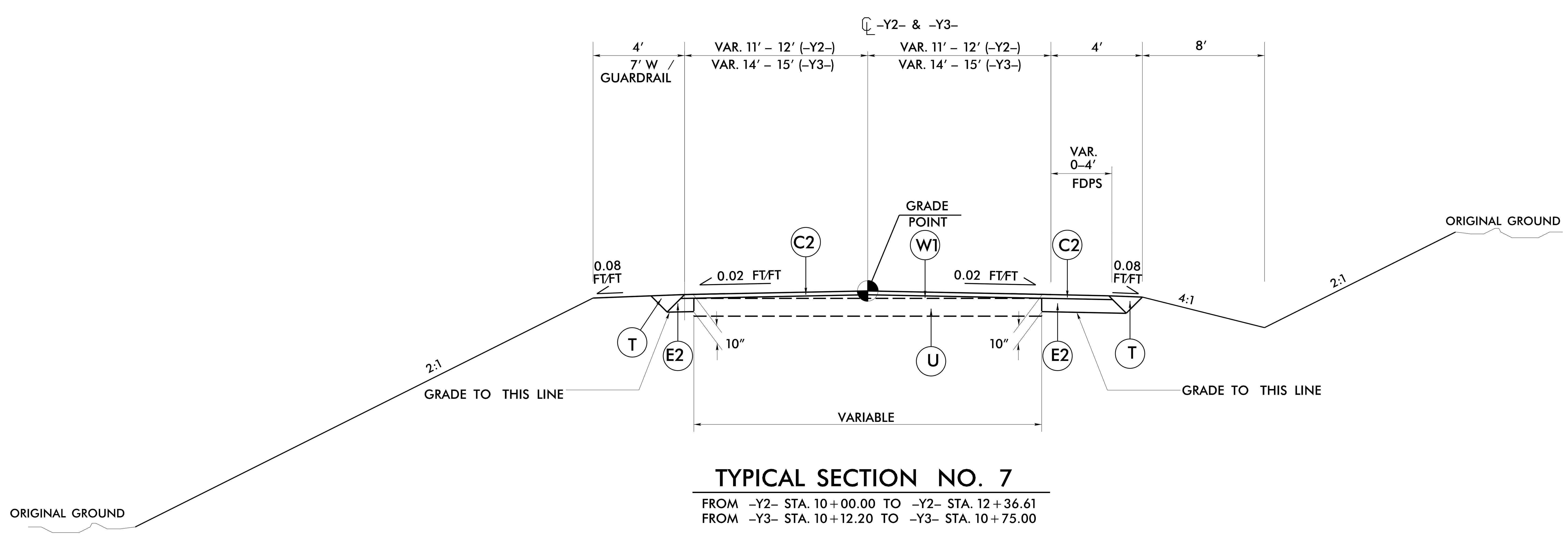
J3	VAR. ABC
K	STABILIZED SUBGRADE
N	5/8" UTBWS
N1	GEOTEXTILE
P	PRIME COAT
R1	2'-6" C & G
S1	4" SIDEWALK
T	EARTH MATERIAL
U	EXIST. PAVEMENT
Y	MILLED RUM. STRIPS
V	VAR. MILLING
W1	WEDGING
W2	WEDGING



NOTE: FOR MATCH LINE A-B SEE DETAIL ON SHEET 2A-1

TYPICAL SECTION NO. 6

FROM -RPA- STA. 13+00.00 TO -RPA- STA. 16+22.90
FROM -RPB- STA. 11+50.00 TO -RPB- STA. 13+27.58 * MIRROR
FROM -RPC- STA. 13+00.00 TO -RPC- STA. 15+00.00
FROM -RPD- STA. 11+50.00 TO -RPD- STA. 14+00.00 * MIRROR



TYPICAL SECTION NO. 7

FROM -Y2- STA. 10+00.00 TO -Y2- STA. 12+36.61
FROM -Y3- STA. 10+12.20 TO -Y3- STA. 10+75.00

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PROJECT REFERENCE NO.	SHEET NO.
U-5818	2A-5

ROADWAY DESIGN ENGINEER 3/21/2019 — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22999 GREG S. PURVIS — DocuSigned by: Greg S. Purvis D1F0F7C256E3403...

PAVEMENT DESIGN ENGINEER 3/22/2019 — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 43228 BRENDAN W. MERITHEW — DocuSigned by: Brendan Merithew 5DBC61849E8048F...

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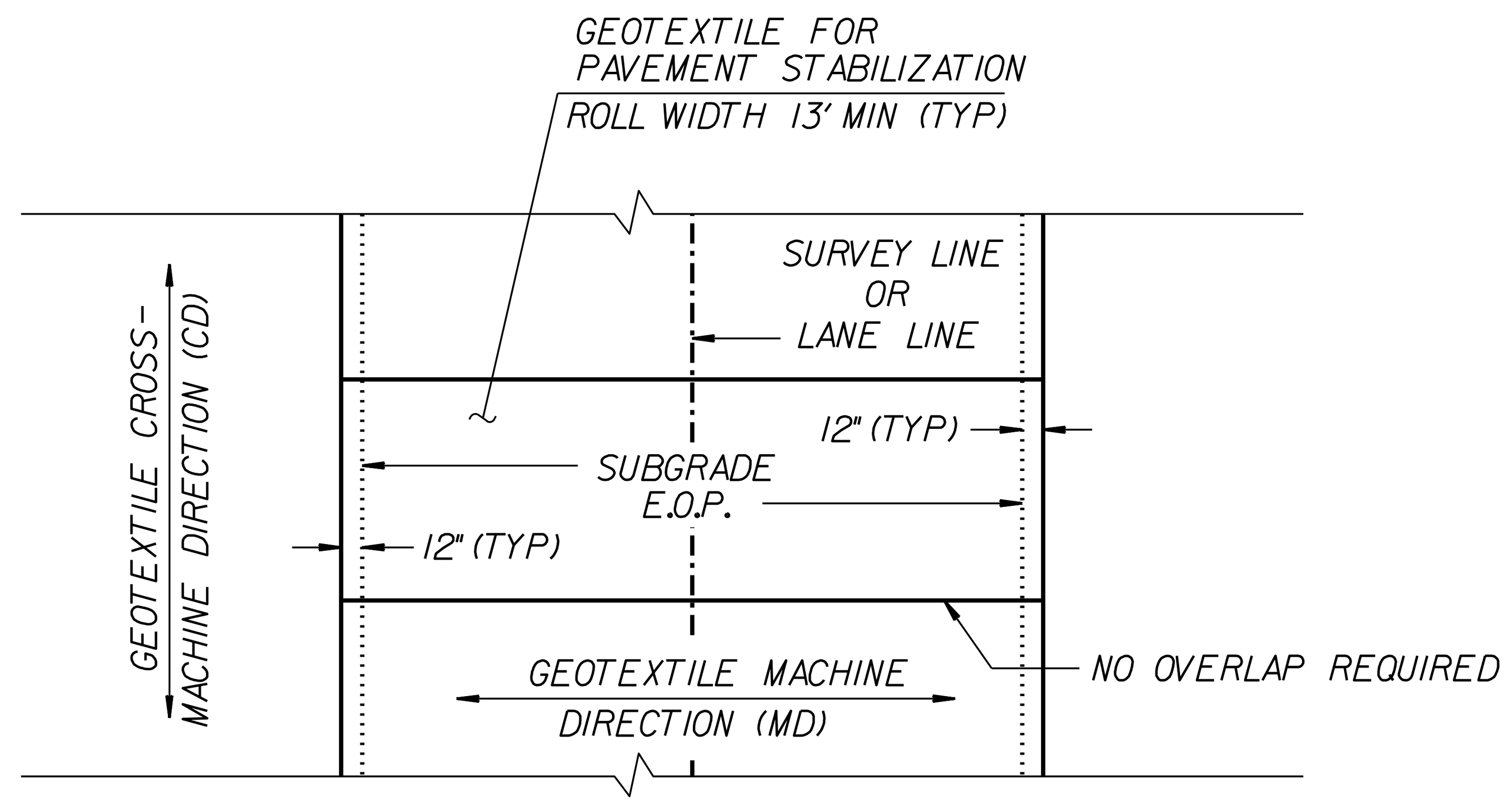
GEOTEXTILE FOR PAVEMENT STABILIZATION

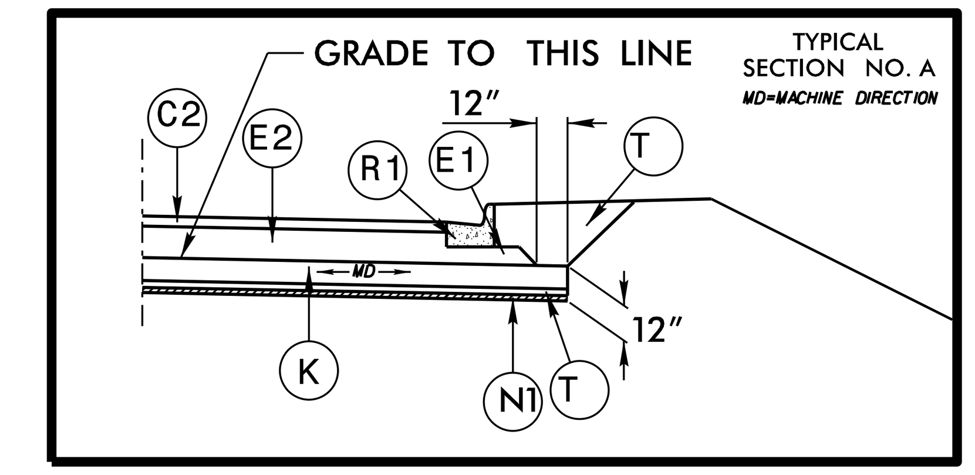
PER GEOTECH RECOMMENDATION 11-13-2018

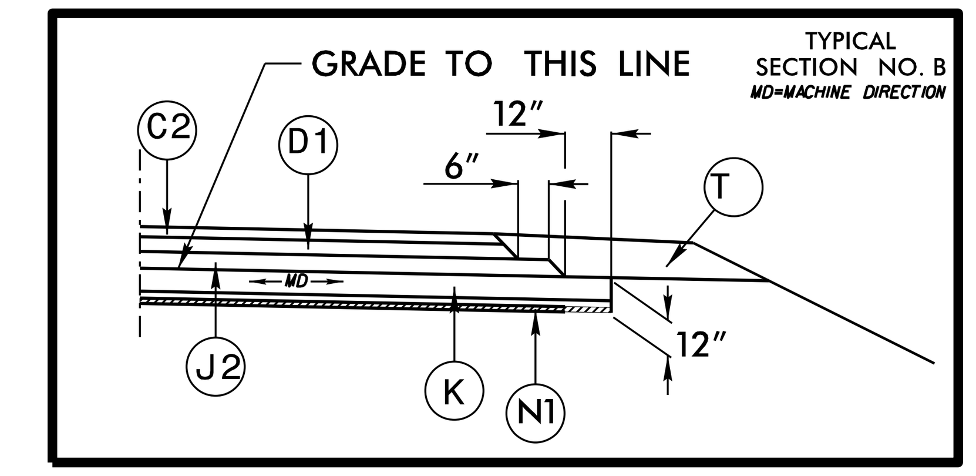
NOTE: SEE SHEET 3G-1 FOR SUMMARY

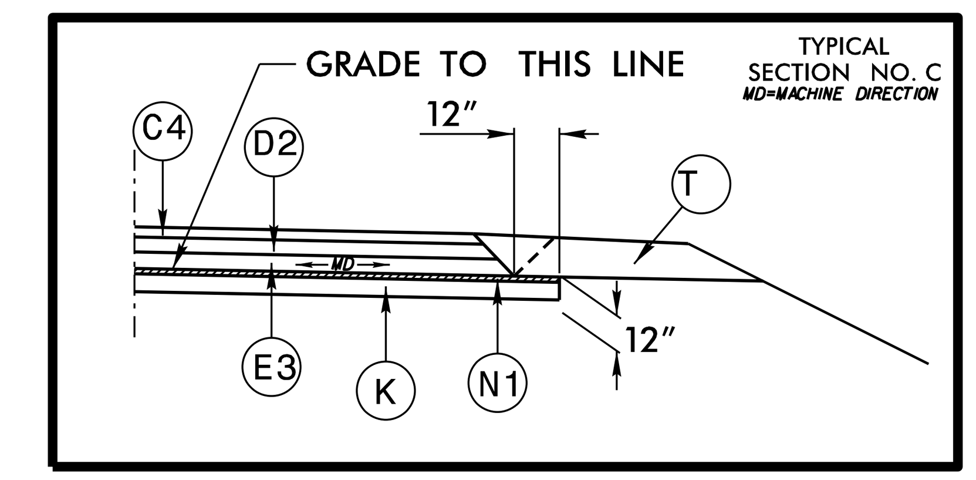


GEOTEXTILE FOR PAVEMENT STABILIZATION PLACEMENT (PLAN VIEW)

(100% COVERAGE REQUIRED)







PAVEMENT SCHEDULE
(FINAL PAVEMENT DESIGN)

C1	2½" S9.5B
C2	3" S9.5B
C3	VAR. S9.5B
C4	3" S9.5C
C5	VAR. S9.5C
D1	2½" I19.0C
D2	4" I19.0C
D3	VAR. I19.0C
E1	3" B25.0C
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J1	6" ABC
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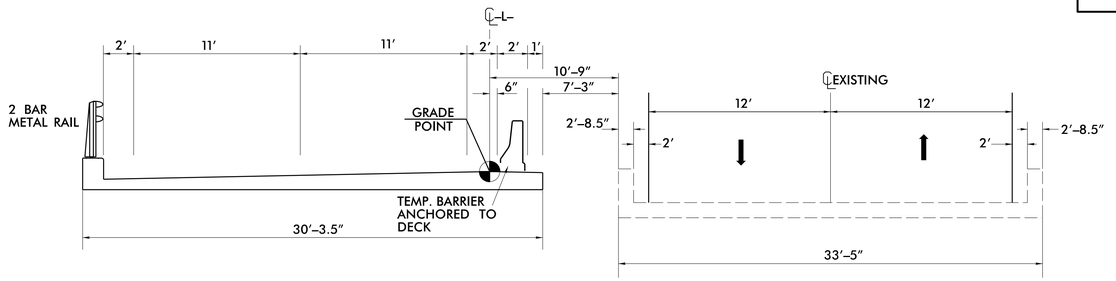
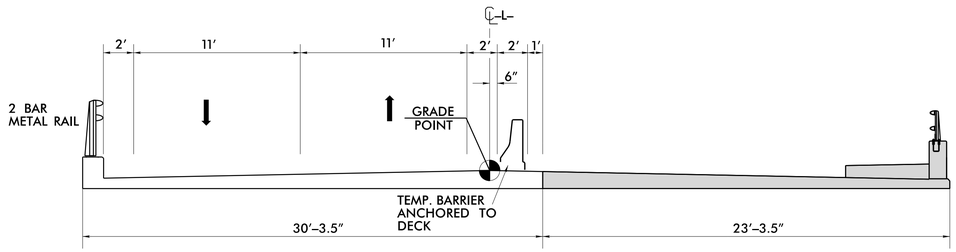
S1	4" SIDEWALK
T	EARTH MATERIAL
U	EXIST. PAVEMENT
Y	MILLED RUM. STRIPS
V	VAR. MILLING
W1	WEDGING
W2	WEDGING

6/2/99

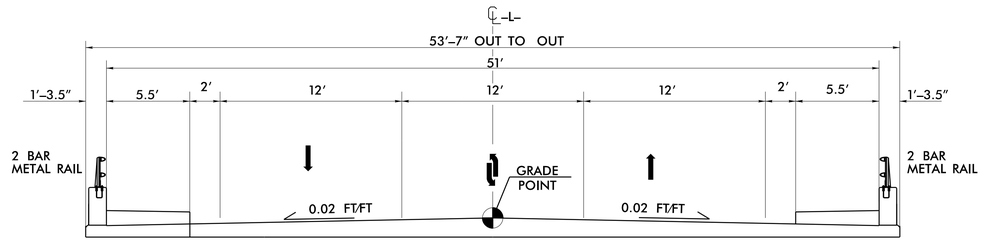
PHASE CONSTRUCTION FOR BRIDGE



PHASE I FOR STRUCTURE



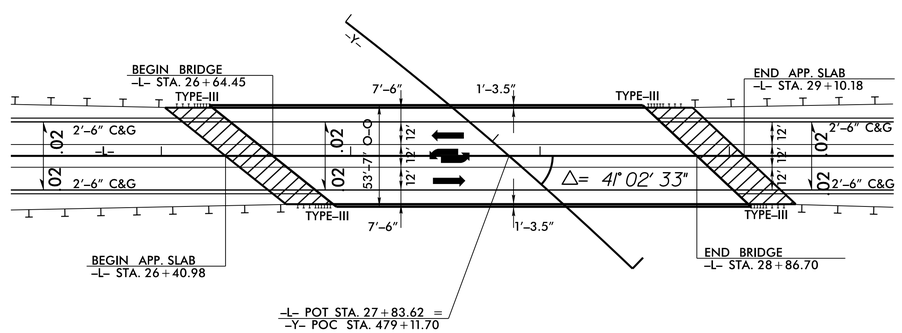
PHASE II FOR STRUCTURE



–L– (SR 1001 SUGAR HILL RD.) OVER –Y– I–40

FINAL BRIDGE TYPICAL

STRUCTURE/PAVEMENT RELATIONSHIP



SEE SHEETS S–1 THRU S–49 FOR STRUCTURE PLANS

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PROJECT REFERENCE NO.	SHEET NO.
U-5818	2A-6

ROADWAY DESIGN ENGINEER
3/21/2019

NORTH CAROLINA PROFESSIONAL SEAL 22999 ENGINEER GREG S. PURVIS

DocuSigned by: Greg S. Purvis

PAVEMENT DESIGN ENGINEER

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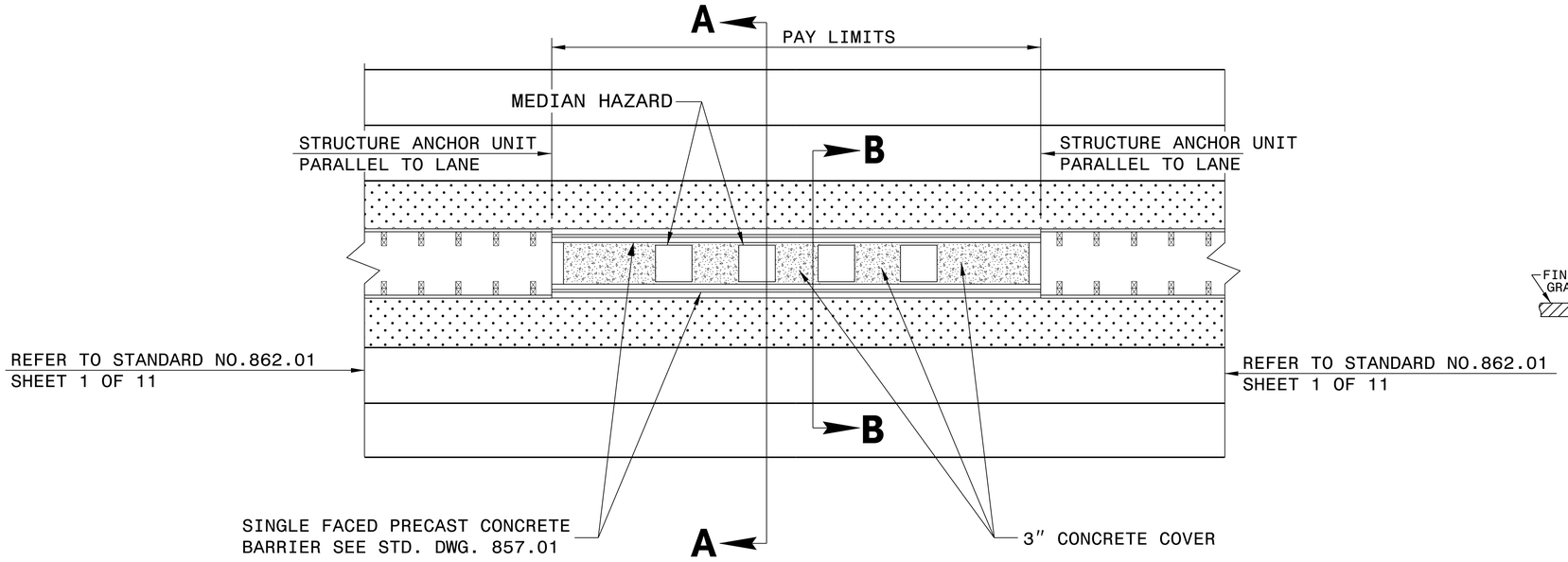
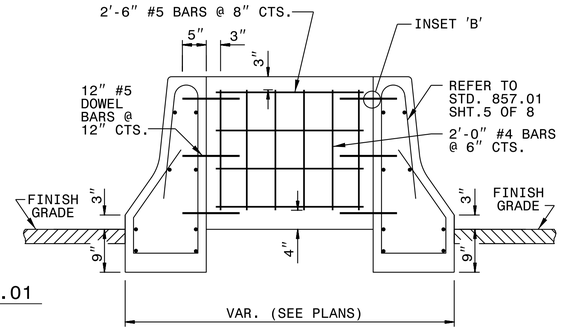
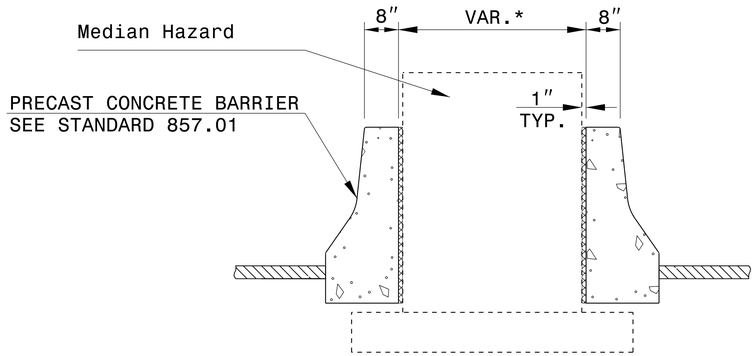
PROJECT REFERENCE NO.	SHEET NO.
U-5818	2C-1



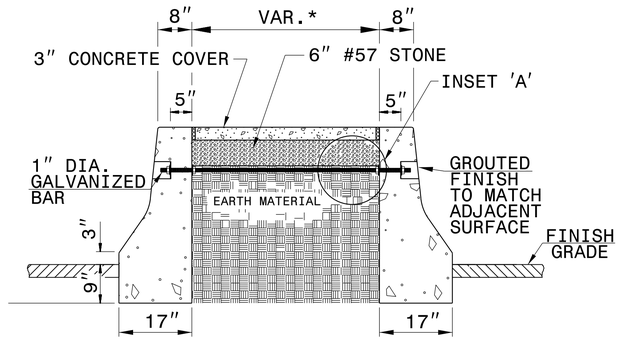


ENDWALL

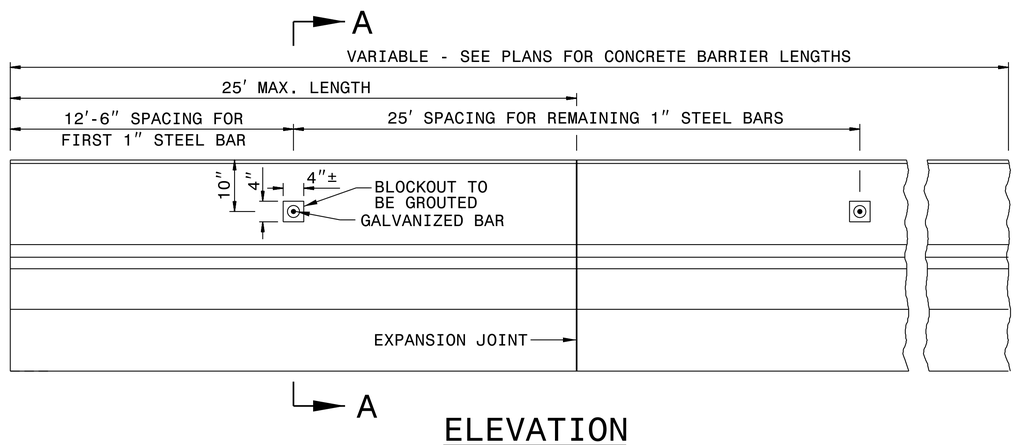
INSET 'A'



SECTION A-A



SECTION B-B



ELEVATION

GENERAL NOTES:

*THIS DIMENSION MAY VARY DEPENDING ON THE WIDTH OF THE PIER.
INSET FIRST 1" DIA. GALVANIZED BAR 12'-6" AND SPACE THE REMAINING 1" BARS AT 25'-0".

USE AN APPROVED BONDING SYSTEM IN ACCORDANCE WITH SECTION 1081-1, TYPE 3A OF THE STANDARD SPECIFICATIONS.

USE CLASS B CONCRETE FOR THE CONCRETE COVER

SEAL ALL EXPANSION JOINTS WITH JOINT FILLER (SEE SECTION 1028 OF THE SPECIFICATIONS).

PLACE A 1" BAR BETWEEN EACH SET OF PIERS

DocuSigned by: Joel S. Howerton
NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER Joel S. Howerton
3/6/2019

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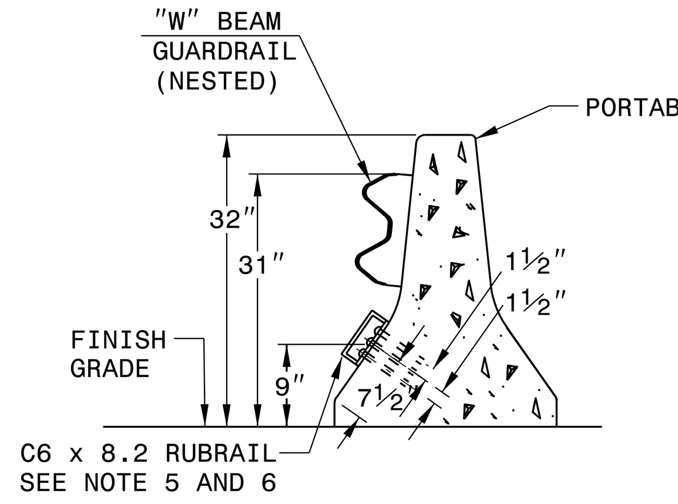
CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

DETAIL OF MEDIAN HAZARD PROTECTION

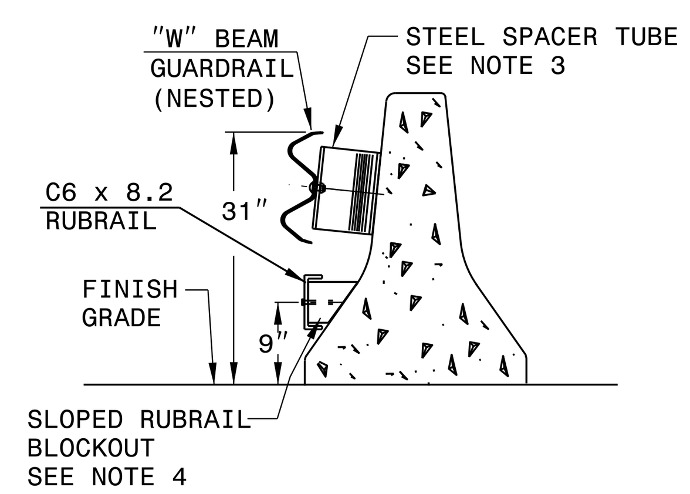
ORIGINAL BY: T.S.Spell DATE: 2-4-10
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.: howerton\Barrier Cover for Median Hazard Protection

15-NOV-2017 13:03
S:\Contracts\Contracts\Special Details\jhowerton\Barrier Cover for Median Hazard Protection.dgn
jhowerton AT CSD-292595

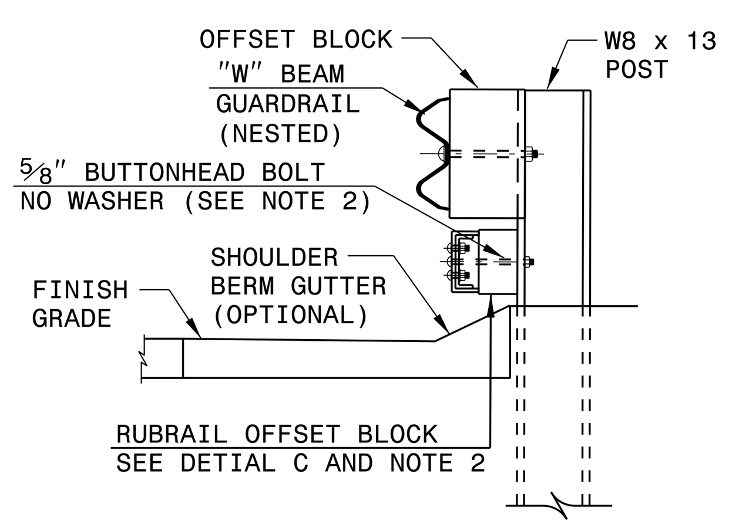
PROJECT REFERENCE NO.	SHEET NO.
U-5818	2C-2



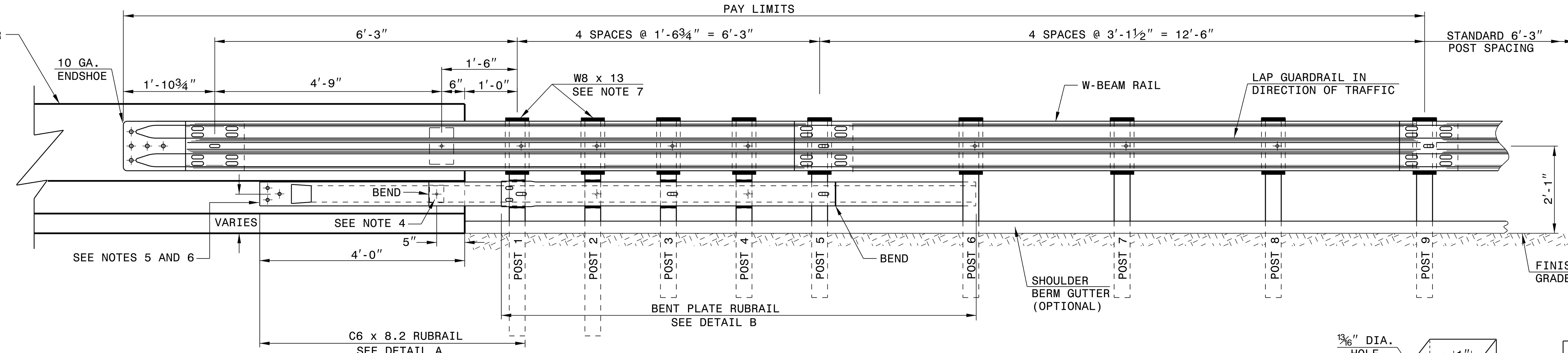
SECTION A-A



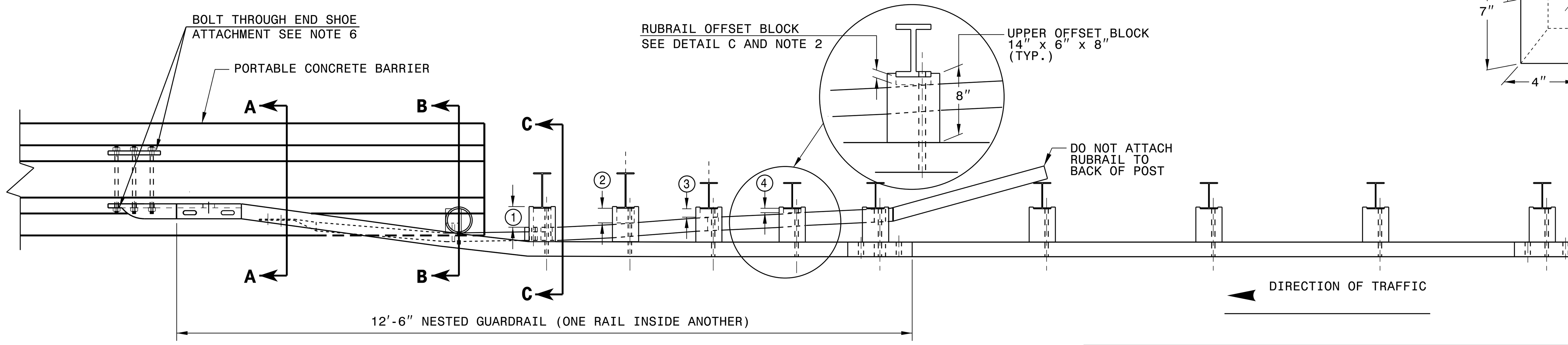
SECTION B-B



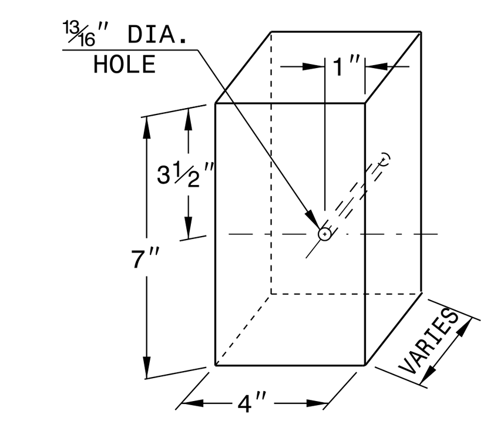
SECTION C-C



ELEVATION



PLAN



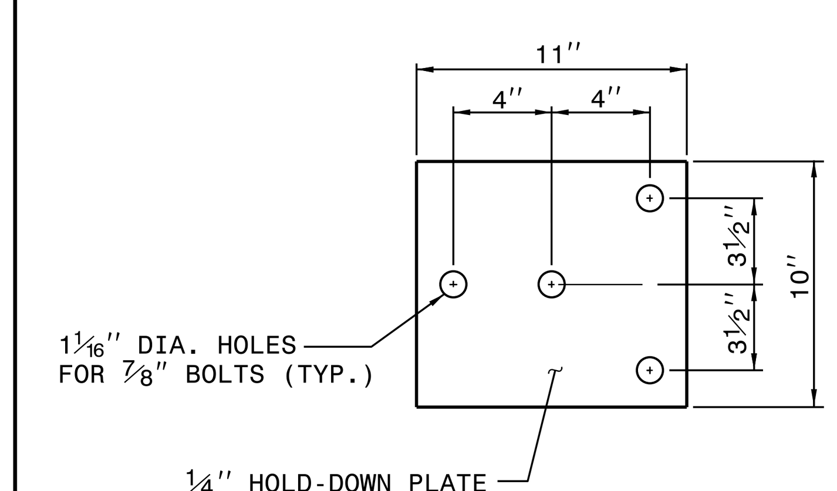
RUBRAIL BLOCKS 7" HIGH x 4" WIDE		
POST	THICKNESS	BOLT LENGTH
①	4¼"	9"
②	3¼"	5" *
③	2"	6"
④	1"	3" *

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

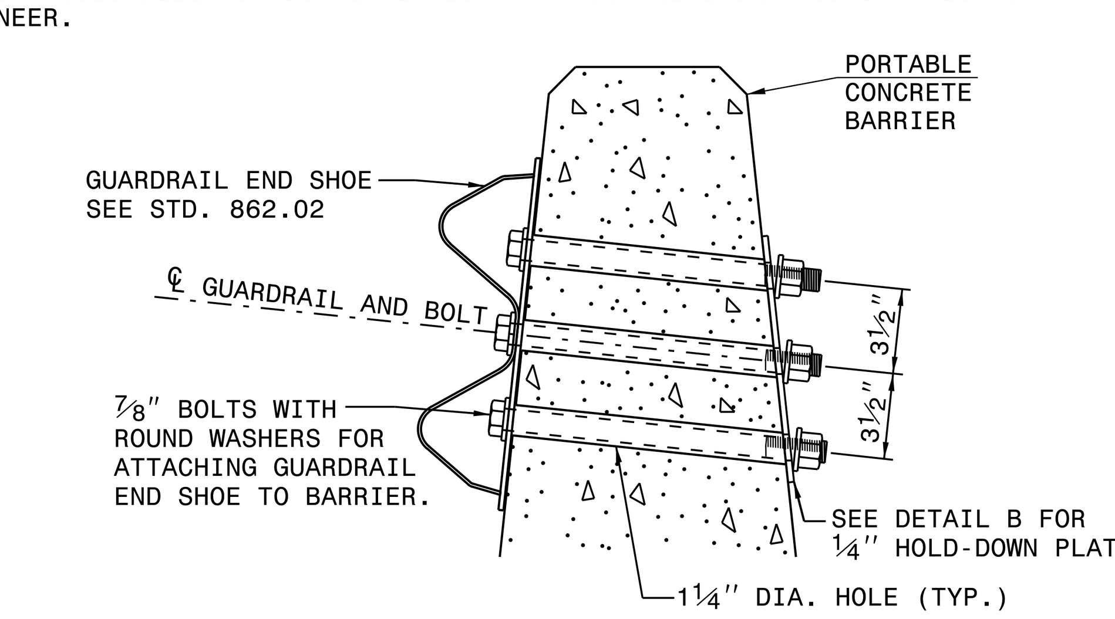
DETAIL C
RUBRAIL BLOCKOUT

GENERAL NOTES:
1) POSTS 1 THROUGH 5 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER BLOCKOUTS AND/OR RUBRAIL.
2) RUBRAIL BLOCKOUTS LOCATED ON POSTS 1 THROUGH 4 ARE OFFSET DRILLED AND SECURED WITH 5⁄8" BUTTONHEAD BOLTS (SEE CHART FOR BOLT LENGTHS). SECURE BLOCKS ONLY TO POSTS 2 AND 4. SECURE RUBRAIL AND BLOCKOUTS TO POSTS 1 AND 3. RUBRAIL IS SECURED TO POST 5 WITH A 5⁄8" x 4½" BUTTONHEAD BOLT. RUBRAIL IS FLARED TO BACK OF POST 6 AND NOT SECURED.
3) STEEL SPACER TUBE IS A SCHEDULE 40 GALVANIZED PIPE 6" INSIDE DIAMETER x 9" LONG. ATTACH TUBE TO GUARDRAIL ONLY WITH 5⁄8" x 1¼" LONG BUTTONHEAD BOLT AND RECTANGULAR PLATE WASHER.
4) SEE DETAIL D FOR SLOPED RUBRAIL BLOCKOUT. BLOCKOUT IS ATTACHED TO RAIL ELEMENT ONLY. USE 3⁄8" x 3" LAG BOLT WITH FLAT WASHER.
5) SHOP FABRICATE THE C6 x 8.2 RUBRAIL END TO BE CONSISTENT WITH THE SLOPE OF THE JERSEY SHAPE AND ATTACH FLUSH WITH THE SLOPED TOE OF THE BARRIER OR BRIDGE RAIL.
6) ANCHORAGE:
   (a) AT PORTABLE CONCRETE BARRIER, ANCHOR RUBRAIL USING THREE 5⁄8" x 6" CHEMICALLY ANCHORED BOLTS WITH WASHERS.
   (b) AT PORTABLE CONCRETE BARRIER, ANCHOR THE W-BEAM END SHOE USING A 4 BOLT HOLD-DOWN PLATE AS SHOWN. INSTALL THE W-BEAM END SHOE BEHIND THE NESTED W-BEAM ELEMENTS.
7) POSTS 1 AND 2 ARE W8 x 13, 7'-6" LONG. ALL OTHER POSTS IN THE ANCHOR UNIT ARE W6 x 8.5.

NOTES FOR 4 BOLT HOLD DOWN PLATE
1) THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A ¼" HOLD DOWN PLATE AND 4 - 7⁄8" DIA. BOLTS WITH NUTS AND WASHERS.
2) THE HOLD-DOWN PLATE SHALL CONFORM TO AASHTO M270 GRADE 36. AFTER FABRICATION, THE HOLD-DOWN PLATE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M111.
3) AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL. THE 1¼" DIA. HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

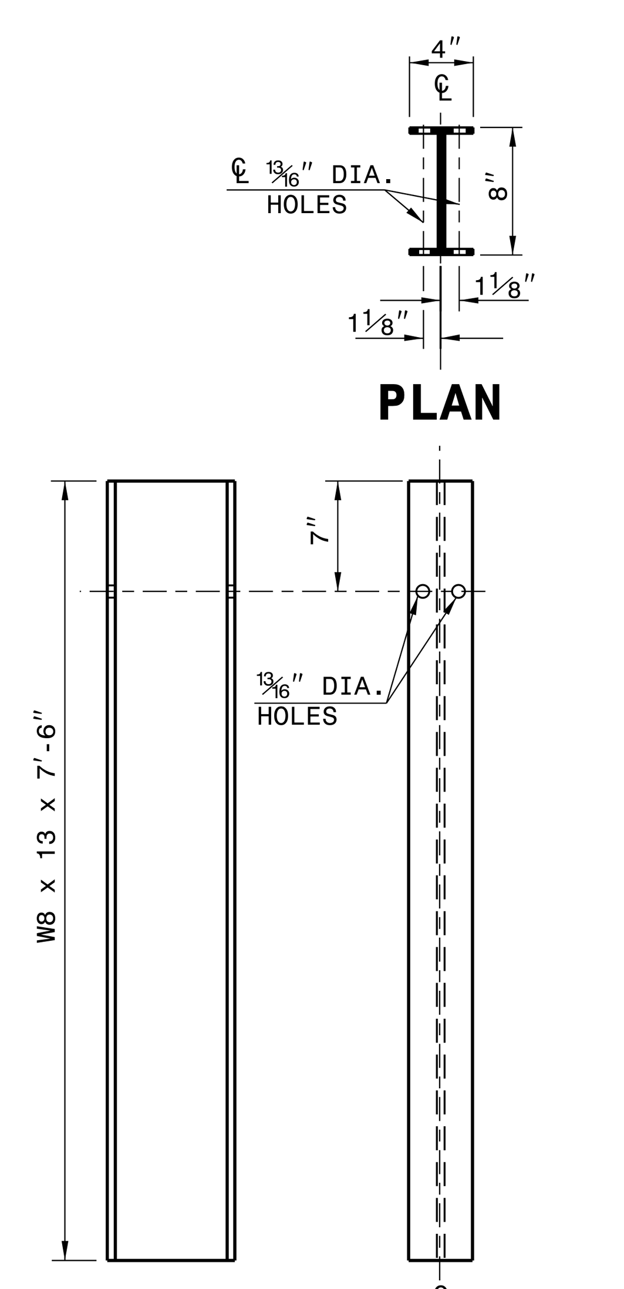


4 BOLT HOLD DOWN PLATE

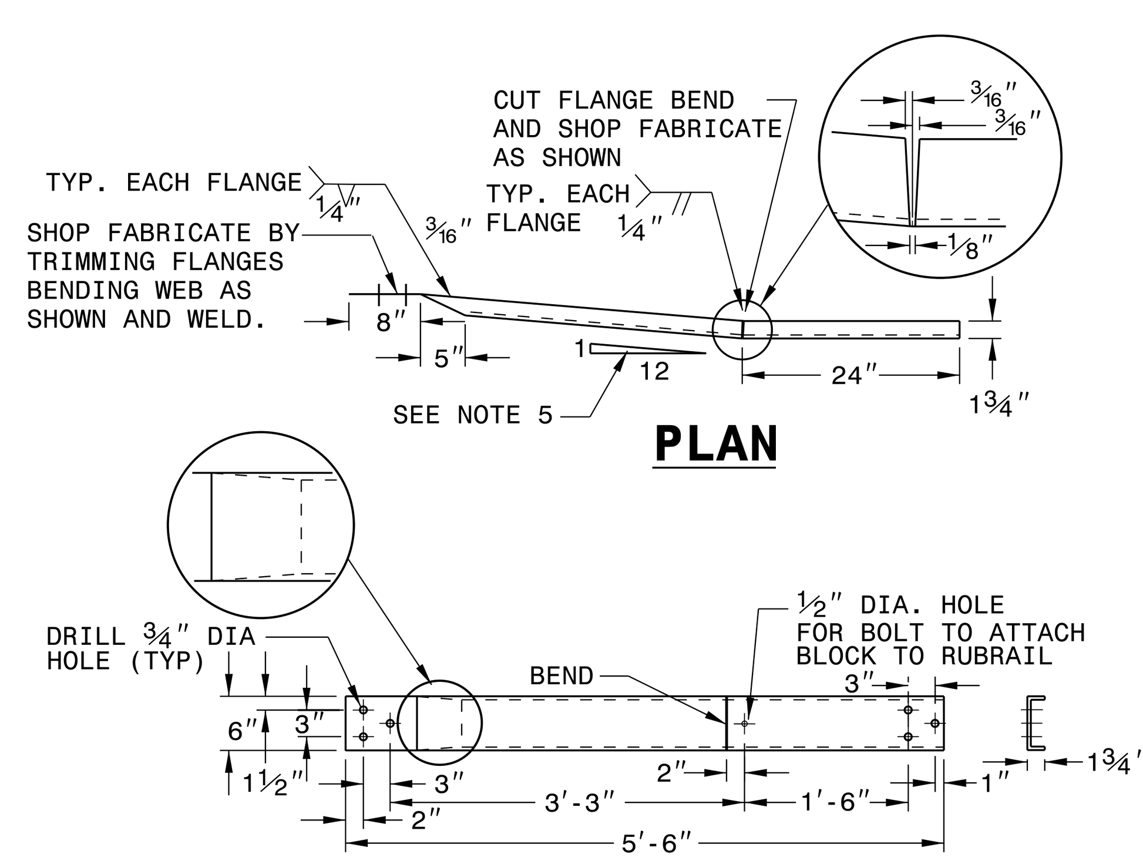


PART SECTION
OF BARRIER OR RAIL

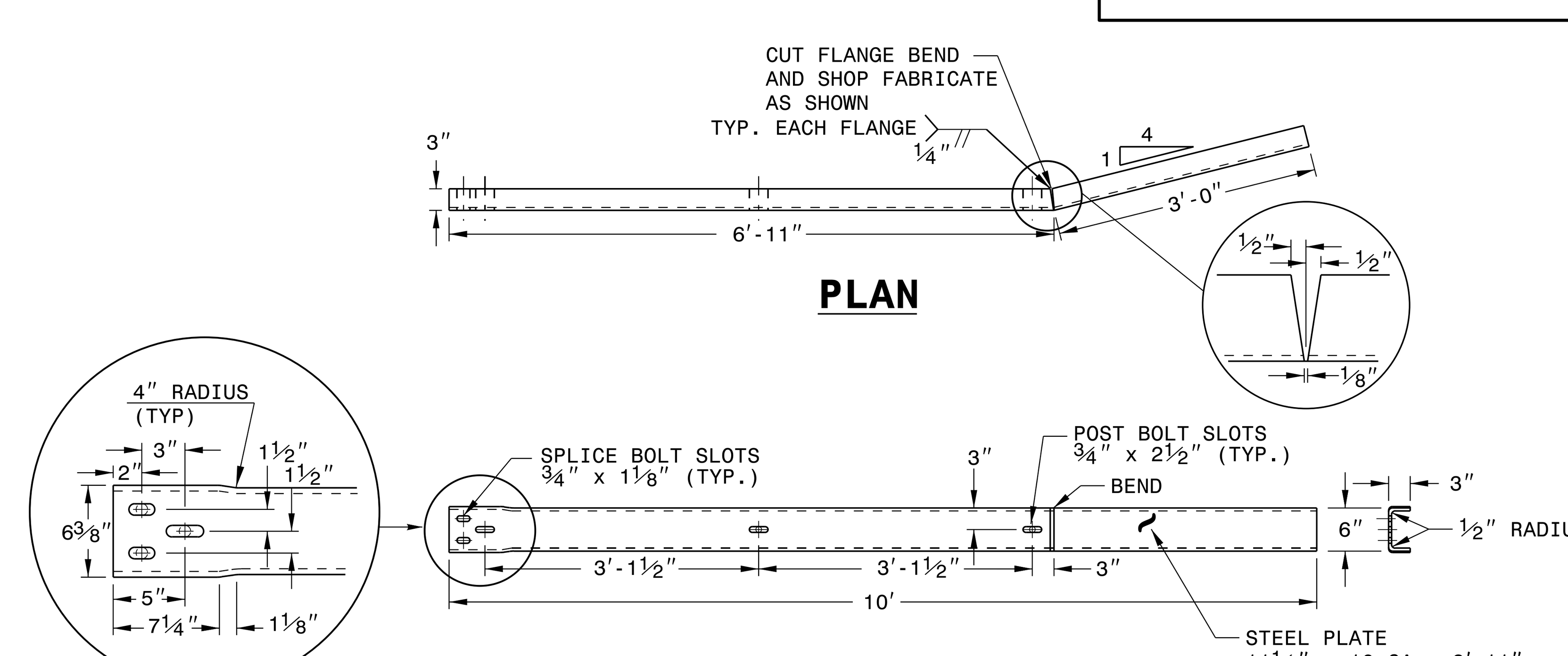
THRU END SHOE SECTION AND
4 BOLT HOLD DOWN PLATE



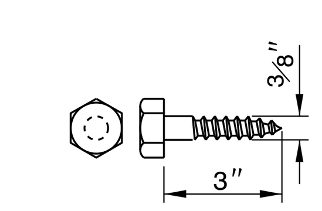
DETAIL F
"W8 X 13 X 7'-6". STEEL POST



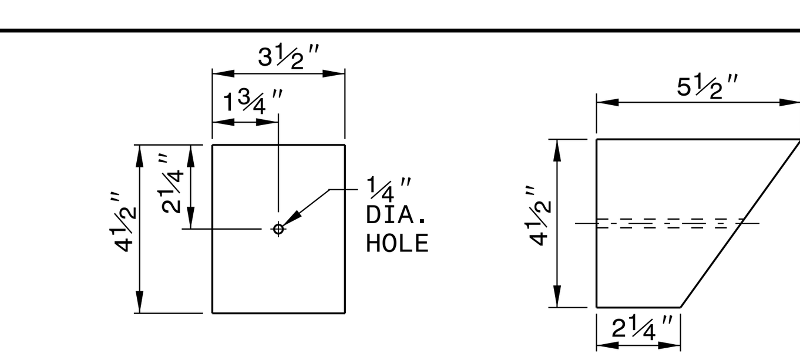
DETAIL A
C6 x 8.2 RUBRAIL



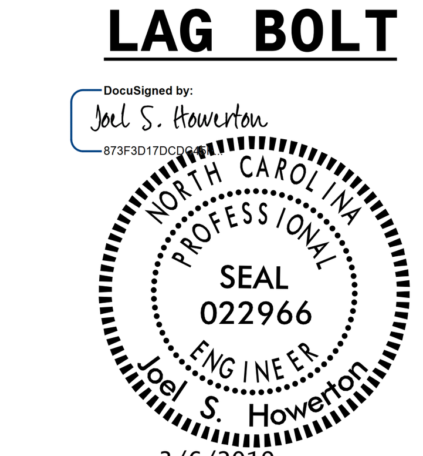
DETAIL B
BENT PLATE RUBRAIL



DETAIL E
LAG BOLT



DETAIL D
SLOPED RUBRAIL BLOCKOUT



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

TEMPORARY GUARDRAIL ANCHOR UNIT TYPE B-77

ORIGINAL BY: E.E. WARD DATE: 04-07-04
MODIFIED BY: J.S. Howerton DATE: 10-02-18
CHECKED BY: DATE:
FILE SPEC.:

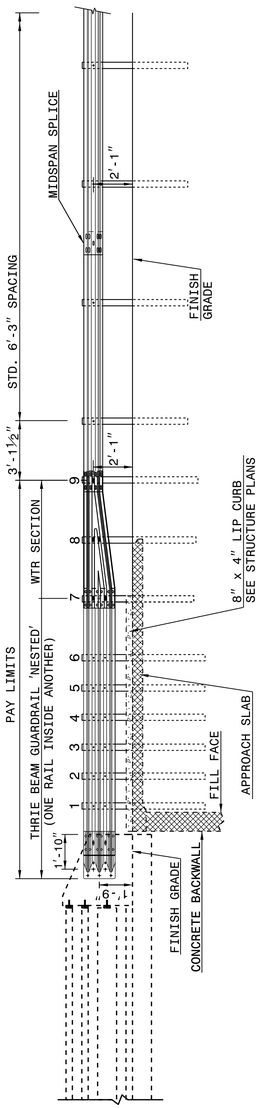
02-OCT-2018 14:39
S:\Contracts\Contracts\Special Details\jhowerton\Temporary B-77 to PCB.dgn
jhowerton AT CSD-292595

PROJECT REFERENCE NO.	SHEET NO.
U-5818	2C-3

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

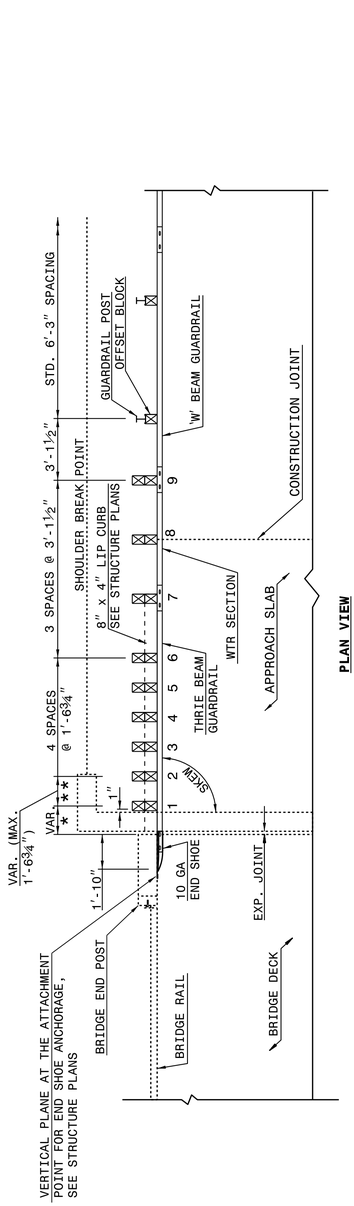
ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III
FOR ATTACHMENT TO RAIL ON BRIDGE

SHEET 1 OF 7
862D03



ELEVATION

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 11½" 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.



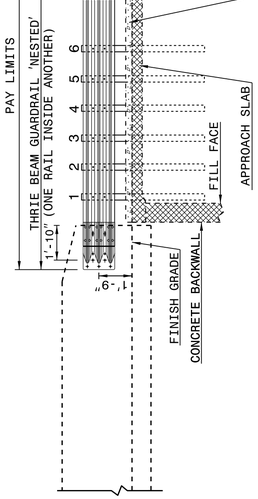
PLAN VIEW

GUARDRAIL ANCHOR UNIT, TYPE III
FOR ATTACHMENT TO RAIL ON BRIDGE

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

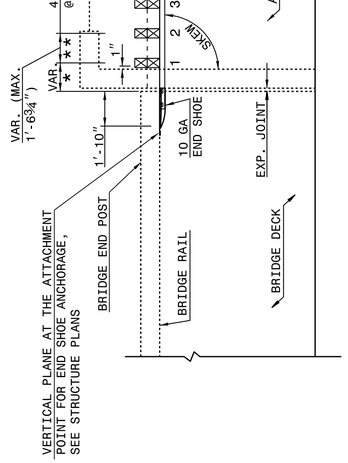
ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO
RAIL ON BRIDGE - SUB REGIONAL TIER

SHEET 2 OF 7
862D03



ELEVATION

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 11½" 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.



PLAN VIEW

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

3/21/2019

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER Joel S. Howerton

Joel S. Howerton

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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.: _____

14-DEC-2017 10:36
S:\Contracts\Contracts\Special Details\jhowerton\Standard Drawings\2018 Standard Drawings\Details in Lieu of Standards\Division 8\0862d0301.dgn
jhowerton AT CSD-2425965

PROJECT REFERENCE NO.	SHEET NO.
U-5818	2C-4

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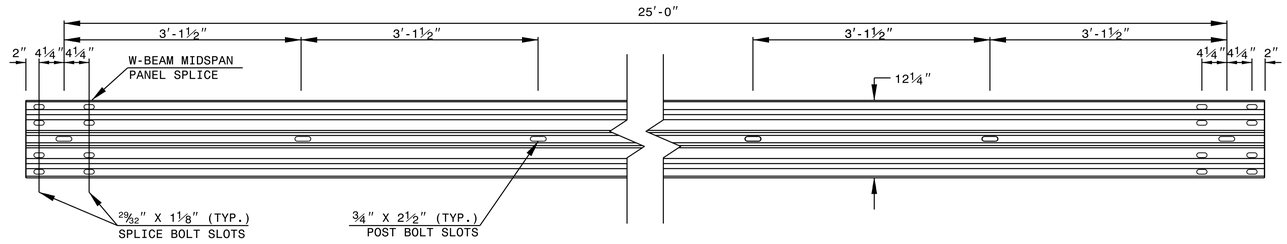
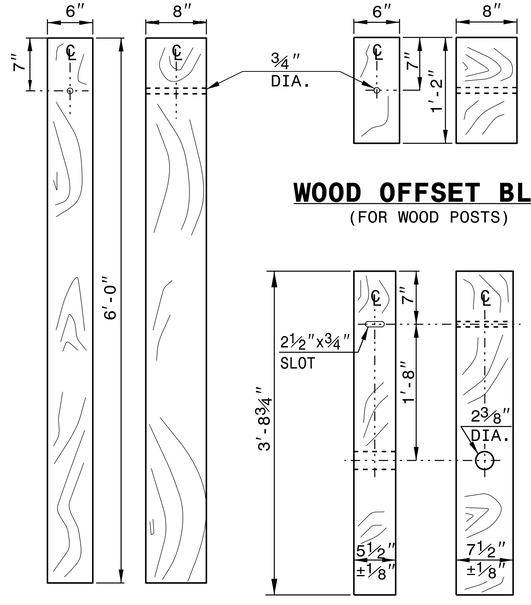
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 6 OF 8
862D02



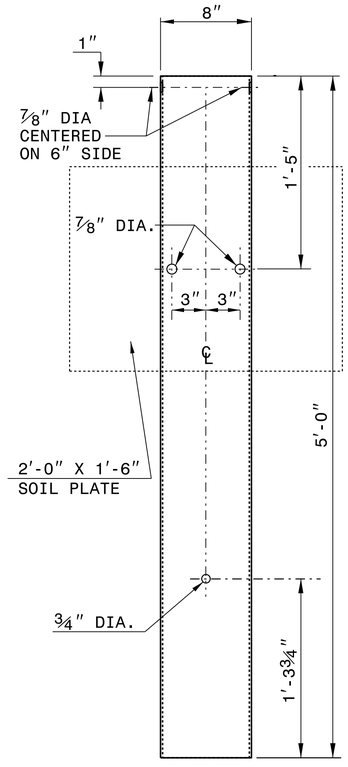
STANDARD W-BEAM GUARDRAIL



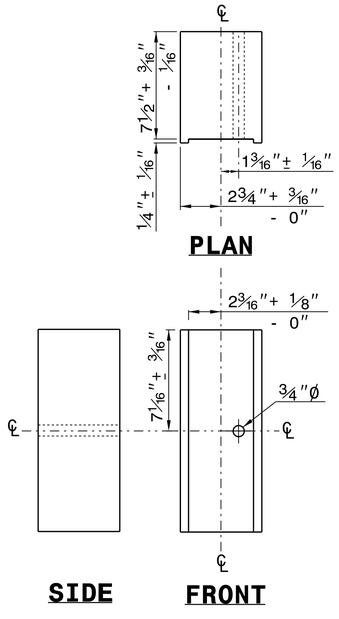
WOOD OFFSET BLOCK
(FOR WOOD POSTS)

STANDARD LINE POST

SHORT WOOD BREAKAWAY POST



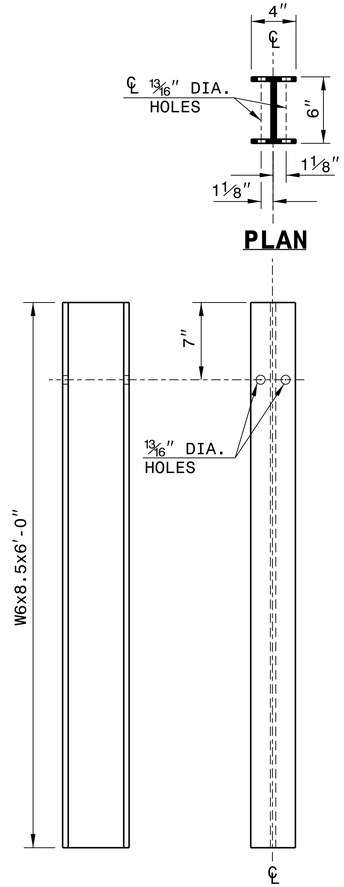
STEEL TUBE
TS 6"x8"x0.1875"



PLAN

SIDE **FRONT**

ROUTED OFFSET BLOCK



PLAN

SIDE **FRONT**

"W6" STEEL POST

SYSTEM PARTS

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 6 OF 8
862D02

3/21/2019
NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER JOEL S. HOWERTON
Joel S. Howerton

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

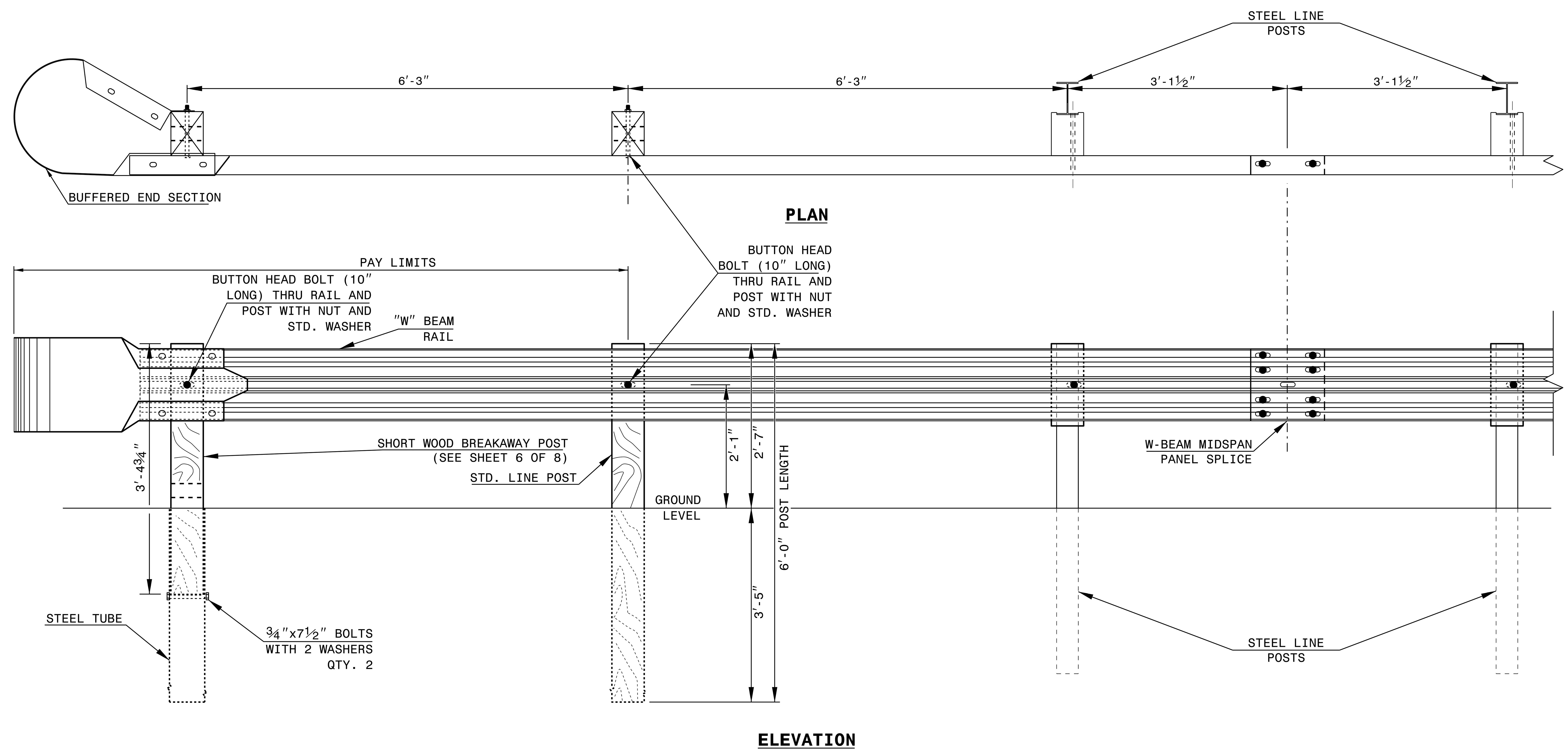
SEE TITLE BLOCK

ORIGINAL BY: J.HOWERTON DATE: 3-7-2018
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.:

PROJECT REFERENCE NO.	SHEET NO.
U-5818	2C-5

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION



TRAILING END UNIT ASSEMBLY

A.T.-1 SYSTEM

SHEET OF

3/21/2019

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER JOEL S. HOWERTON

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

A.T.-1 SYSTEM

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

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8/17/99

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

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PROJECT REFERENCE NO.	SHEET NO.
U-5818	2D-1
R/W SHEET NO.	

HYDRAULICS ENGINEER
3/6/2019

NORTH CAROLINA PROFESSIONAL SEAL 23993 ENGINEER MAX S. PRICE

DocuSigned by: Max S. Price

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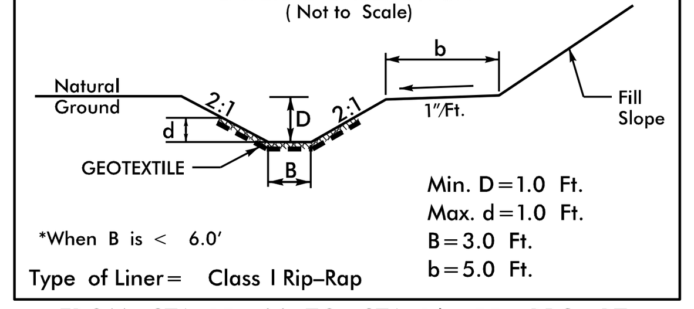
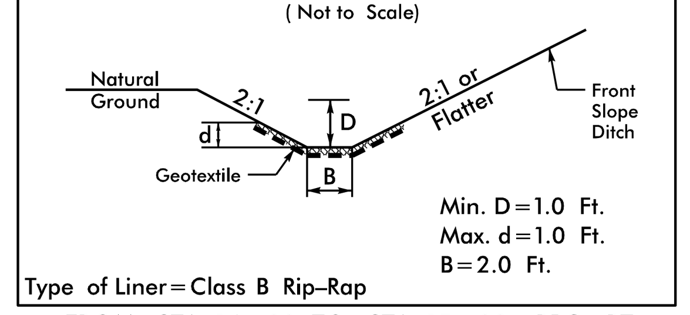
DETAIL A
LATERAL BASE DITCH (Not to Scale)



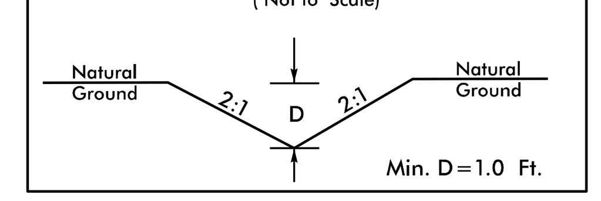
FROM STA. 15+00 TO STA. 16+55 -RPC- RT
EST. - 132 TON; 248 SY GF
DDE = 95CY

DETAIL B
SPECIAL CUT BASE DITCH (Not to Scale)



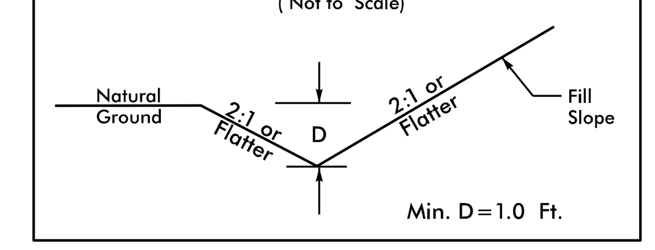
FROM STA. 14+00 TO STA. 15+00 -RPC- RT
EST. - 45 TON; 127 SY GF

DETAIL C
STANDARD 'V' DITCH (Not to Scale)



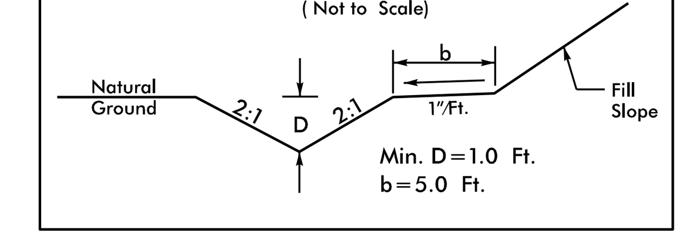
FROM STA. 10+50 TO STA. 11+50 -RPD- LT
DDE = 22 CY
FROM STA. 24+37 TO STA. 24+60 -L- LT
DDE = 2 CY

DETAIL D
SPECIAL LATERAL 'V' DITCH (Not to Scale)



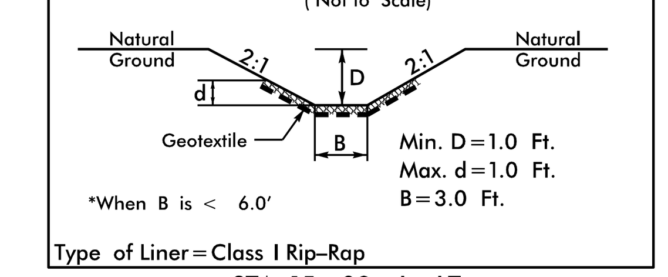
FROM STA. 17+50 TO STA. 19+00 -L- RT
FROM STA. 35+50 -L- TO STA. 14+20 -RPA- RT
FROM STA. 24+60 TO STA. 25+27 -L- LT

DETAIL E
LATERAL 'V' DITCH (Not to Scale)



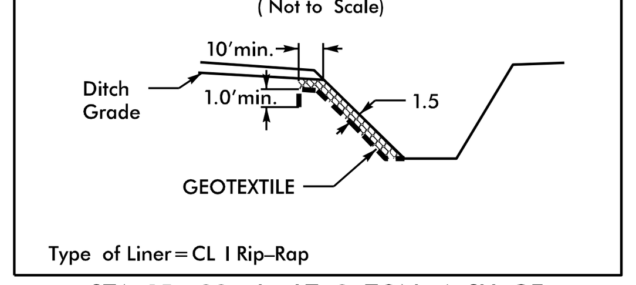
FROM STA. 13+57.35 TO STA. 15+00 -RPD- LT
DDE = 43 CY

DETAIL F
STANDARD BASE DITCH (Not to Scale)



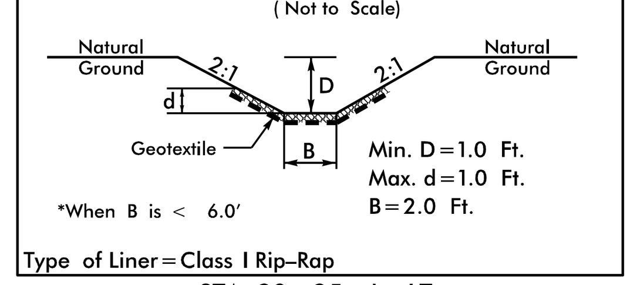
STA. 15+38 -L- LT
EST. - 43 TON; 60 SY GF
DDE = 22 CY

DETAIL G
RIP RAP AT EMBANKMENT (Not to Scale)



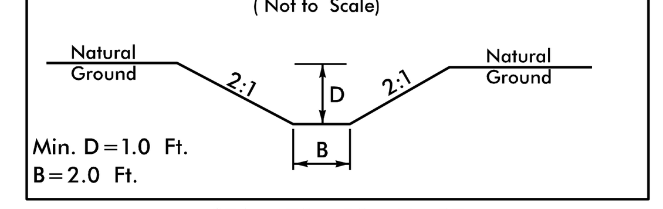
STA. 15+33 -L- LT; 3 TON; 4 SY GF
STA. 23+25 -L- LT; 2 TON; 3 SY GF
STA. 15+00 -RPD- LT; 5 TON; 7 SY GF
STA. 473+75 -Y- RT; 2 TON; 3 SY GF

DETAIL H
STANDARD BASE DITCH (Not to Scale)



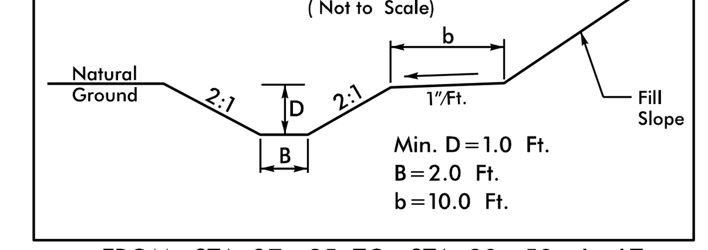
STA. 23+25 -L- LT
EST. - 14 TON; 22 SY GF
DDE = 5 CY

DETAIL I
STANDARD BASE DITCH (Not to Scale)



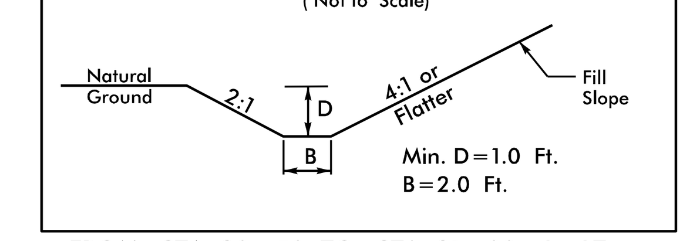
STA. 473+50 -Y- RT
DDE = 23 CY

DETAIL J
LATERAL BASE DITCH (Not to Scale)



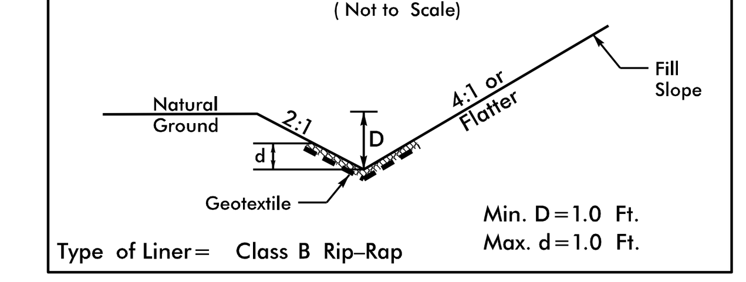
FROM STA. 27+95 TO STA. 30+50 -L- LT
DDE = 308 CY

DETAIL K
SPECIAL LATERAL BASE DITCH (Not to Scale)



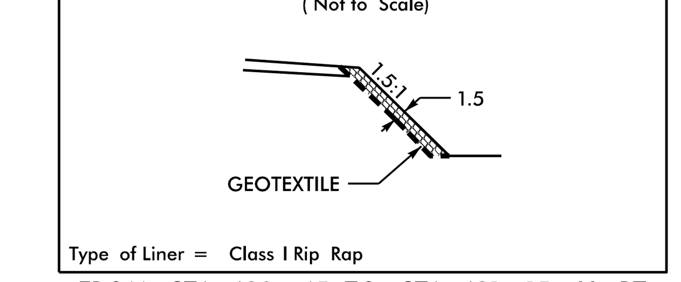
FROM STA. 30+50 TO STA. 31+00 -L- LT

DETAIL L
SPECIAL LATERAL 'V' DITCH (Not to Scale)



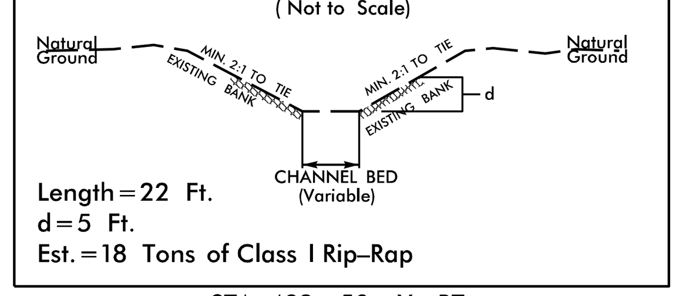
FROM STA. 10+50 TO STA. 11+00 -RPC- RT
EST. - 17 TON; 52 SY GF

DETAIL M
ROCK PLATING (Not to Scale)



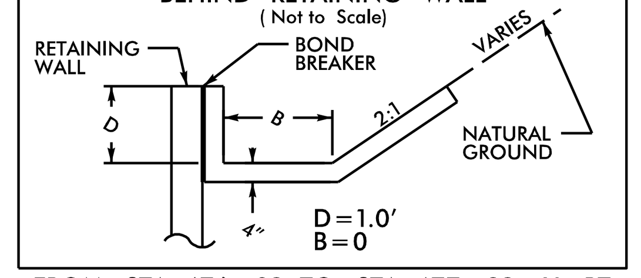
FROM STA. 480+45 TO STA. 481+15 -Y- RT
EST. - 80 TON; 115 SY GF

DETAIL N
PIPE OUTLET CHANNEL (Not to Scale)



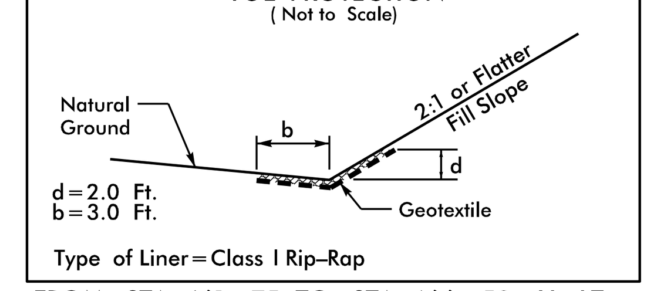
STA. 482+59 -Y- RT

DETAIL O
CONCRETE DITCH BEHIND RETAINING WALL (Not to Scale)



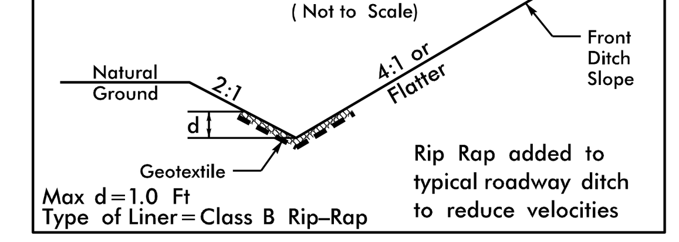
FROM STA. 476+92 TO STA. 477+82 -Y- RT
FROM STA. 480+18 TO STA. 480+84 -Y- LT

DETAIL P
TOE PROTECTION (Not to Scale)



FROM STA. 461+75 TO STA. 466+50 -Y- LT
EST. - 300 TON; 423 SY GF

DETAIL Q
ROADWAY CUT DITCH (Not to Scale)



FROM STA. 10+00 TO STA. 10+50 -RPC- RT
EST. - 20 TON; 45 SY GF
FROM STA. 11+00 TO STA. 13+50 -RPC- RT
EST. - 100 TON; 225 SY GF

REVISIONS

11/27/2018
...\U-5818_rdy_psh_2D-1.dgn

PROJECT REFERENCE NO.	SHEET NO.
U-5818	2G-1

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 031013 ENGINEER STEWART S. LANEY

DocuSigned by: Stewart Laney 3/27/2019
75BB4AB1... SIGNATURE DATE

ENGINEER

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

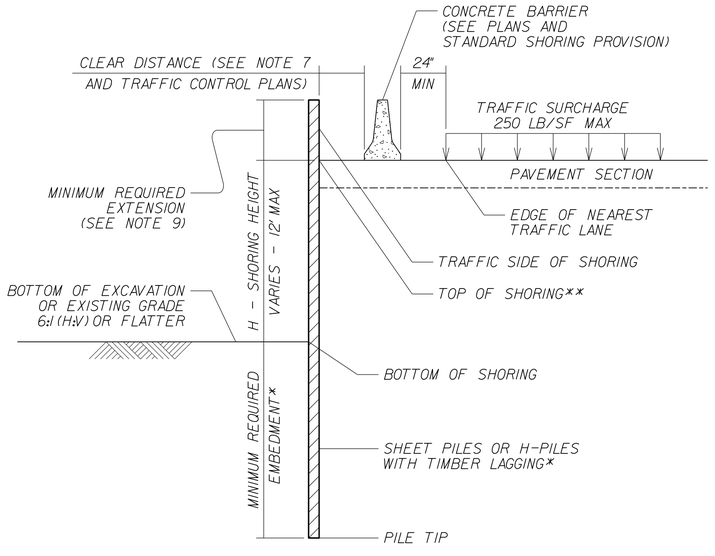
GROUNDWATER CONDITION (SEE NOTE 6)	H SHORING HEIGHT (FT)	SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT					SURCHARGE CASE WITH TRAFFIC IMPACT				
		SHEET PILES		H-PILES WITH TIMBER LAGGING			SHEET PILES		H-PILES WITH TIMBER LAGGING		
		MINIMUM REQUIRED EMBEDMENT (FT)	MINIMUM REQUIRED SECTION MODULUS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

MINIMUM REQUIRED EMBEDMENT AND SECTION MODULUS

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

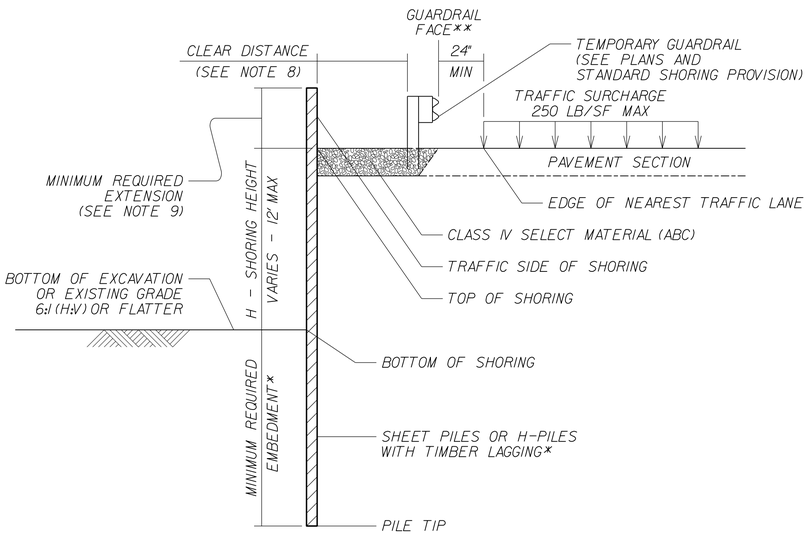
NOTES:

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



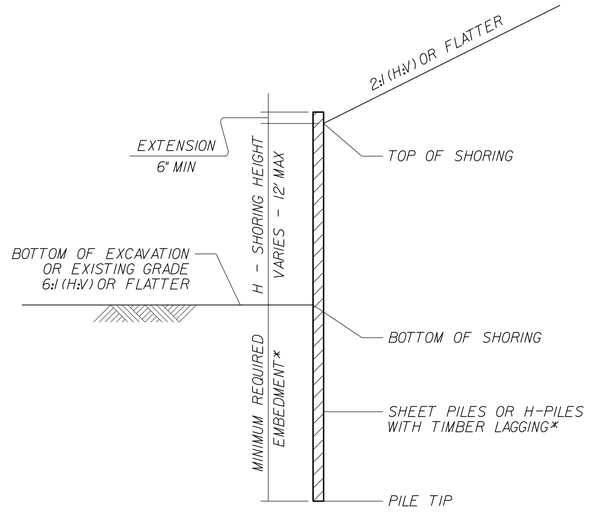
CONCRETE BARRIER

**TOP OF SHORING = EDGE OF PAVEMENT



TEMPORARY GUARDRAIL

**GUARDRAIL FACE = EDGE OF PAVEMENT



STANDARD TEMPORARY SHORING

(SLOPE CASE)
*SEE TABLE ABOVE.

STANDARD TEMPORARY SHORING

(SURCHARGE CASE)
*SEE TABLE ABOVE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS	STANDARD DETAIL NO. 1801.01
GEOTECHNICAL ENGINEERING UNIT	STANDARD TEMPORARY SHORING
	DATE: 11-19-13

PROJECT REFERENCE NO.	SHEET NO.
U-5818	2G-2

GEOTECHNICAL ENGINEER

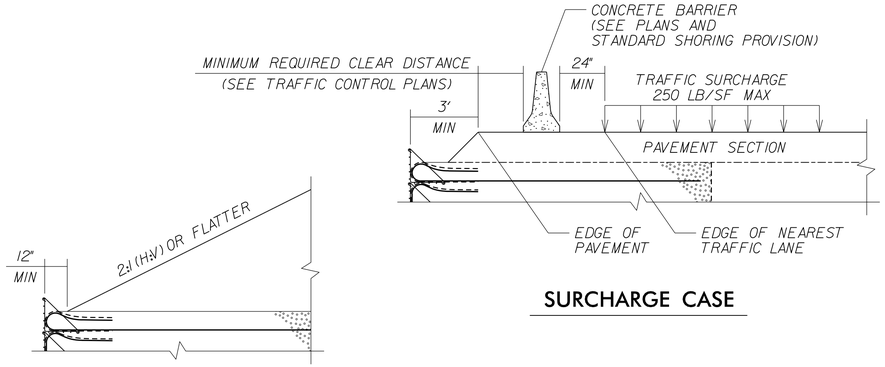
NORTH CAROLINA PROFESSIONAL SEAL 031013 ENGINEER STEWART S. LANEY

DocuSigned by: Stewart Laney 75BB4AB1... SIGNATURE 3/27/2019 DATE

ENGINEER

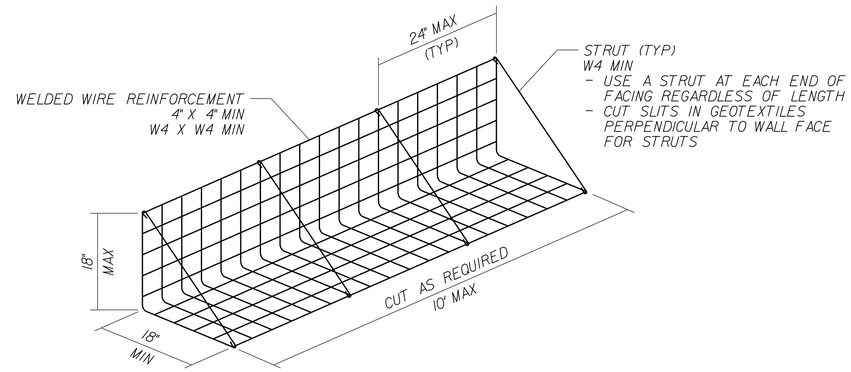
SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

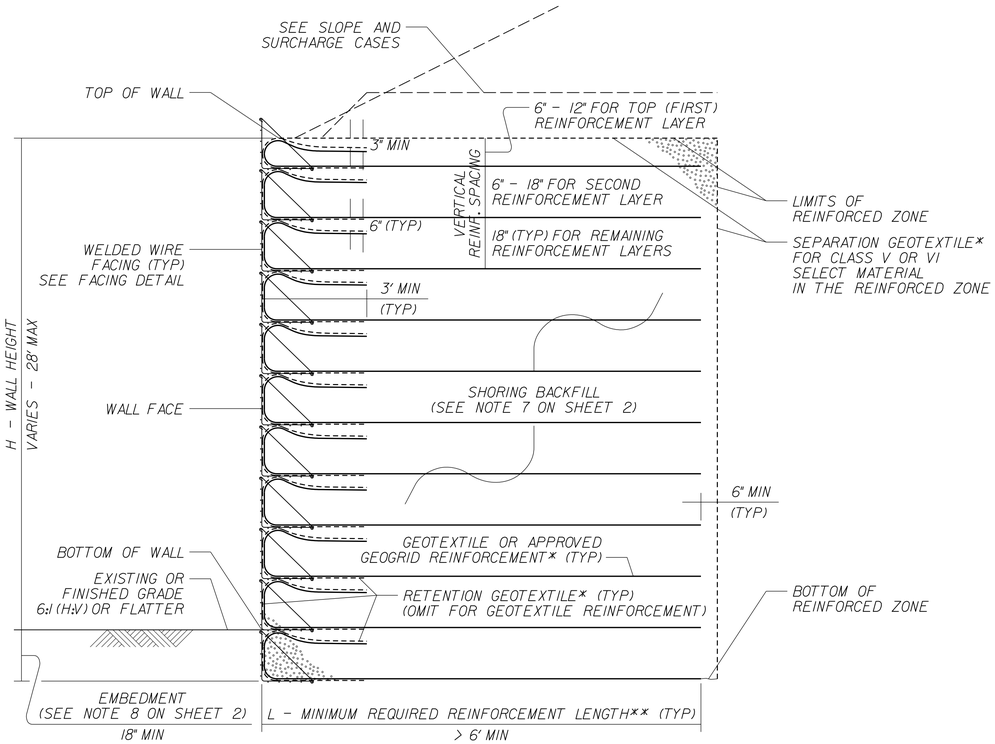


SURCHARGE CASE

SLOPE CASE

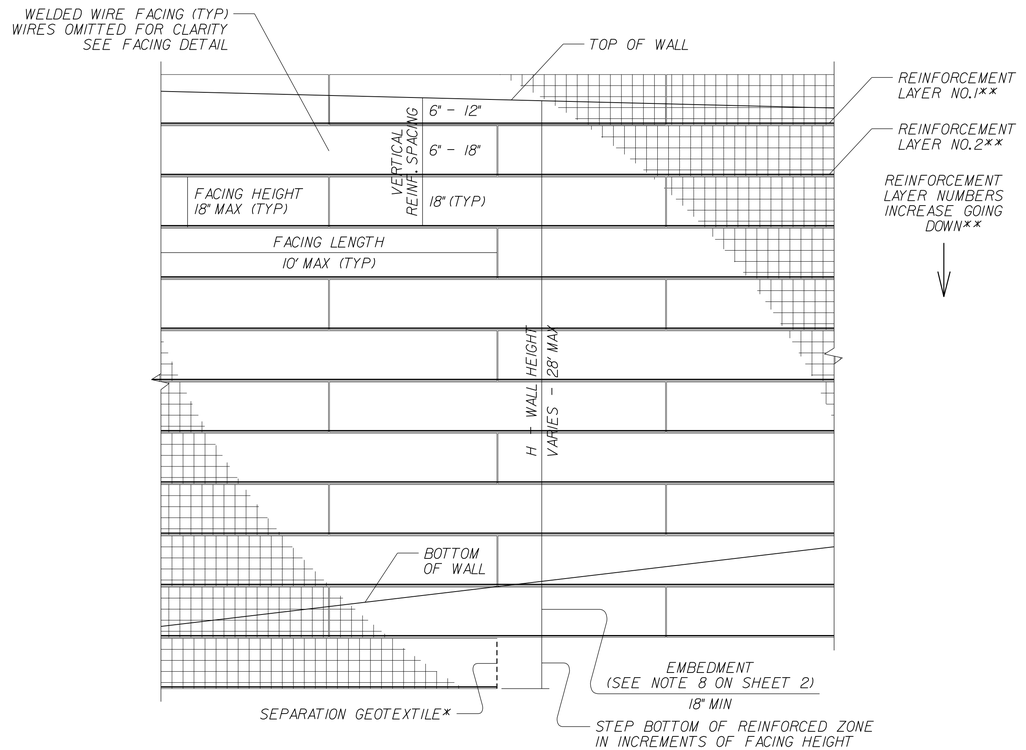


FACING DETAIL



STANDARD TEMPORARY WALL

(FOR STANDARD TEMPORARY WALLS ON STRUCTURES, SEE TEMPORARY WALL ON STRUCTURE DETAIL ON SHEET 2.)
*SEE GEOSYNTHETIC PLACEMENT DETAILS ON SHEET 2.
**SEE REINFORCEMENT TABLES ON SHEET 3.



STANDARD TEMPORARY WALL – PARTIAL ELEVATION

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

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STANDARD DETAIL NO. 1801.02

STANDARD
TEMPORARY SHORING

DATE: 11-19-13

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 031013 ENGINEER STEWART S. LANEY

DocuSigned by: Stewart Laney 3/27/2019
SIGNATURE DATE

ENGINEER

SIGNATURE DATE

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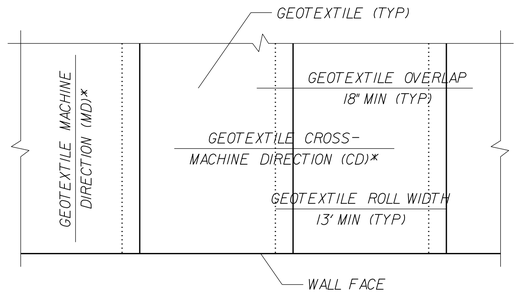
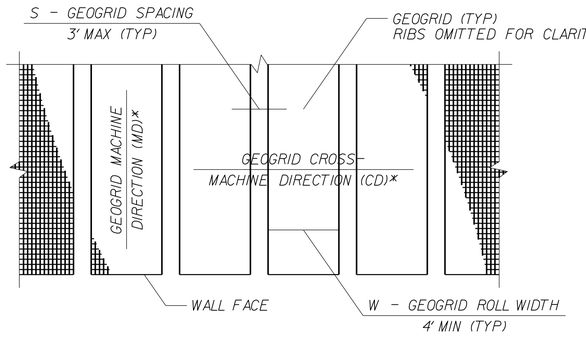


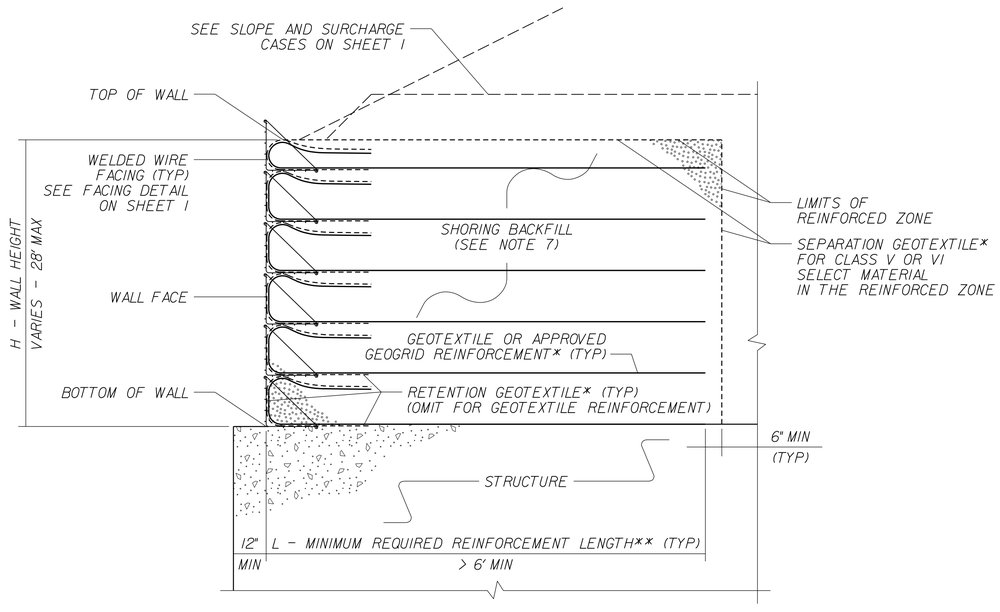
GEOTEXTILE PLACEMENT
(100% COVERAGE MIN FOR GEOTEXTILE REINFORCEMENT)



GEOGRID PLACEMENT
(80% COVERAGE MIN FOR GEOGRID REINFORCEMENT – $\frac{W}{W+S}$ x 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, γ = 120 LB/CF
   FRICTION ANGLE, ϕ = 30 DEGREES
   COHESION, c = 0 LB/SF
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 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. 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 ARE TYPICALLY APPROVED FOR ULTIMATE TENSILE STRENGTHS IN THE MACHINE DIRECTION (MD) AND CROSS-MACHINE DIRECTION (CD) OR SHORT-TERM DESIGN STRENGTHS FOR A 3-YEAR DESIGN LIFE IN THE MD BASED ON MATERIAL TYPE. THE LIST OF APPROVED GEOGRIDS WITH DESIGN STRENGTHS IS AVAILABLE FROM: connect.ncdot.gov/resources/Materials/Pages/SoilsLaboratory.aspx
    DEFINE MATERIAL TYPE FROM THE WEBSITE ABOVE FOR SHORING BACKFILL AS FOLLOWS:

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

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS	STANDARD DETAIL NO. 1801.02
GEOTECHNICAL ENGINEERING UNIT	STANDARD TEMPORARY SHORING
	DATE: 11-19-13

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 031013 ENGINEER STEWART S. LANEY

DocuSigned by: Stewart Laney 3/27/2019

SIGNATURE DATE

ENGINEER

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SLOPE OR SURCHARGE CASE	GROUNDWATER DEPTH BELOW BOTTOM OF REINFORCED ZONE (SEE NOTE 6 ON SHEET 2) (FT)	SHORING BACKFILL TYPE IN THE REINFORCED ZONE (SEE NOTE 7 ON SHEET 2)	H - WALL HEIGHT (FT)																							
			< 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
SLOPE CASE	> 0	CLASS II,TYPE I, CLASS III,CLASS V OR CLASS VI SELECT MATERIAL	6	6	7	8	9	11	12	13	13	14	15	16	17	18	19	20	21	22	23	24	24	25	26	27	27
SURCHARGE CASE	> 0 TO 7 FOR H < 20' > 0 TO 10 FOR H ≥ 20'	ALL SHORING BACKFILL TYPES	6	7	7	8	8	9	9	10	11	11	12	12	13	14	14	15	16	17	17	18	19	19	20	21	22
	> 7 FOR H < 20' > 10 FOR H ≥ 20'	A-2-4 SOIL	6	6	7	8	8	9	9	10	11	11	12	12	13	14	14	15	16	16	17	18	18	19	20	20	21
		CLASS II,TYPE 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
		CLASS V OR CLASS VI SELECT MATERIAL	6	6	7	7	7	8	8	9	9	10	10	11	12	13	13	14	14	15	15	16	17	17	18	19	19

L – MINIMUM REQUIRED REINFORCEMENT LENGTH (FT)

(FOR ALL REINFORCEMENT TYPES)

WALL HEIGHT (H) + 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: CLASS II,TYPE I OR CLASS III SELECT MATERIAL	SLOPE CASE: CLASS V SELECT MATERIAL	SURCHARGE CASE: A-2-4 SOIL	SURCHARGE CASE: CLASS II,TYPE I OR CLASS III SELECT MATERIAL	SURCHARGE CASE: 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: CLASS II,TYPE I OR CLASS III SELECT MATERIAL	SLOPE CASE: CLASS V OR CLASS VI SELECT MATERIAL	SURCHARGE CASE: A-2-4 SOIL	SURCHARGE CASE: CLASS II,TYPE I OR CLASS III SELECT MATERIAL	SURCHARGE CASE: 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 SHORING

DATE: 11-19-13

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-5818	3B-1

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

SUMMARY OF EARTHWORK

(EARTHWORK VOLUMES IN CUBIC YARDS)

STATION	STATION	UNCL. EXCAV.	EMBANK. +%	BORROW	WASTE	UNDERCUT
–Y– MED.						
459+11.61	493+62.76	2647	64	0	2583	0
SUBTOTAL:		2647	64	0	2583	0
–Y– LT.						
461+00.00	470+50.00	542	4924	4382	149	149
478+00.00	483+50.00	209	17	0	192	0
SUBTOTAL:		751	4941	4382	341	149
–Y– RT.						
459+50.00	460+50.00	55	0	0	55	0
468+00.00	485+46.29	1465	445	0	1020	0
SUBTOTAL:		1520	445	0	1075	0
–L– LT.						
10+00.00	13+25.31	8	1771	1763	0	0
–RPC–						
10+00.00	17+49.97	1765	4967	3202	665	665
–RPD–						
10+00.00	16+66.66	183	3310	3127	284	284
–L– LT.						
13+25.31	26+64.45 (Begin Bridge)	864	19482	18618	0	0
SUBTOTAL:		2820	29530	26710	949	949
–L– LT.						
28+86.70 (End Bridge)	32+53.35	0	8723	8723	0	0
–RPB–						
10+00.00	13+27.58	62	2558	2496	0	0
–L– LT.						
32+53.35	36+06.51	0	1987	1987	0	0
–Y2–						
10+00.00	12+36.61	12	26	14	0	0
–L– LT.						
36+06.51	38+00.00	17	35	18	0	0
SUBTOTAL:		91	13329	13238	0	0
–L– RT.						
10+00.00	26+64.45 (Begin Bride)	41	2619	2578	0	0
–L– RT.						
28+86.70 (End Bride)	32+49.34	0	2847	2847	0	0
–RPA–						
10+00.00	16+22.90	419	2100	1681	0	0
–L– RT.						
32+49.34	38+00.00	22	1294	1272	0	0
SUBTOTAL:		482	8860	8378	0	0
–Y3–						
10+00.00	11+61.17	32	19	0	12	0
SUBTOTAL:		32	19	0	12	0
PROJECT SUBTOTALS:		8343	57188	52708	4959	1098
LOSS DUE TO CLEARING & GRUBBING		–375	0	375		0
ADDITIONAL UNDERCUT (CONTINGENCY)		0	575	575	500	500
ESTIMATED SHOULDER MATERIAL		0	7475	7475		0
WASTE IN LIEU OF BORROW		0	0	–3862	–3862	0
PROJECT TOTALS:		7968	65238	57270	1598	1598
5% TO REPLACE TOPSOIL ON BORROW PIT				2864		
GRAND TOTALS:		7968	65238	60134	1598	1598
SAY:		8600		60500		1600

EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT.
THESE QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.
DDE = 520 CY
PAVEMENT STRUCTURE VOLUME = 13,597 CY

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

PAVEMENT REMOVAL SUMMARY

SURVEY LINE	STATION	STATION	LOCATION LT/RT/CL	YD^2
–L–	17+07.08	26+53.98	RT.	1724.12
–L–	29+61.01	32+16.19	RT.	736.18
–RPA–	11+70.64	16+37.36	LT.	172.66
–RPA–	10+66.75	11+70.64	LT.	1.16
–RPA–	15+37.00	15+96.73	RT.	42.37
–RPB–	10+19.03	11+52.48	RT.	2.41
–RPB–	10+00.00	13+45.01	LT.	94.54
–RPB–	12+27.83	12+92.07	RT.	53.36
–L–	33+72.79	36+06.42	RT.	84.68
–RPC–	12+39.04	16+85.93	LT.	476.24
–RPD–	11+93.04	14+64.71	RT.	523.08
–RPD–	14+15.19	15+44.95	LT.	24.65
–Y2–	10+96.30	11+36.11	RT.	7.48
–Y2–	11+78.51	12+32.67	LT.	16.77
–L–	36+46.71	36+91.03	LT.	1.32
–L–	17+22.00	20+72.00	RT	262.00
–L–	23+54.00	26+11.00	LT.	157.78
–L–	28+81.00	31+50.00	LT.	166.78
		TOTAL:		4,547.59
		SAY:		4,550.00

BREAKING OF EXIST. PAVEMENT SUMMARY

SURVEY LINE	STATION	STATION	LOCATION LT/RT/CL	YD^2
–L–	29+57.00	35+50.00	CL	2298.00
–RPA–	13+50.00	16+18.00	CL	777.00
–RPB–	12+50.00	13+84.00	CL	830.67
			TOTAL:	3,905.67
			SAY:	3,910.00

12/06/07

COMPUTED BY: REQ DATE: 08/30/17
CHECKED BY: GSP DATE: 08/30/17

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-5818	3B-2

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

"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

TEMPORARY GUARDRAIL SUMMARY

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOUL. WIDTH	FLARE LENGTH		W		ANCHORS								IMPACT ATTENUATOR TYPE 350			SINGLE FACED GUARDRAIL	REMOVE EXISTING GUARDRAIL	REMOVE AND STOCKPILE EXISTING GUARDRAIL	REMARKS
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	TYPE B-83	TEMP. TYPE III	TEMP. GREU TL-3	M-350	TEMP. B-77	TEMP. CAT-1	VI MOD	BIC	AT-1	EA	G	NG				
-Y-	475+00.00	479+20.00	MED. LT./RT.	6.25'		413.75'			VAR.										1										TIE TO PROP. GR. (SEE TRAFFIC CONTROL PLANS)
-Y-	479+61.00	481+50.00	MED. RT.	189.00'					VAR.										1	1									TIE TO EXIST. BARRIER (SEE TRAFFIC CONTROL PLANS)
-Y-	477+00.00	479+47.00	MED. LT	247.00'					VAR.										1	1									TIE TO PROP. GR. (SEE TRAFFIC CONTROL PLANS)
-Y-	479+87.00	483+50.00	MED. LT./RT.	6.25'		356.75'			VAR.										1										TIE TO EXIST. BARRIER (SEE TRAFFIC CONTROL PLANS)
-Y-	475+00.00		MED. RT.						VAR.											1									TIE TO PROP. GR. (SEE TRAFFIC CONTROL PLANS)
-Y-	481+50.00		MED. LT						VAR.											1									TIE TO PROP. GR. (SEE TRAFFIC CONTROL PLANS)
-L-	22+55.00	26+00.00	RT.	345.00'					VAR.							1	1												(SEE TRAFFIC CONTROL PLANS)
-L-	29+55.00	31+38.00	RT.	173.00'					VAR.							1	1												(SEE TRAFFIC CONTROL PLANS)
			PROJECT SUBTOTAL	966.50'		770.50'										2	2		4	4									
GUARDRAIL ANCHOR DEDUCTIONS			2 TEMP. GREU TL-3 @ 50.00'	-100.00'																									
			2 TEMP. TYPE III @ 18.75'	-37.50'																									
			4 TEMP. CAT-1 @ 6.25'			-25.00'																							
			4 TEMP. B-77 @ 22.875'			-91.50'																							
			PROJECT TOTAL	829.00'		654.00'										2	2		4	4									
			SAY:	837.50'		662.50'										2	2		4	4									
ADDITIONAL GUARDRAIL POST = 5 EA.																													

3/29/2018
U-5818_rdy_psh_3B-2.dgn
USER:rdy

COMPUTED BY: REO	DATE: 08/30/17
CHECKED BY: GSP	DATE: 08/30/17

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-5818	3B-3

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

"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 CON. BARRIER	REMOVE EXISTING GUARDRAIL	MEDIAN HAZARD PROTECTION	REMARKS
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	TYPE B-83	TYPE III	GREU TL-3	M-350	B-77	CAT-1	VI MOD	BIC	AT-1	EA	G	NG				
-L-	24+71.38	26+96.38	RT.	225.00'			26+96.38		7.5'	10'	206.25'		1'			1	1													
-L-	29+13.92	31+38.92	RT.	225.00'				29+13.92	7.5'	10'		206.25'		1'		1				1										
-L-	23+00.00	26+32.52	LT.	332.52'			26+32.52	23+00.00	7.5'	10'	313.77'		1'			1				1										
-L-	28+59.48	30+84.48	LT.	225.00'			28+59.48		7.5'	10'		206.25'		1'		1	1													
-L-	10+10.87	11+76.63	LT.	165.76'				10+10.87	8'	10'										1										
-RPC-	14+00.00	16+24.51	RT.	224.51'			15+00.00		8'	10'	50'		1'				1											305.00'		
-L- /-RPC-	11+76.63	16+24.51	LT./RT.		177'				8'	10'																				
-RPD-	10+00.00	15+31.29	LT.	531.29'					8'	10'																				
-RPD- /-L-	15+31.29	15+41.34	RT./LT.	50.00'	178'				8'	10'		50'		1'			1													
-L-	33+12.72	34+71.56	LT.	161.84'			33+12.72		8'	10'																				
-L- /-Y2-	34+71.56	10+81.25	LT/RT.		83.25'		33+12.72	10+81.25	8'	10'													1							
-RPB-	12+00.00	13+17.96	LT.	117.96'			13+17.96	12+00.00	8'	10'										1										
-RPB- /-L-	13+17.96	33+12.72	LT.		88'		13+17.96	33+12.72	8'	10'																				
-Y2-	10+00.00	11+26.18	LT.	126.18'			10+00.00	11+26.18	6'	9'																				TIE TO EXIST. GUARDRAIL
-Y2- /-Y3-	11+26.18	10+24.14	LT.		26'		11+26.18	10+24.14	6'	9'																				
-Y3-	10+24.14	10+75.00	LT.	50.86'			10+24.14	10+75.00	6'	9'																				TIE TO EXIST. GUARDRAIL
-Y-	460+94.53	469+81.70	LT.	887.17'			469+81.70	460+94.53	12'	15'	50'		1'				1											750.00'		TIE TO EXIST. GUARDRAIL
-Y-	480+82.20	483+70.70	LT.	288.50'			480+82.20		12'	15'	50'		1'				1		1									215.00'		
-Y-	468+18.99	476+89.72	RT.	870.73'			468+18.99	476+89.72	12'	15'									1											
-Y-	479+62.67	485+46.29	RT.	583.62'			479+62.67	485+46.29	12'	15'									1											TIE TO EXIST. GUARDRAIL
-Y-	460+00.00	471+80.00	MED. LT.	1,180.00'			460+00.00	471+80.00	7.5'		50'	270'	1'	21'			1													TIE TO EXIST. GUARDRAIL
-Y-	472+00.00	478+68.28	MED. LT.	668.28'			472+00.00	478+68.28	7.5'			132'		8.8'					1	1										
-Y-	479+53.94	486+80.00	MED. LT.	726.06'			479+53.94	486+80.00	7.5'		132'	50'	8.8'	1'			1		1											
-Y-	487+00.00	493+22.76	MED. LT.	622.76'			487+00.00	493+22.76	7.5'			270'		21'						1										TIE TO EXIST. GUARDRAIL
-Y-	460+00.00	470+00.00	MED. RT.	1000.00'			460+00.00	470+00.00	7.5'											1										TIE TO EXIST. GUARDRAIL
-Y-	470+20.00	478+68.28	MED. RT.	848.28'			470+20.00	478+68.28	7.5'		50'	132'	1'	8.8'			1		1											
-Y-	479+53.94	485+00.00	MED. RT.	546.06'			479+53.94	485+00.00	7.5'		132'		8.8'						1	1										
-Y-	485+20.00	493+22.76	MED. RT.	802.76'			485+20.00	493+22.76	7.5'			55'		4.5'			1													TIE TO EXIST. GUARDRAIL
-Y-	460+00.00	493+22.76	MED. RT.																									3,322.76'		
-Y-	477+25.52	481+80.93	MED. LT.																									455.41'		
-L-	22+55.30	26+24.79	RT.																									369.49'		
-L-	29+54.75	31+13.38	RT.																									158.63'		
-L-	23+39.37	26+56.13	RT.																									316.76'		
-L-	29+87.47	31+79.68	RT.																									192.21'		
-RPC-	12+67.16	15+68.03	LT.																									300.87'		
-RPC-	13+86.73	16+94.15	RT.																									307.42'		
-L- /-RPC-	10+00.00	16+98.30	LT./RT.																									300.00'		
-RPD- /-Y-	16+27.44	468+18.99	LT./RT.																									610.00'		
-Y-	468+18.99	478+65.72	RT.																									1,046.82'		
-Y-	480+48.46	485+46.29	RT.																									497.83'		
-Y-	478+65.55	480+82.230	LT.																								216.68'			WALL PROTECTION
-Y-	476+89.72	479+62.67	RT.																								272.95'			WALL PROTECTION
-Y-	478+68.28	479+53.94	MED. LT.																										85.66'	PIER PROTECTION SEE DETAIL SHEET 2C-1
-Y-	478+68.28	479+53.94	MED. RT.																										85.66'	PIER PROTECTION SEE DETAIL SHEET 2C-1
			PROJECT SUBTOTAL	11,460.14'	552.25'											4	10		7	8			1				489.63'	9,148.20	171.32'	
GUARDRAIL ANCHOR DEDUCTIONS			4 TYPE III @ 18.75'	-75.00'																										
			10 GREU TL-3 @ 50.00'	-500.00'																										
			7 B-77 @ 22.875'	-160.125'																										
			8 CAT-1 @ 6.25'	-50.00'																										
			1 AT-1 @ 6.25'	-6.25'																										
			PROJECT TOTAL	10,668.765'	552.25'																									
																4	10		7	8			1				500.00'	9,148.20	180.00'	
ADDITIONAL GUARDRAIL POST = 10 EA.			SAY:	10,675.00'	562.50'											4	10		7	8			1				500.00'	9,148.20	180.00'	

12/06/07

3/27/2019
...\Pr...U-5818_rdy_psh_3B-3.dgn

RAL-WS061

COMPUTED BY:	Matthew Harvey	DATE:	3/1/2018
CHECKED BY:	Greg Purvis	DATE:	

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

PROJECT NO.	SHEET NO.
U-5818	3D-1

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

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

LINE & STATION (SIZE / THICKNESS OR GAUGE)	OFFSET		STRUCTURE NUMBER FROM	STRUCTURE NUMBER TO	TOP ELEVATION FT.	INVERT ELEVATION FT.	INVERT ELEVATION FT.	MINIMUM REQUIRED SLOPE %	Drainage Pipe (RCP, CSP, CAAP, HDPE, or PVC) 15	18	24	30	36	42	48	DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE	DO NOT USE PVC	C. S. PIPE 15 .064	18 .064	24 .064	30 .079
L 13+78	37	RT	0401		1396.0																			
			0401	0402		1394.0	1393.1			20														
L 13+78	20	RT	0402		1396.3																			
			0402	0403		1393.1	1392.3	0.3																
L 14+50	20	RT	0403		1395.5																			
			0403	0405		1392.3	1390.8	0.4																
L 15+80	20	RT	0404		1394.2																			
			0404	0405		1391.2	1391.1																	
L 15+38	20	RT	0405		1394.6																			
			0405	0406		1390.8	1390.3	0.6																
L 15+38	35	LT	0406		1394.4																			
			0406	0407		1390.3	1377.0	3.4		68						X								
L 10+59	37	RT	0408		1398.6																			
			0408	0410		1395.9	1394.0		60															
L 11+82	35	RT	0409		1396.9																			
			0409	0410		1395.0	1394.0		60															
L 11+21	36	RT	0410		1397.6																			
RPC 16+75	41	RT	0411		1395.4																			
			0411	0413		1392.4	1390.7																	
RPC 15+14	27	RT	0412		1393.9																			
			0412	0413		1390.9	1390.7																	
RPC 16+00	30	RT	0413		1394.7																			
			0413	0414		1390.7	1376.4	0.5	52							X								
L 11+77	24	LT	0415		1398.0																			
			0415	0416		1395.0	1376.7		52							X								
RPD 12+84	70	RT	0417		1393.7																			
			0417	0418		1391.0	1390.7		96															
RPD 13+57	34	RT	0418		1394.0																			
			0418	0419		1390.7	1390.4																	
RPD 13+57	14	LT	0419		1393.4																			
			0419	0420		1390.4	1375.0	0.9	48							X								
RPD 11+50	14	LT	0421		1393.2																			
			0421	0422		1390.2	1374.2		60							X								
L 19+39	20	LT	0423		1390.2																			
			0423	0503		1387.2	1386.2																	
L 16+00	20	RT	0424		1394.4																			
			0424	0404		1391.4	1391.2																	
Y 459+98	65	RT	0425		1414.5																			
			0425	0426		1411.8	1411.1		52															
L 14+15	66	LT	0427		1395.0																			
			0427	0406		1392.0	1390.6																	
L 17+80	32	LT	0428		1391.6																			
			0428	0423		1388.6	1387.2																	
Y 463+50	63	LT	0429		1404.3																			
			0429	0430		1401.6	1394.4		248															
Y 466+00	65	LT	0430		1397.2																			
			0430	0431		1394.4	1388.7		200															
Y 468+00	65	LT	0431		1391.5																			
			0431	0432		1388.7	1381.2	1.3	44							X								
Y 473+50	0	CL	0501		1374.5																			
SHEET TOTALS									972	88														

STRUCTURE	R. C. PIPE CLASS III 12	15	18	24	30	36	42	48	R. C. PIPE CLASS IV 12	15	18	24	30	R. C. PIPE CLASS V 12	15	18	24	30	36	42	48	18" WELDED STEEL PIPE 0.25" THICK, GRADE B IN SOIL	15" SIDE DRAIN PIPE	18" SIDE DRAIN PIPE	24" SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CY	REINFORCED ENDWALLS CY	DRAINAGE STRUCTURE MASONRY CY	QUANTITIES FOR DRAINAGE STRUCTURES (NOTE: TOTAL LIN. FT. FOR PAY QUANTITY SHALL BE A + (1.3 X B)) 0' THRU 5' EACH	A 5' THRU 10' LIN. FT.	B 10' AND ABOVE LIN. FT.	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STD. 840.03 GRATE TYPE E	F	G	
0401																																				
0401–0402																																				
0402																													1			1		1		
0402–0403											72																									
0403																													1			1		1		
0403–0405											88																									
0404																													1			1		1		
0404–0405										40																										
0405																													1			1		1		
0405–0406											52																									
0406																													1			1			1	
0406–0407																																				
0408																													1							
0408–0410																																				
0409																													1							
0409–0410																																				
0410																													1							
0411																													1			1			1	
0411–0413										76																										
0412																													1			1	1			
0412–0413										80																										
0413																													1			1			1	
0413–0414																																				
0415																													1			1			1	
0415–0416																																				
0417																													1							
0417–0418																																				
0418																													1							
0418–0419										48																										
0419																													1			1	1			
0419–0420																																				
0421																													1			1		1		
0421–0422																																				
0423																													1			1			1	
0423–0503										100																										
0424																													1			1		1		
0424–0404										20																										
0425																													1							
0425–0426																																				
0427																													1			1			1	
0427–0406										128																										
0428																													1			1			1	
0428–0423										156																										
0429																													1							
0429–0430																																				
0430																													1							
0430–0431																																				
0431																													1							
0431–0432																																				
0501																													1							
SHEET TOTALS										648	212																		25			15	2	6	7	

STRUCTURE	CONCRETE TRANSITIONAL SECTION D.I. STD. 852.04 OR STD. 852.06	C.B. STD. 852.05	G.D.I. TYPE "A" STD. 840.17 OR STD. 840.26	G.D.I. TYPE "B" STD. 840.18 OR STD. 840.27	G.D.I. TYPE "D" STD. 840.19 OR STD. 840.28	G.D.I. (W.S. FLAT) FRAME WITH GRATE STD. 840.20	G.D.I. (W.S. FLAT) FRAME W/ 2 GRATES STD. 840.20	G.D.I. (W.S. SAG) FRAME W/ GRATE STD. 840.22	G.D.I. (W.S. SAG) FRAME W/ 2 GRATES STD. 840.22	T.B.J.B. STD. 840.34	T.B.D.I. STD. 840.35	M.H. STD. 840.51, STD. 840.52, OR STD. 840.53	M.H. FRAME AND COVER STD. 840.54	ADJUST M.H.	15" DRAINAGE PIPE ELBOW	18" DRAINAGE PIPE ELBOW	15" C.S. ELBOW	18" C.S. ELBOW	24" C.S. ELBOW	30" C.S. ELBOW	36" C.S. ELBOW	BERM DITCH OUTLET STD. 850.10 (PER EACH)	BERM DITCH OUTLET STD. 850.11 (PER EACH)		FLOWABLE FILL CY	CONCRETE COLLARS CL. "B" STD. 840.72 CY	PIPE REMOVAL LIN. FT.	REMARKS
0401																												Open End
0401–0402																												
0402																												
0402–0403																												
0403																												
0403–0405																											72	
0404																												
0404–0405																												
0405																												
0405–0406																												
0406																												
0406–0407																2												
0408				1					1																			
0408–0410																												
0409					1				1																			
0409–0410																												
0410				1					1																			
0411																												
0411–0413																												
0412																												
0412–0413																												
0413																												
0413–0414															2													
0415																												
0415–0416															2													
0417				1					1																			
0417–0418																									3		40	
0418				1					1																			
0418–0419																												
0419																												
0419–0420															2													
0421																												
0421–0422															2													
0423																												
0423–0503																												
0424																												
0424–0404																												
0425				1			1																					
0425–0426																												
0427																												
0427–0406																												
0428																												
0428–0423																												
0429				1			1																					
0429–0430																												
0430				1			1																					
0430–0431																												
0431				1			1																					
0431–0432															2													
0501				1					1																3			
SHEET TOTALS				9	1		4		6						10	2									6		112	

ABBREVIATIONS

- C.A.A. CORRUGATED ALUMINIUM ALLOY
- C.B. CATCH BASIN
- C.S. CORRUGATED STEEL
- D.I. DROP INLET
- G.D.I. GRATED DROP INLET
- H.D.P.E. HIGH DENSITY POLYETHYLENE
- J.B. JUNCTION BOX
- M.H. MANHOLE
- N.S. NARROW SLOT
- P.V.C. POLYVINYL CHLORIDE
- R.C. REINFORCED CONCRETE
- T.B.D.I. TRAFFIC BEARING DROP INLET
- T.B.J.B. TRAFFIC BEARING JUNCTION BOX
- W.S. WIDE SLOT

RAL-WS061

COMPUTED BY:	Matthew Harvey	DATE:	3/1/2018
CHECKED BY:	Greg Purvis	DATE:	

PROJECT NO.	SHEET NO.
U-5818	3D-2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

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

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

LINE & STATION	OFFSET	STRUCTURE NUMBER FROM	STRUCTURE NUMBER TO	TOP ELEVATION FT.	INVERT ELEVATION FT.	INVERT ELEVATION FT.	MINIMUM REQUIRED SLOPE %	Drainage Pipe (RCP, CSP, CAAP, HDPE, or PVC) 15	18	24	30	36	42	48	DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE	DO NOT USE PVC	C. S. PIPE 15 (.064)	18 (.064)	24 (.064)	30 (.079)
		0501	0502		1371.5	1366.4	0.5																
L 20+39	20 LT	0503		1389.2																			
		0503	0504		1386.2	1384.0	0.3	24							X								
L 22+06	20 LT	0505		1387.7																			
		0505	0506		1384.7	1384.6																	
L 22+49	20 LT	0506		1387.8																			
		0506	0509		1384.6	1384.4																	
L 23+56	20 RT	0507		1388.3																			
		0507	0508		1385.3	1385.2																	
L 23+26	20 RT	0508		1388.3																			
		0508	0509		1385.2	1384.4																	
L 23+26	20 LT	0509		1388.1																			
		0509	0510		1384.4	1363.5	2.4	64							X								
L 30+82	20 RT	0511		1391.3																			
		0511	0512		1388.3	1388.1																	
L 31+27	20 RT	0512		1391.2																			
		0512	0514		1388.1	1388.0																	
L 30+82	20 LT	0513		1391.3																			
		0513	0514		1388.3	1388.0																	
L 31+27	20 LT	0514		1391.2																			
		0514	0515		1388.0	1387.5																	
RPB 12+90	29 RT	0515		1390.5																			
		0515	0516		1387.5	1386.8	0.4																
RPB 12+55	14 RT	0516		1389.8																			
		0516	0517		1386.8	1373.0	1.6													72			
Y 478+61	76 LT	0518		1366.5																			
		0518	0519		1363.8	1363.4	0.5	20															
Y 478+61	56 LT	0519		1369.9																			
		0519	0528		1363.4	1362.7	0.5																
L 33+15	36 LT	0520		1392.7																			
		0520	0521		1389.7	1388.5																	
L 32+61	50 LT	0521		1391.5																			
		0521	0522		1388.5	1375.7		64							X								
L 23+00	56 RT	0525																					
L 25+50	20 RT	0526		1391.3																			
		0526	0507		1388.3	1385.3																	
L 25+50	20 LT	0527		1391.3																			
		0527	0509		1388.3	1384.4																	
Y 479+01	56 LT	0528		1369.8																			
Y 478+08	1 LT	0529		1365.6																			
		0529	0530		1362.8	1360.7		92															
Y 479+00	17 LT	0530		1366.2																			
		0530	0531		1360.4	1360.4	0.5		12														
Y 479+17	17 LT	0531		1366.2																			
		0531	0532		1360.4	1359.0			32														
Y 479+06	16 RT	0532		1367.3																			
Y 478+94	64 RT	0533		1363.3																			
		0533	0534		1359.0	1357.9																	
Y 479+24	62 RT	0534		1363.6																			
		0534	0535		1356.1	1356.0				12													
SHEET TOTALS								264	44	12										72			

FROM	TO	R. C. PIPE CLASS III 12	15	18	24	30	36	42	48	R. C. PIPE CLASS IV 12	15	18	24	30	R. C. PIPE CLASS V 12	15	18	24	30	36	42	48	18" WELDED STEEL PIPE 0.25" THICK, GRADE B IN SOIL	15" SIDE DRAIN PIPE	18" SIDE DRAIN PIPE	24" SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CY	REINFORCED ENDWALLS CY	DRAINAGE STRUCTURE MASONRY CY
0501	0502																						88						
0503																													
0503	0504																												
0505																													
0505	0506										40																		
0506																													
0506	0509										76																		
0507																													
0507	0508										28																		
0508																													
0508	0509										40																		
0509																													
0509	0510																												
0511																													
0511	0512										44																		
0512																													
0512	0514										40																		
0513																													
0513	0514										44																		
0514																													
0514	0515										64																		
0515																													
0515	0516										36																		
0516																													
0516	0517																												
0518																													
0518	0519																												
0519																													
0519	0528		40																										
0520																													
0520	0521										56																		
0521																													
0521	0522																												
0525																										54			
0526																													
0526	0507										192																		
0527																													
0527	0509										224																		
0528																													
0529																													
0529	0530																												
0530																													
0530	0531																												
0531																													
0531	0532																												
0532																													
0533																													
0533	0534		28																										
0534																													
0534	0535																												
SHEET TOTALS			68								884												88			54			

FROM	TO	QUANTITIES FOR DRAINAGE STRUCTURES (NOTE: TOTAL LIN. FT. FOR PAY QUANTITY SHALL BE A + (1.3 X B)) 0' THRU 5' EACH	A: 5' THRU 10' LIN. FT.	B: 10' AND ABOVE LIN. FT.	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STD. 840.03 GRATE TYPE E	F	G		CONCRETE TRANSITIONAL SECTION D.I. STD. 852.04 OR STD. 852.06	C.B. STD. 852.05	G.D.I. TYPE "A" STD. 840.17 OR STD. 840.26	G.D.I. TYPE "B" STD. 840.18 OR STD. 840.27	G.D.I. TYPE "D" STD. 840.19 OR STD. 840.28	G.D.I. (W.S. FLAT) FRAME WITH GRATE STD. 840.20	G.D.I. (W.S. FLAT) FRAME W/ 2 GRATES STD. 840.20	G.D.I. (W.S. SAG) FRAME W/ GRATE STD. 840.22	G.D.I. (W.S. SAG) FRAME W/ 2 GRATES STD. 840.22	T.B.J.B. STD. 840.34	T.B.D.I. STD. 840.35	M.H. STD. 840.51, STD. 840.52, OR STD. 840.53	M.H. FRAME AND COVER STD. 840.54	ADJUST M.H.	15" DRAINAGE PIPE ELBOW	18" DRAINAGE PIPE ELBOW	15" C.S. ELBOW	18" C.S. ELBOW	24" C.S. ELBOW	30" C.S. ELBOW	36" C.S. ELBOW	BERM DITCH OUTLET STD. 850.10 (PER EACH)	BERM DITCH OUTLET STD. 850.11 (PER EACH)		FLOWABLE FILL CY	CONCRETE COLLARS CL. "B" STD. 840.72 CY	PIPE REMOVAL LIN. FT.	REMARKS
0501	0502																																				Trenchless Installation; Bore & Jack
0503		1			1			1																													
0503	0504																							2													
0505		1			1			1																													
0505	0506																																				
0506		1			1	1																															
0506	0509																																				
0507		1			1			1																													
0507	0508																																				
0508		1			1			1																													
0508	0509																																				
0509		1			1		1																														
0509	0510																							2													
0511		1			1		1																														
0511	0512																																				
0512		1			1	1																															
0512	0514																																				
0513		1			1			1																													
0513	0514																																				
0514		1			1	1																															
0514	0515																																				
0515		1			1			1																													
0515	0516																																				
0516		1			1			1																													
0516	0517																									2											
0518		1											1					1																			
0518	0519																																				
0519		1	1.5										1			1																					
0519	0528																																			32	
0520		1			1		1																														
0520	0521																																				
0521		1			1		1																														
0521	0522																							2													
0525																																					
0526		1			1			1																												65	
0526	0507																																				
0527		1			1		1																														
0527	0509																																				
0528		1	2.0										1			1																				29	
0529		1											1					1																			
0529	0530																																			17	
0530		1	0.8													1				1																	
0530	0531																																				
0531		1	0.8													1				1																	
0531	0532																																			18	
0532		1	3.4													1				1																	
0533		1														1				1																	
0533	0534																																				
0534		1	2.5																1			1															
0534	0535																																				
SHEET TOTALS		25	11.0		16	3	5	8					4			6		2	1	4		1		6		2										161	

ABBREVIATIONS

C.A.A.	CORRUGATED ALUMINIUM ALLOY
C.B.	CATCH BASIN
C.S.	CORRUGATED STEEL
D.I.	DROP INLET
G.D.I.	GRATED DROP INLET
H.D.P.E.	HIGH DENSITY POLYETHYLENE
J.B.	JUNCTION BOX
M.H.	MANHOLE
N.S.	NARROW SLOT
P.V.C.	POLYVINYL CHLORIDE
R.C.	REINFORCED CONCRETE
T.B.D.I.	TRAFFIC BEARING DROP INLET
T.B.J.B.	TRAFFIC BEARING JUNCTION BOX
W.S.	WIDE SLOT

RAL-WS061

COMPUTED BY:	Matthew Harvey	**DATE:**	3/1/2018
CHECKED BY:	Greg Purvis	**DATE:**	

PROJECT NO.	SHEET NO.
U-5818	3D-3

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

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

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

LINE & STATION (SIZE / THICKNESS OR GAUGE)	OFFSET		STRUCTURE NUMBER FROM	TO	TOP ELEVATION FT.	INVERT ELEVATION FT.	INVERT ELEVATION FT.	MINIMUM REQUIRED SLOPE %	Drainage Pipe (RCP, CSP, CAAP, HDPE, or PVC) 15	18	24	30	36	42	48	DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE	DO NOT USE PVC	C. S. PIPE 15 .064	18 .064	24 .064	30 .079
L 36+50	32	LT	0601		1404.5																			
			0601	0602		1401.5	1398.0		48															
L 36+91	32	LT	0603		1406.8																			
L 35+67	32	RT	0604		1402.5					16														
Y2 11+20	26	RT	0605		1395.8																			
			0605	0606		1392.8	1392.0		52															
L 35+30	28	LT	0607		1399.7																			
RPA 14+45	34	RT	0701		1382.8																			
			0701	0702		1379.8	1378.1		28															
RPA 14+20	47	RT	0702		1380.0																			
			0702	0703		1377.8	1375.4																	
RPA 14+09	26	RT	0703		1376.9																			
RPD 14+89		CL																						
SHEET TOTALS									128	16														
PROJECT TOTALS									1364	148	12										72			

LINE & STATION	FROM	TO	R. C. PIPE CLASS III 12	15	18	24	30	36	42	48	R. C. PIPE CLASS IV 12	15	18	24	30	R. C. PIPE CLASS V 12	15	18	24	30	36	42	48	18" WELDED STEEL PIPE 0.25" THICK, GRADE B IN SOIL	15" SIDE DRAIN PIPE	18" SIDE DRAIN PIPE	24" SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CY	REINFORCED ENDWALLS CY	DRAINAGE STRUCTURE MASONRY CY
L 36+50	0601																													
	0601	0602																												
L 36+91	0603																													
L 35+67	0604																													
Y2 11+20	0605																													
	0605	0606																												
L 35+30	0607																													
RPA 14+45	0701																													
	0701	0702																												
RPA 14+20	0702																													
	0702	0703			24																									
RPA 14+09	0703																													
RPD 14+89																														
SHEET TOTALS					24																									
PROJECT TOTALS				68	24							1532	212											88			54			

LINE & STATION	FROM	TO	QUANTITIES FOR DRAINAGE STRUCTURES (NOTE: TOTAL LIN. FT. FOR PAY QUANTITY SHALL BE A + (1.3 X B)) 0' THRU 5' EACH	A 5' THRU 10' LIN. FT.	B 10' AND ABOVE LIN. FT.	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STD. 840.03 GRATE TYPE E	F	G		CONCRETE TRANSITIONAL SECTION D.I. STD. 852.04 OR STD. 852.06	C.B. STD. 852.05	G.D.I. TYPE "A" STD. 840.17 OR STD. 840.26	G.D.I. TYPE "B" STD. 840.18 OR STD. 840.27	G.D.I. TYPE "D" STD. 840.19 OR STD. 840.28	G.D.I. (W.S. FLAT) FRAME WITH GRATE STD. 840.20	G.D.I. (W.S. FLAT) FRAME W/ 2 GRATES STD. 840.20	G.D.I. (W.S. SAG) FRAME W/ GRATE STD. 840.22	G.D.I. (W.S. SAG) FRAME W/ 2 GRATES STD. 840.22	T.B.J.B. STD. 840.34	T.B.D.I. STD. 840.35	M.H. STD. 840.51, STD. 840.52, OR STD. 840.53	M.H. FRAME AND COVER STD. 840.54	ADJUST M.H.	15" DRAINAGE PIPE ELBOW	18" DRAINAGE PIPE ELBOW	15" C.S. ELBOW	18" C.S. ELBOW	24" C.S. ELBOW	30" C.S. ELBOW	36" C.S. ELBOW	BERM DITCH OUTLET STD. 850.10 (PER EACH)	BERM DITCH OUTLET STD. 850.11 (PER EACH)		FLOWABLE FILL CY	CONCRETE COLLARS CL. "B" STD. 840.72 CY	PIPE REMOVAL LIN. FT.	REMARKS
L 36+50	0601		1			1		1																														
	0601	0602																																				
L 36+91	0603		1			1		1																														
L 35+67	0604		1	2.9		1			1																													
Y2 11+20	0605		1			1			1																													
	0605	0606																																				
L 35+30	0607																								1														
RPA 14+45	0701		1			1			1																													
	0701	0702																																				
RPA 14+20	0702		1												1				1																			
	0702	0703																																				
RPA 14+09	0703																																			0.4465		Collar
RPD 14+89																																			4			
SHEET TOTALS			6	2.9		5		2	3						1				1					1											4	0.4465		
PROJECT TOTALS			56	13.9		36	5	13	18					13	2		10		9	1	4		1	1	16	2	2								10	0.4465	273	

ABBREVIATIONS

C.A.A.	CORRUGATED ALUMINIUM ALLOY
C.B.	CATCH BASIN
C.S.	CORRUGATED STEEL
D.I.	DROP INLET
G.D.I.	GRATED DROP INLET
H.D.P.E.	HIGH DENSITY POLYETHYLENE
J.B.	JUNCTION BOX
M.H.	MANHOLE
N.S.	NARROW SLOT
P.V.C.	POLYVINYL CHLORIDE
R.C.	REINFORCED CONCRETE
T.B.D.I.	TRAFFIC BEARING DROP INLET
T.B.J.B.	TRAFFIC BEARING JUNCTION BOX
W.S.	WIDE SLOT

RAL-WS061

COMPUTED BY: Matthew Harvey DATE: 3/1/2018

CHECKED BY: Greg Purvis DATE:

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

PROJECT NO.	SHEET NO.
U-5818	3D-4

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

LIST OF PIPES, ENDWALLS, ETC. (FOR PIPES 54 INCHES & OVER)

LINE & STATION	OFFSET	STRUCTURE NUMBER FROM	STRUCTURE NUMBER TO	TOP ELEVATION FT.	INVERT ELEVATION FT.	INVERT ELEVATION FT.	MINIMUM REQUIRED SLOPE %	Drainage Pipe (RCP, CSP, CAAP, HDPE, or PVC) SIZE	Drainage Pipe THICKNESS OR GAUGE	C. S. PIPE SIZE	C. S. PIPE THICKNESS OR GAUGE	R. C. PIPE CLASS III	R. C. PIPE CLASS IV	R. C. PIPE CLASS V	STRUCTURAL PLATE PIPE	### R.C. PIPE CULVERTS, CONTRACTOR DESIGN	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CY	REINFORCED ENDWALLS CY	DRAINAGE STRUCTURE MASONRY CY	QUANTITIES FOR DRAINAGE STRUCTURES 0' THRU 5' EACH	5' THRU 10' LIN. FT.	10' AND ABOVE LIN. FT.	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STD. 840.03 GRATE TYPE E	F	G	CONCRETE TRANSITIONAL SECTION D.I. STD. 852.04 OR STD. 852.06	C.B. STD. 852.05	OPEN THROAT C.B. STD. 840.04 OR STD. 840.05	CONCRETE BRIDGE APPROACH D.I. STD. 840.13	D.I. STD. 840.14 OR STD. 840.15	FRAME W/ GRATE FOR DRIVEWAY STD. 840.30	J.B. STD. 840.31 OR STD. 840.32	ANGLED VANE GRATES AND FRAMES STD. 840.33	T.B.J.B. STD. 840.34	CONCRETE COLLARS CL. "B" STD. 840.72 CY	CONCRETE AND BRICK PIPE PLUG STD. 840.71 CY	PIPE REMOVAL LIN. FT.	REMARKS
Y 842+57	74 RT	0523		1357.7															7.400																			
		0523	0524		1350.4	1350.4																																	
SHEET TOTALS											4								7.400														1					
PROJECT TOTALS											4								7.400														1					

ABBREVIATIONS

C.A.A.	CORRUGATED ALUMINIUM ALLOY
C.B.	CATCH BASIN
C.S.	CORRUGATED STEEL
D.I.	DROP INLET
G.D.I.	GRATED DROP INLET
H.D.P.E.	HIGH DENSITY POLYETHYLENE
J.B.	JUNCTION BOX
M.H.	MANHOLE
N.S.	NARROW SLOT
P.V.C.	POLYVINYL CHLORIDE
R.C.	REINFORCED CONCRETE
T.B.D.I.	TRAFFIC BEARING DROP INLET
T.B.J.B.	TRAFFIC BEARING JUNCTION BOX
W.S.	WIDE SLOT

COMPUTED BY: TJD DATE: 11/13/18 CHECKED BY: SSL DATE: 11/13/18	(5-15-18)	PROJECT NO. U-5818	SHEET NO. 3G-1

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

SUMMARY OF SUBSURFACE DRAINAGE

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

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

SUMMARY OF GEOTEXTILE FOR PAVEMENT STABILIZATION

LINE	Station	Station	Geotextile for Pavement Stabilization SY	Class IV Subgrade Stabilization TONS
-L-	10+25	11+75	72	24
-L-	14+75	16+25	2598	23
-L-	22+75	26+25	2179	0
-L-	29+25	31+25	561	0
-Y-	460+75	468+75	2045	0
-RPC-	15+25	17+25	1433	0
-RPD-	10+75	13+25	1247	0
CONTINGENCY			200	100
		TOTAL SY/TONS:	10335	147*

*Total tons of "Class IV Subgrade Stabilization" is only the estimated quantity for pavement stabilization and may only represent a portion of the subgrade stabilization quantity shown in the Item Sheets of the Proposal.

SUMMARY OF AGGREGATE SUBGRADE/STABILIZATION

LINE	Station	Station	Aggregate Type* ASU(1/2)/ AST	Aggregate Thickness INCHES [8" for ASU(2)]	Shallow Undercut CY	Class IV Subgrade Stabilization TONS	Geotextile for Soil Stabilization SY	Stabilizer Aggregate TONS	Class IV Aggregate Stabilization TONS
-L-	10+25	11+75	ASU	6	10	0	0	0	0
-L-	14+75	16+25	ASU	6	10	0	0	0	0
CONTINGENCY					100	100	200		
			TOTAL CY/TONS/SY:		120	100**	200**	0	0

*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 Soil 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 ROCK PLATING

LINE	Beginning Slope (H:V)	Approx. Station	Ending Slope (H:V)	Approx. Station	Location LT/RT	Rock Plating Detail No. 1/2/3/4	Riprap Class* 1/2/B	Rock Plating SY
-Y-	2:1	466+25	2:1	467+25	LT	1		180
-L-	1.5:1	23+75	1.5:1	24+50	LT	1		470
							TOTAL SY:	650

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

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
					TOTAL SY:	0	0	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.

PROJ. REFERENCE NO.	SHEET NO.
U-5818	3P-1

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PARCEL INDEX SHEET

PARCEL No.	SHEET No.	PROPERTY OWNER NAME
16	6	CAROLINA ENERGIES INC.
21	4	LINDA D. HAMILTON

PARCEL No.	SHEET No.	PROPERTY OWNER NAME

WETHERILL ENGINEERING
1223 Jones Franklin Rd.
Raleigh, N.C. 27606
License No. F-0377
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TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

PROJECT REFERENCE NO.	SHEET NO.
U-5818	4

ROADWAY DESIGN ENGINEER 3/28/2019 — SEAL 22999 — Greg S. Purvis

HYDRAULICS ENGINEER 3/29/2019 — SEAL 23993 — Max S. Price

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED


REVISIONS
NAD 83/2001
460+00
465+00
470+00
SUSAN B. BELL & TED BRIGHT
DB 856 PG 508
BM#4 ELEVATION = 1385.94
N 703774 E 1097131
BY STATION 16+11.00 164 LEFT
BENCH TIE NAIL SET IN 16" MAPLE
BEGIN CONSTRUCTION
-Y- POT STA. 459+11.61
300' TAPER
TOE PROTECTION
SEE DETAIL P
CL. I RIP RAP
EST. 300 TON
EST. 423 SY GF
BEG. SBG
STA. 460+94.5
TIE GUARDRAIL TO EXIST.
CL B RIP RAP
EST. 2 TON
EST. 7 SY GF
700' FULL LANE
ROCK PLATING
SEE ROADWAY
STD. 275.01
15" w/ELBOWS
END SBG
STA. 468+00
TIE TO DOUBLE FACE GR
EXPRESSWAY GUTTER
BEG. STA. =459+12 RT
EXPRESSWAY GUTTER
END STA. =460+00 RT
ROADWAY CUT DITCH
SEE DETAIL Q
CL. B RIP RAP
EST. 20 TON
EST. 45 SY GF
SPECIAL LATERAL V DITCH
SEE DETAIL L
CL. B RIP RAP
EST. 17 TON
EST. 52 SY GF
ROADWAY CUT DITCH
SEE DETAIL Q
CL. B RIP RAP
EST. 100 TON
EST. 225 SY GF
LINDA D. HAMILTON
DB 1059 PG 684
-RPC- ST Sta. 10+00.00
=-Y- STA. 460+83.17
-RPC- SC Sta. 11+50.00
REMOVE
REMOVE 40 LF OF 15" CMP
15" w/ELBOWS
PLUG & FILL w/ FLOWABLE FILL
STANDARD V DITCH
SEE DETAIL C
DDE=22 CY
CL B RIP RAP
EST. 2 TON
EST. 7 SY GF
-Y- POT Sta. 468+18.99
-RPD- ST Sta. 10+00.00
-RPD- SC Sta. 11+50.00
SPECIAL CUT 2' BASE DITCH
SEE DETAIL B
CL. B RIP RAP
EST. 45 TON
EST. 127 SY GF
-RPC- CS Sta. 15+03.56
RMOVE & REPLACE 125' WW FENCE
SPECIAL LATERAL 3' BASE DITCH
SEE DETAIL A
CL. B RIP RAP
EST. 132 TON
EST. 248 SY GF
DDE=95 CY
LATERAL V DITCH
SEE DETAIL E
DDE=43 CY
PLUG & FILL w/ FLOWABLE FILL
-RPD- CS Sta. 13+68.59
RIP RAP AT EMBANKMENT
SEE DETAIL G
CL. I RIP RAP
EST. 3 TON
EST. 4 SY GF
RIP RAP AT EMBANKMENT
SEE DETAIL G
CL. I RIP RAP
EST. 5 TON
EST. 7 SY GF
PROP CONC. ISLAND
BEGIN PROJECT U-5818
-L- POT STA. 10+00.00
-RPC- ST Sta. 16+53.56
-RPD- ST Sta. 15+18.59
150' TAPER
375' FULL LANE
CL. I RIP RAP
EST. 141 TON
EST. 150 SY GF
135' TAPER
CL. B RIP RAP
EST. 1 TON
EST. 5 SY GF
STANDARD 3' BASE DITCH
SEE DETAIL F
CL. I RIP RAP
EST. 43 TON
EST. 60 SY GF
DDE=22 CY
RMOVE & REPLACE 50' WW FENCE
18" w/ELBOWS
135' TAPER
RMOVE & REPLACE 80' WW FENCE
RETAIN AND EXTEND
-RPD- POT Sta. 16+84.66
SPECIAL LATERAL V DITCH
SEE DETAIL D
TIE TO EXIST. CURB
-L- POC Sta. 13+25.31
=-RPC- POT Sta. 17+67.97
-L- PC Sta. 11+44.61
-L- POC Sta. 13+57.84
=-RPD- POT Sta. 16+84.66
-L- PCC Sta. 15+67.41
FRED A. STATON
DB 172 PG 601
DB 179 PG 170
MATCHLINE -Y- STA. 471+50.00 SEE SHEET 5
MATCHLINE -L- STA. 20+00.00 SEE SHEET 5
SR 1001 Sugar Hill Rd.
I-40 EB ramps
2019
2040
3/27/2019
U-5818_rdy_psh_04.dgn

SEE SHEET 8 FOR -L- PROFILE
SEE SHEET 10 FOR -RPC- PROFILE
SEE SHEET 10 FOR -RPD- PROFILE
SEE SHEET 11 FOR -Y- PROFILE
SEE SHEET 2D-1 FOR DITCH DETAILS

-RPD-			-RPC-			-L-	
PIs Sta 11+00.65	PI Sta 12+69.90	PIs Sta 14+19.18	PIs Sta 11+00.24	PI Sta 13+43.52	PIs Sta 15+53.78	PI Sta 13+56.02	PI Sta 19+04.00
Θs = 20° 04' 49.1"	Δ = 58° 31' 25.9" (LT)	Θs = 20° 04' 49.1"	Θs = 12° 16' 39.6"	Δ = 57° 52' 41.0" (RT)	Θs = 12° 16' 39.6"	Δ = 0° 55' 14.2" (LT)	Δ = 16° 43' 23.9" (LT)
Ls = 150.00'	D = 26° 46' 25.4"	Ls = 150.00'	Ls = 150.00'	D = 16° 22' 12.8"	Ls = 150.00'	D = 0° 13' 03.9"	D = 2° 30' 07.2"
LT = 100.65'	L = 218.59'	LT = 100.65'	LT = 100.24'	L = 353.56'	LT = 100.24'	L = 422.80'	L = 668.40'
ST = 50.59'	T = 119.90'	ST = 50.59'	ST = 50.22'	T = 193.52'	ST = 50.22'	T = 211.40'	T = 336.59'
	R = 214.00'			R = 350.00'		R = 26,313.20'	R = 2,290.00'
	SE = .08			SE = .08		SE = NC	SE = .03
	DS = 35 MPH			DS = 35 MPH		DS = 50 MPH	DS = 50 MPH

WETHERILL ENGINEERING
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CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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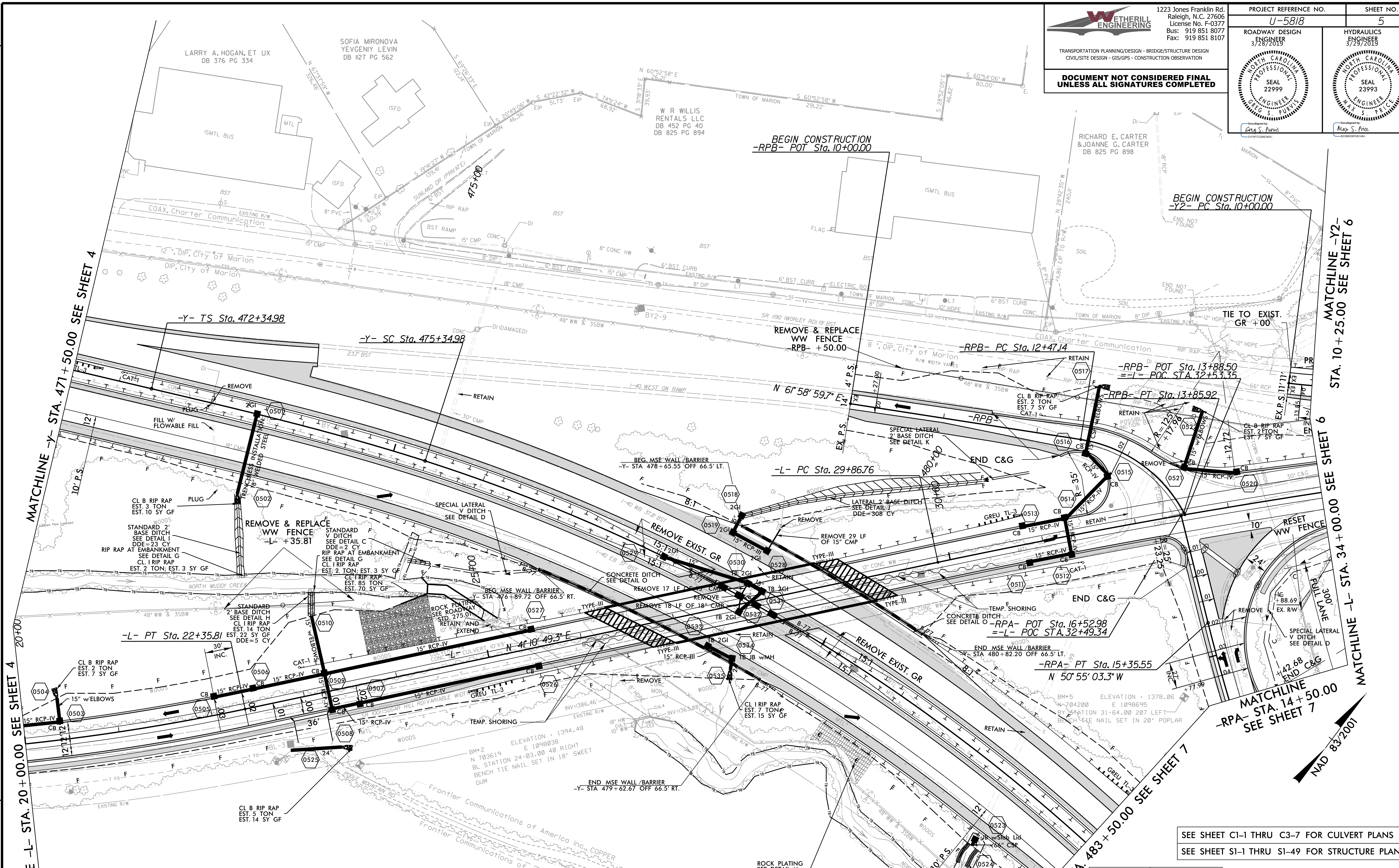
PROJECT REFERENCE NO.	SHEET NO.
U-5818	5

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
3/28/2019	3/29/2019
NORTH CAROLINA PROFESSIONAL SEAL 22999 ENGINEER GREG S. PURVIS	NORTH CAROLINA PROFESSIONAL SEAL 23993 ENGINEER MAX S. PRICE
DocuSigned by: Greg S. Purvis D1F0F7C256E3403...	DocuSigned by: Max S. Price 82CBB0D6FEB1484...

REVISIONS



-L-		-Y-		-RPB-
PI Sta 19+04.00	PI Sta 32+37.82	PIs Sta 474+35.04	PI Sta 483+42.39	PI Sta 13+21.95
△ = 16° 43' 23.9" (LT)	△ = 3° 58' 59.0" (RT)	Θs = 4° 30' 00.0"	△ = 45° 50' 00.0" (RT)	△ = 53° 00' 39.0" (RT)
D = 2° 30' 07.2"	D = 0° 47' 36.9"	Ls = 300.00'	D = 3° 00' 00.0"	D = 38° 11' 49.9"
L = 668.40'	L = 501.92'	LT = 200.06'	L = 1,527.78'	L = 138.78'
T = 336.59'	T = 251.06'	ST = 100.06'	T = 807.41'	T = 74.80'
R = 2,290.00'	R = 7,220.00'		R = 1,909.86'	R = 150.00'
SE = .03			SE = EXIST.	SE = EXIST.
DS = 50 MPH				

SEE SHEET C1-1 THRU C3-7 FOR CULVERT PLANS
SEE SHEET S1-1 THRU S1-49 FOR STRUCTURE PLANS
SEE SHEET 2D-1 FOR DITCH DETAILS
SEE SHEET 8 FOR -L- PROFILE
SEE SHEET 9 FOR -RPA- PROFILE
SEE SHEET 9 FOR -RPB- PROFILE
SEE SHEET 11&12 FOR -Y- PROFILE

TEMP. SHORING
SEE SHEET TMP-02E FOR SHORING NOTES.

3/27/2019

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8/17/99

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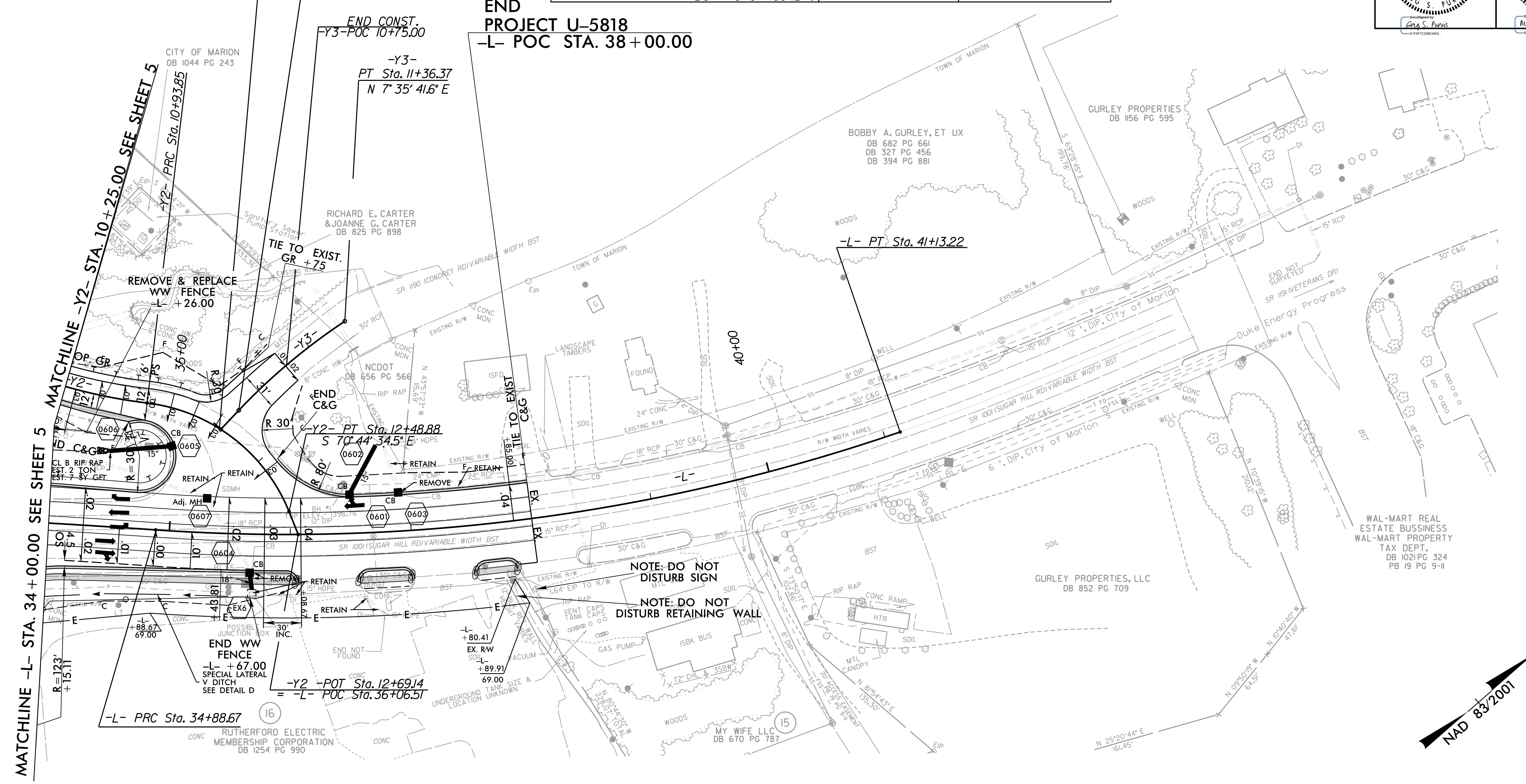
PROJECT REFERENCE NO.	SHEET NO.
U-5818	6

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
5/1/2019	5/1/2019
NORTH CAROLINA PROFESSIONAL SEAL 22999 ENGINEER GREG S. PURVIS	NORTH CAROLINA PROFESSIONAL SEAL 23993 ENGINEER MAX S. PRICE
Greg S. Purvis	Max S. Price

-Y2-		-L-	-Y3-
PI Sta 10+47.11	PI Sta 11+79.70	PI Sta 38+05.20	PI Sta 10+79.23
△ = 12° 34' 52.2" (LT)	△ = 61° 15' 38.5" (RT)	△ = 22° 57' 43.5" (LT)	△ = 12° 57' 20.2" (RT)
D = 13° 24' 21.2"	D = 39° 30' 51.6"	D = 3° 40' 35.7"	D = 11° 17' 12.6"
L = 93.85'	L = 155.03'	L = 624.55'	L = 114.79'
T = 47.11'	T = 85.86'	T = 316.52'	T = 57.64'
R = 427.39'	R = 145.00'	R = 1,558.40'	R = 507.63'
SE = EXIST.	SE = .03	SE = .04	SE = EXIST.
	DS = STOP CONDT.	DS = 50 MPH	


-Y3- POT Sta. 10+00.00
N 5° 21' 38.5" W
-Y2- POC Sta. 11+59.04
-Y3- PC Sta. 10+21.59
END CONST. -Y3- POC 10+75.00
-Y3- PT Sta. 11+36.37
N 7° 35' 41.6" E
END PROJECT U-5818
-L- POC STA. 38+00.00
CITY OF MARION
DB 1044 PG 243
MATCHLINE -Y2- STA. 10+25.00 SEE SHEET 5
-Y2- PRC Sta. 10+93.85
RICHARD E. CARTER
&JOANNE G. CARTER
DB 825 PG 898
TIE TO EXIST. GR +75
REMOVE & REPLACE WW FENCE -L- +26.00
END C&G
-Y2- PT Sta. 12+48.88
S 70° 44' 34.5" E
TIE TO EXIST. C&G
NCDOT
DB 656 PG 566
BOBBY A. GURLEY, ET UX
DB 682 PG 661
DB 327 PG 456
DB 394 PG 881
GURLEY PROPERTIES
DB 1156 PG 595
-L- PT Sta. 41+13.22
SR 1190 (CONLEY RD)
SR 1001 (SUGAR HILL RD) VARIABLE WIDTH BST
Duke Energy Progress
WAL-MART REAL ESTATE BUSSINESS
WAL-MART PROPERTY TAX DEPT.
DB 1021 PG 324
PB 19 PG 9-11
GURLEY PROPERTIES, LLC
DB 852 PG 709
NOTE: DO NOT DISTURB SIGN
NOTE: DO NOT DISTURB RETAINING WALL
MATCHLINE -L- STA. 34+00.00 SEE SHEET 5
END WW FENCE -L- +67.00
SPECIAL LATERAL V DITCH
SEE DETAIL D
-Y2 -POT Sta. 12+69.14
= -L- POC Sta. 36+06.51
-L- PRC Sta. 34+88.67
RUTHERFORD ELECTRIC MEMBERSHIP CORPORATION
DB 1254 PG 990
MY WIFE LLC
DB 670 PG 787
NAD 83/2001

SEE SHEET 2D-1 FOR DITCH DETAILS
SEE SHEET 8&9 FOR -L- PROFILE
SEE SHEET 10 FOR -Y2- PROFILE
SEE SHEET 10 FOR -Y3- PROFILE

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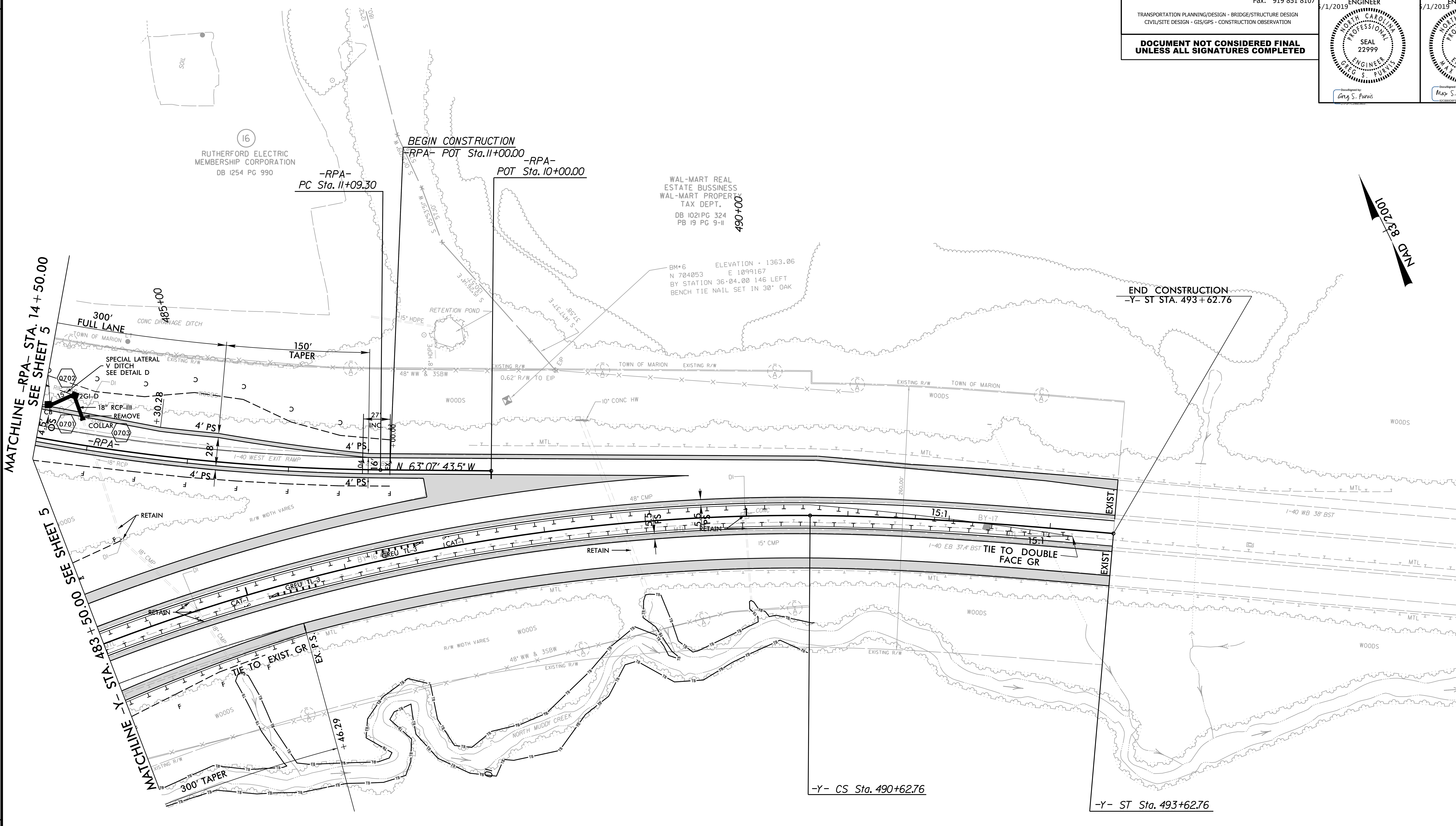
PROJECT REFERENCE NO.	SHEET NO.
U-5818	7

ROADWAY DESIGN ENGINEER — 5/1/2019 — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22999 GREG S. PURVIS — DocuSigned by: Greg S. Purvis

HYDRAULICS ENGINEER — 5/1/2019 — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23993 MAX S. PRICE — DocuSigned by: Max S. Price — 82CBB0D6FEB1484...

REVISIONS



-Y-		-RPA-
PI Sta 483+42.39	PIs Sta 491+62.82	PI Sta 13+23.24
Δ = 45° 50' 00.0" (RT)	θs = 4° 30' 00.0"	Δ = 12° 12' 40.2" (RT)
D = 3° 00' 00.0"	Ls = 300.00'	D = 2° 51' 53.2"
L = 1,527.78'	LT = 200.06'	L = 426.25'
T = 807.41'	ST = 100.06'	T = 213.94'
R = 1,909.86'		R = 2,000.00'
SE = EXIST.		SE = .04
		DS = STOP CONDT.

FRED A. STATON
DB 172 PG 601
DB 179 PG 170

SEE SHEET 2D-1 FOR DITCH DETAILS
SEE SHEET 9 FOR -RPA- PROFILE
SEE SHEET 12 FOR -Y- PROFILE

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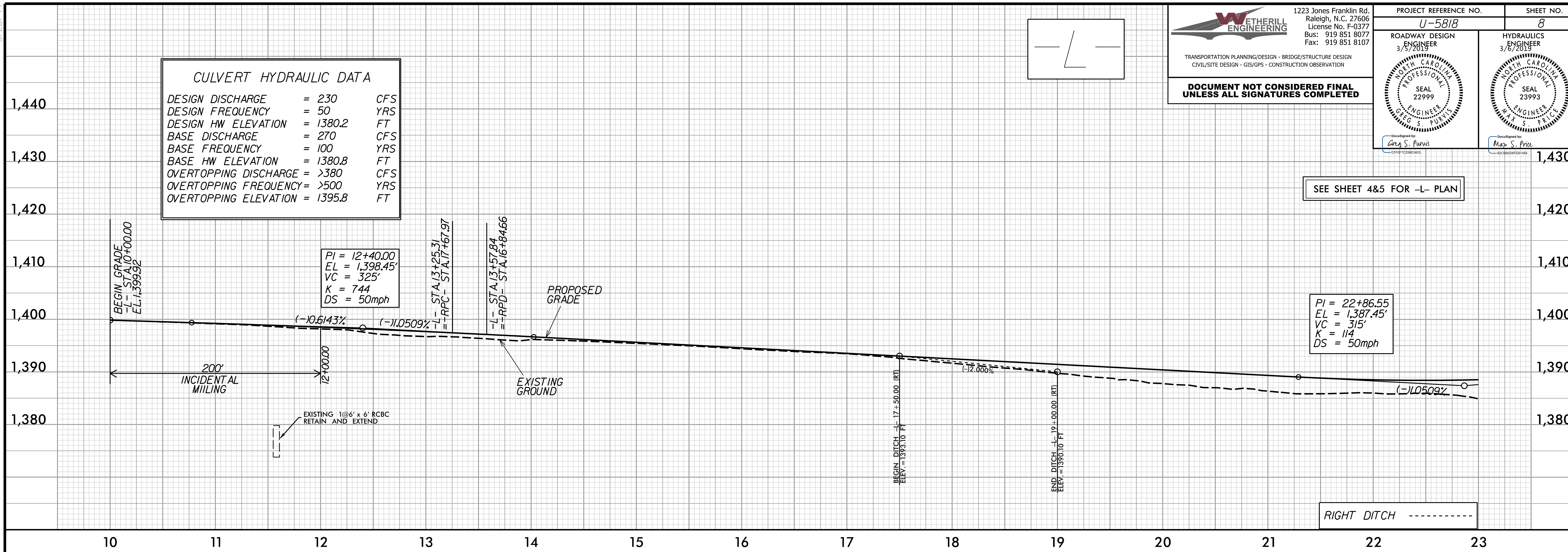
PROJECT REFERENCE NO.	SHEET NO.
U-5818	8

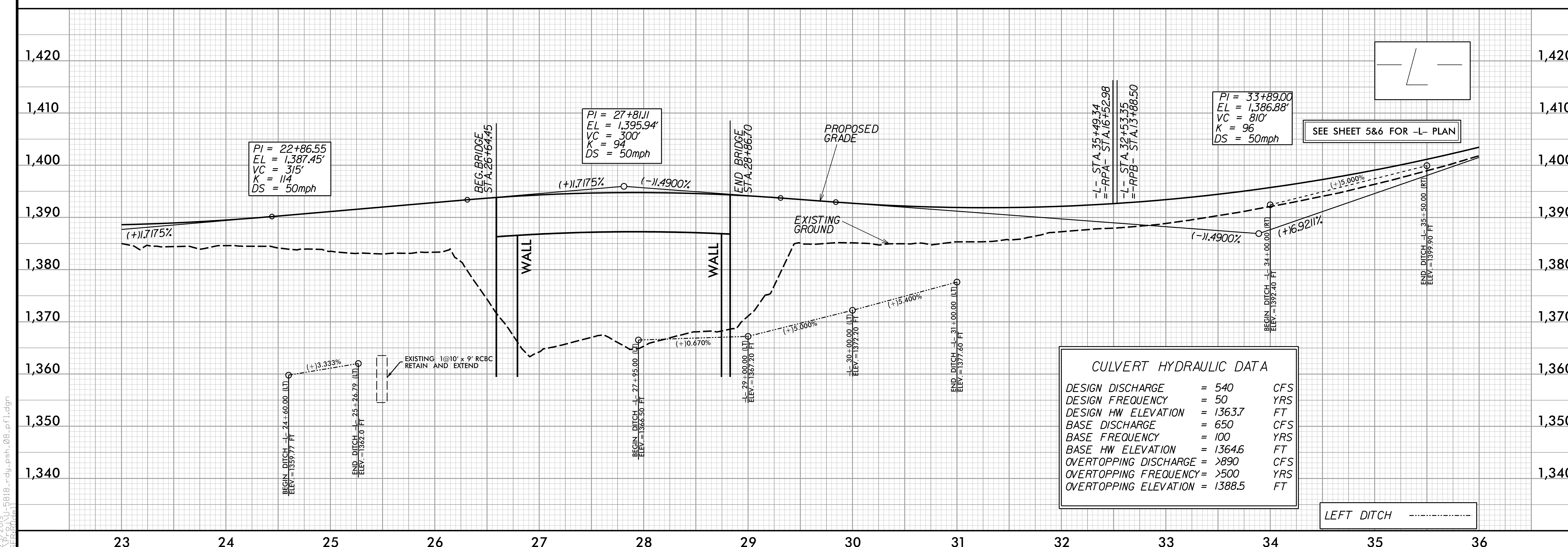
ROADWAY DESIGN ENGINEER 3/5/2019 — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22999 GREG S. PURVIS — Greg S. Purvis

HYDRAULICS ENGINEER 3/6/2019 — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23993 MAX S. PRICE — Max S. Price



CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	=	230	CFS
DESIGN FREQUENCY	=	50	YRS
DESIGN HW ELEVATION	=	1380.2	FT
BASE DISCHARGE	=	270	CFS
BASE FREQUENCY	=	100	YRS
BASE HW ELEVATION	=	1380.8	FT
OVERTOPPING DISCHARGE	=	>380	CFS
OVERTOPPING FREQUENCY	=	>500	YRS
OVERTOPPING ELEVATION	=	1395.8	FT



CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	=	540	CFS
DESIGN FREQUENCY	=	50	YRS
DESIGN HW ELEVATION	=	1363.7	FT
BASE DISCHARGE	=	650	CFS
BASE FREQUENCY	=	100	YRS
BASE HW ELEVATION	=	1364.6	FT
OVERTOPPING DISCHARGE	=	>890	CFS
OVERTOPPING FREQUENCY	=	>500	YRS
OVERTOPPING ELEVATION	=	1388.5	FT

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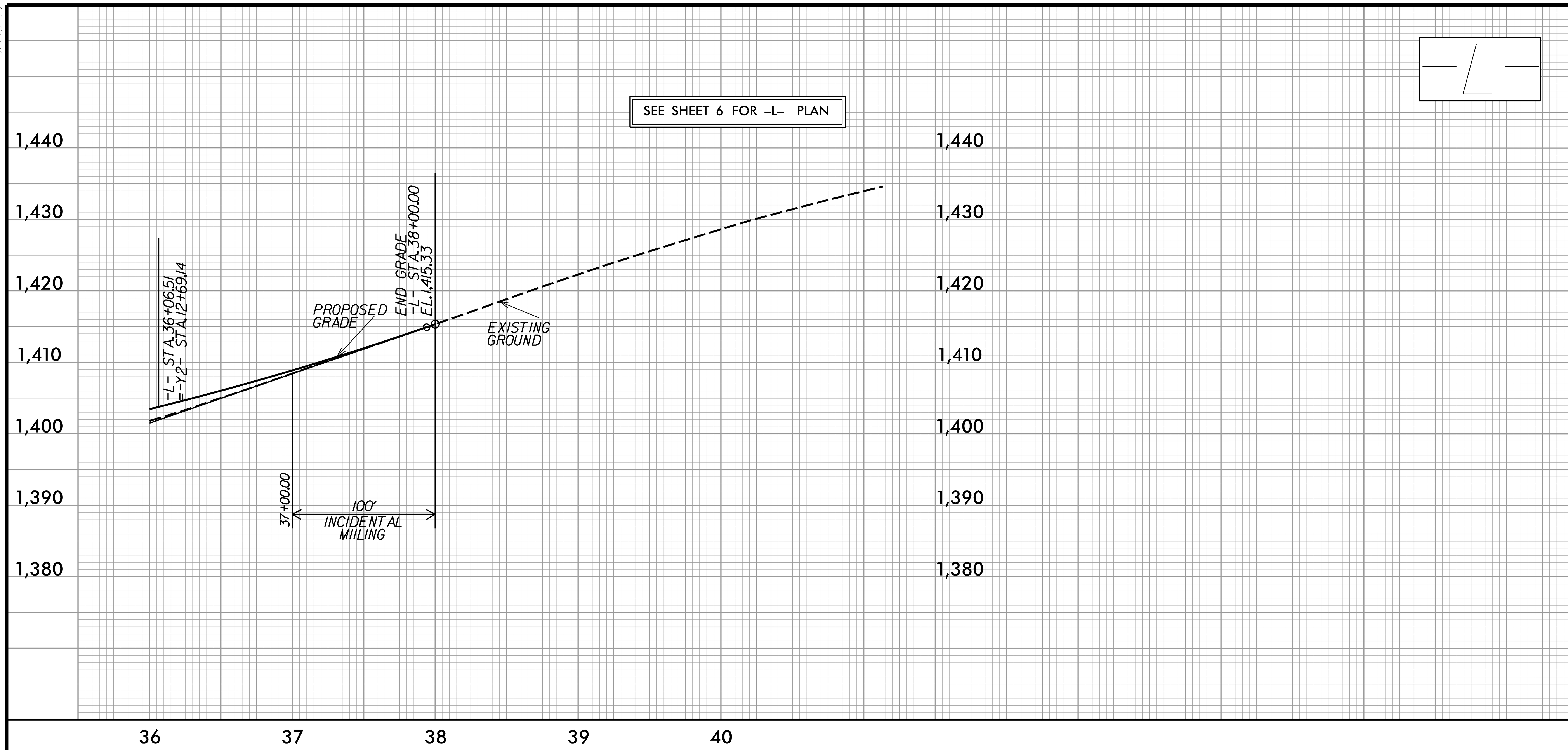
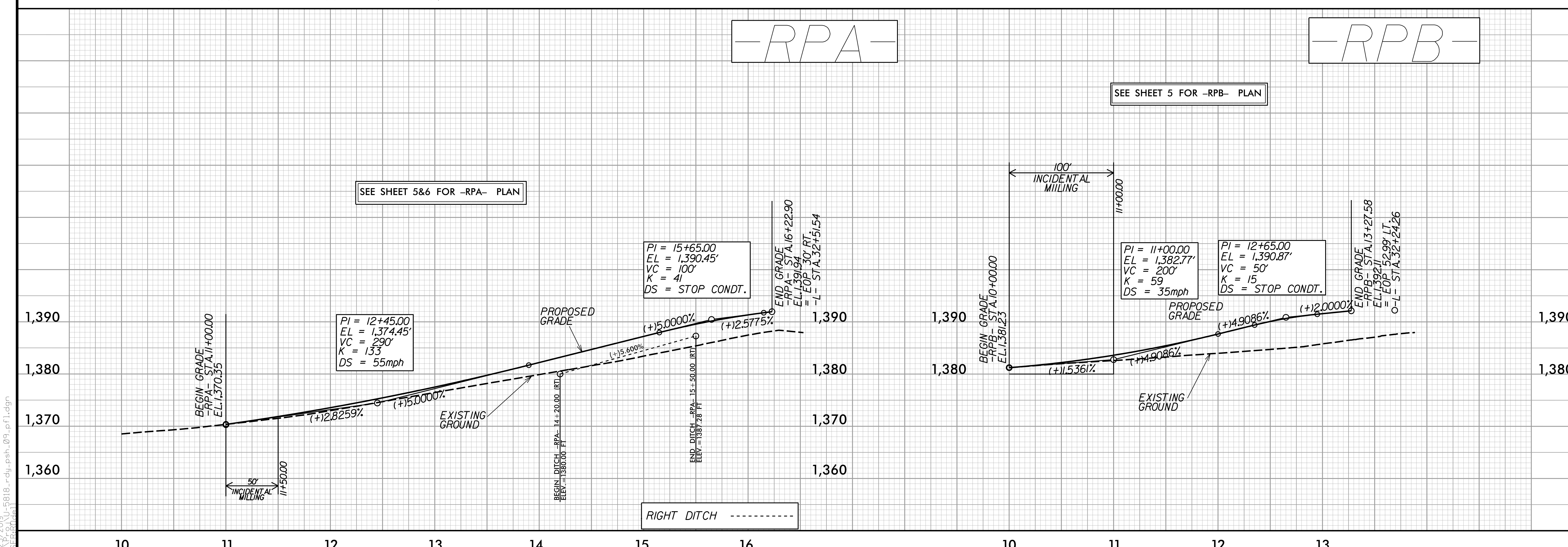
PROJECT REFERENCE NO.	SHEET NO.
U-5818	9

ROADWAY DESIGN ENGINEER 3/5/2019 — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22999 GREG S. PURVIS — DocuSigned by: Greg S. Purvis D1F0F7C256E3403...

HYDRAULICS ENGINEER 3/6/2019 — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 23993 MAX S. PRICE — DocuSigned by: Max S. Price 82CBB0D6FEB1484...





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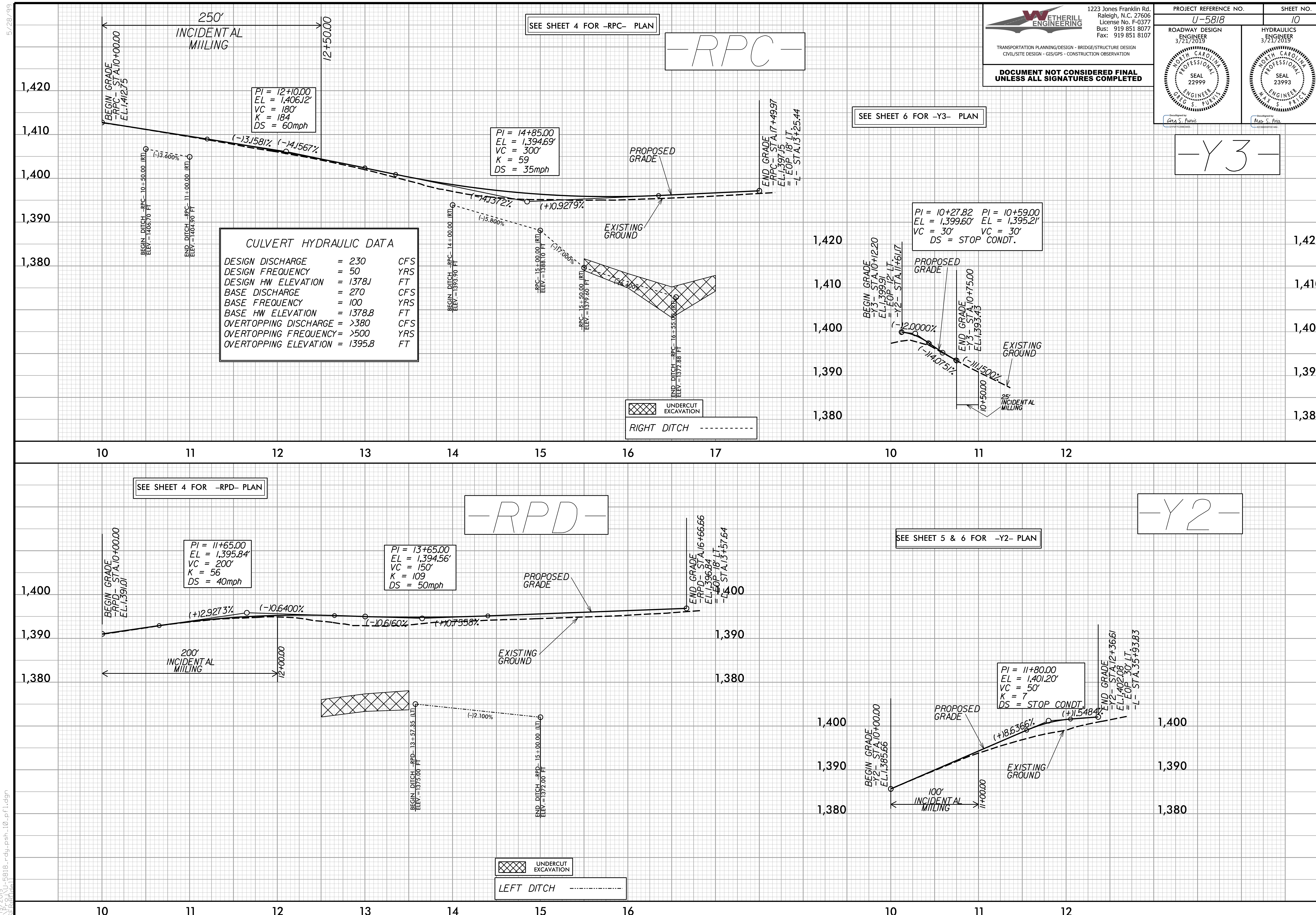
PROJECT REFERENCE NO.	SHEET NO.
U-5818	10

ROADWAY DESIGN ENGINEER 3/21/2019 — NORTH CAROLINA PROFESSIONAL SEAL 22999 ENGINEER GREG S. PURVIS

HYDRAULICS ENGINEER 3/21/2019 — NORTH CAROLINA PROFESSIONAL SEAL 23993 ENGINEER MAX S. PRICE


-RPC-
SEE SHEET 4 FOR -RPC- PLAN
250' INCIDENTAL MILLING
12+50.00
BEGIN GRADE -RPC- STA.10+00.00 EL.1,412.75
PI = 12+10.00 EL = 1,406.12' VC = 180' K = 184 DS = 60mph
(-)3.1581% (-)4.1567%
PI = 14+85.00 EL = 1,394.69' VC = 300' K = 59 DS = 35mph
(-)4.1372% (+)0.9279%
PROPOSED GRADE
EXISTING GROUND
END GRADE -RPC- STA.17+49.97 EL.1,397.15 = EOP 18' LT. -L- STA.13+25.44
BEGIN DITCH -RPC- 10+50.00 (RT) ELEV.=1406.70 FT
END DITCH -RPC- 11+00.00 (RT) ELEV.=1404.90 FT
(-)3.600%
BEGIN DITCH -RPC- 14+00.00 (RT) ELEV.=1393.90 FT
(-)5.800%
-RPC- 15+00.00 (RT) ELEV.=1388.10 FT
(-)17.000%
-RPC- 15+50.00 (RT) ELEV.=1379.60 FT
END DITCH -RPC- 16+55.00 (RT) ELEV.=1372.88 FT
UNDERCUT EXCAVATION
RIGHT DITCH
-Y3-
SEE SHEET 6 FOR -Y3- PLAN
PI = 10+27.82 EL = 1,399.60' VC = 30' DS = STOP CONDT.
PI = 10+59.00 EL = 1,395.21' VC = 30'
BEGIN GRADE -Y3- STA.10+12.20 EL.1,399.91 = EOP 12' LT. -Y2- STA.11+61.17
(-)2.0000% (-)14.0751% (-)11.1500%
END GRADE -Y3- STA.10+75.00 EL.1,393.43
25' INCIDENTAL MILLING
10+50.00
-RPD-
SEE SHEET 4 FOR -RPD- PLAN
BEGIN GRADE -RPD- STA.10+00.00 EL.1,391.01
PI = 11+65.00 EL = 1,395.84' VC = 200' K = 56 DS = 40mph
(+)2.9273% (-)0.6400%
PI = 13+65.00 EL = 1,394.56' VC = 150' K = 109 DS = 50mph
(-)0.6160% (+)0.7558%
END GRADE -RPD- STA.16+66.66 EL.1,396.84 = EOP 18' LT. -L- STA.13+57.64
200' INCIDENTAL MILLING
12+00.00
BEGIN DITCH -RPD- 13+57.35 (LT) ELEV.=1375.00 FT
(-)2.100%
END DITCH -RPD- 15+00.00 (LT) ELEV.=1372.00 FT
LEFT DITCH
-Y2-
SEE SHEET 5 & 6 FOR -Y2- PLAN
PI = 11+80.00 EL = 1,401.20' VC = 50' K = 7 DS = STOP CONDT.
BEGIN GRADE -Y2- STA.10+00.00 EL.1,385.66
(+)8.6366% (+)1.5484%
END GRADE -Y2- STA.12+36.61 EL.1,402.08 = EOP 30' LT. -L- STA.35+93.83
100' INCIDENTAL MILLING
11+00.00
1,420 1,410 1,400 1,390 1,380
10 11 12 13 14 15 16 17

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	=	230	CFS
DESIGN FREQUENCY	=	50	YRS
DESIGN HW ELEVATION	=	1378.1	FT
BASE DISCHARGE	=	270	CFS
BASE FREQUENCY	=	100	YRS
BASE HW ELEVATION	=	1378.8	FT
OVERTOPPING DISCHARGE	=	>380	CFS
OVERTOPPING FREQUENCY	=	>500	YRS
OVERTOPPING ELEVATION	=	1395.8	FT

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5/28/99

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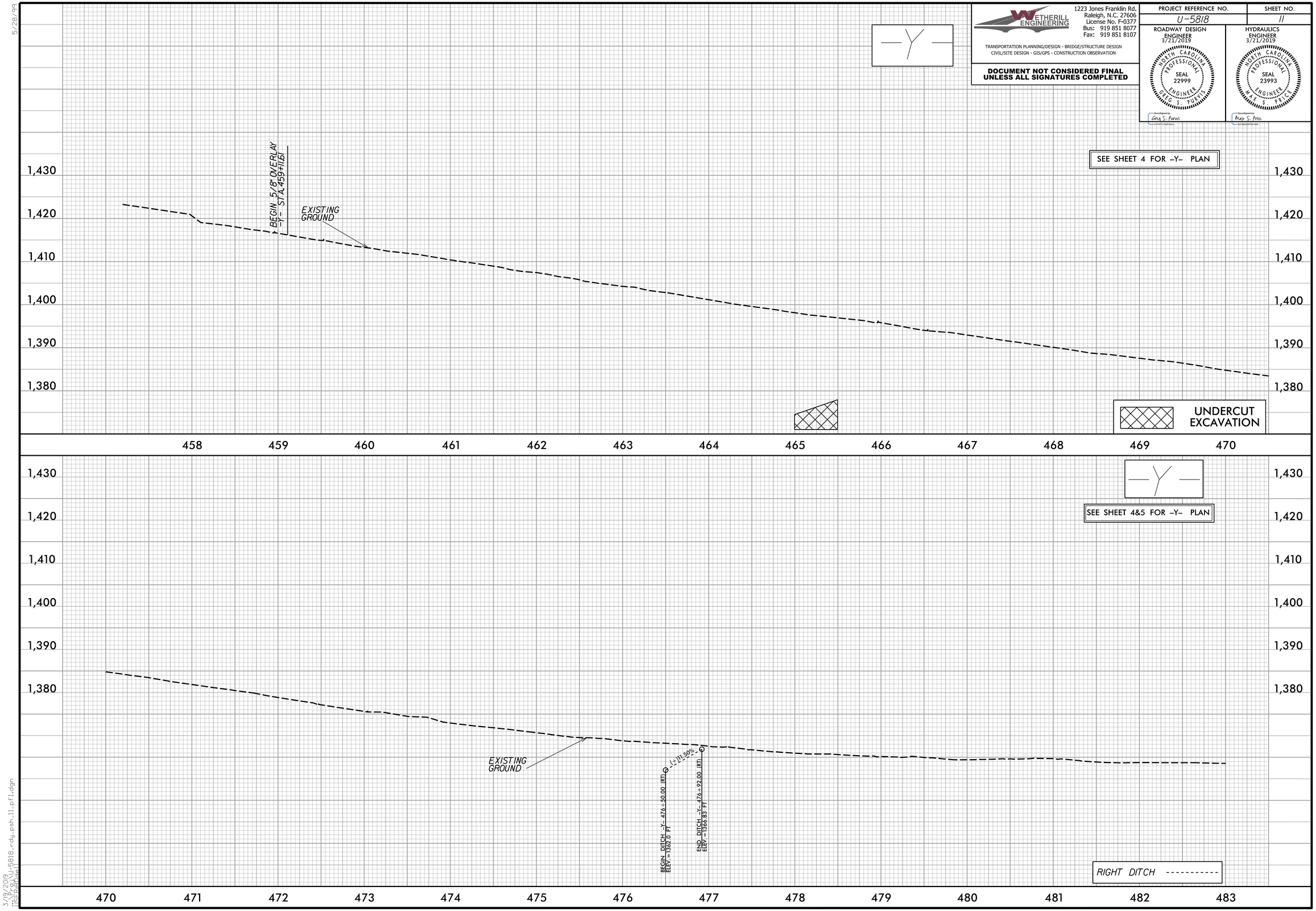
PROJECT REFERENCE NO.	SHEET NO.
U-5818	11

ROADWAY DESIGN ENGINEER
3/21/2019
NORTH CAROLINA PROFESSIONAL SEAL 22999 ENGINEER GREG S. PURVIS
Docusigned by: Greg S. Purvis

HYDRAULICS ENGINEER
3/21/2019
NORTH CAROLINA PROFESSIONAL SEAL 23993 ENGINEER MAX S. PRICE
Docusigned by: Max S. Price



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USER:gpurvis

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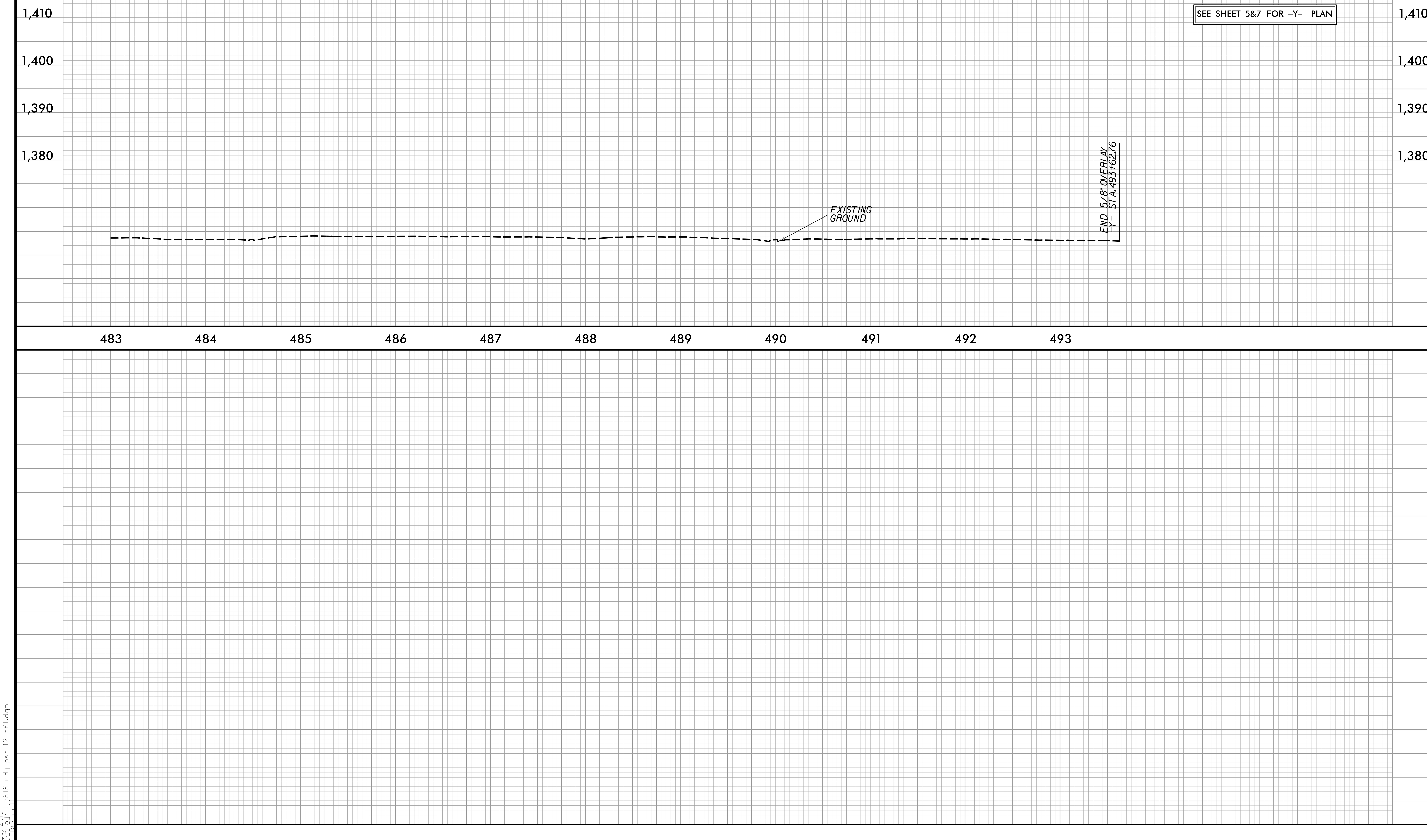
PROJECT REFERENCE NO.	SHEET NO.
U-5818	12

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
3/5/2019	3/6/2019
NORTH CAROLINA PROFESSIONAL SEAL 22999 ENGINEER GREG S. PURVIS	NORTH CAROLINA PROFESSIONAL SEAL 23993 ENGINEER MAX S. PRICE
Greg S. Purvis	Max S. Price

-Y-

SEE SHEET 5&7 FOR -Y- PLAN



5/28/99
1/25/2019 U-5818_rdy_psh_12_pfl.dgn