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This file or an individual page shall not be considered a certified document.

TIP PROJECT: 17BP.5.R.62

CONTRACT: DE00208

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.5.R.62	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
17BP.5.R.62	N/A	PE
17BP.5.R.62	N/A	ROW
17BP.5.R.62	N/A	UTILITY
17BP.5.R.62	N/A	CONSTRUCTION

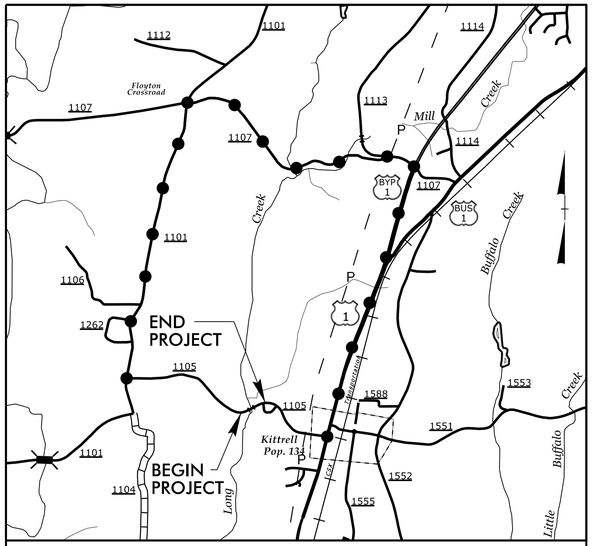
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

VANCE COUNTY

LOCATION: BRIDGE NO. 12 OVER LONG CREEK ON SR 1105 (KITTRELL COLLEGE RD.)

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURE

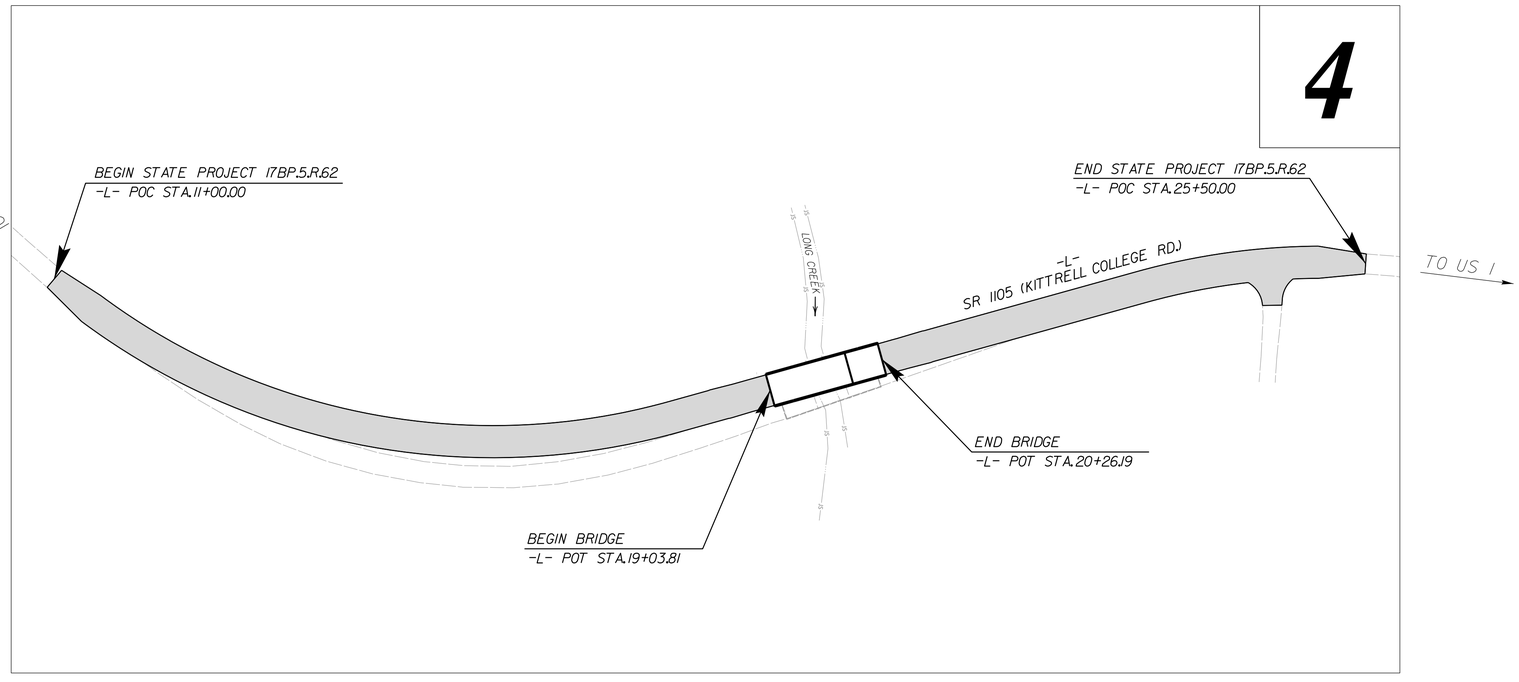
NAD 83/NA 2011



VICINITY MAP

OFF-SITE DETOUR

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



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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 = 1300
V = 45 MPH
CLASS = MINOR COLLECTOR

SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY STATE PROJECT 17BP.5.R.62	=	0.252 mi.
LENGTH STRUCTURES STATE PROJECT 17BP.5.R.62	=	0.023 mi.
TOTAL LENGTH STATE PROJECT 17BP.5.R.62	=	0.275 mi.

Prepared in the Offices of:

STEWART
421 FAYETTEVILLE ST, STE 400
RALEIGH, NC 27601
T 919.380.8750
Firm License #: C-1051
www.stewartinc.com
PROJECT #:B15001.02

NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0929
ECOLOGICAL ENGINEERING

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: FEBRUARY 7, 2017

RIGHT OF WAY COMPLETE:

LETTING DATE: DECEMBER 13, 2017

ANDY YOUNG, PE
PROJECT ENGINEER

MICHAEL BURNS, PE
PROJECT DESIGN ENGINEER

LISA GILCHRIST, EI
NCDOT CONTACT

HYDRAULICS ENGINEER

DocuSigned by: Brandon Barham
C7351A57E0E0499
10/31/2017
P.E.
SIGNATURE:

NORTH CAROLINA PROFESSIONAL SEAL 039102 ENGINEER BRANDON T. BARHAM

ROADWAY DESIGN ENGINEER

DocuSigned by: Andrew P. Young
EE21D93DD62F4EF
10/31/2017
P.E.
SIGNATURE:

NORTH CAROLINA PROFESSIONAL SEAL 034407 ENGINEER ANDREW P. YOUNG

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

09/08/99

10/31/2017
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USER:ayoung

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	1A

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 034407 ENGINEER ANDREW P. YOUNG

DocuSigned by: 9/6/2017
Andrew D. Young
EF34D89D9D5F45F...

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STEWART

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INDEX OF SHEETS

SHEET NUMBER	SHEET
1	TITLE SHEET
1A	INDEX OF SHEETS, GENERAL NOTES, AND STANDARD DRAWINGS
1B	CONVENTIONAL SYMBOLS
1C-1	SURVEY CONTROL SHEETS
2A-1	PAVEMENT SCHEDULE AND TYPICAL SECTIONS
2C-1 THRU 2C-6	GUARDRAIL PLACEMENT DETAILS
2C-7 THRU 2C-10	GUARDRAIL INSTALLATION DETAILS
2C-11 THRU 2C-14	STRUCTURE ANCHOR UNIT DETAILS
3B-1	ROADWAY SUMMARIES
3D-1	DRAINAGE SUMMARIES
4	PLAN SHEET
5	PROFILE SHEET
TMP-1 THRU TMP-3	TRAFFIC MANAGEMENT PLANS
PMP-1	PAVEMENT MARKING PLANS
EC-1 THRU EC-5	EROSION CONTROL PLANS
RF-1	REFORESTATION PLANS
UC-1 THRU UC-4	UTILITY CONSTRUCTION PLANS
UO-1 THRU UO-2	UTILITIES BY OTHERS PLANS
X-1A	CROSS-SECTION SUMMARY SHEET
X-1 THRU X-10	CROSS-SECTIONS
S-1 THRU S-25	STRUCTURE PLANS

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

2012 ROADWAY ENGLISH STANDARD DRAWINGS

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

STD.NO.	TITLE
DIVISION 2 - EARTHWORK	
200.03	Method of Clearing - Method III
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superelevation - Two Lane Pavement
DIVISION 3 - PIPE CULVERTS	
300.01	Method of Pipe Installation
DIVISION 4 - MAJOR STRUCTURES	
422.10	Reinforced Bridge Approach Fills
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
DIVISION 8 - INCIDENTALS	
806.01	Concrete Right-of-Way Marker
806.02	Granite Right-of-Way Marker
840.00	Concrete Base Pad for Drainage Structures
840.24	Frames and Narrow Slot Sag Grates
840.25	Anchorage of Frames - Brick or Concrete or Precast
840.29	Frames and Narrow Slot Flat Grates
840.35	Traffic Bearing Grated Drop Inlet - for Cast Iron Double Frame and Grates
846.01	Concrete Curb, Gutter and Curb & Gutter
846.04	Drop Inlet Installation in Shoulder Berm Gutter
850.10	Guide for Berm Drainage Outlet - 15" and 18" Pipe
876.01	Rip Rap in Channels
876.02	Guide for Rip Rap at Pipe Outlets
876.04	Drainage Ditches with Class 'B' Rip Rap

GENERAL NOTES:

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

GRADE LINE:
GRADING AND SURFACING:

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

CLEARING:

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

SUPERELEVATION:

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

SHOULDER CONSTRUCTION:

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

BERM DITCHES:

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

GUARDRAIL:

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

TEMPORARY SHORING:

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

END BENTS:

THE SURVEYOR 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:
VANCE COUNTY WATER DISTRICT
CENTURYLINK

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

RIGHT-OF-WAY MARKERS:

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

ROCK

ROCK IS ANTICIPATED BETWEEN -L- STA 15+75 TO 17+50 LT. BLASTING MAY BE REQUIRED FOR EXCAVATION ON THE PROJECT. SEE SECTION 220 OF THE STANDARD SPECIFICATIONS AND IF APPLICABLE, ROCK BLASTING PROVISION.

9/6/2017
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USER:dyoung

12/2/2016

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	1B

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

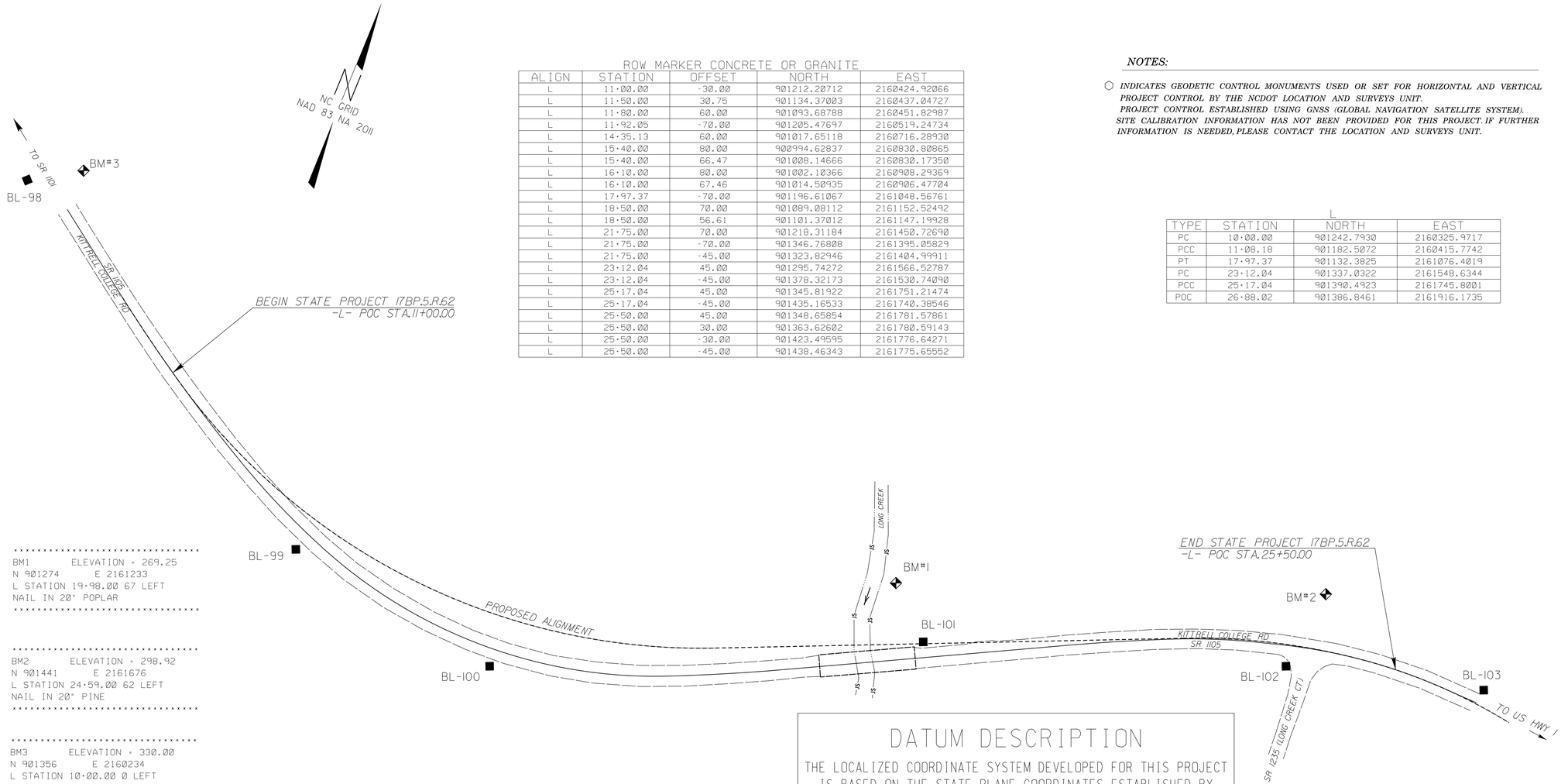
MISCELLANEOUS:

- 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.

03/22/17

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	IC-1
Location and Surveys	

SURVEY CONTROL SHEET 90-0012



ROW MARKER CONCRETE OR GRANITE

ALIGN	STATION	OFFSET	NORTH	EAST
L	11+00.00	-30.00	901212.20712	2160424.92066
L	11+50.00	30.75	901134.37003	2160437.04727
L	11+80.00	60.00	901093.68788	2160451.82987
L	11+92.05	-70.00	901205.47697	2160519.24734
L	14+35.13	60.00	901017.65118	2160716.28930
L	15+40.00	80.00	900994.62837	2160830.80865
L	15+40.00	66.47	901008.14666	2160830.17350
L	16+10.00	80.00	901002.10366	2160908.29369
L	16+10.00	67.46	901014.50935	2160906.47704
L	17+97.37	-70.00	901196.61067	2161048.56761
L	18+50.00	70.00	901089.08112	2161152.52492
L	18+50.00	56.61	901101.37012	2161147.19928
L	21+75.00	70.00	901218.31184	2161450.72690
L	21+75.00	-70.00	901346.76808	2161395.05829
L	21+75.00	-45.00	901323.82946	2161404.99911
L	23+12.04	45.00	901295.74272	2161566.52787
L	23+12.04	-45.00	901378.32173	2161530.74090
L	25+17.04	45.00	901345.81922	2161751.21474
L	25+17.04	-45.00	901435.16533	2161740.38546
L	25+50.00	45.00	901348.65854	2161781.57861
L	25+50.00	30.00	901363.62602	2161780.59143
L	25+50.00	-30.00	901423.49595	2161776.64271
L	25+50.00	-45.00	901438.46343	2161775.65552

NOTES:

⬡ *INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL AND VERTICAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.*
PROJECT CONTROL ESTABLISHED USING GNSS (GLOBAL NAVIGATION SATELLITE SYSTEM). SITE CALIBRATION INFORMATION HAS NOT BEEN PROVIDED FOR THIS PROJECT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.

L

TYPE	STATION	NORTH	EAST
PC	10+00.00	901242.7930	2160325.9717
PCC	11+08.18	901182.5072	2160415.7742
PT	17+97.37	901132.3825	2161076.4019
PC	23+12.04	901337.0322	2161548.6344
PCC	25+17.04	901390.4923	2161745.8001
POC	26+88.02	901386.8461	2161916.1735

BM1 ELEVATION = 269.25
N 901274 E 2161233
L STATION 19+98.00 67 LEFT
NAIL IN 20" POPLAR

BM2 ELEVATION = 298.92
N 901441 E 2161676
L STATION 24+59.00 62 LEFT
NAIL IN 20" PINE

BM3 ELEVATION = 330.00
N 901356 E 2160234
L STATION 10+00.00 0 LEFT
NAIL IN 12" GUM

BL

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
98	BL-98	901322.5730	2160180.2720	328.75	OUTSIDE PROJECT LIMITS	
99	BL-99	901058.2620	2160607.6860	312.41	13+28.41	38.93 RT
100	BL-100	901019.9000	2160853.8200	295.81	15+62.40	56.22 RT
101	BL-101	901225.2540	2161285.5870	285.08	20+26.24	2.03 LT
102	BL-102	901351.4750	2161665.3530	297.62	24+29.32	23.83 RT
103	BL-103	901409.4600	2161876.8350	307.89	26+46.69	17.37 LT

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "900012-2"
WITH NAD 83/NA 2011 STATE PLANE GRID COORDINATES OF
NORTHING: 900222.212(ft) EASTING: 2163647.594(ft)
ELEVATION: 406.81(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99999879
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "900012-2" TO -L- STATION 11+00 IS
N 73°24'49.8" W 3,379.35'
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

GEOID G12NC
NOTE: DRAWING NOT TO SCALE

10/3/2017
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ISEBrowning

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	2A-1

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 034407 ENGINEER ANDREW P. YOUNG

DocuSigned by: Andrew P. Young 9/6/2017

PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 22896 ENGINEER CLARK D. MORRISON

DocuSigned by: Clark Morrison 9/7/2017

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REVISIONS

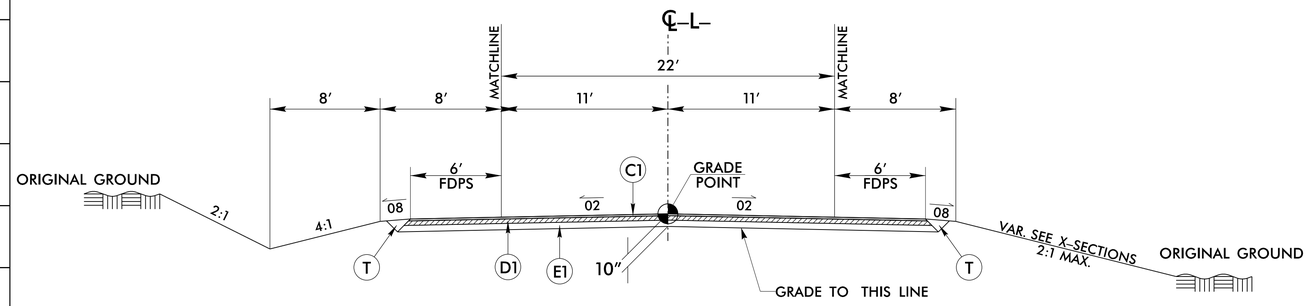
5/14/99

PAVEMENT SCHEDULE

(FINAL PAVEMENT DESIGN)

C1	PROP. APPROX. 1½" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.
C2	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT TO EXCEED 1½" IN DEPTH
D1	PROP. APPROX. 3½" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 399 LBS. PER SQ. YD.
E1	PROP. APPROX. 5" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 570 LBS. PER SQ. YD.
R	SHOULDER BERM GUTTER.
T	EARTH MATERIAL

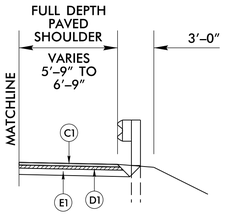
NOTE: PAVEMENT EDGE SLOPES ARE 1:1, UNLESS SHOWN OTHERWISE



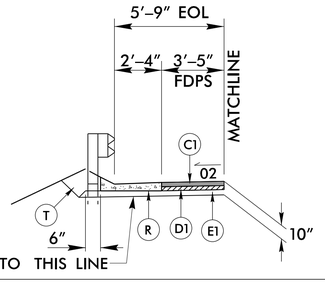
TYPICAL SECTION NO. 1

–L– STA. 11+00.00 TO –L– STA. 19+03.81 (BEGIN BRIDGE)
–L– STA. 20+26.19 (END BRIDGE) TO –L– STA. 25+50.00

NOTE:
6–FOOT FDPS IS TO ACCOMMODATE A FUTURE BIKE LANE

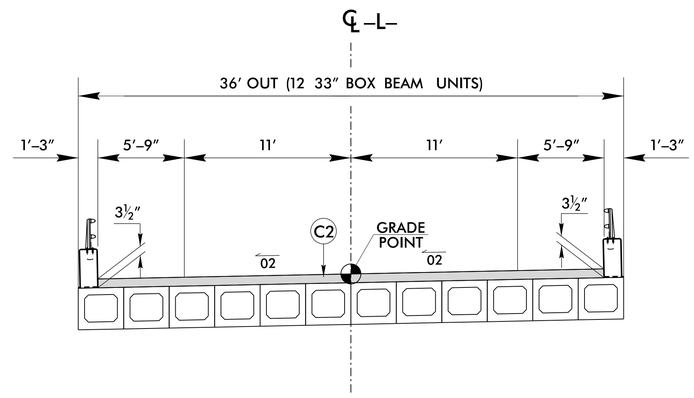


DETAIL SHOWING PAVING TO THE FACE OF GUARDRAIL



DETAIL SHOWING GUARDRAIL WITH SHOULDER BERM GUTTER

USE SHOULDER BERM GUTTER AT THE FOLLOWING LOCATIONS:
–L– STA. 18+70.00 TO –L– STA. 18+92.93 (BEG. APPROACH SLAB) (LEFT)



TYPICAL SECTION NO. 2

–L– STA. 19+03.81 (BEGIN BRIDGE) TO –L– STA. 20+26.19 (END BRIDGE)

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PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	2C-1

STATE OF
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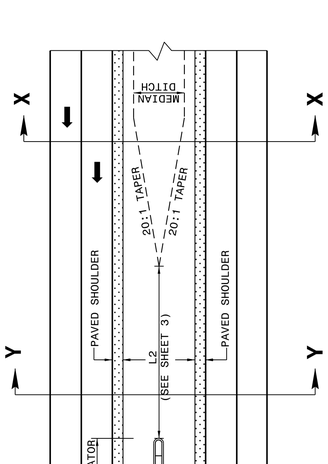
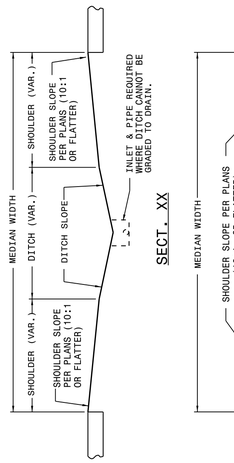
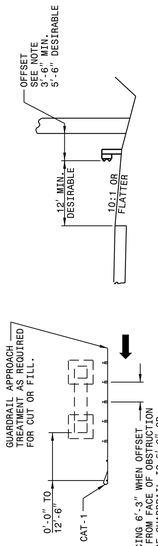
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 1 OF 11
862D01

DETAIL OF MEDIAN TREATMENT AT UNDERPASS







NOTE: WHEN OFFSET DISTANCE FROM FACE OF OBSTRUCTION TO FACE OF GUARDRAIL IS BETWEEN 3'-6" AND 5'-6", BEGIN 3'-1½" POST SPACING AT A POINT 25' BEFORE REACHING THE OBSTRUCTION AND CARRY THROUGHOUT ITS LENGTH. IF THE OFFSET IS LESS THAN 3'-6" USE CONCRETE BARRIER.

DETAIL OF RIGHT SIDE GUARDRAIL AT UNDERPASS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022966 Joel S. Howerton 9/6/2017

DocuSigned by: Joel S. Howerton 873F3D17DCDC45F...

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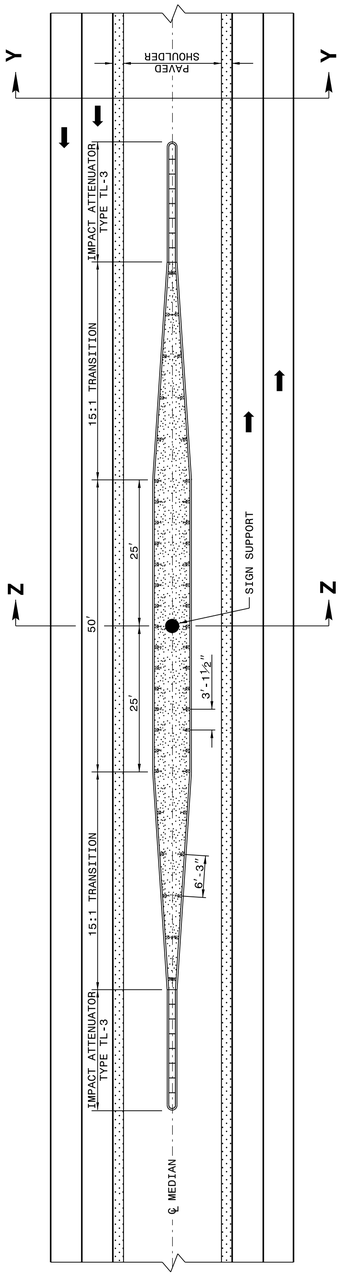
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

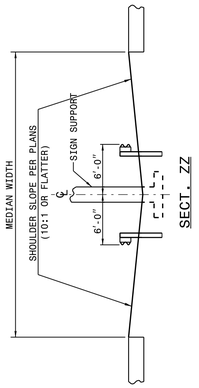
SHEET 2 OF 11
862D01

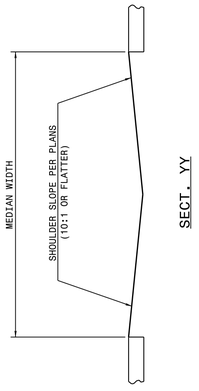
DETAIL OF GUARDRAIL AT MEDIAN SIGN SUPPORT



NOTE SPECIAL LAYER OF PAVEMENT .....

USE 3'-1½" POST SPACING ON THE 50' OF GUARDRAIL PARALLEL TO LANES AND 6'-3" POST SPACING ON 15:1 TRANSITION SECTIONS.
GRADE MEDIAN IN THE VICINITY OF THE SIGN SUPPORT AS ILLUSTRATED IN THE ROADWAY STANDARD DRAWINGS (STARDARD 862D01 SHEET 1 OF 12).





DETAIL OF GUARDRAIL AT MEDIAN SIGN SUPPORT

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 2 OF 11
862D01

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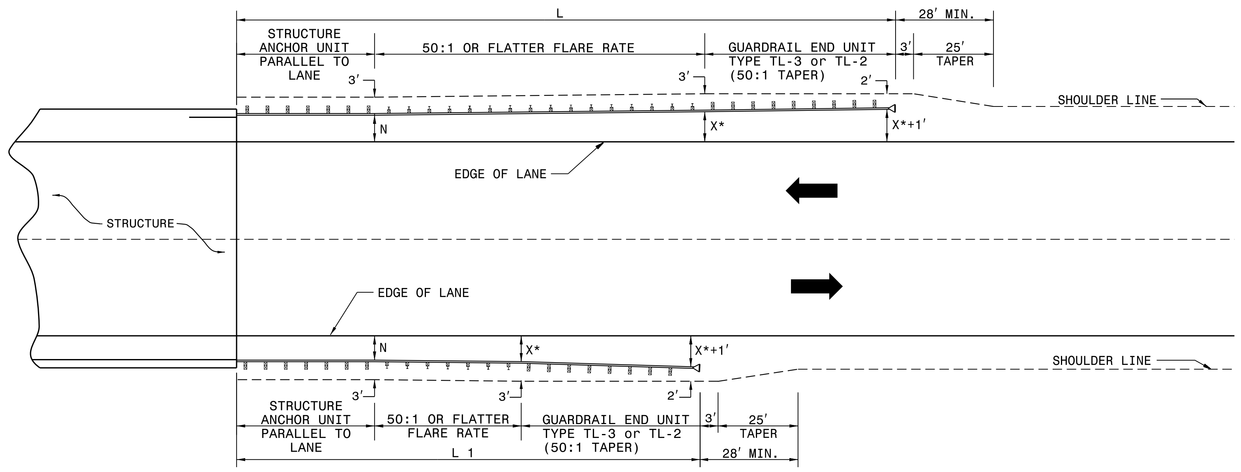
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT



* USE FLARE RATE AS THE CONTROL IF THE "X" DISTANCE IS NOT OBTAINED. ("X" IS BASED ON SHOULDER WIDTHS IN THE HIGHWAY DESIGN BRANCH MANUAL, PART 1, 1-4B, F1).

"N"= DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL WHERE GUARDRAIL IS PARALLEL TO LANE.

SEE STD. 862.03 FOR STRUCTURE ANCHOR UNITS

FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

GUARDRAIL INSTALLATION AT BRIDGE APPROACHES FOR TWO-LANE, TWO-WAY TRAFFIC

DESIGN SPEED (MPH)	"L" APPROACH LENGTH (FT.)				"L1" TRAILING LENGTH (FT.)			
	DESIGN YEAR ADT		CURRENT YEAR ADT		DESIGN YEAR ADT		CURRENT YEAR ADT	
	OVER 2000	1001-2000	400-1000	UNDER 400	OVER 2000	1001-2000	400-1000	UNDER 400
70	362.5'	362.5'	350.0'	287.5'	187.5'	187.5'	175.0'	75.0'
60	300.0'	287.5	275.0'	225.0'	137.5'	137.5'	100.0'	75.0'
50	212.5'	212.5'	200.0'	162.5'	87.5'	75.0'	75.0'	75.0'
40	175.0'	150.0'	137.5'	112.5'	75.0'	75.0'	75.0'	75.0'
X *	8'	6'	4'	4'	8'	6'	4'	4'

SHEET 4 OF 11
862D01

LENGTHS AND OFFSETS FOR PROPOSED GUARDRAIL AT TWO LANE - TWO WAY LOCATIONS

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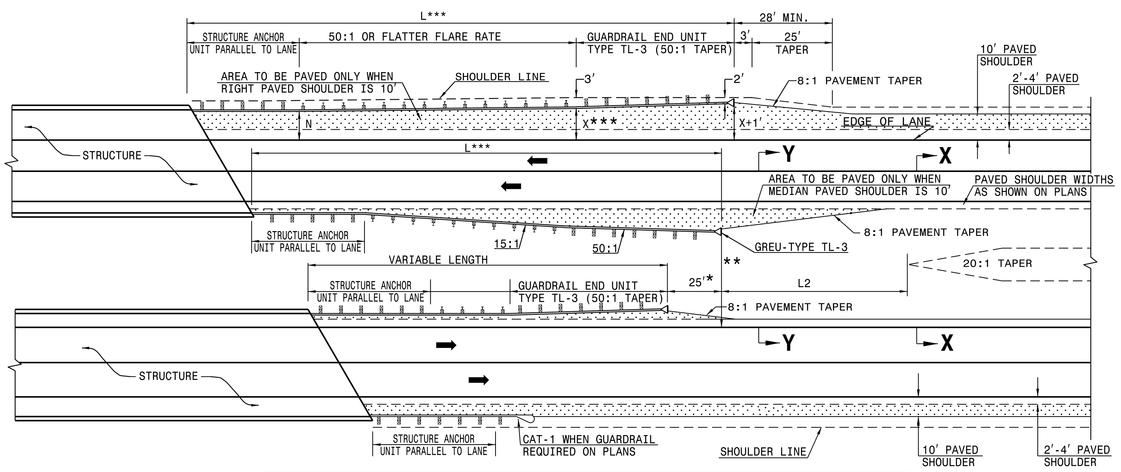
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT



FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

DIMENSIONS FOR LENGTH OF GUARDRAIL APPROACHING DUAL LANE BRIDGES

MEDIAN WIDTH	-L-***						-L2- DIM.
	70 MPH	60 MPH	50 MPH				
30'	300.0'	250.0'	150.0'				80.0'
36'	300.0'	250.0'	150.0'				60.0'
40' & ABOVE	300.0'	250.0'	150.0'				40.0'

NOTES: * MINOR VARIATION TO THE 25'-0" DIMENSION IS PERMISSIBLE TO ACCOMODATE THE 12'-6" IN GUARDRAIL LENGTHS.

** NO GUARDRAIL IS REQUIRED ON THE TRAILING END WHEN THIS DISTANCE EXCEEDS CLEAR ROADSIDE RECOVERY AREA FOR THE APPROPRIATE DESIGN SPEED.

*** BASED ON "X" OF 12'
USE FLARE RATE AS THE CONTROL IF THE "X" DISTANCE IS NOT OBTAINED. ("X" IS BASED ON SHOULDER WIDTHS IN THE HIGHWAY DESIGN BRANCH MANUAL, PART 1, 1-4B, F1A).

"N"= DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL WHERE GUARDRAIL IS PARALLEL TO LANE.

THE DESIGN LAYOUT FOR LENGTHS SHOWN ON THIS STANDARD ARE MINIMUM DESIGN LENGTHS.

SEE SHEET 1 OF 12 FOR SECTIONS XX, YY

SEE STD. 862.03 FOR STRUCTURE ANCHOR UNITS

SHEET 3 OF 11
862D01

DETAIL OF GUARDRAIL APPROACHING DUAL LANE BRIDGES

STATE OF NORTH CAROLINA
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RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 3 OF 11
862D01

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Digitally signed by Jay S. Howerton
DN: cn=Jay S. Howerton, o=NCDOT, ou=Roadway Standards, email=jshowerton@ncdot.gov, c=US
Date: 2017.07.06 09:58:14 -04'00'

PROFESSIONAL ENGINEER SEAL 022966 JAY S. HOWERTON 7/6/2017

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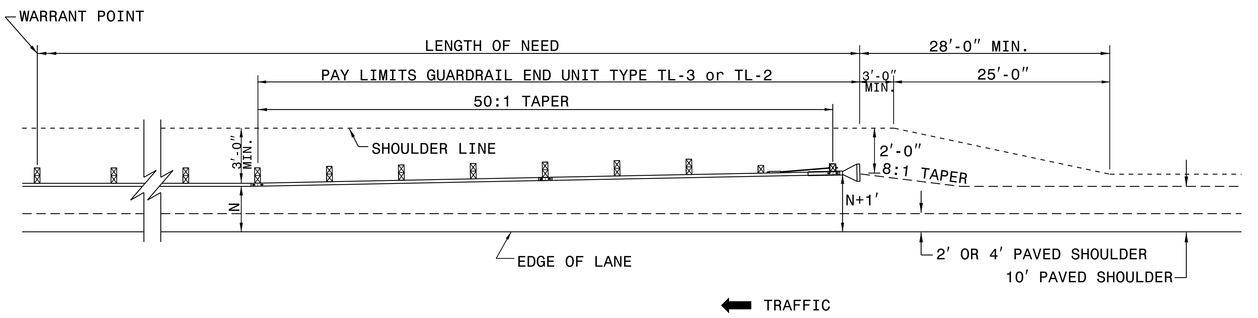
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT



FILL SECTION

CUT SECTION

"N"= DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL WHERE GUARDRAIL IS PARALLEL TO LANE.



FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

DETAIL OF BEGINNING OF GUARDRAIL IN CUT OR FILL SECTION

SHEET 6 OF 11
862D01

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 6 OF 11
862D01

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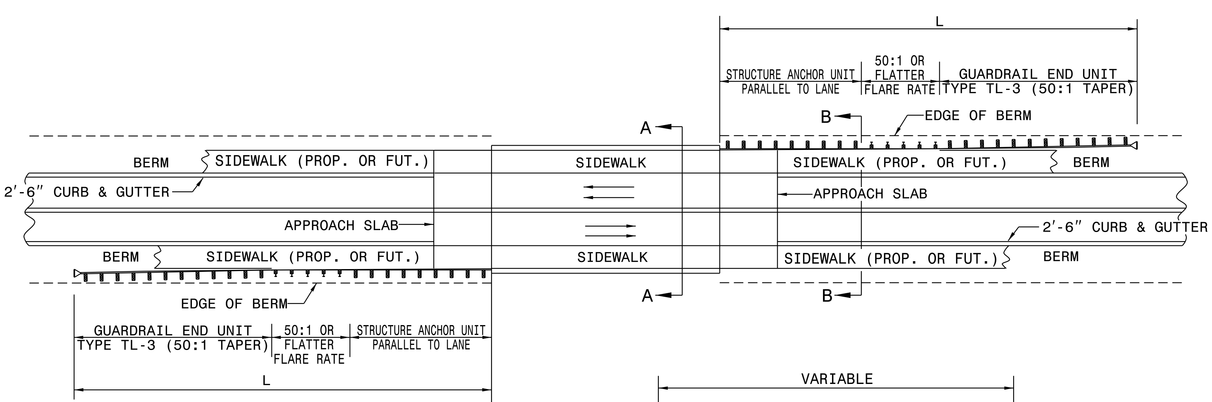
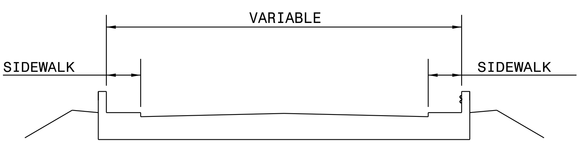
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT



MINIMUM GUARDRAIL LENGTHS "L" REQUIRED AT BRIDGE APPROACHES ON 2'-6" CONCRETE CURB AND GUTTER ROADWAYS	
DESIGN SPEED (MPH)	"L"
40	150'
50	225'

NOTE: "L" VALUES ARE BASED ON NO HAZARDS OTHER THAN END OF BRIDGE BEING PRESENT WITHIN THE CLEAR ZONE.

SEE STD. 862D03 FOR STRUCTURE ANCHOR UNITS.



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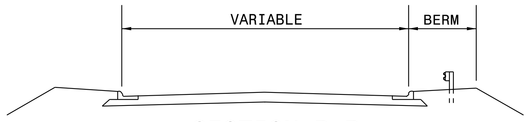

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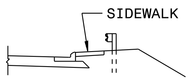

FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

STANDARD GUARDRAIL PLACEMENT AT BRIDGES WITH 2'-6" CONCRETE CURB AND GUTTER

SHEET 5 OF 11
862D01

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RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 5 OF 11
862D01

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DN: c=US, o=Government, ou=Transportation, cn=Joel S. Howerton, 9/6/2017

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SHEET NO. 2C-3

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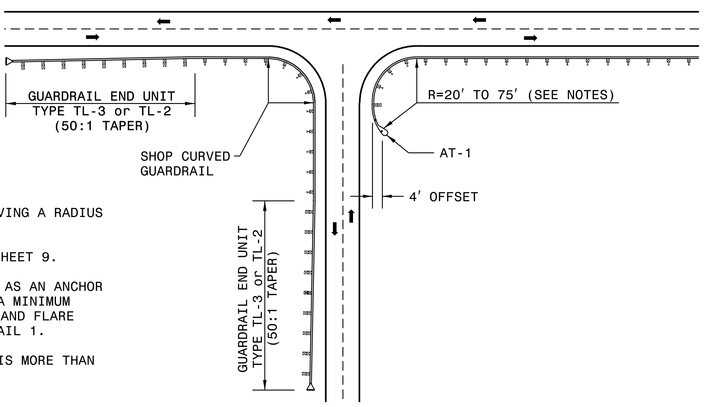
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT



NOTES:

SHOP CURVED GUARDRAIL IS DEFINED AS HAVING A RADIUS OF 150' OR LESS.

WHEN RADIUS IS LESS THAN 20' REFER TO SHEET 9.

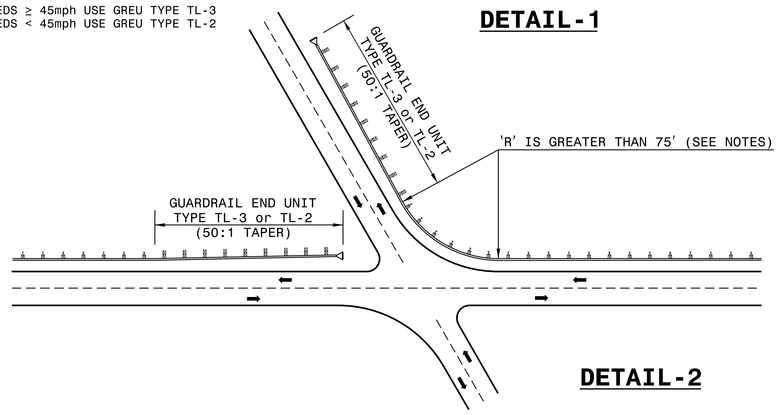
WHENEVER SHOP CURVED GUARDRAIL IS USED AS AN ANCHOR AND THE RADIUS IS FROM 20' TO 75', USE A MINIMUM LENGTH OF 50' OF SHOP CURVED GUARDRAIL AND FLARE WITH AN AT-1 ANCHOR UNIT. REFER TO DETAIL 1.

WHENEVER SHOP CURVED GUARDRAIL RADIUS IS MORE THAN 75', REFER TO DETAIL 2.

MAINTAIN CLEAR SIGHT DISTANCE.

FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

DETAIL-1



DETAIL-2

GUARDRAIL TREATMENT AT INTERSECTIONS

SHEET 8 OF 11
862D01

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 8 OF 11
862D01

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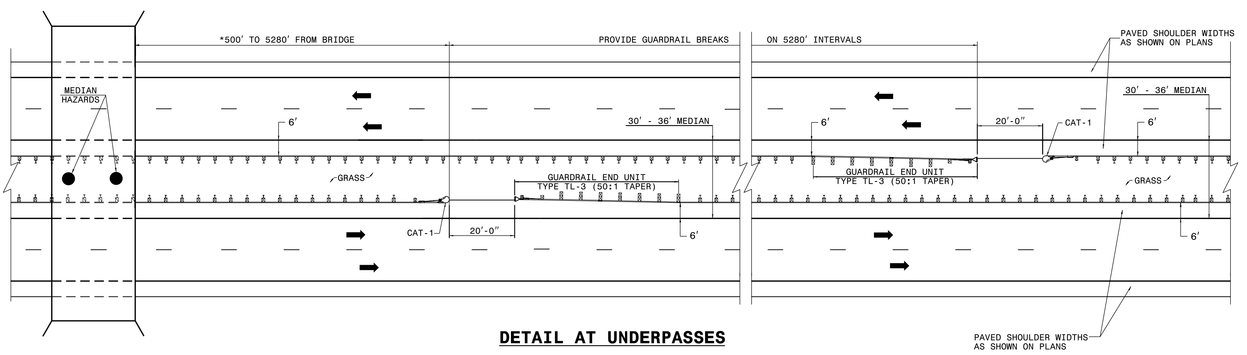
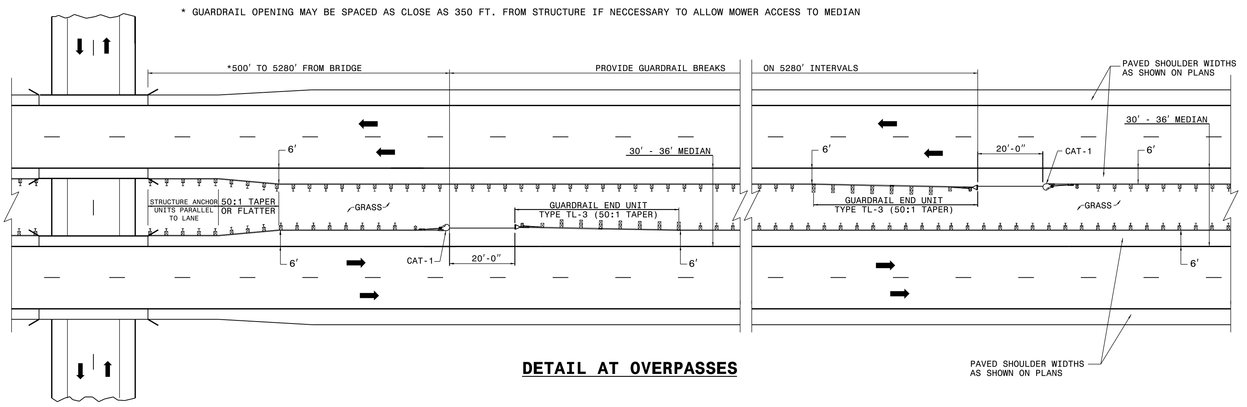
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT



DETAIL AT UNDERPASSES

* GUARDRAIL OPENING MAY BE SPACED AS CLOSE AS 350 FT. FROM STRUCTURE IF NECCESSARY TO ALLOW MOWER ACCESS TO MEDIAN



DETAIL AT OVERPASSES

FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

GUARDRAIL BREAK INTERVALS WITH 30' - 36' MEDIANS

SHEET 7 OF 11
862D01

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 7 OF 11
862D01

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Jack S. Howerton
9/6/2017
Digitally signed by Jack S. Howerton
DN: cn=Jack S. Howerton, o=Engineer, ou=Professional Engineer, email=jshowerton@ncdot.gov, c=US
Date: 2017.09.06 12:06:06 -04'00'

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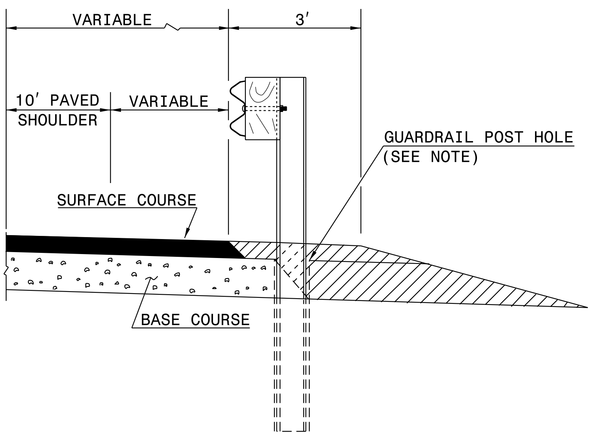
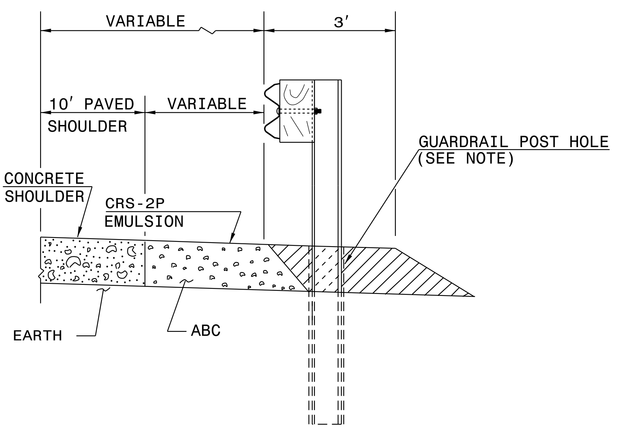
ENGLISH DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 10 OF 11
862D01



FLEXIBLE PAVED SHOULDER



CONCRETE PAVED SHOULDER

EARTH MATERIAL

NOTE:
WHEN WOODEN GUARDRAIL POSTS ARE USED, DRILL HOLES THROUGH EARTH MATERIAL AND BASE COURSE.THE POST MAY THEN BE DRIVEN TO THE PROPER DEPTH. DRILL THE HOLE OF SUFFICIENT SIZE TO ACCOMMODATE THE PARTICULAR POST BEING USED. BACKFILL AND TAMP HOLES USING THE EXCAVATED MATERIAL.

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ENGLISH DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 10 OF 11
862D01

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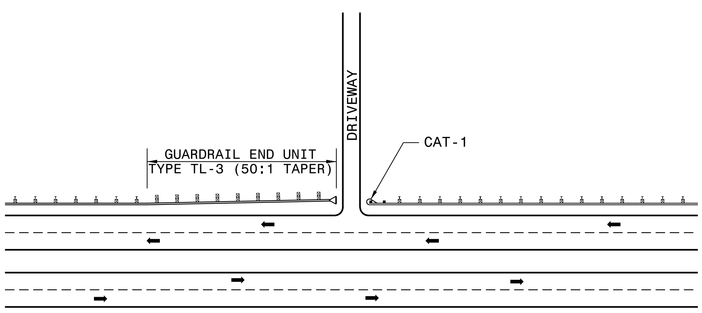
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 9 OF 11
862D01

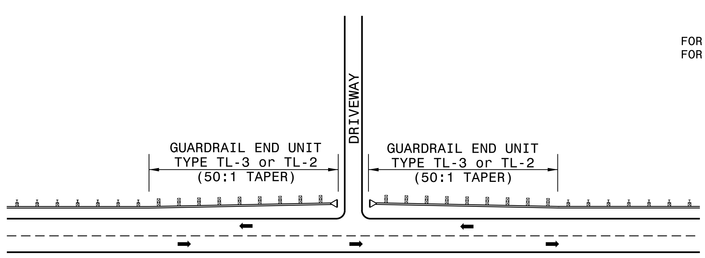


DETAIL-3
DIVIDED HIGHWAY

NOTE: USE DETAIL 3 & 4 WHENEVER 20′ OR LARGER RADIUS CANNOT BE UTILIZED.

MAINTAIN CLEAR SIGHT DISTANCE.

FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2



DETAIL-4
UNDIVIDED HIGHWAY

GUARDRAIL TREATMENT AT DRIVEWAYS

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 9 OF 11
862D01

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Jed S. Howerton
Digitally signed by Jed S. Howerton
DN: cn=Jed S. Howerton, o=NCDOT, ou=Roadway Design Unit, email=jshowerton@ncdot.gov, c=US
Date: 2017.06.16 08:46:16 -04'00'

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022966 JED S. HOWERTON

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SHEET NO. 2C-5

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	2C-6

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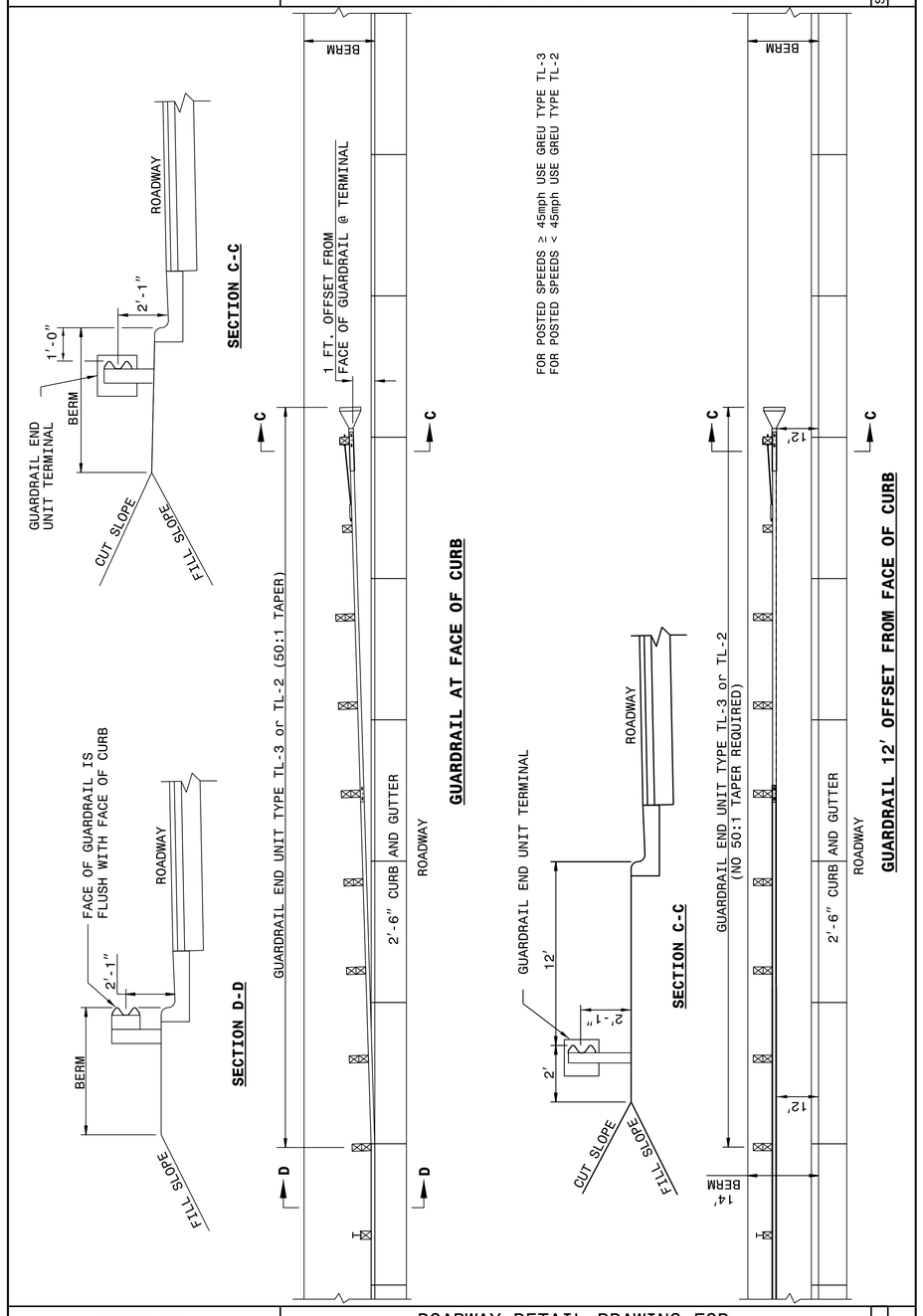
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT
GUARDRAIL TREATMENT AT CURB AND GUTTER

SHEET 11 OF 11
862D01



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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT
GUARDRAIL TREATMENT AT CURB AND GUTTER

SHEET 11 OF 11
862D01

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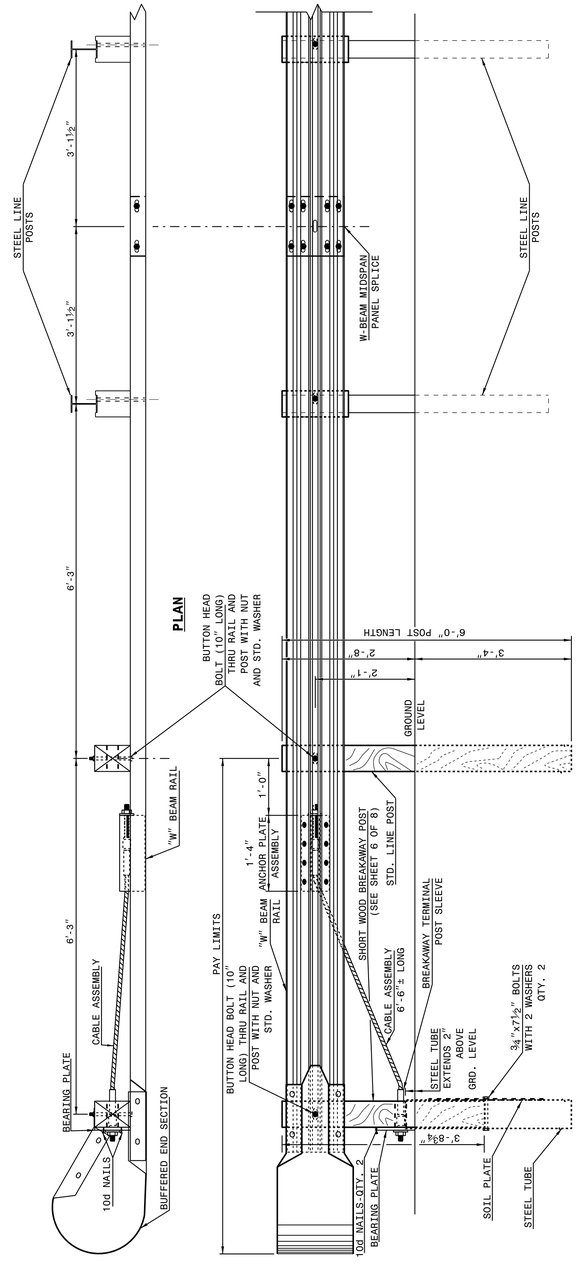
17BP.5.R.62	2C-7



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

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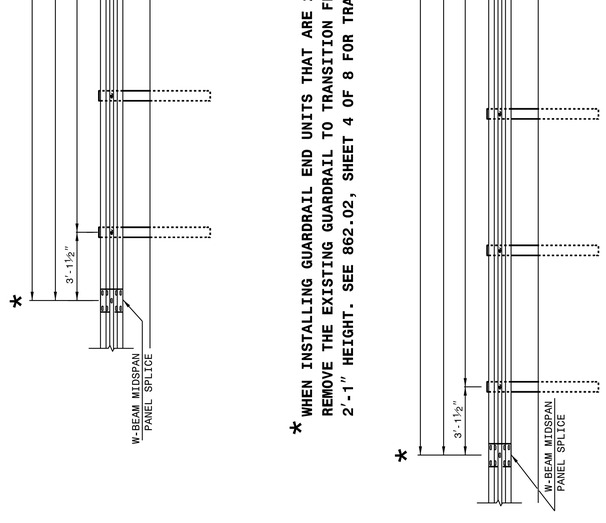
ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 2 OF 8
862D02



FLARED AND TANGENT APPROACH END UNITS
ELEVATION VIEW

FLARED AND TANGENT APPROACH END UNITS
ELEVATION VIEW

* **WHEN INSTALLING GUARDRAIL END UNITS THAT ARE 2'-1" MOUNTING HEIGHT TO EXISTING GUARDRAIL, REMOVE THE EXISTING GUARDRAIL TO TRANSITION FROM THE EXISTING HEIGHT TO THE PROPOSED 2'-1" HEIGHT. SEE 862.02, SHEET 4 OF 8 FOR TRANSITION DETAILS.**

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 2 OF 8
862D02

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PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	2C-8

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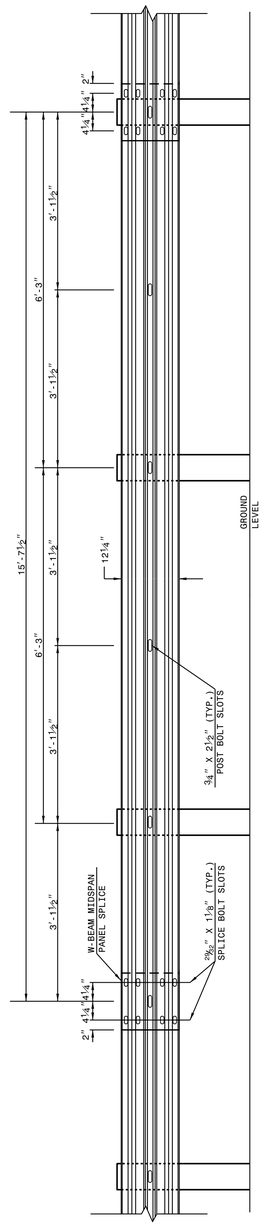
ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 3 OF 8
862D02



15'-7½" W-BEAM GUARDRAIL PANEL

NOTE: USE 5-SPACE 15'-7½" W-BEAM GUARDRAIL PANEL AT THE DOWNSTREAM END OF EXISTING GUARDRAIL THAT DOES NOT OFFSET THE W-BEAM PANEL SPLICE TO MIDSPAN

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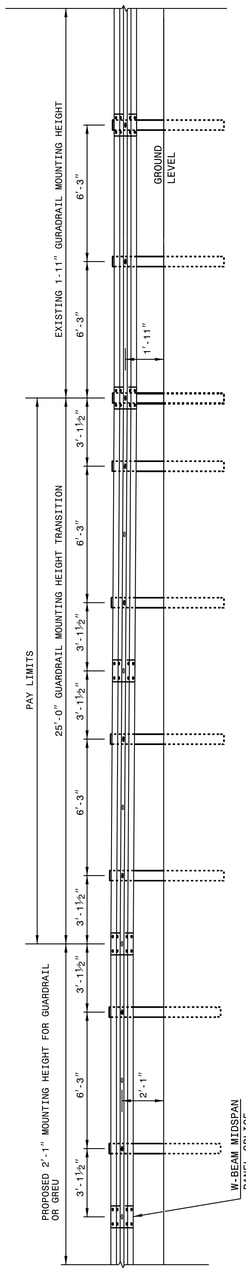
ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 4 OF 8
862D02

TRANSITION FROM OR 1'-11" TO 2'-1" W-BEAM GUARDRAIL MOUNTING HEIGHT



ELEVATION VIEW

NOTE: IF EXISTING GUARDRAIL IS LOWER THAN 1'-11", USE AN ADDITIONAL 12'-6" LONG SECTION OF GUARDRAIL, FOR EVERY 1" OF HEIGHT DIFFERENCE, TO TRANSITION FROM EXISTING GUARDRAIL TO PROPOSED 2'-1" GUARDRAIL.

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 4 OF 8
862D02

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17BP.5.R.62	2C-9

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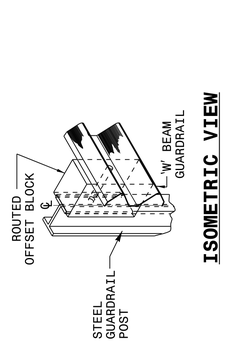
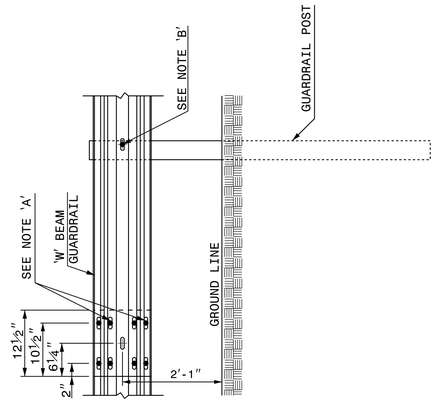
RALEIGH, N.C.

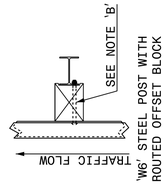
ISOMETRIC VIEW



FRONT - MID SPAN SPLICE

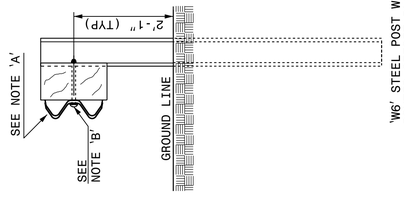


TYPICAL GUARDRAIL AND GUARDRAIL POST ALTERNATIVES



'W6' STEEL POST WITH ROUTED OFFSET BLOCK

PLAN



'W6' STEEL POST WITH ROUTED OFFSET BLOCK

SIDE

NOTES:
A - ⅝" DIA. BUTTON HEAD SPLICE BOLT 1¼" LONG (8 REQ. PER SPLICE JOINT).
B - ⅝" DIA. BUTTON HEAD BOLT 7½"/9" LONG WITH NUT FOR BOLTING 6"/8" ROUTED OFFSET BLOCK TO STEEL POSTS.
C - FIELD PUNCHING OF HOLES INTO GUARDRAIL AS DIRECTED BY THE ENGINEER.

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9/6/2017
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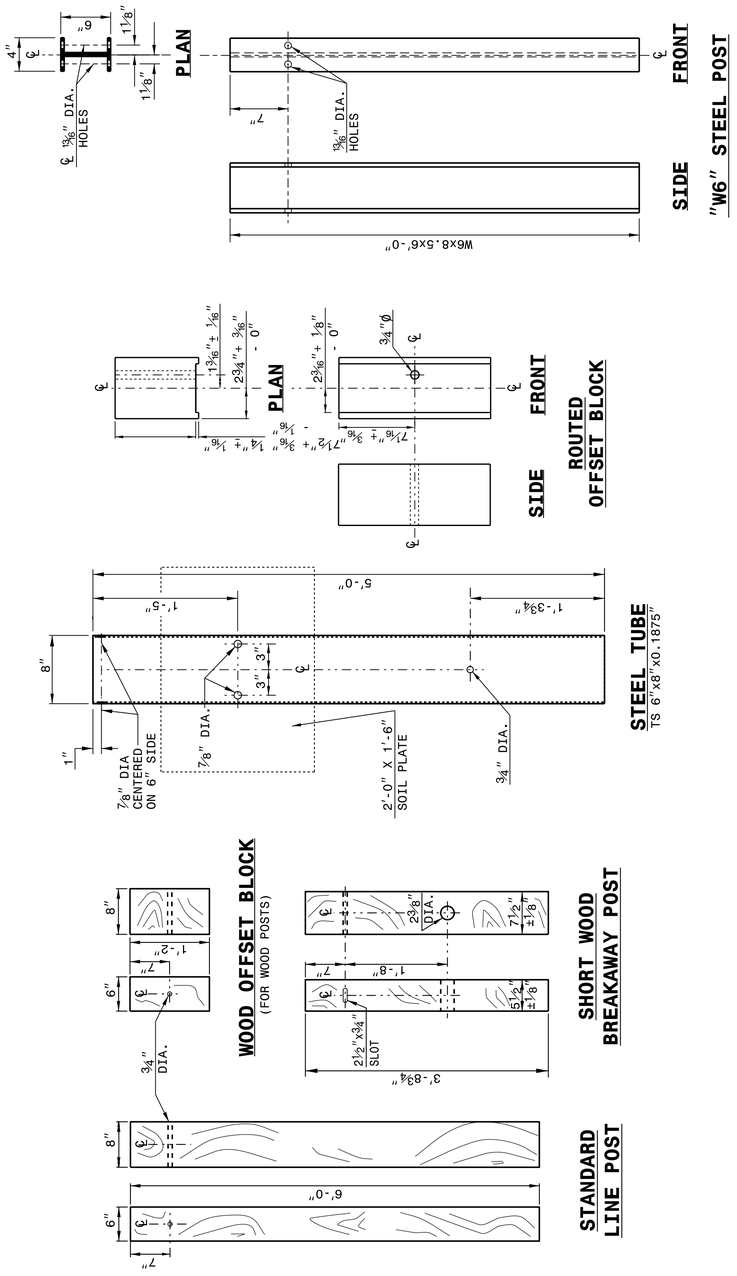
SYSTEM PARTS



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GUARDRAIL INSTALLATION
ROADWAY DETAIL DRAWING FOR
SHEET 6 OF 8 862D02

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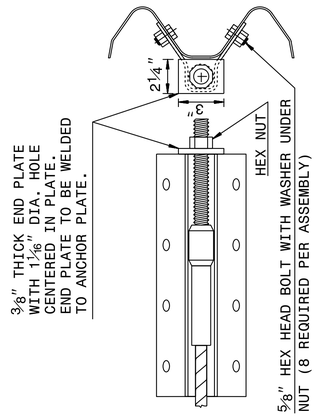
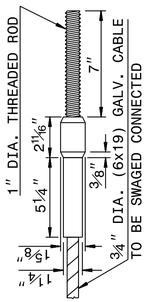


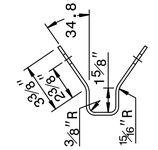
⅜" THICK END PLATE WITH 1⅛" DIA. HOLE CENTERED IN PLATE. END PLATE TO BE WELDED TO ANCHOR PLATE.

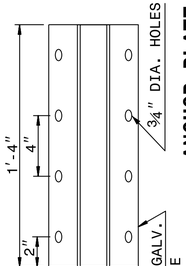
⅝" HEX HEAD BOLT WITH WASHER UNDER NUT (8 REQUIRED PER ASSEMBLY)

ANCHOR PLATE ASSEMBLY



SWAGED CABLE





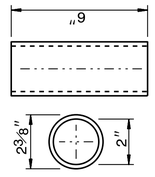
¾" DIA. HOLES

¾" THICK GALV. STEEL PLATE

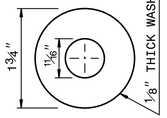
ANCHOR PLATE

CABLE ASSEMBLY

SYSTEM PARTS

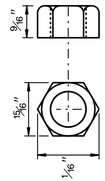


BREAKAWAY TERMINAL POST SLEEVE

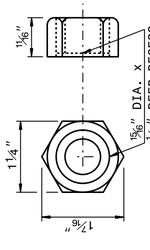


DETAIL OF STANDARD WASHER

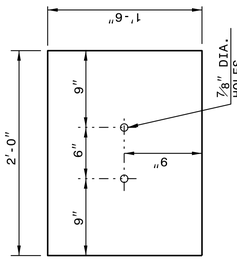
STANDARD WASHER: TYPICAL USE UNDER NUT WITH WOOD POST



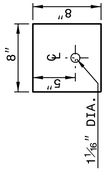
DETAIL OF STANDARD HEX BOLT AND NUT



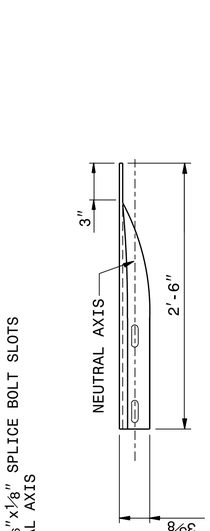
DETAIL OF BUTTON HEAD BOLT AND NUT

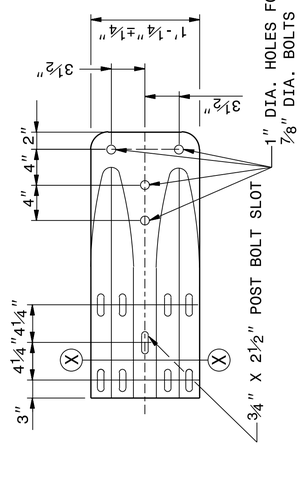


SOIL PLATE
¼" THICK PLATE



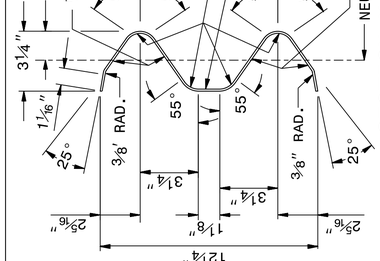
BEARING PLATE
⅝" THICK PLATE





TYPICAL END SHOE

SYSTEM PARTS - GENERAL USE



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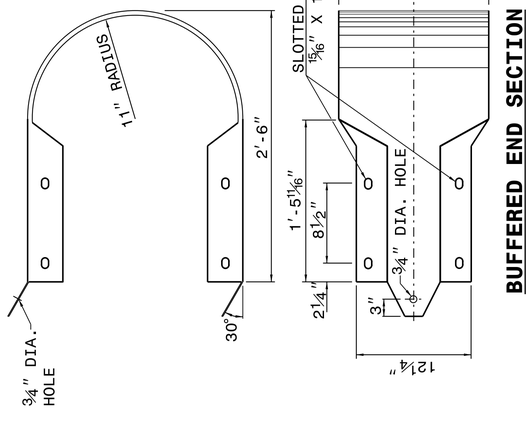

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STATE OF
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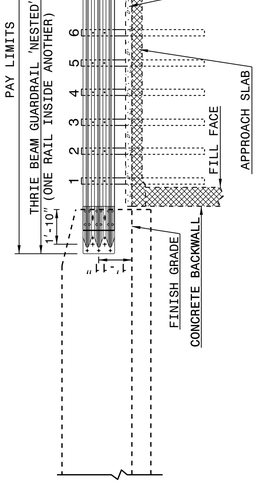
RALEIGH, N.C.

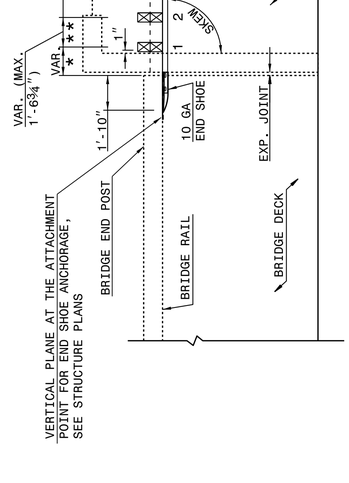
ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO
RAIL ON BRIDGE - SUB REGIONAL TIER

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 5 FOR POST SECTIONS 1 THRU 9.



PLAN VIEW

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

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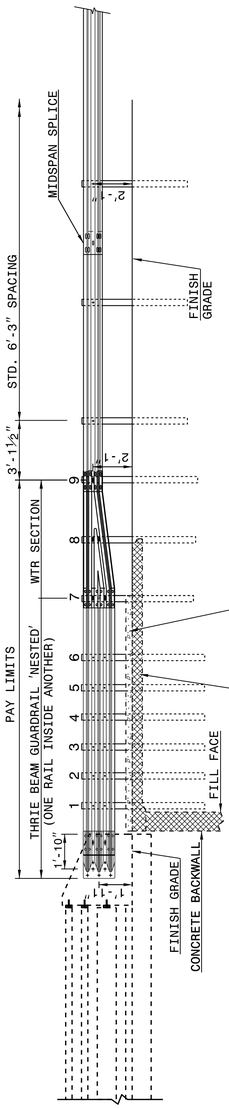
ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III
FOR ATTACHMENT TO RAIL ON BRIDGE

SHEET 1 OF 7
862D03



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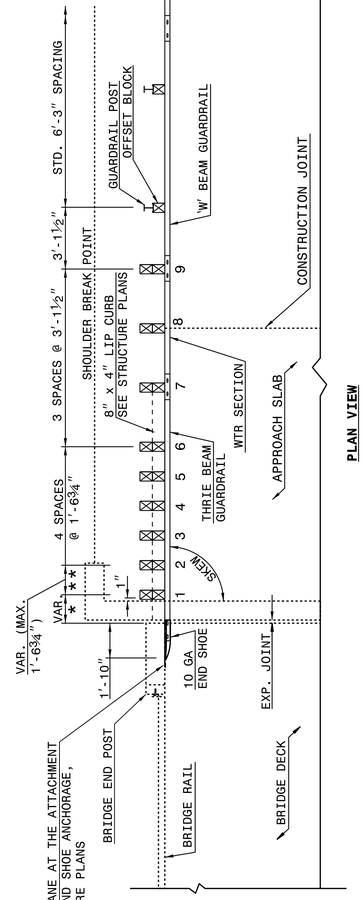
-SEE SHEET 5 FOR POST SECTIONS 1 THRU 9.



PLAN VIEW

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

STATE OF
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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

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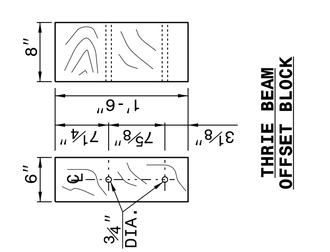
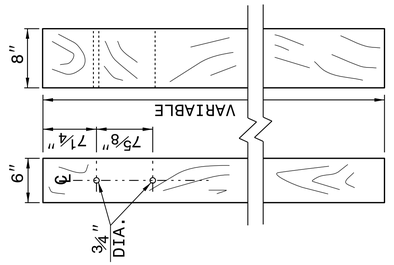
ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III

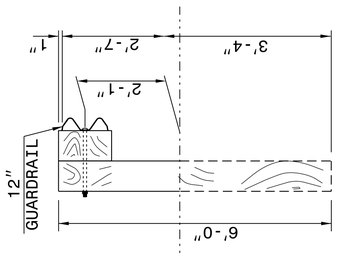
SHEET 3 OF 7
862D03



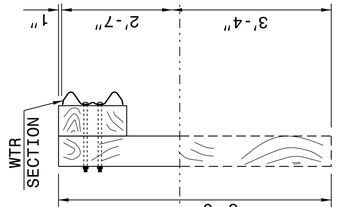
THRIE BEAM OFFSET BLOCK



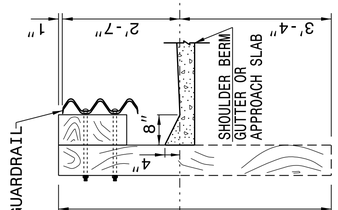
THRIE BEAM LINE POST



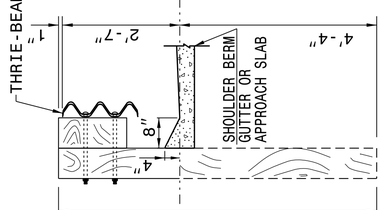
SECTION OF 'W' BEAM POST 9



SECTION OF WTR BEAM POST 8

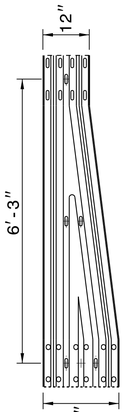


SECTION OF THRIE BEAM POST 7

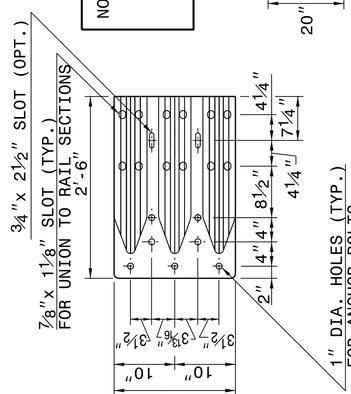


SECTION OF THRIE BEAM POSTS 1 THRU 6

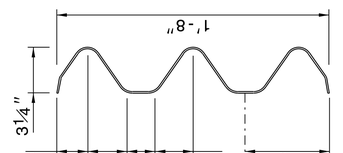
NOTE: THE MID POST AND OFFSET BLOCK OF THE WTR SECTION WILL REQUIRE SPECIAL BOLT HOLE DRILLING IN THE THRIE BEAM OFFSET BLOCK AND LINE POST.



WTR SECTION
ELEVATION VIEW



END SHOE

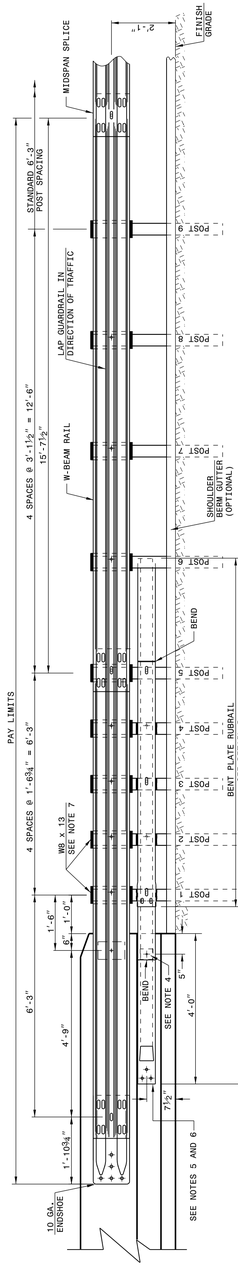


THRIE-BEAM SECTION

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

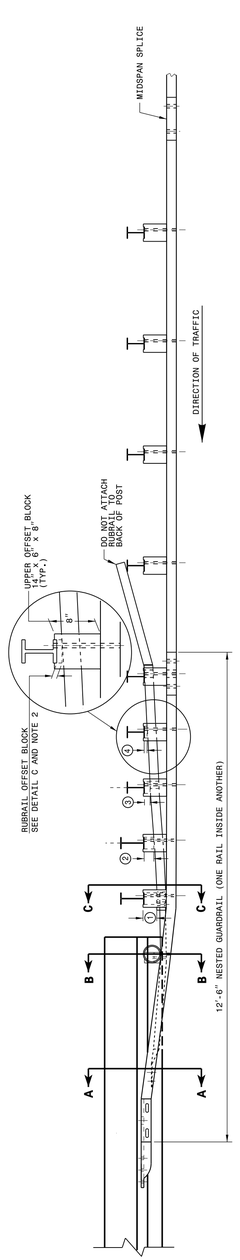
ROADWAY DETAIL DRAWING FOR
GUARDRAIL ANCHOR UNIT
GUARDRAIL ANCHOR UNIT TYPE B-77
FOR F-SHAPE BARRIER

SHEET 4 OF 7
862D03



ELEVATION

GENERAL NOTES:
1) POSTS 1 THROUGH 5 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER BLOCKOUTS AND/OR RUBRAIL; 5/8" BUTTONHEAD BOLTS (SEE CHART FOR BOLT LENGTHS). RUBRAIL IS SECURED TO POST 5 WITH A 5/8" x 4½" BUTTONHEAD BOLT.
2) RUBRAIL BLOCKOUTS CONSIST OF TWO 4" x 8" x 14" BLOCKS AND ARE SECURED TO POSTS 1 AND 3. RUBRAIL IS SECURED TO POST 2 AND 4. SECURE RUBRAIL AND BLOCKOUTS TO POSTS 1 AND 3. RUBRAIL BLOCKOUTS ONLY TO POSTS 2 AND 4. SECURE RUBRAIL IS SECURED TO POST 5 WITH A 5/8" x 4½" BUTTONHEAD BOLT.
3) STEEL SPACER TUBE IS A SCHEDULE 40 GALVANIZED PIPE 6" INSIDE DIAMETER x 9" LONG. ATTACH TUBE TO RAIL ELEMENT ONLY. USE 3/8" x 3" LAG BOLT WITH FLAT WASHER. RUBRAIL IS FLARED TO BACK OF POST 6 AND NOT SECURED.
4) SEE DETAIL D FOR SLOTTED RUBRAIL BLOCKOUT DETAILS. RUBRAIL IS ATTACHED TO RAIL ELEMENT WITH 5/8" BUTTONHEAD BOLT AND RECTANGULAR PLATE WASHER.
5) SHOP FABRICATE THE C6 x 8.2 RUBRAIL END TO BE CONSISTENT WITH THE SLOPE OF THE F-SHAPE AND ATTACH FLUSH WITH THE SLOPED TOE OF THE BARRIER OR BRIDGE RAIL.
6) ANCHORAGE:
   (a) AT EXISTING BRIDGE RAIL AND NEW OR EXISTING BARRIERS, ANCHOR RUBRAIL USING THREE 5/8" x 6" CHEMICALLY ANCHORED BOLTS WITH WASHERS. MAXIMUM PROJECTION FOR BOLTS IS 1½".
   (b) AT EXISTING BRIDGE RAIL AND NEW OR EXISTING BARRIERS, ANCHOR THE W-BEAM END SHOE USING A 4 BOLT HOLD DOWN PLATE (SEE STD. DWG. 862.04). A 4 BOLT INSERT ASSEMBLY IS ALLOWED ON PRECAST REINFORCED CONCRETE BARRIER (SEE STD. DWG. 857.01). INSTALL THE W-BEAM END SHOE BEHIND THE NESTED W-BEAM ELEMENTS.
   (c) AT NEW BRIDGE RAIL, ANCHORAGE DETAILS SHALL BE DETAILED ON THE STRUCTURE PLANS.
7) POSTS 1 AND 2 ARE W6 x 13, 7'-6" LONG. ALL OTHER POSTS IN THE ANCHOR UNIT ARE W6 x 8.5.



PLAN

GUARDRAIL ANCHOR UNIT TYPE B-77

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL ANCHOR UNIT
GUARDRAIL ANCHOR UNIT TYPE B-77
FOR F-SHAPE BARRIER

SHEET 4 OF 7
862D03

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER Joel S. Howerton
9/6/2017
DocuSigned by: Joel S. Howerton 873F3D17DCDC45F...

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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.: _____

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jhowerton AT CSD-292595

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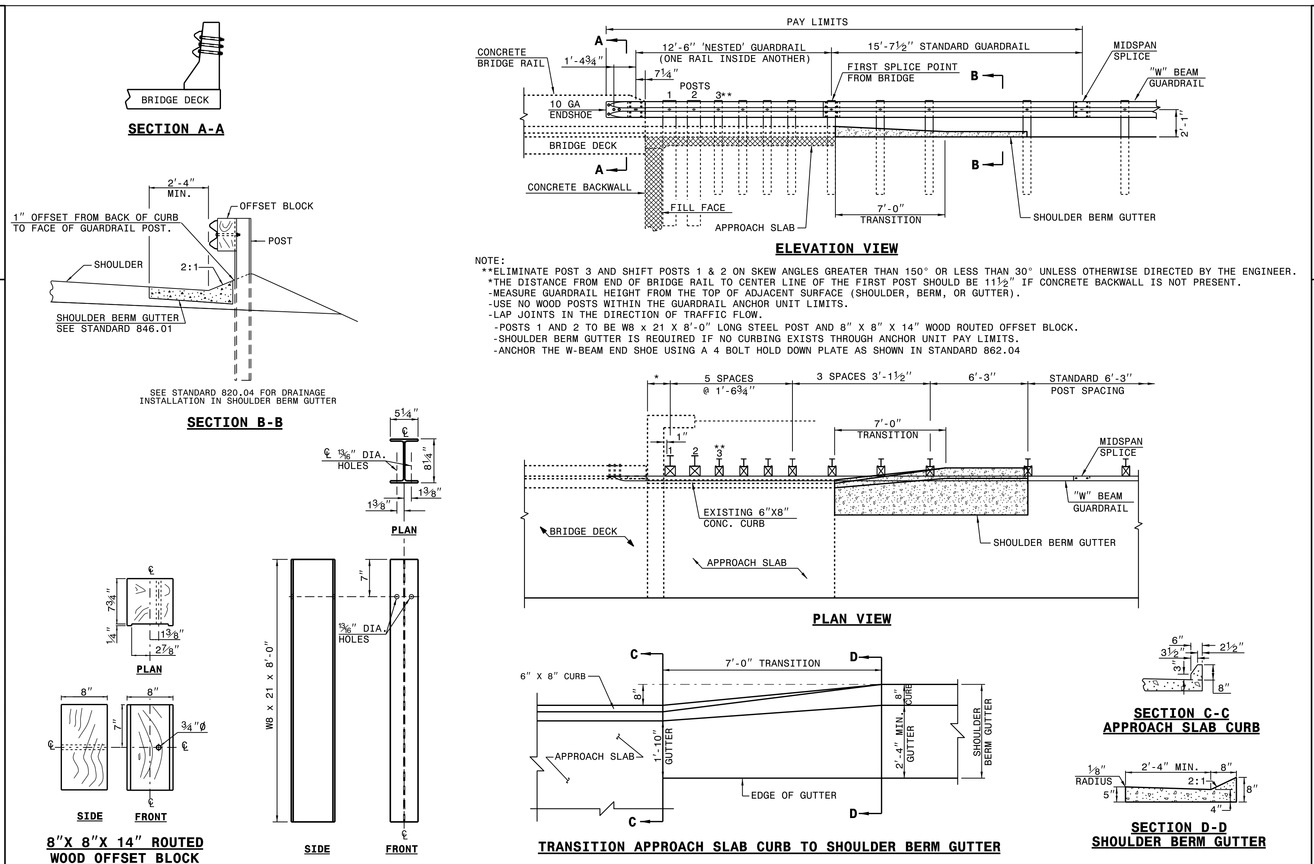
jhowerton AT CSD-292595

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

ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT TYPE B-83

SHEET 6 OF 7
862D03



NOTE:
**ELIMINATE POST 3 AND SHIFT POSTS 1 & 2 ON 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.
-MEASURE GUARDRAIL HEIGHT FROM THE TOP OF ADJACENT SURFACE (SHOULDER, BERM, OR GUTTER).
-USE NO WOOD POSTS WITHIN THE GUARDRAIL ANCHOR UNIT LIMITS.
-LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
-POSTS 1 AND 2 TO BE W8 x 21 X 8'-0" LONG STEEL POST AND 8" X 8" X 14" WOOD ROUTED OFFSET BLOCK.
-SHOULDER BERM GUTTER IS REQUIRED IF NO CURBING EXISTS THROUGH ANCHOR UNIT PAY LIMITS.
-ANCHOR THE W-BEAM END SHOE USING A 4 BOLT HOLD DOWN PLATE AS SHOWN IN STANDARD 862.04

GUARDRAIL ANCHOR UNIT TYPE B-83

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

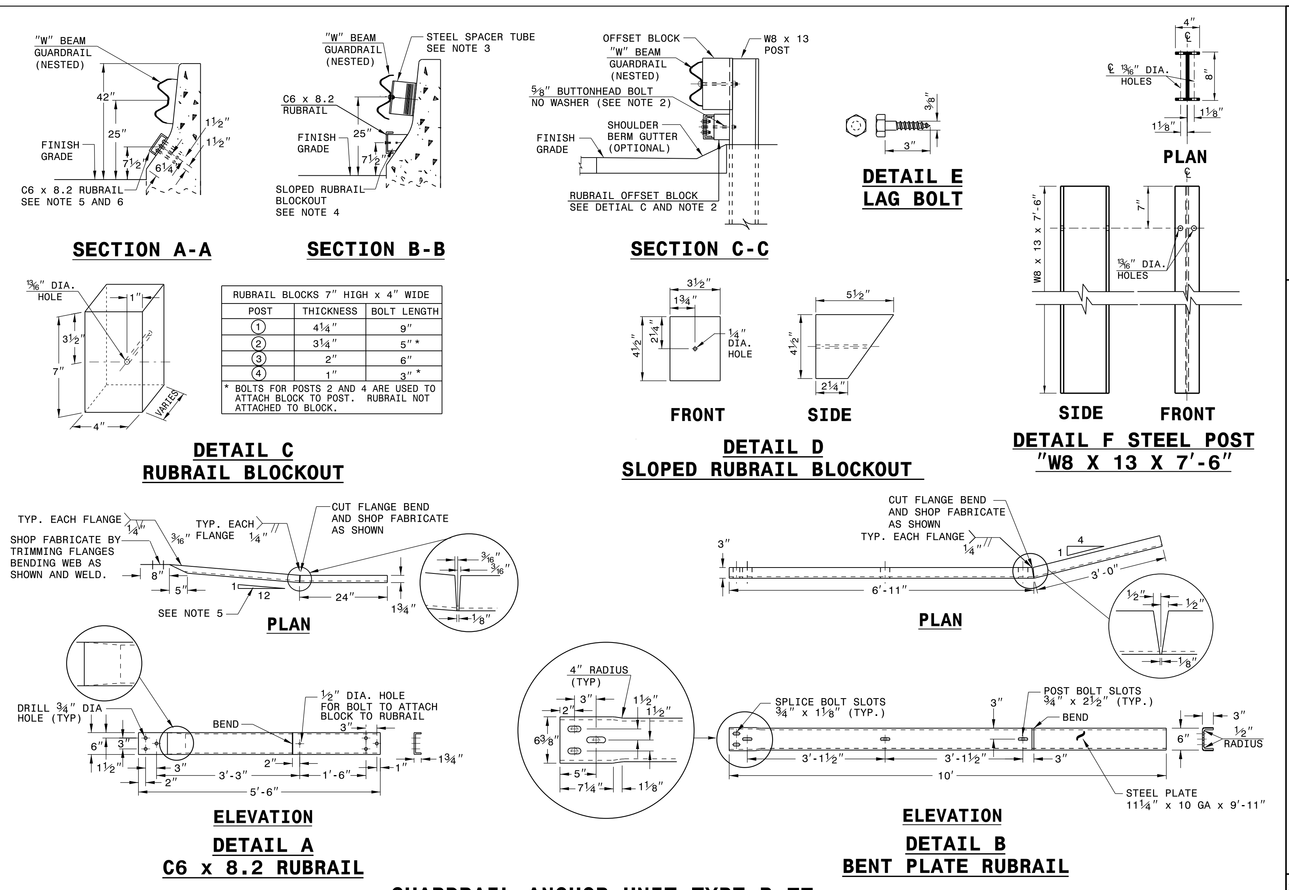
ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT TYPE B-83

SHEET 6 OF 7
862D03

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

ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNIT
GUARDRAIL ANCHOR UNIT TYPE B-77
FOR F-SHAPE BARRIER

SHEET 5 OF 7
862D03



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.

GUARDRAIL ANCHOR UNIT TYPE B-77

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

ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNIT
GUARDRAIL ANCHOR UNIT TYPE B-77
FOR F-SHAPE BARRIER

SHEET 5 OF 7
862D03

SEE TITLE BLOCK

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

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

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NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER J. S. Howerton 9/6/2017
Digitally signed by Jack S. Howerton
DN: cn=Jack S. Howerton, o=Contractor, ou=Engineer, email=jshowerton@ncdot.gov

PROJECT REFERENCE NO. 17BP.5.R.62
SHEET NO. 2C-13

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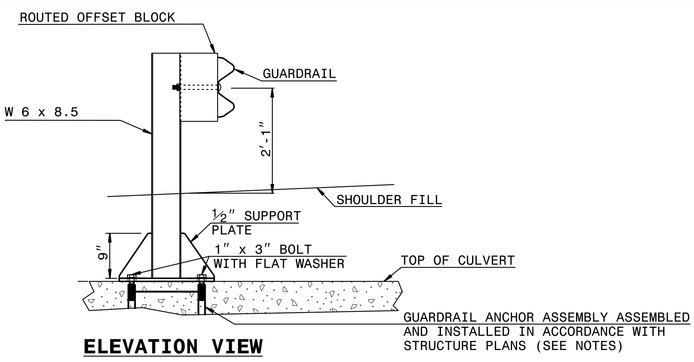
jhowerton AT CSD-242595

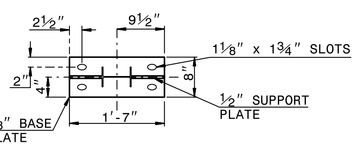
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
ANCHORAGE FOR GUARDRAIL POST ON BOX CULVERT

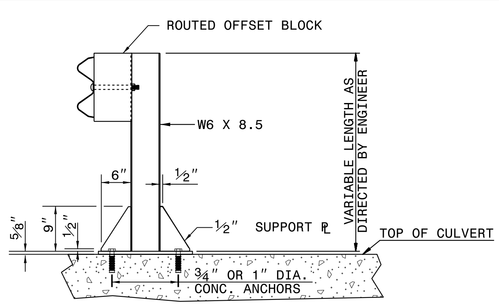
SHEET 7 OF 7
862D03



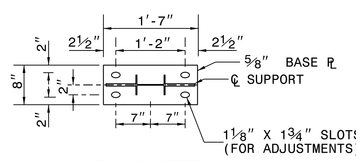
ELEVATION VIEW



PLAN VIEW



ELEVATION VIEW



PLAN VIEW

NOTES FOR:
GUARDRAIL POST ANCHORED TO STRUCTURE:
- -USE FULL LENGTH ¼" BUTT WELDS AT ALL LOCATIONS OF CONTACT BETWEEN THE BASE PLATE, SUPPORT PLATES AND STEEL POST.
- -USE POST AND POST BASE PLATES CONFORMING TO THE REQUIREMENTS OF A.S.T.M. A-36 AND GALVANIZED AFTER FABRICATION TO CONFORM TO A.S.T.M. A-123.

NEW STRUCTURES:
- -ATTACH POST TO INSERT ASSEMBLY UNITS (USING ANCHOR BOLTS SUPPLIED WITH INSERTS) WHICH HAVE BEEN CAST INTO THE STRUCTURE DURING CONSTRUCTION.

EXISTING STRUCTURES:
- -USE CONCRETE ANCHORS CONSISTING OF A STUD BOLT WITH NUT AND WASHER. USE STUDS THREADED ON ONE END AND HAVING AN EXPANDED WEDGE ASSEMBLY POSITIONED AROUND A TAPERED AREA AT THE OTHER END. USE ANCHORS WHICH PROVIDE A MINIMUM SAFE HOLDING POWER OF 2875 LBS. FOR A ¾" OR 1" DIAMETER BOLT. CALCULATE HOLDING POWER BASED ON ¼ THE ACTUAL HOLDING POWER OF THE ANCHOR IN 3500 PSI CONCRETE AS DETERMINED BY AN APPROVED COMMERCIAL TESTING LABORATORY.

- -USE ANCHORS GALVANIZED IN ACCORDANCE WITH A.S.T.M. A-153. SIZE HOLES FOR THE CONCRETE ANCHORS IN ACCORDANCE WITH THE ANCHOR MANUFACTURER'S RECOMMENDATIONS. DRILL HOLES WITH A CARBIDE OR DIAMOND TIPPED MASONRY BIT POWERED BY A ROTARY OR ROTARY IMPACT DRILL. NO OTHER IMPACT TOOLS WILL BE PERMITTED. DRILL HOLES VERTICALLY. FURNISH DOCUMENTATION OF HOLE SIZE RECOMMENDED FOR THE SPECIFIED ANCHOR TO THE ENGINEER BEFORE DRILLING HOLES. THOROUGHLY CLEAN HOLES FOR ANCHORS OF ALL CONCRETE CHIPS, DUST, GREASE, OIL, ETC. BEFORE ANCHORS ARE INSTALLED. REPAIR ALL DAMAGE CAUSED BY THIS WORK TO THE SATISFACTION OF THE ENGINEER.

ANCHORAGE FOR GUARDRAIL POST ON BOX CULVERT

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

ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
ANCHORAGE FOR GUARDRAIL POST ON BOX CULVERT

SHEET 7 OF 7
862D03

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

Digitally signed by Jonathan S. Howerton
Date: 2017.09.06 09:16:15 -04'00'

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022966 JONATHAN S. HOWERTON

PROJECT REFERENCE NO. 17BP.5.R.82
SHEET NO. 20-14

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	3B-1

8/17/99

REVISIONS

SUMMARY OF EARTHWORK

IN CUBIC YARDS

Station	Station	Uncl. Excav.	Embank. +%	Borrow	Waste
-L- Sta. 11+00.00	-L- Sta. 19+03.93	6659	1988		4671
SUBTOTAL:		6659	1988		4671
-L- Sta. 20+26.19	-L- Sta. 25+50.00	569	2218	1649	
SUBTOTAL:		569	2218	1649	
WASTE IN LEIU OF BORROW:				-1649	-1649
PROJECT TOTALS:		7228	4206	0	3022
GRAND TOTAL:		7228	4206	0	3022
SAY:		**7590**		**0**	

UNDERCUT = 400 CY
SELECT GRANULAR MATERIAL = 400 CY
GEOTEXTILE FOR SOIL STABILIZATION = 400 SY

DDE = 120 CY

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

PAVEMENT REMOVAL SUMMARY

IN SQUARE YARDS

SURVEY LINE	Station	Station	LOCATION LT/RT/CL	ASPHALT REMOVAL	ASPHALT BREAKUP	CONCRETE REMOVAL	CONCRETE BREAKUP
-L-	11+00.00	19+12.32	EXIST. ROAD	2,135.53			
-L-	20+16.20	25+50.00	EXIST. ROAD	1,401.30			
		TOTAL:		3,536.83			
		SAY:		3,575.00			

SHOULDER BERM GUTTER SUMMARY

IN LINEAR FEET

LINE	Station	Station	LENGTH
-L- (LT)	18+70.00	18+92.93	22.93
		TOTAL:	22.93
		SAY:	25

"N" = DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL
TOTAL SHOULDER WIDTH = DISTANCE FROM EDGE OF TRAVEL LANE TO SHOULDER BREAK POINT.
FLARE LENGTH = DISTANCE FROM LAST SECTION OF PARALLEL GUARDRAIL TO END OF GUARDRAIL
W = TOTAL WIDTH OF FLARE FROM BEGINNING OF TAPER TO END OF GUARDRAIL

GUARDRAIL SUMMARY

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

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOUL WIDTH	FLARE LENGTH		W		ANCHORS									IMPACT ATTENUATOR TYPE 350		SINGLE FACED CONCRETE BARRIER	REMOVE EXISTING GUARDRAIL	REMOVE & STOCKPILE EXISTING GUARDRAIL	REMARKS
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	XI MOD	XI	GREU TL-2	M-350	Type-III	CAT-1	VI MOD	BIC	AT-1	G	NG				
-L-	18+41.31	19+03.81	RT	62.5'			19+03.81		5'-9"	8'-9"	25'		0.5'				1		1										
-L-	18+53.81	19+03.81	LT	50'				19+03.81	5'-9"	8'-9"		25'		0.5'			1		1										
-L-	20+26.19	20+76.19	RT	50'				20+26.19	5'-9"	8'-9"		25'		0.5'			1		1										
-L-	20+26.19	20+76.19	LT	50'			20+26.19		5'-9"	8'-9"	25'		0.5'				1		1										
			SUBTOTAL:	212.5'																									
			LESS ANCHOR DEDUCTIONS:																										
			TYPE III (4 @ 18.75')	75'																									
			GREU TL-2 (4 @ 25')	100'																									
			TOTAL:	37.5'																									
			SAY:	37.5'																									
			ADDITIONAL GUARDRAIL POSTS = 5 EA																										

9/6/2017
X:\Roadway\900012_rdy_sum_3b-1.dgn
USER:Doug

8/17/99

COMPUTED BY: DGL DATE: 11/16/2016

CHECKED BY: ECOLOGICAL ENGINEERING, LLP DATE: 11/18/2016

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	3D-1

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

Note: Invert Elevations indicated are for Bid Purposes only and shall not be used for project construction stakeout.

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

STATION	LOCATION (LT, RT, OR CL)'	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	SIDE DRAIN PIPE (RCP, CSP, CAAP, HDPE, or PVC) SIZE	12"	15"	18"	24"	30"	36"	42"	48"	DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE
								THICKNESS OR GAUGE												
11+97 -L-	CL	0401	0402		311.3	311														
15+70 -L-	LT	0403			296.3															
15+70 -L-	LT	0403	0404		296.3	288.65														
15+70 -L-	LT	0404		292.4	288.65															
15+70 -L-	CL	0404	0405		288.65	286.6														
18+75 -L-	LT	0406		289.95	287.2															
	LT	0406	0407		287.2	287.17														
18+84 -L-	LT	0407		289.99	287.17															
18+84 -L-	LT	0407	0408		287.17	280				28								X		X	X
21+00 -L-	LT	0409										52							X	X
24+48 -L-	RT	0410	0411		294.2	296.2				28		52								
SHEET TOTALS										28		52								

STATION	C.S. PIPE SIZE	12"	15"	18"	24"	30"	36"	42"	48"	R.C. PIPE CLASS III SIZE	12"	15"	18"	24"	30"	36"	42"	48"	R.C. PIPE CLASS IV SIZE	12"	15"	18"	24"	30"	36"	42"	48"
	THICKNESS OR GAUGE		.064	.064	.064	.079	.079	.109	.109																		
11+97 -L-																					68						
15+70 -L-																											
15+70 -L-					24																						
15+70 -L-														76													
18+75 -L-																					8						
18+84 -L-																											
21+00 -L-																											
24+48 -L-																					64						
SHEET TOTALS					24									76							8	132					

	** R.C. PIPE (CLASS V)	*** RC PIPE CULVERTS, CONTRACTOR DESIGN	**** RC PIPE CULVERTS, CONTRACTOR DESIGN	15" SIDE DRAIN PIPE	18" SIDE DRAIN PIPE	ENDWALLS STD. 838.01 838.11 OR STD. 838.80 (UNLESS NOTED OTHERWISE) CU. YARDS R.C.P.	ENDWALLS STD. 838.01 838.11 OR STD. 838.80 (UNLESS NOTED OTHERWISE) CU. YARDS C.S.P.	QUANTITIES FOR DRAINAGE STRUCTURES PER EACH (0' THRU 5.0')	*TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL. 'B') LIN. FT. A: 5.0' THRU 10.0'	*TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL. 'B') LIN. FT. B: 10.0' AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G	CONCRETE TRANSITIONAL SECTION DROP INLET	CATCH BASIN	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME WITH TWO GRATES STD. 840.16	G.D.I. TYPE "A" STD. 840.17 OR 840.26	G.D.I. TYPE "B" STD. 840.18 OR 840.27	G.D.I. TYPE "D" STD. 840.19 OR 840.28	G.D.I. FRAME WITH GRATE STD. 840.20	G.D.I. FRAME WITH TWO GRATES STD. 840.22	G.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	G.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	JB. STD. 840.31 OR 840.32	G.D.I. (N.S. FLAT) FRAME W/ 2 GRATES STD. 840.29	T.B.D.I. STD. 840.35	BERM DITCH OUTLET STD. 850.10 (PER EACH)	18" C.S. ELBOW	SIDE DRAIN PIPE ELBOWS NO. & SIZE	CONC. & BRICK PIPE PLUG, C.Y. STD. 840.71	CONC. COLLARS CL. "B" C.Y. STD. 840.72	PIPE REMOVAL LIN. FT.	REMARKS
11+97 -L-																											
15+70 -L-																											
15+70 -L-																											
15+70 -L-								1																			
15+70 -L-																											
18+75 -L-								1																			
18+84 -L-								1																			
18+84 -L-																										2-15"	
21+00 -L-																											
24+48 -L-								3																			REMOVE 53' - 18" RCP
SHEET TOTALS								3																1	2	2	1	1	2-15"				

ABBREVIATIONS

C.B.	CATCH BASIN
N.D.I.	NARROW DROP INLET
D.I.	DROP INLET
G.D.I.	GRATED DROP INLET
G.D.I.(N.S.)	(NARROW SLOT)
J.B.	JUNCTION BOX
M.H.	MANHOLE
T.B.D.I.	TRAFFIC BEARING DROP INLET
T.B.J.B.	TRAFFIC BEARING JUNCTION BOX

REVISIONS

9/6/2017
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USER:Rayburn

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	4

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 034407 ENGINEER ANDREW P YOUNG
DocuSigned by: Andrew P. Young 10/31/2017
EF21D93DD62E4EE...

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 039102 ENGINEER BRANDON T BARHAM
DocuSigned by: Brandon Barham 10/31/2017
C2351A525E6D490...

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ECOLOGICAL ENGINEERING

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REVISIONS
5/14/99

NAD 83/NA 2011

PC Sta. 10+00.00
BEGIN STATE PROJECT 17BP.5.R.62 -L- POC STA.11+00.00
PCC Sta. 11+08.18

-L-

PI Sta 10+54.11
△ = 3° 31' 54.2" (LT)
D = 3° 15' 53.0"
L = 108.18'
T = 54.11'
R = 1,755.00'

PI Sta 14+82.56
△ = 55° 32' 18.6" (LT)
D = 8° 03' 30.5"
L = 689.19'
T = 374.38'
R = 711.00'
S.E. = 4%
RUNOFF = 84'

PI Sta 24+15.25
△ = 16° 31' 09.9" (RT)
D = 8° 03' 30.5"
L = 204.99'
T = 103.21'
R = 711.00'
S.E. = 4%
RUNOFF = 84'

PI Sta 26+03.11
△ = 16° 16' 25.6" (RT)
D = 9° 31' 03.3"
L = 170.99'
T = 86.07'
R = 602.00'

DETAIL 1
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground, 2:1, d, D, 3:1 or Flatter, Front Ditch Slope, Geotextile
Min. D=1.5 Ft.
Max. d=1.0 Ft.
Type of Liner= CLASS I RIPRAP
FROM STA 15+00 TO STA 15+75 L RT

DETAIL 2
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground, 2:1, d, D, 3:1 or Flatter, Front Ditch Slope, Geotextile
Min. D=1.5 Ft.
Max. d=1.0 Ft.
Type of Liner= CLASS B RIPRAP
FROM STA 11+00 TO STA 12+00 L LT
FROM STA 21+08 TO STA 25+50 L RT
FROM STA 21+25 TO STA 24+50 L LT

DETAIL 3
BERM DITCH
(Not to Scale)
SLOPE STAKE, CLEARING LIMITS, 5.0', 6.0', 5.0', 4.0', 10.0' V.C., 2:1, D, V=B, d, Geotextile
Min. D=1.5 Ft.
Max. d=1.0 Ft.
Type of Liner= CLASS I RIPRAP
FROM STA 15+00 TO STA 16+15 L LT

DETAIL 4
STANDARD BASE DITCH
(Not to Scale)
Natural Ground, 2:1, d, D, 2:1, Natural Ground, Geotextile, B
Min. D= 1.5 Ft.
Max. d= 1.5 Ft.
B= 2.0 Ft.
*When B is < 6.0'
Type of Liner= CLASS I RIPRAP
STA 15+73 L RT

DETAIL 5
TOE PROTECTION
(Not to Scale)
NATURAL GROUND, 2:1 OR FLATTER, FILL SLOPE, d, GEOTEXTILE
d=1.5 Ft.
Type of Liner= CLASS B RIPRAP
FROM STA 17+85 TO STA 19+00 L LT

DETAIL 8
CUT DITCH
(Not to Scale)
Natural Ground, 2:1, D, 4:1 or Flatter, Front Ditch Slope, d, Geotextile
Min. D=1.5 Ft.
Max. d=1.0 Ft.
Type of Liner= CLASS B RIPRAP
FROM STA. 13+00 TO STA. 17+80 L LT
FROM STA. 13+50 TO STA. 15+00 L RT

DETAIL 6
BANK STABILIZATION
(Not to Scale)
3.0' min., 2.0', NWS, GEOTEXTILE
Type of Liner= CLASS II RIPRAP
FROM STA 19+40 TO STA 19+52 -L- RT

DETAIL 7
FALSE SUMP
(Not to Scale)
Outside Ditch Traffic Flow, 20:1, 10:1, 2', 0.5' Min / 1.0' Max, GI etc., S, ℄ Proposed Ditch
S=Ditch Slope
STA. 15+86 -L- LT

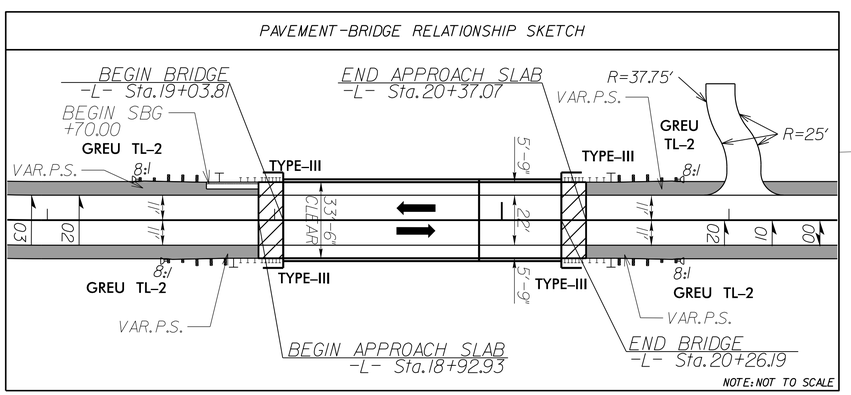
REMOVE ALL PORTIONS OF THE EXISTING CONCRETE FOOTERS ADJACENT TO BOTH STREAMBANKS AND INSTALL BANK STABILIZATION FOLLOWING DETAIL 6. USE IMPERVIOUS DIKE NCDOT STANDARD BMP ALONG WEST STREAMBANK TO REMOVE THE CONCRETE FOOTER AND INSTALL BANK STABILIZATION IN THE DRY. THE PLACEMENT OF THE IMPERVIOUS DIKE IS CONSIDERED INCIDENTAL TO REMOVAL OF THE FOOTER AND INSTALLATION OF THE STREAMBANK.

RETAIN +00.00 EXIST.R/W LT
SPECIAL CUT DITCH SEE DETAIL 2 CLASS B RIP RAP EST 120 TONS EST 190 SY GEOTEXTILE
+92.05 P/L LT
50' TAPER LT & RT
+21.00 (TYP.)
INC. 2%
+50.00 EXIST.R/W RT
+80.00 60' RT
CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE
REMOVE
CUT DITCH SEE DETAIL 8 CLASS B RIP RAP EST 75 TONS EST 220 SY GEOTEXTILE
+35.13 EXIST.R/W RT
SPECIAL CUT DITCH SEE DETAIL 1 CLASS I RIP RAP EST 90 TONS EST 145 SY GEOTEXTILE
REMOVE
+40.00 EXIST.R/W & 80' RT
STANDARD BASE DITCH CLASS I RIP RAP EST 36 TONS EST 53 SY GEOTEXTILE EST DDE = 120 CY SLOPE = 8% SEE DETAIL 4
+10.00 EXIST.R/W & 80' RT
GRADE TO DRAIN
+50.00 EXIST.R/W & 70' RT
CUT DITCH SEE DETAIL 8 CLASS B RIP RAP EST 235 TONS EST 700 SY GEOTEXTILE
BERM DITCH SEE DETAIL 3 CLASS I RIP RAP EST 115 TONS EST 185 SY GEOTEXTILE
BDO
PT Sta. 17+97.37
+97.37 70' LT
TOE PROTECTION SEE DETAIL 5 CLASS B RIP RAP EST 40 TONS EST 120 SY GEOTEXTILE
CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE
BANK STABALIZATION SEE DETAIL 6 CLASS II RIP RAP EST 100 TONS EST 160 SY GEOTEXTILE
CLASS II RIP RAP EST 4 TONS EST 12 SY GEOTEXTILE
CLASS I RIP RAP EST 4 TONS EST 12 SY GEOTEXTILE
PROPOSED GATE
+75.00 45' & 70' LT
+12.04 45' LT
+00.00 45' & 60' LT
SPECIAL CUT DITCH SEE DETAIL 2 CLASS B RIP RAP EST 135 TONS EST 405 SY GEOTEXTILE
+17.04 60' LT
+17.04 45' LT
+50.00 60' LT
+50.00 EXIST.R/W & 45' LT
+75.00 70' RT
+12.04 45' RT
REMOVE 18" RCP-IV
SPECIAL CUT DITCH SEE DETAIL 2 CLASS B RIP RAP EST 110 TONS EST 330 SY GEOTEXTILE
+00.00 45' & 55' RT
+17.04 45' RT
50' TAPER LT & RT
+00.00 45' & 55' RT
+50.00 EXIST.R/W & 45' RT
PC Sta. 23+12.04
POC Sta. 25+17.04
POC Sta. 26+88.02
BL-103
ISBFD
FOR -L- PROFILE, SEE SHEET 5
FOR STRUCTURE PLANS, SEE SHEETS S-1 THRU S-25
ALL DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED

END STATE PROJECT 17BP.5.R.62 -L- POC STA.25+50.00

GEORGE M. DAYE & RACHEL DAYE DB 1033 PG 608
SECOND DISTRICT RELIGIOUS EDUCATIONAL AND CHARITABLE DEVLOPMENT PROJECTS DB 958 PG 513
KATHERINE K KERNS DB 1240 PG 208
FORMOSA LONG CREEK COURT LLC DB 1246 PG 939

PAVEMENT-BRIDGE RELATIONSHIP SKETCH



10/31/2017 5900012_rdy_psh04.dgn USER:Brandon Barham

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	5

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 034407 ENGINEER ANDREW P YOUNG

DocuSigned by: Andrew P. Young EF21D93DD62F4EE 10/31/2017

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 039102 ENGINEER BRANDON T BARHAM

DocuSigned by: Brandon Barham C7A64A4E5D5D400 10/31/2017

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ECOLOGICAL ENGINEERING

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REVISIONS

5/14/99

-L-

BM#3
ELEVATION = 330.00'
N 901356' E 2160234'
BL STATION 5+28.00 56' LEFT
NAIL SET IN 12" SWEETGUM

BM#1
ELEVATION = 269.25'
N 901274' E 2161233'
BL STATION 17+03.00 66' LEFT
NAIL SET IN 20" POPLAR

BM#2
ELEVATION = 298.92'
N 901441' E 2161676'
BL STATION 21+64.00 84' LEFT
NAIL SET IN 20" PINE

BEGIN GRADE
-L- STA 11+00.00
EL. 318.95'

PI = 12+25.00
EL = 315.43'
VC = 250'
K = 63

(-)12.8200%
(-)5.8211%
(-)6.7858%
(-)10.000%
(+)19.33%
(-)6.7858%
(-)11.92%
(+)0.5000%

18" RCP-V

24" RCP-III

BEGIN DITCH LT
STA 11+00 -L-
EL=317.12'

END DITCH LT
STA 12+00 -L-
EL=311.30

BEGIN DITCH LT
STA 15+00 -L-
EL=303.30'

PI =15+70.000
EL= 296.30

END DITCH LT
STA 16+15
EL=305.00'

PI = 16+15.00
EL = 288.96'
VC = 530'
K = 73
V_D = 40 MPH

BEGIN DITCH RT
STA 15+00 -L-
EL=296.95'

END DITCH RT
STA 15+75 -L-
EL=288.00'

BEGIN BRIDGE
-L- STA.19+03.81

END BRIDGE
-L- STA.20+26.19

EXCAVATE TO EL 270' (TYP)

PI = 22+85.00
EL = 292.31'
VC = 300'
K = 85

BEGIN DITCH LT
STA 21+25 -L-
EL=281.00'

(+)10.5000%
(+)12.40%
(+)7.98%
(+)2.97%
(+)14.0%
(+)3.56%
(+)4.0180%

BEGIN DITCH RT
STA 21+08 -L-
EL=282.30'

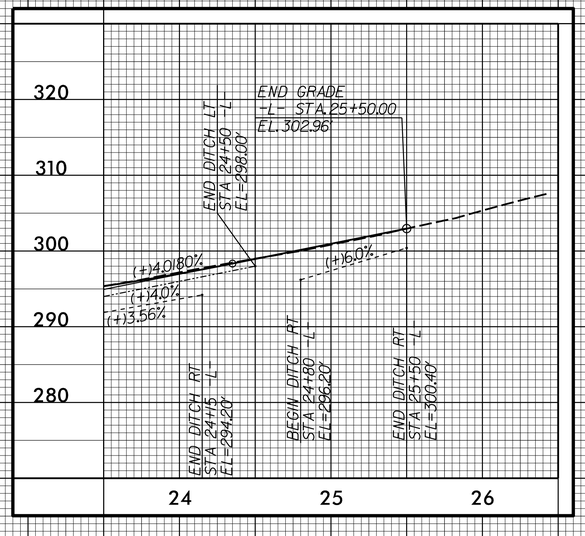
PI=21+50
El.=285.65'

PI=22+50
El.=290.00

PI=23+00
El.=290.11'

END DITCH LT
STA 24+50 -L-
EL=298.00'

END DITCH RT
STA 24+15 -L-
EL=294.20'



BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	= 1800	CFS
DESIGN FREQUENCY	= 25	YR
DESIGN HW ELEVATION	= 270.4	FT
BASE DISCHARGE	= 2615	CFS
BASE FREQUENCY	= 100	YR
BASE HW ELEVATION	= 271.76	FT
OVERTOPPING DISCHARGE	= 24845	CFS
OVERTOPPING FREQUENCY	= 500+	YR
OVERTOPPING ELEVATION	= 290.5	FT
DATE OF SURVEY	= 6/7/2016	
W.S.ELEVATION AT DATE OF SURVEY	= 261.4	FT

DITCH LEGEND

LEFT DITCH ----·----·----

RIGHT DITCH ----------

FOR -L- PLAN VIEW SEE SHEET 4

FOR STRUCTURE PLANS, SEE SHEETS S-1 THRU S-25

330 320 310 300 290 280 270 260 250

11 12 13 14 15 16 17 18 19 20 21 22 23 24

10/31/2017
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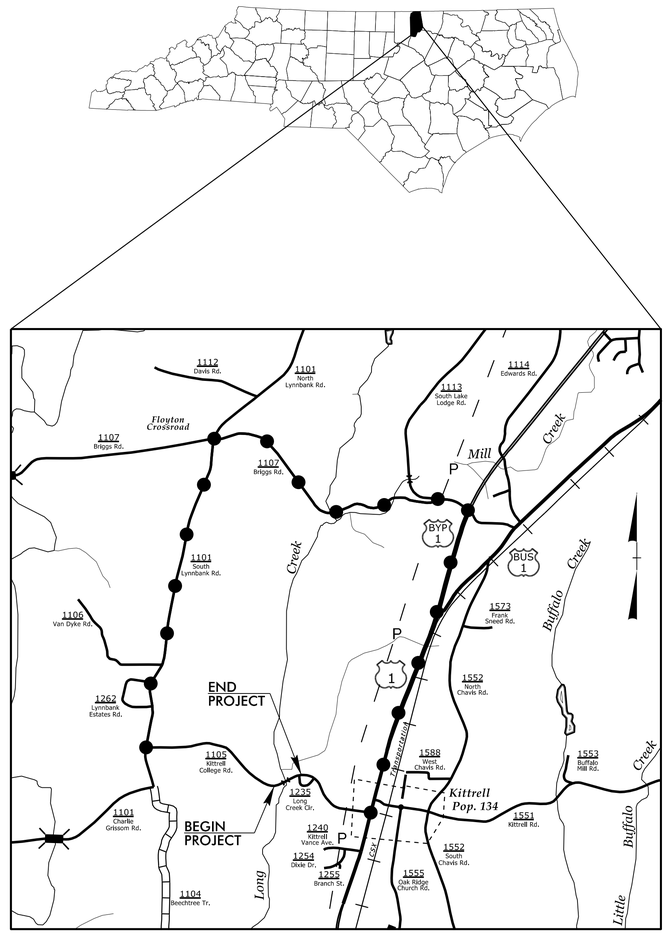
USER:bbarham

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

TRANSPORTATION MANAGEMENT PLAN

VANCE COUNTY



OFF-SITE DETOUR

INDEX OF SHEETS

SHEET NO.	TITLE
TMP-1	TITLE SHEET, VICINITY MAP, AND INDEX OF SHEETS
TMP-1A	LIST OF APPLICABLE ROADWAY STANDARD DRAWINGS, AND LEGEND
TMP-1B	TRANSPORTATION OPERATIONS PLAN: (MANAGEMENT STRATEGIES, GENERAL NOTES, LOCAL NOTES, AND PHASING)
TMP-2	SPECIAL SIGN DESIGN
TMP-3	OFF-SITE DETOUR

SHEET NO.
TMP-1

17BP.5.R.62

TIP PROJECT:



WORK ZONE SAFETY & MOBILITY
"from the MOUNTAINS to the COAST"

N.C.D.O.T. WORK ZONE TRAFFIC CONTROL
1561 MAIL SERVICE CENTER (MSC) RALEIGH, NC 27699-1561
750 N. GREENFIELD PARKWAY, GARNER, NC 27529 (DELIVERY)
PHONE: (919) 773-2800 FAX: (919) 771-2745

ANDY YOUNG, PE — TRAFFIC CONTROL PROJECT ENGINEER
MICHAEL BURNS, PE — TRAFFIC CONTROL DESIGN ENGINEER

DIVISION OF HIGHWAYS ★ STATE OF NORTH CAROLINA ★ DEPARTMENT OF TRANSPORTATION ★ WORK ZONE TRAFFIC CONTROL

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

PLANS PREPARED BY:

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RALEIGH, NC 27601
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Firm License #: C-1051
www.stewartinc.com
PROJECT #:B15001.02

APPROVED: DocuSigned by: Michael S. Burns, Jr. D425C8CC006F437...

DATE: 9/8/2017

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 045230 ENGINEER MICHAEL S. BURNS JR

9/7/2017
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USER:mburns

PROJ. REFERENCE NO.	SHEET NO.
17BP.5.R.62	TMP-1A

ROADWAY STANDARD DRAWINGS

THE FOLLOWING ROADWAY STANDARDS AS SHOWN IN "ROADWAY STANDARD DRAWINGS" - PROJECT SERVICES UNIT - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 2012 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD. NO.	TITLE
1101.03	TEMPORARY ROAD CLOSURES
1101.11	TRAFFIC CONTROL DESIGN TABLES
1110.01	STATIONARY WORK ZONE SIGNS
1130.01	DRUM
1145.01	BARRICADES

LEGEND

GENERAL

- DIRECTION OF TRAFFIC FLOW
- DIRECTION OF PEDESTRIAN TRAFFIC FLOW
- EXIST. PVMT.
- NORTH ARROW
- PROPOSED PVMT.
- TEMP. SHORING (LOCATION PURPOSES ONLY)
- WORK AREA
- REMOVAL

SIGNALS

EXISTING PROPOSED TEMPORARY (TEMP)

PAVEMENT MARKINGS

- EXISTING LINES
- TEMPORARY LINES

TRAFFIC CONTROL DEVICES

- BARRICADE (TYPE III)
- CONE
- DRUM SKINNY DRUM TUBULAR MARKER
- TEMPORARY CRASH CUSHION
- FLASHING ARROW BOARD
- FLAGGER
- LAW ENFORCEMENT
- TRUCK MOUNTED ATTENUATOR (TMA)
- CHANGEABLE MESSAGE SIGN

TEMPORARY SIGNING

- PORTABLE SIGN
- STATIONARY SIGN
- STATIONARY OR PORTABLE SIGN

PAVEMENT MARKERS

- CRYSTAL/CRYSTAL
- CRYSTAL/RED
- YELLOW/YELLOW

PAVEMENT MARKING SYMBOLS

PAVEMENT MARKING SYMBOLS

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Suite 400
Raleigh, NC 27601
T 919.380.8750
www.stewartinc.com

APPROVED: DocuSigned by: Michael S. Burns, Jr. D425C8CC006F437...

DATE: 9/8/2017

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 045230 ENGINEER MICHAEL S. BURNS, JR.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DIVISION OF HIGHWAYS · STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION · WORK ZONE TRAFFIC CONTROL

ROADWAY STANDARD DRAWINGS & LEGEND

9/7/2017
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USER:mburns

PROJ. REFERENCE NO.	SHEET NO.
17BP.5.R.62	TMP-1B

MANAGEMENT STRATEGIES

DURING CONSTRUCTION OF PROPOSED STRUCTURE BRIDGE No. 12 OVER LONG CREEK, SR 1105 (KITTRELL COLLEGE RD) WILL BE CLOSED TO THROUGH TRAFFIC. THROUGH TRAFFIC ON SR 1105 (KITTRELL COLLEGE RD) WILL BE MAINTAINED USING AN OFFSITE DETOUR.

THE OFFSITE DETOUR WILL INCLUDE SR 1101, SR 1107, SR 1113, AND US 1 (SEE SHEET TMP-3).

ACCESS TO ALL RESIDENCES AND BUSINESSES WITHIN THE PROJECT LIMITS MUST BE MAINTAINED AT ALL TIMES.

GENERAL NOTES

CHANGES MAY BE REQUIRED WHEN PHYSICAL DIMENSIONS IN THE DETAIL DRAWINGS, STANDARD DETAILS, AND ROADWAY DETAILS ARE NOT ATTAINABLE TO MEET FIELD CONDITIONS OR RESULT IN DUPLICATE OR UNDESIRED OVERLAPPING OF DEVICES. MODIFICATION MAY INCLUDE: MOVING, SUPPLEMENTING, COVERING, OR REMOVAL OF DEVICES AS DIRECTED BY THE ENGINEER.

THE FOLLOWING GENERAL NOTES APPLY AT ALL TIMES FOR THE DURATION OF THE CONSTRUCTION PROJECT EXCEPT WHEN OTHERWISE NOTED IN THE PLAN OR DIRECTED BY THE ENGINEER.

SIGNING

A) PROVIDE SIGNING AND DEVICES REQUIRED TO CLOSE THE ROAD ACCORDING TO THE ROADWAY STANDARD DRAWINGS AND TRAFFIC CONTROL PLANS.

   PROVIDE SIGNING REQUIRED FOR THE OFF-SITE DETOUR ROUTE AS SHOWN IN THE TRAFFIC CONTROL PLANS.

B) COVER OR REMOVE ALL SIGNS AND DEVICES REQUIRED TO CLOSE THE ROAD WHEN ROAD CLOSURE IS NOT IN OPERATION.

   COVER OR REMOVE ALL SIGNS REQUIRED FOR THE OFF-SITE DETOUR WHEN THE DETOUR IS NOT IN OPERATION.

C) ENSURE ALL NECESSARY SIGNING IS IN PLACE PRIOR TO ALTERING ANY TRAFFIC PATTERN.

LOCAL NOTES

1. NOTIFY THE ENGINEER AT LEAST 30 DAYS PRIOR TO ANY TRAFFIC PATTERN ALTERATION.
2. NOTIFY THE VANCE COUNTY SCHOOLS TRANSPORTATION DIRECTOR OF THE BRIDGE REMOVAL 30 DAYS PRIOR TO ROAD CLOSURE.
3. NOTIFY THE VANCE COUNTY EMERGENCY MANAGEMENT SERVICES DIRECTOR OF BRIDGE REMOVAL 30 DAYS PRIOR TO ROAD CLOSURE.

PHASING

STEP 1:

PROVIDE AND MAINTAIN CHANGEABLE MESSAGE SIGNS AT EACH END OF SR 1105 (KITTRELL COLLEGE RD) FOR FOURTEEN (14) CALENDAR DAYS PRIOR TO ROAD CLOSURE, AS SHOWN ON TMP-3.

STEP 2:

USING RSD 1101.03, SHEET 1 OF 9, SHEETS TMP-2 AND TMP-3, INSTALL ROAD CLOSURE AND DETOUR SIGNS, PLACE TYPE III BARRICADES TO CLOSE SR 1105 (KITTRELL COLLEGE RD) TO THROUGH TRAFFIC, AND DETOUR TRAFFIC OFFSITE. REMOVE CHANGEABLE MESSAGE SIGNS ONCE DETOUR IS IN PLACE.

STEP 3:

REMOVE THE EXISTING STRUCTURE.

STEP 4:

CONSTRUCT THE PROPOSED STRUCTURE AND ROADWAY.

STEP 5:

PLACE FINAL PAVEMENT MARKINGS ACCORDING TO THE PAVEMENT MARKING PLANS.

STEP 6:

OPEN SR 1105 (KITTRELL COLLEGE RD) TO TRAFFIC AND REMOVE ALL WORK ZONE TRAFFIC CONTROL DEVICES.

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421 Fayetteville St,
Suite 400
Raleigh, NC 27601
T 919.380.8750
www.stewartinc.com

APPROVED: DocuSigned by: Michael S. Burns, Jr. D425C8CC006F437...

DATE: 9/8/2017

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 045230 ENGINEER MICHAEL S. BURNS JR

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION WORK ZONE TRAFFIC CONTROL

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TRANSPORTATION OPERATIONS PLAN

9/7/2017
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USER:mburns

PROJ. REFERENCE NO.	SHEET NO.
17BP.5.R.62	TMP-2

SIGN NUMBER: SIGN-1
TYPE: STATIONARY
QUANTITY: SEE PLANS

SIGN WIDTH: 3′-4″
HEIGHT: 3′-0″
TOTAL AREA: 10.0 Sq.Ft.

BORDER TYPE: INSET
RECESS: 0.38″
WIDTH: 0.5″
RADII: 1.5″

NO. Z BARS:
LENGTH:

BACKG COLOR: Fluorescent Orange
COPY COLOR: Black

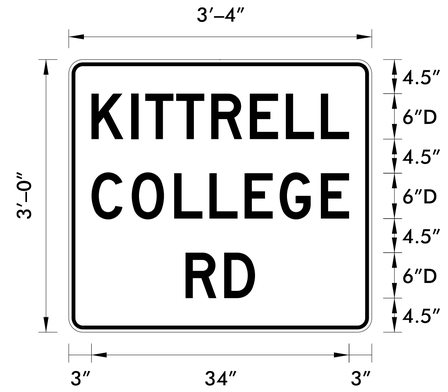
SYMBOL	X	Y	WID	HT

MAT'L: 0.080″ (2.0 mm) ALUMINUM

USE NOTES: 1,2

1. Legend and border shall be direct applied black non-reflective sheeting.
2. Background shall be NC GRADE B fluorescent orange retroreflective sheeting.

DESIGN BY: Michael Burns, PE
PROJECT ID: 17BP.5.R.62
CHECKED BY: Andy Young, PE
LOCATION: Vance County
Mar 13, 2017
DIV: 5



BORDER
R=1.5″
TH=0.5″
IN=0.38″

Panel Style: Traffic Control.ssi
M.U.T.C.D.: 2009 Edition

Spacing Factor is 1 unless specified otherwise

LETTER POSITIONS

Letter locations are panel edge to lower left corner

																									Series/Size Text Length
	K	I	T	T	R	E	L	L																	D 2000
	3	8.2	10.1	14.2	18.8	23.9	28.7	33.3																	34
	C	O	L	L	E	G	E																		D 2000
	3	8.3	13.9	18.6	23.2	27.9	33.3																		34
	R	D																							D 2000
	15.4	20.5																							9.2

FILENAME: 900012_TC_TMP_02

NORTH CAROLINA D.O.T. SIGN DETAIL

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

APPROVED: DocuSigned by: Michael S. Burns, Jr. D425CBCC006F437...
DATE: 9/8/2017
SEAL
NORTH CAROLINA PROFESSIONAL SEAL 045230 ENGINEER MICHAEL S. BURNS, JR.

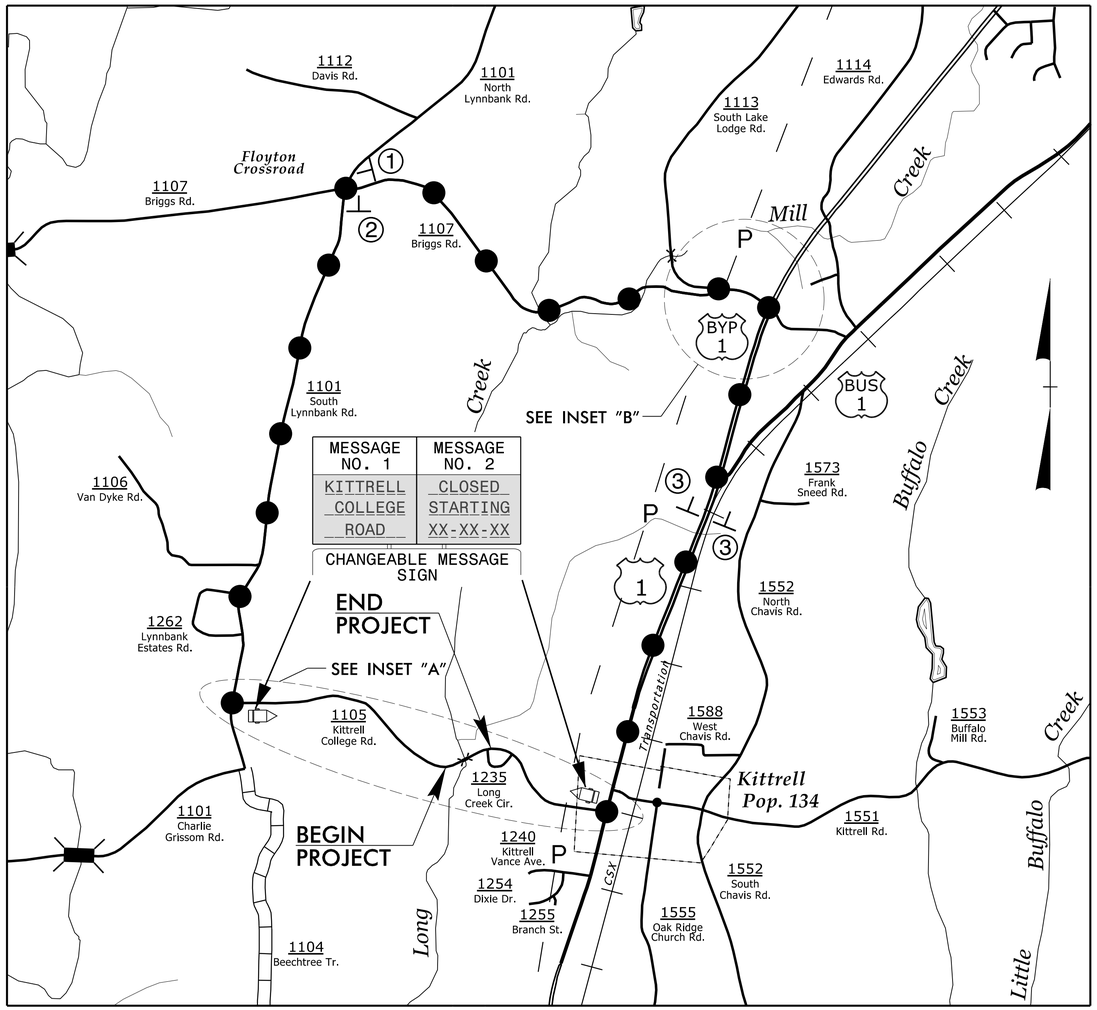
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DIVISION OF HIGHWAYS · STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION · WORK ZONE TRAFFIC CONTROL

SPECIAL SIGN DESIGN

9/7/2017
...\TCP\900012_TC_TMP_02.dgn
USER:mburns

PROJ. REFERENCE NO.	SHEET NO.
17BP.5.R.62	TMP-3



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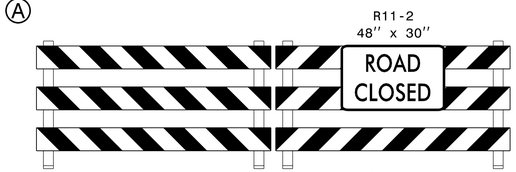

TYPE III BARRICADE(S)

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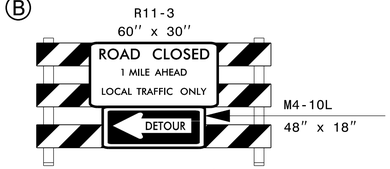

TYPE III BARRICADE

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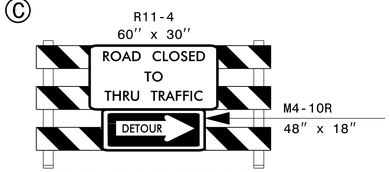

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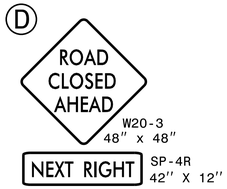

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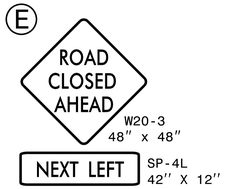

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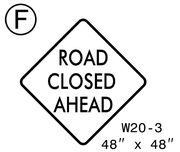

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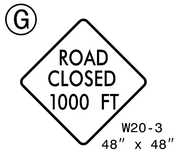

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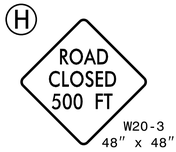

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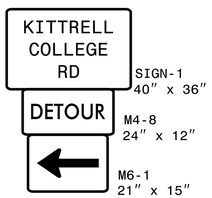

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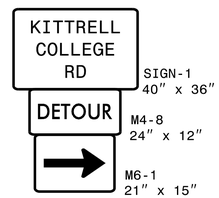

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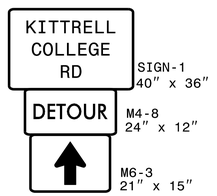

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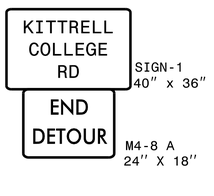
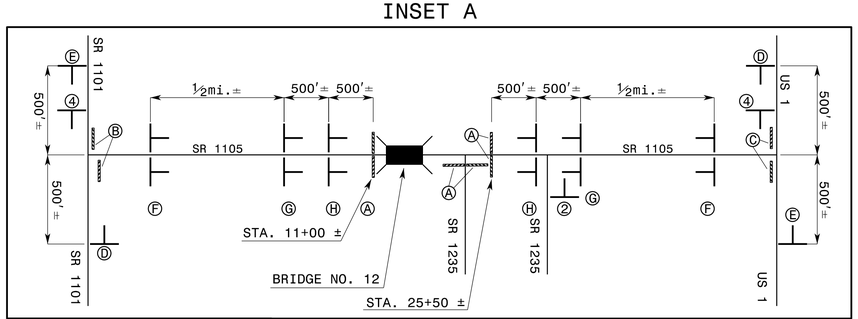
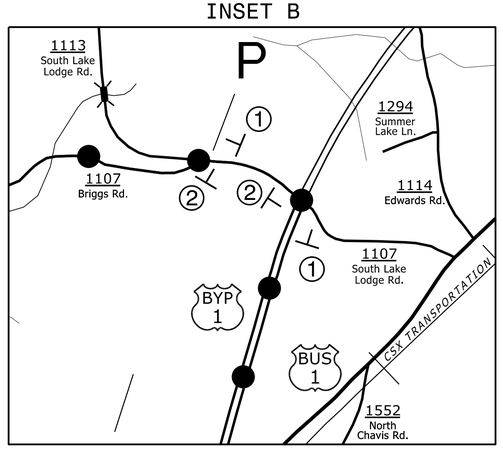


INSET A



REFER TO ROADWAY STANDARD DRAWING 1101.03, SHEET 1 OF 9 FOR APPLICABLE NOTES.

INSET B



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STEWART

APPROVED: DocuSigned by: Michael S. Burns, Jr. D425CBCC006F437...

DATE: 9/8/2017

SEAL

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 045230 MICHAEL S. BURNS, JR.

DIVISION OF HIGHWAYS · STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION · WORK ZONE TRAFFIC CONTROL

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

OFF-SITE DETOUR

9/7/2017
...\TCP\90002_TC_TMP_03.dgn
USER:mburns

TIP: 17BP.5.R.62

CONTRACT: DE00208

TIP NO.	SHEET NO.
17BP.5.R.62	PMP-1

APPROVED: DocuSigned by: Michael S. Burns, Jr. D425C8CC006F437...

DATE: 10/31/2017

SEAL:

NORTH CAROLINA PROFESSIONAL SEAL 045230 ENGINEER MICHAEL S. BURNS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKING PLAN

VANCE COUNTY

LOCATION: BRIDGE NO. 12 OVER LONG CREEK ON SR 1105 (KITTRELL COLLEGE RD.)

ROADWAY STANDARD DRAWING

THE FOLLOWING ROADWAY STANDARDS AS APPEAR IN "ROADWAY STANDARD DRAWINGS" - PROJECT SERVICES UNIT - N.C. DEPARTMENT OF TRANSPORTATION - RALEIGH, N.C., DATED JANUARY 2012 ARE APPLICABLE TO THIS PROJECT AND BY REFERENCE HEREBY ARE CONSIDERED A PART OF THESE PLANS:

STD. NO.	TITLE
1205.01	PAVEMENT MARKINGS - LINE TYPES AND OFFSETS
1205.02	PAVEMENT MARKINGS - TWO-LANE AND MULTILANE ROADWAYS
1205.12	PAVEMENT MARKINGS - BRIDGES
1250.01	RAISED PAVEMENT MARKERS - INSTALLATION SPACING
1251.01	RAISED PAVEMENT MARKERS - PERMANENT AND TEMPORARY
1261.01	GUARDRAIL AND BARRIER DELINEATORS - INSTALLATION SPACING
1261.02	GUARDRAIL AND BARRIER DELINEATORS - TYPES AND MOUNTING
1262.01	GUARDRAIL END DELINEATION

PAVEMENT MARKING SCHEDULE

SYMBOL	DESCRIPTION
P8	PAINT 2 FT. - 6 FT./SP WHITE MINISKIP (4") X2
PA	PAINT WHITE EDGELINE (4") X2
PI	PAINT YELLOW DOUBLE CENTER (4") X2
MA	YELLOW & YELLOW, PERMANENT RAISED PAVEMENT MARKERS

GENERAL NOTES

THE FOLLOWING GENERAL NOTES APPLY AT ALL TIMES FOR THE DURATION OF THE CONSTRUCTION PROJECT, EXCEPT WHEN OTHERWISE NOTED IN THE PLAN, OR DIRECTED BY THE ENGINEER.

A) INSTALL PAVEMENT MARKINGS AND PAVEMENT MARKERS ON THE FINAL SURFACE AS FOLLOWS:

ROAD NAME	MARKING	MARKER
KITTRELL COLLEGE RD	PAINT	RAISED

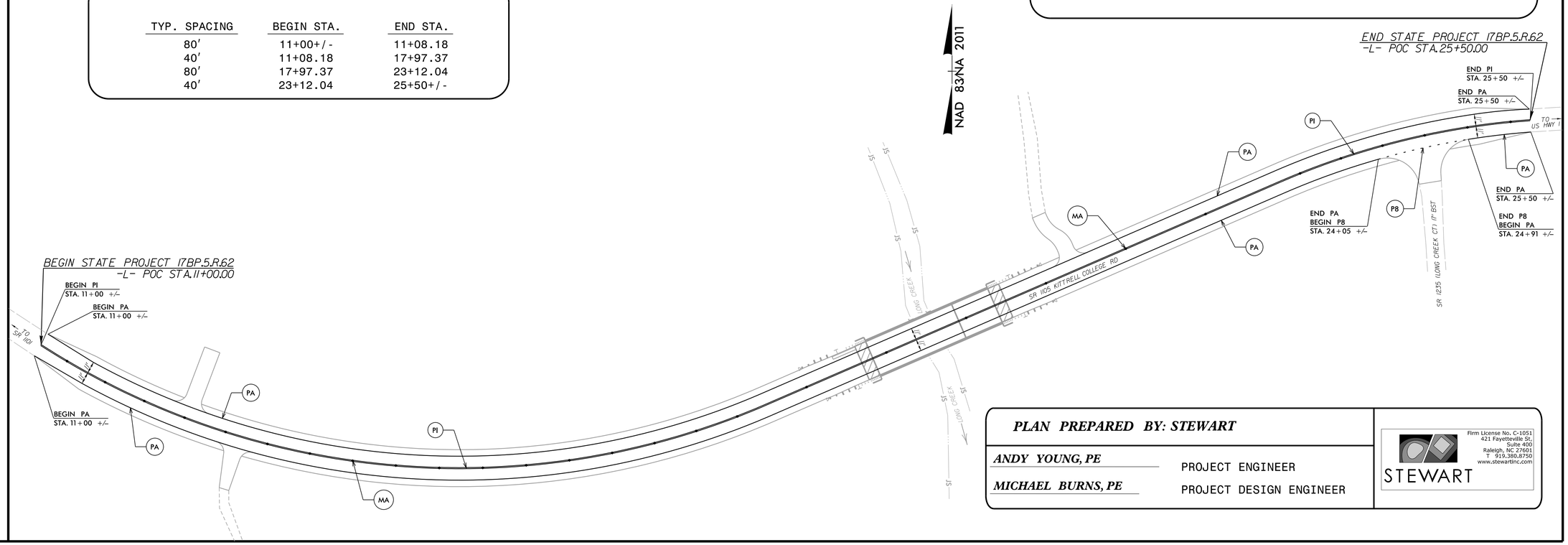
B) PLACE TWO APPLICATIONS OF PAINT PAVEMENT MARKINGS ON THE FINAL WEARING SURFACE. PLACE THE SECOND APPLICATION OF PAINT UPON SUFFICIENT DRYING TIME OF THE FIRST.

C) TIE PROPOSED PAVEMENT MARKING LINES TO EXISTING PAVEMENT MARKING LINES.

D) REMOVE/REPLACE ANY CONFLICTING/DAMAGED PAVEMENT MARKINGS.

RAISED PAVEMENT MARKERS

TYP. SPACING	BEGIN STA.	END STA.
80'	11+00+/-	11+08.18
40'	11+08.18	17+97.37
80'	17+97.37	23+12.04
40'	23+12.04	25+50+/-



PLAN PREPARED BY: STEWART	
ANDY YOUNG, PE	PROJECT ENGINEER
MICHAEL BURNS, PE	PROJECT DESIGN ENGINEER

STEWART
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10/31/2017
I:\TIP\900012_TC_PMP_01.dgn
USER:mburns

TIP PROJECT: 17BP.5.R.62

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.5.R.62	EC-1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PLAN FOR PROPOSED
HIGHWAY EROSION CONTROL

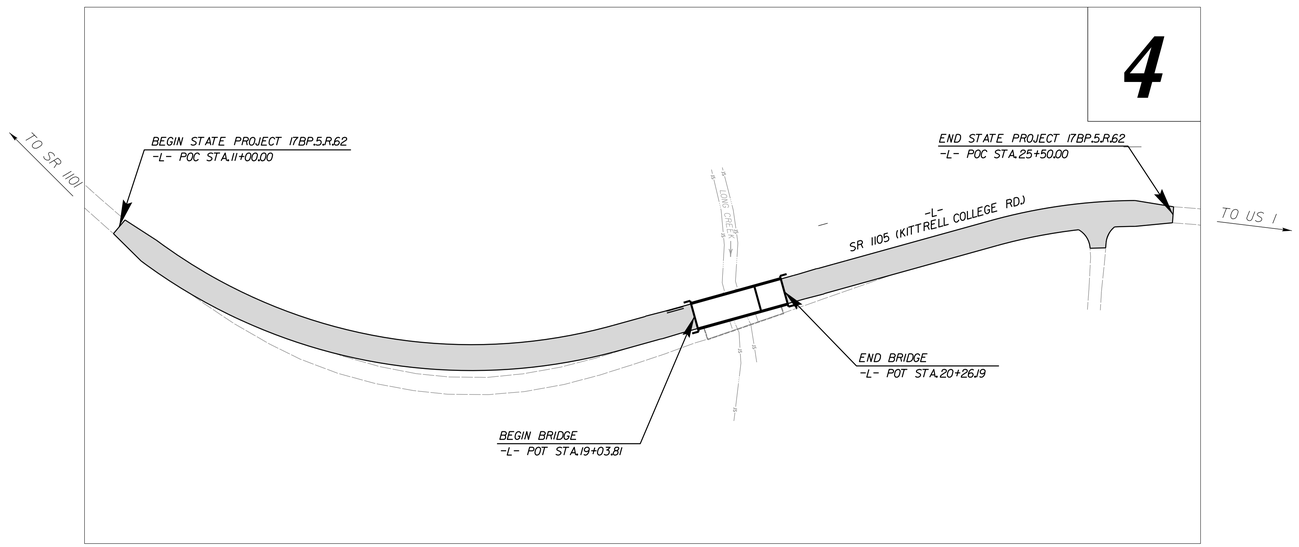
VANCE COUNTY

BRIDGE NO. 12 OVER LONG CREEK
ON SR 1105 (KITTRELL COLLEGE RD.)

GRADING, DRAINAGE, PAVING, AND STRUCTURE

NAD 83/NA 2011

4



EROSION AND SEDIMENT CONTROL MEASURES

Std. #	Description	Symbol
1630.03	Temporary Silt Ditch	TSD
1630.05	Temporary Diversion	TD
1605.01	Temporary Silt Fence	
1606.01	Special Sediment Control Fence	
1622.01	Temporary Berms and Slope Drains	
1630.02	Silt Basin Type B	
1633.01	Temporary Rock Silt Check Type-A	
	Temporary Rock Silt Check Type-A with Matting and Polyacrylamide (PAM)	
1633.02	Temporary Rock Silt Check Type-B	
	Wattle / Coir Fiber Wattle	EW CFW
	Wattle / Coir Fiber Wattle with Polyacrylamide (PAM)	
1634.01	Temporary Rock Sediment Dam Type-A	
1634.02	Temporary Rock Sediment Dam Type-B	
1635.01	Rock Pipe Inlet Sediment Trap Type-A	
1635.02	Rock Pipe Inlet Sediment Trap Type-B	
1630.04	Stilling Basin	
1630.06	Special Stilling Basin	
	Rock Inlet Sediment Trap:	
1632.01	Type A	A
1632.02	Type B	B
1632.03	Type C	C
	Skimmer Basin	
	Tiered Skimmer Basin	
	Infiltration Basin	

THIS PROJECT CONTAINS EROSION CONTROL PLANS FOR CLEARING AND GRUBBING PHASE OF CONSTRUCTION.

THIS PROJECT HAS BEEN DESIGNED TO SENSITIVE WATERSHED STANDARDS.

ENVIRONMENTALLY SENSITIVE AREA(S) EXIST ON THIS PROJECT

Refer To E. C. Special Provisions for Special Considerations.

GRAPHIC SCALE

25 0 50
PLANS

25 0 50
PROFILE (HORIZONTAL)

5 0 10
PROFILE (VERTICAL)

THESE EROSION AND SEDIMENT CONTROL PLANS COMPLY WITH THE REGULATIONS SET FORTH BY THE NCG-010000 GENERAL CONSTRUCTION PERMIT EFFECTIVE AUGUST 3, 2011 AND ISSUED BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES DIVISION OF WATER RESOURCES.

Prepared in the Office of:

ECOLOGICAL ENGINEERING

NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

Designed by:

BRANDON BARHAM ***3368***
NAME LEVEL III CERTIFICATION NO.

Reviewed in the Office of:

ROADSIDE ENVIRONMENTAL UNIT
1 South Wilmington St.
Raleigh, NC 27611

2012 STANDARD SPECIFICATIONS

Reviewed by:

AARON HARPER

Roadway Standard Drawings

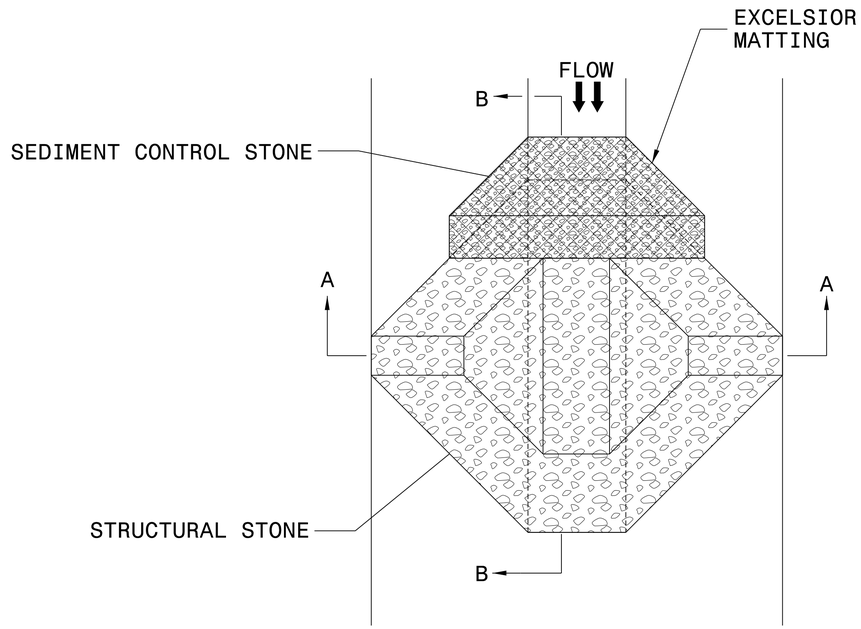
The following roadway english standards as appear in "Roadway Standard Drawings"– Roadway Design Unit – N. C. Department of Transportation – Raleigh, N. C., dated January 2012 and the latest revison thereto are applicable to this project and by reference hereby are considered a part of these plans.

1604.01	*Railroad Erosion Control Detail*	1632.01	*Rock Inlet Sediment Trap Type A*
1605.01	*Temporary Silt Fence*	1632.02	*Rock Inlet Sediment Trap Type B*
1606.01	*Special Sediment Control Fence*	1632.03	*Rock Inlet Sediment Trap Type C*
1607.01	*Gravel Construction Entrance*	1633.01	*Temporary Rock Silt Check Type A*
1622.01	*Temporary Berms and Slope Drains*	1633.02	*Temporary Rock Silt Check Type B*
1630.01	*Riser Basin*	1634.01	*Temporary Rock Sediment Dam Type A*
1630.02	*Silt Basin Type B*	1634.02	*Temporary Rock Sediment Dam Type B*
1630.03	*Temporary Silt Ditch*	1635.01	*Rock Pipe Inlet Sediment Trap Type A*
1630.04	*Stilling Basin*	1635.02	*Rock Pipe Inlet Sediment Trap Type B*
1630.05	*Temporary Diversion*	1640.01	*Coir Fiber Baffle*
1630.06	*Special Stilling Basin*	1645.01	*Temporary Stream Crossing*
1631.01	*Matting Installation*		

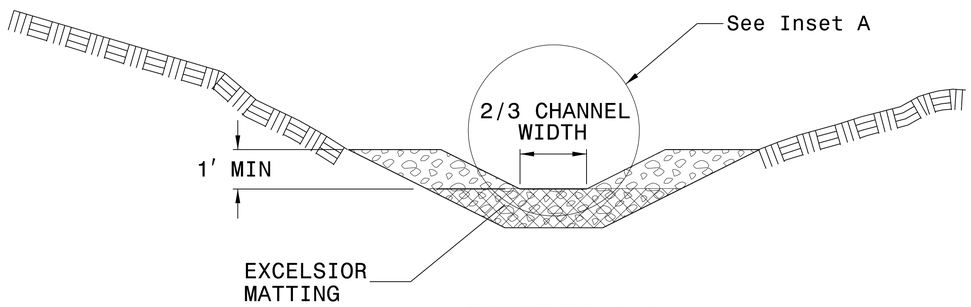
10/27/2017
USER: rcox
PLOT: 9/8/2012 - REU, tsh.dgn

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	EC-2
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

TEMPORARY ROCK SILT CHECK TYPE 'A' WITH EXCELSIOR MATTING AND POLYACRYLAMIDE (PAM)



PLAN



SECTION A-A

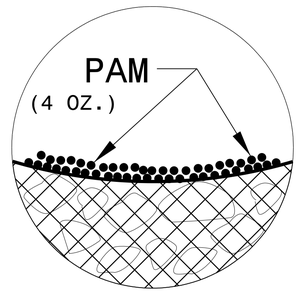
NOTES:

INSTALL TEMPORARY ROCK SILT CHECK TYPE A IN ACCORDANCE WITH ROADWAY STANDARD DRAWING NO. 1633.01.

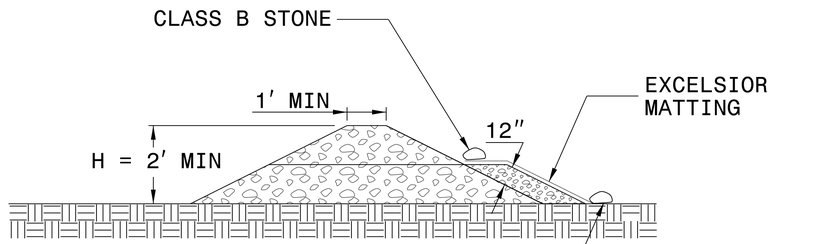
USE EXCELSIOR FOR MATTING MATERIAL AND ANCHOR MATTING SECTION AT TOP AND BOTTOM WITH CLASS B STONE.

PRIOR TO POLYACRYLAMIDE (PAM) APPLICATION, OBTAIN A SOIL SAMPLE FROM PROJECT LOCATION, AND FROM OFFSITE MATERIAL, AND ANALYZE FOR APPROPRIATE PAM FLOCCULANT TO BE APPLIED TO EACH ROCK SILT CHECK.

INITIALLY APPLY 4 OUNCES OF POLYACRYLAMIDE (PAM) TO TOP OF MATTING SECTION AND AFTER EVERY RAINFALL EVENT THAT EQUALS OR EXCEEDS 0.50 INCHES.



INSET A



SECTION B-B

NOT TO SCALE

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	EC-3
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

SOIL STABILIZATION SUMMARY SHEET

MATTING FOR EROSION CONTROL

CONST SHEET NO.	LINE	FROM STATION	TO STATION	SIDE	ESTIMATE (SY)
4	-L-	13+00	17+50	LT	600
4	-L-	13+50	15+00	RT	250
			SUBTOTAL		850
MISCELLANEOUS MATTING TO BE INSTALLED AS DIRECTED BY THE ENGINEER					0
				TOTAL	850
				SAY	950

PERMANENT SOIL REINFORCEMENT MAT

CONST SHEET NO.	LINE	FROM STATION	TO STATION	SIDE	ESTIMATE (SY)
4					
			SUBTOTAL		
		ADDITIONAL PSRM TO BE INSTALLED			
				TOTAL	
				SAY	

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	EC-3A
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

SOIL STABILIZATION TIMEFRAMES

SITE DESCRIPTION	STABILIZATION TIME	TIMEFRAME EXCEPTIONS
PERIMETER DIKES, SWALES, DITCHES AND SLOPES	7 DAYS	NONE
HIGH QUALITY WATER (HQW) ZONES	7 DAYS	NONE
SLOPES STEEPER THAN 3:1	7 DAYS	IF SLOPES ARE 10' OR LESS IN LENGTH AND ARE NOT STEEPER THAN 2:1, 14 DAYS ARE ALLOWED.
SLOPES 3:1 OR FLATTER	14 DAYS	7 DAYS FOR SLOPES GREATER THAN 50' IN LENGTH.
ALL OTHER AREAS WITH SLOPES FLATTER THAN 4:1	14 DAYS	NONE, EXCEPT FOR PERIMETERS AND HQW ZONES.

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	EC-04/CONST.04
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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REVISIONS 5/14/19

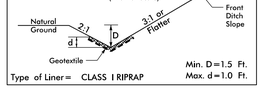
NAD 83/NA 2011

ENVIRONMENTALLY SENSITIVE AREA
SEE PROJECT SPECIAL PROVISIONS

REMOVE ALL PORTIONS OF THE EXISTING CONCRETE FOOTERS ADJACENT TO BOTH STREAMBANKS AND INSTALL BANK STABILIZATION FOLLOWING DETAIL 6, USE IMPERVIOUS DIKE NCDOT STANDARD BMP ALONG WEST STREAMBANK TO REMOVE THE CONCRETE FOOTER AND INSTALL BANK STABILIZATION IN THE DRY. THE PLACEMENT OF THE IMPERVIOUS DIKE IS CONSIDERED INCIDENTAL TO REMOVAL OF THE FOOTER AND INSTALLATION OF THE STREAMBANK.

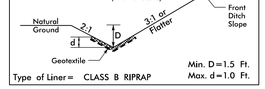
CLEARING AND GRUBBING
EROSION CONTROL FOR
CONSTRUCTION SHEET 04

DETAIL 1
SPECIAL CUT DITCH
(Not to Scale)



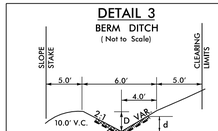
Min. D=1.5 Ft.
Max. d=1.0 Ft.
Type of Liner= CLASS I RIPRAP
FROM STA 15+00 TO STA 15+75 L RT

DETAIL 2
SPECIAL CUT DITCH
(Not to Scale)



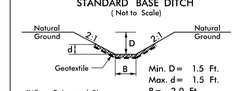
Min. D=1.5 Ft.
Max. d=1.0 Ft.
Type of Liner= CLASS B RIPRAP
FROM STA 11+00 TO STA 12+00 L LT
FROM STA 21+08 TO STA 25+50 L RT
FROM STA 21+25 TO STA 24+50 L LT

DETAIL 3
BERM DITCH
(Not to Scale)



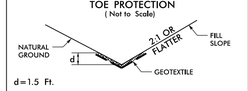
Min. D=1.5 Ft.
Max. d=1.0 Ft.
Type of Liner= CLASS I RIPRAP
FROM STA 15+00 TO STA 16+15 L LT

DETAIL 4
STANDARD BASE DITCH
(Not to Scale)



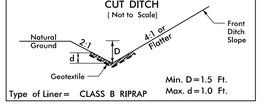
Min. D= 1.5 Ft.
Max. d= 1.5 Ft.
B= 2.0 Ft.
*When B is < 6.0'
Type of Liner= CLASS I RIPRAP
STA 15+73 L RT

DETAIL 5
TOE PROTECTION
(Not to Scale)



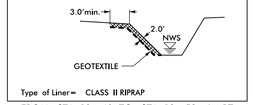
d=1.5 Ft.
Type of Liner= CLASS B RIPRAP
FROM STA 17+85 TO STA 19+00 L LT

DETAIL 8
CUT DITCH
(Not to Scale)



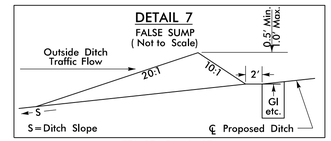
Min. D=1.5 Ft.
Max. d=1.0 Ft.
Type of Liner= CLASS B RIPRAP
FROM STA. 13+00 TO STA. 17+80 L LT
FROM STA. 13+50 TO STA. 15+00 L RT

DETAIL 6
BANK STABILIZATION
(Not to Scale)



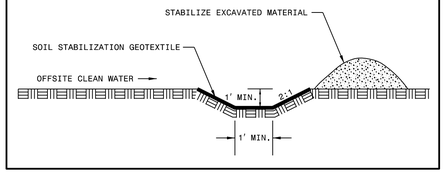
Type of Liner= CLASS II RIPRAP
FROM STA 19+40 TO STA 19+52 –L– RT

DETAIL 7
FALSE SUMP
(Not to Scale)

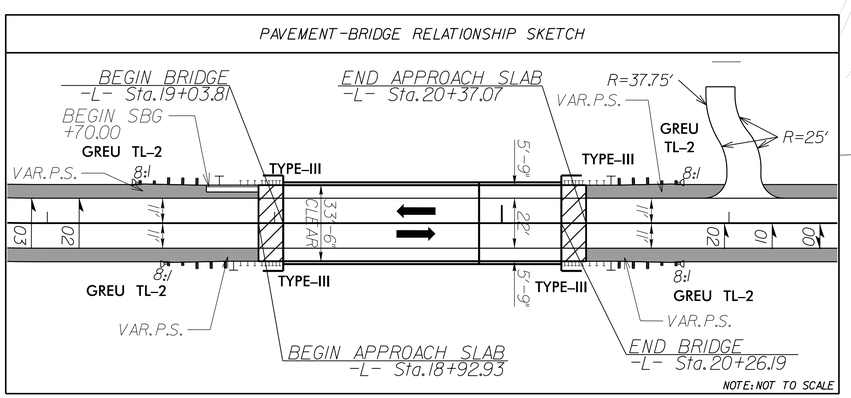


STA. 15+86 –L– LT

CLEAN WATER DIVERSION
CWD CWD CWD CWD CWD CWD
(Not to Scale)



PAVEMENT–BRIDGE RELATIONSHIP SKETCH



NOTE: NOT TO SCALE

FOR -L- PROFILE, SEE SHEET 5

FOR STRUCTURE PLANS, SEE SHEETS S-1 THRU S-25

10/27/2017
C:\Projects\9000012.REU.EC.CG.dgn
USER: Brad.Hunt

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	EC-05/CONST.05
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

NC FIRM LICENSE No: P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 567-0935
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

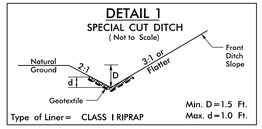
REVISIONS

5/14/99

NAD 83/NA 2011

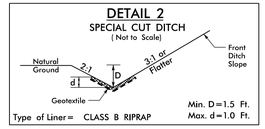
REMOVE ALL PORTIONS OF THE EXISTING CONCRETE FOOTERS ADJACENT TO BOTH STREAMBANKS AND INSTALL BANK STABILIZATION FOLLOWING DETAIL 6. USE IMPERVIOUS DIKE NCDOT STANDARD BMP ALONG WEST STREAMBANK TO REMOVE THE CONCRETE FOOTER AND INSTALL BANK STABILIZATION IN THE DRY. THE PLACEMENT OF THE IMPERVIOUS DIKE IS CONSIDERED INCIDENTAL TO REMOVAL OF THE FOOTER AND INSTALLATION OF THE STREAMBANK.

DETAIL 1
SPECIAL CUT DITCH
(Not to Scale)



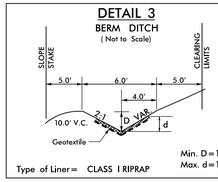
Min. D=1.5 Ft.
Max. d=1.0 Ft.
Type of Liner= CLASS I RIPRAP
FROM STA 15+00 TO STA 15+75 L RT

DETAIL 2
SPECIAL CUT DITCH
(Not to Scale)



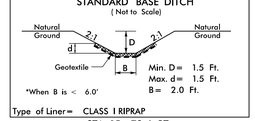
Min. D=1.5 Ft.
Max. d=1.0 Ft.
Type of Liner= CLASS B RIPRAP
FROM STA 11+00 TO STA 12+00 L LT
FROM STA 21+08 TO STA 25+50 L RT
FROM STA 21+25 TO STA 24+50 L LT

DETAIL 3
BERM DITCH
(Not to Scale)



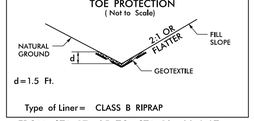
Min. D=1.5 Ft.
Max. d=1.0 Ft.
Type of Liner= CLASS I RIPRAP
FROM STA 15+00 TO STA 16+15 L LT

DETAIL 4
STANDARD BASE DITCH
(Not to Scale)



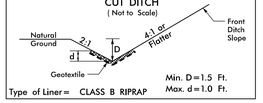
Min. D= 1.5 Ft.
Max. d= 1.5 Ft.
B= 2.0 Ft.
*When B is < 6.0'
Type of Liner= CLASS I RIPRAP
STA 15+73 L RT

DETAIL 5
TOE PROTECTION
(Not to Scale)



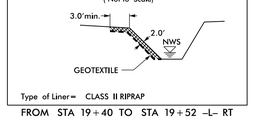
d=1.5 Ft.
Type of Liner= CLASS B RIPRAP
FROM STA 17+85 TO STA 19+00 L LT

DETAIL 8
CUT DITCH
(Not to Scale)



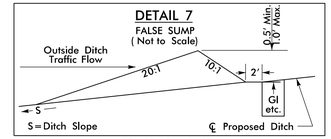
Min. D=1.5 Ft.
Max. d=1.0 Ft.
Type of Liner= CLASS B RIPRAP
FROM STA. 13+00 TO STA. 17+80 L LT
FROM STA. 13+50 TO STA. 15+00 L RT

DETAIL 6
BANK STABILIZATION
(Not to Scale)



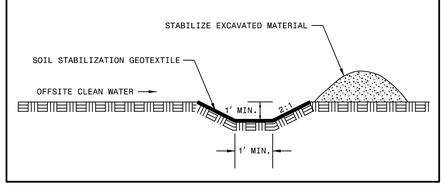
Type of Liner= CLASS II RIPRAP
FROM STA 19+40 TO STA 19+52 –L– RT

DETAIL 7
FALSE SUMP
(Not to Scale)

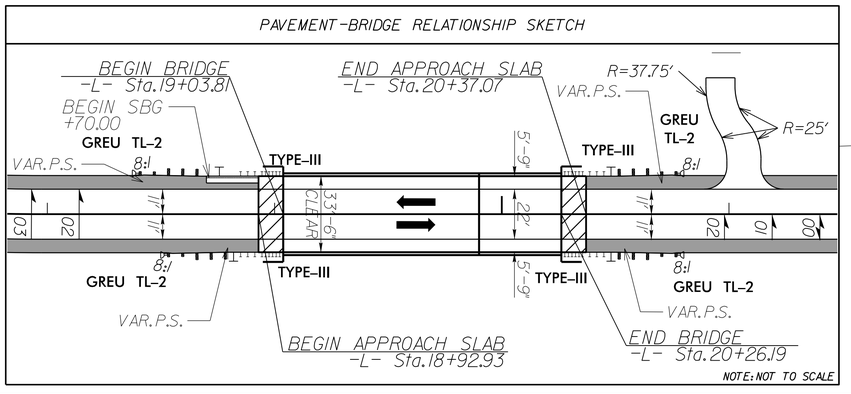


S=Ditch Slope
STA. 15+86 –L– LT

CLEAN WATER DIVERSION
CWD CWD CWD CWD CWD CWD
(Not to Scale)



PAVEMENT-BRIDGE RELATIONSHIP SKETCH



1
GEORGE W DAYE
DB 461 PG 266
PB S PG 7
+00.00
EXIST.R/W LT
RETAIN
ISFD
WOODS
SPECIAL CUT DITCH
SEE DETAIL 2
CLASS B RIP RAP
EST 120 TONS
EST 190 SY GEOTEXTILE
+92.05
P/L LT
+21.00
50' TAPER LT & RT
+80.00
EXIST.R/W & 60' LT
CLASS B RIP RAP
EST 2 TONS
EST 7 SY GEOTEXTILE
REMOVE
PUE
2
GEORGE W DAYE
DB 1033 PG 608
PB W PG 922
CUT DITCH
SEE DETAIL 8
CLASS B RIP RAP
EST 75 TONS
EST 220 SY GEOTEXTILE
+35.13
EXIST.R/W RT
SPECIAL CUT DITCH
SEE DETAIL 1
CLASS I RIP RAP
EST 90 TONS
EST 145 SY GEOTEXTILE
REMOVE
+40.00
EXIST.R/W & 80' LT
STANDARD BASE DITCH
CLASS I RIP RAP
EST 36 TONS
EST 53 SY GEOTEXTILE
EST DDE = 120 CY
SLOPE = 8%
SEE DETAIL 4
+10.00
EXIST.R/W & 80' LT
GRADE TO DRAIN
+50.00
EXIST.R/W & 70' RT
3
SECOND DISTRICT RELIGIOUS EDUCATIONAL AND CHARITABLE DEVLOPMENT PROJECTS
DB 958 PG 513
CWD
CWD
CWD

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.5.R.62	RF-1	
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	

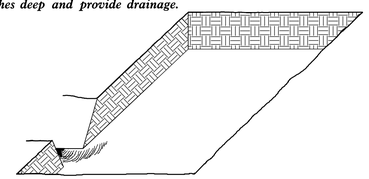
PLANTING DETAILS

SEEDLING / LINER BAREROOT PLANTING DETAIL

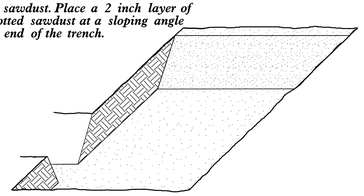
HEALING IN

1. Locate a healing–in site in a shady, well protected area.

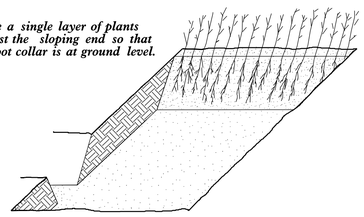
2. Excavate a flat bottom trench 12 inches deep and provide drainage.



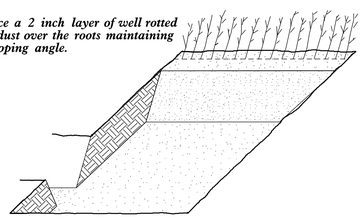
3. Backfill the trench with 2 inches well rotted sawdust. Place a 2 inch layer of well rotted sawdust at a sloping angle at one end of the trench.



4. Place a single layer of plants against the sloping end so that the root collar is at ground level.

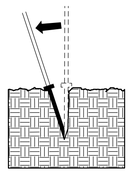


5. Place a 2 inch layer of well rotted sawdust over the roots maintaining a sloping angle.

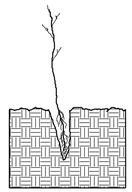


6. Repeat layers of plants and sawdust as necessary and water thoroughly.

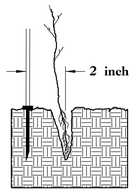
DIBBLE PLANTING METHOD
USING THE KBC PLANTING BAR



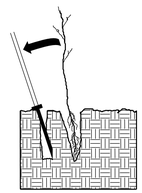
1. Insert planting bar as shown and pull handle toward planter.



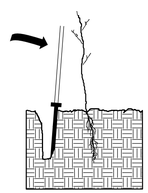
2. Remove planting bar and place seedling at correct depth.



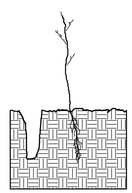
3. Insert planting bar 2 inches toward planter from seedling.



4. Pull handle of bar toward planter, firming soil at bottom.



5. Push handle forward firming soil at top.



6. Leave compaction hole open. Water thoroughly.

PLANTING NOTES:

PLANTING BAG
During planting, seedlings shall be kept in a moist canvas bag or similar container to prevent the root systems from drying.



KBC PLANTING BAR
Planting bar shall have a blade with a triangular cross section, and shall be 12 inches long, 4 inches wide and 1 inch thick at center.



ROOT PRUNING
All seedlings shall be root pruned, if necessary, so that no roots extend more than 10 inches below the root collar.

REFORESTATION

☐ *TREE REFORESTATION SHALL BE PLANTED 6 FT. TO 10 FT. ON CENTER, RANDOM SPACING, AVERAGING 8 FT. ON CENTER, APPROXIMATELY 680 PLANTS PER ACRE.*

REFORESTATION

MIXTURE, TYPE, SIZE, AND FURNISH SHALL CONFORM TO THE FOLLOWING:

25%	*LIRIODENDRON TULIPIFERA*	*TULIP POPLAR*	*12 in – 18 in BR*
25%	*PLATANUS OCCIDENTALIS*	*AMERICAN SYCAMORE*	*12 in – 18 in BR*
25%	*FRAXINUS PENNSYLVANICA*	*GREEN ASH*	*12 in – 18 in BR*
25%	*BETULA NIGRA*	*RIVER BIRCH*	*12 in – 18 in BR*

REFORESTATION DETAIL SHEET

N.C.D.O.T. - ROADSIDE ENVIRONMENTAL UNIT

09/08/99

TIP PROJECT: 17BP.5.R.62

CONTRACT:

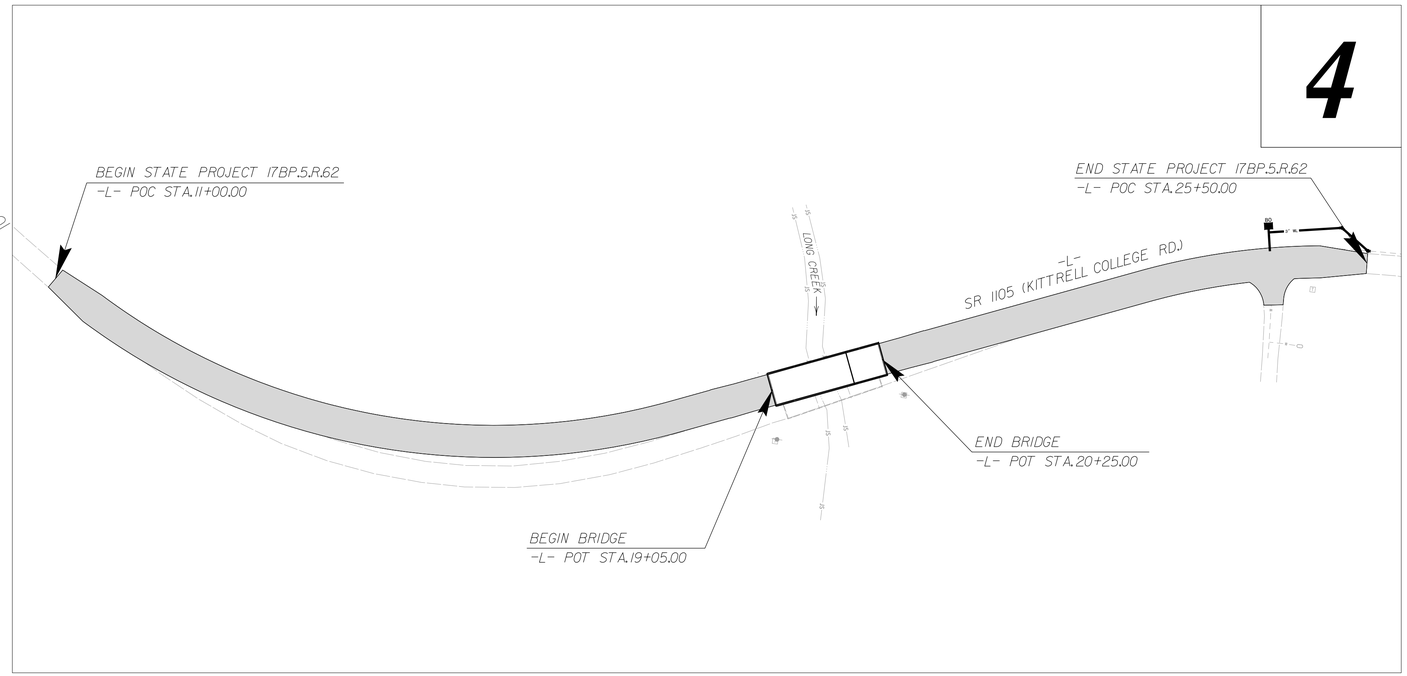
T.I.P. NO.	SHEET NO.
17BP.5.R.62	UC–1

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

UTILITY CONSTRUCTION PLANS
VANCE COUNTY

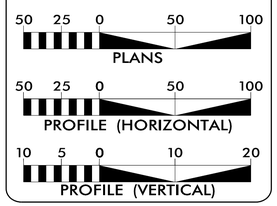
LOCATION: BRIDGE NO. 12 OVER LONG CREEK ON SR 1105 (KITTRELL COLLEGE RD.)

TYPE OF WORK: PERMANENT WATER RELOCATION



DOCUMENT NOT CONSIDERED FINAL UNTIL ALL SIGNATURES ARE COMPLETED

GRAPHIC SCALES



INDEX OF SHEETS

SHEET NO.:	*DESCRIPTION:*
UC–1	*TITLE SHEET*
UC–2	*UTILITY SYMBOLOGY*
UC–3	*DETAIL SHEET*
UC–4	*UTILITY CONSTRUCTION PLAN SHEET (WATER)*

UTILITY OWNERS WITH CONFLICTS

(A) KITTRELL WATER ASSOCIATION – WATER

PREPARED IN THE OFFICE OF

STEWART
421 FAYETTEVILLE ST, STE 400
RALEIGH, NC 27601
T 919.380.8750
Firm License # C-1251
www.stewartinc.com
PROJECT # 8150012.02

DAVID RUGGLES, PE PROJECT ENGINEER

MICHAEL BURNS, EI PROJECT DESIGN ENGINEER

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 11725 ENGINEER DAVID R RUGGLES

DocuSigned by: David Ruggles 9/12/2017
C4027768DF412422...

DIVISION OF HIGHWAYS
DIVISION 05

4809 BERYL ROAD
RALEIGH, NC 27606

LISA GILCHRIST, EI DIVISION CONTACT #1

9/12/2017
8150012_utl_tsh_water.dgn
USER:default

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	UC-2

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

UTILITIES PLAN SHEET SYMBOLS

PROPOSED WATER SYMBOLS

- Water Line (Sized as Shown) — 12" WL
- 11¼ Degree Bend
- 22½ Degree Bend
- 45 Degree Bend
- 90 Degree Bend
- Plug
- Tee
- Cross
- Reducer
- Gate Valve — GV
- Butterfly Valve — BV
- Tapping Valve — TGV
- Line Stop — LS
- Line Stop with Bypass — LS/BP
- Blow Off — BO
- Fire Hydrant — PFH
- Relocate Fire Hydrant — RFH
- Remove Fire Hydrant — REM FH
- Water Meter — PWM
- Relocate Water Meter — RWM
- Remove Water Meter — REM WM
- Water Pump Station — PS(W)
- RPZ Backflow Preventer — PRPZ
- DCV Backflow Preventer — PBFP
- Relocate RPZ Backflow Preventer — RRPZ
- Relocate DCV Backflow Preventer — RBFP

PROPOSED SEWER SYMBOLS

- Gravity Sewer Line (Sized as Shown) — 12" SS
- Force Main Sewer Line (Sized as Shown) — 12" FSS
- Manhole (Sized per Note)
- Sewer Pump Station — PS(SS)

PROPOSED MISCELLANOUS UTILITIES SYMBOLS

- Power Pole
- Telephone Pole
- Joint Use Pole
- Telephone Pedestal — TEL PED
- Utility Line by Others (Type as Shown) — PROP O/H POW LINES
- Trenchless Installation — 12" TL INSTALL
- Encasement by Open Cut — 24" ENCAS BY OC
- Encasement — 24" ENCASEMENT
- Thrust Block
- Air Release Valve — AR
- Utility Vault — UV
- Concrete Pier — CP
- Steel Pier — SP
- Plan Note — NOTE
- Pay Item Note — PAY ITEM

EXISTING UTILITIES SYMBOLS

- Power Pole
- Telephone Pole
- Joint Use Pole
- Utility Pole
- Utility Pole with Base
- H-Frame Pole
- Power Transmission Line Tower
- Water Manhole
- Power Manhole
- Telephone Manhole
- Sanitary Sewer Manhole
- Hand Hole for Cable
- Power Transformer
- Telephone Pedestal
- CATV Pedestal
- Gas Valve
- Gas Meter
- Located Miscellaneous Utility Object
- Abandoned According to Utility Records — AATUR
- End of Information — E.O.I.
- *Underground Power Line
- *Underground Telephone Cable
- *Underground Telephone Conduit
- *Underground Fiber Optics Telephone Cable
- *Underground TV Cable
- *Underground Fiber Optics TV Cable
- *Underground Gas Pipeline
- Aboveground Gas Pipeline — A/G Gas
- *Underground Water Line
- Aboveground Water Line — A/G Water
- *Underground Gravity Sanitary Sewer Line — SS
- Aboveground Gravity Sanitary Sewer Line — A/G Sanitary Sewer
- *Underground SS Forced Main Line
- Underground Unknown Utility Line
- SUE Test Hole
- Water Meter
- Water Valve
- Fire Hydrant
- Sanitary Sewer Cleanout

*For Existing Utilities

- Utility Line Drawn from Record (Type as Shown)
- Designated Utility Line (Type as Shown)

REV: 2/1/2012

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	UC–3

UTILITY ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 11725 ENGINEER DAVID R. RUGGLES

DocuSigned by: David Ruggles 9/12/2017
C46276BDF412422...

Firm License No: C-1053
421 Fayetteville St.
Suite 400
Raleigh, NC 27601
T: 919.380.8750
www.stewartinc.com

STEWART

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NOTES:

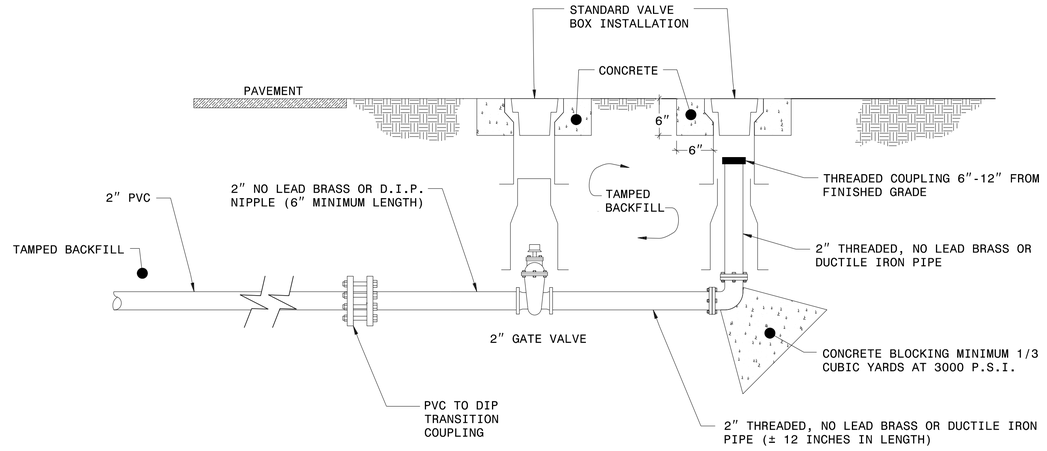
1. LENGTH OF CROSSING, LOCATION OF INSPECTION/OBSERVATION EXCAVATION, NUMBER OF P.E. PIPE JOINTS, AND TIE-IN POINTS ARE TO BE APPROVED BY THE ENGINEER PRIOR TO ANY START OF WORK.

2. ALL WORK PERFORMED SHALL BE IN CONFORMANCE WITH PERMIT DRAWINGS FOR THIS PROJECT. FOR PERMIT DRAWINGS, SEE CONTRACT DOCUMENTS.

3. ALL WORK PERFORMED SHALL BE IN CONFORMANCE WITH NCDOT SPECIFICATIONS.

4. TRENCHES FOR WATERLINE SHALL BE IN CONFORMANCE WITH NCDOT STANDARD DRAWING 300.01

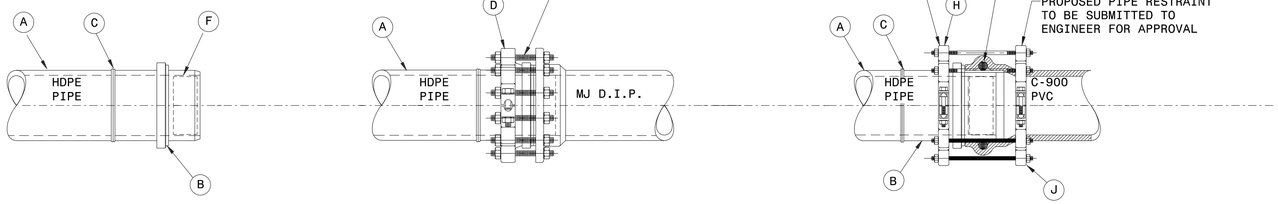
5. PROPOSED PVC TO DIP TRANSITION COUPLING TO BE SUBMITTED TO ENGINEER FOR APPROVAL.



2″ BLOW-OFF ASSEMBLY DETAIL

DETAIL PARTS LIST

ITEM	DESCRIPTION
A	HDPE PIPE
B	HDPE TO MJ/PVC TRANSITION FITTING
C	HDPE FUSED JOINT
D	SPLIT MJ GLAND
E	MJ GASKET AS SPECIFIED
F	STAINLESS STEEL SLEEVE INSERT
G	MJ TAPPED CAP
H	HDPE PIPE RESTRAINT RING
J	PVC BELL RESTRAINT RING



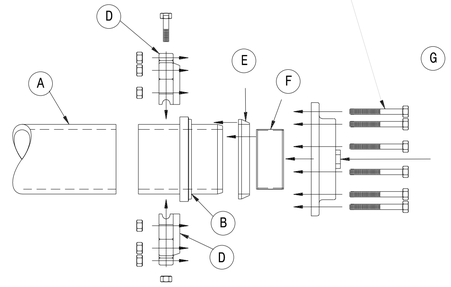
HDPE TO MJ/PVC TRANSITION FITTING

HDPE/MJ TRANSITION ASSEMBLY

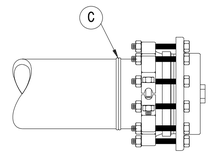
HDPE/PVC TRANSITION ASSEMBLY

HDPE TO MJ/PVC TRANSITION DETAIL

BOLT LENGTH AS REQUIRED OR USE THREADED ROD RESTRAINTS (SEE HDPE/MJ TRANSITION ASSEMBLY)



PRE-ASSEMBLY



ASSEMBLED

TEMPORARY TAPPED MJ CAP ASSEMBLY

REVISIONS

8/17/99

$$$$$$$$SYSTIME$$$$$$
$$$$$$$$

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	UC-4

UTILITY ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 11725 ENGINEER DAVID R. RUGGLES

DocuSigned David Ruggles 11/7/2017

C462768DF412422...

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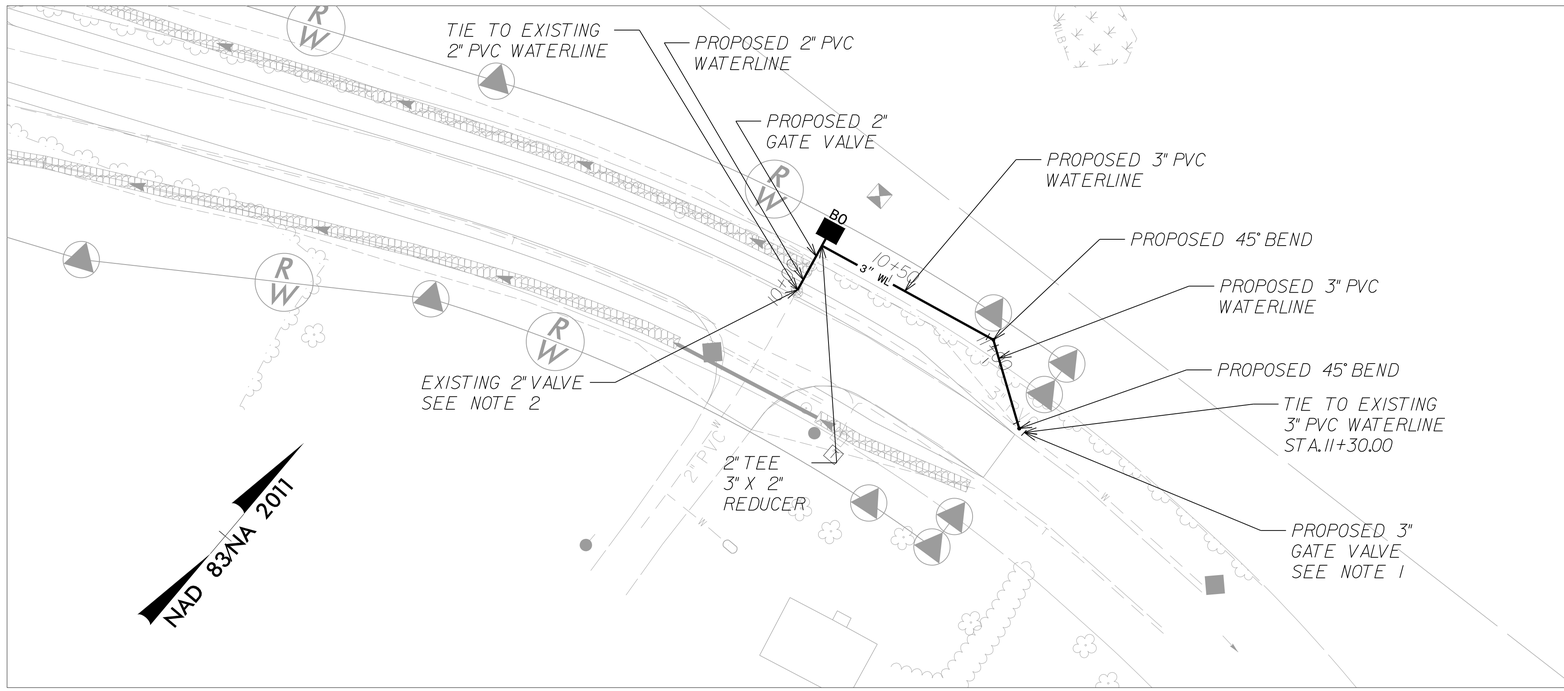
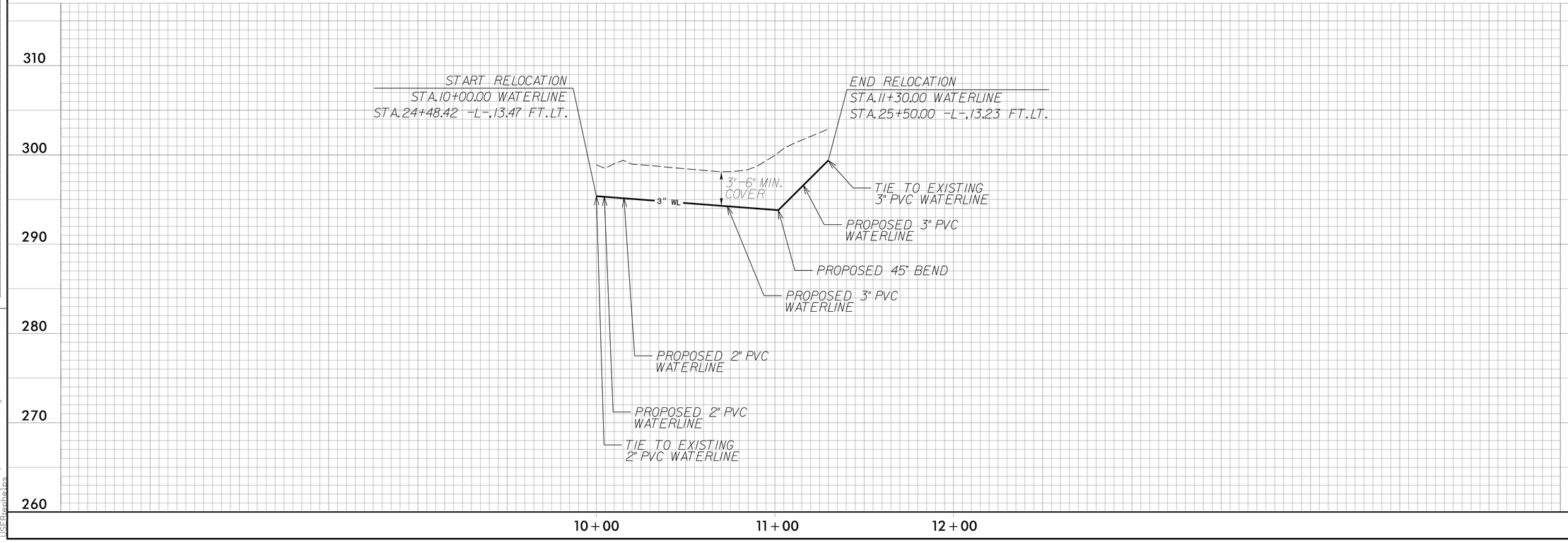


NOTES:

1. CONTRACTOR SHALL INSTALL NEW 3" VALVE AT CONNECTION POINT. VALVE SHALL BE INSTALLED AFTER 9:00 PM AND BEFORE 5:00 AM ANY GIVEN DAY. TIME RESTRICTIONS ARE NOT APPLICABLE IF CONTRACTOR ELECTS TO USE INSERTION VALVE (WET TAP). CONTRACTOR SHALL PROVIDE 24 HOURS MINIMUM NOTICE TO OWNER PRIOR TO INSTALLING VALVE. SEE INTERMEDIATE CONTRACT TIME AND LIQUIDATED DAMAGES SPECIAL PROVISION.
2. CONTRACTOR SHALL USE EXISTING 2" VALVE AS ISOLATION FOR CONSTRUCTION AND TESTING. ONCE THE NEW WATER MAIN IS COMPLETE AND ACCEPTED BY THE OWNER, THE EXISTING VALVE SHALL BE FULLY OPENED AND VALVE BOX REMOVED.



REVISIONS

8/17/99

11/7/2017
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USER:ephelps

09/08/99

TIP PROJECT: 17BP.5.R.62

CONTRACT:

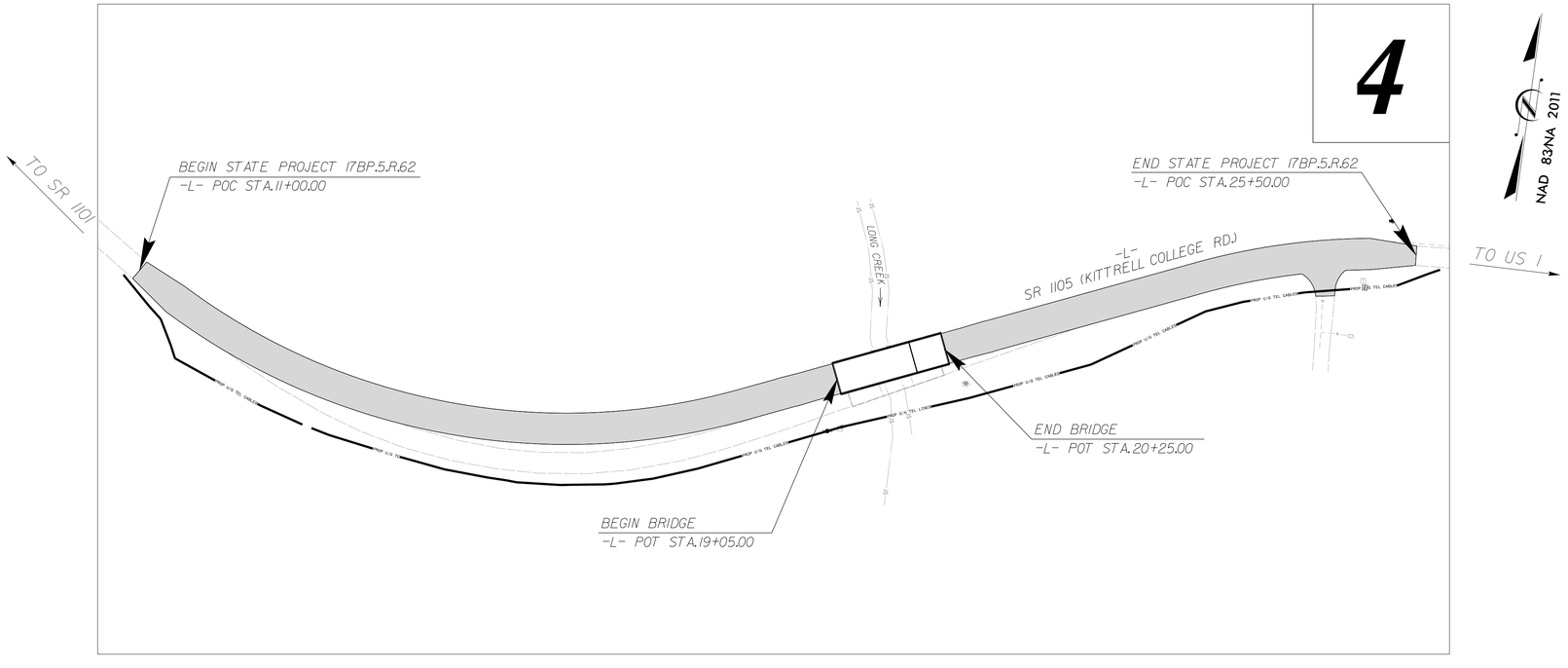
T.I.P. NO.	SHEET NO.
17BP.5.R.62	UO–1

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

UTILITIES BY OTHERS PLANS
VANCE COUNTY

LOCATION: BRIDGE NO. 12 OVER LONG CREEK
ON SR 1105 (KITTRELL COLLEGE RD.)

TYPE OF WORK: PERMANENT TELECOMMUNICATIONS



GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

INDEX OF SHEETS

SHEET NO.:	*DESCRIPTION:*
UO–1	*TITLE SHEET*
UO–2	*UBO PLAN SHEET (TELECOMMUNICATIONS)*

UTILITY OWNERS WITH CONFLICTS

(A) CENTURY LINK – TELECOMMUNICATIONS

PREPARED IN THE OFFICE OF

STEWART
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RALEIGH, NC 27601
T 919.380.8750
Firm License #: C-1051
www.stewartllc.com
PROJECT #:815001.02

DAVID RUGGLES, PE *PROJECT ENGINEER*

MICHAEL BURNS, EI *PROJECT DESIGN ENGINEER*

SEAL

DIVISION OF HIGHWAYS
DIVISION 05

4809 BERYL ROAD
RALEIGH, NC 27606

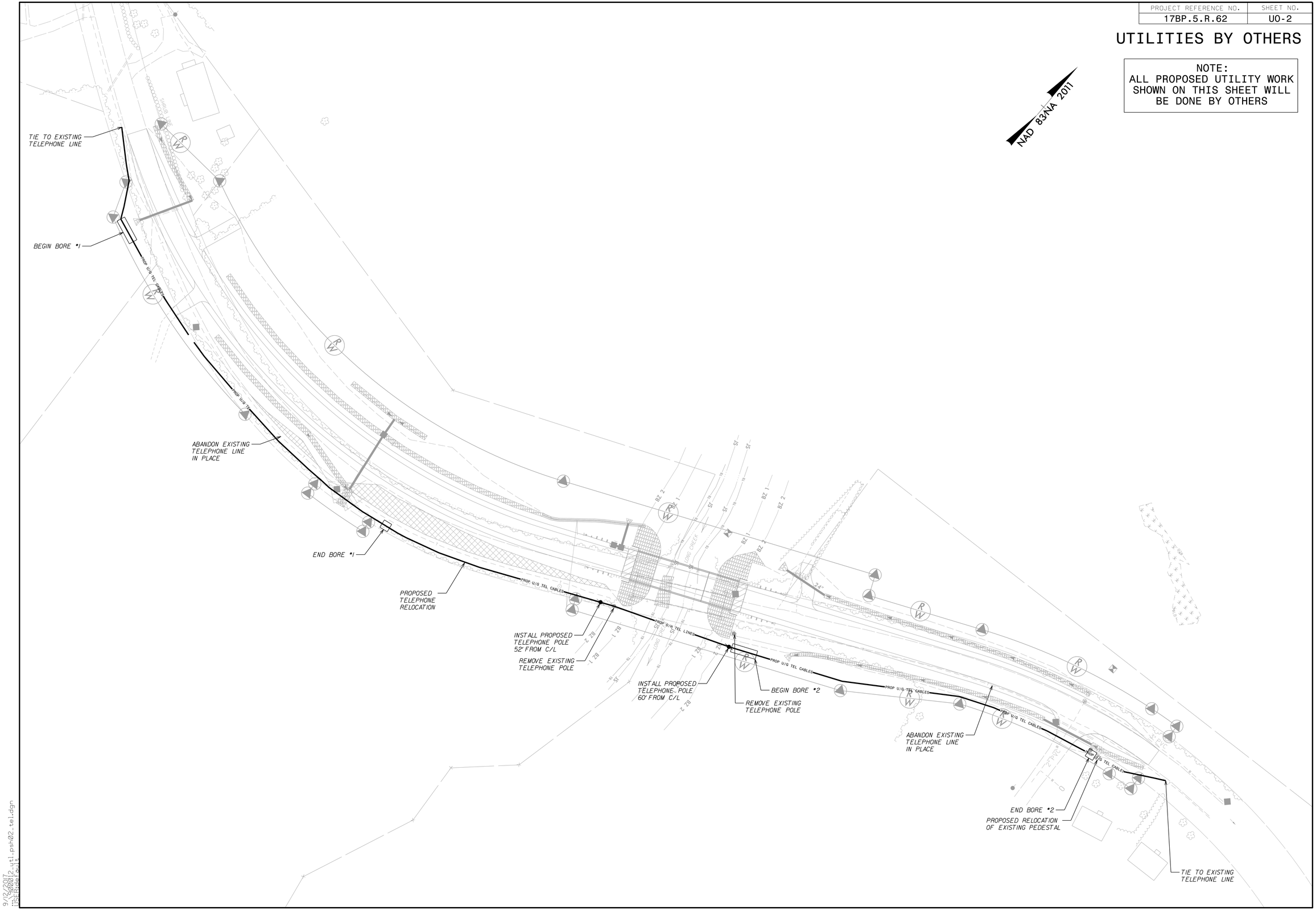
LISA GILCHRIST, EI *DIVISION CONTACT #1*

9/12/2017
i:\3002_utl_tsh_tel.dgn
USER:default

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	U0-2

UTILITIES BY OTHERS

NOTE:
ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS



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PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.62	X-1A

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

NOTE: EMBANKMENT COLUMN DOES NOT INCLUDE BACKFILL FOR UNDERCUT

CROSS-SECTION SUMMARY

Station L	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
11+00.00	0	0
11+50.00	75	5
12+00.00	183	6
12+50.00	389	1
13+00.00	635	0
13+50.00	912	0
14+00.00	1090	0
14+50.00	925	0
15+00.00	565	4
15+50.00	431	53
16+00.00	324	80
16+50.00	426	43
17+00.00	489	45
17+50.00	182	107
18+00.00	33	212
18+50.00	0	419
19+00.00	0	782
19+03.81	0	83

Station L	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
20+26.19	0	0
20+50.00	0	404
21+00.00	0	568
21+50.00	20	409
22+00.00	50	198
22+50.00	59	114
23+00.00	64	62
23+50.00	77	36
24+00.00	93	19
24+50.00	93	9
25+00.00	69	16
25+50.00	44	13

Approximate quantities only. Unclassified excavation, fine grading, clearing and grubbing, and removal of existing pavement will be paid for at the lump sum price for "Grading".

REVISIONS

8/17/99

9/6/2017
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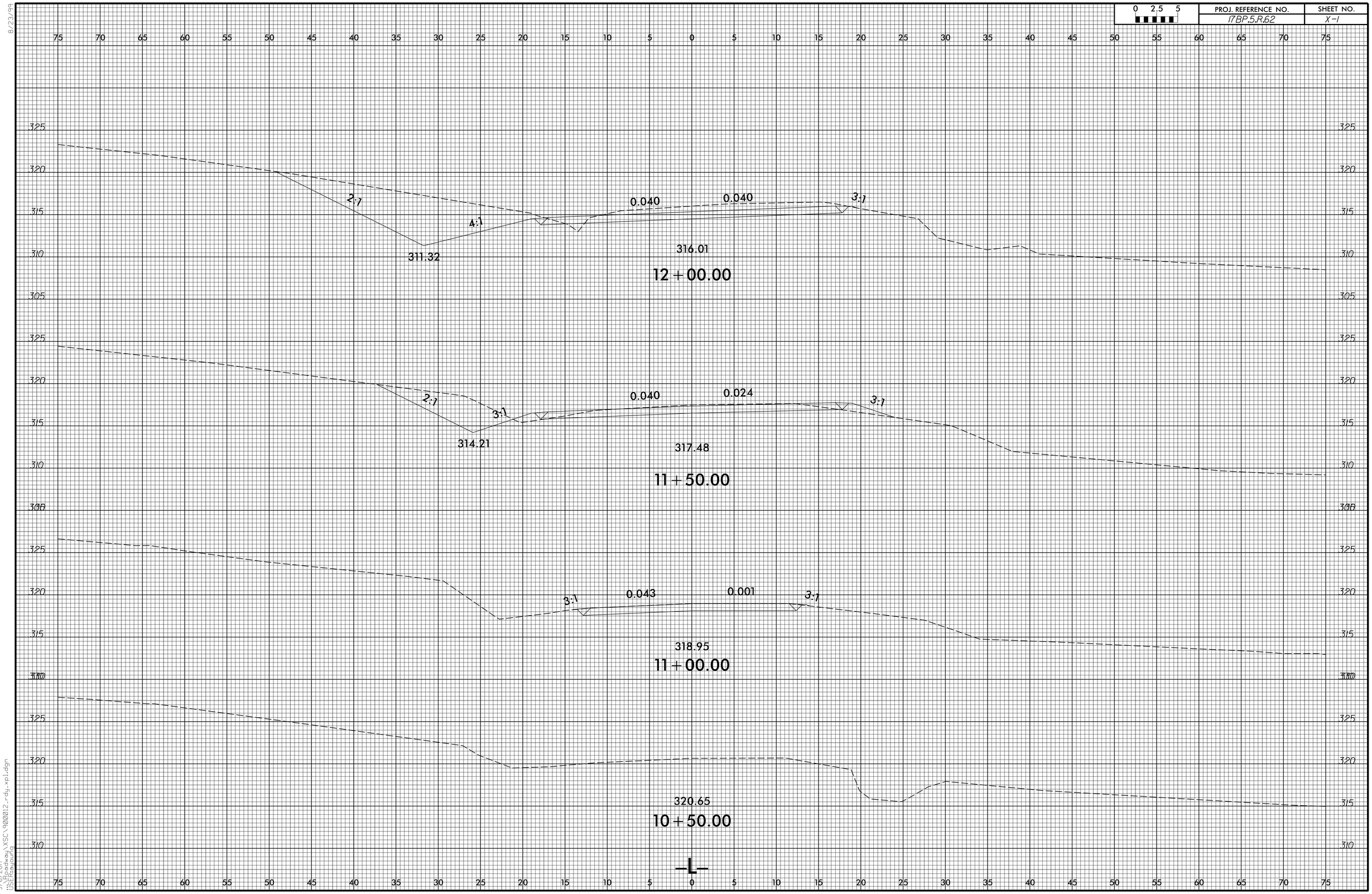

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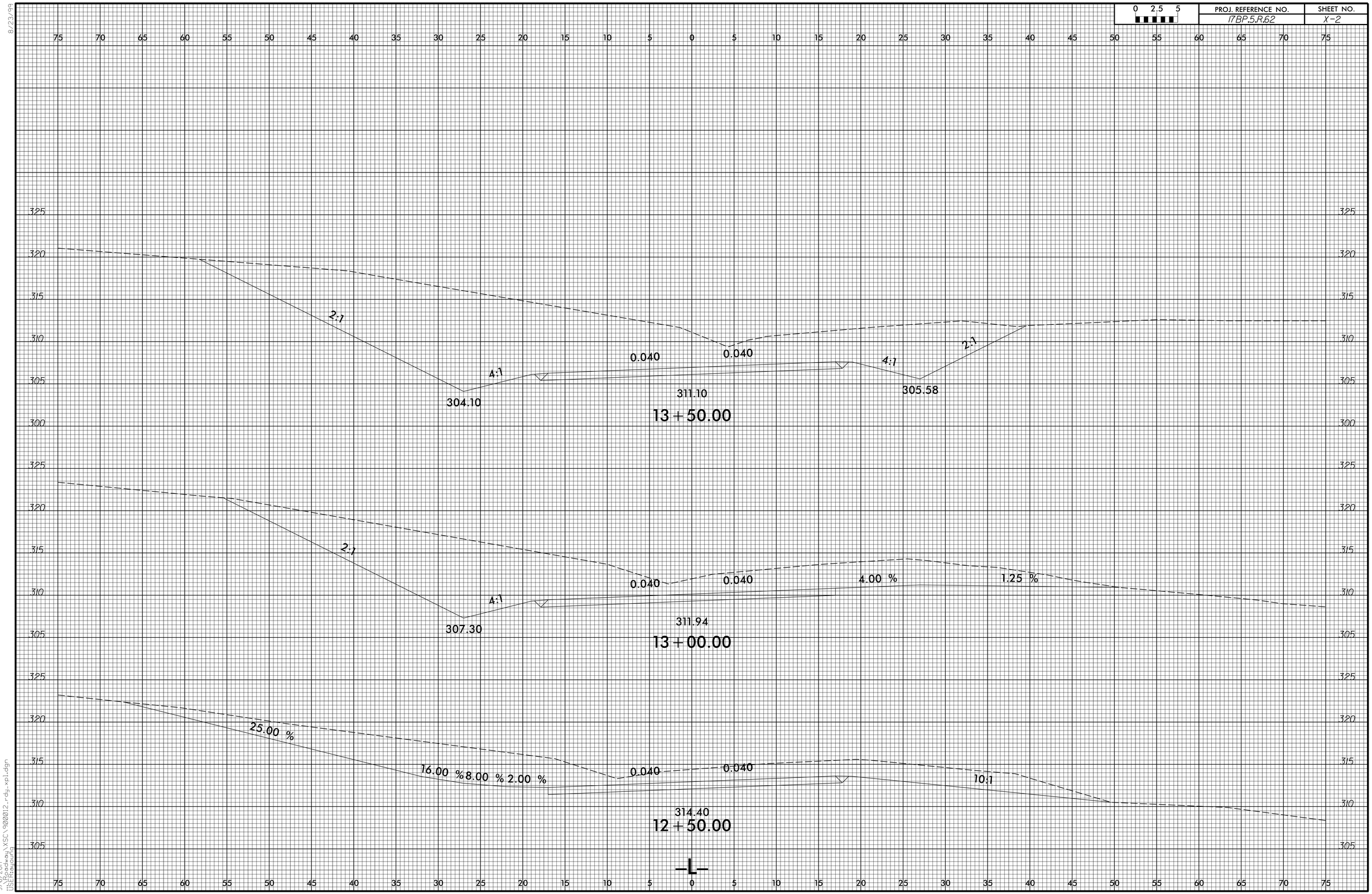

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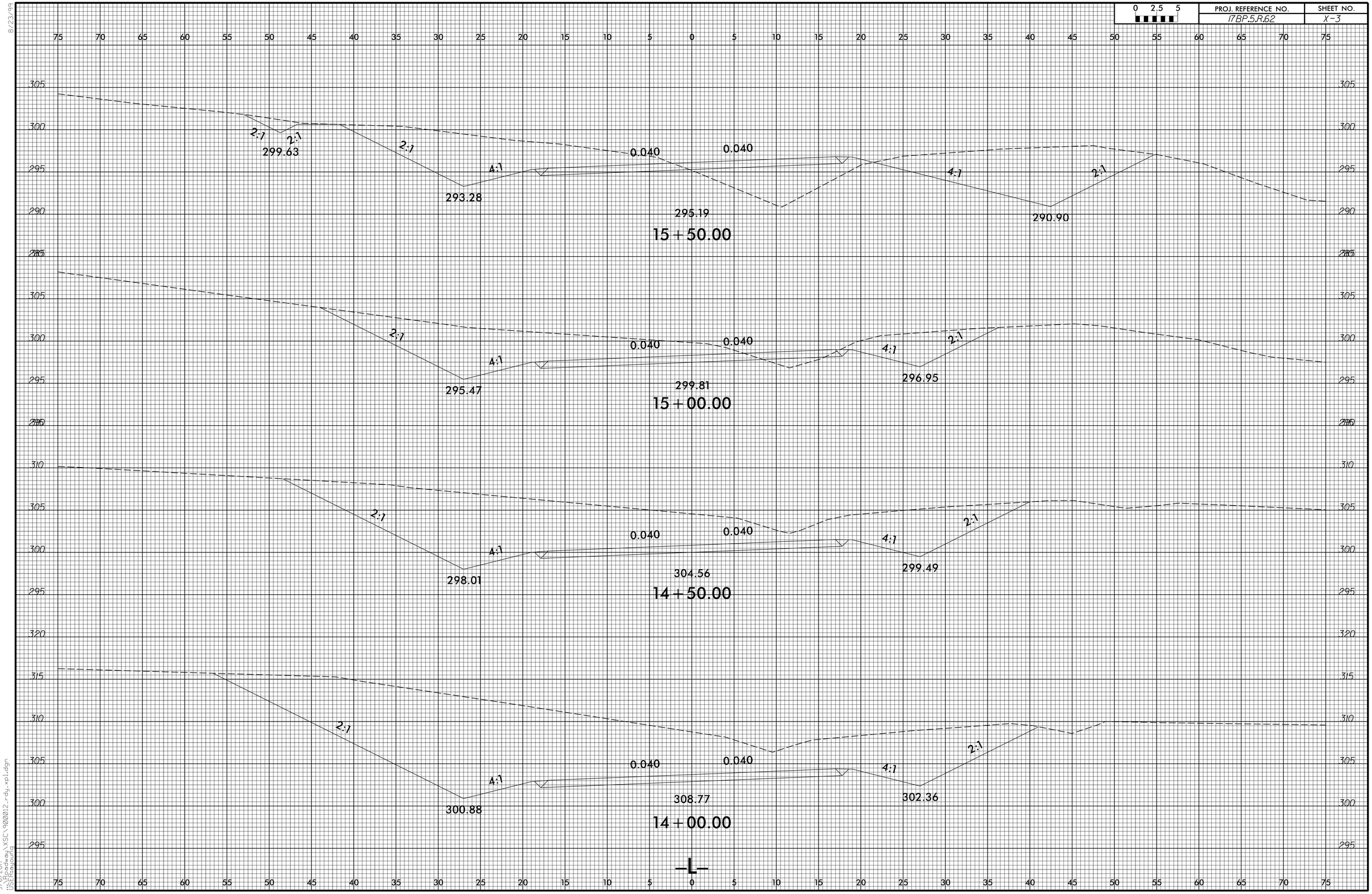

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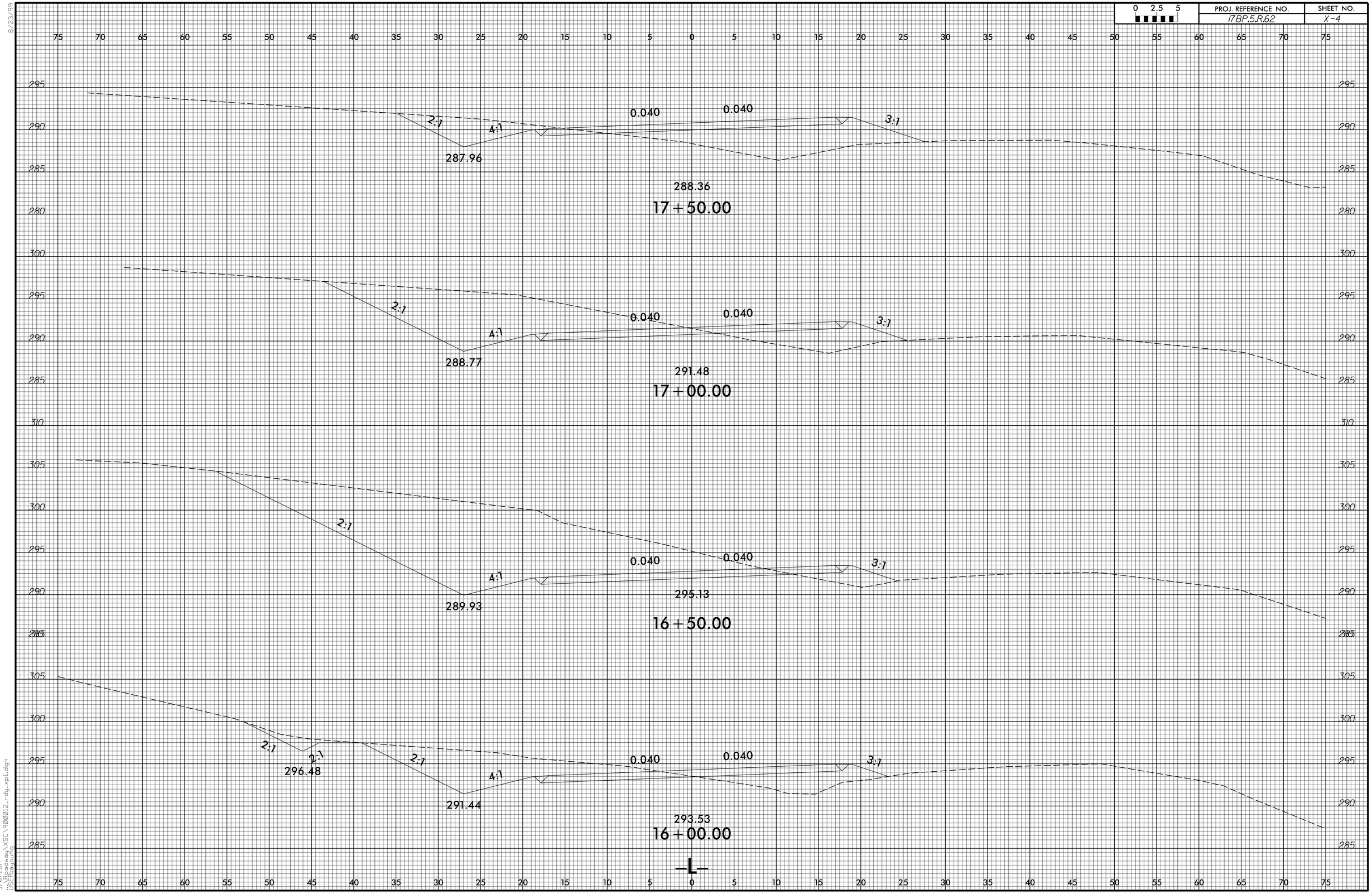

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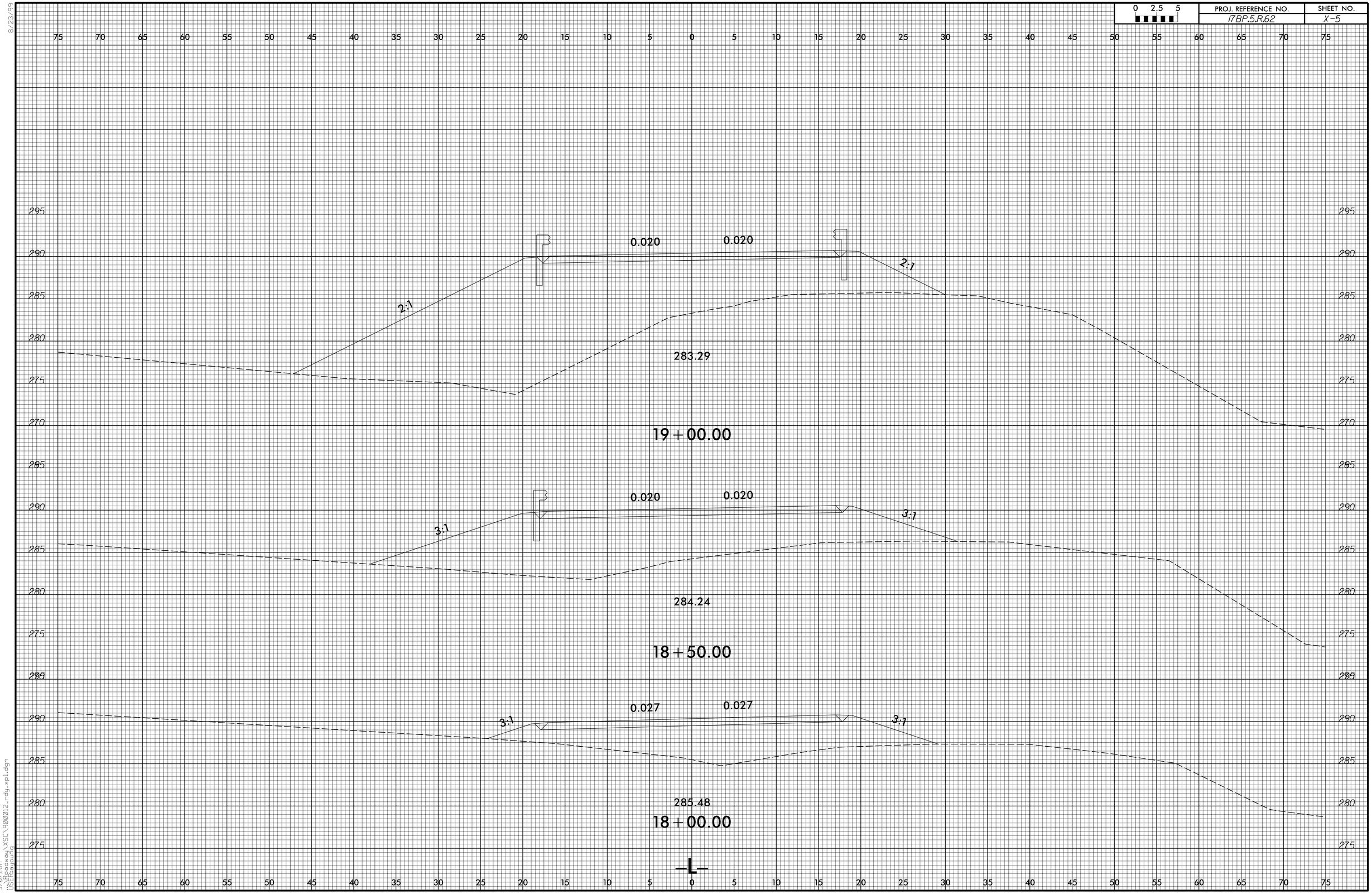

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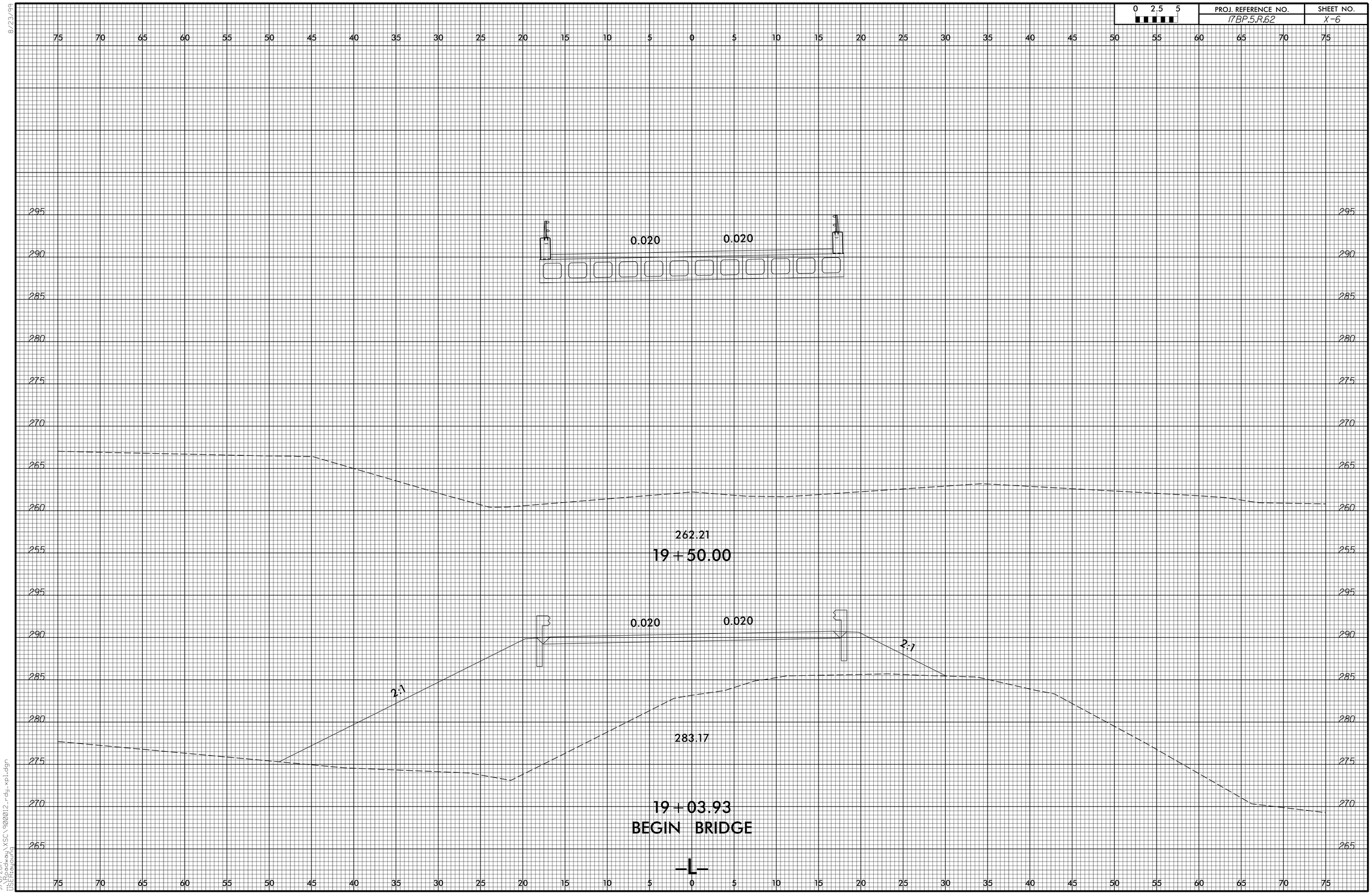

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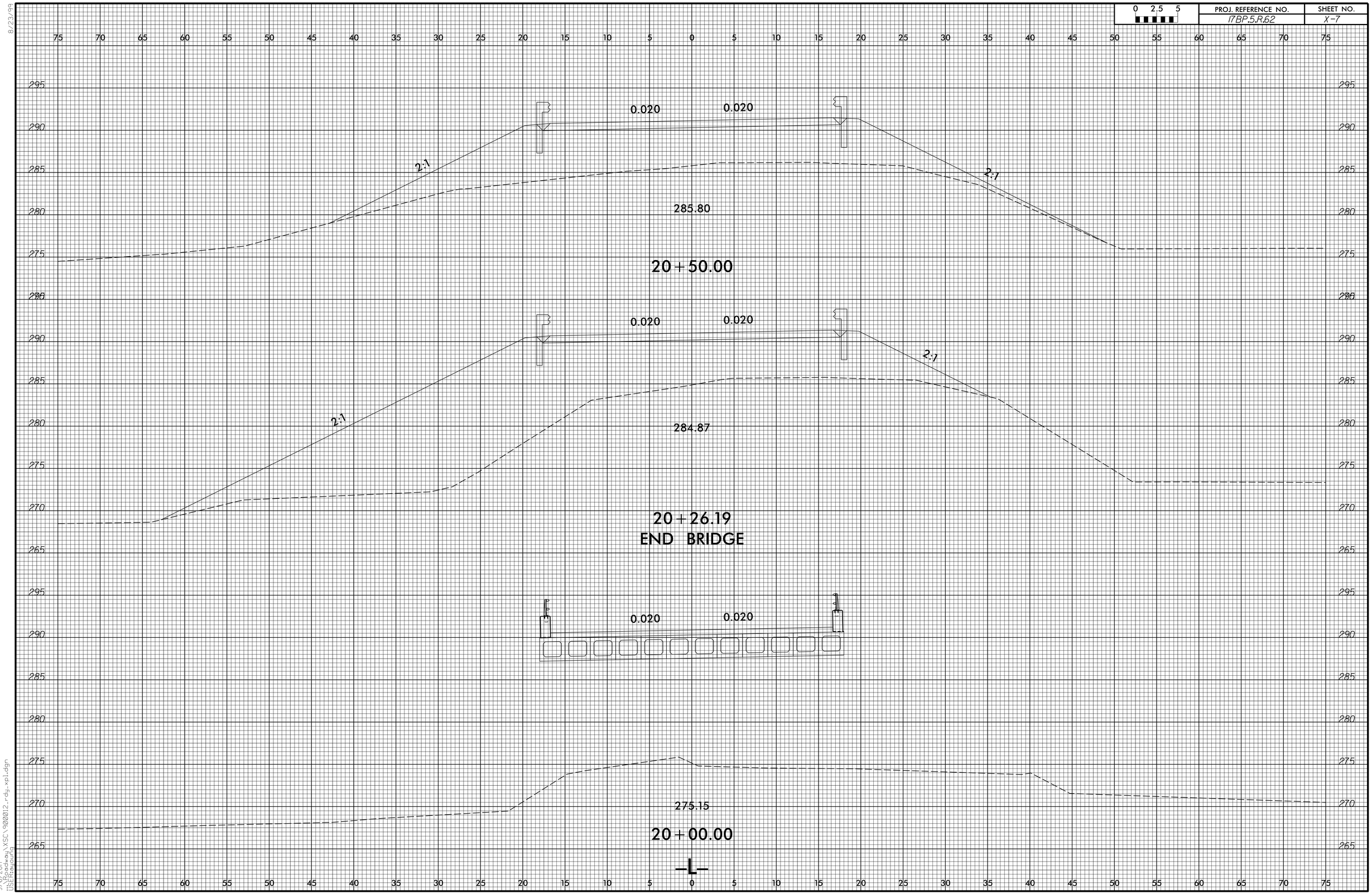

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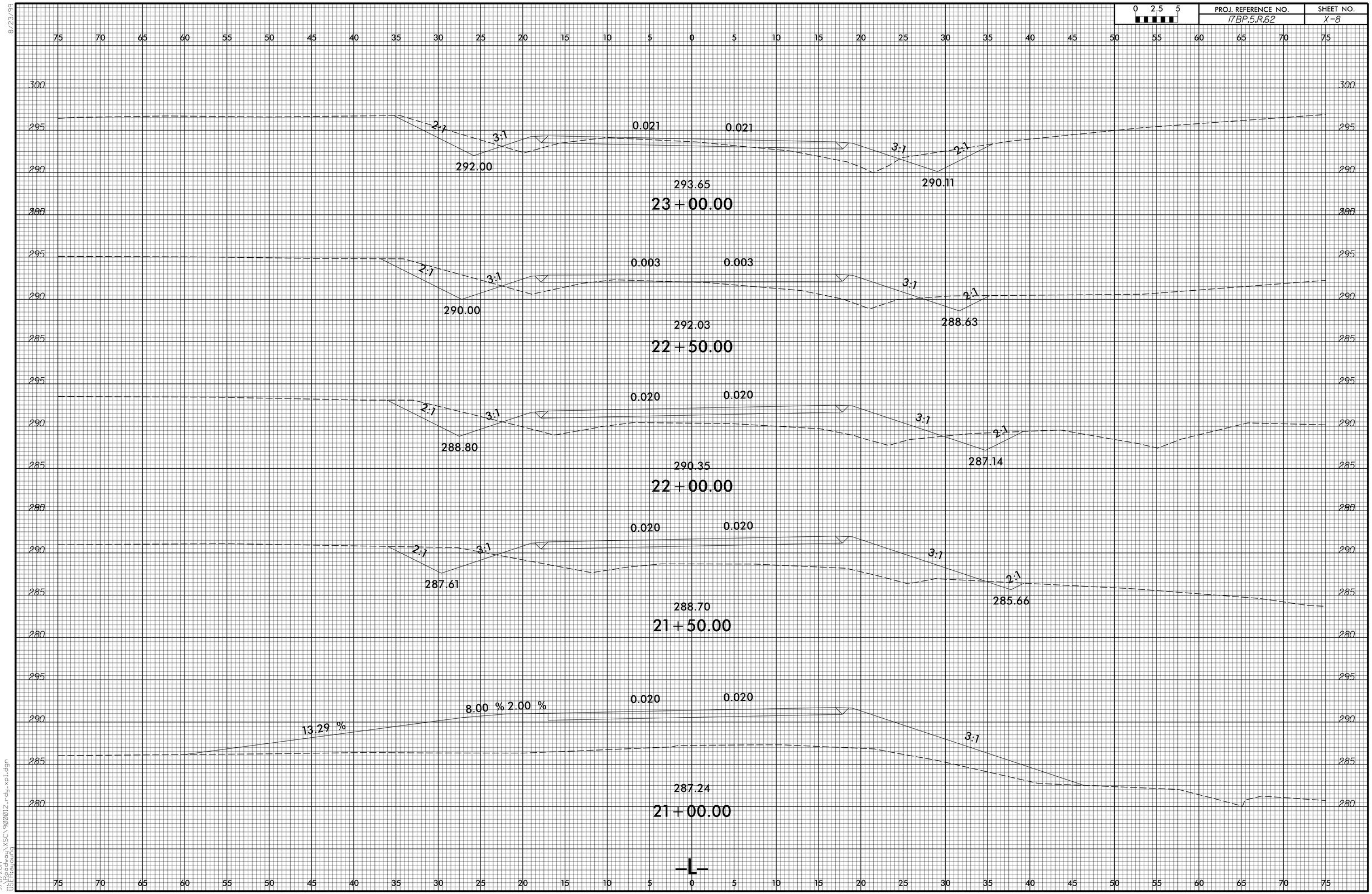

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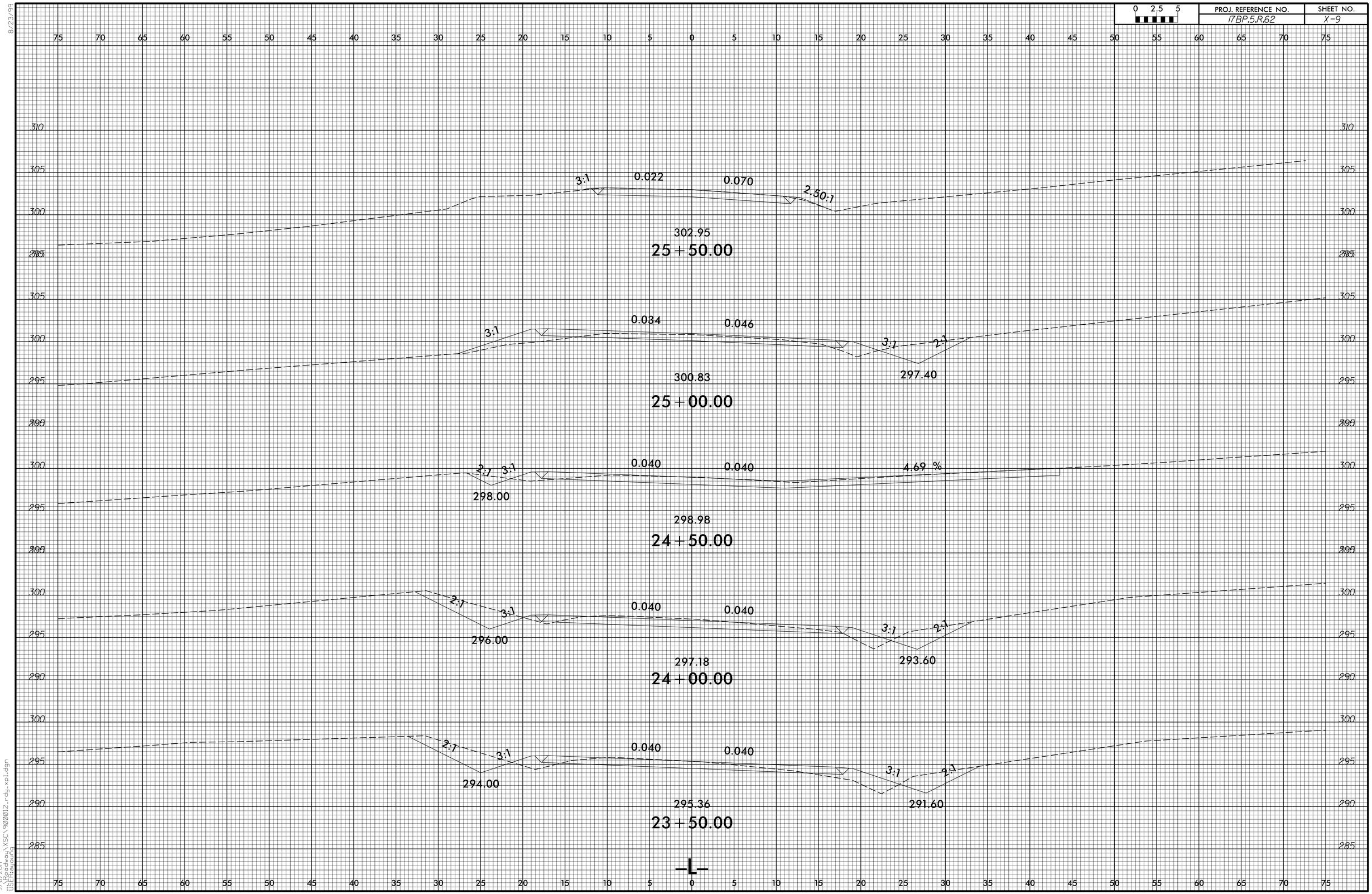
USER:ayoung



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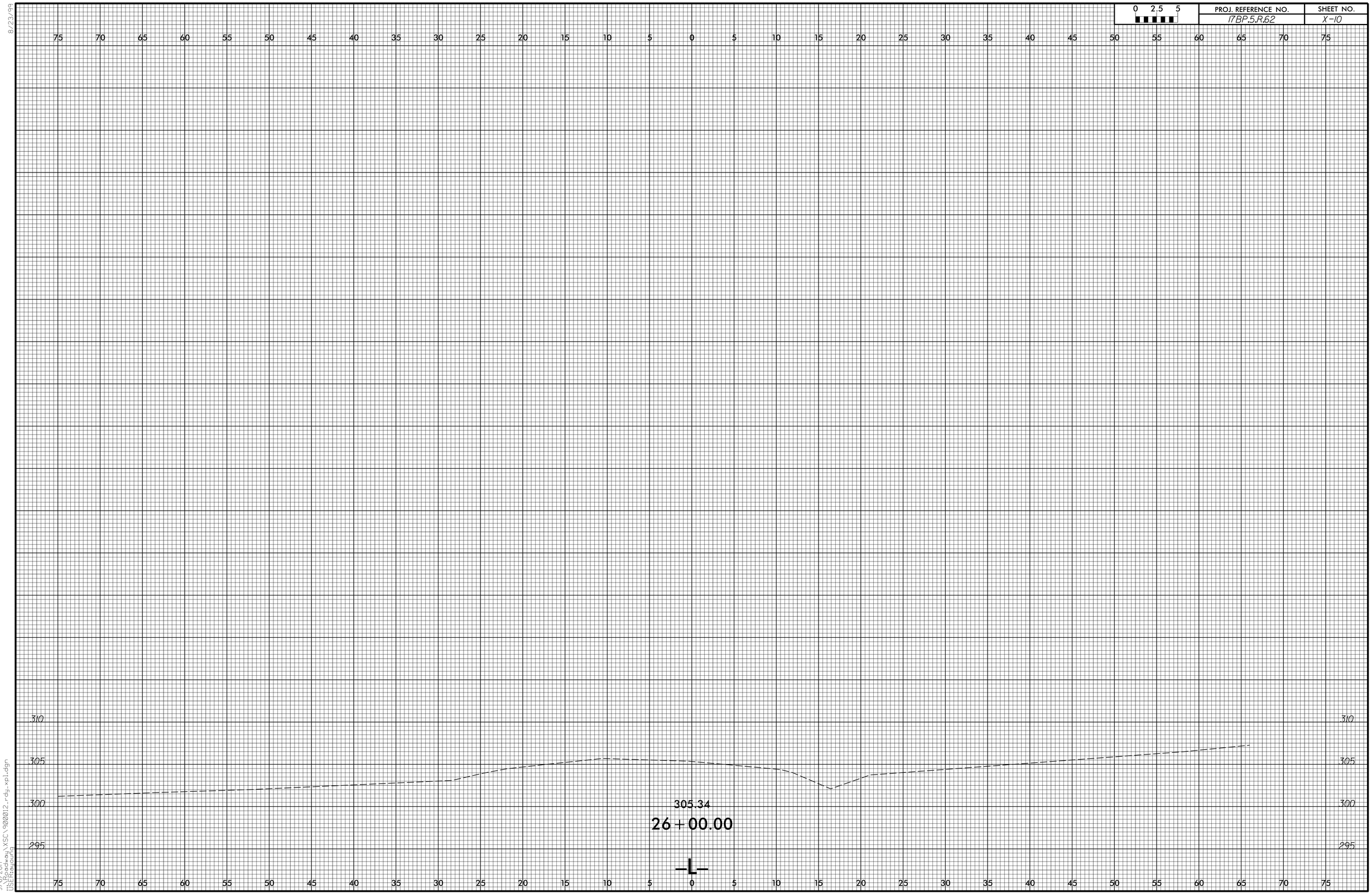

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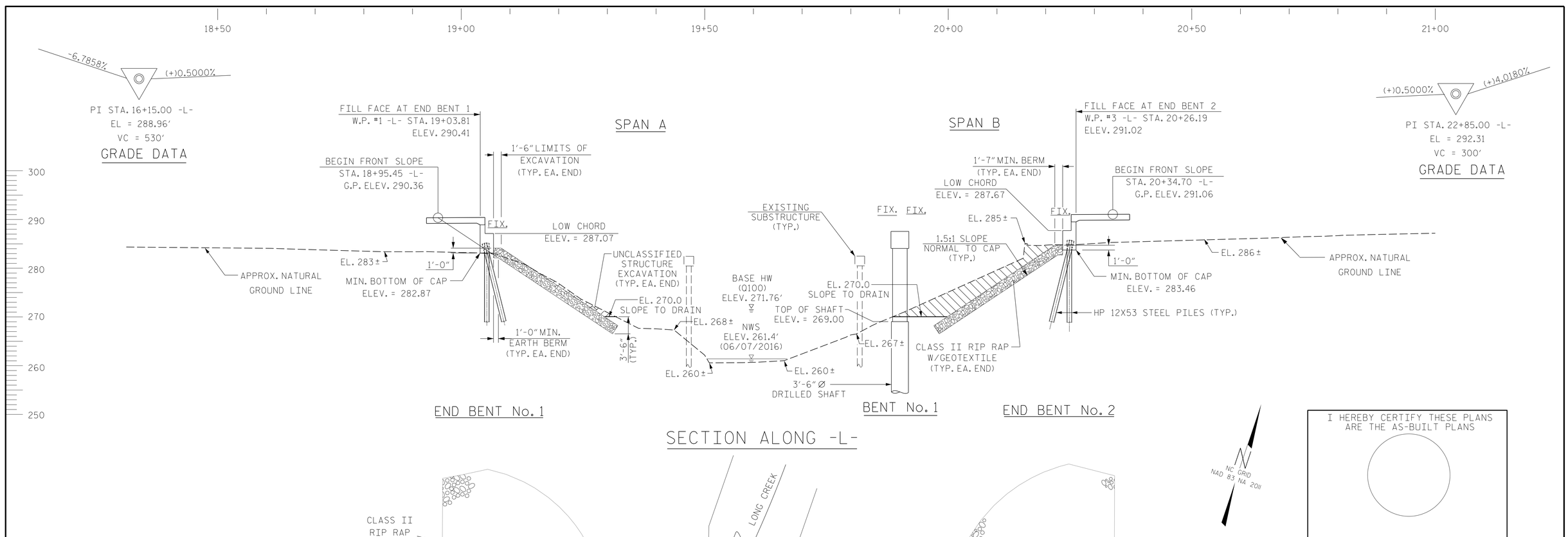

PROJECT NO. 17BP.5.R.62

VANCE COUNTY

STATION: 19+65.00 -L-

SHEET 1 OF 5 REPLACES BRIDGE 900012

DocuSigned by: Jeff Loftus FE51DC02E6794A9... 11/2/2017

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
BRIDGE OVER LONG CREEK ON SR 1105 (KITTRELL COLLEGE RD) BETWEEN SR 1101 AND US 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-1
1			3			TOTAL SHEETS
2			4			25

STEWART
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421 Fayetteville St,
Suite 400
Raleigh, NC 27601
T 919.380.8750
www.stewartinc.com

DRAWN BY: H.ASSFOURA DATE : 12/16
CHECKED BY: J. LOFTUS DATE : 03-17
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 03-17

900012

11/2/2017
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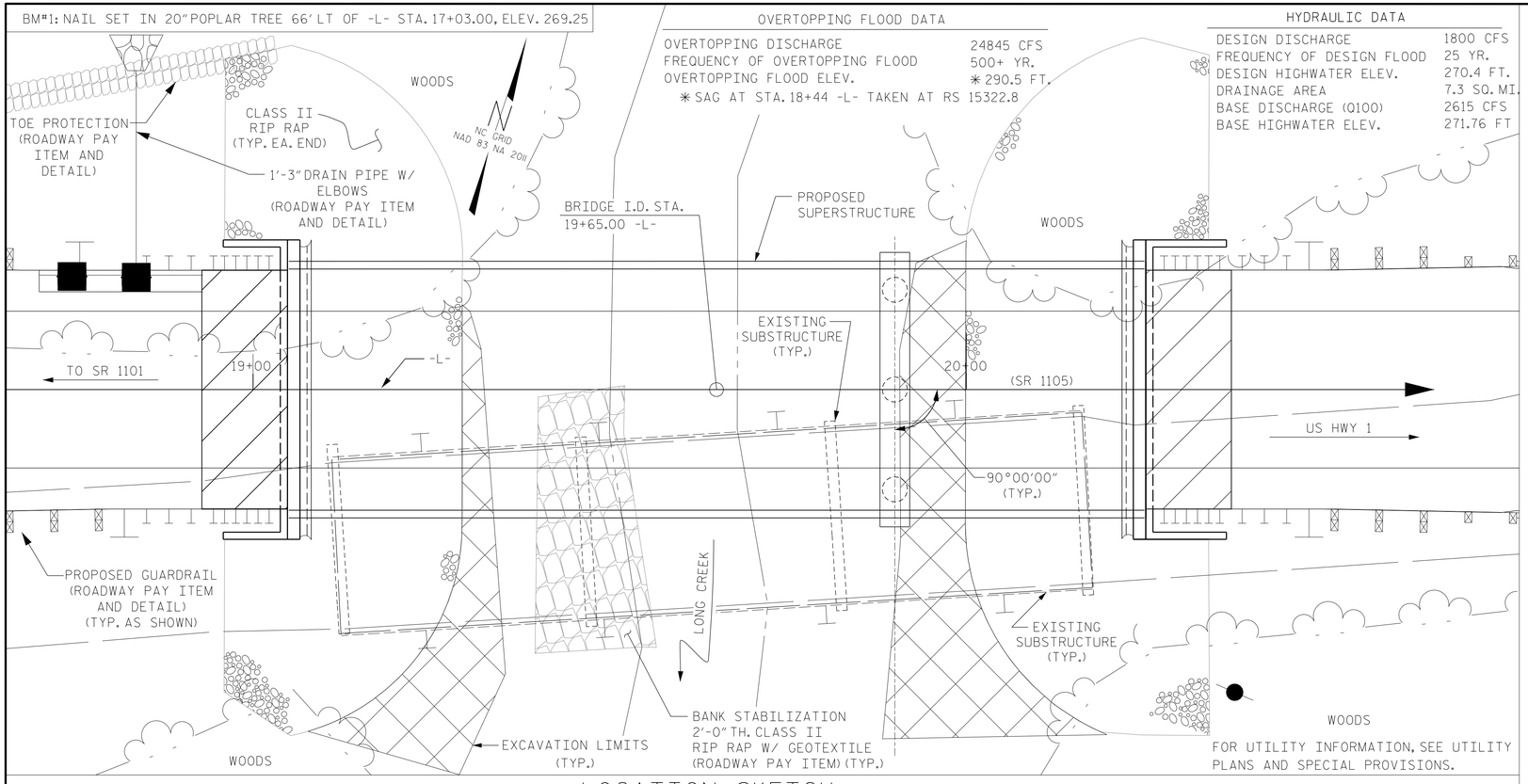
USER:jloftus



OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	24845 CFS
FREQUENCY OF OVERTOPPING FLOOD	500+ YR.
OVERTOPPING FLOOD ELEV.	✳290.5 FT.

✳SAG AT STA. 18+44 -L- TAKEN AT RS 15322.8

HYDRAULIC DATA

DESIGN DISCHARGE	1800 CFS
FREQUENCY OF DESIGN FLOOD	25 YR.
DESIGN HIGHWATER ELEV.	270.4 FT.
DRAINAGE AREA	7.3 SQ. MI.
BASE DISCHARGE (Q100)	2615 CFS
BASE HIGHWATER ELEV.	271.76 FT

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

NOTES:

1. ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING
2. THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS
3. THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.
4. THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18 - EVALUATING SCOUR AT BRIDGES."
5. THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR. THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCE BETWEEN THE EXISTING BRIDGE SUBSTRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.
6. THE EXISTING STRUCTURE CONSISTING OF THREE SPANS (35'-3", 35'-3" & 35'-3"); TIMBER DECK ON STEEL GIRDER FLOOR BEAM SYSTEM; 24.17' CLEAR ROADWAY WIDTH SUPPORTED ON TIMBER CAPS ON TIMBER PILES ENCASED WITH CONCRETE NEAR THE WATER LINE AND LOCATED 20' DOWNSTREAM FROM THE PROPOSED STRUCTURE SHALL BE REMOVED IN ITS ENTIRETY (INCLUDING PILES AND CONCRETE ENCASEMENTS).
7. REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED IN A MANNER THAT PREVENTS DEBRIS FROM FALLING INTO THE WATER. THE CONTRACTOR SHALL SUBMIT DEMOLITION PLANS FOR REVIEW AND REMOVE THE BRIDGE IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.
8. FOR ASBESTOS ASSESSMENT, SEE SPECIAL PROVISIONS.
9. FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
10. FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
11. FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
12. FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
13. FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.
14. ASPHALT WEARING SURFACE IS INCLUDED IN ROADWAY QUANTITY ON ROADWAY PLANS.
15. THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA ON SHEET S-1 SHALL BE EXCAVATED FOR A DISTANCE OF 20 FT ON THE LEFT SIDE OF CENTERLINE ROADWAY AND 50 FT ON THE RIGHT SIDE OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.
16. INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 19+65.00 -L-".
17. FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.

DocuSigned by: Jeff Loftus FE51DC02E6794A9... 11/2/2017

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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www.stewartinc.com
STEWART

PROJECT NO. 17BP.5.R.62

VANCE COUNTY

STATION: 19+65.00 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
BRIDGE OVER LONG CREEK ON
SR 1105 (KITTRELL COLLEGE RD)
BETWEEN SR 1101 AND US 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-2
1			3			TOTAL SHEETS
2			4			25

DRAWN BY: H. ASSFOURA DATE : 12-16
CHECKED BY: J. LOFTUS DATE : 03-17
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 03-17

900012

11/2/2017
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USER:jloftus

FOUNDATION NOTES

1. FOR PILES, SEE GEOTECHNICAL SPECIAL PROVISIONS AND SECTION 450 OF THE STANDARD SPECIFICATIONS.
2. PILES AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 100 TONS PER PILE.
3. DRIVE PILES AT END BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 170 TONS PER PILE.
4. PILES AT END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 90 TONS PER PILE.
5. DRIVE PILES AT END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 150 TONS PER PILE.
6. STEEL H-PILE POINTS ARE REQUIRED FOR STEEL H-PILES AT END BENT NO. 1 AND END BENT NO. 2. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
7. FOR DRILLED PIERS, SEE GEOTECHNICAL SPECIAL PROVISIONS AND SECTION 411 OF THE STANDARD SPECIFICATIONS.
8. DRILLED PIERS AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 285 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 30 TSF.
9. INSTALL DRILLED PIERS AT BENT NO. 1 TO A TIP ELEVATION NO HIGHER THAN 253 FT AND WITH THE REQUIRED TIP RESISTANCE.
10. THE SCOUR CRITICAL ELEVATION FOR BENT NO. 1 IS ELEVATION 258 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
11. SID INSPECTIONS MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR SID INSPECTIONS. FOR SID INSPECTIONS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
12. CSL TUBES ARE REQUIRED AND CSL TESTING MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR CSL TESTING. FOR CSL TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
13. DO NOT USE SLURRY CONSTRUCTION FOR DRILLED PIERS AT BENT NO. 1.

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE	3'-6" DIA. DRILLED PIERS NOT IN SOIL	3'-6" DIA. DRILLED PIERS IN SOIL	SID INSPECTIONS	CSL TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	HP 12X53 STEEL PILES		STEEL PILE POINTS	TWO BAR METAL RAIL	1'-2" X 2'-9½" CONCRETET PARAPET	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3'-0" x 2'-9" PRESTRESSED CONCRETE BOX BEAMS		ASBESTOS ASSESSMENT
	LUMP SUM	LIN. FT.	LIN. FT.	EACH	EACH	LUMP SUM	CY. YDS.	LUMP SUM	LBS	LBS	EACH	No.	LIN. FT.	EACH	LIN. FT.	LIN. FT.	TON	SQ. YDS.	LUMP SUM	No.	LIN. FT.	LUMP SUM
SUPERSTRUCTURE								LUMP SUM							225.25	240.25			LUMP SUM	24	1440	
END BENT No. 1						LUMP SUM	26.9		3,797		7	7	175	7			355	395				
BENT No. 1		25.0	23.0	1	1		28.1		10,655	2,076												
END BENT No. 2						LUMP SUM	26.9		3,926		5	5	100	5			380	422				
TOTAL	LUMP SUM	25.0	23.0	1	1	LUMP SUM	81.9	LUMP SUM	18,378	2,076	12	12	275	12	225.25	240.25	735	817	LUMP SUM	24	1440	LUMP SUM

DocuSigned by: Jeff Loftus FE51DC02E6794A9... 11/2/2017

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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VANCE COUNTY

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SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
BRIDGE OVER LONG CREEK ON SR 1105 (KITTRELL COLLEGE RD) BETWEEN SR 1101 AND US 1

REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-3

TOTAL SHEETS 25

DRAWN BY: H. ASSFOURA DATE : 12-16
CHECKED BY: J. LOFTUS DATE : 03-17
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 03-17

900012

11/2/2017
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USER:jloftus

LOAD AND RESISTANCE FACTOR RATING (LRFD) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR					MOMENT						
							LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93(Inv)	N/A	1	1.401	--	1.75	0.273	1.73	A	EL	41.75	0.497	1.54	A	EL	8.35	0.80	0.273	1.40	A	EL	41.75	
		HL-93(Opr)	N/A	--	1.994	--	1.35	0.273	2.25	A	EL	41.75	0.497	1.99	A	EL	8.35	N/A	--	--	--	--	--	
		HS-20(Inv)	36.000	2	1.882	67.762	1.75	0.273	2.33	A	EL	41.75	0.497	1.99	A	EL	8.35	0.80	0.273	1.88	A	EL	41.75	
		HS-20(Opr)	36.000	--	2.584	93.027	1.35	0.273	3.02	A	EL	41.75	0.497	2.58	A	EL	8.35	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SV	SNSH	13.500	--	4.355	58.789	1.4	0.273	6.74	A	EL	41.75	0.497	6.03	A	EL	8.35	0.80	0.273	4.35	A	EL	41.75	
		SNGARBS2	20.000	--	3.199	63.989	1.4	0.273	4.95	A	EL	41.75	0.497	4.26	A	EL	8.35	0.80	0.273	3.20	A	EL	41.75	
		SNAGRIS2	22.000	--	3.011	66.245	1.4	0.273	4.66	A	EL	41.75	0.497	3.94	A	EL	8.35	0.80	0.273	3.01	A	EL	41.75	
		SNCOTTS3	27.250	--	2.166	59.016	1.4	0.273	3.35	A	EL	41.75	0.497	3.01	A	EL	8.35	0.80	0.273	2.17	A	EL	41.75	
		SNAGGRS4	34.925	--	1.792	62.595	1.4	0.273	2.77	A	EL	41.75	0.497	2.47	A	EL	8.35	0.80	0.273	1.79	A	EL	41.75	
		SNS5A	35.550	--	1.754	62.349	1.4	0.273	2.71	A	EL	41.75	0.497	2.49	A	EL	8.35	0.80	0.273	1.75	A	EL	41.75	
		SNS6A	39.950	--	1.602	63.995	1.4	0.273	2.48	A	EL	41.75	0.497	2.27	A	EL	8.35	0.80	0.273	1.60	A	EL	41.75	
		SNS7B	42.000	--	1.525	64.059	1.4	0.273	2.36	A	EL	41.75	0.497	2.22	A	EL	8.35	0.80	0.273	1.53	A	EL	41.75	
	TTST	TNAGRIT3	33.000	--	1.951	64.392	1.4	0.273	3.02	A	EL	41.75	0.497	2.7	A	EL	8.35	0.80	0.273	1.95	A	EL	41.75	
		TNT4A	33.075	--	1.958	64.758	1.4	0.273	3.03	A	EL	41.75	0.497	2.64	A	EL	8.35	0.80	0.273	1.96	A	EL	41.75	
		TNT6A	41.600	--	1.594	66.309	1.4	0.273	2.47	A	EL	41.75	0.497	2.34	A	EL	8.35	0.80	0.273	1.59	A	EL	41.75	
		TNT7A	42.000	--	1.598	67.128	1.4	0.273	2.47	A	EL	41.75	0.497	2.3	A	EL	8.35	0.80	0.273	1.60	A	EL	41.75	
		TNT7B	42.000	--	1.645	69.07	1.4	0.273	2.54	A	EL	41.75	0.497	2.17	A	EL	8.35	0.80	0.273	1.64	A	EL	41.75	
		TNAGRIT4	43.000	--	1.571	67.556	1.4	0.273	2.43	A	EL	41.75	0.497	2.11	A	EL	8.35	0.80	0.273	1.57	A	EL	41.75	
		TNAGT5A	45.000	--	1.484	66.8	1.4	0.273	2.3	A	EL	41.75	0.497	2.08	A	EL	8.35	0.80	0.273	1.48	A	EL	41.75	
		TNAGT5B	45.000	3	1.469	66.118	1.4	0.273	2.27	A	EL	41.75	0.497	2	A	EL	8.35	0.80	0.273	1.47	A	EL	41.75	

LOAD FACTORS:

DESIGN LOAD RATING FACTORS	LIMIT STATE	γ_{DC}	γ_{DW}
	STRENGTH I	1.25	1.50
	SERVICE III	1.00	1.00

NOTES:

MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

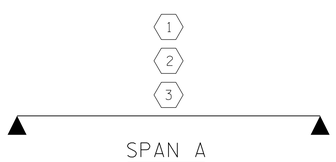
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
EL - EXTERIOR LEFT GIRDER
ER - EXTERIOR RIGHT GIRDER



LRFR SUMMARY

FOR 85' UNIT

DocuSigned by: Jeff Loftus FE51DC02E6794A9... 11/2/2017

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR 85' BOX BEAM UNIT 90° SKEW (NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-4
1			3			TOTAL SHEETS
2			4			25

DRAWN BY: H. ASSFOURA DATE: 12-16
CHECKED BY: J. LOFTUS DATE: 03-17
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE: 03-17

900012

11/2/2017
...\400_004_900012_SMU_LRFR04.dgn
USER:jloftus

STD. NO. 33LRFR1_90S_85L

LOAD AND RESISTANCE FACTOR RATING (LRFD) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR					MOMENT						
							LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93(Inv)	N/A	1	2.57	--	1.75	0.210	2.57	B	EL	16.75	0.500	2.58	B	EL	30.90	0.80	0.210	4.10	B	EL	16.75	
		HL-93(Opr)	N/A	--	3.33	--	1.35	0.210	3.33	B	EL	16.75	0.500	3.37	B	EL	30.90	N/A	--	--	--	--	--	
		HS-20(Inv)	36.000	2	3.35	120.60	1.75	0.210	3.35	B	EL	13.40	0.500	2.98	B	EL	30.90	0.80	0.210	5.35	B	EL	13.40	
		HS-20(Opr)	36.000	--	4.35	156.60	1.35	0.210	4.35	B	EL	13.40	0.500	3.90	B	EL	30.90	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SV	SNSH	13.500	--	7.14	96.39	1.4	0.210	7.14	B	EL	16.75	0.500	7.57	B	EL	30.90	0.80	0.210	7.55	B	EL	16.75	
		SNGARBS2	20.000	--	5.97	119.40	1.4	0.210	5.97	B	EL	13.40	0.500	5.71	B	EL	30.90	0.80	0.210	6.31	B	EL	13.40	
		SNAGRIS2	22.000	--	5.90	129.80	1.4	0.210	5.90	B	EL	13.40	0.500	5.45	B	EL	30.90	0.80	0.210	6.24	B	EL	13.40	
		SNCOTTS3	27.250	--	3.57	97.28	1.4	0.210	3.57	B	EL	16.75	0.500	3.01	B	EL	30.90	0.80	0.210	3.77	B	EL	16.75	
		SNAGGRS4	34.925	--	3.28	114.55	1.4	0.210	3.28	B	EL	16.75	0.500	3.37	B	EL	30.90	0.80	0.210	3.47	B	EL	16.75	
		SNS5A	35.550	--	3.19	113.40	1.4	0.210	3.19	B	EL	16.75	0.500	3.55	B	EL	30.90	0.80	0.210	3.37	B	EL	16.75	
		SNS6A	39.950	--	3.07	122.65	1.4	0.210	3.07	B	EL	16.75	0.500	3.33	B	EL	30.90	0.80	0.210	3.25	B	EL	16.75	
		SNS7B	42.000	--	2.93	123.06	1.4	0.210	2.93	B	EL	16.75	0.500	3.42	B	EL	30.90	0.80	0.210	3.10	B	EL	16.75	
	TTST	TNAGRIT3	33.000	--	3.80	125.40	1.4	0.210	3.80	B	EL	16.75	0.500	3.93	B	EL	30.90	0.80	0.210	4.02	B	EL	16.75	
		TNT4A	33.075	--	3.81	126.02	1.4	0.210	3.81	B	EL	16.75	0.500	3.70	B	EL	30.90	0.80	0.210	4.03	B	EL	16.75	
		TNT6A	41.600	--	3.30	137.28	1.4	0.210	3.30	B	EL	16.75	0.500	3.62	B	EL	30.90	0.80	0.210	3.49	B	EL	16.75	
		TNT7A	42.000	--	3.34	140.28	1.4	0.210	3.41	B	EL	16.75	0.500	3.34	B	EL	30.90	0.80	0.210	3.61	B	EL	16.75	
		TNT7B	42.000	--	3.28	137.76	1.4	0.210	3.39	B	EL	16.75	0.500	3.28	B	EL	30.90	0.80	0.210	3.58	B	EL	16.75	
		TNAGRIT4	43.000	--	3.12	134.16	1.4	0.210	3.37	B	EL	20.10	0.500	3.12	B	EL	30.90	0.80	0.210	3.56	B	EL	20.10	
		TNAGT5A	45.000	--	3.13	140.85	1.4	0.210	3.13	B	EL	16.75	0.500	3.32	B	EL	30.90	0.80	0.210	3.31	B	EL	16.75	
		TNAGT5B	45.000	3	2.94	132.30	1.4	0.210	3.03	B	EL	16.75	0.500	2.94	B	EL	30.90	0.80	0.210	3.20	B	EL	16.75	

LOAD FACTORS:

	LIMIT STATE	γ_{DC}	γ_{DW}
DESIGN LOAD RATING FACTORS	STRENGTH I	1.25	1.50
	SERVICE III	1.00	1.00

NOTES:

MINIMUM RATING FACTORS ARE BASED ON THE STRENGTH I AND SERVICE III LIMIT STATES.

ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

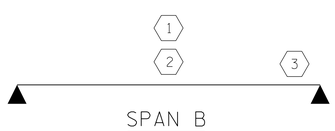
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
EL - EXTERIOR LEFT GIRDER
ER - EXTERIOR RIGHT GIRDER



LRFR SUMMARY

FOR 35' UNIT

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NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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VANCE COUNTY

STATION: 19+65.00 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

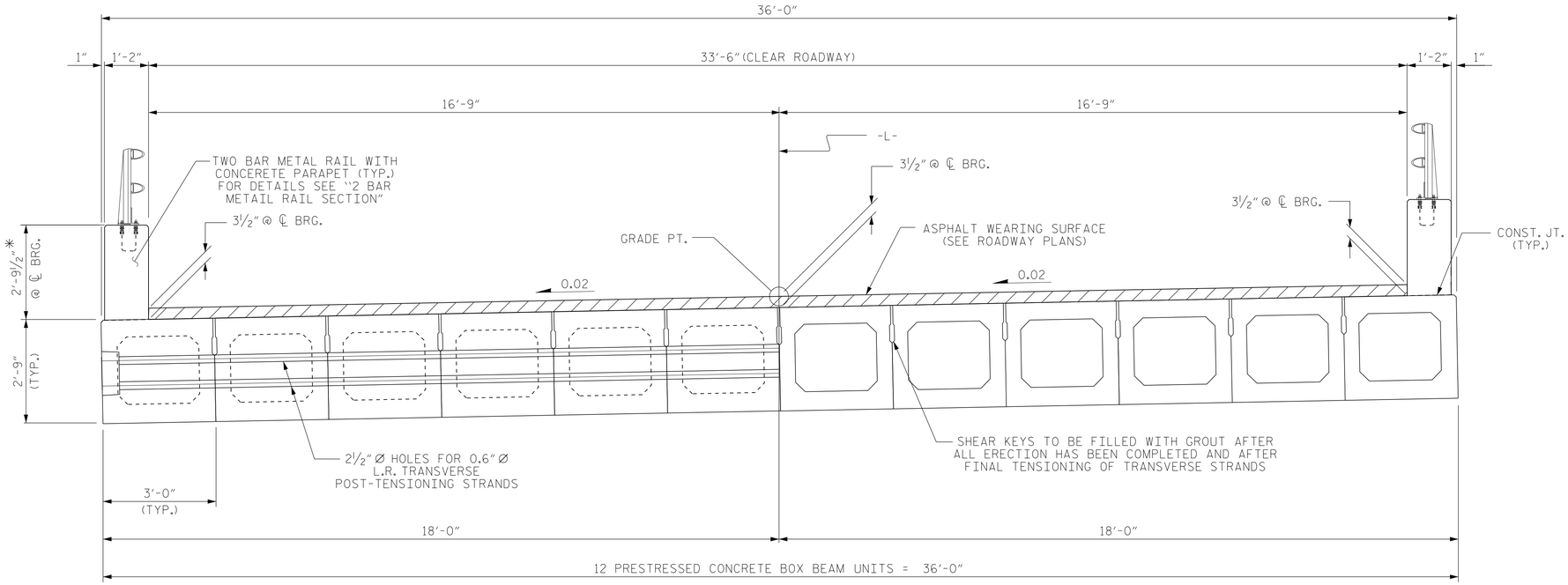
LRFR SUMMARY FOR 35' BOX BEAM UNIT 90° SKEW (NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS
2			4			25

DRAWN BY:	H. ASSFOURA	DATE : 12-16
CHECKED BY:	J. LOFTUS	DATE : 03-17
DESIGN ENGINEER OF RECORD:	J. LOFTUS	DATE : 03-17

900012

11/2/2017
...\400_005_900012_SMU_LRFR05.dgn
USER:jloftus



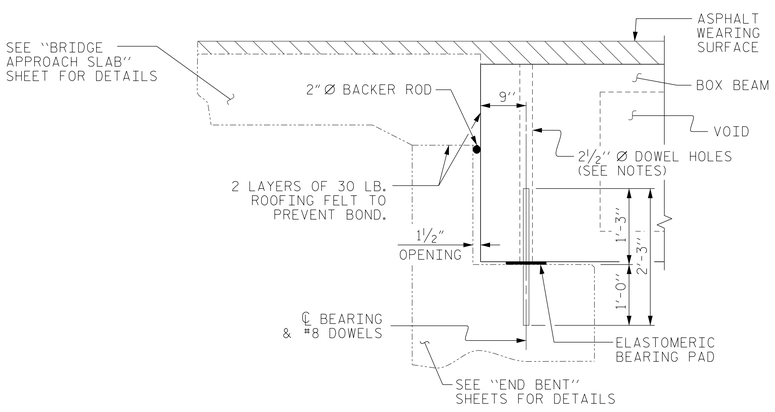
HALF SECTION
AT INTERMEDIATE DIAPHRAGMS

HALF SECTION
THROUGH VOIDS

TYPICAL SECTION

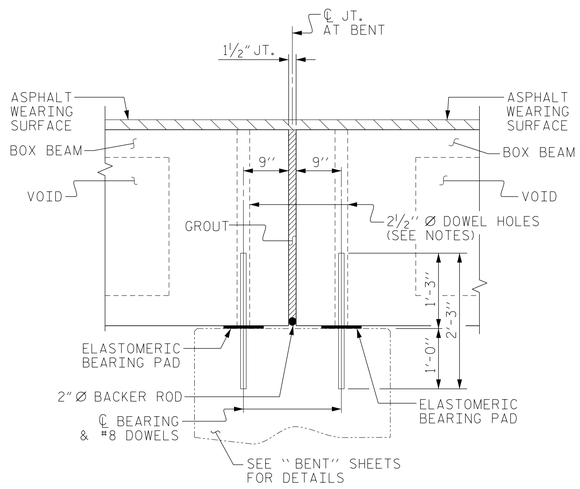
*THE MAXIMUM BARRIER RAIL HEIGHT AND ASPHALT THICKNESS IS SHOWN. THE HEIGHT OF THE BARRIER RAIL AND ASPHALT THICKNESS VARIES WHILE THE TOP OF THE BARRIER RAIL FOLLOWS THE PROFILE OF THE GUTTERLINE. FOR RAIL HEIGHT DETAILS AND ASPHALT THICKNESS, SEE THE "SECTION THRU PARAPET AND RAIL" DETAIL FOR THE TWO BAR METAL RAIL.

FIXED END



SECTION AT END BENT

FIXED END FIXED END



SECTION AT BENT

PERMITTED THREADED INSERT CAST IN OUTSIDE FACE OF EXTERIOR UNIT AND RECESSED ⅜". SIZE TO BE DETERMINED BY CONTRACTOR.



THREADED INSERT DETAIL

NOTES

ALL PRESTRESSING STRANDS SHALL BE 7-WIRE LOW RELAXATION GRADE 270 STRANDS AND SHALL CONFORM TO AASHTO M203 EXCEPT FOR SAMPLING REQUIREMENTS WHICH SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ALL REINFORCING STEEL CAST WITH THE BOX BEAM SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE BOX BEAMS.

FLAME CUTTING OF THE TRANSVERSE POST-TENSIONING STRAND IS NOT ALLOWED.

RECESSES FOR TRANSVERSE STRANDS SHALL BE GROUTED AFTER THE TENSIONING OF THE STRANDS.

THE 2½" Ø DOWEL HOLES AT FIXED ENDS OF BOX BEAM SECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT.

THE BACKER RODS SHALL CONFORM TO THE REQUIREMENTS OF TYPE M BOND BREAKER. SEE SECTION 1028 OF THE STANDARD SPECIFICATIONS.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE BOX BEAM UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6000 PSI.

ALL REINFORCING STEEL IN THE CONCRETE PARAPETS SHALL BE EPOXY COATED.

PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE BOX BEAM UNIT ENDS.

APPLY EPOXY PROTECTIVE COATING TO BOX BEAM UNIT ENDS.

VERTICAL GROOVED CONTRACTION JOINTS, ½" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A VERTICAL CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF BARRIER RAIL SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

THE LOCATION OF THE VOID DRAINS MAY BE SHIFTED SLIGHTLY WHERE NECESSARY TO CLEAR PRESTRESSING STRANDS OR TRANSVERSE REINFORCING STEEL.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE PERMITTED THREADED INSERTS ARE DETAILED AS AN OPTION FOR THE CONTRACTOR TO ATTACH FALSEWORK AND FORMWORK DURING CONSTRUCTION.

THE PERMITTED THREADED INSERTS IN THE EXTERIOR UNITS SHALL BE SIZED BY THE CONTRACTOR, SPACED AT 4'-0" CENTERS AND GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS. STAINLESS STEEL THREADED INSERTS MAY BE USED AS AN ALTERNATE.

THE PERMITTED THREADED INSERTS SHALL BE GROUTED BY THE CONTRACTOR IMMEDIATELY FOLLOWING REMOVAL OF THE FALSEWORK.

THE COST OF THE PERMITTED THREADED INSERTS SHALL BE INCLUDED IN THE PRICE BID FOR THE PRECAST UNITS.

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NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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VANCE COUNTY

STATION: 19+65.00 -L-

SHEET 1 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

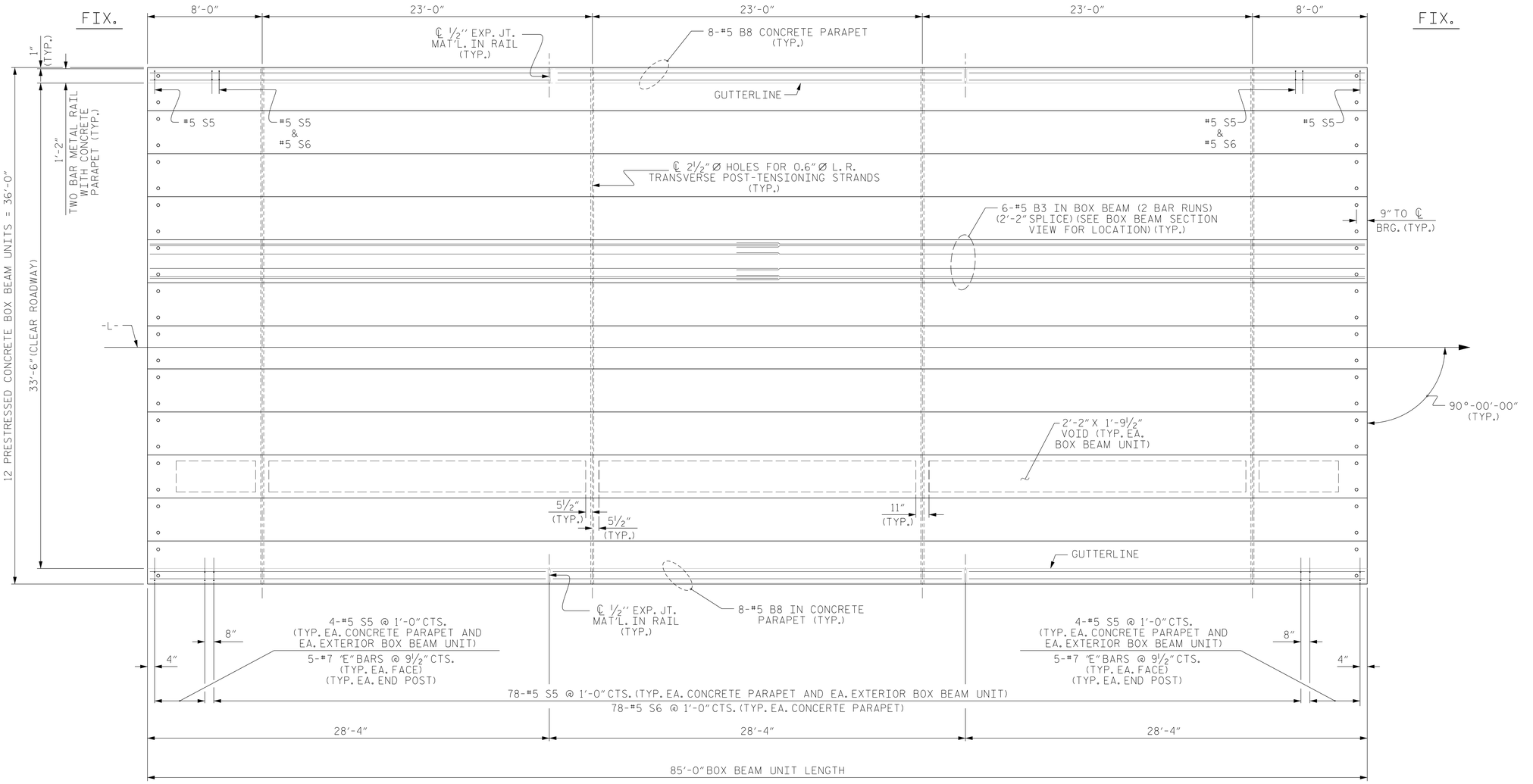
STANDARD

3'-0" X 2'-9" PRESTRESSED CONCRETE BOX BEAM UNIT

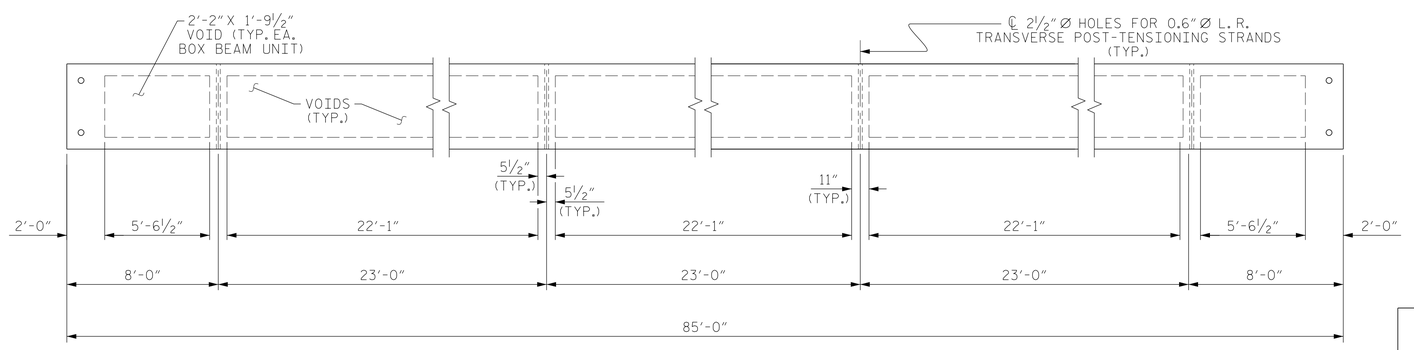
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			25

DRAWN BY: H.ASSFOURA DATE: 12/16
CHECKED BY: J. LOFTUS DATE: 03-17
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE: 03-17

900012
11/2/2017
...\400_006_900012_SMU_BBU01.dgn
USER:jloftus



PLAN OF 85' UNIT



DIAPHRAGM AND VOID LAYOUT

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NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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PROJECT NO. 17BP.5.R.62

VANCE COUNTY

STATION: 19+65.00 -L-

SHEET 2 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 85' UNIT
33'-6" CLEAR ROADWAY
90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-7
1			3			TOTAL SHEETS
2			4			25

DRAWN BY: H.ASSFOURA DATE: 12/16
CHECKED BY: J. LOFTUS DATE: 03-17
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE: 03-17

900012

11/2/2017
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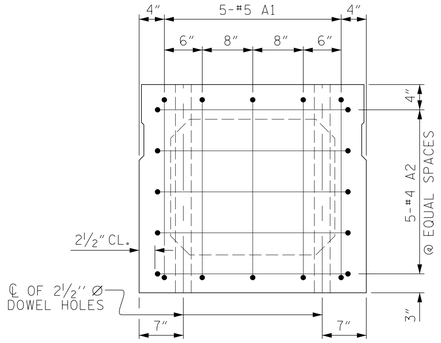
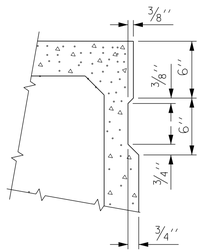
USER:jloftus



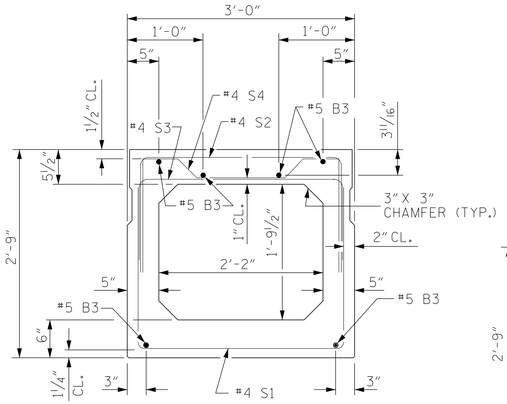
END ELEVATION

SHOWING PLACEMENT OF #5 & #4 "A" BARS AND LOCATION OF DOWEL HOLES. (INTERIOR BOX BEAM SECTION SHOWN-EXTERIOR SECTION SIMILAR EXCEPT SHEAR KEY LOCATION. STRAND LAYOUT NOT SHOWN.)



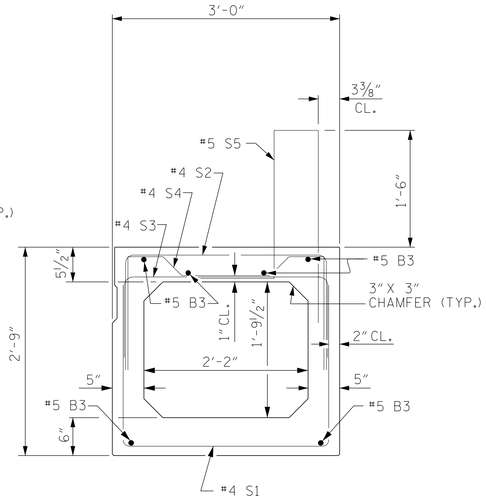
SHEAR KEY DETAIL

NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR BOX BEAMS.



INTERIOR BOX BEAM SECTION

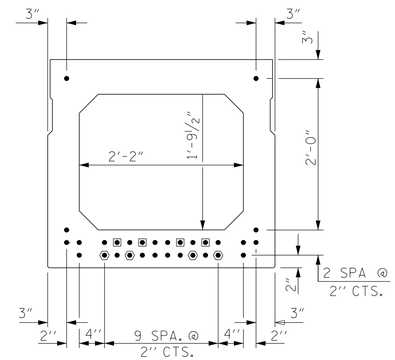
(STRAND LAYOUT NOT SHOWN)



EXTERIOR BOX BEAM SECTION

(STRAND LAYOUT NOT SHOWN)

0.6" Ø LOW RELAXATION STRAND LAYOUT



TYPICAL STRAND LOCATION

(30 STRANDS REQUIRED)

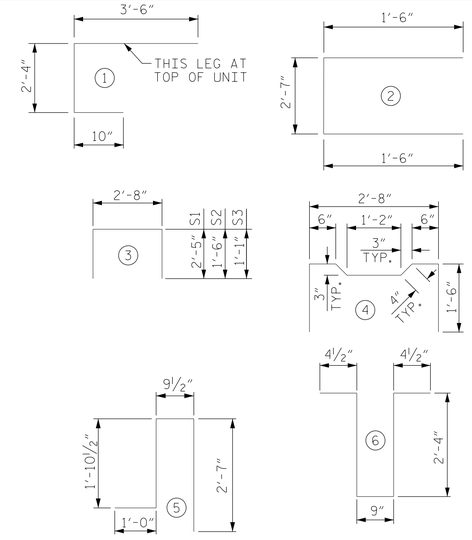
DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ◘ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- ⬢ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER

BOND SHALL BE BROKEN ON STRANDS AS SHOWN FOR THE SPECIFIED LENGTH FROM EACH END OF THE BOX BEAM. SEE STANDARD SPECIFICATIONS ARTICLE 1078-7.

GRADE 270 STRANDS	0.6" Ø L.R.
AREA (SQUARE INCHES)	0.217
ULTIMATE STRENGTH (LBS. PER STRAND)	58,600
APPLIED PRESTRESS (LBS. PER STRAND)	43,950

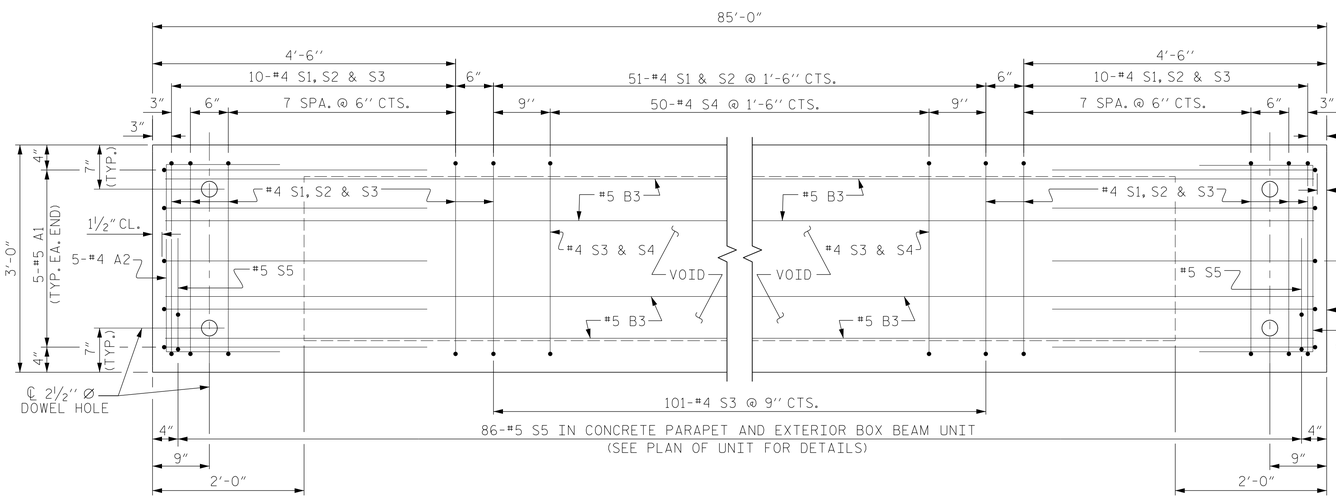
BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR ONE BOX BEAM SECTION

				EXTERIOR UNIT		INTERIOR UNIT	
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT
A1	10	#5	1	6'-8"	70	6'-8"	70
A2	34	#4	2	5'-7"	127	5'-7"	127
B3	12	#5	STR	43'-5"	543	43'-5"	543
K1	12	#4	6	6'-2"	49	6'-2"	49
K2	8	#4	STR	2'-7"	14	2'-7"	14
S1	71	#4	3	7'-6"	356	7'-6"	356
S2	71	#4	3	5'-8"	269	5'-8"	269
S3	121	#4	3	4'-10"	391	4'-10"	391
S4	50	#4	4	5'-10"	195	5'-10"	195
✳ S5	86	#5	5	6'-3"	561	--	--
REINFORCING STEEL					2014 LBS.		2014 LBS.
✳ EPOXY COATED REINF. STEEL					561 LBS.		
8000 P.S.I. CONCRETE					15.1 CU. YDS.		15.0 CU. YDS.
0.6" Ø L.R. STRANDS					No. 30		No. 30



PLAN OF 85' BOX BEAM

EXTERIOR UNIT SHOWN, INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S5 BARS.
FOR LOCATION OF DIAPHRAGMS, SEE "PLAN OF UNIT".
FOR THREADED INSERTS, SEE "THREADED INSERT DETAIL".
FOR REINFORCING STEEL IN DIAPHRAGMS, SEE "DOUBLE DIAPHRAGM DETAILS".

DocuSigned by: Jeff Loftus FE51DC02E6794A9... 11/2/2017

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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VANCE COUNTY

STATION: 19+65.00 -L-

SHEET 3 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

3'-0" X 2'-9" PRESTRESSED CONCRETE BOX BEAM UNIT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
1			3			TOTAL SHEETS
2			4			25

DRAWN BY: H.ASSFOURA DATE : 12/16
CHECKED BY: J. LOFTUS DATE : 03-17
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 03-17

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USER:jloftus

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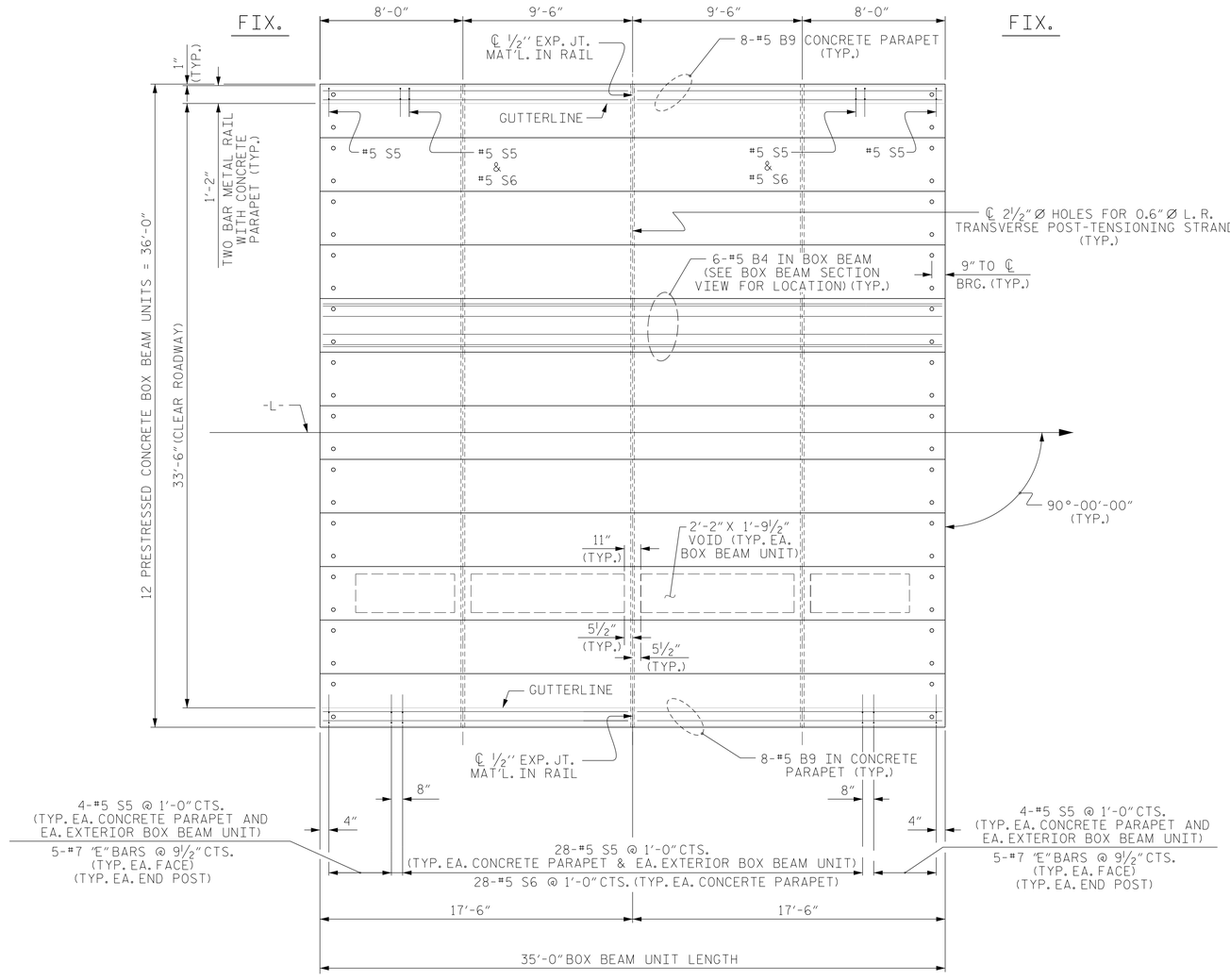
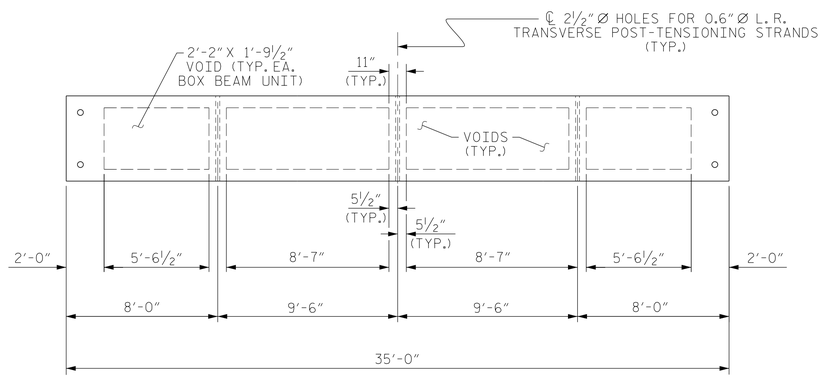
STD. NO. 33PCBB4_90S_85L



PLAN OF 35' UNIT



DIAPHRAGM AND VOID LAYOUT

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11/2/2017

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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VANCE COUNTY

STATION: 19+65.00 -L-

SHEET 4 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF 35' UNIT 33'-6" CLEAR ROADWAY 90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-9
1			3			TOTAL SHEETS
2			4			25

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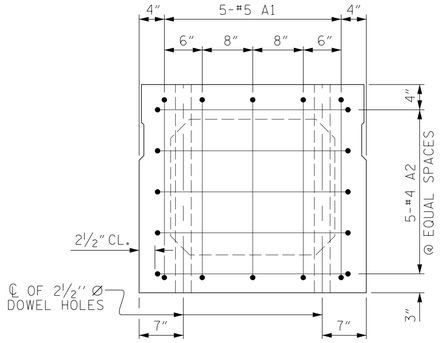
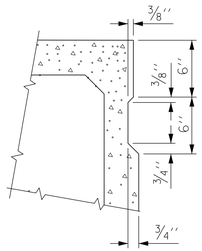
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE: 03-17

11/2/2017
...\400_009_900012_SMU_BBU04.dgn
USER:jloftus
900012



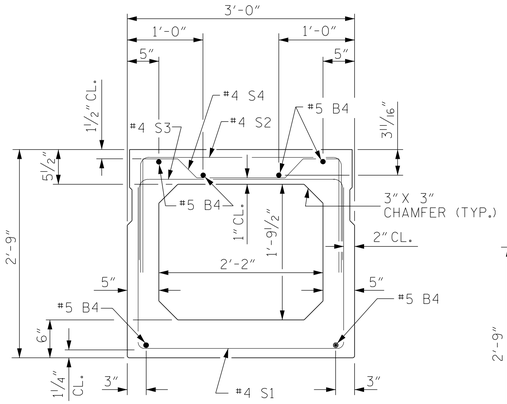
END ELEVATION

SHOWING PLACEMENT OF #5 & #4 "A" BARS AND LOCATION OF DOWEL HOLES. (INTERIOR BOX BEAM SECTION SHOWN-EXTERIOR SECTION SIMILAR EXCEPT SHEAR KEY LOCATION. STRAND LAYOUT NOT SHOWN.)



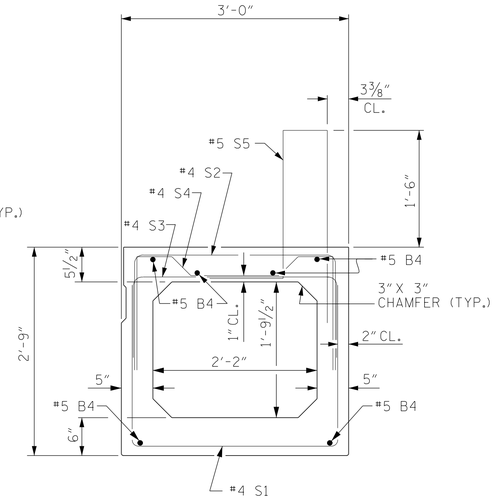
SHEAR KEY DETAIL

NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR BOX BEAMS.



INTERIOR BOX BEAM SECTION

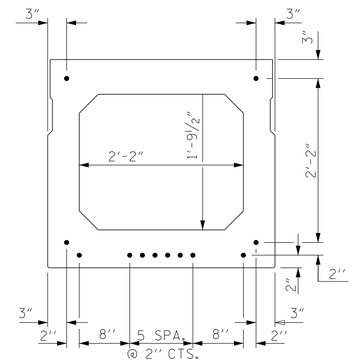
(STRAND LAYOUT NOT SHOWN)



EXTERIOR BOX BEAM SECTION

(STRAND LAYOUT NOT SHOWN)

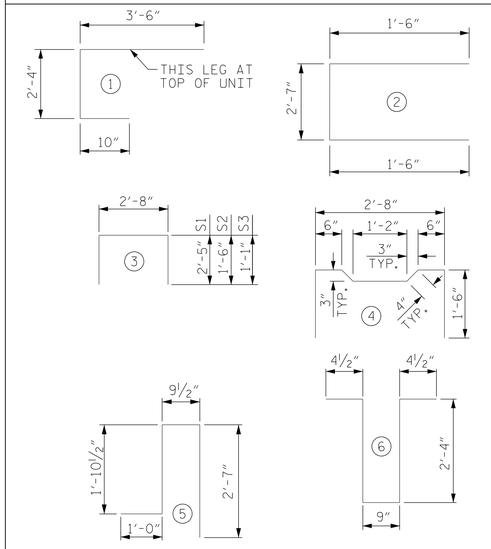
0.6" Ø LOW RELAXATION STRAND LAYOUT



TYPICAL STRAND LOCATION

(12 STRANDS REQUIRED)

BAR TYPES



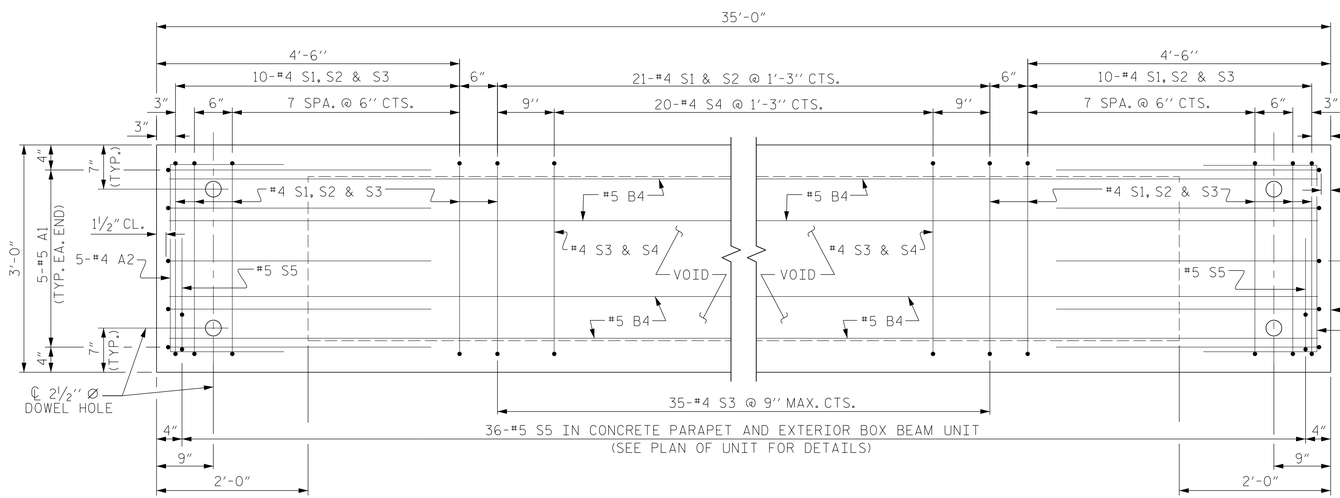
ALL BAR DIMENSIONS ARE OUT TO OUT

GRADE 270 STRANDS

	0.6" Ø L.R.
AREA (SQUARE INCHES)	0.217
ULTIMATE STRENGTH (LBS. PER STRAND)	58,600
APPLIED PRESTRESS (LBS. PER STRAND)	43,950

BILL OF MATERIAL FOR ONE BOX BEAM SECTION

				EXTERIOR UNIT		INTERIOR UNIT	
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT
A1	10	#5	1	6'-8"	70	6'-8"	70
A2	28	#4	2	5'-7"	104	5'-7"	104
B4	6	#5	STR	34'-8"	217	34'-8"	217
K1	9	#4	6	6'-2"	37	6'-2"	37
K2	6	#4	STR	2'-7"	10	2'-7"	10
S1	42	#4	3	7'-6"	210	7'-6"	210
S2	42	#4	3	5'-8"	159	5'-8"	159
S3	55	#4	3	4'-10"	178	4'-10"	178
S4	20	#4	4	5'-10"	78	5'-10"	78
✻ S5	36	#5	5	6'-3"	235	--	--
REINFORCING STEEL					1063 LBS.		1063 LBS.
✻ EPOXY COATED REINF. STEEL					235 LBS.		
8000 P.S.I. CONCRETE					6.5 CU. YDS.		6.4 CU. YDS.
0.6" Ø L.R. STRANDS					No. 12		No. 12



PLAN OF 35' BOX BEAM

EXTERIOR UNIT SHOWN, INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S5 BARS.
FOR LOCATION OF DIAPHRAGMS, SEE "PLAN OF UNIT".
FOR THREADED INSERTS, SEE "THREADED INSERT DETAIL".
FOR REINFORCING STEEL IN DIAPHRAGMS, SEE "DOUBLE DIAPHRAGM DETAILS".

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NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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VANCE COUNTY

STATION: 19+65.00 -L-

SHEET 5 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

3'-0" X 2'-9" PRESTRESSED CONCRETE BOX BEAM UNIT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-10
1			3			TOTAL SHEETS
2			4			25

DRAWN BY: H.ASSFOURA DATE : 12/16
CHECKED BY: J. LOFTUS DATE : 03-17
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 03-17

11/2/2017
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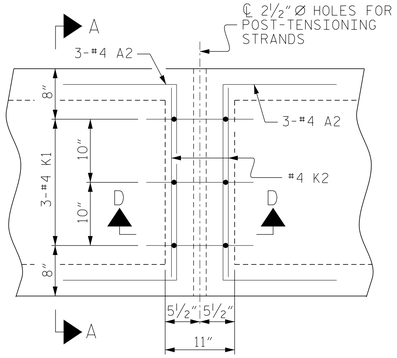
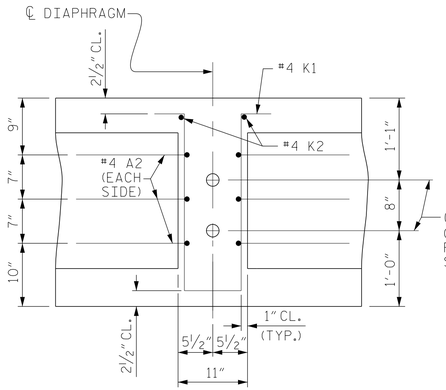
USER:jloftus

900012

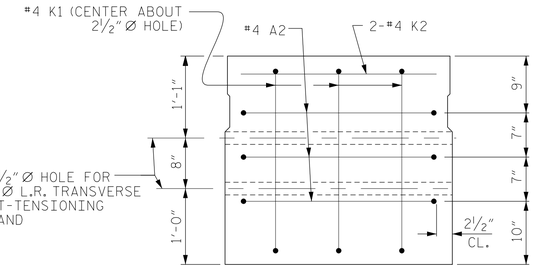
STD. NO. 33PCBB4_90S_85L



PLAN



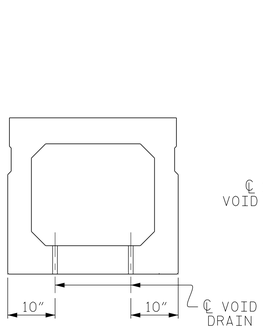
SECTION D-D



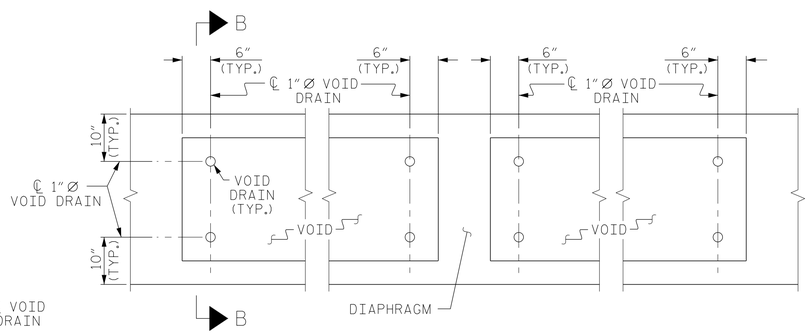
SECTION A-A
VOIDS NOT SHOWN

DOUBLE DIAPHRAGM DETAILS

#4 "S" BARS NOT SHOWN. #4 "S" BARS MAY BE SHIFTED SLIGHTLY TO CLEAR 2½" Ø HOLE.



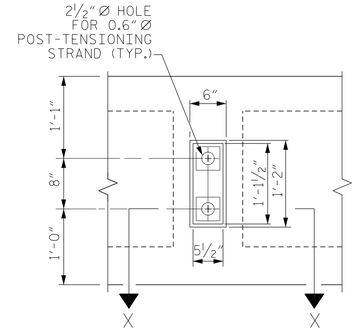
SECTION B-B



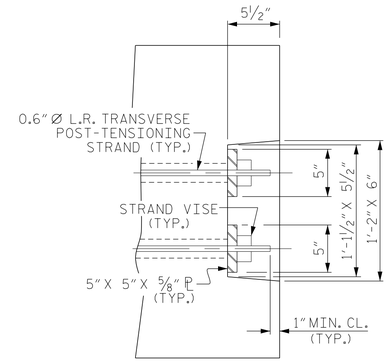
PART PLAN

VOID DRAIN DETAILS

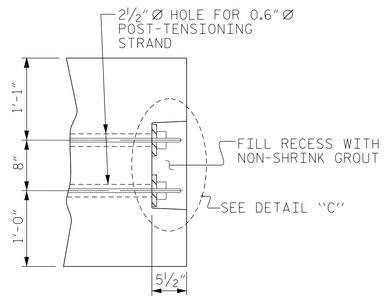
(DIMENSIONS SHOWN ARE TYPICAL FOR EACH VOID)



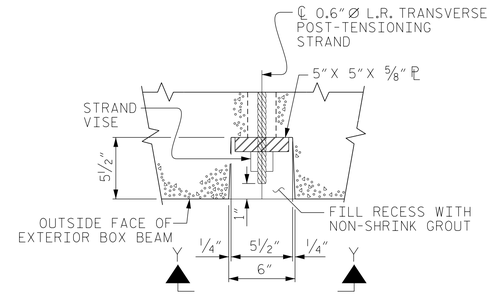
VIEW Y-Y
SHOWING ELEVATION VIEW OF GROUTED RECESS



DETAIL "C"



PART SECTION AT RECESS



SECTION X-X
SHOWING PLAN VIEW OF GROUTED RECESS

GROUTED RECESS DETAIL AT END OF POST-TENSIONED STRANDS OF EXTERIOR BOX BEAM

DEAD LOAD DEFLECTION AND CAMBER	
	3'-0" x 2'-9"
85' BOX BEAM UNIT (NC & SE)	0.6" Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	2⅝" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD**	⅞" ↓
FINAL CAMBER	1¾" ↑

** INCLUDES FUTURE WEARING SURFACE

DEAD LOAD DEFLECTION AND CAMBER	
	3'-0" x 2'-9"
35' BOX BEAM UNIT (NC & SE)	0.6" Ø L.R. STRAND
CAMBER (SLAB ALONE IN PLACE)	¼" ↑
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD**	0" ↓
FINAL CAMBER	¼" ↑

** INCLUDES FUTURE WEARING SURFACE

PROJECT NO. 17BP.5.R.62

VANCE COUNTY

STATION: 19+65.00 -L-

SHEET 6 OF 7

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NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M LOFTUS

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
3'-0" X 2'-9"
PRESTRESSED CONCRETE
BOX BEAM UNIT

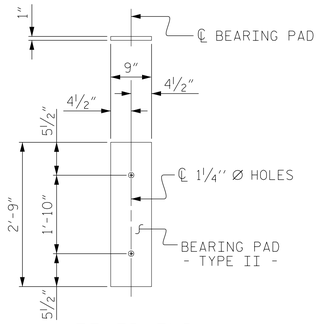
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-11
1			3			TOTAL SHEETS
2			4			25

DRAWN BY:	H.ASSFOURA	DATE: 12/16
CHECKED BY:	J. LOFTUS	DATE: 03-17
DESIGN ENGINEER OF RECORD:	J. LOFTUS	DATE: 03-17

900012

11/2/2017
...\400_011_900012_SMU_BBU06.dgn
USER:jloftus

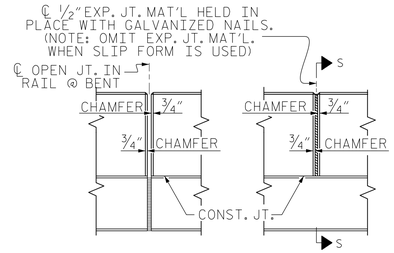
STD.NO.33PCBB5_90S



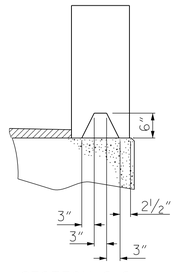
FIXED END

(TYPE II - 48 REQ'D)

GUTTERLINE ASPHALT THICKNESS & RAIL HEIGHT		
	ASPHALT OVERLAY THICKNESS @ MID-SPAN	RAIL HEIGHT @ MID-SPAN
35' UNITS	3¼"	3'-9¼"
85' UNITS	1¾"	3'-7¾"

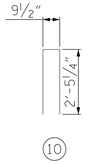


ELEVATION AT EXPANSION JOINTS



SECTION S-S

AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)



BAR TYPE

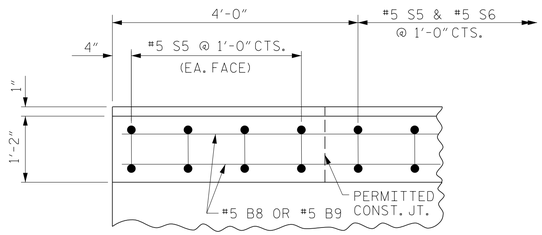
BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR PARAPET & END POSTS

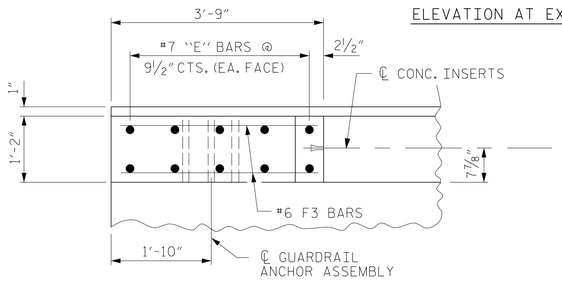
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B8	48	# 5	STR	27'-10"	1393
✳B9	48	# 5	STR	17'-0"	851
✳E1	8	# 7	STR	2'-9"	45
✳E2	8	# 7	STR	3'-3"	53
✳E3	8	# 7	STR	3'-9"	61
✳E4	8	# 7	STR	4'-3"	69
✳E5	8	# 7	STR	4'-6"	74
✳F1	8	# 6	STR	1'-10"	22
✳F2	8	# 6	STR	3'-0"	36
✳F3	8	# 6	STR	3'-8"	44
✳S6	212	# 5	10	5'-8"	1253
✳EPOXY COATED REINFORCING STEEL					3901 LBS.
CLASS AA CONCRETE					29.8 CU.YDS.
TOTAL LIN.FT. OF CONCRETE PARAPET					240.25 LF

ELASTOMERIC BEARING DETAILS

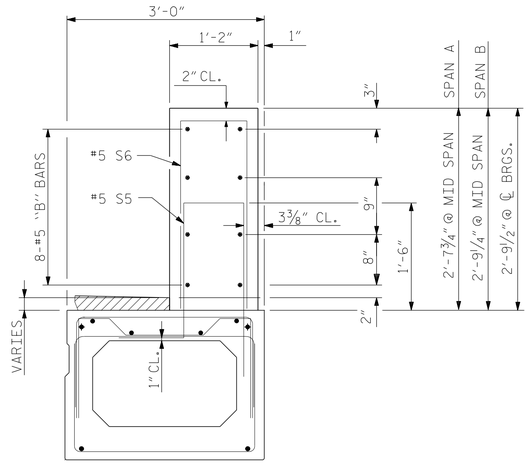
ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.



PLAN OF PARAPET

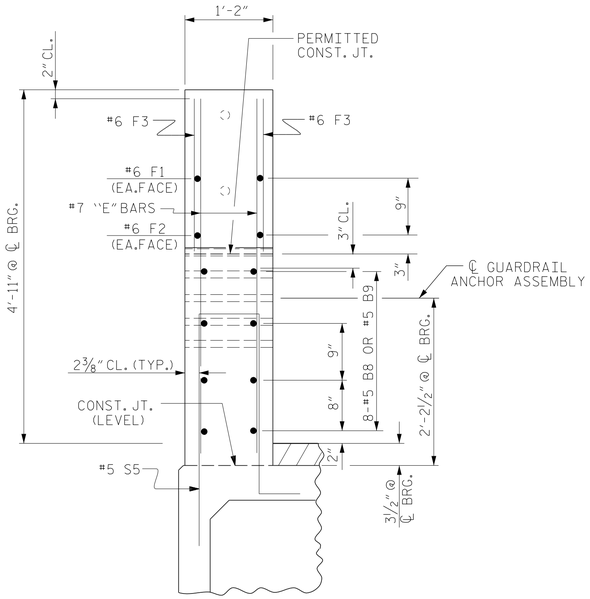


PLAN OF END POST

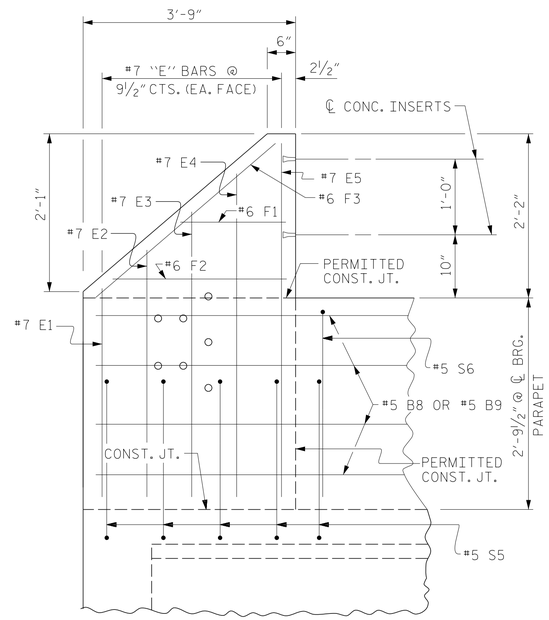


PARAPET SECTION

THE HEIGHT OF THE PARAPET VARIES WHILE THE TOP OF THE PARAPET FOLLOWS THE PROFILE OF THE GUTTERLINE.



END VIEW



ELEVATION

PARAPET AND END POST FOR TWO BAR RAIL

BOX BEAM UNITS REQUIRED			
	NUMBER	LENGTH	TOTAL LENGTH
85' UNIT			
EXTERIOR B.B.	2	85'-0"	170'-0"
INTERIOR B.B.	10	85'-0"	850'-0"
TOTAL	12	———	1020'-0"
35' UNIT			
EXTERIOR B.B.	2	35'-0"	70'-0"
INTERIOR B.B.	10	35'-0"	350'-0"
TOTAL	12	———	420'-0"

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NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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SHEET 7 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD 3'-0" X 2'-9" PRESTRESSED CONCRETE BOX BEAM UNIT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-12
1			3			TOTAL SHEETS
2			4			25

DRAWN BY:	H.ASSFOURA	DATE : 12/16
CHECKED BY:	J. LOFTUS	DATE : 03-17
DESIGN ENGINEER OF RECORD:	J. LOFTUS	DATE : 03-17

900012

11/2/2017
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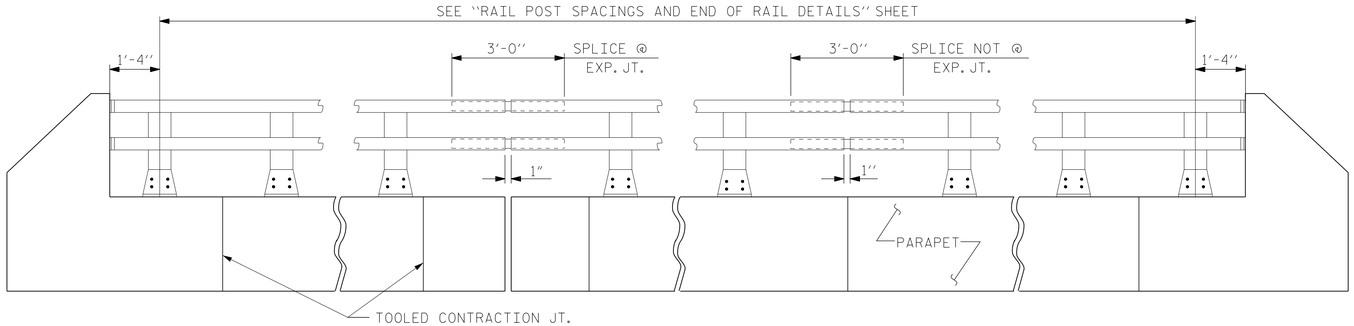
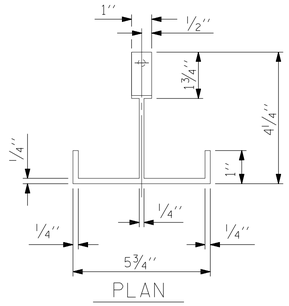
USER:jloftus

STD.NO.33PCBB5_90S

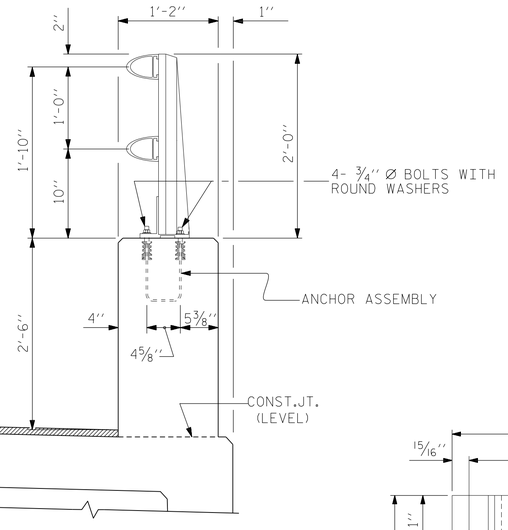


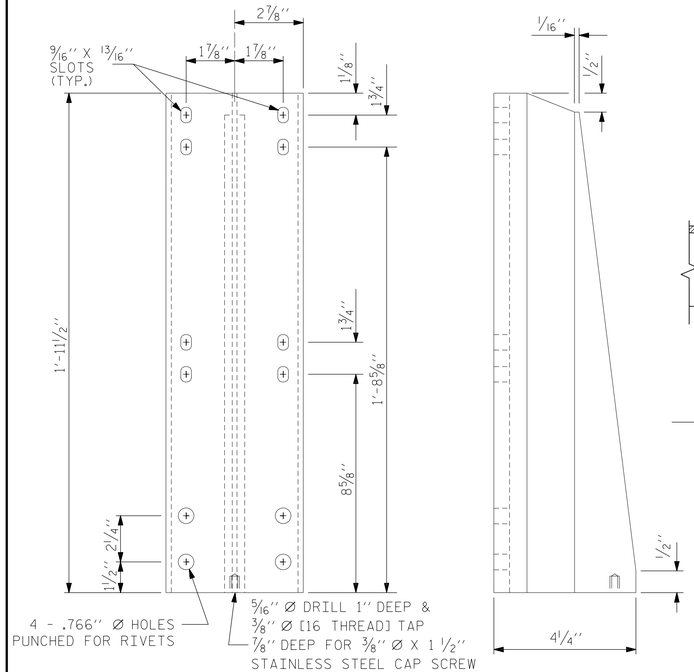
ELEVATION

NOTE : FOR ATTACHMENT OF METAL RAIL TO END POST, SEE STANDARD NO. BMR2.



PLAN

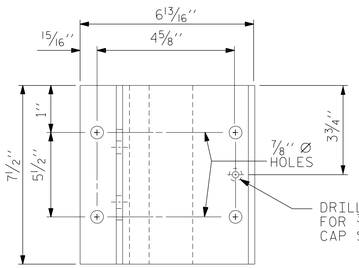




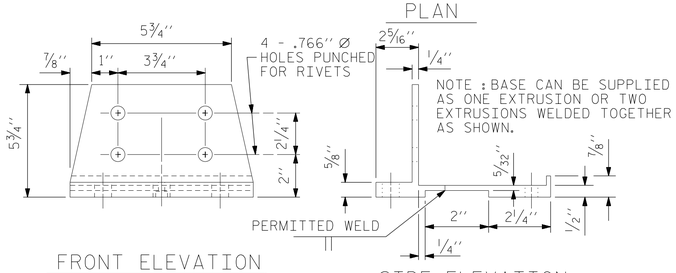
FRONT ELEVATION SIDE ELEVATION

DETAILS OF POST

SECTION THRU PARAPET AND RAIL



PLAN



FRONT ELEVATION SIDE ELEVATION

POST BASE DETAILS

NOTES

AT THE CONTRACTOR'S OPTION, METAL RAIL MAY BE EITHER ALUMINUM OR GALVANIZED STEEL IN ACCORDANCE WITH THE REQUIREMENTS OF THE GENERAL NOTES AND THE FOLLOWING SPECIFICATIONS FOR THE ALTERNATE MATERIALS; HOWEVER, THE CONTRACTOR WILL BE REQUIRED TO USE THE SAME RAIL MATERIAL ON ALL STRUCTURES ON THE PROJECT FOR WHICH METAL RAIL IS DESIGNATED.

UNLESS OTHERWISE REQUIRED IN THE CONTRACT DOCUMENTS, THE CONTRACTOR HAS THE OPTION TO USE AN ALTERNATE TO THE 2 BAR METAL RAIL. THE ALTERNATE RAIL SHALL MEET THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND MUST BE LISTED ON THE DEPARTMENT'S APPROVED PRODUCTS LIST (APL) UNDER "2 BAR METAL RAIL ALTERNATE". ADJUSTMENTS TO THE CONCRETE PARAPET WILL NOT BE ALLOWED.

ALUMINUM RAILS

MATERIAL FOR POSTS, BASES AND RAILS, EXPANSION BARS AND CLAMP BARS SHALL BE ASTM B-221 ALLOY 6061-T6.

MATERIAL FOR RIVETS SHALL BE ASTM B316 ALLOY 6061-T6. RIVETS SHALL BE STANDARD BUTTON HEAD AND CONE POINT COLD DRIVEN AS PER DRAWING.

THE BASE OF RAIL POSTS, OR ANY OTHER ALUMINUM SURFACE IN CONTACT WITH CONCRETE SHALL BE THOROUGHLY COATED WITH AN ALUMINUM IMPREGNATED CAULKING COMPOUND OF APPROVED QUALITY.

MATERIAL FOR SHIMS TO BE ASTM B209 ALLOY 6061-T6.

GALVANIZED STEEL RAILS

MATERIAL AND GALVANIZING ARE TO CONFORM TO THE FOLLOWING SPECIFICATIONS:

POST, POST BASES, RAILS, EXPANSION BARS AND CLAMP BARS: AASHTO M270 GRADE 36 STRUCTURAL STEEL - GALVANIZED TO AASHTO M111.

RIVETS: RIVETS SHALL MEET THE REQUIREMENTS OF ASTM A502 FOR GRADE 1 RIVETS.

THE CUT ENDS OF GALVANIZED STEEL RAILING, AFTER GRINDING SMOOTH SHALL BE GIVEN TWO COATS OF ZINC RICH PAINT MEETING THE REQUIREMENTS OF FEDERAL SPECIFICATION MIL-P-26915 USAF TYPE 1, OR OF FEDERAL SPECIFICATIONS TT-P-641.

SHIMS: SHIMS SHALL MEET THE REQUIREMENTS OF ASTM A570 FOR GRADE 33 OR A611 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.

RAIL CAPS: RAIL CAPS SHALL MEET THE REQUIREMENTS OF ASTM A570 FOR GRADE 33 OR A611 FOR GRADE C AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.

GENERAL NOTES

RAILING SHALL BE CONTINUOUS FROM END POST TO END POST OF BRIDGE. EACH JOINT IN RAIL LENGTH SHALL BE SPLICED AS DETAILED. PANEL LENGTHS OF RAIL SHALL BE ATTACHED TO A MINIMUM OF THREE POSTS.

FOR END OF RAIL TO CLEAR FACE OF CONCRETE END POST DIMENSION, SEE STANDARD NO. BMR2.

CAP SCREWS SHALL BE ASTM F593 ALLOY 305 STAINLESS STEEL. WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL.

CERTIFIED MILL REPORTS ARE REQUIRED FOR RAILS AND POSTS. SHOP INSPECTION IS NOT REQUIRED.

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

METHOD OF MEASUREMENT FOR METAL RAILS: FOR LENGTH OF METAL RAILS TO BE PAID FOR, SEE THE STANDARD SPECIFICATIONS.

CURVED RAIL USAGE: WHERE RAILS ARE TO BE USED ON BRIDGES ON HORIZONTAL AND/OR VERTICAL CURVATURE THE CONTRACTOR MAY, AT HIS OPTION, HAVE THE REQUIRED CURVATURE IN THE RAIL FORMED IN THE SHOP OR IN THE FIELD. IN EITHER EVENT, THE RAIL SHALL CONFORM WITHOUT BUCKLING OR KINKING TO THE REQUIRED CURVATURE IN A UNIFORM MANNER ACCEPTABLE TO THE ENGINEER.

TO INSURE FUTURE IDENTIFICATION OF THE FABRICATOR, A PERMANENT IDENTIFYING MARK SHALL BE PLACED ON EACH POST. THE METHOD OF MARKING AND LOCATION SHALL BE SUCH THAT IT DOES NOT DETRACT FROM THE APPEARANCE OF THE POST, BUT REMAINS VISIBLE AFTER RAIL PLACEMENT.

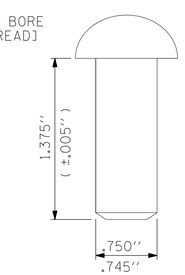
SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

ALLOY 6351-T5 MAY BE SUBSTITUTED FOR ALLOY 6061-T6 WHERE APPLICABLE.

MINOR VARIATIONS IN DETAILS OF METAL RAIL WILL BE CONSIDERED. DETAILS OF SUCH VARIATIONS, IF DESIRED, SHALL BE SUBMITTED FOR APPROVAL.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPET AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN PARAPET EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF PARAPET SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

PAY LENGTH = 225.25 LIN. FT.



RIVET DETAIL

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NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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PROJECT NO. 17BP.5.R.62

VANCE COUNTY

STATION: 19+65.00 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

2 BAR METAL RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-13
1			3			TOTAL SHEETS
2			4			25

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DRAWN BY:	H.ASSFOURA	DATE : 01/17
CHECKED BY:	J. LOFTUS	DATE : 03-17
DESIGN ENGINEER OF RECORD:	J. LOFTUS	DATE : 03-17

STD. NO. BMR3

900012

11/2/2017
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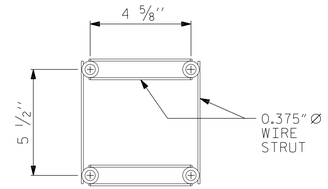
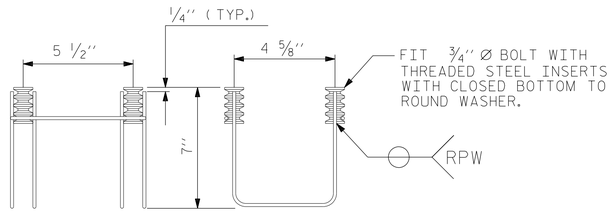
USER:jloftus



PLAN



SIDE VIEW ELEVATION

4-BOLT METAL RAIL ANCHOR ASSEMBLY

(44 ASSEMBLIES REQUIRED)

NOTES

STRUCTURAL CONCRETE ANCHOR ASSEMBLY

THE STRUCTURAL CONCRETE ANCHOR ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS :

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2'' FOR 3/4'' FERRULES.

B. 4 - 3/4'' Ø X 2 1/2'' BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 3/4'' Ø X 2 1/2'' GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.

C. WIRE STRUT SHOWN IN THE CONCRETE ANCHOR ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 7/16'' Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

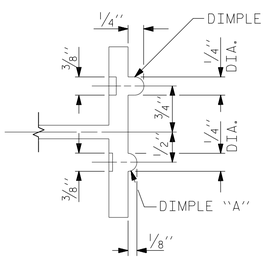
D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.

E. THE COST OF THE METAL RAIL ANCHOR ASSEMBLY WITH BOLTS AND WASHERS COMPLETE IN PLACE SHALL BE INCLUDED IN THE PRICE BID FOR LINEAR FEET OF METAL RAIL.

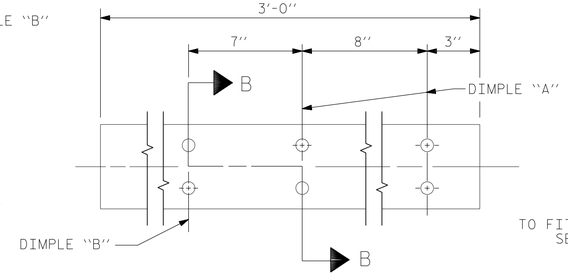
F. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

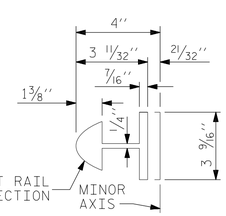
THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF THE METAL RAIL ANCHOR ASSEMBLY. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 10 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE THE STANDARD SPECIFICATIONS.

WHEN ADHESIVELY ANCHORED ANCHOR BOLTS ARE USED, BOLTS SHALL MEET THE REQUIREMENTS OF ASTM F593 ALLOY 304 STAINLESS STEEL WITH MINIMUM 75,000 PSI ULTIMATE STRENGTH. NUTS SHALL MEET THE REQUIREMENTS OF ASTM F594 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL.



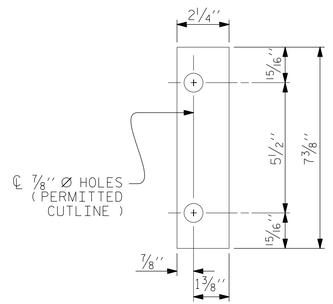
SECTION B - B



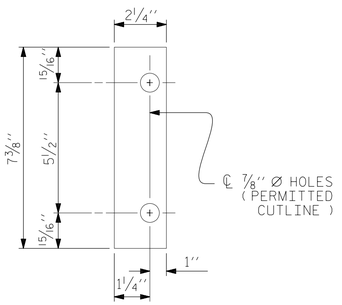


BAR SECTION

EXPANSION BAR DETAILS



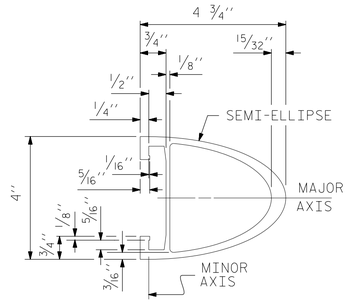
FRONT PLATE



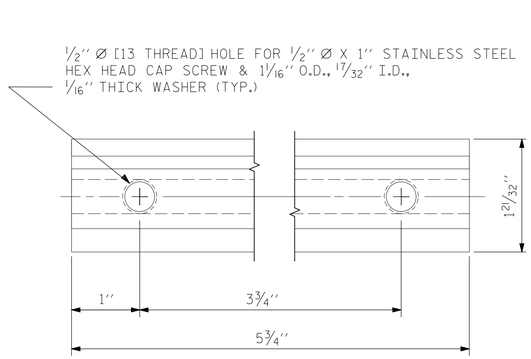
REAR PLATE

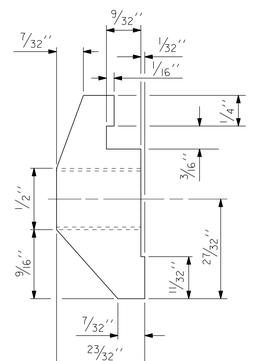
SHIM DETAILS

NOTE :
SHIMS MAY BE CUT ALONG PERMITTED CUTLINE OR SLOTTED TO EDGE OF PLATE TO FACILITATE PLACEMENT.



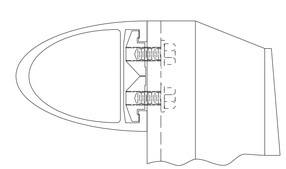
RAIL SECTION



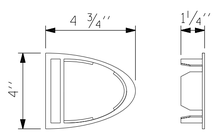


CLAMP BAR DETAIL

(4 REQUIRED PER POST)



CLAMP ASSEMBLY



RAIL CAP

DocuSigned by: Jeff Loftus FE51DC02E6794A9... 11/2/2017

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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PROJECT NO. 17BP.5.R.62

VANCE COUNTY

STATION: 19+65.00 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

2 BAR METAL RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-14
1			3			TOTAL SHEETS
2			4			25

DRAWN BY:	H.ASSFOURA	DATE : 01/17
CHECKED BY:	J. LOFTUS	DATE : 03-17
DESIGN ENGINEER OF RECORD:	J. LOFTUS	DATE : 03-17

11/2/2017
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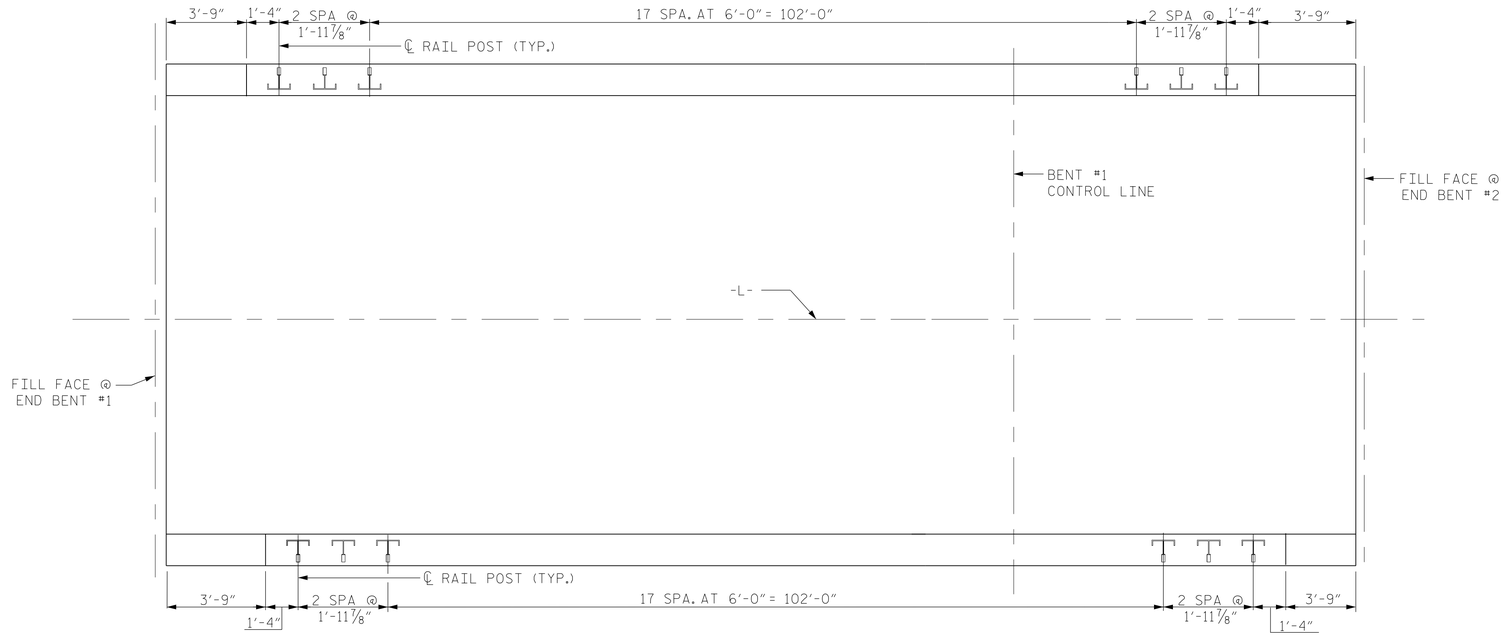
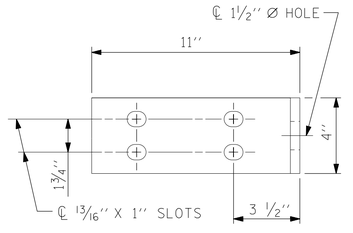
USER:jloftus

900012

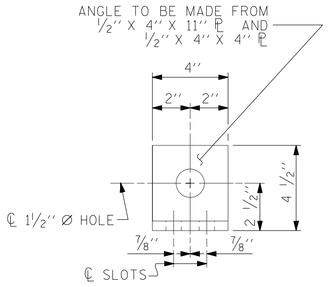
STD. NO. BMR4



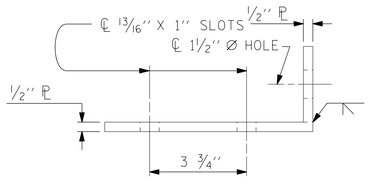
PLAN OF RAIL POST SPACINGS



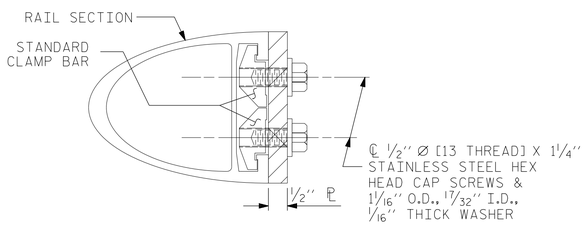
ELEVATION



END VIEW (FIX AND EXP.)



TOP VIEW



SECTION H-H (FIX)

FIXED

DETAILS FOR ATTACHING METAL RAIL TO END POST

NOTES

STRUCTURAL CONCRETE INSERT

THE STRUCTURAL CONCRETE INSERT ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS:

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 1½".

B. 1 - ¾" Ø X 1⅝" BOLT WITH WASHER. BOLT SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLT AND WASHER SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLT AND WASHER MAY BE USED AS AN ALTERNATE FOR THE ¾" Ø X 1⅝" GALVANIZED BOLT AND WASHER. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

C. WIRE STRUT SHOWN IN THE CONCRETE INSERT ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

NOTES

METAL RAIL TO END POST CONNECTION

THE METAL RAIL TO END POST CONNECTION SHALL CONSIST OF THE FOLLOWING COMPONENTS:

A. ½" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.

B. ¾" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A ¾"Ø X 1⅝" BOLT WITH 2" O.D. WASHER IN PLACE. THE ¾"Ø X 1⅝" BOLT SHALL HAVE N. C. THREADS.

C. CAP SCREWS FOR RAIL ATTACHMENT TO ANGLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM F593 ALLOY 305 STAINLESS STEEL. CAP SCREWS TO BE CENTERED IN SLOTS AT 60°F.

D. STANDARD CLAMP BARS (SEE METAL RAIL SHEET).

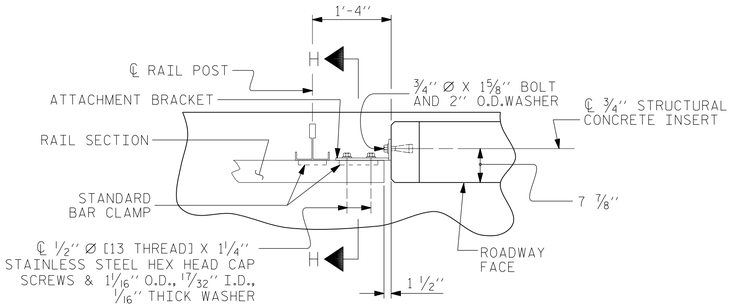
E. ½" Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

THE COST OF THE STANDARD CLAMP BARS AND CAP SCREWS USED IN THE METAL RAIL TO END POST CONNECTION SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR LINEAR FEET OF 1 OR 2 BAR METAL RAILS.

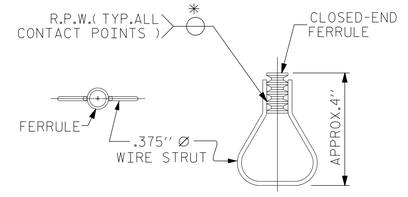
THE ¾" STRUCTURAL CONCRETE INSERT WITH BOLT SHALL BE ASSEMBLED IN THE SHOP.

THE COST OF THE ¾" STRUCTURAL CONCRETE INSERT ASSEMBLY, AND THE ½" PLATES COMPLETE IN PLACE SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

THE CONTRACTOR, AT HIS OPTION, MAY USE AN ADHESIVE BONDING SYSTEM IN LIEU OF THE STRUCTURAL CONCRETE INSERT EMBEDDED IN THE END POST. IF THE ADHESIVE BONDING SYSTEM IS USED, THE ¾" Ø X 1⅝" BOLT WITH WASHER SHALL BE REPLACED WITH A ¾"Ø X 6½" BOLT AND 2" O.D. WASHER. ALL SPECIFICATIONS THAT APPLY TO THE ¾" Ø X 1⅝" BOLT SHALL APPLY TO THE ¾"Ø X 6 ½" BOLT. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.



PLAN - RAIL AND END POST



PLAN ELEVATION

STRUCTURAL CONCRETE INSERT

* EACH WELDED ATTACHMENT OF WIRE TO FERRULE SHALL DEVELOP THE TENSILE STRENGTH OF THE WIRE.

PROJECT NO. 17BP.5.R.62

VANCE COUNTY

STATION: 19+65.00 -L-

SHEET 3 OF 3

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

RAIL POST SPACINGS AND END OF RAIL DETAILS
FOR TWO BAR METAL RAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-15
1			3			TOTAL SHEETS
2			4			25

DRAWN BY: H. ASSFOURA DATE : 12-16
CHECKED BY: J. LOFTUS DATE : 03-17
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 03-17

STD. NO. BMR2

900012
11/2/2017
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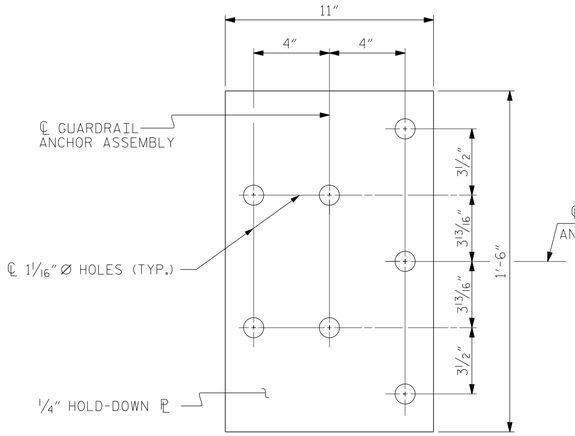
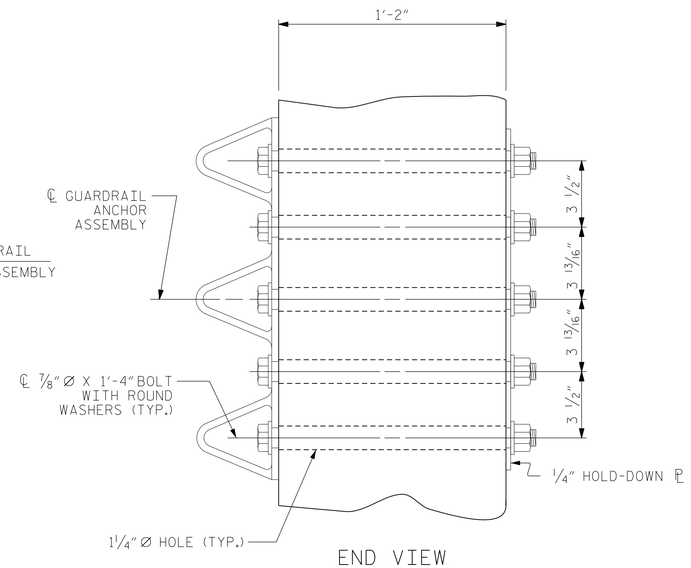
USER:jloftus



PLAN



END VIEW

GUARDRAIL ANCHOR ASSEMBLY DETAILS

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4'' HOLD DOWN PLATE AND 7 - 7/8'' Ø BOLTS WITH NUTS AND WASHERS.

THE HOLD-DOWN PLATE SHALL CONFORM TO AASHTO M270 GRADE 36. AFTER FABRICATION, THE HOLD-DOWN PLATE SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH AASHTO M111.

BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 7/8'' Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.

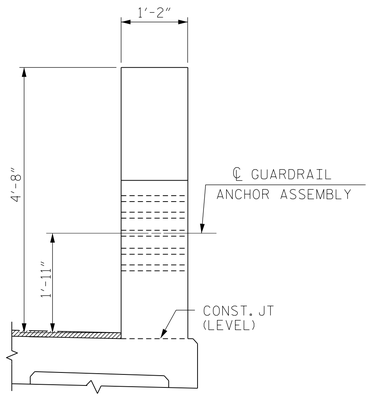
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

AFTER INSTALLATION, THE EXPOSED THREAD OF THE BOLT SHALL BE BURRED WITH A SHARP POINTED TOOL.

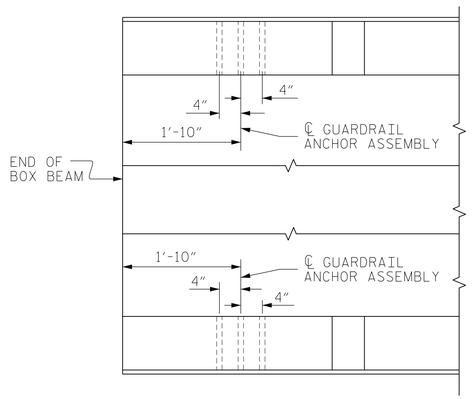
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLIES WITH BOLTS, NUTS AND WASHERS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE END POST TO CLEAR ASSEMBLY BOLTS.

THE 1 1/4'' Ø 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.



END VIEW
(TWO BAR METAL RAIL)



PLAN

LOCATION OF GUARDRAIL ANCHOR AT END POST



SKETCH SHOWING POINTS OF ATTACHMENT

✳ LOCATION OF GUARDRAIL ATTACHMENT

PROJECT NO. 17BP.5.R.62

VANCE COUNTY

STATION: 19+65.00 -L-

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Jeff LoFtus
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11/2/2017

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GUARDRAIL ANCHORAGE DETAILS FOR 2 BAR METAL RAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-16
1			3			TOTAL SHEETS
2			4			25

DRAWN BY: H. ASSFOURA DATE : 12-16
CHECKED BY: J. LOFTUS DATE : 03-17
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE : 03-17

(SHT 2) STD. NO. GRA3

900012

11/2/2017
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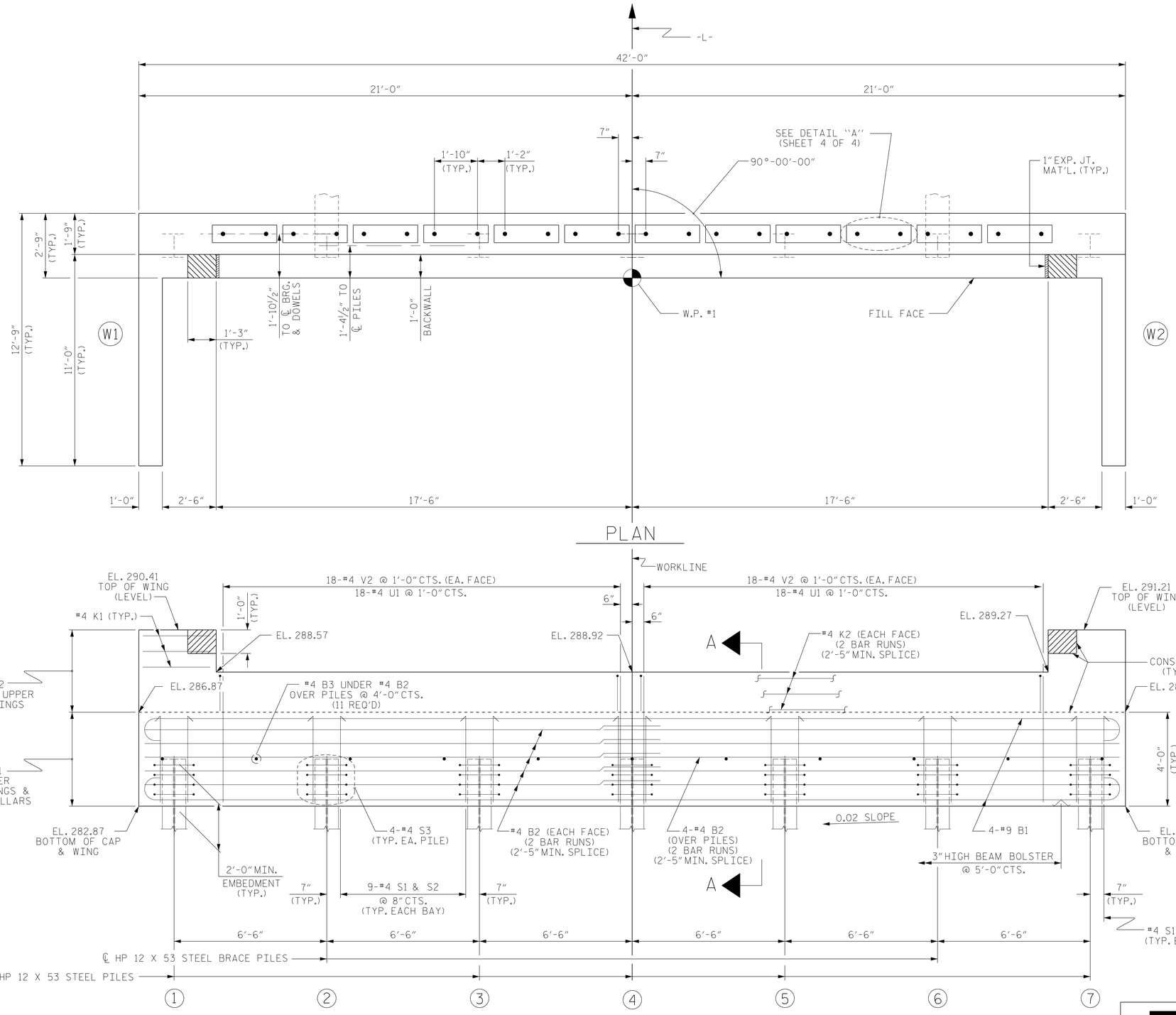
USER:jloftus



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 4 OF 4.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE CONCRETE PARAPET IS CAST IF SLIP FORMING IS USED.

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.

TOP OF PILE ELEVATIONS	
1	284.90
2	285.03
3	285.16
4	285.29
5	285.42
6	285.55
7	285.68

0.02 SLOPE

PROJECT NO. 17BP.5.R.62

VANCE COUNTY

STATION: 19+65.00 -L-

SHEET 1 OF 4

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SUBSTRUCTURE

END BENT No. 1

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-17
1			3			TOTAL SHEETS
2			4			25

DRAWN BY: H.ASSFOURA DATE: 01/17
CHECKED BY: J. LOFTUS DATE: 03-17
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE: 03-17

STD. NO. EB_36_90S4_33BB

11/2/2017
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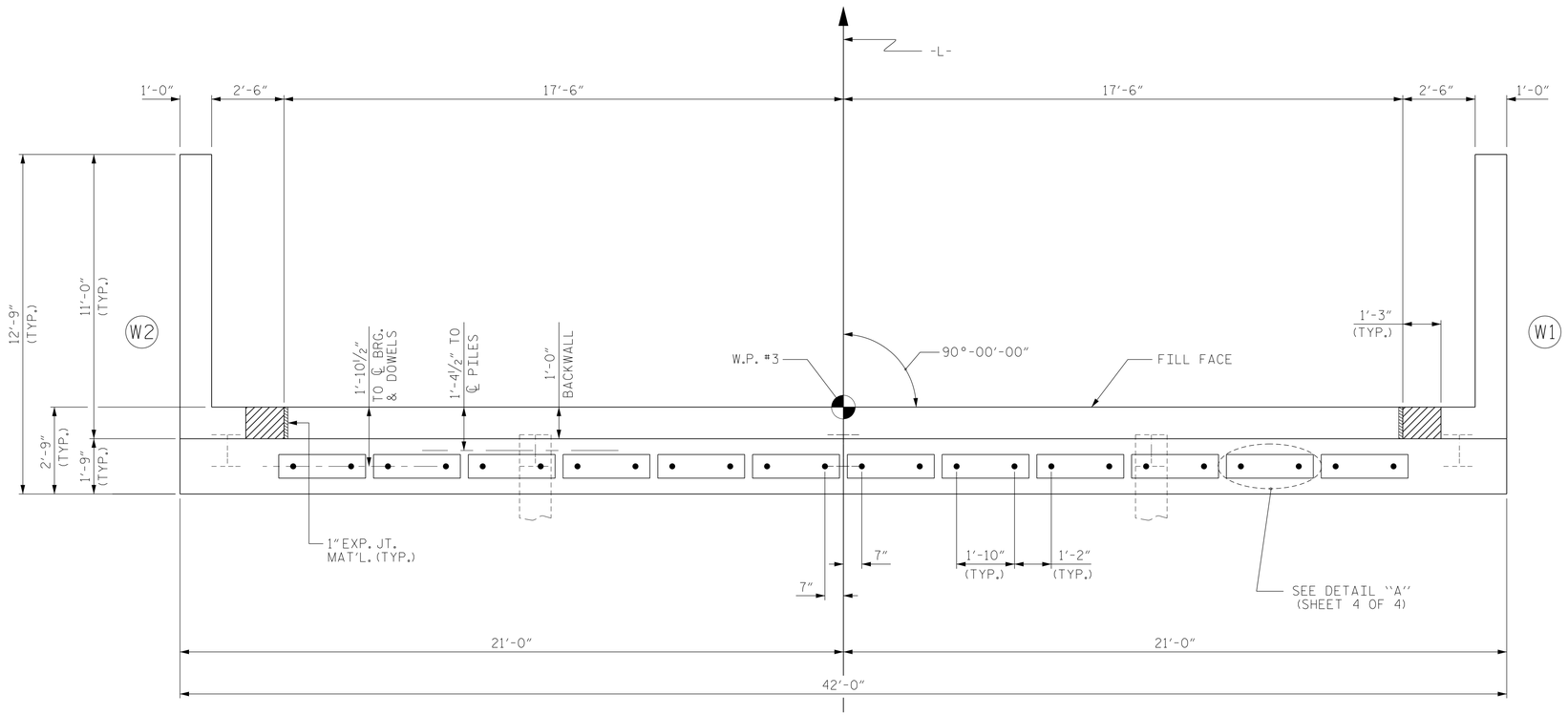
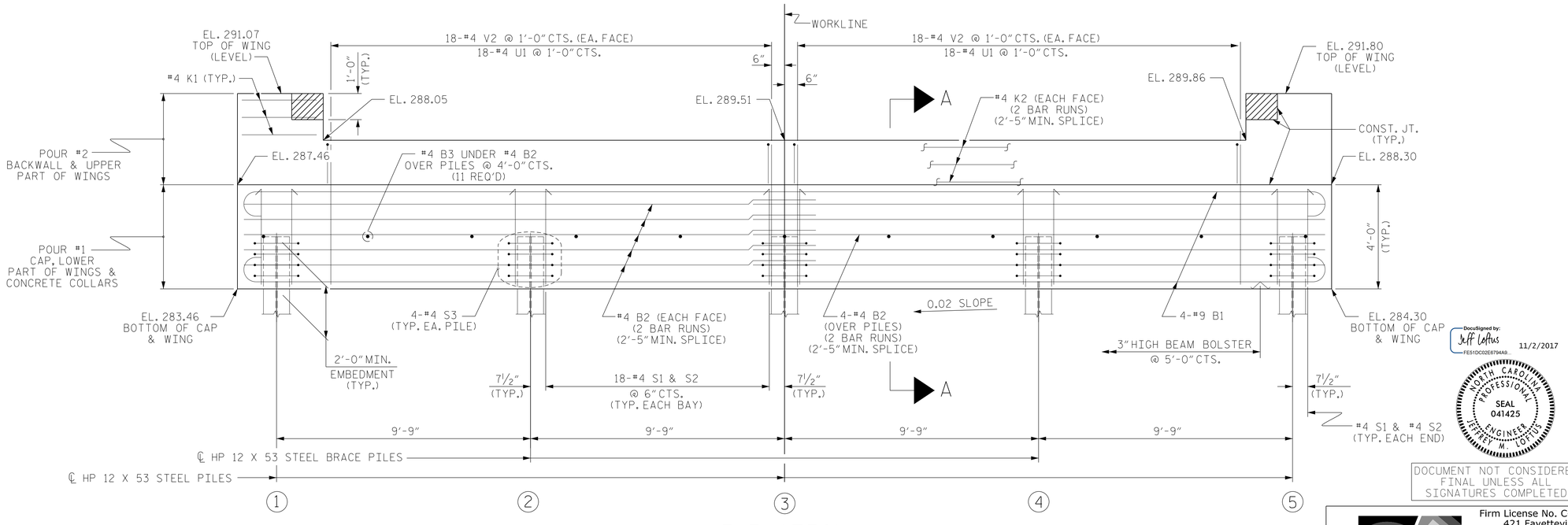
USER:jloftus
900012



PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTION A-A, SEE SHEET 4 OF 4.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE CONCRETE PARAPET IS CAST IF SLIP FORMING IS USED.

FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.

TOP OF PILE ELEVATIONS	
1	285.49
2	285.69
3	285.88
4	286.08
5	286.27

0.02 SLOPE

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SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS
2			4			25

DRAWN BY:	H.ASSFOURA	DATE : 01/17
CHECKED BY:	J. LOFTUS	DATE : 03-17
DESIGN ENGINEER OF RECORD:	J. LOFTUS	DATE : 03-17

11/2/2017
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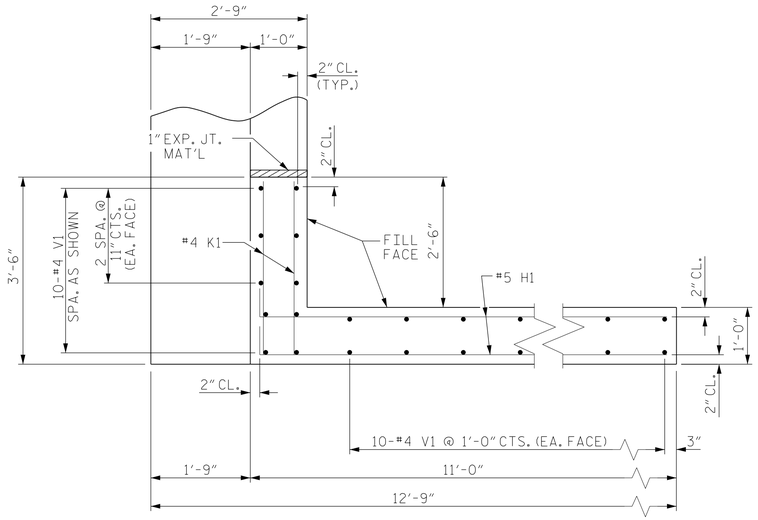
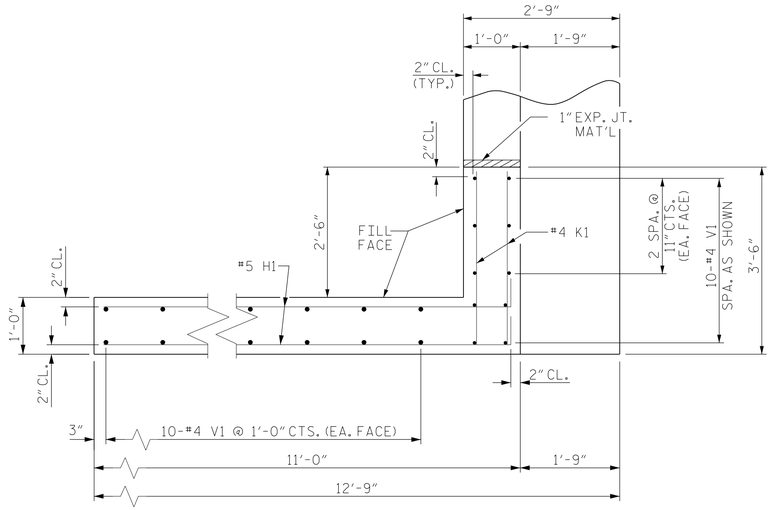
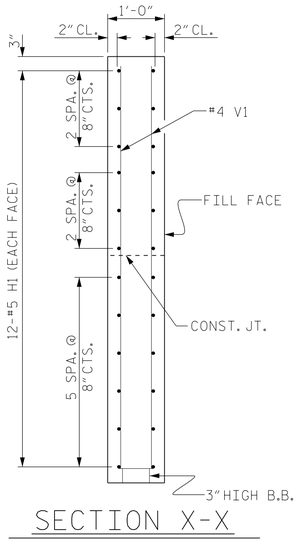


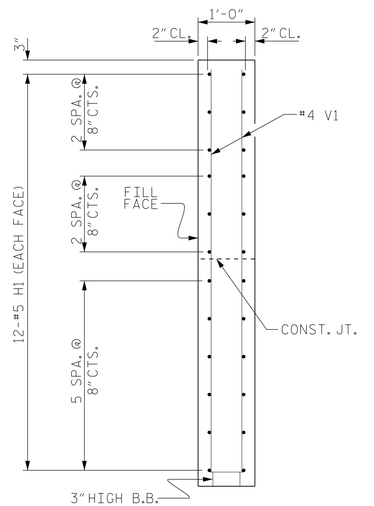
PLAN OF WING (W1)



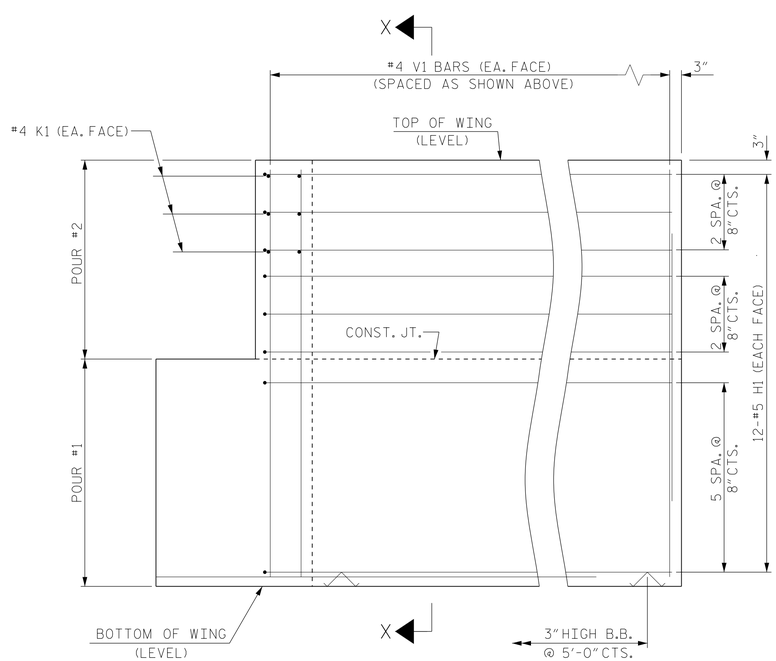
PLAN OF WING (W2)



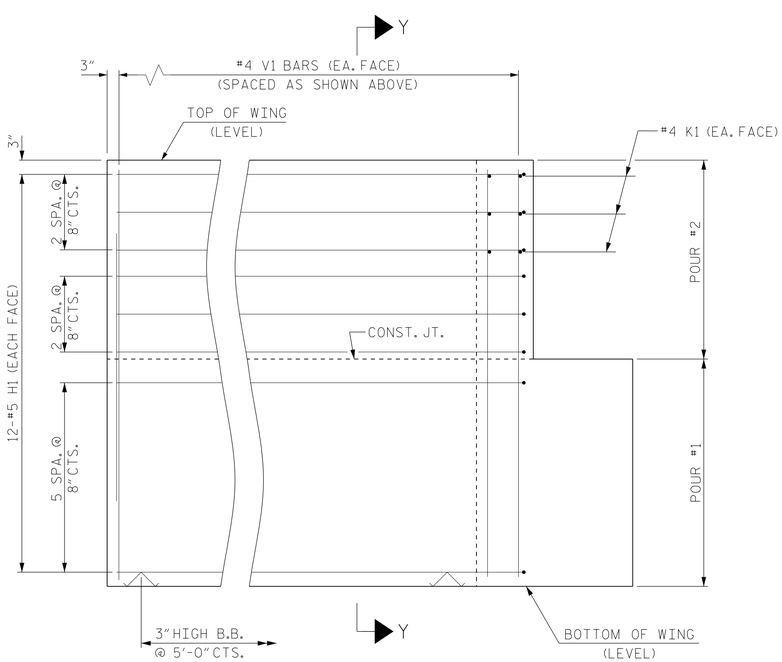
SECTION X-X



SECTION Y-Y



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)

WING DETAILS

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PROJECT NO. 17BP.5.R.62

VANCE COUNTY

STATION: 19+65.00 -L-

SHEET 3 OF 4

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT
WING DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-19
1			3			TOTAL SHEETS
2			4			25

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DESIGN ENGINEER OF RECORD:	J. LOFTUS	DATE : 03-17

STD. NO. EB_36_90S4_33BB

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11/2/2017
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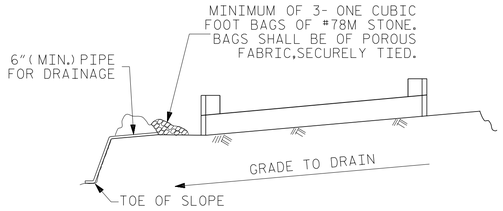
USER:jloftus

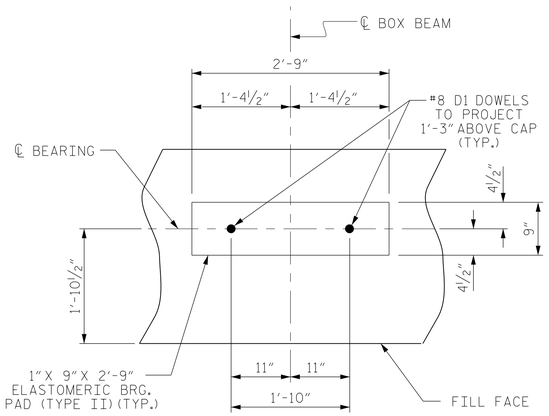


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR EFFECTIVENESS.

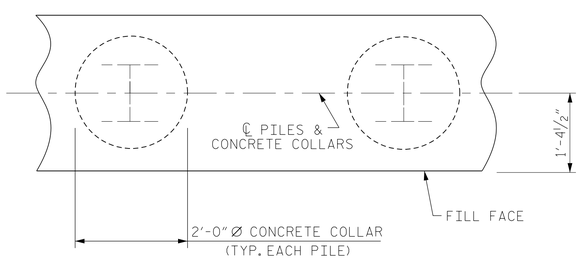
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

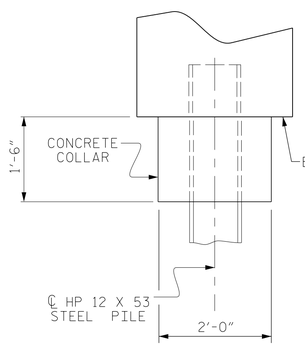


DETAIL "A"

(END BENT No. 1 SHOWN, END BENT No. 2 SIMILAR BY ROTATION)



PLAN

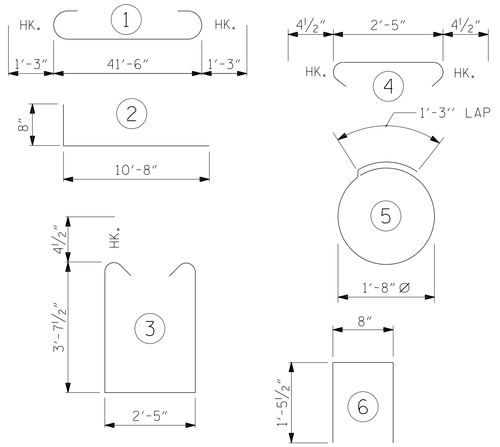


ELEVATION

CORROSION PROTECTION FOR STEEL PILES DETAIL

(END BENT No. 1 SHOWN, END BENT No. 2 SIMILAR BY ROTATION)

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

END BENT No. 1	
HP 12 X 53 STEEL PILES	
NO: 7	LIN. FT.= 175
PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	NO: 7
STEEL PILE POINTS	NO: 7

END BENT No. 2	
HP 12 X 53 STEEL PILES	
NO: 5	LIN. FT.= 100
PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	NO: 5
STEEL PILE POINTS	NO: 5

BILL OF MATERIAL FOR ONE END BENT #1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	44'-0"	1197
B2	28	#4	STR	22'-1"	413
B3	11	#4	STR	2'-5"	18
D1	24	#8	STR	2'-3"	144
H1	48	#5	2	11'-4"	567
K1	12	#4	STR	3'-1"	25
K2	12	#4	STR	22'-1"	177
S1	56	#4	3	10'-5"	390
S2	56	#4	4	3'-2"	118
S3	28	#4	5	6'-6"	122
U1	36	#4	6	3'-7"	86
V1	60	#4	STR	7'-2"	287
V2	72	#4	STR	5'-3"	253

REINFORCING STEEL (FOR ONE END BENT) 3797 LBS.

CLASS A CONCRETE BREAKDOWN (FOR ONE END BENT #1)

POUR #1	CAP, LOWER PART OF WINGS & COLLARS	21.3 C.Y.
POUR #2	BACKWALL & UPPER PART OF WINGS	5.5 C.Y.
TOTAL CLASS A CONCRETE		26.9 C.Y.

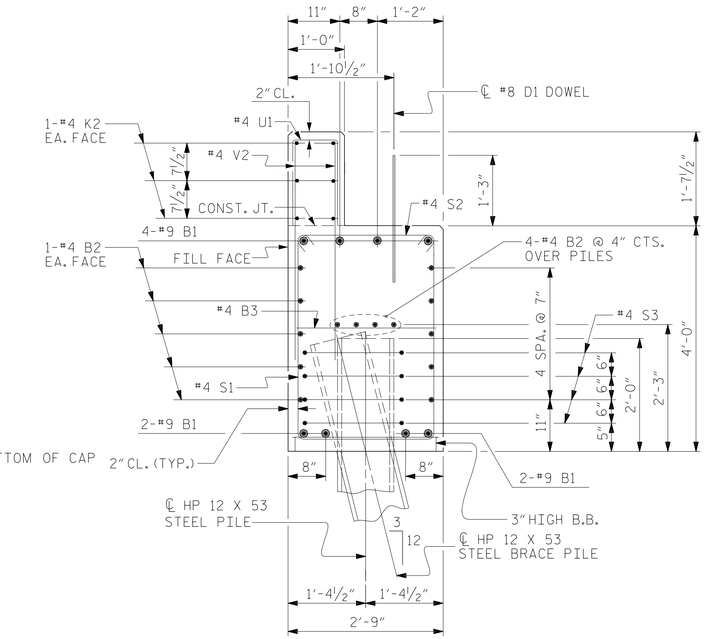
BILL OF MATERIAL FOR ONE END BENT #2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9	1	44'-0"	1197
B2	28	#4	STR	22'-1"	413
B3	11	#4	STR	2'-5"	18
D1	24	#8	STR	2'-3"	144
H1	48	#5	2	11'-4"	567
K1	12	#4	STR	3'-1"	25
K2	12	#4	STR	22'-1"	177
S1	74	#4	3	10'-5"	515
S2	74	#4	4	3'-2"	157
S3	20	#4	5	6'-6"	87
U1	36	#4	6	3'-7"	86
V1	60	#4	STR	7'-2"	287
V2	72	#4	STR	5'-3"	253

REINFORCING STEEL (FOR ONE END BENT) 3926 LBS.

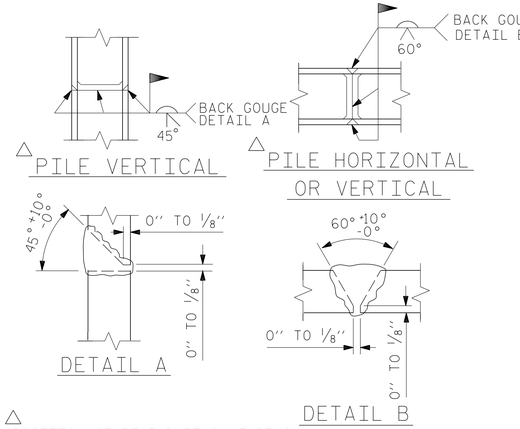
CLASS A CONCRETE BREAKDOWN (FOR ONE END BENT #2)

POUR #1	CAP, LOWER PART OF WINGS & COLLARS	21.3 C.Y.
POUR #2	BACKWALL & UPPER PART OF WINGS	5.5 C.Y.
TOTAL CLASS A CONCRETE		26.9 C.Y.



SECTION A-A

(CONCRETE COLLAR NOT SHOWN FOR CLARITY. SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL.")



PILE SPLICE DETAILS

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NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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PROJECT NO. 17BP.5.R.62

VANCE COUNTY

STATION: 19+65.00 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT No. 1 & 2 DETAILS

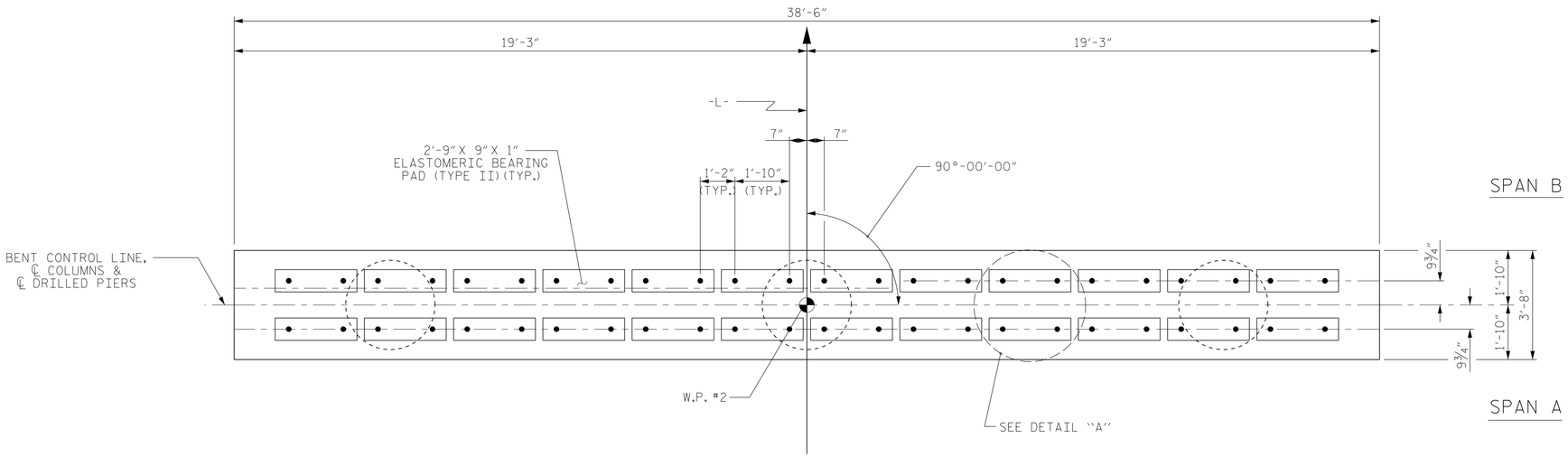
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS
2			4			25

DRAWN BY:	H.ASSFOURA	DATE : 01/17
CHECKED BY:	J. LOFTUS	DATE : 03-17
DESIGN ENGINEER OF RECORD:	J. LOFTUS	DATE : 03-17

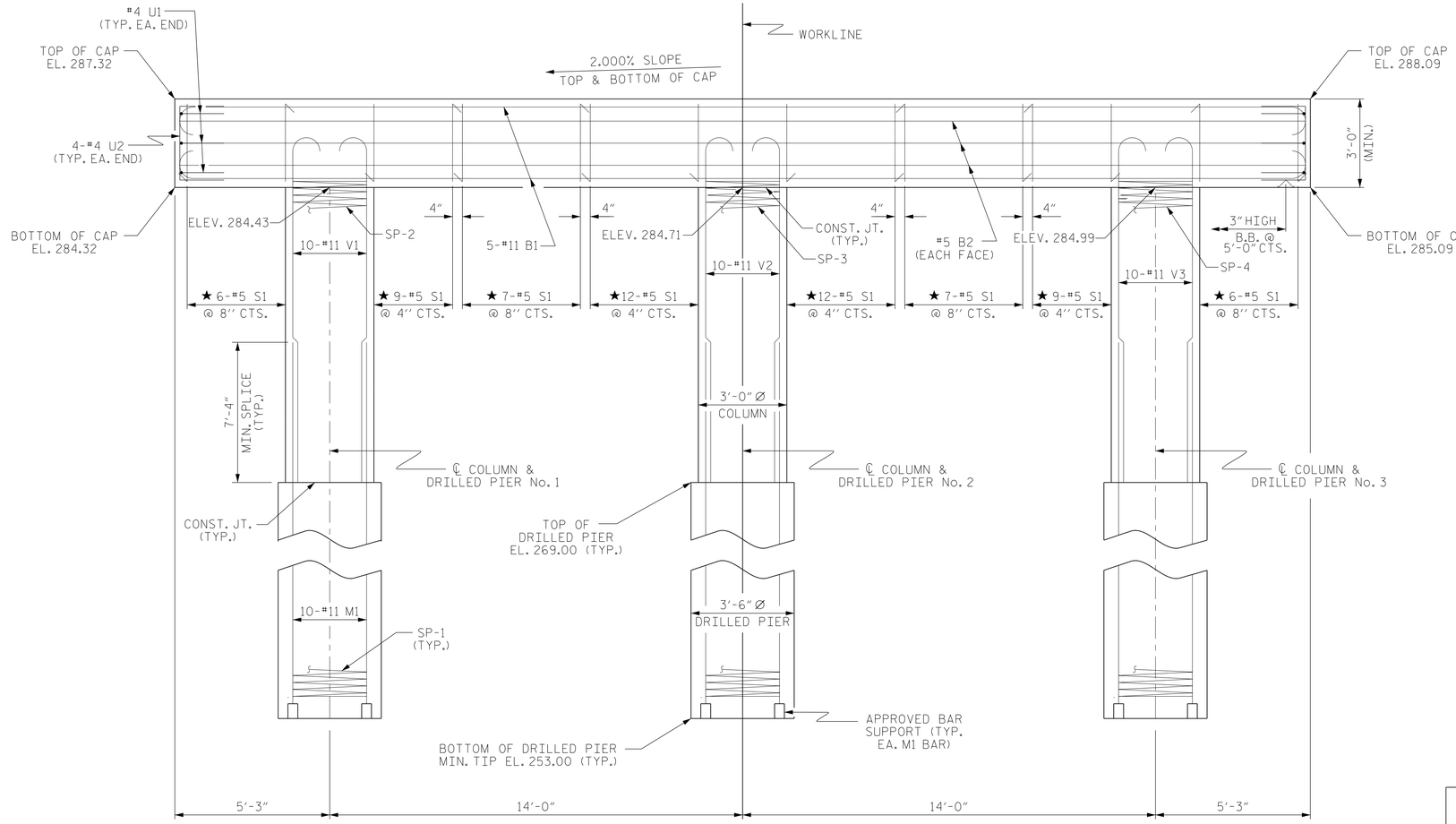
STD. NO. EB_36_90S4_33BB

900012

11/2/2017
...\400_020_900012_SMU_EB04.dgn
USER:jloftus



PLAN



ELEVATION

DIMENSIONS & REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN & DRILLED PIER UNLESS OTHERWISE NOTED.

NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.

HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

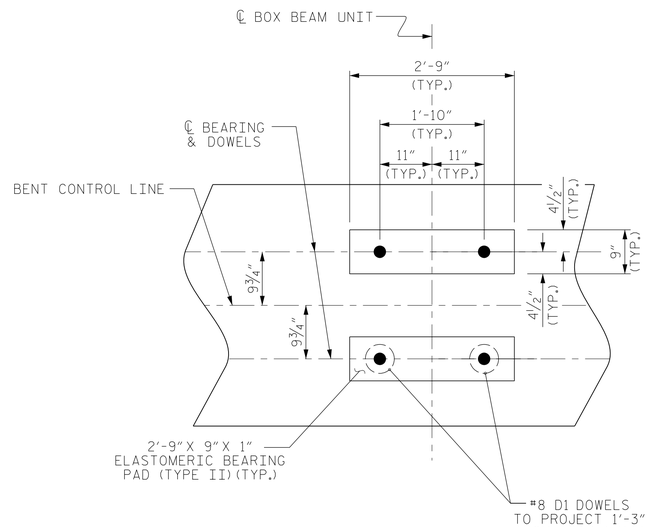
ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."

★ INVERT ALTERNATE STIRRUPS.

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND LINE ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT ONE FOOT BELOW THE GROUND LINE.

DRILLED PIERS SHALL BE TERMINATED ONE FOOT ± ABOVE NORMAL WATER SURFACE ELEVATION FOR SHAFTS LOCATED IN WATER.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.



DETAIL "A"

(DIMENSIONS ARE TYPICAL EACH BEARING)

PROJECT NO. 17BP.5.R.62

VANCE COUNTY

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SHEET 1 OF 2

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11/2/2017

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SUBSTRUCTURE
BENT No. 1

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1			3			TOTAL SHEETS
2			4			25

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CHECKED BY:	J. LOFTUS	DATE : 03-17
DESIGN ENGINEER OF RECORD:	J. LOFTUS	DATE : 03-17

900012

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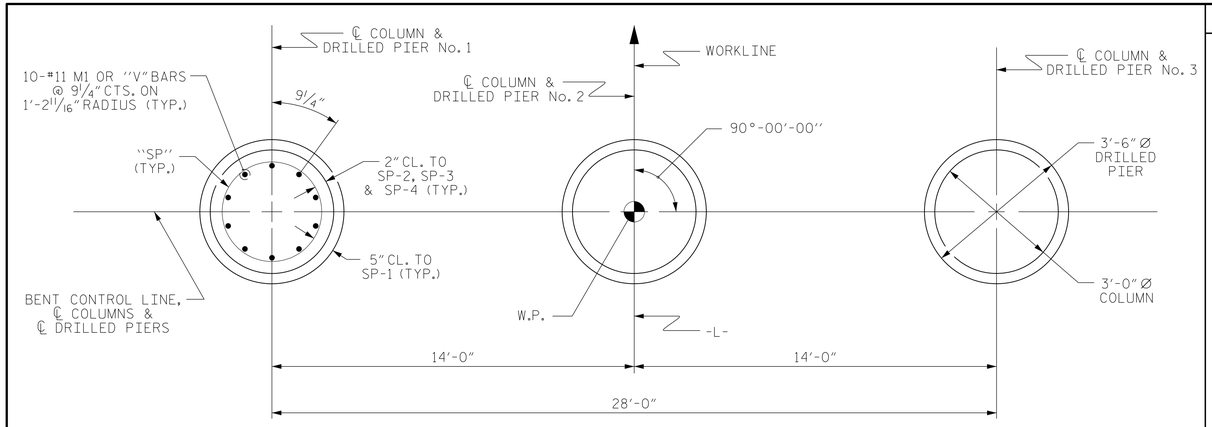
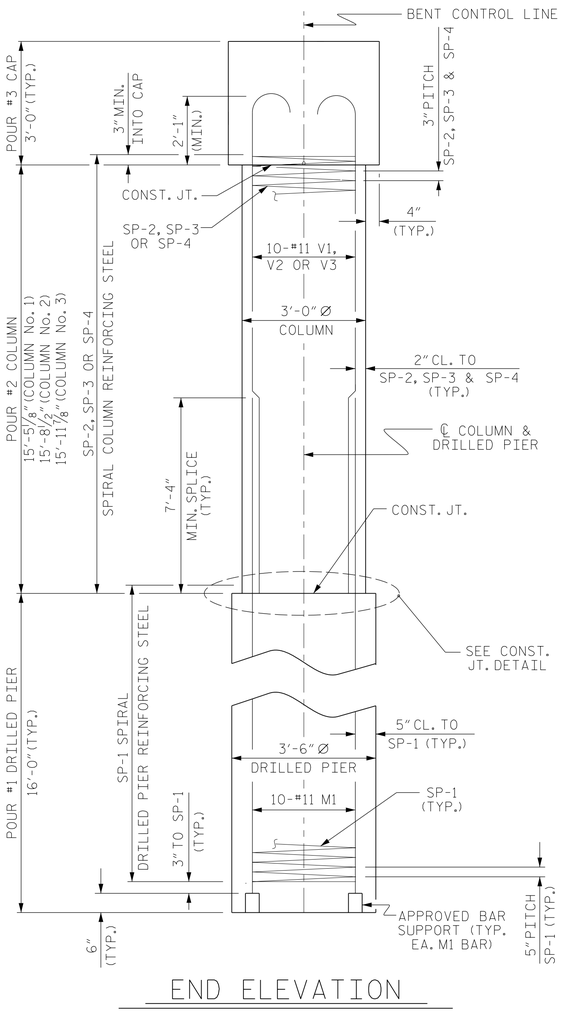
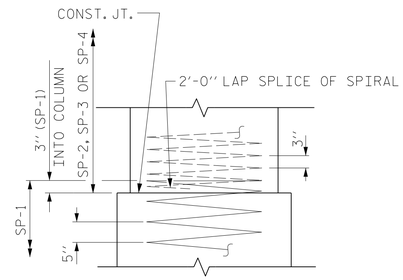
USER:jloftus



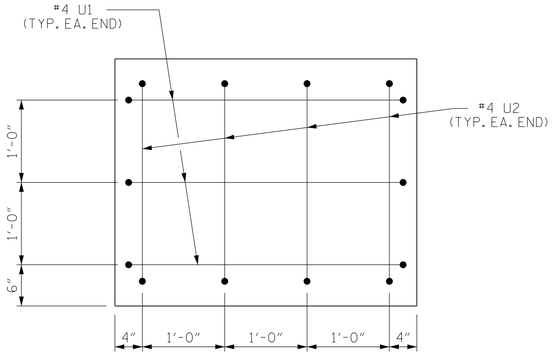
PLAN OF DRILLED PIERS & COLUMNS



END ELEVATION



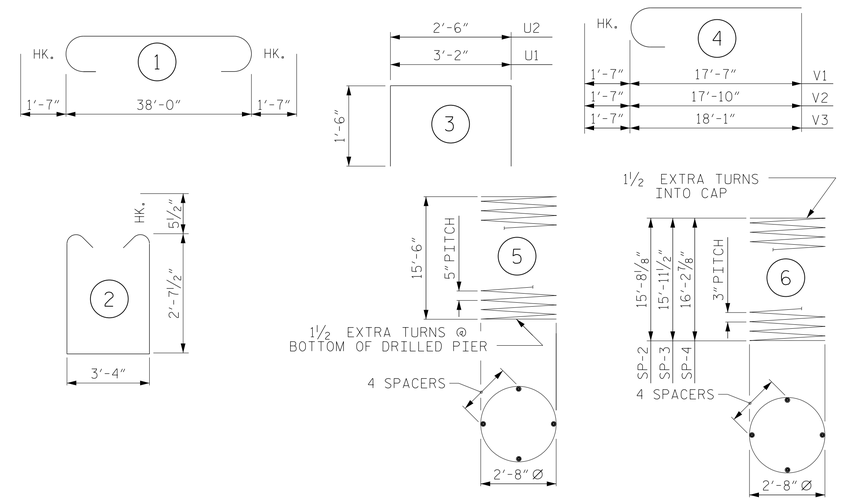
CONSTRUCTION JOINT DETAIL



END OF CAP VIEW

(TYPICAL BOTH ENDS)

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR ONE BENT

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#11	1	41'-2"	2187
B2	6	#5	STR	38'-2"	239
D1	48	#8	STR	2'-3"	288
M1	30	#11	STR	25'-10"	4118
S1	68	#5	2	9'-6"	674
U1	6	#4	3	6'-2"	25
U2	8	#4	3	5'-6"	29
V1	10	#11	4	19'-2"	1018
V1	10	#11	4	19'-5"	1032
V1	10	#11	4	19'-8"	1045

REINFORCING STEEL (FOR ONE BENT) 10,655 LBS.

SP-1	3	*	5	318'-3"	996
SP-2	1	**	6	529'-10"	354
SP-3	1	**	6	539'-1"	360
SP-4	1	**	6	548'-4"	366

SPIRAL COLUMN REINFORCING STEEL (FOR ONE BENT) 2076 LBS.

* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR

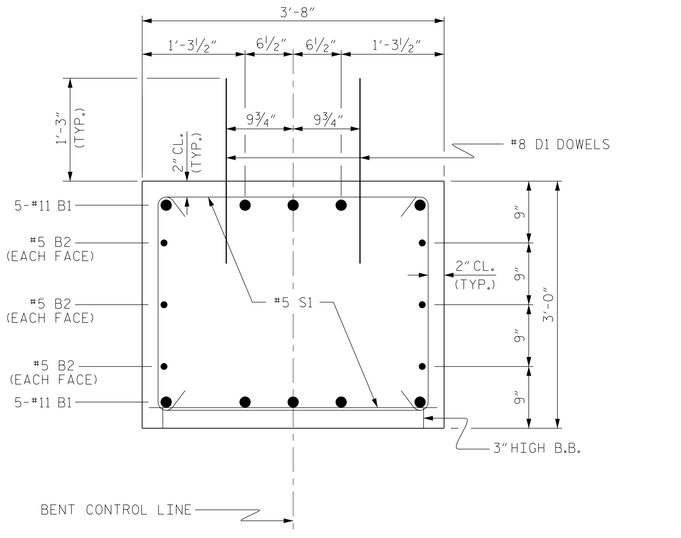
** THE SP-2 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR

CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)

POUR #2 (COLUMNS)	12.4 C.Y.
POUR #3 (CAP)	15.7 C.Y.
TOTAL CLASS A CONCRETE	28.1 C.Y.

DRILLED PIERS: (FOR ONE BENT)

DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	17.1 C.Y.
3'-6" Ø DRILLED PIER NOT IN SOIL	25.0 LIN. FT.
3'-6" Ø DRILLED PIER IN SOIL	23.0 LIN. FT.
CSL TUBES	210 LIN. FT.
CSL TESTING	1 EA.
SID INSPECTIONS	1 EA.



SECTION THRU CAP

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NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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PROJECT NO. 17BP.5.R.62

VANCE COUNTY

STATION: 19+65.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT No. 1

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CHECKED BY: J. LOFTUS DATE: 03-17
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE: 03-17

900012

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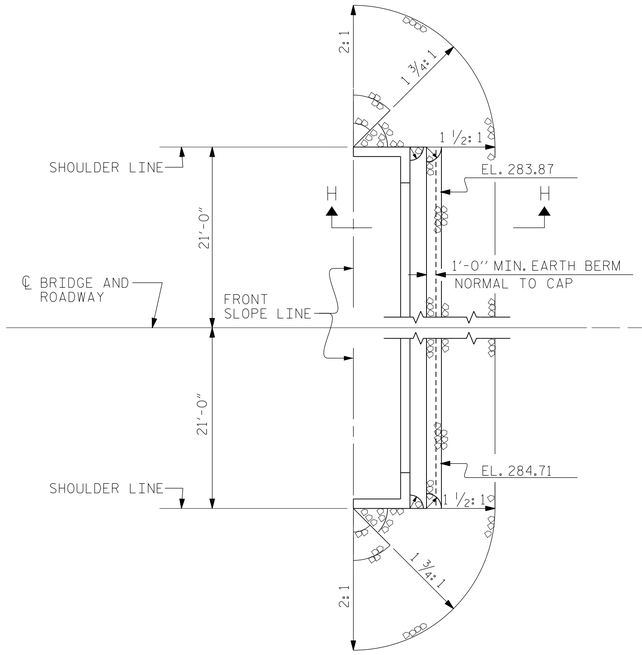
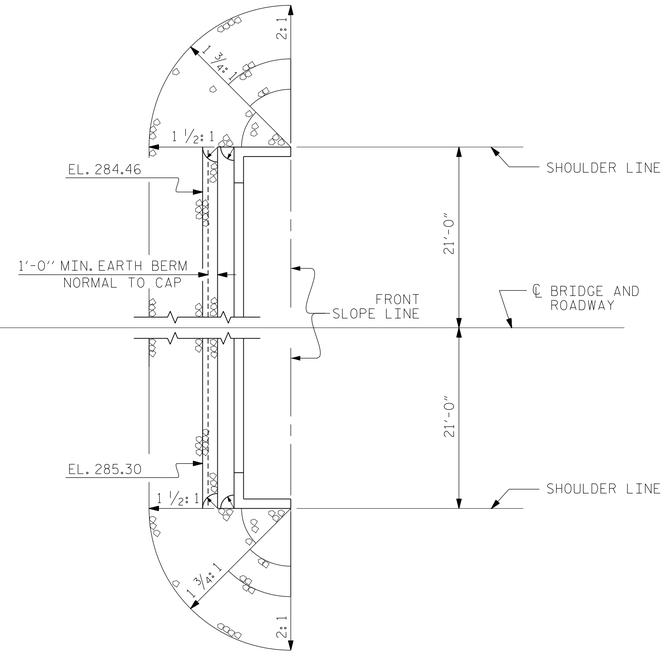
USER:jloftus

NOTES :

FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.



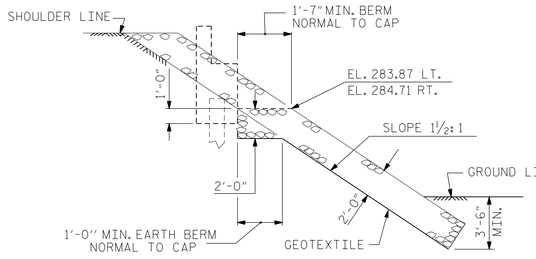
END BENT 1



END BENT 2

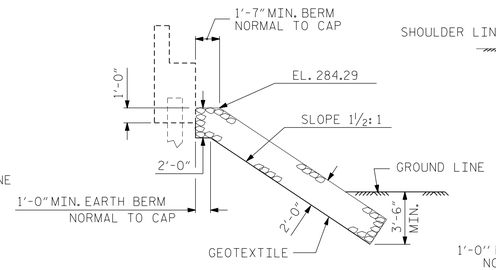
ESTIMATED QUANTITIES		
BRIDGE @ STA. 16+65.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	355	395
END BENT 2	380	422

PLAN VIEW



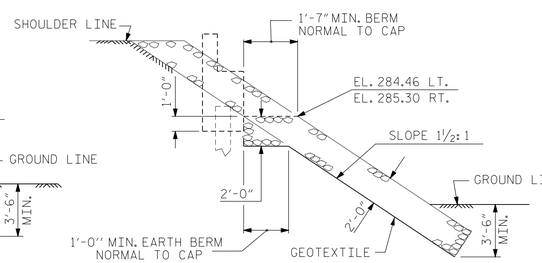
SECTION H-H

END BENT 1



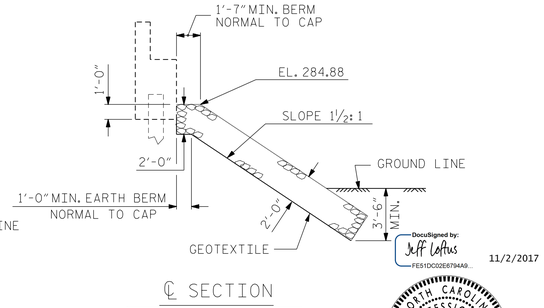
℄ SECTION
BERM RIP RAPPED

END BENT 1



SECTION H-H

END BENT 2



℄ SECTION
BERM RIP RAPPED

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Jeff Loftus
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11/2/2017

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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PROJECT NO. 17BP.5.R.62

VANCE COUNTY

STATION: 19+65.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

RIP RAP DETAILS

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DESIGN ENGINEER OF RECORD:	J. LOFTUS	DATE : 03-17

STD. NO. RR1 (Sht 2)

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11/2/2017
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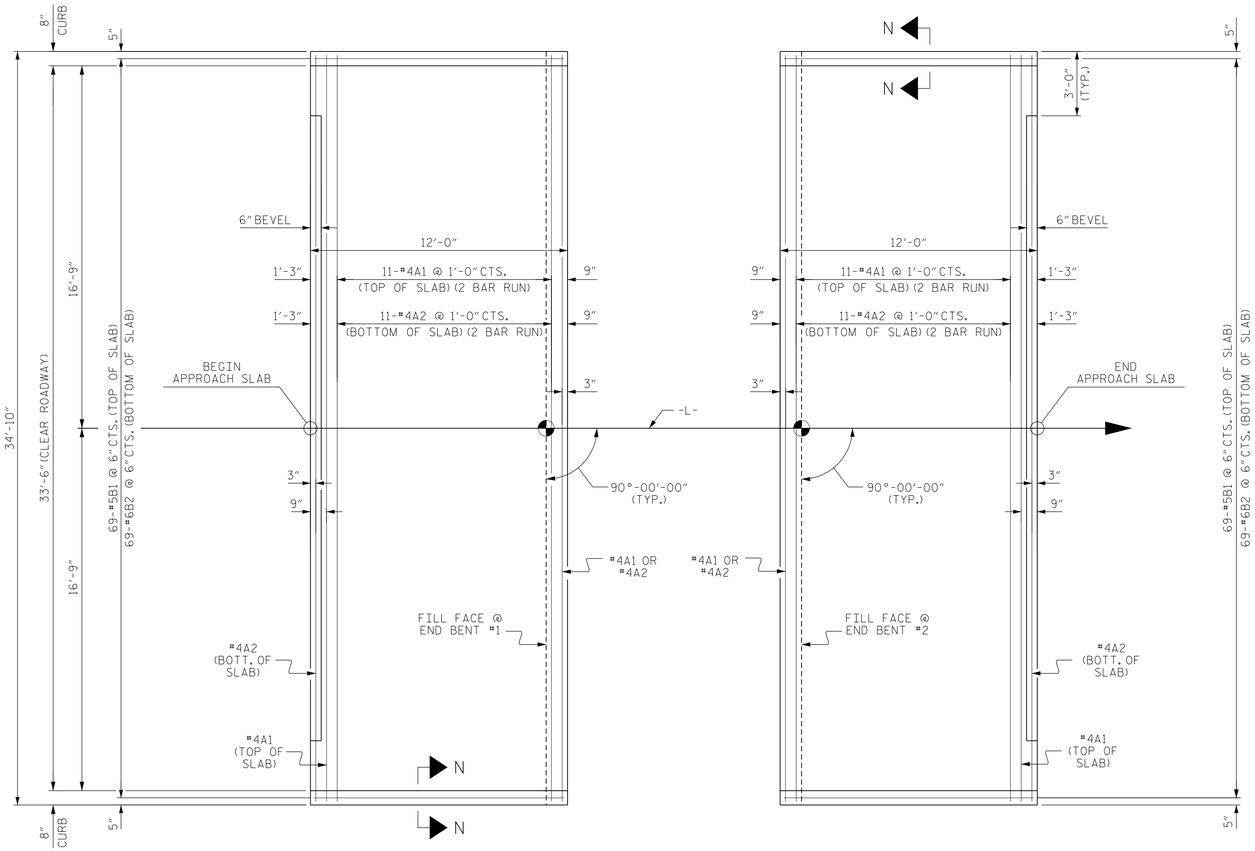
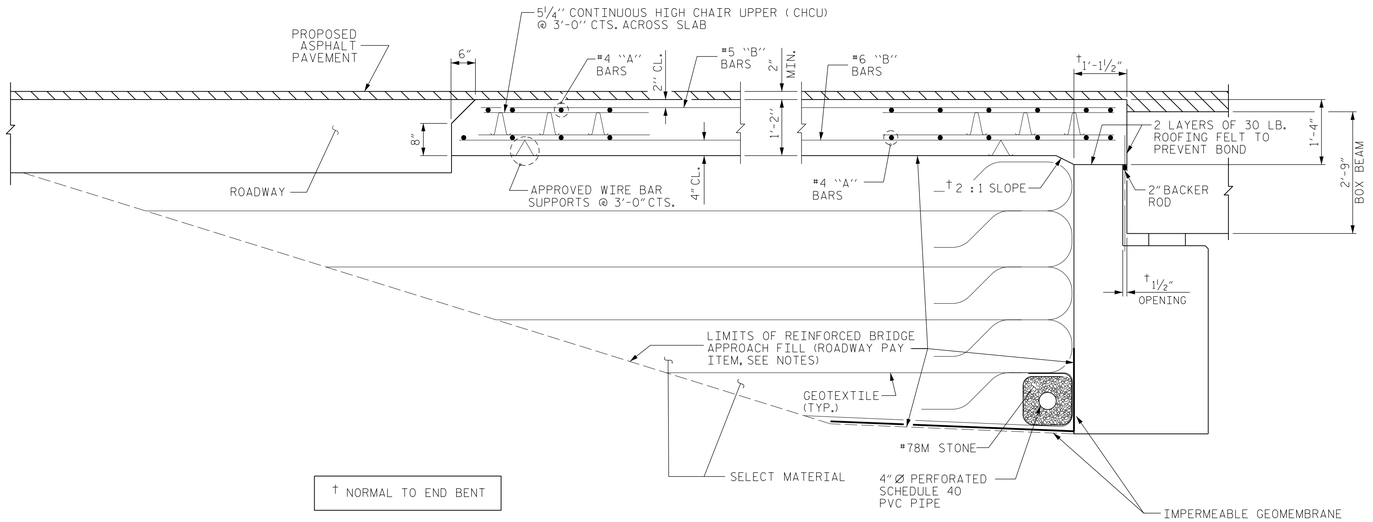
USER:jloftus



PLAN @ END BENT #1

PLAN @ END BENT #2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



† NORMAL TO END BENT

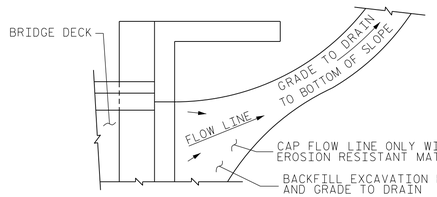
SECTION THRU SLAB

NOTES

FOR REINFORCED BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, IMPERMEABLE GEOMEMBRANE, 4" Ø DRAINAGE PIPE, #78M STONE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

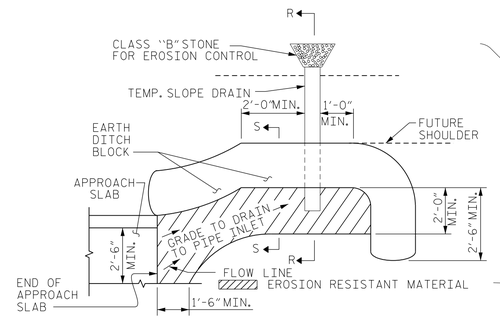
AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

APPROACH SLAB GROOVING IS NOT REQUIRED.

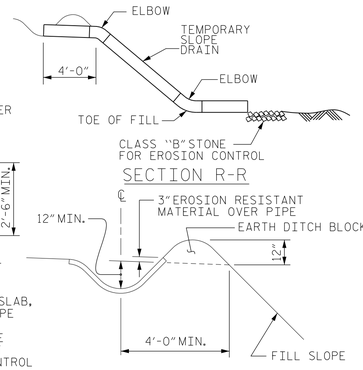


NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT TO THE STRUCTURE. THE CONTRACTOR WILL BE REQUIRED TO REMOVE THESE MATERIALS PRIOR TO CONSTRUCTION OF THE APPROACH SLAB.

TEMPORARY DRAINAGE DETAIL



NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN. 2" DEPTH, 2) EROSION CONTROL MAT, OR 3) CONCRETE, AS DIRECTED BY THE ENGINEER. THE SLOPE DRAIN SHALL CONSIST OF A NON-PERFORATED TEMPORARY DRAINAGE PIPE, 12 INCHES IN DIAMETER.



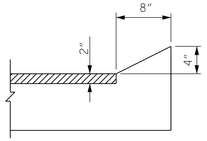
SECTION R-R

SECTION S-S

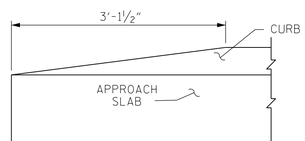
PLAN VIEW

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

SPLICE LENGTHS		
BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-9"
#5	2'-6"	2'-2"
#6	3'-10"	2'-7"

BILL OF MATERIAL					
APPROACH SLAB AT EB #1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	26	#4	STR	18'-4"	318
A2	26	#4	STR	18'-2"	316
* B1	69	#5	STR	11'-2"	804
B2	69	#6	STR	11'-8"	1209
REINFORCING STEEL				LBS.	1525
* EPOXY COATED REINFORCING STEEL				LBS.	1122
CLASS AA CONCRETE				C. Y.	18.5
APPROACH SLAB AT EB #2					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	26	#4	STR	18'-4"	318
A2	26	#4	STR	18'-2"	316
* B1	69	#5	STR	11'-2"	804
B2	69	#6	STR	11'-8"	1209
REINFORCING STEEL				LBS.	1525
* EPOXY COATED REINFORCING STEEL				LBS.	1122
CLASS AA CONCRETE				C. Y.	18.5

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11/2/2017

SEAL 041425 NORTH CAROLINA PROFESSIONAL ENGINEER JEFFREY M. LOFTUS

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PROJECT NO. 17BP.5.R.62

VANCE COUNTY

STATION: 19+65.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB FOR PRESTRESSED CONCRETE BOX BEAM UNIT (SUB-REGIONAL TIER) 90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-24
1			3			TOTAL SHEETS
2			4			25

DRAWN BY: H.ASSFOURA DATE: 01/17
CHECKED BY: J. LOFTUS DATE: 03-17
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE: 03-17

900012

11/2/2017
...\400_024_900012_SMU_AS01.dgn
USER:jloftus

STANDARD NOTES

DESIGN DATA:

SPECIFICATIONS	A.A.S.H.T.O. (CURRENT)
LIVE LOAD	SEE PLANS
IMPACT ALLOWANCE	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF	
STRUCTURAL STEEL - AASHTO M270 GRADE 36	20,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50W	27,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION	
GRADE 60	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR	
UNTREATED - EXTREME FIBER STRESS	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	30 LBS. PER CU. FT. (MINIMUM)

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2012 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1-1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY 1/16 INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.

PROJECT NO. 17BP.5.R.62

VANCE COUNTY

STATION: 19+65.00 -L-

ENGLISH

JANUARY, 1990

REV. 6-16-95 EEM (/) RGW REV. 5-7-03 RWW (/) JTE REV. 10-1-11 MAA (/) GM
REV. 8-16-99 RWW (/) LES REV. 5-1-06 TLA (/) GM

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD NOTES

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-25
1			3			TOTAL SHEETS
2			4			25