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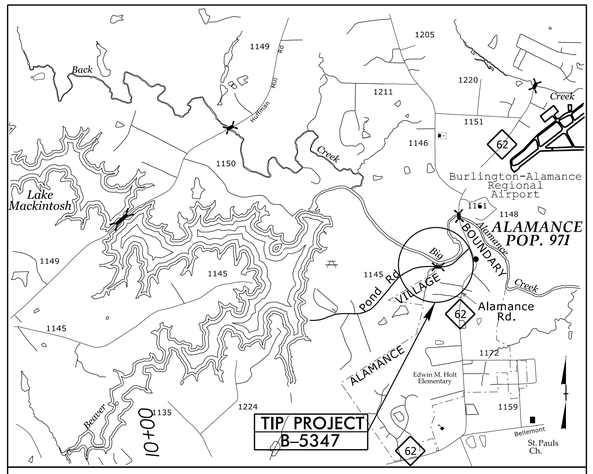
09/08/49

TIP PROJECT: B-5347

CONTRACT: C203984

See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Symbols
See Sheet 1C-1 For Survey Control Sheet



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ALAMANCE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5347	1	

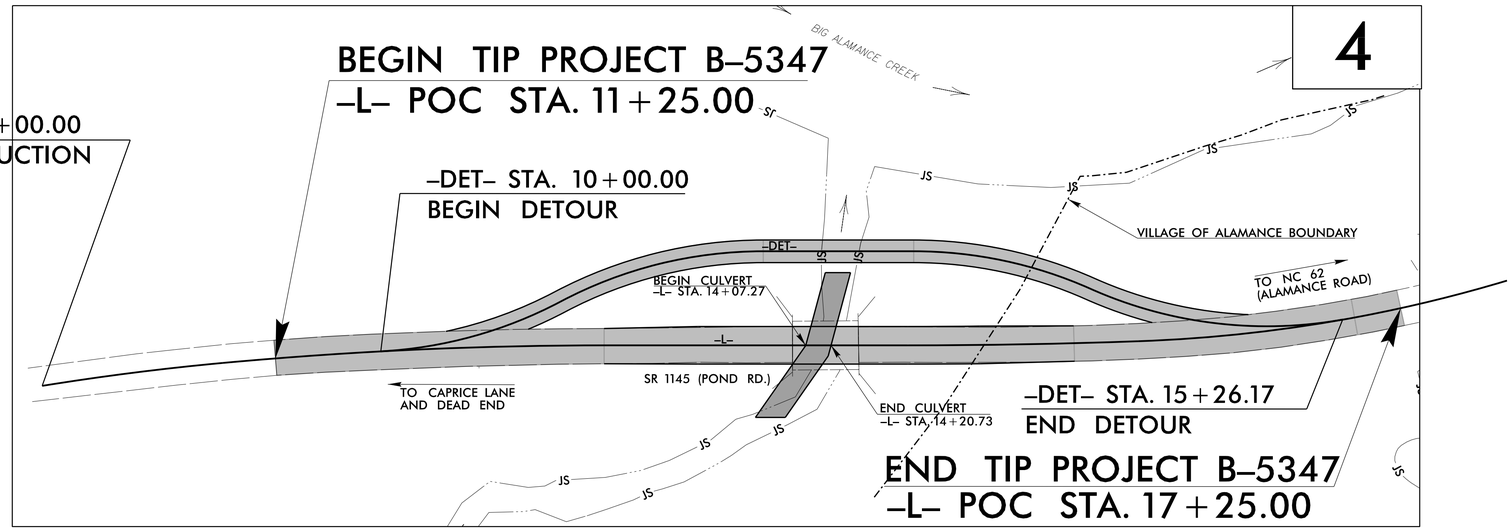
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
46061.1.1	BRZ-1145(8)	PE
46061.2.1		R/W/UTIL.
46061.3.1		CONST.

LOCATION: BRIDGE NO. 170 OVER A PRONG OF BIG ALAMANCE CREEK ON SR 1145 (POND RD.)

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

NAD 83/2011

4



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

PLANS 50 25 0 50 100

PROFILE (HORIZONTAL) 50 25 0 50 100

PROFILE (VERTICAL) 10 5 0 10 20

DESIGN DATA

ADT 2017 = 455
ADT 2037 = 700
K = 12 %
D = 60 %
T = 7 % *
V = 45 MPH

* (TTST 2% + DUAL 5%)

FUNC CLASS = Local
SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-5347 = 0.114 MILES
TOTAL LENGTH TIP PROJECT B-5347 = 0.114 MILES

NCDOT POINT OF CONTACT:

TATIA WHITE, PE, PLS
PROJECT DESIGN ENGINEER

Prepared in the Office of:
JOHNSON, MIRMIRAN, & THOMPSON, INC.
1130 Situs Court, Suite 200, Raleigh NC, 27606

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
NOVEMBER 28, 2016

LETTING DATE:
NOVEMBER 21, 2017

JAMES W. JENKINS, PE
PROJECT ENGINEER

ENRICO A. ROQUE, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 032581 ENGINEER BROOK E. ANDERSON

DocuSigned by: Brook Anderson 9/25/2017
CEC3F33C9B9E495... P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 019824 ENGINEER ENRICO A. ROQUE

DocuSigned by: Enrico Roque 9/25/2017
4DD8C9DEEB5640A... P.E.
SIGNATURE:

STATE OF NORTH CAROLINA * DEPARTMENT OF TRANSPORTATION *

9/21/2017
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User: eroque

DocuSign Envelope ID: 22725CAB-A3BF-423D-A7BE-6C3B4A7ADBFF

8/17/99

Prepared In the Office of:
JOHNSON, MIRMIRAN, & THOMPSON, INC.
1130 Situs Court, Suite 200, Raleigh NC, 27606

PROJECT REFERENCE NO.	SHEET NO.
B-5347	1A

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 019824 ENGINEER ENRICO A. ROOS

9/25/2017

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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
2B-1	DETAIL FOR ON-SITE DETOUR
2C-1 THRU 2C-6	GUARDRAIL PLACEMENT DETAILS
2C-7 THRU 2C-10	GUARDRAIL INSTALLATION DETAILS
2C-11	REINFORCED SANDBAG HEADWALL DETAIL
2C-12	SPECIAL JUNCTION BOX DETAIL
2C-13	SPECIAL TEMPORARY PIPE PLUGS DETAIL
3B-1	GUARDRAIL SUMMARY, SUMMARY OF EARTHWORK AND PAVEMENT REMOVAL SUMMARY.
3D-1	DRAINAGE SUMMARIES
3G-1	GEOTECHNICAL SUMMARIES
4	PLAN SHEET
5	PROFILE SHEET
TMP-1 THRU TMP-5	TRANSPORTATION MANAGEMENT PLANS
PMP-1	PAVEMENT MARKING PLANS
EC-1 THRU EC-7	EROSION CONTROL PLANS
RF-1	REFORESTATION PLANS
UO-1 THRU UO-2	UTILITIES BY OTHERS PLANS
X-1A	CROSS-SECTION SUMMARY SHEET
X-1 THRU X-6	CROSS-SECTIONS
C-1 THRU C-8	CULVERT PLANS

GENERAL NOTES:

2012 SPECIFICATIONS
EFFECTIVE: 01-17-2012
REVISED: 01-24-2017

GRADE LINE:
GRADING AND SURFACING:

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

CLEARING:

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

SUPERELEVATION:

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

SHOULDER CONSTRUCTION:

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

GUARDRAIL:

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

TEMPORARY SHORING:

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

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE AT&T, DUKE ENERGY, AND

CHARTER COMMUNICATIONS.

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

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	
200.02	Method of Clearing - Method II
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 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
DIVISION 6 - ASPHALT BASES AND PAVEMENTS	
654.01	Pavement Repairs
DIVISION 8 - INCIDENTALS	
840.00	Concrete Base Pad for Drainage Structures
840.66	Drainage Structure Steps
876.01	Rip Rap in Channels

9/21/2017
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12/2/2016

PROJECT REFERENCE NO.	SHEET NO.
B-5347	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

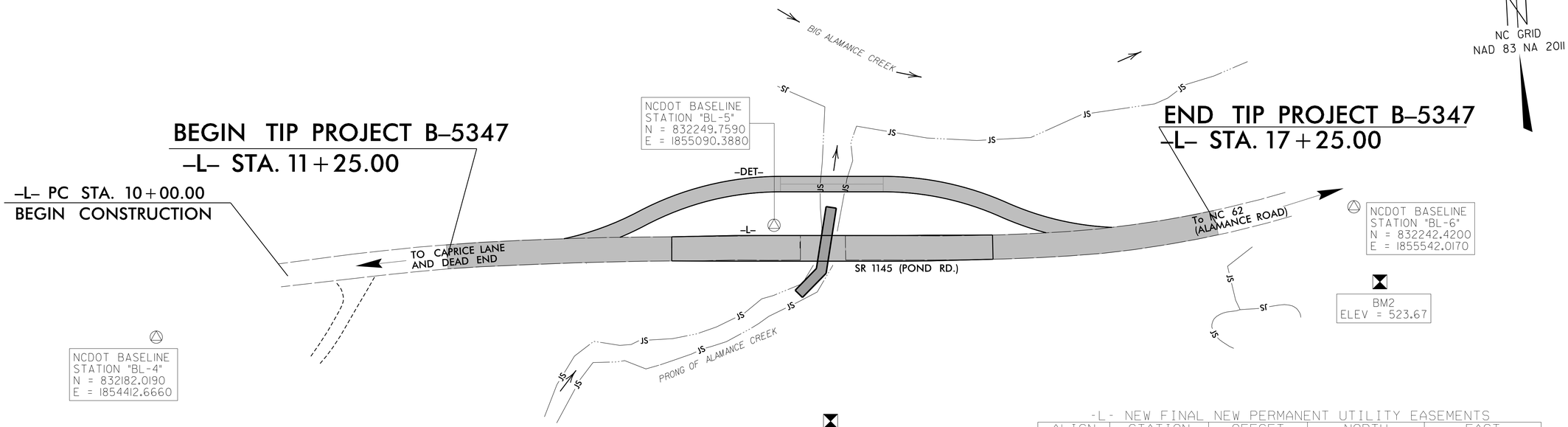
MISCELLANEOUS:

- 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.

12/01/2005

PROJECT REFERENCE NO.	SHEET NO.
B–5347	1C–1
Location and Surveys	

B–5347 SURVEY CONTROL SHEET



-L- NEW FINAL DRAINAGE UTILITY EASEMENT

ALIGN	STATION	OFFSET	NORTH	EAST
L	13+25.00	30.00	832207.82805	1855033.16514
L	13+25.00	50.00	832187.85787	1855032.07337
L	14+40.00	66.00	832165.60407	1855146.02849
L	14+61.62	60.00	832170.41492	1855167.94378
L	15+00.00	30.00	832198.47025	1855208.24551

-L- NEW FINAL PERMANENT DRAINAGE EASEMENTS

ALIGN	STATION	OFFSET	NORTH	EAST
L	13+80.00	-60.00	832294.6915	1855092.9961
L	13+80.00	-30.00	832264.7362	1855091.3584
L	14+61.71	-30.00	832260.2760	1855172.9441
L	14+61.62	-60.00	832290.2360	1855174.4944

L

TYPE	STATION	NORTH	EAST
PC	10+00.00	832233.9539	1854710.1829
PCC	10+96.99	832240.8649	1854806.9049
PT	13+01.56	832239.0630	1855011.3951
PC	14+61.62	832230.3255	1855171.2186
PCC	15+84.01	832225.7949	1855293.5216
PT	17+83.45	832247.2733	1855491.2540

-L- NEW FINAL NEW PERMANENT UTILITY EASEMENTS

ALIGN	STATION	OFFSET	NORTH	EAST
L	10+00.00	30.00	832204.12122	1854713.34705
L	10+00.00	60.00	832174.28856	1854716.51124
L	11+61.00	70.00	832172.31768	1854871.48149
L	16+02.00	30.00	832195.65207	1855311.61547
L	15+01.61	72.29	832156.14919	1855208.04480
L	15+04.50	89.91	832138.41900	1855210.24721
L	14+93.00	92.00	832136.84941	1855198.36617
L	14+91.00	80.00	832148.93079	1855196.86930

BASELINE DATA

BL

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
1	B5347-1	830830.7330	1853021.4640	597.40	OUTSIDE PROJECT LIMITS	
2	B5347-2	831354.5510	1853493.6660	596.00	OUTSIDE PROJECT LIMITS	
3	BL-3	831838.6020	1853859.0300	582.97	OUTSIDE PROJECT LIMITS	
4	BL-4	832182.0190	1854412.6660	535.81	OUTSIDE PROJECT LIMITS	
5	BL-5	832249.7590	1855090.3880	507.07	13+79.85	14.99 LT
6	BL-6	832242.4200	1855542.0170	511.38	OUTSIDE PROJECT LIMITS	

NOTES

1. *THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:*
   HTTP://WWW.DOH.DOT.STATE.NC.US/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/

   THE FILES TO BE FOUND ARE AS FOLLOWS:
   b5347_ls_control.txt

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

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

PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B5347-2" WITH NAD 83/NA 2011 STATE PLANE GRID COORDINATES OF NORTHING: 831354.5510(ft) EASTING: 1853493.6660(ft) ELEVATION: 596.00'(ft) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9999417698 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B5347-2" TO -L- STATION 11+80.00 IS N 57°32'54" E 1,654.61' ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NAVD 88

BENCHMARK DATA

BM1 ELEVATION - 515.66
N 832098 E 1855126
BL STATION 31+82.00 151 RIGHT
RR SPIKE IN BASE OF 27" RED OAK

BM2 ELEVATION - 523.67
N 832183 E 1855559
BL STATION 5+00.00
N 61°56'47.76" E DIST 2875.36
RR SPIKE IN BASE OF 18" PINE

NOTE: DRAWING NOT TO SCALE

8/10/2017
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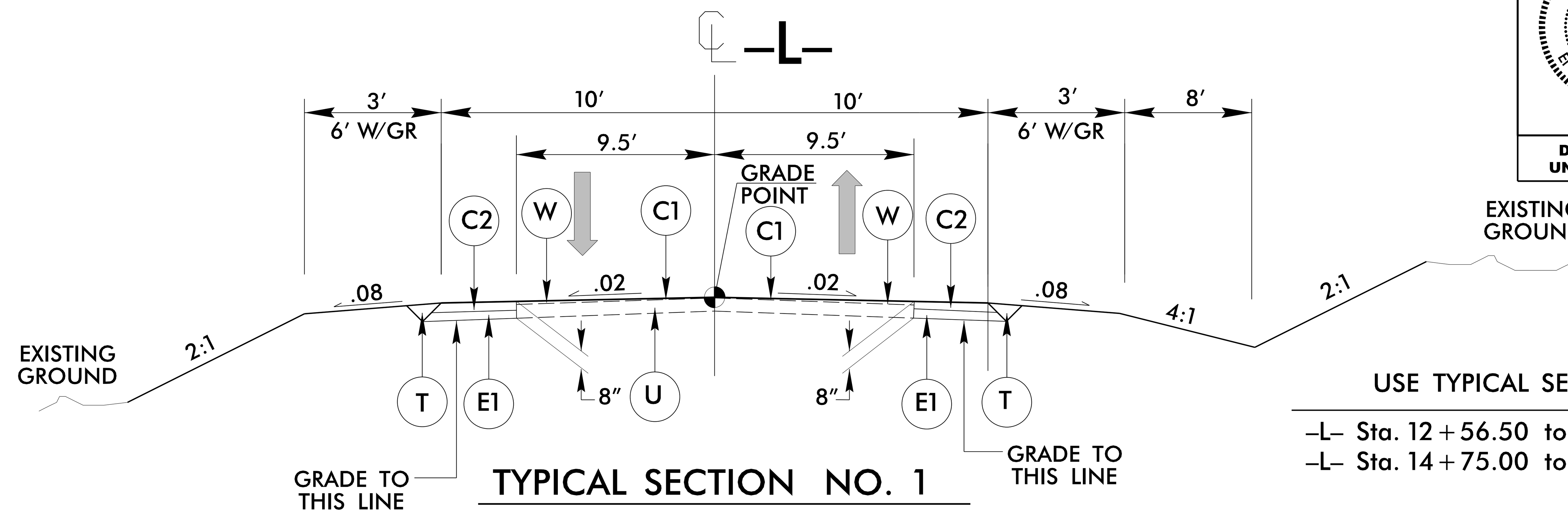
1130 Situs Court, Suite 200, Raleigh NC, 27606

PROJECT REFERENCE NO.	SHEET NO.
B-5347	2A-1
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 019824 ENRICO A. ROQUE 9/25/2017	NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022896 CLARK S. MORRISON 9/26/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

FINAL PAVEMENT SCHEDULE	
C1	PROP. APPROX. 1¼" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 137.5 LBS. PER SQ. YD.
C2	PROP. APPROX. 2½" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 137.5 LBS. PER SQ. YD. IN EACH OF TWO LAYERS
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 110 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 1½" IN DEPTH.
E1	PROP. APPROX. 5½" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 627 LBS. PER SQ. YD.
E2	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5½" IN DEPTH.
J	PROP. 8" AGGREGATE BASE COURSE.
P	PRIME COAT AT THE RATE OF .35 GAL. PER SQ. YD.
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
W	VARIABLE DEPTH ASPHALT PAVEMENT. (SEE WEDGING DETAIL BELOW)

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

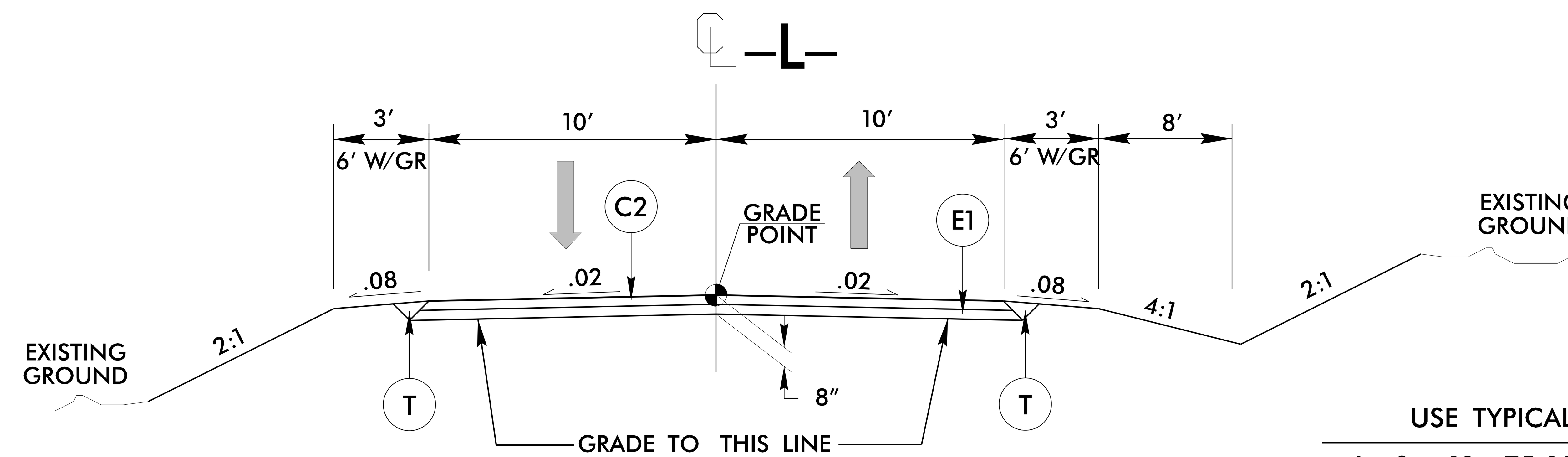


TYPICAL SECTION NO. 1

USE TYPICAL SECTION NO.1:

-L- Sta. 12+56.50 to -L- Sta. 12+75.00
-L- Sta. 14+75.00 to -L- Sta. 15+50.00

NOTE: OVERLAY EXISTING ROAD WITH (C1) FROM
-L- Sta. 11+25.00 to -L- Sta. 12+56.50
-L- Sta. 15+50.00 to -L- Sta. 17+25.00

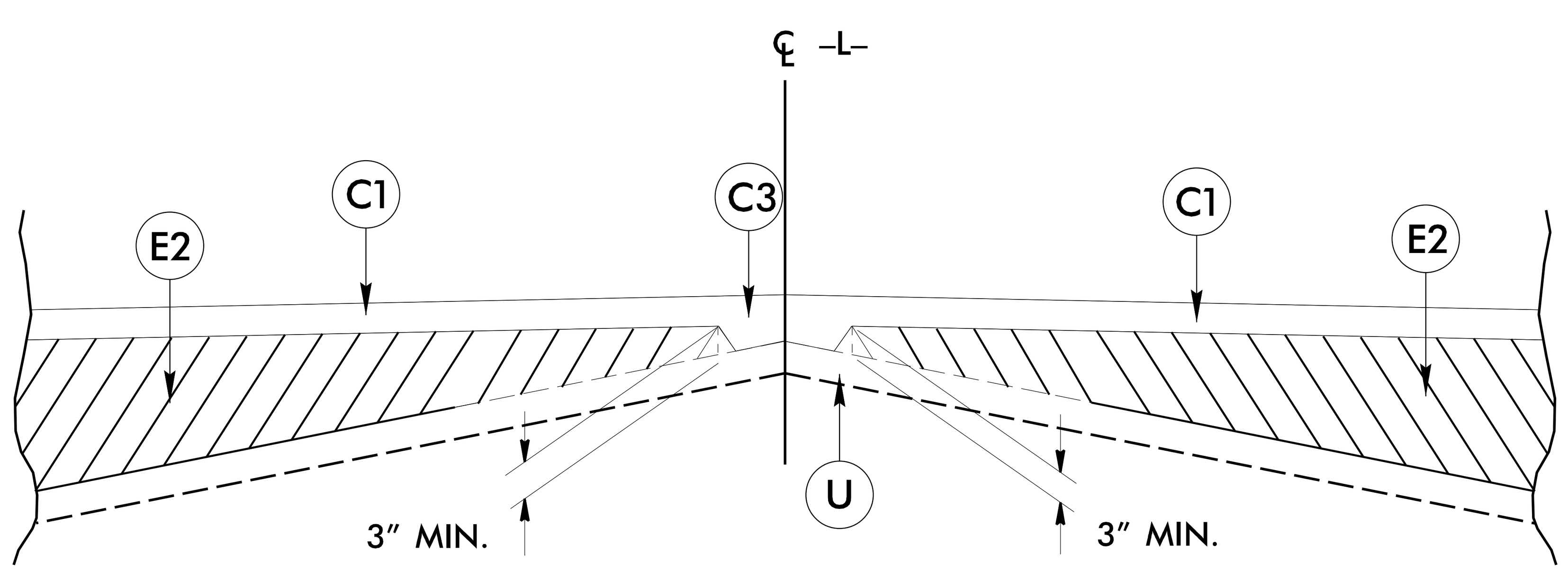


TYPICAL SECTION NO. 2

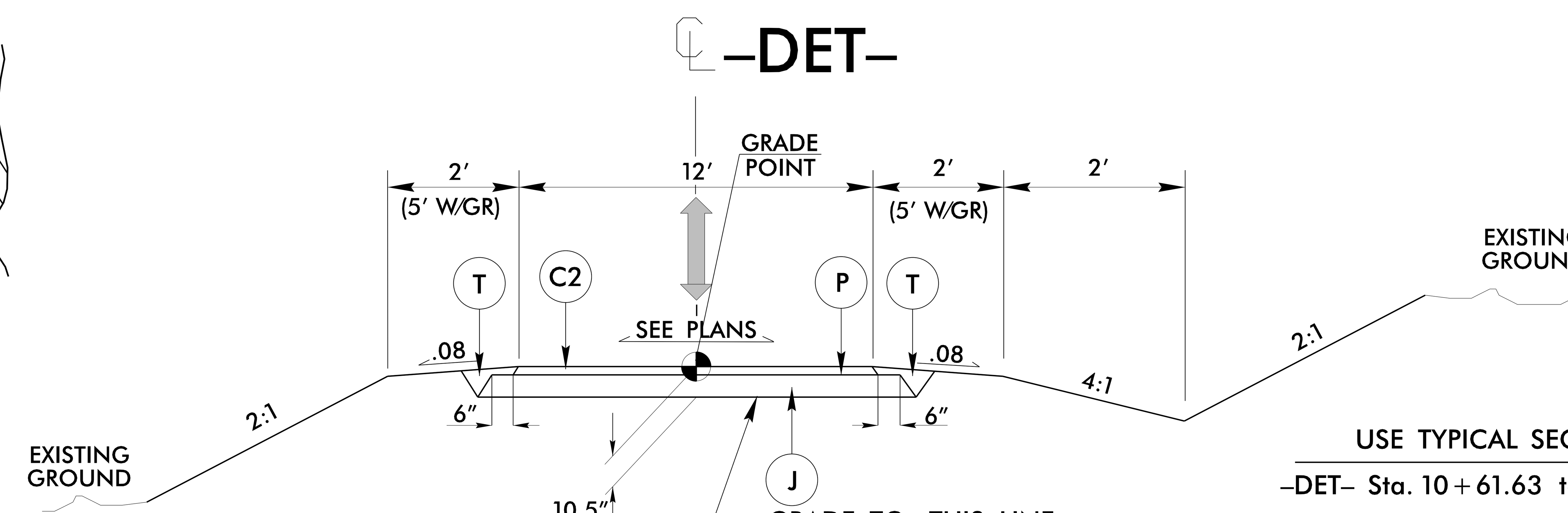
USE TYPICAL SECTION NO.2:

-L- Sta. 12+75.00 to -L- Sta. 14+75.00

NOTE: PAVE TO THE FACE OF GUARDRAIL, SEE PLANS FOR LOCATIONS.



DETAIL SHOWING METHOD OF WEDGING



TYPICAL SECTION NO. 3

USE TYPICAL SECTION NO.3:

-DET- Sta. 10+61.63 to -DET- Sta. 14+46.20

NOTE: SEE PLANS FOR TEMPORARY GUARDRAIL LOCATIONS. USE EXTRA LONG GUARDRAIL POSTS WITH OFFSET OF 3' FROM THE E.O.L. (EDGE OF LANE). SEE DEPTH REQUIREMENTS AT THE CULVERT ON DETAIL 2B-1.

9/21/2017 ...\Proj\B5347_Rdy_typ.dgn

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8/17/99

DETAIL FOR ONSITE DETOUR

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1130 Situs Court, Suite 200, Raleigh NC, 27606

PROJECT REFERENCE NO.	SHEET NO.
B-5347	2B-1
R/W SHEET NO.	

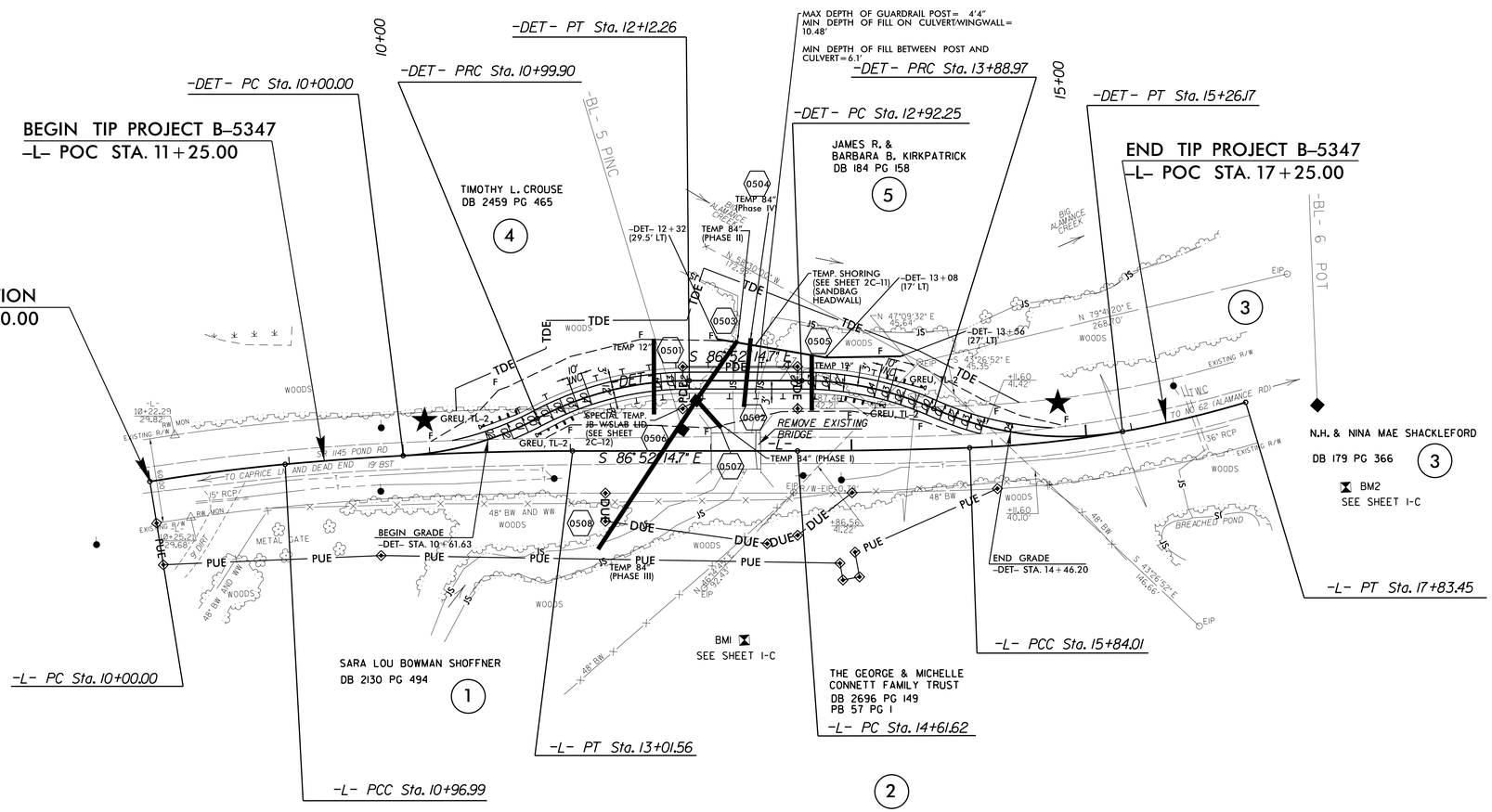
ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 019824 ENGINEER ENRICO A. ROSSI
9/25/2017

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 032581 ENGINEER BROOKE E. ANDERSON
9/25/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83/2011

-DET- VDET - 25 MPH			
PI Sta 10+50.74 Δ = 24° 46' 42.9" (LT) D = 24° 48' 12.1" L = 99.90' T = 50.74' R = 231.00' SE = 4% RO = 40'	PI Sta 11+57.21 Δ = 27° 52' 08.7" (RT) D = 24° 48' 12.1" L = 112.36' T = 57.31' R = 231.00' SE = 4% RO = 40'	PI Sta 13+41.33 Δ = 23° 59' 18.3" (RT) D = 24° 48' 12.1" L = 96.71' T = 49.08' R = 231.00' SE = 4% RO = 40'	PI Sta 14+59.66 Δ = 34° 01' 52.7" (LT) D = 24° 48' 12.1" L = 137.20' T = 70.69' R = 231.00' SE = 4% RO = 40'



PROPOSED SIGNALIZED
ONE LANE – 2 WAY DETOUR

★ DENOTES TEMPORARY SIGNALS

SEE EROSION CONTROL PLANS FOR CULVERT CONSTRUCTION SEQUENCE PLAN

SEE SHEET 4 FOR MAINLINE (–L–)
SEE SHEET 5 FOR PROFILE

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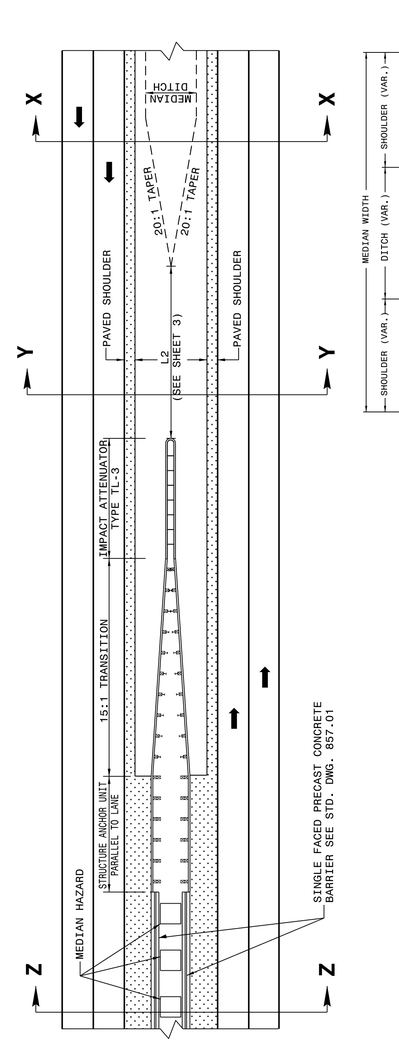
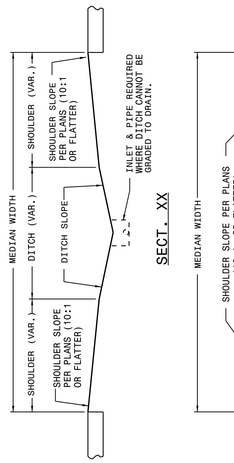
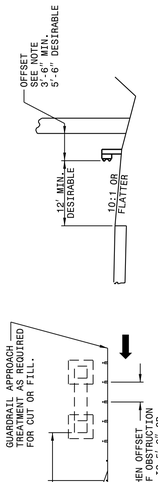
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

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

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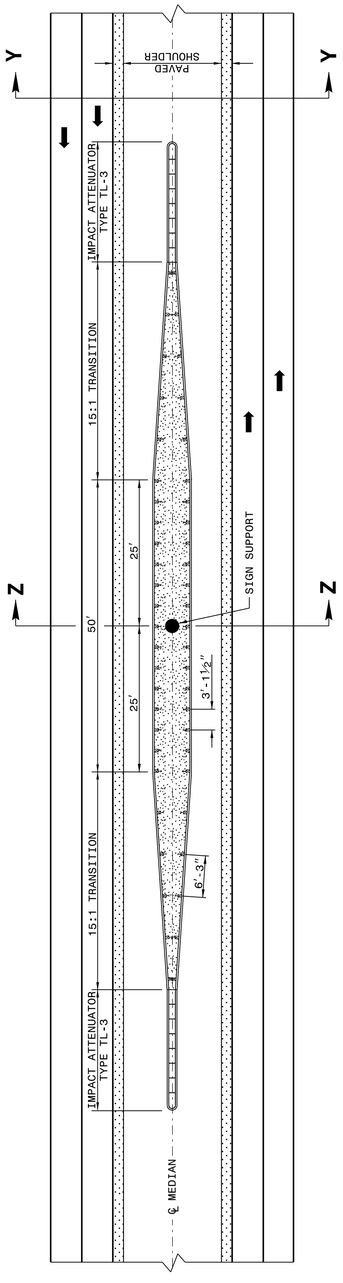
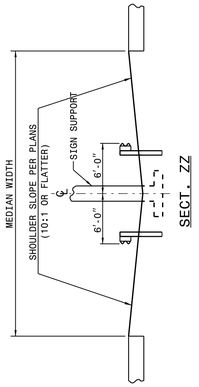
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 2 OF 11
862D01

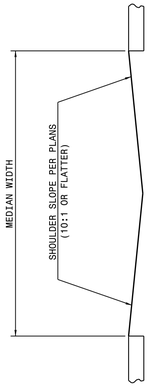
DETAIL OF GUARDRAIL AT MEDIAN SIGN SUPPORT





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
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SHEET 2 OF 11
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9/25/2017

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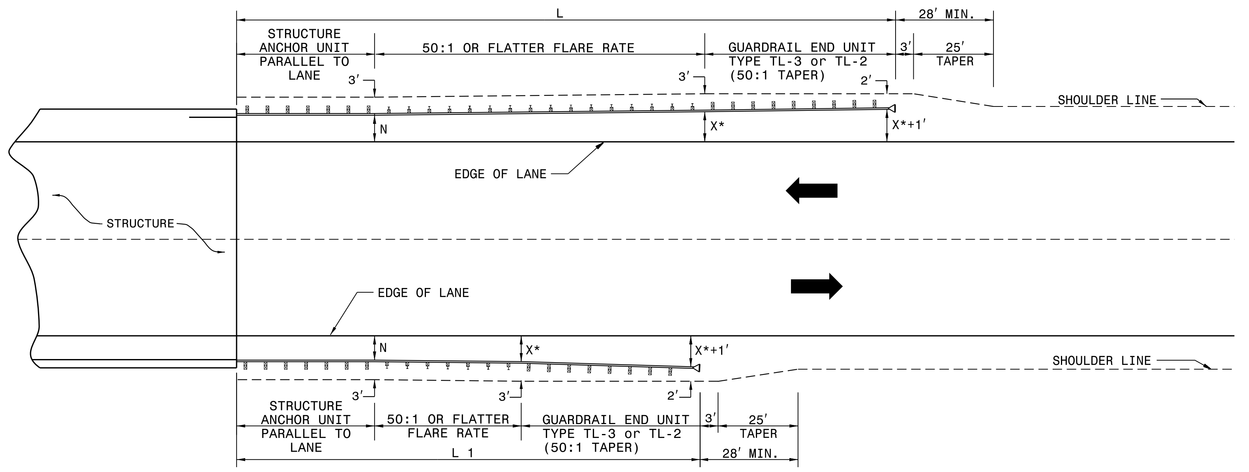
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT



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

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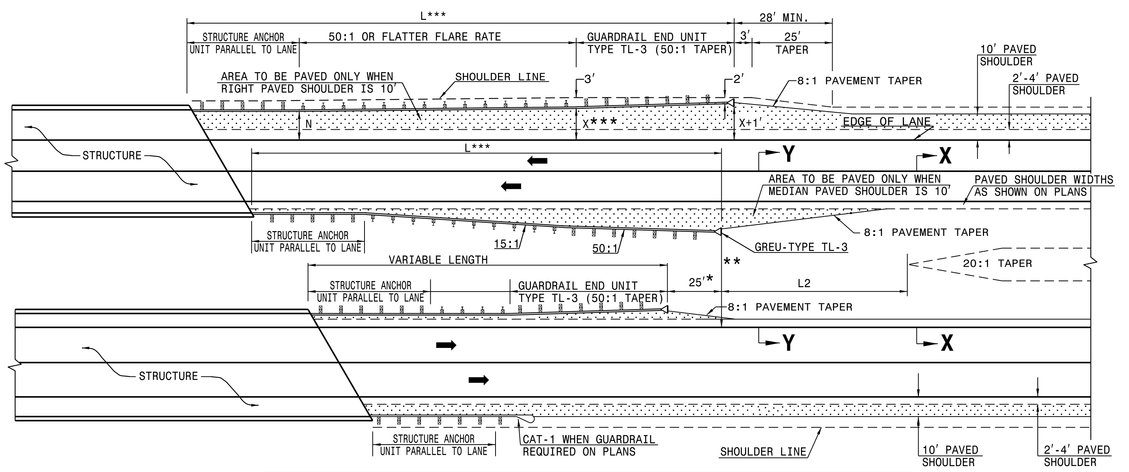
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT



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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ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 3 OF 11
862D01

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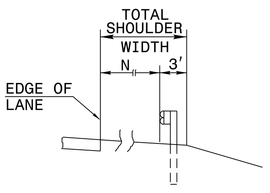
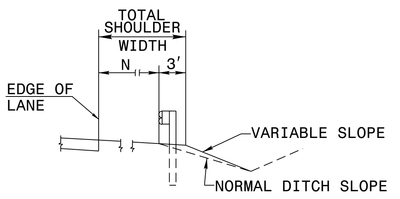
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

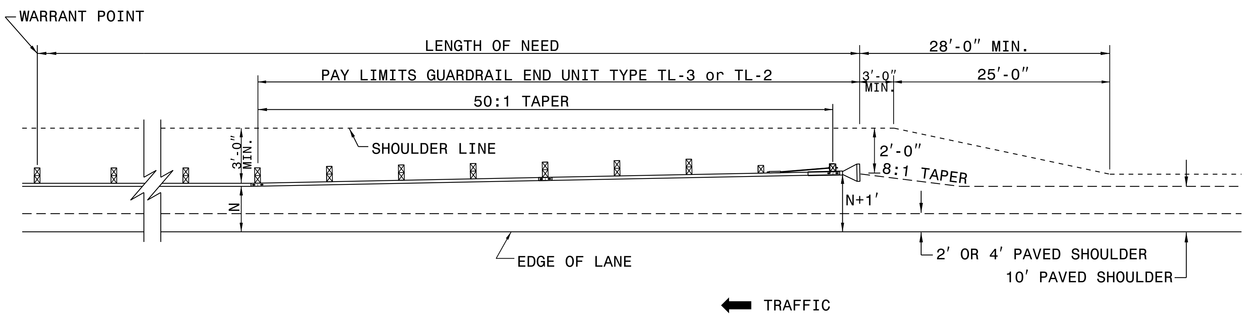


FILL SECTION



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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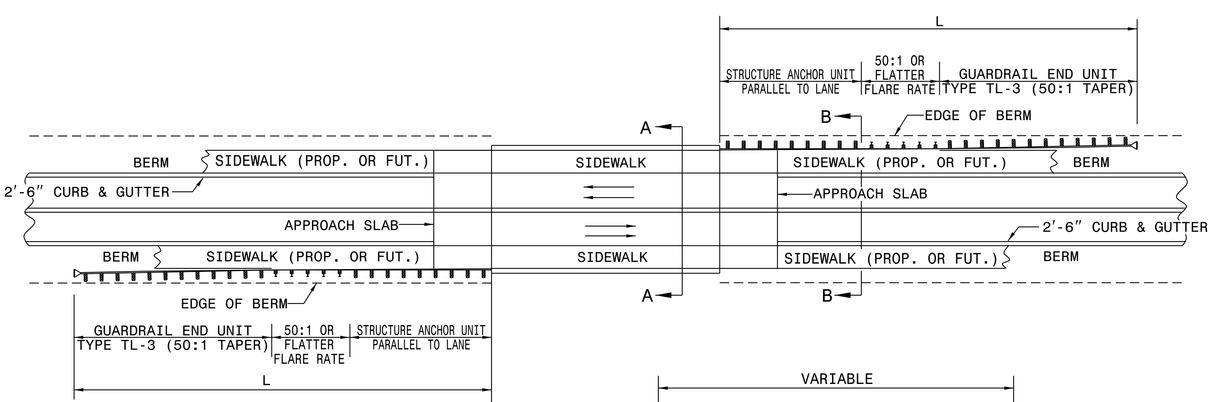
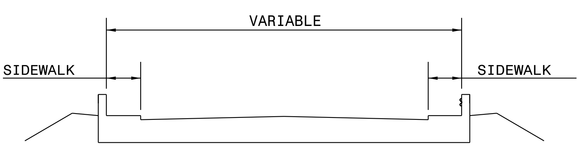
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT



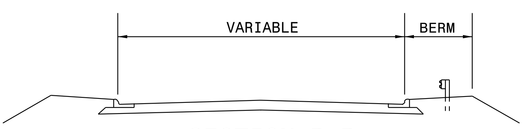
MINIMUM GUARDRAIL LENGTHS "L" REQUIRED AT BRIDGE APPROACHES ON 2'-6" CONCRETE CURB AND GUTTER ROADWAYS	
DESIGN SPEED (MPH)	"L"
40	150'
50	225'

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.



SECTION A-A



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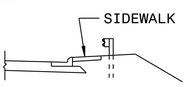

FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

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

SHEET 5 OF 11
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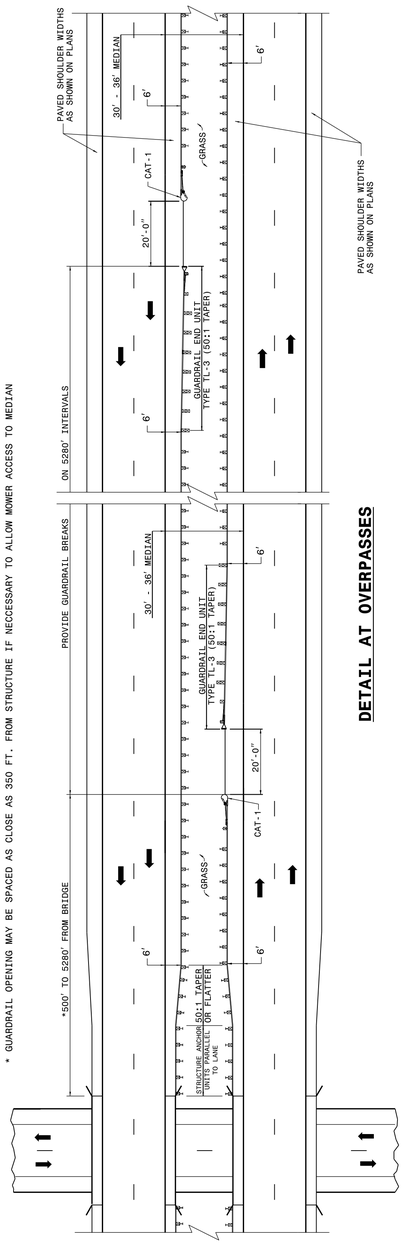
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 7 OF 11
862D01

GUARDRAIL BREAK INTERVALS WITH 30' - 36' MEDIANS



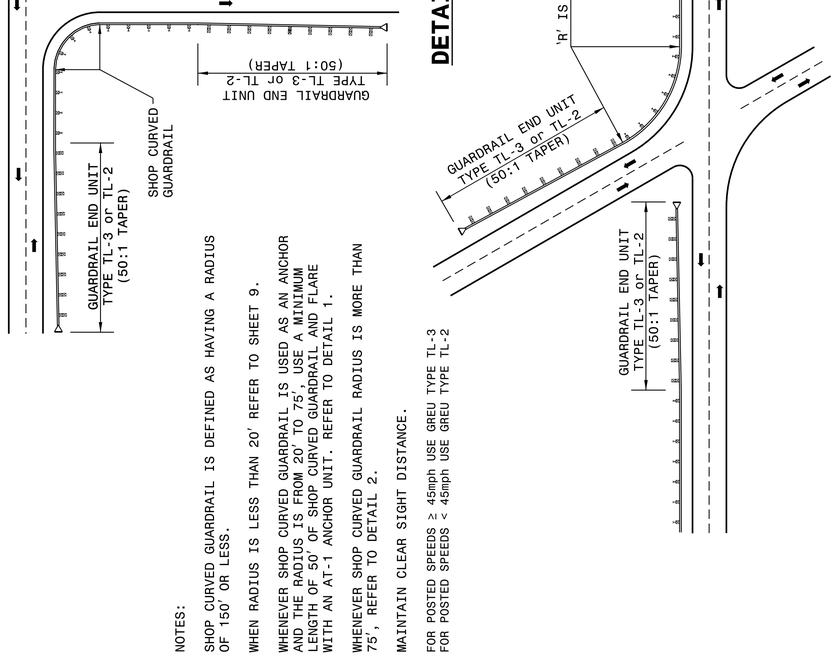
DETAIL AT OVERPASSES

DETAIL AT UNDERPASSES

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

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

GUARDRAIL TREATMENT AT INTERSECTIONS



DETAIL-1

DETAIL-2

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

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ROADWAY DETAIL DRAWING FOR
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ROADWAY DETAIL DRAWING FOR
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ENGLISH DETAIL DRAWING FOR
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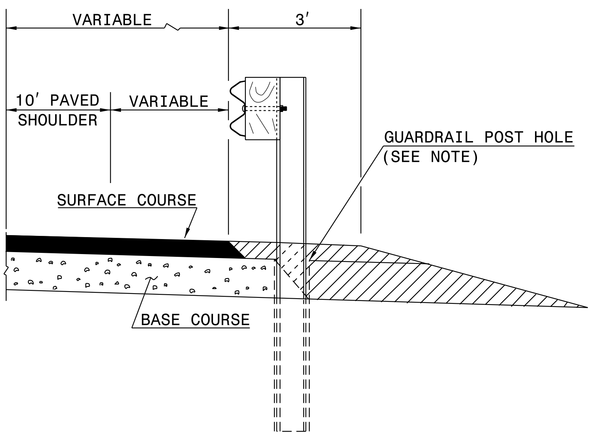
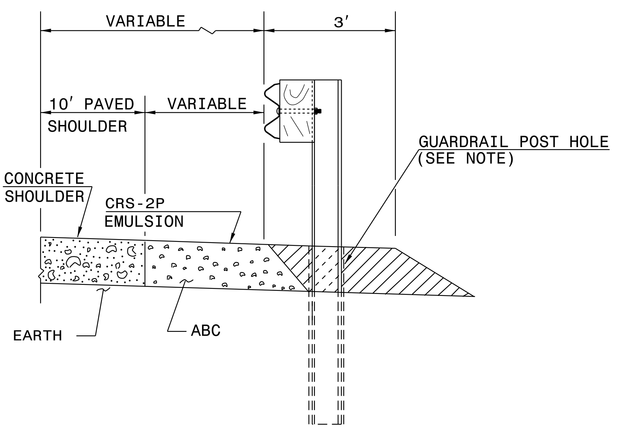


FLEXIBLE PAVED SHOULDER



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.

SHEET 10 OF 11
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ENGLISH DETAIL DRAWING FOR
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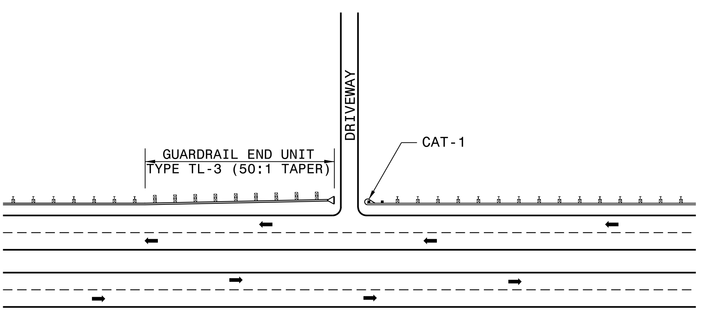
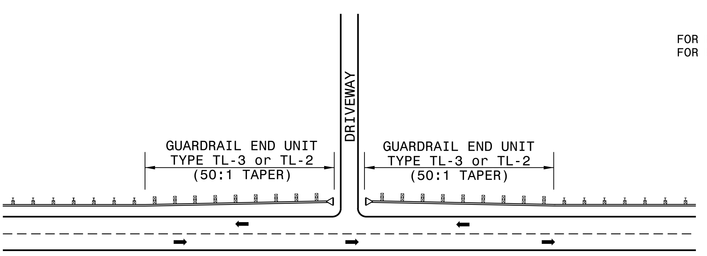


DETAIL-3
DIVIDED HIGHWAY

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

SHEET 9 OF 11
862D01

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

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862D01

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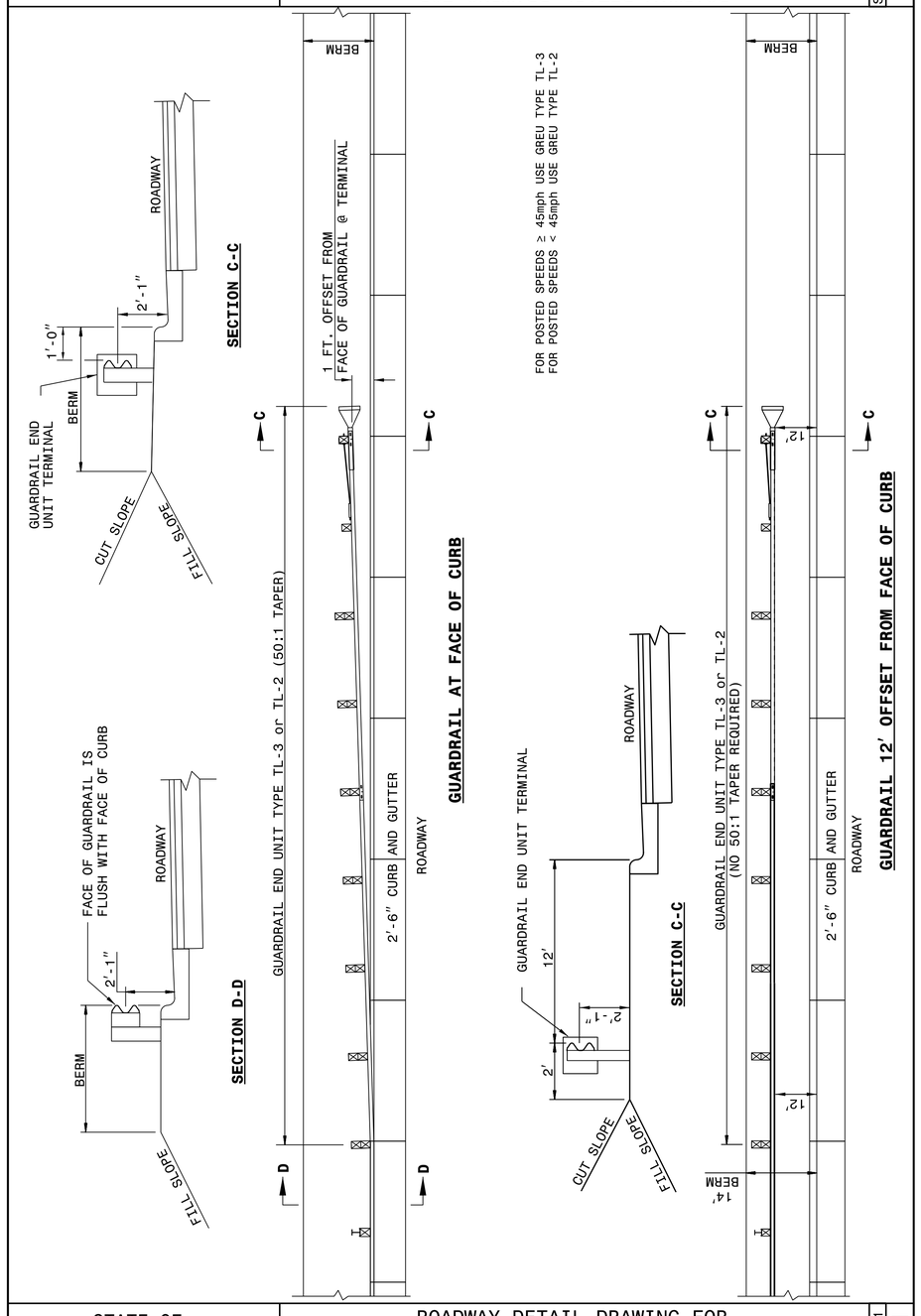
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT
GUARDRAIL TREATMENT AT CURB AND GUTTER

SHEET 11 OF 11
862D01



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ROADWAY DETAIL DRAWING FOR
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GUARDRAIL TREATMENT AT CURB AND GUTTER

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862D01

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jhowerton
AT CSD-292695

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER J. HOWERTON
9/25/2017

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B-5347	2C-7

STATE OF
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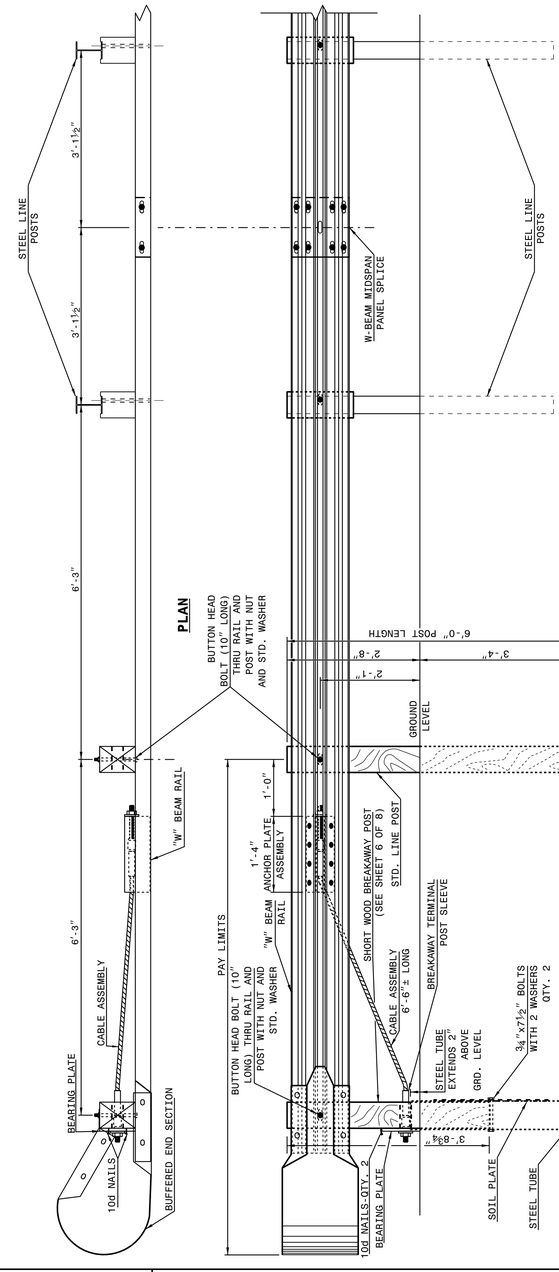
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 1 OF 8
862D02



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

NORTH CAROLINA PROFESSIONAL SEAL 022965 ENGINEER J. Howerton
9/25/2017

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STATE OF
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RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 2 OF 8
862D02

FLARED AND TANGENT
ELEVATION VIEW

FLARED AND TANGENT
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.

APPROACH END UNITS

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ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 2 OF 8
862D02

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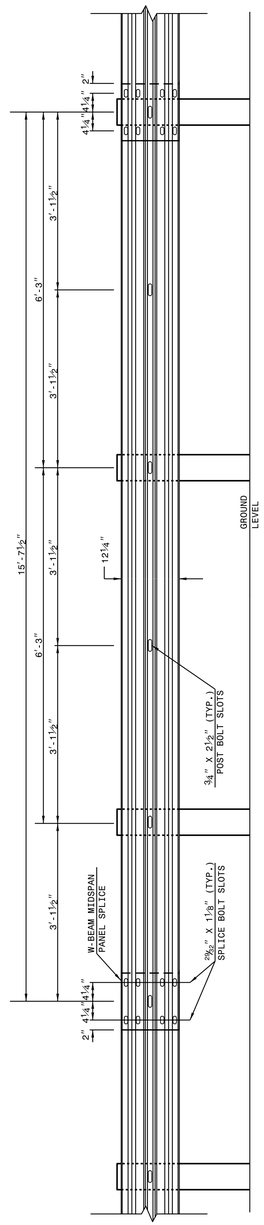
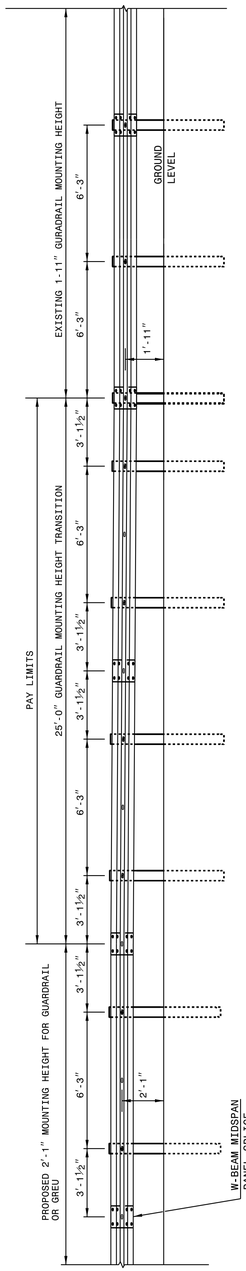


15'-7½" W-BEAM GUARDRAIL PANEL

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

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.



ELEVATION VIEW

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

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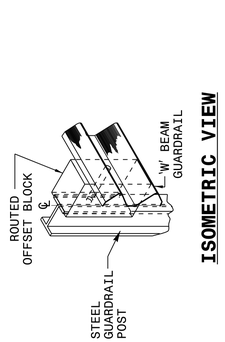
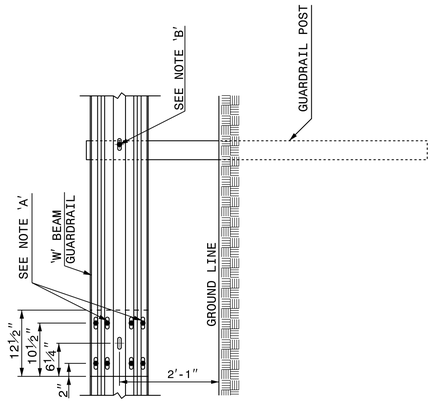
B-5347	2C-9

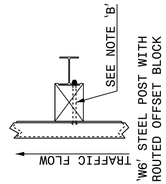
TYPICAL GUARDRAIL AND GUARDRAIL POST ALTERNATIVES



ISOMETRIC VIEW

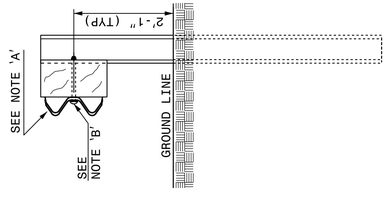


FRONT - MID SPAN SPLICE



'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.

9/25/2017

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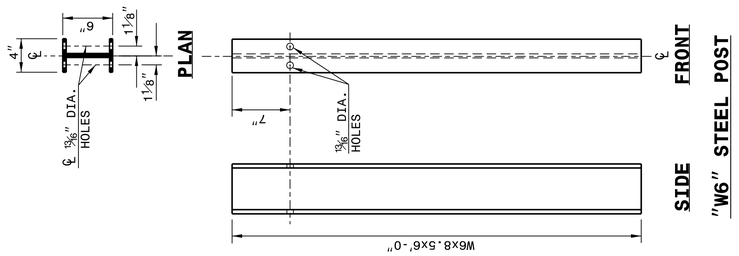
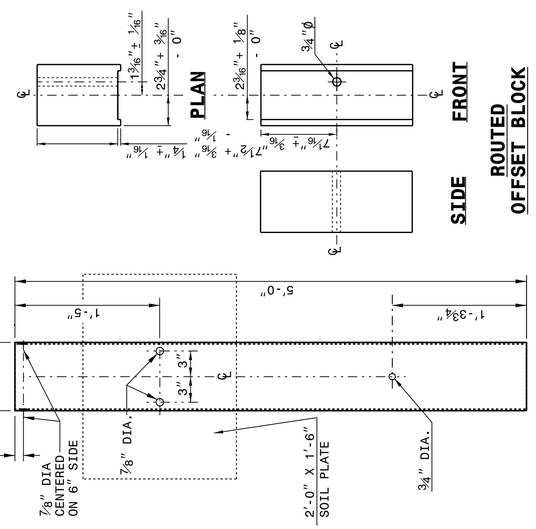
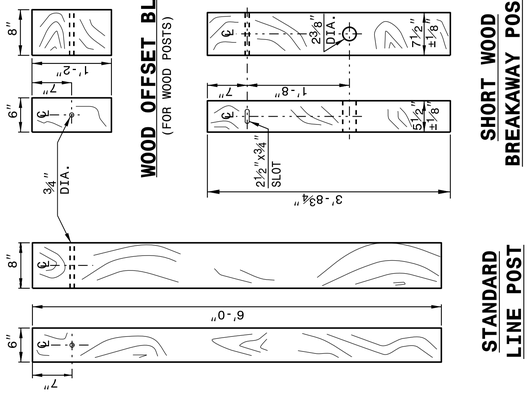
SYSTEM PARTS







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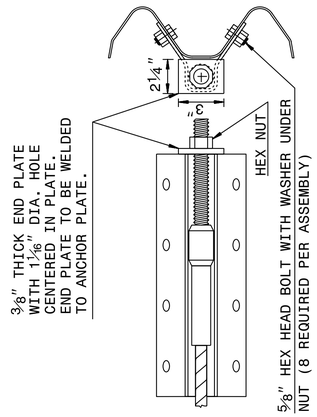
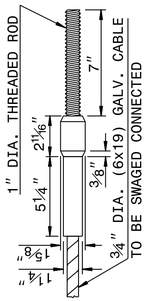


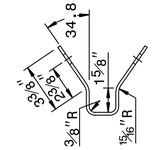
⅜" THICK END PLATE WITH 1⅛" DIA. HOLE CENTERED IN PLATE. END PLATE TO BE WELDED TO ANCHOR PLATE.

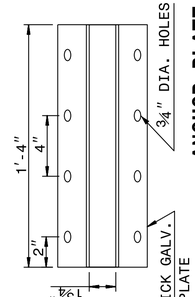
⅝" HEX HEAD BOLT WITH WASHER UNDER NUT (8 REQUIRED PER ASSEMBLY)

ANCHOR PLATE ASSEMBLY



SWAGED CABLE

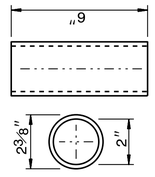




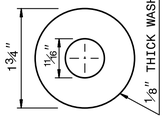
ANCHOR PLATE

CABLE ASSEMBLY

SYSTEM PARTS

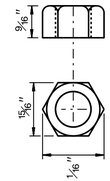


BREAKAWAY TERMINAL POST SLEEVE

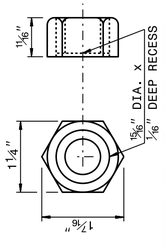


DETAIL OF STANDARD WASHER

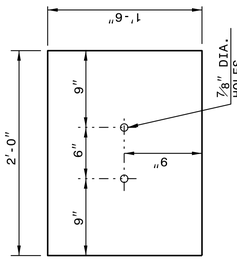
STANDARD WASHER: TYPICAL USE UNDER NUT WITH WOOD POST



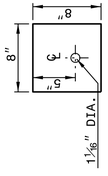
DETAIL OF STANDARD HEX BOLT AND NUT



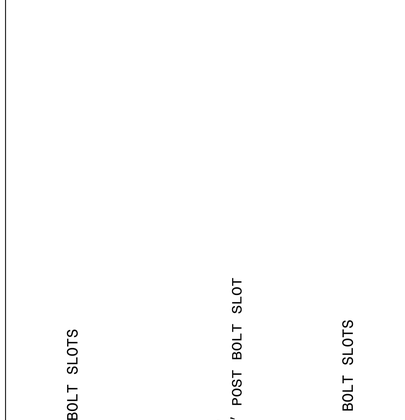
DETAIL OF BUTTON HEAD BOLT AND NUT

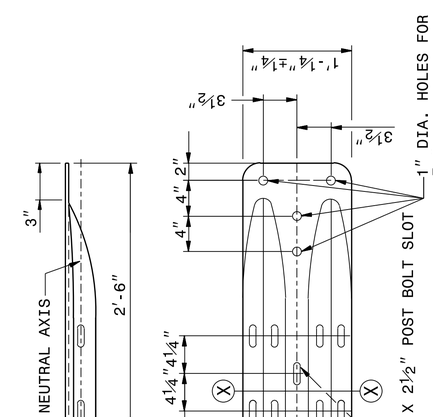


SOIL PLATE
¼" THICK PLATE



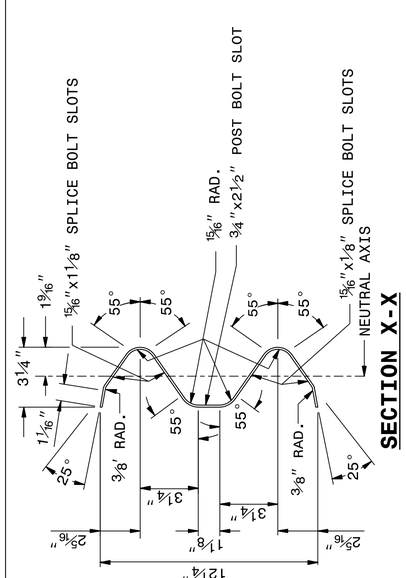
BEARING PLATE
⅝" THICK PLATE



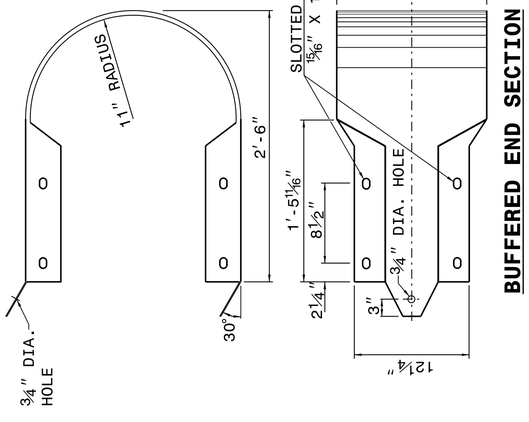


TYPICAL END SHOE

SYSTEM PARTS - GENERAL USE



SECTION X-X



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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 022966 JAMES S. HOWERTON
9/25/2017

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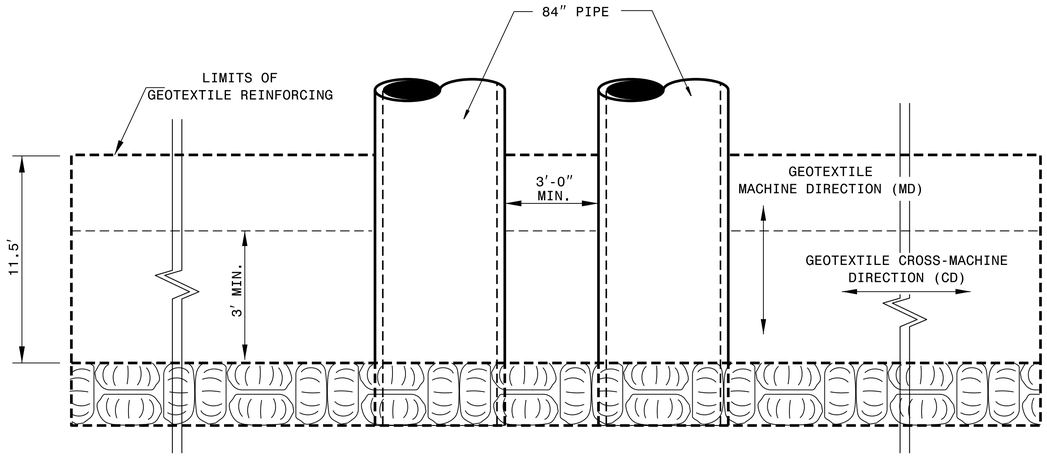
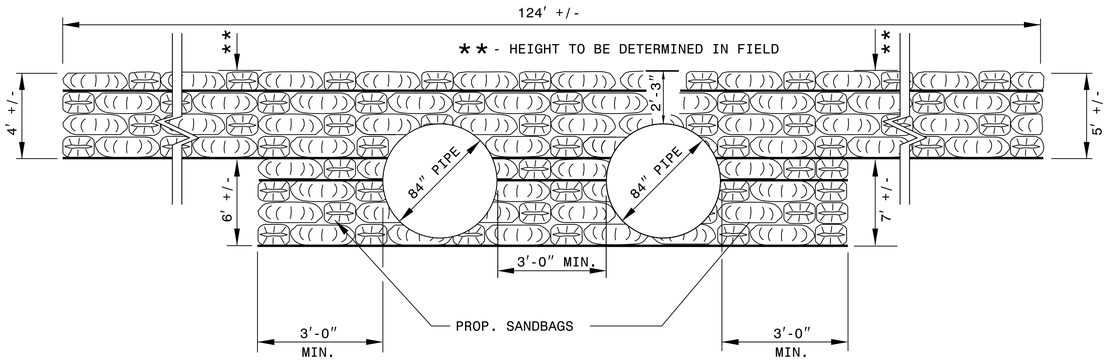


PLAN



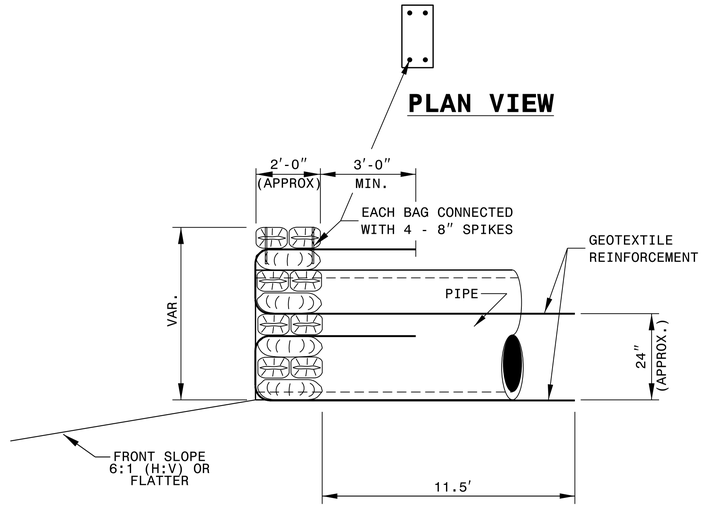
FRONT ELEVATION

GENERAL NOTES:

1. FOR REINFORCED SANDBAG HEADWALLS, SEE SANDBAG HEADWALLS PROVISION.
2. REINFORCED SANDBAG HEADWALLS ARE BASED ON A TRAFFIC SURCHARGE OF 250 LB/SF OR LESS AND A BACK SLOPE OF 2:1(H:V) OR FLATTER.
3. REINFORCED SANDBAG HEADWALLS ARE BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:

   UNIT WEIGHT, γ = 120 LB/CF
   FRICTION ANGLE, ϕ = 30 DEGREES
   COHESION, c = 0 LB/SF

4. DO NOT USE REINFORCED SANDBAG HEADWALLS IF ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE.
5. DO NOT USE REINFORCED SANDBAG HEADWALLS WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS BELOW SANDBAGS OR PIPES.
6. DO NOT PLACE GEOTEXTILE REINFORCEMENT OR SANDBAGS UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.
7. 24″ LONG #4 REINFORCING STEEL BARS MAY BE SUBSTITUTED FOR 8″ LONG STEEL SPIKES. DRIVE #4 BAR THROUGH NO MORE THAN 5 SANDBAGS.
8. DO NOT SPLICE OR OVERLAP GEOTEXTILE REINFORCEMENT SO SEAMS ARE PARALLEL TO THE HEADWALL FACE.
9. HEADWALL DIMENSIONS MAY BE ADJUSTED FOR ONE OR MORE PIPES AS SHOWN IN THE PLANS.



PLAN VIEW

SIDE ELEVATION

GEOTEXTILE REINFORCEMENT (TYPE 5 GEOTEXTILE)

WALL HEIGHT H (ft)	REINF. LENGTH L (ft)	WIDE WIDTH TENSILE STRENGTH @ ULTIMATE (MD) (lb/ft)
< 4	6	2400
4 TO 6	6	3400
6 TO 8	= H	4300
8 TO 10	= H	5200
10 TO 12	= H	6200

TOTAL APPROXIMATE AREA SANDBAG HEADWALL = 619 S.F.

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER CHRISTOPHER J. HOWGREN
9/25/2017

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STANDARDS AND SPECIAL DESIGN
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DETAIL OF REINFORCED SANDBAG HEADWALL

ORIGINAL BY: _____ DATE: _____
MODIFIED BY: kkempf DATE: 10-27-16
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FILE SPEC.: * sidetails/kkempf/english/B5347 Double Pipe Reinforced Sandbag Headwall.dgn

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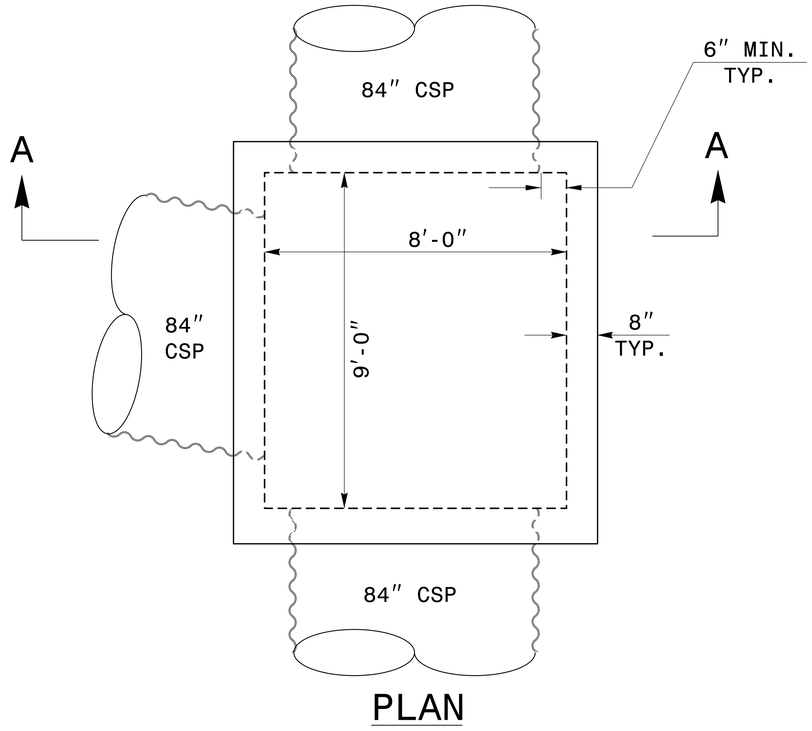
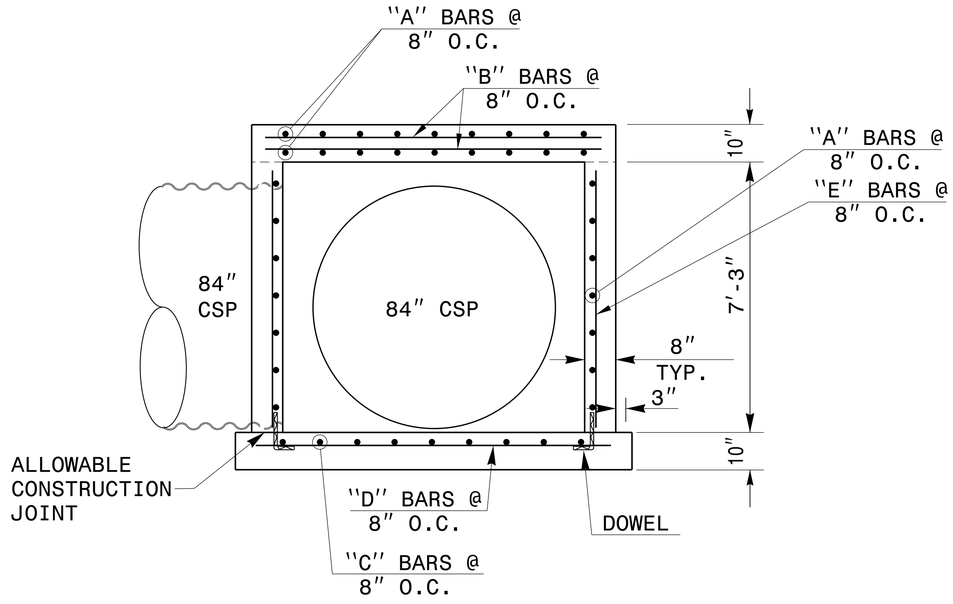


PLAN



SECTION A-A

GENERAL NOTES:

-CONSTRUCT THE BASE SLAB BY FORMING.

-SEE STD. DWG. 840.00 FOR CONSTRUCTION OF BASE SLAB IF PIPE IS SET INTO BASE SLAB.

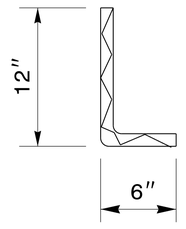
-USE CLASS 'B' CONCRETE THROUGHOUT.

-CONSTRUCTION OPTIONS: MONOLITHIC POUR, 2″ KEYWAY, OR #5 BAR DOWELS AT 12″ CENTERS AS DIRECTED BY THE ENGINEER.

-CUT, BEND OR RELOCATE REINFORCING STEEL TO POSITION PIPE AS DIRECTED BY THE ENGINEER.

-CHAMFER ALL EXPOSED CORNERS 1″.

-CONTRACTOR MAY ADJUST DIMENSIONS OF BOX AS FIELD CONDITIONS DICTATE OR AS DIRECTED BY THE ENGINEER.



DOWEL

BILL OF MATERIAL

BAR	NO.	SIZE	LENGTH	WEIGHT
A	36	#4	10′-0″	240.1
B	38	#4	9′-0″	228.1
C	15	#4	10′-6″	105.1
D	17	#4	9′-6″	107.7
E	54	#4	7′-1″	183.1
TOTAL REINF. STEEL (lbs.)				864.1
CLASS "B" CONC. (cu. yds.) NO DEDUCTIONS FOR PIPES				12.8

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NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER JOHN A. HOWERTON

9/25/2017

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

DETAIL OF SPECIAL JUNCTION BOX

ORIGINAL BY: K. KEMPF DATE: 10-27-16
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FILE SPEC.: special details\kkempf\english\B5347_jb82csp.dgn

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B-5347	2C-13

STATE OF
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DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR

CONCRETE AND BRICK PIPE PLUG

SHEET 1 OF 1

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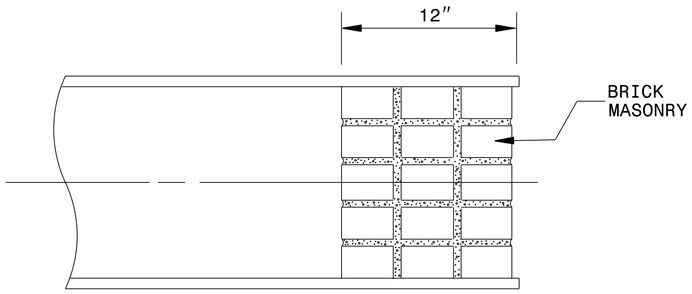
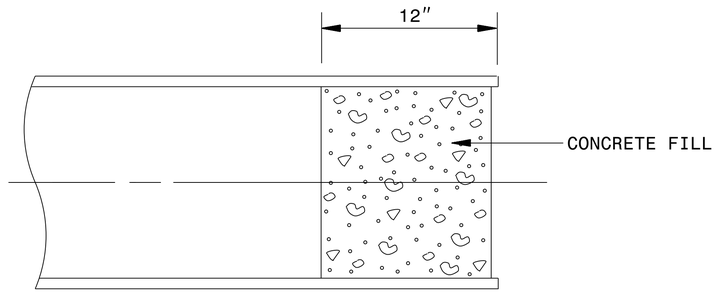


SECTION OF MASONRY
PIPE PLUG



SECTION OF CONCRETE
PIPE PLUG

QUANTITIES	
PIPE SIZE	CUBIC YARDS
12″	0.029
15″	0.045
18″	0.065
24″	0.116
30″	0.182
36″	0.262
42″	0.356
48″	0.465
54″	0.589
60″	0.727
66″	0.880
84″	1.426

NOTE:

EITHER BRICK MASONRY OR CONCRETE MAY BE USED.

CONCRETE BRICK MAY BE USED IN LIEU OF CLAY BRICK. JUMBO BRICK WILL BE PERMITTED.

NOTE:

USE PAY LIMITS (C.Y.) FOR PIPE PLUGS 12″ IN THICKNESS ONLY.

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

ENGLISH DETAIL DRAWING FOR

CONCRETE AND BRICK PIPE PLUG

SHEET 1 OF 1

840D71

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER Jonathan S. Howerton
9/25/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SEE TITLE BLOCK

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

21-AUG-2017 11:39
S:\Contracts\Special Details\jhowerton\840d71 Pipe Plug.dgn
jhowerton
AT CSD-242995

6/16/99

COMPUTED BY: EAR DATE: 3/31/17
CHECKED BY: JWJ DATE: 4/6/17

PROJECT REFERENCE NO.	SHEET NO.
B-5347	3B-1

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

GUARDRAIL SUMMARY

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOULDER WIDTH	FLARE LENGTH		W		ANCHORS							IMPACT ATTENUATOR TYPE 350					REMOVE 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							NO.	PERMITTED G	PERMITTED NG				
-L-	STA. 13+60.00	STA. 14+85.00	LT.	125			STA. 14+43.29		3	6	25	25	0.5	0.5			2												
-L-	STA. 13+40.00	STA. 14+77.50	RT.	137.5			STA. 13+58.55		3	6	25	25	0.5	0.5			2												
			SUB-TOTAL	262.5																									
		DEDUCTION	FOR ANCHOR UNITS																										
		GREU, TL-2	4 @ 25.0 =	-100																									
			PROJECT TOTAL	162.5													4												
	ADDITIONAL GUARDRAIL POST = 5 EA.		SAY	187.5																									
		TEMPORARY GUARDRAIL																											
-DET-	STA. 10+56.00	STA. 13+81.00	LT.	325			STA. 13+00.00		3	5	25	25	0.5	0.5			2												USE EXTRA LONG GR POSTS
-DET-	STA. 10+94.00	STA. 13+56.50	RT.	262.5			STA. 11+69.00		3	5	25	25	0.5	0.5			2												USE EXTRA LONG GR POSTS
			SUB-TOTAL	587.5																									
		DEDUCTION	FOR ANCHOR UNITS																										
		GREU, TL-2	4 @ 25.0 =	-100																									
			PROJECT TOTAL	487.5													4												
	ADDITIONAL GUARDRAIL POST = 5 EA.		SAY	500.0																									

SUMMARY OF EARTHWORK

STATION	STATION	UNCL. EXCAV.	UNDERCUT EXCAV.	EMBANK. +%	BORROW	WASTE
PHASE I						
DETOUR CONSTRUCTION						
-L- STA. 12+16.24	-L- STA. 16+44.03	10		3594	3584	
SUBTOTALS:		10		3594	3584	
PHASE II						
-L- CONSTRUCTION						
-L- STA. 12+56.50	-L- STA. 15+50.00	60	300	830	770	300
SUBTOTALS:		60	300	830	770	300
PHASE III						
REMOVE DETOUR						
-L- STA. 12+16.24	-L- STA. 16+44.03	3205		17		3187
SUBTOTALS:		3205		17		3187
TOTAL:		3275	300	4441	4354	3487
ADDITIONAL UNDERCUT			350	420	420	350
PROJECT TOTALS:		3275	650	4861	4774	3837
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT.					239	
GRAND TOTAL		3275	650	4861	5013	3837
SAY		3300	650		5200	

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

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

PAVEMENT REMOVAL SUMMARY

SURVEY LINE	STATION	STATION	LOCATION LT/RT/CL	YD^2
-L-	12+75	14+00	LT & RT	265.46
-L-	14+35	14+75	LT & RT	83.11
-DET-	10+36	10+79	LT & RT	23.93
-DET-	10+79	14+26	LT & RT	478.74
-DET-	14+26	14+76	LT & RT	29.16
			TOTAL:	880.41
			SAY:	890

8/21/2017
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4/04/06

COMPUTED BY: EAR DATE: 4/3/17
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STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

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

SUB–REGIONAL & REGIONAL

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

STATION	LOCATION (LT,RT, OR CL)	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	DRAINAGE 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												
–DET– 11+87.06	CL	501			503.23	498.07			56											
–DET– 12+99.32	CL	505			502.68	500.25			40											
TOTAL									96											

STATION	C.S. PIPE SIZE	12"	15"	18"	24"	36"	42"	48"
	THICKNESS OR GAUGE	.064	.064	.064	.064	.079	.109	.109
–DET– 11+87.06								
–DET– 12+99.32								
TOTAL								

STATION	R.C. PIPE (CLASS III) SIZE	12"	18"	24"	30"	36"	42"	48"
–DET– 11+87.06								
–DET– 12+99.32								
TOTAL								

STATION	R.C. PIPE (CLASS IV) SIZE	12"	15"	18"	24"	30"	36"	42"	48"
–DET– 11+87.06									
–DET– 12+99.32									
TOTAL									

STATION	*** R. C. PIPE (CLASS V)	*** R. C. PIPE CULVERTS, CONTRACTOR DESIGN PIPE	*** R. C. PIPE CULVERTS, CONTRACTOR DESIGN PIPE	15" SIDE DRAIN PIPE	18" SIDE DRAIN PIPE	ENDWALLS STD. 838.01, STD. 838.11 OR STD. 838.80 (UNLESS NOTED OTHERWISE) CU. YDS. R.C.P.	ENDWALLS STD. 838.01, STD. 838.11 OR STD. 838.80 (UNLESS NOTED OTHERWISE) CU. YDS. C.S.P.
–DET– 11+87.06							
–DET– 12+99.32							
TOTAL							

STATION	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')	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	
–DET– 11+87.06								
–DET– 12+99.32								
TOTAL								

STATION	CONCRETE TRANSITIONAL SECTION CATCH BASIN	CONCRETE TRANSITIONAL SECTION DROP INLET	G.D.I. FRAME WITH GRATE STD. 840.22	G.D.I. FRAME WITH TWO GRATES STD. 840.22	G.D.I. FRAME WITH GRATE STD. 840.24	G.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	G.D.I. (N.S.) FRAME WITH GRATE STD. 840.32	J.B. STD. 840.31 OR 840.32	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" C.Y. STD 840.72	CONC. & BRICK PIPE PLUG, C.Y. STD. 840.71	PIPE REMOVAL LIN.FT.	REMARKS
–DET– 11+87.06												56	TEMP PIPE
–DET– 12+99.32												40	TEMP PIPE
TOTAL												96	

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.)	GRATED DROP INLET (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

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

STATION	LOCATION (LT,RT, OR CL)	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	DRAINAGE PIPE (RCP, CSP, CAAP, HDPE, or PVC) SIZE	54"	60"	66"	72"	78"	84"
								THICKNESS OR GAUGE						
–DET– 12+17.10	RT	506		499.27	490.55									
–DET– 11+69.61	RT	506	508		490.55	491.40								124
–DET– 12+26.76	CL	506	503		490.55	490.20								52
–DET– 12+30.00	RT	506	507		490.55	494.88								28
–DET– 12+52.94	CL	502	504		490.51	490.37								52
TOTAL														256

STATION	BITUMINOUS COATED C.S. PIPE TYPE B SIZE	54"	SHOP ELON–GATED 54"	60"	66"	84"
	THICKNESS OR GAUGE	.109	.138	.168	.138	.168	.138	.168	.138	.168	.138	.168
–DET– 12+17.10												
–DET– 11+69.61												
–DET– 12+26.76												
–DET– 12+30.00												
–DET– 12+52.94												
TOTAL												

STATION	STRUCTURAL PLATE PIPE 60"		66"		72"	
		12	10	12	10	12	10
–DET– 12+17.10							
–DET– 11+69.61							
–DET– 12+26.76							
–DET– 12+30.00							
–DET– 12+52.94							
TOTAL							

STATION	REINFORCED ENDWALLS WITH R.C. – C.Y.	REINFORCED ENDWALLS WITH C.S. – C.Y.	MASONARY DRAINAGE STRUCTURES CUBIC YARDS	SPECIAL JB WITH SLAB LID (SEE DETAIL 2C-12)	REINFORCED SANDBAG HEADWALLS (DETAIL 2C-11) (SF)	REINF. CONC. FLARED END SECTIONS NO. & SIZE	CORR. STEEL FLARED END SECTIONS NO. & SIZE	REINF. CONC. ELBOWS NO. & SIZE	CORR. STEEL ELBOWS NO. & SIZE	TEMP PIPE PLUGS C.Y. (SEE DETAIL 2C-13)	PIPE REMOVAL LIN.FT.	REMARKS
–DET– 12+17.10			12.8	1								TEMP. JB (PHASE I & V)
–DET– 11+69.61											124	TEMP. PIPE (PHASE III & V)
–DET– 12+26.76											52	TEMP. PIPE (PHASE II & V)
–DET– 12+30.00										1.426	28	TEMP. PIPE (PHASE I & V)
–DET– 12+52.94										2.852	52	TEMP. PIPE (PHASE IV & V)
TOTAL			12.8	1	619				SAY	4.278 5.0	256	

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.)	GRATED DROP INLET (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

8/2/2017
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12/06/07

COMPUTED BY: EAR DATE: 4/11/17
CHECKED BY: JWJ DATE: 4/11/17

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT REFERENCE NO.	SHEET NO.
B-5347	3G-1

SUMMARY OF AGGREGATE SUBGRADE/STABILIZATION

LINE	STATION	STATION	AGGREGATE TYPE* ASU/AST	AGGREGATE THICKNESS INCHES	SHALLOW UNDERCUT CY	CLASS IV SUBGRADE STABILIZATION TONS	GEOTEXTILE FOR SOIL STABILIZATION SY	STABILIZER AGGREGATE TONS	CLASS VI SELECT MATERIAL (#57 STONE) TONS
	CONTINGENCY		ASU		100	200	200		
				TOTAL CY/TONS/SY:	100	200	200**		

*ASU = AGGREGATE SUBGRADE
*AST = AGGREGATE STABILIZATION
**TOTAL SQUARE YARDS OF GEOTEXTILE FOR SOIL STABILIZATION IS ONLY THE ESTIMATED QUANTITY FOR ASU/AST AND MAY ONLY REPRESENT A PORTION OF THE GEOTEXTILE QUANTITY SHOWN IN THE ITEM SHEETS OF THE PROPOSAL.

9/21/2017
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8/17/99

REVISIONS

–L–
PI Sta 10+48.51 △ = 3° 56' 05.7" (RT) D = 4° 03' 25.6" L = 96.99' T = 48.51' R = 1,412.23' SE= EXIST.
PI Sta 11+99.34 △ = 5° 14' 55.5" (RT) D = 2° 33' 56.7" L = 204.57' T = 102.36' R = 2,233.10' SE = SEE PLANS
PI Sta 15+22.82 △ = 2° 00' 55.7" (LT) D = 1° 38' 48.2" L = 122.39' T = 61.20' R = 3,479.38' SE = SEE PLANS
PI Sta 16+84.28 △ = 14° 37' 34.7" (LT) D = 7° 20' 01.7" L = 199.44' T = 100.26' R = 781.26' SE = EXIST.

Prepared in the Office of:
JOHNSON, MIRMIRAN, & THOMPSON, INC.
1130 Situs Court, Suite 200, Raleigh NC, 27606

PROJECT REFERENCE NO.	SHEET NO.
B-5347	4
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 019824 ENGINEER ENRICO A. SCHIAVONE
9/25/2017

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 032581 ENGINEER BROOKE E. ANDERSON
9/25/2017

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NAD 83/2011

10+00

15+00

BEGIN TIP PROJECT B–5347
–L– POC STA. 11+25.00

END TIP PROJECT B–5347
–L– POC STA. 17+25.00
END CONSTRUCTION

–L– PC STA. 10+00.00
BEGIN CONSTRUCTION

–BL– 5 PINC

–BL– 6 POT

TIMOTHY L. CROUSE
DB 2459 PG 465
4

JAMES R. &
BARBARA B. KIRKPATRICK
DB 184 PG 158
5

N.H. & NINA MAE SHACKLEFORD
DB 179 PG 366
3

SARA LOU BOWMAN SHOFFNER
DB 2130 PG 494
1

THE GEORGE & MICHELLE
CONNETT FAMILY TRUST
DB 2696 PG 149
PB 57 PG 1
2

BM2
SEE SHEET 1-C

BANK STABILIZATION
SEE DETAIL B

STANDARD BASE DITCH
SEE DETAIL A
BMI
SEE SHEET 1C-1
PROP. 1 @13'X7' RCBC, BURIED 1'

BEGIN CULVERT
–L– STA.14+07.27

END CULVERT
–L– STA.14+20.73

REMOVE
EXISTING
BRIDGE

BEGIN GRADE
–L– STA.12+56.50
END OVERLAY

–L– STA.11+25.00
BEGIN OVERLAY

END GRADE
–L– STA.15+50.00
BEGIN OVERLAY

END OVERLAY
–L– STA.17+25.00

–L– PT Sta. 17+83.45

–L– PCC Sta. 15+84.01

–L– PC Sta. 14+61.62

–L– PT Sta. 13+01.56

–L– PCC Sta. 10+96.99

–L– PC Sta. 10+00.00

S 86° 52' 14.7" E

N 58°30'00" W
178.52'

S 43°26'52" E
46.35'

N 47°09'32" E
45.64'

N 79°41'20" E
268.70'

S 43°26'52" E
146.66'

SR 1145 POND RD

TO CAPRICE LN AND DEAD END

TO NO 62 (ALAMANCE RD)

RETAIN

WOODS

METAL GATE

BREACHED POND

BIG ALAMANCE CREEK

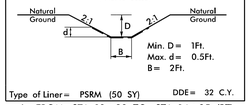
EXISTING R/W

48" BW AND WW

36" RCP

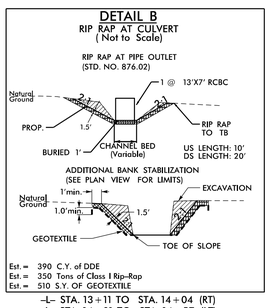
15" RCP

DETAIL A
STANDARD BASE DITCH
(Not to Scale)



Type of Liner = PSRM (50 SY) DDE = 32 C.Y.
–L– FROM STA. 13+98 TO STA. 14+85 (RT)

DETAIL B
RIP RAP AT CULVERT
(Not to Scale)



Est. = 390 C.Y. of DDE
Est. = 350 Tons of Class I Rip-Rap
Est. = 510 S.Y. OF GEOTEXTILE
–L– STA. 13+11 TO STA. 14+04 (RT)
–L– STA. 14+01 TO STA. 14+57 (LT)

SEE DETAIL SHEET 2B–1 FOR DETOUR
SEE SHEET 5 FOR PROFILE
SEE SHEETS C1 THRU C8 FOR CULVERT PLANS

9/21/2017
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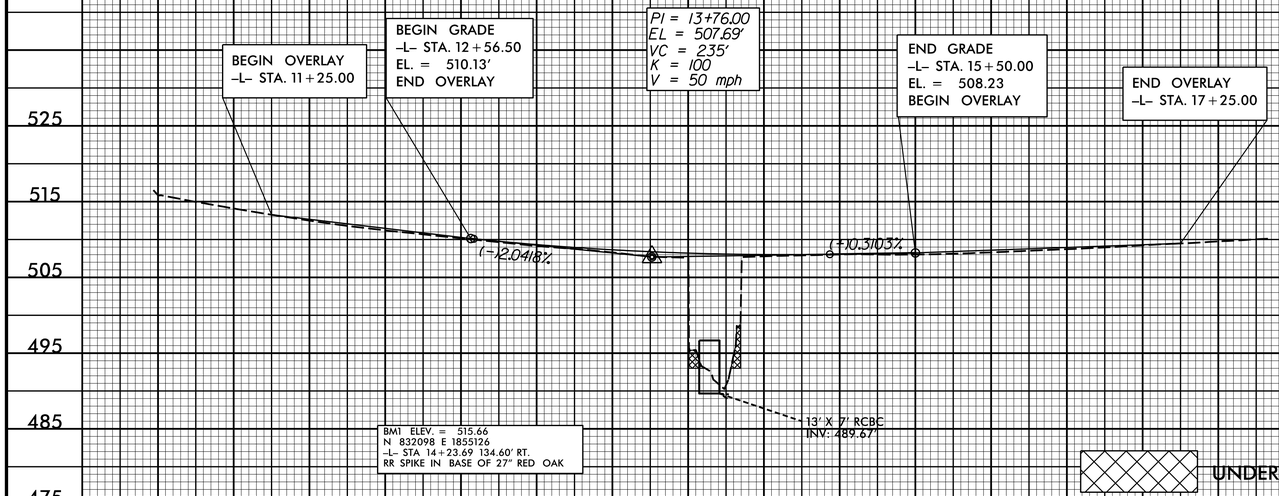
PROJECT REFERENCE NO.	SHEET NO.
B-5347	5

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 019824 ENGINEER MICHAEL A. ROBINSON
9/25/2017

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 032681 ENGINEER BROOKE E. ANDERSON
9/25/2017



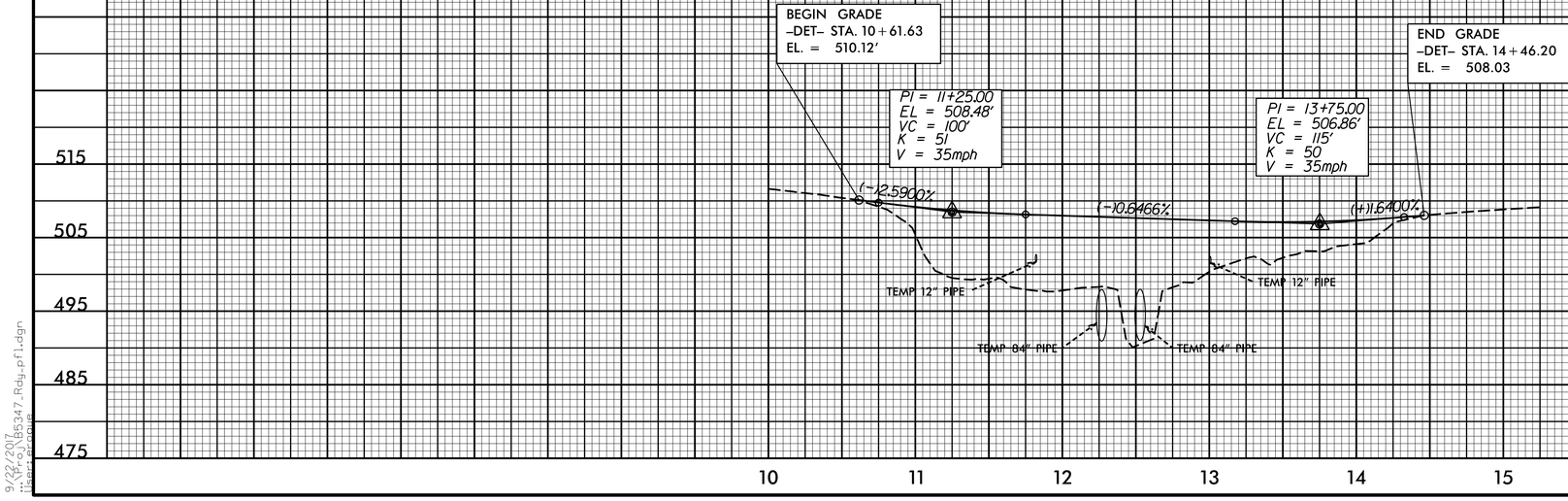
CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 450	CFS
DESIGN FREQUENCY	= 25	YRS
DESIGN HW ELEVATION	= 496.3	FT
BASE DISCHARGE	= 510	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 496.7	FT
OVERTOPPING DISCHARGE	= 580+	CFS
OVERTOPPING FREQUENCY	= 500	YRS
OVERTOPPING ELEVATION	= 508.0	FT

UNDERCUT EXCAVATION

SEE SHEET 4 FOR PLAN VIEW

–DET–



SEE DETAIL SHEET 2B–1 FOR PLAN VIEW

9/22/2017
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