This electronic collection of documents is provided for the convenience of the user and is Not a Certified Document –

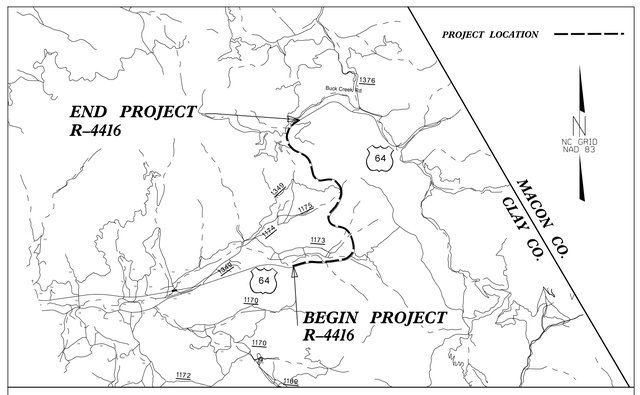
The documents contained herein were originally issued and sealed by the individuals whose names and license numbers appear on each page, on the dates appearing with their signature on that page.
This file or an individual page shall not be considered a certified document.

09/08/99

TIP PROJECT: R–4416

CONTRACT: C202434

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional symbols



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CLAY COUNTY

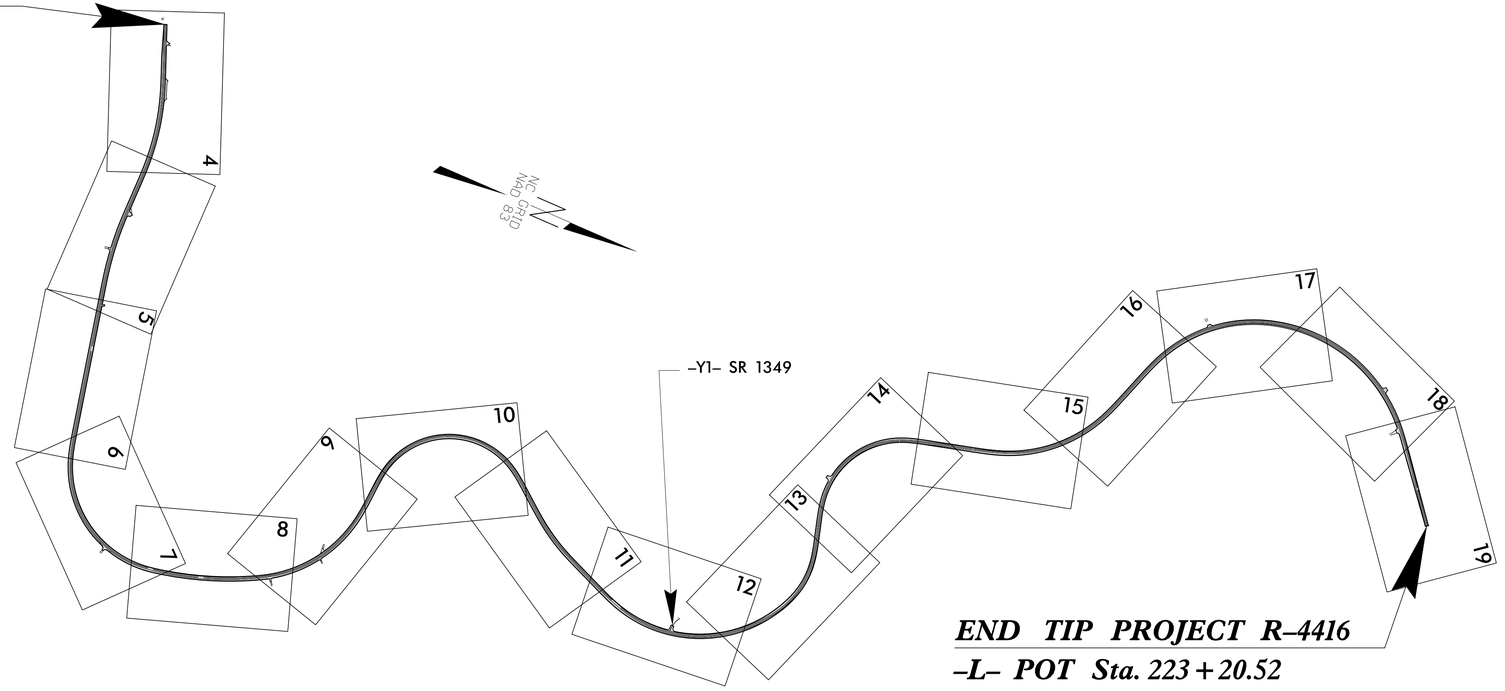
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R–4416	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
38908.1.1		PE
38908.2.1		R/W
38908.3.FS2	STP–0064(136)	CONST.

LOCATION: US 64 FROM 1.5 MI. EAST OF THE WEST END OF SR 1349 TO 1.8 MI. EAST OF THE EAST END OF SR 1349

TYPE OF WORK: GRADING, DRAINAGE, AND PAVING

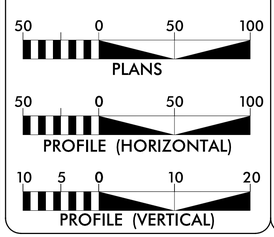
BEGIN TIP PROJECT R–4416
–L– POT Sta. 10 + 00.00



END TIP PROJECT R–4416
–L– POT Sta. 223 + 20.52

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES



DESIGN DATA

ADT 2010 = 2950
ADT 2030 = 3950
DHV = %
D = %
T = 6.4 % *
V = 60 MPH

* TTST 5.2 DUAL 1.2
STATEWIDE TIER

PROJECT LENGTH

ROADWAY LENGTH TIP PROJECT R–4416 = 4.038 MILES
TOTAL LENGTH TIP PROJECT R–4416 = 4.038 MILES

Prepared In the Office of:
Michael Baker INTERNATIONAL
8000 REGENCY PARKWAY, SUITE 600
CARY, NC 27518
PROFESSIONAL CORP. LICENSE NUMBER: F–1084

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: N/A

LETTING DATE: May 17, 2016

TODD BUCKNER, PE
PROJECT ENGINEER

WARREN E. JOHNSON
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER
DocuSigned by: Marc Shown 49D24AEC0AD84C2...
NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN P.E.
2/18/2016
SIGNATURE:

ROADWAY DESIGN ENGINEER
DocuSigned by: 1087011E67F6435...
NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER P.E.
2/18/2016
SIGNATURE:

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA
STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION

2/17/2016 2:47:33 PM
R:\Roadway\Proj\R-4416_rdy_tsh.dgn
USER: todd.buckner

8/17/99

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
R-4416	1A

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER
Digitally signed by
1087011E67F6435...
2/24/2016
Michael Baker Engineering, Inc.
Michael Baker INTERNATIONAL
3000 Regency Pkwy Suite 600 Cary, NC 27518
NC License: F-1084

INDEX OF SHEETS

SHEET NUMBER	SHEET
1	TITLE SHEET
1A	INDEX OF SHEETS AND GENERAL NOTES
1B	CONVENTIONAL SYMBOLS
1C–1	SURVEY CONTROL SHEETS
1D–1	CENTERLINE COORDINATE LIST
2A–1 THRU 2A–2	PAVEMENT SCHEDULE AND TYPICAL SECTIONS
2C–1	DETAIL TO CONVERT EXISTING DI TO JB
3B–1	ROADWAY SUMMAIRES (EARTHWORK, GUARDRAIL, ECT.)
3D–1 THRU 3D–3	DRAINAGE SUMMARIES
3G–1	GEOTECHNICAL SUMMARIES
4 THRU 28	PLAN AND PROFILE SHEETS
TMP–1 THRU TMP–2	TRAFFIC MANAGEMENT PLANS
PMP–1 THRU PMP–5	PAVEMENT MARKING PLANS
EC–1 THRU EC–35	EROSION CONTROL PLANS
RF–1	REFORESTATION PLAN
SIGN–1 THRU SIGN–11	SIGNING PLANS
X–1 THRU X–1A	CROSS–SECTION SUMMARY SHEET
X–2 THRU X–88	CROSS–SECTIONS

LIST OF STANDARDS

EFF. 01–17–2012
REV. 10–30–2012

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	
815.03	Pipe Underdrain and Blind Drain
838.01	Concrete Endwall for Single and Double Pipe Culverts – 15" thru 48" Pipe 90 Skew
838.11	Brick Endwall for Single and Double Pipe Culverts – 15" thru 48" Pipe 90 Skew
838.80	Precast Concrete Endwall – For Single 12" thru 72" Pipe 90 Skew
840.00	Concrete Base Pad for Drainage Structures
840.14	Concrete Drop Inlet – 12" thru 30" Pipe
840.15	Brick Drop Inlet – 12" thru 30" Pipe
840.16	Drop Inlet Frame and Grates – for use with Std. Dwg 840.14 and 840.15
840.17	Concrete Grated Drop Inlet Type 'A' – 12" thru 72" Pipe
840.22	Frames and Wide Slot Sag Grates
840.25	Anchorage for Frames – Brick or Concrete or Precast
840.26	Brick Grated Drop Inlet Type 'A' – 12" thru 72" Pipe
840.31	Concrete Junction Box – 12" thru 66" Pipe
840.32	Brick Junction Box – 12" thru 66" Pipe
840.45	Precast Drainage Structure
840.66	Drainage Structure Steps
840.71	Concrete and Brick Pipe Plug
840.72	Pipe Collar
862.01	Guardrail Placement
862.02	Guardrail Installation
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

GENERAL NOTES: 2012 SPECIFICATIONS

EFFECTIVE: 01–17–2012
REVISED: 07–30–2012

GRADING AND SURFACING OR RESURFACING AND WIDENING:

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

CLEARING:

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

SUPERELEVATION:

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

SHOULDER CONSTRUCTION:

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

SIDE ROADS:

THE CONTRACTOR WILL BE REQUIRED TO DO ALL NECESSARY WORK TO PROVIDE SUITABLE CONNECTIONS WITH ALL ROADS, STREETS, AND DRIVES ENTERING THIS PROJECT. THIS WORK WILL BE PAID FOR AT THE CONTRACT UNIT PRICE FOR THE PARTICULAR ITEMS INVOLVED.

UNDERDRAINS:

UNDERDRAINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. NO. 815.03 AT LOCATIONS DIRECTED BY THE ENGINEER.

GUARDRAIL:

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

TEMPORARY SHORING:

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

SUBSURFACE PLANS:

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

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE: DUKE ENERGY (ELECTRIC POWER) AND FRONTIER COMM. (TELEPHONE).

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

ROCK:

ROCK IS ANTICIPATED BETWEEN –L– STA. 10+00 – 223+20.52. BLASTING MAY BE REQUIRED FOR EXCAVATION ON THE PROJECT. SEE SECTION 220 OF THE STANDARD SPECIFICATIONS AND IF APPLICABLE, ROCK BLASTING PROVISION.

2/24/2016 01:09:42 PM
R-4416_roddesign_SHT_1A.dgn
USER:toddbuckner

04/06/15

PROJECT REFERENCE NO.	SHEET NO.
R-4416	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
- 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
- Potential Contamination Area: Soil
- Known Contamination Area: Water
- Potential Contamination Area: Water
- Contaminated Site: Known or Potential

BUILDINGS AND OTHER CULTURE:

- Gas Pump Vent or U/G Tank Cap
- Sign — 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:

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

ROADS AND RELATED FEATURES:

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

VEGETATION:

- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard — Vineyard

EXISTING STRUCTURES:

MAJOR:

- Bridge, Tunnel or Box Culvert — CONC
- Bridge Wing Wall, Head Wall and End Wall — CONC WW

MINOR:

- Head and End Wall — CONC HW
- Pipe Culvert
- Footbridge
- Drainage Box: Catch Basin, DI or JB — CB
- Paved Ditch Gutter
- Storm Sewer Manhole — S
- Storm Sewer — S

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — 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.

6/2/99

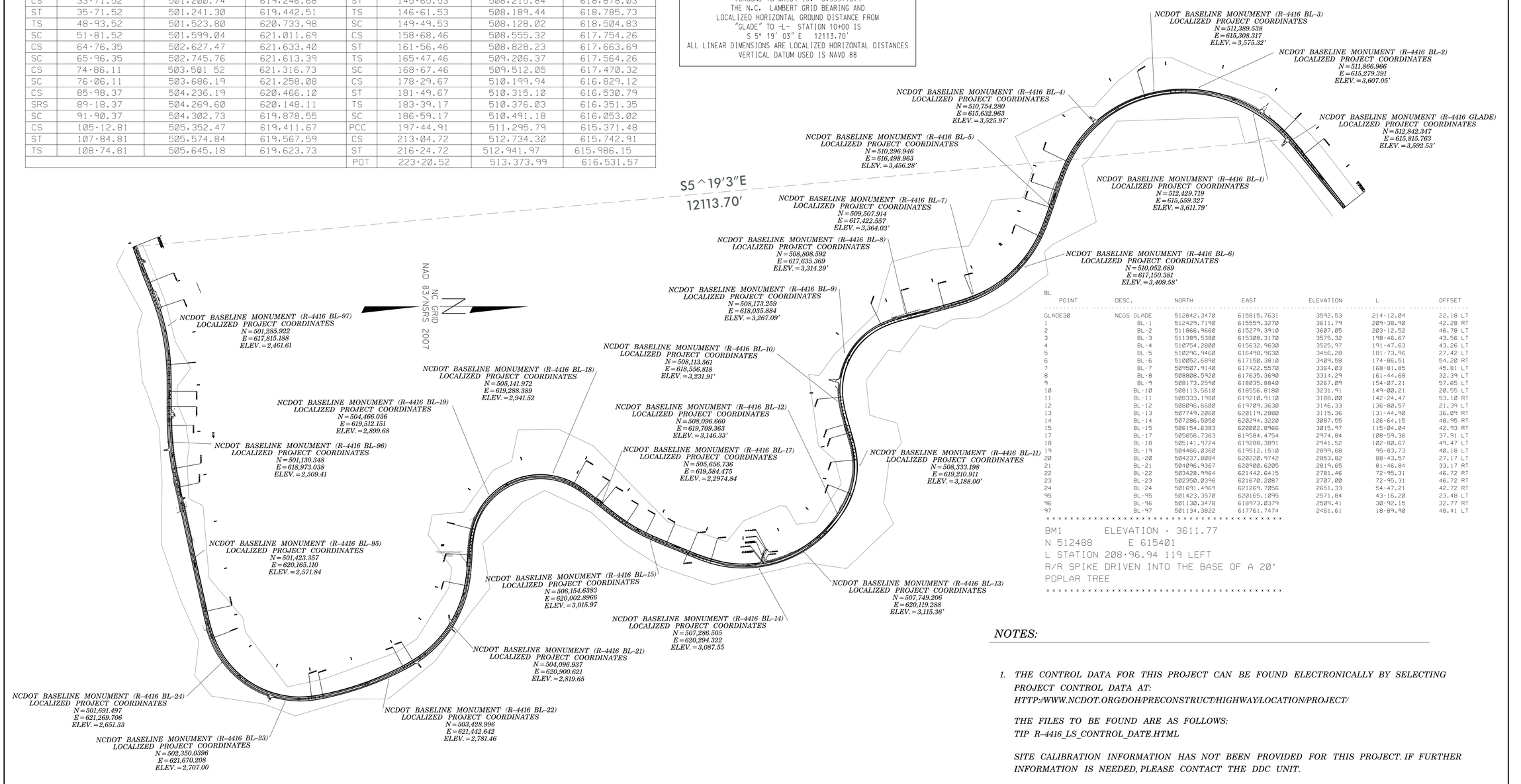
PROJECT REFERENCE NO.	SHEET NO.
R-4416	1C-1
Location and Surveys	

SURVEY CONTROL SHEET R-4416

TYPE	STATION	NORTH	EAST	TYPE	STATION	NORTH	EAST
CPOT	10+00.00	500,780.78	616,938.40	SC	111+94.81	505,901.00	619,815.78
TS	14+05.00	500,931.99	617,314.12	CS	114+25.59	506,101.06	619,930.49
SC	16+85.00	501,031.22	617,575.89	ST	116+65.59	506,320.93	620,026.59
CS	22+85.21	501,144.99	618,163.49	TS	119+20.59	506,556.80	620,123.50
ST	25+65.21	501,150.65	618,443.39	SC	121+60.59	506,781.63	620,207.16
TS	27+25.21	501,150.63	618,603.39	PCC	139+23.71	508,226.68	619,505.88
SC	29+25.21	501,152.84	618,803.36	CS	142+77.53	508,277.27	619,158.93
CS	33+71.52	501,200.74	619,246.68	ST	145+65.53	508,215.84	618,878.03
ST	35+71.52	501,241.30	619,442.51	TS	146+61.53	508,189.44	618,785.73
TS	48+93.52	501,523.80	620,733.98	SC	149+49.53	508,128.02	618,504.83
SC	51+81.52	501,599.04	621,011.69	CS	158+68.46	508,555.32	617,754.26
CS	64+76.35	502,627.47	621,633.40	ST	161+56.46	508,828.23	617,663.69
SC	65+96.35	502,745.76	621,613.39	TS	165+47.46	509,206.37	617,564.26
CS	74+86.11	503,581 52	621,316.73	SC	168+67.46	509,512.05	617,470.32
SC	76+06.11	503,686.19	621,258.08	CS	178+29.67	510,199.94	616,829.12
CS	85+98.37	504,236.19	620,466.10	ST	181+49.67	510,315.10	616,530.79
SRS	89+18.37	504,269.60	620,148.11	TS	183+39.17	510,376.03	616,351.35
SC	91+90.37	504,302.73	619,878.55	SC	186+59.17	510,491.18	616,053.02
CS	105+12.81	505,352.47	619,411.67	PCC	197+44.91	511,295.79	615,371.48
ST	107+84.81	505,574.84	619,567.59	CS	213+04.72	512,734.30	615,742.91
TS	108+74.81	505,645.18	619,623.73	ST	216+24.72	512,941.97	615,986.15
				POT	223+20.52	513,373.99	616,531.57

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR MONUMENT "GLADE" WITH NAD 83/NSRS 2007 STATE PLANE GRID COORDINATES OF NORTHING: 512841.26(ft) EASTING: 615815.89(ft) ELEVATION: 3592.53(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99971014
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "GLADE" TO -L- STATION 10+00 IS S 5° 19' 03" E 12113.70'
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88



BL

POINT	DESC.	NORTH	EAST	ELEVATION	L	OFFSET
GLADE30	NCGS GLADE	512842.3470	615815.7631	3592.53	214+12.04	22.18 LT
1	BL-1	512429.7190	615559.3270	3611.79	209+38.90	42.28 RT
2	BL-2	511866.9660	615279.3910	3607.05	203+12.52	46.78 LT
3	BL-3	511389.5380	615308.3170	3575.32	198+46.67	43.56 LT
4	BL-4	510754.2800	615632.9630	3525.97	191+47.63	43.26 LT
5	BL-5	510296.9460	616498.9630	3456.28	181+73.96	27.42 LT
6	BL-6	510052.6890	617150.3810	3409.58	174+86.51	54.20 RT
7	BL-7	509507.9140	617422.5570	3364.03	168+81.85	45.81 LT
8	BL-8	508808.5920	617635.3690	3314.29	161+44.68	32.39 LT
9	BL-9	508173.2590	618035.8840	3267.09	154+07.21	57.65 LT
10	BL-10	508113.5610	618556.8180	3231.91	149+00.21	20.55 LT
11	BL-11	508333.1980	619210.9110	3188.00	142+24.47	53.10 RT
12	BL-12	508096.6600	619709.3630	3146.33	136+80.57	21.39 LT
13	BL-13	507749.2060	620119.2880	3115.36	131+44.90	36.09 RT
14	BL-14	507286.5050	620294.3220	3087.55	126+64.15	48.95 RT
15	BL-15	506154.6383	620002.8966	3015.97	115+04.04	42.93 RT
17	BL-17	505656.7363	619584.4754	2974.84	108+59.36	37.91 LT
18	BL-18	505141.9724	619288.3891	2941.52	102+80.67	49.47 LT
19	BL-19	504466.0360	619512.1510	2899.68	95+83.73	40.18 LT
20	BL-20	504237.8084	620220.9742	2853.82	88+43.57	27.17 LT
21	BL-21	504096.9367	620900.6205	2819.65	81+46.84	33.17 RT
22	BL-22	503428.9964	621442.6415	2781.46	72+95.31	46.72 RT
23	BL-23	502350.0396	621670.2087	2707.00	72+95.31	46.72 RT
24	BL-24	501691.4969	621269.7056	2651.33	54+47.21	42.72 RT
95	BL-95	501423.3570	620165.1095	2571.84	43+16.20	23.48 LT
96	BL-96	501130.3478	618973.0379	2509.41	30+92.15	32.77 RT
97	BL-97	501134.3822	617761.7474	2461.61	18+89.90	48.41 LT

BM1 ELEVATION = 3611.77
N 512488 E 615401
L STATION 208+96.94 119 LEFT
R/R SPIKE DRIVEN INTO THE BASE OF A 20" POPLAR TREE

NOTES:

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

   THE FILES TO BE FOUND ARE AS FOLLOWS: TIP R-4416_LS_CONTROL_DATE.HTML

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

   NETWORK ESTABLISHED FROM EXISTING HARN MONUMENTATION

NOTE: DRAWING NOT TO SCALE

2/17/2016 2:47:36 PM
R:\Roadway\Projects\R-4416_LS_lc.dgn
USER:cadbuckner

PROJECT REFERENCE NO.	SHEET NO.
R-4416	ID-1

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CENTERLINE COORDINATE LIST

Point #	Chain	Station	Northing (Y)	Easting (X)
1	L	10+00.00	500780.7810	616938.4000
2	L	11+00.00	500818.1157	617031.1692
3	L	12+00.00	500855.4504	617123.9384
4	L	13+00.00	500892.7851	617216.7075
5	L	14+00.00	500930.1198	617309.4767
6	L	15+00.00	500967.2485	617402.3283
7	L	16+00.00	501003.0028	617495.7157
8	L	17+00.00	501035.9129	617590.1388
9	L	18+00.00	501064.8395	617685.8554
10	L	19+00.00	501089.5785	617782.7389
11	L	20+00.00	501110.0831	617880.6061
12	L	21+00.00	501126.3146	617979.2720
13	L	22+00.00	501138.2423	618078.5501
14	L	23+00.00	501145.8445	618178.2529
15	L	24+00.00	501149.4955	618278.1815
16	L	25+00.00	501150.5821	618378.1743
17	L	26+00.00	501150.6453	618478.1742
18	L	27+00.00	501150.6366	618578.1742
19	L	28+00.00	501150.7442	618678.1741
20	L	29+00.00	501152.1027	618778.1630
21	L	30+00.00	501156.2568	618878.0721
22	L	31+00.00	501163.7338	618977.7876
23	L	32+00.00	501174.5299	619077.1984
24	L	33+00.00	501188.6330	619176.1942
25	L	34+00.00	501206.0213	619274.6663
26	L	35+00.00	501226.1182	619372.6243
27	L	36+00.00	501247.3878	619470.3360
28	L	37+00.00	501268.7567	619568.0262
29	L	38+00.00	501290.1257	619665.7164
30	L	39+00.00	501311.4946	619763.4065
31	L	40+00.00	501332.8635	619861.0967
32	L	41+00.00	501354.2325	619958.7869
33	L	42+00.00	501375.6014	620056.4770
34	L	43+00.00	501396.9703	620154.1672
35	L	44+00.00	501418.3393	620251.8574
36	L	45+00.00	501439.7082	620349.5475
37	L	46+00.00	501461.0771	620447.2377
38	L	47+00.00	501482.4461	620544.9279
39	L	48+00.00	501503.8150	620642.6180
40	L	49+00.00	501525.1841	620740.3082
41	L	50+00.00	501547.2519	620837.8410
42	L	51+00.00	501572.9986	620934.4562
43	L	52+00.00	501605.7630	621028.8996
44	L	53+00.00	501647.7295	621119.6193
45	L	54+00.00	501698.7637	621205.5655
46	L	55+00.00	501758.3293	621285.8349
47	L	56+00.00	501825.8002	621359.5839
48	L	57+00.00	501900.4672	621426.0374
49	L	58+00.00	501981.5457	621484.4969
50	L	59+00.00	502068.1835	621534.3481
51	L	60+00.00	502159.4699	621575.0669
52	L	61+00.00	502254.4456	621606.2255
53	L	62+00.00	502352.1123	621627.4962
54	L	63+00.00	502451.4436	621638.6557
55	L	64+00.00	502551.3955	621639.5865
56	L	65+00.00	502650.9191	621630.2919
57	L	66+00.00	502749.3370	621612.6573
58	L	67+00.00	502846.9733	621591.0629
59	L	68+00.00	502943.8800	621566.3998
60	L	69+00.00	503039.9605	621538.6924
61	L	70+00.00	503135.1194	621507.9685
62	L	71+00.00	503229.2619	621474.2584
63	L	72+00.00	503322.2942	621437.5958
64	L	73+00.00	503414.1240	621398.0172
65	L	74+00.00	503504.6597	621355.5619
66	L	75+00.00	503593.8104	621310.2704
67	L	76+00.00	503680.9653	621261.2694
68	L	77+00.00	503764.2059	621205.9050
69	L	78+00.00	503842.5494	621143.8042
70	L	79+00.00	503915.4519	621075.3978
71	L	80+00.00	503982.4075	621001.1606
72	L	81+00.00	504042.9515	620921.6079
73	L	82+00.00	504096.6636	620837.2917
74	L	83+00.00	504143.1712	620748.7972
75	L	84+00.00	504182.1513	620656.7388
76	L	85+00.00	504213.3335	620561.7552
77	L	86+00.00	504236.5014	620464.5057
78	L	87+00.00	504251.9456	620365.7261
79	L	88+00.00	504261.7516	620266.2162
80	L	89+00.00	504268.4865	620166.4446
81	L	90+00.00	504274.9640	620066.6559
82	L	91+00.00	504285.5379	619967.2351
83	L	92+00.00	504305.1409	619869.2332
84	L	93+00.00	504337.3509	619774.6452
85	L	94+00.00	504382.1760	619685.3419
86	L	95+00.00	504438.7763	619602.9964
87	L	96+00.00	504506.0912	619529.1515
88	L	97+00.00	504582.8597	619465.1908
89	L	98+00.00	504667.6435	619412.3127
90	L	99+00.00	504758.8538	619371.5079
91	L	100+00.00	504854.7820	619343.5408
92	L	101+00.00	504953.6307	619328.9355
93	L	102+00.00	505053.5478	619327.9657
94	L	103+00.00	505152.6614	619340.6494
95	L	104+00.00	505249.1143	619366.7491
96	L	105+00.00	505341.0996	619405.7758
97	L	106+00.00	505427.1945	619456.5302
98	L	107+00.00	505508.2322	619515.0880
99	L	108+00.00	505586.7078	619577.0661
100	L	109+00.00	505664.8691	619639.4424
101	L	110+00.00	505743.3770	619701.3808
102	L	111+00.00	505823.2099	619761.5966
103	L	112+00.00	505905.3307	619818.6427
104	L	113+00.00	505990.3601	619871.2491
105	L	114+00.00	506078.1794	619919.0528
106	L	115+00.00	506168.4517	619962.0512
107	L	116+00.00	506260.3096	620001.5674
108	L	117+00.00	506352.7654	620039.6712
109	L	118+00.00	506445.2628	620077.6743
110	L	119+00.00	506537.7601	620115.6775
111	L	120+00.00	506630.3677	620153.4099
112	L	121+00.00	506723.9827	620188.5454
113	L	122+00.00	506819.5919	620217.7638
114	L	123+00.00	506917.2852	620238.9801
115	L	124+00.00	507016.4146	620251.9217
116	L	125+00.00	507116.2804	620256.4973
117	L	126+00.00	507216.1779	620252.6744
118	L	127+00.00	507315.4020	620240.4802
119	L	128+00.00	507413.2524	620220.0007
120	L	129+00.00	507509.0386	620191.3804
121	L	130+00.00	507602.0845	620154.8213
122	L	131+00.00	507691.7336	620110.5814
123	L	132+00.00	507777.3530	620058.9730
124	L	133+00.00	507858.3386	620000.3602
125	L	134+00.00	507934.1187	619935.1568
126	L	135+00.00	508004.1586	619863.8229
127	L	136+00.00	508067.9639	619786.8619
128	L	137+00.00	508125.0844	619704.8169
129	L	138+00.00	508175.1169	619618.2672
130	L	139+00.00	508217.7083	619527.8233
131	L	140+00.00	508251.2367	619433.6811
132	L	141+00.00	508272.2200	619335.9815
133	L	142+00.00	508280.1691	619236.3707
134	L	143+00.00	508274.9546	619136.5788
135	L	144+00.00	508258.0155	619038.0653
136	L	145+00.00	508233.6555	618941.0899
137	L	146+00.00	508206.3628	618844.8868
138	L	147+00.00	508178.9053	618748.7303
139	L	148+00.00	508153.3201	618652.0659
140	L	149+00.00	508133.9185	618553.9979
141	L	150+00.00	508125.2294	618454.4444
142	L	151+00.00	508129.6187	618354.6134
143	L	152+00.00	508147.1021	618256.2272
144	L	153+00.00	508177.3756	618160.9958
145	L	154+00.00	508219.9132	618070.5742
146	L	155+00.00	508273.9755	617986.5339
147	L	156+00.00	508338.6230	617910.3355
148	L	157+00.00	508412.7322	617843.3031
149	L	158+00.00	508495.0150	617786.6019
150	L	159+00.00	508584.0319	617741.1952
151	L	160+00.00	508677.7037	617706.2937
152	L	161+00.00	508773.6605	617678.1817
153	L	162+00.00	508870.3377	617652.6187
154	L	163+00.00	508967.0502	617627.1886
155	L	164+00.00	509063.7627	617601.7584
156	L	165+00.00	509160.4752	617576.3283
157	L	166+00.00	509257.1729	617550.8419
158	L	167+00.00	509353.5271	617524.0957
159	L	168+00.00	509448.8289	617493.8373
160	L	169+00.00	509542.1135	617457.8697
161	L	170+00.00	509632.4083	617414.9521
162	L	171+00.00	509719.1379	617365.2225
163	L	172+00.00	509801.7896	617308.9750
164	L	173+00.00	509879.8743	617246.5424
165	L	174+00.00	509952.9304	617178.2937
166	L	175+00.00	510020.5257	617104.6327
167	L	176+00.00	510082.2605	617025.9950
168	L	177+00.00	510137.7697	616942.8457
169	L	178+00.00	510186.7249	616855.6766
170	L	179+00.00	510228.9643	616765.0589
171	L	180+00.00	510265.7065	616672.0638
172	L	181+00.00	510299.0822	616577.8005
173	L	182+00.00	510331.2825	616483.1267
174	L	183+00.00	510363.4364	616388.4370
175	L	184+00.00	510395.6756	616293.7765
176	L	185+00.00	510429.3173	616199.6083
177	L	186+00.00	510466.5706	616106.8180
178	L	187+00.00	510509.5353	616016.5432
179	L	188+00.00	510559.2372	615929.7977
180	L	189+00.00	510615.4583	615847.1281
181	L	190+00.00	510677.8660	615769.0234
182	L	191+00.00	510746.0914	615695.9455
183	L	192+00.00	510819.7308	615628.3267
184	L	193+00.00	510898.3488	615566.5668
185	L	194+00.00	510981.4803	615511.0312
186	L	195+00.00	511068.6339	615462.0482
187	L	196+00.00	511159.2938	615419.9075
188	L	197+00.00	511252.9241	615384.8584
189	L	198+00.00	511348.9401	615356.9915
190	L	199+00.00	511446.6671	615335.8853
191	L	200+00.00	511545.6162	615321.5637
192	L	201+00.00	511645.3171	615314.0948
193	L	202+00.00	511745.2956	615313.5142
194	L	203+00.00	511845.0764	615319.8245
195	L	204+00.00	511944.1852	615332.9958
196	L	205+00.00	512042.1508	615352.9655
197	L	206+00.00	512138.5073	615379.6386
198	L	207+00.00	512232.7967	615412.8884
199	L	208+00.00	512324.5707	615452.5566
200	L	209+00.00	512413.3930	615498.4548
201	L	210+00.00	512498.8412	615550.3646
202	L	211+00.00	512580.5092	615608.0394
203	L	212+00.00	512658.0086	615671.2049
204	L	213+00.00	512730.9710	615739.5608
205	L	214+00.00	512799.2801	615812.5740
206	L	215+00.00	512863.9800	615888.8153
207	L	216+00.00	512926.6105	615966.7717
208	L	217+00.00	512988.7053	616045.1569
209	L	218+00.00	513050.7959	616123.5454
210	L	219+00.00	513112.8865	616201.9339
211	L	220+00.00	513174.9771	616280.3224
212	L	221+00.00	513237.0677	616358.7109
213	L	222+00.00	513299.1583	616437.0994
214	L	223+00.00	513361.2489	616515.4879
215	L	223+20.52	513373.9896	616531.5728
216	Y1	10+00.00	507358.0890	620087.2970
217	Y1	11+00.00	507323.5551	620179.7445
218	Y1	11+58.90	507328.2666	620238.2748

Point #	Chain	Station	Northing (Y)	Easting (X)

Point #	Chain	Station	Northing (Y)	Easting (X)

2/17/2016 2:47:38 PM
K:\Projects\R-4416\R-4416_rdy_SHT_ID.dgn
User: sgoldsmith

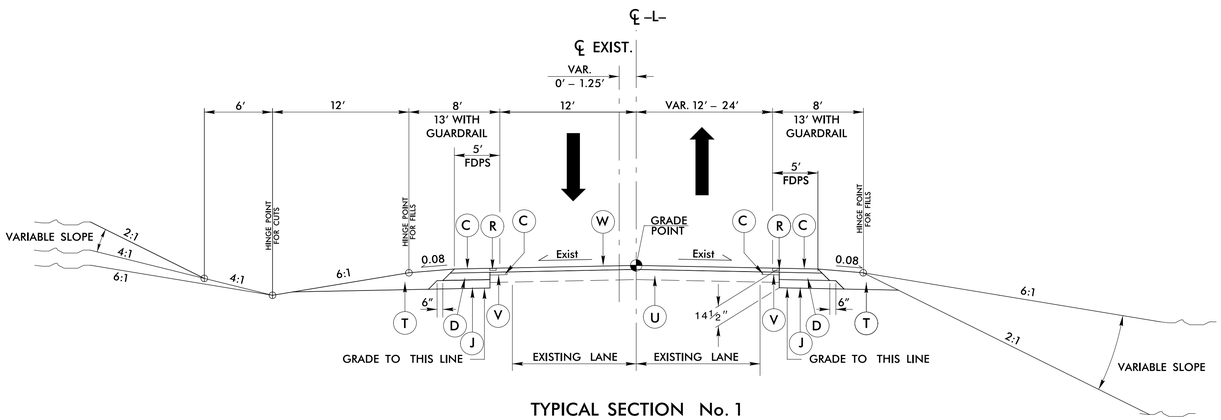
6/2/99

PAVEMENT SCHEDULE

(PRELIMINARY PAVEMENT DESIGN)

C	PROP. APPROX. 1½″ ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.
C1	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1″ DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 2″ IN DEPTH.
D	PROP. APPROX. 3″ ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YD.
D1	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1″ DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2½″ IN DEPTH OR GREATER THAN 4″ IN DEPTH.
J	PROP. 10″ AGGREGATE BASE COURSE.
R	MILLED RUMBLE STRIPS. SEE DETAIL.
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V	MILLING ASPHALT PAVEMENT 1½″ IN DEPTH 4′ WIDE AT EXISTING RUMBLE STRIPS.
V1	INCIDENTAL MILLING, MAX. 3″
W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE WEDGING DETAILS)

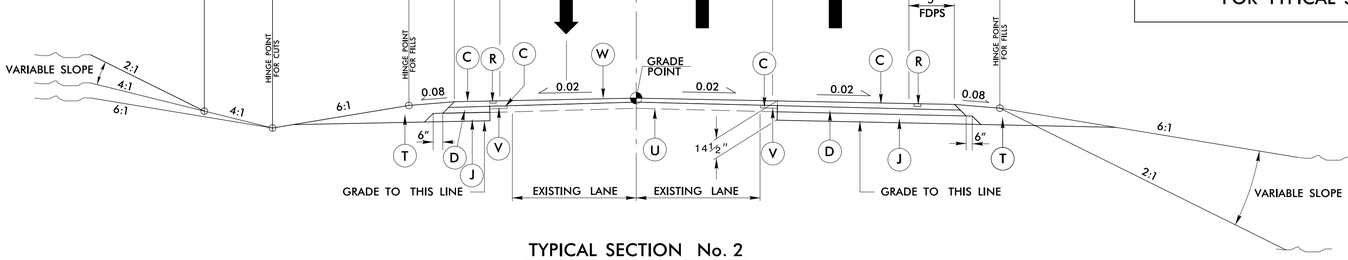
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



TYPICAL SECTION No. 1

NOT TO SCALE

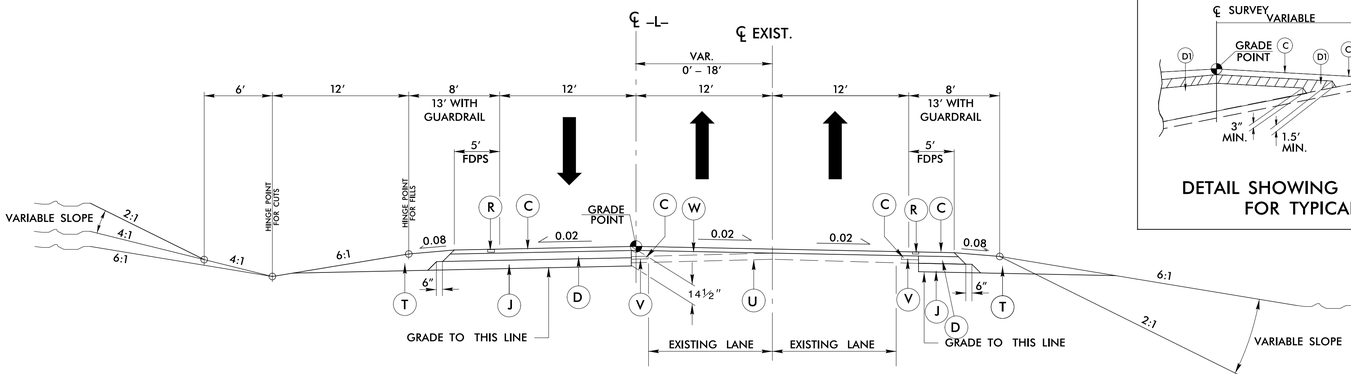
–L– STA 10+00.00 TO 13+00.00
–L– STA 215+93.77 TO 223+20.52



TYPICAL SECTION No. 2

NOT TO SCALE

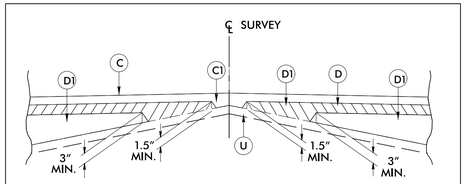
–L– STA 13+00.00 TO 136+51.79
–L– STA 164+82.88 TO 215+93.77



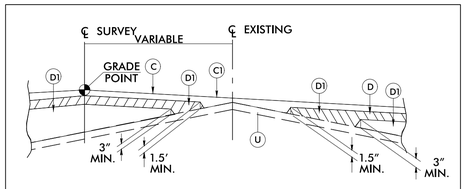
TYPICAL SECTION No. 3

NOT TO SCALE

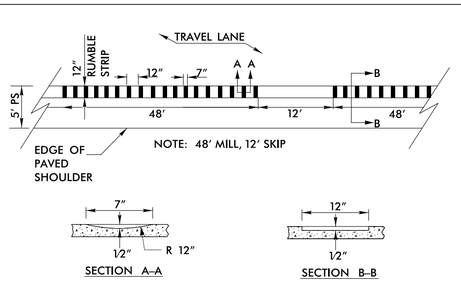
–L– STA 136+51.79 TO 164+82.88



DETAIL SHOWING METHOD OF WEDGING FOR TYPICAL SECTION No. 1 & 2



DETAIL SHOWING METHOD OF WEDGING FOR TYPICAL SECTION No. 3



PLACEMENT OF MILLED RUMBLE STRIP DETAIL

–L– STA 10+00.00 TO 223+20.52

PROJECT REFERENCE NO.	SHEET NO.
R-4416	2A-1

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER

DocuSigned by: 2/20/2016
108711E67E6435...

PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022896 ENGINEER CLARK S. MORRISON

DocuSigned by: Clark Morrison 2/20/2016
80A110DD1E004C4...

Michael Baker Engineering, Inc.
Michael Baker INTERNATIONAL
5000 Regency Pkwy Suite 600 Cary, NC 27518
NC License: F-1084

NC DEPARTMENT OF TRANSPORTATION
PAVEMENT MANAGEMENT UNIT
1593 MAIL SERVICE CENTER
RALEIGH, NC 27699-1593

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

2/19/2016 3:35:37 PM
R-4416_rdy_typ.dgn
USER: cbuckner

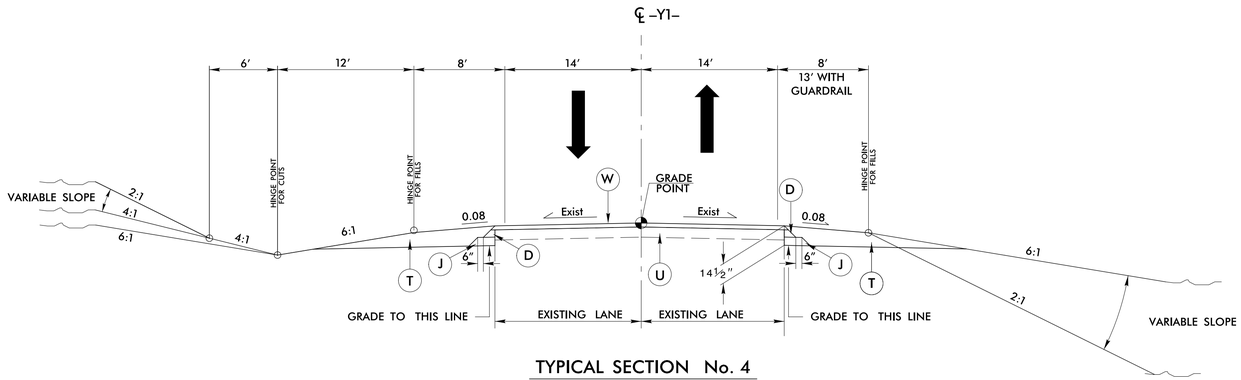
6/2/99

PAVEMENT SCHEDULE

(PRELIMINARY PAVEMENT DESIGN)

C	PROP. APPROX. 1½″ ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.
C1	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1″ DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 2″ IN DEPTH.
D	PROP. APPROX. 3″ ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YD.
D1	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1″ DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2½″ IN DEPTH OR GREATER THAN 4″ IN DEPTH.
J	PROP. 10″ AGGREGATE BASE COURSE.
R	MILLED RUMBLE STRIPS. SEE DETAIL.
T	EARTH MATERIAL
U	EXISTING PAVEMENT
V	MILLING ASPHALT PAVEMENT 1½″ IN DEPTH 4′ WIDE AT EXISTING RUMBLE STRIPS.
V1	INCIDENTAL MILLING, MAX. 3″
W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE WEDGING DETAILS)

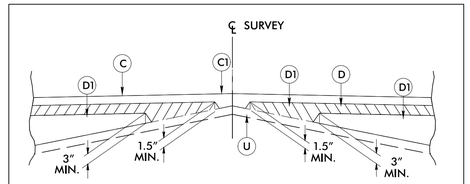
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



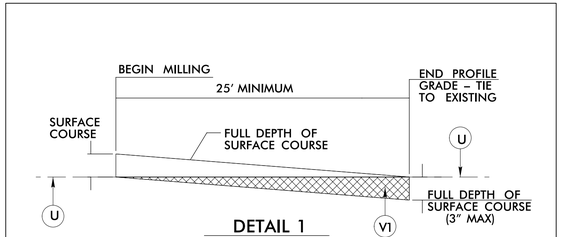
TYPICAL SECTION No. 4

NOT TO SCALE

–Y1– STA 10+95.00 TO 11+46.90

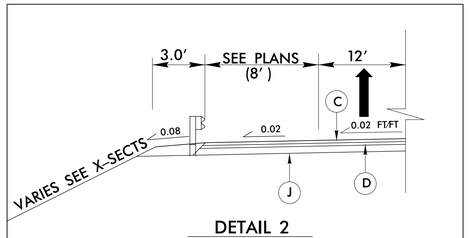


DETAIL SHOWING METHOD OF WEDGING FOR TYPICAL SECTION No. 4



DETAIL 1

INCIDENTAL MILLING DETAIL
SEE PROFILE FOR LIMITS



DETAIL 2

–L– SHOULDER WHEN GUARDRAIL IS REQUIRED (LT OR RT). SEE PLANS

PROJECT REFERENCE NO.	SHEET NO.
R-4416	2A-2

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER

DocuSigned by: 2/20/2016

PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022896 ENGINEER CLARK S. MORRISON

DocuSigned by: Clark Morrison 2/20/2016

80A110DD1E004C4...

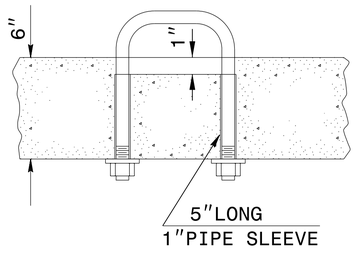
Michael Baker Engineering, Inc. Michael Baker INTERNATIONAL
5000 Regency Pkwy Suite 600 Cary, NC 27518
NC License: F-1084

NC DEPARTMENT OF TRANSPORTATION
PAVEMENT MANAGEMENT UNIT
1593 MAIL SERVICE CENTER
RALEIGH, NC 27699-1593

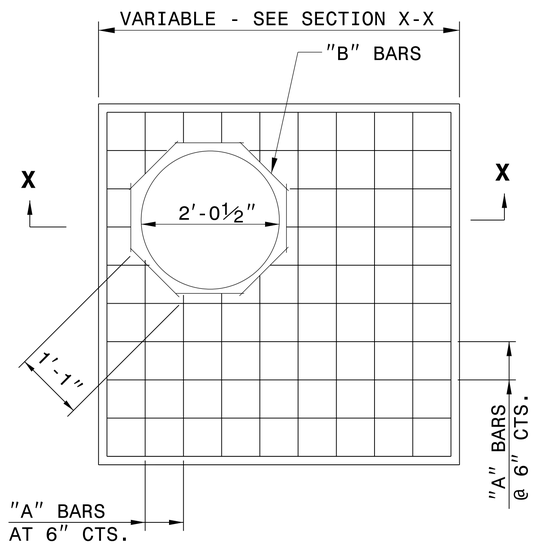
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

2/19/2016 3:35:37 PM
R-4416_rdy_typ.dgn
USER: todd.buckner

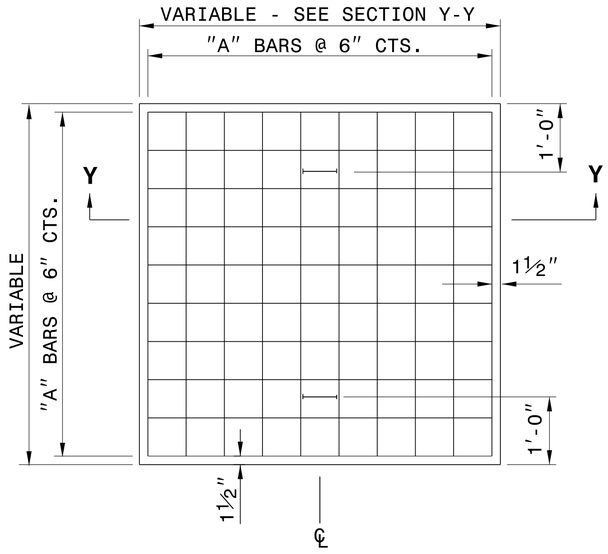
PROJECT REFERENCE NO.	SHEET NO.
R-4416	2C-1



PARTIAL SECTION



PLAN



PLAN

GENERAL NOTES:

CONSTRUCT IN ACCORDANCE WITH SECTION 859 OF THE STANDARD SPECIFICATIONS.

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

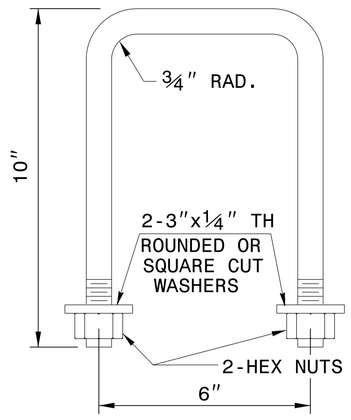
DETAIL INTENDED FOR NON-TRAFFIC BEARING DRAINAGE STRUCTURES.

BILL OF MATERIALS

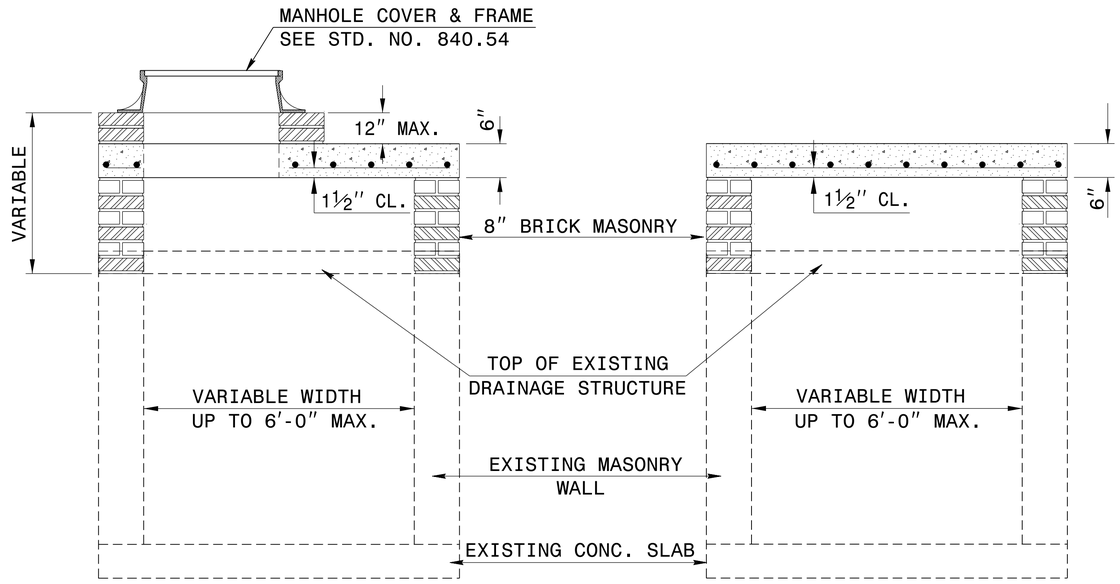
REINFORCING STEEL

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

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



DETAIL OF HANDLE



SECTION X-X

SECTION Y-Y

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: Joel Howerton 873F3D17D...

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER Joel S. Howerton

2/16/2016

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

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

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

$$$$SYSTIME$$$$
$$$$SYSJUN$$$$
$$$$USERNAME$$$$

12/06/07

COMPUTED BY: WEJ DATE: 06-15
CHECKED BY: THB DATE: 06-15

"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

PROJECT REFERENCE NO.	SHEET NO.
R-4416	3B-1

GUARDRAIL SUMMARY

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOUL WIDTH	FLARE LENGTH		W		ANCHORS								IMPACT ATTENUATOR TYPE 350		SINGLE FACED CONCRETE BARRIER	REMOVE EXISTING GUARDRAIL	REMOVE & STOCKPILE EXISTING GUARDRAIL	REMARKS
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	XI MOD	XI	GRAU 350	M-350	XIII	CAT-1	VI MOD	BIC	AT-1	G	NG			
L	10+00.00	11+37.50	LT	137.50			11+37.50	Exist	13/9	18/14	30																154.64		Tie Existing Guardrail (Approach)
L	11+37.53	11+65.92	LT		28.39																		1						
L	28+35.38	28+54.90	LT		25.00																		1						
L	25+54.90	35+42.40	LT	987.50			34+17.40	25+45.90	8	13	50		1				1										684.14		
L	35+00.00	38+37.50	RT	337.50			36+25.00	37+12.5	8	13	50	50	1	1			2												
L	37+50.00	41+50.00	LT	400.00			40+25.00	38+75.00	8	13	50	50	1	1			2										433.43		
L	50+65.30	60+15.30	RT	950.00			51+90.30	58+90.30	8	13	50		1				1						1				980.13		
L	60+15.40	60+36.50	RT		37.50																								
L	88+04.00	93+16.50	LT	512.50			91+91.50	89+29.00	8	13	50	50	1	1			2										514.91		
L	127+50.00	127+76.00	LT		26.00																						292.09		Tie Shop Curve GR to Existing Guardrail
L	127+74.00	130+49.00	LT	275.00			129+24.00	128+99.00	8	13	50		1				1												
L	137+20.33	150+70.33	LT	1,350.00			149+45.33	138+45.33	8	13	50	50	1	1			1										1344.39		Tie Existing Guardrail (Trailing)
L	159+87.50	163+00.00	LT	312.50			163+00.00	161+12.5	22/8	27/13		50		1			1										310.01		Tie Existing Guardrail (Trailing)
L	210+88.52	216+01.00	LT	512.48			214+76.01	210+88.53	8	13	50	30	1	1			1												
			SUBTOTAL	5,262.50	116.89												12						3				4713.74		
LESS ANCHOR DEDUCTION																													
GRAU, TYPE 350			12 @ 50'	= 600'																									
AT-1			3 @ 6.25'		= 18.75'																								
	TOTAL			4,662.50	98.14												12						3				5226.21		
			SAY	4,700.00	100.00																						5230		
		ADDITIONAL POSTS =		15																									

SUMMARY OF EARTHWORK (IN CUBIC YARDS)

STATION	STATION	EXCAVATION		EMBANKMENT	BORROW	TOTAL
		TOTAL UNCLASS.	UNDERCUT	EMBANK. + %		
-L- 10+00	-L- 40+00	4,472		3,609		863
-L- 40+00	-L- 70+00	3,761		6,161	2,400	
-L- 70+00	-L- 100+00	3,719		8,464	4,745	
-L- 100+00	-L- 130+00	3,938		7,237	3,299	
-L- 130+00	-L- 160+00	5,712		7,875	2,163	
-L- 160+00	-L- 190+00	3,168		7,254	4,086	
-L- 190+00	-L- 223+20.51	4,925		4,307		618
-Y1- 10+95	-Y1- 11+46.90	82				82
	SUBTOTAL	29,777		44,906	16,693	1,564
TOTAL		29,777		44,906	16,693	1,564
WASTE TO REPLACE BORROW					-1,564	-1,564
MATERIAL FOR SHOULDER CONSTRUCTION				10,672	10,672	
	SUBTOTAL	29,777		55,578	25,801	0
ESTL 5% TO REPLACE TO SOIL ON BORROW PIT					1,290	
GRAND TOTAL		29,777		55,578	27,091	
SAY		30,000			27,250	
ADDITIONAL UNDERCUT : 1,000 CY						
6" PERFORATED SUBDRAINS PIPES: 500 LF						
SHALLOW UNDERCUT EXCAV. CONTINGENCY PER GEO. REPORT: 1000 CY						
EST. DDE = 20 CY						
CLASS IV SUBGRADE STABLIZATION: 1900 TONS						
PAVEMENT STRUCTURE VOLUME = 71460 CY						

EARTHWORK QUANTITIES ARE CALCULATED BY DIVISION 14. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATE PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.

NOTE: APPROXIMATE QUANTITIES ONLY. UNCLASSIFIED EXCAVATION, BORROW EXCAVATION, FINE GRADING, CLEARING AND GRUBBING, AND REMOVAL OF EXISTING PAVEMENT WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR "GRADING".

SUMMARY OF EXISTING ASPHALT PAVEMENT REMOVAL

SURVEY LINE	STATION	STATION	LOCATION LT / RT	YD^2
L	50+42	52+70	LT	19.03
L	63+43	66+04	LT	43.50
L	84+65	87+76	LT	34.56
L	96+49	103+30	LT	158.90
L	136+73	140+27	RT	177.00
L	157+80	160+29	RT	41.50
L	161+74	163+90	RT	67.20
L	165+31	171+32	LT	207.01
L	184+42	191+53	LT	165.90
L	191+83	192+94	LT	9.25
L	199+59	209+82	LT	605.00
L	210+12	211+06	LT	43.13
L	215+99	222+36	LT	237.00
			TOTAL	1,808.97
			SAY	1,810

12/06/07

COMPUTED BY: WEJ DATE: 02-16
CHECKED BY: THB DATE: 02-16

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".

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT REFERENCE NO.	SHEET NO.
R-4416	3D-1

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	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												
10+00	LT	401																		
		402	401		2414.1	2410.0										80				
10+03	RT	402		2420.3																
		403	402		2426.1	2414.1									344					
13+50	RT	403		2432.3																
		404	403		2444.0	2427.1							20				X			
16+72	RT	405		2439.5																
		405	403		2433.7	2426.6								320						
16+79	RT	406																		
		406	405		2448.0	2434.2							24							
21+50	RT	407		2458.2																
		407	405		2453.5	2434.7						464								
11+75	LT	408									40									
25+00	RT	501		2476.1																
		501	407		2473.4	2454.2					340									
42+00	RT	602		2562.4																
		602	601		2558.9	2556.0														
44+00	RT	603		2574.9																
		603	602		2571.9	2559.4						200								
47+00	RT	604		2596.0																
		604	603		2593.3	2572.2					296									
60+50	RT	701											36							
66+70	RT	802		2730.3																
		803	802		2746.8	2725.1							232							
69+00	RT	803		2752.0																
69+00	RT	804																		
		804	803		2753.0	2746.8							28				X			
70+53	RT	805		2762.8																
		805	803		2760.1	2748.0					156									
90+00	RT	1002		2860.7																
		1002	1001		2857.2	2855.0														
93+00	RT	1003		2876.8																
		1003	1002		2873.8	2857.7						280								
96+50	RT	1004		2898.1																
		1004	1003		2895.4	2874.1					328									
101+00	RT	1006		2925.3																
		1006	1005		2920.6	2919.0														
100+04	RT	1007		2943.6																
		1007	1006		2938.9	2920.6							284							
107+50	RT	1101		2966.4																
		1101	1007		2963.7	2939.4					328									
110+50	RT	1104		2985.7																
		1104	1103		2983.0	2981.4														
110+50	LT	1103		2984.1																
		1103	1102		2981.4	2980.0					28									
115+00	RT	1108		3013.2																
		1108	1107		3010.5	2999.2														
113+00	RT	1107		3001.9							204									
		1107	1106		2998.4	2995.5														
113+00	LT	1106		2999.0																
SHEET TOTALS									0	1720	480	784	304	320	344	0				

STATION	12"	15"	18"	24"	30"	36"	42"	48"	ENDWALLS STD. 838.01 838.11 OR STD. 838.80 (UNLESS NOTED OTHERWISE) CU. YARDS R.C.P.	ENDWALLS CU. YARDS C.S.P.	QUANTITIES FOR DRAINAGE STRUCTURES "TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. "A" + 1.3 X COL. "B" LIN. FT. A PER EACH (0' THRU 5.0')	LIN. FT. B 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	TYPE OF GRATE F	TYPE OF GRATE G	CONCRETE TRANSITIONAL SECTION DROP INLET	CATCH BASIN
10+00																			
								80											
10+03											1	1.25							
							344												
13+50											1	1.25							
								X											
16+72											1	0.80							
						320													
16+79																			
					24														
21+50											1								
				464															
11+75		40																	
25+00											1								
		340																	
42+00											1								
44+00											1								
			200																
47+00											1								
		296																	
60+50				36															
66+70											1	0.20							
					232														
69+00											1	0.25							
69+00																			
					28			X											
70+53											1								
		156																	
90+00											1								
93+00											1								
			280																
96+50											1								
		328																	
101+00											1								
100+04											1								
				284															
107+50											1								
		328																	
110+50											1								
								80											
110+50											1								
		28																	
115+00																			
113+00		204									1								
113+00											1								
SHEET TOTALS	0	1720	480	784	304	320	344	0	0	80	21	3.75	0	0	0	0	0	0	0	0

STATION	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. 840.22	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	J.B. STD. 840.31 OR 840.32	CONVERT EXISTING DI TO JB	FLOWABLE FILL, CY	SIDE DRAIN PIPE ELBOWS NO. & SIZE	C.S PIPE ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" C.Y. STD. 840.72	PIPE REMOVAL LIN. FT.	REMARKS
10+00																
10+03			1				1									
13+50			1				1									
													2-30"			
16+72			1				1									
16+79																
													2-30"			
21+50			1				1									
11+75															31	Remove 31 LF of existing 15" CMP
25+00	1	1														
42+00	1	1										6				Remove existing GI
44+00	1	1														
47+00	1	1														
60+50															24	Remove 24 LF of existing 18" CMP
66+70			1			1						6				Remove existing 2GI
69+00			1			1										
69+00																
													2-30"			
70+53	1	1														
90+00	1	1														
															118	Remove 118 LF of existing 24" CMP and GI
93+00	1	1														
96+50	1	1														
101+00				1			1					9			133	Remove 133 LF of existing 18" CMP
100+04				1			1									
107+50	1	1										8				
															116	Remove 116 LF of existing 18" CMP
110+50	1	1														
110+50	1	1														
115+00																
113+00	1	1										32				
113+00	1	1														
SHEET TOTALS	13	13	8	0	0	8	0	0	0	0	0	61	6-30"		422	

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

COMPUTED BY: WEJ	DATE: 02-16
CHECKED BY: THB	DATE: 02-16

PROJECT REFERENCE NO.	SHEET NO.
R-4416	3D-2

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".

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	SIDE DRAIN PIPE (RCP, CSP, CAAP, HDPE, or PVC) 12"	15"	18"	24"	30"	36"	42"	48"	DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE
		1106	1105		2995.5	2994.0					28								
117+50	RT	1111		3028.1															
		1111	1110		3024.6	3023.6													
117+50	LT	1110		3027.1															
		1110	1109		3023.6	3020.0					48								
119+50	RT	1201		3040.2															
		1201	1111		3037.2	3025.1				200									
122+00	RT	1202		3057.5															
		1202	1201		3054.8	3037.5			252										
125+50	RT	1204		3076.6															
		1204	1203		3073.9	3063.0			56							X			
129+88	LT	1210																	
		1210	1209		3110.0	3098.8					20					X			
131+14	RT	1207		3110.6															
		1207	1209		3103.9	3096.8									132				
131+15	RT	1208	1207		3120.0	3014.9							12			X			
133+00	RT	1316		3123.0															
		1316	1207		3116.7	3104.4								192					
135+75	RT	1314		3140.8															
		1314	1316		3134.7	3116.7								280					
135+77	RT	1315	1314		3156.0	3135.7						20				X			
136+65	RT	1313		3146.8															
		1313	1314		3141.0	3135.2							92						
136+65	RT	1312	1313		3162.0	3141.0							20			X			
145+48	RT	1309		3205.8															
		1309	1308		3201.6	3193.9				100									
144+47	RT	1308		3198.1															
		1308	1307		3193.4	3184.1					152								
143+00	RT	1307		3188.8															
		1307	1306		3183.6	3174.3						160							
141+46	RT	1306		3179.5															
		1306	1305		3174.3	3170.6						48							
141+00	RT	1305		3175.8															
		1305	1304		3170.1	3166.3							52						
140+49	RT	1304		3172.0															
		1304	1303		3166.8	3162.3							52						
140+00	RT	1303		3168.0															
		1303	1302		3162.3	3153.2							152						
138+51	RT	1302		3158.9															
		1302	1301		3152.7	3151.2								48					
146+51	RT	1310		3212.1															
		1310	1311		3206.9	3200.0													
158+50	RT	1404		3291.8															
		1404	1403		3289.1	3269.1			280										
155+50	RT	1403		3271.9															
		1403	1402		3268.9	3245.8				280									
152+50		1402		3250.0															
		1402	1401		3245.3	3226.2					280								
149+50	RT	1401		3230.9															
		1401	1310		3226.2	3207.4					288								
SHEET TOTALS								0	588	580	816	228	380	520	132				

STATION	STRUCTURE NO. FROM	TO	C.S. PIPE 12" (.064)	15" (.064)	18" (.064)	24" (.064)	30" (.079)	36" (.079)	42" (.109)	48" (.109)	R.C. PIPE CLASS III 12"	15"	18"	24"	30"	36"	42"	48"	R.C. PIPE CLASS IV 12"	15"	18"	24"	30"	36"	42"	48"	** R.C. PIPE (CLASS V)	*** RC PIPE CULVERTS, CONTRACTOR DESIGN	*** RC PIPE CULVERTS, CONTRACTOR DESIGN	15" SIDE DRAIN PIPE	18" SIDE DRAIN PIPE
	1106	1105																													
117+50	1111																														
	1111	1110																				76									
117+50	1110																														
	1110	1109																													
119+50	1201																														
	1201	1111																													
122+00	1202																														
	1202	1201																													
125+50	1204																														
	1204	1203																													
129+88	1210																														
	1210	1209																													
131+14	1207																														
	1207	1209																													
131+15	1208	1207																													
133+00	1316																														
	1316	1207																													
135+75	1314																														
	1314	1316																													
135+77	1315	1314																													
136+65	1313																														
	1313	1314																													
136+65	1312	1313																													
145+48	1309																														
	1309	1308																													
144+47	1308																														
	1308	1307																													
143+00	1307																														
	1307	1306																													
141+46	1306																														
	1306	1305																													
141+00	1305																														
	1305	1304																													
140+49	1304																														
	1304	1303																													
140+00	1303																														
	1303	1302																													
138+51	1302																														
	1302	1301																													
146+51	1310																														
	1310	1311																					144								
158+50	1404																														
	1404	1403																													
155+50	1403																														
	1403	1402																													
152+50	1402																														
	1402	1401																													
149+50	1401																														
	1401	1310																													
SHEET TOTALS			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76	144	0	0	0	0	0	0	0	0

STATION	STRUCTURE NO. FROM	TO	ENDWALLS STD. 838.01, 838.11 OR STD. 838.80 (UNLESS NOTED OTHERWISE) CU. YARDS R.C.P.	C.S.P.	QUANTITIES FOR DRAINAGE STRUCTURES (*TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B')) PER EACH (0' THRU 5.0')	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	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. 840.22	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	J.B. STD. 840.31 OR 840.32	CONVERT EXISTING DI TO JB	FLOWABLE FILL, CY	SIDE DRAIN PIPE ELBOWS NO. & SIZE	C.S PIPE ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" C.Y. STD. 840.72	PIPE REMOVAL LIN. FT.	REMARKS
	1106	1105																												
117+50	1111				1									1	1															
	1111	1110																												
117+50	1110				1									1	1															
	1110	1109																												
119+50	1201				1									1	1															
	1201	1111																												
122+00	1202				1									1	1															
	1202	1201																												
125+50	1204				1									1	1															
	1204	1203																								2-15"				
129+88	1210																								39					
	1210	1209																								2-24"				
131+14	1207				1	1.75										1				1										
	1207	1209																												
131+15	1208	1207																								2-36"				
133+00	1316				1	1.25										1				1										
	1316	1207																												
135+75	1314				1	1.15										1				1										
	1314	1316																												
135+77	1315	1314																								2-30"				
136+65	1313				1	0.75										1				1										
	1313	1314																												
136+65	1312	1313																								2-36"			56	Remove 56 LF of 12" CMP
145+48	1309				1											1			1	1										
	1309	1308																												
144+47	1308				1											1			1	1										
	1308	1307																												
143+00	1307				1	0.25										1				1										
	1307	1306																												
141+46	1306				1	0.3										1				1										
	1306	1305																												
141+00	1305				1	0.75										1				1										
	1305	1304																												
140+49	1304				1	0.25										1				1										
	1304	1303																												
140+00	1303				1	0.75										1				1										
	1303	1302																												
138+51	1302				1	1.25										1				1										
	1302	1301																												
146+51	1310				1	0.25										1				1					18					Remove GI and fill 24" CMP
	1310	1311																												
158+50	1404				1									1	1															
	1404	1403																												
155+50	1403				1									1	1															
	1403	1402																												
152+50	1402				1											1				1										
	1402	1401																												
149+50	1401				1											1				1										
	1401	1310																												
SHEET TOTALS			0	0	22	8.65	0	0	0	0	0	0	0	7	7	15	0	0	2	15	0	0	0	0	57	2-15", 2-24", 2-30", 4-36"			56	

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

COMPUTED BY: WEJ DATE: 02-16
CHECKED BY: THB DATE: 02-16

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".

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT REFERENCE NO.	SHEET NO.
R-4416	3D-3

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	Side Drain Pipe (RCP, CSP, CAAP, HDPE, or PVC) 12"	15"	18"	24"	30"	36"	42"	48"	Do Not Use RCP	Do Not Use CSP	Do Not Use CAAP	Do Not Use HDPE
163+11	RT	1504	1503		3324.0	3217.5						16				X			
163+02	RT	1503		3322.7															
		1503	1502		3317.5	3310.6						100							
162+01	RT	1502		3315.8															
		1502	1501		3310.6	3290.0										X			
161+98	LT	1501		3294.0															
165+06	RT	1506	1505		3336.0	3334.7					12								
169+09	RT	1508	1507		3365.0	3363.1							12			X			
173+98	RT	1511		3401.0															
		1511	1510		3398.3	3385.2			204										
171+99	RT	1510		3387.9															
		1510	1509		3384.9	3381.0													
179+38	RT	1603		3439.1															
		1603	1602		3433.9	3421.7						176							
177+66	RT	1602		3427.0															
		1602	1601		3421.7	3420.9						28							
177+40	RT	1601		3425.9															
200+54	LT	1707		3587.4															
		1707	1706		3584.7	3563.5			300										
197+53	LT	1706		3566.2															
		1706	1705		3563.2	3541.2				304									
194+53	LT	1705		3545.4															
		1705	1704		3540.7	3525.4					200								
198+07	RT	1703		3566.1															
		1703	1702		3561.4	3541.2					292								
195+02	RT	1702		3545.9															
		1702	1701		3541.2	3522.5					240								
192+50	RT	1701		3527.2															
		1701	1704		3522.5	3521.9													
192+53	LT	1704		3530.1															
		1704	1708		3521.9	3521.4							52						
192+01	LT	1708		3527.6															
		1708	1709		3521.4	3508.0							112			X			
204+08	RT	1802		3604.4															
		1802	1801		3601.7	3582.9			288										
201+04	RT	1801		3586.9															
		1801	1703		3582.2	3561.4					284								
SHEET TOTALS								0	792	304	1028	320	176	0	0				
PROJECT TOTALS								0	3100	1364	2628	852	876	864	132				

Station	Structure No. From	Structure No. To	C.S. Pipe 12" (.064)	C.S. Pipe 15" (.064)	C.S. Pipe 18" (.064)	C.S. Pipe 24" (.064)	C.S. Pipe 30" (.079)	C.S. Pipe 36" (.079)	C.S. Pipe 42" (.109)	C.S. Pipe 48" (.109)	R.C. Pipe Class III 12"	15"	18"	24"	30"	36"	42"	48"	R.C. Pipe Class IV 12"	15"	18"	24"	30"	36"	42"	48"
163+11	1504	1503																								
163+02	1503																									
	1503	1502																								
162+01	1502																									
	1502	1501					128																			
161+98	1501																									
165+06	1506	1505																								
169+09	1508	1507																								
173+98	1511																									
	1511	1510																								
171+99	1510																									
	1510	1509																			116					
179+38	1603																									
	1603	1602																								
177+66	1602																									
	1602	1601																								
177+40	1601																									
200+54	1707																									
	1707	1706																								
197+53	1706																									
	1706	1705																								
194+53	1705																									
	1705	1704																								
198+07	1703																									
	1703	1702																								
195+02	1702																									
	1702	1701																								
192+50	1701																									
	1701	1704																					80			
192+53	1704																									
	1704	1708																								
192+01	1708																									
	1708	1709																								
204+08	1802																									
	1802	1801																								
201+04	1801																									
	1801	1703																								
SHEET TOTALS			0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	116	0	80	0	0	0
PROJECT TOTALS			0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	80	116	468	224	0	80	0

Station	Structure No. From	Structure No. To	** " 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.	C.S.P.	Quantities for Drainage Structures Per Each (0' thru 5.0')	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	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. 840.22	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	J.B. Std. 840.31 or 840.32	Convert Existing DI to JB	Flowable Fill (CY)	Side Drain Pipe Elbows No. & Size	C.S Pipe Elbows No. & Size	Conc. Collars Cl. "B" C.Y. Std. 840.72	Pipe Removal Lin. Ft.	Remarks
163+11	1504	1503																																	
163+02	1503									1	0.25										1				1										
	1503	1502																																	
162+01	1502									1	0.25										1				1					8					Remove 2GI, fill 18" CMP
	1502	1501																														2-30"			
161+98	1501									1												1			1										
165+06	1506	1505																															0.3528		Remove existing HW
169+09	1508	1507							2.8																										Remove existing HW
173+98	1511									1									1	1															
	1511	1510																																	
171+99	1510									1									1	1										7					Remove 2GI, fill 18" CMP
	1510	1509																																	
179+38	1603									1	0.25										1				1										
	1603	1602																																	
177+66	1602									1	0.25										1				1									200	Remove 200 LF of existing 24" CMP
	1602	1601																																	
177+40	1601																												1						
200+54	1707									1									1	1															
	1707	1706																																	
197+53	1706									1									1	1															
	1706	1705																																	
194+53	1705									1											1				1										Remove 2GI
	1705	1704																																	
198+07	1703									1											1				1										
	1703	1702																																	
195+02	1702									1											1				1					5					
	1702	1701																																	
192+50	1701									1											1				1					10					Remove 2GI, fill 24" CMP
	1701	1704																																	
192+53	1704									1	3.20										1				1										
	1704	1708																																	
192+01	1708									1	1.20										1				1									74	Remove 74 LF of existing 24" CMP
	1708	1709																													2-36"				
204+08	1802									1											1				1										
	1802	1801																																	
201+04	1801									1											1				1										
	1801	1703																																	
SHEET TOTALS			0	0	0	0	0	0	2.8	17	5.4	0	0	0	0	0	0	0	4	4	12	1	0	0	13	0	0	0	1	30	2-36"	2-30"	0.3528	274	
PROJECT TOTALS			0	0	0	0	0	0	2.8	60	17.8	0	0	0	0	0	0	0	24	24	35	1	0	2	36	0	0	0	1	148	2-15", 2-24", 8-30", 6-36"	2-30"	0.3528	752	

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	Class IV R.C. Pipe (Unless Noted Otherwise) 54"	60"	66"	72"	78"	84"	C.S. Pipe 54" .109	54" .138	54" .168	54" Shop-Elongated .138	54" Shop-Elongated .168	60" .138	60" .168	66" .138	66" .168	72" .139	72" .168	Structural Plate Pipe 60" 12	60" 10	66" 12	66" 10	72" 12	72" 10	Reinforced Endwalls with R.C. - C.Y.	Reinforced Endwalls with C.S. - C.Y.	Masonry Drainage Structures Cubic Yards	C.B. Std. 840.01 or 840.02	Frames, Grates & Hood Standard 840.03 Type of Grate E	F	G	Concrete Transitional Section Drop Inlet	Catch Basin	G.D.I. Type "A" Std. 840.17 or 840.26	G.D.I. Frame with Two Grates Std. 840.22	Reinf. Conc. Flared End Sections No. & Size	Corr. Steel Flared End Sections No. & Size	Corr. Steel Elbows No. & Size	Conc. Collars Cl. "B" C.Y. Std. 840.72	Pipe Removal Lin. Ft.	Remarks
129+83	RT	1209		3103.6																													4.944							1	1						
		1209	1206	3096.3	3090.2			92																																							
129+50	LT	1206		3097.4																													4.939							1	1						
		1206	1205	3090.2	3056.0									92																														2-54"			
PROJECT TOTALS								92						92																			9.883							2	2			2-54"			

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

12/06/07
2/19/2016 4:06:04 PM
R:\Roadway\Proj\R-4416_rdy_SHT_3D-3.dgn
USER: todd.buckner

12/06/07

COMPUTED BY: WEJ	DATE: 02-16
CHECKED BY: THB	DATE: 02-16

PROJECT REFERENCE NO.	SHEET NO.
R-4416	3G-1

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

SUMMARY OF SUBSURFACE DRAINAGE

LINE	Station	Station	Location LT/RT/CL	Drain Type* UD/BD/SD	LF
CONTINGENCY				UD	500
				TOTAL LF:	500

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

SUMMARY OF AGGREGATE SUBGRADE/STABILIZATION

LINE	Station	Station	Aggregate Type* ASU/AST	Aggregate Thickness INCHES	Shallow Undercut CY	Class IV Subgrade Stabilization TONS	Geotextile for Soil Stabilization SY	Stabilizer Aggregate TONS	Class IV Aggregate Stabilization TONS
CONTINGENCY			ASU		1000	1900	1000		
				TOTAL CY/TONS/SY:	1000	1900	1000	0	0

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

2/17/2016 2:47:45 PM
K:\Projects\R-4416\R-4416_rdy_SHT_3G.dgn
USER:tcollins_cr

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-4416	4
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 034367 TODD H. BUCKNER — DocuSigned by: 2/18/2016 — 1087011E67F6435...

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20870 MARC T. SHOWN — DocuSigned by: Marc Shown 2/18/2016 — 4B024AEC0A0B4C2...

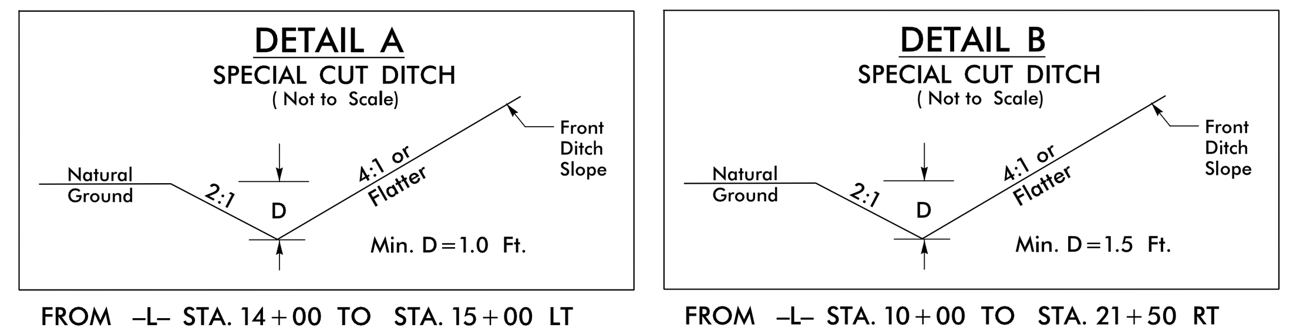
Michael Baker Engineering, Inc. 8000 Regency Pkwy Suite 600 Cary, NC 27518 NC License: F-1084 — Michael Baker INTERNATIONAL

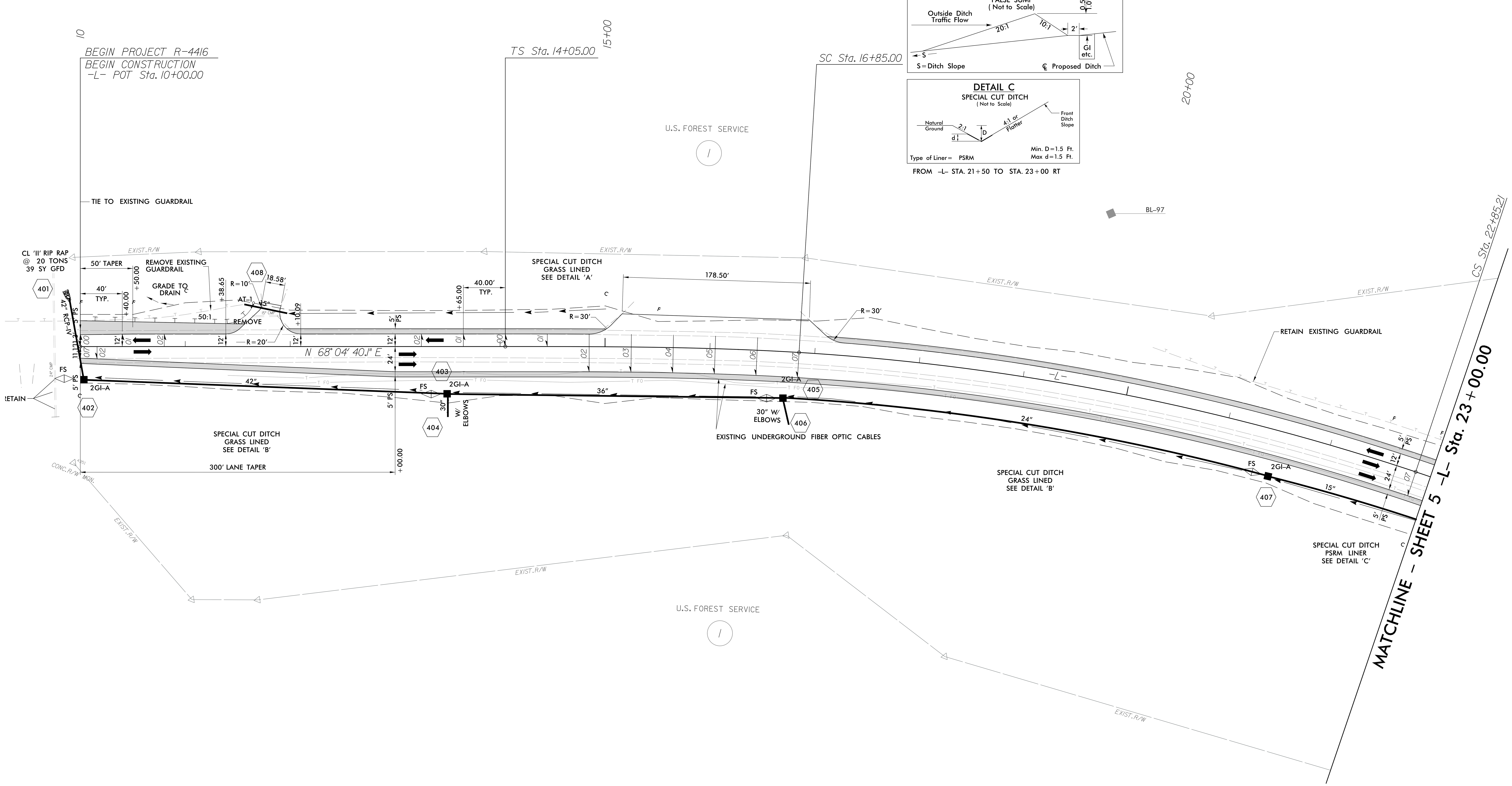
NC DEPARTMENT OF TRANSPORTATION HYDRAULICS UNIT 1590 MAIL SERVICE CENTER RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- LINE

PIs Sta 15+91.70	PI Sta 19+86.82	PIs Sta 23+78.58
Θs = 3° 29' 15.2"	Δ = 14° 57' 07.1" (RT)	Θs = 3° 29' 15.2"
Ls = 280.00'	D = 2° 29' 28.0"	Ls = 280.00'
LT = 186.70'	L = 600.21'	LT = 186.70'
ST = 93.37'	T = 301.82'	ST = 93.37'
	R = 2,300.00'	
	Ds = 60mph	
	SE = .07	





FOR -L- PROFILE SEE SHEET 20

2/18/2016 2:28:09 PM R:\Roadway\Proj\R4416_rdy_psh04.dgn USER: todd.buckner

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-4416	5
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER
DocuSigned by: 2/18/2016
108701E6F7F6435...

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN
DocuSigned by: Marc Shown 2/18/2016
2B024ABC0A0B4F3...

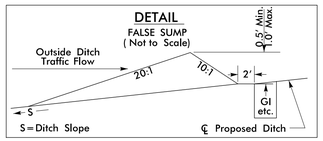
Michael Baker Engineering, Inc.
Michael Baker INTERNATIONAL
8000 Regency Pkwy Suite 600 Cary, NC 27518 NC License: F-1084
NC DEPARTMENT OF TRANSPORTATION HYDRAULICS UNIT 1590 MAIL SERVICE CENTER RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

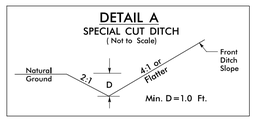
-L- LINE
PIs Sta 23+78.58 Θs = 3° 29' 15.2" Ls = 280.00' LT = 186.70' ST = 93.37'

DETAIL
FALSE SUMP
(Not to Scale)



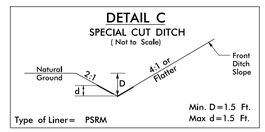
-L- LINE		
PIs Sta 28+58.55 Θs = 1° 54' 35.5" Ls = 200.00' LT = 133.34' ST = 66.67'	PI Sta 31+48.78 Δ = 8° 31' 25.9" (LT) D = 1° 54' 35.5" L = 446.31' T = 223.57' R = 3,000.00' Ds = 60mph SE = .05	PIs Sta 34+38.19 Θs = 1° 54' 35.5" Ls = 200.00' LT = 133.34' ST = 66.67'

DETAIL A
SPECIAL CUT DITCH
(Not to Scale)



FROM -L- STA. 31+50 TO STA. 34+00 LT
-L- STA. 29+00 TO STA. 31+00 LT
-L- STA. 24+00 TO STA. 27+50 LT

DETAIL C
SPECIAL CUT DITCH
(Not to Scale)



FROM -L- STA. 35+30 TO STA. 37+00 RT
-L- STA. 23+00 TO STA. 29+00 RT

U.S. FOREST SERVICE

25+00 30+00 35+00

ST Sta. 25+65.21 TS Sta. 27+25.21 SC Sta. 29+25.21 CS Sta. 33+71.52 ST Sta. 35+71.52

MATCHLINE – SHEET 4 -L- Sta. 23+00.00

MATCHLINE – SHEET 6 -L- Sta. 37+00.00

EXIST.R/W

RETAIN EXISTING GUARDRAIL
SPECIAL CUT DITCH GRASS LINED SEE DETAIL'A'
40.00' TYP.
+05.21
GRADE TO DRAIN
5' PS
F
C
R=30'
25.89'
SAW DRIVE
AT-1
8' PS
R=20'
S 89° 59' 42.2" E
12'
24'
5' PS
15"
FS
2GI
501
+45.21
40.00' TYP.
+62.05
SPECIAL CUT DITCH PSRM LINER SEE DETAIL'C'
EXISTING UNDERGROUND FIBER OPTIC CABLES
BL-96
SPECIAL CUT DITCH GRASS LINED SEE DETAIL'A'
REMOVE EXISTING GUARDRAIL
RETAIN
U.S.64 22' BST
14.4'
+43.83
+97.43
R=20'
SOIL DRIVE
NOTE: USE 4:1 FILL SLOPES
-L- STA. 36+00 TO 36+50 LT
R=10'
11'
REMOVE EXISTING GUARDRAIL
GRADE TO DRAIN
5' CONC.DITCH
GRAU 350 TL-3
8:1
N 77° 39' 40.9" E
80.76'
+51.52
SPECIAL CUT DITCH PSRM LINER SEE DETAIL'C'
SIGN
48" CMP
EXIST.R/W
6583
6579

U.S. FOREST SERVICE

FOR -L- PROFILE SEE SHEET 20

2/18/2016 2:28:10 PM
K:\TIP\R-4416\Roadway\R-4416_rdy_pst05.dgn
USER:toddbuckner

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-4416	6
R/W SHEET NO.	

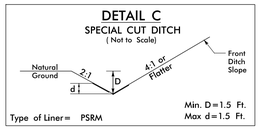
ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER
DocuSigned by: 2/18/2016
10870116879435...

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN
DocuSigned by: Marc Shown 2/18/2016
4B024AECOA0B4F2...

Michael Baker Engineering, Inc.
Michael Baker INTERNATIONAL
8000 Regency Pkwy Suite 600 Cary, NC 27518
NC License: F-1084
NC DEPARTMENT OF TRANSPORTATION HYDRAULICS UNIT
1590 MAIL SERVICE CENTER RALEIGH, NC 27699-1590

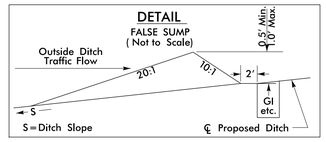
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DETAIL C
SPECIAL CUT DITCH
(Not to Scale)



Type of Liner= PSRM

DETAIL
FALSE SUMP
(Not to Scale)



FROM -L- STA. 38+00 TO STA. 50+50 RT

-L- LINE

PIs Sta 50+85.74
Θs = 8° 27' 43.7"
Ls = 288.00'
LT = 192.22'
ST = 96.20'

NAD 83

40+00 45+00 50+00

TS Sta. 48+93.52

EXIST. R/W

U.S. FOREST SERVICE

BL-95

NOTE: USE 4:1 FILL SLOPES
STA. 44+00 TO 46+00 LT

MATCHLINE – SHEET 5 -L- Sta. 37+00.00

MATCHLINE – SHEET 7 -L- Sta. 51+00.00

REMOVE EXISTING GUARDRAIL

RETAIN EXISTING GUARDRAIL

GRAU 350 TL-3

R=10'

8:1

8' PS

5' PS

12'

24'

+22.74

02

U.S.64 22' BST

5' CONC. DITCH

RETAIN EXISTING GUARDRAIL

601

RIP RAP @ 10 TONS 15 SY GFD

24" RCP-IV

FILL W/ FLOWABLE MATERIAL

-L-

N 77° 39' 40.9" E

REMOVE 2GI

FS

2GI

18"

15"

602

603

604

EXISTING UNDERGROUND FIBER OPTIC CABLES

REMOVE EXISTING PORTABLE CONCRETE BARRIER WALL

PCB Retaining Wall

+21.52

36' TYP.

SPECIAL CUT DITCH
PSRM LINER
SEE DETAIL 'C'

SPECIAL CUT DITCH
PSRM LINER
SEE DETAIL 'C'

SPECIAL CUT DITCH
PSRM LINER
SEE DETAIL 'C'

EXIST. R/W

U.S. FOREST SERVICE

FOR -L- PROFILE SEE SHEET 21

2/18/2016 2:28:11 PM
R:\roadway\r-4416_rdy_psh06.dgn
USER:toddbuckner

PROJECT REFERENCE NO.	SHEET NO.
R-4416	7
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER
DocuSigned by: 2/18/2016
108701188796435...

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN
DocuSigned by: Marc Shown 2/18/2016
49024A5C0A0B4D3...

Michael Baker Engineering, Inc.
Michael Baker INTERNATIONAL
8000 Regency Pkwy Suite 600 Cary, NC 27518 NC License: F-1084

NC DEPARTMENT OF TRANSPORTATION
HYDRAULICS UNIT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27699-1590

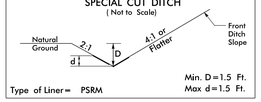
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

8/17/99

REVISIONS

-L- LINE	
PIs Sta 50+85.74	PI Sta 59+44.52
θs = 8° 27' 43.7"	Δ = 76° 05' 26.1" (LT)
Ls = 288.00'	D = 5° 52' 35.4"
LT = 192.22'	L = 1,294.83'
ST = 96.20'	T = 763.00'
	R = 975.00'
	Ds = 60mph
	SE = .08

DETAIL C
SPECIAL CUT DITCH
(Not to Scale)



Type of Liner= PSRM
Min. D=1.5 Ft.
Max d=1.5 Ft.

FROM -L- STA. 60+70 TO STA. 64+50 RT

NAD 83

U.S. FOREST SERVICE

EXIST. R/W

55+00

60+00

SC Sta. 51+81.52

MATCHLINE – SHEET 6 -L- Sta. 51+00.00

RETAIN EXISTING GUARDRAIL

REMOVE EXISTING GUARDRAIL

BL-24

BL-94

RETAIN

-L-

U.S.64 22" BST

84" CMP Approximate Location

MATCHLINE – SHEET 8 -L- Sta. 64+00.00

RETAIN EXISTING GUARDRAIL

6' CONC. DITCH

SPECIAL CUT DITCH PSRM LINER SEE DETAIL 'C'

BL-23

REMOVE EXISTING GUARDRAIL

RETAIN CONCRETE DITCH

R=30'

4' CONC. DITCH

AT-1

701

GATE

REMOVE 18" CMP

5' PS

12'

24'

-90.03

-19.81

FOR -L- PROFILE SEE SHEET 21

2/18/2016 2:28:12 PM
R:\R-4416\Roadway\R-4416_rdy_pst07.dgn
USER: todbuckner

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-4416	8
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER
DocuSigned by: 2/18/2016

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN
DocuSigned by: Marc Shown 2/18/2016
4B024AEC0A0B4F2...

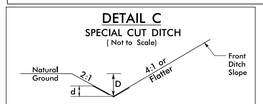
Michael Baker Engineering, Inc. | Michael Baker INTERNATIONAL | 8000 Regency Pkwy Suite 600 Cary, NC 27518 NC License: F-1066 | NC DEPARTMENT OF TRANSPORTATION HYDRAULICS UNIT 1590 MAIL SERVICE CENTER RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- LINE

PI Sta 59+44.52	PIs Sta 65+25.79	PI Sta 70+44.18	PIs Sta 75+55.15	PI Sta 81+32.59
△ = 76° 05' 26.1" (LT)	Θs = 1° 05' 03.4"	△ = 16° 04' 55.0" (LT)	Θs = 1° 05' 03.7"	△ = 47° 22' 36.4" (LT)
D = 5° 52' 35.4"	Θs = 3° 31' 33.9"	D = 1° 48' 26.8"	Θs = 2° 51' 53.6"	D = 4° 46' 28.7"
L = 1,294.83'	Ls = 120.00'	L = 889.76'	Ls = 120.00'	L = 992.26'
T = 763.00'	LT = 70.62'	T = 447.83'	LT = 69.04'	T = 526.47'
R = 975.00'	ST = 49.44'	R = 3,170.00'	ST = 51.01'	R = 1,200.00'
Ds = 50mph		Ds = 60mph		Ds = 60mph
SE = .08		SE = .05		SE = .08

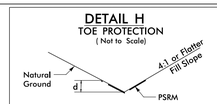
DETAIL C
SPECIAL CUT DITCH
(Not to Scale)



Type of Liner= PSRM
Min. D=1.5 Ft.
Max d=1.5 Ft.

FROM -L- STA. 66+70 TO STA. 75+50 RT
-L- STA. 64+00 TO STA. 64+50 RT

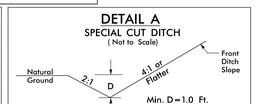
DETAIL H
TOE PROTECTION
(Not to Scale)



d=1.5 Ft.
Type of Liner= PSRM

FROM -L- STA. 69+50 TO STA. 73+50 LT

DETAIL A
SPECIAL CUT DITCH
(Not to Scale)



Min. D=1.0 Ft.

FROM -L- STA. 74+00 TO STA. 74+50 LT

NAD 83

65+00 70+00 75+00

CS Sta. 64+76.35
SC Sta. 65+96.35
SC Sta. 76+06.11
CS Sta. 74+86.11

U.S. FOREST SERVICE

EXIST. R/W

MATCHLINE – SHEET 7 -L- Sta. 64+00.00

MATCHLINE – SHEET 9 -L- Sta. 77+00.00

RETAIN EXISTING GUARDRAIL

FILL W/ FLOWABLE MATERIAL

RETAIN

REMOVE 2GI

4' CONC. DITCH

SPECIAL CUT DITCH PSRM LINER SEE DETAIL 'C'

40' TYP.

2GI-A

30"

15"

FS

2GI

W/ELBOWS

802 803 804 805

EXISTING UNDERGROUND FIBER OPTIC CABLES

TOE PROTECTION PSRM LINER SEE DETAIL 'H'

NOTE: USE 4:1 FILL SLOPES STA. 69+50 TO 73+50 LT

SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'A'

GRADE TO DRAIN

U.S.64 22' BST

-L-

5' FS

24'

12'

R=20'

SOIL DRIVE

BL-22

FOR -L- PROFILE SEE SHEET 22

2/18/2016 2:28:12 PM
R4416_rdy_psh08.dgn
USER: toddbuckner

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-4416	9
R/W SHEET NO.	

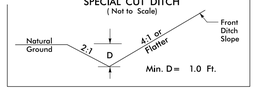
ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER
DocuSigned by: 2/18/2016
10870715E67E435...

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN
DocuSigned by: Marc Shown 2/18/2016
48024AEC0A0B4C2...

Michael Baker Engineering, Inc.
Michael Baker INTERNATIONAL
8000 Regency Pkwy Suite 600 Cary, NC 27518
NC License: F-1084
NC DEPARTMENT OF TRANSPORTATION
HYDRAULICS UNIT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27699-1590

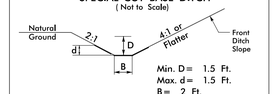
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DETAIL A
SPECIAL CUT DITCH
(Not to Scale)



FROM –L– STA. 86+80 TO STA. 88+00 LT
–L– STA. 83+90 TO STA. 86+50 LT
–L– STA. 79+40 TO STA. 81+00 LT
–L– STA. 77+00 TO STA. 79+00 LT

DETAIL G
SPECIAL CUT BASE DITCH
(Not to Scale)



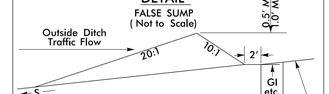
Type of Liner = PSRM
FROM –L– STA. 83+60 TO STA. 87+75 RT

–L– LINE

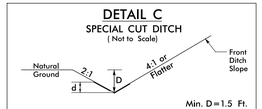
PI Sta 81+32.59
△ = 47° 22' 36.4" (LT)
D = 4° 46' 28.7"
L = 992.26'
T = 526.47'
R = 1,200.00'
Ds = 60mph
SE = .08

PIs Sta 87+05.22
Θs = 7° 38' 22.0"
Ls = 320.00'
LT = 213.53'
ST = 106.85'

DETAIL
FALSE SUMP
(Not to Scale)

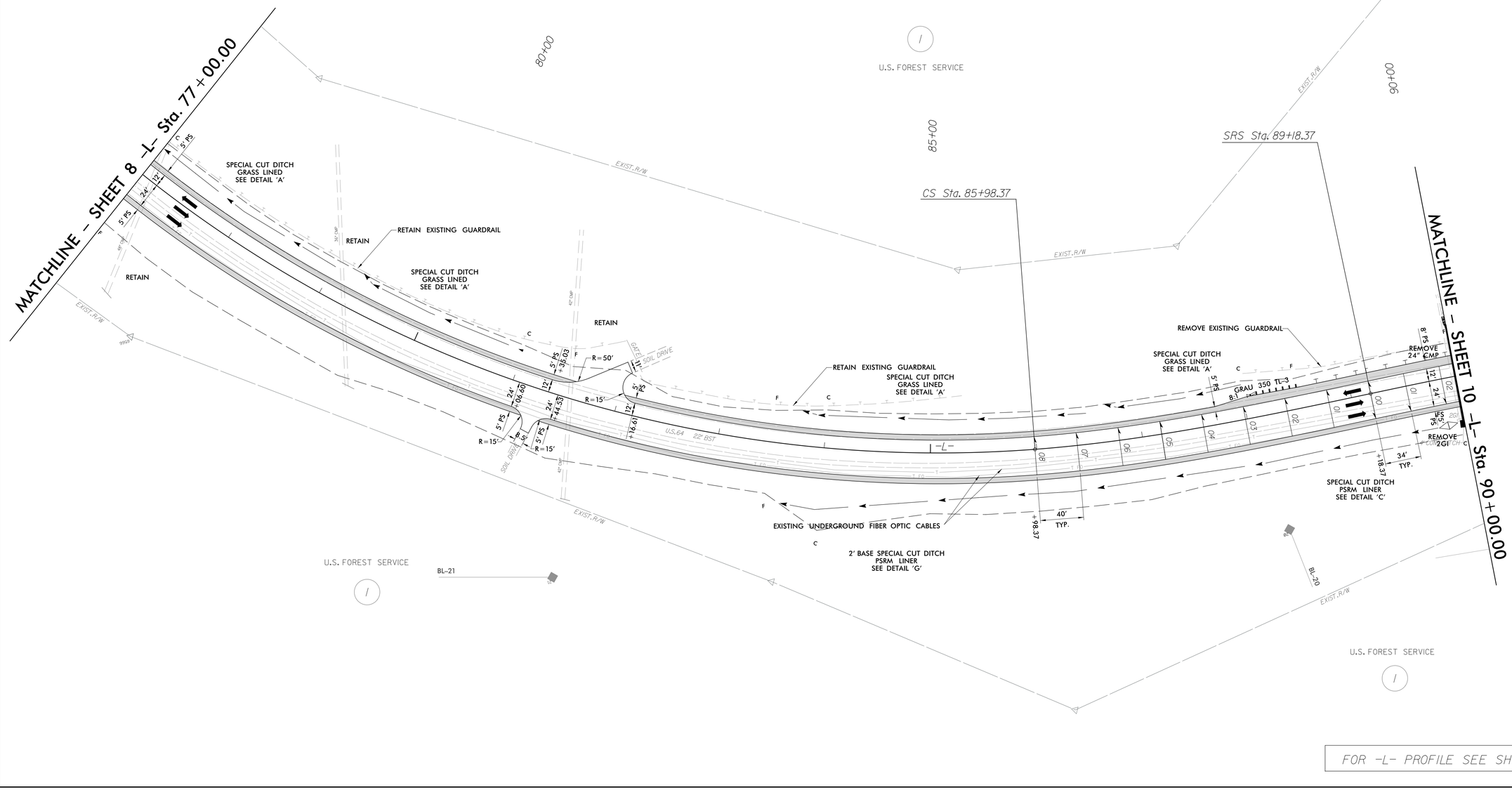


DETAIL C
SPECIAL CUT DITCH
(Not to Scale)



Type of Liner = PSRM
FROM –L– STA. 87+75 TO STA. 90+00 RT

NAD 83



2/18/2016 2:28:13 PM
R-4416_rdy_psh09.dgn
USER: toddbuckner

PROJECT REFERENCE NO.	SHEET NO.
R-4416	10
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER
DocuSigned by: 2/18/2016

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN
DocuSigned by: 2/18/2016

Michael Baker Engineering, Inc.
Michael Baker INTERNATIONAL
8000 Regency Pkwy Suite 600 Cary, NC 27518 NC License: F-1066
NC DEPARTMENT OF TRANSPORTATION HYDRAULICS UNIT 1590 MAIL SERVICE CENTER RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS 8/17/99

NAD 83

U.S. FOREST SERVICE

EXIST. R/W

95+00

100+00

105+00

SC Sta. 91+90.37

RETAIN EXISTING GUARDRAIL

REMOVE EXISTING GUARDRAIL

GRAU 350 TL-3

8:1

15"

FS

2GI

1003

1004

BL-19

EXISTING UNDERGROUND FIBER OPTIC CABLES

SPECIAL CUT DITCH
PSRM LINER
SEE DETAIL 'C'

4' CONC. DITCH

REMOVE 2GI

1006

2GI-A

24" RCP-IV

FILL W/ FLOWABLE MATERIAL

CL 'II' RIP RAP @10 TONS 15 SY GFD

1005

24"

BL-18

RETAIN EXISTING GUARDRAIL

1007

5' PS

12'

24'

15"

CL 'II' RIP RAP @ 10 TONS 15 SY GFD

1001

8' PS

12'

24'

24" RCP-IV

5' PS

1002

18'

34' TYP.

+56.37

07

06

05

04

03

08

MATCHLINE – SHEET 9 –L– Sta. 90+00.00

MATCHLINE – SHEET 11 –L– Sta. 105+00.00

–L– LINE

PIs Sta 91+00.04	PI Sta 101+21.29
θs = 10° 40' 27.4"	Δ = 103° 47' 40.9" (RT)
Ls = 272.00'	D = 7° 50' 55.5"
LT = 181.66'	L = 1,322.44'
ST = 90.97'	T = 930.91'
	R = 730.00'
	Ds = 45mph
	SE = .08

DETAIL
FALSE SUMP
(Not to Scale)

Outside Ditch Traffic Flow
20:1
10:1
2'
0.5' Min. 1.0' Max.
GI etc.
S
S=Ditch Slope
℄ Proposed Ditch

DETAIL C
SPECIAL CUT DITCH
(Not to Scale)

Natural Ground
2:1
d
D
4:1 or Flatter
Front Ditch Slope
Type of Liner = PSRM
Min. D=1.5 Ft.
Max d=1.5 Ft.

FROM –L– STA. 90+00 TO STA. 105+00 RT

FOR –L– PROFILE SEE SHEET 23

2/18/2016 2:28:14 PM
R:\Roadway\R-4416_rdy_psh10.dgn
USER: todd.buckner

PROJECT REFERENCE NO.	SHEET NO.
R-4416	11
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER
DocuSigned by: 2/18/2016
10870115E7F9435...

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN
DocuSigned by: Marc Shown 2/18/2016
4B024AEC0A0B4C2...

Michael Baker Engineering, Inc.
Michael Baker INTERNATIONAL
8000 Regency Pkwy Suite 600 Cary, NC 27518 NC License: F-1056

NC DEPARTMENT OF TRANSPORTATION
HYDRAULICS UNIT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

8/17/99

REVISIONS

MATCHLINE – SHEET 10 –L– Sta. 105+00.00

MATCHLINE – SHEET 12 –L– Sta. 119+00.00

U.S. FOREST SERVICE

–L– LINE		
PIs Sta 110+88.23	PI Sta 113+10.36	PIs Sta 115+05.62
Θs = 5° 05' 34.6"	△ = 7° 20' 45.0" (LT)	Θs = 3° 49' 11.0"
Ls = 320.00'	D = 3° 10' 59.2"	Ls = 240.00'
LT = 213.42'	L = 230.78'	LT = 160.04'
ST = 106.75'	T = 115.55'	ST = 80.03'
	R = 1,800.00'	
	Ds = 60mph	
	SE = .08	

NAD 83

105+00 110+00 115+00

CS Sta. 105+12.81 ST Sta. 107+84.81 TS Sta. 108+74.81 SC Sta. 111+94.81 CS Sta. 114+25.59 ST Sta. 116+65.59

EXIST. R/W

STANDARD 'V' DITCH CLASS 'B' RIP RAP SEE DETAIL 'F' @6 TONS @3 CY DDE 20 SY GFD

34' TYP.

+46.81

RETAIN EXISTING GUARDRAIL

SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'A'

CL 'III' RIP RAP @5 TONS 7 SY GFD

CL 'II' RIP RAP @10 TONS 15 SY GFD

SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'A'

FILL W/ FLOWABLE MATERIAL

SPECIAL CUT DITCH PSRM LINER SEE DETAIL 'C'

N 38° 35' 38.9" E

N 22° 20' 08.3" E

–L– U.S.64 22' BST

4' CONC. DITCH

REMOVE 2GI

SPECIAL CUT DITCH PSRM LINER SEE DETAIL 'C'

+54.81 40' TYP.

15" PROPOSED 40' TYP. +45.58

EXISTING UNDERGROUND FIBER OPTIC CABLES

SPECIAL CUT DITCH PSRM LINER SEE DETAIL 'C'

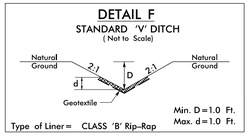
BL–17 BL–15

EXIST. R/W

–L– LINE		
PI Sta 101+21.29	PIs Sta 106+03.78	
△ = 103° 47' 40.9" (RT)	Θs = 10° 40' 27.4"	
D = 7° 50' 55.5"	Ls = 272.00'	
L = 1,322.44'	LT = 181.66'	
T = 930.91'	ST = 90.97'	
R = 730.00'		
Ds = 45mph		
SE = .08		

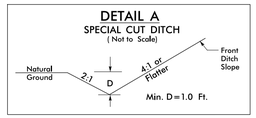
U.S. FOREST SERVICE

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



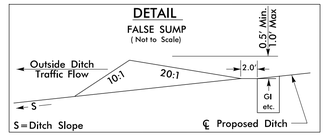
Min. D = 1.0 Ft.
Max. d = 1.0 Ft.
Type of Liner = CLASS 'B' Rip–Rap

DETAIL A
SPECIAL CUT DITCH
(Not to Scale)



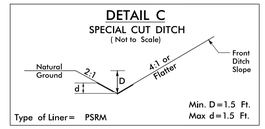
Min. D = 1.0 Ft.
FROM –L– STA. 107+00 TO STA. 119+00 LT

DETAIL
FALSE SUMP
(Not to Scale)



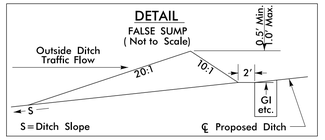
S = Ditch Slope

DETAIL C
SPECIAL CUT DITCH
(Not to Scale)



Min. D = 1.5 Ft.
Max d = 1.5 Ft.
Type of Liner = PSRM
FROM –L– STA. 105+00 TO STA. 119+00 RT

DETAIL
FALSE SUMP
(Not to Scale)



S = Ditch Slope

FOR –L– PROFILE SEE SHEET 23 & 24

2/18/2016 2:28:15 PM
R:\R-4416\Roadway\Plans\R-4416_rdy_psh11.dgn
USER:toddbuckner

8/17/99

REVISIONS

NAD 83

PROJECT REFERENCE NO.	SHEET NO.
R-4416	12
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER
DocuSigned by: 2/18/2016
-1087011E87B43B...

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN
DocuSigned by: Marc Shown 2/18/2016
-48D24AEC0A0B4C2...

Michael Baker Engineering, Inc.
Michael Baker INTERNATIONAL
8000 Regency Pkwy Suite 600 Cary, NC 27518 NC License: F-1084

NC DEPARTMENT OF TRANSPORTATION
HYDRAULICS UNIT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- LINE	
Pls Sta 120+80.67	Pl Sta 132+48.93
Θs = 5° 46' 39.8"	△ = 84° 53' 25.2" (LT)
Ls = 240.00'	D = 4° 48' 53.2"
LT = 160.09'	L = 1,763.12'
ST = 80.08'	T = 1,088.34'
	R = 1,190.00'
	Ds = 60mph
	SE = .08

-Y1-
Pl Sta 10+78.05
△ = 43° 51' 27.6" (LT)
D = 32° 44' 25.6"
L = 133.96'
T = 70.45'
R = 175.00'

DETAIL
FALSE SUMP (Not to Scale)
Outside Ditch Traffic Flow; 20:1; 10:1; 2'; 0.5' Min. 1.0 Max.; GI etc.; S; S=Ditch Slope; ℄ Proposed Ditch

DETAIL F
STANDARD 'V' DITCH (Not to Scale)
Natural Ground; 2:1; D; d; Geotextile; Min. D=1.0 Ft. Max. d=1.0 Ft.
Type of Liner= CLASS 'B' Rip-Rap

DETAIL A
SPECIAL CUT DITCH (Not to Scale)
Natural Ground; 2:1; D; 4:1 or Flatter; Front Ditch Slope; Min. D=1.0 Ft.
FROM -L- STA. 122+50 TO STA. 126+50 LT
-L- STA. 121+00 TO STA. 122+00 LT
-L- STA. 119+00 TO STA. 120+00 LT

DETAIL C
SPECIAL CUT DITCH (Not to Scale)
Natural Ground; 2:1; d; D; 4:1 or Flatter; Front Ditch Slope; Min. D=1.5 Ft. Max d=1.5 Ft.
Type of Liner= PSRM
FROM -L- STA. 129+50 TO STA. 133+00 LT
-L- STA. 125+50 TO STA. 128+00 RT
-L- STA. 119+00 TO STA. 124+50 RT

DETAIL E
STANDARD 'V' DITCH (Not to Scale)
Natural Ground; 2:1; D; 2:1; Natural Ground; Min. D=1.5 Ft.

DETAIL B
SPECIAL CUT DITCH (Not to Scale)
Natural Ground; 2:1; D; 4:1 or Flatter; Front Ditch Slope; Min. D=1.5 Ft.
FROM -L- STA. 129+00 TO STA. 129+50 RT
-L- STA. 129+85 TO STA. 133+00 RT

U.S. FOREST SERVICE

EXIST. R/W

MATCHLINE - SHEET 11 -L- Sta. 119+00.00

MATCHLINE - SHEET 13 -L- Sta. 133+00.00

120+00

125+00

130+00

TS Sta. 119+20.59

SC Sta. 121+60.59

-Y1- POT Sta. 10+00.00

-Y1- PC Sta. 10+07.59

BEGIN CONSTRUCTION
-Y1- POC Sta. 10+95.00

-Y1- PT Sta. 11+41.55

-Y1- POT Sta. 11+58.90 =
-L- POC Sta. 127+13.05

N 22° 20' 08.3" E

S 55° 32' 26.1" E

N 80° 36' 06.3" E

SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'A'

RETAIN EXISTING GUARDRAIL

GRADE TO DRAIN

STANDARD 'V' DITCH CLASS 'B' RIP RAP SEE DETAIL 'F' @6 TONS @3 CY DDE 20 SY GFD

RETAIN

SPECIAL CUT DITCH PSRM LINER SEE DETAIL 'C'

SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'B'

1201 2GI 18" FS 15" 20.59 40' TYP.

1202 2GI FS

1203 CL 'B' RIP RAP @ 2 TONS 5 SY GFD

1204 2GI 15" W/ELBOWS

1205 CL 'II' RIP RAP @50 TONS 62 SY GFD

1206 GRAU 350 TL-3 8:1

1207 REMOVE 2GI

1208 2GI-A 36" W/ ELBOWS

1209 REMOVE 2GI

1210 2GI-A 24" W/ ELBOWS

REMOVE EXISTING GUARDRAIL

2GI-A 54" W/ELBOWS

54" RCP

FILL W/ FLOWABLE MATERIAL

TIE TO EXIST. GUARDRAIL

6' CONC. DITCH

4' CONC. DITCH

OLD US 64

U.S. 64 22' BST

-L-

BL-13

BL-14

EXISTING UNDERGROUND FIBER OPTIC CABLES

CLASS 'B' RIP RAP @ 1 TON 3 SY GFD

STANDARD 'V' DITCH GRASS LINED SEE DETAIL 'E' @ 10 CY DDE

U.S. FOREST SERVICE

FOR -L- PROFILE SEE SHEET 24

2/18/2016 2:28:16 PM
K:\TEAMS\NW\R-4416\Roadway\R-4416_rdy_psh12.dgn
USER:toddbuckner

PROJECT REFERENCE NO.	SHEET NO.
R-4416	13
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER
DocuSigned by: 2/18/2016

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN
DocuSigned by: Marc Shown 2/18/2016

Michael Baker Engineering, Inc. / Michael Baker INTERNATIONAL
8000 Regency Pkwy Suite 600 Cary, NC 27518 NC License: F-1084

NC DEPARTMENT OF TRANSPORTATION
HYDRAULICS UNIT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS 8/17/99

-L- LINE

PI Sta 132+48.93
△ = 84° 53' 25.2" (LT)
D = 4° 48' 53.2"
L = 1,763.12'
T = 1,088.34'
R = 1,190.00'
Ds = 60mph
SE = .08

PI Sta 141+03.90
△ = 26° 44' 40.3" (LT)
D = 1° 33' 31.7"
L = 353.82'
T = 180.19'
R = 758.00'
Ds = 50mph
SE = .08

PIs Sta 143+73.86
Θs = 10° 53' 04.9"
Ls = 288.00'
LT = 192.36'
ST = 96.33'

-L- LINE

PIs Sta 148+53.89
Θs = 10° 53' 04.9"
Ls = 288.00'
LT = 192.36'
ST = 96.33'

DETAIL B
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground, 2:1, D, 4:1 or Flatter, Front Ditch Slope
Min. D= 1.5 Ft.

FROM -L- STA. 135+75 TO STA. 137+50 RT.
-L- STA 135+00 TO STA. 137+50 LT.

DETAIL
FALSE SUMP
(Not to Scale)
Outside Ditch Traffic Flow, 20:1, 10:1, 2', 0.5' Min. 1.0' Max., S, GI etc.
S=Ditch Slope ℄ Proposed Ditch

DETAIL C
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground, 2:1, D, d, 4:1 or Flatter, Front Ditch Slope
Type of Liner= PSRM
Min. D=1.5 Ft.
Max d=1.5 Ft.

FROM -L- STA. 138+50 TO STA. 146+00 RT.
-L- STA. 133+00 TO STA. 135+00 RT.
-L- STA. 146+50 TO STA. 147+00 RT.
-L- STA. 133+00 TO STA. 135+75 LT.

NAD 83

MATCHLINE - SHEET 12 -L- Sta. 133+00.00

MATCHLINE - SHEET 14 -L- Sta. 147+00.00

135+00 / 140+00 / 145+00

U.S. FOREST SERVICE

EXIST. R/W

CS Sta. 142+77.53

PCC Sta. 139+23.71

TS Sta. 146+61.53

ST Sta. 145+65.53

SPECIAL CUT DITCH PSRM LINER SEE DETAIL 'C'

SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'B'

REMOVE EXISTING GUARDRAIL

GRAU 350 TL-3

RETAIN -L-

FILL W/ FLOWABLE MATERIAL

1311 CL 'II' RIP RAP @15 TONS 22 SY GFD

30" RCP-V

REMOVE 2GI

2GI-A

3GI

U.S.64 EB BST

1316 1315 1314 1313 1312 1311 1310 1309 1308 1307 1306 1305 1304 1303 1302 1301

42" 36" 30" 24" 18"

30" W/ ELBOWS

36" W/ ELBOWS

CLEAN OUT INLET OF 48" CMP

CL I RIP RAP @ 20 TONS 39 SY GFD

EXISTING UNDERGROUND FIBER OPTIC CABLES

BL-12 BL-11

FOR -L- PROFILE SEE SHEET 24 & 25

2/18/2016 2:28:17 PM
R:\R-4416\Roadway\R-4416_rdy_psh13.dgn
USER:toddbuckner

8/17/99

REVISIONS

U.S. FOREST SERVICE

EXIST.R/W

150+00

SC Sta. 149+49.53

TIE TO EXISTING GUARDRAIL

Outlet Approx.

RETAIN

18" CMP

RED BRUSH TO REMAIN

GRADE TO DRAIN

25'

R=30'

5' PS

12'

24'

55.37'

74.13'

8:1

BL-10

BL-09

U.S.64 22" BST

SPECIAL CUT DITCH
PSRM LINER
SEE DETAIL 'C'

EXISTING UNDERGROUND FIBER OPTIC CABLES

2GI-A

FS

1401

1402

1403

2GI

1404

18"

15"

36' TYP

77.53'

8' PS

MATCHLINE – SHEET 13 –L– Sta. 147+00.00

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'B'

CS Sta. 158+68.46

160+00

104.46'

REMOVE EXISTING GUARDRAIL
FROM –L– Sta. 159+90 TO Sta. 163+00.00

GRAU 350 TL-3

SPECIAL CUT DITCH
PSRM LINER
SEE DETAIL 'C'

MATCHLINE – SHEET 15 –L– Sta. 161+00.00

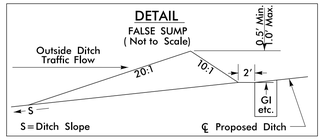
NAD 83

155+00

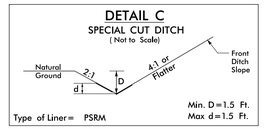
EXIST.R/W

U.S. FOREST SERVICE

DETAIL
FALSE SUMP
(Not to Scale)



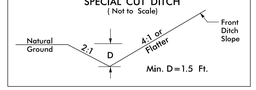
DETAIL C
SPECIAL CUT DITCH
(Not to Scale)



Type of Liner = PSRM
Min. D=1.5 Ft.
Max d=1.5 Ft.

FROM –L– STA. 147+00 TO STA. 161+00 RT.
–L– STA. 152+00 TO 154+00 LT.

DETAIL B
SPECIAL CUT DITCH
(Not to Scale)



Min. D=1.5 Ft.

FROM –L– STA. 154+00 TO 159+50 LT.

PROJECT REFERENCE NO.	SHEET NO.
R-4416	14
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER
DocuSigned by: 2/18/2016
108701158756436...

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN
DocuSigned by: Marc Shown 2/18/2016
4B0A5ACC5A5B4C3...

Michael Baker Engineering, Inc.
Michael Baker INTERNATIONAL
8000 Regency Pkwy Suite 600 Cary, NC 27518 NC License: F-1056

NC DEPARTMENT OF TRANSPORTATION
HYDRAULICS UNIT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

–L– LINE		
PIs Sta 148+53.89	PI Sta 154+74.98	PIs Sta 159+64.79
Θs = 10° 53' 04.9"	△ = 69° 27' 36.2" (RT)	Θs = 10° 53' 04.9"
Ls = 288.00'	D = 7° 33' 31.7"	Ls = 288.00'
LT = 192.36'	L = 918.93'	LT = 192.36'
ST = 96.33'	T = 525.45'	ST = 96.33'
	R = 758.00'	
	Ds = 50mph	
	SE = .08	

FOR –L– PROFILE SEE SHEET 25

2/18/2016 2:28:18 PM
R:\Roadway\R-4416\r-dy-psh14.dgn
USER:toddbucker

PROJECT REFERENCE NO.	SHEET NO.
R-4416	15
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER
DocuSigned by: 2/18/2016

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN
DocuSigned by: Marc Shown 2/18/2016
48D24AEC0A0B4C2...

Michael Baker Engineering, Inc.
Michael Baker INTERNATIONAL
8000 Regency Pkwy Suite 600 Cary, NC 27518 NC License: F-1084

NC DEPARTMENT OF TRANSPORTATION
HYDRAULICS UNIT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS 8/17/99

U.S. FOREST SERVICE — EXIST. R/W

-L- LINE

PIs Sta 159+64.79
Θs = 10° 53' 04.9"
Ls = 288.00'
LT = 192.36'
ST = 96.33'

-L- LINE

PIs Sta 167+60.96
Θs = 7° 03' 06.4"
Ls = 320.00'
LT = 213.50'
ST = 106.82'

PI Sta 173+71.80
Δ = 42° 24' 29.6" (LT)
D = 4° 24' 26.5"
L = 962.21'
T = 504.34'
R = 1,300.00'
Ds = 60mph
SE = .08

NAD 83

DETAIL
FALSE SUMP
(Not to Scale)
Outside Ditch Traffic Flow
20:1
10:1
2'
0.5' Min. 1.0' Max.
GI etc.
S
S=Ditch Slope
℄ Proposed Ditch

DETAIL B
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground
2:1
D
4:1 or Flatter
Front Ditch Slope
Min. D=1.5 Ft.
FROM -L- STA. 169+00 TO STA. 172+00 RT
-L- STA. 163+00 TO STA. 164+50 RT.

DETAIL C
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground
2:1
D
d
4:1 or Flatter
Front Ditch Slope
Min. D=1.5 Ft.
Max d=1.5 Ft.
Type of Liner= PSRM
FROM -L- STA. 172+00 TO STA. 175+00 RT.
-L- STA. 165+00 TO STA. 168+50 RT.
-L- STA. 162+00 TO STA. 163+00 RT.

MATCHLINE – SHEET 16 –L– Sta. 175+00.00

MATCHLINE – SHEET 14 –L– Sta. 161+00.00

ST Sta. 161+56.46
TS Sta. 165+47.46
SC Sta. 168+67.46
165+00
170+00
175+00

RETAIN
REMOVE EXISTING GUARDRAIL FROM -L- Sta. 159+90.00 TO 163+00.00
TIE TO EXISTING GUARDRAIL
RETAIN EXISTING GUARDRAIL FROM -L- Sta. 163+00.00 TO 167+75.00
RETAIN EXISTING GUARDRAIL
FILL W/ FLOWABLE MATERIAL
CL 'II' RIP RAP @7 TONS 10 SY GFD
1501 2GI-B 36' TYP. +28.46
1502 2GI-A REMOVE 2GI PROPOSED
1503 30" CSP W/ELBOWS
1504 SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'B'
1505 2GI-A 30"
1506 40' TYP. +67.46
1507 COLLAR REM. HW
1508 36" HW
1509 FILL W/ FLOWABLE MATERIAL
1510 REMOVE 2GI PROPOSED
1511 2GI 15"
SPECIAL CUT DITCH PSRM LINER SEE DETAIL 'C'
SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'B'
SPECIAL CUT DITCH PSRM LINER SEE DETAIL 'C'
EXISTING UNDERGROUND FIBER OPTIC CABLES
GRAU 350 TL-3
N 14° 43' 55.9" W
-L-
U.S.64 22' BST
5' PS
12'
24'
50:1
FS
2GI
4' CONC. DITCH
BL-08
BL-07
BL-06
RT-CRP 18"
C
F
T
FO

FOR -L- PROFILE SEE SHEET 25 & 26

U.S. FOREST SERVICE — EXIST. R/W

DocuSign Envelope ID: 0A5E2CB4-9E64-49E5-805C-3CC81644697B

PROJECT REFERENCE NO.	SHEET NO.
R-4416	16

R/W SHEET NO.

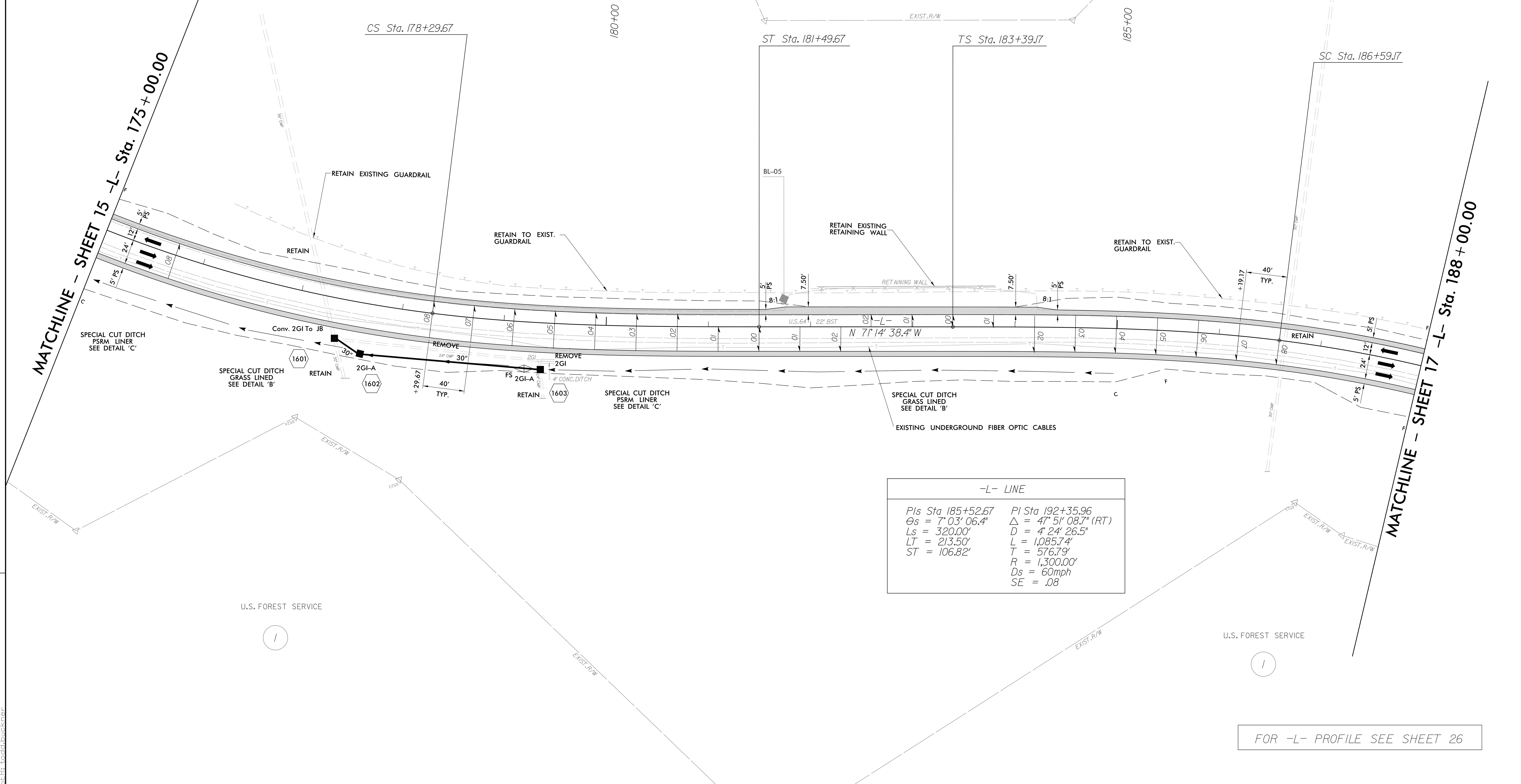
ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER — DocuSigned by: 2/18/2016

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN — DocuSigned by: Marc Shown 2/18/2016

Michael Baker Engineering, Inc. 8000 Regency Pkwy Suite 600 Cary, NC 27518 NC License: F-1084

NC DEPARTMENT OF TRANSPORTATION HYDRAULICS UNIT 1590 MAIL SERVICE CENTER RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



-L- LINE

PI Sta 173+71.80	PIs Sta 179+36.49
Δ = 42° 24' 29.6" (LT)	Θs = 7° 03' 06.4"
D = 4° 24' 26.5"	Ls = 320.00'
L = 962.21'	LT = 213.50'
T = 504.34'	ST = 106.82'
R = 1,300.00'	
Ds = 60mph	
SE = .08	

DETAIL
FALSE SUMP
(Not to Scale)

Outside Ditch Traffic Flow — 20:1 — 10:1 — 2' — 0.5' Min. 1.0' Max. — GI etc. — S = Ditch Slope — ℄ Proposed Ditch

DETAIL B
SPECIAL CUT DITCH
(Not to Scale)

Natural Ground — 2:1 — D — 4:1 or Flatter — Front Ditch Slope — Min. D = 1.5 Ft.

FROM -L- STA. 182+50 TO STA. 185+00 RT.
-L- STA. 176+00 TO STA. 179+30 RT.

DETAIL C
SPECIAL CUT DITCH
(Not to Scale)

Natural Ground — 2:1 — D — d — 4:1 or Flatter — Front Ditch Slope — Min. D = 1.5 Ft. — Max d = 1.5 Ft. — Type of Liner = PSRM

FROM -L- STA. 179+30 TO STA. 182+50 RT.
-L- STA. 175+00 TO STA. 176+00 RT.

-L- LINE

PIs Sta 185+52.67	PI Sta 192+35.96
Θs = 7° 03' 06.4"	Δ = 47° 51' 08.7" (RT)
Ls = 320.00'	D = 4° 24' 26.5"
LT = 213.50'	L = 1,085.74'
ST = 106.82'	T = 576.79'
	R = 1,300.00'
	Ds = 60mph
	SE = .08

FOR -L- PROFILE SEE SHEET 26

REVISIONS

8/17/99

2/18/2016 2:28:20 PM
R:\Roadway\Proj\R4416_rdy_psh16.dgn
$USER: todd.buckner

PROJECT REFERENCE NO.	SHEET NO.
R-4416	17
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER
DocuSigned by: 2/18/2016

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN
DocuSigned by: 2/18/2016

Michael Baker Engineering, Inc.
Michael Baker INTERNATIONAL
8000 Regency Pkwy Suite 600 Cary, NC 27518 NC License: F-1056

NC DEPARTMENT OF TRANSPORTATION
HYDRAULICS UNIT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

8/17/99

REVISIONS

NAD 83

EXIST. R/W

190+00

195+00

200+00

U.S. FOREST SERVICE

PCC Sta. 197+44.91

BL-04

BL-03

CL 'I' RIP RAP @25 TONS 30 SY GFD

RETAIN EXISTING GUARDRAIL

36" W/ELBOWS

R=30'

RETAIN

FILL W/ FLOWABLE MATERIAL

REMOVE

PROPOSED 2GI

SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'A'

SPECIAL CUT DITCH GRASS LINED SEE DETAIL 'B'

SPECIAL CUT DITCH PSRM LINER SEE DETAIL 'C'

SPECIAL CUT DITCH PSRM LINER SEE DETAIL 'D'

U.S.64 22' BST

MATCHLINE – SHEET 16 –L– Sta. 188+00.00

MATCHLINE – SHEET 18 –L– Sta. 201+00.00

DETAIL
FALSE SUMP
(Not to Scale)
Outside Ditch Traffic Flow
10:1
20:1
2.0'
0.5' Min. 1.0' Max
GI etc.
S
S=Ditch Slope
℄ Proposed Ditch

DETAIL
FALSE SUMP
(Not to Scale)
Outside Ditch Traffic Flow
20:1
10:1
2'
0.5' Min. 1.0' Max
GI etc.
S
S=Ditch Slope
℄ Proposed Ditch

DETAIL A
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground
2:1
D
4:1 or Flatter
Front Ditch Slope
Min. D=1.0 Ft.

FROM –L– STA. 192+00 TO STA. 194+50 LT.

–L– LINE	
PI Sta 192+35.96	PI Sta 206+09.88
△ = 47° 51' 08.7" (RT)	△ = 61° 38' 06.6" (RT)
D = 4° 24' 26.5"	D = 3° 57' 05.2"
L = 1,085.74'	L = 1,559.82'
T = 576.79'	T = 864.98'
R = 1,300.00'	R = 1,450.00'
Ds = 60mph	Ds = 60mph
SE = .08	SE = .08

DETAIL B
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground
2:1
D
4:1 or Flatter
Front Ditch Slope
Min. D=1.5 Ft.

FROM –L– STA. 192+50 TO STA. 195+00 RT.

DETAIL C
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground
2:1
d
D
4:1 or Flatter
Front Ditch Slope
Min. D=1.5 Ft.
Max d=1.5 Ft.
Type of Liner= PSRM

FROM –L– STA. 195+00 TO STA. 201+00 RT.

DETAIL D
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground
2:1
d
D
4:1 or Flatter
Front Ditch Slope
Min. D=1.0 Ft.
Max d=1.0 Ft.
Type of Liner= PSRM

FROM –L– STA. 194+50 TO STA. 201+00 LT.

FOR –L– PROFILE SEE SHEET 26 & 27

2/18/2016 2:28:21 PM
R-4416_rdy_psh17.dgn
USER:toddbuckner

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-4416	18
R/W SHEET NO.	

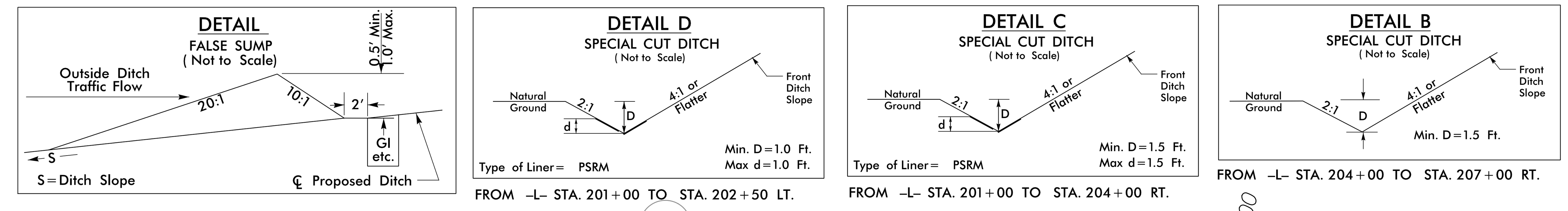
ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER — DocuSigned by: 2/18/2016 — 1087011E67F6435...

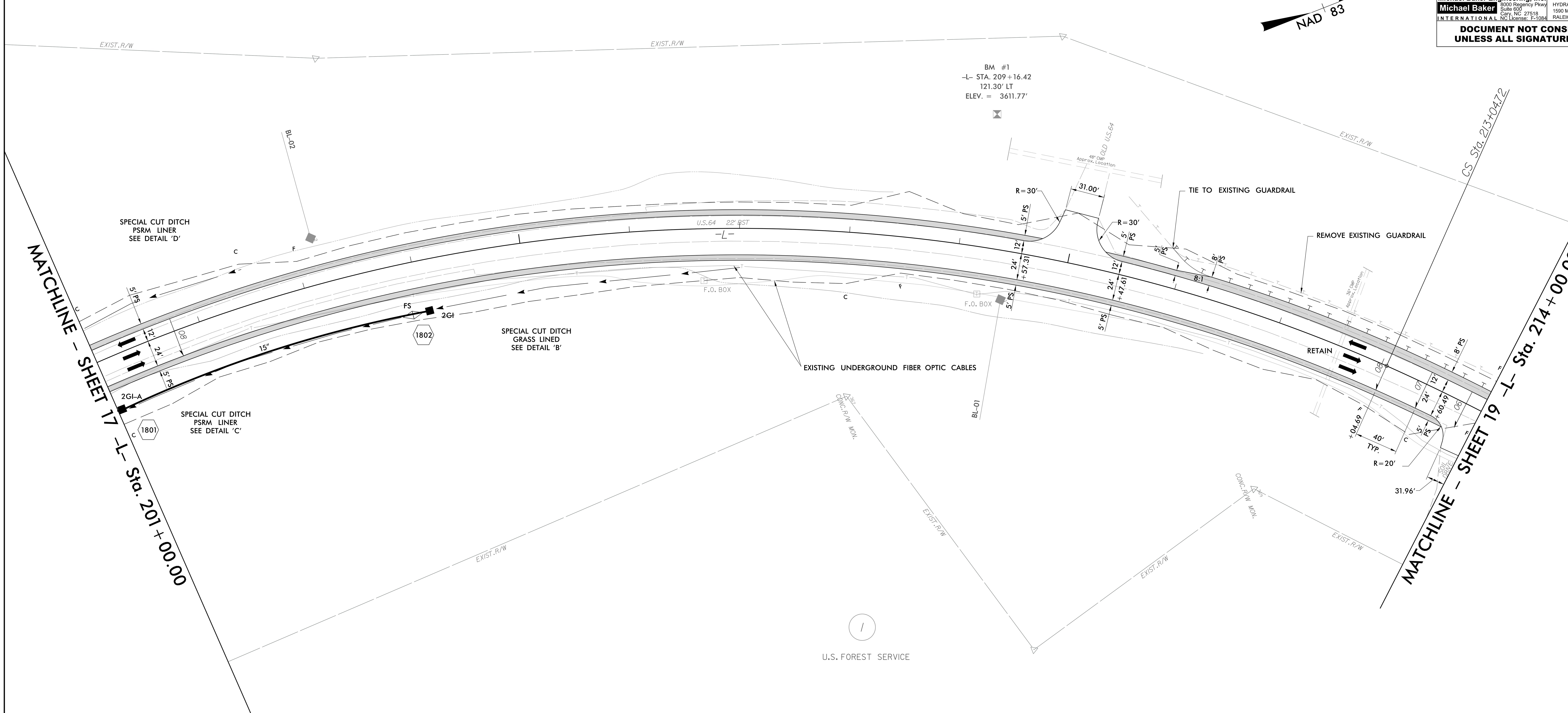
HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN — DocuSigned by: Marc Shown 2/18/2016 — 4B024AEC0A0B4C2...

Michael Baker Engineering, Inc. 8000 Regency Pkwy Suite 600 Cary, NC 27518 NC License: F-1084
Michael Baker INTERNATIONAL

NC DEPARTMENT OF TRANSPORTATION HYDRAULICS UNIT 1590 MAIL SERVICE CENTER RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED





REVISIONS

-L- LINE

PI Sta 206+09.88	PIs Sta 214+11.51
Δ = 61° 38' 06.6" (RT)	Θs = 6° 19' 20.3"
D = 3° 57' 05.2"	Ls = 320.00'
L = 1,559.82'	LT = 213.47'
T = 864.98'	ST = 106.79'
R = 1,450.00'	
Ds = 60mph	
SE = .08	

FOR -L- PROFILE SEE SHEET 27

2/18/2016 2:28:22 PM
R:\Roadway\Proj\R4416_rdy_psh18.dgn
USER: todd.buckner

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-4416	19
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER
DocuSigned by: 2/18/2016
10B7013E6F5A436...

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN
DocuSigned by: Marc Shown 2/18/2016
4B024AFC0A0B4C2...

Michael Baker Engineering, Inc.
Michael Baker INTERNATIONAL
8000 Regency Pkwy Suite 600 Cary, NC 27518 NC License: F-1084
NC DEPARTMENT OF TRANSPORTATION HYDRAULICS UNIT 1590 MAIL SERVICE CENTER RALEIGH, NC 27699-1590

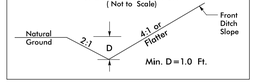
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

-L- LINE

PIs Sta 214+11.51
Θs = 6°19' 20.3"
Ls = 320.00'
LT = 213.47'
ST = 106.79'

DETAIL A
SPECIAL CUT DITCH
(Not to Scale)



FROM -L- STA. 219+50 TO STA. 223+00 LT.

U.S. FOREST SERVICE

/

215+00

220+00

ST Sta. 216+24.72

END PROJECT R-4416
END CONSTRUCTION
-L- POT Sta. 223+20.52

EXIST.R/W

EXIST.R/W

-BL- GLADE

REMOVE EXISTING GUARDRAIL

8' PS

8' PS

5' PS

40' TYP.

+04.72

C

SPECIAL CUT DITCH
GRASS LINED
SEE DETAIL 'A'

50' TAPER

+70.52

+80.52

40' TYP.

C

5' PS

GRAU 350 TL-3

8:1

12'

12'

10'

10'

10'

10'

U.S.64 22' BST

N 51° 37' 03.6" E

-L-

12'

12'

10'

10'

11'

11'

5' PS

+36.44

24'

24'

5' PS

5' PS

C

R=20'

31.96'

SOIL DRIVE

ASPHALT PAVEMENT

+70.53

EXISTING UNDERGROUND FIBER OPTIC CABLES

750' LANE DROP

EXIST.R/W

EXIST.R/W

MATCHLINE – SHEET 19 -L- Sta. 214+00.00

/

U.S. FOREST SERVICE

FOR -L- PROFILE SEE SHEET 27 & 28

2/18/2016 2:28:22 PM
K:\Projects\NC_Projects\R-4416\rdy\R4416_rdy_psh19.dgn
USER:toddbuckner

PROJECT REFERENCE NO.	SHEET NO.
R-4416	20

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCHNER

DocuSigned by: 2/18/2016

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN

DocuSigned by: Marc Shown 2/18/2016

Michael Baker Engineering, Inc. 8000 Regency Pkwy Suite 600 Cary, NC 27518 NC Licence: F-1084

NC DEPARTMENT OF TRANSPORTATION HYDRAULICS UNIT 1590 MAIL SERVICE CENTER RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

5/28/99

-L-

BEGIN PROJECT R-4416
BEGIN GRADE
-L- Sta.10+0.00, EL=2,423.59'

PI = 10+63.00
EL = 2,426.49'
VC = 90'
K = 155
Ds > 60mph

BEG.SPEC CUT DITCH
STA.10+00 -L- RT
EL=2,420.30

PI = 11+00.000
EI = 2,424.30

PI = 12+09.00
EL = 2,432.34'
VC = 202'
K = 27.8
Ds > 60mph

PI =12+50.000
EI = 2,429.80

BEG.SPEC CUT DITCH
STA.14+00 -L- LT
EL=2,436.40

PI =13+50.000
EI = 2,432.30

PI = 14+15.00
EL = 2,439.11'
VC = 210'
K = 1516
Ds > 60mph

PI =14+00.000
EI = 2,434.50

PI =14+50.000
EI = 2,438.20

END SPEC CUT DITCH
STA.15+00 -L- LT
EL=2,440.20

PI =14+50.000
EI = 2,436.20

PI =17+50.000
EI = 2,444.00

PI = 19+90.00
EL = 2,457.20'
VC = 174'
K = 258
Ds > 60mph

PI =18+00.000
EI = 2,445.60

PI = 21+36.00
EL = 2,462.78'
VC = 118'
K = 160
Ds > 60mph

PI =20+50.000
EI = 2,454.00

PI = 23+87.00
EL = 2,474.23'
VC = 150'
K = 327
Ds > 60mph

PI =22+00.000
EI = 2,460.40

PI =23+00.000
EI = 2,465.10

PI =24+00.000
EI = 2,470.50

BEG.SPEC CUT DITCH
STA.24+00 -L- LT
EI = 2,473.60

(+)4.5924%
(+)4.0119%
(+)3.2853%
(+)3.6667%
(+)4.0000%
(+)2.5000%
(+)4.4000%
(+)3.6000%
(+)3.4000%
(+)2.6000%
(+)3.1468%
(+)3.2000%
(+)3.6000%
(+)3.4682%
(+)3.8205%
(+)4.2667%
(+)4.7000%
(+)4.5596%
(+)5.4000%

FOR -L- PLANVIEW SEE SHEETS 4 THUR 6

-L-

PI = 23+87.00
EL = 2,474.23'
VC = 150'
K = 327
Ds > 60mph

BEG.SPEC CUT DITCH
STA.24+00 -L- LT
EI = 2,473.60

PI =24+00.000
EI = 2,470.50

PI =25+00.000
EI = 2,478.00

PI =25+00.000
EI = 2,476.10

PI =26+50.000
EI = 2,486.80

PI =26+50.000
EI = 2,483.60

END SPEC CUT DITCH
STA.27+50 -L- LT
EI = 2,488.80

PI =28+00.000
EI = 2,492.40

PI = 30+60.00
EL = 2,508.00'
VC = 400'
K = 19573
Ds > 60mph

END SPEC CUT DITCH
STA.29+00 -L- RT
EL = 2,497.00

BEG.SPEC CUT DITCH
STA.29+00 -L- LT
EI = 2,495.50

END SPEC CUT DITCH
STA.31+00 -L- LT
EI = 2,505.50

BEG.SPEC CUT DITCH
STA.31+50 -L- LT
EI = 2,508.00

END SPEC CUT DITCH
STA.34+00 -L- LT
EI = 2,520.60

PI =35+50.000
EI = 2,529.40

END SPEC CUT DITCH
STA.36+00 -L- RT
EL=2,532.20

BEG.SPEC CUT DITCH
STA.38+00 -L- RT
EL=2,541.80

BEG.SPEC CUT DITCH
STA.25+30 -L- RT
EL=2,528.50

(+)5.0177%
(+)4.5333%
(+)4.0000%
(+)5.0000%
(+)4.4000%
(+)5.5000%
(+)4.6000%
(+)5.8667%
(+)4.9973%
(+)5.0400%
(+)4.5000%
(+)5.6000%
(+)4.9973%

FOR -L- PLANVIEW SEE SHEETS 4 THUR 6

PROJECT REFERENCE NO.	SHEET NO.
R-4416	21

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER

DocuSigned by: 2/18/2016

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN

DocuSigned by: Marc Shown 2/18/2016

CONSULTANT ENGINEER
Michael Baker Engineering, Inc.
8000 Regency Pkwy Suite 600 Cary, NC 27518
NC License: F-1084

NC DEPARTMENT OF TRANSPORTATION
HYDRAULICS UNIT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

5/28/99

-L-

PI = 39+63.00
EL = 2,553.12'
VC = 114'
K = 424
Ds > 60mph

PI = 40+95.00
EL = 2,560.07'
VC = 150'
K = 173
Ds > 60mph

PI = 43+20.00
EL = 2,573.87'
VC = 150'
K = 428
Ds > 60mph

PI = 44+80.00
EL = 2,584.24'
VC = 170'
K = 275
Ds > 60mph

PI = 50+40.00
EL = 2,624.00'
VC = 200'
K = 469
Ds > 60mph

BEG. SPEC. CUT DITCH
STA. 38+00 -L- RT
EL=2,541.80

PI =38+50.000
EI = 2,543.40

PI =39+50.000
EI = 2,548.20

PI =40+00.000
EI = 2,551.20

PI =40+50.000
EI = 2,553.50

PI =41+50.000
EI = 2,559.00

PI =42+00.000
EI = 2,562.40

PI =42+50.000
EI = 2,565.00

PI =43+00.000
EI = 2,568.80

PI =44+00.000
EI = 2,574.90

PI =46+00.000
EI = 2,588.90

PI =46+50.000
EI = 2,592.00

PI =47+00.000
EI = 2,596.00

PI =48+00.000
EI = 2,603.00

PI =50+00.000
EI = 2,611.70

END SPEC. CUT DITCH
STA. 50+50
EL=2,621.70

(+)4.9973%
(+)3.2000%
(+)4.8000%
(+)6.0000%
(+)5.2659%
(+)4.6000%
(+)5.5000%
(+)6.3159%
(+)6.8000%
(+)5.2000%
(+)7.6000%
(+)6.4821%
(+)6.1000%
(+)7.1006%
(+)7.0000%
(+)6.2000%
(+)8.0000%
(+)7.3500%
(+)8.0000%
(+)7.1006%

FOR -L- PLANVIEW SEE SHEETS 6 THUR 7

-L-

PI = 50+40.00
EL = 2,624.00'
VC = 200'
K = 469
Ds > 60mph

PI = 54+15.00
EL = 2,649.03'
VC = 150'
K = 478
Ds > 60mph

PI = 56+58.00
EL = 2,666.01'
VC = 150'
K = 853
Ds > 60mph

PI = 58+70.00
EL = 2,681.20'
VC = 200'
K = 8396
Ds > 60mph

PI = 62+10.00
EL = 2,705.47'
VC = 190'
K = 2871
Ds > 60mph

PI = 64+00.00
EL = 2,718.91'
VC = 190'
K = 721
Ds > 60mph

END SPEC. CUT DITCH
STA. 50+50
EL=2,621.70

BEG. SPEC. CUT DITCH
STA. 60+70
EL=2,693.60

PI =62+00.000
EI = 2,704.10

PI =63+00.000
EI = 2,711.20

PI =64+00.000
EI = 2,717.30

(+)6.6742%
(+)6.9877%
(+)7.1636%
(+)7.1398%
(+)8.0769%
(+)7.0000%
(+)7.0736%
(+)6.1000%
(+)7.0736%

FOR -L- PLANVIEW SEE SHEETS 6 THUR 7

PROJECT REFERENCE NO.	SHEET NO.
R-4416	22

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER

DocuSigned by: Todd H. Buckner 2/18/2016

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC SHOWN

DocuSigned by: Marc Shown 2/18/2016

Michael Baker Engineering, Inc.
8000 Regency Pkwy Suite 600
Cary, NC 27518
NC License: F-1056

NC DEPARTMENT OF TRANSPORTATION
HYDRAULICS UNIT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

5/28/99

PI = 64+00.00
EL = 2,718.91'
VC = 190'
K = 72.1
Ds > 60mph

PI =64+00.000
EI = 2,717.30

(+)6.8100%

(+)6.6000%

END SPEC CUT DITCH
STA 64+50 -L- RT
EL=2,720.60

(+)6.8100%

(+)17.2616%

BEG SPEC CUT DITCH
STA 66+70 -L- RT
EL=2,730.30

(+)17.2616%

PI = 65+60.00
EL = 2,729.81'
VC = 130'
K = 288
Ds > 60mph

(+)11.6250%

(+)6.9975%

PI = 67+00.00
EL = 2,739.98'
VC = 150'
K = 568
Ds = 60mph

(+) 8.0000%

PI =67+50.000
EI = 2,739.60

(+) 9.0000%

PI =68+00.000
EI = 2,743.60

(+) 7.8000%

PI =68+50.000
EI = 2,748.10

(+) 7.0000%

PI =69+50.000
EI = 2,755.90

(+) 6.9000%

PI =70+00.000
EI = 2,759.40

(+)6.9975%

PI = 71+45.00
EL = 2,771.11'
VC = 210'
K = 219
Ds > 60mph

(+) 6.5000%

PI =71+00.000
EI = 2,766.30

(+)6.0381%

PI =72+00.000
EI = 2,772.80

(+)5.9333%

PI = 74+25.00
EL = 2,788.02'
VC = 350'
K = 208
Ds > 60mph

(+)6.038 %

PI =73+50.000
EI = 2,781.70

(+) 5.4000%

BEG SPEC CUT DITCH
STA 74+00 -L- LT
EI = 2,781.80

(+)4.3554%

END SPEC CUT DITCH
STA 75+00 -L- LT
EI = 2,784.50

(+) 5.3000%

END SPEC CUT DITCH
STA 75+50 -L- RT
EL=2,792.30

MATCHLINE THIS SHEET

FOR -L- PLANVIEW SEE SHEET 8

PI = 77+50.000
EI = 2,796.60

(+) 4.4000%

BEG SPEC CUT DITCH
STA 77+00 -L- LT
EI = 2,794.40

(+)4.3554%

(+) 5.4000%

PI =78+00.000
EI = 2,799.30

(+) 4.8000%

PI =78+50.000
EI = 2,801.70

(+) 4.2000%

END SPEC CUT DITCH
STA 79+00 -L- LT
EI = 2,803.80

(+) 3.0000%

PI =79+50.000
EI = 2,806.00

BEG SPEC CUT DITCH
STA 79+40 -L- LT
EI = 2,805.70

(+) 4.4000%

(+) 4.8000%

PI =80+50.000
EI = 2,810.40

END SPEC CUT DITCH
STA 81+00 -L- LT
EI = 2,812.80

PI = 83+70.00
EL = 2,829.18'
VC = 250'
K = 265
Ds > 60mph

BEG SPEC CUT DITCH
STA 83+60 -L- RT
EL=2,828.00

BEG SPEC CUT DITCH
STA 83+80 -L- LT
EI = 2,825.50

(+)4.3554%

(+) 1.5000%

(+) 3.0000%

PI =84+00.000
EI = 2,828.60

(+) 6.2000%

PI =84+00.000
EI = 2,825.80

(+) 5.2000%

PI =84+50.000
EI = 2,831.70

(+)5.2999%

PI = 86+50.00
EL = 2,844.02'
VC = 310'
K = 387
Ds > 60mph

PI =85+00.000
EI = 2,831.00

(+) 5.1000%

PI =85+50.000
EI = 2,836.80

(+) 7.0000%

(+)5.2999%

PI =86+00.000
EI = 2,840.30

(+) 5.9000%

PI =86+00.000
EI = 2,836.90

(+) 6.2000%

(+) 4.7000%

END SPEC CUT DITCH
STA 86+50 -L- LT
EI = 2,840.00

(+) 0.5%

BEG SPEC CUT DITCH
STA 86+80 -L- RT
EL=2,843.00

PI =87+00.000
EI = 2,843.10

(+) 6.2000%

PI =87+00.000
EI = 2,845.00

(+)6.1000%

PI =87+50.000
EI = 2,846.20

(+) 5.6000%

END SPEC CUT DITCH
STA 88+00 -L- RT
EL=2,849.00

PI =89+50.000
EI = 2,857.80

(+) 5.8000%

(+) 5.1200%

FOR -L- PLANVIEW SEE SHEET 9

2/18/2016 2:30:02 PM
K:\Projects\R-4416\Roadway\Design\R-4416_rdy_pl122.dgn
USER:tbuckner

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-4416	23

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER

DocuSigned by: Todd H. Buckner 2/18/2016

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC E. SHOWN

DocuSigned by: Marc Shown 2/18/2016

Michael Baker INTERNATIONAL
Michael Baker Engineering, Inc.
8000 Regency Pkwy Suite 600
Cary, NC 27518
NC License: F-1056

NC DEPARTMENT OF TRANSPORTATION
HYDRAULICS UNIT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PI = 90+50.000
EL = 2,863.60

PI = 91+00.000
EI = 2,866.00

PI = 91+50.000
EI = 2,868.80

PI = 92+50.000
EI = 2,873.80

PI = 93+50.000
EI = 2,879.90

PI = 94+00.000
EI = 2,883.30

PI = 94+50.000
EI = 2,886.30

PI = 95+00.000
EI = 2,889.00

PI = 96+00.000
EI = 2,895.30

PI = 98+00.000
EI = 2,906.40

PI = 98+50.000
EI = 2,909.50

PI = 99+50.000
EI = 2,916.20

PI = 101+00.000
EI = 2,925.50

PI = 101+50.000
EI = 2,928.00

PI = 102+00.000
EI = 2,931.00

PI = 91+93.09
EL = 2,877.15'
VC = 200'
K = 863
Ds > 60mph

PI = 98+40.00
EL = 2,915.11'
VC = 170'
K = 828
Ds > 60mph

PI = 101+80.00
EL = 2,935.76'
VC = 220'
K = 1178
Ds > 60mph

(+) 5.8000% (+) 4.8000% (+) 5.6000% (+) 5.0000% (+) 6.1000% (+) 6.8000% (+) 6.0000% (+) 5.4000% (+) 6.3000% (+) 5.5500% (+) 5.8000% (+) 6.0667% (+) 6.9000% (+) 6.0736% (+) 5.4000% (+) 6.0000% (+) 6.1042%

(+)6.1000% (+)5.8682% (+)5.8682% (+)6.0736%

MATCHLINE THIS SHEET

FOR -L- PLANVIEW SEE SHEET 10

PI = 102+00.000
EI = 2,931.00

PI = 102+50.000
EI = 2,934.50

PI = 103+00.000
EI = 2,938.00

PI = 103+75.00
EL = 2,947.66'
VC = 170'
K = 1192
Ds > 60mph

PI = 105+50.000
EI = 2,952.80

PI = 105+75.00
EL = 2,959.85'
VC = 230'
K = 2085
Ds > 60mph

PI = 107+00.000
EI = 2,963.40

PI = 107+65.00
EL = 2,971.22'
VC = 150'
K = 709
Ds > 60mph

PI = 108+00.000
EI = 2,969.40

PI = 108+50.000
EI = 2,971.80

PI = 109+00.000
EI = 2,974.70

PI = 109+50.000
EI = 2,978.70

PI = 109+40.00
EL = 2,981.32'
VC = 200'
K = 482
Ds > 60mph

PI = 110+50.000
EI = 2,984.10

PI = 111+50.000
EI = 2,992.70

PI = 112+00.000
EI = 2,992.80

PI = 113+00.000
EI = 2,999.00

PI = 113+00.000
EI = 3,001.90

PI = 113+50.00
EL = 3,006.68'
VC = 300'
K = 1458
Ds > 60mph

PI = 114+00.000
EI = 3,005.00

PI = 114+50.000
EI = 3,008.20

PI = 116+00.000
EI = 3,018.90

BEG. SPEC. CUT DITCH
STA. 107+00 -L- LT
EI = 2,964.60

(+) 7.0000% (+) 6.1000% (+) 6.0930% (+) 6.1042% (+) 6.0930% (+) 7.0667% (+) 5.9827% (+) 5.9827% (+) 6.0000% (+) 5.4000% (+) 7.3800% (+) 5.2000% (+) 5.8000% (+) 6.2000% (+) 5.7710% (+) 5.7710% (+) 7.4000% (+) 5.7000% (+) 6.1863% (+) 7.0000% (+) 5.8000% (+) 6.3333% (+) 6.2000% (+) 5.9805% (+) 5.6667% (+) 6.0000% (+) 6.4000% (+) 5.6667%

FOR -L- PLANVIEW SEE SHEETS 9 THUR 10

2/18/2016 2:28:25 PM
R4416_Sht_Plan_Prof_Sht_23.dgn
USER: tbuckner

2,950 2,940 2,930 2,920 2,910 2,900 2,890 2,880 2,870 2,860

90 91 92 93 94 95 96 97 98 99 100 101 102

3,020 3,010 3,000 2,990 2,980 2,970 2,960 2,950 2,940 2,930

102 103 104 105 106 107 108 109 110 111 112 113 114 115 116

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-4416	24

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER

DocuSigned by: 2/18/2016

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC E. SHOWN

DocuSigned by: Marc Shown 2/18/2016

Michael Baker INTERNATIONAL — Michael Baker Engineering, Inc., 8000 Regency Pkwy Suite 600, Cary, NC 27518, NC License: F-1084

NC DEPARTMENT OF TRANSPORTATION, HYDRAULICS UNIT, 1590 MAIL SERVICE CENTER, RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L-

PI = 116+00.000
EI = 3,018.90

PI = 116+50.000
EI = 3,021.00

PI = 117+00.000
EI = 3,025.10

PI = 117+50.000
EI = 3,027.10

PI = 118+00.000
EI = 3,029.40

PI = 118+50.000
EI = 3,033.10

PI = 119+00.000
EI = 3,037.10

PI = 119+50.00
EL = 3,042.56'
VC = 300'
K = 181.5
Ds > 60mph

PI = 120+00.000
EI = 3,046.30

END SPEC. CUT DITCH
STA. 120+00 -L- LT
EI = 3,041.90

PI = 120+50.000
EI = 3,049.70

BEG. SPEC. CUT DITCH
STA. 121+00 -L- LT
EI = 3,047.50

PI = 121+00.000
EI = 3,057.50

PI = 122+00.000
EI = 3,063.40

PI = 122+50.00
EL = 3,061.00'
VC = 300'
K = 858
Ds > 60mph

END SPEC. CUT DITCH
STA. 122+00 -L- LT
EI = 3,053.50

BEG. SPEC. CUT DITCH
STA. 122+50 -L- LT
EI = 3,056.50

PI = 123+00.000
EI = 3,058.70

PI = 123+50.000
EI = 3,061.90

PI = 123+00.000
EI = 3,063.40

PI = 124+00.000
EI = 3,064.50

PI = 124+50.000
EI = 3,067.60

END SPEC. CUT DITCH
STA. 124+50 -L- RT
EI = 3,071.20

PI = 125+10.00
EL = 3,076.07'
VC = 220'
K = 745
Ds > 60mph

PI = 125+00.000
EI = 3,071.00

BEG. SPEC. CUT DITCH
STA. 125+50 -L- RT
EI = 3,077.60

PI = 126+00.000
EI = 3,079.90

PI = 126+50.000
EI = 3,084.00

PI = 127+00.00
EL = 3,087.64'
VC = 160'
K = 395
Ds > 60mph

END SPEC. CUT DITCH
STA. 126+50 -L- LT
EI = 3,080.00

PI = 127+50.000
EI = 3,088.80

END SPEC. CUT DITCH
STA. 128+00 -L- RT
EI = 3,092.10

MATCHLINE THIS SHEET

FOR -L- PLANVIEW SEE SHEETS 11THUR 12

-L-

PI = 128+45.00
EL = 3,095.89'
VC = 130'
K = 27.6
Ds > 60mph

BEG. SPEC. CUT DITCH
STA. 129+00 -L- RT
EI = 3,091.70

END SPEC. CUT DITCH
STA. 129+50 -L- RT
EI = 3,101.20

BEG. SPEC. CUT DITCH
STA. 129+85 -L- RT
EI = 3,103.60

PI = 130+10.00
EL = 3,106.05'
VC = 200'
K = 99.3
Ds > 60mph

PI = 130+00.000
EI = 3,099.90

BEG. SPEC. CUT DITCH
STA. 129+50 -L- LT
EI = 3,097.40

PI = 130+50.000
EI = 3,107.00

PI = 131+00.000
EI = 3,106.20

PI = 131+50.000
EI = 3,112.60

PI = 132+00.000
EI = 3,116.10

PI = 132+50.000
EI = 3,119.80

PI = 132+50.000
EI = 3,116.50

PI = 133+00.000
EI = 3,121.80

PI = 133+50.000
EI = 3,126.10

PI = 133+30.00
EL = 3,126.40'
VC = 170'
K = 546
Ds > 60mph

PI = 134+00.000
EI = 3,129.90

PI = 134+50.000
EI = 3,128.80

PI = 135+00.000
EI = 3,136.10

PI = 135+00.00
EL = 3,136.68'
VC = 170'
K = 455
Ds > 60mph

PI = 135+50.000
EI = 3,134.20

PI = 136+00.000
EI = 3,138.50

PI = 136+50.000
EI = 3,141.70

PI = 137+00.000
EI = 3,144.90

PI = 137+00.000
EI = 3,148.90

END SPEC. CUT DITCH
STA. 137+50 -L- RT
EL = 3,152.20

PI = 138+25.00
EL = 3,157.54'
VC = 200'
K = 220
Ds > 60mph

BEG. SPEC. CUT DITCH
STA. 138+50 -L- RT
EL = 3,158.90

PI = 139+50.000
EI = 3,164.70

PI = 140+00.000
EI = 3,168.00

PI = 140+20.00
EL = 3,171.84'
VC = 190'
K = 427
Ds > 60mph

PI = 140+50.000
EI = 3,172.00

PI = 141+00.000
EI = 3,175.80

PI = 141+50.000
EI = 3,179.50

PI = 142+15.00
EL = 3,185.27'
VC = 200'
K = 122.4
Ds > 60mph

PI = 142+00.000
EI = 3,182.30

FOR -L- PLANVIEW SEE SHEETS 12 THUR 13

2/18/2016 2:28:26 PM
R-4416_rdy_pf124.dgn
USER: tbuckner

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-4416	25

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER

DocuSigned by: 2/18/2016

HYDRAULICS ENGINEER

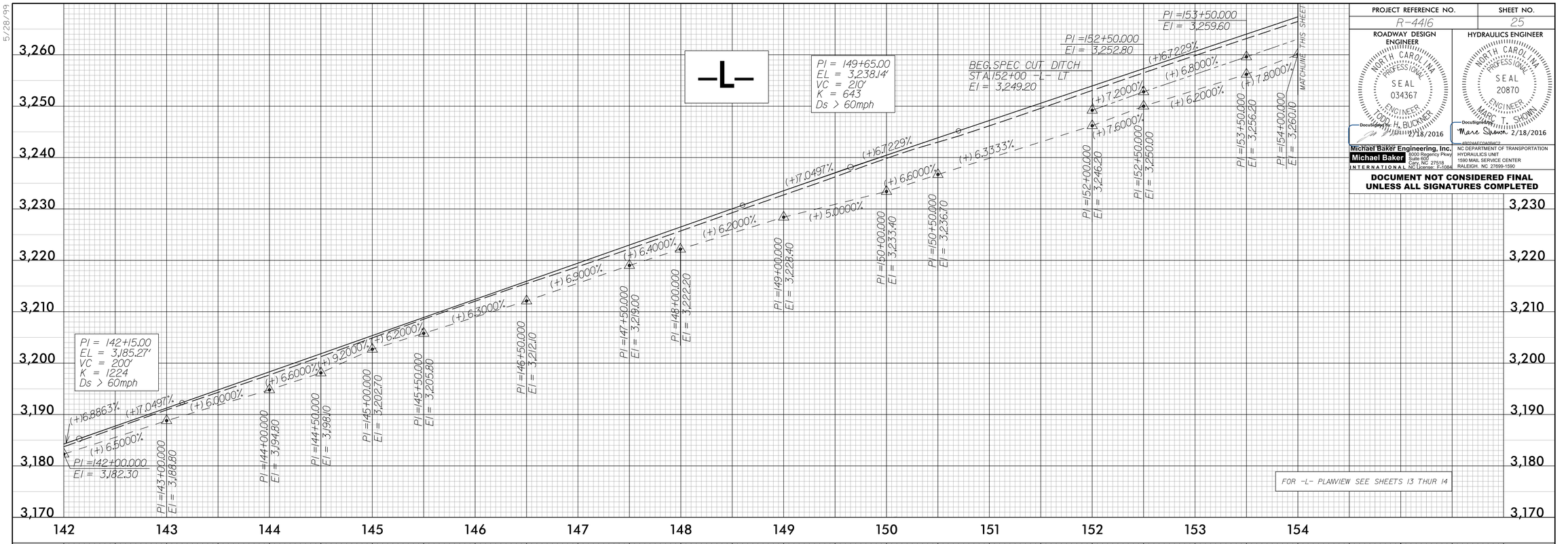
NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN

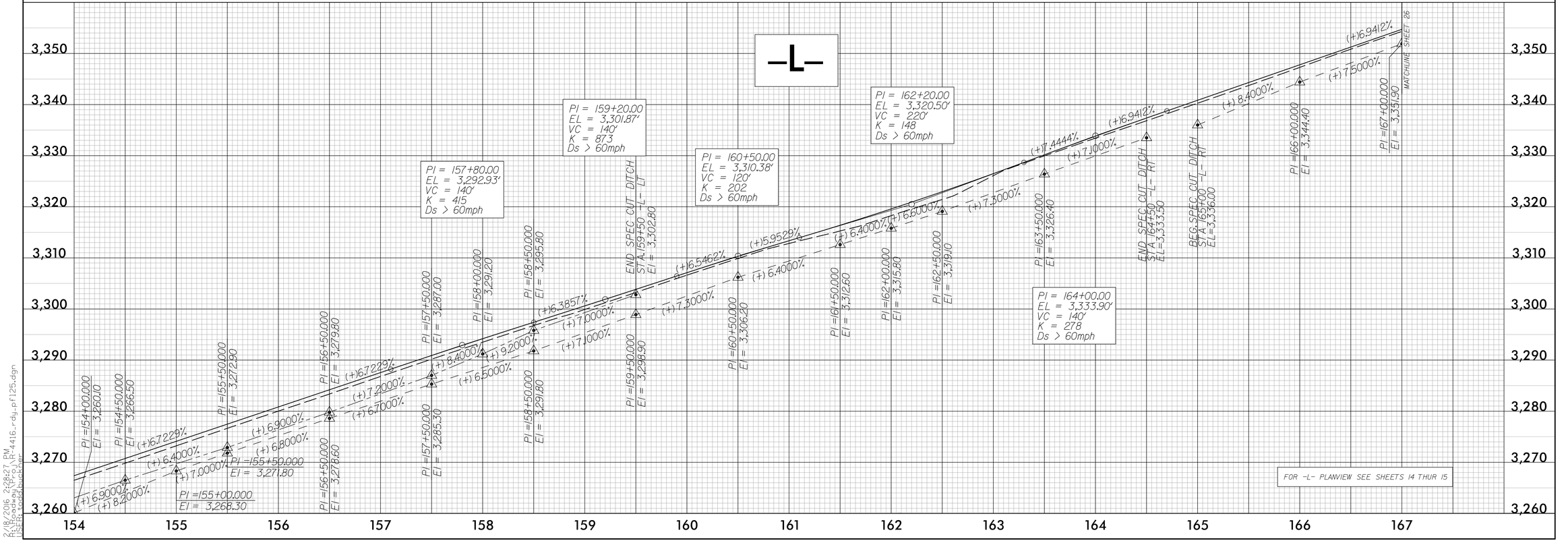
DocuSigned by: Marc Shown 2/18/2016

Michael Baker Engineering, Inc.
Michael Baker INTERNATIONAL
8000 Regency Pkwy, Suite 600, Cary, NC 27518
NC License: F-1056

NC DEPARTMENT OF TRANSPORTATION
HYDRAULICS UNIT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED





2/18/2016 2:28:27 PM
R-4416_Sheet_Plan_Profile_Sheets.dgn
USER:tbuckner

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-4416	26

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCHNER

DocuSigned by: Todd H. Buchner 2/18/2016

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC E. SHOWN

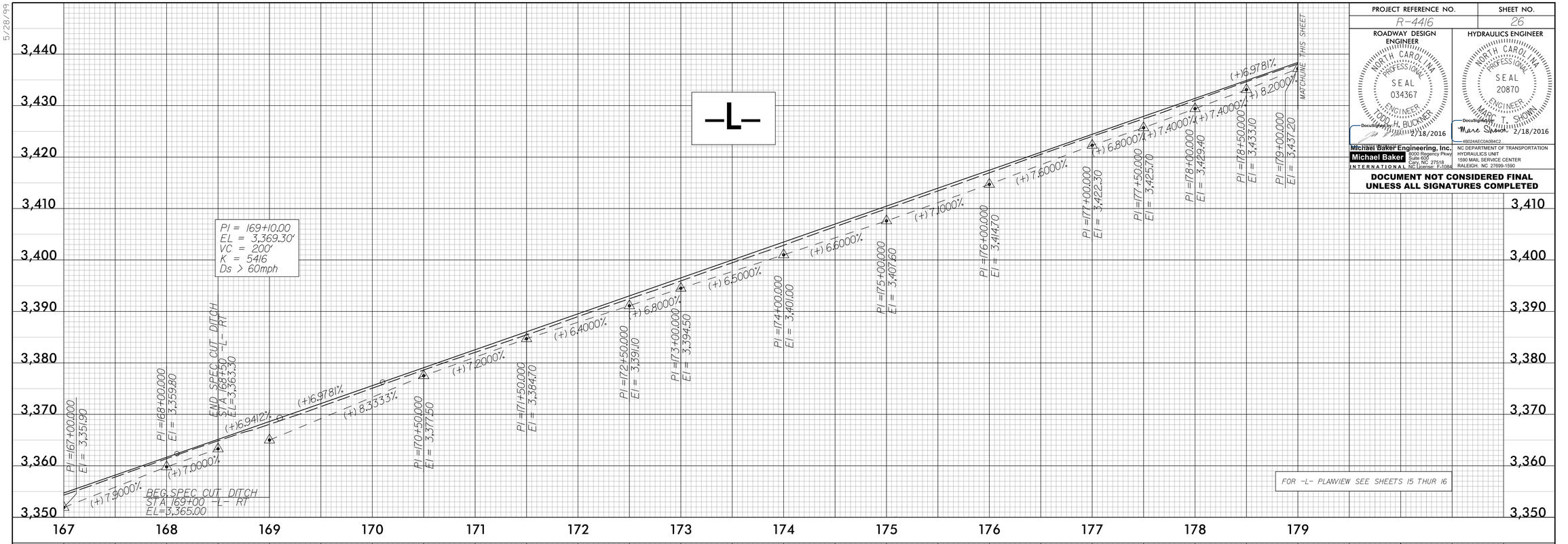
DocuSigned by: Marc Shown 2/18/2016

4B024AEC0A0B4C2...

Michael Baker INTERNATIONAL
Michael Baker Engineering, Inc.
8000 Regency Pkwy Suite 600 Cary, NC 27518
NC License: F-1056

NC DEPARTMENT OF TRANSPORTATION
HYDRAULICS UNIT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



2/18/2016 2:28:27 PM
K:\TPD\R-4416\Design\R-4416_rdy_pf126.dgn
USER:todd.buchner

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-4416	27

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER

DocuSigned by: Todd H. Buckner 2/18/2016

HYDRAULICS ENGINEER

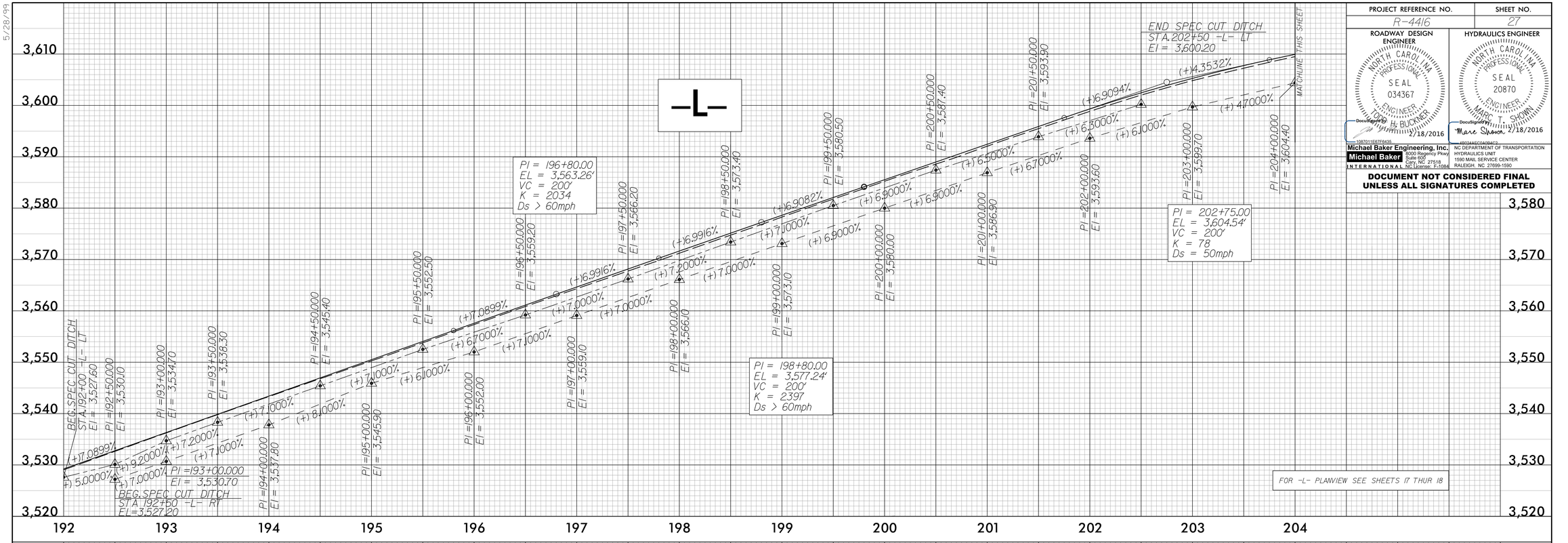
NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC E. SHOWN

DocuSigned by: Marc Shown 2/18/2016

Michael Baker Engineering, Inc.
Michael Baker INTERNATIONAL
8000 Regency Pkwy Suite 600 Cary, NC 27518
NC License: F-1084

NC DEPARTMENT OF TRANSPORTATION
HYDRAULICS UNIT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



2/18/2016 2:28:28 PM
R-4416_Sheet_Plan_Profile.dgn
USER:cbuckner
R-4416_rdy_pf127.dgn

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-4416	28

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 034367 ENGINEER TODD H. BUCKNER

DocuSigned by: Todd H. Buckner 2/18/2016

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 20870 ENGINEER MARC T. SHOWN

DocuSigned by: Marc Shown 2/18/2016

PREPARED BY:
Michael Baker Engineering, Inc.
Michael Baker INTERNATIONAL
8000 Regency Pkwy Suite 600 Cary, NC 27518
NC License: F-1056

PREPARED FOR:
NC DEPARTMENT OF TRANSPORTATION
HYDRAULICS UNIT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27699-1590

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L-

END PROJECT R-4416
END GRADE
-L- Sta.223+20.52 EL=3,543.91'

PI = 218+00.00
EL = 3,572.68'
VC = 170'
K = 861
Ds > 60mph

PI = 219+50.00
EL = 3,564.35'
VC = 130'
K = 1683
Ds > 60mph

PI = 221+20.00
EL = 3,555.04'
VC = 120'
K = 370
Ds > 60mph

PI = 222+45.00
EL = 3,547.78'
VC = 130'
K = 192
Ds > 60mph

(-)5.5566%
(-)5.5566%
(-)5.4794%
(-)5.4794%
(-)5.5967%
(-)5.8041%
(-)5.8041%
(-)5.1267%
(-)5.0000%

BEG. SPEC CUT DITCH
STA.219+50 -L- LT
EI = 3,556.79

PI =222+50.000
EI = 3,545.00

3,540.50

END SPEC CUT DITCH
STA.223+00 L- LT
EI = 3,542.50

FOR -L- PLANVIEW SEE SHEET 19

-Y1-

BEGIN GRADE
-Y1Sta.10+95.00
EL = 3,084.24'

END GRADE
-Y1- Sta.11+46.90
EL=3,084.37'

(+)5.0011% (+)7.0000%

PI = 11+20.00
EL = 3,085.49'
VC = 50'
K = 25
(MATCHING EXIST.)

FOR -Y1- PLANVIEW SEE SHEET 12