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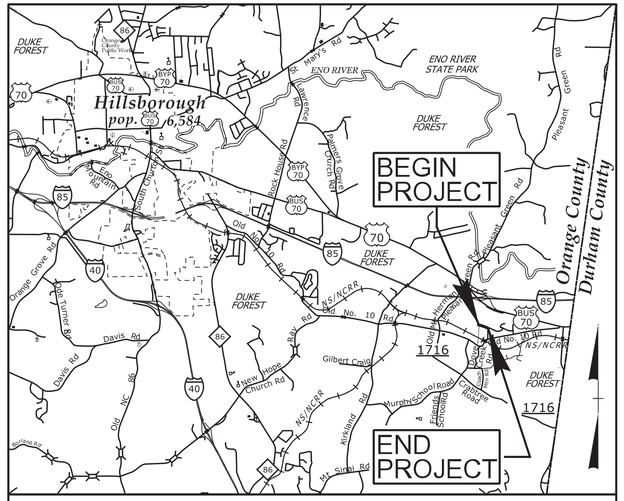
TIP PROJECT: P–4405 J

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



VICINITY MAP

STATE OF NORTH CAROLINA
RAIL DIVISION

ORANGE COUNTY

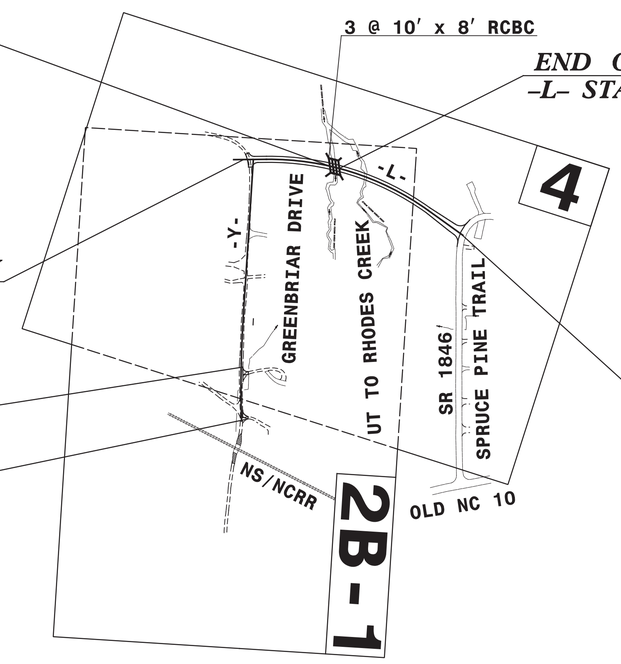
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P–4405 J	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
62000.7.STR23T1B		PE
43219.2.STR01P4405J		ROW
62000.7.STR25T4		CONST

LOCATION: GREENBRIAR DRIVE EXTENSION TO SR 1846 (SPRUCE PINE TRAIL) AND CROSSING CLOSURE

TYPE OF WORK: GRADING, PAVING, DRAINAGE AND CULVERT

NAD 83/
NSRS 2007



SUBMITTAL: FINAL PLANS
DATE: FEBRUARY 8, 2016

NCDOT CONTACT: DAN HAVENER, PE
PROJECT MANAGER

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

CONTRACT:

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT (2015) = 100
ADT =
DHV = %
D = %
T = % *
V = 30 MPH
* TTST =
* DUAL =
FUNC CLASS =SUBDIVISION
SUB REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT P–4405 J = 0.138 MILE
LENGTH STRUCTURE TIP PROJECT P–4405 J = 0.007 MILE
TOTAL LENGTH TIP PROJECT P–4405 J = 0.145 MILE

Prepared In the Office of:
ICA Engineering
5121 Kingdom Way
Suite 100
Raleigh, NC 27607
NC License No: F-0258

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
MARCH 11, 2015

LETTING DATE:
MARCH 17, 2016

DAVID C. WALLER, PE
PROJECT ENGINEER

ALEXANDER D. SNIDER, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER
STACEY H. BAILEY
DocuSigned by: 2/16/2016
Stacey H. Bailey P.E.
SIGNATURE:
NORTH CAROLINA PROFESSIONAL SEAL 24451 ENGINEER STACEY H. BAILEY

ROADWAY DESIGN ENGINEER
ALEXANDER D. SNIDER
DocuSigned by: 2/16/2016
Alexander D. Snider P.E.
SIGNATURE:
NORTH CAROLINA PROFESSIONAL SEAL 041473 ENGINEER ALEXANDER D. SNIDER

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
NC DEPARTMENT OF TRANSPORTATION
RAIL DIVISION
ENGINEERING COORDINATION AND SAFETY

2/12/2016
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ICA ENGINEERING, INC.

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8/17/99

PROJECT REFERENCE NO.	SHEET NO.
P-4405 J	1A

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 041473 ENGINEER ALEXANDER D. SNIDER

DocuSigned by: 2/4/2016
Alexander D. Snider

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

INDEX OF SHEETS

SHEET NUMBER	SHEET
1	TITLE SHEET
1A	INDEX OF SHEETS, GENERAL NOTES, AND STANDARD DRAWINGS
1B	CONVENTIONAL SYMBOLS
1C-1 THRU 1C-2	SURVEY CONTROL SHEET
1D-1	CENTERLINE COORDINATE LIST
2A-1	PAVEMENT SCHEDULE AND TYPICAL SECTIONS
2B-1	CROSSING CLOSURE DETAIL
2D-1	DRAINAGE DITCH DETAILS
3B-1	EARTHWORK, GUARDRAIL AND PAVEMENT REMOVAL SUMMARIES
3D-1 THRU 3D-2	DRAINAGE SUMMARIES
3P-1	PARCEL INDEX SHEET
4	PLAN AND PROFILE SHEET
TMP-1 THRU TMP-4	TRAFFIC MANAGEMENT PLANS
EC-1 THRU EC-7	EROSION CONTROL PLANS
RF-1	REFORESTATION PLANS
SIGN-1 THRU SIGN-3	SIGNING PLANS
X-1A	CROSS-SECTION SUMMARY SHEET
X-1 THRU X-5	CROSS-SECTIONS
C-1 THRU C-6	CULVERT PLANS

GENERAL NOTES:

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

GRADE LINE:
GRADING AND SURFACING:

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

CLEARING:

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

SUPERELEVATION:

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

SHOULDER CONSTRUCTION:

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

SIDE ROADS:

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

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.

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE Frontier Communications,

Duke Energy Progress, Time Warner Cable, Aqua

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

RIGHT-OF-WAY MARKERS:

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

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
225.06	Method of Grading Sight Distance at Intersections
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	
806.01	Concrete Right-of-Way Marker
806.02	Granite Right-of-Way Marker
838.39	Reinforced Concrete Endwall - for Single 72" Pipe 90 Skew
838.45	Notes for Reinforced Concrete Endwall - Std. Dwg 838.21 thru 838.40
838.69	Reinforced Brick Endwall - for Single 72" Pipe 90 Skew
838.75	Notes for Reinforced Brick Endwall - Std. Dwg 838.51 thru 838.70
838.80	Precast Endwalls - 12" thru 72" Pipe 90 Skew
840.00	Concrete Base Pad for Drainage Structures
840.29	Frames and Narrow Slot Flat Grates
840.35	Traffic Bearing Grated Drop Inlet - for Cast Iron Double Frame and Grates
840.46	Traffic Bearing Precast Drainage Structure
840.66	Drainage Structure Steps
846.01	Concrete Curb, Gutter and Curb & Gutter
846.04	Drop Inlet Installation in Shoulder Berm Gutter
862.01	Guardrail Placement
862.02	Guardrail Installation
876.01	Rip Rap in Channels
876.02	Guide for Rip Rap at Pipe Outlets
876.04	Drainage Ditches with Class 'B' Rip Rap

2/3/2016
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HAL ENGINEERING INC

PROJECT REFERENCE NO.	SHEET NO.
P-4405 J	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:

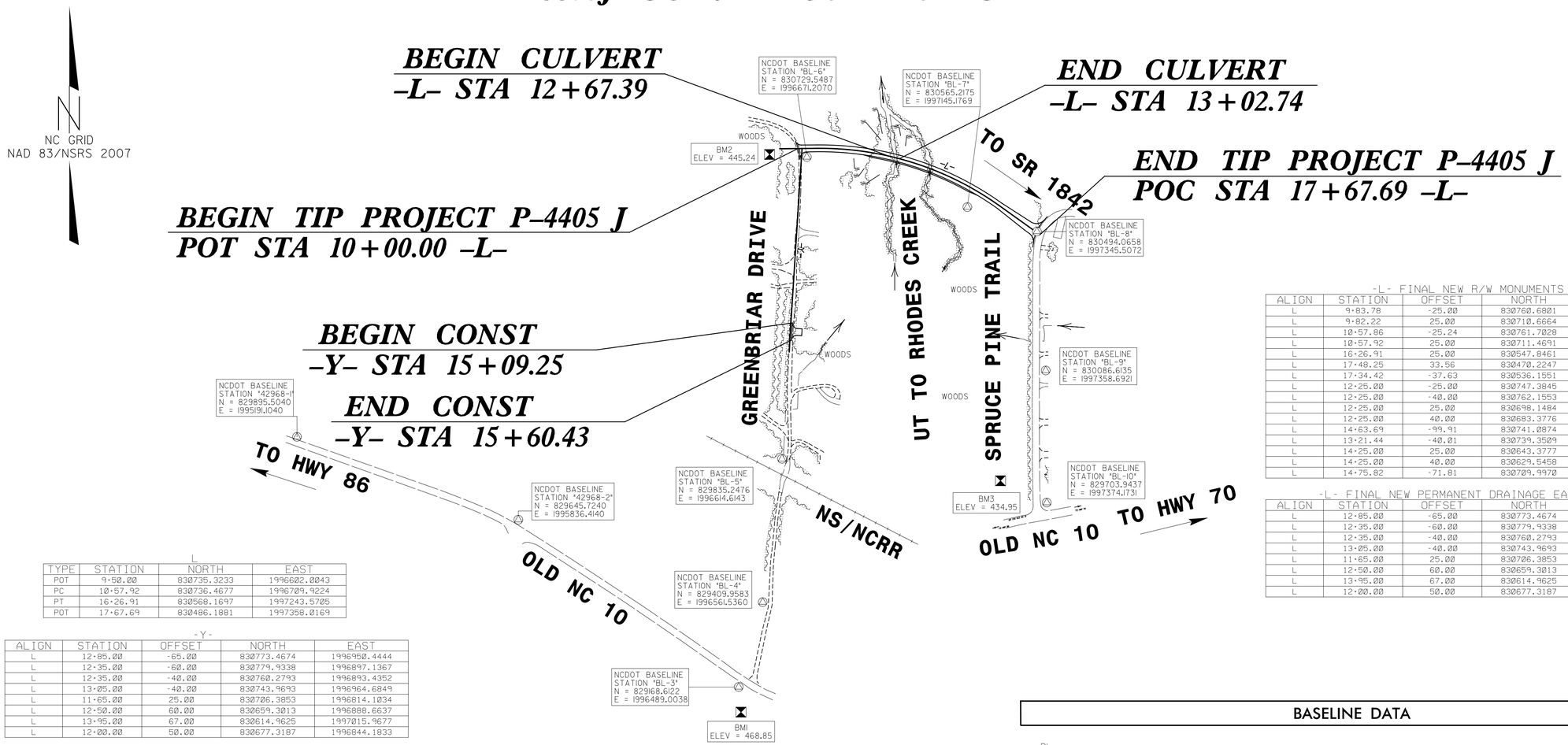
- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line — SS
- Above Ground Sanitary Sewer — A/G Sanitary Sewer
- SS Forced Main Line LOS B (S.U.E.*) — FSS
- SS Forced Main Line LOS C (S.U.E.*) — FSS
- SS Forced Main Line LOS D (S.U.E.*) — FSS

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.
- 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.

PROJECT REFERENCE NO.	SHEET NO.
62000.7.STR23T1B	1C-1
Location and Surveys	

P-4405J SURVEY CONTROL SHEET



-L- FINAL NEW R/W MONUMENTS

ALIGN	STATION	OFFSET	NORTH	EAST
L	9+83.78	-25.00	830760.6801	1996635.5138
L	9+82.22	25.00	830710.6664	1996634.4883
L	10+57.86	-25.24	830761.7028	1996709.5884
L	10+57.92	25.00	830711.4691	1996710.1875
L	16+26.91	25.00	830547.8461	1997229.0120
L	17+48.25	33.56	830470.2247	1997322.6640
L	17+34.42	-37.63	830536.1551	1997352.8817
L	12+25.00	-25.00	830747.3845	1996880.5485
L	12+25.00	-40.00	830762.1553	1996883.1607
L	12+25.00	25.00	830698.1484	1996871.8413
L	12+25.00	40.00	830683.3776	1996869.2292
L	14+63.69	-99.91	830741.0874	1997145.5867
L	13+21.44	-40.01	830739.3509	1996981.2179
L	14+25.00	25.00	830643.3777	1997057.9958
L	14+25.00	40.00	830629.5458	1997052.1924
L	14+75.82	-71.81	830709.9970	1997145.4254

-L- FINAL NEW PERMANENT DRAINAGE EASEMENTS

ALIGN	STATION	OFFSET	NORTH	EAST
L	12+85.00	-65.00	830773.4674	1996950.4444
L	12+35.00	-60.00	830779.9338	1996897.1367
L	12+35.00	-40.00	830760.2793	1996893.4352
L	13+05.00	-40.00	830743.9693	1996964.6849
L	11+65.00	25.00	830706.3853	1996814.1034
L	12+50.00	60.00	830659.3013	1996888.6637
L	13+95.00	67.00	830614.9625	1997015.9677
L	12+00.00	50.00	830677.3187	1996844.1833

L

TYPE	STATION	NORTH	EAST
POT	9+50.00	830735.3233	1996602.0043
PC	10+57.92	830736.4677	1996709.9224
PT	16+26.91	830568.1697	1997243.5705
POT	17+67.69	830486.1881	1997358.0169

-Y-

ALIGN	STATION	OFFSET	NORTH	EAST
L	12+85.00	-65.00	830773.4674	1996950.4444
L	12+35.00	-60.00	830779.9338	1996897.1367
L	12+35.00	-40.00	830760.2793	1996893.4352
L	13+05.00	-40.00	830743.9693	1996964.6849
L	11+65.00	25.00	830706.3853	1996814.1034
L	12+50.00	60.00	830659.3013	1996888.6637
L	13+95.00	67.00	830614.9625	1997015.9677
L	12+00.00	50.00	830677.3187	1996844.1833

BASELINE DATA

BL

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
1	42968-1	829895.5040	1995191.1040	451.12	OUTSIDE PROJECT LIMITS	
2	42968-2	829645.7240	1995836.4140	470.57	OUTSIDE PROJECT LIMITS	
3	BL-3	829168.6122	1996489.0038	468.49	16+26.91	1590.01 LT
4	BL-4	829409.9583	1996561.5360	473.15	17+46.92	1338.74 RT
5	BL-5	829835.2476	1996614.6143	449.71	9+53.07	900.16 RT
6	BL-6	830729.5487	1996671.2070	442.52	10+19.14	6.51 RT
7	BL-7	830565.2175	1997145.1769	429.48	15+43.32	56.06 RT
8	BL-8	830494.0658	1997345.5072	445.94	17+52.93	0.88 RT
9	BL-9	830086.6135	1997358.6921	438.80	OUTSIDE PROJECT LIMITS	
10	BL-10	829703.9437	1997374.1731	441.36	OUTSIDE PROJECT LIMITS	

NOTES

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

THE FILES TO BE FOUND ARE AS FOLLOWS:
p4405j_ls_control.txt

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

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

PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.

NETWORK ESTABLISHED FROM NGS ONLINE POSITIONING SERVICE (OPUS)

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "42968-2"
WITH NAD 83/NSRS 2007 STATE PLANE GRID COORDINATES OF
NORTHING: 829645.7240(ft) EASTING: 1995836.4140(ft)
ELEVATION: 470.57'(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9999469784
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "42968-2" TO -L- STATION 10+00.00 IS
N 36°48'08" E 1,361.46'
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

BENCHMARK DATA

```
*************************************
BM1       ELEVATION = 468.85
N 829093      E 1996485
BL STATION 39+38.00 1607 RIGHT
RR SPIKE IN ROOT OF 15" OAK
*************************************
*************************************
BM2       ELEVATION = 445.24
N 830710      E 1996576
BL STATION 35+52.00 94 LEFT
RR SPIKE IN BASE OF 18" GUM
*************************************
*************************************
BM3       ELEVATION = 434.95
N 829768      E 1997242
BL STATION 50+13.00 130 RIGHT
RR SPIKE IN ROOT OF 14" OAK
*************************************
```

NOTE: DRAWING NOT TO SCALE

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DCN

FINAL PAVEMENT DESIGN	
C1	PROP. APPROX 1.5" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 165 LBS. PER SQ. YD.
J1	8" AGGREGATE BASE COURSE.
J2	VAR. DEPTH AGGREGATE BASE COURSE.
P	PRIME COAT
T	EARTH MATERIAL
U	EXISTING ABC PAVEMENT

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

NOTE: SEE PLANS FOR LOCATIONS OF PAVED SHOULDER

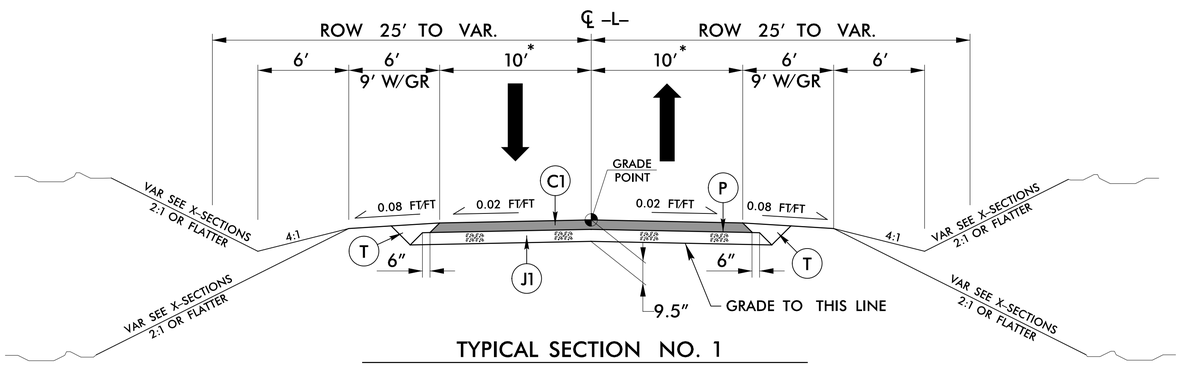
ICA Engineering
5121 Kingdom Way,
Suite 100
Raleigh, NC 27607
NC License No: F-0258

PROJECT REFERENCE NO.	SHEET NO.
P-4405 J	2A-1

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 041473 ENGINEER ALEXANDER D. SNIDER
DocuSigned by: Alexander D. Snider 2/4/2016
FD61A6

PAVEMENT DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 022896 ENGINEER CLARK S. MORRISON
DocuSigned by: Clark S Morrison 2/4/2016

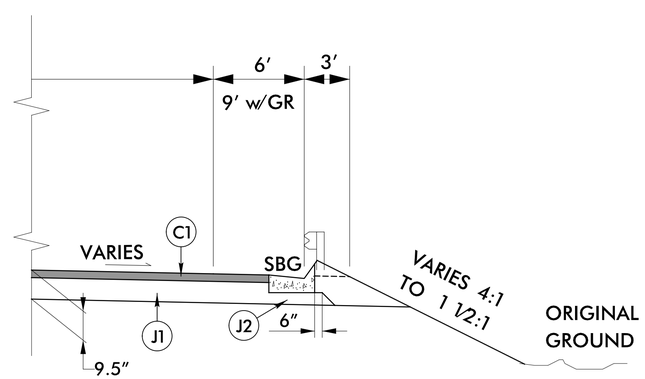
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



TYPICAL SECTION NO. 1
-L- GREENBRIAR DRIVE

* VARIES 10' TO 15' FROM -L- STA 16+25.73 TO -L- STA 17+25.73

USE TYPICAL SECTION NO. 1 FROM:
-L- STA 10+00.00 TO -L- STA 17+57.83



TYPICAL SECTION NO. 1A
-L- STA 12+25 TO -L- STA 15+25 RT

2/3/2016
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ICA ENGINEERING, INC.

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DGN 0673DEL_P21p1

ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
NC License No: F-0258

PROJECT REFERENCE NO.	SHEET NO.
P-4405 J	2B-1
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 041473 ENGINEER ALEXANDER D. SNIDER
DocuSigned by: Alexander D. Snider FD61A6 3/11/2016

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 24451 ENGINEER STACEY H. BAILEY
DocuSigned by: Stacey H. Bailey 3/11/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

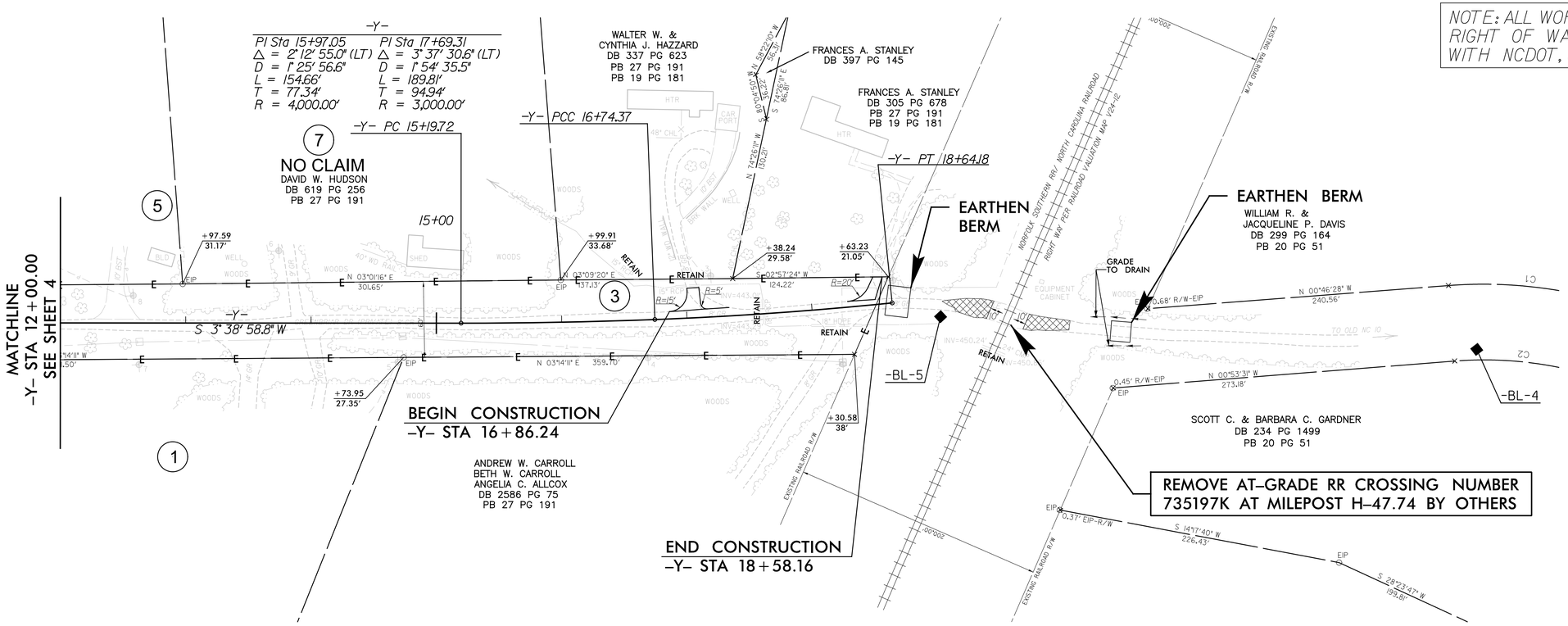
CROSSING CLOSURE DETAIL

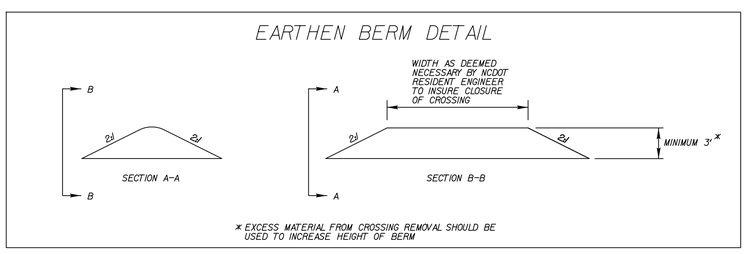
GREENBRIAR DR

NAD 83/NSRS 2007

OBLITERATE

NOTE: ALL WORK WITHIN NCRR RIGHT OF WAY TO BE COORDINATED WITH NCDOT, NCRR, AND NS





NOTES:

1. CONTACT THE NCDOT RESIDENT ENGINEER TO SCHEDULE THE CLOSURE OF GREENBRIAR DRIVE.
2. THE EXISTING PAVEMENT WITHIN 10' OF THE CENTERLINE OF THE TRACK, WILL BE REMOVED BY OTHERS. THE TIMBER SURFACE AND RAIL SEAL FLANGES WILL ALSO BE REMOVED BY OTHERS. THE EXISTING CROSSBUCKS WILL BE REMOVED BY OTHERS.
3. CONTRACTOR SHALL SEED AND MULCH THE DISTURBED AREA OUTSIDE THE RAILROAD BALLAST LINE.
4. CONTRACTOR SHALL CONTACT NORTH CAROLINA 811 TO LOCATE ALL UNDERGROUND UTILITIES IN THE WORK AREA. CONTRACTOR SHALL ALSO CONTACT NORFOLK SOUTHERN RAILWAY TO LOCATE ANY UNDERGROUND RAILROAD UTILITIES IN THE WORK AREA PRIOR TO COMMENCEMENT OF WORK ON THE RIGHT OF WAY CORRIDOR.
5. CONTRACTOR SHALL REMOVE EXISTING HIGHWAY ROADBED AND GRADE AREA TO MATCH ADJACENT TOPOGRAPHY. ANY EXISTING CULVERTS IN THE RAILROAD DITCHES SHALL BE REMOVED AND GRADE EXISTING TRACK ROADBED DITCHES THROUGH CROSSING SURFACE LIMITS TO DRAIN. CONTRACTOR SHALL COORDINATE WITH THE ENGINEER ON HAULING AWAY ANY ASPHALT LEFT BY THE REMOVAL OF OTHERS. ALL PAVEMENT WITHIN THE RAILROAD CORRIDOR IS TO BE REMOVED AT THE CONCLUSION OF THE PROJECT.
6. PROVIDE PERMANENT SIGNING AS SHOWN.
7. PROVIDE SIGNING AND DEVICES REQUIRED TO CLOSE THE ROAD ACCORDING TO THE ROADWAY STANDARD DRAWINGS AND TRAFFIC CONTROL PLANS.
8. ENSURE ALL NECESSARY SIGNING IS IN PLACE PRIOR TO ALTERNATING ANY TRAFFIC PATTERN.

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ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
NC License No: F-0258

PROJECT REFERENCE NO.	SHEET NO.
P-4405 J	2D-1

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 041473 ENGINEER ALEXANDER D. SNIDER
DocuSigned by: Alexander D. Snider 5/4/2016
FD61A6

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 24451 ENGINEER STACEY H. BAILEY
DocuSigned by: Stacey H. Bailey 5/4/2016

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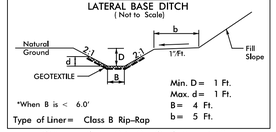
DITCH DETAILS

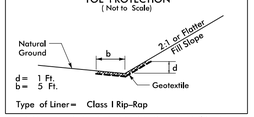
DETAIL A
LATERAL BASE DITCH
(Not to Scale)



Type of Liner = Class B Rip-Rap

FROM -L- STA. 13+78 TO STA. 15+43 LT

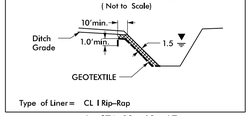
DETAIL B
TOE PROTECTION
(Not to Scale)



Type of Liner = Class I Rip-Rap

FROM -L- STA. 12+00 TO STA. 12+64 RT
FROM -L- STA. 14+05 TO STA. 14+50 RT

DETAIL C
RIP RAP AT EMBANKMENT
(Not to Scale)

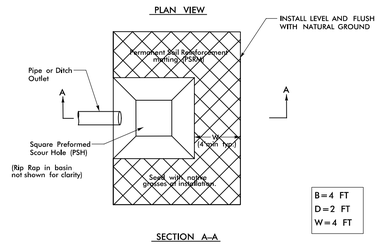


Type of Liner = CL I Rip-Rap

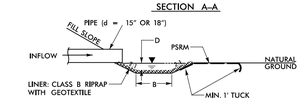
-L- STA. 13+63 LT
-L- STA. 13+77 LT

PREFORMED SCOUR HOLE
*NOT TO SCALE

PLAN VIEW



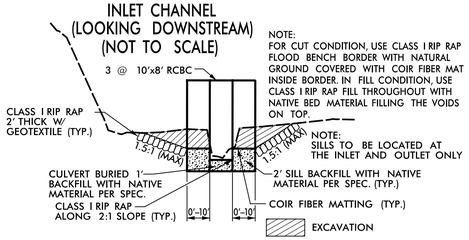
SECTION A-A



3/08

-L- STA. 13+75 RT

DETAIL G
INLET CHANNEL
(LOOKING DOWNSTREAM)
(NOT TO SCALE)

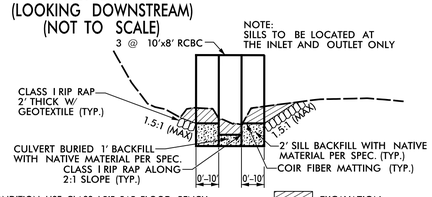


NOTE:
FOR CUT CONDITION, USE CLASS I RIP RAP FLOOD BENCH BORDER WITH NATURAL GROUND COVERED WITH COIR FIBER MAT INSIDE BORDER. IN FILL CONDITION, USE CLASS I RIP RAP FILL THROUGHOUT WITH NATIVE BED MATERIAL FILLING THE VOIDS ON TOP.

NOTE:
SILLS TO BE LOCATED AT THE INLET AND OUTLET ONLY

EXCAVATION = 70 CY
CLASS II RIP RAP = 65 TONS
GEOTEXTILE = 75 SY

DETAIL H
OUTLET CHANNEL
(LOOKING DOWNSTREAM)
(NOT TO SCALE)



NOTE:
SILLS TO BE LOCATED AT THE INLET AND OUTLET ONLY

NOTE:
FOR CUT CONDITION, USE CLASS I RIP RAP FLOOD BENCH BORDER WITH NATURAL GROUND COVERED WITH COIR FIBER MAT INSIDE BORDER. IN FILL CONDITION, USE CLASS I RIP RAP FILL THROUGHOUT WITH NATIVE BED MATERIAL FILLING THE VOIDS ON TOP.

EXCAVATION = 50 CY
CLASS II RIP RAP = 60 TONS
GEOTEXTILE = 70 SY

5/3/2016
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ICA ENGINEERING INC.

DCN 0673DEL_P21p1

COMPUTED BY: ADS DATE: 3/9/2016
CHECKED BY: DCW DATE: 3/9/2016

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT REFERENCE NO.	SHEET NO.
P-4405 J	3B-1

SUMMARY OF EARTHWORK

IN CUBIC YARDS

STATION	STATION	UNCL. EXCAV.	EMBANK. +%	BORROW	WASTE
-L- 10+00.00	-L- 17+67.69	656	5515	4812	
	3 @ 10' x 8' RCBC			-427	
SUBTOTALS:		656	5515	4432	
PROJECT TOTALS:		656	5515	4432	
MATERIAL FOR EARTH BERM CONSTRUCTION				50	
EST. TO REPLACE TOP SOIL ON BORROW PIT				224	
GRAND TOTALS:		656		4706	
SAY:		700		4800	

ADDITIONAL UNDERCUT (CY) = 300

DDE (CY) = 160

SELECT GRANULAR MATERIAL (CY) = 150

GEOTEXTILE FOR SOIL STABILIZATION (CY) = 300

PAVEMENT STRUCUTRE VOLUME (CY) = 120

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

PAVEMENT REMOVAL SUMMARY

SURVEY LINE	STATION	STATION	LOCATION LT/RT/CL	YD^2
	10' SOUTH OF RR	TRACKS WITHIN RR	EASMENT	87
TOTAL:				87
SAY:				90

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

GUARDRAIL SUMMARY

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOUL. WIDTH	FLARE LENGTH		W		ANCHORS									IMPACT ATTENUATOR TYPE 350			SINGLE FACED GUARDRAIL	REMOVE EXISTING GUARDRAIL	REMOVE AND STOCKPILE EXISTING GUARDRAIL	REMARKS
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	XI MOD	XI	GRAU 350 TL-2	M-350	XIII	CAT-1	VI MOD	BIC	TES	EA	G	NG				
-L-	11+75.00	15+75.00	RT	400			12+50.00	14+00.00	6	9	50	50	1	1			2													EXTENDED FOR SHOULDER BERM GUTTER
-L-	11+75.00	14+75.00	LT	300			14+00.00	12+50.00	6	9	50	50	1	1			2													
	TOTAL			700													4													
	DEDUCTIONS FOR	ANCHOR UNITS		-100																										
	SAY			600													4													NOTE: 5 EACH ADDITIONAL GUARDRAIL POSTS

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ICA ENGINEERING, INC.

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NC10481

COMPUTED BY:	ADS	DATE:	1/21/2016
CHECKED BY:	SHB	DATE:	1/21/2016

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

PROJECT NO.	SHEET NO.
P-4405 J	3D-1

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

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

STATION	LOCATION (LT, RT, OR CL)*	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL
L 13+22, 15	RT	401		432.2			
		401	402		428.9	428.6	
L 13+72, 15	RT	402		431.9			
		402	403		428.6	427.0	
L 13+75, 31	RT	403					
SHEET TOTALS							
SAY							

DRAINAGE PIPE (RCP, CSP, CAAP, HDPE, or PVC)

STATION (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
L 13+22, 15												
(401–402)												
L 13+72, 15												
(402–403)		20										
L 13+75, 31												
SHEET TOTALS		20										
SAY		20										

C.S. PIPE

SIZE	12"	15"	18"	24"	30"	36"	42"	48"
THICKNESS OR GAUGE	.064	.064	.064	.064	.079	.079	.109	.109
(all rows)								

R.C. PIPE CLASS III

SIZE	12"	15"	18"	24"	30"	36"	42"	48"
(all rows)								

R.C. PIPE CLASS IV

STATION (SIZE)	12"	15"	18"	24"	30"	36"	42"	48"
L 13+22, 15								
(401–402)		52						
L 13+72, 15								
(402–403)								
L 13+75, 31								
SHEET TOTALS		52						
SAY		52						

STATION	** " 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 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. YARDS R.C.P.	ENDWALLS CU. YARDS C.S.P.	QUANTITIES FOR DRAINAGE STRUCTURES PER EACH (0' THRU 5.0')	*TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') LIN. FT. A 5.0' THRU 10.0'	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
L 13+22, 15															
(401–402)								1							
L 13+72, 15															
(402–403)								1							
L 13+75, 31															
SHEET TOTALS								2							
SAY								2							

STATION	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME AND GRATE STD. 840.16	G.D.I. TYPE "A" STD. 840.17 OR 840.26	G.D.I. TYPE "B" STD. 840.18 OR 840.27	G.D.I. TYPE "D" STD. 840.19 OR 840.28	G.D.I. FRAME WITH GRATE STD. 840.20	G.D.I. FRAME WITH TWO GRATES STD. 840.22	G.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	G.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	J.B. STD. 840.31 OR 840.32	G.D.I. (N.S. FLAT) FRAME WITH TWO GRATES STD. 840.29	T.B.D.I.STD. 840.35	PREFORMED SCOUR HOLE (PER EACH)		DRAINAGE PIPE ELBOWS NO. & SIZE	CONC. & BRICK PIPE PLUG, C.Y. STD. 840.71	CONC. COLLARS CL. "B" C.Y. STD. 840.72	PIPE REMOVAL LIN. FT.	REMARKS
L 13+22, 15																			
(401–402)											1	1							
L 13+72, 15																			
(402–403)											1	1							
L 13+75, 31													1						
SHEET TOTALS											2	2	1						
SAY											2	2	1						

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

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NC10481

COMPUTED BY:	ADS	DATE:	1/21/2016
CHECKED BY:	SHB	DATE:	1/21/2016

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

PROJECT NO.	SHEET NO.
P-4405 J	3D-2

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

LIST OF PIPES, ENDWALLS, ETC. (FOR PIPES 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) SIZE 54"	60"	66"	72"	78"	84"			BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE) SIZE 54" THICKNESS OR GAUGE .109	.138	.168	SHOP ELON-GATED .138	SHOP ELON-GATED .168	60" .138	.168	66" .138	.168	72" .139	.168		STRUCTURAL PLATE PIPE 60" 12	10		66" 12	10		72" 12	10					REINFORCED ENDWALLS WITH R.C. - C.Y.	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													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
L 13+87	CL	404	405		423.7	423.6					68																												7.1																											
SHEET TOTALS											68																												7.1																											
SAY											68																												7.5																											

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

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ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
NC License No: F-0258

PROJECT REFERENCE NO.	SHEET NO.
P-4405 J	4
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 041473 ENGINEER ALEXANDER D. SNIDER
DocuSigned by: Alexander D. Snider 2/16/2016
FD61A6

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 24451 ENGINEER STACEY H. BAILEY
DocuSigned by: Stacey H. Bailey 2/16/2016

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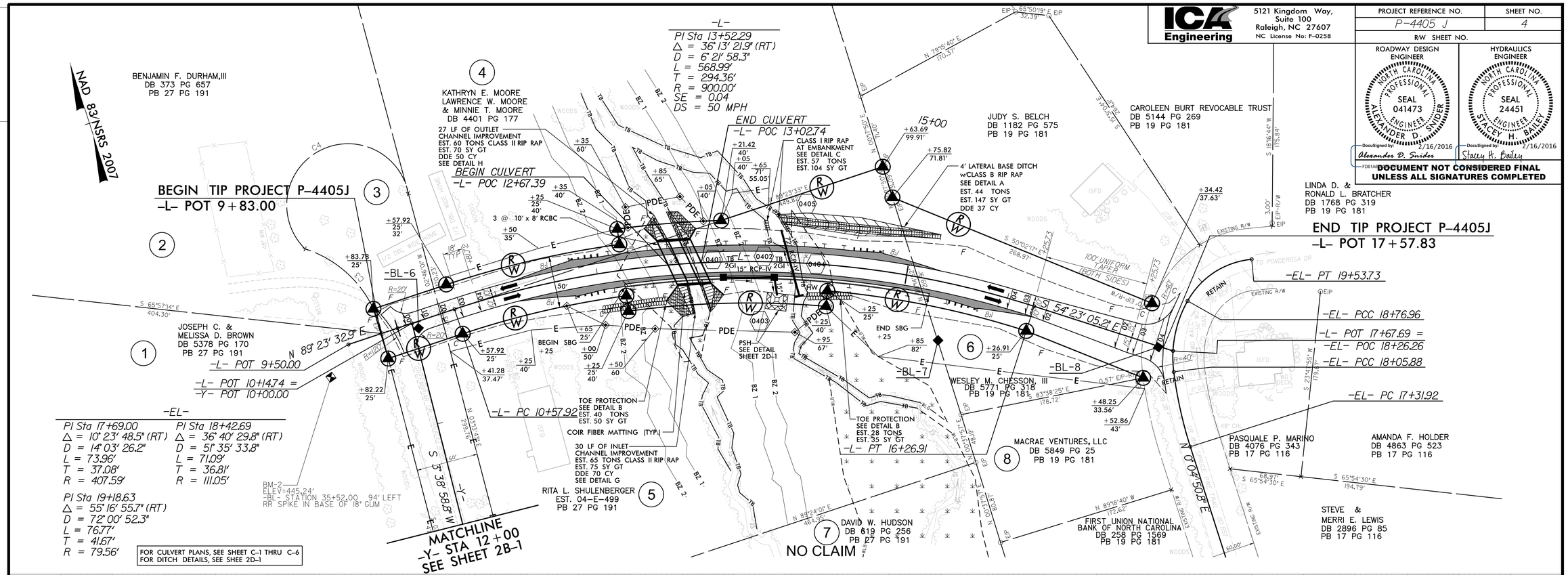

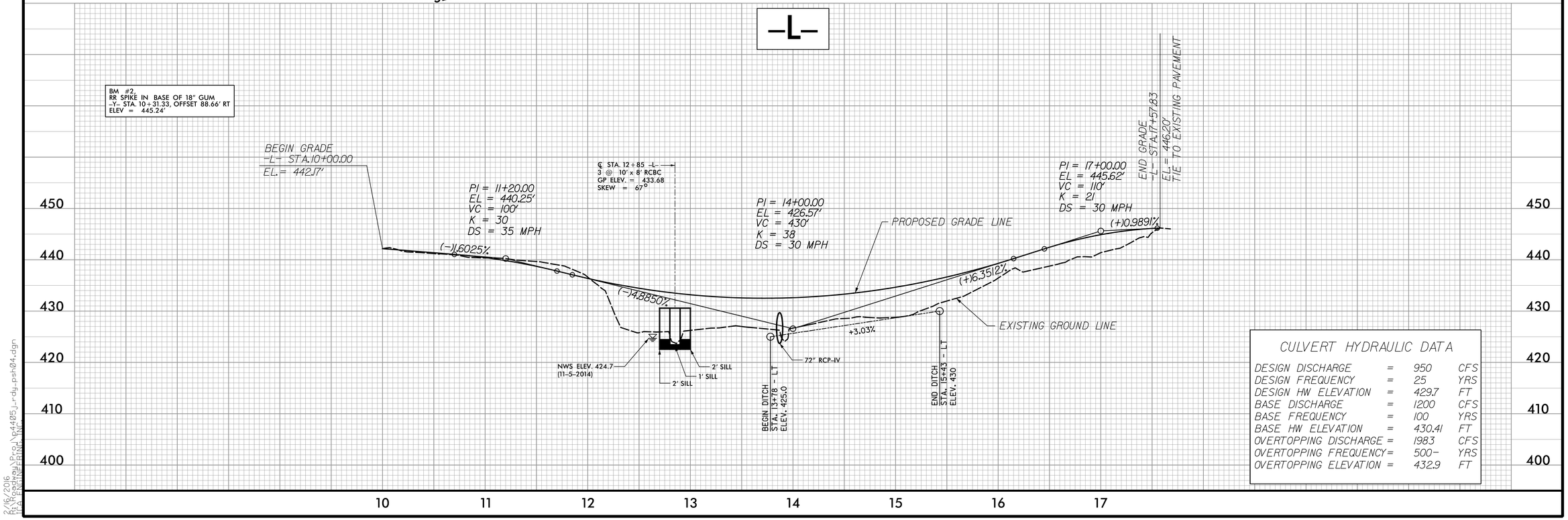

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	=	950	CFS
DESIGN FREQUENCY	=	25	YRS
DESIGN HW ELEVATION	=	429.7	FT
BASE DISCHARGE	=	1200	CFS
BASE FREQUENCY	=	100	YRS
BASE HW ELEVATION	=	430.41	FT
OVERTOPPING DISCHARGE	=	1983	CFS
OVERTOPPING FREQUENCY	=	500-	YRS
OVERTOPPING ELEVATION	=	432.9	FT

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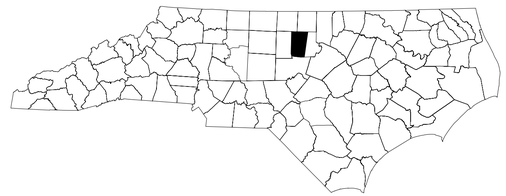
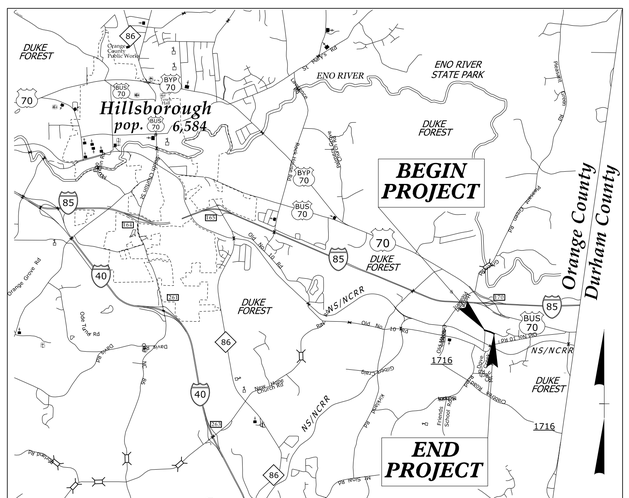
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

TRANSPORTATION MANAGEMENT PLAN

ORANGE COUNTY





SKETCH MAP SHOWING THE VICINITY OF STATE PROJECT P-4405J

INDEX OF SHEETS

SHEET NO.	TITLE
TMP-1	INDEX OF SHEETS
TMP-1A	LIST OF APPLICABLE ROADWAY STANDARD DRAWINGS, LEGEND & TEMPORARY PAVEMENT MARKING SCHEDULE
TMP-2	PROJECT NOTES
TMP-3	PHASING
TMP-4	PHASE I DETAIL

SHEET NO.
TMP-1

P-4405J

TIP PROJECT:

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

J. S. BOURNE, P.E. — STATE TRAFFIC MANAGEMENT ENGINEER
D. BISSETTE, P.E. — TRAFFIC CONTROL PROJECT ENGINEER
_____ — TRAFFIC CONTROL PROJECT DESIGN ENGINEER
_____ — TRAFFIC CONTROL DESIGN ENGINEER

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

ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
NC License No: P0200

APPROVED: DocuSigned by: Michael T. Rzepka 01BC3480C260490... 2/3/2016
DATE:

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1/20/2016
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ICA Engineering

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PROJ. REFERENCE NO.	SHEET NO.
P-4405J	TMP-1A

ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
NC License No: F-1326

ROADWAY STANDARD DRAWINGS

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

STD. NO.	TITLE
1101.01	WORK ZONE ADVANCE WARNING SIGNS
1101.02	TEMPORARY LANE CLOSURES
1101.03	TEMPORARY ROAD CLOSURES
1101.05	WORK ZONE VEHICLE ACCESSES
1101.11	TRAFFIC CONTROL DESIGN TABLES
1110.01	STATIONARY WORK ZONE SIGNS
1110.02	PORTABLE WORK ZONE SIGNS
1130.01	DRUM
1135.01	CONES
1145.01	BARRICADES
1150.01	FLAGGING DEVICES
1180.01	SKINNY-DRUM

LEGEND

GENERAL

- DIRECTION OF TRAFFIC FLOW
- DIRECTION OF PEDESTRIAN TRAFFIC FLOW
- EXIST. PVMT.
- NORTH ARROW
- PROPOSED PVMT.
- WORK AREA
- REMOVAL

TRAFFIC CONTROL DEVICES

- BARRICADE (TYPE III)
- CONE
- DRUM — SKINNY DRUM — TUBULAR MARKER
- TEMPORARY CRASH CUSHION
- FLASHING ARROW PANEL (TYPE C)
- FLAGGER
- LAW ENFORCEMENT
- TRUCK MOUNTED IMPACT ATTENUATOR (TMIA)
- CHANGEABLE MESSAGE SIGN

TEMPORARY SIGNING

- PORTABLE SIGN
- STATIONARY SIGN
- STATIONARY OR PORTABLE SIGN

SIGNALS

- EXISTING
- PROPOSED
- TEMP TEMPORARY

PAVEMENT MARKINGS

- EXISTING LINES
- TEMPORARY LINES

PAVEMENT MARKERS

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

PAVEMENT MARKING SYMBOLS

- PAVEMENT MARKING SYMBOLS

TEMPORARY PAVEMENT MARKING

SYMBOL	DESCRIPTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

APPROVED: DocuSigned by: Michael T. Rzepka 01BC3B8DC260482... DATE: 2/3/2016

SEAL — NORTH CAROLINA PROFESSIONAL SEAL 15876 ENGINEER MICHAEL T. RZEPKA

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

ROADWAY STANDARD DRAWINGS, LEGEND & TEMPORARY PAVEMENT MARKING SCHEDULE

1/20/2016
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PROJ. REFERENCE NO.	SHEET NO.
P-4405J	TMP-2

GENERAL NOTES

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

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

LANE AND SHOULDER CLOSURE REQUIREMENTS

A) REMOVE LANE CLOSURE DEVICES FROM THE LANE WHEN WORK IS NOT BEING PERFORMED BEHIND THE LANE CLOSURE OR WHEN A LANE CLOSURE IS NO LONGER NEEDED OR AS DIRECTED BY THE ENGINEER.

B) WHEN PERSONNEL AND/OR EQUIPMENT ARE WORKING WITHIN 15 FT OF AN OPEN TRAVEL LANE, CLOSE THE NEAREST OPEN SHOULDER USING ROADWAY STANDARD DRAWING NO. 1101.04 UNLESS THE WORK AREA IS PROTECTED BY BARRIER OR GUARDRAIL OR A LANE CLOSURE IS INSTALLED.

C) WHEN PERSONNEL AND/OR EQUIPMENT ARE WORKING ON THE SHOULDER ADJACENT TO AN UNDIVIDED FACILITY AND WITHIN 5 FT OF AN OPEN TRAVEL LANE, CLOSE THE NEAREST OPEN TRAVEL LANE USING ROADWAY STANDARD DRAWING NO. 1101.02 UNLESS THE WORK AREA IS PROTECTED BY BARRIER OR GUARDRAIL.

D) WHEN PERSONNEL AND/OR EQUIPMENT ARE WORKING WITHIN A LANE OF TRAVEL OF AN UNDIVIDED OR DIVIDED FACILITY, CLOSE THE LANE ACCORDING TO THE TRAFFIC CONTROL PLANS, ROADWAY STANDARD DRAWINGS, OR AS DIRECTED BY THE ENGINEER. CONDUCT THE WORK SO THAT ALL PERSONNEL AND/OR EQUIPMENT REMAIN WITHIN THE CLOSED TRAVEL LANE.

PAVEMENT EDGE DROP OFF REQUIREMENTS

E) BACKFILL AT A 6:1 SLOPE UP TO THE EDGE AND ELEVATION OF EXISTING PAVEMENT IN AREAS ADJACENT TO AN OPENED TRAVEL LANE THAT HAS AN EDGE OF PAVEMENT DROP-OFF AS FOLLOWS:

BACKFILL DROP-OFFS THAT EXCEED 2 INCHES ON ROADWAYS WITH POSTED SPEED LIMITS OF 45 MPH OR GREATER.

BACKFILL DROP-OFFS THAT EXCEED 3 INCHES ON ROADWAYS WITH POSTED SPEED LIMITS LESS THAN 45 MPH.

BACKFILL WITH SUITABLE COMPACTED MATERIAL, AS APPROVED BY THE ENGINEER, AT NO EXPENSE TO THE DEPARTMENT.

TRAFFIC PATTERN ALTERATIONS

F) NOTIFY THE ENGINEER TWENTY ONE (21) CALENDAR DAYS PRIOR TO ANY TRAFFIC PATTERN ALTERATION.

SIGNING

G) INSTALL ADVANCE WORK ZONE WARNING SIGNS WHEN WORK IS WITHIN 40 FT FROM THE EDGE OF TRAVEL LANE AND NO MORE THAN THREE (3) DAYS PRIOR TO THE BEGINNING OF CONSTRUCTION.

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

TRAFFIC CONTROL DEVICES

I) WHEN LANE CLOSURES ARE NOT IN EFFECT SPACE CHANNELIZING DEVICES IN WORK AREAS NO GREATER IN FEET THAN TWICE THE POSTED SPEED LIMIT (MPH) EXCEPT, 10 FT ON-CENTER IN RADII, AND 3 FT OFF THE EDGE OF AN OPEN TRAVELWAY. REFER TO STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES SECTIONS 1130 (DRUMS), 1135 (CONES) AND 1180 (SKINNY DRUMS) FOR ADDITIONAL REQUIREMENTS.

J) PLACE TYPE III BARRICADES, WITH "ROAD CLOSED" SIGN R11-2 ATTACHED, OF SUFFICIENT LENGTH TO CLOSE ENTIRE ROADWAY.

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SEAL

NORTH CAROLINA PROFESSIONAL SEAL 15876 ENGINEER MICHAEL T. RZEPKA

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

TRANSPORTATION OPERATIONS PLAN

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PROJ. REFERENCE NO.	SHEET NO.
P-4405J	TMP-3

PHASING

PHASE I

STEP 1

INSTALL ALL ADVANCE WORK ZONE WARNING SIGNS.

STEP 2

AWAY FROM TRAFFIC, BEGIN INSTALLATION OF PROPOSED DRAINAGE INCLUDING CULVERT AT -L- STA 12+75±.

STEP 3

AWAY FROM TRAFFIC AND USING RSD 1101.02 (SHEET 1 OF 15), CONSTRUCT THE FOLLOWING UP TO AND INCLUDING THE ASPHALT SURFACE LAYER (SEE SHEET TMP-4):

-L- STA 10+00± TO -L- STA 17+67±
-Y- DRIVE TIES

STEP 4

PERFORM THE FOLLOWING:

-COMPLETE PROPOSED DRAINAGE
-OPEN -L- TO PROPOSED TRAFFIC PATTERN
-UPON OPENING OF -L-, CLOSE EXISTING GREENBRIAR DRIVE AT THE RAILROAD CROSSING USING TYPE III BARRICADE UNTIL PHASE II WORK IS COMPLETED

PHASE II

STEP 1

PERFORM PAVEMENT REMOVAL (REFER TO ROADWAY PLANS).

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NORTH CAROLINA PROFESSIONAL SEAL 15876 ENGINEER MICHAEL T. RZEPKA

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

PHASING

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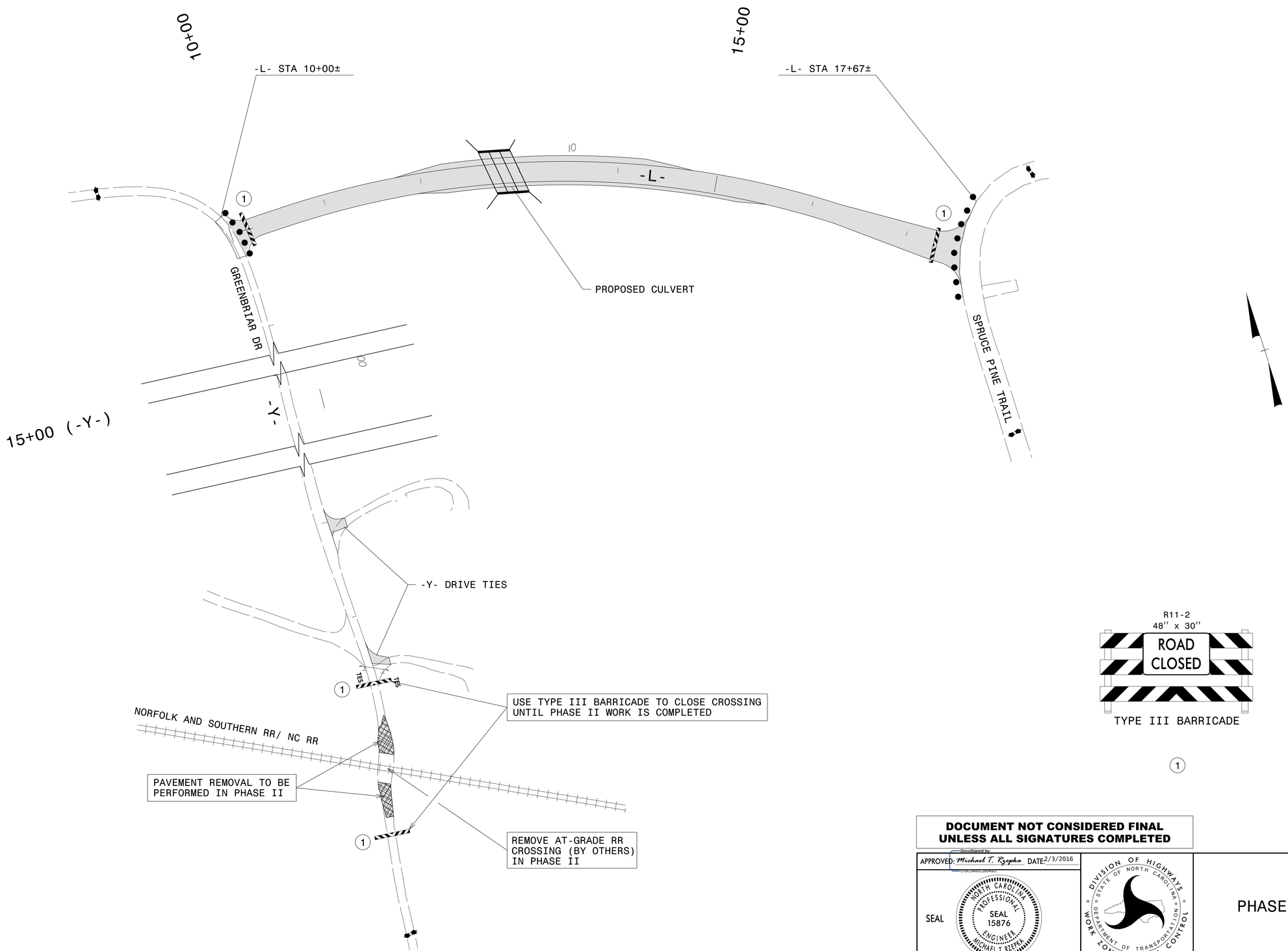
PROJ. REFERENCE NO.	SHEET NO.
P-4405J	TMP-4



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SEAL

NORTH CAROLINA PROFESSIONAL SEAL 15876 ENGINEER MICHAEL T. RZEPKA

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

PHASE I DETAIL

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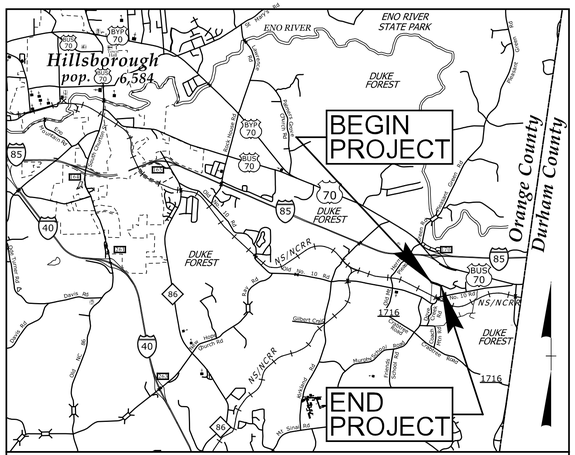
TIP PROJECT: P-4405J

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-4405 J	EC-1	

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



VICINITY MAP

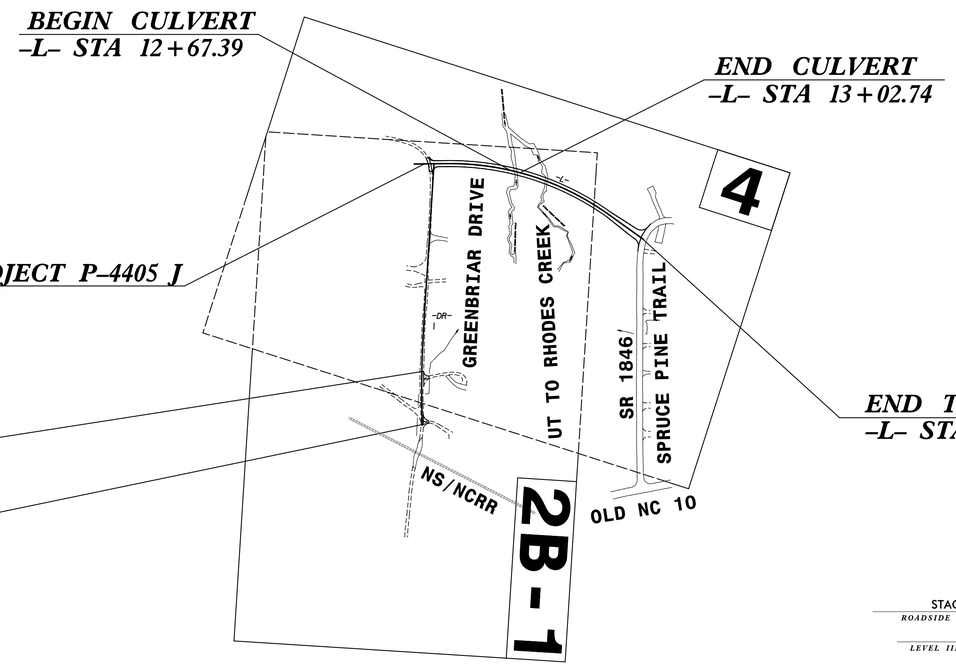
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PLAN FOR PROPOSED
HIGHWAY EROSION CONTROL

ORANGE COUNTY

LOCATION: GREENBRIAR DRIVE EXTENSION TO SR 1846 (SPRUCE PINE TRAIL) AND CROSSING CLOSURE

TYPE OF WORK: GRADING, PAVING, DRAINAGE AND CULVERT



NAD 83/
NSRS 2007

EROSION AND SEDIMENT CONTROL MEASURES

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

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

THIS PROJECT HAS BEEN DESIGNED TO SENSITIVE WATERSHED STANDARDS.

ENVIRONMENTALLY SENSITIVE AREA(S) EXIST ON THIS PROJECT

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

STACEY H. BAILEY, P.E.
ROADSIDE ENVIRONMENTAL ENGINEER

3074
LEVEL III CERTIFICATION NUMBER

TRENTON J. CORMIER, P.E.
ROADSIDE ENVIRONMENTAL PROJECT ENGINEER

3377
LEVEL III CERTIFICATION NUMBER

GRAPHIC SCALE

0
PLANS

0
PROFILE (HORIZONTAL)

0
PROFILE (VERTICAL)

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

Prepared In the Office of:

ICA ENGINEERING, INC.
5121 KINGDOM WAY, SUITE 100
RALEIGH NC 27607
NC LICENSE NO: F-0258

2012 STANDARD SPECIFICATIONS

Designed by:

STACEY H BAILEY, P.E. ***3074***
NAME *LEVEL III CERTIFICATION NO.*

Reviewed In the Office of:

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

2012 STANDARD SPECIFICATIONS

Reviewed by:

JENNIFER PARISH

Roadway Standard Drawings

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

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

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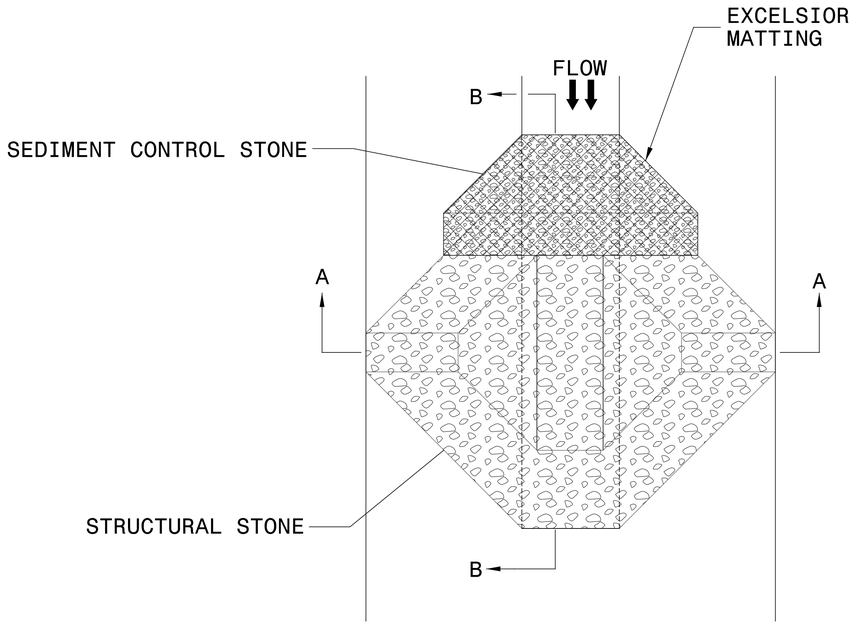
TEMPORARY ROCK SILT CHECK TYPE 'A' WITH EXCELSIOR MATTING AND POLYACRYLAMIDE (PAM)



PLAN

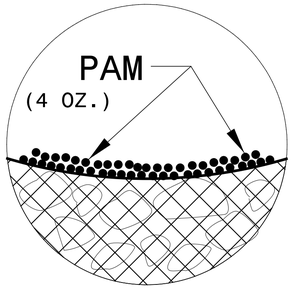
NOTES:

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

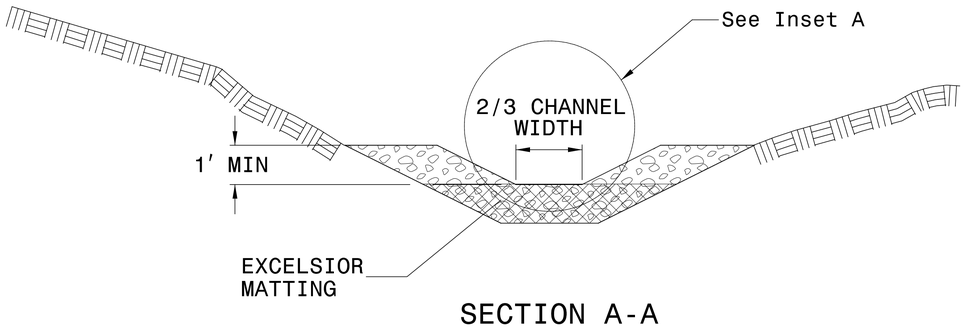
USE EXCELSIOR FOR MATTING MATERIAL AND ANCHOR MATTING SECTION AT TOP AND BOTTOM WITH CLASS B STONE.

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

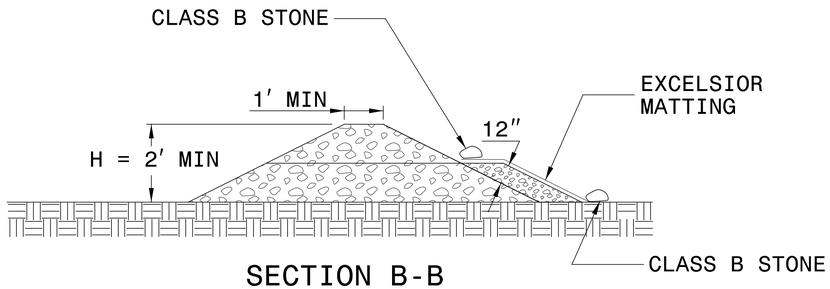
INITIALLY APPLY 4 OUNCES OF POLYACRYLAMIDE (PAM) TO TOP OF MATTING SECTION AND AFTER EVERY RAINFALL EVENT THAT EQUALS OR EXCEEDS 0.50 INCHES.



INSET A



SECTION A-A



SECTION B-B

NOT TO SCALE

PROJECT REFERENCE NO.	SHEET NO.
P-4405J	EC-2A

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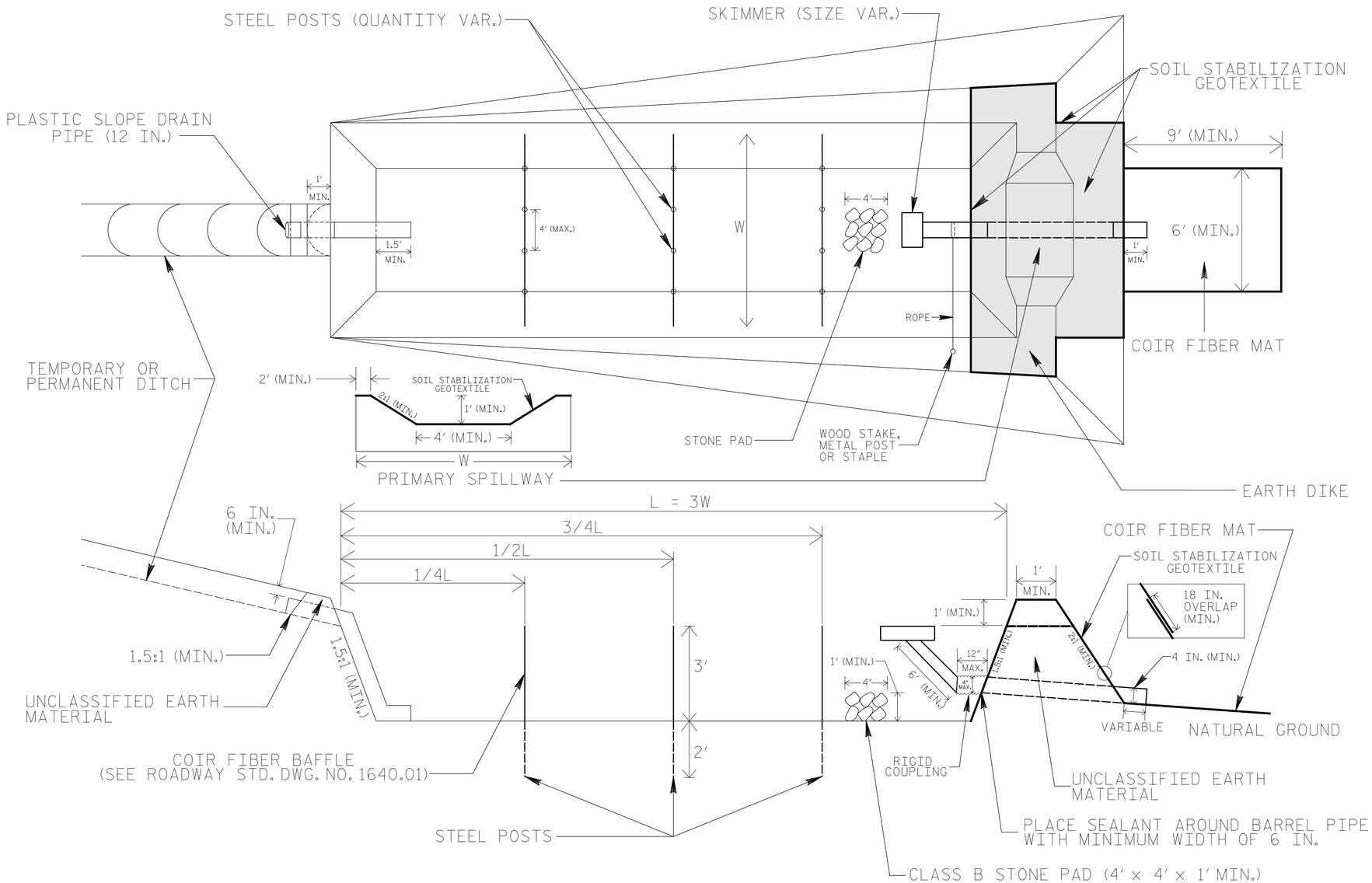
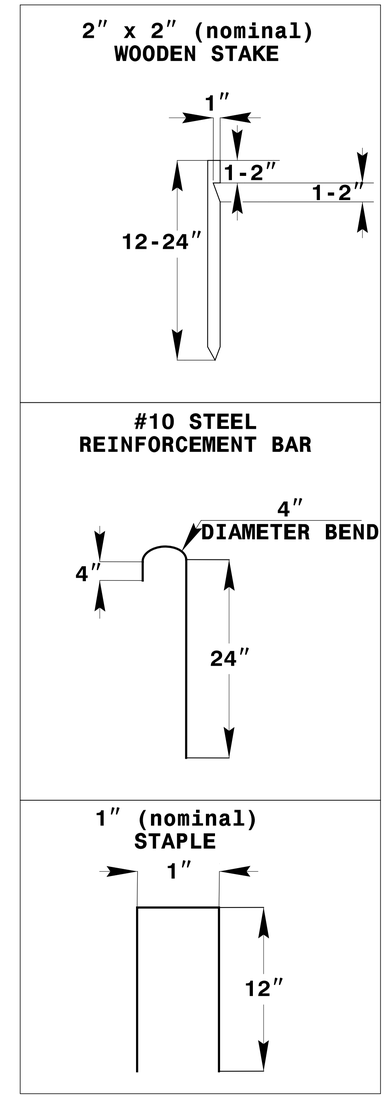
SKIMMER BASIN WITH BAFFLES DETAIL





COIR FIBER MAT ANCHOR OPTIONS

NOTES

1. SEED AND PLACE MATTING FOR EROSION CONTROL ON INTERIOR AND EXTERIOR SIDESLOPES.
2. LIMIT EARTH DIKE HEIGHT TO 5 FT.
3. FOR BASIN DEPTH OF 3 FT., THE MINIMUM BASIN WIDTH SHALL BE 9 FT.
4. DETERMINE PRIMARY SPILLWAY WEIR LENGTH (FT.) USING Q/0.8, WHERE Q IS FLOW RATE (CFS) INTO BASIN.
5. PLASTIC SLOPE DRAIN PIPE AT INLET OF BASIN MAY BE REPLACED BY FILTRATION GEOTEXTILE OR TARP AS DIRECTED.
6. SOIL STABILIZATION GEOTEXTILE FOR PRIMARY SPILLWAY SHALL BE ONE CONTINUOUS PIECE OF MATERIAL OR OVERLAPPED 18 IN. (MIN.).

NOT TO SCALE

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PROJECT REFERENCE NO.	SHEET NO.
P-4405J	EC-3
R/W SHEET NO.	
ROADSIDE ENVIRONMENTAL PROJECT ENGINEER	

LEVEL III CERTIFIED BY:
STACEY H. BAILEY, PE
CERTIFICATION NUMBER: 3074
ISSUED: JANUARY 21, 2016

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

SOIL STABILIZATION SUMMARY SHEET

MATTING FOR EROSION CONTROL

CONST SHEET NO.	LINE	FROM STATION	TO STATION	SIDE	ESTIMATE (SY)
4	-L-	10+00	12+00	RT	210
				SUBTOTAL	210
MISCELLANEOUS MATTING TO BE INSTALLED AS DIRECTED BY THE ENGINEER					2900
				TOTAL	3110
				SAY	3110

PERMANENT SOIL REINFORCEMENT MAT

CONST SHEET NO.	LINE	FROM STATION	TO STATION	SIDE	ESTIMATE (SY)

0673DEL_P21p1

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

SOIL STABILIZATION TIMEFRAMES

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

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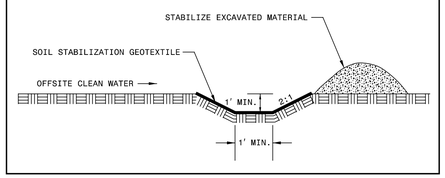
DGN

CLEAN WATER DIVERSION

→→ CWD →→ CWD →→ CWD →→ CWD →

(Not to Scale)



NOTE:
PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE – B AND TEMPORARY ROCK SILT CHECKS TYPE – A AT DRAINAGE OUTLETS.

NOTE:
PERIMETER EROSION CONTROL MEASURES SHALL BE INSTALLED DURING CLEARING AND GRUBBING PHASE.

NOTE:
ALL EROSION CONTROL DEVICES SHOWN ARE LOCATED WITHIN EXISTING R/W OR EASEMENT.

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ROADSIDE ENVIRONMENTAL PROJECT ENGINEER	

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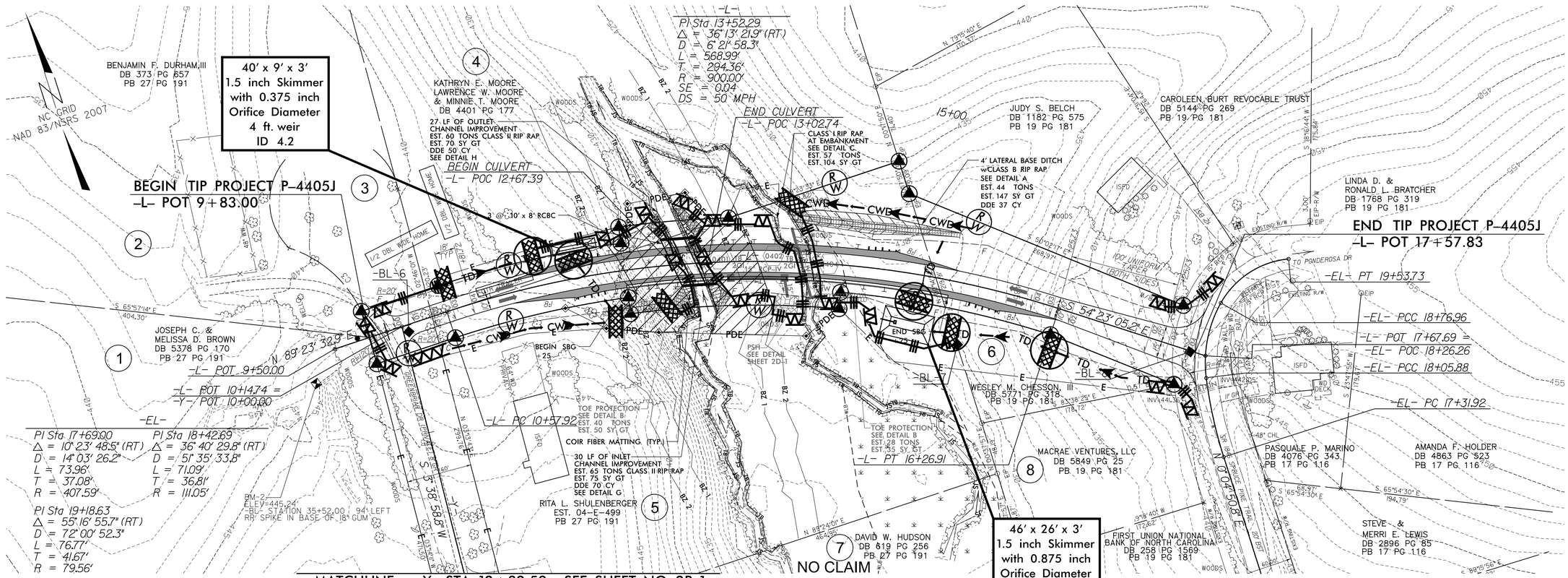
STACEY H. BAILEY, PE
CERTIFICATION NUMBER: 3074
ISSUED: MARCH 10, 2016

CLEARING AND GRUBBING
EROSION CONTROL FOR
CONSTRUCTION SHEET 4



ENVIRONMENTALLY SENSITIVE AREA
SEE PROJECT SPECIAL PROVISIONS

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R/W SHEET NO.	
ROADSIDE ENVIRONMENTAL PROJECT ENGINEER	

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CERTIFICATION NUMBER: 3074
ISSUED: MARCH 10, 2016

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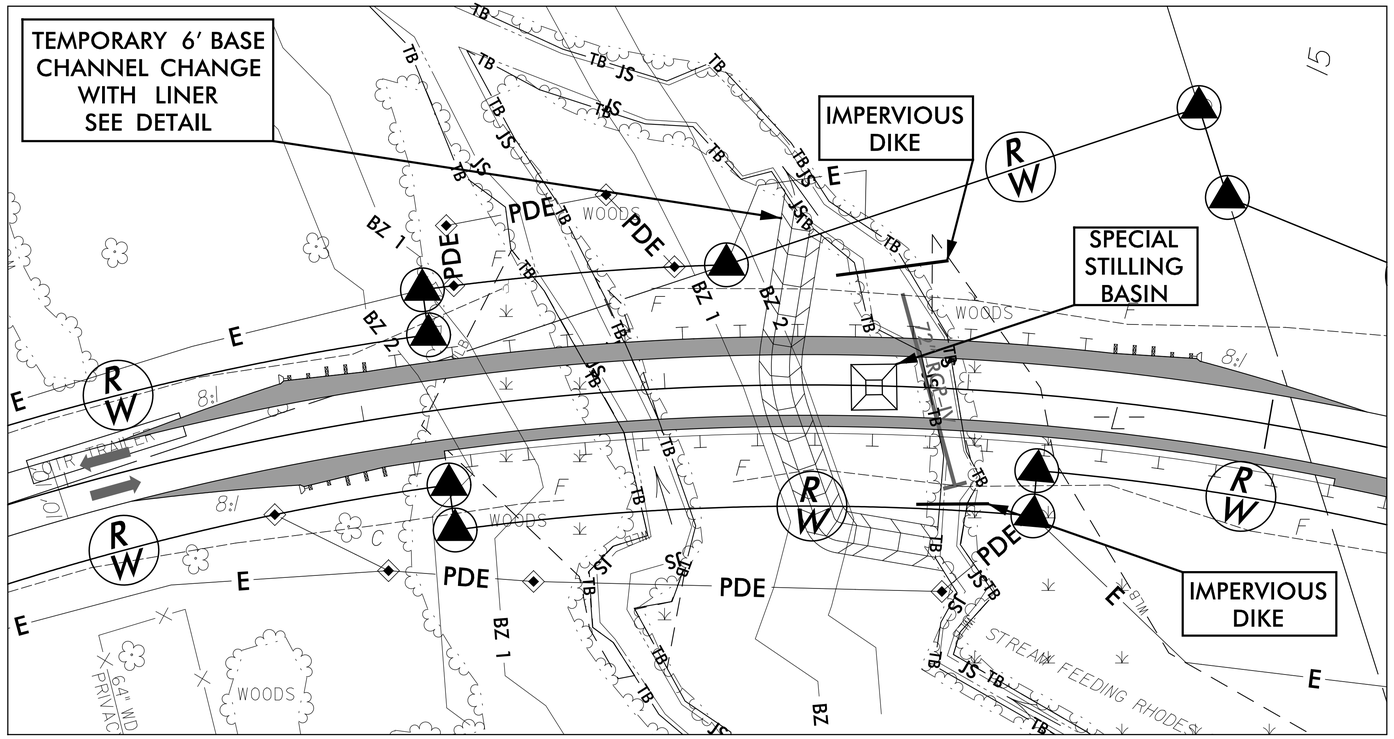
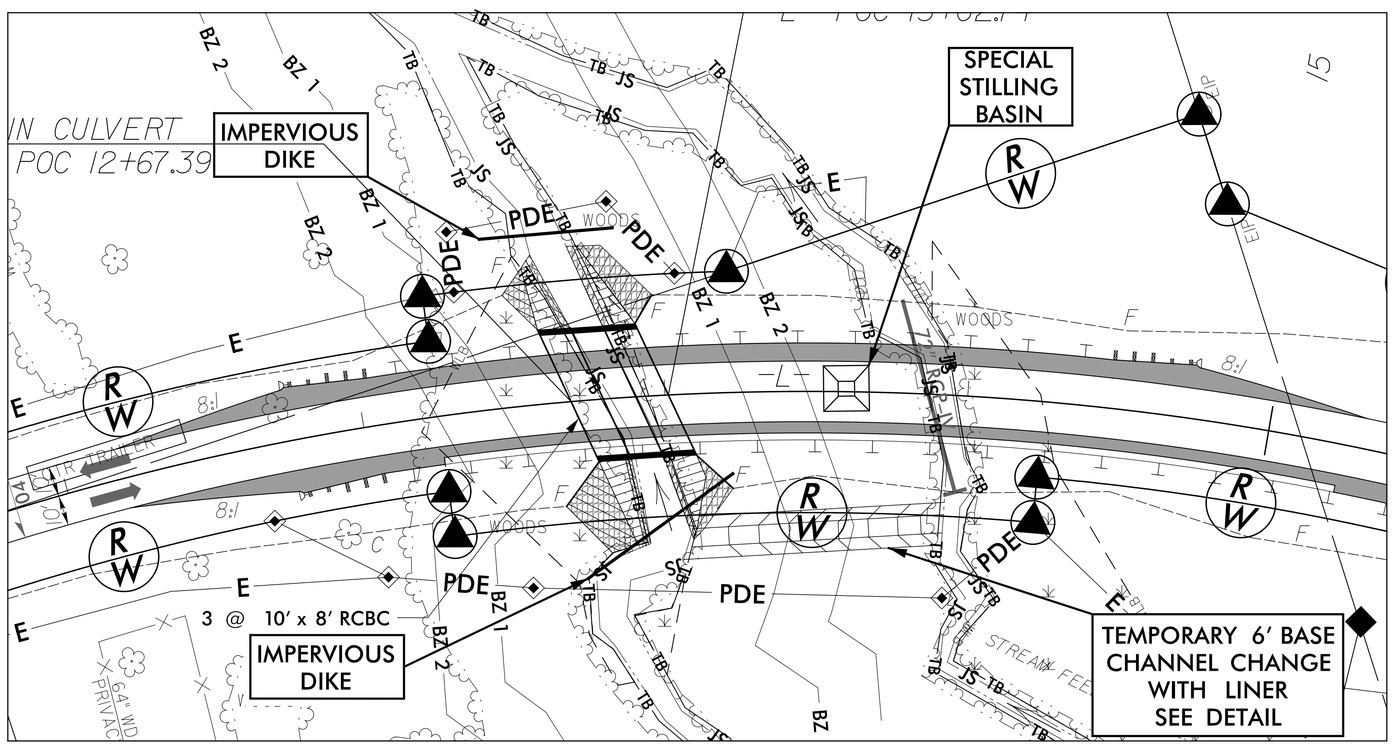


PHASE I



PHASE II

CULVERT CONSTRUCTION SEQUENCE STA. 12+90 –L–

NOTES

1. CULVERT CONSTRUCTION SHALL BE PERFORMED IN ONLY DRY OR ISOLATED SECTIONS OF CHANNEL.
2. IMPERVIOUS DIKES ARE TO BE USED TO ISOLATE WORK FROM STREAM FLOW AS NECESSARY.
3. ALL GRADED AREAS SHALL BE STABILIZED WITHIN 24 HOURS.
4. MAINTENANCE OF STREAM FLOW OPERATIONS SHALL BE INCIDENTAL TO THE WORK. THIS INCLUDES POLYETHYLENE SHEETING, DIVERSION PIPES, PUMPS AND HOSES.
5. PUMPS AND HOSES SHALL BE SUFFICIENT SIZE TO DEWATER THE WORK AREA.
6. THE CONTRACTOR SHALL NOT PUMP SEDIMENT-LADEN WATER DIRECTLY INTO STREAM. FOR DEWATERING OF CULVERT SITES, THE CONTRACTOR SHALL FILTER SEDIMENT-LADEN WATER THROUGH STILLING BASIN AND/OR SPECIAL STILLING BASIN.

CONSTRUCTION SEQUENCE

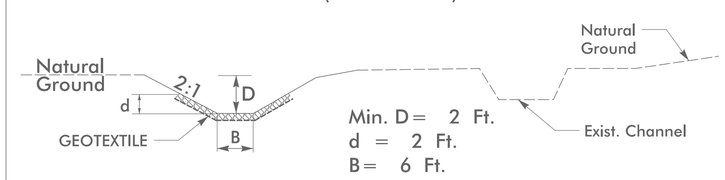
PHASE I

1. CONSTRUCT 6' BASE TEMPORARY CHANNEL CHANGE (140 LF) WITH LINER (GEOTEXTILE FOR SOIL STABILIZATION, TYPE 4) AND IMPERVIOUS DIKES AS SHOWN. DIVERT CHANNEL FLOW THROUGH 6' BASE TEMPORARY CHANNEL CHANGE.
2. INSTALL 72" RCP AND HW WITH THE USE OF A SPECIAL STILLING BASIN..
3. REMOVE IMPERVIOUS DIKES, SPECIAL STILLING BASIN, AND 6' BASE DITCH. DIRECT FLOW THOUGH NEWLY CONSTRUCTED 72" RCP.

PHASE II

1. CONSTRUCT 6' BASE TEMPORARY CHANNEL CHANGE (80 LF) WITH LINER (GEOTEXTILE FOR SOIL STABILIZATION, TYPE 4) AND IMPERVIOUS DIKES AS SHOWN. DIVERT CHANNEL FLOW THROUGH 6' BASE TEMPORARY CHANNEL CHANGE.
2. CONSTRUCT 3 @ 10' x 8' RCBC w/SILLS AND BEVELED INLET AND CHANNEL IMPROVEMENTS WITH THE USE OF A SPECIAL STILLING BASIN.
3. REMOVE IMPERVIOUS DIKES, SPECIAL STILLING BASIN, AND 6' BASE DITCH. DIRECT FLOW THOUGH NEWLY CONSTRUCTED CULVERT AND 72" RCP.
4. CONSTRUCT PROPOSED ROADWAY.

TEMPORARY CHANNEL CHANGE DETAIL
(Not to Scale)



Min. D = 2 Ft.
d = 2 Ft.
B = 6 Ft.

Type of Liner = Geotextile For Soil Stabilization, Type 4

3/10/2016
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ICA ENGINEERING, INC.

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DGN

ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
NC License No: F-0258

PROJECT REFERENCE NO.	SHEET NO.
P-4405 J	EC-05/CONST.2B
R/W SHEET NO.	

ROADSIDE ENVIRONMENTAL PROJECT ENGINEER

LEVEL III CERTIFIED BY:
STACEY H. BAILEY, PE
CERTIFICATION NUMBER: 3074
ISSUED: MARCH 10, 2016

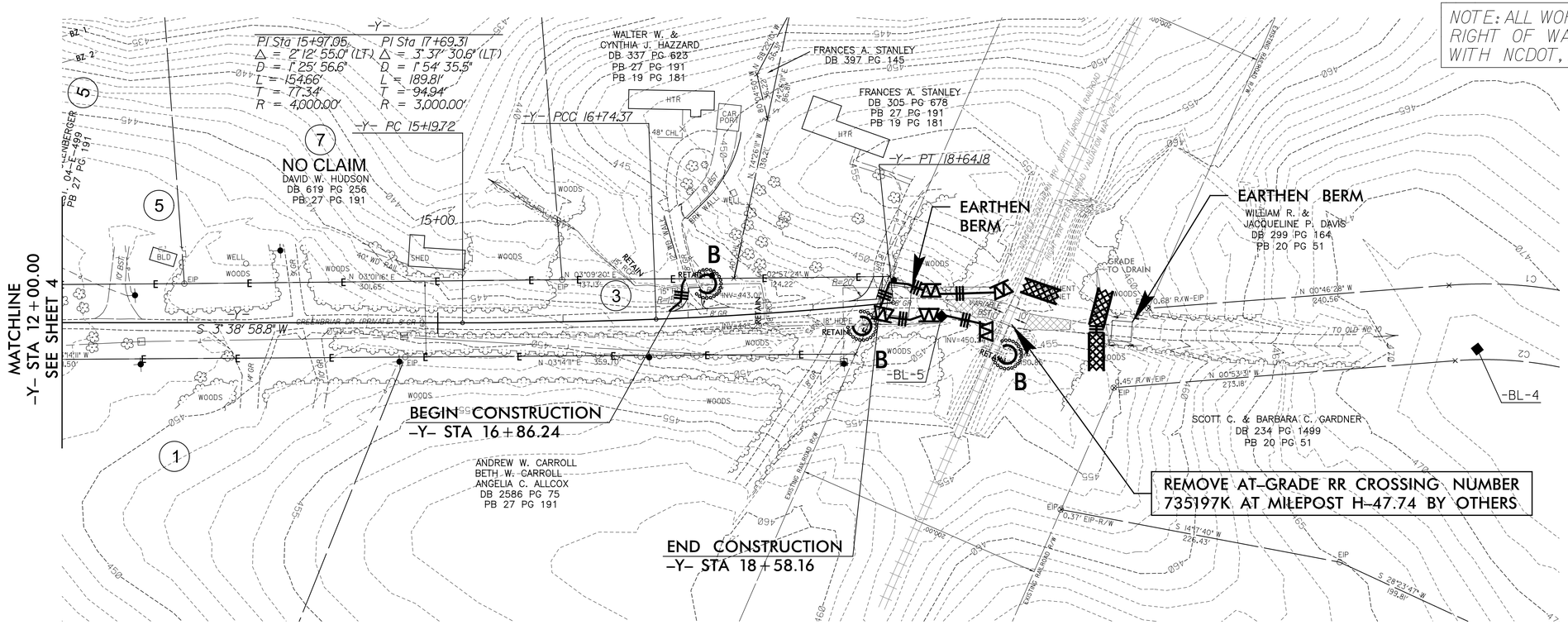
CROSSING CLOSURE DETAIL

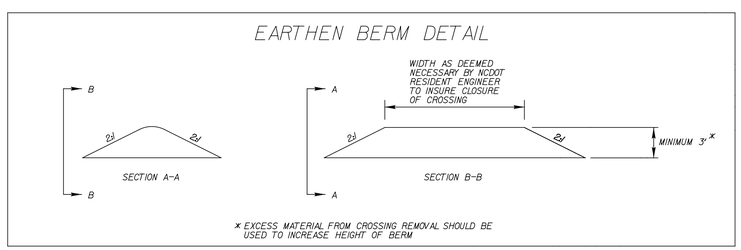
GREENBRIAR DR

NAD 83/NSRS 2007

CLEARING AND GRUBBING
EROSION CONTROL FOR
CONSTRUCTION SHEET 2B

NOTE: ALL WORK WITHIN NCRR RIGHT OF WAY TO BE COORDINATED WITH NCDOT, NCRR, AND NS





NOTE:
PLACE TEMPORARY ROCK SEDIMENT DAMS TYPE – B AND TEMPORARY ROCK SILT CHECKS TYPE – A AT DRAINAGE OUTLETS.

NOTE:
PERIMETER EROSION CONTROL MEASURES SHALL BE INSTALLED DURING CLEARING AND GRUBBING PHASE.

NOTE:
ALL EROSION CONTROL DEVICES SHOWN ARE LOCATED WITHIN EXISTING R/W OR EASEMENT.

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ICA ENGINEERING, INC.

0673DEL_P21p1

DGN

ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
NC License No: F-0258

PROJECT REFERENCE NO.	SHEET NO.
P-4405 J	EC-06/CONST.04
R/W SHEET NO.	
ROADSIDE ENVIRONMENTAL PROJECT ENGINEER	

LEVEL III CERTIFIED BY:
STACEY H. BAILEY, PE
CERTIFICATION NUMBER: 3074
ISSUED: MARCH 10, 2016

FINAL EROSION CONTROL
FOR CONSTRUCTION SHEET 4

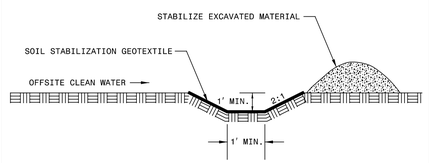
NOTE:
ALL EROSION CONTROL DEVICES SHOWN ARE LOCATED WITHIN R/W OR EASEMENT.

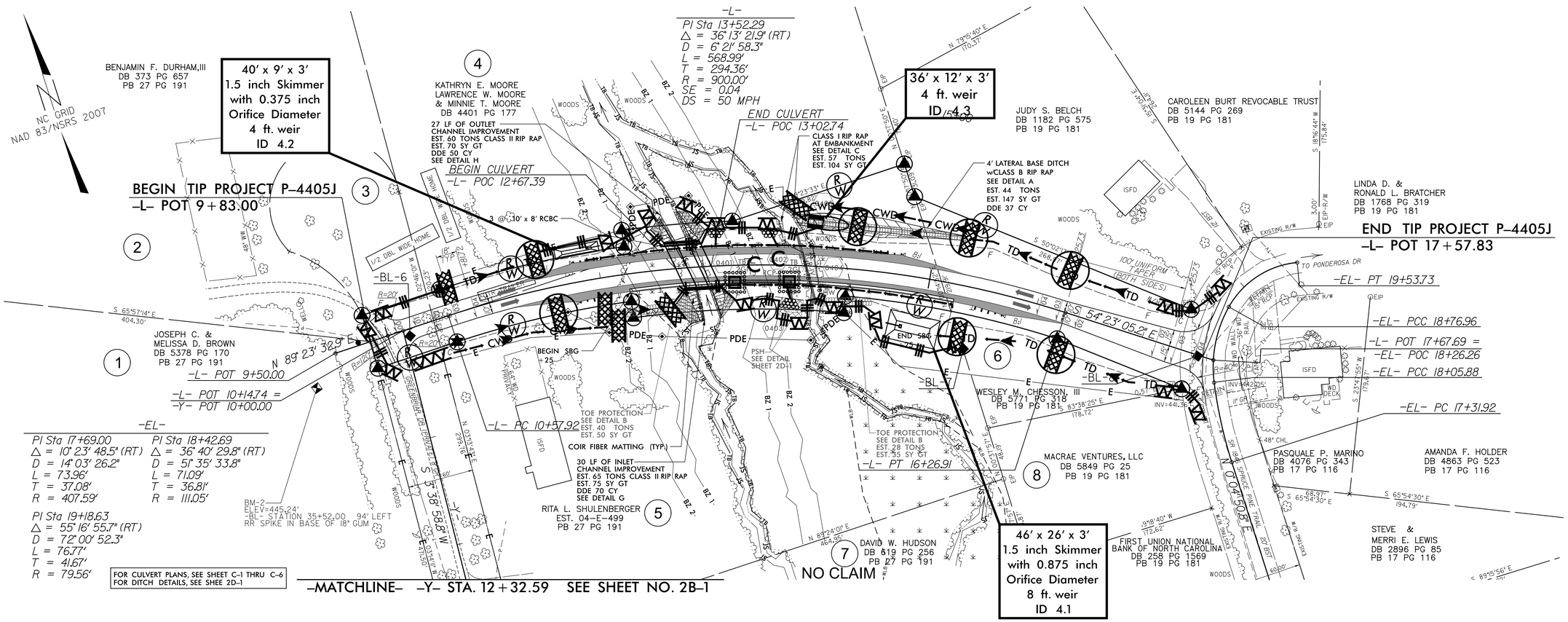
NOTE:
CONTRACTOR SHALL MAINTAIN ALL DEVICES AS PROJECT IS BROUGHT UP TO GRADE.

CLEAN WATER DIVERSION

→→ CWD →→ CWD →→ CWD →→ CWD →→

(Not to Scale)





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DGN

ICA Engineering	5121 Kingdom Way, Suite 100 Raleigh, NC 27607 NC License No: F-0258	PROJECT REFERENCE NO.	SHEET NO.
		P-4405 J	EC-07/CONST.2B
		R/W SHEET NO.	
		ROADSIDE ENVIRONMENTAL PROJECT ENGINEER	

LEVEL III CERTIFIED BY:
STACEY H. BAILEY, PE
CERTIFICATION NUMBER: 3074
ISSUED: MARCH 10, 2016

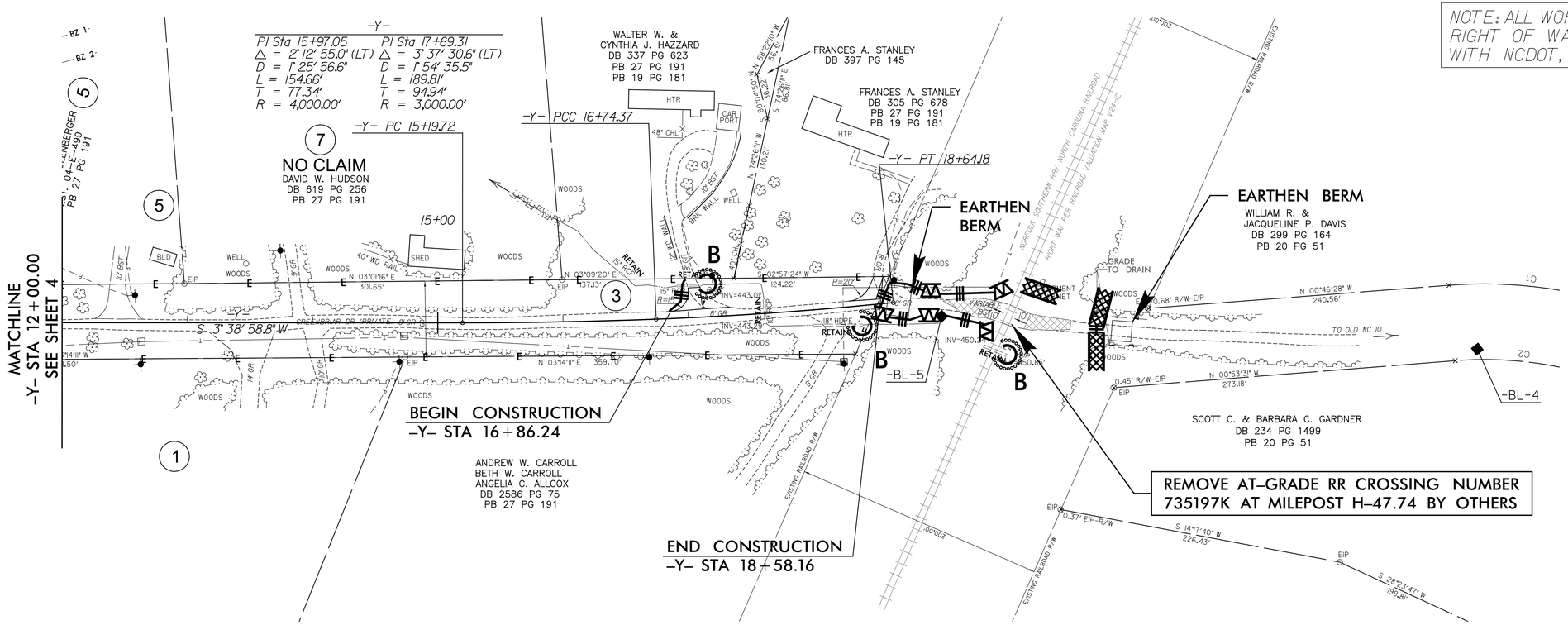
CROSSING CLOSURE DETAIL

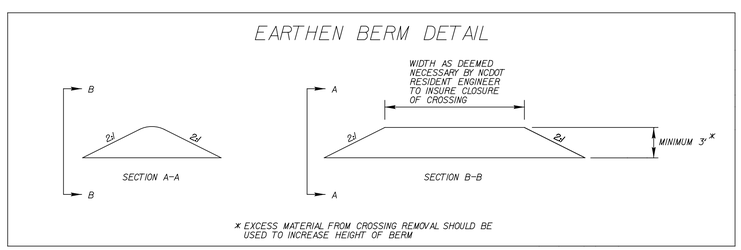
GREENBRIAR DR

NAD 83/NSRS 2007

FINAL EROSION CONTROL FOR CONSTRUCTION SHEET 2B

NOTE: ALL WORK WITHIN NCRR RIGHT OF WAY TO BE COORDINATED WITH NCDOT, NCRR, AND NS





NOTE:
ALL EROSION CONTROL DEVICES SHOWN ARE LOCATED WITHIN R/W OR EASEMENT.

NOTE:
CONTRACTOR SHALL MAINTAIN ALL DEVICES AS PROJECT IS BROUGHT UP TO GRADE.

3/10/2016
p4405_bud_ec_final_psh_02B-1.dgn
ICA ENGINEERING, INC.

0673DEL_P21p1

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	P-4405J	RF-1	

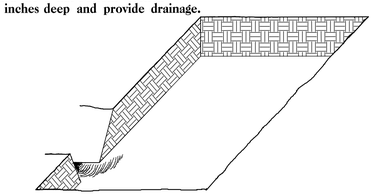
STATE PROJ.NO.	F.A. PROJ.NO.	DESCRIPTION

PLANTING DETAILS

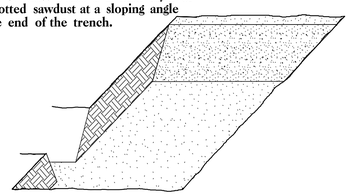
SEEDLING / LINER BAREROOT PLANTING DETAIL

HEALING IN

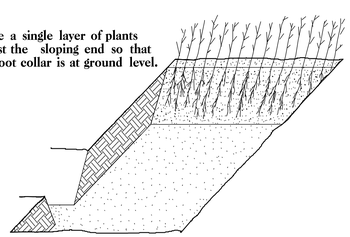
1. Locate a healing-in site in a shady, well protected area.
2. Excavate a flat bottom trench 12 inches deep and provide drainage.



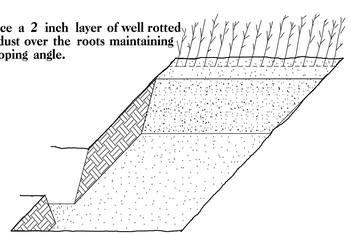
3. Backfill the trench with 2 inches well rotted sawdust. Place a 2 inch layer of well rotted sawdust at a sloping angle at one end of the trench.



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

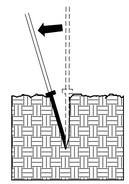


5. Place a 2 inch layer of well rotted sawdust over the roots maintaining a sloping angle.

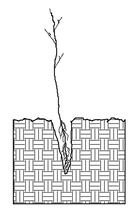


6. Repeat layers of plants and sawdust as necessary and water thoroughly.

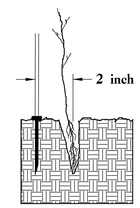
DIBBLE PLANTING METHOD
USING THE KBC PLANTING BAR



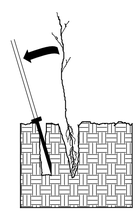
1. Insert planting bar as shown and pull handle toward planter.



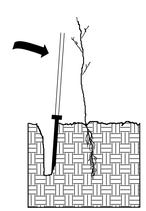
2. Remove planting bar and place seedling at correct depth.



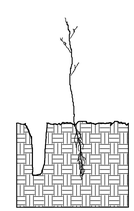
3. Insert planting bar 2 inches toward planter from seedling.



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



5. Push handle forward firming soil at top.



6. Leave compaction hole open. Water thoroughly.

PLANTING NOTES:

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

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

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

REFORESTATION

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

REFORESTATION

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

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

REFORESTATION DETAIL SHEET

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

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T.I.P.: P-4405J

CONTRACT:

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

TIP NO.	SHEET NO.
P-4405J	SIGN-1

APPROVED: DocuSigned by: Michael T. Rzepka 01BC3480C26049D...

DATE: 2/3/2016

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 15876 ENGINEER MICHAEL T. RZEPKA

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SIGNING PLAN
ORANGE COUNTY

LOCATION: GREENBRIAR DRIVE EXTENSION TO SR 1846 (SPRUCE PINE TRAIL) AND CROSSING CLOSURE

ROADWAY STANDARD DRAWING

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

STD. NO.	TITLE
904.10	ORIENTATION OF GROUND MOUNTED SIGNS
904.50	MOUNTING OF TYPE 'D', 'E' AND 'F' SIGNS ON 'U' CHANNEL POSTS

INDEX

SHEET NO.	DESCRIPTION
SIGN-1	TITLE SHEET
SIGN-2	E SHEET
SIGN-3	SIGN DETAIL SHEET

GENERAL NOTES

SIGNING NOTES

- SIGNS FURNISHED BY CONTRACTOR
- IF REMOVAL OR RELOCATION OF SIGNS ON PRIVATE STREET (NON-STATE MAINTAINED) IS REQUIRED DUE TO CONSTRUCTION, THE CONTRACTOR SHALL INFORM THE ENGINEER. THE WORK WILL BE COMPLETED BY OTHERS.
- WHEN NOT STATIONED OR DIMENSIONED ON PLANS, ALL 'E' AND 'F' SIGNS SHALL BE FIELD LOCATED BY THE ENGINEER
- ALL EXISTING SIGNS ON "U" CHANNEL POST WITHIN THE PROJECT LIMITS SHALL BE REMOVED AND DISPOSED OF UNLESS OTHERWISE NOTED ON PLANS.
- WHEN EXISTING SIGNS ARE REMOVED AND INSTALLED ON NEW SUPPORTS, THE RE-ERECTION SHALL IMMEDIATELY FOLLOW THE REMOVAL.
- THE BACKGROUND FOR TYPE E & F SIGNS SHALL BE TYPE C REFLECTIVE SHEETING.
- SEE ROADWAY PLANS FOR GUARD/GUIDE RAIL DETAILS.

SUMMARY OF QUANTITIES

ITEM NO. DESC. NO.	ITEM NO. SECT. NO.	ITEM DESCRIPTION	QUANTITY	UNIT
4072000000	903	SUPPORTS, 3 LB STEEL U-CHANNEL	39	L.F.
4102000000	904	SIGN ERECTION, TYPE E	3	EA.
4025000000	901	CONTRACTOR FURNISHED, TYPE E SIGN	30.5	S.F.

PLAN REVIEWED BY: N.C.D.O.T. SIGNING AND DELINEATION UNIT

RENEE ROACH, P.E. SIGNING & DELINEATION REGIONAL ENGINEER

JAMES HAMBRIGHT SIGNING & DELINEATION PROJECT DESIGN ENGINEER

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

PLAN PREPARED BY: ICA ENGINEERING

M. T. RZEPKA, P.E. PROJECT ENGINEER

A. C. PILZ, P.E. DESIGN ENGINEER

ICA Engineering 5121 Kingdom Way, Suite 100 Raleigh, NC 27607 NC License No: F-0250

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401 QUANTITY REQ'D 2

36 X 36
R1-1

ONE "U" POST PER SIGN

402 QUANTITY REQ'D 1

30 X 30
W14-2

ONE "U" POST PER SIGN

TIP NO.	SHEET NO.
P-4405J	SIGN-2

APPROVED: DocuSigned by: Michael T. Rzepka 018C3480C260490...

DATE: 2/3/2016

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 15876 ENGINEER MICHAEL T. RZEPKA

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TYPE "E" SIGNS

1/20/2016
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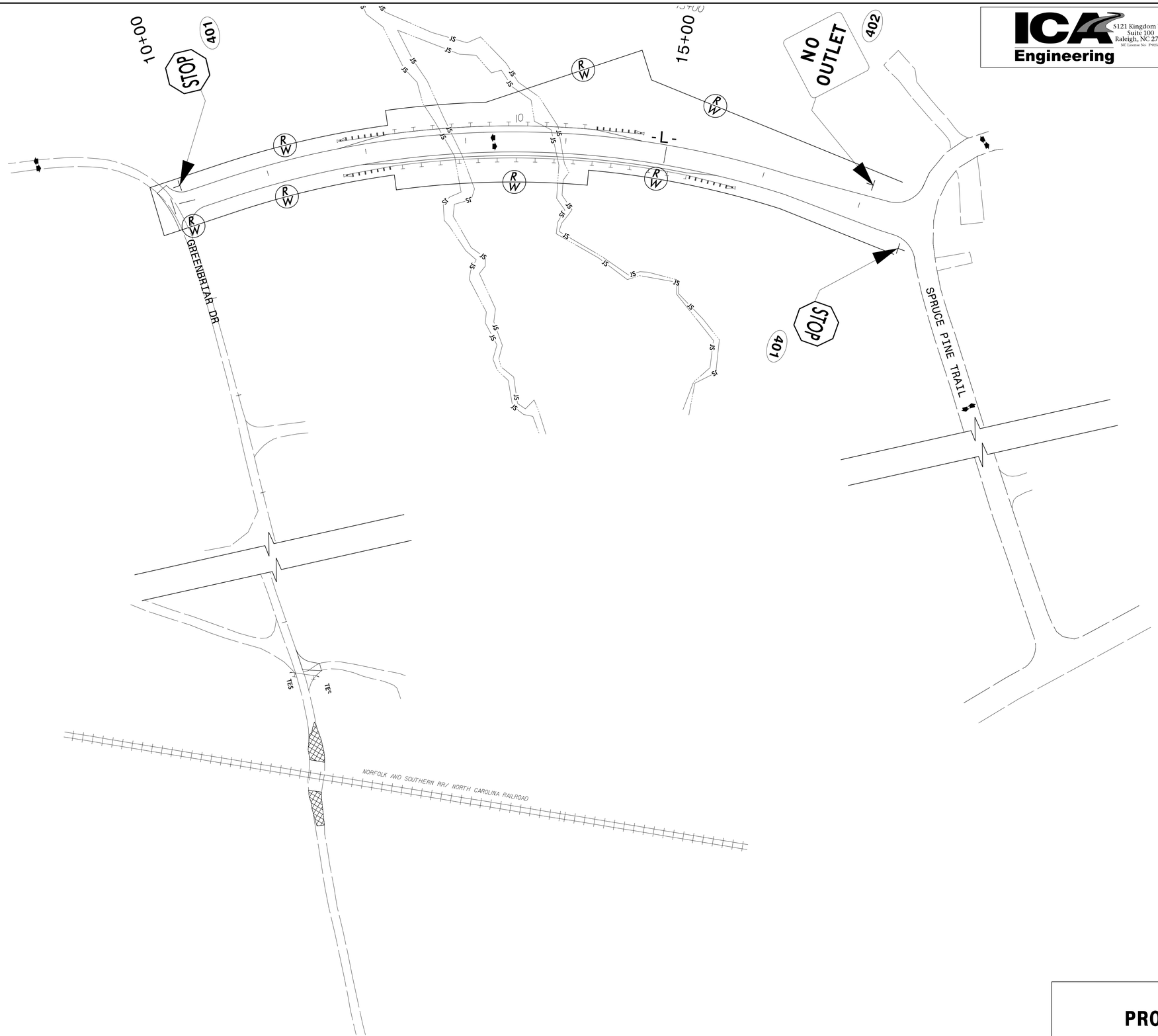

ICA Engineering
5121 Kingdom Way,
Suite 100
Raleigh, NC 27607
NC License No: P-0250

TIP NO.	SHEET NO.
P-4405J	SIGN-3

APPROVED: DocuSigned by: Michael T. Rzepka 01BC3480C26049D...

DATE: 2/3/2016

SEAL

NORTH CAROLINA PROFESSIONAL SEAL 15876 ENGINEER MICHAEL T. RZEPKA

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PROPOSED SIGNS

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ICA Engineering

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STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CROSS-SECTION SUMMARY

PROJ. REFERENCE NO.	SHEET NO.
P-4405 J	X-1A

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

NOTE: EMBANKMENT COLUMN DOES NOT INCLUDE BACKFILL FOR UNDERCUT

Station L	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
10+00.00	0	0
10+50.00	67	11
11+00.00	67	15
11+50.00	124	4
12+00.00	165	8
12+50.00	80	426
13+00.00	0	734
13+50.00	0	548
14+00.00	24	490
14+50.00	65	431
15+00.00	49	416
15+50.00	8	450
16+00.00	0	313
16+50.00	0	249
17+00.00	0	282
17+25.00	0	120
17+50.00	7	60

PROJ. REFERENCE NO.	SHEET NO.
P-4405 J	X-1

0 2.5 5

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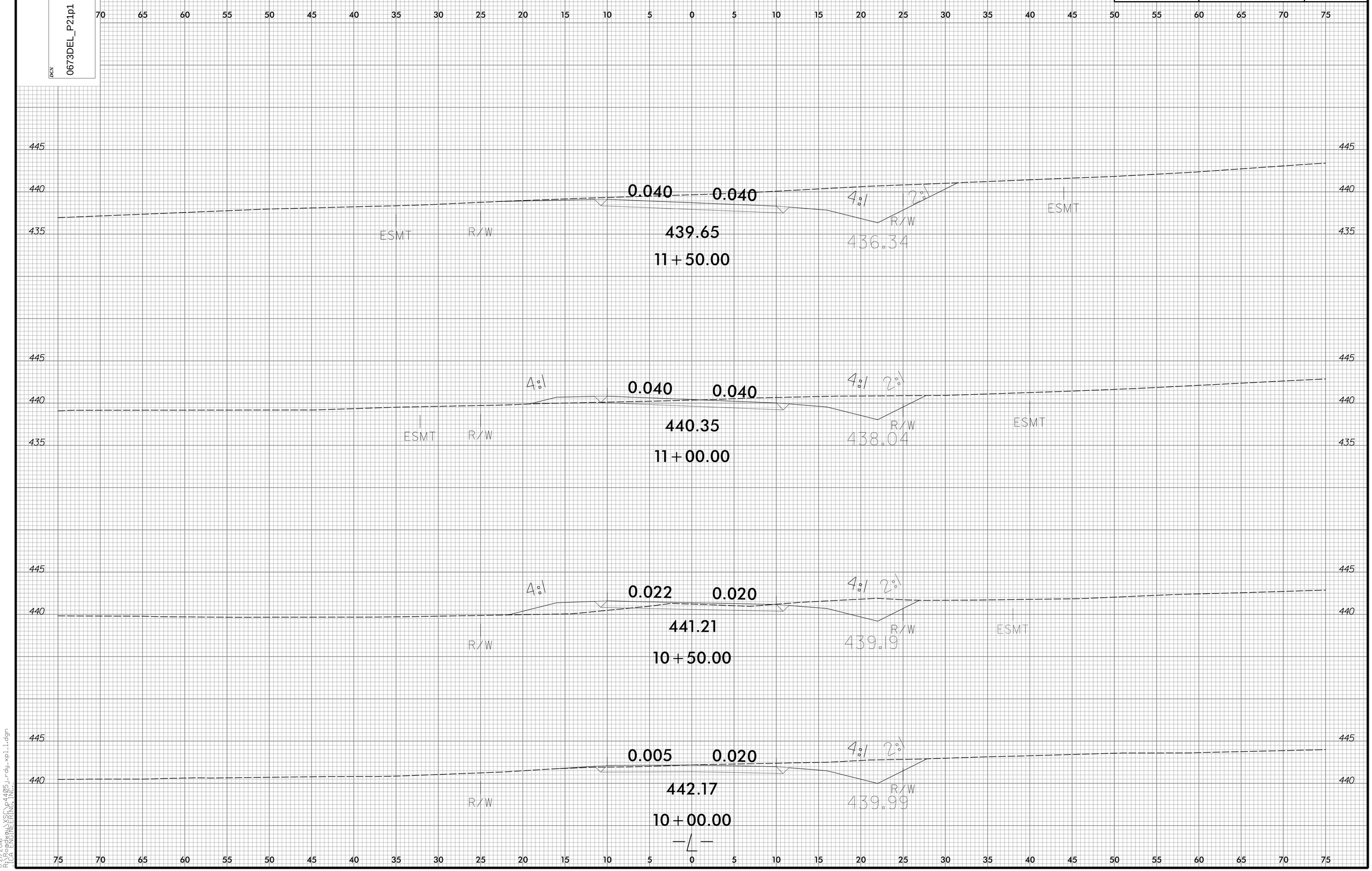

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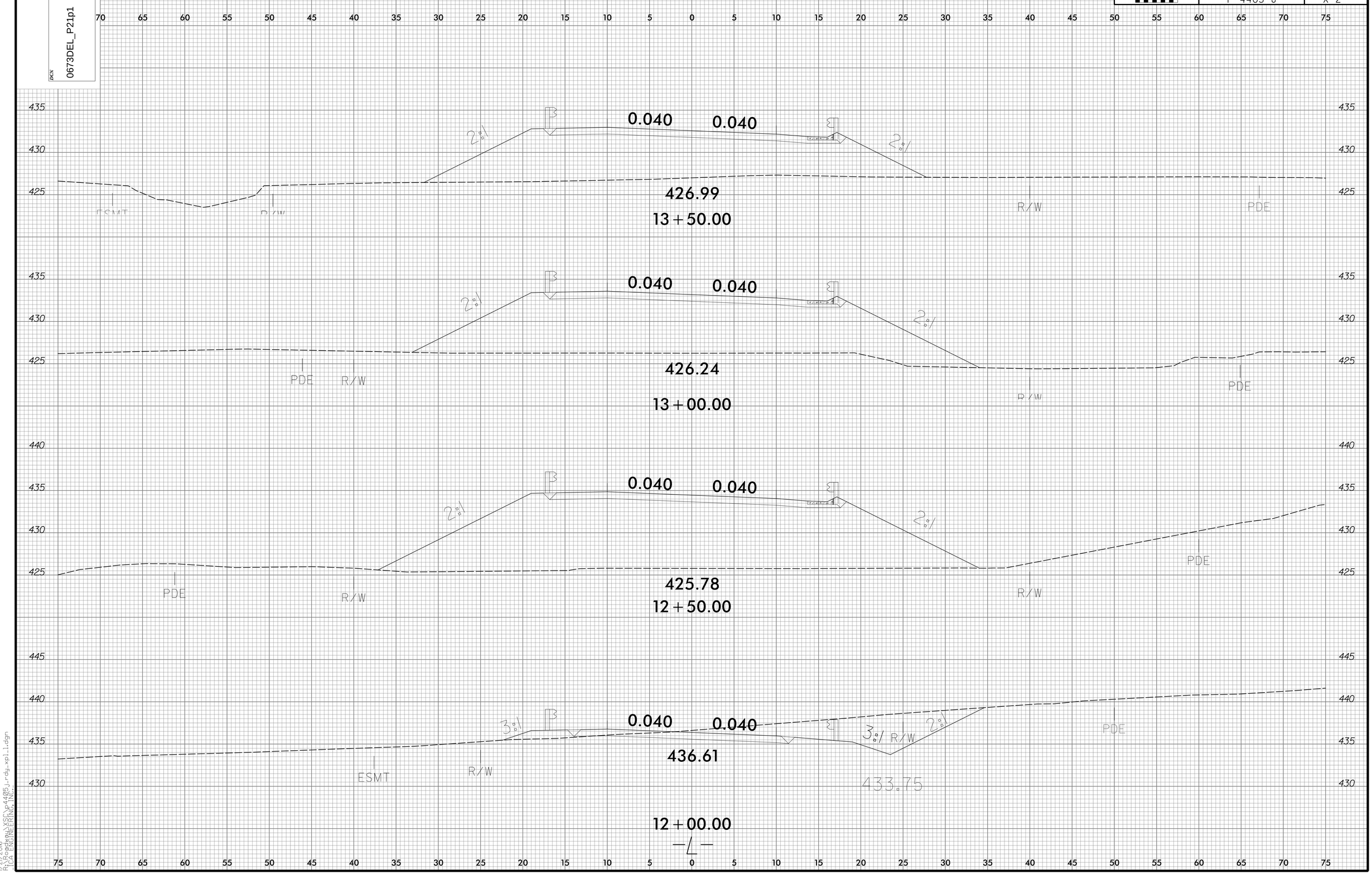

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PROJ. REFERENCE NO.	SHEET NO.
P-4405 J	X-3

0 2.5 5

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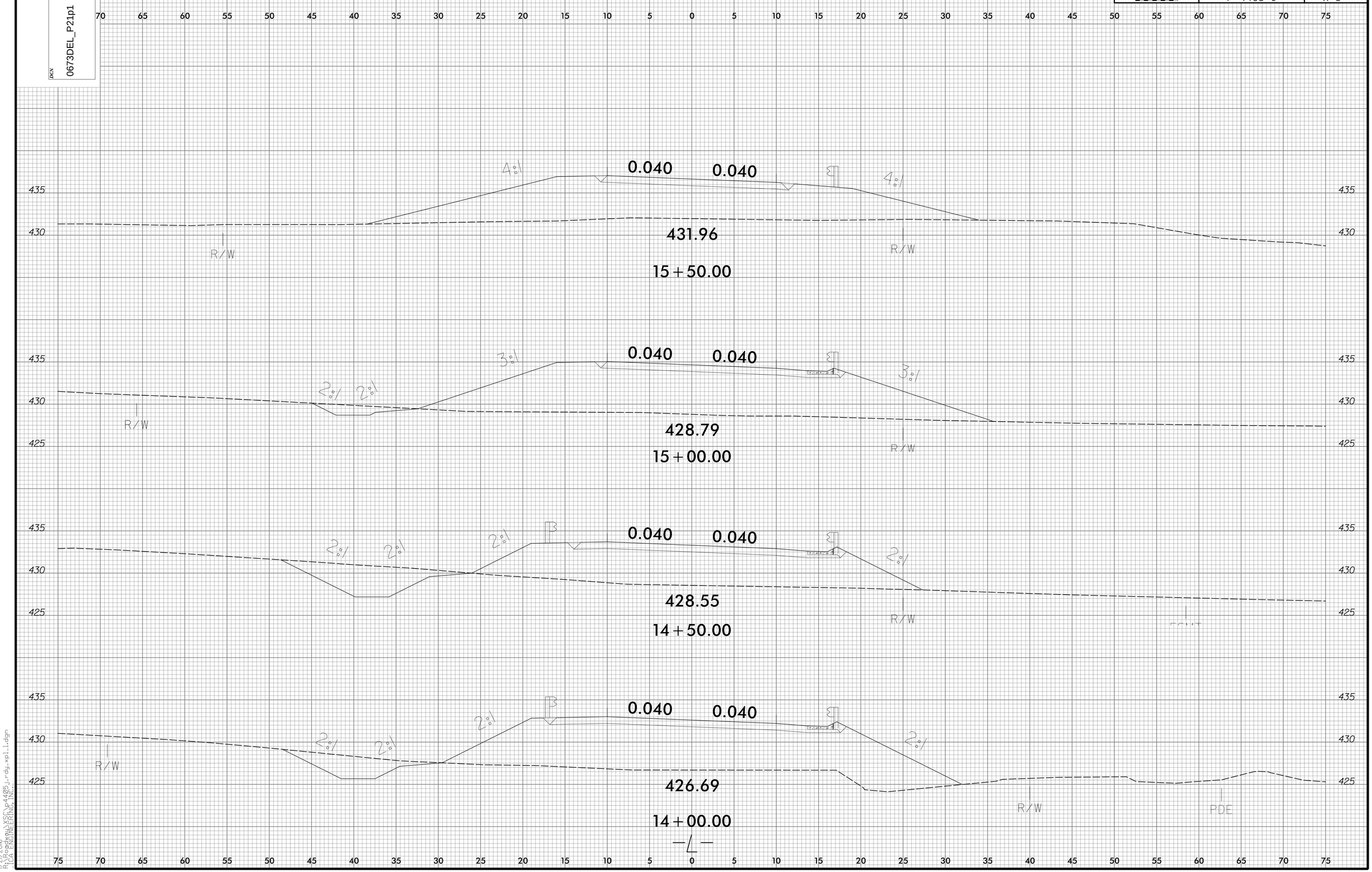

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0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	P-4405 J	X-4

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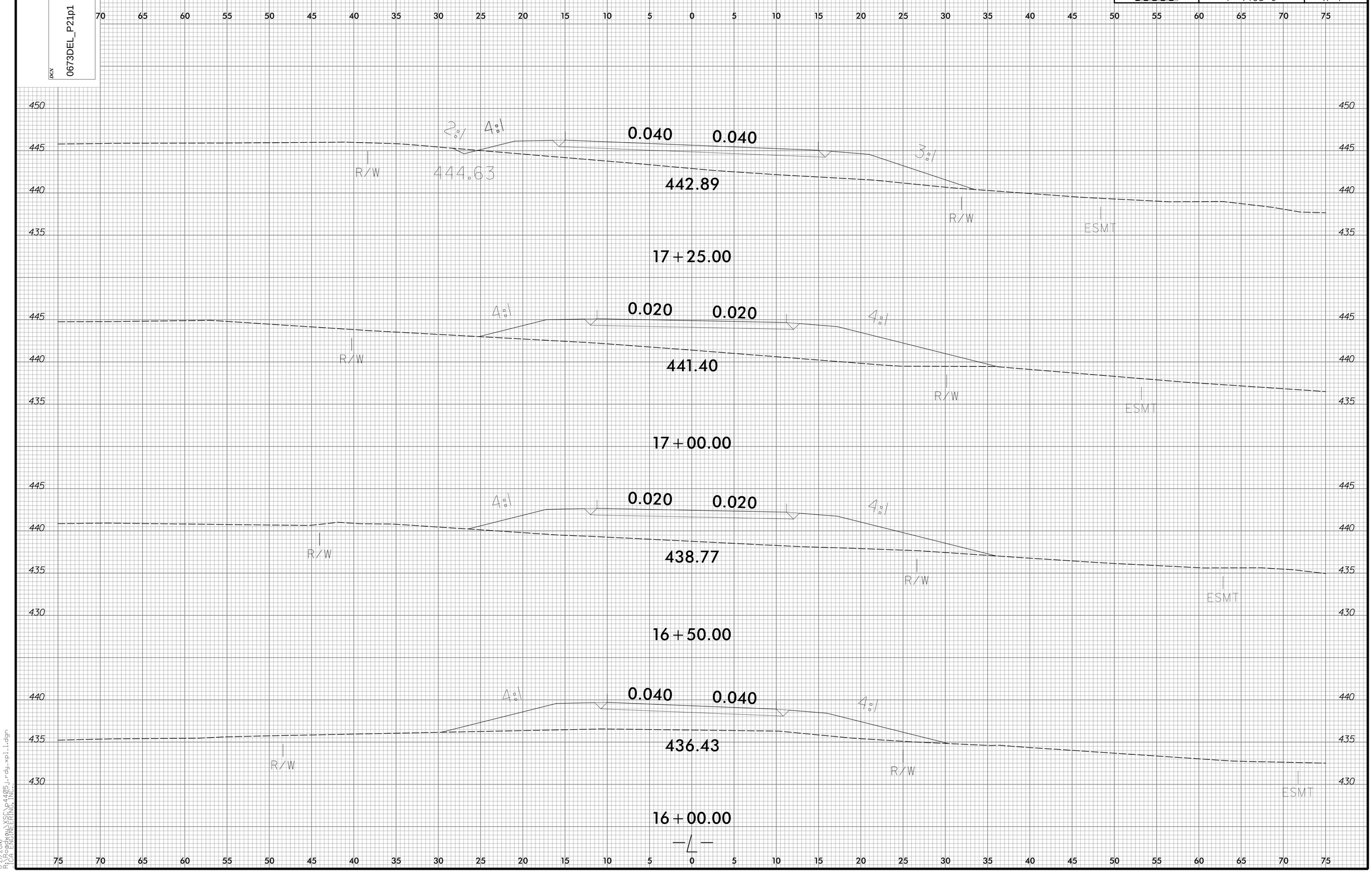

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TICA ENGINEERING, INC.

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	P-4405 J	X-5

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TICA ENGINEERING, INC.

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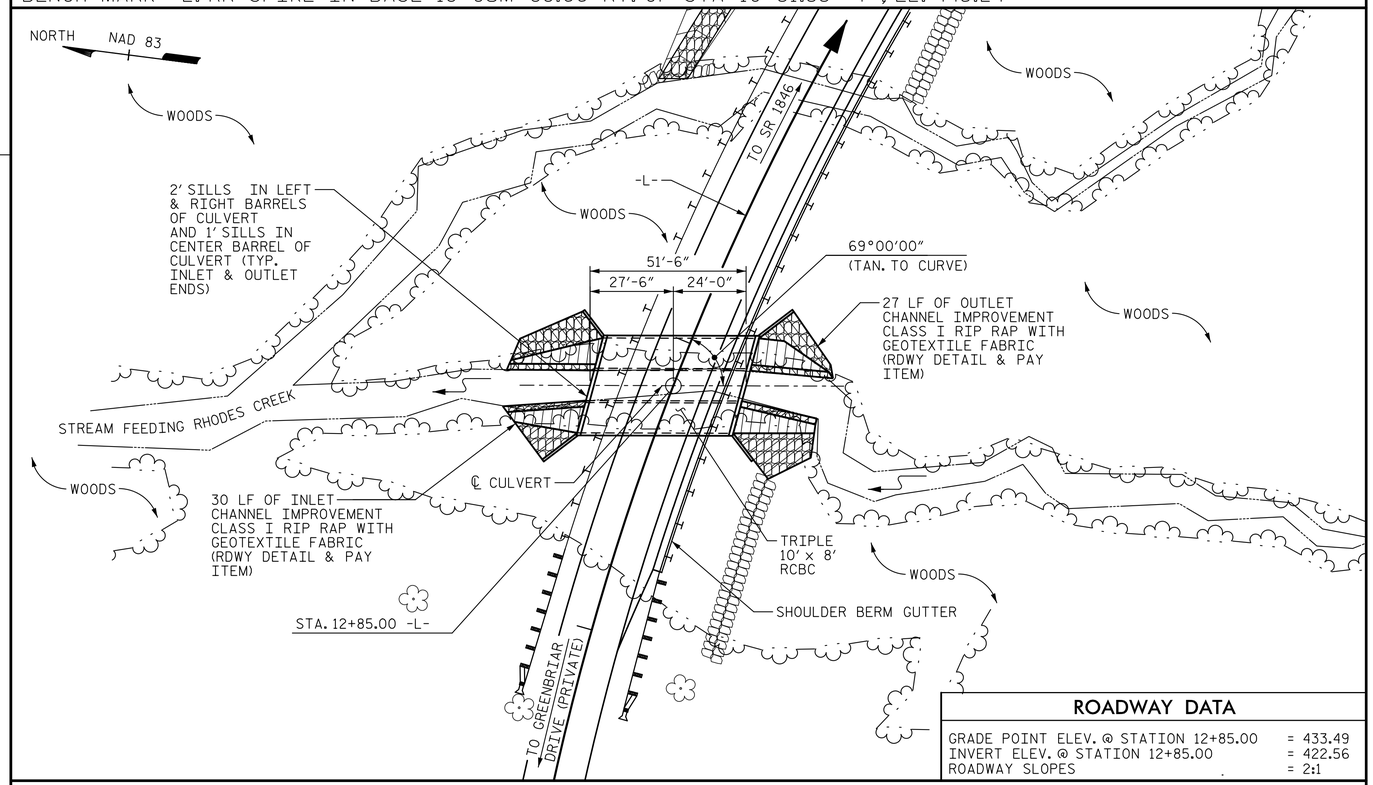
BENCH MARK #2: RR SPIKE IN BASE 18" GUM 88.66' RT. OF STA 10+31.33 -Y-, EL. 445.24



ROADWAY DATA

GRADE POINT ELEV. @ STATION 12+85.00	= 433.49
INVERT ELEV. @ STATION 12+85.00	= 422.56
ROADWAY SLOPES	= 2:1

LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE		
BARREL @ 3.753 CY/FT	193.3	C.Y.
WINGS, ETC.	29.6	C.Y.
SILLS/BAFFLES	3.7	C.Y.
TOTAL	226.6	C.Y.
REINFORCING STEEL		
BARREL, SILLS, BAFFLES	25,481	LBS.
WINGS, ETC.	1,547	LBS.
TOTAL	27,028	LBS.
FOUNDATION CONDITIONING MATERIAL	124	TONS
CULVERT EXCAVATION	LUMP SUM	
PLACEMENT OF NATIVE STREAM BED MATERIAL	LUMP SUM	

HYDRAULIC DATA

DESIGN DISCHARGE	= 950 CFS
FREQUENCY OF DESIGN FLOOD	= 25 YR.
DESIGN HIGH WATER ELEVATION	= 429.7
DRAINAGE AREA	= 1.17 SQ MI
BASE DISCHARGE (Q 100)	= 1,200 CFS
BASE HIGH WATER ELEVATION	= 430.41

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 1,983 CFS
FREQUENCY OF OVERTOPPING FLOOD	= 500 YR -
OVERTOPPING FLOOD ELEVATION	= 432.9

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

DESIGN FILL = 1.99'

STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.

A 3 FOOT STRIP OF GEOTEXTILE SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:

1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
2. THE REMAINING PORTIONS OF THE WALLS, SILLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.

THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.

DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALLS AND BOTH FACES OF INTERIOR WALLS ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

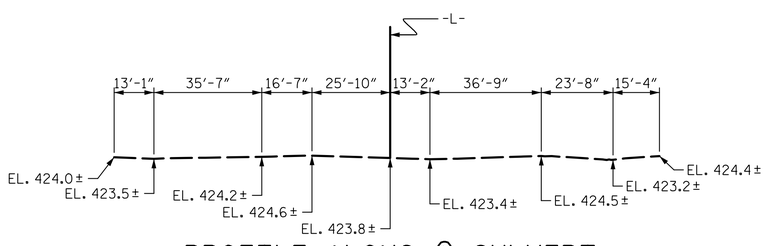
FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

3"Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.

NATIVE STREAM BED MATERIAL SHALL BE USED TO BACKFILL THE CULVERT BETWEEN SILLS. SEE SPECIAL PROVISIONS FOR "PLACEMENT OF NATIVE STREAM BED MATERIAL."

AT THE CONTRACTOR'S OPTION HE MAY SUBMIT, TO THE ENGINEER FOR APPROVAL, DESIGN AND DETAIL DRAWINGS FOR A PRECAST REINFORCED CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE CULVERT SHOWN ON THE PLANS. THE DESIGN SHALL PROVIDE THE SAME SIZE AND NUMBER OF BARRELS AS USED ON THE CAST-IN-PLACE DESIGN. FOR OPTIONAL PRECAST REINFORCED CONCRETE BOX CULVERT, SEE SPECIAL PROVISIONS.



PROFILE ALONG ℄ CULVERT

PROJECT NO. P-4405J

ORANGE COUNTY

STATION: 12+85.00 -L-

SHEET 1 OF 6 CULVERT NO. 670345

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BARREL STANDARD TRIPLE 10 FT. X 8 FT. CONCRETE BOX CULVERT 69° SKEW

NORTH CAROLINA PROFESSIONAL SEAL 43031 ENGINEER MATTHEW T. NEITHEISEL

DocuSigned by: Matthew T. Neitheisel
84E31BF9E30749E...
2/23/2016

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5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

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2			4				6

ASSEMBLED BY : D. H. CARTER	DATE : JAN 2016	SPECIAL
CHECKED BY : M. T. NEITHEISEL	DATE : JAN 2016	
DRAWN BY : R.W.WRIGHT	DATE : OCT. 1989	STANDARD
CHECKED BY : A.R.BISSETTE	DATE : OCT. 1989	

2/23/2016
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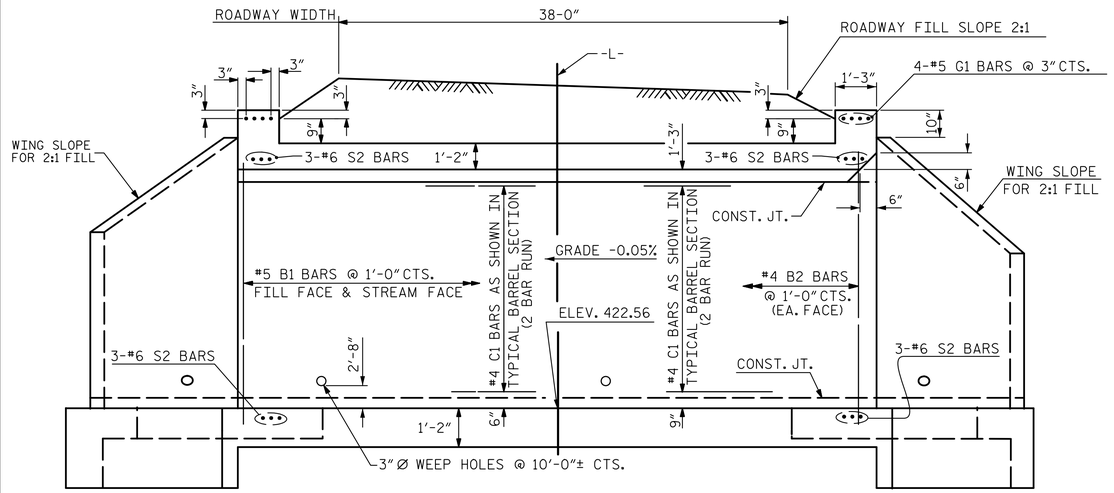
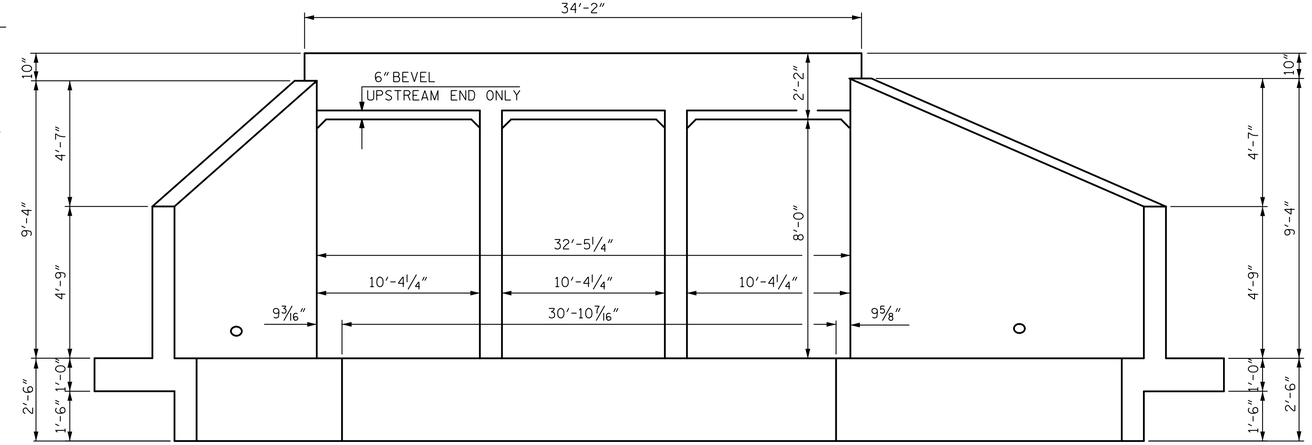
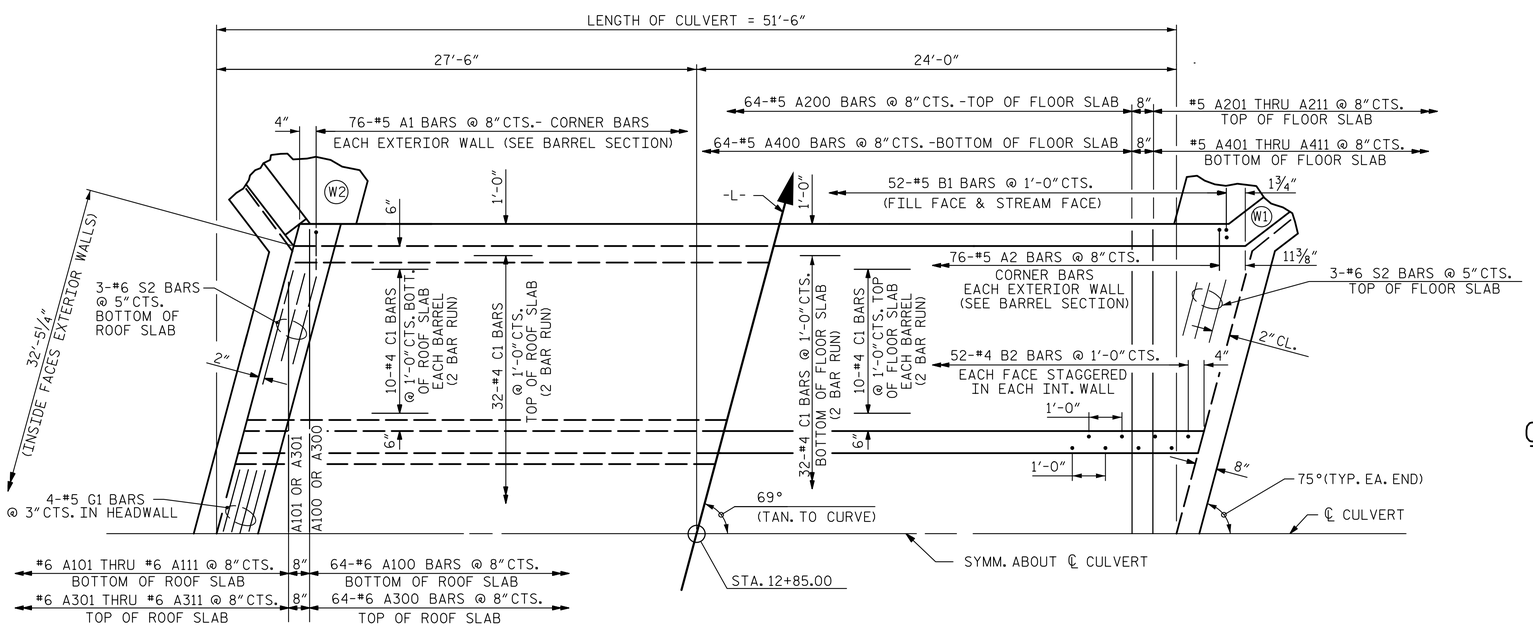


EXTERIOR WALL INTERIOR WALL

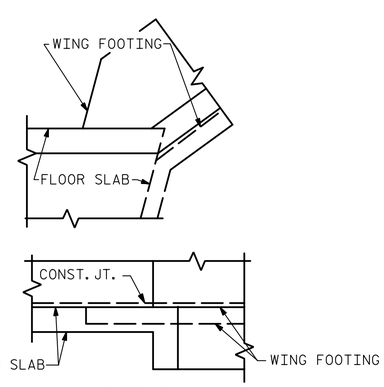
CULVERT SECTION NORMAL TO ROADWAY



END ELEVATION NORMAL TO SKEW

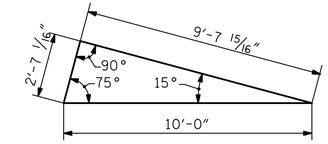


PART PLAN - ROOF SLAB PART PLAN - FLOOR SLAB



DETAIL

CONNECTION OF WING FOOTING AND FLOOR SLAB WHEN SLAB IS THICKER THAN FOOTING



SKEW TRIANGLE

PROJECT NO. P-4405J

ORANGE COUNTY

STATION: 12+85.00 -L-

SHEET 2 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BARREL STANDARD
TRIPLE 10 FT. X 8 FT.
CONCRETE BOX CULVERT
69° SKEW

NORTH CAROLINA PROFESSIONAL SEAL 43031 ENGINEER MATTHEW T. NEIHEISEL

DocuSigned by: Matthew T. Neiheisel
84E31BF9E30749E...
2/23/2016

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5121 Kingdom Way, Suite 100 Raleigh, NC 27607
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2			4				

ASSEMBLED BY : D. H. CARTER	DATE : JAN 2016	SPECIAL	
CHECKED BY : M. T. NEIHEISEL	DATE : JAN 2016		
DRAWN BY : R.F. HOLMES	DATE : NOV. 1971	STANDARD	
CHECKED BY : J.A. JOHNSON	DATE : NOV. 1971		

REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.
REVISED 8-28-92 BY E.L.R.; BY G.R.P.
REDRAWN 10-16-89 BY R.W.W.; BY A.R.B.

STD. NO. CB23

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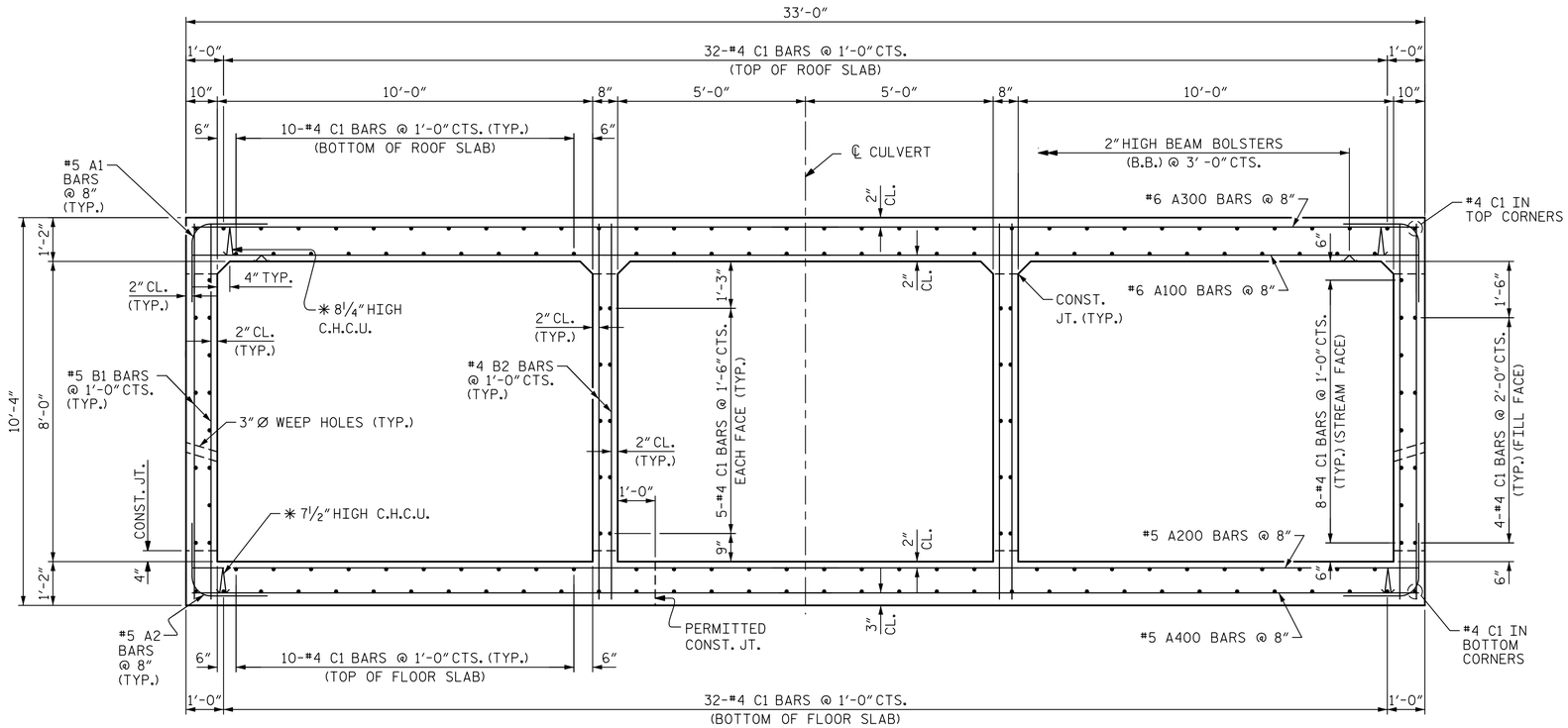
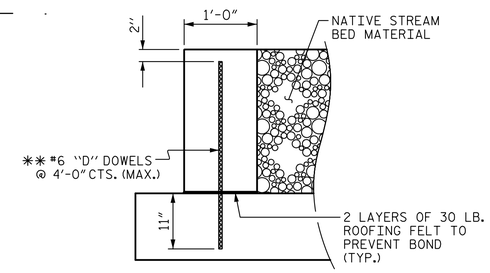


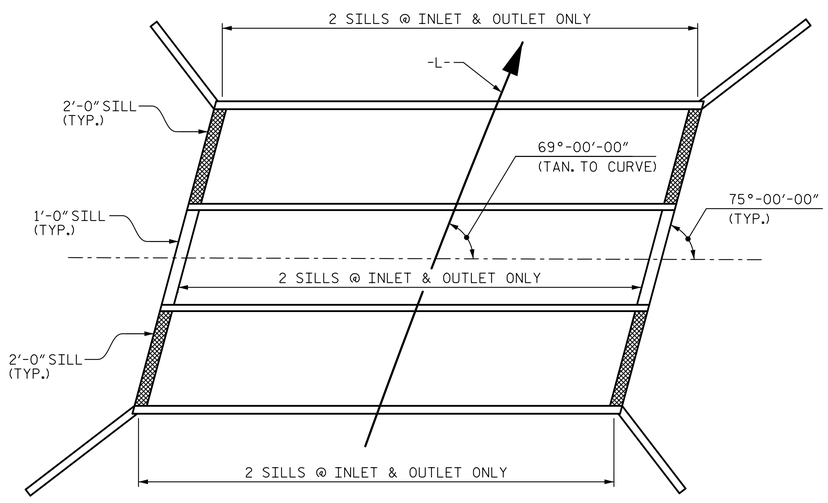
RIGHT ANGLE SECTION OF BARREL

THERE ARE 172 "C" BARS IN SECTION OF BARREL.
✱ ALL CONTINUOUS HIGH CHAIR UPPER (C.H.C.U.) @ 3'-0" CTS.

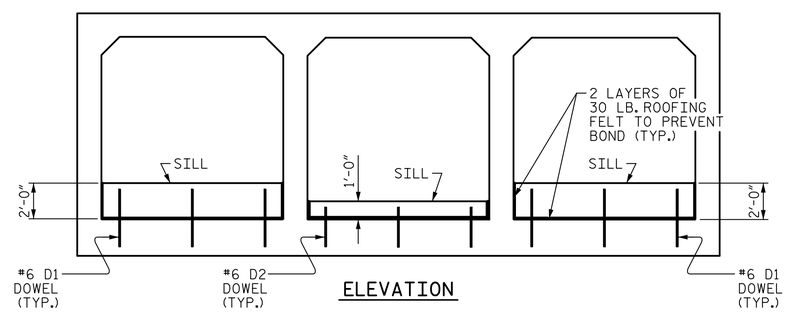


SECTION

✱✱ DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED.



PLAN VIEW SHOWING SILL LOCATIONS

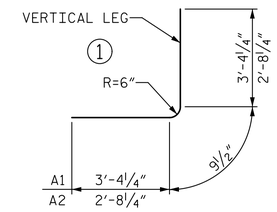


ELEVATION

SILL DETAILS

(LOOKING DOWN STREAM)

BAR TYPES



SPLICE LENGTH CHART

BAR	SIZE	SPLICE LENGTH
A200	#5	2'-5"
A400	#5	1'-9"
B1	#4	1'-5"
B2	#4	1'-5"
C1	#4	1'-11"

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	152	5	1	7'-6"	1,189
A2	152	5	1	6'-2"	978
A100	64	6	STR	32'-8"	3,140
A101	2	6	STR	31'-0"	93
A102	2	6	STR	28'-6"	86
A103	2	6	STR	26'-0"	78
A104	2	6	STR	23'-6"	71
A105	2	6	STR	21'-0"	63
A106	2	6	STR	18'-6"	56
A107	2	6	STR	16'-0"	48
A108	2	6	STR	13'-6"	41
A109	2	6	STR	11'-0"	33
A110	2	6	STR	8'-6"	26
A111	2	6	STR	6'-0"	18
A200	64	5	STR	32'-8"	2181
A201	2	5	STR	31'-0"	65
A202	2	5	STR	28'-6"	59
A203	2	5	STR	26'-0"	54
A204	2	5	STR	23'-6"	49
A205	2	5	STR	21'-0"	44
A206	2	5	STR	18'-6"	39
A207	2	5	STR	16'-0"	33

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A208	2	5	STR	13'-6"	28
A209	2	5	STR	11'-0"	23
A210	2	5	STR	8'-6"	18
A211	2	5	STR	6'-0"	13
A300	64	6	STR	32'-8"	3,140
A301	2	6	STR	31'-0"	93
A302	2	6	STR	28'-6"	86
A303	2	6	STR	26'-0"	78
A304	2	6	STR	23'-6	71
A305	2	6	STR	21'-0"	63
A306	2	6	STR	18'-6"	56
A307	2	6	STR	16'-0"	48
A308	2	6	STR	13'-6"	41
A309	2	6	STR	11'-0"	33
A310	2	6	STR	8'-6"	26
A311	2	6	STR	6'-0"	18
A400	64	5	STR	32'-8"	2181
A401	2	5	STR	31'-0"	65
A402	2	5	STR	28'-6"	59
A403	2	5	STR	26'-0"	54
A404	2	5	STR	23'-6"	49
A405	2	5	STR	21'-0"	44
A406	2	5	STR	18'-6"	39
A407	2	5	STR	16'-0"	33
A408	2	5	STR	13'-6"	28
A409	2	5	STR	11'-0"	23
A410	2	5	STR	8'-6"	18
A411	2	5	STR	6'-0"	13
B1	208	5	STR	9'-11"	2,151
B2	208	4	STR	9'-11"	1,378
C1	344	4	STR	26'-7"	6,109
D1	12	6	STR	2'-9"	50
D2	6	6	STR	1'-9"	16
G1	8	5	STR	33'-10"	282
S2	12	6	STR	33'-10"	610

REINFORCING STEEL 25,481 LBS

CLASS A CONCRETE
CULVERT 193.3 CY
BAFFLES, SILLS 3.7 CY
TOTAL 197.0 CY

PROJECT NO. P-4405J

ORANGE COUNTY

STATION: 12+85.00 -L-

SHEET 3 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CULVERT DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 43031 ENGINEER MATTHEW T. NEIHEISEL

DocuSigned by: Matthew T. Neiheisel
84E318F9E30749E...
2/23/2016

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TOTAL SHEETS 6

DRAWN BY : D. H. CARTER DATE : JAN 2016
CHECKED BY : T. E. TALLMAN DATE : JAN 2016
DESIGN ENGINEER OF RECORD: M. T. NEIHEISEL DATE : JAN 2016

2/23/2016
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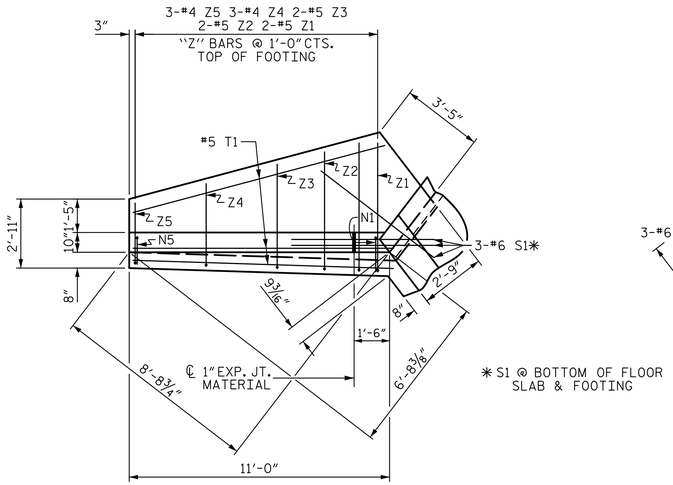
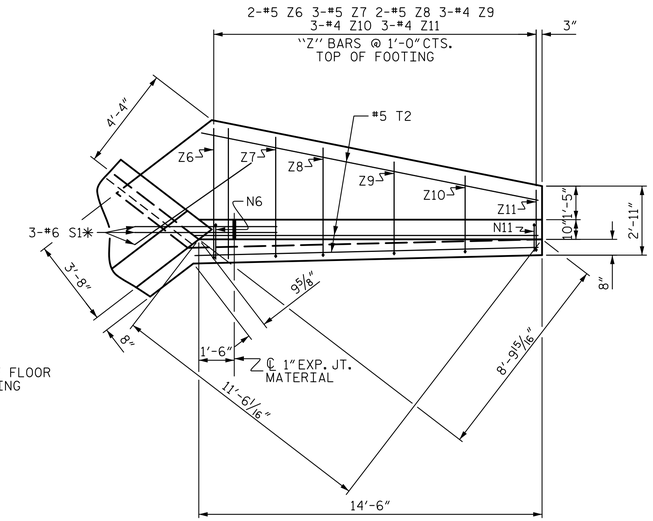
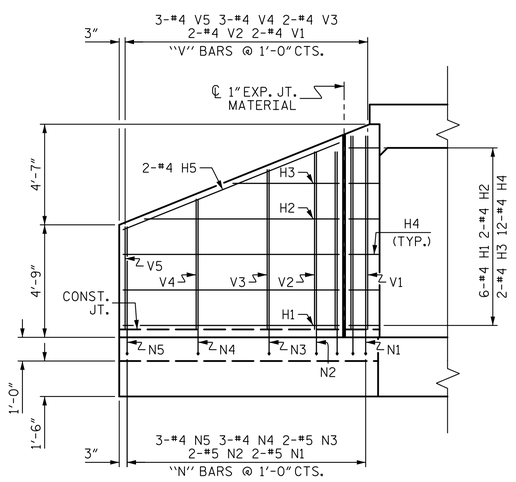


✱ S1 @ BOTTOM OF FLOOR SLAB & FOOTING

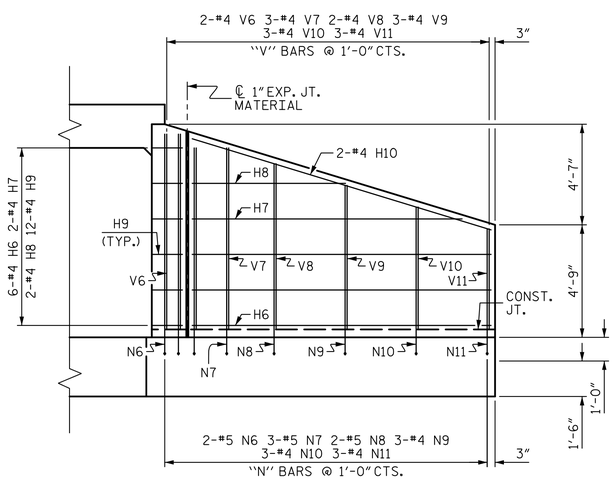
PLAN W2



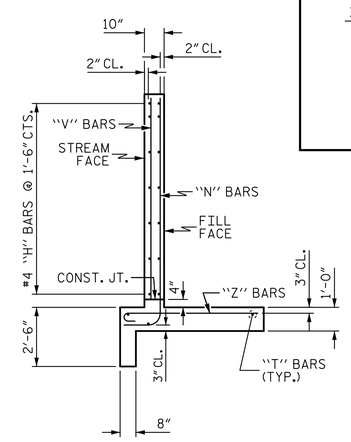
PLAN W1



ELEVATION W2



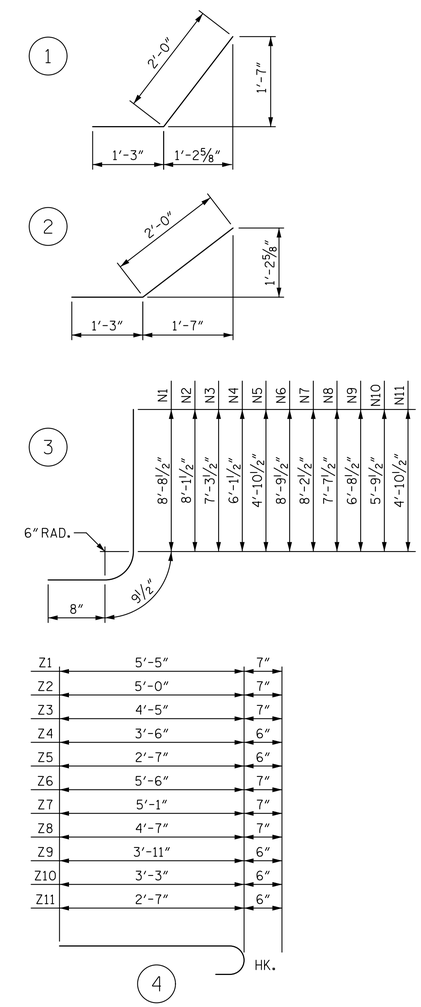
ELEVATION W1



TYPICAL WING SECTION

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	9'-1"	73
H2	4	#4	STR	8'-2"	22
H3	4	#4	STR	4'-5"	12
H4	24	#4	1	3'-3"	52
H5	4	#4	STR	9'-10"	26
H6	12	#4	STR	12'-7"	101
H7	4	#4	STR	11'-4"	30
H8	4	#4	STR	6'-5"	17
H9	24	#4	2	3'-3"	52
H10	4	#4	STR	13'-2"	35
N1	4	#5	3	10'-2"	42
N2	4	#5	3	9'-7"	40
N3	4	#5	3	8'-9"	37
N4	6	#4	3	7'-7"	30
N5	6	#4	3	6'-4"	25
N6	4	#5	3	10'-3"	43
N7	6	#5	3	9'-8"	60
N8	4	#5	3	9'-1"	38
N9	6	#4	3	8'-2"	33
N10	6	#4	3	7'-3"	29
N11	6	#4	3	6'-4"	25
S1	12	#6	STR	6'-0"	108
T1	6	#5	STR	11'-0"	69
T2	6	#5	STR	14'-6"	91
V1	4	#4	STR	8'-2"	22
V2	4	#4	STR	7'-6"	20
V3	4	#4	STR	6'-9"	18
V4	6	#4	STR	5'-6"	22
V5	6	#4	STR	4'-4"	17
V6	4	#4	STR	8'-3"	22
V7	6	#4	STR	7'-8"	31
V8	4	#4	STR	7'-0"	19
V9	6	#4	STR	6'-1"	24
V10	6	#4	STR	5'-2"	21
V11	6	#4	STR	4'-3"	17
Z1	4	#5	4	6'-0"	25
Z2	4	#5	4	5'-7"	23
Z3	4	#5	4	5'-0"	21
Z4	6	#4	4	4'-0"	16
Z5	6	#4	4	3'-1"	12
Z6	4	#5	4	6'-1"	25
Z7	6	#5	4	5'-8"	35
Z8	4	#5	4	5'-2"	22
Z9	6	#4	4	4'-5"	18
Z10	6	#4	4	3'-9"	15
Z11	6	#4	4	3'-1"	12

REINFORCING STEEL FOR 4 WINGS 1547 LBS

CLASS A CONCRETE
- 4 WINGS 22.6 CY
- 2 HEADWALLS 3.2 CY
- 2 END CURTAIN WALLS 3.8 CY
- TOTAL 29.6 CY

PROJECT NO. P-4405J

ORANGE COUNTY

STATION: 12+85.00 -L-

SHEET 4 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT

H = 8'-0" SLOPE = 2:1

75° SKEW

NORTH CAROLINA PROFESSIONAL SEAL 43031 ENGINEER MATTHEW T. NEIHEISEL

DocuSigned by: Matthew T. Neiheisel
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2/3/2016

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2			4				6

STD. NO. CW7508

ASSEMBLED BY : D. H. CARTER		DATE : JAN 2016	
CHECKED BY : M. T. NEIHEISEL		DATE : JAN 2016	
DRAWN BY : CCJ	01/00		
CHECKED BY : RWW	03/00		

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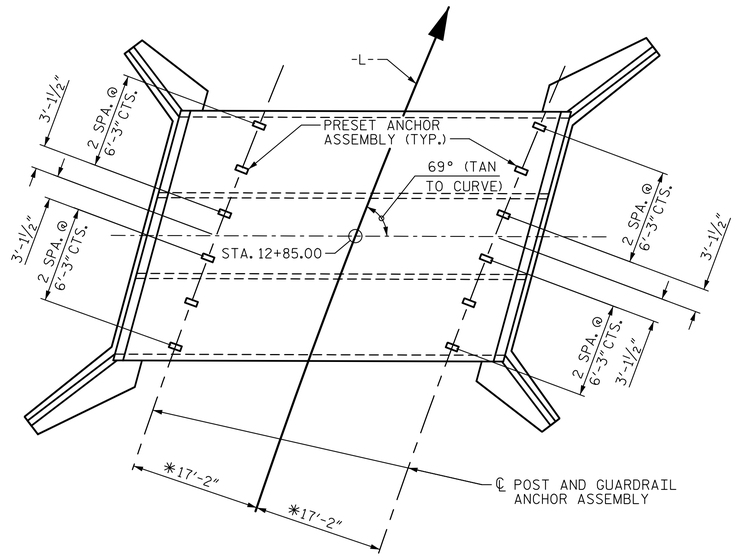


* THIS DIMENSION TO BE CONFIRMED BY THE ENGINEER IN THE FIELD.

PLAN

SHOWING : GUARDRAIL ANCHOR ASSEMBLY SPACING.

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS SHALL CONSIST OF THE FOLLOWING COMPONENTS :

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2½".

B. 4 - 1" Ø X 2¼" BOLTS WITH WASHERS, BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 1" Ø X 2¼" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

C. WIRE STRUTS SHOWN IN THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS DETAIL ARE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 P.S.I. AS AN OPTION, A 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

GUARDRAIL ANCHOR ASSEMBLY WITH BOLTS SHALL BE ASSEMBLED IN THE SHOP. BOLT THREADS MAY BE RECUT AS NECESSARY TO INSURE FIT.

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CLASS "A" CONCRETE.

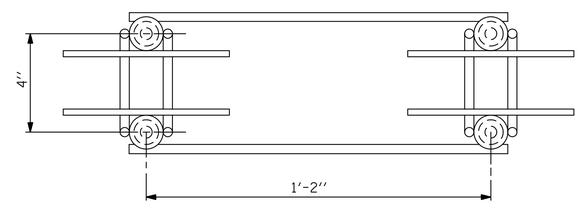
FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

AT THE CONTRACTOR'S OPTION, FERRULES WITH OPEN OR CLOSED ENDS MAY BE USED.

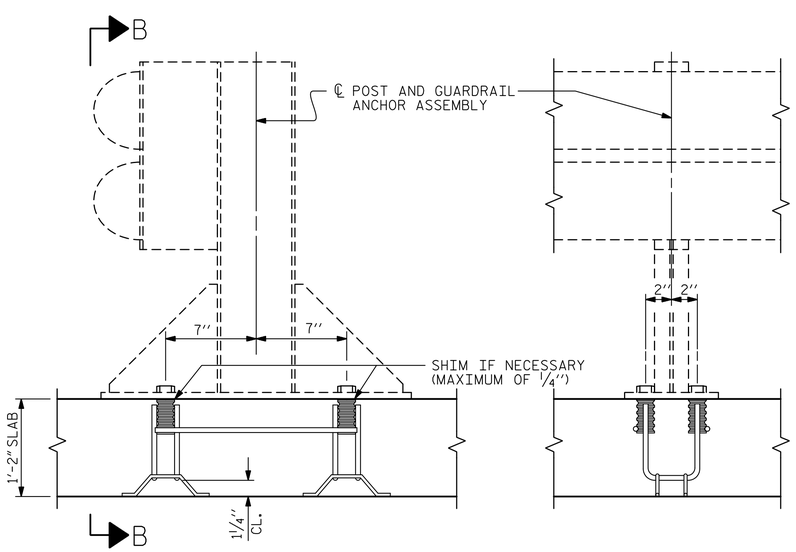
PAYMENT FOR GUARDRAIL, POSTS, AND POST BASE PLATES IS INCLUDED IN ROADWAY PAY ITEMS.

SLAB REINFORCING STEEL MAY BE SHIFTED AS NECESSARY TO CLEAR GUARDRAIL ANCHOR ASSEMBLY. CARE SHOULD BE TAKEN TO KEEP THE SHIFTING OF REINFORCING STEEL TO A MINIMUM.

THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF GUARDRAIL ANCHOR ASSEMBLY. LEVEL TWO FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 1"Ø BOLT IS 21.8 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS.

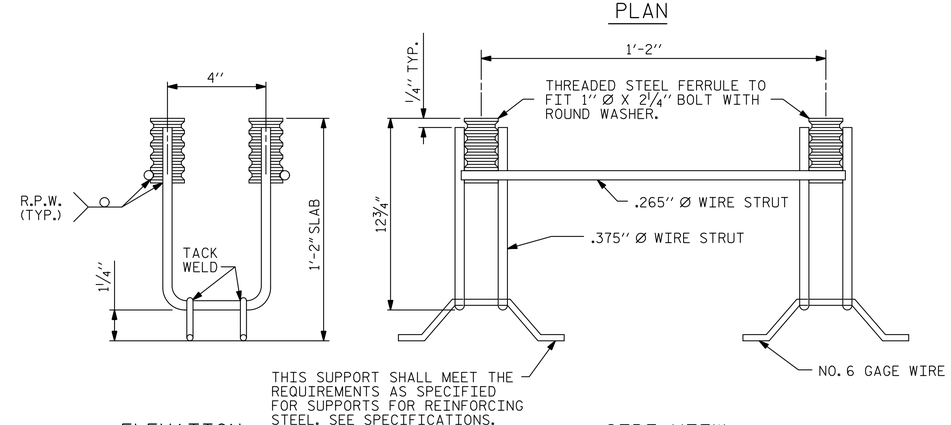


PLAN



SECTION A-A

SECTION B-B



ELEVATION

SIDE VIEW

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

PROJECT NO. P-4405J

ORANGE COUNTY

STATION: 12+85.00 -L-

SHEET 5 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

ANCHORAGE DETAILS FOR GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

NORTH CAROLINA PROFESSIONAL SEAL 43031 ENGINEER MATTHEW T. NEIHEISEL

DocuSigned by: Matthew T. Neiheisel
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ASSEMBLED BY : D. H. CARTER		DATE : JAN 2016	
CHECKED BY : M. T. NEIHEISEL		DATE : JAN 2016	
DRAWN BY : FCJ	6/88	REV. 7/10/01	LES/RDR
CHECKED BY : ARB	6/88	REV. 5/7/03	RWW/JTE
		REV. 5/1/06R	KMM/GM

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LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
							LIVE-LOAD FACTORS (γ_{LL})	MOMENT				SHEAR				
								RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	**1.76**	--	1.75	1.77	1	TOP SLAB	5.00	**1.76**	1	TOP SLAB	**0.30**	1
		HL-93 (OPERATING)	N/A		2.29	--	1.35	2.29	1	TOP SLAB	5.00	2.29	1	TOP SLAB	0.30	1
		HS-20 (INVENTORY)	36.000	2	**1.76**	63.4	1.75	1.77	1	TOP SLAB	5.00	**1.76**	1	TOP SLAB	**0.30**	1
		HS-20 (OPERATING)	36.000		2.29	82.4	1.35	2.29	1	TOP SLAB	5.00	2.29	1	TOP SLAB	0.30	1
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.07	54.9	1.40	4.07	1	TOP SLAB	5.00	4.58	1	TOP SLAB	9.70	1
		SNGARBS2	20.000		3.81	76.2	1.40	3.81	1	TOP SLAB	5.00	4.20	1	TOP SLAB	9.70	1
		SNAGRIS2	22.000		4.07	89.5	1.40	4.07	1	TOP SLAB	5.00	4.58	1	TOP SLAB	9.70	1
		SNCOTTS3	27.250	3	**2.02**	55.0	1.40	2.58	1	INTERIOR WALL	8.00	**2.02**	1	TOP SLAB	**9.70**	2
		SNAGGRS4	34.925		2.76	96.4	1.40	3.17	1	INTERIOR WALL	8.00	2.76	1	TOP SLAB	9.70	2
		SNS5A	35.550		2.47	87.8	1.40	2.99	1	INTERIOR WALL	8.00	2.47	1	TOP SLAB	9.70	2
		SNS6A	39.950		2.38	95.1	1.40	2.99	1	INTERIOR WALL	8.00	2.38	1	TOP SLAB	9.70	2
		SNS7B	42.000		2.38	100.0	1.40	2.99	1	INTERIOR WALL	8.00	2.38	1	TOP SLAB	9.70	2
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		3.91	129.0	1.40	3.91	1	TOP SLAB	5.00	4.09	1	TOP SLAB	9.70	1
		TNT4A	33.075		2.53	83.7	1.40	3.06	1	INTERIOR WALL	8.00	2.53	1	TOP SLAB	9.70	2
		TNT6A	41.600		2.47	102.8	1.40	2.99	1	INTERIOR WALL	8.00	2.47	1	TOP SLAB	9.70	2
		TNT7A	42.000		2.50	105.0	1.40	3.03	1	INTERIOR WALL	8.00	2.50	1	TOP SLAB	9.70	2
		TNT7B	42.000		2.49	104.6	1.40	3.00	1	INTERIOR WALL	8.00	2.49	1	TOP SLAB	9.70	2
		TNAGRIT4	43.000		2.45	105.4	1.40	3.06	1	INTERIOR WALL	8.00	2.45	1	TOP SLAB	9.70	2
		TNAGT5A	45.000		2.49	112.1	1.40	3.05	1	INTERIOR WALL	8.00	2.49	1	TOP SLAB	9.70	2
		TNAGT5B	45.000		2.46	110.7	1.40	3.04	1	INTERIOR WALL	8.00	2.46	1	TOP SLAB	9.70	2

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

1. MOMENT AND SHEAR RATINGS WERE CONTROLLED BY ANALYSIS WITH 1.99′ OF FILL ON TOP OF THE CULVERT.
2. MOMENT RATINGS WERE CONTROLLED BY ANALYSIS WITH 0.4′ OF FILL ON TOP OF THE CULVERT. SHEAR RATINGS WERE CONTROLLED BY ANALYSIS WITH 1.99′ OF FILL ON TOP OF THE CULVERT.

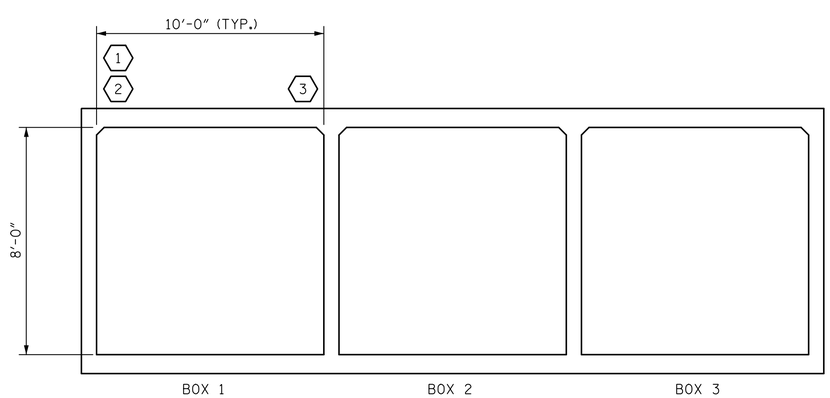
(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. P-4405J

ORANGE COUNTY

STATION: 12+85.00 -L-

SHEET 6 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS
(NON-INTERSTATE TRAFFIC)

NORTH CAROLINA PROFESSIONAL SEAL 43031 ENGINEER MATTHEW T. NEIHEISEL

DocuSigned by: Matthew T. Neiheisel
84E31BF9E30749E...
2/3/2016

ICA Engineering
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0258

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

ASSEMBLED BY : D. H. CARTER DATE : JAN 2016
CHECKED BY : M. T. NEIHEISEL DATE : JAN 2016
DRAWN BY : WMC 7/11
CHECKED BY : GM 7/11
REV. 10/1/11 MAA/GM

STD. NO. LRFR5

1/20/2016
ICA Engineering
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