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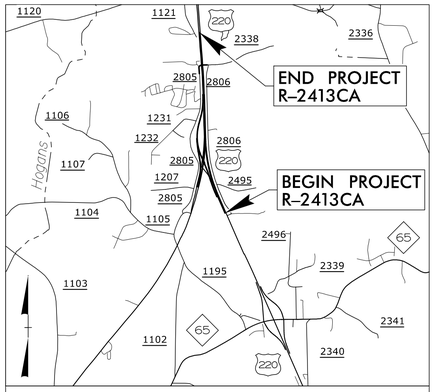
This file or an individual page shall not be considered a certified document.

9/09/99

CONTRACT: C203645 TIP PROJECT: R-2413CA

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



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ROCKINGHAM COUNTY

LOCATION: *US 220 /FUTURE I-73 AT NC 68 – CONVERT AT-GRADE INTERSECTION TO INTERCHANGE*

TYPE OF WORK: *GRADING, DRAINAGE, STRUCTURE & PAVING*

ALL DIMENSIONS IN THESE PLANS ARE IN METERS AND/OR MILLIMETERS UNLESS OTHERWISE NOTED

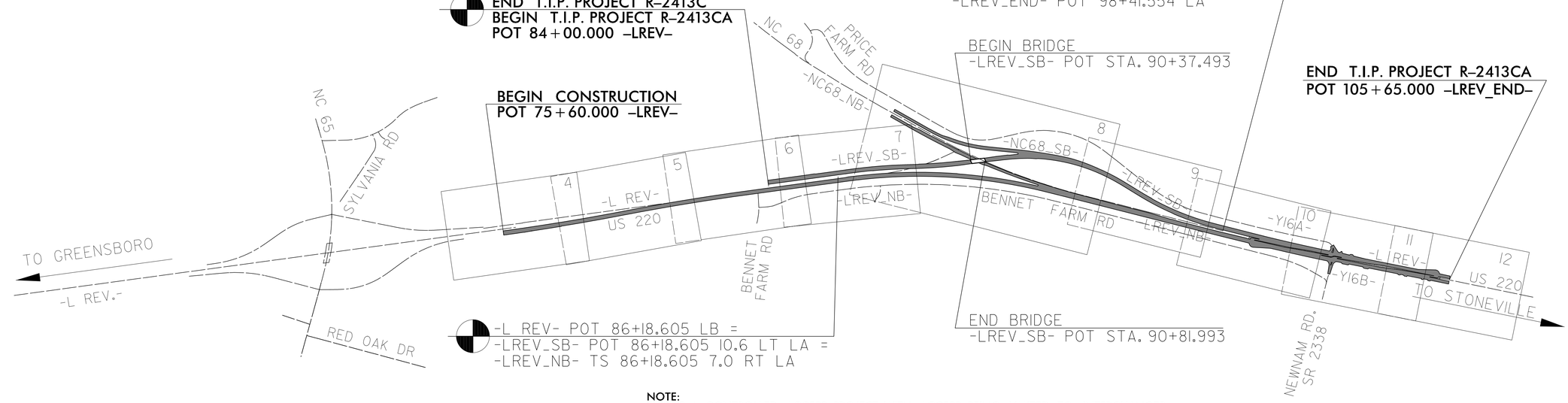
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2413CA	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34429.3.S9		PE
34429.3.S9		UTIL
34429.3.S9		CONST

NAD 83

END T.I.P. PROJECT R-2413C
BEGIN T.I.P. PROJECT R-2413CA
POT 84+00.000 –LREV–

-LREV_SB ST 98+72.769 8.1LT LB =
-LREV_NB POT 98+39.270 7.0 RT LB =
-LREV_END- POT 98+41.554 LA



NCDOT CONTACT: RON E. McCULLUM, P.E., PROJECT ENGINEER

NOTE:
THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.
THERE IS NO CONTROL OF ACCESS BEYOND THE INTERSECTION OF SR 2338 (NEWNAM RD.)

GRAPHIC SCALES

5 0 10
PLANS

5 0 10
PROFILE (HORIZONTAL)

1 0 2
PROFILE (VERTICAL)

DESIGN DATA

ADT 2014 = 22600
ADT 2034 = 48600
DHV = 12 %
D = 65 %
T = 17 % *
*(13% TTST +4% DUALS)
V = 110 km/h
FUNC. CLASS.: INTERSTATE
STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY T.I.P PROJECT R-2413CA 2.163 KM (1.344 MI)

TOTAL LENGTH T.I.P. PROJECT R-2413CA 2.163 KM (1.344 MI)

NOTE: NB LANE STATIONING USED TO DETERMINE LENGTH OF ROADWAY T.I.P. PROJECT

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:
RIGHT-OF-WAY WAS ACQUIRED UNDER R-2413C

LETTING DATE:
JUNE 16, 2015

DAVID C. WALLER, P.E.
PROJECT ENGINEER

HENRY BARE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 19732 ENGINEER SHICHEN FUH

DocuSigned by: Shichen Fuh F14BC27398BE439...

P.E. 4/8/2015

SIGNATURE:

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 22606 ENGINEER DAVID C. WALLER

DocuSigned by: David C. Waller 89ADDF7156C5435...

P.E. 4/8/2015

SIGNATURE:

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

4/8/2015
R:\Roadway\Proj\R2413CA_rdy_tsh.dgn
TSH ENGINEERING INC.

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	1A

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 22606 ENGINEER DAVID C. WALLER

4/8/2015

INDEX OF SHEETS

SHEET NUMBER	DESCRIPTION
1	Title Sheet
1A	Index of Sheets, General Notes, List of Standards
1B	Conventional Symbols
1C-1 thru 1C-2	Survey Control Sheets
1D	Centerline Coordinate List
2A-1 thru 2A-4	Typical Sections, Pavement Schedule and Wedging Details
2B-1 thru 2B-9	Detail Sheets and Sheer Point Diagrams
2C-1	Structure Anchor Unit Detail
2C-2	Convert Existing DI, CB, DTCB, or GI to Junction Box (Manhole Optional)Detail
2C-3	Detail of Temporary 1" Steel Cover over Drainage Structure
2C-4	Detail to Convert Existing DI, CB or JB to 2-GI
2D-1	Inlet/Outlet Channel Improvement Detail
3B-1 thru 3B-3	Summary of Guardrail, Summary of Earthwork and Summary of Pavement Removal
3D-1 thru 3D-3	Summary of Drainage Quantities
3G-1	Summary of Geotechnical Quantities
4 thru 12	Plan Sheets
13 thru 24	Profile Sheets
TMP-1 thru TMP-34	Transportation Management Plans
PMP-1 thru PMP-10	Pavement Marking Plans
EC-1 thru EC-21	Erosion Control Plans
SIGN-1 thru SIGN-11	Signing Plans
SIG-1 thru SIG-2.4	Signal Plans
UO-1 thru UO-4	Utility Plans by Others
X-1 thru X-65	Cross-Sections
S-1 thru S-28	Structure Plans
W-1 thru W-2	Retaining Wall No. 1 Plans

GENERAL NOTES:

2012 SPECIFICATIONS
EFFECTIVE: 01-17-12
REVISED: 07/30/12

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 III.

SUPERELEVATION:

ALL CURVES ON THIS PROJECT SHALL BE SUPERELEVATED IN ACCORDANCE WITH STD. NO. 225.04 OR STD. NO. 225.05 USING THE RATE OF SUPERELEVATION AND RUNOFF SHOWN ON THE PLANS. SUPERELEVATION IS TO BE REVOLVED ABOUT THE GRADE POINTS SHOWN ON THE TYPICAL SECTIONS.

SHOULDER CONSTRUCTION:

ASPHALT, EARTH, AND CONCRETE SHOULDER CONSTRUCTION ON THE HIGH SIDE OF SUPERELEVATED CURVES SHALL BE IN ACCORDANCE WITH STD. NO. 560.01 OR STD. NO. 560.02.

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.

BERM DITCHES:

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

UNDERDRAINS:

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

SHOULDER DRAINS:

SHOULDER DRAINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. NO. 816.03 AND DETAILS IN PLANS 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.

END BENTS:

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

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE DUKE ENERGY PROGRESS.

CENTURY LINK, PIEDMONT NATURAL GAS CO. INC., ROCKINGHAM COUNTY

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

2012 ROADWAY ENGLISH STANDARD DRAWINGS

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

STD.NO.	TITLE
DIVISION 2 - EARTHWORK	
200.03	Method of Clearing - Method III
225.01	Guide for Grading Subgrade - Interstate and Freeway
225.02	Guide for Grading Subgrade - Secondary and Local
225.03	Deceleration and Acceleration Lanes
225.04	Method of Obtaining Superelevation - Two Lane Pavement
225.05	Method of Obtaining Superelevation - Divided Highways
225.09	Guide for Shoulder and Ditch Transition at Grade Separations
240.01	Guide for Berm Ditch Construction
DIVISION 3 - PIPE CULVERTS	
300.01	Method of Pipe Installation
DIVISION 4 - MAJOR STRUCTURES	
422.10	Reinforced Bridge Approach Fills
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
560.02	Method of Shoulder Construction - High Side of Superelevated Curve - Method II (Sheet 2 of 3 is no longer applicable)
DIVISION 6 - ASPHALT BASES AND PAVEMENTS	
610.01	Guide for Paving Shoulders Under Bridges - Method I
654.01	Pavement Repairs
665.01	Asphalt Shoulders - Milled Rumble Strips
DIVISION 8 - INCIDENTALS	
815.03	Pipe Underdrain and Blind Drain
816.02	Aggregate Shoulder Drain
816.04	Markers for Drainage Structure and Concrete Pad
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 Endwalls - 12" thru 72" Pipe 90 Skew
840.00	Concrete Base Pad for Drainage Structures
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
840.18	Concrete Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.19	Concrete Grated Drop Inlet Type 'D' - 12" thru 36" Pipe
840.20	Frames and Wide Slot Flat Grates
840.22	Frames and Wide Slot Sag Grates
840.25	Anchorage for Frames - Brick or Concrete or Precast
840.26	Brick Grated Drop Inlet Type 'A' - 12" thru 72" Pipe
840.27	Brick Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.28	Brick Grated Drop Inlet Type 'D' - 12" thru 36" Pipe
840.31	Concrete Junction Box - 12" thru 66" Pipe
840.32	Brick Junction Box - 12" thru 66" Pipe
840.34	Traffic Bearing Junction Box - for Use with Pipes 42" and Under
840.45	Precast Drainage Structure
840.46	Traffic Bearing Precast Drainage Structure
840.54	Manhole Frame and Cover
840.66	Drainage Structure Steps
840.72	Pipe Collar
846.04	Drop Inlet Installation in Shoulder Berm Gutter
850.01	Concrete Paved Ditches
850.10	Guide for Berm Drainage Outlet - 15" and 18" Pipe
852.01	Concrete Islands
852.06	Method for Placement of Drop Inlets in Concrete Islands
857.01	Precast Reinforced Concrete Barrier - 41" Single Faced
862.01	Guardrail Placement
862.02	Guardrail Installation
862.04	Anchoring End of Guardrail - B-77 and B-83 Anchor Units
865.01	Cable Guiderail
866.02	Woven Wire Fence - with Wood Post
876.01	Rip Rap in Channels
876.02	Guide for Rip Rap at Pipe Outlets
876.04	Drainage Ditches with Class 'B' Rip Rap

4/7/2015
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FLA ENGINEERING INC.

Note: Not to Scale

**S.U.E. = Subsurface Utility Engineering*

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	1B

CONVENTIONAL PLAN SHEET SYMBOLS

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
- Known Soil Contamination: Area or Site
- Potential Soil Contamination: Area or Site

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 — R/W
- Proposed Right of Way Line with Iron Pin and Cap Marker
- Proposed Right of Way Line with Concrete or Granite R/W Marker
- Proposed Control of Access Line with Concrete C/A Marker
- Existing Control of Access
- Proposed Control of Access
- 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
- Recorded U/G Power Line — P
- Designated U/G Power Line (S.U.E.*) — P

TELEPHONE:

- Existing Telephone Pole
- Proposed Telephone Pole
- Telephone Manhole — T
- Telephone Booth
- Telephone Pedestal — T
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole — HH
- Recorded U/G Telephone Cable — T
- Designated U/G Telephone Cable (S.U.E.*) — T
- Recorded U/G Telephone Conduit — TC
- Designated U/G Telephone Conduit (S.U.E.*) — TC
- Recorded U/G Fiber Optics Cable — T FO
- Designated U/G Fiber Optics Cable (S.U.E.*) — T FO

WATER:

- Water Manhole — W
- Water Meter
- Water Valve
- Water Hydrant
- Recorded U/G Water Line — W
- Designated U/G Water Line (S.U.E.*) — W
- Above Ground Water Line — A/G Water

TV:

- TV Satellite Dish
- TV Pedestal — C
- TV Tower
- U/G TV Cable Hand Hole — HH
- Recorded U/G TV Cable — TV
- Designated U/G TV Cable (S.U.E.*) — TV
- Recorded U/G Fiber Optic Cable — TV FO
- Designated U/G Fiber Optic Cable (S.U.E.*) — TV FO

GAS:

- Gas Valve
- Gas Meter
- Recorded U/G Gas Line — G
- Designated U/G Gas Line (S.U.E.*) — G
- Above Ground Gas Line — A/G Gas

SANITARY SEWER:

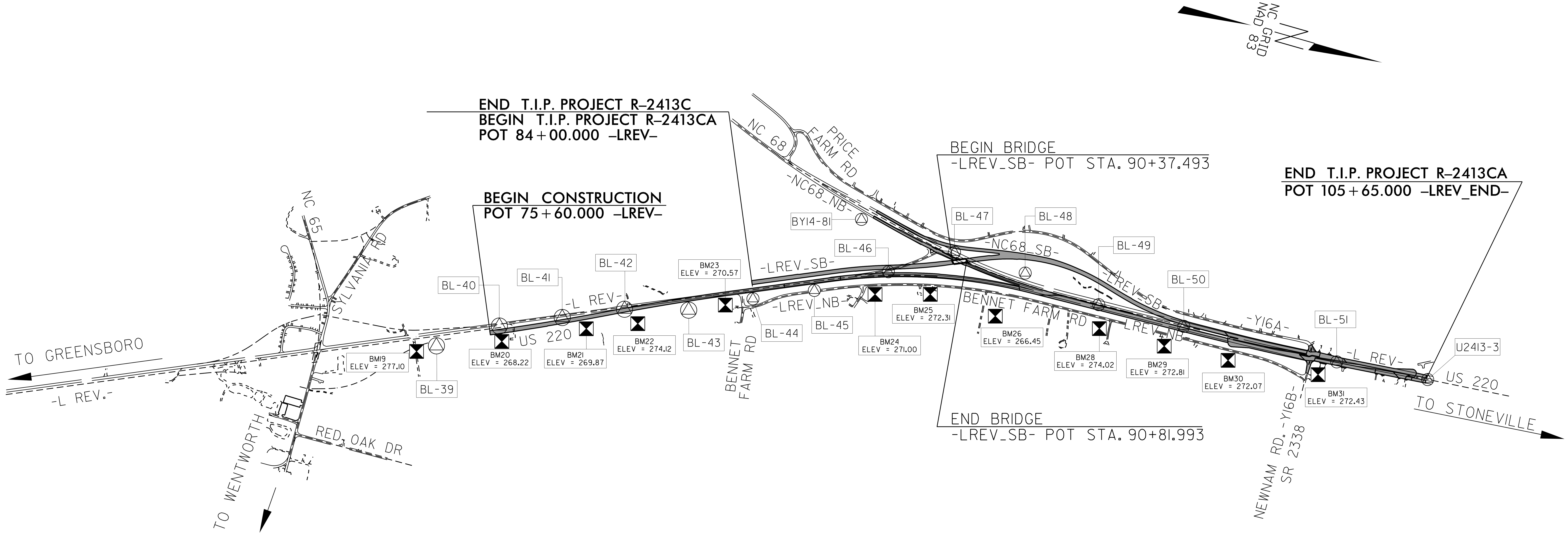
- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line — SS
- Above Ground Sanitary Sewer — A/G Sanitary Sewer
- Recorded SS Forced Main Line — FSS
- Designated SS Forced Main Line (S.U.E.*) — FSS

MISCELLANEOUS:

- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box — S
- Utility Unknown U/G Line — ?UTL
- U/G Tank; Water, Gas, Oil
- Underground Storage Tank, Approx. Loc.
- A/G Tank; Water, Gas, Oil
- Geoenvironmental Boring
- U/G Test Hole (S.U.E.*)
- Abandoned According to Utility Records — AATUR
- End of Information — E.O.I.

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	1C-1
Location and Surveys	

R2413CA SURVEY CONTROL SHEET



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:
r2413ca_ls_control_150310.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 "U2413-1"
WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING: 273885.6884(m) EASTING: 527983.5894(m)
ELEVATION: 266.664(m)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.999989076
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "U2413-1" TO -L- STATION 75+60.00 IS
N 19°20'03" W 6,667.861
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29

NOTE: DRAWING NOT TO SCALE

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	1C-2
Location and Surveys	

R2413CA SURVEY CONTROL SHEET

BASELINE DATA

BL

POINT	DESC.	NORTH	EAST	ELEVATION	LREV STATION	OFFSET
39	BL-39	280022.0224	525838.9437	275.428	73+92.330	4.738 LT
40	BL-40	280204.8228	525758.8889	266.792	75+91.914	4.650 LT
41	BL-41	280388.1768	525678.5948	267.947	77+92.127	0.818 LT
42	BL-42	280571.1339	525598.5410	274.125	79+91.612	8.443 RT
43	BL-43	280754.3170	525518.3239	274.135	81+91.820	15.234 RT
44	BL-44	280937.5599	525438.4297	268.301	83+92.029	16.904 RT
45	BL-45	281121.1718	525358.4255	269.066	85+92.314	17.285 RT
46	BL-46	281337.6523	525257.6830	272.818	88+31.505	0.387 RT
47	BL-47	281515.9480	525151.4154	269.066	90+26.845	60.091 LT
48	BL-48	281755.9282	525177.1490	264.460	92+57.832	5.725 LT
49	BL-49	282004.1733	525175.8315	269.892	95+05.875	0.876 RT
50	BL-50	282280.9426	525167.9819	273.909	97+82.755	1.196 RT
51	BL-51	282775.3950	525143.6689	271.224	102+77.818	1.881 RT
GPS3	U2413-3	283066.4347	525118.6541	269.400	OUTSIDE PROJECT LIMITS	
GPS4	U2413-4	284198.8820	525029.6551	263.480	OUTSIDE PROJECT LIMITS	

BY14

POINT	DESC.	NORTH	EAST	ELEVATION	LREV STATION	OFFSET
81	BY14-81	281223.6179	525090.3682	273.696	87+77.687	193.984 LT
A47		281515.9480	525151.4154	269.066	90+26.845	60.091 LT

BENCHMARK DATA

BM19 ELEVATION = 277.099
N 279979 E 525878
BL STATION 69+94.00 18 RIGHT
RR SPIKE IN BASE OF POWER POLE

BM20 ELEVATION = 268.222
N 280217 E 525769
BL STATION 72+56.00 14 RIGHT
RR SPIKE IN 460 MM TWIN MAPLES

BM21 ELEVATION = 269.874
N 280479 E 525661
BL STATION 75+38.00 21 RIGHT
RR SPIKE IN BASE OF 760 MM OAK

BM22 ELEVATION = 274.122
N 280594 E 525610
BL STATION 76+64.00 19 RIGHT
RR SPIKE IN BASE OF POWER POLE

BM23 ELEVATION = 270.565
N 280888 E 525491
BL STATION 79+81.00 29 RIGHT
EXISTING NAIL 700 MM ABOVE GROUND IN POWER POLE (OLD TBM)

BM24 ELEVATION = 271.001
N 281287 E 525315
BL STATION 84+17.00 30 RIGHT
RR SPIKE IN BASE OF POWER POLE

BM25 ELEVATION = 272.312
N 281484 E 525280
BL STATION 86+01.00 94 RIGHT
RR SPIKE IN BASE OF 610 MM OAK

BM26 ELEVATION = 266.451
N 281683 E 525241
BL STATION 88+70.00 71 RIGHT
RR SPIKE IN BASE OF POWER POLE

BM28 ELEVATION = 274.025
N 282044 E 525225
BL STATION 92+23.00 50 RIGHT
RR SPIKE IN BASE OF POWER POLE

BM29 ELEVATION = 272.806
N 282232 E 525220
BL STATION 94+10.00 51 RIGHT
RR SPIKE IN BASE OF POWER POLE

BM30 ELEVATION = 272.074
N 282442 E 525220
BL STATION 96+19.00 60 RIGHT
RR SPIKE IN BASE OF POWER POLE

BM31 ELEVATION = 272.434
N 282709 E 525174
BL STATION 98+89.00 27 RIGHT
RR SPIKE IN BASE OF POWER POLE

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "U2413-1"
WITH NAD 83/NSRS 2007 STATE PLANE GRID COORDINATES OF
NORTHING: 273885.6884(m) EASTING: 527983.5894(m)
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"U2413-1" TO -L- STATION 75+60.00 IS
N 19°20'03" W 6,667.861
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29

NOTE: DRAWING NOT TO SCALE

12-MAR-2015 10:01
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$$$$USERNAME$$$$

PROJ. REFERENCE NO.	SHEET NO.
R-2413CA	1D

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CENTERLINE COORDINATE LIST

Point #	Chain	Station	Northing (Y)	Easting (X)
1	LREV	75+60.00	280177.5074	525776.0150
2	LREV	75+80.00	280195.8142	525767.9614
3	LREV	76+00.00	280214.0979	525759.8553
4	LREV	76+20.00	280232.3582	525751.6970
5	LREV	76+40.00	280250.5952	525743.4865
6	LREV	76+60.00	280268.8086	525735.2239
7	LREV	76+80.00	280286.9983	525726.9091
8	LREV	77+00.00	280305.1641	525718.5424
9	LREV	77+20.00	280323.3060	525710.1237
10	LREV	77+40.00	280341.4236	525701.6531
11	LREV	77+60.00	280359.5170	525693.1308
12	LREV	77+80.00	280377.5858	525684.5567
13	LREV	78+00.00	280395.6301	525675.9309
14	LREV	78+20.00	280413.6496	525667.2535
15	LREV	78+40.00	280431.6443	525658.5247
16	LREV	78+60.00	280449.6138	525649.7443
17	LREV	78+80.00	280467.5582	525640.9126
18	LREV	79+00.00	280485.4772	525632.0296
19	LREV	79+20.00	280503.3708	525623.0953
20	LREV	79+40.00	280521.2387	525614.1099
21	LREV	79+60.00	280539.0981	525605.1076
22	LREV	79+80.00	280556.9823	525596.1547
23	LREV	80+00.00	280574.8920	525587.2530
24	LREV	80+20.00	280592.8272	525578.4026
25	LREV	80+40.00	280610.7876	525569.6035
26	LREV	80+60.00	280628.7731	525560.8559
27	LREV	80+80.00	280646.7836	525552.1597
28	LREV	81+00.00	280664.8188	525543.5151
29	LREV	81+20.00	280682.8788	525534.9222
30	LREV	81+40.00	280700.9632	525526.3810
31	LREV	81+60.00	280719.0720	525517.8915
32	LREV	81+80.00	280737.2051	525509.4539
33	LREV	82+00.00	280755.3621	525501.0682
34	LREV	82+20.00	280773.5432	525492.7345
35	LREV	82+40.00	280791.7479	525484.4529
36	LREV	82+60.00	280809.9763	525476.2234
37	LREV	82+80.00	280828.2282	525468.0460
38	LREV	83+00.00	280846.5034	525459.9210
39	LREV	83+20.00	280864.8018	525451.8482
40	LREV	83+40.00	280883.1195	525443.8194
41	LREV	83+60.00	280901.4393	525435.7955
42	LREV	83+80.00	280919.7592	525427.7716
43	LREV	84+00.00	280938.0790	525419.7477
44	LREV	84+20.00	280956.3989	525411.7237
45	LREV	84+40.00	280974.7187	525403.6998
46	LREV	84+60.00	280993.0386	525395.6759
47	LREV	84+80.00	281011.3584	525387.6520
48	LREV	85+00.00	281029.6783	525379.6281
49	LREV	85+20.00	281047.9981	525371.6042
50	LREV	85+40.00	281066.3180	525363.5803
51	LREV	85+60.00	281084.6378	525355.5564
52	LREV	85+80.00	281102.9577	525347.5325
53	LREV	86+00.00	281121.2775	525339.5086
54	REV_NB	86+20.00	281142.4057	525337.8966
55	REV_NB	86+40.00	281160.7322	525329.8877
56	REV_NB	86+60.00	281179.0931	525321.9582
57	REV_NB	86+80.00	281197.5195	525314.1826
58	REV_NB	87+00.00	281216.0348	525306.6208
59	REV_NB	87+20.00	281234.6403	525299.2840
60	REV_NB	87+40.00	281253.3334	525292.1732
61	REV_NB	87+60.00	281272.1114	525285.2896
62	REV_NB	87+80.00	281290.9714	525278.6340
63	REV_NB	88+00.00	281309.9106	525272.2076
64	REV_NB	88+20.00	281328.9264	525266.0111
65	REV_NB	88+40.00	281348.0159	525260.0457
66	REV_NB	88+60.00	281367.1763	525254.3120
67	REV_NB	88+80.00	281386.4047	525248.8110
68	REV_NB	89+00.00	281405.6985	525243.5435
69	REV_NB	89+20.00	281425.0546	525238.5102
70	REV_NB	89+40.00	281444.4704	525233.7119
71	REV_NB	89+60.00	281463.9429	525229.1493
72	REV_NB	89+80.00	281483.4692	525224.8231
73	REV_NB	90+00.00	281503.0466	525220.7338
74	REV_NB	90+20.00	281522.6721	525216.8822
75	REV_NB	90+40.00	281542.3428	525213.2687
76	REV_NB	90+60.00	281562.0559	525209.8939
77	REV_NB	90+80.00	281581.8085	525206.7583
78	REV_NB	91+00.00	281601.5976	525203.8623
79	REV_NB	91+20.00	281621.4203	525201.2064
80	REV_NB	91+40.00	281641.2738	525198.7910
81	REV_NB	91+60.00	281661.1551	525196.6164

Point #	Chain	Station	Northing (Y)	Easting (X)
82	LREV_NB	91+80.00	281681.0613	525194.6830
83	LREV_NB	92+00.00	281700.9895	525192.9909
84	LREV_NB	92+20.00	281720.9367	525191.5406
85	LREV_NB	92+40.00	281740.9000	525190.3321
86	LREV_NB	92+60.00	281760.8765	525189.3645
87	LREV_NB	92+80.00	281780.8618	525188.6007
88	LREV_NB	93+00.00	281800.8516	525187.9624
89	LREV_NB	93+20.00	281820.8429	525187.3700
90	LREV_NB	93+40.00	281840.8342	525186.7799
91	LREV_NB	93+60.00	281860.8254	525186.1898
92	LREV_NB	93+80.00	281880.8167	525185.5997
93	LREV_NB	94+00.00	281900.8080	525185.0096
94	LREV_NB	94+20.00	281920.7993	525184.4195
95	LREV_NB	94+40.00	281940.7906	525183.8294
96	LREV_NB	94+60.00	281960.7819	525183.2393
97	LREV_NB	94+80.00	281980.7732	525182.6492
98	LREV_NB	95+00.00	282000.7645	525182.0591
99	LREV_NB	95+20.00	282020.7558	525181.4690
100	LREV_NB	95+40.00	282040.7471	525180.8789
101	LREV_NB	95+60.00	282060.7384	525180.2888
102	LREV_NB	95+80.00	282080.7297	525179.6987
103	LREV_NB	96+00.00	282100.7210	525179.1086
104	LREV_NB	96+20.00	282120.7122	525178.5185
105	LREV_NB	96+40.00	282140.7035	525177.9284
106	LREV_NB	96+60.00	282160.6948	525177.3383
107	LREV_NB	96+80.00	282180.6861	525176.7482
108	LREV_NB	97+00.00	282200.6774	525176.1581
109	LREV_NB	97+20.00	282220.6687	525175.5680
110	LREV_NB	97+40.00	282240.6600	525174.9779
111	LREV_NB	97+60.00	282260.6513	525174.3878
112	LREV_NB	97+80.00	282280.6426	525173.7977
113	LREV_NB	98+00.00	282300.6339	525173.2076
114	LREV_NB	98+20.00	282320.6252	525172.6175
115	LREV_NB	98+39.27	282339.8867	525172.0489
116	LREV_END	98+60.00	282358.1185	525164.5077
117	LREV_END	98+80.00	282378.1098	525163.9176
118	LREV_END	99+00.00	282398.1011	525163.3275
119	LREV_END	99+20.00	282418.0923	525162.7368
120	LREV_END	99+40.00	282438.0832	525162.1320
121	LREV_END	99+60.00	282458.0728	525161.4886
122	LREV_END	99+80.00	282478.0603	525160.7822
123	LREV_END	100+00.00	282498.0451	525160.0012
124	LREV_END	100+20.00	282518.0267	525159.1453
125	LREV_END	100+40.00	282538.0051	525158.2144
126	LREV_END	100+60.00	282557.9797	525157.2085
127	LREV_END	100+80.00	282577.9505	525156.1277
128	LREV_END	101+00.00	282597.9171	525154.9719
129	LREV_END	101+20.00	282617.8792	525153.7413
130	LREV_END	101+40.00	282637.8365	525152.4357
131	LREV_END	101+60.00	282657.7888	525151.0553
132	LREV_END	101+80.00	282677.7357	525149.6000
133	LREV_END	102+00.00	282697.6772	525148.0714
134	LREV_END	102+20.00	282717.6143	525146.4859
135	LREV_END	102+40.00	282737.5488	525144.8685
136	LREV_END	102+60.00	282757.4826	525143.2425
137	LREV_END	102+80.00	282777.4164	525141.6164
138	LREV_END	103+00.00	282797.3501	525139.9902
139	LREV_END	103+20.00	282817.2839	525138.3641
140	LREV_END	103+40.00	282837.2177	525136.7380
141	LREV_END	103+60.00	282857.1515	525135.1119
142	LREV_END	103+80.00	282877.0853	525133.4858
143	LREV_END	104+00.00	282897.0191	525131.8597
144	LREV_END	104+20.00	282916.9528	525130.2336
145	LREV_END	104+40.00	282936.8866	525128.6074
146	LREV_END	104+60.00	282956.8204	525126.9813
147	LREV_END	104+80.00	282976.7542	525125.3552
148	LREV_END	105+00.00	282996.6880	525123.7291
149	LREV_END	105+20.00	283016.6218	525122.1030
150	LREV_END	105+40.00	283036.5556	525120.4769
151	LREV_END	105+60.00	283056.4893	525118.8507
152	LREV_END	105+80.00	283076.4231	525117.2246
153	LREV_END	106+00.00	283096.3569	525115.5985
154	LREV_SB	86+20.00	281135.3606	525321.7763
155	LREV_SB	86+40.00	281153.6804	525313.7524
156	LREV_SB	86+60.00	281172.0043	525305.7376
157	LREV_SB	86+80.00	281190.3683	525297.8153
158	LREV_SB	87+00.00	281208.8187	525290.0969
159	LREV_SB	87+20.00	281227.3684	525282.6200
160	LREV_SB	87+40.00	281246.0142	525275.3863
161	LREV_SB	87+60.00	281264.7530	525268.3969

Point #	Chain	Station	Northing (Y)	Easting (X)
162	LREV_SB	87+80.00	281283.5816	525261.6530
163	LREV_SB	88+00.00	281302.4967	525255.1558
164	LREV_SB	88+20.00	281321.4929	525248.8995
165	LREV_SB	88+40.00	281340.5416	525242.8049
166	LREV_SB	88+60.00	281359.6025	525236.7483
167	LREV_SB	88+80.00	281378.6356	525230.6052
168	LREV_SB	89+00.00	281397.6018	525224.2586
169	LREV_SB	89+20.00	281416.4836	525217.6653
170	LREV_SB	89+40.00	281435.2776	525210.8256
171	LREV_SB	89+60.00	281453.9806	525203.7410
172	LREV_SB	89+80.00	281472.5893	525196.4124
173	LREV_SB	90+00.00	281491.1011	525188.8422
174	LREV_SB	90+20.00	281509.5333	525181.0800
175	LREV_SB	90+40.00	281527.9329	525173.2406
176	LREV_SB	90+60.00	281546.3303	525165.3961
177	LREV_SB	90+80.00	281564.7277	525157.5516
178	LREV_SB	91+00.00	281583.1251	525149.7071
179	LREV_SB	91+20.00	281601.5272	525141.8738
180	LREV_SB	91+40.00	281619.9843	525134.1712
181	LREV_SB	91+60.00	281638.5686	525126.7814
182	LREV_SB	91+80.00	281657.3432	525119.8909
183	LREV_SB	92+00.00	281676.3428	525113.6478
184	LREV_SB	92+20.00	281695.5513	525108.0810
185	LREV_SB	92+40.00	281714.9449	525103.1975
186	LREV_SB	92+60.00	281734.4991	525099.0034
187	LREV_SB	92+80.00	281754.1895	525095.5039
188	LREV_SB	93+00.00	281773.9914	525092.7036
189	LREV_SB	93+20.00	281793.8801	525090.6058
190	LREV_SB	93+40.00	281813.8305	525089.2131
191	LREV_SB	93+60.00	281833.8177	525088.5275
192	LREV_SB	93+80.00	281853.8166	525088.5496
193	LREV_SB	94+00.00	281873.8022	525089.2794
194	LREV_SB	94+20.00	281893.7495	525090.7162
195	LREV_SB	94+40.00	281913.6335	525092.8579
196	LREV_SB	94+60.00	281933.4291	525095.7021
197	LREV_SB	94+80.00	281953.1118	525099.2450
198	LREV_SB	95+00.00	281972.6581	525103.4762
199	LREV_SB	95+20.00	281992.0710	525108.2843
200	LREV_SB	95+40.00	282011.3847	525113.4778
201	LREV_SB	95+60.00	282030.6454	525118.8654
202	LREV_SB	95+80.00	282049.9030	525124.2638
203	LREV_SB	96+00.00	282069.2009	525129.5164
204	LREV_SB	96+20.00	282088.5766	525134.4730
205	LREV_SB	96+40.00	282108.0579	525138.9960
206	LREV_SB	96+60.00	282127.6438	525143.0427
207	LREV_SB	96+80.00	282147.3225	525146.6105
208	LREV_SB	97+00.00	282167.0823	525149.6974
209	LREV_SB	97+20.00	282186.9116	525152.3014
210	LREV_SB	97+40.00	282206.7984	525154.4210
211	LREV_SB	97+60.00	282226.7311	525156.0551
212	LREV_SB	97+80.00	282246.6976	525157.2025
213	LREV_SB	98+00.00	282266.6862	525157.8626
214	LREV_SB	98+20.00	282286.6850	525158.0385
215	LREV_SB	98+40.00	282306.6834	525157.8089
216	LREV_SB	98+60.00	282326.6775	525157.3256
217	LREV_SB	98+72.77	282339.4411	525156.9555
218	NC68_NB	10+00.00	281246.0644	525102.9189
219	NC68_NB	10+20.00	281265.5028	525107.6254
220	NC68_NB	10+40.00	281284.9411	525112.3318
221	NC68_NB	10+60.00	281304.3795	525117.0383
222	NC68_NB	10+80.00	281323.8226	525121.7250
223	NC68_NB	11+00.00	281343.2931	525126.2961
224	NC68_NB	11+20.00	281362.8039	525130.6925
225	NC68_NB	11+40.00	281382.3538	525134.9113
226	NC68_NB	11+60.00	281401.9412	525138.9522
227	NC68_NB	11+80.00	281421.5646	525142.8149
228	NC68_NB	12+00.00	281441.2223	525146.4990
229	NC68_NB	12+20.00	281460.9127	525150.0042
230	NC68_NB	12+40.00	281480.6341	525153.3304
231	NC68_NB	12+60.00	281500.3849	525156.4771
232	NC68_NB	12+80.00	281520.1635	525159.4441
233	NC68_NB	13+00.00	281539.9683	525162.2312
234	NC68_NB	13+20.00	281559.7976	525164.8381
235	NC68_NB	13+40.00	281579.6498	525167.2647
236	NC68_NB	13+60.00	281599.5232	525169.5107
237	NC68_NB	13+80.00	281619.4162	525171.5759
238	NC68_NB	14+00.00	281639.3272	525173.4602
239	NC68_NB	14+20.00	281659.2545	525175.1635
240	NC68_NB	14+40.00	281679.1964	525176.6855
241	NC68_NB	14+60.00	281699.1513	525178.0261
242	NC68_NB	14+80.00	281719.1177	525179.1853

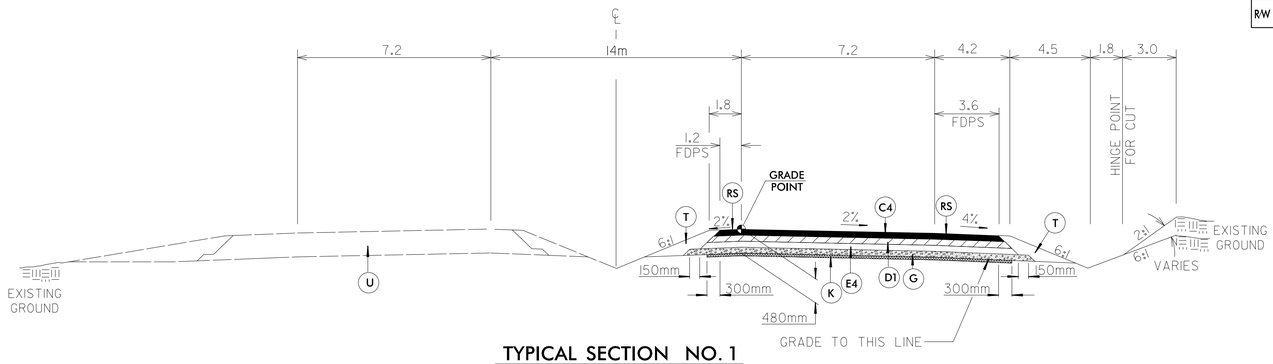
Point #	Chain	Station	Northing (Y)	Easting (X)
243	NC68_NB	15+00.00	281739.0937	525180.1629
244	NC68_NB	15+20.00	281759.0778	525180.9589
245	NC68_NB	15+40.00	281779.0683	525181.5732
246	NC68_NB	15+60.00	281799.0635	525182.0058
247	NC68_NB	15+80.00	281819.0619	525182.2565
248	NC68_NB	16+00.00	281839.0617	525182.3254
249	NC68_NB	16+20.00	281859.0613	525182.2125
250	NC68_NB	16+40.00	281879.0591	525181.9179
251	NC68_NB	16+60.00	281899.0534	525181.4463
252	NC68_NB	16+77.50	281916.5494	525180.9434
253	NC68_SB	10+00.00	281250.1421	525085.8111
254	NC68_SB	10+20.00	281269.5804	525090.5175
255	NC68_SB	10+40.00	281289.0188	525095.2240
256	NC68_SB	10+60.00	281308.4571	525099.9304
257	NC68_SB	10+80.00	281327.8955	525104.6369
258	NC68_SB	11+00.00	281347.3338	525109.3433
259	NC68_SB	11+20.00	281366.7869	525113.9882
260	NC68_SB	11+40.00	281386.3101	525118.3272
261	NC68_SB	11+60.00	281405.9539	525122.0792
262	NC68_SB	11+80.00	281425.7378	525124.9992
263	NC68_SB	12+00.00	281445.6330	525127.0275
264	NC68_SB	12+20.00	281465.5993	525128.1598
265	NC68_SB	12+40.00	281485.5962	525128.3939
266	NC68_SB	12+60.00	281505.5835	525127.7294
267	NC68_SB	12+80.00	281525.5207	525126.1675
268	NC68_SB	13+00.00	281545.3714	525123.7394
269	NC68_SB	13+20.00	281565.1321	525120.6585
270	NC68_SB	13+40.00	281584.8323	525117.2087
271	NC68_SB	13+60.00	281604.5143	525113.6564
272	NC68_SB	13+80.00	281624.1960	525110.1028
273	NC68_SB	14+00.00	281643.8791	525106.5565
274	NC68_SB	14+20.00	281663.5789	525103.1047
275	NC68_SB	14+40.00	281683.3163	525099.8752
276	NC68_SB	14+60.00	281703.0963	525096.9176
277	NC68_SB	14+80.00	281722.9151	525094.2331
278	NC68_SB	15+00.00	281742.7691	525091.8222
279	NC68_SB	15+20.00	281762.6545	525089.6854
280	NC68_SB	15+40.00	281782.5674	525087.8230
281	NC68_SB	15+60.00	281802.5072	525086.2760
282	NC68_SB	15+79.11	281821.5887	525085.2602
283	Y16A	10+00.00	282589.9193	525115.2767
284	Y16A	10+20.00	282609.8625	525113.7709
285	Y16A	10+40.00	282629.8057	525112.2650
286	Y16A	10+60.00	282649.7489	525110.7591
287	Y16A	10+80.00	282669.6328	525110.7426
288	Y16A	11+00.00	282684.8882	525122.8417
289	Y16A	11+20.00	282690.6554	525141.9433
290	Y16A	11+26.76	282692.3678	525148.4850
291	Y16B	10+00.00	282692.3678	525148.4850
292	Y16B	10+20.00	282693.1010	525168.4715
293	Y16B	10+40.00	282693.8343	525188.4581
294	Y16B	10+59.03	282694.5321	525207.4783

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

PAVEMENT SCHEDULE

C1	PROP. APPROX. 80mm ASPHALT CONC. SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 96 kg PER Sq. METER, IN EACH OF TWO LAYERS.
C2	PROP. VAR. DEPTH ASPHALT CONC. SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 2.40 kg PER Sq. METER PER 1mm DEPTH TO BE PLACED IN LAYERS NOT TO EXCEED 50mm IN DEPTH.
C3	PROP. APPROX. 50mm ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 120 kg PER Sq. METER
C4	PROP. APPROX. 80mm ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 96 kg PER Sq. METER, IN EACH OF TWO LAYERS.
C5	PROP. VAR. DEPTH ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 2.40 kg PER Sq. METER PER 1mm DEPTH TO BE PLACED IN LAYERS NOT TO EXCEED 50mm IN DEPTH.
D1	PROP. APPROX. 80mm ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 196 kg PER Sq. METER.
D2	PROP. APPROX. 100mm ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 245 kg PER Sq. METER.
D3	PROP. VAR. DEPTH ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 2.45 kg PER Sq. METER PER 1mm DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 65mm OR GREATER THAN 110mm IN DEPTH.
E1	PROP. APPROX. 100mm ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 245 Kg PER SQ. METER.
E2	PROP. VAR. DEPTH ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 2.45 Kg PER SQ. METER PER 1mm DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 75mm OR GREATER THAN 140mm IN DEPTH.
E3	PROP. APPROX. 180mm ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 220.5 Kg PER SQ. METER IN EACH OF TWO LAYERS.
E4	PROP. APPROX. 120mm ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 294 Kg PER SQ. METER.
E5	PROP. 310mm ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 253.17 Kg PER SQ. METER IN EACH OF THREE LAYERS.
E6	PROP. APPROX. 130mm ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 318.5 Kg PER SQ. METER.
E7	PROP. 210mm ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 257.25 Kg PER SQ. METER IN EACH OF TWO LAYERS.
E8	PROP. VAR. DEPTH ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 2.45 Kg PER SQ. METER PER 1mm DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 75mm OR GREATER THAN 140mm IN DEPTH.
G	PROP. APPROX. 200mm CEMENT TREATED BASE COURSE (PLANT MIXED). OR PROP. 200mm ABC WITH THE TOP 180mm TO BE CEMENT TREATED (ROAD MIXED).
K	BASE TO BE TREATED WITH LIME TO A DEPTH OF 200mm AT A RATE OF 11 Kg PER SQ. METER AS DIRECTED BY THE ENGINEER. (SLURRY METHOD – 30%) OR BASE TO BE TREATED WITH CEMENT TO A DEPTH OF 180mm AT A RATE OF 30 Kg PER SQ. METER AS DIRECTED BY THE ENGINEER. (70%) OR BASE TO BE TREATED WITH AGGREGATE AT A RATE OF 135 Kg PER SQ. METER (10% of Cement) AND CEMENT AT A RATE OF 30 Kg PER SQ. METER TO A DEPTH OF 180mm AS DIRECTED BY THE ENGINEER. (70%)
N	GEOTEXTILE FOR PAVEMENT STABILIZATION
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W1	VARIABLE DEPTH ASPHALT PAVEMENT. (SEE WEDGING DETAIL)
W2	VARIABLE DEPTH ASPHALT PAVEMENT. (SEE WEDGING DETAIL)
W3	VARIABLE DEPTH ASPHALT PAVEMENT. (SEE WEDGING DETAIL)
W4	VARIABLE DEPTH ASPHALT PAVEMENT. (SEE WEDGING DETAIL)
R1	125mm MONOLITHIC CONCRETE ISLAND (KEYED IN)
RS	RUMBLE STRIP

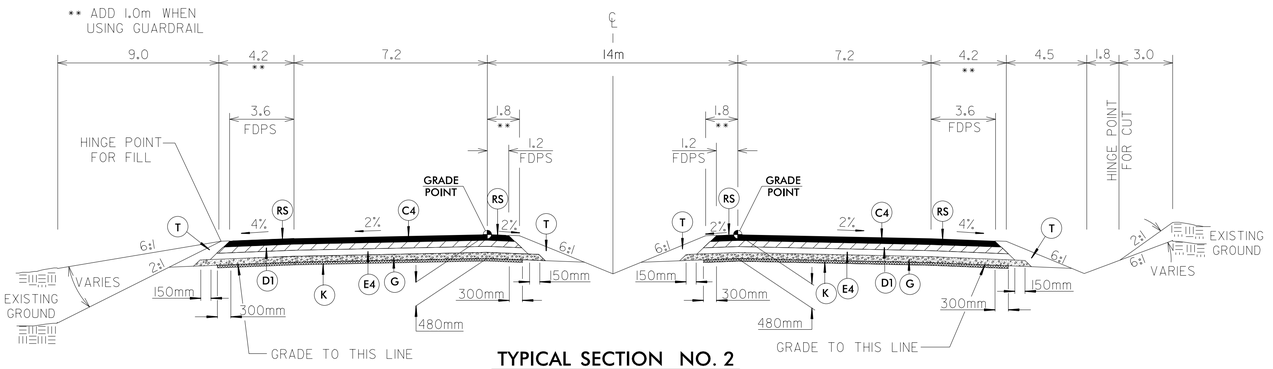
ALL PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE



TYPICAL SECTION NO. 1

–L REV– (US 220)

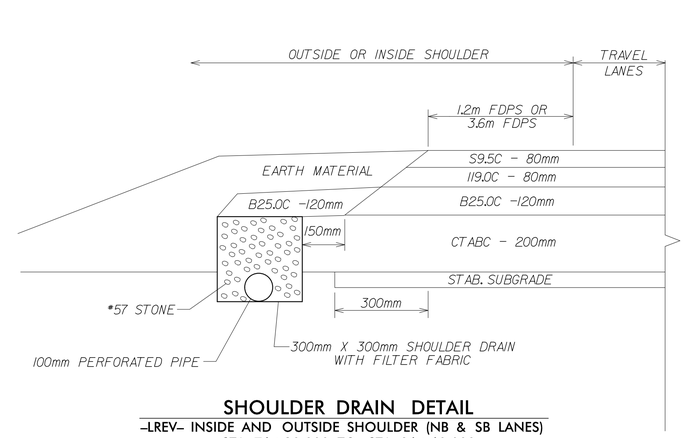
STA. 75+60.000 TO STA. 84+00.000



TYPICAL SECTION NO. 2

–L REV– (US 220)

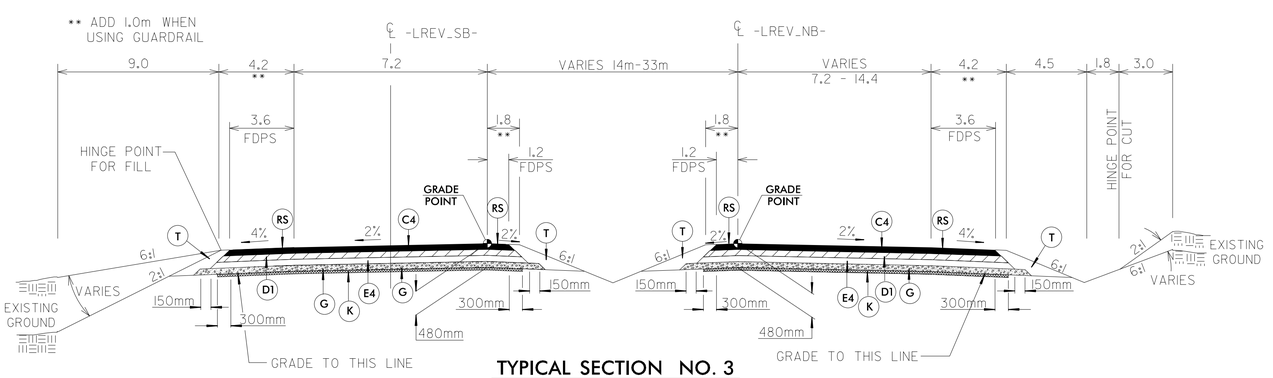
STA. 84+00.000 TO STA. 86+18.605 (L.B.)



SHOULDER DRAIN DETAIL

–LREV– INSIDE AND OUTSIDE SHOULDER (NB & SB LANES)

STA. 76+20.000 TO STA. 96+60.000



TYPICAL SECTION NO. 3

–LREV_SB– (US 220) SB

STA. 86+18.605 (L.A.) TO STA. 90+15.367

–LREV_NB– (US 220) NB

STA. 86+18.605 (L.A.) TO STA. 90+09.480

ICA Engineering
5121 Kingdom Way, Suite 100
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METRIC

5m 0 10m

CONST.REV.

R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	2A-1
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 22606 ENGINEER DAVID C. WALLER
DocuSigned by: David C. Waller 3/23/2015
89AD3F7156C5435...

PAVEMENT DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 013368 ENGINEER DON-CHI CHIN
DocuSigned by: Don-Chi Chin 3/24/2015
F5A34BED43D5420...

3/23/2015
R-2413CA_rdu_typ.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	2A-2
R/W SHEET NO.	

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

METRIC

5m 0 10m

CONST.REV.

R/W REV.

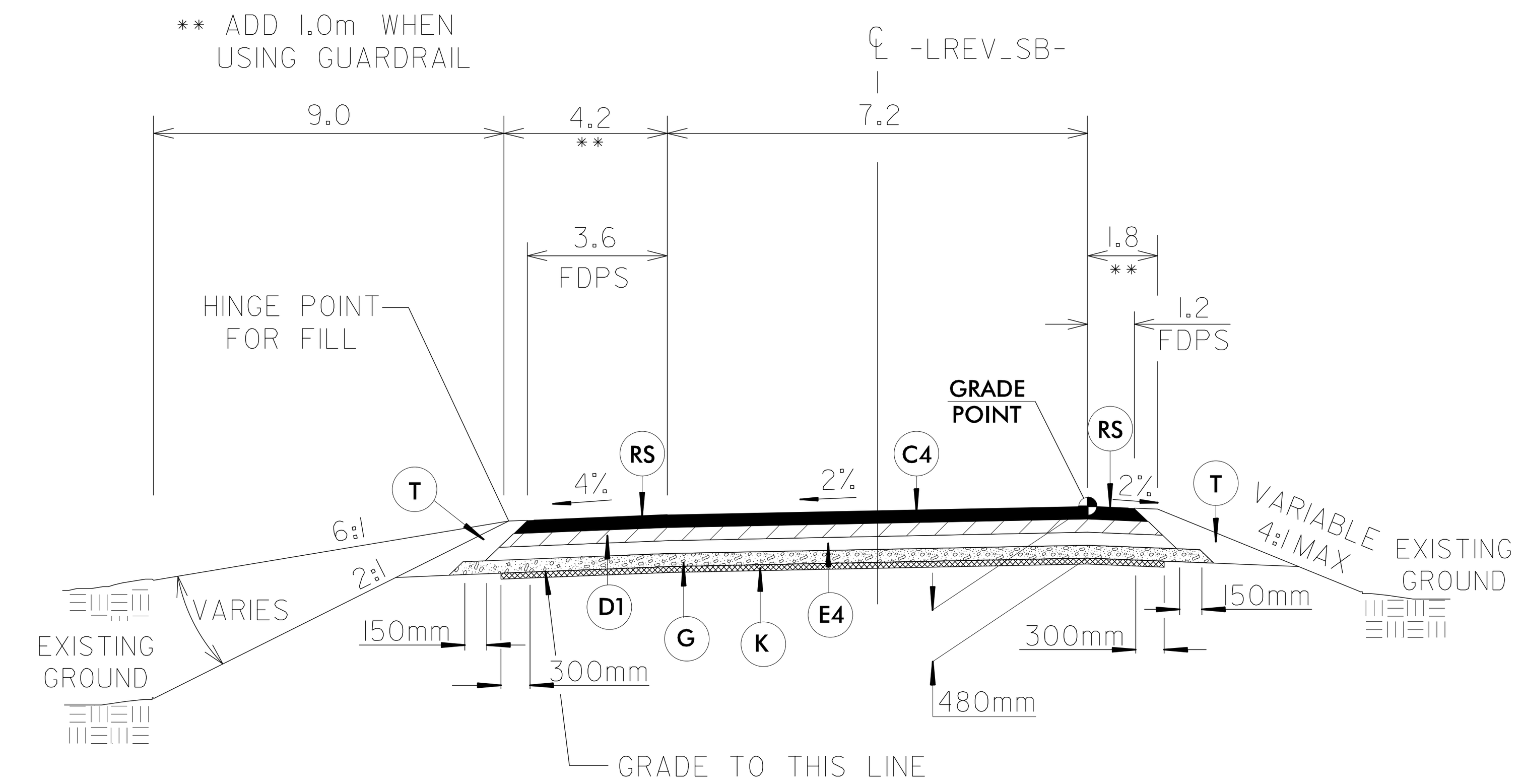
ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 22606 ENGINEER DAVID C. WALLER
David C. Waller 3/23/2015

PAVEMENT DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 013368 ENGINEER DON-CHI CHEN
Don-Chi Chen 3/24/2015

PAVEMENT SCHEDULE

C1	80mm TYPE S9.5B
C2	VAR. DEPTH TYPE S9.5B
C3	50mm TYPE S9.5C
C4	80mm TYPE S9.5C
C5	VAR. DEPTH TYPE S9.5C
D1	80mm TYPE I19.0C
D2	100mm TYPE I19.0C
D3	VAR. DEPTH TYPE I19.0C
E1	100mm TYPE B25.0B
E2	VAR. DEPTH TYPE B25.0B
E3	180mm TYPE B25.0C
E4	120mm TYPE B25.0C
E5	310mm TYPE B25.0C
E6	130mm TYPE B25.0C
E7	210mm TYPE B25.0C
E8	VAR. DEPTH TYPE B25.0C
G	200mm CEMENT TREATED ABC
K	CEMENT /LIME STABILIZATION
N	GEOTEXTILE FOR PAV'T STABILIZATION
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W1	VAR. DEPTH ASPHALT PAVEMENT
W2	VAR. DEPTH ASPHALT PAVEMENT
W3	VAR. DEPTH ASPHALT PAVEMENT
W4	VAR. DEPTH ASPHALT PAVEMENT
R1	125mm MONOLITHIC CONC. ISLAND
RS	RUMBLE STRIPS

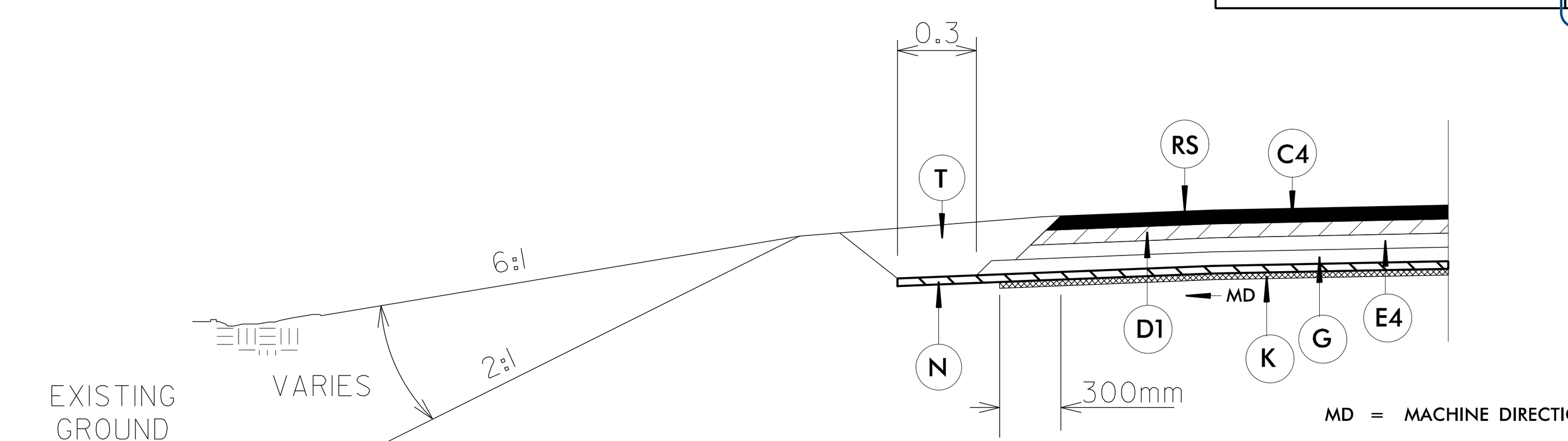
ALL PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE



TYPICAL SECTION NO. 4

–LREV_SB– (US 220) SB

STA. 90+15.367 TO STA. 90+37.493
STA. 90+81.993 TO STA. 97+85.000

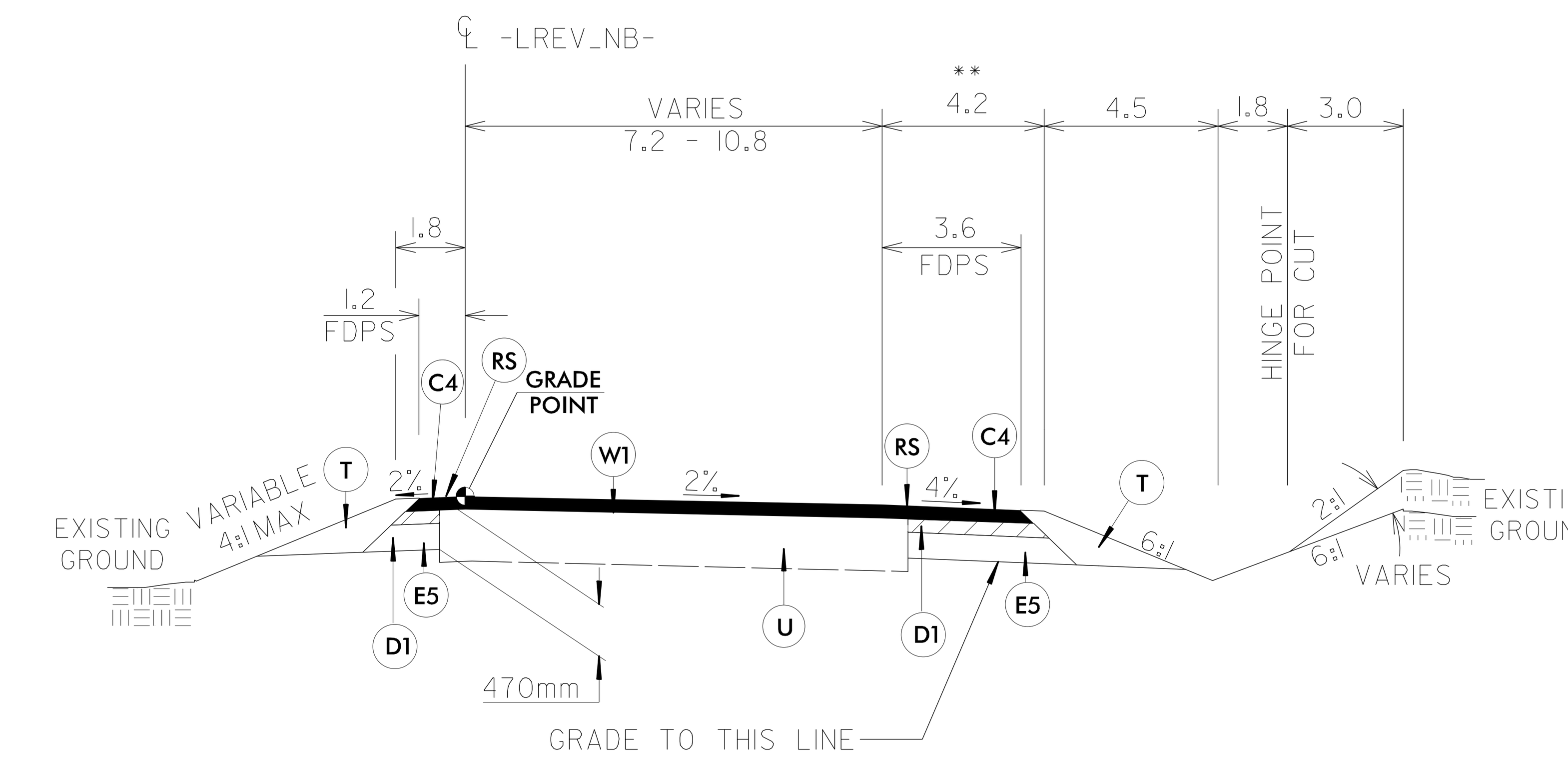


INSET A

USE GEOTEXTILE FOR PAVEMENT STABLILIZATION DETAIL FOR GRADED SHOULDER SECTION AS FOLLOWS:

–LREV_SB–

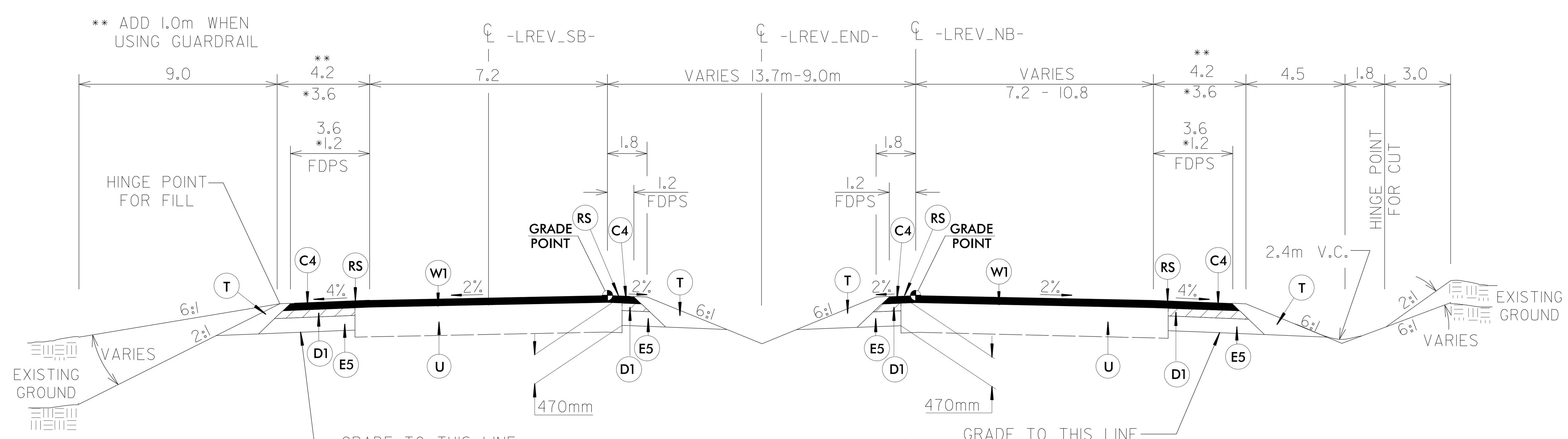
(THESE LOCATIONS TO BE INVESTIGATED DURING CONSTRUCTION)
STA. 88+41 TO STA. 96+17



TYPICAL SECTION NO. 5

–LREV_NB– (US 220) NB

STA. 90+09.480 TO STA. 97+50.362



TYPICAL SECTION NO. 6

–LREV_SB– (US 220) SB

STA. 97+85.000 TO STA. 98+72.769 (L.B.)

–LREV_END– (US 220) SB

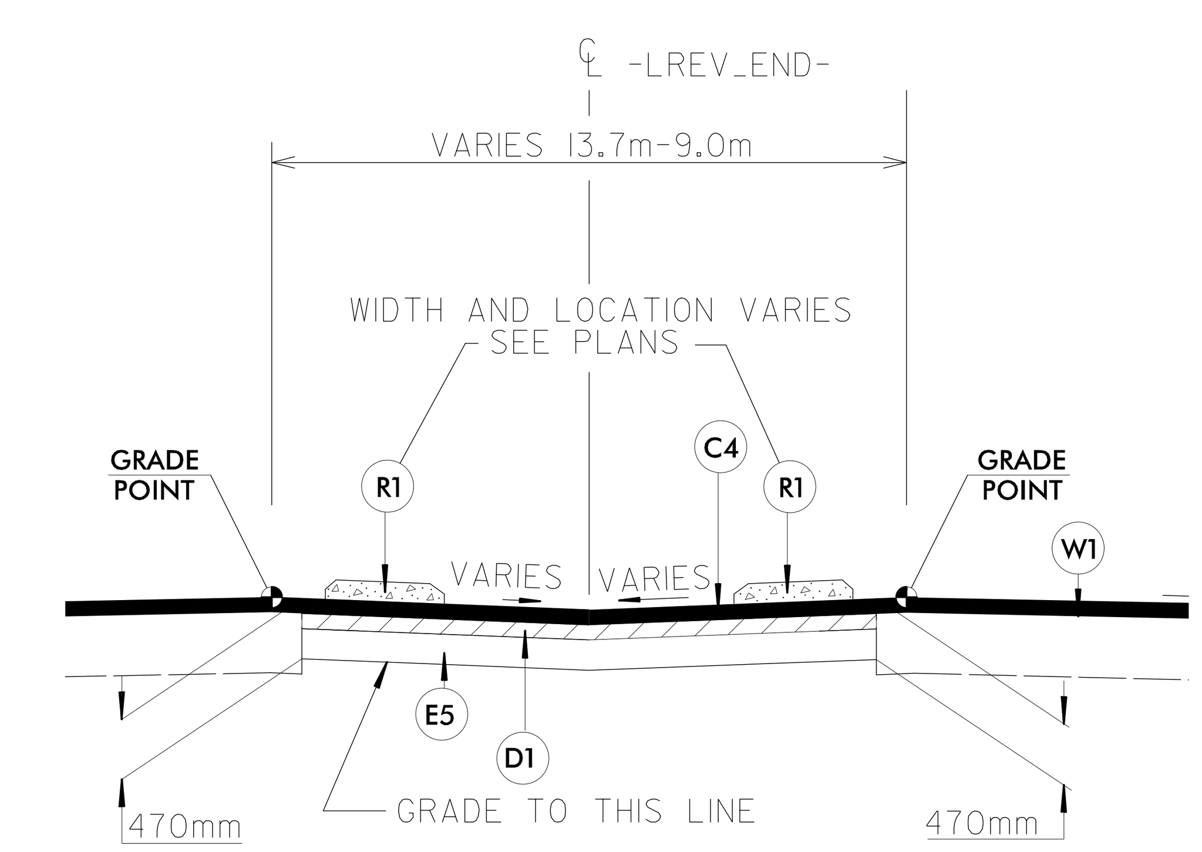
STA. 98+41.554 (L.A.) TO STA. 101+71.723
*STA. 101+71.723 TO STA. 105+65.000

–LREV_NB– (US 220) NB

STA. 97+50.362 TO STA. 98+39.270 (L.B.)

–LREV_END– (US 220) NB

STA. 98+41.554 (L.A.) TO STA. 99+30.260
*STA. 99+30.260 TO STA. 105+65.000



PARTIAL TYPICAL SECTION NO. 6A

USE IN CONJUNCTION WITH TS NO. 6 FROM:
–LREV END– STA. 99+26.075 TO STA. 105+34.809

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Raleigh, NC 27607
NC License No: F-0258

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	2A-3
R/W SHEET NO.	

5m 0 10m

CONST.REV.

R/W REV.

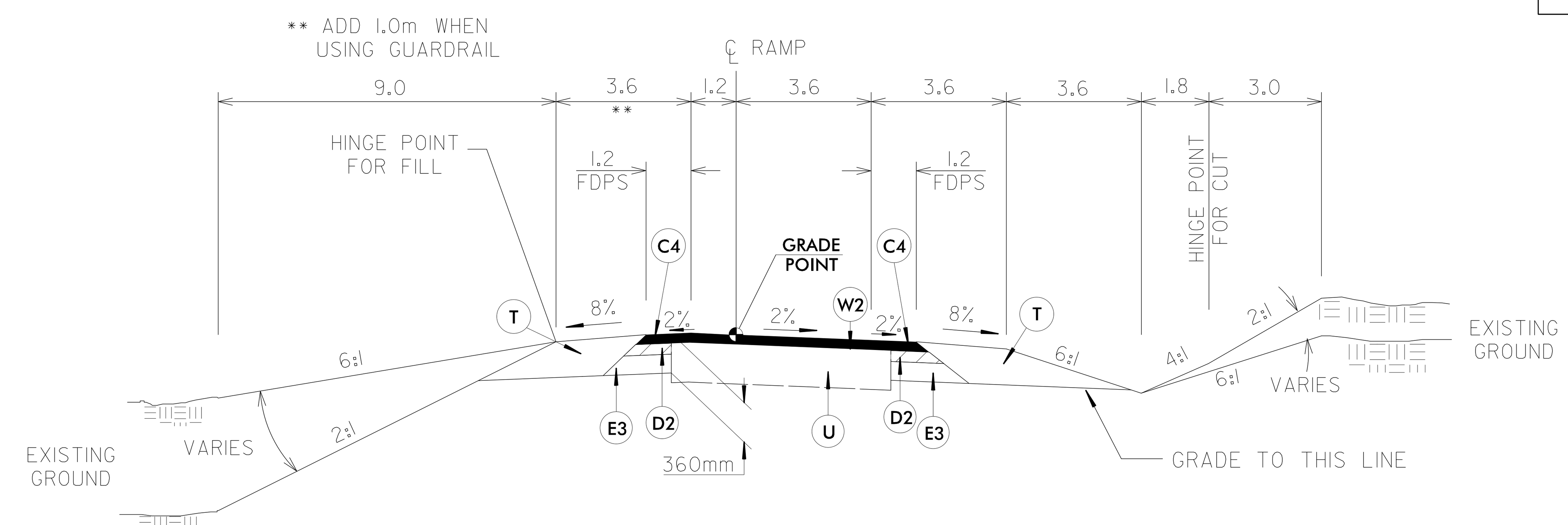
ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22606 DAVID C. WALLER
David C. Waller 2/23/2015

PAVEMENT DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 013368 DON-CHI CHEN
Don-Chi Chen 2/24/2015

PAVEMENT SCHEDULE

C1	80mm TYPE S9.5B
C2	VAR. DEPTH TYPE S9.5B
C3	50mm TYPE S9.5C
C4	80mm TYPE S9.5C
C5	VAR. DEPTH TYPE S9.5C
D1	80mm TYPE I19.0C
D2	100mm TYPE I19.0C
D3	VAR. DEPTH TYPE I19.0C
E1	100mm TYPE B25.0B
E2	VAR. DEPTH TYPE B25.0B
E3	180mm TYPE B25.0C
E4	120mm TYPE B25.0C
E5	310mm TYPE B25.0C
E6	130mm TYPE B25.0C
E7	210mm TYPE B25.0C
E8	VAR. DEPTH TYPE B25.0C
G	200mm CEMENT TREATED ABC
K	CEMENT /LIME STABILIZATION
N	GEOTEXTILE FOR PAV'T STABILIZATION
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W1	VAR. DEPTH ASPHALT PAVEMENT
W2	VAR. DEPTH ASPHALT PAVEMENT
W3	VAR. DEPTH ASPHALT PAVEMENT
W4	VAR. DEPTH ASPHALT PAVEMENT
RS	RUMBLE STRIPS

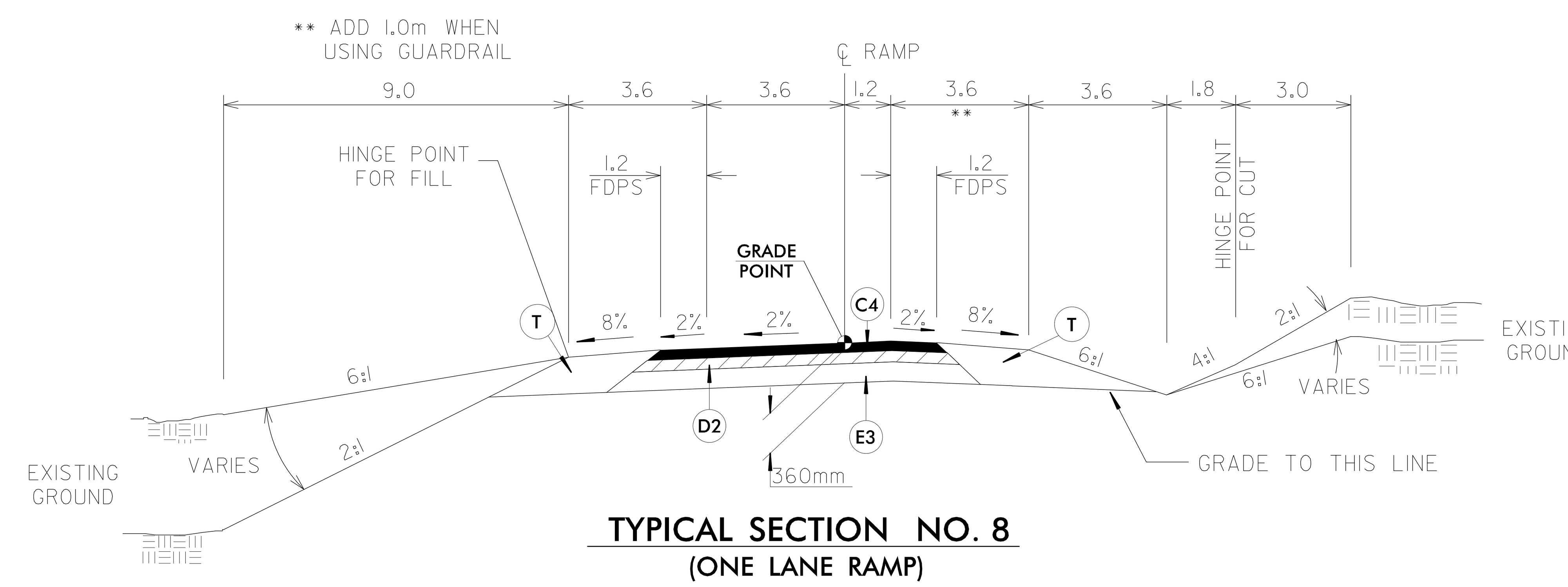
ALL PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE



TYPICAL SECTION NO. 7
(ONE LANE RAMP)

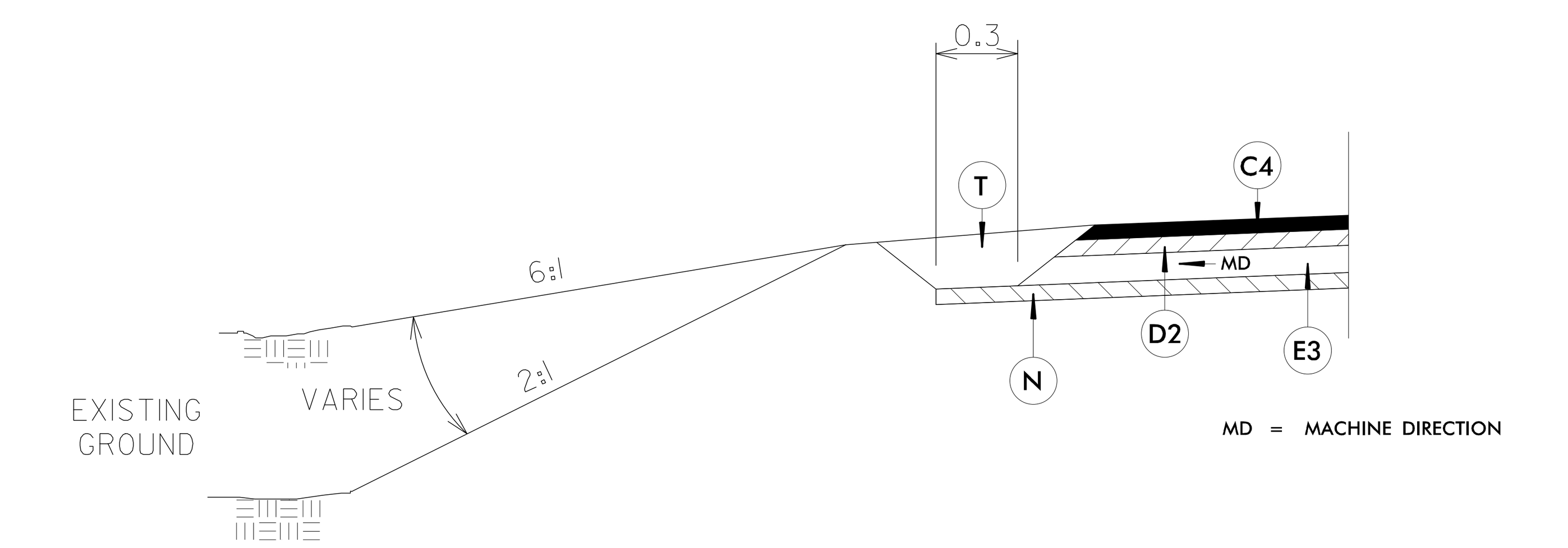
-NC68_SB-
STA. 10+00.000 TO STA. 11+45.000

-NC68_NB-
STA. 10+00.000 TO STA. 15+07.038 (GORE)



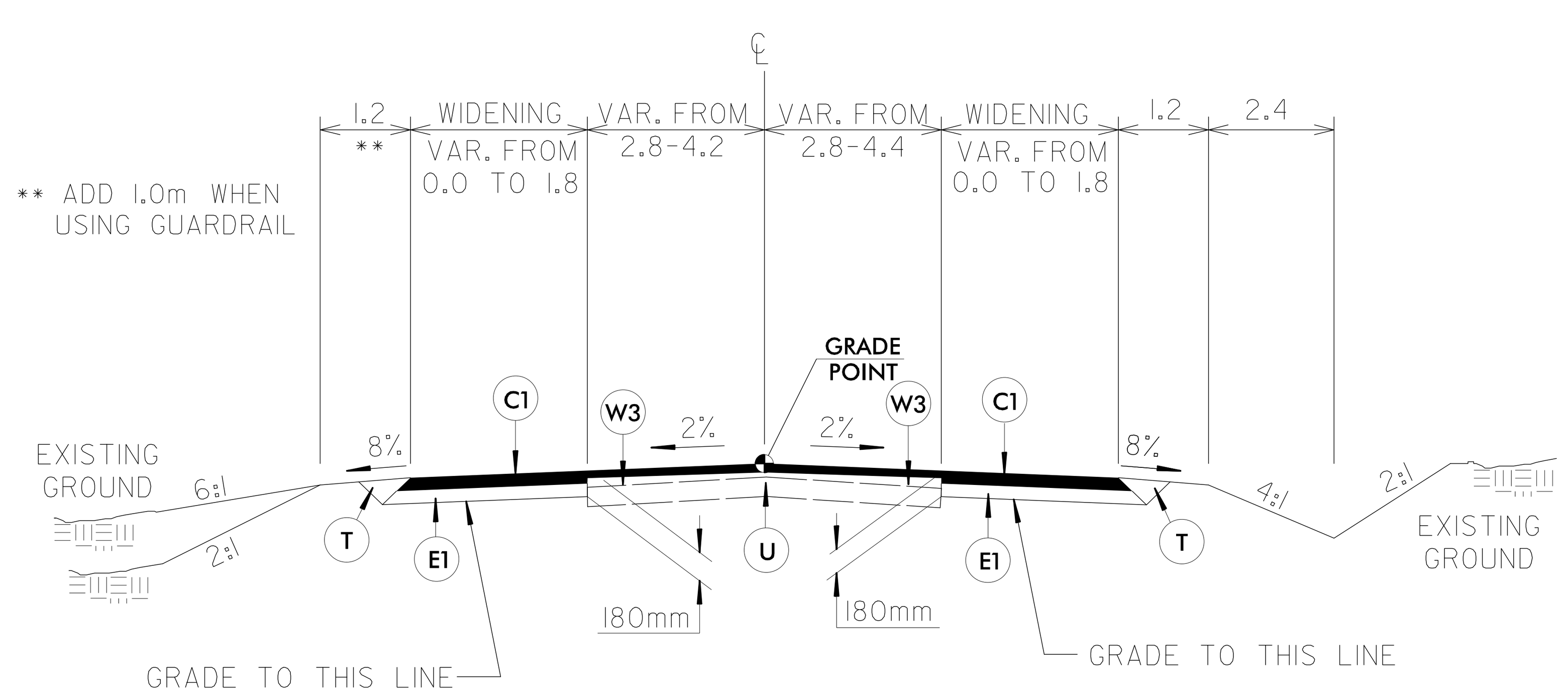
TYPICAL SECTION NO. 8
(ONE LANE RAMP)

-NC68_SB-
STA. 11+45.000 TO STA. 14+14.054 (GORE)



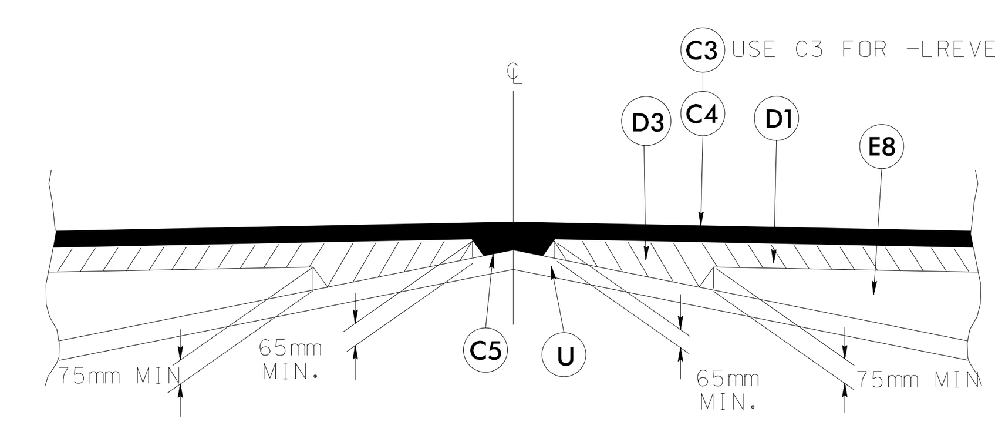
INSET B
USE GEOTEXTILE FOR PAVEMENT STABLIZATION DETAIL FOR TRENCH SHOULDER SECTION AS FOLLOWS:

-NC68_SB-
(THESE LOCATIONS TO BE INVESTIGATED DURING CONSTRUCTION)
STA. 13+43 TO STA. 15+52

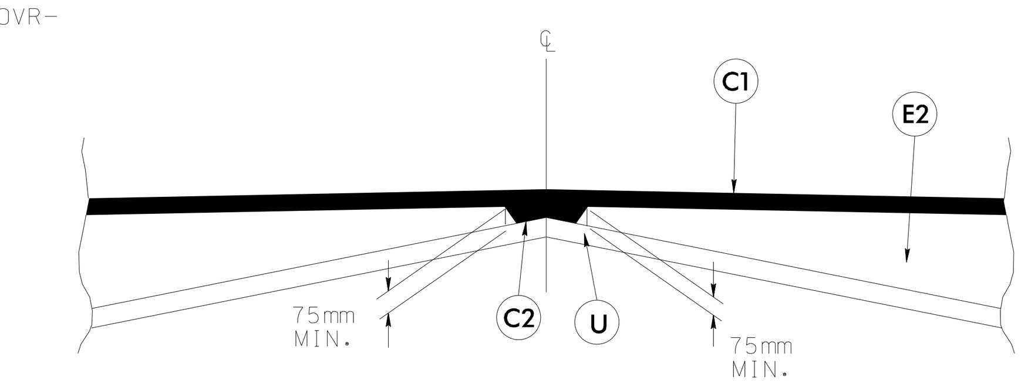


TYPICAL SECTION NO. 9

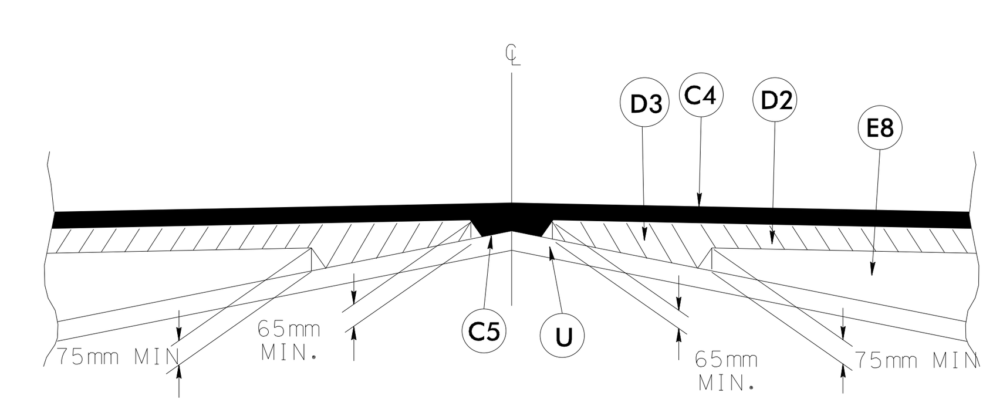
-Y16A- (PRICE FARM RD.) & -Y16B- (NEWNAM RD.)
-Y16A- STA. 10+92.331 TO STA. 11+14.872
-Y16B- STA. 10+04.503 TO STA. 10+55.267



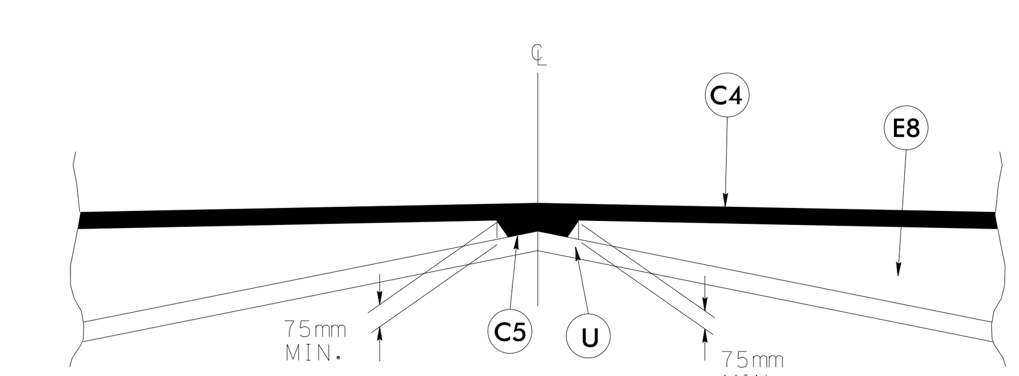
DETAIL SHOWING METHOD OF WEDGING (W1)



DETAIL SHOWING METHOD OF WEDGING (W3)



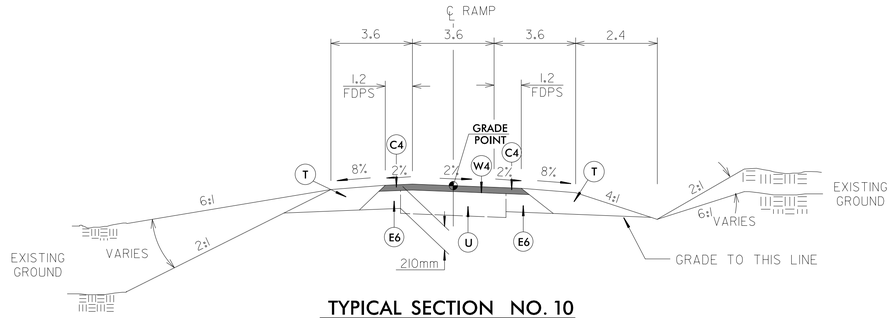
DETAIL SHOWING METHOD OF WEDGING (W2)



DETAIL SHOWING METHOD OF WEDGING (W4)

PAVEMENT SCHEDULE	
C1	80mm TYPE S9.5B
C2	VAR. DEPTH TYPE S9.5B
C3	50mm TYPE S9.5C
C4	80mm TYPE S9.5C
C5	VAR. DEPTH TYPE S9.5C
D1	80mm TYPE I19.0C
D2	100mm TYPE I19.0C
D3	VAR. DEPTH TYPE I19.0C
E1	100mm TYPE B25.0B
E2	VAR. DEPTH TYPE B25.0B
E3	180mm TYPE B25.0C
E4	120mm TYPE B25.0C
E5	310mm TYPE B25.0C
E6	130mm TYPE B25.0C
E7	210mm TYPE B25.0C
E8	VAR. DEPTH TYPE B25.0C
G	200mm CEMENT TREATED ABC
K	CEMENT /LIME STABILIZATION
N	GEOTEXTILE FOR PAV'T STABILIZATION
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W1	VAR. DEPTH ASPHALT PAVEMENT
W2	VAR. DEPTH ASPHALT PAVEMENT
W3	VAR. DEPTH ASPHALT PAVEMENT
W4	VAR. DEPTH ASPHALT PAVEMENT
RS	RUMBLE STRIPS

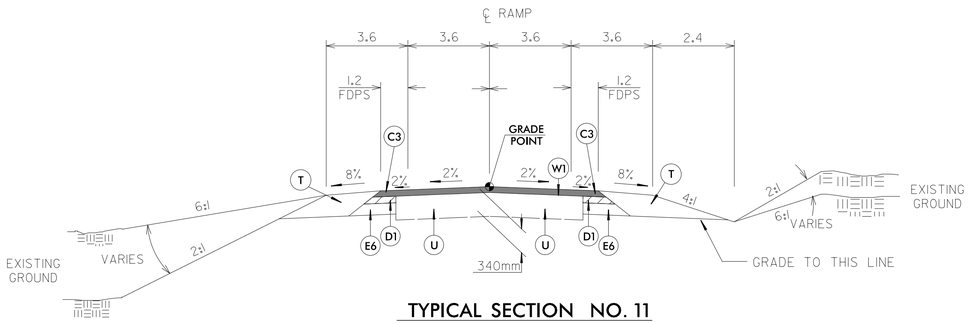
ALL PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE



TYPICAL SECTION NO. 10
(ONE LANE RAMP)

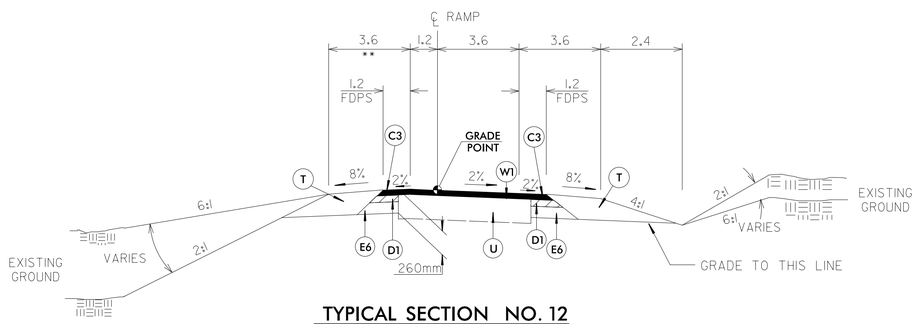
–NC68SB_DET–
STA. 10+00.000 TO STA. 17+07.249

–NC68NB_DET–
STA. 10+00.000 TO STA. 13+20.886



TYPICAL SECTION NO. 11
(ONE LANE RAMP)

–LREVEND_XOVR–
STA. 10+00.000 TO STA. 13+60.189



TYPICAL SECTION NO. 12
(ONE LANE RAMP)

–LREVSB_XOVR–
STA. 97+88.117 TO STA. 101+05.157

ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
NC License No: P-0268

METRIC

5m 0 10m

CONST.REV.

R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	2A-4
R /W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 22606 ENGINEER DAVID C WALLER
DocuSigned by: David C. Waller 3/23/2015
89AD3F7156C5435...

PAVEMENT DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 013368 ENGINEER DON-CHI CHIN
DocuSigned by: Don-Chi Chin 3/24/2015
F5A34BED43D6420...

3/23/2015
R-2413CA_rdy_typ.dgn

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

METRIC

5m 0 10m

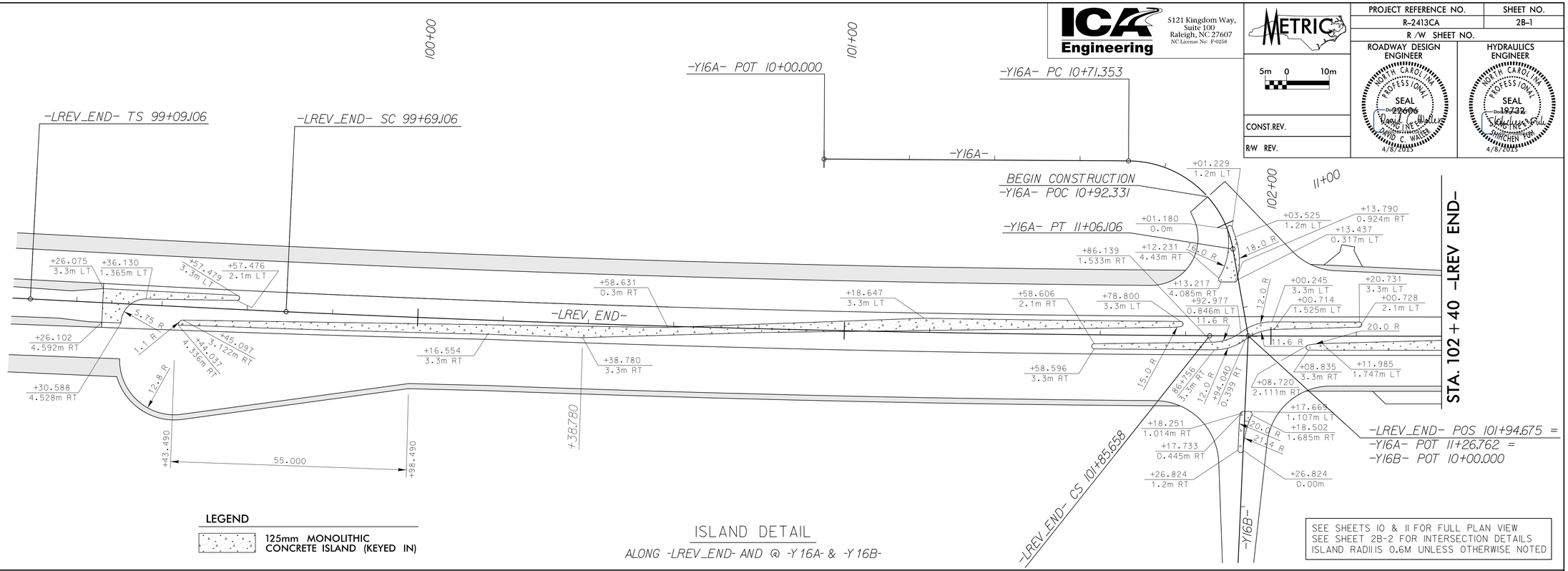
CONST.REV.

R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	2B-1
R /W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 22606 ENGINEER DAVID C WHEELER
4/8/2015

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 19732 ENGINEER STEPHEN F SMITHERMAN
4/8/2015



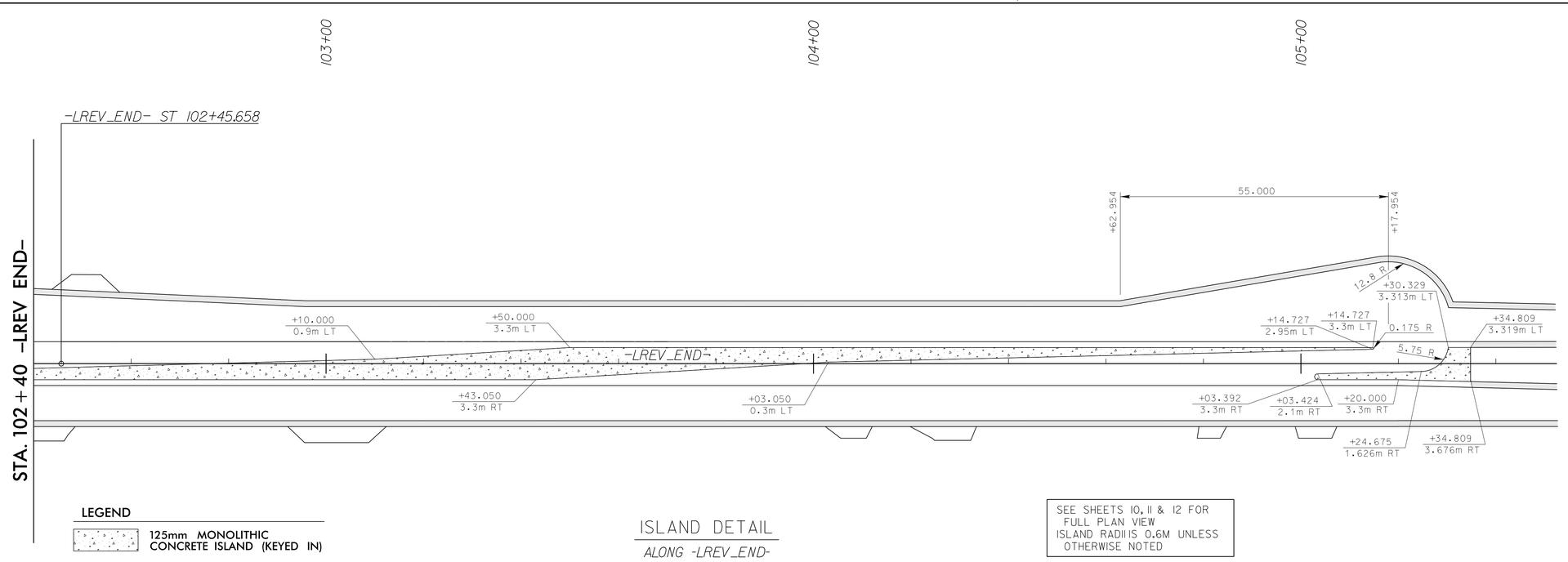
SEE SHEETS 10 & 11 FOR FULL PLAN VIEW
SEE SHEET 2B-2 FOR INTERSECTION DETAILS
ISLAND RADIIS 0.6M UNLESS OTHERWISE NOTED

LEGEND

125mm MONOLITHIC CONCRETE ISLAND (KEYED IN)

ISLAND DETAIL

ALONG -LREV_END- AND @ -Y16A- & -Y16B-



LEGEND

125mm MONOLITHIC CONCRETE ISLAND (KEYED IN)

ISLAND DETAIL

ALONG -LREV_END-

SEE SHEETS 10, 11 & 12 FOR FULL PLAN VIEW
ISLAND RADIIS 0.6M UNLESS OTHERWISE NOTED

CONCRETE ISLAND DETAIL

4/7/2015
R:\Roadway Proj\R2413CA_rdy_det_conc_isl_2B-1.dgn
ICA ENGINEERING, INC.

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

METRIC

5m 0 10m

NAD 83

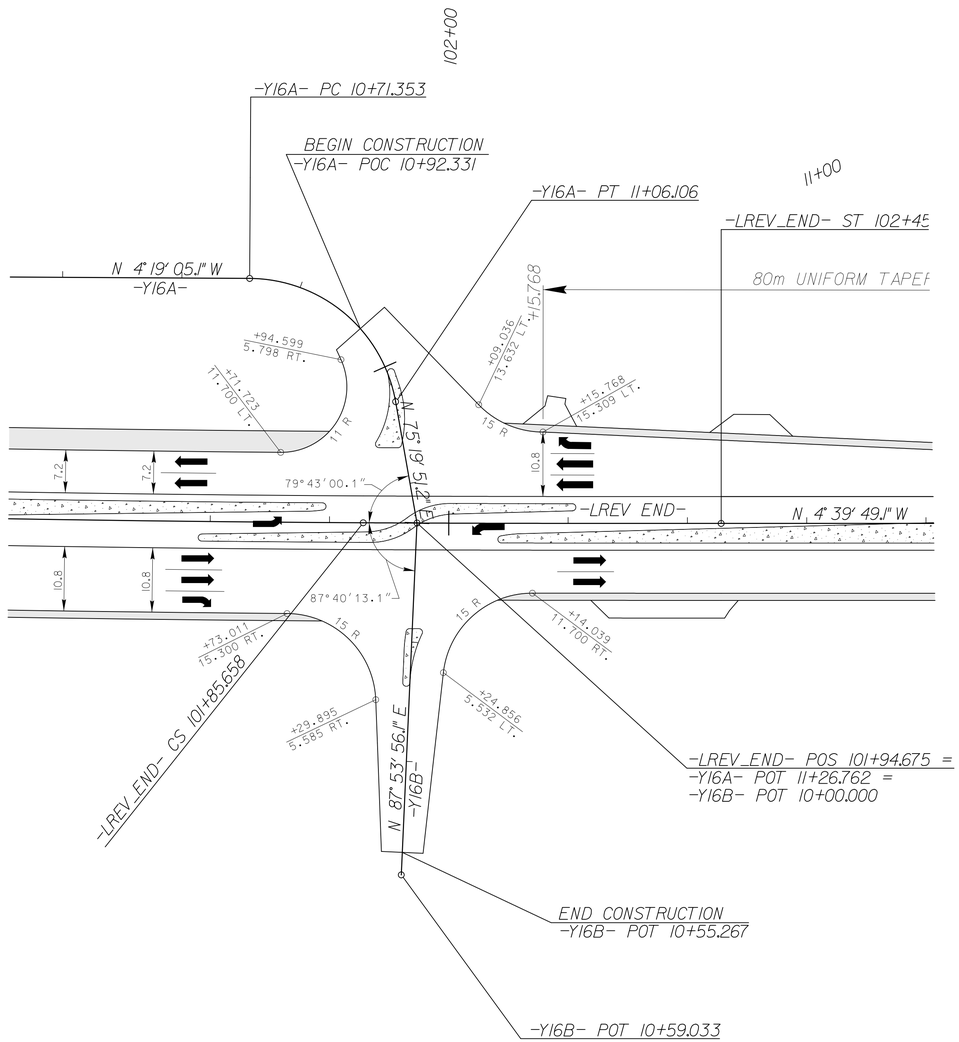
CONST.REV.

R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	2B-2
R /W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 22606 ENGINEER DAVID C WALKER
4/8/2015

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 19732 ENGINEER SCOTT M SWITCHENKO
4/8/2015



INTERSECTION DETAIL
US 220 & Y16A/Y16B
SCALE = 1:500

LEGEND

125mm MONOLITHIC CONCRETE ISLAND (KEYED IN)

SEE SHEET 11 FOR FULL PLAN VIEW

INTERSECTION DETAIL

4/7/2015
R:\ROADWAY\Proj\R2413CA-rdy_det_Intersect_2B-2.dgn
ICA ENGINEERING, INC.

DETAIL OF TEMPORARY DETOUR

-NC68SB_DET-
-NC68NB_DET-

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

METRIC

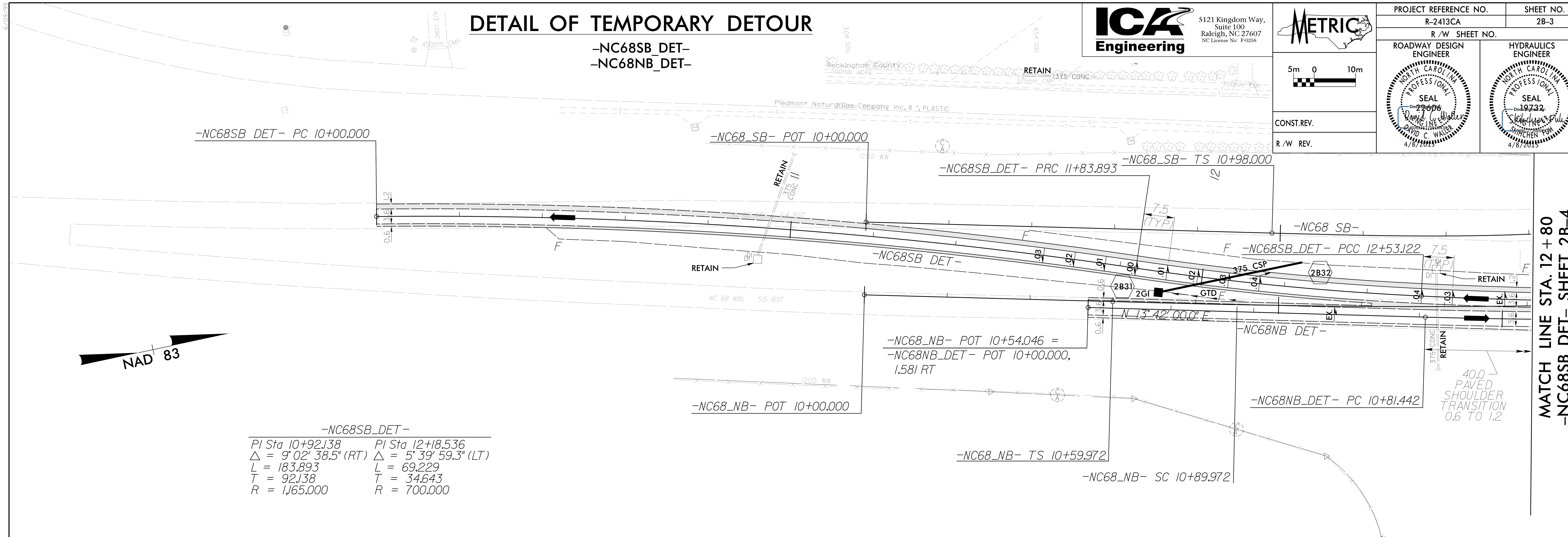
PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	2B-3
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER — SEAL 22606 — DAVID C. WALLER — 4/8/2015

HYDRAULICS ENGINEER — SEAL 19732 — SHINCHEN YOH — 4/8/2015

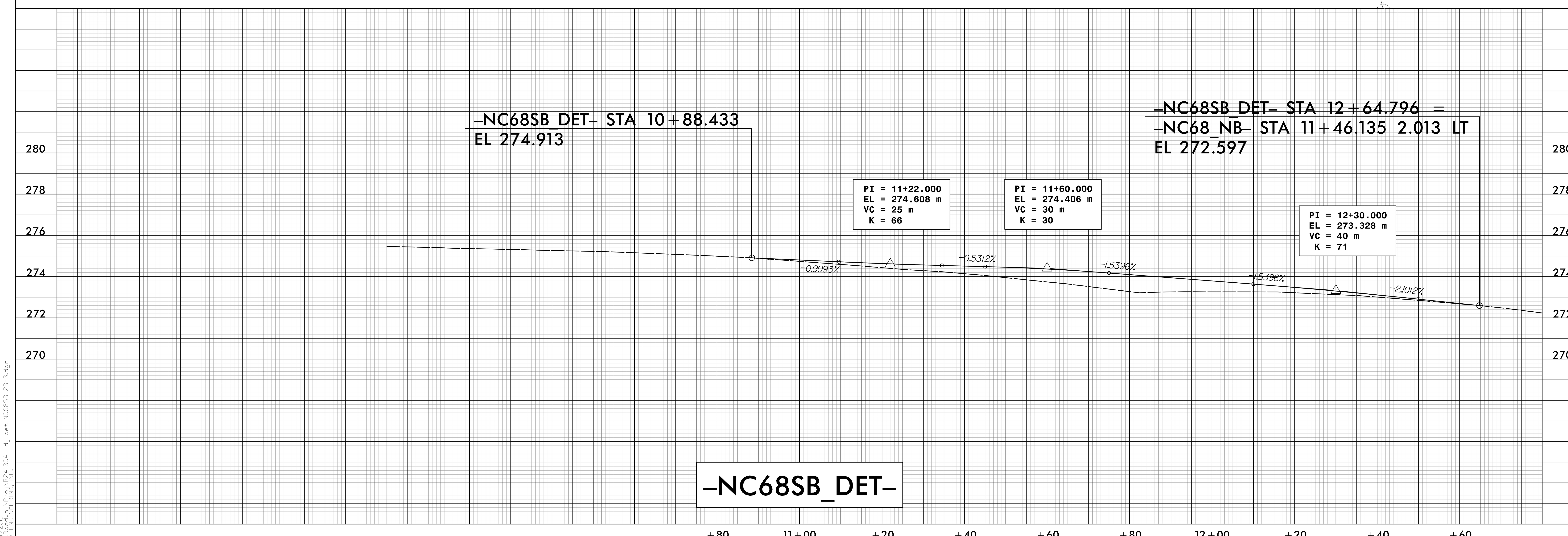
CONST.REV.

R/W REV.



-NC68SB_DET-

PI Sta 10+92.138	PI Sta 12+18.536
Δ = 9° 02' 38.5" (RT)	Δ = 5° 39' 59.3" (LT)
L = 183.893	L = 69.229
T = 92.138	T = 34.643
R = 1,165.000	R = 700.000



-NC68SB_DET-

DETAIL OF TEMPORARY DETOUR

–NC68NB_DET–
–NC68SB_DET–

METRIC

5m 0 10m

CONST.REV.

R/W REV.

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22606 DAVID C. WALLER — 4/27/2015

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19732 SHINCHEN FUH — 4/27/2015

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

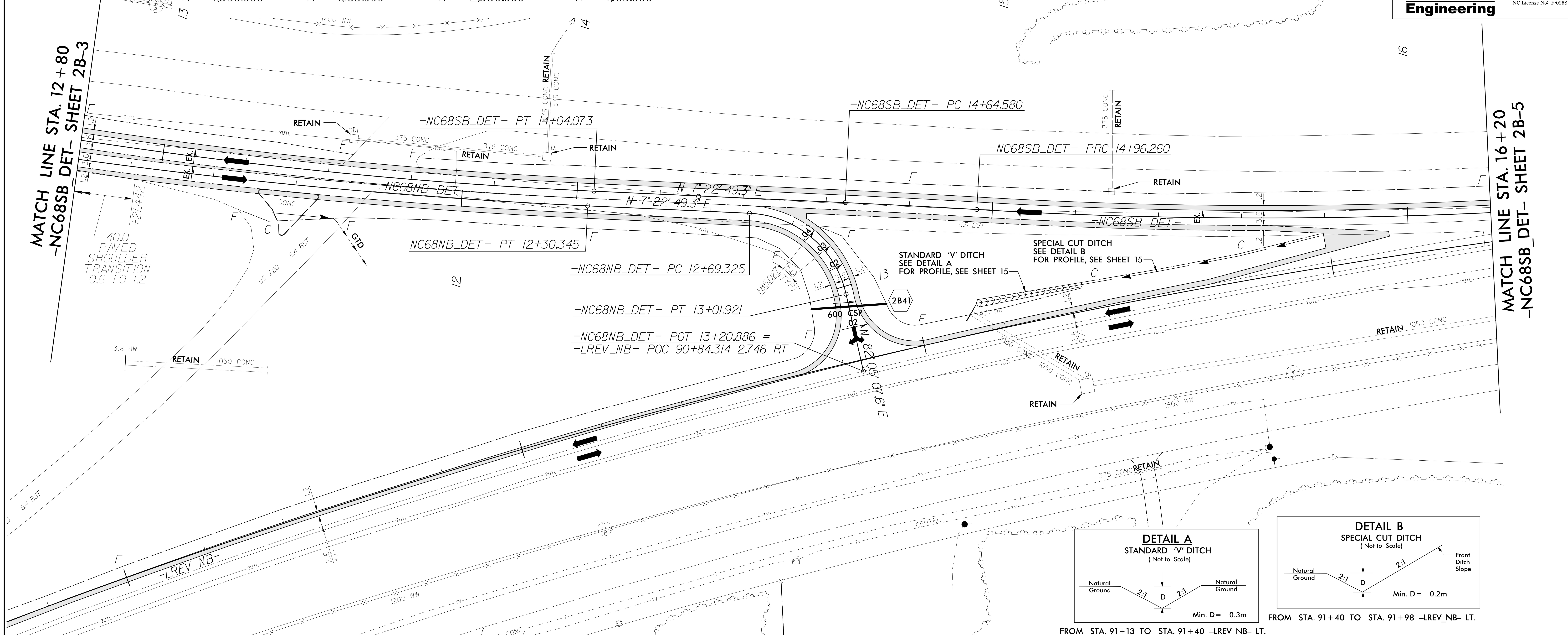
NAD 83

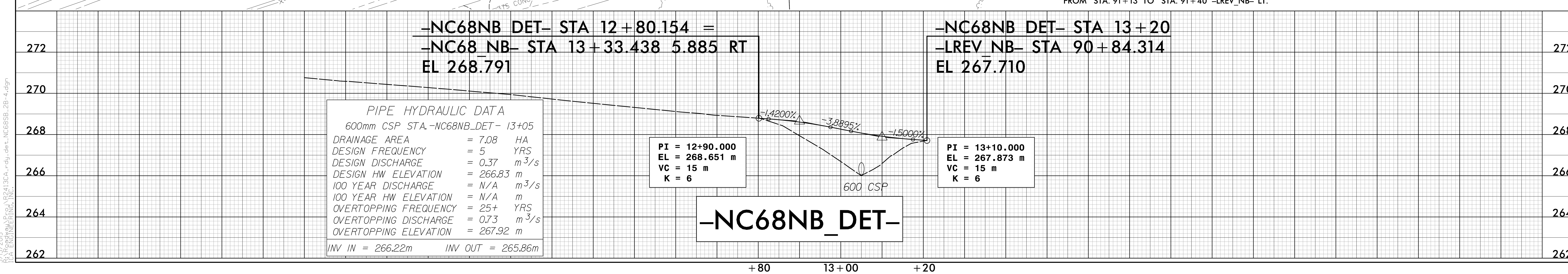
–NC68NB_DET–

PI Sta 12+88.406
△ = 74° 42' 18.4" (RT)
L = 32.596
T = 19.081
R = 25.000

–NC68SB_DET–

PI Sta 11+55.969	PI Sta 13+28.703	PI Sta 14+80.420	PI Sta 16+02.044
△ = 6° 19' 10.7" (LT)	△ = 7° 25' 26.0" (LT)	△ = 0° 46' 44.5" (RT)	△ = 10° 22' 35.7" (LT)
L = 148.903	L = 150.951	L = 31.680	L = 210.988
T = 74.527	T = 75.581	T = 15.840	T = 105.783
R = 1,350.000	R = 1,165.000	R = 2,330.000	R = 1,165.000





PIPE HYDRAULIC DATA

600mm CSP STA.–NC68NB_DET– 13+05

DRAINAGE AREA	= 7.08	HA
DESIGN FREQUENCY	= 5	YRS
DESIGN DISCHARGE	= 0.37	m^3/s
DESIGN HW ELEVATION	= 266.83	m
100 YEAR DISCHARGE	= N/A	m^3/s
100 YEAR HW ELEVATION	= N/A	m
OVERTOPPING FREQUENCY	= 25+	YRS
OVERTOPPING DISCHARGE	= 0.73	m^3/s
OVERTOPPING ELEVATION	= 267.92	m

INV IN = 266.22m INV OUT = 265.86m

DETAIL OF TEMPORARY DETOUR

–NC68SB_DET–

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	2B-5
R /W SHEET NO.	

METRIC

5m 0 10m

CONST.REV.

R/W REV.

ROADWAY DESIGN ENGINEER — SEAL by NORTH CAROLINA PROFESSIONAL ENGINEER DAVID C WALLER — 4/27/2015

HYDRAULICS ENGINEER — SEAL by NORTH CAROLINA PROFESSIONAL ENGINEER SHIHCHEN FU — 4/27/2015

ICA Engineering
5121 Kingdom Way, Suite 100
Raleigh, NC 27607
NC License No: P-0238

NAD 83

MATCH LINE STA. 16+20 –NC68SB_DET– SHEET 2B-4

–NC68SB_DET– PT 17+07.249 = –LREV_NB– POT 93+26.581 3.907 LT

–NC68_NB– CS 16+47.503

–NC68_NB– ST 16+77.503 = –LREV_NB– ST 94+15.855 3.6 RT

TYPICAL ROADWAY CUT DITCH SEE DETAIL C FOR PROFILE, SEE SHEET 16

2B51 2B52 2B53 2B54 2B55 2B56

2GI-D 375 CSP JB

2GI TBJB 375 CSP

375 CONC RETAIN

–NC68 NB– –NC68SB_DET– –LREV_NB–

US 220 & NC 68 SBL 8.6 BST

US 220 & NC 68 NBL 8.6 BST

N 1° 41' 26.7" W

2UTL

RETAIN DI

375 CONC RETAIN

1500 WW

RETAIN 375 CONC (RETAIN)

SR 2806 BENNETT FARM RD 6.2 BST

RETAIN 450 CONC

RETAIN 375 CONC (RETAIN)

RETAIN 375 CONC

3.5 GR

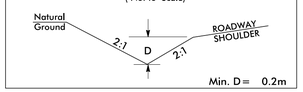
3.4 GR

1050 CONC RETAIN

–LREV_NB– CS 92+51.071

–LREV_NB– ST 93+41.071

DETAIL C
TYPICAL ROADWAY CUT DITCH
(Not to Scale)



Min. D = 0.2m

FROM STA. 93+60 TO STA. 97+00 –LREV_NB– LT.

–LREVEND_XOVR– POT 10+00.000 = –LREV_NB– POT 97+13.905 2.300 LT.

MATCH LINE STA. 95+80 –LREV_NB–

TYPICAL ROADWAY CUT DITCH SEE DETAIL C FOR PROFILE, SEE SHEET 16

MTL GUARDRAIL

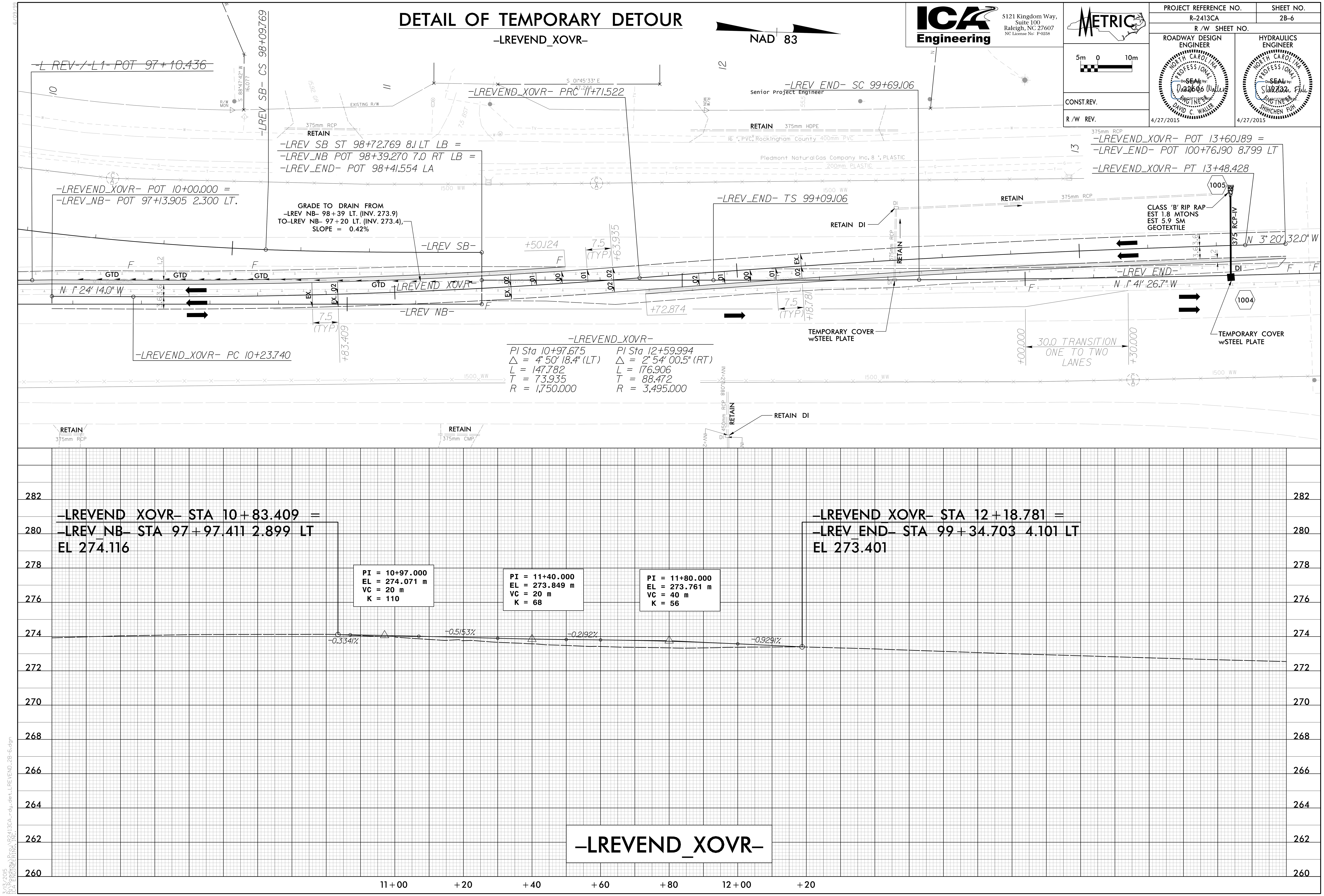
–LREVEND_XOVR– N 1° 24' 14.9" W

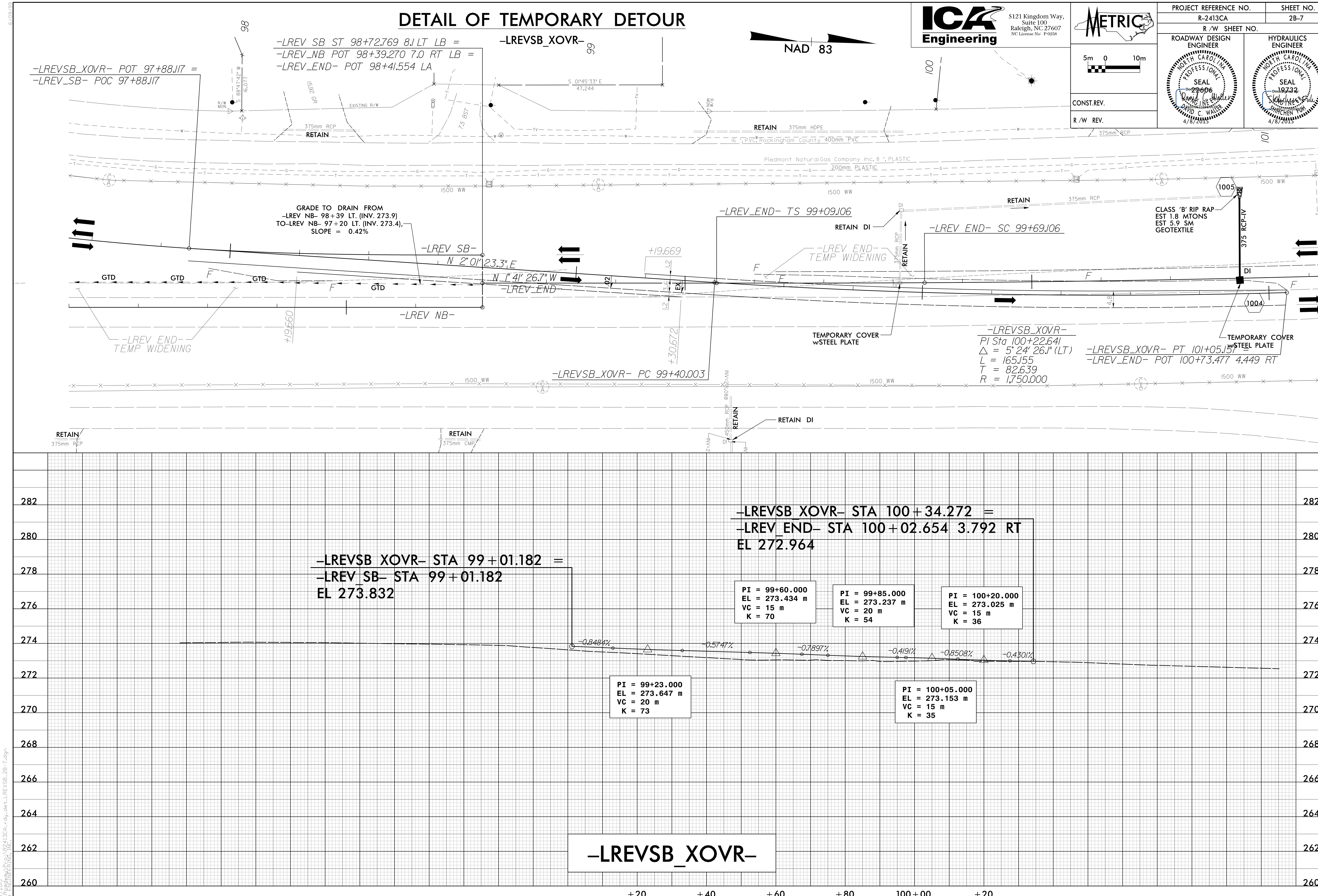
96 –LREV_NB– N 1° 41' 26.7" W 97

1500 WW

MATCH LINE STA. 95+80 –LREV_NB–

3/3/2015
R:\Roadway\Proj\R2413CA_rdy_des_NC68SB_2B-5.dgn
ICA ENGINEERING, INC.





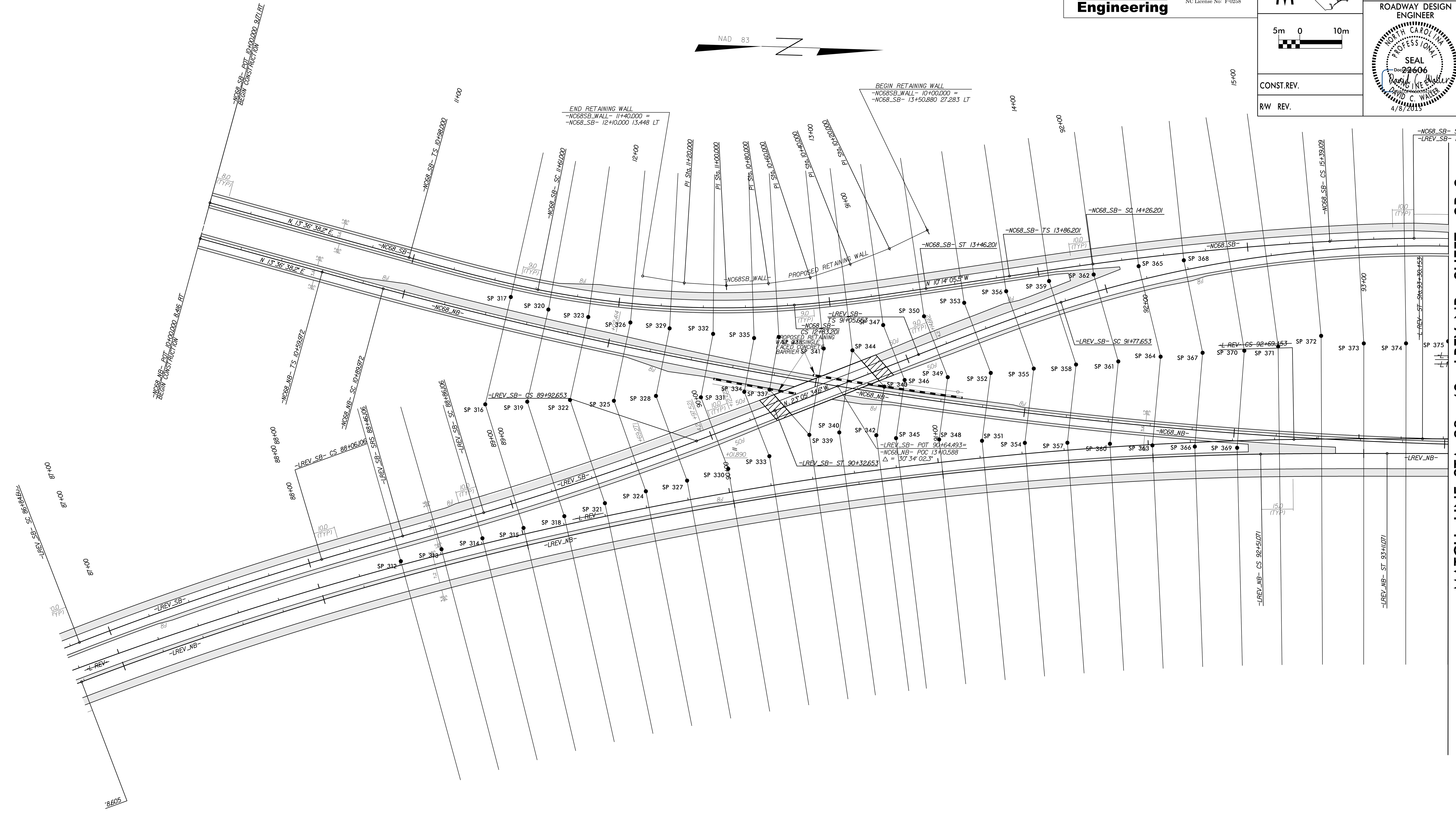
PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	2B-8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

METRIC

CONST. REV.

R/W REV.



NORTH CAROLINA PROFESSIONAL SEAL 22606 DAVID C. WALLER 4/8/2015

NORTH CAROLINA PROFESSIONAL SEAL 19732 SHINCHEN PUH 4/8/2015

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

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	2B-9
R/W SHEET NO.	

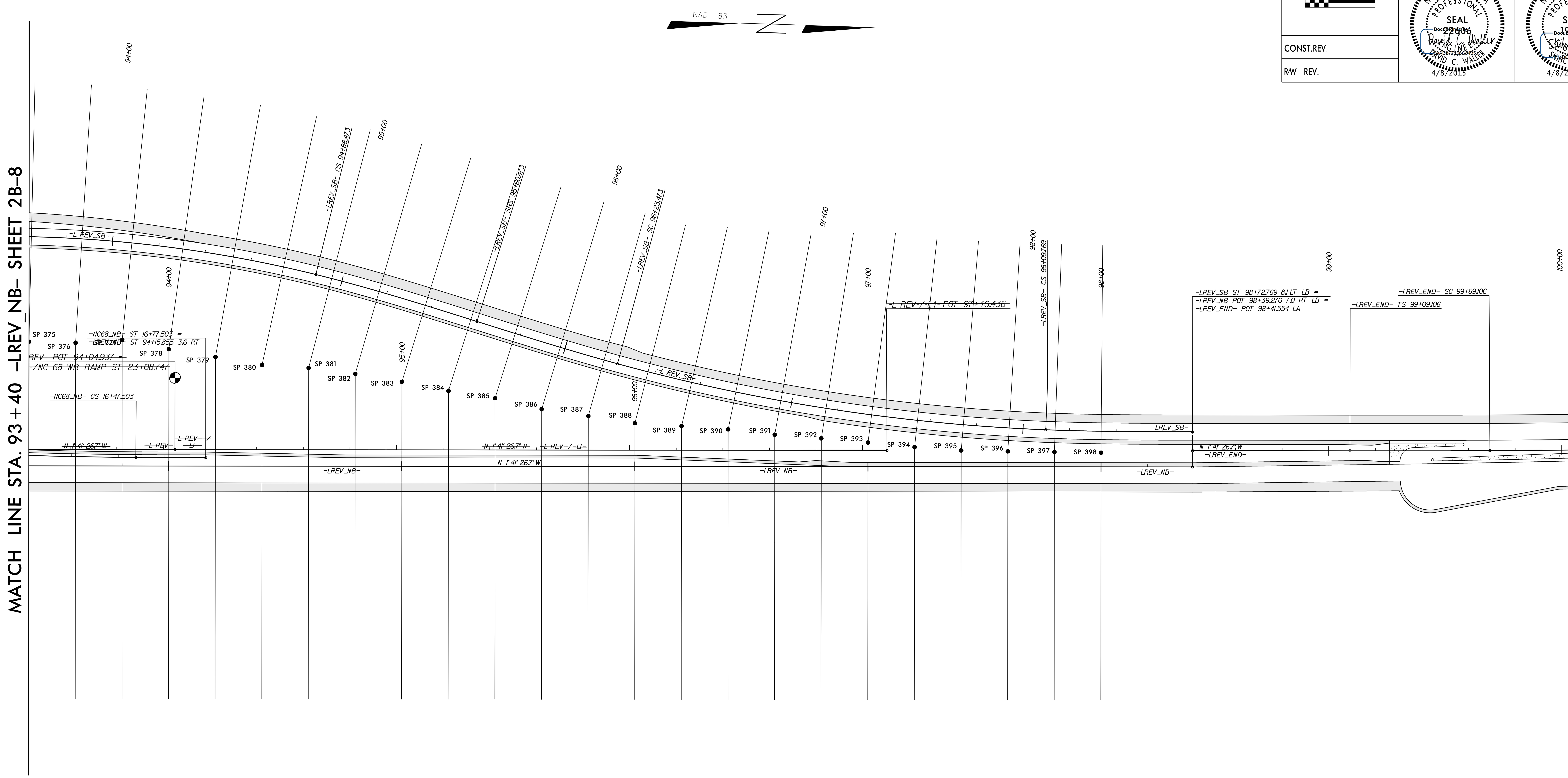
ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22606 DAVID C. WALLER 4/8/2015

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19732 SHINCHEN PUH 4/8/2015

5m 0 10m

CONST.REV.

R/W REV.

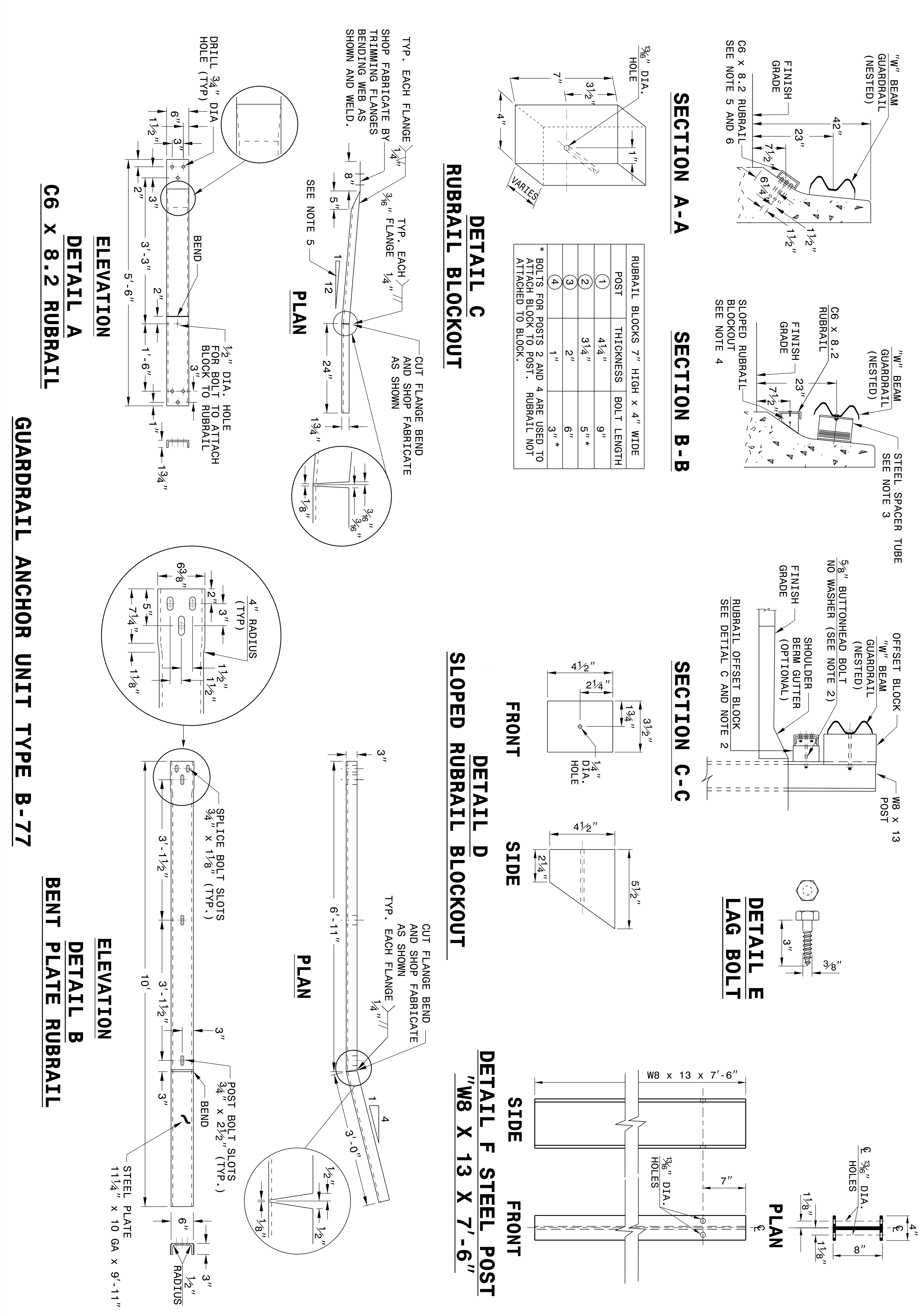


PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	2C-1

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

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

SHEET 5 OF 7
862D03



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

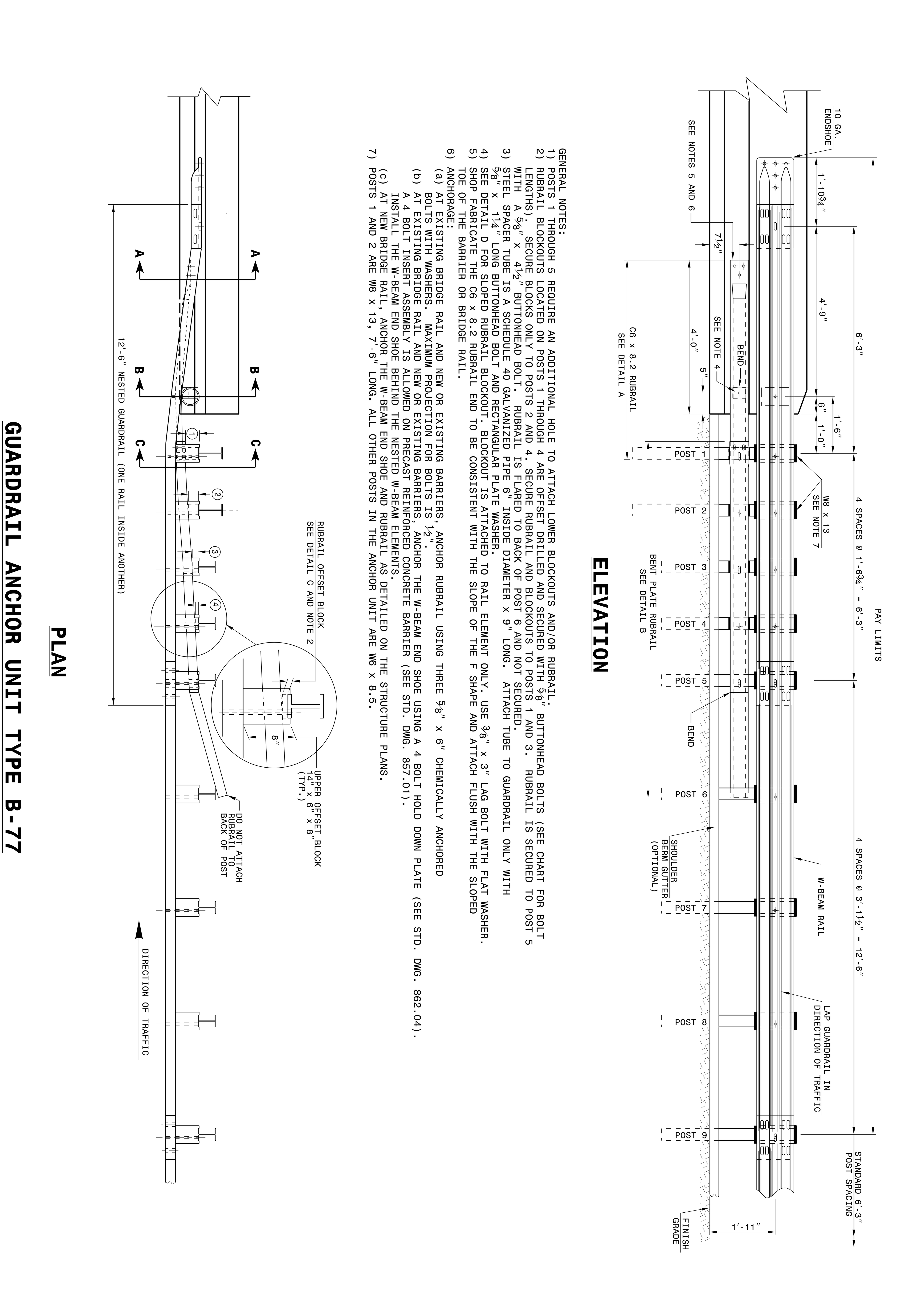
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

SHEET 5 OF 7
862D03

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

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

SHEET 4 OF 7
862D03



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

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

SHEET 4 OF 7
862D03

4/15/2015

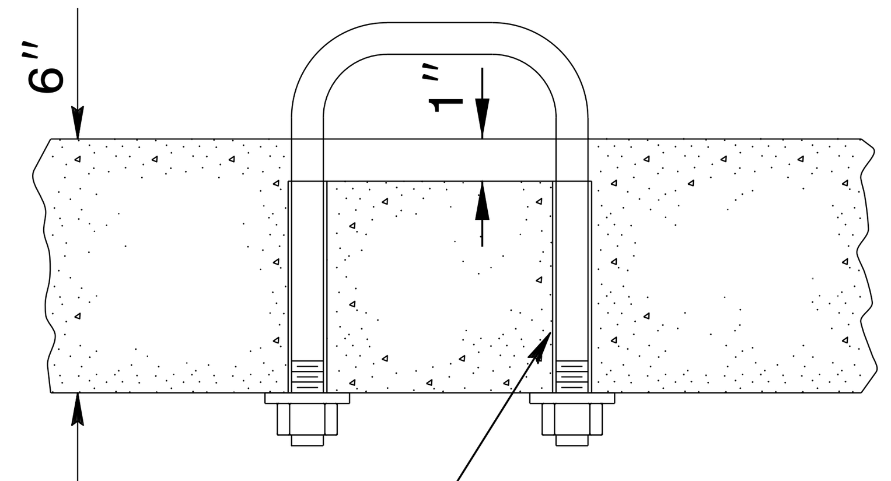
SEAL 022966 Joel S. Howerton

DocuSigned by: Joel Howerton

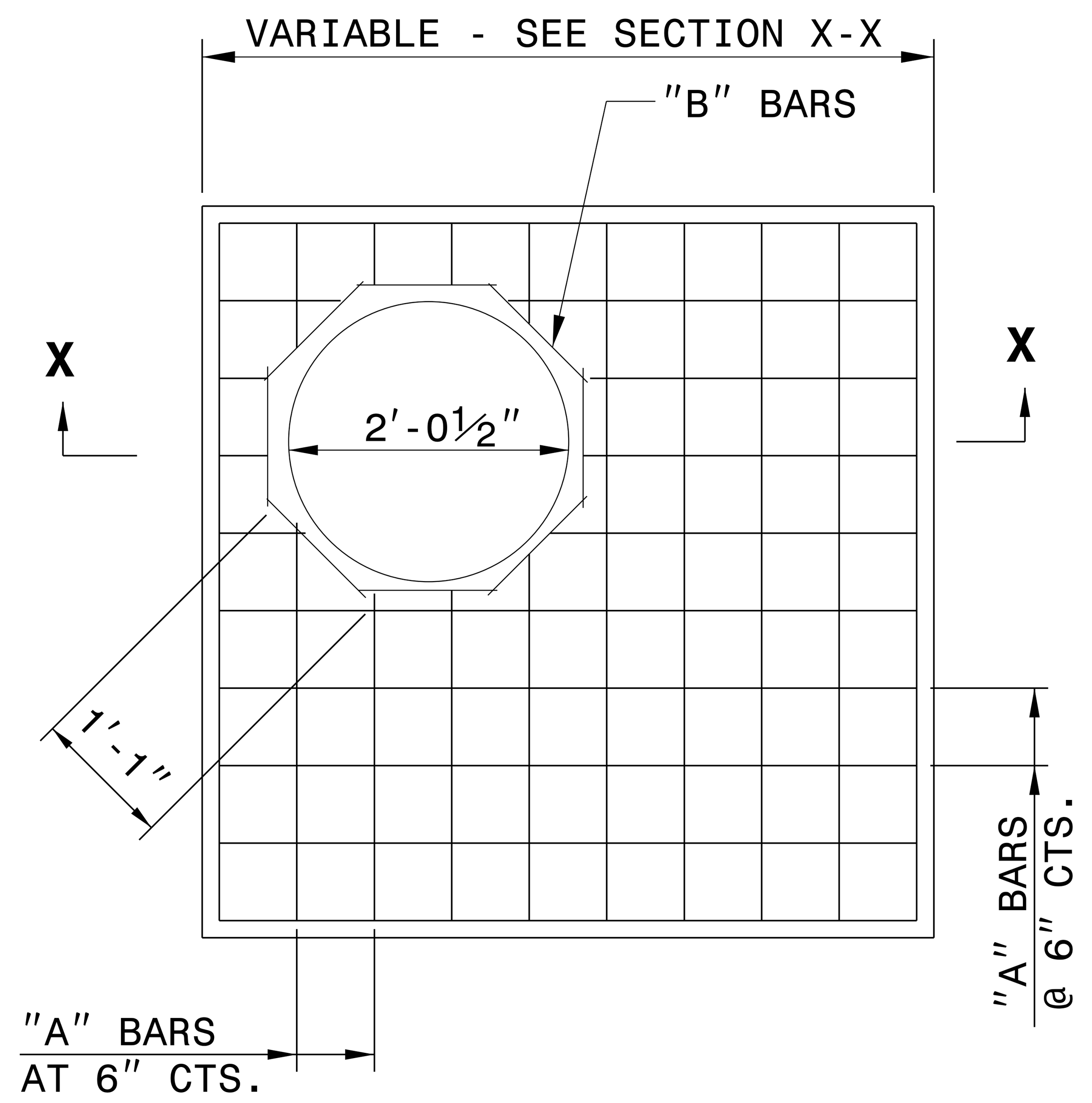
CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

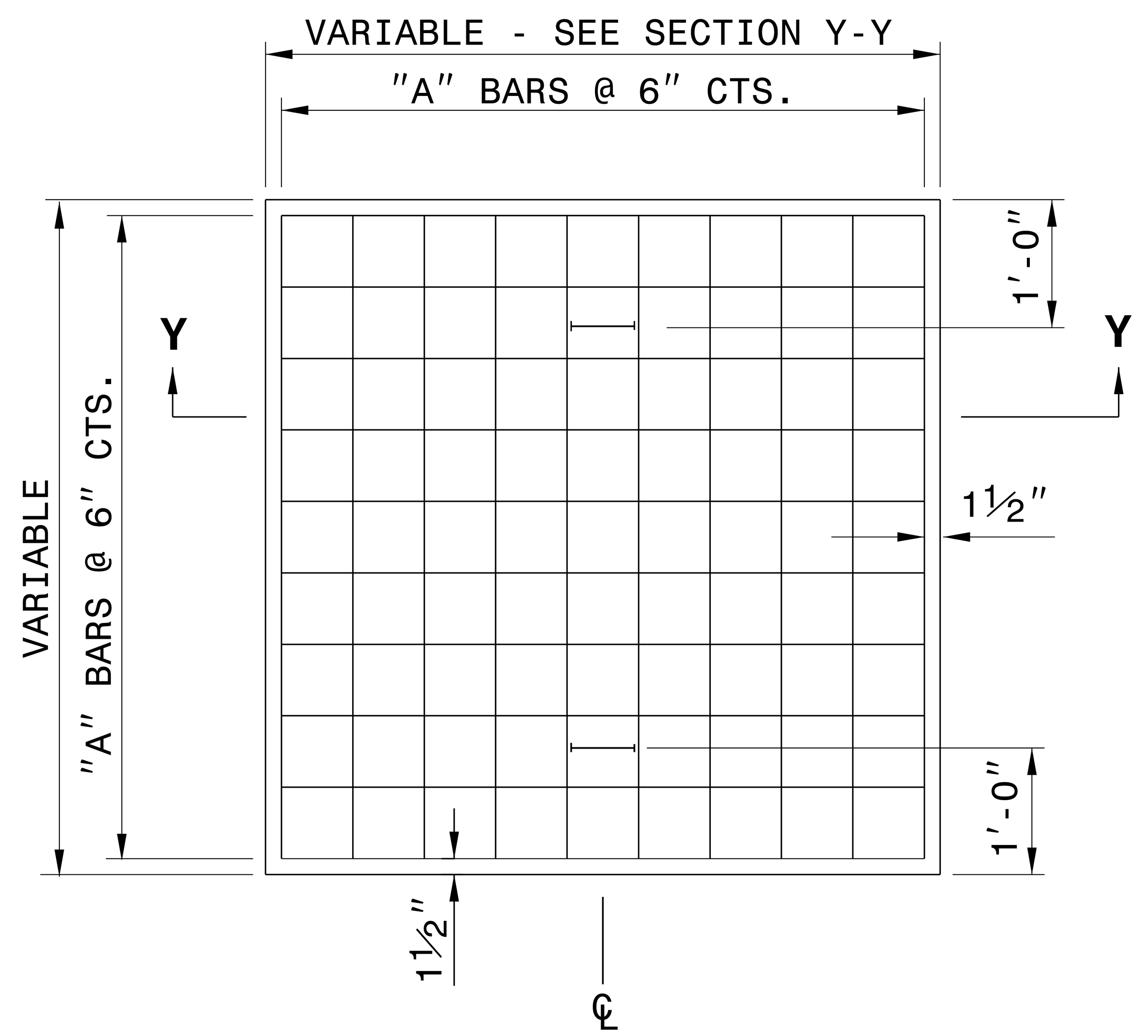
ORIGINAL BY: J HOWERTON DATE: 06-22-12
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.:



PARTIAL SECTION



PLAN



PLAN

GENERAL NOTES:

CONSTRUCT IN ACCORDANCE WITH SECTION 859 OF THE STANDARD SPECIFICATIONS.

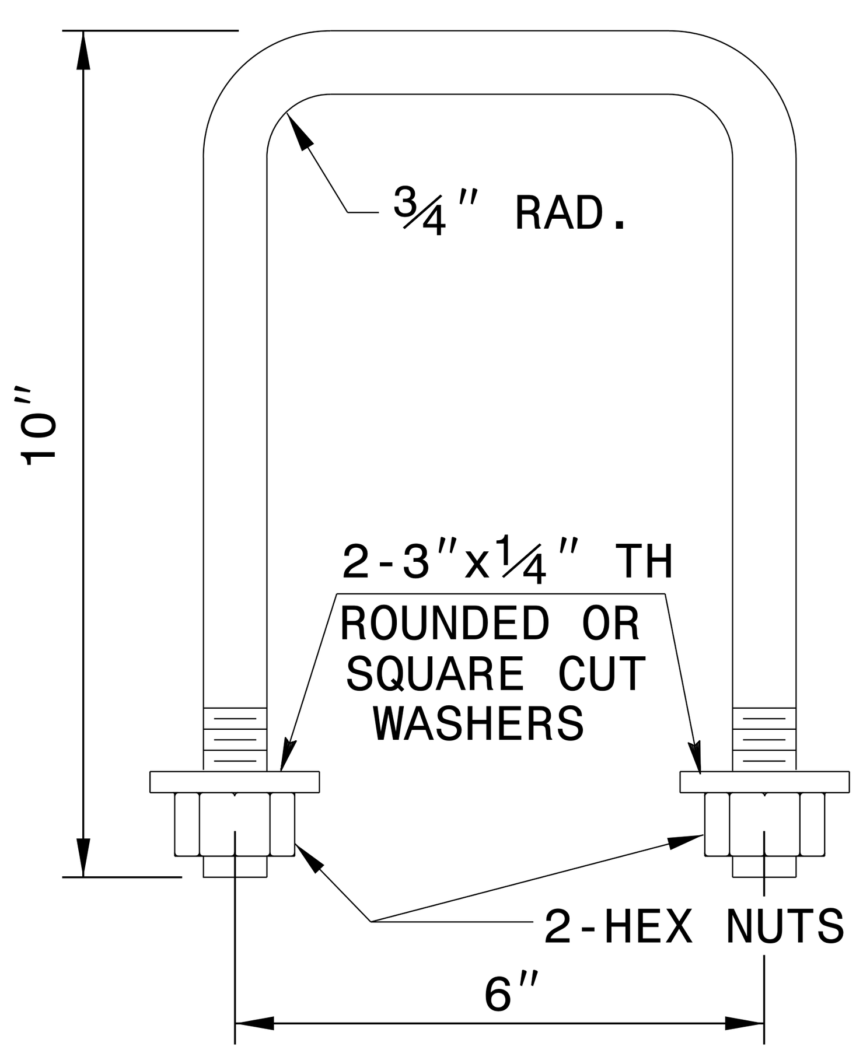
THE DIMENSIONS FOR THE EXISTING BOXES ARE APPROXIMATE AND MAY VARY SLIGHTLY.

DETAIL INTENDED FOR NON-TRAFFIC BEARING DRAINAGE STRUCTURES.

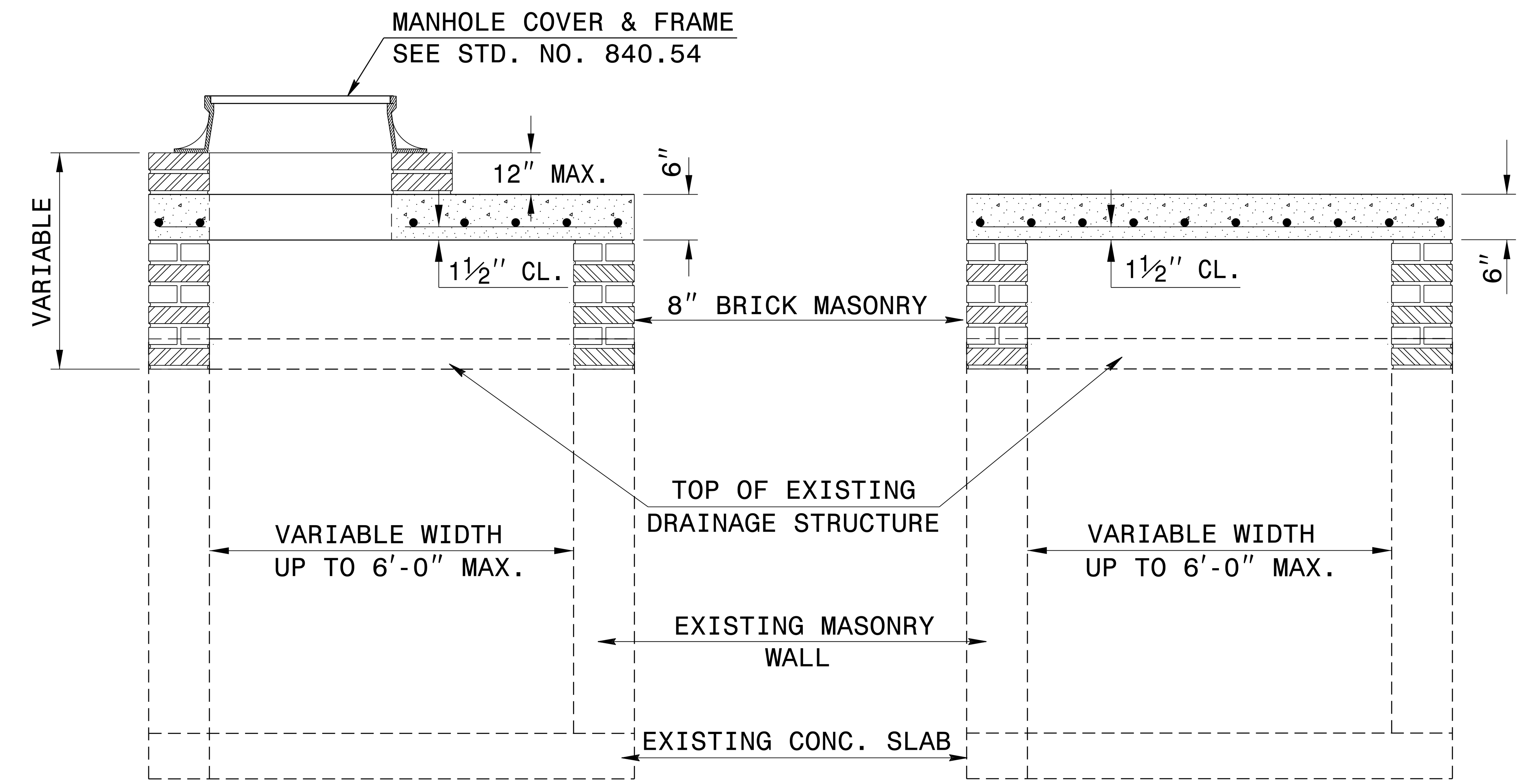
BILL OF MATERIALS

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**

4/15/2015

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER Joel S. Howerton

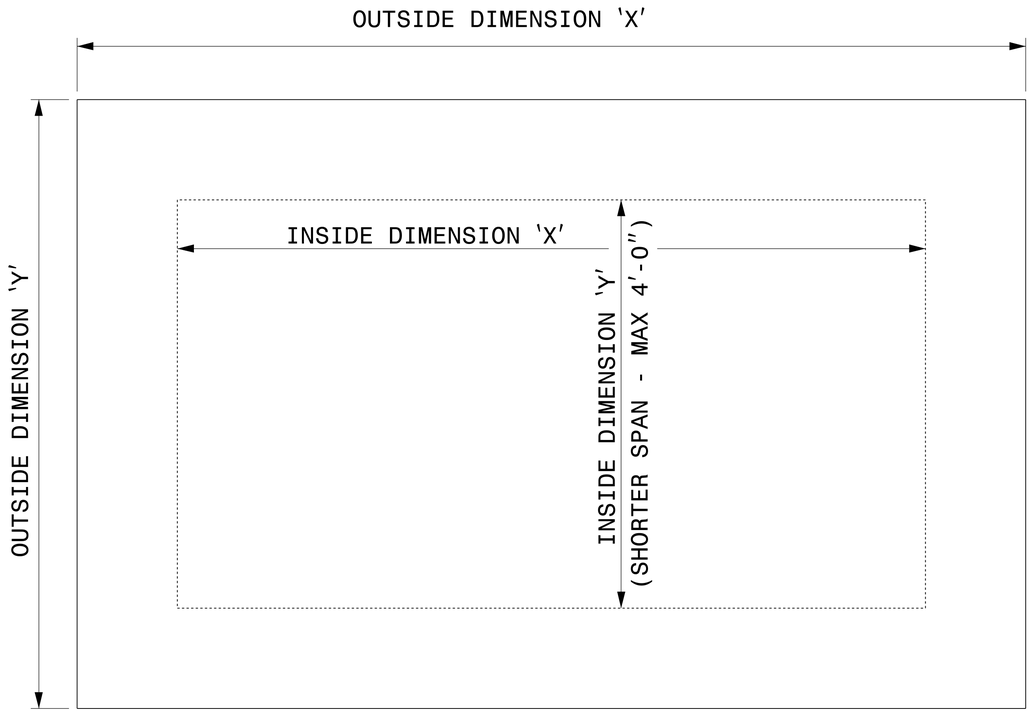
DocuSigned by: Joel Howerton

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

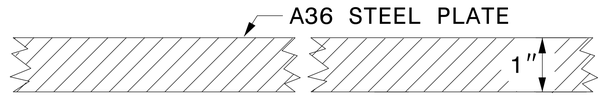
PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	2C-3



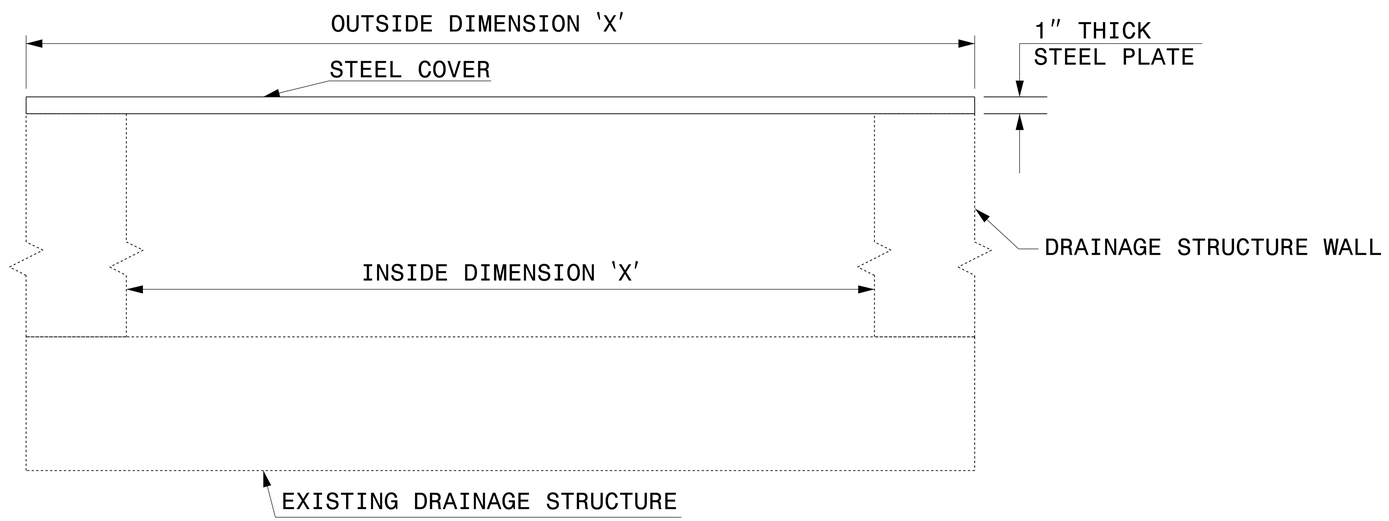
PLAN VIEWS

GENERAL NOTES:

-USE GRADE A36 STEEL
-STEEL COVERS ARE FOR TEMPORARY USE DURING PHASE CONSTRUCTION.
-FILL SHALL BE PLACED DIRECTLY OVER THE STEEL PLATES.
-SEE ROADWAY PLANS AND PROVISIONS FOR LOCATIONS
-QUANTITES TO BE PAID FOR AT THE UNIT PRICE BID PER EACH.



SECTION VIEW OF STEEL TOP PLATE



ELEVATION VIEWS

4/15/2015

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER Joel S Howerton

DocuSigned by: Joel Howerton B73F3D17DCDC45F...

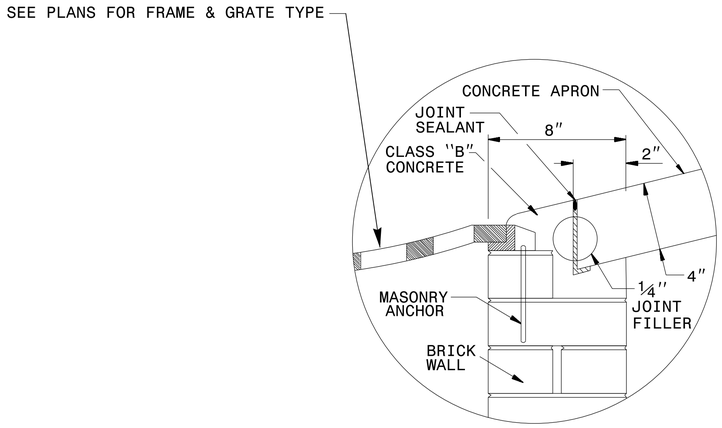
CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

DETAIL OF TEMPORARY 1" STEEL COVER OVER DRAINAGE STRUCTURE

ORIGINAL BY: E.E. WARD DATE: 2-2-98
MODIFIED BY: _____ DATE: _____
CHECKED BY: _____ DATE: _____
FILE SPEC.: eric:/usr/details/metric/stand/stlcvr2.dgn

$$$$SYSTIME$$$$
$$$$TIME$$$$
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	2C-4



GRATE PLACEMENT DETAIL

FOR GRATED DROP INLETS

GENERAL NOTES:

-CONSTRUCT IN ACCORDANCE WITH SECTION 859 OF THE STANDARD SPECIFICATIONS.

-USE CLASS B CONCRETE.

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

-JUMBO CONCRETE BRICK WILL BE PERMITTED. 4″ CONCRETE BRICK OR 8″ SOLID CONCRETE BLOCK ARE REQUIRED FOR DRAINAGE STRUCTURE.

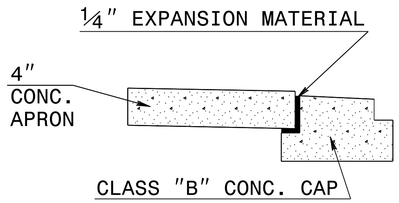
-INCLUDE CONCRETE APRON IN UNIT PRICE BID PER EACH, CONVERT EXISTING DROP INLET TO 2GI AS NEEDED.

-SPECIAL DESIGN IS REQUIRED FOR USE UNDER PAVEMENT.

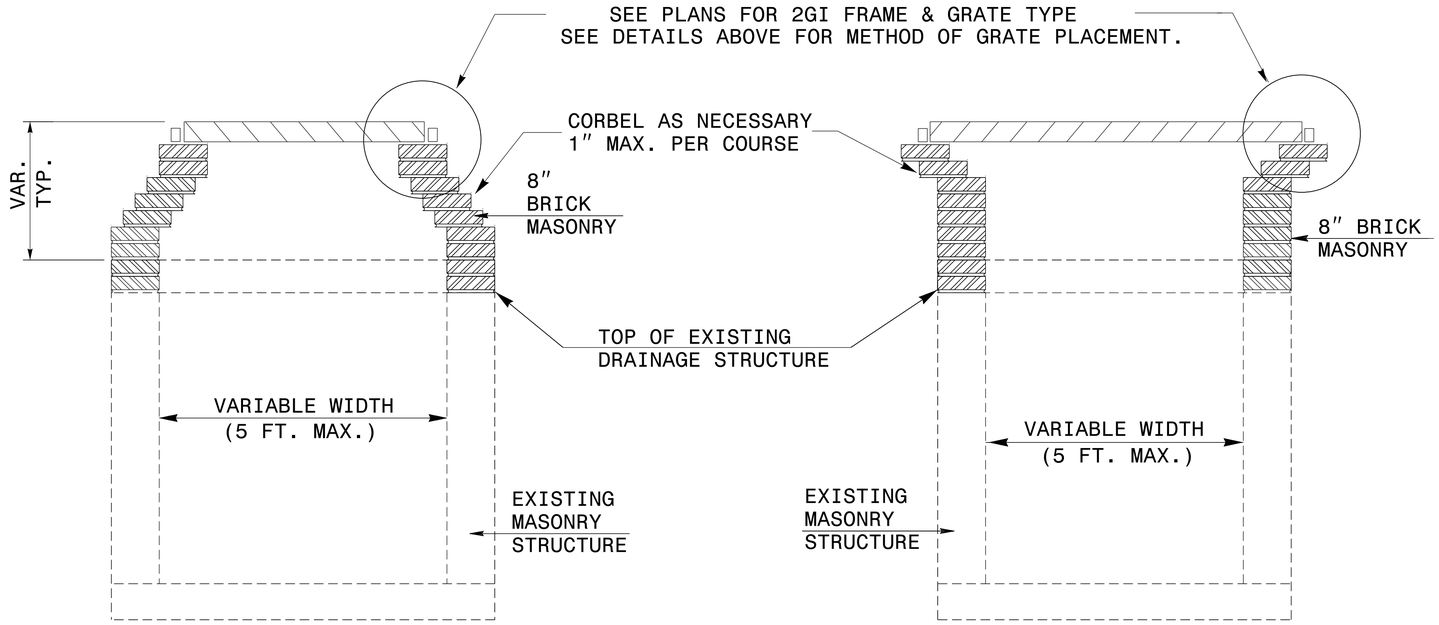
-CONFIRM DIMENSIONS ON EACH INDIVIDUAL FRAME & GRATE PROPOSAL.

-SEE STD. DRAWING 840.25 FOR MASONRY ANCHORAGE.

-SEE STD. DRAWING 840.17 FOR CONCRETE APRON.



EXPANSION JOINT DETAIL



TYPICAL SECTION

TYPICAL SECTION

4/15/2015

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER Joel S. Howerton

DocuSigned by: Joel Howerton 873F3D17DCDC45F...

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

DETAIL TO CONVERT EXISTING DI, CB or JB TO 2-GI

ORIGINAL BY:	T.S.S.	DATE:	NOV.1997
MODIFIED BY:	T.S.S.	DATE:	FEB.2000
CHECKED BY:		DATE:	
FILE SPEC.:	s:jhowerton/Convert DI to 2GI		

$$$$$$SYSTIME$$$$$$
$$$$$$USERNAME$$$$$$

8/17/99

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

METRIC

0

CONST.REV.

R /W REV.

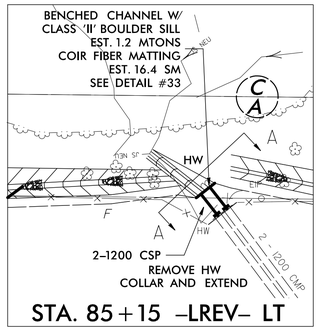
PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	2D-1
R /W SHEET NO.	

HYDRAULICS ENGINEER

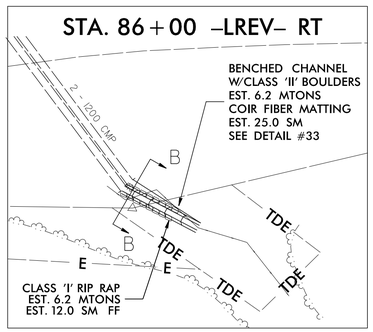
NORTH CAROLINA PROFESSIONAL SEAL 19732 ENGINEER Christopher Smithen

4/8/2015

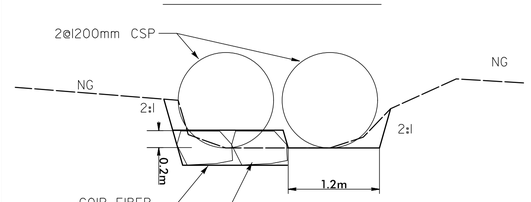
INLET/OUTLET CHANNEL IMPROVEMENT DETAIL



STA. 85+15 –LREV– LT

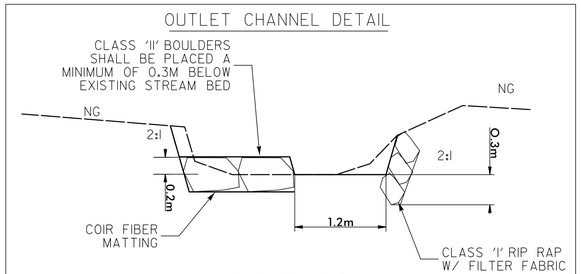


INLET CHANNEL DETAIL



SECTION A-A
NOT TO SCALE

OUTLET CHANNEL DETAIL



SECTION B-B
NOT TO SCALE

DETAIL #33

NOTES:

1. A BENCH 0.2m ABOVE THE BED SHALL BE ARMORED WITH BOULDERS AS SHOWN ON THE PLAN VIEW. THE DEPTH OF ARMOR PROTECTION SHOULD EXTEND A MINIMUM OF 0.3M BELOW THE STREAM BED AND LINED WITH COIR FIBER MATTING.

2. DIMENSIONS AND SLOPES MAY BE ADJUSTED TO FIT BY THE ENGINEER.

3. EDGE ARMOR CAN BE NATURAL STREAM BOULDERS OR EXTRACTED FROM CLASS II RIPRAP OR SHOT ROCK MATERIAL AND CAN BE CUBICAL OR RECTANGULAR IN NATURE.

4. ACCEPTABLE BOULDERS FOR THE EDGE ARMOR SHALL HAVE THE FOLLOWING APPROXIMATE DIMENSIONS; 0.9m x 0.6m x 0.3m. UNSUITABLE EDGE ARMOR MATERIAL THAT REMAINS FROM CLASS II RIP RAP OR SHOT ROCK STORES, MAY BE USED IN BACK FILL OF THE OVER BANK AREA OR DISCARDED.

5. COIR FIBER MATTING SHALL EXTEND FROM THE BOTTOM OF THE FOOTER BOULDERS AND ACROSS THE BENCHED AREA TO PREVENT WASHOUT OF SEDIMENT THROUGH BOULDER GAPS.

4/7/2015
R:\Projects\R-2413CA\R2413CA-dy_det_2D-1.dgn
ICA ENGINEERING, INC.

COMPUTED BY: HWB DATE: May-15

CHECKED BY: ADS DATE: May-15

STATE OF NORTH CAROLINA

DIVISION OF HIGHWAYS

METRIC

PROJECT NO.	SHEET NO.
R-2413CA	3B-1

SUMMARY OF EARTHWORK

IN CUBIC METERS

LOCATION	UNCL. EXCAVATION	UNDERCUT	EMBT + %	BORROW	TOTAL WASTE
SUMMARY #1 PHASE 1					
-L REV- 84+00 TO -L REV- 86+18.605 (STEP 1)	10,013		3,522		6,491
-LREV_SB- 86+18.605 TO -LREV_SB- 87+00.000 (STEP 1)	11,126				11,126
-LREV_SB- 91+80.000 TO -LREV_SB- 96+60.000 (STEP 1)			171,731	171,731	
-NC68_SB- 13+60 TO -NC68_SB- 14+09.215 (STEP 1)			23,210	23,210	
-NC68SB_DET- 13+61.670 TO -NC68SB_DET-15+18.666 (STEP 2)	76		19		57
-NC68SB_DET- 15+18.666 TO -NC68SB_DET-17+07.249 (STEP 2)	40		113	73	
-LREV_NB- 87+65.000 TO -LREV_NB- 92+94.000 (STEP 2)	412		162		250
-LREV_NB- 93+26.000 TO -LREV_NB- 97+14.000 (STEP 2)	208		180		28
-LREVEND_DET- 10+00.000 TO -LREVEND_DET- 13+60.189 (STEP 2)	180		73		107
-LREV_SB- 90+00 TO -LREV_SB- 90+37.493 (STEP 3)			10,714	10,714	
-LREV_NB- 90+60 TO -LREV_END- 100+00.000 (STEP 3)	995		2,066	1,071	
-NC68NB_DET- 11+75.967 TO -NC68NB_DET-13+18.14 (STEP 3)	61		806	745	
SUBTOTAL: SUMMARY #1 PHASE 1	23,111		212,596	207,544	18,059
WASTE TO BE USED IN LIEU OF BORROW				-18,059	-18,059
TOTAL SUMMARY #1 PHASE 1	23,111		212,596	189,485	
PROJECT SUBTOTAL PHASE 1	23,111		212,596	189,485	
SUMMARY #2 PHASE 2					
-LREV_SB- 87+00.000 TO -LREV_SB- 90+00.000	11,365		23,000	11,635	
-NC68_SB- 10+00.000 TO -NC68_SB- 13+60.000	44		40,210	40,166	
-LREV_SB- 90+81.993 TO -LREV_SB- 91+80.000			25,900	25,900	
-LREV_SB- 96+60.000 TO -LREV_SB- 98+72.769	438		1,783	1,345	
-LREV_END- 98+41.554 TO -LREV_END- 105+65.000	4,656		1,188		3,468
-Y16A- 10+92.331 TO -Y16A- 11+09.036	71		37		34
-Y16B- 10+24.856 TO -Y16B- 10+55.267	37				37
SUBTOTAL: SUMMARY #2 PHASE 2	16,611		92,118	79,046	3,539
WASTE TO BE USED IN LIEU OF BORROW				-3,539	-3,539
PROJECT SUBTOTAL PHASE 2	16,611		92,118	75,507	
SUMMARY #3 PHASE 3					
-LREVSB_XOVR- 99+33.836 TO -LREV_SB- 101+05.157 (STEP 1A)	128				128
-LREV- 75+60.000 TO -LREV- 86+18.605 (STEP 2)	71,774		1,188		70,586
-LREV_NB- 86+18.605 TO -LREV_NB- 90+09.000 (STEP 2)	19,109		7		19,102
-NC68_NB- 10+00.000 TO NC68_NB- 16+00.000 (STEP 2)	677		1,150	473	
-LREV_NB- 92+45.000 TO-LREV_NB- 98+39.270 (STEP 2)	2,215		2,026		189
-LREV_NB- 90+09.000 TO -LREV_SB- 92+45.000 (STEP 3)	373		1,429	1,056	
SUBTOTAL: SUMMARY #3 PHASE 3	94,276		5,800	1,529	90,005
WASTE TO BE USED IN LIEU OF BORROW				-1,529	-1,529
TOTAL SUMMARY #3 PHASE 3	94,276		5,800		88,476
PROJECT SUBTOTAL PHASE 3	94,276		5,800		88,476

LOCATION	UNCL. EXCAVATION	UNDERCUT	EMBT + %	BORROW	TOTAL WASTE
PROJECT SUBTOTAL PHASE 1	23,111		212,596	189,485	
PROJECT SUBTOTAL PHASE 2	16,611		92,118	75,507	
PROJECT SUBTOTAL PHASE 3	94,276		5,800		88,476
SUBTOTAL (PHASES 1-3)	133,998		310,514	264,992	88,476
MATERIAL FOR SHOULDER CONSTRUCTION			17,018	17,018	
LOSS DUE TO CLEARING & GRUBBING					
PROJECT SUBTOTAL	133,998		327,532	282,010	
ESTIMATE 5% TO REPLACE TOPSOIL IN BORROW PITS				14,101	
GRAND TOTAL (M^3)	133,998		327,532	296,111	
ENGLISH TOTAL (CY)	175,269			387,313	
ENGLISH SAY (CY)	**175,300**			**387,400**	

ADDITIONAL UNDERCUT = 400 CM (523 CY)	SAY	530 CY
DRAINAGE DITCH EXCAVATION = 350 CM (458 CY)	SAY	460 CY
SELECT GRANULAR MATERIAL = 400 CM (523 CY)	SAY	530 CY
PAVEMENT STRUCTURE VOLUME = 17,373 CM 22,723 CY)	SAY	22,800 CY

NOTE: ADDITIONAL UNDERCUT AND SELECT GRANULAR MATERIAL CONTINGENCY PER DIVISION GEOTECHNICAL REPORT, 1/29/2015

EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.

NC10404

COMPUTED BY:	HWB	DATE:	2-15
CHECKED BY:	ADS	DATE:	2-15

"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 BEGIN

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

GUARDRAIL SUMMARY

METRIC

PROJECT REF NO.	SHT
R-2413CA	3B-2

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

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOUL WIDTH	FLARE LENGTH		W		ANCHORS									IMPACT ATTENUATOR TYPE 350		SINGLE FACED CONCRETE BARRIER	REMOVE EXISTING GUARDRAIL	REMOVE & STOCKPILE EXISTING GUARDRAIL	REMARKS
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END		B-77	GRAU 350	M-350		CAT-1	TEMP GRAU 350	AT-1	TERM SECT	G	NG				
L REV	76+26.371	77+40.671	RT (NB)	114.300			76+72.091	77+40.000	4.2	5.2	15.24	-	0.3	-			1			1							387.483		
L REV	84+00.000	85+48.590	LT (SB)	148.590			85+02.870	84+00.000	4.2	5.2	15.24	-	0.3	-			1												TIE TO EXISTING GUARDRAIL
LREV_NB	86+50.168	89+89.258	LT (MED)	339.090			86+95.888	89+89.258	1.8	2.8	15.24	-	0.3	-			1			1									
LREV_SB	87+30.630	90+39.240	RT (MED)	308.610			90+39.240	87+30.630	1.8	2.8	-	-	-	-		1				1									
LREV_SB	88+74.852	90+34.872	LT	160.020			90+34.872	88+74.852	4.2	5.2	-	-	-	-		1				1									
LREV_SB	90+79.372	91+53.667	LT	74.295			91+07.947	90+79.372	4.2	5.2	15.24	-	0.3	-		1	1												
LREV_SB	90+83.740	92+41.855	RT	158.115			91+96.135	90+83.740	1.8	2.8	15.24	-	0.3	-		1	1												
NC68_SB	11+88.584	15+79.109	LT	390.525			11+88.584	11+88.584	3.6	4.6	-	-	-	-						1									
LREV_SB	93+47.903	96+26.033	LT	278.130			93+93.623	93+47.903	4.2	5.2	15.24	-	0.3	-			1										257.175		
LREV_SB	97+14.654	98+72.769	RT (MED)	158.115			98+72.769	97+14.654	1.8	2.8	-	-	-	-						1									
LREV_NB	96+79.250	98+39.270	LT (MED)	160.020			97+24.970	98+39.270	1.8	2.8	15.24	-	0.3	-			1										273.824		
LREV_END	98+41.554	99+17.754	RT (MED)	76.200			98+41.554	99+17.754	1.8	2.8	-	-	-	-						1							310.161		
LREV_END	98+41.554	99+15.849	LT (MED)	74.295			98+70.129	99+15.849	1.8	2.8	15.24	-	0.3	-			1										326.776		
LREV_END	104+62.350	105+53.000	LT	64.770	26.670		105+20.000	104+62.350	3.6	4.6	15.24	-	0.3	-			1			1									
LREV_END	105+42.140	105+65.000	RT (MED)	22.860			105+42.140	105+65.000	1.8	2.8	15.24	-	0.3	-			1										344.551		TIE TO EXISTING GUARDRAIL
LREV_END	105+44.045	105+65.000	LT (MED)	20.955			105+65.000	105+44.045	1.8	2.8	-	-	-	-						1							328.225		TIE TO EXISTING GUARDRAIL
NC68_NB	11+01.922	12+98.137	LT	196.215			11+34.922	12+98.137	3.6	4.6	15.24	-	0.3	-		1	1										71.758		
NC68_NB	12+31.045	12+52.000	RT	20.955			12+52.000	12+52.000	3.6	4.6	15.24	-	0.3	-		1	1										39.677		
NC68_NB	13+70.000	13+94.765	LT	24.765			13+70.000	13+70.000	3.6	4.6	-	-	-	-		1				1									
TOTAL				2790.825	26.670											7	12			10									
LESS ANCHOR UNIT DEDUCTIONS																													
B-77		7	@ 5.72	40.005																									
GRAU 350		12	@ 15.24	182.88																									
CAT-1		10	@ 1.91	19.05																									
TOTAL (M)				2548.890	26.670											7	12			10						111.435	2228.195		
ENGLISH TOTAL (LF)				8362.500	87.500											7	12			10						365.600	7310.351		
ENGLISH SAY (LF)				**8362.5**	**87.5**		***ADD 5 ADDITIONAL GUARDRAIL POSTS**									**7**	**12**			**10**						**366**	**7311**		

DOUBLE FACE CABLE GUIDERAIL SUMMARY

	LINE	BEG STA	END STA	LENGTH	INTERMED ANCHORS	TERMINAL ANCHORS
	LREV	75+60.000	86+18.605	1058.61	1	1
	LREV_NB	86+18.605	86+52.177	33.57	0	1
*	LESS ANCHOR DEDUCTIONS					
	TERMINAL ANCHORS	2	@ 7.6m =	-15.20		
	TOTAL (M)			1076.98	1	2
*	**ENGLISH (LF)**			3533.39	1	2
	SAY (LF)			**3535**	**1**	**2**

ADDITIONAL GUIDERAIL POSTS - 10

8/17/99

COMPUTED BY:	ADS	DATE:	2-13-2015
CHECKED BY:	DCW	DATE:	2-13-2015

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	3B-3

SUMMARY OF SHOULDER DRAINS ASPHALT PAVEMENT

LINE	STATION TO STATION	SIDE	SHOULDER DRAIN PIPE	SHOULDER DRAINS	OUTLET PIPE			OUTLET LOCATIONS	
						PAD	2GI		
-LREV-	STA. 76+20 TO STA. 78+20	NB Outside	200	200	9.04	2 (Sag)		77+25 (SAG)	
-LREV-	STA. 79+80 TO STA. 80+90	NB Outside	110	110	4.52	1		79+80	
-LREV-	STA. 85+60 TO STA. 86+60	NB Outside	100	100	4.52		1	85+60	
-LREV-	STA. 84+00 TO STA. 86+40	SB Outside	240	240	13.56		3 (1 Sag)	84+89 (SAG)	85+40
-LREV-	STA. 89+07 TO STA. 90+25	SB Outside	118	118	4.52		1	89+07	
-LREV-	STA. 91+06 TO STA. 91+69	SB Inside	63	63	4.52		1	91+69	
-LREV-	STA. 93+90 TO STA. 95+60	SB Inside	170	170	9.04	2 (Sag)		94+80 (SAG)	
-LREV-	STA. 95+60 TO STA. 96+60	SB Outside	100	100	4.52	1		95+60	
		TOTAL	1101	1101	54.25	6			
		ENG. TOTAL	3612.16 LF	3612.16 LF	177.95 LF	6			
		SAY	3620 LF	3620 LF	180	6			

SUMMARY OF REMOVAL OF EXISTING ASPHALT PAVEMENT

SURVEY LINE	STATION	STATION	LOCATION LT/RT/CL	M^2
-LREV_NB-	86+18.605	90+09	RT.	2773.04
-LREV_NB-	87+64	88+57	LT.	520.50
-LREV_SB-	88+82	89+80	LT.	1021.71
-NC68_NB-	11+78	15+07	LT.	2712.90
-LREV_NB-	92+46	97+64	LT.	4026.30
-LREV_SB-	97+16	97+85	RT.	299.16
-NC68_SB-	10+15	11+75	LT.	133.31
		TEMPORARY DETOURS		
-NC68SB_DET-	10+41	12+70	LT./RT.	712.00
-NC68NB_DET-	12+70	13+17	LT./RT.	303.00
-LREV_NB-	91+07	92+37	LT.	225.00
-LREV_NB-	93+35	97+14	LT.	920.00
-LREVEND_XOVR-	10+00	12+10	LT./RT.	1278.00
			TOTAL:	14924.92
			ENGLISH TOTAL (SY):	17850
			SAY (SY):	17900

SUMMARY OF BREAKING OF EXISTING PAVEMENT

SURVEY LINE	STATION	STATION	LOCATION LT/RT/CL	M^2
-LREV_SB-	88+29	89+07	LT./RT.	344.67
			TOTAL:	344.67
			ENGLISH TOTAL (SY):	412
			SAY (SY):	420

SUMMARY OF SHOULDER BERM GUTTER

SURVEY LINE	STATION	STATION	LENGTH (M)
-LREV-	76+50	77+37	87
-LREV-	84+00	85+30	130
-LREV_SB-	88+90	90+28	138
-LREV_SB-	91+05	91+70	65
		TOTAL:	420
		ENGLISH TOTAL (LF):	1378
		SAY (LF):	1380

4/7/2015
R:\Roadway\Proj\R2413CA_rdy_3B-3.dgn
ICA ENGINEERING, INC.

NC10382

COMPUTED BY: Henry Bare DATE: 2/13/2015

CHECKED BY: David Fuh DATE: 2/13/2015

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

METRIC

PROJECT NO.	SHEET NO.
R-2413CA	3D-1

LIST OF PIPES, ENDWALLS, ETC. (FOR PIPES 1200mm & 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) 375	450	600	750	900	1050	1200	DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE
-LREV- 76+40	CL	0401		267.01														
-LREV- 77+26	RT	0402		266.99														
-LREV- 77+26	CL	0403		266.34														
-LREV- 77+60	CL	0404		266.45														
-LREV- 77+80	RT	0405		266.48														
-LREV- 79+60	CL	0501		269.42														
-LERV- 83+20	CL	0608		268.01														
-LREV- 84+15	LT	0601																
-LREV- 84+15	LT	0601	0602		257.20	257.15												
-LREV- 84+17.91	LT	0602																
-LREV- 84+16.48	LT	0603	0604		257.20	257.15												
-LREV- 84+19.42	LT	0604																
-LREV- 84+89.28	CL	0605		265.83														
-LREV- 84+89	LT	0605	0606		264.99	264.89												
-LREV- 8489	LT	0606		266.46														
-LREV- 84+89	LT	0606	0607		264.89	261.45		15.6							X			
-LREV- 85+30	LT	0702	0701		264.45	263.50				21.6								
-LREV- 85+40	LT	0702		265.90														
-LREV- 85+49	LT	0703	0702		270.40	264.60			15.6						X			
-LREV- 85+50	LT	0704	0702		265.33	264.68												
-LREV- 85+49	LT	0703																
-LREV- 85+50	CL	0704		266.17														
-LREV- 85+60	RT	0705	0704		265.57	265.33												
-LREV- 85+60	RT	0705		266.16														
-NC68_SB- 11+38	LT	0801		272.22	271.08													
-NC68_SB- 12+24	LT	0802		273.64	272.81													
-NC68_SB- 12+09	LT	0803		273.37	272.53													
-NC68_SB- 12+09	LT	0802	0803		272.81	272.53		15.6										
-NC68_SB- 12+09	LT	0804		271.15	270.31													
-NC68_SB- 12+09	LT	0803	0804		272.53	270.31		6.0							X		X	X
-NC68_SB- 12+09	LT	0804	0805		270.31	270.25	X	6.0										
-LREV_SB- 89+07	LT	0806		275.26	274.43													
-LREV_SB- 88+92	LT	0807		274.93	274.09													
-LREV_SB- 88+92	LT	0806	0807		274.43	274.09		15.6										
-LREV_SB- 88+92	LT	0807	0808		274.09	271.06		12.0							X		X	X
-LREV_SB- 89+53	LT	0809	0810		269.48	268.65		15.6										
-LREV_SB- 89+53	LT	0810		270.26	268.65													
-LREV_SB- 89+53	CL	0810	0811		268.65	266.76												
-NC68_SB- 12+68	LT	0812		268.46	267.62													
-NC68_SB- 12+68	CL	0812	0813		267.62	266.85												
SHEET 3D-1 TOTALS								86.4	15.6	21.6								

STATION	CS PIPE 400 (1.63)	450 (1.63)	600 (1.63)	800 (2.01)	900 (2.01)	1000 (2.01)	1200 (2.01)	R.C. PIPE CLASS III 300	375	450	600	750	900	1050	1200	R.C. PIPE CLASS IV 300	375	450	600	750	900	1050	1200
-LREV- 76+40																							
-LREV- 77+26																							
-LREV- 77+26																							
-LREV- 77+60																							
-LREV- 77+80																							
-LREV- 79+60																							
-LERV- 83+20																							
-LREV- 84+15																							
-LREV- 84+15							4.8																
-LREV- 84+17.91																							
-LREV- 84+16.48							4.8																
-LREV- 84+19.42																							
-LREV- 84+89.28																							
-LREV- 84+89									18.0														
-LREV- 8489																							
-LREV- 84+89																							
-LREV- 85+30																							
-LREV- 85+40																							
-LREV- 85+49																							
-LREV- 85+50									26.4														
-LREV- 85+49																							
-LREV- 85+50																							
-LREV- 85+60									25.2														
-LREV- 85+60																							
-NC68_SB- 11+38																							
-NC68_SB- 12+24																							
-NC68_SB- 12+09																							
-NC68_SB- 12+09																							
-NC68_SB- 12+09																							
-NC68_SB- 12+09																							
-NC68_SB- 12+09																							
-LREV_SB- 89+07																							
-LREV_SB- 88+92																							
-LREV_SB- 88+92																							
-LREV_SB- 88+92																							
-LREV_SB- 89+53																							
-LREV_SB- 89+53																							
-LREV_SB- 89+53																						105.6	
-NC68_SB- 12+68																							
-NC68_SB- 12+68																	39.6						
SHEET 3D-1 TOTALS							9.6		69.6								39.6					105.6	

STATION	600mm (24") R.C. PIPE, MAX FILL > 12.2m (40ft), USE LRFD DIRECT DESIGN METHOD (CONTRACTOR DESIGN)	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. METERS R.C.P.	C.S.P.	QUANTITIES FOR DRAINAGE STRUCTURES PER EACH (0 THRU 1.50)	*TOTAL METERS FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') METERS A 1.5 THRU 3.0	B 3.0 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
-LREV- 76+40												
-LREV- 77+26												
-LREV- 77+26												
-LREV- 77+60												
-LREV- 77+80												
-LREV- 79+60												
-LERV- 83+20												
-LREV- 84+15			5.7									
-LREV- 84+15												
-LREV- 84+17.91												
-LREV- 84+16.48												
-LREV- 84+19.42												
-LREV- 84+89.28				1								
-LREV- 84+89												
-LREV- 8489				1	0.07							
-LREV- 84+89												
-LREV- 85+30												
-LREV- 85+40				1								
-LREV- 85+49												
-LREV- 85+50												
-LREV- 85+49												
-LREV- 85+50				1								
-LREV- 85+60												
-LREV- 85+60				1								
-NC68_SB- 11+38				1								
-NC68_SB- 12+24				1								
-NC68_SB- 12+09				1								
-NC68_SB- 12+09												
-NC68_SB- 12+09				1								
-NC68_SB- 12+09												
-NC68_SB- 12+09												
-LREV_SB- 89+07				1								
-LREV_SB- 88+92				1								
-LREV_SB- 88+92												
-LREV_SB- 88+92												
-LREV_SB- 89+53												
-LREV_SB- 89+53				1	0.11							
-LREV_SB- 89+53												
-NC68_SB- 12+68				1								
-NC68_SB- 12+68												
SHEET 3D-1 TOTALS			5.7	13	0.18							

STATION	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME AND 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 TWO GRATES STD. 840.20	G.D.I. FRAME WITH ONE GRATE STD. 840.22	G.D.I. FRAME WITH TWO GRATES STD. 840.22	G.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.29	G.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	T.B.D.I. STD. 840.35	TEMP. COVER W/ STEEL PLATE SEE SHT. 2C-3	TEMPORARY CONCRETE LID	CONVERT JB TO 2 GI SEE SHT. 2C-4	CONVERT DI TO 3 GI	J.B. STD. 840.31 OR 840.32	M.H. FRAME AND COVER STD. 840.54	T.B.J.B. STD. 840.34	CONVERT DI TO JB SEE SHT 2C-2	O.T.C.B. STD. 840.04 OR 840.05	CONVERT DI TO TBJB	375 SIDE DRAIN PIPE ELBOWS W/ 1.63 MM THICKNESS	450 SIDE DRAIN PIPE ELBOWS W/ 1.63 MM THICKNESS	600 SIDE DRAIN PIPE ELBOWS W/ 1.63 MM THICKNESS	900 SIDE DRAIN PIPE ELBOWS W/ 2.01 MM THICKNESS	CONC. & BRICK PIPE PLUG, M^3 STD. 840.71	CONC. COLLARS CL. "B" M^3 STD. 840.72	PIPE REMOVAL (METERS)	REMARKS
-LREV- 76+40								1						1															
-LREV- 77+26						1								1															
-LREV- 77+26								1						1															
-LREV- 77+60								1						1															
-LREV- 77+80								1						1														50	REMOVE 450 CMP
-LREV- 79+60								1						1															
-LERV- 83+20								1						1															
-LREV- 84+15																													
-LREV- 84+15																													
-LREV- 84+17.91																											0.74		REMOVE HEADWALL
-LREV- 84+16.48																													
-LREV- 84+19.42																											0.74		
-LREV- 84+89.28				1				1																					
-LREV- 84+89																													
-LREV- 8489				1		1																							
-LREV- 84+89																						2							
-LREV- 85+30																													
-LREV- 85+40			1					1																				6	
-LREV- 85+49																							2						
-LREV- 85+50																													
-LREV- 85+49																													BDO
-LREV- 85+50				1				1																					
-LREV- 85+60																													
-LREV- 85+60					1			1																					
-NC68_SB- 11+38				1				1																					REMOVE DI
-NC68_SB- 12+24				1				1																					
-NC68_SB- 12+09				1				1																					
-NC68_SB- 12+09																													
-NC68_SB- 12+09				1				1																					
-NC68_SB- 12+09																													
-NC68_SB- 12+09																													
-LREV_SB- 89+07				1				1																					
-LREV_SB- 88+92				1				1																					
-LREV_SB- 88+92																													
-LREV_SB- 88+92																						2							
-LREV_SB- 89+53																													
-LREV_SB- 89+53																1													W/ SLAB LID
-LREV_SB- 89+53																													
-NC68_SB- 12+68				1				1																				45.5	REMOVE 2 DI AND 375 CONC
-NC68_SB- 12+68																												24.5	REMOVE 375 CONC
SHEET 3D-1 TOTALS			1	10	1	2		17						7		1						4	2				1.48	126	

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

NC10480

COMPUTED BY: Henry Bare DATE: 2/13/2015

CHECKED BY: David Fuh DATE: 2/13/2015

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

METRIC

PROJECT NO.	SHEET NO.
R-2413CA	3D-2

LIST OF PIPES, ENDWALLS, ETC. (FOR PIPES 1200mm & UNDER)

STATION SIZE THICKNESS OR GAUGE	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) 375	450	600	750	900	1050	1200	DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE	CS PIPE 400 (1.63)	450 (1.63)	600 (1.63)	800 (2.01)	900 (2.01)	1000 (2.01)	1200 (2.01)	R.C. PIPE CLASS III 300	375	450	600	750	900	1050	1200	R.C. PIPE CLASS IV 300	375	450	600	750	900	1050	1200	600mm (24") R.C. PIPE, MAX FILL > 12.2m (40ft), USE LRFD DIRECT DESIGN METHOD (CONTRACTOR DESIGN)	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. METERS R.C.P.	C.S.P.
-LREV_SB- 90+90	LT	0814		277.10	276.26																																							
-LREV_SB- 90+90	LT	0814	0815		276.26	274.35		13.2							X																													
-NC68_SB- 13+54	LT	0816		265.67	264.83																																							
-NC68_SB- 13+54	LT	0816	0817		264.83	264.81	X	6.0																																				
-NC68_SB- 13+69	LT	0818		267.80	266.96																																							
-NC68_SB- 13+69	LT	0819		267.79	266.95																																							
-NC68_SB- 13+69	LT	0818	0819		266.96	266.95	X	2.4																																				
-NC68_SB- 13+69	LT	0819	0820		266.95	266.80	X	18.0																																				
-LREV_NB- 91+10	LT	0821																																									3.4	
-LREV_NB- 91+12	LT	0822																																										
-LREV_NB- 91+10	LT	0821	0822		265.39	265.37																										4.8												
-LREV_NB- 91+40	LT	0823		265.25	264.41																																							
-LREV_NB- 91+36	RT	0824		265.07	264.23																																							
-LREV_NB- 91+37	RT	0825		265.30	263.00																																							
-LREV_NB- 91+40	LT	0823	0825		264.41	263.00																								26.4																		
-LREV_NB- 91+36	RT	0824	0825		264.23	264.19	X	2.4																																				
-LREV_NB- 92+60	RT	0826		262.30	261.39																																							
-LREV_NB- 92+62	RT	0829		263.40	261.30																																							
-LREV_NB- 92+60	RT	0826	0829		261.39	261.30			4.8																																			
-LREV_SB- 91+69	RT	0827		276.38	275.54																																							
-LREV_SB- 91+69	RT	0827	0828		275.54	266.05		30.0							X		X	X																										
-LREV_SB- 93+02	CL	0830			261.70	259.64																																				94.8		
-NC68_SB- 16+42	LT	0831		266.84	266.25																																							
-NC68_SB- 16+42	LT	0832		267.57	266.03																																							
-NC68_SB- 16+42	LT	0831	0832	266.25	266.03			6.0																																				
-LREV_NB- 95+03	LT	0901		269.71	269.13		X																																					
-LREV_NB- 95+03	LT	0902		270.30	269.11																																							
-LREV_NB- 99+20	CL	1001		272.90	272.06																																							
-LREV_NB- 99+62	CL	1002		273.32	271.83																																							
-LREV_NB- 95+03	LT	0901	0902	269.13	269.11		X	3.6																																				
-LREV_END- 99+20	CL	1001	1002		272.06	271.83	X																																					
-LREV_END- 99+45	RT	1003			272.11	271.92	X	37.2																																				
-LREV_END- 100+60	CL	1004		272.79	271.82																																							
-LREV_END- 100+60	LT	1004	1005		271.82	270.72																														24.0										
-LREV_END- 101+78	RT	1101	1102		270.90	270.85																									3.6																	
-LREV_END- 101+82	RT	1102																																										
-LREV_END- 103+20	LT	1103		271.42	270.45																																							
-LREV_END- 103+32	CL	1104		271.54	270.27																																							
-LREV_END- 103+20	LT	1103	1104		270.45	270.27																														12.0										
-LREV_END- 105+25	RT	1201		270.33	269.36																																							
-LREV_END- 105+69	RT	1202		269.38	267.40																																							
-LREV_END- 105+25	RT	1201	1202		269.36	267.40		44.4																																				
SHEET 3D-2 TOTALS								163.2	4.8																			26.4	3.6					4.8			78.0							94.8	3.4	

STATION	QUANTITIES FOR DRAINAGE STRUCTURES PER EACH (0 THRU 1.50)	*TOTAL METERS FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') METERS A 1.5 THRU 3.0	METERS B 3.0 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 AND 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 TWO GRATES STD. 840.20	G.D.I. FRAME WITH ONE GRATE STD. 840.22	G.D.I. FRAME WITH TWO GRATES STD. 840.22	G.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.29	G.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	T.B.D.I. STD. 840.35	TEMP. COVER W/ STEEL PLATE SEE SHT. 2C-3	TEMPORARY CONCRETE LID	CONVERT JB TO 2 GI SEE SHT. 2C-4	CONVERT DI TO 3 GI	J.B. STD. 840.31 OR 840.32	M.H. FRAME AND COVER STD. 840.54	T.B.J.B. STD. 840.34	CONVERT DI TO JB SEE SHT 2C-2	O.T.C.B. STD. 840.04 OR 840.05	CONVERT DI TO TBJB	375 SIDE DRAIN PIPE ELBOWS W/ 1.63 MM THICKNESS	450 SIDE DRAIN PIPE ELBOWS W/ 1.63 MM THICKNESS	600 SIDE DRAIN PIPE ELBOWS W/ 1.63 MM THICKNESS	900 SIDE DRAIN PIPE ELBOWS W/ 2.01 MM THICKNESS	CONC. & BRICK PIPE PLUG, M^3 STD. 840.71	CONC. COLLARS CL. "B" M^3 STD. 840.72	PIPE REMOVAL (METERS)	REMARKS
-LREV_SB- 90+90	1												1				1																					
-LREV_SB- 90+90																																						
-NC68_SB- 13+54	1												1				1																					
-NC68_SB- 13+54																																						
-NC68_SB- 13+69	1												1				1																					
-NC68_SB- 13+69	1												1				1																					
-NC68_SB- 13+69																																						
-NC68_SB- 13+69																																						
-LREV_NB- 91+10																																						
-LREV_NB- 91+12																																				0.65		REMOVE HW
-LREV_NB- 91+10																																						
-LREV_NB- 91+40	1												1				1																					
-LREV_NB- 91+36	1												1				1																					
-LREV_NB- 91+37																									1		1											
-LREV_NB- 91+40																																						
-LREV_NB- 91+36																																						
-LREV_NB- 92+60	1												1				1																					
-LREV_NB- 92+62																									1		1										28	REMOVE DI
-LREV_NB- 92+60																																						
-LREV_SB- 91+69	1												1				1																					
-LREV_SB- 91+69																														2								
-LREV_SB- 93+02																																						
-NC68_SB- 16+42	1													1			1																					
-NC68_SB- 16+42																									1		1											
-NC68_SB- 16+42																																						
-LREV_NB- 95+03	1													1			1																					
-LREV_NB- 95+03																									1		1											
-LREV_NB- 99+20	1												1				1																					
-LREV_NB- 99+62	1																								1	1												
-LREV_NB- 95+03																																						
-LREV_END- 99+20																																						
-LREV_END- 99+45																																						
-LREV_END- 100+60	1							1		1	1																											
-LREV_END- 100+60																																						
-LREV_END- 101+78																																						
-LREV_END- 101+82																																				0.33		
-LREV_END- 103+20	1							1		1	1																											
-LREV_END- 103+32																									1		1											
-LREV_END- 103+20																																						
-LREV_END- 105+25	1							1		1	1																											
-LREV_END- 105+69	1												1				1																					REMOVE DI
-LREV_END- 105+25																																						
SHEET 3D-2 TOTALS	16							3		3	3		10	2			12								6	1	5			2					0.98	28	

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

NC10382

COMPUTED BY: Henry Bare DATE: 2/13/2015

CHECKED BY: David Fuh DATE: 2/13/2015

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

METRIC

PROJECT NO.	SHEET NO.
R-2413CA	3D-3

LIST OF PIPES, ENDWALLS, ETC. (FOR PIPES 1200mm & UNDER)

STATION / SIZE / THICKNESS OR GAUGE	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) 375	450	600	750	900	1050	1200	DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE
-NC68SB_DET- 11+90	RT	2B31		273.84	273.00													
-NC68SB_DET- 12+05	CL	2B31	2B32		273.00	272.83	X	36.0							X		X	X
-NC68NB_DET- 13+05	CL	2B41			266.22	265.86												
-NC68SB_DET- 16+34	LT	2B51		264.45	263.86													
-NC68SB_DET- 16+34	LT	2B52		264.62	263.70													
-NC68SB_DET- 16+34	LT	2B51	2B52		263.86	263.70		2.4							X		X	X
-NC68SB_DET- 17+07	LT	2B53		267.00	266.16													
-NC68_NB- 16+42	LT	2B54		267.10	266.03													
-NC68_NB- 16+42	LT	2B53	2B54		266.16	266.03		2.4							X		X	X
-NC68_NB- 16+78	LT	2B55		270.30	269.46													
-NC68_NB- 16+78	LT	2B56		270.18	269.11													
-NC68_NB- 16+78	LT	2B55	2B56		269.46	269.11		2.4							X		X	X
-LREV_END- 100+60	RT	1004																
99+60	CL	EXIST	DI															
SHEET 3D-3 TOTALS								43.2										
GRAND TOTAL								292.8	20.4	21.6								
ENGLISH TOTAL								961	67	71								
ENGLISH SAY								976	68	72								

STATION	CS PIPE 400 (1.63)	450 (1.63)	600 (1.63)	800 (2.01)	900 (2.01)	1000 (2.01)	1200 (2.01)	R.C. PIPE CLASS III 300	375	450	600	750	900	1050	1200	R.C. PIPE CLASS IV 300	375	450	600	750	900	1050	1200	600mm (24") R.C. PIPE, MAX FILL > 12.2m (40ft), USE LRFD DIRECT DESIGN METHOD (CONTRACTOR DESIGN)	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. METERS R.C.P.	C.S.P.	QUANTITIES FOR DRAINAGE STRUCTURES *TOTAL METERS FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') PER EACH (0 THRU 1.50)	METERS A 1.5 THRU 3.0	METERS B 3.0 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
-NC68SB_DET- 11+90																											1								
-NC68SB_DET- 12+05																																			
-NC68NB_DET- 13+05			18.0																																
-NC68SB_DET- 16+34																											1								
-NC68SB_DET- 16+34																											1								
-NC68SB_DET- 16+34																																			
-NC68SB_DET- 17+07																											1								
-NC68_NB- 16+42																											1								
-NC68_NB- 16+42																																			
-NC68_NB- 16+78																											1								
-NC68_NB- 16+78																											1								
-NC68_NB- 16+78																																			
-LREV_END- 100+60																																			
99+60																																			
SHEET 3D-3 TOTALS			18.0																								7								
GRAND TOTAL			18.0				9.6		96.0	3.6				4.8			117.6					105.6		94.8	3.4	5.7	36	0.18						3	
ENGLISH TOTAL			59				31		315	12				16			386					346		311	4.4	7.5	36	0.6						3	
																									11.9										
ENGLISH SAY			60				32		320	12				16			392					352		316	12.0		36	0.6						3	

STATION	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME AND 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 TWO GRATES STD. 840.20	G.D.I. FRAME WITH ONE GRATE STD. 840.22	G.D.I. FRAME WITH TWO GRATES STD. 840.22	G.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.29	G.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	T.B.D.I. STD. 840.35	TEMP. COVER W/ STEEL PLATE SEE SHT. 2C-3	TEMPORARY CONCRETE LID	CONVERT JB TO 2 GI SEE SHT. 2C-4	CONVERT DI TO 3 GI	J.B. STD. 840.31 OR 840.32	M.H. FRAME AND COVER STD. 840.54	T.B.J.B. STD. 840.34	CONVERT DI TO JB SEE SHT 2C-2	O.T.C.B. STD. 840.04 OR 840.05	CONVERT DI TO TBJB	375 SIDE DRAIN PIPE ELBOWS W/ 1.63 MM THICKNESS	450 SIDE DRAIN PIPE ELBOWS W/ 1.63 MM THICKNESS	600 SIDE DRAIN PIPE ELBOWS W/ 1.63 MM THICKNESS	900 SIDE DRAIN PIPE ELBOWS W/ 2.01 MM THICKNESS	CONC. & BRICK PIPE PLUG, M^3 STD. 840.71	CONC. COLLARS CL. "B" M^3 STD. 840.72	PIPE REMOVAL (METERS)	REMARKS
-NC68SB_DET- 11+90				1		1																							
-NC68SB_DET- 12+05																												36.0	
-NC68NB_DET- 13+05																												18.0	
-NC68SB_DET- 16+34					1	1																							
-NC68SB_DET- 16+34																1													W/ SLAB LID
-NC68SB_DET- 16+34																												2.4	
-NC68SB_DET- 17+07				1		1																							
-NC68_NB- 16+42																		1											W/ SLAB LID
-NC68_NB- 16+42																												2.4	
-NC68_NB- 16+78				1		1																							
-NC68_NB- 16+78																		1											W/ SLAB LID
-NC68_NB- 16+78																												2.4	
-LREV_END- 100+60												1																	
99+60												1																	
SHEET 3D-3 TOTALS				3	1	4						2				1		2										61.2	
GRAND TOTAL	3	3	1	23	4	6		29				2		7		2	6	3	5			6	2				2.46	215.2	
ENGLISH TOTAL	3	3	1	23	4	6		29				2		7		2	6	3	5			6	2				3.22	706	
ENGLISH SAY	3	3	1	23	4	6		29				2		7		2	6	3	5			6	2				4	706	

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

8/17/98

COMPUTED BY: ADS DATE: 3-16-2015
CHECKED BY: DCW DATE: 3-16-2015

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	3G-1

SUMMARY OF SUBSURFACE DRAINAGE

LINE	STATION	STATION	LOCATION LT/RT/CL	DRAIN TYPE* UD/BD/SD	M
	CONTINGENCY			UD	200
				TOTAL:	200
				ENGLISH TOTAL (LF):	656
				SAY (LF):	700

*UD = UNDER DRAIN
*BD = BLIND DRAIN
*SD = SUBSURFACE DRAIN

SUMMARY OF GEOTEXTILE FOR PAVEMENT STABILIZATION

SURVEY LINE	STATION	STATION	LOCATION LT/RT/CL	M^2
-LREV_SB-	88+41	96+17	LT./RT.	1121
-NC68_SB-	13+43	15+52	LT./RT.	176
			TOTAL:	1297
			ENGLISH TOTAL (SY):	1551
			SAY (SY):	1560

SUMMARY OF GEOTEXTILE FOR SOIL STABILIZATION

SURVEY LINE	STATION	STATION	LOCATION LT/RT/CL	M^2
	CONTINGENCY			400
			TOTAL:	400
			ENGLISH TOTAL (SY):	478
			SAY (SY):	480

THIS QUANTITY MAY NOT INCLUDE ALL OF THE GEOTEXTILE FOR SOIL STABILIZATION FOR THE ENTIRE PROJECT.

4/7/2015
R:\Roadway Proj\R2413CA_rdy_3G-1.dgn
TGE ENGINEERING, INC.

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

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	4
R/W SHEET NO.	

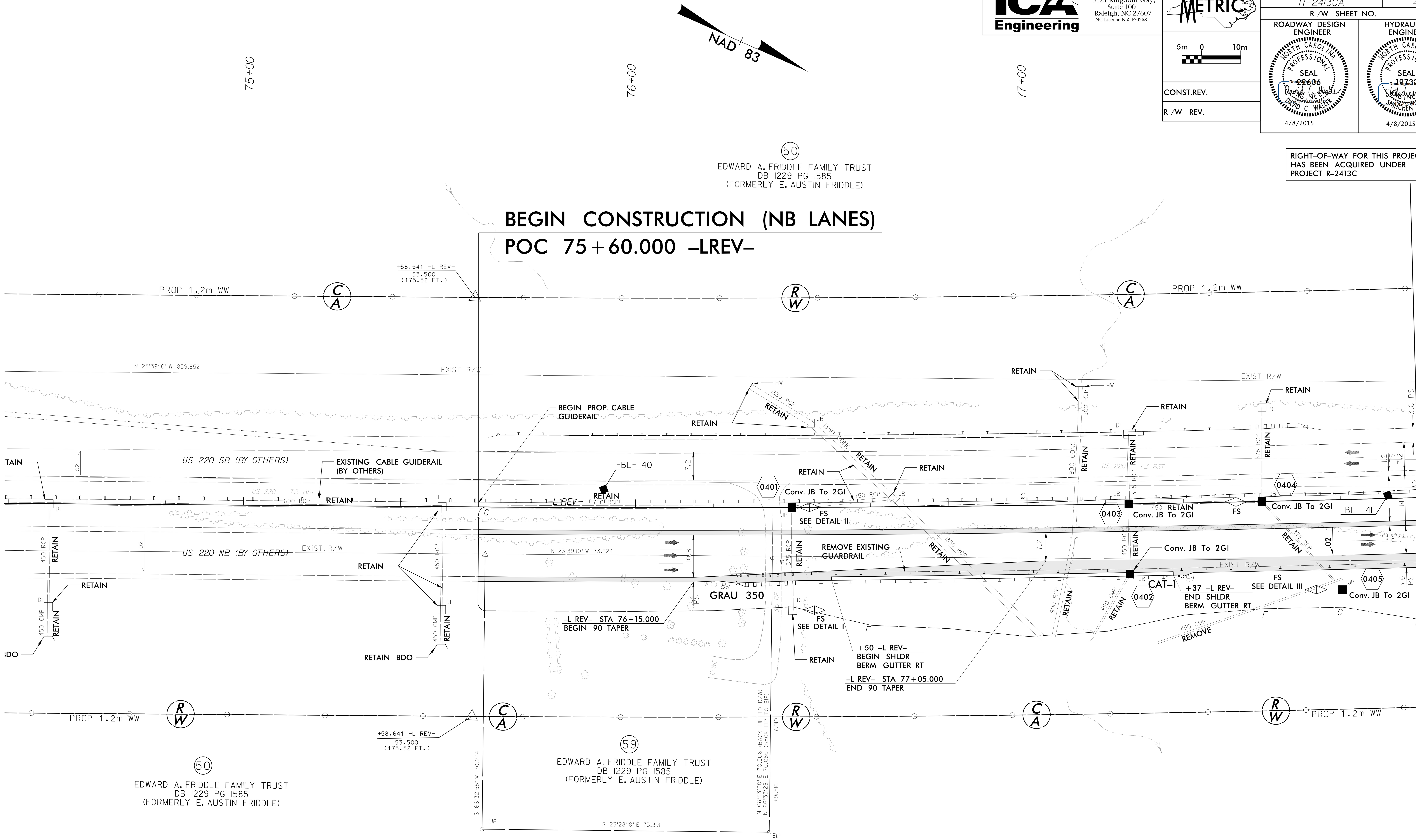
ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22606 DAVID C. WALLER — 4/8/2015

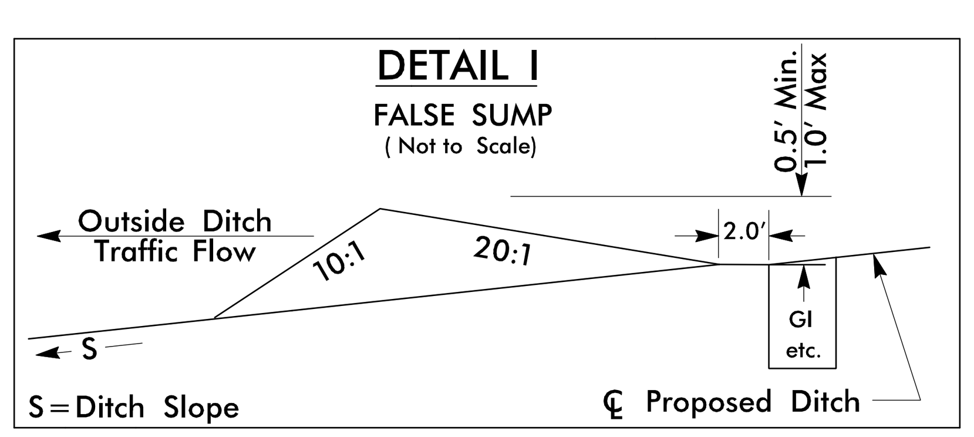
HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19732 SHIHCHEN RUH — 4/8/2015

CONST. REV.

R/W REV.

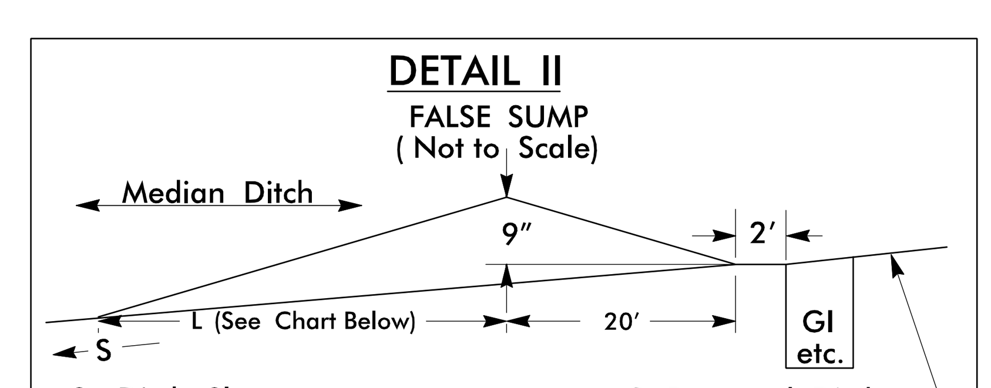
RIGHT-OF-WAY FOR THIS PROJECT HAS BEEN ACQUIRED UNDER PROJECT R-2413C





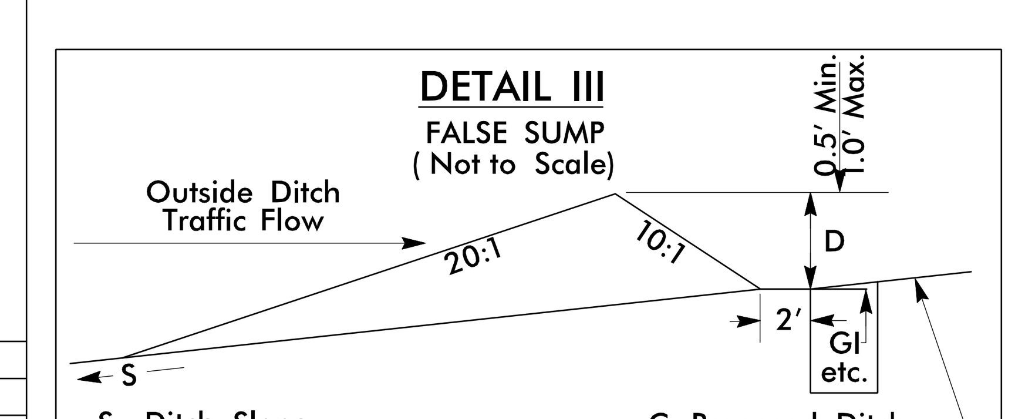
STA. 76+40 -L REV- RT.

-L REV-
PI Sta 77+51.191
Δ = 3°09' 20.9" (LT)
L = 385.004
T = 192.550
R = 6,990.000
SE = NC



Ditch Grade	L	Ditch Grade	L
0.0% To 2.0%	20'	Over 4.0% To 6.0%	40'
Over 2.0% To 4.0%	30'	Over 6.0%	50'

STA. 76+40 -L REV- MED.
STA. 77+60 -L REV- MED.



STA. 77+80 -L REV- RT. USE D = 1'

SEE SHEET 13 FOR -L REV- PROFILE

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

METRIC

5m 0 10m

CONST.REV.

R /W REV.

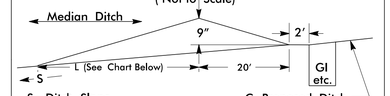
PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	5
R /W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 23606 ENGINEER DAVID C WALKER
4/8/2015

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 19732 ENGINEER Christopher Kitchen
4/8/2015

RIGHT-OF-WAY FOR THIS PROJECT HAS BEEN ACQUIRED UNDER PROJECT R-2413C

DETAIL II
FALSE SUMP
(Not to Scale)



S = Ditch Slope ℄ Proposed Ditch

Ditch Grade	L	Ditch Grade	L
0.0% To 2.0%	20'	Over 4.0% To 6.0%	40'
Over 2.0% To 4.0%	30'	Over 6.0%	50'

STA. 79+60 -L REV- MED.

NAD 83

MATCH LINE STA 78+00 -L REV- SHEET 4

MATCH LINE STA 81+50 -L REV- SHEET 6

79+00

80+00

-L REV-

PI Sta 77+51.91	PI Sta 81+36.195
△ = 3°09'20.9" (LT)	△ = 3°09'20.9" (RT)
L = 385.004	L = 385.004
T = 192.550	T = 192.550
R = 6,990.000	R = 6,990.000
SE = NC	SE = NC

(60) W.H. KNIGHT TRUSTEE
DB 998 PG 1537
(FORMERLY WALDO H. KNIGHT)

(50) EDWARD A. FRIDDLE FAMILY TRUST
DB 1229 PG 1585
(FORMERLY E. AUSTIN FRIDDLE)

S 1°54'31" W 492.731

S 1°54'31" W 344.977

PROP 1.2m WW

EXIST R/W

+43.644 -L REV-
53.500
(175.52 FT.)

-L REV- PRC 79+43.644

RETAIN

750 RCP

750 CONC

US 220 SB (BY OTHERS)

FIELD PATH FIELD PATH

Conv. JB To 2GI

JB

-L REV-

FS
SEE DETAIL II

PROPOSED CABLE GUIDERAIL

-BL- 42

N 23°39'10" W 358.420

150 RCP

SPEC. LAT. V-DITCH
W/121.8 CL 'B' RIP RAP
EST. 314.6 SM GF
STA 79+10 TO
STA 80+00 -L REV- RT
SEE DETAIL #25

+95 -LREV-
53.500 (RT)
(175.52 FT.)

+80.000 -L REV-
53.500
(175.52 FT.)

+43.644 -LREV-
53.500 (RT)
(175.52 FT.)

+95 -LREV-
65.000 (RT)
(213.25 FT.)

+43.644 -LREV-
65.000 (RT)
(213.25 FT.)

+60.000 -LREV-
53.500 (RT)
(175.52 FT.)

+60 -LREV-
58.000 (RT)
(190.29 FT.)

S 1°54'31" W 92.636

+14.103

33.422

TREE

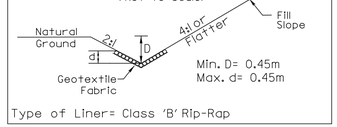
S 83°25'29" E 198.649

TDE

+80.000 -L REV-
127.000
(416.67 FT.)

+43.644 -L REV-
127.000
(416.67 FT.)

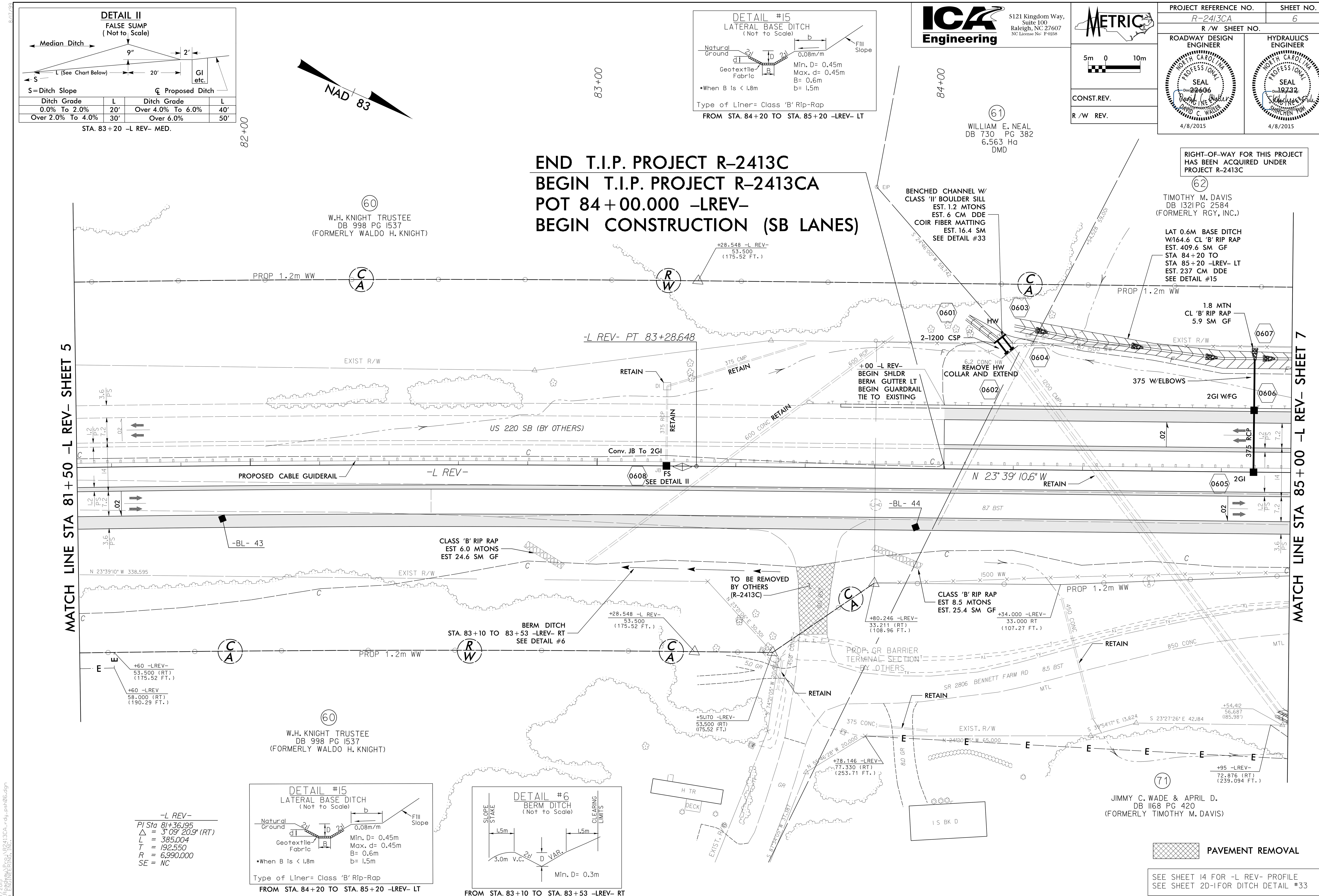
DETAIL #25
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



Type of Liner= Class 'B' Rip-Rap

FROM STA. 79+10 TO STA. 80+00 -LREV- RT

SEE SHEET 13 FOR -L REV- PROFILE



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PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	7
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER — SEAL 22606, DAVID C. WALTER, 4/8/2015

HYDRAULICS ENGINEER — SEAL 19732, SHINCHEN FUH, 4/8/2015

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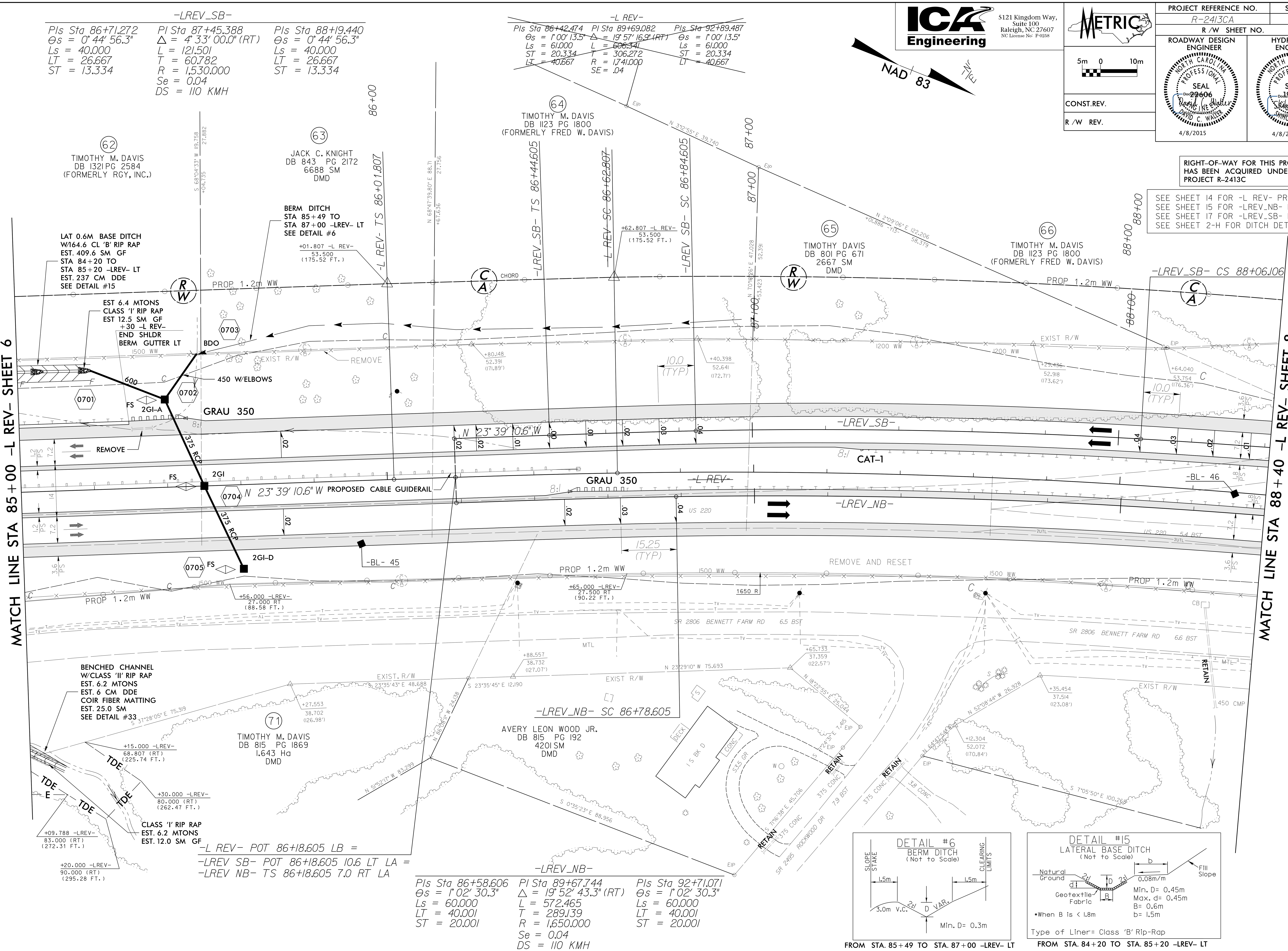
METRIC

CONST. REV.

R/W REV.

RIGHT-OF-WAY FOR THIS PROJECT HAS BEEN ACQUIRED UNDER PROJECT R-2413C

SEE SHEET 14 FOR -L REV- PROFILE
SEE SHEET 15 FOR -LREV_NB- PROFILE
SEE SHEET 17 FOR -LREV_SB- PROFILE
SEE SHEET 2-H FOR DITCH DETAIL #33



-LREV_SB-
PIs Sta 86+71.272
Θs = 0° 44' 56.3"
Ls = 40.000
LT = 26.667
ST = 13.334
PI Sta 87+45.388
Δ = 4° 33' 00.0" (RT)
L = 121.501
T = 60.782
R = 1,530.000
Se = 0.04
DS = 110 KMH
PIs Sta 88+19.440
Θs = 0° 44' 56.3"
Ls = 40.000
LT = 26.667
ST = 13.334
-L REV-
PIs Sta 86+42.474
Θs = 1° 00' 13.5"
Ls = 61.000
ST = 20.334
LT = 40.667
PI Sta 89+69.082
Δ = 19° 57' 16.9" (RT)
L = 606.341
T = 306.272
R = 1,741.000
SE = .04
PIs Sta 92+89.487
Θs = 1° 00' 13.5"
Ls = 61.000
ST = 20.334
LT = 40.667
NAD 83
TIMOTHY M. DAVIS DB 1321 PG 2584 (FORMERLY RGY, INC.)
JACK C. KNIGHT DB 843 PG 2172 6688 SM DMD
TIMOTHY M. DAVIS DB 1123 PG 1800 (FORMERLY FRED W. DAVIS)
TIMOTHY DAVIS DB 801 PG 671 2667 SM DMD
TIMOTHY M. DAVIS DB 1123 PG 1800 (FORMERLY FRED W. DAVIS)
LAT 0.6M BASE DITCH W/164.6 CL 'B' RIP RAP EST. 409.6 SM GF STA 84+20 TO STA 85+20 -LREV- LT EST. 237 CM DDE SEE DETAIL #15
EST 6.4 MTONS CLASS 'I' RIP RAP EST 12.5 SM GF
+30 -L REV- END SHLDR BERM GUTTER LT
BERM DITCH STA 85+49 TO STA 87+00 -LREV- LT SEE DETAIL #6
BDO
450 W/ELBOWS
GRAU 350
375 RCP
REMOVE
PROPOSED CABLE GUIDERAIL
N 23° 39' 10.6" W
-LREV_SB-
CAT-1
-L REV-
-LREV_NB-
-BL- 46
-BL- 45
REMOVE AND RESET
PROP 1.2m WW
EXIST R/W
-LREV_SB- CS 88+06.106
MATCH LINE STA 85+00 -L REV- SHEET 6
MATCH LINE STA 88+40 -L REV- SHEET 8
-L REV- TS 86+01.807
-LREV_SB- TS 86+44.605
-L REV- SC 86+62.807
-LREV SB- SC 86+84.605
SR 2806 BENNETT FARM RD
BENCHED CHANNEL W/CLASS 'II' RIP RAP EST. 6.2 MTONS EST. 6 CM DDE COIR FIBER MATTING EST. 25.0 SM SEE DETAIL #33
TIMOTHY M. DAVIS DB 815 PG 1869 1.643 Ha DMD
AVERY LEON WOOD JR. DB 815 PG 192 4201 SM DMD
-LREV_NB- SC 86+78.605
CLASS 'I' RIP RAP EST. 6.2 MTONS EST. 12.0 SM GF
-L REV- POT 86+18.605 LB =
-LREV SB- POT 86+18.605 10.6 LT LA =
-LREV NB- TS 86+18.605 7.0 RT LA
-LREV_NB-
PIs Sta 86+58.606
Θs = 1° 02' 30.3"
Ls = 60.000
LT = 40.001
ST = 20.001
PI Sta 89+67.744
Δ = 19° 52' 43.3" (RT)
L = 572.465
T = 289.139
R = 1,650.000
Se = 0.04
DS = 110 KMH
PIs Sta 92+71.071
Θs = 1° 02' 30.3"
Ls = 60.000
LT = 40.001
ST = 20.001
SR 2495 ROCKWOOD DR
DETAIL #6 BERM DITCH (Not to Scale)
Min. D= 0.3m
FROM STA. 85+49 TO STA. 87+00 -LREV- LT
DETAIL #15 LATERAL BASE DITCH (Not to Scale)
Min. D= 0.45m
Max. d= 0.45m
B= 0.6m
b= 1.5m
•When B is < 1.8m
Type of Liner= Class 'B' Rip-Rap
FROM STA. 84+20 TO STA. 85+20 -LREV- LT

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	8
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER — SEAL 22606 — DAVID C. WALLER — 4/8/2015
HYDRAULICS ENGINEER — SEAL 19732 — SHICHEN FU — 4/8/2015

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

METRIC

CONST. REV.
R/W REV.

RIGHT-OF-WAY FOR THIS PROJECT HAS BEEN ACQUIRED UNDER PROJECT R-2413C

-LREV_SB-

	PIs Sta 86+71.272	PI Sta 87+45.388	PIs Sta 88+19.440	PIs Sta 88+72.773	PI Sta 89+39.401	PIs Sta 90+05.987	PIs Sta 91+53.664	PI Sta 93+37.105	PIs Sta 95+12.483	PIs Sta 96+02.477	PI Sta 97+17.024	PIs Sta 98+30.772
θs / Δ	θs = 0° 44' 56.3"	Δ = 4° 33' 00.0" (RT)	θs = 0° 44' 56.3"	θs = 0° 44' 56.3"	Δ = 3° 59' 24.0" (LT)	θs = 0° 44' 56.3"	θs = 3° 39' 02.5"	Δ = 31° 31' 11.2" (RT)	θs = 3° 39' 02.5"	θs = 2° 12' 03.6"	Δ = 13° 01' 01.3" (LT)	θs = 2° 12' 03.6"
Ls / L	Ls = 40.000	L = 121.501	Ls = 40.000	Ls = 40.000	L = 106.547	Ls = 40.000	Ls = 72.000	L = 310.820	Ls = 72.000	Ls = 63.000	L = 186.296	Ls = 63.000
LT / T	LT = 26.667	T = 60.782	LT = 26.667	LT = 26.667	T = 53.295	LT = 26.667	LT = 48.010	T = 159.452	LT = 48.010	LT = 42.003	T = 93.551	LT = 42.003
ST / R	ST = 13.334	R = 1,530.000	ST = 13.334	ST = 13.334	R = 1,530.000	ST = 13.334	ST = 24.009	R = 565.000	ST = 24.009	ST = 21.003	R = 820.000	ST = 21.003
Se		Se = 0.04			Se = 0.04			Se = 0.08			Se = 0.07	
DS		DS = 110 KMH			DS = 110 KMH			DS = 110 KMH			DS = 110 KMH	

-LREV_NB-

PIs Sta 86+58.606	PI Sta 89+67.744	PIs Sta 92+71.071
θs = 1° 02' 30.3"	Δ = 19° 52' 43.3" (RT)	θs = 1° 02' 30.3"
Ls = 60.000	L = 572.465	Ls = 60.000
LT = 40.001	T = 289.139	LT = 40.001
ST = 20.001	R = 1,650.000	ST = 20.001
	Se = 0.04	
	DS = 110 KMH	

-NC68_NB-

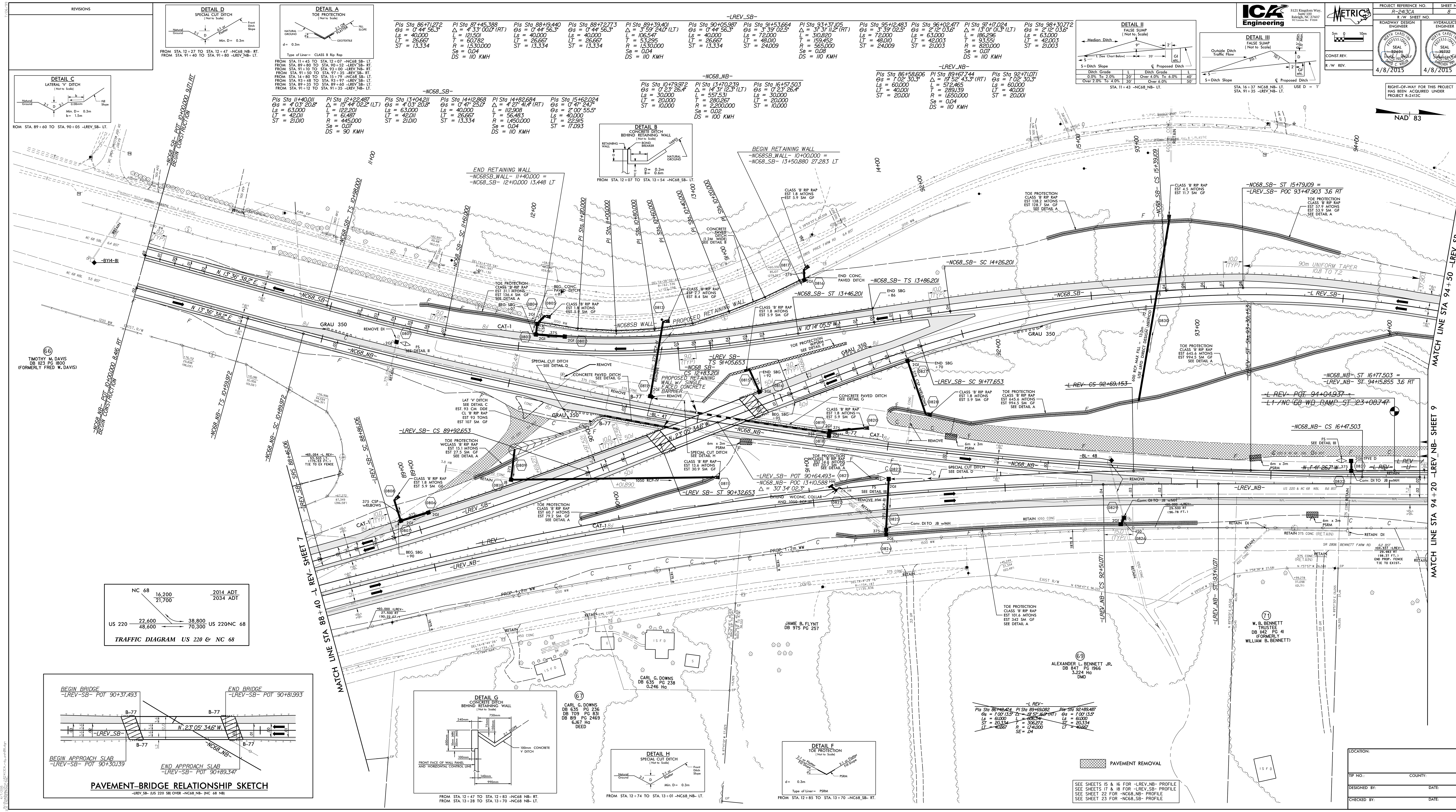
PIs Sta 10+79.972	PI Sta 13+70.239	PIs Sta 16+57.503
θs = 0° 23' 26.4"	Δ = 14° 31' 12.3" (LT)	θs = 0° 23' 26.4"
Ls = 30.000	L = 557.531	Ls = 30.000
LT = 20.000	T = 280.267	LT = 20.000
ST = 10.000	R = 2,200.000	ST = 10.000
	Se = 0.02	
	DS = 100 KMH	

-NC68_SB-

PIs Sta 11+40.011	PI Sta 12+22.487	PIs Sta 13+04.211	PIs Sta 14+12.868	PI Sta 14+82.684	PIs Sta 15+62.024
θs = 4° 03' 20.8"	Δ = 15° 44' 02.2" (LT)	θs = 4° 03' 20.8"	θs = 0° 47' 25.0"	Δ = 4° 27' 41.4" (RT)	θs = 0° 47' 24.7"
Ls = 63.000	L = 122.201	Ls = 63.000	Ls = 40.000	L = 112.908	θs = 2° 00' 55.5"
LT = 42.011	T = 61.487	LT = 42.011	LT = 26.667	T = 56.483	Ls = 40.000
ST = 21.010	R = 445.000	ST = 21.010	ST = 13.334	R = 1,450.000	LT = 22.915
	Se = 0.07			Se = 0.04	ST = 17.093
	DS = 90 KMH			DS = 110 KMH	

-L REV- (struck out)

PIs Sta 86+42.474	PI Sta 89+69.082	PIs Sta 92+89.487
θs = 1° 00' 13.5"	Δ = 19° 57' 16.9" (RT)	θs = 1° 00' 13.5"
Ls = 61.000	L = 606.341	Ls = 61.000
ST = 20.334	T = 306.272	ST = 20.334
LT = 40.667	R = 1,741.000	LT = 40.667
	SE = .04	



SEE SHEETS 15 & 16 FOR -LREV_NB- PROFILE
SEE SHEETS 17 & 18 FOR -LREV_SB- PROFILE
SEE SHEET 22 FOR -NC68_NB- PROFILE
SEE SHEET 23 FOR -NC68_SB- PROFILE

LOCATION:	
TIP NO.:	COUNTY:
DESIGNED BY:	DATE:
CHECKED BY:	DATE:

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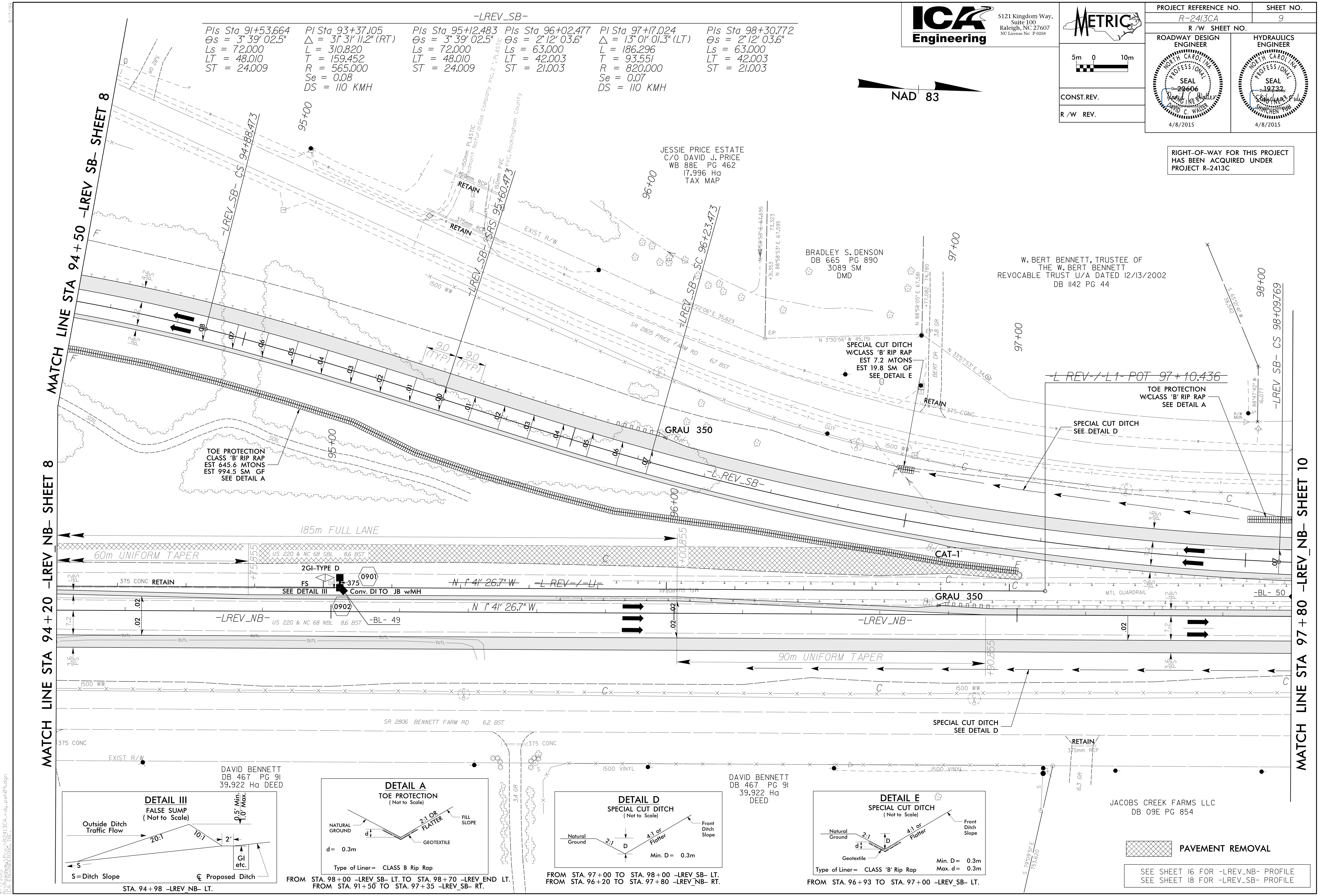

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Raleigh, NC 27607
NC License No: F-0258

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	10
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER — SEAL 22606 — DAVID C. WALTER — 4/8/2015

HYDRAULICS ENGINEER — SEAL 19732 — 4/8/2015

CONST. REV.

R/W REV.

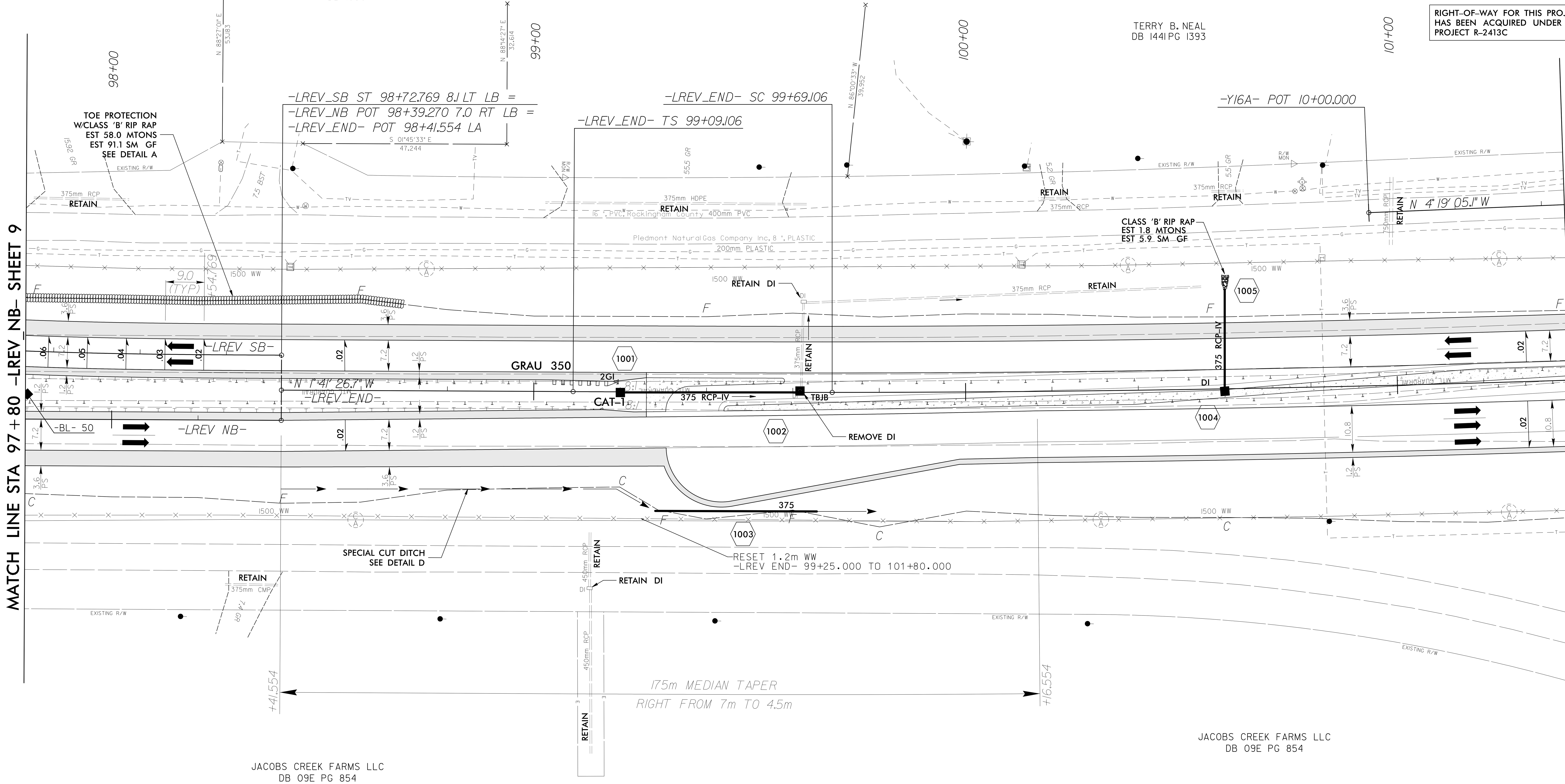
5m 0 10m

NAD 83

RIGHT-OF-WAY FOR THIS PROJECT HAS BEEN ACQUIRED UNDER PROJECT R-2413C

-LREV_SB-

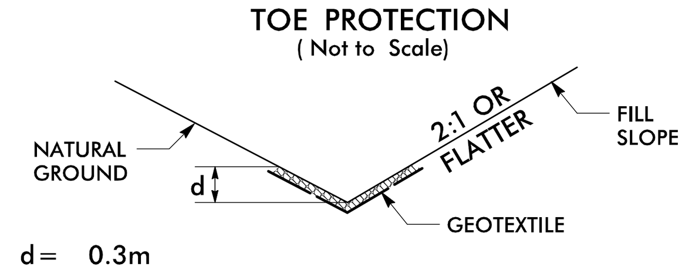
PIs Sta 96+02.477	PI Sta 97+17.024	PIs Sta 98+30.772
θs = 2° 12' 03.6"	△ = 13° 01' 01.3" (LT)	θs = 2° 12' 03.6"
Ls = 63.000	L = 186.296	Ls = 63.000
LT = 42.003	T = 93.551	LT = 42.003
ST = 21.003	R = 820.000	ST = 21.003
	Se = 0.07	
	DS = 110 KMH	



DAVID MARTIN SHELTON
DB 1231 PG 328
SIMAAN QUAIL ACRES, LLC.
DB 1030 PG 1840
DAVID MARTIN SHELTON
DB 1231 PG 325
TERRY B. NEAL
DB 1441 PG 1393
-LREV_SB ST 98+72.769 8.1 LT LB =
-LREV_NB POT 98+39.270 7.0 RT LB =
-LREV_END- POT 98+41.554 LA
-LREV_END- SC 99+69.106
-LREV_END- TS 99+09.106
-Y16A- POT 10+00.000
TOE PROTECTION
W/CLASS 'B' RIP RAP
EST 58.0 MTONS
EST 91.1 SM GF
SEE DETAIL A
CLASS 'B' RIP RAP
EST 1.8 MTONS
EST 5.9 SM GF
N 4° 19' 05.1" W
N 1° 41' 26.7" W
GRAU 350
2GI
CAT-1
375 RCP-IV
TBJB
REMOVE DI
RETAIN DI
375 RCP-IV
SPECIAL CUT DITCH
SEE DETAIL D
RESET 1.2m WW
-LREV END- 99+25.000 TO 101+80.000
175m MEDIAN TAPER
RIGHT FROM 7m TO 4.5m
+41.554
+16.554
JACOBS CREEK FARMS LLC
DB 09E PG 854
JACOBS CREEK FARMS LLC
DB 09E PG 854
MATCH LINE STA 97+80 -LREV_NB- SHEET 9
MATCH LINE STA 101+40 -LREV_END- SHEET 11
-LREV SB-
-LREV_END-
-LREV NB-
-BL- 50

DETAIL A

TOE PROTECTION
(Not to Scale)



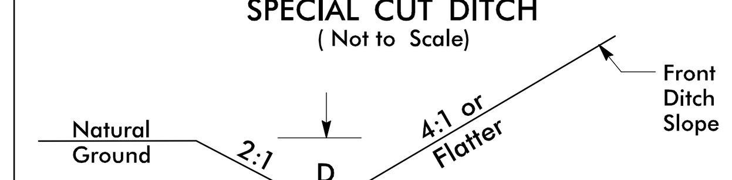
d = 0.3m

Type of Liner = CLASS B Rip Rap

FROM STA. 98+00 -LREV_SB- LT. TO STA. 98+70 -LREV_END LT.

DETAIL D

SPECIAL CUT DITCH
(Not to Scale)



Min. D = 0.3m

FROM STA. 98+42 TO STA. 99+80 -LREV_END- RT.

-LREV_END-

PIs Sta 99+49.106	PI Sta 100+77.397	PIs Sta 102+05.658
θs = 0° 19' 21.0"	△ = 20° 19' 40.3" (LT)	θs = 0° 19' 21.0"
Ls = 60.000	L = 216.552	Ls = 60.000
LT = 40.000	T = 108.291	LT = 40.000
ST = 20.000	R = 5,330.000	ST = 20.000
	Se = NC	
	DS = 110 KMH	

LEGEND

125mm MONOLITHIC CONCRETE ISLAND (KEYED IN)

SEE SHEET 16 FOR -LREV_NB- PROFILE
SEE SHEET 18 FOR -LREV_SB- PROFILE
SEE SHEET 19 FOR -LREV_END- PROFILES
SEE SHEET 2B-1 FOR CONC. ISLAND DETAILS

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Raleigh, NC 27607
NC License No: P-0258

METRIC

5m 0 10m

CONST.REV.

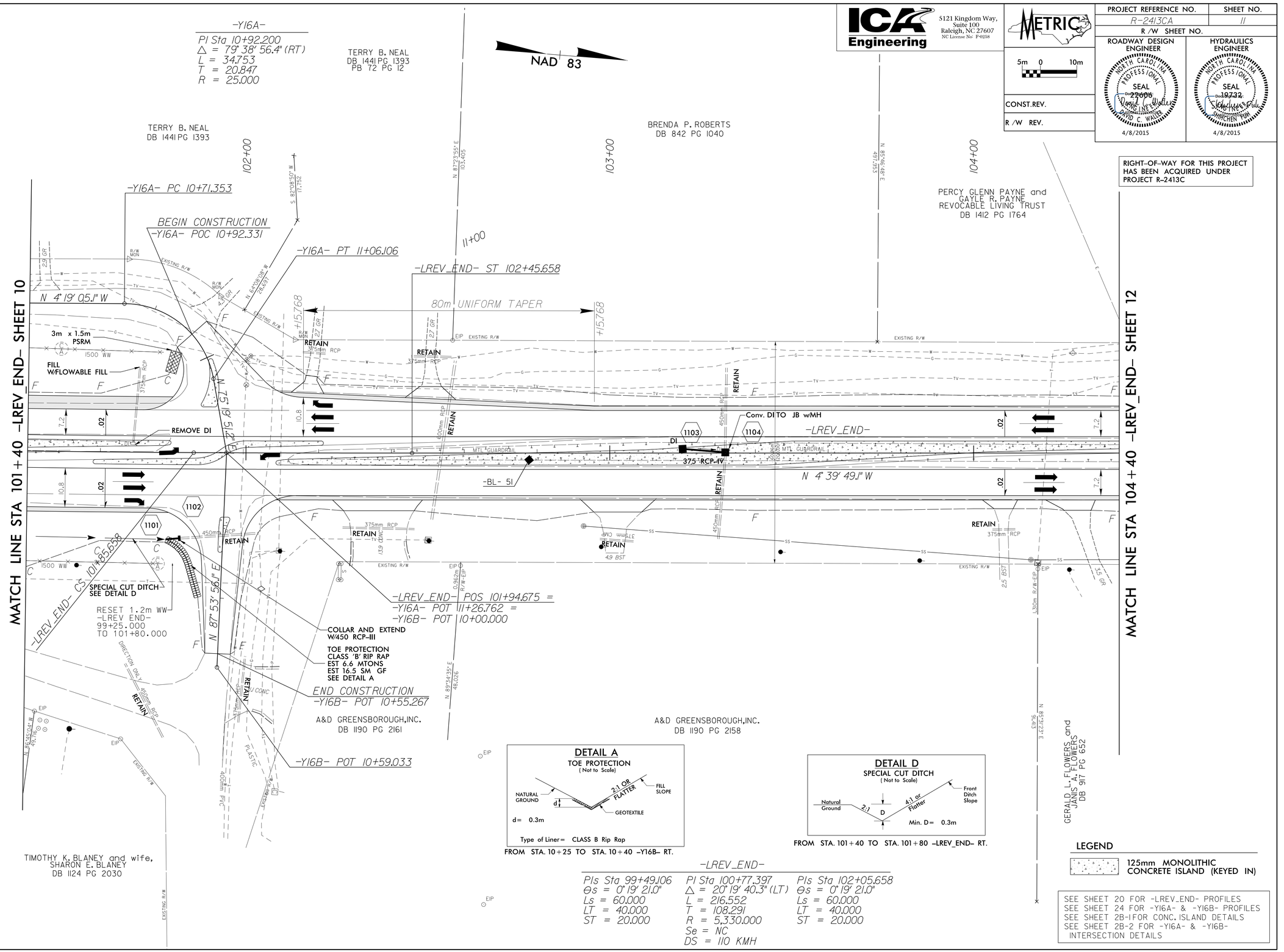
R /W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	11
R /W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 22606 ENGINEER DAVID C. WALLER
4/8/2015

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 19732 ENGINEER STEPHEN FINCHER FOR
4/8/2015

RIGHT-OF-WAY FOR THIS PROJECT HAS BEEN ACQUIRED UNDER PROJECT R-2413C



DETAIL A
TOE PROTECTION
(Not to Scale)

d= 0.3m

Type of Liner= CLASS B Rip Rap

FROM STA. 10+25 TO STA. 10+40 -Y16B- RT.

DETAIL D
SPECIAL CUT DITCH
(Not to Scale)

Min. D= 0.3m

FROM STA. 101+40 TO STA. 101+80 -LREV_END- RT.

-LREV_END-

PIs Sta 99+49.106	PI Sta 100+77.397	PIs Sta 102+05.658
Θs = 0° 19' 21.0"	△ = 20° 19' 40.3" (LT)	Θs = 0° 19' 21.0"
Ls = 60.000	L = 216.552	Ls = 60.000
LT = 40.000	T = 108.291	LT = 40.000
ST = 20.000	R = 5,330.000	ST = 20.000
	Se = NC	
	DS = 110 KMH	

LEGEND

125mm MONOLITHIC CONCRETE ISLAND (KEYED IN)

SEE SHEET 20 FOR -LREV_END- PROFILES
SEE SHEET 24 FOR -Y16A- & -Y16B- PROFILES
SEE SHEET 2B-1 FOR CONC. ISLAND DETAILS
SEE SHEET 2B-2 FOR -Y16A- & -Y16B- INTERSECTION DETAILS

4/7/2015
R-2413CA_rdy_psh11.dgn
ICA ENGINEERING, INC.

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

METRIC

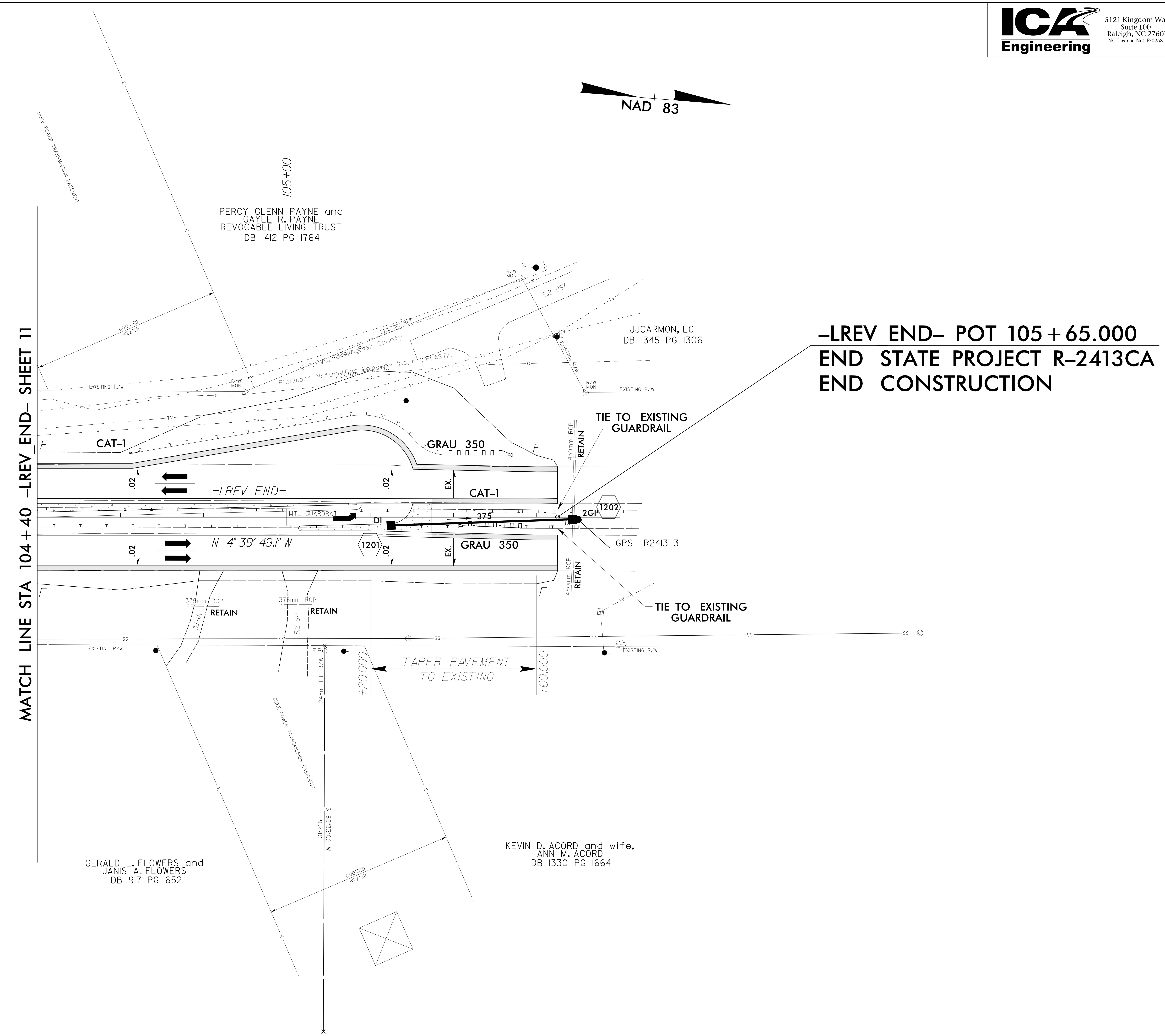
5m 0 10m

CONST.REV.

R /W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	12
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
SEAL 22606, 4/8/2015	SEAL 19732, 4/8/2015

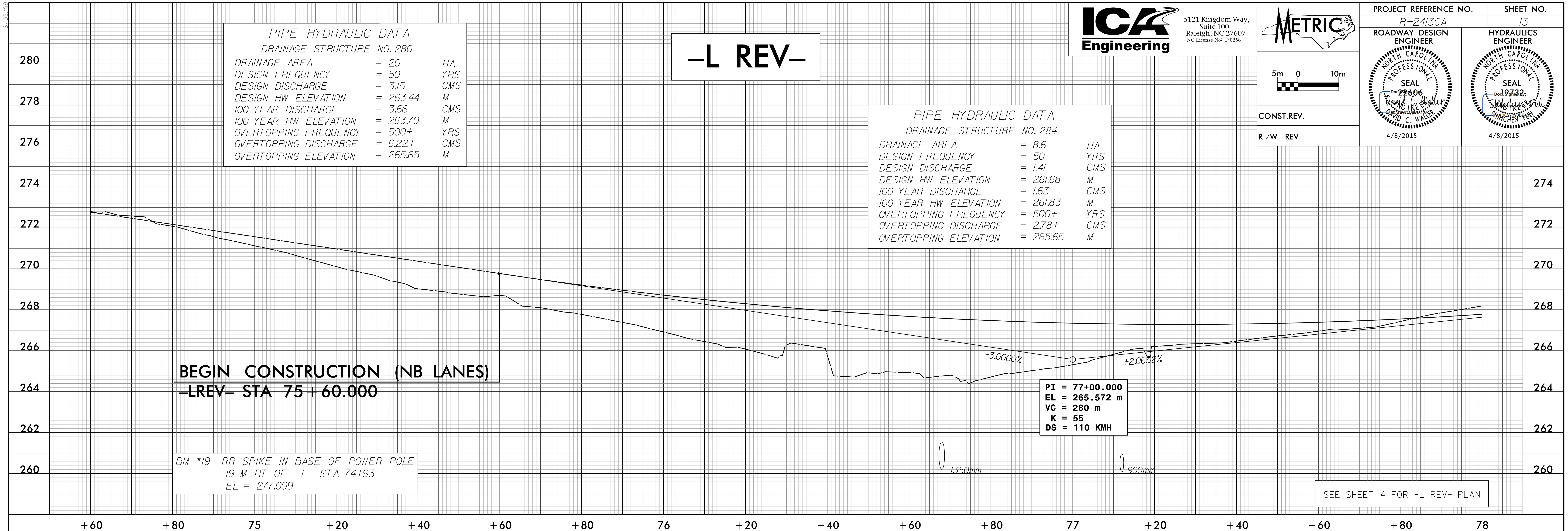
RIGHT-OF-WAY FOR THIS PROJECT HAS BEEN ACQUIRED UNDER PROJECT R-2413C

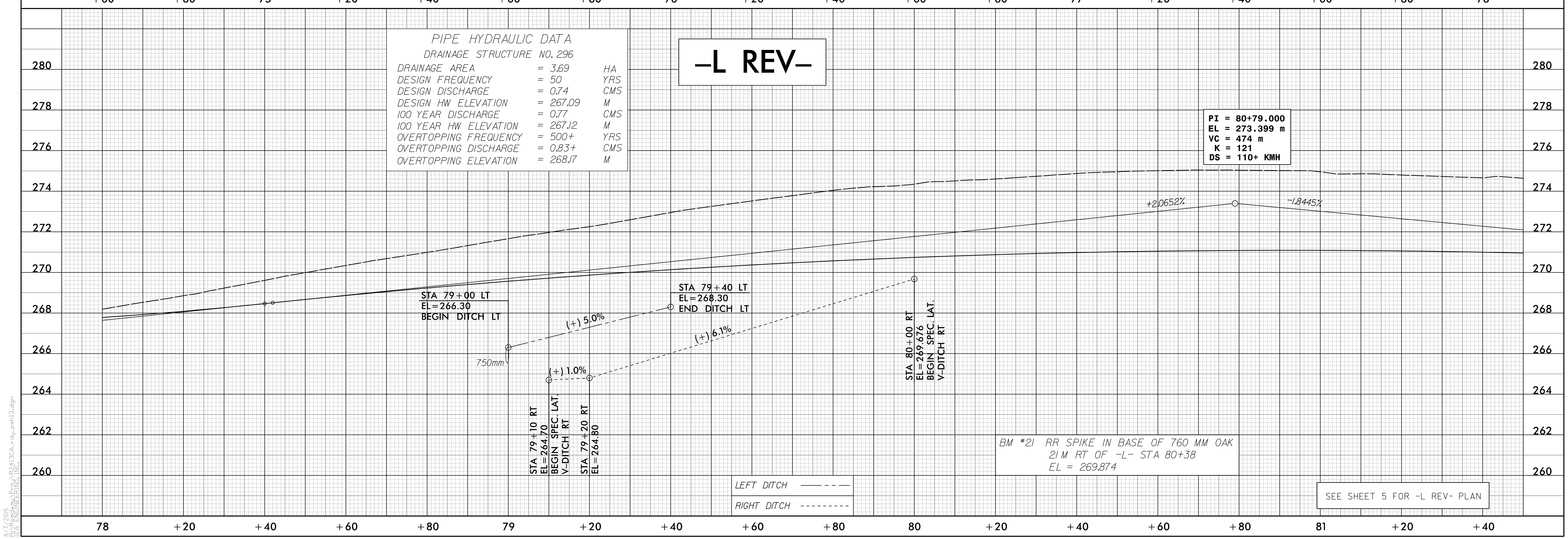


LEGEND

125mm MONOLITHIC CONCRETE ISLAND (KEYED IN)

SEE SHEETS 20 & 21 FOR -LREV_END- PROFILES
SEE SHEET 2B-1 FOR CONC. ISLAND DETAILS





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Raleigh, NC 27607
NC License No: F-0258

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	14

ROADWAY DESIGN ENGINEER — SEAL 22606 — NORTH CAROLINA PROFESSIONAL ENGINEER DAVID C. WALLER — DocuSigned by: David C. Waller — 4/8/2015

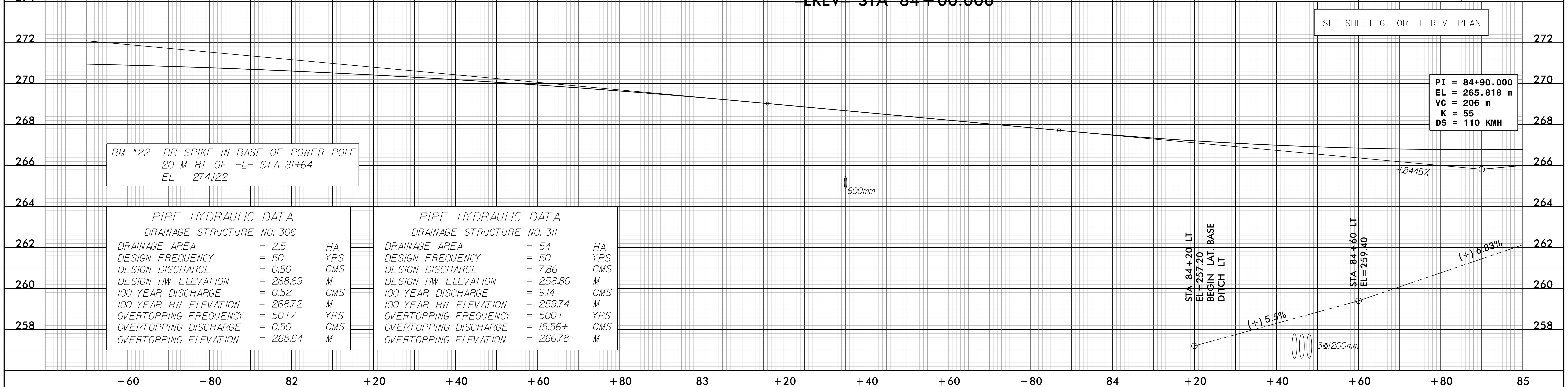
HYDRAULICS ENGINEER — SEAL 19732 — NORTH CAROLINA PROFESSIONAL ENGINEER SHIHCHEN FUH — DocuSigned by: Shihchen Fuh — 4/8/2015

5m 0 10m

CONST.REV.

R /W REV.

-L REV-



BM #22 RR SPIKE IN BASE OF POWER POLE
20 M RT OF -L- STA 81+64
EL = 274.122

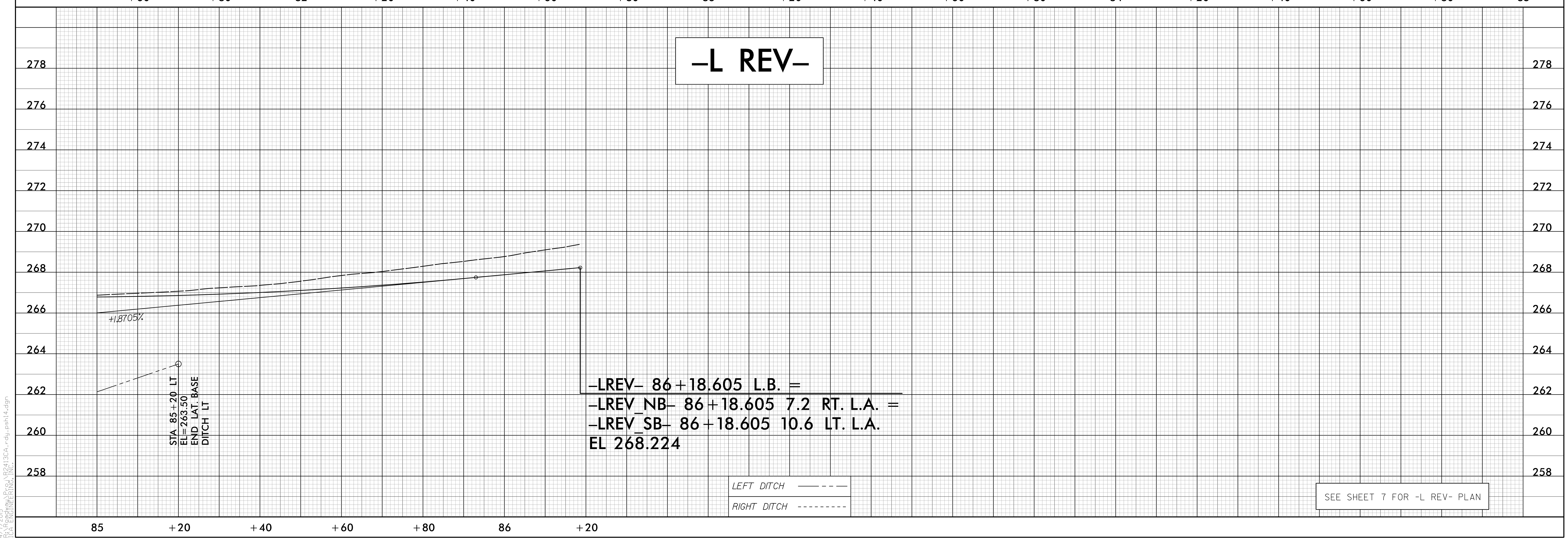
PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 306

DRAINAGE AREA	= 2.5	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.50	CMS
DESIGN HW ELEVATION	= 268.69	M
100 YEAR DISCHARGE	= 0.52	CMS
100 YEAR HW ELEVATION	= 268.72	M
OVERTOPPING FREQUENCY	= 50+/-	YRS
OVERTOPPING DISCHARGE	= 0.50	CMS
OVERTOPPING ELEVATION	= 268.64	M

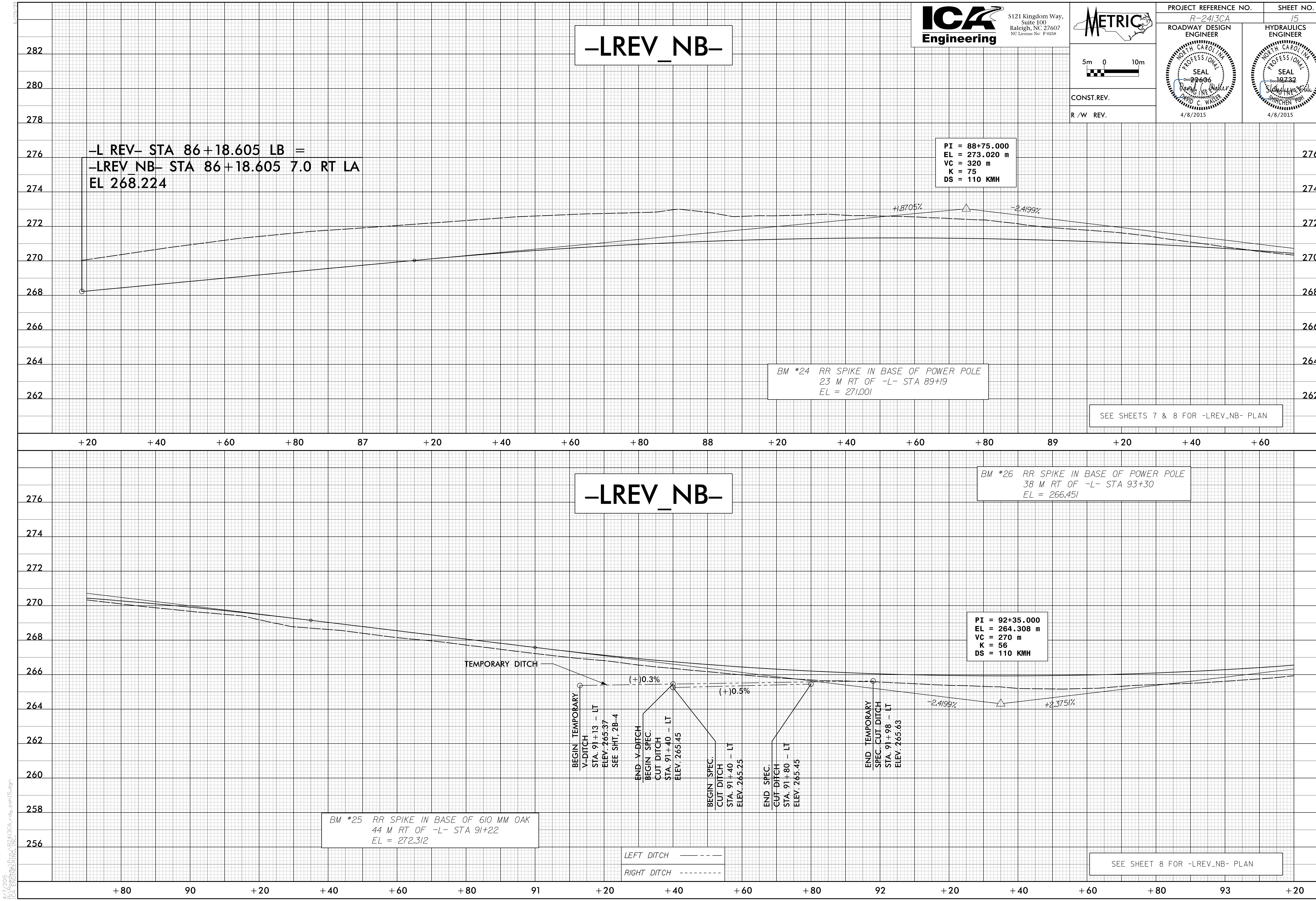
PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 311

DRAINAGE AREA	= 54	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 7.86	CMS
DESIGN HW ELEVATION	= 258.80	M
100 YEAR DISCHARGE	= 9.14	CMS
100 YEAR HW ELEVATION	= 259.74	M
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 15.56+	CMS
OVERTOPPING ELEVATION	= 266.78	M

-L REV-



4/7/2015



6/09/98

-LREV_NB-

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METRIC

5m 0 10m

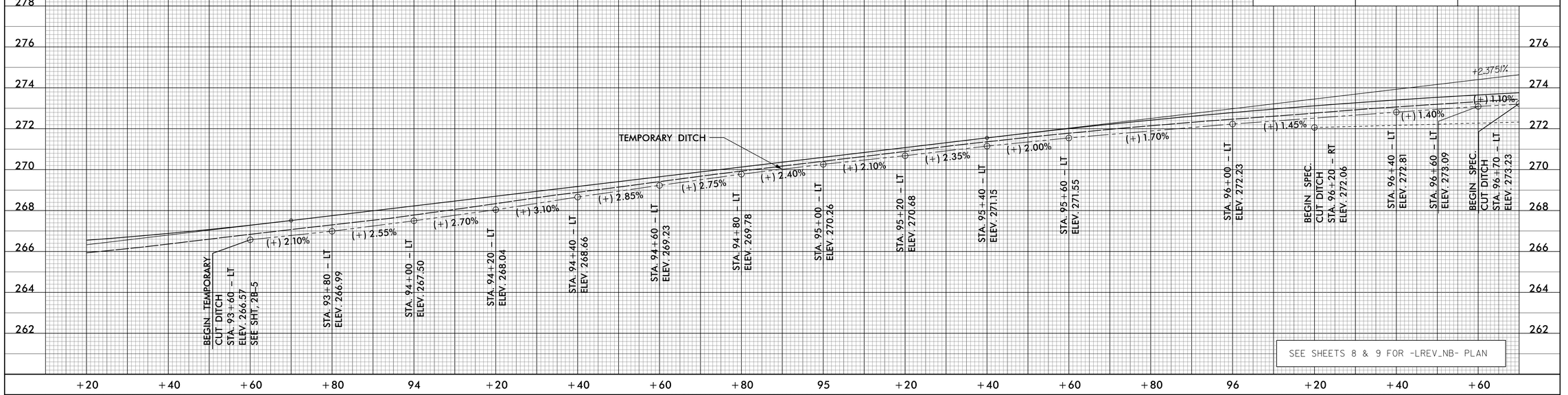
CONST.REV.

R /W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	16

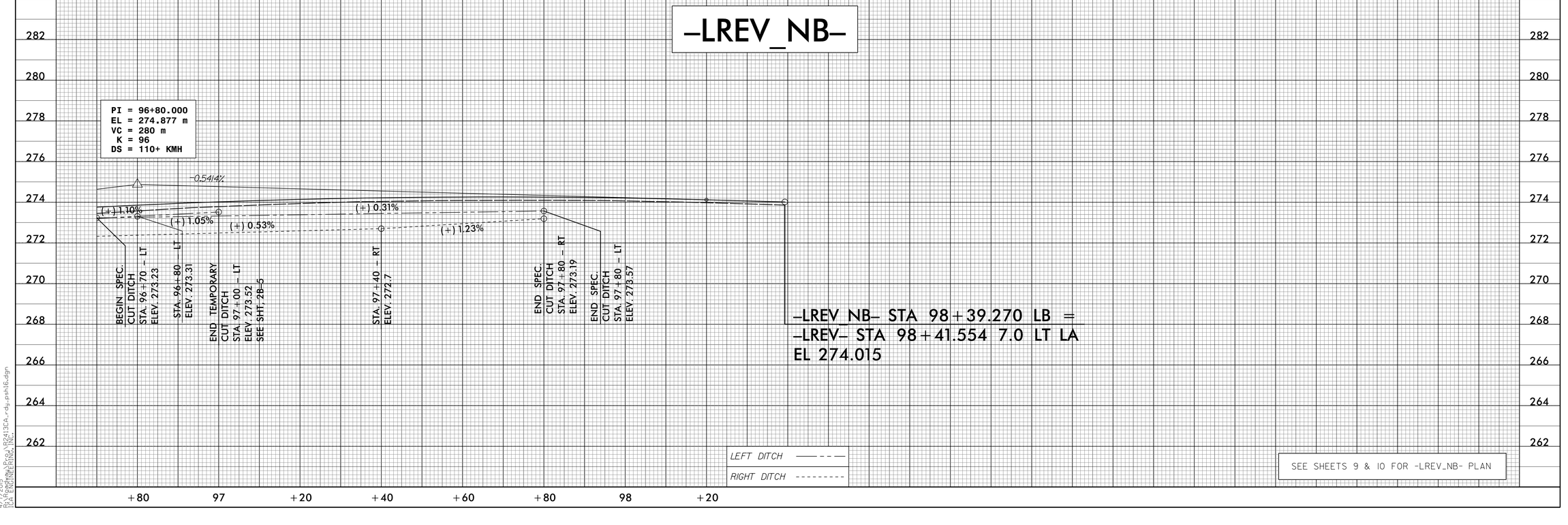
ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 22606 ENGINEER DAVID C. WALKER
4/8/2015

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 19732 ENGINEER JOHN F. MITCHEN, PE
4/8/2015



SEE SHEETS 8 & 9 FOR -LREV_NB- PLAN

-LREV_NB-



-LREV_NB- STA 98+39.270 LB =
-LREV- STA 98+41.554 7.0 LT LA
EL 274.015

SEE SHEETS 9 & 10 FOR -LREV_NB- PLAN

4/7/2015
R:\Projects\R-2413CA\rdu_psh16.dgn
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METRIC

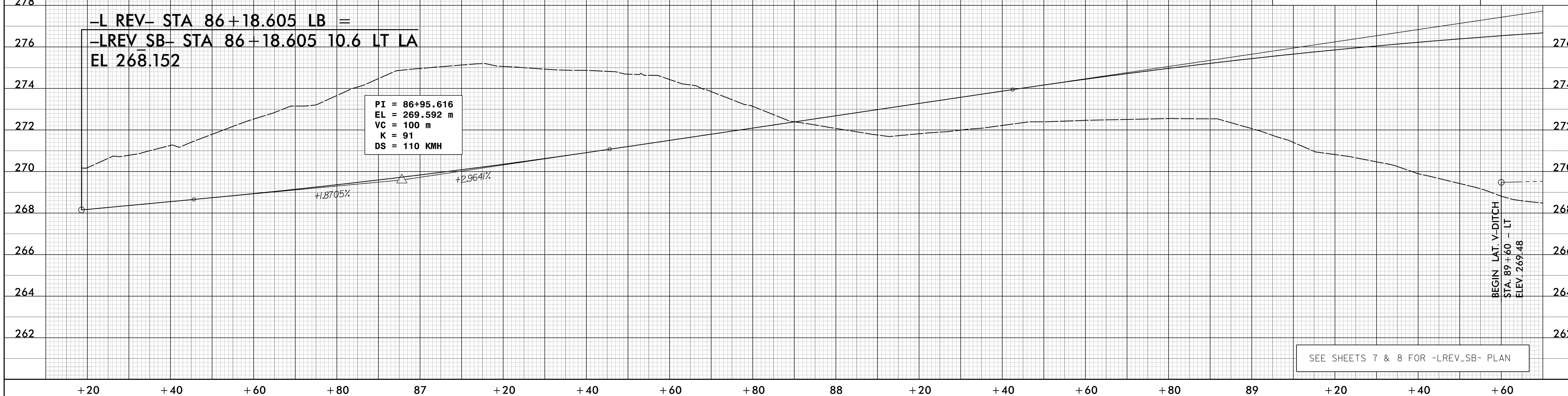
PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	17
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 22606 ENGINEER DAVID C. WALLER — 4/8/2015	NORTH CAROLINA PROFESSIONAL SEAL 19732 ENGINEER SHICHEN YUH — 4/8/2015

5m 0 10m

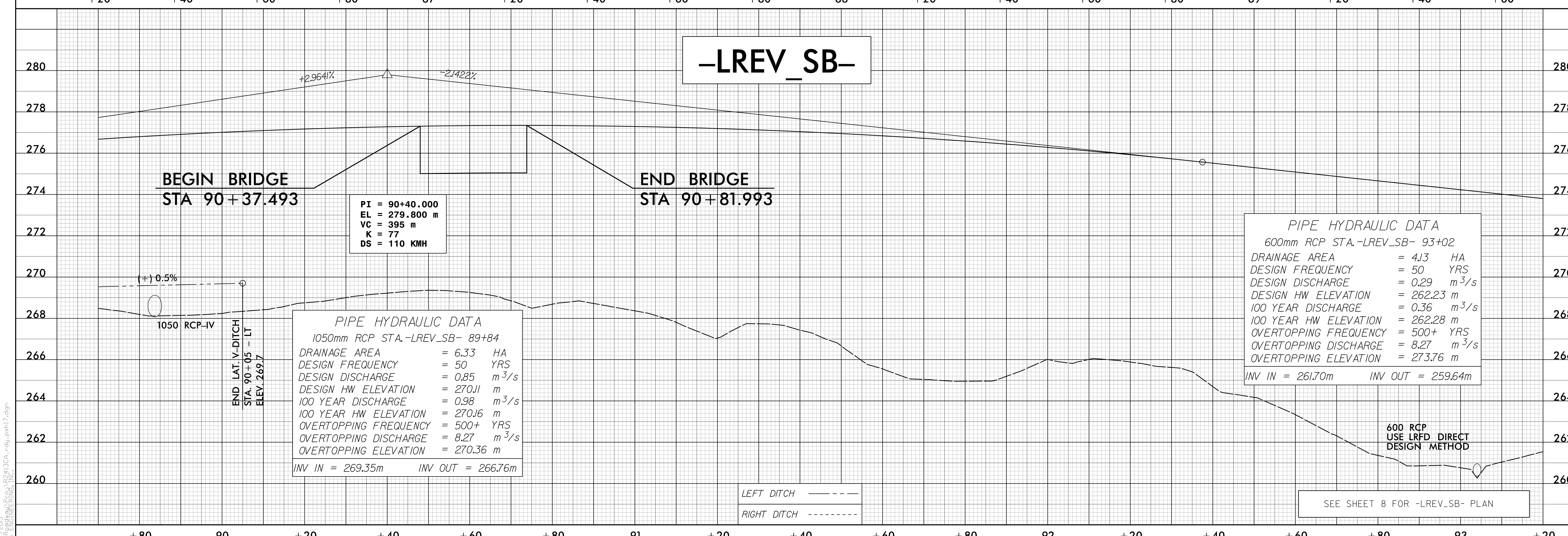
CONST. REV.

R/W REV.

–LREV_SB–



–LREV_SB–



PIPE HYDRAULIC DATA
1050mm RCP STA.-LREV_SB- 89+84

DRAINAGE AREA	= 6.33	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.85	m^3/s
DESIGN HW ELEVATION	= 270.11	m
100 YEAR DISCHARGE	= 0.98	m^3/s
100 YEAR HW ELEVATION	= 270.16	m
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 8.27	m^3/s
OVERTOPPING ELEVATION	= 270.36	m

INV IN = 269.35m INV OUT = 266.76m

PIPE HYDRAULIC DATA
600mm RCP STA.-LREV_SB- 93+02

DRAINAGE AREA	= 4.13	HA
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 0.29	m^3/s
DESIGN HW ELEVATION	= 262.23	m
100 YEAR DISCHARGE	= 0.36	m^3/s
100 YEAR HW ELEVATION	= 262.28	m
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING DISCHARGE	= 8.27	m^3/s
OVERTOPPING ELEVATION	= 273.76	m

INV IN = 261.70m INV OUT = 259.64m

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METRIC

5m 0 10m

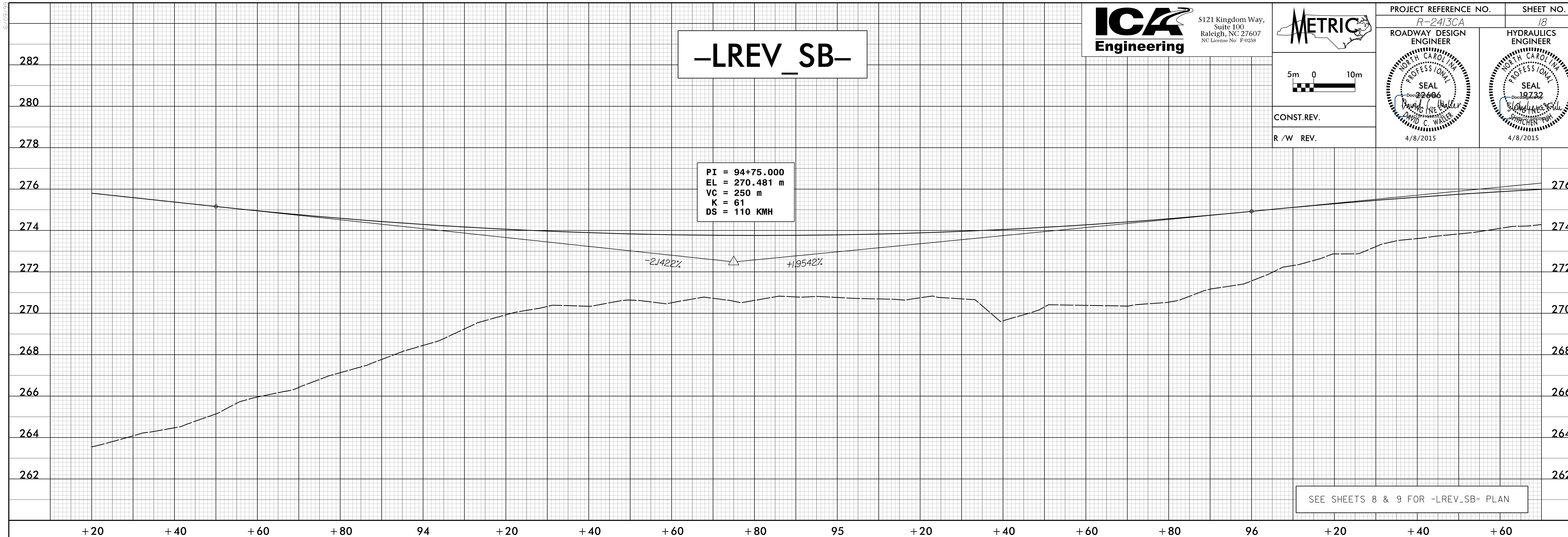
PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	18

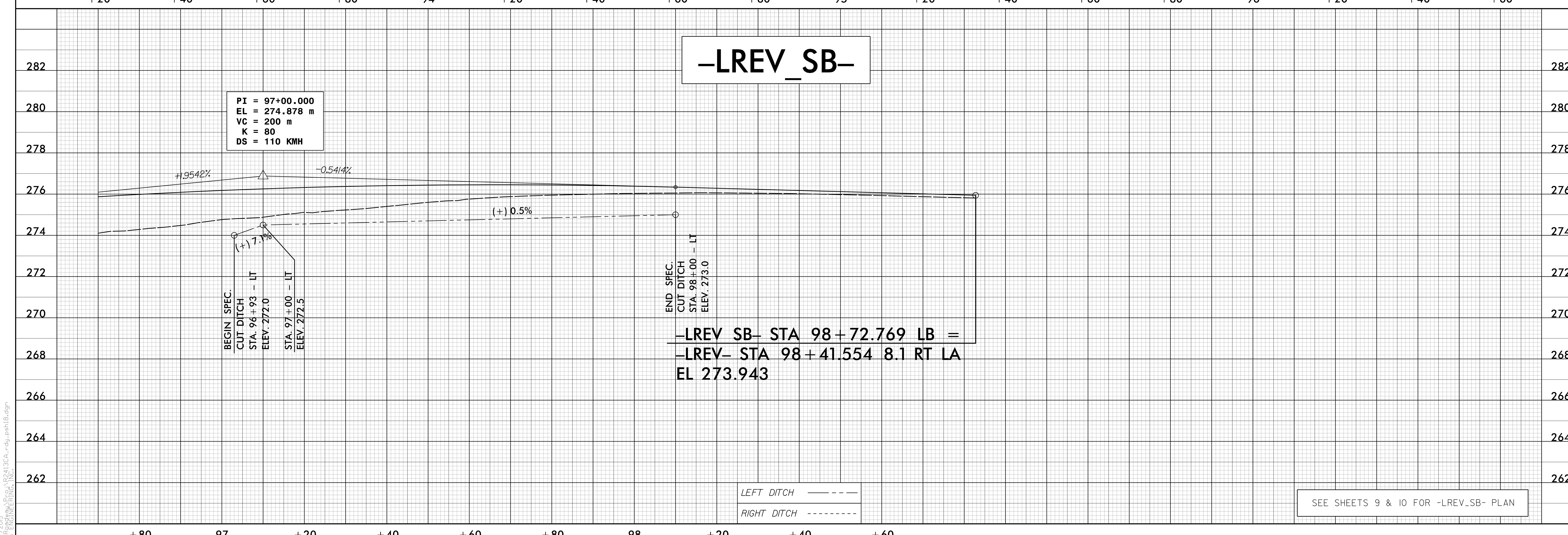
CONST. REV.

R/W REV.

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 22606 — DAVID C. WALLER — 4/8/2015

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 19732 — SHIHCHEN FAN — 4/8/2015





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METRIC

5m 0 10m

CONST.REV.

R /W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	19

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 22606 ENGINEER DAVID C. WALLER
4/8/2015

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 19732 ENGINEER SUNGHWAN KIM
4/8/2015

–LREV_END–
SB LANES

PI = 98+70.000
EL = 273.861 m
VC = 50 m
K = 510
DS = 110+ KMH

PI = 99+30.000
EL = 273.477 m
VC = 50 m
K = 429
DS = 110+ KMH

PI = 100+40.000
EL = 272.902 m
VC = 90 m
K = 1121
DS = 110+ KMH

PI = 101+40.000
EL = 272.299 m
VC = 50 m
K = 2344
DS = 110+ KMH

-0.5414% -0.6394% -0.5227% -0.5227% -0.6030% -0.6030%

–LREV SB STA 98+72.769 8.1 LT LB =
–LREV_NB STA 98+39.270 7.0 RT LB =
–LREV_END– STA 98+41.554 LA
EL 274.015

SEE SHEET 10 FOR -LREV_END- SB PLAN

284 282 280 278 276 274 272 270 268 266 264

+40 +60 +80 99 +20 +40 +60 +80 100 +20 +40 +60 +80 101 +20 +40

–LREV_END–
NB LANES

BEGIN SPEC.
CUT DITCH
STA. 98+42 – RT
ELEV 272.54

PI = 98+70.000
EL = 273.861 m
VC = 50 m
K = 252
DS = 110+ KMH

PI = 99+30.000
EL = 273.417 m
VC = 70 m
K = 325
DS = 110+ KMH

PI = 100+20.000
EL = 272.945 m
VC = 110 m
K = 6376
DS = 110+ KMH

PI = 101+40.000
EL = 272.295 m
VC = 50 m
K = 344
DS = 110+ KMH

-0.5414% -0.7394% -0.5243% -0.5243% -0.5416% -0.5416%

(–) 0.5%

END SPEC.
CUT DITCH
STA. 99+80 – RT
ELEV. 271.84

BEGIN SPEC.
CUT DITCH
STA. 101+40 – RT
ELEV. 271.1

–LREV SB STA 98+72.769 8.1 LT LB =
–LREV_NB STA 98+39.270 7.0 RT LB =
–LREV_END– STA 98+41.554 LA
EL 274.015

LEFT DITCH ——— - - —
RIGHT DITCH ---------

SEE SHEET 10 FOR -LREV_END- NB PLAN

284 282 280 278 276 274 272 270 268 266 264

+40 +60 +80 99 +20 +40 +60 +80 100 +20 +40 +60 +80 101 +20 +40

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4/7/2015
R:\Projects\R-2413CA\roadway\R2413CA_rdy_psh19.dgn
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METRIC

5m 0 10m

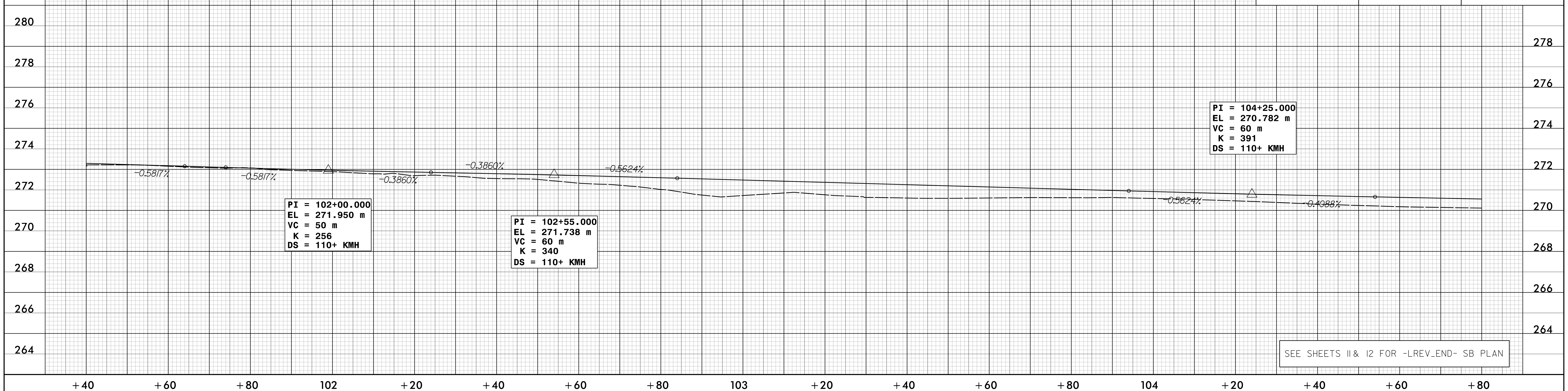
CONST.REV.

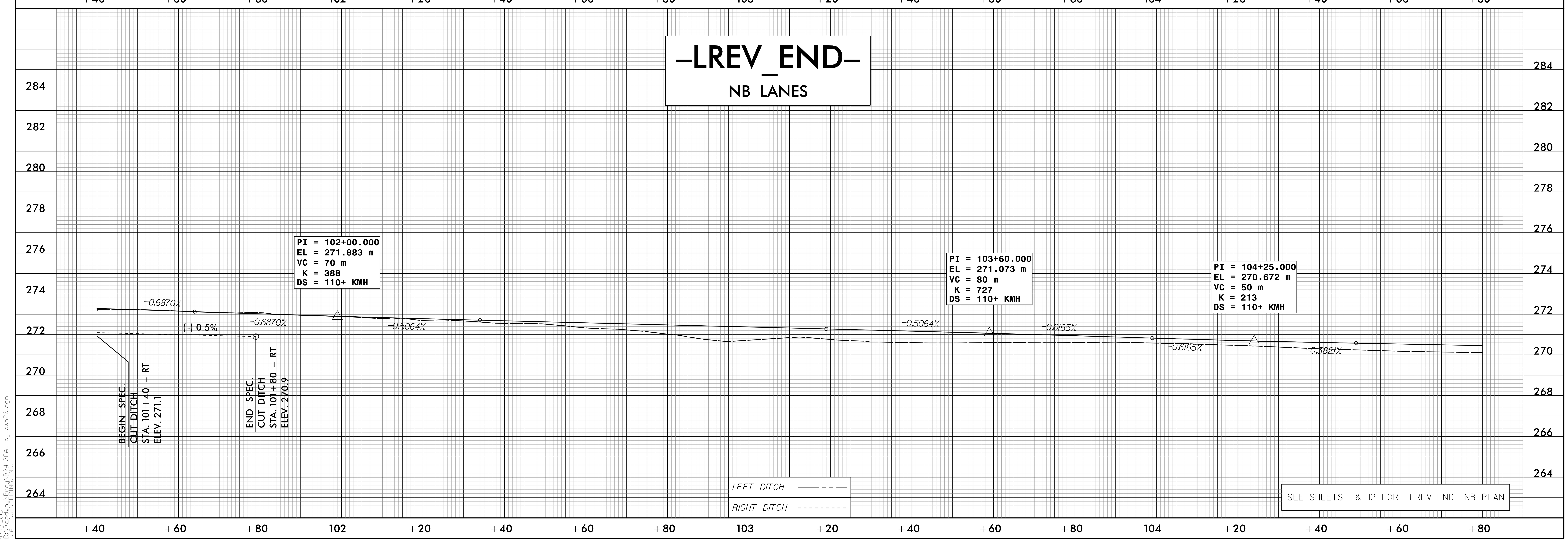
R /W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	20

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 22606 ENGINEER DAVID C. WALLER
DocuSigned by: David C. Waller
4/8/2015

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 19732 ENGINEER SHIHCHEN FUH
DocuSigned by:
4/8/2015





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METRIC
5m 0 10m

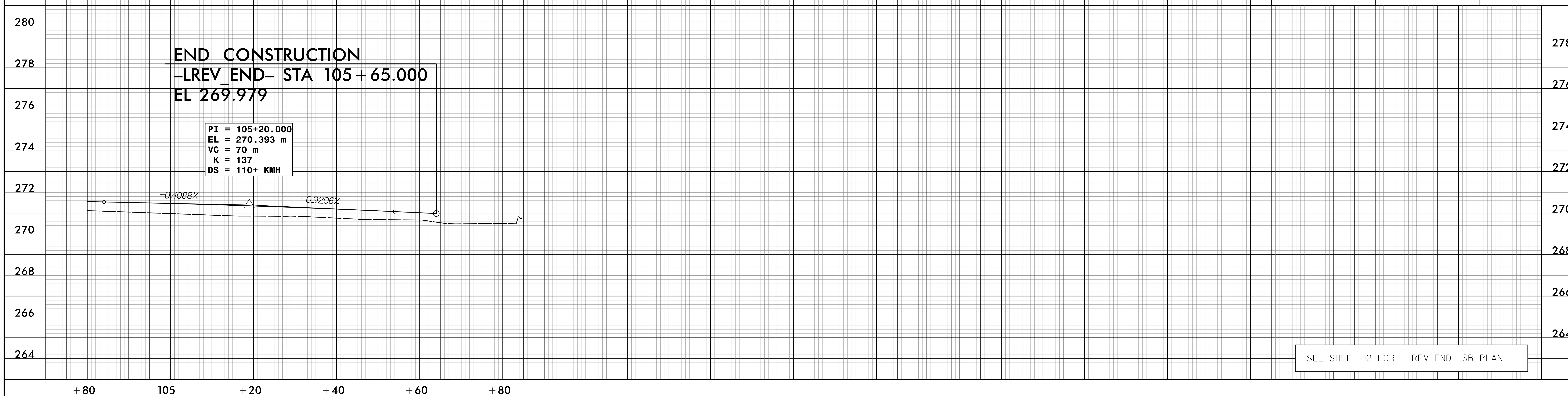
CONST.REV.
R /W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	21

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 22606 DAVID C. WALLER — DocuSigned by: David C. Waller — 89AD3F7156C5435 — 4/8/2015

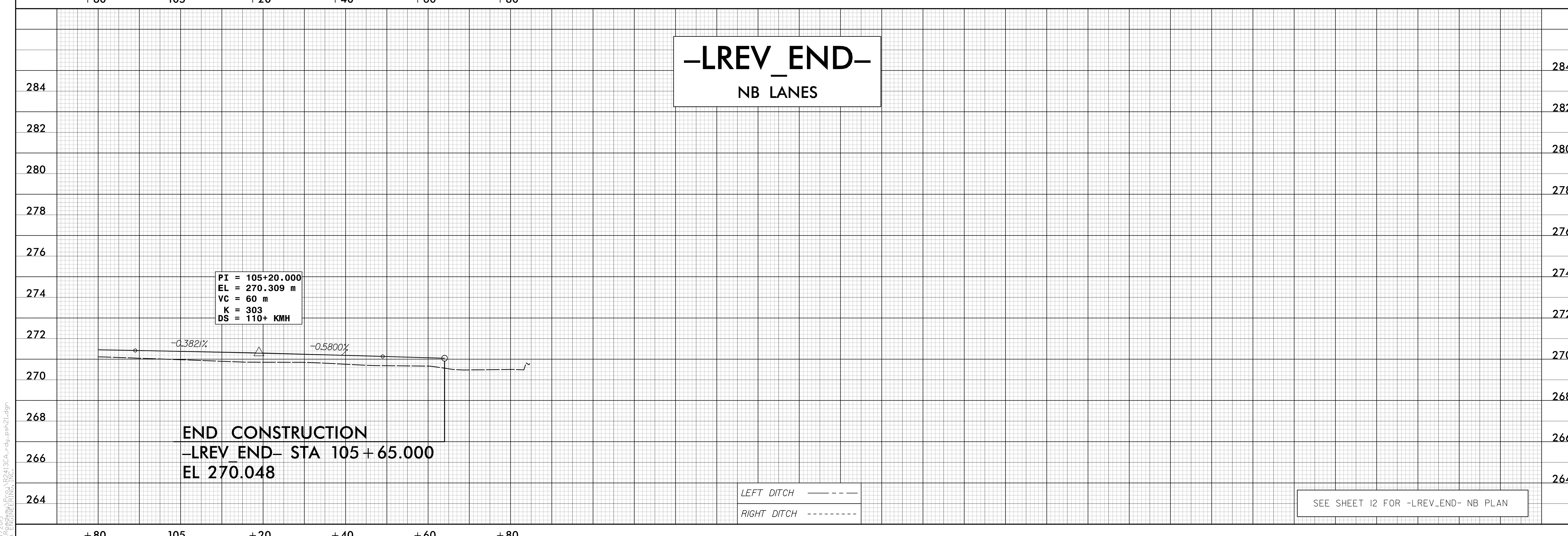
HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19732 SHIHCHEN FUH — DocuSigned by: Shihchen Fuh — F748C27398BE430 — 4/8/2015

-LREV_END-
SB LANES



SEE SHEET 12 FOR -LREV_END- SB PLAN

-LREV_END-
NB LANES



LEFT DITCH
RIGHT DITCH

SEE SHEET 12 FOR -LREV_END- NB PLAN

4/7/2015
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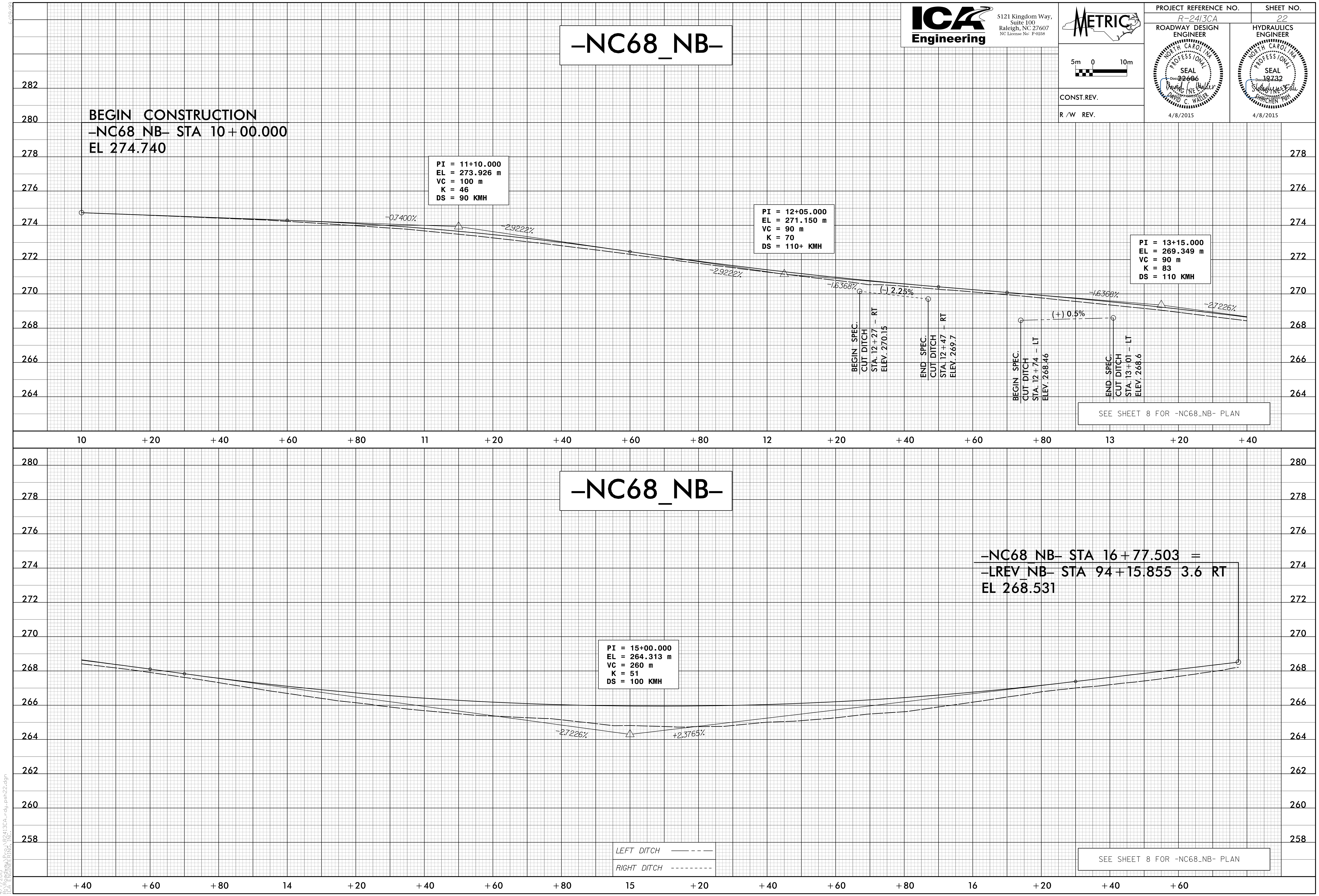

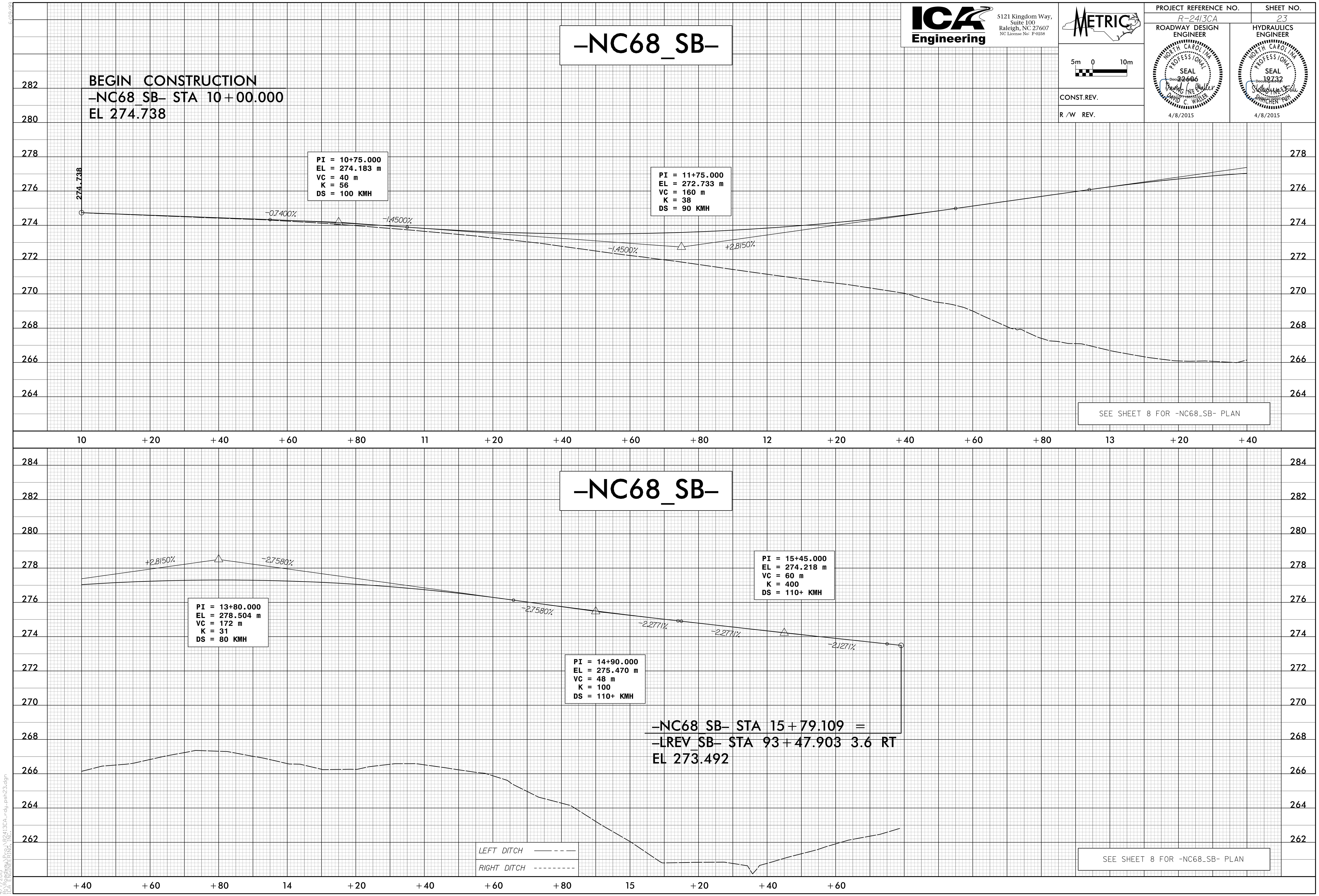

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METRIC

5m 0 10m

PROJECT REFERENCE NO.	SHEET NO.
R-2413CA	24

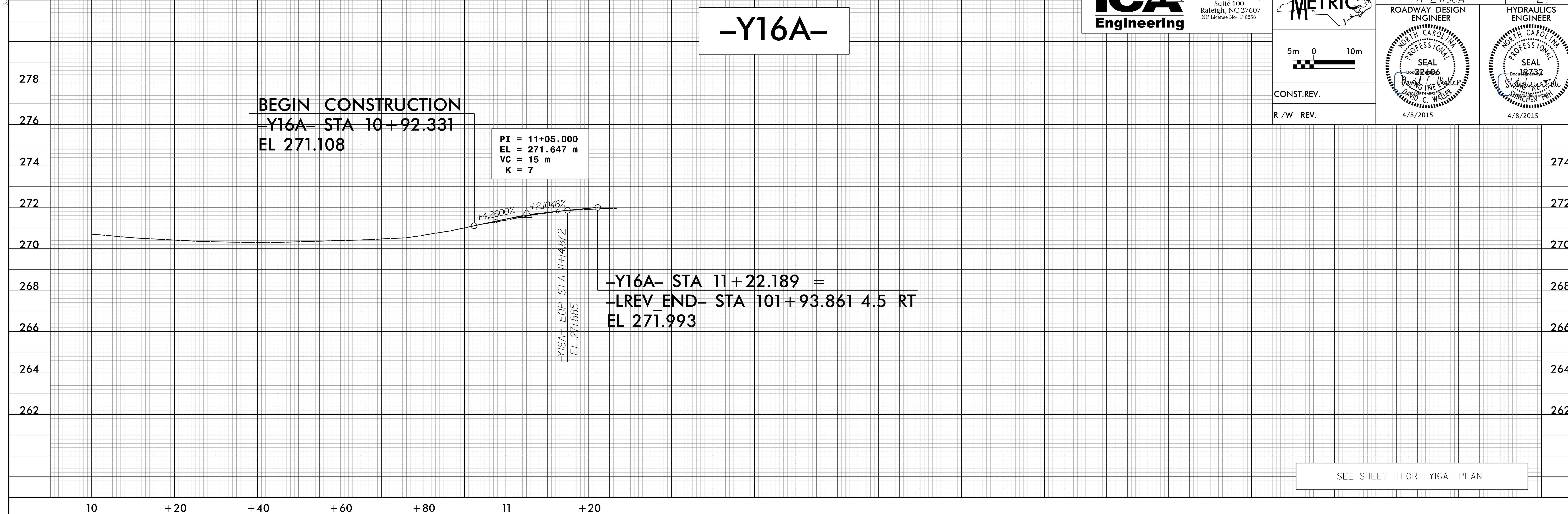
CONST.REV.

R /W REV.

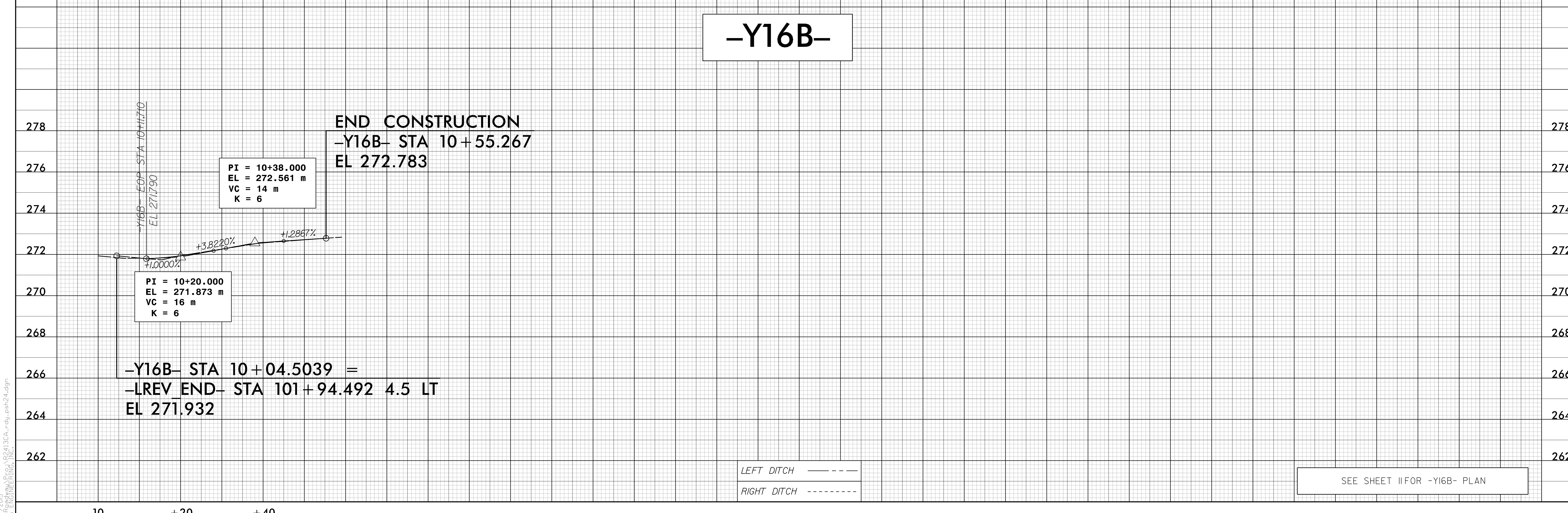
ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 22606 ENGINEER DAVID C. WALLER
DocuSigned by: David C. Waller
4/8/2015

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 19732 ENGINEER SHIHCHEN PUH
DocuSigned by:
4/8/2015

-Y16A-



-Y16B-



4/7/2015
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