TIP PROJECT: R-2414B

CONTRACT: C202914

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CAMDEN COUNTY

LOCATION: US 158 FROM SOUTH OF SR 1139 (COUNTRY CLUB RD.) TO EAST OF NC 34 IN BELCROSS

TYPE OF WORK: WIDENING, GRADING, DRAINAGE, PAVING, CURB & GUTTER, SIGNALS & CULVERTS

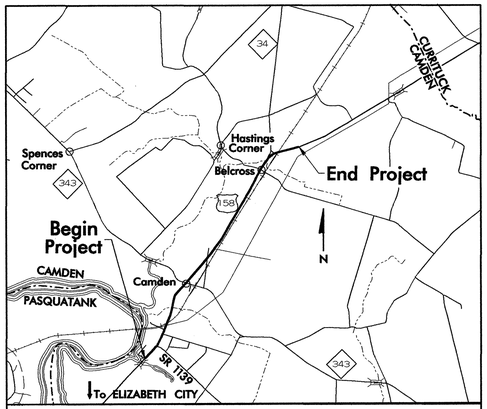
METRIC

ALL DIMENSIONS IN THESE PLANS ARE IN METERS UNLESS OTHERWISE SHOWN

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2414B	1	

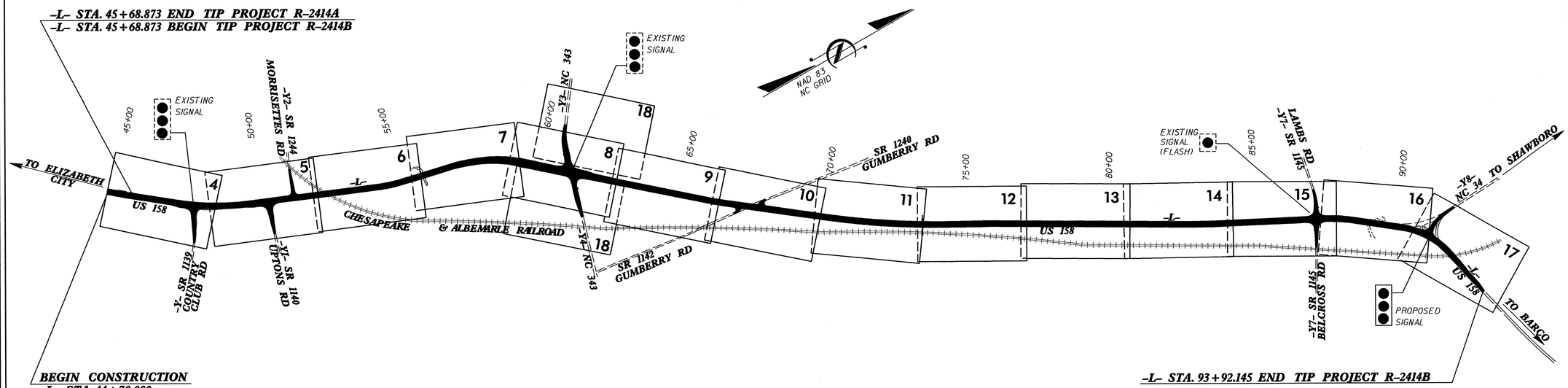
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34430.1.1	STP-158(2)	PE
34430.2.5		ROW & UTILITIES
34430.3.3		CONST.

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



VICINITY MAP

-L- STA. 45+68.873 END TIP PROJECT R-2414A
-L- STA. 45+68.873 BEGIN TIP PROJECT R-2414B



BEGIN CONSTRUCTION
-L- STA. 44+70.000

-L- STA. 93+92.145 END TIP PROJECT R-2414B

TRANSITE CONSULTING
ENGINEERS, INCORPORATED
1300 Paddock Drive, Suite G-10
Raleigh, N.C. 27609

GRAPHIC SCALES

5 0 10
PLANS

5 0 10
PROFILE (HORIZONTAL)

1 0 2
PROFILE (VERTICAL)

DESIGN DATA

ADT (2009) = 26,000
ADT (2029) = 41,500
DHV = 12%
D = 60%
T = 6% *
V = 80 km/h

* (TTST 2%+ DUAL 4%)

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2414B = 4.823 Km
TOTAL LENGTH TIP PROJECT R-2414B = 4.823 Km

WETHERILL ENGINEERING

Prepared for the North Carolina Department of Transportation in the Office of:
559 JONES FRANKLIN ROAD
SUITE 164
Raleigh, N.C. 27606
Licenses No. F-0377
Bus: 919 851 8077
Fax: 919 851 8107

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
NOVEMBER 15, 2006

LETTING DATE:
MARCH 20, 2012

NCDOT CONTACT:

EDWARD G. WETHERILL, PE
PROJECT ENGINEER

BOB A. MAY, PE
PROJECT DESIGN ENGINEER

BRENDA L. MOORE, PE
ROADWAY DESIGN: ENGINEERING COORDINATION SECTION ENGINEER

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 18442 ENGINEER RICHARD LEON BOLLINGER, JR.

SIGNATURE: Richard L Bollinger P.E. 1-11-2012

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY

SIGNATURE: Bob A May P.E. 12-19-11

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

P.E.
STATE HIGHWAY DESIGN ENGINEER

12/19/2011 12:09:22 PM
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WETHERILL ENGINEERING
559 Jones Franklin Rd. Suite 164
Raleigh, N.C. 27606
Licenses No. F-0377
Bus: 919 851 8077
Fax: 919 851 8107
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	1-A

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY
12-29-11

EFF. 08-01-08
REV. 07-16-06

INDEX OF SHEETS

SHEET NUMBER	SHEET
1	TITLE SHEET
1-A	INDEX OF SHEETS, GENERAL NOTES, AND LIST OF STANDARD DRAWINGS
1-B	CONVENTIONAL SYMBOLS
1-C	SURVEY CONTROL SHEET
2 THRU 2-E	PAVEMENT SCHEDULE, TYPICAL SECTIONS, AND WEDGING DETAILS
2-F THRU 2-I	DETAILS OF INTERSECTIONS
2-J	DETOUR -DET1- SHEET FOR R.C. BOX CULVERT CONSTRUCTION
2-K	DETOUR -DET2- SHEET FOR R.C. BOX CULVERT CONSTRUCTION
2-L	DETOUR -DET3- SHEET FOR R.C. BOX CULVERT CONSTRUCTION
2-M	DETAILS OF TEMPORARY SHORING
2-N THRU 2-O	METHOD OF PIPE INSTALLATION
2-P	EMBANKMENT MONITORING DETAIL
2-Q	DETAIL FOR MONOLITHIC CONCRETE ISLAND
2-R	DETAIL FOR CSAP COLLAR
2-S THRU 2-T	DETAIL FOR WHEELCHAIR RAMPS
2-U TO 2-Y	DETAILS FOR FOAMED CONCRETE EMBANKMENT
2-Z	DETAIL FOR EMBANKMENT STABILIZATION FABRIC
2-AA	DETAIL FOR CONCRETE STEPS
2-AB	DETAIL FOR SHALLOW UNDERCUT
2-AC THRU 2-AN	DETAIL FOR TEMPORARY SHORING
3 (2 SHEETS)	SUMMARY OF QUANTITIES
3-A THRU 3-M	SUMMARY OF DRAINAGE QUANTITIES (PIPES 1200mm & UNDER)
3-N	SUMMARY OF GUARDRAIL & DRAINAGE QUANTITIES (PIPES 1200mm & OVER)
3-O	SUMMARIES OF EARTHWORK, PAVEMENT REMOVAL & SUBSURFACE DRAINS
3-P	PARCEL INDEX SHEET
4 THRU 18	PLAN SHEETS
19 THRU 28	PROFILE SHEETS
TCP-1 THRU TCP-32	TRAFFIC CONTROL PLANS
PM-1 THRU PM-11	PAVEMENT MARKING PLANS
EC-1 THRU EC-39	EROSION CONTROL PLANS
RF-1	REFORESTATION PLANS
SIGN-1 THRU SIGN-11	SIGNING PLANS
SIG-1 THRU SIG-51	SIGNAL PLANS
UC-1 THRU UC-18	UTILITY CONSTRUCTION PLANS
UO-1 THRU UO-16	UTILITY BY OTHERS PLANS
X-INDEX	CROSS-SECTION INDEX OF SHEETS
X-1A THRU X-1B	CROSS-SECTION SUMMARY SHEETS
X-1 THRU X-97	CROSS-SECTIONS
C-1 THRU C-26	CULVERT PLANS

GENERAL NOTES:

2006 SPECIFICATIONS
EFFECTIVE: 07-18-06
REVISED: 07-30-08

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 USING THE RATE OF SUPERELEVATION AND RUNOFF SHOWN ON THE PLANS. SUPERELEVATION IS TO BE REVOLVED ABOUT THE GRADE POINTS SHOWN ON THE TYPICAL SECTIONS.

SHOULDER CONSTRUCTION:

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

SIDE ROADS:

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

UNDERDRAINS:

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

DRIVEWAYS:

DRIVEWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. 848.02 USING 900 MM RADII OR RADII AS SHOWN ON THE PLANS. LOCATIONS OF DRIVES WILL BE AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.

STREET TURNOUT:

STREET RETURNS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. NO. 848.04 USING THE RADII NOTED ON PLANS.

GUARDRAIL:

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

TEMPORARY SHORING:

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

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE CTT, SPRINT & CITY OF ELIZABETH CITY.

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

RIGHT-OF-WAY MARKERS:

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

WHEELCHAIR RAMPS:

WHEELCHAIR RAMPS ARE SHOWN ON THE PLANS AT APPROXIMATE LOCATIONS. THE CONSTRUCTION OF ALL WHEELCHAIR RAMPS SHALL BE IN ACCORDANCE WITH DETAIL SHEET 2-S THRU 2-T IN THE PLANS.

2006 ROADWAY METRIC STANDARD DRAWINGS

The following Roadway Standards as appear in "Roadway Standard Drawings" Highway Design Branch - N. C. Department of Transportation - Raleigh, N. C., Dated July 18, 2006 are applicable to this project and by reference hereby are considered a part of these plans:

STD.NO.	TITLE
DIVISION 2 - EARTHWORK	
200.03	Method of Clearing - Method III
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superelevation - Two Lane Pavement
225.06	Method of Grading Sight Distance at Intersections
DIVISION 3 - PIPE CULVERTS	
310.10	Driveway Pipe Construction
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
DIVISION 6 - ASPHALT BASES AND PAVEMENTS	
654.01	Pavement Repairs
DIVISION 8 - INCIDENTALS	
815.03	Pipe Underdrain and Blind Drain
838.07	Conc. Endwall for Single & Double Pipe Culvrts - 1016mm x 787mm thru 1676mm x 1295mm Arch 90 Skew
838.17	Brick Endwall for Single & Double Pipe Culverts - 1016mm x 787mm thru 1676mm x 1295mm Arch 90 Skew
840.00	Concrete Base Pad for Drainage Structures
840.01	Brick Catch Basin - 300mm thru 1350mm Pipe
840.02	Concrete Catch Basin - 300mm thru 1350mm Pipe
840.03	Frame, Grates and Hood - for Use on Standard Catch Basin
840.14	Concrete Drop Inlet - 300mm thru 750mm Pipe
840.15	Brick Drop Inlet - 300mm thru 750mm Pipe
840.16	Drop Inlet Frame and Grates - for use with Std. Dwg 840.14 and 840.15
840.18	Concrete Grated Drop Inlet Type 'B' - 300mm thru 900mm Pipe
840.24	Frames and Narrow Slot Sag Grates
840.25	Anchorage for Frames - Brick or Concrete
840.27	Brick Grated Drop Inlet Type 'B' - 300mm thru 900mm Pipe
840.45	Precast Drainage Structure
840.66	Drainage Structure Steps
840.71	Concrete and Brick Pipe Plug
840.72	Pipe Collar
846.01	Concrete Curb, Gutter and Curb & Gutter
848.01	Concrete Sidewalk
848.02	Driveway Turnout - Radius Type
848.04	Street Turnout
852.06	Method for Placement of Drop Inlets in Concrete Islands
862.01	Guardrail Placement
862.02	Guardrail Installation
876.02	Guide for Rip Rap at Pipe Outlets
876.04	Drainage Ditches with Class 'B' Rip Rap

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04/16/11

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	1-B

Note: Not to Scale

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

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

ROADS AND RELATED FEATURES:

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

VEGETATION:

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

EXISTING STRUCTURES:

MAJOR:

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

MINOR:

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

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — P
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole
- H-Frame Pole
- 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

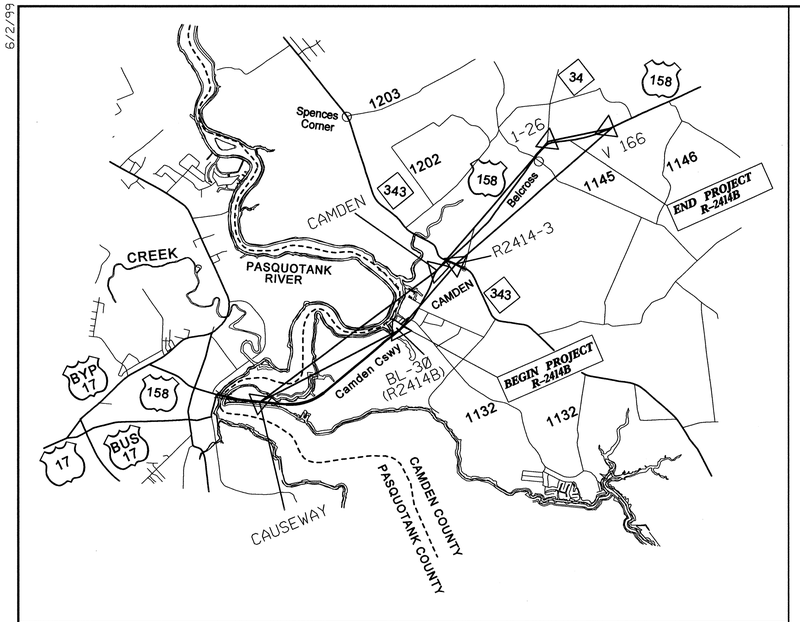
MISCELLANEOUS:

- 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. — UST
- 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-2414B	1C
Location and Surveys	

METRIC

SURVEY CONTROL SHEET R-2414B



GPS CONTROL NETWORK

BY4

POINT	DESC.	NORTH	EAST	ELEVATION	Y4 STATION	OFFSET
EQ35	BL-35	289613.1780	863523.0680	2.787	10+05.116	14.101 RT
3	GPS 2414-3	289581.3940	863697.6660	2.782	OUTSIDE PROJECT LIMITS	

BY6

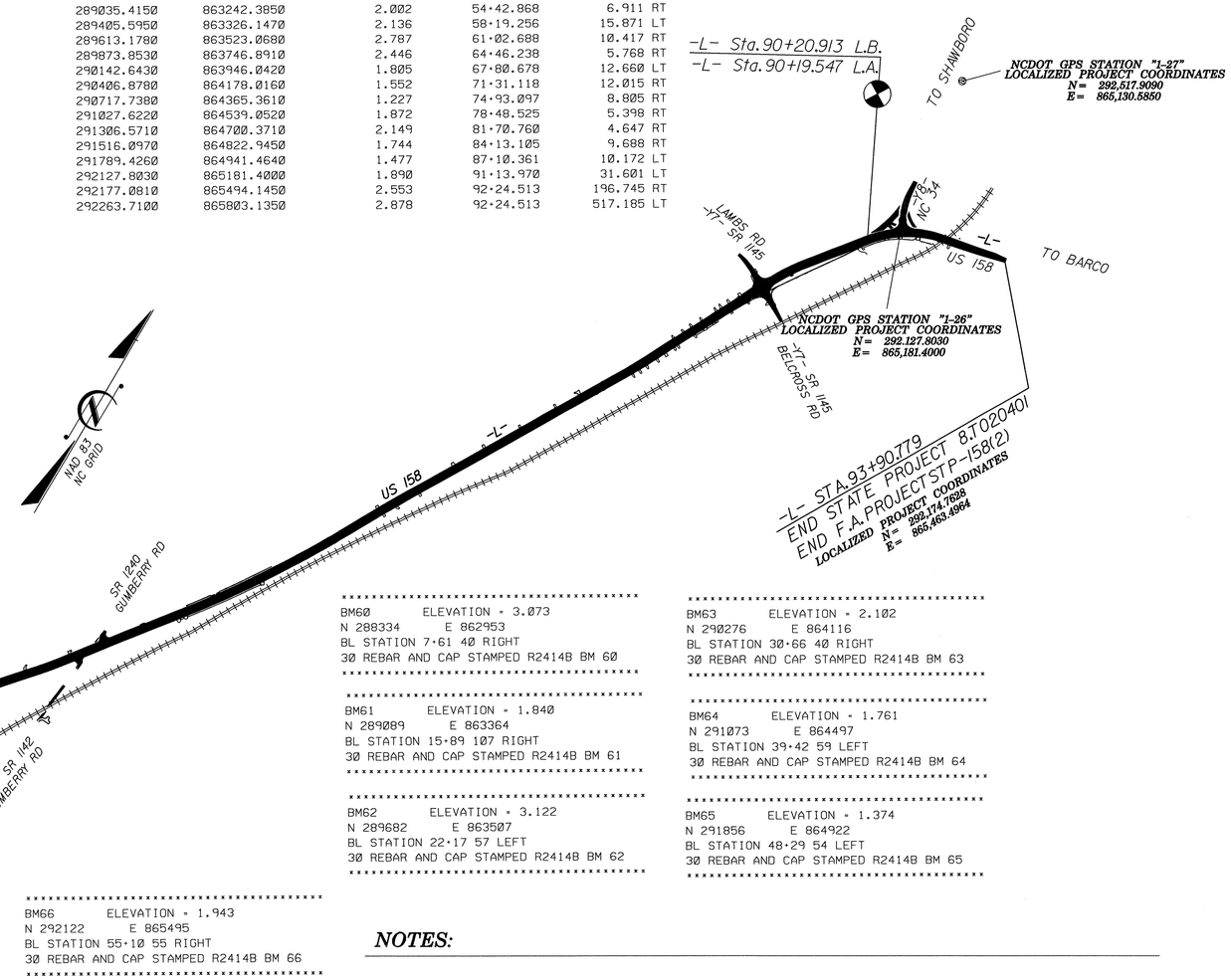
POINT	DESC.	NORTH	EAST	ELEVATION	Y6 STATION	OFFSET
EQ37	BL-37	290142.6430	863946.0420	1.805	OUTSIDE PROJECT LIMITS	
50	BL-50	289868.9840	863899.1200	2.853	OUTSIDE PROJECT LIMITS	

BY8

POINT	DESC.	NORTH	EAST	ELEVATION	Y8 STATION	OFFSET
27	GPS 1-27	292517.9090	865130.5850	2.164	OUTSIDE PROJECT LIMITS	
EQ26	GPS 1-26	292127.8030	865181.4000	1.890	12+05.432	0.698 RT

BL

POINT	DESC.	NORTH	EAST	ELEVATION	-L- STATION	OFFSET
30	BL-30	288168.7190	862747.6600	2.274	44+36.581	2.858 LT
31	BL-31	288402.1300	862962.6990	2.271	47+52.776	15.559 RT
70	BL-70	288734.5570	863118.4520	2.512	51+17.813	6.749 RT
71	BL-71	289035.4150	863242.3850	2.002	54+42.868	6.911 RT
72	BL-72	289405.5950	863326.1470	2.136	58+19.256	15.871 LT
35	BL-35	289613.1780	863523.0680	2.787	61+02.688	10.417 RT
36	BL-36	289873.8530	863746.8910	2.446	64+46.238	5.768 RT
37	BL-37	290142.6430	863946.0420	1.805	67+80.678	12.660 LT
38	BL-38	290406.8780	864178.0160	1.552	71+31.118	12.015 RT
39	BL-39	290717.7380	864365.3610	1.227	74+93.097	8.805 RT
40	BL-40	291027.6220	864539.0520	1.872	78+48.525	5.398 RT
41	BL-41	291306.5710	864700.3710	2.149	81+70.760	4.647 RT
42	BL-42	291516.0970	864822.9450	1.744	84+13.105	9.688 RT
43	BL-43	291789.4260	864941.4640	1.477	87+10.361	10.172 LT
26	GPS 1-26	292127.8030	865181.4000	1.890	91+13.970	31.601 LT
44	BL-44	292177.0810	865494.1450	2.553	92+24.513	196.745 RT
45	BL-45	292263.7100	865803.1350	2.878	92+24.513	517.185 LT

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*************************************
BM60      ELEVATION = 3.073
N 288334      E 862953
BL STATION 7+61 40 RIGHT
30 REBAR AND CAP STAMPED R2414B BM 60
*************************************

*************************************
BM61      ELEVATION = 1.840
N 289089      E 863364
BL STATION 15+89 107 RIGHT
30 REBAR AND CAP STAMPED R2414B BM 61
*************************************

*************************************
BM62      ELEVATION = 3.122
N 289682      E 863507
BL STATION 22+17 57 LEFT
30 REBAR AND CAP STAMPED R2414B BM 62
*************************************

*************************************
BM63      ELEVATION = 2.102
N 290276      E 864116
BL STATION 30+66 40 RIGHT
30 REBAR AND CAP STAMPED R2414B BM 63
*************************************

*************************************
BM64      ELEVATION = 1.761
N 291073      E 864497
BL STATION 39+42 59 LEFT
30 REBAR AND CAP STAMPED R2414B BM 64
*************************************

*************************************
BM65      ELEVATION = 1.374
N 291856      E 864922
BL STATION 48+29 54 LEFT
30 REBAR AND CAP STAMPED R2414B BM 65
*************************************

*************************************
BM66      ELEVATION = 1.943
N 292122      E 865495
BL STATION 55+10 55 RIGHT
30 REBAR AND CAP STAMPED R2414B BM 66
*************************************
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DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "R2414-1"
WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING: 286521.540(m) EASTING: 859732.336(m)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 1.0000523
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "R2414-1" TO -L- STATION 45+68.873 IS
N 60°38'06.4" E 3,560.642m
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29

CONTROL NETWORK STATIONS
(STATE PLANE GRID COORDINATES)

NAME	NORTH	EAST	ELEVATION
NCGS "CAUSEWAY"	286490.077	860256.333	1.788
BL-30 (R2414B)	288168.805	862747.818	2.274
NCGS "CAMDEN"	289416.757	863350.573	2.430
NCDOT GPS (R2414-3)	289581.554	863697.873	2.780
NCDOT GPS "1-26"	292128.096	865181.685	1.890
CGS "V 166"	292507.581	866305.684	3.451

NOTE: DRAWING NOT TO SCALE

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:
R-2414B_LS_CONTROL_061204.DGN

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.

6/2/99

8:55:59 AM
R-2414B\Roadway\Proj\r2414b_ls_lc_061204.dgn
10/6/2010

WETHERILL ENGINEERING
559 Jones Franklin Rd. Suite 164
Raleigh, N.C. 27606
License No. F-0377
Bus: 919 851 8077
Fax: 919 851 8107
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

METRIC

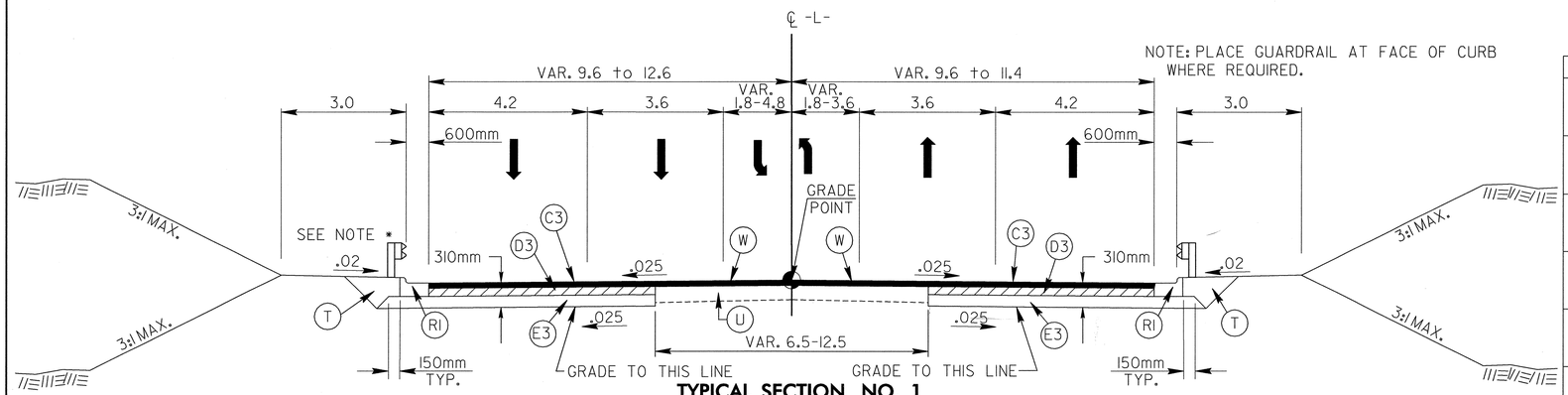
PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY
1/3/12

PAVEMENT DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 22896 ENGINEER CLARK S. WARNER
4/5/12

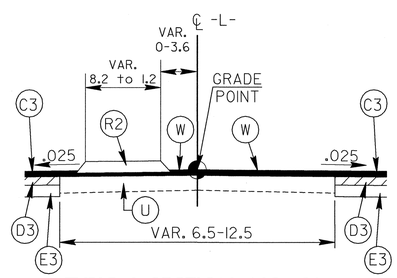
NOTE: PLACE FINAL LAYER OF SURFACE COURSE FROM
-L- STA. 44+70+/- TO -L- STA. 45+68.873 LT
-L- STA. 44+70+/- TO -L- STA. 46+50.000 RT

NOTE: PLACE GUARDRAIL AT FACE OF CURB WHERE REQUIRED.



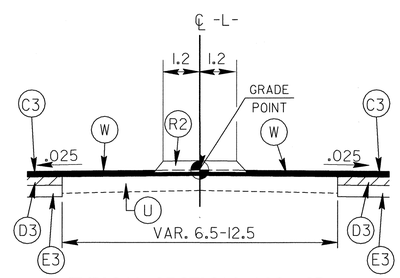
TYPICAL SECTION NO. 1

STA. 45+68.873 -L- LT. TO STA. 52+30.000 -L- LT.
STA. 46+50.000 -L- RT. TO STA. 52+30.000 -L- RT.
STA. 53+00.000 -L- TO STA. 55+33.000 -L-
STA. 56+34.000 -L- TO STA. 72+50.00 -L-
STA. 74+12.000 -L- TO STA. 88+54.592 -L-
STA. 89+25.457 -L- TO STA. 90+80.000 -L-



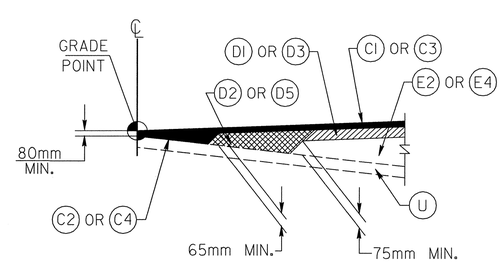
TYPICAL SECTION NO. 1A

USE IN CONJUNCTION WITH T.S. 1
STA. 58+45.707 -L- LT. TO STA. 60+71.153 -L- LT.



TYPICAL SECTION NO. 1B

USE IN CONJUNCTION WITH T.S. 1 & T.S. 2
STA. 52+09.199 -L- TO STA. 52+39.199 -L-



*NOTE: SEE TYPICAL SECTIONS AND PAVEMENT SCHEDULE FOR MINIMUM DEPTH FOR -Y- LINES.

DETAIL SHOWING METHOD OF WEDGING (W)

PAVEMENT SCHEDULE

C1	PROP. APPROX. 80 mm 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 1 mm DEPTH TO BE PLACED IN LAYERS NOT TO EXCEED 50 mm IN DEPTH.
C3	PROP. APPROX. 80 mm ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 96 kg PER SQ. METER IN EACH OF TWO LAYERS.
C4	PROP. VAR. DEPTH ASPHALT CONC. SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 2.40 kg PER SQ. METER PER 1 mm DEPTH TO BE PLACED IN LAYERS NOT TO EXCEED 50 MM IN DEPTH.
D1	PROP. APPROX. 65 mm ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 159.25 kg PER SQ. METER.
D2	PROP. VAR. DEPTH CONC. INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 2.45 kg PER SQ. METER PER 1 mm DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 65 mm OR GREATER THAN 110 mm IN DEPTH.
D3	PROP. APPROX. 100 mm ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 245 kg PER SQ. METER.
D4	PROP. APPROX. 65 mm ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 159.25 kg PER SQ. METER.
D5	PROP. VAR. DEPTH CONC. INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 2.45 kg PER SQ. METER PER 1 mm DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 65 mm OR GREATER THAN 110 mm IN DEPTH.
E1	PROP. APPROX. 130 mm ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 318.5 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 1 mm DEPTH, TO BE PLACED IN LAYERS NOT GREATER THAN 140 mm OR LESS THAN 75 mm IN DEPTH.
E3	PROP. APPROX. 130 mm ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 318.5 kg PER SQ. METER.
E4	PROP. VAR. DEPTH ASPHALT CONC. BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 2.45 kg PER SQ. METER PER 1 mm DEPTH, TO BE PLACED IN LAYERS NOT GREATER THAN 140 mm OR LESS THAN 75 mm IN DEPTH.
J	PROP. 150 mm AGGREGATE BASE COURSE.
L	CLASS IV SUBGRADE STABILIZATION
N	FABRIC STABILIZATION
R1	750 mm CONCRETE CURB AND GUTTER
R2	125 mm MONOLITHIC CONCRETE ISLAND (KEYED-IN)
S	100 mm CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING (SEE DETAIL THIS SHEET)

NOTE: ALL PAVEMENT SLOPES ARE 1:1 UNLESS OTHERWISE NOTED.

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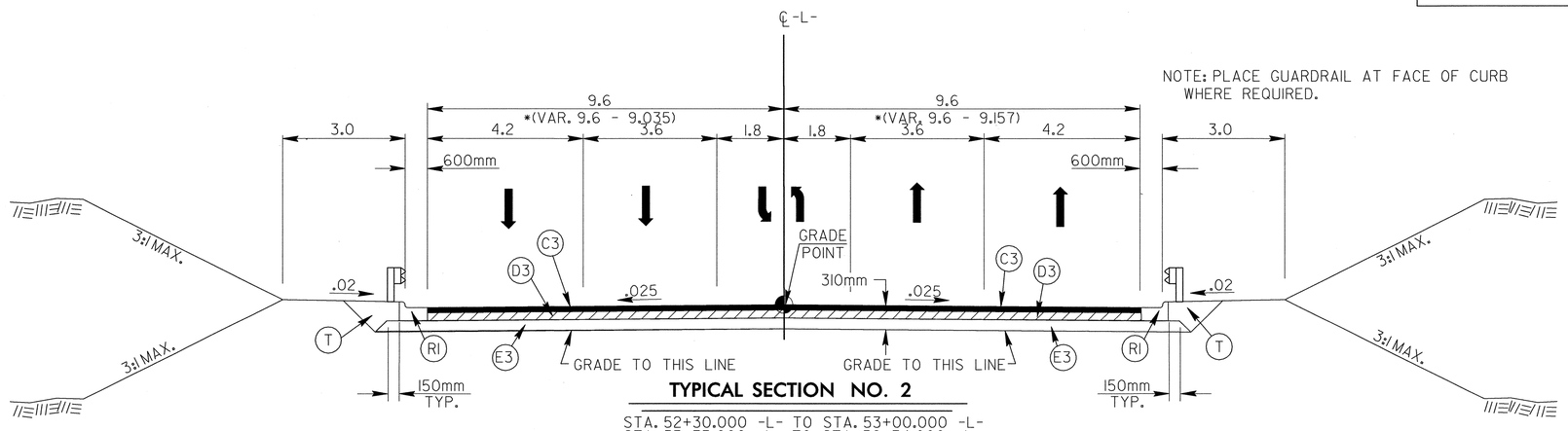
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-A

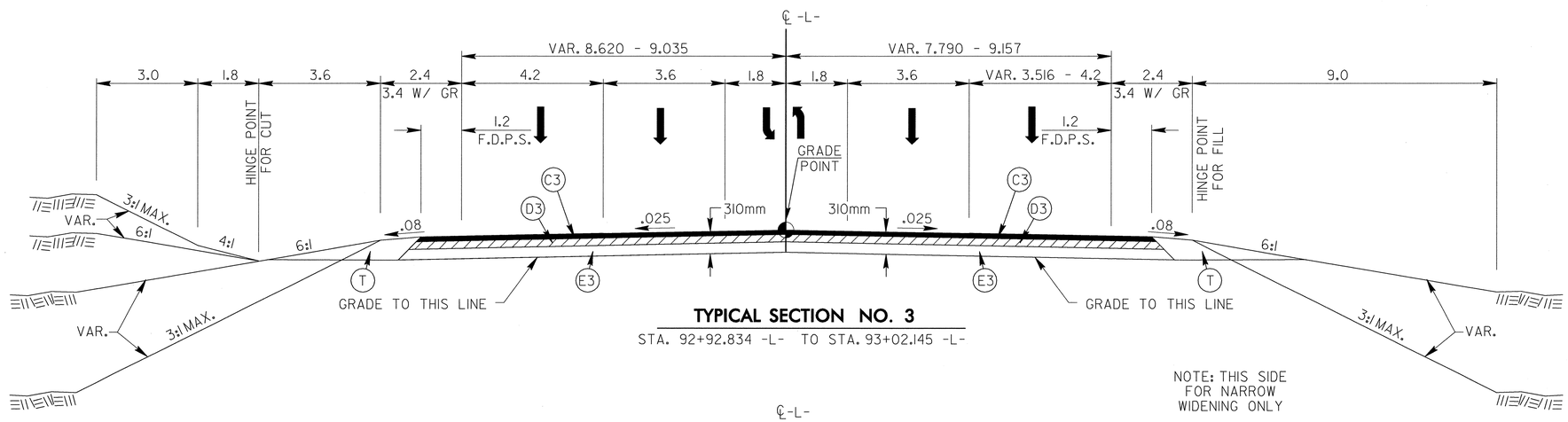
ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY
1/3/12

PAVEMENT DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 22896 ENGINEER CLARK S. MORRISON
1/5/12



TYPICAL SECTION NO. 2

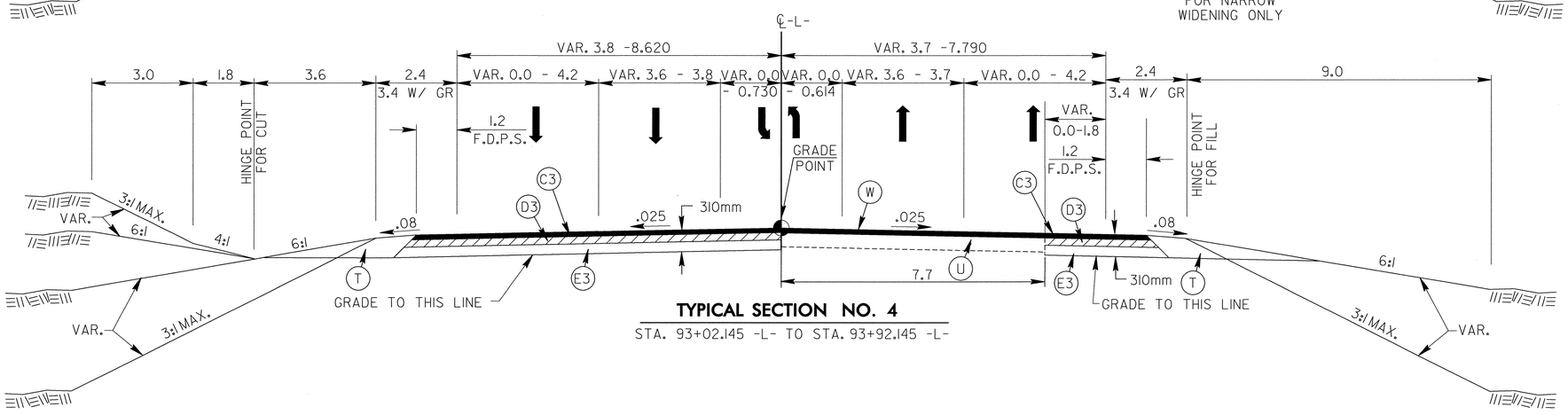
STA. 52+30.000 -L- TO STA. 53+00.000 -L-
STA. 55+33.000 -L- TO STA. 56+34.000 -L-
STA. 72+50.000 -L- TO STA. 74+12.000 -L-
STA. 88+54.592 -L- TO STA. 89+25.457 -L-
STA. 90+80.000 -L- TO STA. 92+92.834 -L-



TYPICAL SECTION NO. 3

STA. 92+92.834 -L- TO STA. 93+02.145 -L-

NOTE: THIS SIDE FOR NARROW WIDENING ONLY



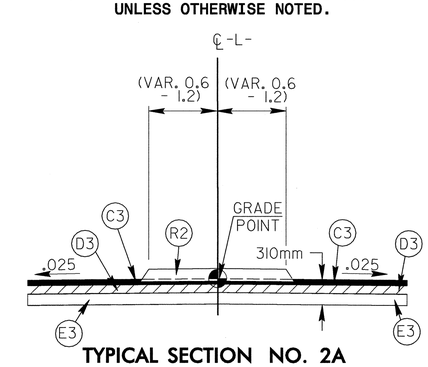
TYPICAL SECTION NO. 4

STA. 93+02.145 -L- TO STA. 93+92.145 -L-

PAVEMENT SCHEDULE

C1	80 mm S9.5B
C2	VAR. S9.5B
C3	80 mm S9.5C
C4	VAR. S9.5C
D1	65 mm I19.0B
D2	VAR. I19.0B
D3	100 mm I19.0C
D4	65 mm I19.0C
D5	VAR. I19.0C
E1	130 mm B25.0B
E2	VAR. B25.0B
E3	130 mm B25.0C
E4	VAR. B25.0C
J	150 mm ABC
L	CLASS IV SUBGRADE STABILIZATION
N	FABRIC STABILIZATION
R1	750 mm CONCRETE CURB & GUTTER
R2	125 mm MONOLITHIC CONC. ISLAND
S	100 mm CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING (SEE SHEET 2 FOR DETAIL)

NOTE: ALL PAVEMENT SLOPES ARE 1:1 UNLESS OTHERWISE NOTED.



TYPICAL SECTION NO. 2A

USE IN CONJUNCTION WITH T.S. 2 & T.S. 3
STA. 52+51.893 -L- TO STA. 52+94.000 -L-
STA. 91+99.980 -L- TO STA. 92+29.980 -L-
STA. 92+40.970 -L- TO STA. 92+70.970 -L-

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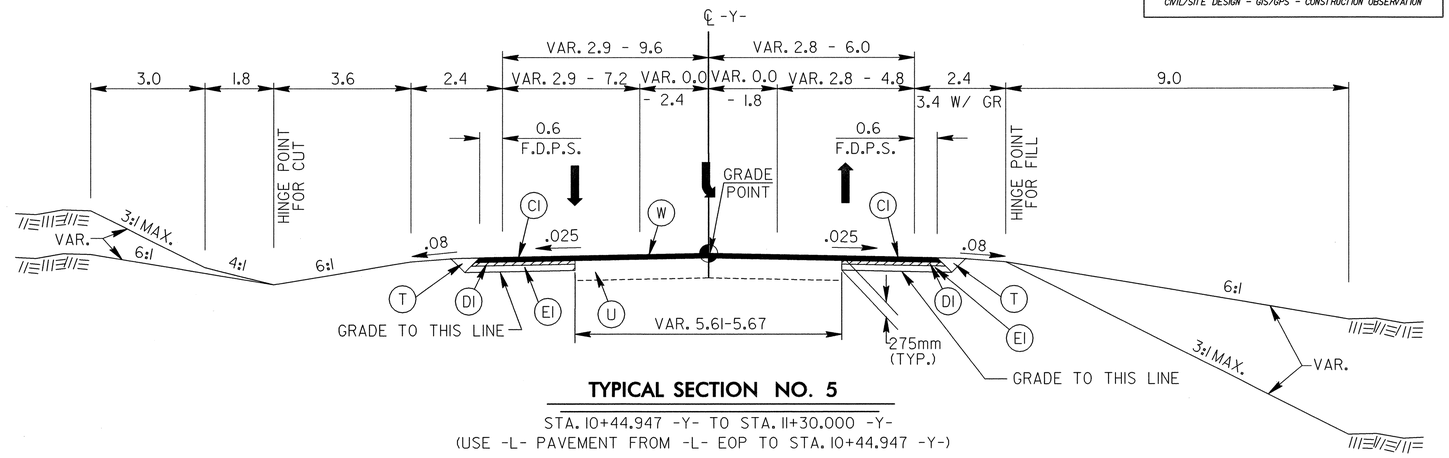
METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-B

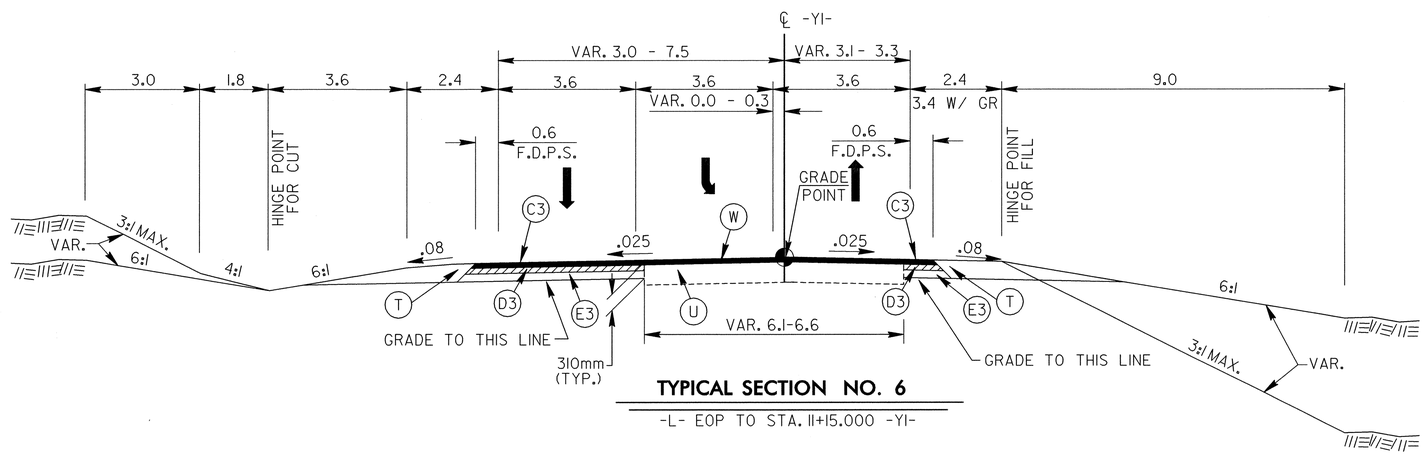
ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21 ENGINEER BOB A. MAY
10/7/10

PAVEMENT DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 22896 ENGINEER CLARK S. MORRISON
10/11/10



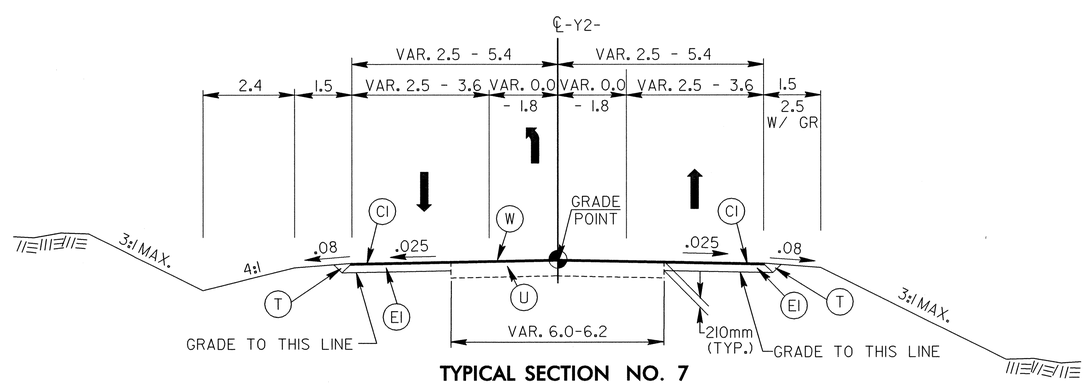
TYPICAL SECTION NO. 5

STA. 10+44.947 -Y- TO STA. 11+30.000 -Y-
(USE -L- PAVEMENT FROM -L- EOP TO STA. 10+44.947 -Y-)



TYPICAL SECTION NO. 6

-L- EOP TO STA. 11+15.000 -Y1-



TYPICAL SECTION NO. 7

STA. 10+12.000 -Y2- TO 10+91.134 -Y2-
(USE -L- PAVEMENT STA. 10+90.134 -Y2- TO -L- EOP)

PAVEMENT SCHEDULE

C1	80 mm S9.5B
C2	VAR. S9.5B
C3	80 mm S9.5C
C4	VAR. S9.5C
D1	65 mm I19.0B
D2	VAR. I19.0B
D3	100 mm I19.0C
D4	65 mm I19.0C
D5	VAR. I19.0C
E1	130 mm B25.0B
E2	VAR. B25.0B
E3	130 mm B25.0C
E4	VAR. B25.0C
J	150 mm ABC
L	CLASS IV SUBGRADE STABILIZATION
N	FABRIC STABILIZATION
R1	750 mm CONCRETE CURB & GUTTER
R2	125 mm MONOLITHIC CONC. ISLAND
S	100 mm CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING (SEE SHEET 2 FOR DETAIL)

NOTE: ALL PAVEMENT SLOPES ARE 1:1 UNLESS OTHERWISE NOTED.

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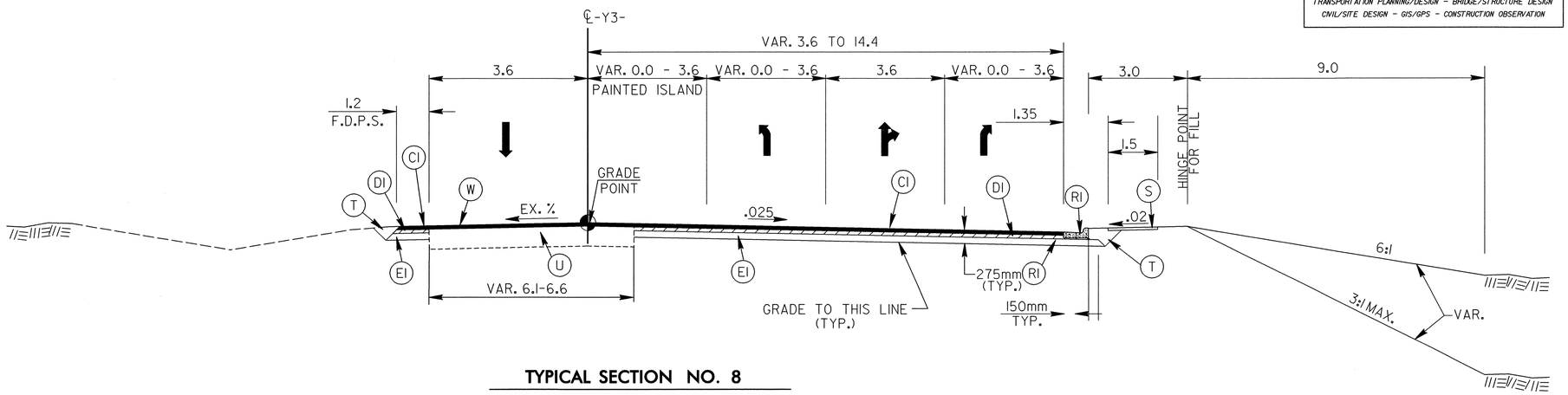
METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-C

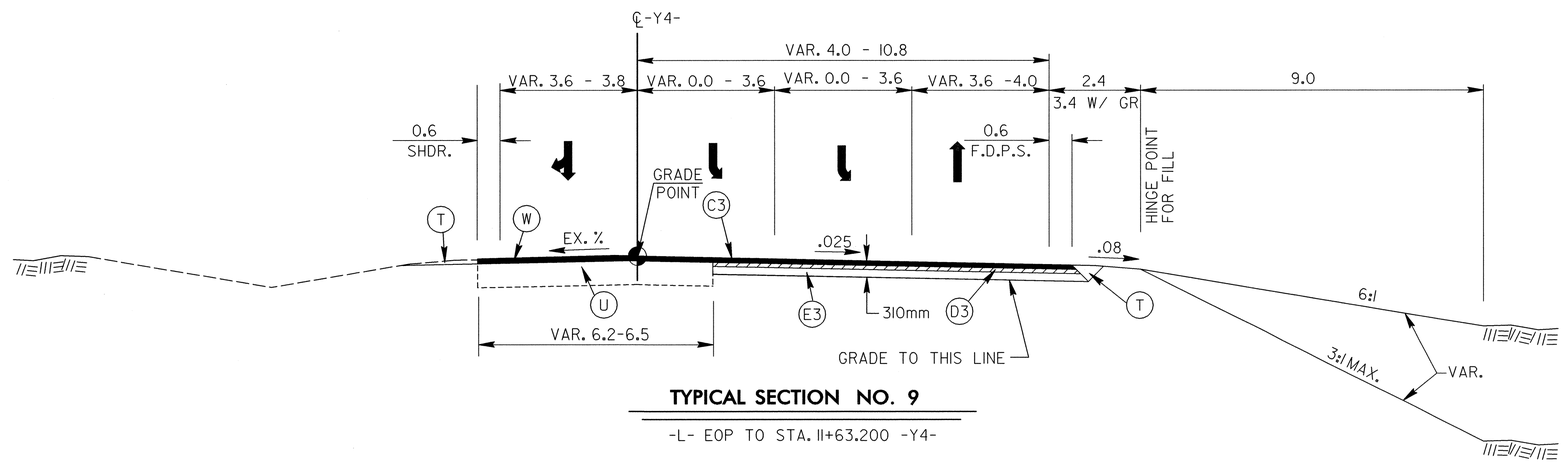
ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 027180 ENGINEER BOB A. MAY
10/7/10

PAVEMENT DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 22896 ENGINEER CLARK S. MORRISON
10/7/10



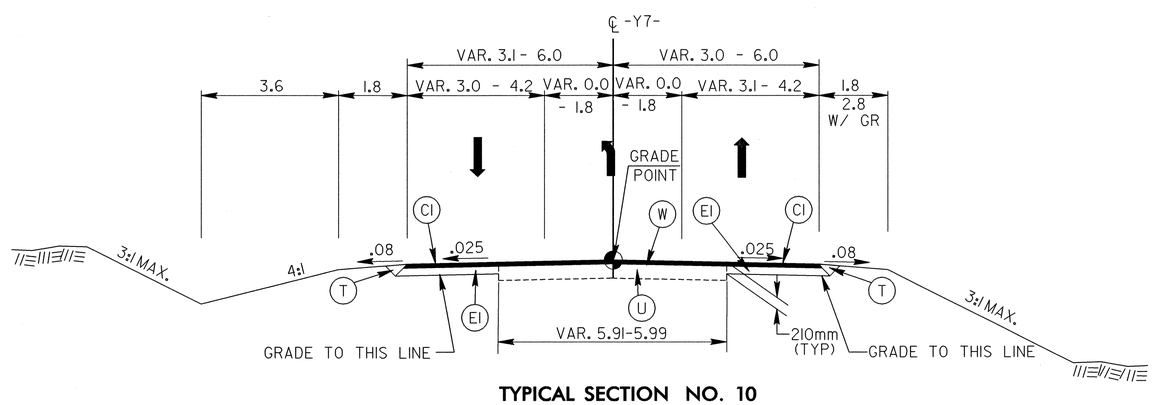
TYPICAL SECTION NO. 8

STA. 9+48.030 -Y3- TO STA. 11+12.321 -Y3-
(USE -L- PAVEMENT STA. 11+12.321 -Y3- TO -L- EOP)



TYPICAL SECTION NO. 9

-L- EOP TO STA. 11+63.200 -Y4-



TYPICAL SECTION NO. 10

SR 1145 (NORTH OF -L-)
STA. 10+10.000 -Y7- TO STA. 10+71.129 -Y7-
(USE -L- PAVEMENT, -Y7- STA. 10+71.129 TO -L- EOP)

PAVEMENT SCHEDULE

C1	80 mm S9.5B
C2	VAR. S9.5B
C3	80 mm S9.5C
C4	VAR. S9.5C
D1	65 mm I19.0B
D2	VAR. I19.0B
D3	100 mm I19.0C
D4	65 mm I19.0C
D5	VAR. I19.0C
E1	130 mm B25.0B
E2	VAR. B25.0B
E3	130 mm B25.0C
E4	VAR. B25.0C
J	150 mm ABC
L	CLASS IV SUBGRADE STABILIZATION
N	FABRIC STABILIZATION
R1	750 mm CONCRETE CURB & GUTTER
R2	125 mm MONOLITHIC CONC. ISLAND
S	100 mm CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING (SEE SHEET 2 FOR DETAIL)

NOTE: ALL PAVEMENT SLOPES ARE 1:1 UNLESS OTHERWISE NOTED.

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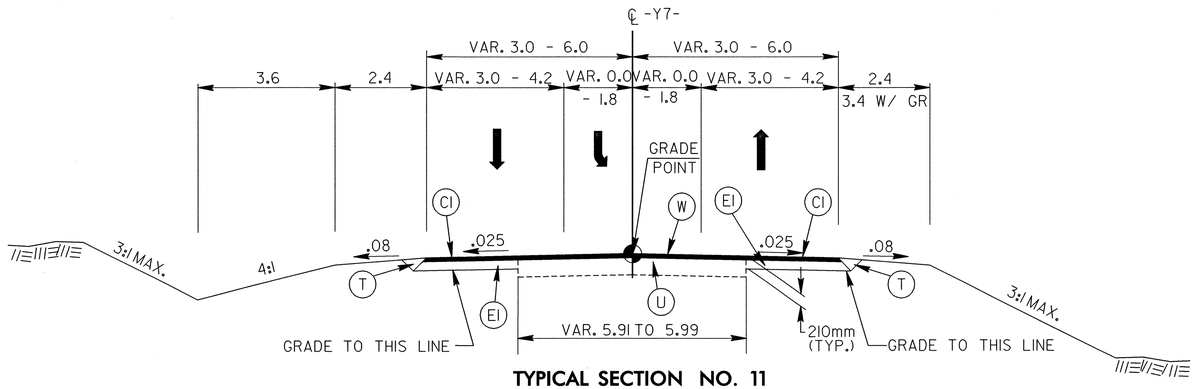
METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-D

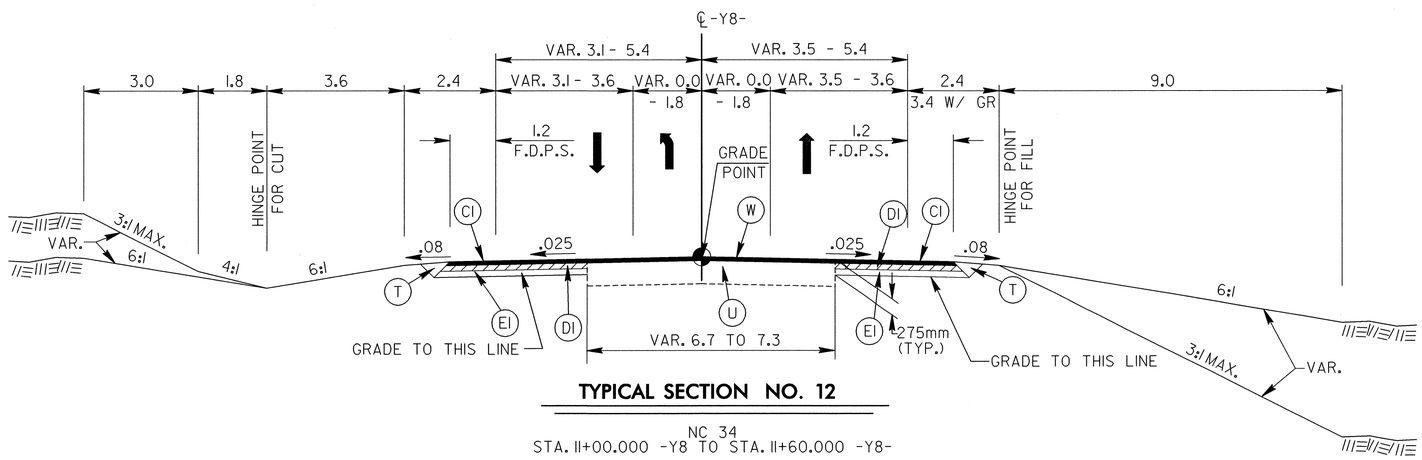
ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 10/7/10

PAVEMENT DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 22896 ENGINEER CLARK S. MORRISON 10/11/10



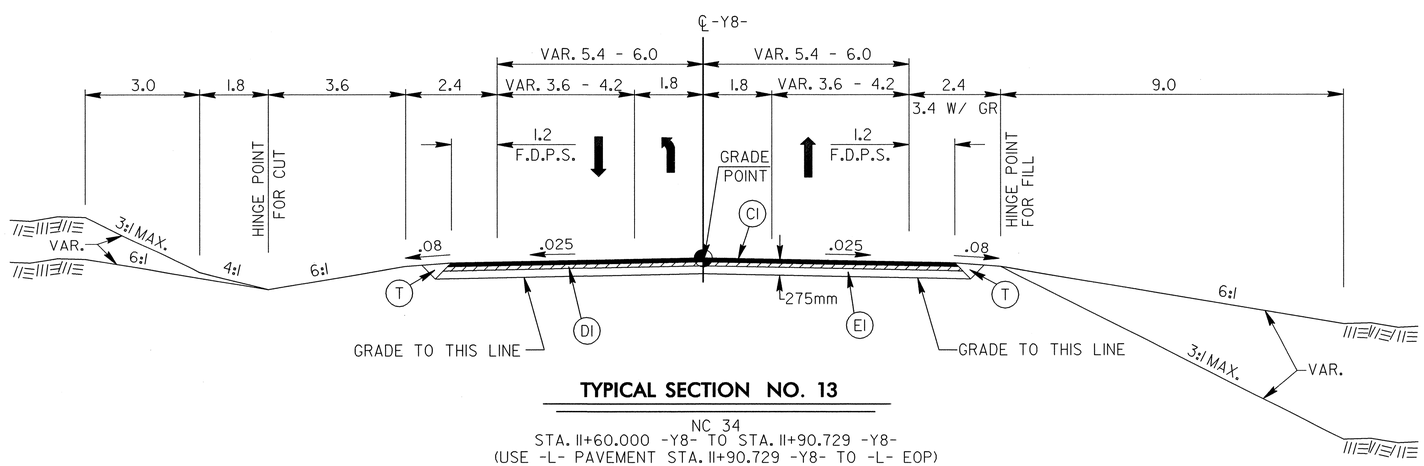
TYPICAL SECTION NO. 11

SR 1145 (SOUTH OF -L-)
STA. 11+56.547 -Y7- TO STA. 12+12.000 -Y7-
(USE -L- PAVEMENT, -L- EOP TO -Y7- STA. 11+56.547)



TYPICAL SECTION NO. 12

NC 34
STA. 11+00.000 -Y8 TO STA. 11+60.000 -Y8-



TYPICAL SECTION NO. 13

NC 34
STA. 11+60.000 -Y8- TO STA. 11+90.729 -Y8-
(USE -L- PAVEMENT STA. 11+90.729 -Y8- TO -L- EOP)

PAVEMENT SCHEDULE

C1	80 mm S9.5B
C2	VAR. S9.5B
C3	80 mm S9.5C
C4	VAR. S9.5C
D1	65 mm I19.0B
D2	VAR. I19.0B
D3	100 mm I19.0C
D4	65 mm I19.0C
D5	VAR. I19.0C
E1	130 mm B25.0B
E2	VAR. B25.0B
E3	130 mm B25.0C
E4	VAR. B25.0C
J	150 mm ABC
L	CLASS IV SUBGRADE STABILIZATION
N	FABRIC STABILIZATION
R1	750 mm CONCRETE CURB & GUTTER
R2	125 mm MONOLITHIC CONC. ISLAND
S	100 mm CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING (SEE SHEET 2 FOR DETAIL)

NOTE: ALL PAVEMENT SLOPES ARE 1:1 UNLESS OTHERWISE NOTED.

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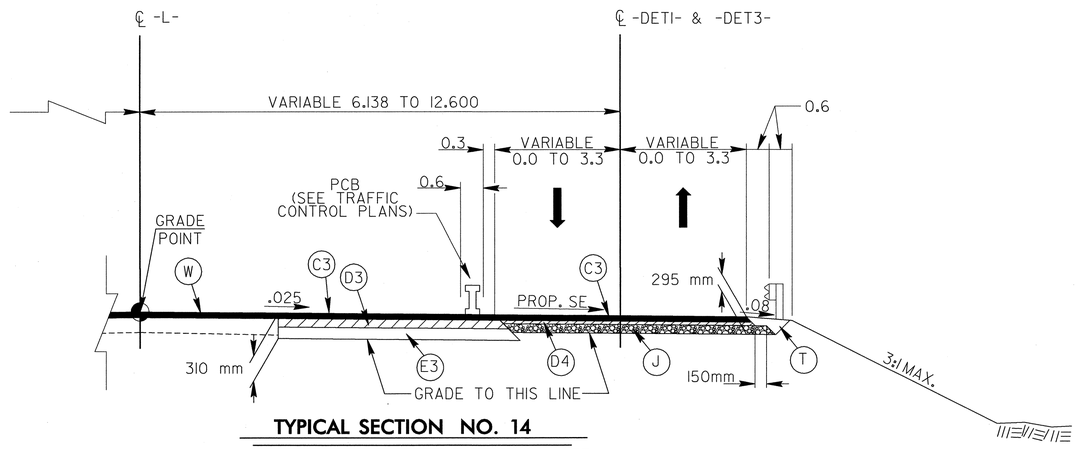
METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-E

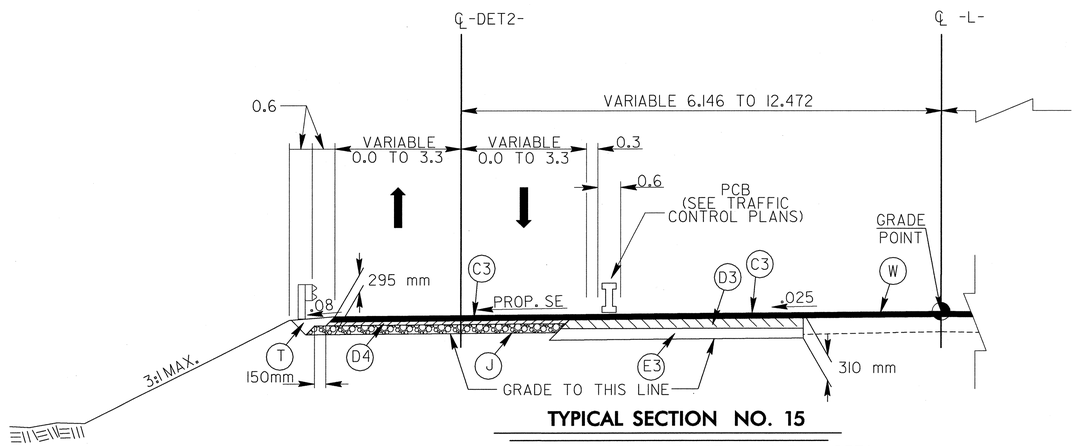
ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 1/4/12

PAVEMENT DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 22896 ENGINEER CLARK S. MORRISON 1/5/12



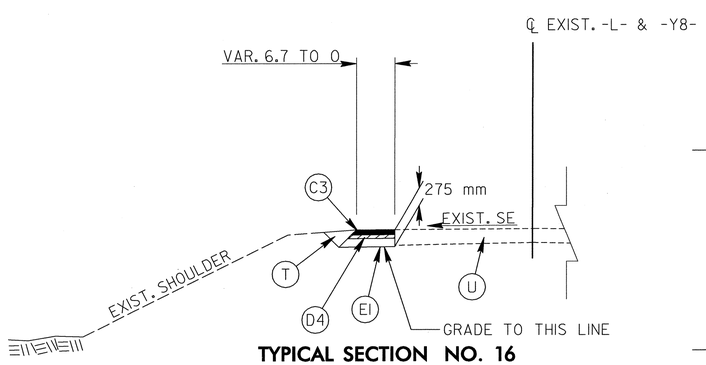
TYPICAL SECTION NO. 14

STA. 10+44.930 -DET1- TO STA. 12+78.161 -DET1-
STA. 10+46.666 -DET3- TO STA. 12+00.194 -DET3-



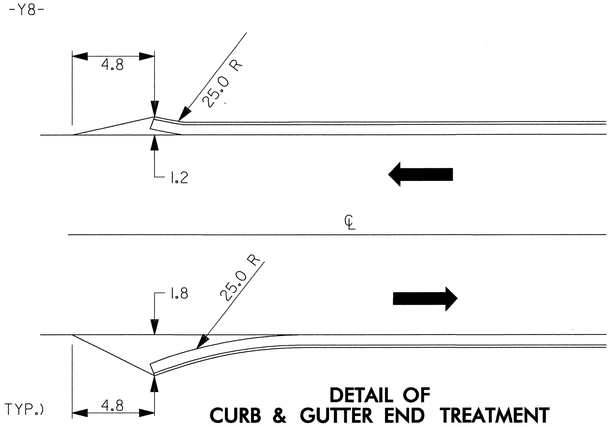
TYPICAL SECTION NO. 15

STA. 10+75.649 -DET2- TO STA. 12+61.768 -DET2-

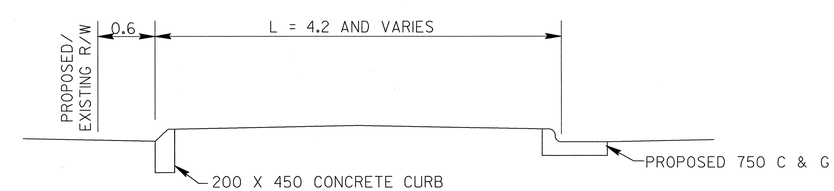


TYPICAL SECTION NO. 16

TEMPORARY WIDENING FOR TRAFFIC CONTROL
STA. 54+70+/- -L- TO STA. 56+95+/- -L- LT.
STA. 72+00+/- -L- TO STA. 74+75+/- -L- RT. (INVERT TYP.)
STA. 88+20+/- -L- TO STA. 90+30+/- -L- LT.
STA. 89+75+/- -L- LT. TO STA. 11+20+/- -Y8- RT.
STA. 91+42+/- -L- TO STA. 91+73+/- -L- LT.



DETAIL OF CURB & GUTTER END TREATMENT



DETAIL FOR PROPOSED CHANNELIZATION

200 X 450 CONCRETE CURB

PAVEMENT SCHEDULE

C1	80 mm S9.5B
C2	VAR. S9.5B
C3	80 mm S9.5C
C4	VAR. S9.5C
D1	65 mm I19.0B
D2	VAR. I19.0B
D3	100 mm I19.0C
D4	65 mm I19.0C
D5	VAR. I19.0C
E1	130 mm B25.0B
E2	VAR. B25.0B
E3	130 mm B25.0C
E4	VAR. B25.0C
J	150 mm ABC
L	CLASS IV SUBGRADE STABILIZATION
N	FABRIC STABILIZATION
R1	750 mm CONCRETE CURB & GUTTER
R2	125 mm MONOLITHIC CONC. ISLAND
S	100 mm CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING (SEE SHEET 2 FOR DETAIL)

NOTE: ALL PAVEMENT SLOPES ARE 1:1 UNLESS OTHERWISE NOTED.

6/18/99
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1/4/2012

REVISIONS

WETHERILL ENGINEERING
559 Jones Franklin Rd. Suite 164
Raleigh, N.C. 27606
Licenses No. F-0377
Bus: 919 851 8077
Fax: 919 851 8107
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

METRIC

5 0 10

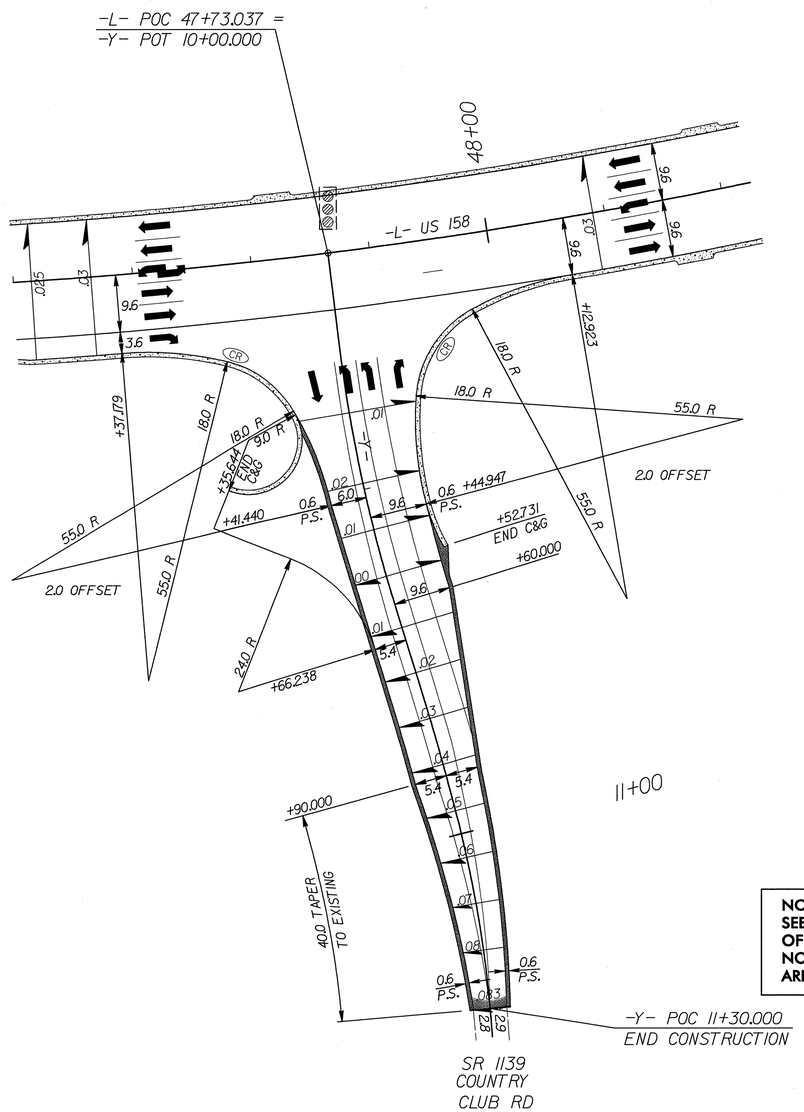
CONST.REV.

R /W REV.

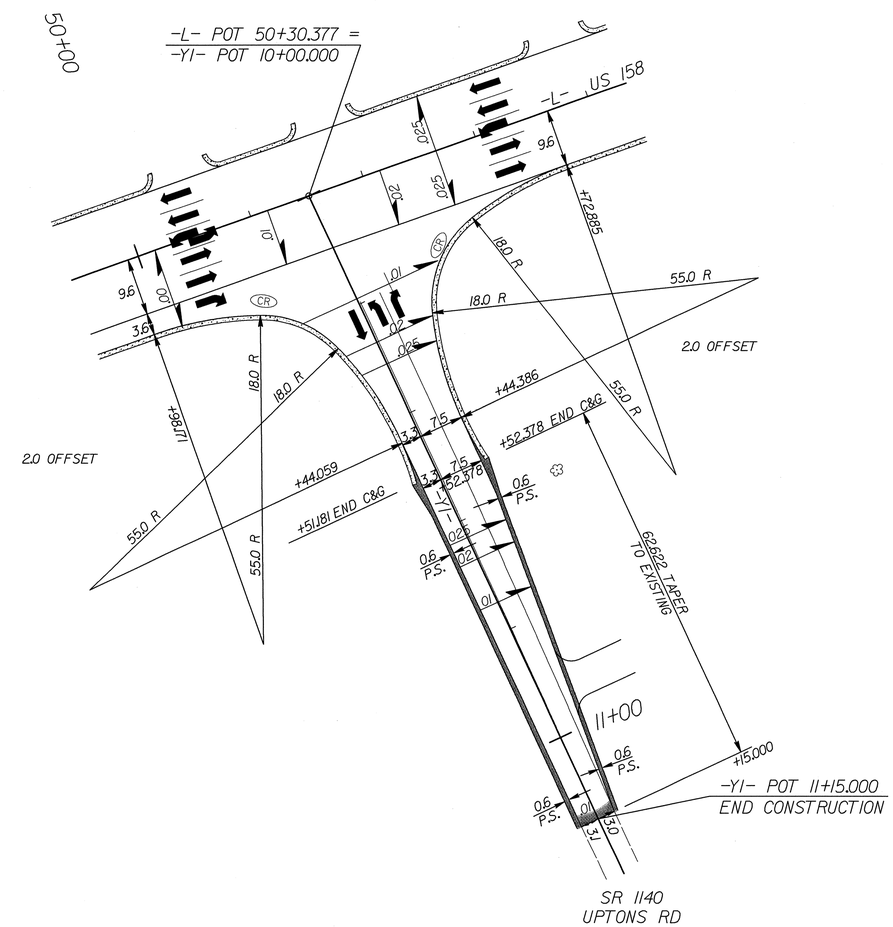
PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-F
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	~~HYDRAULICS ENGINEER~~

NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 12-19-11

INTERSECTION DETAIL FOR -L- AND -Y- SEE PLAN SHEET No. 4



INTERSECTION DETAIL FOR -L- AND -Y1- SEE PLAN SHEET No. 5



NOTE:
SEE SHEET 2-E FOR DETAIL
OF CURB & GUTTER END TREATMENT.
NON-STANDARD CURB & GUTTER RADII
ARE SHOWN ON PLAN SHEETS.

125mm MONOLITHIC CONCRETE ISLAND, 750mm CONCRETE CURB AND GUTTER, REINFORCED CONCRETE BOX CULVERT

6/10/99

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REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-G
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	~~HYDRAULICS ENGINEER~~

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559 Jones Franklin Rd. Suite 164
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License No. F-0377
Bus: 919 851 8077
Fax: 919 851 8107
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

METRIC

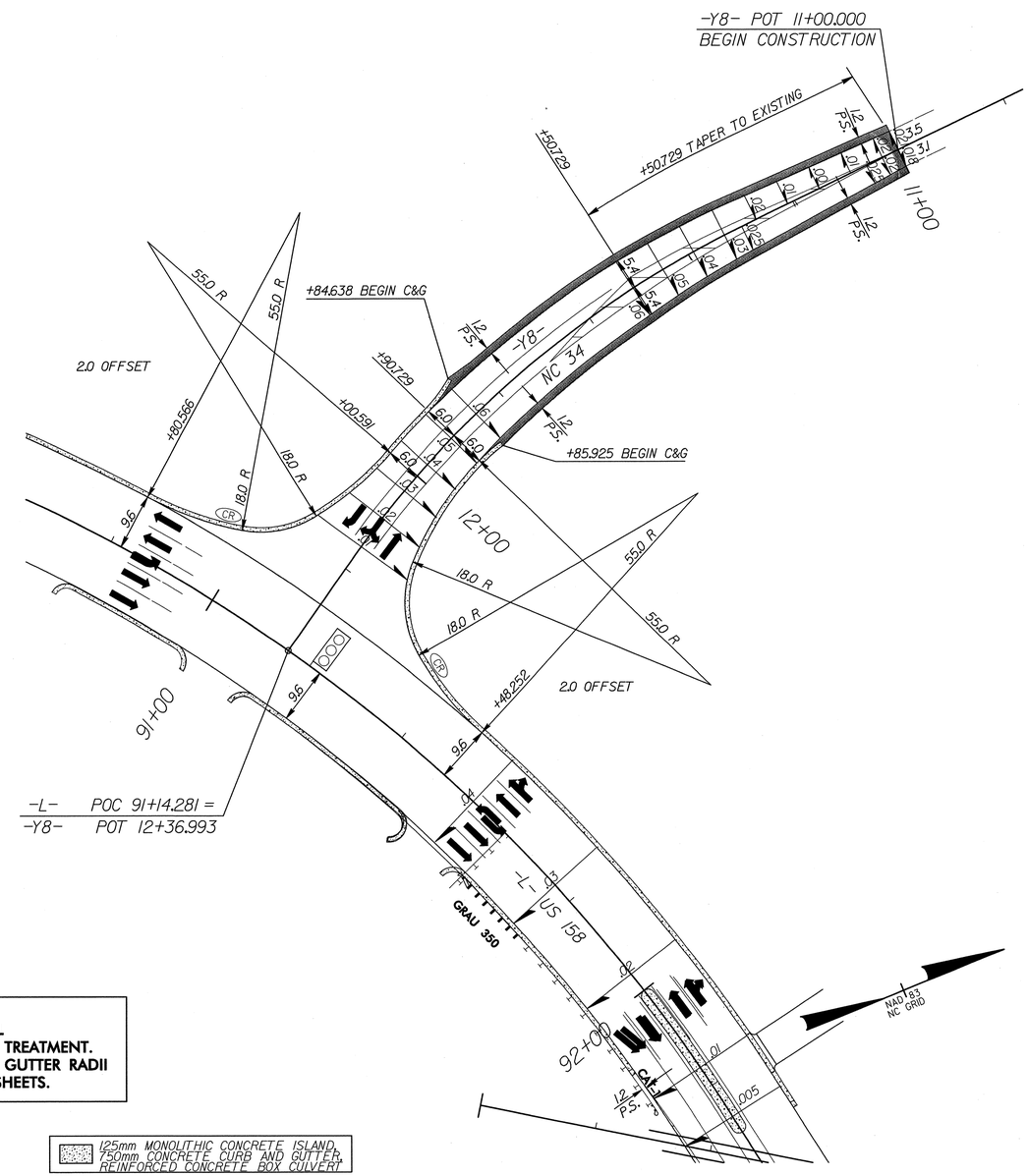
5 0 10

CONST.REV.

R/W REV.

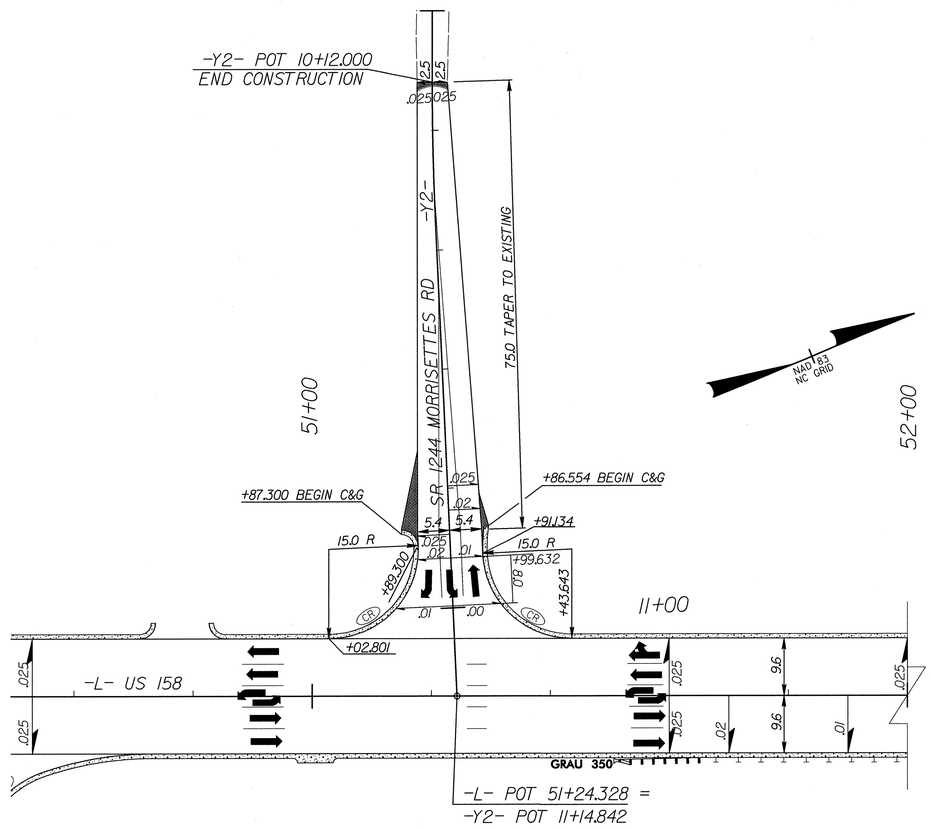
NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 12-19-11

INTERSECTION DETAIL FOR -L- AND -Y8- SEE PLAN SHEET No. 17



NOTE:
SEE SHEET 2-E FOR DETAIL OF CURB & GUTTER END TREATMENT. NON-STANDARD CURB & GUTTER RADII ARE SHOWN ON PLAN SHEETS.

125mm MONOLITHIC CONCRETE ISLAND, 750mm CONCRETE CURB AND GUTTER, REINFORCED CONCRETE BOX CULVERT



INTERSECTION DETAIL FOR -L- AND -Y2- SEE PLAN SHEET No. 5

6/10/99

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REVISIONS

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559 Jones Franklin Rd. Suite 164
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Fax: 919 851 8107
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CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

METRIC

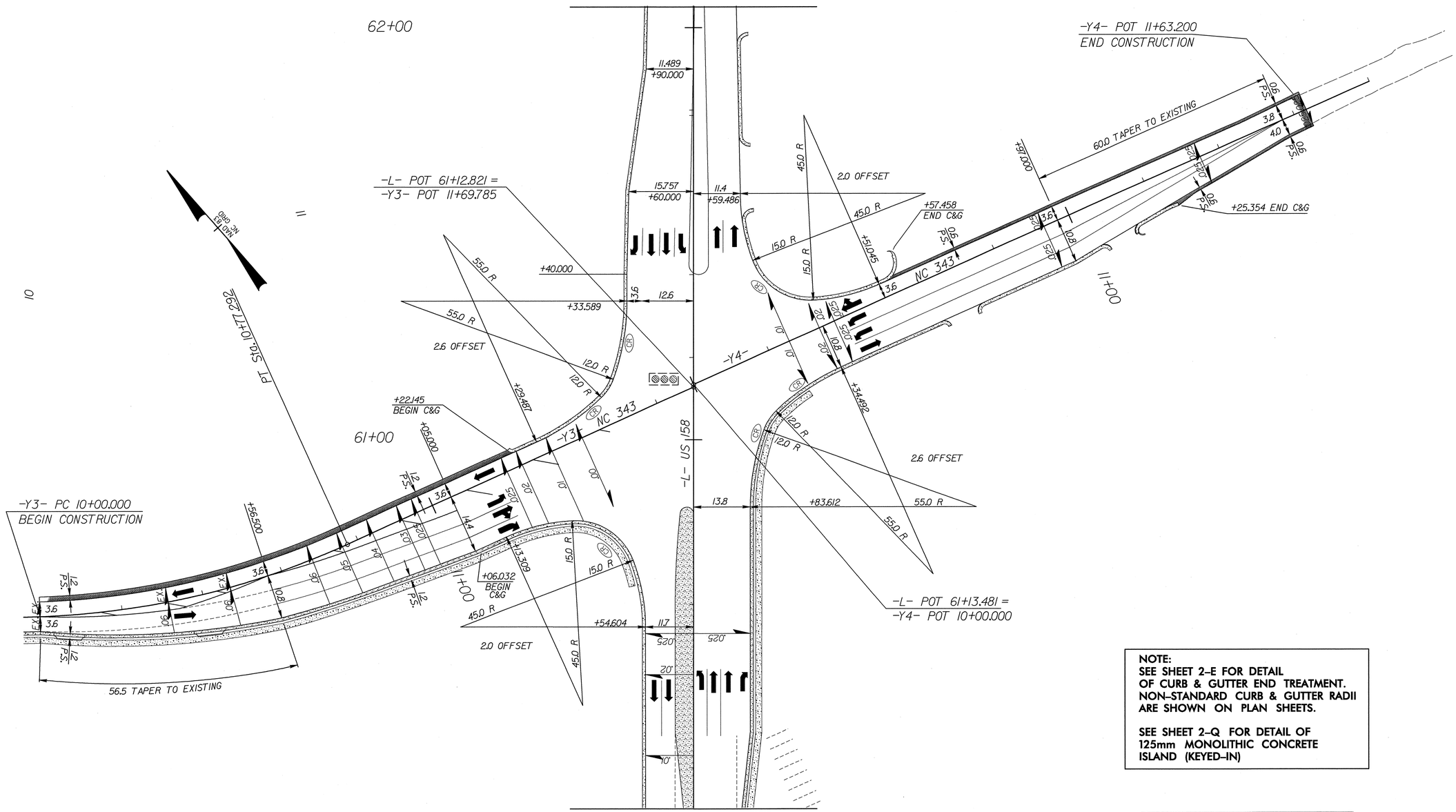
5 0 10

CONST.REV.

R /W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-H
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	~~HYDRAULICS ENGINEER~~

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 21116 BOB A. MAY
12-29-11



NOTE:
SEE SHEET 2-E FOR DETAIL OF CURB & GUTTER END TREATMENT. NON-STANDARD CURB & GUTTER RADII ARE SHOWN ON PLAN SHEETS.

SEE SHEET 2-Q FOR DETAIL OF 125mm MONOLITHIC CONCRETE ISLAND (KEYED-IN)

125mm MONOLITHIC CONCRETE ISLAND, 750mm CONCRETE CURB AND GUTTER, REINFORCED CONCRETE BOX CULVERT

INTERSECTION DETAIL FOR -L- AND -Y3-, -Y4- SEE PLAN SHEET No. 8

6/10/99

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REVISIONS

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559 Jones Franklin Rd. Suite 164
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CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

METRIC

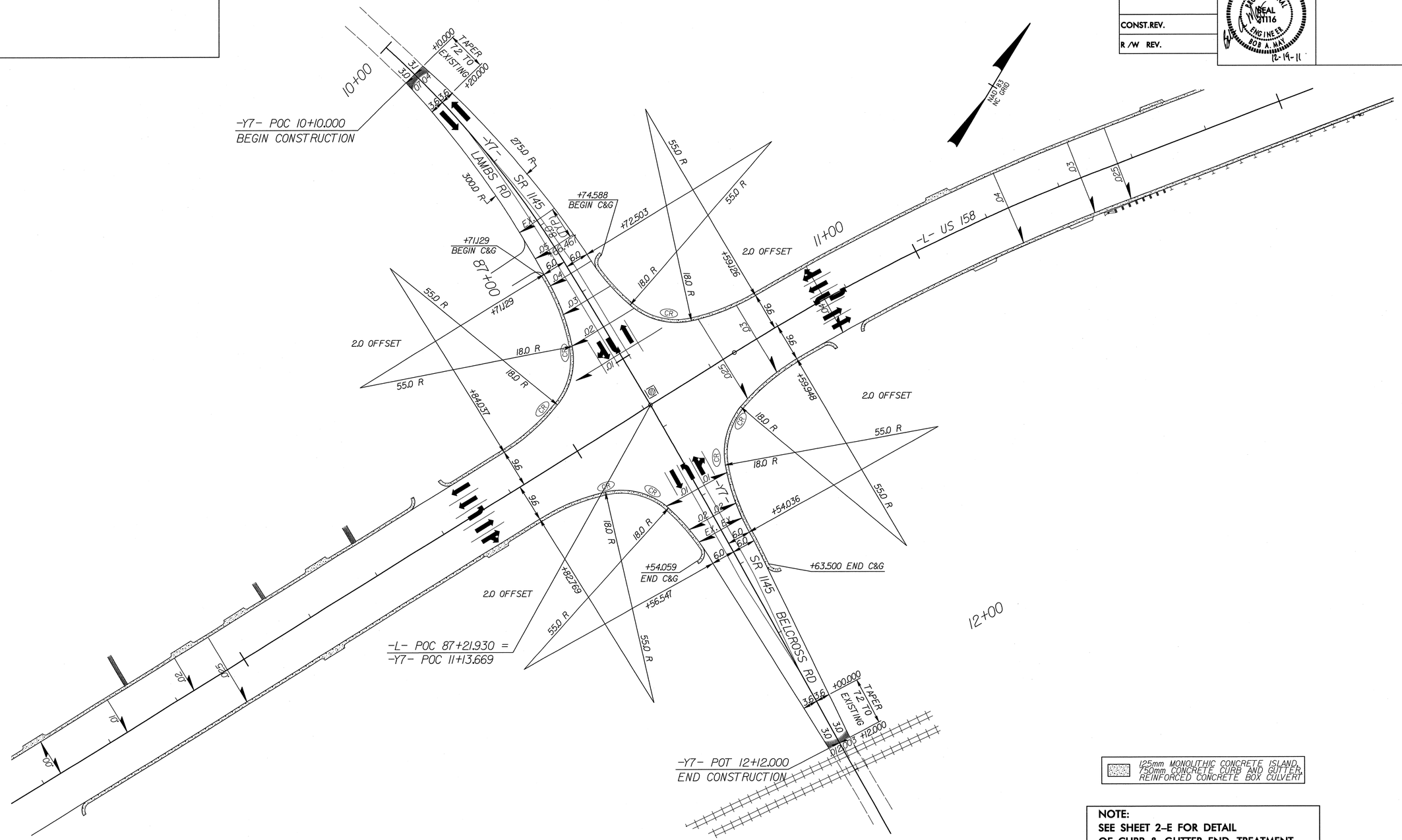
5 0 10

CONST.REV.

R /W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-1
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	~~HYDRAULICS ENGINEER~~

NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY
12-19-11



125mm MONOLITHIC CONCRETE ISLAND, 750mm CONCRETE CURB AND GUTTER, REINFORCED CONCRETE BOX CULVERT

NOTE:
SEE SHEET 2-E FOR DETAIL OF CURB & GUTTER END TREATMENT
NON-STANDARD CURB & GUTTER RADII ARE SHOWN ON PLAN SHEETS.

INTERSECTION DETAIL FOR -L- AND -Y7-
SEE PLAN SHEET No. 15

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12/15/2011

DETOUR -DET1- SHEET

REVISIONS

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1300 Paddock Drive, Suite G-10
Raleigh, N.C. 27609
License No. C-1628

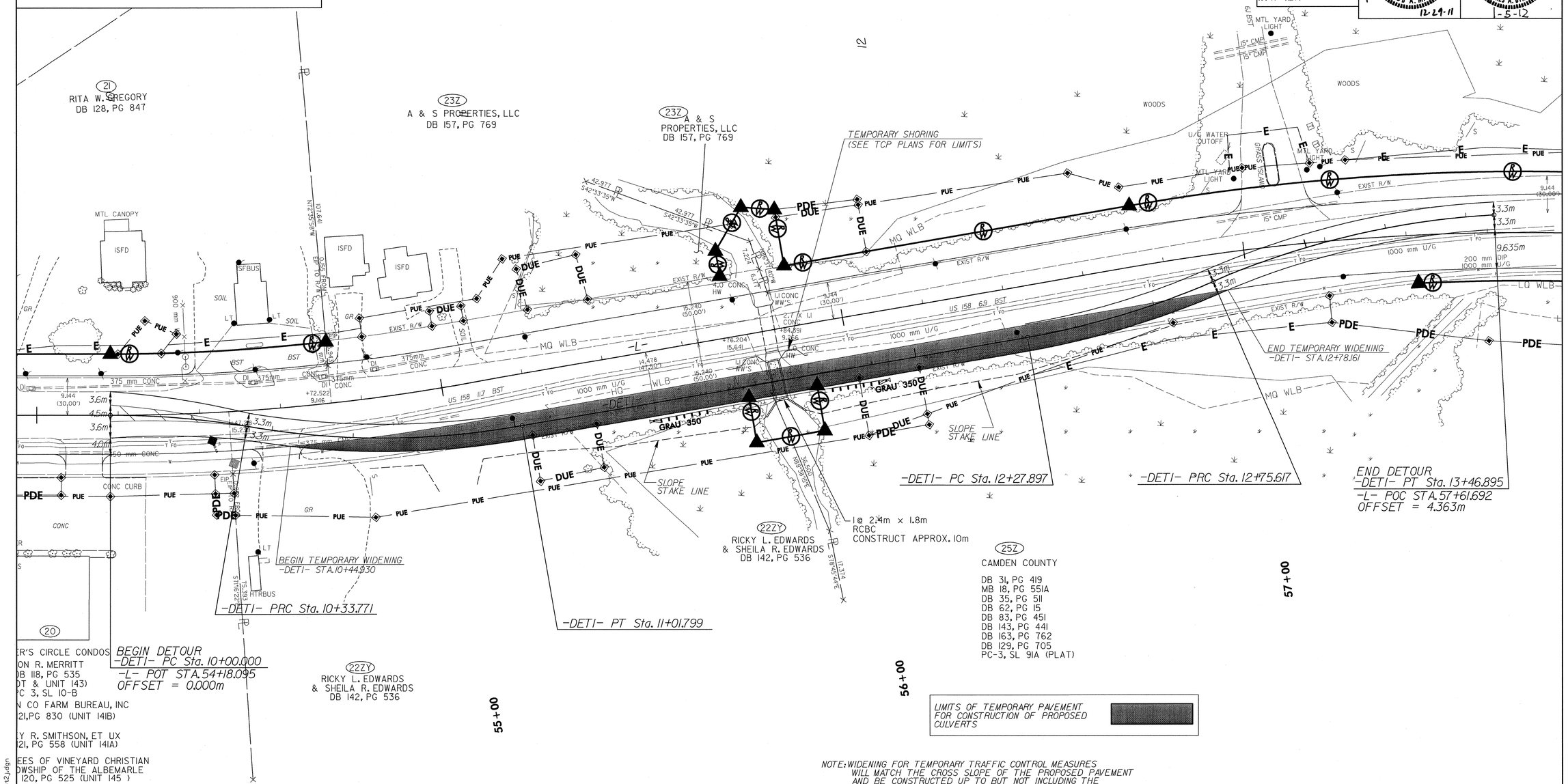
WETHERILL ENGINEERING
559 Jones Franklin Rd. Suite 164
Raleigh, N.C. 27606
License No. F-0377
Bus: 919 851 8077
Fax: 919 851 8107
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-J
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 12-29-11	NORTH CAROLINA PROFESSIONAL SEAL 15764 ENGINEER JAMES A. BYRD 1-5-12

CONST.REV.

R/W REV.



LIMITS OF TEMPORARY PAVEMENT FOR CONSTRUCTION OF PROPOSED CULVERTS

NOTE: WIDENING FOR TEMPORARY TRAFFIC CONTROL MEASURES WILL MATCH THE CROSS SLOPE OF THE PROPOSED PAVEMENT AND BE CONSTRUCTED UP TO BUT NOT INCLUDING THE SURFACE COURSE LAYER.

-DET1-

PI Sta 10+16.926	PI Sta 10+68.117	PI Sta 12+51.871	PI Sta 13+11.638
△ = 9° 40' 28.4" (RT)	△ = 19° 29' 19.3" (LT)	△ = 13° 40' 14.2" (LT)	△ = 20° 25' 11.4" (RT)
L = 33.771	L = 68.028	L = 47.719	L = 71.279
T = 16.926	T = 34.346	T = 23.974	T = 36.021
R = 200.000	R = 200.000	R = 200.000	R = 200.000

125mm MONOLITHIC CONCRETE ISLAND, 750mm CONCRETE CURB AND GUTTER, REINFORCED CONCRETE BOX CULVERT

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12/29/2011

REVISIONS

DETOUR –DET2– SHEET

WETHERILL ENGINEERING
809 Jones Franklin Rd. Suite 164
Raleigh, N.C. 27606
License No. F-0377
Bus: 919 851 8077
Fax: 919 851 8107
TRANSPORTATION PLANNING/DESIGN – BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN – GIS/GPS – CONSTRUCTION OBSERVATION

TRANSITE CONSULTING
ENGINEERS, INCORPORATED
1300 Paddock Drive, Suite G-10
Raleigh, N.C. 27609
Liscense No. C-1628

METRIC

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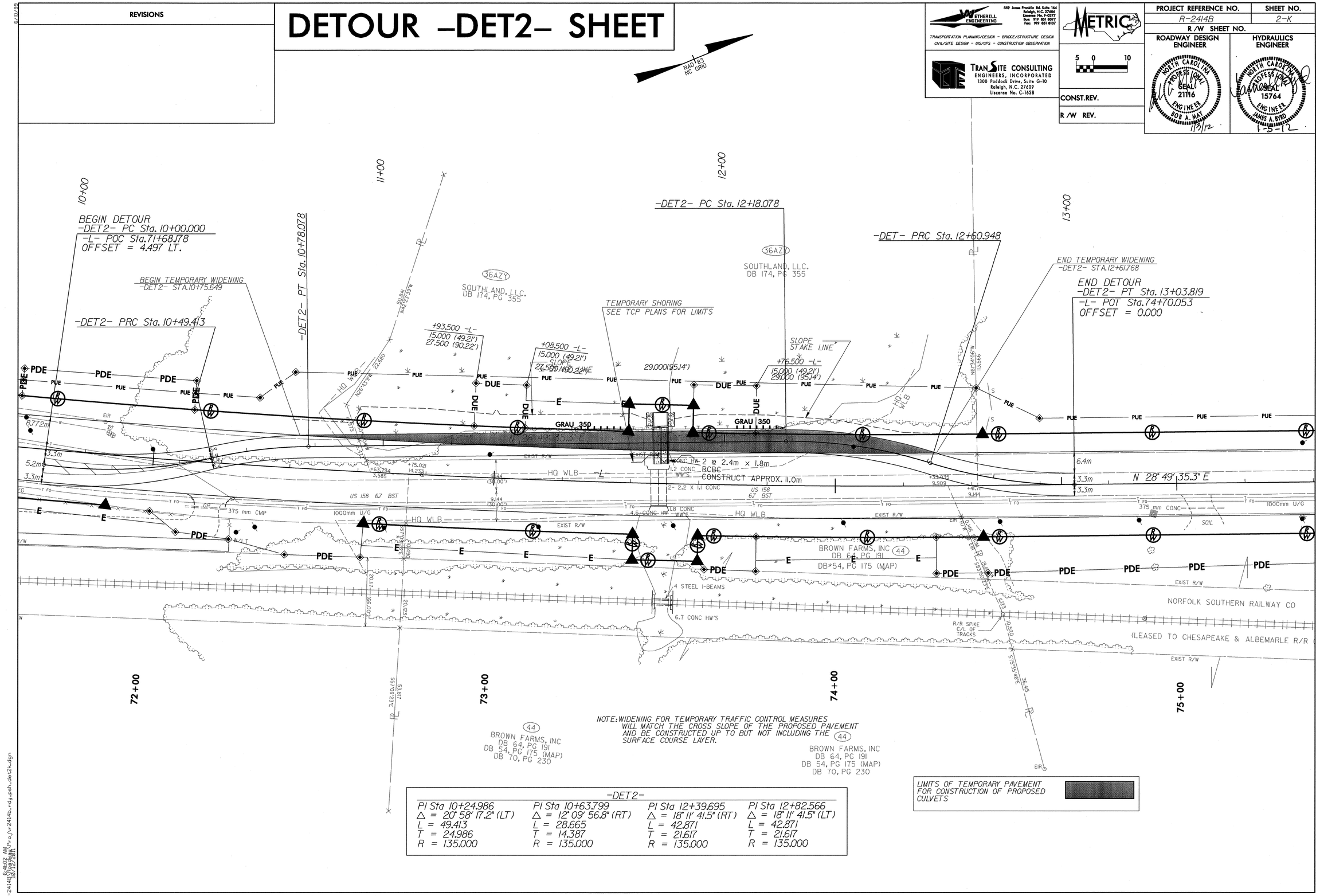
CONST.REV.

R /W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-K
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 1/9/12

NORTH CAROLINA PROFESSIONAL SEAL 15764 ENGINEER JAMES A. BYRD 1-5-12



NOTE: WIDENING FOR TEMPORARY TRAFFIC CONTROL MEASURES WILL MATCH THE CROSS SLOPE OF THE PROPOSED PAVEMENT AND BE CONSTRUCTED UP TO BUT NOT INCLUDING THE SURFACE COURSE LAYER.

LIMITS OF TEMPORARY PAVEMENT FOR CONSTRUCTION OF PROPOSED CULVETS

-DET2-			
PI Sta 10+24.986	PI Sta 10+63.799	PI Sta 12+39.695	PI Sta 12+82.566
Δ = 20° 58' 17.2" (LT)	Δ = 12° 09' 56.8" (RT)	Δ = 18° 11' 41.5" (RT)	Δ = 18° 11' 41.5" (LT)
L = 49.413	L = 28.665	L = 42.871	L = 42.871
T = 24.986	T = 14.387	T = 21.617	T = 21.617
R = 135.000	R = 135.000	R = 135.000	R = 135.000

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DETOUR -DET3- SHEET

REVISIONS

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559 Jones Franklin Rd. Suite 164
Raleigh, N.C. 27606
License No. F-0377
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TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

TRANSITE CONSULTING ENGINEERS, INCORPORATED
1300 Paddock Drive, Suite G-10
Raleigh, N.C. 27609
License No. C-1628

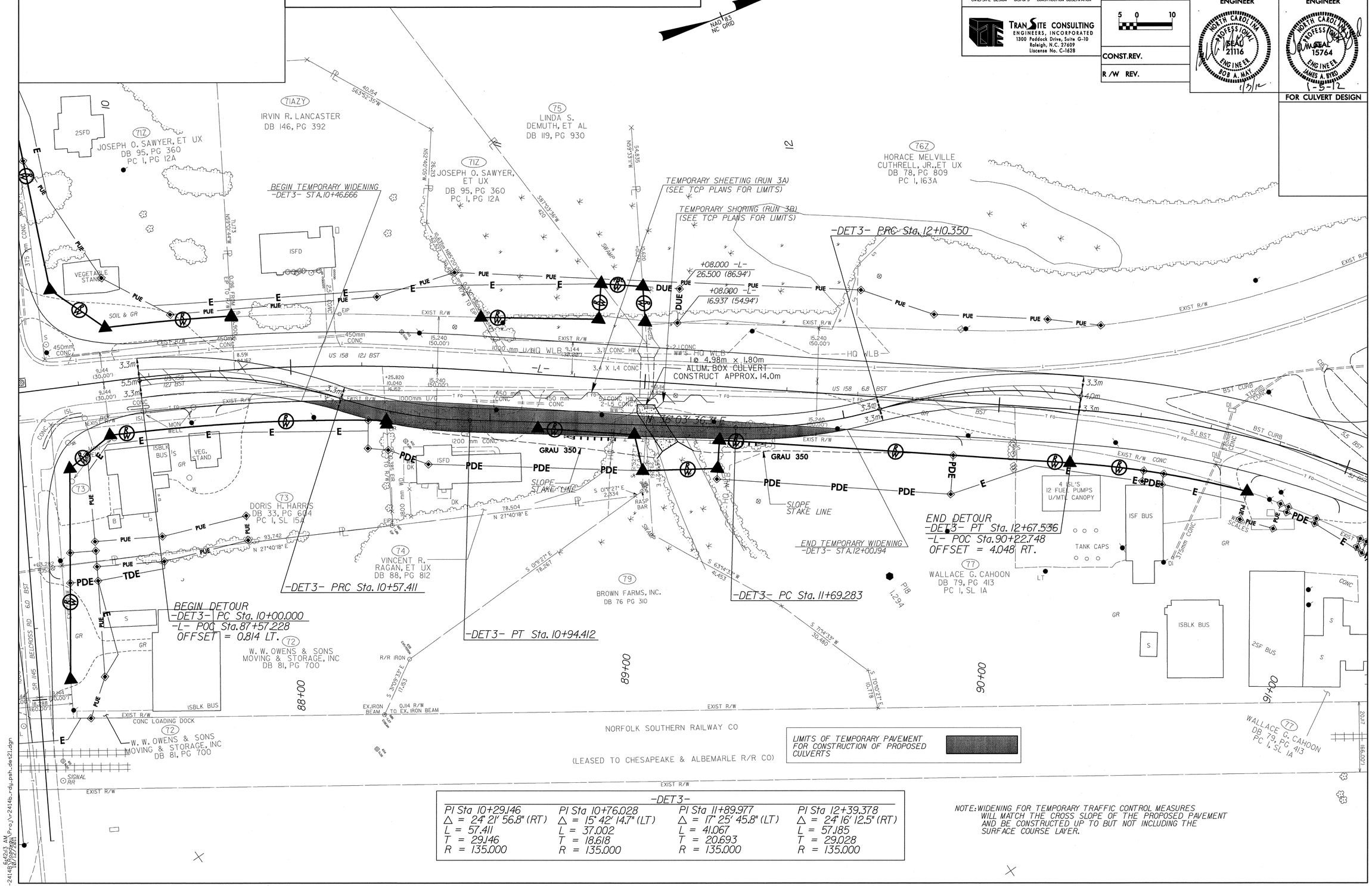
METRIC

5 0 10

CONST.REV.

R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-L
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 1/3/12	NORTH CAROLINA PROFESSIONAL SEAL 15764 ENGINEER JAMES A. BYRD 1-5-12
	FOR CULVERT DESIGN



-DET3-

PI Sta 10+29.146	PI Sta 10+76.028	PI Sta 11+89.977	PI Sta 12+39.378
Δ = 24° 21' 56.8" (RT)	Δ = 15° 42' 14.7" (LT)	Δ = 17° 25' 45.8" (LT)	Δ = 24° 16' 12.5" (RT)
L = 57.411	L = 37.002	L = 41.067	L = 57.185
T = 29.146	T = 18.618	T = 20.693	T = 29.028
R = 135.000	R = 135.000	R = 135.000	R = 135.000

NOTE: WIDENING FOR TEMPORARY TRAFFIC CONTROL MEASURES WILL MATCH THE CROSS SLOPE OF THE PROPOSED PAVEMENT AND BE CONSTRUCTED UP TO BUT NOT INCLUDING THE SURFACE COURSE LAYER.

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WETHERILL ENGINEERING
559 Jones Franklin Rd. Suite 164
Raleigh, N.C. 27606
License No. F-0377
Bus: 919 851 8077
Fax: 919 851 8107
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

METRIC

CONST.REV.

R /W REV.

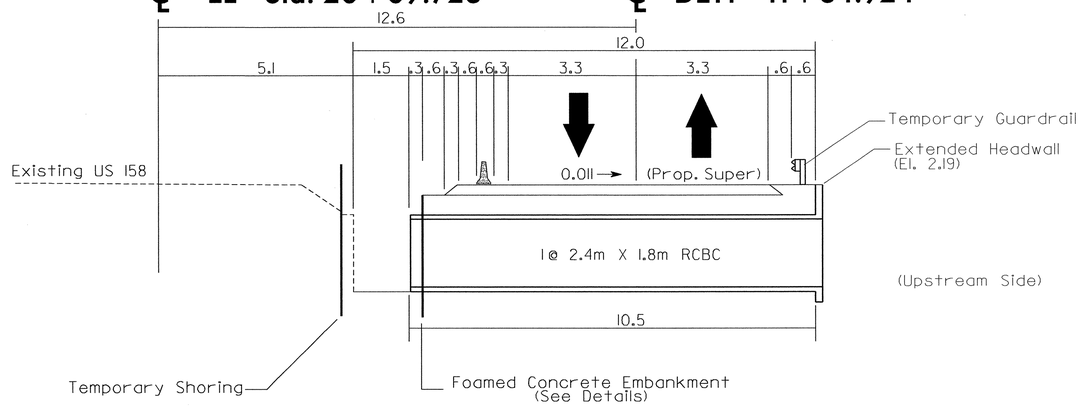
PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-M

ROADWAY DESIGN ENGINEER

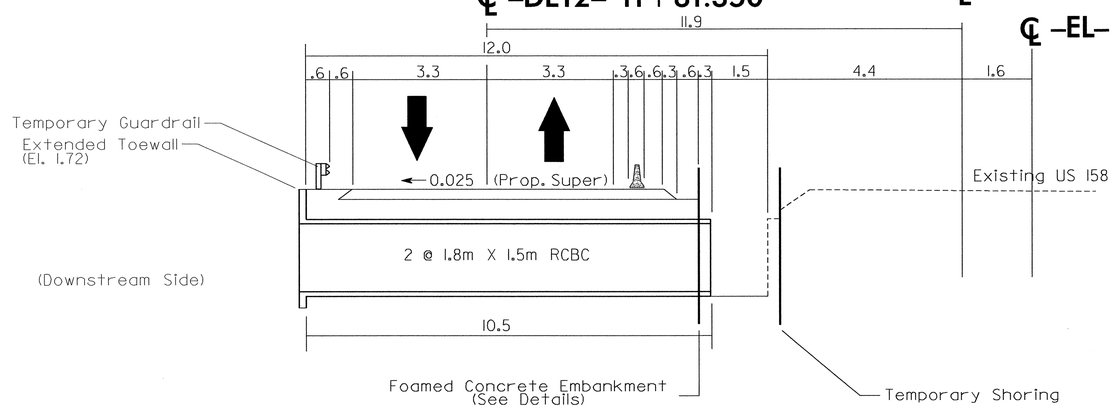
NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 1/3/12

PAVEMENT DESIGN ENGINEER

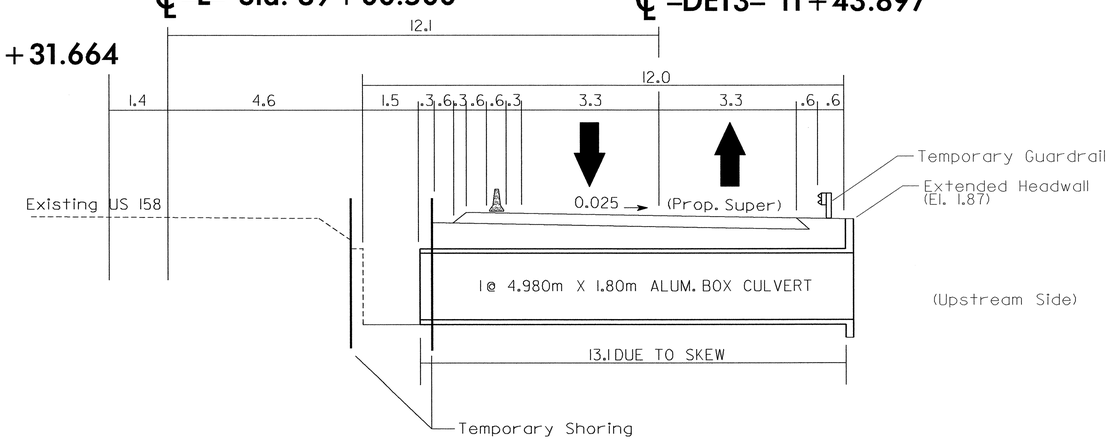
-L- Sta. 55+81.000
℄ -EL- Sta. 20+09.723
℄ -DET1- 11+64.924



℄ -DET2- 11+81.350
℄ -L- Sta. 73+49.000
℄ -EL- Sta. 37+80.219



℄ -L- Sta. 89+00.500
℄ -DET3- 11+43.897
-EL- Sta. 53+31.664



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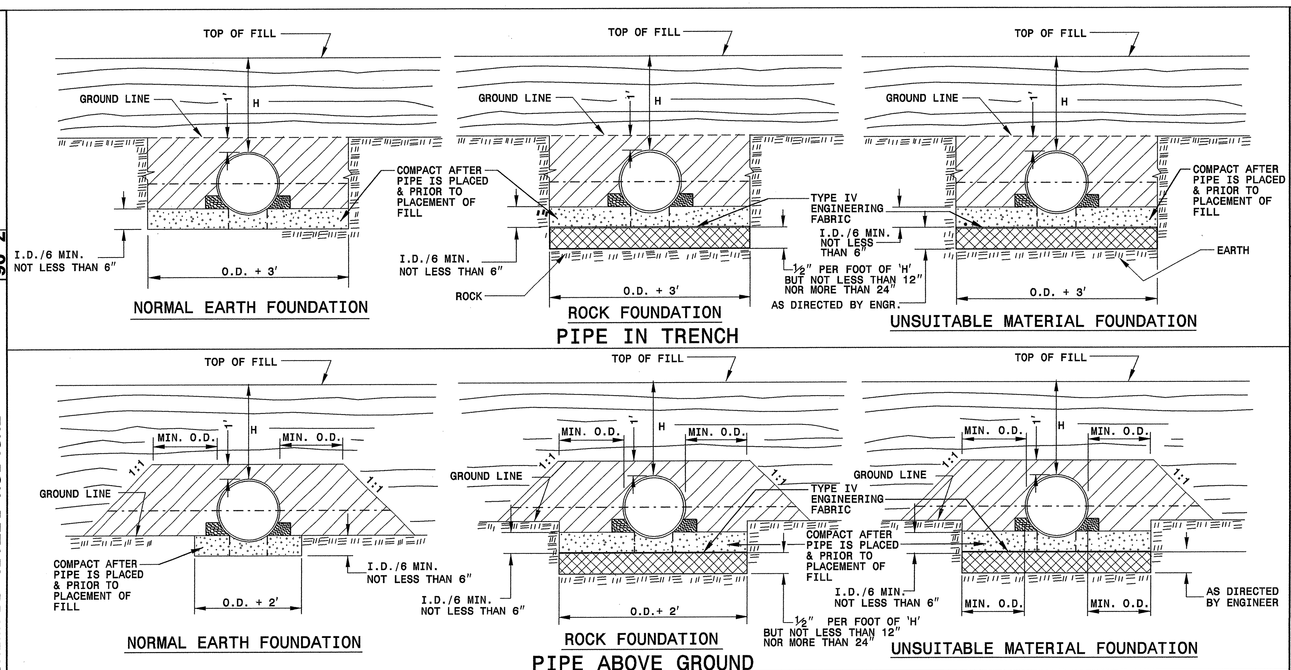
5/14/99

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

7-06

ENGLISH DETAIL DRAWING FOR
METHOD OF PIPE INSTALLATION

FLEXIBLE PIPE



GENERAL NOTES:

I.D. = THE MAXIMUM HORIZONTAL INSIDE DIAMETER DIMENSION.

O.D. = THE MAXIMUM HORIZONTAL OUTSIDE DIAMETER DIMENSION.

H = THE FILL HEIGHT MEASURED VERTICALLY AT ANY POINT ALONG THE PIPE FROM THE TOP OF THE PIPE TO THE TOP OF THE EMBANKMENT AT THAT POINT.

TAKE CARE TO FULLY COMPACT HAUNCH ZONE OF PIPE BACKFILL.

LOOSELY PLACED SELECT MATERIAL CLASS III OR CLASS II, TYPE 1 FOR PIPE BEDDING. LEAVE SECTION DIRECTLY BENEATH PIPE UNCOMPACTED AS PIPE SEATING AND BACKFILL WILL ACCOMPLISH COMPACTION.

DO NOT OPERATE HEAVY EQUIPMENT OVER ANY PIPE CULVERT UNTIL THE PIPE CULVERT HAS BEEN PROPERLY BACKFILLED AND COVERED WITH AT LEAST 3 FEET OF APPROVED MATERIAL.

SPRINGLINE OF PIPE

SELECT BACKFILL MATERIAL CLASS III OR CLASS II, TYPE 1 ABOVE AND BELOW SPRINGLINE.

APPROVED SUITABLE LOCAL MATERIAL.

UNDISTURBED EARTH MATERIAL

SELECT MATERIAL CLASS V OR VI FOR FOUNDATION CONDITIONING. ENCAPSULATE WITH ENGINEERING FABRIC AS DIRECTED BY THE ENGINEER.

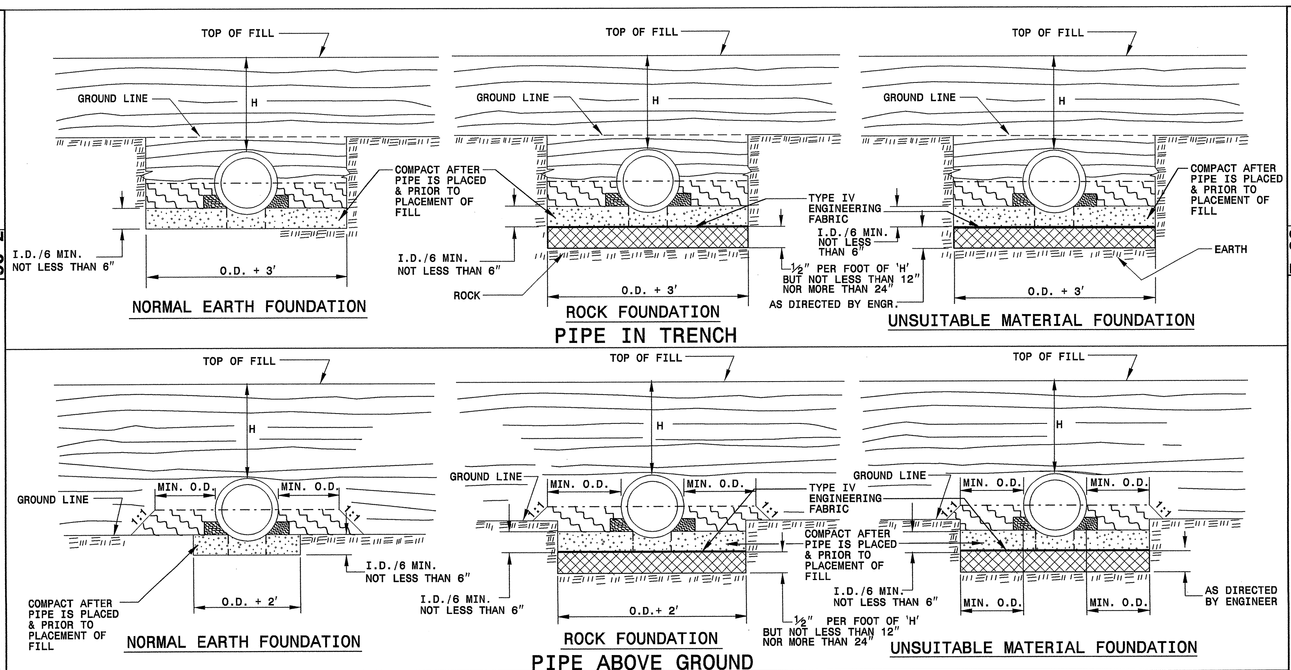
SHEET 1 OF 3
300D01

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

7-06

ENGLISH DETAIL DRAWING FOR
METHOD OF PIPE INSTALLATION

RIGID PIPE



GENERAL NOTES:

I.D. = THE MAXIMUM HORIZONTAL INSIDE DIAMETER DIMENSION.

O.D. = THE MAXIMUM HORIZONTAL OUTSIDE DIAMETER DIMENSION.

H = THE FILL HEIGHT MEASURED VERTICALLY AT ANY POINT ALONG THE PIPE FROM THE TOP OF THE PIPE TO THE TOP OF THE EMBANKMENT AT THAT POINT.

TAKE CARE TO FULLY COMPACT HAUNCH ZONE OF PIPE BACKFILL.

LOOSELY PLACED SELECT MATERIAL CLASS III OR CLASS II, TYPE 1 FOR PIPE BEDDING. LEAVE SECTION DIRECTLY BENEATH PIPE UNCOMPACTED AS PIPE SEATING AND BACKFILL WILL ACCOMPLISH COMPACTION.

DO NOT OPERATE HEAVY EQUIPMENT OVER ANY PIPE CULVERT UNTIL THE PIPE CULVERT HAS BEEN PROPERLY BACKFILLED AND COVERED WITH AT LEAST 3 FEET OF APPROVED MATERIAL.

SPRINGLINE OF PIPE

SELECT BACKFILL MATERIAL CLASS III OR CLASS II, BELOW SPRINGLINE.

APPROVED SUITABLE LOCAL MATERIAL ABOVE SPRINGLINE.

UNDISTURBED EARTH MATERIAL

SELECT MATERIAL CLASS V OR VI FOR FOUNDATION CONDITIONING. ENCAPSULATE WITH ENGINEERING FABRIC AS DIRECTED BY THE ENGINEER.

SHEET 2 OF 3
300D01

PROJECT SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128 FAX 919-250-4119

SEE PLATE FOR TITLE

ORIGINAL BY: KKempf DATE: 5-15-09
MODIFIED BY: DATE:
CHECKED BY: DATE: 7/14/09
FILE SPEC/proj/ericward/stds/stdstodetails/30001/0300d01.dgn

NORTH CAROLINA PROFESSIONAL SEAL 022956 ENGINEER

PROJECT REFERENCE NO. R-2414B
SHEET NO. 2-N

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

7-06

ENGLISH DETAIL DRAWING FOR
METHOD OF PIPE INSTALLATION
FILL HEIGHT TABLES

SHEET 3 OF 3
300D01

FLEXIBLE PIPE

Round Corrugated Steel Pipe
2 2/3 x ½ corrugation **

Diameter (inches)	Minimum cover (inches)	Maximum Height of Cover (feet) (Ga) 16	14	12	10	8
12	12	204	256			
15	12	162	204			
18	12	135	169	239		
21	12	115	145	204		
24	12	100	126	178		
30	12	79	100	142		
36	12	65	83	117	152	
42	12	55	70	100	130	160
48	12	48	61	87	113	139
54	12		54	77	100	123
60	12			69	90	111
66	12				81	100
72	12				74	91
78	12					81
84	12					69

Round Corrugated Aluminum Pipe
2 2/3 x ½ corrugation **

Diameter (inches)	Minimum cover (inches)	Maximum Height of Cover (feet) (Ga) 16	14	12	10	8
12	12	123	155	218	281	344
15	12	98	123	174	224	275
18	12	81	102	144	187	228
21	12	69	87	123	160	195
24	12	60	76	108	139	171
27	12		67	95	123	151
30	12		60	85	111	136
36	12		50	71	92	113
42	12			60	78	96
48	12			52	68	84
54	12			46	50	74
60	12				50	62
66	12					51
72	12					41

** FOR DIFFERENT CORRUGATIONS AND ARCH PIPES REFER TO ROADWAY DESIGN MANUAL OR MANUFACTURERS SPECIFICATION.

HDPE - * (Minimum fill) 2′ for pipe diameters ≥ 12″ and ≤ 60″
* (Maximum fill) 20′ for pipe diameters ≤ 24″
17′ for pipe diameters ≥ 30″ and ≤ 60″

PVC - * (Minimum fill) 2′ for pipe diameters ≥ 12″ and ≤ 36″
* (Maximum fill) 30′ for pipe diameters ≥ 12″ and ≤ 36″

* FILL HEIGHT IS MEASURED FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE PAVEMENT STRUCTURE

REFER TO THE FOLLOWING FOR PIPE SPECIFICATIONS

CSP - AASHTO M36
CAAP - AASHTO M196
HDPE - AASHTO M294
PVC - ASTM F949 or AASHTO M304

NOTES: FILL HEIGHTS SHOWN WERE CALCULATED USING AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

1′ MINIMUM COVER FOR ALL SIDE DRAIN PIPE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS

RIGID PIPE

RCP - * (Minimum fill) 1′ for Class IV & CLASS V
2′ for Class III & Class II

* (Maximum fill) 10′ - Class II pipe
20′ - Class III pipe
30′ - Class IV pipe
40′ - Class V pipe

(For fills > 40′ & < 80′ use LRFD Direct Design Method)

* FILL HEIGHT IS MEASURED FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE PAVEMENT STRUCTURE

REFER TO THE FOLLOWING FOR PIPE SPECIFICATIONS

RCP - AASHTO M170

NOTES: FILL HEIGHTS SHOWN WERE CALCULATED USING AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

1′ MINIMUM COVER FOR ALL SIDE DRAIN PIPE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS

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

7-06

ENGLISH DETAIL DRAWING FOR
METHOD OF PIPE INSTALLATION
FILL HEIGHT TABLES

SHEET 3 OF 3
300D01

PROJECT SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128 FAX 919-250-4119

SEE PLATE FOR TITLE

ORIGINAL BY: KKampf
MODIFIED BY: DATE: 5-15-09
CHECKED BY: DATE: 7/30/09
FILE SPEC/ericward/stds/stdstodetails/30001/0300d01.dgn

NORTH CAROLINA PROFESSIONAL SEAL 22006 ENGINEER

PROJECT REFERENCE NO. R-2414 B
SHEET NO. 2-0

PROJECT REFERENCE NO.	SHEET
34430.1.1 (R-2414B)	2-P

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 032672 ENGINEER MICHAEL D. VALIQUETTE

SIGNATURE DATE

ENGINEER

SIGNATURE DATE

NOTES

THE USE OF EITHER THE WOOD BASE OR THE STEEL BASE SETTLEMENT GAUGE SHALL BE THE CONTRACTOR'S OPTION.

SETTLEMENT GAUGES SHALL BE INSTALLED ON THE EMBANKMENT STABILIZATION FABRIC.

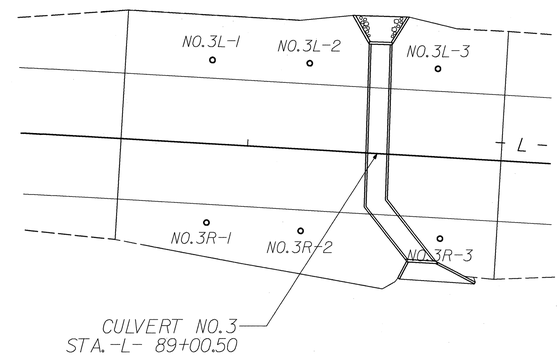
SETTLEMENT GAUGE ELEVATIONS ARE TO BE DETERMINED AND RECORDED WEEKLY BY THE RESIDENT ENGINEER.

THE INITIAL ELEVATION OF THE SETTLEMENT GAUGE PLATE (AT TOP OF PLATE) SHALL BE DETERMINED AT THE TIME OF INSTALLATION ALONG WITH THE EMBANKMENT ELEVATION. WHEN NEW SECTIONS OF THE PIPE ARE ADDED, ELEVATIONS SHALL BE RECORDED AT THE TOP OF EXISTING PIPE AND AT THE TOP OF THE NEW PIPE. THIS IS TO TAKE INTO ACCOUNT INTERIM SETTLEMENT, VARIABLE PIPE LENGTHS, AND THREAD LENGTHS IN COUPLING.

RESULTS OF SETTLEMENT GAUGE READINGS SHALL BE FORWARDED TO MR. K.J. KIM, EASTERN REGIONAL GEOTECHNICAL MANAGER, WITHIN THREE DAYS.

OBSERVE A 2 MONTH WAITING PERIOD FOR PHASE 1 AND PHASE 2, EACH, AFTER CONSTRUCTING THE EMBANKMENT TO 0.6 METERS ABOVE THE FINAL GRADE ELEVATION. THE FINAL GRADE ELEVATION IS THE TOP OF PAVEMENT ELEVATION SHOWN IN THE ROADWAY PLANS. MAINTAIN THE EMBANKMENT TO 0.6 METERS ABOVE THE FINAL GRADE ELEVATION THROUGHOUT THE WAITING PERIOD.

DO NOT BEGIN PHASE 1 OR PHASE 2 CULVERT CONSTRUCTION UNTIL AFTER THE WAITING PERIODS ARE COMPLETE.



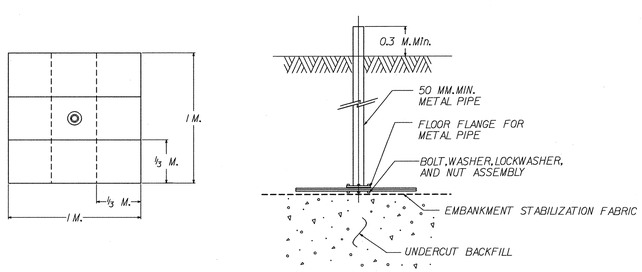
SETTLEMENT GAUGE LOCATIONS, NTS.

FROM STA. 88+60 -L- TO STA. 89+20± -L-

SETTLEMENT GUAGE QUANTITIES	
EMBANKMENT SETTLEMENT GAUGES	6 EA.

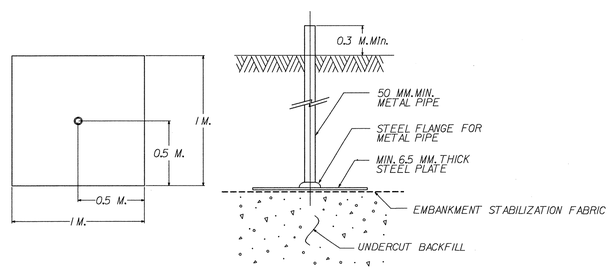
SETTLEMENT GAUGE LOCATIONS			
PHASE I		PHASE II	
GAUGE NO.	STATION & OFFSET	GAUGE NO.	STATION & OFFSET
3R-1	88 + 75 ± -L- 11M ± RT	3L-1	88 + 75 ± -L- 12M ± LT
3R-2	88 + 90 ± -L- 11M ± RT	3L-2	88 + 90 ± -L- 12M ± LT
3R-3	89 + 10 ± -L- 11M ± RT	3L-3	89 + 10 ± -L- 12M ± LT

0.6M SURCHARGE AND WAITING PERIOD			
BEGIN STATION	END STATION	ESTIMATED WAITING PERIOD	
		PHASE I	PHASE II
88 + 60 ± -L-	89 + 20 ± -L-	2 MONTHS	2 MONTHS



DETAIL OF WOOD BASE

SIX - 25 MM. X 1/3 M. X 1 M. PLANKS OF LUMBER OR TWO PIECES 25 MM. X 1 M. X 1 M. EXTERIOR GRADE PLYWOOD, SECURELY FASTENED AND THEN COATED WITH WOOD PRESERVATIVE



DETAIL OF STEEL BASE

PREPARED BY: M. D. VALIQUETTE	DATE: 8/2011
REVIEWED BY: K. J. KIM	DATE: 8/2011

GEOTECHNICAL ENGINEERING UNIT

☒ EASTERN REGIONAL OFFICE

☐ WESTERN REGIONAL OFFICE

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

Embankment Monitoring Detail

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
1			3			TOTAL SHEETS
2			4			

DETAIL FOR 125mm MONOLITHIC CONCRETE ISLAND (KEYED-IN)

WETHERILL ENGINEERING
509 James Franklin Rd. Suite 144
Raleigh, N.C. 27606
License No. F-0377
Bus: 919 851 8077
Fax: 919 851 8107
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

TRANSITE CONSULTING ENGINEERS, INCORPORATED
1300 Paddock Drive, Suite G-10
Raleigh, N.C. 27609
Liscense No. C-1628

METRIC

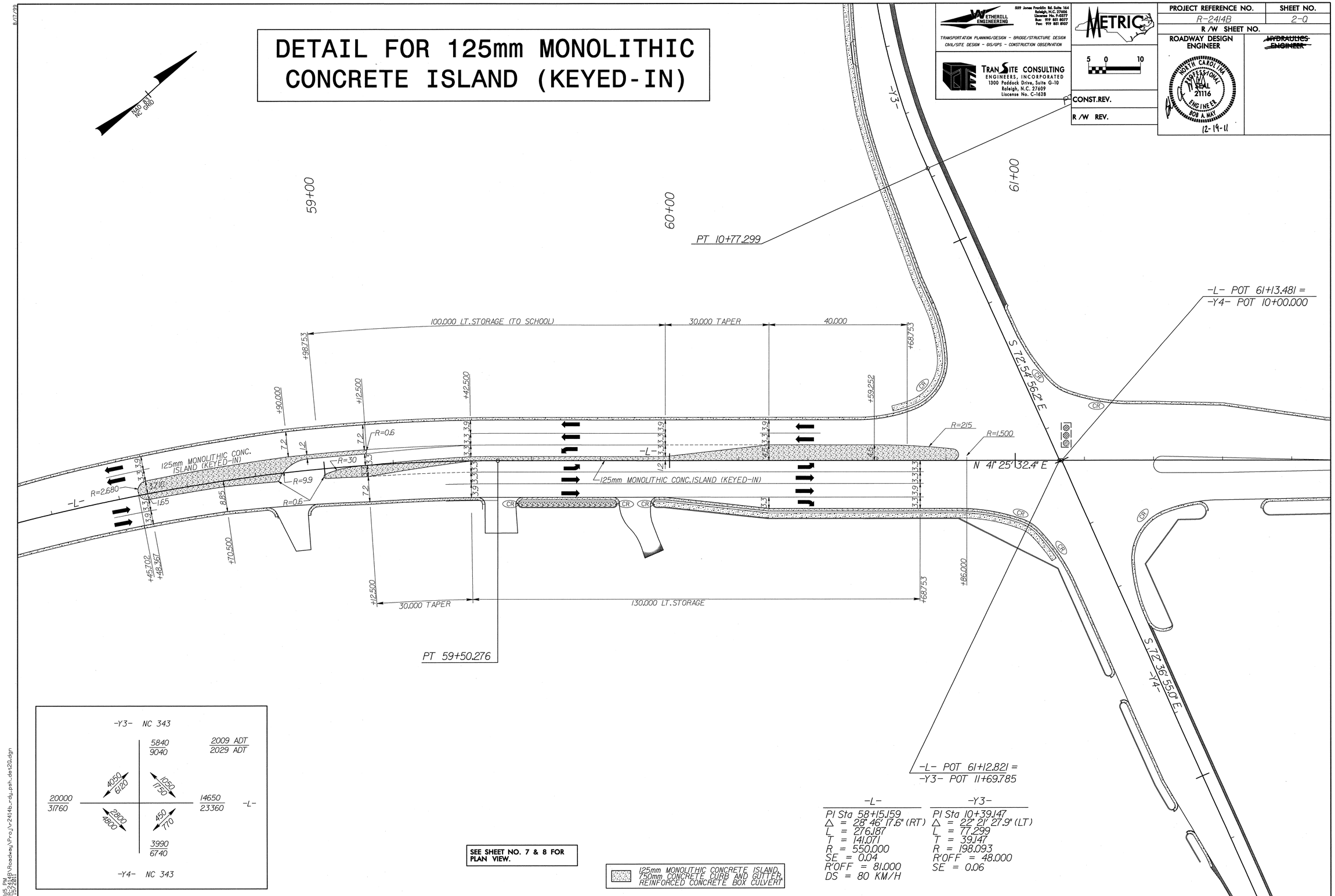
5 0 10

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-Q
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	~~HYDRAULICS ENGINEER~~

NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER ROB A. MAY
12-19-11

CONST.REV.

R/W REV.



-L-	-Y3-
PI Sta 58+15.159	PI Sta 10+39.147
Δ = 28° 46' 17.6" (RT)	Δ = 22° 21' 27.9" (LT)
L = 276.187	L = 77.299
T = 141.071	T = 39.147
R = 550.000	R = 198.093
SE = 0.04	R'OFF = 48.000
R'OFF = 81.000	SE = 0.06
DS = 80 KM/H	

SEE SHEET NO. 7 & 8 FOR PLAN VIEW.

125mm MONOLITHIC CONCRETE ISLAND
750mm CONCRETE CURB AND GUTTER
REINFORCED CONCRETE BOX CULVERT

8/17/99

30015_PM
12/15/2011 10:29:18 AM
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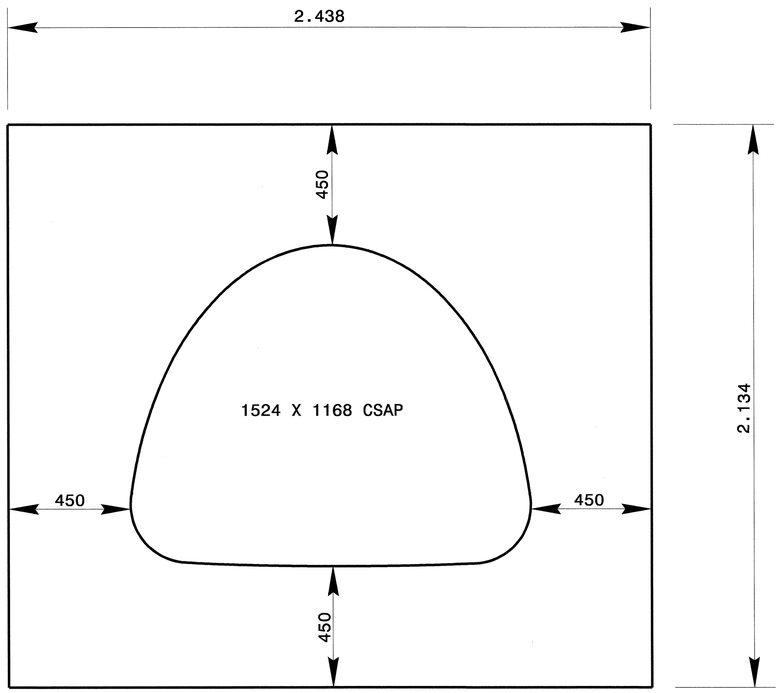
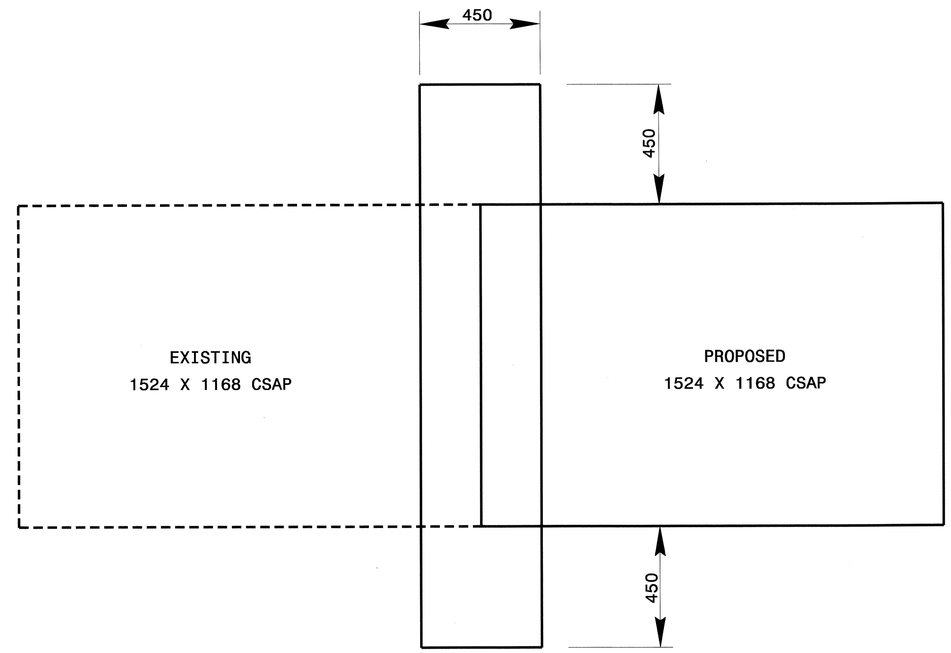
PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-R

METRIC



ELEVATION



SIDE ELEVATION

NOTES:

USE PIPE COLLAR FOR EXTENDING CSAP AT LOCATIONS SHOWN ON PLANS OR AS DIRECTED BY THE ENGINEER

CONSTRUCT THE PIPE COLLAR WITH CLASS "B" OR BETTER CONCRETE.

OBSERVE ALL REQUIREMENTS OF SECTION 840 OF THE STANDARD SPECIFICATIONS.

QUANTITIES:

CLASS "B" CONCRETE 1.72 CM.

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER JOEL S. HOWERTON
10/14/10

PROJECT SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128 FAX 919-250-4119

DETAIL OF CSAP COLLAR
FOR 1.524m X 1.168m (Pipe Arch)-90°

ORIGINAL BY: DATE:
MODIFIED BY: rnbritt DATE: 3-22-10
CHECKED BY: DATE: 3/22/10
FILE SPEC.: details/nbritt/metric/mhydro/r2414b 1.524m x 1.168m CSAP sk90.dgn

22-MAR-2010 10:54
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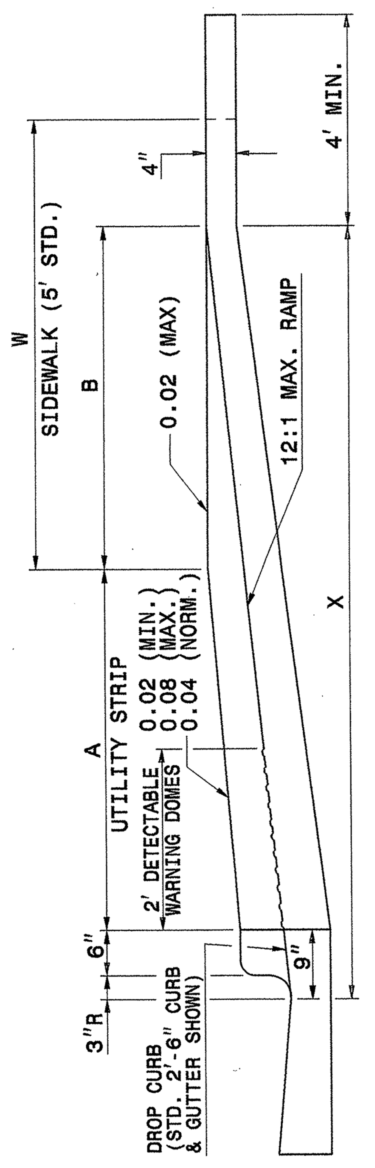
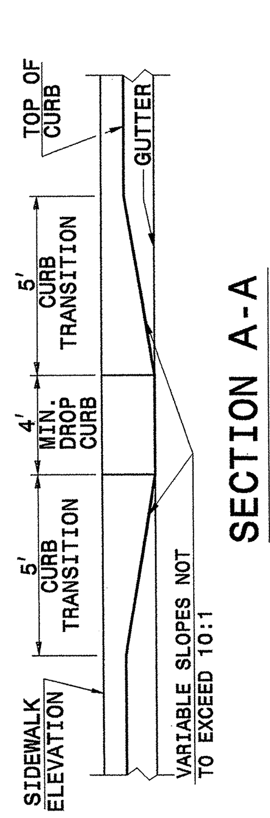
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-S

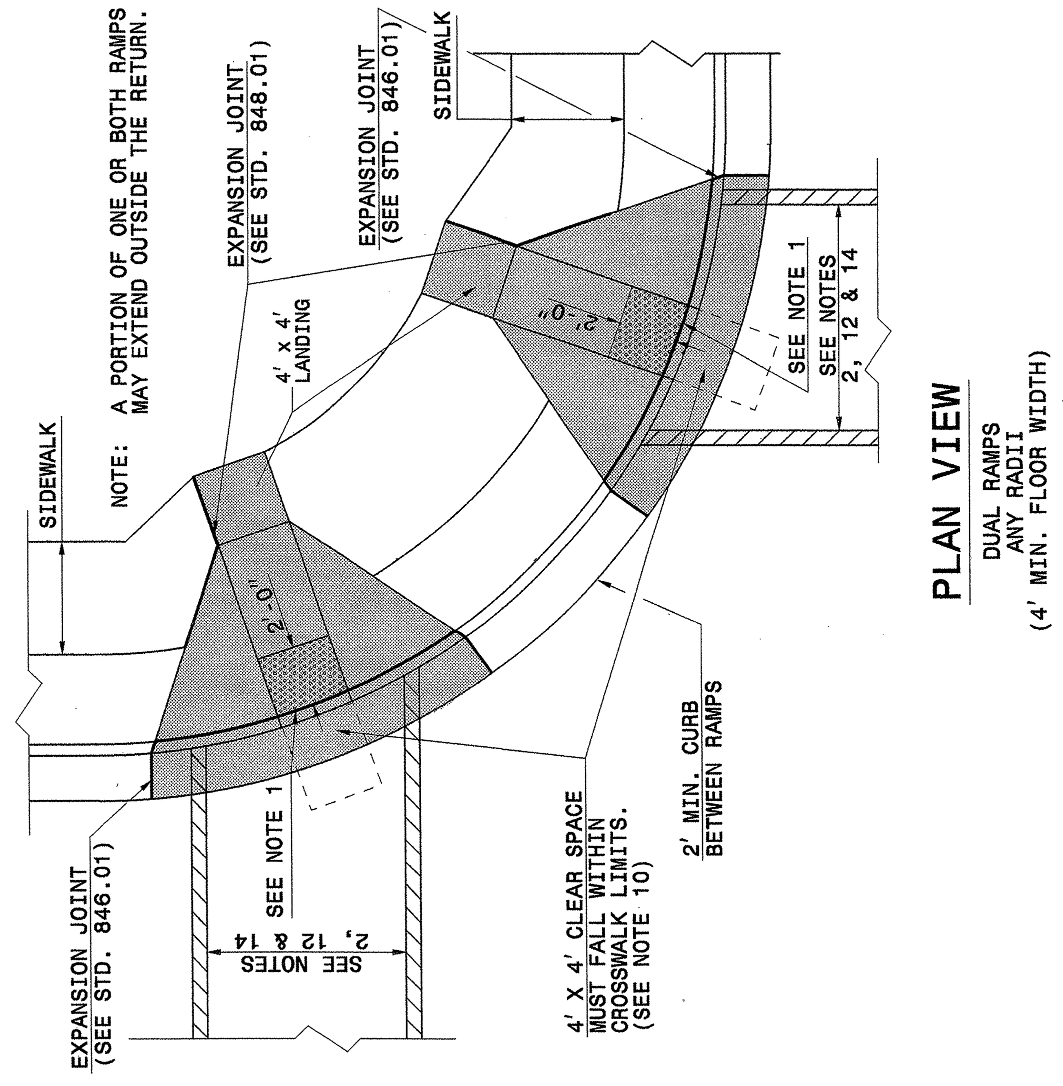
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
ENGLISH DETAIL DRAWING FOR CURB RAMP PROPOSED CURB AND GUTTER
SHEET 1 OF 3 848D05



SECTION B-B

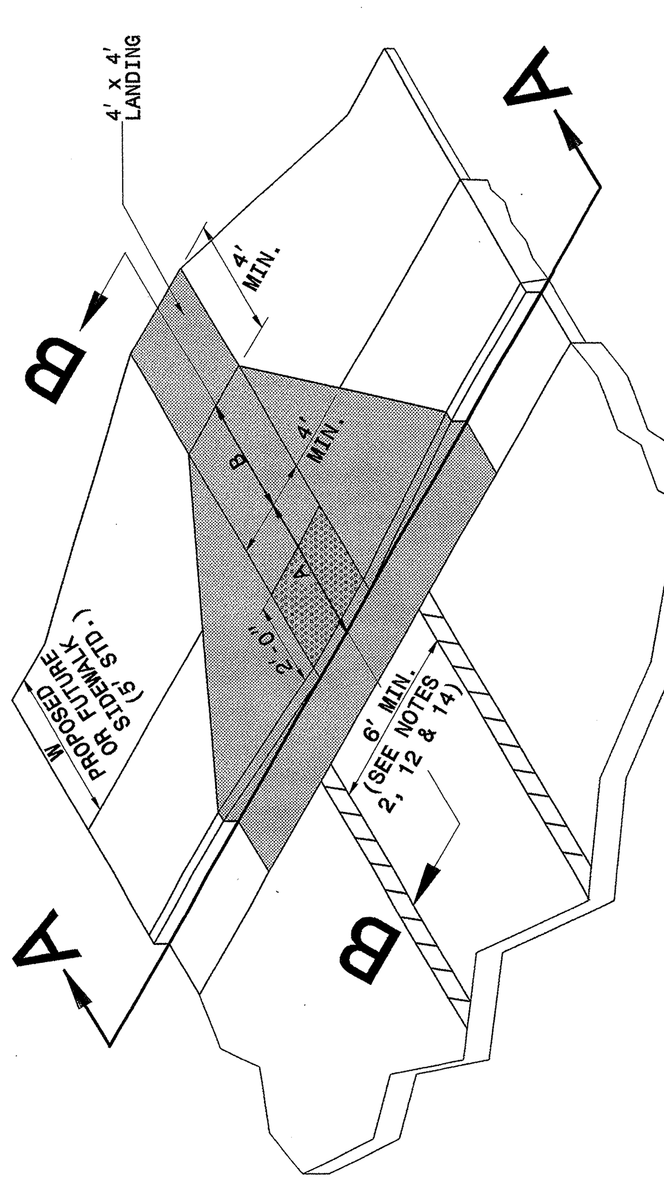


SECTION A-A



PLAN VIEW

DUAL RAMPS
ANY RADII
(4' MIN. FLOOR WIDTH)



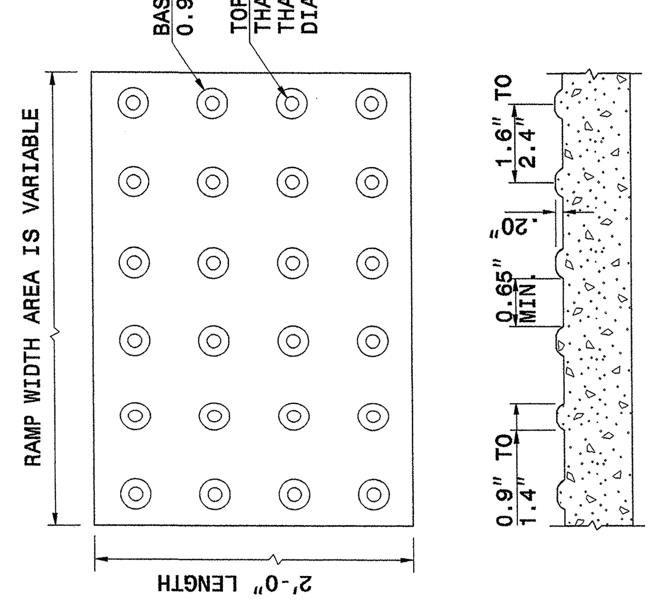
ISOMETRIC VIEW

PAY LIMITS FOR CURB RAMP

NOTES:
1. DETECTABLE WARNING DOMES WILL COVER 2'-0" LENGTH AND FULL WIDTH OF THE RAMP FLOOR AS SHOWN ON THE DETAILS.
2. DETECTABLE WARNING DOMES WILL CONTRAST VISIBILITY WITH ADJOINING SURFACE, EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT SEQUENCE COVERING THE ENTIRE RAMP.

W	A	W+A+9"	X	B
5'	0.0'	5.8'	5.8'	5.0'*
6'	0.0'	6.8'	6.8'	6.0'**
7'	0.0'	7.8'	7.3'	6.5'**
8'	0.0'	8.8'	7.3'	6.5'**
5'	2.0'	7.8'	7.8'	5.0'
5'	2.5'	8.3'	8.1'	4.8'
5'	3.0'	8.8'	8.3'	4.4'
5'	3.5'	9.3'	8.4'	4.1'
5'	4.0'	9.8'	8.6'	3.8'
5'	4.5'	10.3'	8.7'	3.4'
5'	5.0'	10.8'	8.9'	3.1'

B = X-(A+9")
B = DISTANCE FROM FRONT EDGE OF SIDEWALK TO BACK POINT OF 12:1 (8.33%) SLOPE.
* BACK OF SIDEWALK DROP REQUIRED FOR ALL SIDEWALK SLOPES.
** BACK OF SIDEWALK DROP REQUIRED FOR SIDEWALK SLOPES 0.04.



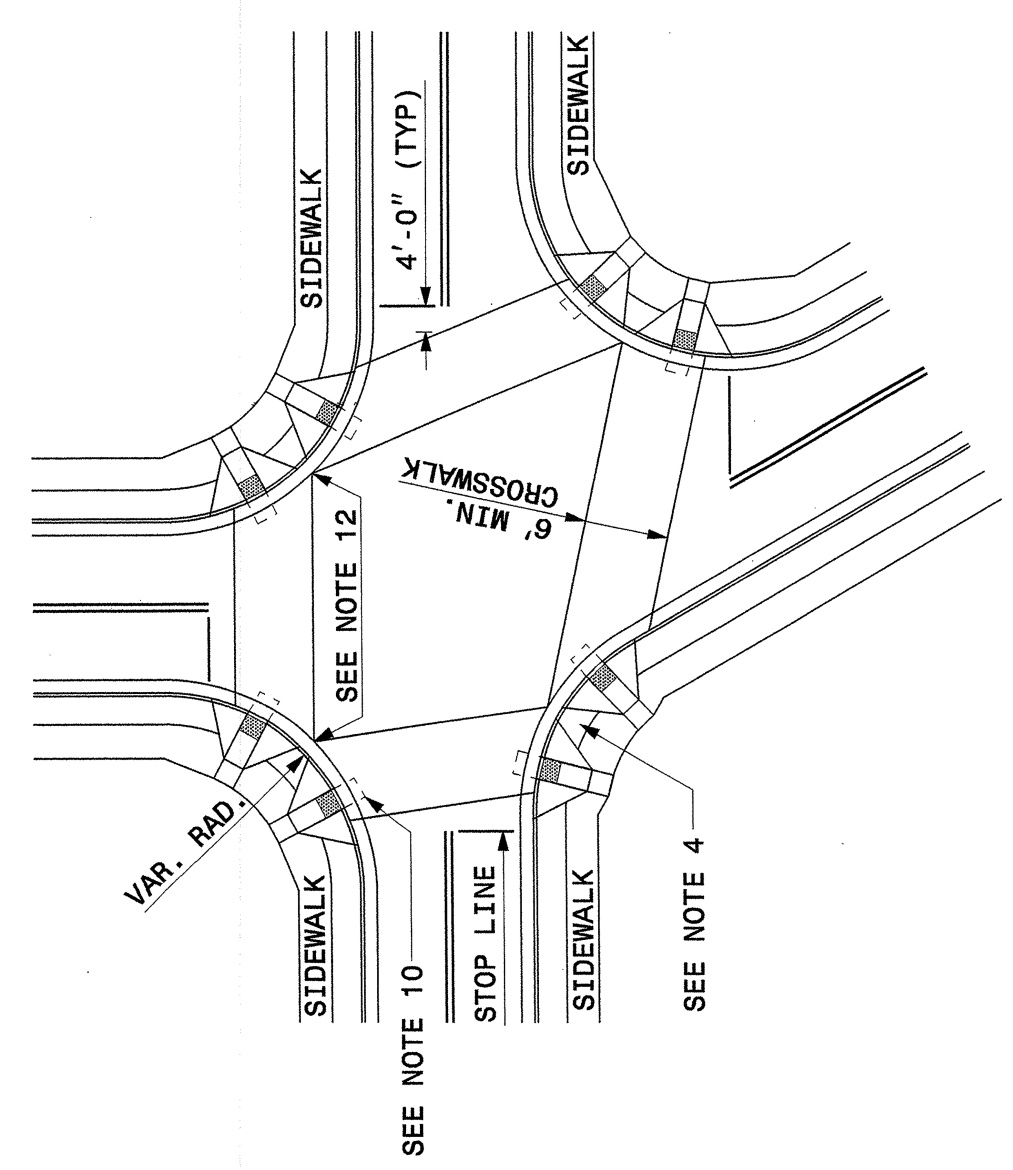
DETECTABLE WARNING DOMES

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

ENGLISH DETAIL DRAWING FOR
CURB RAMP
PROPOSED CURB AND GUTTER

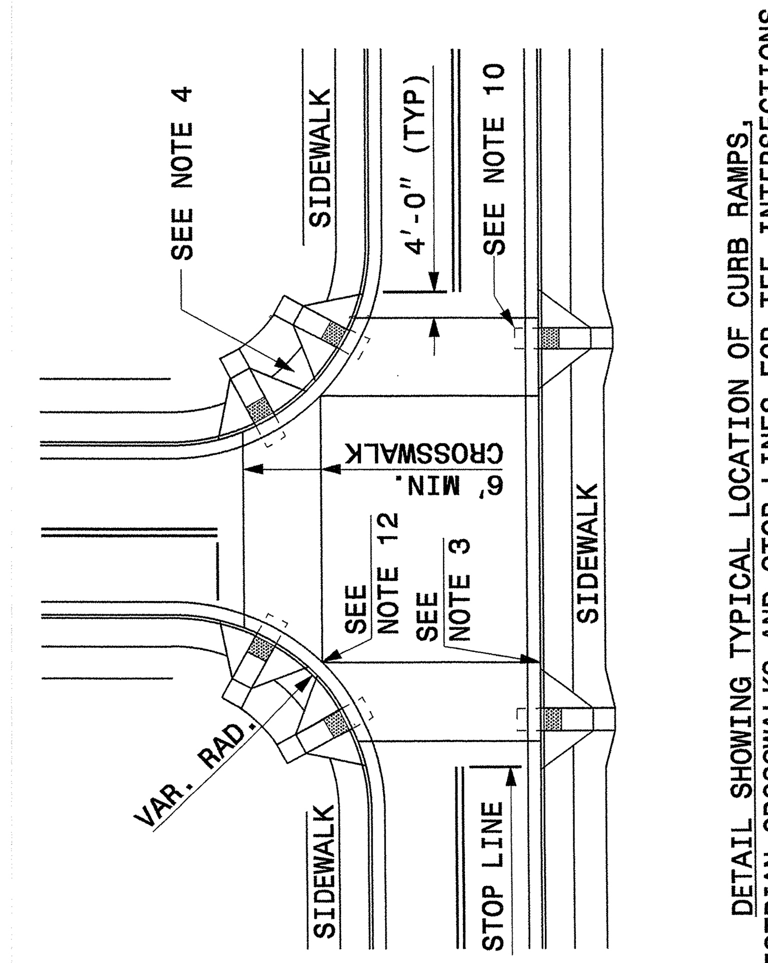
SHEET 1 OF 3 **848D05**

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
ENGLISH DETAIL DRAWING FOR CURB RAMP PROPOSED CURB AND GUTTER
SHEET 2 OF 3 848D05

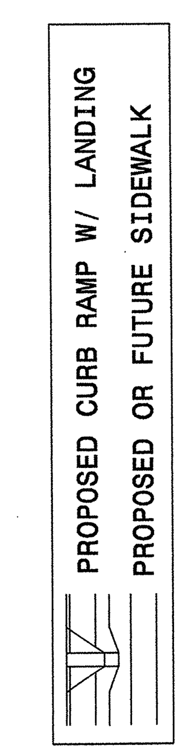


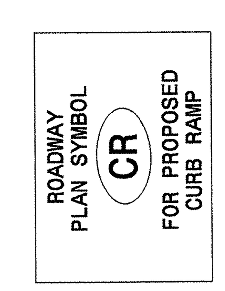
DETAIL SHOWING TYPICAL LOCATION OF CURB RAMPS, PEDESTRIAN CROSSWALKS AND STOP LINES

ALLOWABLE LOCATIONS
DUAL RAMP RADII............ANY



DETAIL SHOWING TYPICAL LOCATION OF CURB RAMPS, PEDESTRIAN CROSSWALKS AND STOP LINES FOR TEE INTERSECTIONS

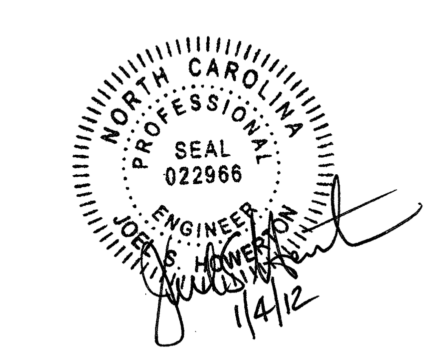




STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
CURB RAMP
PROPOSED CURB AND GUTTER

SHEET 2 OF 3 **848D05**



PROJECT SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128 FAX 919-250-4119

SEE PLATE FOR TITLE

ORIGINAL BY: STD.NO.848.05 DATE: 4-22-10
MODIFIED BY: DATE:
CHECKED BY: [signature] DATE: 4/12/10
FILE SPEC.: SpecialDetails/EricWard/STDS/848d05.dgn

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

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

7-06

ENGLISH DETAIL DRAWING FOR

CURB RAMPS

NOTES

SHEET 3 OF 3

848D05

NOTES:

1. CONSTRUCT THE RAMP SURFACE TO BE STABLE, FIRM, AND SLIP RESISTANT.
2. PROVIDE DETECTABLE WARNINGS FOR ALL RAMPS. THE DETECTABLE WARNING SURFACE SHOULD CONTRAST VISIBLY WITH ADJACENT SURFACES.
3. NORTH CAROLINA GENERAL STATUTE 136-44.14 REQUIRES THAT ALL STREET CURBS BEING CONSTRUCTED OR RECONSTRUCTED FOR MAINTENANCE PROCEDURES, TRAFFIC OPERATIONS, REPAIRS, CORRECTION OF UTILTIES OR ALTERED FOR ANY REASON AFTER SEPTEMBER 1, 1973 SHALL PROVIDE CURB RAMPS FOR THE PHYSICALLY DISABLED AT ALL INTERSECTIONS WHERE BOTH CURB AND GUTTER AND SIDEWALKS ARE PROVIDED AND AT OTHER POINTS OF PEDESTRIAN FLOW.

   IN ADDITION, SECTION 228 OF THE 1973 FEDERAL AID HIGHWAY SAFETY ACT REQUIRES PROVISION OF CURB RAMPS ON ANY CURB CONSTRUCTION AFTER JULY 1,1976 WHETHER A SIDEWALK IS PROPOSED INITIALLY OR IS PLANNED FOR A FUTURE DATE.

   THE AMERICANS WITH DISABILITIES ACT (ADA) OF 1990 EXTENDS TO INDIVIDUALS WITH DISABILITIES. COMPREHENSIVE CIVIL RIGHTS PROTECTIONS SIMILIAR TO THOSE PROVIDED TO PERSONS ON THE BASIS OF RACE, SEX, NATIONAL ORIGIN AND RELIGION UNDER THE CIVIL RIGHTS ACT OF 1964. THESE CURB RAMPS HAVE BEEN DESIGNED TO COMPLY WITH THE CURRENT ADA STANDARDS.
4. PROVIDE CURB RAMPS AT LOCATIONS AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. LOCATE CURB RAMPS AS DIRECTED BY THE ENGINEER WHERE EXISTING LIGHT POLES, FIRE HYDRANTS, DROP INLETS, ETC. AFFECT PLACEMENT. PLACE DUAL RAMPS PERPENDICULAR TO THE TRAVEL LANE OR AS DIRECTED BY THE ENGINEER.
5. DO NOT EXCEED 0.08 (12:1) SLOPE ON THE RAMP.
6. CONSTRUCT CURB RAMPS A MINIMUM OF 4′ FOR SINGLE RAMPS.
7. PLACE A ½″ EXPANSION JOINT WHERE THE CONCRETE CURB RAMP JOINS THE CURB AND AS SHOWN ON STD. DWG. 848.01.
8. PLACE THE INSIDE PEDESTRIAN CROSSWALK LINES NO CLOSER IN THE INTERSECTION BY BISECTING THE INTERSECTION RADII, WITH ALLOWANCE OF A 4′ CLEAR ZONE IN THE VEHICULAR TRAVELWAY WHEN ONE RAMP IS INSTALLED. (SEE NOTE 14)
9. COORDINATE THE CURB CUT AND THE PEDESTRIAN CROSSWALK LINES SO THE 4′ X 4′ CLEAR SPACE AT THE BASE OF THE CURB RAMP WILL FALL WITHIN THE PEDESTRIAN CROSSWALK LINES.
10. CONSTRUCT THE PEDESTRIAN CROSSWALK A MINIMUM OF 6 FEET IN WIDTH. A CROSSWALK WIDTH OF 10 FEET OR GREATER IS DESIRABLE.
11. USE STOP LINES, NORMALLY PERPENDICULAR TO THE LANE LINES, WHERE IT IS IMPORTANT TO INDICATE THE POINT BEHIND WHICH VEHICLES ARE REQUIRED TO STOP IN COMPLIANCE WITH A TRAFFIC SIGNAL, STOP SIGN OR OTHER LEGAL REQUIREMENT. AN UNUSUAL APPROACH SKEW MAY REQUIRE THE PLACEMENT OF THE STOP LINE TO BE PARALLEL TO THE INTERSECTING ROADWAY.
12. TERMINATE PARKING A MINIMUM OF 20 FEET BACK OF PEDESTRIAN CROSSWALK.
13. PLACE ALL PAVEMENT MARKINGS IN ACCORDANCE WITH THE LATEST EDITION OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION AND THE NORTH CAROLINA SUPPLEMENT TO THE MUTCD.
14. CONSTRUCT ALL RAMPS SURFACES TO COMPLY WITH SECTIONS R301 AND R303.3.3 OF THE REVISED ADA GUIDELINES.
15. CONSTRUCT ALL RAMPS AND SIDEWALKS WITH A 2% MAXIMUM CROSS SLOPE.
16. PLACE ALL PEDESTRIAN PUSH BUTTON ACTUATORS AND CROSSING SIGNALS AS SHOWN IN THE PLANS OR AS SHOWN IN THE MUTCD.
17. CONSTRUCT ALL SIDE FLARES FOR CURB RAMPS WITH SLOPES NO GREATER THAN 10:1.
18. CURB RAMPS THROUGH MEDIAN ISLANDS, SINGLE RAMPS AT DUAL CROSSWALKS OR LIMITED R/W SITUATIONS, WILL BE HANDLED BY SPECIAL DETAILS. CONTACT THE CONTRACT STANDARDS AND DEVELOPMENT SECTION FOR THE DETAILS OR FOR A SPECIAL DESIGN.

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

7-06

ENGLISH DETAIL DRAWING FOR

CURB RAMPS

NOTES

SHEET 3 OF 3

848D05

PROJECT SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128 FAX 919-250-4119

NORTH CAROLINA PROFESSIONAL SEAL 022566 ENGINEER
1/4/12

SEE PLATE FOR TITLE

ORIGINAL BY: STD.NO.848.05 DATE: 4-22-10
MODIFIED BY: DATE: 4/12/10
CHECKED BY: DATE:
FILE SPEC.: /SpecialDetails/Ericsword/STDS/848d05.dgn

PROJECT REFERENCE NO. R-2418B
SHEET NO. 2-T

PROJECT REFERENCE NO.	SHEET
R-2414B	2-U

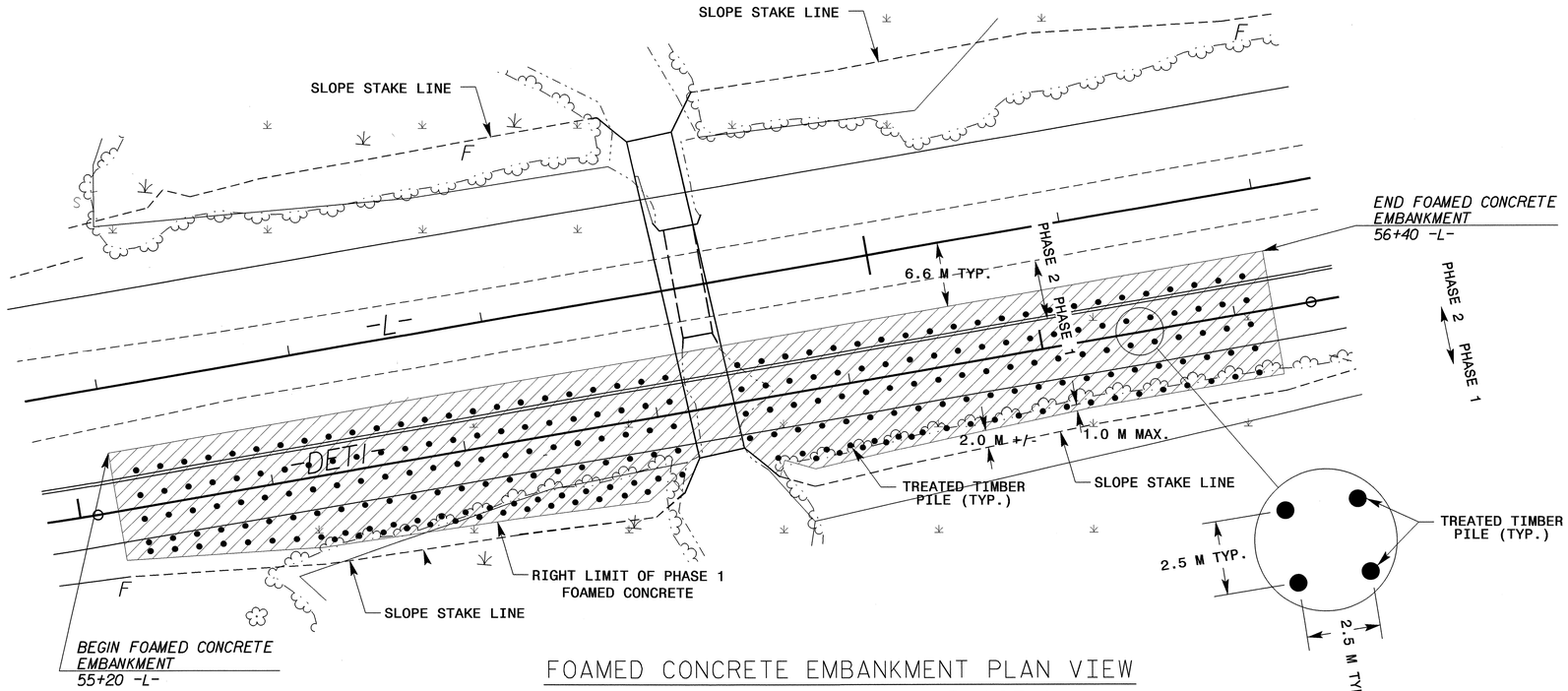
GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 032672 ENGINEER MICHAEL D. VALIQUETTE

SIGNATURE DATE

ENGINEER

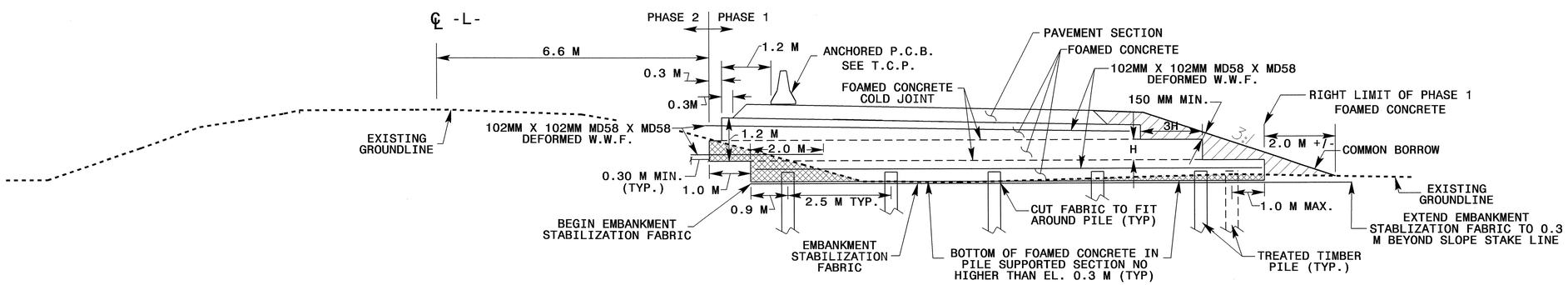
SIGNATURE DATE



FOAMED CONCRETE EMBANKMENT PLAN VIEW

55+20 TO 56+40 -L-, PHASE 1

N.T.S.



FOAMED CONCRETE EMBANKMENT TYP. SECTION

55+20 TO 56+40 -L-, PHASE 1

N.T.S.

PREPARED BY:	MDV	DATE:	8/2011
REVIEWED BY:	KJK	DATE:	8/2011

GEOTECHNICAL ENGINEERING UNIT

■ EASTERN REGIONAL OFFICE

☐ WESTERN REGIONAL OFFICE

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

FOAMED CONCRETE EMBANKMENT

55+20 TO 56+40 -L-, PHASE 1

REVISIONS

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

PROJECT REFERENCE NO.	SHEET
R-2414B	2-V

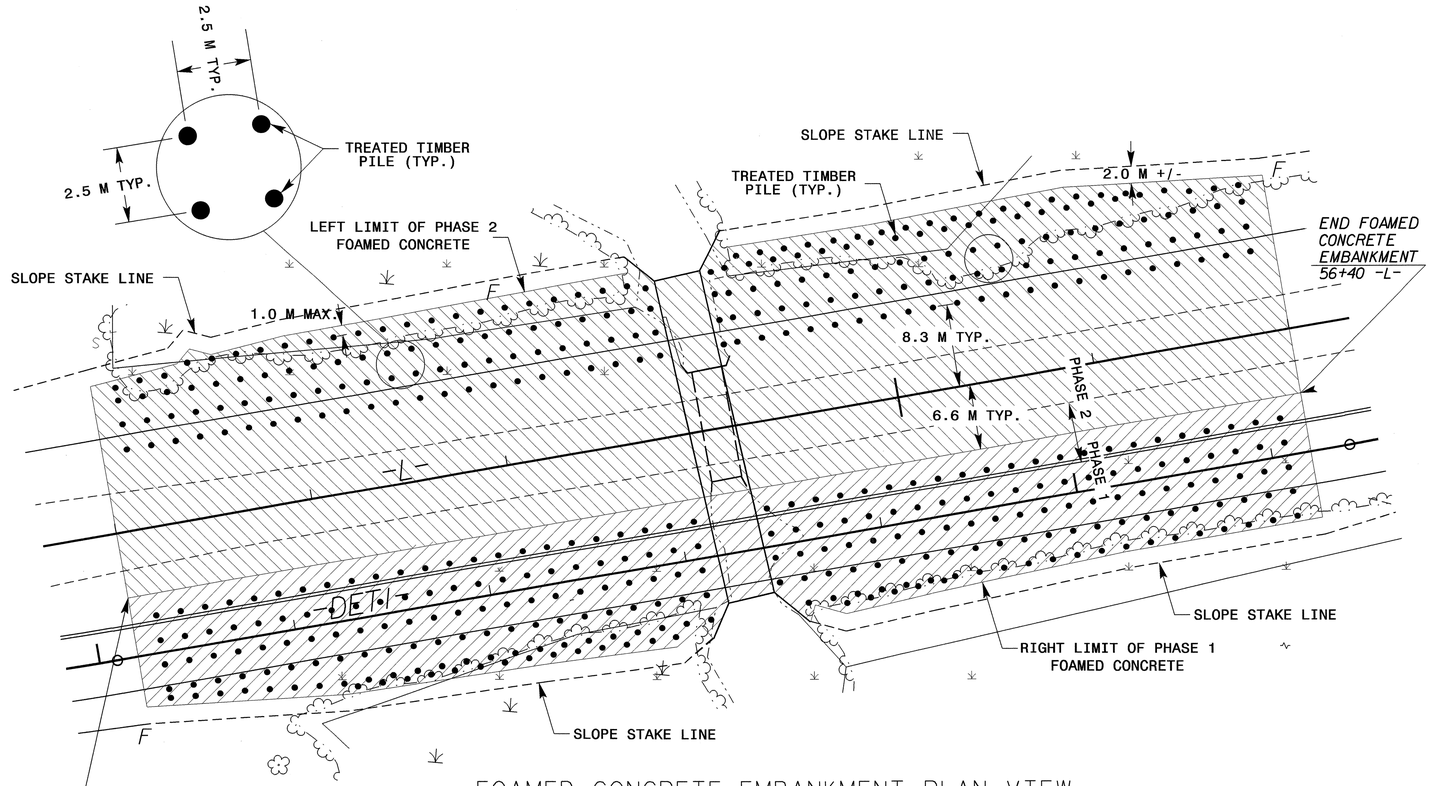
GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 032672 ENGINEER MICHAEL D. VALIQUETTE

SIGNATURE DATE

ENGINEER

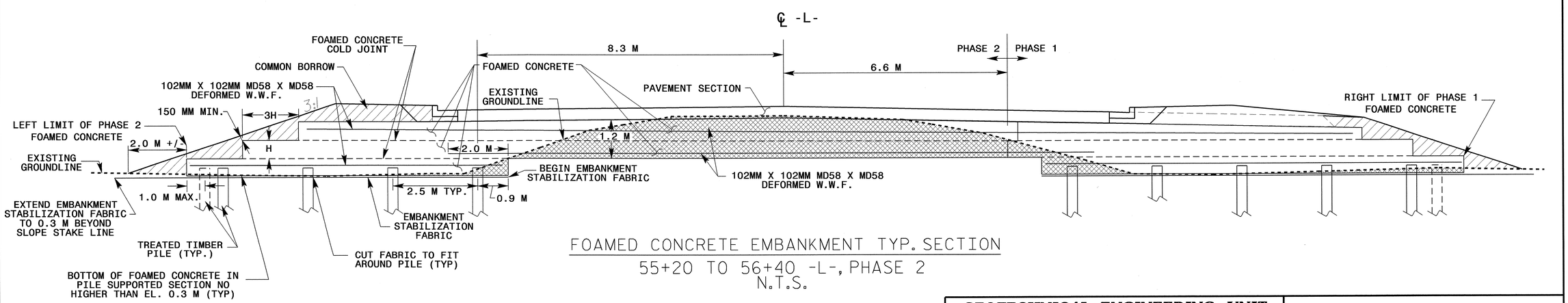
SIGNATURE DATE



FOAMED CONCRETE EMBANKMENT PLAN VIEW

55+20 TO 56+40 -L-, PHASE 2

N.T.S.



FOAMED CONCRETE EMBANKMENT TYP. SECTION

55+20 TO 56+40 -L-, PHASE 2

N.T.S.

PREPARED BY:	MDV	DATE:	8/2011
REVIEWED BY:	KJK	DATE:	8/2011

GEOTECHNICAL ENGINEERING UNIT

■ EASTERN REGIONAL OFFICE

☐ WESTERN REGIONAL OFFICE

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

FOAMED CONCRETE EMBANKMENT

55+20 TO 56+40 -L-, PHASE 2

REVISIONS

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

PROJECT REFERENCE NO.	SHEET
R-2414B	2-W

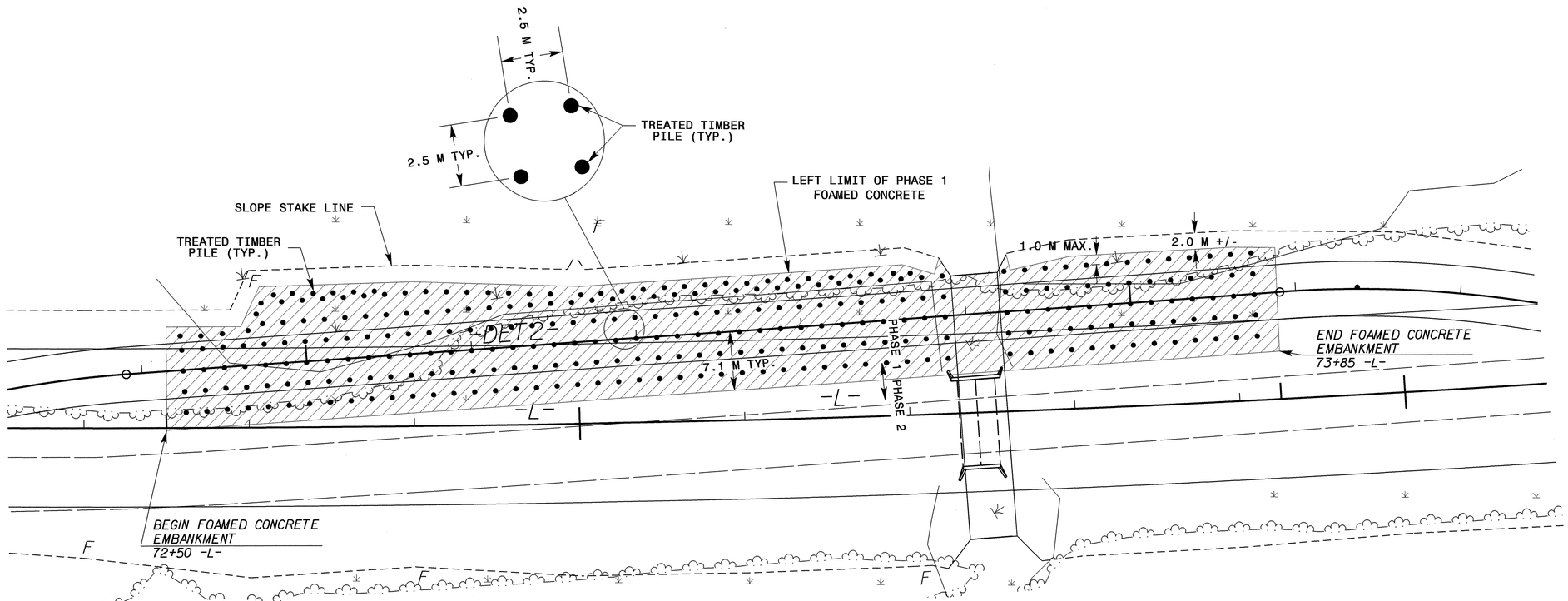
GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 032672 ENGINEER MICHAEL D. VALIULIS

SIGNATURE DATE

ENGINEER

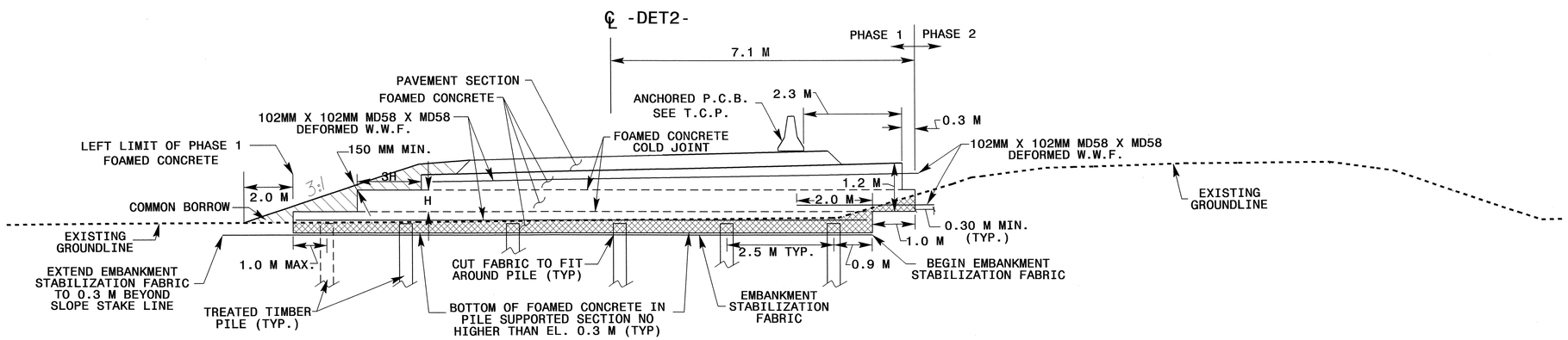
SIGNATURE DATE



FOAMED CONCRETE EMBANKMENT PLAN VIEW

72+50 TO 73+85 -L-, PHASE 1

N.T.S.



FOAMED CONCRETE EMBANKMENT TYP. SECTION

72+50 TO 73+85 -L-, PHASE 1

N.T.S.

PREPARED BY: MDV	DATE: 8/2011
REVIEWED BY: KJK	DATE: 8/2011

GEOTECHNICAL ENGINEERING UNIT

■ EASTERN REGIONAL OFFICE

☐ WESTERN REGIONAL OFFICE

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

FOAMED CONCRETE EMBANKMENT 72+50 TO 73+85 -L-, PHASE 1

REVISIONS

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

PROJECT REFERENCE NO.	SHEET
R-2414B	2-X

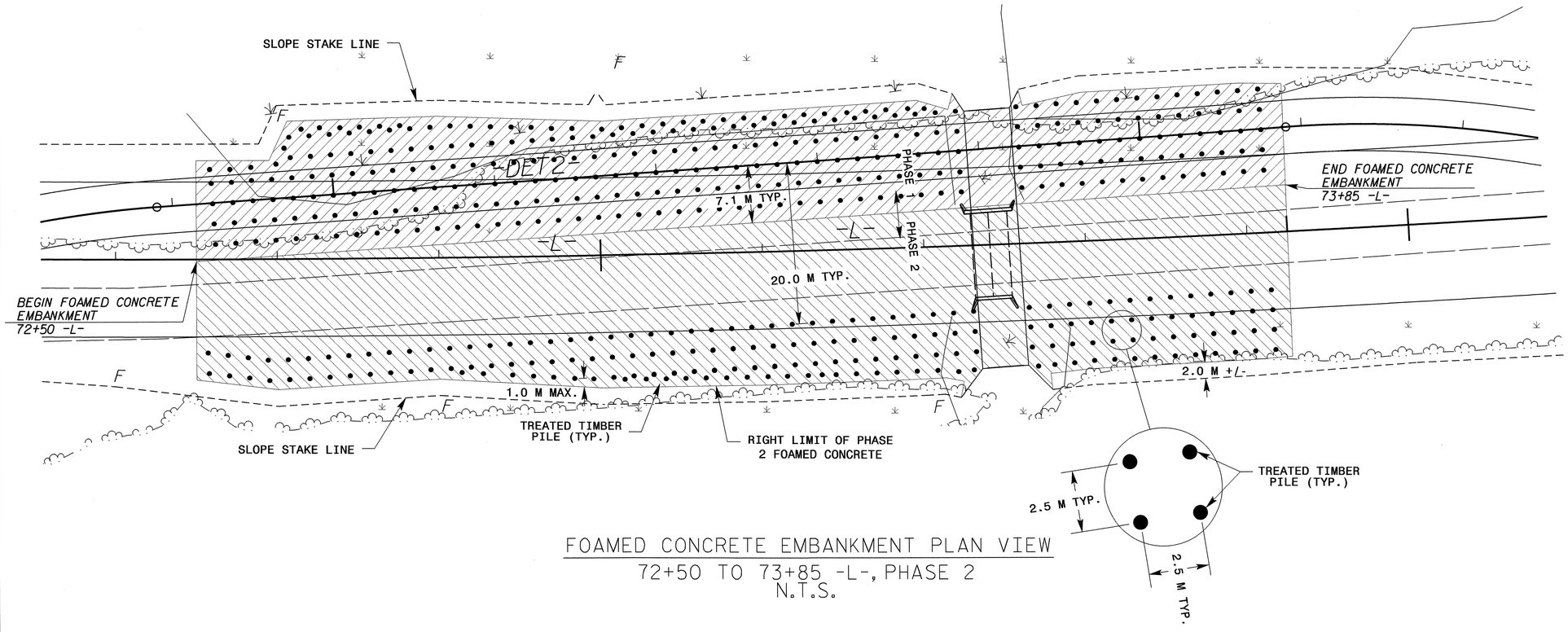
GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 032672 ENGINEER MICHAEL D. VALIQUETTE 12/6/12

SIGNATURE DATE

ENGINEER

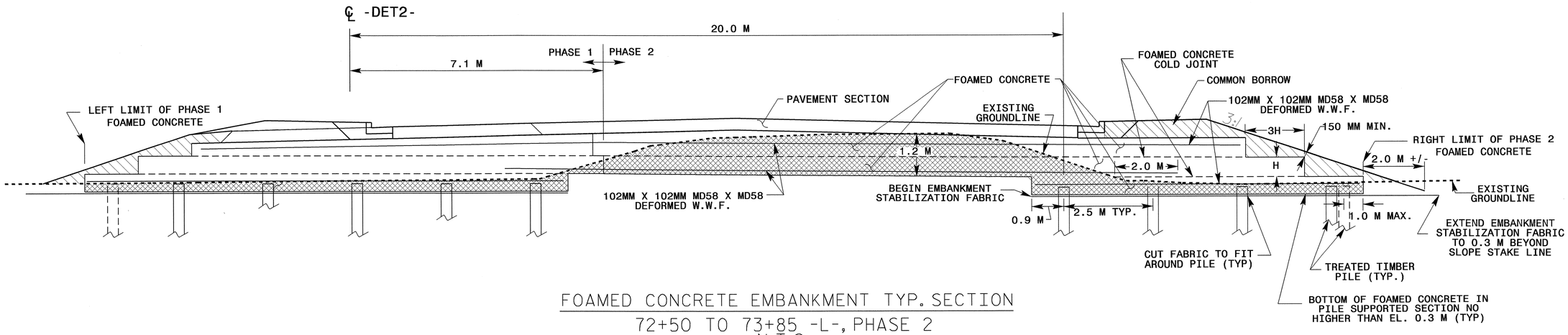
SIGNATURE DATE



FOAMED CONCRETE EMBANKMENT PLAN VIEW

72+50 TO 73+85 -L-, PHASE 2

N.T.S.



FOAMED CONCRETE EMBANKMENT TYP. SECTION

72+50 TO 73+85 -L-, PHASE 2

N.T.S.

GEOTECHNICAL ENGINEERING UNIT

■ EASTERN REGIONAL OFFICE

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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

FOAMED CONCRETE EMBANKMENT 72+50 TO 73+85 -L-, PHASE 2

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

PREPARED BY: MDV	DATE: 8/2011
REVIEWED BY: KJK	DATE: 8/2011

RD248630 12/29/2011 R2414B_GEO_Foamed_Concrete_Embankments_REV btkyle RD-Oce860-34

PROJECT REFERENCE NO.	SHEET
R-2414B	2-Y

GEOTECHNICAL ENGINEER — SIGNATURE — DATE

ENGINEER — SIGNATURE — DATE

NORTH CAROLINA PROFESSIONAL SEAL 032672 ENGINEER MICHAEL D. VALIONIS 12/14/11

NOTES

UNDERCUT AS NECESSARY TO BRING THE GROUND SURFACE TO THE BOTTOM OF FOAMED CONCRETE EMBANKMENT AS SHOWN ON THE PLANS

DRIVE TIMBER PILES FOR FOAMED CONCRETE EMBANKMENT FROM 55+20 TO 56+40 -L- TO A REQUIRED BEARING CAPACITY OF 480 KN PER PILE. THE REQUIRED BEARING CAPACITY IS EQUAL TO THE ALLOWABLE BEARING CAPACITY WITH A MINIMUM FACTOR OF SAFETY OF TWO.

THE ALLOWABLE BEARING CAPACITY FOR TIMBER PILES FOR FOAMED CONCRETE EMBANKMENT FROM 55+20 TO 56+40 -L- IS 240 KN PER PILE.

DRIVE TIMBER PILES FOR FOAMED CONCRETE EMBANKMENT FROM 72+50 TO 73+85 -L- TO A REQUIRED BEARING CAPACITY OF 450 KN PER PILE. THE REQUIRED BEARING CAPACITY IS EQUAL TO THE ALLOWABLE BEARING CAPACITY WITH A MINIMUM FACTOR OF SAFETY OF TWO.

THE ALLOWABLE BEARING CAPACITY FOR TIMBER PILES FOR FOAMED CONCRETE EMBANKMENT FROM 72+50 TO 73+85 -L- IS 225 KN PER PILE.

PILE CUTOFF ELEVATION SHALL BE 225 MM ABOVE BOTTOM OF FOAMED CONCRETE.

THE CONTRACTOR SHALL LOCATE TIMBER PILES ON A 2.5 M X 2.5 M SQUARE SPACING UNDER THE FOAMED CONCRETE EMBANKMENT. PILE LAYOUT SHOWN ON THE PLANS IS CONCEPTUAL ONLY AND WILL BE FIELD DETERMINED BASED ON THE ACTUAL EMBANKMENT WIDTH AND PILE SPACING.

SOFT SWAMPY SITE CONDITIONS WILL REQUIRE THE CONTRACTOR TO TAKE SPECIAL EFFORTS SUCH AS TIMBER MATS TO REACH PILE LOCATIONS. DO NOT USE PRODUCTION TIMBER PILES TO SUPPORT EQUIPMENT OR WORKING PLATFORM. SOIL/GRAVEL WORK PLATFORMS ON THE GROUND WILL NOT BE ALLOWED.

TESTING THE FIRST PRODUCTION PILES WITH THE PILE DRIVING ANALYZER DURING DRIVING, RESTRIKING, OR REDRIVING IS REQUIRED FOR BOTH PHASE 1 AND PHASE 2 OF FOAMED CONCRETE EMBANKMENT CONSTRUCTION. FOR PILE DRIVING ANALYZER, SEE SPECIAL PROVISIONS.

TREATED TIMBER PILES SHALL HAVE A MINIMUM DIAMETER OF 203 MM AS MEASURED 900 MM FROM THE PILE TIP.

SPLICE TIMBER PILES AS SHOWN ON THIS PLAN. ONLY ONE TIMBER PILE SPLICE IS ALLOWED PER PILE. SPLICING IS INCIDENTAL TO THE COST OF THE PILE.

TIMBER PILES SHALL BE MADE OF TREATED SOUTHERN YELLOW PINE. PILES SHALL BE TREATED TO A MINIMUM RETENTION OF 40 KG/M³(2.5 PCF) OF CCA AND SHALL MEET ALL THE REQUIREMENTS OF AWPA STANDARD C3.

PLACE EMBANKMENT STABILIZATION FABRIC WITH THE ROLL DIRECTION PERPENDICULAR TO THE CENTERLINE OF THE ROADWAY. CUT FABRIC AT PILE LOCATIONS AS NECESSARY TO FIT AROUND THE PILE.

ADJACENT EMBANKMENT STABILIZATION FABRIC SHALL BE OVERLAPPED A MINIMUM OF 1 METER IN THE CROSS-MACHINE DIRECTION. NO OVERLAPS ARE ALLOWED IN THE MACHINE DIRECTION. PAY QUANTITY FOR EMBANKMENT STABILIZATION FABRIC DOES NOT INCLUDE OVERLAPS.

FOR EMBANKMENT STABILIZATION FABRIC, SEE EMBANKMENT STABILIZATION FABRIC SPECIAL PROVISION.

BOTTOM WELDED WIRE FABRIC SHALL BE SUPPORTED AS NECESSARY TO MAINTAIN A MINIMUM OF 152 MM OF CLEARANCE BETWEEN THE WELDED WIRE FABRIC AND THE GROUND SURFACE.

TERMINATE WELDED WIRE FABRIC 15 CM FROM SIDES OF FOAMED CONCRETE EXCEPT AS WHERE SHOWN ON THE PLANS.

WELDED WIRE FABRIC SHALL BE DEFORMED AND EPOXY COATED. FOR WELDED WIRE FABRIC FOR FOAMED CONCRETE, SEE WELDED WIRE FABRIC FOR FOAMED CONCRETE SPECIAL PROVISION.

ADJACENT WELDED WIRE FABRIC PANELS SHALL BE OVERLAPPED A MINIMUM OF 300 MM ON ALL SIDES. PAY QUANTITY FOR WELDED WIRE FABRIC FOR FOAMED CONCRETE DOES NOT INCLUDE OVERLAPS.

WELDED WIRE FABRIC OVERLAPS PERPENDICULAR TO THE CENTERLINE SHALL BE STAGGERED BY 1.2 M MINIMUM.

THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING MEANS AND METHODS OF SUPPORTING WELDED WIRE FABRIC PRIOR TO AND DURING FOAMED CONCRETE PLACEMENT.

USE DURABLE NON-DEGRADABLE MATERIALS TO SUPPORT WELDED WIRE FABRIC.

FIRST LIFT OF FOAMED CONCRETE SHALL BE PLACED DIRECTLY ON EMBANKMENT STABILIZATION FABRIC OR GROUND SURFACE. ANY STANDING WATER SHALL BE PUMPED OFF PRIOR TO PLACING FOAMED CONCRETE.

FOR FOAMED CONCRETE, SEE FOAMED CONCRETE SPECIAL PROVISION.

FOAMED CONCRETE LIFTS SHALL BE A MINIMUM OF 23 CM AND A MAXIMUM OF 61 CM THICK, AND MAXIMUM LENGTH OF 60 METERS.

TOP WELDED WIRE FABRIC SHALL BE SUPPORTED AS NECESSARY TO MAINTAIN A MINIMUM OF 15 CM OF CLEARANCE BETWEEN THE MESH AND TOP OF FOAMED CONCRETE.

TOP LIFT OF FOAMED CONCRETE SHALL BE PLACED UP TO THE BOTTOM OF THE TYPICAL PAVEMENT SECTION. THE PAVEMENT SECTION WILL BE PLACED DIRECTLY ON THE TOP OF THE FOAMED CONCRETE.

TOP LIFT OF FOAMED CONCRETE SHALL HAVE THE SAME GRADE AND SLOPE AS THE TYPICAL PAVEMENT SECTION.

NO EQUIPMENT WILL BE ALLOWED ON THE FOAMED CONCRETE UNTIL THE TOP LIFT HAS BEEN POURED AND HAS REACHED SPECIFIED 28-DAY COMPRESSIVE STRENGTH.

PREPARED BY: MDV	DATE: 8/2011
REVIEWED BY: KJK	DATE: 8/2011

FOAMED CONCRETE EMBANKMENT 55+20 TO 56+40 -L-
ESTIMATED QUANTITIES

UNDERCUT EXCAVATION	2,604 C.M.
EMBANKMENT STABILIZATION FABRIC	3,125 SO.M. (1)
WELDED WIRE FABRIC FOR FOAMED CONCRETE	8,402 SO.M. (1)
FOAMED CONCRETE	5,886 C.M
TREATED TIMBER PILES	8,800 L.M (2) (4)
PDA TESTING	4 EA
PDA ASSISTANCE	4 EA

(2) ESTIMATED LENGTH OF TIMBER PILES IS 20.0 M EACH.

FOAMED CONCRETE EMBANKMENT 72+50 TO 73+85 -L-
ESTIMATED QUANTITIES

UNDERCUT EXCAVATION	2,385 C.M.
EMBANKMENT STABILIZATION FABRIC	3,420 SO.M. (1)
WELDED WIRE FABRIC FOR FOAMED CONCRETE	9,086 SO.M. (1)
FOAMED CONCRETE	5,398 C.M
TREATED TIMBER PILES	10,318 L.M (3) (4)
PDA TESTING	4 EA
PDA ASSISTANCE	4 EA

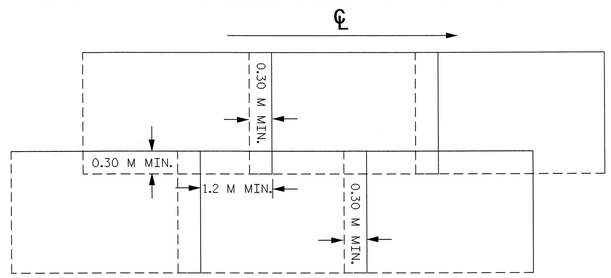
(3) ESTIMATED LENGTH OF TIMBER PILES IS 22.0 M EACH.

(1) EMBANKMENT STABILIZATION FABRIC AND WELDED WIRE FABRIC QUANTITY DOES NOT INCLUDE OVERLAPS OR WASTE.

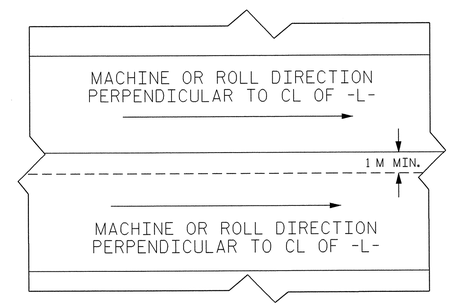
(4) THE ESTIMATED PILE LENGTH IS FOR BID PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING AND FURNISHING TIMBER PILING OF SUFFICENT LENGTH TO OBTAIN THE REQUIRED BEARING CAPACITY AND REQUIRED EMBEDMENT INTO THE FOAMED CONCRETE AS NOTED ON THE PLANS.

TOTAL COMBINED FOAMED CONCRETE EMBANKMENT
ESTIMATED QUANTITIES

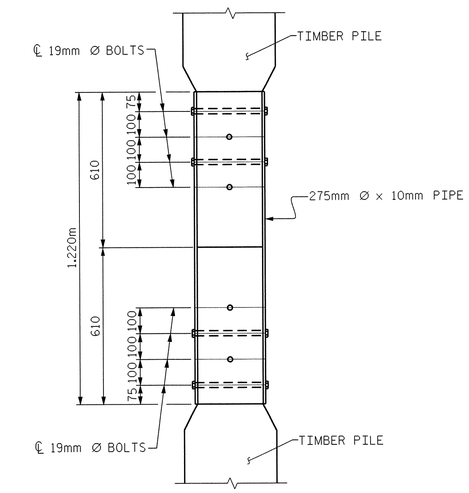
UNDERCUT EXCAVATION	4,989 C.M.
EMBANKMENT STABILIZATION FABRIC	6,545 SO.M. (1)
WELDED WIRE FABRIC FOR FOAMED CONCRETE	17,488 SO.M. (1)
FOAMED CONCRETE	11,284 C.M
TREATED TIMBER PILES	19,118 L.M (4)
PDA TESTING	8 EA
PDA ASSISTANCE	8 EA



WELDED WIRE FABRIC
FOR FOAMED CONCRETE
OVERLAP DETAIL
PLAN VIEW
NTS



EMBANKMENT STABILIZATION FABRIC
OVERLAP DETAIL
PLAN VIEW
NTS



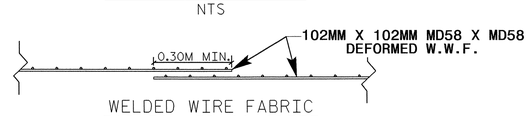
TIMBER PILE SPICE

NOTES: ENDS OF PILES AT SPLICE LOCATION SHALL HAVE A MINIMUM DIAMETER OF 255mm.

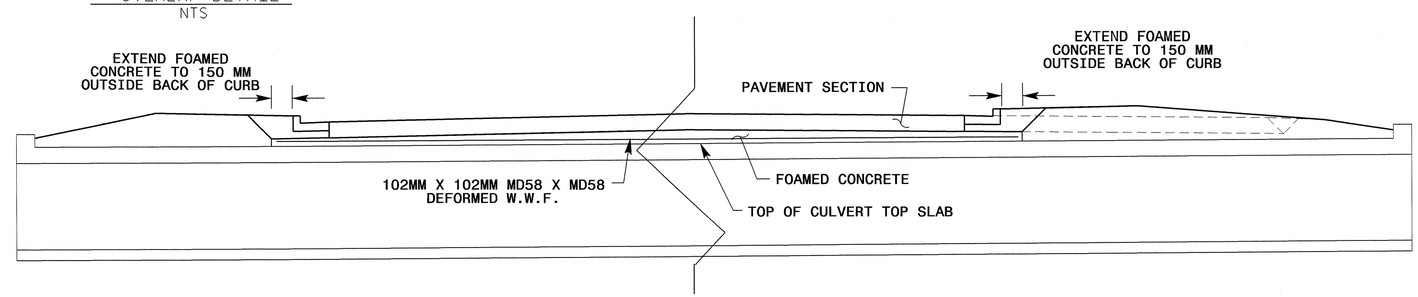
DIAMETER OF HOLES THRU TIMBER PILES SHALL BE 2mm LESS THAN BOLT DIAMETER FOR TIGHT FIT.

THE TOP OF THE PILE SPLICE SHALL BE DRIVEN A MINIMUM OF 2.50m BELOW GROUND.

PIPES, BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.



WELDED WIRE FABRIC
FOR FOAMED CONCRETE
OVERLAP DETAIL
NTS



FOAMED CONCRETE TYP. SECTION AT CULVERTS
CULVERT 1 AND CULVERT 2
N.T.S.

GEOTECHNICAL ENGINEERING UNIT

■ EASTERN REGIONAL OFFICE
☐ WESTERN REGIONAL OFFICE

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

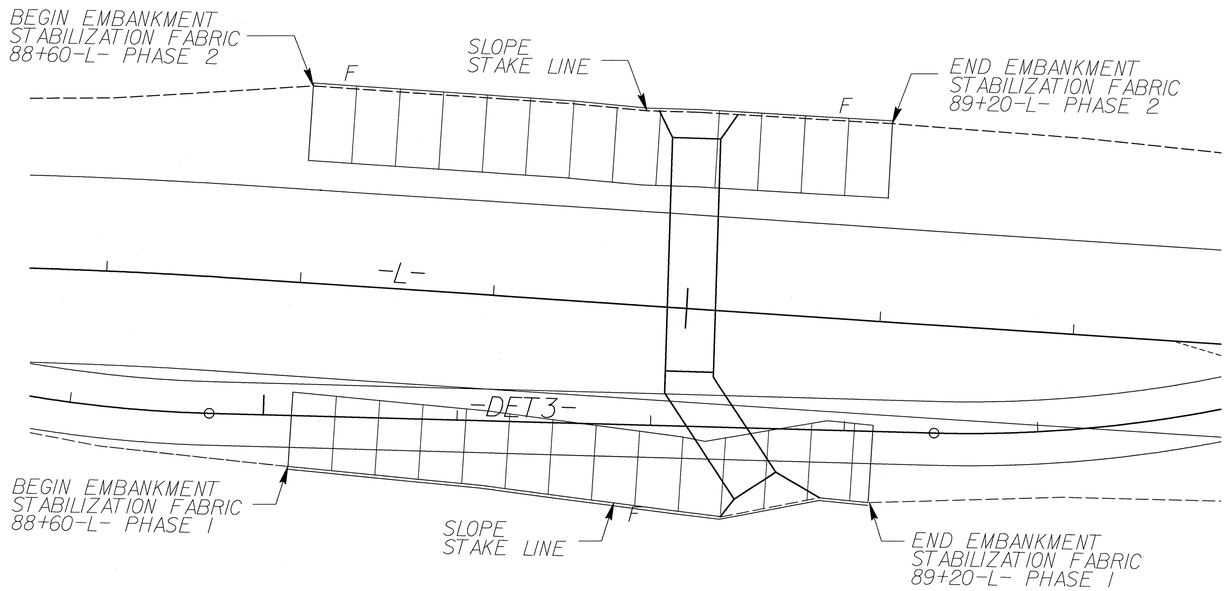
FOAMED CONCRETE
EMBANKMENT NOTES AND DETAILS
55+20 TO 56+40 -L-
72+50 TO 73+85 -L-

REVISIONS

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

PROJECT REFERENCE NO.	SHEET
R-2414B	2-Z

GEOTECHNICAL ENGINEER	ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 032672 ENGINEER MICHAEL D. VALIQUETTE 1/6/12	
SIGNATURE DATE	SIGNATURE DATE



EMBANKMENT STABILIZATION FABRIC PLAN VIEW

88+60 TO 89+20 -L-
N.T.S.

NOTES

PERFORM UNDERCUT AS SHOWN ON THE ROADWAY CROSS-SECTIONS.

BACKFILL UNDERCUT EXCAVATION WITH SELECT MATERIAL, CLASS III TO 30 CM ABOVE THE WATER SURFACE PRIOR TO PLACING EMBANKMENT STABILIZATION FABRIC.

PLACE EMBANKMENT STABILIZATION FABRIC WITH THE ROLL DIRECTION PERPENDICULAR TO THE CENTERLINE OF THE ROADWAY.

ADJACENT EMBANKMENT STABILIZATION FABRIC SHALL BE OVERLAPPED A MINIMUM OF 1 METER IN THE CROSS-MACHINE DIRECTION. NO OVERLAPS ARE ALLOWED IN THE MACHINE DIRECTION. PAY QUANTITY FOR EMBANKMENT STABILIZATION FABRIC DOES NOT INCLUDE OVERLAPS.

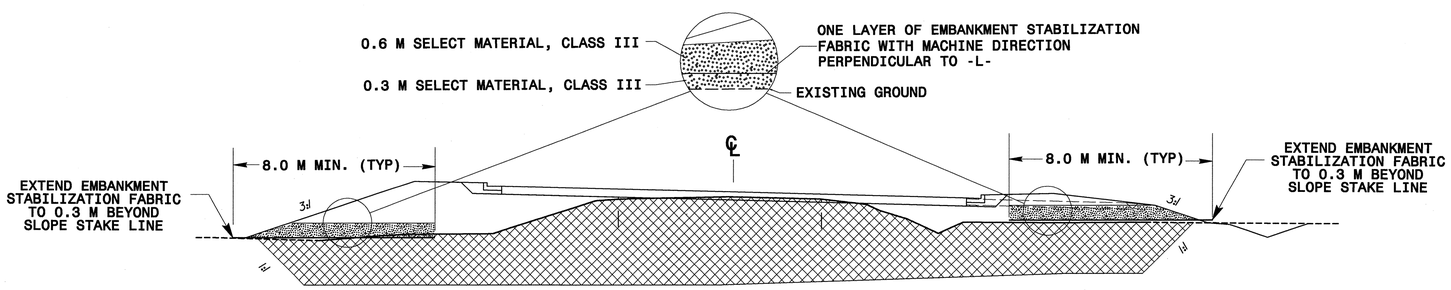
FOR EMBANKMENT STABILIZATION FABRIC, SEE EMBANKMENT STABILIZATION FABRIC SPECIAL PROVISION.

BACKFILL TO 60 CM ABOVE EMBANKMENT STABILIZATION FABRIC WITH SELECT MATERIAL, CLASS III.

OBSERVE A 2 MONTH WAITING PERIOD FOR PHASE 1 AND PHASE 2, EACH, AFTER CONSTRUCTING THE EMBANKMENT TO 0.6 METERS ABOVE THE FINAL GRADE ELEVATION. THE FINAL GRADE ELEVATION IS THE TOP OF PAVEMENT ELEVATION SHOWN IN THE ROADWAY PLANS. MAINTAIN THE EMBANKMENT TO 0.6 METERS ABOVE THE FINAL GRADE ELEVATION THROUGHOUT THE WAITING PERIOD.

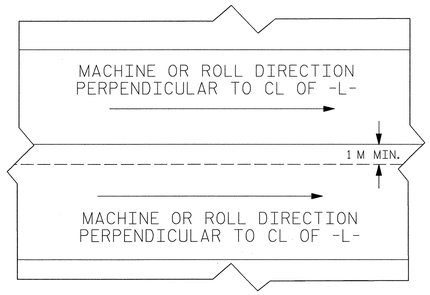
DO NOT BEGIN PHASE 1 OR PHASE 2 CULVERT CONSTRUCTION UNTIL AFTER THE WAITING PERIODS ARE COMPLETE.

0.6M SURCHARGE AND WAITING PERIOD			
BEGIN STATION	END STATION	ESTIMATED WAITING PERIOD	
		PHASE I	PHASE II
88 + 60 ± -L-	89 + 20 ± -L-	2 MONTHS	2 MONTHS



EMBANKMENT STABILIZATION FABRIC TYPICAL SECTION

88+60 TO 89+20 -L-
N.T.S.



EMBANKMENT STABILIZATION FABRIC OVERLAP DETAIL PLAN VIEW

NTS

EMBANKMENT STABILIZATION FABRIC 88+60 TO 89+20 -L-
ESTIMATED QUANTITIES

EMBANKMENT STABILIZATION FABRIC.....960 SQ.M. (1)
SELECT GRANULAR MATERIAL, CLASS III.....6,884 C.M. (2)
UNDERCUT EXCAVATION.....6,231 C.M.

(1) EMBANKMENT STABILIZATION FABRIC QUANTITY DOES NOT INCLUDE OVERLAPS OR WASTE.
(2) SELECT MATERIAL, CLASS III QUANTITY SHOWN INCLUDES UNDERCUT BACKFILL QUANTITY.

PREPARED BY: MDV	DATE: 8/2011
REVIEWED BY: KJK	DATE: 8/2011

GEOTECHNICAL ENGINEERING UNIT

■ EASTERN REGIONAL OFFICE
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

EMBANKMENT STABILIZATION FABRIC 88+60 TO 89+20 -L-

REVISIONS

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

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-AA

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

ENGLISH DETAIL DRAWING FOR

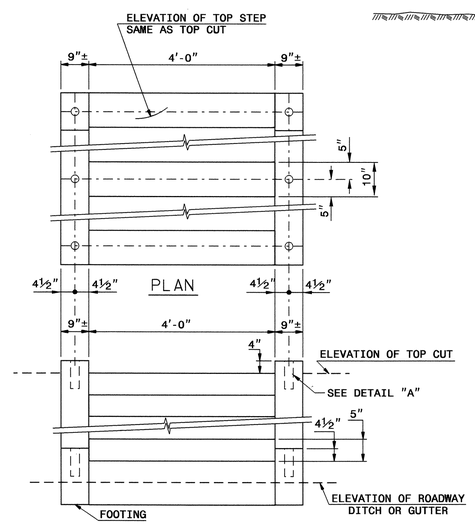
CONCRETE STEPS WITH HANDRAIL

GENERAL NOTES :

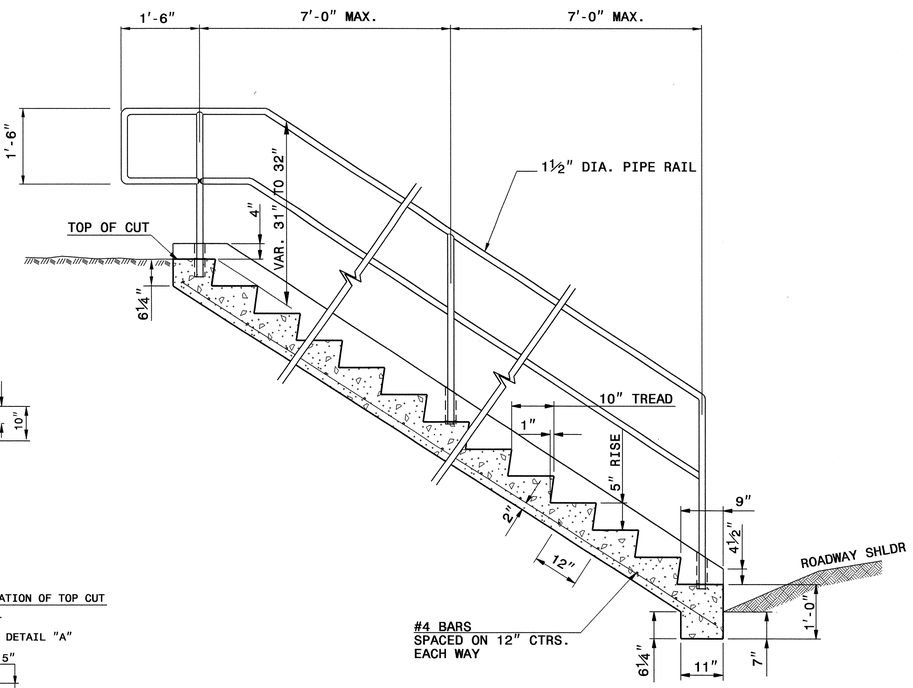
1- CONSTRUCT PROPOSED STEEL PIPE RAIL OF 1½" DIAMETER SCHEDULE 40 PLAIN END GALVANIZED STEEL PIPE MEETING THE REQUIREMENTS OF ASTM A53. EMBED PIPE RAIL 8" INTO PROPOSED STEPS WITH CHEMICAL OR CONCRETE GROUT ANCHORING SYSTEM AS DIRECTED BY THE ENGINEER.
2- USE A ROTARY DRILL FOR DRILLING THE HOLES FOR THE PIPE RAIL. NO IMPACT DRILLS ALLOWED.
3- USE CLASS "B" CONCRETE THROUGHOUT FOR CONCRETE STEPS.
4- LOCATION AND QUANTIES SHOWN ARE APPROXIMATE ONLY. EXACT LOCATION AND QUANTIES WILL BE DETERMINED BY THE ENGINEER.
5- ALL WORK AS DIRECTED BY THE ENGINEER.
6- REPAIR OF GALVANIZING IN ACCORDANCE WITH SCT.1076 OF THE STANDARD SPECIFICATIONS.
7- WELD IN ACCORDANCE WITH ARTICLE 1072-20 OF THE STANDARD SPECIFICATIONS.
8- 2" CLEAR SPACING ON ALL REINFORCING BARS.
9- EXTEND HORIZONTAL REINFORCING BARS UPWARD INTO SIDE WALLS.

BILL OF MATERIALS		
2 STEPS	CONCRETE (CUBIC YARDS)	.347 YDS.
	REINFORCING STEEL (POUNDS)	19.4 #
EACH ADDITIONAL STEPS	CONCRETE (CUBIC YARDS)	.153 YDS.
	REINFORCING STEEL (POUNDS)	8.85 #

DETAIL "A"



FRONT ELEVATION



SECTION
CONCRETE STEPS

SHEET 1 OF 1
844D01

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

ENGLISH DETAIL DRAWING FOR
CONCRETE STEPS WITH HANDRAIL

SHEET 1 OF 1
844D01

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER JOEL R. HOCUTT
11/1/10

CONTRACT STANDARDS
AND DEVELOPMENT UNIT
Office 919-250-4128 FAX 919-250-4119

SEE PLATE FOR TITLE

ORIGINAL BY: T.Spell DATE: Oct.7,1998
MODIFIED BY: DATE:
CHECKED BY: DATE: 11/1/10
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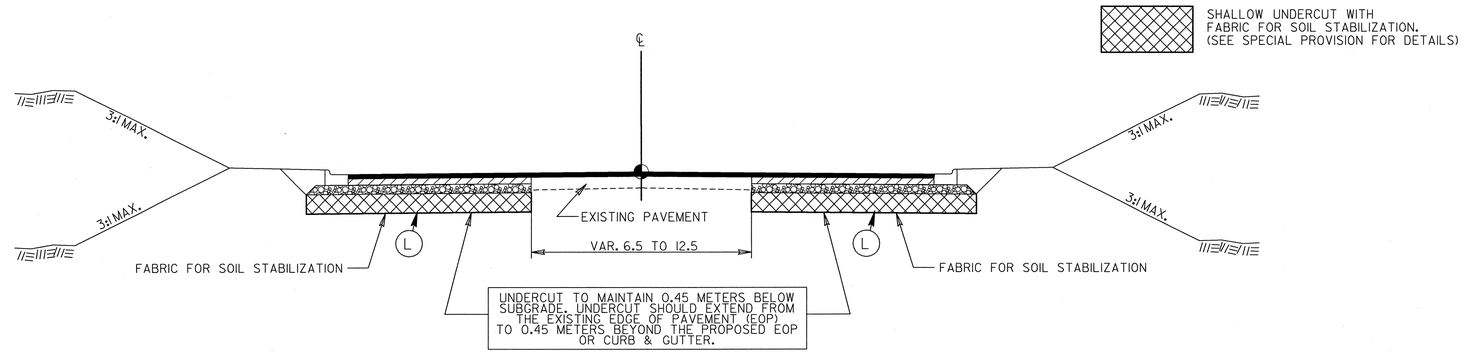
WETHERILL ENGINEERING
559 Jones Franklin Rd. Suite 164
Raleigh, N.C. 27606
Liscense No. F-0377
Bus: 919 851 8077
Fax: 919 851 8107
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	2-AB
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 12-19-11

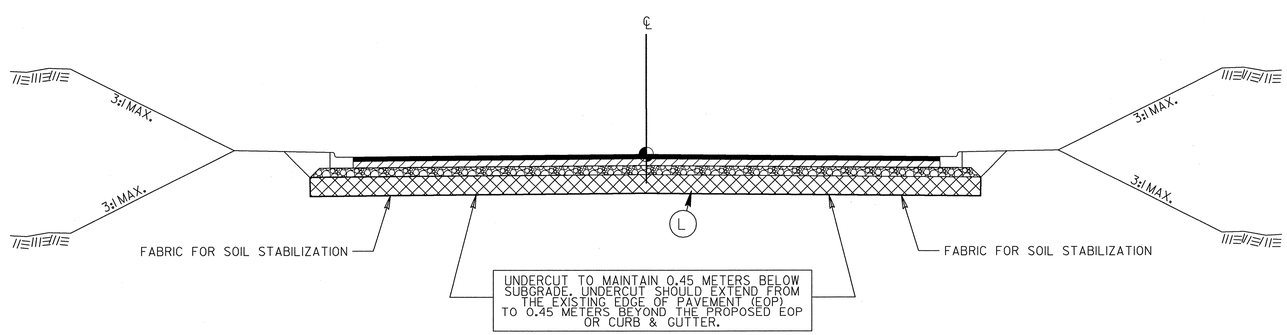
SHALLOW UNDERCUT TYPICAL SECTION NO. 1



USE DETAIL FOR SHALLOW UNDERCUT IN CONJUNCTION WITH TYPICAL SECTION NOS. 1, 4, 5, 6, 7, 8, 9, 10 & 11 AT THE FOLLOWING LOCATIONS

STA. 45+68.873 -L- TO STA. 52+30.000 -L-
STA. 53+00.000 -L- TO STA. 55+20.000 -L-
STA. 56+40.000 -L- TO STA. 72+50.000 -L-
STA. 74+12.000 -L- TO STA. 88+54.592 -L-
STA. 89+25.457 -L- TO STA. 90+80.000 -L-
STA. 93+02.145 -L- TO STA. 93+92.145 -L-
STA. 10+12.000 -Y- TO STA. 11+30.000 -Y-
STA. 10+06.000 -Y1- TO STA. 11+15.000 -Y1-
STA. 10+12.000 -Y2- TO STA. 11+10.000 -Y2-
STA. 10+01.000 -Y3- TO STA. 11+54.000 -Y3-
STA. 10+05.000 -Y4- TO STA. 11+57.000 -Y4-
STA. 10+19.000 -Y7- TO STA. 12+01.000 -Y7-

SHALLOW UNDERCUT TYPICAL SECTION NO. 2



USE DETAIL FOR SHALLOW UNDERCUT IN CONJUNCTION WITH TYPICAL SECTION NOS. 2, 3 & 13 AT THE FOLLOWING LOCATIONS

STA. 52+30.000 -L- TO STA. 53+00.000 -L-
STA. 73+85.000 -L- TO STA. 74+12.000 -L-
STA. 88+54.592 -L- TO STA. 88+60.000 -L-
STA. 89+20.000 -L- TO STA. 89+25.457 -L-
STA. 90+80.000 -L- TO STA. 93+02.145 -L-
STA. 11+67.000 -Y8- TO STA. 12+36.000 -Y8-

PAVEMENT SCHEDULE

C1	80 mm S9.5B
C2	VAR. S9.5B
C3	80 mm S9.5C
C4	VAR. S9.5C
D1	65 mm I19.0B
D2	VAR. I19.0B
D3	100 mm I19.0C
D4	65 mm I19.0C
D5	VAR. I19.0C
E1	130 mm B25.0B
E2	VAR. B25.0B
E3	130 mm B25.0C
E4	VAR. B25.0C
J	150 mm ABC
L	CLASS IV SUBGRADE STABILIZATION
N	FABRIC STABILIZATION
R1	750 mm CONCRETE CURB & GUTTER
R2	125 mm MONOLITHIC CONC. ISLAND
S	100 mm CONCRETE SIDEWALK
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	WEDGING (SEE SHEET 2 FOR DETAIL)

NOTE: ALL PAVEMENT SLOPES ARE 1:1 UNLESS OTHERWISE NOTED.

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12/15/2011

PROJECT REFERENCE NO.	SHEET
R-2414 B	2-AC

GEOTECHNICAL ENGINEER

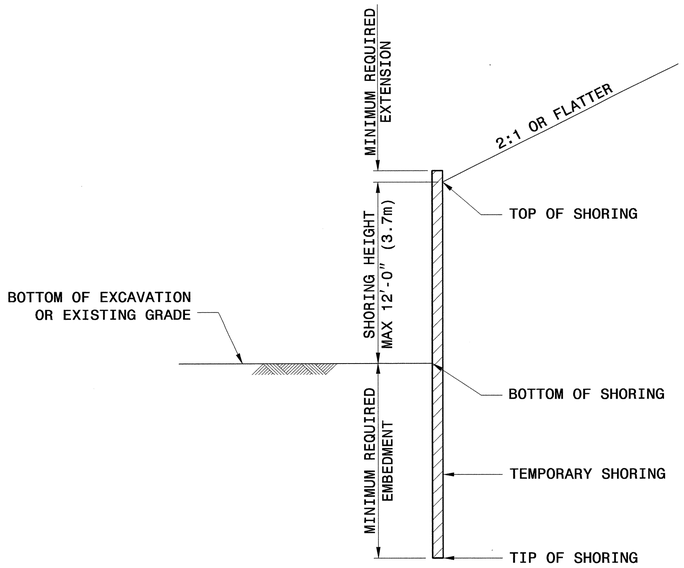
NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

Scott A. Hidden 1/6/12

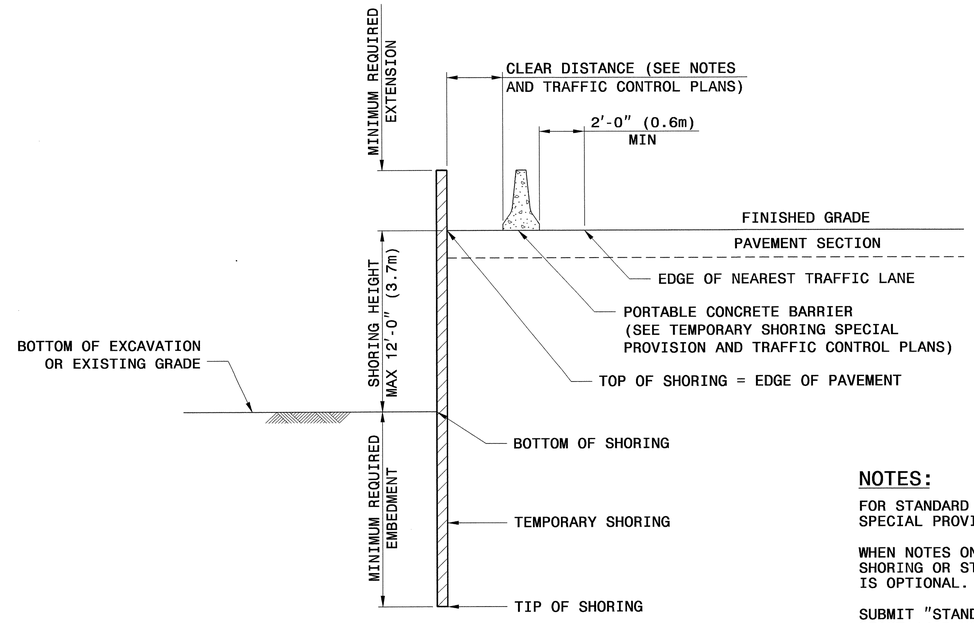
SIGNATURE DATE

ENGINEER

SIGNATURE DATE



SLOPE CASE



SURCHARGE CASE

		SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT					SURCHARGE CASE WITH TRAFFIC IMPACT				
		SHEET PILES		H PILES WITH TIMBER LAGGING			SHEET PILES		H PILES WITH TIMBER LAGGING		
				MINIMUM REQUIRED EMBEDMENT FT (m)					MINIMUM REQUIRED EMBEDMENT FT (m)		
GROUNDWATER CONDITION	SHORING HEIGHT FT (m)	MINIMUM REQUIRED EMBEDMENT FT (m)	MINIMUM REQUIRED SECTION MODULUS IN^3/FT (cm^3/m)	HP 10x42 (HP 250x62)	HP 12x53 (HP 310x79)	HP 14x73 (HP 360x108)	MINIMUM REQUIRED EMBEDMENT FT (m)	MINIMUM REQUIRED SECTION MODULUS IN^3/FT (cm^3/m)	HP 10x42 (HP 250x62)	HP 12x53 (HP 310x79)	HP 14x73 (HP 360x108)
GROUNDWATER ELEVATION BELOW TIP OF SHORING	< 6 (1.8)	7.5 (2.3)	3.0 (161)	8.0 (2.4)	8.0 (2.4)	8.0 (2.4)	11.0 (3.4)	10.0 (538)	9.5 (2.9)	9.5 (2.9)	9.5 (2.9)
	7 (2.1)	8.5 (2.6)	4.5 (242)	9.5 (2.9)	9.5 (2.9)	9.5 (2.9)	12.0 (3.7)	12.0 (645)	10.5 (3.2)	10.5 (3.2)	10.5 (3.2)
	8 (2.4)	10.0 (3.0)	6.5 (349)	10.5 (3.2)	10.5 (3.2)	10.5 (3.2)	12.5 (3.8)	14.0 (753)	11.5 (3.5)	11.5 (3.5)	11.5 (3.5)
	9 (2.7)	11.0 (3.4)	9.5 (511)	--	12.0 (3.7)	12.0 (3.7)	13.5 (4.1)	16.5 (887)	--	12.5 (3.8)	12.5 (3.8)
	10 (3.0)	12.5 (3.8)	13.0 (699)	--	--	13.5 (4.1)	14.0 (4.3)	19.5 (1048)	--	13.5 (4.1)	13.5 (4.1)
	11 (3.4)	13.5 (4.1)	17.0 (914)	--	--	14.5 (4.4)	15.0 (4.6)	22.5 (1210)	--	--	14.5 (4.4)
	12 (3.7)	15.0 (4.6)	21.5 (1156)	--	--	16.0 (4.9)	16.0 (4.9)	25.5 (1371)	--	--	15.5 (4.7)
GROUNDWATER ELEVATION BEWTEEN BOTTOM OF SHORING AND TIP OF SHORING	< 6 (1.8)	11.5 (3.5)	4.5 (242)	11.5 (3.5)	11.5 (3.5)	11.5 (3.5)	16.0 (4.9)	12.0 (645)	13.0 (4.0)	13.0 (4.0)	13.0 (4.0)
	7 (2.1)	13.0 (4.0)	7.0 (376)	13.0 (4.0)	13.0 (4.0)	13.0 (4.0)	17.0 (5.2)	14.5 (780)	14.5 (4.4)	14.5 (4.4)	14.5 (4.4)
	8 (2.4)	15.0 (4.6)	10.0 (538)	--	15.0 (4.6)	15.0 (4.6)	18.0 (5.5)	17.0 (914)	--	15.5 (4.7)	15.5 (4.7)
	9 (2.7)	17.0 (5.2)	14.0 (753)	--	17.0 (5.2)	17.0 (5.2)	19.0 (5.8)	20.0 (1075)	--	17.0 (5.2)	17.0 (5.2)
	10 (3.0)	18.5 (5.6)	19.5 (1048)	--	--	18.5 (5.6)	20.0 (6.1)	23.5 (1263)	--	--	18.5 (5.6)
	11 (3.4)	20.5 (6.3)	26.0 (1398)	--	--	--	21.0 (6.4)	28.0 (1505)	--	--	20.0 (6.1)
	12 (3.7)	22.5 (6.9)	33.0 (1774)	--	--	--	22.0 (6.7)	33.0 (1774)	--	--	21.5 (6.6)

NOTE: MINIMUM REQUIRED EXTENSION IS 6" (150mm) FOR "SLOPE OR SURCHARGE CASE WITH NO TRAFFIC IMPACT" AND 32" (800 mm) FOR "SURCHARGE CASE WITH TRAFFFIC IMPACT".

NOTES:

FOR STANDARD TEMPORARY SHORING, SEE TEMPORARY SHORING SPECIAL PROVISION.

WHEN NOTES ON PLANS DO NOT PROHIBIT STANDARD TEMPORARY SHORING OR STANDARD SHORING, STANDARD TEMPORARY SHORING IS OPTIONAL.

SUBMIT "STANDARD TEMPORARY SHORING SELECTION FORM" AT LEAST 14 DAYS BEFORE BEGINNING SHORING CONSTRUCTION. UP TO THREE LOCATIONS MAY BE INCLUDED ON EACH SELECTION FORM.

STANDARD TEMPORARY SHORING IS BASED ON THE FOLLOWING CONDITIONS:
1) MAXIMUM SHORING HEIGHT IS 12'-0" (3.7m).
2) TRAFFIC SURCHARGE IS 240 PSF (11.5 KPA) MAXIMUM OR BACKSLOPE IS 2:1 (H:V) OR FLATTER.
3) BOTTOM OF EXCAVATION OR EXISTING GRADE IN FRONT OF SHORING IS 6:1 (H:V) SLOPE OR FLATTER.
4) H PILE SPACING IS 6'-0" (1.8m).
5) H PILE EMBEDMENT DEPTHS ARE FOR DRIVEN PILES.
6) TIMBER LAGGING IS A MINIMUM OF 3" (75mm) THICK.

STANDARD TEMPORARY SHORING IS BASED ON THE FOLLOWING IN-SITU ASSUMED SOIL PARAMETERS:
TOTAL UNIT WEIGHT = 120 PCF (18.8 KN/M^3)
FRICTION ANGLE = 30 DEGREES
COHESION = 0 PSF (0 KPA)
GROUNDWATER IS ASSUMED TO BE BELOW BOTTOM OF SHORING.

DO NOT USE STANDARD TEMPORARY SHORING WHEN THE ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE OR GROUNDWATER IS ABOVE THE BOTTOM OF SHORING.

DO NOT USE STANDARD TEMPORARY SHORING WHEN VERY LOOSE OR SOFT SOIL OR MUCK IS PRESENT WITHIN THE EMBEDMENT DEPTH.

VERIFY GROUNDWATER ELEVATION BEFORE BEGINNING SHORING CONSTRUCTION.

IF THE CLEAR DISTANCE AVAILABLE IS LESS THAN THE MINIMUM REQUIRED IN ACCORDANCE WITH THE TRAFFIC CONTROL PLANS, SET THE BARRIER AGAINST THE TRAFFIC SIDE OF THE SHORING AND USE THE "SURCHARGE CASE WITH TRAFFIC IMPACT".

AT THE CONTRACTOR'S OPTION, H PILE EMBEDMENT DEPTHS FOR PILES SET IN DRILLED HOLES MAY BE REDUCED BY 25%. FOR PILE EXCAVATION, SEE TEMPORARY SHORING SPECIAL PROVISION.

CONTROL DRAINAGE DURING CONSTRUCTION IN THE VICINITY OF THE SHORING. COLLECT AND DIRECT RUNOFF AWAY FROM SHORING.

CONTACT THE ENGINEER IF MINIMUM REQUIRED EMBEDMENT IS NOT ACHIEVED.

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

STANDARD DRAWING NO. 1801.01

STANDARD TEMPORARY SHORING

DATE: 2-20-07

PROJECT REFERENCE NO.	SHEET
R-2414B	2-AD

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

Scott A. Hidden 1/6/12

SIGNATURE DATE

ENGINEER

SIGNATURE DATE

STANDARD TEMPORARY MSE WALL OPTIONS

TEMPORARY MSE WALL OPTION	VENDOR	CONTACT INFORMATION	REINFORCEMENT TYPE	SHEETS
TEMPORARY FABRIC WALL	N/A	N/A	POLYESTER OR POLYPROPYLENE FABRIC	3
HILFIKER TEMPORARY WALL	HILFIKER RETAINING WALLS	1902 HILFIKER LANE, EUREKA, CA 95503-5711 707-443-5093 WWW.HILFIKER.COM	WELDED WIRE MAT	4
SIERRASCAPE TEMPORARY WALL	TENSAR EARTH TECHNOLOGIES, INC	5883 GLENRIDGE DRIVE, SUITE 200 ATLANTA, GA 30328-5363 404-250-1290 WWW.TENSARCORP.COM	GEOGRID	5
RETAINED EARTH TEMPORARY WALL	THE REINFORCED EARTH COMPANY	8614 WESTWOOD CENTER DRIVE, SUITE 1100 VIENNA, VA 22182-2233 703-749-4325 WWW.REINFORCEDEARTH.COM	WELDED WIRE MESH	6-8
TERRATREL TEMPORARY WALL	THE REINFORCED EARTH COMPANY	8614 WESTWOOD CENTER DRIVE, SUITE 1100 VIENNA, VA 22182-2233 703-749-4325 WWW.REINFORCEDEARTH.COM	RIBBED STEEL STRIPS	9-11

FOR STANDARD TEMPORARY MSE WALLS, SEE TEMPORARY SHORING SPECIAL PROVISION.

WHEN NOTES ON PLANS DO NOT PROHIBIT TEMPORARY MSE WALLS OR STANDARD SHORING, STANDARD TEMPORARY MSE WALLS ARE OPTIONAL.

WHEN NOTES ON PLANS REQUIRE TEMPORARY MSE WALLS, USE STANDARD TEMPORARY MSE WALLS OR CONTRACTOR DESIGNED TEMPORARY MSE WALLS.

WHEN THE ALIGNMENT OF STANDARD TEMPORARY MSE WALLS RESULTS IN AN INTERIOR ANGLE LESS THAN 90 DEGREES, SUBMIT AN ACUTE CORNER DETAIL FOR THE SPECIFIC SITUATION IN ACCORDANCE WITH THE WALL VENDOR RECOMMENDATIONS. ALSO, SUBMIT A "STANDARD TEMPORARY MSE WALL SELECTION FORM" FOR EACH TEMPORARY MSE WALL LOCATION. SUBMIT THESE ITEMS AT LEAST 14 DAYS BEFORE BEGINNING WALL CONSTRUCTION.

STANDARD TEMPORARY MSE WALLS ARE BASED ON THE FOLLOWING CONDITIONS:
1) MAXIMUM WALL HEIGHT IS 28'-0" (8.5m).
2) TRAFFIC SURCHARGE IS 240 PSF (11.5 KPA) MAXIMUM OR BACKSLOPE IS 2:1 (H:V) OR FLATTER.
3) EXISTING OR FINISHED GRADE IN FRONT OF WALL IS 6:1 (H:V) SLOPE OR FLATTER.
4) THE GRADE OF THE TOP OF WALL IS LESS THAN 4% FOR RETAINED EARTH AND TERRATREL TEMPORARY WALLS.
5) DESIGN SERVICE LIFE IS 3 YEARS.
6) MATERIAL IN REINFORCED ZONE IS SHORING BACKFILL.
7) MAXIMUM APPLIED BEARING PRESSURE IS 1 TSF (100 KPA) FOR WALL HEIGHTS UP TO 8'-0" (2.4m), 2 TSF (195 KPA) FOR WALL HEIGHTS BETWEEN 8'-0" AND 18'-0" (2.4m AND 5.5m) AND 3 TSF (290 KPA) FOR WALL HEIGHTS OVER 18'-0" (5.5m).

STANDARD TEMPORARY MSE WALLS ARE BASED ON THE FOLLOWING IN-SITU ASSUMMED SOIL PARAMETERS:
TOTAL UNIT WEIGHT = 120 PCF (18.8 KN/M^3)
FRICTION ANGLE = 30 DEGREES
COHESION = 0 PSF (0 KPA)
GROUNDWATER IS ASSUMED TO BE BELOW BOTTOM OF REINFORCED ZONE.

DO NOT USE STANDARD TEMPORARY MSE WALLS WHEN THE ASSUMED SOIL PARAMETERS ARE NOT APPLICABLE OR VERY LOOSE OR SOFT SOIL OR MUCK IS PRESENT BELOW THE BOTTOM OF REINFORCED ZONE.

CONTROL DRAINAGE DURING CONSTRUCTION IN THE VICINITY OF STANDARD TEMPORARY MSE WALLS. COLLECT AND DIRECT RUNOFF AWAY FROM WALLS AND SHORING BACKFILL.

EXCAVATE AS NECESSARY FOR STANDARD TEMPORARY MSE WALLS IN ACCORDANCE WITH THE FOLLOWING FOR THE WALL OPTION CHOSEN:
1) MINIMUM EMBEDMENT OF 18" (450mm) UNLESS WALL BEARS ON ROCK, CONCRETE OR PAVEMENT AS DETERMINED BY THE ENGINEER
2) VERTICAL STEPS IN INCREMENTS EQUAL TO THE VERTICAL REINFORCEMENT SPACING
3) WITH THE EXCEPTION OF EITHER THE FIRST OR LAST SECTION OF WALL, HORIZONTAL SECTION LENGTHS IN INCREMENTS EQUAL TO THE FOLLOWING:

STANDARD TEMPORARY MSE WALL OPTION	INCREMENT
TEMPORARY FABRIC WALL	9'-0" (2.7m) MIN (VARIES)
HILFIKER TEMPORARY WALL	10'-0" (3.0m) MIN (VARIES)
SIERRASCAPE TEMPORARY WALL	18'-7¼" (5.7m)
RETAINED EARTH TEMPORARY WALL	24'-0" (7.3m)
TERRATREL TEMPORARY WALL	19'-8" (6.0m)

DO NOT PLACE SHORING BACKFILL OR FIRST REINFORCEMENT LAYER UNTIL OBTAINING APPROVAL OF THE EXCAVATION DEPTH AND FOUNDATION MATERIAL.

IF APPLICABLE, INSTALL FOUNDATIONS LOCATED WITHIN THE REINFORCED ZONE BEFORE BEGINNING WALL CONSTRUCTION UNLESS DIRECTED OTHERWISE BY THE ENGINEER.

ERECT AND MAINTAIN FACINGS AND FORMS AS SHOWN ON THE STANDARD TEMPORARY MSE WALL DETAILS. STAGGER VERTICAL JOINTS OF FACINGS AND FORMS TO CREATE A RUNNING BOND WHEN POSSIBLE UNLESS SHOWN OTHERWISE ON THESE DETAILS.

PLACE FACINGS AND FORMS AS NEAR TO VERTICAL AS POSSIBLE WITH NO NEGATIVE BATTER. CONSTRUCT STANDARD TEMPORARY MSE WALLS WITH A VERTICAL AND HORIZONTAL TOLERANCE OF 3" (75mm) WHEN MEASURED WITH A 10'-0" (3m) STRAIGHT EDGE AND AN OVERALL VERTICAL PLUMBNESS (BATTER) AND HORIZONTAL ALIGNMENT OF LESS THAN 6" (150mm).

PLACE REINFORCEMENT AT LOCATIONS AND ELEVATIONS SHOWN ON THE STANDARD TEMPORARY MSE WALL DETAILS AND IN SLIGHT TENSION FREE OF KINKS, FOLDS, WRINKLES OR CREASES.

DO NOT SPLICE REINFORCEMENT IN THE REINFORCEMENT DIRECTION (RD), i.e., PARALLEL TO THE WALL FACE. SEAMS ARE ALLOWED IN THE CROSS-REINFORCEMENT DIRECTION (CRD).

CONTACT THE ENGINEER WHEN EXISTING OR FUTURE STRUCTURES SUCH AS FOUNDATIONS, PAVEMENTS, PIPES, INLETS OR UTILITIES WILL INTERFERE WITH REINFORCEMENT. TO AVOID STRUCTURES, DELFECT, SKEW AND MODIFY REINFORCEMENT.

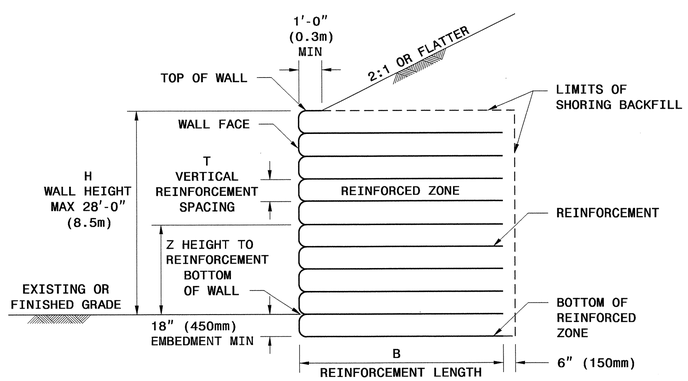
PLACE SHORING BACKFILL IN 8" TO 10" (200mm to 250mm) THICK LIFTS AND COMPACT IN ACCORDANCE WITH SUBARTICLE 235-4(C) OF THE STANDARD SPECIFICATIONS. USE ONLY HAND OPERATED COMPACTION EQUIPMENT WITHIN 3'-0" (1m) OF THE WALL FACE.

DO NOT DAMAGE REINFORCEMENT WHEN PLACING AND COMPACTING SHORING BACKFILL. DO NOT OPERATE HEAVY EQUIPMENT ON REINFORCEMENT UNTIL IT IS COVERED WITH AT LEAST 10" (250mm) OF SHORING BACKFILL. DO NOT USE SHEEPSFOOT, GRID ROLLERS OR OTHER TYPES OF COMPACTION EQUIPMENT WITH FEET.

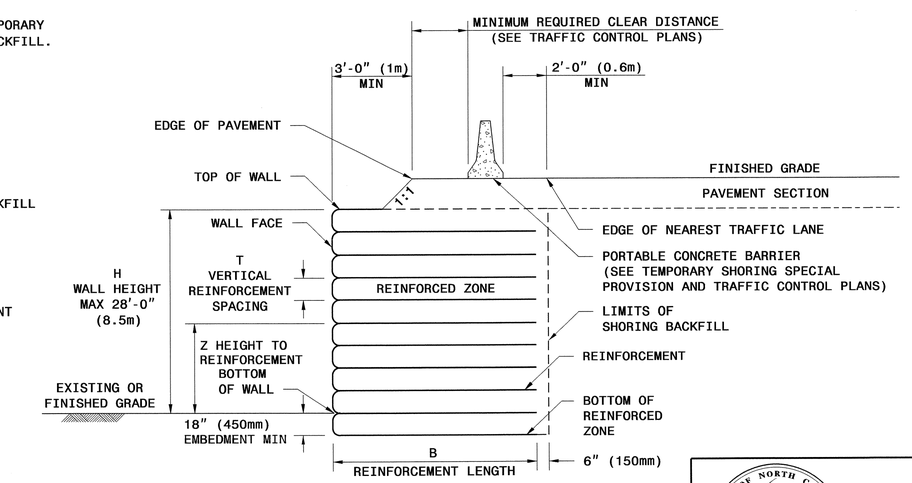
COVER REINFORCING AND RETENTION FABRIC WITH AT LEAST 3" (75mm) OF SHORING BACKFILL. PLACE TOP REINFORCEMENT LAYER BETWEEN 4" AND 24" (100mm and 600mm) BELOW TOP OF WALL DEPENDING ON WALL OPTION.

BENCH STANDARD TEMPORARY MSE WALLS INTO THE SIDES OF EXCAVATIONS WHERE APPLICABLE.

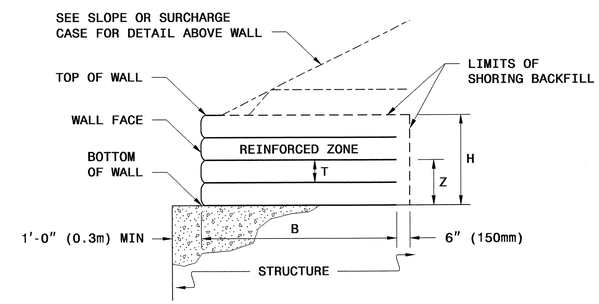
IF THE TOP OF WALL IS WITHIN 5'-0" (1.5m) OF FINISHED GRADE, REMOVE TOP FORM OR FACING AND INCORPORATE THE TOP REINFORCEMENT LAYER INTO THE FILL WHEN PLACING FILL IN FRONT OF THE WALL. STANDARD TEMPORARY MSE WALLS REMAIN IN PLACE PERMANENTLY UNLESS REQUIRED OTHERWISE.



SLOPE CASE



SURCHARGE CASE



TEMPORARY MSE WALL ON STRUCTURE

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD DRAWING NO. 1801.02

STANDARD TEMPORARY MECHANICALLY STABILIZED EARTH (MSE) WALLS

SHEET 1 OF 11 DATE: 2-20-07

PROJECT REFERENCE NO.	SHEET
R-2414 B	2-AE

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

Scott A. Hidden 1/6/12

SIGNATURE DATE

ENGINEER

SIGNATURE DATE

HOW TO USE THIS SHEET:

- FOR ALL WALL OPTIONS, DETERMINE MINIMUM REQUIRED REINFORCEMENT LENGTH (B) FROM TABLE AT RIGHT BASED ON WALL HEIGHT (H) AND SLOPE OR SURCHARGE CASE
- FOR STANDARD TEMPORARY FABRIC WALL, SEE SHEET 3 FOR FABRIC STRENGTH REQUIREMENTS BASED ON WALL HEIGHT (H)
- FOR ALL OTHER WALL OPTIONS, DETERMINE REINFORCEMENT TYPE FROM TABLES BELOW FOR EACH HEIGHT TO REINFORCEMENT (Z) BASED ON WALL HEIGHT (H) AND SLOPE OR SURCHARGE CASE

MINIMUM REQUIRED REINFORCEMENT LENGTH B (FT)

(FOR ALL WALL OPTIONS)

WALL HEIGHT H (FT)	<8	8 TO 10	10 TO 12	12 TO 14	14 TO 16	16 TO 18	18 TO 20	20 TO 22	22 TO 24	24 TO 26	26 TO 28
SLOPE CASE	8	11	13	14	16	18	20	22	24	25	27
SURCHARGE CASE	8	9	11	12	14	15	16	18	19	21	22

TERRATREL TEMPORARY WALL (STRIPS PER LEVEL PER PANEL)

H (FT)

<4	4 TO 6	6 TO 8	8 TO 10	10 TO 12	12 TO 14	14 TO 16	16 TO 18	18 TO 20	20 TO 22	22 TO 24	24 TO 26	26 TO 28	Z (FT-INCHES)
												3	27 - 8
											3	3	26 -10
											3	3	25 - 2
										3	3	3	23 - 6
									3	3	3	3	21 -10
								3	3	3	3	3	20 - 2
							3	3	3	3	3	3	18 - 6
						3	3	3	3	3	3	3	16 -10
						3	3	3	3	3	3	3	15 - 2
					4	3	3	3	3	3	3	3	13 - 6
				4	4	3	3	3	3	3	3	3	11 -10
			5	4	4	3	3	3	3	3	3	3	10 - 2
		5	5	4	4	3	3	3	3	3	3	3	8 - 6
	5	5	5	4	4	3	3	3	3	3	3	3	6 -10
	5	5	5	4	4	3	3	3	3	3	3	3	5 - 2
5	5	5	5	4	4	3	3	3	3	3	3	3	3 - 6
5	5	5	5	4	4	3	3	3	3	3	3	3	1 -10
5	5	5	5	4	4	3	3	3	3	3	3	3	0 - 2
5	5	5	5	4	4	3	3	3	3	3	3	3	-0 - 8

SLOPE AND SURCHARGE CASES

SIERRASCAPE TEMPORARY WALL (GEOGRID TYPE)

11 = UX1100MSE
14 = UX1400MSE
15 = UX1500MSE
16 = UX1600MSE
17 = UX1700MSE

H (FT)

<4	4 TO 6	6 TO 8	8 TO 10	10 TO 12	12 TO 14	14 TO 16	16 TO 18	18 TO 20	20 TO 22	22 TO 24	24 TO 26	26 TO 28	Z (FT)
												11	26.5
											11	11	25.5
											11	11	24
										11	11	11	22.5
									11	11	11	15	21
								11	11	11	14	15	19.5
								11	11	11	14	15	18
							11	11	11	14	15	15	16.5
						11	11	11	14	15	15	15	15
					11	11	11	11	15	15	15	15	13.5
					11	11	11	15	15	15	15	15	12
				11	11	11	11	15	15	15	15	16	10.5
			11	11	11	11	15	15	15	15	16	16	9
		11	11	11	11	14	15	15	15	15	16	16	7.5
		11	11	11	11	14	15	15	16	16	16	16	6
	11	11	11	11	15	15	15	15	15	16	16	17	4.5
11	11	11	11	14	15	15	15	15	16	16	16	17	3
11	11	11	11	14	15	15	15	16	16	16	17	17	1.5
11	11	11	14	15	15	15	15	16	16	17	17	17	0
11	11	11	14	15	15	15	15	16	16	17	17	17	-1.5

SLOPE CASE

H (FT)

<4	4 TO 6	6 TO 8	8 TO 10	10 TO 12	12 TO 14	14 TO 16	16 TO 18	18 TO 20	20 TO 22	22 TO 24	24 TO 26	26 TO 28	Z (FT)
												11	26.5
												11	25.5
											11	11	24
										11	11	11	22.5
									11	11	11	11	21
								11	11	11	11	11	19.5
							11	11	11	11	11	15	18
						11	11	11	11	11	15	15	16.5
					11	11	11	11	11	11	15	15	15
				11	11	11	11	11	11	15	15	15	13.5
				11	11	11	11	11	15	15	15	15	12
			11	11	11	11	11	15	15	15	15	15	10.5
		11	11	11	11	11	15	15	15	15	15	15	9
		11	11	11	11	11	15	15	15	15	15	16	7.5
		11	11	11	11	11	15	15	15	15	15	16	6
	11	11	11	11	11	14	14	15	15	15	15	16	4.5
11	11	11	11	11	14	15	15	15	15	15	16	16	3
11	11	11	11	11	15	15	15	15	15	16	16	16	1.5
11	11	11	11	14	15	15	15	15	15	16	16	17	0
11	11	11	11	14	15	15	15	15	15	16	16	17	-1.5

SURCHARGE CASE

HILFIKER TEMPORARY WALL (WELDED WIRE MAT TYPE)

4.5 = W4.5 x W3.5
7.0 = W7.0 x W3.5
9.5 = W9.5 x W4.0

H (FT)

<4	4 TO 6	6 TO 8	8 TO 10	10 TO 12	12 TO 14	14 TO 16	16 TO 18	18 TO 20	20 TO 22	22 TO 24	24 TO 26	26 TO 28	Z (FT)
												4.5	26
											4.5	7.0	24
										4.5	7.0	7.0	22
									4.5	7.0	7.0	7.0	20
								4.5	7.0	7.0	7.0	7.0	18
							4.5	7.0	7.0	7.0	7.0	7.0	16
						4.5	7.0	7.0	7.0	7.0	7.0	9.5	14
					4.5	7.0	7.0	7.0	7.0	7.0	9.5	9.5	12
				4.5	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	10
			4.5	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	8
		4.5	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	9.5	6
	4.5	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	9.5	4
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7.0	3
4.5	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	9.5	7.0	2
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7.0	7.0	1
7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	9.5	7.0	7.0	0
7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	-1.5

SLOPE CASE

H (FT)

<4	4 TO 6	6 TO 8	8 TO 10	10 TO 12	12 TO 14	14 TO 16	16 TO 18	18 TO 20	20 TO 22	22 TO 24	24 TO 26	26 TO 28	Z (FT)
												4.5	26
											4.5	7.0	24
										4.5	7.0	7.0	22
									4.5	7.0	7.0	7.0	20
								4.5	7.0	7.0	7.0	7.0	18
							4.5	7.0	7.0	7.0	7.0	7.0	16
						4.5	7.0	7.0	7.0	7.0	7.0	7.0	14
					4.5	7.0	7.0	7.0	7.0	7.0	7.0	9.5	12
				4.5	7.0	7.0	7.0	7.0	7.0	7.0	9.5	9.5	10
			4.5	7.0	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	8
		4.5	7.0	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	6
	4.5	7.0	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	4
4.5	7.0	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	9.5	2
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7.0	1
7.0	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	9.5	7.0	0
7.0	7.0	7.0	7.0	7.0	7.0	9.5	9.5	9.5	9.5	9.5	9.5	9.5	-1.5

SURCHARGE CASE

RETAINED EARTH TEMPORARY WALL (WELDED WIRE MESH TYPE)

3X1 = 3W8 x W8 x 1.0′
3X2 = 3W8 x W8 x 2.0′

H (FT)

<4	4 TO 6	6 TO 8	8 TO 10	10 TO 12	12 TO 14	14 TO 16	16 TO 18	18 TO 20	20 TO 22	22 TO 24	24 TO 26	26 TO 28	Z (FT-INCHES)
												3X1	27 - 6
												3X1	26 -10
											3X1	3X2	25 - 2
										3X1	3X1	3X2	23 - 6
									3X1	3X1	3X2	3X2	21 -10
								3X1	3X1	3X2	3X2	3X2	20 - 2
							3X1	3X1	3X2	3X2	3X2	3X2	18 - 6
						3X1	3X2	3X2	3X2	3X2	3X2	3X2	16 -10
					3X1	3X2	3X2	3X2	3X2	3X2	3X2	3X2	15 - 2
				3X1	3X1	3X2	3X2	3X2	3X2	3X2	3X2	3X2	13 - 6
			3X1	3X1	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	11 -10
		3X1	3X1	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	10 - 2
	3X1	3X1	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	8 - 6
	3X1	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	6 -10
	3X1	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	5 - 2
3X1	3X1	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3 - 6
3X1	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	1 -10
3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	0 - 2
3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	3X2	-1 - 6

SLOPE AND SURCHARGE CASES

NOTES FOR HILFIKER TEMPORARY WALL

1) CAP MAT AT TOP OF WALL IS NOT INCLUDED IN TABLES.
2) REINFORCEMENT IS NOT REQUIRED AT 1′ LEVEL FOR SLOPE CASE UNTIL WALL HEIGHT (H) IS GREATER THAN 24′.
3) REINFORCEMENT IS NOT REQUIRED AT 3′ LEVEL FOR SLOPE CASE UNTIL WALL HEIGHT (H) IS GREATER THAN 26′.
4) REINFORCEMENT IS NOT REQUIRED AT 1′ LEVEL FOR SURCHARGE CASE UNTIL WALL HEIGHT (H) IS GREATER THAN 26′.

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STANDARD DRAWING NO. 1801.02

STANDARD TEMPORARY MSE WALL REINFORCEMENT TABLES - ENGLISH UNITS

SHEET 2 OF 11 DATE: 2-20-07

PROJECT REFERENCE NO.	SHEET
R-2414 B	2-AF

GEOTECHNICAL ENGINEER

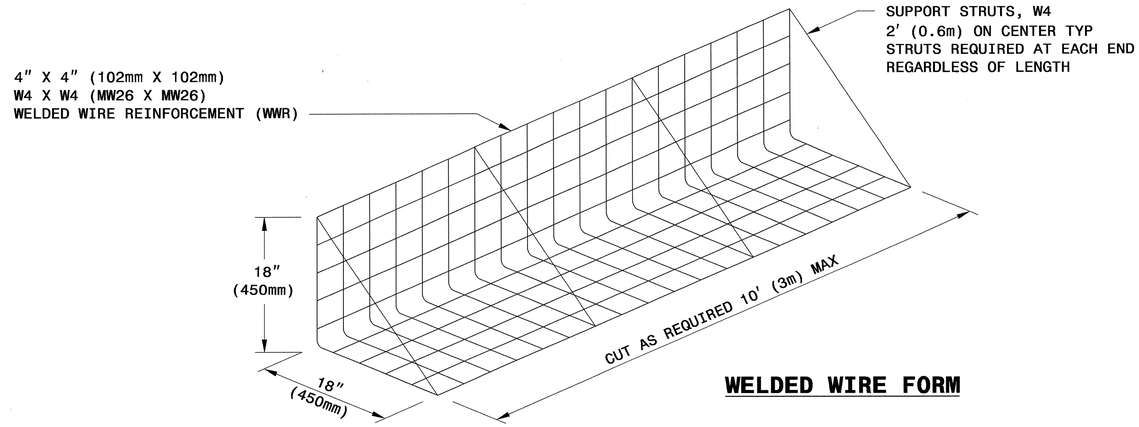
NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

Scott A. Hidden 1/6/12

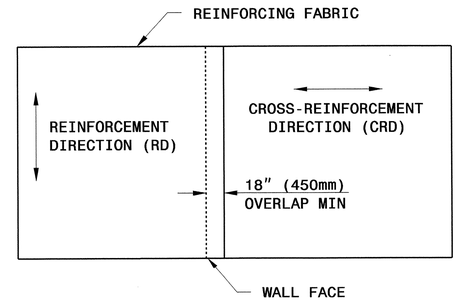
SIGNATURE DATE

ENGINEER

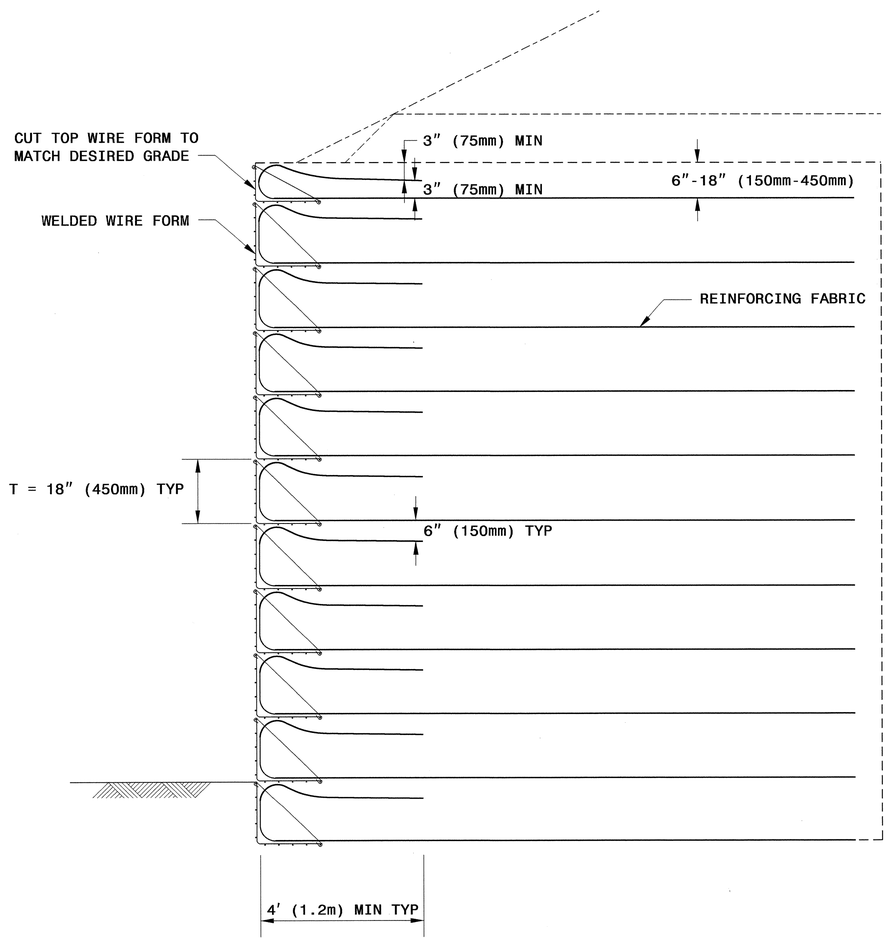
SIGNATURE DATE



WELDED WIRE FORM



PLAN VIEW OF FABRIC OVERLAP



TYPICAL SECTION

MINIMUM REQUIRED REINFORCING FABRIC STRENGTH FOR RD*
(SLOPE AND SURCHARGE CASES)

WALL HEIGHT H FEET (M)	POLYESTER WIDE WIDTH TENSILE STRENGTH @ ULTIMATE LB/INCH (KN/M)	POLYPROPYLENE WIDE WIDTH TENSILE STRENGTH @ ULTIMATE LB/INCH (KN/M)
4 (1.2)	200 (35)	200 (35)
6 (1.8)	200 (35)	200 (35)
8 (2.4)	200 (35)	200 (35)
10 (3.0)	200 (35)	230 (40)
12 (3.7)	220 (39)	264 (46)
14 (4.3)	248 (43)	297 (52)
16 (4.9)	276 (48)	330 (58)
18 (5.5)	304 (53)	364 (64)
20 (6.1)	332 (58)	397 (70)
22 (6.7)	359 (63)	431 (76)
24 (7.3)	387 (68)	464 (81)
26 (7.9)	415 (73)	497 (87)
28 (8.5)	443 (78)	531 (93)

*RD = REINFORCEMENT DIRECTION

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STANDARD DRAWING NO. 1801.02

TEMPORARY FABRIC WALL

SHEET 3 OF 11 DATE: 12-19-06

PROJECT REFERENCE NO.	SHEET
R-2414 B	2-AG

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

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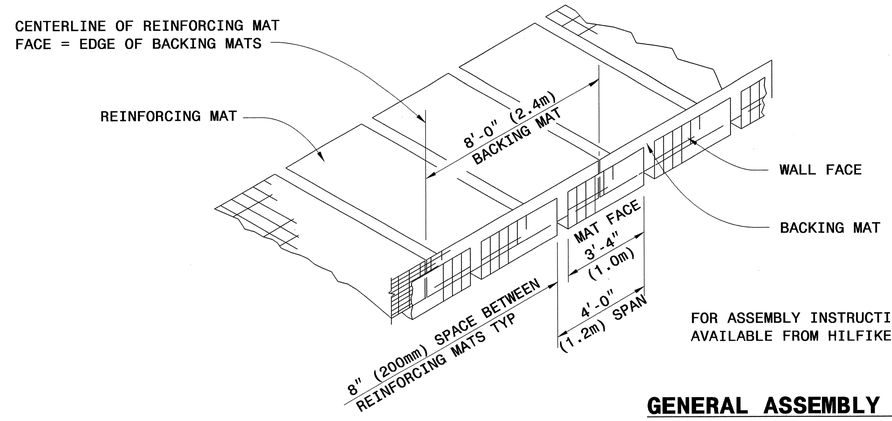
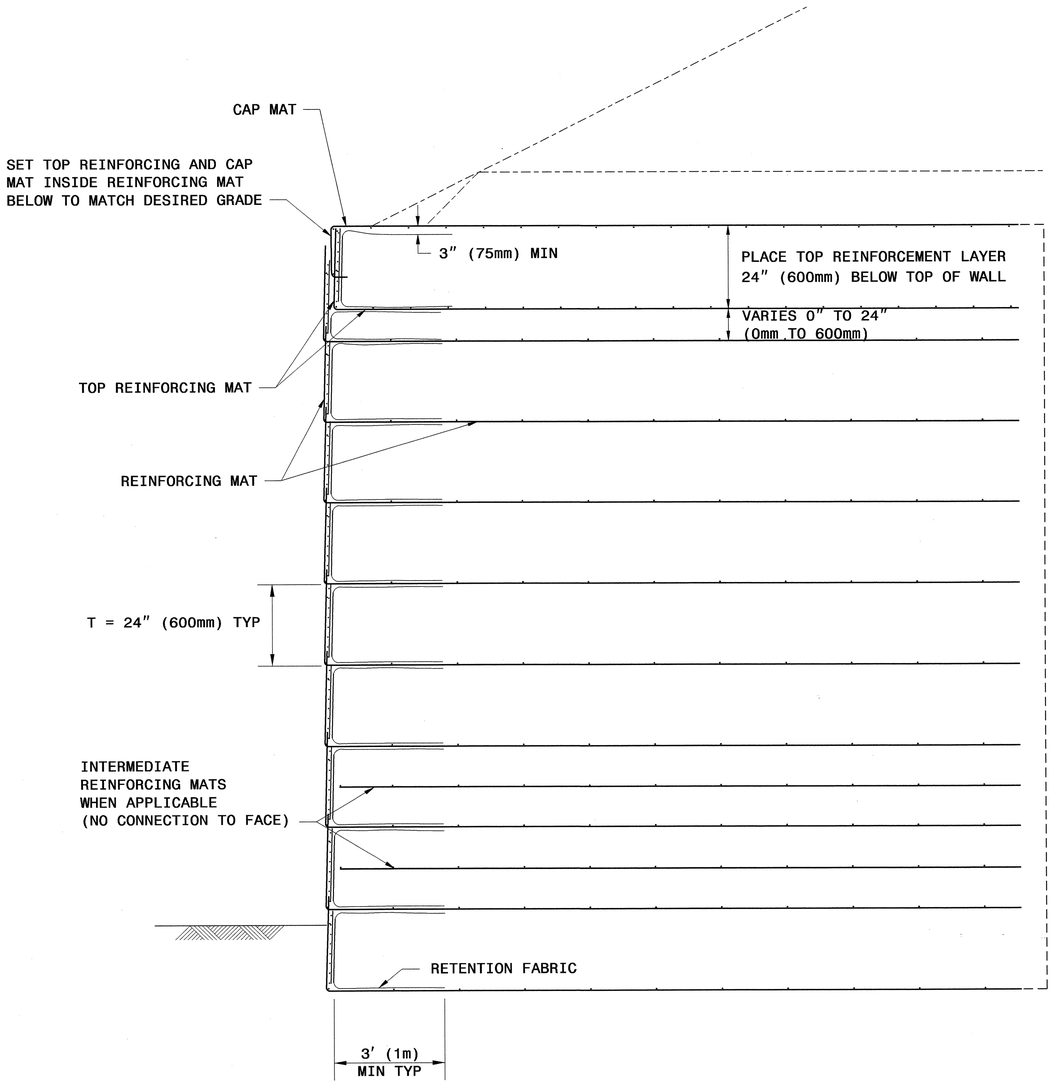
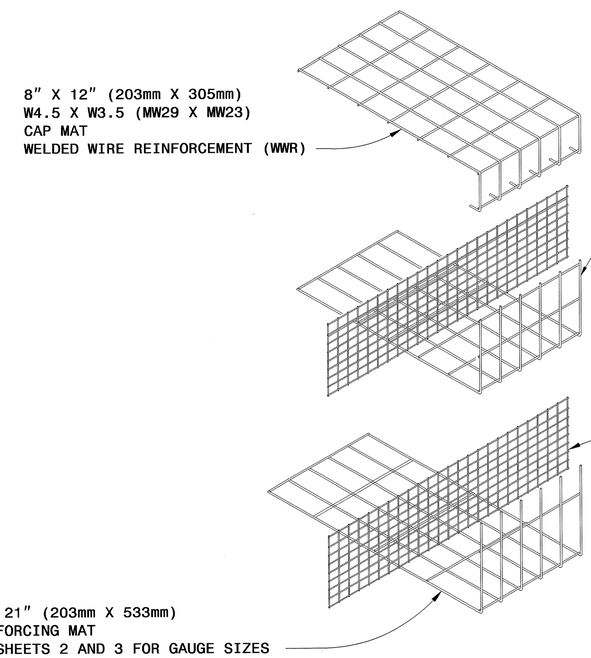


FOR ASSEMBLY INSTRUCTIONS, SEE WELDED WIRE WALL CONSTRUCTION GUIDE AVAILABLE FROM HILFIKER WEBSITE AT WWW.HILFIKER.COM/WWW

GENERAL ASSEMBLY DETAIL



TYPICAL SECTION



WALL COMPONENTS

HILFIKER RETAINING WALLS

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GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

STANDARD DRAWING NO. 1801.02

HILFIKER TEMPORARY WALL

SHEET 4 OF 11 DATE: 12-19-06

PROJECT REFERENCE NO.	SHEET
R-2414 B	2-AH

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

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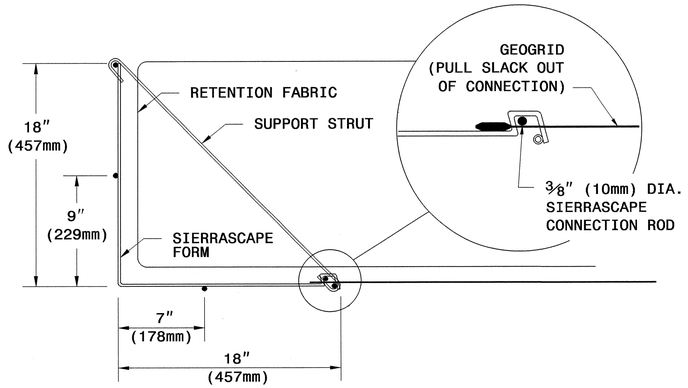
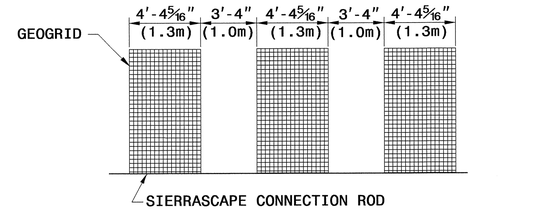
SIGNATURE DATE

ENGINEER

SIGNATURE DATE

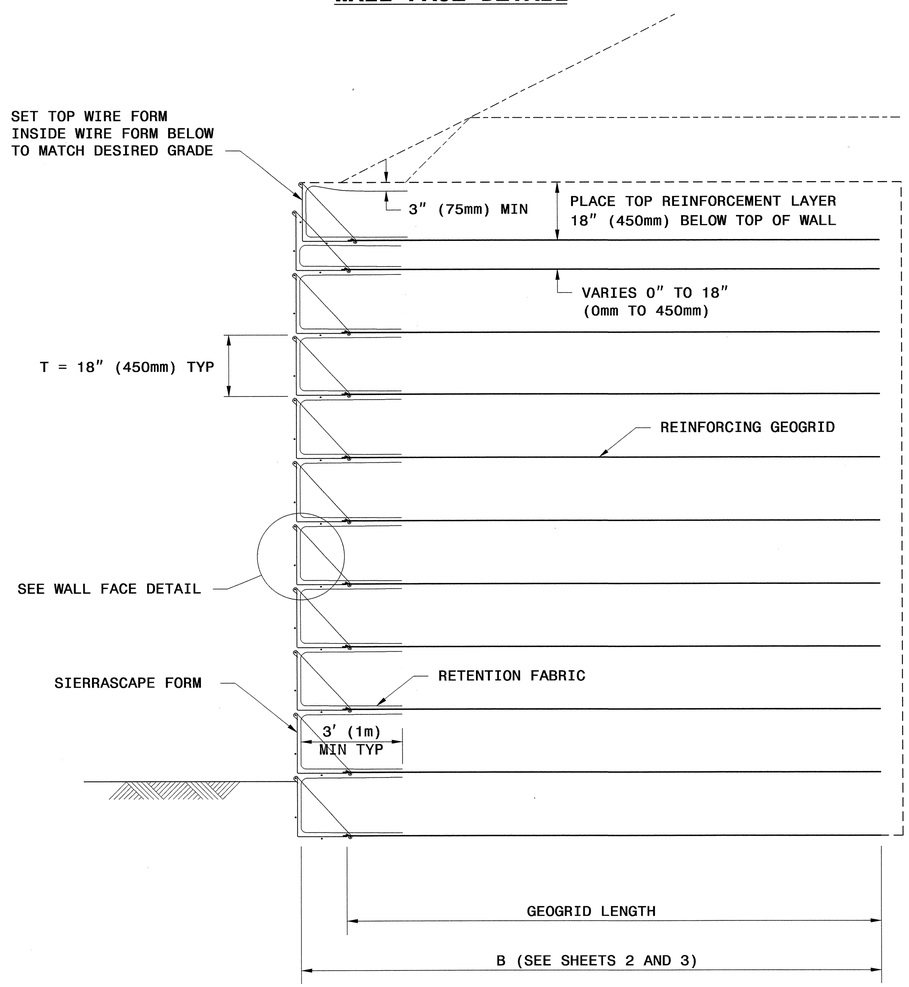


WALL FACE DETAIL

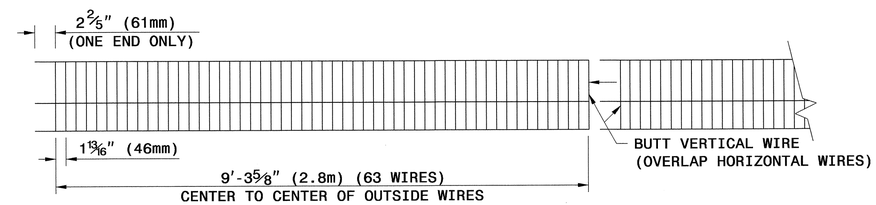


PLACE ALTERNATE LAYERS OF GEOGRID IN STAGGERED PATTERN SUCH THAT THE LAYER ABOVE IS CENTERED OVER SPACE BELOW

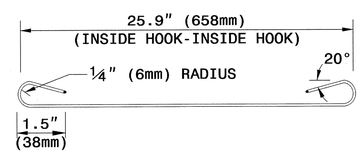
TYPICAL GEOGRID COVERAGE



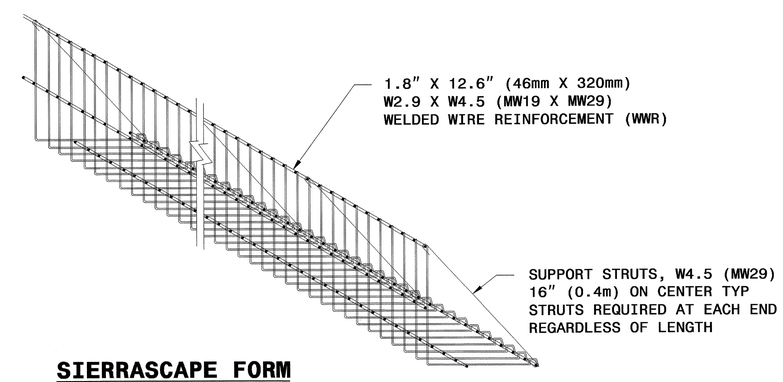
TYPICAL SECTION



ELEVATION VIEW



SUPPORT STRUT



SIERRASCAPE FORM

WALL COMPONENTS

Tensar®
Tensar Earth Technologies, Inc.

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GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

STANDARD DRAWING NO. 1801.02

SIERRASCAPE TEMPORARY WALL

SHEET 5 OF 11 DATE: 12-19-06

PROJECT REFERENCE NO.	SHEET
R-2414 B	2-AI

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

Scott A. Hidden 1/6/12

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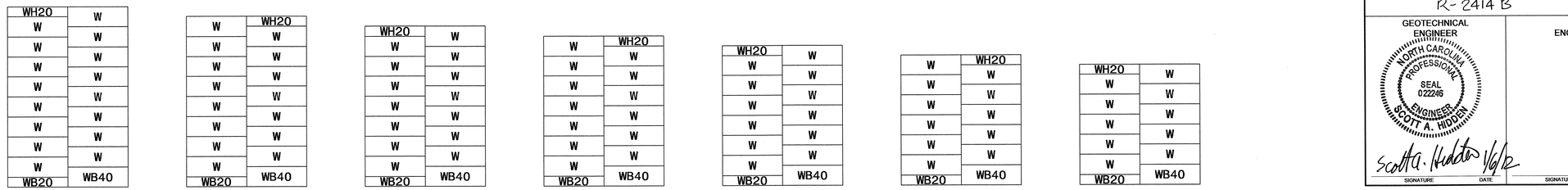
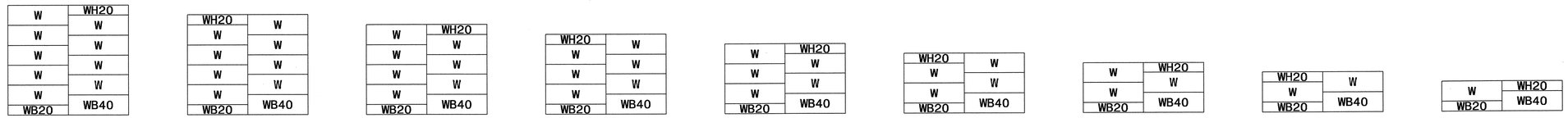
ENGINEER

SIGNATURE DATE

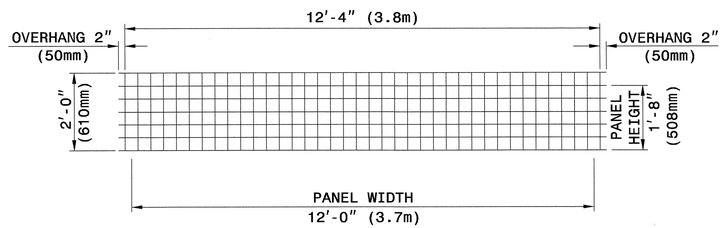
PANEL LAYOUTS



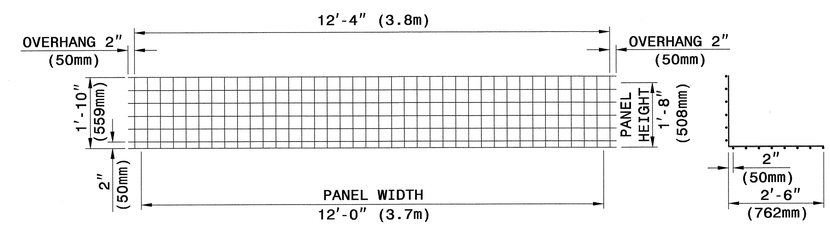
H - WALL HEIGHT							
(FEET-INCHES)	< 28 - 0	< 27 - 0	< 25 - 4	< 23 - 8	< 22 - 0	< 20 - 4	< 18 - 8
(METER)	< 8.5	< 8.2	< 7.7	< 7.2	< 6.7	< 6.2	< 5.7



(FEET-INCHES)	< 17 - 0	< 15 - 4	< 13 - 8	< 12 - 0	< 10 - 4	< 8 - 8	< 7 - 0	< 5 - 4	< 3 - 8
(METER)	< 5.2	< 4.7	< 4.2	< 3.7	< 3.2	< 2.6	< 2.1	< 1.6	< 1.1

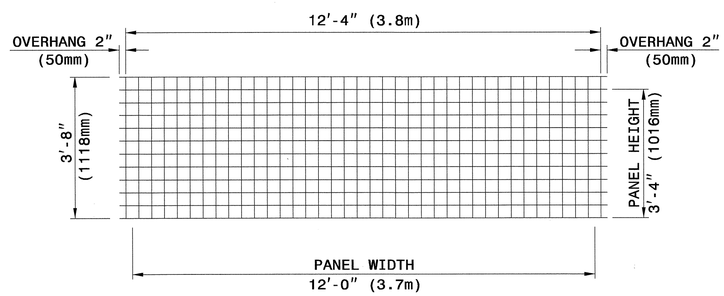


TYPE WH20

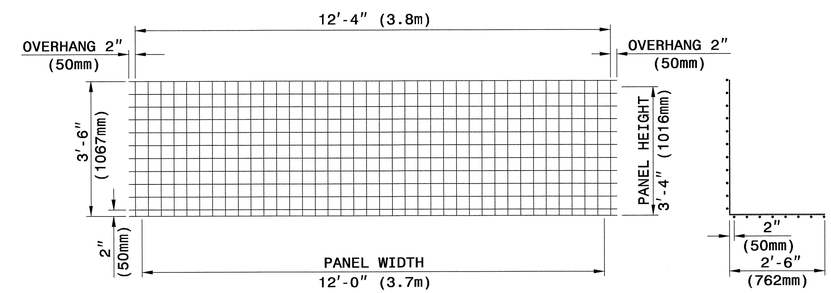


TYPE WB20

SECTION



TYPE W



TYPE WB40

SECTION

WELDED WIRE FACINGS

WELDED WIRE FORMS

PANEL TYPES (WELDED WIRE FACINGS AND FORMS)

4" X 4" (100mm X 100mm), W8 X W8 (MW52 X MW52) WELDED WIRE REINFORCEMENT (WWR)

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STANDARD DRAWING NO. 1801.02

RETAINED EARTH TEMPORARY WALL

SHEET 6 OF 11

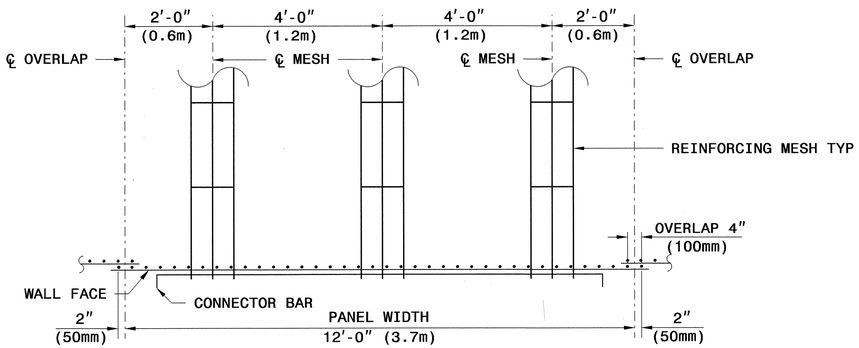
DATE: 12-19-06

PROJECT REFERENCE NO.	SHEET
R-2414 B	2-AJ

GEOTECHNICAL ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

Scott A. Hidden 1/6/12

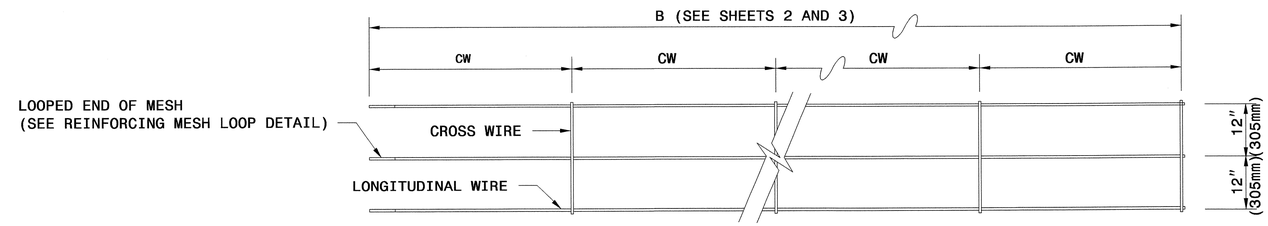
SIGNATURE DATE — ENGINEER — SIGNATURE DATE



REINFORCING MESH PLACEMENT DETAIL
(PLAN VIEW)

½" (13mm) DIA. BAR

CONNECTOR BAR



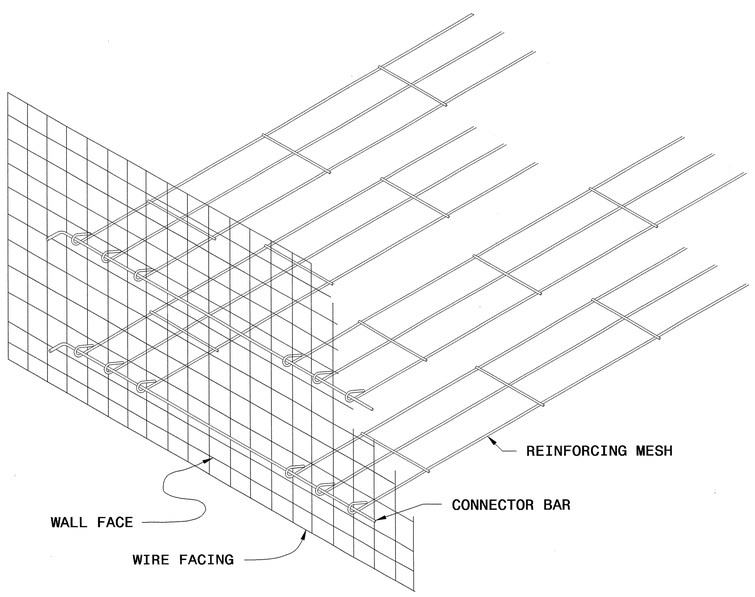
IF REINFORCEMENT LENGTH IS NOT AN INCREMENT OF 2'-0" (610mm) MAKE CW EQUAL TO 12" (305mm) AT THE END OF THE REINFORCING MESH OPPOSITE THE LOOPED END

3W8 X W8 x 2.0' (3MW52 X MW52 X 610mm)

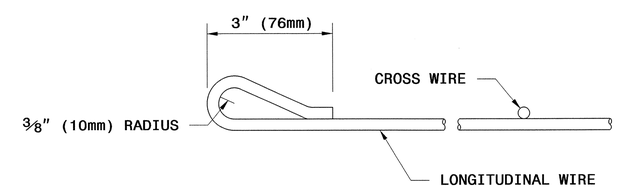
NO. OF LONGITUDINAL WIRES
GAUGE OF LONGITUDINAL WIRES
GAUGE OF CROSS WIRES
SPACING OF CROSS WIRES IN FT (mm), CW

REINFORCING MESH DESIGNATION

REINFORCING MESH



GENERAL ASSEMBLY DETAIL



REINFORCING MESH LOOP DETAIL

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GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

STANDARD DRAWING NO. 1801.02

RETAINED EARTH TEMPORARY WALL

SHEET 7 OF 11 — DATE: 12-19-06

PROJECT REFERENCE NO.	SHEET
R-2414 B	2-AK

GEOTECHNICAL ENGINEER

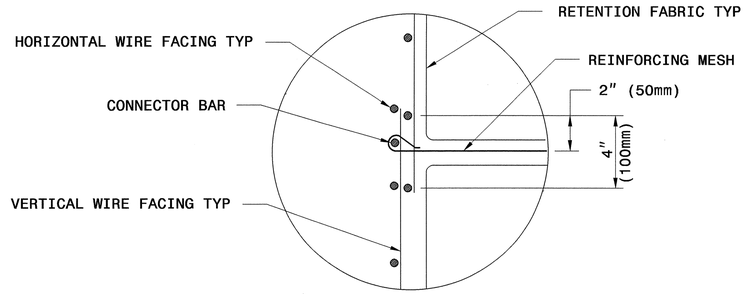
NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

Scott A. Hidden 1/6/12

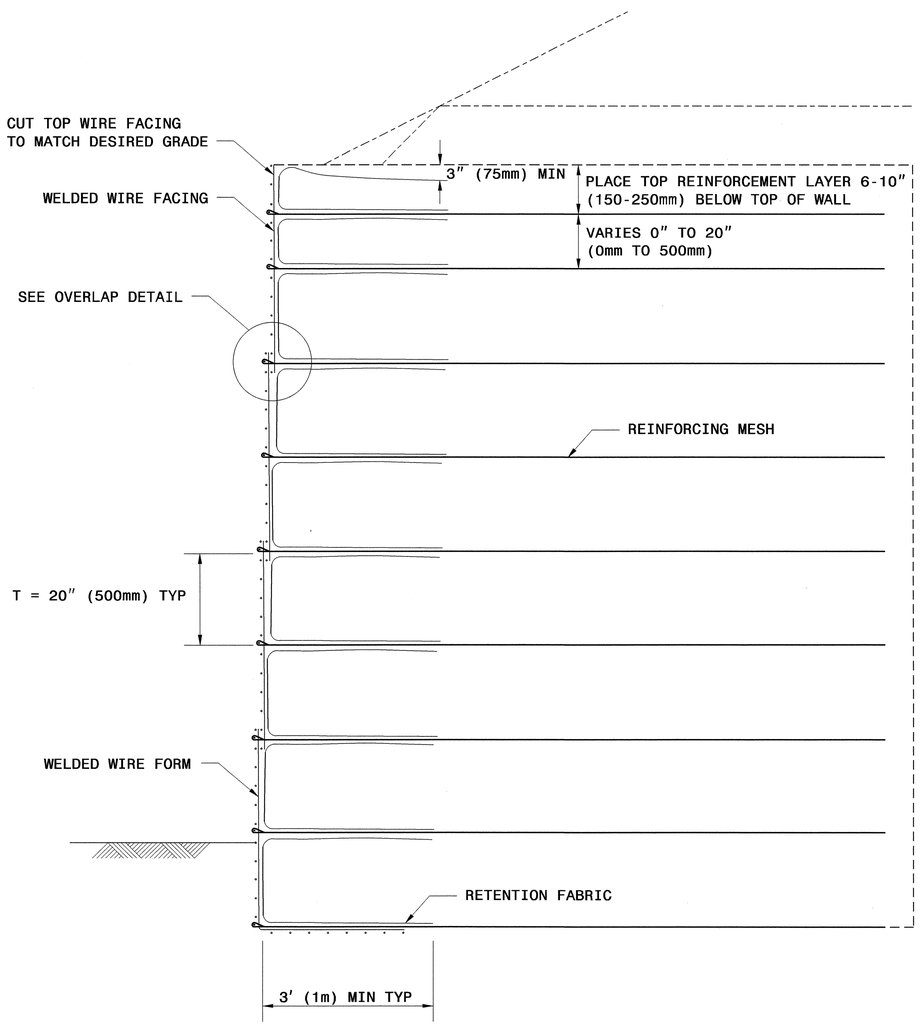
SIGNATURE DATE

ENGINEER

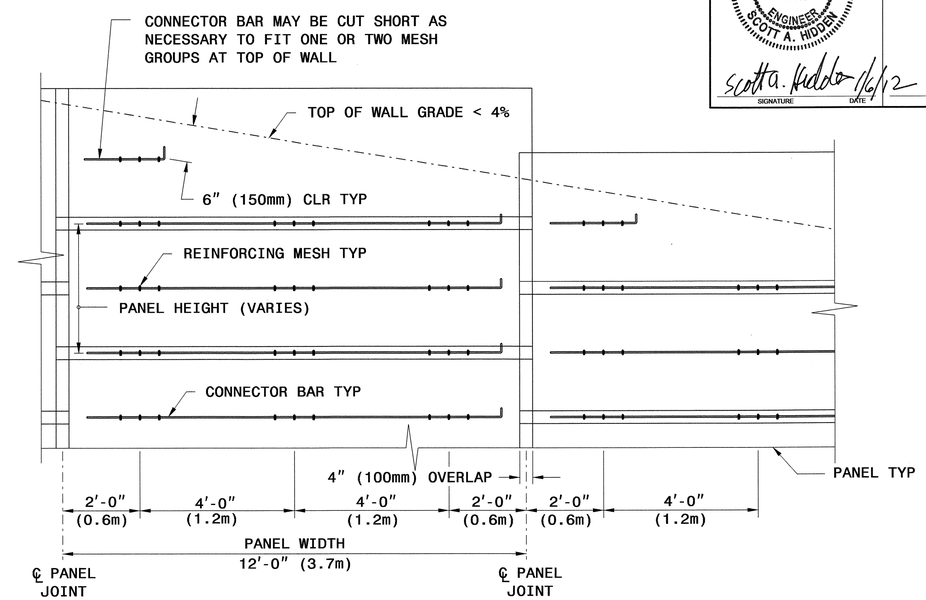
SIGNATURE DATE



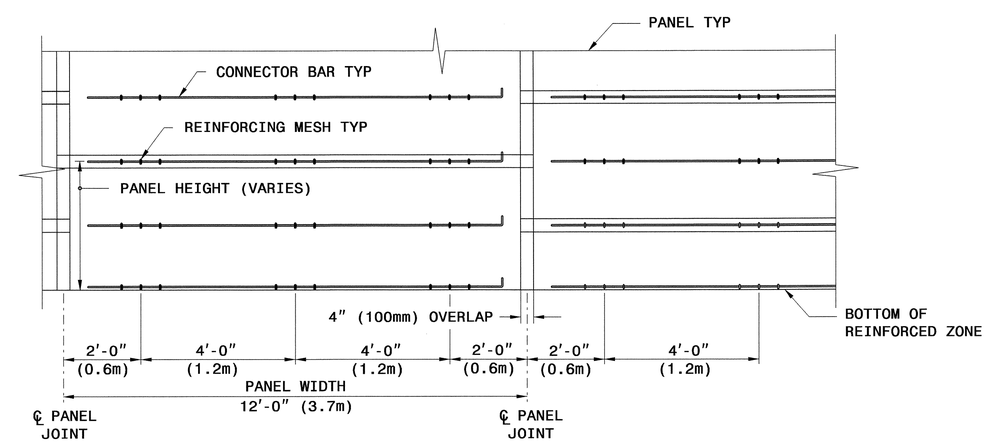
OVERLAP DETAIL



TYPICAL SECTION



TYPICAL ELEVATION @ TOP OF WALL
(WIRES NOT SHOWN FOR CLARITY)



TYPICAL ELEVATION @ BOTTOM OF WALL
(WIRES NOT SHOWN FOR CLARITY)

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DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD DRAWING NO. 1801.02

RETAINED EARTH
TEMPORARY WALL

SHEET 8 OF 11 DATE: 12-19-06

PROJECT REFERENCE NO.	SHEET
R-2414 B	2-AL

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

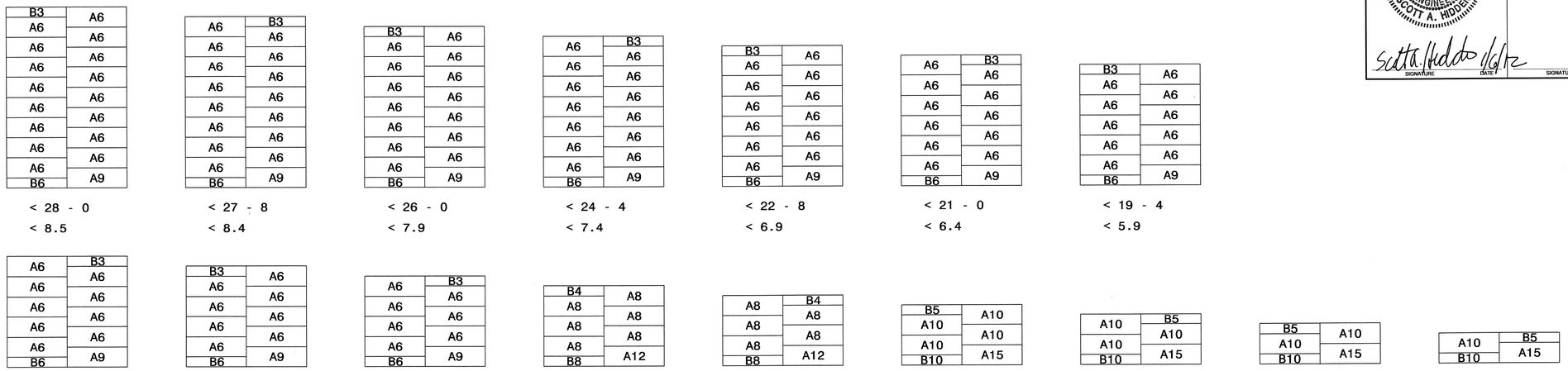
Scott A. Hidden 1/6/12

SIGNATURE DATE

ENGINEER

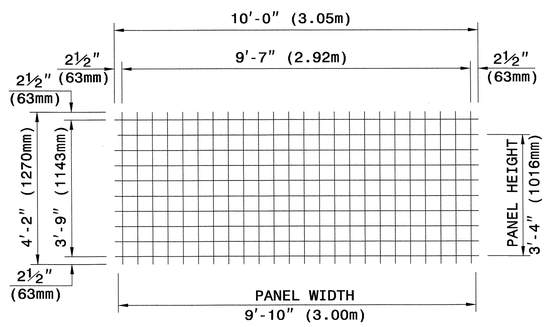
SIGNATURE DATE

PANEL LAYOUTS

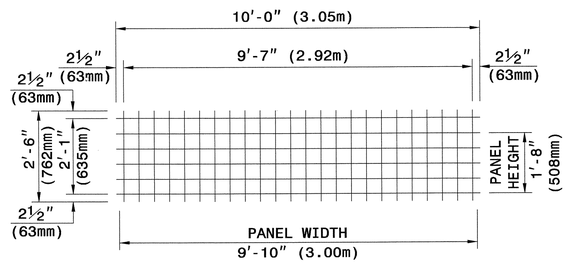


H - WALL HEIGHT							
(FEET-INCHES)	< 28 - 0	< 27 - 8	< 26 - 0	< 24 - 4	< 22 - 8	< 21 - 0	< 19 - 4
(METER)	< 8.5	< 8.4	< 7.9	< 7.4	< 6.9	< 6.4	< 5.9

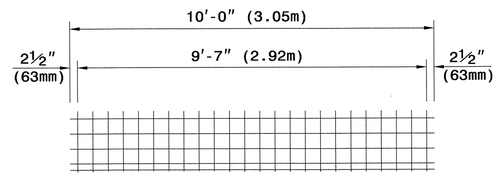
(FEET-INCHES)	< 17 - 8	< 16 - 0	< 14 - 4	< 12 - 8	< 11 - 0	< 9 - 4	< 7 - 8	< 6 - 0	< 4 - 4
(METER)	< 5.4	< 4.9	< 4.4	< 3.9	< 3.4	< 2.8	< 2.3	< 1.8	< 1.3



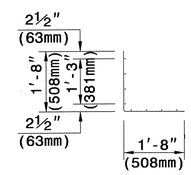
TYPE A



TYPE B



WELDED WIRE FORM



SECTION

WELDED WIRE FACINGS

PANEL TYPES (WELDED WIRE FACINGS AND FORM

5" X 5" (125mm X 125mm), W5 X W5 (MW32 X MW32) WELDED WIRE REINFORCEMENT (WWR)

The Reinforced Earth Company

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

STANDARD DRAWING NO. 1801.02

TERRATREL TEMPORARY WALL

SHEET 9 OF 11 DATE: 12-19-06

PROJECT REFERENCE NO.	SHEET
R-2414 B	2-AM

GEOTECHNICAL ENGINEER

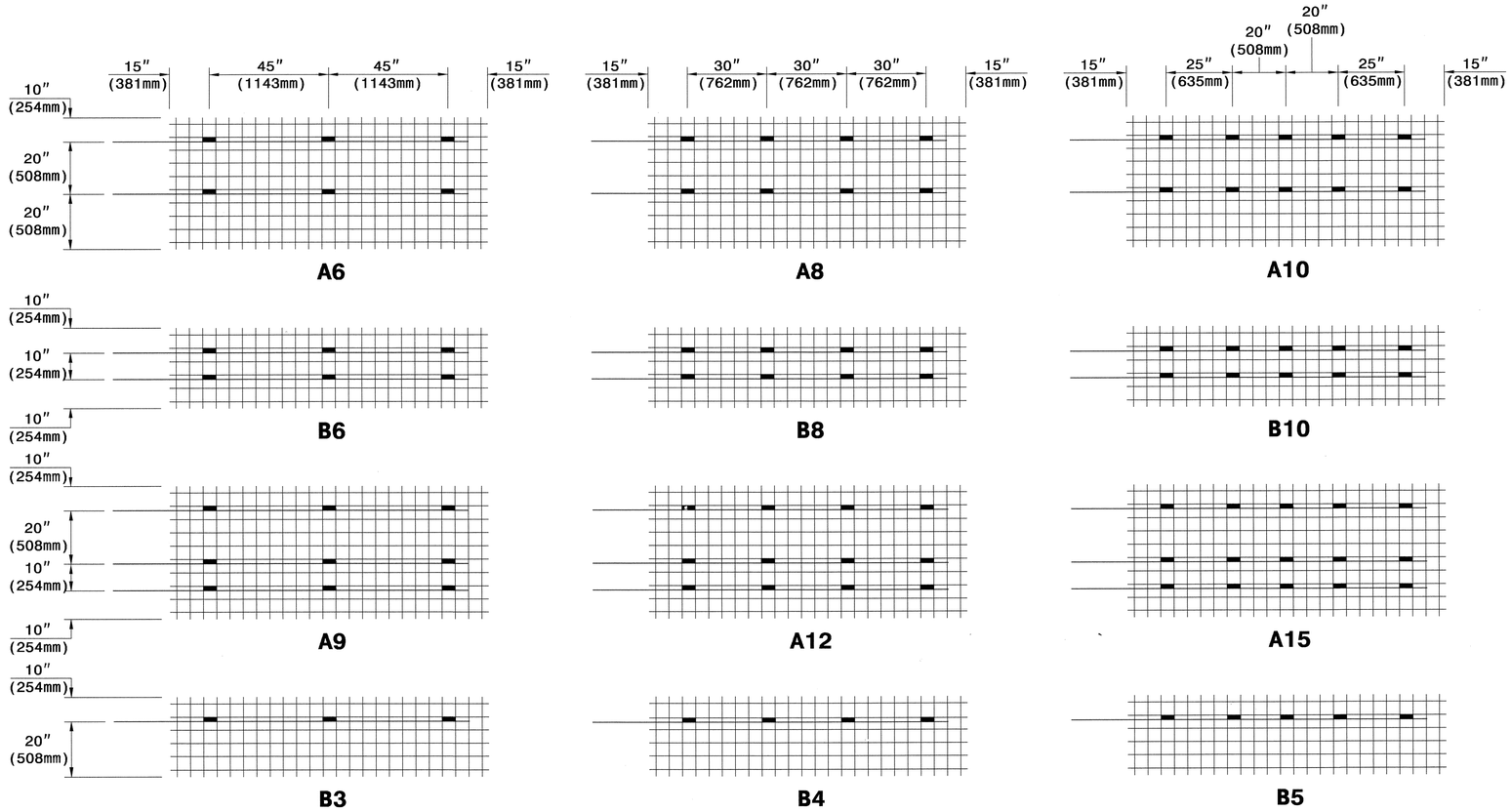
NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

Scott A. Hidden 1/6/12

SIGNATURE DATE

ENGINEER

SIGNATURE DATE

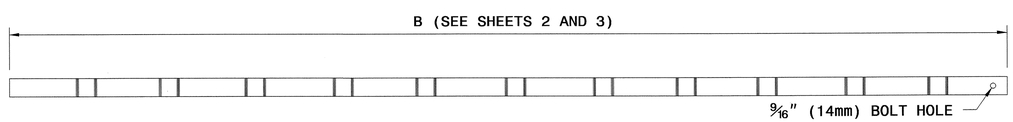


KEY: A8

NUMBER OF REINFORCING STRIPS

PANEL TYPE

CONNECTOR ROD AND REINFORCING STRIP PLACEMENT DIAGRAMS



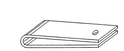
REINFORCING STRIP - 2" X 5/32" (50mm X 4mm)

1/2" (13mm) DIA. ROD

CONNECTOR ROD

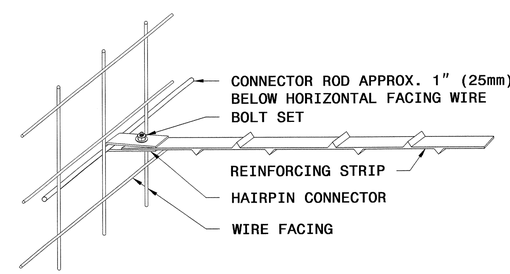
1/2" (13mm) BOLT WITH NUT AND WASHER

BOLT SET



HAIRPIN CONNECTOR

WALL COMPONENTS



STRIP TO FACING CONNECTION

The Reinforced Earth Company

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

STANDARD DRAWING NO. 1801.02

TERRATREL TEMPORARY WALL

SHEET 10 OF 11 DATE: 12-19-06

PROJECT REFERENCE NO.	SHEET
R-2414B	2-AN

GEOTECHNICAL ENGINEER

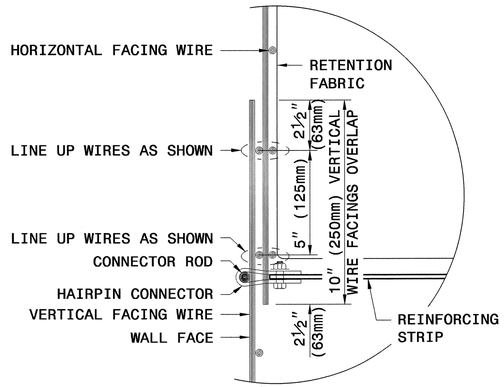
NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

Scott A. Hidden 1/6/12

SIGNATURE DATE

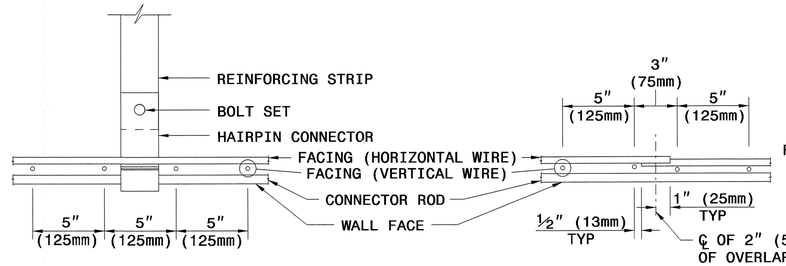
ENGINEER

SIGNATURE DATE



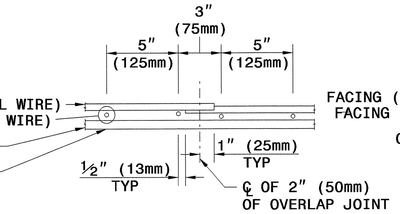
OVERLAP FACINGS VERTICALLY ONE FULL 5" (125mm) WIRE SQUARE DISREGARDING HALF SQUARES AT EDGES

VERTICAL OVERLAP DETAIL



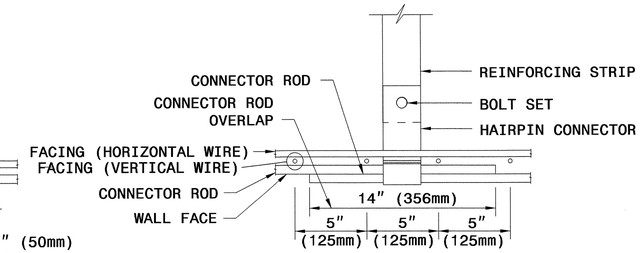
PLAN DETAIL 'A'

STRIP CONNECTION



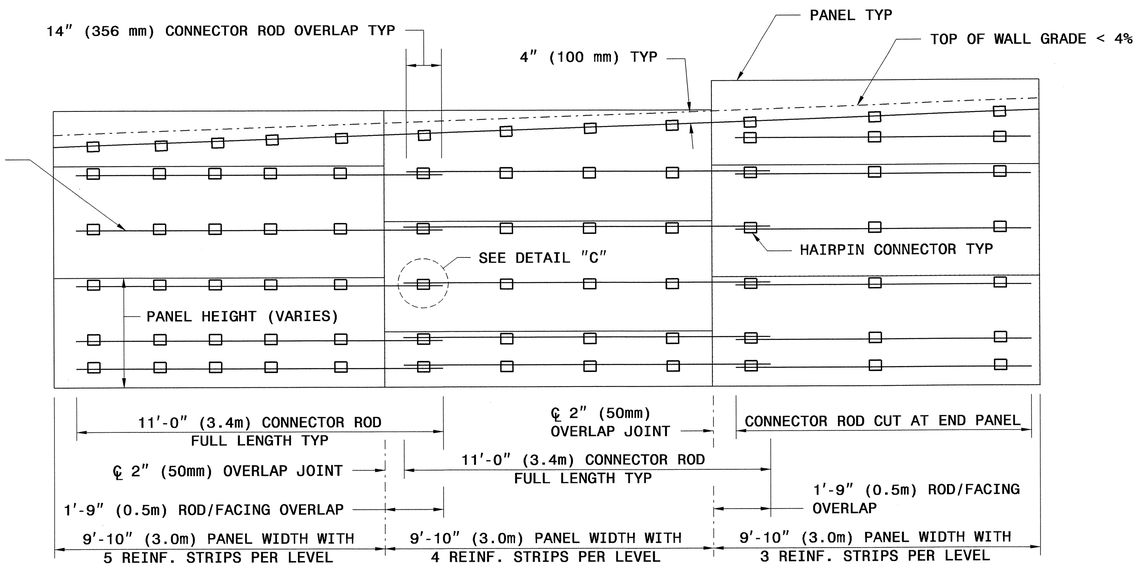
PLAN DETAIL 'B'

HORIZONTAL OVERLAP DETAIL



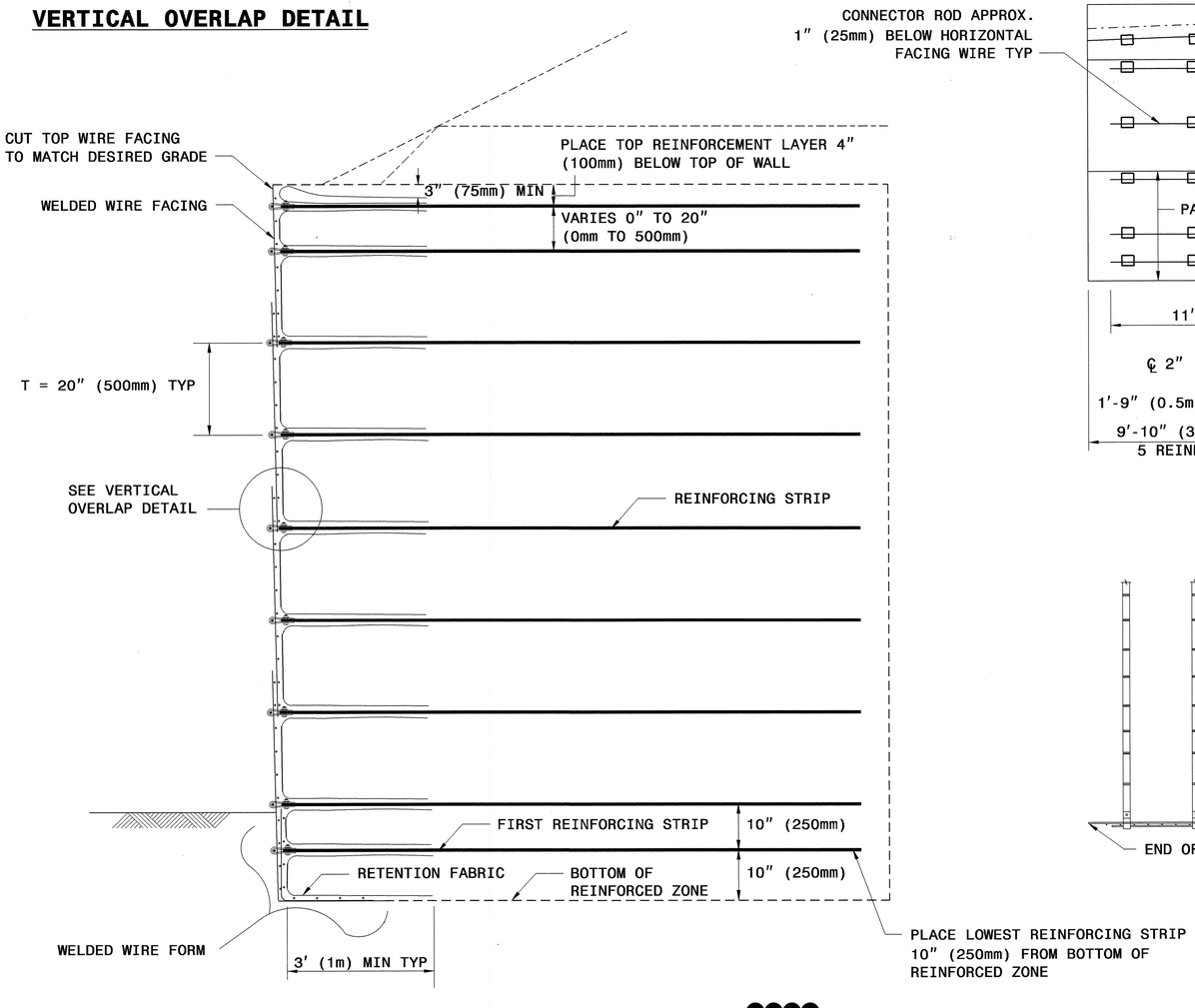
PLAN DETAIL 'C'

STRIP CONNECTION WITH HORIZONTAL OVERLAP DETAIL

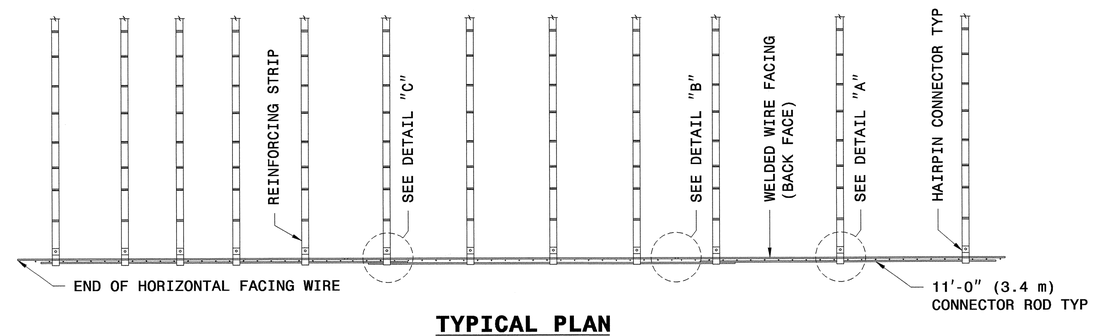


TYPICAL ELEVATION

(WIRES NOT SHOWN FOR CLARITY)



TYPICAL SECTION



TYPICAL PLAN

The Reinforced Earth Company

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH

STANDARD DRAWING NO. 1801.02

TERRATREL TEMPORARY WALL

SHEET 11 OF 11

DATE: 12-19-06

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	3 (1 of 2)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
ROADWAY SUMMARY OF QUANTITIES FOR CONTRACT - C202914

ItemNumber	Sec #	Quantity	Unit	Description
0000100000-N	800	Lump Sum		MOBILIZATION
0001000000-M	200	Lump Sum		CLEARING & GRUBBING .. HECTARE(S)
0008000000-M	200	0.4	HA	SUPPLEMENTARY CLEARING & GRUBBING
0022000000-M	225	14,500	M3	UNCLASSIFIED EXCAVATION
0036000000-M	225	13,293	M3	UNDERCUT EXCAVATION
0038000000-M	SP	21,900	M3	SHALLOW UNDERCUT
0080000000-M	SP	75,000	MTN	CLASS IV SUBGRADE STABILIZATION
0106000000-M	230	86,000	M3	BORROW EXCAVATION
0127000000-N	SP	6	EA	EMBANKMENT SETTLEMENT GAUGES
0134000000-M	240	2,400	M3	DRAINAGE DITCH EXCAVATION
0156000000-M	250	10,600	M2	REMOVAL OF EXISTING ASPHALT PAVEMENT
0194000000-M	SP	9,014	M3	SELECT GRANULAR MATERIAL, CLASS III
0196000000-M	270	350	M2	FABRIC FOR SOIL STABILIZATION
0199000000-M	SP	84	M2	TEMPORARY SHORING
0234000000-M	SP	11,284	M3	GENERIC GRADING ITEM FOAMED CONCRETE
0241000000-M	SP	7,505	M2	GENERIC GRADING ITEM EMBANKMENT STABILIZATION FABRIC
0241000000-M	SP	72,400	M2	GENERIC GRADING ITEM FABRIC FOR SUBGRADE STABILIZATION
0241000000-M	SP	17,488	M2	GENERIC GRADING ITEM WELDED WIRE FABRIC FOR FOAMED CONCRETE
0255000000-M	SP	100	MTN	GENERIC GRADING ITEM EXCAVATION AND STOCKPILING CONTAMINATED SOIL
0257000000-M	SP	60	M	GENERIC GRADING ITEM TEMPORARY SHEETING
0257000000-M	SP	19,118	M	GENERIC GRADING ITEM TREATED TIMBER PILES (FOAMED CONCRETE EMBANKMENT)
0262000000-N	SP	5	EA	GENERIC GRADING ITEM CONTAMINATED WATER STORAGE VESSEL DAILY RENTAL
0262000000-N	SP	8	EA	GENERIC GRADING ITEM PDA ASSISTANCE (FOAMED CONCRETE EMBANKMENT)
0262000000-N	SP	8	EA	GENERIC GRADING ITEM PDA TESTING (FOAMED CONCRETE EMBANKMENT)
0318000000-M	SP	2,340	MTN	FOUNDATION CONDITIONING MATERIAL, MINOR STRS
0320000000-M	SP	5,120	M2	FOUNDATION CONDITIONING FABRIC
0962000000-M	320	18	M	*** X ***MM CAA STRUCTURAL PLATE PIPE ARCH, ****MM THICK (1524MM X 1168MM , 2.77MM)
0986000000-M	SP	24	M	GENERIC PIPE ITEM 375MM DI PIPE
0987000000-M	310	9.6	M	GENERIC PIPE ITEM 1500MM RC PIPE CULVERTS, CLASS III
0987000000-M	310	14.4	M	GENERIC PIPE ITEM 300MM SIDE DRAIN PIPE
0987000000-M	310	78.4	M	GENERIC PIPE ITEM 375MM SIDE DRAIN PIPE
0987000000-M	310	7.2	M	GENERIC PIPE ITEM 450MM SIDE DRAIN PIPE
0987000000-M	310	14.4	M	GENERIC PIPE ITEM 600MM SIDE DRAIN PIPE
0988000000-M	310	3	EA	GENERIC PIPE ITEM 375MM X 375MM X 375MM RC PIPE TEES, CLASS III
0988000000-M	310	2	EA	GENERIC PIPE ITEM 450MM X 450MM X 375MM RC PIPE TEES, CLASS III
0988000000-M	310	1	EA	GENERIC PIPE ITEM 600MM X 600MM X 375MM RC PIPE TEES, CLASS III
0995000000-M	340	1,500	M	PIPE REMOVAL
1011000000-N	500	Lump Sum		FINE GRADING
1121000000-M	520	1,170	MTN	AGGREGATE BASE COURSE
1220000000-M	545	1,000	MTN	INCIDENTAL STONE BASE
1489000000-M	610	2,250	MTN	ASPHALT CONC BASE COURSE, TYPE B25.0B
1491000000-M	610	26,500	MTN	ASPHALT CONC BASE COURSE, TYPE B25.0C
1498000000-M	610	440	MTN	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0B
1503000000-M	610	23,500	MTN	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0C
1519000000-M	610	1,720	MTN	ASPHALT CONC SURFACE COURSE, TYPE S9.5B
1523000000-M	610	22,000	MTN	ASPHALT CONC SURFACE COURSE, TYPE S9.5C
1560000000-M	620	2,561	MTN	ASPHALT BINDER FOR PLANT MIX, GRADE PG 64-22
1565000000-M	620	1,320	MTN	ASPHALT BINDER FOR PLANT MIX, GRADE PG 70-22
1693000000-M	654	490	MTN	ASPHALT PLANT MIX, PAVEMENT REPAIR
2022000000-M	SP	9,650	M3	SUBDRAIN EXCAVATION
2026000000-M	SP	32,000	M2	FILTER FABRIC FOR SUBSURFACE DRAINS
2036000000-M	SP	4,850	M3	SUBDRAIN COARSE AGGREGATE
2044000000-M	SP	11,648	M	150MM PERFORATED SUBDRAIN PIPE
2070000000-N	SP	78	EA	SUBDRAIN PIPE OUTLETS
2077000000-M	SP	156	M	150MM OUTLET PIPE (SUBDRAINS)
2209000000-M	838	4	M3	ENDWALLS
2253000000-M	840	2	M3	PIPE COLLARS
2264000000-M	840	1	M3	PIPE PLUGS
2286000000-N	840	192	EA	MASONRY DRAINAGE STRUCTURES
2308000000-M	840	10	M	MASONRY DRAINAGE STRUCTURES
2364000000-N	840	39	EA	FRAME WITH TWO GRATES, STD 840.16
2366000000-N	840	1	EA	FRAME WITH TWO GRATES, STD 840.24
2374000000-N	840	33	EA	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (E)
2374000000-N	840	48	EA	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (F)
2374000000-N	840	71	EA	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (G)
2451000000-N	852	5	EA	CONCRETE TRANSITIONAL SECTION FOR DROP INLETS
2535000000-M	846	30	M	*** X ***MM CONCRETE CURB (200MM X 400MM)
2535000000-M	846	1,400	M	*** X ***MM CONCRETE CURB (200MM X 450MM)
2549000000-M	846	9,160	M	750MM CONCRETE CURB & GUTTER
2591000000-M	848	580	M2	100MM CONCRETE SIDEWALK
2612000000-M	848	650	M2	150MM CONCRETE DRIVEWAY
2655000000-M	852	1,200	M2	125MM MONOLITHIC CONCRETE ISLANDS (KEYED IN)
2759000000-N	SP	29	EA	GENERIC PAVING ITEM CONCRETE CURB RAMPS
3030000000-M	862	552.45	M	STEEL BM GUARDRAIL
3045000000-M	862	7	M	STEEL BM GUARDRAIL, SHOP CURVED
3105000000-N	862	1	EA	STEEL BM GUARDRAIL TERMINAL SECTIONS
3150000000-N	862	10	EA	ADDITIONAL GUARDRAIL POSTS
3210000000-N	862	10	EA	GUARDRAIL ANCHOR UNITS, TYPE CAT-1
3270000000-N	SP	9	EA	GUARDRAIL ANCHOR UNITS, TYPE 350
3360000000-M	863	42	M	REMOVE EXISTING GUARDRAIL
3380000000-M	862	87.63	M	TEMPORARY STEEL BM GUARDRAIL
3389100000-N	SP	6	EA	GUARDRAIL ANCHOR UNITS, TYPE 350 TEMPORARY
3572000000-M	867	230	M	CHAIN LINK FENCE RESET
3574000000-M	867	23	M	GENERIC FENCING ITEM WOOD FENCE RESET
3628000000-M	876	185	MTN	RIP RAP, CLASS I
3649000000-M	876	125	MTN	RIP RAP, CLASS B
3656000000-M	876	5,250	M2	FILTER FABRIC FOR DRAINAGE
3659000000-N	SP	1	EA	PREFORMED SCOUR HOLES WITH LEVEL SPREADER APRON
4082000000-M	903	610	M	SUPPORTS, WOOD
4096000000-N	904	7	EA	SIGN ERECTION, TYPE D
4102000000-N	904	52	EA	SIGN ERECTION, TYPE E
4108000000-N	904	21	EA	SIGN ERECTION, TYPE F
4158000000-N	907	75	EA	DISPOSAL OF SIGN SYSTEM, WOOD
4400000000-M	1110	57	M2	WORK ZONE SIGNS (STATIONARY)
4405000000-M	1110	39	M2	WORK ZONE SIGNS (PORTABLE)
4410000000-M	1110	13	M2	WORK ZONE SIGNS (BARRICADE MOUNTED)
4415000000-N	1115	2	EA	FLASHING ARROW PANELS, TYPE C
4422000000-N	1120	60	DAY	CHANGEABLE MESSAGE SIGN (SHORT TERM)
4430000000-N	1130	482	EA	DRUMS
4435000000-N	1135	482	EA	CONES
4445000000-M	1145	30	M	BARRICADES (TYPE III)
4455000000-N	1150	540	MD	FLAGGER
4465000000-N	1160	8	EA	TEMPORARY CRASH CUSHIONS
4470000000-N	1160	4	EA	RESET TEMPORARY CRASH CUSHIONS
4480000000-N	1165	2	EA	TMIA
4485000000-M	1170	1,280	M	PORTABLE CONCRETE BARRIER
4490000000-M	1170	530	M	PORTABLE CONCRETE BARRIER (ANCHORED)
4510000000-N	SP	16	HR	LAW ENFORCEMENT
4650000000-N	1251	297	EA	TEMPORARY RAISED PAVEMENT MARKERS
4685000000-M	1205	2,135	M	THERMOPLASTIC PAVEMENT MARKING LINES (100MM, 2.3MM)
4686000000-M	1205	15,813	M	THERMOPLASTIC PAVEMENT MARKING LINES (100MM, 3.1MM)
4695000000-M	1205	500	M	THERMOPLASTIC PAVEMENT MARKING LINES (200MM, 2.3MM)
4705000000-M	1205	80	M	THERMOPLASTIC PAVEMENT MARKING LINES (400MM, 3.1MM)
4710000000-M	1205	362	M	THERMOPLASTIC PAVEMENT MARKING LINES (600MM, 3.1MM)
4721000000-M	1205	23	EA	THERMOPLASTIC PAVEMENT MARKING CHARACTER (3.1MM)
4725000000-M	1205	219	EA	THERMOPLASTIC PAVEMENT MARKING SYMBOL (2.3MM)
4770000000-M	1205	305	M	COLD APPLIED PLASTIC PAVEMENT MARKING LINES, TYPE ** (100MM) (IV)
4810000000-M	1205	17,672	M	PAINT PAVEMENT MARKING LINES (100MM)
4820000000-M	1205	95	M	PAINT PAVEMENT MARKING LINES (200MM)
4825000000-M	1205	100	M	PAINT PAVEMENT MARKING LINES (300MM)
4830000000-M	1205	30	M	PAINT PAVEMENT MARKING LINES (400MM)
4835000000-M	1205	246	M	PAINT PAVEMENT MARKING LINES (600MM)
4840000000-N	1205	4	EA	PAINT PAVEMENT MARKING CHARACTER
4845000000-N	1205	29	EA	PAINT PAVEMENT MARKING SYMBOL
4850000000-M	1205	3,061	M	REMOVAL OF PAVEMENT MARKING LINES (100MM)
4870000000-M	1205	18	M	REMOVAL OF PAVEMENT MARKING LINES (600MM)
4875000000-N	1205	11	EA	REMOVAL OF PAVEMENT MARKING SYMBOLS & CHARACTERS
4900000000-N	1251	989	EA	PERMANENT RAISED PAVEMENT MARKERS
5325200000-M	1510	95	M	50MM WATER LINE
5325600000-M	1510	153	M	150MM WATER LINE
5325800000-M	1510	228	M	200MM WATER LINE
5326000000-M	1510	716	M	250MM WATER LINE
5326200000-M	1510	1,036	M	300MM WATER LINE
5536000000-M	1515	1	EA	50MM VALVE
5540000000-M	1515	2	EA	150MM VALVE

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	3(2of2)

ItemNumber	Sec #	Quantity	Unit	Description
5546000000-M	1515	1	EA	200MM VALVE
5552000000-M	1515	4	EA	250MM VALVE
5558000000-M	1515	3	EA	300MM VALVE
5648000000-N	1515	54	EA	RELOCATE WATER METER
5649000000-N	1515	1	EA	RECONNECT WATER METER
5672000000-N	1515	10	EA	RELOCATE FIRE HYDRANT
5709000000-M	1520	19	M	***MM FORCE MAIN SEWER (40MM)
5709000000-M	1520	286	M	***MM FORCE MAIN SEWER (75MM)
5709100000-M	1520	30	M	50MM FORCE MAIN SEWER
5709200000-M	1520	29	M	100MM FORCE MAIN SEWER
5798000000-M	1530	112	M	ABANDON ***MM UTILITY PIPE (50MM)
5800000000-M	1530	101	M	ABANDON 150MM UTILITY PIPE
5801000000-M	1530	188	M	ABANDON 200MM UTILITY PIPE
5802000000-M	1530	667	M	ABANDON 250MM UTILITY PIPE
5804000000-M	1530	899	M	ABANDON 300MM UTILITY PIPE
5871200000-M	1550	112	M	TRENCHLESS INSTALLATION OF 75MM IN SOIL
5871210000-M	1550	13	M	TRENCHLESS INSTALLATION OF 75MM NOT IN SOIL
5871600000-M	1550	115	M	TRENCHLESS INSTALLATION OF 250MM IN SOIL
5871610000-M	1550	13	M	TRENCHLESS INSTALLATION OF 250MM NOT IN SOIL
5871700000-M	1550	265	M	TRENCHLESS INSTALLATION OF 300MM IN SOIL
5871710000-M	1550	30	M	TRENCHLESS INSTALLATION OF 300MM NOT IN SOIL
6000000000-M	1605	15,000	M	TEMPORARY SILT FENCE
6006000000-M	1610	4,070	MTN	STONE FOR EROSION CONTROL, CLASS A
6009000000-M	1610	7,780	MTN	STONE FOR EROSION CONTROL, CLASS B
6012000000-M	1610	6,080	MTN	SEDIMENT CONTROL STONE
6015000000-M	1615	50	HA	TEMPORARY MULCHING
6018000000-M	1620	825	KG	SEED FOR TEMPORARY SEEDING
6021000000-M	1620	6.75	MTN	FERTILIZER FOR TEMPORARY SEEDING
6024000000-M	1622	1,000	M	TEMPORARY SLOPE DRAINS
6027000000-N	1622	50	EA	INLET PROTECTION AT TEMPORARY SLOPE DRAINS
6029000000-M	SP	300	M	SAFETY FENCE
6030000000-M	1630	10,800	M3	SILT EXCAVATION
6036000000-M	1631	12,900	M2	MATTING FOR EROSION CONTROL
6037000000-M	SP	200	M2	COIR FIBER MAT
6042000000-M	1632	4,200	M	6.4MM HARDWARE CLOTH
6045000000-M	SP	160	M	***MM TEMPORARY PIPE (450MM)
6048000000-M	SP	50	M2	FLOATING TURBIDITY CURTAIN
6069000000-M	1638	275	M3	STILLING BASINS
6071010000-M	SP	100	M	WATTLE
6071020000-M	SP	50	KG	POLYACRYLAMIDE (PAM)
6071030000-M	SP	2,000	M	COIR FIBER BAFFLE
6071050000-M	SP	16	EA	***MM SKIMMER (38MM)
6084000000-M	1660	30	HA	SEEDING & MULCHING
6087000000-M	1660	30	HA	MOWING
6090000000-M	1661	1,550	KG	SEED FOR REPAIR SEEDING
6093000000-M	1661	5.25	MTN	FERTILIZER FOR REPAIR SEEDING
6096000000-M	1662	1,300	KG	SEED FOR SUPPLEMENTAL SEEDING
6108000000-M	1665	77	MTN	FERTILIZER TOPDRESSING
6111000000-M	SP	460	M	IMPERVIOUS DIKE
6114500000-N	SP	20	MHR	SPECIALIZED HAND MOWING
6117000000-N	SP	75	EA	RESPONSE FOR EROSION CONTROL
6123000000-M	1670	5	HA	REFORESTATION

ItemNumber	Sec #	Quantity	Unit	Description
6138000000-M	SP	8,000	M3	GENERIC EROSION CONTROL ITEM BORROW PIT DEWATERING BASIN
6890000000-M	SP	3	M3	CONCRETE STEPS
7000000000-M	1705	2	EA	PEDESTRIAN SIGNAL HEAD (***MM, ** SECTION) (400MM, 1 SECTION W/COUNTDOWN)
7060000000-M	1705	2,268	M	SIGNAL CABLE
7108000000-M	1705	16	EA	VEHICLE SIGNAL HEAD (300MM, 1 SECTION)
7120000000-M	1705	30	EA	VEHICLE SIGNAL HEAD (300MM, 3 SECTION)
7132000000-M	1705	9	EA	VEHICLE SIGNAL HEAD (300MM, 4 SECTION)
7144000000-M	1705	9	EA	VEHICLE SIGNAL HEAD (300MM, 5 SECTION)
7264000000-M	1710	516	M	MESSENGER CABLE (9.52MM)
7300000000-M	1715	628	M	UNPAVED TRENCHING (**********) (1, 50MM)
7300000000-M	1715	32	M	UNPAVED TRENCHING (**********) (2, 50MM)
7301000000-M	1715	138	M	DIRECTIONAL DRILL (**********) (2, 50MM)
7301000000-M	1715	177	M	DIRECTIONAL DRILL (**********) (3, 50MM)
7324000000-N	1716	16	EA	JUNCTION BOX (STANDARD SIZE)
7348000000-N	1716	10	EA	JUNCTION BOX (OVER-SIZED, HEAVY DUTY)
7360000000-N	1720	14	EA	WOOD POLE
7372000000-N	1721	26	EA	GUY ASSEMBLY
7408000000-M	1722	3	EA	25MM RISER WITH WEATHERHEAD
7420000000-M	1722	11	EA	50MM RISER WITH WEATHERHEAD
7444000000-M	1725	1,459	M	INDUCTIVE LOOP SAWCUT
7456000000-M	1726	3,848	M	LEAD-IN CABLE (**********) (14-2)
7588000000-N	SP	6	EA	METAL POLE WITH SINGLE MAST ARM
7590000000-N	SP	2	EA	METAL POLE WITH DUAL MAST ARM
7613000000-N	SP	8	EA	SOIL TEST
7614100000-M	SP	43	M3	DRILLED PIER FOUNDATION
7631000000-N	SP	7	EA	MAST ARM WITH METAL POLE DESIGN
7636000000-N	1745	6	EA	SIGN FOR SIGNALS
7684000000-N	1750	3	EA	SIGNAL CABINET FOUNDATION
7756000000-N	1751	3	EA	CONTROLLER WITH CABINET (TYPE 2070L, BASE MOUNTED)
7780000000-N	1751	16	EA	DETECTOR CARD (TYPE 2070L)
7901000000-N	1753	3	EA	CABINET BASE EXTENDER
7912000000-N	1755	1	EA	BEACON CONTROLLER ASSEMBLY & CABINET (********) (F1)
7980000000-N	SP	10	EA	GENERIC SIGNAL ITEM OPTICAL PREEMPTION DETECTOR
7980000000-N	SP	3	EA	GENERIC SIGNAL ITEM OPTICAL PREEMPTION PHASE SELECTOR

******* BEGIN SCHEDULE AA *******
******* (2 ALTERNATES) *******

0987000000-M AA1	310	2,931.6	M	GENERIC PIPE ITEM 375MM RC PIPE CULVERTS, CLASS III
0987000000-M AA1	310	1,353.6	M	GENERIC PIPE ITEM 450MM RC PIPE CULVERTS, CLASS III
0987000000-M AA1	310	740.4	M	GENERIC PIPE ITEM 600MM RC PIPE CULVERTS, CLASS III
0987000000-M AA1	310	224.4	M	GENERIC PIPE ITEM 750MM RC PIPE CULVERTS, CLASS III
0987000000-M AA1	310	65.2	M	GENERIC PIPE ITEM 900MM RC PIPE CULVERTS, CLASS III

*** OR ***

0536000000-M AA2	SP	376.8	M	****MM HDPE PIPE CULVERTS (375MM)
0536000000-M AA2	SP	240	M	****MM HDPE PIPE CULVERTS (450MM)
0536000000-M AA2	SP	118.8	M	****MM HDPE PIPE CULVERTS (600MM)
0536000000-M AA2	SP	63.6	M	****MM HDPE PIPE CULVERTS (750MM)
0536000000-M AA2	SP	25.2	M	****MM HDPE PIPE CULVERTS (900MM)
0987000000-M AA2	310	2,554.8	M	GENERIC PIPE ITEM 375MM RC PIPE CULVERTS, CLASS III
0987000000-M AA2	310	1,113.6	M	GENERIC PIPE ITEM 450MM RC PIPE CULVERTS, CLASS III
0987000000-M AA2	310	621.6	M	GENERIC PIPE ITEM 600MM RC PIPE CULVERTS, CLASS III
0987000000-M AA2	310	160.8	M	GENERIC PIPE ITEM 750MM RC PIPE CULVERTS, CLASS III
0987000000-M AA2	310	40	M	GENERIC PIPE ITEM 900MM RC PIPE CULVERTS, CLASS III

******* END SCHEDULE AA *******

RAL-WS024,2/1/2011,P:\R-2414B\Drainage\R-2414B Drainage Sum_REV_10nov01.xls

COMPUTED BY: TCE DATE: 12/5/2006

CHECKED BY: LHM DATE: 4/22/2009

METRIC

PROJECT NO.	SHEET NO.
R-2414B	3-A

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

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".

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

STATION	LOCATION (LT, RT, M, OR CL')	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE)								
SIZE								300	375	450	450	600	600	750	750	900
THICKNESS OR GAUGE											CLASS IV		CLASS IV		CLASS IV	
SHEET 4																
L 46+20	LT	1		2.600												
L 46+20	LT	1	2		1.900	1.790										
L 46+20	LT	2		2.730												
L 46+20	LT	2	3		1.790	1.591			32.4							
L 46+53	LT	3		2.730												
L 46+53	LT	3	4		1.591	1.403			26.4							
L 46+80	LT	4		2.755												
L 46+20	RT	5		2.631												
L 46+20	RT	5	6		1.970	1.815			19.2							
L 46+40	RT	6		2.708												
L 46+40	RT	6	7		1.815	1.768			12.0							
L 46+53	RT	7		2.550												
L 46+53	RT	7	8		1.768	1.620			25.2							
L 46+79	RT	8		2.822												
L 46+79	RT	9	8		2.220	1.680										
L 46+79	RT	10	8		1.850	1.620			42.0							
L 47+21	RT	10		2.550												
L 46+79	RT	8	4		1.620	1.403				19.2						
L 46+80	LT	4	11		1.403	1.007						39.6				
L 47+20	LT	11		2.422												
L 47+20	LT	11	12		1.007	0.817						28.8				
L 47+50	LT	12		2.221												
L 47+50	LT	12	13		0.817	0.603						33.6				
L 47+84	LT	13		2.048												
L 47+87	LT	13	14		0.603	0.280										
Y 10+55	RT	15	16		0.833	0.798	X									
Y 10+27	RT	16		2.206												
Y 10+27	RT	16	17		0.798	0.766	X			20.4						
Y 10+35	LT	17		2.180												
Y 10+35	LT	17	18		0.766	0.741	X			8.4						
Y 10+31	LT	19	18		1.002	0.741										
Y 10+25	LT	18		2.520												
Y 10+25	LT	18	13		0.741	0.603								33.6		
L 47+87	LT	21		2.046												
L 47+87	LT	21	13		0.612	0.603						4.8				
L 48+10	LT	22		2.132												
L 48+10	LT	22	21		0.756	0.612						22.8				
L 48+39	RT	20	20A						10.8							
L 48+39	RT	20A														
SHEET TOTAL									168.0	48.0		129.6		33.6		

STATION	BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE)												CLASS III R.C. PIPE OR HDPE PIPE, TYPE S OR D							300mm SIDE DRAIN PIPE	375mm SIDE DRAIN PIPE	450mm SIDE DRAIN PIPE	600mm SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. METERS	
SIZE	400	450	600		800		900		1000		1200		375	400	450	600	750	900	1000					R.C.P.	C.S.P.
THICKNESS OR GAUGE	1.63	1.63	1.63		2.01		2.01		2.01		2.01														
SHEET 4																									
L 46+20																									
L 46+20													4.8												
L 46+20																									
L 46+20																									
L 46+53																									
L 46+53																									
L 46+80																									
L 46+20																									
L 46+20																									
L 46+40																									
L 46+40																									
L 46+53																									
L 46+53																									
L 46+79																									
L 46+79															4.8										
L 46+79																									
L 47+21																									
L 46+79																									
L 46+80																									
L 47+20																									
L 47+20																									
L 47+50																									
L 47+50																									
L 47+84																									
L 47+87																		6							
Y 10+55															28.8										
Y 10+27																									
Y 10+27																									
Y 10+35																									
Y 10+35																									
Y 10+31																	8.4								
Y 10+25																									
Y 10+25																									
L 47+87																									
L 47+87																									
L 48+10																									
L 48+10																									
L 48+39																									
L 48+39																									
SHEET TOTAL													4.8		33.6		8.4	6							

STATION	QUANITIES FOR DRAINAGE STRUCTURES PER EACH (0 THRU 1.50)	*TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') METERS A 1.5 THRU 3.00	B 3.00 AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME W/ TWO GRATES STD. 840.16	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.22	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	J.B. STD. 840.31 OR 840.32	M.D.I. FRAME WITH TWO GRATES STD. 840.29	MANHOLE STD. 840.51	M.H. STD. 840.51 OR 840.53	M.H. FRAME AND COVER STD. 840.54	DRY DETENTION DRAWDOWN STRUCTURE
SHEET 4																						
L 46+20	1							1	1													
L 46+20																						
L 46+20	1			1			1															
L 46+20																						
L 46+53	1			1			1															
L 46+53																						
L 46+80	1			1			1															
L 46+20	1			1		1																
L 46+20																						
L 46+40	1			1		1																
L 46+40																						
L 46+53	1			1		1																
L 46+53																						
L 46+79	1			1		1																
L 46+79																						
L 46+79																						
L 47+21	1							1	1													
L 46+79																						
L 46+80																						
L 47+20	1			1			1															
L 47+20																						
L 47+50	1			1			1															
L 47+50																						
L 47+84	1			1	1																	
L 47+87																						
Y 10+55																						
Y 10+27	1			1		1																
Y 10+27																						
Y 10+35	1			1			1															
Y 10+35																						
Y 10+31																						
Y 10+25	1	0.28		1			1															
Y 10+25																						
L 47+87	1			1	1																	
L 47+87																						
L 48+10	1			1		1																
L 48+10																						
L 48+39																						
L 48+39	1							1	1													
SHEET TOTAL	18	0.28		15	2	6	7	3	3													

STATION	375 X 375 X 375 RC PIPE TEES, CLASS III	450 X 450 X 375 RC PIPE TEES, CLASS III	600 X 600 X 375 RC PIPE TEES, CLASS III	375mm DUCTILE IRON	CONCRETE TRANSITIONAL SECTION CATCH BASIN	CONCRETE TRANSITIONAL SECTION DROP INLET	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" M^3 STD. 840.72	CONC. & BRICK PIPE PLUG, M^3 STD. 840.71	PIPE REMOVAL (METERS)	REMARKS
SHEET 4											
L 46+20											
L 46+20											
L 46+20											
L 46+20										15	
L 46+53											
L 46+53											
L 46+80											
L 46+20											
L 46+20											
L 46+40											
L 46+40											
L 46+53											
L 46+53											
L 46+79											
L 46+79											
L 46+79										37	
L 47+21											
L 46+79											
L 46+80											
L 47+20											
L 47+20											
L 47+50											
L 47+50										6.2	
L 47+84											
L 47+87											
Y 10+55										21.6	
Y 10+27											
Y 10+27										10.6	
Y 10+35											
Y 10+35											
Y 10+31											
Y 10+25											
Y 10+25										22.7	
L 47+87											
L 47+87											
L 48+10											
L 48+10											
L 48+39										9.2	
L 48+39											
SHEET TOTAL										122.3	

ABBREVIATIONS

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

COMPUTED BY: TCE DATE: 12/5/2006
CHECKED BY: LHM DATE: 4/22/2009

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

METRIC

PROJECT NO.	SHEET NO.
R-2414B	3-B

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".

600mm SIDE DRAIN PIPE

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

STATION / SIZE / THICKNESS OR GAUGE	LOCATION (LT, RT, M, OR CL)'	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE) 300	375	450	450 CLASS IV	600	600 CLASS IV	750	750 CLASS IV	900
SHEET 5																
L 48+50	LT	23		2.398												
L 48+50	LT	23	22		0.975	0.765						38.4				
L 48+92	LT	24		2.547												
L 48+92	LT	24	23		1.159	0.975						43.2				
L 49+17	LT	25		2.620												
L 49+17	LT	25	24		1.243	1.159						22.8				
L 49+23	RT	26		2.850												
L 49+23	RT	26	25		1.837	1.243			26.4							
L 49+36	RT	27		2.900												
L 49+36	RT	27	26		1.890	1.837										
L 49+65	LT	28		2.808												
L 49+65	LT	28	25		1.380	1.243						46.8				
L 49+70	RT	29		3.262												
L 49+70	RT	29	28		1.928	1.380				21.6						
L 49+71	RT	30	29		1.968	1.928										
L 50+16	LT	31		2.850												
L 50+16	LT	31	29		2.090	1.928				46.8						
Y1 10+60	RT	32	31		2.264	2.090										
L 49+82	LT	33		TEE												
L 49+82	LT	33	28		1.428	1.380			18.0							
L 49+82	LT	34		2.750												
L 49+82	LT	34	33		1.740	1.428										
L 50+28	LT	35		2.997												
L 50+28	LT	35	33		1.565	1.428			46.8							
L 50+28	LT	36		2.700												
L 50+28	LT	36	35		1.690	1.565										
L 50+70	LT	37		3.120												
L 50+70	LT	37	35		1.685	1.565			42.0							
L 50+70	LT	38		2.400												
L 50+70	LT	38	37		1.700	1.685										
Y1 10+60	LT	39	40		2.180	1.915										
Y1 10+92.50	LT	39A														
Y1 10+44	LT	40		2.775												
Y1 10+44	RT	40	41		1.915	1.830				26.4						
L 50+48	RT	41		2.865												
L 50+48	RT	41	42		1.830	1.730	X			32.4						
L 50+83	RT	42		3.159												
L 50+83	RT	43		2.920												
L 50+83	RT	43	42		1.910	1.689										
L 50+83	RT	42	44		1.730	1.618	X									
SHEET TOTAL									133.2	127.2		151.2				

STATION / SIZE / THICKNESS OR GAUGE	BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE) 400	450	600	800	900	1000	1200	CLASS III R.C. PIPE OR HDPE PIPE, TYPE S OR D 375	400	450	600	750	900	1000
SHEET 5														
L 48+50														
L 48+50														
L 48+92														
L 48+92														
L 49+17														
L 49+17														
L 49+23														
L 49+23														
L 49+36														
L 49+36								13.2						
L 49+65														
L 49+65														
L 49+70														
L 49+70														
L 49+71										7.2				
L 50+16														
L 50+16														
Y1 10+60										45.6				
L 49+82														
L 49+82														
L 49+82														
L 49+82								4.8						
L 50+28														
L 50+28														
L 50+28														
L 50+28								3.6						
L 50+70														
L 50+70														
L 50+70														
L 50+70								3.6						
Y1 10+60										16.8				
Y1 10+92.50														
Y1 10+44														
Y1 10+44														
L 50+48														
L 50+48														
L 50+83														
L 50+83														
L 50+83								4.8						
L 50+83											44.4			
SHEET TOTAL								30		69.6	44.4			

STATION / SIZE / THICKNESS OR GAUGE	300mm SIDE DRAIN PIPE	375mm SIDE DRAIN PIPE	450mm SIDE DRAIN PIPE	600mm SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 CU. METERS R.C.P.	C.S.P.	ENDWALLS FOR DRAINAGE STRUCTURES METERS A PER EACH (0 THRU 1.50)	1.5 THRU 3.00	B 3.00 AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME W/ TWO GRATES STD. 840.16	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.22	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	J.B. STD. 840.31 OR 840.32	M.D.I. FRAME WITH TWO GRATES STD. 840.29	MANHOLE STD. 840.51	M.H. STD. 840.51 OR 840.53	M.H. FRAME AND COVER STD. 840.54	DRY DETENTION DRAWDOWN STRUCTURE	375 X 375 X 375 RC PIPE TEES, CLASS III	450 X 450 X 375 RC PIPE TEES, CLASS III	600 X 600 X 375 RC PIPE TEES, CLASS III	375mm DUCTILE IRON	CONCRETE TRANSITION (AL SECTION) CATCH BASIN	DROP INLET	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" M^3 STD. 840.72	CONC. & BRICK PIPE PLUG, M^3 STD. 840.71	PIPE REMOVAL (METERS)	REMARKS
SHEET 5																																									
L 48+50							1			1		1																													
L 48+50																																								15.5	
L 48+92							1			1		1																													
L 48+92																																								11.9	
L 49+17							1			1		1																													
L 49+17																																									
L 49+23							1							1	1																										
L 49+23																																									
L 49+36							1							1	1																										
L 49+36																																								15.3	
L 49+65							1			1		1																													
L 49+65																																								25.2	
L 49+70							1			1		1																													
L 49+70																																									
L 49+71																																									
L 50+16							1			1		1																													
L 50+16																																								4.8	
Y1 10+60																																									
L 49+82																															1										
L 49+82																																								8	
L 49+82							1							1	1																										
L 49+82																																									
L 50+28							1			1		1																													
L 50+28																																								17.5	
L 50+28							1							1	1																										
L 50+28																																									
L 50+70							1			1		1																												9	
L 50+70																																								9.2	
L 50+70							1							1	1																										
L 50+70																																									
Y1 10+60																																									
Y1 10+92.50				7.20																																					
Y1 10+44							1			1		1																													
Y1 10+44																																									
L 50+48							1			1		1																													
L 50+48																																									
L 50+83							1			1		1																													
L 50+83							1							1	1																										
L 50+83																																									
L 50+83																																								6.4	
SHEET TOTAL				7.2			17			11		6	5	6	6																1									122.8	

ABBREVIATIONS

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

COMPUTED BY: TCE DATE: 12/5/2006
CHECKED BY: LHM DATE: 4/22/2009

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

METRIC

PROJECT NO.	SHEET NO.
R-2414B	3-C

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".

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

STATION	LOCATION (LT, RT, M, OR CL)	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE) SIZE	300	375	450	450	600	600	750	750	900
								THICKNESS OR GAUGE				CLASS IV		CLASS IV		CLASS IV	
SHEET 5																	
Y2 10+27	RT	45	46		1.200	0.466				12.0							
Y2 10+27	RT	46		1.500													
Y2 10+27	RT	46	47		0.416	3.373				15.6							
L 51+45	LT	48		3.342													
L 51+45	LT	48	49		2.387	1.500				12.0							
L 51+72	LT	50															
L 51+85	LT	51	52		1.463	1.315											
L 51+85	LT	52		3.503													
L 51+85	RT	52	53		1.315	1.078									21.6		
L 51+85	LT	53		3.383													
L 51+85	LT	53	54		1.078	0.900											
SHEET 6																	
L 52+96	LT	59		2.647													
L 52+95	LT	59	60		1.707	1.320											
L 53+20	RT	61		2.020													
L 53+20	RT	61	60		1.320	1.248				25.2							
L 53+20	LT	60		2.586													
L 53+20	LT	60	62		1.248	1.158				36.0							
L 53+56	LT	62		2.230													
L 53+56	LT	62	63		1.158	1.082				24.0							
L 53+80	RT	64		1.980													
L 53+80	RT	64	63		1.219	1.082				27.6							
L 53+60	RT	65		2.070													
L 53+60	RT	65	64		1.370	1.219				19.2							
L 54+02	RT	66		1.980													
L 54+02	RT	66	64		1.280	1.219				22.8							
L 53+80	LT	63		2.133													
L 53+80	LT	63	67		1.082	1.077				4.8							
L 53+84	LT	67		2.133													
L 53+84	LT	67	68		1.077	0.769					75.6						
L 54+60	LT	68		2.079													
L 54+60	LT	68	69		0.769	0.418					30.0						
L 54+60	RT	70								15.6							
SHEET TOTAL										214.8	105.6				21.6		

STATION	BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE) SIZE	400	450	600	800	900	1000	1200	CLASS III R.C. PIPE OR HDPE PIPE, TYPE S OR D SIZE	375	400	450	600	750	900	1000
	THICKNESS OR GAUGE	1.63	1.63	1.63	2.01	2.01	2.01	2.01								
SHEET 5																
Y2 10+27																
Y2 10+27																
Y2 10+27																
L 51+45																
L 51+45																
L 51+72																
L 51+85														14.4		
L 51+85																
L 51+85																
L 51+85																
L 51+85																
L 51+85														14.4		
SHEET 6																
L 52+96																
L 52+95																
L 53+20																
L 53+20																
L 53+20																
L 53+20																
L 53+56																
L 53+56																
L 53+80																
L 53+80																
L 53+60																
L 53+60																
L 54+02																
L 54+02																
L 53+80																
L 53+80																
L 53+84																
L 53+84																
L 54+60																
L 54+60																
L 54+60																
SHEET TOTAL														28.8		

STATION	300mm SIDE DRAIN PIPE	375mm SIDE DRAIN PIPE	450mm SIDE DRAIN PIPE	600mm SIDE DRAIN PIPE	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)	METERS A 1.5 THRU 3.00	B 3.00 AND ABOVE	*TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. "A" * (1.3 X COL."B")	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME W/ TWO GRATES STD. 840.16	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.22	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. FRAME WITH GRATE STD. 840.24	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	M.D.I. (N.S.) FRAME WITH GRATE STD. 840.32	J.B. STD. 840.31 OR 840.32	M.D.I. FRAME WITH TWO GRATES STD. 840.29	MANHOLE STD. 840.51	M.H. STD. 840.51 OR 840.53	M.H. FRAME AND COVER STD. 840.54	DRY DETENTION DRAWDOWN STRUCTURE	375 X 375 X 375 RC PIPE TEES, CLASS III	450 X 450 X 375 RC PIPE TEES, CLASS III	600 X 600 X 375 RC PIPE TEES, CLASS III	375mm DUCTILE IRON	CONCRETE TRANSITIONAL SECTION CATCH BASIN	DROP INLET	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" M^3 STD. 840.72	CONC. & BRICK PIPE PLUG, M^3 STD. 840.71	PIPE REMOVAL (METERS)	REMARKS
SHEET 5																																									
Y2 10+27																																								14.4	
Y2 10+27							1												1								1														
Y2 10+27																																									
L 51+45							1			1		1																													
L 51+45																																									
L 51+72																																								0.13	
L 51+85																																									
L 51+85							1	0.69		1		1																													
L 51+85																																									
L 51+85							1	0.81		1			1																												
L 51+85																																									
SHEET 6																																									
L 52+96							1			1			1																												INCLUDED IN SEALED SYSTEM
L 52+95																																		24.0							INCLUDED IN SEALED SYSTEM
L 53+20							1								1	1																									
L 53+20																																								14.7	
L 53+20							1			1			1																												INCLUDED IN SEALED SYSTEM
L 53+20																																									
L 53+56							1			1			1																												
L 53+56																																									
L 53+80							1								1	1																									
L 53+80																																									
L 53+60							1								1	1																									
L 53+60																																								12.3	
L 54+02							1								1	1																									
L 54+02																																								12.3	
L 53+80							1				1	1																													
L 53+80																																									
L 53+84							1				1	1																													
L 53+84																																								53.9	
L 54+60							1				1			1																										16.8	
L 54+60																																								12.3	
L 54+60																																									
SHEET TOTAL							14	1.49		9	2	2	5	4	4		1					1											24.0					0.13	136.7	

ABBREVIATIONS

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

COMPUTED BY: TCE DATE: 12/5/2006

CHECKED BY: LHM DATE: 4/22/2009

METRIC

PROJECT NO.	SHEET NO.
R-2414B	3-D

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

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".

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

STATION (SIZE / THICKNESS OR GAUGE)	LOCATION (LT, RT, M, OR CL')	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE) 300	375	450	450 CLASS IV	600	600 CLASS IV	750	750 CLASS IV	900	BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE) 400 (1.63)	450 (1.63)	600 (1.63)	800 (2.01)	900 (2.01)	1000 (2.01)	1200 (2.01)
SHEET 6																							
L 55+03	LT	71		1.866																			
L 55+03	LT	71	68		0.875	0.844				42.0													
L 55+03	LT	72		2.500																			
L 55+03	LT	72	71		1.800	1.770																	
L 55+29	LT	73		1.845																			
L 55+29	LT	73	74		0.880	0.250																	
L 55+56	LT	75		1.900																			
L 55+56	LT	75	73		0.960	0.880			25.2														
SHEET 7																							
L 56+00	LT	76		2.236																			
L 56+00	LT	76	77		1.322	0.390																	
L 55+90	RT	78		2.145																			
L 55+90	RT	78	79		1.205	1.109			20.4														
L 56+10	LT	79		2.133																			
L 56+10	LT	79	80		1.109	0.600																	
L 57+24	RT	81		2.082																			
L 57+24	RT	81	82		1.142	0.750																	
L 57+52	RT	83		2.150																			
L 57+52	RT	83	84		1.215	0.410																	
L 57+95	LT	85																					
L 57+95	LT	86																					
L 58+14	LT	87		2.110																			
L 58+14	LT	87	88		1.100	0.770			30.0														
L 58+14	RT	88		2.356																			
L 58+14	RT	88	89		0.752	0.440																	
L 58+80	LT	90	91		1.750	1.471				19.2													
L 58+80	M	91		3.149																			
L 58+80	M	91	92		1.471	1.195				15.6													
L 58+80	RT	92		2.559																			
	RT	98	92		0.932	0.825								43.2									
	RT	92	89A		0.675	0.507										40.0							
L 58+40	RT	89A		2.442																			
	RT	89A	89B		0.507	0.453																	
L 58+50	LT	89C		3.003																			
	RT	89C	89A		2.032	1.050			16.8														
SHEET 8																							
L 59+61	RT	94																					
L 59+83	LT	95																					
L 59+23	LT	96		2.170																			
L 59+23	LT	96	97		1.160	1.035			21.6														
L 59+04	RT	97A		2.980																			
	RT	97A	97		2.010	1.035			19.2														
SHEET TOTAL									133.2	76.8				43.2		40.0							

STATION	LOCATION	FROM	TO	CLASS III R.C. PIPE OR HDPE PIPE, TYPE S OR D 375	400	450	600	750	900	1000	300mm SIDE DRAIN PIPE	375mm SIDE DRAIN PIPE	450mm SIDE DRAIN PIPE	600mm SIDE DRAIN PIPE	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 L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') METERS A 1.5 THRU 3.00	B 3.00 AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G
SHEET 6																							
L 55+03	LT	71															1			1			1
L 55+03	LT	71	68																				
L 55+03	LT	72															1						
L 55+03	LT	72	71	6																			
L 55+29	LT	73															1			1	1		
L 55+29	LT	73	74	8.4																			
L 55+56	LT	75															1			1		1	
L 55+56	LT	75	73																				
SHEET 7																							
L 56+00	LT	76															1			1		1	
L 56+00	LT	76	77	9.6																			
L 55+90	RT	78															1			1			1
L 55+90	RT	78	79																				
L 56+10	LT	79															1			1	1		
L 56+10	LT	79	80	10.8																			
L 57+24	RT	81															1			1	1		
L 57+24	RT	81	82	8.4																			
L 57+52	RT	83															1			1			1
L 57+52	RT	83	84	8.4																			
L 57+95	LT	85																					
L 57+95	LT	86																					
L 58+14	LT	87															1						
L 58+14	LT	87	88																				
L 58+14	RT	88															1	0.10		1			1
L 58+14	RT	88	89	10.8																			
L 58+80	LT	90	91																				
L 58+80	M	91															1	0.18					
L 58+80	M	91	92																				
L 58+80	RT	92															1	0.38		1			1
	RT	98	92																				
	RT	92	89A																				
L 58+40	RT	89A															1	0.44		1			1
	RT	89A	89B						15.6														
L 58+50	LT	89C															1						
	RT	89C	89A																				
SHEET 8																							
L 59+61	RT	94																					
L 59+83	LT	95																					
L 59+23	LT	96															1						
L 59+23	LT	96	97																				
L 59+04	RT	97A															1						
	RT	97A	97																				
SHEET TOTAL				62.4					15.6								17	1.10		11	3	2	6

STATION	LOCATION	FROM	TO	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME W/ TWO GRATES STD. 840.16	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.22	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	J.B. STD. 840.31 OR 840.32	M.D.I. FRAME WITH TWO GRATES STD. 840.29	MANHOLE STD. 840.51	M.H. STD. 840.51 OR 840.53	M.H. FRAME AND COVER STD. 840.54	DRY DETENTION DRAWDOWN STRUCTURE		375 X 375 X 375 RC PIPE TEES, CLASS III	450 X 450 X 375 RC PIPE TEES, CLASS III	600 X 600 X 375 RC PIPE TEES, CLASS III		375mm DUCTILE IRON		CONCRETE TRANSITIONAL SECTION CATCH BASIN	DROP INLET	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" M^3 STD. 840.72	CONC. & BRICK PIPE PLUG, M^3 STD. 840.71	PIPE REMOVAL (METERS)	REMARKS
SHEET 6																																
L 55+03	LT	71																														
L 55+03	LT	71	68																												43.7	
L 55+03	LT	72		1	1																											
L 55+03	LT	72	71																													
L 55+29	LT	73																														
L 55+29	LT	73	74																													
L 55+56	LT	75																														
L 55+56	LT	75	73																													
SHEET 7																																
L 56+00	LT	76																														
L 56+00	LT	76	77																													
L 55+90	RT	78																														
L 55+90	RT	78	79																													
L 56+10	LT	79																														
L 56+10	LT	79	80																													
L 57+24	RT	81																														
L 57+24	RT	81	82																													
L 57+52	RT	83																														
L 57+52	RT	83	84																													
L 57+95	LT	85																												0.05		
L 57+95	LT	86																												0.05		
L 58+14	LT	87		1	1																											
L 58+14	LT	87	88																												11.5	
L 58+14	RT	88																														
L 58+14	RT	88	89																													
L 58+80	LT	90	91																													
L 58+80	M	91		1	1																						1					
L 58+80	M	91	92																													
L 58+80	RT	92																														
	RT	98	92																												95	
	RT	92	89A																													
L 58+40	RT	89A																														
	RT	89A	89B																													
L 58+50	LT	89C		1	1																						1					
	RT	89C	89A																													
SHEET 8																																
L 59+61	RT	94																												0.05		
L 59+83	LT	95																												0.05		
L 59+23	LT	96		1	1																											
L 59+23	LT	96	97																												61.4	
L 59+04	RT	97A		1	1																						1					
	RT	97A	97																													
SHEET TOTAL				6	6																						3			0.2	211.6	

ABBREVIATIONS

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

COMPUTED BY: TCE DATE: 12/5/2006
CHECKED BY: LHM DATE: 4/22/2009

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

METRIC

PROJECT NO.	SHEET NO.
R-2414B	3-E

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".

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

STATION	LOCATION (LT, RT, M, OR CL)'	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE) SIZE 300	375	450	450	600	600	750	750	900
THICKNESS OR GAUGE											CLASS IV		CLASS IV		CLASS IV	
SHEET 8																
L 59+23	M	97		3.117												
L 59+23	M	97	98		1.035	0.932			10.8							
L 59+23	RT	98		2.651												
L 59+60	RT	100		2.941												
L 59+60	RT	100	98		1.114	0.932								34.8		
L 59+60	RT	101	100		1.490	1.114										
L 59+83	RT	102		3.017												
L 59+85	RT	102	100		1.203	1.144						24.0				
L 59+86	M	103		3.333												
L 59+86	M	103	102		1.402	1.203				12.0						
L 59+86	LT	104	103		1.663	1.402				22.8						
L 60+00	RT	104B														
L 60+00	RT	104A		2.310												
	RT	104A	104B		1.550	1.250			4.8							
	RT	104B	102		1.250	1.203				18.0						
L 60+53	RT	105		3.166												
L 60+53	RT	105	104B		1.389	1.250				52.8						
L 60+54	RT	106		2.590												
L 60+54	RT	106	105		1.410	1.389										
L 60+53	LT	107		3.219												
L 60+53	LT	107	105		2.279	1.389			27.6							
L 60+43	LT	108		3.247												
L 60+43	LT	108	107		2.307	2.279			10.8							
L 61+05	RT	109		3.258												
L 61+05	RT	109	105		1.570	1.389				52.8						
Y4 10+60	RT	110		2.803												
Y4 10+60	RT	110	109		1.686	1.553			64.8							
Y4 10+60	RT	111		2.400												
Y4 10+60	RT	111	110		1.700	1.686										
Y4 10+74	RT	112		2.700												
Y4 10+74	RT	112	111		2.000	1.700										
L 61+16	LT	113		3.313												
L 61+16	LT	113	114		2.533	2.290			30.0							
Y3 11+25	LT	114		2.908												
Y3 11+25	LT	115	114		2.323	2.290										
Y3 11+25	LT	114	116		2.290	2.250										
L 61+43	RT	117		3.552												
L 61+43	RT	117	118		2.612	2.445			31.2							
L 61+75	RT	118		3.693												
L 61+75	RT	119		3.160												
L 61+75	RT	119	118		2.460	2.445										
L 61+75	RT	118	120		2.445	2.290			19.2							
SHEET TOTAL									199.2	158.4		24.0		34.8		

STATION	BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE) SIZE 400	450	600	800	900	1000	1200	CLASS III R.C. PIPE OR HDPE PIPE, TYPE S OR D SIZE 375	400	450	600	750	900	1000
THICKNESS OR GAUGE	1.63	1.63	1.63	2.01	2.01	2.01	2.01							
SHEET 8														
L 59+23														
L 59+23														
L 59+23														
L 59+60														
L 59+60														
L 59+60										7.2				
L 59+83														
L 59+85														
L 59+86														
L 59+86														
L 59+86														
L 60+00														
L 60+00														
L 60+53														
L 60+53														
L 60+54														
L 60+54								3.6						
L 60+53														
L 60+53														
L 60+43														
L 60+43														
L 61+05														
L 61+05														
Y4 10+60														
Y4 10+60														
Y4 10+60								3.6						
Y4 10+74														
Y4 10+74								14.4						
L 61+16														
L 61+16														
Y3 11+25														
Y3 11+25										4.8				
Y3 11+25										19.2				
L 61+43														
L 61+43														
L 61+75														
L 61+75														
L 61+75								3.6						
L 61+75														
SHEET TOTAL								25.2		31.2				

STATION	300mm SIDE DRAIN PIPE	375mm SIDE DRAIN PIPE	450mm SIDE DRAIN PIPE	600mm SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. METERS R.C.P.	C.S.P.	QUANTITIES FOR DRAINAGE STRUCTURES *TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. "A" + (1.3 X COL. "B") PER EACH (0 THRU 1.50)	METERS 1.5 THRU 3.00 A	3.00 AND ABOVE B	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME W/ TWO GRATES STD. 840.16	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.22	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	J.B. STD. 840.31 OR 840.32	M.D.I. FRAME WITH TWO GRATES STD. 840.29	MANHOLE STD. 840.51	M.H. STD. 840.51 OR 840.53	M.H. FRAME AND COVER STD. 840.54	DRY DETENTION DRAINDOWN STRUCTURE	375 X 375 X 375 RC PIPE TEES, CLASS III	450 X 450 X 375 RC PIPE TEES, CLASS III	600 X 600 X 375 RC PIPE TEES, CLASS III	375mm DUCTILE IRON	CONCRETE TRANSITIONAL SECTION CATCH BASIN	DROP INLET	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" M^3 STD. 840.72	CONC. & BRICK PIPE PLUG, M^3 STD. 840.71	PIPE REMOVAL (METERS)	REMARKS
SHEET 8																																							
L 59+23							1	0.58						1	1																		1						
L 59+23																																							
L 59+23							1	0.22		1			1																									
L 59+60																																							
L 59+60							1	0.33		1			1																									
L 59+60																																					39		
L 59+60																																							
L 59+83							1	0.31		1			1																									
L 59+85																																							
L 59+86							1	0.43						1	1																		1						
L 59+86																																					13.5		
L 59+86																																							
L 60+00																														1									
L 60+00							1							1	1																								
L 60+53							1	0.28		1			1																									
L 60+53																																							
L 60+54							1							1	1																								
L 60+54																																							
L 60+53							1			1			1																									
L 60+53																																					9.8		
L 60+43							1			1			1																									
L 60+43																																							
L 61+05							1	0.19		1			1																									
L 61+05																																							
Y4 10+60							1			1			1																									
Y4 10+60																																							
Y4 10+60							1							1	1																								
Y4 10+60																																							
Y4 10+74							1							1	1																								
Y4 10+74																																							
L 61+16							1			1			1																								32.6		
L 61+16																																							
L 61+16																																					7.6		
Y3 11+25							1			1			1																									
Y3 11+25																																							
Y3 11+25																																							
Y3 11+25																																							
L 61+43							1			1			1																									
L 61+43																																					14.7		
L 61+75							1			1			1																									
L 61+75							1							1	1																								
L 61+75																																							
L 61+75																																					27.3		
SHEET TOTAL							19.0	2.34		12		6	6	7	7																		2				144.5		

ABBREVIATIONS

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

COMPUTED BY: TCE DATE: 12/5/2006
CHECKED BY: LHM DATE: 4/22/2009

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

METRIC

PROJECT NO.	SHEET NO.
R-2414B	3-F

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".

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

STATION	LOCATION (LT, RT, M, OR CL)	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE) SIZE	300	375	450	450	600	600	750	750	900
								THICKNESS OR GAUGE				CLASS IV		CLASS IV		CLASS IV	
SHEET 8																	
L 61+95	RT	120		TEE													
L 61+95	RT	121		3.230													
L 61+95	RT	121	120		2.530	2.290											
L 61+95	RT	120	122		2.290	2.151				19.2							
L 62+15	RT	123		3.190													
L 62+15	RT	123	122		2.180	2.151											
L 62+15	RT	122		3.714													
L 62+15	RT	122	124		2.151	1.758				36.0							
L 62+49	RT	125		2.790													
L 62+49	RT	125	124		1.780	1.758											
L 62+49	RT	124		3.648													
L 62+49	RT	124	126		1.758	1.426				26.4							
SHEET 9																	
L 62+75	RT	126		3.572													
L 62+75	RT	126	127		1.426	1.313											
L 62+81	CL	130	129		1.053	0.816							33.6				
L 62+87	RT	130		3.538													
L 62+87	RT	131	130		1.105	1.053											
L 63+00	LT	132		3.497													
L 63+00	LT	132	133		2.557	1.700											
L 63+50	RT	134		3.348													
L 63+50	RT	134	135		2.408	2.312				21.6							
L 63+50	LT	135		3.348													
L 63+50	LT	135	136		2.312	2.000											
L 64+30	LT	137		3.108													
L 64+30	LT	137	138		2.168	2.110	X			21.6							
L 64+30	RT	138		3.108													
L 64+30	RT	138	139		2.110	1.841	X			64.8							
L 64+95	RT	140		2.914													
L 64+95	LT	140	139		1.974	1.841	X			21.6							
L 64+95	LT	139		2.914													
L 64+95	LT	139	141		1.841	1.816	X										
L 65+38	LT	142															
L 65+56	LT	143															
L 65+35	LT	144		2.793													
L 65+35	LT	144	145		1.860	1.571				38.4							
SHEET TOTAL										249.6			33.6				

STATION	BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE) SIZE	400	450	600	800	900	1000	1200	CLASS III R.C. PIPE OR HDPE PIPE, TYPE S OR D SIZE	375	400	450	600	750	900	1000
	THICKNESS OR GAUGE	1.63	1.63	1.63	2.01	2.01	2.01	2.01								
SHEET 8																
L 61+95																
L 61+95																
L 61+95										4.8						
L 61+95																
L 62+15																
L 62+15										4.8						
L 62+15																
L 62+15																
L 62+49																
L 62+49										7.2						
L 62+49																
L 62+49																
SHEET 9																
L 62+75																
L 62+75										10.8						
L 62+81																
L 62+87																
L 62+87												10.8				
L 63+00																
L 63+00										9.6						
L 63+50																
L 63+50																
L 63+50																
L 63+50										8.4						
L 64+30																
L 64+30																
L 64+30																
L 64+30																
L 64+95																
L 64+95																
L 64+95																
L 64+95										7.2						
L 65+38																
L 65+56																
L 65+35																
L 65+35																
SHEET TOTAL										52.8		10.8				

STATION	300mm SIDE DRAIN PIPE	375mm SIDE DRAIN PIPE	450mm SIDE DRAIN PIPE	600mm SIDE DRAIN PIPE	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)	METERS 1.5 THRU 3.00	A	3.00 AND ABOVE	B	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G
SHEET 8															
L 61+95															
L 61+95							1								
L 61+95															
L 61+95															
L 62+15							1								
L 62+15															
L 62+15							1	0.06			1			1	
L 62+15															
L 62+49							1								
L 62+49															
L 62+49							1	0.39			1			1	
L 62+49															
SHEET 9															
L 62+75							1	0.65			1			1	
L 62+75															
L 62+81															
L 62+87							1	0.93			1			1	
L 62+87															
L 63+00							1				1				1
L 63+00															
L 63+50							1				1			1	
L 63+50															
L 63+50							1				1				1
L 63+50															
L 64+30							1				1				1
L 64+30															
L 64+30							1				1			1	
L 64+30															
L 64+95							1				1				1
L 64+95															
L 64+95							1				1			1	
L 64+95															
L 65+38															
L 65+56															
L 65+35							1				1				1
L 65+35															
SHEET TOTAL							15	2.03			12		7	5	3

STATION	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME W/ TWO GRATES STD. 840.16	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.22	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. FRAME WITH GRATE STD. 840.24	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	J.B. STD. 840.31 OR 840.32	M.D.I. FRAME WITH TWO GRATES STD. 840.29	MANHOLE STD. 840.51	M.H. STD. 840.51 OR 840.53	M.H. FRAME AND COVER STD. 840.54	DRY DETENTION DRAWDOWN STRUCTURE	375 X 375 X 375 RC PIPE TEES, CLASS III	450 X 450 X 375 RC PIPE TEES, CLASS III	600 X 600 X 375 RC PIPE TEES, CLASS III	375mm DUCTILE IRON	CONCRETE TRANSITIONAL SECTION CATCH BASIN	DROP INLET	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" M^3 STD. 840.72	CONC. & BRICK PIPE PLUG, M^3 STD. 840.71	PIPE REMOVAL (METERS)	REMARKS
SHEET 8																										
L 61+95																1										
L 61+95	1	1																								
L 61+95																										
L 61+95																									15.9	
L 62+15	1	1																								
L 62+15																										
L 62+15																										
L 62+15																										
L 62+49	1	1																								
L 62+49																										
L 62+49																										
L 62+49																									11	
SHEET 9																										
L 62+75																										
L 62+75																										
L 62+81																									20	
L 62+87																										
L 62+87																										
L 63+00																										
L 63+00																										
L 63+50																										
L 63+50																										
L 63+50																										
L 63+50																										
L 64+30																										
L 64+30																										
L 64+30																										
L 64+30																										
L 64+95																										
L 64+95																										
L 64+95																										
L 64+95																										
L 65+38																								0.08		
L 65+56																								0.08		
L 65+35																										
L 65+35																										
SHEET TOTAL	3	3														1								0.16	46.9	

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

* TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL. 'B')

COMPUTED BY: TCE DATE: 12/5/2006
CHECKED BY: LHM DATE: 4/22/2009

RAL-WS024

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

METRIC

PROJECT NO.	SHEET NO.
R-2414B	3-G

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".

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

STATION	LOCATION (LT, RT, M, OR CL)'	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE) 300	375	450	450 CLASS IV	600	600 CLASS IV	750	750 CLASS IV	900
SHEET 9																
L 65+73	LT	145		2.679												
L 65+73	LT	145	146		1.487	1.460	X									
L 65+73	RT	147	145		1.579	1.487				28.8						
L 66+10	LT	148		2.520												
L 66+10	RT	148	149		1.580	1.475	X		34.8							
L 65+55	RT	147A														
SHEET 10																
L 66+45	LT	149		2.415												
L 66+45	LT	149	150		1.475	1.265			34.8							
L 66+80	LT	151		1.910												
L 66+80	LT	151	150		1.280	1.265										
L 66+80	LT	150		2.310												
L 66+80	LT	150	152		1.265	0.542			54.0							
L 67+35	LT	152		2.260												
L 67+35	LT	152	153		0.542	0.500										
L 67+46	RT	154		2.322												
L 67+46	RT	154	152		0.648	0.542								24.0		
L 67+38	RT	155	156		1.710	1.340				48.0						
L 67+38	RT	156		2.380												
L 67+38	RT	156	154		1.340	0.648				8.4						
L 67+49	RT	157	154		0.680	0.648										
L 67+56	RT	158		2.287												
L 67+56	RT	158	154		0.690	0.648				9.6						
L 67+80	RT	159		2.347												
L 67+80	RT	159	158		0.931	0.690				24.0						
L 67+80	RT	160	159		1.000	0.931										
L 68+61	RT	161		2.100												
L 68+61	RT	161	162		1.400	1.368	X									
L 68+81	RT	163		2.193												
L 68+81	RT	163	162		1.433	1.368	X		20.4							
L 68+61	RT	162		2.216												
L 68+61	RT	162	164		1.368	1.310	X		21.6							
L 68+85	RT	166		2.193												
L 68+85	RT	166	164		1.433	1.180			25.2							
L 68+61	RT	164		2.216												
L 68+61	RT	164	165		1.310	1.280	X									
SHEET TOTAL									190.8	118.8				24.0		

STATION	BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE) 400 (1.63)	450 (1.63)	600 (1.63)	800 (2.01)	900 (2.01)	1000 (2.01)	1200 (2.01)	CLASS III R.C. PIPE OR HDPE PIPE, TYPE S OR D 375	400	450	600	750	900	1000	300mm SIDE DRAIN PIPE	375mm SIDE DRAIN PIPE	450mm SIDE DRAIN PIPE	600mm SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. METERS R.C.P.	C.S.P.
SHEET 9																				
L 65+73																				
L 65+73										8.4										
L 65+73																				
L 66+10																				
L 66+10																				
L 65+55																	7.2			
SHEET 10																				
L 66+45																				
L 66+45																				
L 66+80																				
L 66+80								6												
L 66+80																				
L 66+80																				
L 67+35																				
L 67+35												9.6								
L 67+46																				
L 67+46																				
L 67+38																				
L 67+38																				
L 67+38																				
L 67+49												7.2								
L 67+56																				
L 67+56																				
L 67+80																				
L 67+80																				
L 67+80										8.4										
L 68+61																				
L 68+61								4.8												
L 68+81																				
L 68+81																				
L 68+61																				
L 68+61																				
L 68+85																				
L 68+85																				
L 68+61																				
L 68+61										6										
SHEET TOTAL								10.8		22.8		16.8					7.2			

STATION	QUANITIES FOR DRAINAGE STRUCTURES PER EACH (0 THRU 1.50)	*TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') METERS A 1.5 THRU 3.00	METERS B 3.00 AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME W/ TWO GRATES STD. 840.16
SHEET 9									
L 65+73	1			1			1		
L 65+73									
L 65+73									
L 66+10	1			1			1		
L 66+10									
L 65+55									
SHEET 10									
L 66+45	1			1			1		
L 66+45									
L 66+80	1							1	1
L 66+80									
L 66+80	1			1			1		
L 66+80									
L 67+35	1	0.22		1	1				
L 67+35									
L 67+46	1	0.17		1			1		
L 67+46									
L 67+38									
L 67+38	1			1	1				
L 67+38									
L 67+49									
L 67+56	1	0.10		1			1		
L 67+56									
L 67+80	1			1			1		
L 67+80									
L 67+80									
L 68+61	1							1	1
L 68+61									
L 68+81	1			1	1				
L 68+81									
L 68+61	1			1			1		
L 68+61									
L 68+85	1			1	1				
L 68+85									
L 68+61	1			1		1			
L 68+61									
SHEET TOTAL	15	0.49		13	4	1	8	2	2

STATION	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.22	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	J.B. STD. 840.31 OR 840.32	M.D.I. FRAME WITH TWO GRATES STD. 840.29	MANHOLE STD. 840.51	M.H. STD. 840.51 OR 840.53	M.H. FRAME AND COVER STD. 840.54	DRY DETENTION DRAWDOWN STRUCTURE	375 X 375 X 375 RC PIPE TEES, CLASS III	450 X 450 X 375 RC PIPE TEES, CLASS III	600 X 600 X 375 RC PIPE TEES, CLASS III	375mm DUCTILE IRON	CONCRETE TRANSITIONAL SECTION CATCH BASIN	CONCRETE TRANSITIONAL SECTION DROP INLET	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" M^3 STD. 840.72	CONC. & BRICK PIPE PLUG, M^3 STD. 840.71	PIPE REMOVAL (METERS)	REMARKS
L 66+80 (150 to 152)																							31.6	
L 68+81 (163)																							17.2	
SHEET TOTAL																							48.8	

ABBREVIATIONS

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

COMPUTED BY: TCE DATE: 12/5/2006

CHECKED BY: LHM DATE: 4/22/2009

RAL-WS018

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

METRIC

PROJECT NO.	SHEET NO.
R-2414B	3-H

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".

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

STATION	LOCATION (LT, RT, M, OR CL)'	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE) 300	375	450	450 CLASS IV	600	600 CLASS IV	750	750 CLASS IV	900	BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE) 400 (1.63)	450 (1.63)	600 (1.63)	800 (2.01)	900 (2.01)	1000 (2.01)	1200 (2.01)
SHEET 11																							
L 69+93	RT	167		1.931																			
L 69+93	RT	167	168		1.231	1.217																	
L 69+93	RT	168		2.332																			
L 69+93	RT	168	169		1.217	1.019			68.4														
L 70+60	RT	169		2.138																			
L 70+60	RT	169	170		1.019	0.860			54.0														
L 71+13	RT	170		1.999																			
L 71+13	RT	170	171		0.860	0.719	X		46.8														
L 71+60	RT	171		2.106																			
L 71+60	RT	171	172		0.719	0.571				49.2													
L 72+09	RT	172		2.222																			
L 72+09	RT	172	173		0.571	0.524																	
L 72+09	RT	173		1.700																			
L 72+09	RT	173	174		0.524	0.477																	
L 73+00	RT	175		2.010																			
L 73+00	RT	175	172		1.070	0.763			92.4														
L 70+60	RT	176		2.138																			
L 70+60	LT	176	177		1.198	1.040			51.6														
L 71+13	LT	177		1.999																			
L 71+13	LT	177	178		1.040	0.899	X		46.8														
L 71+60	LT	178		2.106																			
L 71+60	LT	178	179		0.899	0.865	X																
L 73+00	LT	180		2.010																			
L 73+00	LT	180	181		1.070	0.400																	
SHEET 12																							
L 73+70	RT	182		1.800																			
L 73+70	RT	182	183		0.860	0.250																	
L 73+70	LT	184		1.800																			
L 73+70	LT	184	185		0.488	0.155																	
L 74+38	LT	186		1.634																			
L 74+38	LT	186	184		0.874	0.538			68.4														
L 74+38	RT	187		1.634																			
L 74+38	RT	187	188		0.694	0.250																	
L 75+68	LT	189		1.599																			
L 75+68	RT	189	190		0.839	0.751			21.6														
L 75+70	RT	190		1.599																			
L 75+70	RT	190	191		0.751	0.719																	
SHEET TOTAL									450.0	49.2													

STATION	LOCATION	FROM	TO	CLASS III R.C. PIPE OR HDPE PIPE, TYPE S OR D 375	400	450	600	750	900	1000	300mm SIDE DRAIN PIPE	375mm SIDE DRAIN PIPE	450mm SIDE DRAIN PIPE	600mm SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. METERS R.C.P.	C.S.P.	QUANITIES FOR DRAINAGE STRUCTURES PER EACH (0 THRU 1.50)	*TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') METERS A 1.5 THRU 3.00	B 3.00 AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G
SHEET 11																							
L 69+93	RT	167															1						
L 69+93	RT	167	168	4.8																			
L 69+93	RT	168															1			1		1	
L 69+93	RT	168	169																				
L 70+60	RT	169															1			1		1	
L 70+60	RT	169	170																				
L 71+13	RT	170															1			1	1		
L 71+13	RT	170	171																				
L 71+60	RT	171															1			1			1
L 71+60	RT	171	172																				
L 72+09	RT	172															1	0.15		1			1
L 72+09	RT	172	173			6																	
L 72+09	RT	173															1						
L 72+09	RT	173	174				16.8																
L 73+00	RT	175															1			1		1	
L 73+00	RT	175	172																				
L 70+60	RT	176															1			1			1
L 70+60	LT	176	177																				
L 71+13	LT	177															1			1	1		
L 71+13	LT	177	178																				
L 71+60	LT	178															1			1			1
L 71+60	LT	178	179	8.4																			
L 73+00	LT	180															1			1			1
L 73+00	LT	180	181	8.4																			
SHEET 12																							
L 73+70	RT	182															1			1		1	
L 73+70	RT	182	183	8.4																			
L 73+70	LT	184															1			1			1
L 73+70	LT	184	185	9.6																			
L 74+38	LT	186															1			1	1		
L 74+38	LT	186	184																				
L 74+38	RT	187															1			1	1		
L 74+38	RT	187	188	7.2																			
L 75+68	LT	189															1			1	1		
L 75+68	RT	189	190																				
L 75+70	RT	190															1			1	1		
L 75+70	RT	190	191	4.8																			
SHEET TOTAL				51.6		6	16.8										18	0.15		16	6	4	6

STATION	LOCATION	FROM	TO	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME W/ TWO GRATES STD. 840.16	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.22	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	J.B. STD. 840.31 OR 840.32	M.D.I. FRAME WITH TWO GRATES STD. 840.29	MANHOLE STD. 840.51	M.H. STD. 840.51 OR 840.53	M.H. FRAME AND COVER STD. 840.54	DRY DETENTION DRAWDOWN STRUCTURE	375 X 375 X 375 RC PIPE TEES, CLASS III	450 X 450 X 375 RC PIPE TEES, CLASS III	600 X 600 X 375 RC PIPE TEES, CLASS III	375mm DUCTILE IRON	CONCRETE TRANSITIONAL SECTION CATCH BASIN	CONCRETE TRANSITIONAL SECTION DROP INLET	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" M^3 STD. 840.72	CONC. & BRICK PIPE PLUG, M^3 STD. 840.71	PIPE REMOVAL (METERS)	REMARKS
SHEET 11																													
L 69+93	RT	167		1	1																								
L 69+93	RT	167	168																										
L 69+93	RT	168																											
L 69+93	RT	168	169																									11.7	
L 70+60	RT	169																											
L 70+60	RT	169	170																										
L 71+13	RT	170																											
L 71+13	RT	170	171																										
L 71+60	RT	171																											
L 71+60	RT	171	172																										
L 72+09	RT	172																											
L 72+09	RT	172	173																										
L 72+09	RT	173		1	1																								
L 72+09	RT	173	174																										
L 73+00	RT	175																											
L 73+00	RT	175	172																									12.3	
L 70+60	RT	176																											
L 70+60	LT	176	177																									30.7	
L 71+13	LT	177																											
L 71+13	LT	177	178																										
L 71+60	LT	178																											
L 71+60	LT	178	179																										
L 73+00	LT	180																											
L 73+00	LT	180	181																										
SHEET 12																													
L 73+70	RT	182																											
L 73+70	RT	182	183																										
L 73+70	LT	184																											
L 73+70	LT	184	185																										
L 74+38	LT	186																											
L 74+38	LT	186	184																										
L 74+38	RT	187																										12.6	
L 74+38	RT	187	188																										
L 75+68	LT	189																											
L 75+68	RT	189	190																									9.2	
L 75+70	RT	190																											
L 75+70	RT	190	191																										
SHEET TOTAL				2	2																							76.5	

ABBREVIATIONS

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

RAL-WS018,2/2/2011,P:\R-2414B\Drainage\R-2414B Drainage Sum_REV_10nov01.xls

RAL-WS018

COMPUTED BY: TCE DATE: 12/5/2006

CHECKED BY: LHM DATE: 4/22/2009

METRIC

PROJECT NO.	SHEET NO.
R-2414B	3-I

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

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".

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

CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE) — SIZE / THICKNESS OR GAUGE

STATION	LOCATION (LT, RT, M, OR CL)'	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	300	375	450	450 CLASS IV	600	600 CLASS IV	750	750 CLASS IV	900
SHEET 12																
L 76+00	LT	192		1.628												
L 76+00	LT	192	193		0.688	0.526			54							
L 76+55	LT	193		1.696												
L 76+55	LT	193	194		0.526	0.411										
L 76+74	LT	195														
L 76+74	RT	196														
L 76+00	RT	197		1.628												
L 76+00	RT	197	198		0.868	0.655			73.2							
L 76+73	RT	198		1.670												
L 76+73	RT	198	199		0.655	0.580										
L 76+80	RT	200		1.634												
L 76+80	RT	200	198		0.730	0.655						6.0				
L 76+84	LT	201		1.634												
L 76+84	LT	201	200		0.874	0.730			22.8							
SHEET 13																
L 77+18	RT	202		1.718												
L 77+18	RT	202	200		0.895	0.730						38.4				
L 77+18	LT	203		1.718												
L 77+18	LT	203	202		0.958	0.895			20.4							
L 78+06	RT	204		1.999												
L 78+06	RT	204	202		1.182	0.895				88.8						
L 78+06	LT	205		1.999												
L 78+06	LT	205	204		1.239	1.182			20.4							
L 79+50	RT	206		2.144												
L 79+50	RT	206	204		1.326	0.894	X		144.0							
L 79+50	LT	207		2.144												
L 79+50	LT	207	206		1.384	1.326			20.4							
L 80+60	LT	208		2.167												
L 80+60	LT	208	209		1.227	1.170			20.4							
L 80+60	RT	209		2.167												
L 80+60	LT	209	210		1.170	1.150										
SHEET 14																
L 81+37	CL	215	212		0.825	0.791						21.6				
L 81+37	LT	212		2.306												
L 81+37	LT	212	213		0.791	0.766										
SHEET TOTAL									321.6	88.8		66.0				

BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE); CLASS III R.C. PIPE OR HDPE PIPE, TYPE S OR D; SIDE DRAIN PIPE; ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. METERS

STATION	STRUCTURE NO.	BIT. C.S. 400 (1.63)	450 (1.63)	600 (1.63)	800 (2.01)	900 (2.01)	1000 (2.01)	1200 (2.01)	R.C./HDPE 375	400	450	600	750	900	1000	300mm SIDE DRAIN PIPE	375mm SIDE DRAIN PIPE	450mm SIDE DRAIN PIPE	600mm SIDE DRAIN PIPE	ENDWALLS R.C.P.	ENDWALLS C.S.P.
L 76+55	193-194								6												
L 76+73	198-199											6									
L 80+60	209-210								6												
L 81+37	212-213											7.2									
SHEET TOTAL									12			13.2									

QUANITIES FOR DRAINAGE STRUCTURES; *TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B'); FRAME, GRATES, AND HOOD STANDARD 840.03

STATION	STRUCTURE NO.	PER EACH (0 THRU 1.50)	METERS A: 1.5 THRU 3.00	METERS B: 3.00 AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	TYPE OF GRATE E	F	G	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME W/ TWO GRATES STD. 840.16	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.22	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	J.B. STD. 840.31 OR 840.32	M.D.I. FRAME WITH TWO GRATES STD. 840.29	MANHOLE STD. 840.51	M.H. STD. 840.51 OR 840.53	M.H. FRAME AND COVER STD. 840.54	DRY DETENTION DRAWDOWN STRUCTURE		375 X 375 X 375 RC PIPE TEES, CLASS III	450 X 450 X 375 RC PIPE TEES, CLASS III	600 X 600 X 375 RC PIPE TEES, CLASS III	375mm DUCTILE IRON	CONCRETE TRANSITIONAL SECTION: CATCH BASIN	CONCRETE TRANSITIONAL SECTION: DROP INLET	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" M^3 STD. 840.72	CONC. & BRICK PIPE PLUG, M^3 STD. 840.71	PIPE REMOVAL (METERS)	REMARKS
L 76+00	192	1			1		1																												
L 76+55	193	1			1			1																											
L 76+74	195																																0.05		
L 76+74	196																																0.05		
L 76+00	197	1			1			1																											
L 76+73	198	1			1		1																												
L 76+80	200	1			1	1																													
L 76+84	201	1			1	1																													
L 76+84	201-200																																	14.7	
L 77+18	202	1			1			1																											
L 77+18	203	1			1		1																												
L 78+06	204	1			1			1																											
L 78+06	204-202																																	5.6	
L 78+06	205	1			1		1																												
L 78+06	205-204																																	15.4	
L 79+50	206	1			1	1																													
L 79+50	207	1			1	1																													
L 80+60	208	1			1	1																												4.6	
L 80+60	209	1			1	1																													
L 81+37	212	1	0.02		1		1																												
SHEET TOTAL		15	0.02		15	6	5	4																									0.1	40.3	

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

RAL-WS018

COMPUTED BY: TCE DATE: 12/5/2006

CHECKED BY: LHM DATE: 4/22/2009

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

METRIC

PROJECT NO.	SHEET NO.
R-2414B	3-J

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".

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

STATION	LOCATION (LT, RT, M, OR CL)'	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE) SIZE 300	375	450	450	600	600	750	750	900
THICKNESS OR GAUGE											CLASS IV		CLASS IV		CLASS IV	
SHEET 14																
L 81+37	RT	214	215		0.920	0.831										
L 81+37	RT	215		2.306												
L 81+95	RT	217		2.320												
L 81+95	RT	217	218		1.380	0.867			31.2							
L 82+27	RT	218		2.428												
L 82+27	CL	218	221		0.867	0.794					20.4					
L 82+27	RT	221		2.274												
L 82+27	LT	221	222		0.794	0.760				8.4						
L 82+18	LT	222		2.293												
L 82+18	LT	222	223		0.760	0.730										
L 82+70	LT	224		2.159												
L 82+70	LT	224	225		0.926	0.794										
L 83+10	RT	226		2.039												
L 83+10	RT	226	224		1.044	0.926			39.6							
L 83+50	RT	227		1.922												
L 83+50	RT	227	226		1.162	1.044			39.6							
L 83+18	RT	228														
L 83+39	RT	229														
L 83+61	RT	230														
L 83+92	RT	231														
L 83+71	LT	232		1.900												
L 83+71	LT	232	233		1.140	0.989			51.6							
SHEET 15																
L 84+23	LT	233		2.002												
L 84+23	LT	233	234		0.989	0.931			21.6							
L 84+23	RT	235	234		1.310	0.931										
L 84+23	RT	236	234		1.162	0.931										
L 84+23	RT	234		2.156												
L 84+23	RT	234	237		0.931	0.782				27.6						
L 84+50	RT	238		1.500												
L 84+50	RT	238	237		0.800	0.782										
L 84+50	RT	237		2.040												
L 84+50	RT	237	239		0.782	0.696	X			30.0						
L 84+80	RT	240		1.530												
L 84+80	RT	240	239		0.830	0.696										
SHEET TOTAL									183.6	66.0	20.4					

STATION	BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE) SIZE 400	450	600	800	900	1000	1200	CLASS III R.C. PIPE OR HDPE PIPE, TYPE S OR D SIZE 375	400	450	600	750	900	1000
THICKNESS OR GAUGE	1.63	1.63	1.63	2.01	2.01	2.01	2.01							
SHEET 14														
L 81+37											7.2			
L 81+37														
L 81+95														
L 81+95														
L 82+27														
L 82+27														
L 82+27														
L 82+27														
L 82+18														
L 82+18										8.4				
L 82+70														
L 82+70								7.2						
L 83+10														
L 83+10														
L 83+50														
L 83+50														
L 83+18														
L 83+39														
L 83+61														
L 83+92														
L 83+71														
L 83+71														
SHEET 15														
L 84+23														
L 84+23														
L 84+23										12				
L 84+23										4.8				
L 84+23														
L 84+23														
L 84+50														
L 84+50								4.8						
L 84+50														
L 84+50														
L 84+80														
L 84+80								4.8						
SHEET TOTAL								16.8		25.2	7.2			

STATION	300mm SIDE DRAIN PIPE	375mm SIDE DRAIN PIPE	450mm SIDE DRAIN PIPE	600mm SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. METERS R.C.P.	C.S.P.	QUANITIES FOR DRAINAGE STRUCTURES *TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. "A" + (1.5 X COL. "B") PER EACH (0 THRU 1.50)	METERS A 1.5 THRU 3.00	B 3.00 AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME W/ TWO GRATES STD. 840.16	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.22	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	J.B. STD. 840.31 OR 840.32	M.D.I. FRAME WITH TWO GRATES STD. 840.29	MANHOLE STD. 840.51	M.H. STD. 840.51 OR 840.53	M.H. FRAME AND COVER STD. 840.54	DRY DETENTION DRAWDOWN STRUCTURE	375 X 375 X 375 RC PIPE TEES, CLASS III	450 X 450 X 375 RC PIPE TEES, CLASS III	600 X 600 X 375 RC PIPE TEES, CLASS III	375mm DUCTILE IRON	CONCRETE TRANSITIONAL SECTION CATCH BASIN	DROP INLET	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" M^3 STD. 840.72	CONC. & BRICK PIPE PLUG, M^3 STD. 840.71	PIPE REMOVAL (METERS)	REMARKS
SHEET 14																																							
L 81+37																																							
L 81+37							1			1			1																										
L 81+95							1			1		1																											
L 81+95																																						16.1	
L 82+27							1	0.06		1		1																											
L 82+27																																						13.3	
L 82+27							1			1			1																										
L 82+27																																							
L 82+18							1	0.03		1			1																										
L 82+18																																							
L 82+70							1			1			1																										
L 82+70																																							
L 83+10							1			1			1																										
L 83+10																																							
L 83+50							1			1			1																										
L 83+50																																							
L 83+18		6																																				3.9	
L 83+39		6																																					
L 83+61		6																																				5.7	
L 83+92		6																																				6.2	
L 83+71							1			1	1																												
L 83+71																																							
SHEET 15																																							
L 84+23							1			1		1																											
L 84+23																																							
L 84+23																																							
L 84+23																																							
L 84+23							1			1			1																									7.5	
L 84+23																																						6.2	
L 84+50							1							1	1																								
L 84+50																																							
L 84+50							1			1		1																											
L 84+50																																						22.6	
L 84+80							1							1	1																								
L 84+80																																							
SHEET TOTAL		24.0					14	0.09		12	1	4	7	2	2																			1.06		81.5	

ABBREVIATIONS

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

RAL-WS018

COMPUTED BY: TCE DATE: 12/5/2006

CHECKED BY: LHM DATE: 4/22/2009

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

METRIC

PROJECT NO.	SHEET NO.
R-2414B	3-K

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".

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

STATION	LOCATION (LT, RT, IN, OR CL)'	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE) SIZE 300	375	450	450	600	600	750	750	900
SIZE / THICKNESS OR GAUGE											CLASS IV		CLASS IV		CLASS IV	
SHEET 15																
L 84+80	RT	239		TEE												
L 84+80	RT	239	241		0.696	0.651	X			15.6						
L 84+95	RT	241		1.916												
L 85+15	RT	241	242		0.651	0.609						18.0				
L 85+15	RT	243		1.550												
L 85+15	RT	243	242		0.850	0.609										
L 85+15	RT	242		TEE												
L 85+15	RT	242	244		0.609	0.513						38.4				
L 85+74	RT	245		1.688												
L 85+74	RT	245	244		0.748	0.513			21.6							
L 85+52	RT	244		1.668												
L 85+52	RT	244	251		0.513	0.465	X					21.6				
L 85+13	LT	246														
L 85+44	LT	247														
L 84+95	LT	248		1.916												
L 84+95	LT	248	249		1.156	0.977			9.6							
L 85+05	LT	249		1.917												
L 85+05	LT	249	250		0.977	0.881			20.4							
L 85+25	LT	250		1.902												
L 85+25	LT	250	251		0.881	0.465			27.6							
L 85+52	LT	251		1.869												
L 85+52	LT	251	252		0.465	0.288	X					70.8				
L 86+24	LT	252		2.161												
L 86+24	LT	252	253		0.288	0.273										
L 86+25	RT	254		1.694												
L 86+25	RT	254	252		0.744	0.288				21.6						
L 86+25	RT	255	254		0.810	0.744										
L 86+50	RT	256		1.550												
L 86+50	RT	256	254		0.820	0.744				25.2						
L 86+55	RT	257		1.550												
L 86+55	RT	257	256		0.834	0.820				4.8						
L 86+55	RT	258	257		1.100	0.834										
L 86+75	RT	259		1.648												
L 86+75	RT	259	257		0.888	0.834			19.2							
Y7 10+72	RT	260		1.521												
Y7 10+72	RT	260	261		0.550	0.325										
Y7 10+26	RT	262														
Y7 11+46	RT	263		1.636												
Y7 11+46	RT	263	264		0.876	0.808			14.4							
SHEET TOTAL									112.8	67.2		146.8				

STATION	BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE) SIZE 400	450	600	800	900	1000	1200	CLASS III R.C. PIPE OR HDPE PIPE, TYPE S OR D SIZE 375	400	450	600	750	900	1000
SIZE / THICKNESS OR GAUGE	1.63	1.63	1.63	2.01	2.01	2.01	2.01							
SHEET 15														
L 84+80														
L 84+80														
L 84+95														
L 85+15														
L 85+15														
L 85+15								4.8						
L 85+15														
L 85+15														
L 85+74														
L 85+74														
L 85+52														
L 85+52														
L 85+13														
L 85+44														
L 84+95														
L 84+95														
L 85+05														
L 85+05														
L 85+25														
L 85+25														
L 85+52														
L 85+52														
L 86+24														
L 86+24												6		
L 86+25														
L 86+25														
L 86+25										4.8				
L 86+50														
L 86+50														
L 86+55														
L 86+55														
L 86+55										3.6				
L 86+75														
L 86+75														
Y7 10+72														
Y7 10+72								13.2						
Y7 10+26														
Y7 11+46														
Y7 11+46														
SHEET TOTAL								18		8.4		6		

STATION	300mm SIDE DRAIN PIPE	375mm SIDE DRAIN PIPE	450mm SIDE DRAIN PIPE	600mm SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. METERS R.C.P.	C.S.P.	QUANTIES FOR DRAINAGE STRUCTURES *TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' * (1.3 X COL.'B') PER EACH (0 THRU 1.50)	METERS A 1.5 THRU 3.00	B 3.00 AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME W/ TWO GRATES STD. 840.16	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.22	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	J.B. STD. 840.31 OR 840.32	M.D.I. FRAME WITH TWO GRATES STD. 840.29	MANHOLE STD. 840.51	M.H. STD. 840.51 OR 840.53	M.H. FRAME AND COVER STD. 840.54	DRY DETENTION DRAWDOWN STRUCTURE	375 X 375 X 375 RC PIPE TEES, CLASS III	450 X 450 X 375 RC PIPE TEES, CLASS III	600 X 600 X 375 RC PIPE TEES, CLASS III	375mm DUCTILE IRON	CONCRETE TRANSITIONAL SECTION CATCH BASIN	DROP INLET	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" M^3 STD. 840.72	CONC. & BRICK PIPE PLUG, M^3 STD. 840.71	PIPE REMOVAL (METERS)	REMARKS
SHEET 15																																							
L 84+80																															1								
L 84+80																																							
L 84+95							1			1		1																											
L 85+15																																						6.8	
L 85+15							1							1	1																								
L 85+15																																							
L 85+15																															1								
L 85+15																																							
L 85+15																																							
L 85+74							1			1			1																										
L 85+74																																							
L 85+52							1			1	1																												
L 85+52																																							
L 85+13	7.2																																						
L 85+44	7.2																																						
L 84+95							1			1			1																									6.3	
L 84+95																																							
L 85+05							1			1			1																										
L 85+05																																						4.8	
L 85+25							1			1			1																										
L 85+25																																						6.8	
L 85+52							1			1	1																												
L 85+52																																						13.2	
L 86+24							1	0.37		1			1																									7.7	
L 86+24																																							
L 86+25							1			1		1																											
L 86+25																																						13.7	
L 86+25																																							
L 86+50							1			1	1																												
L 86+50																																						7.9	
L 86+55							1			1			1																										
L 86+55																																							
L 86+55																																							
L 86+75							1			1			1																									28.7	
L 86+75																																						19.6	
Y7 10+72							1			1			1																									58.5	
Y7 10+72																																							
Y7 10+26		7.2																																					
Y7 11+46							1			1	1																												
Y7 11+46																																							
SHEET TOTAL	14.4	7.2					15	0.37		14	4	2	8	1	1												1	1									174.0	

ABBREVIATIONS

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

RAL-WS018

COMPUTED BY: TCE DATE: 12/5/2006

CHECKED BY: LHM DATE: 4/22/2009

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

METRIC

PROJECT NO.: R-2414B SHEET NO.: 3-L

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".

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

STATION	LOCATION (LT, RT, M, OR CL)	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE) 300	375	450	450 CLASS IV	600	600 CLASS IV	750	750 CLASS IV	900
SHEET 15																
Y7 11+46	LT	264		1.636												
Y7 11+46	LT	264	265		0.808	0.735			15.6							
Y7 11+65	RT	266	265		0.800	0.735				19.2						
Y7 11+62	LT	265		1.875												
Y7 11+62	LT	265	267		0.735	0.700										
Y7 11+87	L	268							9.6							
SHEET 16																
L 87+83	RT	269		1.591												
L 87+83	RT	269	270		0.831	0.827			3.6							
L 87+86	RT	270		1.591												
L 87+86	RT	270	271		0.827	0.635			39.6							
L 88+26	RT	271		1.683												
L 88+26	RT	271	272		0.635	0.630										
L 88+60	RT	273		1.930												
L 88+60	RT	273	274		0.909	0.594										
L 89+80	RT	275		1.767												
L 89+80	RT	275	276		0.397	0.375										
L 90+31	RT	277		1.462												
L 90+31	RT	277	275		0.541	0.397						50.4				
L 90+45	RT	278		1.447												
L 90+45	RT	278	277		0.671	0.541				14.4						
L 90+45	RT	279		1.550												
L 90+45	RT	279	278		0.850	0.671										
L 90+64	LT	280														
L 90+64	RT	281														
L 90+64	RT	282														
SHEET 17																
L 90+90	RT	283		1.681												
L 90+90	RT	283	278		0.821	0.671				43.2						
L 90+90	RT	284		1.800												
L 90+90	RT	284	283		1.100	0.821										
L 91+17	RT	285		TEE												
L 91+17	RT	285	283		1.027	0.821			24.0							
L 91+17	RT	286		1.900												
L 91+17	RT	286	285		1.200	1.027										
L 91+47	RT	287		2.071												
L 91+47	RT	287	285		1.311	1.027			28.8							
L 92+26	M	288	289		0.889	0.685				54.0						
L 92+44	M	290	291		1.563	1.450				46.8						
SHEET TOTAL									121.2	177.6		50.4				

STATION	STRUCTURE NO. FROM	TO	BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE) 400 (1.63)	450 (1.63)	600 (1.63)		800	800 (2.01)	900	900 (2.01)	1000	1000 (2.01)	1200	1200 (2.01)	CLASS III R.C. PIPE OR HDPE PIPE, TYPE S OR D 375	400	450	600	750	900	1000	300mm SIDE DRAIN PIPE	375mm SIDE DRAIN PIPE	450mm SIDE DRAIN PIPE	600mm SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. METERS R.C.P.	C.S.P.
Y7 11+62	265	267															8.4										
L 88+26	271	272													7.2												
L 88+60	273	274													8.4												
L 89+80	275	276																8.4									
L 90+45	279	278													4.8												
L 90+90	284	283													4.8												
L 91+17	286	285													7.2												
SHEET TOTAL															32.4		8.4	8.4									

STATION	STRUCTURE NO.	QUANITIES FOR DRAINAGE STRUCTURES PER EACH (0 THRU 1.50)	*TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') METERS A 1.5 THRU 3.00	B 3.00 AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME W/ TWO GRATES STD. 840.16
Y7 11+46	264	1			1	1				
Y7 11+62	265	1			1	1				
L 87+83	269	1			1	1				
L 87+86	270	1			1	1				
L 88+26	271	1			1			1		
L 88+60	273	1			1			1		
L 89+80	275	1			1		1			
L 90+31	277	1			1		1			
L 90+45	278	1			1	1				
L 90+45	279	1							1	1
L 90+90	283	1			1			1		
L 90+90	284	1							1	1
L 91+17	286	1							1	1
L 91+47	287	1			1			1		
SHEET TOTAL		14			11	5	2	4	3	3

STATION	STRUCTURE NO.	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.22	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	J.B. STD. 840.31 OR 840.32	M.D.I. FRAME WITH TWO GRATES STD. 840.29	MANHOLE STD. 840.51	M.H. STD. 840.51 OR 840.53	M.H. FRAME AND COVER STD. 840.54	DRY DETENTION DRAWDOWN STRUCTURE		375 X 375 X 375 RC PIPE TEES, CLASS III	450 X 450 X 375 RC PIPE TEES, CLASS III	600 X 600 X 375 RC PIPE TEES, CLASS III		375mm DUCTILE IRON	
L 91+17	285															1					
SHEET TOTAL																1					

STATION	STRUCTURE NO.	CONCRETE TRANSITIONAL SECTION CATCH BASIN	DROP INLET	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" M^3 STD. 840.72	CONC. & BRICK PIPE PLUG, M^3 STD. 840.71	PIPE REMOVAL (METERS)	REMARKS
Y7 11+65	266–265						14.8	
L 88+26	271						7.4	
L 88+60	273						14.5	
L 90+64	280					0.03	64.5	
L 90+64	281					0.03		
L 90+64	282					0.03		
L 92+26	288–289						35.1	
L 92+44	290–291						27.8	
SHEET TOTAL						0.09	164.1	

ABBREVIATIONS

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

COMPUTED BY: TCE DATE: 12/5/2006

CHECKED BY: LHM DATE: 4/22/2009

METRIC

PROJECT NO. R-2414B SHEET NO. 3-M

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

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".

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

STATION	LOCATION (LT, RT, M, OR CL)'	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE) 300	CLASS III R.C. PIPE 375	CLASS III R.C. PIPE 450	450 CLASS IV	600	600 CLASS IV	750	750 CLASS IV	900	BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE) 400 (1.63)	450 (1.63)	600 (1.63)	800 (2.01)	900 (2.01)	1000 (2.01)	1200 (2.01)	CLASS III R.C. PIPE OR HDPE PIPE, TYPE S OR D 375	400	450	600	750	900	1000	300mm SIDE DRAIN PIPE	375mm SIDE DRAIN PIPE	450mm SIDE DRAIN PIPE	600mm SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. METERS R.C.P.	C.S.P.	QUANITIES FOR DRAINAGE STRUCTURES PER EACH (0 THRU 1.50)	*TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') METERS A 1.5 THRU 3.00	B 3.00 AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME W/ TWO GRATES STD. 840.16	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.22	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	J.B. STD. 840.31 OR 840.32	M.D.I. FRAME WITH TWO GRATES STD. 840.29	MANHOLE STD. 840.51	M.H. STD. 840.51 OR 840.53	M.H. FRAME AND COVER STD. 840.54	DRY DETENTION DRAWDOWN STRUCTURE		375 X 375 X 375 RC PIPE TEES, CLASS III	450 X 450 X 375 RC PIPE TEES, CLASS III	600 X 600 X 375 RC PIPE TEES, CLASS III		375mm DUCTILE IRON		CONCRETE TRANSITIONAL SECTION CATCH BASIN	CONCRETE TRANSITIONAL SECTION DROP INLET	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" M^3 STD. 840.72	CONC. & BRICK PIPE PLUG, M^3 STD. 840.71	PIPE REMOVAL (METERS)	REMARKS
SHEET 17																																																																							
																																																																						6.2	
Y3 10+40	RT	294																														6.0																																							6.3	
Y4 11+20	LT	295	296		2.009	1.926			16.8																																																														21	
Y4 11+20	RT	296		3.134																																	1			1		1																													
Y4 11+20	RT	296	297		1.926	1.896																				4.8																																														
SHEET 5																																																																								
Y1 10+73	RT	298																														7.2																																								
Y1 10+89	RT	299																														7.2																																								
L 55+00	RT	300																																14																																						4.8	
L 67+14	RT	301																														13.2																																								
L 57+10	LT	302																																																																						30.3	
SHEET 18																																																																							
Y3 9+65	RT	306																														6																																								
Y3 9+85	RT	307																														6																																								* SEE STD. DRAWING 838.07 OR 838.17
SHEET TOTAL									16.8																	4.8						45.6		14			1			1		1																													68.60	
SHEET 3A									168.0	48.0		129.6		33.6										4.8		33.6		8.4	6								18	0.28		15	2	6	7	3	3																									122.30	
SHEET 3B									133.2	127.2		151.2												30		69.6	44.4						7.2				17			11		6	5	6	6															1.0											122.80	
SHEET 3C									214.8	105.6				21.6														28.8									14	1.49		9	2	2	5	4	4		1					1.0											24.0						0.13	136.70	
SHEET 3D									133.2	76.8				43.2		40.0								62.4					15.6								17	1.10		11	3	2	6	6	6																						3			0.2	211.6	
SHEET 3E									199.2	158.4		24.0		34.8										25.2		31.2											19	2.34		12		6	6	7	7																1						2				144.5	
SHEET 3F									249.6			33.6												52.8			10.8										15	2.03		12		7	5	3	3															1										0.16	46.9	
SHEET 3G									190.8	118.8				24.0										10.8		22.8		16.8									15	0.49		13	4	1	8	2	2																										48.8	
SHEET 3H									450.0	49.2														51.6		6	16.8										18	0.15		16	6	4	6	2	2																										76.5	
SHEET 3I									321.6	88.8		66.0												12			13.2										15	0.02		15	6	5	4																											0.10	40.3	
SHEET 3J									183.6	66.0														16.8		25.2	7.2					24					14	0.09		12	1	4	7	2	2																										81.5	
SHEET 3K									112.8	67.2		148.8												18		8.4		6			14.4	7.2					15	0.37		14	4	2	8	1	1																1	1									174	
SHEET 3L									121.2	177.6		50.4												32.4		8.4	8.4										14			11	5	2	4	3	3															1										0.09	164.1	
SHEET 3M									16.8																	4.8						45.6		14			1			1		1																													68.60	
TOTAL									2494.8	1083.6		603.6		157.2		40.0								316.8		210.0	100.8	60.0	21.6		14.4	76.8	7.2	14.4			192	8.36		152	33	48	71	39	39		1					1								3.0	2.0	1.0		24.0			5.0			0.68	1438.6	
SAY									2554.8	1113.6		621.6		160.8		40.0								376.8		240.0	118.8	63.6	25.2		14.4	78.4	7.2	14.4		4.0		10.00		152	33	48	71	39	39		1					1																		1	1500	

ABBREVIATIONS

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

COMPUTED BY: BAM DATE:
CHECKED BY: LHM DATE:

6/22/00

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	3-N

LIST OF PIPES, ENDWALLS, ETC. (FOR PIPES 1350 mm & OVER)

STATION	LOCATION (LT, RT, OR CL)	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE 1350	CLASS III R.C. PIPE 1500	CLASS III R.C. PIPE 1650	CLASS III R.C. PIPE 1800	CLASS III R.C. PIPE 1950	CLASS III R.C. PIPE 2100	BITUMINOUS COATED C.S. PIPE TYPE B 1400 2.77	1400 3.51	1400 4.27	1500 2.77	1500 3.51	1650	1650	1800	1800	SHOP ELONGATED	STRUCTURAL PLATE PIPE 1500 2.77	1500 3.51	1500 4.27	1650 2.77	1650 3.51	1650 4.27	1800 2.77	1800 3.51	1800 4.27	ENDWALLS STD. 838.07 & 838.17 CLASS "B" CONC. WITH R.C. cu. m.	ENDWALLS STD. 838.07 & 838.17 CLASS "B" CONC. WITH C.S. cu. m.	MASONARY DRAINAGE STRUCTURES CUBIC METERS	C.B. STD. 840.01 OR 840.02	FRAME, GRATES & HOOD STANDARD 840.03 TYPE OF GRATE E	F	G	1524x1168mm CAA STRUCTURAL PLATE PIPE ARCH, 2.77mm THICK	REINF. CONC. FLARED END SECTION NO. & SIZE	CORR. STEEL FLARED END SECTIONS NO. & SIZE	REINF. CONC. ELBOWS NO. & SIZE	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS, CL. "B" m^3 STD.840.72	PIPE REMOVAL (meters)	REMARKS
THICKNESS OR GAUGE																																															
-L- 92+20	LT	305							9.6																																						
-L- 92+07	CL	303	304		0.806	1.008																												3.856						18					1.72		SEE DETAIL OF CSAP COLLAR
TOTAL									9.6																									3.856						18					1.72		
SAY																																		4.000											2		

ABBREVIATIONS

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

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

TEMPORARY GUARDRAIL SUMMARY

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH STRAIGHT	LENGTH SHOP CURVED	LENGTH DOUBLE FACED	WARRANT POINT APPROACH END	WARRANT POINT TRAILING END	"N" DIST. FROM E.O.L.	TOTAL SHOUL. WIDTH	FLARE LENGTH APPROACH END	FLARE LENGTH TRAILING END	W APPROACH END	W TRAILING END	ANCHORS GRAU 350	CAT-1	M-350	XIII	VI MOD	XI	VI	BIC	IMPACT ATTENUATOR TYPE 350 EA	G	NG	SINGLE FACED CONCRETE BARRIERS	REMOVE EXISTING GUARDRAIL	REMARKS
DET1	10+63.000	11+23.960	RT	60.960			10+92.432	11+02.504	0.600	1.200	15.240		0.300		2			GUARDRAIL ANCHOR DEDUCTIONS										
DET2	10+84.040	11+45.000	LT	60.960			11+13.172	11+04.956	0.600	1.200	15.240		0.300		2			6 @ 15.24 =			91.440							
DET3	10+68.850	11+26.000	RT	57.150			10+95.623	11+07.844	0.600	1.200	15.240		0.300		2					=	91.440							
PROJECT SUBTOTAL				179.070											6													
LESS ANCHOR DEDUCTIONS				91.440																								
PROJECT TOTAL				87.630																								
SAY				87.630																								

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

GUARDRAIL SUMMARY

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH STRAIGHT	LENGTH SHOP CURVED	LENGTH DOUBLE FACED	WARRANT POINT APPROACH END	WARRANT POINT TRAILING END	"N" DIST. FROM E.O.L.	TOTAL SHOUL. WIDTH	FLARE LENGTH APPROACH END	FLARE LENGTH TRAILING END	W APPROACH END	W TRAILING END	ANCHORS TES	GRAU 350	CAT-1	M-350	XIII	VI MOD	XI	VI	BIC	IMPACT ATTENUATOR TYPE 350 EA	G	NG	SINGLE FACED CONCRETE BARRIERS	REMOVE EXISTING GUARDRAIL	REMARKS
L	55+18.990	55+87.570	RT	68.580			55+79.650	55+82.350	0.600	3.000	15.240		0.300			1	1		GUARDRAIL ANCHOR DEDUCTIONS										
L	55+75.122	56+74.182	LT	99.060			55+82.350	55+79.650	0.600	3.000	15.240		0.300			1	1		9 @ 15.24 =			137.160							
L	72+54.574	73+57.444	RT	102.870			73+47.050	73+50.950	0.600	3.000	15.240		0.300			1	1		10 @ 1.905 =			19.050							
L	73+45.968	74+41.218	LT	95.250			73+50.950	73+47.050	0.600	3.000	15.240		0.300			1	1				=	156.210							
L	88+45.806	89+18.196	RT	72.390			89+03.350	89+06.650	0.600	3.000	15.240		0.300			1	1												
L	88+94.421	89+93.481	LT	99.060			89+11.024	89+03.350	0.600	3.000	15.240		0.300			1	1										42.000		
L	51+50.682	52+34.877	RT	84.195			52+31.877		0.600	3.000	15.240		0.300			1	1												
L	52+57.282	52+61.099	LT	1.905	6.048		52+60.282		0.600	3.000					1		1												UTILIZE SHOP CURVED THRIE BEAM GUARDRAIL
L	91+64.000	92+19.000	RT	55.000			92+14.573		0.600	3.000	15.240		0.300			1	1												
L	92+51.844	92+76.072	LT	24.228			92+56.126		0.600	3.000	15.240		0.300			1	1												
PROJECT SUBTOTAL				699.538	6.048										1	9	10												
LESS ANCHOR DEDUCTIONS				156.210																									
PROJECT TOTAL				543.328	6.048																								
SAY				552.450	7.000	ADDITIONAL GUARDRAIL POSTS = 10 EA.																							
	REMOVAL OF EXISITNG GUARDRAIL																												
L	91+92.92	92+18.000	RT	26																									
L	92+41.000	92+57.000	LT	16																									
	PROJECT TOTAL			42																									

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PROJECT REFERENCE NO.	SHEET NO.
R-2414B	3-0

SUMMARY OF EARTHWORK
IN CUBIC METERS

LOCATION	UNCL. EXCAVATION	UNDERCUT	EMBT+%	BORROW	WASTE
-L- LT. STA. 45+68.873 to 52+40.000	912		3327	3327	912
-Y2- STA. 10+12.000 TO 11+05.532	2		590	590	2
SUMMARY 1 SUB TOTAL	914		3917	3917	914
-L- RT. STA. 52+60.000 TO 58+80.000	99	1297	9877	9877	1396
-L- RT 55+33.000 TO 56+34.000 (SURCHARGE)			1953	1953	
-L- RT 55+33.000 TO 56+34.000 (SURCHARGE REM.)	1365				1365
SUMMARY 2 SUB TOTAL	1464	1297	11830	11830	2761
-L- LT. STA. 58+80.000 TO 68+80.000	128	130	8722	8722	258
-Y3- STA. 9+48.03.000 TO 11+55.955	128		798	798	128
SUMMARY 3 SUB TOTAL	256	130	9520	9520	386
-L- LT. STA. 68+80.000 TO 78+80.000	299	705	7753	7753	1004
-L- LT 72+50.000 TO 73+80.000 (SURCHARGE)			2730	2730	
-L- LT 72+50.000 TO 73+80.000 (SURCHARGE REM.)	1909				1909
SUMMARY 4 SUB TOTAL	2208	705	10483	10483	2913
-L- LT. STA. 78+80.000 TO 87+60.000	178		4853	4853	178
-Y7- STA 10+00.000 TO 11+04.067	218		810	810	218
SUMMARY 5 SUB TOTAL	396		5663	5663	396
-L- RT. STA. 87+60.000 TO 93+92.145	1125	1677	4172	4172	2802
-L- RT 88+55.000 TO 89+18.000 (SURCHARGE)			1041	1041	
-L- RT 88+55.000 TO 89+18.000 (SURCHARGE REM)	728				728
SUMMARY 6 SUB TOTAL	1853	1677	5213	5213	3530
-L- RT. STA. 45+68.873 TO 52+60.000	202		3927	3927	202
-Y- STA. 10+09.600 TO 11+30.000	878		482	482	878
-Y1- STA. 10+00.000 TO 11+05.780	336		226	226	336
SUMMARY 7 SUB TOTAL	1416		4635	4635	1416

NOTE: 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.

SUMMARY OF PAVEMENT REMOVAL
IN SQUARE METERS

ALIGNMENT	STATION TO STATION	LOCATION	AREA (m2)
-L-	52+30.000 TO 53+00.000	CL	611.194
-L-	90+04.000 TO 93+00.000	LT	4319.326
-DET1-	10+44.930 TO 12+78.161	CL	1240.125
-DET2-	10+75.649 TO 12+61.768	CL	760.279
-DET3-	10+46.666 TO 12+00.194	CL	809.622
-L-	89+75.000 TO 11+20.000 -Y8-	LT	454.87
-L-	55+33.000 TO 56+34.000	CL	689.688
-L-	72+50.000 TO 73+80.000	CL	1075.579
-L-	88+55.000 TO 89+18.000	CL	493.880
	PROJECT TOTAL		10,454.563
	SAY		10,600.000

SUMMARY OF EARTHWORK
IN CUBIC METERS

LOCATION	UNCL. EXCAVATION	UNDERCUT	EMBT+%	BORROW	WASTE
-L- LT. STA. 52+40.000 TO 58+80.000	302	1364	7060	7060	1666
-L- LT 55+33.000 TO 56+34.000 (SURCHARGE)			2534	2534	
-L- LT 55+33.000 TO 56+34.000 (SURCHARGE REM.)	1771				1771
SUMMARY 8 SUB TOTAL	2073	1364	9594	9594	3437
-L- RT. STA. 58+80.000 TO 68+80.000	50		8593	8593	50
-Y4- STA. 10+12.483 TO 11+63.200	77		374	374	77
SUMMARY 9 SUB TOTAL	127		8967	8967	127
-L- RT. STA. 68+80.000 TO 78+80.000	256	1566	6847	6847	1822
-L- RT 72+50.000 TO 73+80.000 (SURCHARGE)			3238	3238	
-L- RT 72+50.000 TO 73+80.000 (SURCHARGE REM.)	2264				2264
SUMMARY 10 SUB TOTAL	2520	1566	10085	10085	4086
-L- RT. STA. 78+80.000 TO 87+60.000	395		3735	3735	395
-Y7- STA. 11+23.273 TO 12+12.000	348		1166	1166	348
SUMMARY 11 SUB TOTAL	743		4901	4901	743
-L- LT. STA. 87+60.000 TO 93+92.145	245	4554	12406	12406	4799
-Y8- STA. 11+00.000 TO 12+27.393	21		1606	1606	21
-L- LT 88+55.000 TO 89+18.000 (SURCHARGE)			1602	1602	
-L- LT 88+55.000 TO 89+18.000 (SURCHARGE REM.)	1120				1120
SUMMARY 12 SUB TOTAL	1386	4554	15614	15614	5940
PROJECT SUBTOTAL	15356	11293	100422	100422	26649
MATERIAL FOR SHOULDER CONSTRUCTION			533	533	
LOSS DUE TO CLEARING & GRUBBING	-1000			1000	-1000
SELECT GRANULAR MATERIAL, CLASS III IN LIEU OF BACKFILL FOR UNDERCUT			-8269	-8269	
WASTE IN LIEU OF BORROW				-4002	-4002
* FOAMED CONC. IN LIEU OF BORROW			-8258	-8258	
* FOAMED CONC. IN LIEU OF BACKIFILL FOR UNDERCUT			-6412	-6412	
ADDITIONAL UNDERCUT		2000	2600	2600	2000
PROJECT TOTAL	14356	13293	80616	77614	23647
5% TO REPLACE TOPSOIL ON BORROW PITS				3881	
GRAND TOTAL	14356			81495	
SAY	14500			86000	

FABRIC FOR SOIL STABILIZATION = 70,400 SM & 2000 SM CONTINGENCY (GEOTECH MEMO DATED 8/16/11)
CL 'IV' SUBGRADE STABILIZATION MATERIAL = EST. 72,500 MTON COMPUTED & 2,500 MTN CONTINGENCY (GEOTECH MEMO OF 8/16/11)
SHALLOW UNDERCUT = EST. 19,400 CM COMPUTED & 2,500 CM CONTINGENCY (GEOTECH MEMOS OF 8/16/11)
SELECT GRANULAR MATERIAL, CL 'III' = EST. 2,000 CM CONTINGENCY (GEOTECH MEMOS OF 8/16/11)
* FOAMED CONCRETE = 11,284 CM (GEOTECH MEMO OF 8/9/11)
TREATED TIMBER PILE = 19,118 M ((PER GEOTECH MEMO OF 11/29/11)
WELDED WIRE FABRIC FOR FOAMED CONCRETE = 17,488 SM (PER GEOTECH MEMO OF 8/9/11)
PDA TESTING = 8 EACH (PER GEOTECH MEMO OF 8/9/11)
PDA ASSISTANCE = 8 EACH (PER GEOTECH MEMO OF 8/9/11)
EMBANKMENT STABILIZATION FABRIC = 7,505 SM (PER GEOTECH MEMO OF 11/29/11)
EMBANKMENT SETTLEMENT GAUGES = 6 EACH (PER GEOTECH MEMO OF 8/9/11)

SUMMARY OF SUBSURFACE DRAINS
IN LINEAR METERS

ALIGNMENT	STATION TO STATION	LOCATION	LENGTH (M)
-L-	45+68.00 TO 93+92.00	LT	4824.00
-L-	45+68.00 TO 93+92.00	RT	4824.00
	PROJECT TOTAL		9648.00
	CONTINGENCY		2000
	GRAND TOTAL		11648.00
	SAY		11648.00

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PROJ. REFERENCE NO.	SHEET NO.
R-2414B	3-P

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

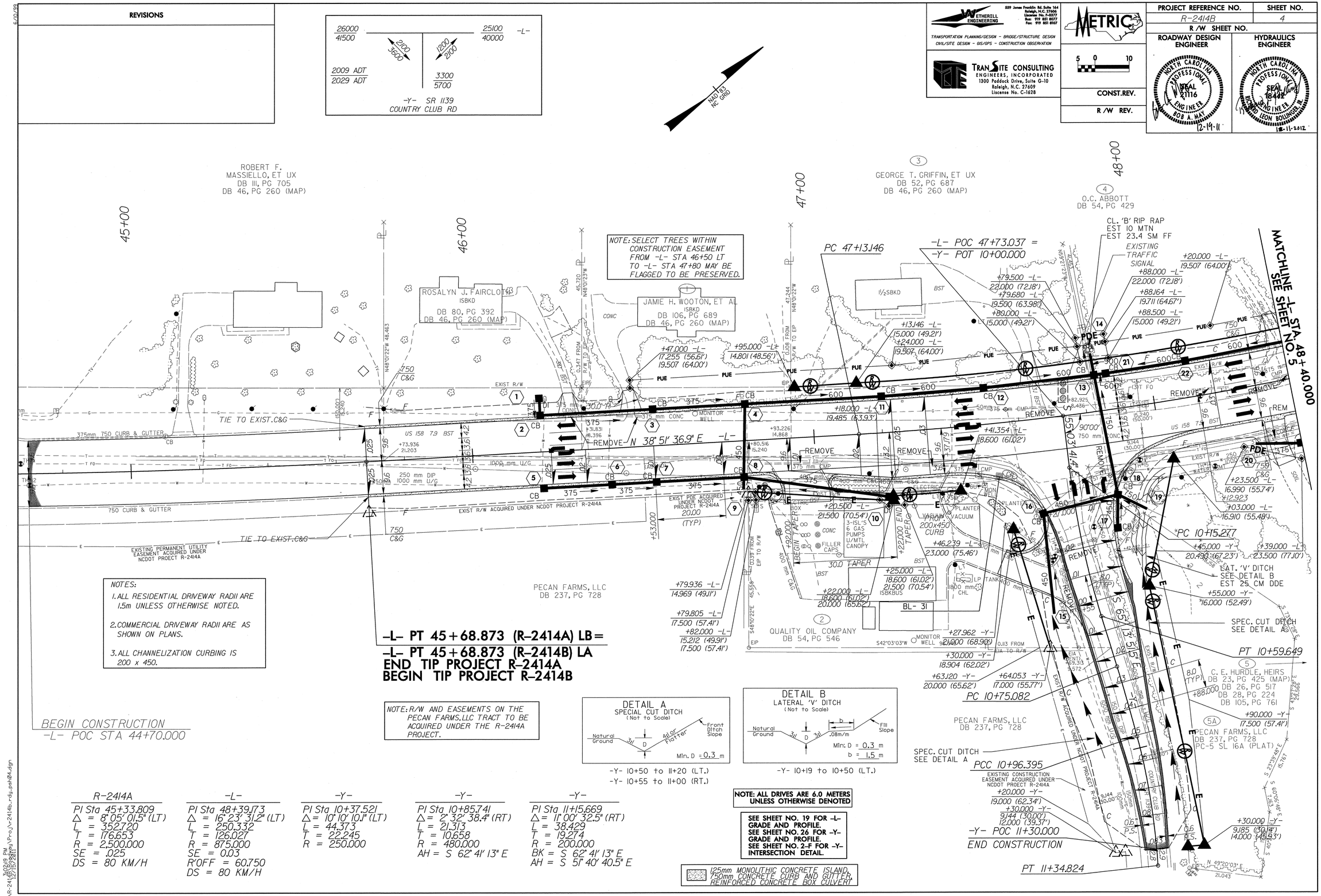
PARCEL INDEX SHEET

PARCEL No.	SHEET No.	PROPERTY OWNER NAME
1	4	JAMIE H. WOOTON, ET AL
2	4	QUALITY OIL COMPANY
3	4	GEORGE T. GRIFFIN, ET UX
4	4,5	O.C. ABBOTT
5	4,5	C. E. HURDLE, HEIRS
5A	4	PECAN FARMS, LLC
6	5	THE BANK OF CURRITUCK
7	5	TERRY CHAMBERLAIN
7A	5	ROBERT & BRENDA ALBURY
8	5	BONNEY, OWNES, TWIFORD, LLC.
9	5	DORIS RODGERS & HILDA GARRETT
9A	5	DORIS RODGERS & HILDA GARRETT
10	5	KEITH DANIEL WARD, ET UX
11	5	ROBERT F. ALBURY, ET UX
12	5	ANTHONY WOODDISSE, ET UX
13	5,6	FRED E. UPTON, HEIRS
14	5	FRED E. UPTON, JR., et ux
15	5	CAMDEN SALES & SERVICE
16	5,6	LINDA SUE LAMB HINTON
16A	5,6,17	NORFOLK SOUTHERN RAILWAY CO.
17	5,6	LARRY LAMB
17A	6	LINDA SUE LAMB HINTON
18	6	G. MATT WOOD, JR.
19	6	ARNOLD & THORNLEY, INC
20	6	WINNER'S CIRCLE CONDOS
21	6	RITA W. GREGORY
22	6,7	RICKY L. EDWARDS & SHEILA R. EDWARDS
23	6,7	A & S PROPERTIES, LLC
24	7	BLUE SKY DEVELOPMENT, LLC
24A	7,8,18	CAMDEN REALTY GROUP, LLC.
25	7,8,18	CAMDEN COUNTY
26	7	CHARLES B. STEVENS
26A	7	HOWARD S. STEVENS C/O F.W. STEVENS
27	7,8	JAMES B. SEYMOUR, JR.,ET AL
28	8	C. RUSSELL HASTINGS, ET UX
29	8	CHARLES H. HODGES, SR., ET AL
31	18	CAMDEN REALTY GROUP, LLC
32	8,9,10	MARY M. GORDON
34	8,9,18	GLEN D. GORDON, ET UX
34	9,10	GLEN & SHEILA GORDON
36	9,10,11	GEORGE WOOD FARMS, INC
36A	11,12	SOUTHLAND, LLC.
37	10	DORIS S. BERRY
38	10	TIDEWATER AGRONOMICS
39	10	MATTHEW HARRELL
40	10	H & R INVESTMENT
41	10,11	NORTHEASTERN COMMUNITY DEVELOPMENT CORP, INC
42	11	JAMES ROEBUCK & ELLIOT W. JACOBS
43	11	ALBEMARLE HOSPITAL, ET AL
44	11,12,13,14	BROWN FARMS, INC
45	12	BELCROSS PROPERTIES LLC
46	12,13	SOUTHLAND, LLC
44A	12, 13,14	BROWN FARMS, INC
47	13,14	RUSSELL E. TWIFORD
48	14	W. CLARENCE OWENS, ET UX

PARCEL No.	SHEET No.	PROPERTY OWNER NAME
49	14	WILLIAM C. LEE
50	14	CHARLES H. BOWSER
51	14	ED SIVELLIS, HEIRS C/O ELIJAH ETHERIDGE
52	14	B. F. ETHERIDGE, HEIRS C/O ELIJAH ETHERIDGE
53	14,15	DORIS H. HARRIS
54	14	CONNIE M. TRAFTON, ET AL
55	14	CLARA L. FREEMAN
56	14	CAROL L. LEE
57	14,15	REX MATTHEWS & RHONDA SAWYER
58	15	MARY WYNN
59	15	MICHAEL L. MATTERA
60	15	PHYILLIS G. MINTON
61	15	DANIEL R. McDOUGALD
62	15	THOMAS M. NOBLITT
63Z	15	SHEILA R. EDWARDS
64	15	EFFIE L. CREEKMORE
65	15	EFFIE L. CREEKMORE
66	15	ROBERT A. & KATIE W. KRANIAK
67	15	GARY D. FILARECKI
68Z	15	ROY GODFREY
69	15	DORIS H. HARRIS
70	15	WILLIAM C. & JUDITH NORTON
71	15,16	JOSEPH O. SAWYER, ET UX
71A	16	IRVIN R. LANCASTER
72	15,16	W. W. OWENS & SONS MOVING & STORAGE
73	15,16	DORIS H. HARRIS
74	16	VINCENT R. RAGAN, ET UX
75	16	LINDA S. DEMUTH, ET AL
76	16,17	HORACE MELVILLE CUTHRELL, JR.,ET UX
77	16,17	WALLACE G. CAHOON
78	17	C. RUSSELL HASTINGS & CALVIN LAMB
79	16,17	BROWN FARMS, INC.
80	17	CAMDEN CHURCH OF CHRIST
8A	5	THE TRESTLES TOWNHOMES
047A	13	LAMB BROS., LLC
047B	13	STATE EMPLOYEES CREDIT UNION

REVISIONS

6/10/98



NOTES:

1. ALL RESIDENTIAL DRIVEWAY RADII ARE 1.5m UNLESS OTHERWISE NOTED.
2. COMMERCIAL DRIVEWAY RADII ARE AS SHOWN ON PLANS.
3. ALL CHANNELIZATION CURBING IS 200 x 450.

NOTE: R/W AND EASEMENTS ON THE PECAN FARMS, LLC TRACT TO BE ACQUIRED UNDER THE R-2414A PROJECT.

DETAIL A
SPECIAL CUT DITCH
(Not to Scale)

-Y- 10+50 to 11+20 (LT.)
-Y- 10+55 to 11+00 (RT.)

DETAIL B
LATERAL 'V' DITCH
(Not to Scale)

-Y- 10+19 to 10+50 (LT.)

NOTE: ALL DRIVES ARE 6.0 METERS UNLESS OTHERWISE DENOTED

SEE SHEET NO. 19 FOR -L- GRADE AND PROFILE.
SEE SHEET NO. 26 FOR -Y- GRADE AND PROFILE.
SEE SHEET NO. 2-F FOR -Y- INTERSECTION DETAIL.

125mm MONOLITHIC CONCRETE ISLAND, 750mm CONCRETE CURB AND GUTTER, REINFORCED CONCRETE BOX CULVERT

R-2414A	-L-	-Y-	-Y-	-Y-
PI Sta 45+33.809	PI Sta 48+39.173	PI Sta 10+37.521	PI Sta 10+85.741	PI Sta 11+15.669
Δ = 8° 05' 01.5" (LT)	Δ = 16° 23' 31.2" (LT)	Δ = 10° 10' 10.1" (LT)	Δ = 2° 32' 38.4" (RT)	Δ = 11° 00' 32.5" (RT)
L = 352.720	L = 250.332	L = 44.373	L = 21.313	L = 38.429
T = 176.653	T = 126.027	T = 22.245	T = 10.658	T = 19.274
R = 2,500.000	R = 875.000	R = 250.000	R = 480.000	R = 200.000
SE = .025	SE = 0.03		AH = S 62° 41' 13" E	BK = S 62° 41' 13" E
DS = 80 KM/H	R'OFF = 60.750			AH = S 51° 40' 40.5" E
	DS = 80 KM/H			

WETHERILL ENGINEERING	559 Jones Franklin Rd. Suite 144 Raleigh, N.C. 27606 License No. F-0377 Bus: 919 851 6077 Fax: 919 851 6107
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION	
TRANSITE CONSULTING ENGINEERS, INCORPORATED	1300 Paddock Drive, Suite G-10 Raleigh, N.C. 27609 License No. C-1628

METRIC
5 0 10

CONST. REV.

R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 12-19-11	NORTH CAROLINA PROFESSIONAL SEAL 18442 ENGINEER LEON BOLLINGER JR. 12-11-2012

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PROJECT REFERENCE NO.	SHEET NO.
R-2414B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

METRIC 5 0 10

CONST. REV.

R/W REV.

NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 12-8-11

NORTH CAROLINA PROFESSIONAL SEAL 18443 ENGINEER LEON BOLLINGER 1-11-2012

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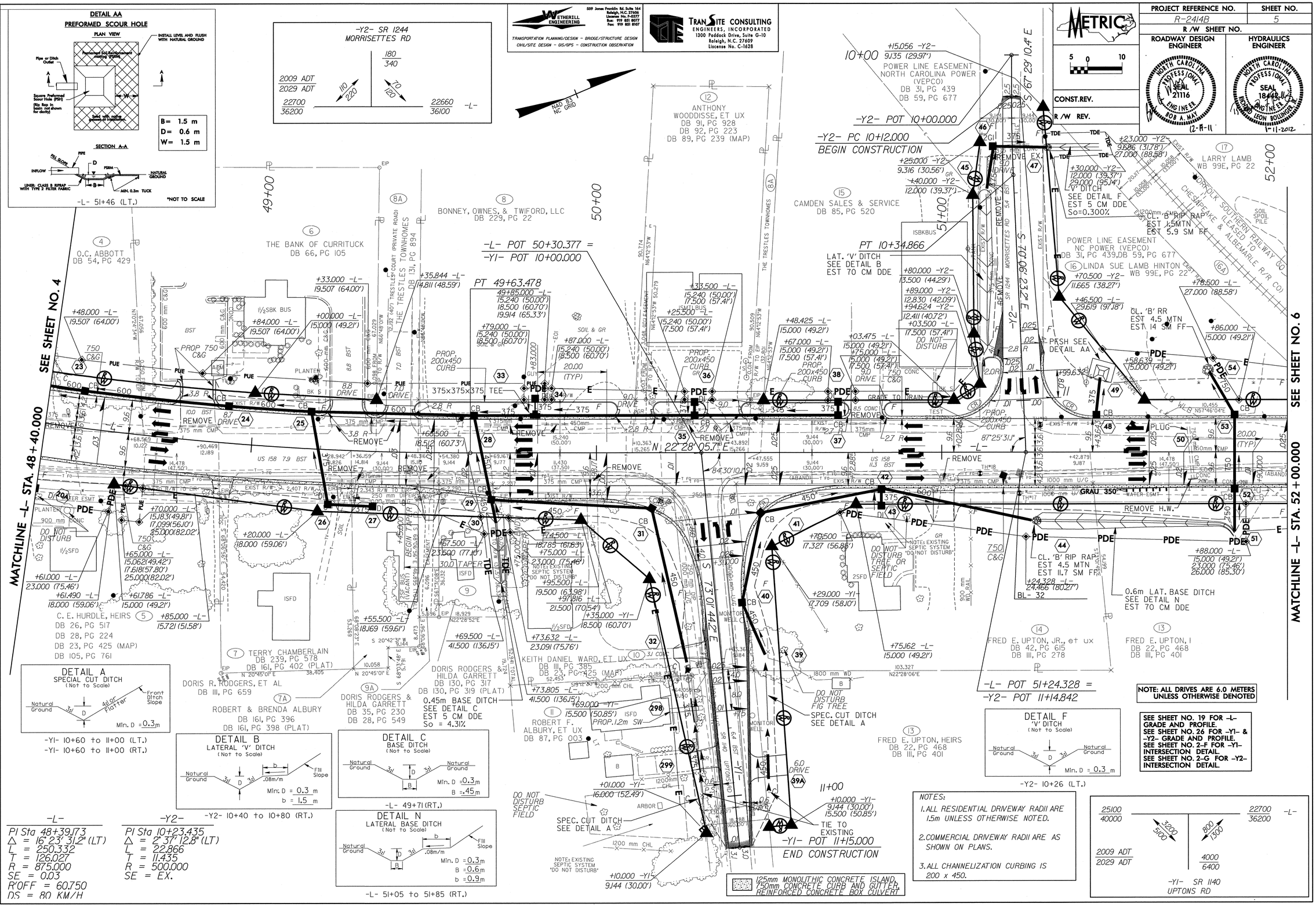
Raleigh, N.C. 27609
License No. C-1628

6/10/99

REVISIONS



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REVISIONS

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Liscense No. F-0377
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CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

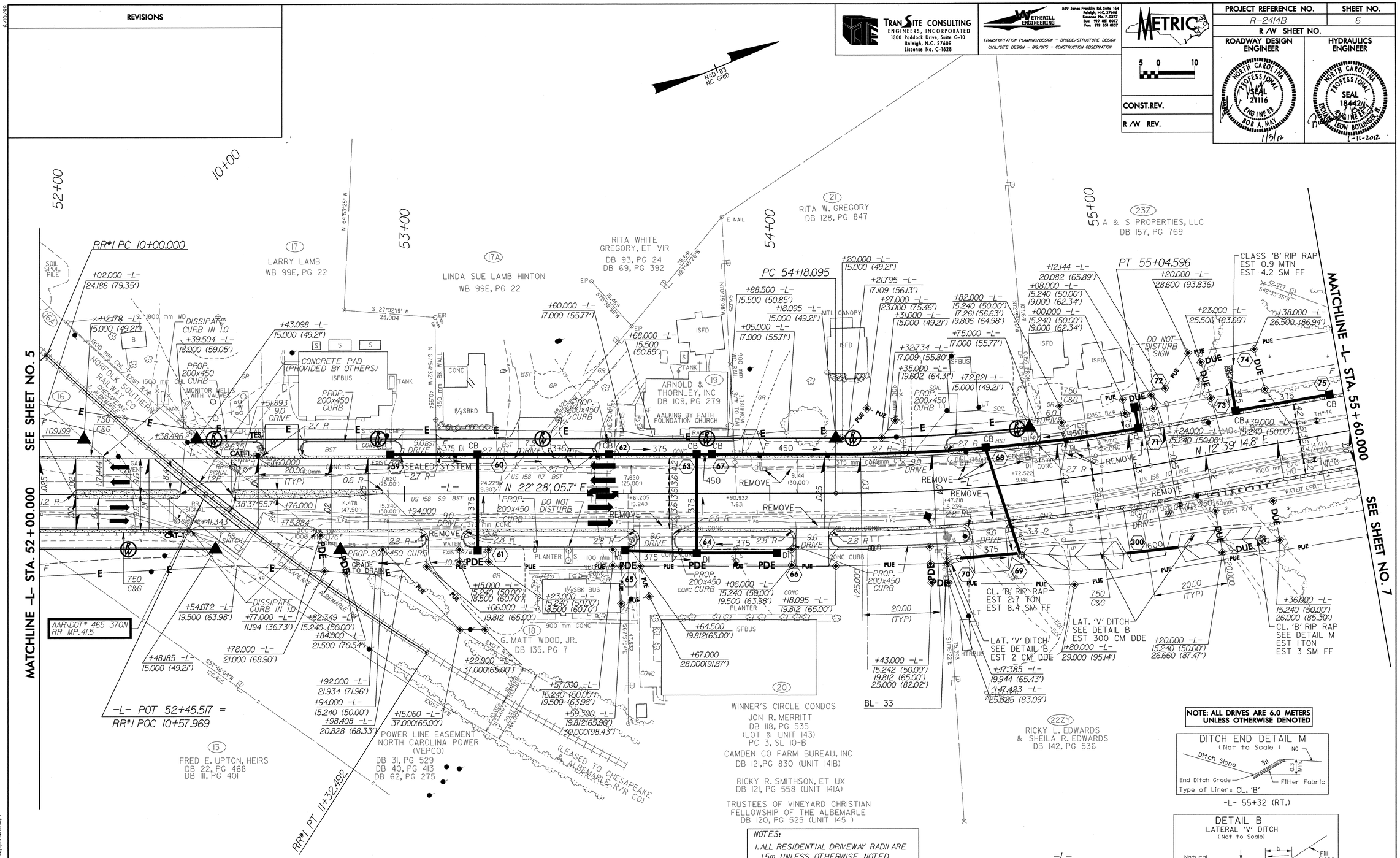
METRIC

5 0 10

CONST.REV.

R /W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	6
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 1/3/12	NORTH CAROLINA PROFESSIONAL SEAL 18442 ENGINEER RICHARD LEON BOLLINGER JR. 1-11-2012

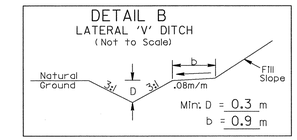


NOTE: ALL DRIVES ARE 6.0 METERS UNLESS OTHERWISE DENOTED

DITCH END DETAIL M
(Not to Scale)

-L- 55+32 (RT.)

DETAIL B
LATERAL 'V' DITCH
(Not to Scale)



-L- 54+47 to 54+52 (RT.)
-L- 54+67 to 55+32 (RT.)

SEE SHEET NO. 20 FOR -L- GRADE AND PROFILE.

NOTES:

1. ALL RESIDENTIAL DRIVEWAY RADII ARE 1.5m UNLESS OTHERWISE NOTED.
2. COMMERCIAL DRIVEWAY RADII ARE AS SHOWN ON PLANS.
3. ALL CHANNELIZATION CURBING IS 200 x 450.

RR #1
PI Sta 10+66.452
Δ = 11° 02' 25.1" (LT)
L = 132.492
T = 66.452
R = 687.593

125mm MONOLITHIC CONCRETE ISLAND, 750mm CONCRETE CURB AND GUTTER, REINFORCED CONCRETE BOX CULVERT

-L-
PI Sta 54+61.452
Δ = 9° 48' 50.9" (LT)
L = 86.501
T = 43.357
R = 505.000
SE = 0.04
R'OFF = 81.000
DS = 80 KM/H

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REVISIONS

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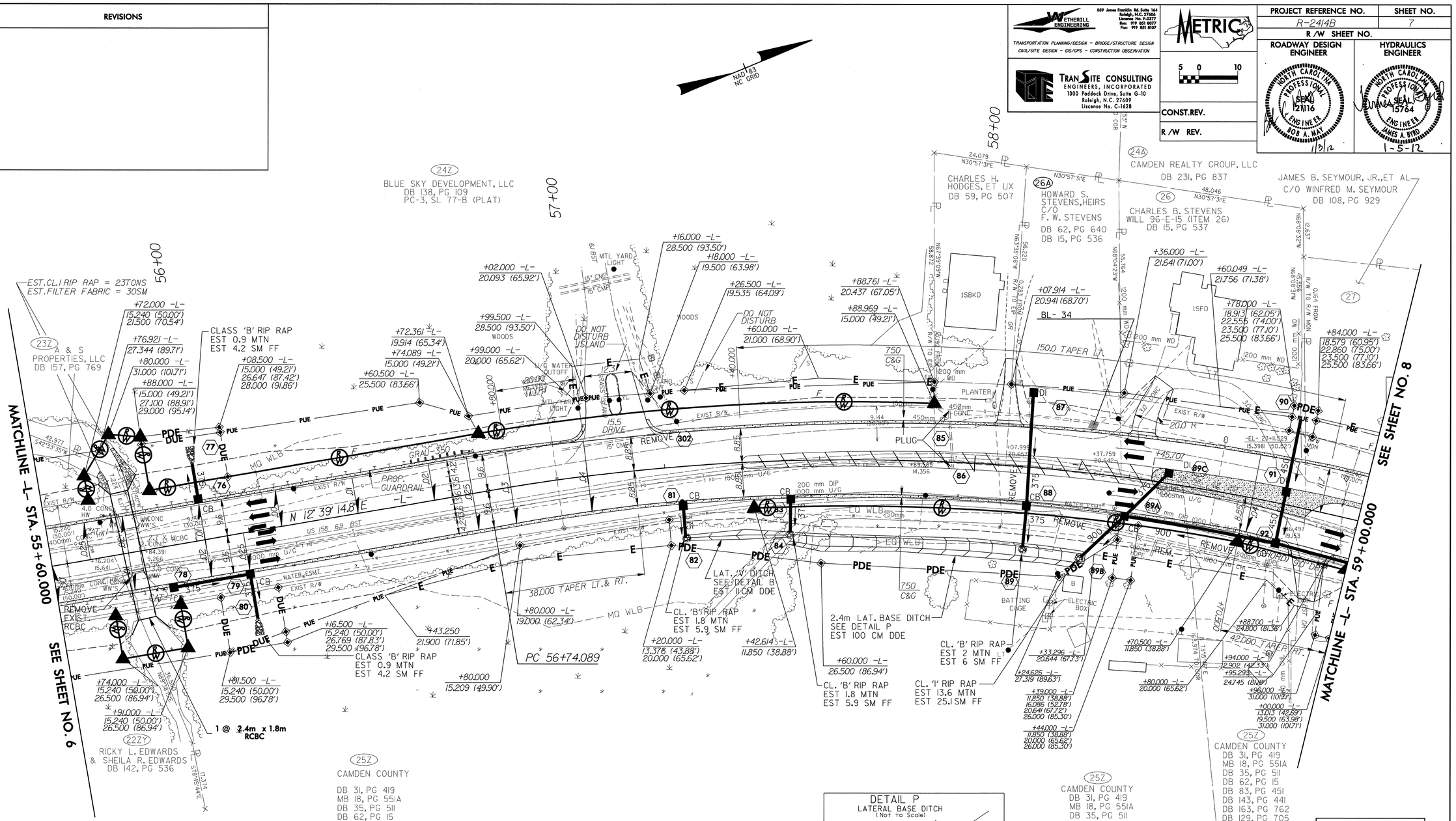
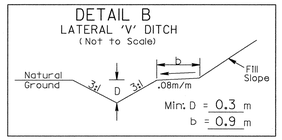
CONST.REV.

R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 1/3/12	NORTH CAROLINA PROFESSIONAL SEAL 15764 ENGINEER JAMES A. BYRD 1-5-12

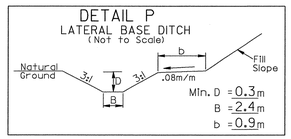




-L- 57+24 to 57+47 (RT.)

-L-

PI Sta 58+15.159
Δ = 28° 46' 17.6" (RT)
L = 276.187
T = 141.071
R = 550.000
SE = 0.04
R'OFF = 81.000
DS = 80 KM/H



-L- 57+52 to 58+25 (RT.)

125mm MONOLITHIC CONCRETE ISLAND, 750mm CONCRETE CURB AND GUTTER, REINFORCED CONCRETE BOX CULVERT

NOTES:

1. ALL RESIDENTIAL DRIVEWAY RADII ARE 1.5m UNLESS OTHERWISE NOTED.
2. COMMERCIAL DRIVEWAY RADII ARE AS SHOWN ON PLANS.
3. ALL CHANNELIZATION CURBING IS 200 x 450.

SEE SHEETS C-1 THRU C-7 FOR CULVERT PLANS

SEE 2-V THRU 2-Y FOR MASS SOIL MIXING DETAILS

SEE 2-Z FOR DETAIL OF EMBANKMENT MONITORING

NOTE: ALL DRIVES ARE 6.0 METERS UNLESS OTHERWISE DENOTED

SEE TCP-7 AND TCP-16 FOR LOCATION OF TEMPORARY SHORING

SEE SHEET NO. 20 FOR -L- FOR GRADE AND PROFILE.

SEE SHEET NO. 2-Q FOR DETAIL OF CONCRETE ISLAND

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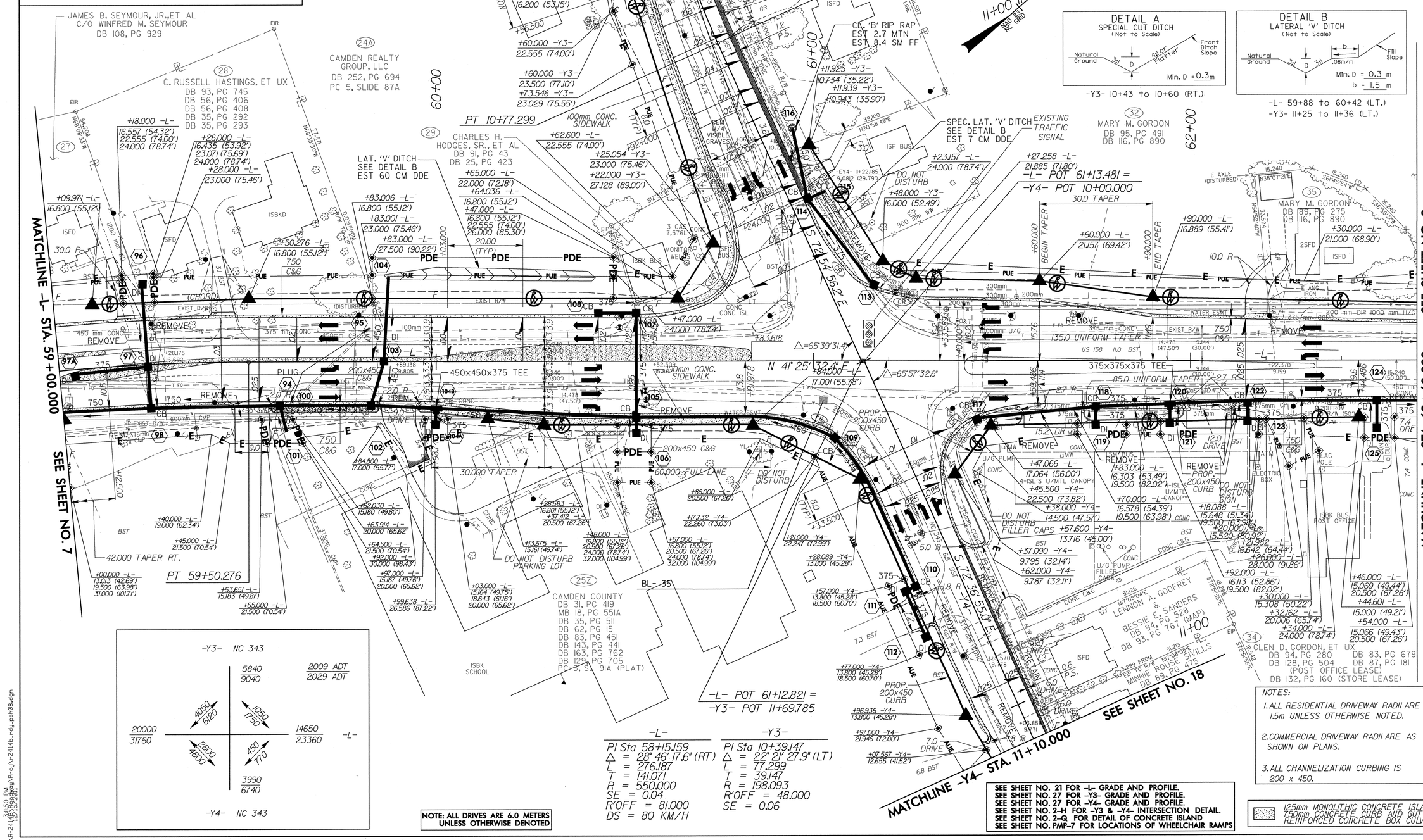
CONST.REV.
R /W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	8
R /W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MATTHEWS 12-19-11	NORTH CAROLINA PROFESSIONAL SEAL 15764 ENGINEER JAMES A. BYRD 1-5-12



-Y3- 10+43 to 10+60 (RT.)

-L- 59+88 to 60+42 (LT.)
-Y3- 11+25 to 11+36 (LT.)

-L-	-Y3-
PI Sta 58+15.59	PI Sta 10+39.147
△ = 28° 46' 17.6" (RT)	△ = 22° 21' 27.9" (LT)
L = 276.187	L = 77.299
T = 141.071	T = 39.147
R = 550.000	R = 198.093
SE = 0.04	R'OFF = 48.000
R'OFF = 81.000	SE = 0.06
DS = 80 KM/H	

NOTE: ALL DRIVES ARE 6.0 METERS UNLESS OTHERWISE DENOTED

SEE SHEET NO. 21 FOR -L- GRADE AND PROFILE.
SEE SHEET NO. 27 FOR -Y3- GRADE AND PROFILE.
SEE SHEET NO. 27 FOR -Y4- GRADE AND PROFILE.
SEE SHEET NO. 2-H FOR -Y3 & -Y4- INTERSECTION DETAIL.
SEE SHEET NO. 2-Q FOR DETAIL OF CONCRETE ISLAND
SEE SHEET NO. PMP-7 FOR LOCATIONS OF WHEELCHAIR RAMPS

NOTES:
1. ALL RESIDENTIAL DRIVEWAY RADII ARE 1.5m UNLESS OTHERWISE NOTED.
2. COMMERCIAL DRIVEWAY RADII ARE AS SHOWN ON PLANS.
3. ALL CHANNELIZATION CURBING IS 200 x 450.

125mm MONOLITHIC CONCRETE ISLAND, 750mm CONCRETE CURB AND GUTTER, REINFORCED CONCRETE BOX CULVERT

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REVISIONS

NOTES:

1. ALL RESIDENTIAL DRIVEWAY RADII ARE 1.5m UNLESS OTHERWISE NOTED.
2. COMMERCIAL DRIVEWAY RADII ARE AS SHOWN ON PLANS.
3. ALL CHANNELIZATION CURBING IS 200 x 450.

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METRIC

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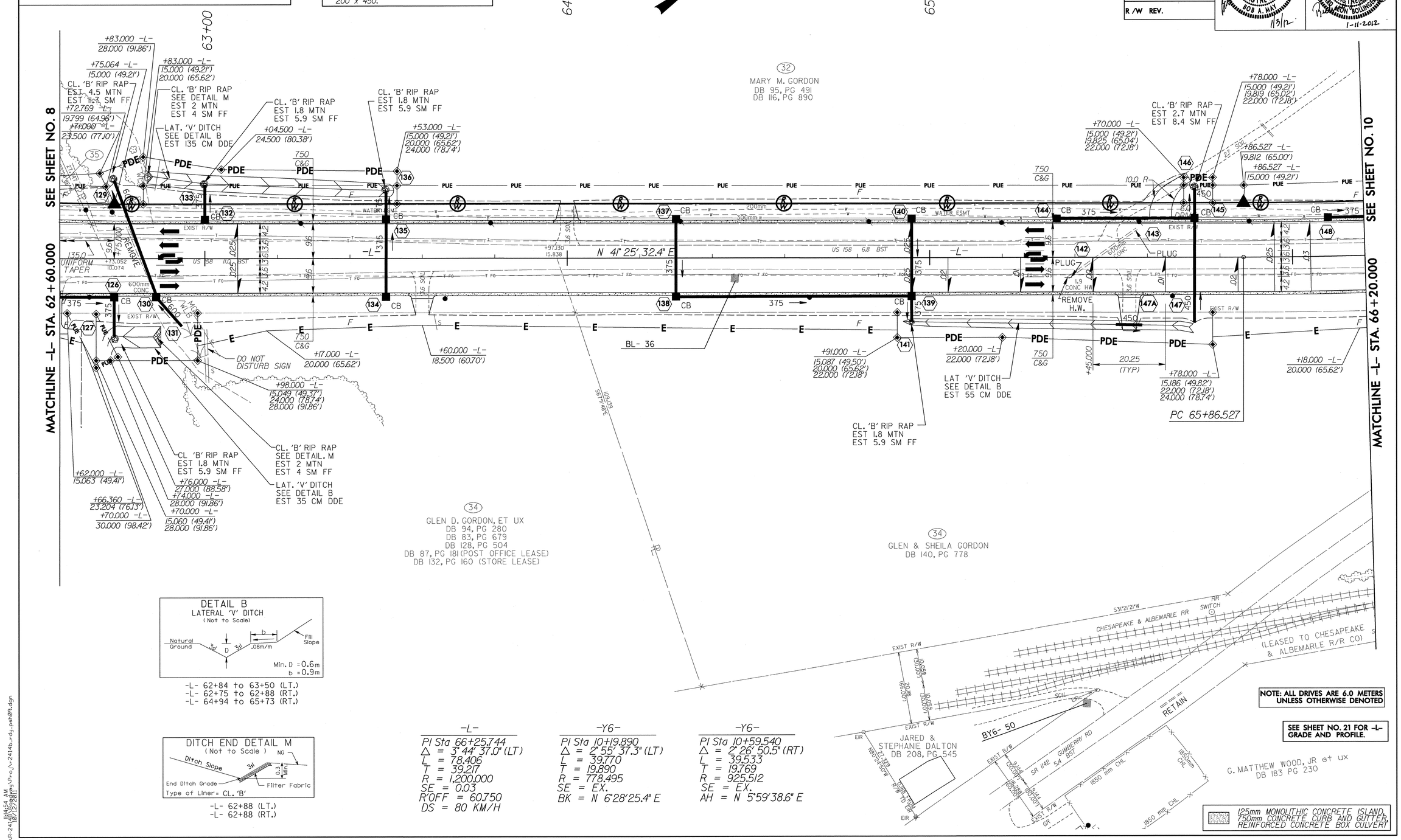
CONST.REV.

R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 1/3/12	NORTH CAROLINA PROFESSIONAL SEAL 18442 ENGINEER RICHARD LEON BOLLINGER 1-11-2012



NOTE: ALL DRIVES ARE 6.0 METERS UNLESS OTHERWISE DENOTED

SEE SHEET NO. 21 FOR -L- GRADE AND PROFILE.

125mm MONOLITHIC CONCRETE ISLAND, 750mm CONCRETE CURB AND GUTTER, REINFORCED CONCRETE BOX CULVERT

DETAIL B
LATERAL 'V' DITCH
(Not to Scale)

-L- 62+84 to 63+50 (LT.)
-L- 62+75 to 62+88 (RT.)
-L- 64+94 to 65+73 (RT.)

DITCH END DETAIL M
(Not to Scale)

-L- 62+88 (LT.)
-L- 62+88 (RT.)

-L-	-Y6-	-Y6-
PI Sta 66+25.744	PI Sta 10+19.890	PI Sta 10+59.540
Δ = 3° 44' 37.0" (LT)	Δ = 2° 55' 37.3" (LT)	Δ = 2° 26' 50.5" (RT)
L = 78.406	L = 39.770	L = 39.533
T = 39.217	T = 19.890	T = 19.769
R = 1,200.000	R = 778.495	R = 925.512
SE = 0.03	SE = EX.	SE = EX.
R'OFF = 60.750	BK = N 6°28'25.4" E	AH = N 5°59'38.6" E
DS = 80 KM/H		

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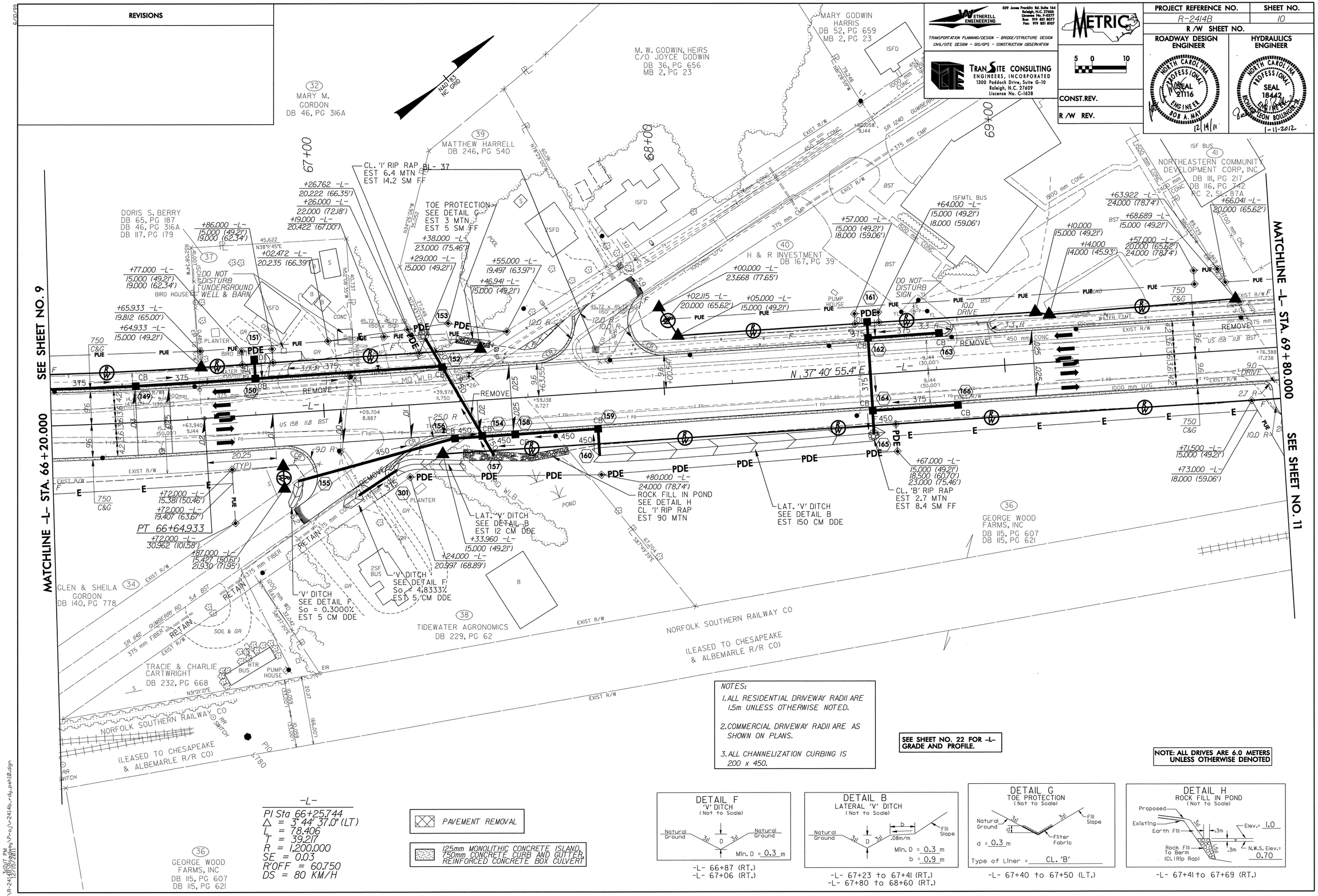
CONST.REV.

R /W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	10
R /W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21716 ENGINEER BOB A. MAY
12/14/11

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 18442 ENGINEER RICHARD LEON BOLLINGER, JR.
1-11-2012



NOTES:

1. ALL RESIDENTIAL DRIVEWAY RADII ARE 1.5m UNLESS OTHERWISE NOTED.
2. COMMERCIAL DRIVEWAY RADII ARE AS SHOWN ON PLANS.
3. ALL CHANNELIZATION CURBING IS 200 x 450.

SEE SHEET NO. 22 FOR -L- GRADE AND PROFILE.

NOTE: ALL DRIVES ARE 6.0 METERS UNLESS OTHERWISE DENOTED

-L-
PI Sta 66+25.744
Δ = 3° 44' 37.0" (LT)
L = 78.406
T = 39.217
R = 1,200.000
SE = 0.03
R'OFF = 60.750
DS = 80 KM/H

PAVEMENT REMOVAL

125mm MONOLITHIC CONCRETE ISLAND, 750mm CONCRETE CURB AND GUTTER, REINFORCED CONCRETE BOX CULVERT

DETAIL F
'V' DITCH
(Not to Scale)
Natural Ground, 3:1, D, 3:1, Natural Ground
Min. D = 0.3 m
-L- 66+87 (RT.)
-L- 67+06 (RT.)

DETAIL B
LATERAL 'V' DITCH
(Not to Scale)
Natural Ground, 3:1, D, 3:1, b, .08m/m, Fill Slope
Min. D = 0.3 m
b = 0.9 m
-L- 67+23 to 67+41 (RT.)
-L- 67+80 to 68+60 (RT.)

DETAIL G
TOE PROTECTION
(Not to Scale)
Natural Ground, 3:1, d, 3:1, Fill Slope, Filter Fabric
d = 0.3 m
Type of Liner = CL. 'B'
-L- 67+40 to 67+50 (LT.)

DETAIL H
ROCK FILL IN POND
(Not to Scale)
Proposed, Existing, Earth Fill, 3:1, .3m, Elev.= 1.0, Rock Fill To Berm (Cl. I Rip Rap), .3m, N.W.S. Elev.= 0.70
-L- 67+41 to 67+69 (RT.)

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REVISIONS

NOTES:
1. ALL RESIDENTIAL DRIVEWAY RADII ARE 1.5m UNLESS OTHERWISE NOTED.
2. COMMERCIAL DRIVEWAY RADII ARE AS SHOWN ON PLANS.
3. ALL CHANNELIZATION CURBING IS 200 x 450.

NAD 83 NC GRID

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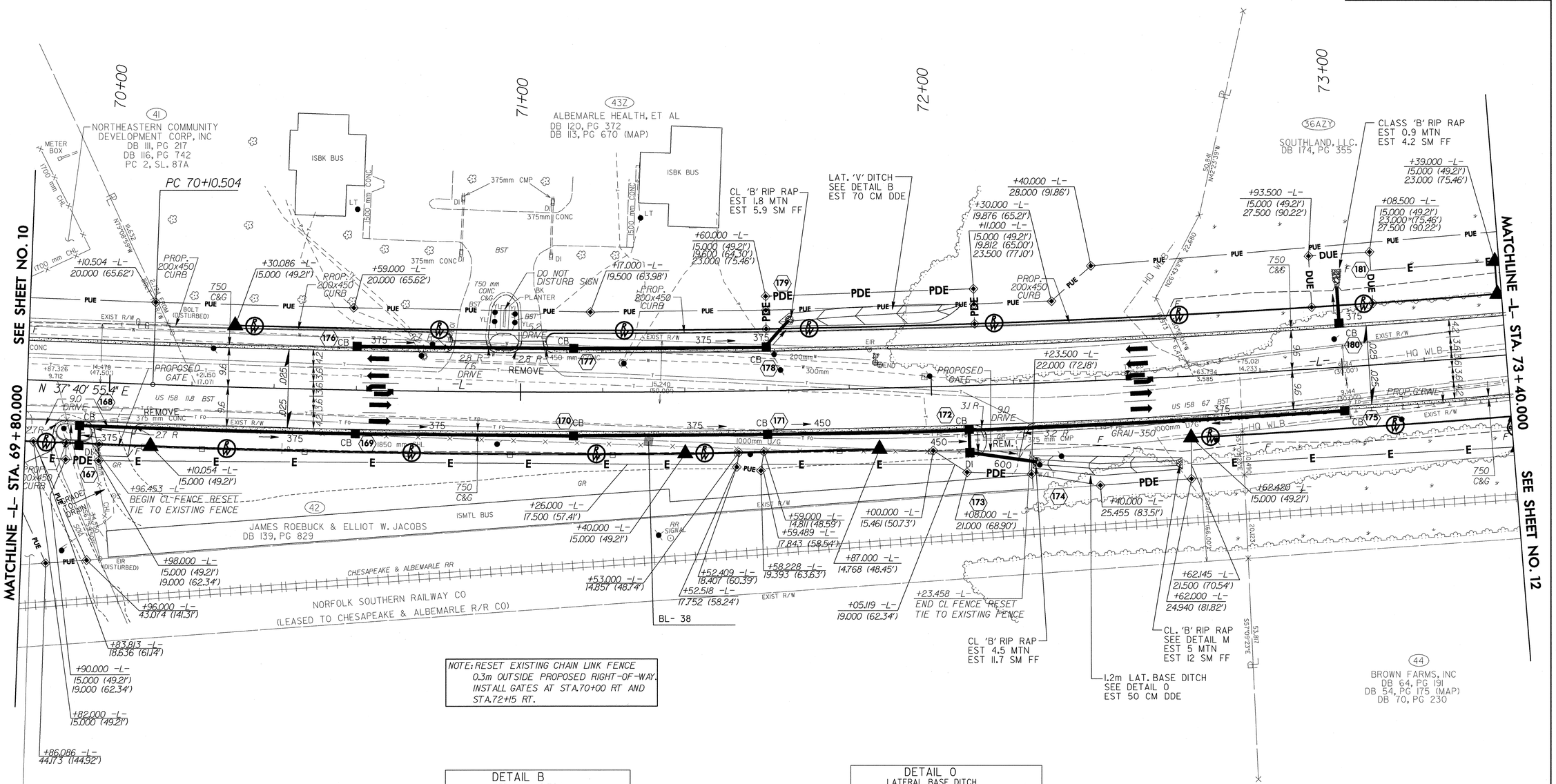
CONST.REV.
R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	11
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAN 12-19-11

HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 18431 ENGINEER RICHARD LEON BOLLINGER JR. 1-11-2012



NOTE: RESET EXISTING CHAIN LINK FENCE 0.3m OUTSIDE PROPOSED RIGHT-OF-WAY. INSTALL GATES AT STA.70+00 RT AND STA.72+15 RT.

DETAIL B
LATERAL 'V' DITCH
(Not to Scale)
Natural Ground, 3:1, D, 3:1, b, .08m/m, Fill Slope
Min. D = 0.3 m
b = 0.9 m
-L- 71+65 to 72+10 (LT.)

-L-
PI Sta 72+27.319
Δ = 8° 51' 20.1" (LT)
L = 432.766
T = 216.815
R = 2,800.000
SE = NC
DS = 80 KM/H

DETAIL O
LATERAL BASE DITCH
(Not to Scale)
Natural Ground, 3:1, D, 3:1, b, .08m/m, Fill Slope, B
Min. D = 0.3m
B = 1.2 m
b = 1.5 m
-L- 72+25 to 72+60 (RT.)

DITCH END DETAIL M
(Not to Scale)
Ditch Slope, 3:1, NG, 0.3 Min., End Ditch Grade, Filter Fabric
Type of Liner = CL. 'B'
-L- 72+60 (RT.)

125mm MONOLITHIC CONCRETE ISLAND, 750mm CONCRETE CURB AND GUTTER, REINFORCED CONCRETE BOX CULVERT

NOTE: ALL DRIVES ARE 6.0 METERS UNLESS OTHERWISE DENOTED

SEE SHEET NO. 22 FOR -L- GRADE AND PROFILE.

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REVISIONS

NOTES:

1. ALL RESIDENTIAL DRIVEWAY RADII ARE 1.5m UNLESS OTHERWISE NOTED.
2. COMMERCIAL DRIVEWAY RADII ARE AS SHOWN ON PLANS.
3. ALL CHANNELIZATION CURBING IS 200 x 450.

NAD 83 NC GRID

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Liscense No. C-1628

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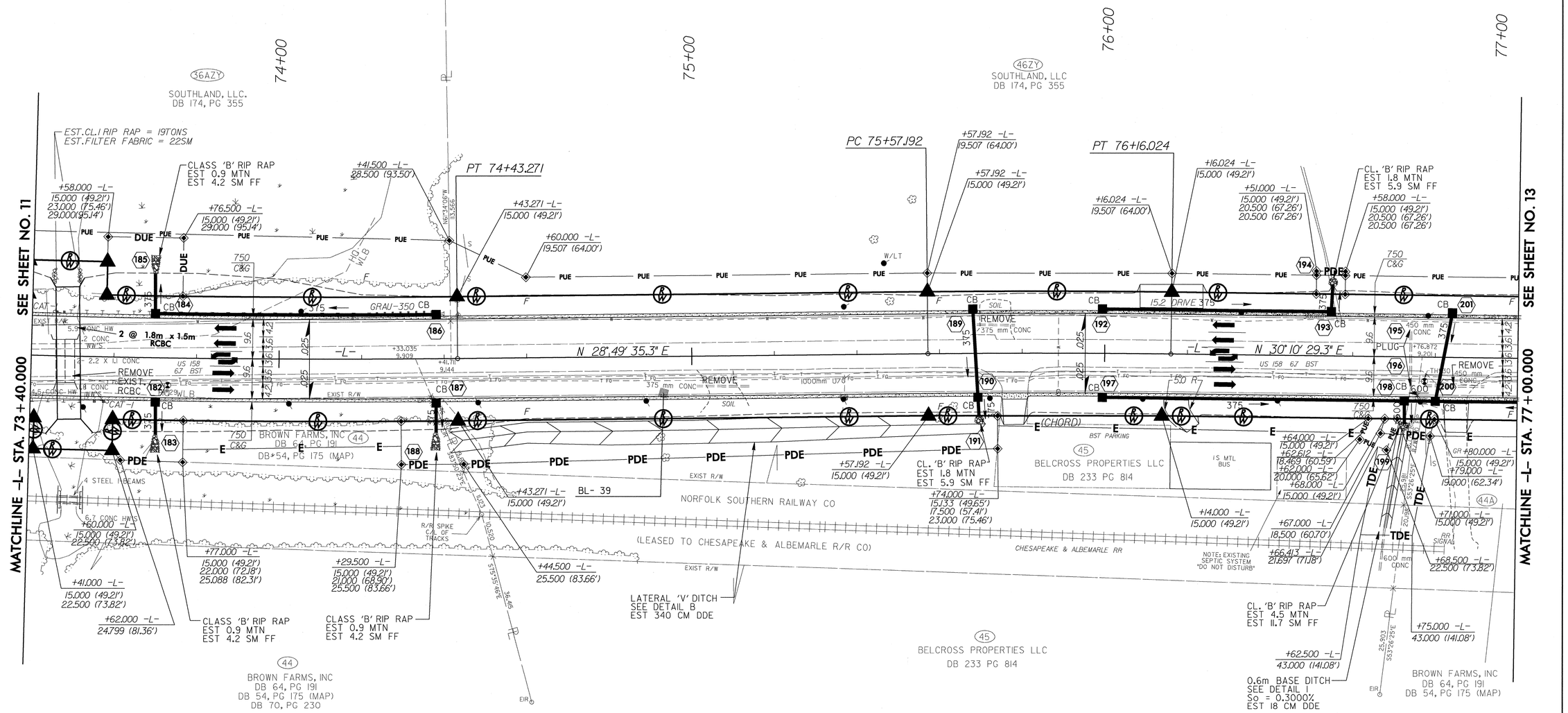
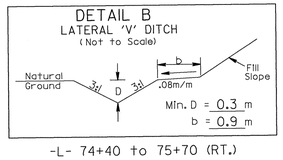
CONST.REV.

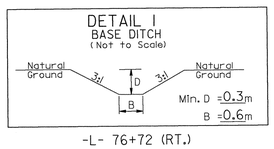
R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 1/3/12	NORTH CAROLINA PROFESSIONAL SEAL 15764 ENGINEER JAMES A. BYRD 1-5-12





-L- 74+40 to 75+70 (RT.)



-L- 76+72 (RT.)

-L-

PI Sta 72+27.319
△ = 8° 51' 20.1" (LT)
L = 432.766
T = 216.815
R = 2,800.000
SE = NC
DS = 80 KM/H

-L-

PI Sta 75+86.610
△ = 1° 20' 54.0" (RT)
L = 58.832
T = 29.418
R = 2,500.000
SE = NC
DS = 80 KM/H

NOTE: ALL DRIVES ARE 6.0 METERS UNLESS OTHERWISE DENOTED

125mm MONOLITHIC CONCRETE ISLAND, 750mm CONCRETE CURB AND GUTTER, REINFORCED CONCRETE BOX CULVERT

SEE SHEETS C-8 THRU C-14 FOR CULVERT PLANS

SEE 2-V THRU 2-Y FOR MASS SOIL MIXING DETAILS

SEE 2-Z FOR DETAIL OF EMBANKMENT MONITORING

SEE TCP-8 AND TCP-17 FOR LOCATION OF TEMPORARY SHORING

SEE SHEET NO. 23 FOR -L- GRADE AND PROFILE.

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REVISIONS

NOTES:

1. ALL RESIDENTIAL DRIVEWAY RADII ARE 1.5m UNLESS OTHERWISE NOTED.
2. COMMERCIAL DRIVEWAY RADII ARE AS SHOWN ON PLANS.
3. ALL CHANNELIZATION CURBING IS 200 x 450.

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Liscense No. C-1628

METRIC

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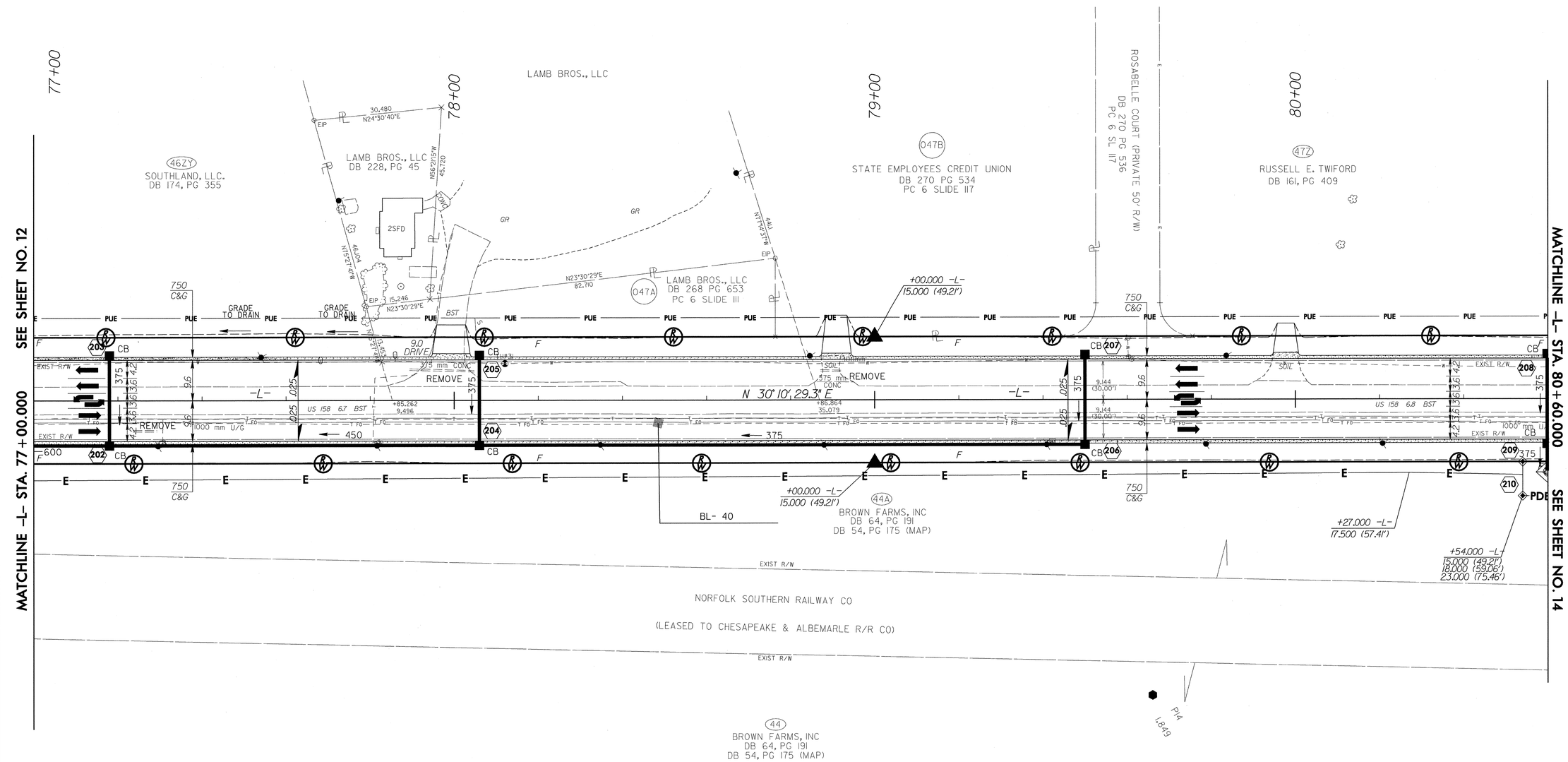
CONST.REV.

R /W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	13
R /W SHEET NO.	

ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 1/3/12

HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 18442 RICHARD LEON BOLLINGER JR. 1-11-2012



NOTE: ALL DRIVES ARE 6.0 METERS UNLESS OTHERWISE DENOTED

125mm MONOLITHIC CONCRETE ISLAND, 150mm CONCRETE CURB AND GUTTER, REINFORCED CONCRETE BOX CULVERT

SEE SHEET NO. 23 FOR -L- GRADE AND PROFILE.

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10/12/2011 11:16:07 AM
6/10/98

REVISIONS

NOTES:

1. ALL RESIDENTIAL DRIVEWAY RADII ARE 1.5m UNLESS OTHERWISE NOTED.
2. COMMERCIAL DRIVEWAY RADII ARE AS SHOWN ON PLANS.
3. ALL CHANNELIZATION CURBING IS 200 x 450.

WETHERILL ENGINEERING
559 James Franklin Rd. Suite 164
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Licenses No. F-0377
Bus: 919 851 8077
Fax: 919 851 8107
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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Raleigh, N.C. 27609
Licenses No. C-1628

METRIC

5 0 10

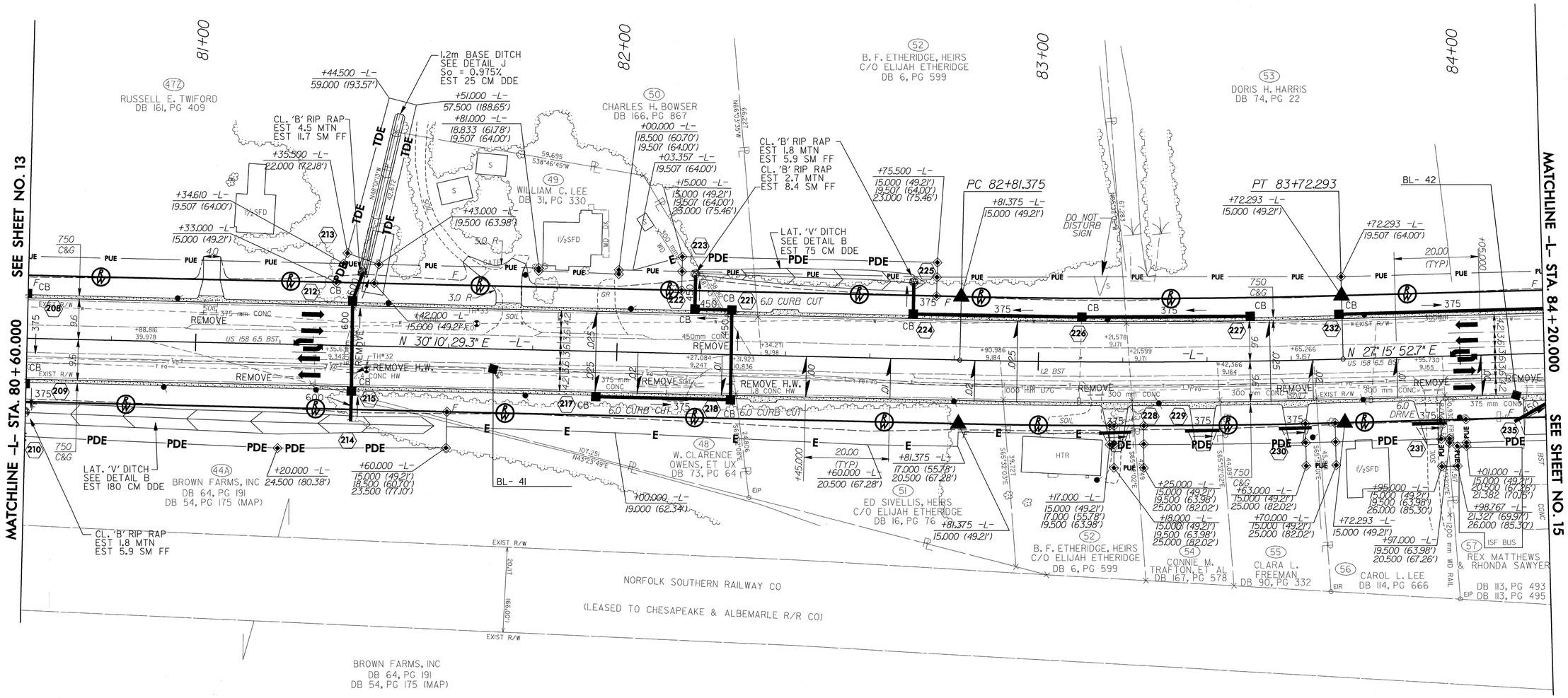
CONST. REV.

R/W REV.

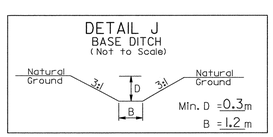
PROJECT REFERENCE NO.	SHEET NO.
R-2414B	14
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 1/3/12

HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 18443 ENGINEER RICHARD BOLLINGER 1-11-2012

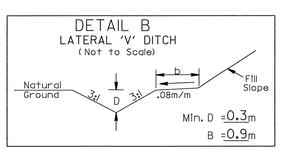


DETAIL J
BASE DITCH
(Not to Scale)



-L- 81+37 (LT.)

DETAIL B
LATERAL 'V' DITCH
(Not to Scale)



-L- 80+60 to 81+57 (RT.)
-L- 82+17 to 82+70 (LT.)

-L-

PI Sta 83+26.844
Δ = 2° 54' 36.6" (LT)
L = 90.918
T = 45.469
R = 1,790.000
SE = 0.025
R'OFF = 50.625
DS = 80 KM/H

125mm MONOLITHIC CONCRETE ISLAND, 750mm CONCRETE CURB AND GUTTER, REINFORCED CONCRETE BOX CULVERT

NOTE: ALL DRIVES ARE 6.0 METERS UNLESS OTHERWISE DENOTED

SEE SHEET NO. 24 FOR -L- GRADE AND PROFILE.

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REVISIONS

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Liscense No. C-1628

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Raleigh, N.C. 27606
Liscense No. F-0377
Bus: 919 851 8077
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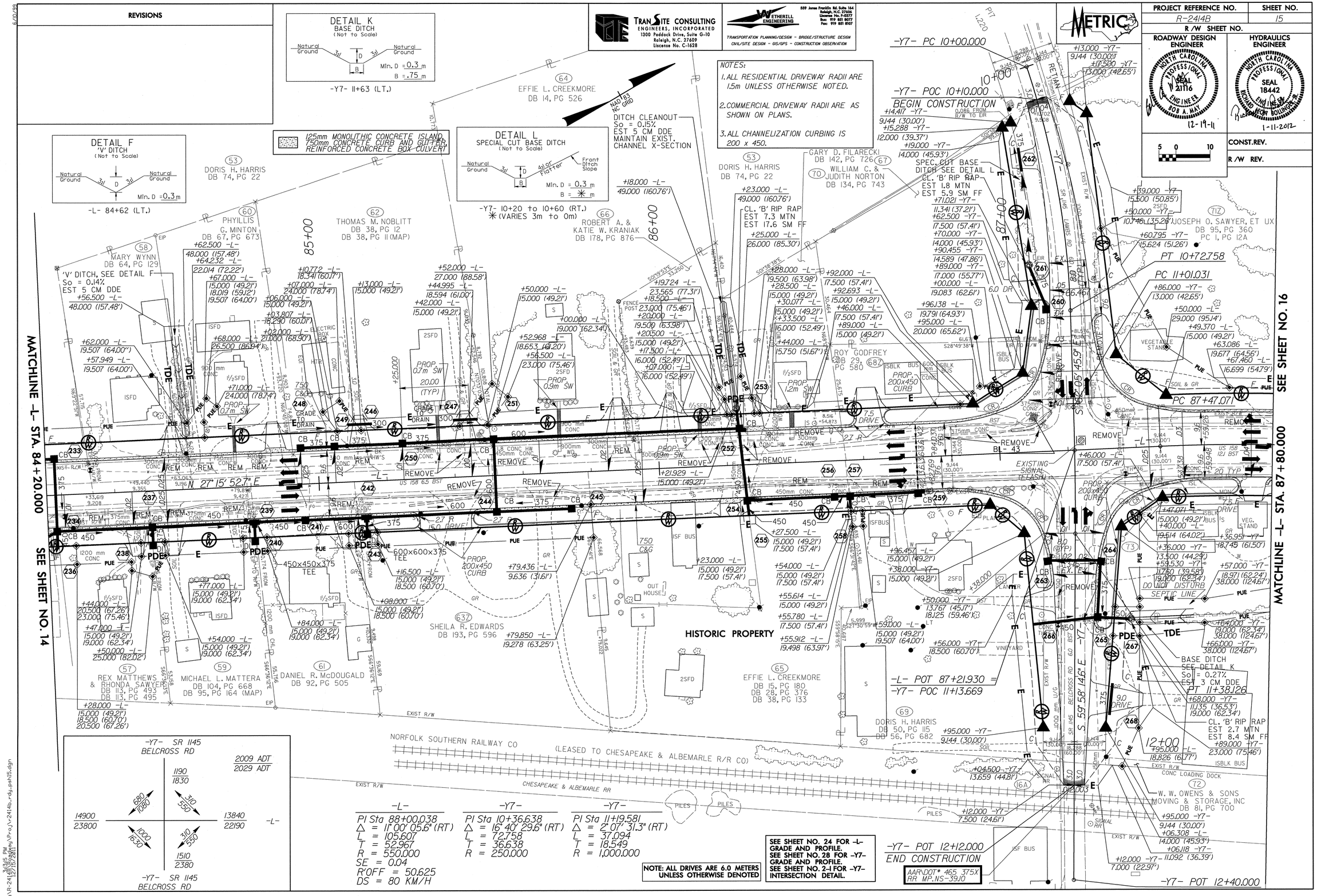
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

METRIC

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 12-19-11	NORTH CAROLINA PROFESSIONAL SEAL 18442 ENGINEER RICHARD LEON BOLLINGER 1-11-2012
CONST.REV.	
R/W REV.	

NOTES:
1. ALL RESIDENTIAL DRIVEWAY RADII ARE 1.5m UNLESS OTHERWISE NOTED.
2. COMMERCIAL DRIVEWAY RADII ARE AS SHOWN ON PLANS.
3. ALL CHANNELIZATION CURBING IS 200 x 450.



-L-	-Y7-	-Y7-
PI Sta 88+00.038	PI Sta 10+36.638	PI Sta 11+19.581
Δ = 11° 00' 05.6" (RT)	Δ = 16° 40' 29.6" (RT)	Δ = 2° 07' 31.3" (RT)
L = 105.607	L = 72.758	L = 37.094
T = 52.967	T = 36.638	T = 18.549
R = 550.000	R = 250.000	R = 1,000.000
SE = 0.04		
R'OFF = 50.625		
DS = 80 KM/H		

NOTE: ALL DRIVES ARE 6.0 METERS UNLESS OTHERWISE DENOTED

SEE SHEET NO. 24 FOR -L- GRADE AND PROFILE.
SEE SHEET NO. 28 FOR -Y7- GRADE AND PROFILE.
SEE SHEET NO. 2-1 FOR -Y7- INTERSECTION DETAIL.

AAR\DOT# 465 375X
RR MP.NS-39.10

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12/15/2011

REVISIONS

NOTES:

1. ALL RESIDENTIAL DRIVEWAY RADII ARE 1.5m UNLESS OTHERWISE NOTED.
2. COMMERCIAL DRIVEWAY RADII ARE AS SHOWN ON PLANS.
3. ALL CHANNELIZATION CURBING IS 200 x 450.

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CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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METRIC

5 0 10

CONST.REV.

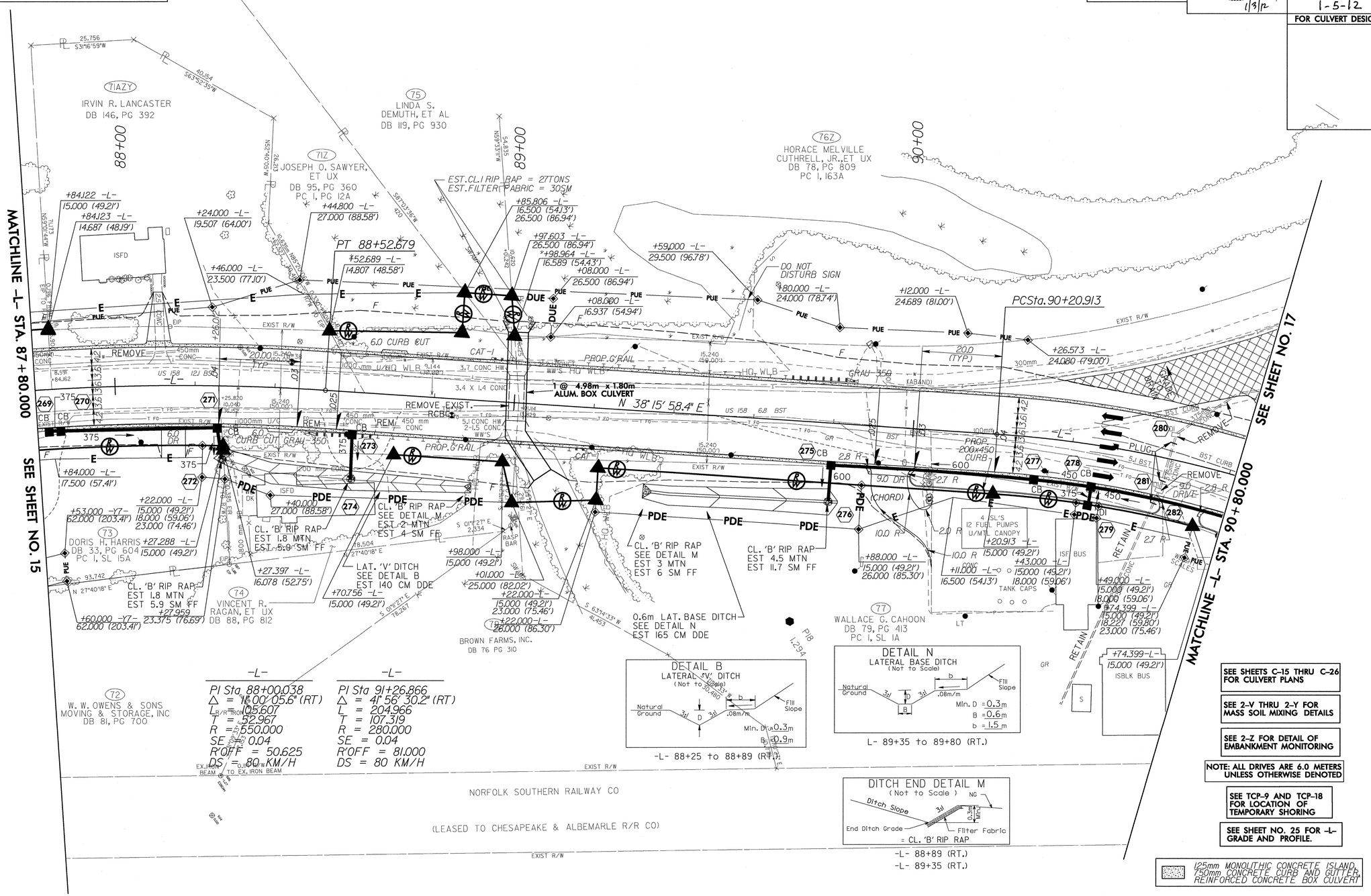
R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	16
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 21116 BOB A. MAY 1/3/12

HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 45764 JAMES A. BYRD 1-5-12

FOR CULVERT DESIGN



-L-

PI Sta 88+00.038
Δ = 11° 00' 05.6" (RT)
L = 105.607
T = 52.967
R = 550.000
SE = 0.04
R'OFF = 50.625
DS = 80 KM/H

-L-

PI Sta 91+26.866
Δ = 41° 56' 30.2" (RT)
L = 204.966
T = 107.319
R = 280.000
SE = 0.04
R'OFF = 81.000
DS = 80 KM/H

DETAIL B
LATERAL 'V' DITCH
(Not to Scale)
Natural Ground
Fill Slope
Min. D = 0.3m
B = 0.9m
-L- 88+25 to 88+89 (RT.)

DETAIL N
LATERAL BASE DITCH
(Not to Scale)
Natural Ground
Fill Slope
Min. D = 0.3m
B = 0.6m
b = 1.5m
L- 89+35 to 89+80 (RT.)

DITCH END DETAIL M
(Not to Scale)
Ditch Slope
End Ditch Grade
Filter Fabric
= CL. 'B' RIP RAP
-L- 88+89 (RT.)
-L- 89+35 (RT.)

SEE SHEETS C-15 THRU C-26 FOR CULVERT PLANS

SEE 2-V THRU 2-Y FOR MASS SOIL MIXING DETAILS

SEE 2-Z FOR DETAIL OF EMBANKMENT MONITORING

NOTE: ALL DRIVES ARE 6.0 METERS UNLESS OTHERWISE DENOTED

SEE TCP-9 AND TCP-18 FOR LOCATION OF TEMPORARY SHORING

SEE SHEET NO. 25 FOR -L- GRADE AND PROFILE.

125mm MONOLITHIC CONCRETE ISLAND, 750mm CONCRETE CURB AND GUTTER, REINFORCED CONCRETE BOX CULVERT

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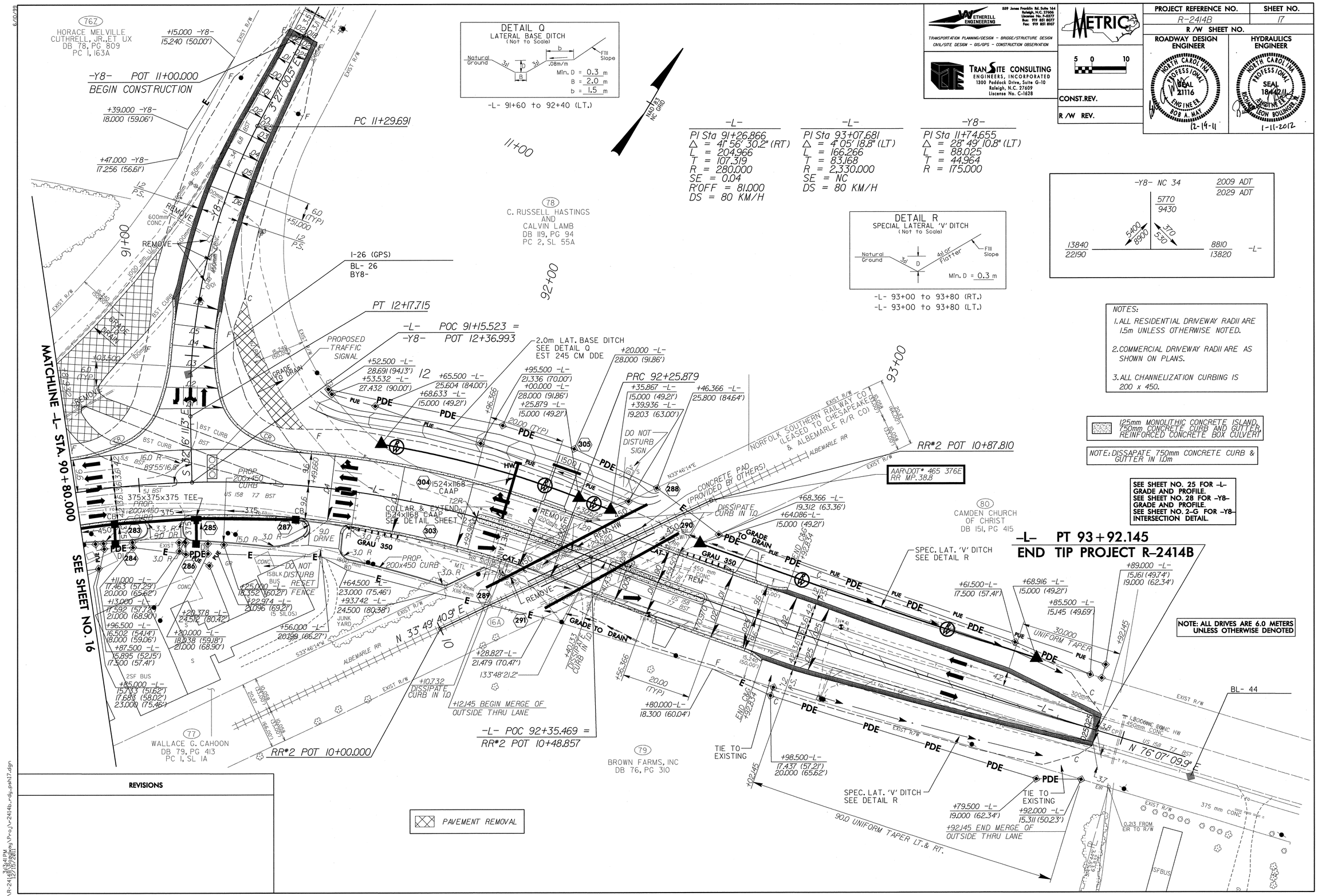

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 12-19-11	NORTH CAROLINA PROFESSIONAL SEAL 18442 ENGINEER RICHARD LEON BOLLINGER 1-11-2012

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CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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License No. C-1628

METRIC
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CONST. REV.
R/W REV.

REVISIONS

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REVISIONS

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Liscense No. C-1628

METRIC
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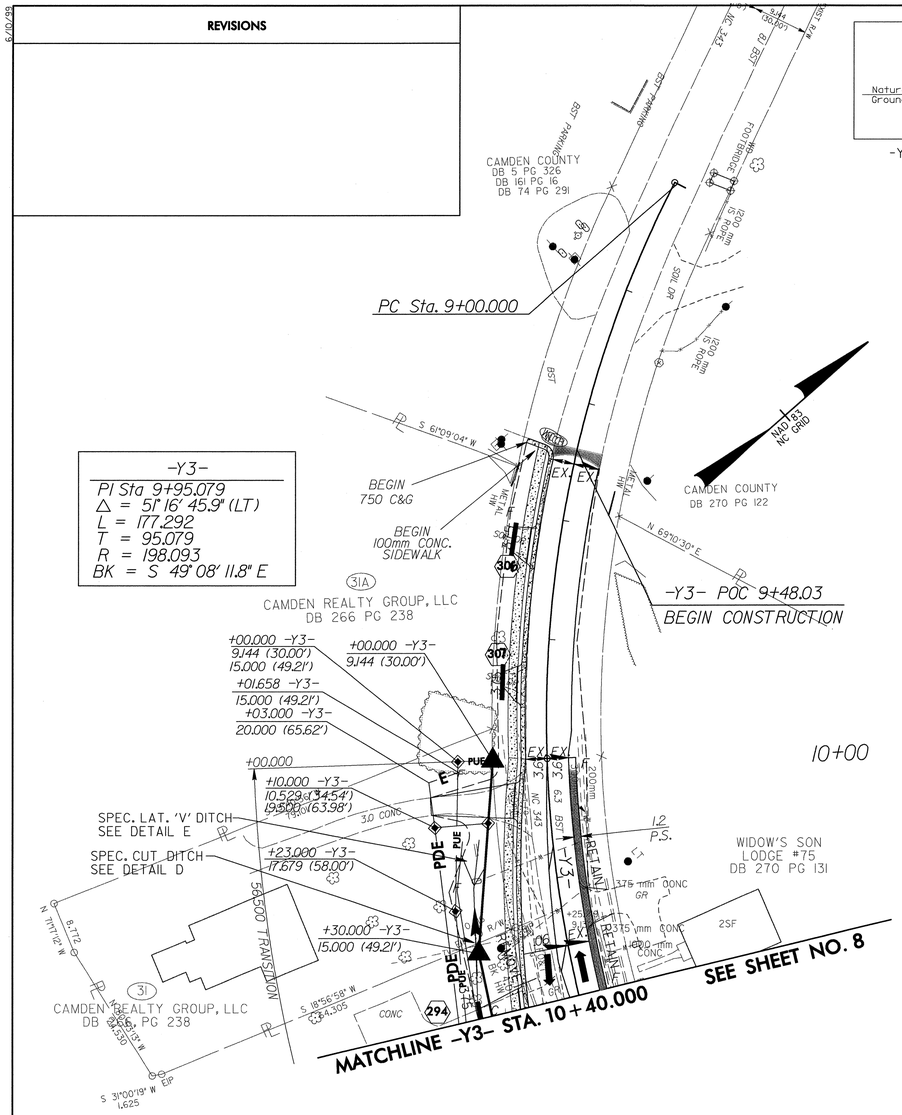
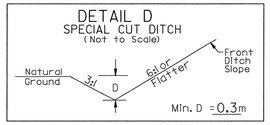
CONST.REV.
R /W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	18
R /W SHEET NO.	

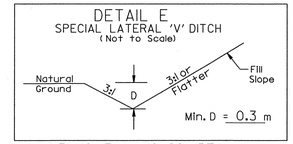
ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY
1/3/12

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 15764 ENGINEER JAMES A. BYRD
1-5-12

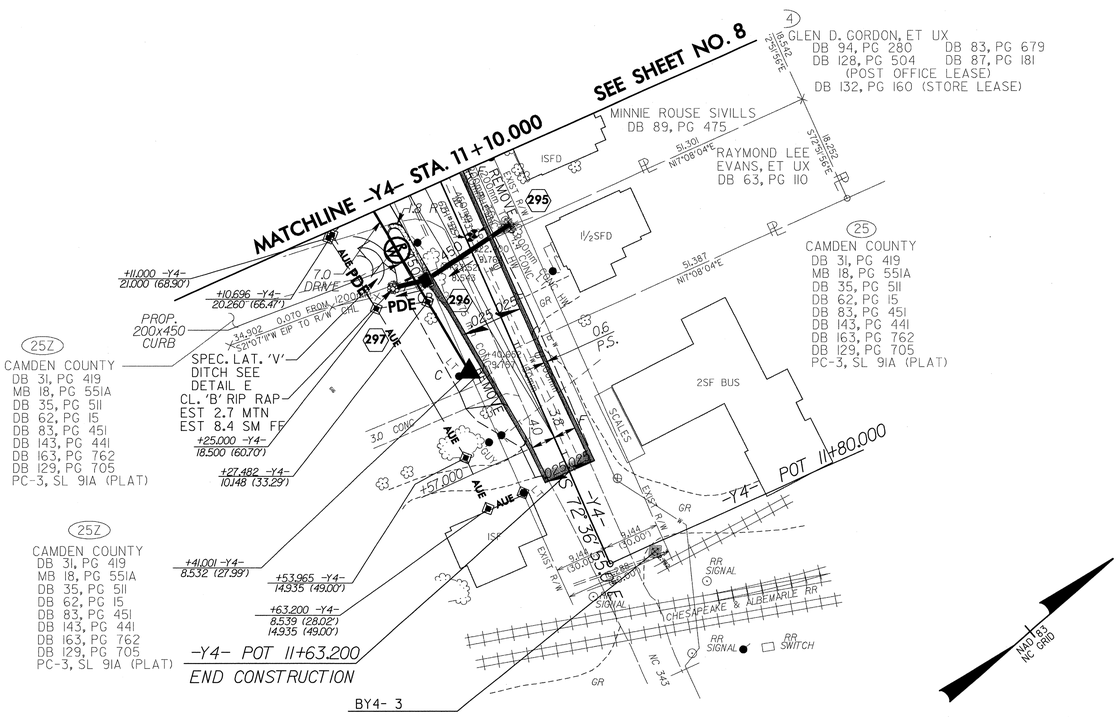


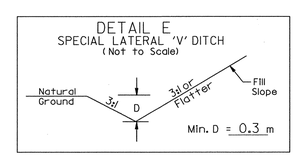


-Y3- 10+20 to 10+36 (RT.)



-Y3- 10+17 to 10+20 (RT.)





-Y4- 11+13 to 11+23 (RT.)

NOTES:

1. ALL RESIDENTIAL DRIVEWAY RADII ARE 1.5m UNLESS OTHERWISE NOTED.
2. COMMERCIAL DRIVEWAY RADII ARE AS SHOWN ON PLANS.
3. ALL CHANNELIZATION CURBING IS 200 x 450.

125mm MONOLITHIC CONCRETE ISLAND, 750mm CONCRETE CURB AND GUTTER, REINFORCED CONCRETE BOX CULVERT

NOTE: ALL DRIVES ARE 6.0 METERS UNLESS OTHERWISE DENOTED

SEE SHEET NO. 27 FOR -Y3- GRADE AND PROFILE.
SEE SHEET NO. 27 FOR -Y4- GRADE AND PROFILE.
SEE SHEET NO. 2-H FOR -Y3- & -Y4- INTERSECTION DETAIL.

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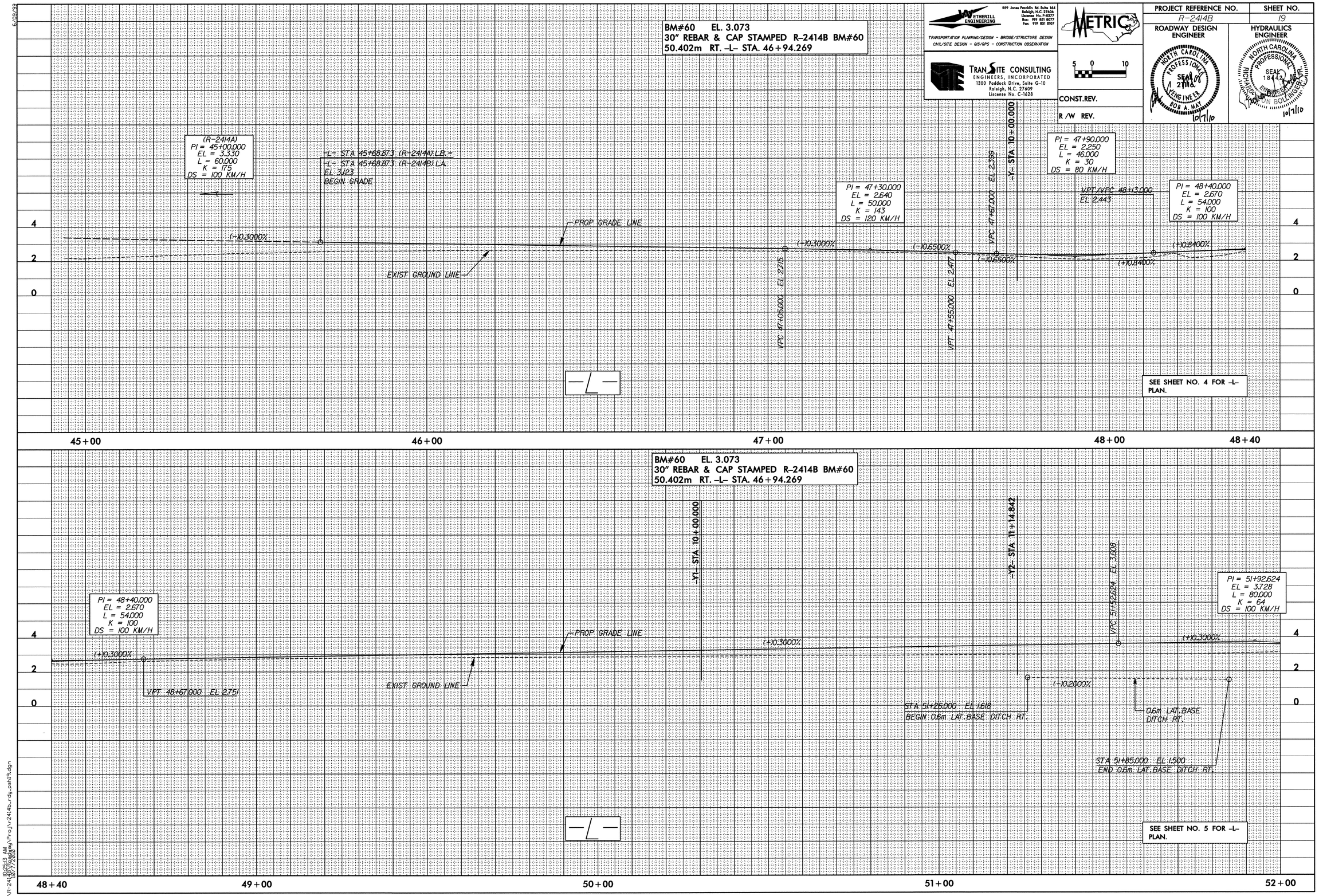

WETHERILL ENGINEERING
559 Jones Franklin Rd. Suite 164
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Licence No. F-0377
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TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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ENGINEERS, INCORPORATED
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Raleigh, N.C. 27609
Liscense No. C-1628

METRIC

5 0 10

CONST.REV.

R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	19

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY
10/7/10

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 18442 ENGINEER RICHARD SHON BOLLINGER, JR.
10/7/10

6/09/99

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10/7/2010

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	20

ROADWAY DESIGN ENGINEER — HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 12-19-11

NORTH CAROLINA PROFESSIONAL SEAL 15764 ENGINEER JAMES A. BYRD 1-5-12

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CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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1300 Paddock Drive, Suite G-10
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METRIC

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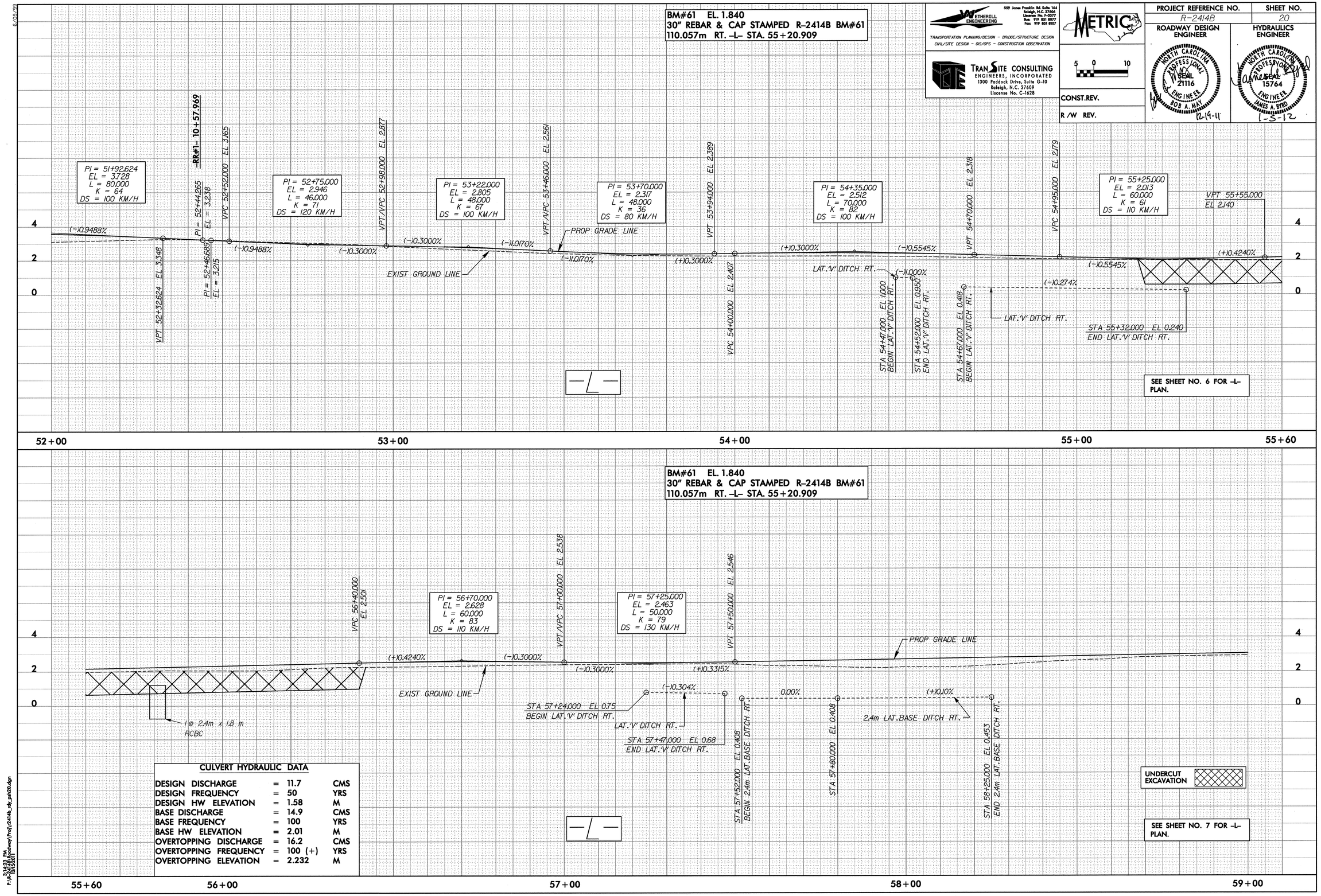
CONST.REV.

R/W REV.



CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	=	11.7	CMS
DESIGN FREQUENCY	=	50	YRS
DESIGN HW ELEVATION	=	1.58	M
BASE DISCHARGE	=	14.9	CMS
BASE FREQUENCY	=	100	YRS
BASE HW ELEVATION	=	2.01	M
OVERTOPPING DISCHARGE	=	16.2	CMS
OVERTOPPING FREQUENCY	=	100 (+)	YRS
OVERTOPPING ELEVATION	=	2.232	M

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PROJECT REFERENCE NO.	SHEET NO.
R-2414B	21

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 12-20-11

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 15764 ENGINEER JAMES A. BYRD 1-5-12

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CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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Raleigh, N.C. 27609
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METRIC

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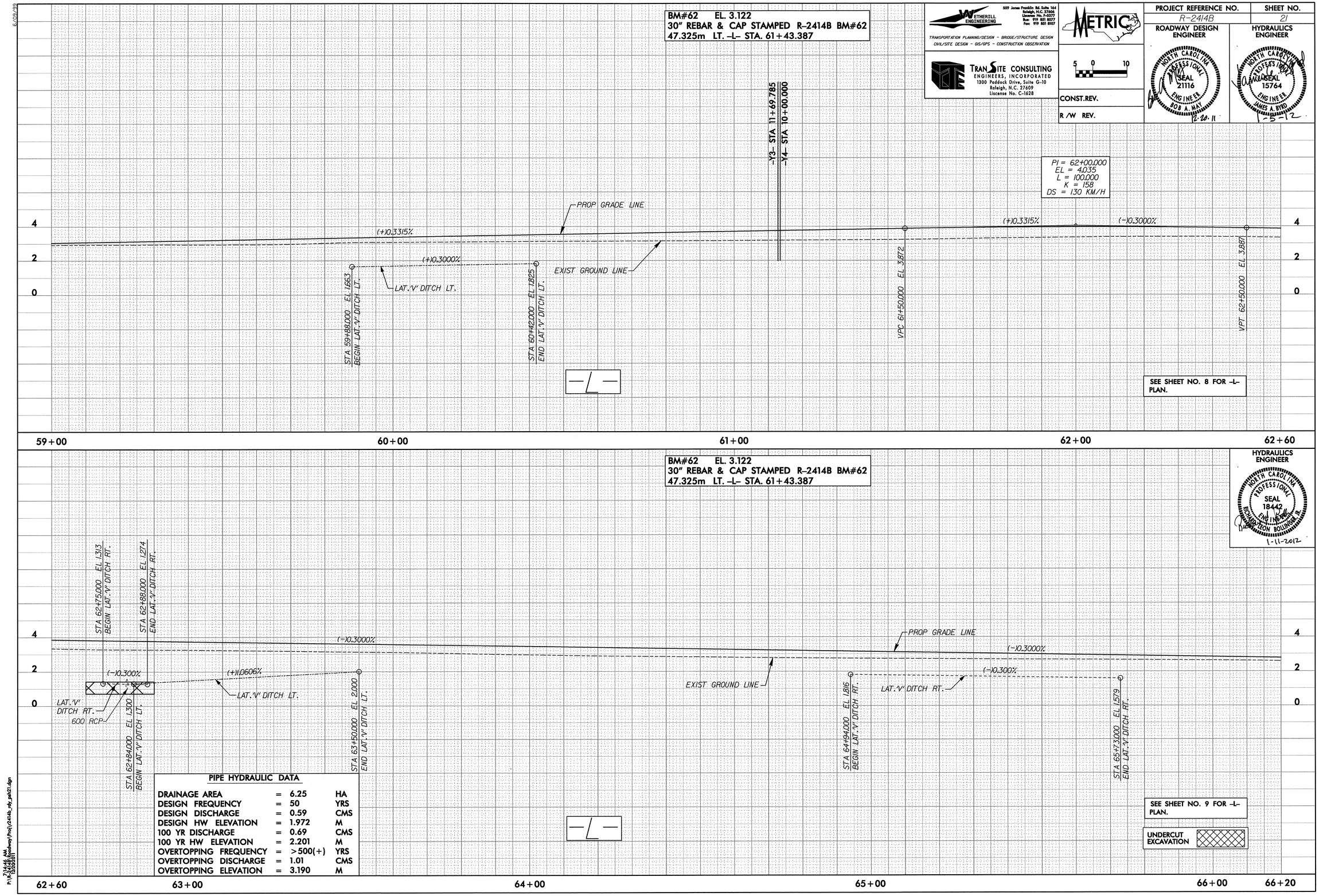
CONST.REV.

R/W REV.



HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 18442 ENGINEER RICHARD LEON BOLLINGER JR. 1-11-2012

PIPE HYDRAULIC DATA

DRAINAGE AREA	=	6.25	HA
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	0.59	CMS
DESIGN HW ELEVATION	=	1.972	M
100 YR DISCHARGE	=	0.69	CMS
100 YR HW ELEVATION	=	2.201	M
OVERTOPPING FREQUENCY	=	>500(+)	YRS
OVERTOPPING DISCHARGE	=	1.01	CMS
OVERTOPPING ELEVATION	=	3.190	M

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PROJECT REFERENCE NO.	SHEET NO.
R-2414B	22

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

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METRIC

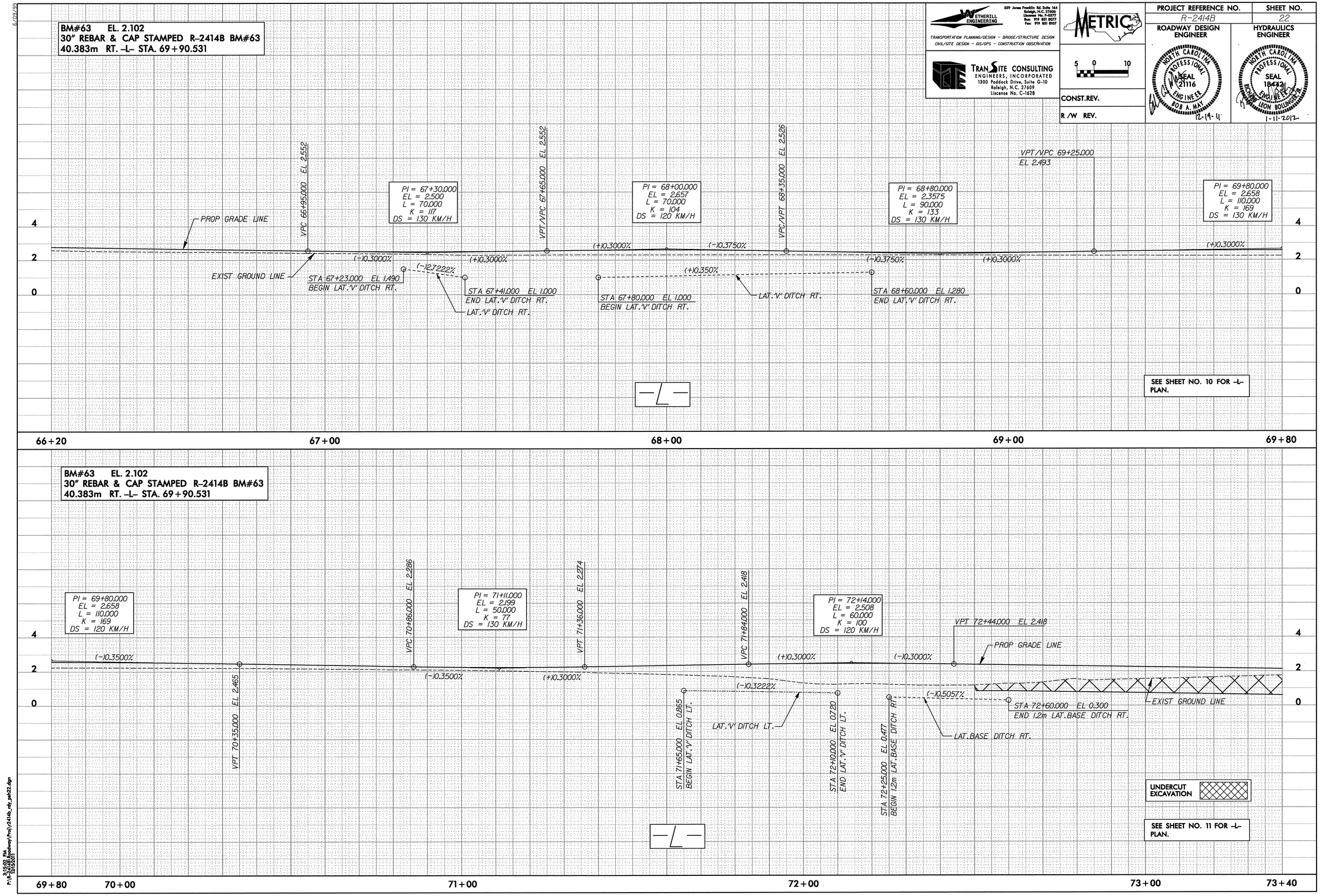
5 0 10

CONST.REV.

R /W REV.

NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 12-19-11

NORTH CAROLINA PROFESSIONAL SEAL 18442 ENGINEER RICHARD LEON BOLLINGER, JR. 1-11-2012



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CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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Raleigh, N.C. 27609
Liscense No. C-1628

METRIC

5 0 10

CONST.REV.

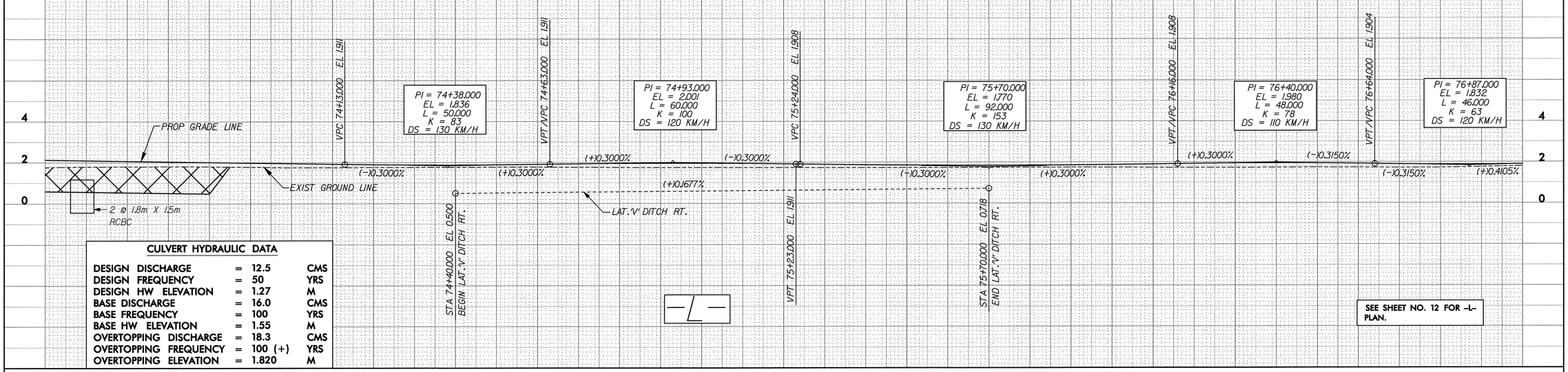
R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	23

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY — 12-19-11

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 15764 ENGINEER JAMES A. BYRD — 1-5-12

BM#64 EL. 1.761
30" REBAR & CAP STAMPED R-2414B BM#64
53.728m LT. -L- STA. 78+66.753

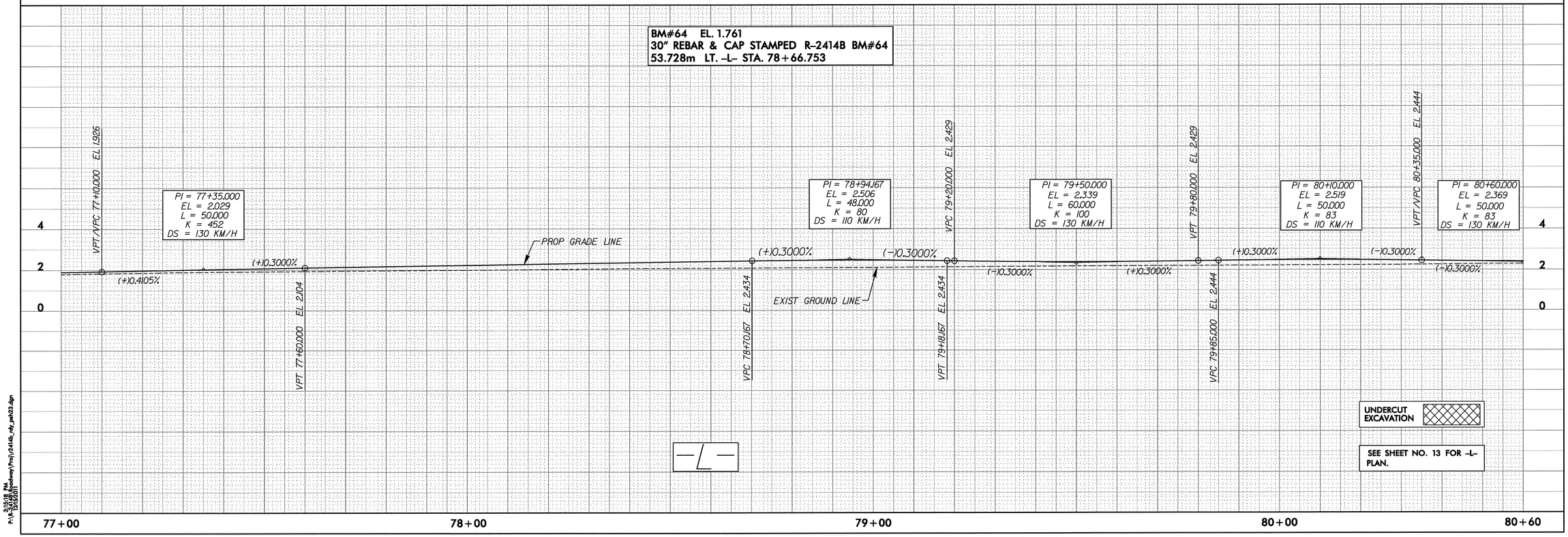


CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	=	12.5	CMS
DESIGN FREQUENCY	=	50	YRS
DESIGN HW ELEVATION	=	1.27	M
BASE DISCHARGE	=	16.0	CMS
BASE FREQUENCY	=	100	YRS
BASE HW ELEVATION	=	1.55	M
OVERTOPPING DISCHARGE	=	18.3	CMS
OVERTOPPING FREQUENCY	=	100 (+)	YRS
OVERTOPPING ELEVATION	=	1.820	M

SEE SHEET NO. 12 FOR -L- PLAN.

BM#64 EL. 1.761
30" REBAR & CAP STAMPED R-2414B BM#64
53.728m LT. -L- STA. 78+66.753



UNDERCUT EXCAVATION

SEE SHEET NO. 13 FOR -L- PLAN.

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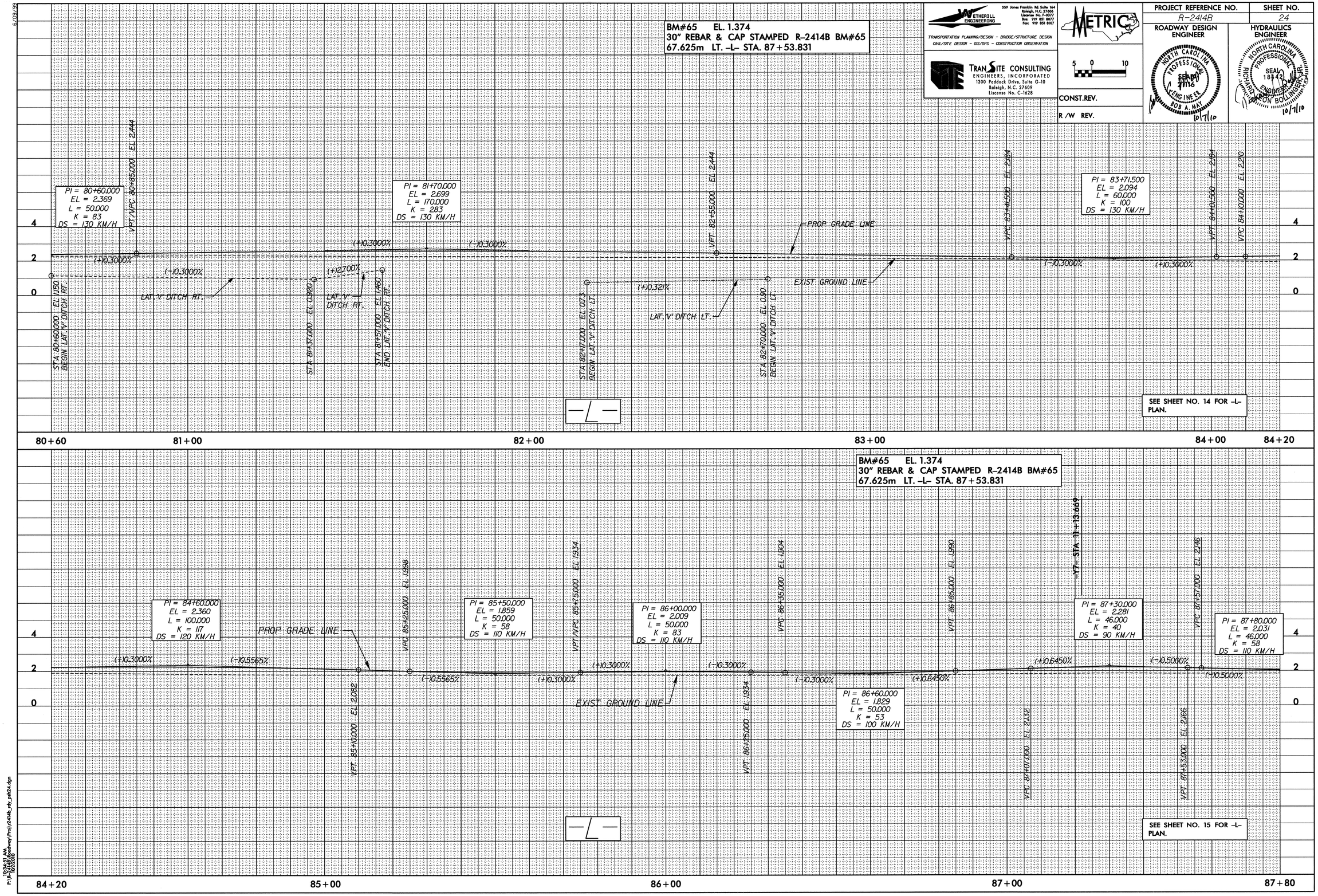
12/5/2011



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TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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ENGINEERS, INCORPORATED
1300 Paddock Drive, Suite G-10
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License No. C-1628

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CONST.REV.

R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	24

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY
10/7/10

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 18842 ENGINEER RICHARD LYNDON BOLLINGER, JR.
10/7/10

6/09/99

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10/7/2010

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559 James Franklin Rd. Suite 164
Raleigh, N.C. 27606
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PROJECT REFERENCE NO.	SHEET NO.
R-2414B	25

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 12-19-11

HYDRAULICS ENGINEER

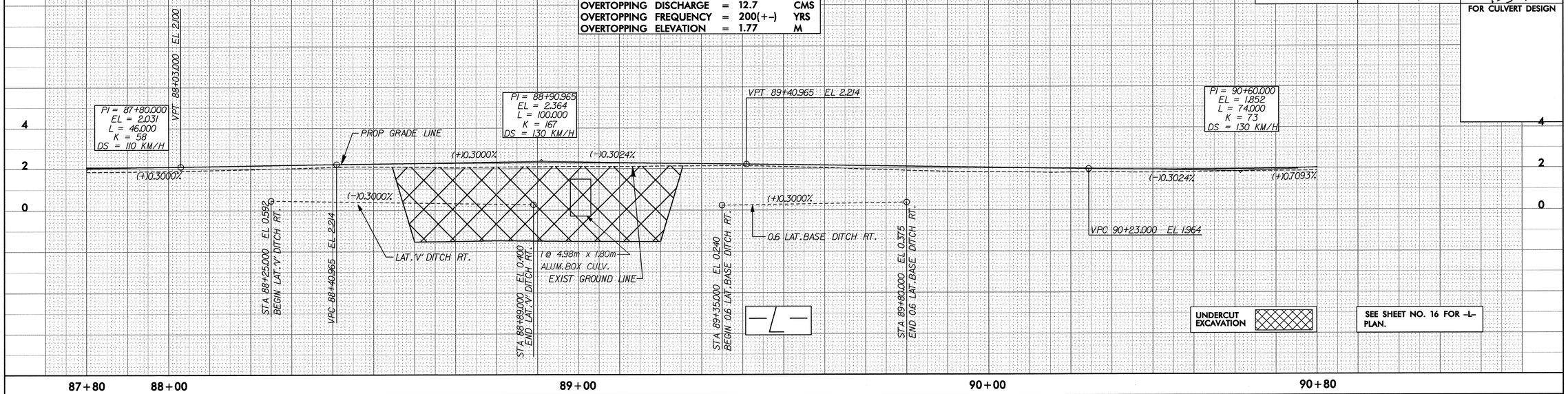
NORTH CAROLINA PROFESSIONAL SEAL 15764 ENGINEER JAMES A. BYRD 12-5-12

FOR CULVERT DESIGN

BM#65 EL. 1.374
30" REBAR & CAP STAMPED R-2414B BM#65
67.625m LT. -L- STA. 87+53.831

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	=	8.18	CMS
DESIGN FREQUENCY	=	50	YRS
DESIGN HW ELEVATION	=	1.28	M
BASE DISCHARGE	=	10.5	CMS
BASE FREQUENCY	=	100	YRS
BASE HW ELEVATION	=	1.53	M
OVERTOPPING DISCHARGE	=	12.7	CMS
OVERTOPPING FREQUENCY	=	200(+-)	YRS
OVERTOPPING ELEVATION	=	1.77	M

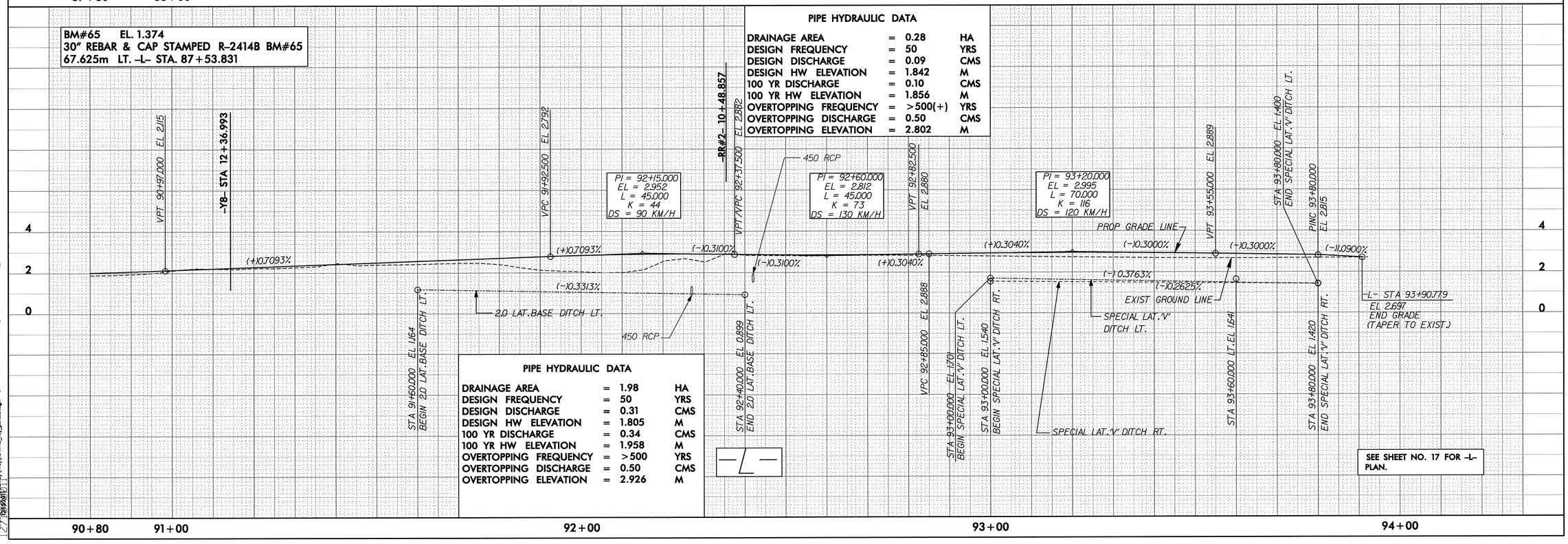


SEE SHEET NO. 16 FOR -L- PLAN.

BM#65 EL. 1.374
30" REBAR & CAP STAMPED R-2414B BM#65
67.625m LT. -L- STA. 87+53.831

PIPE HYDRAULIC DATA

DRAINAGE AREA	=	0.28	HA
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	0.09	CMS
DESIGN HW ELEVATION	=	1.842	M
100 YR DISCHARGE	=	0.10	CMS
100 YR HW ELEVATION	=	1.856	M
OVERTOPPING FREQUENCY	=	>500(+)	YRS
OVERTOPPING DISCHARGE	=	0.50	CMS
OVERTOPPING ELEVATION	=	2.802	M



PIPE HYDRAULIC DATA

DRAINAGE AREA	=	1.98	HA
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	0.31	CMS
DESIGN HW ELEVATION	=	1.805	M
100 YR DISCHARGE	=	0.34	CMS
100 YR HW ELEVATION	=	1.958	M
OVERTOPPING FREQUENCY	=	>500	YRS
OVERTOPPING DISCHARGE	=	0.50	CMS
OVERTOPPING ELEVATION	=	2.926	M

SEE SHEET NO. 17 FOR -L- PLAN.

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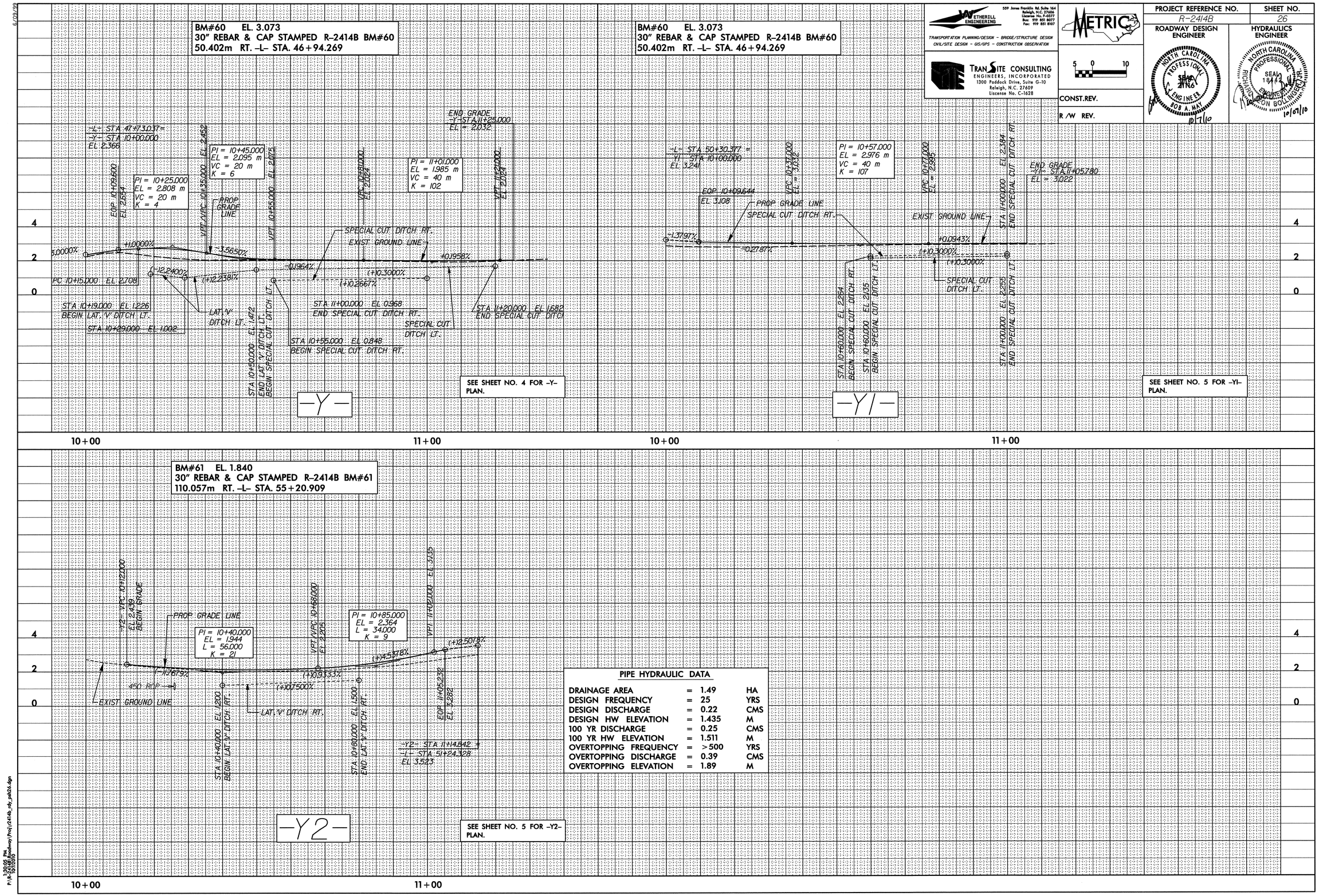
PROJECT REFERENCE NO.	SHEET NO.
R-2414B	26

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21146 ENGINEER BOB A. MAY 10/7/10

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 18412 ENGINEER RICHARD BRAXTON BOLINGER 10/07/10



PIPE HYDRAULIC DATA

DRAINAGE AREA	=	1.49	HA
DESIGN FREQUENCY	=	25	YRS
DESIGN DISCHARGE	=	0.22	CMS
DESIGN HW ELEVATION	=	1.435	M
100 YR DISCHARGE	=	0.25	CMS
100 YR HW ELEVATION	=	1.511	M
OVERTOPPING FREQUENCY	=	>500	YRS
OVERTOPPING DISCHARGE	=	0.39	CMS
OVERTOPPING ELEVATION	=	1.89	M

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6/09/99

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R /W REV.

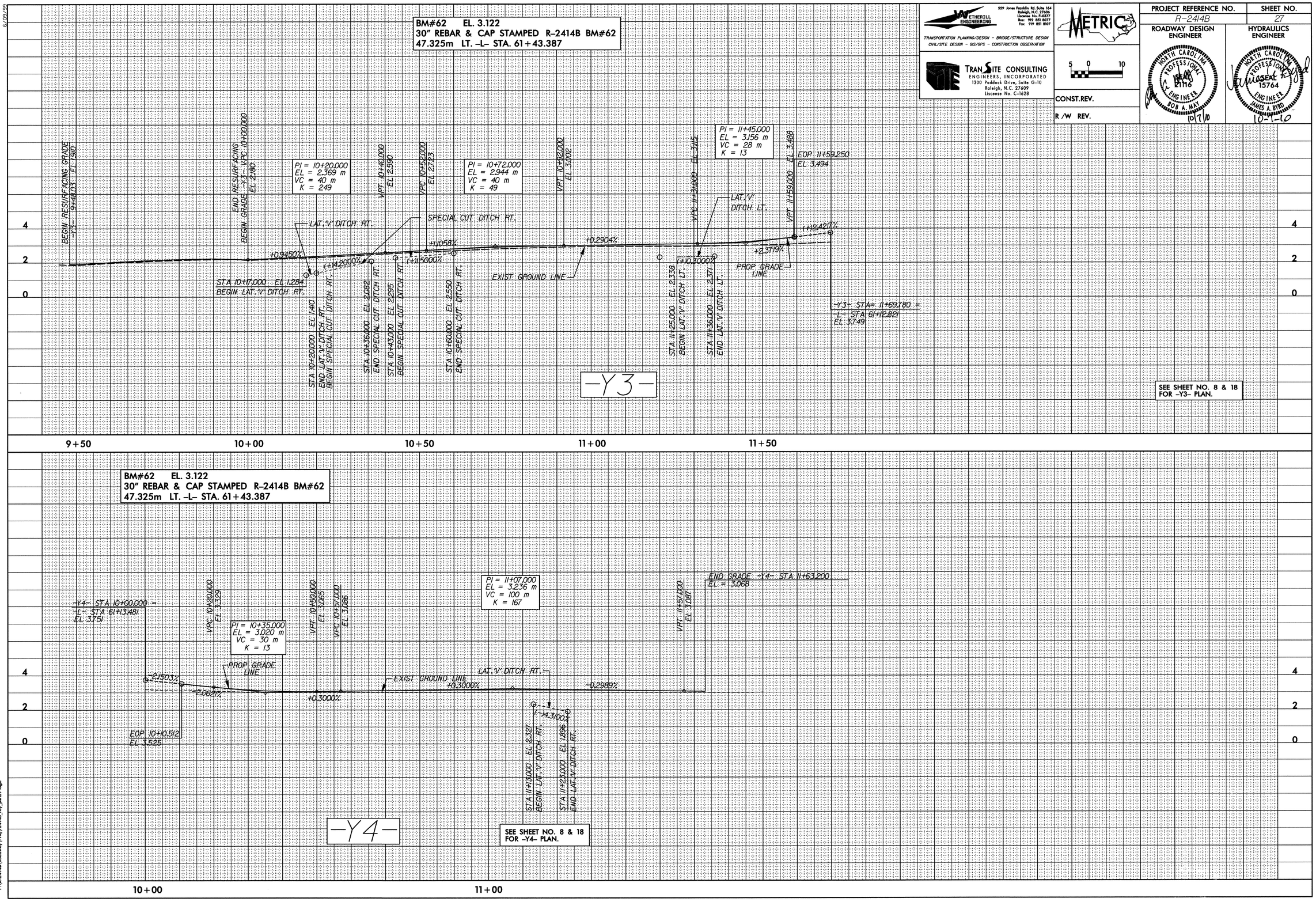
PROJECT REFERENCE NO.	SHEET NO.
R-2414B	27

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 10/7/10

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 15764 ENGINEER JAMES A. BYRD 10-1-10



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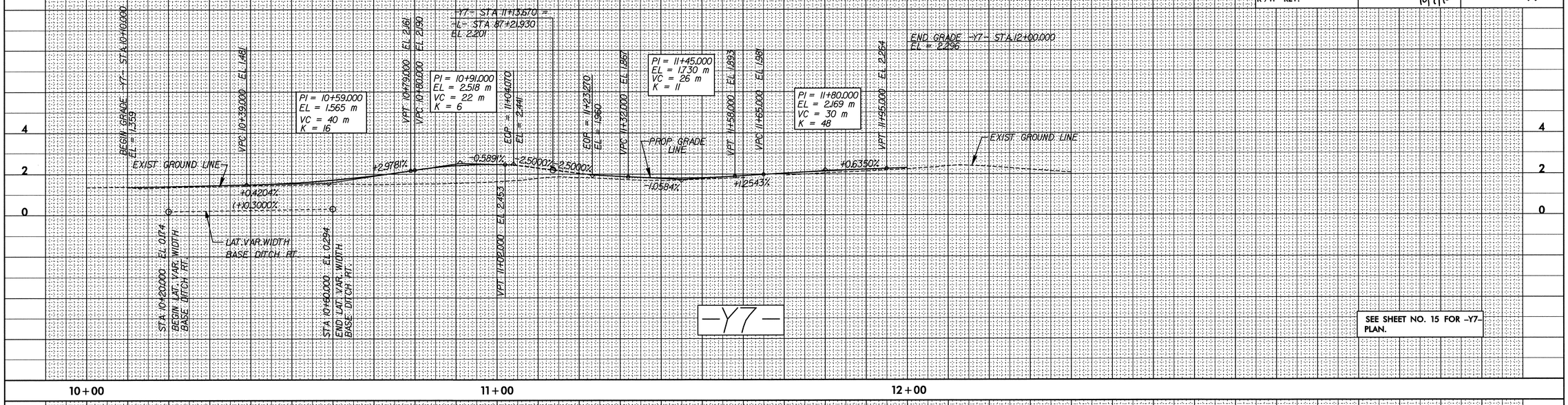
R/W REV.

PROJECT REFERENCE NO.	SHEET NO.
R-2414B	28

ROADWAY DESIGN ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 21116 ENGINEER BOB A. MAY 10/7/10

HYDRAULICS ENGINEER: NORTH CAROLINA PROFESSIONAL SEAL 18442 ENGINEER RICHARD DEON BOLLINGER, JR. 10/07/10



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10/7/2010