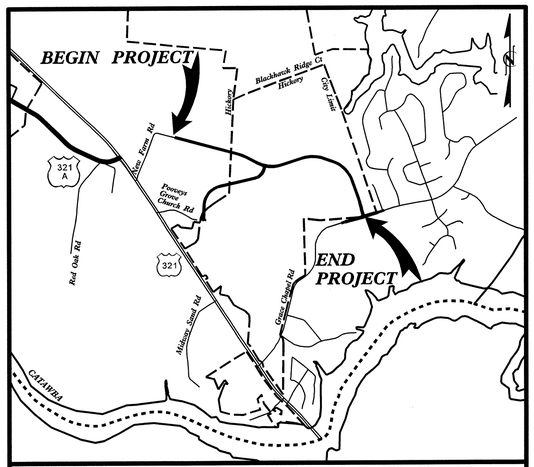
TIP PROJECT: U-5204

CONTRACT: C202565

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



VICINITY MAP NTS

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

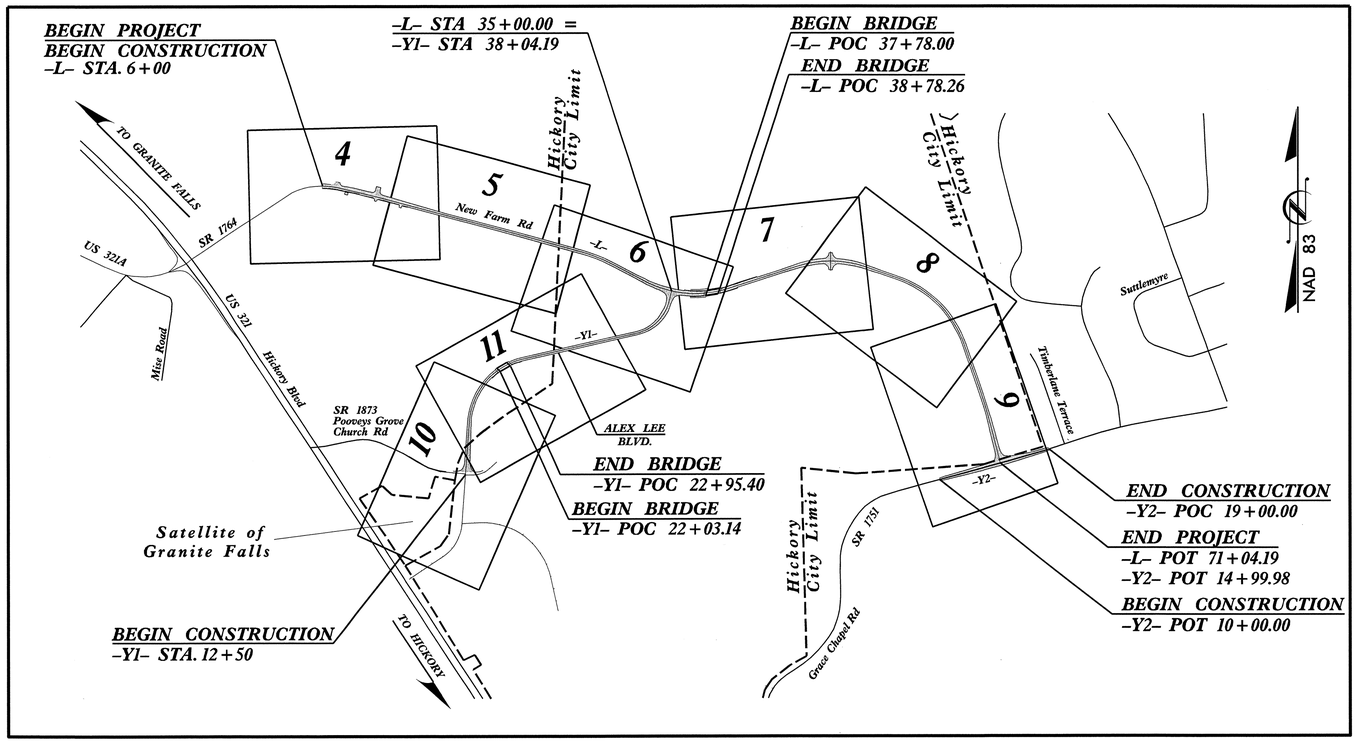
CALDWELL COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5204	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
45328.1.1		P.E., R/W, UTIL.
45328.3.1		CONSTR.

LOCATION: *NEW FARM ROAD*
FROM NEW FARM ROAD (SR 1764)
TO GRACE CHAPEL ROAD (SR 1751)

TYPE OF WORK: *GRADING, DRAINAGE, PAVING,*
STRUCTURES AND RETAINING WALL



GRAPHIC SCALES

PLANS 50 25 0 50 100

PROFILE (HORIZONTAL) 50 25 0 50 100

PROFILE (VERTICAL) 10 5 0 10 20

DESIGN DATA

ADT 2010 = 4,400
ADT 2030 = 6,800
DHV = 50 %
D = 4 %
T = 4 % *
V = 40 MPH
* TTST 4 DUAL 2
SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY PROJECT U-5204 = 1.232 MILES
LENGTH STRUCTURES PROJECT U-5204 = 0.019 MILES
TOTAL LENGTH PROJECT U-5204 = 1.213 MILES

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: July 31, 2011

LETTING DATE: December 20, 2011

Prepared in the Office of:
THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

DEAN HATFIELD, P.E.
PROJECT ENGINEER

WILLIAM TILLITT, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 16003 ENGINEER DEAN D. HATFIELD

SIGNATURE: 10-20-11 P.E.

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 16003 ENGINEER DEAN D. HATFIELD

SIGNATURE: 10-20-11 P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION

art McMillan P.E.

STATE HIGHWAY DESIGN ENGINEER

10/20/2011
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INDEX of SHEETS, GENERAL NOTES, and LIST of STANDARDS

PROJECT REFERENCE NO.	SHEET NO.
U-5204	1A
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 16002 ENGINEER TIMOTHY D. HAITH

REGISTERED ENGINEER
10/25/2011

REVISIONS

10/25/2011
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INDEX OF SHEETS

GENERAL NOTES: 2012 SPECIFICATIONS
EFFECTIVE: 01-17-12
REVISED: 08/31/11

GRADING AND SURFACING OR RESURFACING AND WIDENING:

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

CLEARING:

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

SUPERELEVATION:

ALL CURVES ON THIS PROJECT SHALL BE SUPERELEVATED IN ACCORDANCE WITH STD. NO. 225.04 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.

BERM DITCHES:

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

DRIVEWAYS:

DRIVEWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. 848.02 USING 3' 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 WILL BE PAID FOR AS "EXTRA WORK" IN ACCORDANCE WITH SECTION 104-7.

END BENTS:

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

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE DUKE ENERGY, DUKENET

COMMUNICATIONS, CALDWELL COUNTY PUBLIC UTILITIES, TOWN OF GRANITE FALLS,

EMBARQ, PEIDMONT NATURAL GAS AND CHARTER COMMUNICATIONS

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

RIGHT-OF-WAY MARKERS:

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

EFF. 07-18-06
REV. 01-02-07

2006 ROADWAY ENGLISH STANDARD DRAWINGS

The following Roadway Standards as appear in "Roadway Standard Drawings" Highway Design Branch - N. C. Department of Transportation - Raleigh, N. C., Dated 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	
200.02	Method of Clearing - Method II
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superelevation - Two Lane Pavement
225.06	Method of Grading Sight Distance at Intersections
240.01	Guide for Berm Ditch Construction
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 7 - CONCRETE PAVEMENTS AND SHOULDERS	
700.02	Expansion Joint Layout - for Rigid Doweled Pavement at Bridges
700.04	Concrete Pavement Header Board
700.05	Tying Proposed Pavement to Existing
710.01	Concrete Pavement - Station Marking
DIVISION 8 - INCIDENTALS	
806.01	Concrete Right-of-Way Marker
806.02	Granite Right-of-Way Marker
838.01	Concrete Endwall for Single and Double Pipe Culverts - 15" thru 48" Pipe 90 Skew
838.11	Brick Endwall for Single and Double Pipe Culverts - 15" thru 48" Pipe 90 Skew
838.80	Precast Endwalls - 12" thru 72" Pipe 90 Skew
840.18	Concrete Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.22	Frames and Wide Slot Sag Grates
840.27	Brick Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.29	Frames and Narrow Slot Flat Grates
840.31	Concrete Junction Box - 12" thru 66" Pipe
840.32	Brick Junction Box - 12" thru 66" Pipe
840.35	Traffic Bearing Grated Drop Inlet - for Cast Iron Double Frame and Grates
840.45	Precast Drainage Structure
840.46	Traffic Bearing Precast Drainage Structure
840.54	Manhole Frame and Cover
840.66	Drainage Structure Steps
846.01	Concrete Curb, Gutter and Curb & Gutter
846.04	Drop Inlet Installation in Shoulder Berm Gutter
848.02	Driveway Turnout - Radius Type
848.04	Street Turnout
850.01	Concrete Paved Ditches
850.10	Guide for Berm Drainage Outlet - 15" and 18" Pipe
862.01	Guardrail Placement
862.02	Guardrail Installation
862.03	Structure Anchor Units
866.02	Woven Wire Fence - with Wood Post
876.01	Rip Rap in Channels
876.02	Guide for Rip Rap at Pipe Outlets
876.04	Drainage Ditches with Class 'B' Rip Rap

THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

PROJECT REFERENCE NO.	SHEET NO.
U-5204	1B
R/W SHEET NO.	

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 — 23
- 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

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 Marker — RW
- 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 Utility Easement — PUE
- Proposed Temporary Utility Easement — TUE
- 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 Wheel Chair Ramp — WCR
- 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 — HH
- 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 — TV
- 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 — G
- 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 — ?U/TL
- U/G Tank; Water, Gas, Oil
- A/G Tank; Water, Gas, Oil
- U/G Test Hole (S.U.E.*)
- Abandoned According to Utility Records — AATUR
- End of Information — E.O.I.

REVISIONS

10/17/2011
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1001 Wade Avenue, Suite 400
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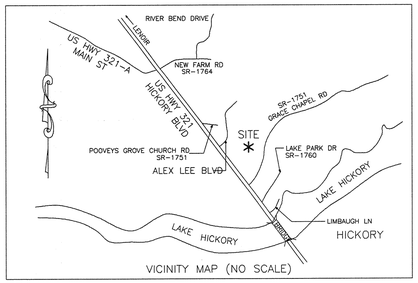
SURVEY CONTROL SHEET U-5204

PROJECT REFERENCE NO.	SHEET NO.
U-5204	1C



NC GRID
NAD 83

CONTROL POINT LISTING

POINT	NORTHING	EASTING	ELEV.	DESCRIPTION	LINE STA.	OFFSET
300	744582.798	1292256.068	1114.184	1/2" EIP	OUTSIDE PROJECT LIMITS	
301	744573.634	1291669.153	1106.537	SPIKE	OUTSIDE PROJECT LIMITS	
302	744966.959	1291787.445	1112.123	SPIKE	Y1 13+54.65	48.12 RT
303	747057.846	1290276.964	1141.257	1/2" EIP	OUTSIDE PROJECT LIMITS	
304	747152.282	1290725.956	1154.739	1/2" EIP	OUTSIDE PROJECT LIMITS	
305	745012.976	1296116.762	1100.360	SPIKE	OUTSIDE PROJECT LIMITS	
306	744869.982	1295587.936	1117.751	SPIKE	OUTSIDE PROJECT LIMITS	
307	744682.601	1294880.334	1098.336	MAG NAIL	OUTSIDE PROJECT LIMITS	
308	740452.223	1293568.190	1004.267	NCGS Mariner	OUTSIDE PROJECT LIMITS	
309	738261.204	1296450.398	1037.986	NCGS Plant	OUTSIDE PROJECT LIMITS	
310	734629.949	1298023.982	1078.801	NCGS Siecor	OUTSIDE PROJECT LIMITS	

1/2" EIP (#304)
N=747152.282'
E=1290725.956'
ELEV=1154.739'

CALDWELL EDC PROPERTIES, LLC
DEED BOOK 1697, PAGE 875

CITY OF HICKORY
DEED BOOK 1230, PAGE 734

1/2" EIP (#303)
N=747057.846'
E=1290276.964'
ELEV=1141.257'

BEGIN PROJECT U-5204
-L- POT 10+00.00

PROPOSED R/W

RIVER BEND DRIVE

U.S. HIGHWAY 321

AMANDA JAN STARNES (WINKLER)
DEED BOOK 801, PAGE 11

PROPOSED R/W

PROPOSED R/W

NINA S. HILL (1/3 INTEREST)
RACHEL S. RITCHIE (1/3 INTEREST)
RALPH L. STARNES (1/6 INTEREST)
ESTATE 93-E-427
REF. DEED BOOK 190, PAGE 34
OMEGA C. STARNES (1/6 INTEREST)
DEED BOOK 1585, PAGE 378 (TRACT 1)

SPIKE (#302)
N=744966.959'
E=1291787.445'
ELEV=1112.123'

MDI MANAGEMENT, INC.
DEED BOOK 1151, PAGE 860

MDI MANAGEMENT, INC.
DEED BOOK 1151, PAGE 25
REF. PLAT BOOK 16, PAGE 192

END PROJECT U-5204
-Y2- POT 15+00.00
-L- POT 71+02.31

GRACE CHAPEL ROAD
SR-1751

SPIKE (#305)
N=745012.976'
E=1296116.762'
ELEV=1100.360'

BEGIN PROJECT U-5204
-Y1- POT 10+00.00

1/2" EIP (#300)
N=744582.798'
E=1292256.068'
ELEV=1114.184'

ALEX LEE BLVD

SPIKE (#306)
N=744869.982'
E=1295587.936'
ELEV=1117.751'

MAG NAIL (#307)
N=744682.601'
E=1294880.334'
ELEV=1098.336'

SPIKE (#301)
N=744573.634'
E=1291669.153'
ELEV=1106.537'

U.S. HIGHWAY 321 (HICKORY BOULEVARD)

N.C.G.S. "MARINER"
N=740452.223'
E=1293568.190'
ELEV=1004.267'

DESIGN ALIGNMENTS

L

TYPE	STATION	NORTH	EAST
P.C.	3+50.00	747,143.3076	1,290,361.8094
P.T.	7+25.80	747,180.0731	1,290,729.1191
P.C.	9+31.36	747,133.8060	1,290,929.4083
P.T.	11+03.54	747,092.1726	1,291,096.4686
P.C.	27+10.79	746,676.7196	1,292,649.1009
P.T.	29+76.67	746,580.2176	1,292,896.2637
P.C.	32+79.37	746,439.6258	1,293,164.3362
P.T.	39+54.41	746,383.1963	1,293,819.3479
P.C.	45+33.25	746,560.4066	1,294,370.3950
P.T.	50+79.36	746,554.9883	1,294,907.1274
P.C.	53+48.44	746,467.4563	1,295,161.5707
P.T.	61+19.37	745,941.1219	1,295,688.5123
P.C.	65+33.08	745,550.0674	1,295,823.5448
P.T.	67+90.29	745,303.8594	1,295,897.7163
POT	71+04.19	744,999.9267	1,295,976.2079

Y1

TYPE	STATION	NORTH	EAST
POT	10+00.00	744,616.7837	1,291,713.4728
P.C.	17+18.89	745,333.7404	1,291,766.1337
P.T.	24+21.18	745,830.1249	1,292,194.3180
P.C.	33+39.59	746,031.0696	1,293,090.4751
P.T.	37+33.96	746,295.0276	1,293,355.1942
POT	38+04.19	746,363.5169	1,293,370.7587

Y2

TYPE	STATION	NORTH	EAST
P.C.	8+95.22	744,846.3033	1,295,391.2837
P.T.	10+00.00	744,873.1604	1,295,492.5615
P.C.	14+66.77	744,991.4574	1,295,944.0919
P.T.	19+46.89	745,124.8493	1,296,405.2627
P.C.	19+46.89	745,124.8493	1,296,405.2627
P.T.	20+70.52	745,163.1250	1,296,522.8106

LEGEND

Existing Iron Pipe	EIP
New Iron Pipe	NIP
Existing Iron Rod	EIR
New Iron Rod	NIR
Rebar Found	RF
Rebar Set	RS
Concrete Monument	CM
P.K. Nail	PK
Point	PT.
Control Point (GPS)	

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT
IS BASED ON THE NORTH CAROLINA STATE PLANE COORDINATES ESTABLISHED BY N.C.G.S. FOR
MONUMENT "MARINER", LOCATED IN CALDWELL COUNTY WITH NAD 83 STATE PLANE GRID COORDINATES OF:
NORTHING: 740,452.223 ft. EASTING: 1,293,568.190 ft.
THE COMBINED FACTOR USED ON THIS PROJECT
(GROUND TO GRID FOR REFERENCE TIES ONLY) IS: 0.9998691
THE NORTH CAROLINA LAMBERT GRID BEARING LOCALIZED HORIZONTAL GROUND DISTANCE FROM
MARINER TO L- STATION 10+00: N 21:0540W 7,145.553 ft.
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED: NAVD 88

NOTE: DRAWING NOT TO SCALE

THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

REVISIONS

10/17/2011
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NOT TO SCALE

PROJECT REFERENCE NO.	SHEET NO.
U-5204	2
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 16931 ENGINEER KEVIN D. HAIRFIELD

REGISTERED ENGINEER
10/17/2011

PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 16931 ENGINEER KEVIN D. HAIRFIELD

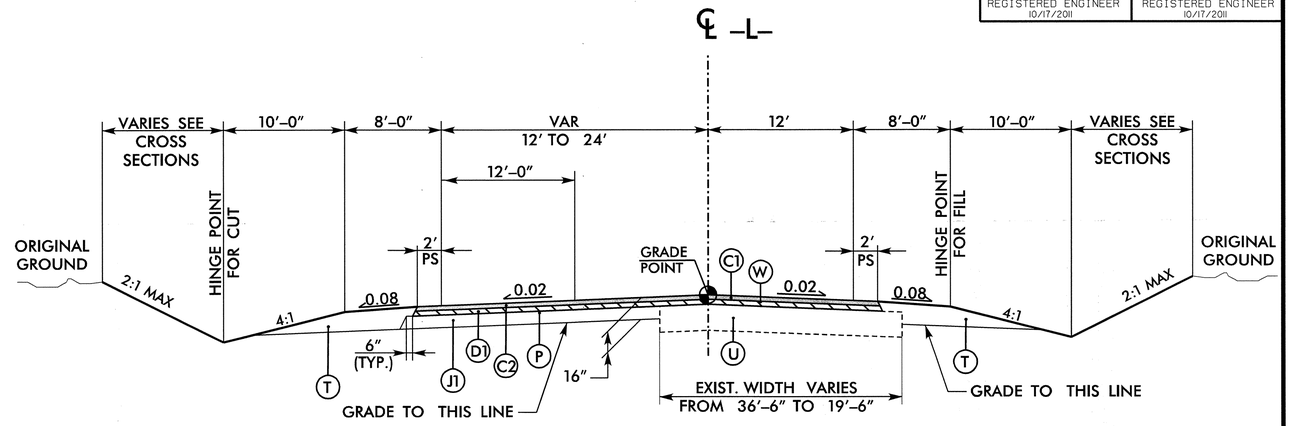
REGISTERED ENGINEER
10/17/2011

PAVEMENT SCHEDULE

ITEM	DESCRIPTION
C1	Prop. Approx 1.5" Asphalt Concrete Surface Course, Type S9.5B, at an Average Rate of 168 lbs. Per sq. yard.
C2	Prop. Approx 3.0" Asphalt Concrete Surface Course, Type S9.5B, at an Average Rate of 168 lbs. Per sq. yard in each of two layers.
C3	Prop. Var. Depth Asphalt Concrete Surface Course, Type S9.5B, at an Average Rate of 112 lbs. Per sq. yard Per 1" Depth, to be placed in layers not less than 1.5" or greater than 2" in depth.
D1	Prop. Approx 3.0" Asphalt Concrete Intermediate Course, Type I19.0B, at an Average Rate of 342 lbs. Per sq. yard.
D2	Prop. Approx 4.0" Asphalt Concrete Intermediate Course, Type I19.0B, at an Average Rate of 456 lbs. Per sq. yard.
D3	Prop. Var. Depth Asphalt Concrete Intermediate Course, Type I19.0B, at an Average Rate of 114 lbs. Per sq. yard Per 1" Depth, to be placed in layers not less than 2.5" or greater than 4.0" in depth.
E1	Prop. Approx 5.0" Asphalt Concrete Base Course, Type B25.0B, at an Average Rate of 570 lbs. Per sq. yard.
J1	Prop. Approx 10.0" Aggregate Base Course
J2	Prop. Var. Depth Aggregate Base Course
P	Proposed Prime Coat at a Rate of 0.35 gal./sq. yd.
R1	2'-6" Curb & Gutter
R2	Shoulder Berm Gutter
T	Earth Material
U	Existing Pavement
W	Var. Depth Asphalt Pavement

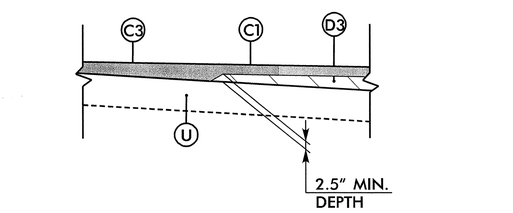
NOTE: Pavement Edge Slopes Are 1:1 Unless Otherwise Indicated.

Contractor needs to mill to tie at the beginning and end of L, Y1, and Y2 with 0" to 1.5" milling.



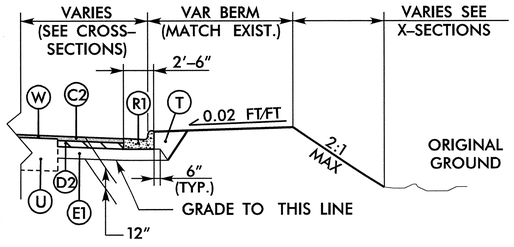
TYPICAL SECTION NO. 1

USE TYPICAL SECTION No. 1 AS FOLLOWS:
–L– STA. 7+30.00 TO –L– STA. 12+00.00



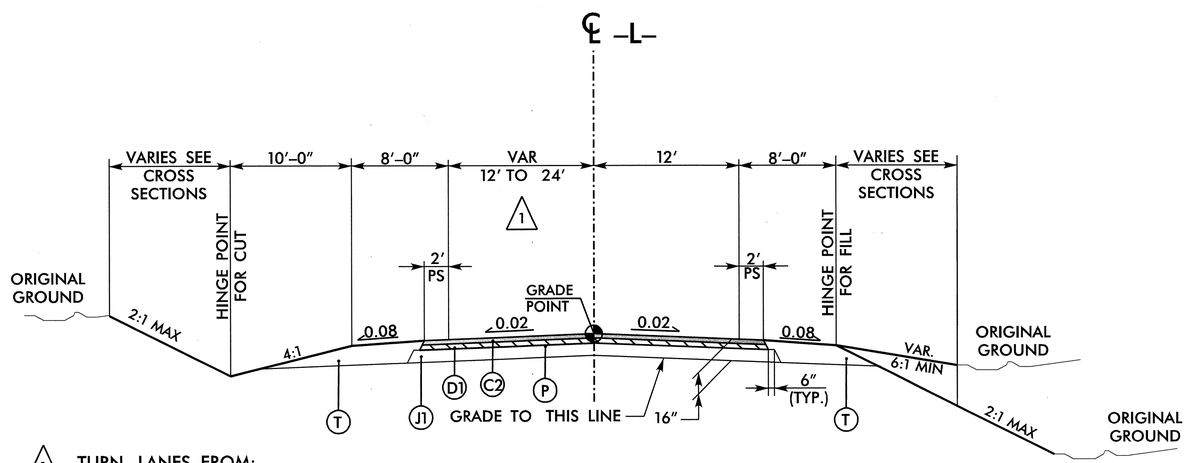
WEDGING DETAIL (W)

USE IN CONJUNCTION w/TYPICAL SECTIONS No. 1 & 5



2'–6" CURB & GUTTER DETAIL

USE IN CONJUNCTION WITH
TYPICAL No. 1 AS FOLLOWS:
–L– STA. 6+00.00 TO –L– STA. 7+30.00 RT



1 TURN LANES FROM:
–L– 12+00.00 TO –L– 16+00.00

TYPICAL SECTION NO. 2

USE TYPICAL SECTION No. 2 AS FOLLOWS:
–L– STA. 12+00.00 TO –L– STA. 25+25.00

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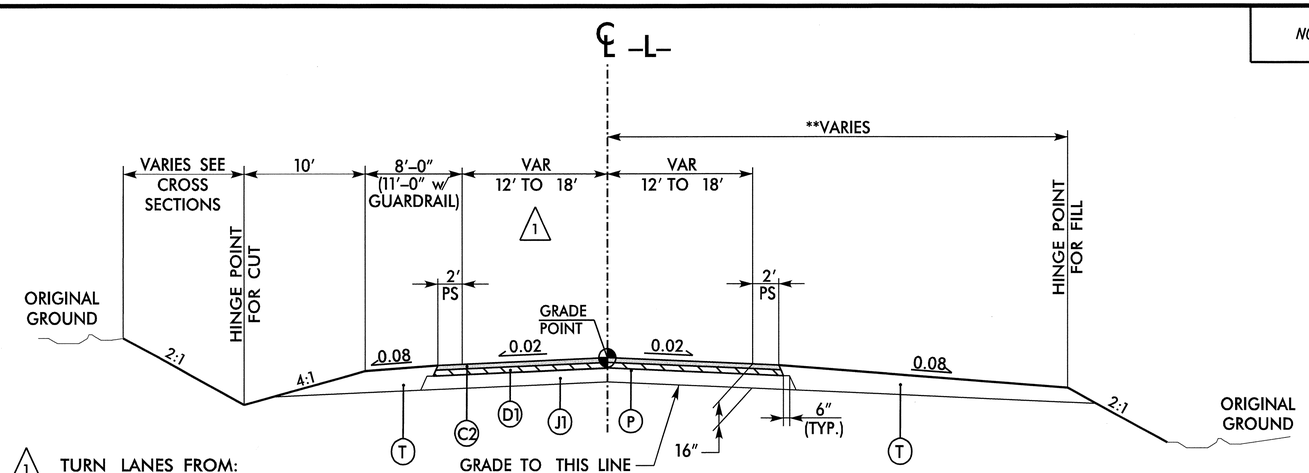
REVISIONS

C1	1.5" TYPE S9.5B
C2	3.0" TYPE S9.5B
C3	VAR. TYPE S9.5B
D1	3.0" TYPE I19.0B
D2	4.0" TYPE I19.0B
D3	VAR. TYPE I19.0B
E1	5.0" TYPE B25.0B
J1	10.0" ABC
J2	VAR. DEPTH ABC
P	PROP PRIME COAT
R1	2'-6" CURB & GUTTER
R2	SHOULDER BERM GUTTER
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	VAR. DEPTH ASPHALT PAVEMENT

NOTE: Pavement Edge Slopes Are 1:1 Unless Otherwise Indicated.

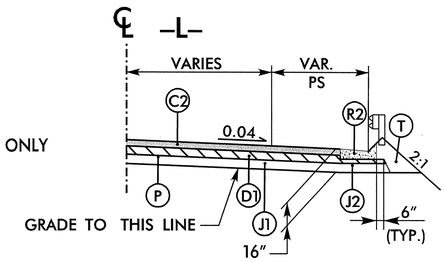


1 TURN LANES FROM:
-L- 31+75.00 TO -L- 39+00.00
-L- 66+50.00 TO -L- 70+86.61
-L- 44+00.00 TO -L- 52+00.00

TYPICAL SECTION NO. 3

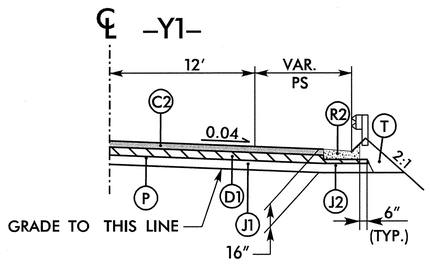
USE TYPICAL SECTION No. 3 AS FOLLOWS:
-L- STA. 25+25.00 TO -L- STA. 37+78.00 BEGIN BRIDGE
-L- STA. 38+78.26 END BRIDGE TO -L- STA. 70+86.61

**CONSTRUCT ADDITIONAL SHOULDER WIDTH TO ACCOMMODATE ULTIMATE BUILDOUT IN FILL SECTIONS ONLY (SEE CROSS-SECTIONS)



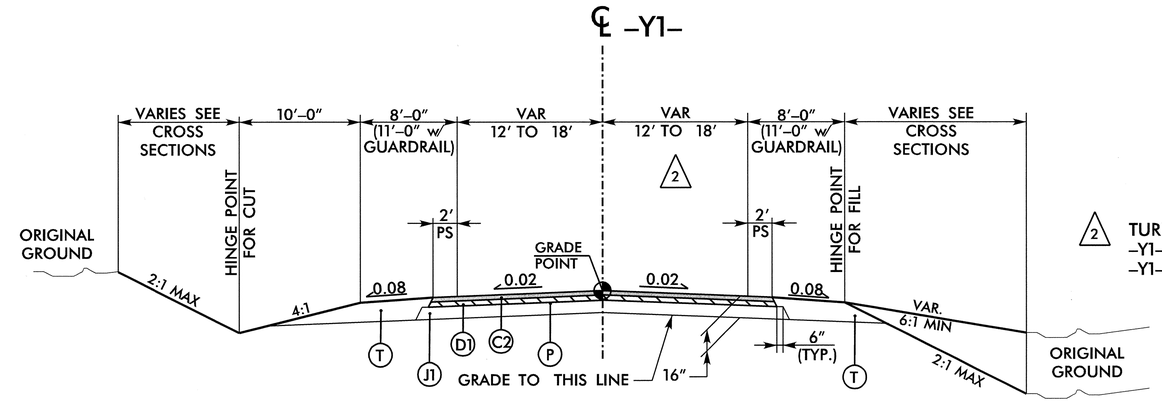
SHOULDER BERM GUTTER DETAIL

-L- 36+00 TO -L- 37+63 LT
-L- 36+50 TO -L- 37+63 RT
-L- 38+93 TO -L- 42+00 LT
-L- 38+93 TO -L- 40+25 RT



SHOULDER BERM GUTTER DETAIL

-Y1- 21+22.50 TO -Y1- 21+91.00 RT
-Y1- 23+18.00 TO -Y1- 24+00.00 RT

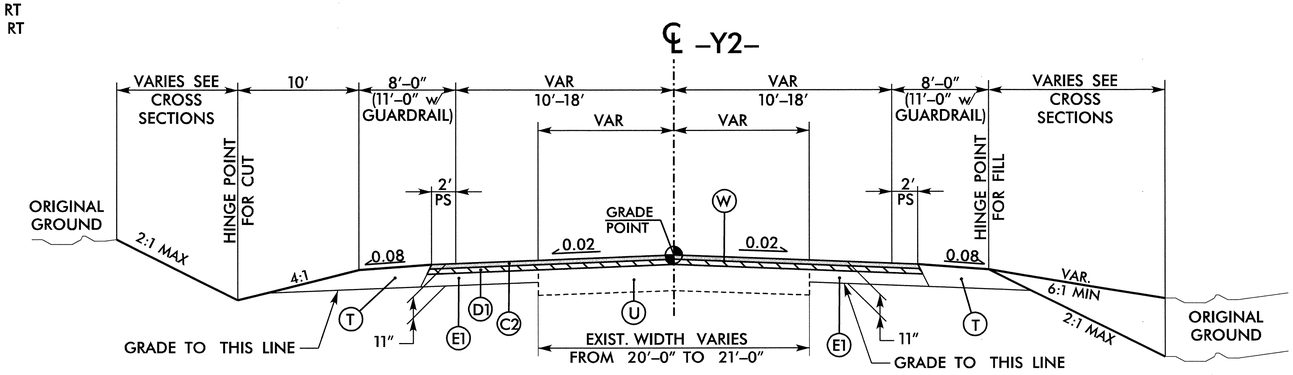


2 TURN LANES FROM:
-Y1- 13+12.00 TO -Y1- 17+50.00
-Y1- 34+00.00 TO -Y1- 37+86.19

TYPICAL SECTION NO. 4

USE TYPICAL SECTION No. 4 AS FOLLOWS:
-Y1- STA. 13+12.00 TO -Y1- STA. 22+03.14 BEGIN BRIDGE
-Y1- STA. 22+95.40 END BRIDGE TO -Y1- STA. 37+86.19

NOTE: RESURFACE ONLY FROM -Y1- 12+50.00 TO -Y1- 13+12.00 (SEE WEDGING DETAIL)



TYPICAL SECTION NO. 5

USE TYPICAL SECTION No. 5 AS FOLLOWS:
-Y2- STA. 10+00.00 TO -Y2- STA. 19+00.00

NOT TO SCALE

PROJECT REFERENCE NO.	SHEET NO.
U-5204	2A
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 16004 ENGINEER DEAN D. HATFIELD — REGISTERED ENGINEER 10/20/2011

PAVEMENT DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 16003 ENGINEER DEAN D. HATFIELD — REGISTERED ENGINEER 10/20/2011

THE LOUIS BERGER GROUP, Inc.
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REVISIONS

10/20/2011
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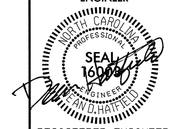
NOT TO SCALE

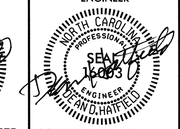
PROJECT REFERENCE NO.	SHEET NO.
U-5204	2B
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

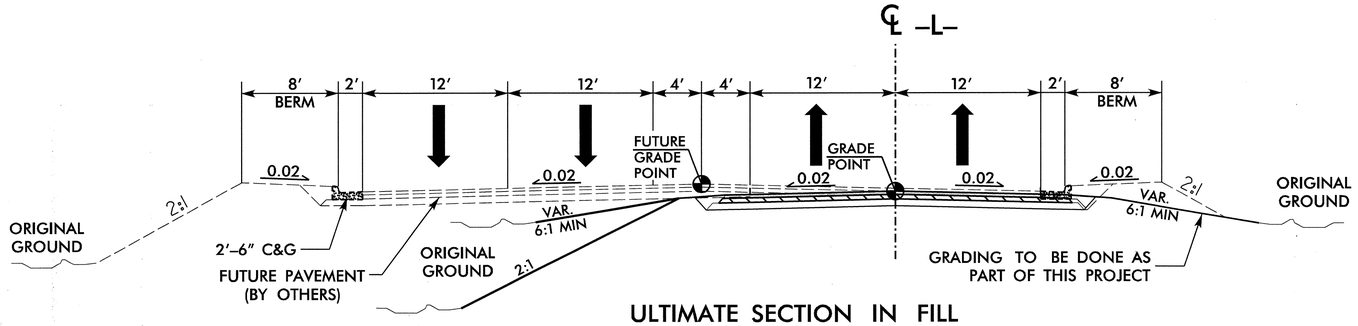


REGISTERED ENGINEER
10/17/2011

PAVEMENT DESIGN ENGINEER



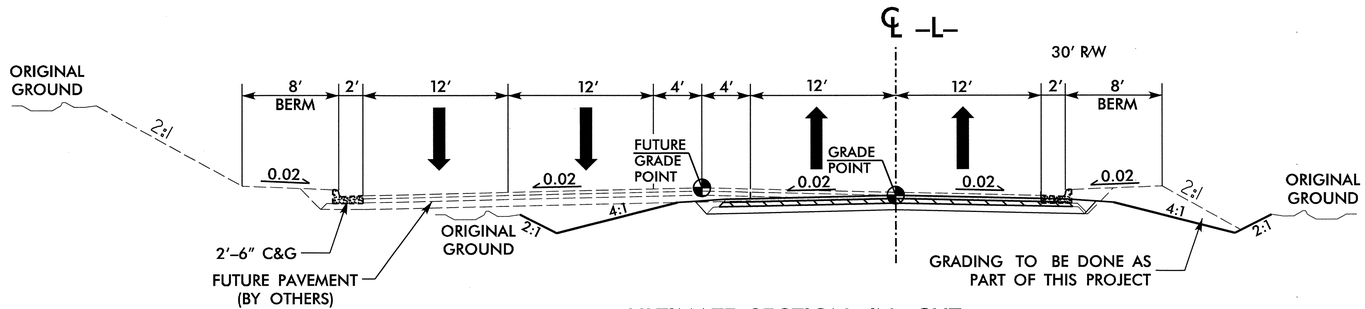
REGISTERED ENGINEER
10/17/2011



ULTIMATE SECTION IN FILL

TYPICAL SECTION FOR INFORMATION ONLY
(ULTIMATE BUILDOUT BY OTHERS)
–L– STA. 6+00.00 TO –L– STA. 25+00.00

(NOT IN CONTRACT)



ULTIMATE SECTION IN CUT

TYPICAL SECTION FOR INFORMATION ONLY
(ULTIMATE BUILDOUT BY OTHERS)
–L– STA. 6+00.00 TO –L– STA. 25+00.00

(NOT IN CONTRACT)

REVISIONS

10/17/2011
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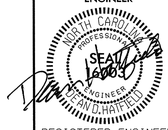
NOT TO SCALE

PROJECT REFERENCE NO.	SHEET NO.
U-5204	2C
R/W SHEET NO.	

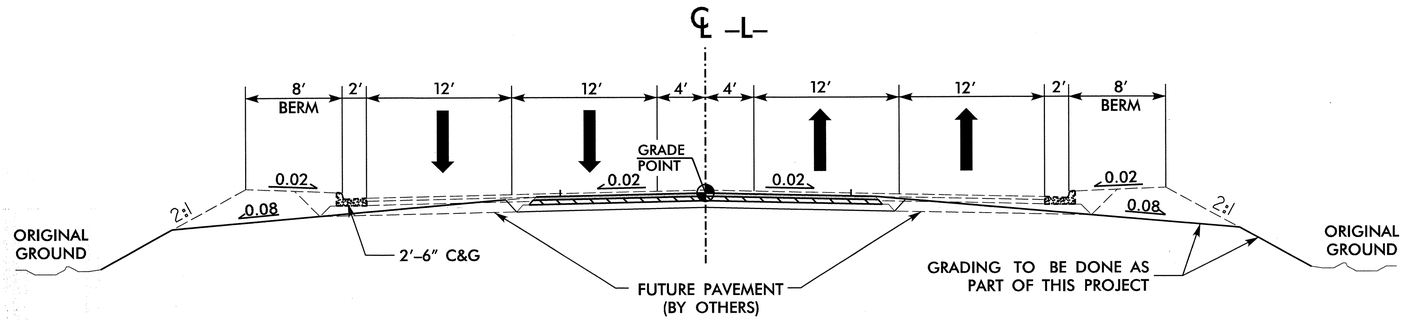
ROADWAY DESIGN ENGINEER



REGISTERED ENGINEER
10/17/2011

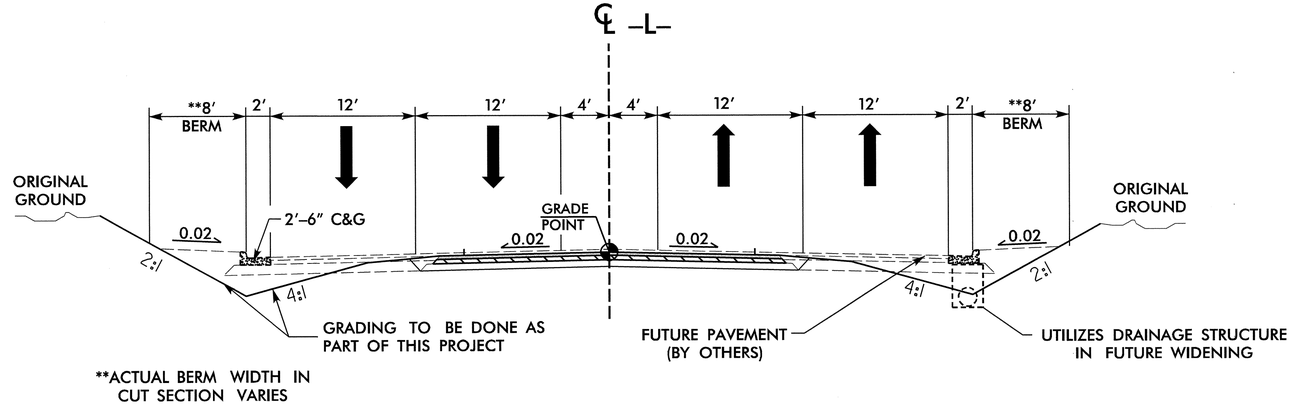
PAVEMENT DESIGN ENGINEER

REGISTERED ENGINEER
10/17/2011



ULTIMATE SECTION IN FILL

TYPICAL SECTION FOR INFORMATION ONLY
(ULTIMATE BUILDOUT BY OTHERS)
–L– STA. 25+00.00 TO –L– STA. 71+00.00



**ACTUAL BERM WIDTH IN CUT SECTION VARIES

ULTIMATE SECTION IN CUT

TYPICAL SECTION FOR INFORMATION ONLY
(ULTIMATE BUILDOUT BY OTHERS)
–L– STA. 25+00.00 TO –L– STA. 71+00.00

REVISIONS

10/17/2011
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PROJECT REFERENCE NO.	SHEET NO.
U-5204	2D
RW SHEET NO.	

NOT TO SCALE

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 16003 ENGINEER DEAN D. HATFIELD — REGISTERED ENGINEER 10/20/2011

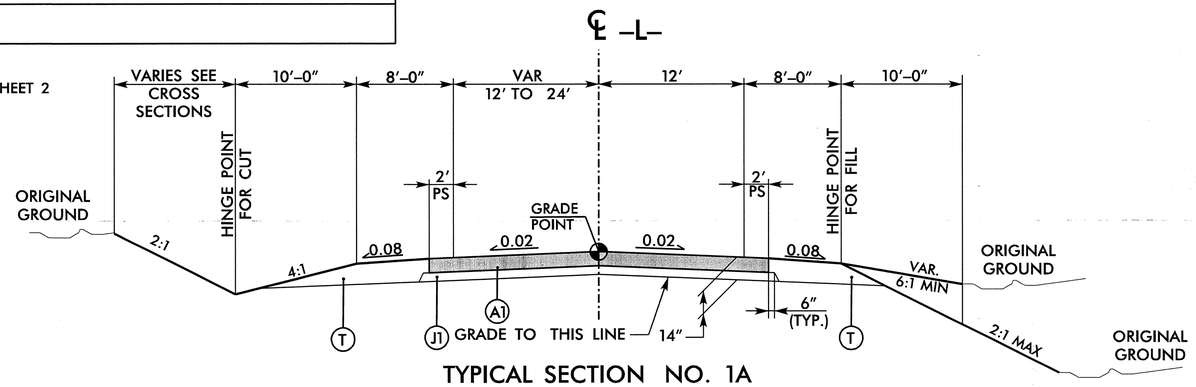
PAVEMENT DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 16003 ENGINEER DEAN D. HATFIELD — REGISTERED ENGINEER 10/20/2011

ALTERNATE PAVEMENT DESIGN

ALTERNATE PAVEMENT SCHEDULE

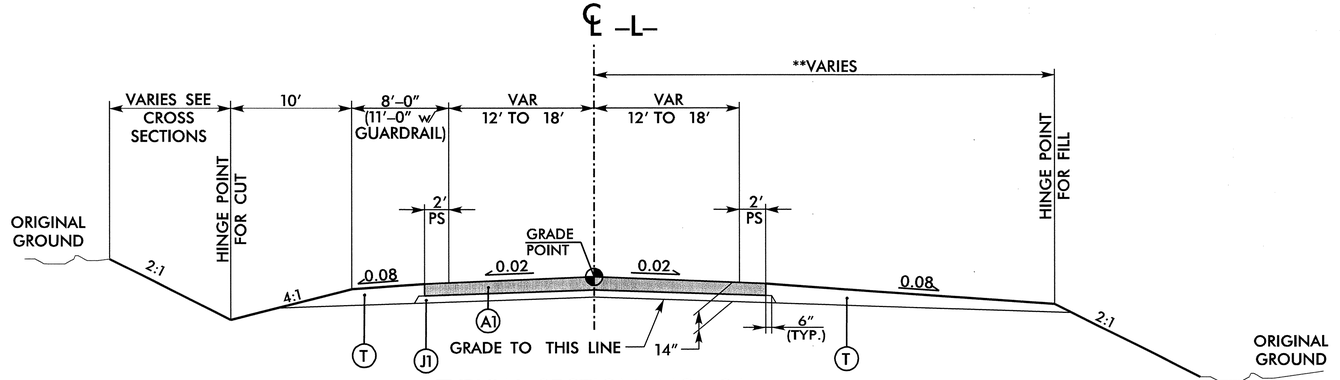
ITEM	DESCRIPTION
(A1)	8.0" Portland Cement Concrete Pavement (W/Dowels)
(J1)	Prop. Approx 6.0" Aggregate Base Course
(T)	Earth Material

NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS OTHERWISE INDICATED.
FOR TIE-IN DETAILS, PAVEMENT DESIGN & TYPICAL SECTIONS, SEE SHEET 2



TYPICAL SECTION NO. 1A

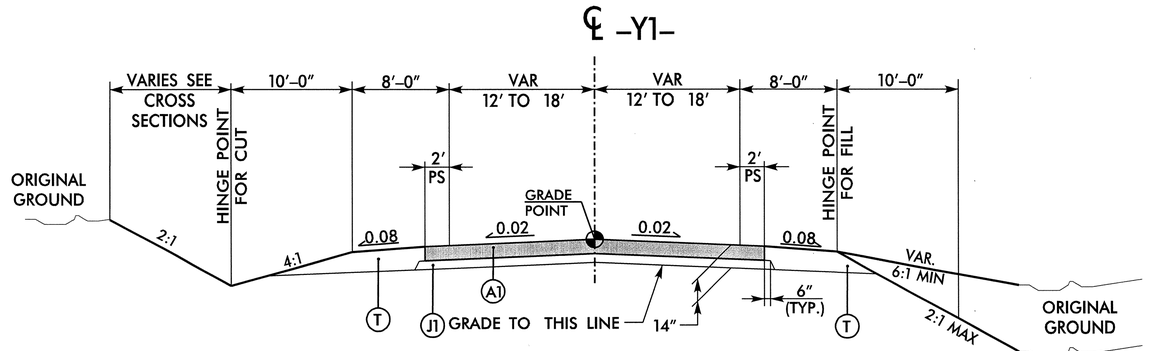
USE TYPICAL SECTION No. 1 AS FOLLOWS:
–L– STA. 8+00.00 TO –L– STA. 25+25.00



TYPICAL SECTION NO. 2A

USE TYPICAL SECTION No. 2 AS FOLLOWS:
–L– STA. 25+25.00 TO –L– STA. 37+78.00 BEGIN BRIDGE
–L– STA. 38+78.26 END BRIDGE TO –L– STA. 69+75.00

**CONSTRUCT ADDITIONAL SHOULDER WIDTH TO ACCOMMODATE ULTIMATE BUILDOUT IN FILL SECTIONS ONLY (SEE CROSS-SECTIONS)



TYPICAL SECTION NO. 3A

USE TYPICAL SECTION No. 3 AS FOLLOWS:
–Y1– STA. 14+00.00 TO –Y1– STA. 22+03.14 BEGIN BRIDGE
–Y1– STA. 22+95.40 END BRIDGE TO –Y1– STA. 37+86.19

THE LOUIS BERGER GROUP, Inc.
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REVISIONS

NOT TO SCALE

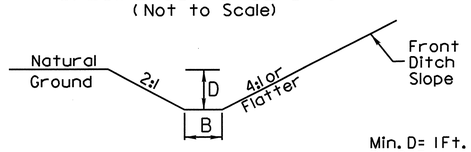
PROJECT REFERENCE NO.	SHEET NO.
U-5204	2E
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 16005 ENGINEER BRIAN D. HATFIELD — REGISTERED ENGINEER 10/17/2011

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 16005 ENGINEER BRIAN D. HATFIELD — REGISTERED ENGINEER 10/17/2011

REVISIONS

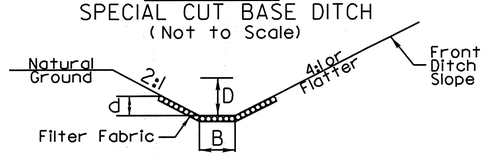
DETAIL 1
SPECIAL CUT BASE DITCH
(Not to Scale)



Min. D= 1Ft.
B= 2 Ft.

STA. 56+50 TO 58+50 RT –L–
STA. 59+00 TO 60+00 RT –L–

DETAIL 2
SPECIAL CUT BASE DITCH
(Not to Scale)

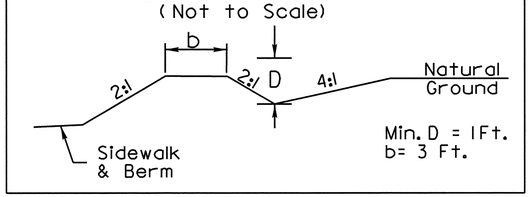


Min. D = 1.5 Ft.
Max. d= 1Ft.
B= 2 Ft.

Type of Liner= Class B Rip-Rap

STA. 35+70 TO 37+65 LT –Y1–

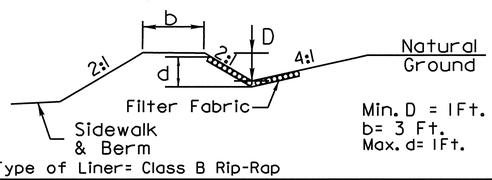
DETAIL 3
BERM 'V' DITCH
(Not to Scale)



Min. D = 1Ft.
b= 3 Ft.

STA. 30+00 TO 33+00 RT –L–
STA. 33+00 TO 33+80 RT –L–
STA. 62+50 TO 67+25 RT –L–
STA. 27+50 TO 32+00 LT –Y1–

DETAIL 4
BERM 'V' DITCH
(Not to Scale)

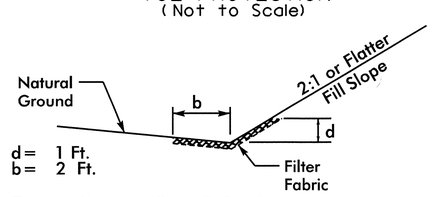


Min. D = 1Ft.
b= 3 Ft.
Max. d= 1Ft.

Type of Liner= Class B Rip-Rap

STA. 28+95 TO 30+00 RT –L–
STA. 53+50 TO 56+00 RT –L–
STA. 60+50 TO 62+50 RT –L–
STA. 32+00 TO 35+25 LT –Y1–

DETAIL 5
TOE PROTECTION
(Not to Scale)

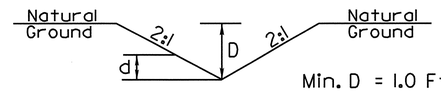


d= 1 Ft.
b= 2 Ft.

Type of Liner= Class B Rip–Rap

STA. 20+00 TO 20+85 RT –L–
STA. 40+50 TO 42+50 RT –L–
STA. 49+00 TO 51+50 RT –L–
STA. 54+75 TO 55+50 LT –L–
STA. 14+50 TO 17+50 LT –Y1–

DETAIL 6
TAIL DITCH
(Not to Scale)



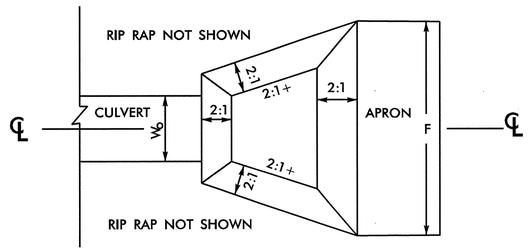
Min. D = 1.0 Ft.
Max. d = 2.0 Ft.

STA. 9+35 TO 10+00 LT –L–

DETAIL 7
RIP-RAPPED ENERGY DISSIPATOR BASIN

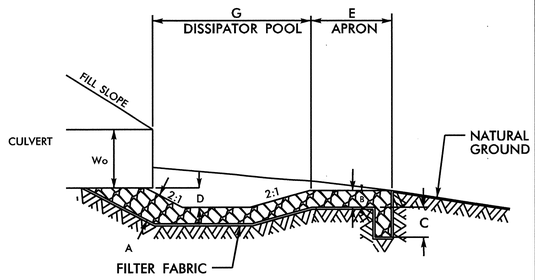
DIM. (ft)	RIP RAP BASIN #		
	1	–	–
A	2.0	–	–
B	1.5	–	–
C	1.5	–	–
D	2.0	–	–
E	3.0	–	–
F	8.5	–	–
G	8.0	–	–

ALL DIMENSIONS APPROXIMATE



PLAN

BASIN #	LOCATION (AT OUTLET)
1	STA 36+37 LT. –L–
–	–
–	–

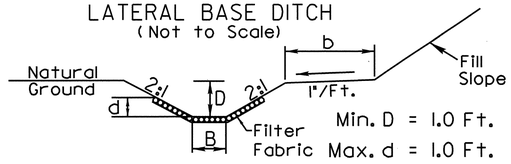


℄ SECTION

7/08

STA. 36+40 LT –L–

DETAIL 8
LATERAL BASE DITCH
(Not to Scale)

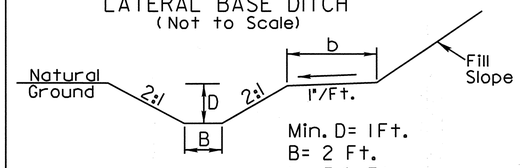


Min. D = 1.0 Ft.
Max. d = 1.0 Ft.
B = 2.0Ft.
b = 5.0 Ft.

Type of Liner = Class B or Class 1Rip Rap
(See Plan Sheet)

STA. 19+60 TO 21+00 LT –L–
STA. 20+85 TO 22+00 RT –L–
STA. 27+00 TO 28+45 LT –L–
STA. 27+00 TO 28+95 RT –L–
STA. 35+25 TO 36+35 LT –L–
STA. 41+00 TO 42+50 LT –L–
STA. 58+65 TO 60+00 LT –L–
STA. 67+50 TO 70+30 LT –L–
STA. 14+75 TO 16+00 RT –Y1–

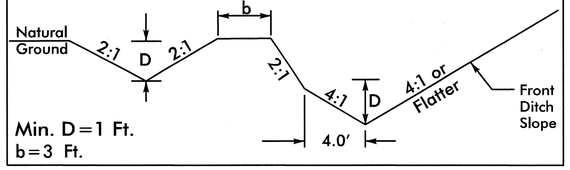
DETAIL 9
LATERAL BASE DITCH
(Not to Scale)



Min. D= 1Ft.
B= 2 Ft.
b= 5.0 Ft.

STA. 58+50 TO 59+00 RT –L–

DETAIL 11
SPECIAL CUT DITCH w/HINGE
(Not to Scale)



Min. D=1 Ft.
b=3 Ft.

FROM STA. 26+00 TO STA. 27+50 LT –Y1–

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PROJECT REFERENCE NO.	SHEET NO.
U-5204	2F
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 16006 ENGINEER JEAN D. HATFIELD

REGISTERED ENGINEER
10/17/2011

REVISIONS

10/17/2011
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INTERSECTION DETAIL OF –L–

0 50 100

NAD 83

5+00

10+00

15+00

+92.98 –L– 24.00' LT
+25.00 –L– 12.00' LT
+50.00 –L– 24.00' LT
+50.24 –L– 12.00' LT
+28.52 –L– 41.46' LT
+54.24 –L– 20.17' LT
+64.80 –L– 8.58' LT
+17.85 –L– 79.09' LT
36' DWY
+53.29 –L– 78.60' LT
+78.15 –L– 24.00' LT
+03.54 –L– 24.00' LT
+55.12 –L– 10.75' LT
+00.00 –L– 12.00' LT
+00.00 –L– 0.00' RT
+25.00 –L– 0.65' RT
24' DWY
+65.13 –L– 2.20' RT
+04.13 –L– 12.00' RT
12' DWY
+67.04 –L– 12.00' RT
+55.00 –L– 0.00' RT
+18.92 –L– 12.00' RT
17' DWY
+58.46 –L– 12.00' RT

R=25' R=5.4' R=10'

2' P.S. 12 12 2' P.S.

S 76° 59' 34.0" E
S 75° 01' 11.1" E
–L–

BEGIN PROJECT
–L– POT 6+00.00

BEGIN CURB & GUTTER

END CURB & GUTTER

–L– PT Sta. 7+25.80

–L– PC Sta. 9+31.36

–L– PT Sta. 11+03.54

–L– PC Sta. 3+50.00

SEE SHEET 4 & 5 FOR PLAN

INTERSECTION DETAIL OF –L–

NAD 83

–L– POT 48+00.00

150' LANE STORAGE
+87.01 –L–
65.98' LT

28'

50+00

250' UNIFORM TAPER

45:1

+87.01 –L– 18.00' LT
+87.01 –L– 6.00' LT
+87.01 –L– 4.00' LT
+87.01 –L– 0.00' LT
+87.01 –L– 0.00' RT
+87.01 –L– 18.00' RT
+87.01 –L– 6.00' RT
+87.01 –L– 70.37' RT

R=50'

50' 50'

2' P.S. 12 12 2' P.S.

GRAU 350

N 72° 10' 22.2" E

+35.91

20.84' (Typ.)

–L– PC 45+33.25

–L– POT 48+00.00

–L– PT 50+79.36

+76.70

SEE SHEET 7 FOR PLAN

THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

PROJECT REFERENCE NO.	SHEET NO.
U-5204	2G
R/W SHEET NO.	

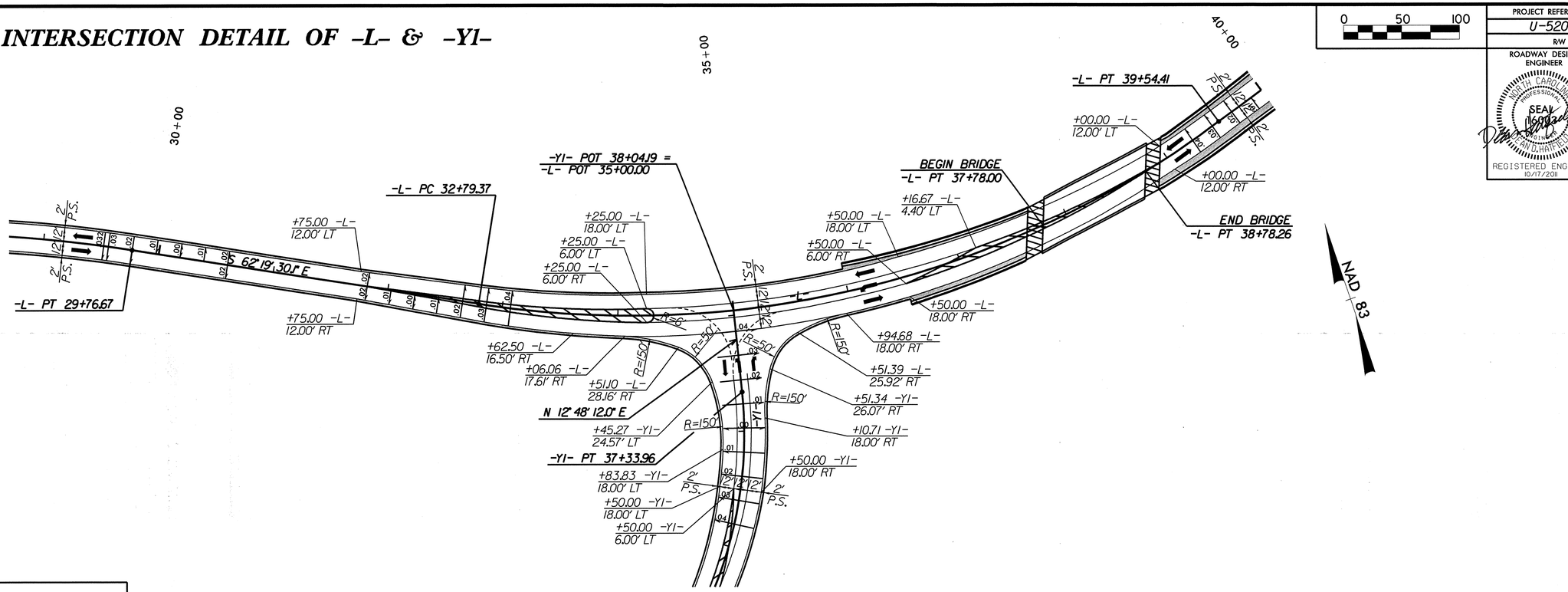
ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 16002 ENGINEER DAN D. HATFIELD

REGISTERED ENGINEER
10/17/2011

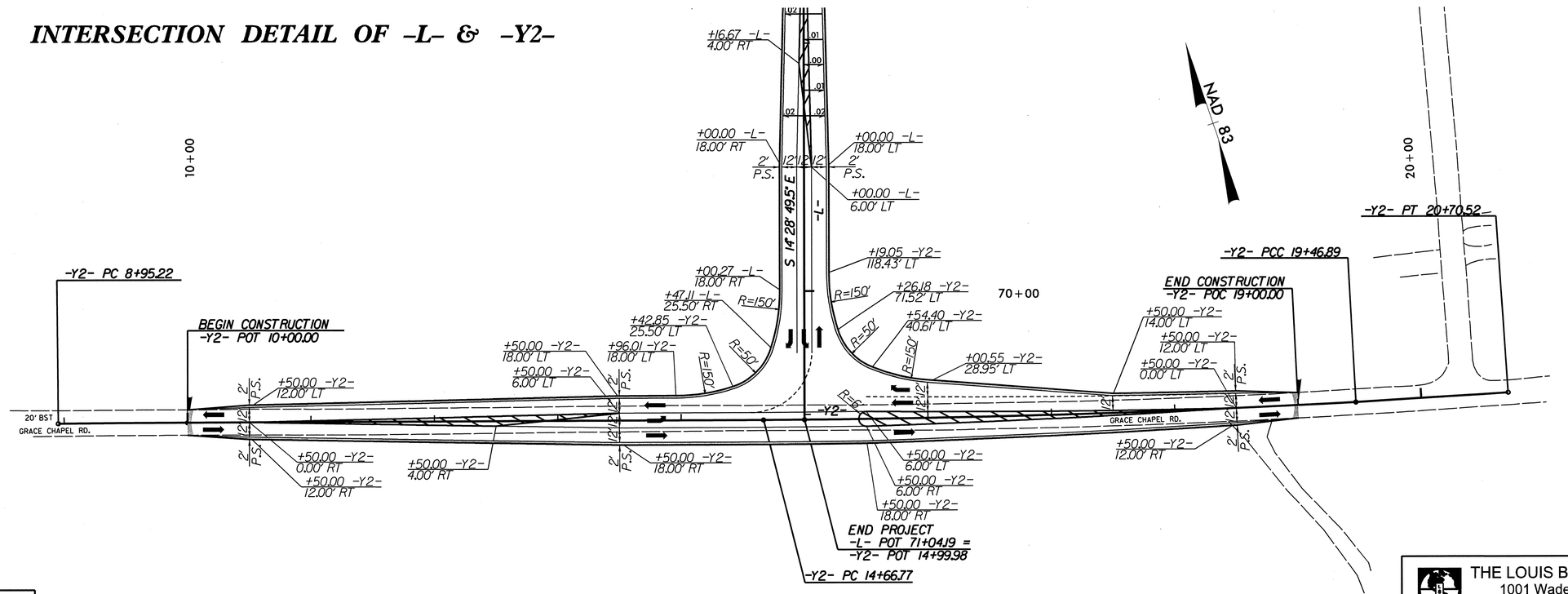
0 50 100

INTERSECTION DETAIL OF –L– & –Y1–



SEE SHEET 6 FOR PLAN

INTERSECTION DETAIL OF –L– & –Y2–



SEE SHEET 9 FOR PLAN

THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

REVISIONS

10/17/2011
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PROJECT REFERENCE NO.	SHEET NO.
U-5204	2H
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 16002 ENGINEER DUAN D. HATFIELD

REGISTERED ENGINEER
10/20/2011

REVISIONS

10/20/2011
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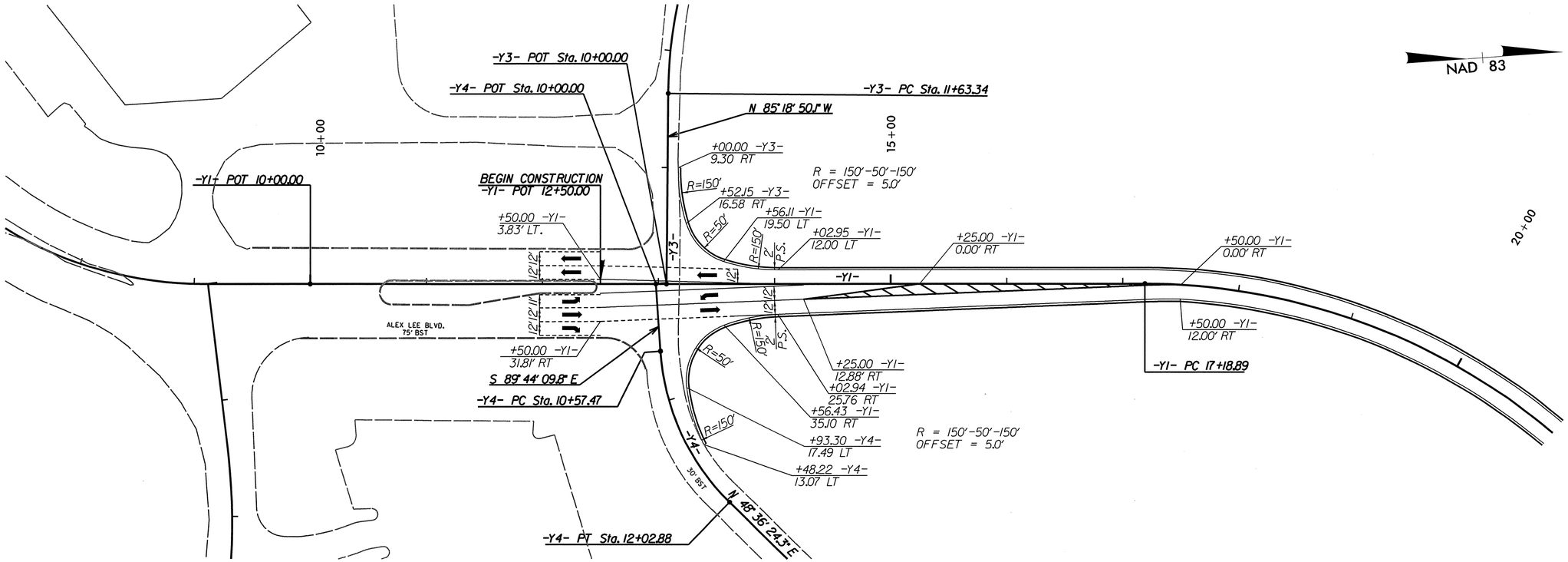
INTERSECTION DETAIL OF –Y1–



THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

NOT TO SCALE

PROJECT REFERENCE NO.	SHEET NO.
U-5204	21
R/W SHEET NO.	

REVISIONS

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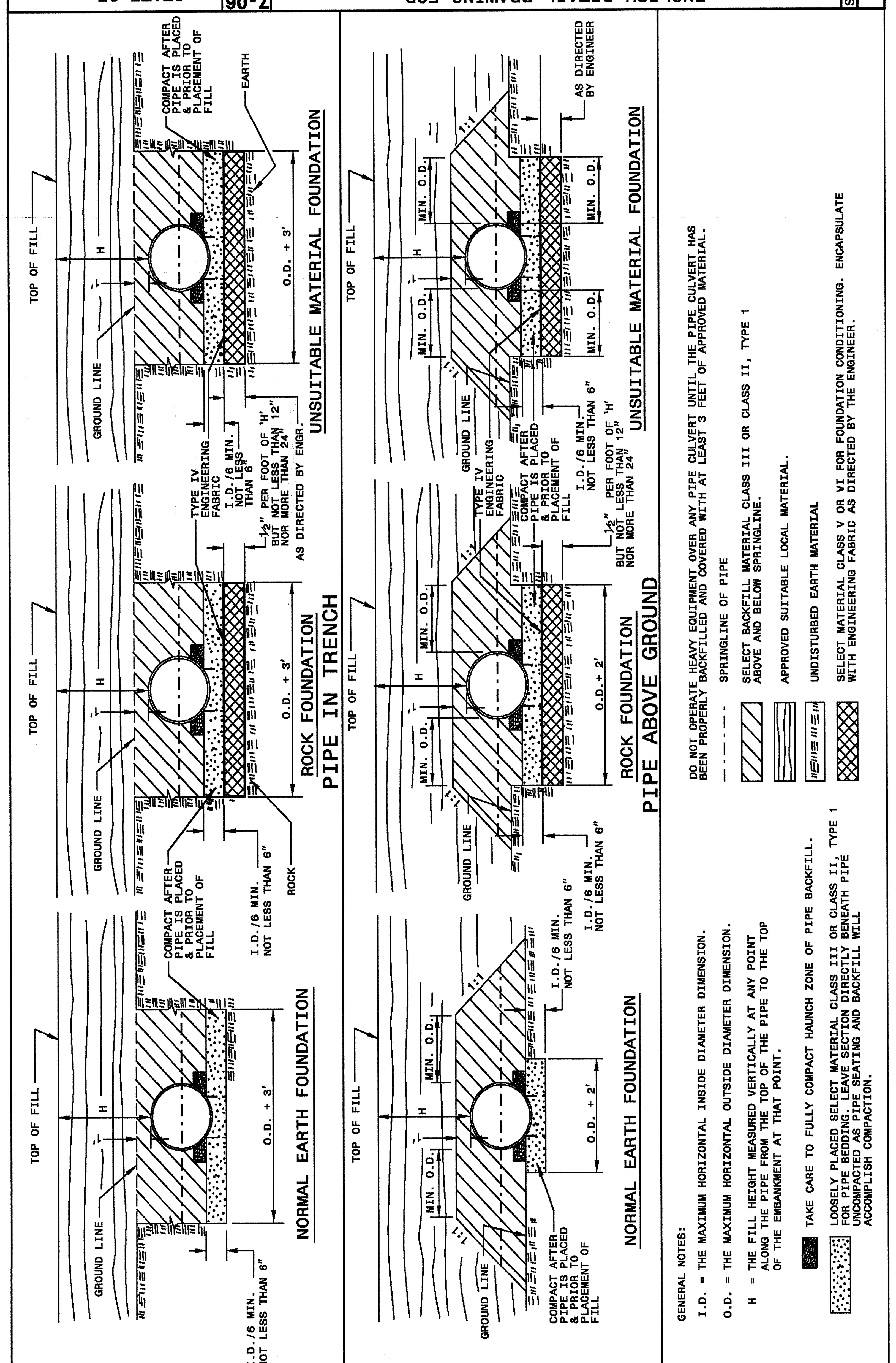
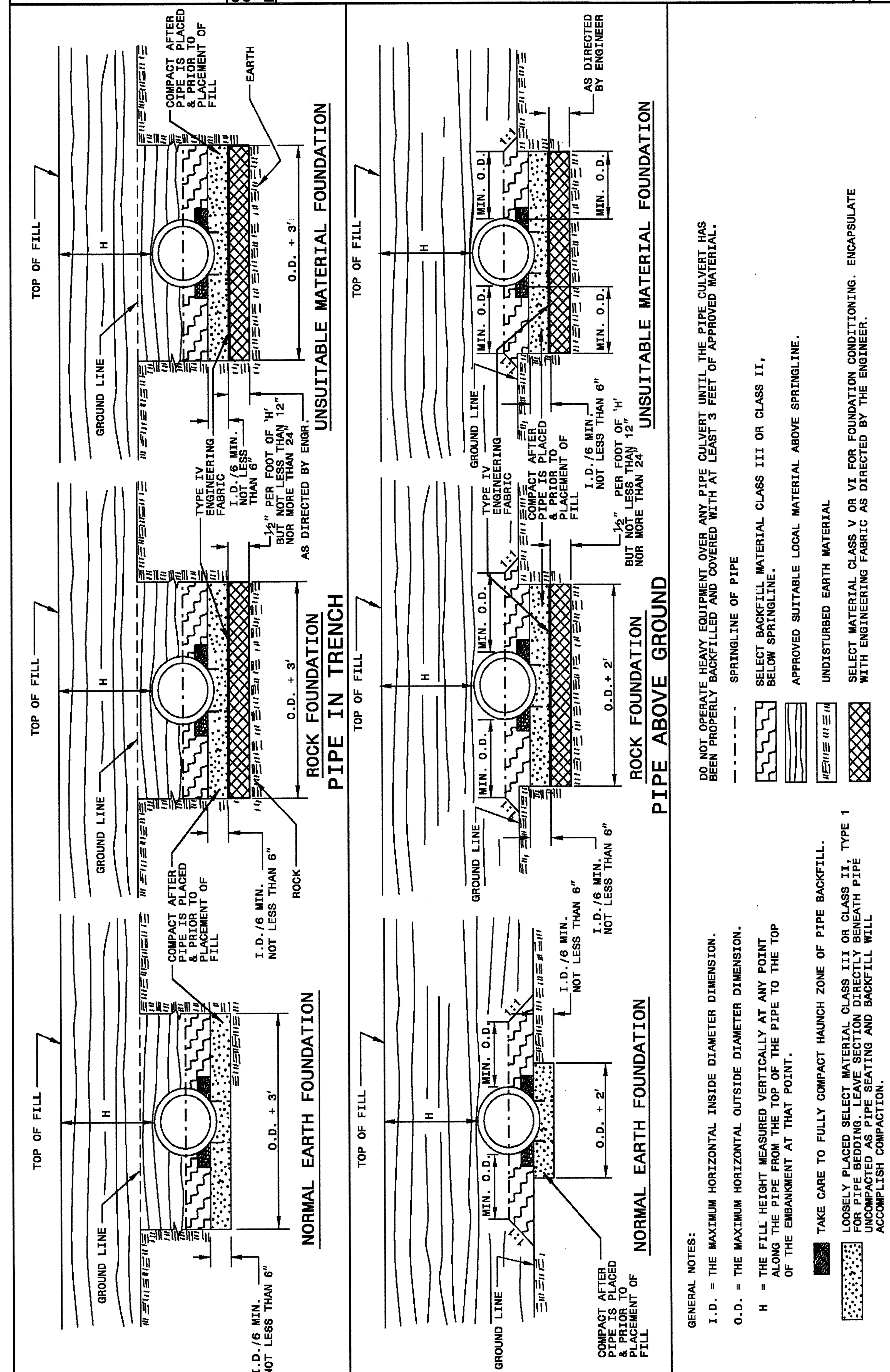


STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C. 7-06	ENGLISH DETAIL DRAWING FOR **METHOD OF PIPE INSTALLATION** FLEXIBLE PIPE	SHEET 1 OF 3 300D01



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	SHEET 2 OF 3 300D01

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER
10/26/11

THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

REVISIONS

ENGLISH DETAIL DRAWING FOR METHOD OF PIPE INSTALLATION

FILL HEIGHT TABLES

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

7-06

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

ENGLISH DETAIL DRAWING FOR METHOD OF PIPE INSTALLATION
FILL HEIGHT TABLES
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
7-06
SHEET 3 OF 3 — 300D01

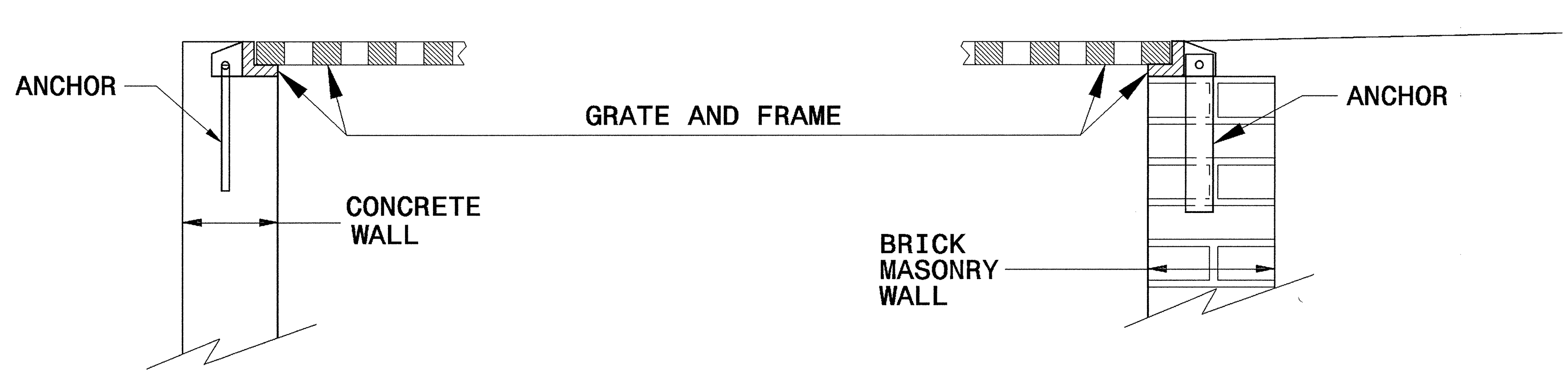
ENGLISH STANDARD DRAWING FOR ANCHORAGE FOR FRAMES

BRICK OR CONCRETE

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

7-06

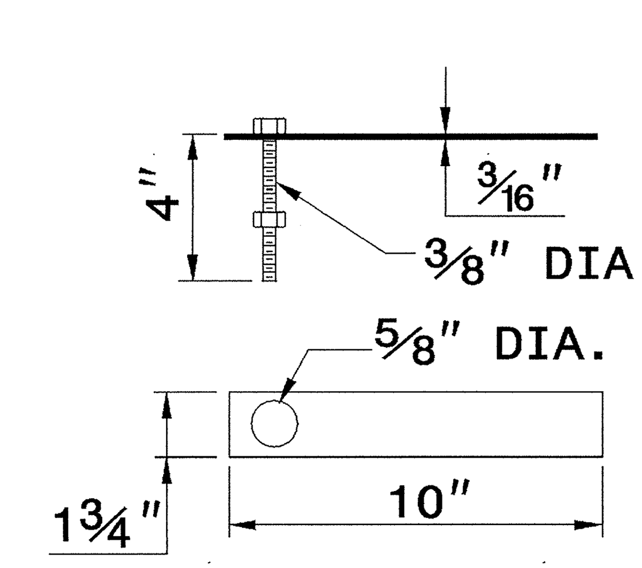
SHEET 1 OF 1 — 840.25



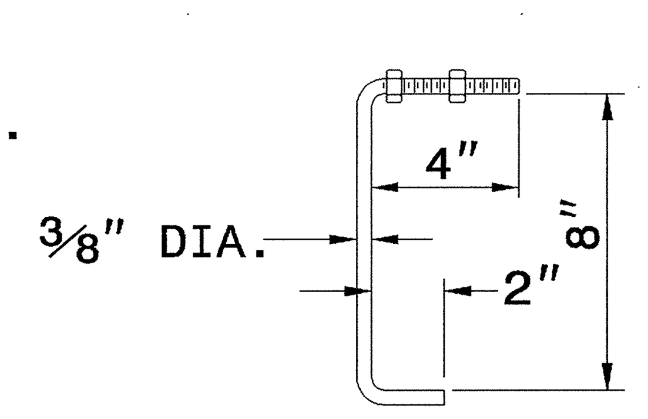
CONCRETE CONSTRUCTION **BRICK MASONRY CONSTRUCTION**

DETAIL SHOWING ANCHORAGE OF FRAME FOR GRATED DROP INLET

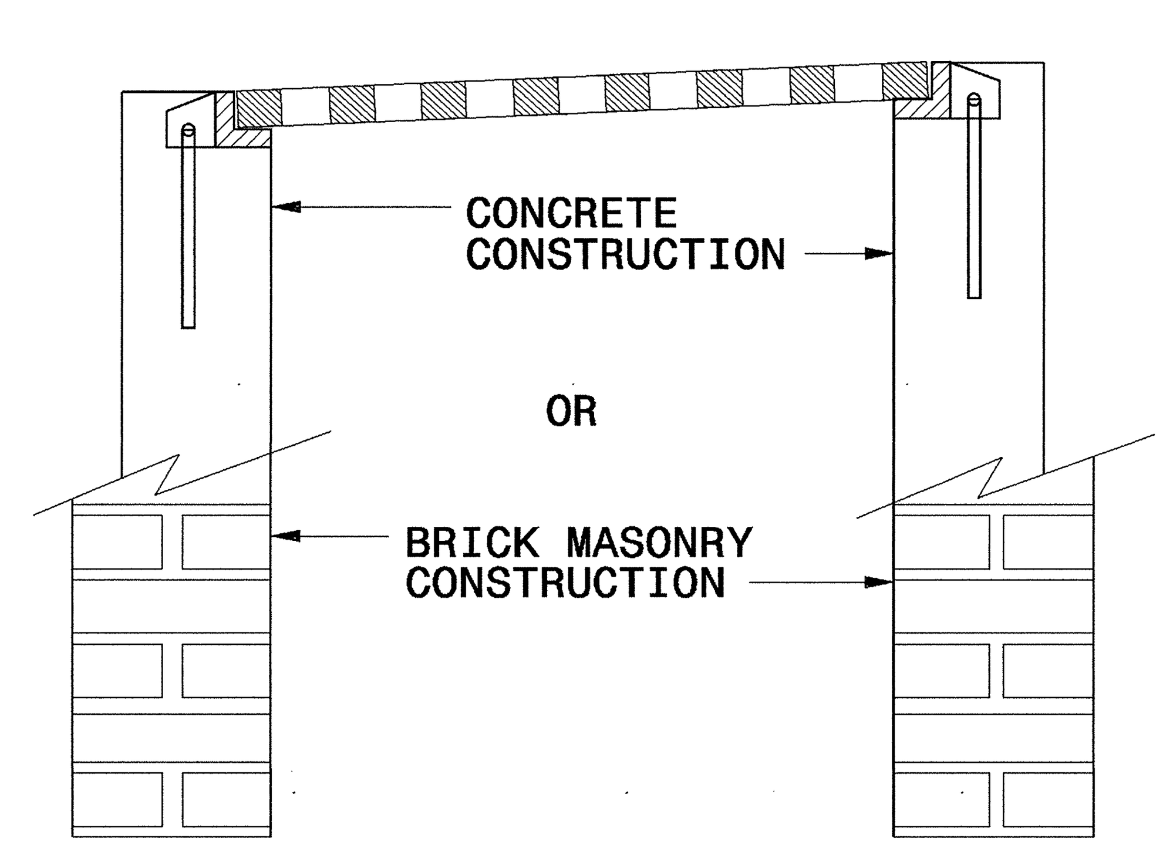
NOTE:
CONSTRUCT GRATED DROP INLET TO COINCIDE WITH NORMAL OR SUPERELEVATED SHOULDER OR PAVEMENT SLOPE.



MASONRY ANCHOR
3/8" DIA. BOLT WITH PLATE



CONCRETE ANCHOR
3/8" DIA. BENT BAR



FRAME AND GRATE INSTALLATION FOR NORMAL CROWN AND SUPERELEVATED SECTIONS

ENGLISH STANDARD DRAWING FOR ANCHORAGE FOR FRAMES
BRICK OR CONCRETE
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.
7-06
SHEET 1 OF 1 — 840.25

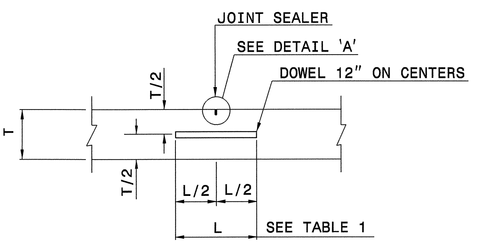
NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER
10/26/11

THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

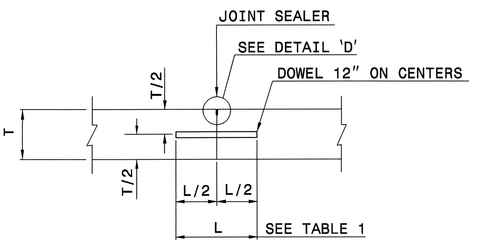
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
CONCRETE PAVEMENT JOINTS
CONSTRUCTION AND CONTRACTION JOINTS

SHEET 1 OF 2
700D01

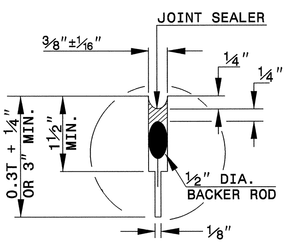


TRANSVERSE CONTRACTION JOINT

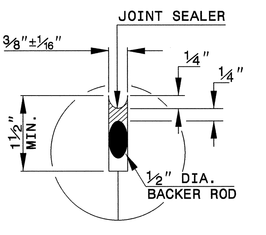


PLANNED TRANSVERSE CONSTRUCTION JOINT

GENERAL NOTES:
- -FORM TRANSVERSE CONTRACTION JOINTS BY SAWING WITH APPROVED EQUIPMENT.
- -SPACE TRANSVERSE CONTRACTION JOINTS AT INTERVALS OF 15'.
- -USE A DOWEL ASSEMBLY OR OTHER APPROVED DOWEL INSERTION TECHNIQUE IN ALL TRANSVERSE CONTRACTION JOINTS. DOWEL ASSEMBLIES ARE COVERED IN DETAIL 700D03.
- -PROVIDE SMOOTH DOWEL BARS. PROVIDE DEFORMED TIE BARS.
- -WHEN UTILIZING AN EARLY ENTRY SAW, CUT THE JOINT TO A MINIMUM DEPTH OF 3".



DETAIL 'A'



DETAIL 'D'

TABLE I - DOWEL BARS		
SLAB THICKNESS	DOWEL BAR "D"	DOWEL LENGTH "L"
8" OR LESS	1"	14"
8½" TO 9½"	1⅛"	16"
10" TO 10½"	1¼"	18"
11" AND ABOVE	1½"	18"

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

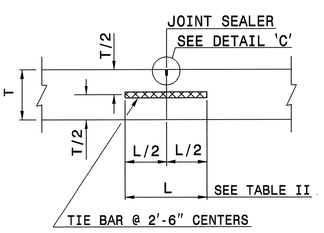
ENGLISH DETAIL DRAWING FOR
CONCRETE PAVEMENT JOINTS
CONSTRUCTION AND CONTRACTION JOINTS

SHEET 1 OF 2
700D01

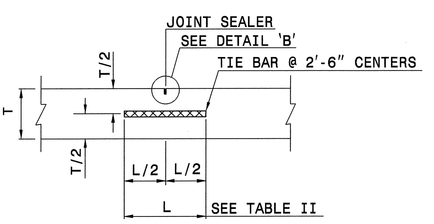
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
CONCRETE PAVEMENT JOINTS
CONSTRUCTION AND CONTRACTION JOINTS

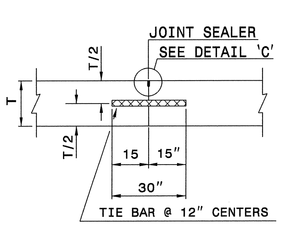
SHEET 2 OF 2
700D01



LONGITUDINAL CONSTRUCTION JOINT

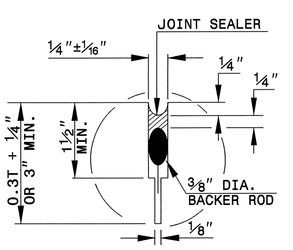


LONGITUDINAL JOINT

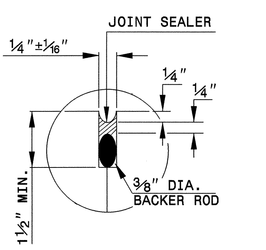


EMERGENCY TRANSVERSE CONSTRUCTION JOINT

GENERAL NOTES:
- -CONSTRUCT TRANSVERSE CONSTRUCTION JOINTS AT THE END OF EACH DAY'S OPERATION (PLANNED JOINT) OR WHEN THE PLACING OF CONCRETE IS SUSPENDED FOR MORE THAN 30 MINUTES (EMERGENCY JOINT).
- -USE AN APPROVED HEADER AT EMERGENCY JOINTS STD. DWG. 700.04 AND DESIGNED TO PERMIT THE PLACEMENT OF AND CORRECTLY HOLD IN PLACE TIE BARS.
- -USE TIE BARS OF THE SAME DIAMETER AS DOWEL BARS FOR EMERGENCY TRANSVERSE CONSTRUCTION JOINTS.
- -LOCATE PLANNED TRANSVERSE CONSTRUCTION JOINTS AT THE SPACING REQUIRED FOR CONTRACTION JOINTS. USE AN APPROVED METHOD OF INSTALLING DOWELS IN ALL PLANNED TRANSVERSE CONSTRUCTION JOINTS.
- -DO NOT LOCATE EMERGENCY TRANSVERSE CONSTRUCTION JOINTS LESS THAN 6' FROM ANY CONTRACTION JOINT OR PLANNED CONSTRUCTION JOINT.
- -DO NOT PLACE TIE BARS IN LONGITUDINAL JOINTS WITHIN 1'-4" OF A TRANSVERSE JOINT.
- -WHEN UTILIZING AN EARLY ENTRY SAW, CUT THE JOINT TO A MINIMUM DEPTH OF 3".



DETAIL 'B'



DETAIL 'C'

TABLE II - LONGITUDINAL TIE BARS		
SLAB THICKNESS	TIE BAR DIA. "D"	TIE BAR LENGTH "L"
8½" OR LESS	½"	30"
9" OR ABOVE	⅝"	30"

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

ENGLISH DETAIL DRAWING FOR
CONCRETE PAVEMENT JOINTS
CONSTRUCTION AND CONTRACTION JOINTS

SHEET 2 OF 2
700D01

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

SEE PLATE FOR TITLE

ORIGINAL BY: 2002 STANDARDS DATE: 01-15-02
MODIFIED BY: E.E. WARD DATE: 09-26-06
CHECKED BY:
FILE SPEC.: stds/06stdstodetails/english/700d01.dgn

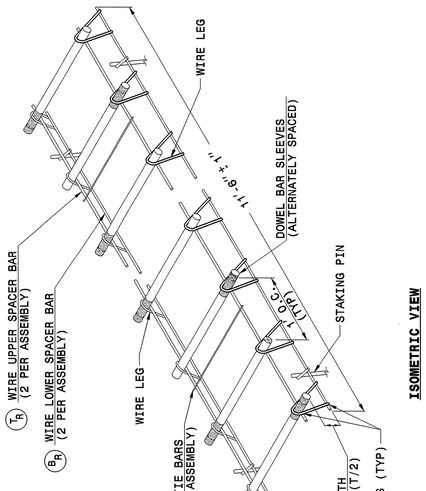
PROJECT REFERENCE NO. U-5204
SHEET NO. 2K

PROJECT REFERENCE NO.	SHEET NO.
U-5204	2L

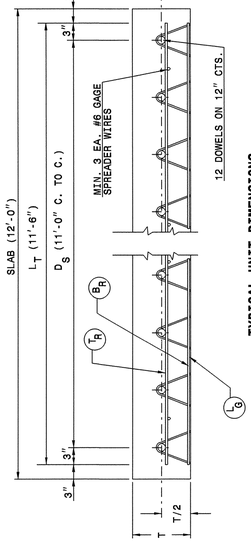
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
DOWEL ASSEMBLY

SHEET 1 OF 2 **700D03**



ISOMETRIC VIEW

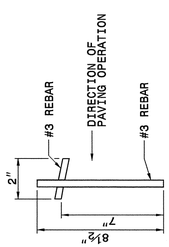


TYPICAL UNIT DIMENSIONS

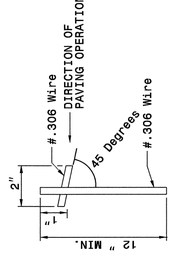
DIMENSION VARIES WITH PAVEMENT THICKNESS (T/2)

WELDS (TYP)

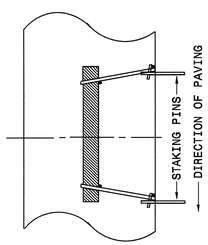
GENERAL NOTES:
- -USE RIGID CONSTRUCTED DOWEL ASSEMBLY CAPABLE OF HOLDING THE DOWEL BAR IN PROPER POSITION DURING PLACMENT OF CONCRETE AND DESIGNED AS TO PERMIT UNRESTRICTED MOVEMENT OF THE SLAB. USE DOWEL ASSEMBLY APPROVED BY THE ENGINEER PRIOR TO USE.
- -USE DOWEL ASSEMBLIES MANUFACTURED WITH DOWELS ALTERNATELY WELDED TO FRAME MEMBERS.
- -USE STAKING PIN OR APPROVED ALTERNATE.
- -SAW CUT EPOXY COATED DOWELS. BUFFING AS NECESSARY TO FACILITATE PROPER WELDING OF THE DOWEL TO THE ASSEMBLY FRAME. TOUCH UP OF THE BUFFED AREA WILL NOT BE REQUIRED.
- -RESISTANCE WELD FRAME MEMBERS; DOWELS AND SPREADER WIRES MAY BE ARC WELDED. WELD IN ACCORDANCE WITH AWS WELDING CODE.
- -FULLY DIP THE DOWEL ASSEMBLIES TO ASSURE A COMPLETE COATING OF WAX.
- -SEE DETAIL 700D01 FOR DOWEL BAR SIZES.



STAKING PIN
(MIN. 8 PER BASKET)



STAKING PIN ALTERNATE
(MIN. 8 PER BASKET)



SLAB THICKNESS	"V" LEG ONLY WIRE GAGE		
	T_R	B_R	L_G
8" OR LESS	2	2	2
8½" - 10"	0	2	2
10½" & ABOVE	2/0's	2/0's	2/0's

STATE OF
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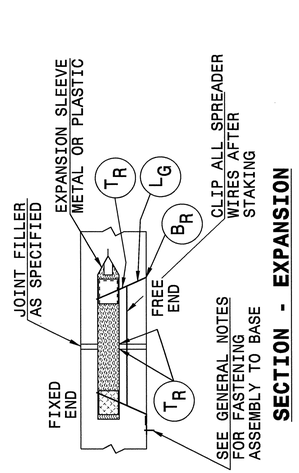
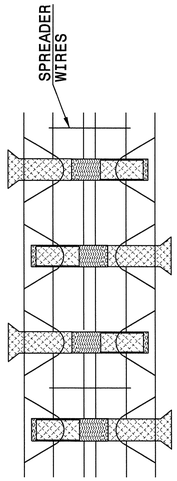
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
DOWEL ASSEMBLY

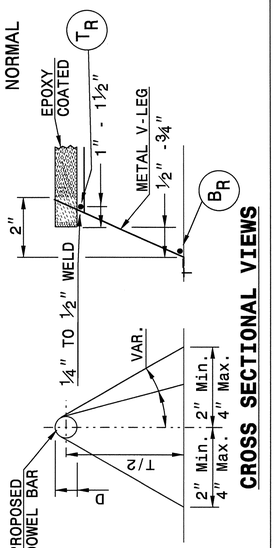
SHEET 2 OF 2 **700D03**



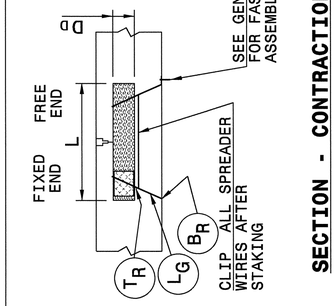
SECTION - EXPANSION



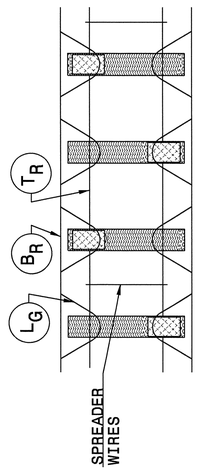
PARTIAL PLAN EXPANSION
NORMAL



CROSS SECTIONAL VIEWS



SECTION - CONTRACTION



PARTIAL PLAN CONTRACTION
NORMAL

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

SEE PLATE FOR TITLE

ORIGINAL BY: 2002 STANDARDS DATE: 01-15-02
MODIFIED BY: E.E. WARD DATE: 12-15-05
CHECKED BY: DATE:
FILE SPEC.: stds/02stdstodetails/english/700d01.dgn

26-OCT-2011 15:29
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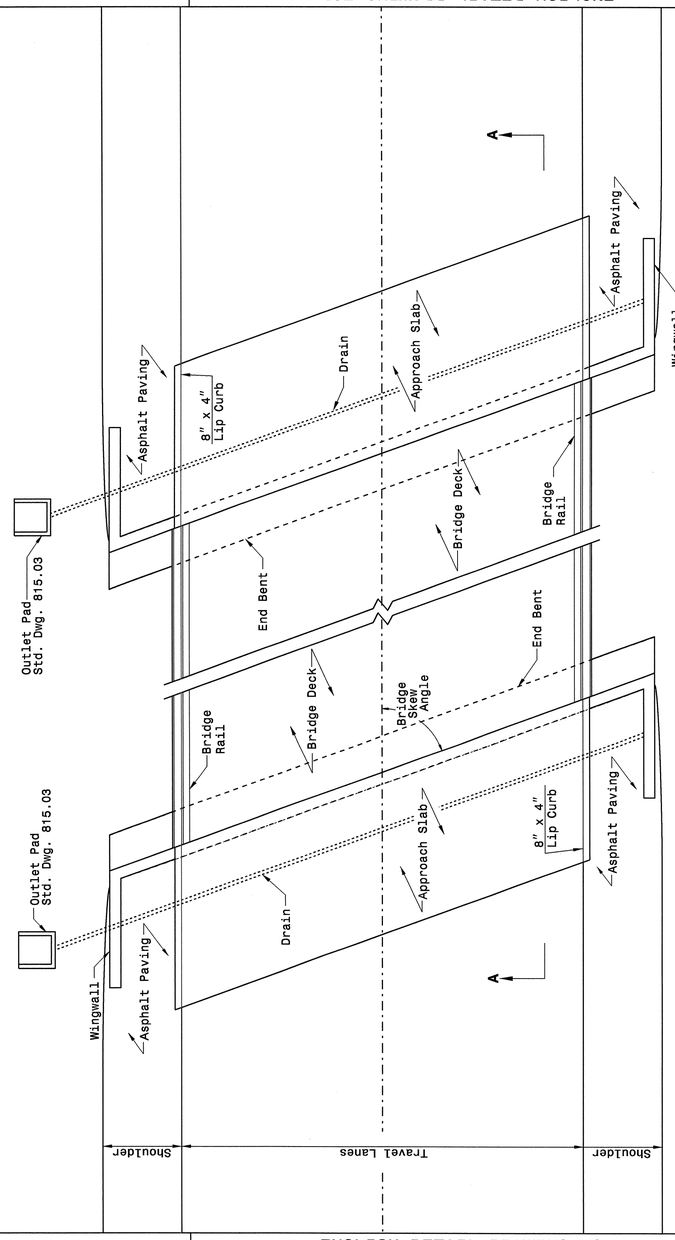
PROJECT REFERENCE NO.	SHEET NO.
U-5204	2-M

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

ENGLISH DETAIL DRAWING FOR
BRIDGE APPROACH FILLS
SUB REGIONAL TIER

SHEET 1 OF 2
422D11

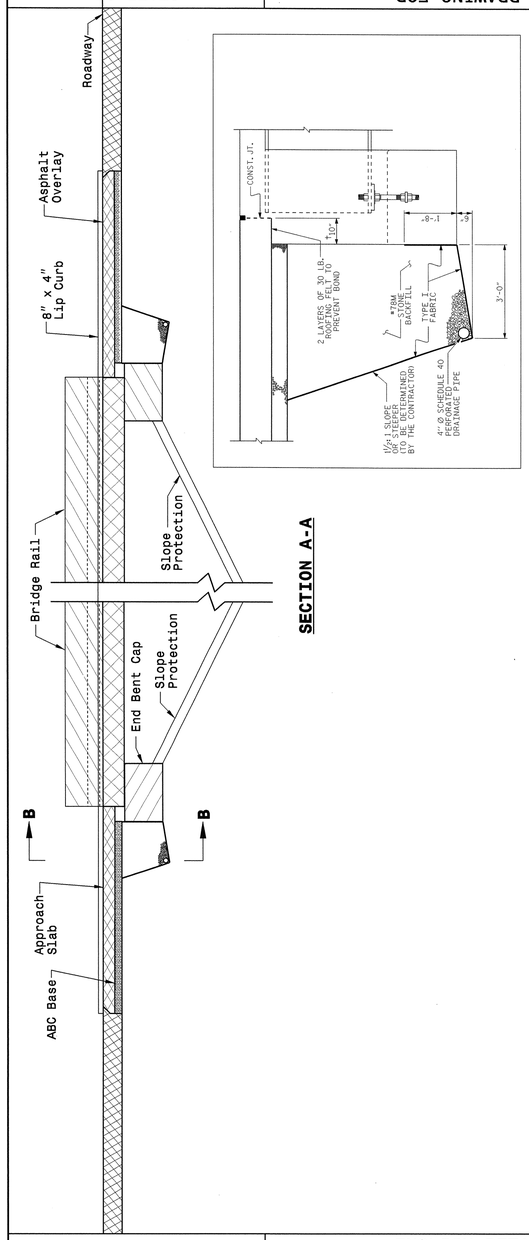


PLAN VIEW
12' APPROACH SLAB

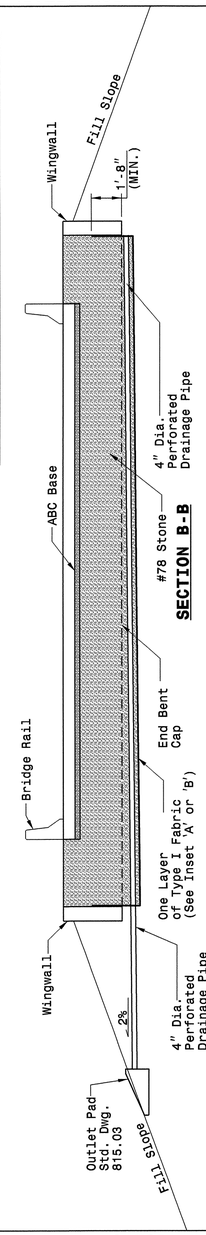
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
BRIDGE APPROACH FILLS
SUB REGIONAL TIER

SHEET 2 OF 2
422D11



SECTION A-A



SECTION B-B

12' APPROACH SLAB

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

ENGLISH DETAIL DRAWING FOR
BRIDGE APPROACH FILLS
SUB REGIONAL TIER

SHEET 2 OF 2
422D11

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER K. A. KEMPF
12/6/11

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

BRIDGE APPROACH FILLS

SUB REGIONAL TIER

ORIGINAL BY: K. A. Kempf DATE: 6-10-08
MODIFIED BY: _____ DATE: _____
CHECKED BY: _____ DATE: _____
FILE SPEC.: kkempf\english\bridge approach fills.dgn

$$$$$$$$SYSTIME$$$$$$$$
$$$$$$$$USERNAME$$$$$$$$
$$$$$$$$DGNNAME$$$$$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-5204	3
R/W SHEET NO.	

REVISIONS

10/17/2011
G:\DR Projects\DR10052_US 321 Connector\Design\DR10052_03_RDY.dgn
3:01:33 PM

SUMMARY OF QUANTITIES

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
ROADWAY SUMMARY OF QUANTITIES FOR CONTRACT - C202565

ItemNumber	Sec #	Quantity	Unit	Description
0000100000-N	800	Lump Sum		MOBILIZATION
0000400000-N	801	Lump Sum		CONSTRUCTION SURVEYING
0000720000-N	SP	18	MO	FIELD OFFICE
0001000000-E	200	Lump Sum		CLEARING & GRUBBING .. ACRE(S)
0008000000-E	200	3	ACR	SUPPLEMENTARY CLEARING & GRUBBING
0015000000-N	205	1	EA	SEALING ABANDONED WELLS
0036000000-E	225	10,000	CY	UNDERCUT EXCAVATION
0134000000-E	240	1,850	CY	DRAINAGE DITCH EXCAVATION
0141000000-E	240	2,340	LF	BERM DITCH CONSTRUCTION
0192000000-N	260	10	HR	PROOF ROLLING
0195000000-E	SP	4,500	CY	SELECT GRANULAR MATERIAL
0196000000-E	270	4,125	SY	FABRIC FOR SOIL STABILIZATION
0318000000-E	SP	340	TON	FOUNDATION CONDITIONING MATERIAL, MINOR STRS
0320000000-E	SP	1,050	SY	FOUNDATION CONDITIONING FABRIC
0335200000-E	SP	80	LF	15" DRAINAGE PIPE
0335300000-E	SP	1,132	LF	18" DRAINAGE PIPE
0335400000-E	SP	284	LF	24" DRAINAGE PIPE
0448000000-E	SP	184	LF	***** RC PIPE CULVERTS, CLASS IV (48")
0448500000-E	SP	196	LF	30" RC PIPE CULVERTS, CLASS IV
0448600000-E	SP	320	LF	36" RC PIPE CULVERTS, CLASS IV
0582000000-E	SP	52	LF	15" CS PIPE CULVERTS, 0.064" THICK
0588000000-E	SP	464	LF	18" CS PIPE CULVERTS, 0.064" THICK
0594000000-E	SP	252	LF	24" CS PIPE CULVERTS, 0.064" THICK
0600000000-E	SP	160	LF	30" CS PIPE CULVERTS, 0.079" THICK
0636000000-E	SP	5	EA	**" CS PIPE ELBOWS, *****" THICK (18", 0.064")
1011000000-N	500	Lump Sum		FINE GRADING
1220000000-E	545	250	TON	INCIDENTAL STONE BASE
1693000000-E	654	250	TON	ASPHALT PLANT MIX, PAVEMENT REPAIR
2000000000-N	806	48	EA	RIGHT OF WAY MARKERS
2209000000-E	838	12.8	CY	ENDWALLS
2286000000-N	840	29	EA	MASONRY DRAINAGE STRUCTURES
2308000000-E	840	15.2	LF	MASONRY DRAINAGE STRUCTURES
2365000000-N	840	20	EA	FRAME WITH TWO GRATES, STD 840.22
2367000000-N	840	8	EA	FRAME WITH TWO GRATES, STD 840.29
2396000000-N	840	1	EA	FRAME WITH COVER, STD 840.54
2549000000-E	846	300	LF	2'-6" CONCRETE CURB & GUTTER
2556000000-E	846	896	LF	SHOULDER BERM GUTTER
2612000000-E	848	20	SY	6" CONCRETE DRIVEWAY
2619000000-E	850	30	SY	4" CONCRETE PAVED DITCH
3030000000-E	862	3,975	LF	STEEL BM GUARDRAIL
3045000000-E	862	50	LF	STEEL BM GUARDRAIL, SHOP CURVED
3150000000-N	862	10	EA	ADDITIONAL GUARDRAIL POSTS
3195000000-N	862	1	EA	GUARDRAIL ANCHOR UNITS, TYPE AT-1
3215000000-N	862	2	EA	GUARDRAIL ANCHOR UNITS, TYPE III
3270000000-N	SP	27	EA	GUARDRAIL ANCHOR UNITS, TYPE 350
3317000000-N	862	6	EA	GUARDRAIL ANCHOR UNITS, TYPE B-77
3503000000-E	866	1,100	LF	WOVEN WIRE FENCE, 47" FABRIC
3509000000-E	866	70	EA	4" TIMBER FENCE POSTS, 7'-6" LONG
3515000000-E	866	20	EA	5" TIMBER FENCE POSTS, 8'-0" LONG
3628000000-E	876	350	TON	RIP RAP, CLASS I
3649000000-E	876	900	TON	RIP RAP, CLASS B
3656000000-E	876	2,735	SY	FILTER FABRIC FOR DRAINAGE
4025000000-E	901	160	SF	CONTRACTOR FURNISHED, TYPE *** SIGN (E)
4072000000-E	903	446	LF	SUPPORTS, 3-LB STEEL U-CHANNEL
4102000000-N	904	28	EA	SIGN ERECTION, TYPE E
4116100000-N	904	3	EA	SIGN ERECTION, RELOCATE, TYPE **** (GROUND MOUNTED) (E)
4155000000-N	907	3	EA	DISPOSAL OF SIGN SYSTEM, U-CHANNEL
4400000000-E	1110	48	SF	WORK ZONE SIGNS (STATIONARY)
4405000000-E	1110	96	SF	WORK ZONE SIGNS (PORTABLE)
4410000000-E	1110	50	SF	WORK ZONE SIGNS (BARRICADE MOUNTED)
4430000000-N	1130	84	EA	DRUMS
4445000000-E	1145	88	LF	BARRICADES (TYPE III)
4450000000-N	1150	320	HR	FLAGGER
4770000000-E	1205	1,300	LF	COLD APPLIED PLASTIC PAVEMENT MARKING LINES, TYPE ** (4") (III)
4905000000-N	1253	160	EA	SNOWPLOWABLE PAVEMENT MARKERS
6000000000-E	1605	5,300	LF	TEMPORARY SILT FENCE
6006000000-E	1610	575	TON	STONE FOR EROSION CONTROL, CLASS A
6009000000-E	1610	850	TON	STONE FOR EROSION CONTROL, CLASS B
6012000000-E	1610	325	TON	SEDIMENT CONTROL STONE
6015000000-E	1615	120	ACR	TEMPORARY MULCHING
6018000000-E	1620	2,450	LB	SEED FOR TEMPORARY SEEDING
6021000000-E	1620	10	TON	FERTILIZER FOR TEMPORARY SEEDING
6024000000-E	1622	1,100	LF	TEMPORARY SLOPE DRAINS
6027000000-N	1622	25	EA	INLET PROTECTION AT TEMPORARY SLOPE DRAINS
6029000000-E	SP	12,000	LF	SAFETY FENCE
6030000000-E	1630	8,100	CY	SILT EXCAVATION
6036000000-E	1631	6,900	SY	MATTING FOR EROSION CONTROL
6037000000-E	SP	100	SY	COIR FIBER MAT
6038000000-E	SP	1,750	SY	PERMANENT SOIL REINFORCEMENT MAT
6042000000-E	1632	400	LF	1/4" HARDWARE CLOTH
6071030000-E	SP	2,300	LF	COIR FIBER BAFFLE
6071050000-E	SP	1	EA	**" SKIMMER (1-1/2")
6084000000-E	1660	25	ACR	SEEDING & MULCHING
6087000000-E	1660	72	ACR	MOWING
6090000000-E	1661	950	LB	SEED FOR REPAIR SEEDING
6093000000-E	1661	3	TON	FERTILIZER FOR REPAIR SEEDING
6096000000-E	1662	1,625	LB	SEED FOR SUPPLEMENTAL SEEDING
6108000000-E	1665	49	TON	FERTILIZER TOPDRESSING
6114500000-N	SP	30	MHR	SPECIALIZED HAND MOWING
6117000000-N	SP	50	EA	RESPONSE FOR EROSION CONTROL

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

0022000000-E AA1	225	279,200	CY	UNCLASSIFIED EXCAVATION
1121000000-E AA1	520	19,000	TON	AGGREGATE BASE COURSE
1231000000-E AA1	560	890	CY	SHOULDER BORROW
1308000000-E AA1	607	5,000	SY	MILLING ASPHALT PAVEMENT, ***" TO ******" DEPTH (0" TO 1-1/2")
1489000000-E AA1	610	390	TON	ASPHALT CONC BASE COURSE, TYPE B25.0B
1498000000-E AA1	610	6,460	TON	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0B
1519000000-E AA1	610	6,370	TON	ASPHALT CONC SURFACE COURSE, TYPE S9.5B
1575000000-E AA1	SP	710	TON	ASPHALT BINDER FOR PLANT MIX
4685000000-E AA1	1205	18,260	LF	THERMOPLASTIC PAVEMENT MARKING LINES (4", 90 MILS)
4686000000-E AA1	1205	25,970	LF	THERMOPLASTIC PAVEMENT MARKING LINES (4", 120 MILS)
4695000000-E AA1	1205	3,100	LF	THERMOPLASTIC PAVEMENT MARKING LINES (8", 90 MILS)
4725000000-E AA1	1205	33	EA	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)

*** OR ***

0022000000-E AA2	225	278,100	CY	UNCLASSIFIED EXCAVATION
0156000000-E AA2	250	1,450	SY	REMOVAL OF EXISTING ASPHALT PAVEMENT
1121000000-E AA2	520	10,600	TON	AGGREGATE BASE COURSE
1231000000-E AA2	560	780	CY	SHOULDER BORROW
1308000000-E AA2	607	4,200	SY	MILLING ASPHALT PAVEMENT, ***" TO ******" DEPTH (0" TO 1-1/2")
1489000000-E AA2	610	560	TON	ASPHALT CONC BASE COURSE, TYPE B25.0B
1498000000-E AA2	610	1,120	TON	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0B
1519000000-E AA2	610	1,110	TON	ASPHALT CONC SURFACE COURSE, TYPE S9.5B
1575000000-E AA2	SP	145	TON	ASPHALT BINDER FOR PLANT MIX
1847000000-E AA2	710	31,330	SY	*****" PORT CEM CONC PAVEMENT, THROUGH LANES (WITH DOWELS) (8")
1902000000-N AA2	710	Lump Sum		SURFACE TESTING CONCRETE PAVEMENT
4685000000-E AA2	1205	2,110	LF	THERMOPLASTIC PAVEMENT MARKING LINES (4", 90 MILS)
4686000000-E AA2	1205	4,260	LF	THERMOPLASTIC PAVEMENT MARKING LINES (4", 120 MILS)
4695000000-E AA2	1205	720	LF	THERMOPLASTIC PAVEMENT MARKING LINES (8", 90 MILS)
4725000000-E AA2	1205	12	EA	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)
4810000000-E AA2	1205	21,200	LF	PAINT PAVEMENT MARKING LINES (4")
4820000000-E AA2	1205	1,400	LF	PAINT PAVEMENT MARKING LINES (8")
4835000000-E AA2	1205	100	LF	PAINT PAVEMENT MARKING LINES (24")
4845000000-N AA2	1205	13	EA	PAINT PAVEMENT MARKING SYMBOL
4847000000-E AA2	1205	37,570	LF	POLYUREA PAVEMENT MARKING LINES (4", *********) (STANDARD GLASS BEADS)
4847110000-E AA2	1205	2,390	LF	POLYUREA PAVEMENT MARKING LINES (8", *********) (STANDARD GLASS BEADS)
4847220000-N AA2	1205	21	EA	POLYUREA PAVEMENT MARKING SYMBOL (**********) (STANDARD GLASS BEADS)

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

THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

COMPUTED BY: RSD DATE: 3/31/2011

CHECKED BY: AP DATE:

RAL-RDYDULAXP

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

PROJECT NO.	SHEET NO.
U-5204	3A

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

STATION	LOCATION (LT, RT, OR CL)	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	DRAINAGE PIPE (RCP, CSP, CAAP, HDPE, or PVC) 12"	15"	18"	24"	30"	36"	42"	48"	DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE
L 19+50.00	LT	1		1103.27															
L 19+50.00	LT	1	OUT		1099.27	1099.00				20									
L 19+50.00	RT	2		1103.27															
L 19+50.00	RT	2	1		1100.27	1099.37				60									
L 20+99.75	CL	3	OUT		1075.80	1065.50													
L 26+50.00	LT	4		1071.62															
L 26+50.00	LT	4	OUT		1067.62	1060.00													
L 26+50.00	RT	5		1071.49															
L 26+50.00	RT	5	4		1068.49	1067.72				60									
L 28+74.92	CL	6	OUT		1044.20	1023.00													
Y1 35+25.00	LT	7		1060.00															
Y1 35+25.00	LT	7	9		1060.00	1012.25													
L 34+50.00	LT	8		1015.91															
L 34+50.00	LT	8	OUT		1010.41	1009.00					76								
L 34+50.00	RT	9		1017.15															
L 34+50.00	RT	9	8		1012.15	1010.51					76								
Y1 37+35.00	RT	10		1016.30															
Y1 37+35.00	RT	10	9		1013.30	1012.25				96									
L 36+39.00	LT	42		1013.74															
L 36+39.00	LT	42	OUT		1008.74	994.00													
L 37+18.00	LT	43		1013.33															
L 37+18.00	LT	43	42		1009.33	1008.84				80								X	X	
L 37+60.00	LT	44		1013.54															
L 37+60.00	LT	44	43		1010.54	1009.43				40								X	X	
L 37+18.00	RT	45		1014.68															
L 37+18.00	RT	45	43		1010.68	1009.43			44									X	X	
L 39+25.00	LT	11		1016.74															
L 39+25.00	LT	11	OUT		1009.74	1008.00				24									
L 39+21.00	RT	12		1017.47															
L 39+21.00	RT	12	11		1010.47	1009.84				40								X	X	
L 39+21.00	RT	13		1014.41															
L 39+21.00	RT	13	12		1011.41	1010.57			12										
L 41+03.95	CL	14	OUT		1003.30	993.00													
L 43+00.00	LT	15		1033.62															
L 43+00.00	LT	15	OUT		1028.62	1027.00				56									
L 43+00.00	RT	16		1033.62															
L 43+00.00	RT	16	15		1030.62	1028.72				60									
L 50+60.46	CL	17	OUT		1022.00	985.00													
L 54+50.00	LT	18		1029.87															
L 54+50.00	LT	18	OUT		1026.87	1021.00													
SHEET 3A TOTALS								0	56	536	152	0	0	0	0	0	0	0	0

STATION	C.S. PIPE 12" .064	15" .064	18" .064	24" .064	30" .079	36" .079	42" .109	48" .109	R.C. PIPE CLASS III 12"	15"	18"	24"	30"	36"	42"	48"	R.C. PIPE CLASS IV 12"	15"	18"	24"	30"	36"	42"	48"
L 19+50.00																								
L 19+50.00																								
L 19+50.00																								
L 19+50.00																								
L 20+99.75																						148		
L 26+50.00																								
L 26+50.00			60																					
L 26+50.00																								
L 26+50.00																								
L 28+74.92																					196			
Y1 35+25.00																								
Y1 35+25.00			196																					
L 34+50.00																								
L 34+50.00																								
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L 39+21.00																								
L 41+03.95																								184
L 43+00.00																								
L 43+00.00																								
L 43+00.00																								
L 43+00.00																								
L 50+60.46				252																				
L 54+50.00																								
L 54+50.00		52																						
SHEET 3A TOTALS	0	52	316	252	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	196	148	0	184

STATION	24" R.C. PIPE (CLASS V)	***" RC PIPE CULVERTS, CONTRACTOR DESIGN	***" RC PIPE CULVERTS, CONTRACTOR DESIGN	15" SIDE DRAIN PIPE	18" SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. YARDS R.C.P.	C.S.P.	QUANTITIES FOR DRAINAGE STRUCTURES PER EACH (0' THRU 5.0')	*TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') LIN. FT. A 5.0' THRU 10.0'	B 10.0' AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G	CONCRETE TRANSITIONAL SECTION DROP INLET	CATCH BASIN	G.D.I. TYPE "B" STD. 840.18 OR 840.27	T.B.G.D.I. STD. 840.35	G.D.I. FRAME WITH TWO GRATES STD. 840.22	G.D.I. FRAME WITH TWO GRATES STD. 840.29	J.B. STD. 840.31 OR 840.32						B.D.O. FOR 15" AND 18" PIPE STD 850.10	15" CORR. STEEL ELBOWS No.	18" CORR. STEEL ELBOWS No.		DRAINAGE PIPE ELBOWS NO. & SIZE	CONC. & BRICK PIPE PLUG, C.Y. STD. 840.71	CONC. COLLARS CL. "B" C.Y. STD. 840.72	PIPE REMOVAL LIN. FT.	REMARKS
L 19+50.00								1									1		1																
L 19+50.00																																			
L 19+50.00								1									1		1																
L 19+50.00																																			
L 20+99.75						3.4																													CROSS-PIPE W/ ONE HDWL
L 26+50.00								1									1		1																
L 26+50.00																																			
L 26+50.00								1									1		1																
L 26+50.00																																			
L 28+74.92																																			CROSS PIPE
Y1 35+25.00																											1								BDO W/ ELB, ROD, LUG & SLEEVES
Y1 35+25.00																													1						
L 34+50.00								1	0.5								1		1																
L 34+50.00																																			
L 34+50.00								1									1		1																
L 34+50.00																																			
Y1 37+35.00								1									1		1																
Y1 37+35.00																																			
L 36+39.00								1										1		1															
L 36+39.00																													2						ELB, ROD, LUG & SLEEVES
L 37+18.00								1										1		1															
L 37+18.00																																			
L 37+60.00								1										1		1															
L 37+60.00																																			
L 37+18.00								1										1		1															
L 37+18.00																																			
L 39+25.00								1	2									1		1															
L 39+25.00																																			
L 39+21.00								1	2									1		1															
L 39+21.00																																			
L 39+21.00								1									1		1																
L 39+21.00																																			
L 41+03.95						6																													CROSS-PIPE W ONE HDWL
L 43+00.00								1									1		1																
L 43+00.00																																			
L 43+00.00								1									1		1																
L 43+00.00																																			
L 50+60.46																																			CROSS PIPE
L 54+50.00								1									1		1																
L 54+50.00																																			
SHEET 3A TOTALS	0	0	0	0	0	9.4	0	17	4.5	0	0	0	0	0	0	0	11	6	11	6	0	0	0	0	0	0	1	0	3	0					

ABBREVIATIONS

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

COMPUTED BY: RS DATE: 9/26/2011

CHECKED BY: AP DATE: 9/26/2011

PROJECT NO.	SHEET NO.
U-5204	3B

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

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

STATION	LOCATION (LT, RT, OR CL)	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	DRAINAGE PIPE (RCP, CSP, CAAP, HDPE, or PVC) 12"	15"	18"	24"	30"	36"	42"	48"	DO NOT USE RCP	DO NOT USE CSP	DO NOT USE CAAP	DO NOT USE HDPE
L 56+00.00	RT	19		1033.47															
L 56+00.00	RT	19	20		1033.47	1023.10													
L 56+75.00	RT	20		1026.00															
L 56+75.00	RT	20	20A		1023.00	1015.70				96									
L 56+75.00	LT	20A		1019.70															
L 56+75.00	LT	20A	OUT		1009.20	1006.00													
L 58+86.52	CL	21	OUT		1021.60	1004.50													
L 60+50.00	LT	22		1034.37															
L 60+50.00	LT	22	OUT		1027.37	1026.00					72								
L 60+50.00	RT	23		1033.61															
L 60+50.00	RT	23	22		1028.61	1027.47					60								
L 60+50.00	RT	24		1051.00															
L 60+50.00	RT	24	23		1051.00	1028.71													
L 70+25.00	RT	30		1099.44															
L 70+25.00	RT	30	OUT		1095.44	1091.00				100									
Y1 14+00.00	LT	33		1103.30															
Y1 14+00.00	LT	33	34		1100.30	1097.00				88									
Y1 14+50.00	RT	34		1099.90															
Y1 14+50.00	RT	34	OUT		1096.90	1096.00				28									
Y1 16+29.00	CL	35	OUT		1058.00	1054.00													
Y1 21+00.00	LT	36		1063.20															
Y1 21+00.00	LT	36	37		1060.20	1059.00				80									
Y1 21+50.00	RT	37		1061.90															
Y1 21+50.00	RT	37	OUT		1058.90	1057.00				68									
Y1 21+95.00	RT	38		1064.25															
Yl 21+95.00	RT	38	OUT		1059.25	1057.00				28									
Y1 23+50.00	LT	39		1062.11															
Y1 23+50.00	LT	39	OUT		1057.11	1055.00				60									
Y1 23+29.00	RT	39A		1065.66															
Y1 23+29.00	RT	39A	OUT		1057.66	1048.00			24										
L 10+32.00	RT	40	OUT		1141.71	1141.18				24									
L 12+39.00	RT	41	OUT		1138.56	1138.25				24									
SHEET 3B TOTALS								0	24	596	132	0	0	0	0	0	0	0	0
PROJECT TOTALS								0	80	1132	284	0	0	0	0	0	0	0	0

STATION	C.S. PIPE 12" .064	15" .064	18" .064	24" .064	30" .079	36" .079	42" .109	48" .109	R.C. PIPE CLASS III 12"	15"	18"	24"	30"	36"	42"	48"	R.C. PIPE CLASS IV 12"	15"	18"	24"	30"	36"	42"	48"
L 56+00.00			76																					
L 56+75.00			28																					
L 58+86.52					160																			
L 60+50.00			44																					
Y1 16+29.00																						172		
SHEET 3B TOTALS	0	0	148	0	160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	172	0	0
PROJECT TOTALS	0	52	464	252	160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	196	320	0	184

(In this table, the L 56+00.00 row is structure 19 to 20, the L 56+75.00 row is 20A to OUT, and the L 60+50.00 row is 24 to 23.)

STATION	24" R.C. PIPE (CLASS V)	*** RC PIPE CULVERTS, CONTRACTOR DESIGN	*** RC PIPE CULVERTS, CONTRACTOR DESIGN	15" SIDE DRAIN PIPE	18" SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. YARDS R.C.P.	C.S.P.	QUANTITIES FOR DRAINAGE STRUCTURES PER EACH (0' THRU 5.0')	*TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') LIN. FT. A 5.0' THRU 10.0'	B 10.0' AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G	CONCRETE TRANSITIONAL SECTION DROP INLET	CATCH BASIN
L 56+75.00 (RT 20)								1								
L 56+75.00 (LT 20A)								1	5	0.5						
L 60+50.00 (LT 22)								1	2							
L 60+50.00 (RT 23)								1								
L 70+25.00 (RT 30)								1								
Y1 14+00.00 (LT 33)								1								
Y1 14+50.00 (RT 34)								1								
Y1 16+29.00 (CL 35)						3.4										
Y1 21+00.00 (LT 36)								1								
Y1 21+50.00 (RT 37)								1								
Y1 21+95.00 (RT 38)								1								
Y1 23+50.00 (LT 39)								1								
Y1 23+29.00 (RT 39A)								1	3							
SHEET 3B TOTALS	0	0	0	0	0	3.4	0	12	10	0.5	0	0	0	0	0	0
PROJECT TOTALS	0	0	0	0	0	12.8	0	29	14.5	0.5	0	0	0	0	0	0

TOTAL L.F. FOR PAY QUANTITY FOR MASONRY DRAINAGE STRUCTURES IS 15.2

STATION	G.D.I. TYPE "B" STD. 840.18 OR 840.27	T.B.G.D.I. STD. 840.35	G.D.I. FRAME WITH TWO GRATES STD. 840.22	G.D.I. FRAME WITH TWO GRATES STD. 840.29	J.B. STD. 840.31 OR 840.32	M.H. FRAME AND COVER STD 840.54					B.D.O. FOR 15" AND 18" PIPE STD 850.10	15" CORR. STEEL ELBOWS No.	18" CORR. STEEL ELBOWS No.		DRAINAGE PIPE ELBOWS NO. & SIZE	CONC. & BRICK PIPE PLUG, C.Y. STD. 840.71	CONC. COLLARS CL. "B" C.Y. STD. 840.72	PIPE REMOVAL LIN. FT.	REMARKS
L 56+00.00 (RT 19)											1								BDO W/ ELB. ROD, LUG & SLEEVES
L 56+00.00 (RT 19–20)													1						
L 56+75.00 (RT 20)	1		1																
L 56+75.00 (LT 20A)					1	1													
L 58+86.52 (CL 21)																			CROSS-PIPE
L 60+50.00 (LT 22)	1		1																
L 60+50.00 (RT 23)	1		1																
L 60+50.00 (RT 24)											1								BDO W/ ELB. ROD, LUG & SLEEVES
L 60+50.00 (RT 24–23)													1						
L 70+25.00 (RT 30)	1		1																
Y1 14+00.00 (LT 33)	1		1																
Y1 14+50.00 (RT 34)	1		1																
Y1 16+29.00 (CL 35)																			CROSS-PIPE W ONE HDWL
Y1 21+00.00 (LT 36)	1		1																
Y1 21+50.00 (RT 37)	1		1																
Y1 21+95.00 (RT 38)		1		1															
Y1 23+50.00 (LT 39)	1		1																
Y1 23+29.00 (RT 39A)		1		1															
L 10+32.00 (RT 40)																			DRIVEWAY CULVERT
L 12+39.00 (RT 41)																			DRIVEWAY CULVERT
SHEET 3B TOTALS	9	2	9	2	1	1	0	0	0	0	2	0	2	0					
PROJECT TOTALS	20	8	20	8	1	1	0	0	0	0	3	0	5	0					

ABBREVIATIONS

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

PROJECT REFERENCE NO.	SHEET NO.
U-5204	3C
R/W SHEET NO.	

SUMMARY OF EARTHWORK

(IN CUBIC YARDS)

STATION	UNCL. EXCAV.	UNDERCUT EXCAV.	EMBANK. +%	BORROW	WASTE
-L- Sta 6+00 to 37+78 (Bridge)	85,569	0	51,090	0	34,479
-L- Sta 38+78 (Bridge) to 66+00	86,045	0	89,291	3,246	0
-L- Sta 66+00 to 70+50	1,217	0	24,135	22,918	0
SUBTOTAL -L-	172,831	0	164,516	26,164	34,479
-Y1- Sta 13+00 to 22+03 (Bridge)	39,746	0	21,063	0	18,683
-Y1- Sta 22+95 (Bridge) to 38+50	72,460	0	1,647	0	70,813
SUBTOTAL -Y1-	112,206	0	22,710	0	89,496
-Y2- Sta 10+00 to 20+00	2,740	0	1,561	0	1,179
SUBTOTAL -Y2-	2,740	0	1,561	0	1,179
SUBTOTAL GRACE CHAPEL ROAD	287,777	0	188,787	26,164	125,154
subtotal US-321	287,777	0	188,787	26,164	125,154
LOSS TO CLEARING & GRUBBING	-8,633		0		-8,633
ROCK TO REPL. BORROW					
SUIT. EARTH WASTE TO REPL. BORROW			0	-26,164	-26,164
TOTAL GRACE CHAPEL ROAD	279,144	0	188,787	0	90,357
SAY	279,200				
drainage ditch excavation (est.)	1,850 cy				
PAVEMENT STRUCTURE VOLUME	12,954 cy				
ADDITIONAL UNDERCUT	10,000				
EARTHWORK TOTALS FOR ALTERNATE PAVEMENT DESIGN					
SUMMARY TOTALS	287,777	0	188,787	26,164	125,154
ADJUSTMENT FOR ALT. PAV'T DESIGN	-1,056		695	1,751	
LOSS TO CLEARING & GRUBBING	-8,633		0		-8,633
ROCK TO REPL. BORROW					
SUIT. EARTH WASTE TO REPL. BORROW			0	-27,915	-27,915
TOTAL GRACE CHAPEL ROAD	278,088	0	189,482	0	88,606
SAY	278,100				
drainage ditch excavation (est.)	1,850 cy				
PAVEMENT STRUCTURE VOLUME	11,344 cy				
ADDITIONAL UNDERCUT	10,000				

PAVEMENT REMOVAL SUMMARY

(TO BE UTILIZED WITH ALTERNATE CONCRETE PAVEMENT DESIGN OPTION ONLY)

SURVEY LINE	STATION	STATION	LOCATION LT/RT/CL	YD^2
-L-	7+30	13+25	CL	1425
			TOTAL:	1425
			SAY:	1450

SHOULDER BERM GUTTER SUMMARY

LINE	STATION	STATION	LOCATION	LENGTH
-L-	36+00.00	37+75.00	LT	175.0
-L-	36+50.00	37+75.00	RT	125.0
-L-	38+90.00	42+00.00	LT	310.0
-L-	38+90.00	40+25.00	RT	135.0
-Y1-	21+22.50	21+91.00	RT	68.5
-Y1-	23+18.00	24+00.00	RT	82.0
			TOTAL	895.5
			SAY	896

GUARDRAIL SUMMARY

"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

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOUL WIDTH	FLARE LENGTH		W		ANCHORS							IMPACT ATTENUATOR TYPE 350			SINGLE FACED GUARDRAIL	REMOVE EXISTING GUARDRAIL	REMOVE AND STOCKPILE EXISTING GUARDRAIL	REMARKS
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	XI MOD	XI	GRAU 350	B-77	TYPE III	CAT-1	VI MOD	BIC	AT-1	EA	G	NG				
-L-	19+00.00	23+00.00	LT	400			19+75.00	22+25.00	8	11	50	50	1	1			2												
-L-	19+00.00	22+50.00	RT	350			19+70.00	21+75.00	8	11	50	50	1	1			2												
-L-	26+50.00	30+50.00	LT	400			27+25.00	29+75.00	8	11	50	50	1	1			2												
-L-	26+50.00	30+00.00	RT	350			27+25.00	29+25.00	8	11	50	50	1	1			2												
-L-	35+00.00	37+87.00	LT	287			35+75.00	41+75.00	8	11	50	50	1	1			1	1											
-L-	35+15.00	37+69.00	RT	214	40		35+75.00	38+75.00	8	11		50	4	1				1					1						
-L-	38+91.00	42+50.00	LT	359			38+90.00	42+00.00	8	11	50	50	1	1			1	1											
-L-	38+66.00	42+50.00	RT	384			38+66.00	42+00.00	8	11	50	50	1	1			1	1											
-L-	48+50.00	52+00.00	LT	350			49+25.00	51+25.00	8	11	50	50	1	1			2												
-L-	48+50.00	52+00.00	RT	350			49+25.00	51+25.00	8	11	50	50	1	1			2												
-L-	66+25.00	69+90.00	LT	365			67+00.00	69+15.00	8	11	50	50	1	1			2												
-Y1-	14+50.00	17+50.00	LT	300			15+25.00	16+75.00	8	11	50	50	1	1			2												
-Y1-	14+50.00	18+00.00	RT	350			15+25.00	17+25.00	8	11	50	50	1	1			2												
-Y1-	20+00.00	22+00.00	LT	200			20+75.00	22+00.00	8	11	50	50	1	1			1	1											
-Y1-	20+00.00	22+07.00	RT	207			20+75.00	22+07.00	8	11	50	50	1	1			1		1										
-Y1-	22+89.00	25+00.00	LT	211			22+89.00	24+25.00	8	11	50	50	1	1			1	1											
-Y1-	23+02.00	25+00.00	RT	198			23+02.00	24+25.00	8	11	50	50	1	1			1		1										
-Y2-	13+75.00	15+75.00	RT	200			14+50.00	15+00.00	8	11	50	50	1	1			2												
			SUBTOTAL	5475	40												27	6	2				1						
			LESS DEDUCTIONS FOR ANCHORS																										
			GRAU-350 (27 @ 50.00')	1350																									
			B-77 (6 @ 18.75')	112.5																									
			TYPE III (2 @ 18.75')	37.5																									
			AT-1 (1 @ 6.25')		6.25																								
			PROJECT TOTALS	3975	35.75																								
			SAY	3975	50																								
			ADDITIONAL GUARDRAIL POST = 10 EA																										

THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-5204	3D
R/W SHEET NO.	

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PARCEL INDEX SHEET

PARCEL NO.	SHEET NO.	PROPERTY OWNERS NAME
1	4	GRANITE FALLS PARTNERS, LLC
2	4	DWANE ALLEN ANDERSON
3	4	EDWIN LYNN MILLER
4	4,5 & 6	AMANDA STARNES WINKLER
5	5,6,7,8,9 & 11	CITY OF HICKORY
6	4,5	CALDWELL COUNTY
7	6,7,8,9,10 & 11	MDI MANAGEMENT INC
8	9	RICHARD D BERRY JR
9	9	C. PHILLIP SUTTLEMYRE
10	10 & 11	OMEGA C. STARNES

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10/17/2011
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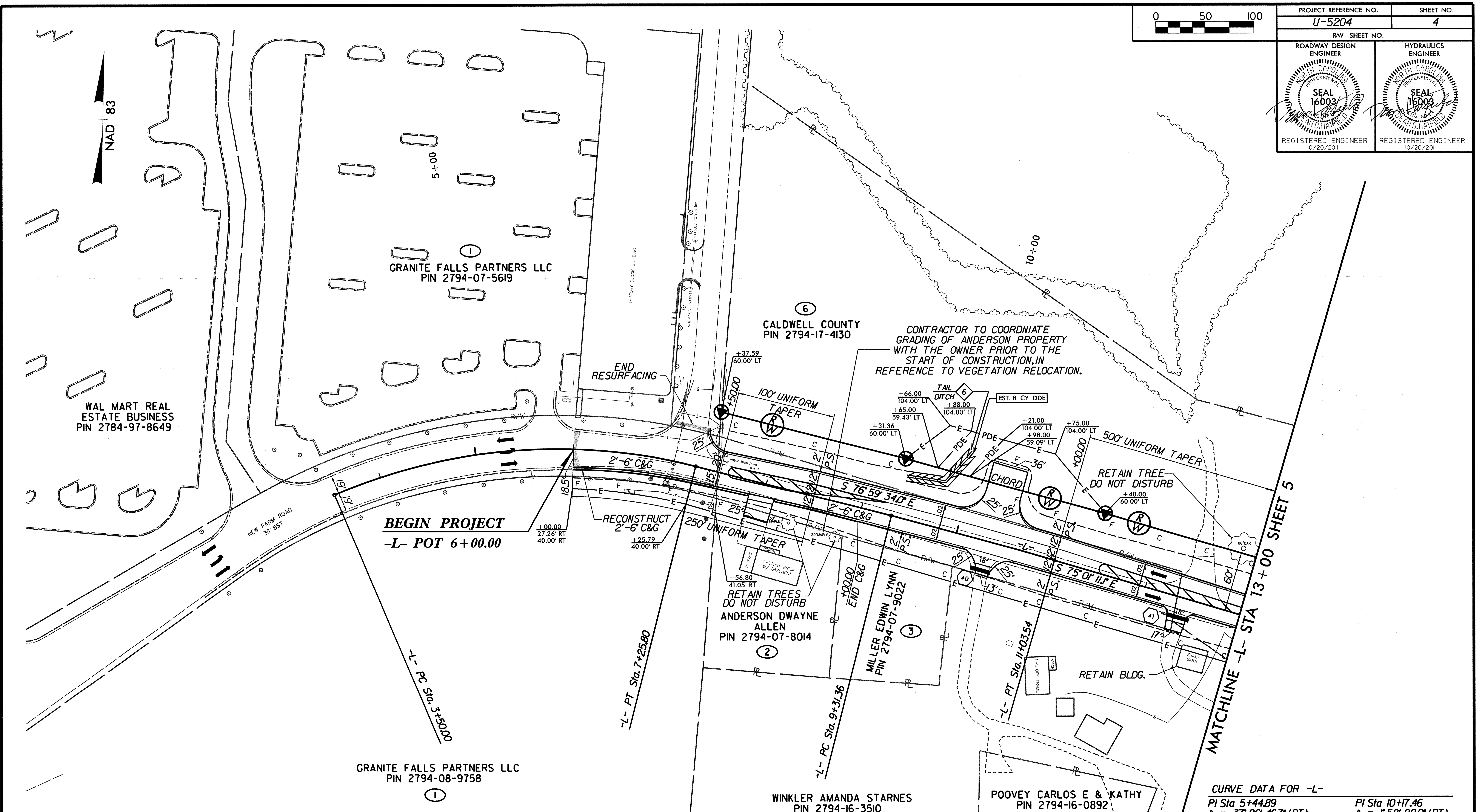
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

PROJECT REFERENCE NO.	SHEET NO.
U-5204	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 16003 ENGINEER DEAN O. HATFIELD — REGISTERED ENGINEER 10/20/2011	NORTH CAROLINA PROFESSIONAL SEAL 16003 ENGINEER DEAN O. HATFIELD — REGISTERED ENGINEER 10/20/2011



CURVE DATA FOR -L-

PI Sta 5+44.89	PI Sta 10+17.46
Δ = 37° 26' 46.7" (RT)	Δ = 1° 58' 22.9" (RT)
D = 9° 57' 52.1"	D = 1° 08' 45.3"
L = 375.80'	L = 172.18'
T = 194.89'	T = 86.10'
R = 575.00'	R = 5,000.00'
Se = Exist.	Se = 0.02
	DS = 40 MPH

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE NORTH CAROLINA STATE PLANE COORDINATES ESTABLISHED BY N.C.G.S. FOR MONUMENT "MARINER", LOCATED IN CALDWELL COUNTY WITH NAD 83 STATE PLANE GRID COORDINATES OF:

NORTHING: 740,452.223 ft. EASTING: 1,293,568.190 ft.

THE COMBINED FACTOR USED ON THIS PROJECT (GROUND TO GRID FOR REFERENCE TIES ONLY) IS: 0.9998691

THE NORTH CAROLINA LAMBERT GRID BEARING LOCALIZED HORIZONTAL GROUND DISTANCE FROM "MARINER" TO -L- STATION 10+00: N 21° 05' 40" W 7,145.553 ft.

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES

VERTICAL DATUM USED: NAVD 88

SEE SHEET 2E FOR DITCH DETAILS
SEE SHEET 2F FOR INTERSECTION DETAILS
SEE SHEET 12 FOR -L- PROFILE

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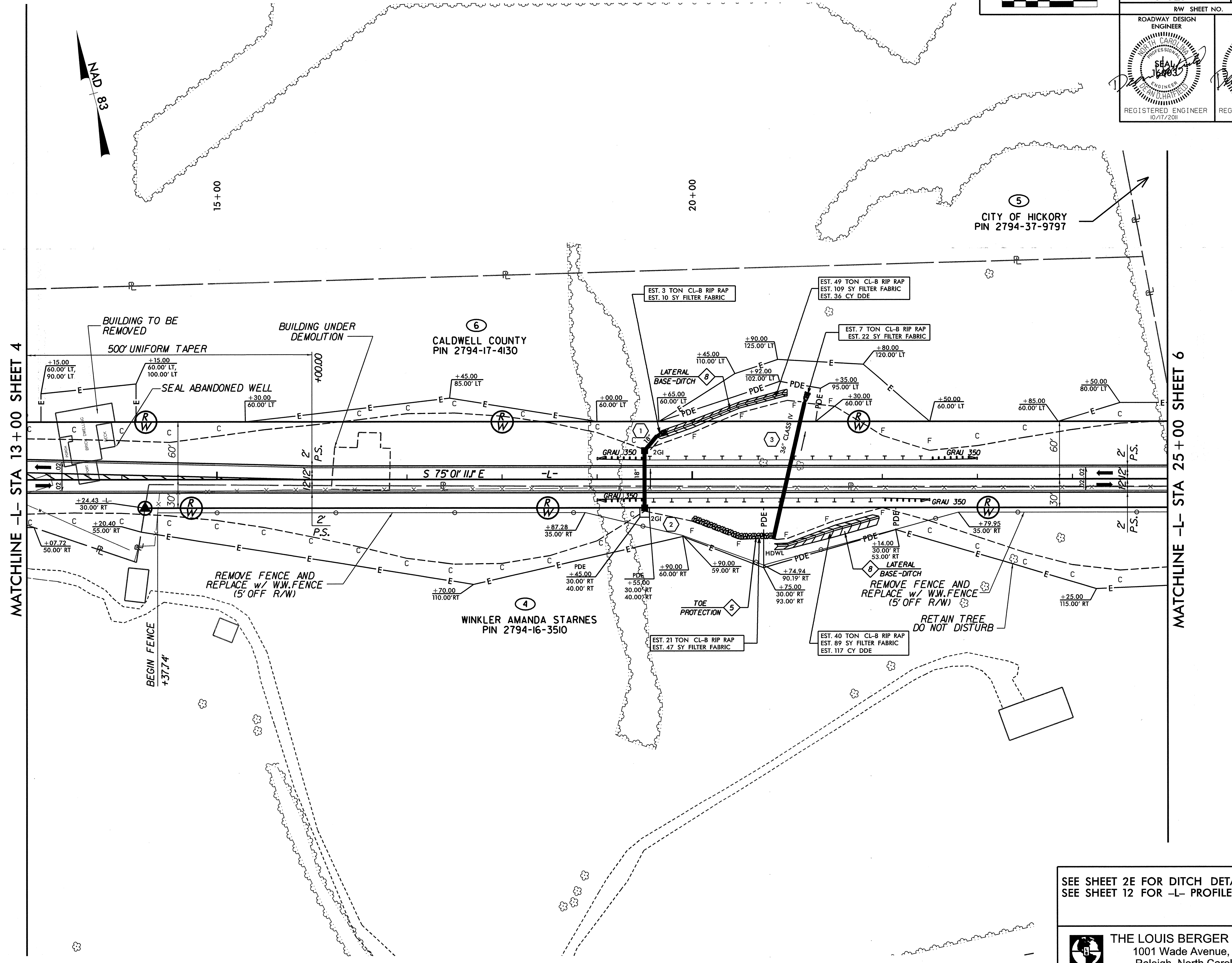
PROJECT REFERENCE NO.	SHEET NO.
U-5204	5
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER — SEAL 16083, DEAN D. HATFIELD, REGISTERED ENGINEER 10/17/2011

HYDRAULICS ENGINEER — SEAL 16083, DEAN D. HATFIELD, REGISTERED ENGINEER 10/17/2011



SEE SHEET 2E FOR DITCH DETAILS
SEE SHEET 12 FOR -L- PROFILE

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CURVE DATA FOR -L-

PI Sta 28+44.28	PI Sta 36+35.83
Δ = 12° 41' 41.0" (RT)	Δ = 45° 30' 07.7" (LT)
D = 4° 46' 28.7"	D = 6° 44' 26.4"
L = 265.88'	L = 675.04'
T = 133.49'	T = 356.45'
R = 1,200.00'	R = 850.00'
Se = 0.032	Se = 0.04
DS = 40 MPH	DS = 45 MPH

CURVE DATA FOR -Y1-

PI Sta 21+27.06	PI Sta 35+60.67
Δ = 73° 09' 38.8" (RT)	Δ = 64° 33' 30.0" (LT)
D = 10° 25' 02.7"	D = 16° 22' 12.8"
L = 702.29'	L = 394.36'
T = 408.17'	T = 221.08'
R = 550.00'	R = 350.00'
Se = 0.04	Se = 0.04
DS = 40 MPH	DS = 30 MPH

2010 ADT / 2030 ADT

NEW FARM ROAD: 3,900 / 5,800 — 4,400 / 6,800

ALEX LEE BLVD.: 1,500 / 1,800

SEE SHEET 2E FOR DITCH DETAILS
SEE SHEET 2G FOR INTERSECTION DETAILS
SEE SHEETS 12 & 13 FOR -L- PROFILE
SEE SHEETS 15 & 16 FOR -Y1- PROFILE

THE LOUIS BERGER GROUP, Inc.
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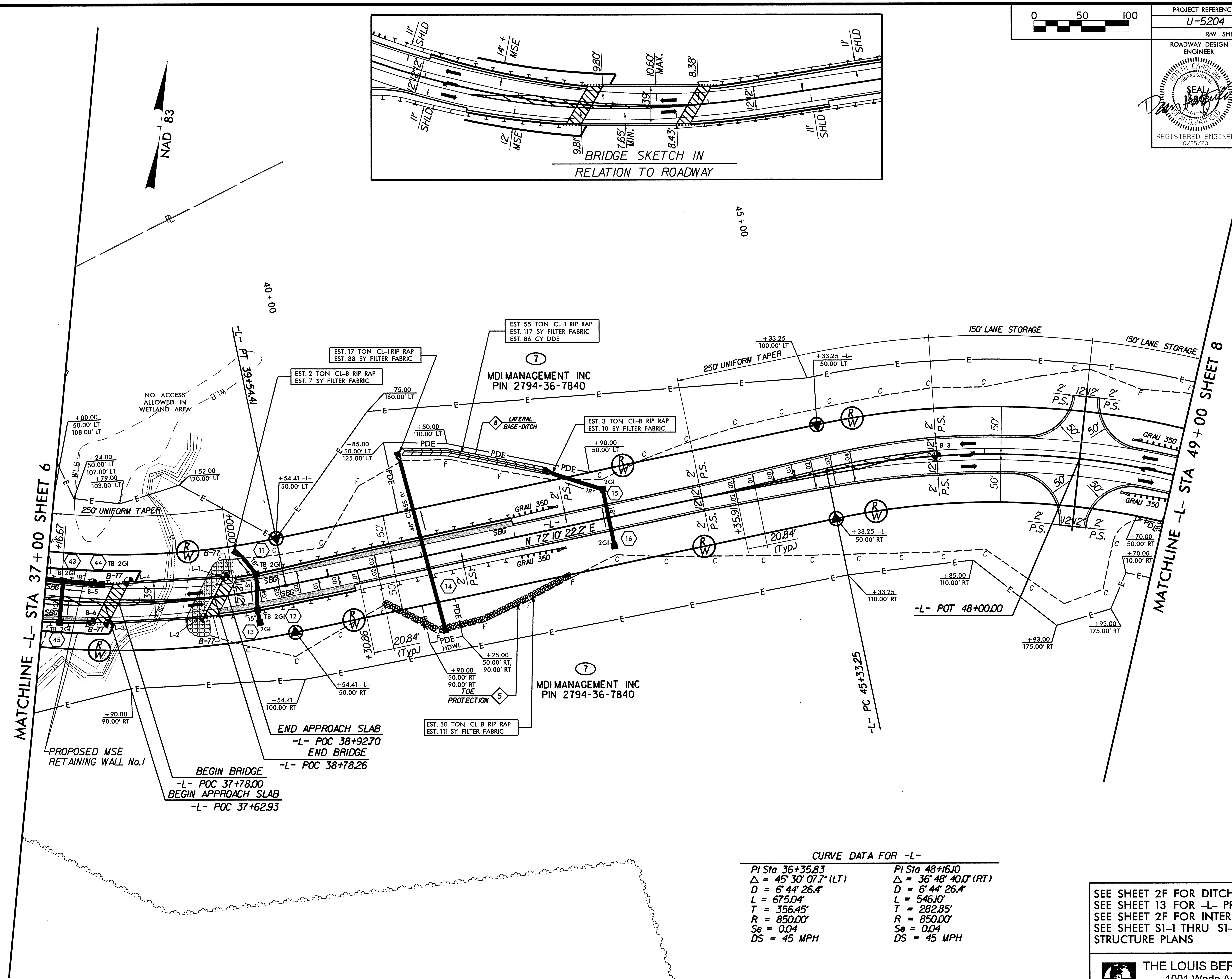
PROJECT REFERENCE NO.	SHEET NO.
U-5204	7
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER — REGISTERED ENGINEER 10/25/2011

HYDRAULICS ENGINEER — REGISTERED ENGINEER 10/25/2011



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CURVE DATA FOR -L-

PI Sta 36+35.83	PI Sta 48+16.10
Δ = 45° 30' 07.7" (LT)	Δ = 36° 48' 40.0" (RT)
D = 6° 44' 26.4"	D = 6° 44' 26.4"
L = 675.04'	L = 546.10'
T = 356.45'	T = 282.85'
R = 850.00'	R = 850.00'
Se = 0.04	Se = 0.04
DS = 45 MPH	DS = 45 MPH

SEE SHEET 2F FOR DITCH DETAILS
SEE SHEET 13 FOR -L- PROFILE
SEE SHEET 2F FOR INTERSECTION DETAILS
SEE SHEET S1-1 THRU S1-23 FOR STRUCTURE PLANS

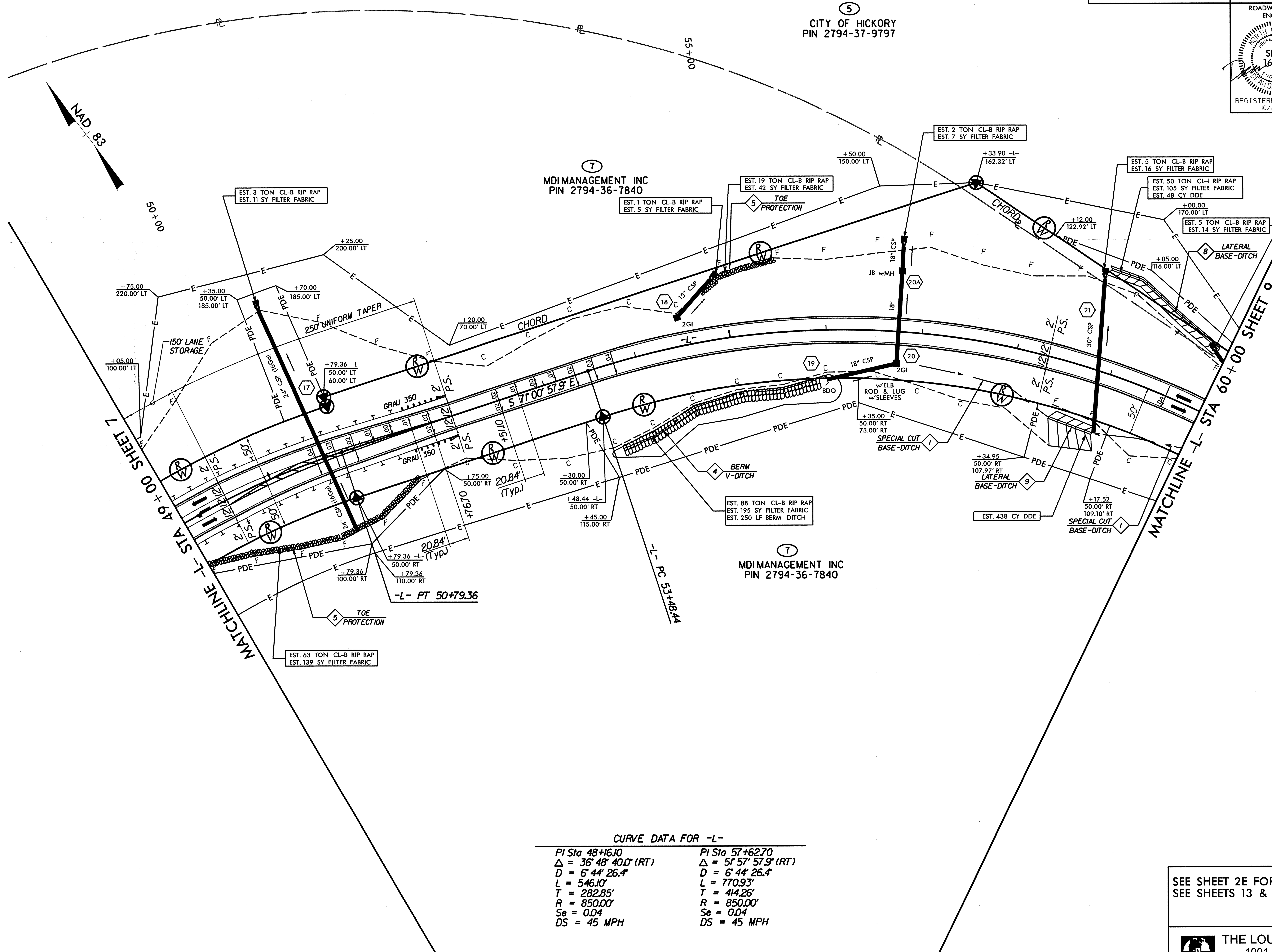
THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

PROJECT REFERENCE NO.	SHEET NO.
U-5204	8
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 16003 DEAN D. HATFIELD — REGISTERED ENGINEER 10/17/2011

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 16003 DEAN D. HATFIELD — REGISTERED ENGINEER 10/17/2011

REVISIONS



CURVE DATA FOR -L-

PI Sta 48+16.10	PI Sta 57+62.70
Δ = 36° 48' 40.0" (RT)	Δ = 51° 57' 57.9" (RT)
D = 6° 44' 26.4"	D = 6° 44' 26.4"
L = 546.10'	L = 770.93'
T = 282.85'	T = 414.26'
R = 850.00'	R = 850.00'
Se = 0.04	Se = 0.04
DS = 45 MPH	DS = 45 MPH

SEE SHEET 2E FOR DITCH DETAILS
SEE SHEETS 13 & 14 FOR -L- PROFILE

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Raleigh, North Carolina 27605

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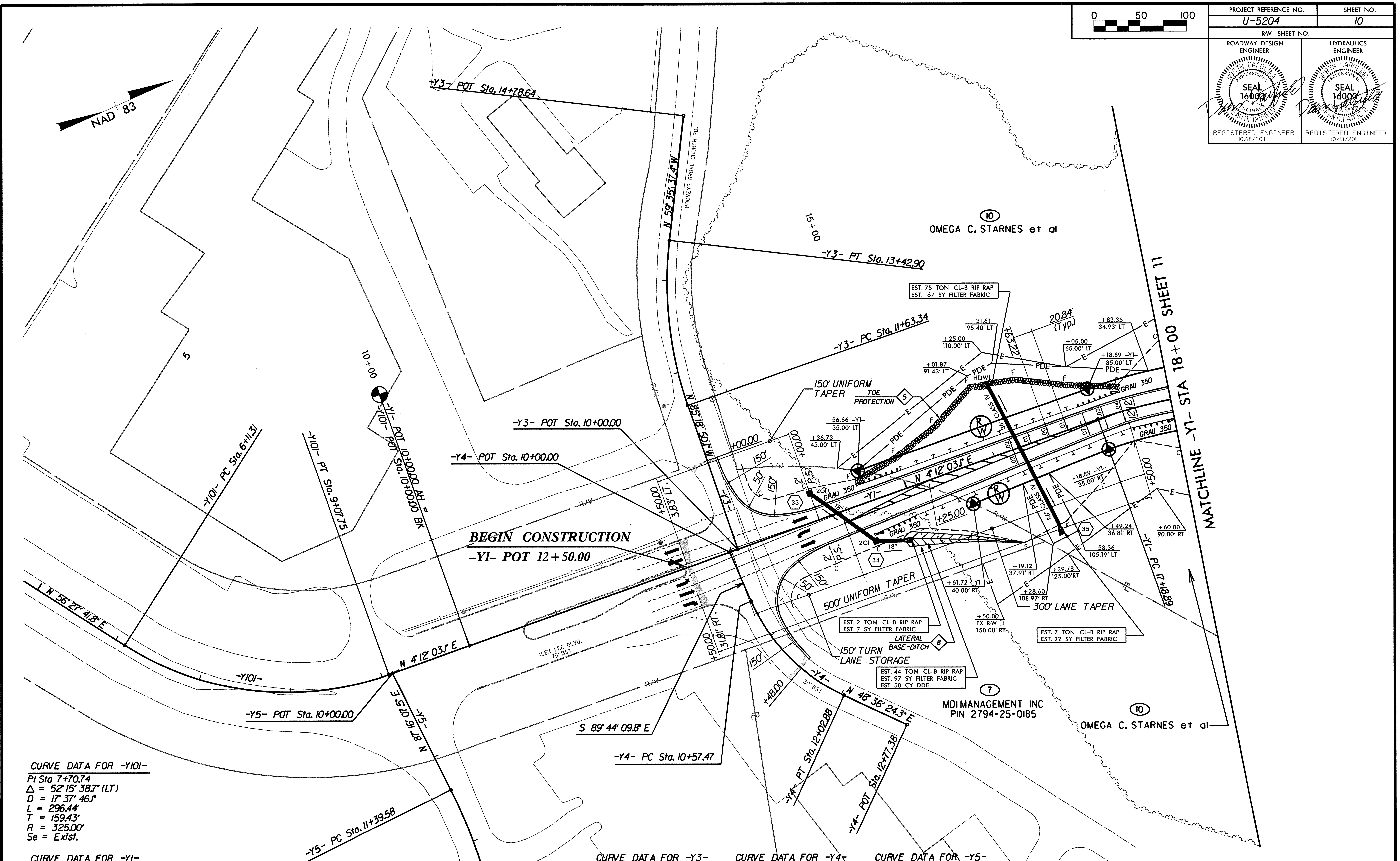
PROJECT REFERENCE NO. U-5204
SHEET NO. 9
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
REGISTERED ENGINEER 10/20/2011
REGISTERED ENGINEER 10/20/2011
0 50 100
NAD 83
CURVE DATA FOR -L-
PI Sta 57+62.70
Δ = 51° 57' 57.9" (RT)
D = 6° 44' 26.4"
L = 770.93'
T = 414.26'
R = 850.00'
Se = 0.04
DS = 45 MPH
PI Sta 66+61.75
Δ = 4° 34' 10.4" (RT)
D = 1° 46' 35.8"
L = 257.21'
T = 128.67'
R = 3,225.00'
Se = 0.02
DS = 40 MPH
CURVE DATA FOR -Y2-
PI Sta 9+47.61
Δ = 0° 20' 30.8" (RT)
D = 0° 19' 34.7"
L = 104.78'
T = 52.39'
R = 17,558.77'
Se = Exist.
PI Sta 17+06.88
Δ = 2° 54' 09.2" (LT)
D = 0° 36' 16.4"
L = 480.13'
T = 240.11'
R = 9,477.56'
Se = Exist.
PI Sta 20+08.71
Δ = 0° 38' 17.8" (LT)
D = 0° 30' 58.7"
L = 123.62'
T = 61.81'
R = 11,097.11'
Se = Exist.
MATCHLINE -L- STA 60+00 SHEET 8
MATCHLINE -Y2- STA 17+00 SEE INSET
5 CITY OF HICKORY PIN 2794-37-9797
7 MDI MANAGEMENT INC PIN 2794-36-7840
9 SUTTLEMYRE C PHILLIP PIN 2794-64-3762
8 BERRY RICHARD D JR PIN 2794-53-4860
8 BERRY RICHARD D JR PIN 2794-53-4860
S 19° 02' 59.9" E
S 14° 28' 49.5" E
N 75° 19' 08.3" E
-L- PT 61+19.37
-L- PC 65+33.08
-L- PT 67+90.29
-Y2- PC 14+66.77
-Y2- PC 8+95.22
END PROJECT
-L- POT 71+04.19 = -Y2- POT 14+99.98
BEGIN CONSTRUCTION
-Y2- POT 10+00.00
250' UNIFORM TAPER
150' TAPER
150' LANE STORAGE
300' UNIFORM TAPER
50' UNIFORM TAPER TO MATCH EXIST.
300' UNIFORM TAPER
150' LANE STORAGE
EST. 103 TON CL-I RIP RAP
EST. 218 SY FILTER FABRIC
EST. 128 CY DDE
EST. 3 TON CL-B RIP RAP
EST. 10 SY FILTER FABRIC
LATERAL BASE-DITCH
BERM V-DITCH
EST. 475 LF BERM DITCH
EST. 70 TON CL-B RIP RAP
EST. 156 SY FILTER FABRIC
EST. 200 LF BERM DITCH
GRAU 350
20.84' (Typ.)
20.5' (Typ.)
20.50' (Typ.)
MATCHLINE -Y2- STA 17+00
END CONSTRUCTION
-Y2- POC 19+00.00
-Y2- PCC 19+46.89
-Y2- PT 20+70.52
GRACE CHAPEL RD.
1-STORY FRAME W/ BASEMENT
300' UNIFORM TAPER
50' UNIFORM TAPER TO MATCH EXIST.
2010 ADT
2030 ADT
NEW FARM ROAD
GRACE CHAPEL ROAD
9,400
15,000
4,400
6,800
5,100
8,200
SEE SHEET 2E FOR DITCH DETAILS
SEE SHEET 2G FOR INTERSECTION DETAILS
SEE SHEET 14 FOR -L- PROFILE
SEE SHEET 16 FOR -Y2- PROFILE
THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605
REVISIONS
10/20/2011
8:29:57 AM

PROJECT REFERENCE NO.	SHEET NO.
U-5204	10
RW SHEET NO.	

ROADWAY DESIGN ENGINEER — SEAL 16000 — REGISTERED ENGINEER 10/18/2011

HYDRAULICS ENGINEER — SEAL 16000 — REGISTERED ENGINEER 10/18/2011



CURVE DATA FOR -Y101-
PI Sta 7+70.74
Δ = 52°15'38.7" (LT)
D = 17°37'46.1"
L = 296.44'
T = 159.43'
R = 325.00'
Se = Exist.

CURVE DATA FOR -Y1-

PI Sta 21+27.06	PI Sta 35+60.67
Δ = 73°09'38.8" (RT)	Δ = 64°33'30.0" (LT)
D = 10°25'02.7"	D = 16°22'12.8"
L = 702.29'	L = 394.36'
T = 408.17'	T = 221.08'
R = 550.00'	R = 350.00'
Se = 0.04	Se = 0.04
DS = 40 MPH	DS = 30 MPH

CURVE DATA FOR -Y3-
PI Sta 12+54.65
Δ = 25°43'12.7" (RT)
D = 14°19'26.2"
L = 179.56'
T = 91.32'
R = 400.00'
Se = Exist.

CURVE DATA FOR -Y4-
PI Sta 11+33.56
Δ = 41°39'25.9" (LT)
D = 28°38'52.4"
L = 145.41'
T = 76.09'
R = 200.00'
Se = Exist.

CURVE DATA FOR -Y5-
PI Sta 16+03.37
Δ = 80°16'44.7" (RT)
D = 10°25'02.7"
L = 770.62'
T = 463.79'
R = 550.00'
Se = Exist.

SEE SHEET 2E FOR DITCH DETAILS
SEE SHEET 2H FOR INTERSECTION DETAILS
SEE SHEET 15 FOR -Y1- PROFILE

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REVISIONS

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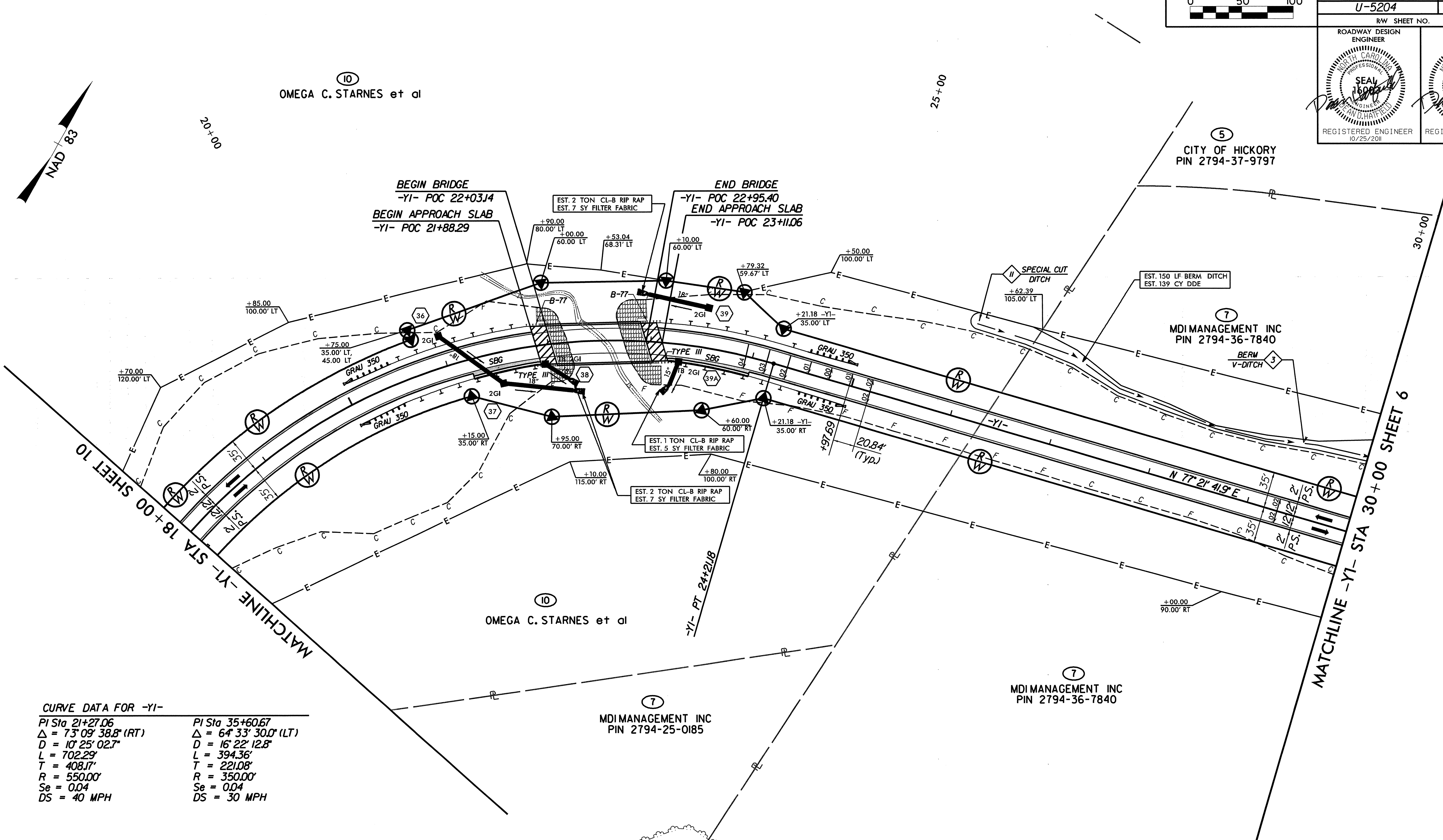
PROJECT REFERENCE NO.	SHEET NO.
U-5204	11

R/W SHEET NO.

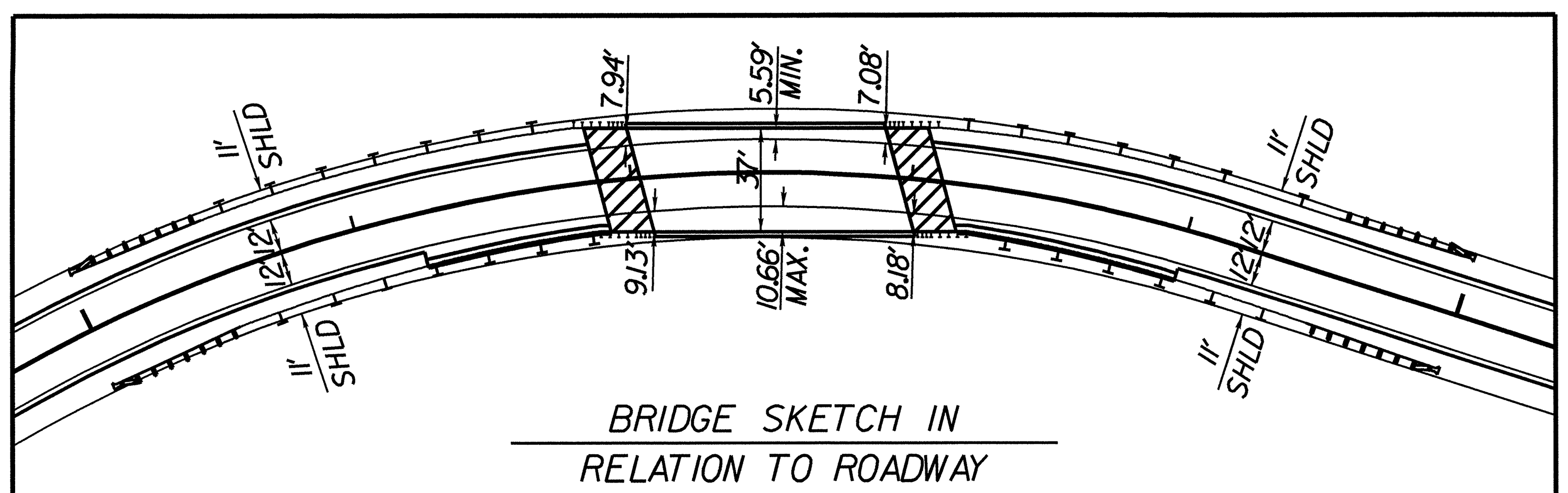
ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL ENGINEER D. HATFIELD — REGISTERED ENGINEER 10/25/2011

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL ENGINEER D. HATFIELD — REGISTERED ENGINEER 10/25/2011



CURVE DATA FOR -Y1-

PI Sta 21+27.06	PI Sta 35+60.67
Δ = 73° 09' 38.8" (RT)	Δ = 64° 33' 30.0" (LT)
D = 10° 25' 02.7"	D = 16° 22' 12.8"
L = 702.29'	L = 394.36'
T = 408.17'	T = 221.08'
R = 550.00'	R = 350.00'
Se = 0.04	Se = 0.04
DS = 40 MPH	DS = 30 MPH



BRIDGE SKETCH IN RELATION TO ROADWAY

SEE SHEET 2E FOR DITCH DETAILS
SEE SHEET 15 FOR -Y1- PROFILE
SEE SHEET S2-1 THRU S2-24 FOR STRUCTURE PLANS

THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

10/25/2011
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THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

PROJECT REFERENCE NO.	SHEET NO.
U-5204	12

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 16003 ENGINEER
JEAN D. HATFIELD
REGISTERED ENGINEER
10/17/2011

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 16003 ENGINEER
JEAN D. HATFIELD
REGISTERED ENGINEER
10/17/2011

0 50 100 HORIZONTAL
0 10 20 VERTICAL

BEGIN PROJECT
BEGIN OVERLAY
-L- 6+00.00

RESURFACE & WIDEN ONLY

BEGIN GRADE
-L- 7+00.00
EL 1,154.54'

PI = 7+70.00
EL = 1,152.30'
VC = 100'
K = 125
DS = 55 MPH

PI = 8+90.00
EL = 1,147.50'
VC = 130'
K = 65
DS = 40 MPH

PI = 10+50.00
EL = 1,144.30
VC = 100'
K = 167
DS = 65 MPH

PI = 15+00.00
EL = 1,138.00'
VC = 476'
K = 85
DS = 50 MPH

(-)3.2000%
(-)4.0000%
(-)2.0000%
(-)1.4000%
(-)1.4000%
(-)7.0000%
(-)7.0000%

EXISTING GROUND
PROPOSED GRADE

-L-

SEE SHEETS 4 & 5 FOR PLAN VIEW

1,175 1,165 1,155 1,145 1,135 1,125 1,115 1,105

6+00 7+00 8+00 9+00 10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00

PI = 21+00.00
EL = 1,096.00'
VC = 350'
K = 100
DS = 50 MPH

(-)7.0000%
(-)3.5000%
(-)27.0000%

BEGIN DITCH LT
PI = 19+60.00
EL = 1,099.00

PI = 20+50.00
EL = 1,074.70

(+) 0.47000%
(+) 11.1800%

END DITCH RT
PI =22+00.00
EL = 1,087.05

PI =21+00.00
EL = 1,075.87

18" 40%

36" RCP
INV IN = 1075.80
INV OUT = 1065.50
℄ STA.20+99.75 -L-
G.P.ELEV.= 1,097.54'
SKEW = 102°55'21"

BEGIN DITCH RT
PI = 20+85.00
EL = 1,075.80

END DITCH LT
PI = 21+00.00
EL = 1,065.50

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE No.3

DRAINAGE AREA (ACRES)	=	4.51 AC
DESIGN FREQUENCY	=	25 YRS
DESIGN DISCHARGE	=	9.55 CFS
DESIGN HW ELEVATION	=	1077.30 FT
100 YR DISCHARGE	=	11.20 CFS
100 YR HW ELEVATION	=	1077.30 FT
OVERTOPPING FREQUENCY	=	+500 YRS
OVERTOPPING DISCHARGE	=	178.50 CFS
OVERTOPPING ELEVATION	=	1096.54 FT

EXISTING GROUND
PROPOSED GRADE

PI = 26+75.00
EL = 1,075.88'
VC = 450'
K = 100
DS = 50 MPH

(-)3.5000%
(-)8.0000%
(-)17.8300%
(-)34.0200%
(-)34.5000%
(-) 1.7442%

PI = 27+50.00
EL = 1,053.42

PI = 28+00.00
EL = 1,050.59

PI = 28+50.00
EL = 1,046.37

PI = 29+50.00
EL = 1,052.06

PI = 30+00.00
EL = 1,059.82

PI = 31+00.00
EL = 1,060.32

BEGIN DITCH RT
PI = 27+00.00
EL = 1,062.33

BEGIN DITCH LT
PI = 27+00.00
EL = 1,058.01

PI = 27+50.00
EL = 1,041.00

PI = 28+00.00
EL = 1,023.75

END DITCH RT
PI =28+95.00
EL = 1,044.20

END DITCH LT
PI = 28+45.00
EL = 1,022.96

(-) 8.4400%
(-) 5.70%
(-) 4.8200%
(+) 14.290%
(+) 15.520%
(+) 0.5000%

30" RCP
INV IN = 1044.20
INV OUT = 1023.00
℄ STA.28+74.92 -L-
G.P.ELEV.= 1,059.85'
SKEW = 73°43'40"

BEGIN DITCH RT
PI = 28+95.00
EL = 1,044.20

END DITCH LT
PI = 28+45.00
EL = 1,022.96

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE No.6

DRAINAGE AREA (ACRES)	=	6.73 AC
DESIGN FREQUENCY	=	25 YRS
DESIGN DISCHARGE	=	14.25 CFS
DESIGN HW ELEVATION	=	1046.08 FT
100 YR DISCHARGE	=	16.72 CFS
100 YR HW ELEVATION	=	1046.25 FT
OVERTOPPING FREQUENCY	=	+500 YRS
OVERTOPPING DISCHARGE	=	91.00 CFS
OVERTOPPING ELEVATION	=	1056.68 FT

-L-

SEE SHEETS 5 & 6 FOR PLAN VIEW

1,125 1,115 1,105 1,095 1,085 1,075 1,065 1,055 1,045 1,035

18+00 19+00 20+00 21+00 22+00 23+00 24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00

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THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

PROJECT REFERENCE NO.	SHEET NO.
U-5204	13

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 16002 ENGINEER — MARK ANTHONY C. HATFIELD — REGISTERED ENGINEER 10/18/2011

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 16003 ENGINEER — MARK ANTHONY C. HATFIELD — REGISTERED ENGINEER 10/18/2011

0 50 100 HORIZONTAL
0 10 20 VERTICAL

-L-

PI = 31+00.00
EL = 1,060.32

PI = 32+50.00
EL = 1,065.57

(+) 3.5000%

END/BEGIN DITCH RT
PI = 33+00.00
EL = 1,066.15

(+) 1.1600%

(-) 5.4000%

END DITCH RT
PI = 33+80.00
EL = 1,061.83

(-)8.0000%

-L- 35+00.00 =
-Y1- 38+04.19
EL 1,015.88'

PI = 36+50.00
EL = 997.88'
VC = 950'
K = 68
DS = 40 MPH

BEGIN BRIDGE
-L- 37+78.00
EL = 1,014.43

100.26'
SPAN

END BRIDGE
-L- 38+78.26
EL = 1,016.06

EXISTING GROUND

PROPOSED GRADE

(+)6.0000%

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE No.14

DRAINAGE AREA (ACRES)	=	26.57 AC
DESIGN FREQUENCY	=	25 YRS
DESIGN DISCHARGE	=	121.32 CFS
DESIGN HW ELEVATION	=	1008.87 FT
100 YR DISCHARGE	=	164.80 CFS
100 YR HW ELEVATION	=	1011.17 FT
OVERTOPPING FREQUENCY	=	500 YRS
OVERTOPPING DISCHARGE	=	295.40 CFS
OVERTOPPING ELEVATION	=	1022.28 FT

(-)8.0000%

(-)21.52%

(-)15.00%

(-)8.00%

BEGIN DITCH LT
PI = 35+25.00
EL = 1,009.00

PI = 35+50.00
EL = 1,003.62

PI = 36+00.00
EL = 996.12'

END DITCH LT
PI = 36+35.00
EL = 993.32'

+5.1

(+)6.0000%

(+)27.0000%

(+)10.56%

END DITCH LT
PI = 42+50.00
EL = 1025.28'

PI = 41+50.00
EL = 998.28'

48" RCP
INV IN = 1003.30
INV OUT = 993.00
℄ STA 41+03.95 -L-
G.P. ELEV. = 1,025.14'
SKEW = 86°37'59"

BEGIN DITCH LT
PI = 41+00.00
EL = 993.00'

SEE SHEETS 6 & 7 FOR PLAN VIEW

31+00 32+00 33+00 34+00 35+00 36+00 37+00 38+00 39+00 40+00 41+00 42+00 43+00

1,175 1,165 1,155 1,145 1,135 1,025 1,015 1,005 995 985

-L-

1,075 1,065 1,055 1,045 1,035 1,025 1,015 1,005 995 985

BEGIN DITCH RT
PI = 53+50.00
EL = 1058.47

PI = 54+50.00
EL = 1043.97

PI = 55+00.00
EL = 1039.97

(-) 14.5000%

(-) 8.0000%

(-)3.5000%

(+)6.0000%

(-)3.5000%

PROPOSED GRADE

EXISTING GROUND

PI = 46+68.42
EL = 1,058.98'
VC = 600'
K = 63
DS = 45 MPH

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE No.17

DRAINAGE AREA (ACRES)	=	3.54 AC
DESIGN FREQUENCY	=	25 YRS
DESIGN DISCHARGE	=	8.60 CFS
DESIGN HW ELEVATION	=	1023.52 FT
100 YR DISCHARGE	=	10.10 CFS
100 YR HW ELEVATION	=	1023.70 FT
OVERTOPPING FREQUENCY	=	500 YRS
OVERTOPPING DISCHARGE	=	79.00 CFS
OVERTOPPING ELEVATION	=	1043.28 FT

24" RCP
INV IN = 1022.00
INV OUT = 985.00
℄ STA 50+60.46 -L-
G.P. ELEV. = 1,045.26'
SKEW = 85°11'36"

SEE SHEETS 7 & 8 FOR PLAN VIEW

43+00 44+00 45+00 46+00 47+00 48+00 49+00 50+00 51+00 52+00 53+00 54+00 55+00

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THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

PROJECT REFERENCE NO.	SHEET NO.
U-5204	14

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 16003 ENGINEER — REGISTERED ENGINEER 10/17/2011

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 16003 ENGINEER — REGISTERED ENGINEER 10/17/2011

HORIZONTAL 0 50 100 — VERTICAL 0 10 20

-L-

PI =55+00.00
EL = 1039.97

PI =55+50.00
EL = 1038.97

END DITCH RT
PI = 56+00.00
EL = 1033.47

BEGIN DITCH RT
PI = 56+50.00
EL = 1026.35

PI = 57+50.00
EL = 1,021.13'
VC = 850'
K = 100
DS = 50 MPH

PI =58+00.00
EL = 1024.85

PI =58+50.00
EL = 1022.10

END DITCH RT
PI = 59+00.00
EL = 1021.60

(-) 2.0000%
(-) 11.0000%
(-) 3.5000%
(-) 1.0000%
(+) 5.0000%
(-) 1.0000%
(-) 5.5000%

30" RCP
INV IN = 1021.60
INV OUT = 1004.50
℄ STA 58+86.52 -L-
G.P. ELEV. = 1032.11'
SKEW = 76°15'39"

BEGIN DITCH LT
PI = 58+65.00
EL = 1004.00

PI = 59+00.00
EL = 1.04.50

(+) 1.43%
(+) 125.00%
(+) 19.00%

PI = 59+50.00
EL = 1017.00

END DITCH LT
PI = 60+00.00
EL = 1026.50

BEGIN DITCH RT
PI =60+50.00
EL = 1051.00

PI =61+50.00
EL = 1065.00

PI =62+00.00
EL = 1070.00

PI =62+50.00
EL = 1076.00

PI =63+00.00
EL = 1078.50

(+) 14.0000%
(+) 10.0000%
(+) 12.0000%
(+) 5.0000%
(+) 0.5000%

EXISTING GROUND

PROPOSED GRADE

(+)8.0000%
(+)5.0000%

PI = 63+00.00
EL = 1,048.63'
VC = 200'
K = 67
DS = 40 MPH

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE No.21

DRAINAGE AREA (ACRES)	=	4.57 AC
DESIGN FREQUENCY	=	25 YRS
DESIGN DISCHARGE	=	10.39 CFS
DESIGN HW ELEVATION	=	1023.15 FT
100 YR DISCHARGE	=	12.19 CFS
100 YR HW ELEVATION	=	1023.30 FT
OVERTOPPING FREQUENCY	=	500 YRS
OVERTOPPING DISCHARGE	=	119.40 CFS
OVERTOPPING ELEVATION	=	1041.95 FT

SEE SHEETS 8 & 9 FOR PLAN VIEW

55+00 56+00 57+00 58+00 59+00 60+00 61+00 62+00 63+00 64+00

1,085 1,075 1,065 1,055 1,045 1,035 1,025 1,015 1,005 995

-L-

PI = 69+65.84
EL = 1,101.89'
VC = 180'
K = 30
DS = 35 MPH

END GRADE
-L- 70+86.24
EL 1,104.30'
-Y2- STA. 15+00.10
OFF 18' LT

END PROJECT
-L- 71+04.19

PI =65+00.00
EL = 1079.50

PI =66+00.00
EL = 1084.50

PI =66+50.00
EL = 1085.75

END DITCH RT
PI = 67+25.00
EL = 1086.13

(+) 0.5000%
(+) 5.0000%
(+) 2.5000%
(+) 0.5000%
(+)2.0000%
(+)8.0000%

PROPOSED GRADE

EXISTING GROUND

(+)29.5000%
(+)25.0000%

PI = 70+00.00
EL = 1083.50

END DITCH LT
PI = 70+30.00
EL = 1091.00

(+)20.0000%

PI = 69+50.00
EL = 1068.75

PI = 68+00.00
EL = 1043.25

(+)15.5000%

PI = 69+00.00
EL = 1058.75

BEGIN DITCH LT
PI = 67+50.00
EL = 1037.25

(+)12.0000%

SEE SHEET 9 FOR PLAN VIEW

55+00 56+00 57+00 58+00 59+00 60+00 61+00 62+00 63+00 64+00

1,115 1,105 1,095 1,085 1,075 1,065 1,055 1,045 1,035

-L-

64+00 65+00 66+00 67+00 68+00 69+00 70+00

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THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

PROJECT REFERENCE NO.	SHEET NO.
U-5204	15

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 16003 ENGINEER DAVID THOMAS HATFIELD
REGISTERED ENGINEER
10/18/2011

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 16003 ENGINEER DAVID THOMAS HATFIELD
REGISTERED ENGINEER
10/18/2011

HORIZONTAL 0 50 100
VERTICAL 0 10 20

-Y1-

BEGIN GRADE
-Y1- 13+00.00
EL 1,110.40'

-Y1- 10+00.00
EL 1,107.00'

(+)2.0000%

(+)2.0000%

(-)8.0000%

PI = 13+25.00
EL = 1,113.50'
VC = 300'
K = 30
DS = 35 MPH

EXISTING GROUND

PROPOSED GRADE

BEGIN DITCH RT
PI = 14+76.00
EL = 1,096.00

(-)28.7432%

PI = 15+50.00
EL = 1,074.73

(-)37.2405%

END DITCH RT
PI = 16+00.00
EL = 1,056.11

36" RCP
INV IN = 1058.00
INV OUT = 1054.00
℄ STA.16+29.20 -Y1-
6.P. ELEV. = 1,089.16'
SKEW = 82°24'10"

(-)8.0000%

(-)3.1809%

PI = 18+25.00
EL = 1,073.50'
VC = 310'
K = 64
DS = 40 MPH

(-)3.1809%

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE No.35

DRAINAGE AREA (ACRES)	=	9.16 AC
DESIGN FREQUENCY	=	25 YRS
DESIGN DISCHARGE	=	25.85 CFS
DESIGN HW ELEVATION	=	1060.40 FT
100 YR DISCHARGE	=	30.34 CFS
100 YR HW ELEVATION	=	1060.70 FT
OVERTOPPING FREQUENCY	=	500+ YRS
OVERTOPPING DISCHARGE	=	211.30 CFS
OVERTOPPING ELEVATION	=	1088.28 FT

SEE SHEETS 10 & 11 FOR PLAN VIEW

1,125 1,115 1,105 1,095 1,085 1,075 1,065 1,055 1,045 1,035

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00

-Y1-

BEGIN BRIDGE
-Y1- 22+03.14
EL = 1,065.05

PI = 22+55.88
EL = 1,059.79'
VC = 540'
K = 66
DS = 40 MPH

END BRIDGE
-Y1- 22+95.40
EL = 1,065.79

(+)5.0000%

1.5:1

1.5:1

BEGIN DITCH LT
PI = 26+00.00
EL = 1,092.87

PI = 27+00.00
EL = 1,090.90

PI = 27+50.00
EL = 1,090.75

PI = 28+00.00
EL = 1,089.75

END DITCH LT
PI = 29+00.00
EL = 1,088.50

(-) 2.000%

(-) 0.3000%

(-) 2.0000%

(-) 1.2500%

(-) 0.5000%

(+)5.0000%

(-)8.0000%

PROPOSED GRADE

EXISTING GROUND

PI = 28+38.83
EL = 1,088.94'
VC = 585'
K = 45
DS = 40 MPH

PI = 32+00.000
EL = 1,087.01

(-) 6.0000%

PI = 33+00.000
EL = 1,081.01

(-) 11.0000%

PI = 34+00.000
EL = 1,070.01

(-)8.0000%

SEE SHEETS 6 & 11 FOR PLAN VIEW

1,105 1,095 1,085 1,075 1,065 1,055 1,045 1,035 1,025 1,015

22+00 23+00 24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00

10/18/2011
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THE LOUIS BERGER GROUP, Inc.
1001 Wade Avenue, Suite 400
Raleigh, North Carolina 27605

PROJECT REFERENCE NO.	SHEET NO.
U-5204	16

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 16005 ENGINEER DEAN D. HATFIELD
REGISTERED ENGINEER
10/17/2011

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 16005 ENGINEER DEAN D. HATFIELD
REGISTERED ENGINEER
10/17/2011

0 50 100 HORIZONTAL
0 10 20 VERTICAL

-Y1-

PI =34+00.000
ET = 1,070.01

PI =34+50.000
ET = 1,066.01

END DITCH LT
PI = 35+25.00
EL = 1,059.64

EXISTING GROUND

PROPOSED GRADE

(-) 8.0000%

(-) 8.5000%

PI = 37+00.00
EL = 1,020.05'
VC = 150'
K = 37
DS = 30 MPH

END GRADE
-Y1- 37+86.19 =
-L- 35+00.00 (18' RT)
EL 1,016.60'

(-)8.0000%

(-) 8.0000%

(-)4.0000%

(-) 5.0000%

BEGIN DITCH LT
PI = 35+70.00
EL = 1,026.98

PI =37+00.000
EL = 1,016.58

END DITCH LT
PI = 37+65.000
EL = 1,013.33

SEE SHEET 6 FOR PLAN VIEW

34+00 35+00 36+00 37+00 38+00

1,095 1,085 1,075 1,065 1,055 1,045 1,035 1,025 1,015 1,005

-Y2-

BEGIN PROJECT
-Y2- 10+00.00

BEGIN GRADE
-Y2- 11+00.00
EL 1,115.57'

RESURFACE & WIDEN ONLY

PI = 11+75.00
EL = 1,116.34'
VC = 300'
K = 71
DS = 45 MPH

(+)0.5000%

(-)3.7500%

PROPOSED GRADE

PI = 15+00.00
EL = 1,104.16'
VC = 200'
K = 100
DS = 50 MPH

(-)3.7500%

(-)1.7500%

(-)1.7500%

END GRADE
-Y2- 18+50.00
EL 1,098.03'

END PROJECT
-Y2- 19+00.00

BM #1 POINT BM01
41.82' RT OF -Y2- STA 8+95.22
EL = 1109.22

-Y2- 14+99.98 =
-L- 71+04.19
EL 1,104.66'

EXISTING GROUND

RESURFACE & WIDEN ONLY

BM #2 POINT BM02
41.49' RT OF -Y2- STA 16+53.54
EL = 1102.19

SEE SHEET 9 FOR PLAN VIEW

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00

1,145 1,135 1,125 1,115 1,105 1,095 1,085 1,075 1,065 1,055

10/17/2011
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