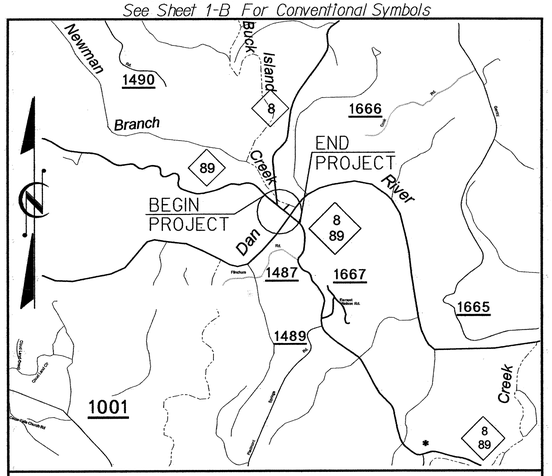
09/08/99

TIP PROJECT: B-4281

CONTRACT: C201815

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



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STOKES COUNTY

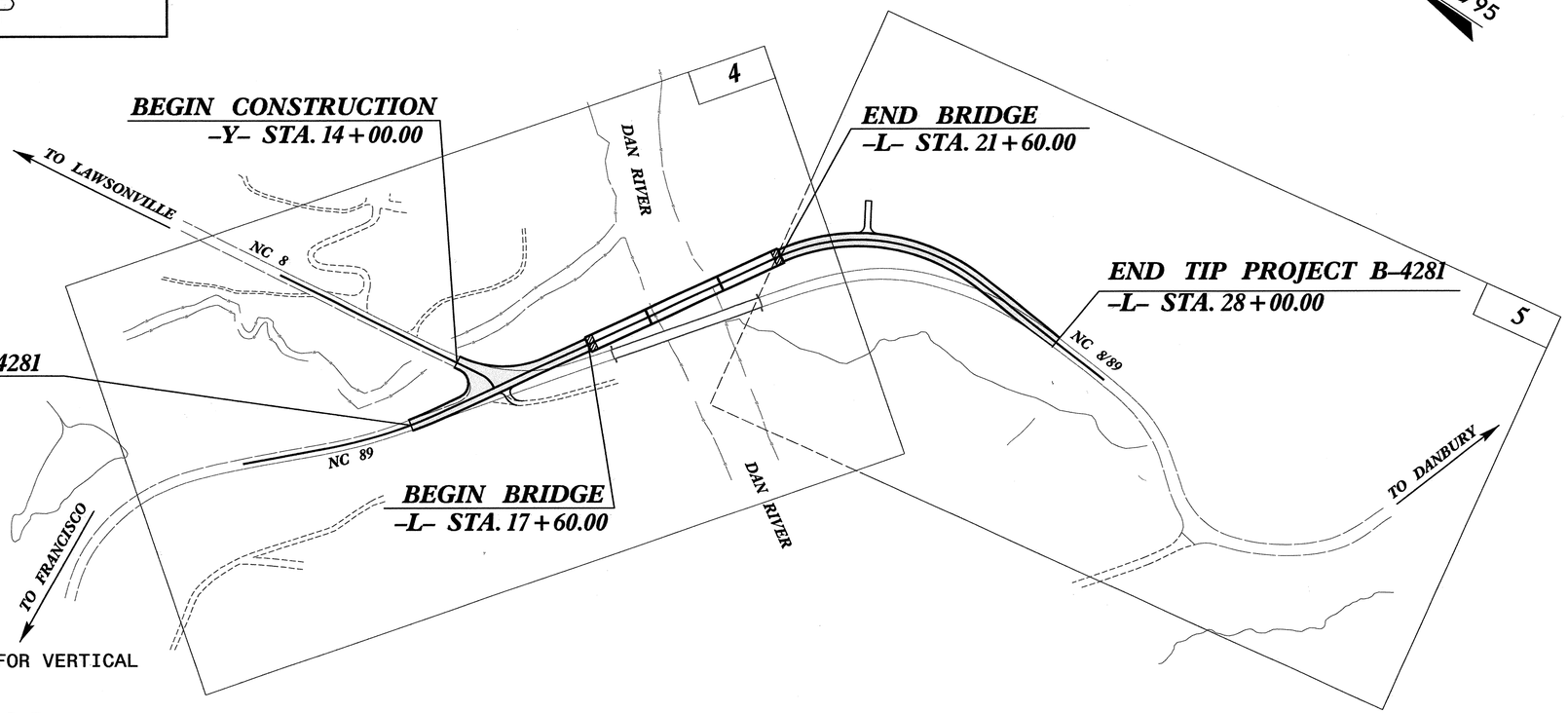
LOCATION: BRIDGE NO. 60 OVER DAN RIVER ON NC 8/89

TYPE OF WORK: GRADING, DRAINAGE, PAVING & STRUCTURE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4281	1	

WBS PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
33621.1.1	BRSTP-008(4)	P.E.
33621.2.1	BRSTP-008(4)	RW/ UTL
33621.3.1	BRSTP-008(4)	CONST

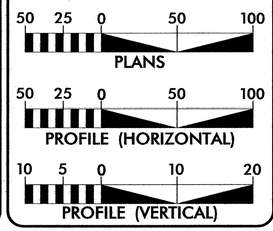
NC GRID
NAD 83/95



** DESIGN EXCEPTION REQUIRED FOR VERTICAL AND HORIZONTAL ALIGNMENT

NCDOT CONTACT: CATHY HOUSER, P.E.
ROADWAY DESIGN - ENGINEERING COORDINATION

GRAPHIC SCALES



DESIGN DATA

ADT 2008 = 3300
ADT 2028 = 5100
DHV = 10 %
D = 65 %
T = 3 % *
** V = 60 MPH

* TTST 1% DUAL 2%

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4281	=	*0.199 MI.*
LENGTH STRUCTURE TIP PROJECT B-4281	=	*0.076 MI.*
TOTAL LENGTH OF TIP PROJECT B-4281	=	*0.275 MI.*

Prepared in the Office of:
KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066 FAX: (919) 851-6846

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: APRIL 20, 2007

LETTING DATE: JULY 15,2008

STEPHEN R. WHITLEY, PE
PROJECT ENGINEER

DAVID C. WALLER, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 19732 ENGINEER SHIHCHEN FUH
SIGNATURE: P.E. 12-20-07

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 20774 ENGINEER STEPHEN R. WHITLEY
SIGNATURE: P.E. 12-20-07

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

P.E.
STATE HIGHWAY DESIGN ENGINEER

12/19/2007
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K.O. & Associates, P.C.

PROJECT REFERENCE NO.	SHEET NO.
B-4281	1-A

ROADWAY DESIGN ENGINEER

SEAL 20774

1-24-08

INDEX OF SHEETS

SHEET NUMBER	DESCRIPTION
1	Title Sheet
1-A	Index of Sheets
1-B	Conventional Symbols
1-C	Survey Control Sheet
1-D	Centerline Coordinate List
2 thru 2-A	Typical Sections and Pavement Schedule
2-B	Detail (Anchorage for Frames)
2-C	Temporary Shoring Details
3	Summary of Quantities
3-A	Earthwork Summary, Drainage Summary, Guardrail Summary and Pavement Removal Sheet
3-B	Parcel Index Sheet
4-5	Plan Sheet
6	Profile Sheet
TCP-1 thru TCP-10	Traffic Control Plans
PM-1 thru PM-2	Pavement Marking Plans
EC-1 thru EC- 6	Erosion Control Plans
RF-1	Reforestation Plans
SIGN-1 thru SIGN-6	Signing Plans
UO-1 thru UO-3	Utilities by Others
X-1	Cross-Section Summary
X-2 thru X-17	Cross-Sections
S-1 thru S-36	Structure Plans

2006 ROADWAY STANDARD DRAWINGS

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

STD.NO.	TITLE
DIVISION 2 - EARTHWORK	
200.03	Method of Clearing - Method III
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superelevation - Two Lane Pavement
DIVISION 3 - PIPE CULVERTS	
300.01	Method of Pipe Installation - Method 'A'
310.10	Driveway Pipe Construction
DIVISION 4 - MAJOR STRUCTURES	
422.10	Reinforced Bridge Approach Fills
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
DIVISION 6 - ASPHALT BASES AND PAVEMENTS	
654.01	Pavement Repairs
DIVISION 8 - INCIDENTALS	
806.01	Concrete Right-of-Way Marker
806.02	Granite Right-of-Way Marker
840.00	Concrete Base Pad for Drainage Structures
840.18	Concrete Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.24	Frames and Narrow 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
840.72	Pipe Collar
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
862.01	Guardrail Placement
862.02	Guardrail Installation
862.03	Structure Anchor Units
862.04	Anchoring End of Guardrail - B-77 and B-83 Anchor Units
876.02	Guide for Rip Rap at Pipe Outlets
876.04	Drainage Ditches with Class 'B' Rip Rap

GENERAL NOTES:

2006 SPECIFICATIONS
EFFECTIVE: 07-18-06
REVISED:

GRADING AND SURFACING OR RESURFACING AND WIDENING:

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

CLEARING:

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

SUPERELEVATION:

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

SHOULDER CONSTRUCTION:

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

SIDE ROADS:

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

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 NOT SHOWN ON THE PLANS WILL BE PAID FOR AT THE CONTRACT PRICE FOR "TEMPORARY SHORING" OR "TEMPORARY SHORING-BARRIER SUPPORTED" DEPENDING UPON THE LOCATION OF THE SHORING.

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 Sprint, Duke Energy and Time Warner Embarq

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.

8/17/99

1/24/2008
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3/15/06

PROJECT REFERENCE NO.	SHEET NO.
B-4281	1-B

Note: Not to Scale

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 123
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB

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

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
- Proposed Wheel Chair Ramp Curb Cut — WCC
- Curb Cut for Future Wheel Chair Ramp — CCFR
- 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 — C
- TV Tower
- U/G TV Cable Hand Hole — HH
- Recorded U/G TV Cable — TV
- Designated U/G TV Cable (S.U.E.*) — TV
- Recorded U/G Fiber Optic Cable — TV FO
- Designated U/G Fiber Optic Cable (S.U.E.*) — TV FO

GAS:

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

SANITARY SEWER:

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

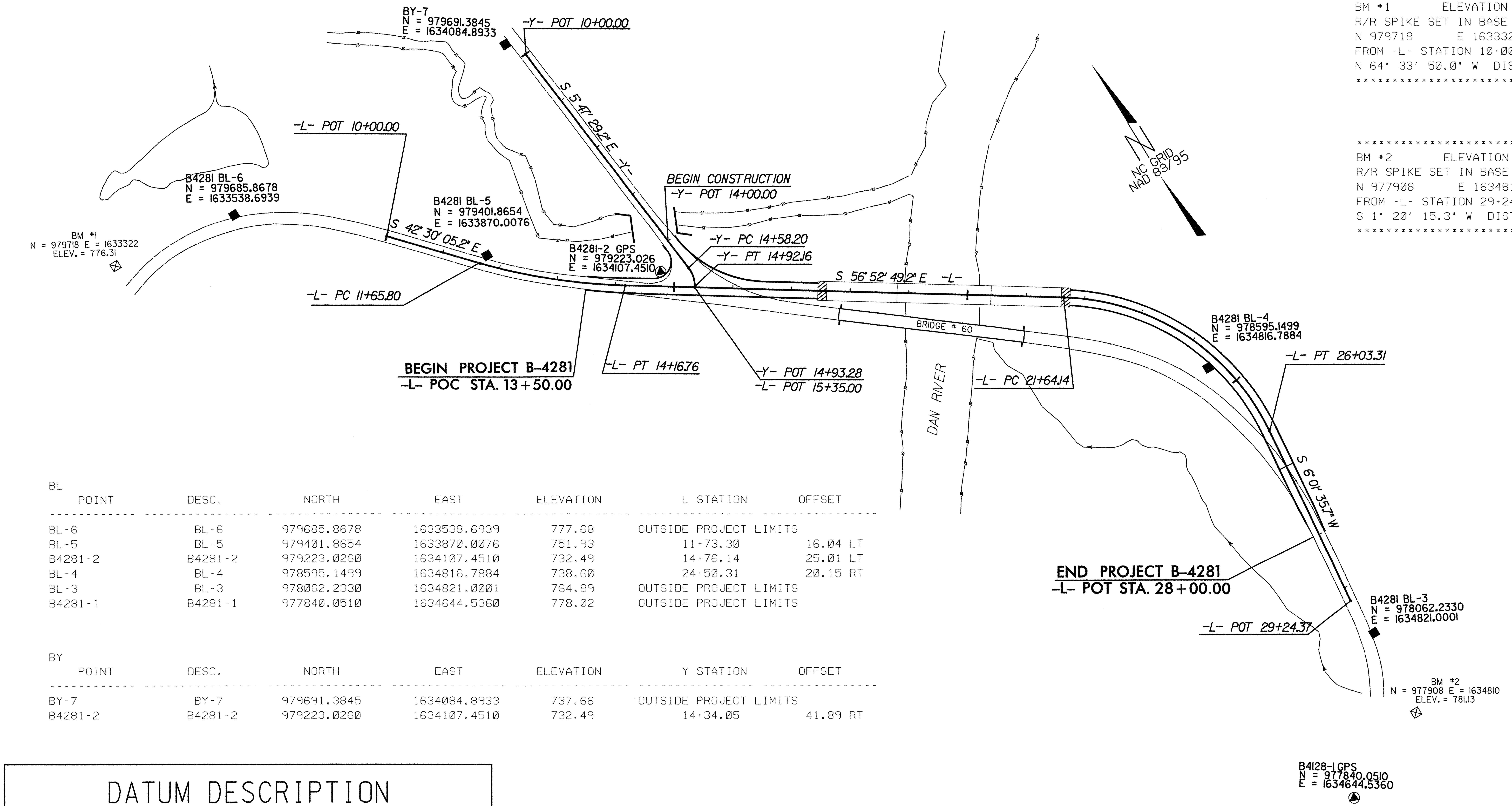
MISCELLANEOUS:

- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box — S
- Utility Unknown U/G Line — ?UTL
- U/G Tank; Water, Gas, Oil
- 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.

SURVEY CONTROL SHEET B-4281

****
BM #1 ELEVATION = 776.31
R/R SPIKE SET IN BASE OF 24" MAPLE
N 979718 E 1633322
FROM -L- STATION 10+00
N 64° 33′ 50.0" W DIST 464.68
****

****
BM #2 ELEVATION = 781.13
R/R SPIKE SET IN BASE OF 18" OAK
N 977908 E 1634810
FROM -L- STATION 29+24
S 1° 20′ 15.3" W DIST 221.44
****



BL

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
BL-6	BL-6	979685.8678	1633538.6939	777.68	OUTSIDE PROJECT LIMITS	
BL-5	BL-5	979401.8654	1633870.0076	751.93	11+73.30	16.04 LT
B4281-2	B4281-2	979223.0260	1634107.4510	732.49	14+76.14	25.01 LT
BL-4	BL-4	978595.1499	1634816.7884	738.60	24+50.31	20.15 RT
BL-3	BL-3	978062.2330	1634821.0001	764.89	OUTSIDE PROJECT LIMITS	
B4281-1	B4281-1	977840.0510	1634644.5360	778.02	OUTSIDE PROJECT LIMITS	

BY

POINT	DESC.	NORTH	EAST	ELEVATION	Y STATION	OFFSET
BY-7	BY-7	979691.3845	1634084.8933	737.66	OUTSIDE PROJECT LIMITS	
B4281-2	B4281-2	979223.0260	1634107.4510	732.49	14+34.05	41.89 RT

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B4281-2"
WITH NAD 1983/95 STATE PLANE GRID COORDINATES OF
NORTHING: 979223.026(ft) EASTING: 1634107.451(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 1.00005585
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B4281-2" TO -L- STATION 10+00.00 IS
N 51°05′25″ W 470.73
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

NOTE: DRAWING NOT TO SCALE

NOTES:

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

THE FILES TO BE FOUND ARE AS FOLLOWS:
B4281_LS_CONTROL_060203.HTML

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

△ INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.
PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.
NETWORK ESTABLISHED FROM NGS ONLINE POSITIONING SERVICE (OPUS)
SEE GPS CALIBRATION SHEET FOR HORIZONTAL AND VERTICAL COORDINATE VALUES.

6/2/99

9/14/2007
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Ko & Associates, P.C.

PROJ. REFERENCE NO.	SHEET NO.
B-4281	1-D

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CENTERLINE COORDINATE LIST

Point #	Chain	Station	Northing (Y)	Easting (X)
1	L	10+00.00	979518.6849	1633741.1623
2	L	10+50.00	979481.8219	1633774.9428
3	L	11+00.00	979444.9588	1633808.7232
4	L	11+50.00	979408.0958	1633842.5037
5	L	12+00.00	979371.6329	1633876.7108
6	L	12+50.00	979336.8368	1633912.6095
7	L	13+00.00	979303.8784	1633950.2023
8	L	13+50.00	979272.8401	1633989.3954
9	L	14+00.00	979243.7993	1634030.0908
10	L	14+50.00	979216.3627	1634071.8900
11	L	15+00.00	979189.0433	1634113.7666
12	L	15+50.00	979161.7238	1634155.6432
13	L	16+00.00	979134.4043	1634197.5197
14	L	16+50.00	979107.0848	1634239.3963
15	L	17+00.00	979079.7654	1634281.2728
16	L	17+50.00	979052.4459	1634323.1494
17	L	18+00.00	979025.1264	1634365.0260
18	L	18+50.00	978997.8069	1634406.9025
19	L	19+00.00	978970.4875	1634448.7791
20	L	19+50.00	978943.1680	1634490.6556
21	L	20+00.00	978915.8485	1634532.5322
22	L	20+50.00	978888.5290	1634574.4088
23	L	21+00.00	978861.2096	1634616.2853
24	L	21+50.00	978833.8901	1634658.1619
25	L	22+00.00	978805.2515	1634699.1205
26	L	22+50.00	978771.9223	1634736.3484
27	L	23+00.00	978734.2118	1634769.1305
28	L	23+50.00	978692.7085	1634796.9553
29	L	24+00.00	978648.0599	1634819.3886
30	L	24+50.00	978600.9628	1634836.0802
31	L	25+00.00	978552.1522	1634846.7699
32	L	25+50.00	978502.3897	1634851.2907
33	L	26+00.00	978452.4518	1634849.5720
34	L	26+50.00	978402.7267	1634844.3362
35	L	27+00.00	978353.0031	1634839.0867
36	L	27+50.00	978303.2794	1634833.8372
37	L	28+00.00	978253.5557	1634828.5877
38	L	28+50.00	978203.8321	1634823.3382
39	L	29+00.00	978154.1084	1634818.0887
40	Y	10+00.00	979659.0837	1634105.3240
41	Y	10+50.00	979609.3389	1634110.3694
42	Y	11+00.00	979559.5941	1634115.4148
43	Y	11+50.00	979509.8493	1634120.4602
44	Y	12+00.00	979460.1045	1634125.5056
45	Y	12+50.00	979410.3598	1634130.5510
46	Y	13+00.00	979360.6150	1634135.5964
47	Y	13+50.00	979310.8702	1634140.6418
48	Y	14+00.00	979261.1254	1634145.6872
49	Y	14+50.00	979211.3806	1634150.7326
50	Y	14+93.28	979169.9196	1634143.0802

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

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

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

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

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
B-4281	2

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 20774 ENGINEER STEPHEN R. WHITLEY
12-6-07

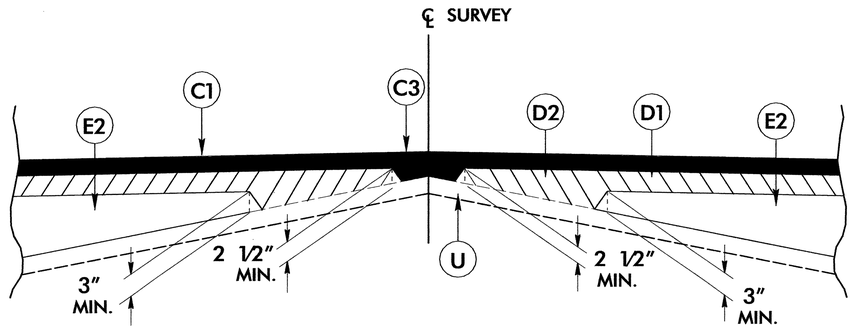
PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 13360 ENGINEER DOW-CHI CHEN
11/30/08

PAVEMENT SCHEDULE

C1	PROP. APPROX. 1¼" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 138 LBS. PER SQ. YD.
C2	PROP. APPROX. 2½" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 138 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 110 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 1½" IN DEPTH.
D1	PROP. APPROX. 2½" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2½" IN DEPTH OR GREATER THAN 4" IN DEPTH.
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
E2	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5½" IN DEPTH.
U	EXISTING PAVEMENT.
T	EARTH MATERIAL.
W	VARIABLE DEPTH ASPHALT PAVEMENT

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

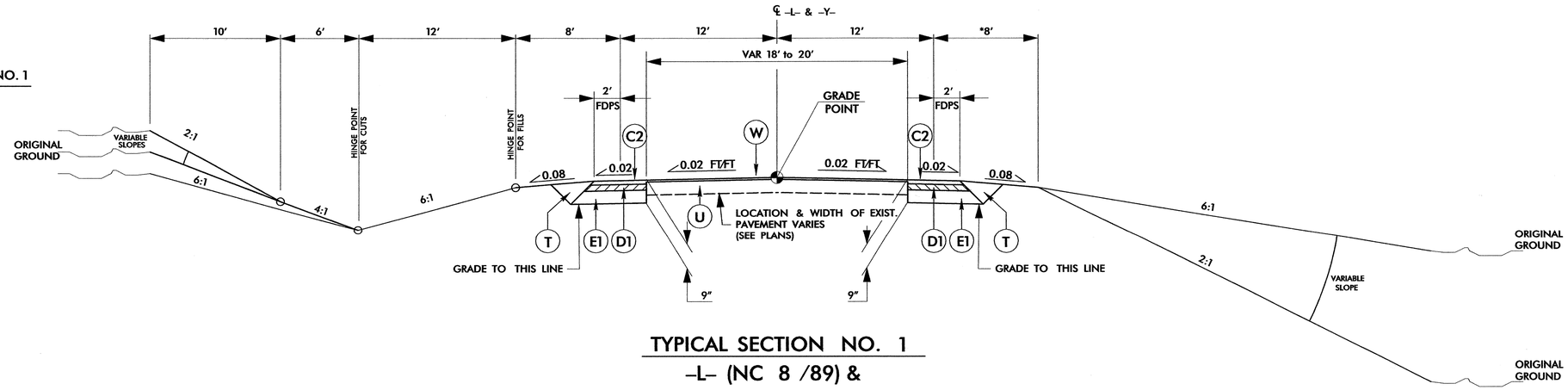


Detail Showing Method of Wedging

TRANSITION FROM EXISTING TO TYPICAL NO. 1
–L– STA. 13+50.00 TO 14+00.00

USE TYPICAL SECTION NO. 1
–L– STA. 14+00.00 TO 16+00.00
–L– STA. 26+50.00 TO 27+50.00
–Y– STA. 14+00.00 TO 14+81.19.00

* ADD 5' WITH GUARDRAIL



TYPICAL SECTION NO. 1
–L– (NC 8 /89) &
–Y– (NC 8)

12/19/2007
R:\Roadway\Proj\B4281_Rdy_typ.dgn
KO & Associates, P.C.

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
B-4281	2-A

ROADWAY DESIGN ENGINEER

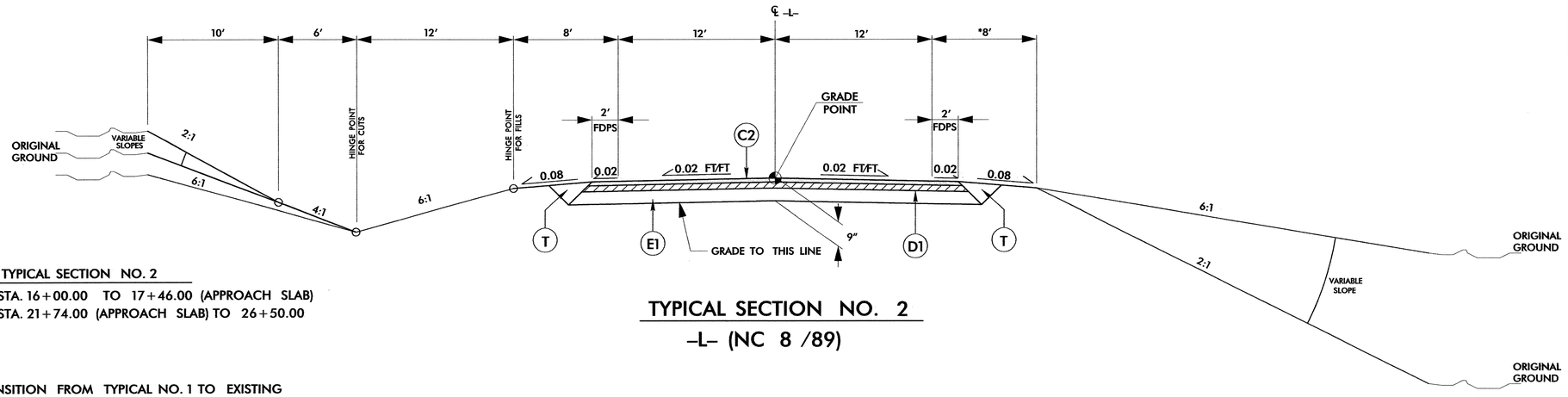
NORTH CAROLINA PROFESSIONAL SEAL 22606 ENGINEER DAVID C. WALLER
1-31-08

PAVEMENT DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 13684 ENGINEER DAVID CHI CHEN
2/1/08

6/2/99

* ADD 5' WITH GUARDRAIL



TYPICAL SECTION NO. 2
–L– (NC 8 /89)

USE TYPICAL SECTION NO. 2

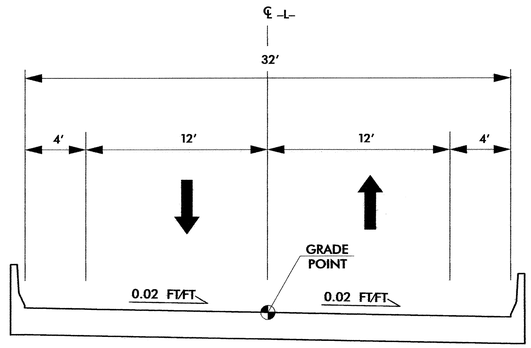
–L– STA. 16+00.00 TO 17+46.00 (APPROACH SLAB)
–L– STA. 21+74.00 (APPROACH SLAB) TO 26+50.00

TRANSITION FROM TYPICAL NO. 1 TO EXISTING

–L– STA. 27+50.00 TO 28+00.00

PAVEMENT SCHEDULE	
C1	PROP. APPROX. 1¼" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 138 LBS. PER SQ. YD.
C2	PROP. APPROX. 2½" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 138 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 110 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 1½" IN DEPTH.
D1	PROP. APPROX. 2½" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2½" IN DEPTH OR GREATER THAN 4" IN DEPTH.
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
E2	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5½" IN DEPTH.
U	EXISTING PAVEMENT.
T	EARTH MATERIAL.
W	VARIABLE DEPTH ASPHALT PAVEMENT

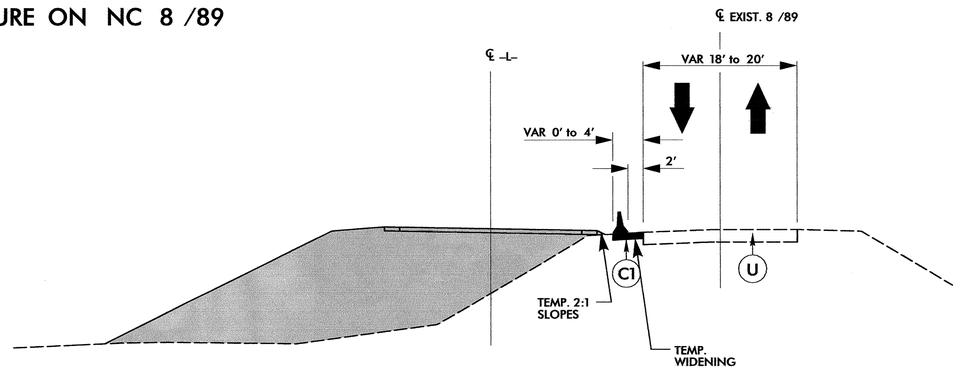
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



TYPICAL SECTION NO. 3
STRUCTURE ON NC 8 /89

USE TYPICAL SECTION NO. 4

–L– STA. 16+60 TO 17+83



TYPICAL SECTION NO. 4
–L– (NC 8 /89)

1/31/2008
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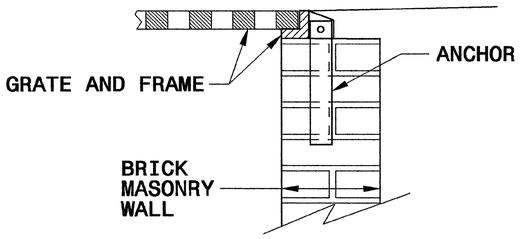
KO & Associates, P.A.

PROJECT REFERENCE NO.	SHEET NO.
B-4281	2-B

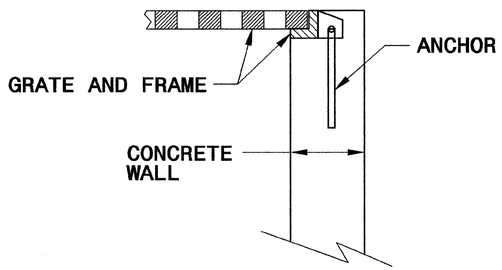
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
ANCHORAGE FOR FRAMES
BRICK/CONCRETE/PRECAST CONCRETE

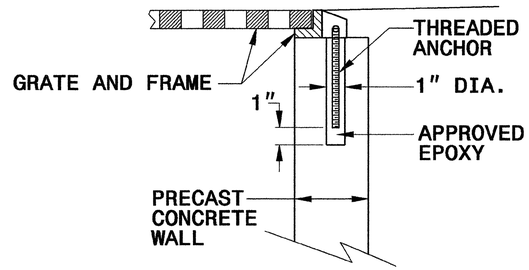
SHEET 1 OF 1
840D25



BRICK MASONRY CONSTRUCTION



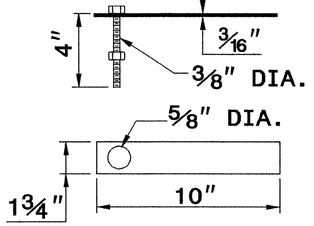
CONCRETE CONSTRUCTION



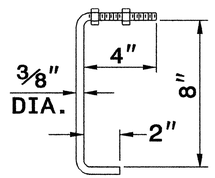
PRECAST CONCRETE CONSTRUCTION

DETAIL SHOWING ANCHORAGE OF FRAME FOR GRATED DROP INLET

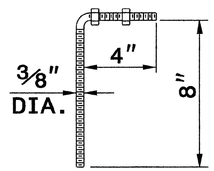
NOTE:
CONSTRUCT GRATED DROP INLET TO COINCIDE WITH NORMAL OR SUPERELEVATED SHOULDER OR PAVEMENT SLOPE.



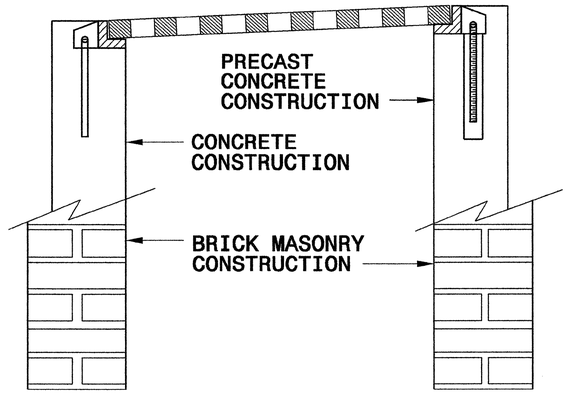
MASONRY ANCHOR
3/8" DIA. BOLT WITH PLATE



CONCRETE ANCHOR
3/8" DIA. BENT BAR



PRECAST CONCRETE ANCHOR
3/8" DIA. BENT BAR



FRAME AND GRATE INSTALLATION FOR NORMAL CROWN AND SUPERELEVATED SECTIONS

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

ENGLISH DETAIL DRAWING FOR
ANCHORAGE FOR FRAMES
BRICK/CONCRETE/PRECAST CONCRETE

SHEET 1 OF 1
840D25

NORTH CAROLINA PROFESSIONAL SEAL 022966 ENGINEER JOEL S. HOWERTON
1/21/08

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

SEE PLATE FOR TITLE

ORIGINAL BY:	2006 STD 840.25	DATE: 07/18/06
MODIFIED BY:	E.E. WARD	DATE: 9/25/06
CHECKED BY:		DATE:
FILE SPEC.:		

27-SEP-2006 08:59
S:\Contracts\Contracts\Special Details\ericward\stds\06 Stds to Special Details\B4025 Anchorage for Frames\0840d25.dgn
ericward
AT PS222293

PROJECT REFERENCE NO.	SHEET
B-4281	2-C

GEOTECHNICAL ENGINEER

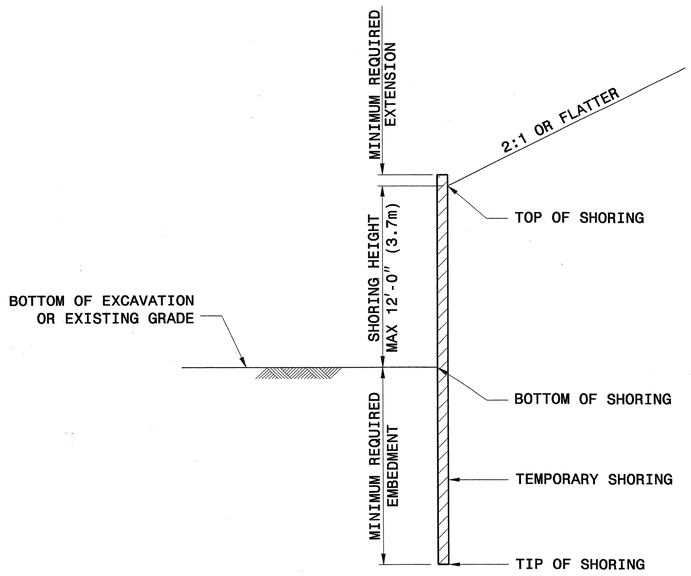
NORTH CAROLINA PROFESSIONAL SEAL 022246 ENGINEER SCOTT A. HIDDEN

Scott A. Hidden 3/29/07

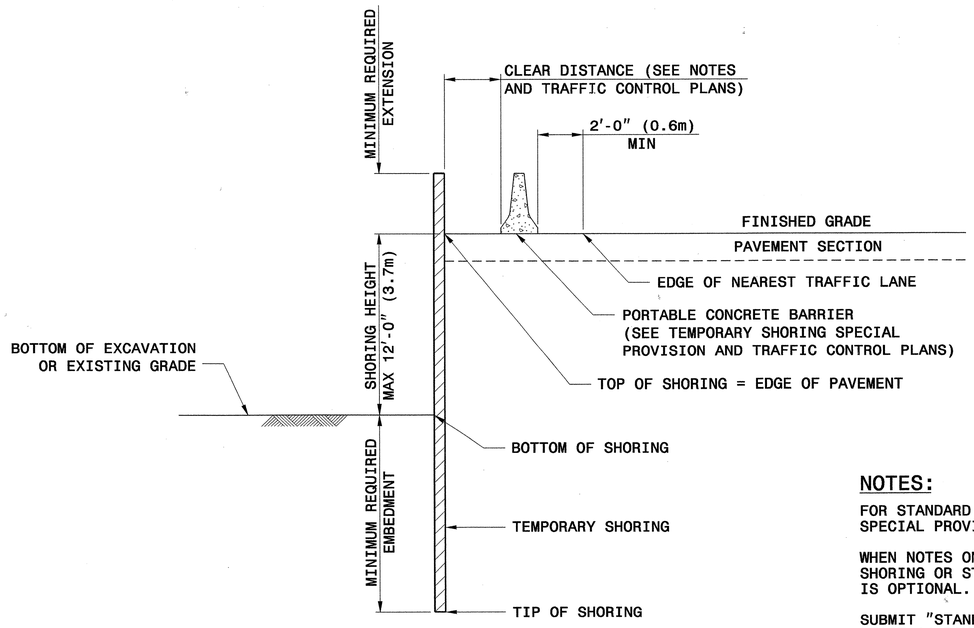
SIGNATURE DATE

ENGINEER

SIGNATURE DATE



SLOPE CASE



SURCHARGE CASE

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

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

NOTES:

FOR STANDARD TEMPORARY SHORING, SEE TEMPORARY SHORING SPECIAL PROVISION.

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

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

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

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

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

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

VERIFY GROUNDWATER ELEVATION BEFORE BEGINNING SHORING CONSTRUCTION.

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

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

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

CONTACT THE ENGINEER IF MINIMUM REQUIRED EMBEDMENT IS NOT ACHIEVED.

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL ENGINEERING UNIT

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD DRAWING NO. 1801.01

STANDARD TEMPORARY SHORING

DATE: 2-20-07

10/26/98

COMPUTED BY:	DATE:
CHECKED BY:	DATE:

SUMMARY OF QUANTITIES

PROJECT REFERENCE NO.	SHEET NO.
B-4281	3

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
ROADWAY SUMMARY OF QUANTITIES FOR CONTRACT - C201815

ItemNumber	Sec #	Quantity	Unit	Description
0000100000-N	800	Lump Sum		MOBILIZATION
0029000000-N	SP	Lump Sum		REINFORCED BRIDGE APPROACH FILL, STATION ************ (19+60.00)
0050000000-E	226	1	ACR	SUPPLEMENTARY CLEARING & GRUB-BING
0057000000-E	226	250	CY	UNDERCUT EXCAVATION
0063000000-N	SP	Lump Sum		GRADING
0080000000-E	SP	500	TON	CLASS IV SUBGRADE STABILIZA-TION
0106000000-E	230	16,550	CY	BORROW EXCAVATION
0134000000-E	240	25	CY	DRAINAGE DITCH EXCAVATION
0195000000-E	265	250	CY	SELECT GRANULAR MATERIAL
0196000000-E	270	500	SY	FABRIC FOR SOIL STABILIZATION
0199000000-E	SP	540	SF	TEMPORARY SHORING
0318000000-E	300	30	TON	FOUNDATION CONDITIONING MATE-RIAL, MINOR STRS
0343000000-E	310	24	LF	15" SIDE DRAIN PIPE
0372000000-E	310	36	LF	18" RC PIPE CULVERTS, CLASS III
0708000000-E	310	84	LF	15" BIT COAT CS PIPE CULVERTS, TYPE B 0.064" THICK
0714000000-E	310	76	LF	18" BIT COAT CS PIPE CULVERTS, TYPE B 0.064" THICK
0807000000-E	310	2	EA	18" BIT COAT CS PIPE ELBOWS, T YPE B 0.064" THICK
0995000000-E	340	27	LF	PIPE REMOVAL
0996000000-N	350	2	EA	PIPE CLEAN-OUT
1220000000-E	545	200	TON	INCIDENTAL STONE BASE
1489000000-E	610	600	TON	ASPHALT CONC BASE COURSE, TYPE B25.0B
1498000000-E	610	410	TON	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0B
1525000000-E	610	490	TON	ASPHALT CONC SURFACE COURSE, TYPE SF9.5A
1560000000-E	620	80	TON	ASPHALT BINDER FOR PLANT MIX, GRADE PG 64-22

ItemNumber	Sec #	Quantity	Unit	Description
2000000000-N	806	13	EA	RIGHT OF WAY MARKERS
2253000000-E	840	1	CY	PIPE COLLARS
2286000000-N	840	3	EA	MASONRY DRAINAGE STRUCTURES
2366000000-N	840	1	EA	FRAME WITH TWO GRATES, STD 840.24
2367000000-N	840	1	EA	FRAME WITH TWO GRATES, STD 840.29
2556000000-E	846	24	LF	SHOULDER BERM GUTTER
3030000000-E	862	650	LF	STEEL BM GUARDRAIL
3150000000-N	862	5	EA	ADDITIONAL GUARDRAIL POSTS
3270000000-N	SP	4	EA	GUARDRAIL ANCHOR UNITS, TYPE 350
3317000000-N	862	4	EA	GUARDRAIL ANCHOR UNITS, TYPE B-77
3635000000-E	876	200	TON	RIP RAP, CLASS II
3649000000-E	876	20	TON	RIP RAP, CLASS B
3656000000-E	876	775	SY	FILTER FABRIC FOR DRAINAGE
3659000000-N	SP	1	EA	PREFORMED SCOUR HOLES WITH LEVEL SPREADER APRON
4025000000-E	901	41.4	SF	CONTRACTOR FURNISHED, TYPE *** SIGN (D)
4025000000-E	901	54.19	SF	CONTRACTOR FURNISHED, TYPE *** SIGN (E)
4025000000-E	901	75.31	SF	CONTRACTOR FURNISHED, TYPE *** SIGN (F)
4072000000-E	903	405	LF	SUPPORTS, 3-LB STEEL U-CHANNEL
4096000000-N	904	6	EA	SIGN ERECTION, TYPE D
4102000000-N	904	11	EA	SIGN ERECTION, TYPE E
4108000000-N	904	5	EA	SIGN ERECTION, TYPE F
4116100000-N	904	3	EA	SIGN ERECTION, RELOCATE, TYPE **** (GROUND MOUNTED) (E)
4155000000-N	907	19	EA	DISPOSAL OF SIGN SYSTEM, U-CHANNEL

ItemNumber	Sec #	Quantity	Unit	Description
4400000000-E	1110	72	SF	WORK ZONE SIGNS (STATIONARY)
4405000000-E	1110	144	SF	WORK ZONE SIGNS (PORTABLE)
4410000000-E	1110	52	SF	WORK ZONE SIGNS (BARRICADE MOUNTED)
4430000000-N	1130	56	EA	DRUMS
4435000000-N	1135	30	EA	CONES
4445000000-E	1145	32	LF	BARRICADES (TYPE III)
4450000000-N	1150	664	HR	FLAGGER
4465000000-N	1160	1	EA	TEMPORARY CRASH CUSHIONS
4470000000-N	1160	1	EA	RESET TEMPORARY CRASH CUSHIONS
4480000000-N	1165	1	EA	TMIA
4485000000-E	1170	260	LF	PORTABLE CONCRETE BARRIER
4516000000-N	1180	56	EA	SKINNY DRUM
4650000000-N	1251	72	EA	TEMPORARY RAISED PAVEMENT MARKERS
4685000000-E	1205	2,180	LF	THERMOPLASTIC PAVEMENT MARKING LINES (4", 90 MILS)
4686000000-E	1205	1,980	LF	THERMOPLASTIC PAVEMENT MARKING LINES (4", 120 MILS)
4710000000-E	1205	42	LF	THERMOPLASTIC PAVEMENT MARKING LINES (24", 120 MILS)
4770000000-E	1205	1,720	LF	COLD APPLIED PLASTIC PAVEMENT MARKING LINES, TYPE ** (4") (3, PERMANENT WET REFLECTIVE)
4810000000-E	1205	11,852	LF	PAINT PAVEMENT MARKING LINES (4")
4835000000-E	1205	84	LF	PAINT PAVEMENT MARKING LINES (24")
4900000000-N	1251	5	EA	PERMANENT RAISED PAVEMENT MARKERS
4905000000-N	1253	13	EA	SNOWPLOWABLE PAVEMENT MARKERS
6000000000-E	1605	1,200	LF	TEMPORARY SILT FENCE
6006000000-E	1610	90	TON	STONE FOR EROSION CONTROL, CLASS A
6009000000-E	1610	145	TON	STONE FOR EROSION CONTROL, CLASS B

ItemNumber	Sec #	Quantity	Unit	Description
6012000000-E	1610	280	TON	SEDIMENT CONTROL STONE
6015000000-E	1615	2.5	ACR	TEMPORARY MULCHING
6018000000-E	1620	100	LB	SEED FOR TEMPORARY SEEDING
6021000000-E	1620	0.5	TON	FERTILIZER FOR TEMPORARY SEED-ING
6024000000-E	1622	375	LF	TEMPORARY SLOPE DRAINS
6027000000-N	1622	4	EA	INLET PROTECTION AT TEMPORARY SLOPE DRAINS
6029000000-E	SP	475	LF	SAFETY FENCE
6030000000-E	1630	850	CY	SILT EXCAVATION
6036000000-E	1631	825	SY	MATTING FOR EROSION CONTROL
6037000000-E	SP	25	SY	COIR FIBER MAT
6038000000-E	SP	75	SY	PERMANENT SOIL REINFORCEMENT MAT
6042000000-E	1632	150	LF	1/4" HARDWARE CLOTH
6070000000-N	SP	8	EA	SPECIAL STILLING BASINS
6071030000-E	SP	175	LF	COIR FIBER BAFFLES
6071050000-E	SP	3	EA	**" SKIMMER (1-1/2")
6071050000-E	SP	1	EA	**" SKIMMER (2,5")
6084000000-E	1660	4	ACR	SEEDING & MULCHING
6087000000-E	1660	1.5	ACR	MOWING
6090000000-E	1661	50	LB	SEED FOR REPAIR SEEDING
6093000000-E	1661	0.25	TON	FERTILIZER FOR REPAIR SEEDING
6096000000-E	1662	50	LB	SEED FOR SUPPLEMENTAL SEEDING
6108000000-E	1665	3	TON	FERTILIZER TOPDRESSING
6114000000-N	SP	2	HR	SPECIALIZED HAND MOWING
6117000000-N	SP	12	EA	RESPONSE FOR EROSION CONTROL
6123000000-E	1670	0.4	ACR	REFORESTATION

9/14/2007
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COMPUTED BY: YTM	DATE: 12/19/07
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PROJECT REFERENCE NO.	SHEET NO.
B-4281	3-A

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

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

STATION	LOCATION (LT,RT, OR CL)	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL
17+27	RT	1		732.41			
17+27	LT/RT	1	2		727.40	716.72	
17+27	RT	3	1		727.66	727.40	X
23+50	LT	4					
24+50	LT	5		740.92			
24+50	LT	5	6		738.17	729.10	
27+50	LT	7		753.50			
27+50	LT	8	7		751.60	749.34	
27+50	LT	9	7		754.20	750.75	
TOTAL							

STATION (SIZE / THICKNESS OR GAUGE)	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE) 12"	15"	18"	24"	30"	36"	42"	48"	BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHRWISE) 12" .064	15" .064	18" .064	24" .064	30" .079	36" .079	42" .109	48" .109	CLASS III R.C. PIPE OR ALUMINIZED C.S. PIPE, TYPE IR OR HDPE PIPE, TYPE S OR D 12"	15"	18"	24"	30"	36"	42"
17+27																							
17+27											68												
17+27			32																				
23+50																							
24+50																							
24+50										84													
27+50																							
27+50			4																				
27+50											8												
TOTAL			36							84	76												

STATION	15" SIDE DRAIN PIPE	18" SIDE DRAIN PIPE	24" SIDE DRAIN PIPE	ENDWALLS STD. 838.01, STD. 838.11 OR STD. 838.80 (UNLESS NOTED OTHERWISE) CU. YDS. 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		G.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.29	T.B.D.I. STD. 840.35	G.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	G.D.I. TYPE 'B' STD. 840.18 OR 840.27	JB STD. 840.31 OR 840.32	PIPE CLEANOUT (EA.)	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" C.Y. STD 840.72	CONC. & BRICK PIPE PLUG, C.Y. STD. 840.71	PIPE REMOVAL LIN.FT.	REMARKS
17+27						1								1	1									
17+27																				2-18"				PSH
17+27																					.4465			
23+50	24																							
24+50						1										1	1							
24+50																							26.5	
27+50						1												1	1					
27+50																								
27+50																			1					
TOTAL	24					3								1	1	1	1	1	2	2-18"	.4465		26.5	
																			SAY		1		27	

ABBREVIATIONS

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

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

GUARDRAIL SUMMARY

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH STRAIGHT	SHOP CURVED	DOUBLE FACED	WARRANT POINT APPROACH END	TRAILING END	"N" DIST. FROM E.O.L.	TOTAL SHOUL. WIDTH	FLARE LENGTH APPROACH END	TRAILING END	W APPROACH END	TRAILING END
-L-	15+66.25	17+60	RT	193.75			17+60		4	11	175		3.5	
-L-/-Y-	-Y- 14+10	-L- 17+60	LT	281.25				-Y- 14+10	4	11	262.50		5.25	
-L-	21+60	24+28.75	RT	268.75				23+00	4	11		250		5.0
-L-	21+60	23+41.25	LT	181.25			21+60		4	11		161.25		3.2
			SUB-TOTAL	925										
			- ANCHOR DEDUCTIONS	275										
			GRAND-TOTAL	650										
			SAY	650							(ADDITIONAL GUARDRAIL POSTS = 5)			

SURVEY LINE	ANCHORS XI MOD	XI	GRAU 350	B-77	III	CAT-1	VI MOD	BIC	AT-1	IMPACT ATTENUATOR TYPE 350 EA	G	NG	SINGLE FACED GUARDRAIL	REMOVE EXISTING GUARDRAIL	REMOVE AND STOCKPILE EXISTING GUARDRAIL	REMARKS
-L-			1	1												
-L-/-Y-			1	1												
-L-			1	1												
-L-			1	1												ANCHOR DEDUCTIONS:
			4	4												TYPE B-77 4 x 18.75' = 75.0
																GRAU 350 4 x 50' = 200.0
																TOTAL = 275.0
			4	4												

SUMMARY OF EARTHWORK
IN CUBIC YARDS

LOCATION	UNCLASSIFIED EXCAVATION	UNDERCUT	EMBT+%	BORROW	WASTE
SUMMARY NO. 1					
-L- 13+50 TO 18+50	55		3762	3707	
-Y- 14+00 TO 14+50	0		208	208	
TOTAL SUMMARY NO. 1	55		3970	3915	
SUMMARY NO. 2					
-L- 20+50 TO 28+00	455		12242	11787	
TOTAL SUMMARY NO. 2	455		12242	11787	
SUMMARY NO. 3					
-L- 15+50 TO 18+50 (Removal of Existing Roadbed)	3225				3225
TOTAL SUMMARY NO. 3	3225				3225
SUMMARY NO. 4					
-L- 20+50 TO 26+00 (Removal of Existing Roadbed)	5484				5484
TOTAL SUMMARY NO. 4	5484				5484
SUB-TOTAL SUMMARY NOS. 1 Thru 4	9219		16212	15702	8709
LOSS DUE TO CLEARING AND GRUBBING	-25			25	
PROJECT TOTALS	9194		16212	15727	8709
EST. 5% FOR REPLACING TOPSOIL ON BORROW PIT				786	
GRAND TOTAL	9194			16513	
SAY	9200			16550	

EST. UNDERCUT EXCAVATION = 250 CY
EST. SELECT MATERIAL CL II or III = 250 CY
EST. SELECT MATERIAL CL IV = 500 CY

Note: Earthwork quantities are calculated by the Roadway Design Unit. These earthwork quantities are based in part on subsurface data provided by the Geotechnical Engineering Unit.

SUMMARY OF PAVEMENT REMOVAL

SURVEY LINE	STATION TO STATION	LOCATION	ASPHALT REMOVAL (SY)
-L-	14+20 to 17+75 (EXIST. BRIDGE)	RT	630
-L-	21+00 (EXIST. BRIDGE) to 26+50	RT	1173
	TOTAL		1803
	SAY		1810

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

6/21/00

1/31/2008
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10/26/98

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CHECKED BY:	SRW	DATE:	12/19/07

PROJECT REFERENCE NO.	SHEET NO.
B-4281	3-B

PARCEL INDEX SHEET

PARCEL NO.	R/W SHEET NO.	PROPERTY OWNERS NAME
1	4	Coy D. Morefield & Clarice S. Morefield
3	4	Paul Bennett & wife Gladys Bennett
4	4	Heirs of W.C. Nelson, Jr. ET AL
5	4 & 5	Jesse O. Sams & wife Jerelene G. Sams
6	4 & 5	Zennie R. Puckett & wife Peggy R. Puckett

12/8/2007
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KA & Associates, P.A.


KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066
PROJECT REFERENCE NO.
B-4281
SHEET NO.
4
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 22606 ENGINEER DAVID C. WALLER
3-14-08
NORTH CAROLINA PROFESSIONAL SEAL 19732 ENGINEER SHIHCHEN PUH
3-14-08
-Y-
PI Sta 14+75.86
△ = 38° 54' 40.0" (RT)
D = 114° 35' 29.6"
L = 33.96'
T = 17.66'
R = 50.00'
-L-
PI Sta 12+91.94
△ = 14° 22' 44.0" (LT)
D = 5° 43' 46.5"
L = 250.96'
T = 126.14'
R = 1,000.00'
SE = 0.04
-L-
PI Sta 24+08.81
△ = 62° 54' 24.9" (RT)
D = 14° 19' 26.2"
L = 439.17'
T = 244.67'
* R = 400.00'
SE = 0.04
DETAIL C
BANK STABILIZATION
(Not to Scale)
Natural Ground
Filter Fabric
Type of Liner= CL II Rip-Rap
CL II RIP RAP FILTER FABRIC
STA. 18+80 80 TONS 80 S.Y.
STA. 20+40 100 TONS 100 S.Y.
NC GRID NAD 83/95
BY-7 POT 5+00.00
-Y- POT 10+00.00
PAUL BENNETT AND WIFE GLADYS BENNETT DB III PG 287
COY D. MOREFIELD AND WIFE CLARICE S. MOREFIELD DB 562 PG 75 PB 9 PG 32
JESSE O. SAMS AND WIFE JERELENE G. SAMS DB 300 PG 515
HEIRS OF W.C. NELSON, JR. ET AL WB III-2E
ZENNIE R. PUCKETT AND WIFE PEGGY R. PUCKETT DB 318 PG 1545
BEGIN BRIDGE -L- POT STA. 17+60.00
BEGIN APPROACH SLAB -L- POT STA. 17+46.00
BEGIN CONSTRUCTION -Y- POT 14+00.00
-Y- PC 14+58.20
-Y- PT 14+92.16
END APPROACH SLAB -L- POT STA. 21+74.00
END BRIDGE -L- POT STA. 21+60.00
-L- POT 10+00.00
-L- PC 11+65.80
S 42° 30' 05.2" E
S 5° 41' 29.2" E
S 56° 52' 49.2" E
S 33° 07' 10.8" W
-L- PC 21+64.14
-MATCHLINE- STA. 22+00 SEE SHEET NO. 5
BL-5 PINC 9+36.38
-L- STA 11+73.29 (16.03' LT)
B4281-2 GPS PINC 12+33.64 = BY POT 9+68.90
-L- STA 14+76.14 (25.01' LT)
-Y- POT 14+93.28
-L- POT 15+35.00
BEGIN PROJECT B-4281
-L- POC STA. 13+50.00
(BEARING)
S 53° 03' 19.8" E
-L- PT 14+16.76
TOE PROTECTION w/PSRM SEE DETAIL A
100' TAPER LT & RT
BANK STABILIZATION, SEE DETAIL C
CLASS II RIP RAP UPTO ELEV. 728.0 (STRUCTURE PAY ITEM)
PREFORMED SCOUR HOLE SEE DETAIL B
BRIDGE
DECK DRAIN (TYP)
WOODS
DAN RIVER
DETAIL A
TOE PROTECTION
(Not to Scale)
Natural Ground
2:1 OR FLATTER
Fill Slope
d= 1 Ft.
Type of Liner= PSRM
FROM STA. 13+50 TO STA. 15+00 RT
PREFORMED SCOUR HOLE
W/ LEVEL SPREADER
DETAIL B
PLAN VIEW
SECTION A-A
B= 4 Ft.
D= 1 Ft.
W= 4 Ft.
d= 0.5 Ft.
5/05
STA. 17+27 LT
PAVEMENT - BRIDGE RELATIONSHIP SKETCH
* GUARDRAIL ANCHORS
-Y-
NC 8
2008 ADT
2028 ADT
2000
3400
100
100
960
1600
1400
2100
-L-
NC 89
-L-
NC 8/89
3300
5100
PROJECTED TRAFFIC VOLUMES
LEGEND
PAVED SHOULDER
APPROACH SLAB
PAVEMENT REMOVAL
NOTE:
• DESIGN EXCEPTION REQUIRED FOR HORIZONTAL CURVE RADIUS
FOR -L- PROFILE, SEE SHEET NO. 6
FOR -Y- PROFILE, SEE SHEET NO. 6
SEE S-1 THRU S- _ FOR STRUCTURE PLANS
3/13/2008
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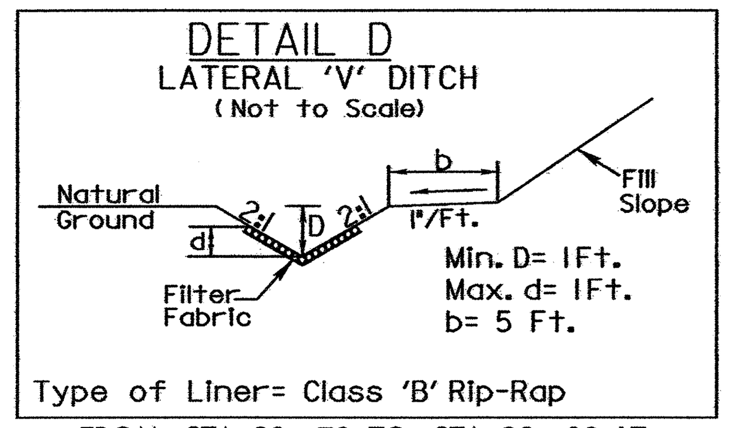
KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
B-4281	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
SEAL 20774 STEPHEN R. WHITLEY 1-24-08	SEAL 19732 SHIHCHEN FUH 1-24-08

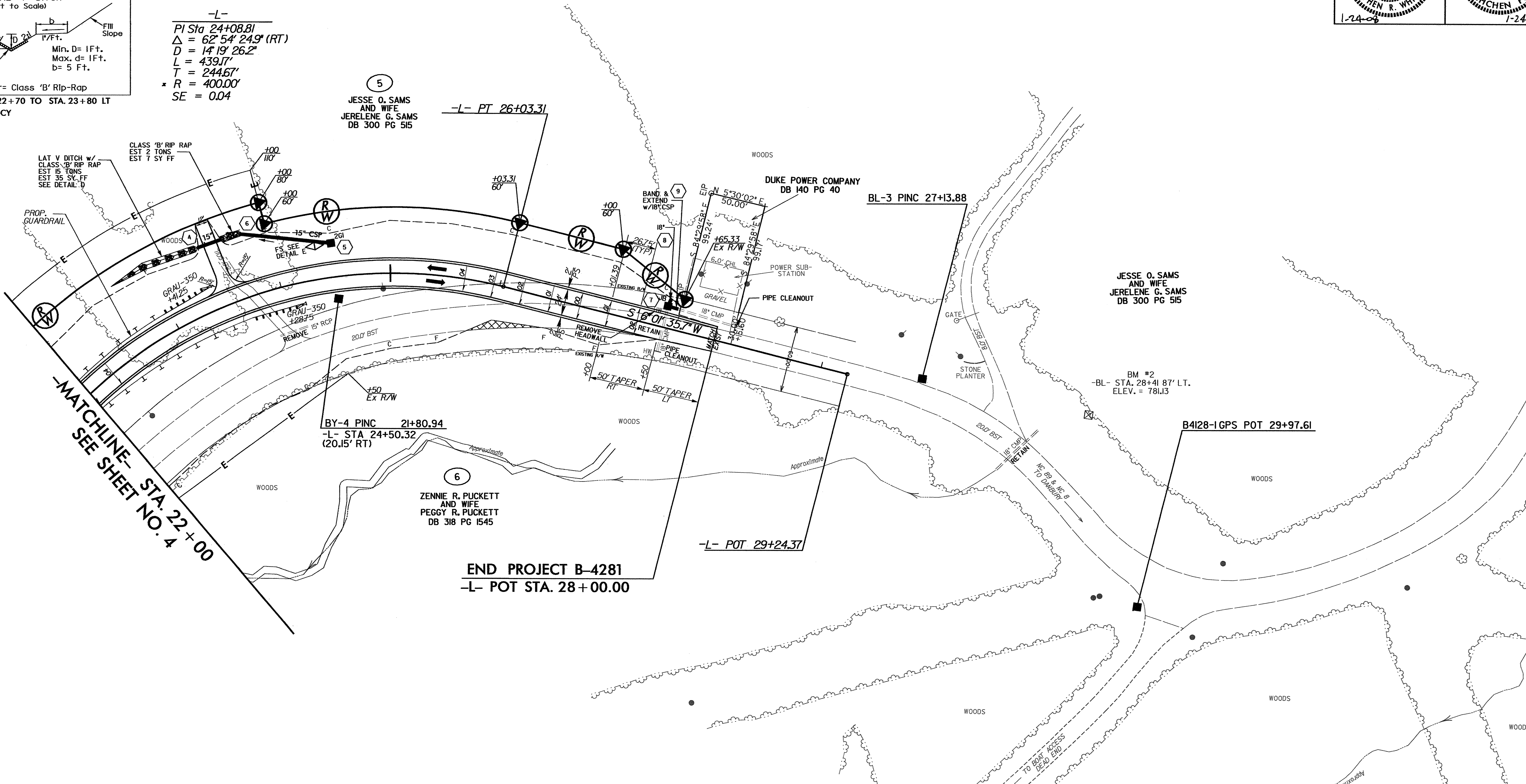
NC GRID NAD 83/95

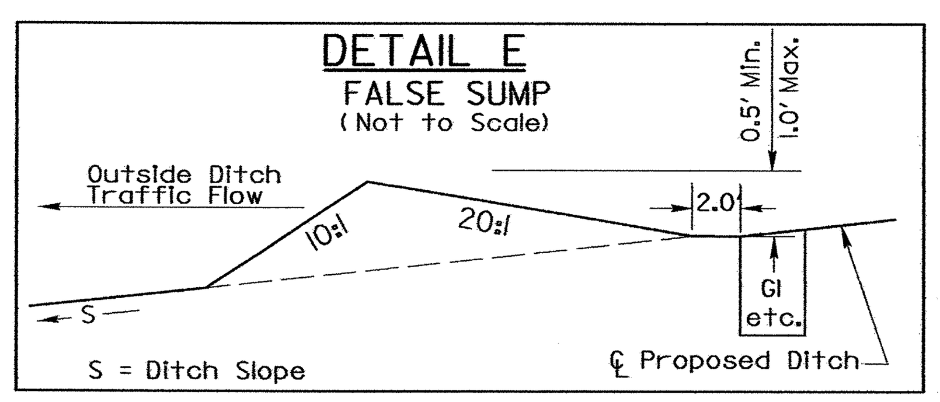
25



FROM STA. 22+70 TO STA. 23+80 LT
DDE = 25 CY

-L-
PI Sta 24+08.81
Δ = 62° 54' 24.9" (RT)
D = 14° 19' 26.2"
L = 439.17'
T = 244.67'
* R = 400.00'
SE = 0.04





STA. 24+40 LT

NOTE:
* DESIGN EXCEPTION REQUIRED FOR HORIZONTAL CURVE RADIUS

LEGEND
- PAVED SHOULDER
- PAVEMENT REMOVAL

FOR -L- PROFILE, SEE SHEET NO. 6

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1/23/2008
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5/28/99

BM.#2 EL = 781.13'
RR SPIKE IN 18" OAK
87' RT OF -BL- STA 28+41

-L-
FOR PLAN, SEE SHEETS NO.4 & 5

KO & ASSOCIATES, P.C.
Consulting Engineers
5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
B-4281	6

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 20774 ENGINEER STEPHEN R. WHITLEY
12-20-07

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 19732 ENGINEER CHINCHEN FU
12-20-07

BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	= 20000	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 727.0	FT
BASE DISCHARGE	= 24000	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 728.8	FT
OVERTOPPING DISCHARGE	= 32100	CFS
OVERTOPPING FREQUENCY	= 500 ±	YRS
OVERTOPPING ELEVATION	= 732.4	FT
DATE OF SURVEY	= 2-25-04	
W.S. ELEVATION AT DATE OF SURVEY	= 704	FT

PI = 15+60.00
EL = 731.39'
VC = 27.2'
* K = 40
DS = 32 MPH

BEGIN GRADE STA 13+50.00 EL 743.99 (INCLUDES 1 1/4" OVERLAY)
(-)6.0000%
PVC STA 14+24.00 EL 739.55
PVT STA 16+96.00 EL 732.48
(+)0.8019%
PVC STA 21+22.00 EL 735.90

PI = 23+40.00
EL = 737.65'
VC = 436'
K = 136
DS = 60 MPH

(+)0.8019%
(+)4.0054%
PROPOSED GRADE
+10.7%
-16.67%
EXISTING GROUND ALONG ℄ OF -L-
BANK STABILIZATION w/ CLASS II RIP RAP AND FILTER FABRIC (TYP.)
BEG. DITCH 22+70 LT EL 717.50
23+00 LT EL 719.50
END DITCH 23+90 LT EL 729.10

* DESIGN EXCEPTION REQUIRED FOR VERTICAL CURVE 'K' FACTOR

-L-
FOR PLAN, SEE SHEET NO.5

PROPOSED GRADE
(+)4.0054%
EX. 18" CSP
EXISTING GROUND
PVT STA 25+58.00 EL 746.38
END GRADE STA 28+00.00 EL 756.07' (INCLUDES 1 1/4" OVERLAY)

PIPE HYDRAULIC DATA

STA 27+52

DRAINAGE AREA	= 2.90	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 6.0	CFS
DESIGN HW ELEVATION	= 753.15	FT
100 YEAR DISCHARGE	= 7.0	CFS
100 YEAR HW ELEVATION	= 753.34	FT
OVERTOPPING FREQUENCY	= 200+	YRS
OVERTOPPING DISCHARGE	= 9.92	CFS
OVERTOPPING ELEVATION	= 754.10	FT

EXTEND 18" CSP
INV In = 751.64 INV out = 744.3

-Y-
FOR PLAN, SEE SHEET NO.4

EXISTING GROUND
BEGIN GRADE PVC STA 14+00.00 EL 730.07' (INCLUDES 1 1/4" OVERLAY)
PVT STA 14+40.00 EL 731.90
STA 14+81.19 EP EL 734.23
END GRADE STA 14+93.28 -Y- STA 15+35.00 -L- EL 737.43
(+)15.6545%
(+)16543%
(+)1.5000%
PROPOSED GRADE

PI = 14+20.00
EL = 730.77'
VC = 40'
K = 19
DS = 20 MPH

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