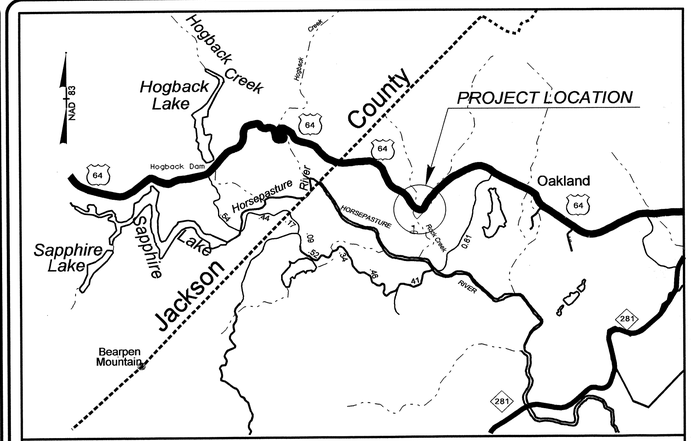
TIP PROJECT: B-5010

CONTRACT: C203092

STRUCTURES



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

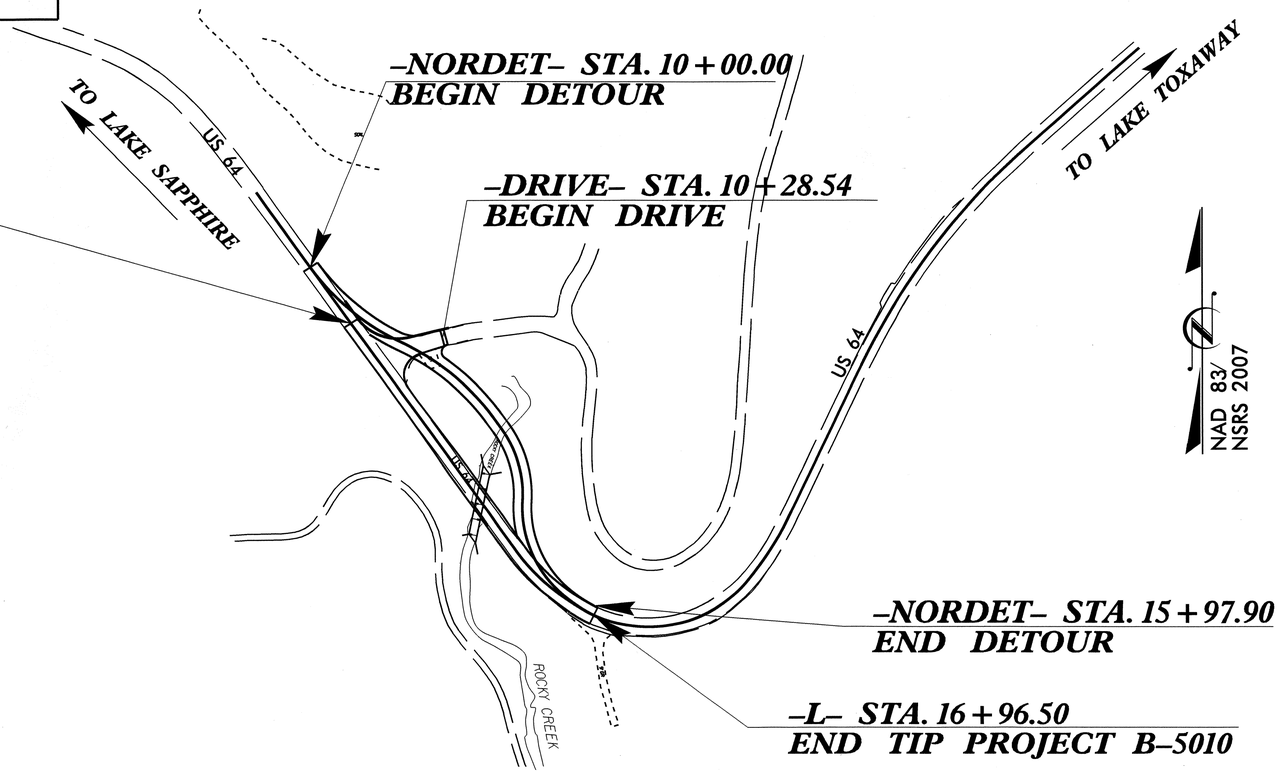
TRANSYLVANIA COUNTY

LOCATION: BRIDGE NO. 27 ON US 64 OVER ROCKY CREEK

TYPE OF WORK: GRADING, PAVING, DRAINAGE, GUARDRAIL, CULVERT, RETAINING WALL AND STRUCTURE REMOVAL

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5010		

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
41536.1.1	BRSTP-0064(99)	P.E.
41536.2.1	BRSTP-0064(99)	R/W & UTIL
41536.3.1	BRSTP-0064(99)	CONST.



–NORDET– STA. 10 + 00.00
BEGIN DETOUR

–DRIVE– STA. 10 + 28.54
BEGIN DRIVE

–L– STA. 12 + 06.44
BEGIN TIP PROJECT B-5010

–NORDET– STA. 15 + 97.90
END DETOUR

–L– STA. 16 + 96.50
END TIP PROJECT B-5010

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DESIGN DATA

ADT 2011 = 5435
ADT 2035 = 8600
DHV = 11 %
D = 65 %
T = 26 % *
V = 25 MPH
* TTST 3 DUAL 23
STATEWIDE TIER
FUNC. CLASS = RURAL MINOR ARTERIAL

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-5010 = 0.093 MILE

TOTAL LENGTH TIP PROJECT B-5010 = 0.093 MILE

Prepared in the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610

2012 STANDARD SPECIFICATIONS

LETTING DATE :
APRIL 16, 2013

Q.H. NGUYEN, P.E.
PROJECT ENGINEER

J.R. DUGGINS, JR., P.E.
PROJECT DESIGN ENGINEER

STRUCTURE MANAGEMENT UNIT
1000 BIRCH RIDGE DR.
RALEIGH, N.C. 27610

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

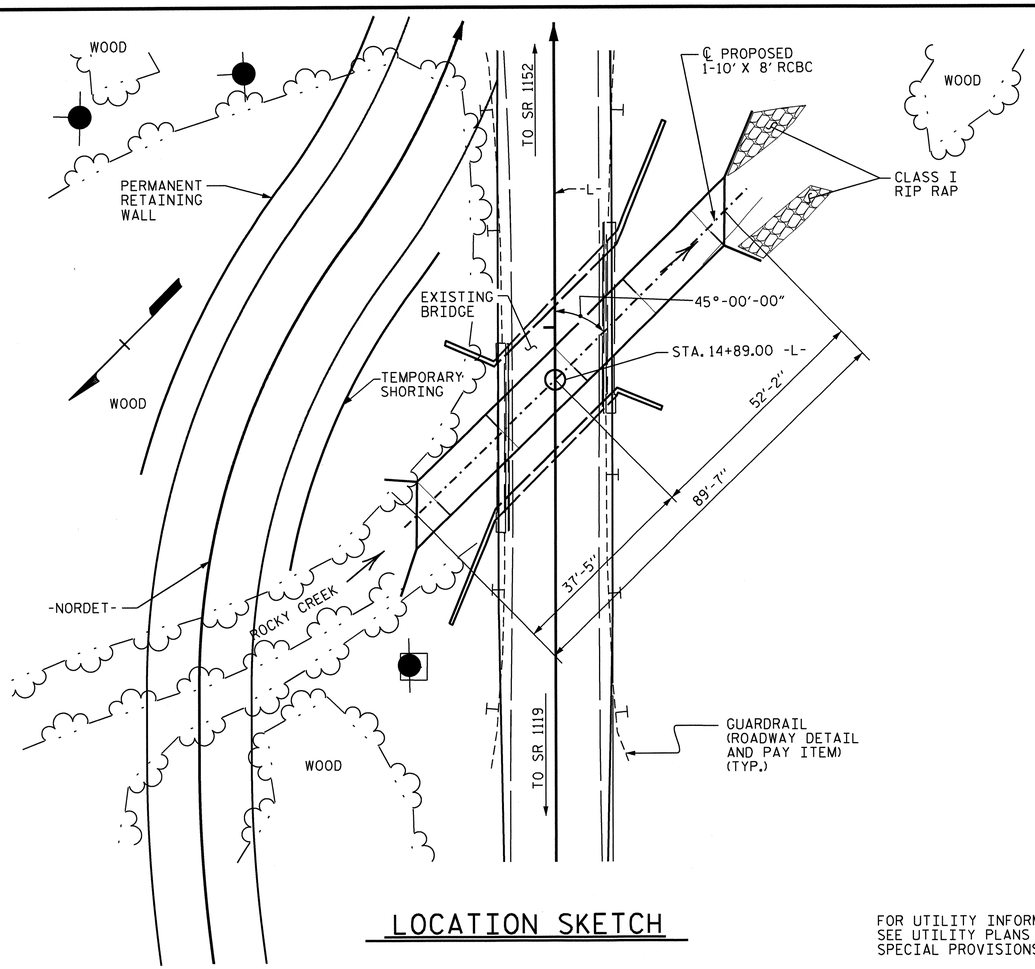
P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR DATE

F. A. PROJECT NO. BRSTP-0064(99)

B.M. #2, 8" SPIKE SET IN ROOT OF 8" POPLAR TREE, STA. 16+98 -L-, 38' RIGHT, ELEV. 2997.59', NAD 83



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

DESIGN FILL ----------7.09'

CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:

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

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

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

TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FEET. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

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

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

THE EXISTING STRUCTURE CONSISTING OF ONE SPAN AT 32'-9" WITH A REINFORCED CONCRETE THRU GIRDER SUPERSTRUCTURE WITH A CLEAR ROADWAY WIDTH OF 20'-0" ON A SUBSTRUCTURE CONSISTING OF REINFORCED CONCRETE ABUTMENTS AND LOCATED AT THE PROPOSED STRUCTURE SHALL BE REMOVED.

THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING BRIDGE SUBSTRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED SO AS NOT TO ALLOW DEBRIS TO FALL INTO THE WATER. THE CONTRACTOR SHALL REMOVE THE BRIDGE AND SUBMIT PLANS FOR DEMOLITION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

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

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.

FOR TEMPORARY ON SITE DETOUR, SEE ROADWAY PLANS.

HYDRAULIC DATA

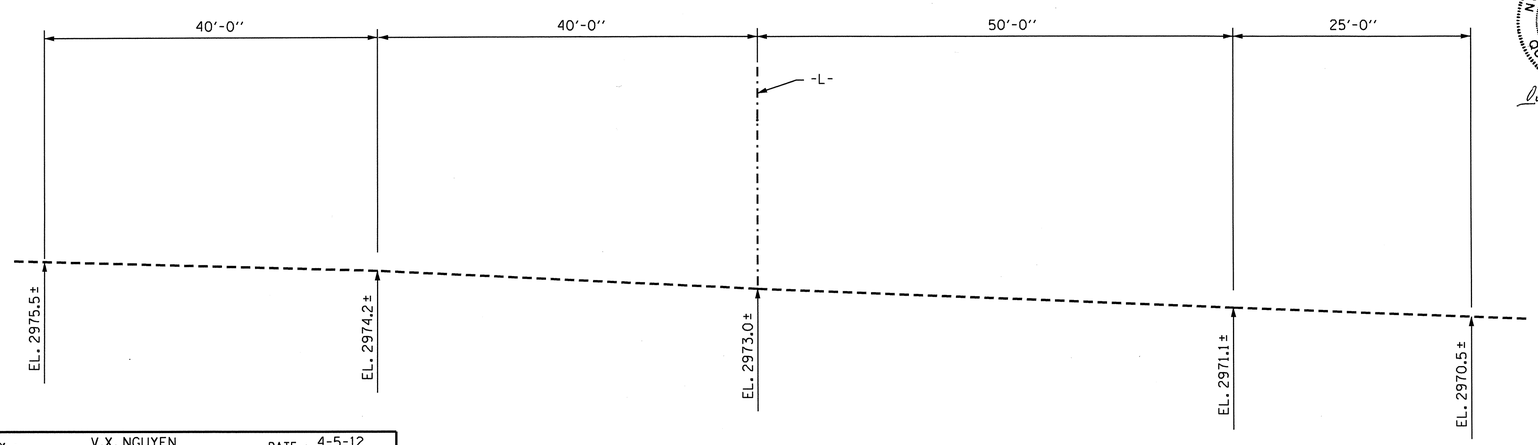
DESIGN DISCHARGE	= 410 CFS
FREQUENCY OF DESIGN FLOOD	= 25 YRS.
DESIGN HIGH WATER ELEVATION	= 2980.2
DRAINAGE AREA	= 0.57 SQ. MI.
BASE DISCHARGE (0100)	= 500 CFS
BASE HIGH WATER ELEVATION	= 2981.1

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= 895 CFS
FREQUENCY OF OVERTOPPING FLOOD	= 500+ YRS.
OVERTOPPING FLOOD ELEVATION	= 2984.6

GRADE DATA

GRADE POINT ELEVATION @ STA. 14+89.00 -L-	= 2985.37'
BED ELEVATION @ STA. 14+89.00 -L-	= 2971.97'
ROADWAY FILL SLOPES	= 2:1



PROFILE ALONG ℄ CULVERT

NORTH CAROLINA PROFESSIONAL SEAL 13014 ENGINEER QUANG H. NGUYEN
Quang H. Nguyen 2-12-13

NORTH CAROLINA PROFESSIONAL SEAL 15779 ENGINEER JOHN R. DUGGINS, JR.
2/12/13

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE		
BARREL @ 1.029 CY/FT	92.2	C.Y.
WING ETC.	32.3	C.Y.
SILLS	2.4	C.Y.
TOTAL	126.9	C.Y.
REINFORCING STEEL		
BARREL, HEADWALLS & SILLS	15,376	LBS.
WINGS ETC.	1876	LBS.
TOTAL	17,252	LBS.
CULVERT EXCAVATION	LUMP SUM	
FOUNDATION COND. MAT'L	72 TONS	
REMOVAL OF EXISTING STRUCTURE	LUMP SUM	
CLASS I RIP RAP	9 TONS	

PROJECT NO. B-5010
TRANSYLVANIA COUNTY
STATION: 14+89.00 -L-

SHEET 1 OF 5 REPLACES BRIDGE NO. 27

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

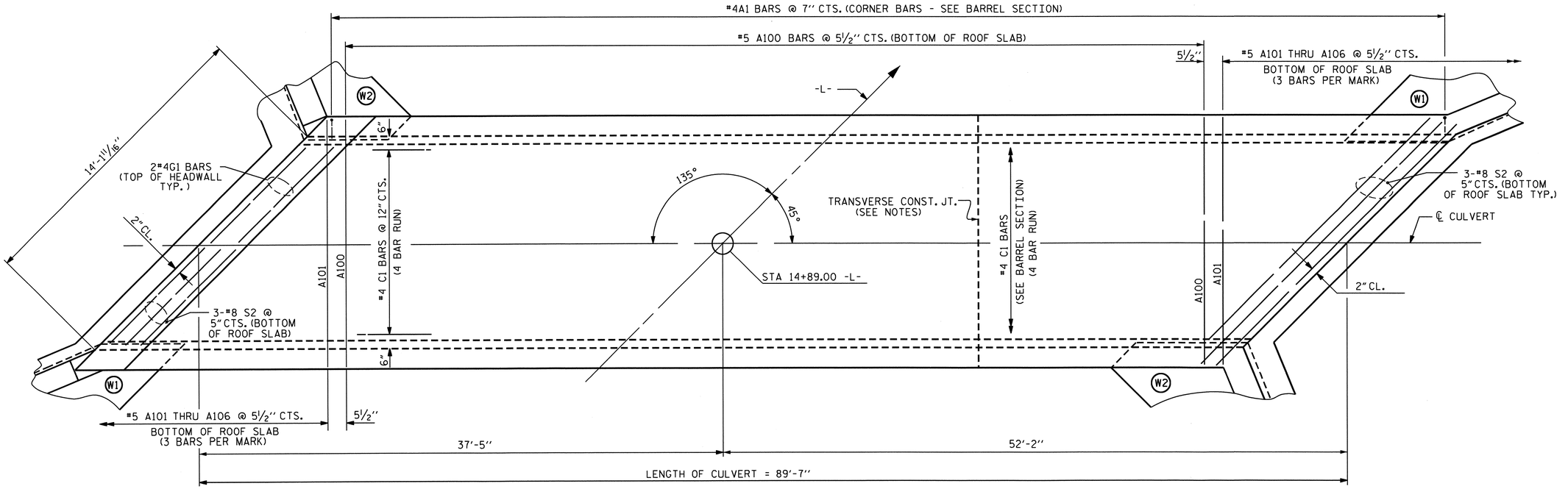
SINGLE 10 FT. X 8 FT. CONCRETE BOX CULVERT 45° SKEW

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

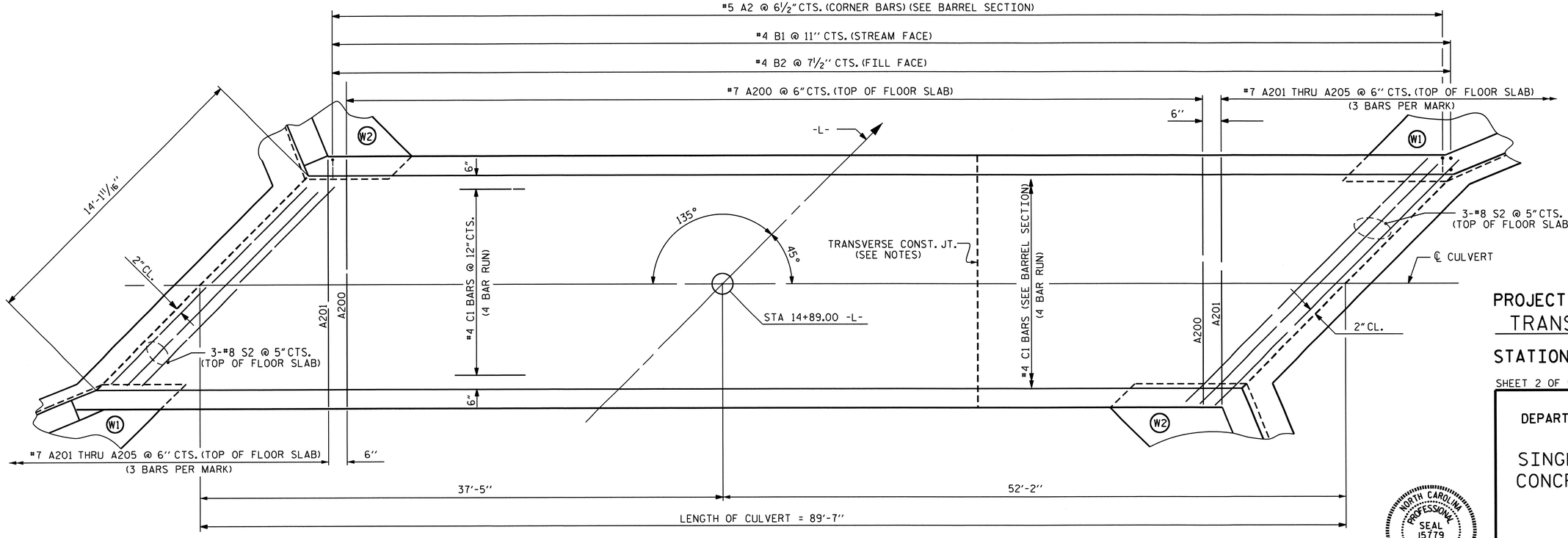
STD. NO. CB41A

DRAWN BY : V.X. NGUYEN DATE : 4-5-12
CHECKED BY : H.P. KIM DATE : 7-12
DESIGN ENGINEER OF RECORD: S.W. PEARCE DATE : 1-7-13
DRAWN BY : R.W. WRIGHT DATE : AUG. 1989
CHECKED BY : A.R. BISSETTE DATE : AUG. 1989
SPECIAL STANDARD

REVISED 11-13-91 BY E.L.R. CHECKED BY G.R.P.
ADDED 8-22-89



PLAN - ROOF SLAB



PLAN - FLOOR SLAB

PROJECT NO. B-5010

TRANSYLVANIA COUNTY

STATION: 14+89.00 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 10 FT. X 8 FT. CONCRETE BOX CULVERT 45° SKEW

DRAWN BY : V.X. NGUYEN	DATE : 4-5-12		
CHECKED BY : H.P. KIM	DATE : 7-12		
DESIGN ENGINEER OF RECORD: S.W. PEARCE	DATE : 1-7-13		

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

NORTH CAROLINA PROFESSIONAL SEAL 15779 ENGINEER JOHN R. DUGGINS, JR.
2/12/13

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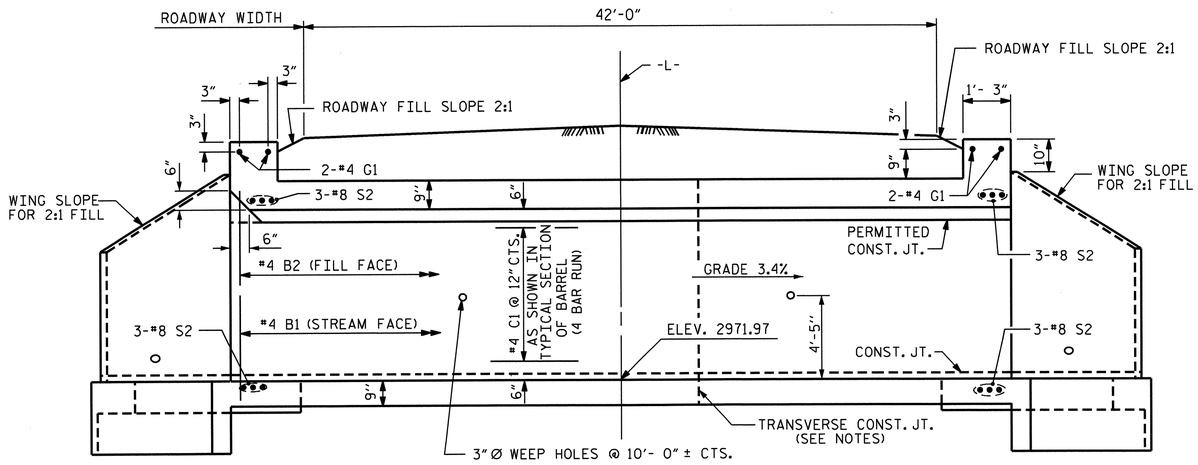
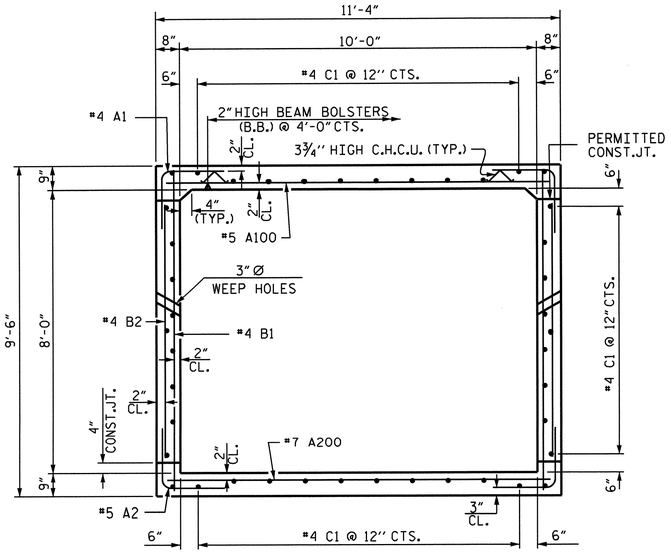
jduggins

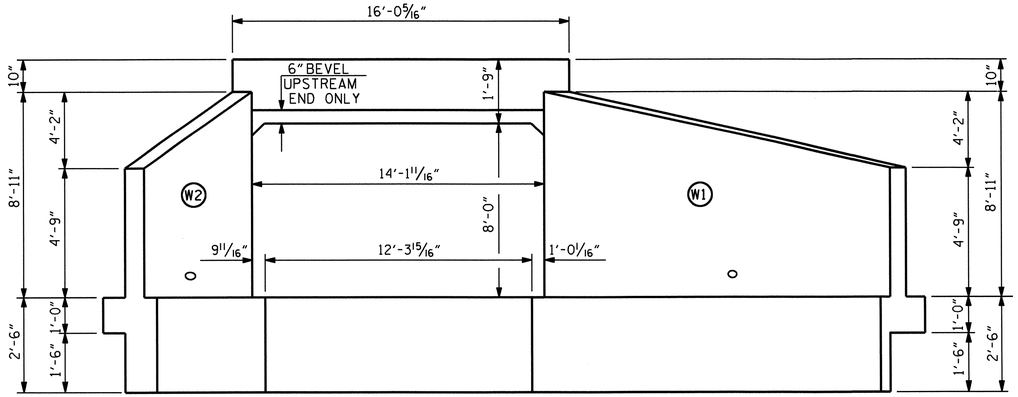


CULVERT SECTION NORMAL TO ROADWAY



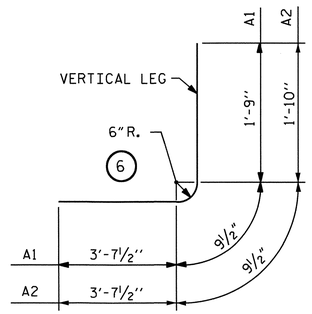
RIGHT ANGLE SECTION OF BARREL

THERE ARE 42 "C" BARS IN SECTION OF BARREL



END ELEVATION NORMAL TO SKEW

BAR TYPE



BAR DIMENSIONS ARE OUT TO OUT

SPLICE LENGTH CHART

BAR	SIZE	LENGTH
C1	#4	1'-11"

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A100	171	#5	STR	10'-11"	1947
A101	6	#5	STR	9'-6"	59
A102	6	#5	STR	8'-2"	51
A103	6	#5	STR	6'-9"	42
A104	6	#5	STR	5'-5"	34
A105	6	#5	STR	4'-0"	25
A106	6	#5	STR	2'-8"	17
A200	157	#7	STR	10'-11"	3503
A201	6	#7	STR	9'-5"	115
A202	6	#7	STR	7'-11"	97
A203	6	#7	STR	6'-5"	79
A204	6	#7	STR	4'-11"	60
A205	6	#7	STR	3'-5"	42
A1	308	#4	6	6'-2"	1269
A2	332	#5	6	6'-3"	2164
B1	196	#4	STR	9'-0"	1178
B2	288	#4	STR	7'-4"	1411
C1	168	#4	STR	23'-11"	2684
D1	10	#6	STR	1'-4"	20
D2	15	#6	STR	1'-10"	41
G1	4	#4	STR	15'-6"	41
S2	12	#8	STR	15'-6"	497
REINFORCING STEEL					15,376 LBS

PROJECT NO. B-5010

TRANSYLVANIA COUNTY

STATION: 14+89.00 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BARREL STANDARD
SINGLE 10 FT. X 8 FT.
CONCRETE BOX CULVERT
45° SKEW

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

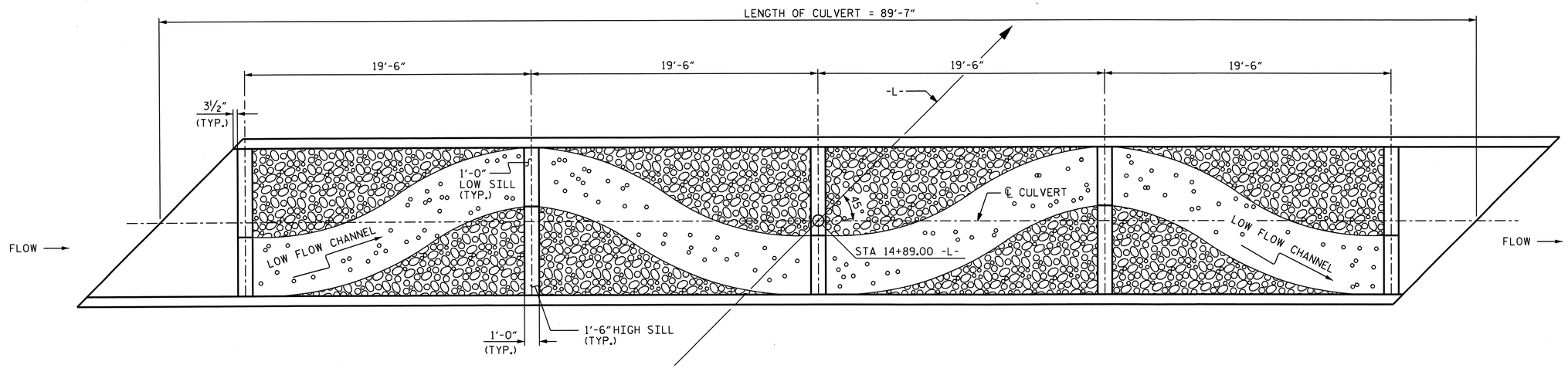
NORTH CAROLINA PROFESSIONAL SEAL 15779 ENGINEER JOHN R. DUGGINS, JR.
2/12/13

STD. NO. CB41

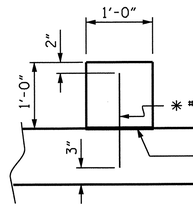
DRAWN BY :	V.X. NGUYEN	DATE :	4-5-12
CHECKED BY :	H.P. KIM	DATE :	7-12
DESIGN ENGINEER OF RECORD:	S.W. PEARCE	DATE :	1-7-13
DRAWN BY :	R.W. WRIGHT	DATE :	AUG. 1989
CHECKED BY :	A.R. BISSETTE	DATE :	AUG. 1989

SPECIAL STANDARD

REVISED 8-28-92 BY E.L.R. CHECKED BY G.R.P.
REVISED 8-22-89 BY A.R.B. CHECKED BY C.R.K.
REDRAWN 8-22-89
REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.

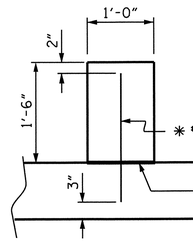


PLAN OF FLOOR SILL LAYOUT



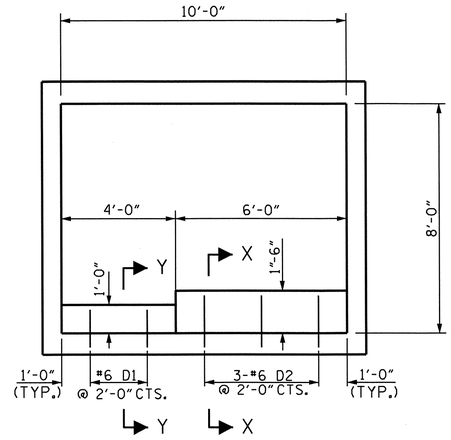
* DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED.

SECTION Y-Y



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

SECTION X-X



SILL ELEVATION

NOTES

THE BED MATERIAL IS ROCKY WITH COBBLES AND SOME BOULDERS.

MATERIAL EXCAVATED FROM THE EXISTING BED SHALL BE STOCKPILED FOR USE IN THE PROPOSED CULVERT AS SHOWN IN THE FLOOR SILL LAYOUT.

BED MATERIAL SHALL BE SUPPLEMENTED WITH CLASS "B" RIP RAP AS NECESSARY. STONE LARGER THAN 1'-0" SHALL NOT BE PLACED WITHIN THE LOW FLOW CHANNEL. BED MATERIAL SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.

THE ENTIRE COST OF WORK REQUIRED TO PLACE THE EXCAVATED MATERIAL AS SHOWN ON THE PLANS SHALL BE INCLUDED IN THE CONTRACT LUMP SUM PRICE BID FOR CULVERT EXCAVATION.

THE ENTIRE COST OF WORK REQUIRED TO CONSTRUCT THE SILLS SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

TOP OF LOW FLOW SILL SHOULD MATCH STREAM BED ELEVATIONS IN LOW FLOW CHANNEL OF STREAM.

PROJECT NO. B-5010

TRANSYLVANIA COUNTY

STATION: 14+89.00 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SINGLE 10 FT. X 8 FT. CONCRETE BOX CULVERT SILL LAYOUT

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

NORTH CAROLINA PROFESSIONAL SEAL 15779 ENGINEER JOHN R. DUGGINS, JR.
2/12/13

DRAWN BY : V.X. NGUYEN DATE : 4-10-12
CHECKED BY : H.P. KIM DATE : 7-12
DESIGN ENGINEER OF RECORD: S.W. PEARCE DATE : 1-7-13

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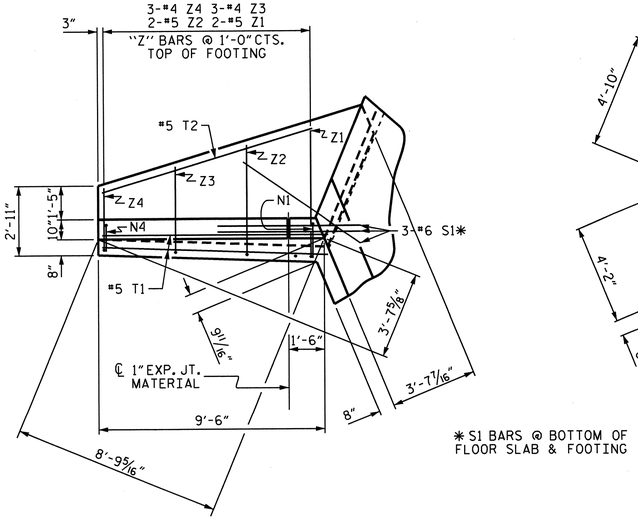
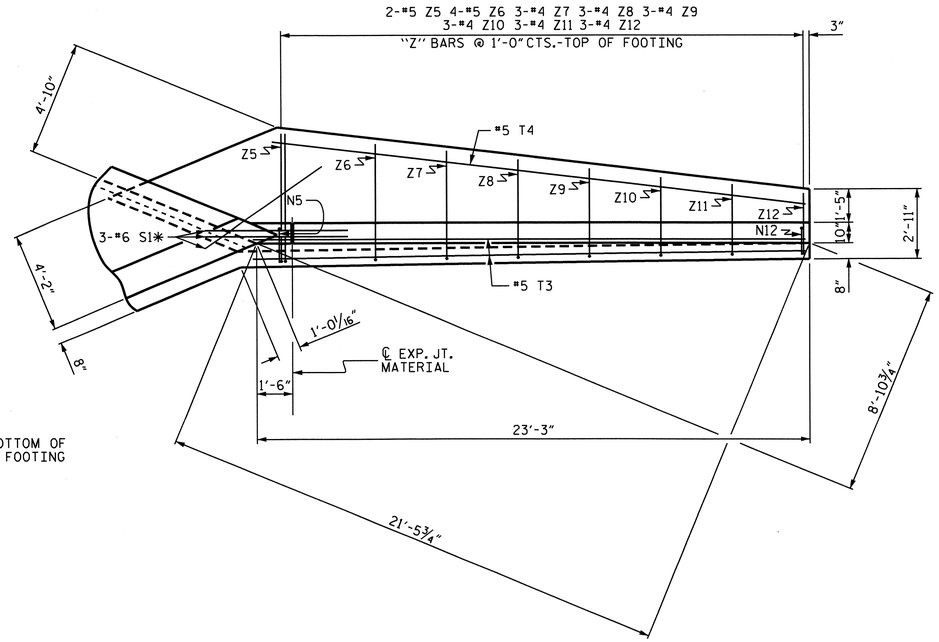
jduggins

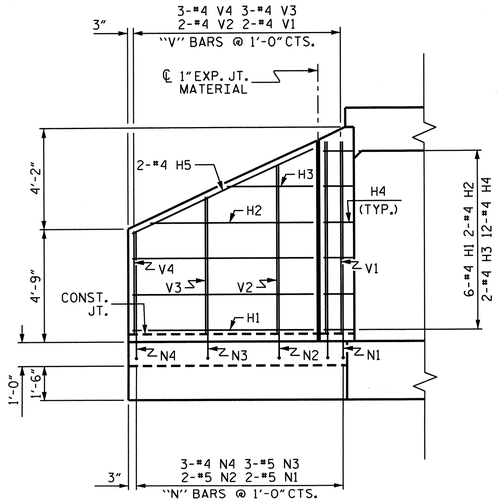


PLAN W2

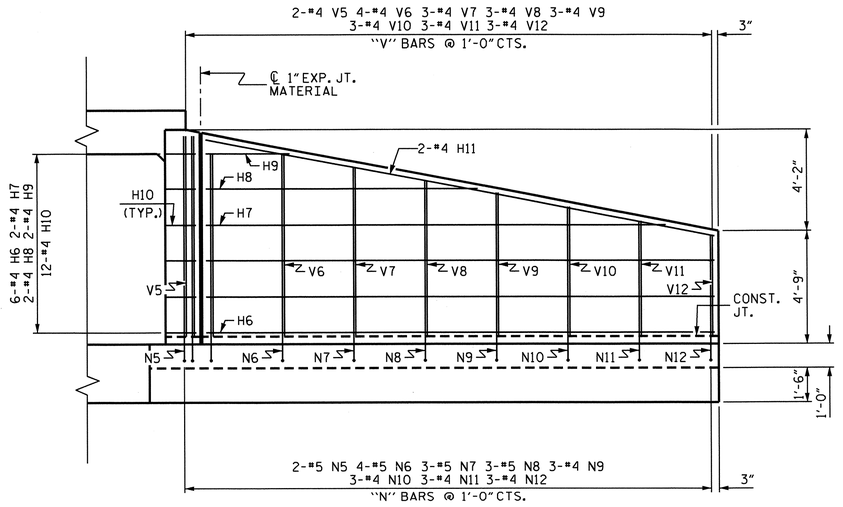


PLAN W1

* S1 BARS @ BOTTOM OF FLOOR SLAB & FOOTING



ELEVATION W2

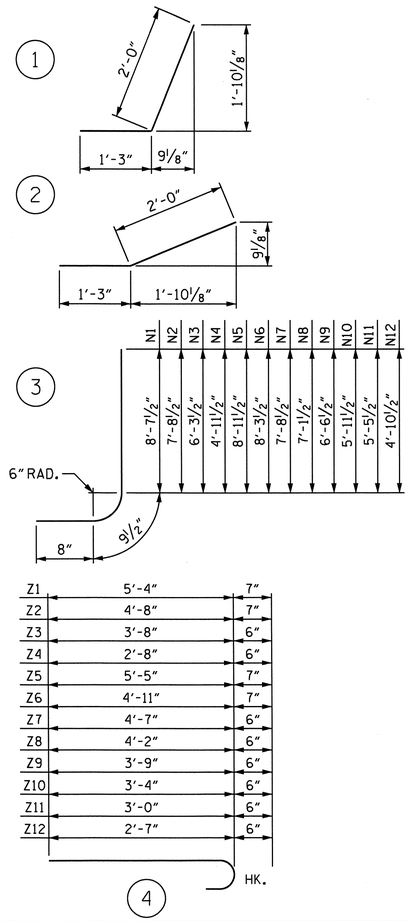


ELEVATION W1

ASSEMBLED BY : V.X. NGUYEN	DATE : 4-10-12
CHECKED BY : H.P. KIM	DATE : 7-12
DRAWN BY : CCJ 01/00	
CHECKED BY : RWW 03/00	

BAR TYPES

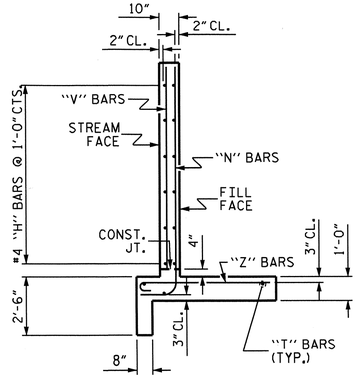
ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	7'-7"	61
H2	4	#4	STR	6'-10"	18
H3	4	#4	STR	3'-7"	10
H4	24	#4	1	3'-3"	52
H5	4	#4	STR	8'-5"	22
H6	12	#4	STR	21'-4"	171
H7	4	#4	STR	19'-4"	52
H8	4	#4	STR	11'-5"	31
H9	4	#4	STR	3'-6"	9
H10	24	#4	2	3'-3"	52
H11	4	#4	STR	21'-9"	58
N1	4	#5	3	10'-1"	42
N2	4	#5	3	9'-2"	38
N3	6	#5	3	7'-9"	48
N4	6	#4	3	6'-5"	26
N5	4	#5	3	10'-5"	43
N6	8	#5	3	9'-9"	81
N7	6	#5	3	9'-2"	57
N8	6	#5	3	8'-7"	54
N9	6	#4	3	8'-0"	32
N10	6	#4	3	7'-5"	30
N11	6	#4	3	6'-11"	28
N12	6	#4	3	6'-4"	25
S1	12	#6	STR	6'-0"	108
T1	4	#5	STR	9'-6"	40
T2	2	#5	STR	9'-3"	19
T3	4	#5	STR	23'-3"	97
T4	2	#5	STR	22'-7"	47
V1	4	#4	STR	8'-1"	22
V2	4	#4	STR	7'-1"	19
V3	6	#4	STR	5'-9"	23
V4	6	#4	STR	4'-4"	17
V5	4	#4	STR	8'-5"	22
V6	8	#4	STR	7'-8"	41
V7	6	#4	STR	7'-1"	28
V8	6	#4	STR	6'-6"	26
V9	6	#4	STR	6'-0"	24
V10	6	#4	STR	5'-5"	22
V11	6	#4	STR	4'-10"	19
V12	6	#4	STR	4'-3"	17
Z1	4	#5	4	5'-11"	25
Z2	4	#5	4	5'-3"	22
Z3	6	#4	4	4'-2"	17
Z4	6	#4	4	3'-2"	13
Z5	4	#5	4	6'-0"	25
Z6	8	#5	4	5'-6"	46
Z7	6	#4	4	5'-1"	20
Z8	6	#4	4	4'-8"	19
Z9	6	#4	4	4'-3"	17
Z10	6	#4	4	3'-10"	15
Z11	6	#4	4	3'-6"	14
Z12	6	#4	4	3'-1"	12

REINFORCING STEEL FOR 4 WINGS	1876 LBS
CLASS A CONCRETE	
4 WINGS	29.1 CY
2 HEADWALLS	1.5 CY
2 END CURTAIN WALLS	1.7 CY
TOTAL	32.3 CY



TYPICAL WING SECTION

PROJECT NO. B-5010

TRANSYLVANIA COUNTY

STATION: 14+89.00 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT

H = 8'-0" SLOPE = 2:1
45° OR 135° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-5
1			3			TOTAL SHEETS
2			4			6

NORTH CAROLINA PROFESSIONAL SEAL 15779 ENGINEER JOHN R. DUGGINS, JR.
2/12/13

STD. NO. CW4508

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE									COMMENT NUMBER
							LIVE-LOAD FACTORS (γ_{LL})	MOMENT				SHEAR				
								RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	(1)	1.39	--	1.75	1.39	1	TOP SLAB	5.33	1.55	1	BOTTOM SLAB	0.87	
		HL-93 (OPERATING)	N/A		1.80	--	1.35	1.80	1	TOP SLAB	5.33	2.00	1	BOTTOM SLAB	0.87	
		HS-20 (INVENTORY)	36.000	(2)	1.39	50.07	1.75	1.39	1	TOP SLAB	5.33	1.55	1	BOTTOM SLAB	0.87	
		HS-20 (OPERATING)	36.000		1.80	64.90	1.35	1.80	1	TOP SLAB	5.33	2.00	1	BOTTOM SLAB	0.87	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.53	34.16	1.40	2.53	1	TOP SLAB	5.33	2.81	1	BOTTOM SLAB	0.87	
		SNGARBS2	20.000		2.36	47.27	1.40	2.36	1	TOP SLAB	5.33	2.62	1	BOTTOM SLAB	0.87	
		SNAGRIS2	22.000		2.53	55.66	1.40	2.53	1	TOP SLAB	5.33	2.81	1	BOTTOM SLAB	0.87	
		SNCOTTS3	27.250	(3)	1.27	34.56	1.40	1.27	1	TOP SLAB	5.33	1.36	1	BOTTOM SLAB	0.87	
		SNAGGRS4	34.925		1.45	50.73	1.40	1.45	1	TOP SLAB	5.33	1.45	1	BOTTOM SLAB	0.87	
		SNS5A	35.550		1.43	50.69	1.40	1.43	1	TOP SLAB	5.33	1.46	1	BOTTOM SLAB	0.87	
		SNS6A	39.950		1.43	56.96	1.40	1.43	1	TOP SLAB	5.33	1.46	1	BOTTOM SLAB	0.87	
		SNS7B	42.000		1.43	59.88	1.40	1.43	1	TOP SLAB	5.33	1.46	1	BOTTOM SLAB	0.87	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.34	77.22	1.40	2.53	1	TOP SLAB	5.33	2.34	1	BOTTOM SLAB	0.87	
		TNT4A	33.075		1.51	49.93	1.40	1.51	1	TOP SLAB	5.33	1.62	1	BOTTOM SLAB	0.87	
		TNT6A	41.600		1.40	58.38	1.40	1.40	1	TOP SLAB	5.33	1.43	1	BOTTOM SLAB	0.87	
		TNT7A	42.000		1.48	62.01	1.40	1.48	1	TOP SLAB	5.33	1.54	1	BOTTOM SLAB	9.79	
		TNT7B	42.000		1.43	59.88	1.40	1.43	1	TOP SLAB	5.33	1.46	1	BOTTOM SLAB	0.87	
		TNAGRIT4	43.000		1.44	61.96	1.40	1.44	1	TOP SLAB	5.33	1.54	1	BOTTOM SLAB	0.87	
		TNAGT5A	45.000		1.48	66.44	1.40	1.48	1	TOP SLAB	5.33	1.58	1	BOTTOM SLAB	0.87	
		TNAGT5B	45.000		1.51	67.93	1.40	1.51	1	TOP SLAB	5.33	1.62	1	BOTTOM SLAB	0.87	

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

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

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

1.
2.
3.
4.

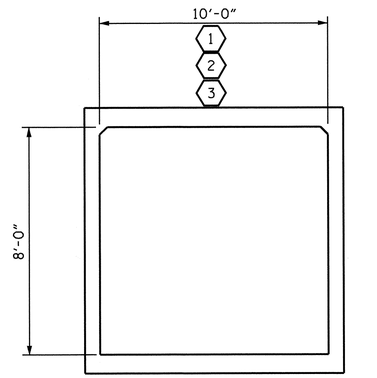
(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE



LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. B-5010

TRANSYLVANIA COUNTY

STATION: 14+89.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

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

NORTH CAROLINA PROFESSIONAL SEAL 15779 ENGINEER JOHN R. DUGGINS, JR.

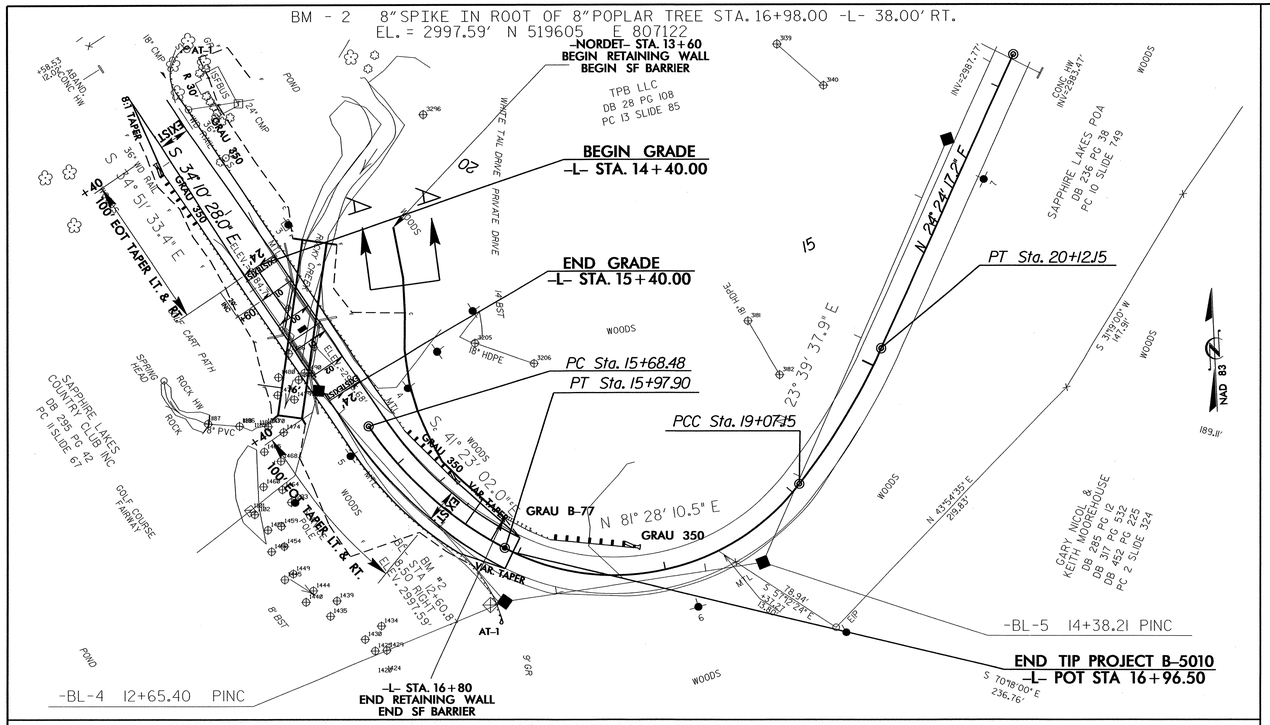
2/12/13

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

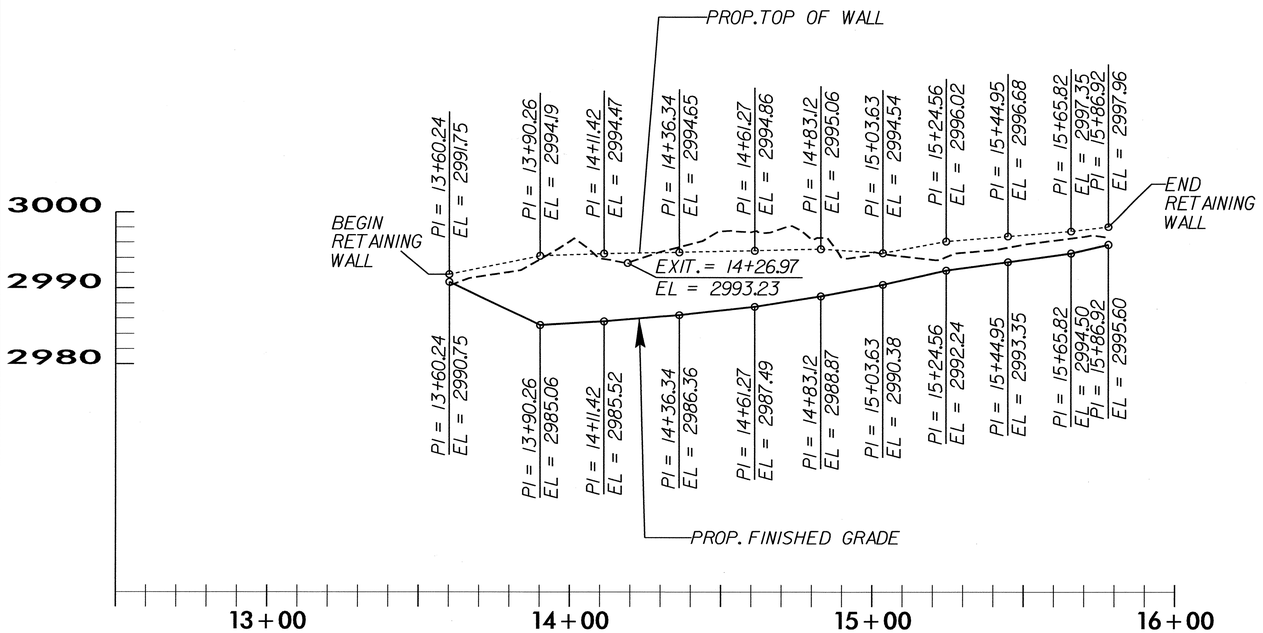
STD. NO. LRFR5

ASSEMBLED BY : V.X. NGUYEN		DATE : 4-10-12
CHECKED BY : H.P. KIM		DATE : 7-12
DESIGN ENGINEER OF RECORD: S.W. PEARCE		DATE : 1-7-13
DRAWN BY : WMC 7/11	REV. 10/1/11	MAA/GM
CHECKED BY : GM 7/11		

12-FEB-2013 14:55
R:\Structures\Plans\FinalPlans\B-5010_SD_CU.dgn
jduggins



LOCATION SKETCH



PREPARED BY:	J.T.W.	DATE: 6/12
REVIEWED BY:	S.C.C.	DATE: 9/12

GEOTECHNICAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 29869 ENGINEER SEANE C CLARK

SIGNATURE 1/4/13 DATE

ENGINEER

SIGNATURE DATE

RETAINING WALL ELEVATIONS

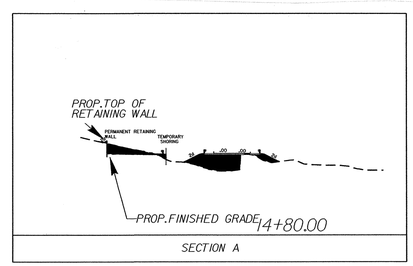
-NORDET- STA	OFFSET FROM ℄ (LEFT)	ELEV @ TOP OF WALL	✳ PROPOSED FINISHED GRADE	✳ EXPOSED WALL HEIGHT	✳✳ DESIGN WALL HEIGHT "H"
13+60.24	18.09	2991.75	2990.75	1.00	0.50
13+90.26	18.09	2994.19	2985.06	9.13	8.63
14+11.42	18.09	2994.47	2985.52	8.95	4.99
14+36.34	18.09	2994.65	2986.36	8.29	7.79
14+61.27	18.09	2994.86	2987.49	7.37	6.87
14+83.12	18.09	2995.06	2988.87	6.19	5.69
15+03.63	18.09	2994.54	2990.38	4.16	3.66
15+24.56	18.09	2996.02	2992.24	3.78	3.28
15+44.95	18.09	2996.68	2993.35	3.33	2.83
15+65.82	18.09	2997.35	2994.50	2.85	2.35
15+86.92	17.16	2997.96	2995.60	2.36	1.86

✳ ELEVATION @ PROPOSED FINISHED GRADE AND EXPOSED WALL HEIGHT DO NOT INCLUDE EMBEDMENT DEPTH

✳✳ FOR DESIGN WALL HEIGHT "H" AND ADDITIONAL CONSTRUCTION DETAILS, SEE SHEET 2 OF 2

ESTIMATED SOIL NAIL WALL QUANTITIES

RETAINING WALL ALONG	SOIL NAIL RETAINING WALLS (SQUARE FEET)	SOIL NAIL VERIFICATION TESTS	SOIL NAIL PROOF TESTS
-NORDET-	1260	1	5



SECTION A

PROJECT NO.: B-5010

JACKSON ***COUNTY***

STATION: 13+60.24 to 15+86.92 -NORDET-

SHEET 1 OF 2

GEOTECHNICAL ENGINEERING UNIT

☐ ***EASTERN REGIONAL OFFICE***

☒ ***WESTERN REGIONAL OFFICE***

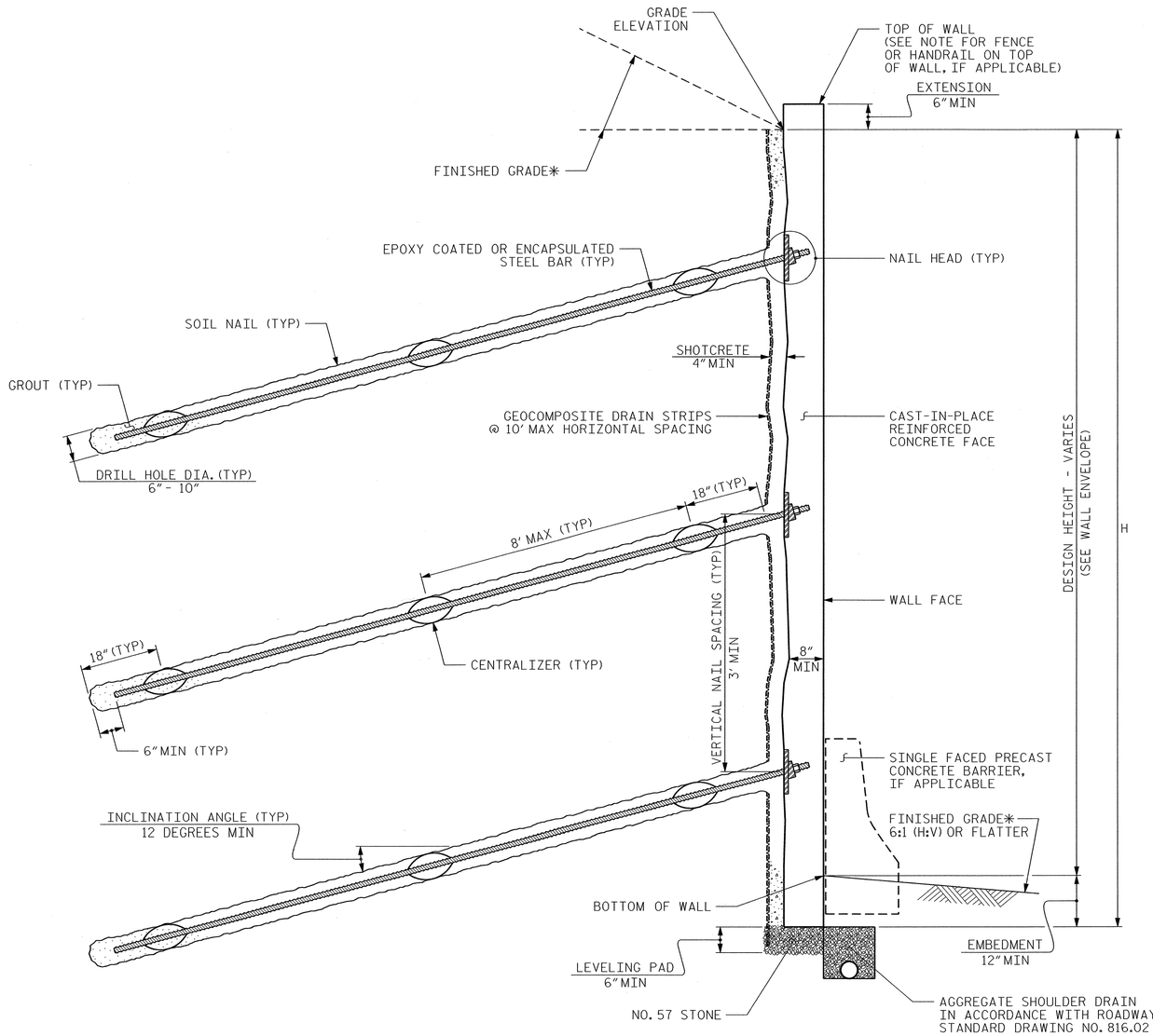
☐ ***CONTRACT OFFICE***

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SOIL NAIL RETAINING WALL

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

GEOTECHNICAL ENGINEER	ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 29869 ENGINEER SHANE C CLARK SIGNATURE 1/4/13 DATE	SIGNATURE DATE



SOIL NAIL WALL - TYPICAL SECTION

*SEE ROADWAY PLANS FOR FINISHED GRADE AND DITCH DETAILS.

NOTES:

FOR SOIL NAIL RETAINING WALLS, SEE SOIL NAIL RETAINING WALLS PROVISION.

FOR STEEL BEAM GUARDRAIL, SEE ROADWAY PLANS AND SECTION 862 OF THE STANDARD SPECIFICATIONS.

FOR SINGLE FACED PRECAST CONCRETE BARRIER, SEE ROADWAY PLANS AND SECTION 857 OF THE STANDARD SPECIFICATIONS.

A FENCE OR HANDRAIL IS REQUIRED ON TOP OF RETAINING WALL. SEE ROADWAY PLANS FOR FENCE OR HANDRAIL ATTACHMENT DETAILS.

AN ASHLAR ARCHITECTURAL FINISH IS REQUIRED FOR THE CAST-IN-PLACE REINFORCED CONCRETE FACE FOR RETAINING WALL.

BEFORE BEGINNING SOIL NAIL WALL DESIGN FOR RETAINING WALL, SURVEY WALL LOCATION AND SUBMIT A REVISED WALL PROFILE VIEW (WALL ENVELOPE) FOR REVIEW. DO NOT START WALL DESIGN OR CONSTRUCTION UNTIL THE REVISED WALL ENVELOPE IS ACCEPTED.

DESIGN RETAINING WALL FOR THE FOLLOWING:
1) H = DESIGN HEIGHT + EMBEDMENT
2) DESIGN LIFE = 75 YEARS
3) MINIMUM EMBEDMENT ELEVATION = 2 FT BELOW FINISHED GRADE
4) IN-SITU ASSUMED MATERIAL PARAMETERS:
UNIT WEIGHT, γ = 120 LB/CF
FRICTION ANGLE, ϕ = 30 DEGREES
COHESION, c = 0 LB/SF

EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, GUARDRAIL, FENCE OR HANDRAIL POSTS, PAVEMENTS, PIPES, INLETS OR UTILITIES MAY INTERFERE WITH SOIL NAILS FOR RETAINING WALL.

PREPARED BY:	J.T.W.	DATE:	6/12
REVIEWED BY:	S.C.C.	DATE:	9/12

PROJECT NO.: B-5010
JACKSON ***COUNTY***
STATION: 13+60.24 to 15+86.92 -NORDET-
SHEET 2 OF 2

GEOTECHNICAL ENGINEERING UNIT
☐ ***EASTERN REGIONAL OFFICE***
☒ ***WESTERN REGIONAL OFFICE***
☐ ***CONTRACT OFFICE***
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SOIL NAIL RETAINING WALL

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

STANDARD NOTES

DESIGN DATA:

SPECIFICATIONS	A.A.S.H.T.O. (CURRENT)
LIVE LOAD	SEE PLANS
IMPACT ALLOWANCE	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF	
STRUCTURAL STEEL - AASHTO M270 GRADE 36	20,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50W	27,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION	
GRADE 60	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR	
UNTREATED - EXTREME FIBER STRESS	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	30 LBS. PER CU. FT. (MINIMUM)

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2012 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1-1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8"Ø SHEAR STUDS FOR THE 3/4"Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8"Ø STUDS FOR 4 - 3/4"Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8"Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4"Ø STUDS BASED ON THE RATIO OF 3 - 7/8"Ø STUDS FOR 4 - 3/4"Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY 1/16 INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.

ENGLISH

JANUARY, 1990

STD. NO. SN

REV. 6-16-95 EEM (W) RGW REV. 5-7-03 RWW (W) JTE REV. 10-1-11 MAA (W) GM
REV. 8-16-99 RWW (W) LES REV. 5-1-06 TLA (W) GM