09/08/60

TIP PROJECT: B-4763

CONTRACT: C203365

CULVERT

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

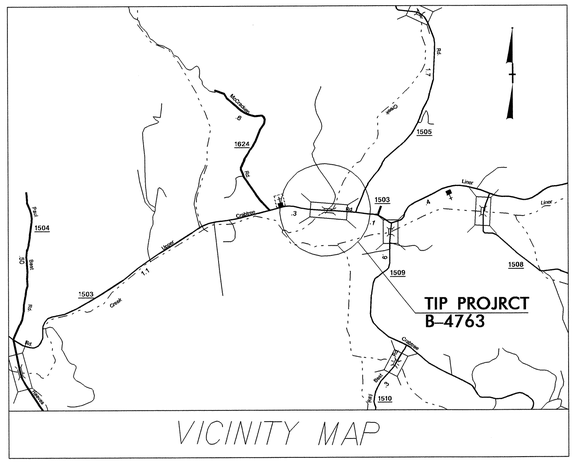
HAYWOOD COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4763		

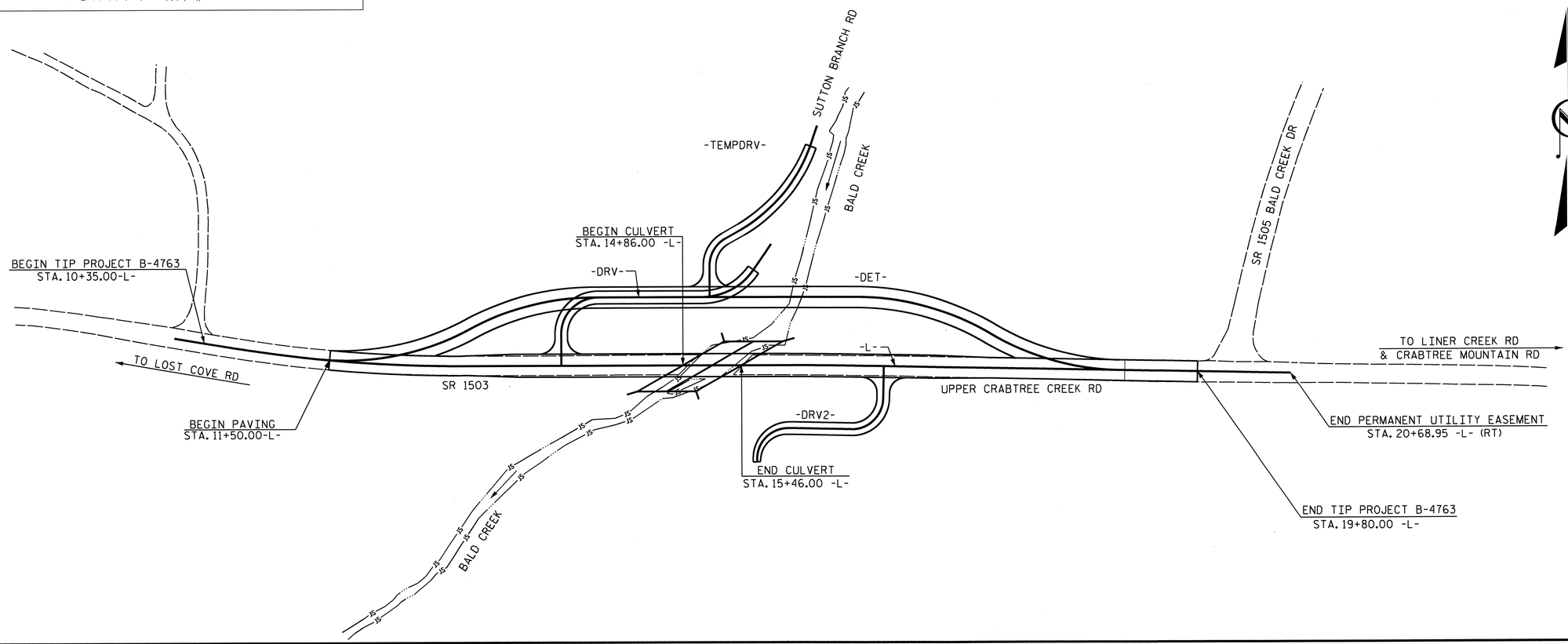
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
38535.1.1	BRZ-1503(8)	PE
38535.2.1	BRZ-1503(8)	R/W, UTIL
38535.3.FD1	BRZ-1503(8)	CONST.

LOCATION: ***BRIDGE NO. 35 OVER BALD CREEK ON SR 1503 (UPPER CRABTREE CREEK RD)***

TYPE OF WORK: GRADING, DRAINAGE, PAVING AND CULVERT



VICINITY MAP



DESIGN DATA

ADT 2013 = 1360
ADT 2035 = 2200
DHV = 9 %
D = 70 %
T = 8 % *

* TTST =1% DUAL 7%
FUNC CLASS =
RURAL, MINOR COLLECTOR
SUB REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4763 = 0.168 MILES
LENGTH STRUCTURE TIP PROJECT B-4763 = 0.011 MILES
TOTAL LENGTH TIP PROJECT B-4763 = 0.179 MILES

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

2012 STANDARD SPECIFICATIONS

LETTING DATE:
MARCH 18, 2014

QUANG NGUYEN, P.E.
PROJECT ENGINEER

WAEL S. ARAFAT, P.E.
PROJECT DESIGN ENGINEER

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

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

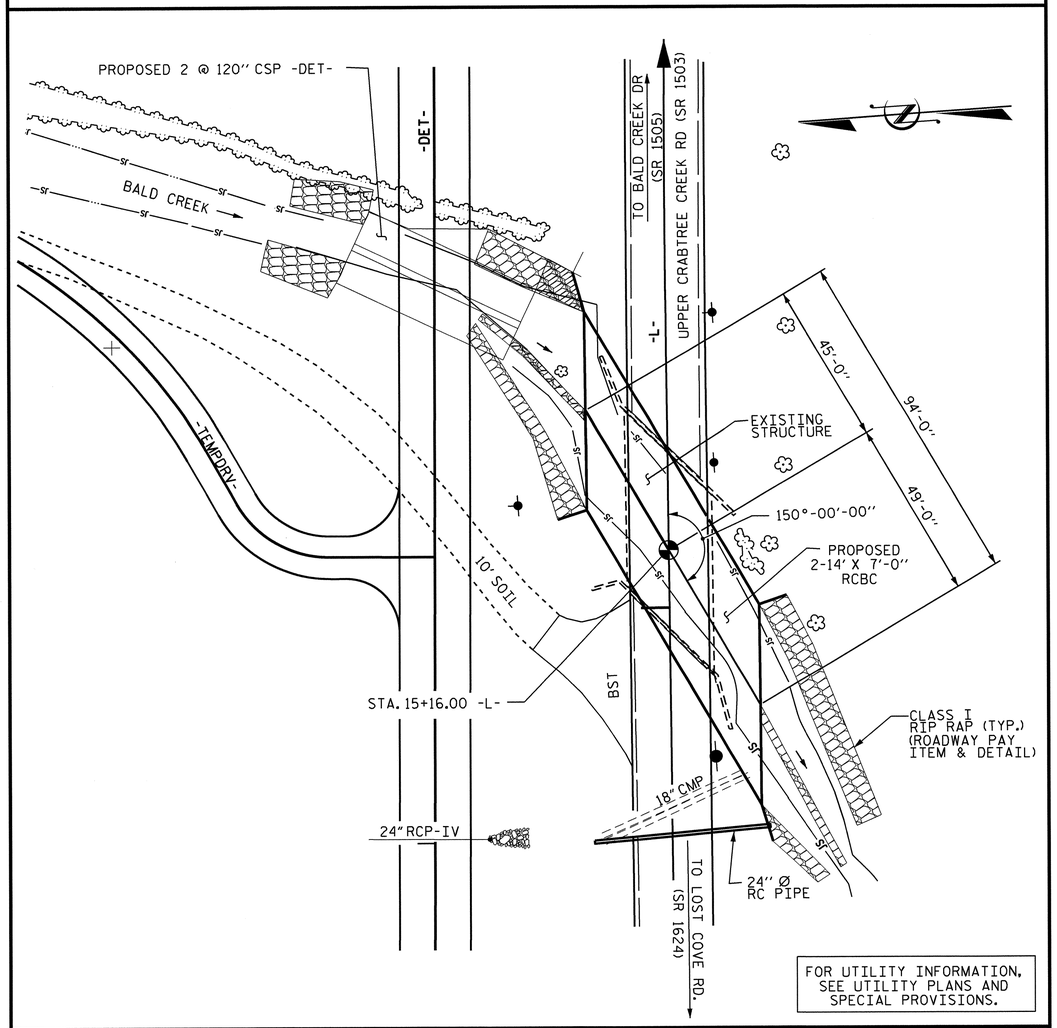
STATE DESIGN ENGINEER *P.E.*

DEPARTMENT OF TRANPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
ENGINEER DIVISION ADMINISTRATION *DATE*

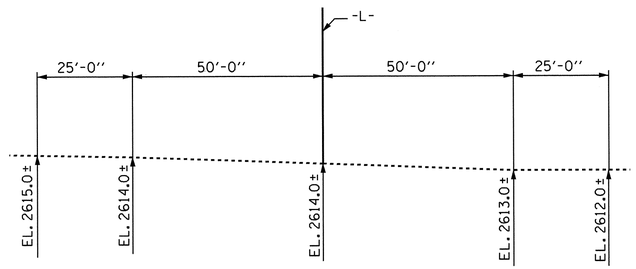
22-JAN-2014 10:11
$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$
amlee

BENCH MARK : RR SPIKE IN TRIPLE POPLAR, 33.76' RT. OF STA. 15+04.27 -L-, EL. 2621.61



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH



PROFILE ALONG ℄ CULVERT

DRAWN BY : V.X. NGUYEN DATE : 9-12-2013
CHECKED BY : H. T. BARBOUR DATE : 11-2013
DESIGN ENGINEER OF RECORD: A.M. LEE, PE DATE : 12-2013

22-JAN-2014 10:12
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TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE		
BARREL @ 3.166 CY/FT	297.6	C.Y.
WING ETC.	40.0	C.Y.
TOTAL	337.6	C.Y.
REINFORCING STEEL		
BARREL	39,624	LBS.
WINGS ETC.	1,501	LBS.
TOTAL	41,125	LBS.
FOUNDATION COND. MAT'L	225	TONS
CULVERT EXCAVATION	LUMP	SUM
RIP RAP CLASS I	250	TONS
REMOVAL OF EXISTING STRUCTURE	LUMP	SUM

F. A. PROJECT No. BRZ-1503(8)

NOTES

INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 15+16.00 -L-"

THE EXISTING STRUCTURE (CONSISTING OF ONE SPAN @ 50 FT. WITH A CRUTCH BENT IN THE MIDDLE) WITH A CLEAR ROADWAY WIDTH OF 24'-3" ON TIMBER DECK ON I-BEAMS AND YOUNT MASONARY VERTICAL ABUTMENTS, LOCATED AT THE PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE FURTHER DETERIORATE, THIS LOAD LIMITATION MAY BE REDUCED AS FOUND NECCESSARY DURING THE LIFE OF THE PROJECT.

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.

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.

ROADWAY DATA

GRADE POINT EL. @ STA. 15+16.00 -L- = 2623.00
BED EL. @ STA. 15+16.00 -L- = 2612.50
ROADWAY SLOPES = 2:1

HYDRAULIC DATA

DESIGN DISCHARGE = 1700 C.F.S.
FREQUENCY OF DESIGN FLOOD = 25 YRS.
DESIGN HIGH WATER ELEVATION = 2621.30
DRAINAGE AREA = 7.50 SQ. MI.
BASE DISCHARGE (Q100) = 2400 C.F.S.
BASE HIGH WATER ELEVATION = 2623.14

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = 1800 C.F.S.
FREQUENCY OF OVERTOPPING FLOOD = 25+ YRS.
OVERTOPPING FLOOD ELEVATION = 2622.30

ASSUMED LIVE LOAD HL93 OR ALTERNATE LOADING.

MAX. DESIGN FILL 3.69 FT.
MIN. DESIGN FILL 2.84 FT.

FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.

3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.

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, SILLS, 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 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.

STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL AND BOTH FACES OF INTERIOR WALLS 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.

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.

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 FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR CULVERT DIVERSION DETAILS, SEE EROSION CONTROL PLANS.

THE 24" Ø PIPE THROUGH THE WING WALL OF THE CULVERT SHALL BE LOCATED BY THE ENGINEER. THE REINFORCING STEEL SHALL BE FIELD BENT AS NECCESSARY TO CLEAR PIPE.

FOR EROSION CONTROL MEASURES, 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.

PROJECT NO. B-4763
HAYWOOD COUNTY
STATION: 15+16.00 -L-

SHEET 1 OF 7 REPLACES BRIDGE No. 35

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 14 FT. X 7 FT. CONCRETE BOX CULVERT 150° SKEW

NORTH CAROLINA PROFESSIONAL SEAL 13014 ENGINEER QUANG H. NGUYEN
Quang H. Nguy 1-22-14

NORTH CAROLINA PROFESSIONAL SEAL 17230 ENGINEER WAEL S. ARAFAT
Wael S. Arafat 01-22-14

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-1
1			3			TOTAL SHEETS
2			4			7

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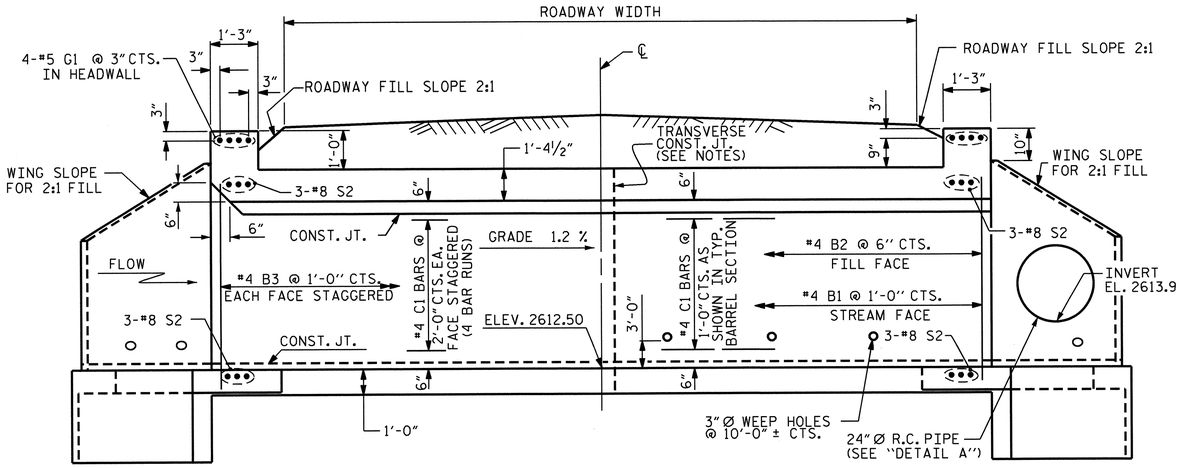
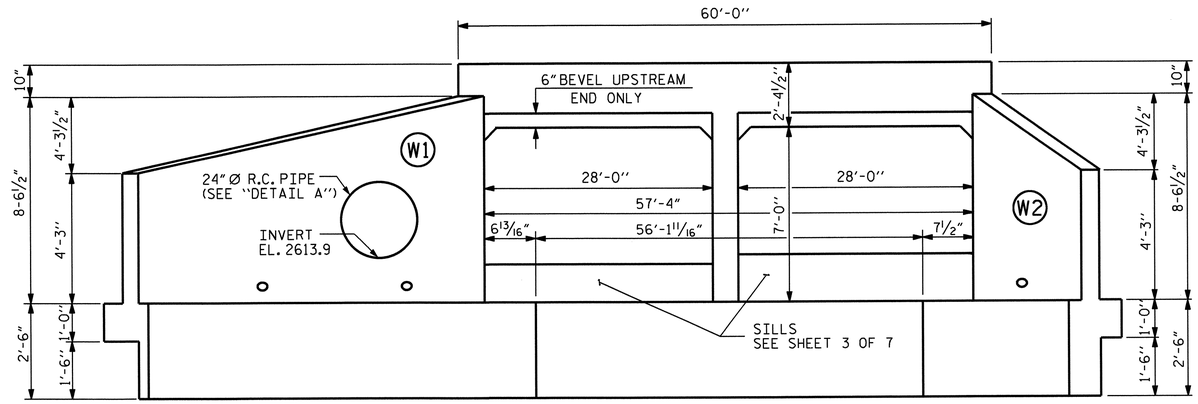


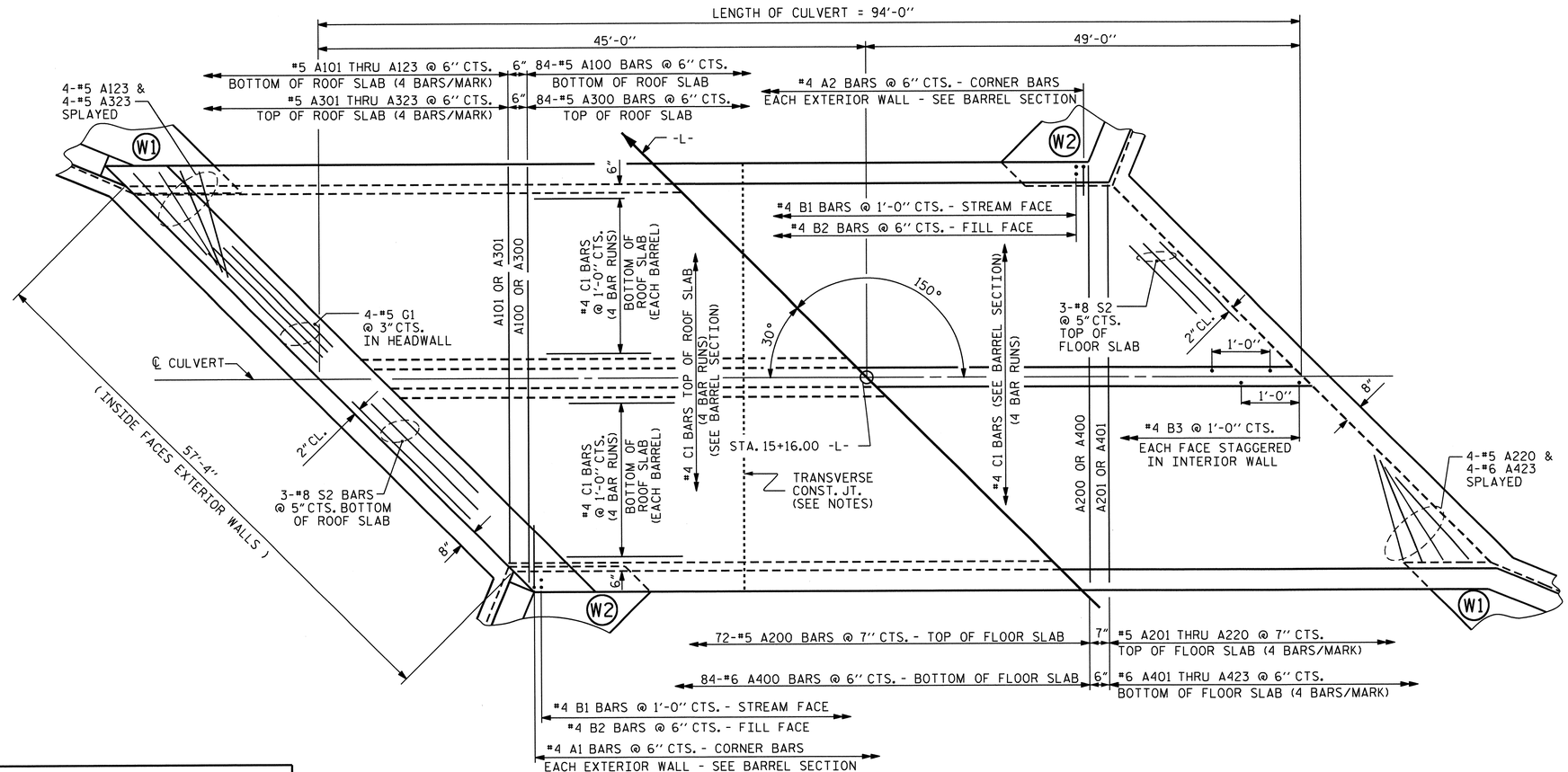
INTERIOR WALL EXTERIOR WALL

CULVERT SECTION NORMAL TO ROADWAY

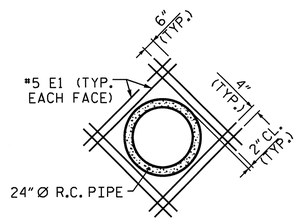


END ELEVATION NORMAL TO SKEW

(LOOKING UPSTREAM)



PART PLAN - ROOF SLAB PART PLAN - FLOOR SLAB



DETAIL "A"

REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.
REDRAWN NOV.1990 BY D.P.D. CHECKED BY M.A.J.

DESIGN ENGINEER OF RECORD: A.M. LEE, PE DATE : 12-2013
ASSEMBLED BY : V.X. NGUYEN DATE : 9-12-2013
CHECKED BY : H. T. BARBOUR DATE : 11-2013
DRAWN BY : RALPH D. UNDERWOOD DATE : APR. 1972
CHECKED BY : HASON A.JUDEH DATE : MAY 1972

SPECIAL STANDARD

PROJECT NO. B-4763
HAYWOOD COUNTY
STATION: 15+16.00 -L-

SHEET 2 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BARREL STANDARD
DOUBLE 14 FT. X 7 FT. CONCRETE BOX CULVERT WITH VERTICAL CLEARANCE OF LESS THAN 8 FT. 150° SKEW

NORTH CAROLINA PROFESSIONAL SEAL 17230 ENGINEER WAEL S. ARAFAT
Wael S. Arafat 01-22-14

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-2
1			3			TOTAL SHEETS
2			4			7

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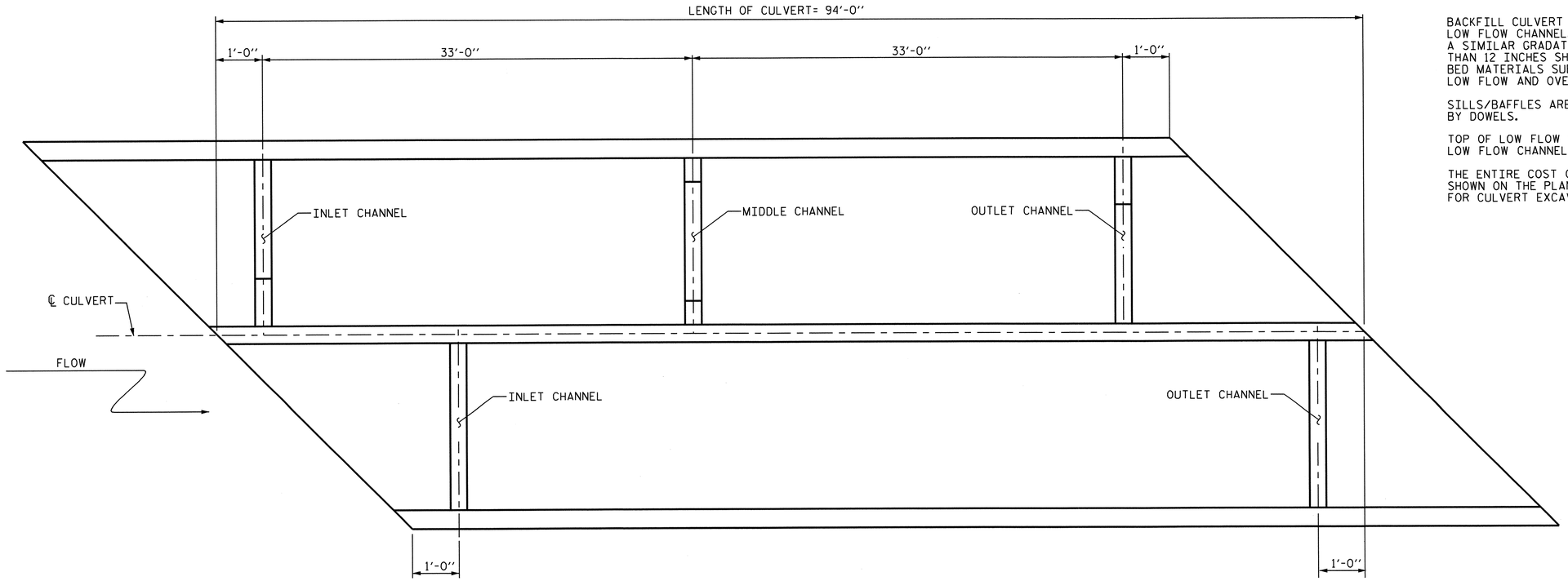


FLOOR SILL LAYOUT

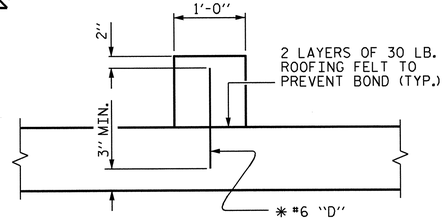
NOTES

BACKFILL CULVERT WITH BED MATERIAL TO PROVIDE A CONTINUOUS LOW FLOW CHANNEL. THE MATERIAL SHALL BE NATURAL STONE WITH A SIMILAR GRADATION SIZE OR CLASS 1 RIP RAP. STONES LARGER THAN 12 INCHES SHALL NOT BE PLACED WITHIN THE LOW FLOW CHANNEL. BED MATERIALS SUBJECT TO APPROVAL BY THE ENGINEER. BACKFILL ENTIRE LOW FLOW AND OVERFLOW BARRELS.

SILLS/BAFFLES ARE TO BE 1.0 FT. WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.

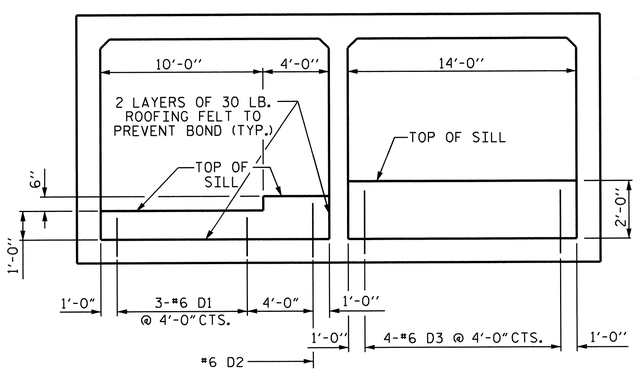
TOP OF LOW FLOW SILL/BAFFLES SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM.

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



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

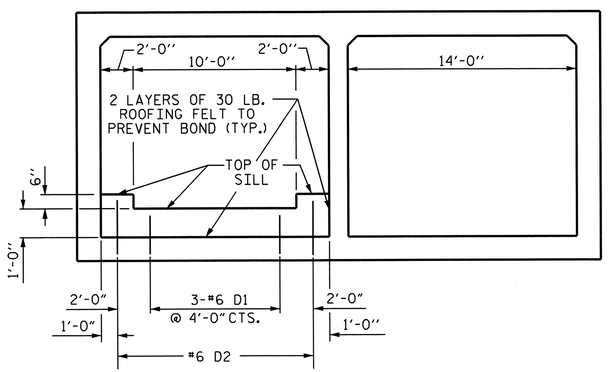
SECTION THROUGH SILL



SILL DETAILS

INLET CHANNEL

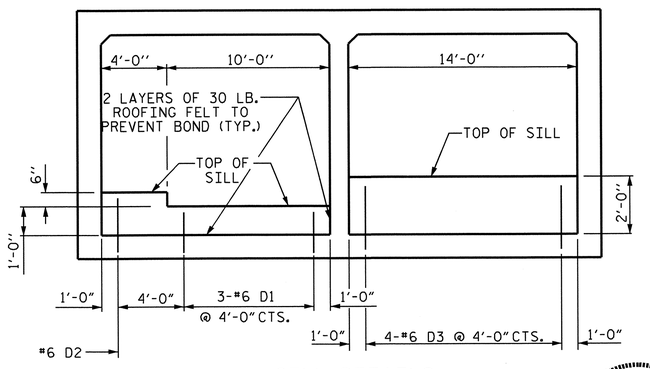
(LOOKING DOWNSTREAM)



SILL DETAILS

MIDDLE CHANNEL

(LOOKING DOWNSTREAM)



SILL DETAILS

OUTLET CHANNEL

(LOOKING DOWNSTREAM)

NORTH CAROLINA PROFESSIONAL SEAL 17230 ENGINEER WAEL S. ARAFAT

Wael S. Arafat 01-22-14

PROJECT NO. B-4763

HAYWOOD COUNTY

STATION: 15+16.00 -L-

SHEET 3 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 14 FT. X 7 FT. REINFORCED CONCRETE BOX CULVERT 150° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-3
1			3			TOTAL SHEETS
2			4			7

DRAWN BY : V.X. NGUYEN DATE : 9-12-2013
CHECKED BY : H. T. BARBOUR DATE : 11-2013
DESIGN ENGINEER OF RECORD: A.M. LEE, PE DATE : 12-2013

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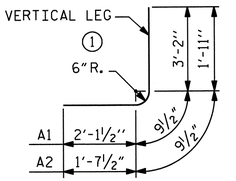
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A100	84	#5	STR	29'- 7''	2592	A200	72	#5	STR	29'- 7''	2222	A300	84	#5	STR	29'- 7''	2592	A400	84	#6	STR	29'- 7''	3732	A1	376	#4	1	6'- 1''	1528
A101	8	#5	STR	28'- 5''	237	A201	8	#5	STR	28'- 3''	236	A301	8	#5	STR	28'- 5''	237	A401	8	#6	STR	28'- 5''	341	A2	376	#4	1	4'- 4''	1088
A102	8	#5	STR	27'- 3''	227	A202	8	#5	STR	26'-11''	225	A302	8	#5	STR	27'- 3''	227	A402	8	#6	STR	27'- 3''	327						
A103	8	#5	STR	26'- 2''	218	A203	8	#5	STR	25'- 7''	213	A303	8	#5	STR	26'- 2''	218	A403	8	#6	STR	26'- 2''	314	B1	188	#4	STR	8'-10''	1109
A104	8	#5	STR	25'- 0''	209	A204	8	#5	STR	24'- 3''	202	A304	8	#5	STR	25'- 0''	209	A404	8	#6	STR	25'- 0''	300	B2	376	#4	STR	6'- 4''	1591
A105	8	#5	STR	23'-10''	199	A205	8	#5	STR	22'-10''	191	A305	8	#5	STR	23'-10''	199	A405	8	#6	STR	23'-10''	286	B3	188	#4	STR	8'-10''	1109
A106	8	#5	STR	22'- 8''	189	A206	8	#5	STR	21'- 6''	179	A306	8	#5	STR	22'- 8''	189	A406	8	#6	STR	22'- 8''	272						
A107	8	#5	STR	21'- 6''	179	A207	8	#5	STR	20'- 2''	168	A307	8	#5	STR	21'- 6''	179	A407	8	#6	STR	21'- 6''	258	C1	388	#4	STR	24'-11''	6458
A108	8	#5	STR	20'- 4''	170	A208	8	#5	STR	18'-10''	157	A308	8	#5	STR	20'- 4''	170	A408	8	#6	STR	20'- 4''	244						
A109	8	#5	STR	19'- 2''	160	A209	8	#5	STR	17'- 6''	146	A309	8	#5	STR	19'- 2''	160	A409	8	#6	STR	19'- 2''	230	D1	9	#6	STR	1'-7"	21
A110	8	#5	STR	18'-1''	151	A210	8	#5	STR	16'- 2''	135	A310	8	#5	STR	18'-1''	151	A410	8	#6	STR	18'-1''	217	D2	4	#6	STR	2'-1"	13
A111	8	#5	STR	16'- 11''	141	A211	8	#5	STR	14'- 9''	123	A311	8	#5	STR	16'- 11''	141	A411	8	#6	STR	16'- 11''	203	D3	8	#6	STR	2'-7"	31
A112	8	#5	STR	15'- 9''	131	A212	8	#5	STR	13'- 5''	112	A312	8	#5	STR	15'- 9''	131	A412	8	#6	STR	15'- 9''	189						
A113	8	#5	STR	14'- 7''	122	A213	8	#5	STR	12'- 1''	101	A313	8	#5	STR	14'- 7''	122	A413	8	#6	STR	14'- 7''	175	E1	16	#5	STR	4'-7"	76
A114	8	#5	STR	13'- 5''	112	A214	8	#5	STR	10'- 9''	90	A314	8	#5	STR	13'- 5''	112	A414	8	#6	STR	13'- 5''	161						
A115	8	#5	STR	12'- 3''	102	A215	8	#5	STR	9'- 5''	79	A315	8	#5	STR	12'- 3''	102	A415	8	#6	STR	12'- 3''	147	G1	8	#5	STR	59'- 3''	494
A116	8	#5	STR	11'- 1''	92	A216	8	#5	STR	8'- 1''	67	A316	8	#5	STR	11'- 1''	92	A416	8	#6	STR	11'- 1''	133						
A117	8	#5	STR	10'-0''	83	A217	8	#5	STR	6'- 8''	56	A317	8	#5	STR	10'-0''	83	A417	8	#6	STR	10'-0''	120	S2	12	#8	STR	59'- 3''	1898
A118	8	#5	STR	8'-10''	74	A218	8	#5	STR	5'- 4''	45	A318	8	#5	STR	8'-10''	74	A418	8	#6	STR	8'-10''	106						
A119	8	#5	STR	7'- 8''	64	A219	8	#5	STR	4'- 0''	33	A319	8	#5	STR	7'- 8''	64	A419	8	#6	STR	7'- 8''	92						
A120	8	#5	STR	6'- 6''	54	A220	16	#5	STR	2'- 8''	45	A320	8	#5	STR	6'- 6''	54	A420	8	#6	STR	6'- 6''	78						
A121	8	#5	STR	5'- 4''	45							A321	8	#5	STR	5'- 4''	45	A421	8	#6	STR	5'- 4''	64						
A122	8	#5	STR	4'- 2''	35							A322	8	#5	STR	4'- 2''	35	A422	8	#6	STR	4'- 2''	50						
A123	16	#5	STR	3'- 0''	50							A323	16	#5	STR	3'- 0''	50	A423	16	#6	STR	3'- 0''	72						

REINFORCING STEEL = 39,624 LBS.

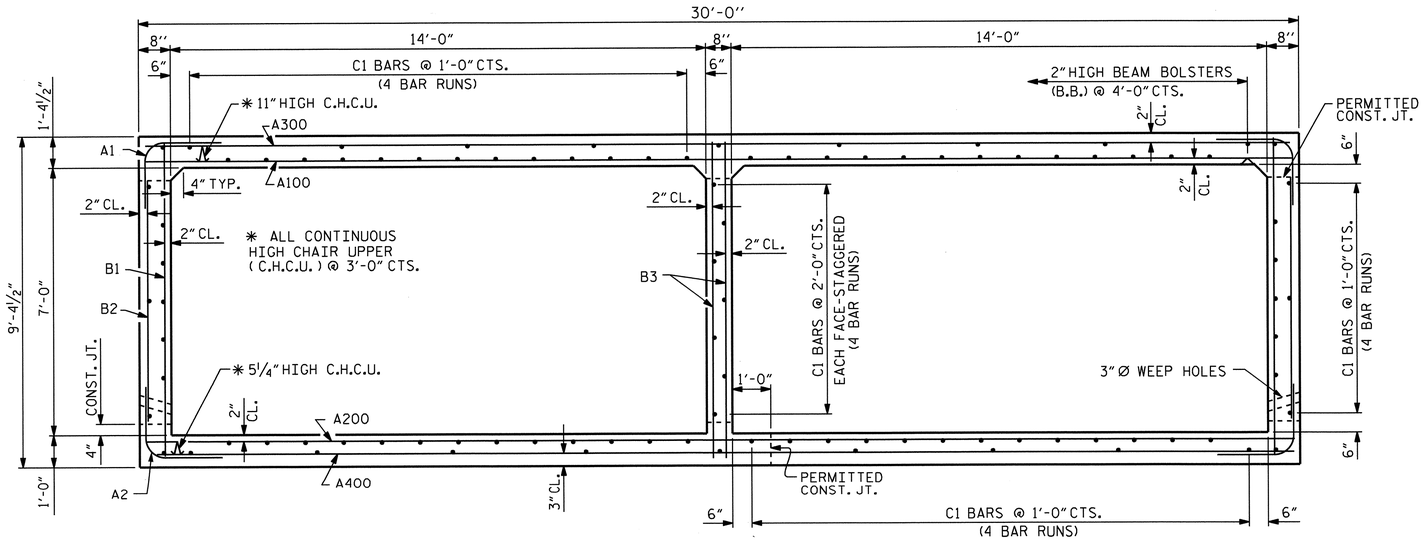
BAR TYPE



BAR DIMENSIONS ARE OUT TO OUT

SPLICE LENGTH CHART

BAR	SIZE	SPLICE
A200	#5	1'-9"
A400	#6	2'-3"
B1	#4	1'-5"
B3	#4	1'-5"
C1	#4	1'-11"



RIGHT ANGLE SECTION OF BARREL

THERE ARE 97 "C" BARS IN SECTION OF BARREL.

PROJECT NO. B-4763

HAYWOOD COUNTY

STATION: 15+16.00 -L-

SHEET 4 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DOUBLE 14 FT. X 7 FT. REINFORCED CONCRETE BOX CULVERT 150° SKEW

NORTH CAROLINA PROFESSIONAL SEAL 17230 ENGINEER WAEL S. ARAFAT

Wael S. Arafat 01-22-14

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-4
1			3			TOTAL SHEETS
2			4			7

DRAWN BY : V.X. NGUYEN DATE : 9-12-2013
CHECKED BY : H. T. BARBOUR DATE : 11-2013
DESIGN ENGINEER OF RECORD: A.M. LEE, PE DATE : 12-2013

21-JAN-2014 14:24
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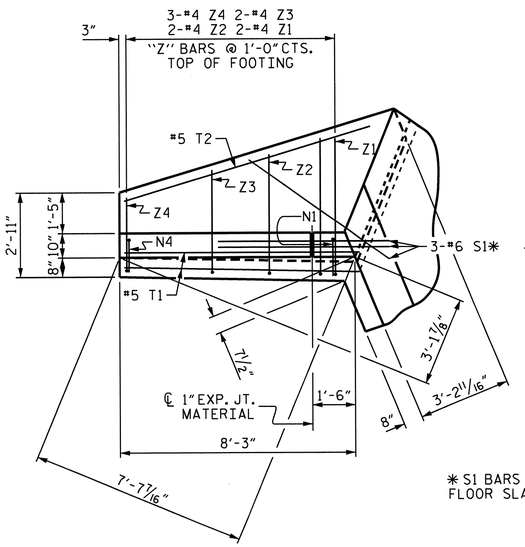
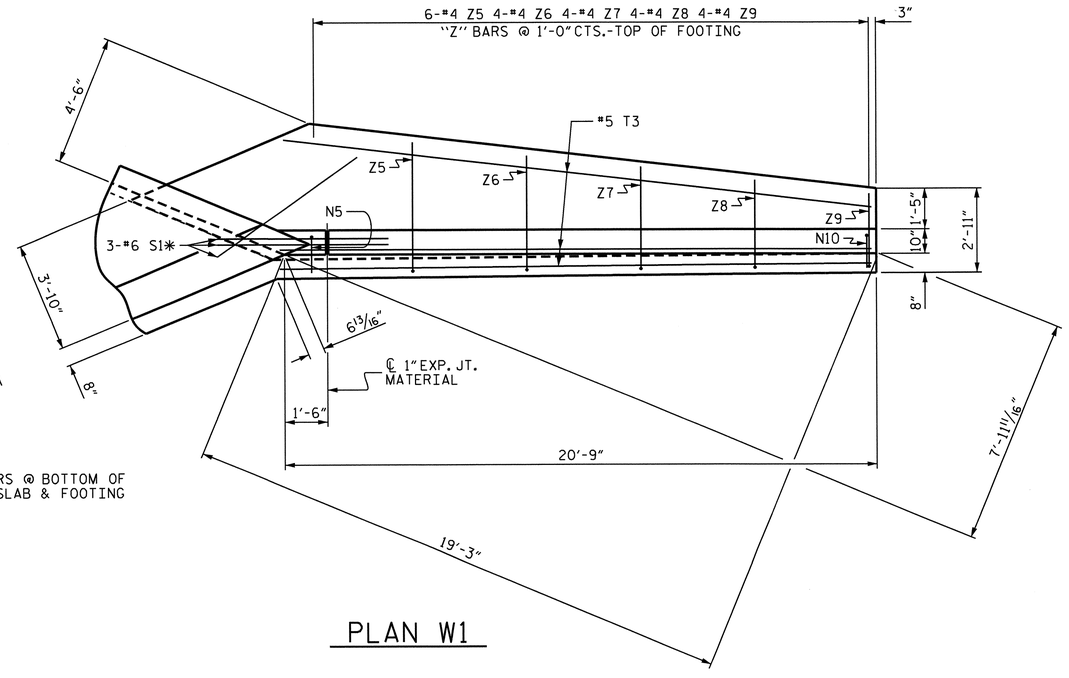


PLAN W2

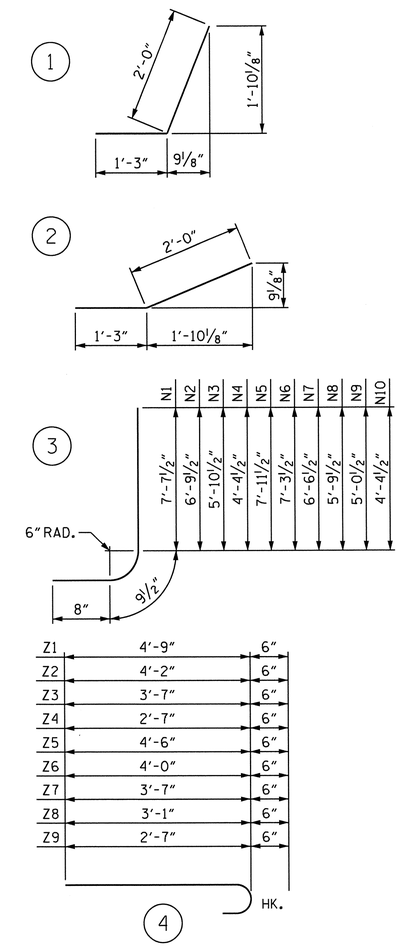


* S1 BARS @ BOTTOM OF FLOOR SLAB & FOOTING

PLAN W1

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



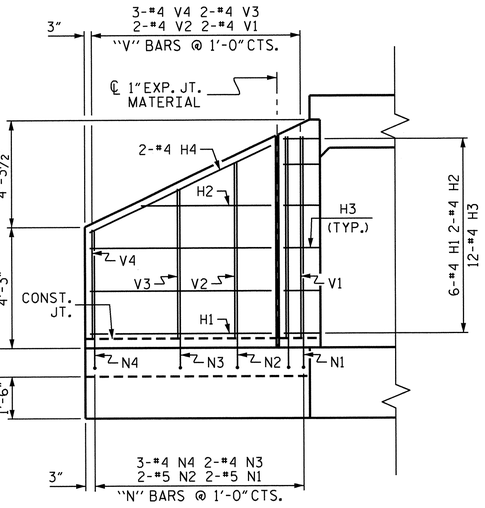
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	6'-4"	51
H2	4	#4	STR	4'-6"	12
H3	24	#4	1	3'-3"	52
H4	4	#4	STR	7'-0"	19
H5	12	#4	STR	18'-10"	151
H6	4	#4	STR	14'-1"	38
H7	4	#4	STR	6'-0"	16
H8	24	#4	2	3'-3"	52
H9	4	#4	STR	19'-2"	51
N1	4	#5	3	9'-1"	38
N2	4	#5	3	8'-3"	34
N3	4	#4	3	7'-4"	20
N4	6	#4	3	5'-7"	22
N5	4	#5	3	9'-5"	39
N6	8	#5	3	8'-9"	73
N7	8	#4	3	8'-0"	43
N8	8	#4	3	7'-3"	39
N9	8	#4	3	6'-6"	35
N10	8	#4	3	5'-10"	31
S1	12	#6	STR	6'-0"	108
T1	4	#5	STR	8'-3"	34
T2	2	#5	STR	9'-0"	19
T3	6	#5	STR	20'-9"	130
V1	4	#4	STR	7'-1"	19
V2	4	#4	STR	6'-2"	16
V3	4	#4	STR	5'-3"	14
V4	6	#4	STR	3'-9"	15
V5	4	#4	STR	7'-4"	20
V6	8	#4	STR	6'-9"	36
V7	8	#4	STR	6'-0"	32
V8	8	#4	STR	5'-3"	28
V9	8	#4	STR	4'-6"	24
V10	8	#4	STR	3'-9"	20
Z1	4	#4	4	5'-3"	14
Z2	4	#4	4	4'-8"	12
Z3	4	#4	4	4'-1"	11
Z4	6	#4	4	3'-1"	12
Z5	12	#4	4	5'-0"	40
Z6	8	#4	4	4'-6"	24
Z7	8	#4	4	4'-1"	22
Z8	8	#4	4	3'-7"	19
Z9	8	#4	4	3'-1"	16

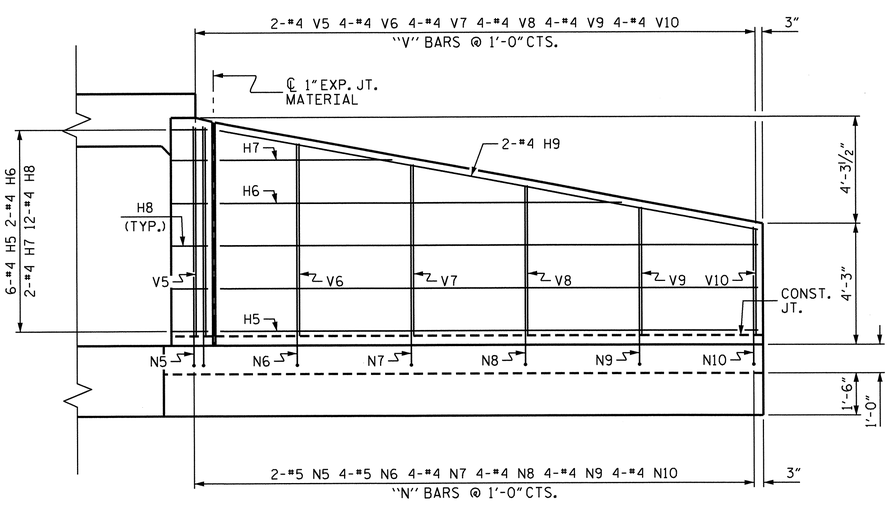
REINFORCING STEEL FOR 4 WINGS 1501 LBS

CLASS A CONCRETE

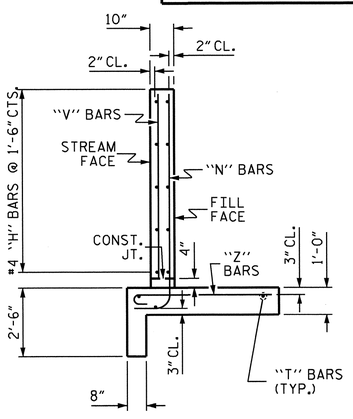
4 WINGS	23.6 CY
2 HEADWALLS	5.6 CY
2 END CURTAIN WALLS	6.9 CY
5 SILLS	3.9 CY
TOTAL	40.0 CY



ELEVATION W2



ELEVATION W1



TYPICAL WING SECTION

PROJECT NO. B-4763

HAYWOOD COUNTY

STATION: 15+16.00 -L-

SHEET 5 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD WINGS FOR CONCRETE BOX CULVERT

H = 7'-0" SLOPE = 2:1
45° OR 135° SKEW

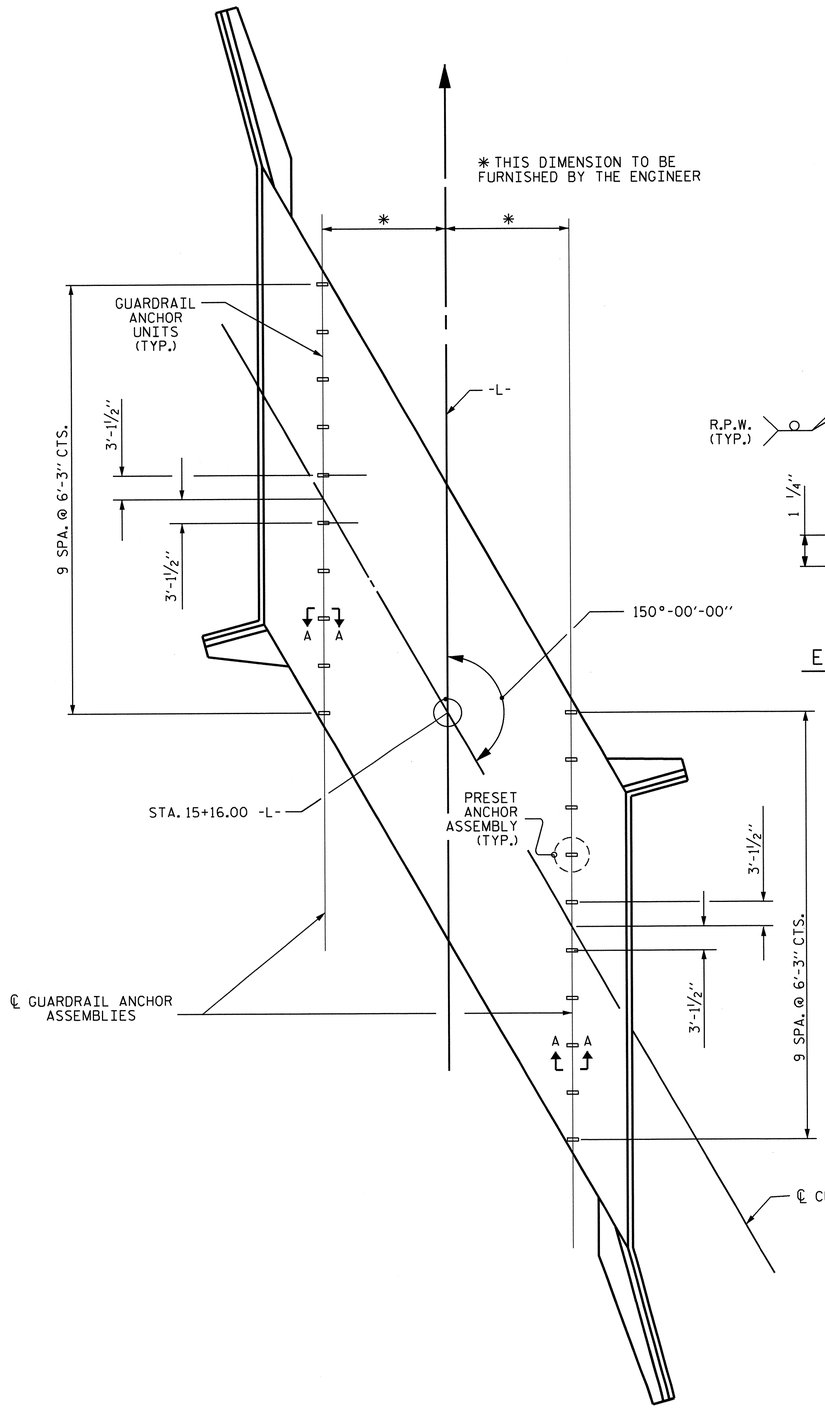
NORTH CAROLINA PROFESSIONAL SEAL 17230 ENGINEER WAEL S. ARAFAT
Wael S. Arafat 01-22-14

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-5
1			3			TOTAL SHEETS
2			4			7

ASSEMBLED BY : V.X. NGUYEN DATE : 9-12-2013
CHECKED BY : H.T. BARBOUR DATE : 11-2013

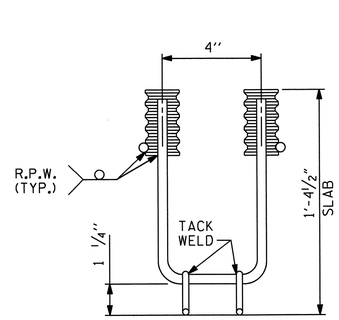
DRAWN BY : CCJ 01/00
CHECKED BY : RWW 03/00

STD. NO. CW4507

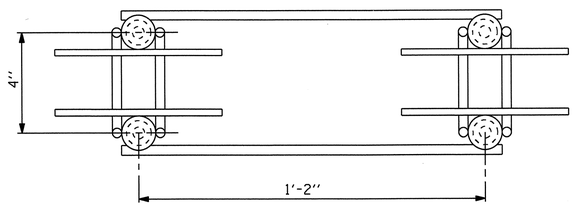


PLAN

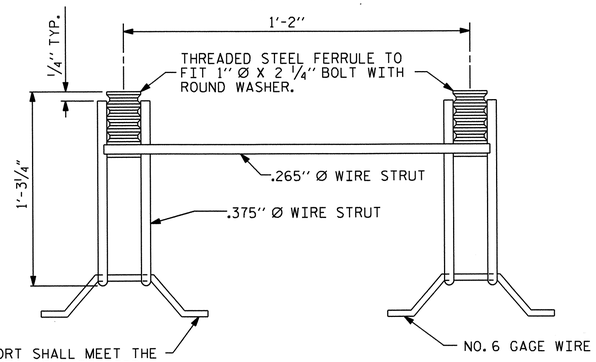
SHOWING : GUARDRAIL ANCHOR ASSEMBLY SPACING.



ELEVATION

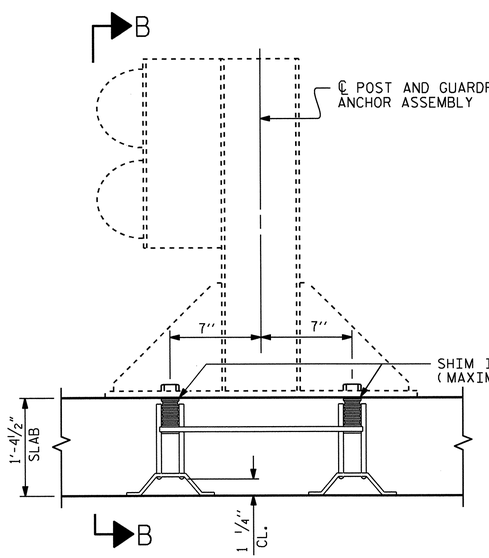


PLAN

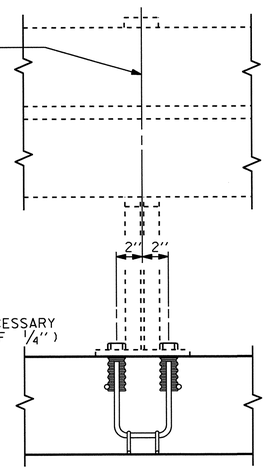


SIDE VIEW

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS



SECTION A-A



SECTION B-B

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS SHALL CONSIST OF THE FOLLOWING COMPONENTS :

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2½".

B. 4 - 1" Ø X 2 ¼" BOLTS WITH WASHERS, BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 1" Ø X 2¼" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

C. WIRE STRUTS SHOWN IN THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS DETAIL ARE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 P.S.I. AS AN OPTION, A 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

GUARDRAIL ANCHOR ASSEMBLY WITH BOLTS SHALL BE ASSEMBLED IN THE SHOP. BOLT THREADS MAY BE RECUT AS NECESSARY TO INSURE FIT.

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CLASS "A" CONCRETE.

FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

AT THE CONTRACTOR'S OPTION, FERRULES WITH OPEN OR CLOSED ENDS MAY BE USED.

PAYMENT FOR GUARDRAIL, POSTS, AND POST BASE PLATES IS INCLUDED IN ROADWAY PAY ITEMS.

SLAB REINFORCING STEEL MAY BE SHIFTED AS NECESSARY TO CLEAR GUARDRAIL ANCHOR ASSEMBLY. CARE SHOULD BE TAKEN TO KEEP THE SHIFTING OF REINFORCING STEEL TO A MINIMUM.

THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF GUARDRAIL ANCHOR ASSEMBLY. LEVEL TWO FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 1"Ø BOLT IS 21.8 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS.

ASSEMBLED BY : V.X. NGUYEN		DATE : 9-12-2013	
CHECKED BY : H.T. BARBOUR		DATE : 12-2013	
DRAWN BY : FCJ 6/88	REV. 5/7/03	RWW/JTE	
CHECKED BY : ARB 6/88	REV. 5/1/06R	KMM/GM	
	REV. 10/1/11	MAA/GM	

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NORTH CAROLINA PROFESSIONAL SEAL 17230 ENGINEER WAEL S. ARAFAT

Wael S. Arafat 01-22-14

PROJECT NO. B-4763
HAYWOOD COUNTY
STATION: 15+16.00 -L-

SHEET 6 OF 7

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

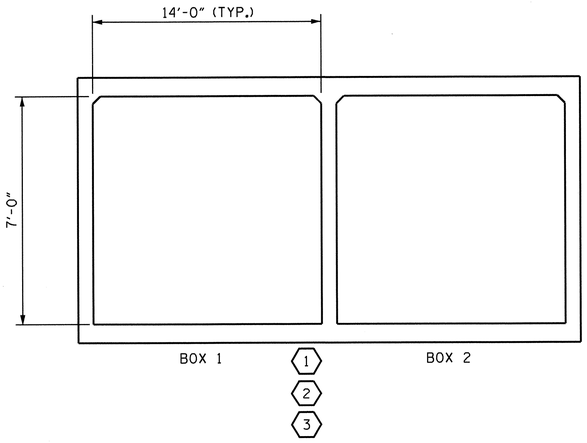
STANDARD

ANCHORAGE DETAILS FOR GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-6
1			3			TOTAL SHEETS
2			4			7

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⟩	1.10	--	1.75	1.17	1	TOP SLAB	5.50	1.10	1	BOTTOM SLAB	13.61	
		HL-93 (OPERATING)	N/A		1.42	--	1.35	1.52	1	TOP SLAB	5.50	1.42	1	BOTTOM SLAB	13.61	
		HS-20 (INVENTORY)	36.00	⟨2⟩	1.10	39.54	1.75	1.40	1	TOP SLAB	5.87	1.10	1	BOTTOM SLAB	13.61	
		HS-20 (OPERATING)	36.00		1.42	51.26	1.35	1.81	1	TOP SLAB	5.87	1.42	1	BOTTOM SLAB	13.61	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.50		2.55	34.45	1.40	2.55	1	TOP SLAB	6.23	3.33	1	BOTTOM SLAB	13.61	
		SNGARBS2	20.00		2.26	45.27	1.40	2.39	1	TOP SLAB	5.87	2.26	1	BOTTOM SLAB	13.61	
		SNAGRIS2	22.00		2.06	45.39	1.40	2.55	1	TOP SLAB	5.87	2.06	1	BOTTOM SLAB	13.61	
		SNCOTTS3	27.25		1.47	39.96	1.40	1.47	1	TOP SLAB	5.87	1.65	1	BOTTOM SLAB	13.61	
		SNAGGRS4	34.93		1.30	45.45	1.40	1.66	1	TOP SLAB	6.23	1.30	1	BOTTOM SLAB	13.61	
		SNS5A	35.55		1.28	45.47	1.40	1.60	1	TOP SLAB	6.23	1.28	1	BOTTOM SLAB	13.61	
		SNS6A	39.95		1.14	45.49	1.40	1.60	1	TOP SLAB	6.23	1.14	1	BOTTOM SLAB	13.61	
		SNS7B	42.00		1.19	49.80	1.40	1.63	1	TOP SLAB	5.87	1.19	1	BOTTOM SLAB	13.61	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.00		1.38	45.65	1.40	2.23	1	BOTTOM SLAB	13.93	1.38	1	BOTTOM SLAB	13.61	
		TNT4A	33.08		1.37	45.41	1.40	1.74	1	TOP SLAB	5.87	1.37	1	BOTTOM SLAB	13.61	
		TNT6A	41.60		1.26	52.31	1.40	1.75	1	TOP SLAB	5.87	1.26	1	BOTTOM SLAB	13.61	
		TNT7A	42.00		1.14	47.97	1.40	1.88	1	BOTTOM SLAB	13.93	1.14	1	BOTTOM SLAB	13.61	
		TNT7B	42.00		1.14	47.82	1.40	1.64	1	TOP SLAB	6.23	1.14	1	BOTTOM SLAB	13.61	
		TNAGRIT4	43.00		1.06	45.49	1.40	1.67	1	TOP SLAB	5.87	1.06	1	BOTTOM SLAB	13.61	
		TNAGT5A	45.00	⟨3⟩	1.01	45.67	1.40	1.63	1	BOTTOM SLAB	13.93	1.01	1	BOTTOM SLAB	13.61	
		TNAGT5B	45.00		1.01	45.67	1.40	1.64	1	BOTTOM SLAB	13.93	1.01	1	BOTTOM SLAB	13.61	



LRFR SUMMARY

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

PROJECT NO. B-4763

HAYWOOD COUNTY

STATION: 15+16.00 -L-

SHEET 7 OF 7

NORTH CAROLINA PROFESSIONAL SEAL 17230 ENGINEER WAEL S. ARAFAT

Wael S. Arafat 01-22-14

DESIGN ENGINEER OF RECORD: A.M. LEE, PE	DATE : 12-2013	
ASSEMBLED BY : H. KIM, PE	DATE : 11-21-2013	
CHECKED BY : H.T. BARBOUR	DATE : 11-2013	
DRAWN BY : WMC 7/11	REV. 10/1/11 MAA/GM	
CHECKED BY : GM 7/11		

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-7
1			3			TOTAL SHEETS
2			4			7

STD. NO. LRFR5

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 @ RGW REV. 5-7-03 RWW @ JTE REV. 10-1-11 MAA @ GM
REV. 8-16-99 RWW @ LES REV. 5-1-06 TLA @ GM