

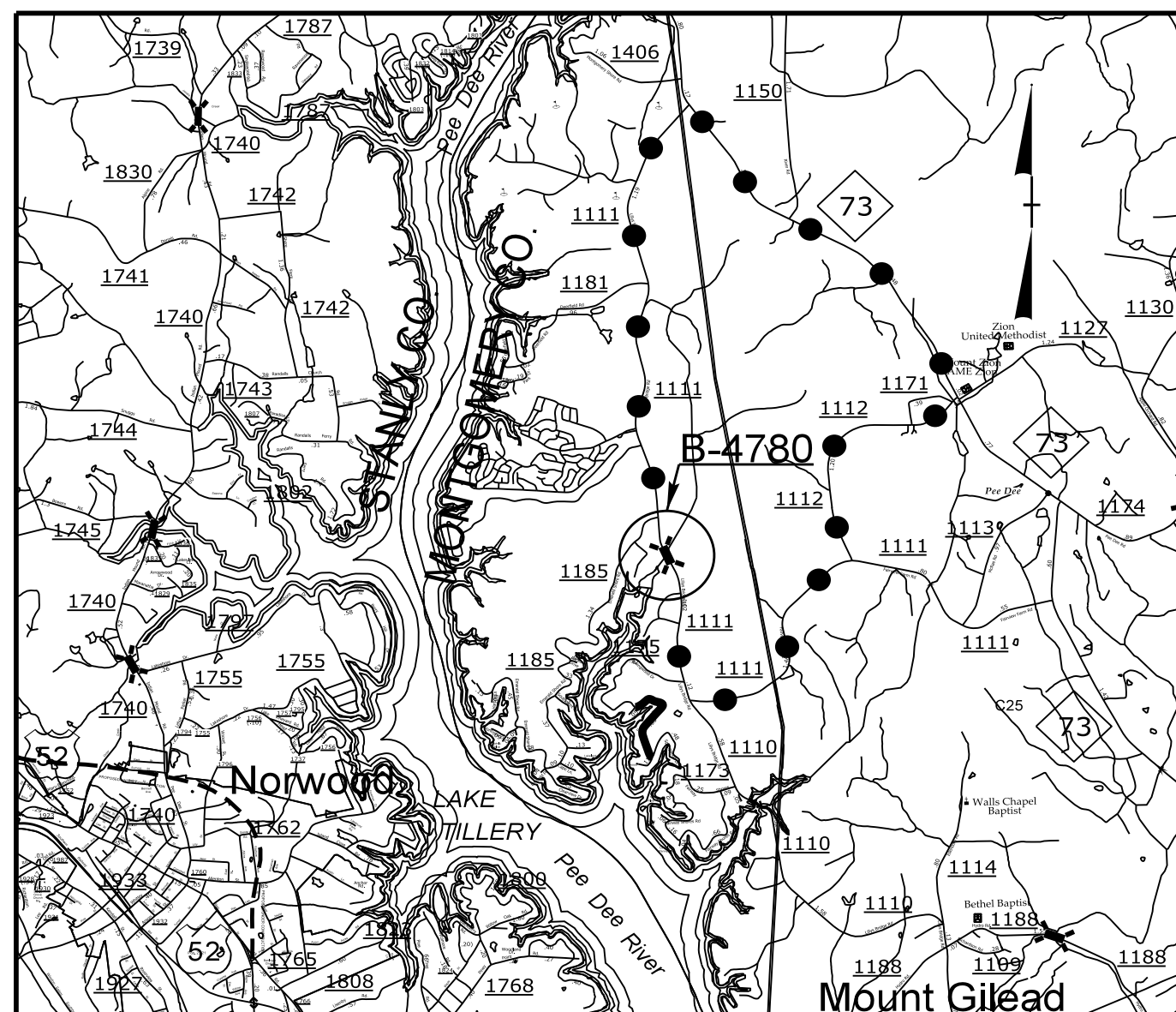
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CONTRACT: C203616 TIP PROJECT: B-4780

CULVERT



VICINITY MAP

—•••• OFFSITE DETOUR

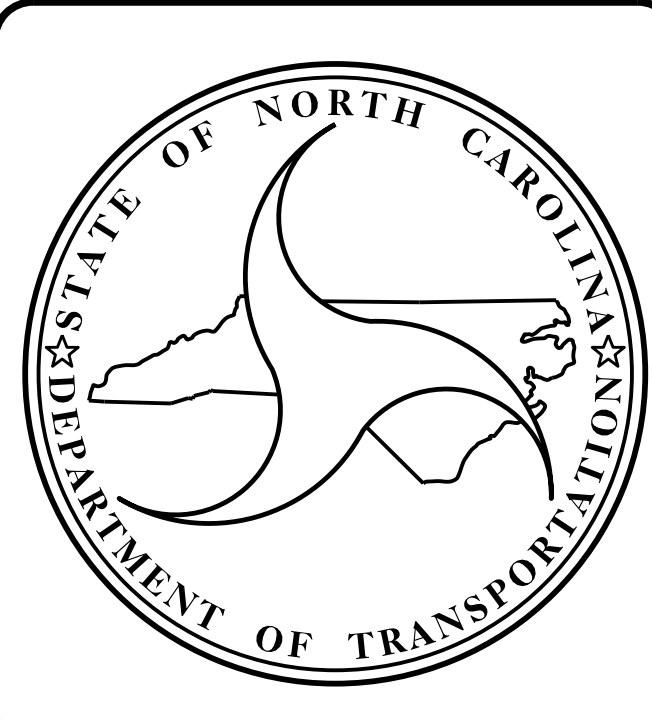
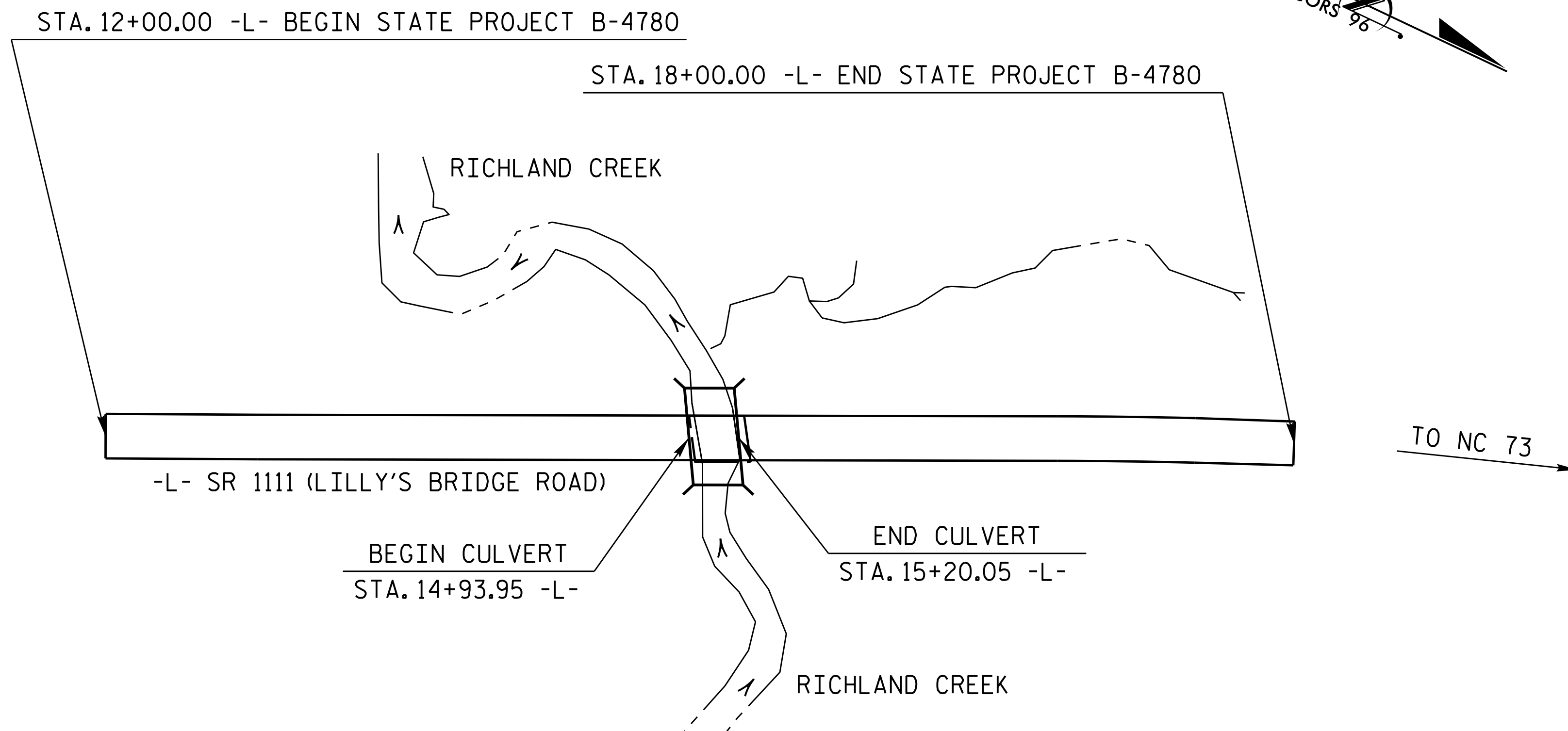
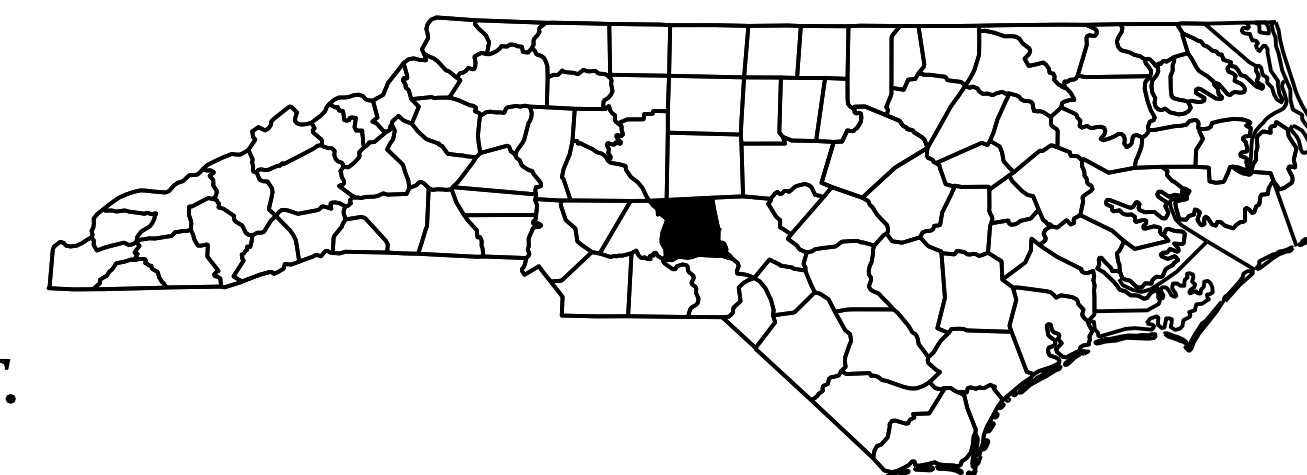
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

MONTGOMERY COUNTY

**LOCATION: BRIDGE NO. 22 ON SR 1111 (LILLY'S BRIDGE RD.)
OVER RICHLAND CREEK**

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND CULVERT.

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4780		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
38551.1.1	BRZ-1111(8)	P. E.	
38551.2.FD1	BRZ-1111(8)	R/W & UTIL.	
38551.3.FD1	BRZ-1111(8)	CONST.	



DESIGN DATA

ADT 2015 =	1310
ADT 2035 =	2000
D =	60 %
T =	11 % *
V =	55 MPH
* TTST	3% DUAL 8%
FUNC. CLASS. =	RURAL LOCAL SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4780 =	0.109 MILE
LENGTH STRUCTURE TIP PROJECT B-4780 =	0.005 MILE
TOTAL LENGTH TIP PROJECT B-4780 =	0.114 MILE

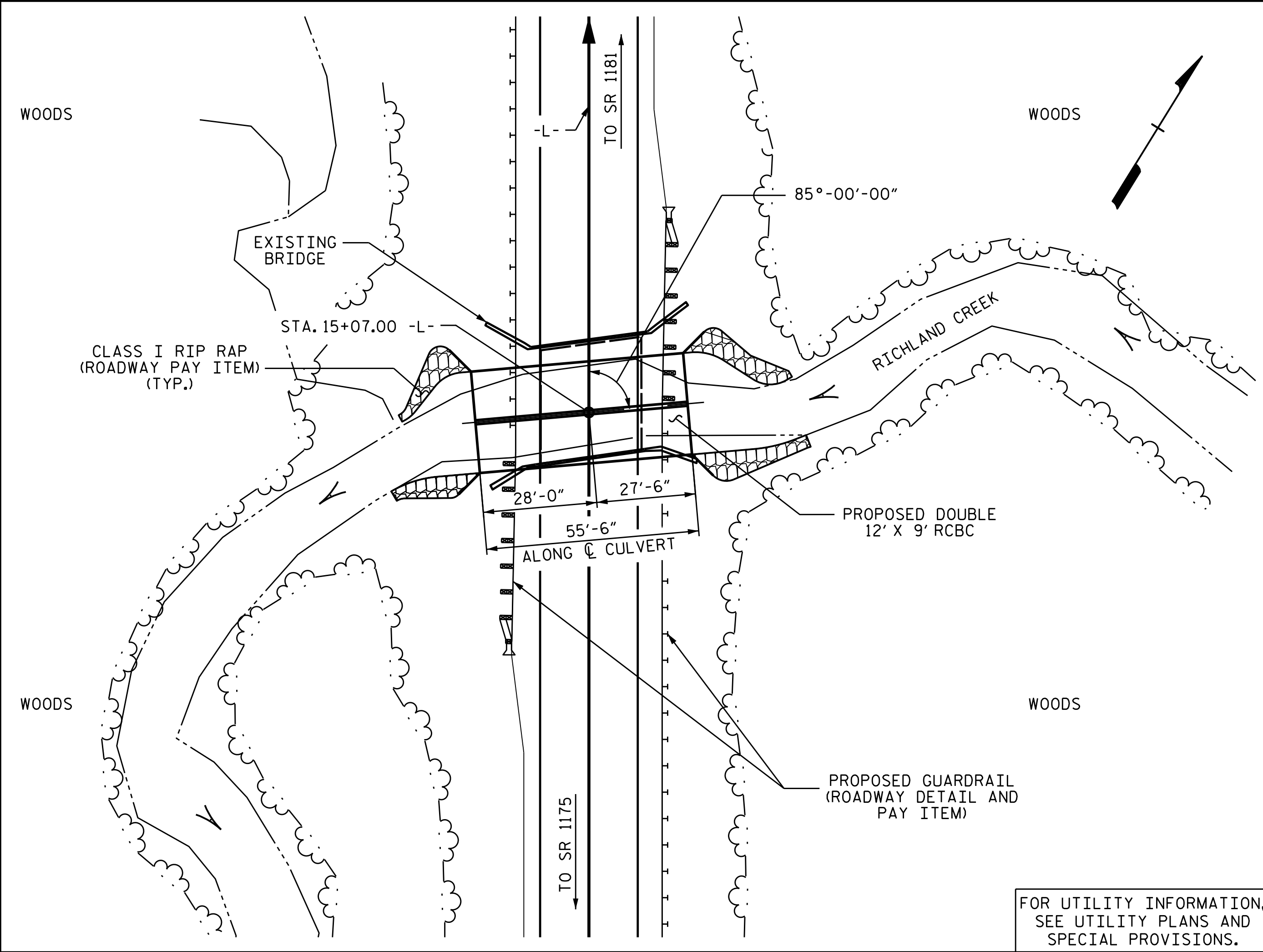
Prepared In the Office of:
DIVISION OF HIGHWAYS
STRUCTURES MANAGEMENT UNIT
1000 BIRCH RIDGE DR.
RALEIGH, N.C. 27610

2012 STANDARD SPECIFICATIONS

<p>LETTING DATE : OCTOBER 20, 2015</p>	<p>J. M. BAILEY, P.E. <small>PROJECT ENGINEER</small></p> <hr/> <p>D.R. CALHOUN, P.E. <small>PROJECT DESIGN ENGINEER</small></p>
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BM #1: RAIL ROAD SPIKE IN BASE OF 8" ELM 118.10' LEFT OF STA. 15+35.64, EL. 281.66

F. A. PROJECT NO. BRZ-1111(8)



LOCATION SKETCH

NOTES

- ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING.
- DESIGN FILL ----- 4.58'
- 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 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 FILL.
- DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.
- 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 EXISTING STRUCTURE CONSISTING OF SINGLE SPAN, 1 @ 29'-3", WITH A CLEAR ROADWAY WIDTH OF 25'-0" WITH DOUBLE TIMBER DECK WITH 4" ASPHALT WEARING SURFACE ON I-BEAMS AND DOUBLE CHANNELS WITH MASS CONCRETE ABUTMENTS AND LOCATED AT THE PROPOSED SITE, SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED BELOW THE LEGAL LOAD LIMIT.

TOTAL STRUCTURE QUANTITIES			
CLASS A CONCRETE			
BARREL @	2.561	CY/FT	142.1 C.Y.
WINGS, ETC.			31.4 C.Y.
		TOTAL	173.5 C.Y.
REINFORCING STEEL			
BARREL		18,613	LBS.
WINGS, ETC.		1,803	LBS.
		TOTAL	20,416 LBS.
FOUNDATION CONDITIONING MATERIAL		121	TONS
CULVERT EXCAVATION			LUMP SUM
REMOVAL OF EXISTING STRUCTURE			LUMP SUM

REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED IN A MANNER THAT PREVENTS DEBRIS FROM FALLING INTO THE WATER. THE CONTRACTOR SHALL SUBMIT DEMOLITION PLANS FOR REVIEW AND REMOVE THE BRIDGE 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.

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 COST 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 STA. 15+07.00 -L-.'

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.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

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

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

NO WORK SHALL BE DONE ON THE CULVERT AT STA. 15+07.00 -L- UNTIL THE AREA OF THE CULVERT HAS BEEN EXCAVATED TO COMPETENT MATERIAL AT THE DISCRETION OF THE ENGINEER AND UNSUITABLE MATERIAL REPLACED WITH FOUNDATION CONDITIONING MATERIAL AND PROPERLY COMPACTED TO THE ELEVATION OF THE BOTTOM OF THE PROPOSED CULVERT FLOOR SLAB AND WING FOOTINGS AS REQUIRED TO CONSTRUCT THE PROPOSED CULVERT. PAYMENT FOR EXCAVATION DOWN TO ONE FOOT BELOW THE BOTTOM OF THE CULVERT FLOOR SLAB AND WING FOOTINGS WILL BE FOR ALL WORK INCLUDING FOUNDATION CONDITIONING MATERIAL DOWN TO ONE FOOT BELOW THE CULVERT AND SHALL BE INCLUDED IN THE LUMP SUM PRICE FOR CULVERT EXCAVATION. PAYMENT FOR EXCAVATION BEYOND ONE FOOT BELOW THE BOTTOM OF THE CULVERT FLOOR SLAB AND WING FOOTINGS WILL BE FOR ALL WORK INCLUDING EXCAVATION, ANY TEMPORARY SHEETING, FOUNDATION CONDITIONING MATERIAL, AND ANY OTHER MISCELLANEOUS ITEMS, AND SHALL BE INCLUDED IN THE PRICE PER CUBIC YARD FOR FOUNDATION CONDITIONING MATERIAL.

THE ESTIMATED QUANTITY FOR THE FOUNDATION CONDITIONING MATERIAL THAT IS INCLUDED IN THE LUMP SUM PAYMENT FOR CULVERT EXCAVATION IS 117 TONS. THE ESTIMATED QUANTITY THAT IS FOR THE FOUNDATION CONDITIONING MATERIAL THAT IS PLACED BEYOND ONE FOOT BELOW THE BOTTOM OF THE CULVERT FLOOR SLAB AND WING FOOTINGS IS 121 TONS. THESE QUANTITIES ARE ESTIMATES ONLY.

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.

HYDRAULIC DATA

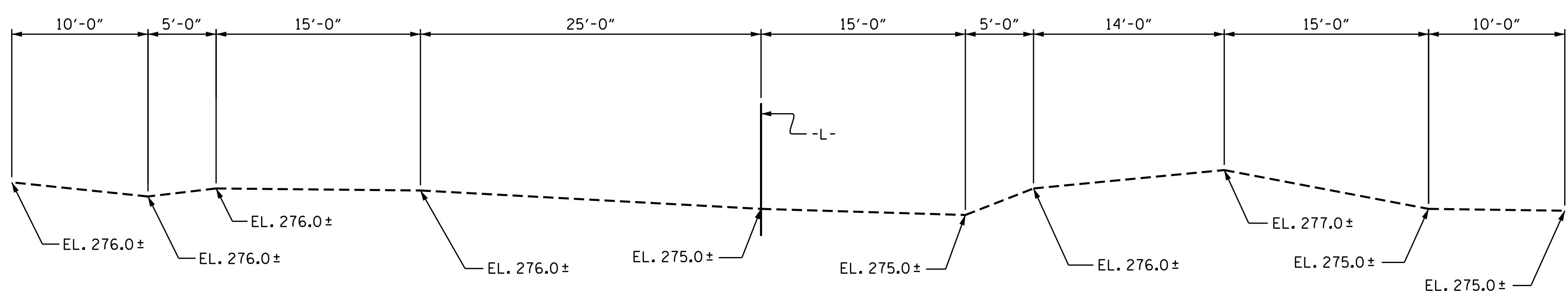
DESIGN DISCHARGE = 1000 CFS
 FREQUENCY OF DESIGN FLOOD = 25 YR.
 DESIGN HIGH WATER ELEVATION = 282.30
 DRAINAGE AREA = 2.9 SQ. MI.
 BASE DISCHARGE (Q100) = 1500 CFS
 BASE HIGH WATER ELEVATION = 283.87

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = 2800 CFS
 FREQUENCY OF OVERTOPPING FLOOD = > 500 YR.
 OVERTOPPING FLOOD ELEVATION = 288.50

GRADE DATA

GRADE POINT ELEVATION @ STA. 15+07.00 -L- = 288.52'
 BED ELEVATION @ STA. 15+07.00 -L- = 274.97'
 ROADWAY FILL SLOPES = 2:1

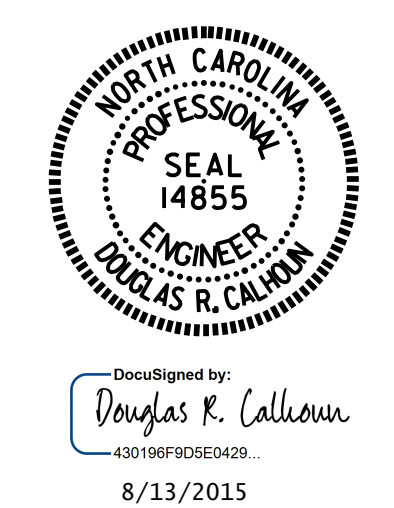


PROFILE ALONG CULVERT

PROJECT NO. B-4780
MONTGOMERY COUNTY
 STATION: 15+07.00 -L-

SHEET 1 OF 6 REPLACES BRIDGE NO. 22

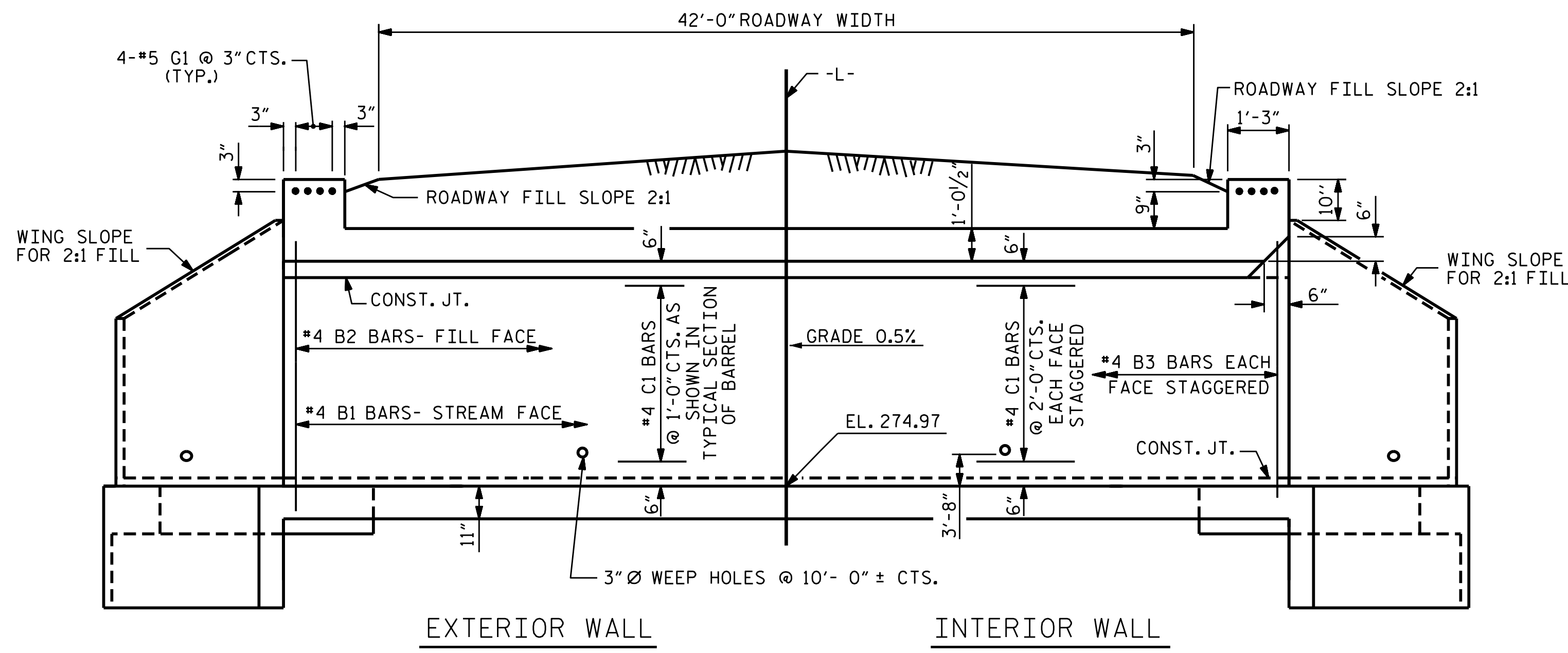
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**DOUBLE 12 FT. X 9 FT.
 CONCRETE BOX CULVERT
 85° SKEW**



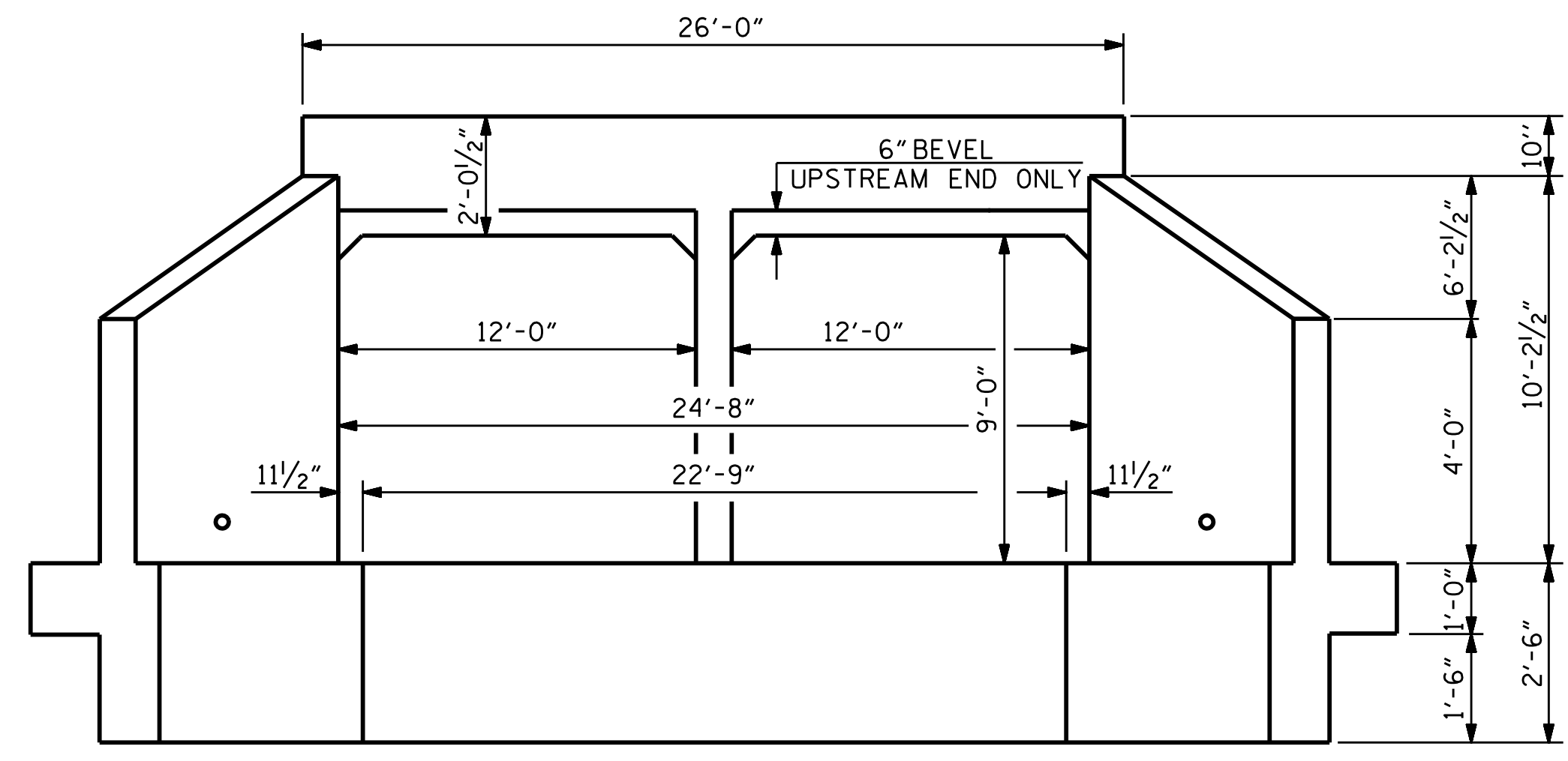
ADDED NOV. 1, 1990

ASSEMBLED BY : <u>A. SORSENGINH</u>	DATE : <u>9/2013</u>	SPECIAL
CHECKED BY : <u>T. KIRSCHBAUM</u>	DATE : <u>10/2013</u>	
DRAWN BY : <u>R.W. WRIGHT</u>	DATE : <u>JULY, 1990</u>	STANDARD
CHECKED BY : <u>D.A. GLADDEN</u>	DATE : <u>JULY, 1990</u>	

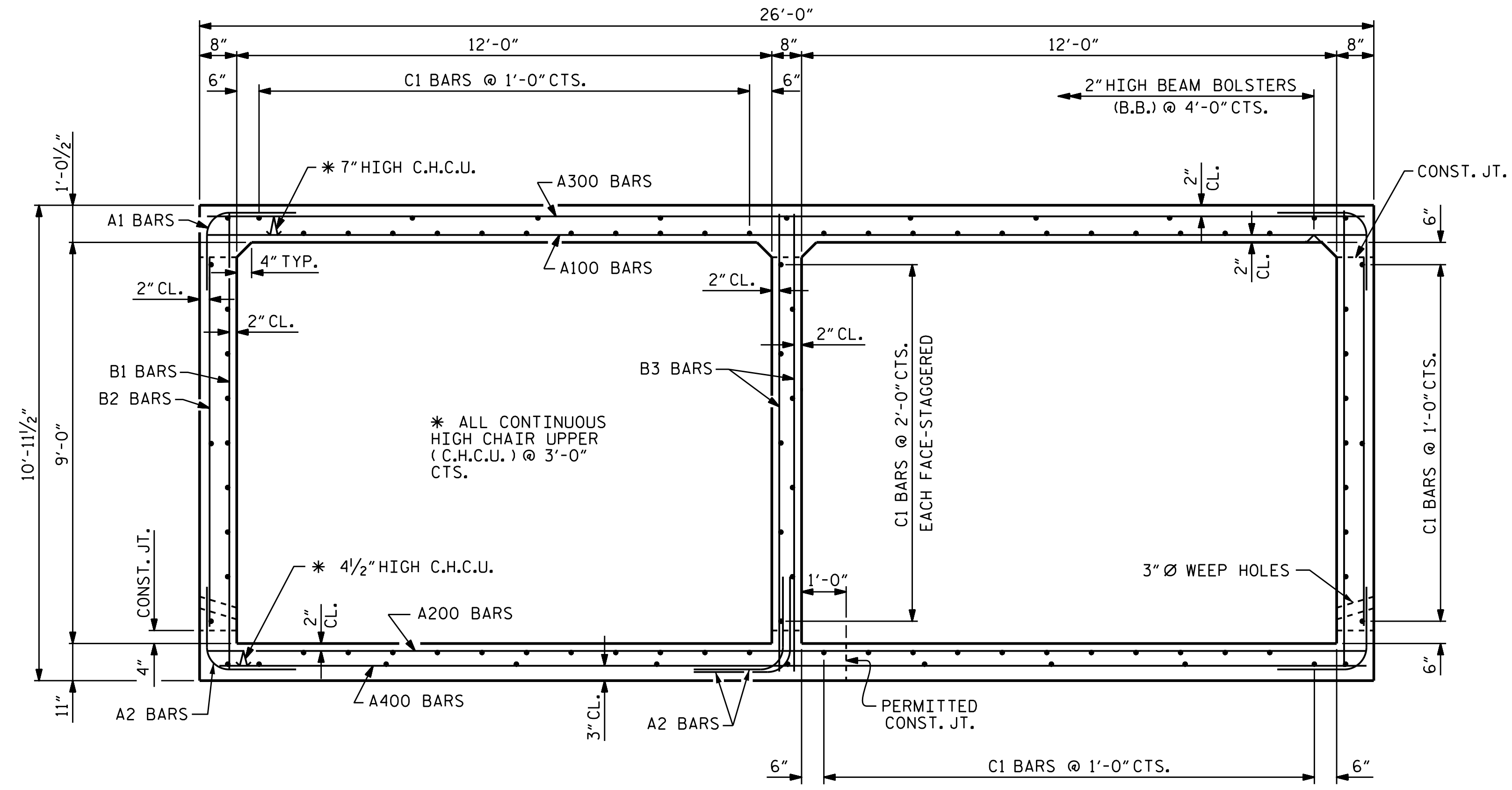
REVISIONS						SHEET NO. C-1
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 6
2			4			



CULVERT SECTION NORMAL TO ROADWAY



INLET END ELEVATION NORMAL TO SKEW

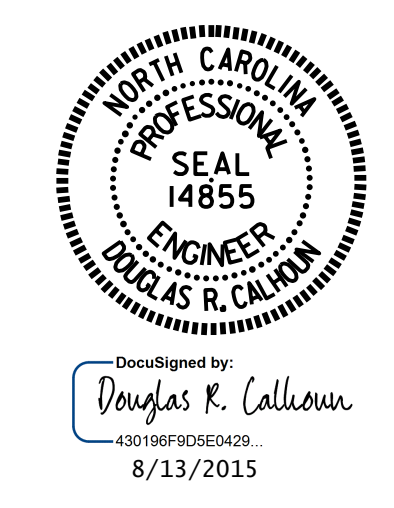


RIGHT ANGLE SECTION OF BARREL

THERE ARE 95 "C" BARS IN SECTION OF BARREL.

PROJECT NO. B-4780
MONTGOMERY COUNTY
 STATION: 15+07.00 -L-

SHEET 2 OF 6



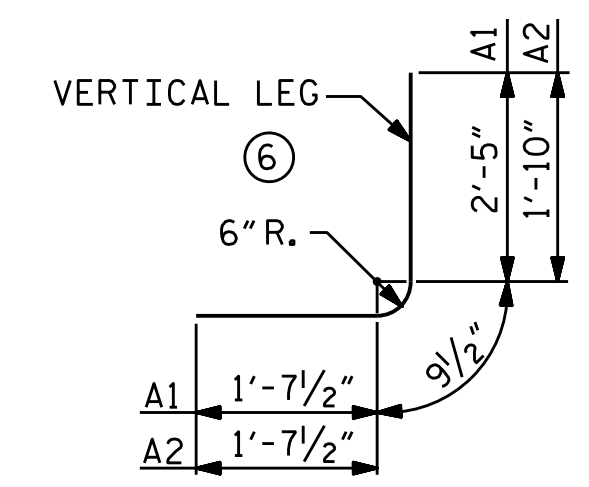
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 12 FT. X 9 FT.
 CONCRETE BOX CULVERT
 85° SKEW

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

REVISED 11-19-99 BY M.M. CHECKED BY B.W.W.
 REDRAWN NOV. 1990 BY TSS CHECKED BY ARB

ASSEMBLED BY : <u>A. SORSENGIN</u>	DATE : <u>9/2013</u>	SPECIAL
CHECKED BY : <u>T. KIRSCHBAUM</u>	DATE : <u>10/2013</u>	
DRAWN BY : <u>RALPH D. UNDERWOOD</u>	DATE : <u>MAY 1971</u>	STANDARD
CHECKED BY : <u>JOEL A. JOHNSON</u>	DATE : <u>JULY 1971</u>	

BAR TYPE



BAR DIMENSIONS ARE OUT TO OUT

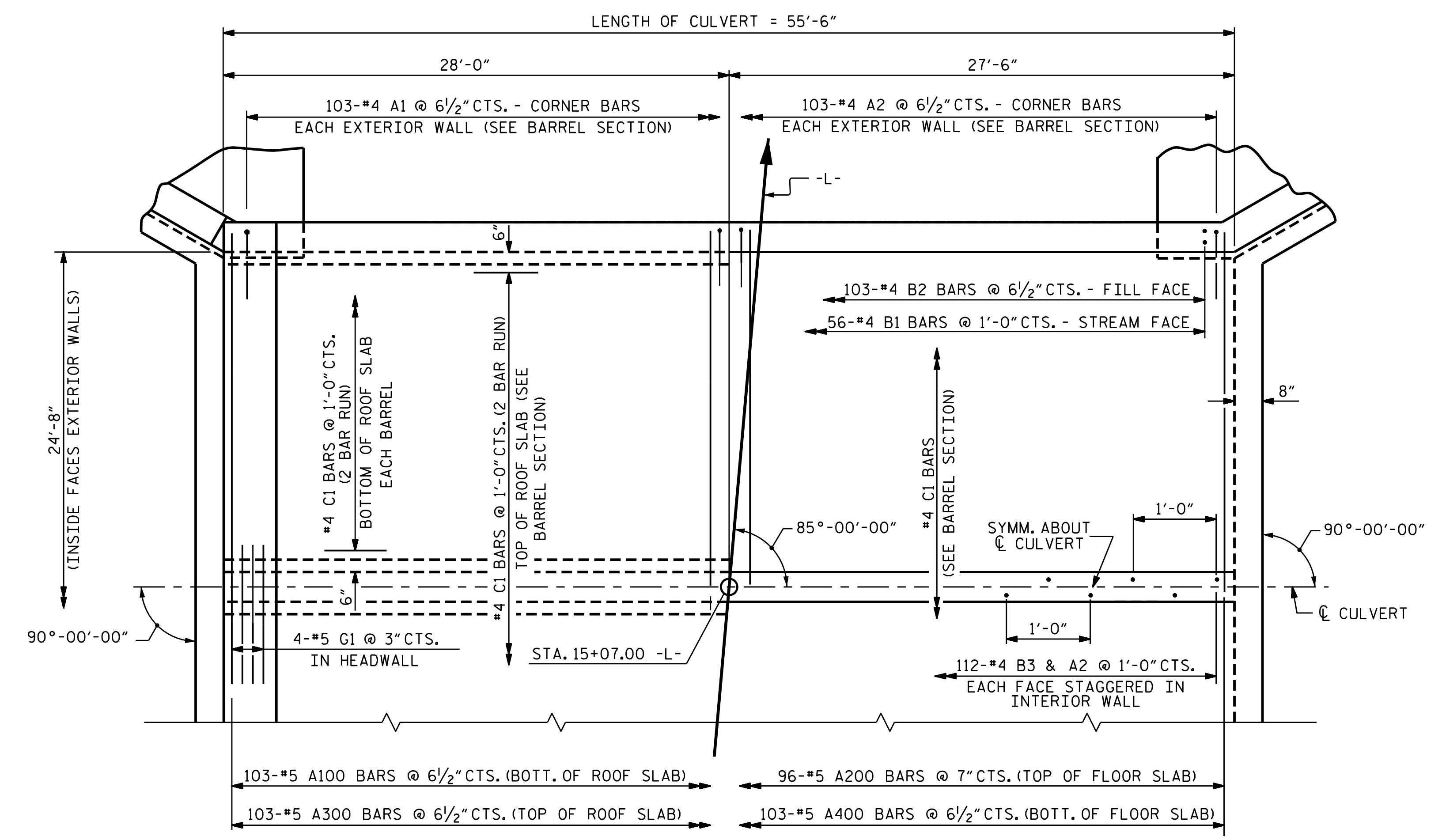
SPLICE LENGTH CHART

BAR	SIZE	LENGTH
A200	#5	1'-9"
A400	#5	1'-9"
B1	#4	1'-5"
B3	#4	1'-5"
C1	#4	1'-11"

BAR SCHEDULE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A100	103	#5	STR	25'-7"	2748
A200	96	#5	STR	25'-7"	2562
A300	103	#5	STR	25'-7"	2748
A400	103	#5	STR	25'-7"	2748
A1	206	#4	6	4'-10"	665
A2	318	#4	6	4'-3"	903
B1	112	#4	STR	10'-5"	779
B2	206	#4	STR	8'-4"	1147
B3	112	#4	STR	10'-5"	779
C1	190	#4	STR	28'-8"	3638
G1	8	#5	STR	25'-8"	214

REINFORCING STEEL = 18,931 LBS

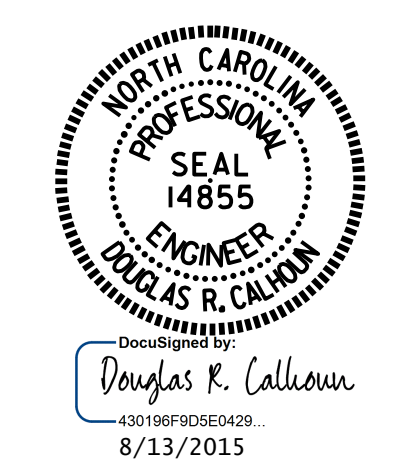


PART PLAN-ROOF SLAB

PART PLAN-FLOOR SLAB

PROJECT NO. B-4780
MONTGOMERY COUNTY
 STATION: 15+07.00 -L-

SHEET 3 OF 6

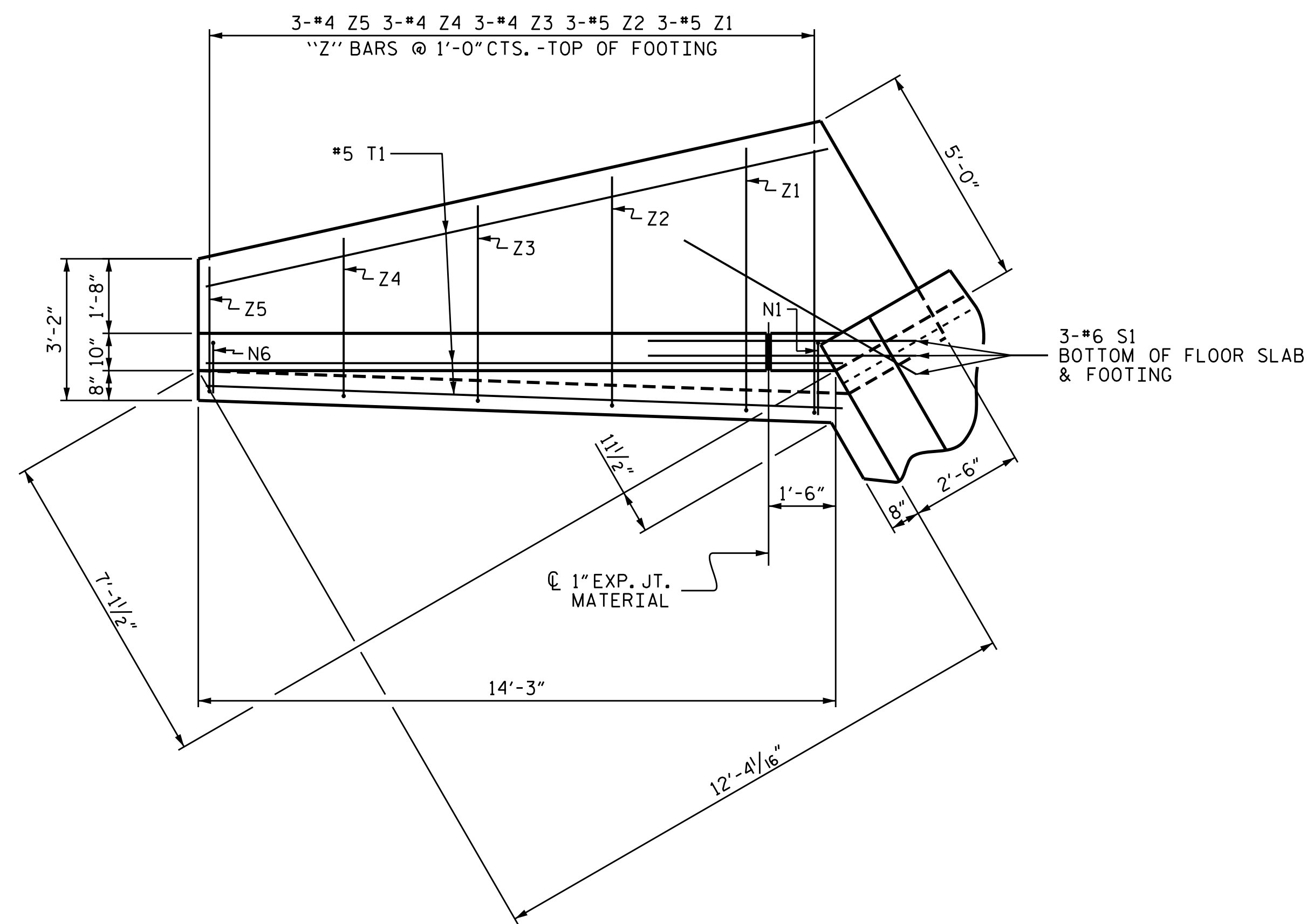


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 12 FT. X 9 FT.
 CONCRETE BOX CULVERT
 85° SKEW

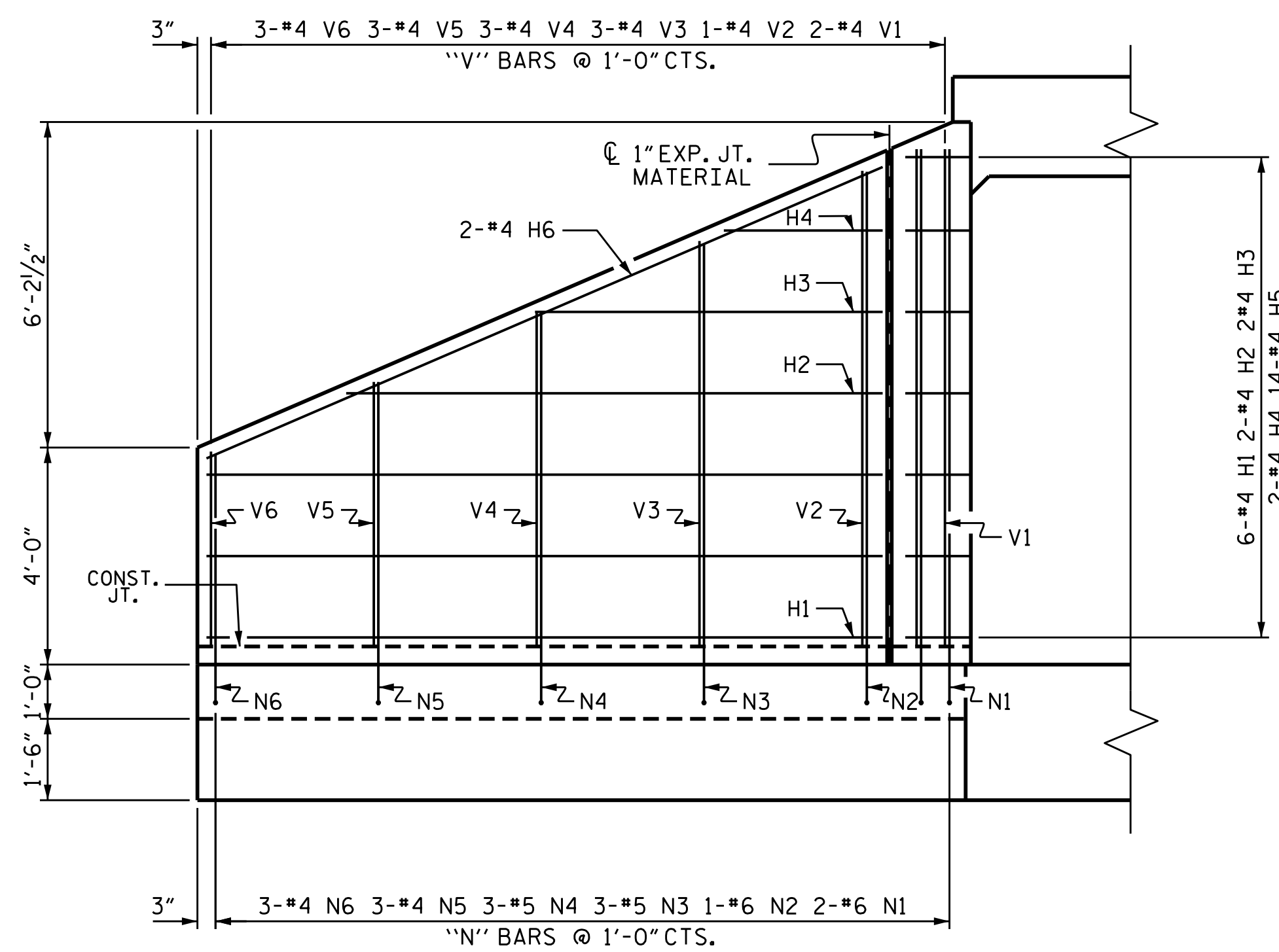
REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.
 REDRAWN NOV. 1990 BY TSS CHECKED BY ARB

ASSEMBLED BY : <u>A. SORSENGIN</u>	DATE : <u>9/2013</u>	SPECIAL
CHECKED BY : <u>T. KIRSCHBAUM</u>	DATE : <u>10/2013</u>	
DRAWN BY : <u>RALPH D. UNDERWOOD</u>	DATE : <u>MAY 1971</u>	STANDARD
CHECKED BY : <u>JOEL A. JOHNSON</u>	DATE : <u>JULY 1971</u>	

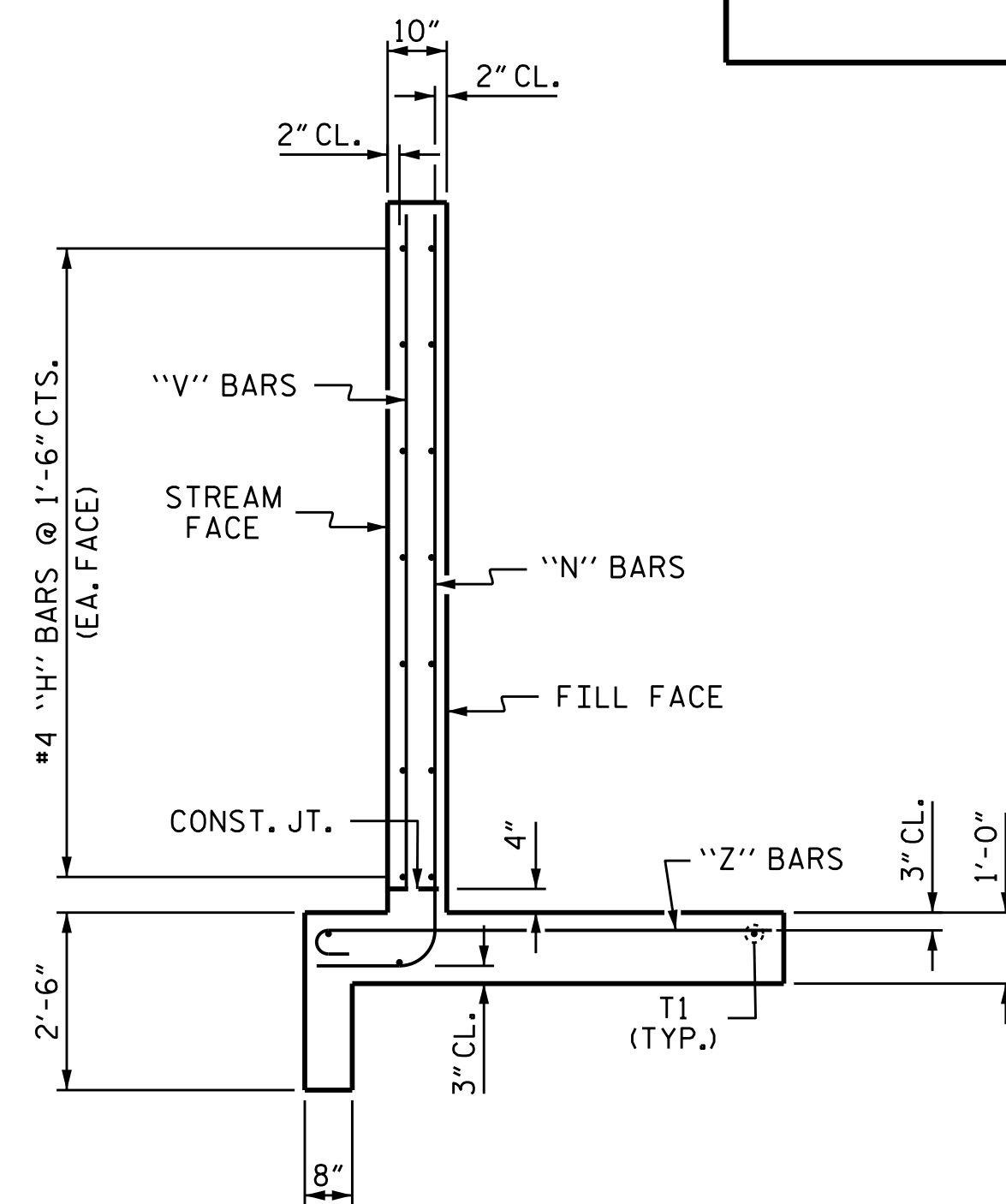
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-3
1			3			TOTAL SHEETS
2			4			6



PLAN



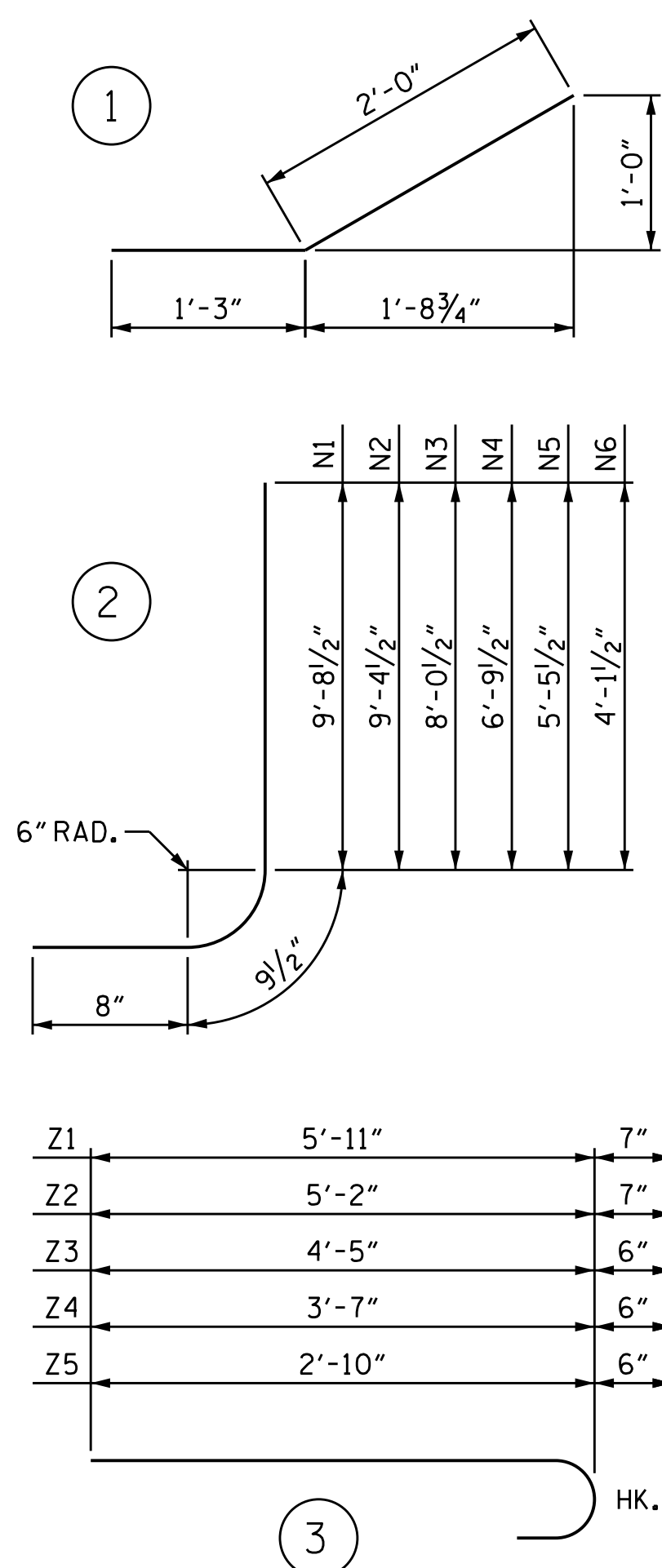
ELEVATION



TYPICAL WING SECTION

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



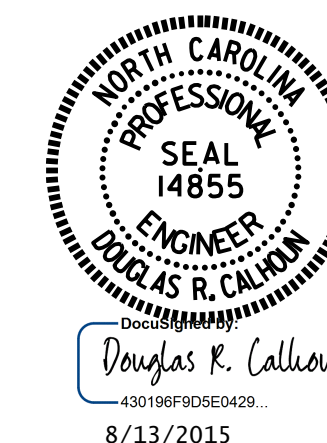
BILL OF MATERIAL

BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	24	#4	STR	12'-5"	199
H2	8	#4	STR	9'-10"	53
H3	8	#4	STR	6'-5"	34
H4	8	#4	STR	2'-11"	16
H5	56	#4	1	3'-3"	122
H6	8	#4	STR	13'-6"	72
N1	8	#6	2	11'-2"	134
N2	4	#6	2	10'-10"	65
N3	12	#5	2	9'-6"	119
N4	12	#5	2	8'-3"	103
N5	12	#4	2	6'-11"	55
N6	12	#4	2	5'-7"	45
S1	12	#6	STR	6'-0"	108
T1	12	#5	STR	14'-3"	178
V1	8	#4	STR	9'-2"	49
V2	4	#4	STR	8'-9"	23
V3	12	#4	STR	7'-5"	59
V4	12	#4	STR	6'-2"	49
V5	12	#4	STR	4'-10"	39
V6	12	#4	STR	3'-7"	29
Z1	12	#5	3	6'-6"	81
Z2	12	#5	3	5'-9"	72
Z3	12	#4	3	4'-11"	39
Z4	12	#4	3	4'-1"	33
Z5	12	#4	3	3'-4"	27

REINFORCING STEEL FOR 4 WINGS 1803 LBS

CLASS A CONCRETE
 4 WINGS 26.2 CY
 2 HEADWALLS 2.4 CY
 2 END CURTAIN WALLS 2.8 CY
 TOTAL 31.4 CY

ASSEMBLED BY : A. SORSENGIH DATE : 9/2013
 CHECKED BY : T. KIRSCHBAUM DATE : 10/2013
 DRAWN BY : CCJ 10/99
 CHECKED BY : RWW 03/00



PROJECT NO. B-4780
MONTGOMERY COUNTY
 STATION: 15+07.00 -L-

SHEET 4 OF 6

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
STANDARD WINGS
 FOR
CONCRETE BOX CULVERT
 H = 9'-0" SLOPE = 2:1
 90° SKEW

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

STD. NO. CW9009

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 2 1/2".
 - B. 4 - 1" Ø X 2 1/4" 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 2 1/4" 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 1/16" 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.

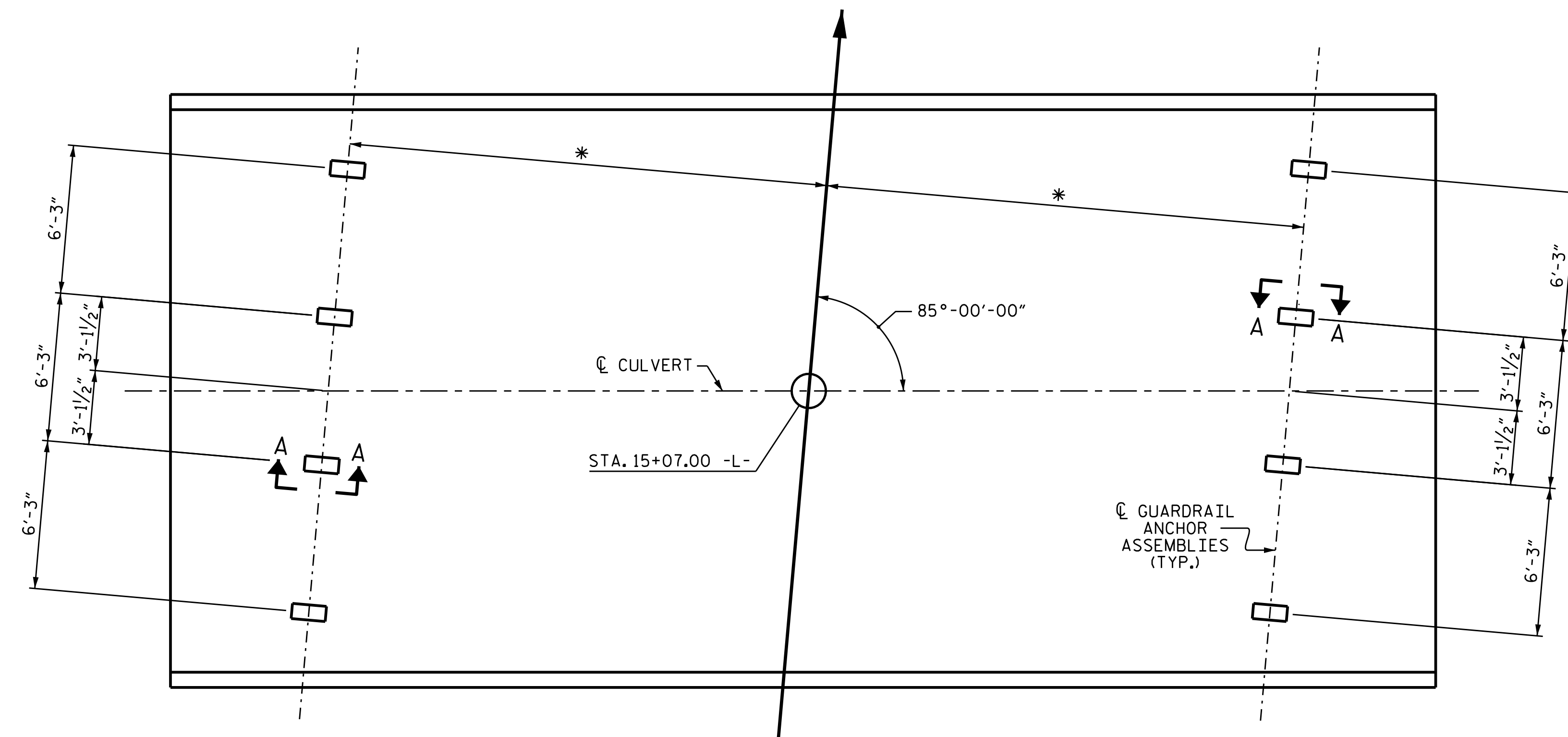
FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

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.

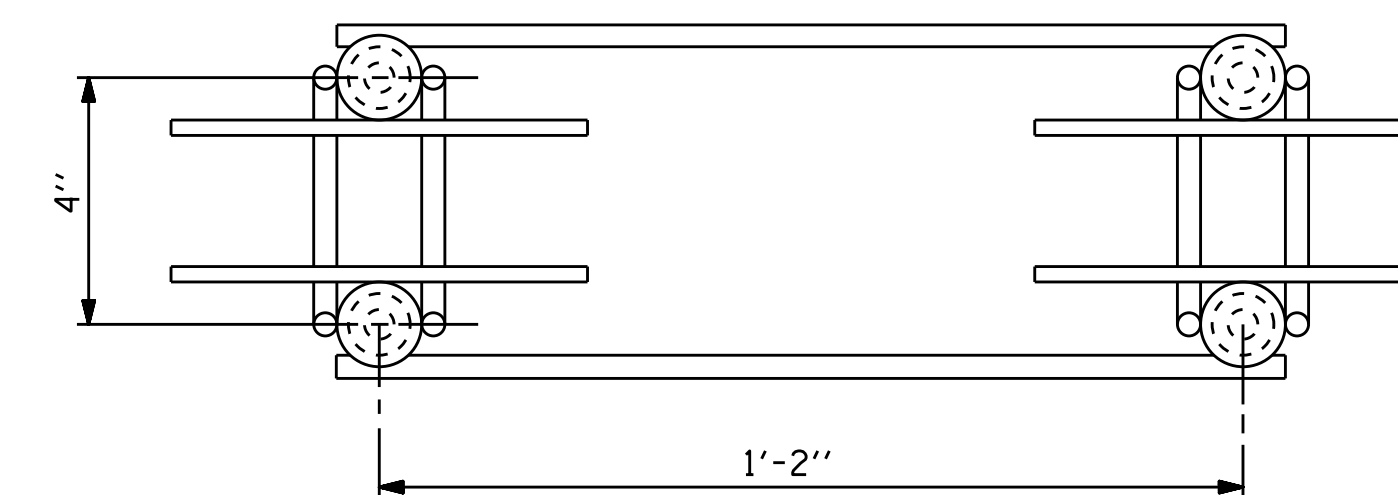
THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF GUARDRAIL ANCHOR ASSEMBLY. LEVEL TWO FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 1" Ø BOLT IS 21.8 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS.



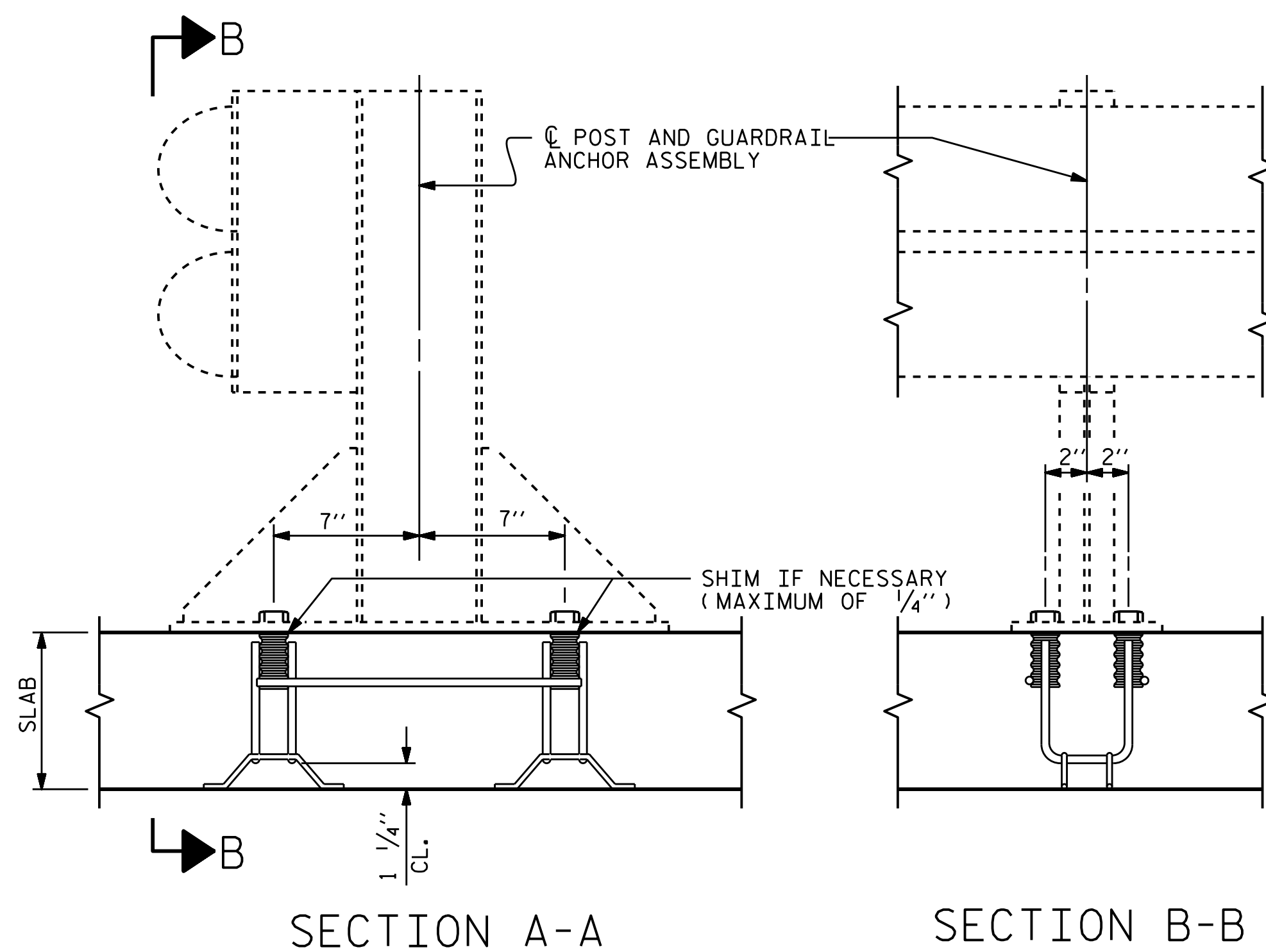
PLAN

SHOWING: GUARDRAIL ANCHOR ASSEMBLY SPACING

* THIS DIMENSION TO BE FURNISHED BY THE ENGINEER.

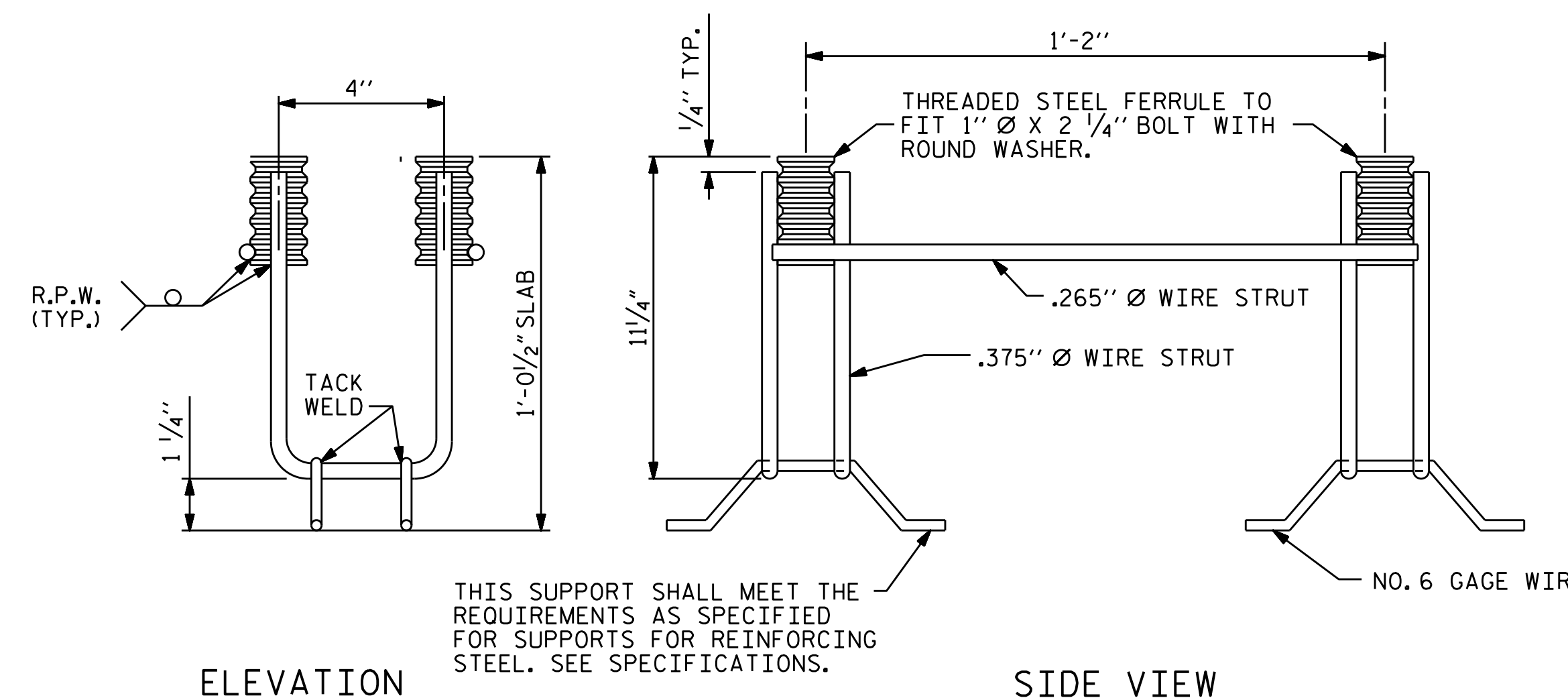


PLAN



SECTION A-A

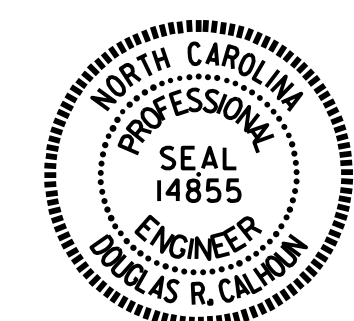
SECTION B-B



ELEVATION

SIDE VIEW

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS



DocuSigned by:
Douglas R. Calhoun
430196F905E0429
8/13/2015

PROJECT NO. B-4780
MONTGOMERY COUNTY
 STATION: 15+07.00 -L-

SHEET 5 OF 6

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD
 ANCHORAGE DETAILS FOR
 GUARDRAIL ANCHOR ASSEMBLY
 FOR CULVERTS

ASSEMBLED BY :	A. SORSENGIH	DATE :	2/2015
CHECKED BY :	D. R. CALHOUN	DATE :	2/2015
DRAWN BY :	FCJ	6/88	REV. 5/7/03
CHECKED BY :	ARB	6/88	REV. 5/1/06R
			REV. 10/1/11
			RWW/JTE
			KMM/GM
			MAA/GM

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

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		
						MOMENT				SHEAR						
						LIVE-LOAD FACTORS (LL)	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	1.06	--	1.75	1.06	1	TOP SLAB	5.38	1.15	1	BOTTOM SLAB	11.67		
	HL-93 (OPERATING)	N/A		1.38	--	1.35	1.38	1	TOP SLAB	5.38	1.49	1	BOTTOM SLAB	11.67		
	HS-20 (INVENTORY)	36.000	2	1.15	41.33	1.75	1.32	1	TOP SLAB	5.38	1.15	1	BOTTOM SLAB	11.67		
	HS-20 (OPERATING)	36.000		1.49	53.57	1.35	1.71	1	TOP SLAB	5.38	1.49	1	BOTTOM SLAB	11.67		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH		2.40	32.45	1.40	2.40	1	TOP SLAB	5.38	2.73	1	TOP SLAB	11.57		
		SNGARBS2	20.000		2.25	44.92	1.40	2.25	1	TOP SLAB	5.38	2.29	1	BOTTOM SLAB	11.67	
		SNAGRIS2	22.000		2.09	46.00	1.40	2.40	1	TOP SLAB	5.38	2.09	1	BOTTOM SLAB	11.67	
		SNCOTTS3	27.250		1.33	36.31	1.40	1.33	1	TOP SLAB	5.38	1.50	1	TOP SLAB	11.57	
		SNAGGRS4	34.925		1.31	45.80	1.40	1.50	1	BOTTOM SLAB	11.72	1.31	1	BOTTOM SLAB	11.67	
		SNS5A	35.550		1.30	46.23	1.40	1.48	1	BOTTOM SLAB	11.72	1.30	1	BOTTOM SLAB	11.67	
		SNS6A	39.950		1.29	51.55	1.40	1.46	1	BOTTOM SLAB	11.72	1.29	1	BOTTOM SLAB	11.67	
		SNS7B	42.000		1.22	51.27	1.40	1.46	1	BOTTOM SLAB	11.72	1.22	1	BOTTOM SLAB	11.67	
	TRUCK TRACTOR SEMI-TRAILER (TTS1)	TNAGRIT3	33.000		1.41	46.38	1.40	1.68	1	BOTTOM SLAB	11.72	1.41	1	BOTTOM SLAB	11.67	
		TNT4A	33.075		1.45	47.92	1.40	1.59	1	TOP SLAB	5.38	1.45	1	BOTTOM SLAB	11.67	
		TNT6A	41.600		1.29	53.55	1.40	1.62	1	BOTTOM SLAB	11.72	1.29	1	BOTTOM SLAB	11.67	
		TNT7A	42.000		1.23	51.72	1.40	1.50	1	BOTTOM SLAB	11.72	1.23	1	BOTTOM SLAB	11.67	
		TNT7B	42.000		1.33	55.69	1.40	1.50	1	BOTTOM SLAB	11.72	1.33	1	BOTTOM SLAB	11.67	
		TNAGRIT4	43.000		1.14	48.98	1.40	1.33	1	BOTTOM SLAB	11.72	1.14	1	BOTTOM SLAB	11.67	
TNAGT5A	45.000		1.19	53.67	1.40	1.40	1	BOTTOM SLAB	11.72	1.19	1	BOTTOM SLAB	11.67			
TNAGT5B	45.000		3	49.33	1.40	1.31	1	BOTTOM SLAB	11.72	1.10	1	BOTTOM SLAB	11.67			

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	--

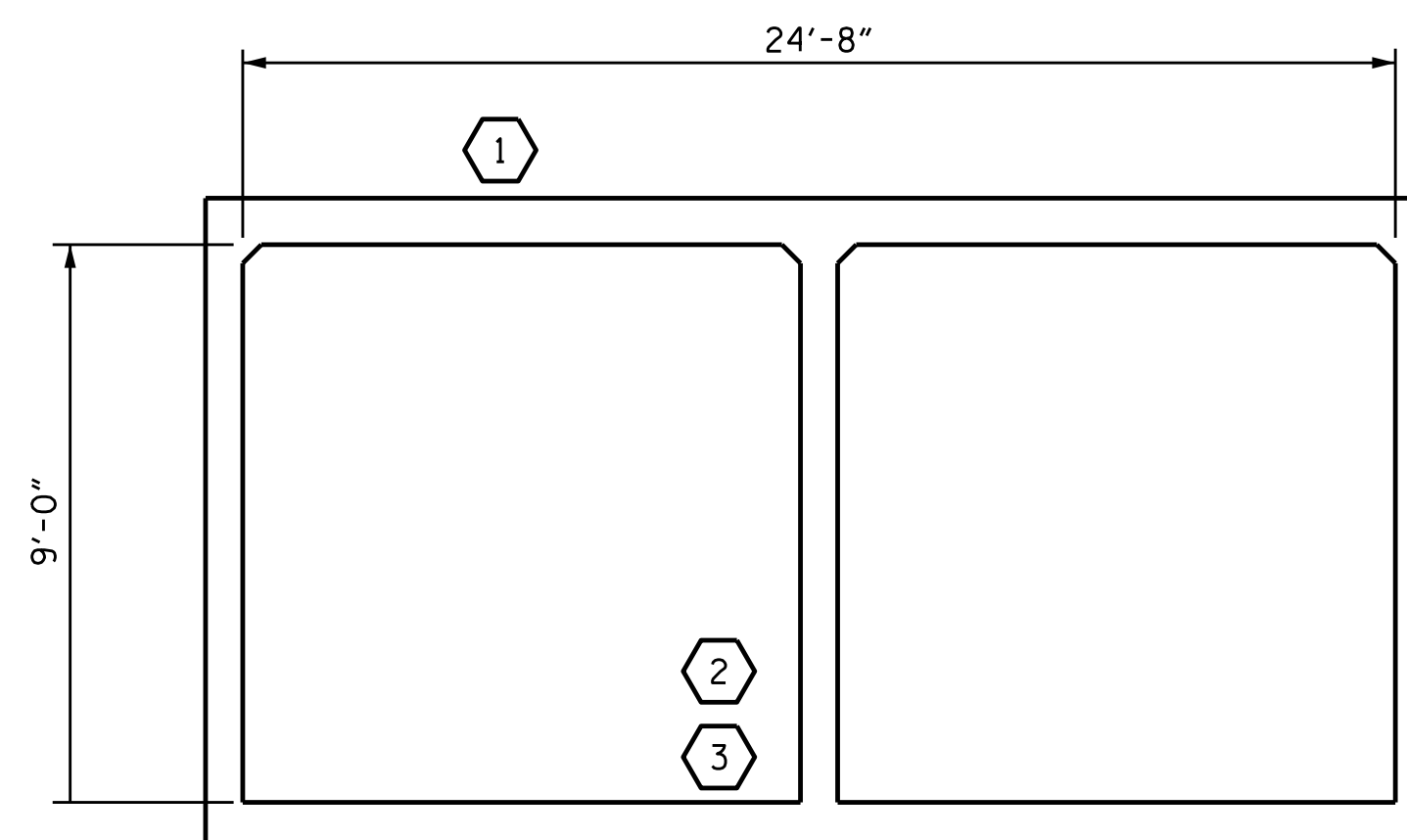
NOTE:

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	

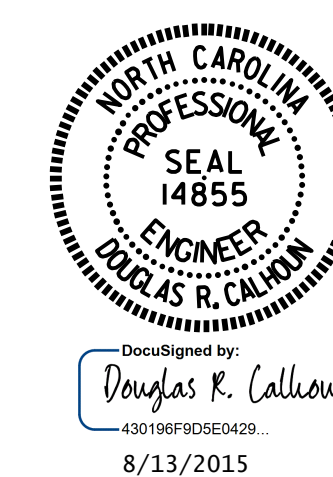


LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. B-4780
MONTGOMERY COUNTY
 STATION: 15+07.00 -L-

SHEET 6 OF 6



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-6
1			3			TOTAL SHEETS
2			4			6

ASSEMBLED BY : A. SORSENGINH	DATE : 9/2013
CHECKED BY : T. KIRSCHBAUM	DATE : 10/2013
DRAWN BY : WMC	REV. 10/1/11
CHECKED BY : GM	MAA/GM

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. FINISHERS 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