

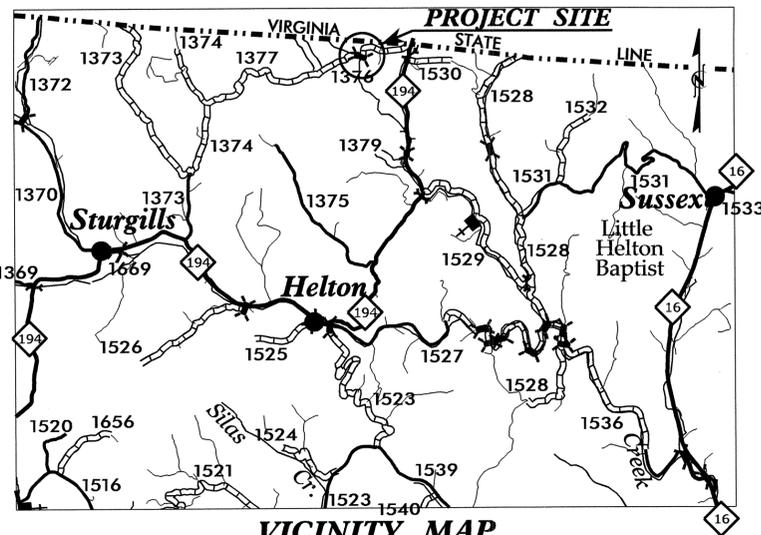
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ASHE COUNTY

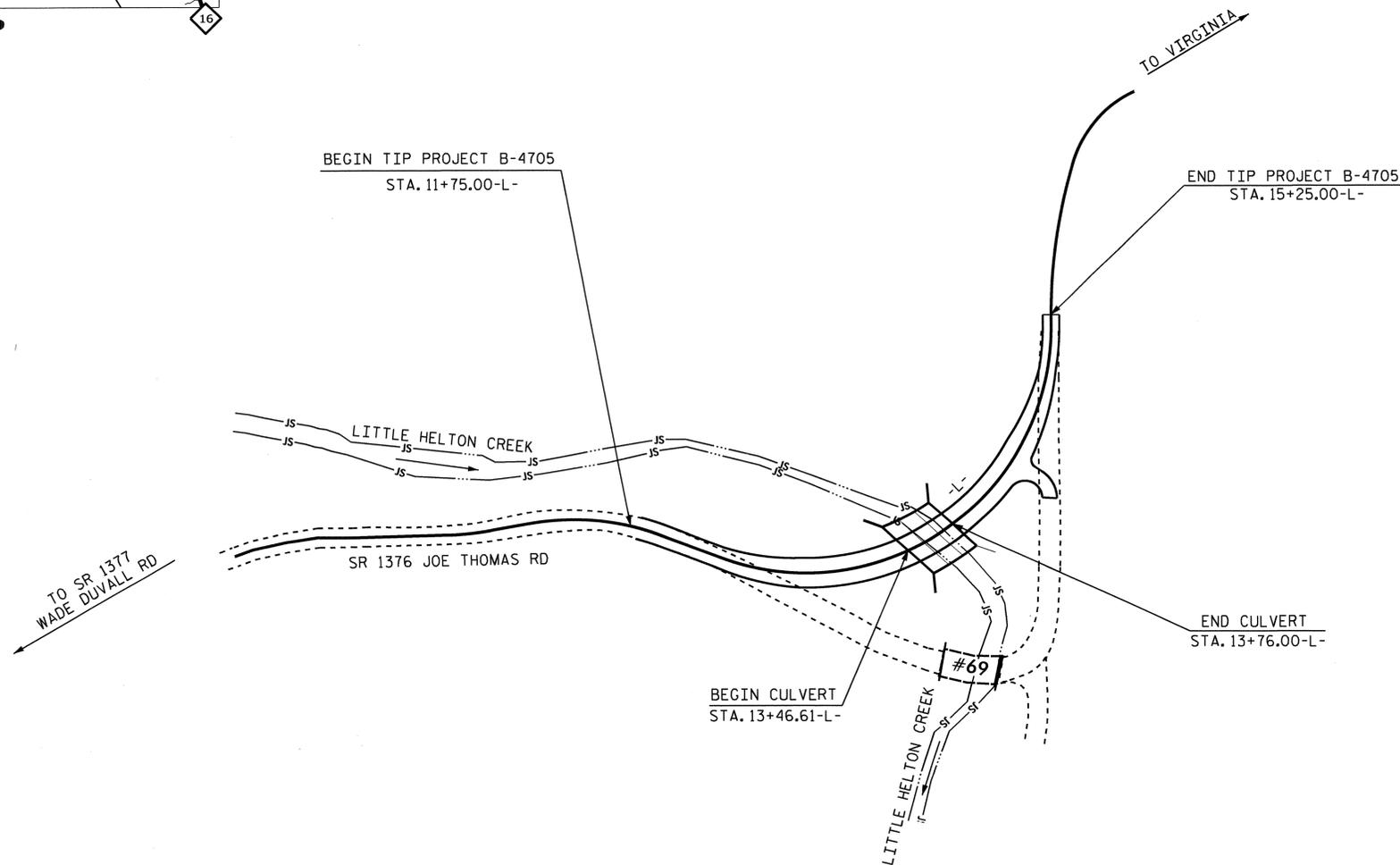
LOCATION: BRIDGE 69 OVER LITTLE HELTON CREEK ON
SR 1376 (JOE THOMAS RD)

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4705		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
38480.1.1	BRZ-1376(2)	PE	
38480.2.1	BRZ-1376(2)	R/W, UTIL	
38480.3.FD1	BRZ-1376(2)	CONST.	



VICINITY MAP



CULVERT

TIP PROJECT: B-4705

CONTRACT: C203295



DESIGN DATA

ADT 2009 = 50
ADT 2035 = 100
K = 10 %
D = 60 %
T = 3 % *
V = 25 MPH
* TTST = 1 DUAL 2
FUNC CLASS = LOCAL
SUB REGIONAL TIER

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT B-4705 = 0.060 MI
LENGTH OF STRUCTURE TIP PROJECT B-4705 = 0.006 MI
TOTAL LENGTH OF TIP PROJECT B-4705 = 0.066 MI

Prepared In the Office of:
DIVISION OF HIGHWAYS

1000 Birch Ridge Dr., Raleigh NC, 27610

2012 STANDARD SPECIFICATIONS

LETTING DATE:
JANUARY 21, 2014

QUANG NGUYEN, PE
PROJECT ENGINEER

B. D. KLAPPENBACH, PE
PROJECT DESIGN ENGINEER

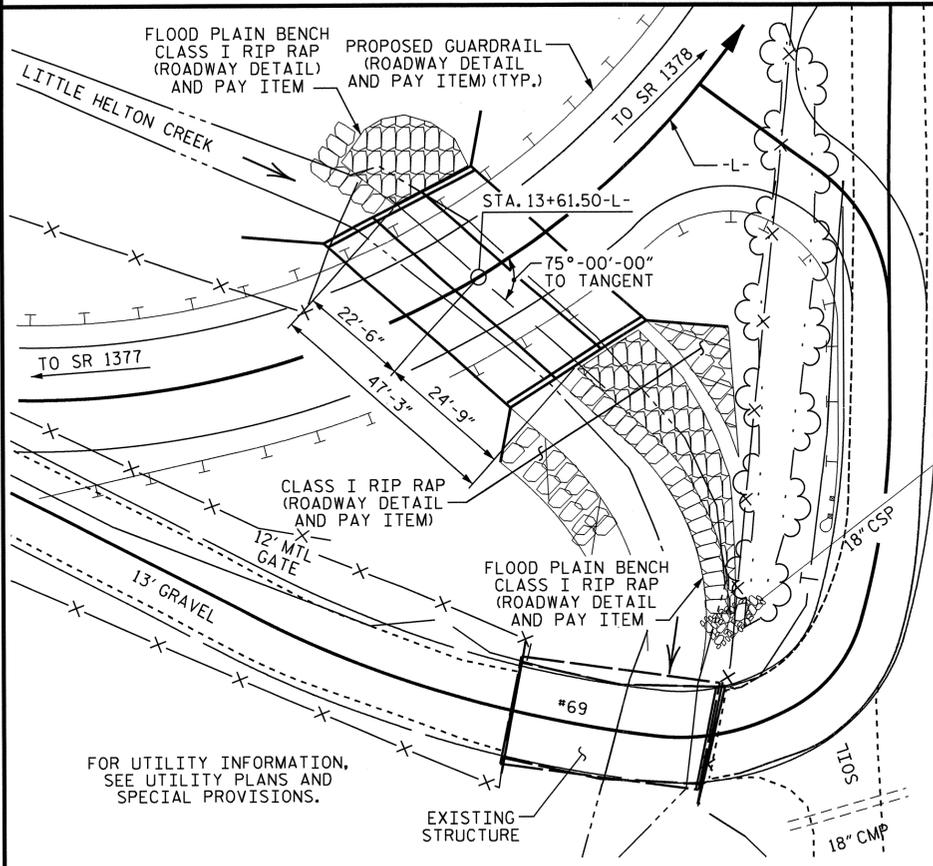
STRUCTURE MANAGEMENT UNIT
1000 BIRCH RIDGE DR.
RALEIGH, N.C. 27610

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER
DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED ENGINEER DIVISION ADMINISTRATION DATE

B. M. #1: 8" SPIKE IN 16" Ø LOCUST TREE STA 12+92.00-L- 94' RT. EL. 2748.03, NAVD 88



ROADWAY DATA

GRADE POINT EL. @ STA. 13+61.50-L- = 2750.49
 BED EL. @ STA. 13+61.50-L- = 2740.41
 ROADWAY SLOPES = 2 : 1

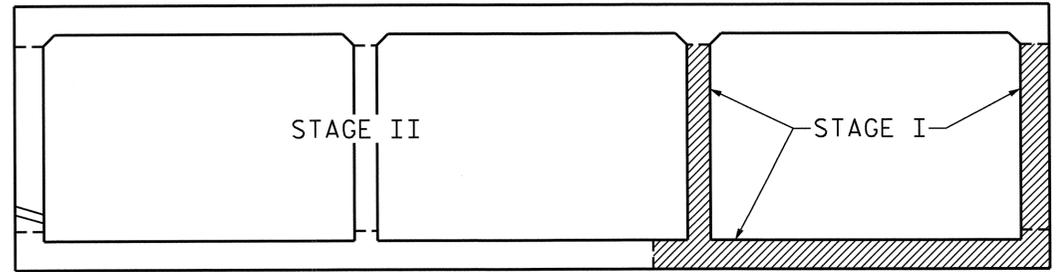
HYDRAULIC DATA

DESIGN DISCHARGE 1300 C.F./SEC.
 FREQUENCY OF DESIGN FLOOD 25 YEARS
 DESIGN HIGH WATER ELEVATION 2749.40
 DRAINAGE AREA 4.90 SQ. MI.
 BASE DISCHARGE (Q100) 1800 C.F./SEC.
 BASE HIGH WATER ELEVATION 2750.20

OVERTOPPING FLOOD DATA

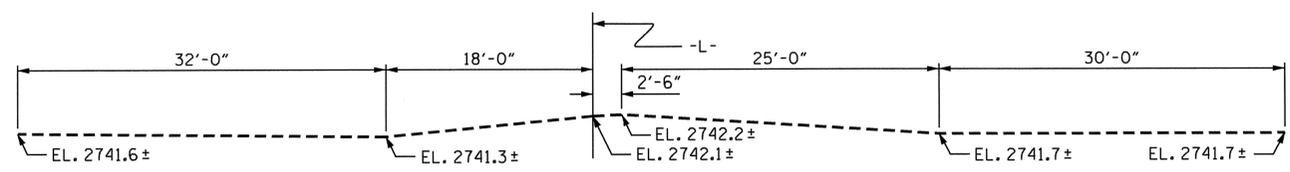
OVERTOPPING DISCHARGE >950 C.F./SEC.
 FREQUENCY OF OVERTOPPING FLOOD 10 YEARS +
 OVERTOPPING FLOOD ELEVATION 2748.60

LOCATION SKETCH



STAGING SEQUENCE

(LOOKING DOWNSTREAM)



PROFILE ALONG CULVERT

NOTES

F.A. PROJECT NO.: BRZ-1376(2)

ASSUMED LIVE LOAD -----HL93 OR ALTERNATE LOADING.
 DESIGN FILL-----MAX. = 5.73, MIN. = 2.55.
 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 FOR STAGE I, INCLUDING 4" OF ALL VERTICAL WALLS OF STAGE I.
2. THE REMAINING PORTIONS OF THE WALLS OF STAGE I AND WINGS FULL HEIGHT.
3. WING FOOTINGS AND FLOOR SLAB FOR STAGE II, INCLUDING 4" OF ALL VERTICAL WALLS OF STAGE II.
4. THE REMAINING PORTIONS OF THE WALLS OF STAGE II AND WINGS FULL HEIGHT.
5. 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.

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.

AFTER SERVING AS A TEMPORARY STRUCTURE, THE EXISTING STRUCTURE CONSISTING OF 2 SPANS (1 @ 17'-6", 1 @ 18'-3") WITH A 1/2" ASPHALT WEARING SURFACE ON A DOUBLE TIMBER DECK ON 9 LINES OF 6 X 12 TIMBER JOISTS AND A CLEAR ROADWAY WIDTH OF 17.2', ON TIMBER CAPS AND TIMBER POST AND SILLS AT THE END BENTS AND ON A REINFORCED CONCRETE BENT, LOCATED 90 FEET DOWNSTREAM FROM THE EXISTING STRUCTURE, SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

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.

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.

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 CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

I HEREBY CERTIFY THESE PLANS ARE THE AS BUILT PLANS

PROJECT NO. B-4705
ASHE COUNTY
 STATION: 13+61.50-L-

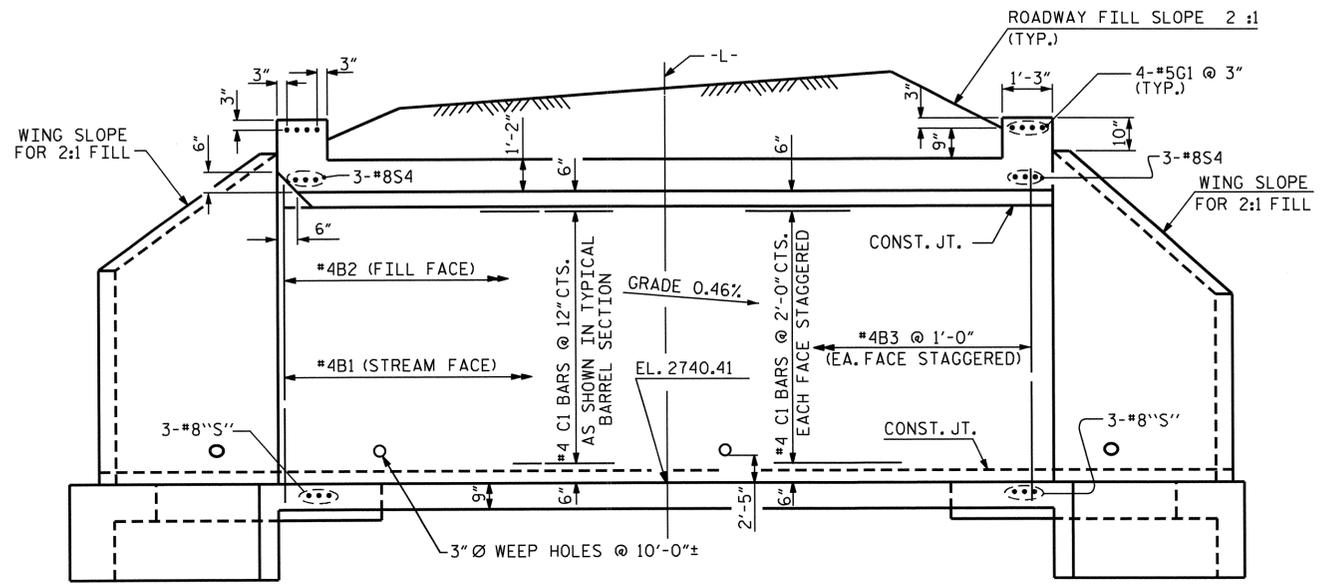
SHEET 1 OF 8 REPLACES BRIDGE No. 69

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**TRIPLE 9 FT. X 6 FT.
 CONCRETE BOX CULVERT
 75° SKEW**

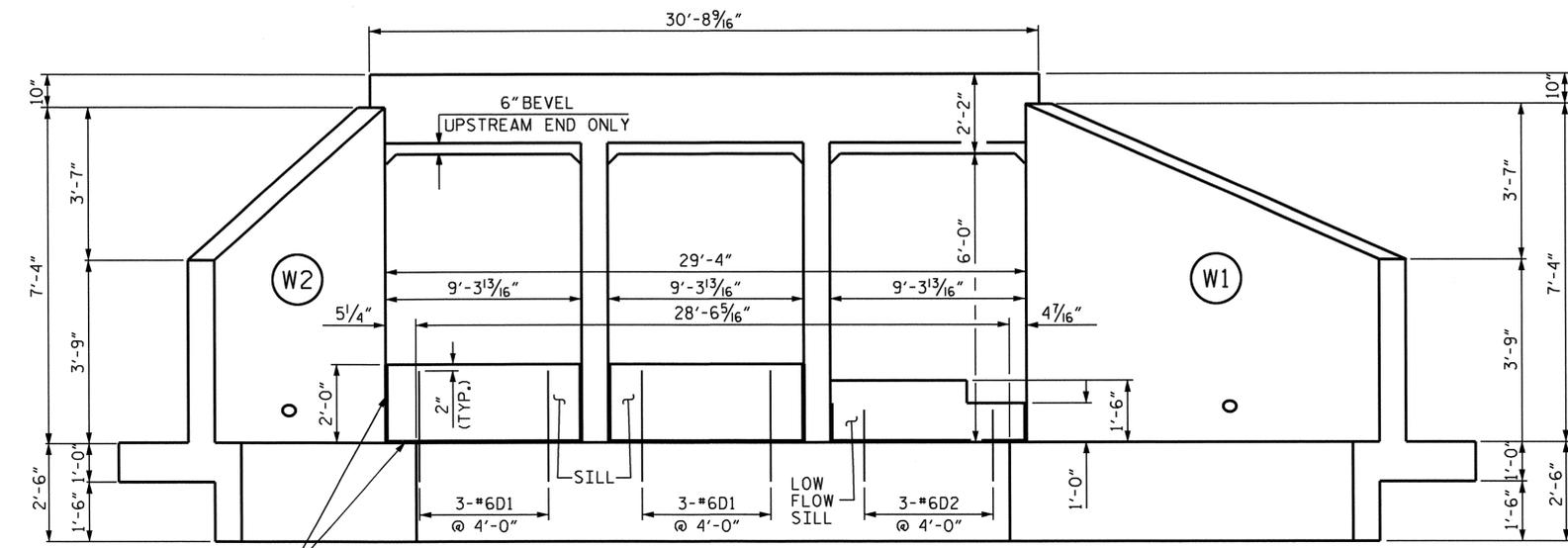
REVISIONS				SHEET NO.
NO.	BY:	DATE:	NO.	DATE:
1			3	
2			4	

TOTAL SHEETS 8

DRAWN BY : H. T. BARBOUR DATE : 8-15-12
 CHECKED BY : M. POOLE DATE : 9-12



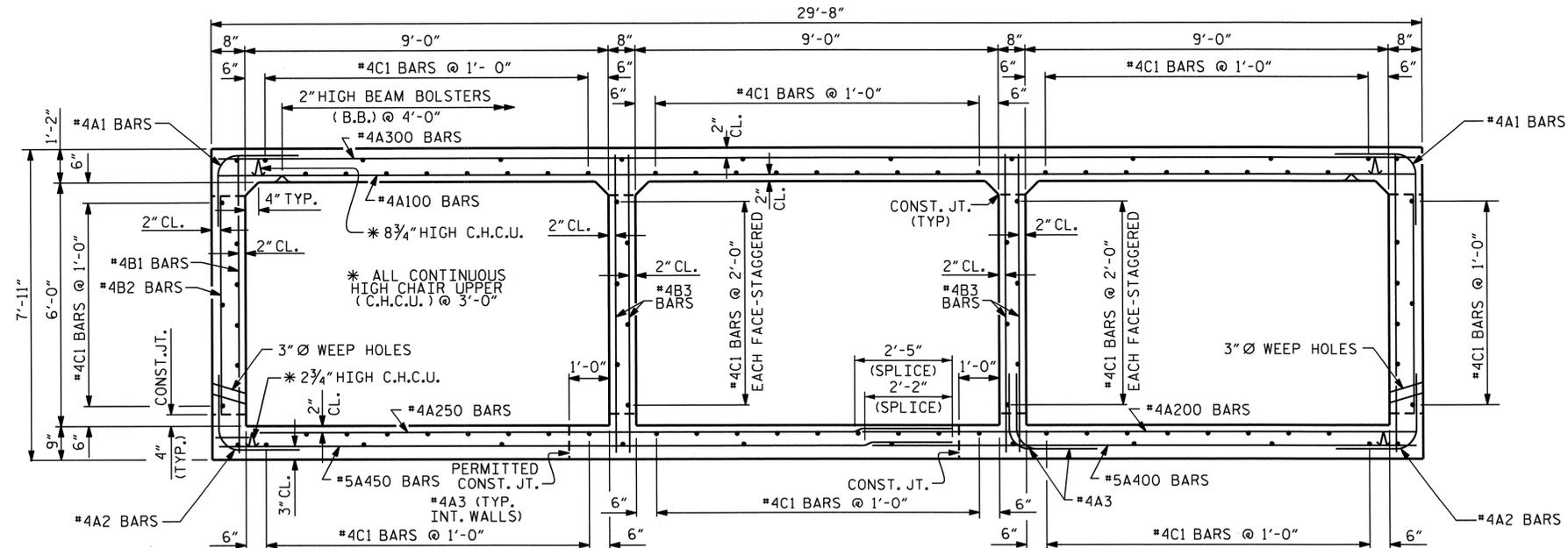
EXTERIOR WALL INTERIOR WALL
CULVERT SECTION NORMAL TO ROADWAY



END ELEVATION NORMAL TO SKEW

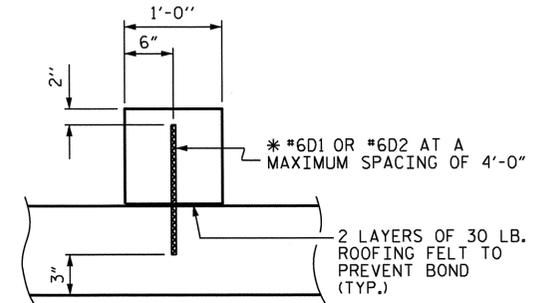
SILLS ARE TYPICAL FOR INLET AND OUTLET ENDS OF CULVERT
 INLET END SHOWN

SEE LOW FLOW CHANNEL SILL SHEET FOR LAYOUT
 AND DIMENSIONS OF LOW FLOW SILLS.



RIGHT ANGLE SECTION OF BARREL

THERE ARE 100 "C" BARS IN SECTION OF BARREL.
 (LOOKING DOWNSTREAM)



SECTION THROUGH SILL

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

PROJECT NO. B-4705
ASHE COUNTY
 STATION: 13+61.50-L-

SHEET 2 OF 8

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 BARREL STANDARD
 TRIPLE 9 FT. X 6 FT.
 CONCRETE BOX CULVERT
 75° SKEW



DESIGN ENGINEER OF RECORD:
 S. T. CHAMPION DATE: 9-13

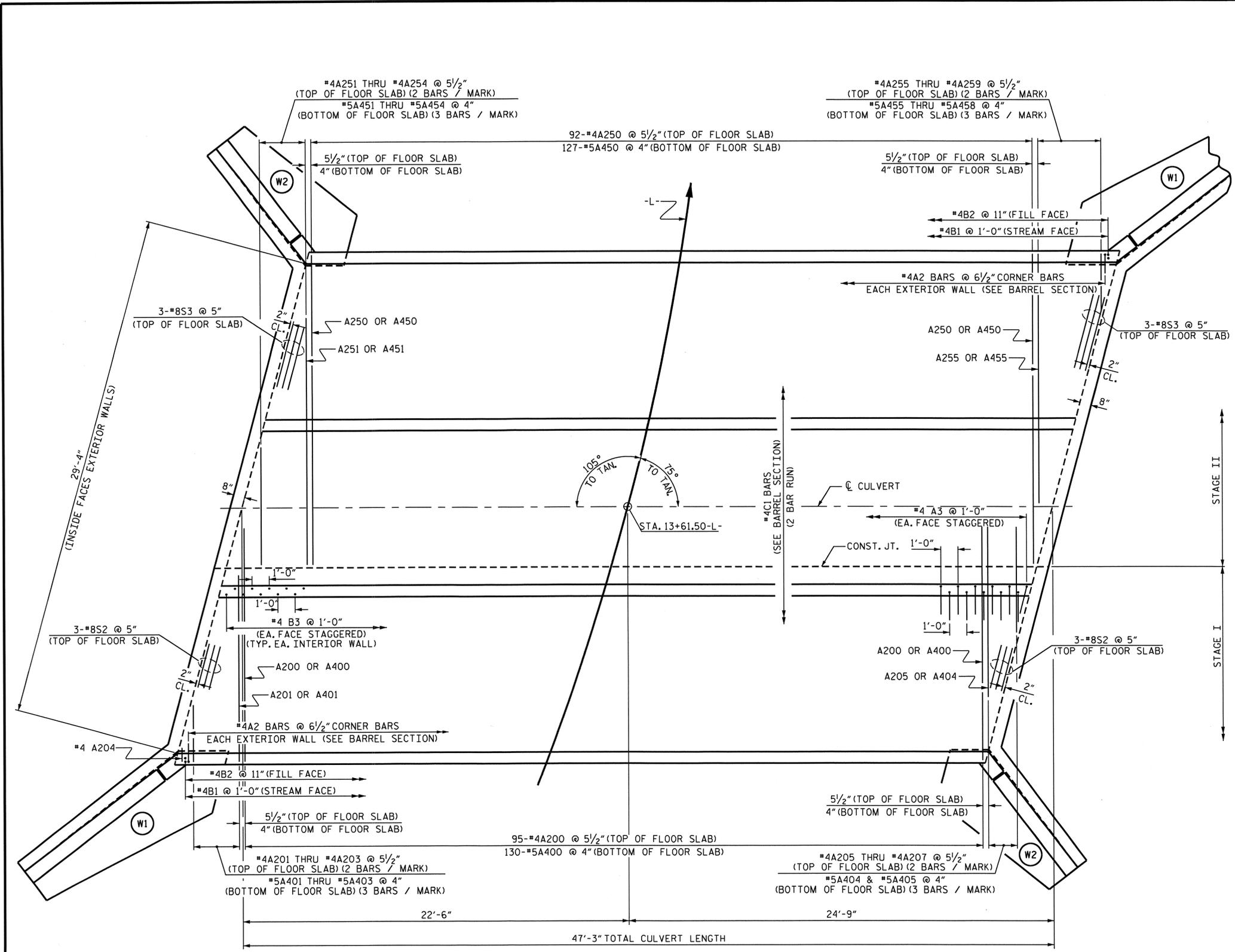
ASSEMBLED BY: H. T. BARBOUR DATE: 8-15-13
 CHECKED BY: M. POOLE DATE: 9-12

DRAWN BY: R.F. HOLMES DATE: NOV. 1971
 CHECKED BY: J.A. JOHNSON DATE: NOV. 1971

**SPECIAL
 STANDARD**

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C-2	
1			3			TOTAL SHEETS	
2			4			8	

REVISED 11-15-99 BY M.M. CHECKED BY R.W.W.
 REVISED 8-28-92 BY E.L.R. / BY G.R.P.
 REDRAWN 10-16-89 BY R.W.W. / BY A.R.E.



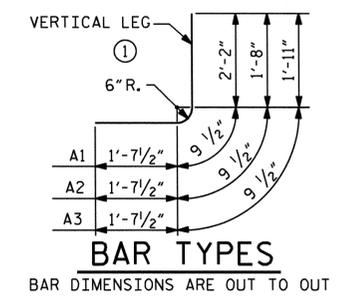
PLAN OF FLOOR SLAB

BILL OF MATERIAL

BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR NO.	SIZE	TYPE	LENGTH	WEIGHT		
A1	114	4	1	4'-7"	349	A400	130	5	STR.	13'-6"	1830
A2	176	4	1	4'-1"	480	A401	3	5	STR.	10'-9"	34
A3	96	4	1	4'-4"	278	A402	3	5	STR.	7'-0"	22
					A403	3	5	STR.	3'-3"	10	
A100	105	4	STR.	29'-4"	2057	A404	3	5	STR.	9'-10"	31
A101	6	4	STR.	25'-2"	101	A405	3	5	STR.	6'-1"	19
A102	6	4	STR.	21'-0"	84						
A103	6	4	STR.	16'-9"	67	A450	127	5	STR.	18'-0"	2384
A104	6	4	STR.	12'-7"	50	A451	3	5	STR.	14'-4"	45
A105	6	4	STR.	8'-5"	34	A452	3	5	STR.	10'-7"	33
A106	6	4	STR.	4'-2"	17	A453	3	5	STR.	6'-10"	21
					A454	3	5	STR.	3'-2"	10	
A200	95	4	STR.	13'-9"	873	A455	3	5	STR.	14'-5"	45
A201	2	4	STR.	10'-8"	14	A456	3	5	STR.	10'-8"	33
A202	2	4	STR.	7'-3"	10	A457	3	5	STR.	7'-0"	22
A203	2	4	STR.	3'-10"	5	A458	3	5	STR.	3'-3"	10
A204	1	4	STR.	2'-1"	1						
A205	2	4	STR.	10'-5"	14	B1	96	4	STR.	7'-5"	476
A206	2	4	STR.	7'-0"	9	B2	104	4	STR.	5'-4"	371
A207	2	4	STR.	3'-7"	5	B3	192	4	STR.	7'-5"	951
A250	92	4	STR.	18'-0"	1106	C1	200	4	STR.	24'-6"	3273
A251	2	4	STR.	14'-8"	20						
A252	2	4	STR.	11'-3"	15	D1	12	6	STR.	2'-4"	42
A253	2	4	STR.	7'-10"	10	D2	12	6	STR.	1'-4"	24
A254	2	4	STR.	4'-5"	6						
A255	2	4	STR.	15'-9"	21	G1	8	5	STR.	30'-4"	253
A256	2	4	STR.	12'-4"	16						
A257	2	4	STR.	8'-11"	12	S2	6	8	STR.	18'-10"	302
A258	2	4	STR.	5'-6"	7	S3	6	8	STR.	19'-5"	311
A259	2	4	STR.	2'-1"	3	S4	6	8	STR.	30'-4"	486
TOTAL REINFORCING STEEL										18239	LBS.
A300	67	4	STR.	29'-4"	1313						
A301	6	4	STR.	23'-9"	95						
A302	6	4	STR.	17'-3"	69						
A303	6	4	STR.	10'-9"	43						
A304	6	4	STR.	4'-2"	17						

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE				
BARREL @	2.711	CY/FT	128.1	C.Y.
WING, SILLS, ETC.	20.5			C.Y.
TOTAL	148.6			C.Y.
REINFORCING STEEL				
BARREL	18239			LBS.
WINGS, SILLS, ETC.	934			LBS.
TOTAL	19173			LBS.
CULVERT EXCAVATION		LUMP SUM		
FOUNDATION COND. MAT'L		112 TONS		
REMOVAL OF EXISTING STRUCTURE		LUMP SUM		



BAR TYPES

BAR DIMENSIONS ARE OUT TO OUT

SPLICE CHART

BAR	SIZE	SPLICE LENGTH
C1	4	1'-11"
A200	4	2'-5"
A250	4	2'-5"
A400	5	2'-2"
A450	5	2'-2"
S2	8	6'-11"

PROJECT NO. B-4705
 ASHE COUNTY
 STATION: 13+61.50-L-

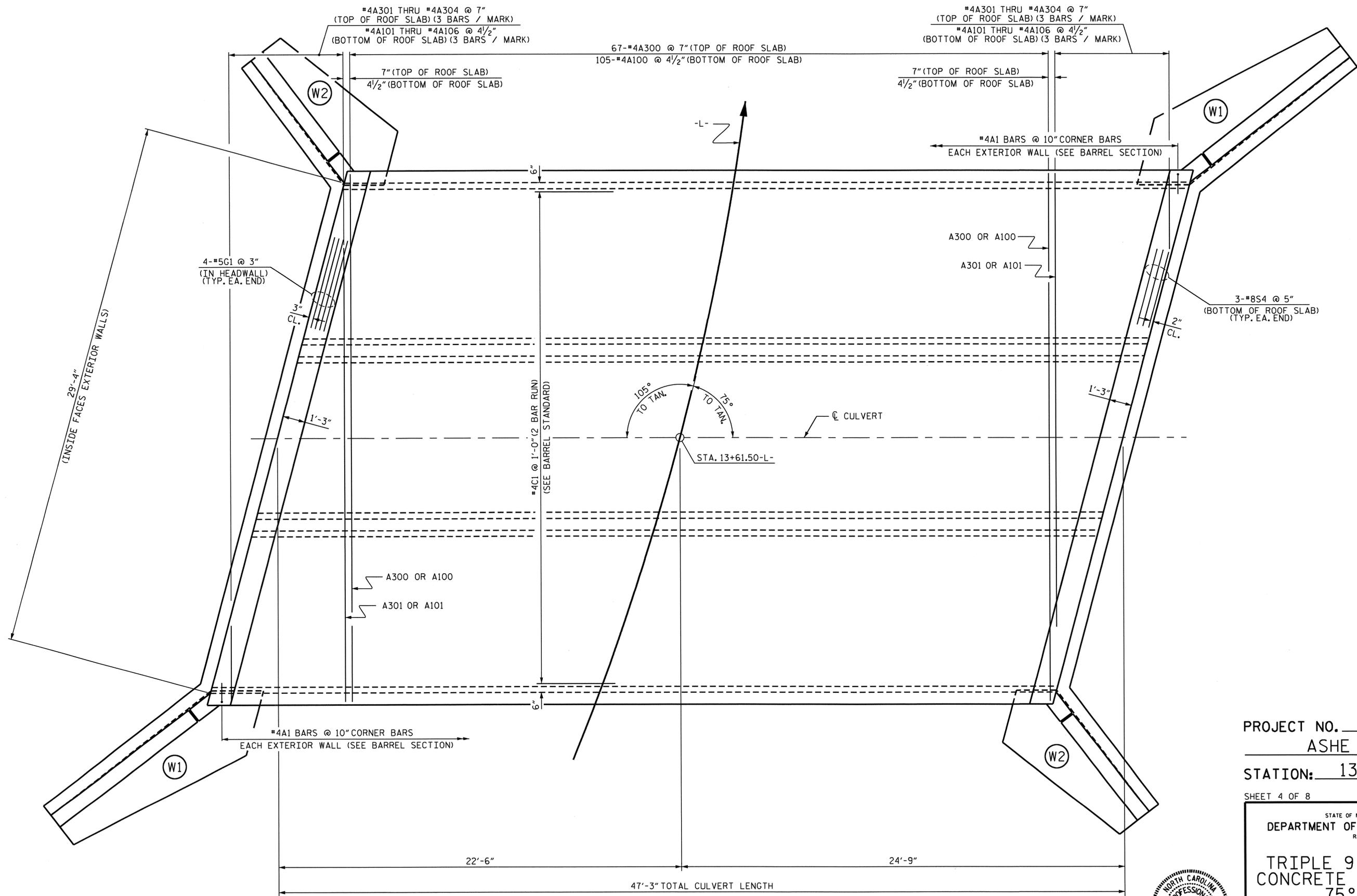
SHEET 3 OF 8
 STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TRIPLE 9 FT. X 6 FT.
 CONCRETE BOX CULVERT
 75° SKEW



DRAWN BY: H. T. BARBOUR DATE: 8-17-12
 CHECKED BY: M. POOLE DATE: 9-12
 DESIGN ENGINEER OF RECORD: S. T. CHAMPION DATE: 8-13

REVISIONS				SHEET NO.
NO.	BY	DATE	NO.	DATE
1			3	
2			4	

TOTAL SHEETS: 8



PLAN OF ROOF SLAB

PROJECT NO. B-4705
ASHE COUNTY
 STATION: 13+61.50-L-
 SHEET 4 OF 8

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TRIPLE 9 FT. X 6 FT.
 CONCRETE BOX CULVERT
 75° SKEW



DRAWN BY : H. T. BARBOUR DATE : 8-17-12
 CHECKED BY : M. POOLE DATE : 9-12
 DESIGN ENGINEER OF RECORD : S. T. CHAMPION DATE : 8-13

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-4
1			3			TOTAL SHEETS
2			4			8

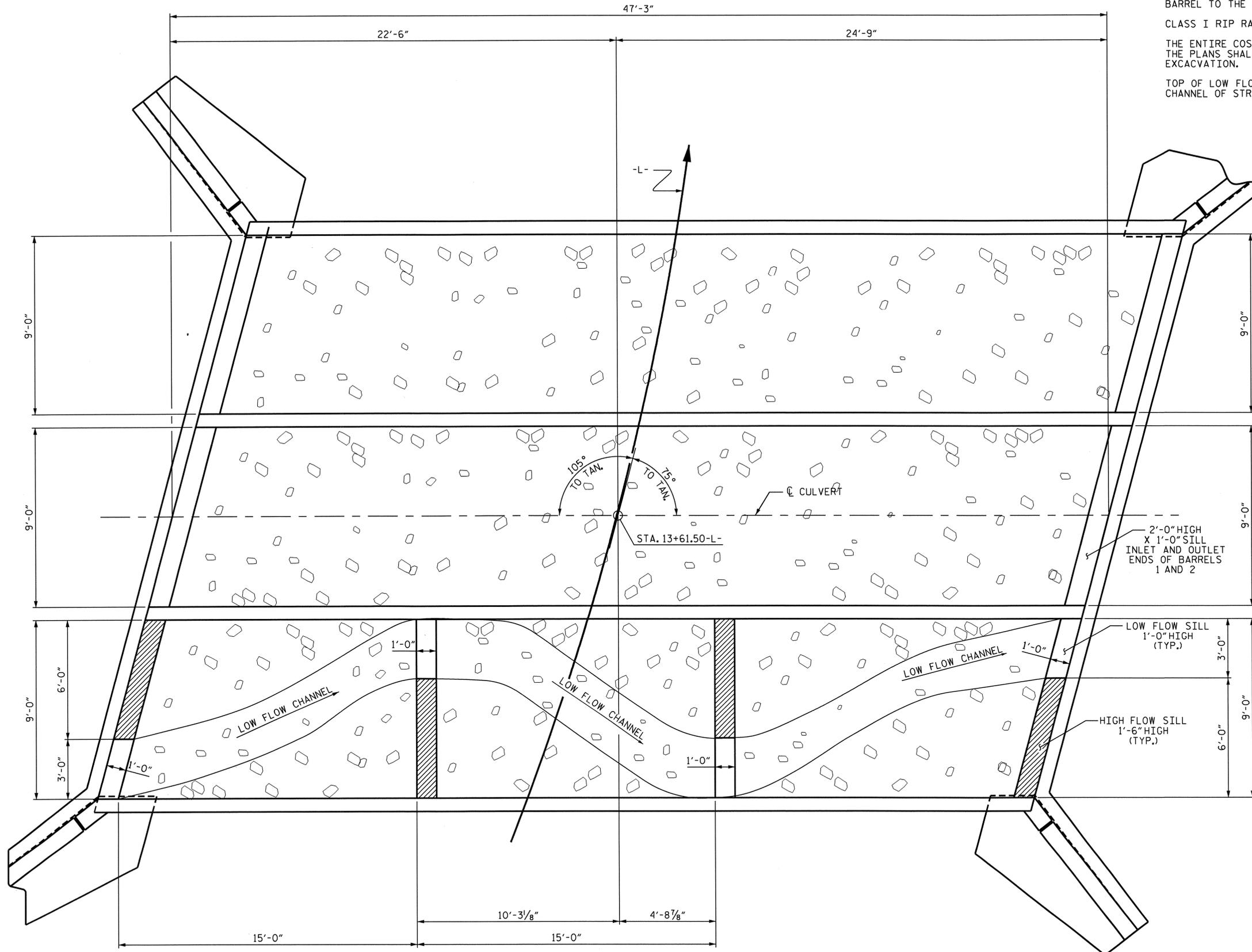
NOTES

BED MATERIAL SHALL BE EXCAVATED AND STOCKPILED DURING INSTALLATION OF THE CULVERT AND SILLS. THE NATURAL BED MATERIALS SHALL THEN BE PLACED IN THE CULVERT BARREL TO THE SPECIFIED ELEVATION.

CLASS I RIP RAP MAY BE USED TO SUPPLEMENT NATURAL BED MATERIAL.

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.

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



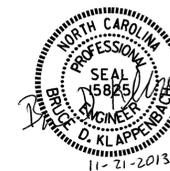
PLAN OF SILL LAYOUT
(SEE SHEET 2 OF 8 FOR SILL DOWEL DETAILS)

PROJECT NO. B-4705
ASHE COUNTY
 STATION: 13+61.50-L

SHEET 5 OF 8

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

TRIPLE 9 FT. X 6 FT.
 CONCRETE BOX CULVERT
 75° SKEW

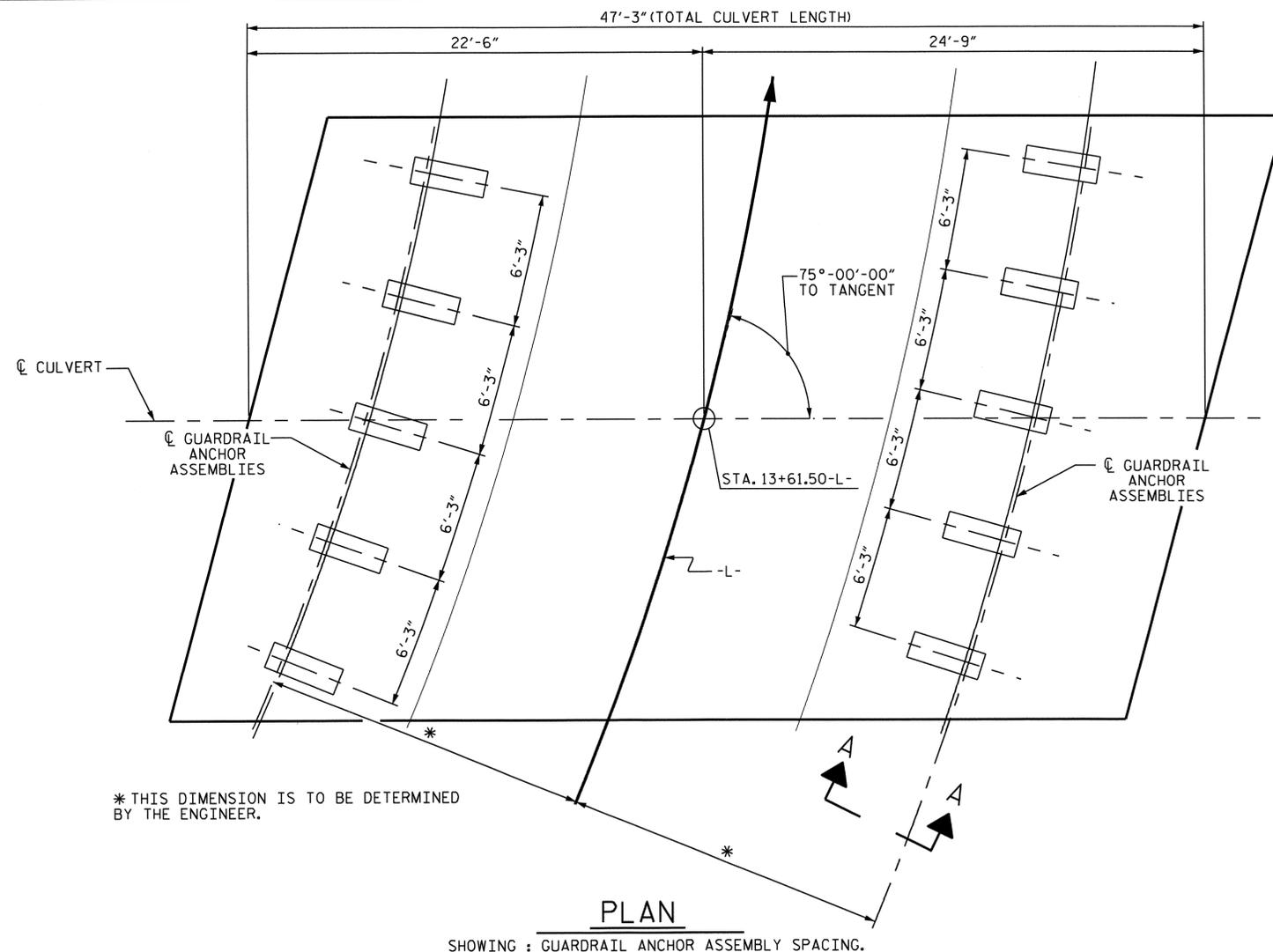


DRAWN BY : H. T. BARBOUR DATE : 8-17-12
 CHECKED BY : M. POOLE DATE : 9-12
 DESIGN ENGINEER OF RECORD : S. T. CHAMPION DATE : 8-13

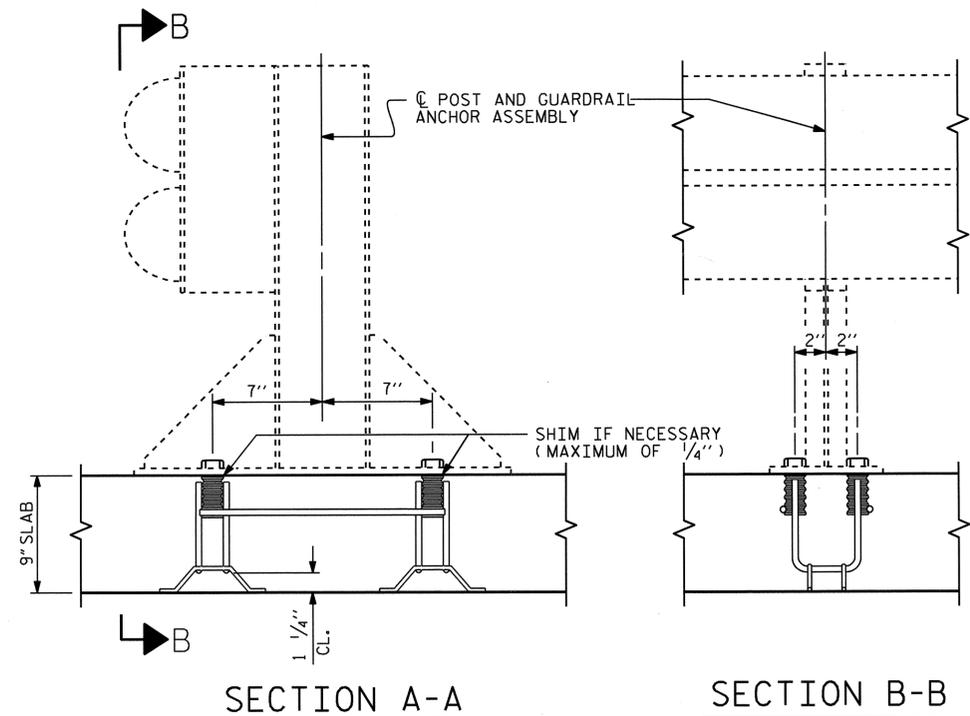
REVISIONS

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1			3		
2			4		

SHEET NO. C-5
 TOTAL SHEETS 8

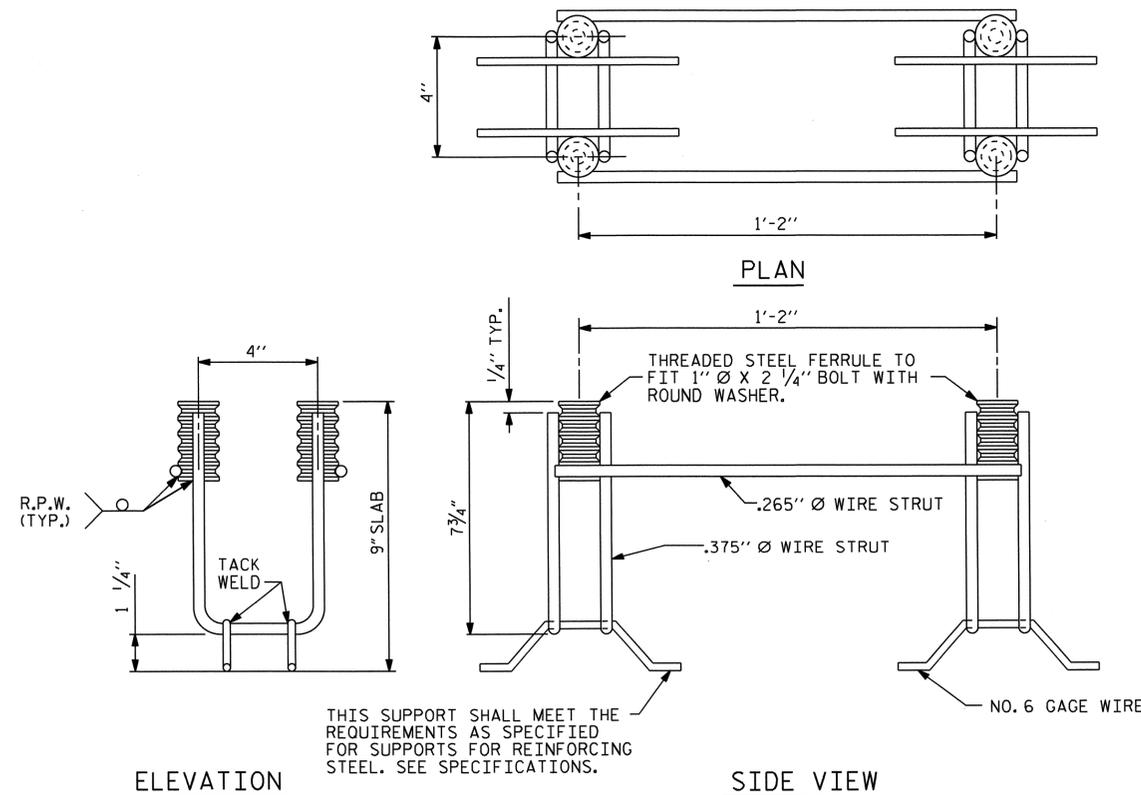


PLAN
SHOWING: GUARDRAIL ANCHOR ASSEMBLY SPACING.



SECTION A-A

SECTION B-B



ELEVATION

SIDE VIEW

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

NOTES

- THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS SHALL CONSIST OF THE FOLLOWING COMPONENTS:
- 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".
 - 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.)
 - 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.



PROJECT NO. B-4705
ASHE COUNTY
STATION: 13+61.50-L-

SHEET 7 OF 8

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

ASSEMBLED BY :	H. T. BARBOUR	DATE :	8-20-12
CHECKED BY :	M. POOLE	DATE :	9-13
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

REVISIONS					SHEET NO. C-7
NO.	BY:	DATE:	NO.	DATE:	
1			3		TOTAL SHEETS 8
2			4		

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	1.04	--	1.75	1.60	1	TOP SLAB	3.87	1.04	1	TOP SLAB	8.45		
	HL-93 (OPERATING)	N/A		1.35	--	1.35	2.08	1	TOP SLAB	3.87	1.35	1	TOP SLAB	8.45		
	HS-20 (INVENTORY)	36.000	2	1.20	43.10	1.75	1.62	1	TOP SLAB	3.87	1.20	1	TOP SLAB	8.45		
	HS-20 (OPERATING)	36.000		1.55	55.88	1.35	2.10	1	TOP SLAB	3.87	1.55	1	TOP SLAB	8.45		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.18	29.38	1.40	2.95	1	TOP SLAB	4.11	2.18	1	TOP SLAB	8.45	
		SNGARBS2	20.000		2.04	40.84	1.40	2.76	1	TOP SLAB	4.11	2.04	1	TOP SLAB	8.45	
		SNAGRIS2	22.000		2.18	47.87	1.40	2.95	1	TOP SLAB	4.11	2.18	1	TOP SLAB	8.45	
		SNCOTTS3	27.250		1.31	35.63	1.40	2.00	1	TOP SLAB	3.87	1.31	1	TOP SLAB	8.45	
		SNAGGRS4	34.925		1.65	57.77	1.40	2.58	1	TOP SLAB	4.11	1.65	1	BOTTOM SLAB	8.79	
		SNS5A	35.550		1.48	52.73	1.40	2.43	1	TOP SLAB	3.87	1.48	1	TOP SLAB	8.45	
		SNS6A	39.950		1.44	57.62	1.40	2.43	1	TOP SLAB	3.87	1.44	1	BOTTOM SLAB	8.79	
		SNS7B	42.000		1.49	62.58	1.40	2.51	1	TOP SLAB	3.87	1.49	1	TOP SLAB	8.45	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.75	57.72	1.40	2.95	1	TOP SLAB	3.87	1.75	1	BOTTOM SLAB	8.79	
		TNT4A	33.075		1.57	51.85	1.40	2.38	1	TOP SLAB	3.87	1.57	1	TOP SLAB	8.45	
		TNT6A	41.600		1.52	63.26	1.40	2.38	1	TOP SLAB	4.11	1.52	1	TOP SLAB	8.45	
		TNT7A	42.000		1.44	60.58	1.40	2.37	1	TOP SLAB	3.87	1.44	1	BOTTOM SLAB	8.79	
		TNT7B	42.000		1.44	60.58	1.40	2.38	1	TOP SLAB	3.87	1.44	1	BOTTOM SLAB	8.79	
		TNAGRIT4	43.000		1.34	57.65	1.40	2.28	1	TOP SLAB	3.87	1.34	1	BOTTOM SLAB	8.79	
TNAGT5A	45.000	3	1.28	57.79	1.40	2.35	1	TOP SLAB	3.87	1.28	1	BOTTOM SLAB	8.79			
TNAGT5B	45.000		1.28	57.79	1.40	2.37	2	TOP SLAB	0.97	1.28	1	BOTTOM SLAB	8.79			

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	--

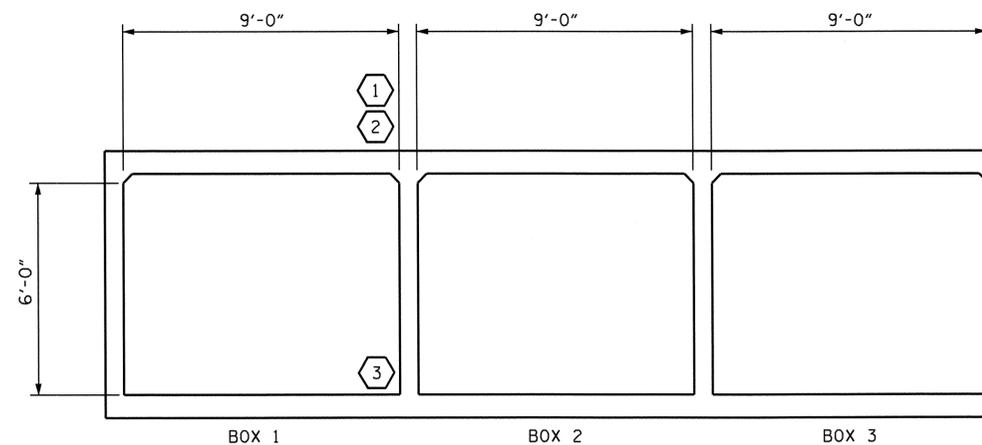
NOTE:

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

(VIEW IS DOWNSTREAM)

PROJECT NO. B-4705

ASHE COUNTY

STATION: 13+61.50 -L-

SHEET 8 OF 8

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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



ASSEMBLED BY : S.T. CHAMPION DATE : 9-26-13
CHECKED BY : B.A. DUKE DATE : 11-21-13
DRAWN BY : WMC 7/11 REV. 10/1/11 MAA/GM
CHECKED BY : GM 7/11

REVISIONS				SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

TOTAL SHEETS 8

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. FINIS 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