

TIP PROJECT: B-5110

CONTRACT: C203353

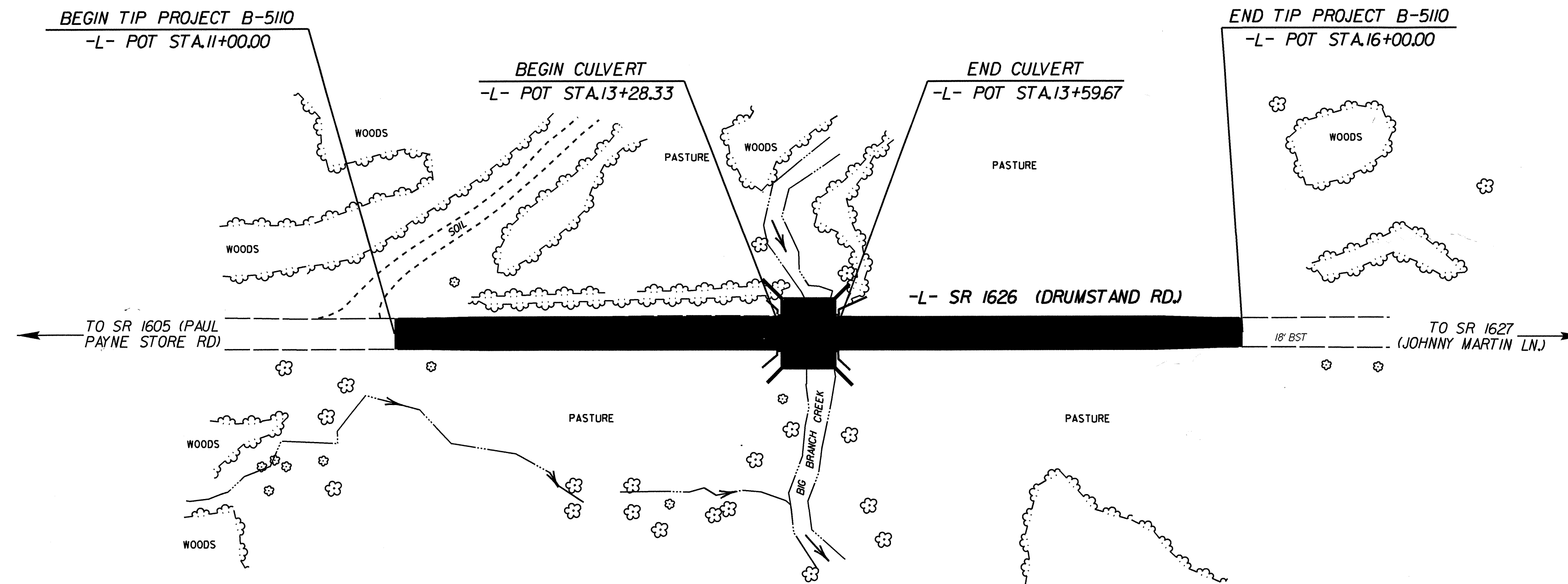
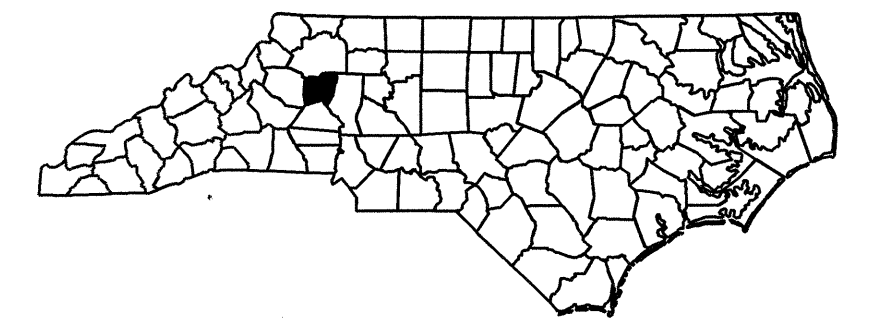
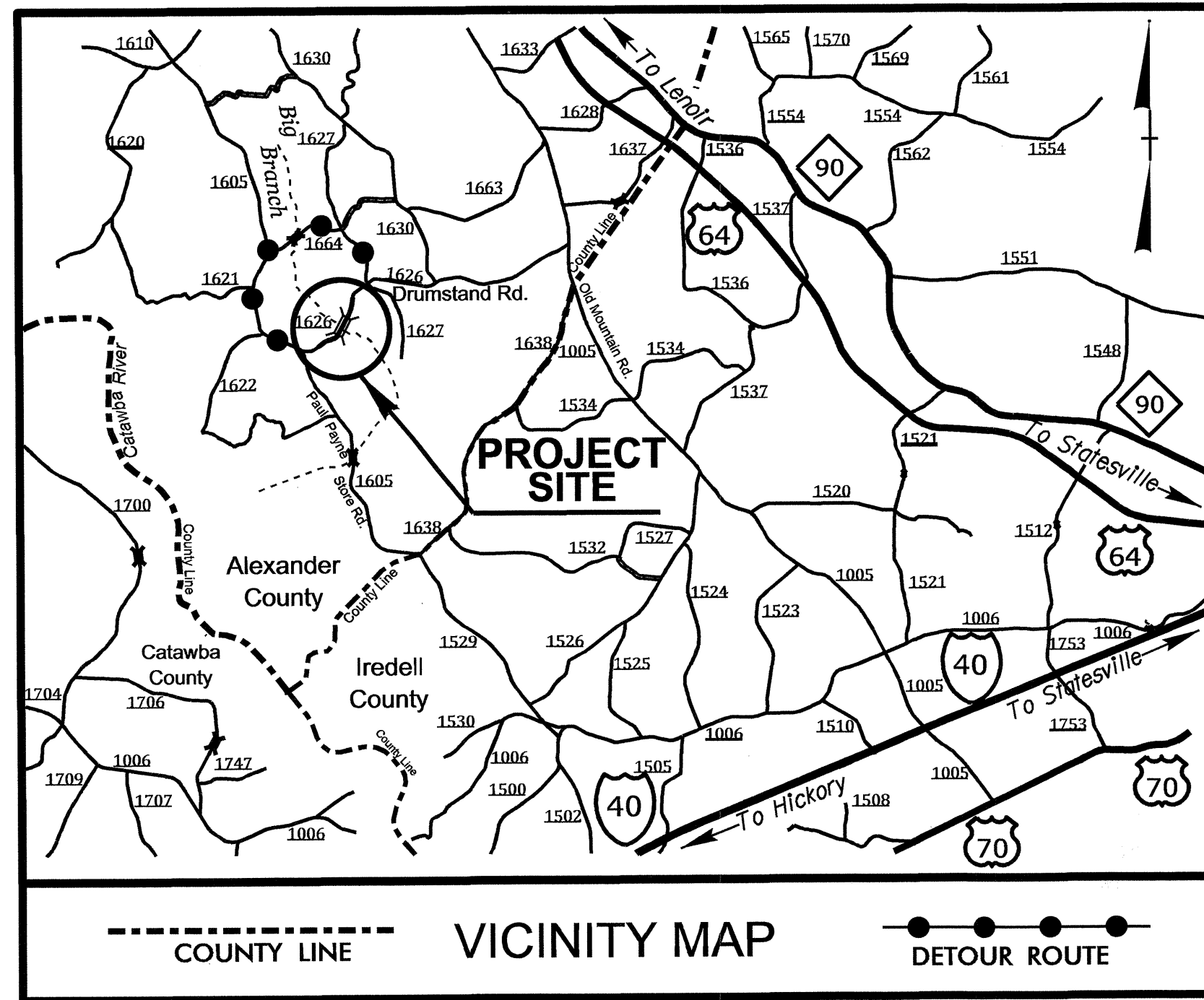
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ALEXANDER COUNTY

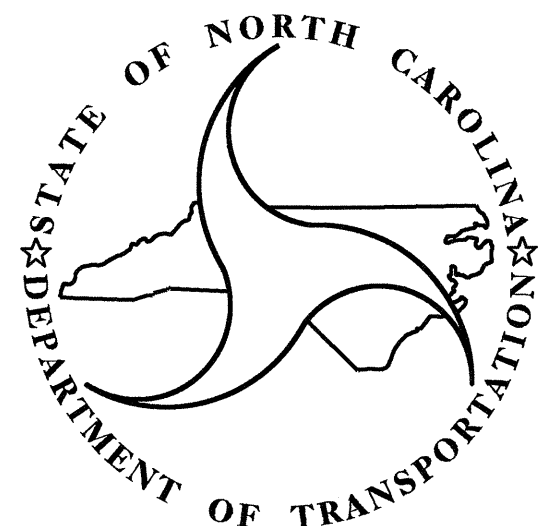
LOCATION: BRIDGE NO. 129 OVER BIG BRANCH CREEK
ON SR 1626

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5110		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
42248.1.1	BRZ-1626(3)	P.E.	
42248.2.1	BRZ-1626(3)	RW/UTIL	
42248.3.FD1	BRZ-1626(3)	CONST	



CULVERT



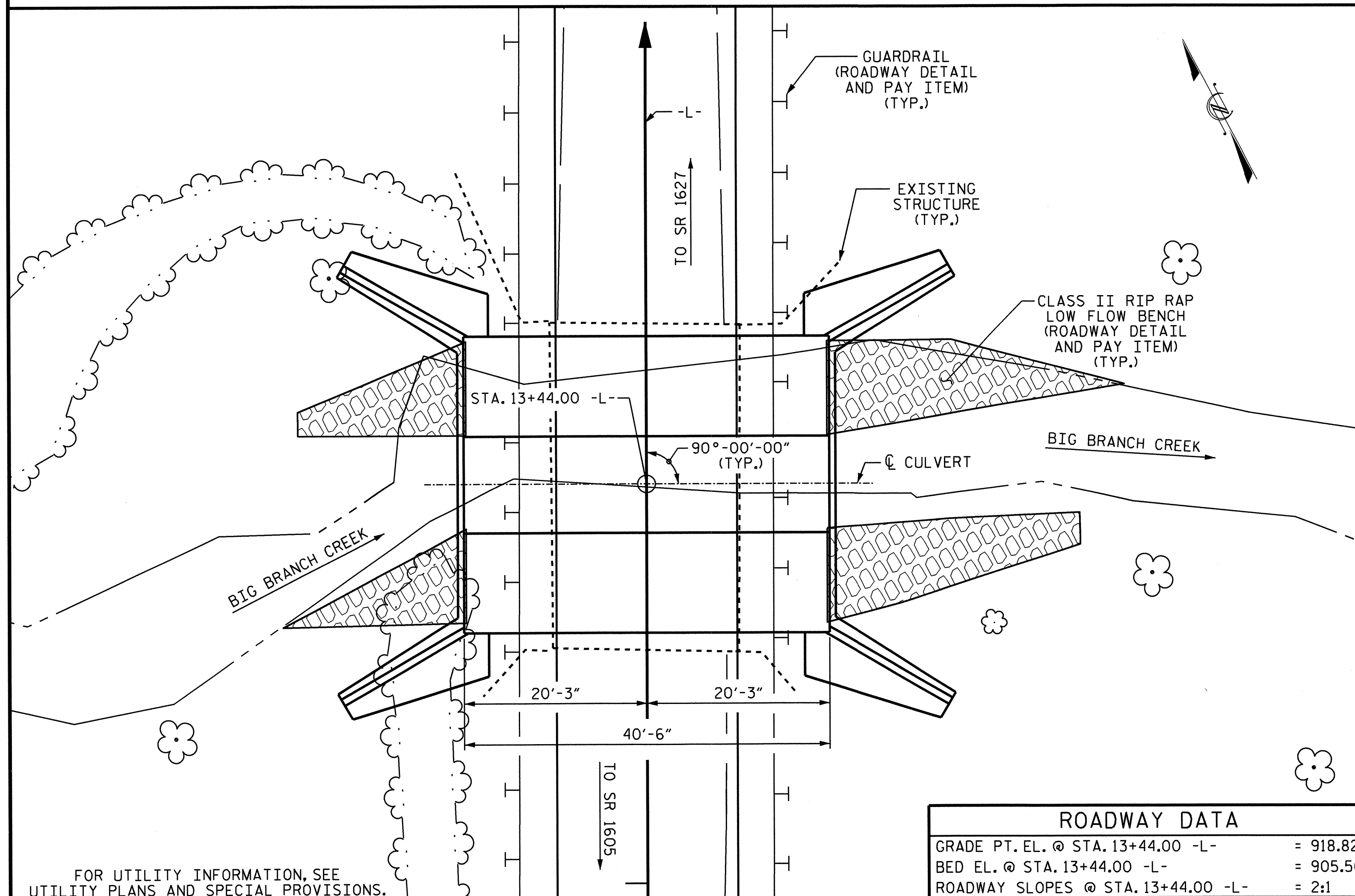
DESIGN DATA	
ADT 2013	= 318
ADT 2035	= 450
DHV	= 10 %
D	= 60 %
T	= 5 % *
V	= 50 MPH
* TTST = 2	DUAL = 3
FUNC CLASS = LOCAL	
SUB-REGIONAL TIER	

PROJECT LENGTH	
LENGTH STRUCTURE TIP PROJECT B-5110	= 0.006 MI.
LENGTH ROADWAY TIP PROJECT B-5110	= 0.089 MI.
TOTAL LENGTH OF TIP PROJECT B-5110	= 0.095 MI.

Prepared In the Office of: DIVISION OF HIGHWAYS	
2012 STANDARD SPECIFICATIONS	
LETTING DATE: FEBRUARY 18, 2014	PROJECT ENGINEER L. E. SUTTON, P.E. PROJECT DESIGN ENGINEER

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

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA	
	P.E.
STATE DESIGN ENGINEER	
DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION	
APPROVED DIVISION ADMINISTRATOR	DATE



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

ROADWAY DATA	
GRADE PT. EL. @ STA. 13+44.00 -L-	= 918.82
BED EL. @ STA. 13+44.00 -L-	= 905.50
ROADWAY SLOPES @ STA. 13+44.00 -L-	= 2:1

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

DESIGN FILL = 3.45' (MAX.), 3.0' (MIN.).

FOR OTHER DESIGN DATA AND NOTES, SEE SHEET SN.

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, FLOOR SLAB AND 4" OF THE VERTICAL WALLS FOR BARRELS 2 AND 3 IN STAGE I.
2. THE REMAINING PORTIONS OF THE WALLS, WINGS FULL HEIGHT, AND SILLS FOR BARRELS 2 AND 3 IN STAGE I.
3. WING FOOTINGS, FLOOR SLAB AND 4" OF THE VERTICAL WALL FOR BARREL 1 IN STAGE II.
4. THE REMAINING PORTIONS OF THE WALL, WINGS FULL HEIGHT, AND SILLS FOR BARREL 1 IN STAGE II.
5. THE ENTIRE 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 THE WING SHEET.

AT THE CONTRACTOR'S OPTION, THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL AND BOTH FACES OF INTERIOR WALLS ABOVE LOWER WALL CONSTRUCTION JOINT MAY BE SPLICED. 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 2 SPANS AT 18'-3" WITH AN ASPHALT WEARING SURFACE ON TIMBER DECK AND I-BEAMS WITH A 19.3' CLEAR ROADWAY AND SUBSTRUCTURE OF TIMBER CAPS, PILES, AND BULKHEADS LOCATED AT THE PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED BELOW THE LEGAL LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE FURTHER DETERIORATE, THIS LOAD LIMITATION MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT. SEE SPECIAL PROVISIONS FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 13+44.00 -L-".

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 13+44.00 -L-".

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

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

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

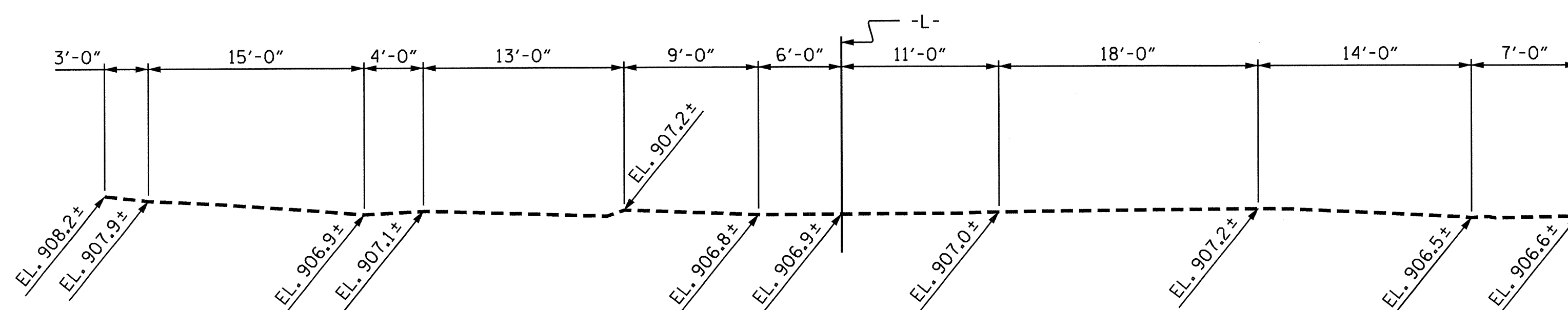
FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

NATURAL STREAM BED MATERIAL SHALL BE USED TO BACKFILL THE CULVERT BETWEEN SILLS. SEE SPECIAL PROVISIONS FOR "PLACEMENT OF NATURAL STREAM BED MATERIAL".

HYDRAULIC DATA	
DESIGN DISCHARGE	= 1183 C.F.S
FREQUENCY OF DESIGN FLOOD	= 25 YR.
DESIGN HIGH WATER ELEVATION	= 914.5
DRAINAGE AREA	= 2.9 SQ. MI.
BASE DISCHARGE (Q100)	= 1767 C.F.S
BASE HIGH WATER ELEVATION	= 915.7
OVERTOPPING FLOOD DATA	
OVERTOPPING DISCHARGE	= 3000 C.F.S
FREQUENCY OF OVERTOPPING FLOOD	= 500+ YR.
OVERTOPPING FLOOD ELEVATION	= 919.0

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

TOTAL STRUCTURE QUANTITIES	
REMOVAL OF EXISTING STRUCTURE	LUMP SUM
CULVERT EXCAVATION	LUMP SUM
FOUNDATION CONDITIONING MATERIAL	105 TONS
CLASS A CONCRETE	
STAGE I	75.0 C.Y.
STAGE II	90.8 C.Y.
TOTAL	165.8 C.Y.
REINFORCING STEEL	
STAGE I	9,149 LBS.
STAGE II	9,882 LBS.
TOTAL	19,031 LBS.
PLACEMENT OF NATURAL STREAM BED MATERIAL	LUMP SUM



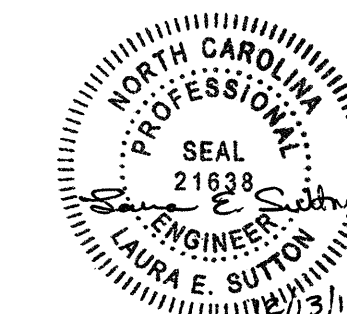
PROFILE ALONG CULVERT

PROJECT NO. B-5110
ALEXANDER COUNTY
 STATION: 13+44.00 -L-

SHEET 1 OF 6 REPLACES BRIDGE NO. 129

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 BARREL STANDARD
 TRIPLE 10 FT. X 10 FT. CONCRETE BOX CULVERT
 90° SKEW

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



ASSEMBLED BY : H.T. DIEU DATE : 7/24/12
 CHECKED BY : J.D. HAWK DATE : 8/1/12

SPECIAL

DRAWN BY : R.W. WRIGHT DATE : JULY, 1990
 CHECKED BY : D.A. GLADDEN DATE : JULY, 1990

STANDARD

DESIGN ENGINEER OF RECORD:
 H.T. DIEU DATE : 11/13/13

**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 (γ _{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	1.11	--	1.75	1.11	1	TOP SLAB	4.80	1.14	1	TOP SLAB	9.64		
	HL-93 (OPERATING)	N/A		1.44	--	1.35	1.44	1	TOP SLAB	4.80	1.48	1	TOP SLAB	9.64		
	HS-20 (INVENTORY)	36.000	②	1.21	43.60	1.75	1.21	1	BOTTOM SLAB	10.40	1.22	1	BOTTOM SLAB	9.79		
	HS-20 (OPERATING)	36.000		1.57	56.52	1.35	1.57	1	BOTTOM SLAB	10.40	1.58	1	BOTTOM SLAB	9.79		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.18	29.42	1.40	2.18	1	TOP CORNER WALL	0.54	2.43	1	TOP SLAB	9.64	
		SNGARBS2	20.000		2.05	41.02	1.40	2.05	1	BOT CORNER WALL	10.58	2.27	1	TOP SLAB	9.64	
		SNAGRIS2	22.000		1.97	43.25	1.40	1.97	1	BOT CORNER WALL	10.58	2.42	1	TOP SLAB	9.64	
		SNCOTTS3	27.250		1.39	37.88	1.40	1.39	1	TOP SLAB	4.53	1.43	1	TOP SLAB	9.64	
		SNAGGRS4	34.925		1.48	51.86	1.40	1.48	1	BOT CORNER WALL	10.58	1.57	1	BOTTOM SLAB	9.79	
		SNS5A	35.550		1.46	51.97	1.40	1.46	1	BOT CORNER WALL	10.58	1.55	1	BOTTOM SLAB	9.79	
		SNS6A	39.950		1.37	54.75	1.40	1.37	1	BOT CORNER WALL	10.58	1.38	1	BOTTOM SLAB	9.79	
	SNS7B	42.000		1.33	55.98	1.40	1.33	1	BOTTOM SLAB	10.40	1.34	1	BOTTOM SLAB	9.79		
	TRUCK TRACTOR SEMI-TRAILER (TTS1)	TNAGRIT3	33.000		1.55	51.13	1.40	1.55	1	BOT CORNER WALL	10.58	1.68	1	BOTTOM SLAB	9.79	
		TNT4A	33.075		1.62	53.57	1.40	1.62	1	BOT CORNER WALL	10.58	1.69	1	BOTTOM SLAB	9.79	
		TNT6A	41.600		1.40	58.09	1.40	1.40	1	BOTTOM SLAB	10.40	1.40	1	BOTTOM SLAB	9.79	
		TNT7A	42.000		1.40	58.76	1.40	1.42	1	BOTTOM SLAB	10.40	1.40	1	BOTTOM SLAB	9.79	
		TNT7B	42.000		1.40	58.61	1.40	1.47	1	BOTTOM SLAB	10.40	1.40	1	BOTTOM SLAB	9.79	
		TNAGRIT4	43.000		1.30	55.92	1.40	1.34	1	BOTTOM SLAB	10.40	1.30	1	BOTTOM SLAB	9.79	
TNAGT5A		45.000	③	1.23	55.20	1.40	1.25	1	BOTTOM SLAB	10.40	1.23	1	BOTTOM SLAB	9.79		
TNAGT5B	45.000		1.23	55.22	1.40	1.24	1	BOTTOM SLAB	10.40	1.23	1	BOTTOM SLAB	9.79			

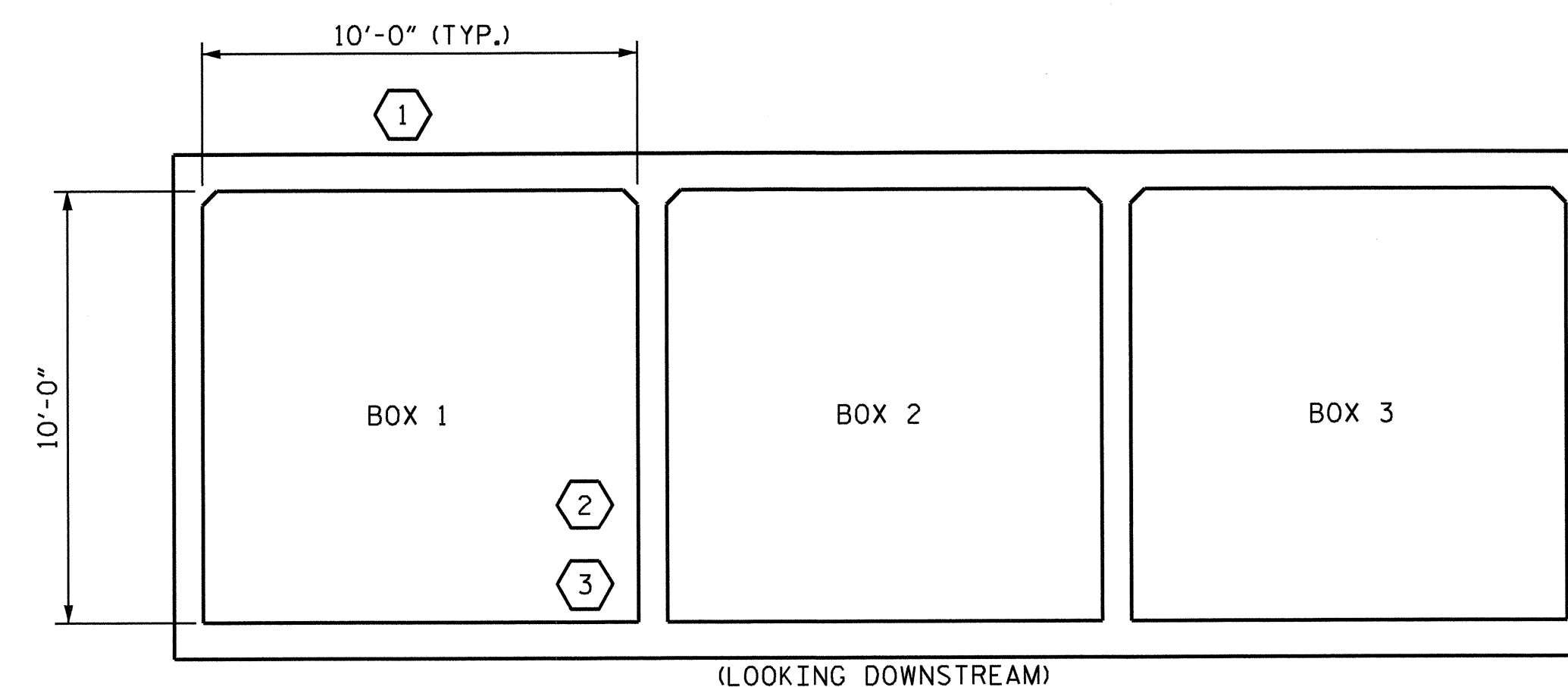
LOAD FACTORS:

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.

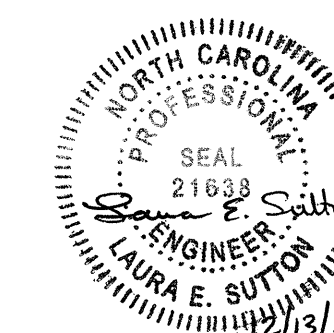
#	CONTROLLING LOAD RATING
①	DESIGN LOAD RATING (HL-93)
②	DESIGN LOAD RATING (HS-20)
③	LEGAL LOAD RATING **
** SEE CHART FOR VEHICLE TYPE	



LRFR SUMMARY

PROJECT NO. B-5110
ALEXANDER COUNTY
 STATION: 13+44.00 -L-

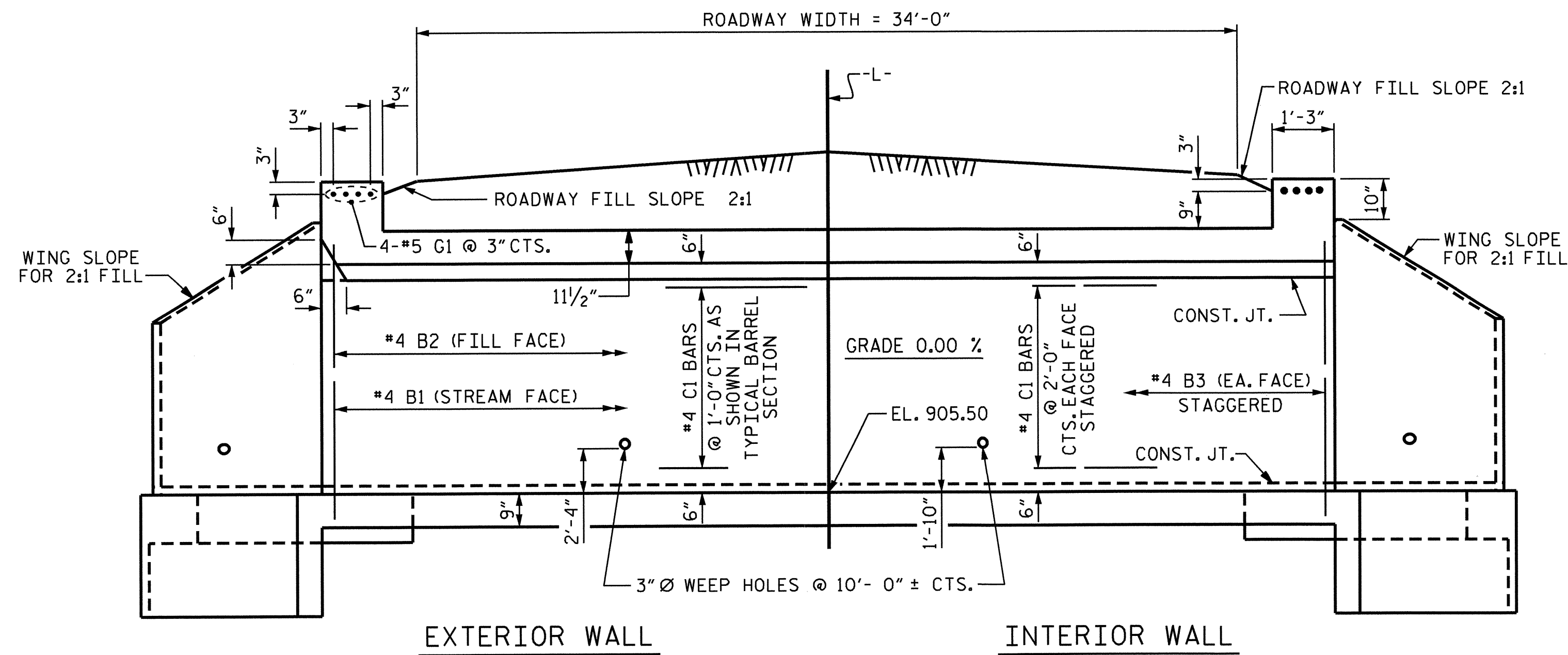
SHEET 2 OF 6



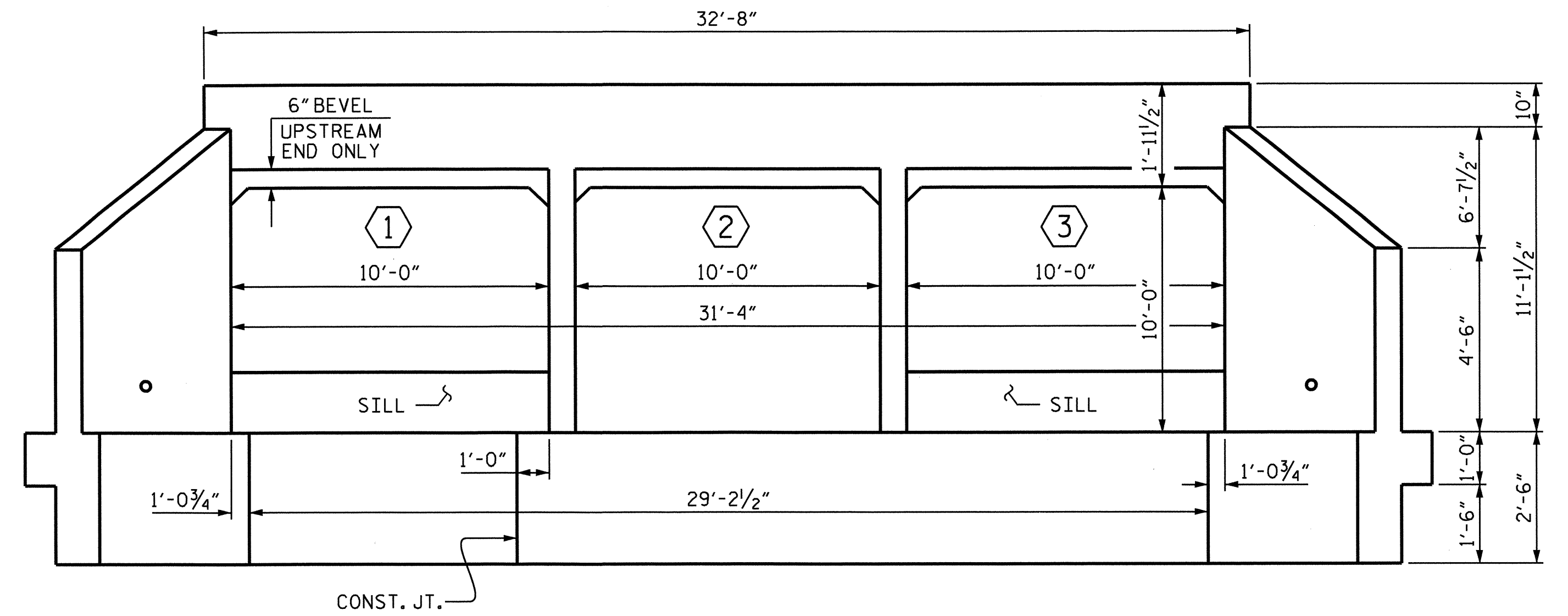
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD
 LRFR SUMMARY FOR
 REINFORCED CONCRETE
 BOX CULVERTS
 (NON-INTERSTATE TRAFFIC)

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

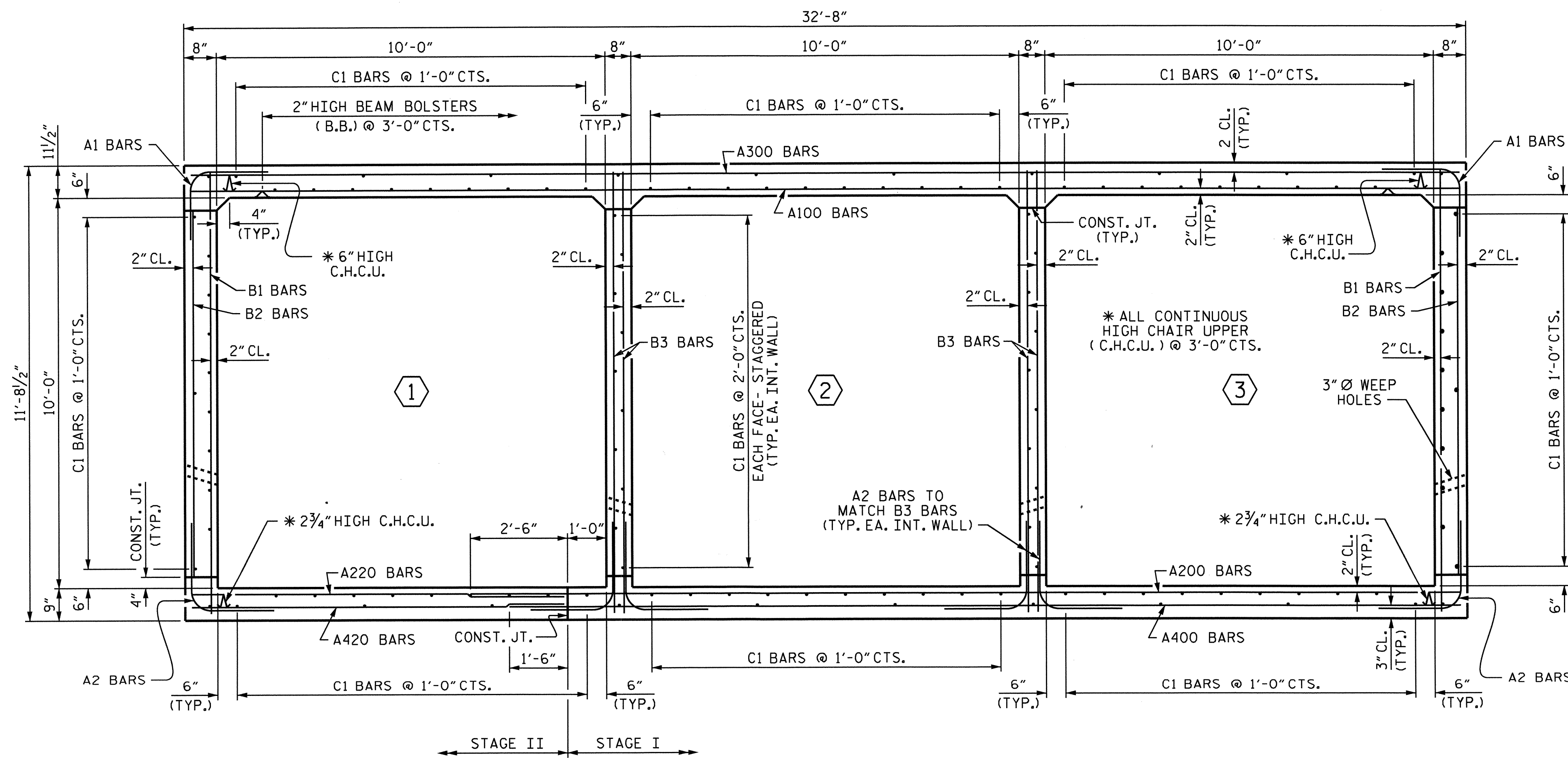
ASSEMBLED BY : H.T. DIEU	DATE : 7/3/13
CHECKED BY : J.D. HAWK	DATE : 8/1/13
DRAWN BY : WMC 7/11	REV. 10/1/11
CHECKED BY : GM 7/11	MAA/GM
DESIGN ENGINEER OF RECORD:	
H.T. DIEU DATE : 11/2/13	



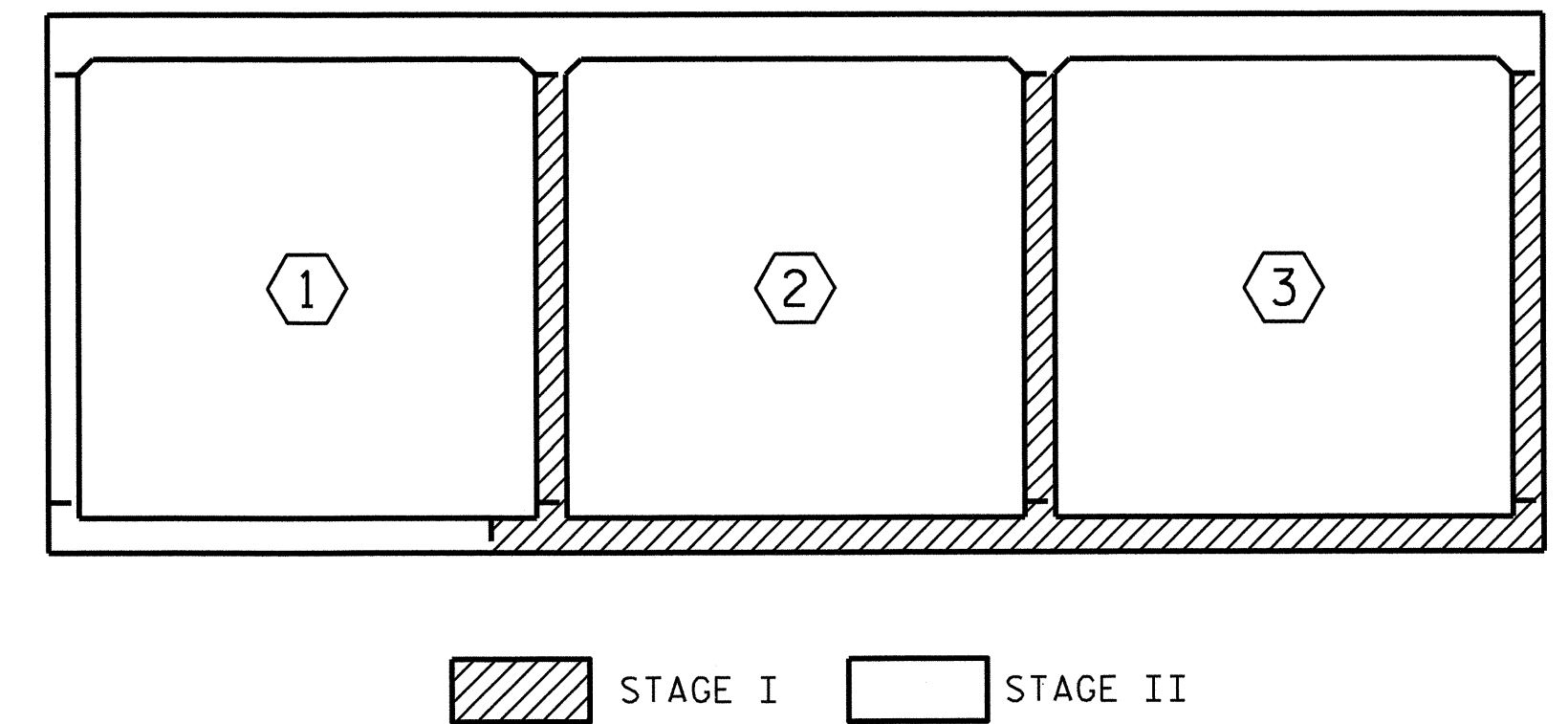
EXTERIOR WALL INTERIOR WALL
CULVERT SECTION NORMAL TO ROADWAY



END ELEVATION
 LOOKING DOWNSTREAM
 FOR SILL DETAILS, SEE SHEET 4 OF 6.



RIGHT ANGLE SECTION OF BARREL
 THERE ARE 122 "C" BARS IN SECTION OF BARREL



CONSTRUCTION SEQUENCE

PROJECT NO. B-5110
ALEXANDER COUNTY
 STATION: 13+44.00 -L-
 SHEET 3 OF 6

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 BARREL STANDARD
 TRIPLE 10 FT. X 10 FT.
 CONCRETE BOX CULVERT
 90° SKEW



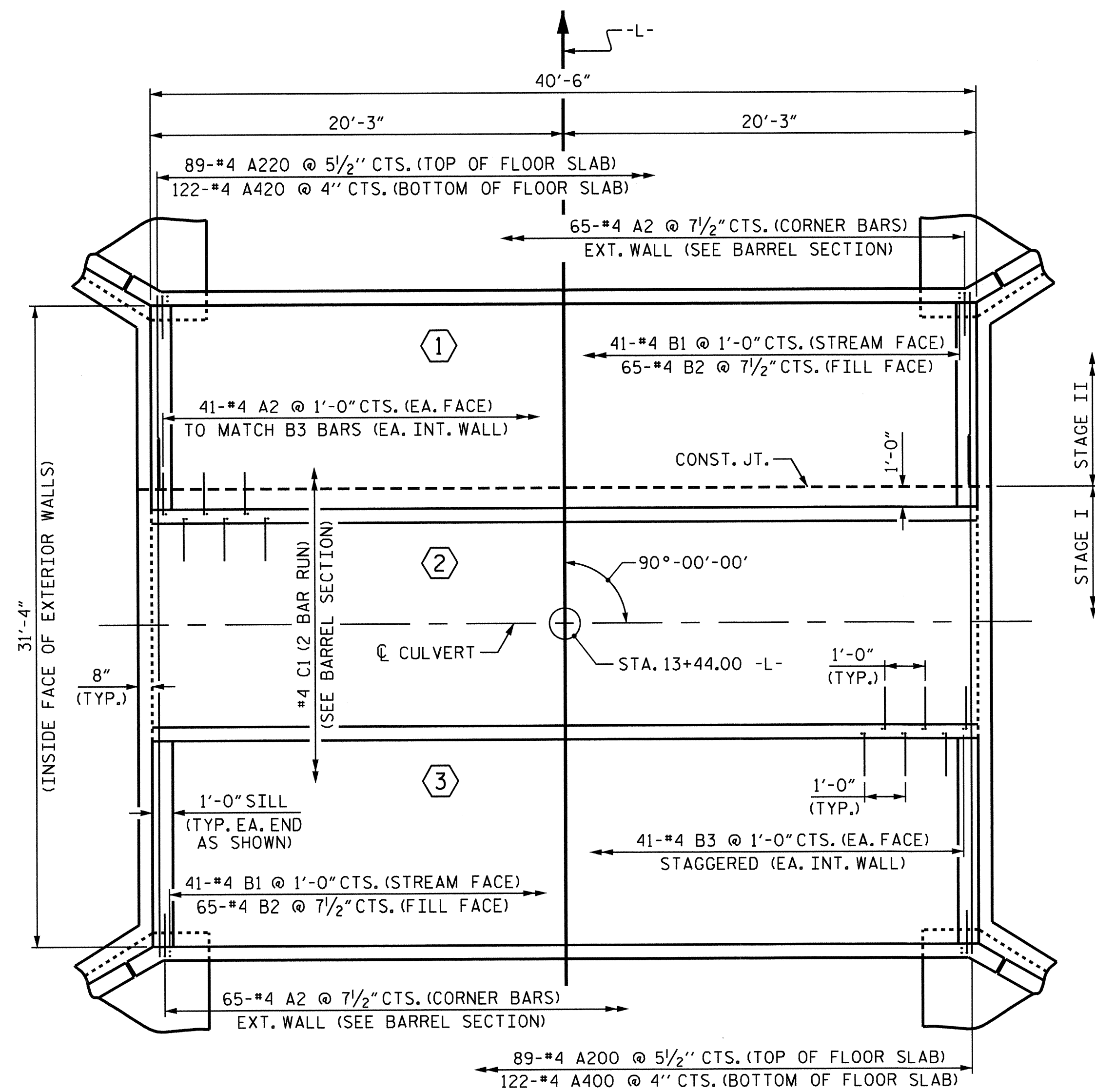
ASSEMBLED BY: H.T. DIEU DATE: 7/24/12
 CHECKED BY: J.D. HAWK DATE: 8/1/12
 DRAWN BY: JOEL JOHNSON DATE: MAR. 1971
 CHECKED BY: GARY BROOME DATE: MAR. 1971

SPECIAL
STANDARD

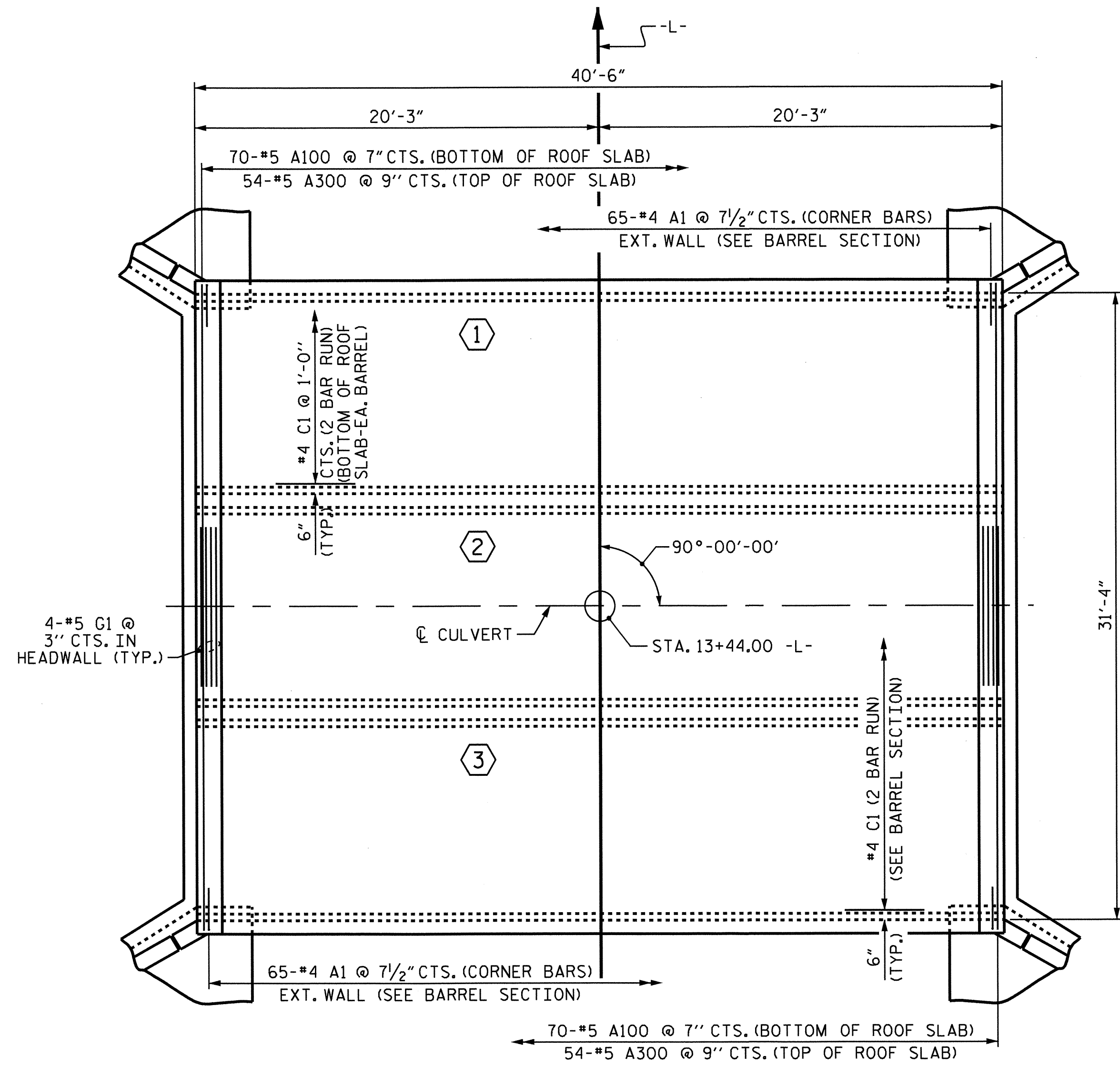
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H.T. DIEU DATE: 11/2/13

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

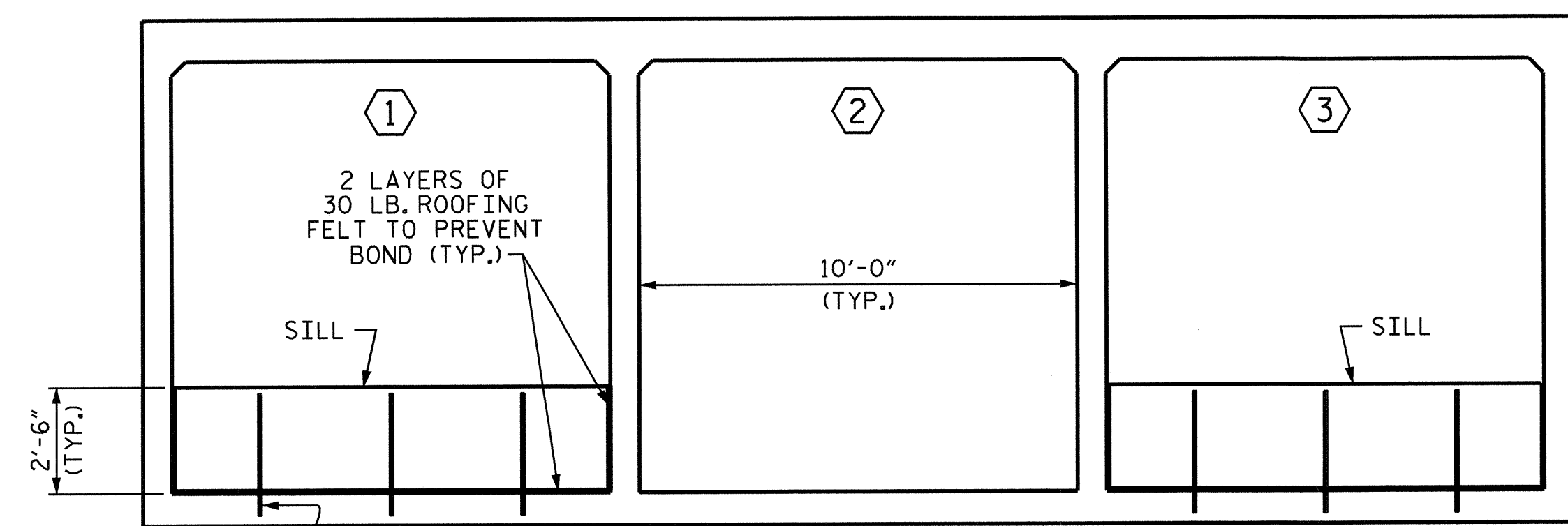
STD. NO. CB13



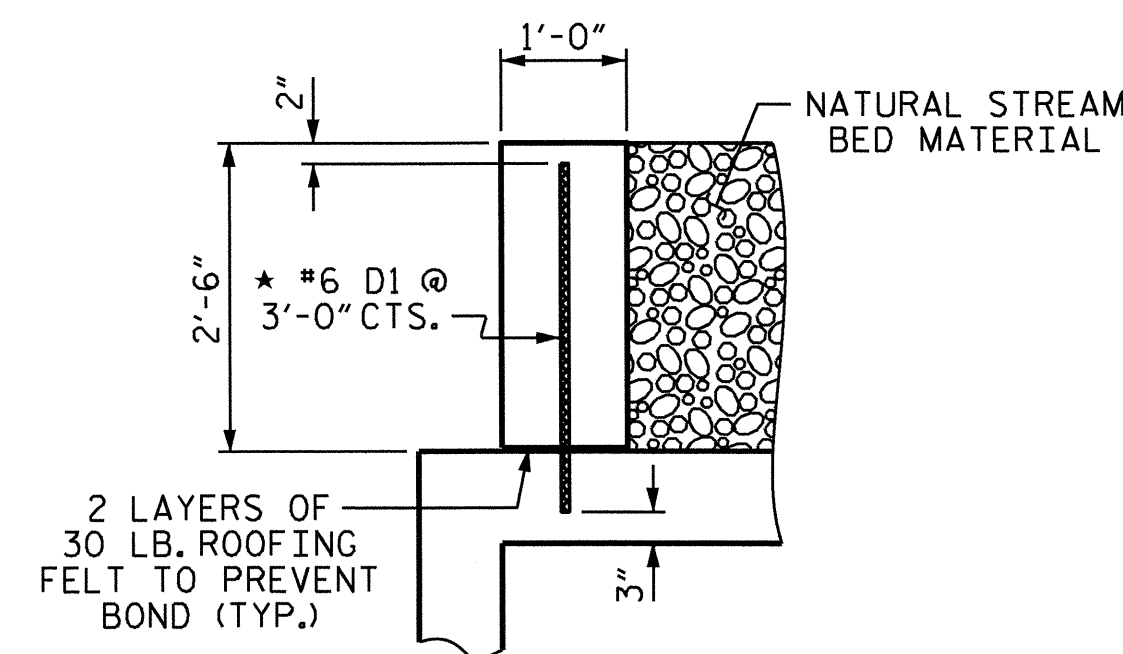
PLAN - FLOOR SLAB



PLAN - ROOF SLAB



ELEVATION



SECTION THROUGH SILL

STAGE I QUANTITIES	
CLASS A CONCRETE	
BARREL @ 1.355 C.Y./FT.	54.9 C.Y.
WINGS, ETC.	20.1 C.Y.
TOTAL	75.0 C.Y.
REINFORCING STEEL	
BARREL	7,934 LBS.
WINGS, ETC.	1,215 LBS.
TOTAL	9,149 LBS.
STAGE II QUANTITIES	
CLASS A CONCRETE	
BARREL @ 1.712 C.Y./FT.	69.3 C.Y.
WINGS, ETC.	21.5 C.Y.
TOTAL	90.8 C.Y.
REINFORCING STEEL	
BARREL	8,667 LBS.
WINGS, ETC.	1,215 LBS.
TOTAL	9,882 LBS.

BAR TYPE					
BAR DIMENSIONS ARE OUT TO OUT.					
BILL OF MATERIAL					
STAGE I					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	65	#4	6	4'-5"	192
A2	229	#4	6	4'-1"	625
A200	89	#4	STR	25'-4"	1506
A400	122	#4	STR	24'-4"	1983
B1	41	#4	STR	11'-2"	306
B2	65	#4	STR	9'-4"	405
B3	164	#4	STR	11'-2"	1223
C1	118	#4	STR	21'-2"	1668
D1	6	#6	STR	2'-10"	26
REINFORCING STEEL					LBS. 7,934
STAGE II					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	65	#4	6	4'-5"	192
A2	65	#4	6	4'-1"	177
A100	70	#5	STR	32'-4"	2361
A220	89	#4	STR	9'-5"	560
A300	54	#5	STR	32'-4"	1821
A420	122	#4	STR	9'-5"	767
B1	41	#4	STR	11'-2"	306
B2	65	#4	STR	9'-4"	405
C1	126	#4	STR	21'-2"	1782
D1	6	#6	STR	2'-10"	26
G1	8	#5	STR	32'-4"	270
REINFORCING STEEL					LBS. 8,667
SPlice LENGTH CHART					
BAR	SIZE	SPlice LENGTH			
B1, B3	#4	1'-9"			
C1	#4	1'-11"			

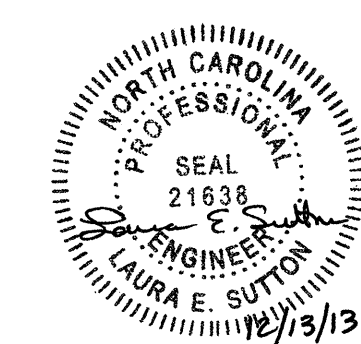
PROJECT NO. B-5110
ALEXANDER COUNTY
 STATION: 13+44.00 -L-
 SHEET 4 OF 6

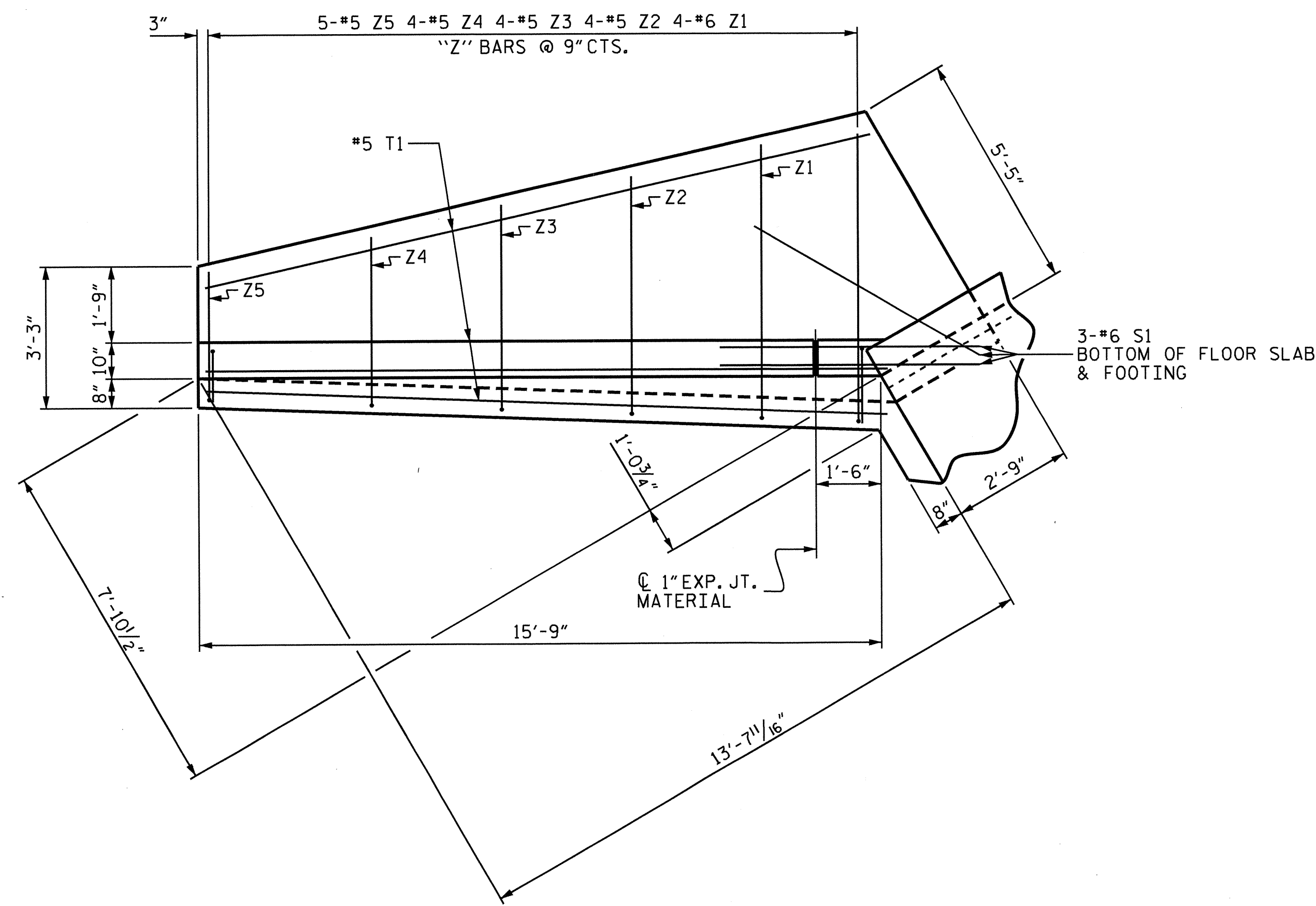
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TRIPLE 10 FT. X 10 FT.
 CONCRETE BOX CULVERT
 90° SKEW

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

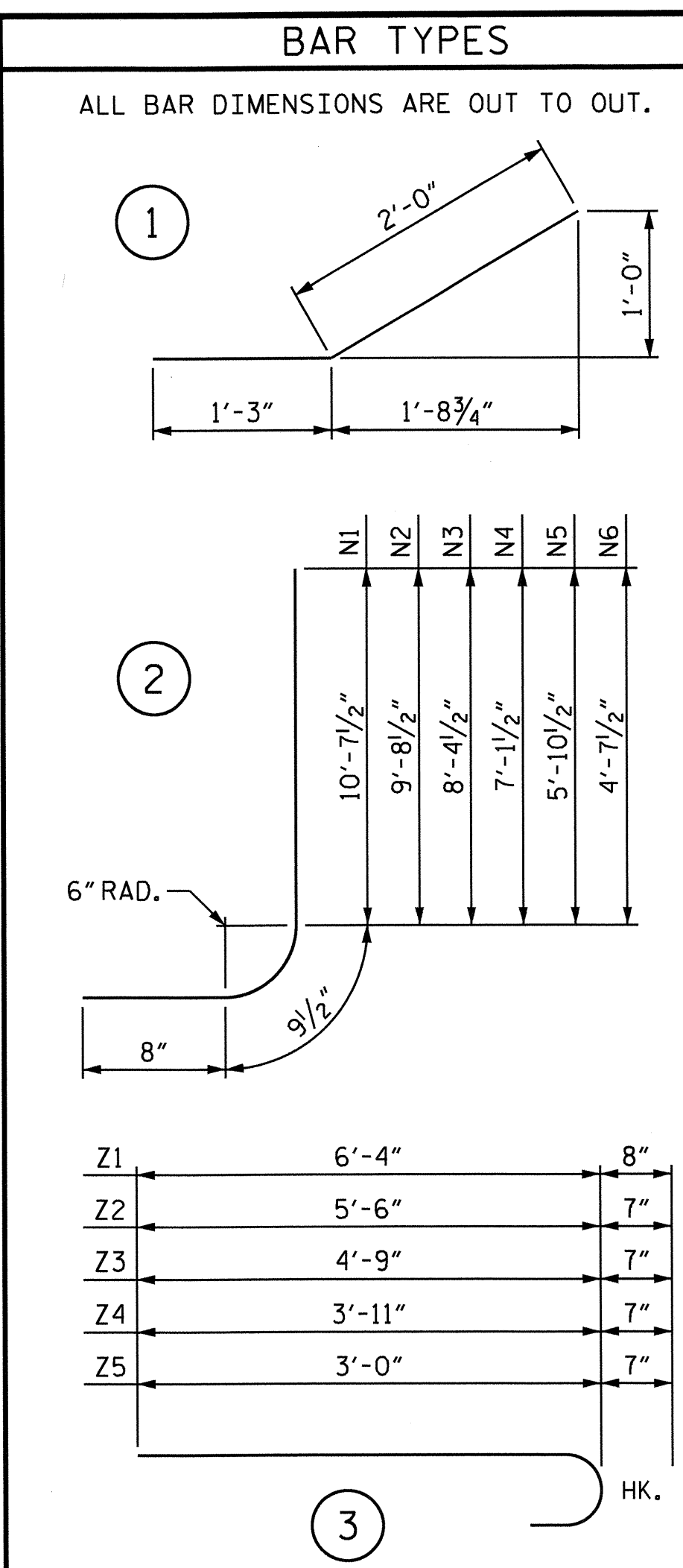
DRAWN BY: H.T. DIEU DATE: 7/24/12 DESIGN ENGINEER OF RECORD:
 CHECKED BY: J.D. HAWK DATE: 8/1/12 H.T. DIEU DATE: 11/12/13

13-DEC-2013 14:56
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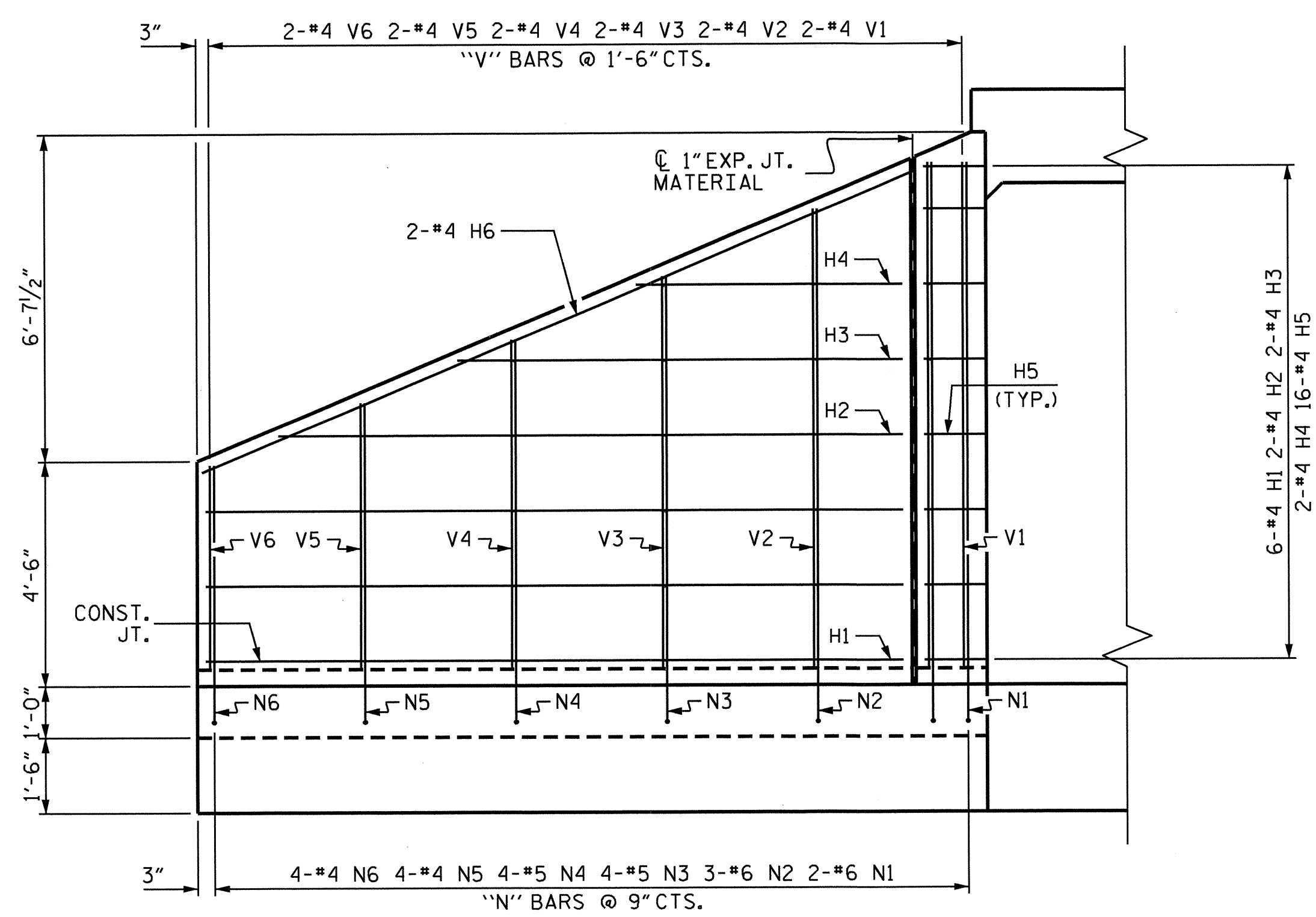




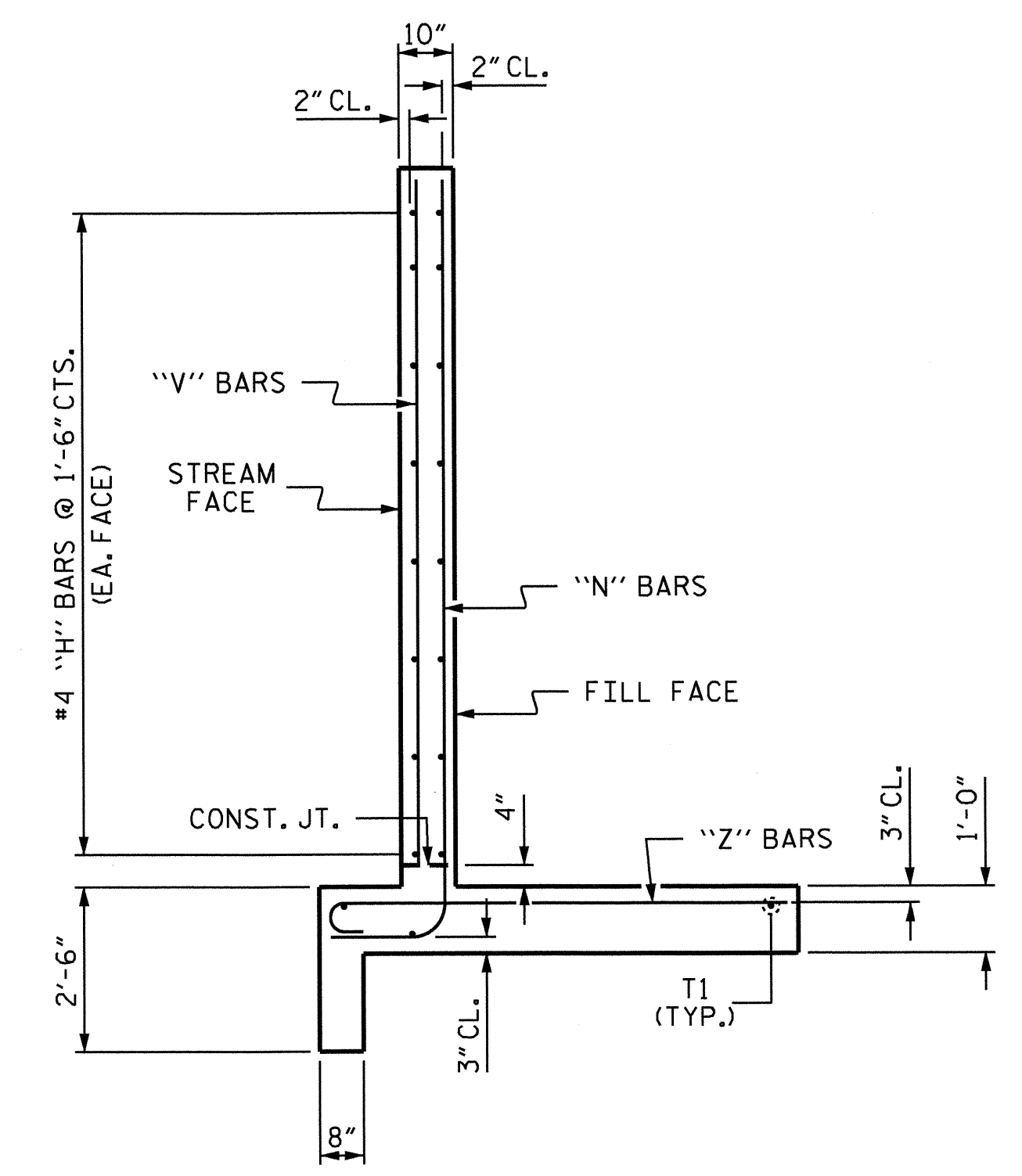
PLAN



BILL OF MATERIAL STAGE I						BILL OF MATERIAL STAGE II					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	13'-10"	111	H1	12	#4	STR	13'-10"	111
H2	4	#4	STR	12'-5"	33	H2	4	#4	STR	12'-5"	33
H3	4	#4	STR	8'-10"	24	H3	4	#4	STR	8'-10"	24
H4	4	#4	STR	5'-4"	14	H4	4	#4	STR	5'-4"	14
H5	32	#4	1	3'-3"	69	H5	32	#4	1	3'-3"	69
H6	4	#4	STR	15'-5"	41	H6	4	#4	STR	15'-5"	41
N1	4	#6	2	12'-1"	73	N1	4	#6	2	12'-1"	73
N2	6	#6	2	11'-2"	101	N2	6	#6	2	11'-2"	101
N3	8	#5	2	9'-10"	82	N3	8	#5	2	9'-10"	82
N4	8	#5	2	8'-7"	72	N4	8	#5	2	8'-7"	72
N5	8	#4	2	7'-4"	39	N5	8	#4	2	7'-4"	39
N6	8	#4	2	6'-1"	33	N6	8	#4	2	6'-1"	33
S1	6	#6	STR	6'-0"	54	S1	6	#6	STR	6'-0"	54
T1	6	#5	STR	15'-9"	99	T1	6	#5	STR	15'-9"	99
V1	4	#4	STR	10'-1"	27	V1	4	#4	STR	10'-1"	27
V2	4	#4	STR	9'-2"	24	V2	4	#4	STR	9'-2"	24
V3	4	#4	STR	7'-10"	21	V3	4	#4	STR	7'-10"	21
V4	4	#4	STR	6'-7"	18	V4	4	#4	STR	6'-7"	18
V5	4	#4	STR	5'-4"	14	V5	4	#4	STR	5'-4"	14
V6	4	#4	STR	4'-1"	11	V6	4	#4	STR	4'-1"	11
Z1	8	#6	3	7'-0"	84	Z1	8	#6	3	7'-0"	84
Z2	8	#5	3	6'-1"	51	Z2	8	#5	3	6'-1"	51
Z3	8	#5	3	5'-4"	45	Z3	8	#5	3	5'-4"	45
Z4	8	#5	3	4'-6"	38	Z4	8	#5	3	4'-6"	38
Z5	10	#5	3	3'-7"	37	Z5	10	#5	3	3'-7"	37
REINFORCING STEEL FOR 2 WINGS						REINFORCING STEEL FOR 2 WINGS					
LBS. 1,215						LBS. 1,215					
CLASS A CONCRETE						CLASS A CONCRETE					
2 WINGS C.Y. 15.6						2 WINGS C.Y. 15.6					
2 END CURTAIN WALLS C.Y. 2.6						2 END CURTAIN WALLS C.Y. 2.6					
2 SILLS C.Y. 1.9						2 SILLS C.Y. 1.9					
TOTAL CLASS A CONCRETE C.Y. 20.1						TOTAL CLASS A CONCRETE C.Y. 21.5					



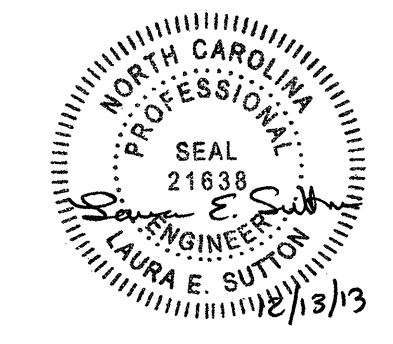
ELEVATION



TYPICAL WING SECTION

PROJECT NO. B-5110
ALEXANDER COUNTY
STATION: 13+44.00 -L-

SHEET 5 OF 6
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD WINGS
FOR
CONCRETE BOX CULVERT
H = 10'-0" SLOPE = 2:1
90° SKEW



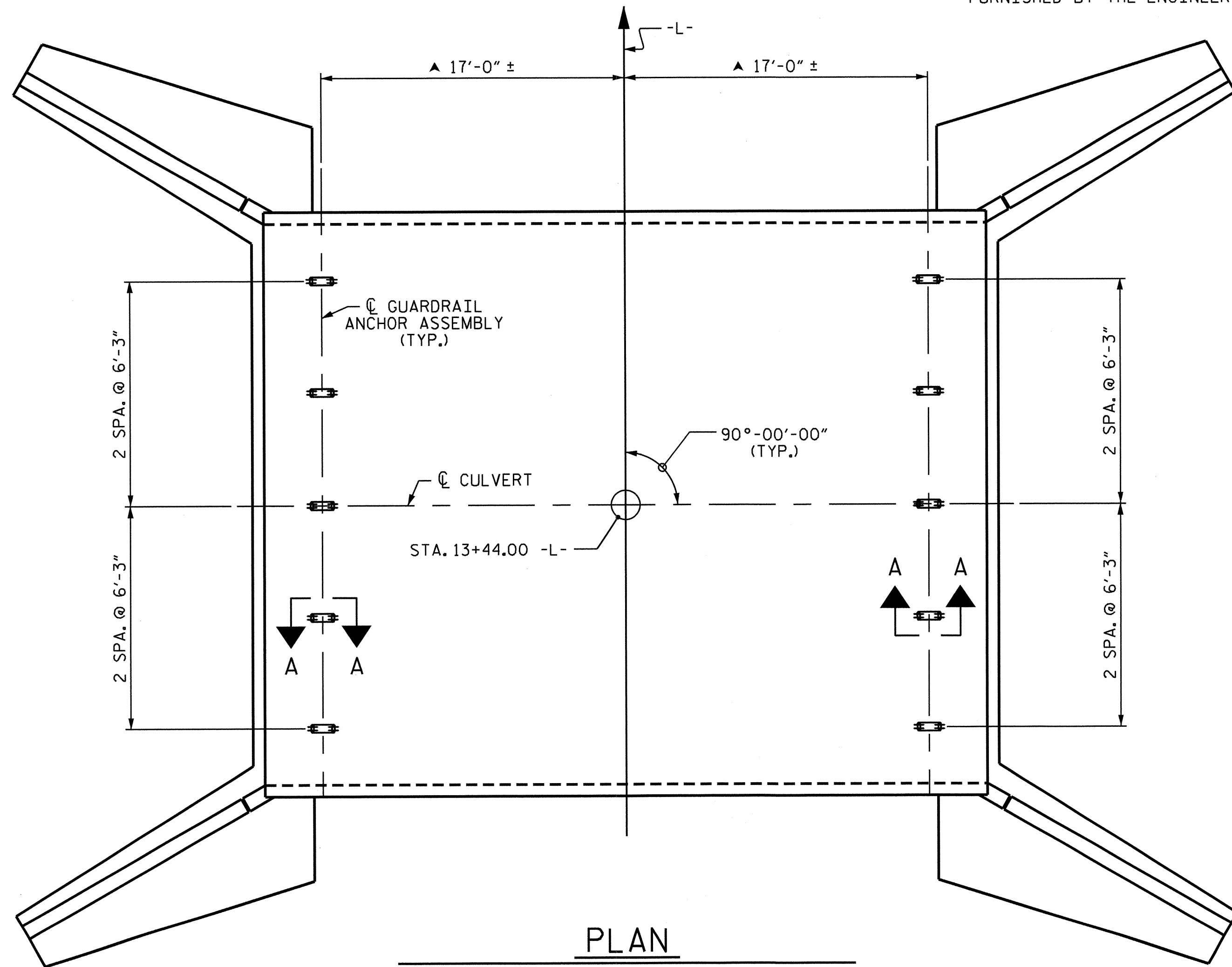
ASSEMBLED BY : H.T. DIEU
CHECKED BY : J.D. HAWK
DATE : 7/23/12
DATE : 8/1/12
DRAWN BY : CCJ 10/99
CHECKED BY : RWW 03/00

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

STD. NO. CW9010

13-DEC-2013 14:57
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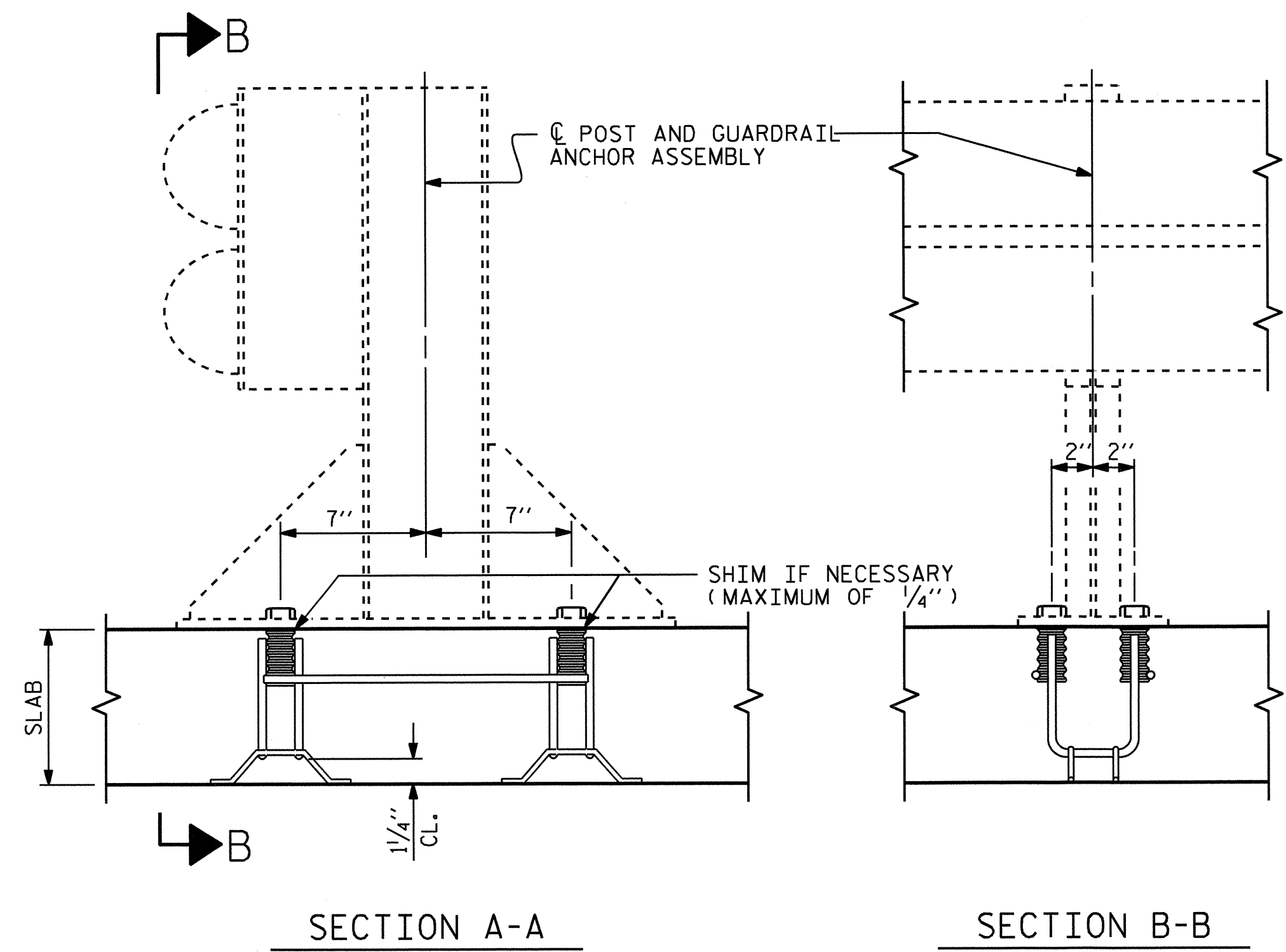
▲ THIS DIMENSION TO BE FURNISHED BY THE ENGINEER



PLAN
SHOWING : GUARDRAIL ANCHOR ASSEMBLY SPACING.

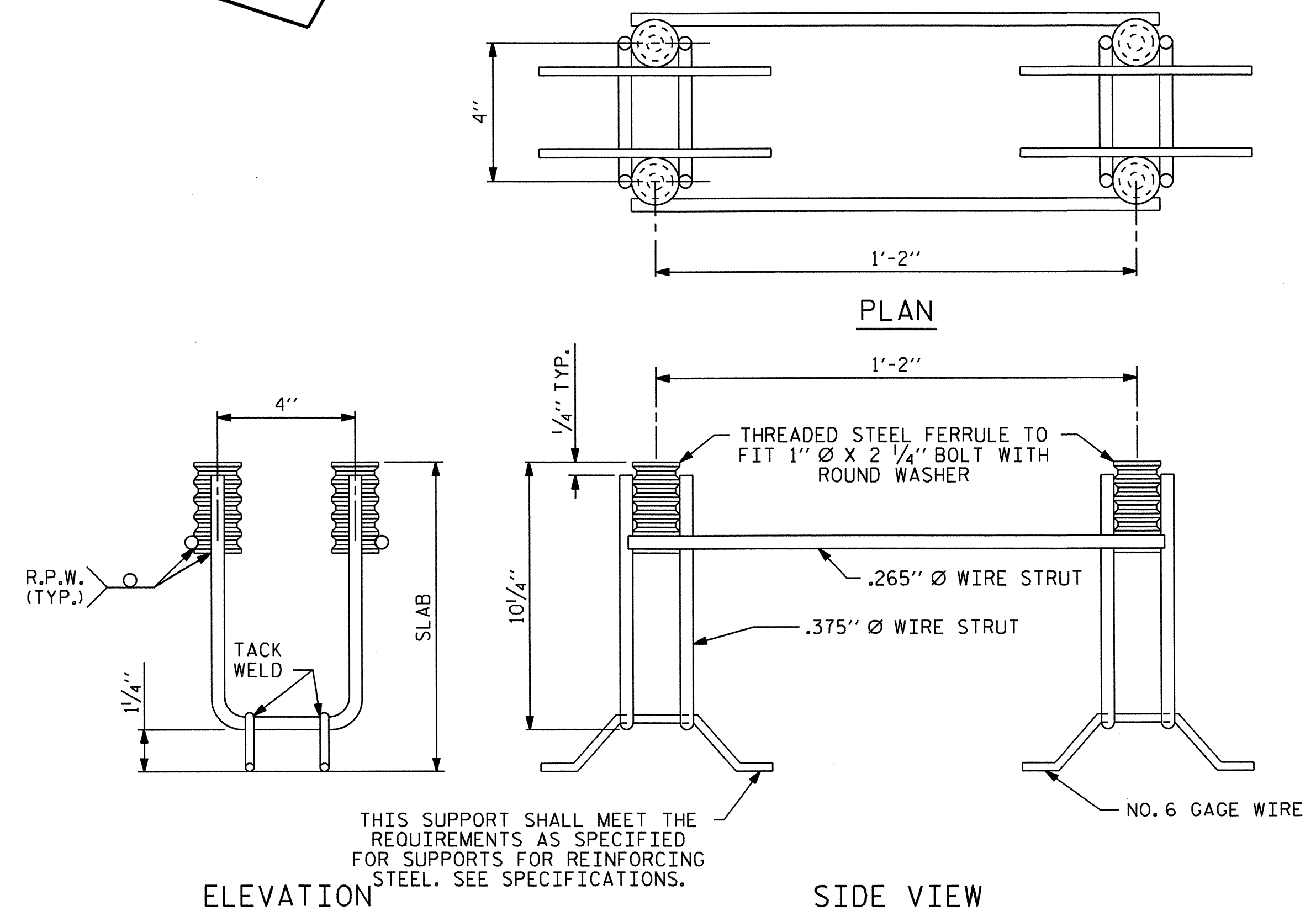
NOTES

- 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 1/6" 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.



SECTION A-A

SECTION B-B



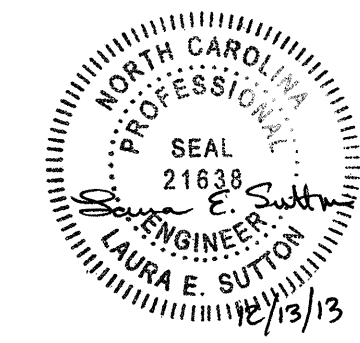
ELEVATION

SIDE VIEW

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

PROJECT NO. B-5110
ALEXANDER COUNTY
 STATION: 13+44.00 -L-
 SHEET 6 OF 6

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			6

ASSEMBLED BY : H.T. DIEU	DATE : 5/23/12
CHECKED BY : J.D. HAWK	DATE : 8/1/12
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

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. FINISHES 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