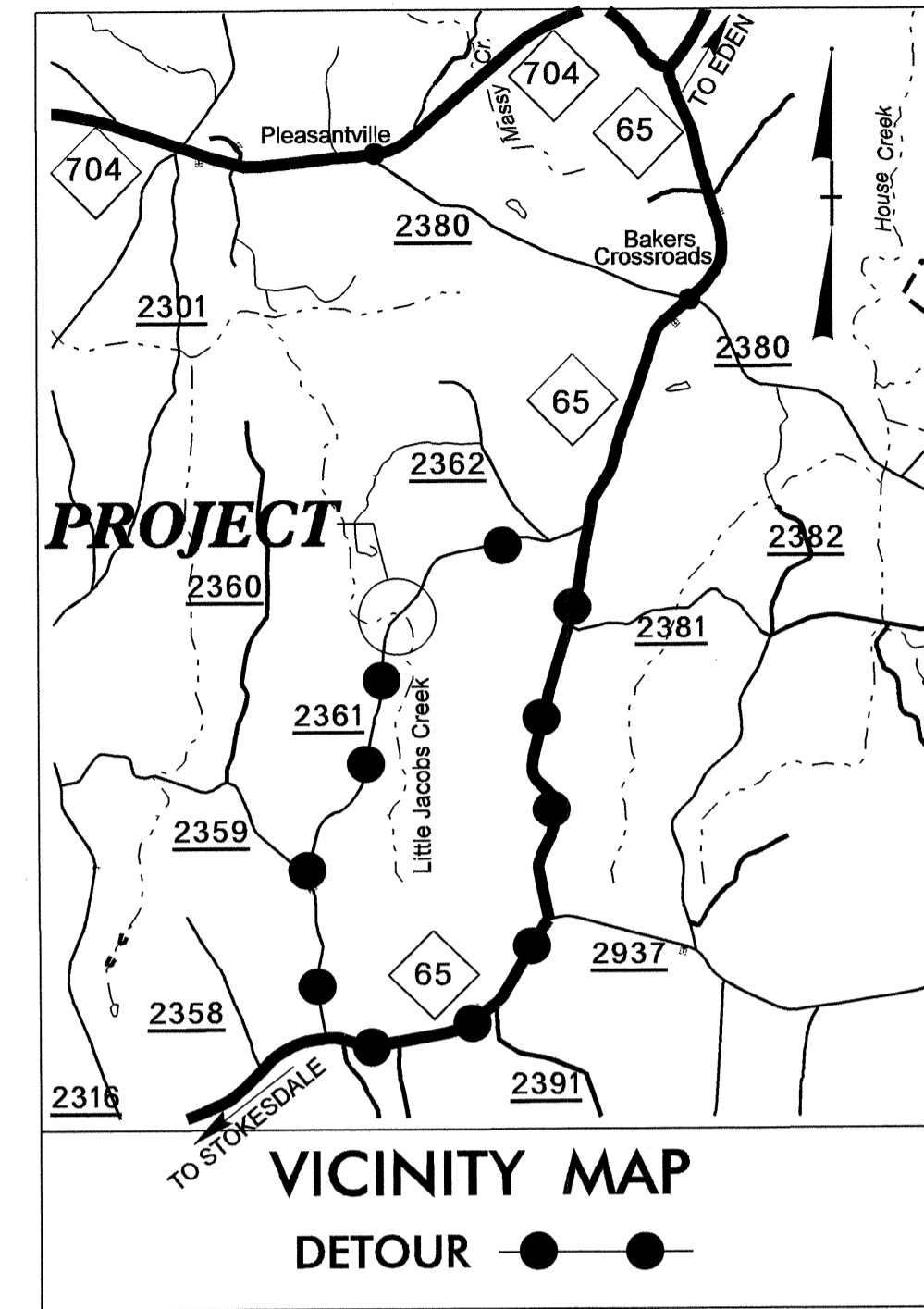


CONTRACT: C203152 TIP PROJECT: B-4963



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

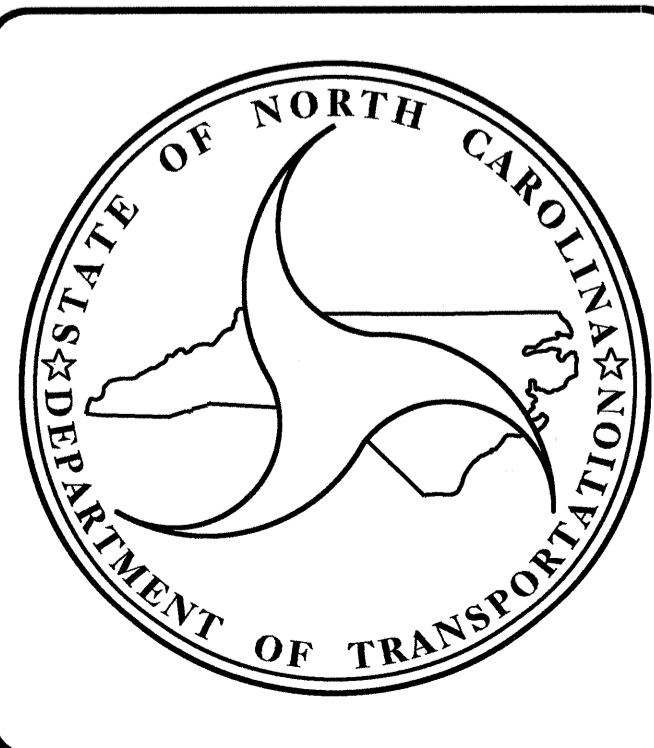
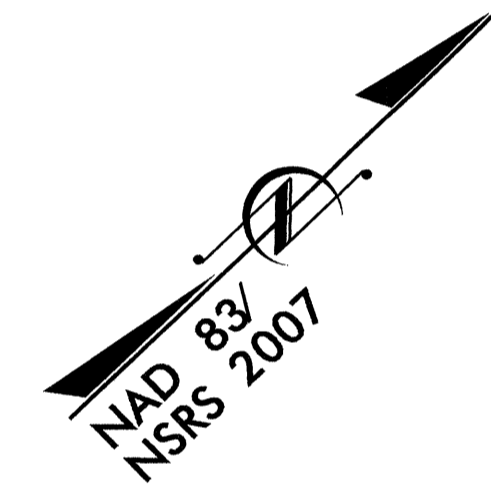
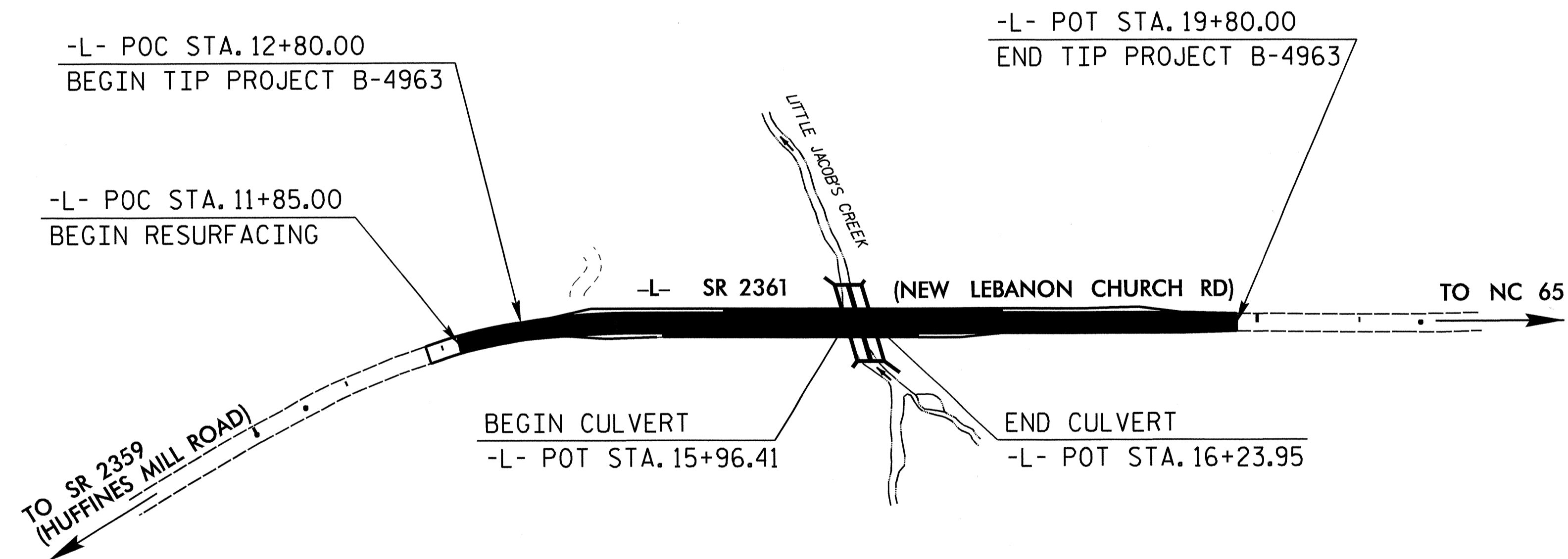
ROCKINGHAM COUNTY

**LOCATION: BRIDGE #32 OVER LITTLE JACOB'S CREEK
ON SR 2361 (NEW LEBANON CHURCH ROAD)**

TYPE OF WORK: GRADING, DRAINAGE, PAVING AND CULVERT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4963		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
40241.1.1	BRZ-2361 (1)	P. E.	
40241.2.1	BRZ-2361 (2)	RW, UTIL.	
40241.3.1	BRZ-2361 (1)	CONST.	

CULVERT



DESIGN DATA

ADT 2013	=	356
ADT 2035	=	620
DHV	=	15 %
D	=	55 %
T	=	6 % *
V	=	55 MPH
* TTST 1% DUAL 5%		
FUNC. CLASS = LOCAL RURAL SUB-REGIONAL TIER		

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4963	=	0.128 MILE
LENGTH STRUCTURE TIP PROJECT B-4963	=	0.005 MILE
TOTAL LENGTH TIP PROJECT B-4963	=	0.133 MILE

Prepared in the Office of:
DIVISION OF HIGHWAYS
1000 BIRCH RIDGE DR.
RALEIGH, N.C. 27610

2012 STANDARD SPECIFICATIONS

<p>LETTING DATE :</p> <p style="text-align: center;">MAY 21, 2013</p>	<p style="text-align: center;">J.M. BAILEY, P.E. PROJECT ENGINEER</p> <hr/> <p style="text-align: center;">D.R. CALHOUN, P.E. PROJECT DESIGN ENGINEER</p>
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STRUCTURES MANAGEMENT UNIT

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

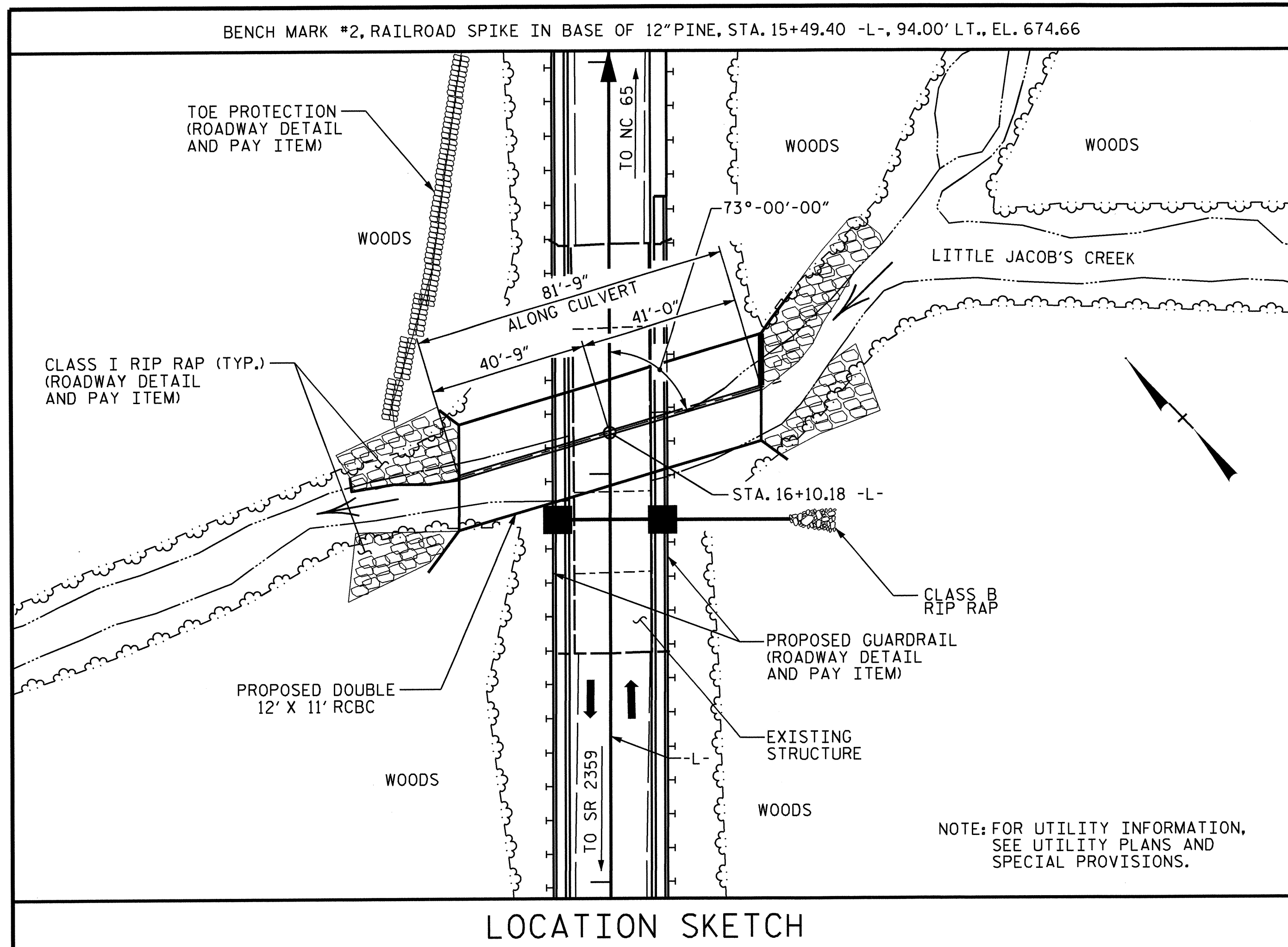
P.E.

STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR

DATE



NOTES

ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING.
 DESIGN FILL-----12.20'
 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. PHASE I WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF PHASE I VERTICAL WALLS.
 2. THE REMAINING PORTIONS OF PHASE I WALLS AND PHASE I WINGS FULL HEIGHT.
 3. PHASE II WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF PHASE II VERTICAL WALL.
 4. THE REMAINING PORTIONS OF PHASE II WALL AND PHASE II WINGS FULL HEIGHT.
 5. ROOF SLAB IN ITS ENTIRETY 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 DESIGN.
 THE EXISTING STRUCTURE CONSISTING OF 4 SPANS, 1 @ 40'-0", 1 @ 20'-1" AND 2 @ 20'-0" WITH CLEAR ROADWAY WIDTH OF 19'-2", TIMBER DECK WITH 3" AWS ON I-BEAMS AND DOUBLE CHANNELS ON TIMBER CAP AND PILE BENTS AND END BENTS WITH BENT 2 CONCRETE ENCASED AND LOCATED AT SAME LOCATION AS PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED BELOW THE LEGAL LOAD LIMIT.
 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.

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
 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.
 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 CRANE SAFETY, SEE SPECIAL PROVISIONS.
 FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
 FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
 FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
 FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
 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.
 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 16+10.18 -L-."
 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.

NOTE: FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

HYDRAULIC DATA

DESIGN DISCHARGE = 890 CFS
 FREQUENCY OF DESIGN FLOOD = 25 YRS.
 DESIGN HIGH WATER ELEVATION = 674.87
 DRAINAGE AREA = 2.29 SQ. MI.
 BASE DISCHARGE (Q100) = 1270 CFS
 BASE HIGH WATER ELEVATION = 676.03

GRADE DATA

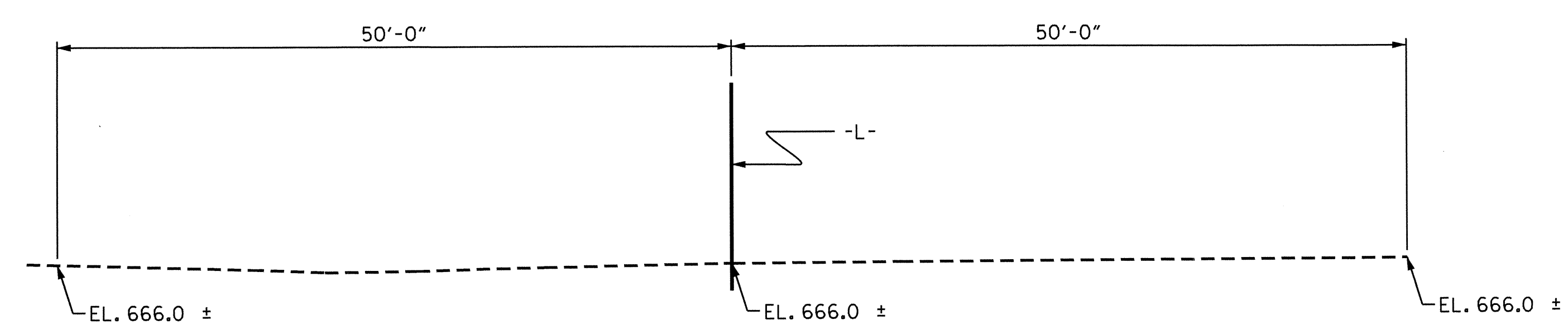
GRADE POINT ELEVATION @ STA. 16+10.18 -L- = 688.12
 BED ELEVATION @ STA. 16+10.18 -L- = 665.00
 ROADWAY FILL SLOPES = 2 : 1

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = 1740+ CFS
 FREQUENCY OF OVERTOPPING FLOOD = 500 YRS.+
 OVERTOPPING FLOOD ELEVATION = 688.07

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE			
BARREL @	3.519	CY/FT	287.7 C.Y.
WING ETC.			49.7 C.Y.
SILL			0.9 C.Y.
TOTAL			338.3 C.Y.
REINFORCING STEEL			
BARREL			31,824 LBS.
WINGS ETC.			3,131 LBS.
TOTAL			34,955 LBS.
FOUNDATION CONDITIONING MAT'L.			175 TONS
CULVERT EXCAVATION			LUMP SUM
REMOVAL OF EXISTING STRUCTURE			LUMP SUM



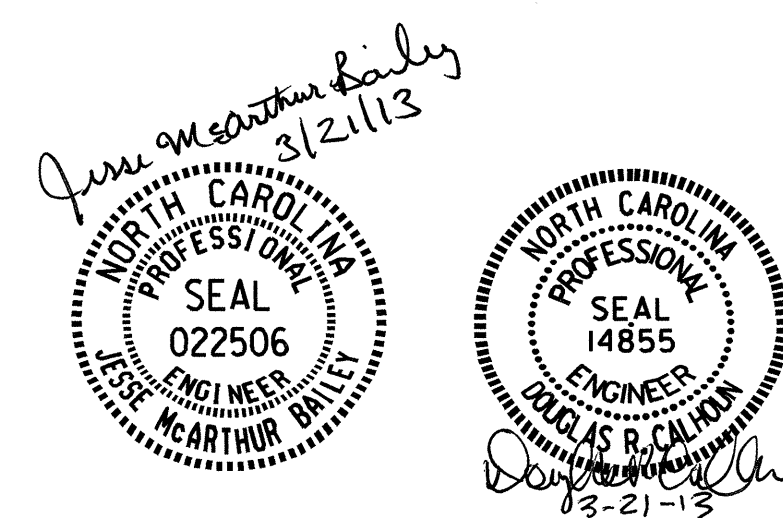
PROFILE ALONG CULVERT

PROJECT NO. B-4963
ROCKINGHAM COUNTY
 STATION: 16+10.18 -L-
 SHEET 1 OF 7 REPLACES BRIDGE NO. 32.

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

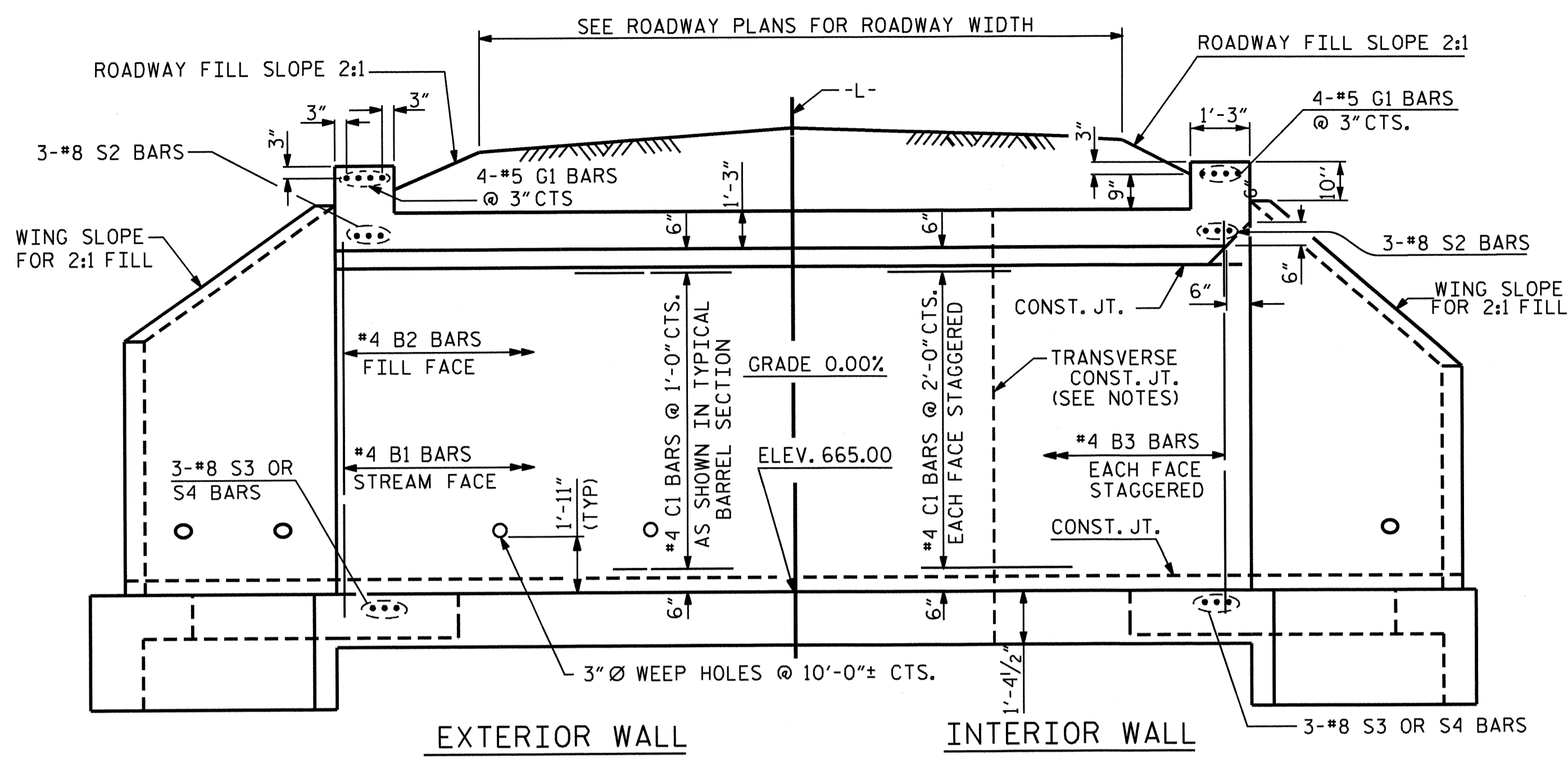
**DOUBLE 12 FT. X 11 FT. CONCRETE BOX CULVERT
 73° SKEW**

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

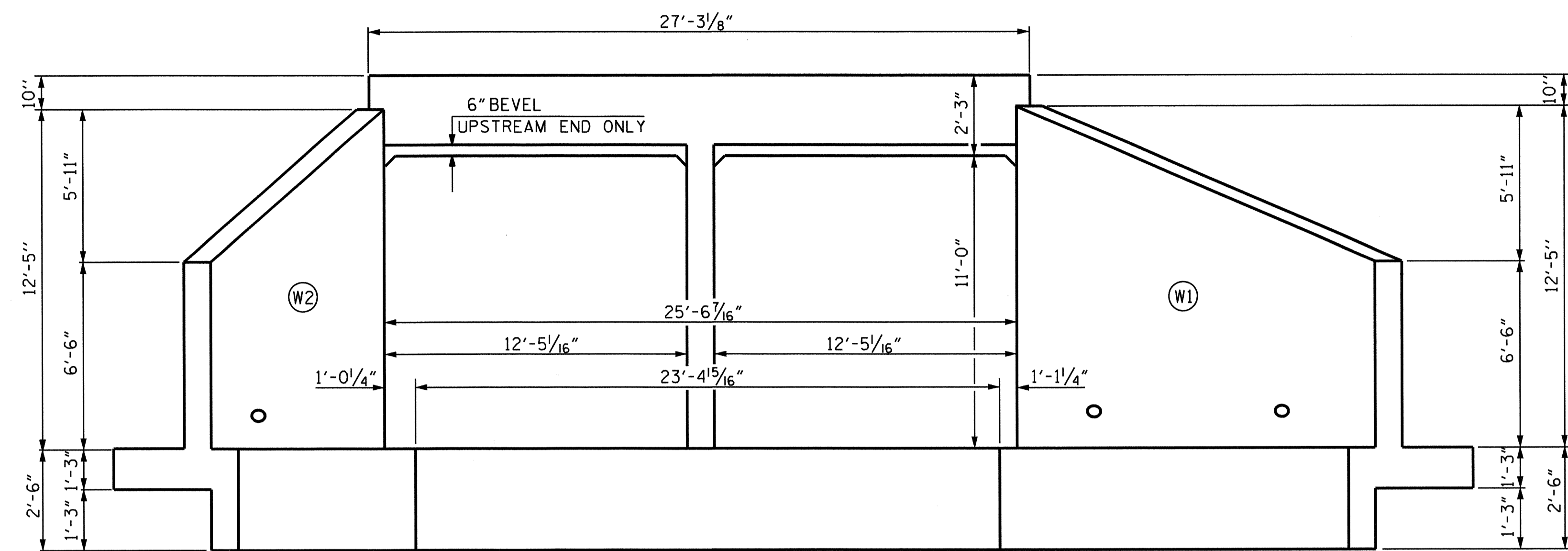


ASSEMBLED BY : <u>A. K. PATEL, PE</u> DATE : <u>12/12</u>	SPECIAL
CHECKED BY : <u>A. SORSENGINH</u> DATE : <u>01/13</u>	
DESIGN ENGINEER OF RECORD : <u>A. SORSENGINH</u> DATE : <u>06/12</u>	STANDARD
DRAWN BY : <u>R. WRIGHT</u> DATE : <u>AUG. 1989</u>	
CHECKED BY : <u>C.R.K.</u> DATE : <u>AUG. 1989</u>	

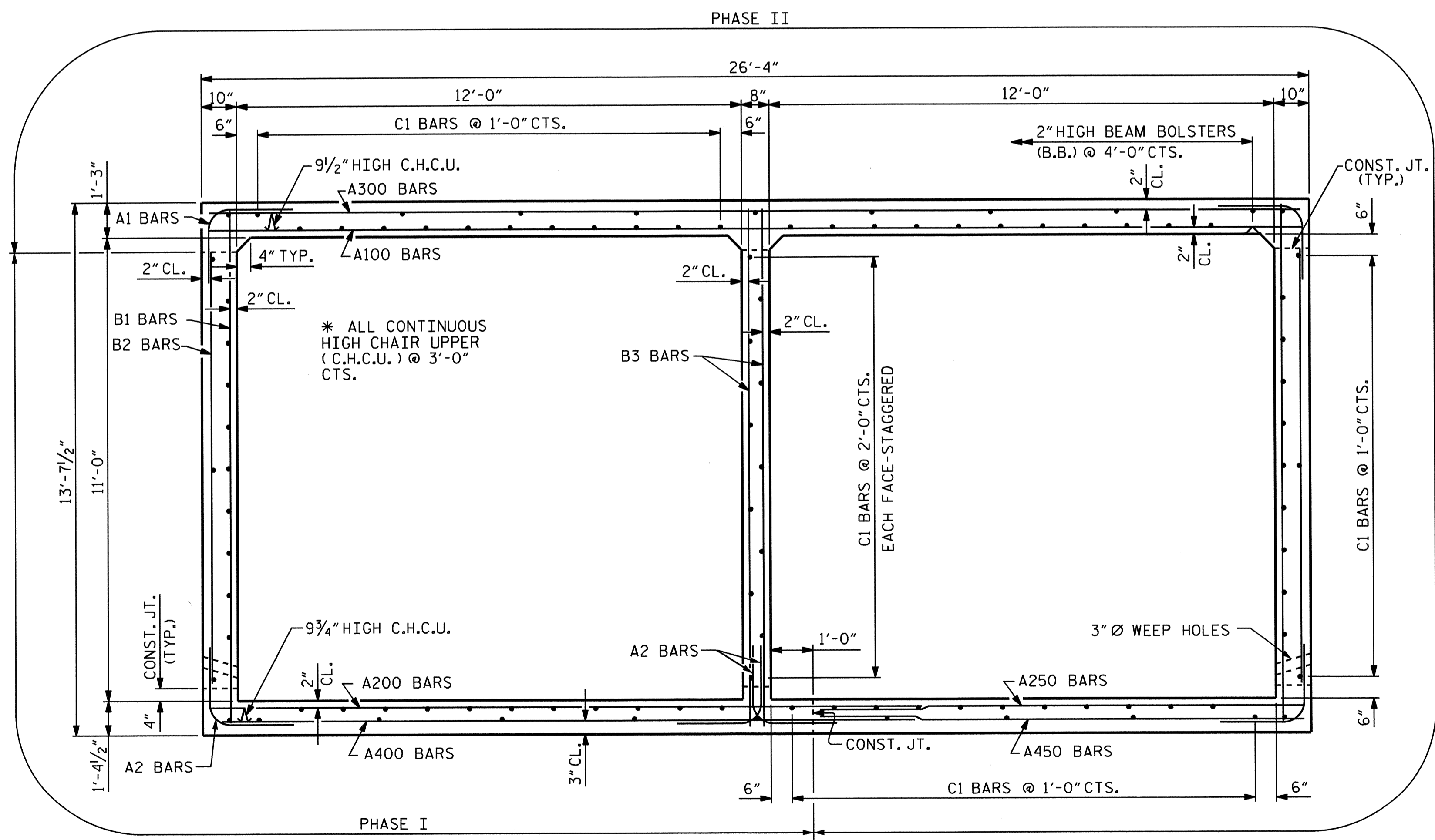
REVISED 11-13-91 BY E.L.R. CHECKED BY G.R.P. ADDED 8-22-89



EXTERIOR WALL INTERIOR WALL
 CULVERT SECTION NORMAL TO ROADWAY

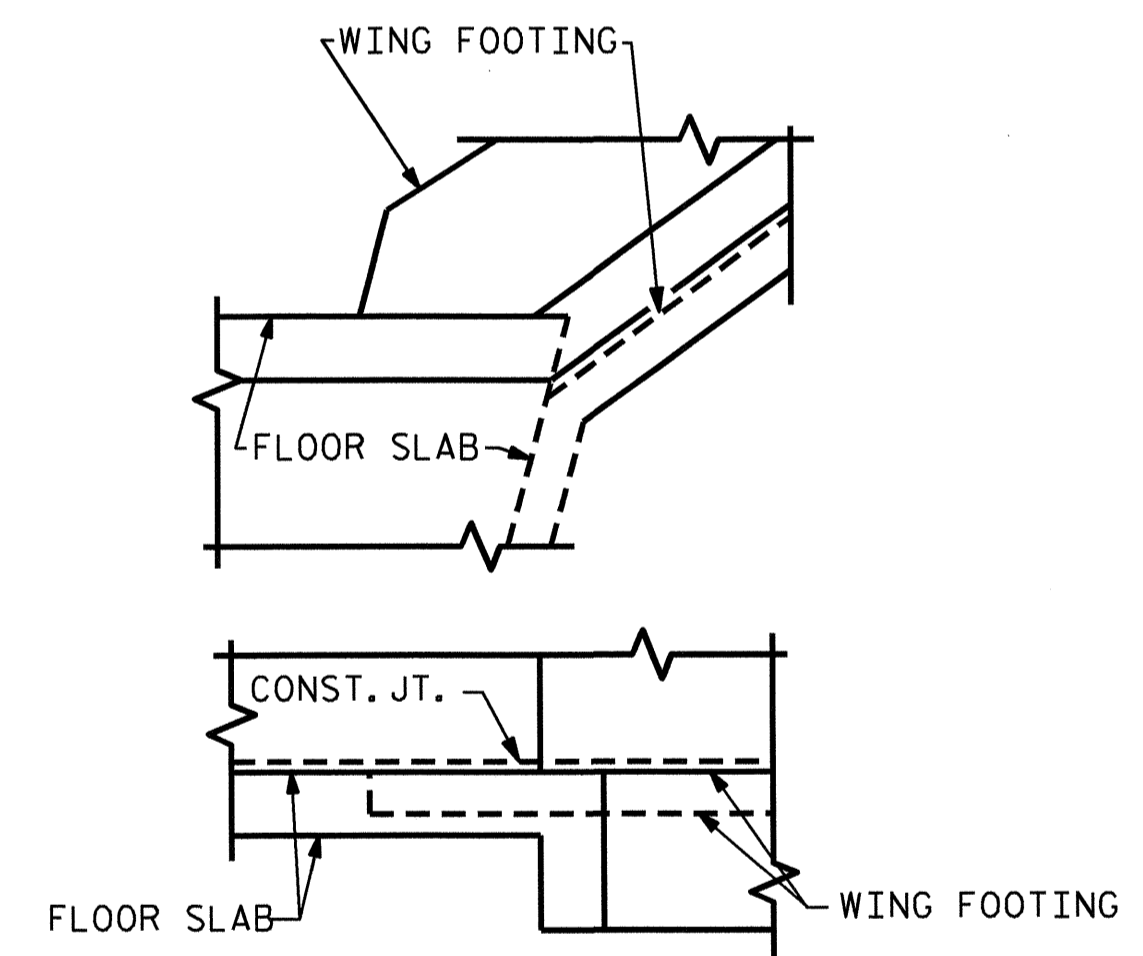


END ELEVATION NORMAL TO SKEW



RIGHT ANGLE SECTION OF BARREL

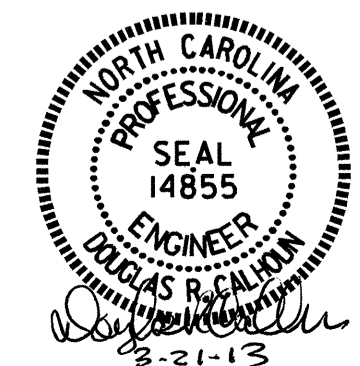
THERE ARE 101 "C1" BARS IN SECTION OF BARREL.
 (LOOKING UPSTREAM)



DETAIL
 CONNECTION OF WING FOOTING
 AND FLOOR SLAB WHEN SLAB
 IS THICKER THAN FOOTING

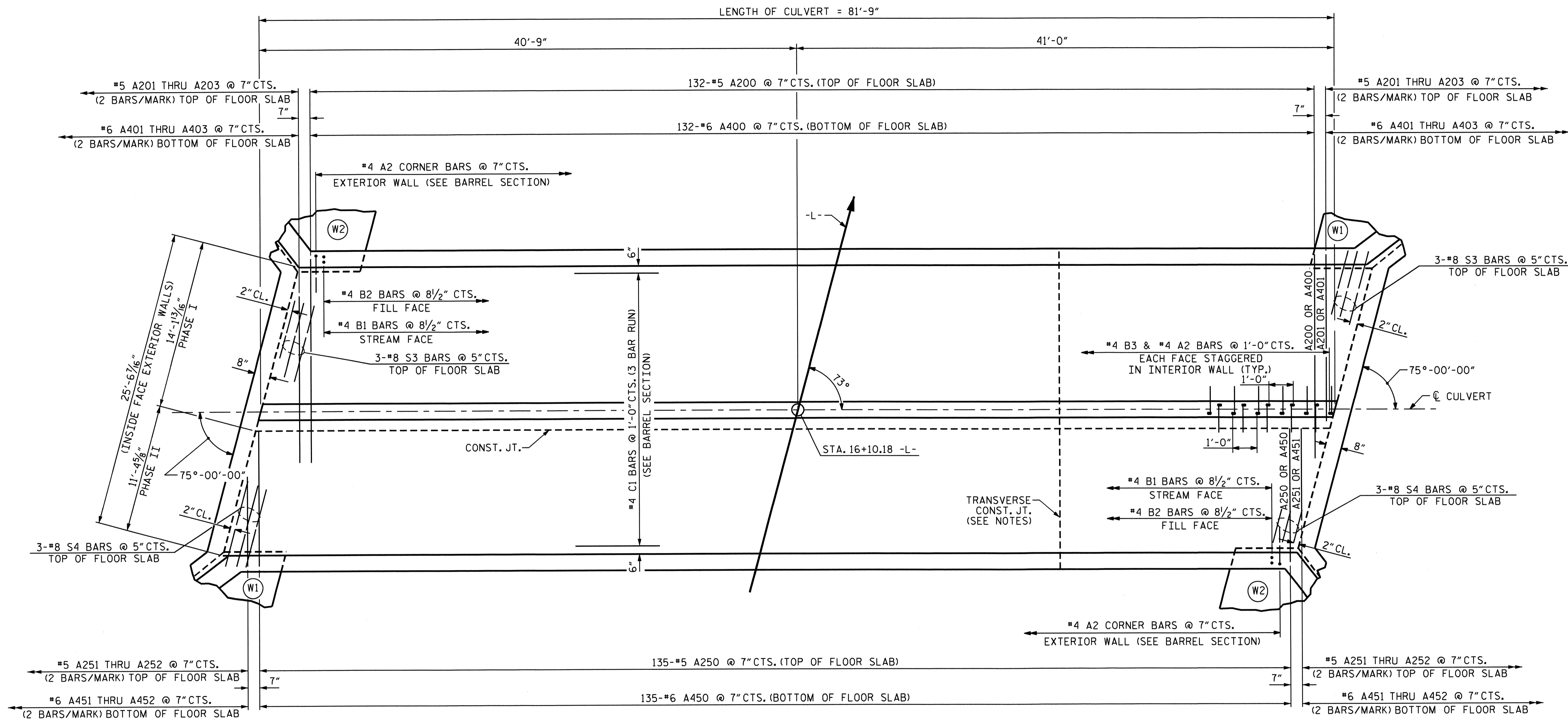
REVISED 11-05-99 BY M.M. CHECKED BY R.W.W.
 REVISION NOT 1990 BY T.S. CHECKED BY A.B.

ASSEMBLED BY : A. K. PATEL, PE	DATE : 12/12	SPECIAL
CHECKED BY : A. SORSENGINH	DATE : 01/13	
DESIGN ENGINEER OF RECORD : A. SORSENGINH	DATE : 06/12	STANDARD
DRAWN BY : W. BRYAN STALEY II	DATE : SEPT. 21, 1971	
CHECKED BY : JOEL A. JOHNSON	DATE : NOV. 12, 1971	



PROJECT NO. B-4963
ROCKINGHAM COUNTY
 STATION: 16+10.18 -L-
 SHEET 2 OF 7

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH BARREL STANDARD DOUBLE 12 FT. X 11 FT. CONCRETE BOX CULVERT 73° SKEW					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO. C-2					TOTAL SHEETS 7



PLAN - FLOOR SLAB

PROJECT NO. B-4963
ROCKINGHAM COUNTY
 STATION: 16+10.18 -L-

SHEET 3 OF 7

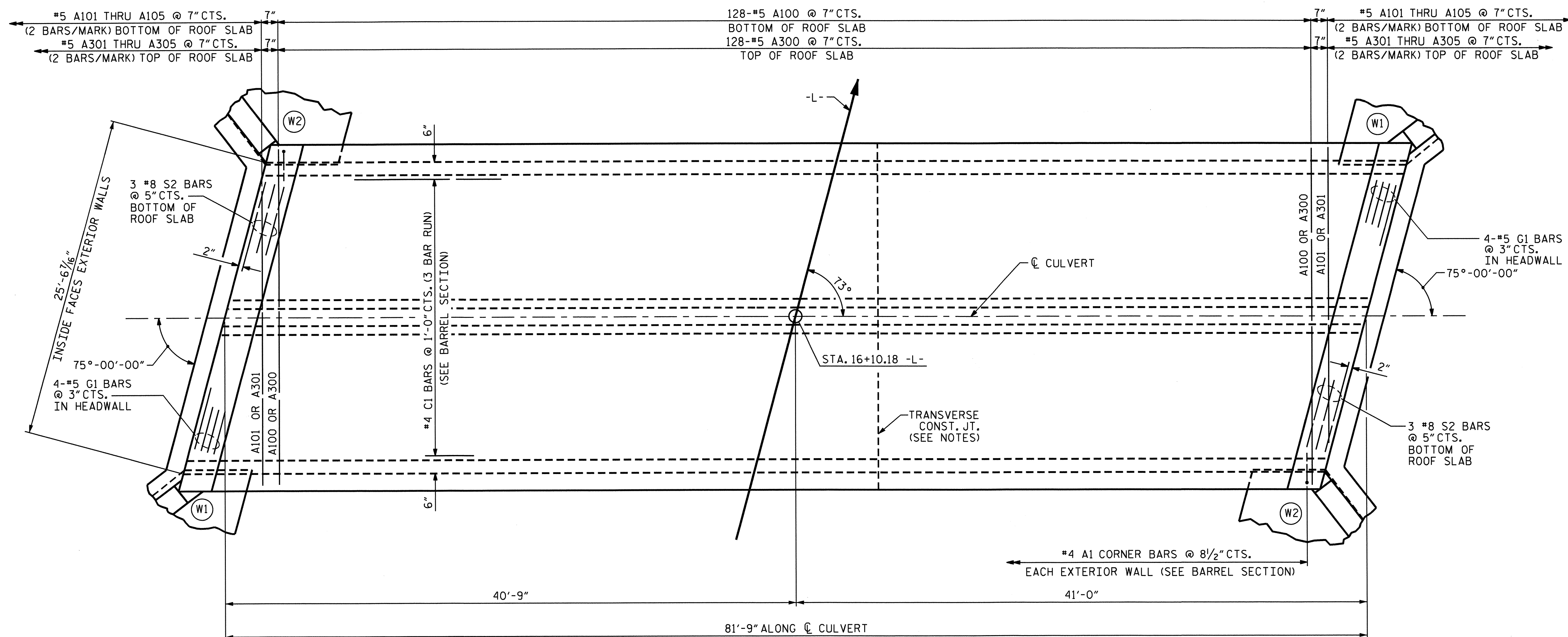
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
BARREL STANDARD
 DOUBLE 12 FT. X 11 FT.
 CONCRETE BOX CULVERT
 73° SKEW



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

ASSEMBLED BY : <u>A. K. PATEL, PE</u>	DATE : <u>12/12</u>	SPECIAL
CHECKED BY : <u>A. SORSENGINH</u>	DATE : <u>01/13</u>	
DESIGN ENGINEER OF RECORD : <u>A. SORSENGINH</u>	DATE : <u>06/12</u>	
DRAWN BY : <u>W. BRYAN STALEY II</u>	DATE : <u>SEPT. 21, 1971</u>	STANDARD
CHECKED BY : <u>JOEL A. JOHNSON</u>	DATE : <u>NOV. 12, 1971</u>	

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



PLAN - ROOF SLAB

PROJECT NO. B-4963
ROCKINGHAM COUNTY
 STATION: 16+10.18 -L-

SHEET 4 OF 7

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 BARREL STANDARD
 DOUBLE 12 FT. X 11 FT.
 CONCRETE BOX CULVERT
 73° SKEW

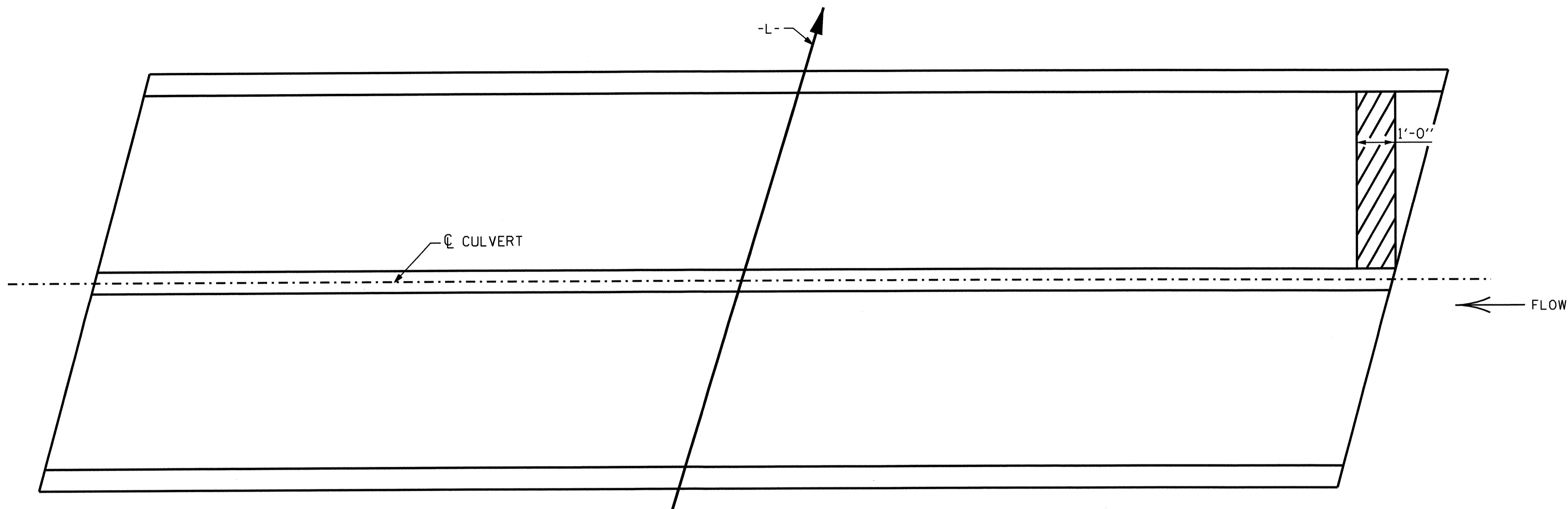


REVISED 11-9-99 BY M.M. CHECKED BY R.W.H.
 REDRAWN NOV. 1990 BY T.S.S. CHECKED BY ARB

ASSEMBLED BY : A. K. PATEL, PE	DATE : 12/12	SPECIAL
CHECKED BY : A. SORSENGINH	DATE : 01/13	
DESIGN ENGINEER OF RECORD : A. SORSENGINH	DATE : 06/12	STANDARD
DRAWN BY : W. BRYAN STALEY II	DATE : SEPT. 21, 1971	
CHECKED BY : JOEL A. JOHNSON	DATE : NOV. 12, 1971	

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

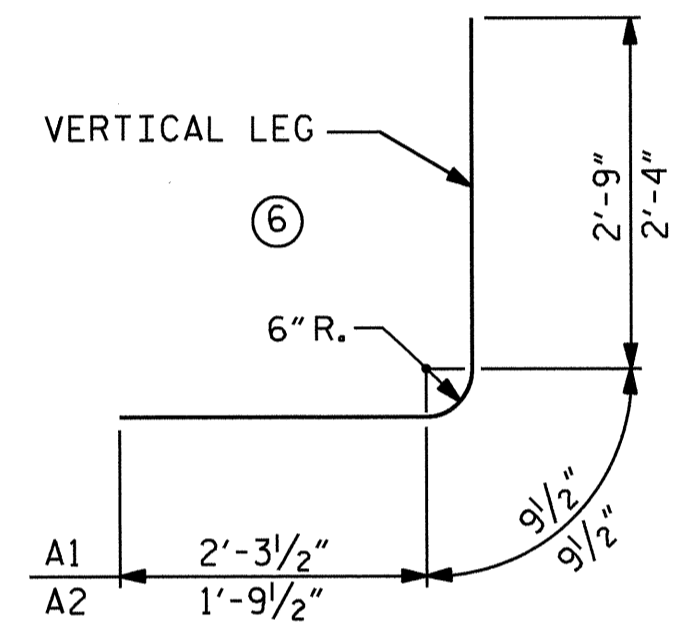
BAR SCHEDULE											
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	232	#4	6	5'-10"	904	A400	132	#6	STR	16'-9"	3321
A2	446	#4	6	4'-11"	1465	A401	4	#6	STR	13'-4"	80
						A402	4	#6	STR	8'-11"	54
A100	128	#5	STR	25'-11"	3460	A403	4	#6	STR	4'-7"	28
A101	4	#5	STR	21'-2"	88						
A102	4	#5	STR	16'-9"	70	A450	135	#6	STR	11'-6"	2332
A103	4	#5	STR	12'-5"	52	A451	4	#6	STR	7'-5"	45
A104	4	#5	STR	8'-1"	34	A452	4	#6	STR	3'-1"	19
A105	4	#5	STR	3'-9"	16						
						B1	232	#4	STR	13'-1"	2028
A200	132	#5	STR	16'-11"	2329	B2	232	#4	STR	10'-4"	1601
A201	4	#5	STR	13'-5"	56	B3	164	#4	STR	13'-1"	1433
A202	4	#5	STR	9'-0"	38						
A203	4	#5	STR	4'-8"	19	C1	303	#4	STR	28'-7"	5785
A250	135	#5	STR	11'-6"	1619	D1	4	#6	STR	2'-11"	18
A251	4	#5	STR	7'-5"	31						
A252	4	#5	STR	3'-1"	13	G1	8	#5	STR	26'-11"	225
A300	128	#5	STR	25'-11"	3460	S2	6	#8	STR	26'-11"	431
A301	4	#5	STR	21'-2"	88	S3	6	#8	STR	19'-11"	319
A302	4	#5	STR	16'-9"	70	S4	6	#8	STR	11'-11"	191
A303	4	#5	STR	12'-5"	52						
A304	4	#5	STR	8'-1"	34						
A305	4	#5	STR	3'-9"	16						
REINFORCING STEEL = 31,824 LBS											



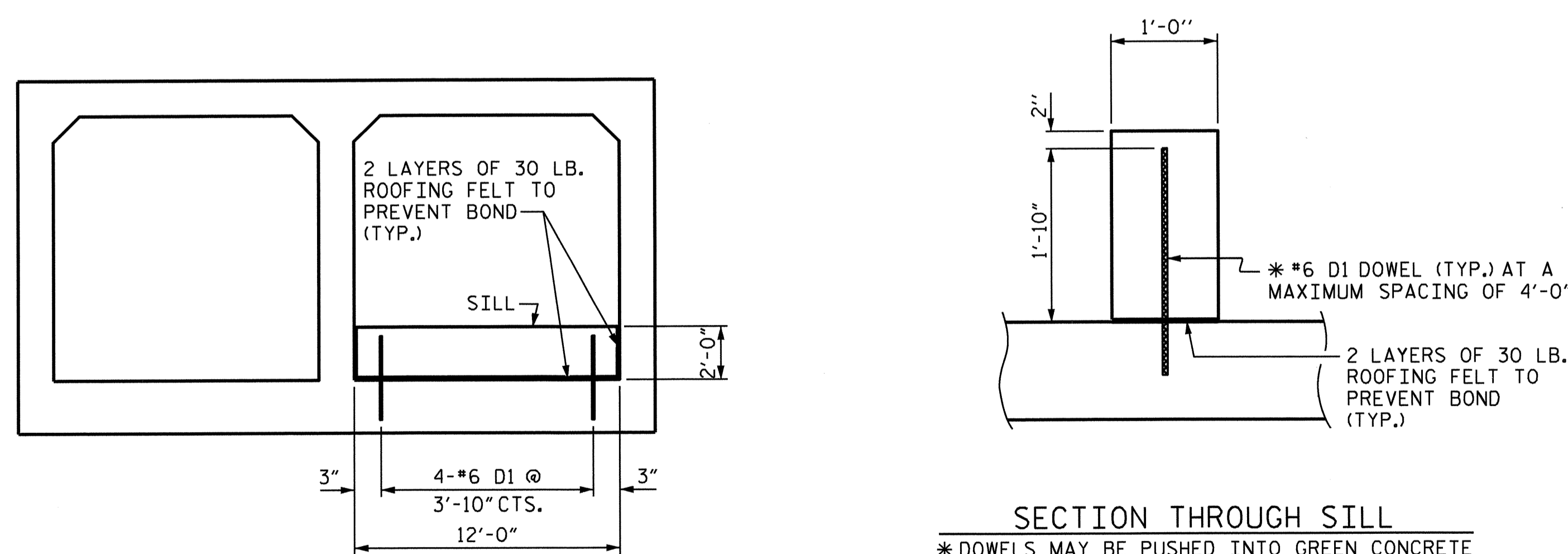
PLAN OF SILL LOCATION

BAR TYPE	
A1	2'-3 1/2"
A2	1'-9 1/2"

BAR	SIZE	SPLICE LENGTH
C1	#4	1'-11"
A200	#5	2'-5"
A400	#6	2'-3"
S3	#8	4'-11"



SPLICE LENGTH CHART



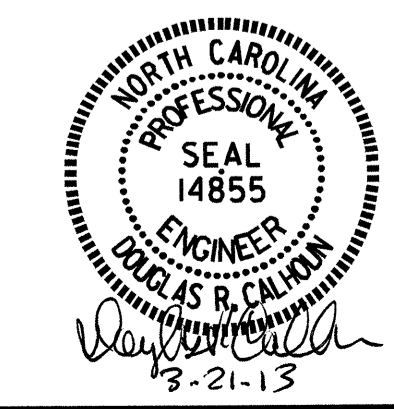
SECTION THROUGH SILL

ELEVATION
 INLET END, NORTHERN BARREL ONLY

CULVERT SILL DETAILS

PROJECT NO. B-4963
ROCKINGHAM COUNTY
 STATION: 16+10.18 -L-
 SHEET 5 OF 7

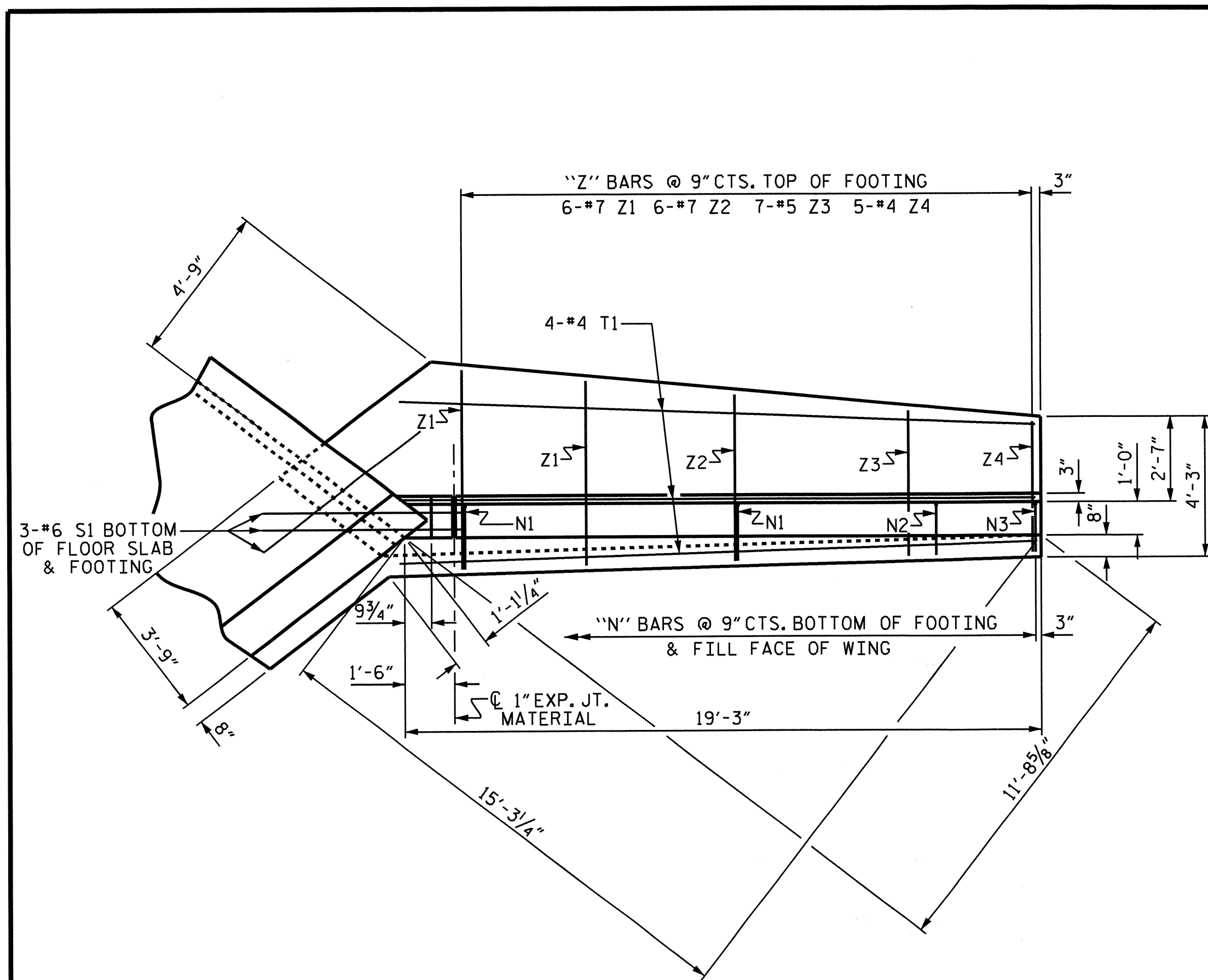
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
BARREL STANDARD
 DOUBLE 12 FT. X 11 FT.
 CONCRETE BOX CULVERT
 73° SKEW



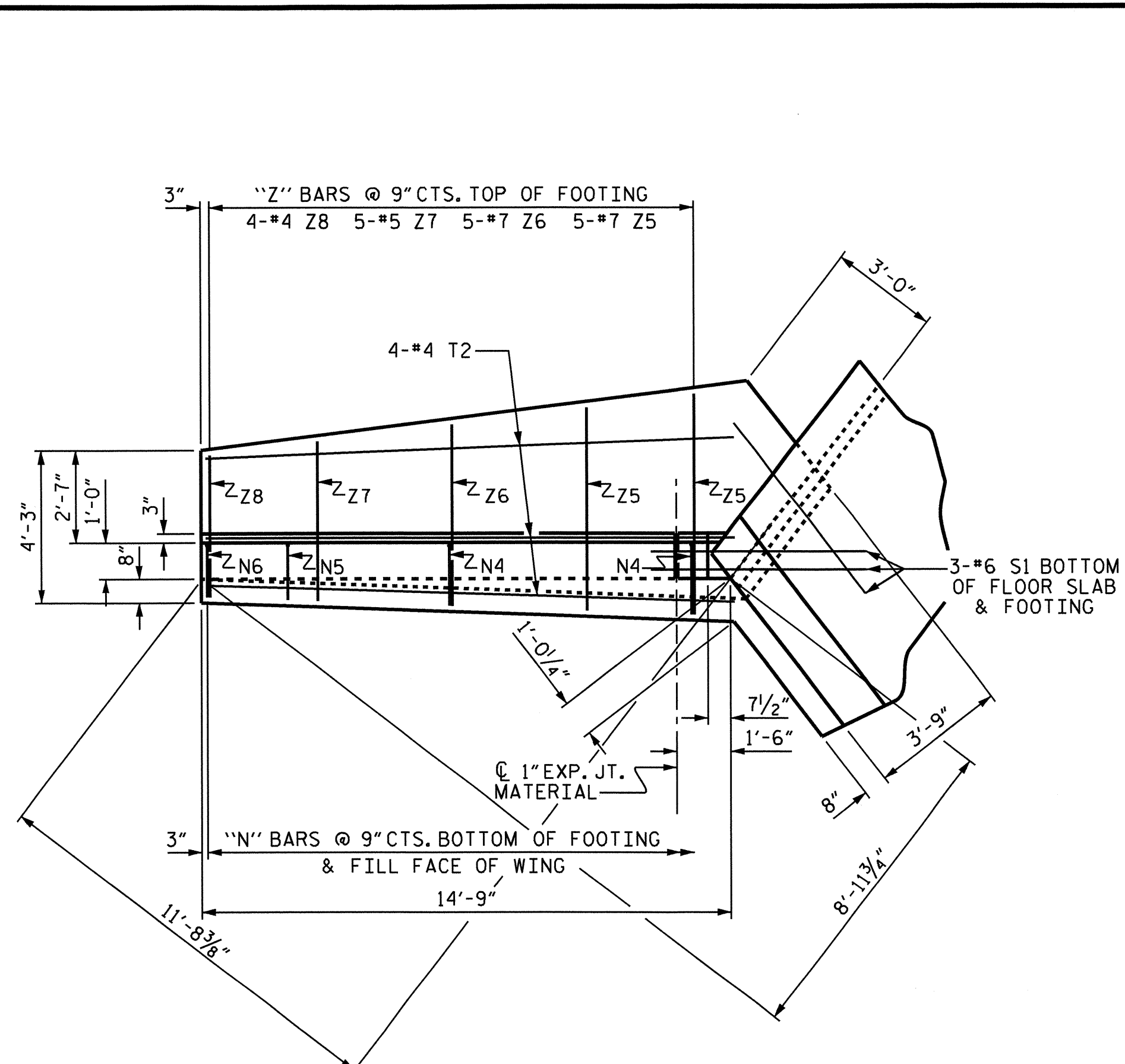
REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.
 REDRAWN NOV. 1990 BY T.S.S. CHECKED BY A.R.B.

ASSEMBLED BY : <u>A. K. PATEL, PE</u> DATE : <u>12/12</u>	SPECIAL
CHECKED BY : <u>A. SORSENGINH</u> DATE : <u>01/13</u>	
DESIGN ENGINEER OF RECORD : <u>A. SORSENGINH</u> DATE : <u>06/12</u>	
DRAWN BY : <u>W. BRYAN STALEY II</u> DATE : <u>SEPT. 21, 1971</u>	STANDARD
CHECKED BY : <u>JOEL A. JOHNSON</u> DATE : <u>NOV. 12, 1971</u>	

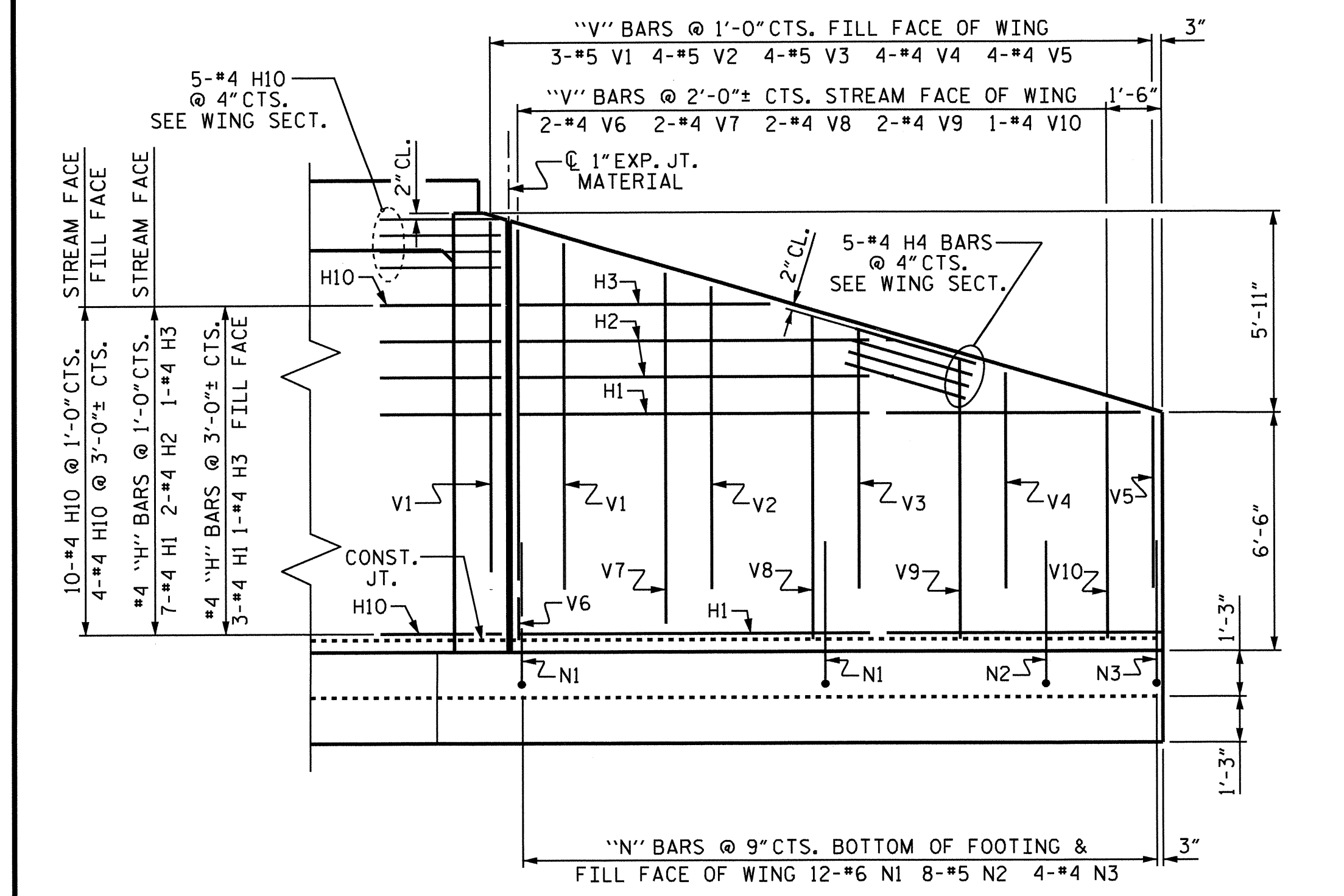
REVISIONS						TOTAL SHEETS
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			7
2			4			



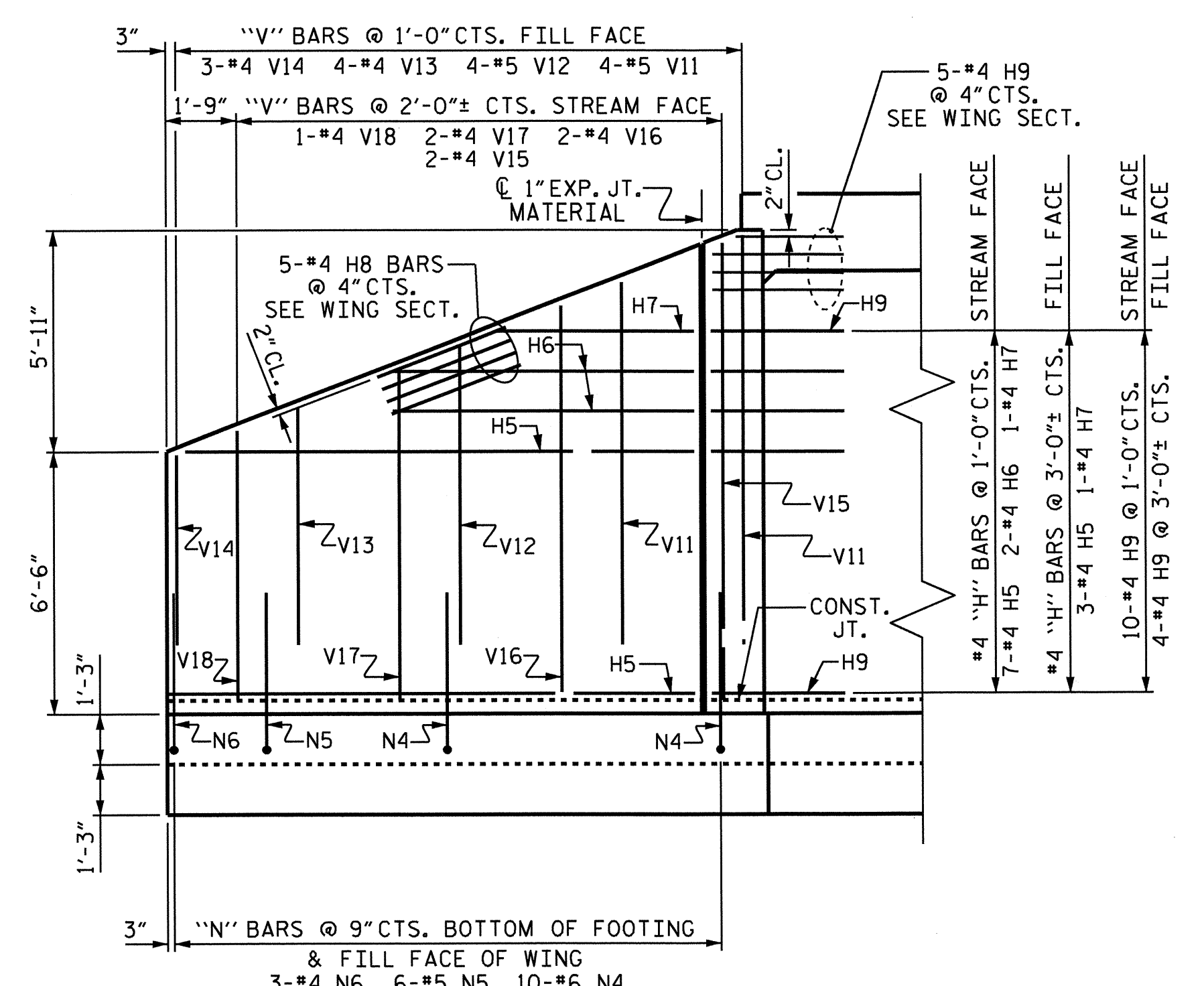
PLAN - W1



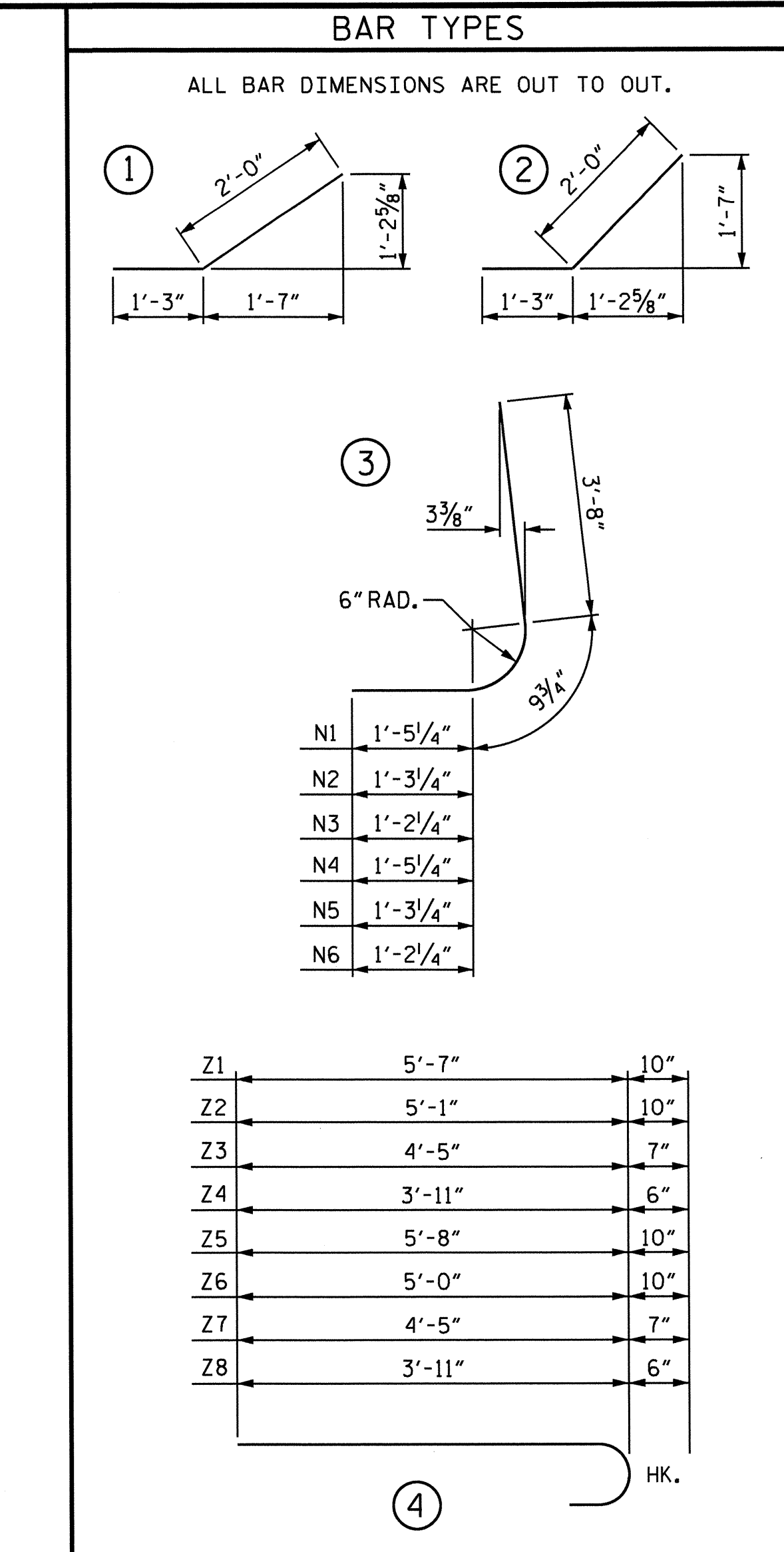
PLAN - W2



ELEVATION - W1

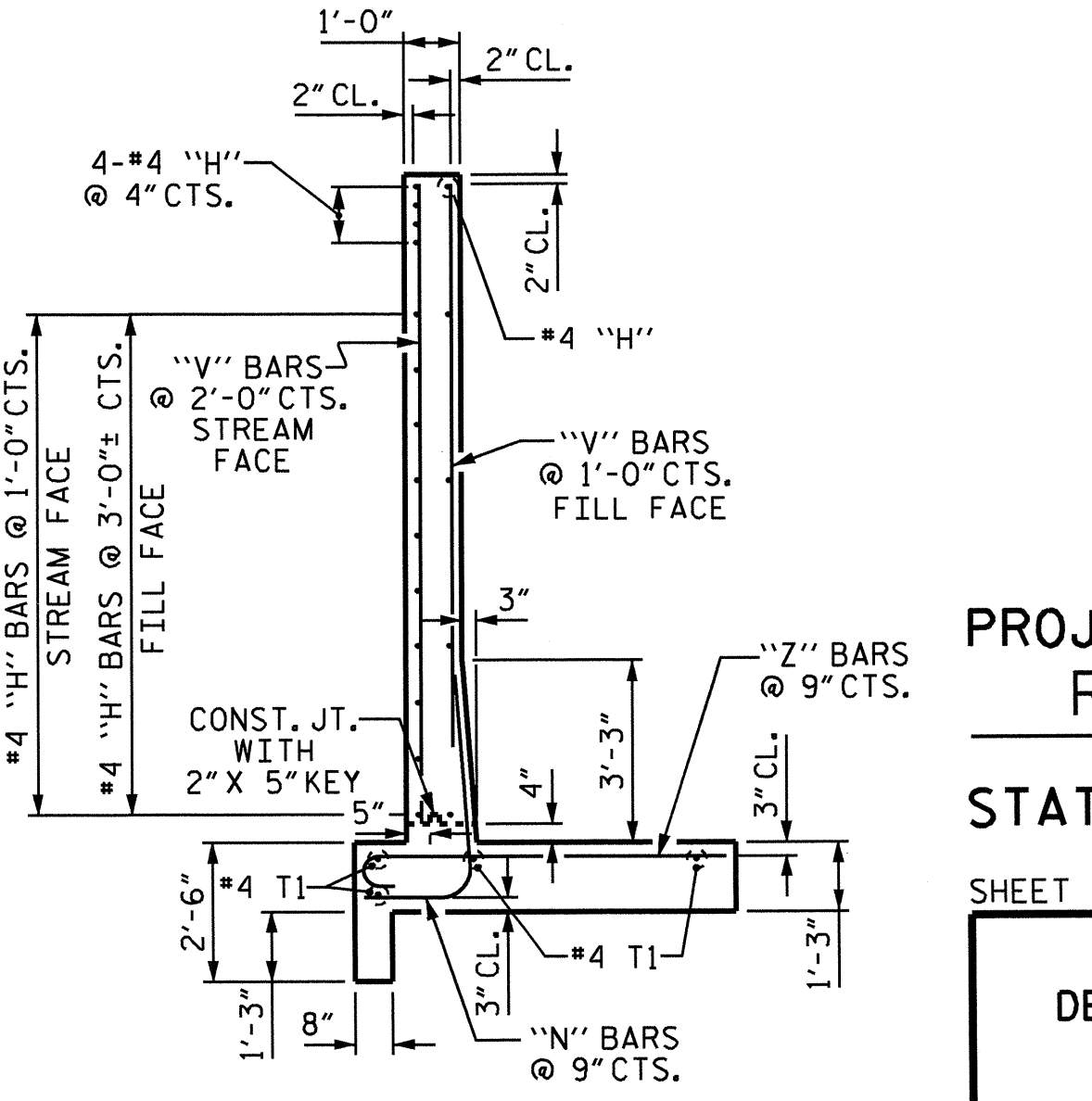


ELEVATION - W2



BILL OF MATERIAL					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	20	4	STR	17-4	232
H2	4	4	STR	10-1	27
H3	4	4	STR	6-10	18
H4	10	4	STR	17-5	116
H5	20	4	STR	12-10	171
H6	4	4	STR	7-4	20
H7	4	4	STR	4-10	13
H8	10	4	STR	13-2	88
H9	38	4	2	3-3	82
H10	38	4	1	3-3	82
N1	24	6	3	5-11	213
N2	16	5	3	5-9	96
N3	8	4	3	5-8	30
N4	20	6	3	5-11	178
N5	12	5	3	5-9	72
N6	6	4	3	5-8	23
S1	12	6	STR	6-0	108
T1	8	4	STR	19-3	103
T2	8	4	STR	14-9	79
V1	6	5	STR	10-3	64
V2	8	5	STR	9-0	75
V3	8	5	STR	7-9	65
V4	8	4	STR	6-3	33
V5	8	4	STR	5-3	28
V6	4	4	STR	10-3	27
V7	4	4	STR	9-3	25
V8	4	4	STR	8-0	21
V9	4	4	STR	7-0	19
V10	2	4	STR	6-3	8
V11	8	5	STR	9-9	81
V12	8	5	STR	8-3	69
V13	8	4	STR	6-3	33
V14	6	4	STR	5-3	21
V15	4	4	STR	10-3	27
V16	4	4	STR	8-9	23
V17	4	4	STR	7-3	19
V18	2	4	STR	6-6	9
Z1	12	7	4	6-5	157
Z2	12	7	4	5-11	145
Z3	14	5	4	5-0	73
Z4	10	4	4	4-5	30
Z5	10	7	4	6-6	133
Z6	10	7	4	5-10	119
Z7	10	5	4	5-0	52
Z8	8	4	4	4-5	24

REINFORCING STEEL FOR 4 WINGS	3,131 LBS
CLASS A CONCRETE 4 WINGS	44.3 CY
2 HEADWALLS	2.5 CY
2 END CURTAIN WALLS	2.9 CY
TOTAL	49.7 CY



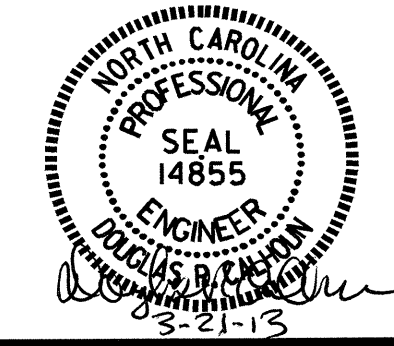
TYPICAL WING SECTION

ASSEMBLED BY : A.K.PATEL, PE DATE : 12/12
 CHECKED BY : A.SORSENGINH DATE : 01/13
 DESIGN ENGINEER OF RECORD : A.SORSENGINH DATE : 06/12
 DRAWN BY : A.K.PATEL DATE : 11/04
 CHECKED BY : M.K.BEARD DATE : 12/04

PROJECT NO. B-4963
 ROCKINGHAM COUNTY
 STATION: 16+10.18 -L-
 SHEET 6 OF 7

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD WINGS
 FOR
 CONCRETE BOX CULVERT
 H = 11'-0" SLOPE = 2:1
 75° SKEW

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C-6	
1			3			TOTAL SHEETS 7	
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		
						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	1.19	--	1.75	1.19	1	TOP CORNER WALL	0.92	1.94	1	TOP SLAB	11.47		
	HL-93 (OPERATING)	N/A		1.54	--	1.35	1.54	1	TOP CORNER WALL	0.92	2.52	1	TOP SLAB	11.47		
	HS-20 (INVENTORY)	36.000	②	1.24	44.53	1.75	1.24	1	BOT CORNER WALL	11.70	2.32	1	BOTTOM SLAB	11.43		
	HS-20 (OPERATING)	36.000		1.60	57.73	1.35	1.60	1	BOT CORNER WALL	11.70	3.01	1	BOTTOM SLAB	11.43		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		1.64	22.16	1.40	1.64	1	BOT CORNER WALL	11.70	3.07	1	EXTERIOR WALL	11.03	
		SNGARBS2	20.000		1.61	32.21	1.40	1.61	1	BOT CORNER WALL	11.70	3.07	1	EXTERIOR WALL	11.03	
		SNAGRIS2	22.000		1.60	35.09	1.40	1.60	1	BOT CORNER WALL	11.70	3.07	1	EXTERIOR WALL	11.03	
		SNCOTTS3	27.250		1.48	40.26	1.40	1.48	1	TOP CORNER WALL	0.92	2.37	1	TOP SLAB	11.47	
		SNAGGRS4	34.925		1.49	52.02	1.40	1.49	1	TOP CORNER WALL	0.92	2.38	1	TOP SLAB	11.47	
		SNS5A	35.550		1.47	52.10	1.40	1.47	1	TOP CORNER WALL	0.92	2.24	1	TOP SLAB	11.47	
		SNS6A	39.950		1.47	58.55	1.40	1.47	1	TOP CORNER WALL	0.92	2.21	1	TOP SLAB	11.47	
		SNS7B	42.000		1.47	61.75	1.40	1.47	1	BOT CORNER WALL	11.70	2.09	1	TOP SLAB	11.47	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.54	50.73	1.40	1.54	1	BOT CORNER WALL	11.70	2.91	1	TOP SLAB	11.47	
		TNT4A	33.075		1.54	50.84	1.40	1.54	1	BOT CORNER WALL	11.70	2.81	1	TOP SLAB	11.47	
		TNT6A	41.600		1.51	62.80	1.40	1.51	1	BOT CORNER WALL	11.70	2.35	1	TOP SLAB	11.47	
		TNT7A	42.000		1.51	63.41	1.40	1.51	1	BOT CORNER WALL	11.70	2.45	1	TOP SLAB	11.47	
		TNT7B	42.000		1.51	63.41	1.40	1.51	1	BOT CORNER WALL	11.70	2.37	1	TOP SLAB	11.47	
		TNAGRIT4	43.000		1.50	64.34	1.40	1.50	1	BOT CORNER WALL	11.70	2.44	1	BOTTOM SLAB	11.43	
		TNAGT5A	45.000		1.48	66.75	1.40	1.48	1	BOT CORNER WALL	11.70	2.40	1	BOTTOM SLAB	11.43	
TNAGT5B	45.000		③	1.42	64.12	1.40	1.42	1	TOP SLAB	12.11	2.25	1	BOTTOM SLAB	11.43		

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	--

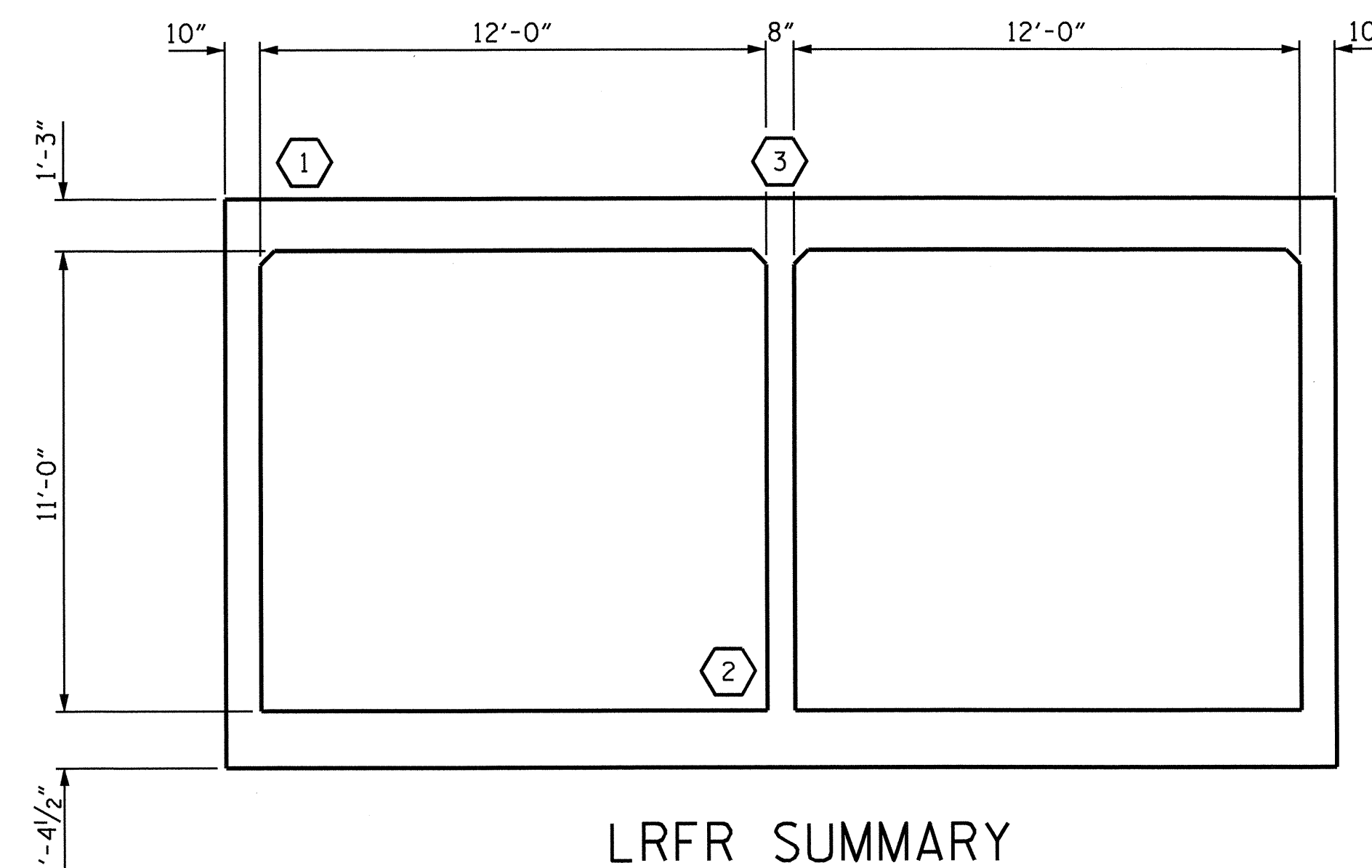
NOTE:

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-4963
ROCKINGHAM COUNTY
 STATION: 16+10.18 -L-

SHEET 7 OF 7

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



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

ASSEMBLED BY : A. K. PATEL, PE	DATE : 12/12
CHECKED BY : A. SORSENGINH	DATE : 1/13
DESIGN ENGINEER OF RECORD : A. SORSENGINH	DATE : 06/12
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11

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