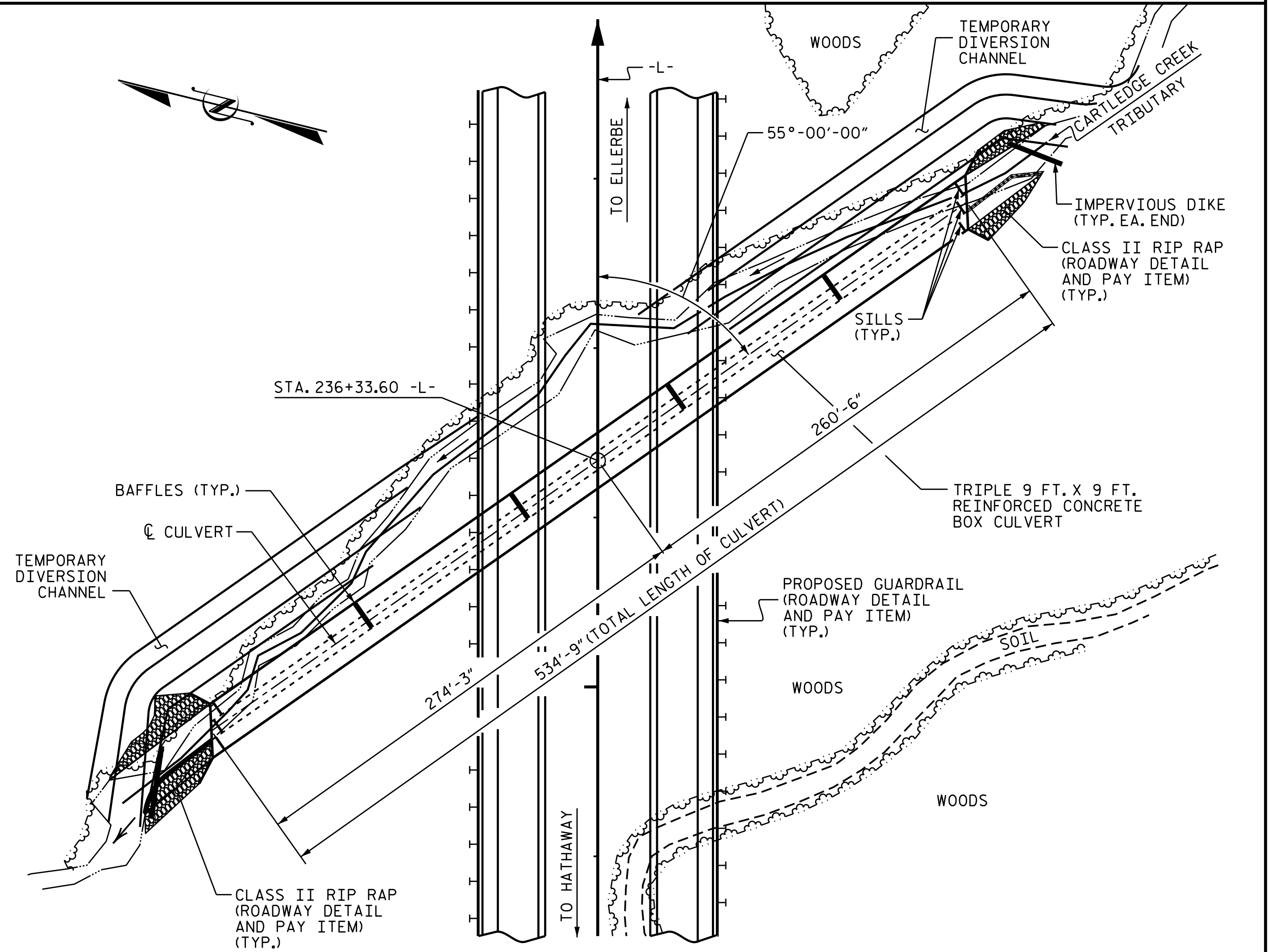


BENCH MARK #17 RR SPIKE ON BASE OF 10" PINE 254.48 FT. RIGHT OF STA. 232+47.47 -L- EL. 251.45'



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

**LOCATION SKETCH**

GRADE DATA	
GRADE PT. EL. @ STA. 236+33.60 -L-	= 273.38
BED EL. @ STA. 236+33.60 -L-	= 189.50
ROADWAY SLOPES	= 2:1

HYDRAULIC DATA	
DESIGN DISCHARGE	= 1,200 CFS
FREQUENCY OF DESIGN FLOOD	= 50 YEARS
DESIGN HIGH WATER ELEVATION	= 199.20
DRAINAGE AREA	= 2.67 SQ. MI.
BASE DISCHARGE (Q100)	= 1,400 CFS
BASE HIGH WATER ELEVATION	= 200.29

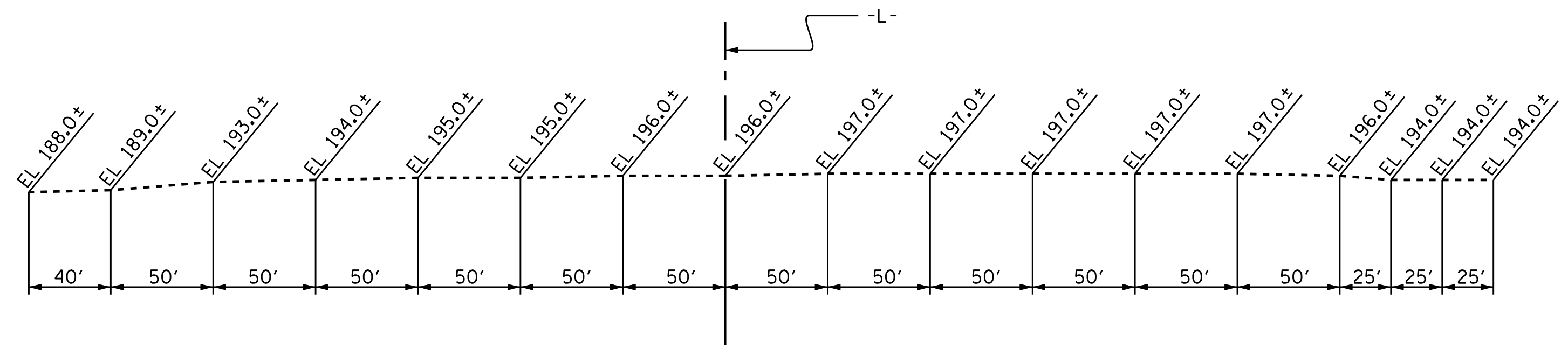
OVERTOPPING DATA	
OVERTOPPING DISCHARGE	= 1,900 CFS
FREQUENCY OF OVERTOPPING FLOOD	= 500+ YEARS
OVERTOPPING FLOOD ELEVATION	= 239.00

TOTAL STRUCTURE QUANTITIES	
CLASS A CONCRETE	
BARREL @ 8.247 CY/FT	4410 C.Y.
BAFFLES	2.7 C.Y.
SILLS	2.7 C.Y.
WINGS ETC.	37.4 C.Y.
<b>TOTAL</b>	<b>4,452.8 C.Y.</b>
REINFORCING STEEL	
BARREL	2,93,297 LBS.
WINGS ETC.	2,148 LBS.
<b>TOTAL</b>	<b>295,445 LBS.</b>
FOUNDATION COND. MAT'L	1,208 TONS
CULVERT EXCAVATION	LUMP SUM

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

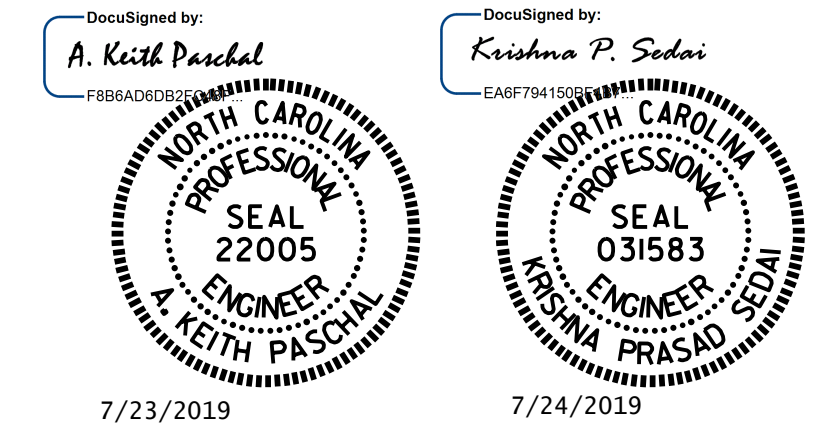
**NOTES:**

ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING.  
 DESIGN FILL-----75.58 FT.  
 FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.  
 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.  
 CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:  
 1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.  
 2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.  
 THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.  
 DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.  
 TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.  
 STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.  
 AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL AND BOTH FACES OF INTERIOR WALLS ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.  
 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 CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.  
 NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.  
 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  
 THE REINFORCED CONCRETE BOX CULVERT SHALL BE PLACED ON THE STANDARD 1.0 FOOT BLANKET OF FOUNDATION CONDITIONING MATERIAL, SEE SECTION 414 OF THE STANDARD SPECIFICATIONS.  
 UNDERCUT SOFT/VERY LOOSE SOILS THAT MAY BE ENCOUNTERED BENEATH THE BOTTOM OF THE FOUNDATION CONDITIONING MATERIAL. BACKFILL UNDERCUT AREAS WITH FOUNDATION CONDITIONING MATERIAL. IF MORE THAN 1.0 FOOT UNDERCUT IS REQUIRED, CONTACT THE OPERATIONS ENGINEER FOR APPROVAL.  
 BACKFILL WITH SELECT MATERIAL, CLASS VI MEETING THE REQUIREMENTS OF SECTION 1016 OF THE STANDARD SPECIFICATION.  
 CONSTRUCT THE REINFORCED CONCRETE BOX CULVERT AT STATION 236+33.60 -L- WITH 4 INCHES OF CAMBER TO ACCOUNT FOR ANTICIPATED SETTLEMENT.



**PROFILE ALONG CULVERT**

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 236+33.60 -L-  
 SHEET 1 OF 5 CULVERT NO. 760258



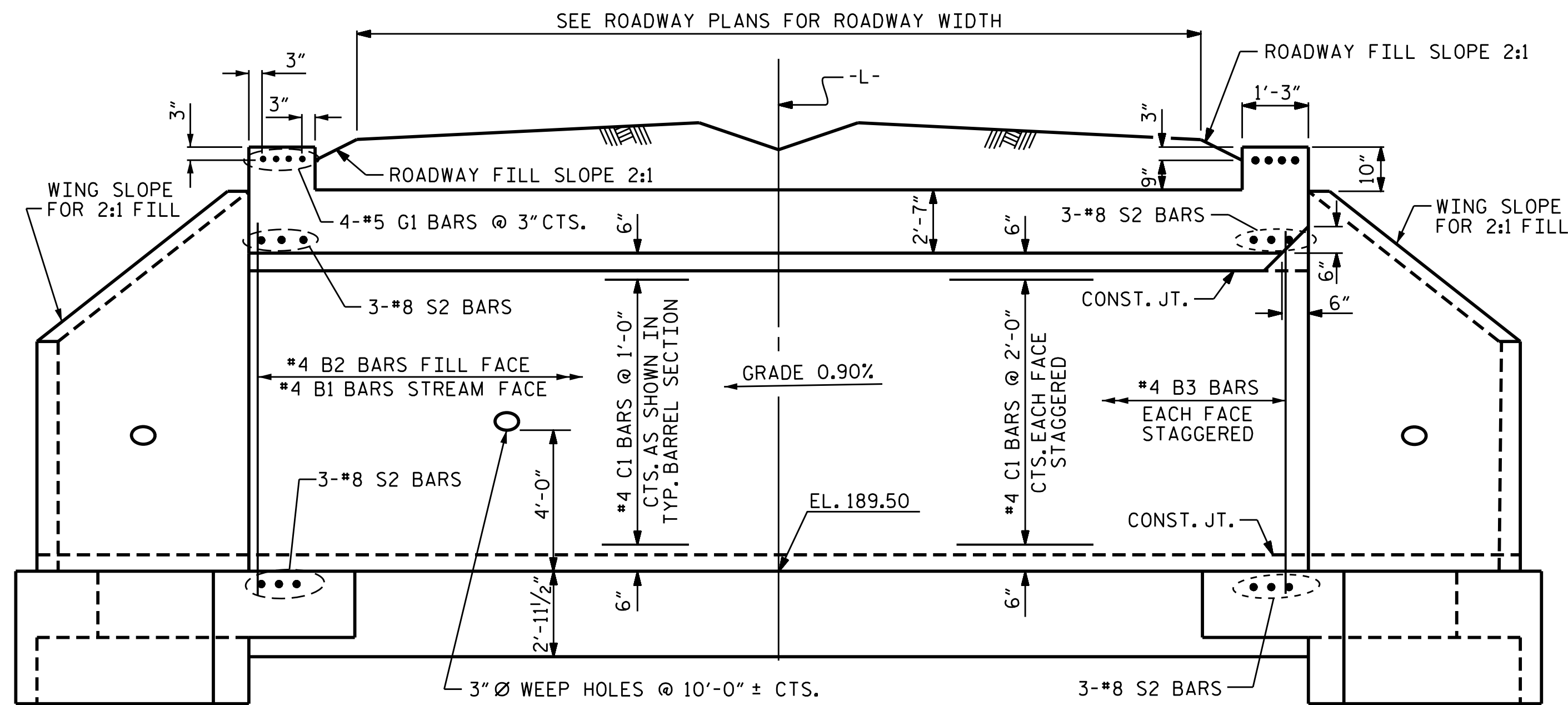
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**TRIPLE 9 FT. X 9 FT.  
 CONCRETE BOX CULVERT  
 55°-00'-00" SKEW**

DRAWN BY : H. B. DESAI DATE : 8/6/15  
 CHECKED BY : A. SORSENGINH DATE : 02/19  
 DESIGN ENGINEER OF RECORD: K. P. SEDA DATE : 02/19

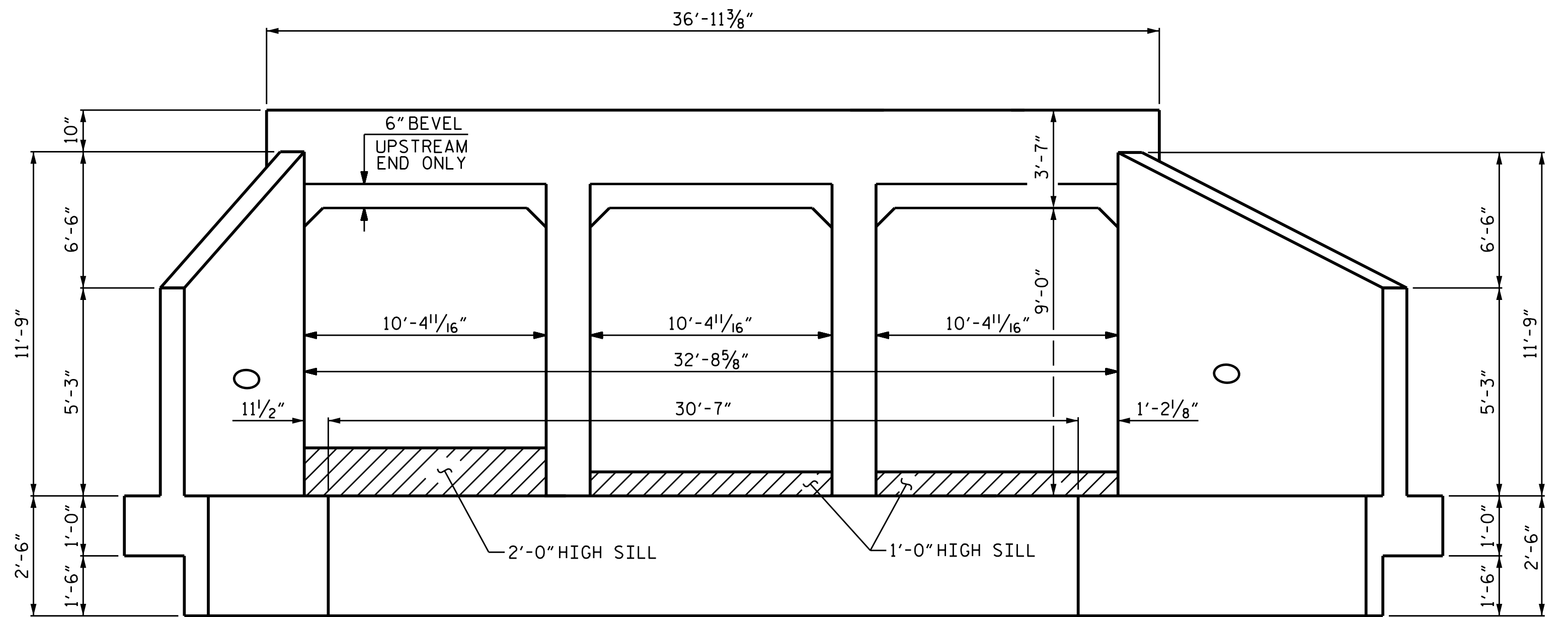
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C6-1
1			3			TOTAL SHEETS
2			4			5

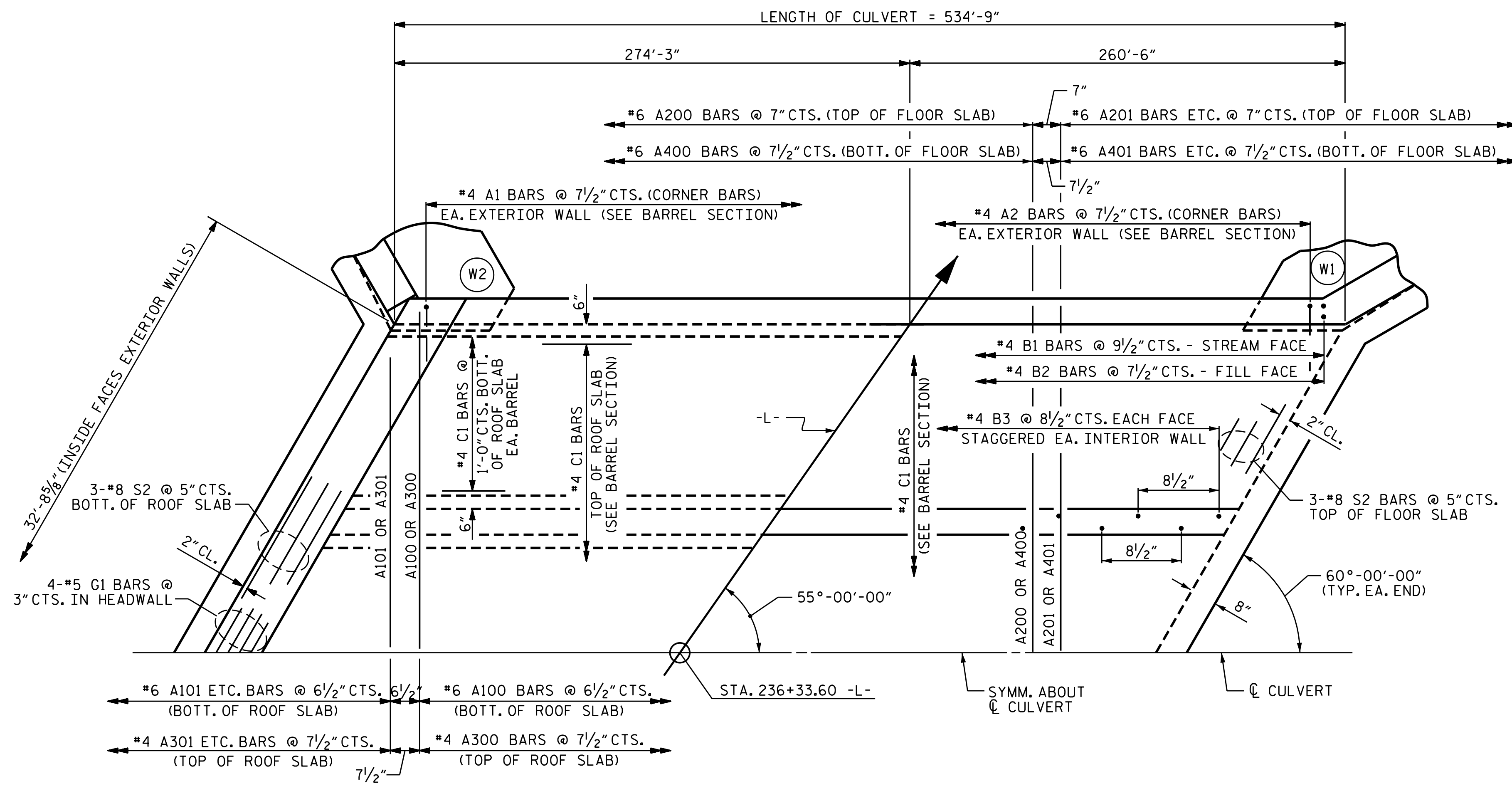




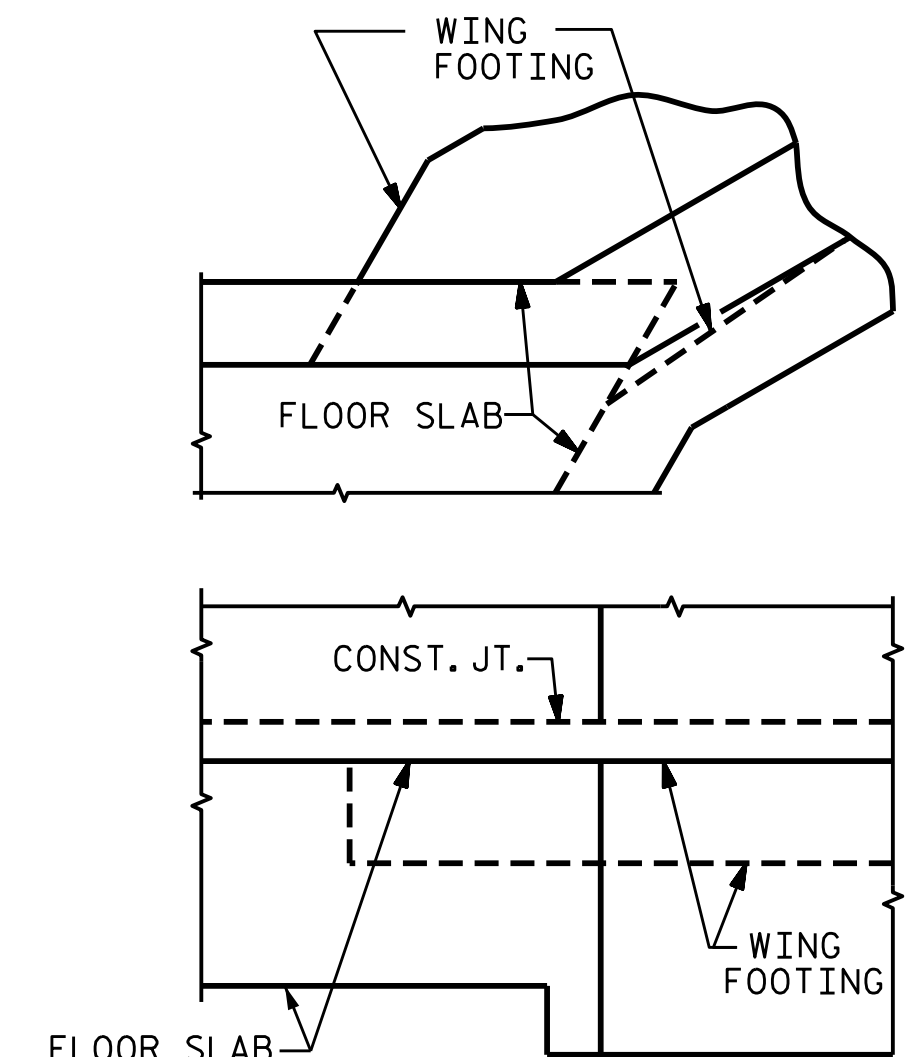
EXTERIOR WALL INTERIOR WALL  
CULVERT SECTION NORMAL TO ROADWAY



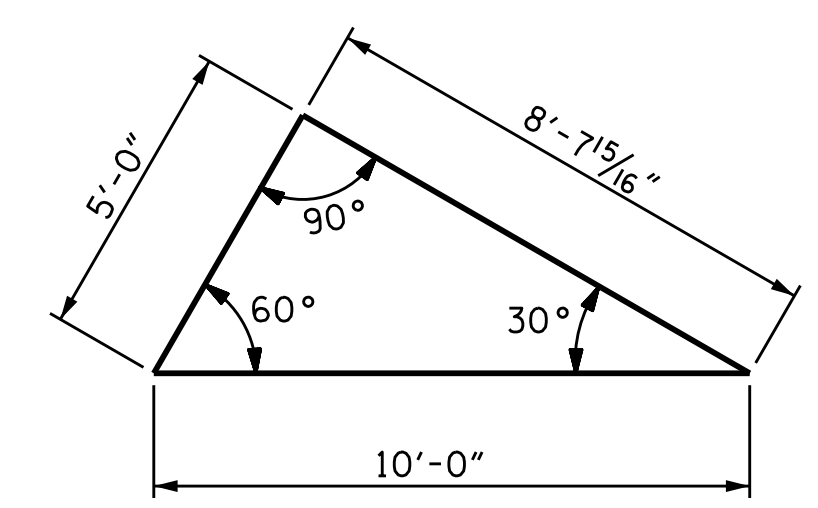
INLET END ELEVATION NORMAL TO SKEW  
 LOOKING DOWNSTREAM



PART PLAN - ROOF SLAB PART PLAN - FLOOR SLAB



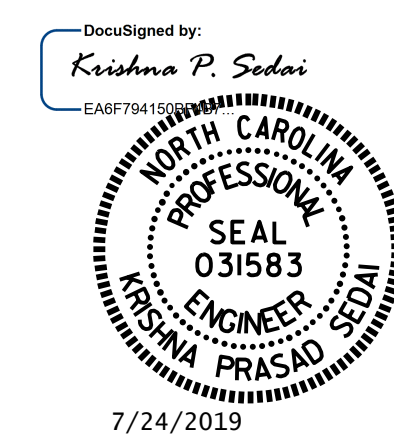
DETAIL  
CONNECTION OF WING FOOTING AND FLOOR SLAB WHEN SLAB IS THICKER THAN FOOTING



SKEW TRIANGLE

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 236+33.60 -L-

SHEET 2 OF 5



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 BARREL STANDARD  
 TRIPLE 9 FT. X 9 FT.  
 CONCRETE BOX CULVERT  
 55°-00'-00" SKEW

ASSEMBLED BY: H. B. DESAI DATE: 8/11/15  
 CHECKED BY: A. SORSENGINH DATE: 02/19  
 DRAWN BY: H. A. JUDEH DATE: JULY 15, 1971  
 CHECKED BY: RALPH D. UNDERWOOD DATE: AUG. 4, 1971

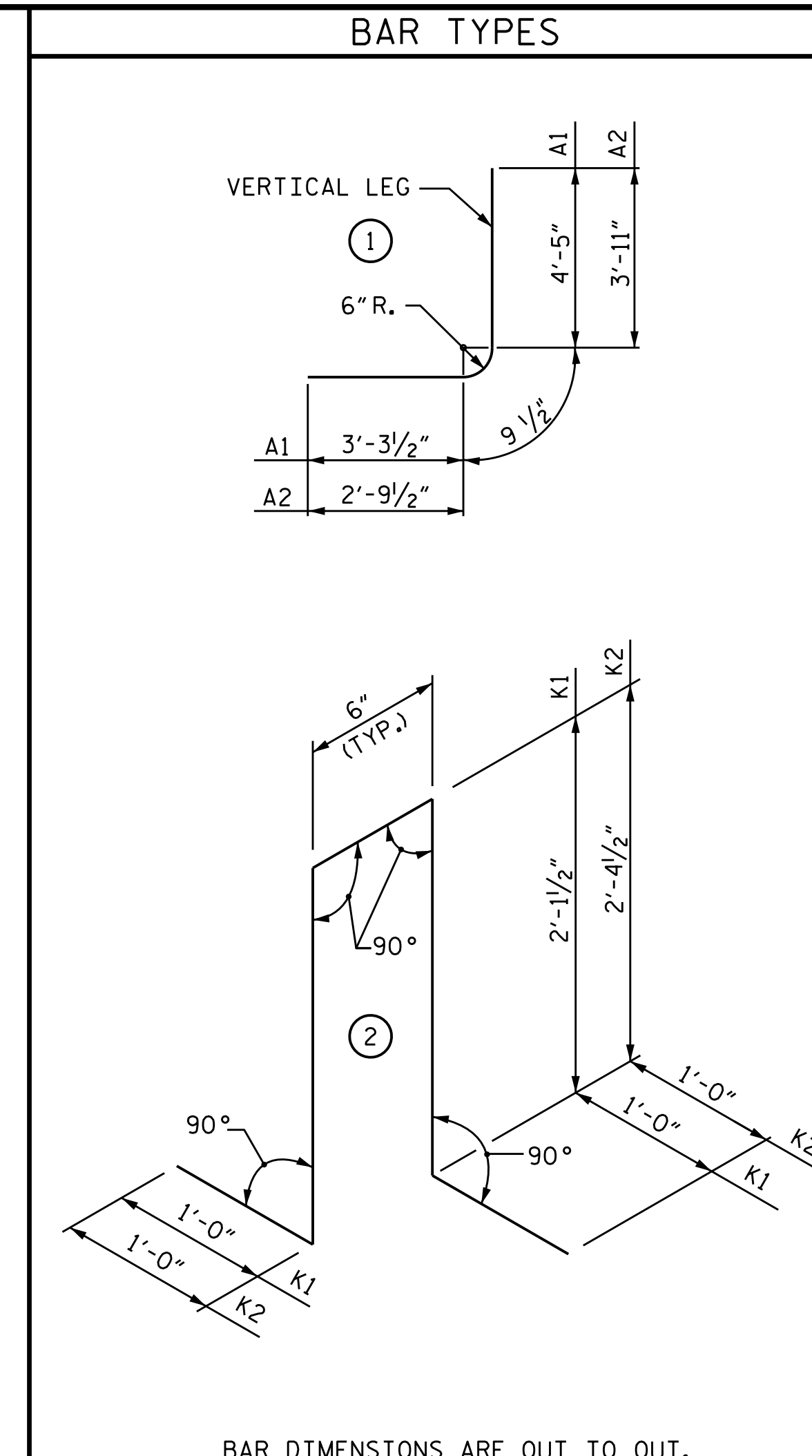
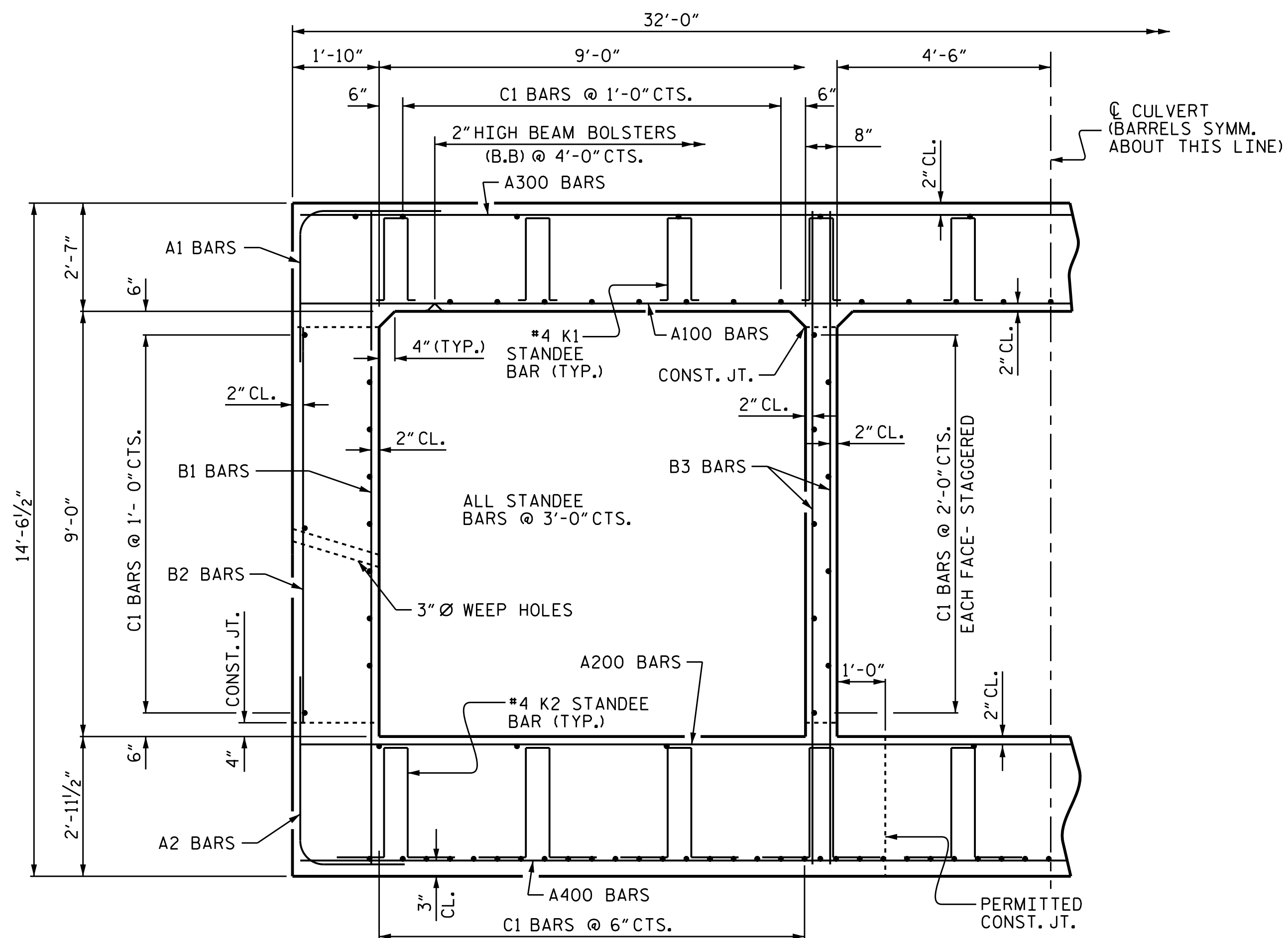
**SPECIAL**  
**STANDARD**

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO. C6-2
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 5
2			4			

REVISED 11-19-99 BY M.A.M. CHECKED BY R.W.W.  
 REVISED 8-28-92 BY E.L.R. CHECKED BY G.R.P.  
 REDRAWN NOV.1990 BY B.E.W., CHECKED BY M.A.J.





BAR TYPES						BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	1712	#4	1	8'-6"	9721	A306	4	#4	STR	18'-6"	49
A2	1712	#4	1	7'-6"	8577	A307	4	#4	STR	16'-4"	44
A100	954	#6	STR	31'-7"	45256	A308	4	#4	STR	14'-2"	38
A101	4	#6	STR	29'-7"	178	A309	4	#4	STR	12'-0"	32
A102	4	#6	STR	27'-8"	166	A310	4	#4	STR	9'-10"	26
A103	4	#6	STR	25'-10"	155	A311	4	#4	STR	7'-8"	20
A104	4	#6	STR	23'-11"	144	A312	4	#4	STR	5'-6"	15
A105	4	#6	STR	22'-1"	133	A313	4	#4	STR	3'-4"	9
A106	4	#6	STR	20'-2"	121	A400	826	#6	STR	31'-7"	39184
A107	4	#6	STR	18'-4"	110	A401	4	#6	STR	29'-4"	176
A108	4	#6	STR	16'-5"	99	A402	4	#6	STR	27'-2"	163
A109	4	#6	STR	14'-7"	88	A403	4	#6	STR	25'-0"	150
A110	4	#6	STR	12'-8"	76	A404	4	#6	STR	22'-10"	137
A111	4	#6	STR	10'-10"	65	A405	4	#6	STR	20'-8"	124
A112	4	#6	STR	8'-11"	54	A406	4	#6	STR	18'-6"	111
A113	4	#6	STR	7'-1"	43	A407	4	#6	STR	16'-4"	98
A114	4	#6	STR	5'-2"	31	A408	4	#6	STR	14'-2"	85
A115	4	#6	STR	3'-4"	20	A409	4	#6	STR	12'-0"	72
A200	885	#6	STR	31'-7"	41983	A410	4	#6	STR	9'-10"	59
A201	4	#6	STR	29'-5"	177	A411	4	#6	STR	7'-8"	46
A202	4	#6	STR	27'-5"	165	A412	4	#6	STR	5'-6"	33
A203	4	#6	STR	25'-5"	153	A413	4	#6	STR	3'-4"	20
A204	4	#6	STR	23'-5"	141	B1	1352	#4	STR	14'-0"	12644
A205	4	#6	STR	21'-4"	128	B2	1712	#4	STR	8'-4"	9530
A206	4	#6	STR	19'-4"	116	B3	3020	#4	STR	14'-0"	28243
A207	4	#6	STR	17'-4"	104	C1	2840	#4	STR	28'-9"	54542
A208	4	#6	STR	15'-4"	92	A209	4	#6	STR	13'-3"	80
A209	4	#6	STR	13'-3"	80	A210	4	#6	STR	11'-3"	68
A210	4	#6	STR	11'-3"	68	D1	6	#6	STR	2'-10"	26
A211	4	#6	STR	9'-3"	56	D2	36	#6	STR	1'-10"	99
A212	4	#6	STR	7'-3"	44	A213	4	#6	STR	5'-2"	31
A213	4	#6	STR	5'-2"	31	G1	8	#5	STR	36'-6"	305
A214	4	#6	STR	3'-2"	19	A214	4	#6	STR	3'-2"	19
A300	1652	#4	STR	16'-9"	18484	K1	1769	#4	2	6'-9"	7976
A301	4	#4	STR	29'-4"	78	K2	1769	#4	2	7'-3"	8567
A302	4	#4	STR	27'-2"	73	S2	12	#8	STR	36'-6"	1169
A303	4	#4	STR	25'-0"	67						
A304	4	#4	STR	22'-10"	61						
A305	4	#4	STR	20'-8"	55						
						REINFORCING STEEL		LBS.		291,004	

**NOTES**

NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OR FLOOD PLAIN AT THE PROJECT SITE DURING CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE LOW FLOW CULVERT BARREL.

RIP RAP MAY BE USED TO SUPPLEMENT THE NATIVE BED MATERIAL IN THE HIGH FLOW CULVERT BARREL(S). IF RIP-RAP IS USED TO LINE THE HIGH FLOW CULVERT BARREL(S), NATIVE MATERIAL SHOULD BE PLACED ON TOP TO FILL VOIDS AND PROVIDE A FLAT SURFACE FOR ANIMAL PASSAGE. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

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

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

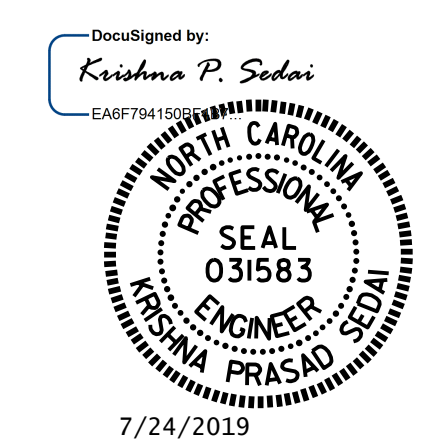
DO NOT SET ELEVATION OF HIGH SILL/BAFFLES ABOVE BANK FULL.

BAR	SIZE	SPLICE LENGTH
A200	#6	3'-3"
A300	#4	1'-11"
A400	#6	2'-4"
B1,B3	#4	1'-5"
C1	#4	1'-11"

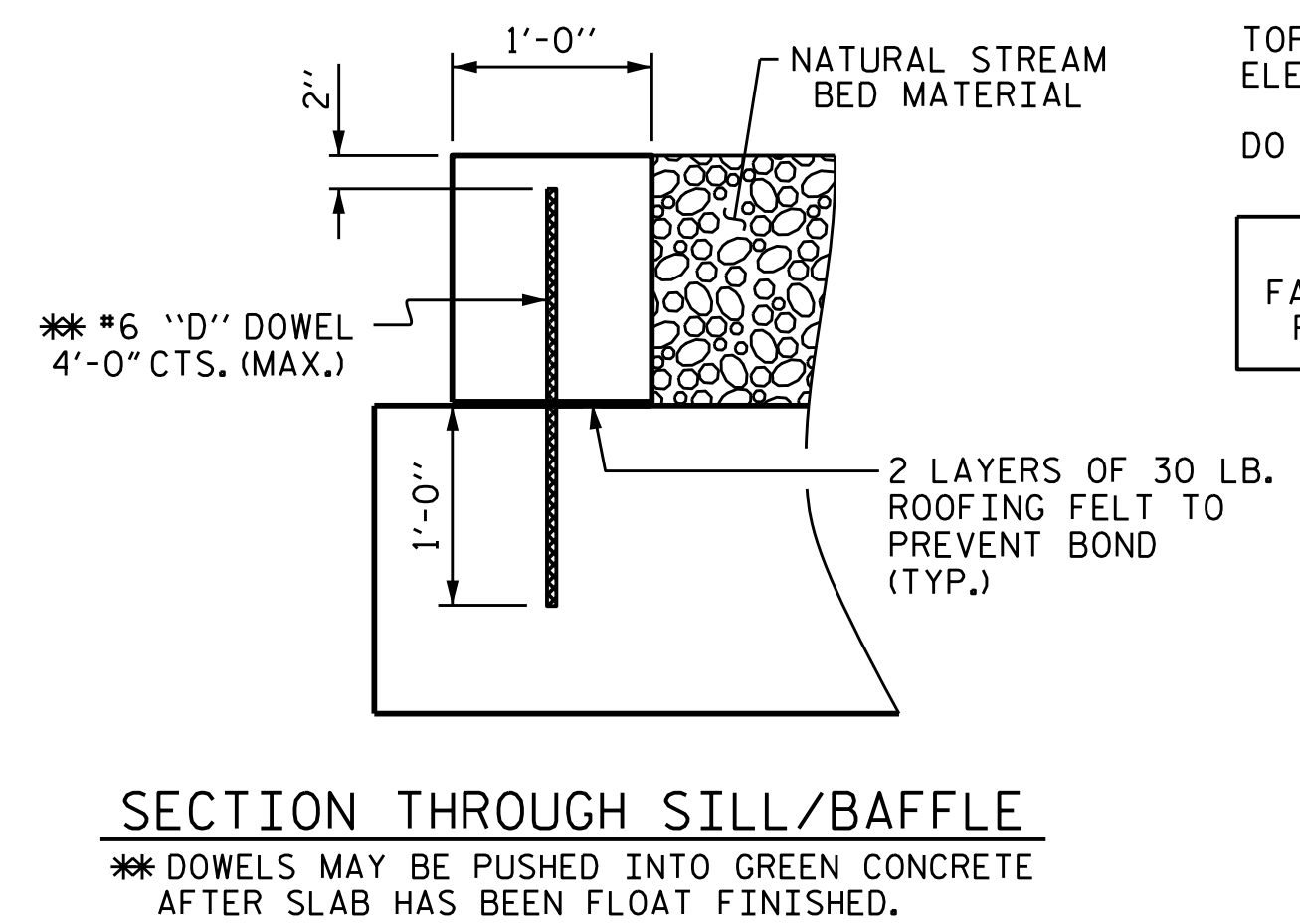
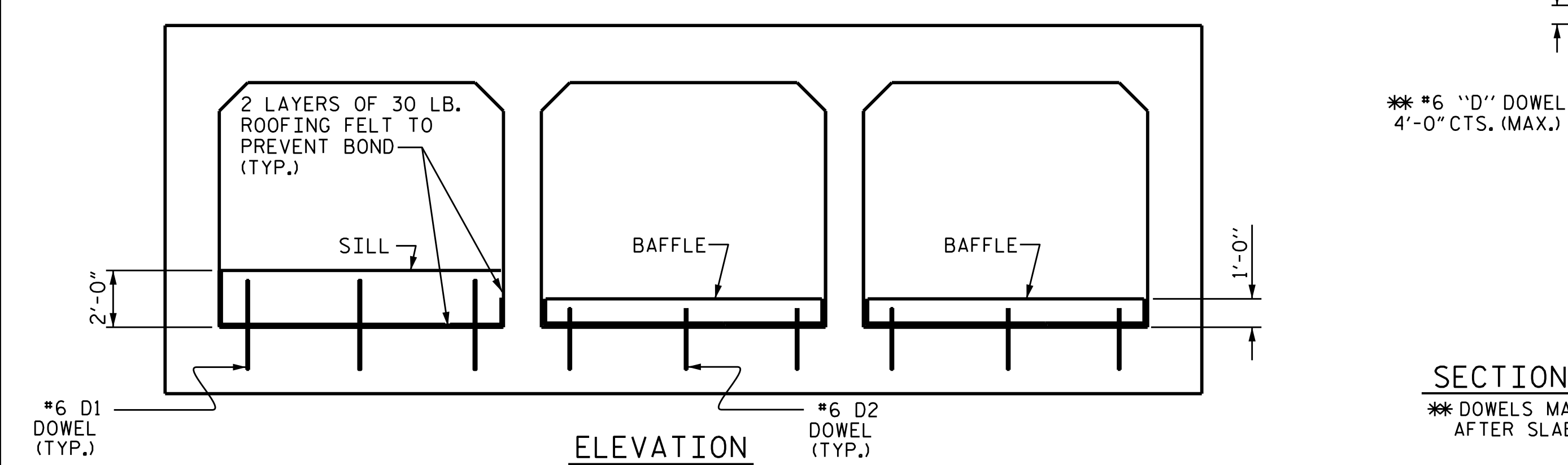
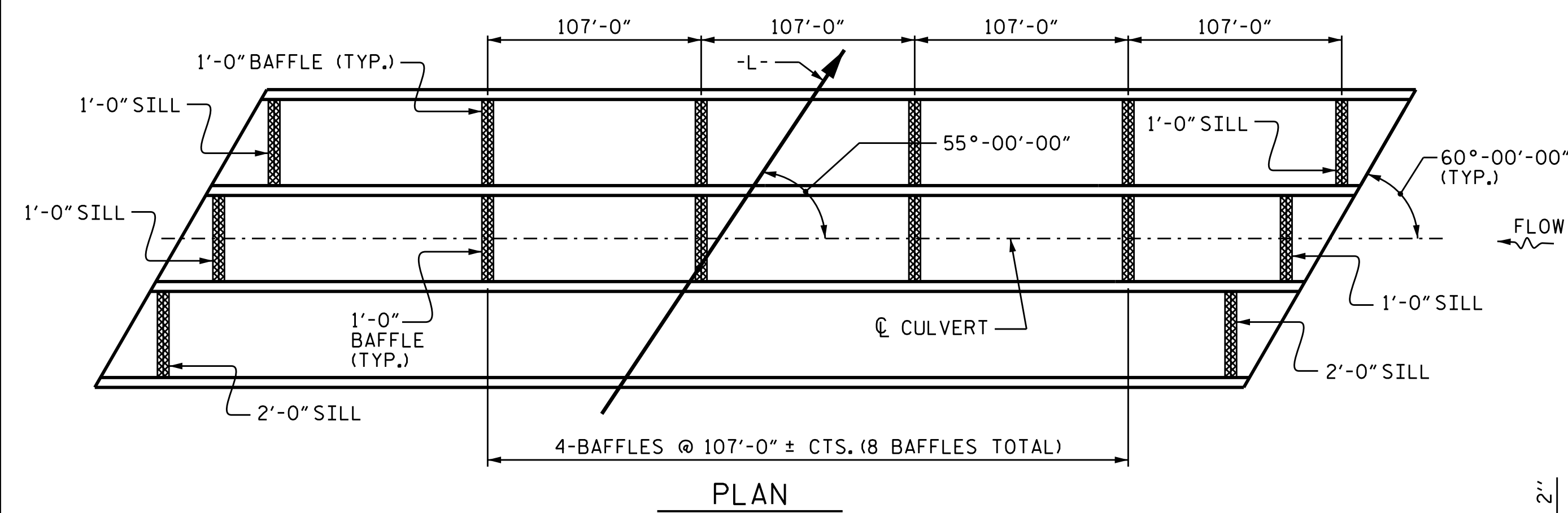
THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE NATIVE MATERIAL BACKFILL SHALL BE PLACED PRIOR TO THE CASTING OF THE ROOF SLAB.

PROJECT NO. R-3421B  
 FORSYTH COUNTY  
 STATION: 236+33.60 -L-

SHEET 3 OF 5



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 TRIPLE 9 FT. X 9 FT.  
 CONCRETE BOX CULVERT  
 55°-00'-00" SKEW

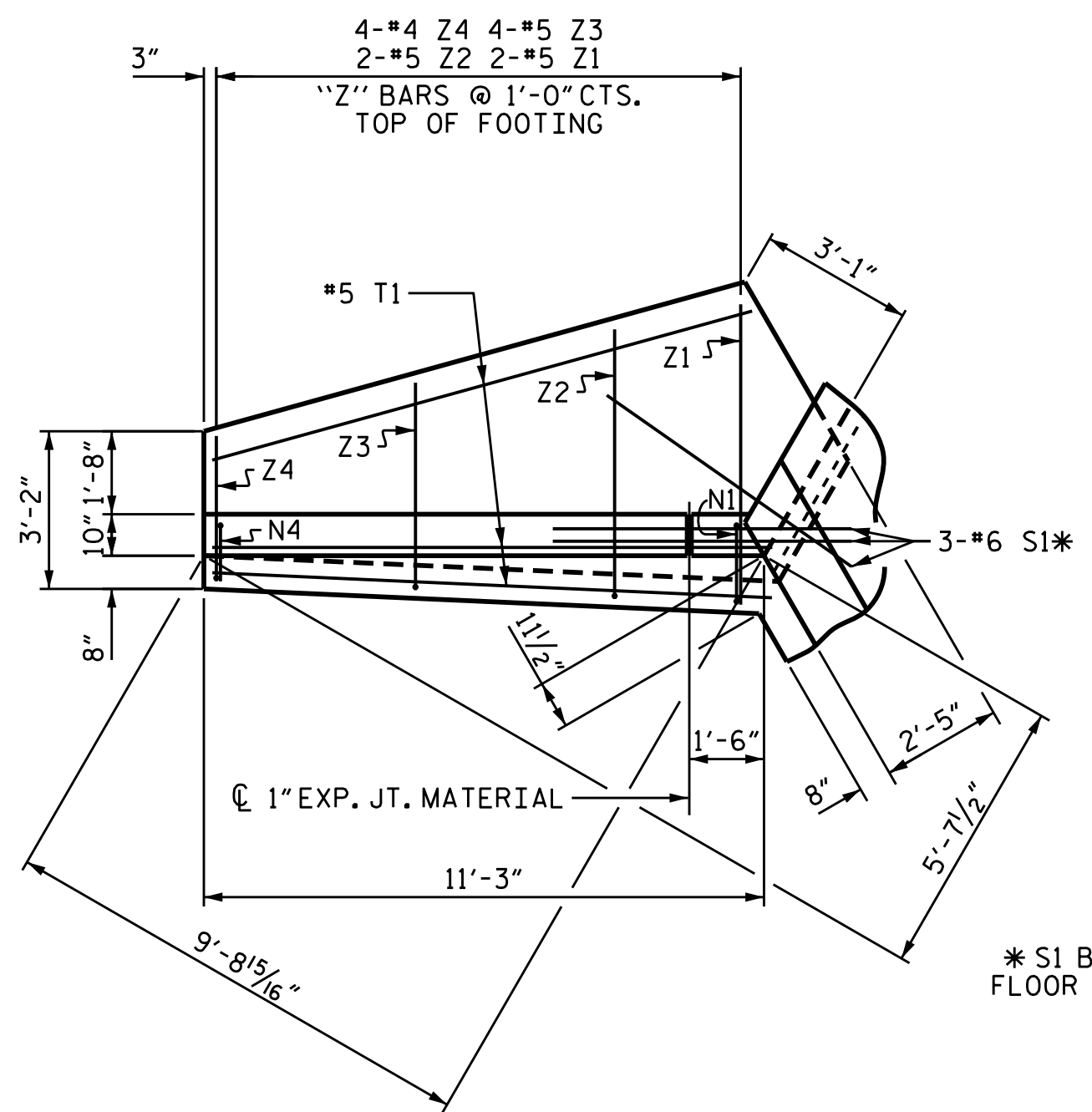


DRAWN BY : H. B. DESAI DATE : 8/12/05  
 CHECKED BY : A. SORSENGINH DATE : 03/19  
 DESIGN ENGINEER OF RECORD: K. P. SEDA DATE : 03/19

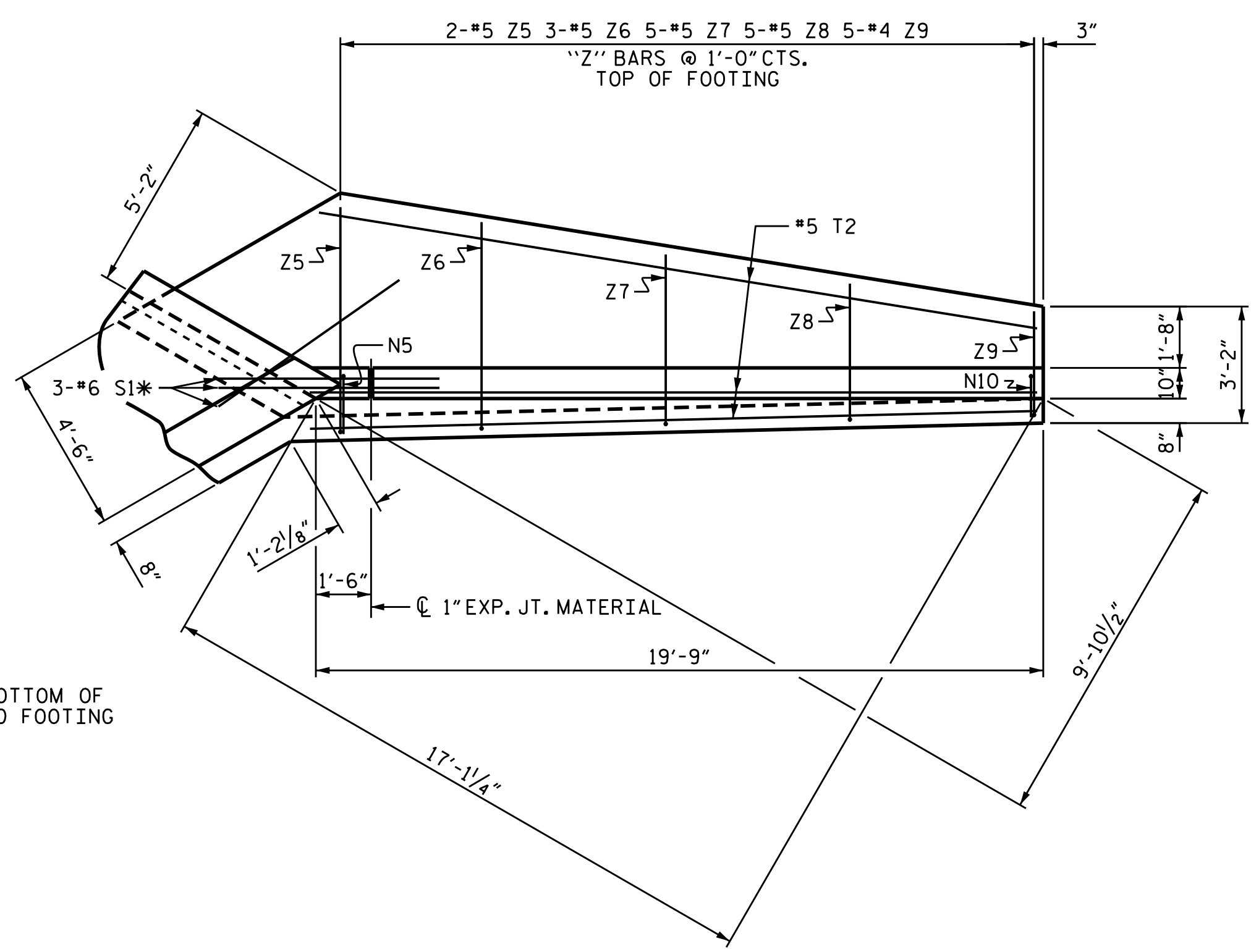
**CULVERT SILL/BAFFLE DETAILS**  
 (LOOKING DOWNSTREAM)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

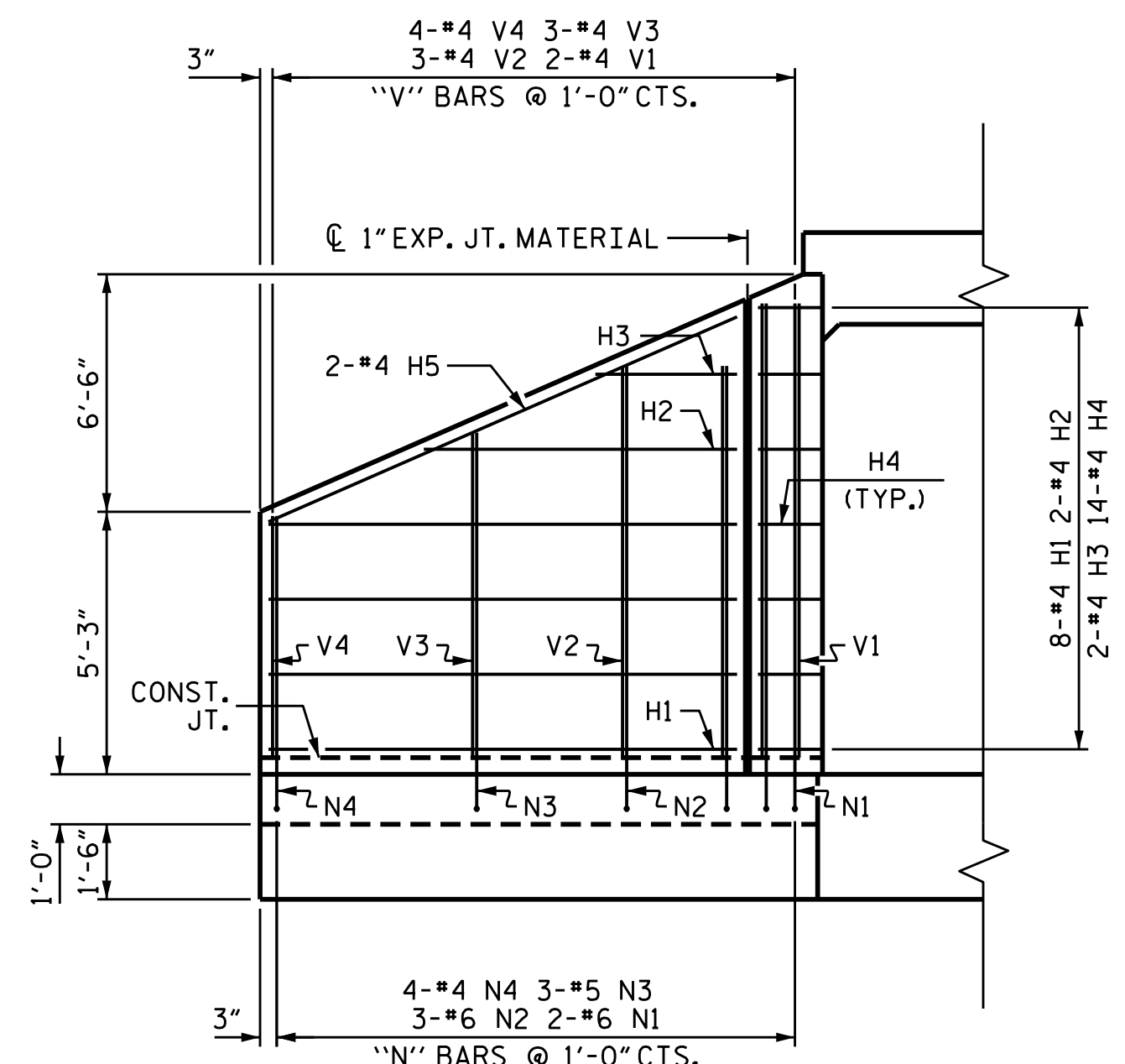
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C6-3
1			3			TOTAL SHEETS
2			4			5



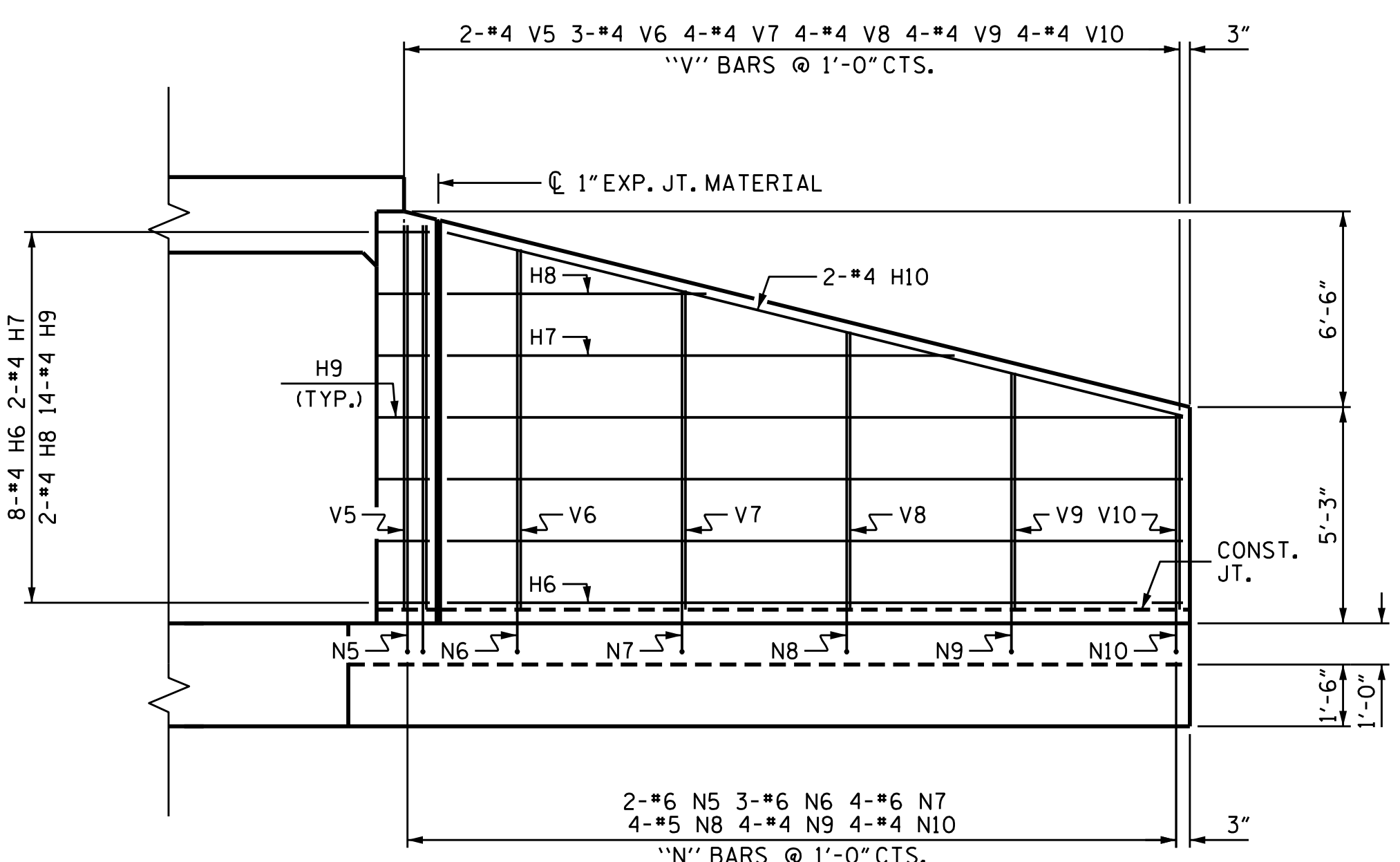
PLAN W2



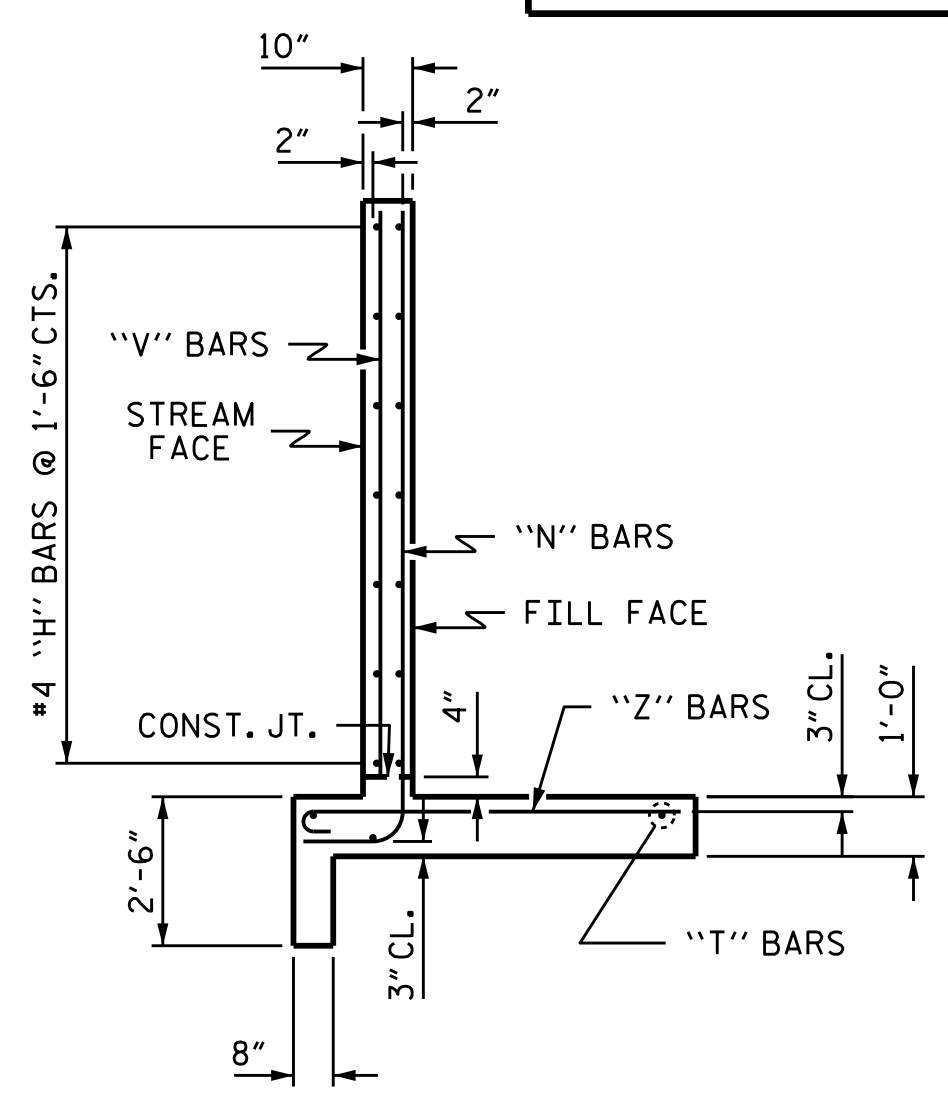
PLAN W1



ELEVATION W2



ELEVATION W1



TYPICAL WING SECTION

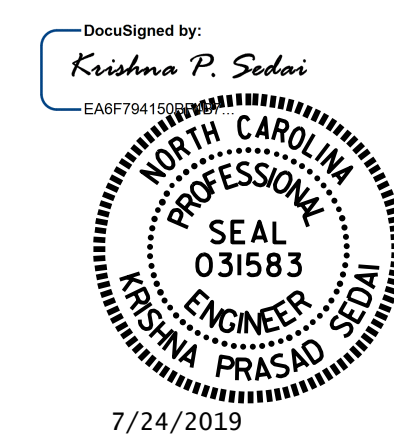
**BAR TYPES**

ALL BAR DIMENSIONS ARE OUT TO OUT.

Z1	6'-0"	7"
Z2	5'-5"	7"
Z3	4'-2"	7"
Z4	2'-10"	6"
Z5	6'-2"	7"
Z6	5'-8"	7"
Z7	4'-8"	7"
Z8	3'-9"	7"
Z9	2'-10"	6"

BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	16	#4	STR	9'-4"	100
H2	4	#4	STR	6'-3"	17
H3	4	#4	STR	2'-10"	8
H4	28	#4	1	3'-3"	61
H5	4	#4	STR	10'-2"	27
H6	16	#4	STR	17'-10"	191
H7	4	#4	STR	12'-4"	33
H8	4	#4	STR	6'-3"	17
H9	28	#4	2	3'-3"	61
H10	4	#4	STR	18'-5"	49
N1	4	#6	3	11'-2"	67
N2	6	#6	3	9'-11"	89
N3	6	#5	3	8'-7"	54
N4	8	#4	3	6'-10"	37
N5	4	#6	3	11'-4"	68
N6	6	#6	3	10'-9"	97
N7	8	#6	3	9'-10"	118
N8	8	#5	3	8'-10"	74
N9	8	#4	3	7'-10"	42
N10	8	#4	3	6'-10"	37
S1	12	#6	STR	6'-0"	108
T1	6	#5	STR	11'-3"	70
T2	6	#5	STR	19'-9"	124
V1	4	#4	STR	9'-1"	24
V2	6	#4	STR	7'-10"	31
V3	6	#4	STR	6'-6"	26
V4	8	#4	STR	4'-10"	26
V5	4	#4	STR	9'-4"	25
V6	6	#4	STR	8'-9"	35
V7	8	#4	STR	7'-9"	41
V8	8	#4	STR	6'-9"	36
V9	8	#4	STR	5'-9"	31
V10	8	#4	STR	4'-9"	25
Z1	4	#5	4	6'-7"	27
Z2	4	#5	4	6'-0"	25
Z3	8	#5	4	4'-9"	40
Z4	8	#4	4	3'-4"	18
Z5	4	#5	4	6'-9"	28
Z6	6	#5	4	6'-3"	39
Z7	10	#5	4	5'-3"	55
Z8	10	#5	4	4'-4"	45
Z9	10	#4	4	3'-4"	22
REINFORCING STEEL				2148	LBS
FOR 4 WINGS					
CLASS A CONCRETE					
4 WINGS				30.2	CY
2 HEADWALLS				3.4	CY
2 END CURTAIN WALLS				3.8	CY
TOTAL				37.4	CY

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 236+33.60 -L-  
 SHEET 4 OF 5



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**STANDARD WINGS**  
 FOR  
**CONCRETE BOX CULVERT**  
 H = 9'-0" SLOPE = 2:1  
 60° SKEW

ASSEMBLED BY : H. B. DESAI DATE : 8/13/15  
 CHECKED BY : A. SORSENGINH DATE : 03/19  
 DRAWN BY : CCJ 12/99  
 CHECKED BY : RWW 03/00

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

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

TOTAL SHEETS: 5



PERMANENT 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
WA	1.00	--

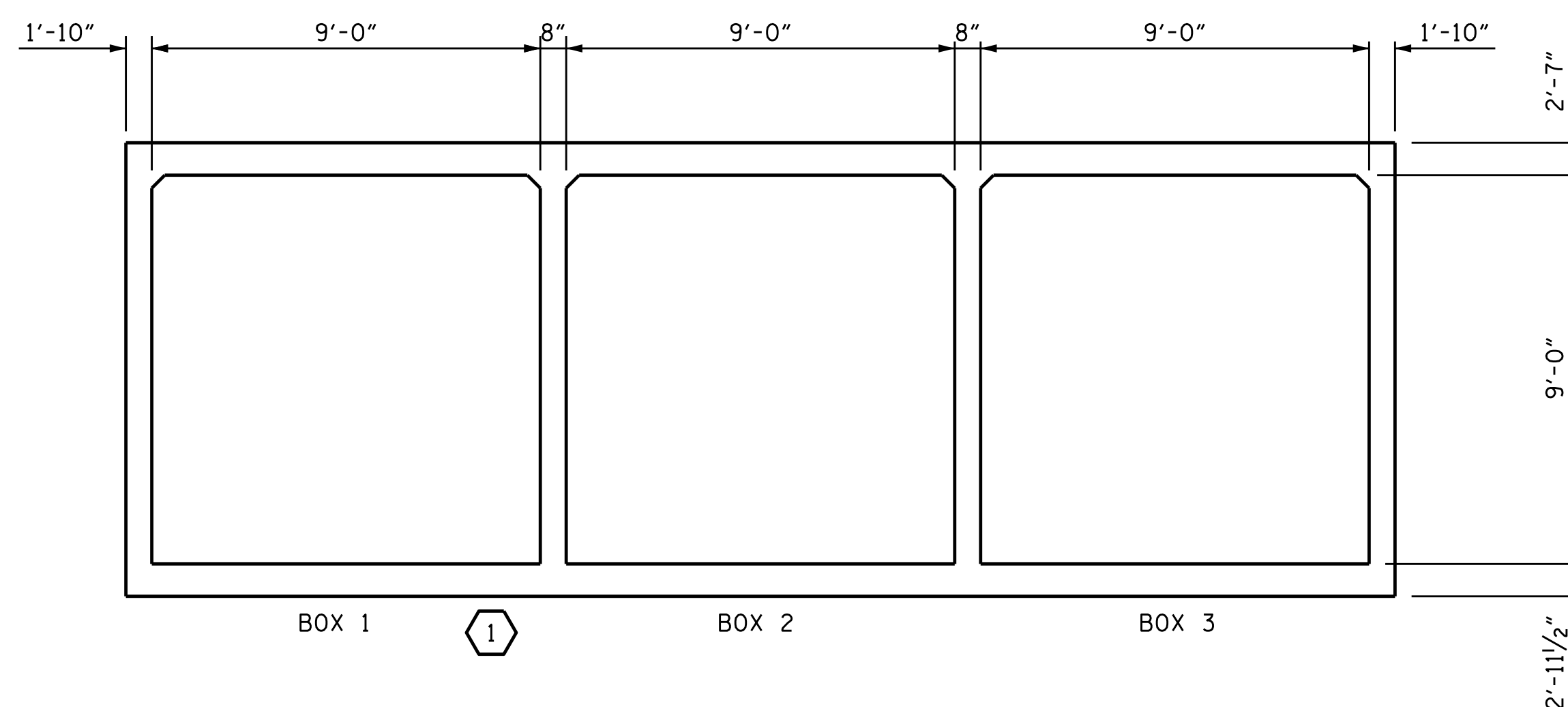
NOTES:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

THE EFFECTS OF LIVE LOAD ON DESIGN AND LOAD RATING MAY BE NEGLECTED FOR CULVERTS WITH CERTAIN FILL DEPTHS DESCRIBED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

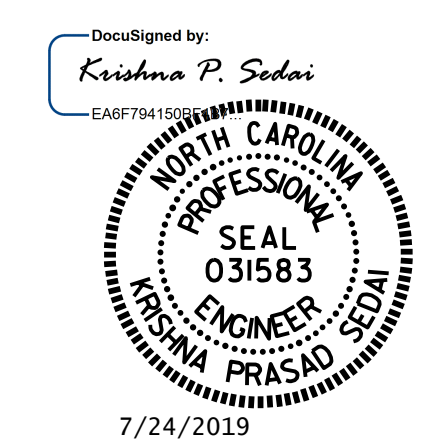
CULVERTS WITH NEGLIGIBLE LIVE LOAD SHOULD BE LOAD RATED FOR PERMANENT LOADS ONLY IN ACCORDANCE WITH THE AASHTO MANUAL FOR BRIDGE EVALUATION.

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS										
	CONTROLLING LOAD RATING	MINIMUM RATING FACTOR (RF)	STRENGTH I LIMIT STATE							
			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)
PERMANENT LOAD RATING	①	1.01	1.35	1	BOTTOM SLAB	4.61	1.01	1	BOTTOM SLAB	7.43



LRFR SUMMARY  
(LOOKING DOWNSTREAM)

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 236+33.60 -L-  
 SHEET 5 OF 5



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

ASSEMBLED BY :	C. RUIZ	DATE :	05/19
CHECKED BY :	A. SORSENGINH	DATE :	05/19
DESIGN ENGINEER OF RECORD:	K. PUROHIT	DATE :	05/19
DRAWN BY :	WMC	7/11	REV. 10/1/11
CHECKED BY :	GM	7/11	MAA/GM

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			C6-5
2			4			TOTAL SHEETS 5