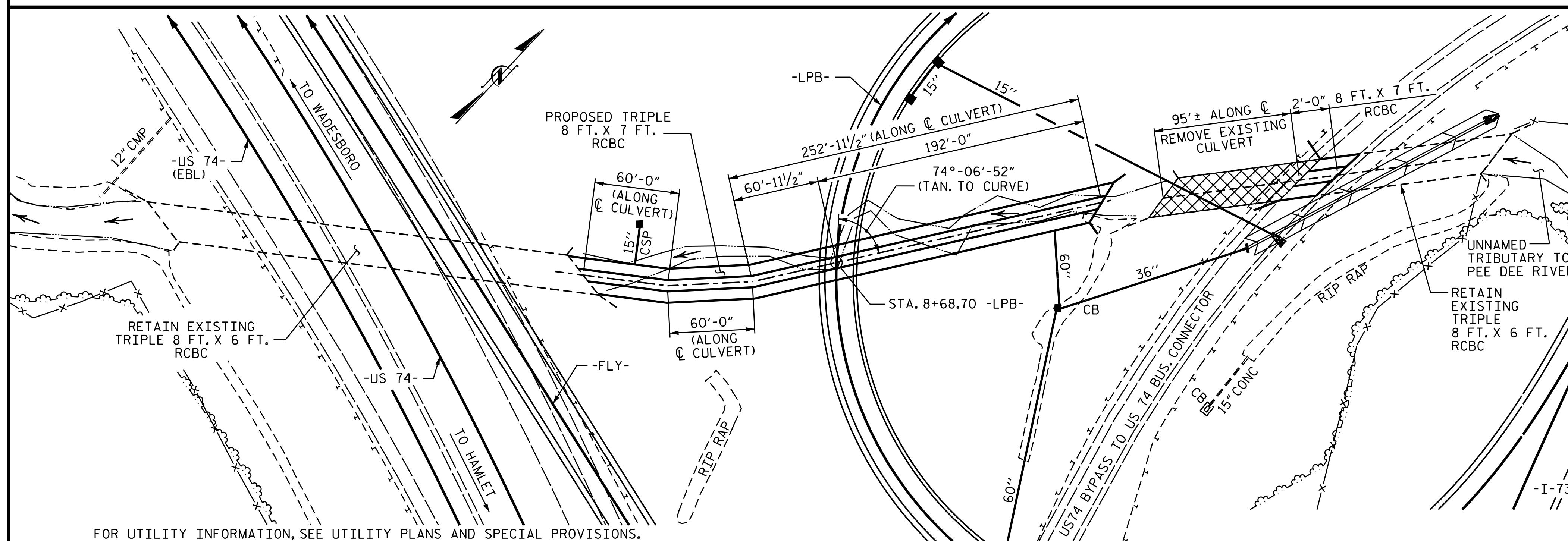
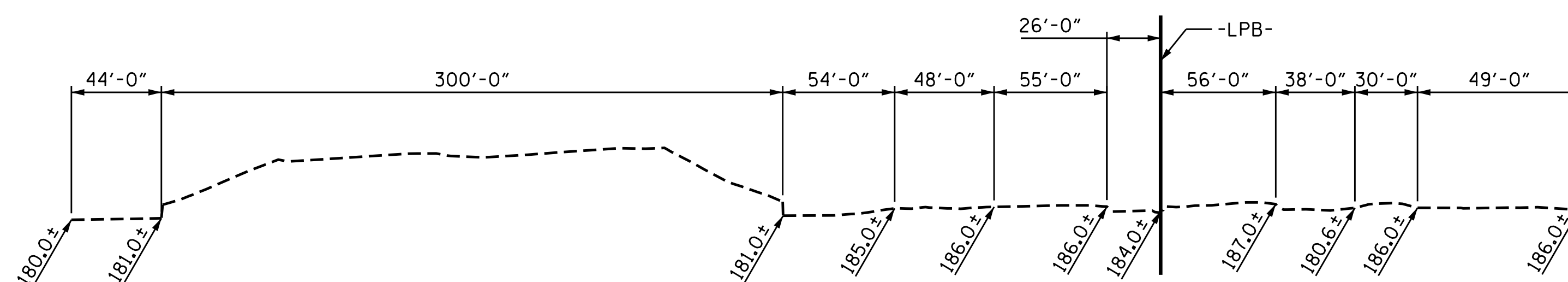


BM: EXISTING INLET INVERT OF CULVERT UNDER US74 BYPASS



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH



PROFILE ALONG CULVERT

NOTES:

- ASSUMED LIVE LOAD ----- HL-93 OR ALTERNATE LOADING.
- DESIGN FILL: ----- 43.34 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:
  - PHASE I WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF PHASE I VERTICAL WALL.
  - THE REMAINING PORTIONS OF PHASE I WALL AND PHASE I WINGS FULL HEIGHT.
  - PHASE II WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF PHASE II VERTICAL WALLS.
  - THE REMAINING PORTIONS OF PHASE II WALLS AND PHASE II WINGS FULL HEIGHT.
  - 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 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 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.

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

IF APPROVED BY THE ENGINEER, THE CONTRACTOR MAY USE THE EXISTING WINGS AS TEMPORARY SHORING FOR THE CONSTRUCTION OF THE CULVERT EXTENSIONS. IN THIS CASE, THE BOTTOM SLAB OF THE EXTENSION SHALL BE POURED AT LEAST 72 HOURS PRIOR TO CUTTING THE WINGS. THE WINGS MAY BE CUT EARLIER PROVIDED THE SLAB CONCRETE STRENGTH HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 1500 PSI.

DOWELS SHALL BE USED TO CONNECT THE CULVERT EXTENSION TO THE EXISTING CULVERT AS SHOWN. FOR NOTE REGARDING SETTING OF DOWELS, SEE SHEET SN.

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.

TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FEET. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

THE 15" DIA. PIPES THROUGH THE SIDEWALL OF THE CULVERT SHALL BE LOCATED BY THE ENGINEER. THE REINFORCING STEEL SHALL BE CUT OR FIELD BENT AS NECESSARY TO CLEAR PIPE.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

NO WORK SHALL BE DONE ON THE CULVERT AT STA. 8+68.70 -LPB- UNTIL THE AREA OF THE BOX CULVERT HAS BEEN UNDERCUT TO 4' BELOW CULVERT BOTTOM ELEVATION AT THE BEGINNING OF CULVERT EXTENSION TO 100', 8' BELOW CULVERT BOTTOM ELEVATION AT 100' TO 225' AND 4' BELOW CULVERT BOTTOM ELEVATION AT 225' TO 350' AND UNSUITABLE MATERIAL REPLACED WITH SUITABLE MATERIAL, PROPERLY COMPACTED TO THE ELEVATION OF THE BOTTOM OF THE PROPOSED FLOOR SLAB. THE LIMITS OF THIS UNDERCUT EXCAVATION SHALL BE AT LEAST THE LIMITS OF THE BOX CULVERT INCLUDING THE WINGS. NO SEPARATE PAYMENT WILL BE MADE FOR ANY TEMPORARY SHEETING, UNDERCUT, OR UNSUITABLE MATERIAL REPLACEMENT AS REQUIRED TO CONSTRUCT THE PROPOSED CULVERT. PAYMENT IS INCLUDED IN THE LUMP SUM PRICE FOR CULVERT EXCAVATION.

BACKFILL WITH SELECT MATERIAL, CLASS VI MEETING THE REQUIREMENTS OF SECTION 1016 OF THE STANDARD SPECIFICATION.

CONSTRUCT THE REINFORCED CONCRETE BOX CULVERT AT STATION 8+68.70 -LPB- WITH 3 INCHES OF CAMBER IN THE SOUTHERN END AND THEN TAPER UP TO A 5 INCH CAMBER IN THE MIDDLE 100 FEET SECTION AND TAPER FROM 5 INCHES TO ZERO CAMBER AT THE NORTH EASTERN SEGMENT TO ACCOUNT FOR ANTICIPATED SETTLEMENT.

HYDRAULIC DATA

DESIGN DISCHARGE	= 1100 C.F.S
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 192.90
DRAINAGE AREA	= 2.17 SQ. MI.
BASE DISCHARGE (Q100)	= 1200 C.F.S
BASE HIGH WATER ELEVATION	= 193.50

OVERTOPPING DATA

OVERTOPPING DISCHARGE	= 6000 C.F.S
FREQUENCY OF OVERTOPPING FLOOD	= 500 YRS.
OVERTOPPING FLOOD ELEVATION	= 232.00

GRADE DATA

GRADE POINT ELEVATION @ STA. 8+68.70 -LPB-	= 232.32'
BED ELEVATION @ STA. 8+68.70 -LPB-	= 183.01'
ROADWAY FILL SLOPES	= 4:1

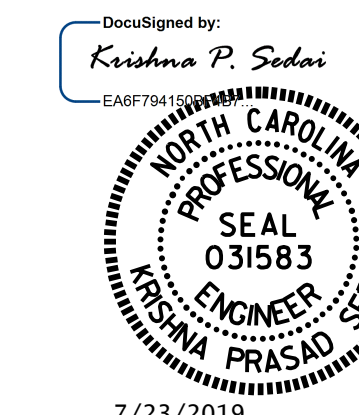
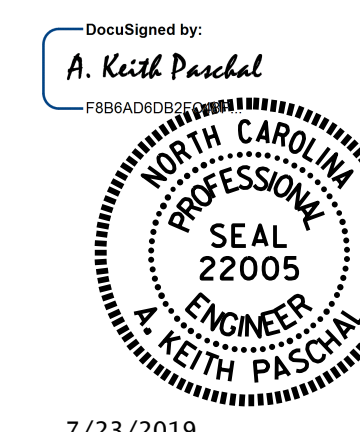
TOTAL QUANTITIES

CLASS A CONCRETE		
BARREL @	4,579 CY/FT	1,734.0 C.Y.
WINGS ETC.		29.4 C.Y.
EDGE BEAMS		4.3 C.Y.
SILLS		1.7 C.Y.
TOTAL		1769.4 C.Y.
REINFORCING STEEL		
BARREL		141,540 LBS.
WINGS ETC.		1,703 LBS.
TOTAL		143,243 LBS.
FOUNDATION COND. MAT'L		721 TONS
CULVERT EXCAVATION		LUMP SUM

PROJECT NO. R-3421A  
 RICHMOND COUNTY  
 STATION: 8+68.70 -LPB-

SHEET 1 OF 8 EXTEND CULVERT NO. 760223

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 TRIPLE 8 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 74°-06'-52" SKEW

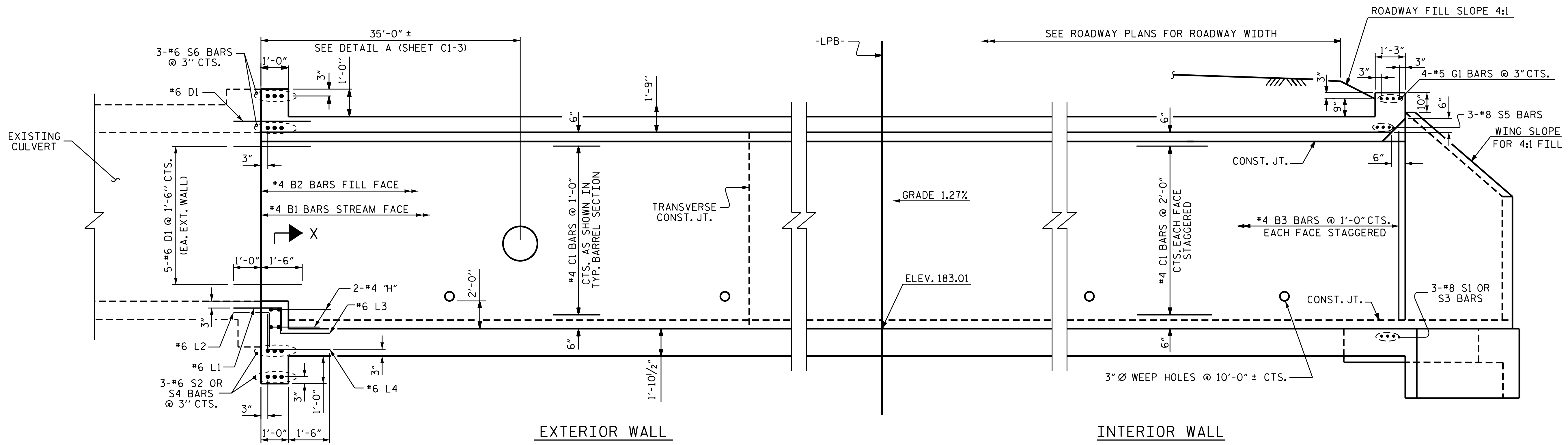


DRAWN BY : A. SORSENGINH DATE : 2/2019  
 CHECKED BY : M. G. SHAIKH DATE : 4/2019  
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 4/2019

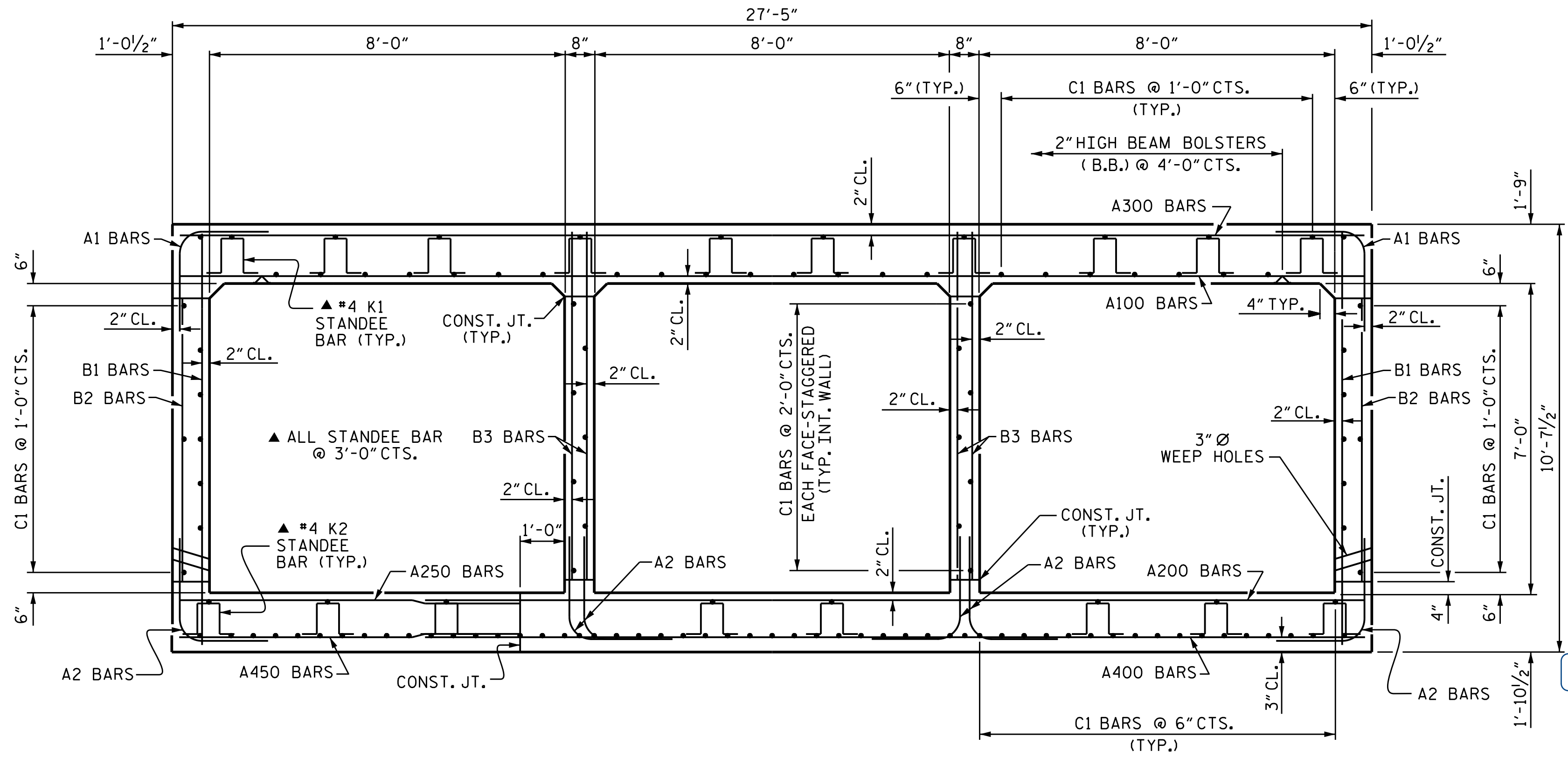
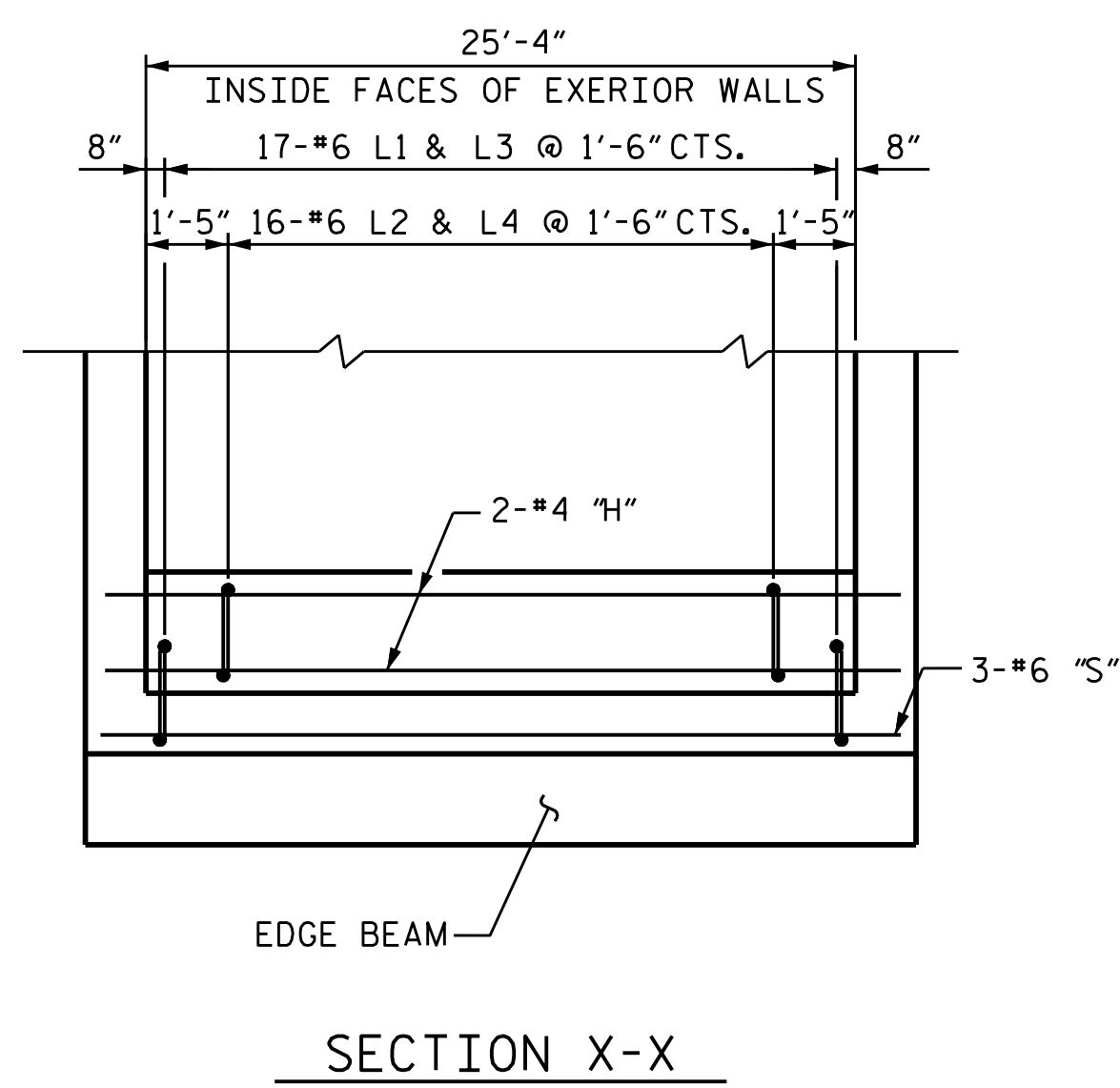
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-1
1			3			TOTAL SHEETS
2			4			8





**CULVERT SECTION NORMAL TO ROADWAY**  
 NOTE: CUT OR FIELD BEND REINFORCING STEEL IN CULVERT WALL AS NEEDED TO CLEAR PIPES.



**RIGHT ANGLE SECTION OF BARREL**  
 THERE ARE 125 "C" BARS IN SECTION OF BARREL. LOOKING DOWNSTREAM

PROJECT NO. R-3421A  
RICHMOND COUNTY  
 STATION: 8+68.70 -LPB-  
 SHEET 2 OF 8

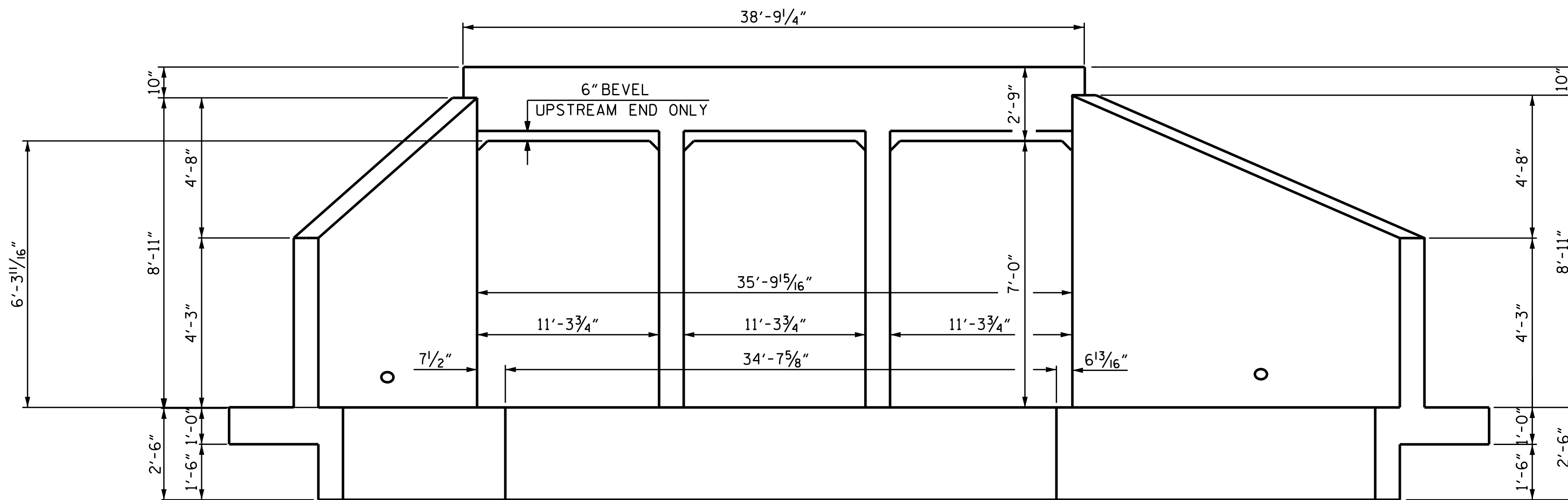


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**TRIPLE 8 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 80°-29'-51" SKEW**

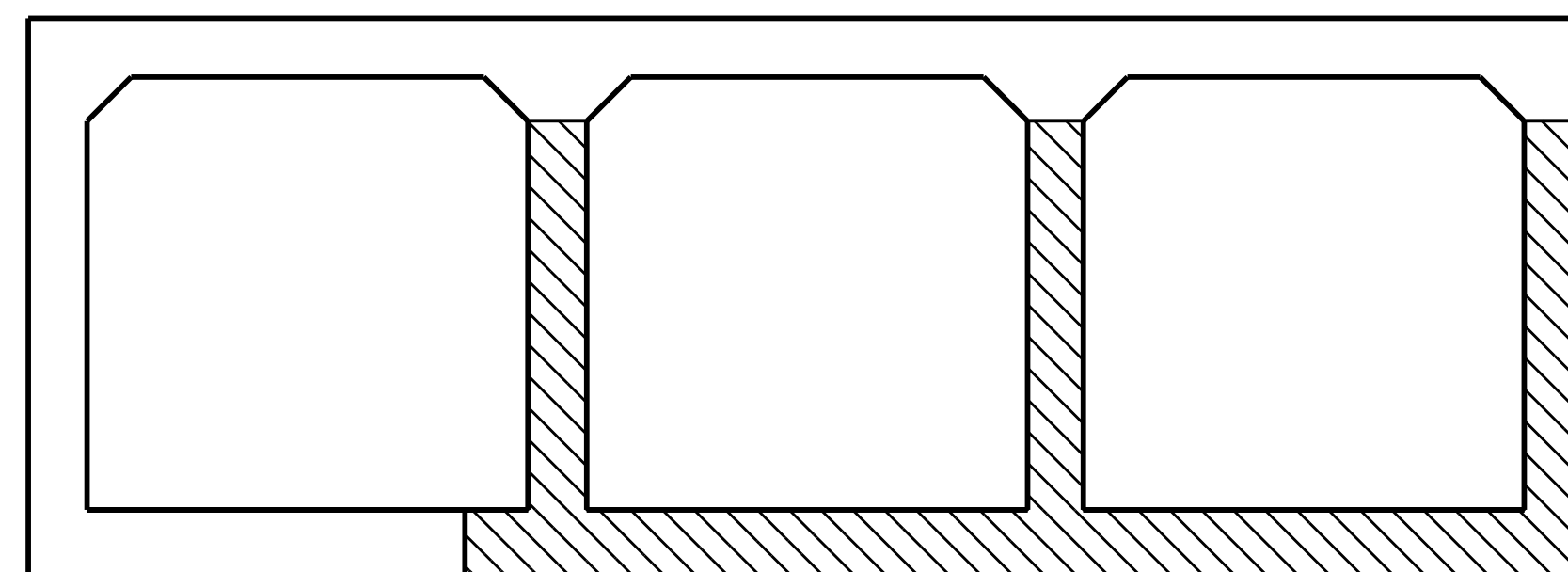
DRAWN BY : A. SORSENGINH DATE : 2/2019  
 CHECKED BY : M. G. SHAIKH DATE : 5/2019  
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 2/2019

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-2
1			3			TOTAL SHEETS
2			4			8

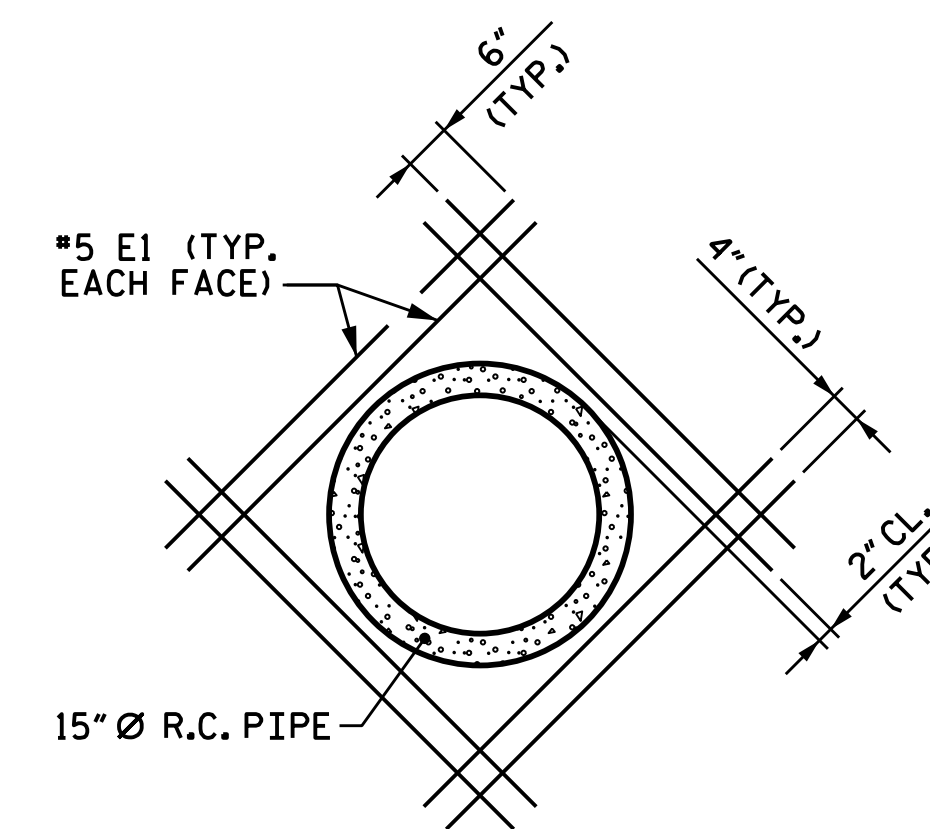


INLET ELEVATION NORMAL TO SKEW



CONSTRUCTION PHASING  
(LOOKING DOWNSTREAM)

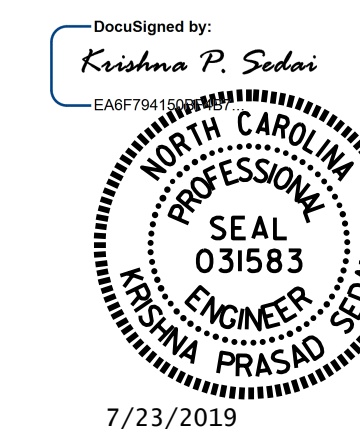
- PHASE I CONSTRUCTION
- PHASE II CONSTRUCTION



DETAIL A

PROJECT NO. R-3421A  
RICHMOND COUNTY  
 STATION: 8+68.70 -LPB-

SHEET 3 OF 8



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 TRIPLE 8 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 74°-06'-52" SKEW

DRAWN BY : A. SORSENGINH DATE : 2/2019  
 CHECKED BY : M. G. SHAIKH DATE : 5/2019  
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 2/2019

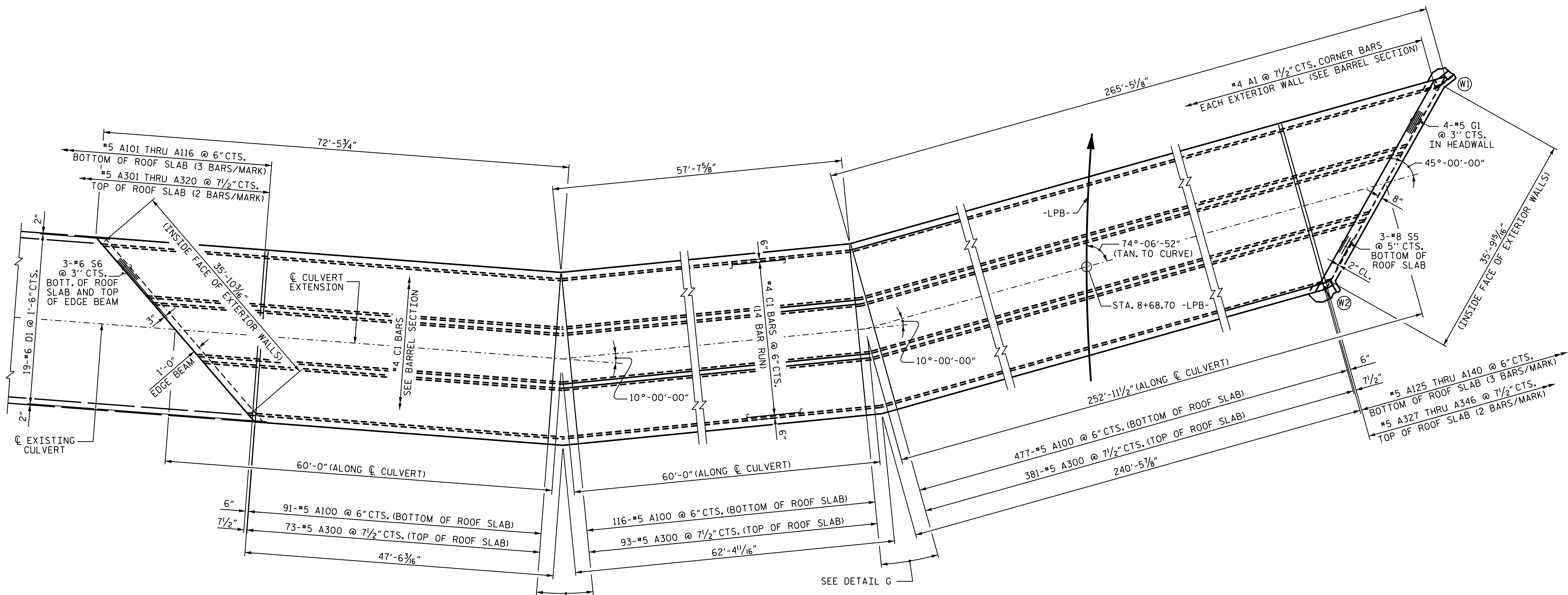
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1			3			TOTAL SHEETS
2			4			8



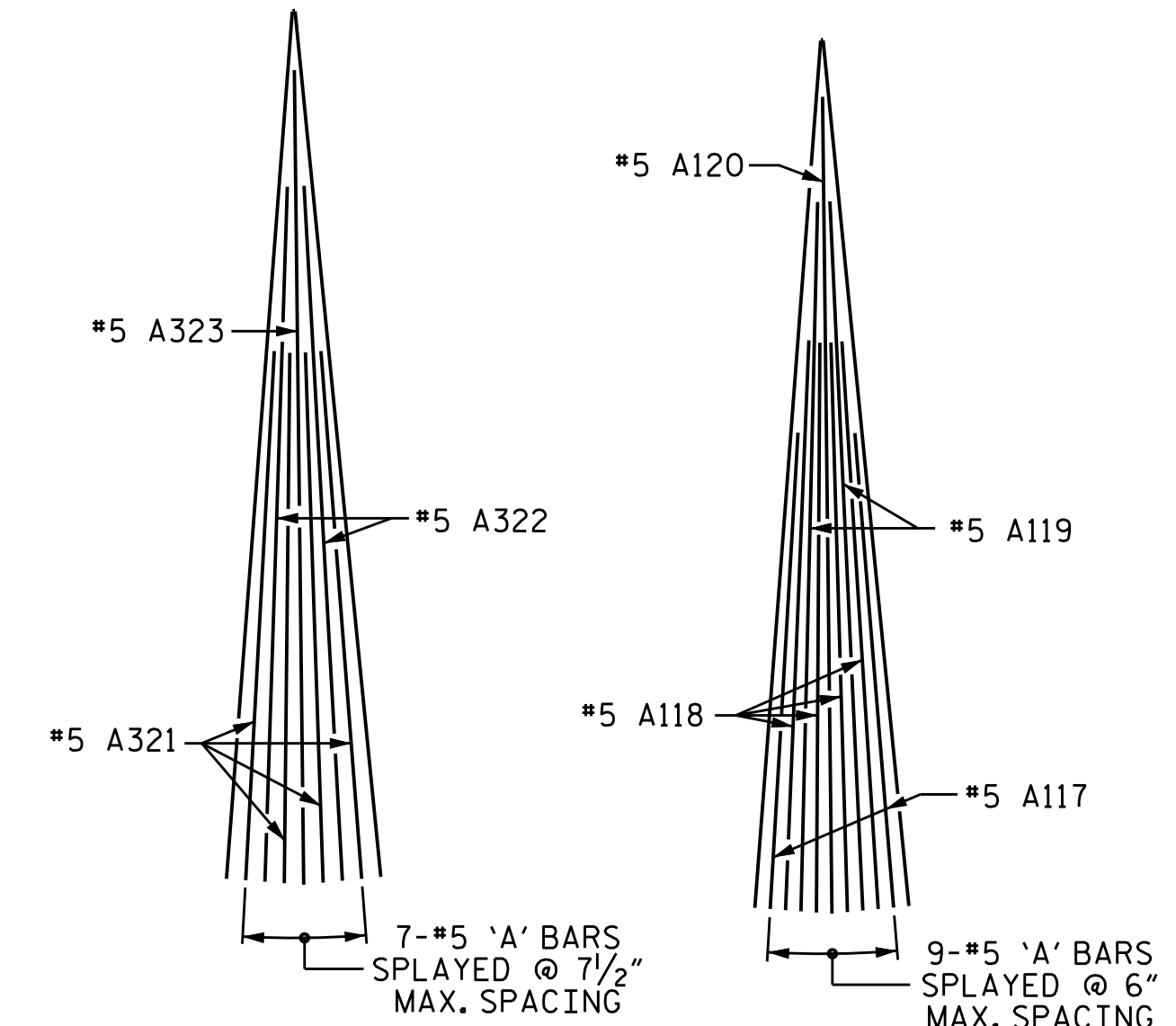




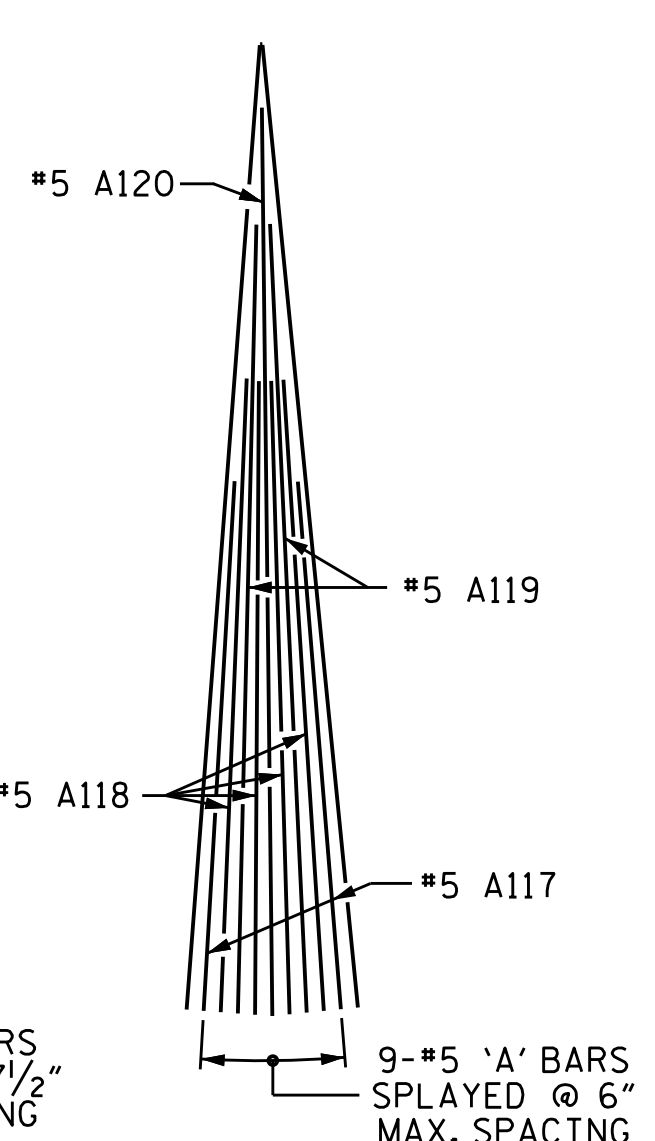


**PLAN - ROOF SLAB**

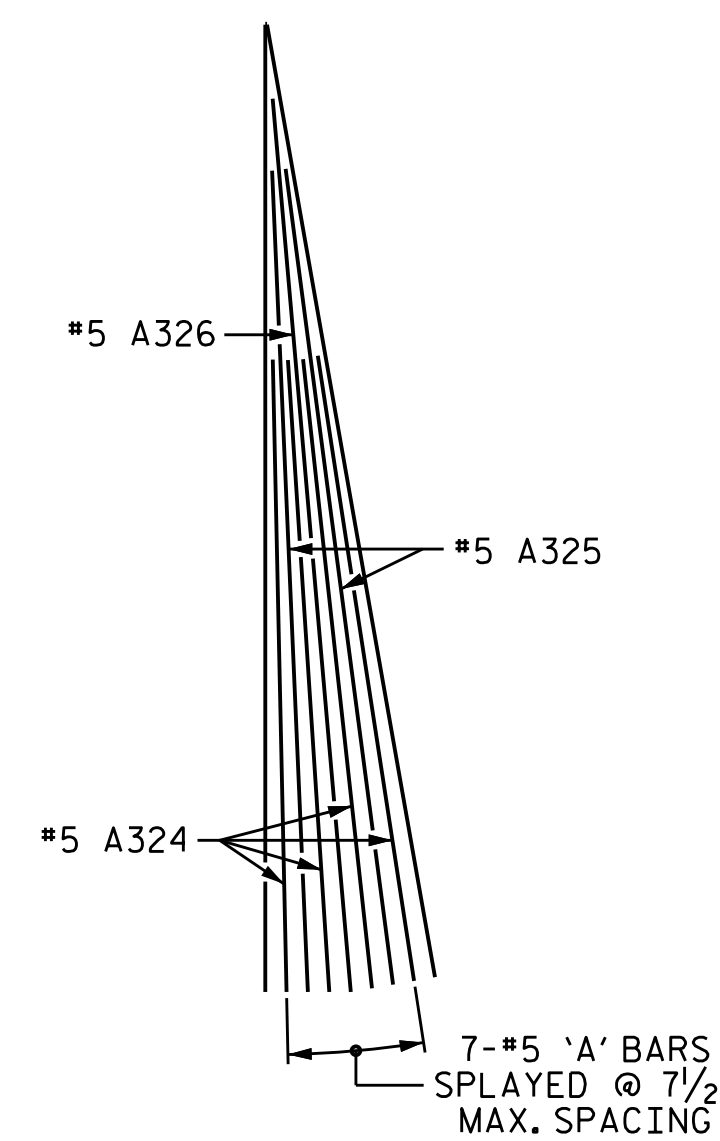
\*4 C1 SHALL BE FIELD BENT AS NECESSARY.



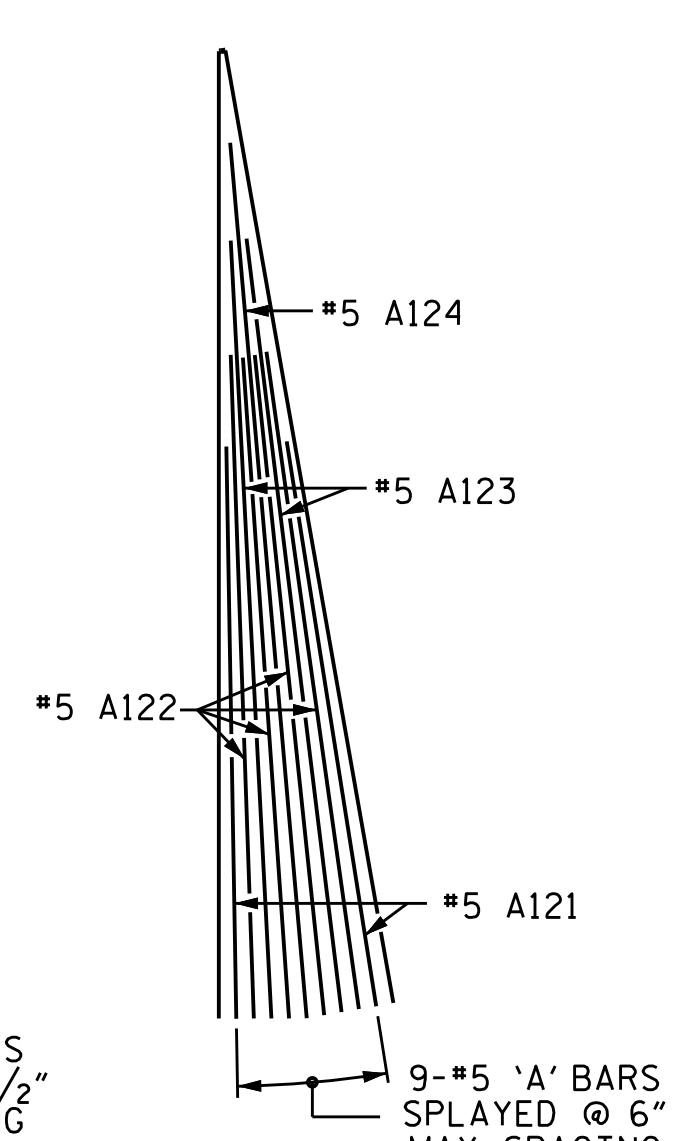
DETAIL F  
TOP OF SLAB



DETAIL F  
BOTTOM OF SLAB



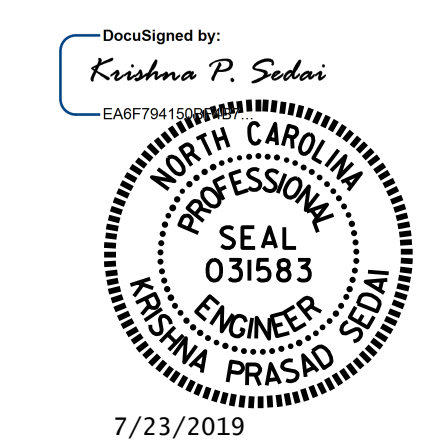
DETAIL G  
TOP OF SLAB



DETAIL G  
BOTTOM OF SLAB

PROJECT NO. R-3421A  
RICHMOND COUNTY  
 STATION: 8+68.70 -LPB-

SHEET 5 OF 8



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**TRIPLE 8 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 74°-06'-52" SKEW  
 INLET EXTENSION**

DRAWN BY : A. SORSENGINH DATE : 2/2019  
 CHECKED BY : M.G. SHAIKH DATE : 4/2019  
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 4/2019

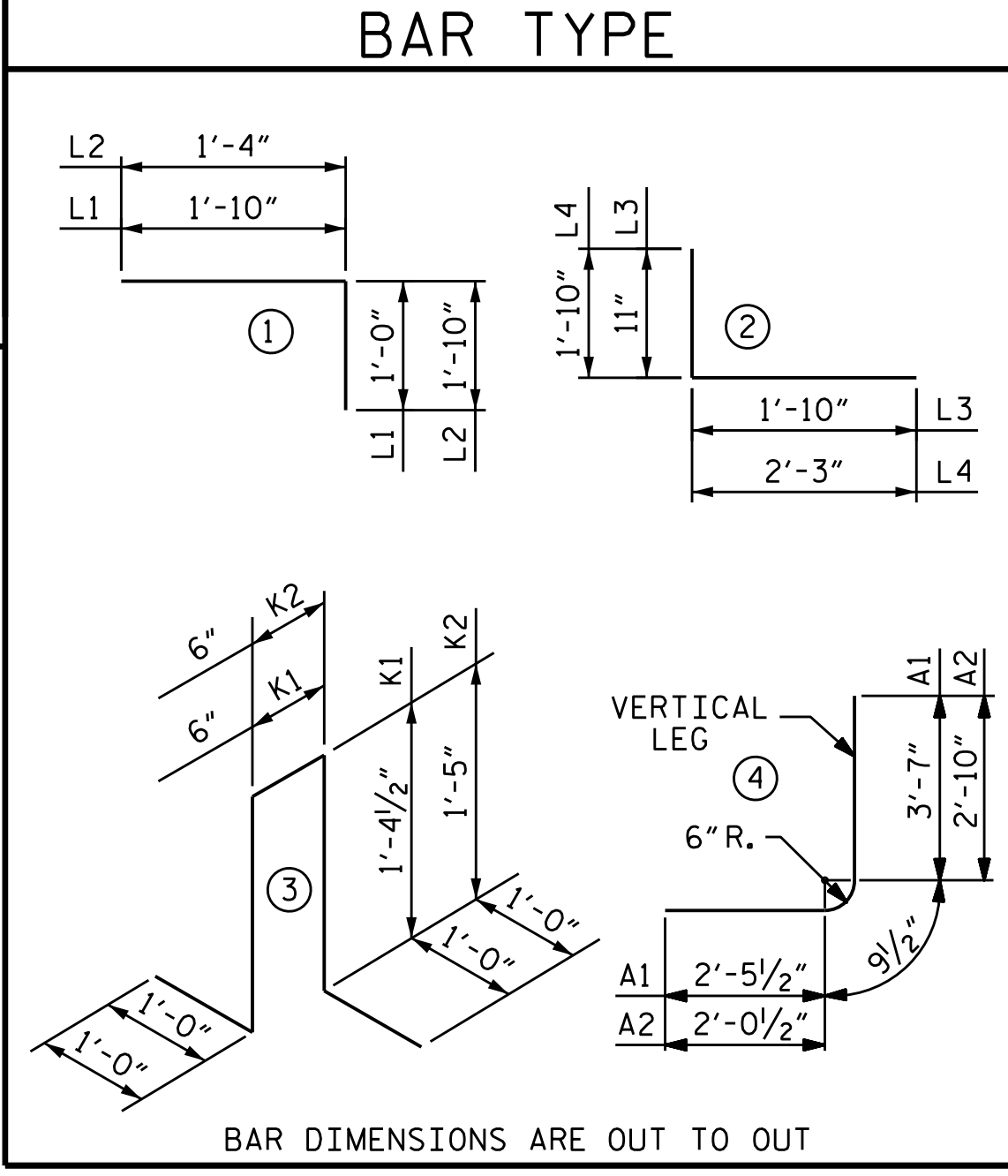
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-5
1			3			TOTAL SHEETS
2			4			8



**SPLICE LENGTH CHART**

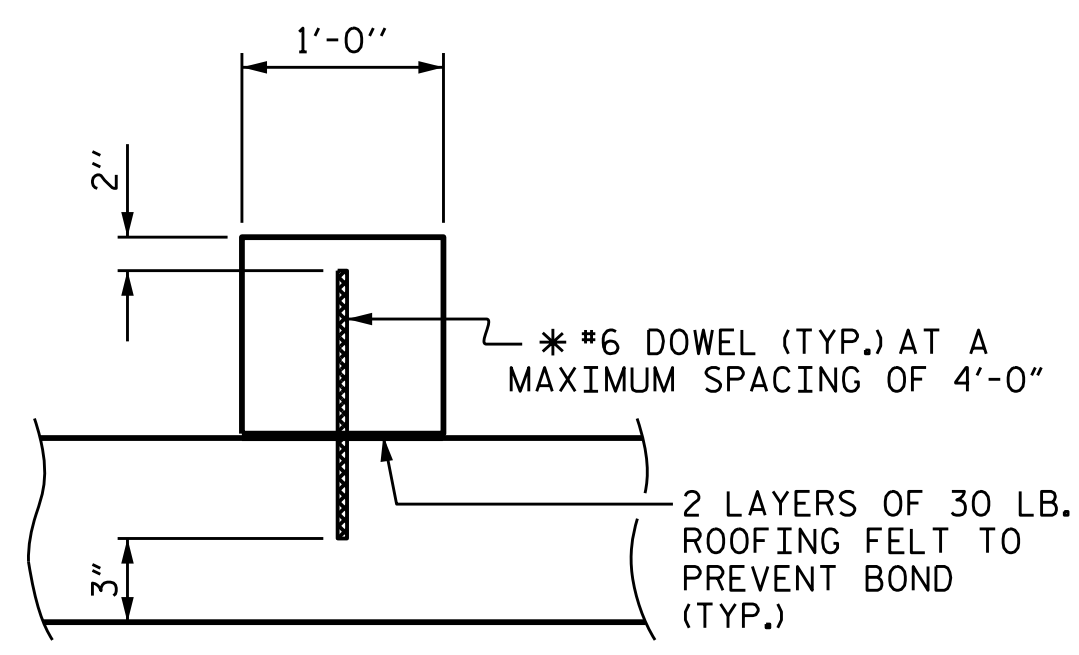
BAR	SIZE	LENGTH
A200	#5	2'-5"
A400	#5	1'-9"
B1	#4	1'-5"
B3	#4	1'-5"
C1	#4	1'-11"
S1	#8	4'-11"
S2	#6	2'-9"



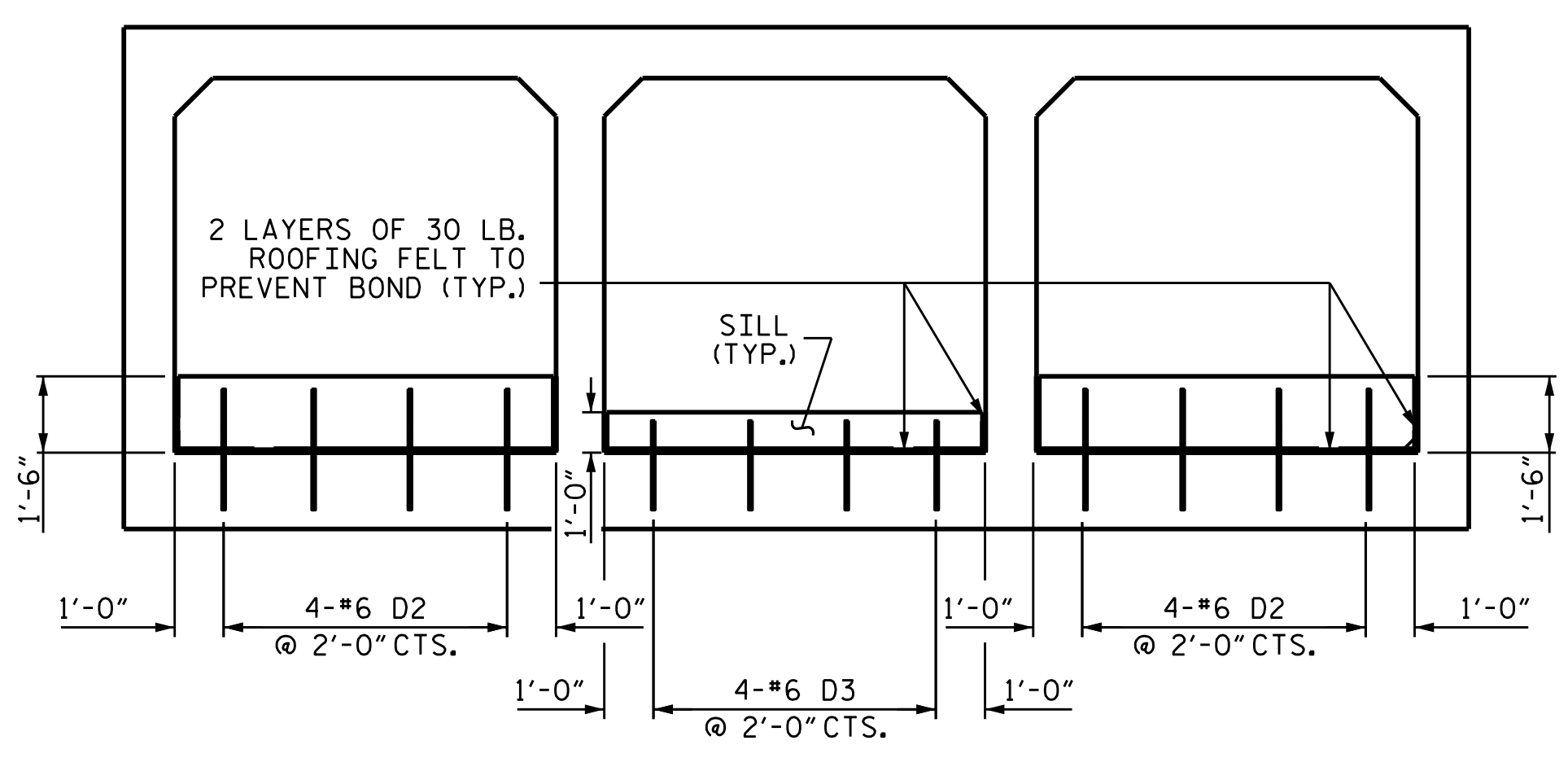
**BAR SCHEDULE**

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
A1	1194	#4	4	6'-10"	5450	A210	3	#5	STR	5'-4"	17	A322	2	#4	STR	21'-8"	29	A431	2	#5	STR	9'-1"	19	
A2	2686	#4	4	5'-8"	10167	A211	3	#5	STR	3'-9"	12	A323	1	#4	STR	25'-5"	17	A432	2	#5	STR	7'-10"	16	
A100	684	#5	STR	27'-0"	19262	A212	3	#5	STR	2'-1"	7	A324	4	#4	STR	17'-9"	47	A433	2	#5	STR	6'-7"	14	
A101	3	#5	STR	25'-6"	80	A214	2	#5	STR	18'-4"	38	A326	1	#4	STR	25'-5"	17	A435	2	#5	STR	4'-1"	9	
A102	3	#5	STR	24'-0"	75	A215	1	#5	STR	20'-6"	21	A327	2	#4	STR	26'-0"	35	A436	2	#5	STR	2'-10"	6	
A103	3	#5	STR	22'-6"	70	A216	4	#5	STR	12'-9"	53	A328	2	#4	STR	24'-9"	33							
A104	3	#5	STR	21'-0"	66	A217	2	#5	STR	17'-9"	37	A329	2	#4	STR	23'-6"	31	A450	557	#5	STR	7'-10"	4551	
A105	3	#5	STR	19'-6"	61	A218	1	#5	STR	20'-3"	21	A330	2	#4	STR	22'-3"	30	A451	2	#5	STR	6'-10"	14	
A106	3	#5	STR	18'-0"	56	A219	3	#5	STR	19'-6"	61	A331	2	#4	STR	21'-0"	28	A452	2	#5	STR	5'-7"	12	
A107	3	#5	STR	16'-6"	52	A220	3	#5	STR	17'-10"	56	A332	2	#4	STR	19'-9"	26	A453	2	#5	STR	4'-4"	9	
A108	3	#5	STR	15'-0"	47	A221	3	#5	STR	16'-3"	51	A333	2	#4	STR	18'-6"	25	A454	2	#5	STR	3'-1"	6	
A109	3	#5	STR	13'-6"	42	A222	3	#5	STR	14'-7"	46	A334	2	#4	STR	17'-3"	23	A455	2	#5	STR	6'-1"	13	
A110	3	#5	STR	12'-0"	38	A223	3	#5	STR	13'-0"	41	A335	2	#4	STR	16'-0"	21	A456	2	#5	STR	5'-10"	12	
A111	3	#5	STR	10'-6"	33	A224	3	#5	STR	11'-4"	35	A336	2	#4	STR	14'-9"	20	A457	2	#5	STR	6'-9"	14	
A112	3	#5	STR	9'-0"	28	A225	3	#5	STR	9'-9"	31	A337	2	#4	STR	13'-6"	18	A458	2	#5	STR	5'-6"	11	
A113	3	#5	STR	7'-6"	23	A226	3	#5	STR	8'-1"	25	A338	2	#4	STR	12'-3"	16	A459	2	#5	STR	4'-3"	9	
A114	3	#5	STR	6'-0"	19	A227	3	#5	STR	6'-6"	20	A339	2	#4	STR	11'-0"	15	A460	2	#5	STR	3'-0"	6	
A115	3	#5	STR	4'-6"	14	A228	3	#5	STR	4'-10"	15	A340	2	#4	STR	9'-9"	13							
A116	3	#5	STR	3'-0"	9	A229	3	#5	STR	3'-3"	10	A341	2	#4	STR	8'-6"	11	B1	746	#4	STR	10'-1"	5025	
A117	2	#5	STR	14'-10"	31	A230	3	#5	STR	1'-7"	5	A342	2	#4	STR	7'-3"	10	B2	1194	#4	STR	6'-4"	5051	
A118	4	#5	STR	17'-9"	74							A343	2	#4	STR	6'-0"	8	B3	1492	#4	STR	8'-3"	8222	
A119	2	#5	STR	22'-2"	46	A250	643	#5	STR	7'-10"	5253	A344	2	#4	STR	4'-9"	6							
A120	1	#5	STR	25'-6"	27	A251	3	#5	STR	6'-3"	20	A345	2	#4	STR	3'-6"	5	C1	1750	#4	STR	28'-7"	33414	
A121	2	#5	STR	16'-0"	33	A252	3	#5	STR	4'-8"	15	A346	2	#4	STR	2'-3"	3							
A122	4	#5	STR	18'-7"	78	A253	3	#5	STR	3'-0"	9							D1	29	#6	STR	2'-6"	109	
A123	2	#5	STR	21'-10"	46	A254	2	#5	STR	5'-9"	12	A400	565	#5	STR	21'-4"	12572	D2	8	#6	STR	2'-11"	35	
A124	1	#5	STR	24'-8"	26	A255	2	#5	STR	5'-7"	12	A401	2	#5	STR	20'-1"	42	D3	4	#6	STR	2'-5"	15	
A125	3	#5	STR	25'-6"	80	A256	3	#5	STR	6'-4"	20	A402	2	#5	STR	18'-10"	39							
A126	3	#5	STR	24'-0"	75	A257	3	#5	STR	4'-8"	15	A403	2	#5	STR	17'-7"	37	E1	16	#5	STR	3'-8"	61	
A127	3	#5	STR	22'-6"	70	A258	3	#5	STR	3'-1"	10	A404	2	#5	STR	16'-4"	34							
A128	3	#5	STR	21'-0"	66							A405	2	#5	STR	15'-1"	31	G1	4	#5	STR	38'-3"	160	
A129	3	#5	STR	19'-6"	61	A300	547	#4	STR	27'-0"	9866	A406	2	#5	STR	13'-10"	29							
A130	3	#5	STR	18'-0"	56	A301	2	#4	STR	25'-9"	34	A407	2	#5	STR	12'-7"	26	H1	4	#4	STR	28'-10"	77	
A131	3	#5	STR	16'-6"	52	A302	2	#4	STR	24'-6"	33	A408	2	#5	STR	11'-4"	24	H2	4	#4	STR	9'-9"	26	
A132	3	#5	STR	15'-0"	47	A303	2	#4	STR	23'-3"	31	A409	2	#5	STR	10'-1"	21							
A133	3	#5	STR	13'-6"	42	A304	2	#4	STR	22'-0"	29	A410	2	#5	STR	8'-10"	18	K1	940	#4	3	5'-3"	3297	
A134	3	#5	STR	12'-0"	38	A305	2	#4	STR	20'-9"	28	A411	2	#5	STR	7'-7"	16	K2	752	#4	3	5'-4"	2679	
A135	3	#5	STR	10'-6"	33	A306	2	#4	STR	19'-6"	26	A412	2	#5	STR	6'-4"	13							
A136	3	#5	STR	9'-0"	28	A307	2	#4	STR	18'-3"	24	A413	2	#5	STR	5'-1"	11	L1	17	#6	1	2'-10"	72	
A137	3	#5	STR	7'-6"	23	A308	2	#4	STR	17'-0"	23	A414	2	#5	STR	3'-10"	8	L2	16	#6	1	3'-2"	76	
A138	3	#5	STR	6'-0"	19	A309	2	#4	STR	15'-9"	21	A415	2	#5	STR	2'-8"	6	L3	17	#6	2	2'-9"	70	
A139	3	#5	STR	4'-6"	14	A310	2	#4	STR	14'-6"	19	A416	2	#5	STR	14'-9"	31	L4	16	#6	2	4'-1"	98	
A140	3	#5	STR	3'-0"	9	A311	2	#4	STR	13'-3"	18	A417	2	#5	STR	15'-5"	32							
						A312	2	#4	STR	12'-0"	16	A418	2	#5	STR	18'-5"	38	S1	3	#8	STR	32'-1"	257	
A200	652	#5	STR	21'-7"	14677	A313	2	#4	STR	10'-9"	14	A419	2	#5	STR	12'-9"	27	S2	6	#6	STR	30'-0"	270	
A201	3	#5	STR	20'-0"	63	A314	2	#4	STR	9'-6"	13	A420	2	#5	STR	15'-5"	32	S3	3	#8	STR	11'-1"	89	
A202	3	#5	STR	18'-4"	57	A315	2	#4	STR	8'-3"	11	A421	2	#5	STR	17'-10"	37	S4	6	#6	STR	11'-2"	101	
A203	3	#5	STR	16'-9"	52	A316	2	#4	STR	7'-0"	9	A422	2	#5	STR	20'-4"	42	S5	3	#8	STR	38'-3"	306	
A204	3	#5	STR	15'-1"	47	A317	2	#4	STR	5'-9"	8	A423	2	#5	STR	19'-1"	40	S6	6	#6	STR	38'-3"	345	
A205	3	#5	STR	13'-6"	42	A318	2	#4	STR	4'-6"	6	A424	2	#5	STR	17'-10"	37							
A206	3	#5	STR	11'-10"	37	A319	2	#4	STR	3'-3"	4	A425	2	#5	STR	16'-7"	35							
A207	3	#5	STR	10'-3"	32	A320	2	#4	STR	2'-0"	3	A426	2	#5	STR	15'-4"	32							
A208	3	#5	STR	8'-7"	27	A321	4	#4	STR	16'-6"	44	A427	2	#5	STR	14'-1"	29							
A209	3	#5	STR	7'-0"	22							A428	2	#5	STR	12'-10"	27							
												A429	2	#5	STR	11'-7"	24							
												A430	2	#5	STR	10'-4"	22							

REINFORCING STEEL = 141,540 LBS

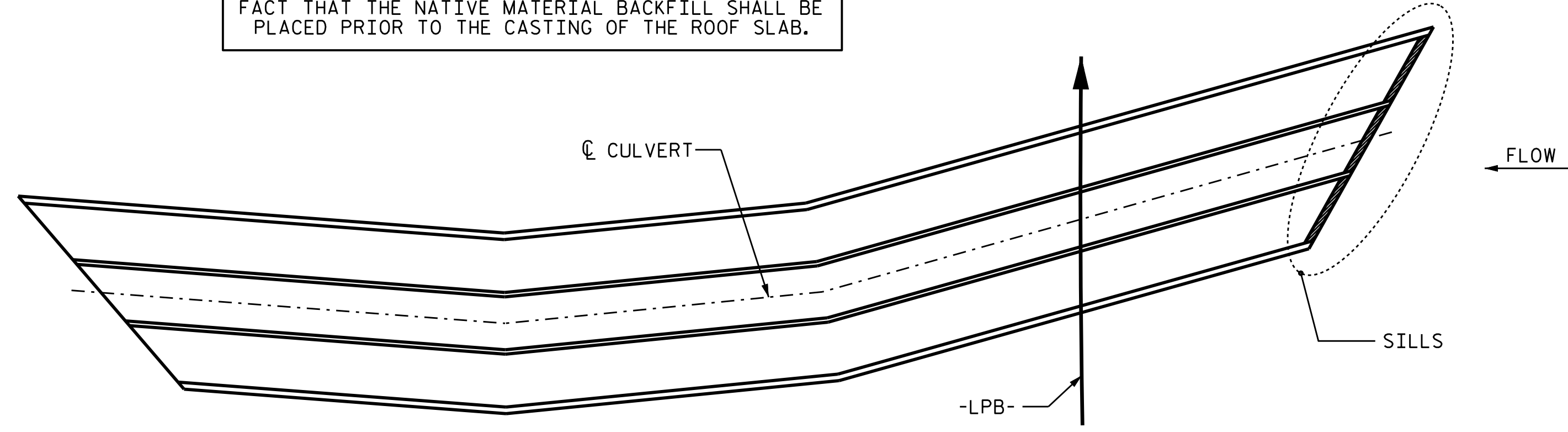


\* DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED.



**CULVERT SILL DETAILS**

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.



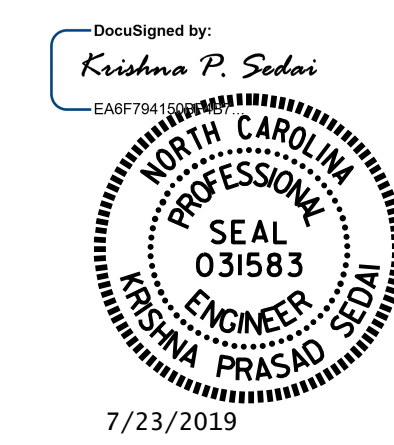
**NOTES**

NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OF FLOODPLAIN AT THE PROJECT SITE DURING CULVERT CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAMBED MAY BE USED TO LINE THE LOW FLOW BARREL. RIP RAP MAY BE USED TO SUPPLEMENT THE NATIVE MATERIAL IN THE HIGH FLOW 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.

THE ENTIRE COST OF WORK REQUIRED TO PLACE EXCAVATED MATERIAL OR SUPPLEMENT MATERIAL AS SHOWN ON THE PLANS SHALL BE INCLUDED IN THE CONTRACT LUMP SUM PRICE BID FOR CULVERT EXCAVATION.

THE ENTIRE COST OF WORK REQUIRED TO CONSTRUCT THE SILLS SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

THE STOCKPILED MATERIAL SHALL BE PLACED EVEN WITH THE TOP OF THE SILLS.



PROJECT NO. R-3421A  
RICHMOND COUNTY  
 STATION: 8+68.70 -LPB-

SHEET 6 OF 8

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**TRIPLE 8 FT. X 7 FT. CONCRETE BOX CULVERT**  
**74°-06'-52" SKEW**

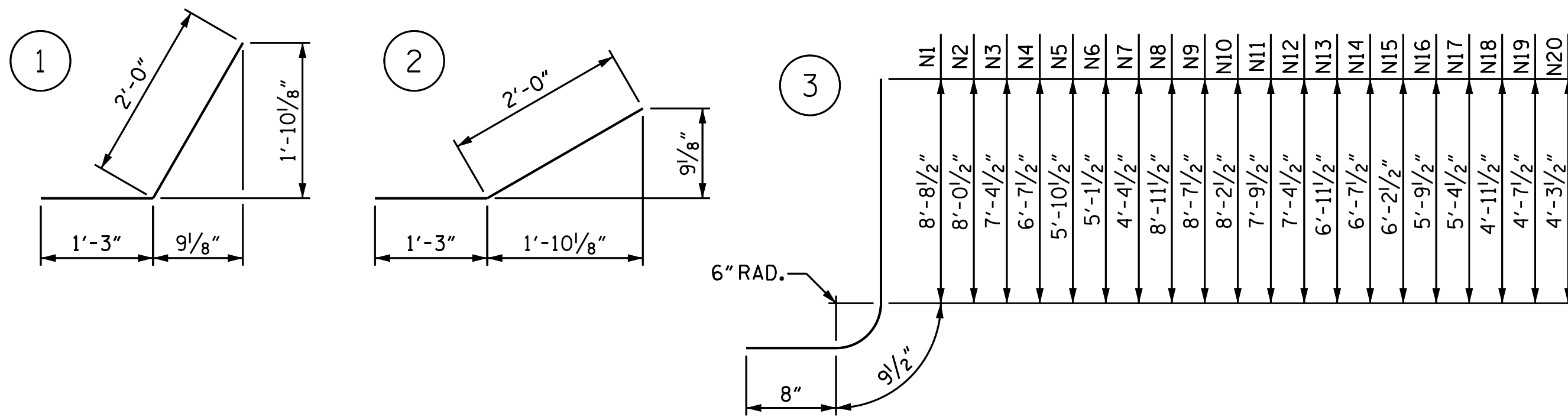
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NO.	BY:	DATE:	NO.	BY:	DATE:	C1-6
1			3			TOTAL SHEETS
2			4			8

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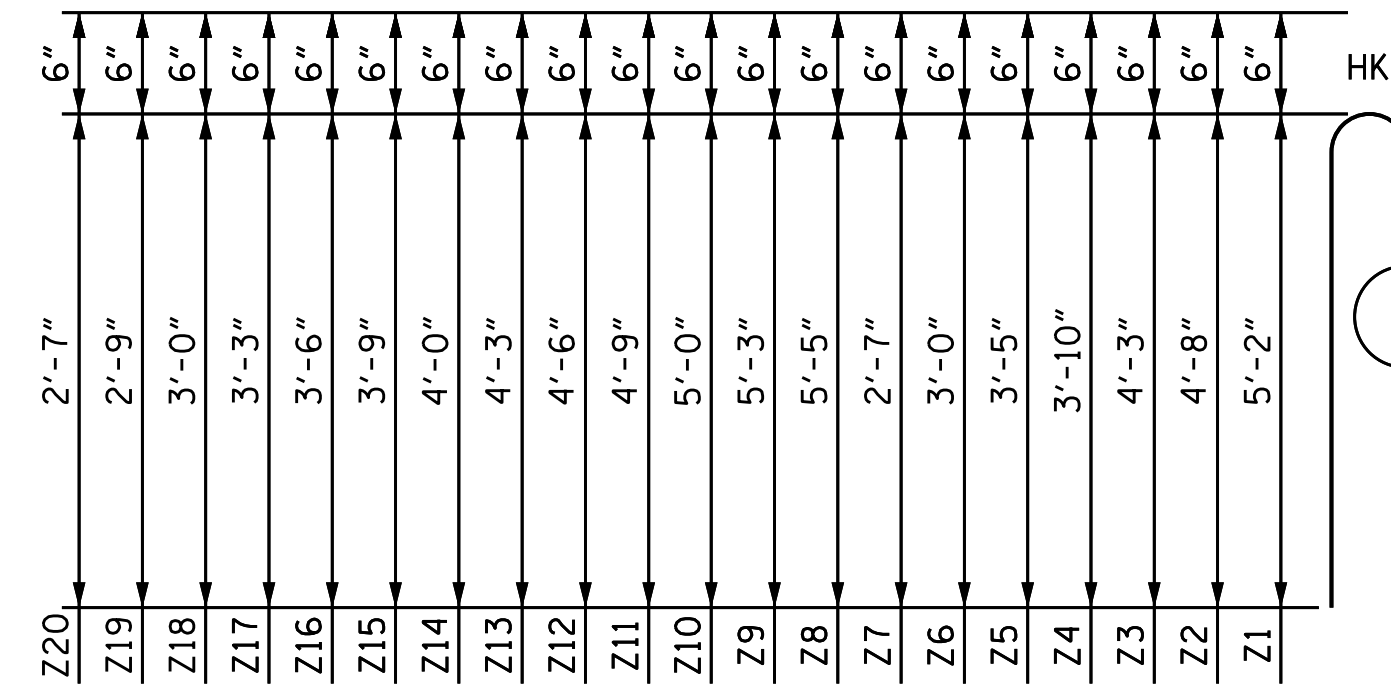
DRAWN BY : A. SORSENGINH DATE : 04/2019  
 CHECKED BY : M. G. SHAIKH DATE : 04/2019  
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 04/2019



BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

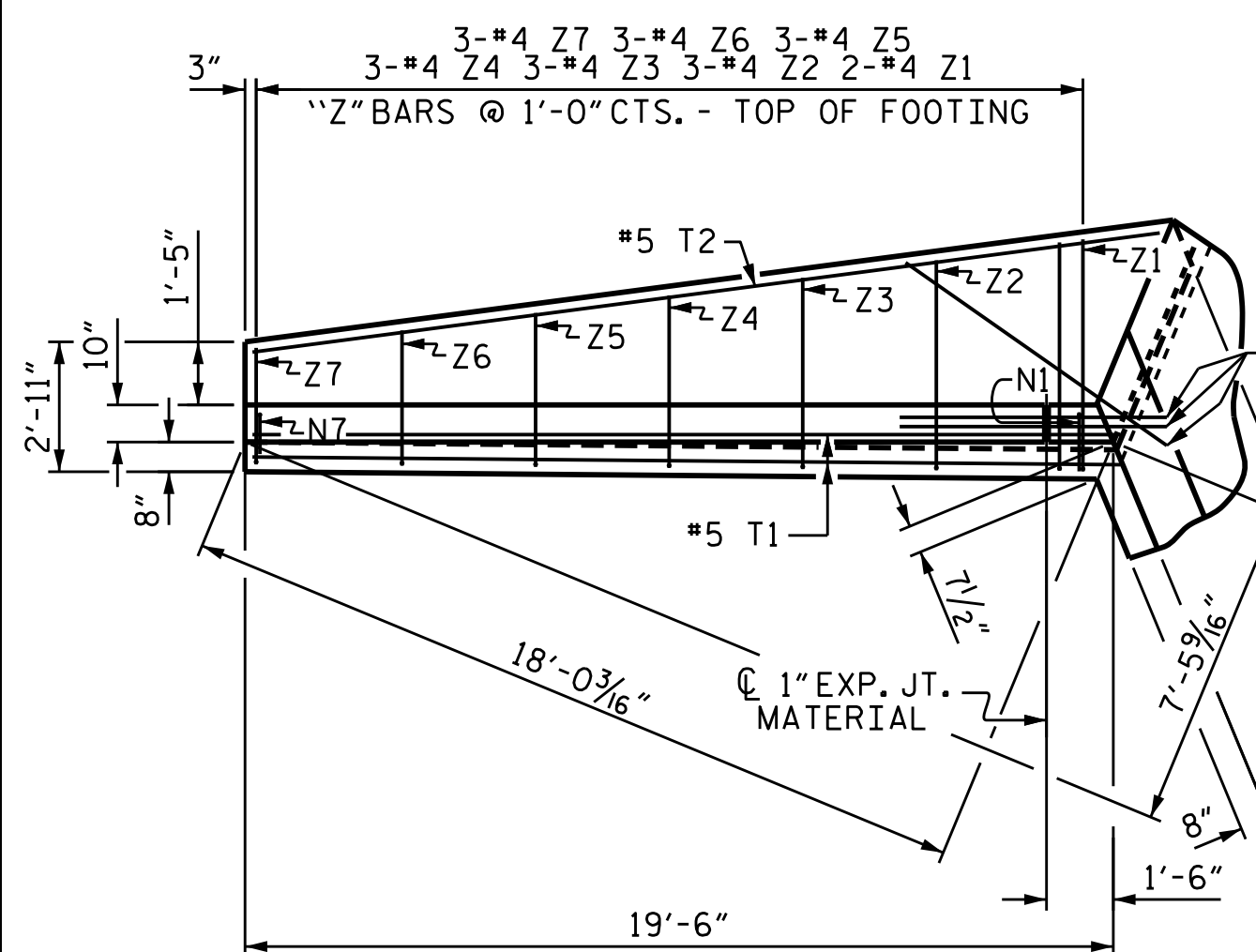


BILL OF MATERIAL

BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	#4	STR	17'-7"	70	S1	#6	STR	6'-0"	54
H2	#4	STR	14'-0"	19					
H3	#4	STR	7'-10"	10	T1	#5	STR	19'-6"	41
H4	#4	1	3'-3"	26	T2	#5	STR	20'-6"	21
H5	#4	STR	18'-1"	24	T3	#5	STR	47'-6"	149
H6	#4	STR	23'-10"	191					
H7	#4	STR	19'-5"	52	V1	#4	STR	8'-2"	11
H8	#4	STR	21'-9"	29	V2	#4	STR	7'-6"	15
H9	#4	2	3'-3"	26	V3	#4	STR	6'-9"	14
H10	#4	STR	24'-0"	64	V4	#4	STR	6'-0"	12
					V5	#4	STR	5'-4"	11
N1	#5	3	10'-2"	21	V6	#4	STR	4'-7"	9
N2	#5	3	9'-6"	30	V7	#4	STR	3'-9"	8
N3	#5	3	8'-10"	28	V8	#4	STR	8'-4"	11
N4	#4	3	8'-1"	16	V9	#4	STR	8'-0"	21
N5	#4	3	7'-4"	15	V10	#4	STR	7'-7"	20
N6	#4	3	6'-7"	13	V11	#4	STR	7'-3"	19
N7	#4	3	5'-10"	12	V12	#4	STR	6'-10"	18
N8	#5	3	10'-5"	22	V13	#4	STR	6'-5"	17
N9	#5	3	10'-1"	42	V14	#4	STR	6'-0"	16
N10	#5	3	9'-8"	40	V15	#4	STR	5'-8"	15
N11	#5	3	9'-3"	39	V16	#4	STR	5'-3"	14
N12	#4	3	8'-10"	24	V17	#4	STR	4'-10"	13
N13	#4	3	8'-5"	22	V18	#4	STR	4'-5"	12
N14	#4	3	8'-1"	22	V19	#4	STR	4'-0"	11
N15	#4	3	7'-8"	20	V20	#4	STR	3'-9"	8
N16	#4	3	7'-3"	19					
N17	#4	3	6'-10"	18	Z1	#4	4	5'-8"	8
N18	#4	3	6'-5"	17	Z2	#4	4	5'-2"	10
N19	#4	3	6'-1"	16	Z3	#4	4	4'-9"	10
N20	#4	3	5'-9"	12	Z4	#4	4	4'-4"	9
					Z5	#4	4	3'-11"	8
					Z6	#4	4	3'-6"	7
					Z7	#4	4	3'-1"	6
					Z8	#4	4	5'-11"	8
					Z9	#4	4	5'-9"	15
					Z10	#4	4	5'-6"	15
					Z11	#4	4	5'-3"	14
					Z12	#4	4	5'-0"	13
					Z13	#4	4	4'-9"	13
					Z14	#4	4	4'-6"	12
					Z15	#4	4	4'-3"	11
					Z16	#4	4	4'-0"	11
					Z17	#4	4	3'-9"	10
					Z18	#4	4	3'-6"	9
					Z19	#4	4	3'-3"	9
					Z20	#4	4	3'-1"	6

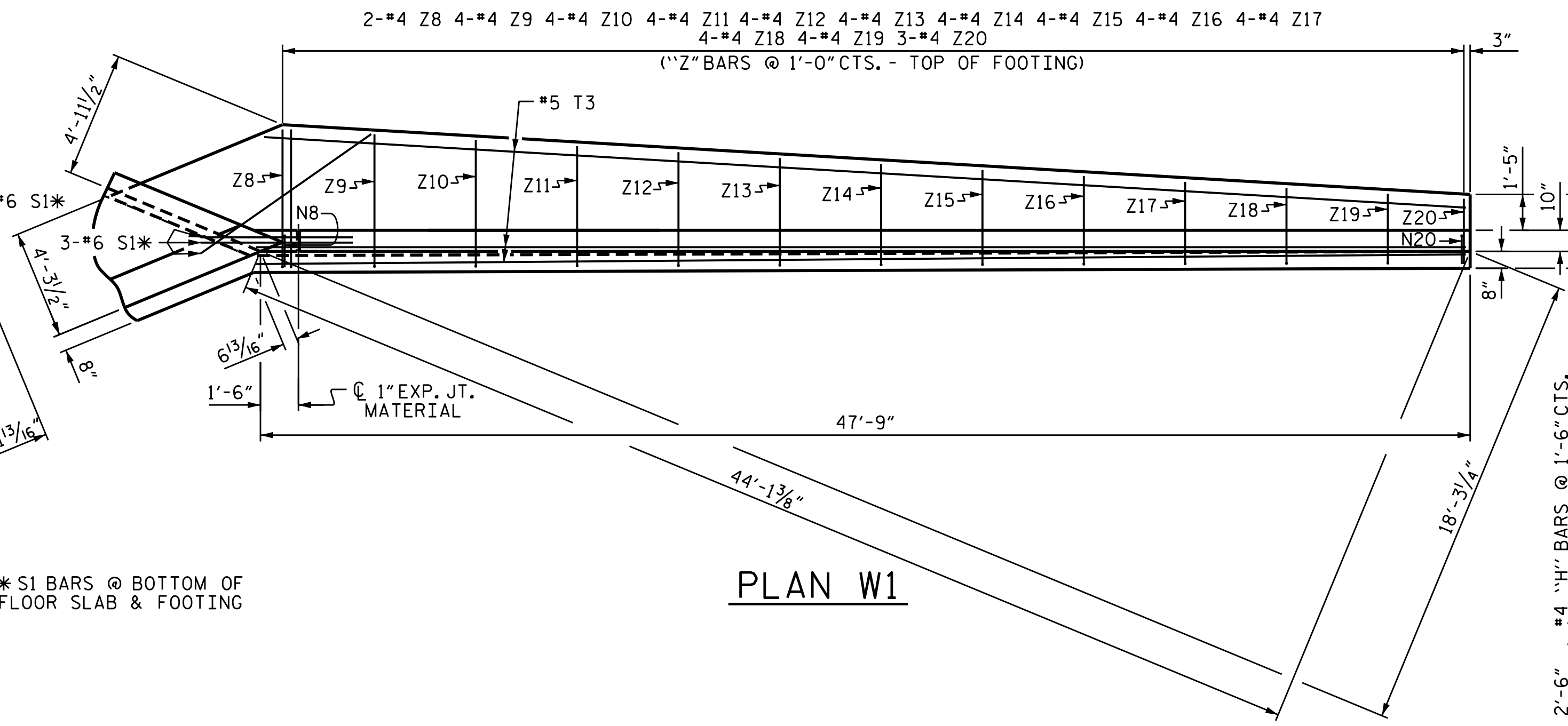
SPlice LENGTH CHART

BAR	SIZE	LENGTH
H6	#4	1'-11"
H7	#4	1'-11"
H10	#4	1'-11"

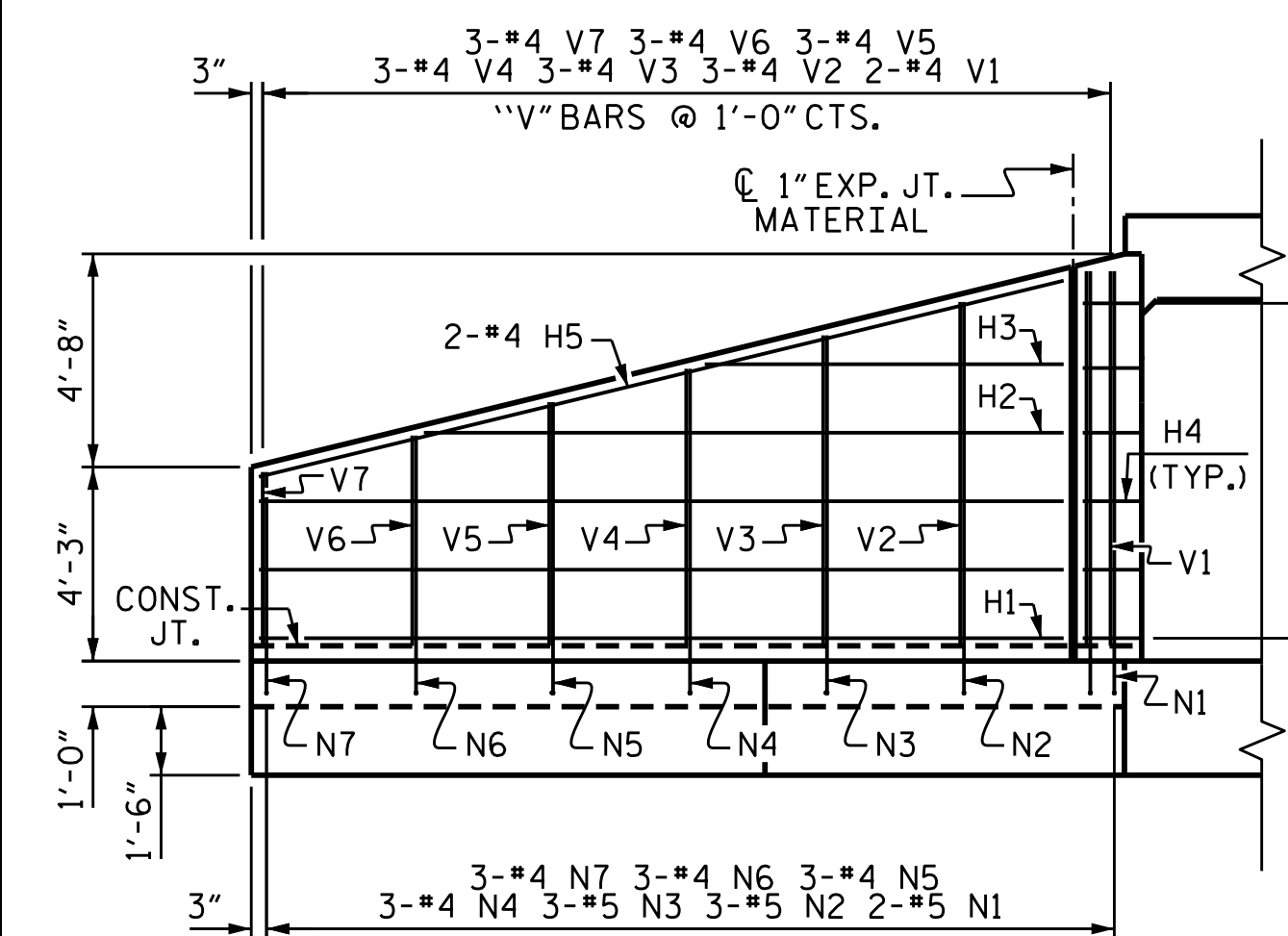


PLAN W2

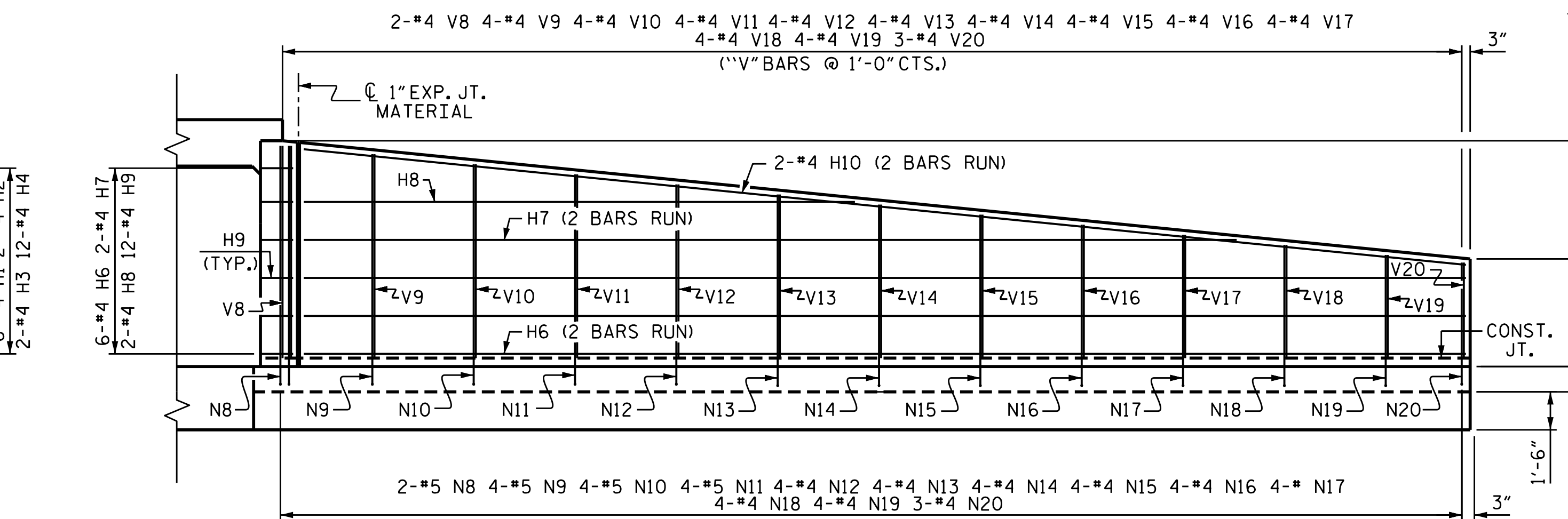
\* S1 BARS @ BOTTOM OF FLOOR SLAB & FOOTING



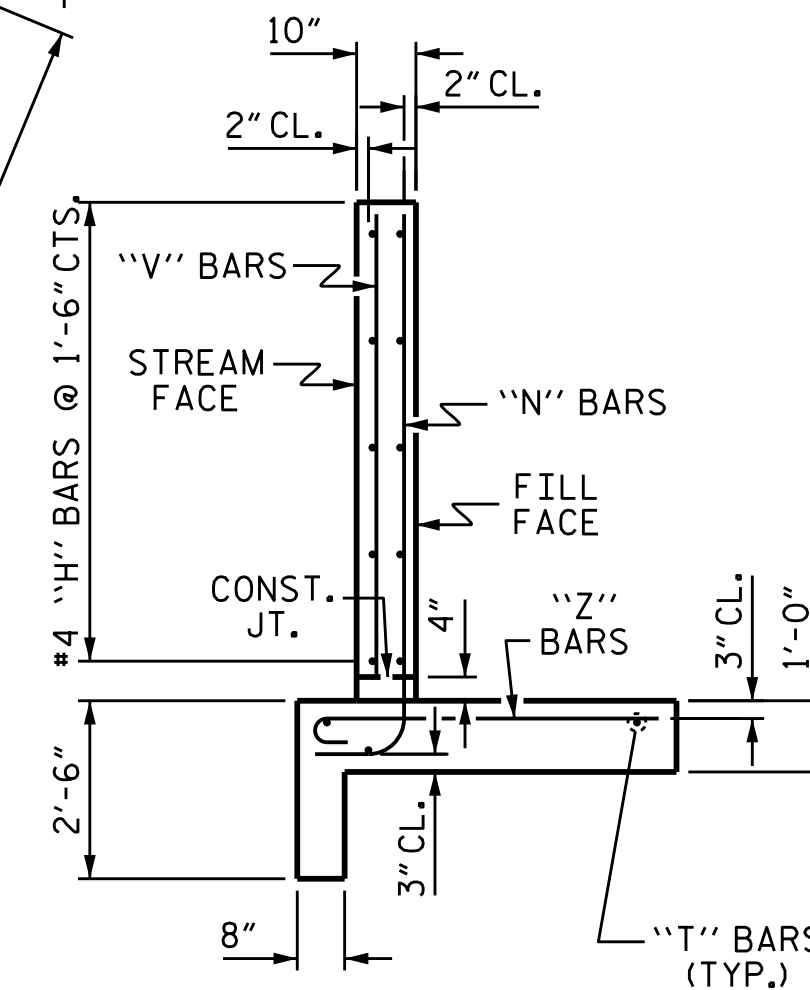
PLAN W1



ELEVATION W2



ELEVATION W1



TYPICAL WING SECTION

REINFORCING STEEL 1703 LBS FOR 2 WINGS

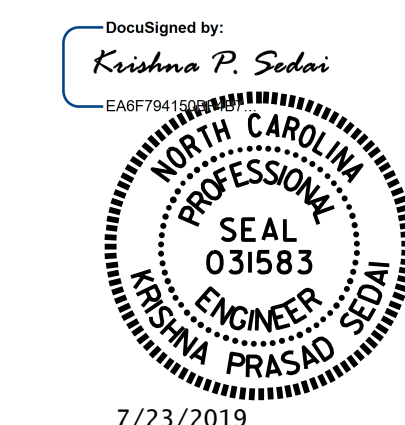
CLASS A CONCRETE

2 WINGS	26.5 CY
1 HEADWALL	1.3 CY
1 END CURTAIN WALL	1.6 CY
<b>TOTAL</b>	<b>29.4 CY</b>

PROJECT NO. R-3421A  
 RICHMOND COUNTY  
 STATION: 8+68.70 -LPB-

SHEET 7 OF 8

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**STANDARD WINGS FOR CONCRETE BOX CULVERT**  
 H = 7'-0" SLOPE = 4:1  
 45° SKEW



DRAWN BY: A. SORSENGINH DATE: 2/2019  
 CHECKED BY: M. G. SHAIKH DATE: 4/2019  
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE: 4/2019

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REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			8

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	--

LOAD AND RESISTANCE FACTOR RATING (LRFR)  
SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

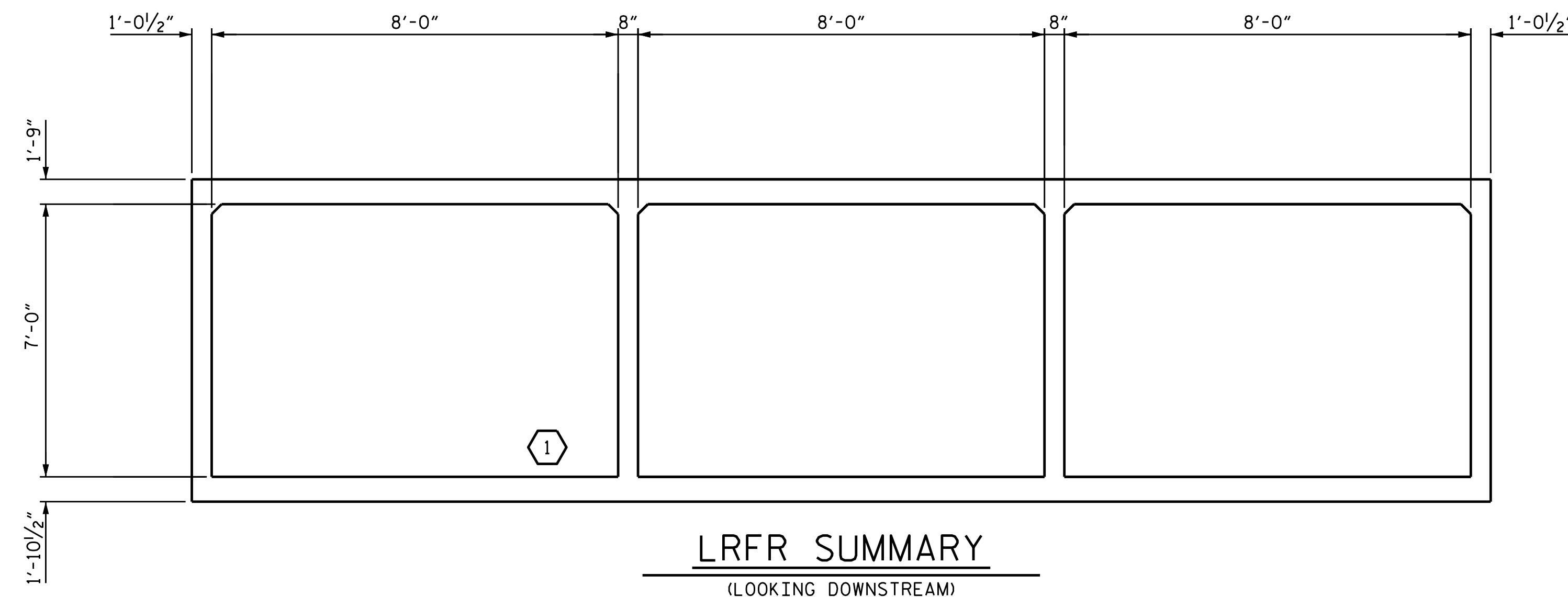
	CONTROLLING LOAD RATING	MINIMUM RATING FACTOR (RF)	STRENGTH I LIMIT STATE							
			MOMENT				SHEAR			
			RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)
PERMANENT LOAD RATING	1	1.02	1.34	2	BOTTOM SLAB	0.65	1.02	1	BOTTOM SLAB	7.01

NOTES:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

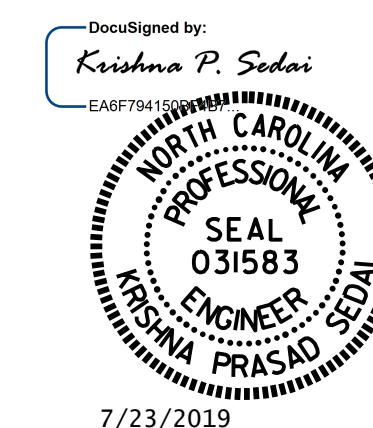
THE EFFECTS OF LIVE LOAD ON DESIGN AND LOAD RATING MAY BE NEGLECTED FOR CULVERTS WITH CERTAIN FILL DEPTHS DESCRIBED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

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



PROJECT NO. R-3421A  
RICHMOND COUNTY  
STATION: 8+68.70 -LPB-

SHEET 8 OF 8



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

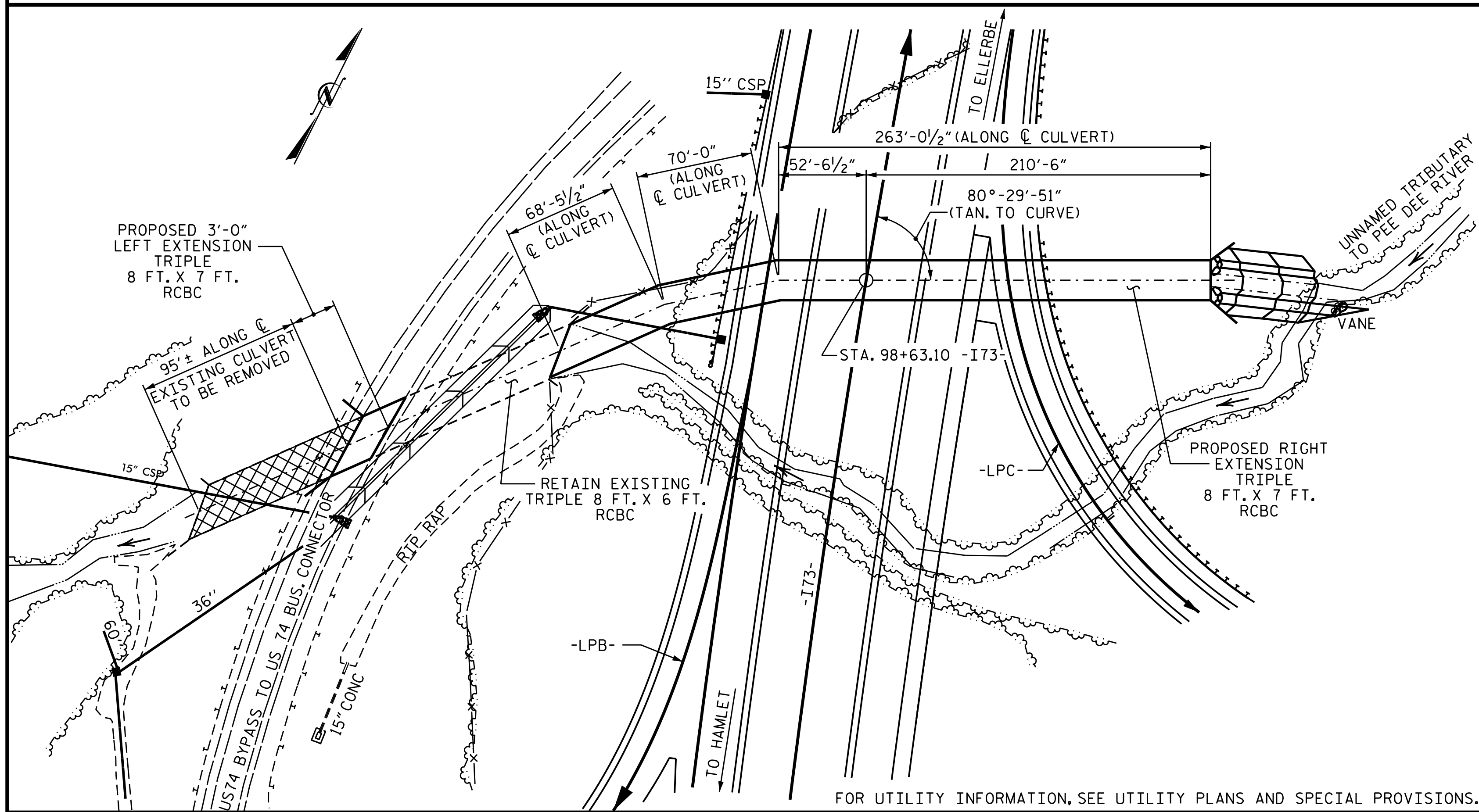
DRAWN BY : A. SORSENGINH DATE : 2/2019  
CHECKED BY : M. G. SHAIKH DATE : 4/2019  
DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 2/2019

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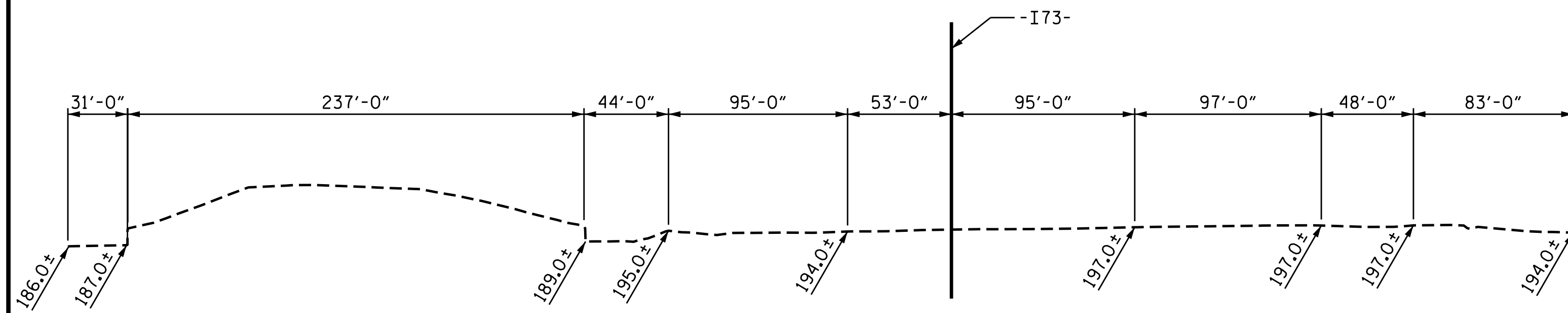
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NO.	BY:	DATE:	NO.	BY:	DATE:	C1-8
1			3			TOTAL SHEETS
2			4			8



BM: EXISTING INLET INVERT OF CULVERT UNDER US74 BYPASS CONNECTOR



LOCATION SKETCH



PROFILE ALONG CULVERT

NOTES:

ASSUMED LIVE LOAD ----- HL-93 OR ALTERNATE LOADING.

DESIGN FILL: ----- 59.06 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. PHASE I WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF PHASE I VERTICAL WALL.
2. THE REMAINING PORTIONS OF PHASE I WALL AND PHASE I WINGS FULL HEIGHT.
3. PHASE II WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF PHASE II VERTICAL WALLS.
4. THE REMAINING PORTIONS OF PHASE II WALLS 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 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 SIDES 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.

NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.

IF APPROVED BY THE ENGINEER, THE CONTRACTOR MAY USE THE EXISTING WINGS AS TEMPORARY SHORING FOR THE CONSTRUCTION OF THE CULVERT EXTENSIONS. IN THIS CASE, THE BOTTOM SLAB OF THE EXTENSION SHALL BE POURED AT LEAST 72 HOURS PRIOR TO CUTTING THE WINGS. THE WINGS MAY BE CUT EARLIER PROVIDED THE SLAB CONCRETE STRENGTH HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 1500 PSI.

NO WORK SHALL BE DONE ON THE CULVERT AT STA. 98+63.10 -I73- UNTIL THE AREA OF THE BOX CULVERT HAS BEEN UNDERCUT TO 3' BELOW CULVERT BOTTOM ELEVATION AT CULVERT INLET END TO 125' AND UNSUITABLE MATERIAL REPLACED WITH SUITABLE MATERIAL, PROPERLY COMPACTED TO THE ELEVATION OF THE BOTTOM OF THE PROPOSED FLOOR SLAB. THE LIMITS OF THIS UNDERCUT EXCAVATION SHALL BE AT LEAST THE LIMITS OF THE BOX CULVERT INCLUDING THE WINGS. NO SEPARATE PAYMENT WILL BE MADE FOR ANY TEMPORARY SHEETING, UNDERCUT, OR UNSUITABLE MATERIAL REPLACEMENT AS REQUIRED TO CONSTRUCT THE PROPOSED CULVERT. PAYMENT IS INCLUDED IN THE LUMP SUM PRICE FOR CULVERT EXCAVATION.

GRADE DATA

GRADE PT. EL. @ STA. 98+63.10 -I73- = 251.64'  
 BED EL. @ STA. 98+63.10 -I73- = 189.92'  
 ROADWAY SLOPES = 2:1

HYDRAULIC DATA

DESIGN DISCHARGE = 1100 C.F.S.  
 FREQUENCY OF DESIGN FLOOD = 50 YEARS  
 DESIGN HIGH WATER ELEVATION = 199.90  
 DRAINAGE AREA = 2.17 SQ. MI.  
 BASE DISCHARGE (Q100) = 1200 C.F.S.  
 BASE HIGH WATER ELEVATION = 200.20

OVERTOPPING DATA

OVERTOPPING DISCHARGE = 5000 C.F.S.  
 FREQUENCY OF OVERTOPPING FLOOD = 500 YEARS+  
 OVERTOPPING FLOOD ELEVATION = 246.00

DOWELS SHALL BE USED TO CONNECT THE CULVERT EXTENSION TO THE EXISTING CULVERT AS SHOWN. FOR NOTE REGARDING SETTING OF DOWELS, SEE SHEET SN.

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.

TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FEET. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

BACKFILL WITH SELECT MATERIAL, CLASS VI MEETING THE REQUIREMENTS OF SECTION 1016 OF THE STANDARD SPECIFICATION.

CONSTRUCT THE REINFORCED CONCRETE BOX CULVERT AT STATION 98+63.10 -I73- WITH THE WESTERN MOST 100 FOOT SEGMENT UP TO 2" INCHES OF CAMBER, THE MIDDLE 200 FOOT SECTION OF CULVERT SHOULD INCREASE FROM 2 INCHES UP TO A 3 INCH CAMBER, AND THE EASTERN MOST 100 FOOT SECTION SHOULD TAPER FROM A 3 INCH THEN TO 6 INCH CAMBER AND THEN BACK TO 3 INCHES OF CAMBER AT THE INLET END TO ACCOUNT FOR ANTICIPATED SETTLEMENT.

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE	
RIGHT EXTENSION	2248.1 C.Y.
LEFT EXTENSION	49.1 C.Y.
TOTAL	2297.2 C.Y.

REINFORCING STEEL	
RIGHT EXTENSION	174,988 LBS.
LEFT EXTENSION	4,449 LBS.
TOTAL	179,437 LBS.

FOUNDATION CONDITIONING MATERIAL	
RIGHT EXTENSION	790 TONS
LEFT EXTENSION	6 TONS
TOTAL	796 TONS

CULVERT EXCAVATION	LUMP SUM
REMOVAL OF EXISTING STRUCTURE	LUMP SUM

PROJECT NO. R-3421A  
 RICHMOND COUNTY  
 STATION: 98+63.10 -I73-

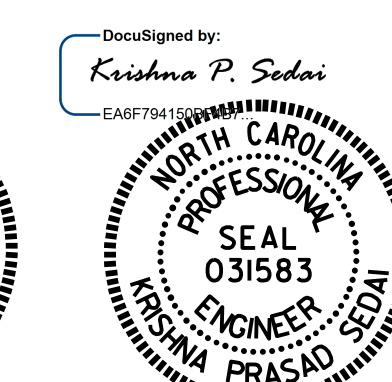
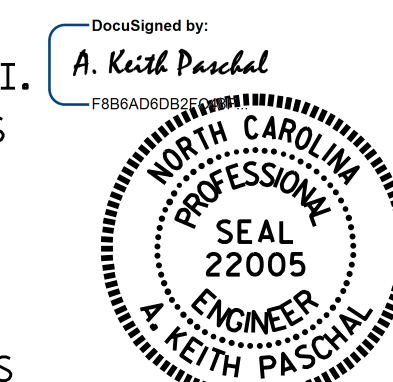
SHEET 1 OF 11 EXTEND CULVERT NO. 760224

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 TRIPLE 8 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 LEFT AND RIGHT  
 EXTENSION

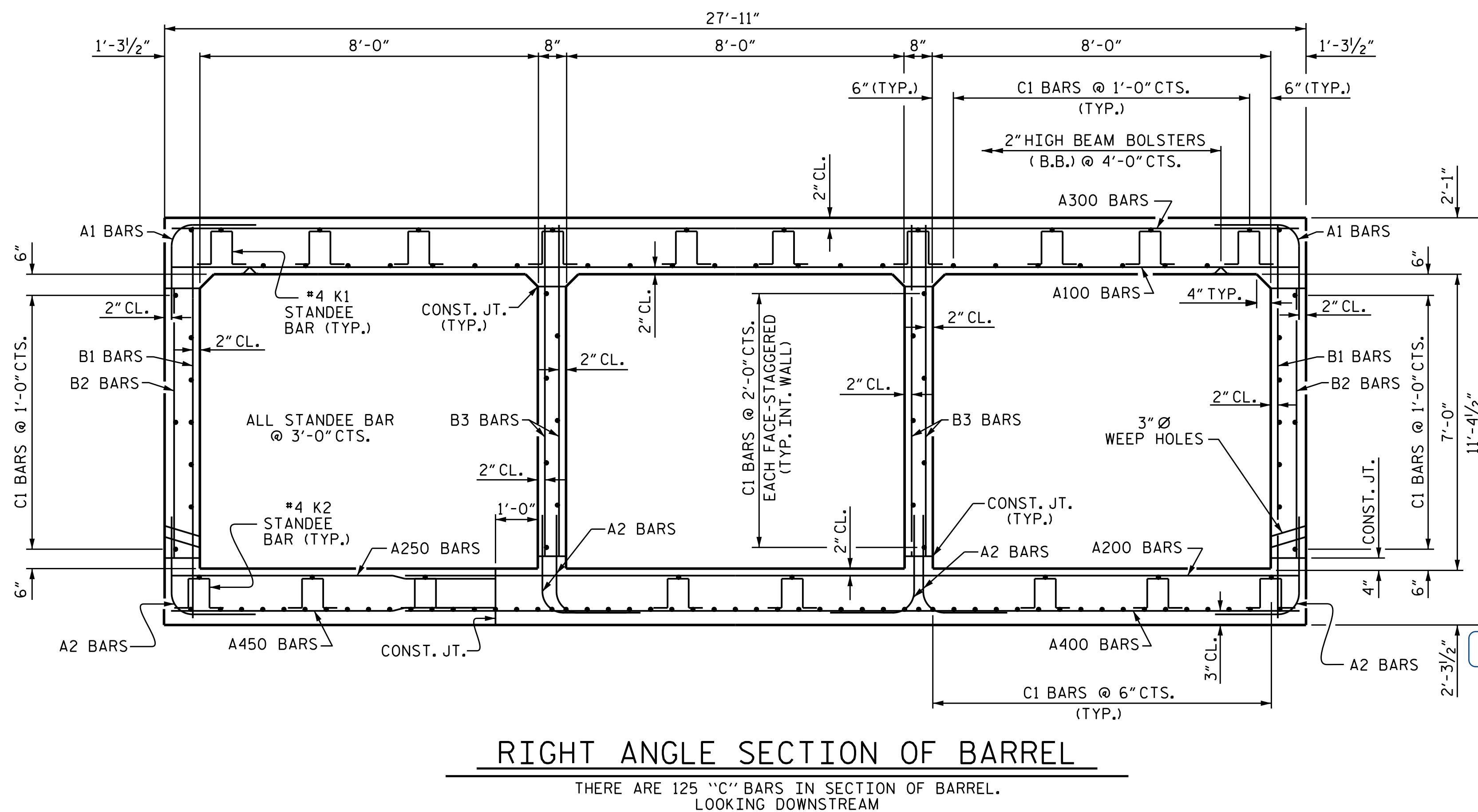
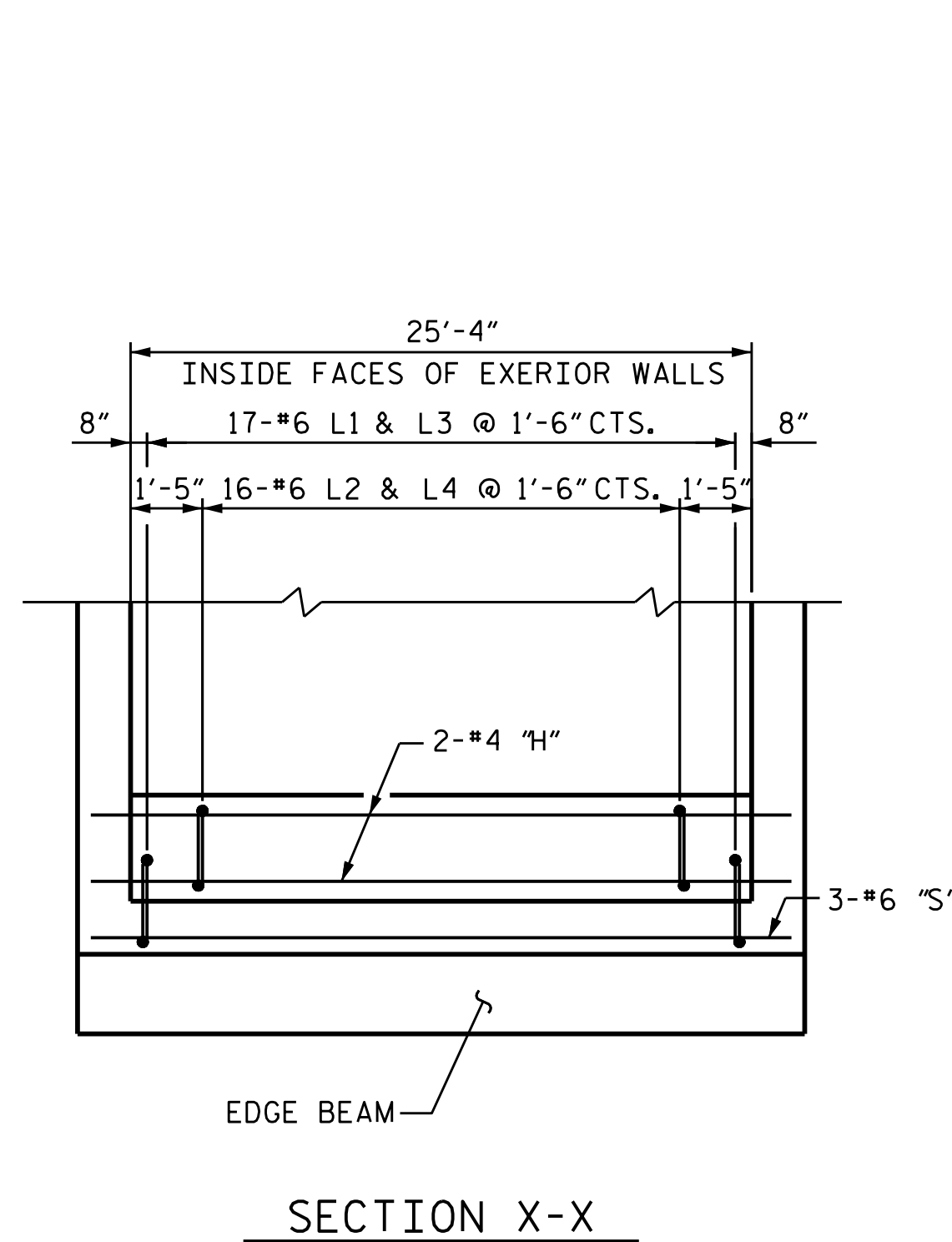
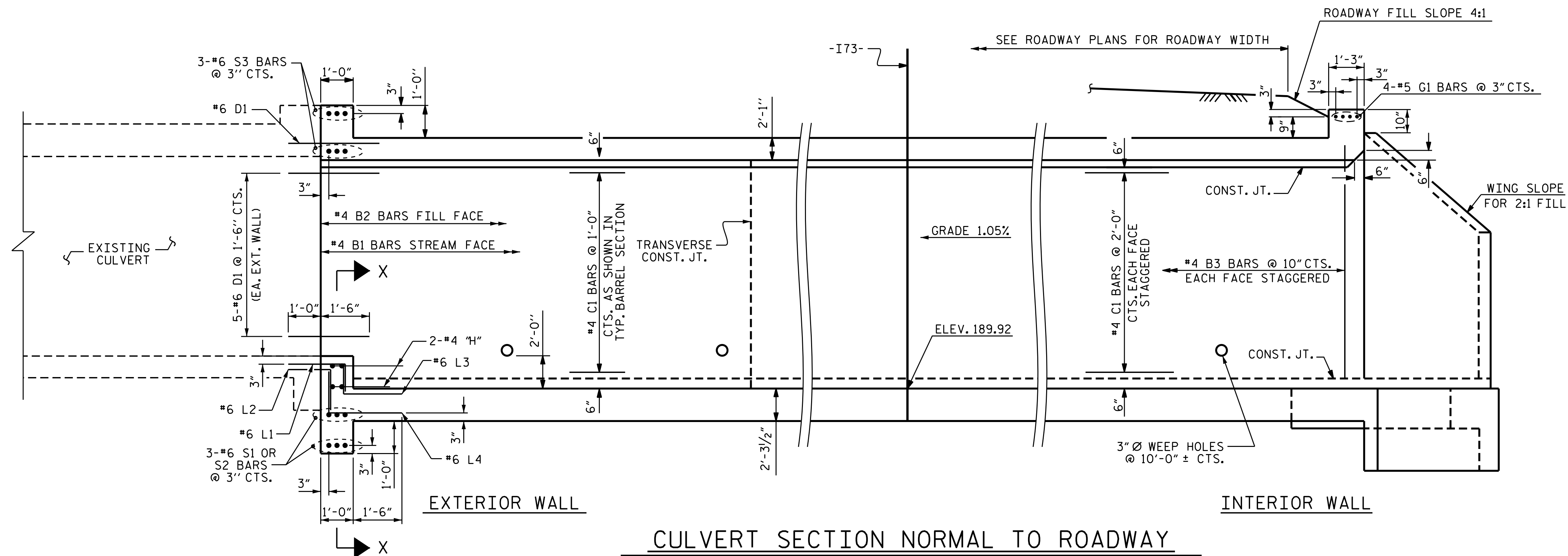
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1			3			TOTAL SHEETS
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DRAWN BY : A. SORSENGINH DATE : 3/2019  
 CHECKED BY : E. BAYISSA/M. G. SHAIKH DATE : 4/2019  
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 4/2019

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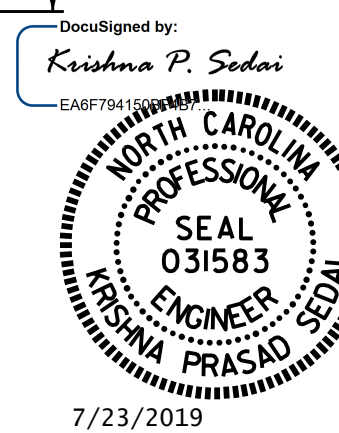


PROJECT NO. R-3421A  
RICHMOND COUNTY  
 STATION: 98+63.10 -I73-

SHEET 2 OF 11

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

TRIPLE 8 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 RIGHT EXTENSION

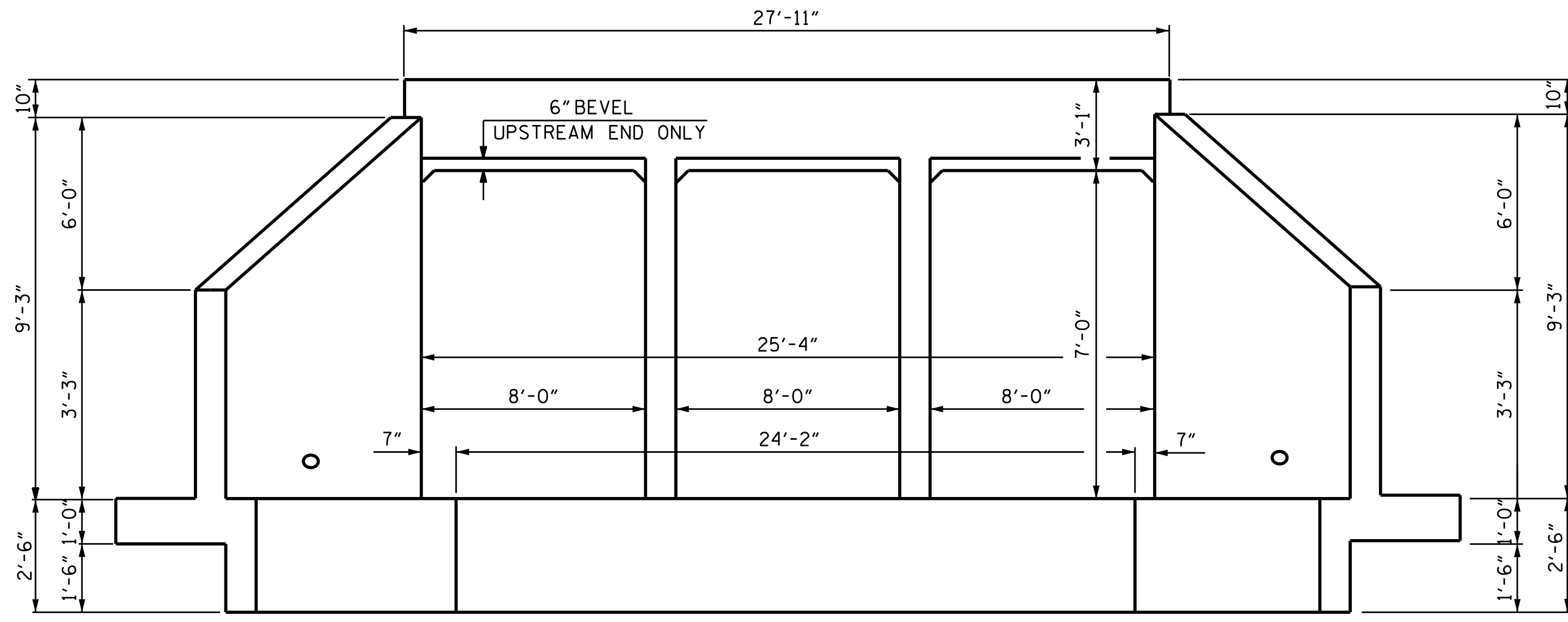


DRAWN BY : A. SORSENGINH DATE : 2/2019  
 CHECKED BY : M. G. SHAIKH DATE : 5/2019  
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 2/2019

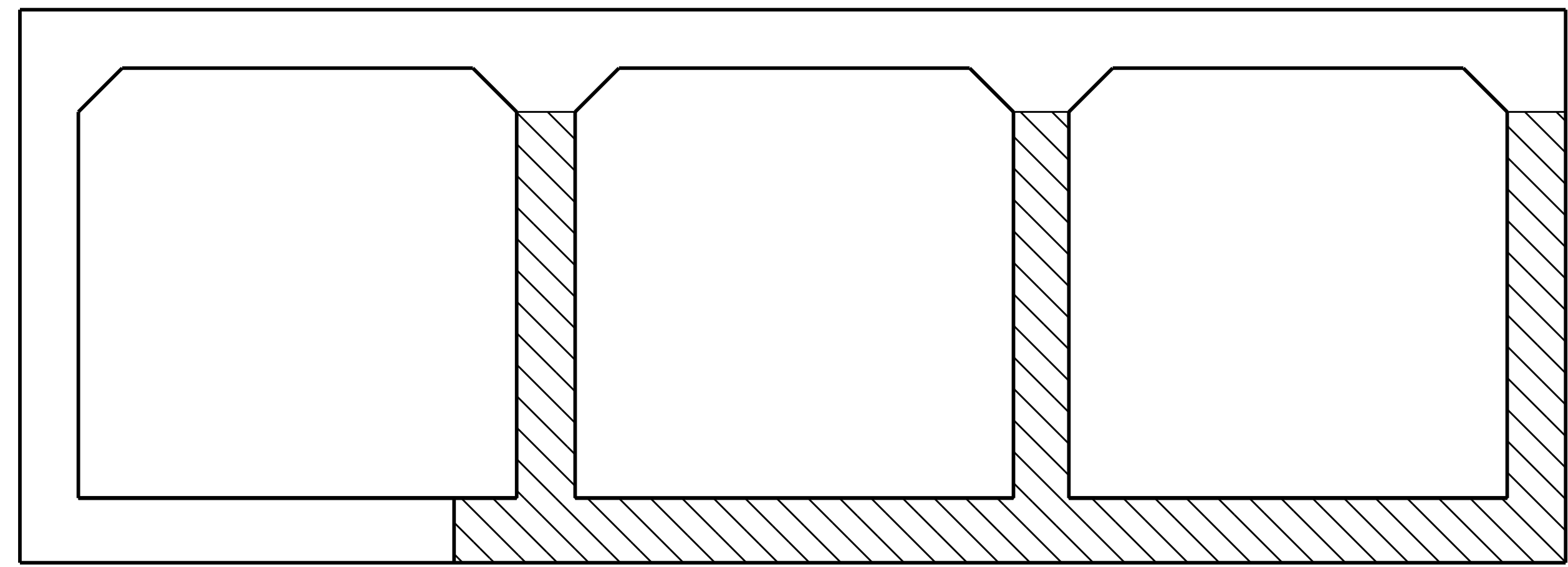
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2			4			11





INLET ELEVATION NORMAL TO SKEW

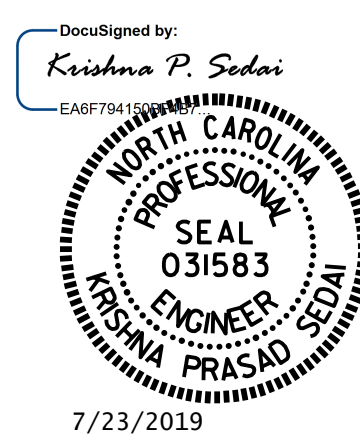


CONSTRUCTION PHASING  
(LOOKING DOWNSTREAM)

- PHASE I CONSTRUCTION
- PHASE II CONSTRUCTION

PROJECT NO. R-3421A  
RICHMOND COUNTY  
 STATION: 98+63.10 -I73-

SHEET 3 OF 11



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 TRIPLE 8 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 RIGHT EXTENSION

DRAWN BY : A. SORSENGINH DATE : 2/2019  
 CHECKED BY : E. BAYISSA/M. G. SHAIKH DATE : 5/2019  
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 2/2019

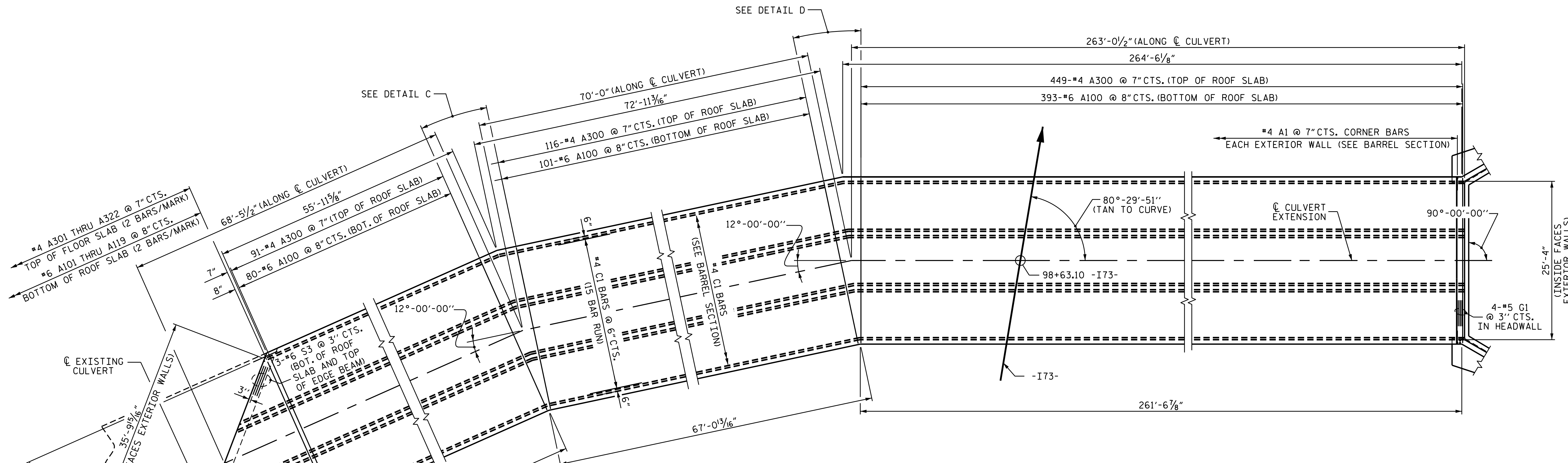
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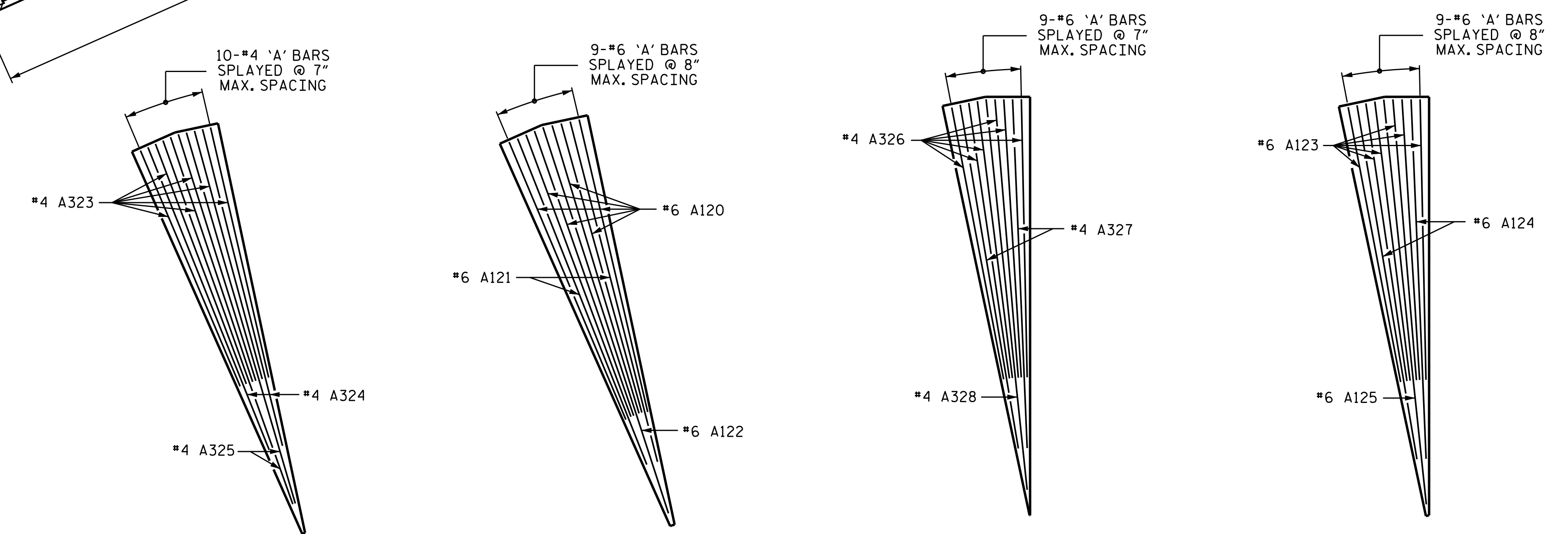






**PLAN - ROOF SLAB**

#4 CI SHALL BE FIELD BENT AS NECESSARY.



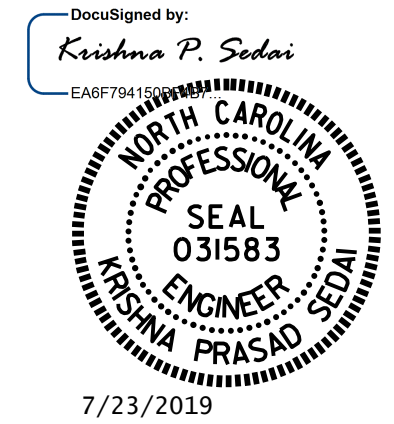
DETAIL C  
TOP OF ROOF SLAB

DETAIL C  
BOTTOM OF ROOF SLAB

DETAIL D  
TOP OF ROOF SLAB

DETAIL D  
BOTTOM OF ROOF SLAB

DRAWN BY : A. SORSENGINH DATE : 3/2019  
 CHECKED BY : E. BAYISSA/M. G. SHAIKH DATE : 4/2019  
 DESIGN ENGINEER OF RECORD : A. SORSENGINH DATE : 3/2019



PROJECT NO. R-3421A  
RICHMOND COUNTY  
 STATION: 98+63.10 -I73-

SHEET 5 OF 11

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**TRIPLE 8 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 80°-29'-51" SKEW  
 RIGHT EXTENSION**

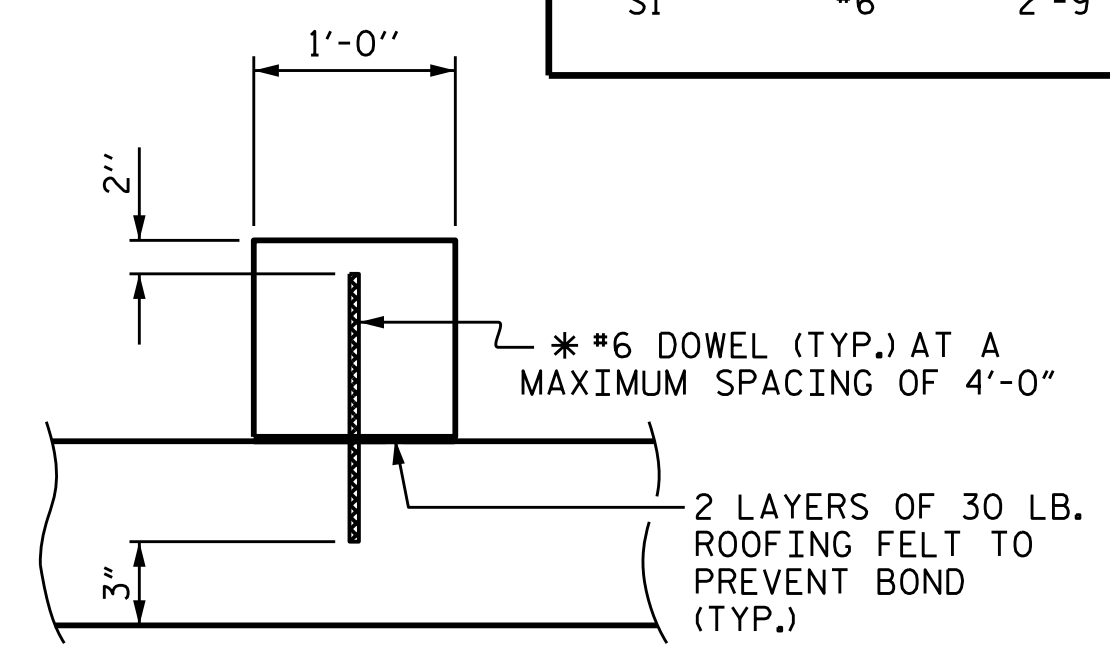
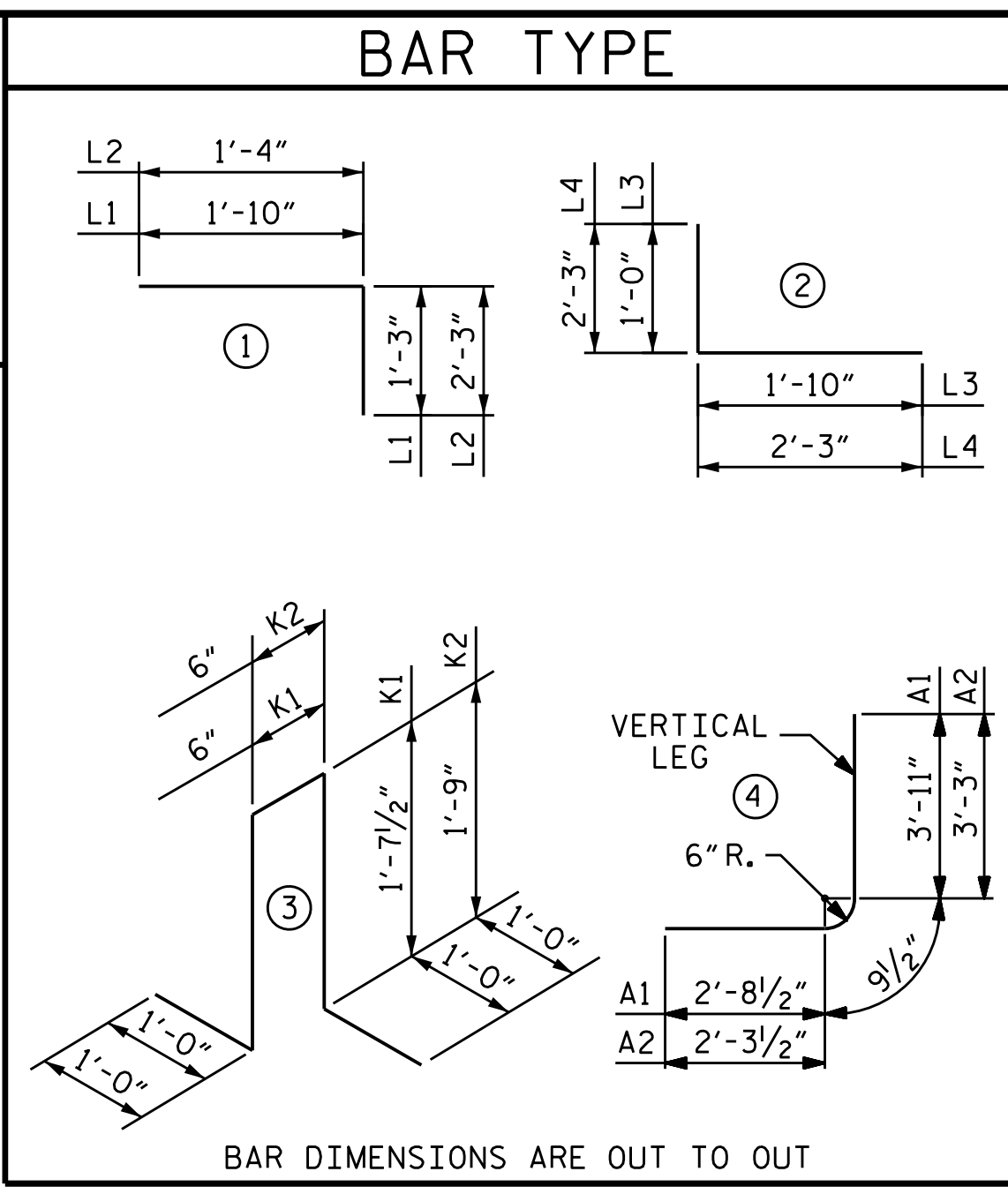
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-5
1			3			TOTAL SHEETS
2			4			11

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED



**SPLICE LENGTH CHART**

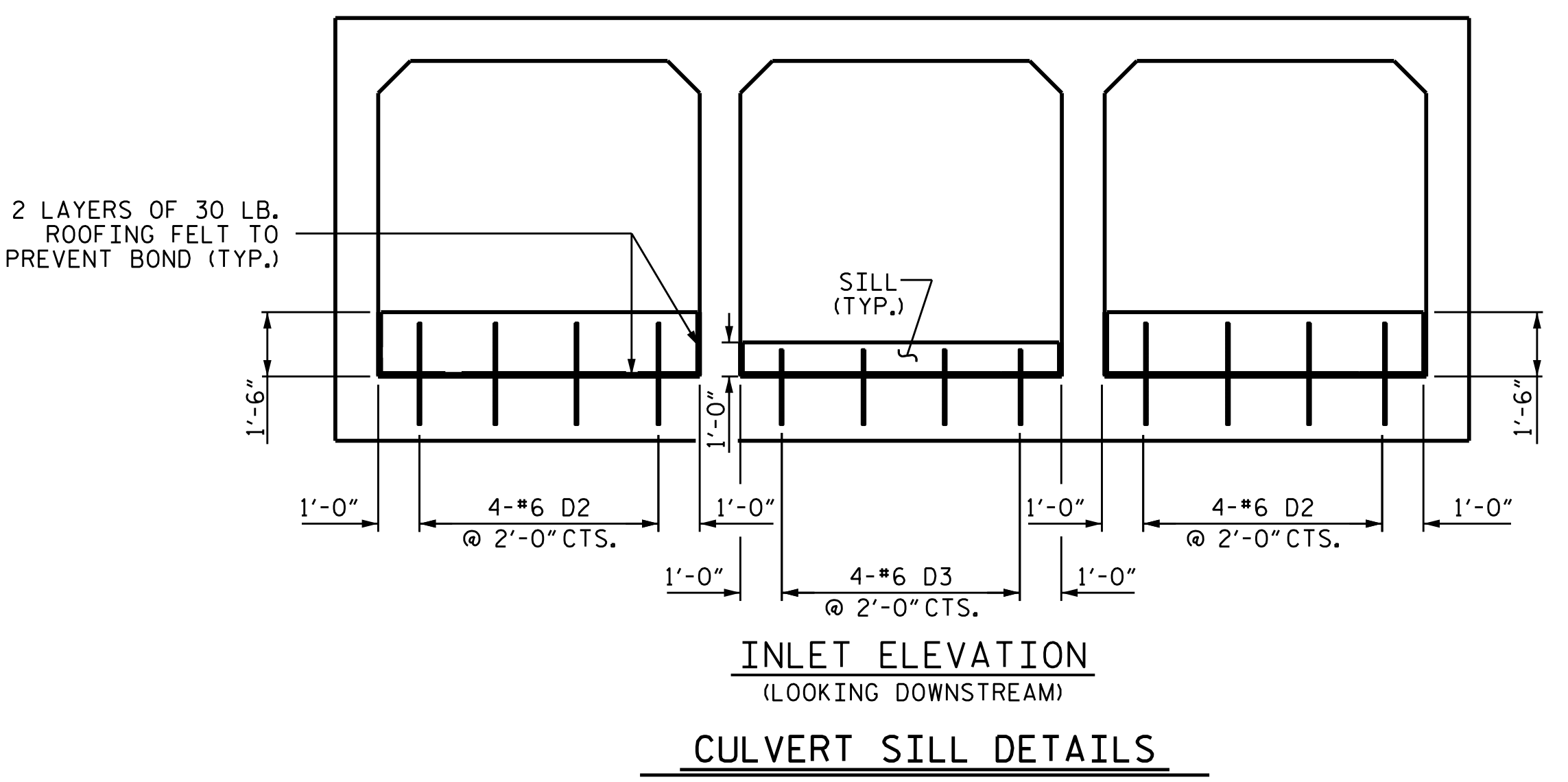
BAR	SIZE	LENGTH
A200	#5	2'-5"
A400	#5	1'-9"
B1	#4	1'-5"
B3	#4	1'-5"
C1	#4	1'-11"
S1	#6	2'-9"



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

**BAR SCHEDULE**

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	1378	#4	4	7'-5"	6827	A210	2	#5	STR	12'-0"	25	A309	2	#4	STR	17'-4"	23	A420	4	#5	STR	13'-8"	57
A2	3306	#4	4	6'-4"	13987	A211	2	#5	STR	11'-0"	23	A310	2	#4	STR	16'-2"	22	A421	2	#5	STR	17'-11"	37
A100	574	#6	STR	27'-7"	23781	A212	2	#5	STR	10'-0"	21	A311	2	#4	STR	15'-0"	20	A422	1	#5	STR	20'-0"	21
A101	2	#6	STR	26'-4"	79	A214	2	#5	STR	8'-0"	17	A313	2	#4	STR	12'-8"	17	A450	690	#5	STR	8'-1"	5817
A102	2	#6	STR	25'-0"	75	A215	2	#5	STR	7'-0"	15	A314	2	#4	STR	11'-6"	15	A451	2	#5	STR	7'-0"	15
A103	2	#6	STR	23'-8"	71	A216	2	#5	STR	6'-0"	13	A315	2	#4	STR	10'-4"	14	A452	2	#5	STR	5'-10"	12
A104	2	#6	STR	22'-4"	67	A217	2	#5	STR	5'-0"	10	A316	2	#4	STR	9'-2"	12	A453	2	#5	STR	4'-8"	10
A105	2	#6	STR	21'-0"	63	A218	2	#5	STR	4'-0"	8	A317	2	#4	STR	8'-0"	11	A454	2	#5	STR	3'-6"	7
A106	2	#6	STR	19'-8"	59	A219	2	#5	STR	8'-4"	17	A318	2	#4	STR	6'-10"	9	A455	2	#5	STR	2'-4"	5
A107	2	#6	STR	18'-4"	55	A220	4	#5	STR	14'-0"	58	A319	2	#4	STR	5'-8"	8	A456	2	#5	STR	6'-0"	13
A108	2	#6	STR	17'-1"	51	A221	2	#5	STR	16'-6"	34	A320	2	#4	STR	4'-6"	6	A457	2	#5	STR	5'-8"	12
A109	2	#6	STR	15'-8"	47	A222	2	#5	STR	8'-8"	18	A321	2	#4	STR	3'-4"	4						
A110	2	#6	STR	14'-5"	43	A223	4	#5	STR	14'-10"	62	A322	2	#4	STR	2'-2"	3	B1	804	#4	STR	10'-10"	5818
A111	2	#6	STR	13'-1"	39	A224	2	#5	STR	17'-2"	36	A323	6	#4	STR	17'-0"	68	B2	1378	#4	STR	6'-4"	5830
A112	2	#6	STR	11'-9"	35							A324	2	#4	STR	21'-8"	29	B3	1928	#4	STR	8'-7"	11055
A113	2	#6	STR	10'-5"	31	A250	803	#5	STR	8'-1"	6770	A325	2	#4	STR	25'-9"	34						
A114	2	#6	STR	9'-1"	27	A251	2	#5	STR	7'-4"	15	A326	6	#4	STR	18'-6"	74	C1	1875	#4	STR	28'-9"	36009
A115	2	#6	STR	7'-9"	23	A252	2	#5	STR	6'-4"	13	A327	2	#4	STR	23'-3"	31						
A116	2	#6	STR	6'-5"	19	A253	2	#5	STR	5'-4"	11	A328	1	#4	STR	26'-2"	17	D1	29	#6	STR	2'-6"	109
A117	2	#6	STR	5'-1"	15	A254	2	#5	STR	4'-4"	9							D2	8	#6	STR	3'-4"	40
A118	2	#6	STR	3'-9"	11	A255	2	#5	STR	3'-4"	7	A400	661	#5	STR	21'-2"	14593	D3	4	#6	STR	2'-10"	17
A119	2	#6	STR	2'-5"	7	A256	2	#5	STR	2'-4"	5	A401	2	#5	STR	20'-1"	42						
A120	6	#6	STR	20'-0"	180	A257	2	#5	STR	5'-7"	12	A402	2	#5	STR	18'-11"	39	G1	4	#5	STR	27'-7"	115
A121	2	#6	STR	23'-4"	70	A258	2	#5	STR	7'-1"	15	A403	2	#5	STR	17'-9"	37						
A122	1	#6	STR	27'-0"	41	A259	2	#5	STR	5'-9"	12	A404	2	#5	STR	16'-7"	35	H1	4	#4	STR	29'-5"	79
A123	6	#6	STR	18'-7"	167	A260	2	#5	STR	7'-5"	15	A405	2	#5	STR	15'-5"	32	H2	4	#4	STR	11'-6"	31
A124	2	#6	STR	23'-11"	72							A406	2	#5	STR	14'-3"	30						
A125	1	#6	STR	27'-1"	41	A300	656	#4	STR	27'-7"	12087	A407	2	#5	STR	13'-1"	27	K1	1206	#4	3	5'-9"	4632
						A301	2	#4	STR	26'-7"	36	A408	2	#5	STR	11'-11"	25	K2	1206	#4	3	6'-0"	4834
A200	771	#5	STR	21'-10"	17557	A302	2	#4	STR	25'-5"	34	A409	2	#5	STR	10'-9"	22						
A201	2	#5	STR	21'-0"	44	A303	2	#4	STR	24'-3"	32	A410	2	#5	STR	9'-7"	20	L1	17	#6	1	3'-1"	79
A202	2	#5	STR	20'-0"	42	A304	2	#4	STR	23'-1"	31	A411	2	#5	STR	8'-5"	18	L2	16	#6	1	3'-7"	86
A203	2	#5	STR	19'-0"	40	A305	2	#4	STR	21'-11"	29	A412	2	#5	STR	7'-3"	15	L3	17	#6	2	2'-10"	72
A204	2	#5	STR	18'-0"	38	A306	2	#4	STR	20'-9"	28	A413	2	#5	STR	6'-1"	13	L4	16	#6	2	4'-6"	108
A205	2	#5	STR	17'-0"	35	A307	2	#4	STR	19'-8"	26	A414	2	#5	STR	4'-11"	10						
A206	2	#5	STR	16'-0"	33	A308	2	#4	STR	18'-6"	25	A415	2	#5	STR	3'-9"	8	S1	3	#6	STR	31'-5"	142
A207	2	#5	STR	15'-0"	31							A416	2	#5	STR	2'-7"	5	S2	3	#6	STR	7'-7"	34
A208	2	#5	STR	14'-0"	29							A417	4	#5	STR	13'-1"	55	S3	6	#6	STR	39'-0"	351
A209	2	#5	STR	13'-0"	27							A418	2	#5	STR	17'-7"	37						
												A419	1	#5	STR	19'-3"	20						
												REINFORCING STEEL = 174,412 LBS											



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.

**RIGHT EXTENSION STRUCTURE QUANTITIES**

CLASS A CONCRETE	
BARREL @ 5.551 CY/FT	2,228.7 C.Y.
WINGS, ETC.	11.4 C.Y.
EDGE BEAMS	4.4 C.Y.
SILLS	3.6 C.Y.
<b>TOTAL</b>	<b>2248.1 C.Y.</b>
REINFORCING STEEL	
BARREL	174,412 LBS.
WINGS, ETC.	576 LBS.
<b>TOTAL</b>	<b>174,988 LBS.</b>
FOUNDATION CONDITIONING MATERIAL	790 TONS
CULVERT EXCAVATION	LUMP SUM

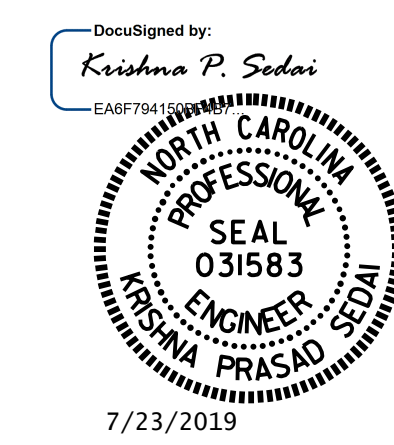
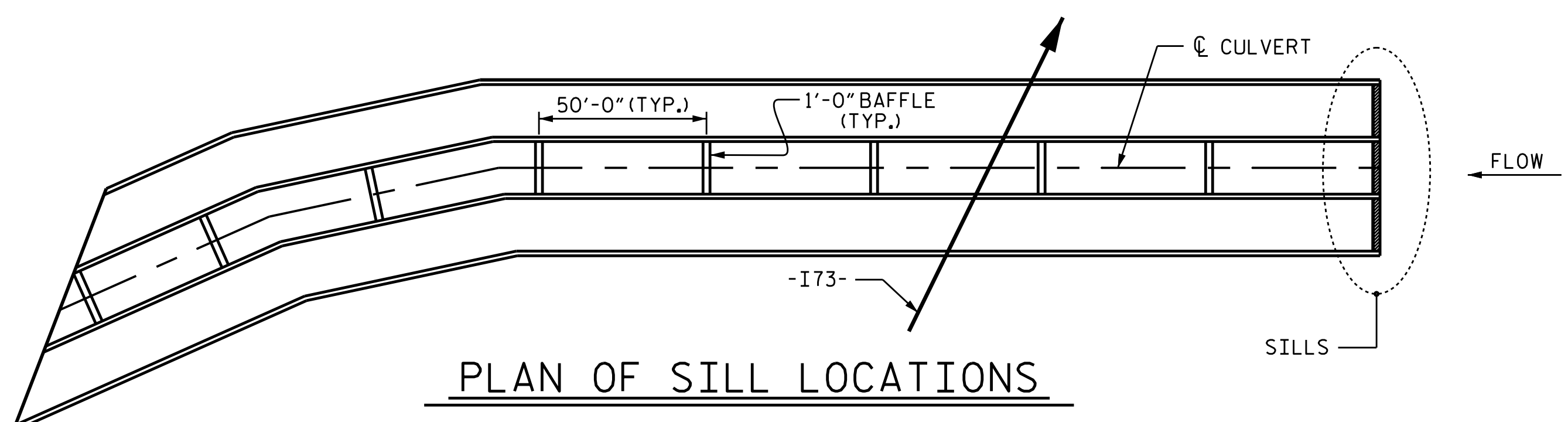
**NOTES**

NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OF FLOODPLAIN AT THE PROJECT SITE DURING CULVERT CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAMBED MAY BE USED TO LINE THE LOW FLOW BARREL. RIP RAP MAY BE USED TO SUPPLEMENT THE NATIVE MATERIAL IN THE HIGH FLOW 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.

THE ENTIRE COST OF WORK REQUIRED TO PLACE EXCAVATED MATERIAL OR SUPPLEMENT MATERIAL AS SHOWN ON THE PLANS SHALL BE INCLUDED IN THE CONTRACT LUMP SUM PRICE BID FOR CULVERT EXCAVATION.

THE ENTIRE COST OF WORK REQUIRED TO CONSTRUCT THE SILLS SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

THE STOCKPILED MATERIAL SHALL BE PLACED EVEN WITH THE TOP OF THE SILLS.



PROJECT NO. R-3421A  
RICHMOND COUNTY  
 STATION: 98+63.10 - I73-  
 SHEET 6 OF 11

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

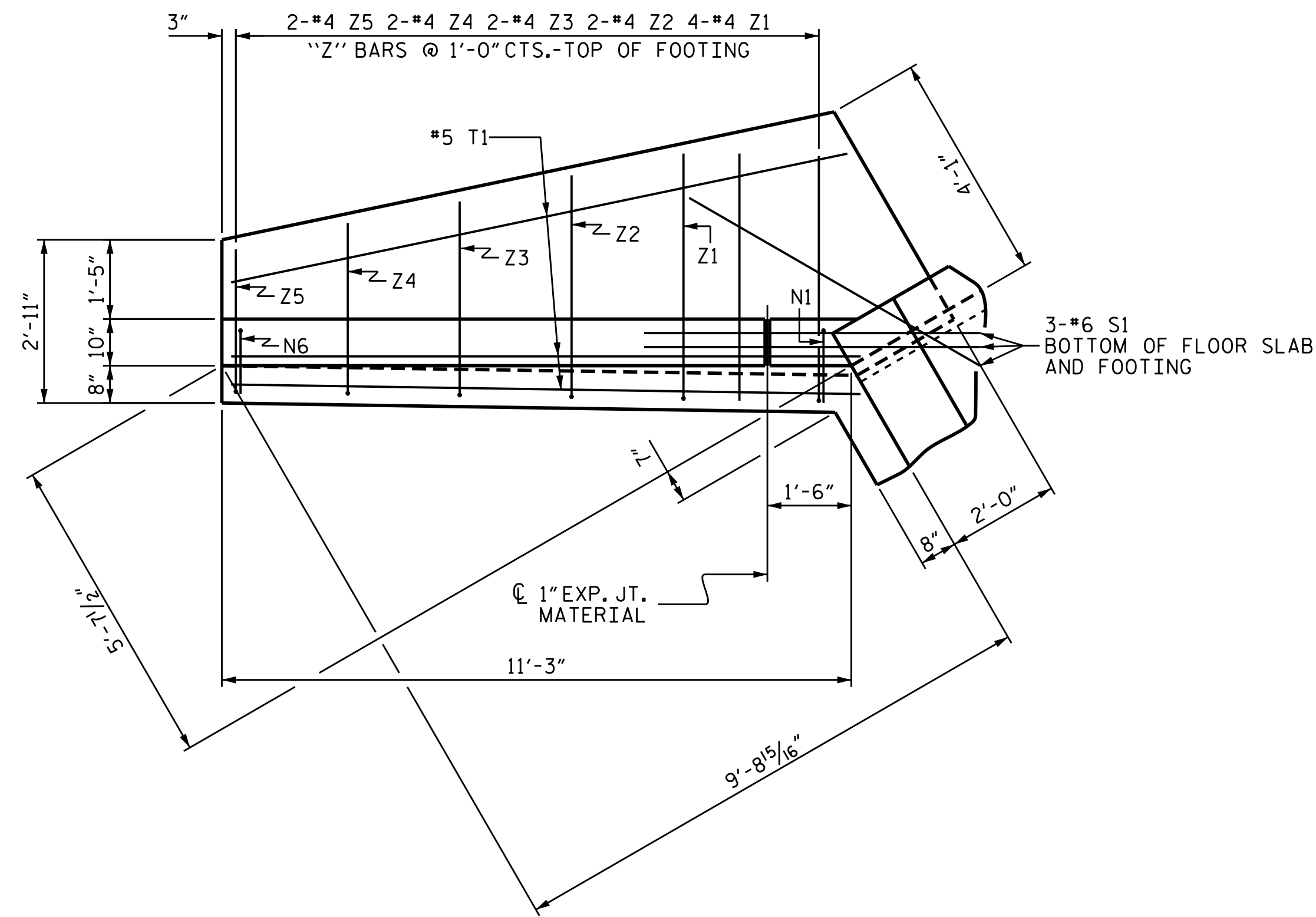
**TRIPLE 8 FT. X 7 FT. CONCRETE BOX CULVERT**  
**80°-29'-51" SKEW**

DRAWN BY : A. SORSENGINH DATE : 3/2019  
 CHECKED BY : E. BAYISSA/M. G. S. DATE : 4/2019  
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 3/2019

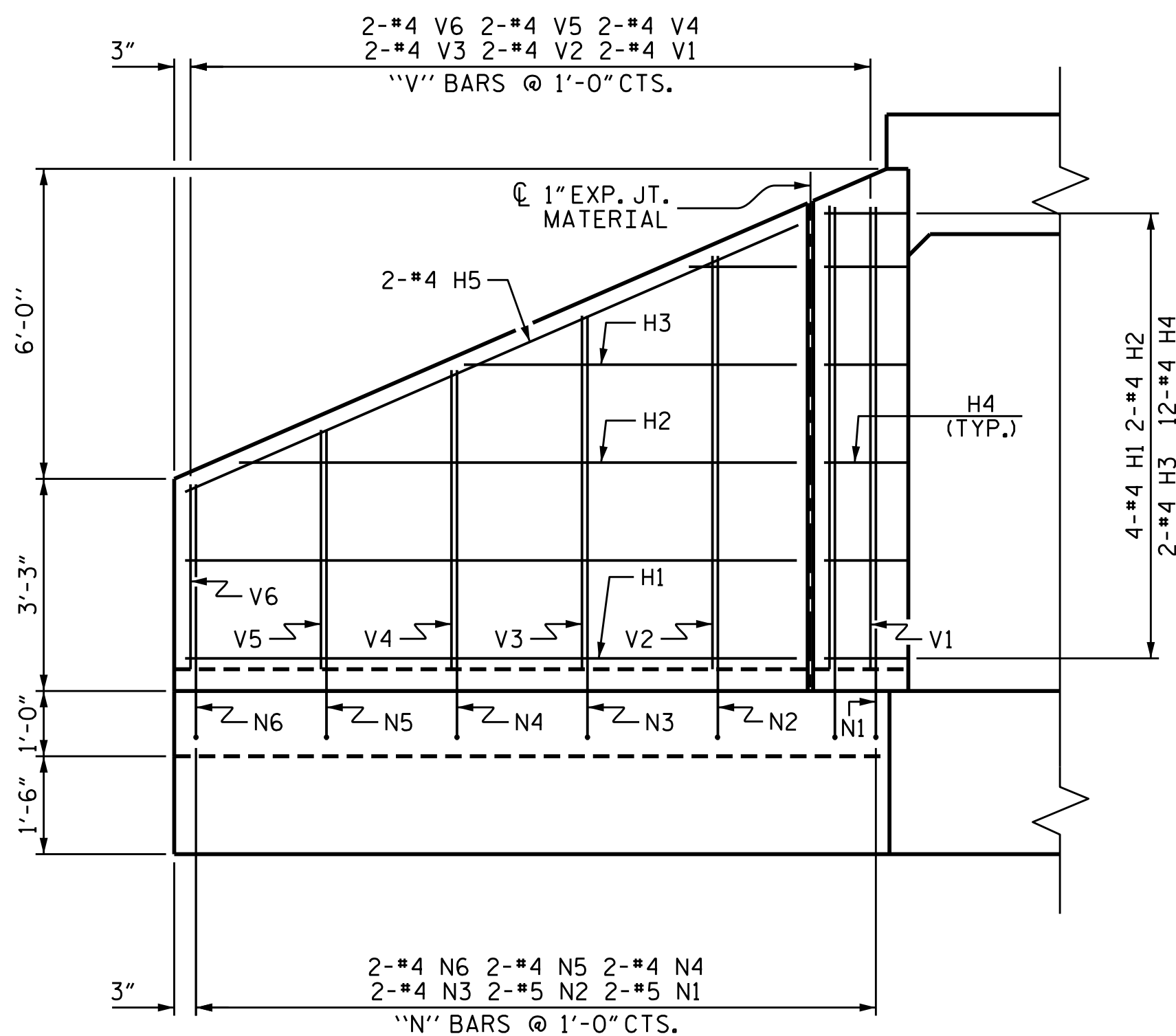
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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2			4			11

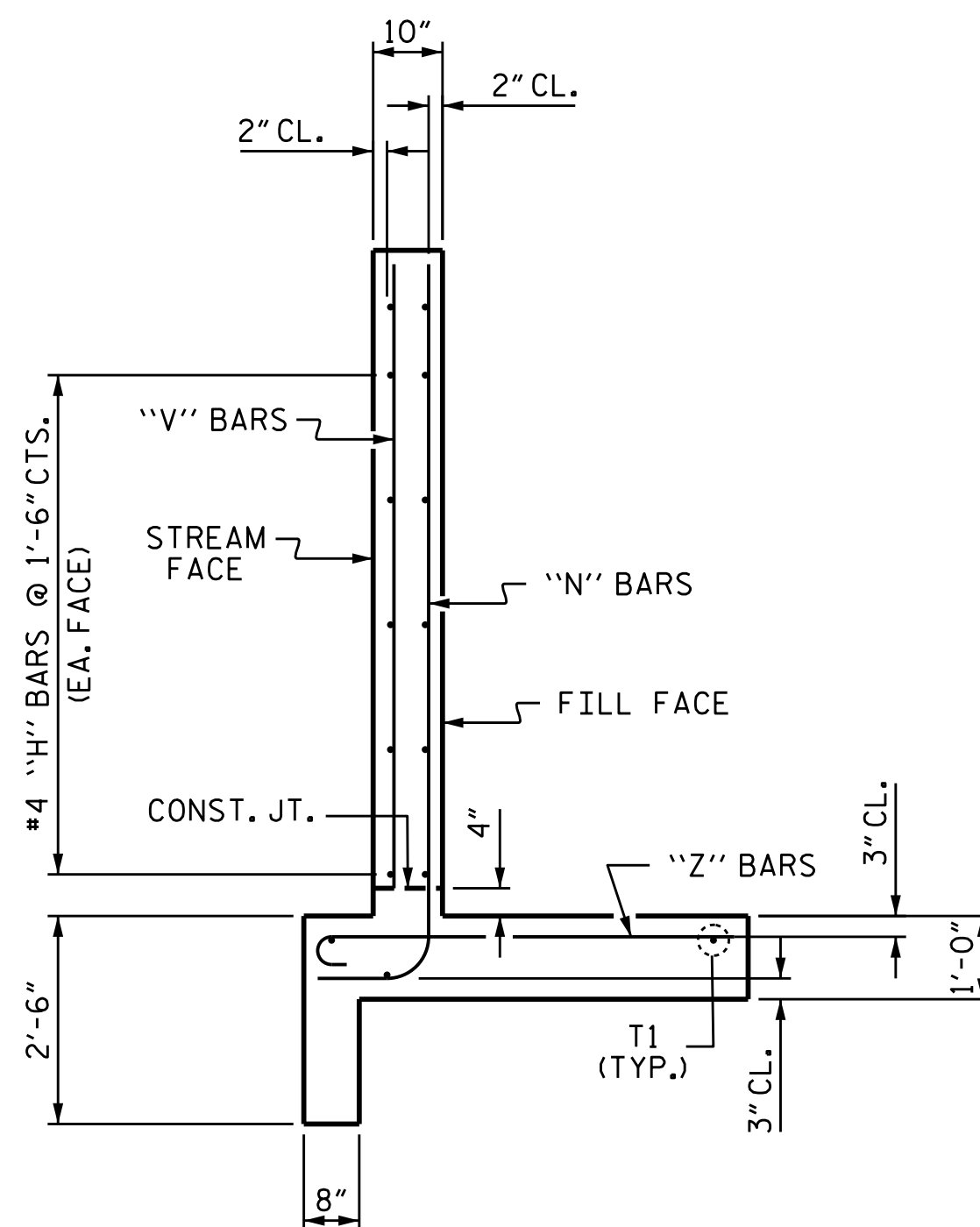




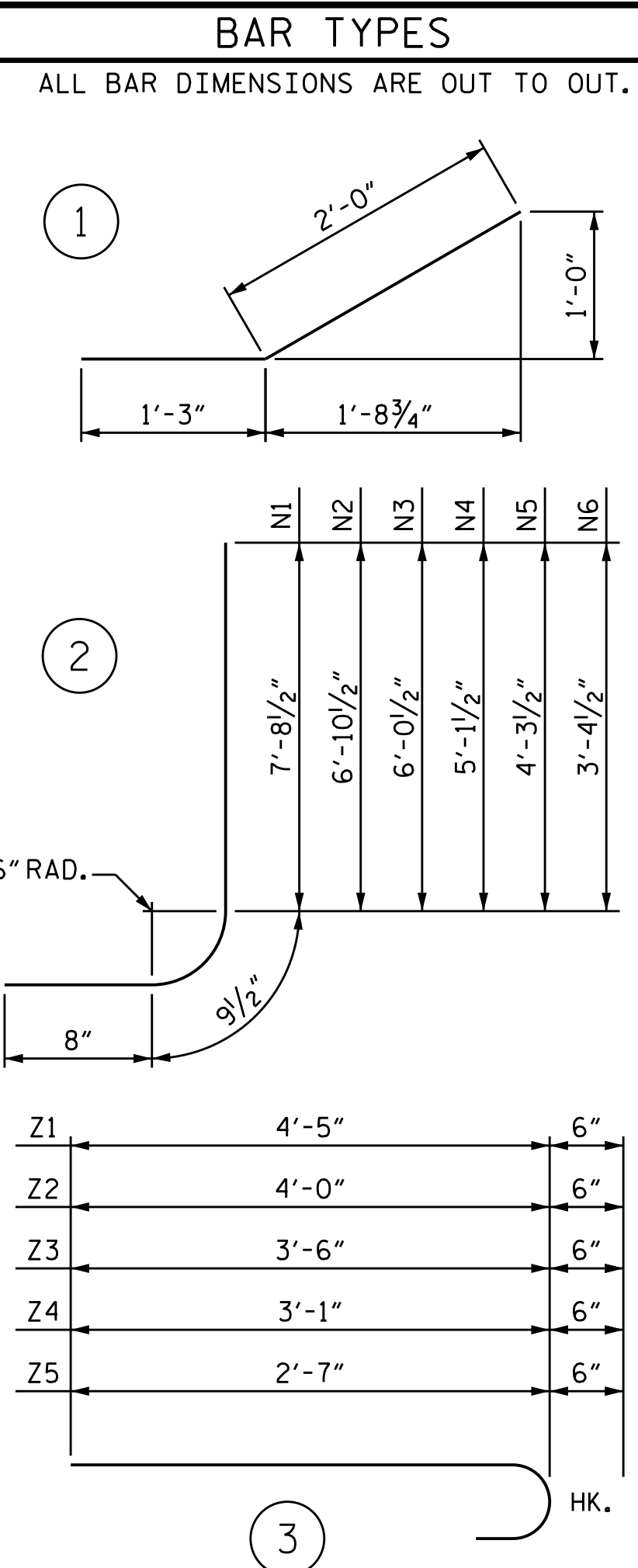
PLAN



ELEVATION



TYPICAL WING SECTION



BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	8	#4	STR	9'-4"	50
H2	4	#4	STR	8'-6"	23
H3	4	#4	STR	5'-1"	14
H4	24	#4	1	3'-3"	52
H5	4	#4	STR	10'-3"	27
N1	4	#5	2	9'-2"	38
N2	4	#5	2	8'-4"	35
N3	4	#4	2	7'-6"	20
N4	4	#4	2	6'-7"	18
N5	4	#4	2	5'-9"	15
N6	4	#4	2	4'-10"	13
S1	6	#6	STR	6'-0"	54
T1	6	#5	STR	11'-3"	70
V1	4	#4	STR	7'-1"	19
V2	4	#4	STR	6'-4"	17
V3	4	#4	STR	5'-5"	14
V4	4	#4	STR	4'-7"	12
V5	4	#4	STR	3'-8"	10
V6	4	#4	STR	2'-10"	8
Z1	8	#4	3	4'-11"	26
Z2	4	#4	3	4'-6"	12
Z3	4	#4	3	4'-0"	11
Z4	4	#4	3	3'-7"	10
Z5	4	#4	3	3'-1"	8

TOTAL REINFORCING STEEL FOR 2 WINGS 576 LBS

CLASS A CONCRETE  
 2 WINGS 8.6 CY  
 1 HEADWALL 1.3 CY  
 1 END CURTAIN WALL 1.5 CY  
 TOTAL 11.4 CY

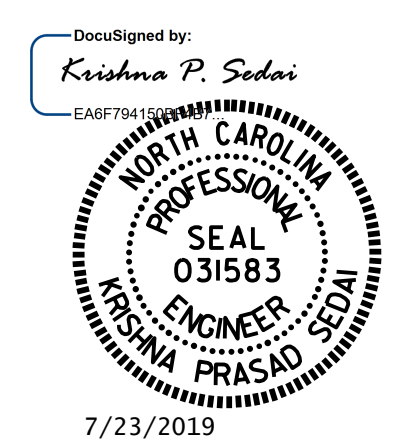
DRAWN BY : A. SORSENGINH DATE : 04/2019  
 CHECKED BY : M. G. SHAIKH DATE : 04/2019  
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 04/2019

23-JUL-2019 13:22  
 P:\Structures\Final Plans\411\_015\_R3421A.SMU.CU.07.dgn  
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1			3			TOTAL SHEETS 11	
2			4				

PROJECT NO. R-3421A  
 RICHMOND COUNTY  
 STATION: 98+63.10 -I73-  
 SHEET 7 OF 11

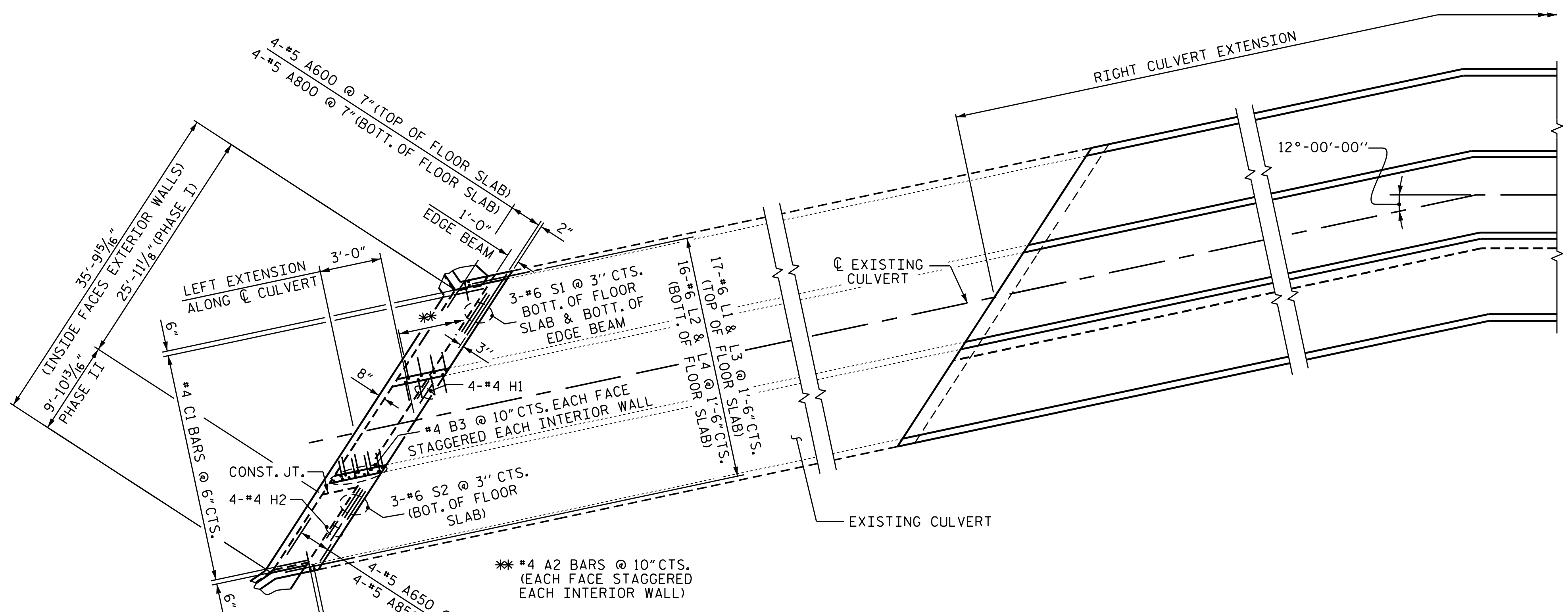


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD WINGS  
 FOR  
 CONCRETE BOX CULVERT  
 H = 7'-0" SLOPE = 2:1  
 90° SKEW

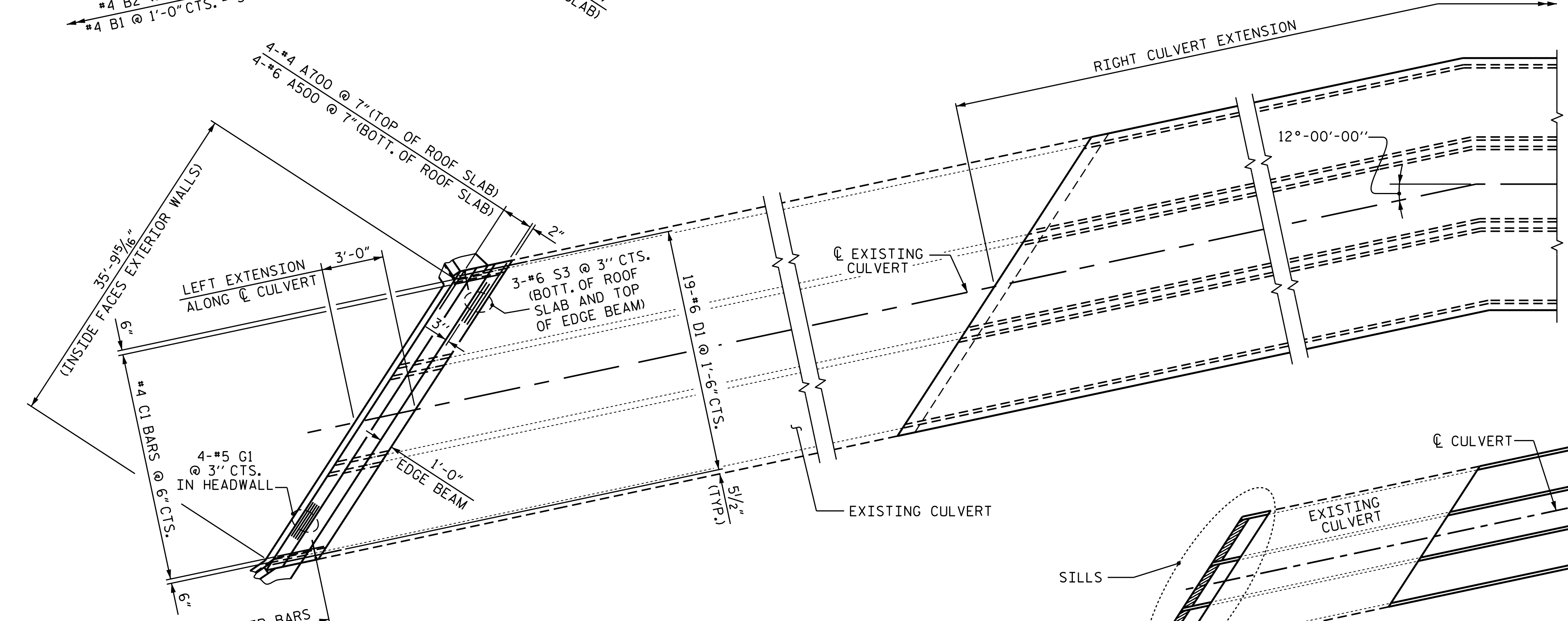
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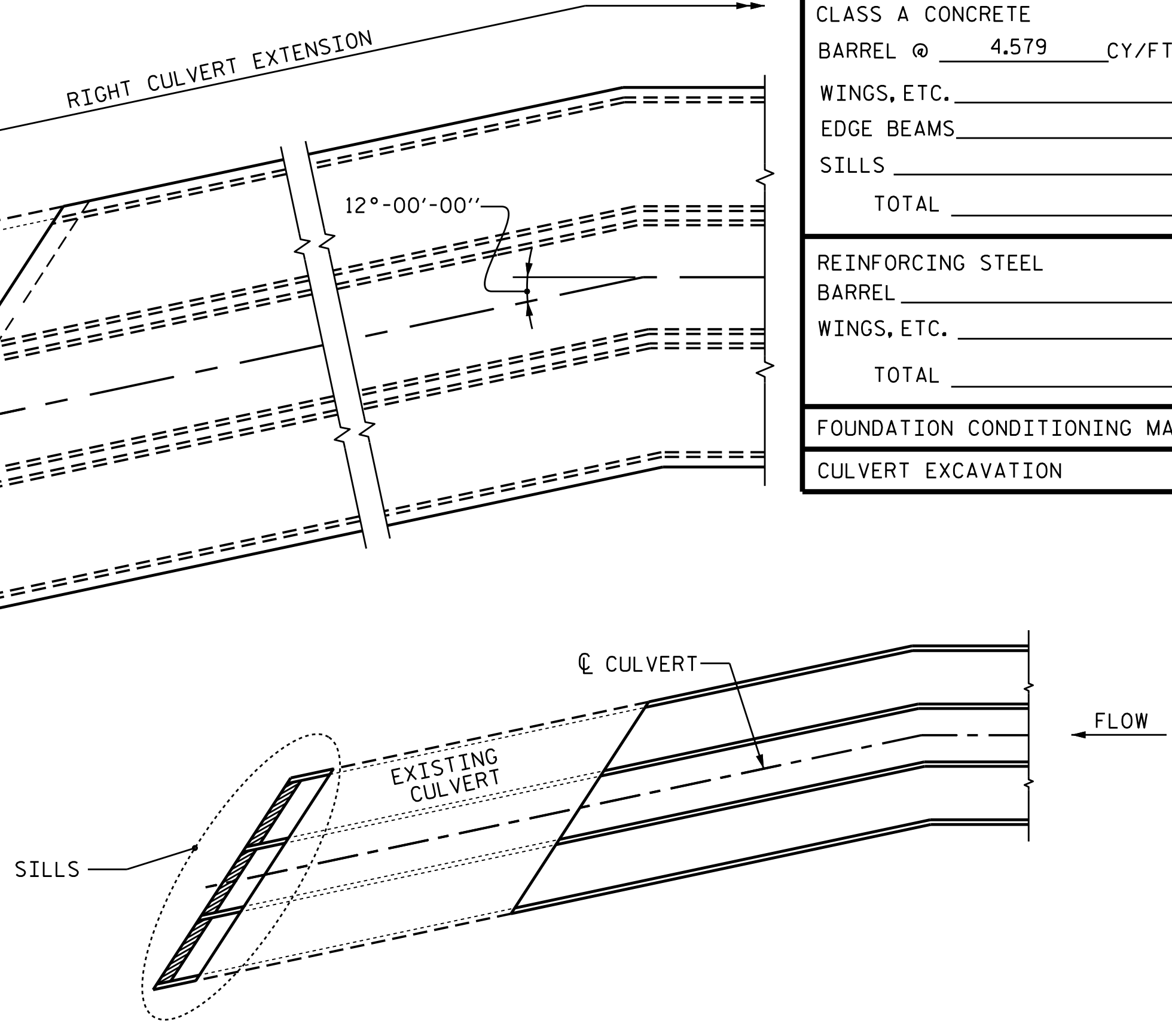




PLAN - FLOOR SLAB



PLAN - ROOF SLAB



PLAN OF SILL LOCATIONS

FOR SILL DETAILS SEE SHEET 6 OF 11

**BAR TYPE**

**BAR DIMENSIONS ARE OUT TO OUT**

**SPLICE LENGTH CHART**

BAR	SIZE	LENGTH
A600	#5	2'-5"
A800	#5	1'-9"
B1	#4	1'-5"
B3	#4	1'-5"
C1	#4	1'-11"
S1	#6	2'-9"

**BAR SCHEDULE**

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	10	#4	4	6'-10"	46
A2	26	#4	4	5'-8"	98
A500	4	#6	STR	38'-3"	230
A600	4	#5	STR	29'-7"	123
A650	4	#5	STR	11'-1"	46
A700	4	#4	STR	20'-2"	54
A800	4	#5	STR	28'-10"	120
A850	4	#5	STR	11'-1"	46
B1	6	#4	STR	10'-1"	40
B2	10	#4	STR	6'-4"	42
B3	16	#4	STR	8'-3"	88
C1	125	#4	STR	2'-6"	209
D1	29	#6	STR	2'-6"	109
D2	8	#6	STR	3'-4"	40
D3	4	#6	STR	2'-10"	17
G1	4	#5	STR	38'-3"	160
H1	4	#4	STR	28'-7"	76
H2	4	#4	STR	11'-1"	30
K1	20	#4	3	5'-3"	70
K2	20	#4	3	5'-4"	71
L1	17	#6	1	2'-10"	72
L2	16	#6	1	3'-2"	76
L3	17	#6	2	2'-9"	70
L4	16	#6	2	4'-1"	98
S1	6	#6	STR	29'-11"	270
S2	6	#6	STR	11'-1"	100
S3	6	#6	STR	38'-3"	345
<b>REINFORCING STEEL =</b>					<b>2746 LBS</b>

**LEFT EXTENSION STRUCTURE QUANTITIES**

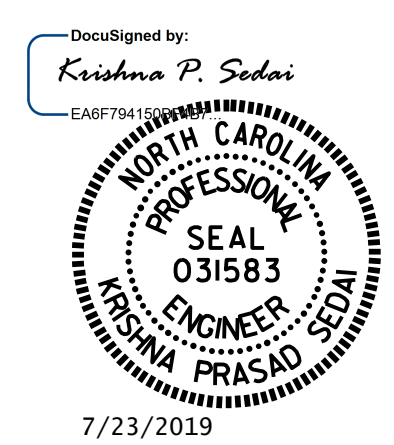
CLASS A CONCRETE		
BARREL @ 4.579 CY/FT	13.7	C.Y.
WINGS, ETC.	29.4	C.Y.
EDGE BEAMS	4.3	C.Y.
SILLS	1.7	C.Y.
<b>TOTAL</b>	<b>49.1</b>	<b>C.Y.</b>
REINFORCING STEEL		
BARREL	2746	LBS.
WINGS, ETC.	1703	LBS.
<b>TOTAL</b>	<b>4449</b>	<b>LBS.</b>
FOUNDATION CONDITIONING MATERIAL	6	TONS
CULVERT EXCAVATION		LUMP SUM

PROJECT NO. R-3421A  
RICHMOND COUNTY  
 STATION: 98+63.10 -I73-

SHEET 9 OF 11

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

TRIPLE 8 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 LEFT EXTENSION



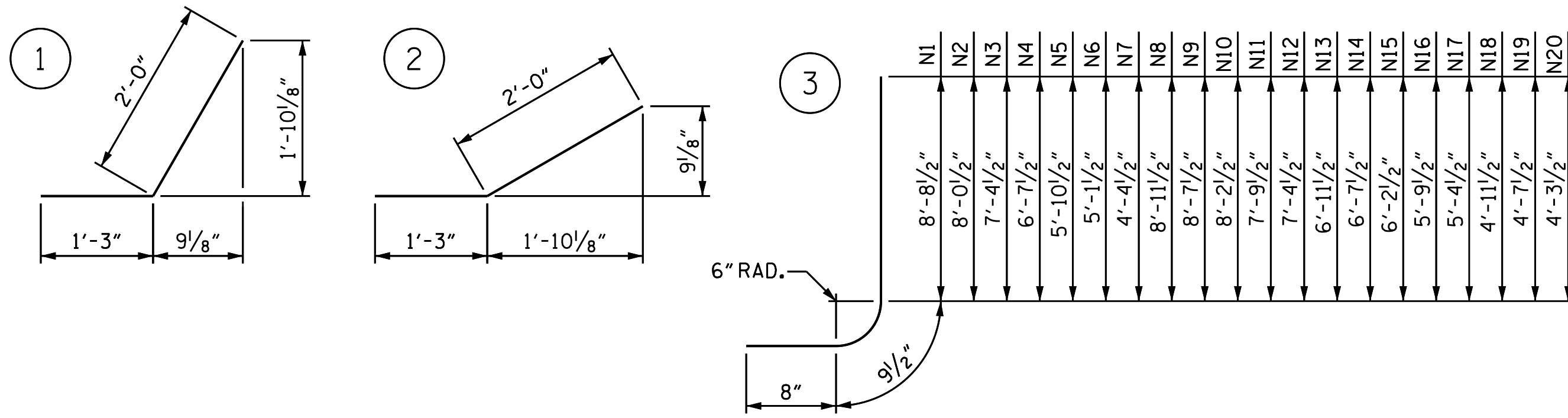
DRAWN BY : A. SORSENGINH DATE : 3/2019  
 CHECKED BY : M. G. SHAIKH DATE : 5/2019  
 DESIGN ENGINEER OF RECORD : A. SORSENGINH DATE : 4/2019

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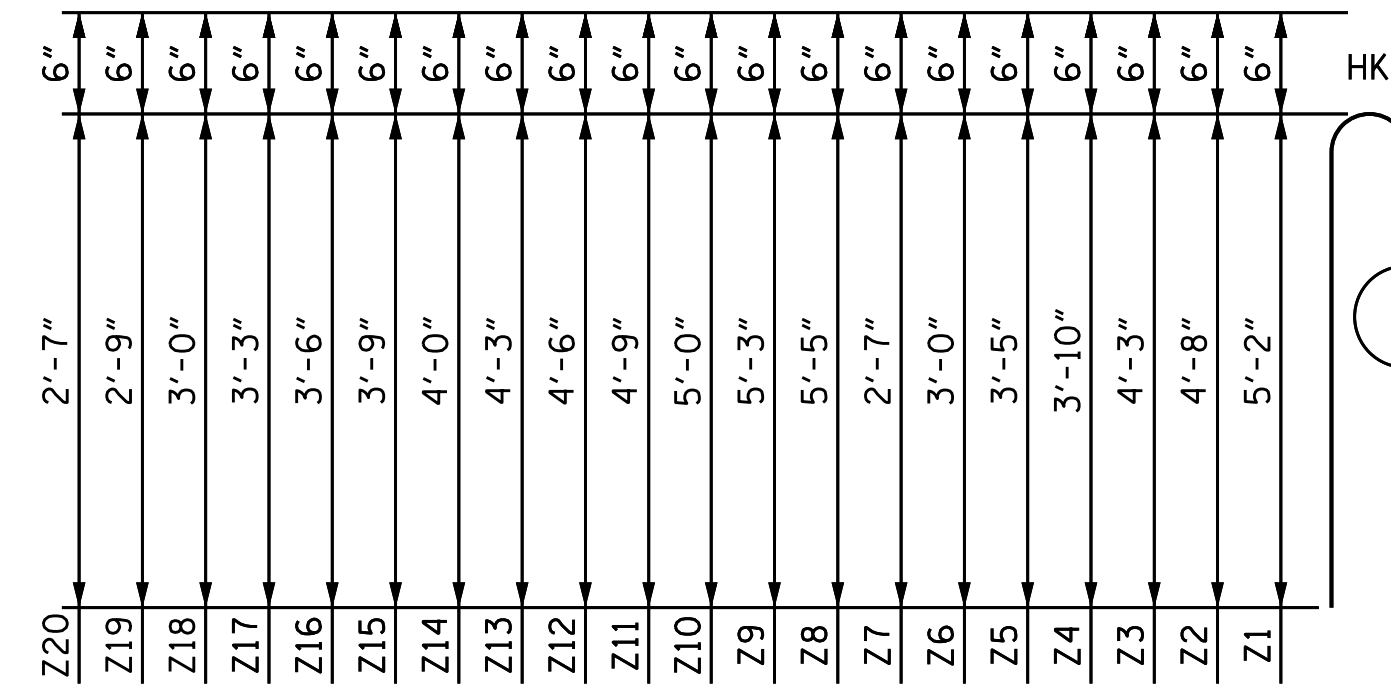
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-9
1			3			TOTAL SHEETS
2			4			11



BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.



SPLICE LENGTH CHART

BAR	SIZE	LENGTH
H6	#4	1'-11"
H7	#4	1'-11"
H10	#4	1'-11"

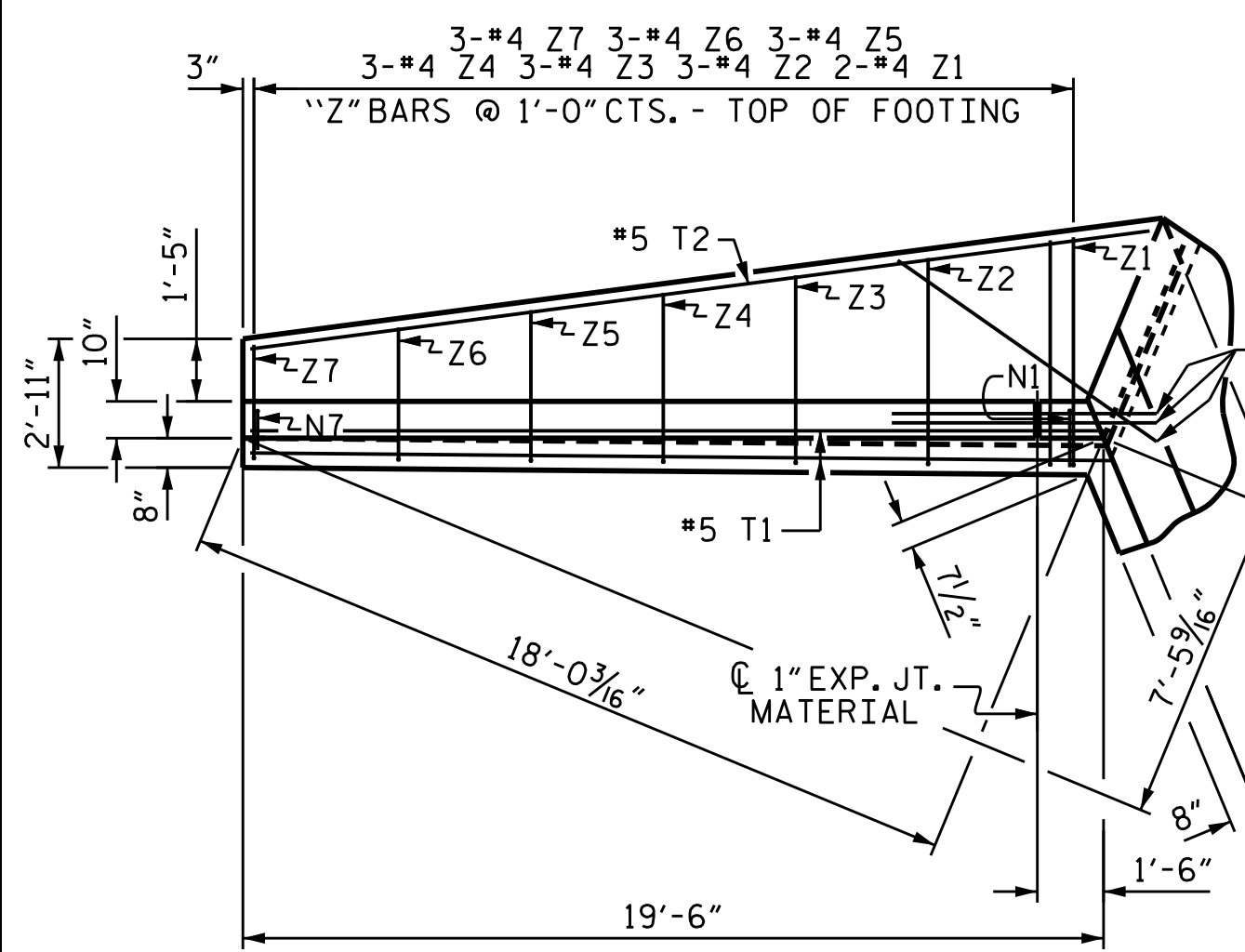
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	17'-7"	70	S1	6	#6	STR	6'-0"	54
H2	2	#4	STR	14'-0"	19						
H3	2	#4	STR	7'-10"	10	T1	2	#5	STR	19'-6"	41
H4	12	#4	1	3'-3"	26	T2	1	#5	STR	20'-6"	21
H5	2	#4	STR	18'-1"	24	T3	3	#5	STR	47'-6"	149
H6	12	#4	STR	23'-10"	191						
H7	4	#4	STR	19'-5"	52	V1	2	#4	STR	8'-2"	11
H8	2	#4	STR	21'-9"	29	V2	3	#4	STR	7'-6"	15
H9	12	#4	2	3'-3"	26	V3	3	#4	STR	6'-9"	14
H10	4	#4	STR	24'-0"	64	V4	3	#4	STR	6'-0"	12
						V5	3	#4	STR	5'-4"	11
N1	2	#5	3	10'-2"	21	V6	3	#4	STR	4'-7"	9
N2	3	#5	3	9'-6"	30	V7	3	#4	STR	3'-9"	8
N3	3	#5	3	8'-10"	28	V8	2	#4	STR	8'-4"	11
N4	3	#4	3	8'-1"	16	V9	4	#4	STR	8'-0"	21
N5	3	#4	3	7'-4"	15	V10	4	#4	STR	7'-7"	20
N6	3	#4	3	6'-7"	13	V11	4	#4	STR	7'-3"	19
N7	3	#4	3	5'-10"	12	V12	4	#4	STR	6'-10"	18
N8	2	#5	3	10'-5"	22	V13	4	#4	STR	6'-5"	17
N9	4	#5	3	10'-1"	42	V14	4	#4	STR	6'-0"	16
N10	4	#5	3	9'-8"	40	V15	4	#4	STR	5'-8"	15
N11	4	#5	3	9'-3"	39	V16	4	#4	STR	5'-3"	14
N12	4	#4	3	8'-10"	24	V17	4	#4	STR	4'-10"	13
N13	4	#4	3	8'-5"	22	V18	4	#4	STR	4'-5"	12
N14	4	#4	3	8'-1"	22	V19	4	#4	STR	4'-0"	11
N15	4	#4	3	7'-8"	20	V20	3	#4	STR	3'-9"	8
N16	4	#4	3	7'-3"	19						
N17	4	#4	3	6'-10"	18	Z1	2	#4	4	5'-8"	8
N18	4	#4	3	6'-5"	17	Z2	3	#4	4	5'-2"	10
N19	4	#4	3	6'-1"	16	Z3	3	#4	4	4'-9"	10
N20	3	#4	3	5'-9"	12	Z4	3	#4	4	4'-4"	9
						Z5	3	#4	4	3'-11"	8
						Z6	3	#4	4	3'-6"	7
						Z7	3	#4	4	3'-1"	6
						Z8	2	#4	4	5'-11"	8
						Z9	4	#4	4	5'-9"	15
						Z10	4	#4	4	5'-6"	15
						Z11	4	#4	4	5'-3"	14
						Z12	4	#4	4	5'-0"	13
						Z13	4	#4	4	4'-9"	13
						Z14	4	#4	4	4'-6"	12
						Z15	4	#4	4	4'-3"	11
						Z16	4	#4	4	4'-0"	11
						Z17	4	#4	4	3'-9"	10
						Z18	4	#4	4	3'-6"	9
						Z19	4	#4	4	3'-3"	9
						Z20	3	#4	4	3'-1"	6

REINFORCING STEEL 1703 LBS FOR 2 WINGS

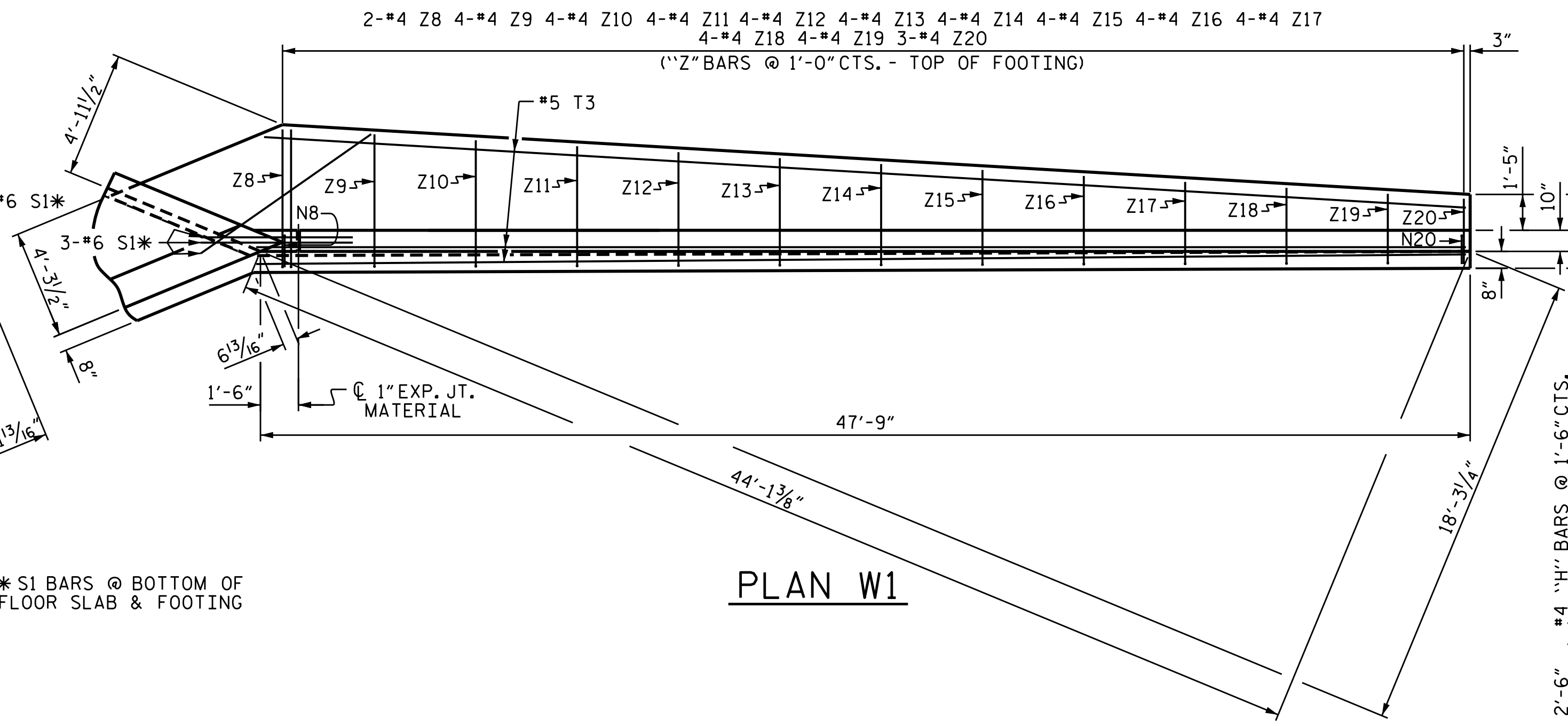
CLASS A CONCRETE

2 WINGS	26.5 CY
1 HEADWALL	1.3 CY
1 END CURTAIN WALL	1.6 CY
<b>TOTAL</b>	<b>29.4 CY</b>

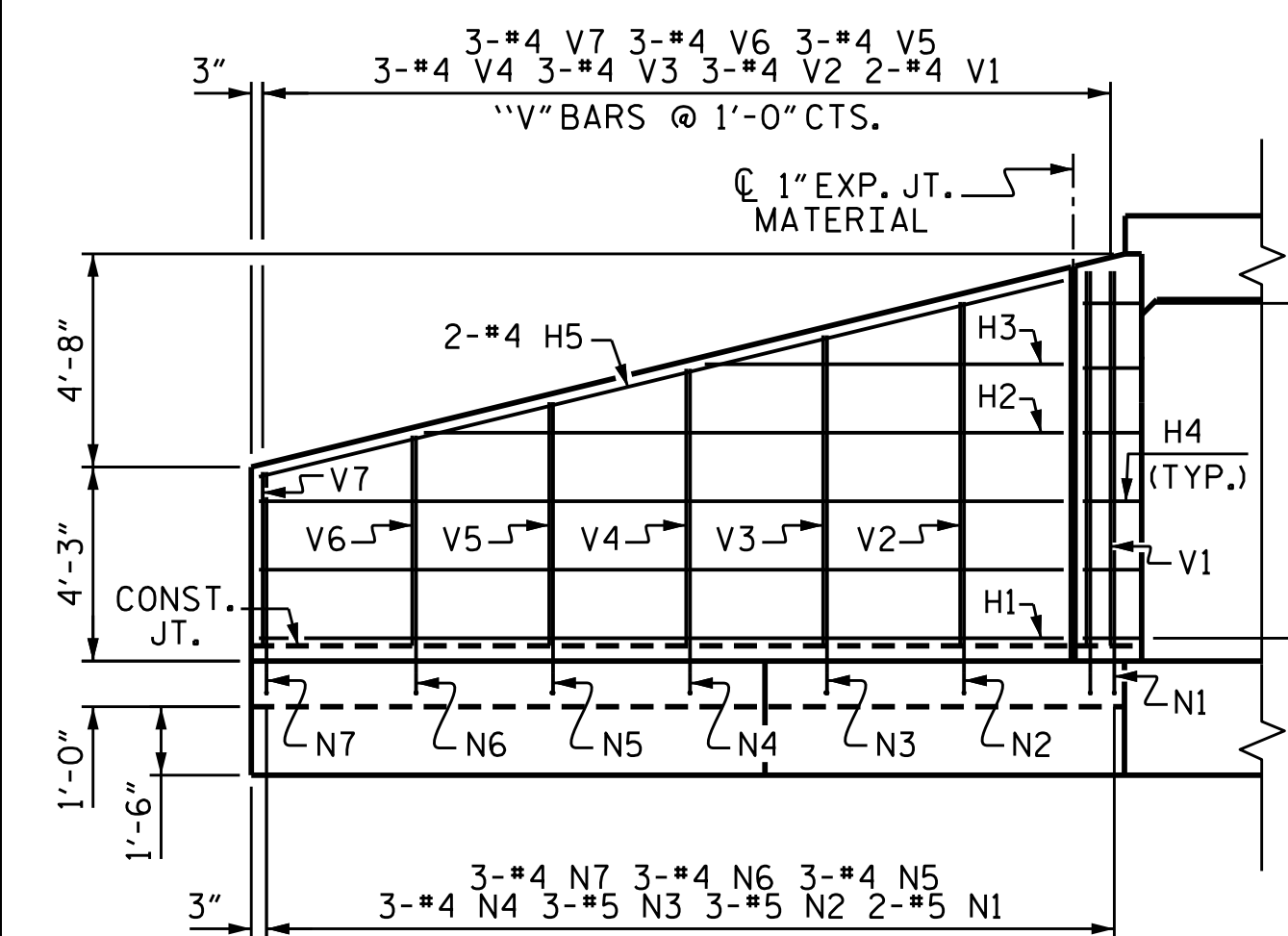


PLAN W2

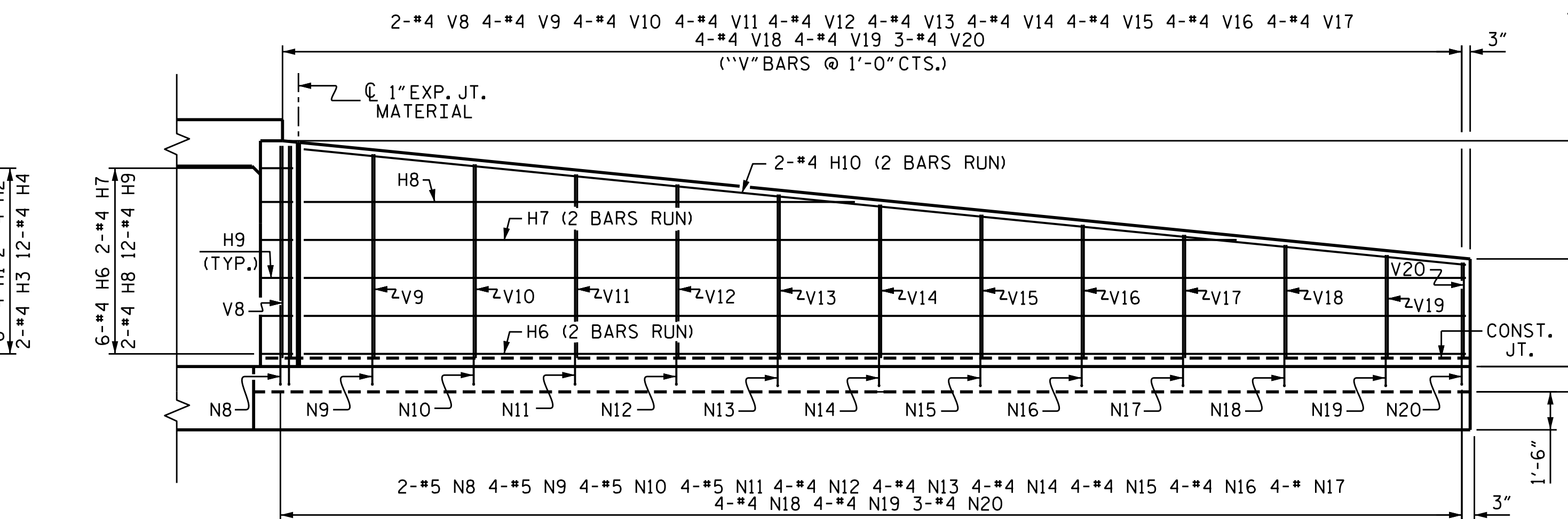
\* S1 BARS @ BOTTOM OF FLOOR SLAB & FOOTING



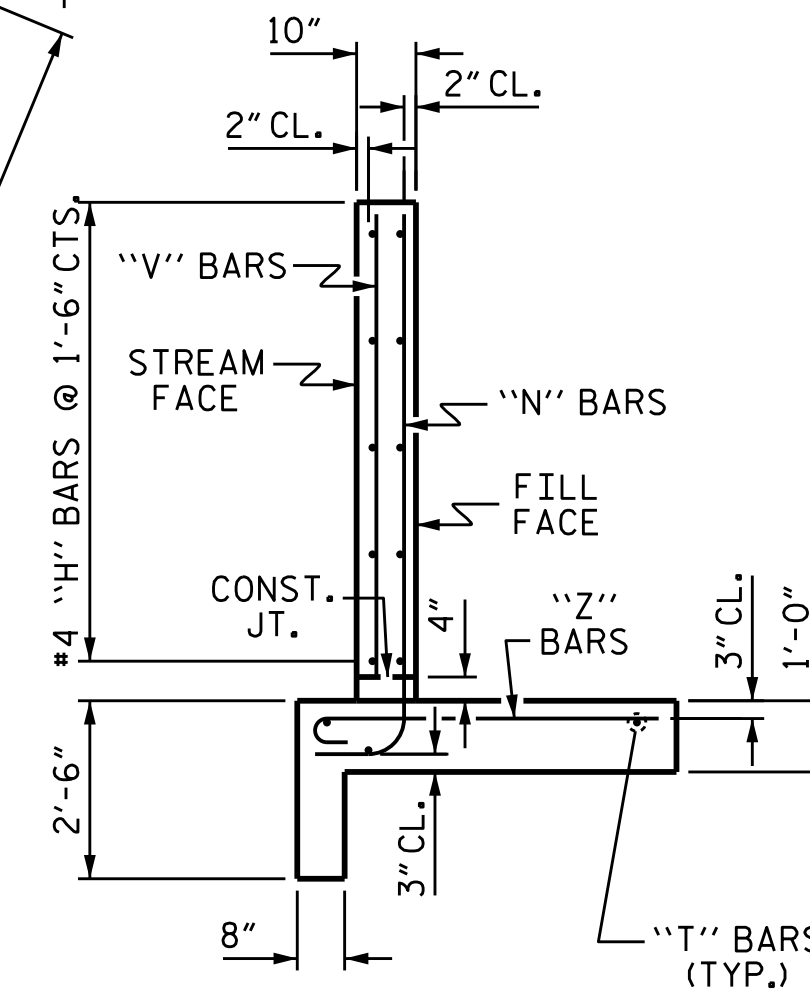
PLAN W1



ELEVATION W2



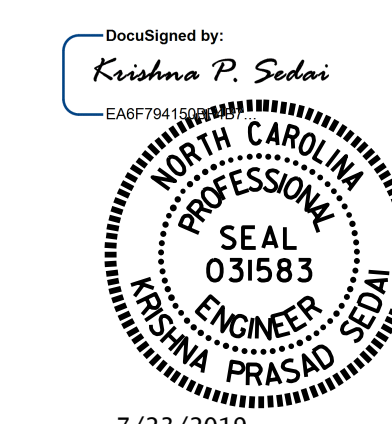
ELEVATION W1



TYPICAL WING SECTION

PROJECT NO. R-3421A  
 RICHMOND COUNTY  
 STATION: 98+63.10 -I73-

SHEET 10 OF 11



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**STANDARD WINGS FOR CONCRETE BOX CULVERT**  
 H = 7'-0" SLOPE = 4:1  
 45° SKEW

DRAWN BY: A. SORSENGINH DATE: 2/2019  
 CHECKED BY: M. G. SHAIKH DATE: 4/2019  
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE: 4/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-10
1			3			TOTAL SHEETS
2			4			11



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	--

LOAD AND RESISTANCE FACTOR RATING (LRFR)  
SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

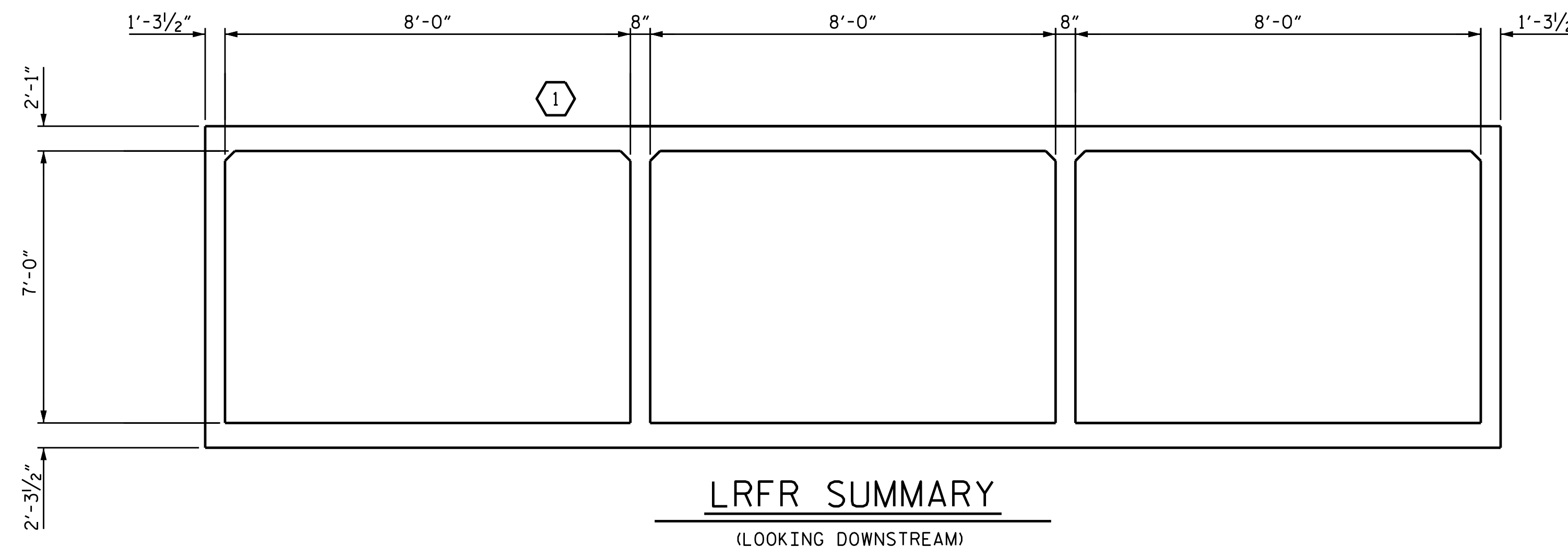
	CONTROLLING LOAD RATING	MINIMUM RATING FACTOR (RF)	STRENGTH I LIMIT STATE							
			MOMENT				SHEAR			
			RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)
PERMANENT LOAD RATING	1	1.01	1.33	2	BOTTOM SLAB	0.65	1.01	1	TOP SLAB	6.95

NOTES:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

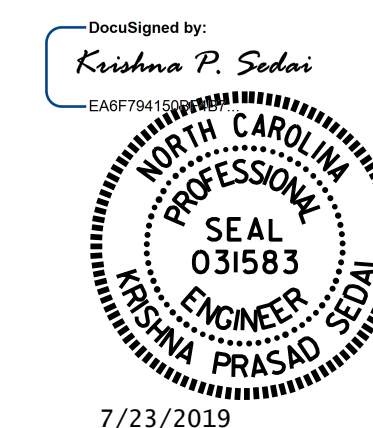
THE EFFECTS OF LIVE LOAD ON DESIGN AND LOAD RATING MAY BE NEGLECTED FOR CULVERTS WITH CERTAIN FILL DEPTHS DESCRIBED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

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



PROJECT NO. R-3421A  
RICHMOND COUNTY  
STATION: 98+63.10 -I73-

SHEET 11 OF 11



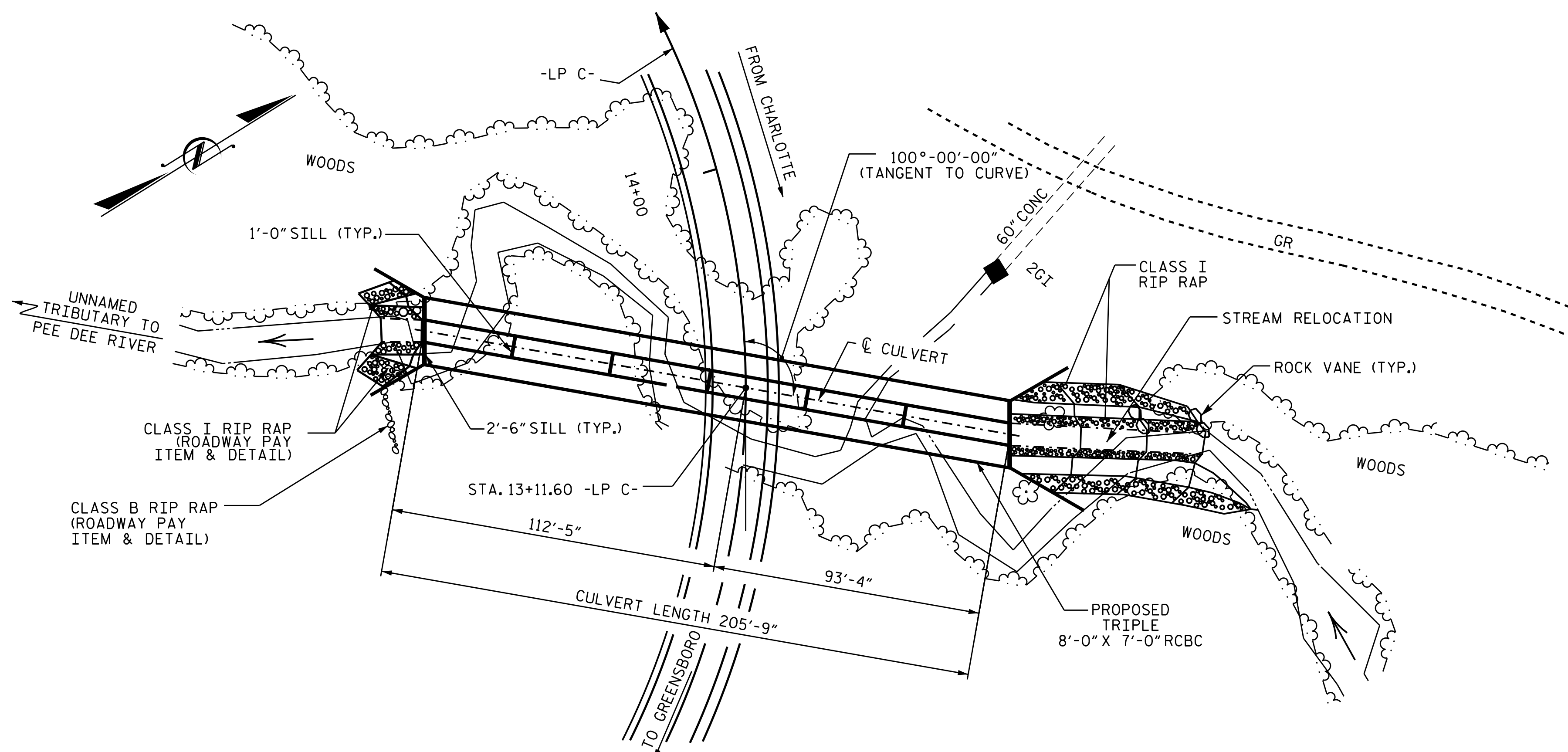
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
LRFR SUMMARY FOR  
REINFORCED CONCRETE  
BOX CULVERTS  
(DEEP FILLS)

DRAWN BY : A. SORSENGINH DATE : 3/2019  
CHECKED BY : E. BAYISSA/M. G. S. DATE : 4/2019  
DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 4/2019

DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-11	
1			3			TOTAL SHEETS	
2			4			11	

BM#6: RR SPIKE IN BASE OF 15" GUM TREE, 208' RT. OF STA. 105+88.00 -I73-, ELEV. 266.10



LOCATION SKETCH

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

**NOTES**

ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING.

DESIGN FILL-----20.80'

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 WALLS AND SILLS WITH NATIVE MATERIAL BACKFILL.
3. FOLLOWED BY THE WING WALLS FULL HEIGHT, 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 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.

BACKFILL WITH SELECT MATERIAL, CLASS VI MEETING THE REQUIREMENTS OF SECTION 1016 OF THE STANDARD SPECIFICATION.

CONSTRUCT THE REINFORCED CONCRETE BOX CULVERT AT STATION 13+11.60 -LPC- WITH 2 INCHES OF CAMBER TO ACCOUNT FOR ANTICIPATED SETTLEMENT.

NO WORK SHALL BE DONE ON THE CULVERT AT STA. 13+11.60 -LPC- UNTIL THE AREA OF THE BOX CULVERT HAS BEEN UNDERCUT TO 3' BELOW CULVERT BOTTOM ELEVATION AT 0 TO 50' RIGHT, 2' BELOW CULVERT BOTTOM ELEVATION AT 50' TO 100' RIGHT, 4' BELOW CULVERT BOTTOM ELEVATION AT 0 TO 50' LEFT, 5' BELOW CULVERT BOTTOM ELEVATION AT 50' TO 125' LEFT AND UNSUITABLE MATERIAL REPLACED WITH SUITABLE MATERIAL, PROPERLY COMPACTED TO THE ELEVATION OF THE BOTTOM OF THE PROPOSED FLOOR SLAB. THE LIMITS OF THIS UNDERCUT EXCAVATION SHALL BE AT LEAST THE LIMITS OF THE BOX CULVERT INCLUDING THE WINGS. NO SEPARATE PAYMENT WILL BE MADE FOR ANY TEMPORARY SHEETING, UNDERCUT, OR UNSUITABLE MATERIAL REPLACEMENT AS REQUIRED TO CONSTRUCT THE PROPOSED CULVERT. PAYMENT IS INCLUDED IN THE LUMP SUM PRICE FOR CULVERT EXCAVATION.

**ROADWAY DATA**

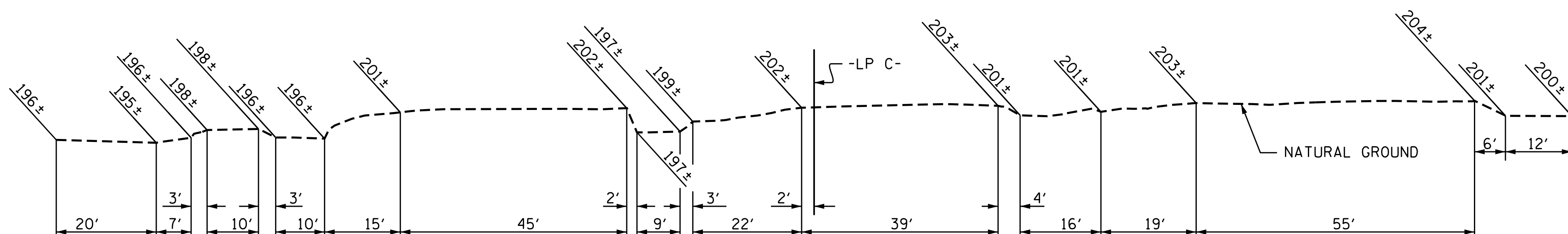
GRADE POINT EL. @ STA. 13+11.60 -LPC-	= 224.04
BED EL. @ STA. 13+11.60 -LPC-	= 196.81
ROADWAY SLOPES	= 4 : 1

**HYDRAULIC DATA**

DESIGN DISCHARGE	= 1000 C.F.S.
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 206.70
DRAINAGE AREA	= 1.9 SQ. MILES
BASIC DISCHARGE (Q100)	= 1100 C.F.S.
BASIC HIGH WATER ELEVATION	= 207.42

**OVERTOPPING FLOOD DATA**

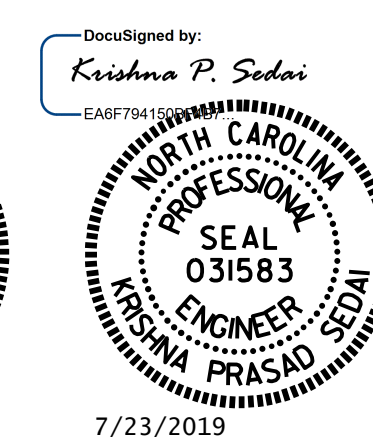
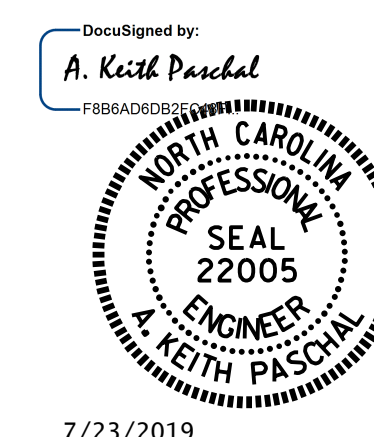
OVERTOPPING DISCHARGE	= 3300 ± C.F.S.
FREQUENCY OF OVER TOPPING FLOOD	= 500 YRS. +
OVERTOPPING FLOOD ELEVATION	= 211.20



PROFILE ALONG CULVERT

**TOTAL STRUCTURE QUANTITIES**

CLASS A CONCRETE	
BARREL @ 3.296 CY/FT	678.2 C.Y.
WING ETC.	42.4 C.Y.
SILLS	4.6 C.Y.
TOTAL	725.2 C.Y.
REINFORCING STEEL	
BARREL	64,072 LBS.
WINGS ETC.	2,491 LBS.
TOTAL	66,563 LBS.
FOUNDATION COND. MAT'L.	387 TONS
CULVERT EXCAVATION	LUMP SUM



PROJECT NO. R-3421A  
RICHMOND COUNTY  
 STATION: 13+11.60 -LPC-

SHEET 1 OF 6 CULVERT NO. 760256

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**TRIPLE 8 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 100° SKEW**

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-1
1			3			TOTAL SHEETS
2			4			6

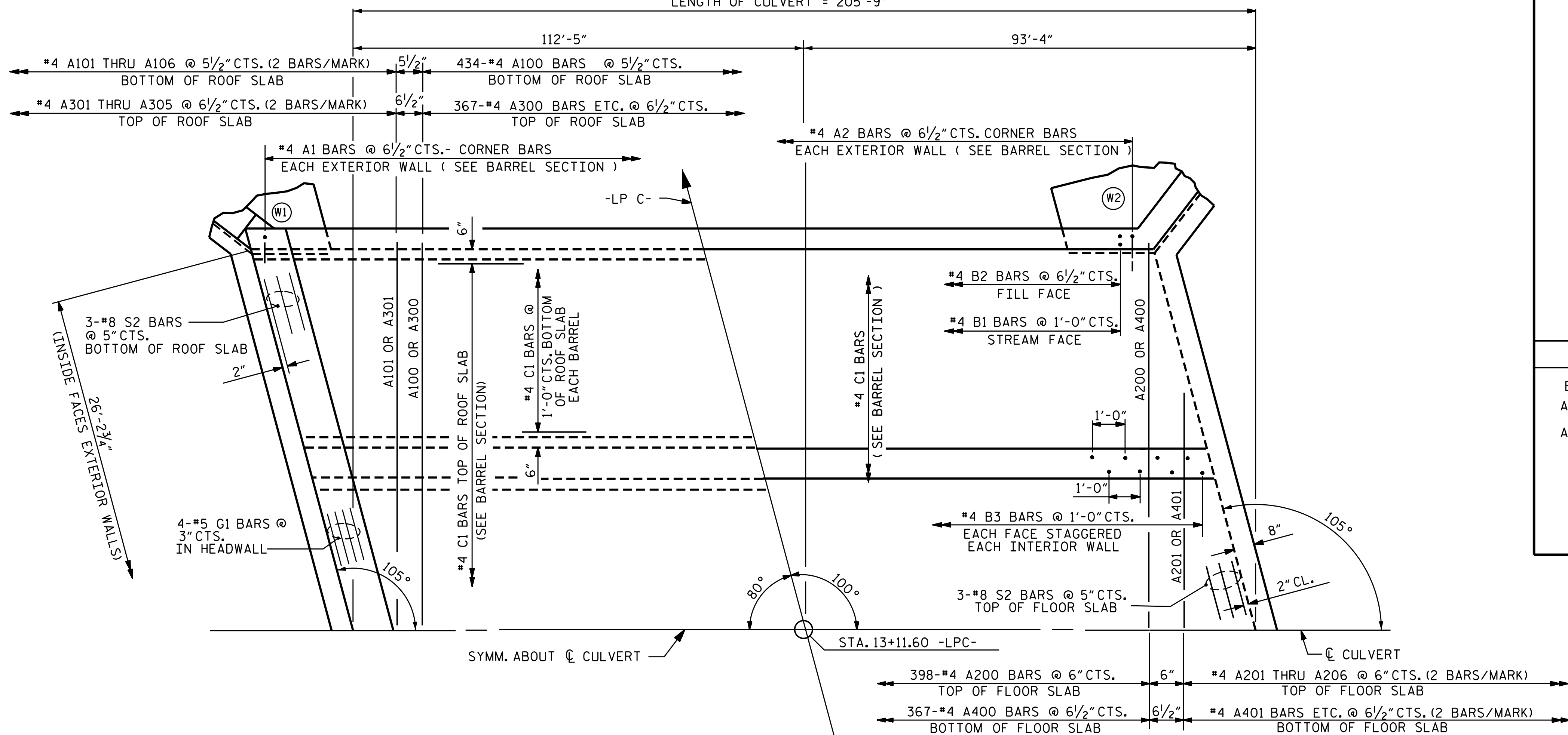
DRAWN BY : C. RUIZ DATE : 02/2019  
 CHECKED BY : G. KOUCHEKI DATE : 02/2019  
 DESIGN ENGINEER OF RECORD: K. SEDAI DATE : 05/2019

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED



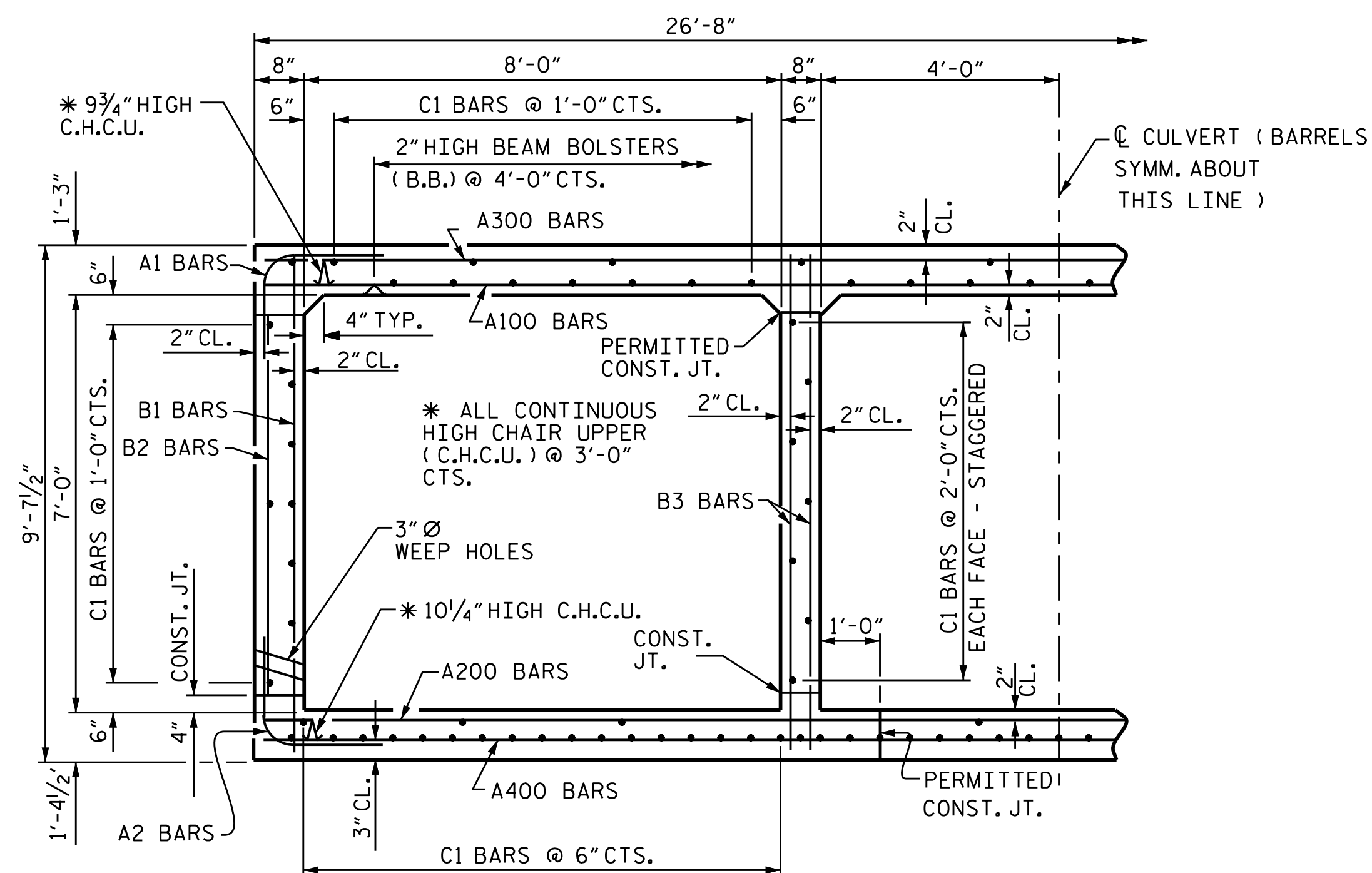


LENGTH OF CULVERT = 205'-9"



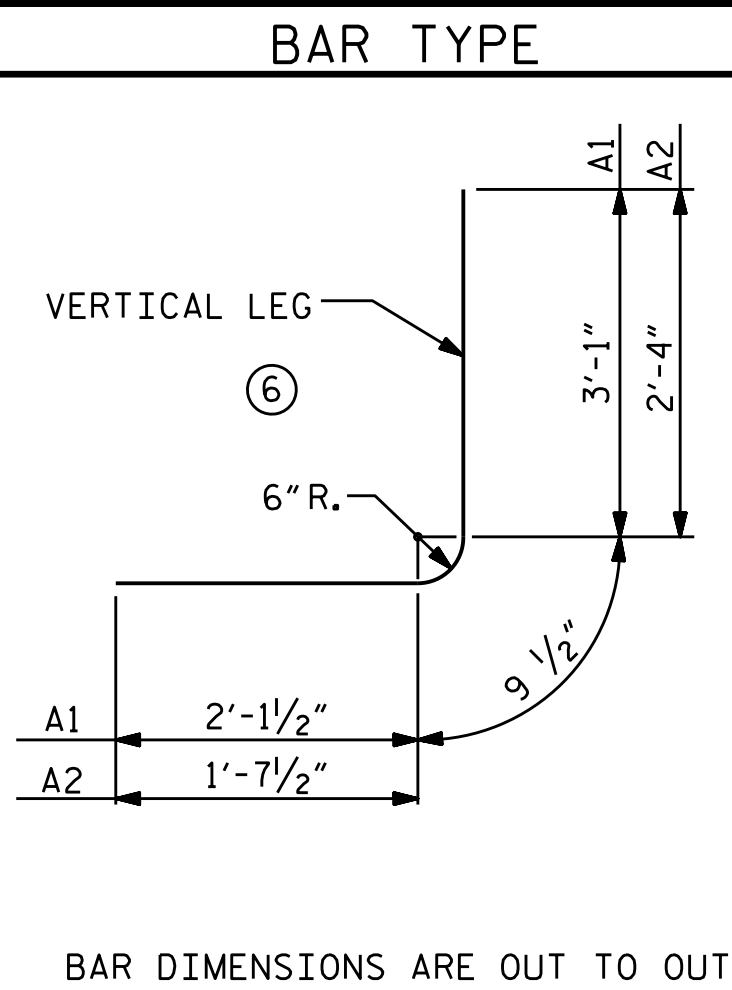
PART PLAN - ROOF SLAB

PART PLAN - FLOOR SLAB



RIGHT ANGLE SECTION OF BARREL

THERE ARE 125 "C" BARS IN SECTION OF BARREL.



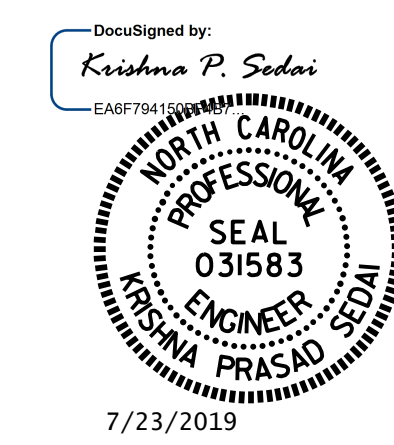
BAR DIMENSIONS ARE OUT TO OUT

SPLICE LENGTHS CHART

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

BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	760	#4	6	6'-0"	3046
A2	760	#4	6	4'-9"	2411
A100	434	#4	STR	26'-3"	7610
A101	4	#4	STR	22'-5"	60
A102	4	#4	STR	19'-0"	51
A103	4	#4	STR	15'-7"	42
A104	4	#4	STR	12'-2"	33
A105	4	#4	STR	8'-9"	23
A106	4	#4	STR	5'-3"	14
A200	398	#4	STR	26'-3"	6979
A201	4	#4	STR	22'-1"	59
A202	4	#4	STR	18'-4"	49
A203	4	#4	STR	14'-7"	39
A204	4	#4	STR	10'-11"	29
A205	4	#4	STR	7'-2"	19
A206	4	#4	STR	3'-5"	9
A300	367	#4	STR	26'-3"	6435
A301	4	#4	STR	21'-9"	58
A302	4	#4	STR	17'-9"	47
A303	4	#4	STR	13'-8"	37
A304	4	#4	STR	9'-8"	26
A305	4	#4	STR	5'-7"	15
A400	367	#4	STR	26'-3"	6435
A401	4	#4	STR	21'-9"	58
A402	4	#4	STR	17'-9"	47
A403	4	#4	STR	13'-8"	37
A404	4	#4	STR	9'-8"	26
A405	4	#4	STR	5'-7"	15
B1	412	#4	STR	9'-1"	2500
B2	760	#4	STR	6'-4"	3215
B3	824	#4	STR	9'-1"	5000
C1	1000	#4	STR	27'-7"	18426
D1	12	#6	STR	3'-5"	62
D2	21	#6	STR	1'-11"	60
G1	8	#5	STR	27'-3"	227
S2	12	#8	STR	27'-3"	873
REINFORCING STEEL				LBS.	64,072

PROJECT NO. R-3421A  
 RICHMOND COUNTY  
 STATION: 13+11.60 -LPC-  
 SHEET 3 OF 6



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 BARREL STANDARD  
 TRIPLE 8 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 100° SKEW

REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.  
 REVISED 8-28-92 BY E.L.R. CHECKED BY G.R.P.  
 REDRAWN 8-27-90 BY C.O.C. CHECKED BY M.A.J.

DRAWN BY: C. RUIZ DATE: 02/2019  
 CHECKED BY: G. KOUCHKI DATE: 02/2019  
 DESIGN ENGINEER OF RECORD: K. SEDAI DATE: 03/2019  
 DRAWN BY: BRAIN STALEY III DATE: 11-30-71  
 CHECKED BY: JOEL A. JOHNSON DATE: 12-30-71

SPECIAL  
 STANDARD

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

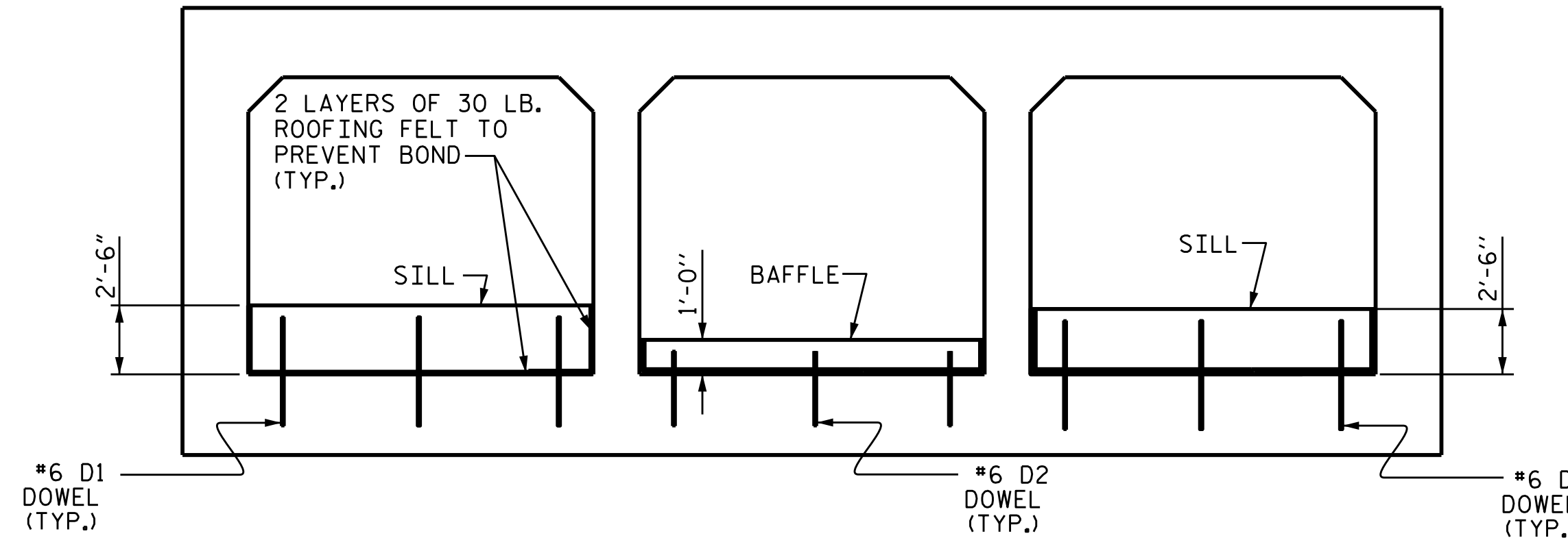
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-3
1			3			TOTAL SHEETS
2			4			6



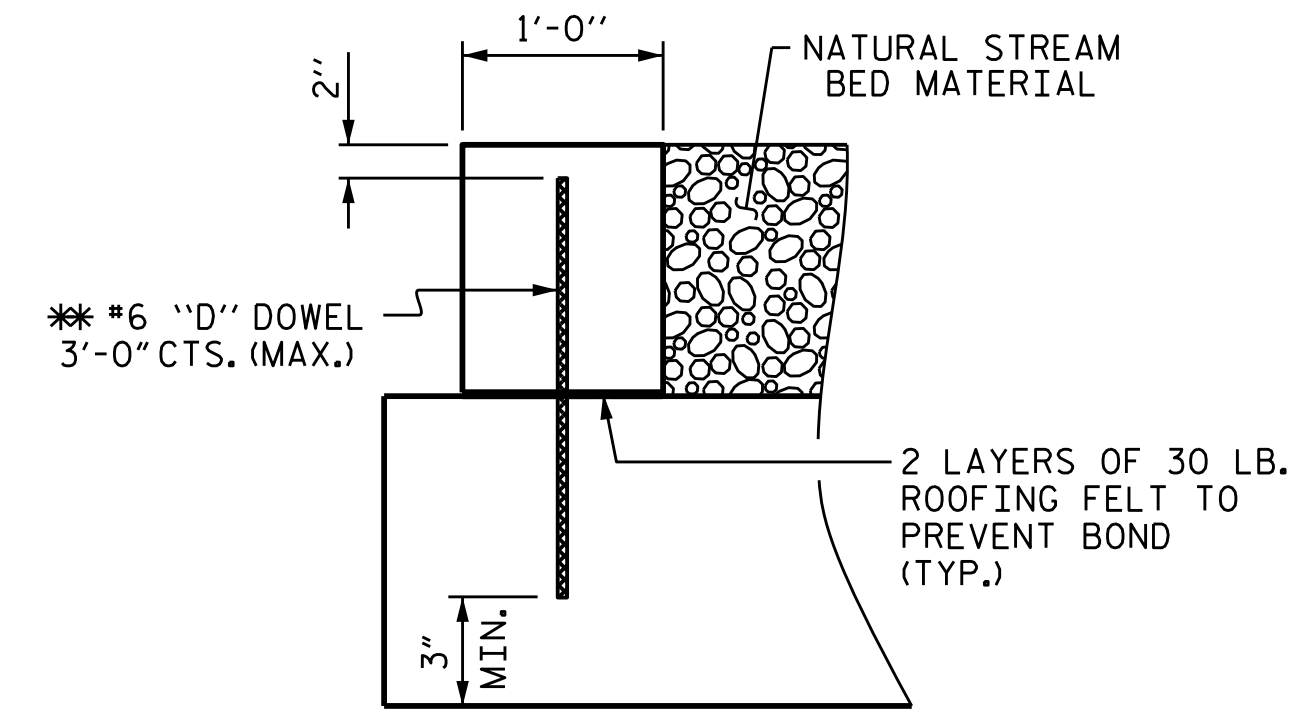
**NOTES:**

NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED AT THE PROJECT SITE DURING CULVERT CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE LOW FLOW BARREL. RIP RAP MAY BE USED TO SUPPLEMENT THE NATIVE MATERIAL IN THE HIGH FLOW BARRELS. 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 THE APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.



ELEVATION

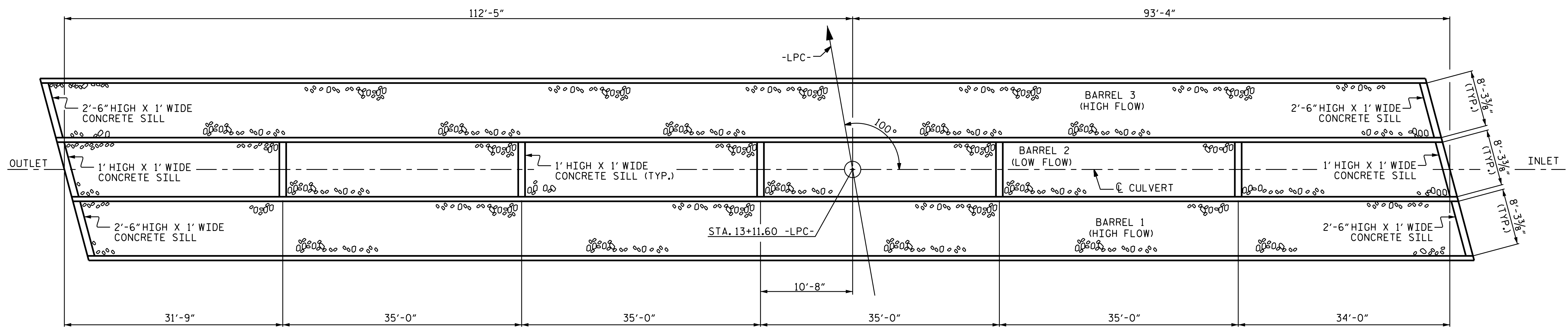


SECTION THROUGH SILL/BAFFLE

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

**CULVERT SILL/BAFFLE DETAILS**

(LOOKING DOWNSTREAM)

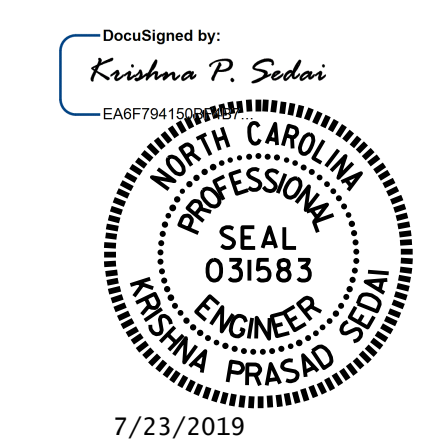


**CONCRETE SILL PLAN**

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-3421A  
RICHMOND COUNTY  
 STATION: 13+11.60 -LPC-

SHEET 4 OF 6



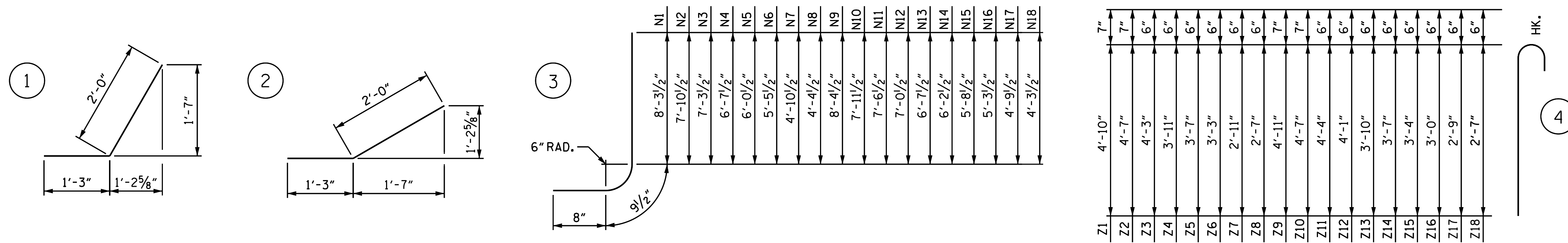
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**DETAILS OF SILLS  
 FOR  
 CONCRETE BOX CULVERT  
 100° SKEW**

DRAWN BY : C. RUIZ DATE : 02/19  
 CHECKED BY : G. KOUCHEKI DATE : 02/19  
 DESIGN ENGINEER OF RECORD: K. SEDAI DATE : 03/19

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 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-4
1			3			TOTAL SHEETS
2			4			6

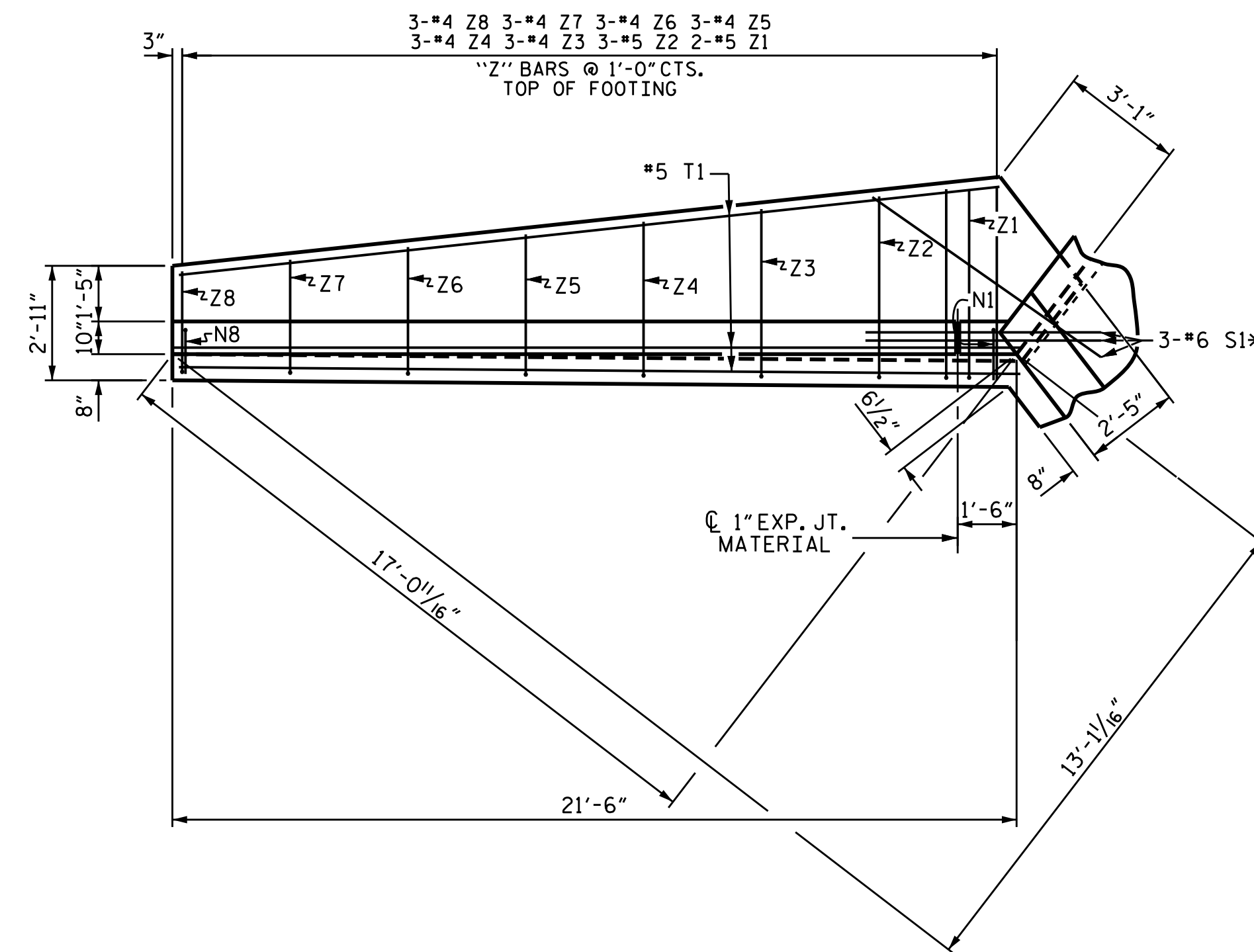
BAR TYPES



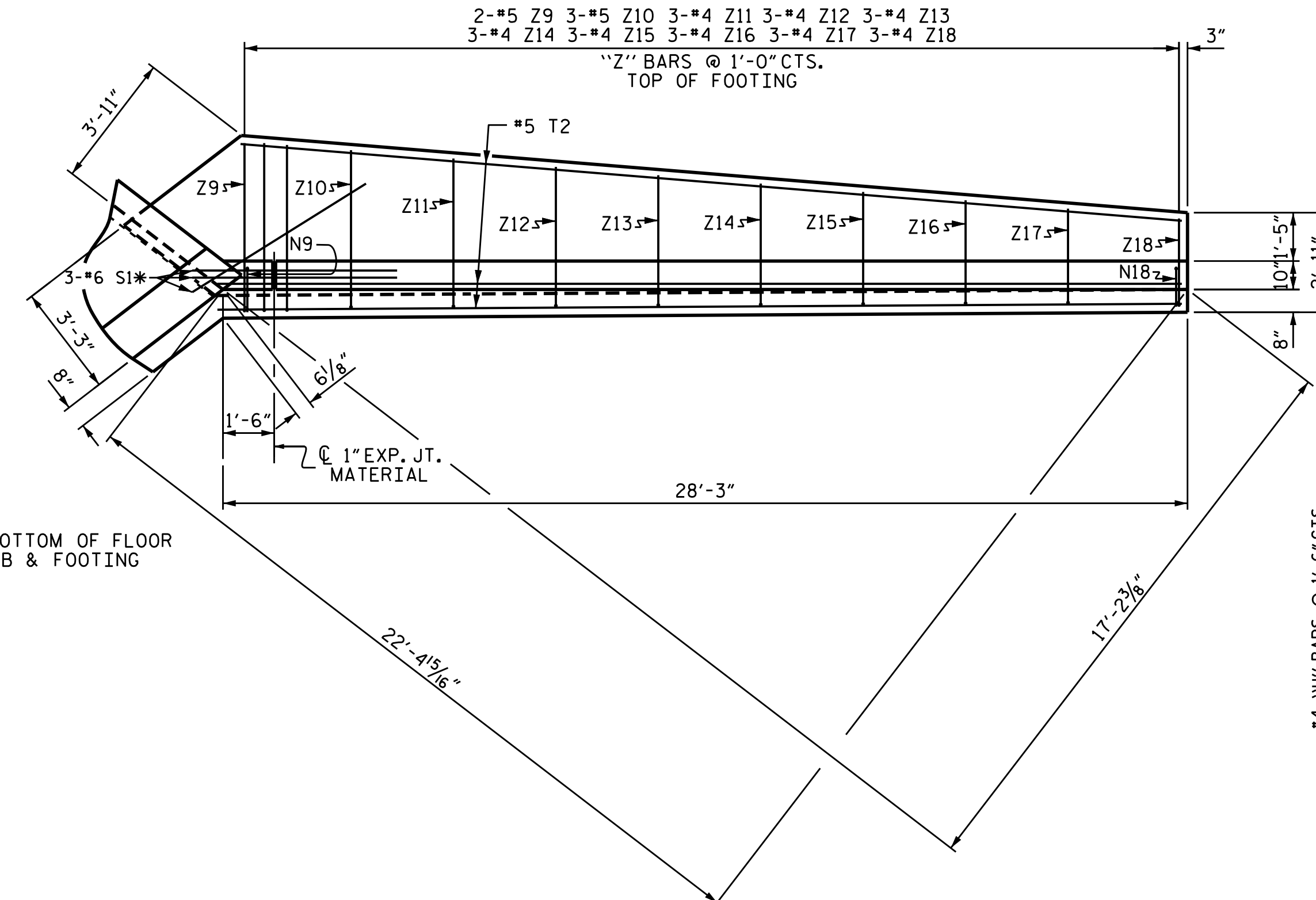
ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

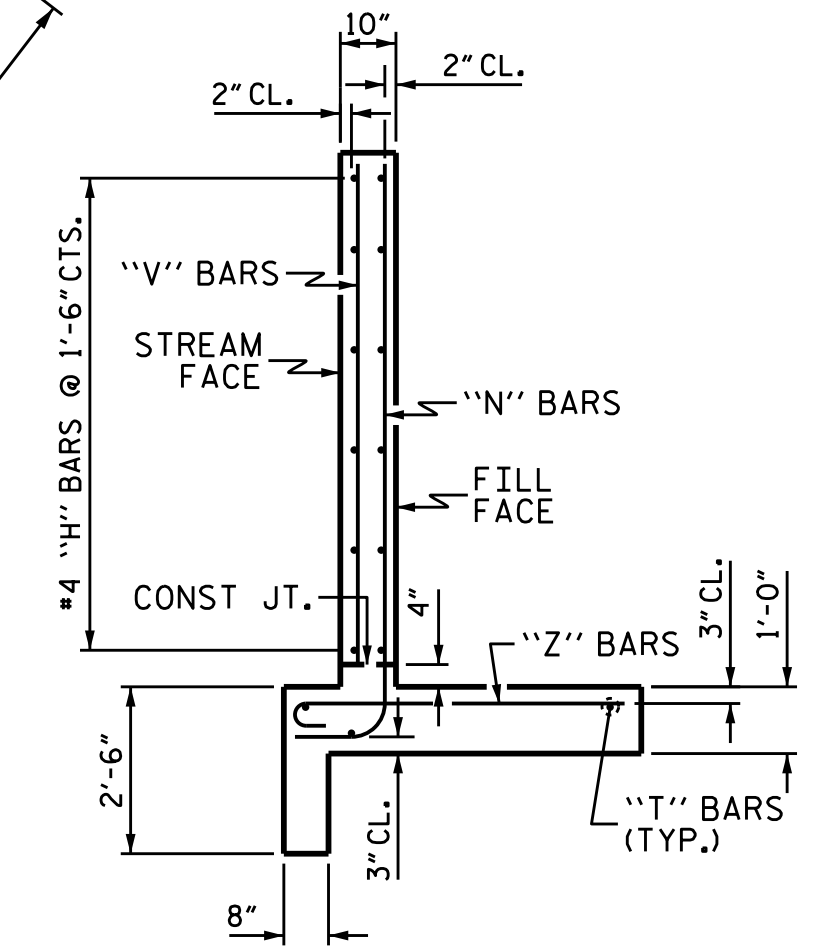
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR NO.	SIZE	TYPE	LENGTH	WEIGHT		
H1	12	#4	STR	19'-7"	157	N10	6	#5	3	9'-5"	59
H2	4	#4	STR	15'-1"	40	N11	6	#4	3	9'-0"	36
H3	4	#4	STR	7'-6"	20	N12	6	#4	3	8'-6"	34
H4	24	#4	1	3'-3"	52	N13	6	#4	3	8'-1"	32
H5	4	#4	STR	20'-0"	53	N14	6	#4	3	7'-8"	31
H6	12	#4	STR	26'-4"	211	N15	6	#4	3	7'-2"	29
H7	4	#4	STR	20'-5"	55	N16	6	#4	3	6'-9"	27
H8	4	#4	STR	10'-5"	28	N17	6	#4	3	6'-3"	25
H9	24	#4	2	3'-3"	52	N18	6	#4	3	5'-9"	23
H10	4	#4	STR	26'-8"	71						
						S1	12	#6	STR	6'-3"	113
N1	4	#5	3	9'-9"	41						
N2	6	#5	3	9'-4"	58	T1	6	#5	STR	21'-0"	131
N3	6	#4	3	8'-9"	35	T2	6	#5	STR	27'-7"	173
N4	6	#4	3	8'-1"	32						
N5	6	#4	3	7'-6"	30	V1	4	#4	STR	7'-9"	21
N6	6	#4	3	6'-11"	28	V2	6	#4	STR	7'-2"	29
N7	6	#4	3	6'-4"	25	V3	6	#4	STR	6'-8"	27
N8	6	#4	3	5'-10"	23	V4	6	#4	STR	6'-1"	24
N9	4	#5	3	9'-10"	41	V5	6	#4	STR	5'-6"	22
						V6	6	#4	STR	4'-11"	20
						V7	6	#4	STR	4'-4"	17
						V8	6	#4	STR	3'-9"	15
						V9	4	#4	STR	7'-9"	21
						V10	6	#4	STR	7'-5"	30
						V11	6	#4	STR	6'-11"	28
						V12	6	#4	STR	6'-6"	26
						V13	6	#4	STR	6'-0"	24
						V14	6	#4	STR	5'-7"	22
						V15	6	#4	STR	5'-2"	21
						V16	6	#4	STR	4'-8"	19
						V17	6	#4	STR	4'-3"	17
						V18	6	#4	STR	3'-9"	15
						Z1	4	#5	4	5'-5"	23
						Z2	6	#5	4	5'-2"	32
						Z3	6	#4	4	4'-9"	19
						Z4	6	#4	4	4'-5"	18
						Z5	6	#4	4	4'-1"	16
						Z6	6	#4	4	3'-9"	15
						Z7	6	#4	4	3'-5"	14
						Z8	6	#4	4	3'-1"	12
						Z9	4	#5	4	5'-6"	23
						Z10	6	#5	4	5'-2"	32
						Z11	6	#4	4	4'-10"	19
						Z12	6	#4	4	4'-7"	18
						Z13	6	#4	4	4'-4"	17
						Z14	6	#4	4	4'-1"	16
						Z15	6	#4	4	3'-10"	15
						Z16	6	#4	4	3'-6"	14
						Z17	6	#4	4	3'-3"	13
						Z18	6	#4	4	3'-1"	12



PLAN W2



PLAN W1

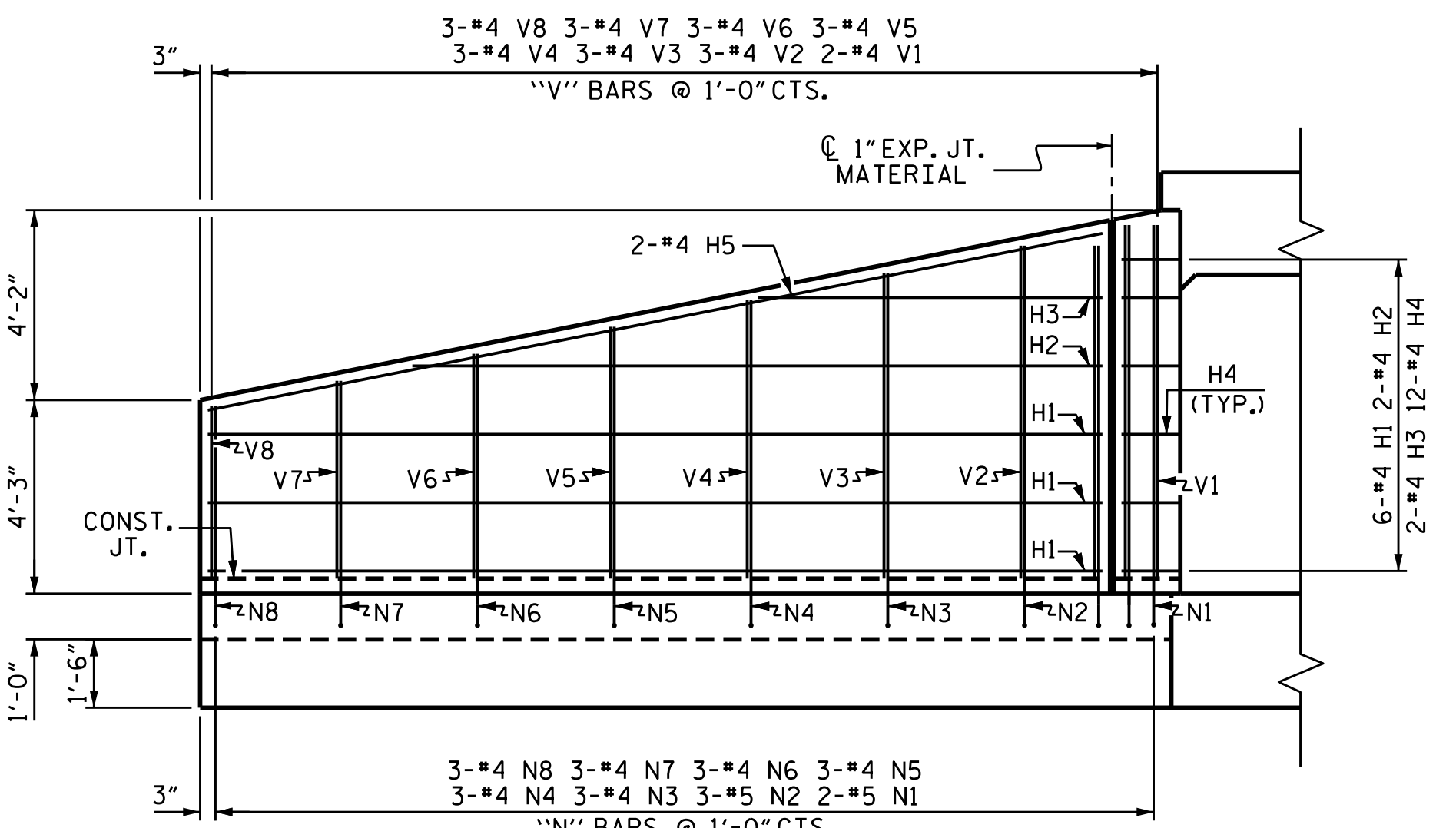


TYPICAL WING SECTION

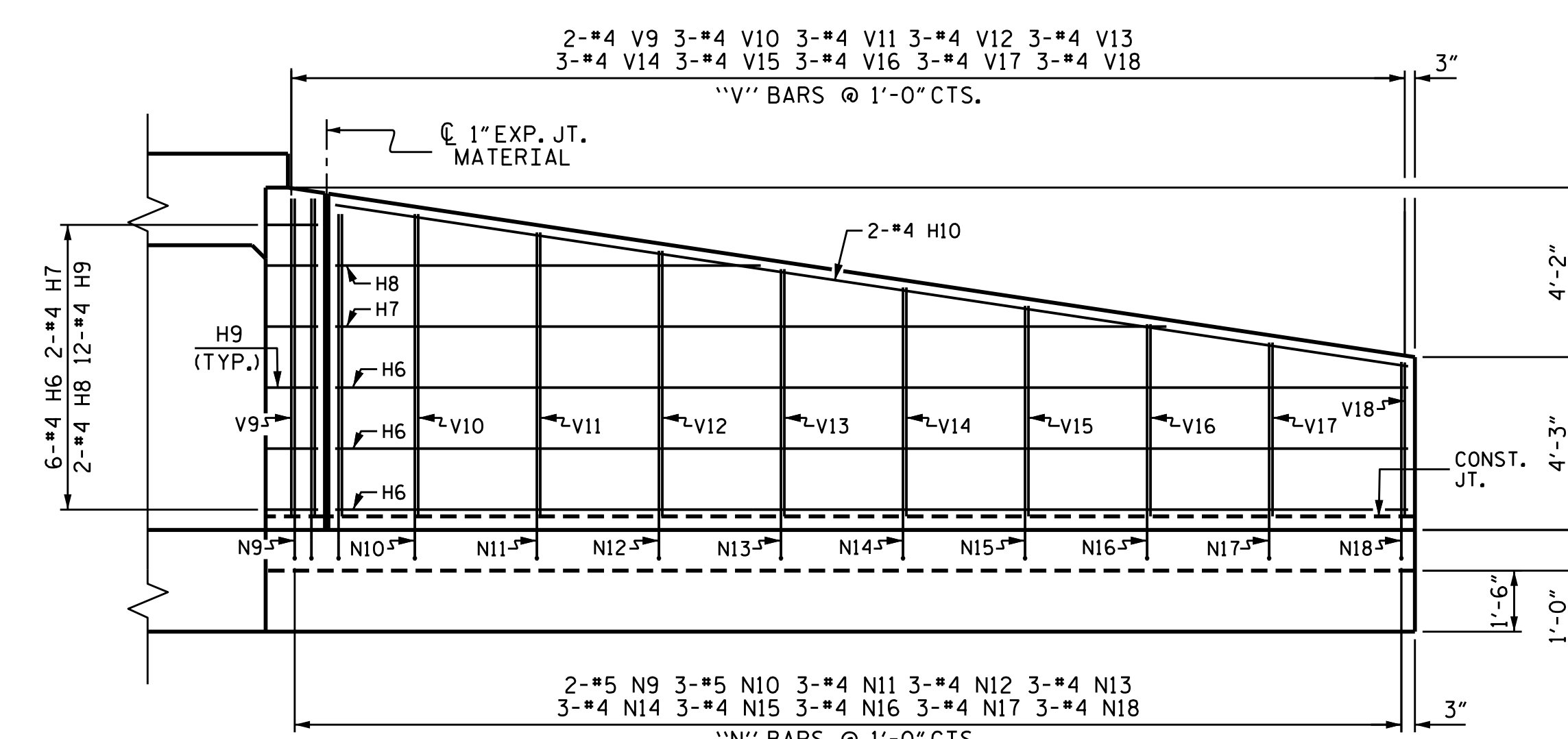
REINFORCING STEEL 2491 LBS FOR 4 WINGS

CLASS A CONCRETE

4 WINGS	36.6 CY
2 HEADWALLS	2.6 CY
2 END CURTAIN WALLS	3.2 CY
<b>TOTAL</b>	<b>42.4 CY</b>



ELEVATION W2



ELEVATION W1

DRAWN BY : A. SORSENGINH DATE : 4/2019  
 CHECKED BY : M. G. SHAIKH DATE : 4/2019  
 DESIGN ENGINEER OF RECORD : K. SEDAI DATE : 4/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. R-3421A  
 RICHMOND COUNTY  
 STATION: 13+11.60 -LPC-

SHEET 5 OF 6

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**STANDARD WINGS FOR CONCRETE BOX CULVERT**  
 H = 7'-0" SLOPE = 4:1  
 105 SKEW

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

TOTAL SHEETS 6

STD. NO. CW7507



LOAD FACTORS:

DESIGN LOAD RATING FACTORS

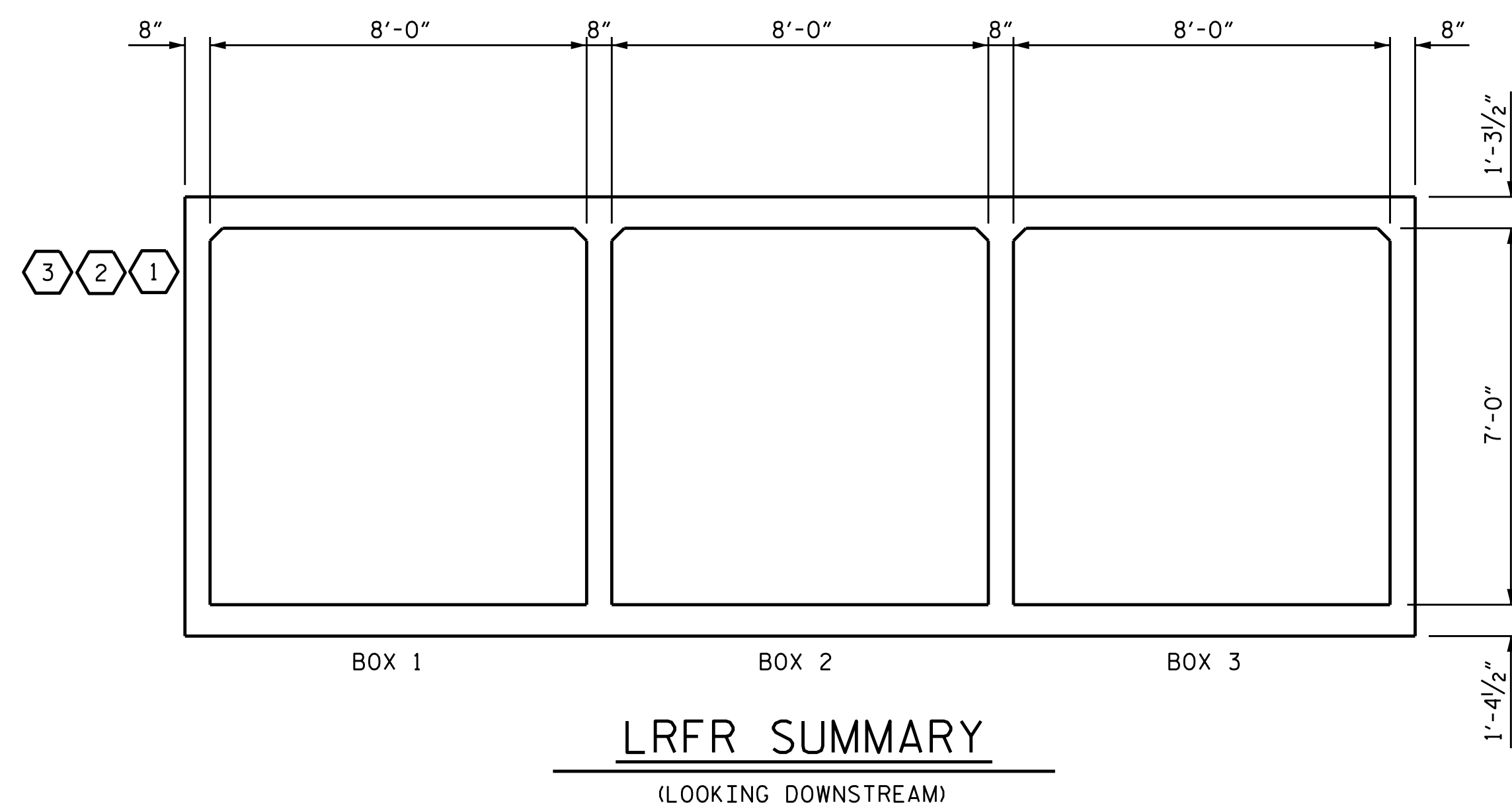
LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

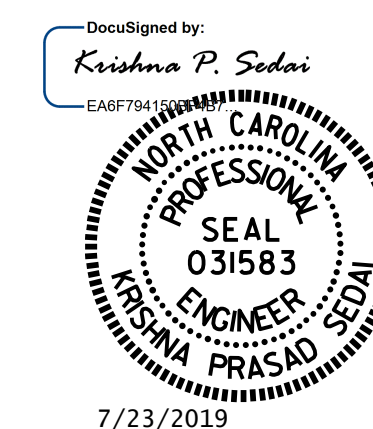
LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS															
LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER	
						LIVE-LOAD FACTORS (LL)	MOMENT				SHEAR				
							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	3.01	--	1.75	6.3	1	EXTERIOR WALL	4.16	3.01	1	1	1.11	
	HL-93 (OPERATING)	N/A		3.91	--	1.35	8.17	1	EXTERIOR WALL	4.16	3.91	1	EXTERIOR WALL	1.11	
	HS-20 (INVENTORY)	36,000	②	3.01	108.45	1.75	6.3	1	EXTERIOR WALL	4.16	3.01	1	EXTERIOR WALL	1.11	
	HS-20 (OPERATING)	36,000		3.91	140.59	1.35	8.17	1	EXTERIOR WALL	4.16	3.91	1	EXTERIOR WALL	1.11	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SH		3.88	48.46	1.40	7.87	1	EXTERIOR WALL	4.16	3.88	1	EXTERIOR WALL	1.11	
		S3C	21,500		3.77	80.96	1.40	7.87	1	EXTERIOR WALL	4.16	3.77	1	EXTERIOR WALL	1.11
		S3A	22,750		3.77	85.67	1.40	7.87	1	EXTERIOR WALL	4.16	3.77	1	EXTERIOR WALL	1.11
		S4A	26,750		3.77	100.73	1.40	7.87	1	EXTERIOR WALL	4.16	3.77	1	EXTERIOR WALL	1.11
		S5A	30,500	③	3.76	114.62	1.40	7.87	1	EXTERIOR WALL	4.16	3.76	1	EXTERIOR WALL	1.11
		S6A	34,500		3.76	129.65	1.40	7.87	1	EXTERIOR WALL	4.16	3.76	1	EXTERIOR WALL	1.11
		S7B	38,500		3.76	144.74	1.40	7.87	1	EXTERIOR WALL	4.16	3.76	1	EXTERIOR WALL	1.11
		S7A	40,000		3.76	150.42	1.40	7.87	1	EXTERIOR WALL	4.16	3.76	1	EXTERIOR WALL	1.11
	TRUCK TRACTOR SEMI-TRAILER (TTST)	T4A	28,250		3.77	106.38	1.40	7.87	1	EXTERIOR WALL	4.16	3.77	1	EXTERIOR WALL	1.11
		T5B	32,000		3.76	120.35	1.40	7.87	1	EXTERIOR WALL	4.16	3.76	1	EXTERIOR WALL	1.11
		T6A	36,000		3.76	135.39	1.40	7.87	1	EXTERIOR WALL	4.16	3.76	1	EXTERIOR WALL	1.11
		T7A	40,000		3.77	150.70	1.40	7.87	1	EXTERIOR WALL	4.16	3.77	1	EXTERIOR WALL	1.11
	T7B	40,000		3.77	150.62	1.40	7.87	1	EXTERIOR WALL	4.16	3.77	1	EXTERIOR WALL	1.11	

#	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. R-3421A  
RICHMOND COUNTY  
 STATION: 13+11.60 -LPC-

SHEET 6 OF 6



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

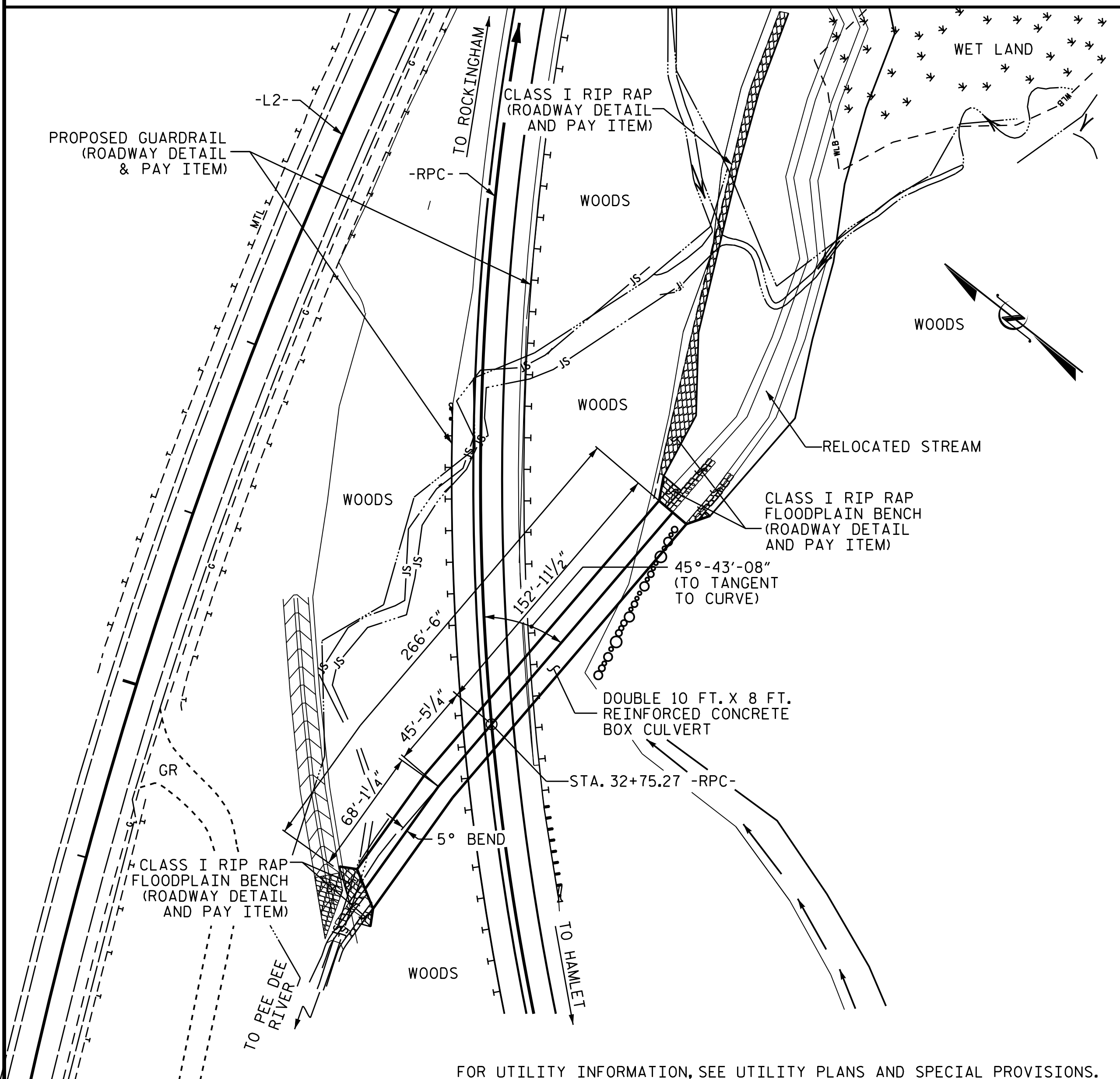
DRAWN BY : C. RUIZ DATE : 3/2019  
 CHECKED BY : M. G. SHAIKH DATE : 4/2019  
 DESIGN ENGINEER OF RECORD: K. DESAI DATE : 4/2019

DOCUMENT NOT CONSIDERED  
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 SIGNATURES COMPLETED

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C3-6	
①			③			TOTAL SHEETS	
②			④			6	



BM #6: RR SPIKE IN BASE OF 15" GUM TREE, 208 FT. RT. OF  
STA. 105+88.00 -I73-, EL. 266.10



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.  
**LOCATION SKETCH**

GRADE DATA	
GRADE PT. EL. @ STA. 32+75.27 -RPC-	= 237.01
BED EL. @ STA. 32+75.27 -RPC-	= 208.72
ROADWAY SLOPES	= 3:1

HYDRAULIC DATA	
DESIGN DISCHARGE	= 830 C.F.S.
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 219.00
DRAINAGE AREA	= 1.45 SQ. MI.
BASIC DISCHARGE (Q100)	= 970 C.F.S.
BASIC HIGH WATER ELEVATION	= 219.60

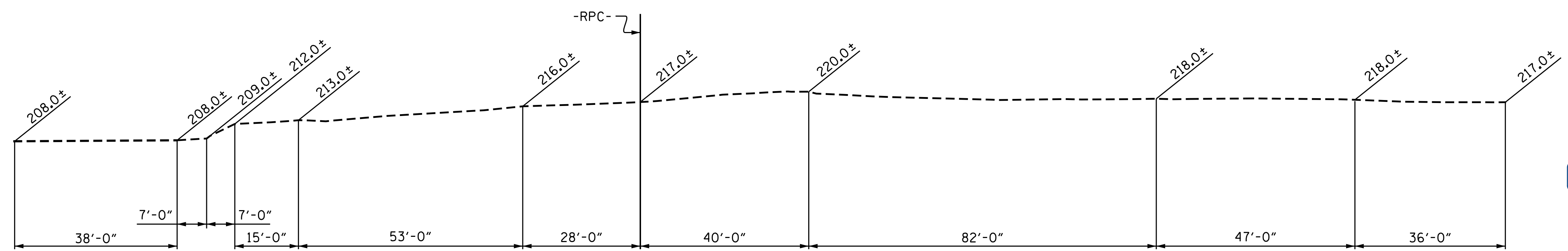
  

OVERTOPPING DATA	
OVERTOPPING DISCHARGE	= 2,600 C.F.S.
FREQUENCY OF OVERTOPPING FLOOD	= 500 YRS.+
OVERTOPPING FLOOD ELEVATION	= 231.00

TOTAL STRUCTURE QUANTITIES	
CLASS A CONCRETE	
BARREL @ 3.079 CY/FT	820.6 C.Y.
SILLS	5.0 C.Y.
INLET WING ETC.	19.0 C.Y.
OUTLET WING ETC.	24.3 C.Y.
TOTAL	868.9 C.Y.
REINFORCING STEEL	
BARREL	82,948 LBS.
INLET WINGS ETC.	1110 LBS.
OUTLET WINGS ETC.	1321 LBS.
TOTAL	85,379 LBS.
FOUNDATION COND. MAT'L	417 TONS
CULVERT EXCAVATION	LUMP SUM

**NOTES**

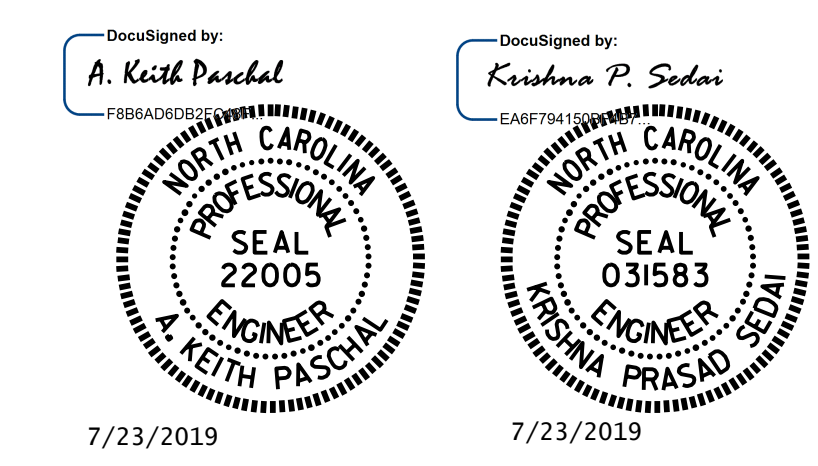
ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING.  
DESIGN FILL-----21.11'  
FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.  
3"Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.  
CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:  
1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.  
2. THE REMAINING PORTIONS OF WALLS AND SILLS WITH NATIVE MATERIAL BACKFILL.  
3. FOLLOWED BY THE WING WALLS FULL HEIGHT, 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 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.  
BACKFILL WITH SELECT MATERIAL, CLASS VI MEETING THE REQUIREMENTS OF SECTION 1016 OF THE STANDARD SPECIFICATION.  
CONSTRUCT THE REINFORCED CONCRETE BOX CULVERT AT STATION 32+75.27 -RPC- WITH 1 INCH ON THE WESTERN SIDE AND TAPERING TO ZERO CAMBER ON THE EASTERN SIDE TO ACCOUNT FOR ANTICIPATED SETTLEMENT.  
NO WORK SHALL BE DONE ON THE CULVERT AT STA. 32+75.27 -RPC- UNTIL THE AREA OF THE BOX CULVERT HAS BEEN UNDERCUT TO 2' BELOW CULVERT BOTTOM ELEVATION AT 25' RIGHT AND 25' LEFT, 3' BELOW CULVERT BOTTOM ELEVATION AT 25' TO 125' RIGHT AND UNSUITABLE MATERIAL REPLACED WITH SUITABLE MATERIAL, PROPERLY COMPACTED TO THE ELEVATION OF THE BOTTOM OF THE PROPOSED FLOOR SLAB. THE LIMITS OF THIS UNDERCUT EXCAVATION SHALL BE AT LEAST THE LIMITS OF THE BOX CULVERT INCLUDING THE WINGS. NO SEPARATE PAYMENT WILL BE MADE FOR ANY TEMPORARY SHEETING, UNDERCUT, OR UNSUITABLE MATERIAL REPLACEMENT AS REQUIRED TO CONSTRUCT THE PROPOSED CULVERT. PAYMENT IS INCLUDED IN THE LUMP SUM PRICE FOR CULVERT EXCAVATION.



**PROFILE ALONG CULVERT**

PROJECT NO. R-3421A  
RICHMOND COUNTY  
STATION: 32+75.27 -RPC-

SHEET 1 OF 8 CULVERT NO. 760257



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

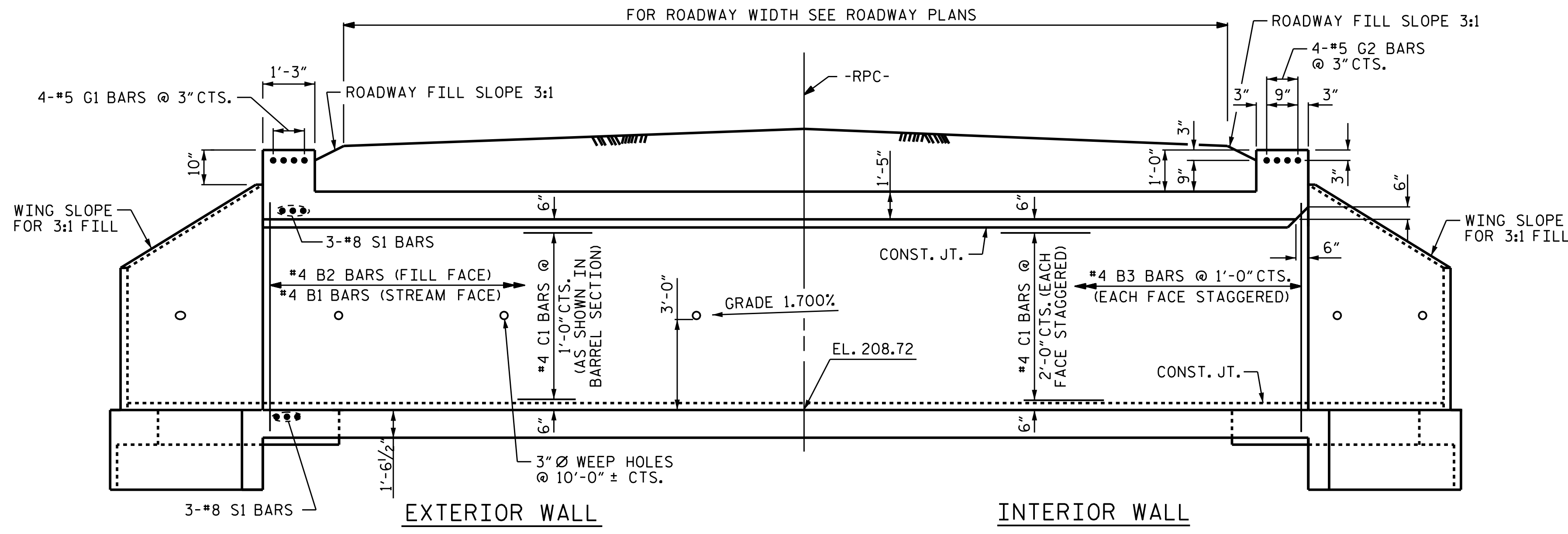
**DOUBLE 10 FT. X 8 FT. CONCRETE BOX CULVERT  
45°-43'-08" SKEW**

DRAWN BY : C. RUIZ DATE : 03/2019  
CHECKED BY : G. KOUCHKEKI DATE : 03/2019  
DESIGN ENGINEER OF RECORD : K. SEDAİ DATE : 04/2019

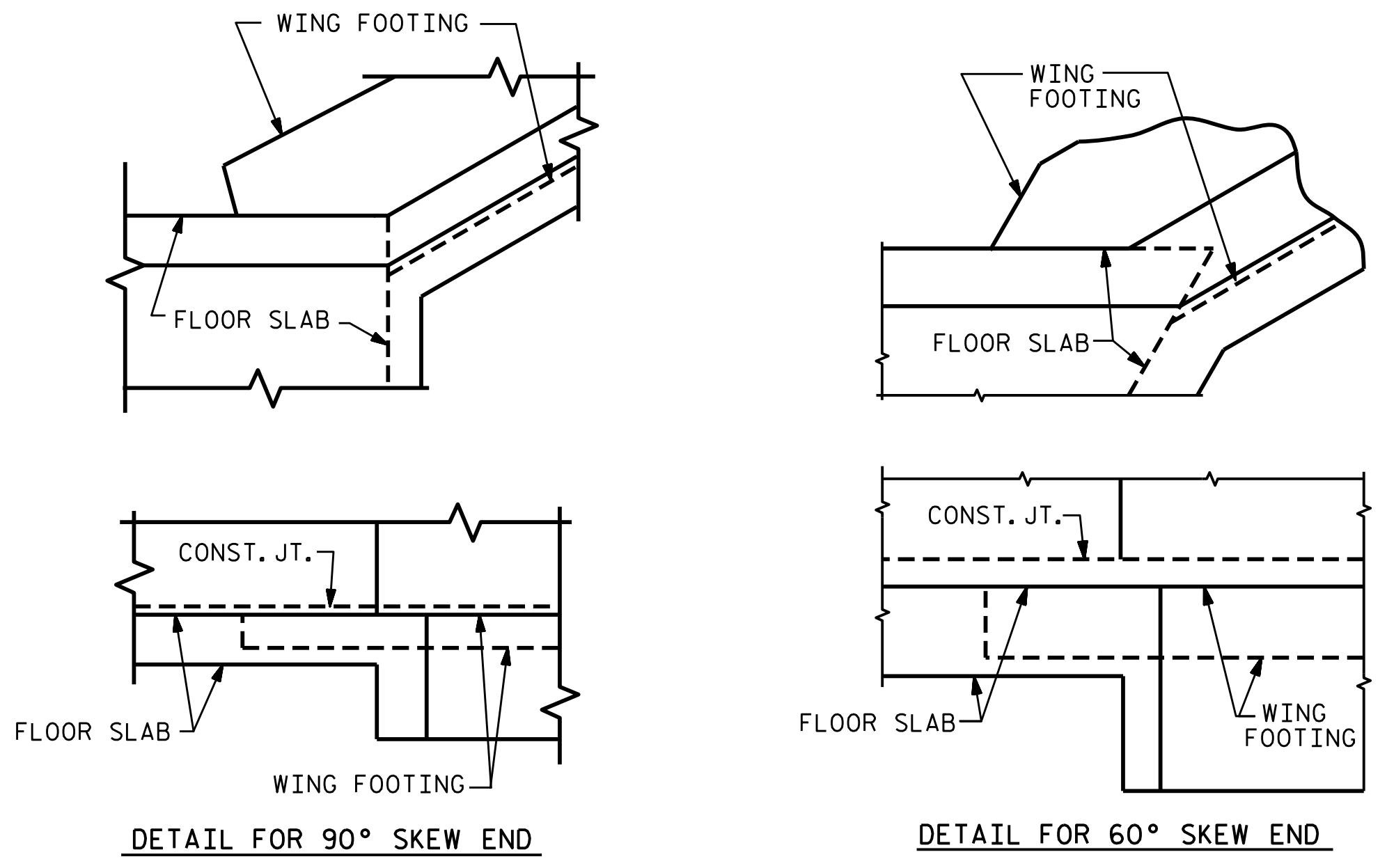
DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-1
1			3			TOTAL SHEETS
2			4			8

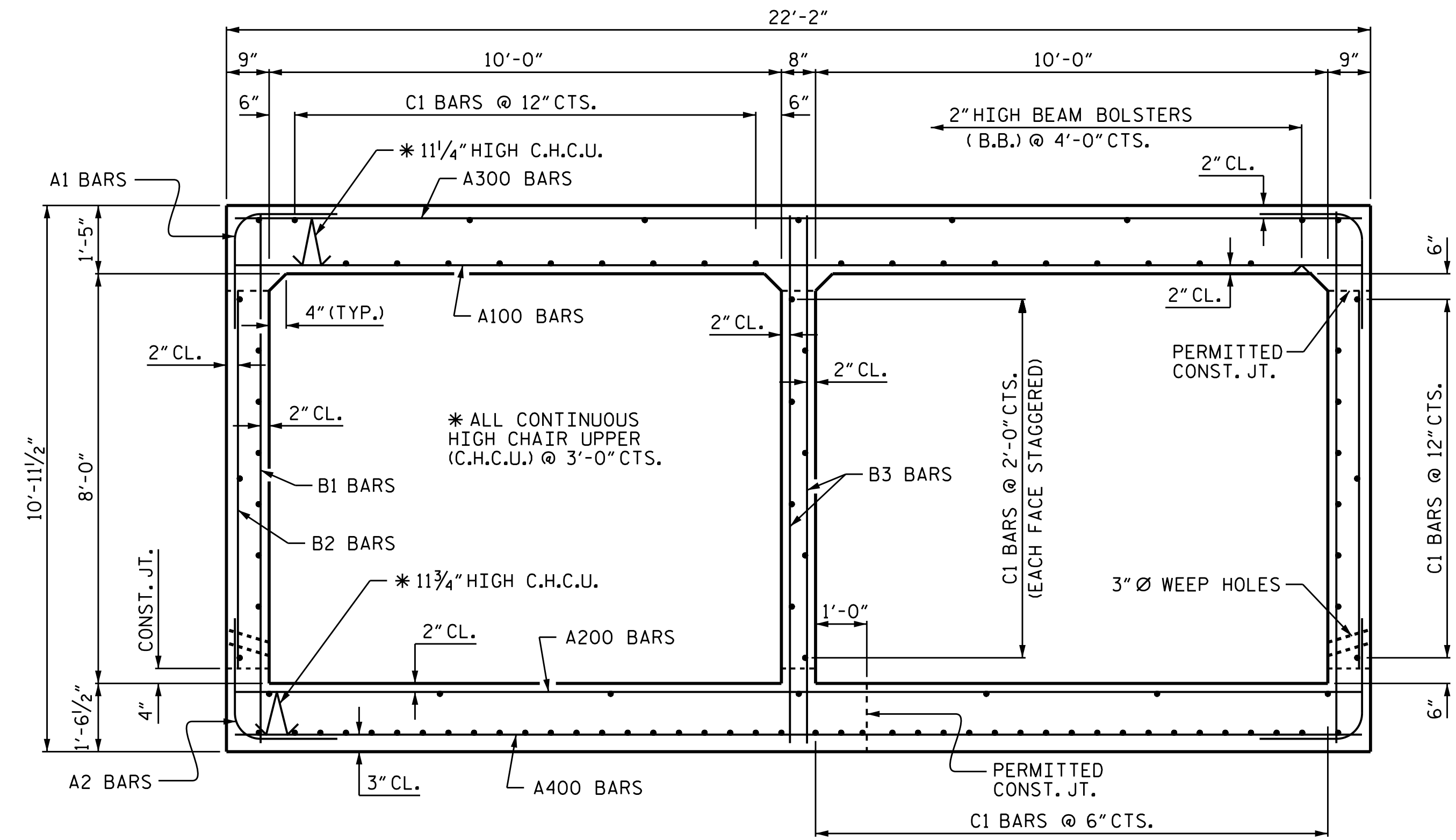




CULVERT SECTION NORMAL TO ROADWAY

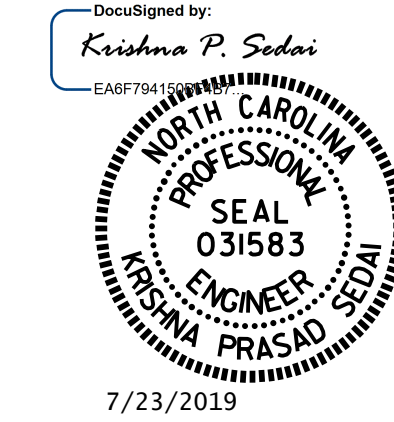


CONNECTION OF WING FOOTING AND FLOOR SLAB WHEN SLAB IS THICKER THAN FOOTING



RIGHT ANGLE SECTION OF BARREL  
THERE ARE 102 "C" BARS IN SECTION OF BARREL.

PROJECT NO. R-3421A  
RICHMOND COUNTY  
STATION: 32+75.27 -RPC-  
SHEET 2 OF 8



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
BARREL STANDARD  
DOUBLE 10 FT. X 8 FT.  
CONCRETE BOX CULVERT  
45°-43'-08" SKEW

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

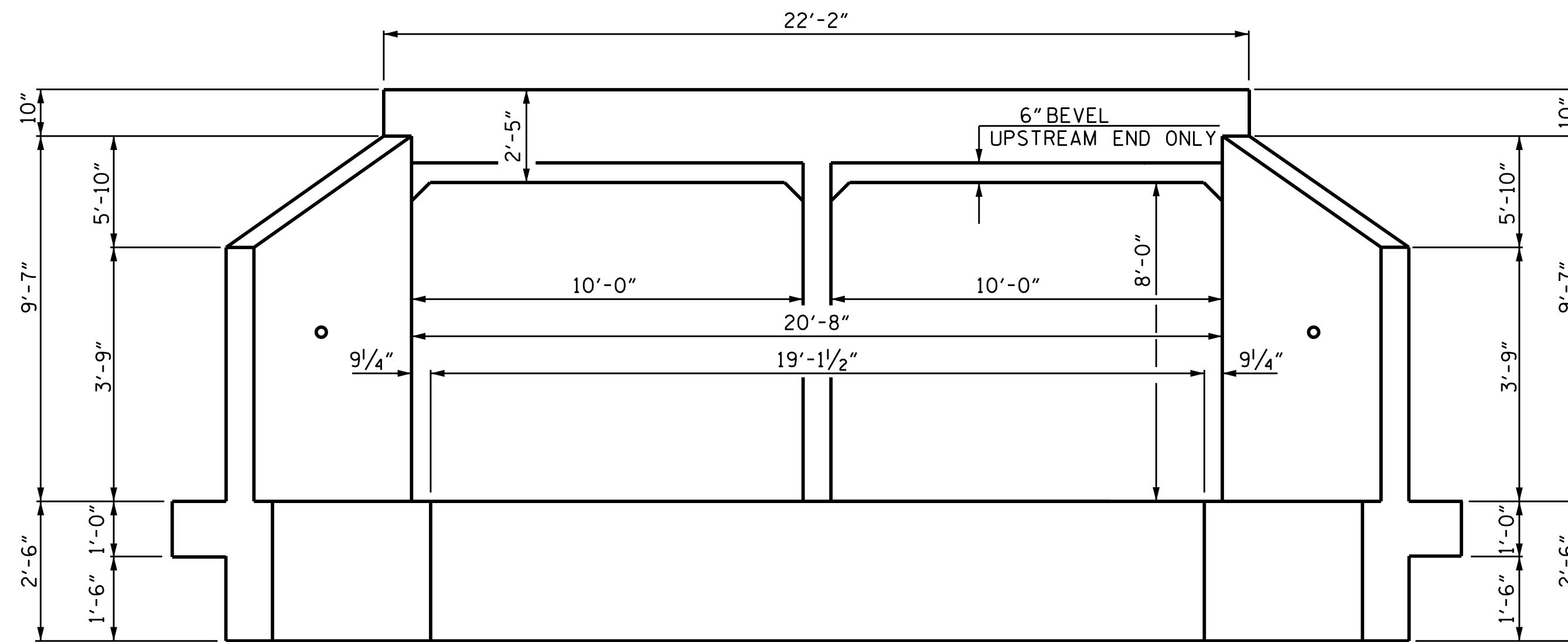
DRAWN BY : C. RUIZ DATE : 03/2019  
CHECKED BY : G. KOUCHEKI DATE : 04/2019  
DESIGN ENGINEER OF RECORD : K. SEDA DATE : 04/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

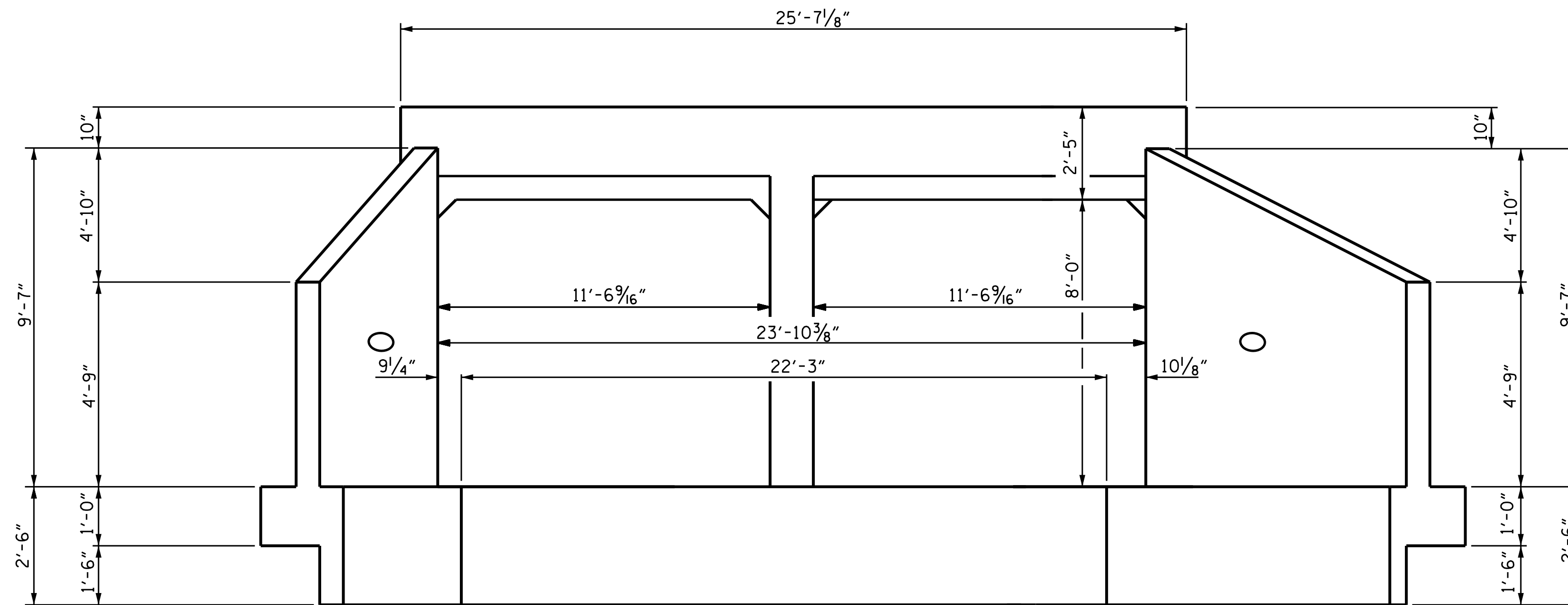
REVISIONS						SHEET NO. C4-2
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 8
2			4			







INLET END ELEVATION NORMAL TO SKEW



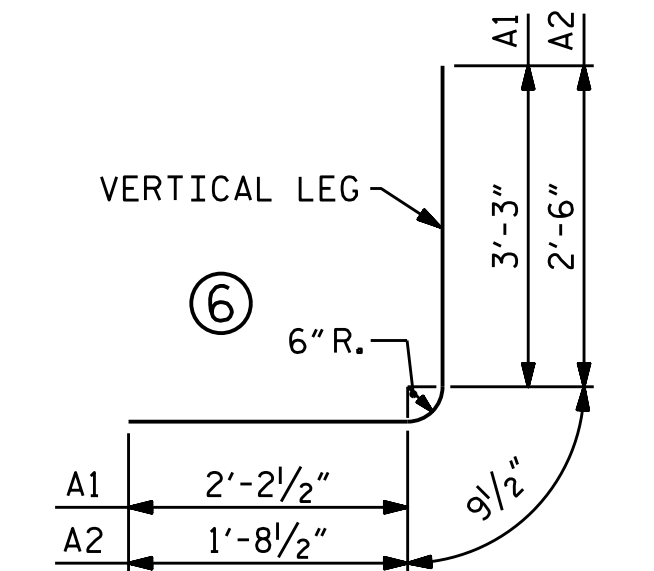
OUTLET END ELEVATION NORMAL TO SKEW

BILL OF MATERIAL

BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	854	4	6	6'-3"	A400	415	6	STR	21'-10"
A2	854	4	6	5'-0"	A401	2	6	STR	19'-9"
					A402	2	6	STR	17'-7"
A100	327	6	STR	21'-10"	A403	2	6	STR	15'-5"
A101	1	6	STR	20'-7"	A404	2	6	STR	13'-3"
A102	1	6	STR	19'-2"	A405	2	6	STR	11'-1"
A103	1	6	STR	17'-10"	A406	2	6	STR	8'-11"
A104	1	6	STR	16'-5"	A407	2	6	STR	6'-9"
A105	1	6	STR	15'-1"	A408	2	6	STR	4'-7"
A106	1	6	STR	13'-8"	A409	2	6	STR	2'-5"
A107	1	6	STR	12'-4"	A410	3	6	STR	21'-10"
A108	1	6	STR	10'-11"					
A109	1	6	STR	9'-7"	B1	534	4	STR	10'-5"
A110	1	6	STR	8'-3"	B2	854	4	STR	7'-4"
A111	1	6	STR	6'-10"	B3	534	4	STR	10'-5"
A112	1	6	STR	5'-6"					
A113	1	6	STR	4'-1"	C1	1020	4	STR	28'-10"
A114	1	6	STR	2'-9"					
A115	1	6	STR	1'-4"	D1	32	6	STR	2'-1"
A116	3	6	STR	21'-10"	D2	8	6	STR	3'-7"
A200	415	5	STR	21'-10"	G1	4	5	STR	25'-2"
A201	2	5	STR	19'-9"	G2	4	5	STR	21'-10"
A202	2	5	STR	17'-7"					
A203	2	5	STR	15'-5"	S1	6	8	STR	25'-2"
A204	2	5	STR	13'-3"					
A205	2	5	STR	11'-1"					
A206	2	5	STR	8'-11"					
A207	2	5	STR	6'-9"					
A208	2	5	STR	4'-7"					
A209	2	5	STR	2'-5"					
A210	3	5	STR	21'-10"					
A300	415	5	STR	21'-10"					
A301	2	5	STR	19'-9"					
A302	2	5	STR	17'-7"					
A303	2	5	STR	15'-5"					
A304	2	5	STR	13'-3"					
A305	2	5	STR	11'-1"					
A306	2	5	STR	8'-11"					
A307	2	5	STR	6'-9"					
A308	2	5	STR	4'-7"					
A309	2	5	STR	2'-5"					
A310	3	5	STR	21'-10"					

REINFORCING STEEL 82,948 LBS.

BAR TYPE



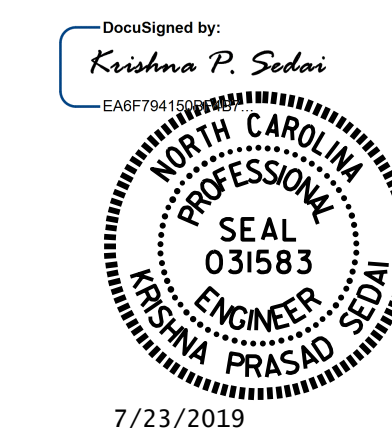
BAR DIMENSIONS ARE OUT TO OUT

SPLICE LENGTH CHART

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

PROJECT NO. R-3421A  
 RICHMOND COUNTY  
 STATION: 32+75.27 -RPC-

SHEET 4 OF 8



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 DOUBLE 10 FT. X 8 FT.  
 CONCRETE BOX CULVERT  
 45°-43'-08" SKEW

DRAWN BY : REZA KOUCHEKI DATE : 04/2019  
 CHECKED BY : M.G.S. DATE : 04/2019  
 DESIGN ENGINEER OF RECORD : K. SEDAI DATE : 03/2019

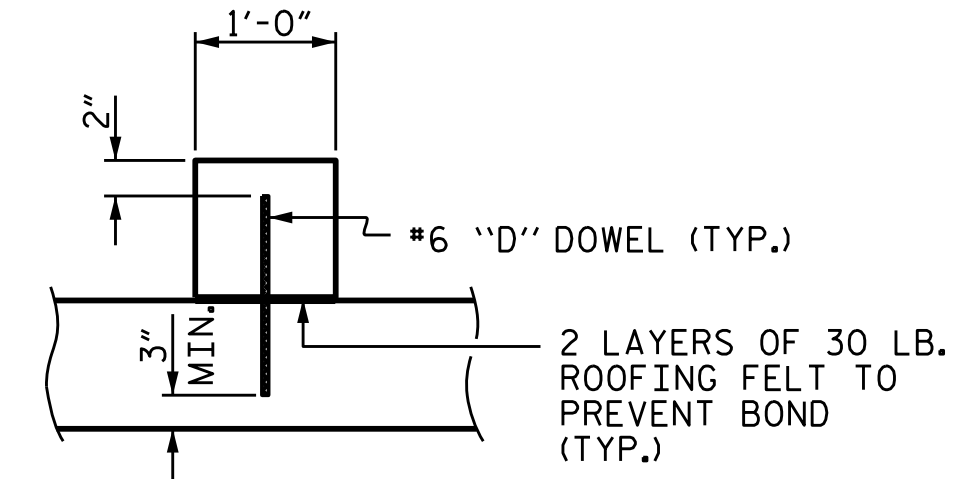
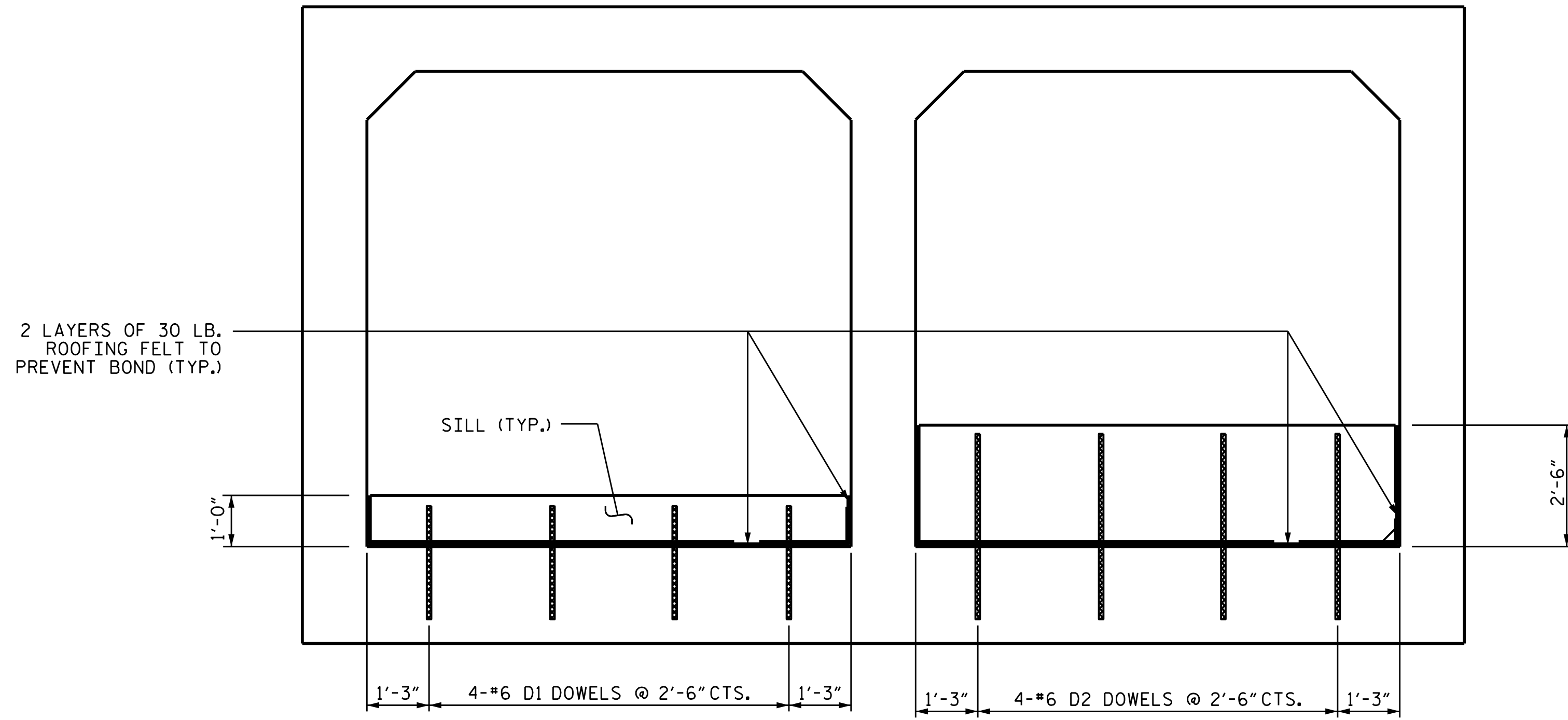
DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-4
1			3			TOTAL SHEETS
2			4			8

**NOTES:**

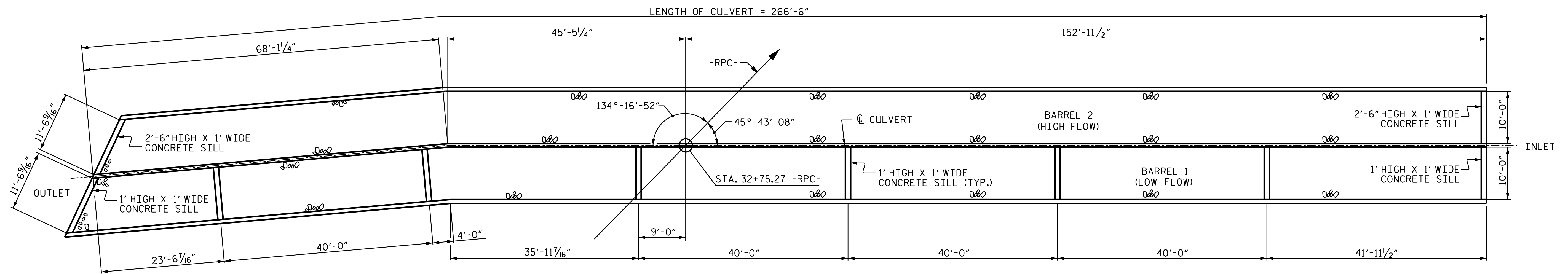
NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OF FLOODPLAIN AT THE PROJECT SITE DURING CULVERT CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE LOW FLOW BARREL. RIP RAP MAY BE USED TO SUPPLEMENT THE NATIVE MATERIAL IN THE THE HIGH 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.



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

**INLET ELEVATION**  
(LOOKING DOWNSTREAM)

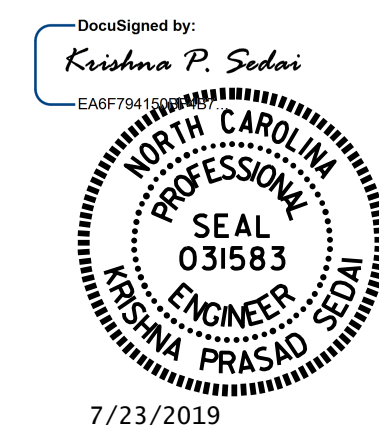


**CONCRETE SILL LAYOUT**

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-3421A  
RICHMOND COUNTY  
STATION: 32+75.27 -RPC-

SHEET 5 OF 8



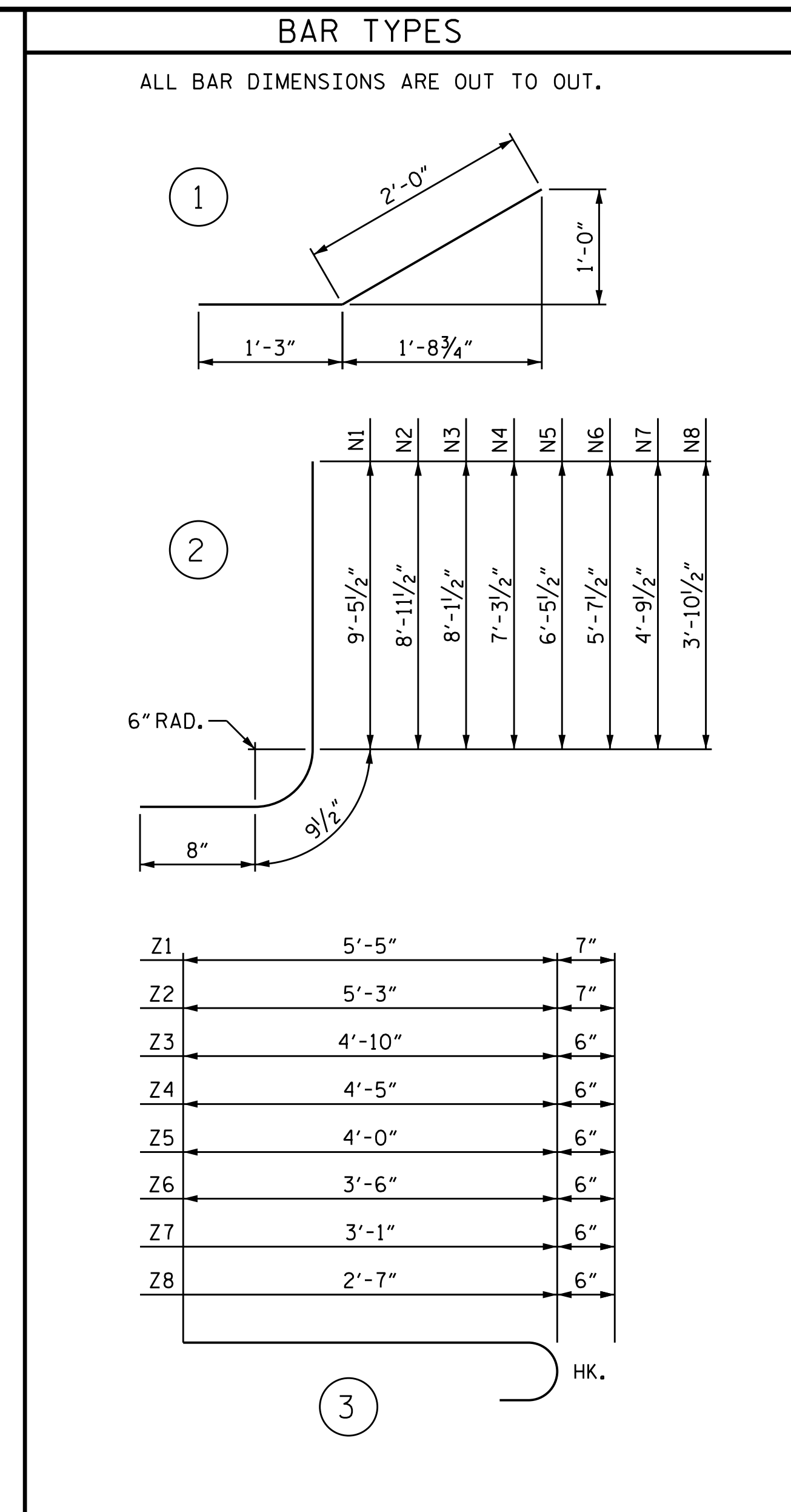
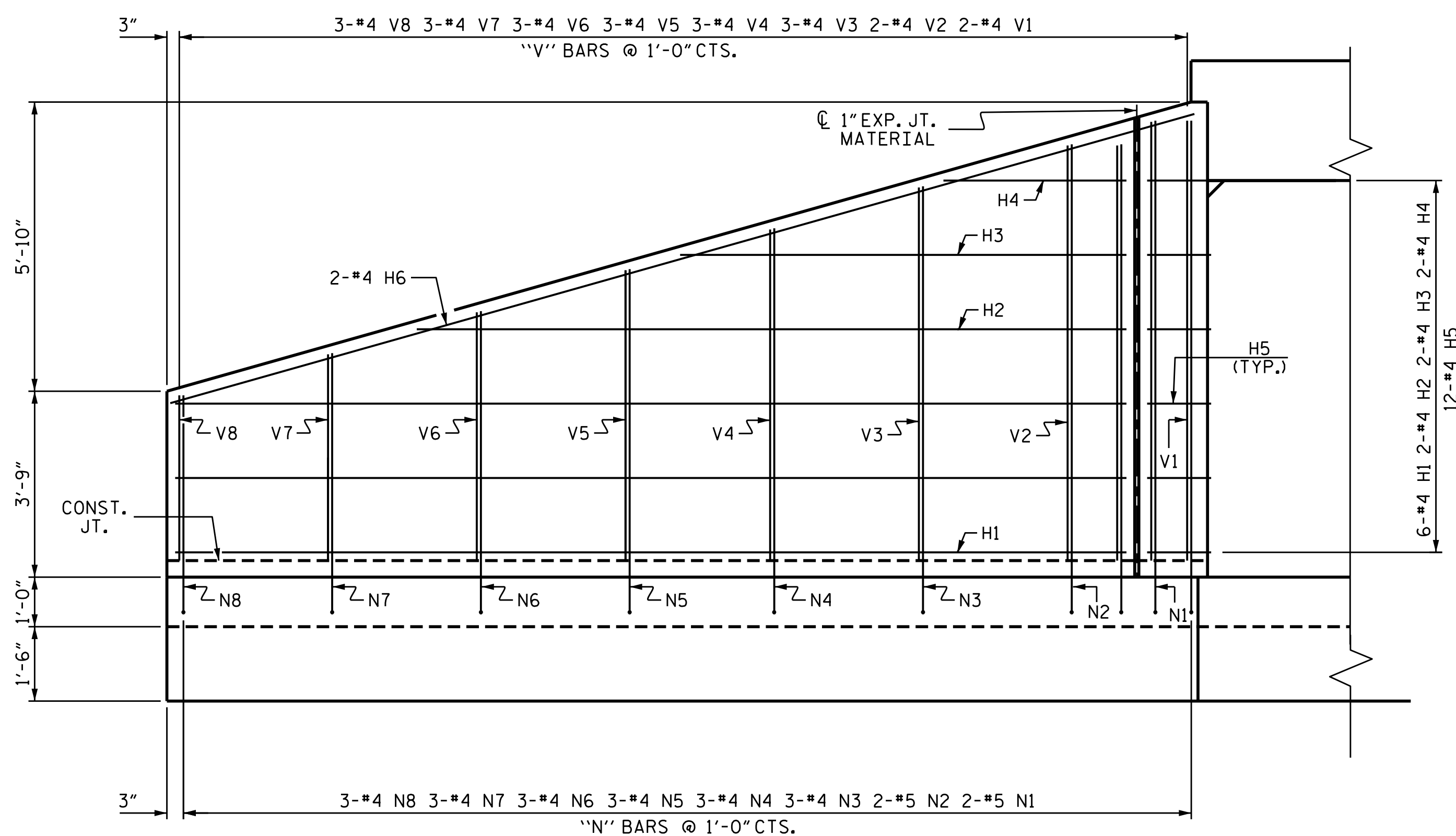
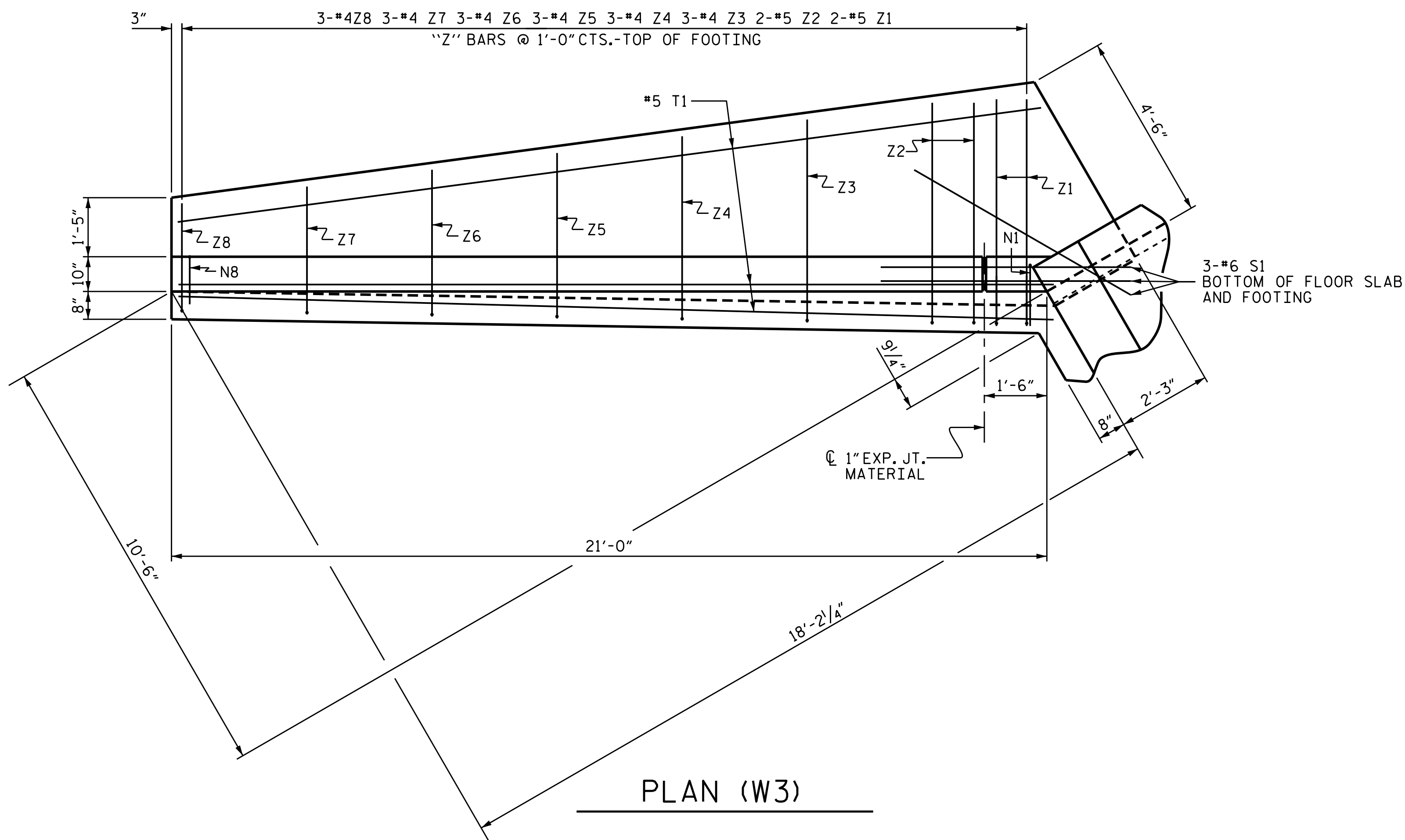
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
DOUBLE 10 FT. X 8 FT.  
CONCRETE BOX CULVERT  
45°-43'-08" SKEW

DRAWN BY : C.RUIZ DATE : 04/2019  
CHECKED BY : REZA KOUCHEKI DATE : 04/2019  
DESIGN ENGINEER OF RECORD: K. SEDAİ DATE : 04/2019

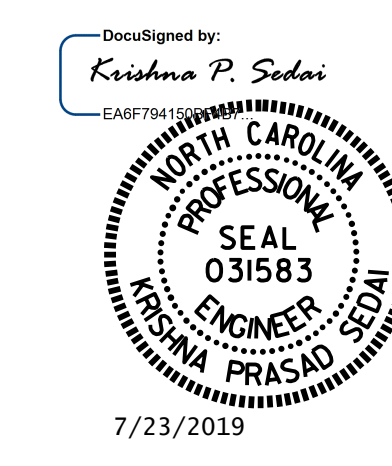
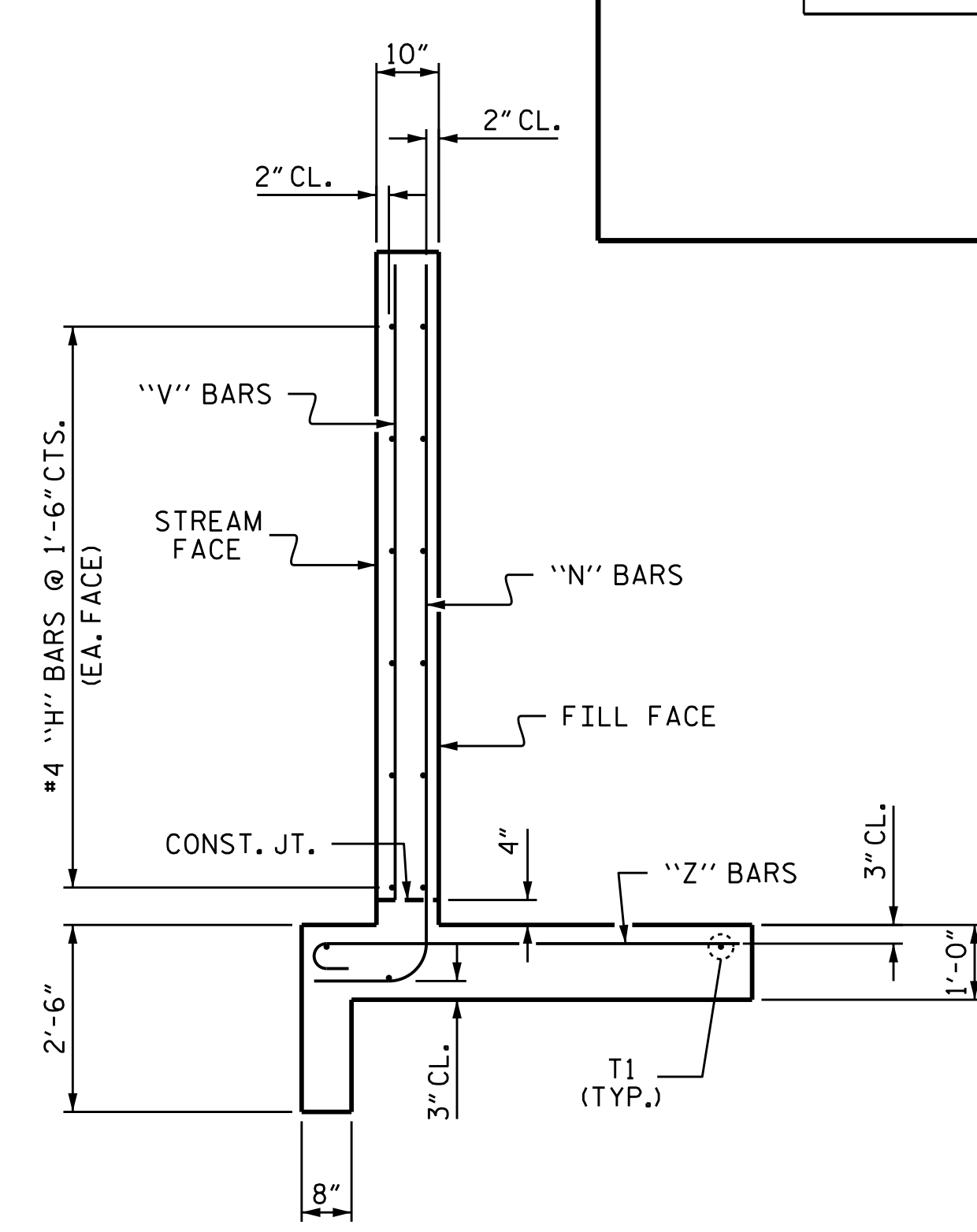
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-5	
1			3			TOTAL SHEETS	8
2			4				





BILL OF MATERIAL					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	19'-2"	154
H2	4	#4	STR	14'-3"	38
H3	4	#4	STR	9'-0"	24
H4	4	#4	STR	3'-8"	10
H5	24	#4	1	3'-3"	52
H6	4	#4	STR	19'-11"	53
N1	4	#5	2	10'-11"	46
N2	4	#5	2	10'-5"	43
N3	6	#4	2	9'-7"	38
N4	6	#4	2	8'-9"	35
N5	6	#4	2	7'-11"	32
N6	6	#4	2	7'-1"	28
N7	6	#4	2	6'-3"	25
N8	6	#4	2	5'-4"	21
S1	6	#6	STR	6'-0"	54
T1	6	#5	STR	21'-0"	131
V1	4	#4	STR	8'-10"	24
V2	4	#4	STR	8'-4"	22
V3	6	#4	STR	7'-6"	30
V4	6	#4	STR	6'-8"	27
V5	6	#4	STR	5'-10"	23
V6	6	#4	STR	5'-0"	20
V7	6	#4	STR	4'-2"	17
V8	6	#4	STR	3'-4"	13
Z1	4	#5	3	6'-0"	25
Z2	4	#5	3	5'-10"	24
Z3	6	#4	3	5'-4"	21
Z4	6	#4	3	4'-11"	20
Z5	6	#4	3	4'-6"	18
Z6	6	#4	3	4'-0"	16
Z7	6	#4	3	3'-7"	14
Z8	6	#4	3	3'-1"	12
REINFORCING STEEL FOR 2 WINGS				1110	LBS
CLASS A CONCRETE					
2 WINGS				16.8	CY
1 HEADWALL				1.0	CY
1 END CURTAIN WALL				1.2	CY
TOTAL				19.0	CY



PROJECT NO. R-3421A  
RICHMOND COUNTY  
 STATION: 32+75.27 -RPC-  
 SHEET 6 OF 8

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

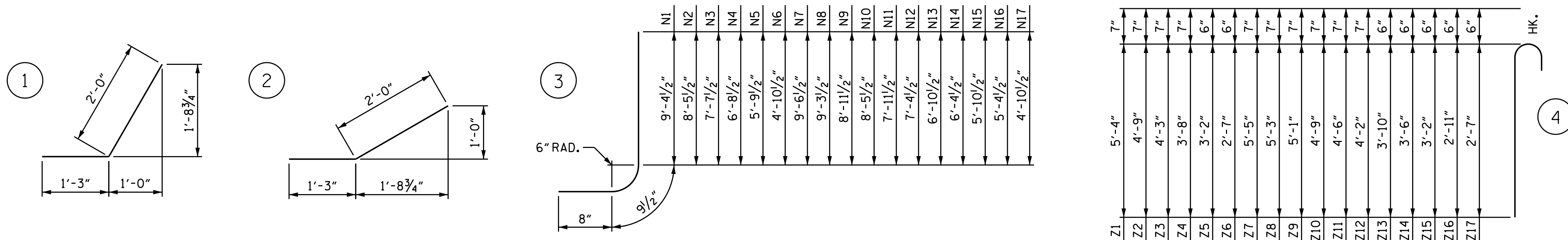
STANDARD WINGS  
 FOR  
 CONCRETE BOX CULVERT  
 H = 8'-0" SLOPE = 3:1  
 90° SKEW

DRAWN BY: REZA KOUICHEKI DATE: 4/15/19  
 CHECKED BY: M.G. SHAIKH DATE: 4/15/19  
 DESIGN ENGINEER OF RECORD: K. SEDAİ DATE: 4/15/19

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-6
1			3			TOTAL SHEETS
2			4			8

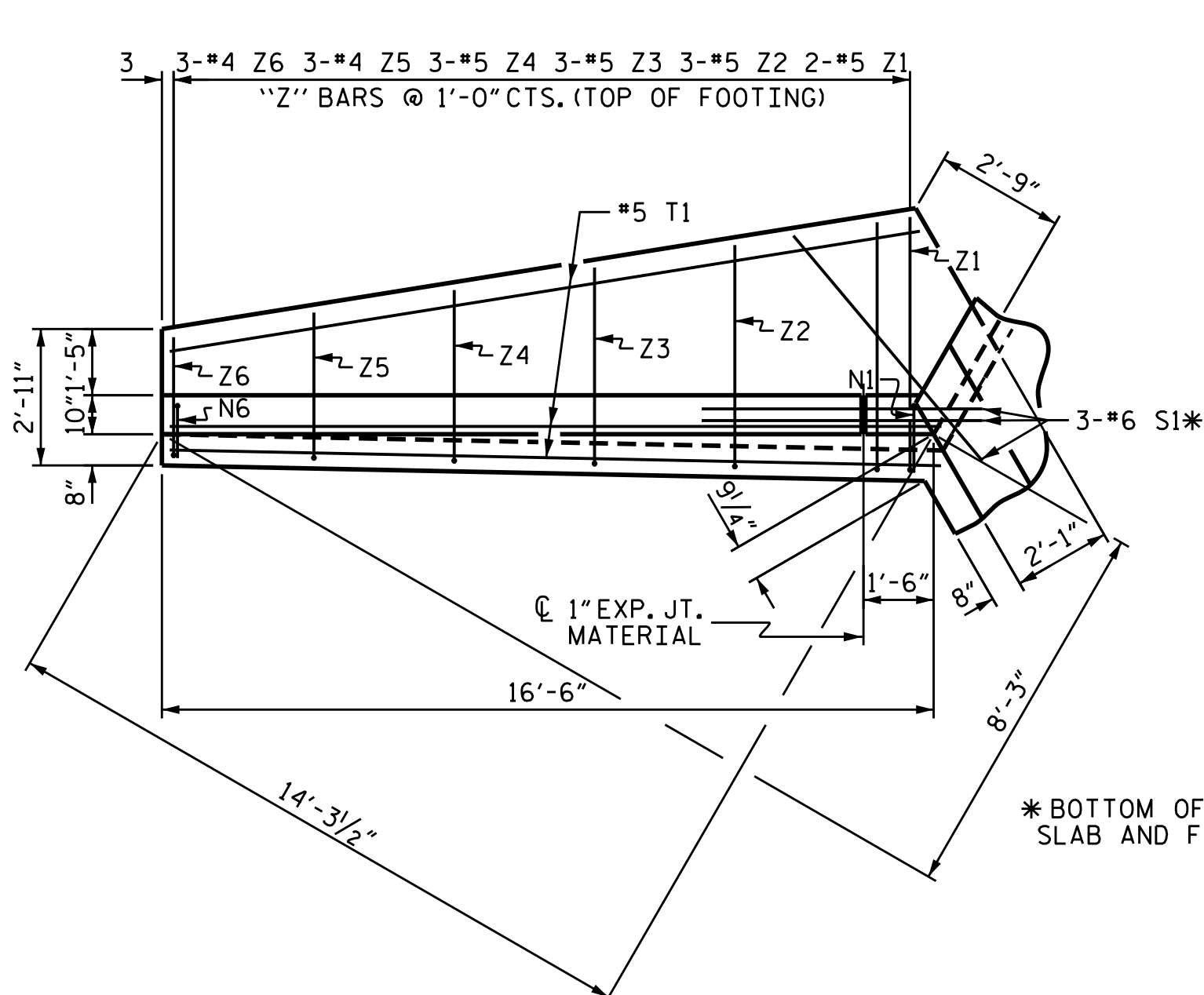
BAR TYPES



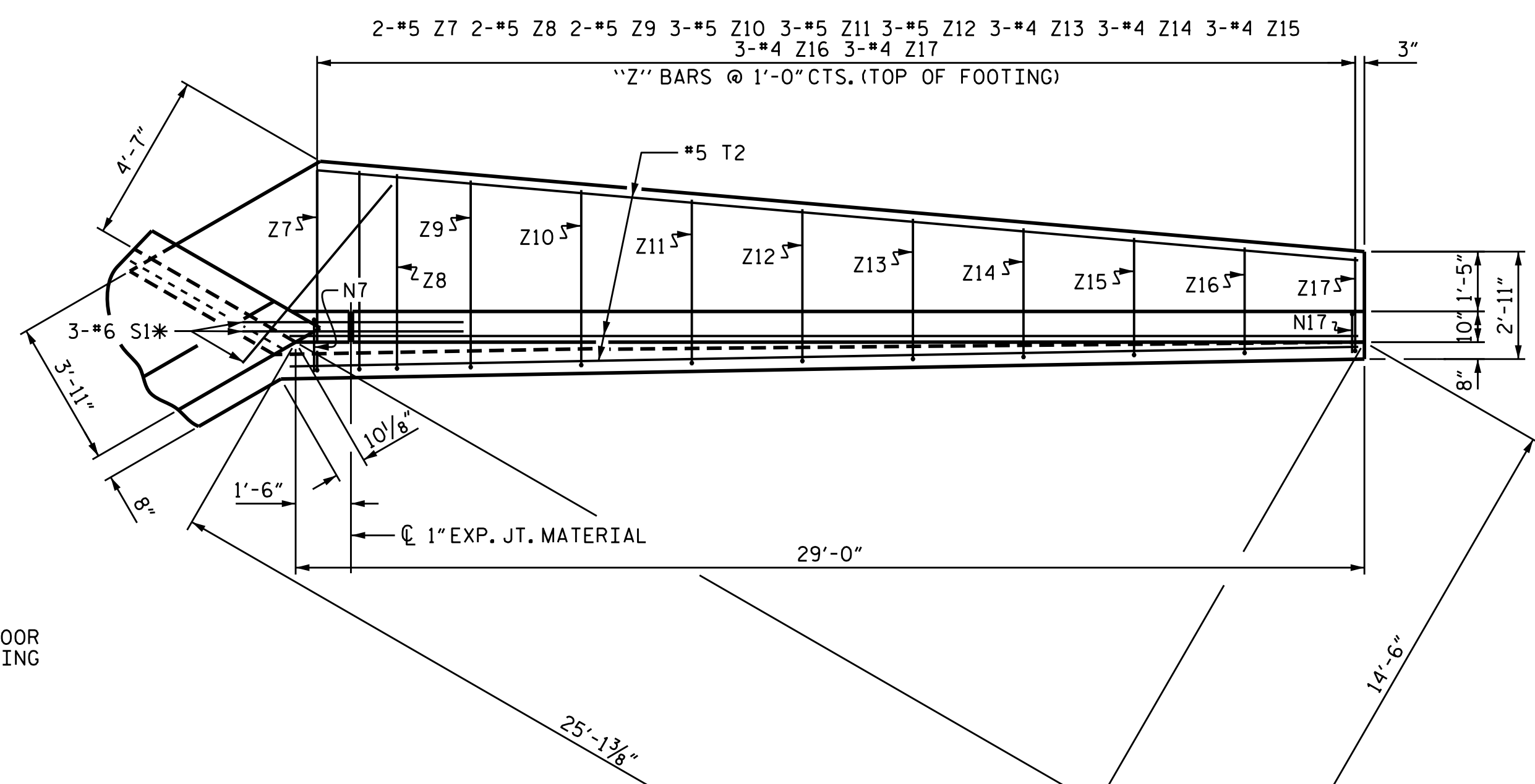
BILL OF MATERIAL

BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	14'-7"	58	N9	2	#5	3	10'-5"	22
H2	2	#4	STR	13'-4"	18	N10	3	#5	3	9'-11"	31
H3	2	#4	STR	8'-4"	11	N11	3	#5	3	9'-5"	29
H4	12	#4	1	3'-3"	26	N12	3	#4	3	8'-10"	18
H5	2	#4	STR	15'-3"	20	N13	3	#4	3	8'-4"	17
H6	6	#4	STR	27'-1"	109	N14	3	#4	3	7'-10"	16
H7	2	#4	STR	24'-10"	33	N15	3	#4	3	7'-4"	15
H8	2	#4	STR	16'-0"	21	N16	3	#4	3	6'-10"	14
H9	2	#4	STR	7'-3"	10	N17	3	#4	3	6'-4"	13
H10	12	#4	2	3'-3"	26						
H11	2	#4	STR	27'-6"	37	S1	6	#6	STR	6'-3"	56
N1	2	#5	3	10'-10"	23	T1	3	#5	STR	16'-2"	51
N2	3	#5	3	9'-11"	31	T2	3	#5	STR	28'-4"	89
N3	3	#5	3	9'-1"	28						
N4	3	#5	3	8'-2"	26	V1	2	#4	STR	8'-9"	12
N5	3	#4	3	7'-3"	15	V2	3	#4	STR	7'-11"	16
N6	3	#4	3	6'-4"	13	V3	3	#4	STR	7'-0"	14
N7	2	#5	3	11'-0"	23	V4	3	#4	STR	6'-1"	12
N8	2	#5	3	10'-9"	22	V5	3	#4	STR	5'-2"	10
						V6	3	#4	STR	4'-3"	9
						V7	2	#4	STR	8'-11"	12
						V8	2	#4	STR	8'-8"	12
						V9	2	#4	STR	8'-4"	11
						V10	3	#4	STR	7'-10"	16
						V11	3	#4	STR	7'-4"	15
						V12	3	#4	STR	6'-10"	14
						V13	3	#4	STR	6'-4"	13
						V14	3	#4	STR	5'-9"	12
						V15	3	#4	STR	5'-3"	11
						V16	3	#4	STR	4'-9"	10
						V17	3	#4	STR	4'-3"	9
						Z1	2	#5	4	5'-11"	12
						Z2	3	#5	4	5'-4"	17
						Z3	3	#5	4	4'-10"	15
						Z4	3	#5	4	4'-3"	13
						Z5	3	#4	4	3'-8"	7
						Z6	3	#4	4	3'-1"	6
						Z7	2	#5	4	6'-0"	13
						Z8	2	#5	4	5'-11"	12
						Z9	2	#5	4	5'-8"	12
						Z10	3	#5	4	5'-4"	17
						Z11	3	#5	4	5'-1"	16
						Z12	3	#5	4	4'-9"	15
						Z13	3	#4	4	4'-4"	9
						Z14	3	#4	4	4'-0"	8
						Z15	3	#4	4	3'-8"	7
						Z16	3	#4	4	3'-5"	7
						Z17	3	#4	4	3'-1"	6

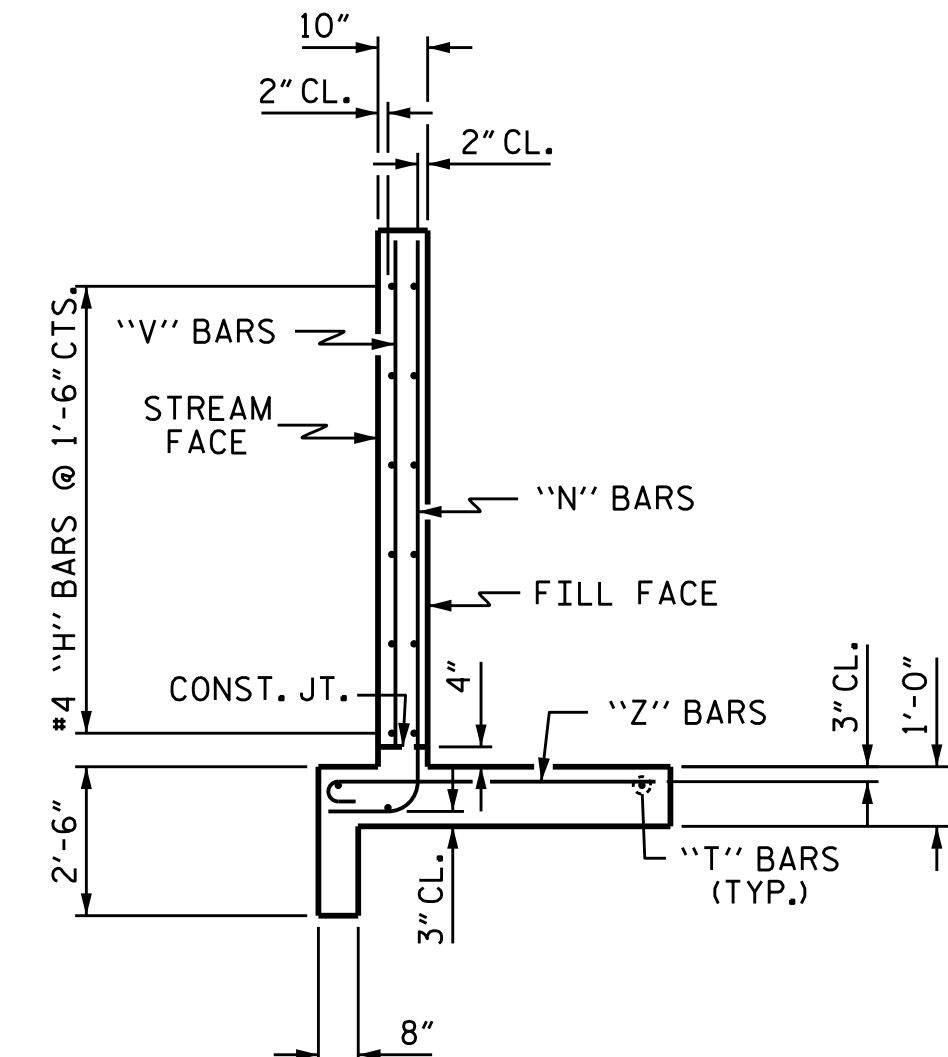
ALL BAR DIMENSIONS ARE OUT TO OUT.



PLAN W2

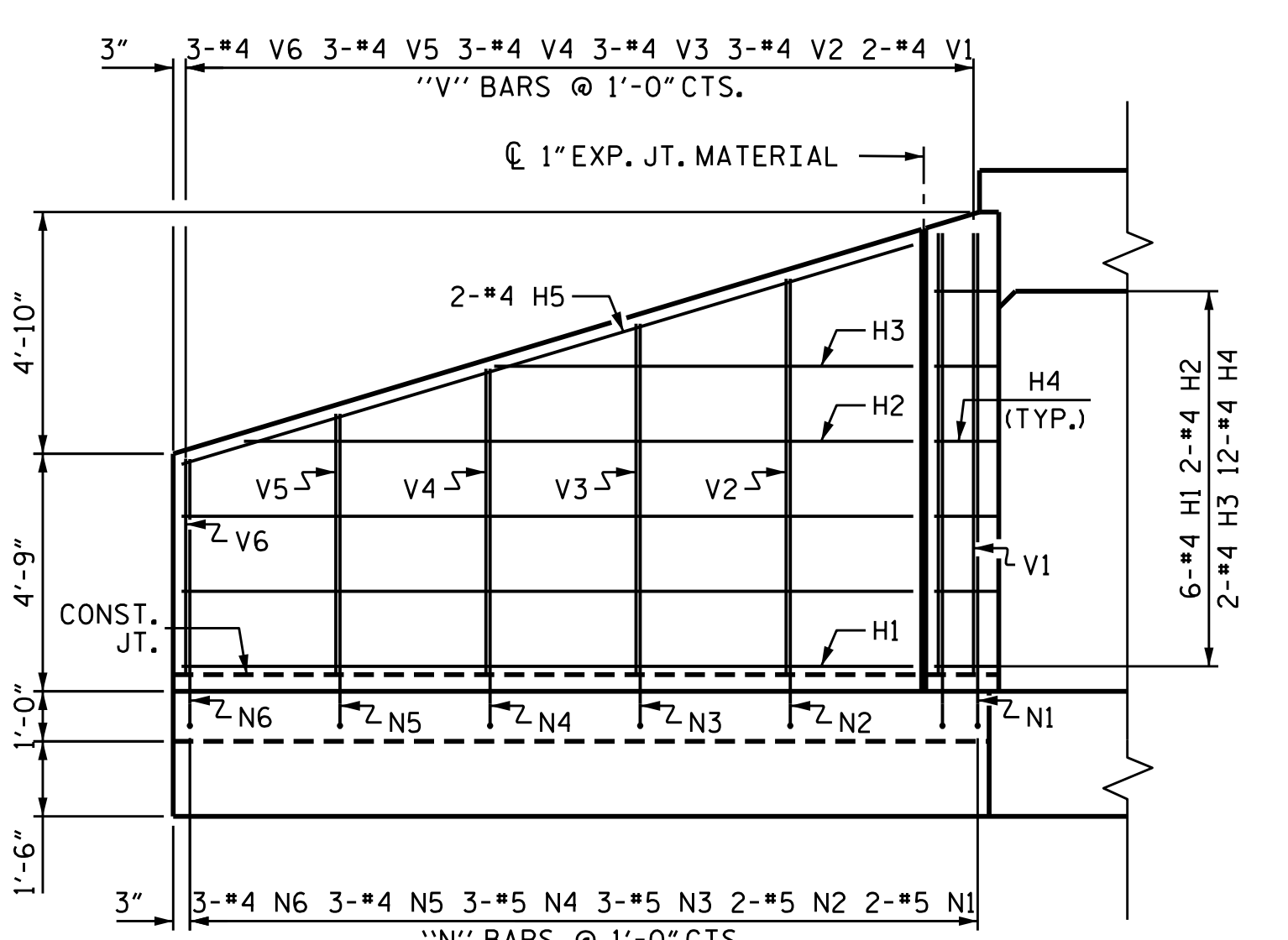


PLAN W1

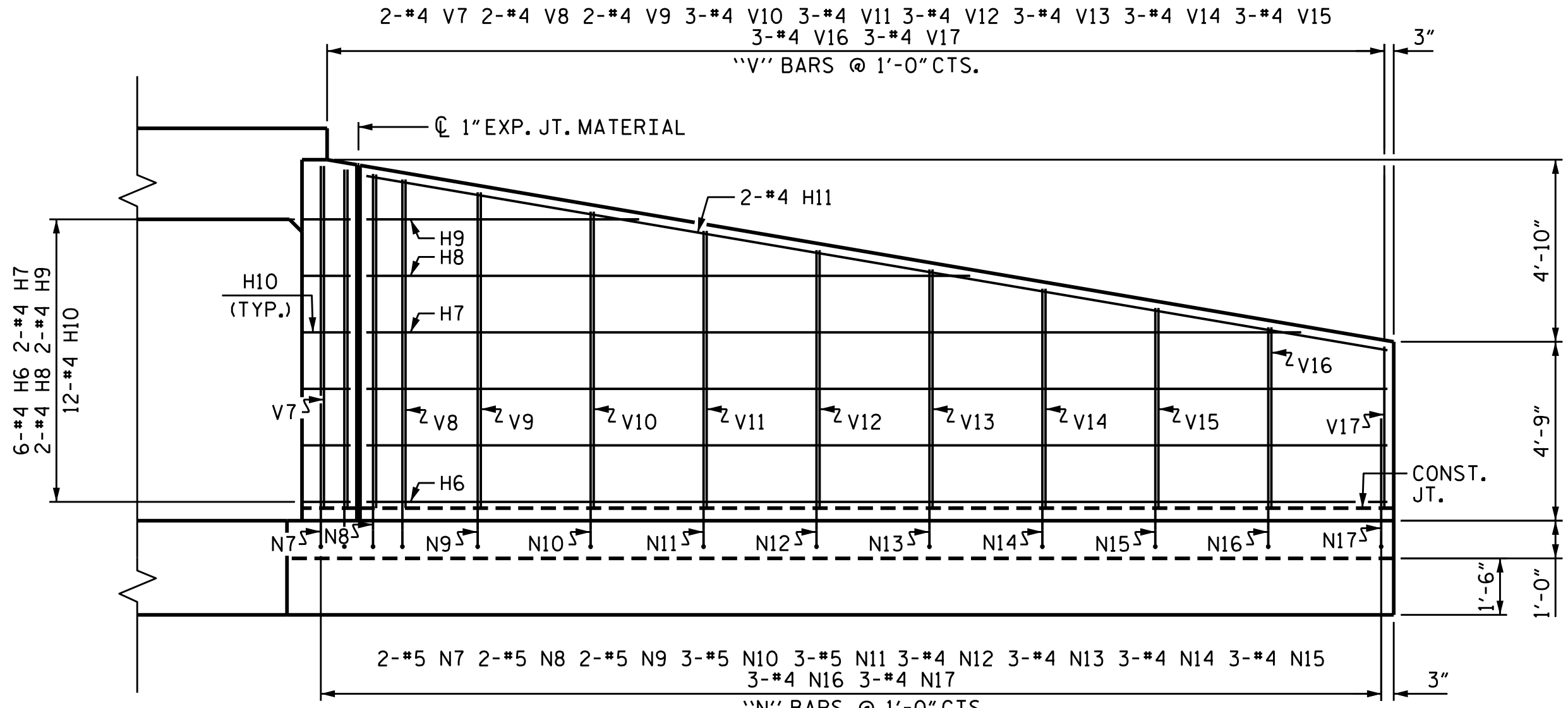


TYPICAL WING SECTION

REINFORCING STEEL	1321 LBS
FOR 2 WINGS	
CLASS A CONCRETE	
2 WINGS	21.7 CY
1 HEADWALL	1.2 CY
1 END CURTAIN WALL	1.4 CY
TOTAL	24.3 CY

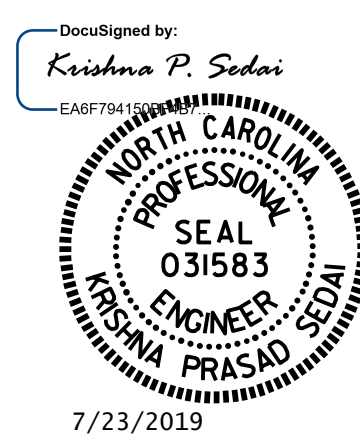


ELEVATION W2



ELEVATION W1

PROJECT NO. R-3421A  
RICHMOND COUNTY  
 STATION: 32+75.27 -RPC-  
 SHEET 7 OF 8



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**STANDARD WINGS**  
**FOR**  
**CONCRETE BOX CULVERT**  
 H = 8'-0" SLOPE = 3:1  
 60° SKEW

DRAWN BY : A. SORSENGINH DATE : 4/2019  
 CHECKED BY : M. G. SHAIKH DATE : 5/2019  
 DESIGN ENGINEER OF RECORD : K. SEDA DATE : 4/2019

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-7
1			3			TOTAL SHEETS
2			4			8



PERMANENT 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	--

LOAD AND RESISTANCE FACTOR RATING (LRFR)  
SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

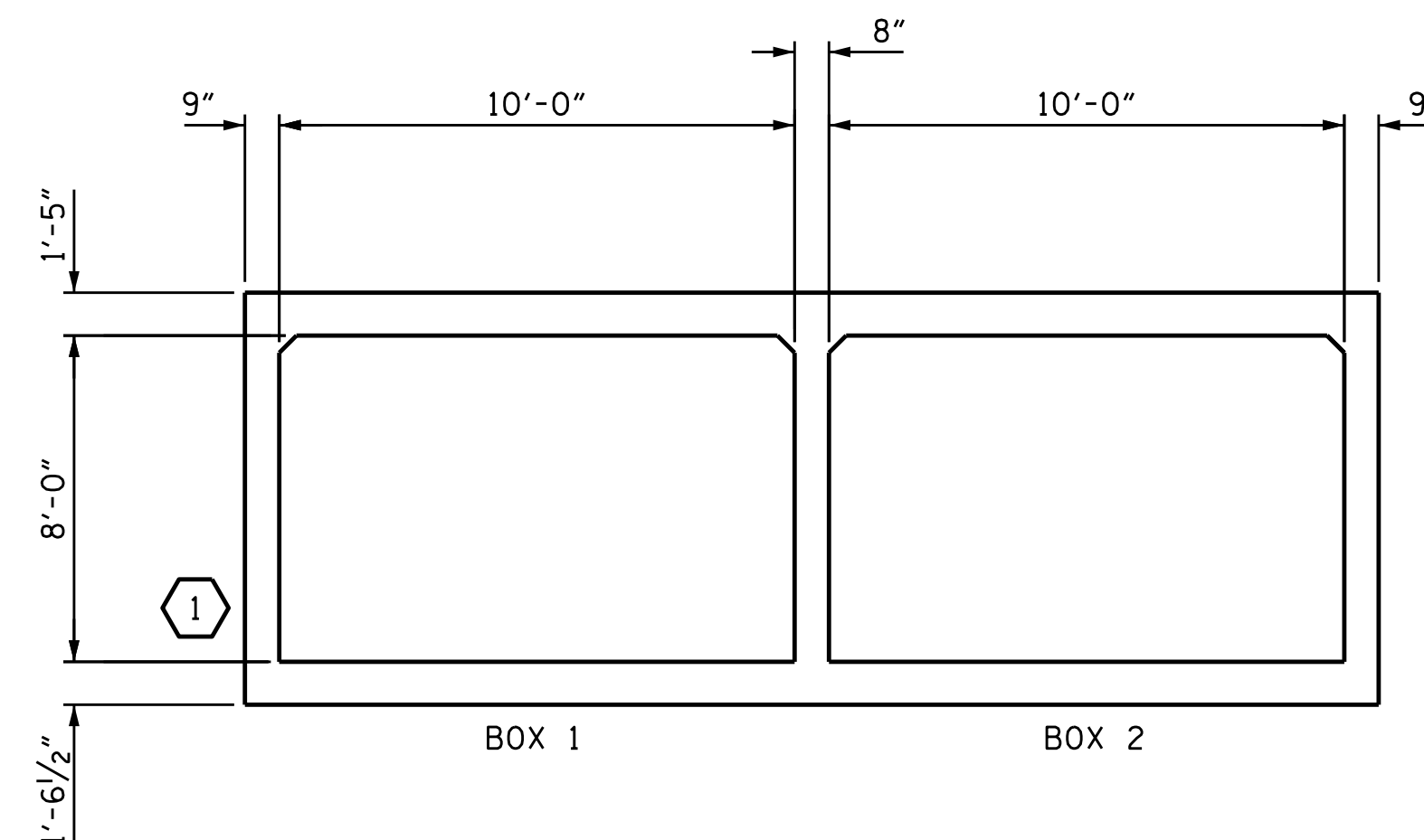
	CONTROLLING LOAD RATING	MINIMUM RATING FACTOR (RF)	STRENGTH I LIMIT STATE							
			MOMENT				SHEAR			
			RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)
PERMANENT LOAD RATING	1	1.31	1.71	1	EXTERIOR WALL	4.98	1.31	1	EXTERIOR WALL	8.17

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.

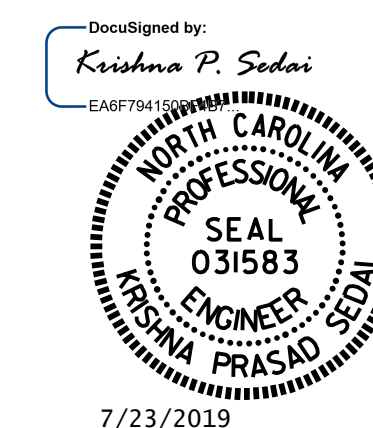
CULVERTS WITH NEGLIGIBLE LIVE LOAD SHOULD BE LOAD RATED FOR PERMANENT LOADS ONLY IN ACCORDANCE WITH THE AASHTO MANUAL FOR BRIDGE EVALUATION.



LRFR SUMMARY  
(LOOKING DOWNSTREAM)

PROJECT NO. R-3421A  
RICHMOND COUNTY  
STATION: 32+75.27 -RPC-

SHEET 8 OF 8



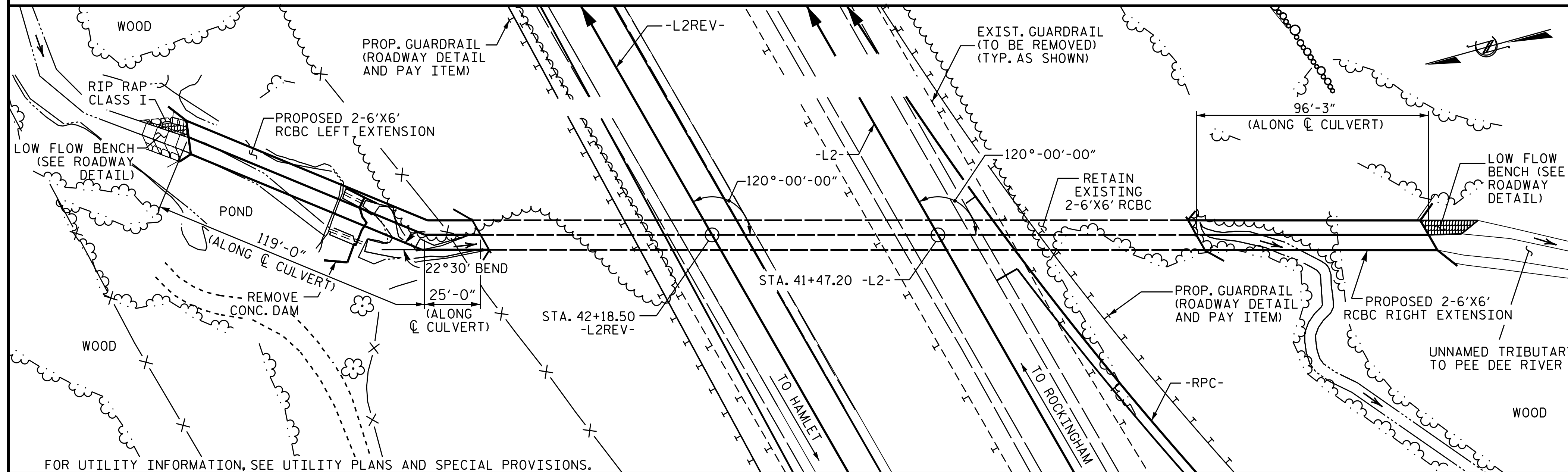
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
LRFR SUMMARY FOR  
REINFORCED CONCRETE  
BOX CULVERTS  
(DEEP FILLS)

DRAWN BY : C. RUIZ DATE : 3/2019  
CHECKED BY : M. G. SHAIKH DATE : 5/2019  
DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 4/2019

DOCUMENT NOT CONSIDERED  
FINAL UNLESS ALL  
SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-8
1			3			TOTAL SHEETS
2			4			8

BM #6 : R.R. SPIKE IN BASE OF 15" SWEETGUM TREE, 208.00 RT. OF 105+88 -I73-, ELV. 266.10



LOCATION SKETCH

NOTES:

ASSUMED LIVE LOAD ----- HL-93 OR ALTERNAT LOADING.  
DESIGN FILL:----- LEFT & RIGHT EXTENSION 30 FT.  
FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE HEET.  
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.  
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.  
IF APPROVED BY THE ENGINEER, THE CONTRACTOR MAY USE THE EXISTING WINGS AS TEMPORARY SHORING FOR THE CONSTRUCTION OF THE CULVERT EXTENSIONS. IN THIS CASE, THE BOTTOM SLAB OF THE EXTENSION SHALL BE POURED AT LEAST 72 HOURS PRIOR TO CUTTING THE WINGS. THE WINGS MAY BE CUT EARLIER PROVIDED THE SLAB CONCRETE STRENGTH HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 1500 PSI.  
DOWELS SHALL BE USED TO CONNECT THE CULVERT EXTENSION TO THE EXISTING CULVERT AS SHOWN. FOR NOTE REGARDING SETTING OF DOWELS, SEE SHEET SN.  
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.  
BACKFILL WITH SELECT MATERIAL, CLASS VI MEETING THE REQUIREMENTS OF SECTION 1016 OF THE STANDARD SPECIFICATION.  
CONSTRUCT THE REINFORCED CONCRETE BOX CULVERT AT STATION 41+47.20 -L2- AND 42+18.50 -L2REV- WITH 4 INCHES OF CAMBER TO ACCOUNT FOR ANTICIPATED SETTLEMENT.  
NO WORK SHALL BE DONE ON THE CULVERT AT STA. 42+18.50 -L2REV- AND 41+47.20 -L2- UNTIL THE AREA OF THE BOX CULVERT HAS BEEN UNDERCUT TO 5' BELOW CULVERT BOTTOM ELEVATION ON UPSTREAM SIDE EXTENSION AND UNSUITABLE MATERIAL REPLACED WITH SUITABLE MATERIAL, PROPERLY COMPACTED TO THE ELEVATION OF THE BOTTOM OF THE PROPOSED FLOOR SLAB. THE LIMITS OF THIS UNDERCUT EXCAVATION SHALL BE AT LEAST THE LIMITS OF THE BOX CULVERT INCLUDING THE WINGS. NO SEPARATE PAYMENT WILL BE MADE FOR ANY TEMPORARY SHEETING, UNDERCUT, OR UNSUITABLE MATERIAL REPLACEMENT AS REQUIRED TO CONSTRUCT THE PROPOSED CULVERT. PAYMENT IS INCLUDED IN THE LUMP SUM PRICE FOR CULVERT EXCAVATION. CONTRACTOR'S ATTENTION IS DRAWN THAT THERE MAY BE SOME ANTICIPATED CONTINGENCY UNDERCUT EXCAVATION ON DOWN STREAM SIDE ALSO.  
TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FEET. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.

GRADE DATA LEFT EXTENSION

GRADE PT. EL. @ STA. 42+18.50 -L2REV-	= 269.21
BED EL. @ STA. 42+18.50 -L2REV-	= 219.52
ROADWAY SLOPES	= 3:1

GRADE DATA RIGHT EXTENSION

GRADE PT. EL. @ STA. 38+79.86 -RPC-	= 268.45
BED EL. @ STA. 38+79.86 -RPC-	= 216.80
ROADWAY SLOPES	= 3:1

HYDRAULIC DATA

DESIGN DISCHARGE	= 590 C.F.S
FREQUENCY OF DESIGN FLOOD	= 50 YEARS
DESIGN HIGH WATER ELEVATION	= 229.70
DRAINAGE AREA	= 530 ACRES
BASIC DISCHARGE (Q100)	= 700 C.F.S
BASIC HIGH WATER ELEVATION	= 230.80

OVERTOPPING DATA

OVERTOPPING DISCHARGE	= 2,000 C.F.S
FREQUENCY OF OVERTOPPING FLOOD	= 500 YEARS+
OVERTOPPING FLOOD ELEVATION	= 234.66

TOTAL QUANTITIES - LEFT EXTENSION

CLASS A CONCRETE			
BARREL @	1.814	CY/FT	261.2 C.Y.
WINGS ETC.			14.3 C.Y.
EDGE BEAMS			0.6 C.Y.
SILLS			0.3 C.Y.
TOTAL			276.4 C.Y.

REINFORCING STEEL			
BARREL			21549 LBS.
WINGS ETC.			751 LBS.
TOTAL			22300 LBS.

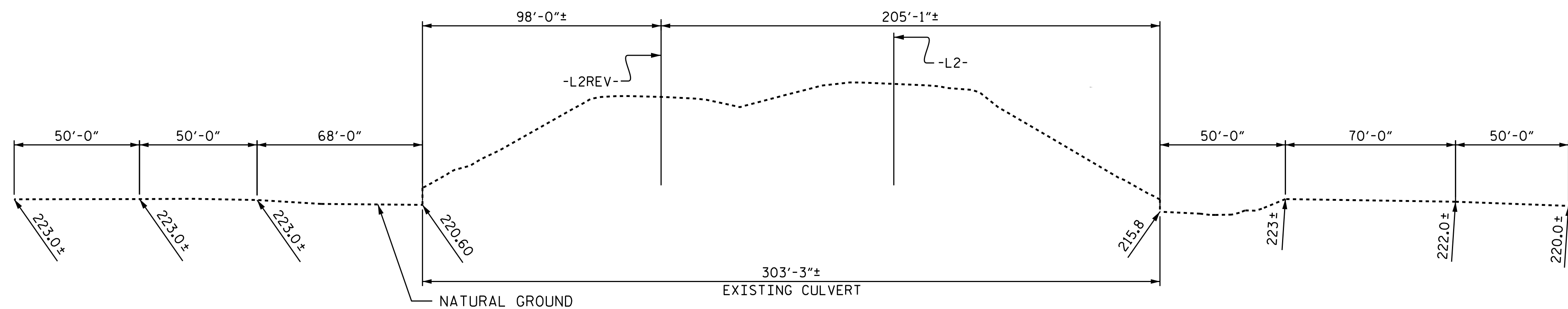
FOUNDATION COND. MAT'L			426 TONS
CULVERT EXCAVATION			LUMP SUM

TOTAL QUANTITIES - RIGHT EXTENSION

CLASS A CONCRETE			
BARREL @	1.814	CY/FT	174.6 C.Y.
WINGS ETC.			14.3 C.Y.
EDGE BEAMS			0.6 C.Y.
SILLS			0.3 C.Y.
TOTAL			189.8 C.Y.

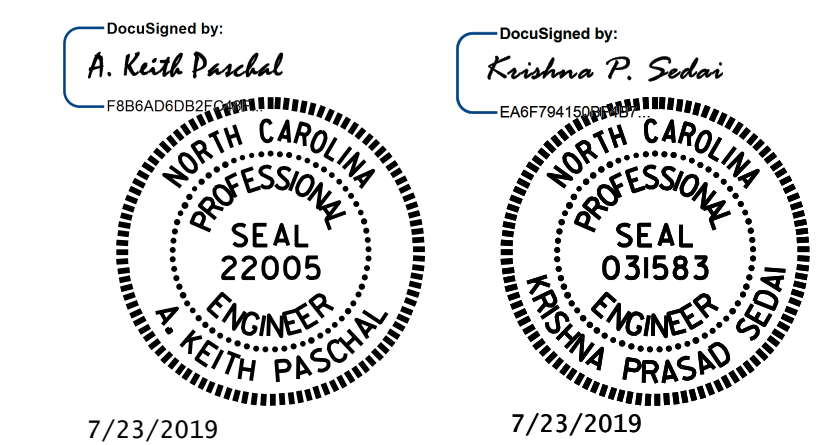
REINFORCING STEEL			
BARREL			14524 LBS.
WINGS ETC.			751 LBS.
TOTAL			15275 LBS.

FOUNDATION COND. MAT'L			285 TONS
CULVERT EXCAVATION			LUMP SUM



PROFILE ALONG Q CULVERT

DRAWN BY : K. PUROHIT DATE : 4/2019  
CHECKED BY : A. SORSENGINH DATE : 4/2019  
DESIGN ENGINEER OF RECORD : K. PUROHIT DATE : 5/2019



PROJECT NO. R-3421A  
RICHMOND COUNTY  
STATION: 42+18.50-L2REV-  
41+47.20 -L2-  
SHEET 1 OF 9

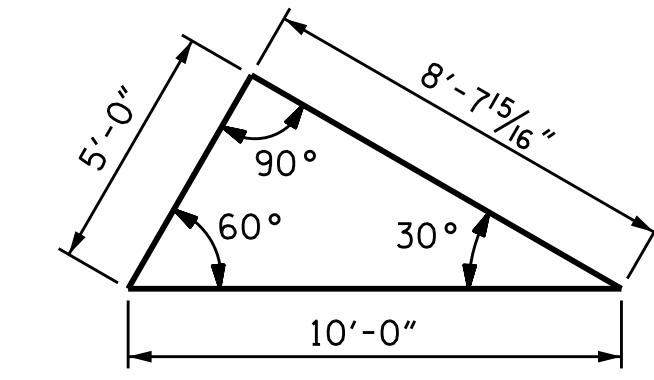
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
DOUBLE 6 FT. X 6 FT.  
CONCRETE BOX CULVERT  
EXTENSIONS  
120° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C5-1
1			3			TOTAL SHEETS
2			4			9

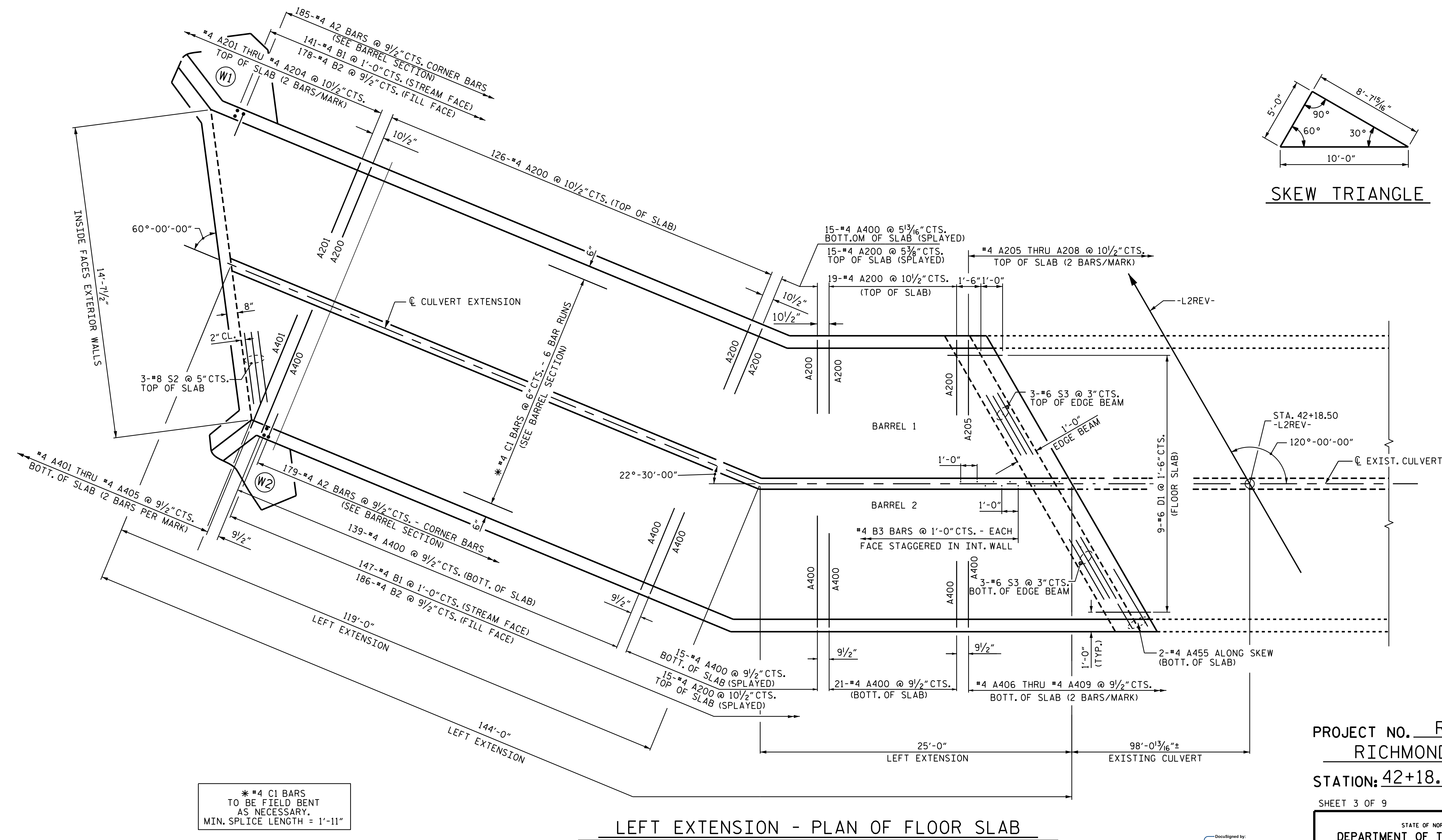
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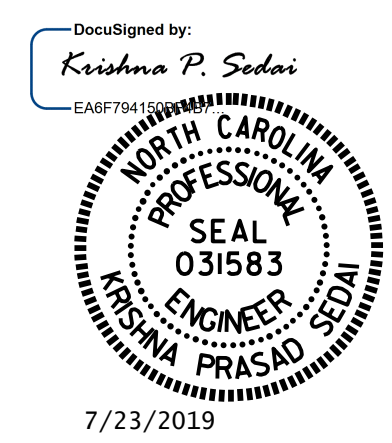


SKEW TRIANGLE



\* #4 C1 BARS  
TO BE FIELD BENT  
AS NECESSARY.  
MIN. SPLICE LENGTH = 1'-11"

PROJECT NO. R-3421A  
RICHMOND COUNTY  
 STATION: 42+18.50 -L2REV-  
 SHEET 3 OF 9



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 DOUBLE 6 FT. X 6 FT.  
 CONCRETE BOX CULVERT  
 120° SKEW  
 LEFT EXTENSION

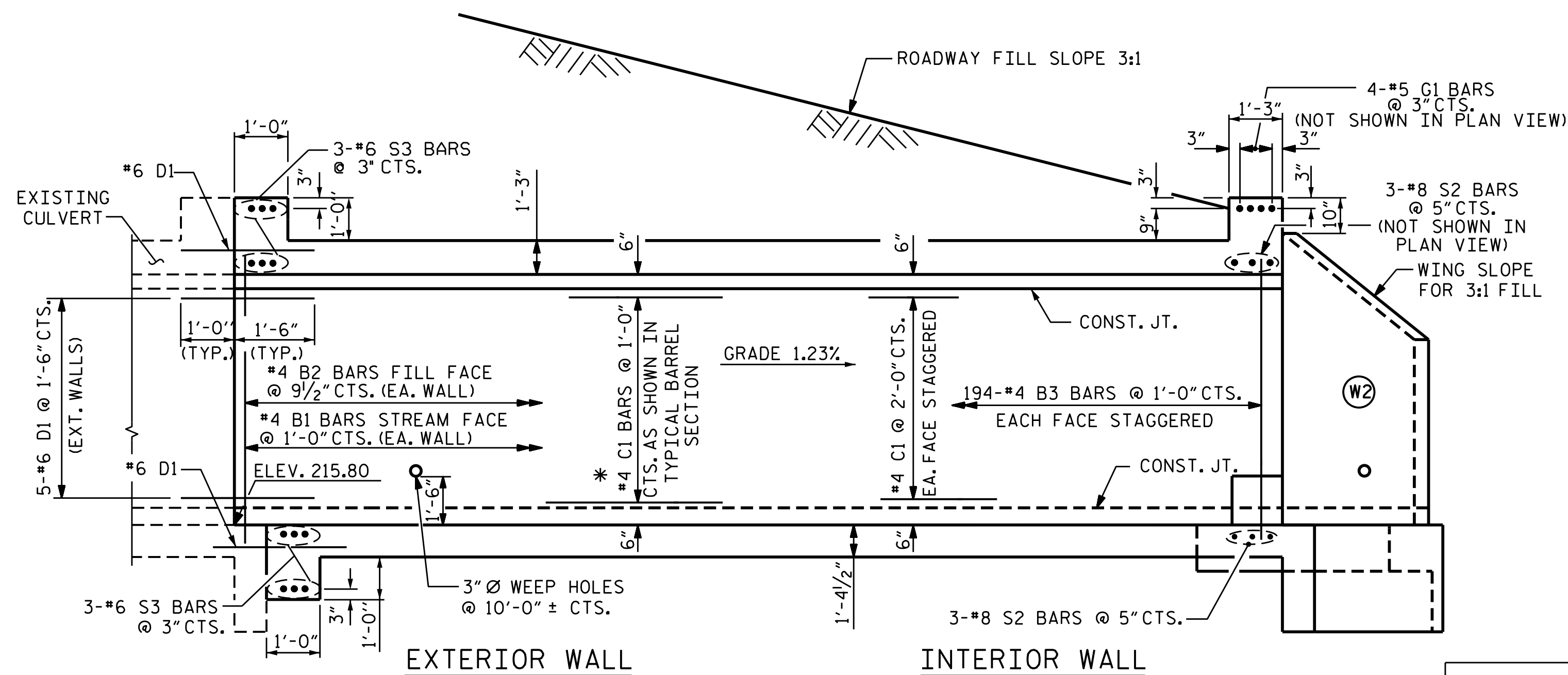
DRAWN BY : K. PUROHIT DATE : 4/2019  
 CHECKED BY : A. SORSENGINH DATE : 4/2019  
 DESIGN ENGINEER OF RECORD: K. PUROHIT DATE : 5/2019

DOCUMENT NOT CONSIDERED  
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 SIGNATURES COMPLETED

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C5-3	
1			3			TOTAL SHEETS	
2			4			9	

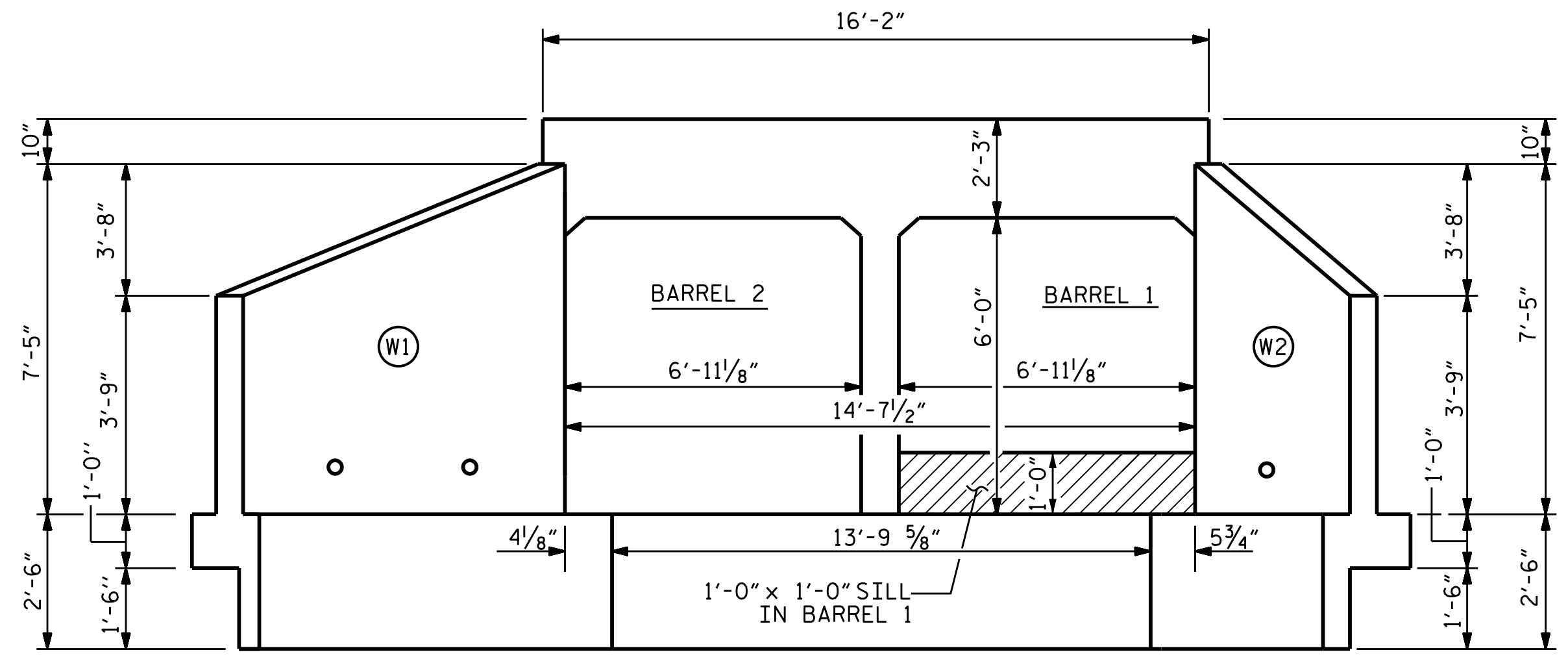






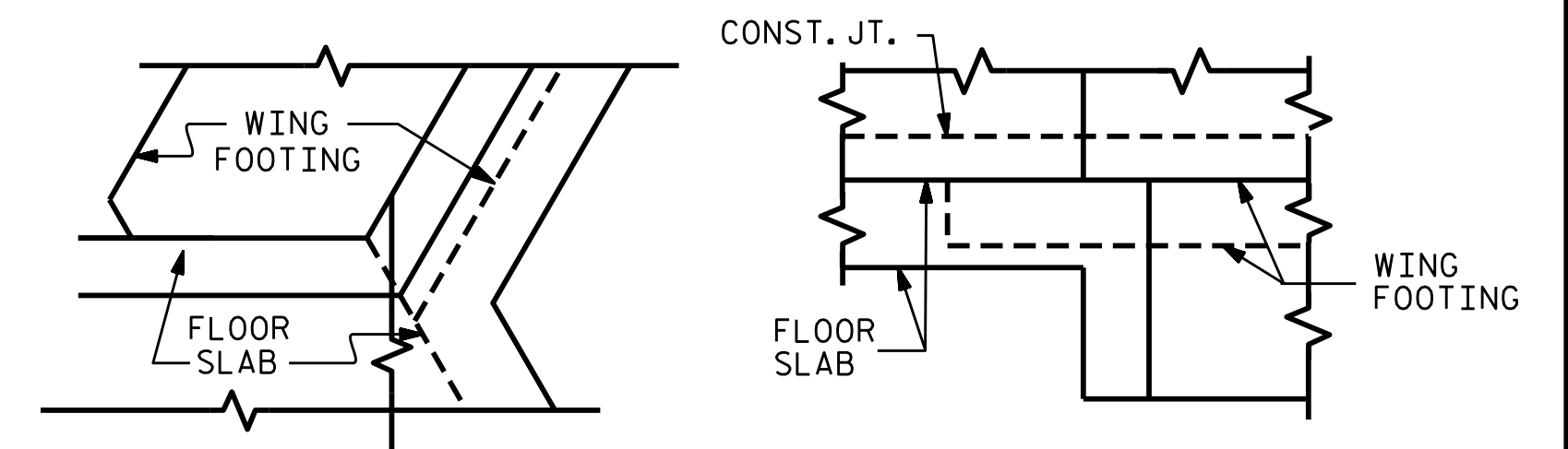
RIGHT CULVERT EXTENSION SECTION NORMAL TO ROADWAY

\* #4 C1 BARS ARE 4 BARS RUN



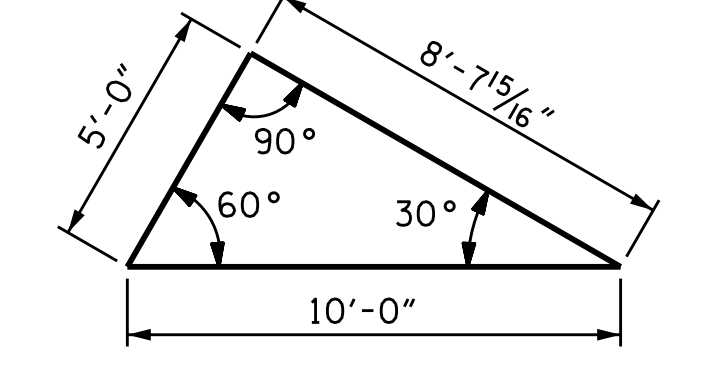
OUTLET END ELEVATION NORMAL TO SKEW

(LOOKING UPSTREAM)

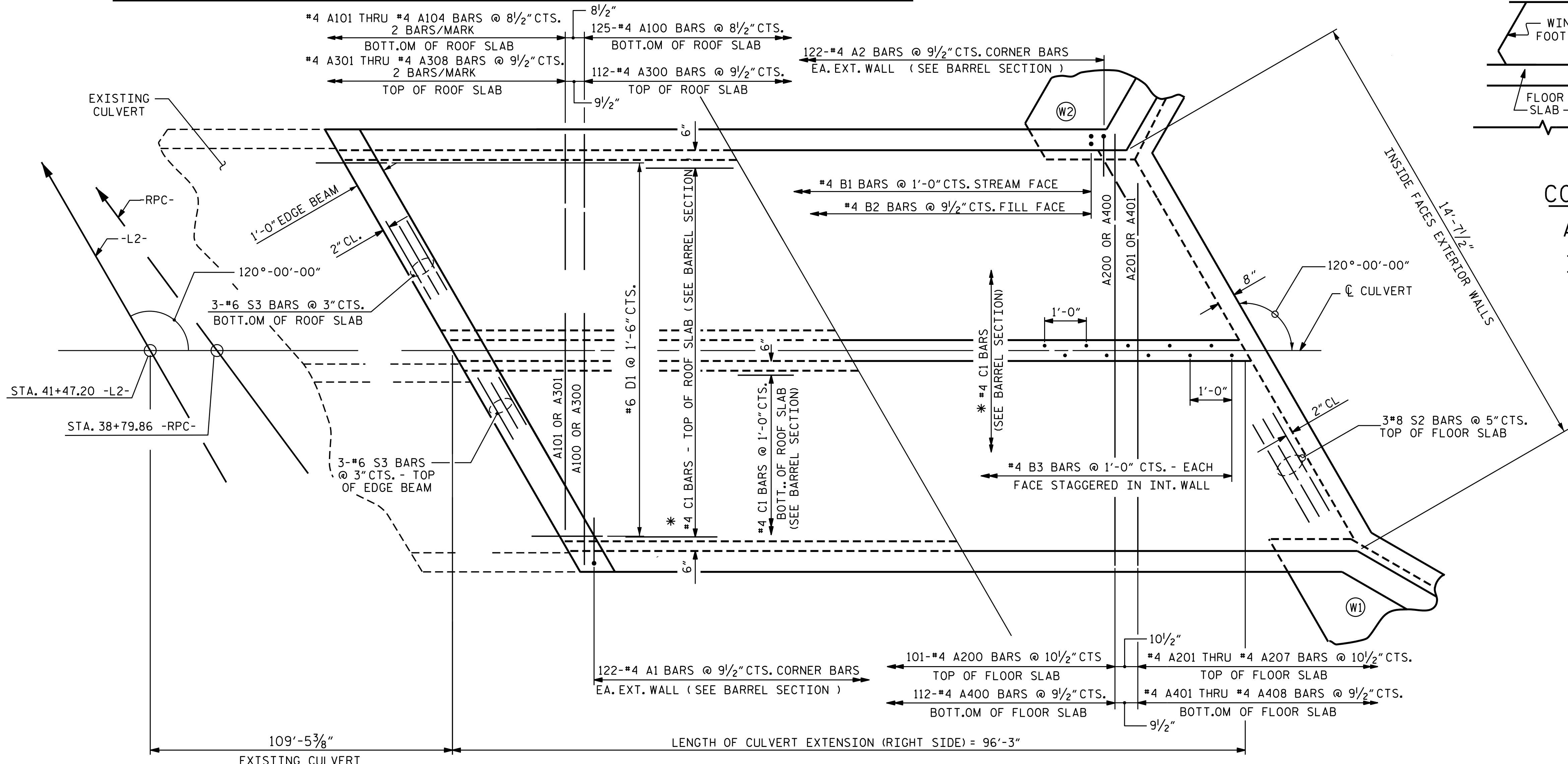


DETAIL

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



SKEW TRIANGLE



PART PLAN - ROOF SLAB

PART PLAN - FLOOR SLAB

DRAWN BY : K. PUROHIT DATE : 4/2019  
 CHECKED BY : A. SORSENGINH DATE : 4/2019  
 DESIGN ENGINEER OF RECORD : K. PUROHIT DATE : 5/2019

DocuSigned by:  
 Krishna P. Seda  
 EABF7211  
 NORTH CAROLINA  
 PROFESSIONAL  
 SEAL  
 031583  
 ENGINEER  
 KRISHNA PRASAD SEDA  
 7/23/2019

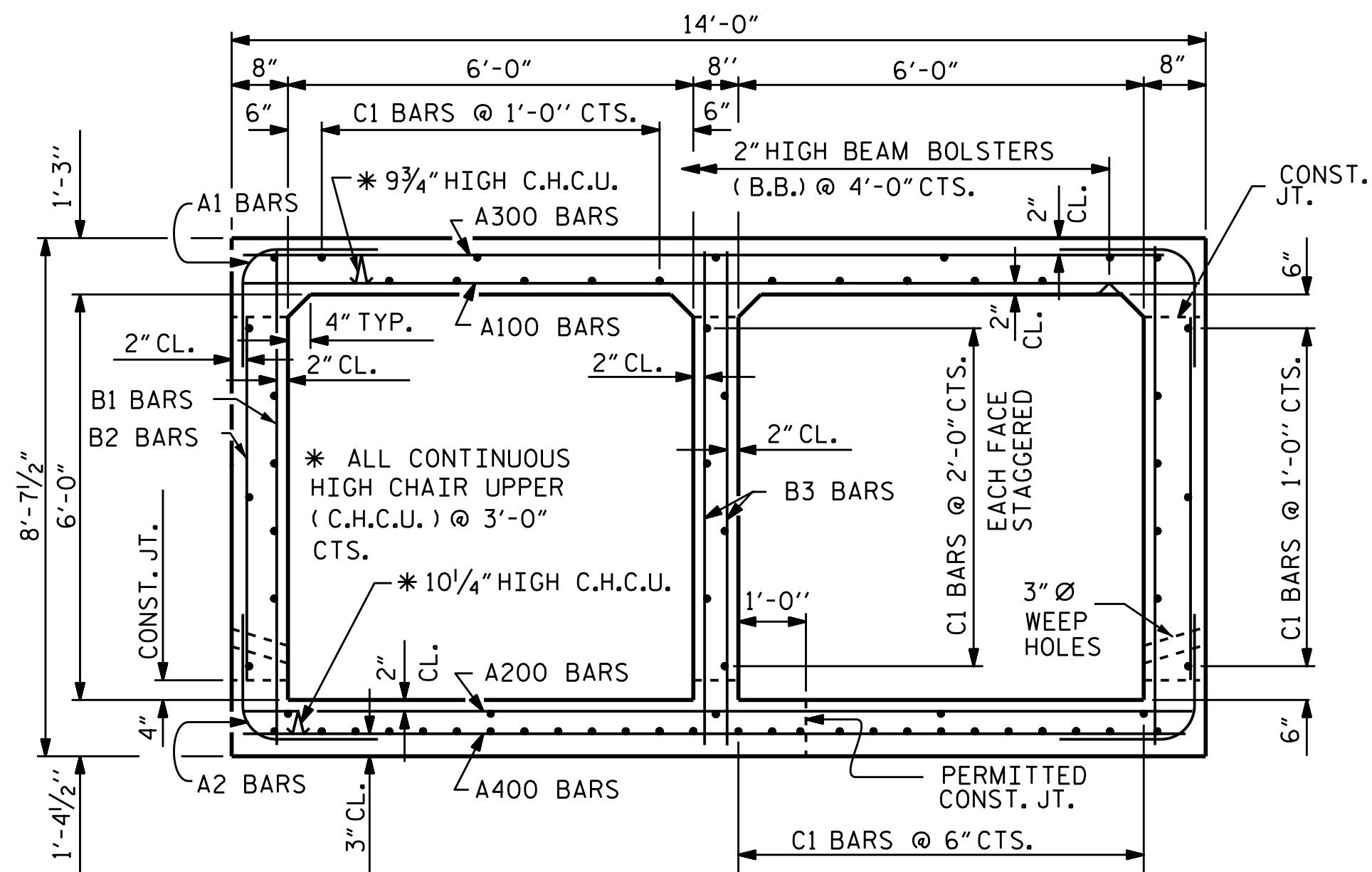
PROJECT NO. R-3421A  
 RICHMOND COUNTY  
 STATION: 41+47.20 -L2-  
 SHEET 5 OF 9

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 DOUBLE 6 FT. X 6 FT.  
 CONCRETE BOX CULVERT  
 120° SKEW  
 RIGHT EXTENSION

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

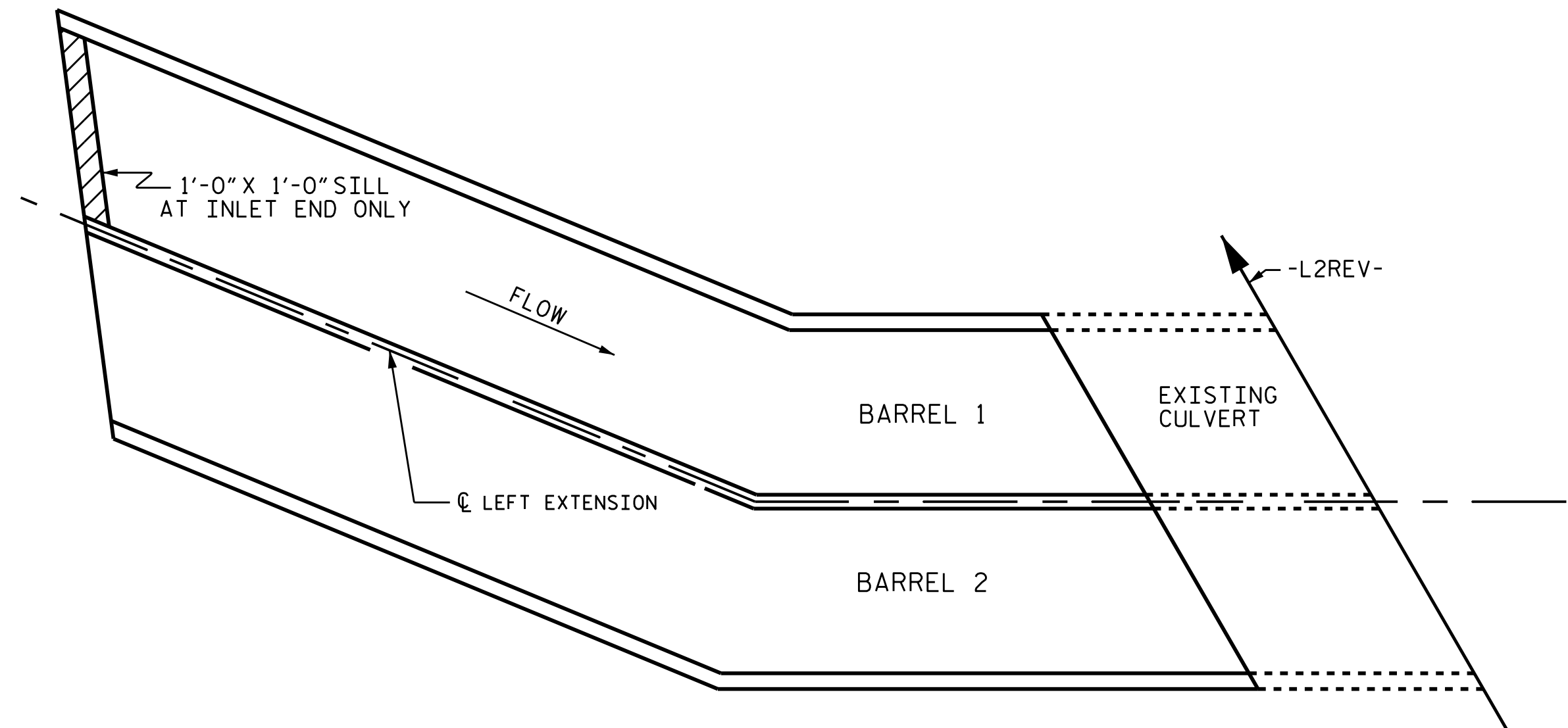
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C5-5
1			3			TOTAL SHEETS
2			4			9



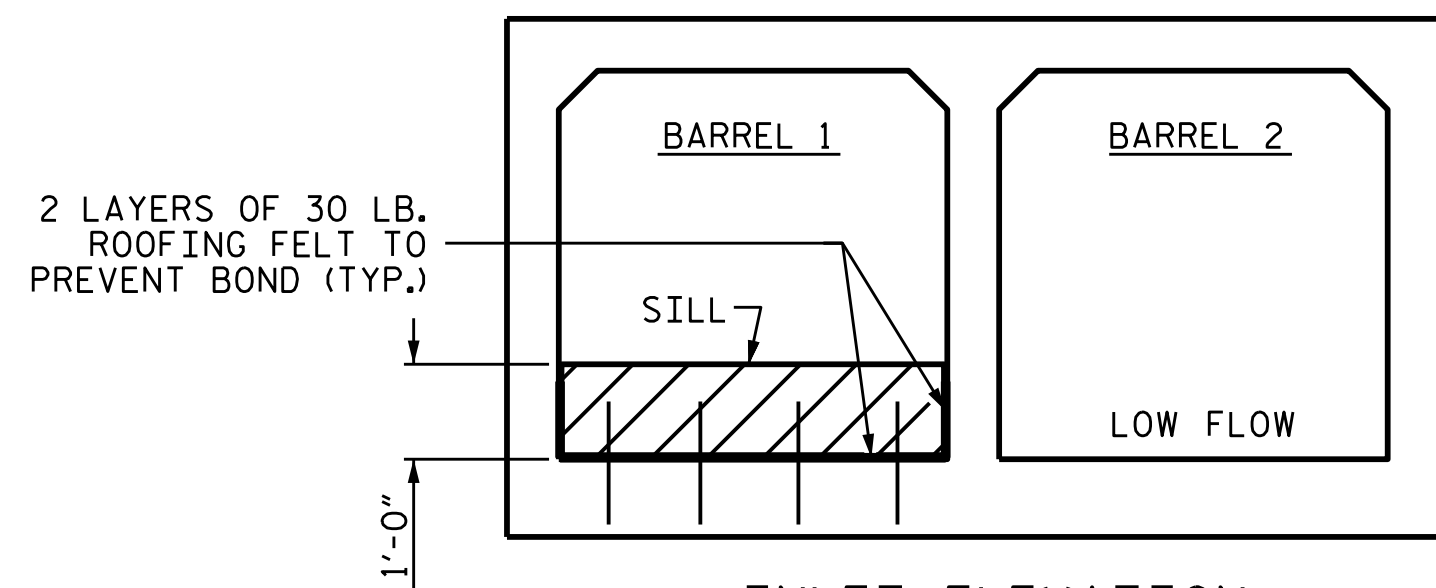


**RIGHT ANGLE SECTION OF BARREL**

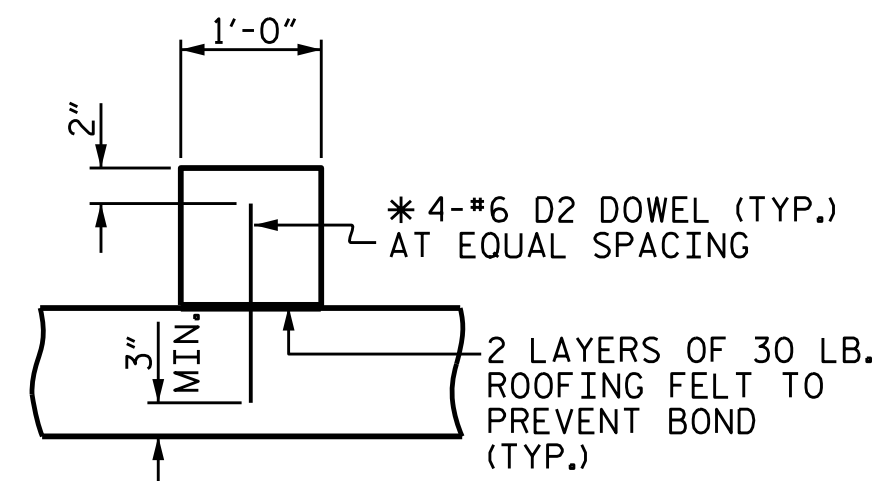
THERE ARE 68 "C" BARS IN SECTION OF BARREL.



**PLAN OF LEFT CULVERT EXTENSION SHOWING LOCATION OF SILL**

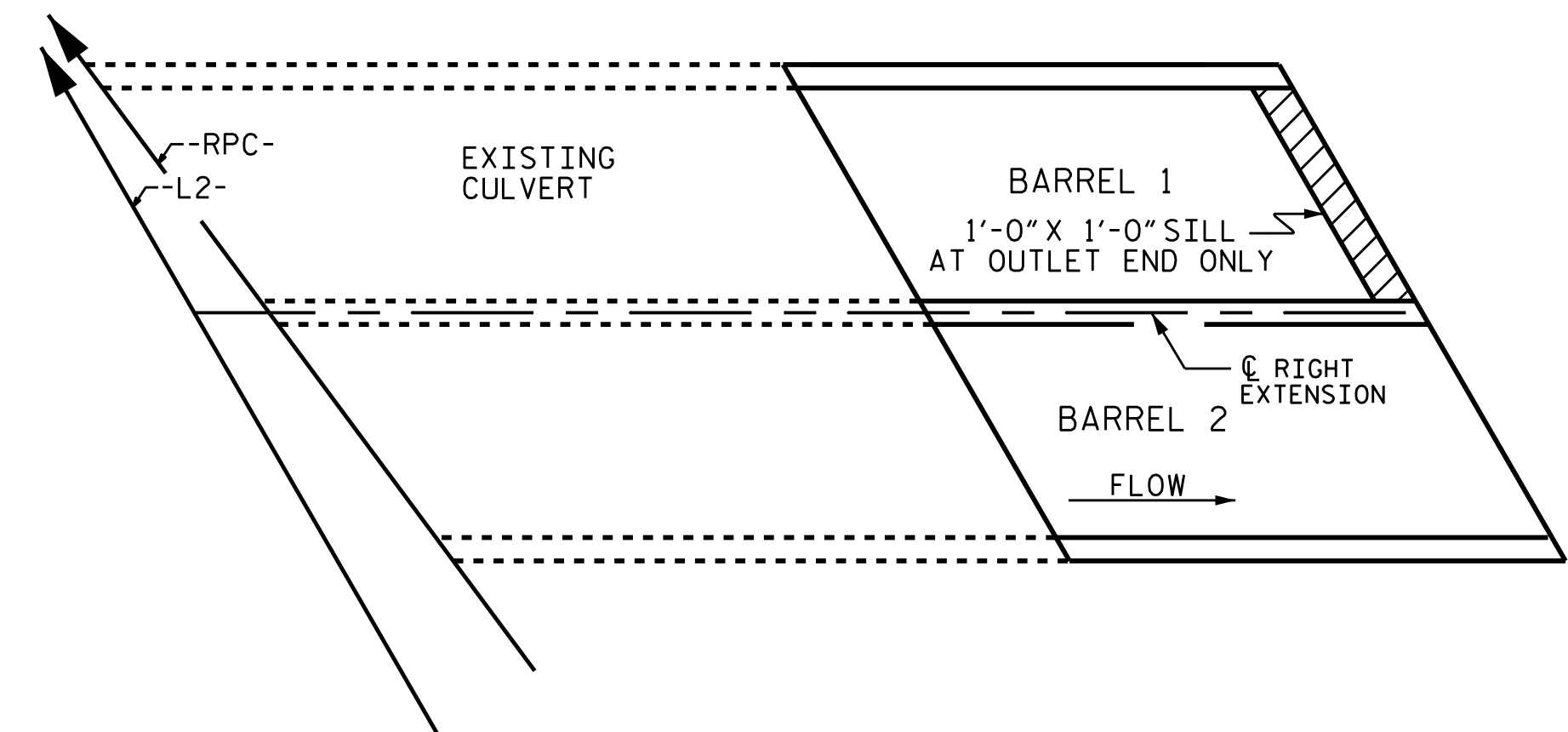


**INLET ELEVATION  
(LOOKING DOWNSTREAM)**

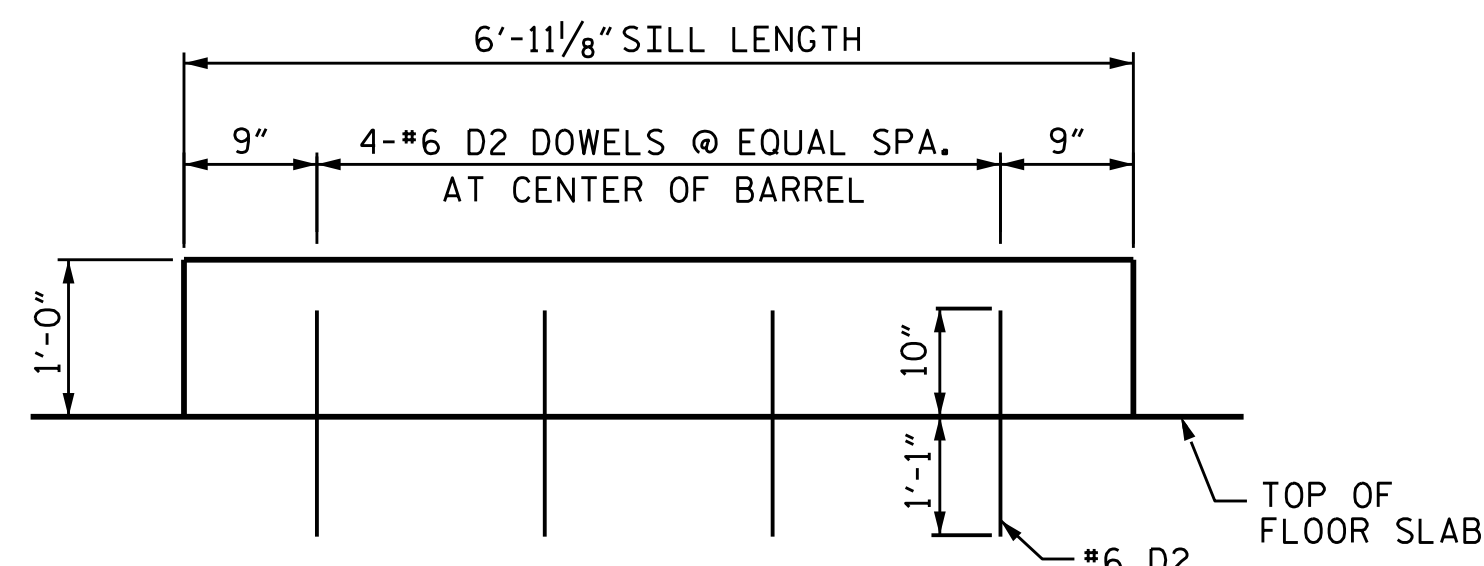


**SECTION THROUGH SILL**

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

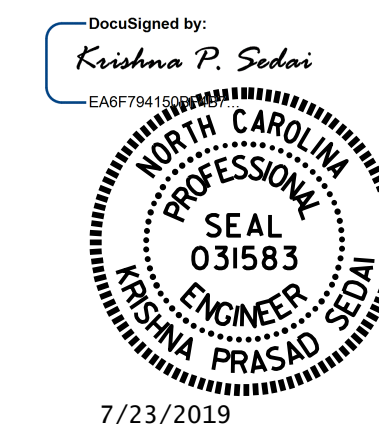


**PLAN OF RIGHT CULVERT EXTENSION SHOWING LOCATION OF SILL**



**ELEVATION  
CONCRETE SILL DETAILS**

PROJECT NO. R-3421A  
RICHMOND COUNTY  
 STATION: 42+18.50 -L2REV-  
 SHEET 6 OF 9 41+47.20 -L2-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**DOUBLE 6 FT. X 6 FT.  
 CONCRETE BOX CULVERT  
 120° SKEW  
 LEFT & RIGHT  
 EXTENSION**

DRAWN BY : K. PUROHIT DATE : 4/2019  
 CHECKED BY : A. SORSENGINH DATE : 4/2019  
 DESIGN ENGINEER OF RECORD: K. PUROHIT DATE : 5/2019

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C5-6
1			3			TOTAL SHEETS
2			4			9





BAR SCHEDULE											
LEFT CULVERT EXTENSION											
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	364	#4	1	6'-0"	1459	A307	2	#4	STR	8'-4"	11
A2	364	#4	1	4'-9"	1155	A308	2	#4	STR	5'-6"	7
						A309	2	#4	STR	2'-10"	4
A100	196	#4	STR	13'-8"	1789	A400	175	#4	STR	13'-8"	1598
A101	2	#4	STR	12'-7"	17	A401	2	#4	STR	13'-4"	18
A102	2	#4	STR	10'-0"	13	A402	2	#4	STR	10'-7"	14
A103	2	#4	STR	7'-8"	10	A403	2	#4	STR	7'-10"	10
A104	2	#4	STR	5'-3"	7	A404	2	#4	STR	5'-2"	7
A105	2	#4	STR	2'-9"	4	A405	2	#4	STR	2'-4"	3
A106	2	#4	STR	11'-8"	16	A406	2	#4	STR	11'-0"	15
A107	2	#4	STR	9'-2"	12	A407	2	#4	STR	8'-4"	11
A108	2	#4	STR	6'-9"	9	A408	2	#4	STR	5'-6"	7
A109	2	#4	STR	4'-3"	6	A409	2	#4	STR	2'-10"	4
A110	2	#4	STR	1'-10"	2						
A200	160	#4	STR	13'-8"	1461	B1	288	#4	STR	8'-1"	1555
A201	2	#4	STR	11'-8"	16	B2	364	#4	STR	5'-4"	1297
A202	2	#4	STR	8'-8"	12	B3	288	#4	STR	8'-1"	1555
A203	2	#4	STR	5'-7"	7						
A204	2	#4	STR	2'-7"	3	C1	408	#4	STR	25'-9"	7018
A205	2	#4	STR	10'-11"	15						
A206	2	#4	STR	7'-10"	10	D1	28	#6	STR	2'-6"	105
A207	2	#4	STR	4'-10"	6	D2	4	#6	STR	1'-11"	12
A208	2	#4	STR	1'-10"	2						
A300	175	#4	STR	13'-8"	1598	G1	4	#5	STR	15'-9"	66
A301	2	#4	STR	13'-4"	18	S2	6	#8	STR	15'-9"	252
A302	2	#4	STR	10'-7"	14	S3	12	#6	STR	15'-9"	284
A303	2	#4	STR	7'-10"	10						
A304	2	#4	STR	5'-2"	7						
A305	2	#4	STR	2'-4"	3						
A306	2	#4	STR	11'-0"	15						

REINFORCING STEEL = 21549 LBS.

BAR SCHEDULE											
RIGHT CULVERT EXTENSION											
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	244	#4	1	6'-0"	978	A400	112	#4	STR	13'-8"	1022
A2	244	#4	1	4'-9"	774	A401	2	#4	STR	12'-1"	16
						A402	2	#4	STR	10'-9"	14
A100	125	#4	STR	13'-8"	1141	A403	2	#4	STR	9'-4"	12
A101	4	#4	STR	11'-0"	29	A404	2	#4	STR	8'-0"	11
A102	4	#4	STR	8'-7"	23	A405	2	#4	STR	6'-7"	9
A103	4	#4	STR	6'-1"	16	A406	2	#4	STR	5'-3"	7
A104	4	#4	STR	3'-8"	10	A407	2	#4	STR	3'-10"	5
						A408	2	#4	STR	2'-6"	3
A200	101	#4	STR	13'-8"	922	B1	194	#4	STR	8'-1"	1048
A201	2	#4	STR	11'-11"	16	B2	244	#4	STR	5'-4"	869
A202	2	#4	STR	10'-5"	14	B3	194	#4	STR	8'-1"	1048
A203	2	#4	STR	8'-11"	12						
A204	2	#4	STR	7'-5"	10	C1	272	#4	STR	25'-9"	4679
A205	2	#4	STR	5'-11"	8						
A206	2	#4	STR	4'-4"	6	D1	28	#6	STR	2'-6"	105
A207	2	#4	STR	2'-10"	4	D2	4	#6	STR	1'-11"	12
A300	112	#4	STR	13'-8"	1022	G1	4	#5	STR	15'-9"	66
A301	2	#4	STR	12'-1"	16						
A302	2	#4	STR	10'-9"	14	S2	6	#8	STR	15'-9"	252
A303	2	#4	STR	9'-4"	12	S3	12	#6	STR	15'-9"	284
A304	2	#4	STR	8'-0"	11						
A305	2	#4	STR	6'-7"	9						
A306	2	#4	STR	5'-3"	7						
A307	2	#4	STR	3'-10"	5						
A308	2	#4	STR	2'-6"	3						

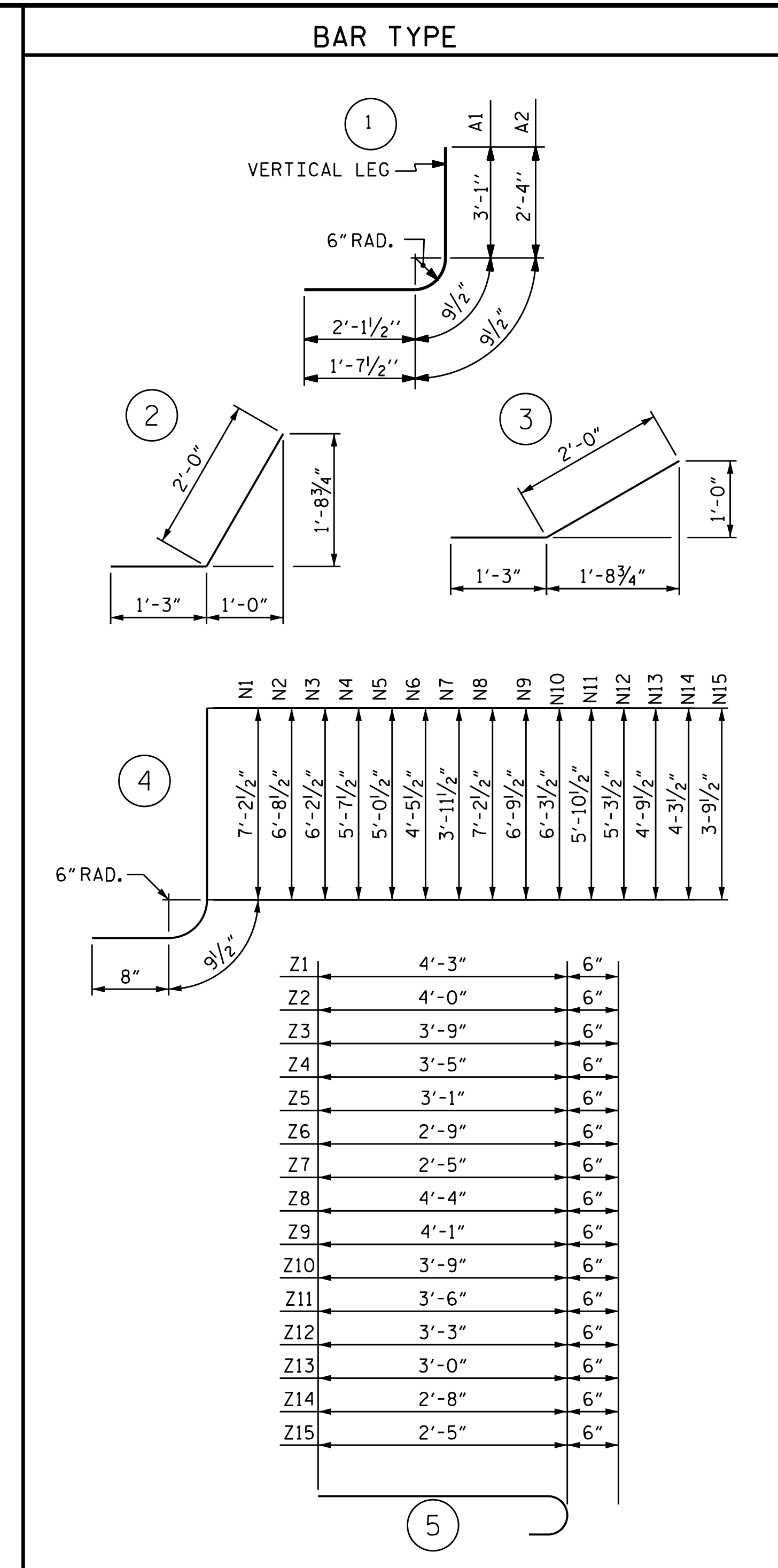
REINFORCING STEEL = 14524 LBS.

SPLICE LENGTH CHART		
BAR	SIZE	LENGTH
C1	#4	1'-11"

BAR SCHEDULE					
WINGS					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	10'-10"	87
H2	4	#4	STR	6'-3"	17
H3	20	#4	2	3'-3"	43
H4	4	#4	STR	11'-3"	30
H5	12	#4	STR	20'-10"	167
H6	4	#4	STR	12'-5"	33
H7	20	#4	3	3'-3"	43
H8	4	#4	STR	21'-1"	56
N1	4	#4	4	8'-8"	23
N2	4	#4	4	8'-2"	22
N3	4	#4	4	7'-8"	20
N4	4	#4	4	7'-1"	19
N5	4	#4	4	6'-6"	17
N6	4	#4	4	5'-11"	16
N7	4	#4	4	5'-5"	14
N8	6	#4	4	8'-8"	35
N9	6	#4	4	8'-3"	33
N10	6	#4	4	7'-9"	31
N11	6	#4	4	7'-4"	29
N12	6	#4	4	6'-9"	27
N13	6	#4	4	6'-3"	25
N14	6	#4	4	5'-9"	23
N15	6	#4	4	5'-3"	21
T1	6	#5	STR	12'-9"	80
T2	6	#5	STR	22'-6"	141
V1	4	#4	STR	6'-8"	18
V2	4	#4	STR	6'-2"	16
V3	4	#4	STR	5'-7"	15
V4	4	#4	STR	5'-0"	13
V5	4	#4	STR	4'-5"	12
V6	4	#4	STR	3'-10"	10
V7	4	#4	STR	3'-3"	9
V8	6	#4	STR	6'-8"	27
V9	6	#4	STR	6'-3"	25
V10	6	#4	STR	5'-9"	23
V11	6	#4	STR	5'-3"	21
V12	6	#4	STR	4'-9"	19
V13	6	#4	STR	4'-3"	17
V14	6	#4	STR	3'-9"	15
V15	6	#4	STR	3'-3"	13
Z1	4	#4	5	4'-9"	13
Z2	4	#4	5	4'-6"	12
Z3	4	#4	5	4'-3"	11
Z4	4	#4	5	3'-11"	10
Z5	4	#4	5	3'-7"	10
Z6	4	#4	5	3'-3"	9
Z7	4	#4	5	2'-11"	8
Z8	6	#4	5	4'-10"	19
Z9	6	#4	5	4'-7"	18
Z10	6	#4	5	4'-3"	17
Z11	6	#4	5	4'-0"	16
Z12	6	#4	5	3'-9"	15
Z13	6	#4	5	3'-6"	14
Z14	6	#4	5	3'-2"	13
Z15	6	#4	5	2'-11"	12

REINFORCING STEEL FOR 4 WINGS 1502 LBS.

CLASS A CONCRETE	
4 WINGS	25.4 C.Y.
2 HEADWALLS	1.5 C.Y.
2 END CURTAIN WALLS	1.7 C.Y.
TOTAL	28.6 C.Y.

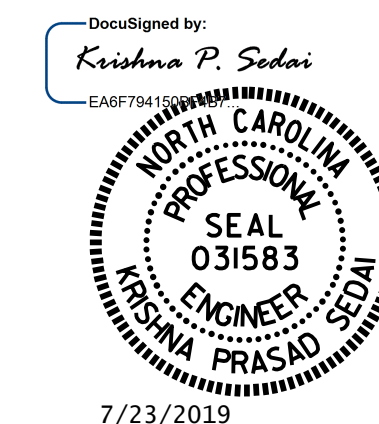


PROJECT NO. R-3421A  
RICHMOND COUNTY  
 STATION: 42+18.50 -L2REV-  
41+47.20 -L2-

SHEET 8 OF 9

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

DOUBLE 6 FT. X 6 FT.  
 CONCRETE BOX CULVERT  
 120° SKEW  
 LEFT & RIGHT EXTENSION



7/23/2019

DRAWN BY : K. PUROHIT DATE : 4/2019  
 CHECKED BY : A. SORSENGINH DATE : 4/2019  
 DESIGN ENGINEER OF RECORD: K. PUROHIT DATE : 5/2019

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C5-8
1			3			TOTAL SHEETS
2			4			9

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	--

LOAD AND RESISTANCE FACTOR RATING (LRFR)  
SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS

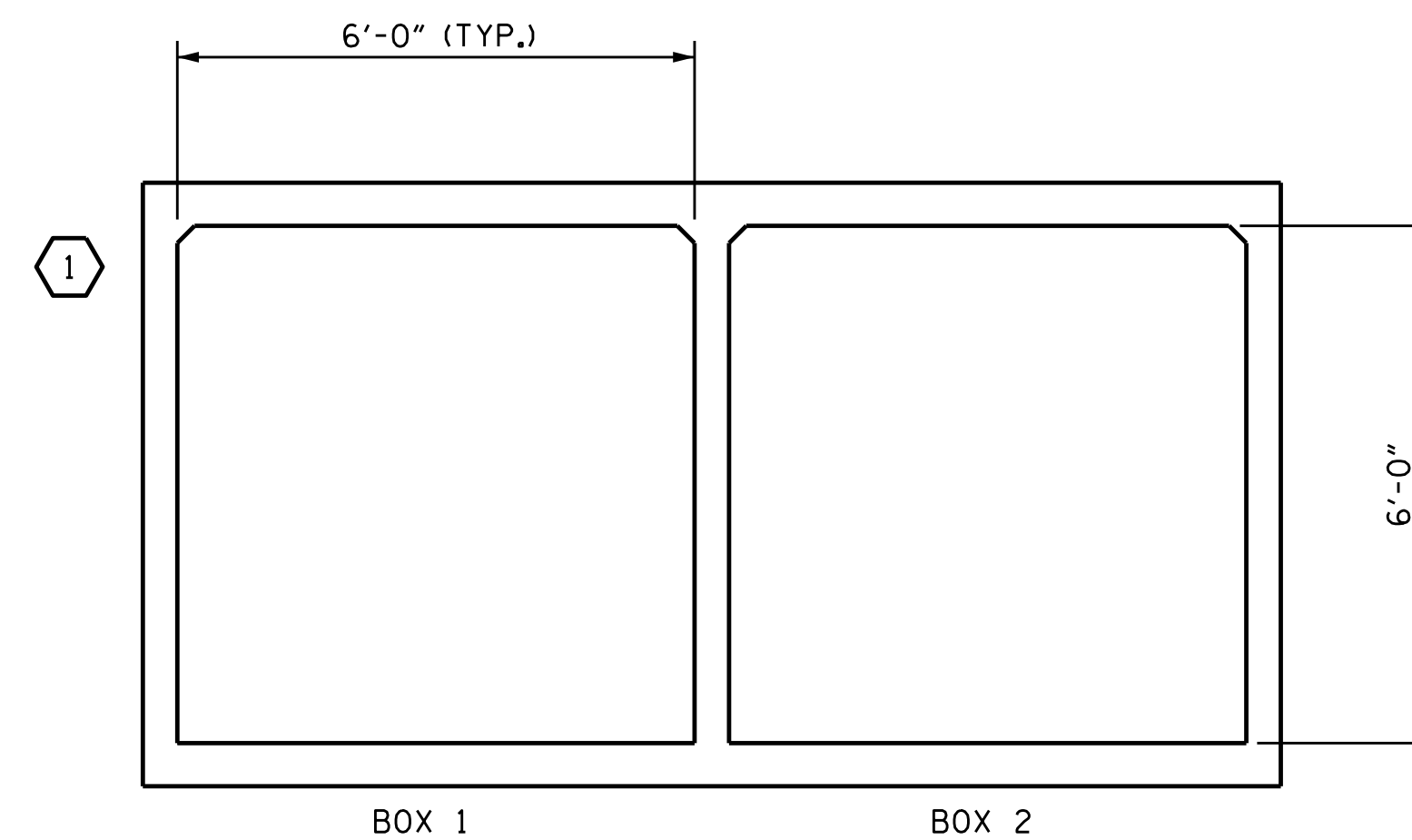
	CONTROLLING LOAD RATING	MINIMUM RATING FACTOR (RF)	STRENGTH I LIMIT STATE							
			MOMENT				SHEAR			
			RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)
PERMANENT LOAD RATING	①	1.15	1.33	1	BOTTOM SLAB	6.00	1.15	1	EXTERIOR WALL	1.11

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.

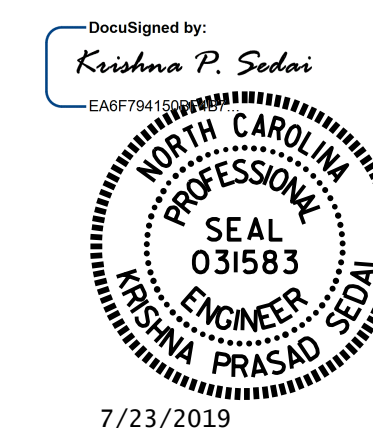
CULVERTS WITH NEGLIGIBLE LIVE LOAD SHOULD BE LOAD RATED FOR PERMANENT LOADS ONLY IN ACCORDANCE WITH THE AASHTO MANUAL FOR BRIDGE EVALUATION.



LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. R-3421A  
RICHMOND COUNTY  
 STATION: 42+18.50 -L2REV-  
41+47.20 -L2-  
 SHEET 9 OF 9



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 LRFR SUMMARY FOR  
 REINFORCED CONCRETE  
 BOX CULVERTS  
 LEFT & RIGHT EXTENSION

ASSEMBLED BY : K. PUROHIT DATE : 4/2019  
 CHECKED BY : A. SORSENGINH DATE : 4/2019  
 DRAWN BY : TMG 3/16  
 CHECKED BY : THC 7/17  
 DESIGN ENGINEER OF RECORD: K. PUROHIT DATE : 5/2019

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REVISIONS						SHEET NO. C5-9
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			9
2			4			



## 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 2018 "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  $\frac{3}{4}$ " WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO  $\frac{1}{2}$ " RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A  $\frac{1}{4}$ " 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  $\frac{1}{4}$ " 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  $\frac{7}{8}$ "  $\emptyset$  SHEAR STUDS FOR THE  $\frac{3}{4}$ "  $\emptyset$  STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 -  $\frac{7}{8}$ "  $\emptyset$  STUDS FOR 4 -  $\frac{3}{4}$ "  $\emptyset$  STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF  $\frac{7}{8}$ "  $\emptyset$  STUDS ALONG THE BEAM AS SHOWN FOR  $\frac{3}{4}$ "  $\emptyset$  STUDS BASED ON THE RATIO OF 3 -  $\frac{7}{8}$ "  $\emptyset$  STUDS FOR 4 -  $\frac{3}{4}$ "  $\emptyset$  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  $\frac{5}{16}$ " 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  $\frac{1}{16}$ " 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

STD. NO. SN