

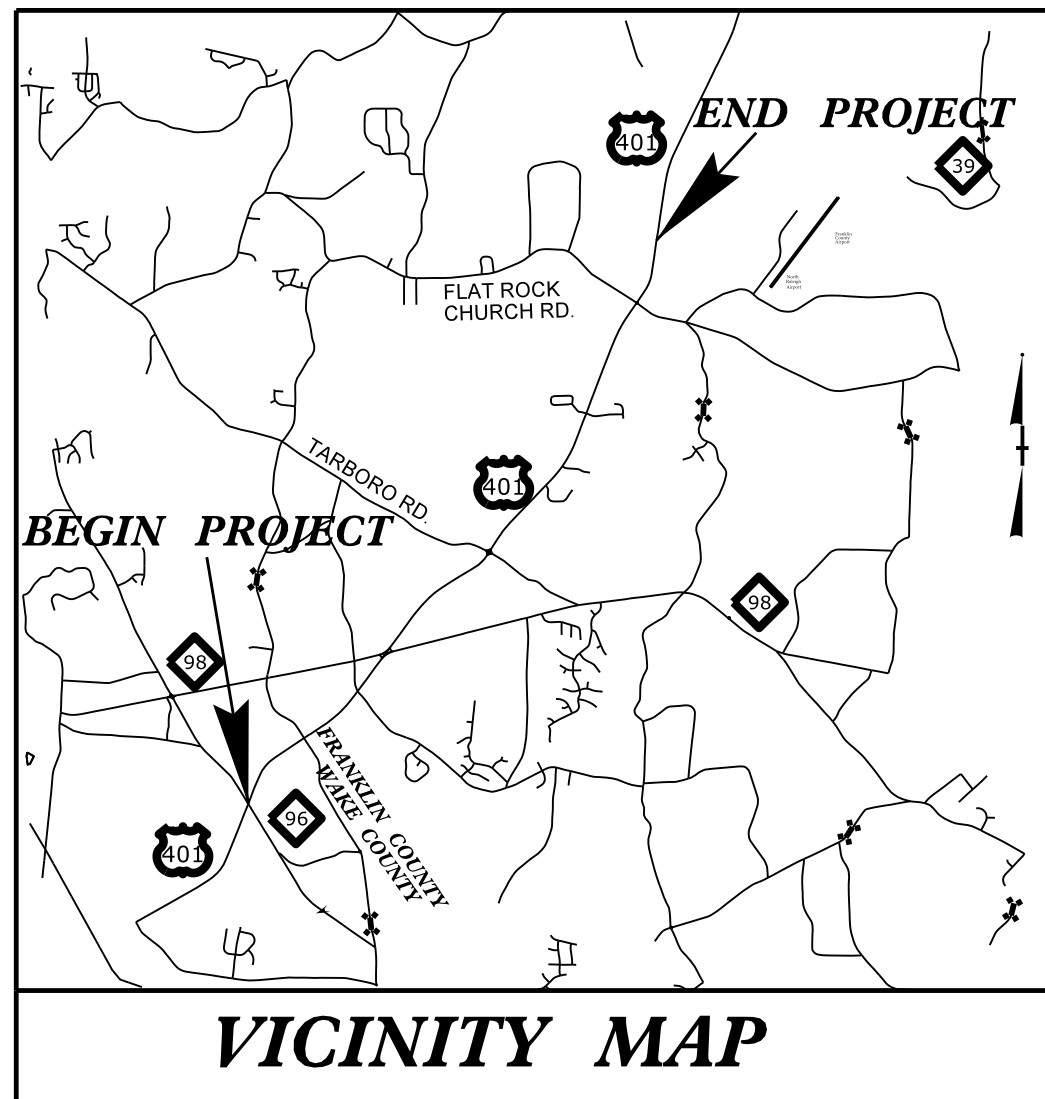
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shall not be considered a certified document.**

TIP PROJECT: R-2814C

CONTRACT: C204105



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

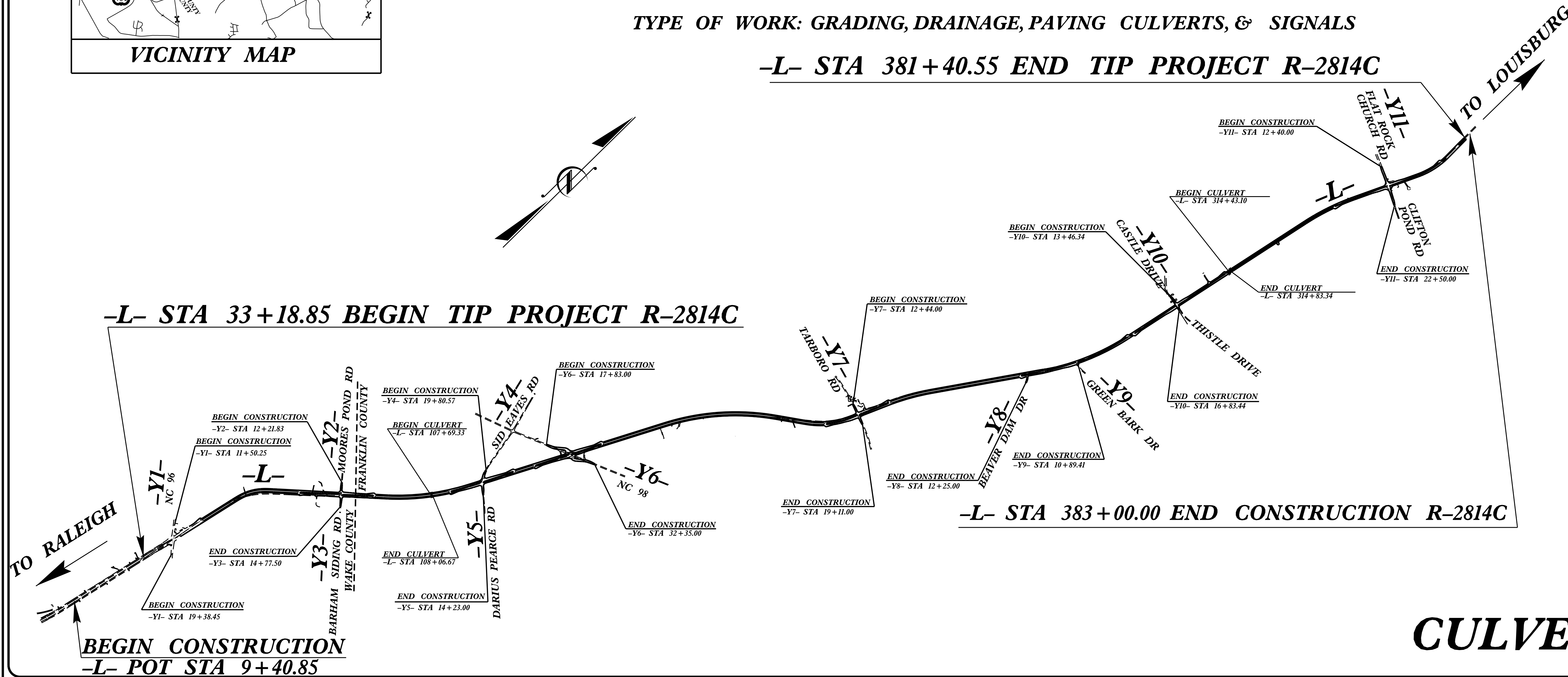
WAKE & FRANKLIN COUNTY

LOCATION: US 401 FROM NC 96 TO NORTH OF SR 1103 (FLAT ROCK CHURCH RD /CLIFTON POND RD.)

TYPE OF WORK: GRADING, DRAINAGE, PAVING CULVERTS, & SIGNALS

-L- STA 381+40.55 END TIP PROJECT R-2814C

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2814C		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34506.1.4	STP-401(249)	P.E.	
34506.2.FR7	STP-401(249)	RW	
34506.2.FRU7	STP-401(249)	UTILITIES	
34506.3.FR6	STP-401(249)	CONST.	



CULVERTS

DESIGN DATA

ADT (2016) =	10,892
ADT (2036) =	15,848
K =	10 %
D =	65 %
T =	6 % **
* V =	60 MPH
** (TTST 2 %, DUAL 4 %)	
FUNC CLASS =	MAJOR COLLECTOR
STATEWIDE TIER	

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2814C =	6.580 MILES
LENGTH STRUCTURE TIP PROJECT R-2814C =	0.015 MILES
TOTAL LENGTH TIP PROJECT R-2814C =	6.595 MILES

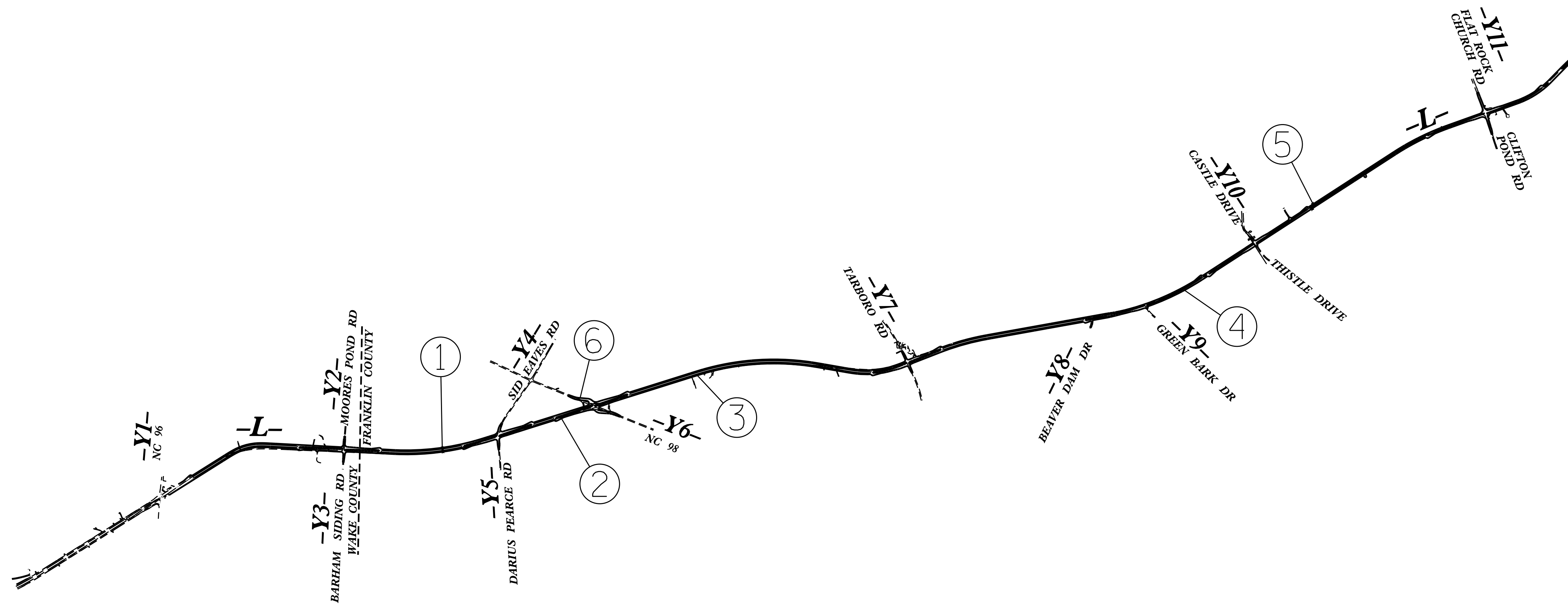
Prepared in the Office of:
DIVISION OF HIGHWAYS
STRUCTURES MANAGEMENT UNIT
1000 BIRCH RIDGE DR.
RALEIGH, N.C. 27610

2018 STANDARD SPECIFICATIONS

LETTING DATE :
JULY 17, 2018

G.W. DICKEY, P.E.
PROJECT ENGINEER

K.W. ALFORD, P.E.
PROJECT DESIGN ENGINEER



INDEX			
STRUCTURE	STATION	DESCRIPTION	SHEET NUMBERS
1	107+88.00 -L-	TRIPLE 12 FT. X 11 FT. CONCRETE BOX CULVERT	C1-1 TO C1-8
2	137+22.00 -L-	SINGLE 12 FT. X 7 FT. CONCRETE BOX CULVERT	C2-1 TO C2-7
3	168+21.00 -L-	DOUBLE 7 FT. X 7 FT. CONCRETE BOX CULVERT	C3-1 TO C3-7
4	283+77.00 -L-	SINGLE 10 FT. X 8 FT. CONCRETE BOX CULVERT	C4-1 TO C4-7
5	314+63.00 -L-	TRIPLE 11 FT. X 11 FT. CONCRETE BOX CULVERT	C5-1 TO C5-9
6	21+86.00 -Y6-	SINGLE 12 FT. X 7 FT. CONCRETE BOX CULVERT	C6-1 TO C6-5

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: _____

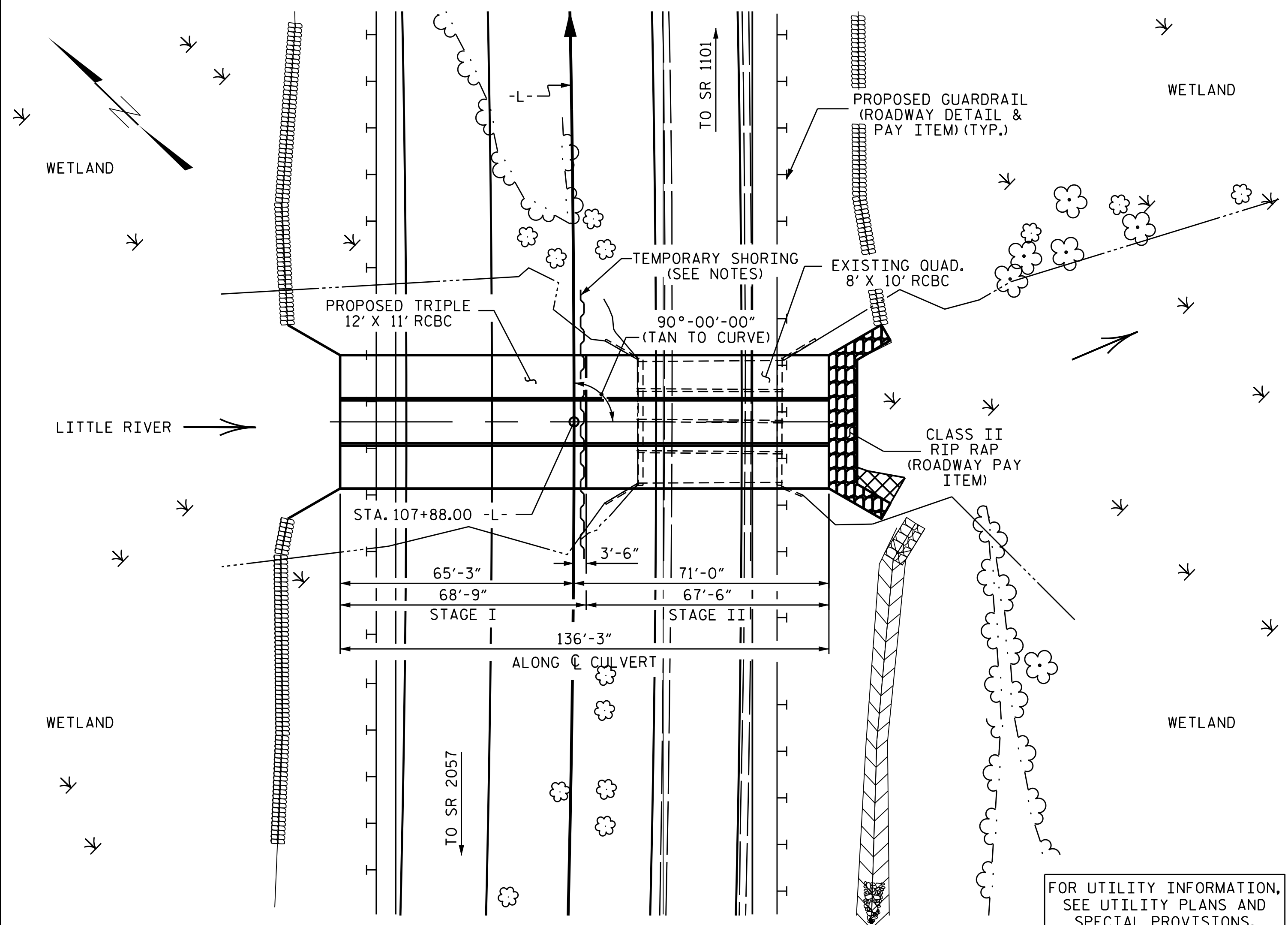
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 INDEX SHEET

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

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

BM #52: RAIL ROAD SPIKE IN 16" PINE TREE, -L- STA. 99+30.00, 178' LEFT, EL. 351.53

F.A. PROJECT NO.: STP-401(249)



LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING.
 MAXIMUM DESIGN FILL----- 7.00'
 MINIMUM DESIGN FILL----- 2.52'
 FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTE SHEET.
 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
 CONCRETE IN EACH STAGE OF 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.
 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.
 AT THE CONTRACTOR'S OPTION HE MAY SUBMIT, TO THE ENGINEER FOR APPROVAL, DESIGN AND DETAIL DRAWINGS FOR A PRECAST REINFORCED CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE CULVERT SHOWN ON THE PLANS. THE DESIGN SHALL PROVIDE THE SAME SIZE OF BARREL AS USED ON THE CAST-IN-PLACE DESIGN. FOR OPTIONAL PRECAST REINFORCED CONCRETE BOX CULVERT, SEE SPECIAL PROVISIONS.
 THE EXISTING STRUCTURE CONSISTING OF A REINFORCED CONCRETE CULVERT 4 @ 8'(W) X 10'(D) SIZE, 41'± LONG AND LOCATED AT THE PROPOSED STRUCTURE, SHALL BE REMOVED. THE EXISTING STRUCTURE IS PRESENTLY NOT POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE STRUCTURE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED STRUCTURE, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.
 FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.
 FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS.
 A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
 FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
 FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
 FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
 FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
 FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
 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.

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE	
STAGE I	327.1 C.Y.
STAGE II	321.7 C.Y.
TOTAL	648.8 C.Y.
REINFORCING STEEL	
STAGE I	36,773 LBS.
STAGE II	35,990 LBS.
TOTAL	72,763 LBS.
FOUNDATION CONDITIONING MATERIAL	
STAGE I	207 TONS
STAGE II	204 TONS
TOTAL	411 TONS
CULVERT EXCAVATION	LUMP SUM
REMOVAL OF EXISTING STRUCTURE	LUMP SUM

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

HYDRAULIC DATA

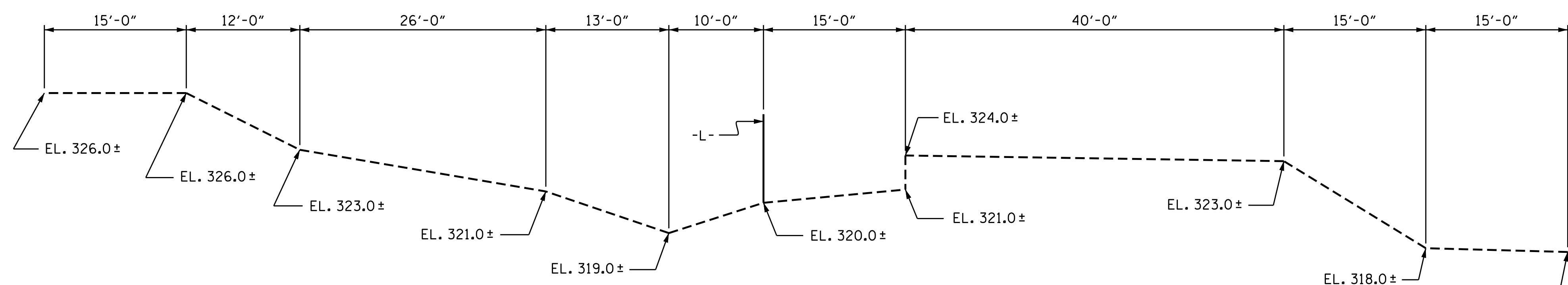
DESIGN DISCHARGE = 3,100 CFS
 FREQUENCY OF DESIGN FLOOD = 50 YRS.
 DESIGN HIGH WATER ELEVATION = 334.60
 DRAINAGE AREA = 8.41 SQ. MI.
 BASE DISCHARGE (Q100) = 3,500 CFS
 BASE HIGH WATER ELEVATION = 335.30

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = 5,200 CFS
 FREQUENCY OF OVERTOPPING FLOOD = 500-YRS.
 OVERTOPPING FLOOD ELEVATION = 339.90

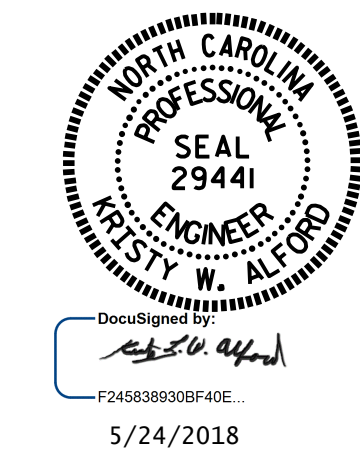
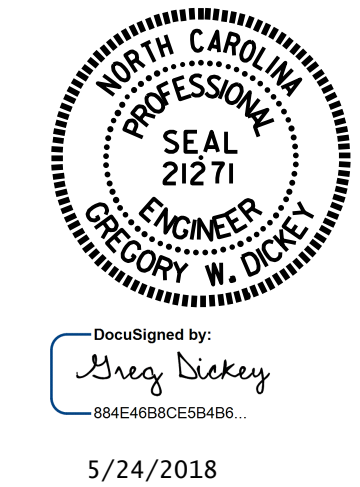
GRADE DATA

GRADE POINT ELEVATION @ STA. 107+88.00 -L- = 339.65'
 BED ELEVATION @ STA. 107+88.00 -L- = 322.85'
 ROADWAY FILL SLOPES = 2:1



PROFILE ALONG CULVERT

ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : K.W. ALFORD DATE : 3/2018
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 1/2014



PROJECT NO. R-2814C
 FRANKLIN COUNTY
 STATION: 107+88.00 -L-
 SHEET 1 OF 8 REPLACES BRIDGE NO. 1

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

TRIPLE 12 FT. X 11 FT. CONCRETE BOX CULVERT 90° SKEW

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

SHEET NO. C1-1
 TOTAL SHEETS 8

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER		
						MOMENT				SHEAR						
						LIVE-LOAD FACTORS (ILL)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE		DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	1.04	--	1.75	1.22	1	TOP SLAB	5.07	1.04	1	TOP SLAB	11.34		
	HL-93 (OPERATING)	N/A		1.35	--	1.35	1.58	1	TOP SLAB	5.07	1.35	1	TOP SLAB	11.34		
	HS-20 (INVENTORY)	36.000	②	1.30	46.67	1.75	1.30	1	BOT. CORNER WALL	11.82	1.31	1	TOP SLAB	11.34		
	HS-20 (OPERATING)	36.000		1.68	60.50	1.35	1.68	1	BOT. CORNER WALL	11.82	1.70	1	TOP SLAB	11.34		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		1.93	26.06	1.40	2.01	1	BOT. CORNER WALL	11.82	1.93	1	EXTERIOR WALL	11.17	
		SNGARBS2	20.000		1.84	36.78	1.40	1.84	1	BOT. CORNER WALL	11.82	1.89	1	EXTERIOR WALL	11.17	
		SNAGRIS2	22.000		1.81	39.89	1.40	1.81	1	BOT. CORNER WALL	11.82	1.89	1	EXTERIOR WALL	11.17	
		SNCOTTS3	27.250	③	1.31	35.62	1.40	1.52	1	TOP SLAB	5.07	1.31	1	TOP SLAB	11.34	
		SNAGGRS4	34.925		1.54	53.76	1.40	1.56	1	BOT. CORNER WALL	11.82	1.54	1	TOP SLAB	11.34	
		SNS5A	35.550		1.46	51.87	1.40	1.56	1	BOT. CORNER WALL	11.82	1.46	1	TOP SLAB	11.34	
		SNS6A	39.950		1.46	58.29	1.40	1.51	1	BOT. CORNER WALL	11.82	1.46	1	TOP SLAB	11.34	
		SNS7B	42.000		1.42	59.44	1.40	1.50	1	BOT. CORNER WALL	11.82	1.42	1	TOP SLAB	11.34	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.59	52.47	1.40	1.59	1	BOT. CORNER WALL	11.82	1.82	1	EXTERIOR WALL	11.17	
		TNT4A	33.075		1.56	51.55	1.40	1.64	1	BOT. CORNER WALL	11.82	1.56	1	TOP SLAB	11.34	
		TNT6A	41.600		1.41	58.65	1.40	1.54	1	BOT. CORNER WALL	11.82	1.41	1	TOP SLAB	11.34	
		TNT7A	42.000		1.46	61.40	1.40	1.50	1	BOT. CORNER WALL	11.82	1.46	1	TOP SLAB	11.34	
		TNT7B	42.000		1.47	61.88	1.40	1.61	1	BOT. CORNER WALL	11.82	1.47	1	TOP SLAB	11.34	
		TNAGRIT4	43.000		1.49	63.98	1.40	1.49	1	BOT. CORNER WALL	11.82	1.49	1	TOP SLAB	11.34	
TNAGT5A	45.000		1.46	65.66	1.40	1.54	1	BOT. CORNER WALL	11.82	1.46	1	BOTTOM SLAB	11.64			
TNAGT5B	45.000		1.44	64.76	1.40	1.44	1	BOT. CORNER WALL	11.82	1.45	1	TOP SLAB	11.34			

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	0.50 OR 0.90
ES	1.35	0.50 OR 0.90
LS	1.75	--
WA	1.00	--

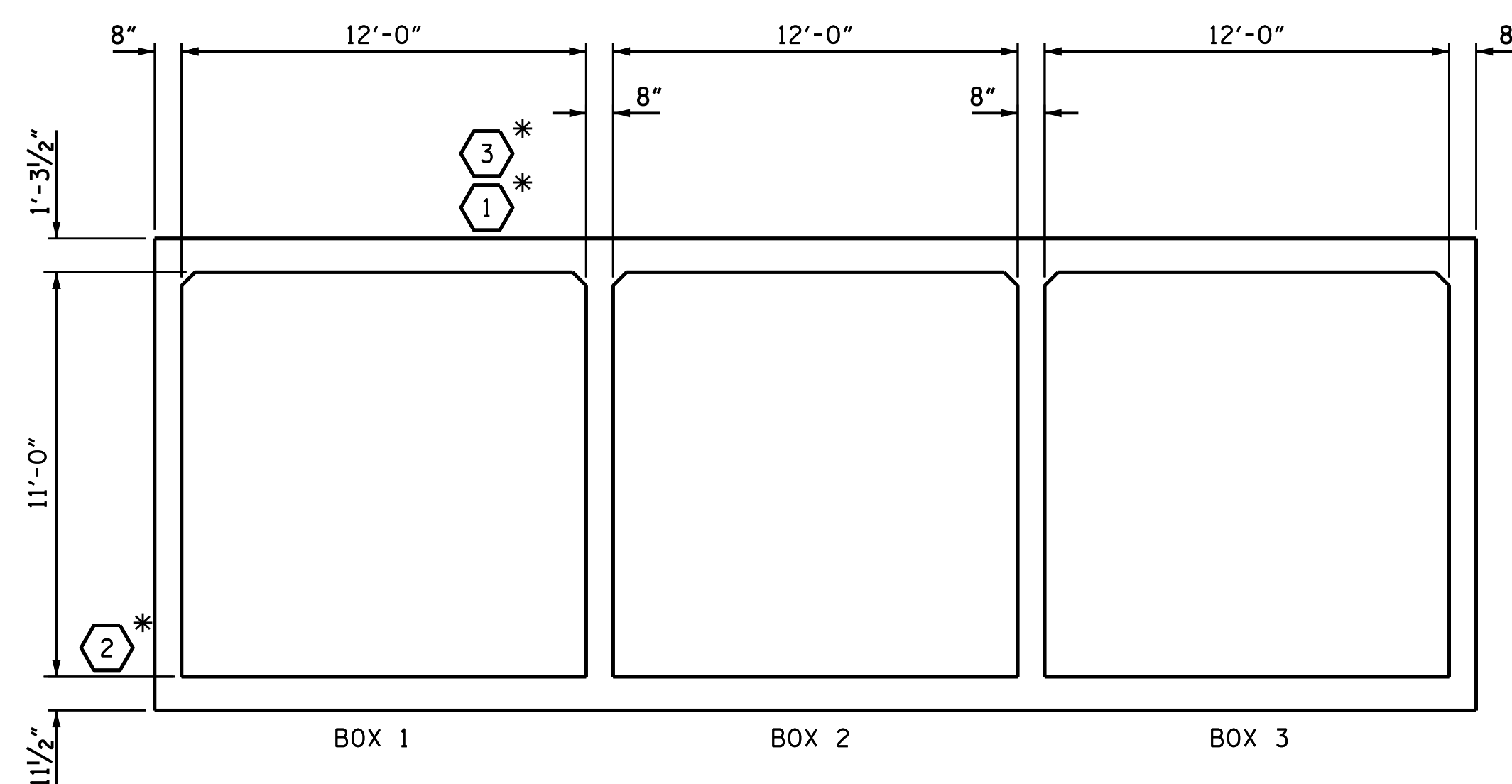
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

- 1.
- 2.
- 3.
- 4.

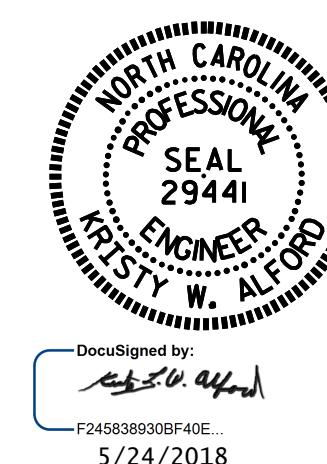
#	CONTROLLING LOAD RATING
①	DESIGN LOAD RATING (HL-93)
②	DESIGN LOAD RATING (HS-20)
③	LEGAL LOAD RATING **
** SEE CHART FOR VEHICLE TYPE	



LRFR SUMMARY
(LOOKING DOWNSTREAM)

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 107+88.00 -L-

SHEET 2 OF 8



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

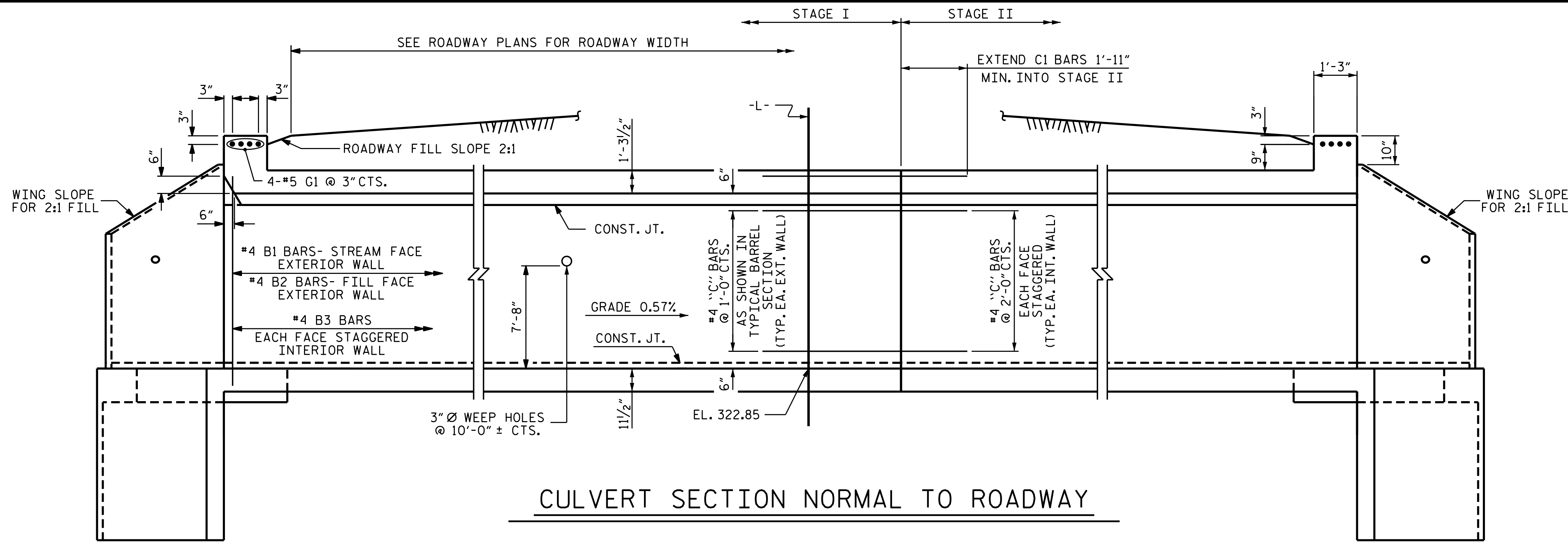
ASSEMBLED BY : D. SHACKELFORD	DATE : 1/2017
CHECKED BY : K.W. ALFORD	DATE : 3/2018
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11
REV. 10/1/11	MAA/GM

24-MAY-2018 07:42
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 kaiford

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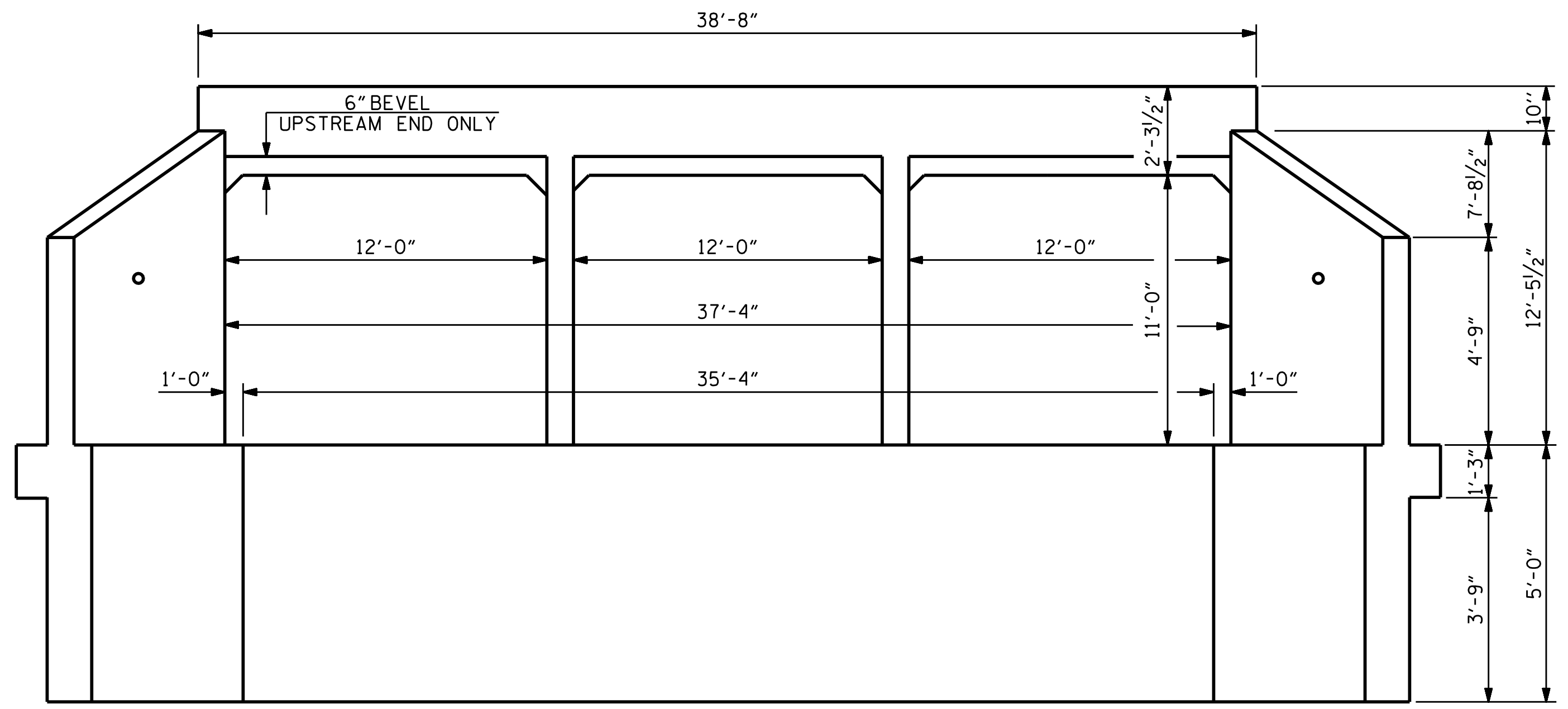
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-2
1			3			TOTAL SHEETS 8
2			4			

STD. NO. LRFR5



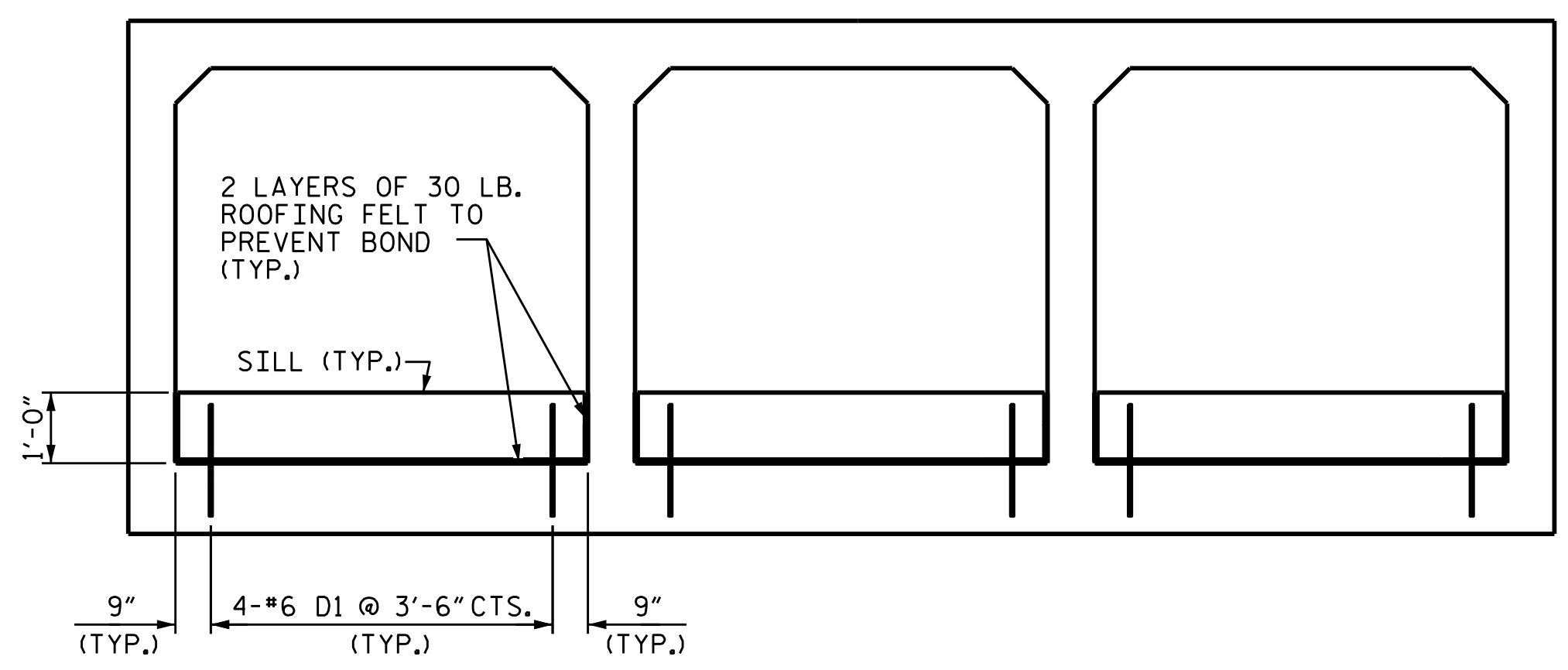
I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

CULVERT SECTION NORMAL TO ROADWAY

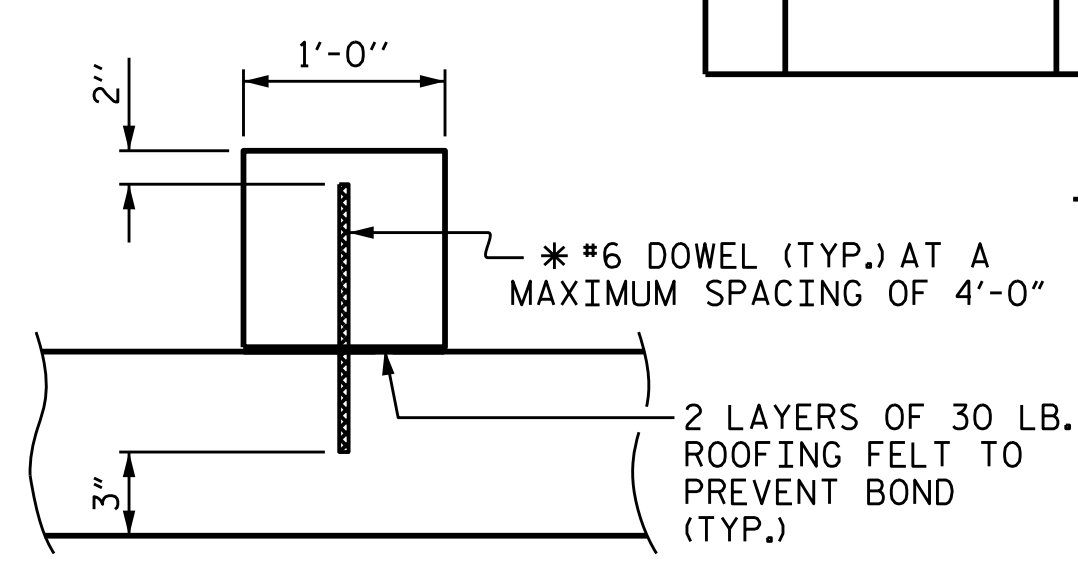


INLET END ELEVATION NORMAL TO SKEW

CONCRETE SILLS NOT SHOWN FOR CLARITY
 SEE CULVERT SILL DETAILS



ELEVATION



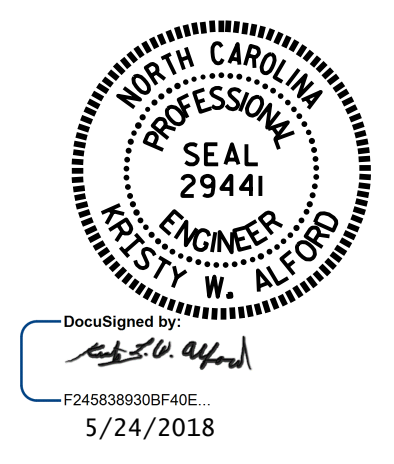
SECTION THROUGH SILL

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

CULVERT SILL DETAILS

SILLS SHALL BE LOCATED IN ALL BARRELS AT BOTH THE INLET AND OUTLET ENDS.

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 107+88.00 -L-
 SHEET 3 OF 8

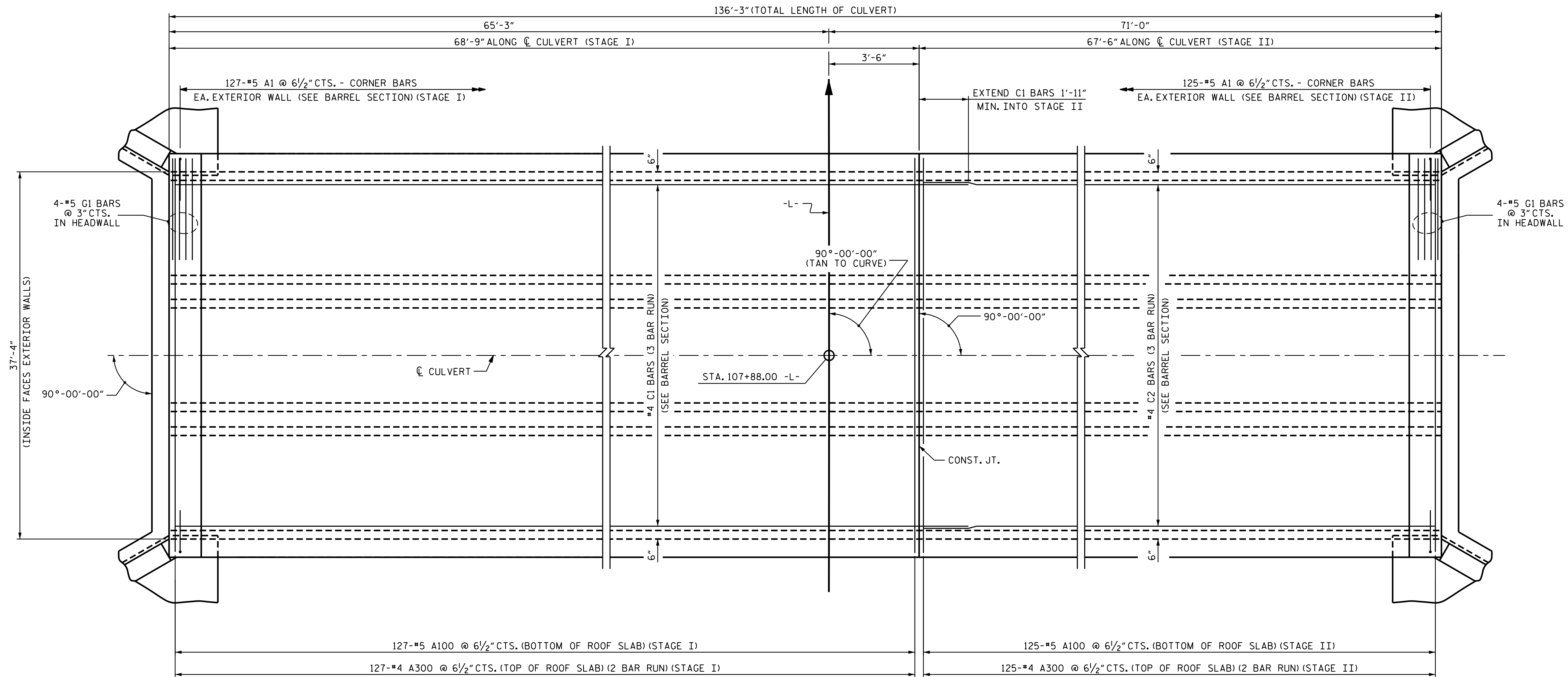


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TRIPLE 12 FT. X 11 FT.
 CONCRETE BOX CULVERT
 90° SKEW

ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : K.W. ALFORD DATE : 3/2018
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

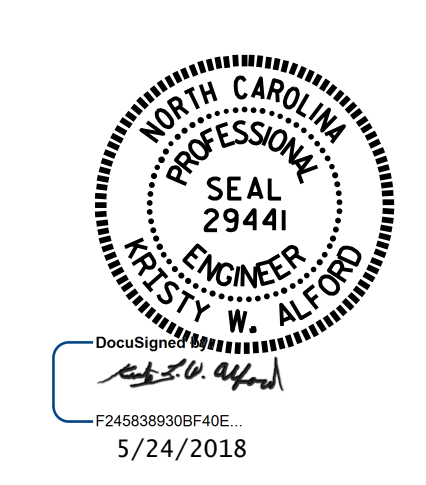
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REVISIONS						SHEET NO. C1-3
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 8
2			4			



PLAN OF ROOF SLAB

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 107+88.00 -L-
 SHEET 4 OF 8

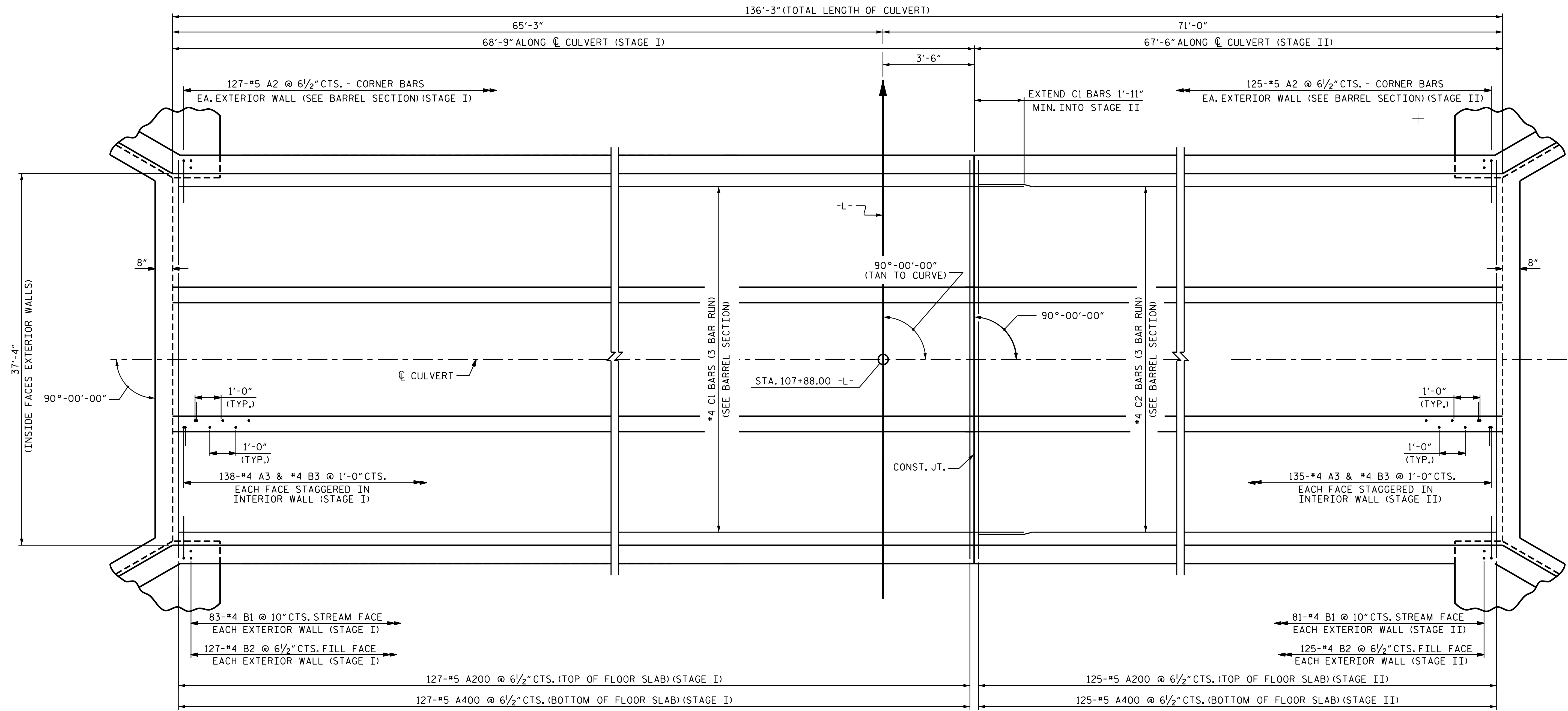


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TRIPLE 12 FT. X 11 FT.
 CONCRETE BOX CULVERT
 90° SKEW

ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : K.W. ALFORD DATE : 3/2018
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

DOCUMENT NOT CONSIDERED FINAL
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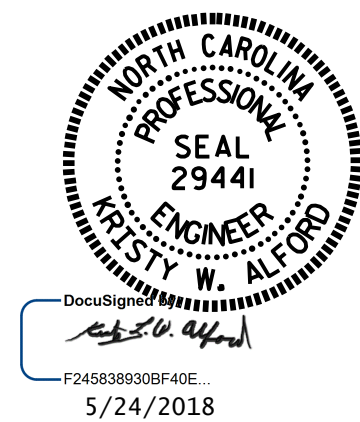
REVISIONS						SHEET NO. C1-4
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 8
2			4			



PLAN OF FLOOR SLAB

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 107+88.00 -L-

SHEET 5 OF 8



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TRIPLE 12 FT. X 11 FT.
 CONCRETE BOX CULVERT
 90° SKEW

ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : K.W. ALFORD DATE : 3/2018
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

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

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS SHALL CONSIST OF THE FOLLOWING COMPONENTS :

- A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2 1/2".
- B. 4 - 1" Ø X 2 1/4" BOLTS WITH WASHERS, BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 1" Ø X 2 1/4" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)
- C. WIRE STRUTS SHOWN IN THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS DETAIL ARE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 P.S.I. AS AN OPTION, A 1/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

GUARDRAIL ANCHOR ASSEMBLY WITH BOLTS SHALL BE ASSEMBLED IN THE SHOP. BOLT THREADS MAY BE RECUT AS NECESSARY TO INSURE FIT.

THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CLASS "A" CONCRETE.

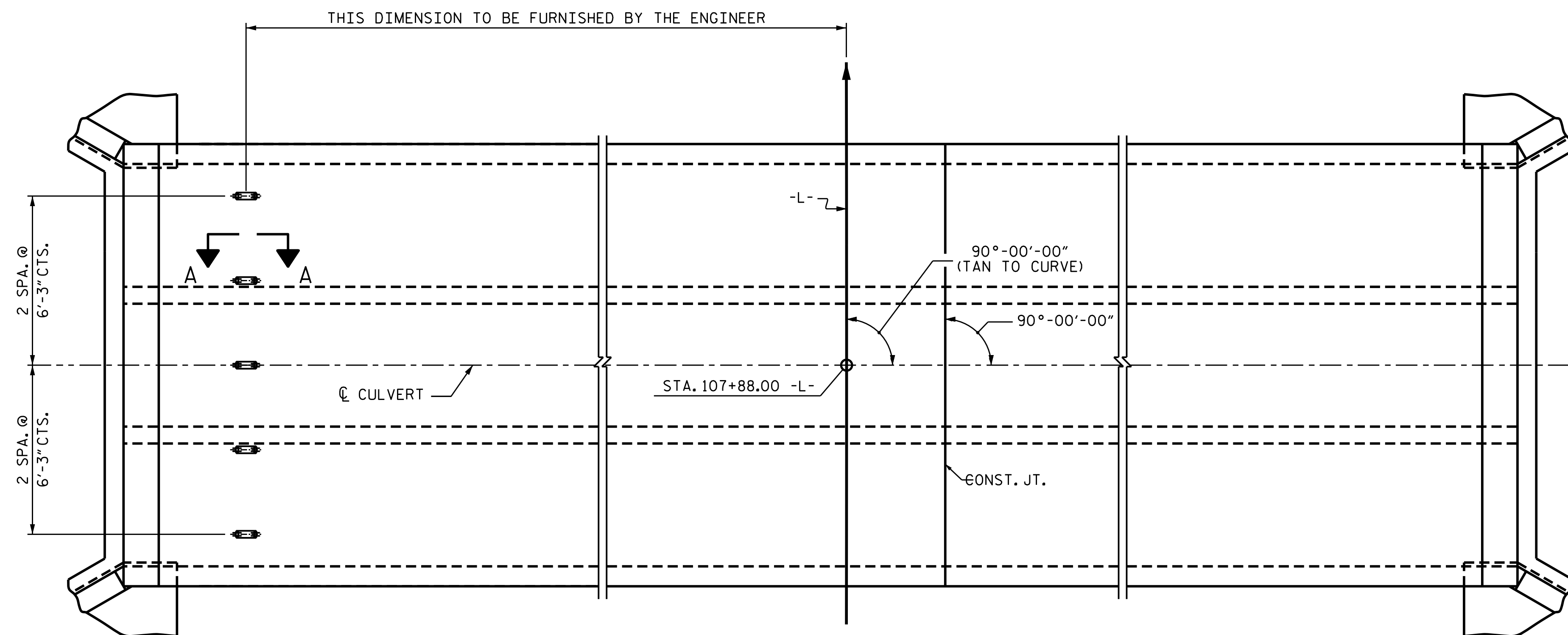
FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

AT THE CONTRACTOR'S OPTION, FERRULES WITH OPEN OR CLOSED ENDS MAY BE USED.

PAYMENT FOR GUARDRAIL, POSTS, AND POST BASE PLATES IS INCLUDED IN ROADWAY PAY ITEMS.

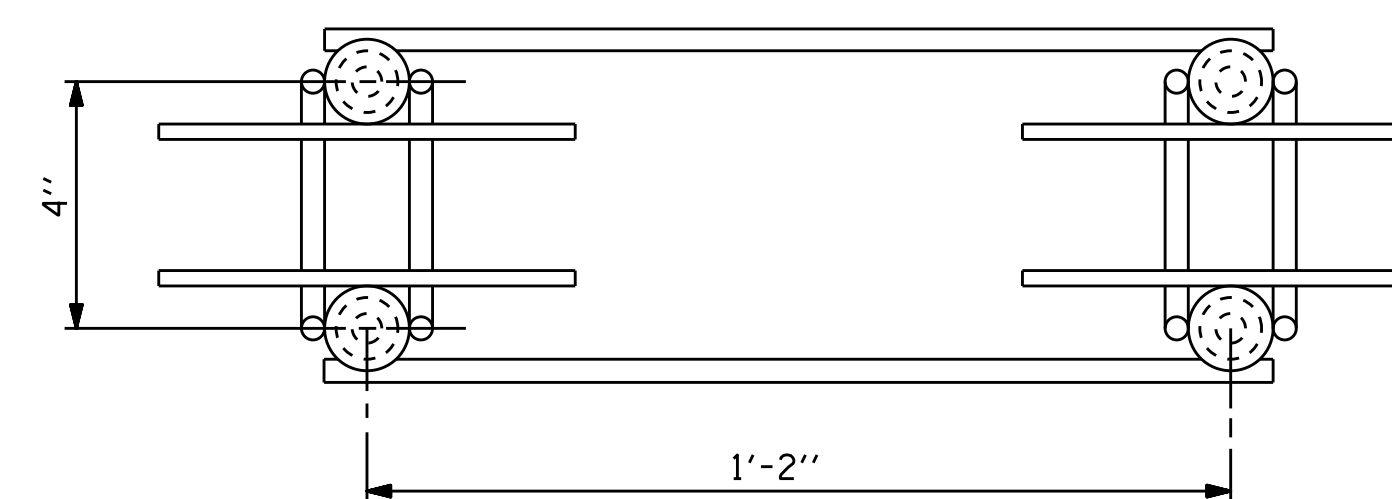
SLAB REINFORCING STEEL MAY BE SHIFTED AS NECESSARY TO CLEAR GUARDRAIL ANCHOR ASSEMBLY. CARE SHOULD BE TAKEN TO KEEP THE SHIFTING OF REINFORCING STEEL TO A MINIMUM.

THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF GUARDRAIL ANCHOR ASSEMBLY. LEVEL TWO FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 1" Ø BOLT IS 21.8 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS.

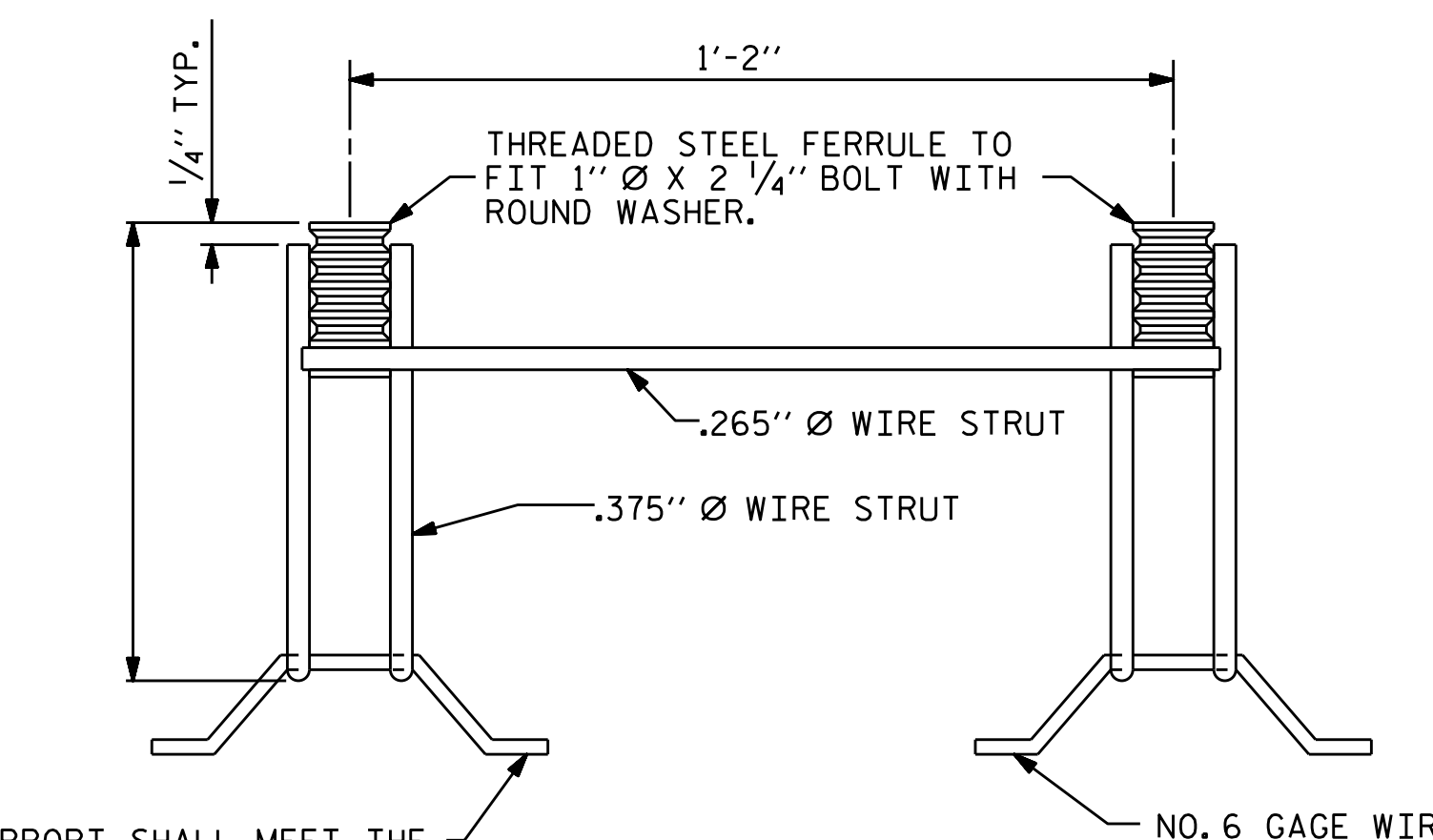


PLAN

SHOWING : GUARDRAIL ANCHOR ASSEMBLY SPACING.

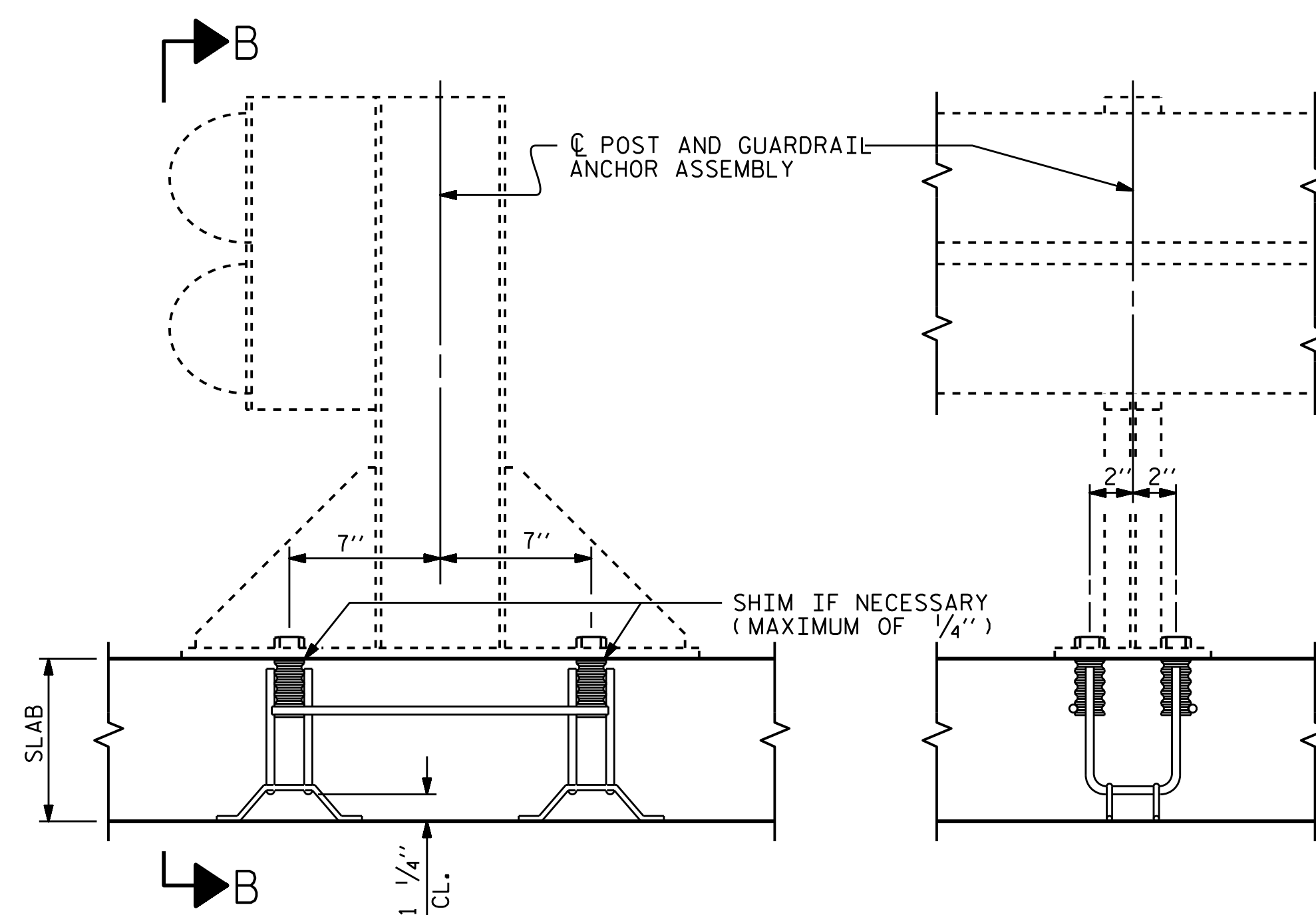


PLAN



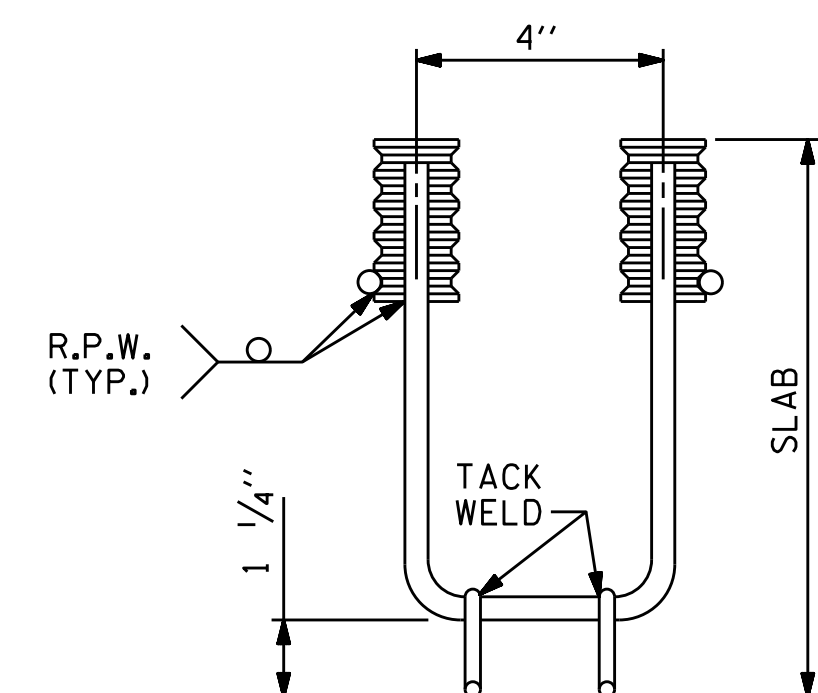
SIDE VIEW

THIS SUPPORT SHALL MEET THE REQUIREMENTS AS SPECIFIED FOR SUPPORTS FOR REINFORCING STEEL. SEE SPECIFICATIONS.



SECTION A-A

SECTION B-B

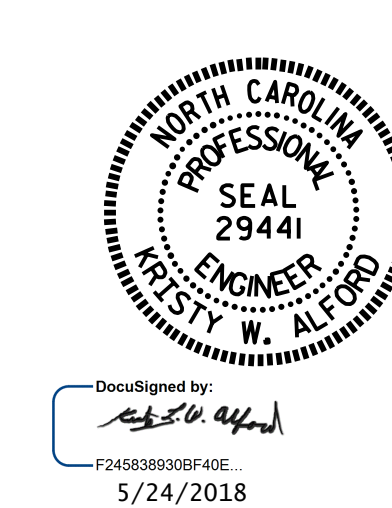


ELEVATION

ASSEMBLED BY : K.W. ALFORD	DATE : 5/2018
CHECKED BY : G.W. DICKEY	DATE : 5/2018
DRAWN BY : FCJ 6/88	REV. 5/1/06R KMM/GM
CHECKED BY : ARB 6/88	REV. 10/1/11 MAA/GM
	REV. 12/17 MAA/THC

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kaiford

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. R-2814C
FRANKLIN COUNTY
STATION: 137+22.00 -L-

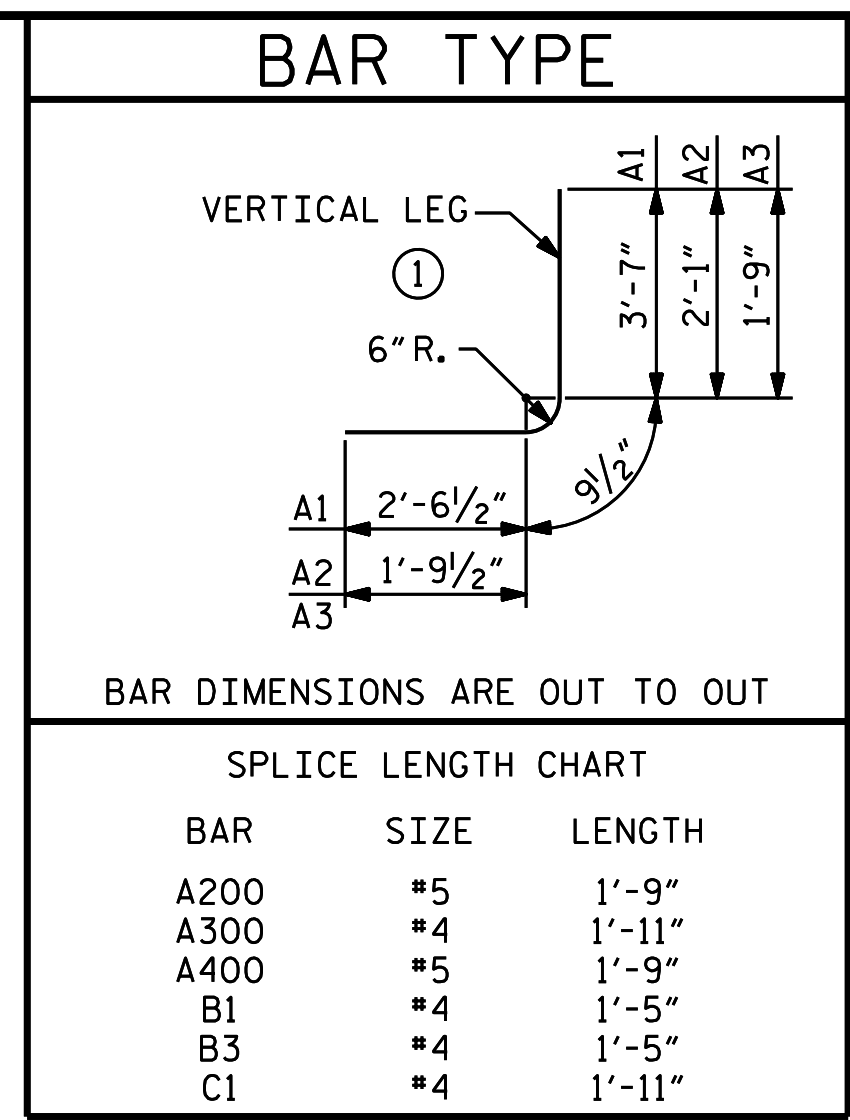
SHEET 6 OF 8

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

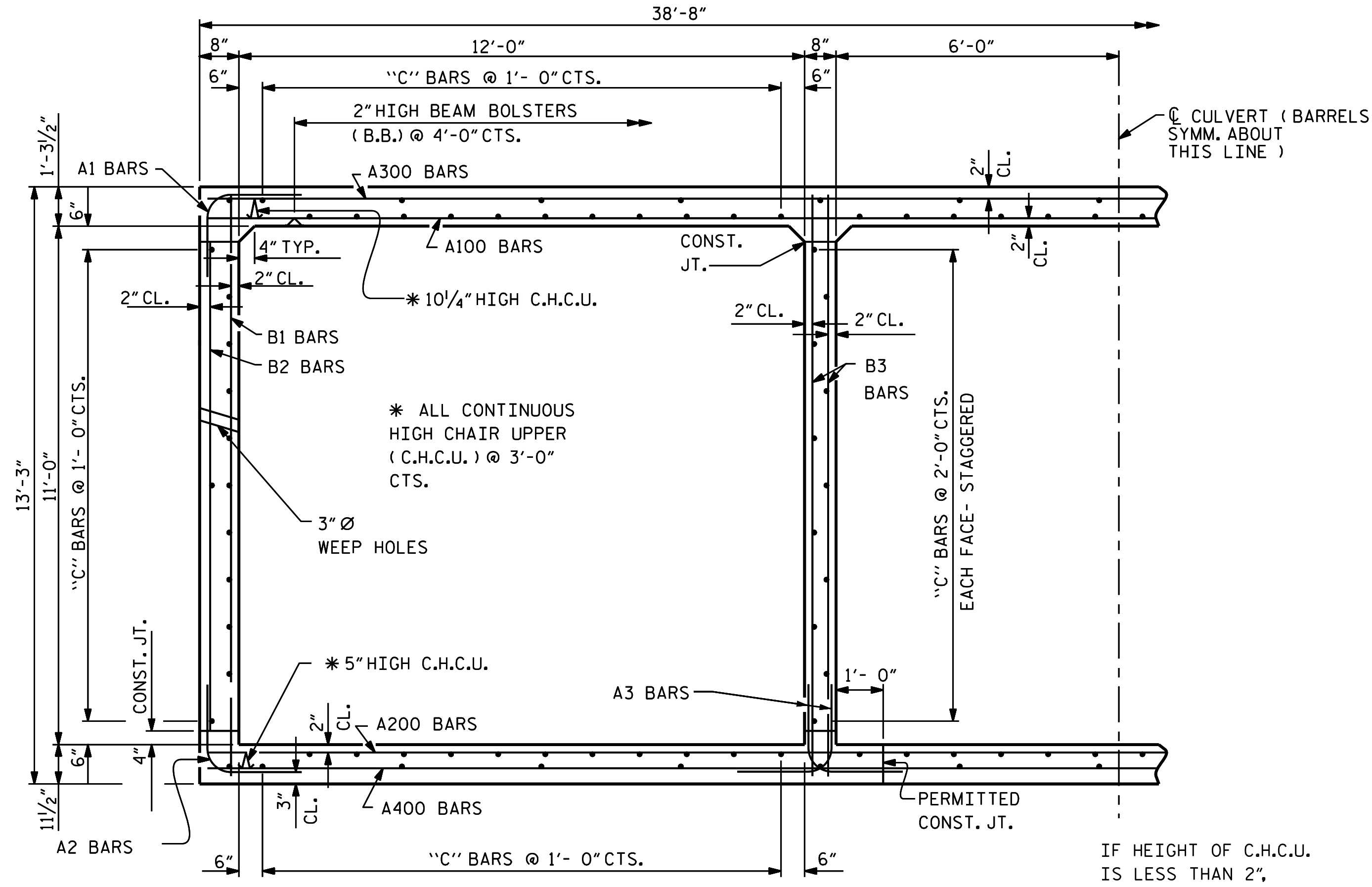
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-6	
1			3			TOTAL SHEETS 8	
2			4				

STD. NO. GRA1

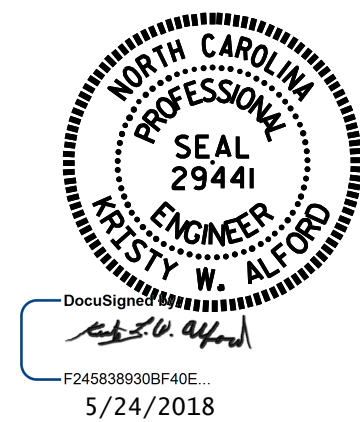
TOTAL STAGE I QUANTITIES		TOTAL STAGE II QUANTITIES	
CLASS A CONCRETE			
BARREL @ 4.321 CY/FT	297.1 C.Y.	BARREL @ 4.321 CY/FT	291.7 C.Y.
WINGS, ETC.	28.7 C.Y.	WINGS, ETC.	28.7 C.Y.
SILL	1.3 C.Y.	SILL	1.3 C.Y.
TOTAL	327.1 C.Y.	TOTAL	321.7 C.Y.
REINFORCING STEEL			
BARREL	35,347 LBS.	BARREL	34,564 LBS.
WINGS, ETC.	1,426 LBS.	WINGS, ETC.	1,426 LBS.
TOTAL	36,773 LBS.	TOTAL	35,990 LBS.
FOUNDATION CONDITIONING MATERIAL	207 TONS	FOUNDATION CONDITIONING MATERIAL	204 TONS
CULVERT EXCAVATION	LUMP SUM	CULVERT EXCAVATION	LUMP SUM



BAR SCHEDULE STAGE I					BAR SCHEDULE STAGE II						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	254	#5	1	6'-11"	1832	A1	250	#5	1	6'-11"	1804
A2	254	#5	1	4'-8"	1236	A2	250	#5	1	4'-8"	1217
A3	276	#4	1	4'-4"	799	A3	270	#4	1	4'-4"	781
A100	127	#5	STR	38'-3"	5067	A100	125	#5	STR	38'-3"	4987
A200	127	#5	STR	38'-3"	5067	A200	125	#5	STR	38'-3"	4987
A300	254	#4	STR	20'-1"	3408	A300	250	#4	STR	20'-1"	3354
A400	127	#5	STR	38'-3"	5067	A400	125	#5	STR	38'-3"	4987
B1	166	#4	STR	12'-9"	1414	B1	162	#4	STR	12'-9"	1380
B2	254	#4	STR	10'-4"	1753	B2	250	#4	STR	10'-4"	1726
B3	276	#4	STR	12'-9"	2351	B3	270	#4	STR	12'-9"	2300
C1	432	#4	STR	24'-10"	7166	C2	432	#4	STR	23'-9"	6854
D1	12	#6	STR	1'-6"	27	D1	12	#6	STR	1'-6"	27
G1	4	#5	STR	38'-4"	160	G1	4	#5	STR	38'-4"	160
REINFORCING STEEL = 35,347 LBS					REINFORCING STEEL = 34,564 LBS						



PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 107+88.00 -L-
 SHEET 7 OF 8



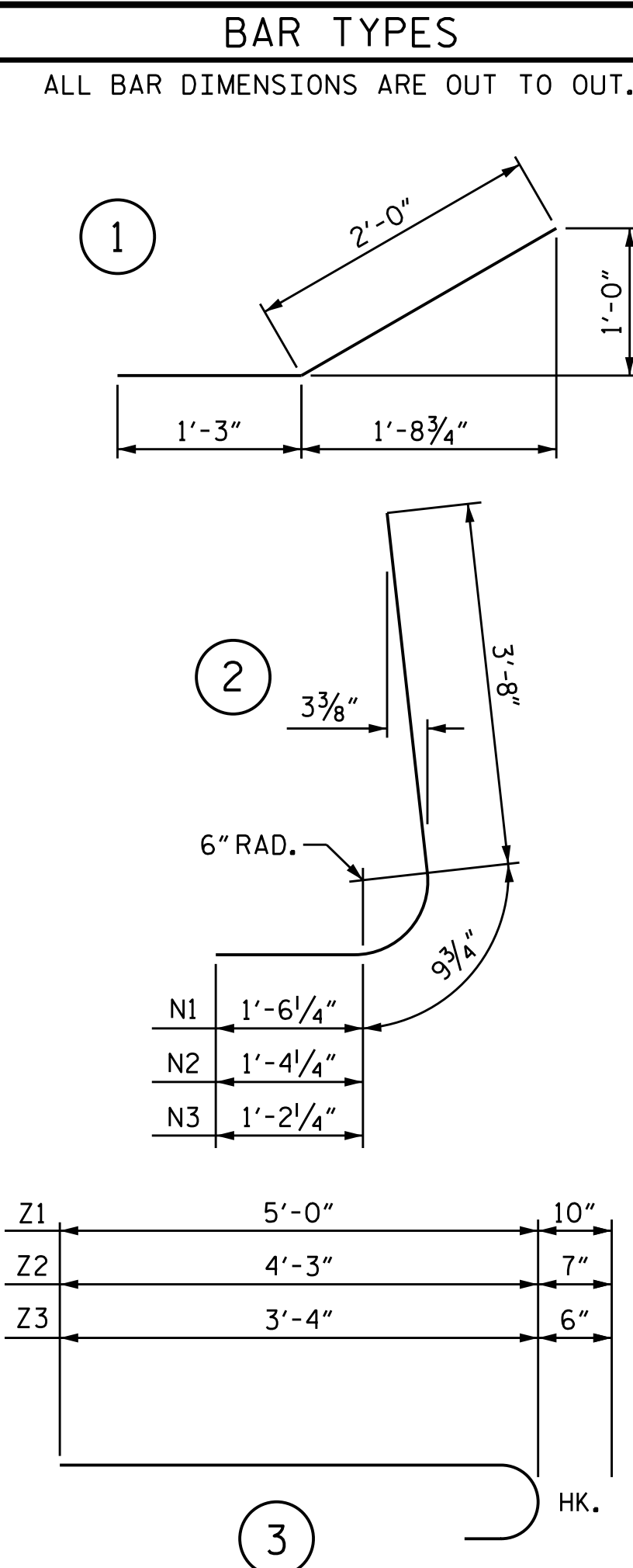
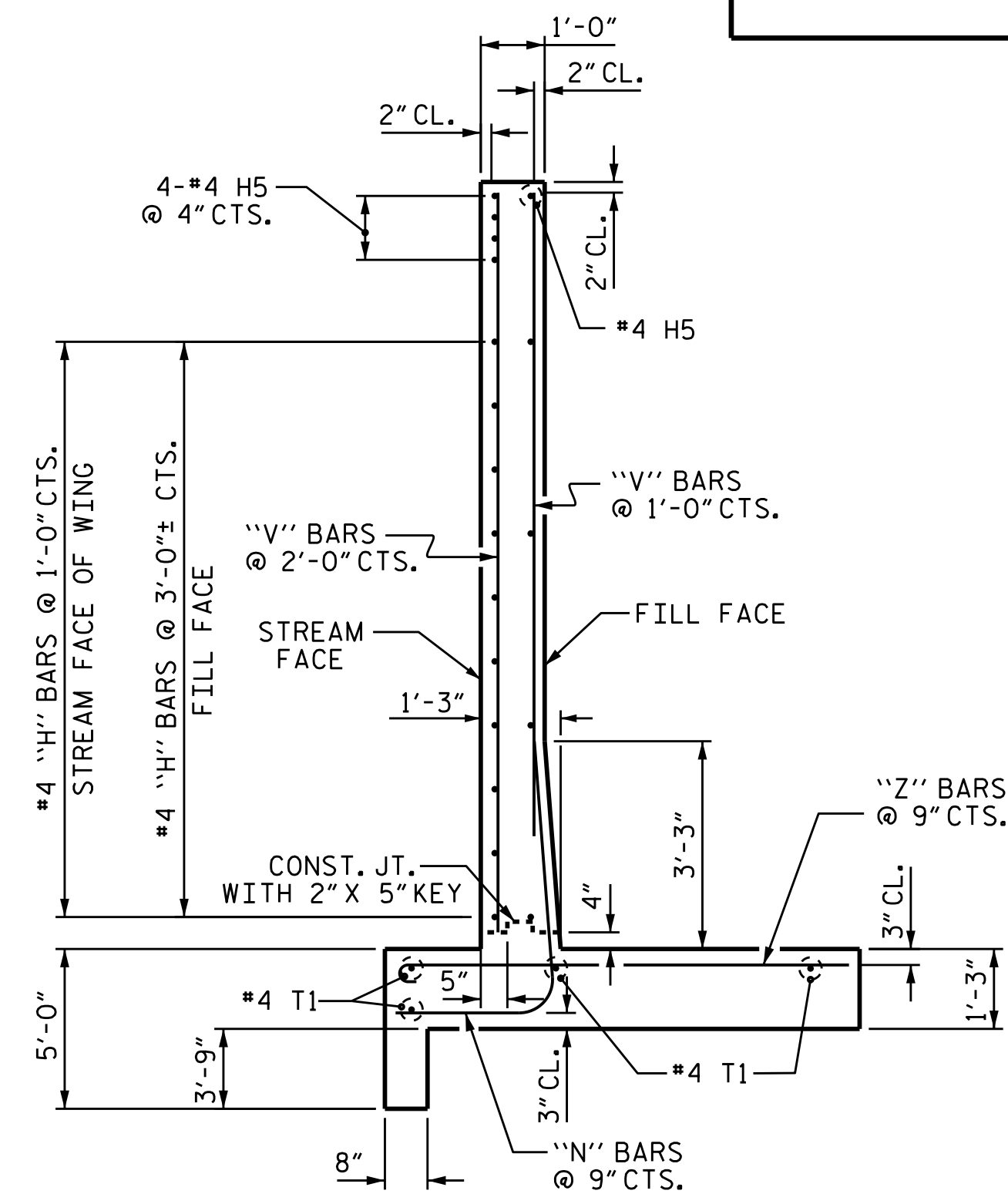
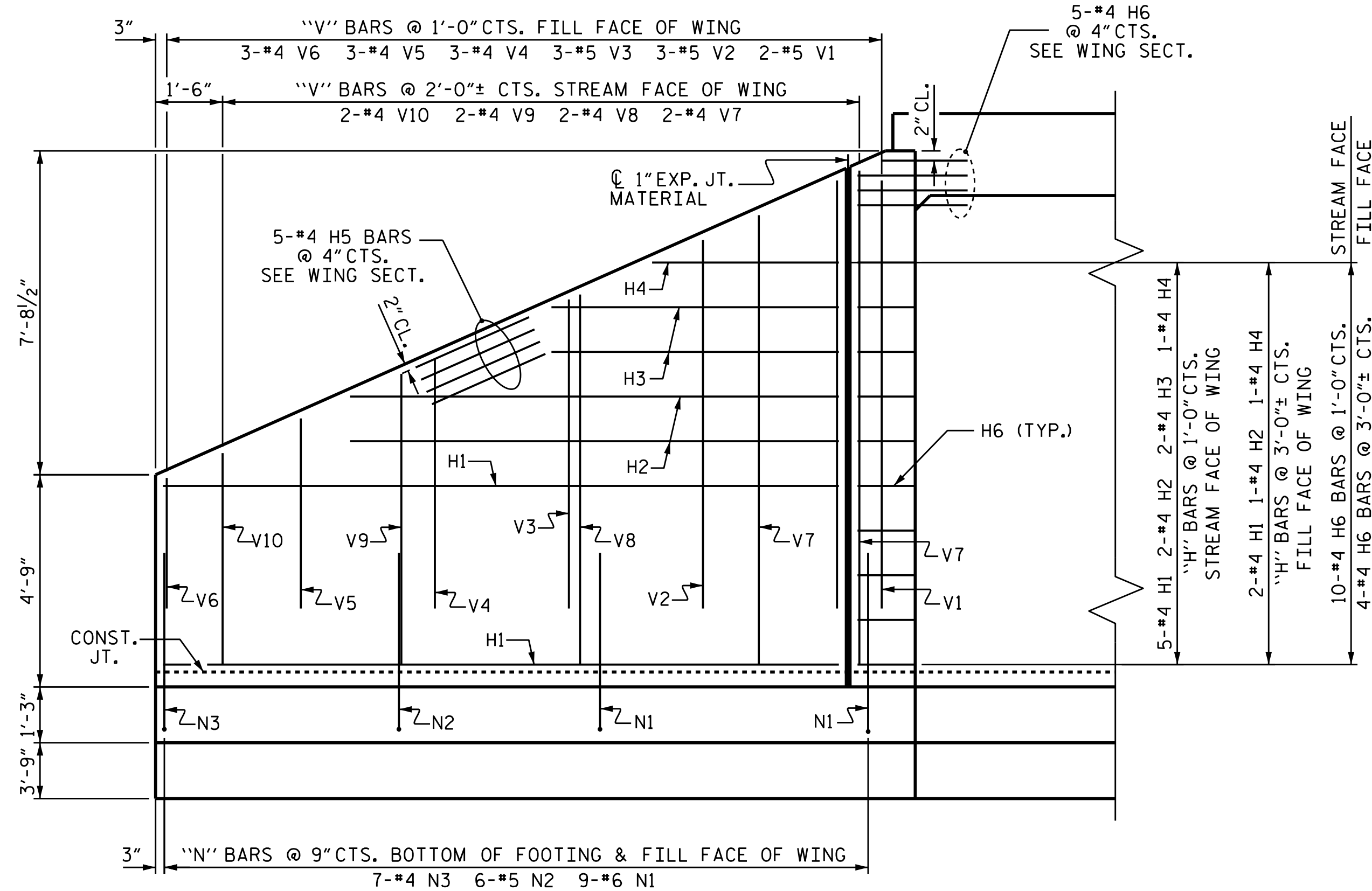
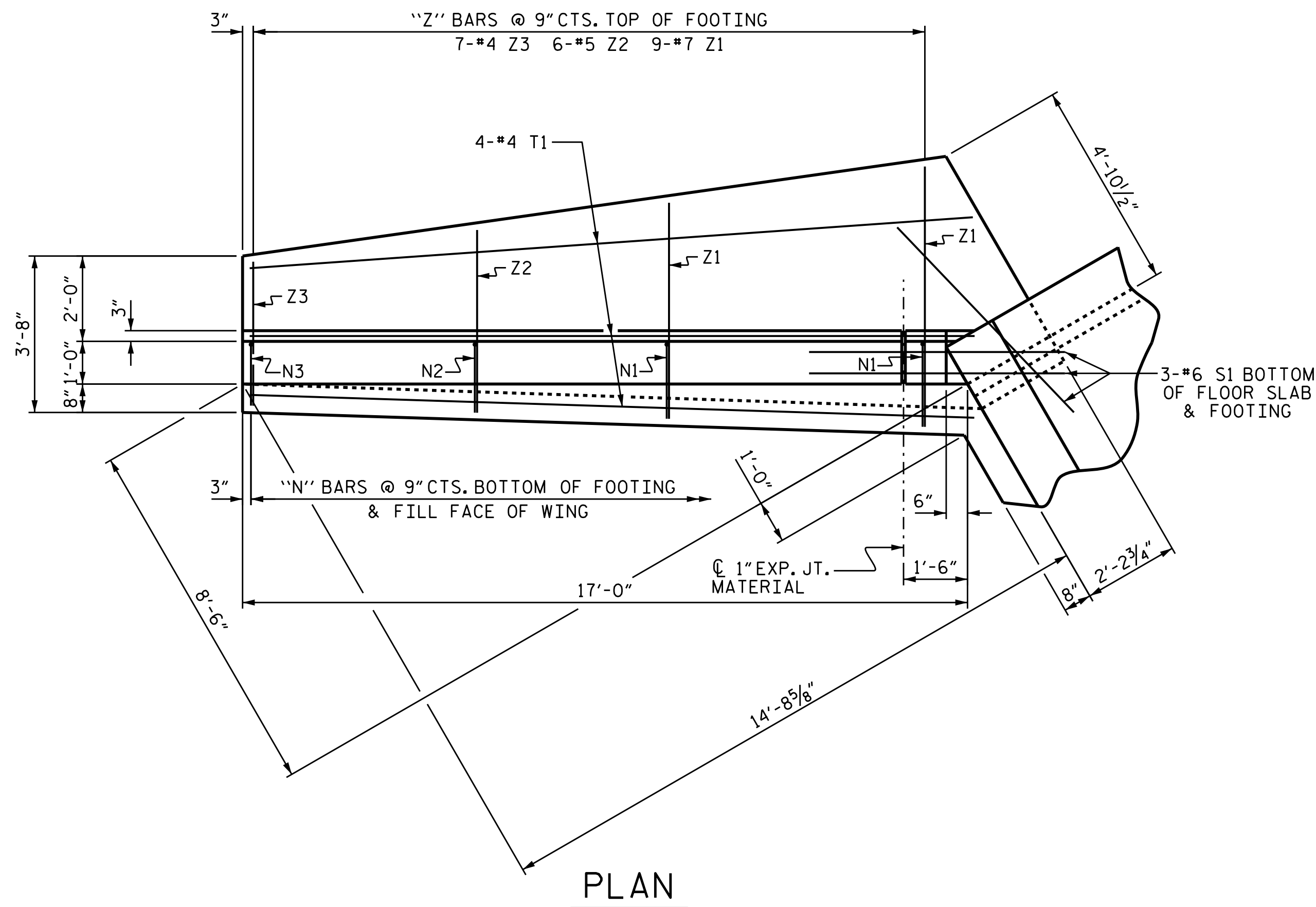
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

**TRIPLE 12 FT. X 11 FT.
 CONCRETE BOX CULVERT
 90° SKEW**

ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : K.W. ALFORD DATE : 3/2018
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

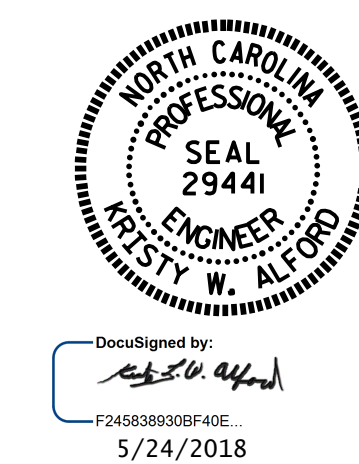
REVISIONS						SHEET NO. C1-7
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 8
2			4			



BILL OF MATERIAL PER STAGE					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	14	#4	STR	15'- 1"	141
H2	6	#4	STR	10'-10"	43
H3	4	#4	STR	6'- 4"	17
H4	4	#4	STR	4'- 1"	11
H5	10	#4	STR	16'-0"	107
H6	38	#4	1	3'- 3"	82
N1	18	#6	2	6'-0"	162
N2	12	#5	2	5'-10"	73
N3	14	#4	2	5'- 8"	53
S1	6	#6	STR	6'- 0"	54
T1	8	#4	STR	17'- 0"	91
V1	4	#5	STR	10'- 3"	43
V2	6	#5	STR	8'- 9"	55
V3	6	#5	STR	7'- 6"	47
V4	6	#4	STR	6'- 0"	24
V5	6	#4	STR	4'- 9"	19
V6	6	#4	STR	3'- 6"	14
V7	4	#4	STR	10'- 0"	27
V8	4	#4	STR	8'- 3"	22
V9	4	#4	STR	6'- 6"	17
V10	4	#4	STR	4'- 9"	13
Z1	18	#7	3	5'-10"	215
Z2	12	#5	3	4'-10"	60
Z3	14	#4	3	3'-10"	36
REINFORCING STEEL FOR 2 WINGS				1426 LBS	
CONCRETE QUANTITIES PER STAGE					
CLASS A CONCRETE				22.5 CY	
2 WINGS				1.8 CY	
1 HEADWALL				4.4 CY	
1 END CURTAIN WALL				28.7 CY	
TOTAL				28.7 CY	

ASSEMBLED BY : A. SORSENGINH DATE : 10/2014
 CHECKED BY : DATE :
 DRAWN BY : A.K.PATEL DATE : 11/04
 CHECKED BY : M.K.BEARD DATE : 12/04

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 kaiford



PROJECT NO. R-2814C
 FRANKLIN COUNTY
 STATION: 107+88.00 -L-
 SHEET 8 OF 8

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD WINGS
 FOR
 CONCRETE BOX CULVERT
 H = 11'-0" SLOPE = 2:1
 90° SKEW

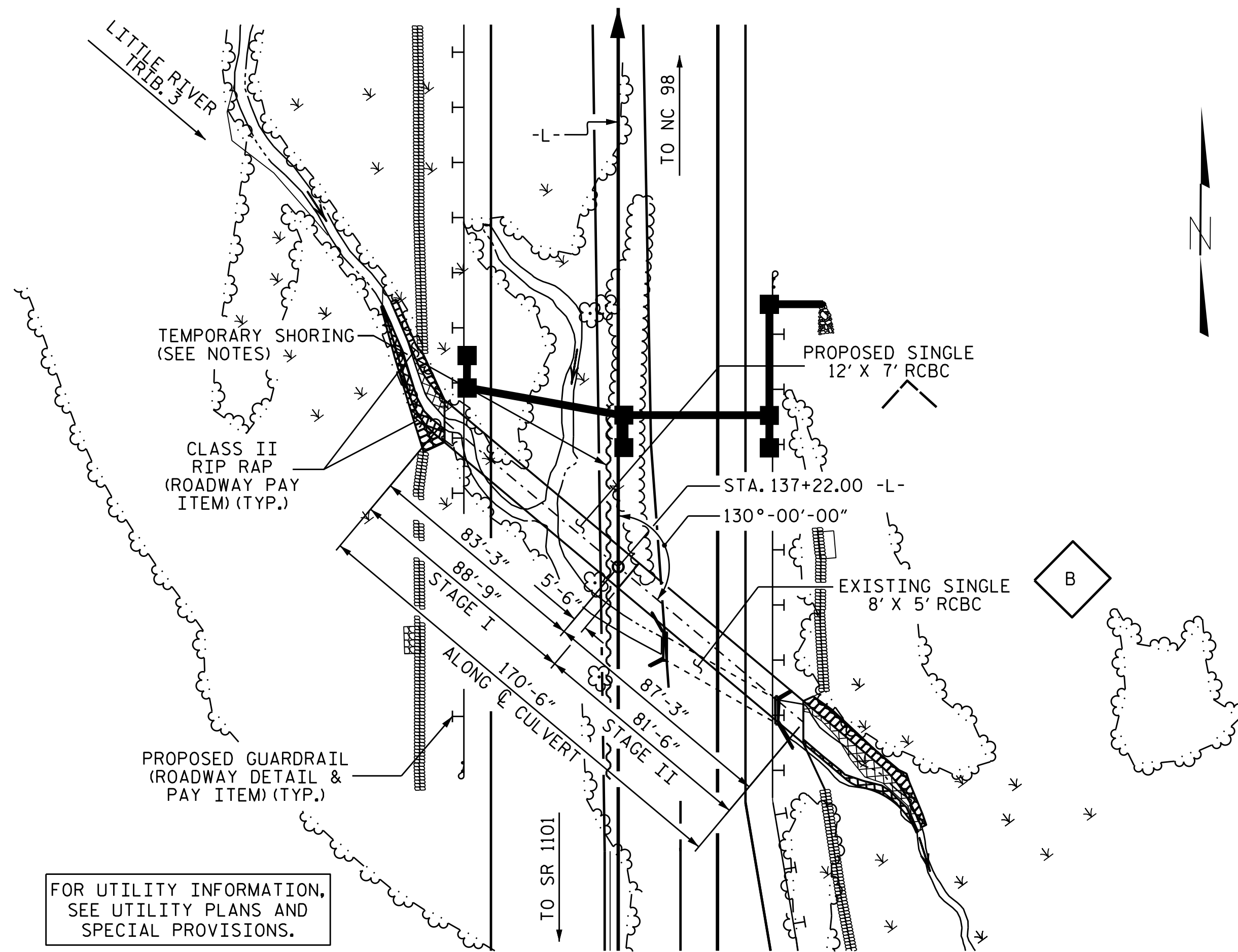
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C1-8	
1			3			TOTAL SHEETS 8	
2			4				

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

STD. NO. CW9011

BM #54: RR SPIKE IN 14" GUM TREE, -L- STA. 147+91.00, 633' LEFT, EL. 372.67

F.A. PROJECT NO.: STP-401(249)



LOCATION SKETCH

NOTES

- ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING.
- MAXIMUM DESIGN FILL----- 4.69'
- MINIMUM DESIGN FILL----- 2.87'
- FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTE SHEET.
- 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
- CONCRETE IN EACH STAGE OF CULVERTS TO BE POURED IN THE FOLLOWING ORDER:
 1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
 2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.
- THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.
- DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.
- TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.
- AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
- AT THE CONTRACTOR'S OPTION HE MAY SUBMIT, TO THE ENGINEER FOR APPROVAL, DESIGN AND DETAIL DRAWINGS FOR A PRECAST REINFORCED CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE CULVERT SHOWN ON THE PLANS. THE DESIGN SHALL PROVIDE THE SAME SIZE OF BARREL AS USED ON THE CAST-IN-PLACE DESIGN. FOR OPTIONAL PRECAST REINFORCED CONCRETE BOX CULVERT, SEE SPECIAL PROVISIONS.
- THE EXISTING STRUCTURE CONSISTING OF A REINFORCED CONCRETE CULVERT 8'(W) X 5'(D) SIZE, 50'± LONG AND LOCATED AT THE OUTLET END OF THE PROPOSED STRUCTURE, SHALL BE REMOVED.

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

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.

FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

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

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE	
STAGE I	112.9 C.Y.
STAGE II	105.1 C.Y.
TOTAL	218.0 C.Y.
REINFORCING STEEL	
STAGE I	21,242 LBS.
STAGE II	19,596 LBS.
TOTAL	40,838 LBS.
FOUNDATION CONDITIONING MATERIAL	
STAGE I	109 TONS
STAGE II	100 TONS
TOTAL	209 TONS
CULVERT EXCAVATION	LUMP SUM
REMOVAL OF EXISTING STRUCTURE	LUMP SUM

HYDRAULIC DATA

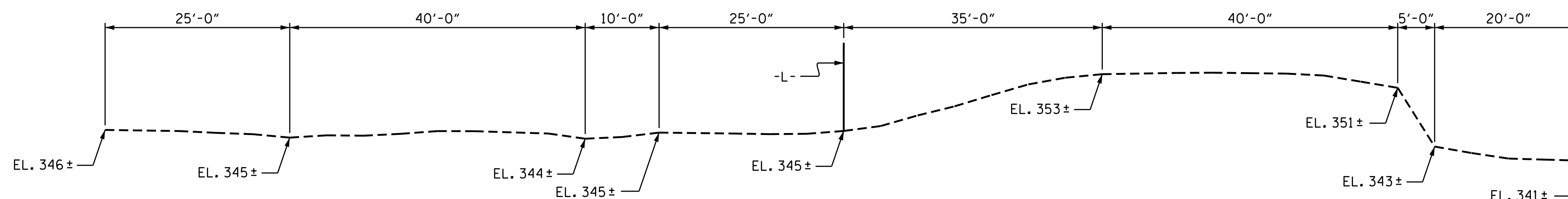
DESIGN DISCHARGE = 550 CFS
 FREQUENCY OF DESIGN FLOOD = 50 YRS.
 DESIGN HIGH WATER ELEVATION = 351.70
 DRAINAGE AREA = 389 AC.
 BASE DISCHARGE (Q100) = 650 CFS
 BASE HIGH WATER ELEVATION = 353.00

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = 850 CFS
 FREQUENCY OF OVERTOPPING FLOOD = 100+ YRS., 500 YRS.-
 OVERTOPPING FLOOD ELEVATION = 354.30

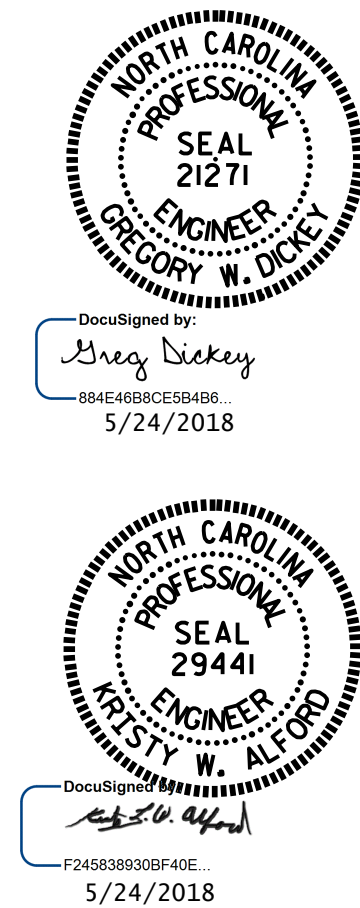
GRADE DATA

GRADE POINT ELEVATION @ STA. 137+22.00 -L- = 354.13'
 BED ELEVATION @ STA. 137+22.00 -L- = 342.91'
 ROADWAY FILL SLOPES = 2:1



PROFILE ALONG CULVERT

ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : A. K. PATEL DATE : 1/2014
 DESIGN ENGINEER OF RECORD : A. SORSENGINH DATE : 1/2014



PROJECT NO. R-2814C
 FRANKLIN COUNTY
 STATION: 137+22.00 -L-

SHEET 1 OF 7

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SINGLE 12 FT. X 7 FT.
 CONCRETE BOX CULVERT
 130° SKEW

REVISIONS						SHEET NO. C2-1
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 7
2			4			

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

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

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER		
						MOMENT				SHEAR						
						LIVE-LOAD FACTORS (LL)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE		DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	1.00	--	1.75	1.06	1	TOP SLAB	6.02	1.00	1	BOTTOM SLAB	0.87		
	HL-93 (OPERATING)	N/A		1.30	--	1.35	1.37	1	TOP SLAB	6.02	1.30	1	BOTTOM SLAB	0.87		
	HS-20 (INVENTORY)	36.000	②	1.23	44.27	1.75	1.23	1	TOP SLAB	6.33	1.37	1	TOP SLAB	0.90		
	HS-20 (OPERATING)	36.000		1.59	57.39	1.35	1.59	1	TOP SLAB	6.33	1.78	1	TOP SLAB	0.90		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH		2.24	30.26	1.40	2.24	1	TOP SLAB	6.33	2.39	1	TOP SLAB	0.90		
		SNGARBS2	20.000		2.10	41.92	1.40	2.10	1	TOP SLAB	6.33	2.23	1	TOP SLAB	0.90	
		SNAGRIS2	22.000		2.24	49.32	1.40	2.24	1	TOP SLAB	6.33	2.39	1	TOP SLAB	0.90	
		SNCOTTS3	27.250		1.25	34.14	1.40	1.27	1	EXTERIOR WALL	6.61	1.25	1	BOTTOM SLAB	0.87	
		SNAGGRS4	34.925	③	1.18	41.30	1.40	1.21	1	EXTERIOR WALL	6.61	1.18	1	BOTTOM SLAB	11.79	
		SNS5A	35.550		1.22	43.34	1.40	1.23	1	EXTERIOR WALL	6.61	1.22	1	BOTTOM SLAB	0.87	
		SNS6A	39.950		1.22	48.70	1.40	1.23	1	EXTERIOR WALL	6.61	1.22	1	BOTTOM SLAB	0.87	
	SNS7B	42.000		1.22	51.20	1.40	1.23	1	EXTERIOR WALL	6.61	1.22	1	BOTTOM SLAB	0.87		
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.43	47.10	1.40	1.43	1	EXTERIOR WALL	6.61	1.46	1	BOTTOM SLAB	0.87	
		TNT4A	33.075		1.47	48.73	1.40	1.47	1	EXTERIOR WALL	6.61	1.50	1	BOTTOM SLAB	0.87	
		TNT6A	41.600		1.21	50.29	1.40	1.25	1	EXTERIOR WALL	6.61	1.21	1	BOTTOM SLAB	11.79	
		TNT7A	42.000		1.37	57.66	1.40	1.40	1	EXTERIOR WALL	6.61	1.37	1	BOTTOM SLAB	11.79	
		TNT7B	42.000		1.26	52.83	1.40	1.29	1	EXTERIOR WALL	6.61	1.26	1	BOTTOM SLAB	11.79	
		TNAGRIT4	43.000		1.42	60.90	1.40	1.42	1	EXTERIOR WALL	6.61	1.43	1	BOTTOM SLAB	0.87	
TNAGT5A		45.000		1.44	65.01	1.40	1.44	1	EXTERIOR WALL	6.61	1.47	1	BOTTOM SLAB	0.87		
TNAGT5B	45.000		1.47	66.30	1.40	1.47	1	EXTERIOR WALL	6.61	1.50	1	BOTTOM SLAB	0.87			

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	0.50 OR 0.90
ES	1.35	0.50 OR 0.90
LS	1.75	--
WA	1.00	--

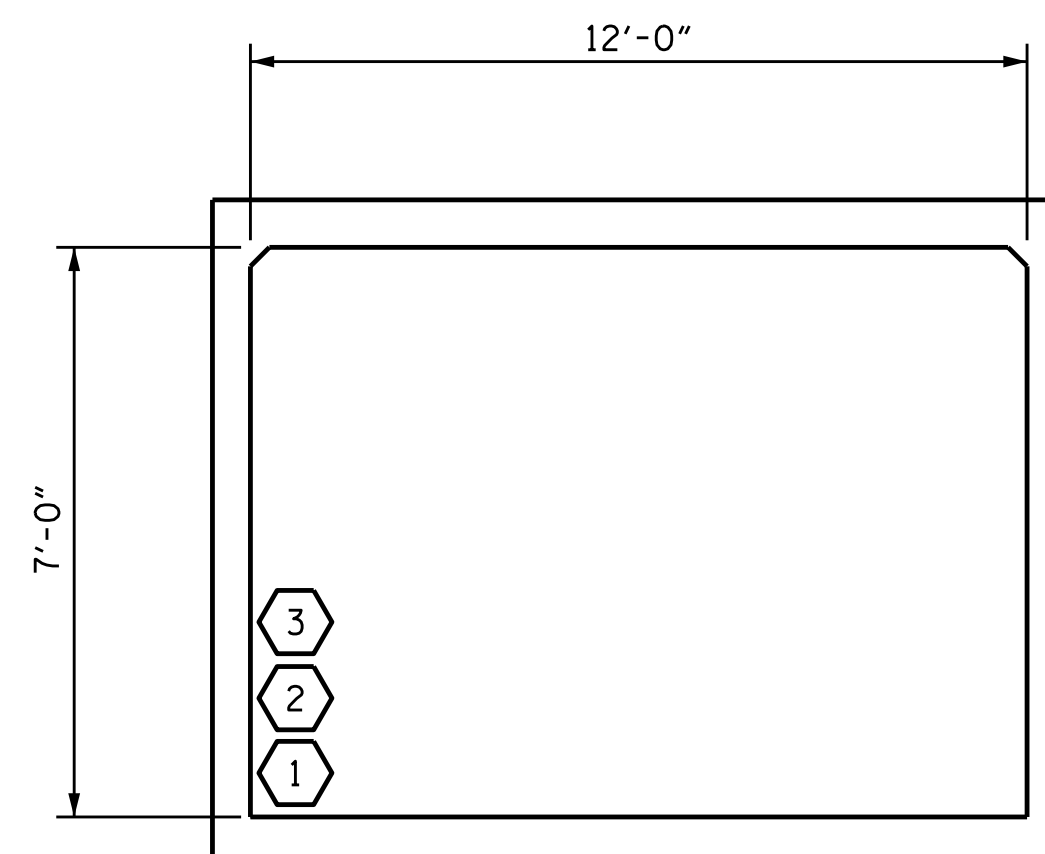
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

- 1.
- 2.
- 3.
- 4.

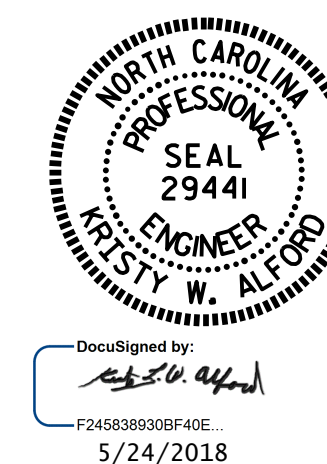
③	CONTROLLING LOAD RATING
①	DESIGN LOAD RATING (HL-93)
②	DESIGN LOAD RATING (HS-20)
③	LEGAL LOAD RATING **
** SEE CHART FOR VEHICLE TYPE	



LRFR SUMMARY

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 137+22.00 -L-

SHEET 2 OF 7

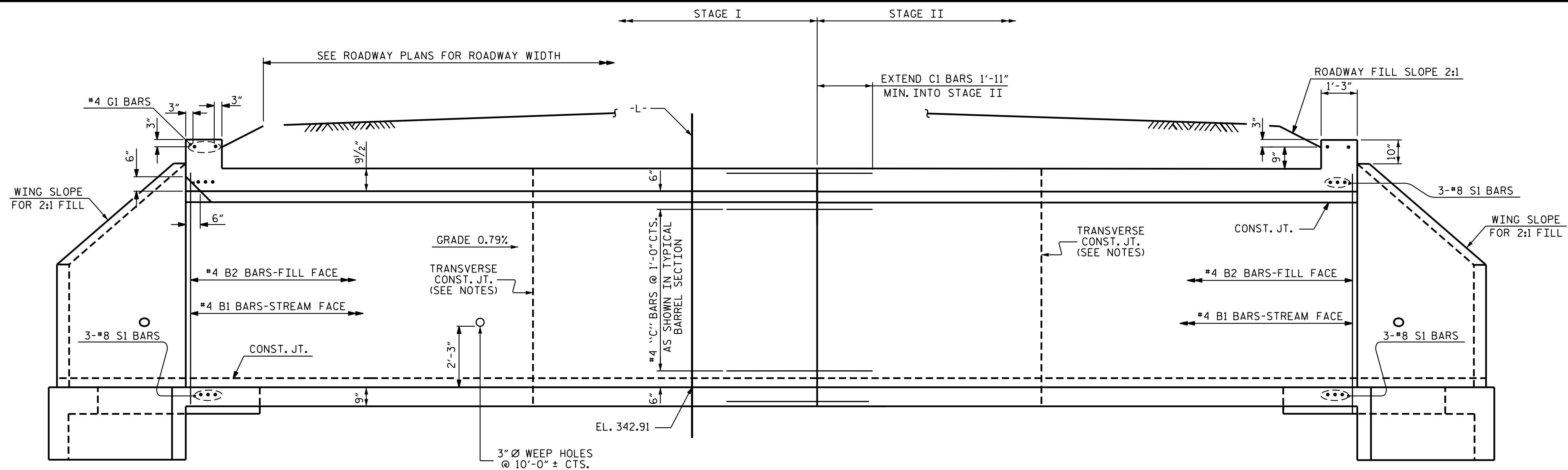


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD
 LRFR SUMMARY FOR
 REINFORCED CONCRETE
 BOX CULVERTS
 (NON-INTERSTATE TRAFFIC)

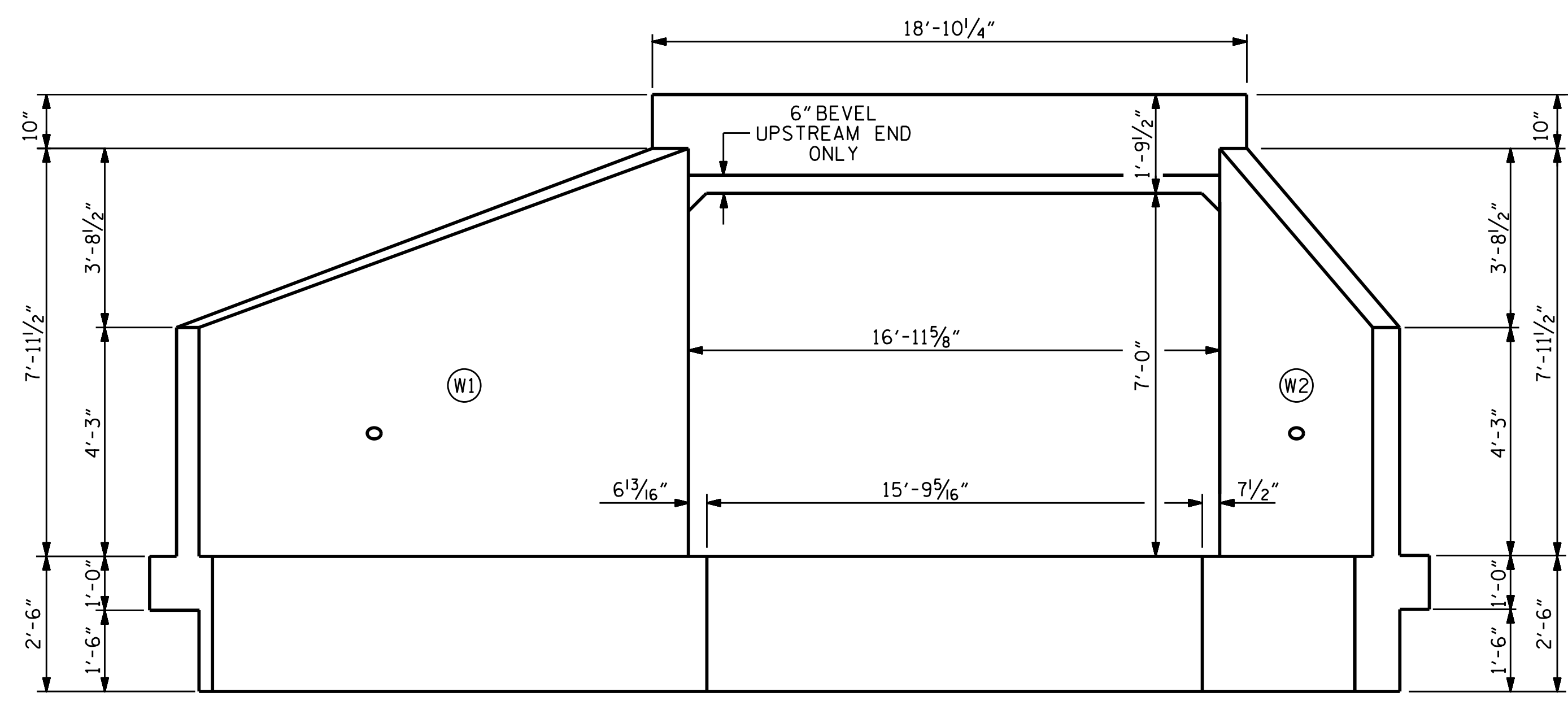
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-2
1			3			TOTAL SHEETS 7
2			4			

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

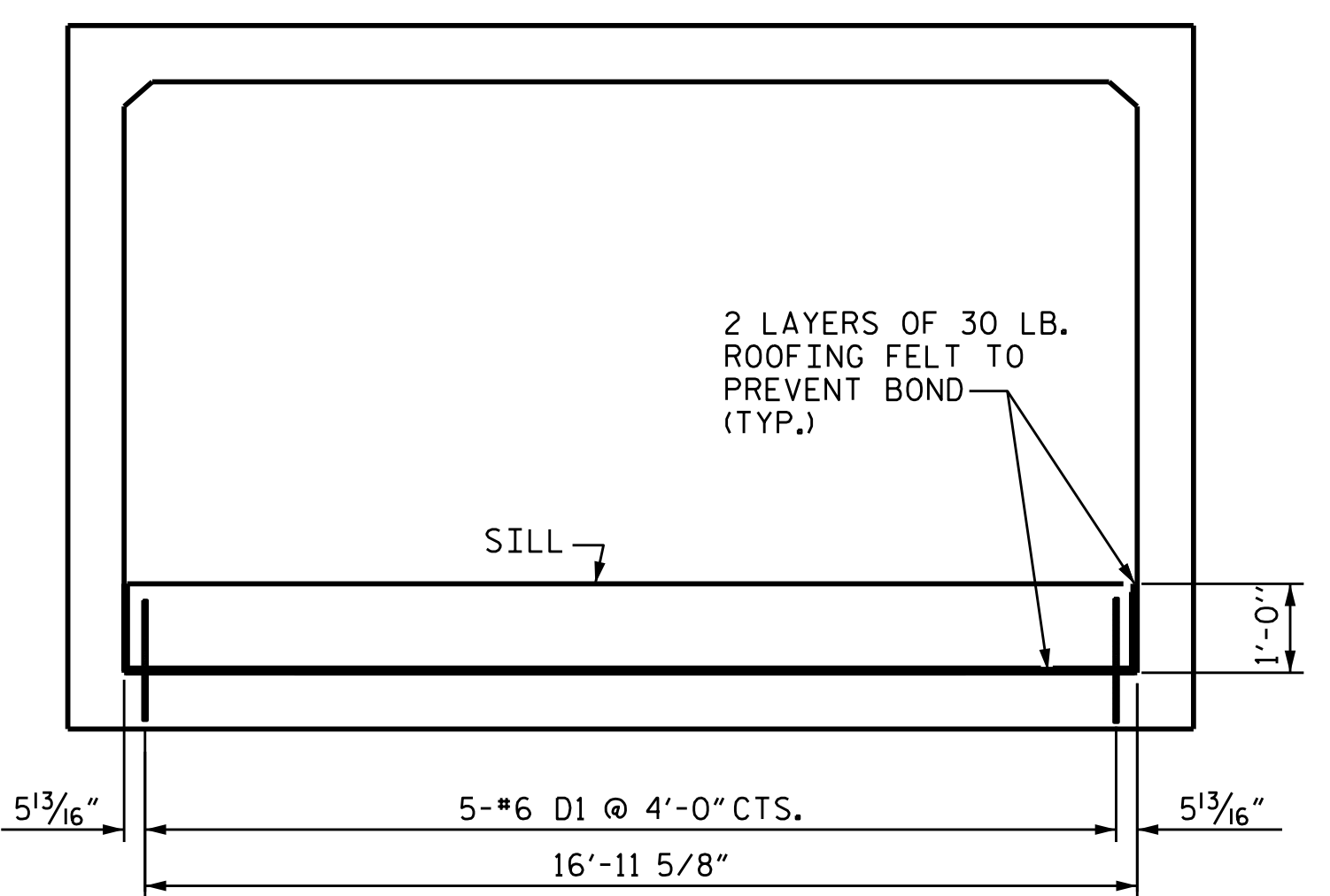
ASSEMBLED BY : A. SORSENGINH	DATE : 1/2014
CHECKED BY : A. K. PATEL	DATE : 1/2014
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11
REV. 10/1/11	MAA/GM



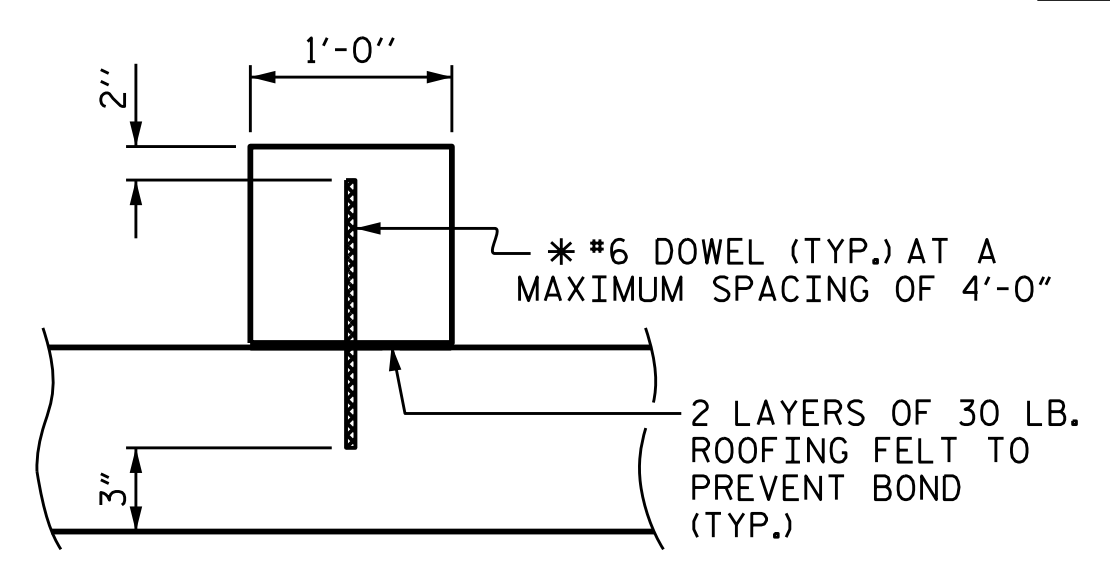
CULVERT SECTION NORMAL TO ROADWAY



INLET END ELEVATION NORMAL TO SKEW
 (135°-00'-00°)



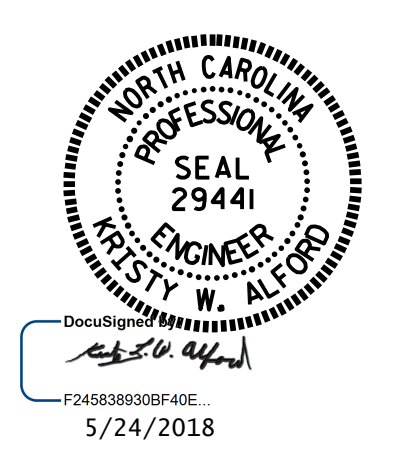
ELEVATION



SECTION THROUGH SILL

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

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS



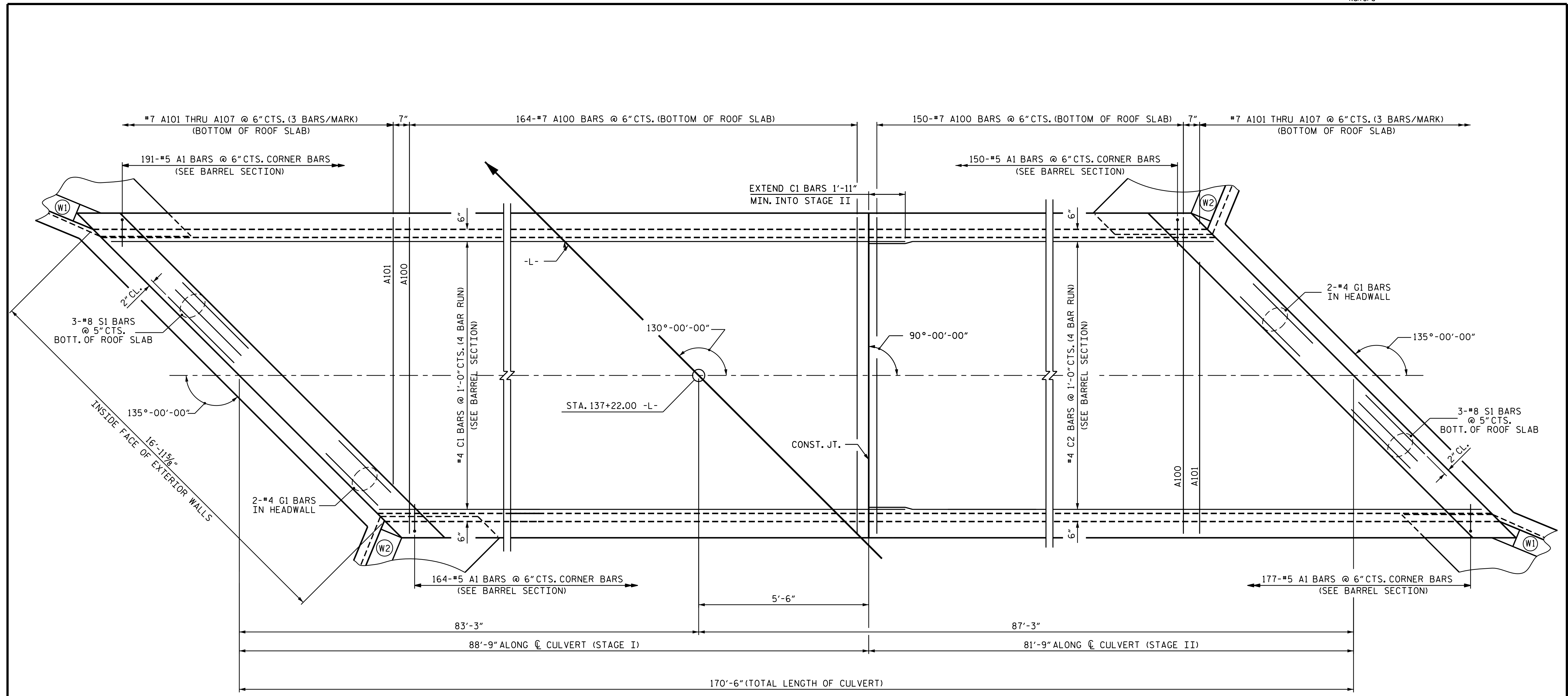
PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 137+22.00 -L-
 SHEET 3 OF 7

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SINGLE 12 FT. X 7 FT.
 CONCRETE BOX CULVERT
 130° SKEW

ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : A. K. PATEL DATE : 1/2014
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

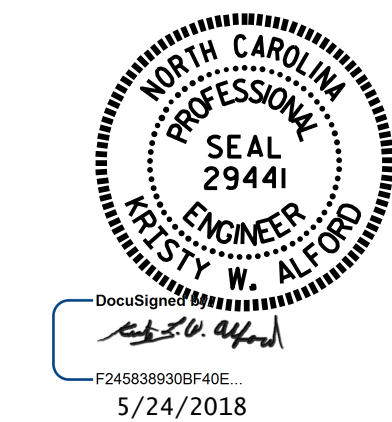
DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO. C2-3
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 7
2			4			



PLAN OF ROOF SLAB

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 137+22.00 -L-
 SHEET 4 OF 7

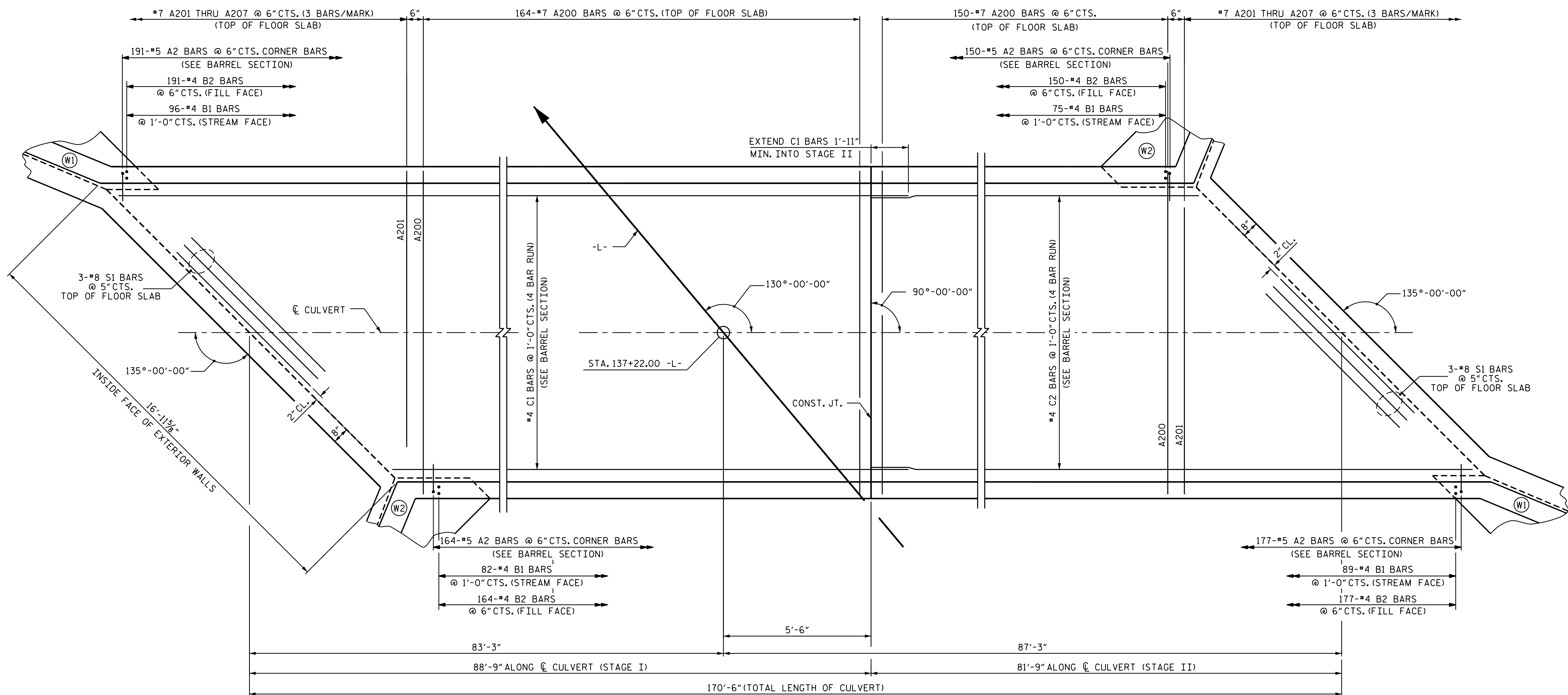


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SINGLE 12 FT. X 7 FT.
 CONCRETE BOX CULVERT
 130° SKEW

ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : A. K. PATEL DATE : 1/2014
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

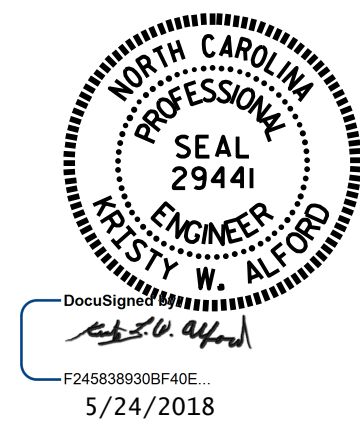
DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO. C2-4
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 7
2			4			



PLAN OF FLOOR SLAB

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 137+22.00 -L-
 SHEET 5 OF 7



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SINGLE 12 FT. X 7 FT.
 CONCRETE BOX CULVERT
 130° SKEW

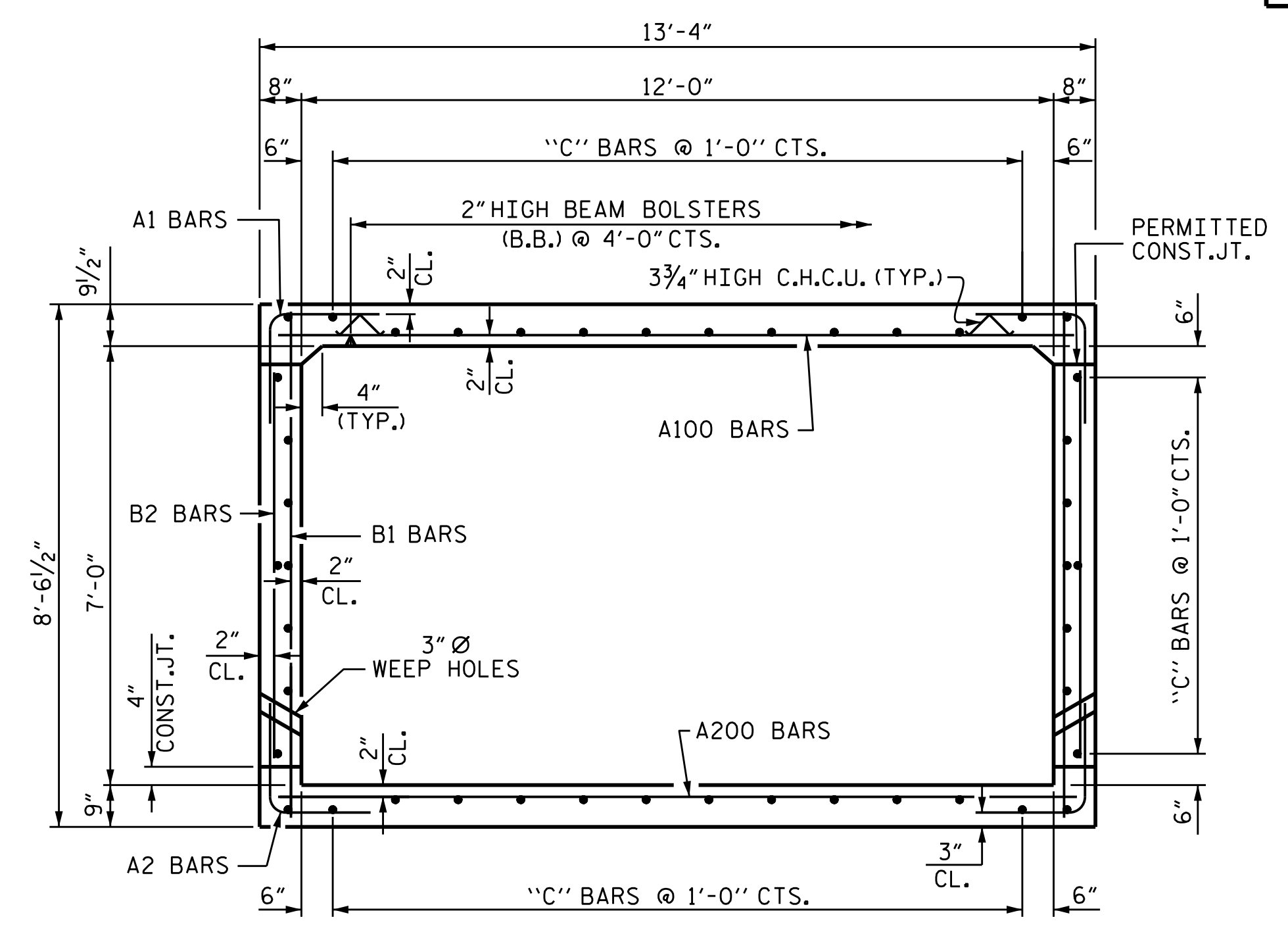
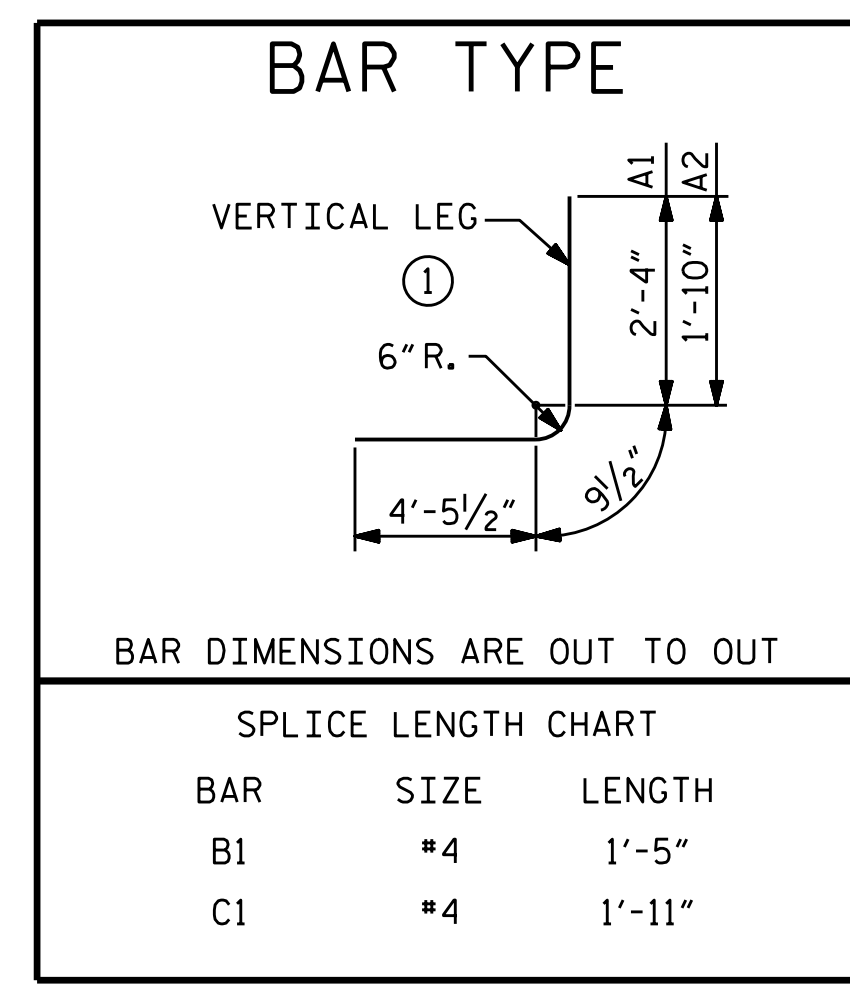
ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : A. K. PATEL DATE : 1/2014
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO. C2-5
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 7
2			4			

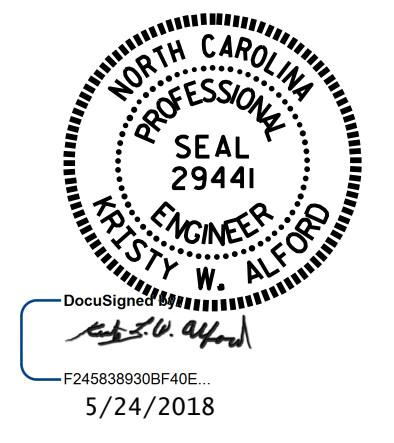
TOTAL STAGE I QUANTITIES		TOTAL STAGE II QUANTITIES	
CLASS A CONCRETE		CLASS A CONCRETE	
BARREL @ 1.111 CY/FT	98.6 C.Y.	BARREL @ 1.111 CY/FT	90.8 C.Y.
WINGS, ETC.	13.7 C.Y.	WINGS, ETC.	13.7 C.Y.
SILL	0.6 C.Y.	SILL	0.6 C.Y.
TOTAL	112.9 C.Y.	TOTAL	105.1 C.Y.
REINFORCING STEEL		REINFORCING STEEL	
BARREL	20,493 LBS.	BARREL	18,847 LBS.
WINGS, ETC.	749 LBS.	WINGS, ETC.	749 LBS.
TOTAL	21,242 LBS.	TOTAL	19,596 LBS.
FOUNDATION CONDITIONING MATERIAL	109 TONS	FOUNDATION CONDITIONING MATERIAL	100 TONS
CULVERT EXCAVATION	LUMP SUM	CULVERT EXCAVATION	LUMP SUM

STAGE I BAR SCHEDULE						STAGE II BAR SCHEDULE					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	355	#5	1	7'-7"	2808	A1	327	#5	1	7'-7"	2586
A2	355	#5	1	7'-1"	2623	A2	327	#5	1	7'-1"	2397
A100	164	#7	STR	12'-11"	4330	A100	150	#7	STR	12'-11"	3960
A101	3	#7	STR	11'-5"	70	A101	3	#7	STR	11'-5"	70
A102	3	#7	STR	9'-11"	61	A102	3	#7	STR	9'-11"	61
A103	3	#7	STR	8'-5"	52	A103	3	#7	STR	8'-5"	52
A104	3	#7	STR	6'-11"	42	A104	3	#7	STR	6'-11"	42
A105	3	#7	STR	5'-5"	33	A105	3	#7	STR	5'-5"	33
A106	3	#7	STR	3'-11"	24	A106	3	#7	STR	3'-11"	24
A107	3	#7	STR	2'-5"	15	A107	3	#7	STR	2'-5"	15
A200	164	#7	STR	12'-11"	4330	A200	150	#7	STR	12'-11"	3960
A201	3	#7	STR	11'-5"	70	A201	3	#7	STR	11'-5"	70
A202	3	#7	STR	9'-11"	61	A202	3	#7	STR	9'-11"	61
A203	3	#7	STR	8'-5"	52	A203	3	#7	STR	8'-5"	52
A204	3	#7	STR	6'-11"	42	A204	3	#7	STR	6'-11"	42
A205	3	#7	STR	5'-5"	33	A205	3	#7	STR	5'-5"	33
A206	3	#7	STR	3'-11"	24	A206	3	#7	STR	3'-11"	24
A207	3	#7	STR	2'-5"	15	A207	3	#7	STR	2'-5"	15
B1	178	#4	STR	8'-0"	951	B1	164	#4	STR	8'-0"	876
B2	355	#4	STR	6'-4"	1502	B2	327	#4	STR	6'-4"	1383
C1	176	#4	STR	25'-9"	3027	C2	176	#4	STR	23'-6"	2763
D1	5	#6	STR	1'-4"	10	D1	5	#6	STR	1'-4"	10
G1	2	#4	STR	18'-4"	24	G1	2	#4	STR	18'-4"	24
S1	6	#8	STR	18'-4"	294	S1	6	#8	STR	18'-4"	294
REINFORCING STEEL = 20,493 LBS						REINFORCING STEEL = 18,847 LBS					



RIGHT ANGLE SECTION OF BARREL
 THERE ARE 44 C1 BARS IN SECTION OF BARREL

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 137+22.00 -L-
 SHEET 6 OF 7

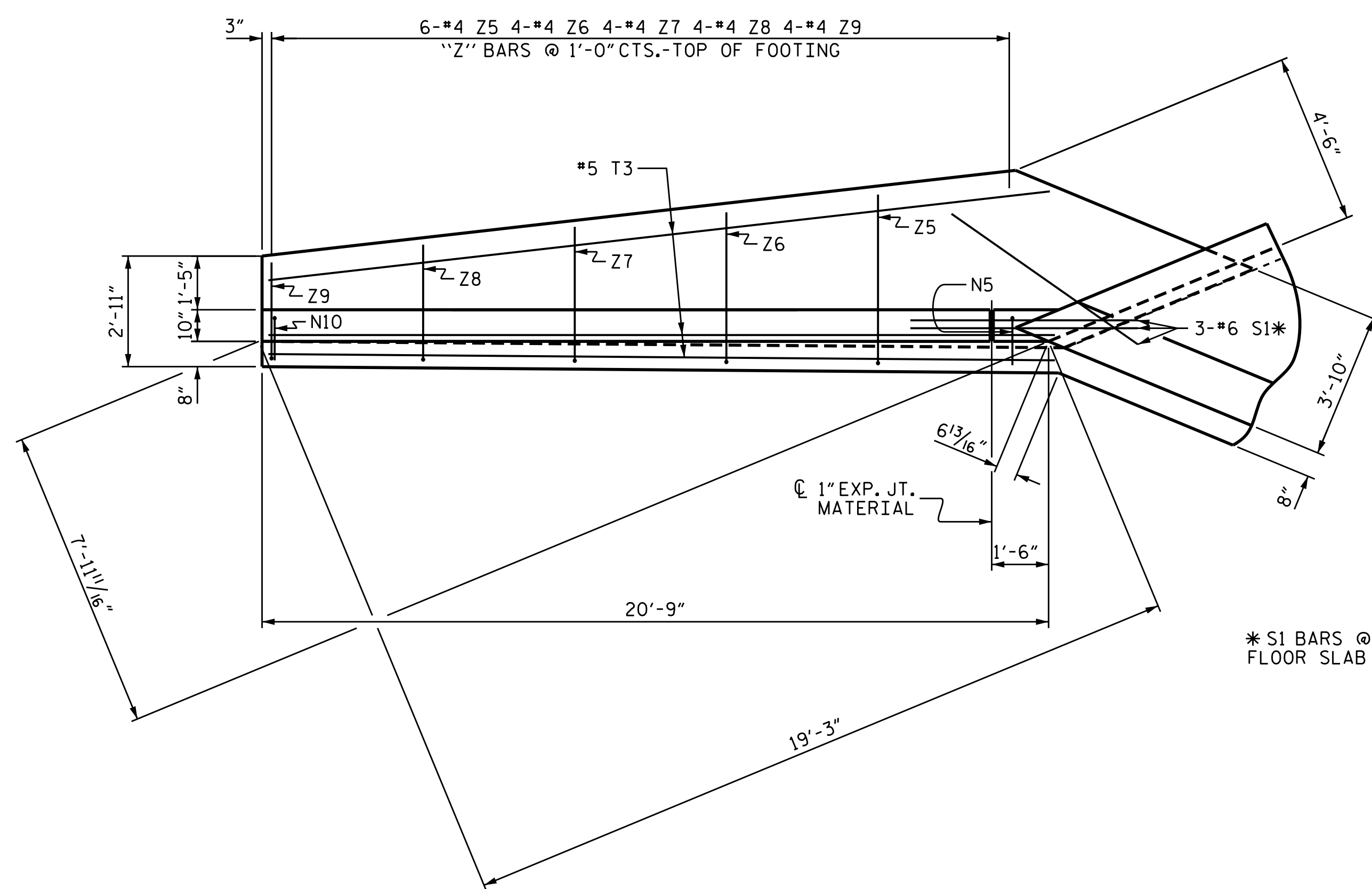


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**SINGLE 12 FT. X 7 FT.
 CONCRETE BOX CULVERT
 130° SKEW**

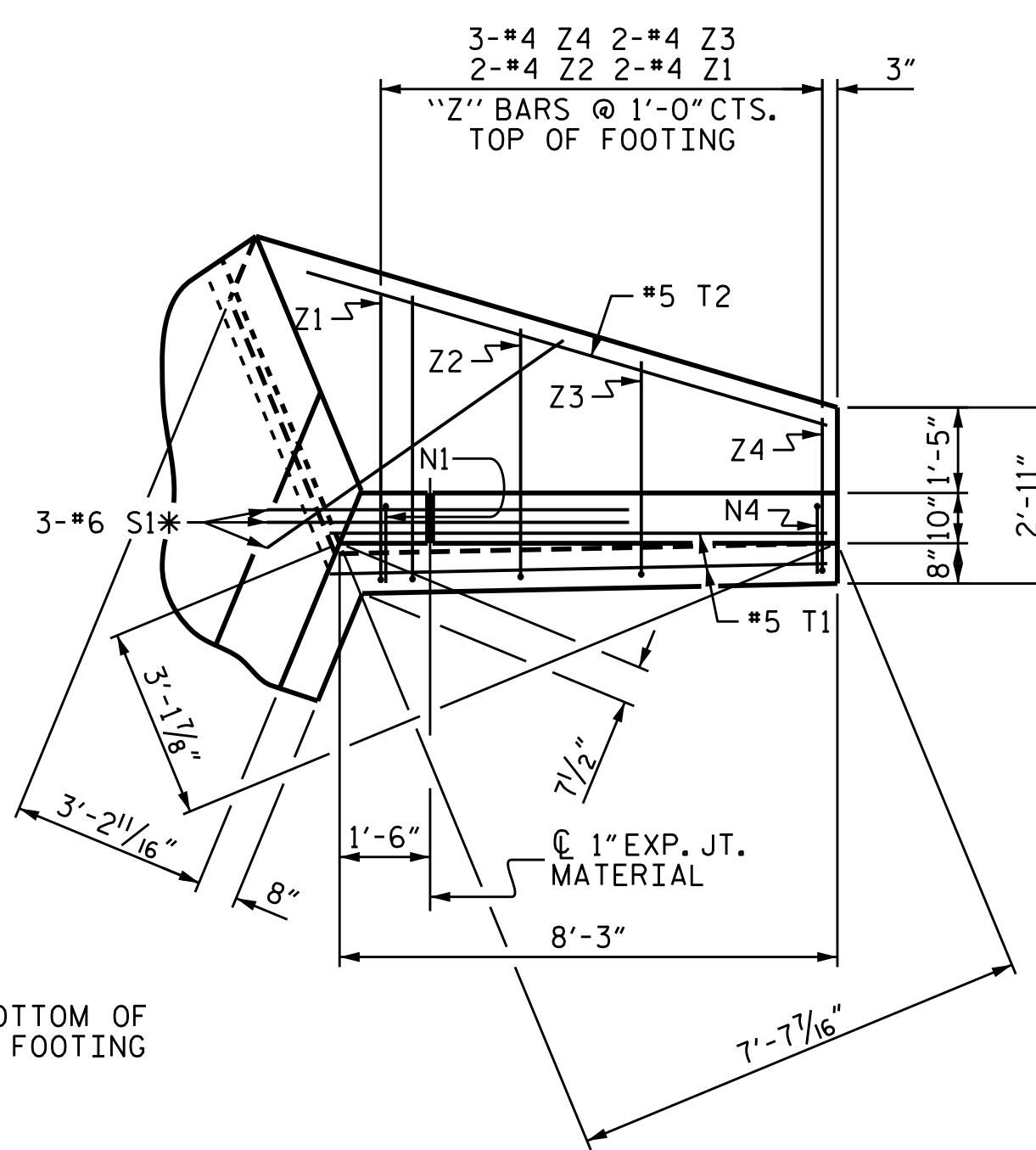
ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : A. K. PATEL DATE : 1/2014
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

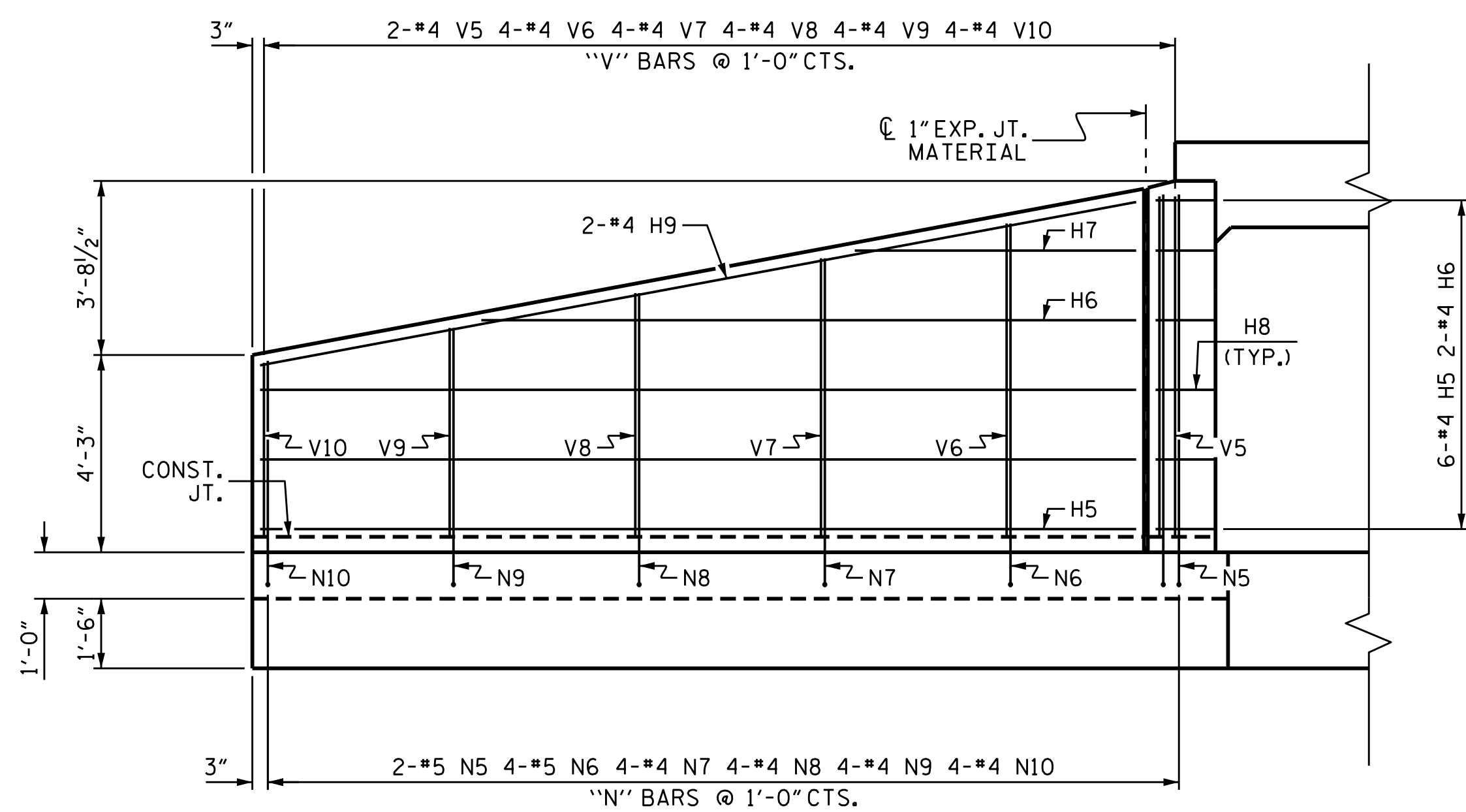
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-6	
1			3			TOTAL SHEETS 7	
2			4				



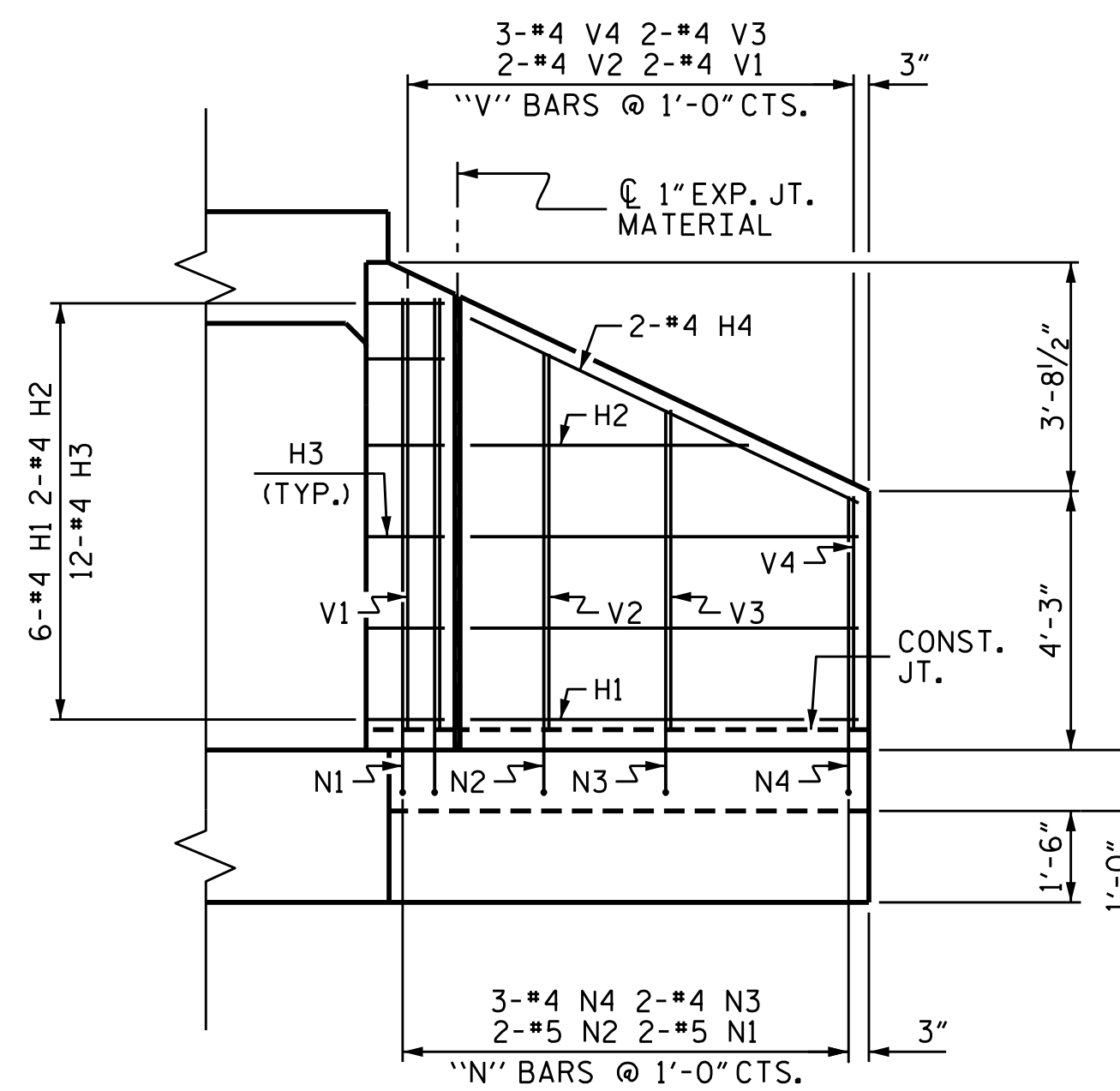
PLAN W1



PLAN W2



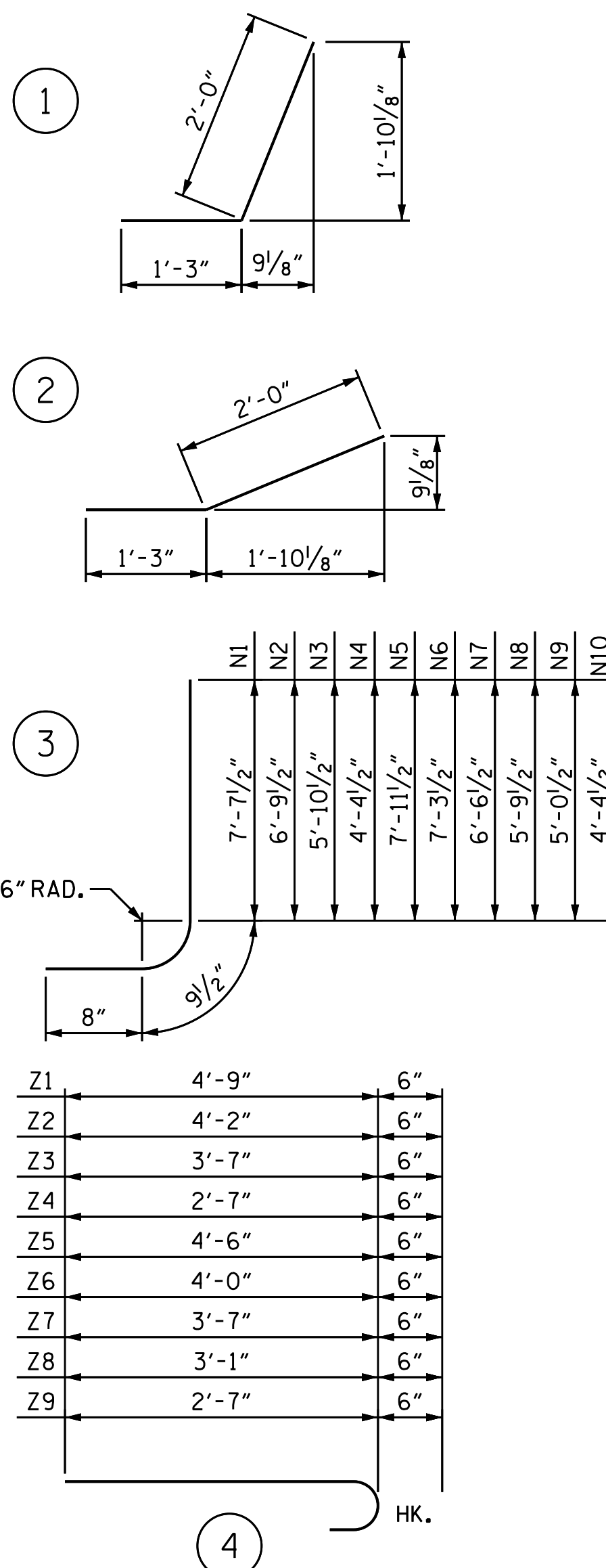
ELEVATION W1



ELEVATION W2

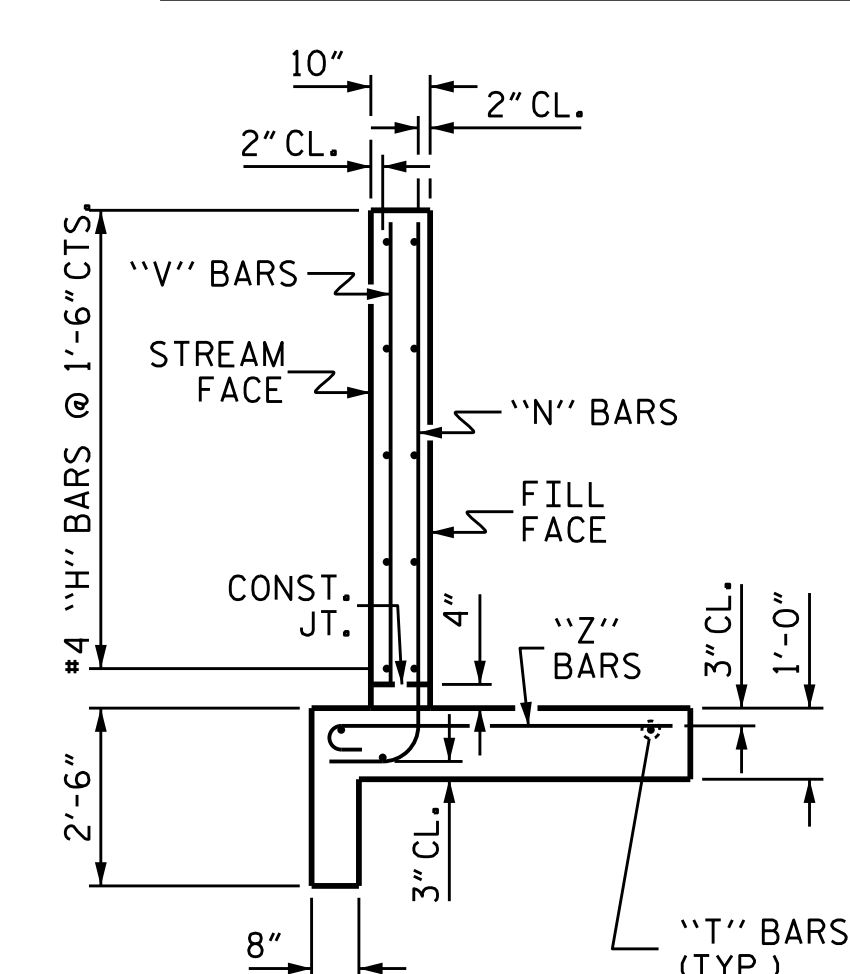
BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

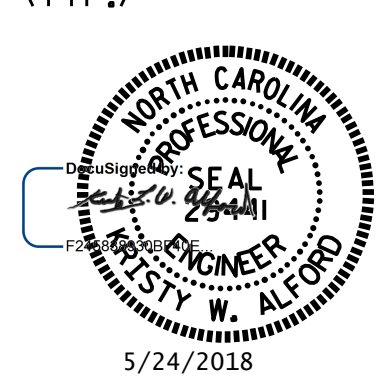
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	6'-4"	25
H2	2	#4	STR	4'-6"	6
H3	12	#4	1	3'-3"	26
H4	2	#4	STR	7'-0"	9
H5	6	#4	STR	18'-10"	75
H6	2	#4	STR	14'-1"	19
H7	2	#4	STR	6'-0"	8
H8	12	#4	2	3'-3"	26
H9	2	#4	STR	19'-2"	26
N1	2	#5	3	9'-1"	19
N2	2	#5	3	8'-3"	17
N3	2	#4	3	7'-4"	10
N4	3	#4	3	5'-7"	11
N5	2	#5	3	9'-5"	20
N6	4	#5	3	8'-9"	37
N7	4	#4	3	8'-0"	21
N8	4	#4	3	7'-3"	19
N9	4	#4	3	6'-6"	17
N10	4	#4	3	5'-10"	16
S1	6	#6	STR	6'-0"	54
T1	2	#5	STR	8'-3"	17
T2	1	#5	STR	9'-0"	9
T3	3	#5	STR	20'-9"	65
V1	2	#4	STR	7'-1"	9
V2	2	#4	STR	6'-2"	8
V3	2	#4	STR	5'-3"	7
V4	3	#4	STR	3'-9"	8
V5	2	#4	STR	7'-4"	10
V6	4	#4	STR	6'-9"	18
V7	4	#4	STR	6'-0"	16
V8	4	#4	STR	5'-3"	14
V9	4	#4	STR	4'-6"	12
V10	4	#4	STR	3'-9"	10
Z1	2	#4	4	5'-3"	7
Z2	2	#4	4	4'-8"	6
Z3	2	#4	4	4'-1"	5
Z4	3	#4	4	3'-1"	6
Z5	6	#4	4	5'-0"	20
Z6	4	#4	4	4'-6"	12
Z7	4	#4	4	4'-1"	11
Z8	4	#4	4	3'-7"	10
Z9	4	#4	4	3'-1"	8
REINFORCING STEEL					749 LBS
FOR 2 WINGS					
CLASS A CONCRETE					
2 WINGS					11.8 CY
1 HEADWALL					0.9 CY
1 END CURTAIN WALL					1.0 CY
TOTAL					13.7 CY



TYPICAL WING SECTION

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 137+22.00

SHEET 7 OF 7
 STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
STANDARD WINGS
 FOR
CONCRETE BOX CULVERT
 H = 7'-0" SLOPE = 2:1
 135° SKEW



ASSEMBLED BY : A. SORSENGH DATE : 1/2014
 CHECKED BY : A. K. PATEL DATE : 1/2014
 DRAWN BY : CCJ 01/00
 CHECKED BY : RWW 03/00

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C2-7
1			3			TOTAL SHEETS
2			4			7

STD. NO. CW4507

BM #55: RAIL ROAD SPIKE IN 14" PINE TREE, -L- STA. 170+93.00, 366' RIGHT, EL. 383.18

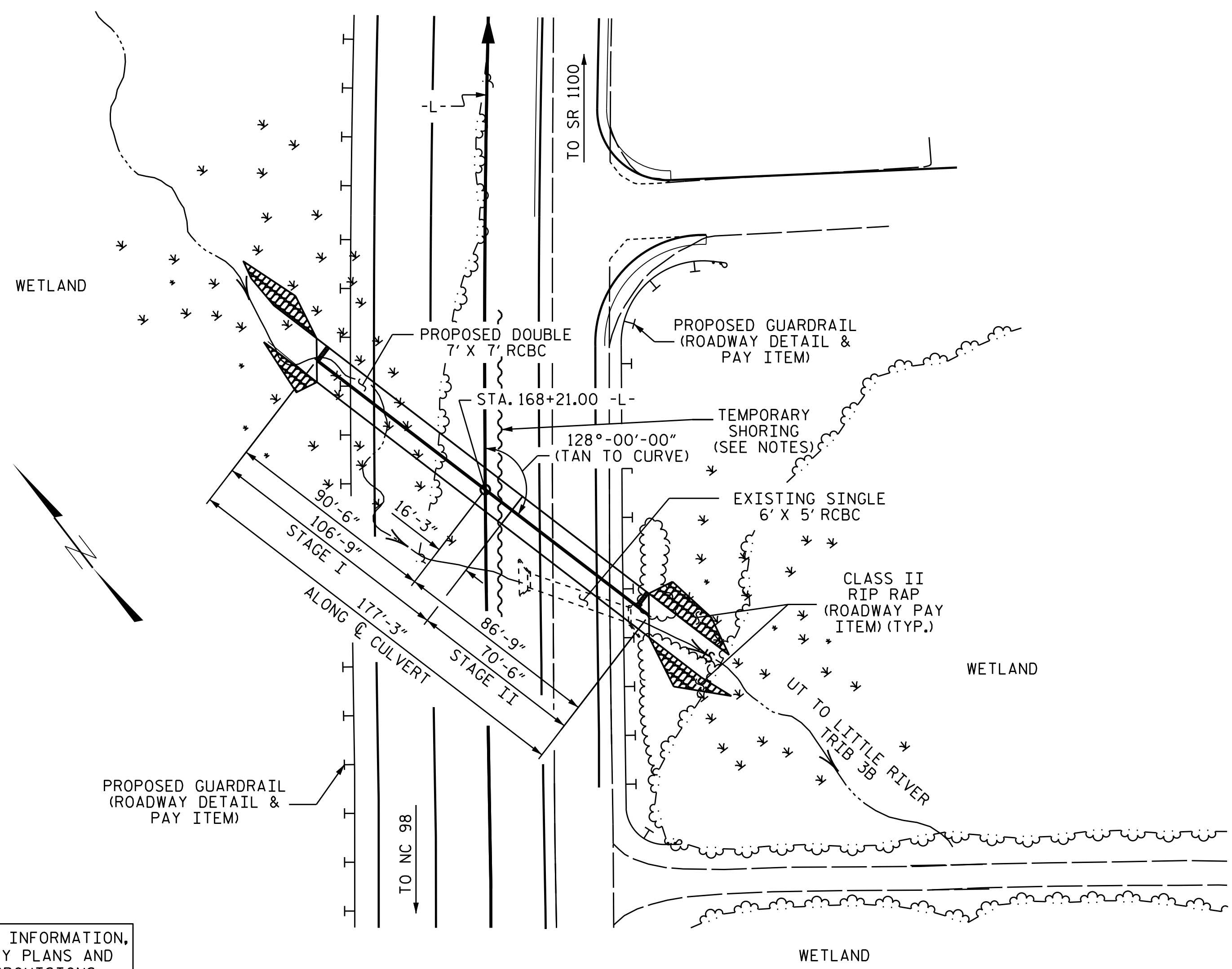
F.A. PROJECT NO.: STP-401(249)

NOTES

ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING.
 DESIGN FILL-----2.51'
 FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTE SHEET.
 3"Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
 CONCRETE IN EACH STAGE OF CULVERTS TO BE POURED IN THE FOLLOWING ORDER:
 1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
 2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.
 THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.
 DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.
 TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.
 AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
 AT THE CONTRACTOR'S OPTION HE MAY SUBMIT, TO THE ENGINEER FOR APPROVAL, DESIGN AND DETAIL DRAWINGS FOR A PRECAST REINFORCED CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE CULVERT SHOWN ON THE PLANS. THE DESIGN SHALL PROVIDE THE SAME SIZE OF BARREL AS USED ON THE CAST-IN-PLACE DESIGN. FOR OPTIONAL PRECAST REINFORCED CONCRETE BOX CULVERT, SEE SPECIAL PROVISIONS.
 THE EXISTING STRUCTURE CONSISTING OF A REINFORCED CONCRETE CULVERT 6'(W) X 5'(D) SIZE, 40'± LONG AND LOCATED AT THE OUTLET END OF THE PROPOSED STRUCTURE, SHALL BE REMOVED.
 BACKFILL THE OVERFLOW BARREL WITH CLASS B RIP RAP. FILL VOIDS WITH NATIVE MATERIAL.
 NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OR FLOODPLAIN DURING CULVERT CONSTRUCTION. RIP RAP MAY BE USED TO SUPPLEMENT THE NATIVE BED MATERIAL IN THE HIGH FLOW CULVERT BARREL. IF RIP RAP IS USED TO LINE THE HIGH FLOW CULVERT BARREL, NATIVE BED MATERIAL SHOULD BE PLACED ON TOP TO FILL VOIDS AND PROVIDE A FLAT SURFACE FOR ANIMAL PASSAGE. NATIVE BED MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.
 FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.
 FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS.
 A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
 FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
 FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
 FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
 FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
 FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
 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 WILL BE PAID FOR BY THE CONTRACTOR.

TOTAL STRUCTURE QUANTITIES	
CLASS A CONCRETE	
STAGE I	176.1 C.Y.
STAGE II	121.2 C.Y.
TOTAL	297.3 C.Y.
REINFORCING STEEL	
STAGE I	22,288 LBS.
STAGE II	15,113 LBS.
TOTAL	37,401 LBS.
FOUNDATION CONDITIONING MATERIAL	
STAGE I	151 TONS
STAGE II	100 TONS
TOTAL	251 TONS
CULVERT EXCAVATION	LUMP SUM
REMOVAL OF EXISTING STRUCTURE	LUMP SUM



FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

HYDRAULIC DATA

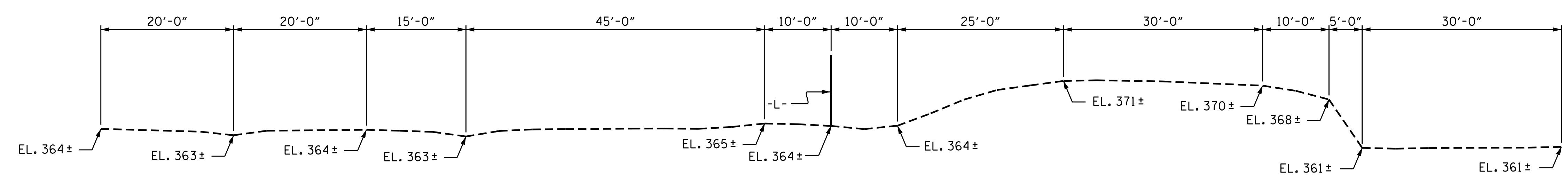
DESIGN DISCHARGE = 500 CFS
 FREQUENCY OF DESIGN FLOOD = 50 YRS.
 DESIGN HIGH WATER ELEVATION = 368.00
 DRAINAGE AREA = 0.41 SQ. MI.
 BASE DISCHARGE (Q100) = 600 CFS
 BASE HIGH WATER ELEVATION = 368.70

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = 750 CFS
 FREQUENCY OF OVERTOPPING FLOOD = 100+YRS.
 OVERTOPPING FLOOD ELEVATION = 370.10

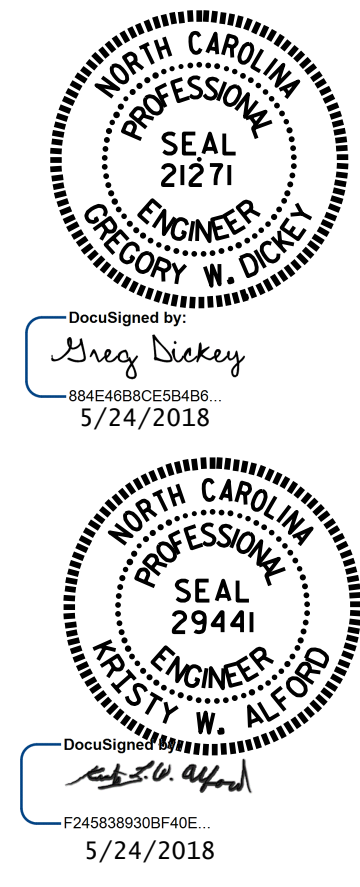
GRADE DATA

GRADE POINT ELEVATION @ STA. 168+21.00 -L- = 372.96'
 BED ELEVATION @ STA. 168+21.00 -L- = 360.34'
 ROADWAY FILL SLOPES = 2:1



PROFILE ALONG CULVERT

ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : K.W. ALFORD DATE : 3/2018
 DESIGN ENGINEER OF RECORD : A. SORSENGINH DATE : 1/2014



PROJECT NO. R-2814C
 FRANKLIN COUNTY
 STATION: 168+21.00 -L-
 SHEET 1 OF 7

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 7 FT. X 7 FT.
 CONCRETE BOX CULVERT
 128° SKEW

REVISIONS						SHEET NO. C3-1
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 7
2			4			

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER		
						MOMENT				SHEAR						
						LIVE-LOAD FACTORS (ILL)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE		DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	1.05	--	1.75	1.44	1	TOP SLAB	3.26	1.05	1	TOP SLAB	6.64		
	HL-93 (OPERATING)	N/A		1.36	--	1.35	1.87	1	TOP SLAB	3.26	1.36	1	TOP SLAB	6.64		
	HS-20 (INVENTORY)	36.000	②	1.05	37.75	1.75	1.44	1	TOP SLAB	3.26	1.05	1	TOP SLAB	6.64		
	HS-20 (OPERATING)	36.000		1.36	48.93	1.35	1.87	1	TOP SLAB	3.26	1.36	1	TOP SLAB	6.64		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		1.90	25.69	1.40	2.63	1	TOP SLAB	3.26	1.90	1	TOP SLAB	6.64	
		SNGARBS2	20.000		1.78	35.60	1.40	2.46	1	TOP SLAB	3.26	1.78	1	TOP SLAB	6.64	
		SNAGRIS2	22.000		1.90	41.86	1.40	2.63	1	TOP SLAB	3.26	1.90	1	TOP SLAB	6.64	
		SNCOTTS3	27.250		1.33	36.23	1.40	2.02	1	TOP SLAB	3.07	1.33	1	TOP SLAB	6.64	
		SNAGGRS4	34.925		1.53	53.41	1.40	2.19	1	BOTTOM SLAB	7.09	1.53	1	BOTTOM SLAB	6.82	
		SNS5A	35.550		1.32	47.06	1.40	2.04	1	BOTTOM SLAB	7.09	1.32	1	BOTTOM SLAB	6.82	
		SNS6A	39.950		1.39	55.52	1.40	1.98	1	BOTTOM SLAB	7.09	1.39	1	BOTTOM SLAB	6.82	
		SNS7B	42.000		1.39	58.37	1.40	1.98	1	BOTTOM SLAB	7.09	1.39	1	BOTTOM SLAB	6.82	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.83	60.30	1.40	2.63	1	TOP SLAB	3.26	1.83	1	TOP SLAB	6.64	
		TNT4A	33.075		1.57	52.01	1.40	2.19	1	BOTTOM SLAB	7.09	1.57	1	BOTTOM SLAB	6.82	
		TNT6A	41.600		1.56	64.84	1.40	2.20	1	BOTTOM SLAB	7.09	1.56	1	TOP SLAB	6.64	
		TNT7A	42.000		1.56	65.47	1.40	2.40	1	TOP SLAB	3.07	1.56	1	TOP SLAB	6.64	
		TNT7B	42.000		1.40	58.85	1.40	1.99	1	BOTTOM SLAB	7.09	1.40	1	BOTTOM SLAB	6.82	
		TNAGRIT4	43.000	③	1.32	56.70	1.40	1.88	1	BOTTOM SLAB	7.09	1.32	1	BOTTOM SLAB	6.82	
TNAGT5A	45.000		1.34	60.28	1.40	1.91	1	BOTTOM SLAB	7.09	1.34	1	BOTTOM SLAB	6.82			
TNAGT5B	45.000		1.36	61.26	1.40	1.94	1	BOTTOM SLAB	7.09	1.36	1	BOTTOM SLAB	6.82			

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	0.50 OR 0.90
ES	1.35	0.50 OR 0.90
LS	1.75	--
WA	1.00	--

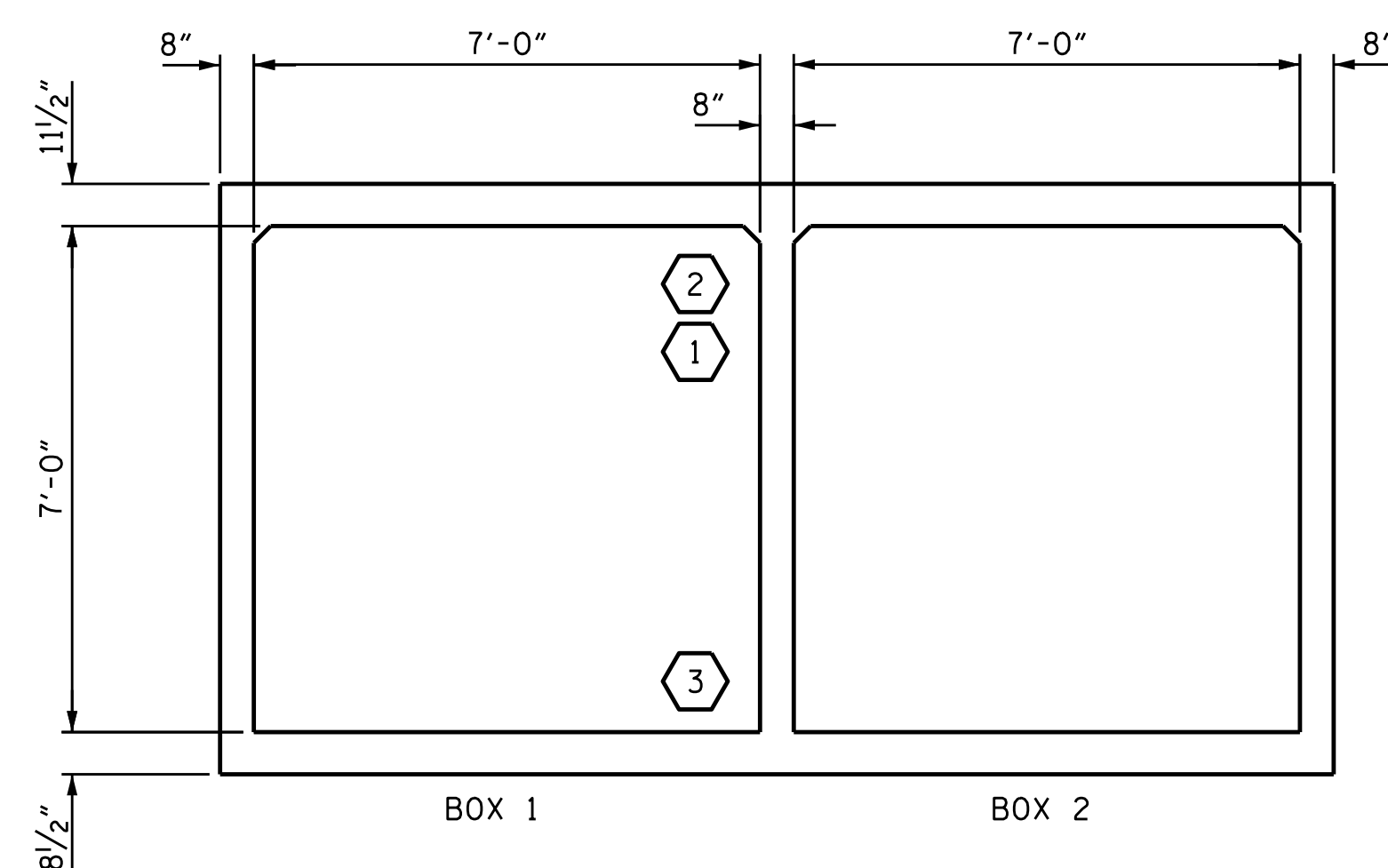
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

- 1.
- 2.
- 3.
- 4.

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

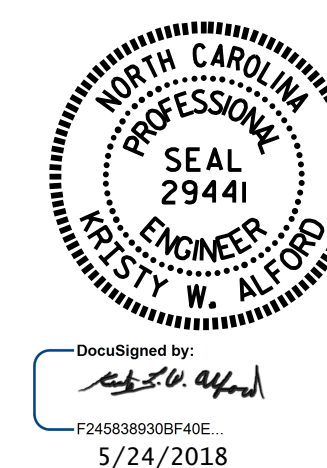


LRFR SUMMARY

(LOOKING DOWNSTREAM)

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 168+21.00 -L-

SHEET 2 OF 7



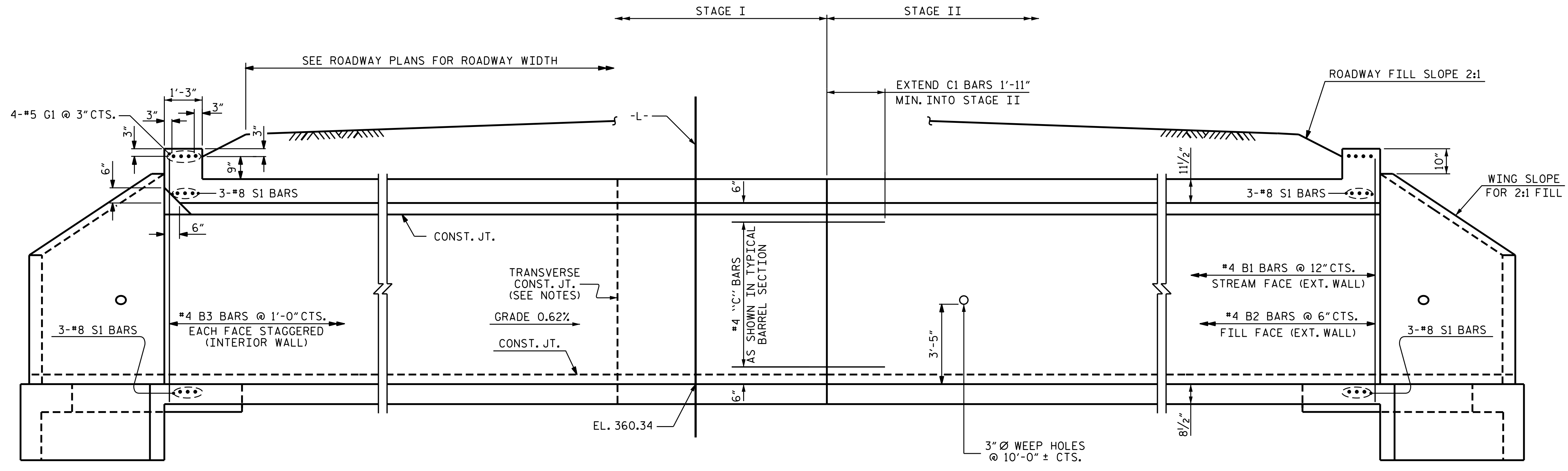
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD
 LRFR SUMMARY FOR
 REINFORCED CONCRETE
 BOX CULVERTS
 (NON-INTERSTATE TRAFFIC)

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

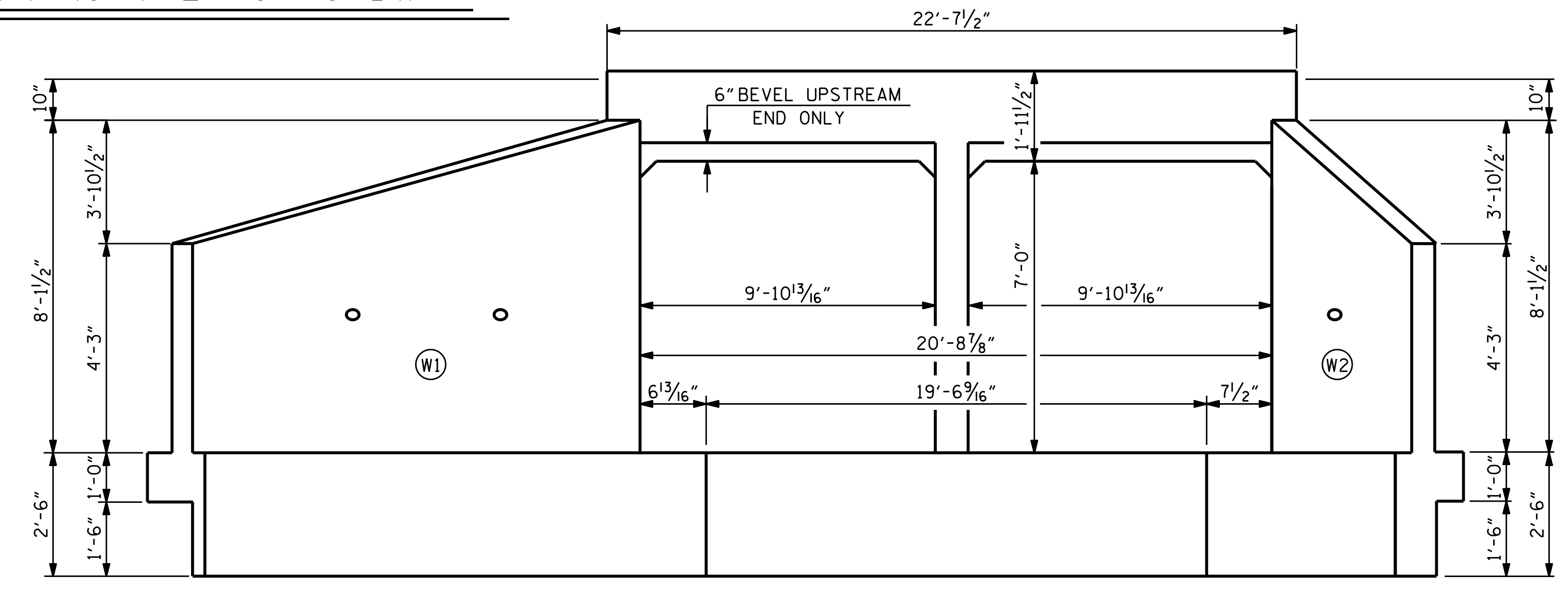
ASSEMBLED BY : A. SORSENGINH	DATE : 1/2014
CHECKED BY : K.W. ALFORD	DATE : 3/2018
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11
REV. 10/1/11	MAA/GM

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

STD. NO. LRFR5



CULVERT SECTION NORMAL TO ROADWAY

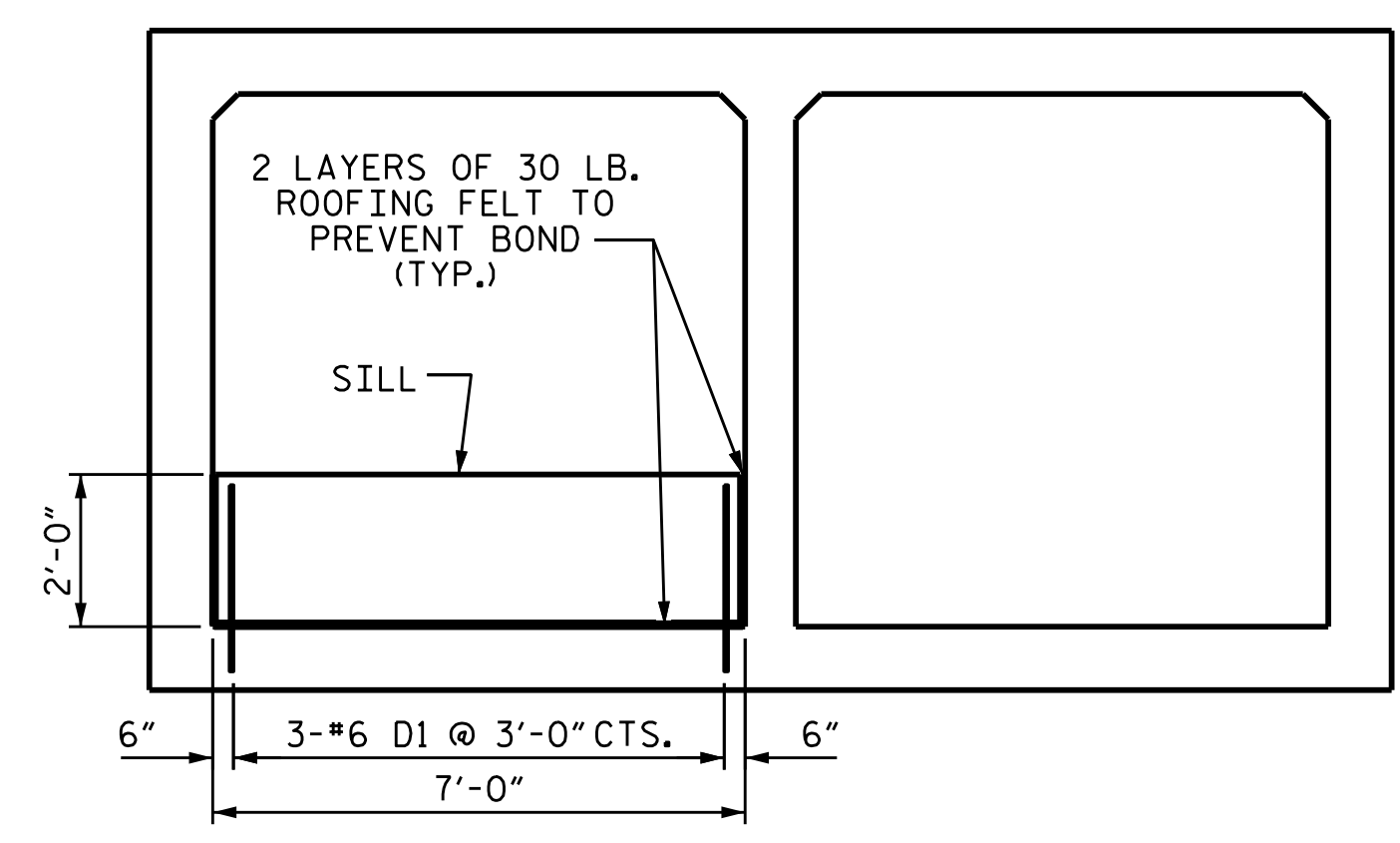


INLET END ELEVATION NORMAL TO SKEW

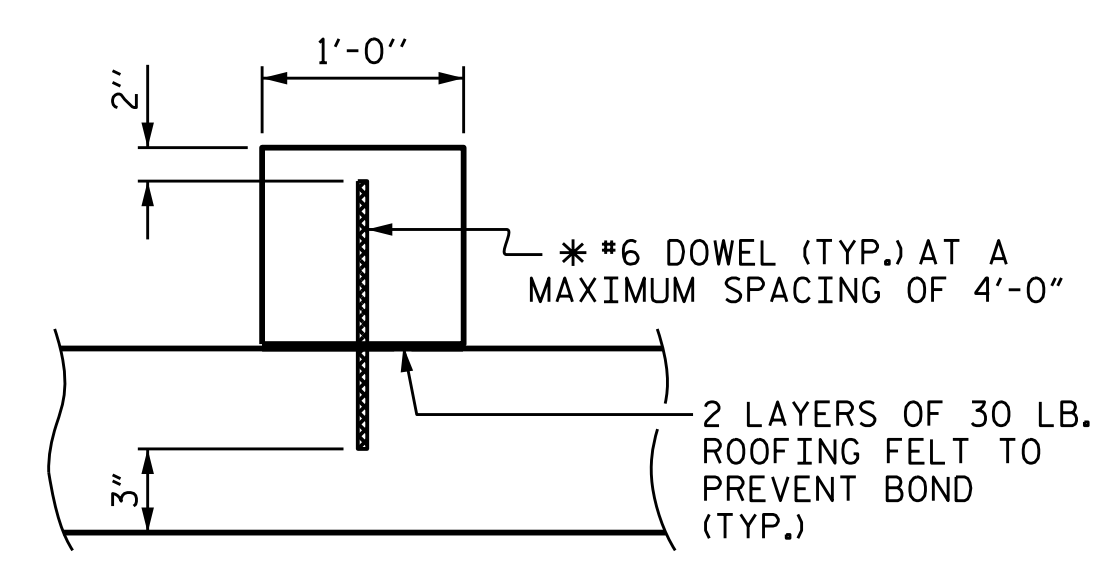
(SILL NOT SHOWN FOR CLARITY)
 (135°-00'-00")

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 168+21.00 -L-

SHEET 3 OF 7



ELEVATION
 LOOKING DOWNSTREAM

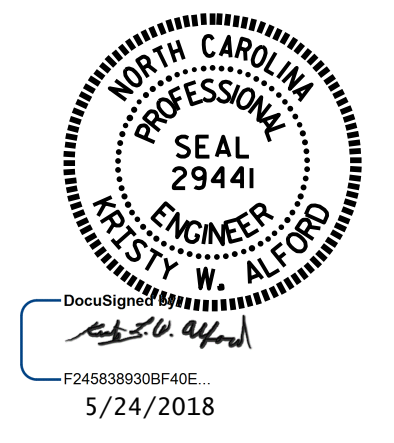


SECTION THROUGH SILL

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

CULVERT SILL DETAILS

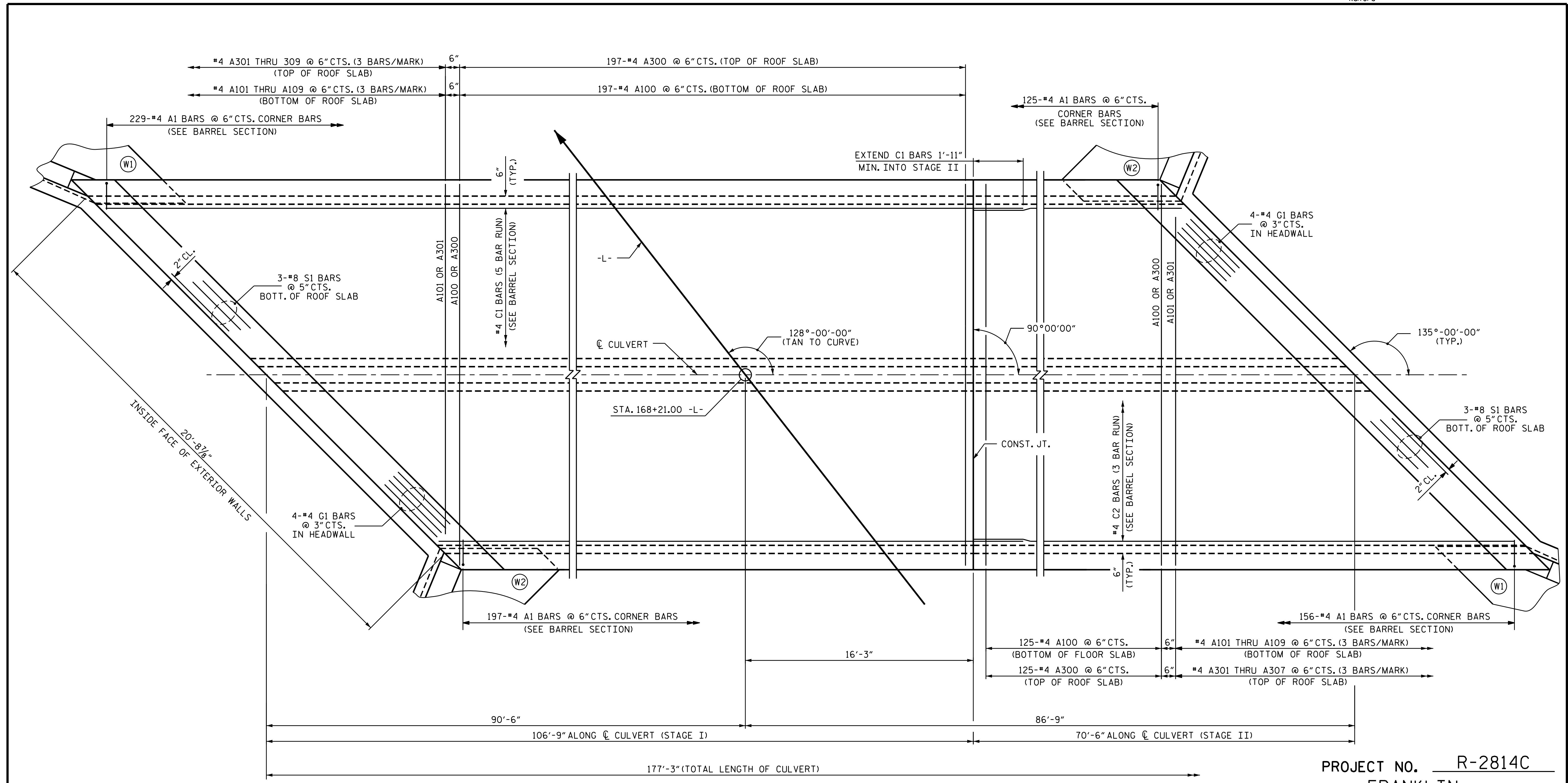
SILLS SHALL BE PLACED PERPENDICULAR TO THE WALL IN THE
 INLET AND OUTLET OF THE NORTHERN MOST BARREL AS SHOWN.



ASSEMBLED BY : A. SORSENGINH DATE : 2/2014
 CHECKED BY : K.W. ALFORD DATE : 3/2018
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

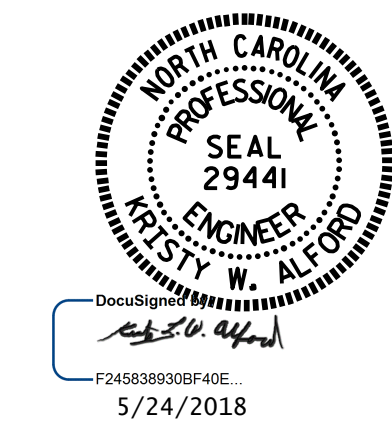
DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO. C3-3
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 7
2			4			



PLAN OF ROOF SLAB

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 168+21.00 -L-
 SHEET 4 OF 7

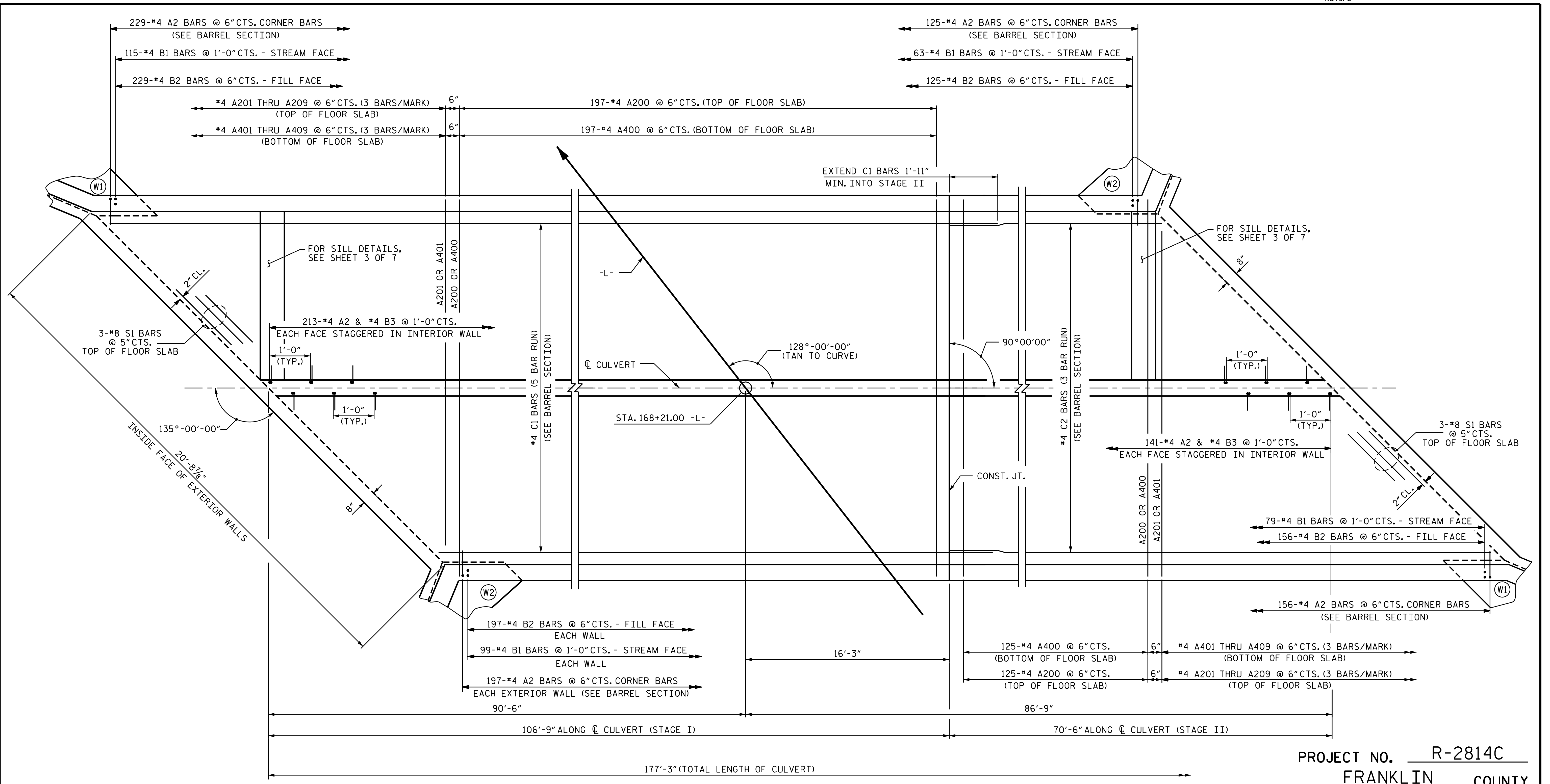


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 7 FT. X 7 FT.
 CONCRETE BOX CULVERT
 128° SKEW

ASSEMBLED BY : A. SORSENGINH DATE : 2/2014
 CHECKED BY : K.W. ALFORD DATE : 3/2018
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

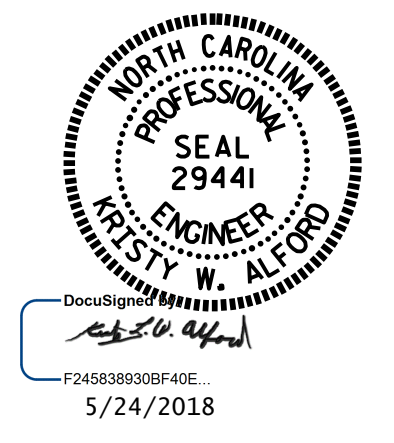
REVISIONS						SHEET NO. C3-4
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 7
2			4			

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED



PLAN OF FLOOR SLAB

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 168+21.00 -L-
 SHEET 5 OF 7



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 7 FT. X 7 FT.
 CONCRETE BOX CULVERT
 128° SKEW

ASSEMBLED BY : A. SORSENGINH DATE : 2/2014
 CHECKED BY : K.W. ALFORD DATE : 3/18
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

REVISIONS						SHEET NO. C3-5
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 7
2			4			

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

TOTAL STAGE I QUANTITIES	
CLASS A CONCRETE	
BARREL @ 1.514 CY/FT	161.6 C.Y.
WINGS, ETC.	14.0 C.Y.
SILL	0.5 C.Y.
TOTAL	176.1 C.Y.
REINFORCING STEEL	
BARREL	21,539 LBS.
WINGS, ETC.	749 LBS.
TOTAL	22,288 LBS.
FOUNDATION CONDITIONING MATERIAL	151 TONS
CULVERT EXCAVATION	LUMP SUM

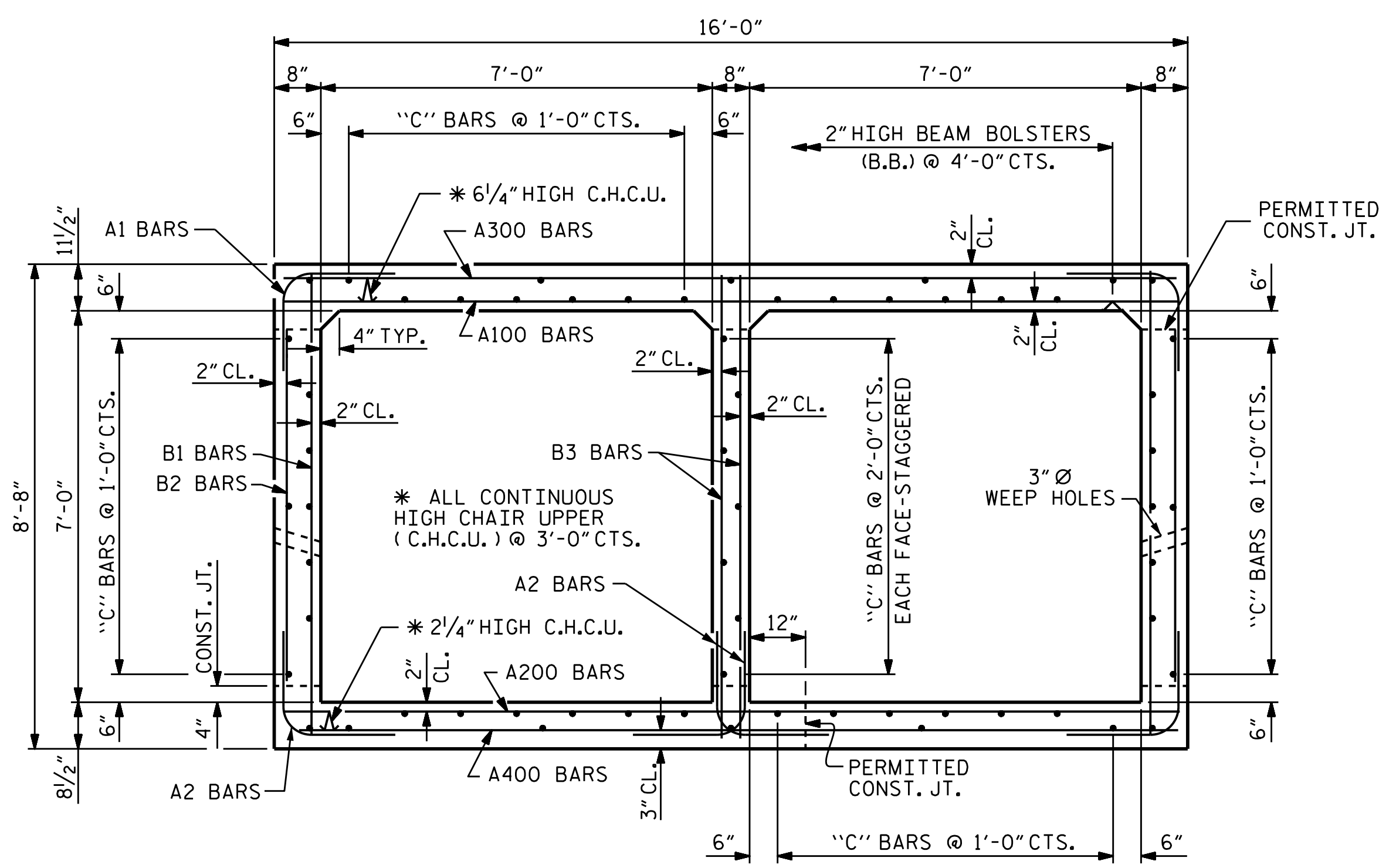
TOTAL STAGE II QUANTITIES	
CLASS A CONCRETE	
BARREL @ 1.514 CY/FT	106.7 C.Y.
WINGS, ETC.	14.0 C.Y.
SILL	0.5 C.Y.
TOTAL	121.2 C.Y.
REINFORCING STEEL	
BARREL	14,364 LBS.
WINGS, ETC.	749 LBS.
TOTAL	15,113 LBS.
FOUNDATION CONDITIONING MATERIAL	100 TONS
CULVERT EXCAVATION	LUMP SUM

BAR SCHEDULE STAGE I											
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	426	#4	1	4'-9"	1352	A304	3	#4	STR	9'-7"	19
A2	639	#4	1	4'-1"	1743	A305	3	#4	STR	8'-1"	16
						A306	3	#4	STR	6'-7"	13
A100	197	#4	STR	15'-7"	2051	A307	3	#4	STR	5'-1"	10
A101	3	#4	STR	14'-1"	28	A308	3	#4	STR	3'-7"	7
A102	3	#4	STR	12'-7"	25	A309	3	#4	STR	2'-1"	4
A103	3	#4	STR	11'-1"	22						
A104	3	#4	STR	9'-7"	19	A400	197	#4	STR	15'-7"	2051
A105	3	#4	STR	8'-1"	16	A401	3	#4	STR	14'-1"	28
A106	3	#4	STR	6'-7"	13	A402	3	#4	STR	12'-7"	25
A107	3	#4	STR	5'-1"	10	A403	3	#4	STR	11'-1"	22
A108	3	#4	STR	3'-7"	7	A404	3	#4	STR	9'-7"	19
A109	3	#4	STR	2'-1"	4	A405	3	#4	STR	8'-1"	16
						A406	3	#4	STR	6'-7"	13
A200	197	#4	STR	15'-7"	2051	A407	3	#4	STR	5'-1"	10
A201	3	#4	STR	14'-1"	28	A408	3	#4	STR	3'-7"	7
A202	3	#4	STR	12'-7"	25	A409	3	#4	STR	2'-1"	4
A203	3	#4	STR	11'-1"	22						
A204	3	#4	STR	9'-7"	19	B1	214	#4	STR	8'-2"	1167
A205	3	#4	STR	8'-1"	16	B2	426	#4	STR	6'-4"	1802
A206	3	#4	STR	6'-7"	13	B3	213	#4	STR	8'-2"	1162
A207	3	#4	STR	5'-1"	10						
A208	3	#4	STR	3'-7"	7	C1	305	#4	STR	24'-11"	5077
A209	3	#4	STR	2'-1"	4						
						D1	3	#6	STR	2'-3"	10
A300	197	#4	STR	15'-7"	2051						
A301	3	#4	STR	14'-1"	28	G1	4	#5	STR	22'-1"	92
A302	3	#4	STR	12'-7"	25						
A303	3	#4	STR	11'-1"	22	S1	6	#8	STR	22'-1"	354

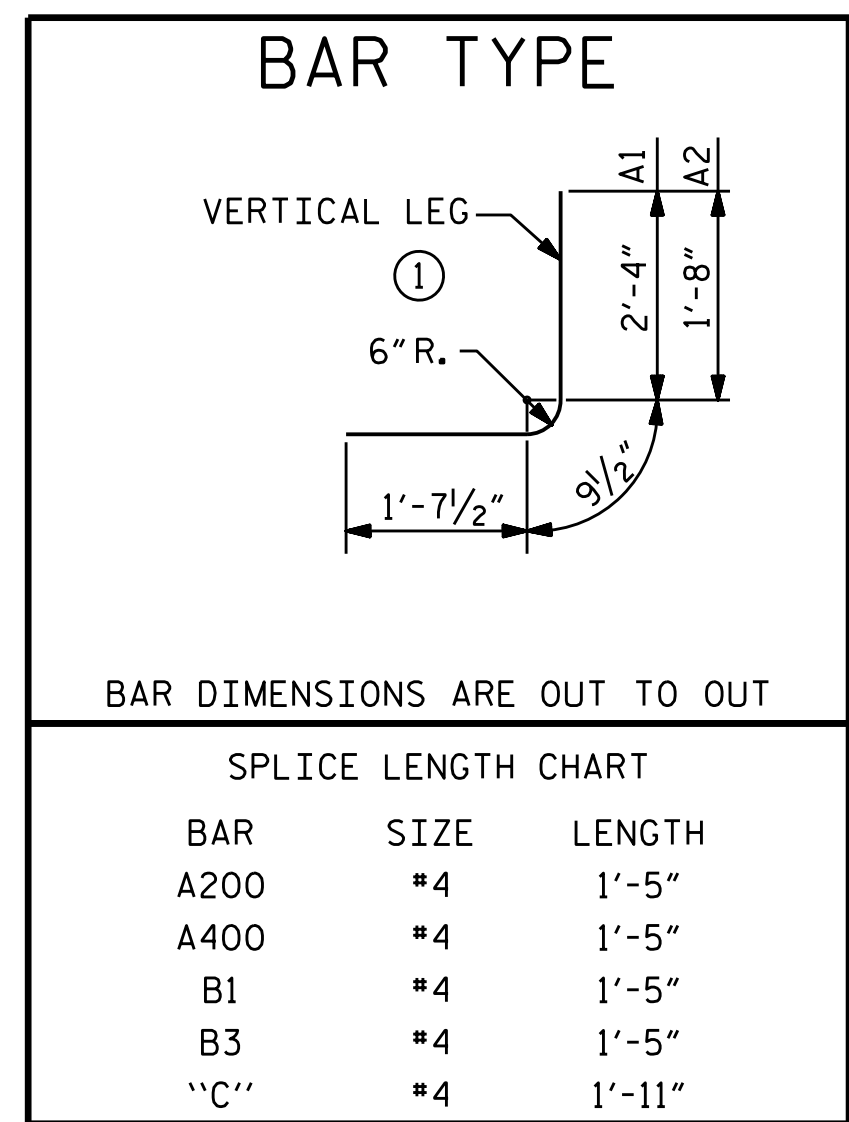
REINFORCING STEEL = 21,539 LBS

BAR SCHEDULE STAGE II											
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	281	#4	1	4'-9"	892	A304	3	#4	STR	9'-7"	19
A2	422	#4	1	4'-1"	1151	A305	3	#4	STR	8'-1"	16
						A306	3	#4	STR	6'-7"	13
A100	125	#4	STR	15'-7"	1301	A307	3	#4	STR	5'-1"	10
A101	3	#4	STR	14'-1"	28	A308	3	#4	STR	3'-7"	7
A102	3	#4	STR	12'-7"	25	A309	3	#4	STR	2'-1"	4
A103	3	#4	STR	11'-1"	22						
A104	3	#4	STR	9'-7"	19	A400	125	#4	STR	15'-7"	1301
A105	3	#4	STR	8'-1"	16	A401	3	#4	STR	14'-1"	28
A106	3	#4	STR	6'-7"	13	A402	3	#4	STR	12'-7"	25
A107	3	#4	STR	5'-1"	10	A403	3	#4	STR	11'-1"	22
A108	3	#4	STR	3'-7"	7	A404	3	#4	STR	9'-7"	19
A109	3	#4	STR	2'-1"	4	A405	3	#4	STR	8'-1"	16
						A406	3	#4	STR	6'-7"	13
A200	125	#4	STR	15'-7"	1301	A407	3	#4	STR	5'-1"	10
A201	3	#4	STR	14'-1"	28	A408	3	#4	STR	3'-7"	7
A202	3	#4	STR	12'-7"	25	A409	3	#4	STR	2'-1"	4
A203	3	#4	STR	11'-1"	22						
A204	3	#4	STR	9'-7"	19	B1	142	#4	STR	8'-2"	775
A205	3	#4	STR	8'-1"	16	B2	281	#4	STR	6'-4"	1189
A206	3	#4	STR	6'-7"	13	B3	141	#4	STR	8'-2"	769
A207	3	#4	STR	5'-1"	10						
A208	3	#4	STR	3'-7"	7	C1	183	#4	STR	27'-5"	3352
A209	3	#4	STR	2'-1"	4						
						D1	3	#6	STR	2'-3"	10
A300	125	#4	STR	15'-7"	1301						
A301	3	#4	STR	14'-1"	28	G1	4	#5	STR	22'-1"	92
A302	3	#4	STR	12'-7"	25						
A303	3	#4	STR	11'-1"	22	S1	6	#8	STR	22'-1"	354

REINFORCING STEEL = 14,364 LBS

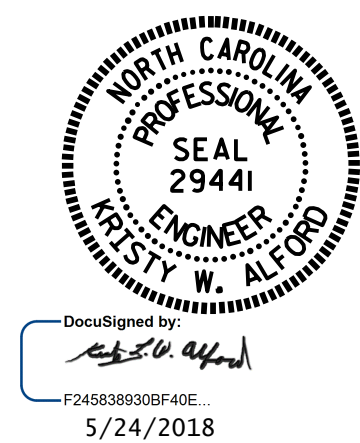


RIGHT ANGLE SECTION OF BARREL
THERE ARE 61 C1 BARS IN SECTION OF BARREL



BAR DIMENSIONS ARE OUT TO OUT

PROJECT NO. R-2814C
FRANKLIN COUNTY
STATION: 168+21.00 -L-
SHEET 6 OF 7

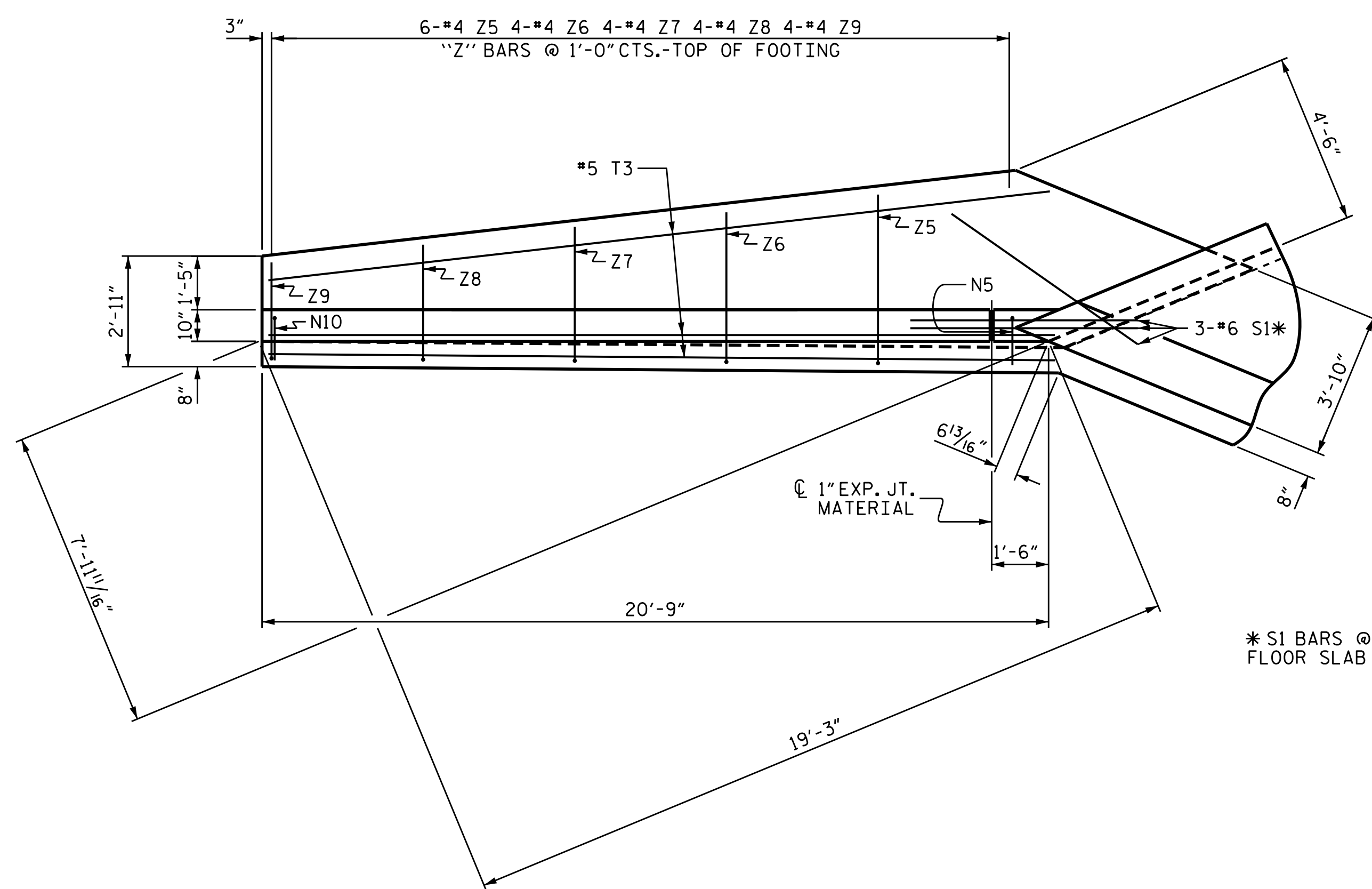


STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
**DOUBLE 7 FT. X 7 FT.
CONCRETE BOX CULVERT
128° SKEW**

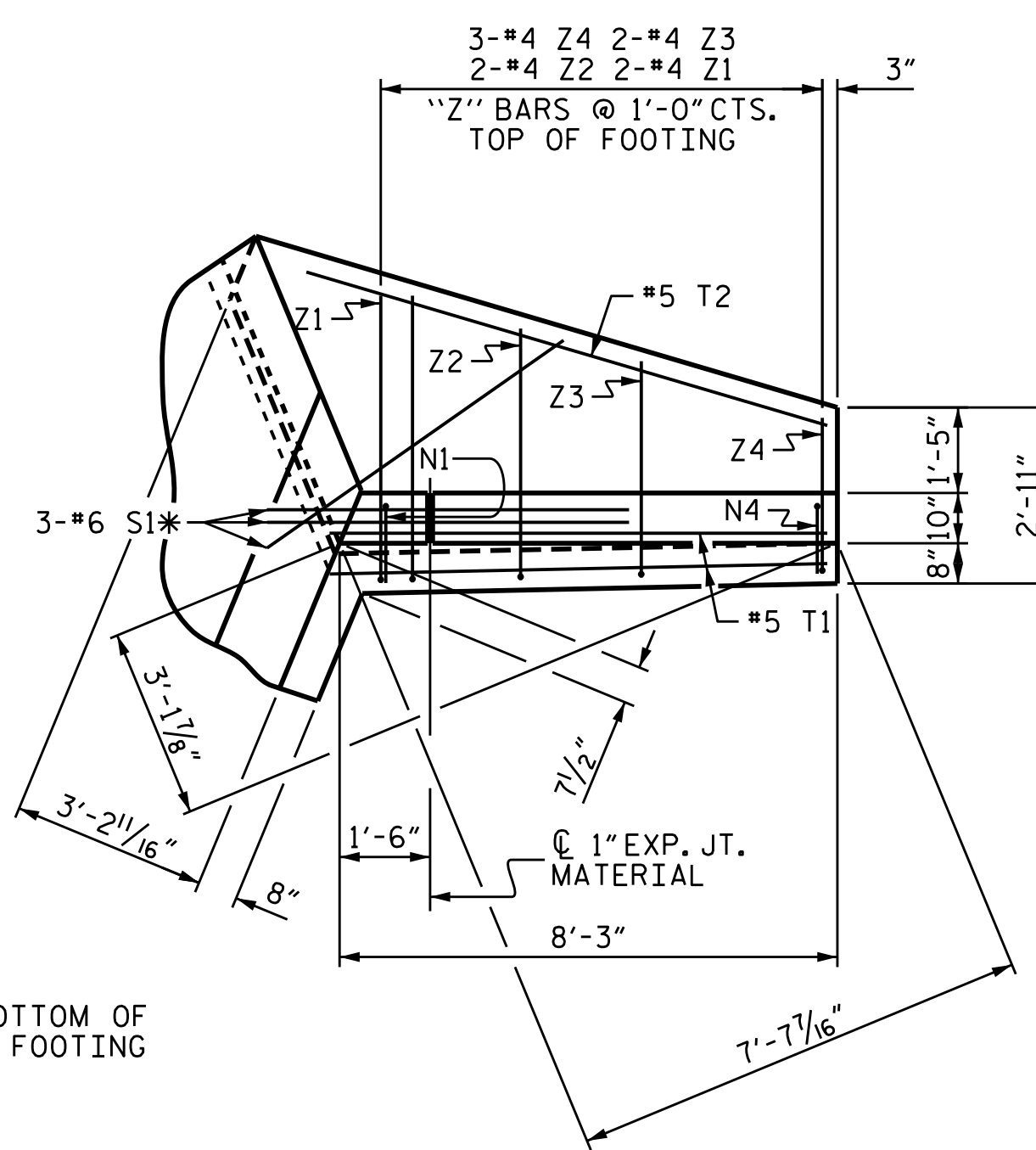
ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
CHECKED BY : K.W. ALFORD DATE : 3/2018
DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

REVISIONS						SHEET NO. C3-6
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 7
2			4			

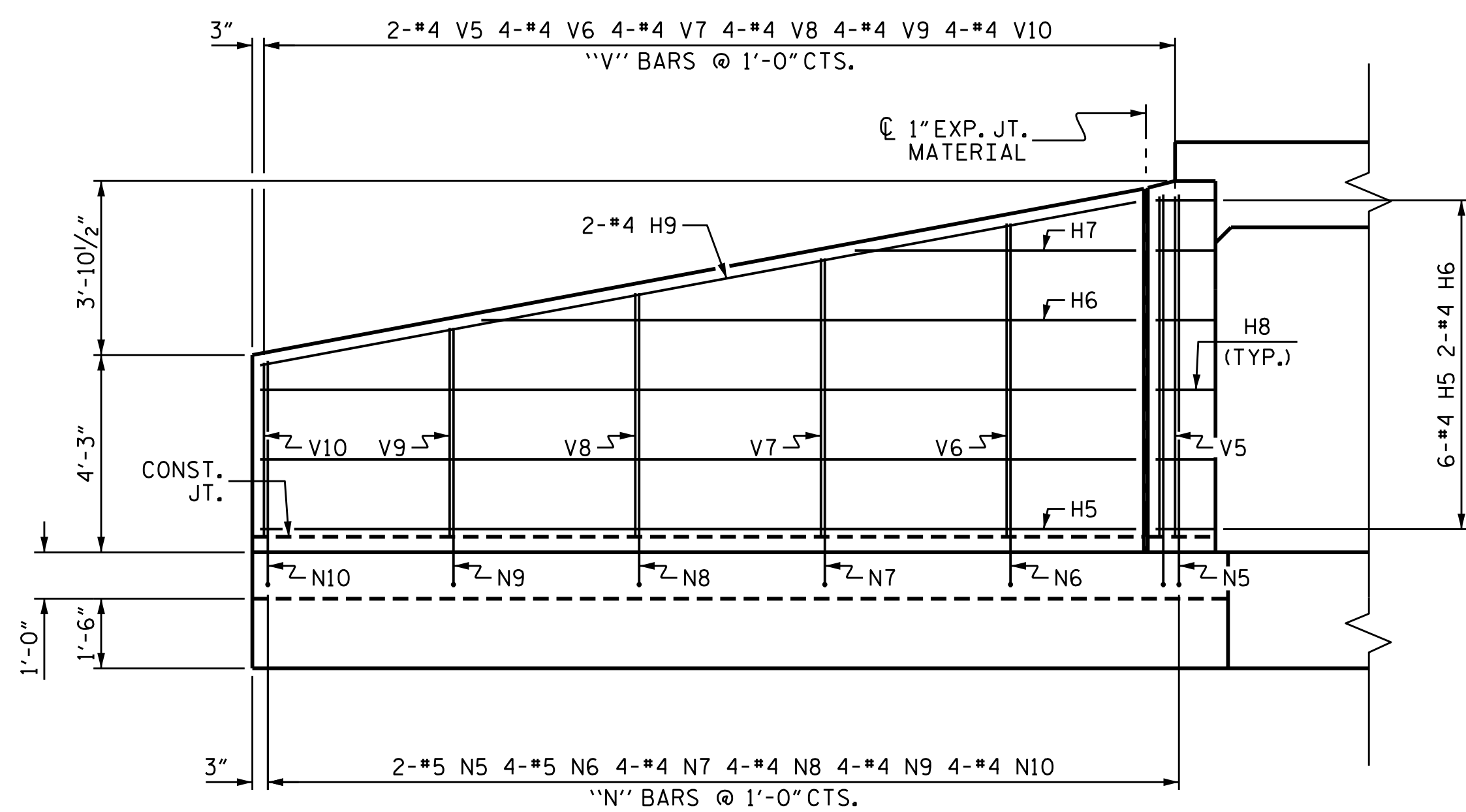
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED



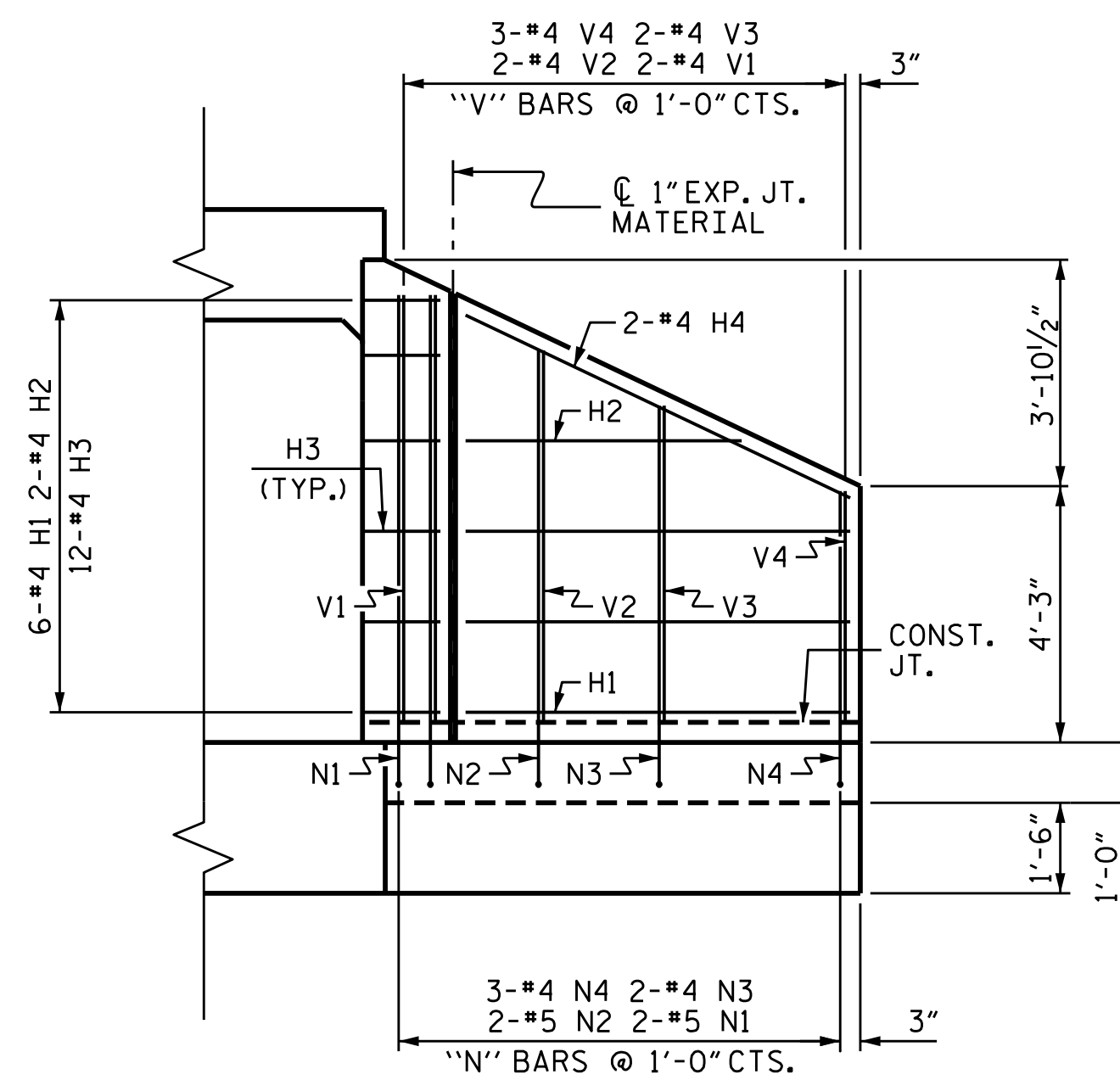
PLAN W1



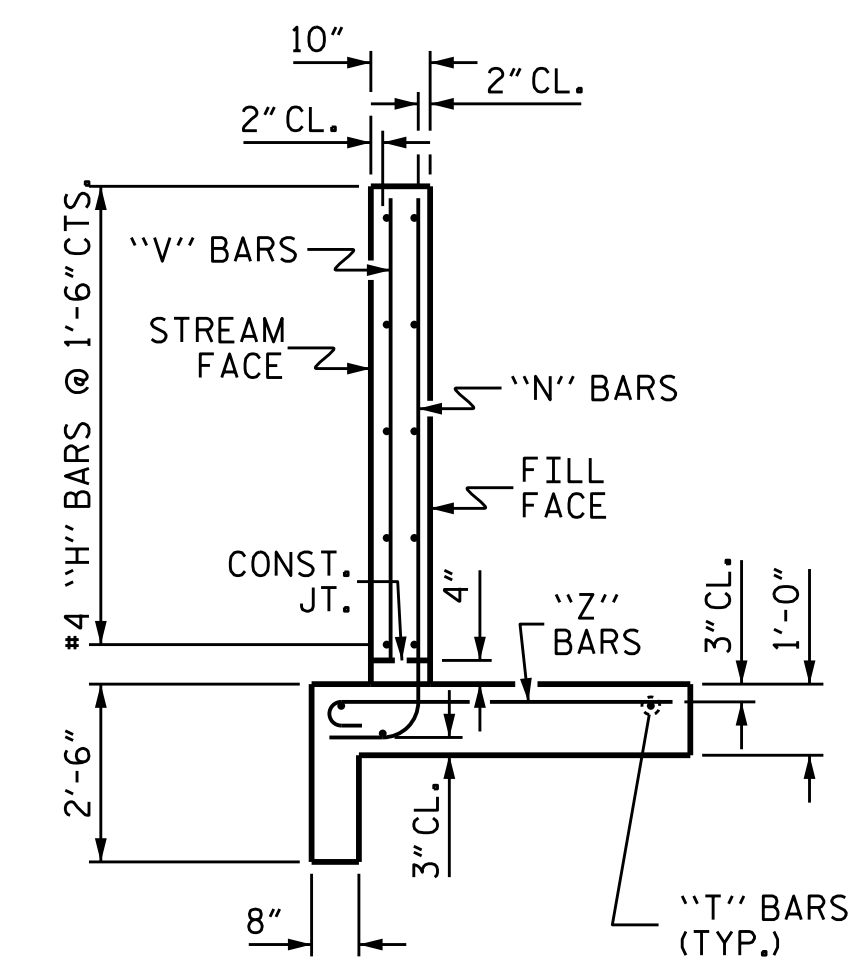
PLAN W2



ELEVATION W1



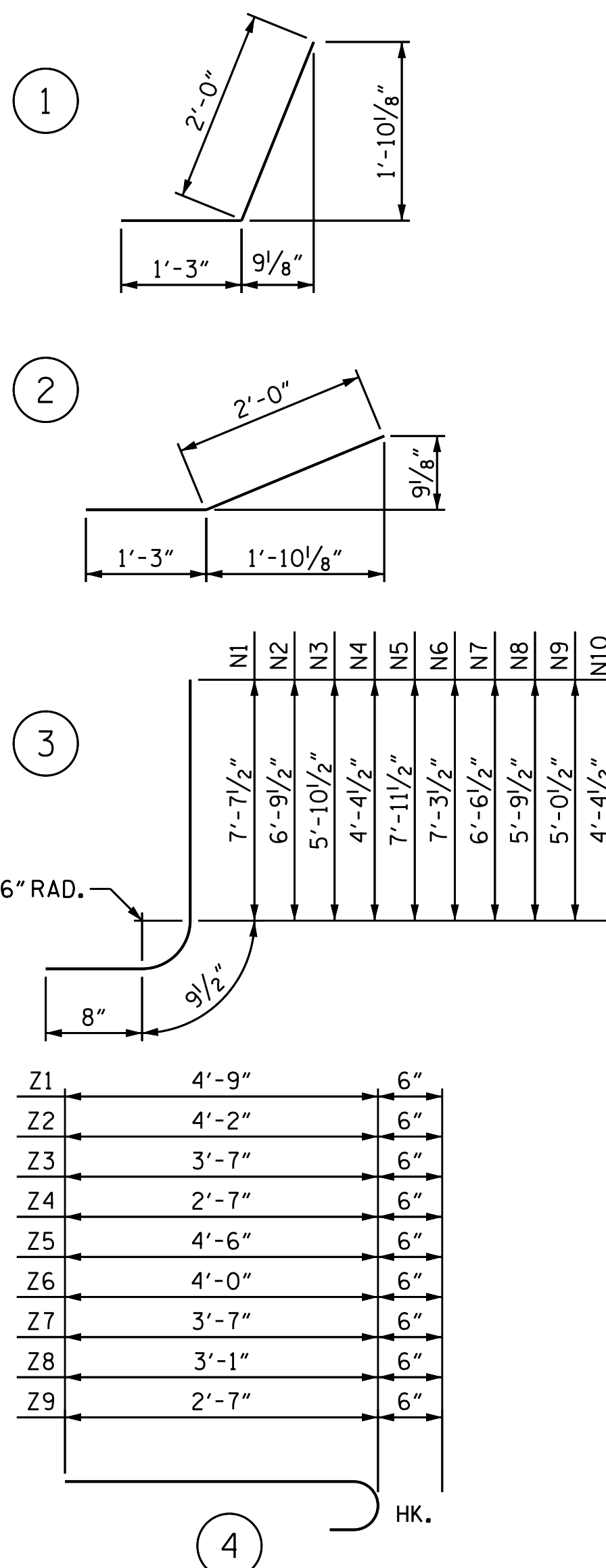
ELEVATION W2



TYPICAL WING SECTION

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

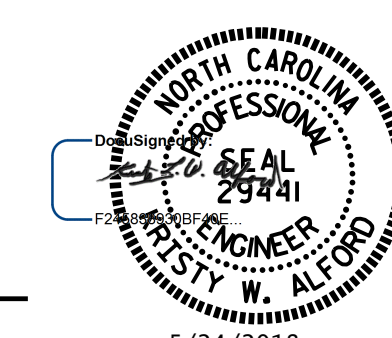
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	6	#4	STR	6'-4"	25
H2	2	#4	STR	4'-6"	6
H3	12	#4	1	3'-3"	26
H4	2	#4	STR	7'-0"	9
H5	6	#4	STR	18'-10"	75
H6	2	#4	STR	14'-1"	19
H7	2	#4	STR	6'-0"	8
H8	12	#4	2	3'-3"	26
H9	2	#4	STR	19'-2"	26
N1	2	#5	3	9'-1"	19
N2	2	#5	3	8'-3"	17
N3	2	#4	3	7'-4"	10
N4	3	#4	3	5'-7"	11
N5	2	#5	3	9'-5"	20
N6	4	#5	3	8'-9"	37
N7	4	#4	3	8'-0"	21
N8	4	#4	3	7'-3"	19
N9	4	#4	3	6'-6"	17
N10	4	#4	3	5'-10"	16
S1	6	#6	STR	6'-0"	54
T1	2	#5	STR	8'-3"	17
T2	1	#5	STR	9'-0"	9
T3	3	#5	STR	20'-9"	65
V1	2	#4	STR	7'-1"	9
V2	2	#4	STR	6'-2"	8
V3	2	#4	STR	5'-3"	7
V4	3	#4	STR	3'-9"	8
V5	2	#4	STR	7'-4"	10
V6	4	#4	STR	6'-9"	18
V7	4	#4	STR	6'-0"	16
V8	4	#4	STR	5'-3"	14
V9	4	#4	STR	4'-6"	12
V10	4	#4	STR	3'-9"	10
Z1	2	#4	4	5'-3"	7
Z2	2	#4	4	4'-8"	6
Z3	2	#4	4	4'-1"	5
Z4	3	#4	4	3'-1"	6
Z5	6	#4	4	5'-0"	20
Z6	4	#4	4	4'-6"	12
Z7	4	#4	4	4'-1"	11
Z8	4	#4	4	3'-7"	10
Z9	4	#4	4	3'-1"	8

REINFORCING STEEL 749 LBS
FOR 2 WINGS
CLASS A CONCRETE 11.8 CY
2 WINGS 1.0 CY
1 HEADWALL 1.2 CY
1 END CURTAIN WALL 1.2 CY
TOTAL 14.0 CY

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 168+21.00

SHEET 7 OF 7

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
STANDARD WINGS
 FOR
CONCRETE BOX CULVERT
 H = 7'-0" SLOPE = 2:1
 135° SKEW



ASSEMBLED BY : A. SORSENGH DATE : 1/2014
 CHECKED BY : DATE :
 DRAWN BY : CCJ 01/00
 CHECKED BY : RWW 03/00

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

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

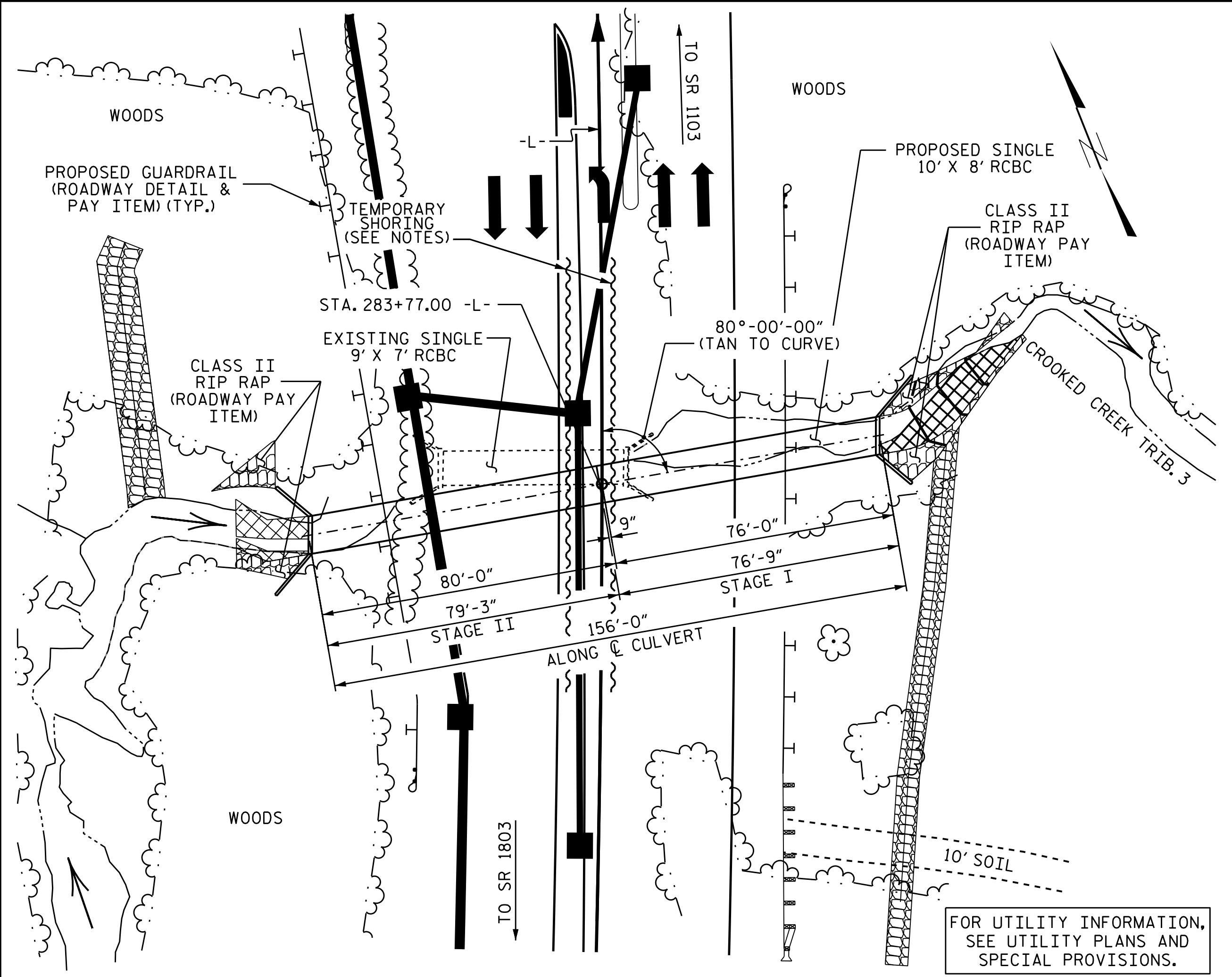
TOTAL SHEETS 7

STD. NO. CW4507

BM #60: RR SPIKE IN 12" POPLAR TREE, -L- STA. 277+71.00, 330' RT., EL. 335.22

NOTES

F.A. PROJECT NO.: STP-401(249)



ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING.
 DESIGN FILL-----10.81'
 FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTE SHEET.
 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
 CONCRETE IN EACH STAGE OF CULVERTS TO BE POURED IN THE FOLLOWING ORDER:
 1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
 2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.
 THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.
 DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.
 TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.
 AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
 AT THE CONTRACTOR'S OPTION HE MAY SUBMIT, TO THE ENGINEER FOR APPROVAL, DESIGN AND DETAIL DRAWINGS FOR A PRECAST REINFORCED CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE CULVERT SHOWN ON THE PLANS. THE DESIGN SHALL PROVIDE THE SAME SIZE OF BARREL AS USED ON THE CAST-IN-PLACE DESIGN. FOR OPTIONAL PRECAST REINFORCED CONCRETE BOX CULVERT, SEE SPECIAL PROVISIONS.
 THE EXISTING STRUCTURE CONSISTING OF A REINFORCED CONCRETE CULVERT 9'(W) X 7'(D) SIZE, 50'± LONG AND LOCATED AT THE PROPOSED STRUCTURE, SHALL BE REMOVED.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.
 FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.
 FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS.
 A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
 FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
 FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
 FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
 FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
 FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
 BACK FILL BARREL WITH NATIVE BED MATERIAL. NATIVE BED MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OR FLOODPLAIN AT THE PROJECT SITE DURING CULVERT CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE CULVERT BARREL. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

LOCATION SKETCH

TOTAL STRUCTURE QUANTITIES	
CLASS A CONCRETE	
STAGE I	95.9 C.Y.
STAGE II	98.6 C.Y.
TOTAL	194.5 C.Y.
REINFORCING STEEL	
STAGE I	14,299 LBS.
STAGE II	14,460 LBS.
TOTAL	28,759 LBS.
FOUNDATION CONDITIONING MATERIAL	
STAGE I	83 TONS
STAGE II	86 TONS
TOTAL	169 TONS
CULVERT EXCAVATION	LUMP SUM
REMOVAL OF EXISTING STRUCTURE	LUMP SUM

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

HYDRAULIC DATA

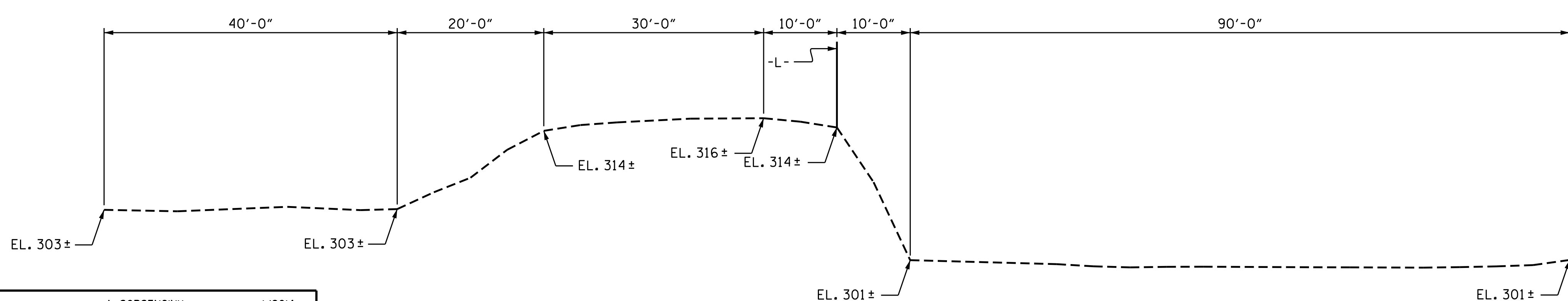
DESIGN DISCHARGE = 1020 CFS
 FREQUENCY OF DESIGN FLOOD = 50 YRS.
 DESIGN HIGH WATER ELEVATION = 314.10
 DRAINAGE AREA = 1.32 SQ. MI.
 BASE DISCHARGE (Q100) = 1160 CFS
 BASE HIGH WATER ELEVATION = 315.60

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = 1420 CFS
 FREQUENCY OF OVERTOPPING FLOOD = 100+ YRS.
 OVERTOPPING FLOOD ELEVATION = 319.40

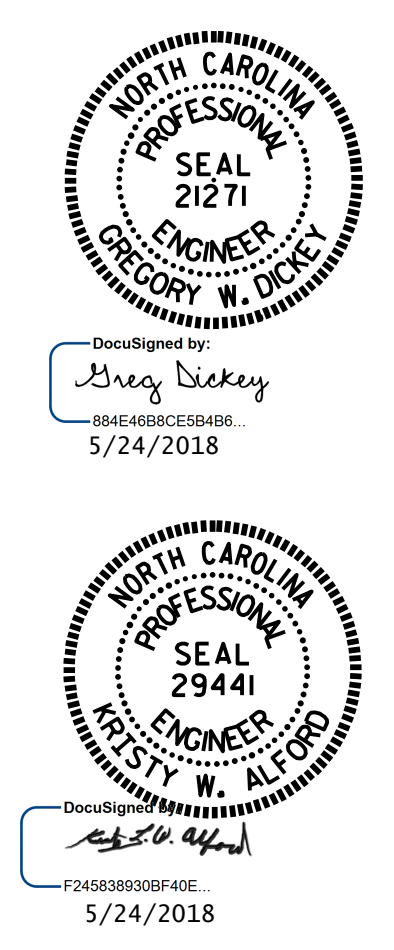
GRADE DATA

GRADE POINT ELEVATION @ STA. 283+77.00 -L- = 317.85'
 BED ELEVATION @ STA. 283+77.00 -L- = 300.61'
 ROADWAY FILL SLOPES = 2:1



PROFILE ALONG CULVERT

ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : A. K. PATEL DATE : 1/2014
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 1/2014



PROJECT NO. R-2814C
 FRANKLIN COUNTY
 STATION: 283+77.00 -L-

SHEET 1 OF 7
 STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SINGLE 10 FT. X 8 FT. CONCRETE BOX CULVERT
 80° SKEW

REVISIONS						SHEET NO. C4-1
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 7
2			4			

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

**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	1.18	--	1.75	1.18	1	TOP SLAB	5.33	1.33	1	TOP SLAB	0.87		
	HL-93 (OPERATING)	N/A		1.53	--	1.35	1.53	1	TOP SLAB	5.33	1.72	1	TOP SLAB	0.87		
	HS-20 (INVENTORY)	36.000	②	1.45	52.04	1.75	1.45	1	BOT CORNER WALL	8.59	2.05	1	TOP SLAB	0.87		
	HS-20 (OPERATING)	36.000		1.87	67.46	1.35	1.87	1	BOT CORNER WALL	8.59	2.66	1	TOP SLAB	0.87		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		2.05	27.61	1.40	2.05	1	BOT CORNER WALL	8.59	3.69	1	TOP SLAB	0.87	
		SNGARBS2	20.000		2.00	40.05	1.40	2.00	1	BOT CORNER WALL	8.59	3.48	1	TOP SLAB	0.87	
		SNAGRIS2	22.000		2.05	45.00	1.40	2.05	1	BOT CORNER WALL	8.59	3.69	1	TOP SLAB	0.87	
		SNCOTTS3	27.250		1.48	40.23	1.40	1.48	1	TOP SLAB	5.33	1.66	1	TOP SLAB	0.87	
		SNAGGRS4	34.925	③	1.50	52.22	1.40	1.50	1	TOP SLAB	5.33	1.74	1	TOP SLAB	0.87	
		SNS5A	35.550		1.55	55.05	1.40	1.55	1	TOP SLAB	5.33	1.83	1	TOP SLAB	0.87	
		SNS6A	39.950		1.55	61.86	1.40	1.55	1	TOP SLAB	5.33	1.83	1	TOP SLAB	0.87	
		SNS7B	42.000		1.55	65.04	1.40	1.55	1	TOP SLAB	5.33	1.83	1	TOP SLAB	0.87	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.88	61.91	1.40	1.88	1	BOT CORNER WALL	8.59	2.60	1	TOP SLAB	0.87	
		TNT4A	33.075		1.68	55.64	1.40	1.68	1	BOT CORNER WALL	8.59	1.96	1	TOP SLAB	0.87	
		TNT6A	41.600		1.50	62.46	1.40	1.50	1	TOP SLAB	5.33	1.77	1	TOP SLAB	0.87	
		TNT7A	42.000		1.62	67.83	1.40	1.62	1	BOT CORNER WALL	8.59	1.92	1	TOP SLAB	0.87	
		TNT7B	42.000		1.55	65.04	1.40	1.55	1	TOP SLAB	5.33	1.83	1	TOP SLAB	0.87	
		TNAGRIT4	43.000		1.64	70.59	1.40	1.64	1	BOT CORNER WALL	8.59	1.88	1	TOP SLAB	0.87	
TNAGT5A	45.000		1.65	74.40	1.40	1.65	1	BOT CORNER WALL	8.59	1.92	1	TOP SLAB	0.87			
TNAGT5B	45.000		1.68	75.70	1.40	1.68	1	BOT CORNER WALL	8.59	1.96	1	TOP SLAB	0.87			

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	0.50 OR 0.90
ES	1.35	0.50 OR 0.90
LS	1.75	--
WA	1.00	--

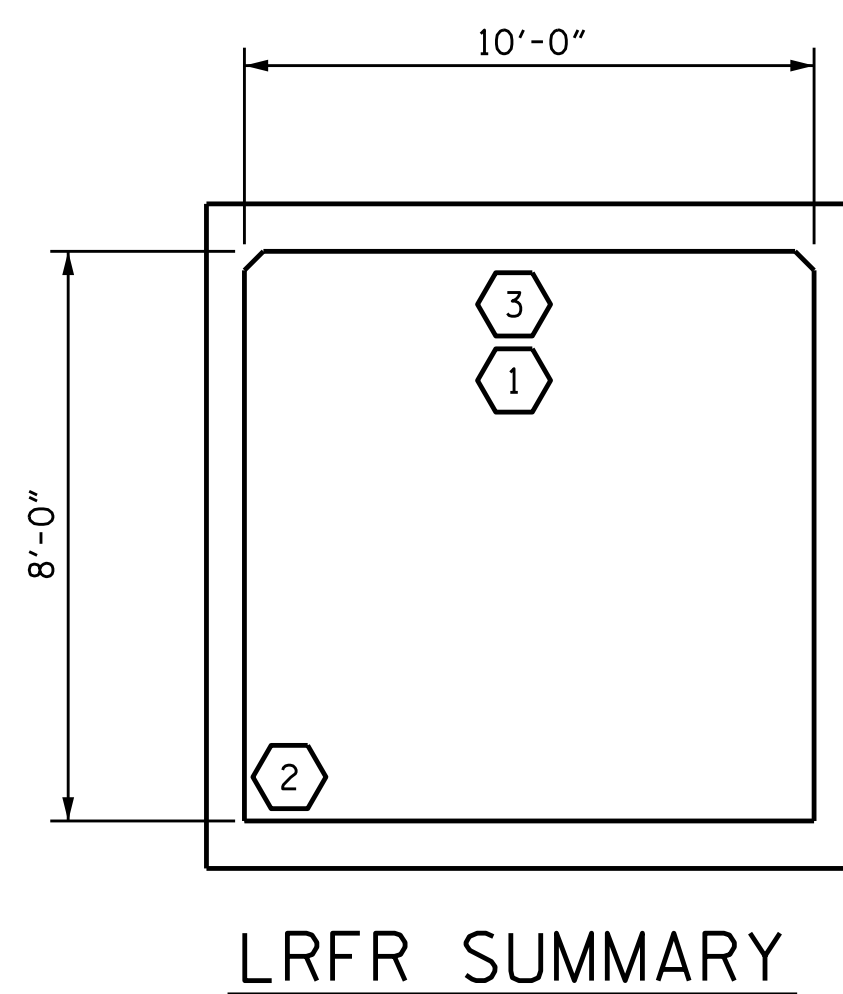
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

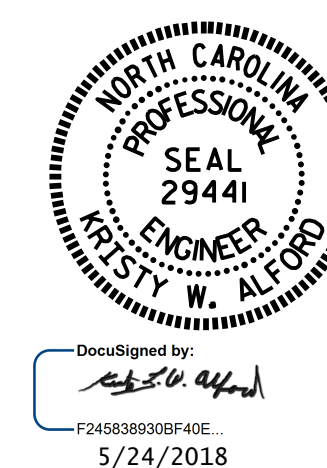
- 1.
- 2.
- 3.
- 4.

①	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-2814C
FRANKLIN COUNTY
 STATION: 283+77.00 -L-

SHEET 2 OF 7

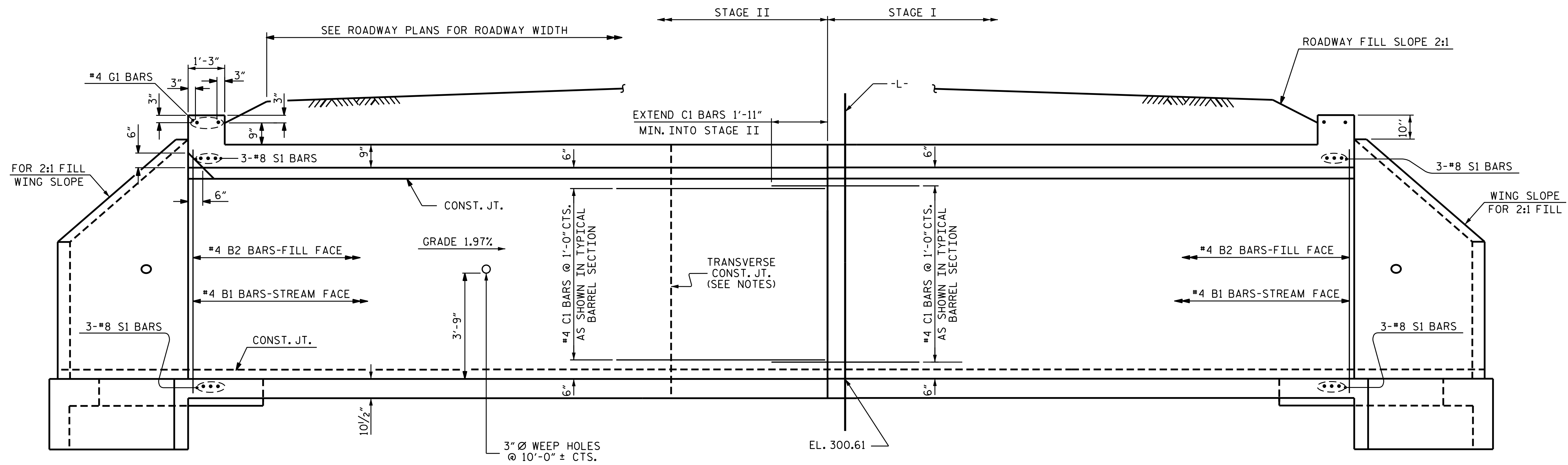


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD
 LRFR SUMMARY FOR
 REINFORCED CONCRETE
 BOX CULVERTS
 (NON-INTERSTATE TRAFFIC)

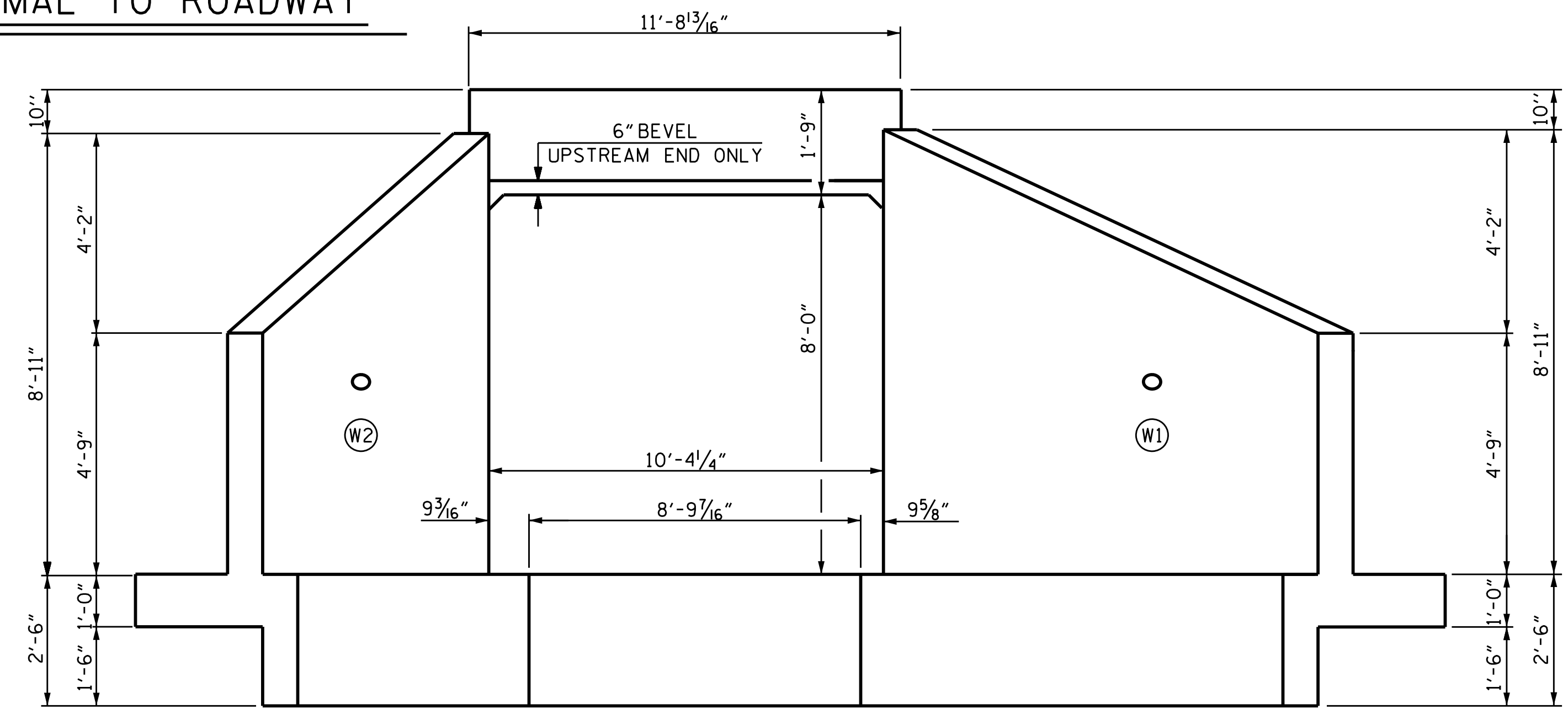
REVISIONS						TOTAL SHEETS
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			7
2			4			

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 UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY : A. SORSENGINH	DATE : 1/2014
CHECKED BY : A. K. PATEL	DATE : 1/2014
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11
REV. 10/1/11	MAA/GM



CULVERT SECTION NORMAL TO ROADWAY

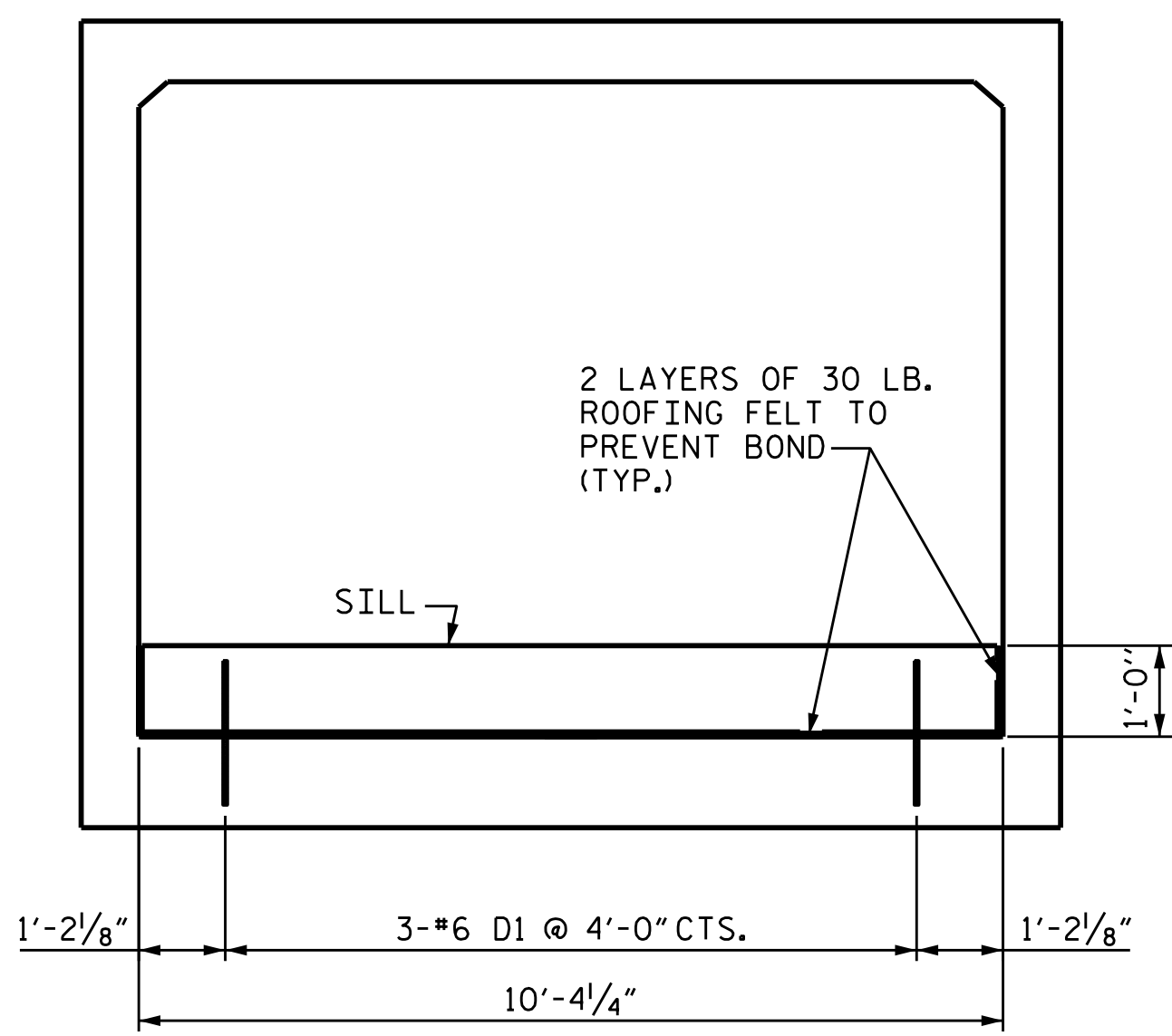


INLET END ELEVATION NORMAL TO SKEW

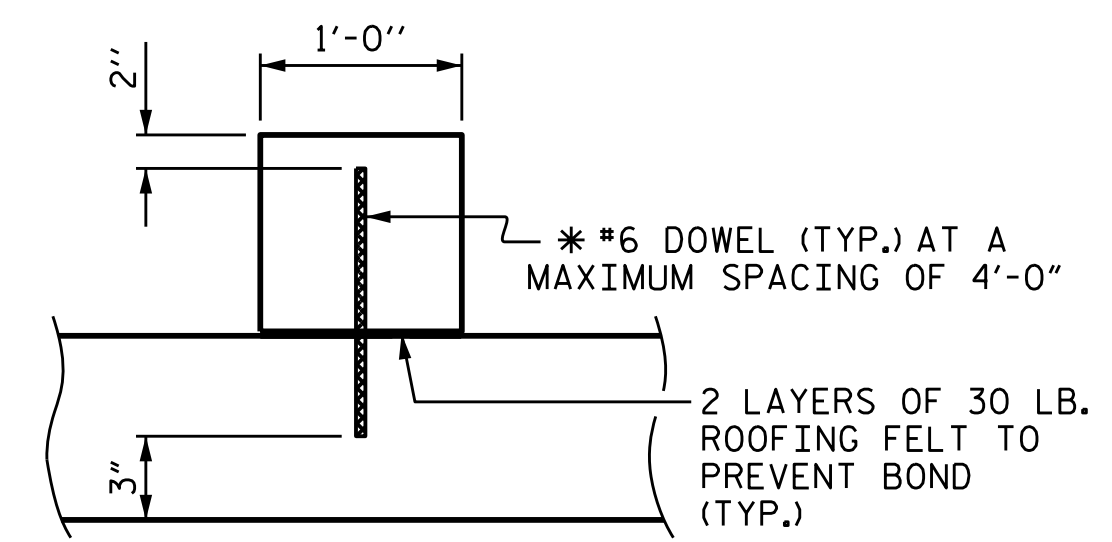
SILL NOT SHOWN FOR CLARITY
 SEE CULVERT SILL DETAILS

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 283+77.00 -L-

SHEET 3 OF 7



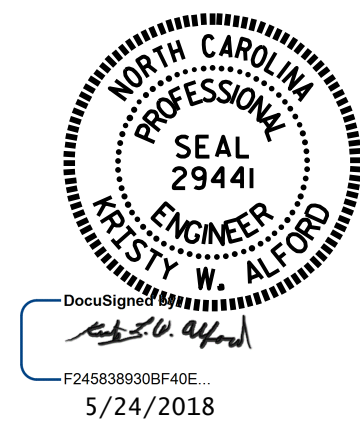
ELEVATION



SECTION THROUGH SILL

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

I HEREBY CERTIFY THESE PLANS
 ARE THE AS-BUILT PLANS



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SINGLE 10 FT. X 8 FT.
 CONCRETE BOX CULVERT
 80° SKEW

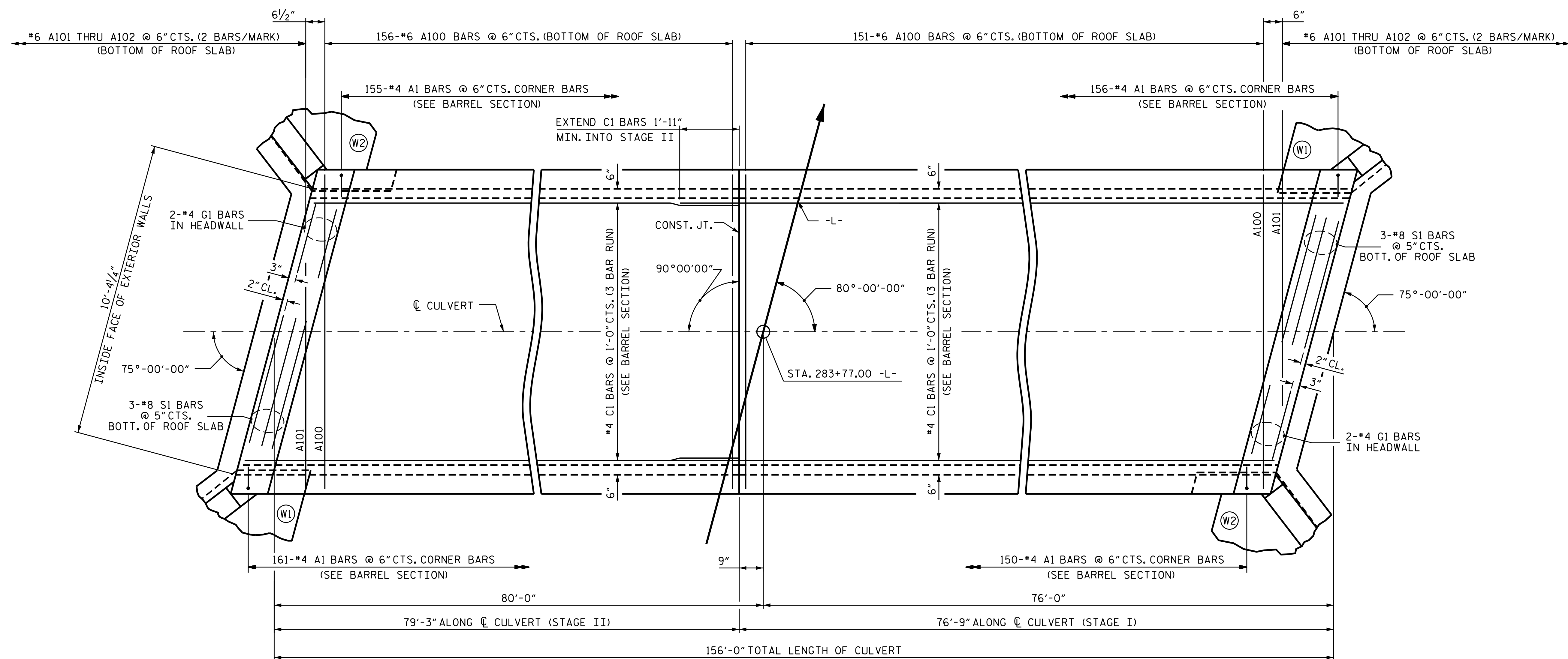
ASSEMBLED BY: A. SORSENGINH DATE: 1/2014
 CHECKED BY: A. K. PATEL DATE: 1/2014
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE: 1/2014

CULVERT SILL DETAILS

SILLS SHALL BE PLACE ALONG THE SKEW AT BOTH
 THE INLET AND OUTLET ENDS OF THE CULVERT

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

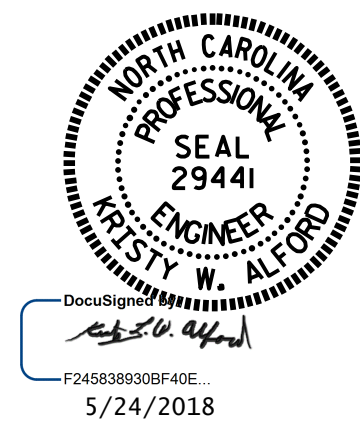
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-3	
1			3			TOTAL SHEETS	
2			4			7	



PLAN OF ROOF SLAB

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 283+77.00 -L-

SHEET 4 OF 7



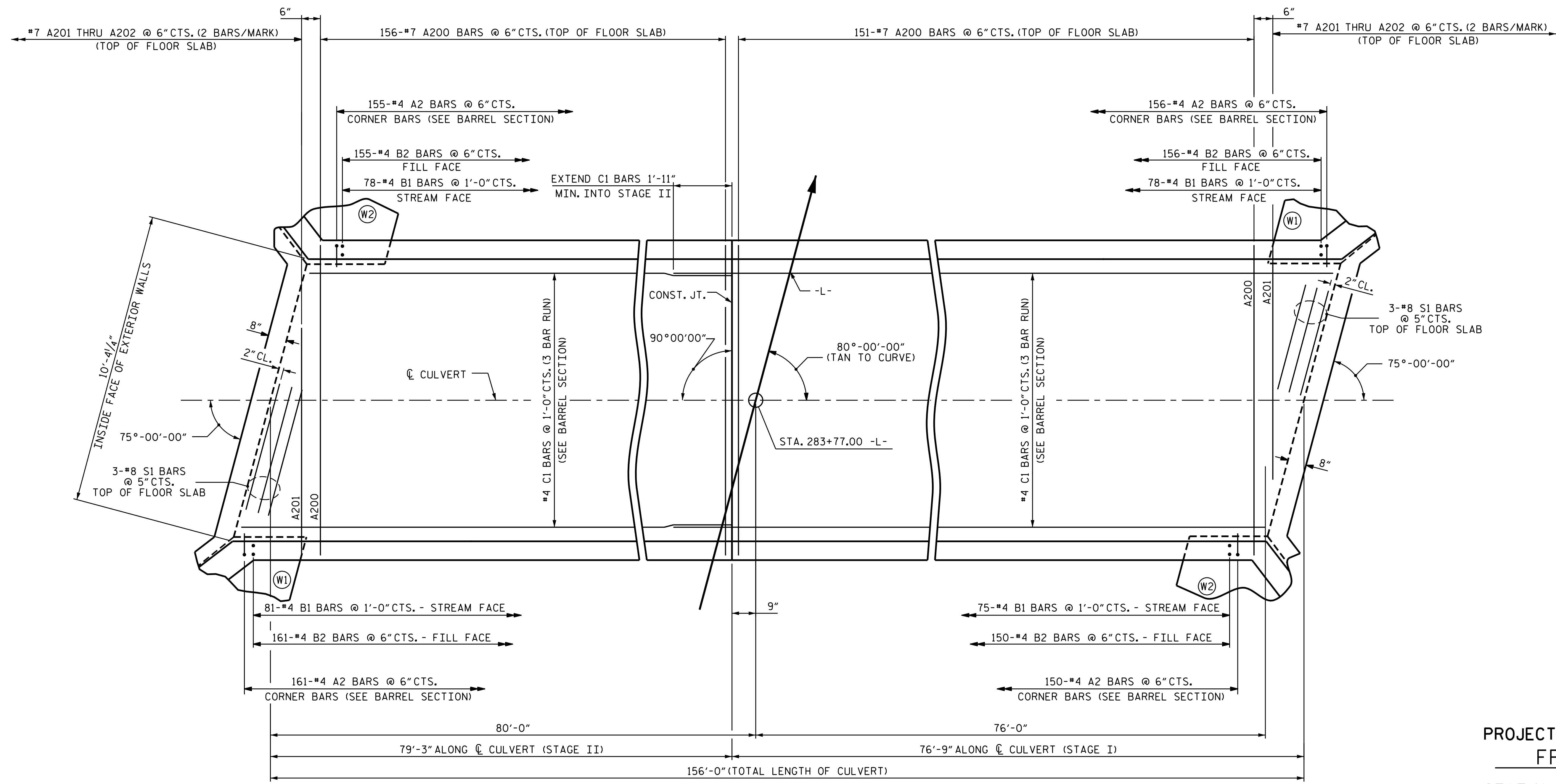
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

**SINGLE 10 FT. X 8 FT.
 CONCRETE BOX CULVERT
 80° SKEW**

ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : A. K. PATEL DATE : 1/2014
 DESIGN ENGINEER OF RECORD : A. SORSENGINH DATE : 1/2014

REVISIONS						SHEET NO. C4-4
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 7
2			4			

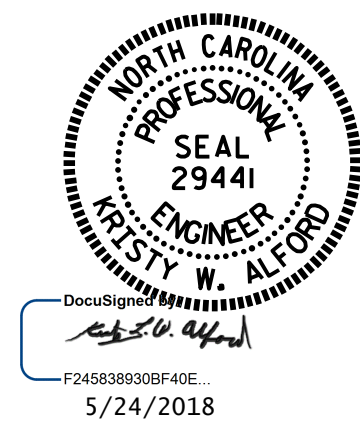
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PLAN OF FLOOR SLAB

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 283+77.00 -L-

SHEET 5 OF 7



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SINGLE 10 FT. X 8 FT.
 CONCRETE BOX CULVERT
 80° SKEW

ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : A. K. PATEL DATE : 1/2014
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

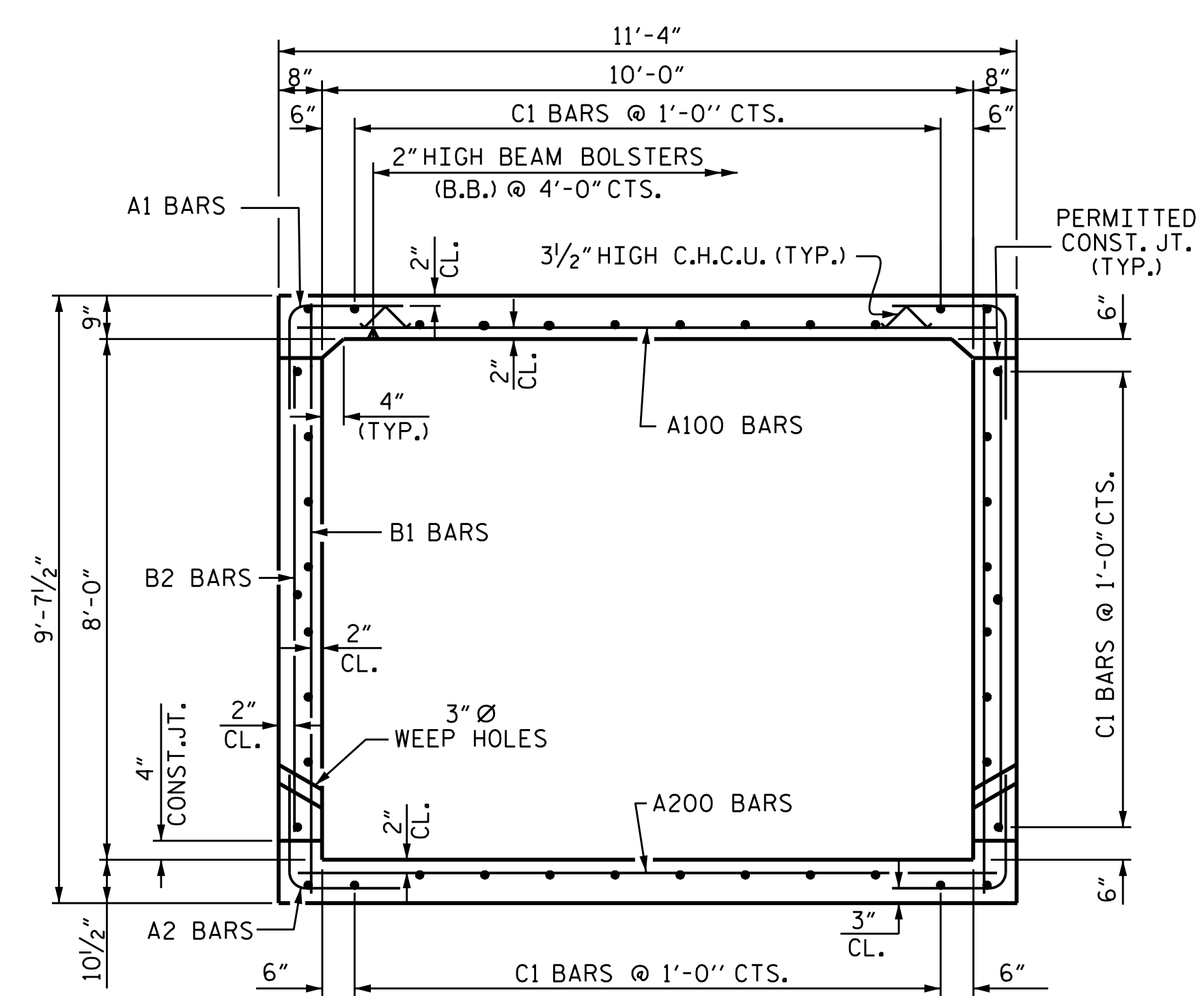
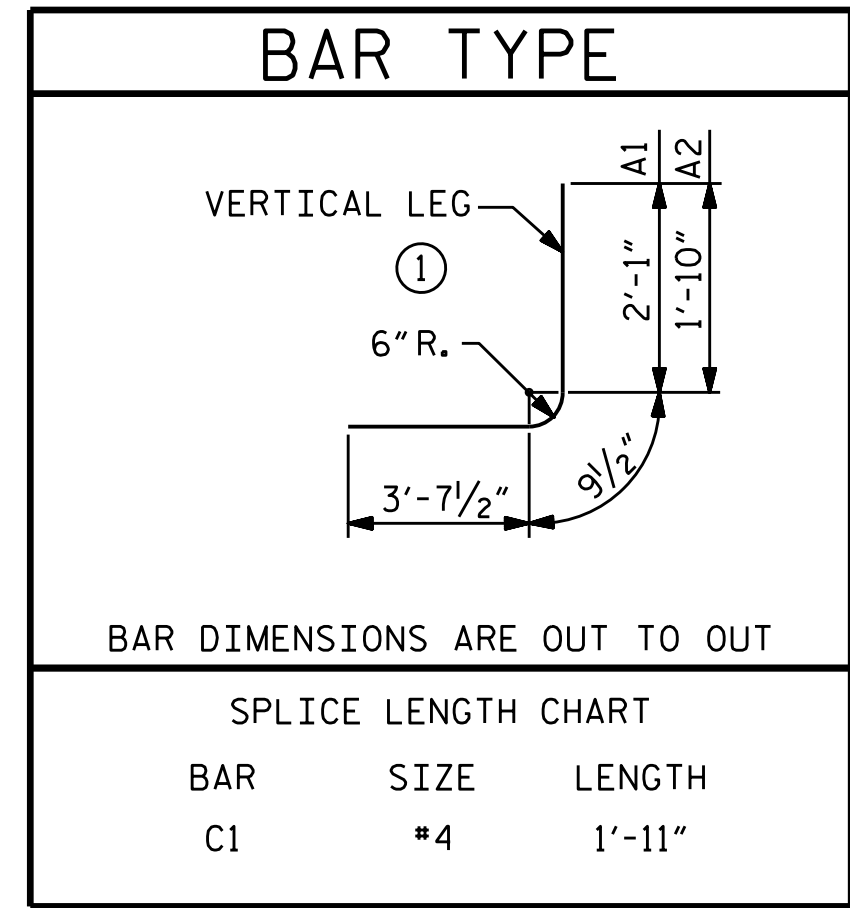
DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO. C4-5
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 7
2			4			

STAGE I BAR SCHEDULE						STAGE II BAR SCHEDULE					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A100	151	#6	STR	10'-11"	2476	A100	156	#6	STR	10'-11"	2355
A101	2	#6	STR	7'-10"	24	A101	2	#6	STR	7'-10"	24
A102	2	#6	STR	2'-2"	7	A102	2	#6	STR	2'-2"	7
A200	151	#7	STR	10'-11"	3369	A200	156	#7	STR	10'-11"	3481
A201	2	#7	STR	7'-10"	32	A201	2	#7	STR	7'-10"	32
A202	2	#7	STR	2'-2"	9	A202	2	#7	STR	2'-2"	9
A1	306	#4	1	6'-6"	1329	A1	316	#4	1	6'-6"	1372
A2	306	#4	1	6'-3"	1278	A2	316	#4	1	6'-3"	1319
B1	153	#4	STR	9'-1"	928	B1	159	#4	STR	9'-1"	965
B2	306	#4	STR	7'-4"	1499	B2	316	#4	STR	7'-4"	1548
C1	126	#4	STR	28'-2"	2371	C1	126	#4	STR	28'-2"	2371
D1	3	#6	STR	1'-5"	6	D1	3	#6	STR	1'-5"	6
G1	2	#4	STR	11'-4"	15	G1	2	#4	STR	11'-4"	15
S1	6	#8	STR	11'-4"	182	S1	6	#8	STR	11'-4"	182
REINFORCING STEEL = 13,525 LBS						REINFORCING STEEL = 13,686 LBS					

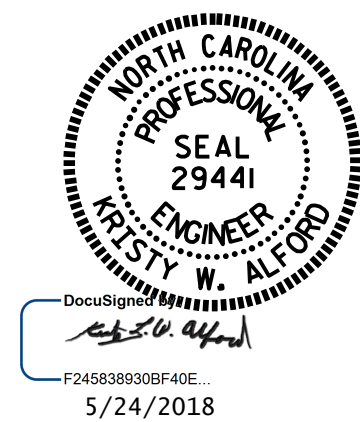
TOTAL STAGE I QUANTITIES	
CLASS A CONCRETE	
BARREL @ 1.081 CY/FT	83.0 C.Y.
WINGS, ETC.	12.5 C.Y.
SILL	0.4 C.Y.
TOTAL	95.9 C.Y.
REINFORCING STEEL	
BARREL	13,525 LBS.
WINGS, ETC.	774 LBS.
TOTAL	14,299 LBS.
FOUNDATION CONDITIONING MATERIAL	83 TONS
CULVERT EXCAVATION	LUMP SUM

TOTAL STAGE II QUANTITIES	
CLASS A CONCRETE	
BARREL @ 1.081 CY/FT	85.7 C.Y.
WINGS, ETC.	12.5 C.Y.
SILL	0.4 C.Y.
TOTAL	98.6 C.Y.
REINFORCING STEEL	
BARREL	13,686 LBS.
WINGS, ETC.	774 LBS.
TOTAL	14,460 LBS.
FOUNDATION CONDITIONING MATERIAL	86 TONS
CULVERT EXCAVATION	LUMP SUM



RIGHT ANGLE SECTION OF BARREL
THERE ARE 42 C1 BARS IN SECTION OF BARREL

PROJECT NO. R-2814C
FRANKLIN COUNTY
STATION: 283+77.00 -L-
SHEET 6 OF 7

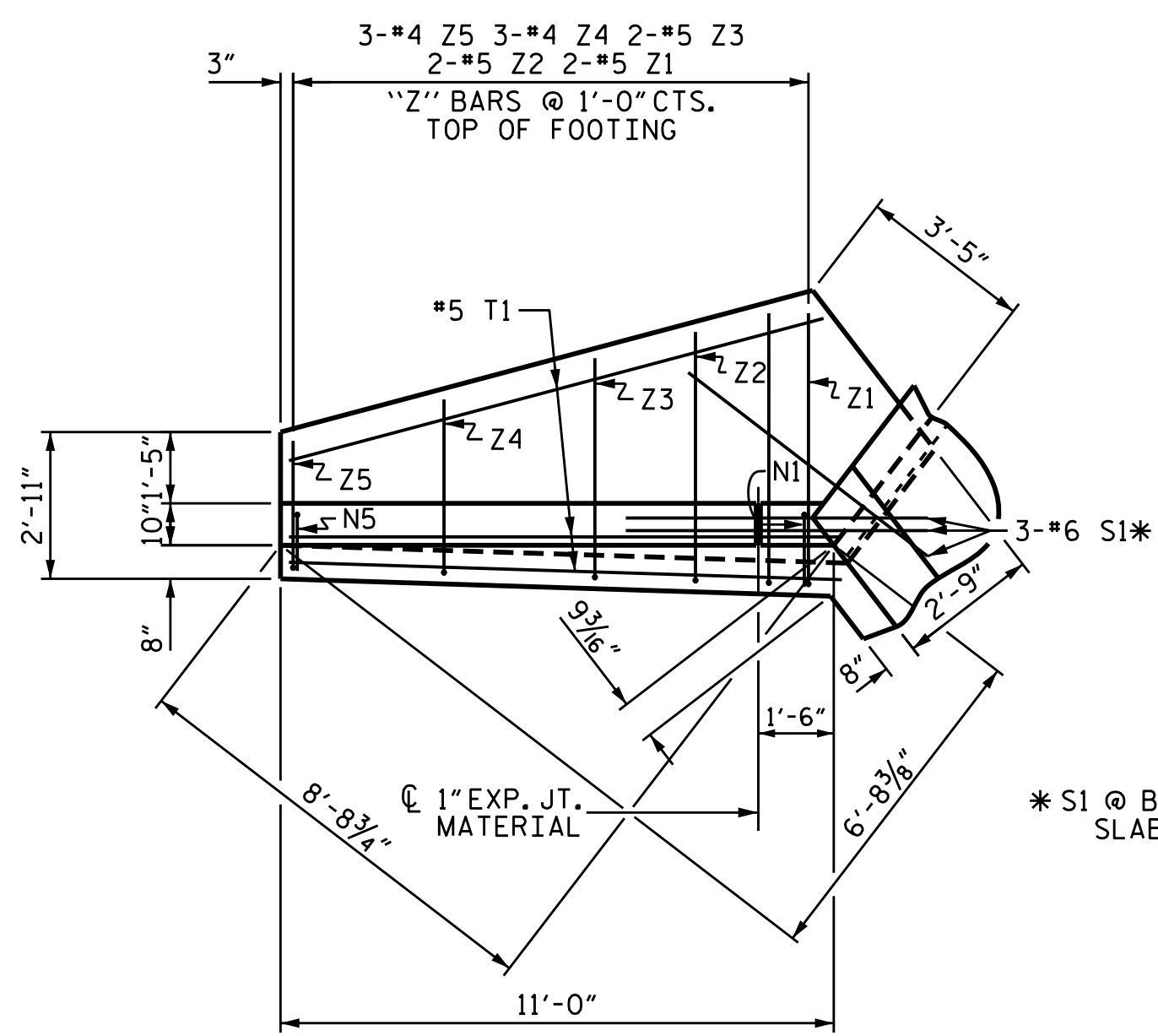


STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
**SINGLE 10 FT. X 8 FT. CONCRETE BOX CULVERT
80° SKEW**

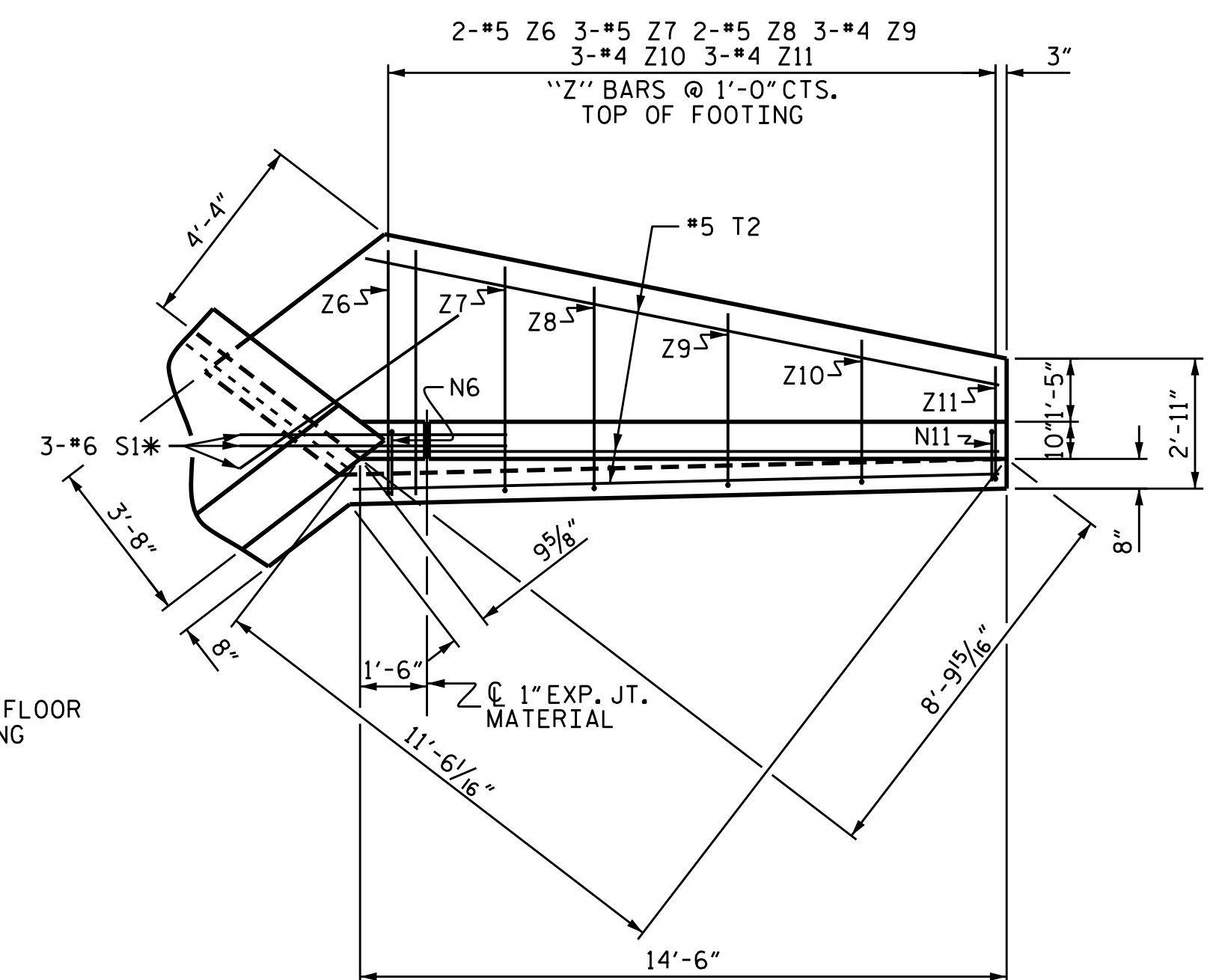
ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
CHECKED BY : A. K. PATEL DATE : 1/2014
DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 1/2014

REVISIONS						SHEET NO. C4-6
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 7
2			4			

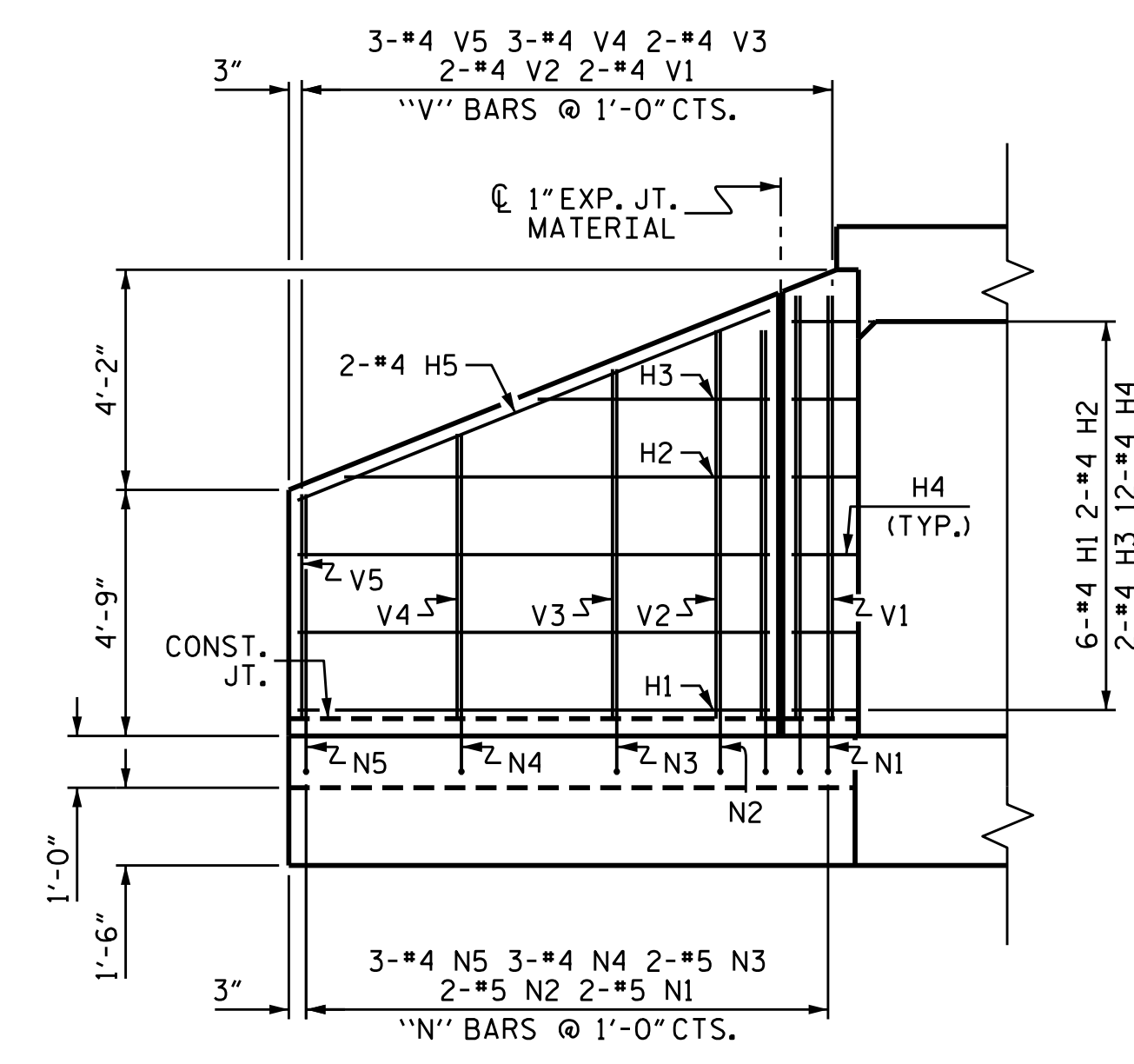
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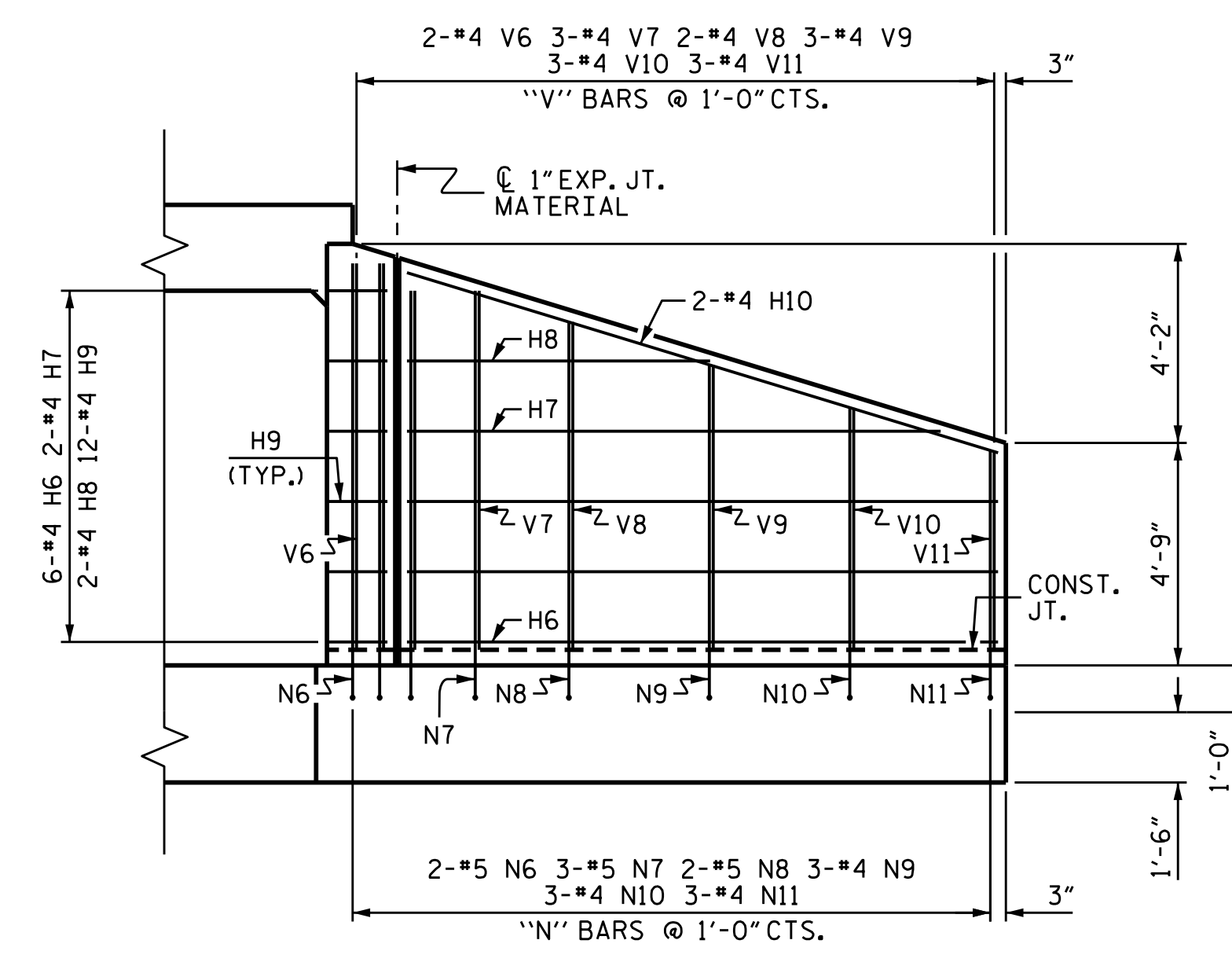
PLAN W2



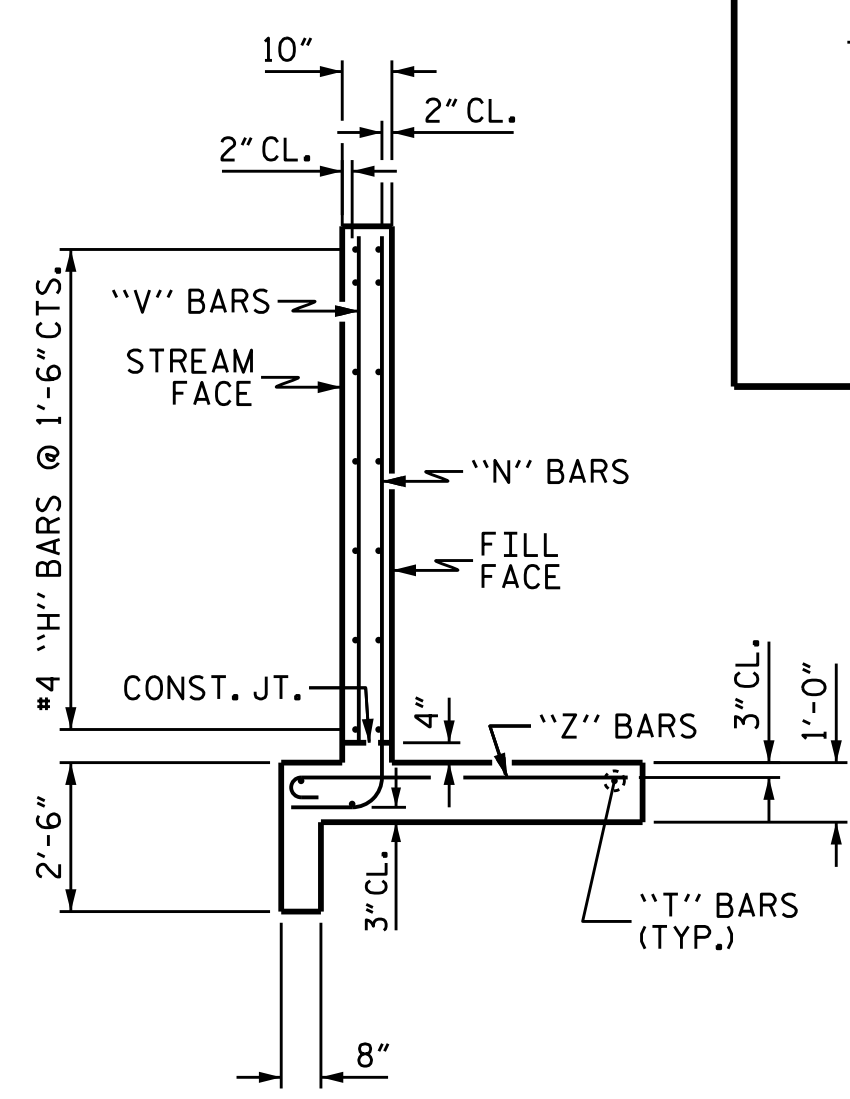
PLAN W1



ELEVATION W2



ELEVATION W1



TYPICAL WING SECTION

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.

NO.	SIZE	TYPE	LENGTH
N1	#5	3	10'-2"
N2	#5	3	9'-7"
N3	#5	3	8'-9"
N4	#4	3	7'-7"
N5	#4	3	6'-4"
N6	#5	3	10'-3"
N7	#5	3	9'-8"
N8	#5	3	9'-1"
N9	#4	3	8'-2"
N10	#4	3	7'-3"
N11	#4	3	6'-4"

NO.	SIZE	TYPE	LENGTH
Z1	#4	5'-5"	7"
Z2	#4	5'-0"	7"
Z3	#4	4'-5"	7"
Z4	#4	3'-6"	6"
Z5	#4	2'-7"	6"
Z6	#4	5'-6"	7"
Z7	#4	5'-1"	7"
Z8	#4	4'-7"	7"
Z9	#4	3'-11"	6"
Z10	#4	3'-3"	6"
Z11	#4	2'-7"	6"

BILL OF MATERIAL PER STAGE

BAR NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	#6	STR	9'-1"	36
H2	#4	STR	8'-2"	11
H3	#4	STR	4'-5"	6
H4	#4	1	3'-3"	26
H5	#4	STR	9'-10"	13
H6	#4	STR	12'-7"	50
H7	#4	STR	11'-4"	15
H8	#4	STR	6'-5"	9
H9	#4	2	3'-3"	26
H10	#4	STR	13'-2"	18
N1	#5	3	10'-2"	21
N2	#5	3	9'-7"	20
N3	#5	3	8'-9"	18
N4	#4	3	7'-7"	15
N5	#4	3	6'-4"	13
N6	#5	3	10'-3"	21
N7	#5	3	9'-8"	30
N8	#5	3	9'-1"	19
N9	#4	3	8'-2"	16
N10	#4	3	7'-3"	15
N11	#4	3	6'-4"	13
S1	#6	STR	6'-0"	54
T1	#5	STR	11'-0"	34
T2	#5	STR	14'-6"	45
V1	#4	STR	8'-2"	11
V2	#4	STR	7'-6"	10
V3	#4	STR	6'-9"	9
V4	#4	STR	5'-6"	11
V5	#4	STR	4'-4"	9
V6	#4	STR	8'-3"	11
V7	#4	STR	7'-8"	15
V8	#4	STR	7'-0"	9
V9	#4	STR	6'-1"	12
V10	#4	STR	5'-2"	10
V11	#4	STR	4'-3"	9
Z1	#5	4	6'-0"	13
Z2	#5	4	5'-7"	12
Z3	#5	4	5'-0"	10
Z4	#4	4	4'-0"	8
Z5	#4	4	3'-1"	6
Z6	#5	4	6'-1"	13
Z7	#5	4	5'-8"	18
Z8	#5	4	5'-2"	11
Z9	#4	4	4'-5"	9
Z10	#4	4	3'-9"	8
Z11	#4	4	3'-1"	6

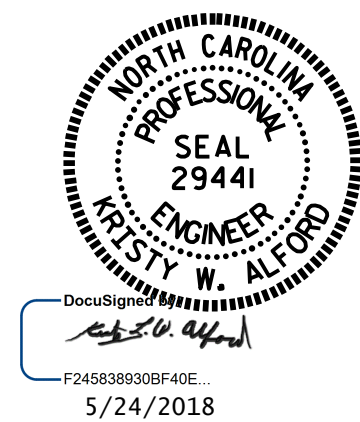
REINFORCING STEEL FOR 2 WINGS 774 LBS

CLASS A CONCRETE 2 WINGS 11.3 CY
 1 HEADWALL 0.6 CY
 1 END CURTAIN WALL 0.6 CY

TOTAL 12.5 CY

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 283+77.00 -L-

SHEET 7 OF 7



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
STANDARD WINGS FOR CONCRETE BOX CULVERT
 H = 8'-0" SLOPE = 2:1
 75° SKEW

ASSEMBLED BY : A. SORSENGIH DATE : 1/2014
 CHECKED BY : A. K. PATEL DATE : 1/2014
 DRAWN BY : CCJ 01/00
 CHECKED BY : RW 03/00

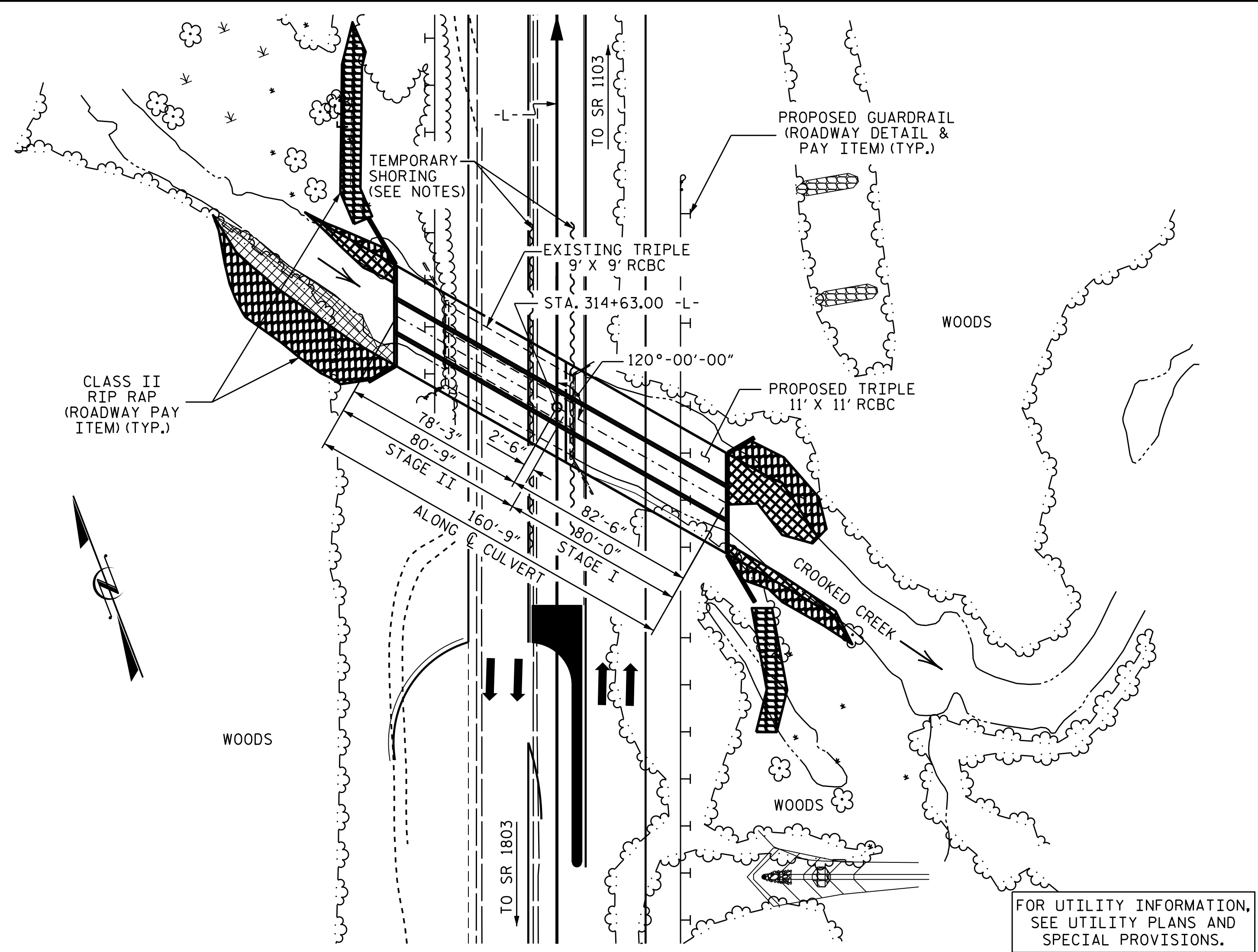
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C4-7
1			3			TOTAL SHEETS
2			4			7

STD. NO. CW7508

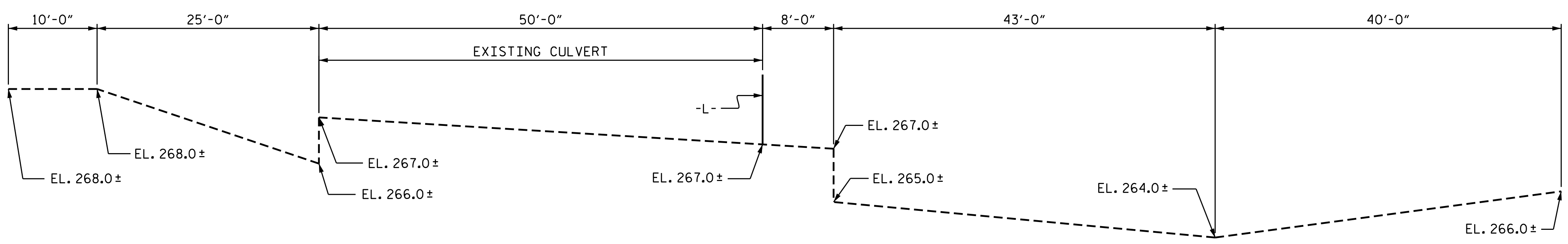
BM #62: RAIL ROAD SPIKE IN 20" OAK TREE, -L- STA. 323+03.00, 181' RT., EL. 315.11

F.A. PROJECT NO.: STP-401(249)



LOCATION SKETCH

HYDRAULIC DATA	OVERTOPPING FLOOD DATA	GRADE DATA
DESIGN DISCHARGE = 2,800 CFS	OVERTOPPING DISCHARGE = 4,800 CFS	GRADE POINT ELEVATION @ STA. 314+63.00 -L- = 287.32'
FREQUENCY OF DESIGN FLOOD = 50 YRS.	FREQUENCY OF OVERTOPPING FLOOD = 200+ YRS.	BED ELEVATION @ STA. 314+63.00 -L- = 266.54'
DESIGN HIGH WATER ELEVATION = 279.70	OVERTOPPING FLOOD ELEVATION = 286.70	ROADWAY FILL SLOPES = 2:1
DRAINAGE AREA = 7.07 SQ. MI.		
BASE DISCHARGE (Q100) = 3,100 CFS		
BASE HIGH WATER ELEVATION = 280.70		



PROFILE ALONG CULVERT

NOTES

- ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING.
- MAXIMUM DESIGN FILL----- 10.56'
- FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTE SHEET.
- 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
- CONCRETE IN EACH STAGE OF CULVERTS TO BE POURED IN THE FOLLOWING ORDER:
 1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
 2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.
- THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.
- DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.
- TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.
- AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
- AT THE CONTRACTOR'S OPTION HE MAY SUBMIT, TO THE ENGINEER FOR APPROVAL, DESIGN AND DETAIL DRAWINGS FOR A PRECAST REINFORCED CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE CULVERT SHOWN ON THE PLANS. THE DESIGN SHALL PROVIDE THE SAME SIZE OF BARREL AS USED ON THE CAST-IN-PLACE DESIGN. FOR OPTIONAL PRECAST REINFORCED CONCRETE BOX CULVERT, SEE SPECIAL PROVISIONS.
- THE EXISTING STRUCTURE CONSISTING OF A REINFORCED CONCRETE CULVERT 3' @ 9'(W) X 9'(D) SIZE, 58'± LONG AND LOCATED AT THE PROPOSED STRUCTURE, SHALL BE REMOVED. THE EXISTING STRUCTURE IS PRESENTLY NOT POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE STRUCTURE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED STRUCTURE, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

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

FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.

FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

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

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

BACKFILL BARRELS WITH 1.0 FT. NATIVE BED MATERIAL.

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 WILL BE PAID FOR BY THE CONTRACTOR.

TOTAL STRUCTURE QUANTITIES

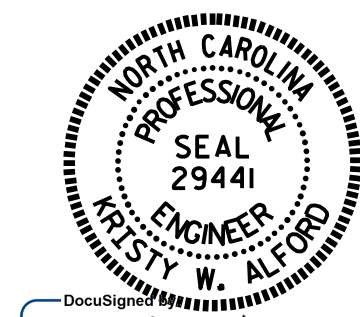
CLASS A CONCRETE	
STAGE I	348.6 C.Y.
STAGE II	351.5 C.Y.
TOTAL	700.1 C.Y.
REINFORCING STEEL	
STAGE I	41,749 LBS.
STAGE II	41,969 LBS.
TOTAL	83,718 LBS.
FOUNDATION CONDITIONING MATERIAL	
STAGE I	225 TONS
STAGE II	227 TONS
TOTAL	452 TONS
CULVERT EXCAVATION	LUMP SUM
REMOVAL OF EXISTING STRUCTURE	LUMP SUM

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 314+63.00 -L-

SHEET 1 OF 9 REPLACES BRIDGE #6

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TRIPLE 11 FT. X 11 FT.
 CONCRETE BOX CULVERT
 120° SKEW



ASSEMBLED BY: A. SORSENGINH DATE: 2/2014
 CHECKED BY: K.W. ALFORD DATE: 3/2018
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE: 1/2014

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER		
						LIVE-LOAD FACTORS (ILL)	MOMENT				SHEAR					
							RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE		DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	1.08	--	1.75	1.24	1	TOP SLAB	5.26	1.08	1	EXTERIOR WALL	11.01		
	HL-93 (OPERATING)	N/A		1.40	--	1.35	1.60	1	TOP SLAB	5.26	1.40	1	EXTERIOR WALL	11.01		
	HS-20 (INVENTORY)	36.000	②	1.10	39.50	1.75	1.57	1	BOT CORNER WALL	11.76	1.10	1	EXTERIOR WALL	11.01		
	HS-20 (OPERATING)	36.000		1.42	51.21	1.35	2.03	1	BOT CORNER WALL	11.76	1.42	1	EXTERIOR WALL	11.01		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		1.41	19.00	1.40	2.15	1	BOT CORNER WALL	11.76	1.41	1	EXTERIOR WALL	11.01	
		SNGARBS2	20.000		1.40	28.07	1.40	2.10	1	BOT CORNER WALL	11.76	1.40	1	EXTERIOR WALL	11.01	
		SNAGRIS2	22.000		1.40	30.86	1.40	2.09	1	BOT CORNER WALL	11.76	1.40	1	EXTERIOR WALL	11.01	
		SNCOTTS3	27.250		1.35	36.81	1.40	1.54	1	TOP SLAB	5.26	1.35	1	EXTERIOR WALL	11.01	
		SNAGGRS4	34.925		1.37	47.90	1.40	1.60	1	TOP SLAB	5.26	1.37	1	EXTERIOR WALL	11.01	
		SNS5A	35.550		1.37	48.63	1.40	1.58	1	TOP SLAB	5.26	1.37	1	EXTERIOR WALL	11.01	
		SNS6A	39.950		1.35	53.80	1.40	1.57	1	TOP SLAB	5.26	1.35	1	EXTERIOR WALL	11.01	
		SNS7B	42.000	③	1.34	56.45	1.40	1.62	1	TOP SLAB	5.26	1.34	1	EXTERIOR WALL	11.01	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.37	45.36	1.40	1.98	1	BOT CORNER WALL	11.76	1.37	1	EXTERIOR WALL	11.01	
		TNT4A	33.075		1.38	45.54	1.40	1.84	1	TOP SLAB	5.26	1.38	1	EXTERIOR WALL	11.01	
		TNT6A	41.600		1.37	56.87	1.40	1.71	1	TOP SLAB	5.26	1.37	1	EXTERIOR WALL	11.01	
		TNT7A	42.000		1.35	56.62	1.40	1.90	1	TOP SLAB	5.26	1.35	1	EXTERIOR WALL	11.01	
		TNT7B	42.000		1.37	57.59	1.40	1.65	1	TOP SLAB	5.26	1.37	1	EXTERIOR WALL	11.01	
		TNAGRIT4	43.000		1.37	59.10	1.40	1.75	1	TOP SLAB	5.26	1.37	1	EXTERIOR WALL	11.01	
		TNAGT5A	45.000		1.37	61.73	1.40	1.80	1	TOP SLAB	5.26	1.37	1	EXTERIOR WALL	11.01	
TNAGT5B	45.000		1.37	61.45	1.40	1.84	1	TOP SLAB	5.26	1.37	1	EXTERIOR WALL	11.01			

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	0.50 OR 0.90
ES	1.35	0.50 OR 0.90
LS	1.75	--
WA	1.00	--

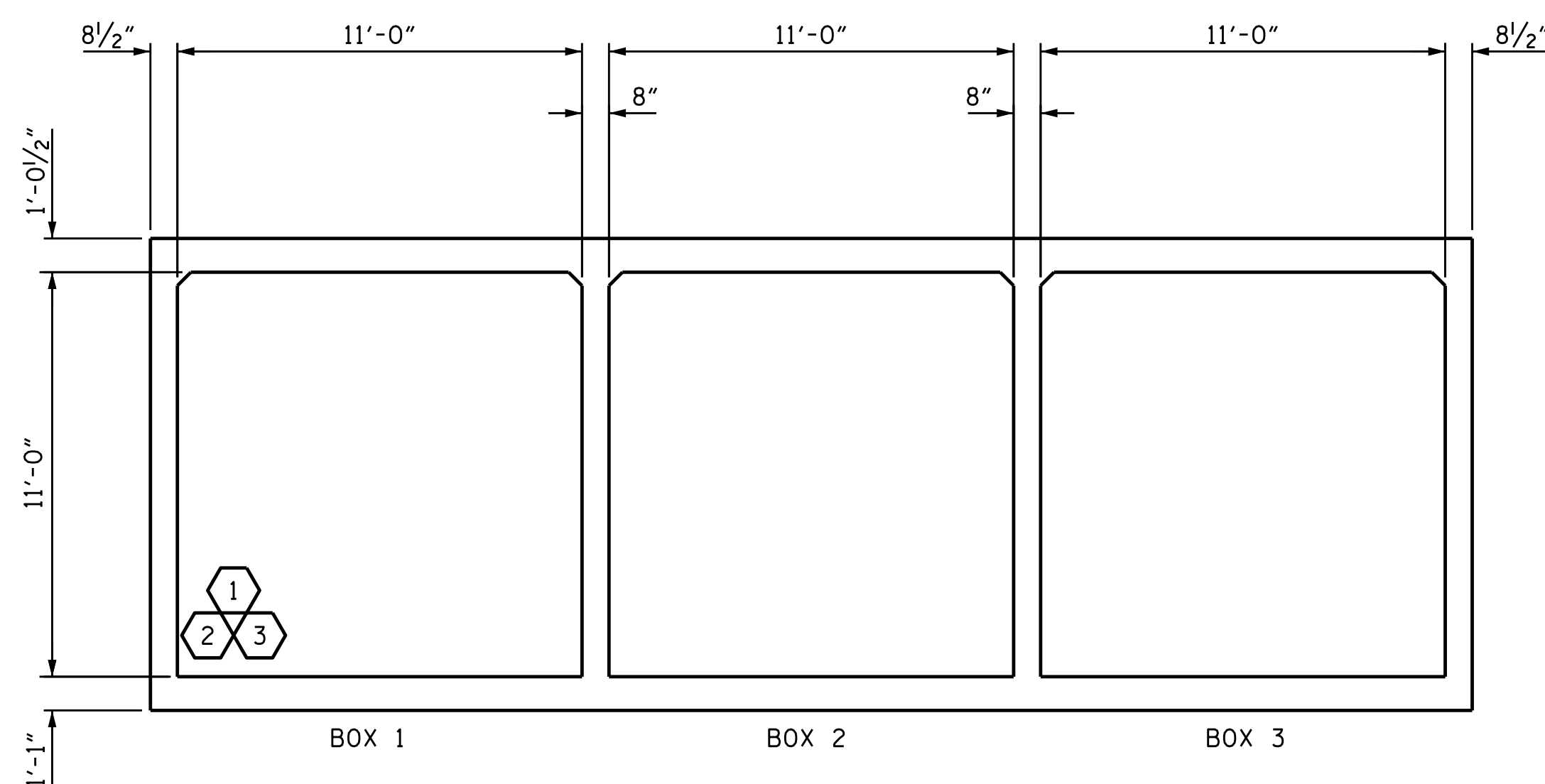
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

- 1.
- 2.
- 3.
- 4.

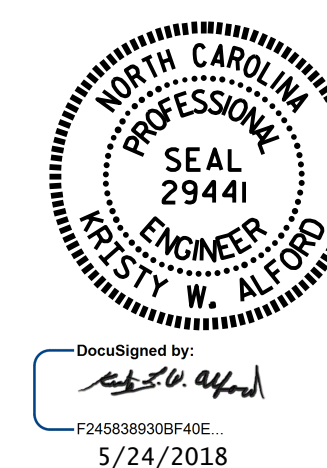
#	CONTROLLING LOAD RATING
①	DESIGN LOAD RATING (HL-93)
②	DESIGN LOAD RATING (HS-20)
③	LEGAL LOAD RATING **
** SEE CHART FOR VEHICLE TYPE	



LRFR SUMMARY
(LOOKING DOWNSTREAM)

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 314+63.00 -L-

SHEET 2 OF 9

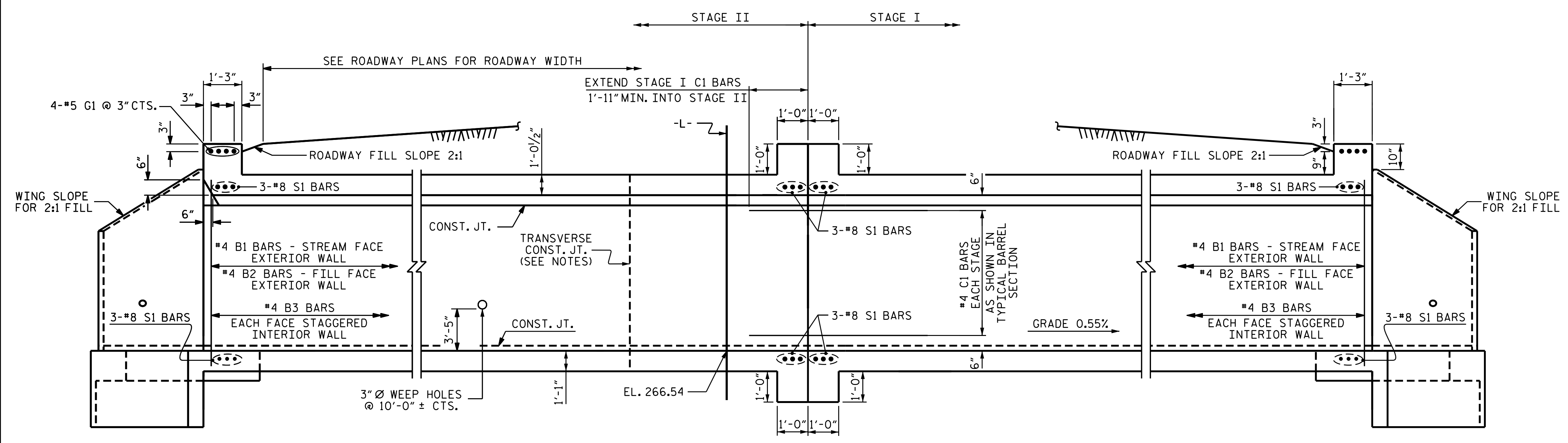


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD
 LRFR SUMMARY FOR
 REINFORCED CONCRETE
 BOX CULVERTS
 (NON-INTERSTATE TRAFFIC)

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

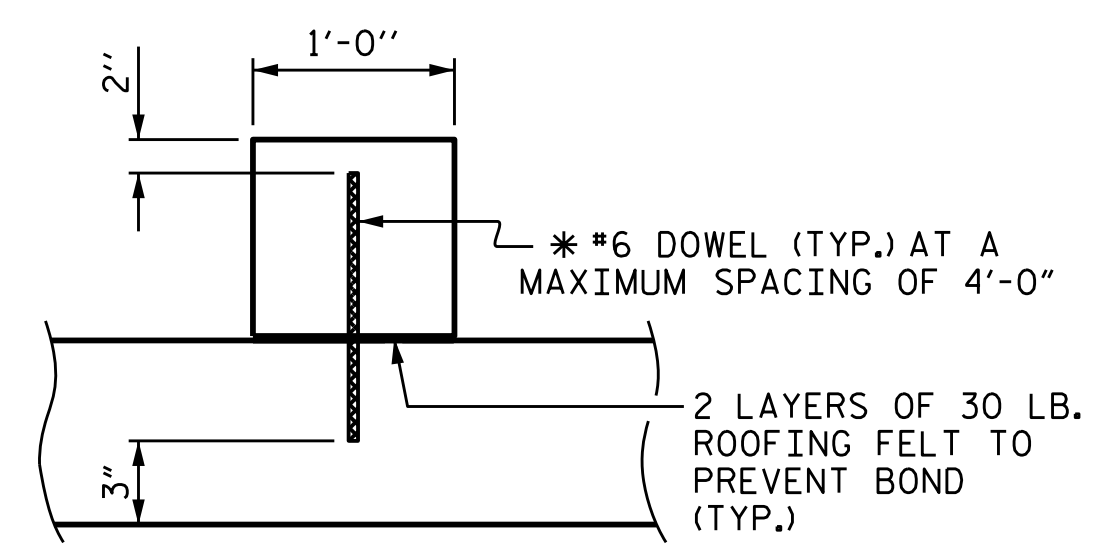
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY : D.R. SHACKELFORD	DATE : 3/2018
CHECKED BY : K.W. ALFORD	DATE : 3/2018
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11
REV. 10/1/11	MAA/GM



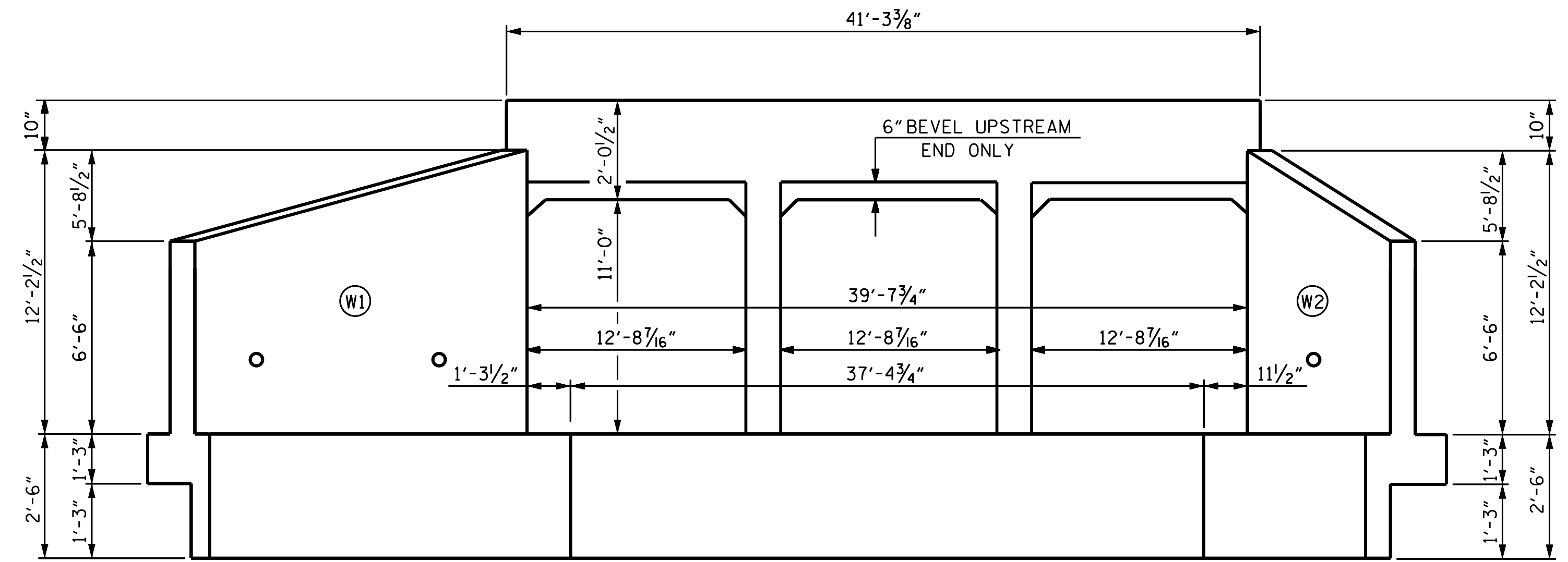
I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

CULVERT SECTION NORMAL TO ROADWAY

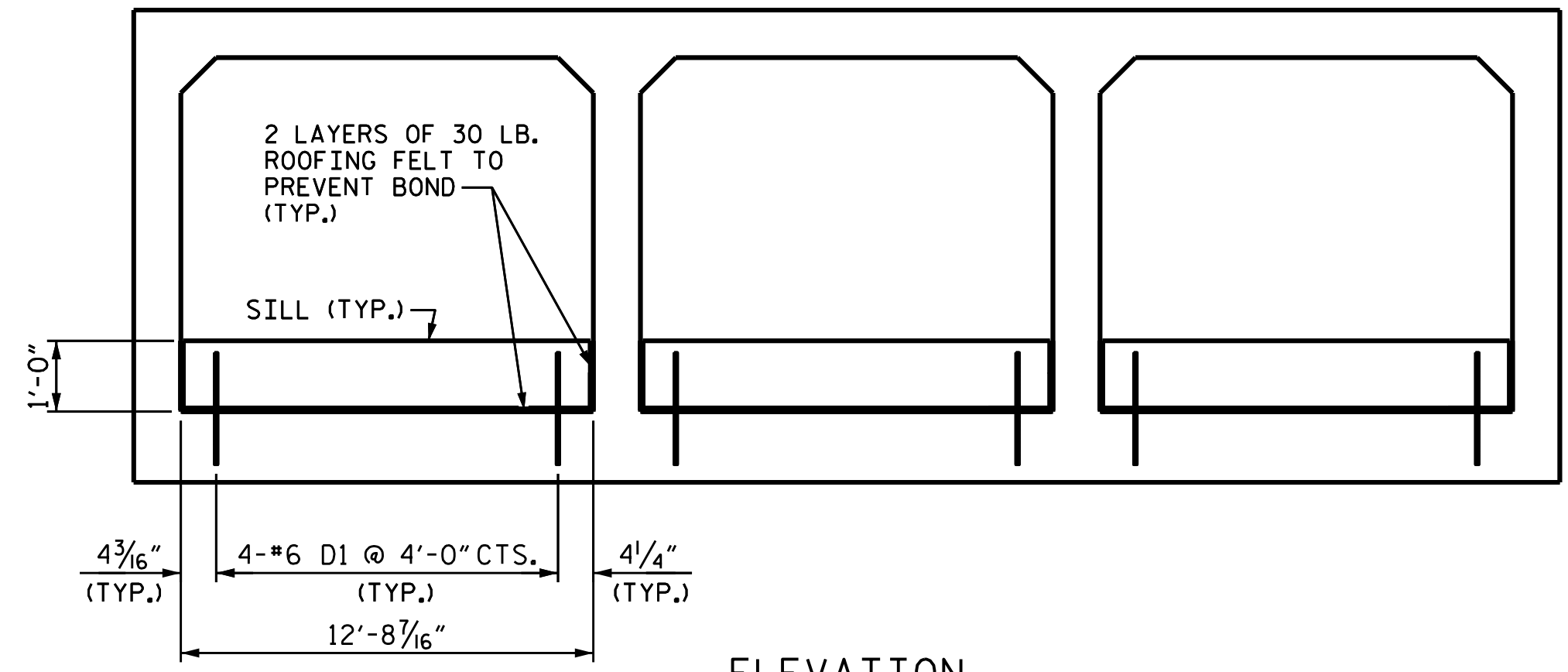


SECTION THROUGH SILL

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



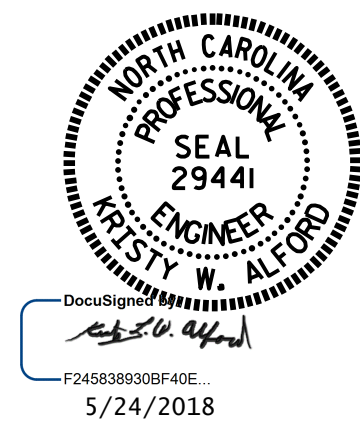
INLET END ELEVATION NORMAL TO SKEW



ELEVATION

CULVERT SILL DETAILS

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 314+63.00 -L-
 SHEET 3 OF 9

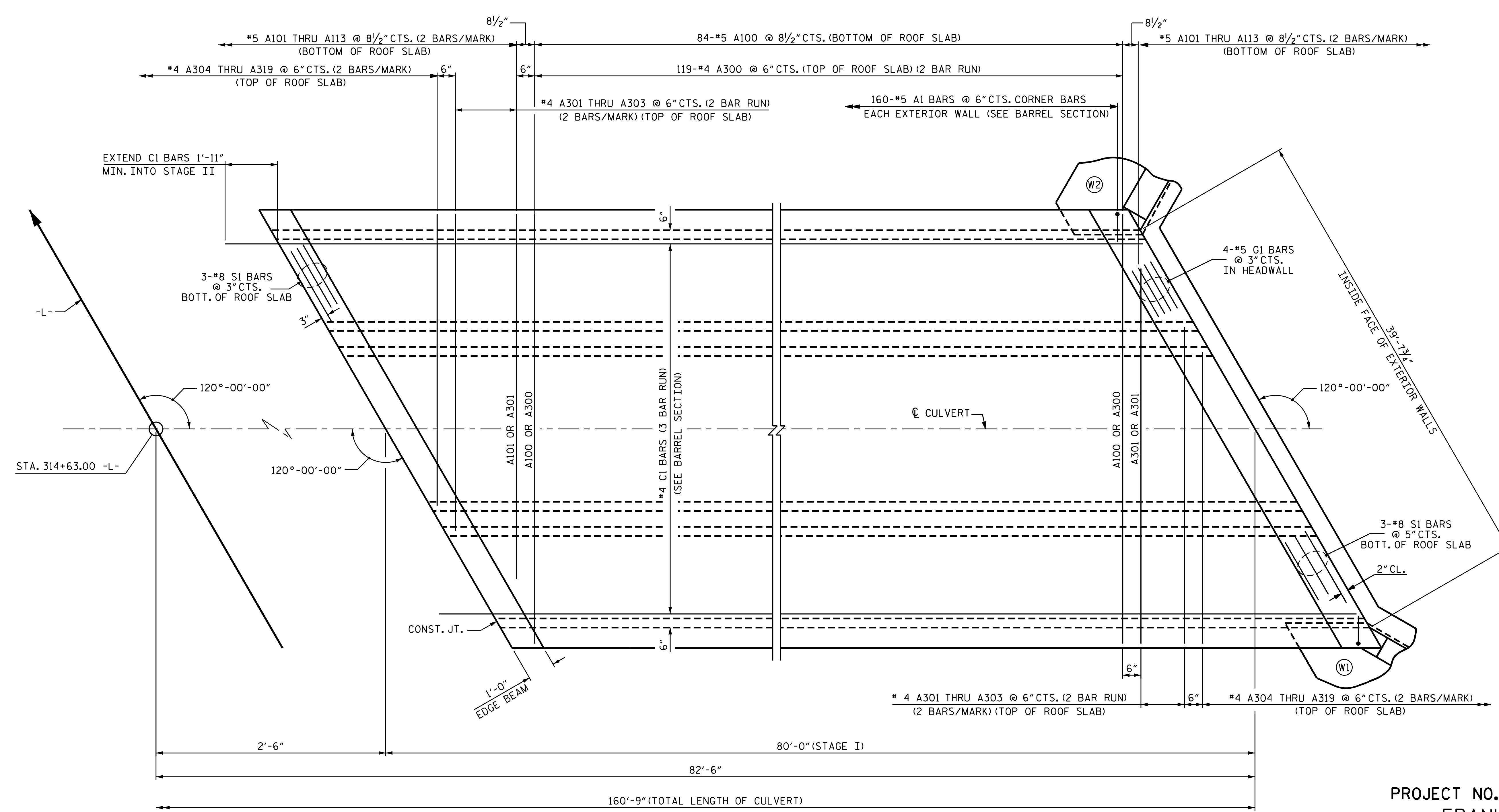


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TRIPLE 11 FT. X 11 FT.
 CONCRETE BOX CULVERT
 120° SKEW

ASSEMBLED BY: A. SORSENGINH DATE: 2/2014
 CHECKED BY: K.W. ALFORD DATE: 3/2018
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE: 1/2014

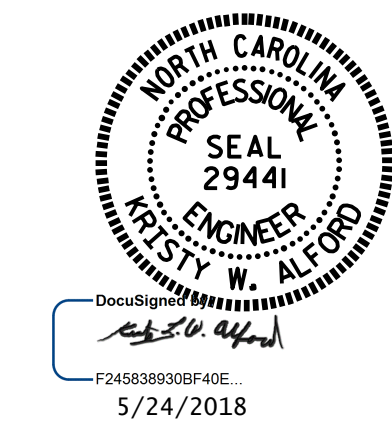
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REVISIONS						SHEET NO. C5-3
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 9
2			4			



**PLAN OF ROOF SLAB
 STAGE I**

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 314+63.00 -L-
 SHEET 4 OF 9

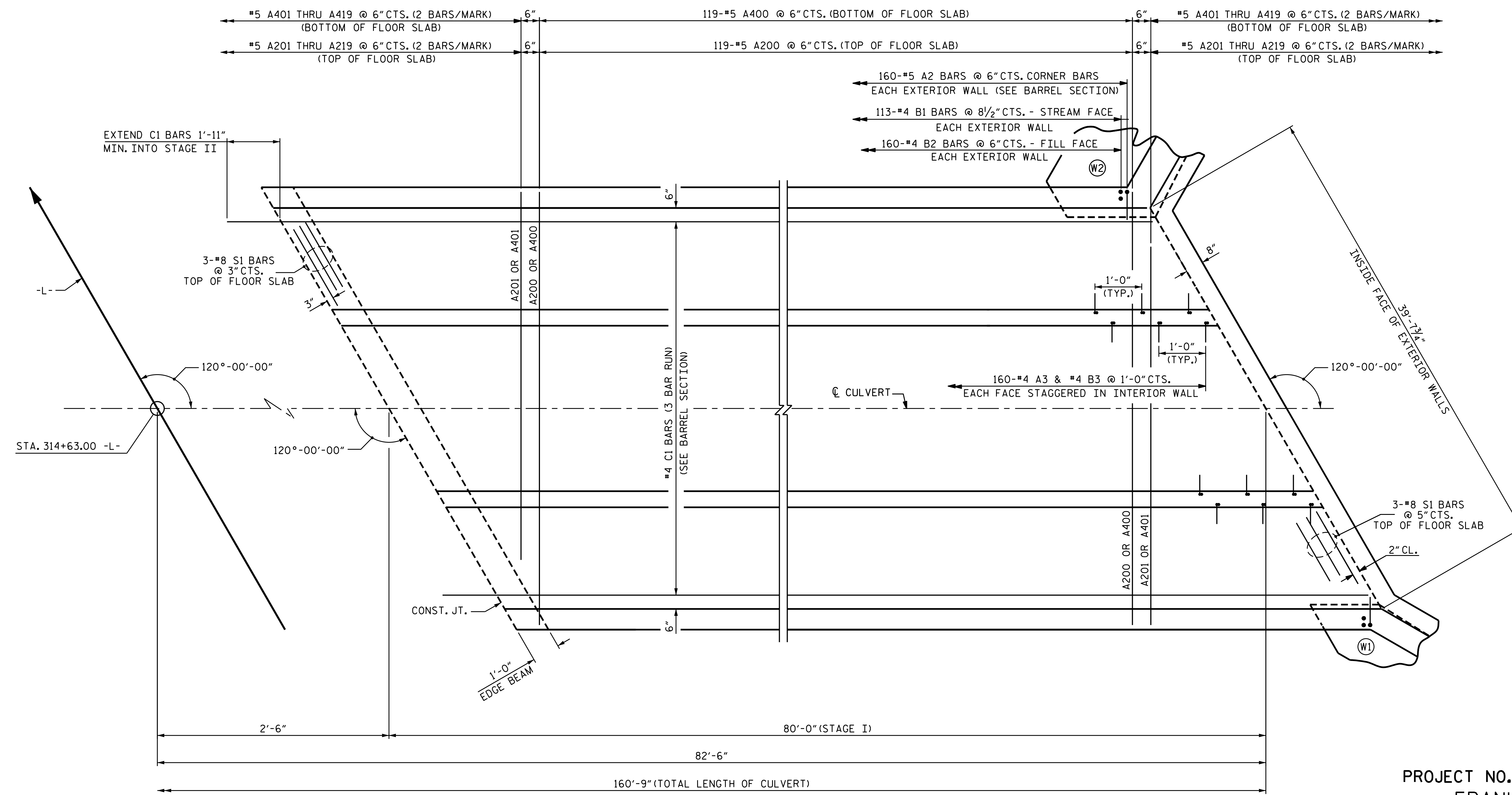


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**TRIPLE 11 FT. X 11 FT.
 CONCRETE BOX CULVERT
 STAGE I
 120° SKEW**

ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : K.W. ALFORD DATE : 3/2018
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

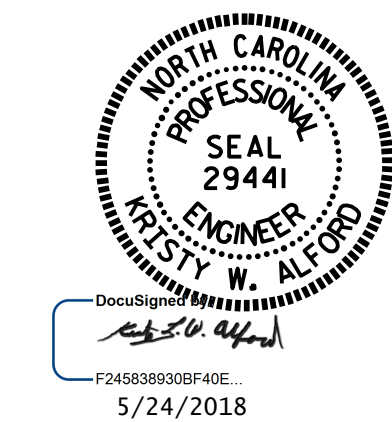
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REVISIONS						SHEET NO. C5-4
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 9
2			4			



**PLAN OF FLOOR SLAB
 STAGE I**

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 314+63.00 -L-
 SHEET 5 OF 9

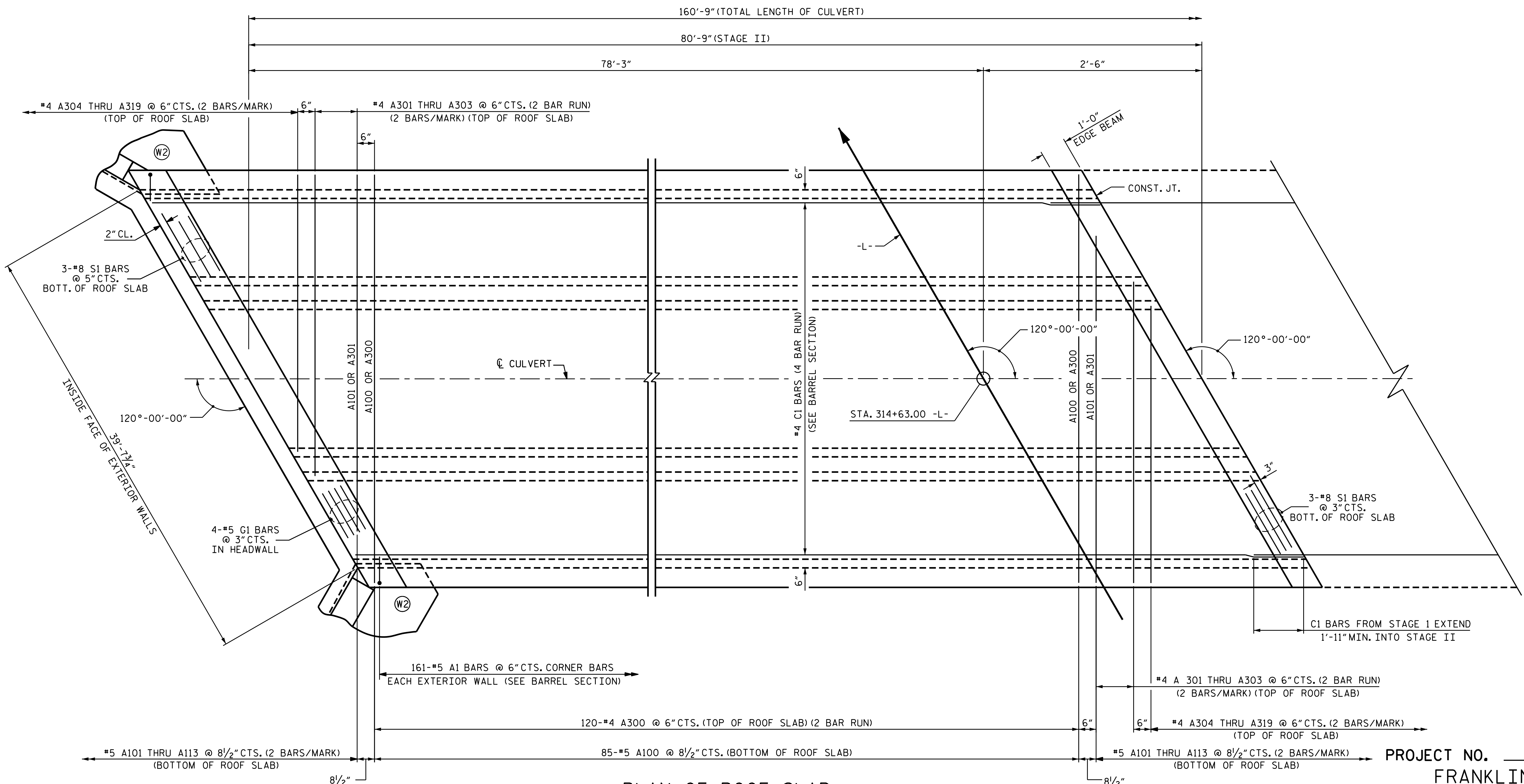


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**TRIPLE 11 FT. X 11 FT.
 CONCRETE BOX CULVERT
 STAGE I
 120° SKEW**

ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : K.W. ALFORD DATE : 3/2018
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

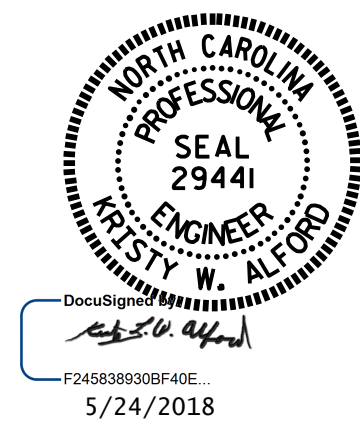
REVISIONS						SHEET NO. C5-5
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 9
2			4			

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PLAN OF ROOF SLAB
 STAGE II

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 314+63.00 -L-
 SHEET 6 OF 9

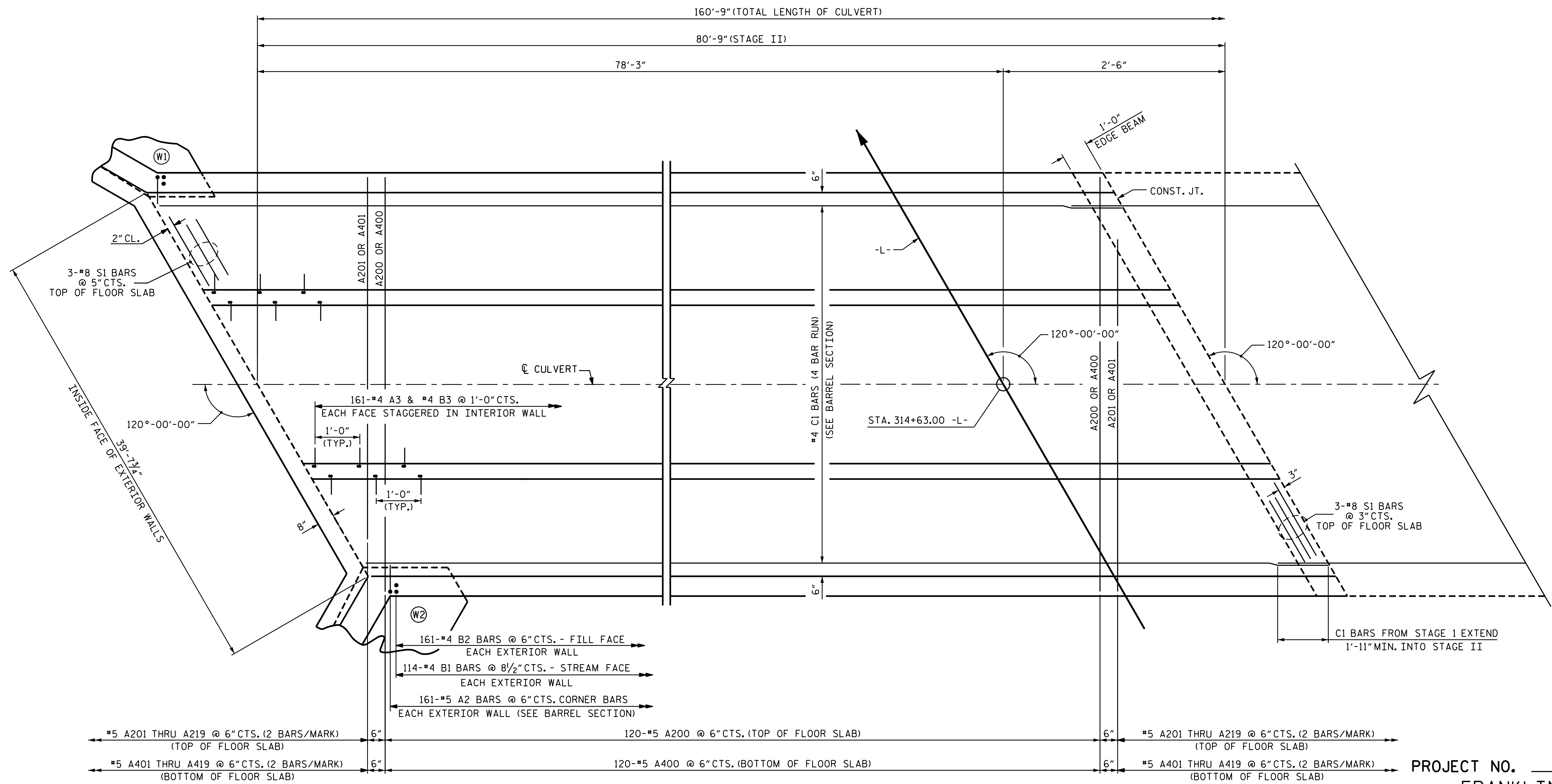


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TRIPLE 11 FT. X 11 FT.
 CONCRETE BOX CULVERT
 STAGE II
 120° SKEW

ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : K.W. ALFORD DATE : 3/2018
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

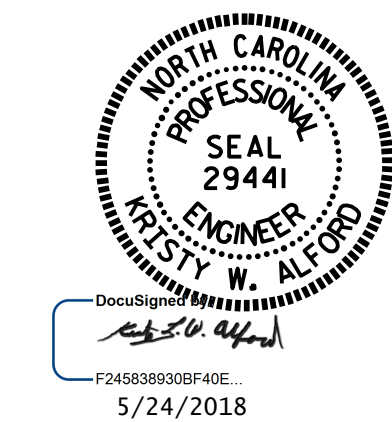
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C5-6
1			3			TOTAL SHEETS 9
2			4			



PLAN OF FLOOR SLAB
 STAGE II

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 314+63.00 -L-
 SHEET 7 OF 9

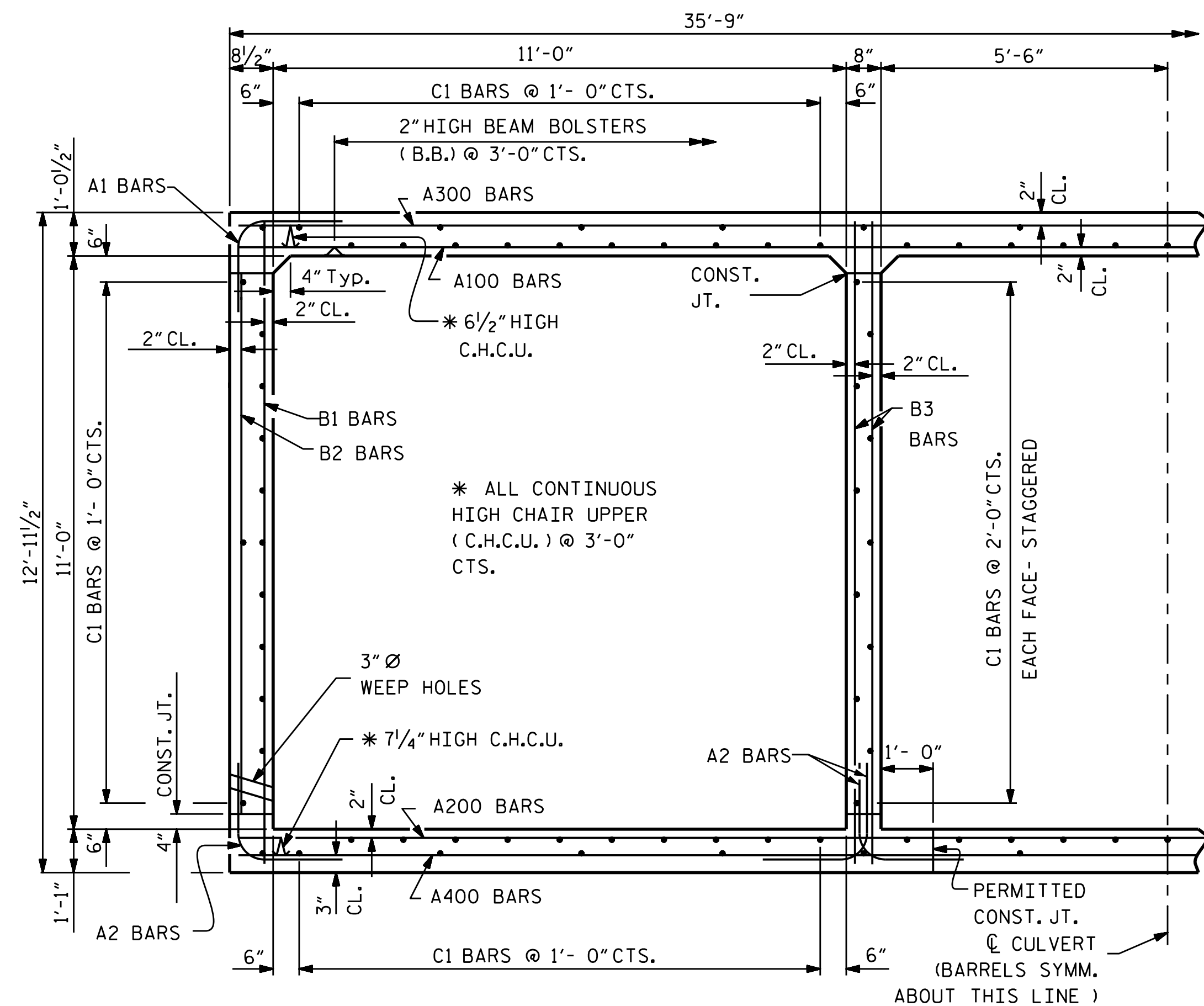


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 TRIPLE 11 FT. X 11 FT.
 CONCRETE BOX CULVERT
 STAGE II
 120° SKEW

ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : K.W. ALFORD DATE : 3/2018
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

REVISIONS						SHEET NO. C5-7
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 9
2			4			

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED



RIGHT ANGLE SECTION OF BARREL

THERE ARE 138 "C" BARS IN SECTION OF BARREL.

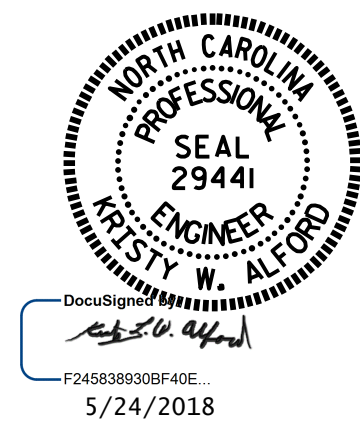
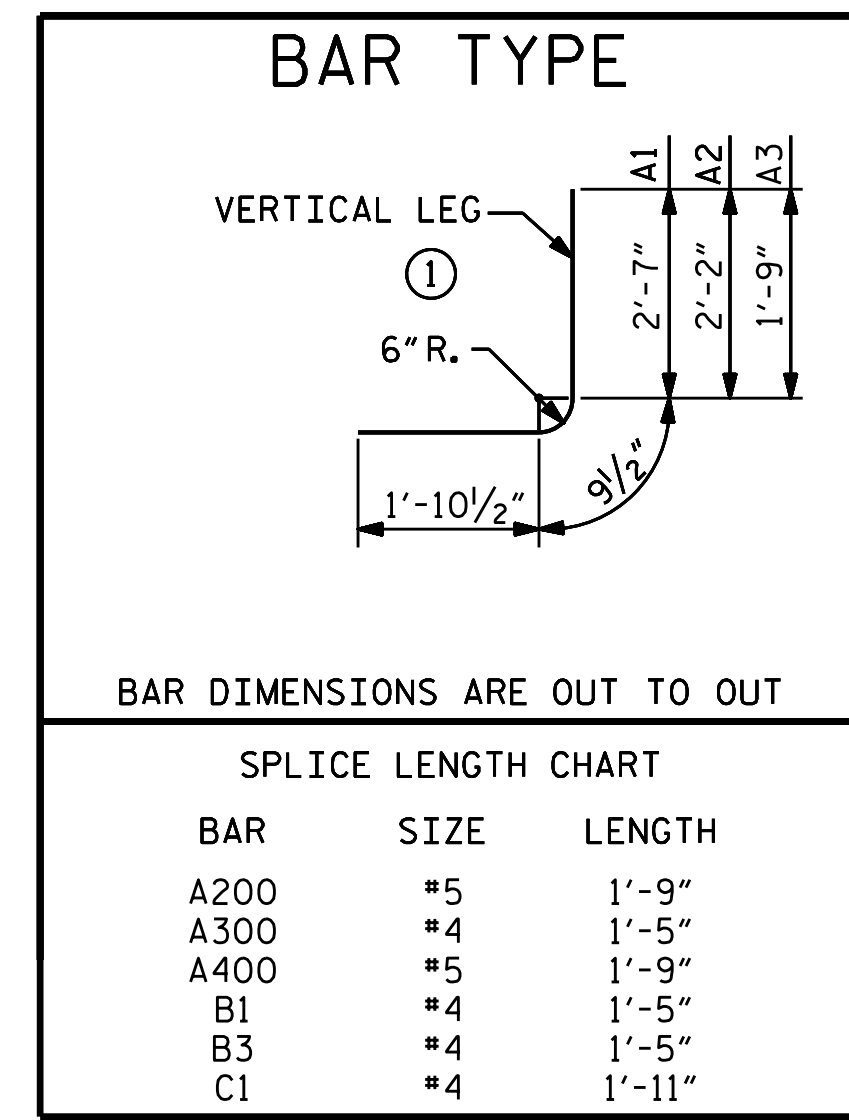
BAR SCHEDULE STAGE I										BAR SCHEDULE STAGE II													
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1	320	#5	1	5'-3"	1741	A307	4	#4	STR	23'-1"	62	A1	322	#5	1	5'-3"	1763	A307	4	#4	STR	23'-1"	62
A2	320	#5	1	4'-10"	1613	A308	4	#4	STR	21'-4"	57	A2	322	#5	1	4'-10"	1623	A308	4	#4	STR	21'-4"	57
A3	320	#4	1	4'-5"	944	A309	4	#4	STR	19'-7"	52	A3	322	#4	1	4'-5"	950	A309	4	#4	STR	19'-7"	52
A100	84	#5	STR	35'-4"	3096	A310	4	#4	STR	17'-11"	48	A100	85	#5	STR	35'-4"	3132	A310	4	#4	STR	17'-11"	48
A101	4	#5	STR	32'-9"	137	A311	4	#4	STR	16'-2"	43	A101	4	#5	STR	32'-9"	137	A311	4	#4	STR	16'-2"	43
A102	4	#5	STR	30'-4"	127	A312	4	#4	STR	14'-5"	39	A102	4	#5	STR	30'-4"	127	A312	4	#4	STR	14'-5"	39
A103	4	#5	STR	27'-10"	116	A313	4	#4	STR	12'-8"	34	A103	4	#5	STR	27'-10"	116	A313	4	#4	STR	12'-8"	34
A104	4	#5	STR	25'-5"	106	A314	4	#4	STR	11'-0"	29	A104	4	#5	STR	25'-5"	106	A314	4	#4	STR	11'-0"	29
A105	4	#5	STR	22'-11"	96	A315	4	#4	STR	9'-3"	25	A105	4	#5	STR	22'-11"	96	A315	4	#4	STR	9'-3"	25
A106	4	#5	STR	20'-6"	86	A316	4	#4	STR	7'-6"	20	A106	4	#5	STR	20'-6"	86	A316	4	#4	STR	7'-6"	20
A107	4	#5	STR	18'-0"	75	A317	4	#4	STR	5'-9"	15	A107	4	#5	STR	18'-0"	75	A317	4	#4	STR	5'-9"	15
A108	4	#5	STR	15'-7"	65	A318	4	#4	STR	4'-0"	11	A108	4	#5	STR	15'-7"	65	A318	4	#4	STR	4'-0"	11
A109	4	#5	STR	13'-1"	55	A319	4	#4	STR	3'-1"	8	A109	4	#5	STR	13'-1"	55	A319	4	#4	STR	3'-1"	8
A110	4	#5	STR	10'-8"	45	A400	119	#5	STR	35'-4"	4385	A110	4	#5	STR	10'-8"	45	A400	120	#5	STR	35'-4"	4422
A111	4	#5	STR	8'-3"	34	A401	4	#5	STR	33'-6"	140	A111	4	#5	STR	8'-3"	34	A401	4	#5	STR	33'-6"	140
A112	4	#5	STR	5'-9"	24	A402	4	#5	STR	31'-3"	130	A112	4	#5	STR	5'-9"	24	A402	4	#5	STR	31'-3"	130
A113	4	#5	STR	3'-4"	14	A403	4	#5	STR	30'-0"	125	A113	4	#5	STR	3'-4"	14	A403	4	#5	STR	30'-0"	125
A200	119	#5	STR	35'-4"	4385	A404	4	#5	STR	28'-3"	118	A200	120	#5	STR	35'-4"	4422	A404	4	#5	STR	28'-3"	118
A201	4	#5	STR	33'-6"	140	A405	4	#5	STR	26'-7"	111	A201	4	#5	STR	33'-6"	140	A405	4	#5	STR	26'-7"	111
A202	4	#5	STR	31'-3"	130	A406	4	#5	STR	24'-10"	104	A202	4	#5	STR	31'-3"	130	A406	4	#5	STR	24'-10"	104
A203	4	#5	STR	30'-0"	125	A407	4	#5	STR	23'-1"	96	A203	4	#5	STR	30'-0"	125	A407	4	#5	STR	23'-1"	96
A204	4	#5	STR	28'-3"	118	A408	4	#5	STR	21'-4"	89	A204	4	#5	STR	28'-3"	118	A408	4	#5	STR	21'-4"	89
A205	4	#5	STR	26'-7"	111	A409	4	#5	STR	19'-7"	82	A205	4	#5	STR	26'-7"	111	A409	4	#5	STR	19'-7"	82
A206	4	#5	STR	24'-10"	104	A410	4	#5	STR	17'-11"	75	A206	4	#5	STR	24'-10"	104	A410	4	#5	STR	17'-11"	75
A207	4	#5	STR	23'-1"	96	A411	4	#5	STR	16'-2"	67	A207	4	#5	STR	23'-1"	96	A411	4	#5	STR	16'-2"	67
A208	4	#5	STR	21'-4"	89	A412	4	#5	STR	14'-5"	61	A208	4	#5	STR	21'-4"	89	A412	4	#5	STR	14'-5"	61
A209	4	#5	STR	19'-7"	82	A413	4	#5	STR	12'-8"	53	A209	4	#5	STR	19'-7"	82	A413	4	#5	STR	12'-8"	53
A210	4	#5	STR	17'-11"	75	A414	4	#5	STR	11'-0"	46	A210	4	#5	STR	17'-11"	75	A414	4	#5	STR	11'-0"	46
A211	4	#5	STR	16'-2"	67	A415	4	#5	STR	9'-3"	39	A211	4	#5	STR	16'-2"	67	A415	4	#5	STR	9'-3"	39
A212	4	#5	STR	14'-5"	61	A416	4	#5	STR	7'-6"	31	A212	4	#5	STR	14'-5"	61	A416	4	#5	STR	7'-6"	31
A213	4	#5	STR	12'-8"	53	A417	4	#5	STR	5'-9"	24	A213	4	#5	STR	12'-8"	53	A417	4	#5	STR	5'-9"	24
A214	4	#5	STR	11'-0"	46	A418	4	#5	STR	4'-0"	17	A214	4	#5	STR	11'-0"	46	A418	4	#5	STR	4'-0"	17
A215	4	#5	STR	9'-3"	39	A419	4	#5	STR	3'-1"	13	A215	4	#5	STR	9'-3"	39	A419	4	#5	STR	3'-1"	13
A216	4	#5	STR	7'-6"	31	B1	226	#4	STR	12'-7"	1900	A216	4	#5	STR	7'-6"	31	B1	228	#4	STR	12'-7"	1916
A217	4	#5	STR	5'-9"	24	B2	320	#4	STR	10'-4"	2209	A217	4	#5	STR	5'-9"	24	B2	322	#4	STR	10'-4"	2223
A218	4	#5	STR	4'-0"	17	B3	320	#4	STR	12'-7"	2690	A218	4	#5	STR	4'-0"	17	B3	322	#4	STR	12'-7"	2707
A219	4	#5	STR	3'-1"	13	C1	414	#4	STR	28'-6"	7882	A219	4	#5	STR	3'-1"	13	C1	414	#4	STR	28'-6"	7882
A300	238	#4	STR	18'-5"	2928							A300	240	#4	STR	18'-5"	2953						
A301	8	#4	STR	17'-8"	94	D1	12	#6	STR	1'-7"	29	A301	8	#4	STR	17'-8"	94	D1	12	#6	STR	1'-7"	29
A302	8	#4	STR	16'-9"	90	G1	4	#5	STR	40'-10"	170	A302	8	#4	STR	16'-9"	90	G1	4	#5	STR	40'-10"	170
A303	8	#4	STR	15'-11"	85	S1	12	#8	STR	40'-10"	1308	A303	8	#4	STR	15'-11"	85	S1	12	#8	STR	40'-10"	1308
A304	4	#4	STR	28'-3"	75							A304	4	#4	STR	28'-3"	75						
A305	4	#4	STR	26'-7"	71							A305	4	#4	STR	26'-7"	71						
A306	4	#4	STR	24'-10"	66							A306	4	#4	STR	24'-10"	66						

REINFORCING STEEL = 40,026 LBS

REINFORCING STEEL = 40,246 LBS

TOTAL STAGE I QUANTITIES	
CLASS A CONCRETE	
BARREL @ 3.946 CY/FT	315.7 C.Y.
EDGE BEAMS	3.1 C.Y.
WINGS, ETC.	28.4 C.Y.
SILL	1.4 C.Y.
TOTAL	348.6 C.Y.
REINFORCING STEEL	
BARREL	40,026 LBS.
WINGS, ETC.	1,723 LBS.
TOTAL	41,749 LBS.
FOUNDATION CONDITIONING MATERIAL	225 TONS
CULVERT EXCAVATION	LUMP SUM

TOTAL STAGE II QUANTITIES	
CLASS A CONCRETE	
BARREL @ 3.946 CY/FT	318.6 C.Y.
EDGE BEAMS	3.1 C.Y.
WINGS, ETC.	28.4 C.Y.
SILL	1.4 C.Y.
TOTAL	351.5 C.Y.
REINFORCING STEEL	
BARREL	40,246 LBS.
WINGS, ETC.	1,723 LBS.
TOTAL	41,969 LBS.
FOUNDATION CONDITIONING MATERIAL	227 TONS
CULVERT EXCAVATION	LUMP SUM



PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 314+63.00 -L-

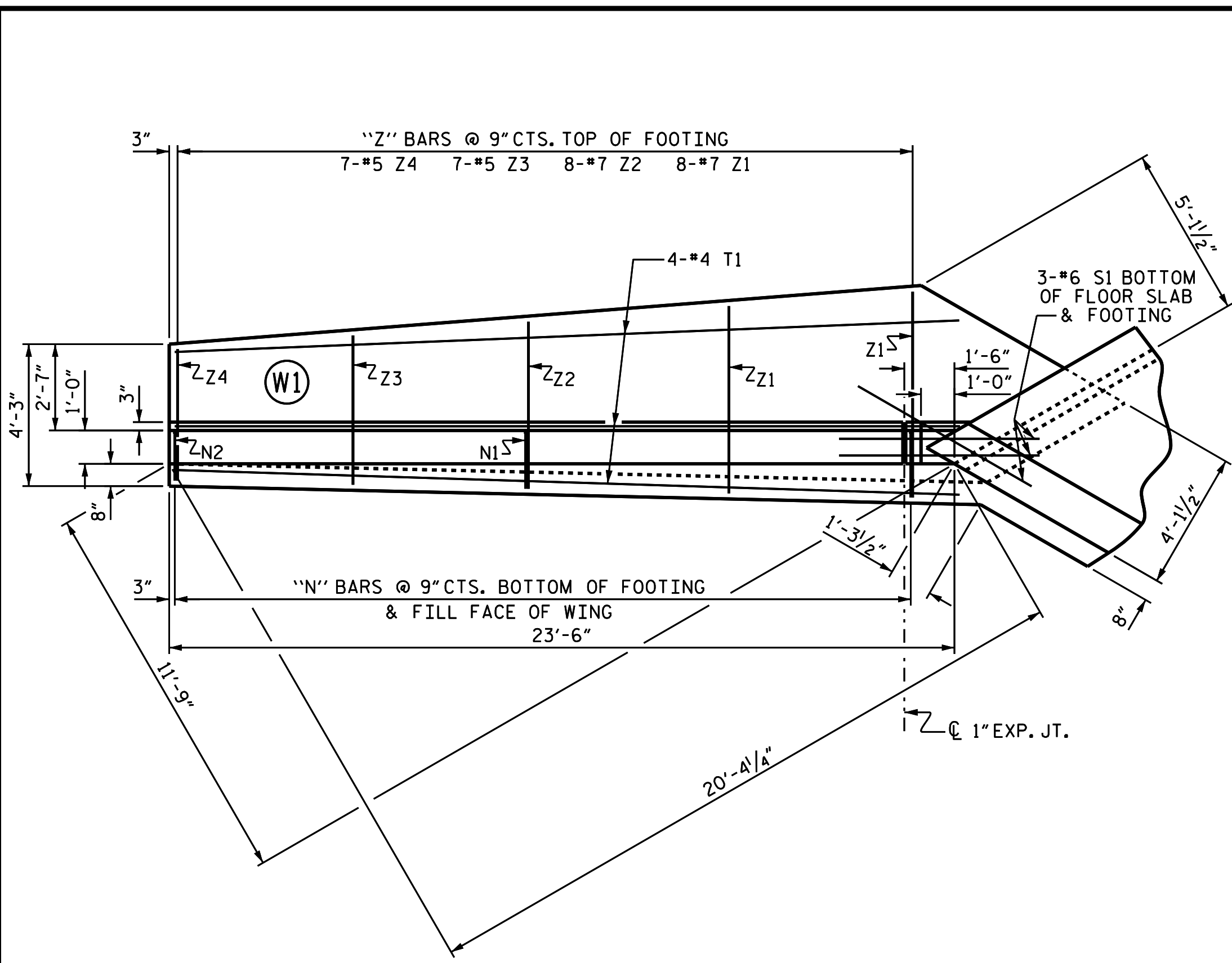
SHEET 8 OF 9

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
TRIPLE 11 FT. X 11 FT. CONCRETE BOX CULVERT 120° SKEW					
REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

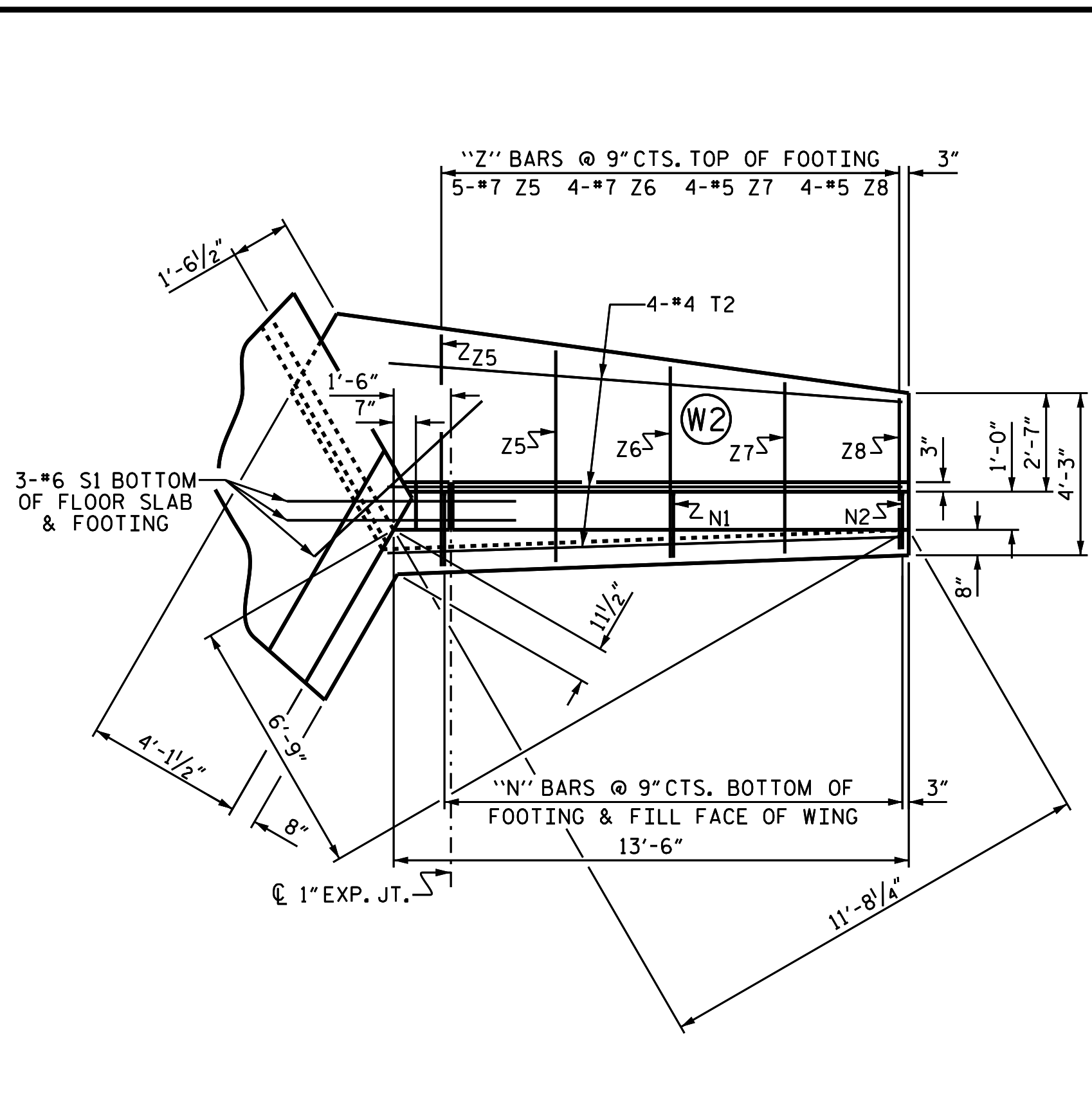
TOTAL SHEETS 9

ASSEMBLED BY : A. SORSENGINH DATE : 2/2014
 CHECKED BY : K.W. ALFORD DATE : 3/2018
 DESIGN ENGINEER OF RECORD : A. SORSENGINH DATE : 1/2014

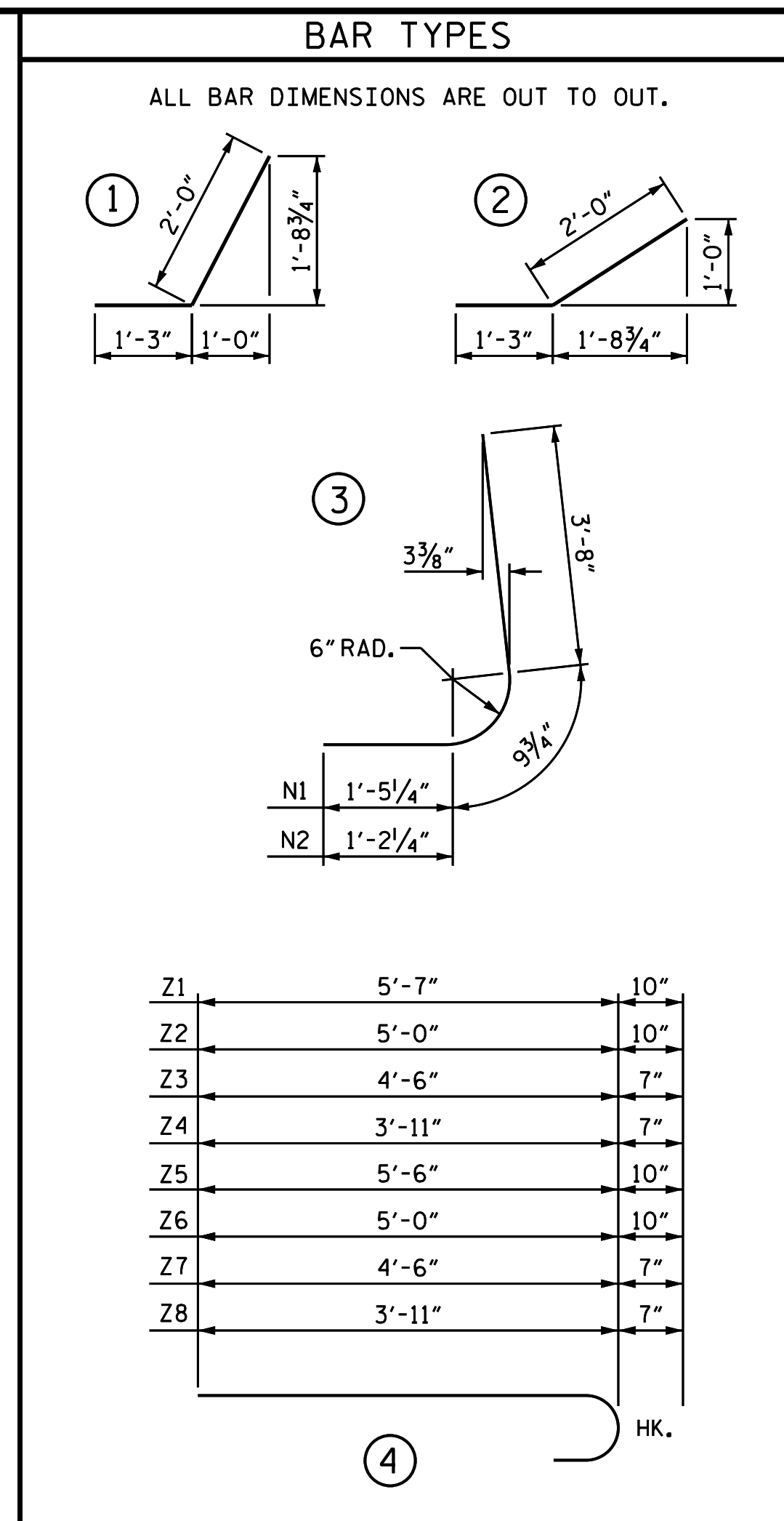
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PLAN - W1

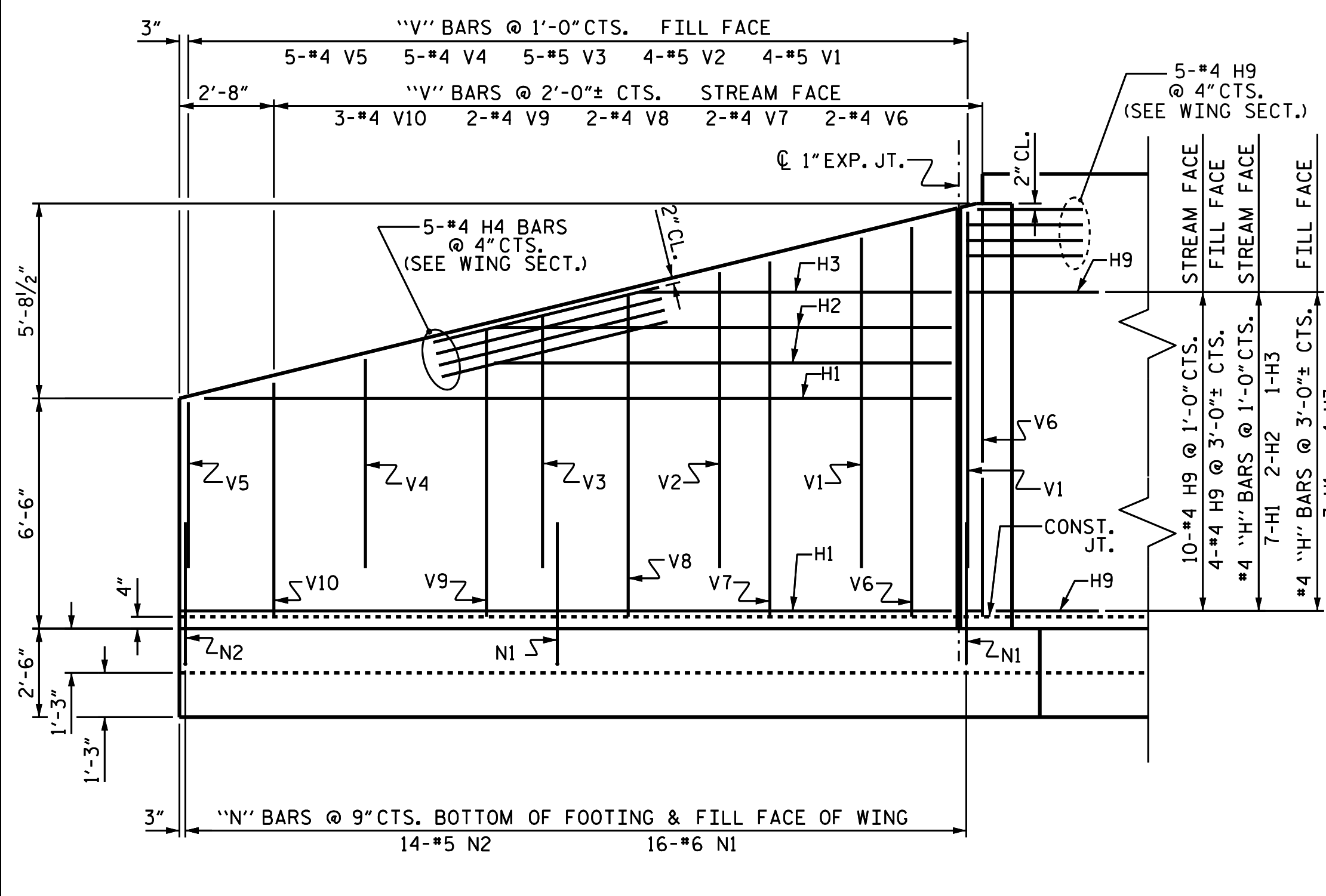


PLAN - W2

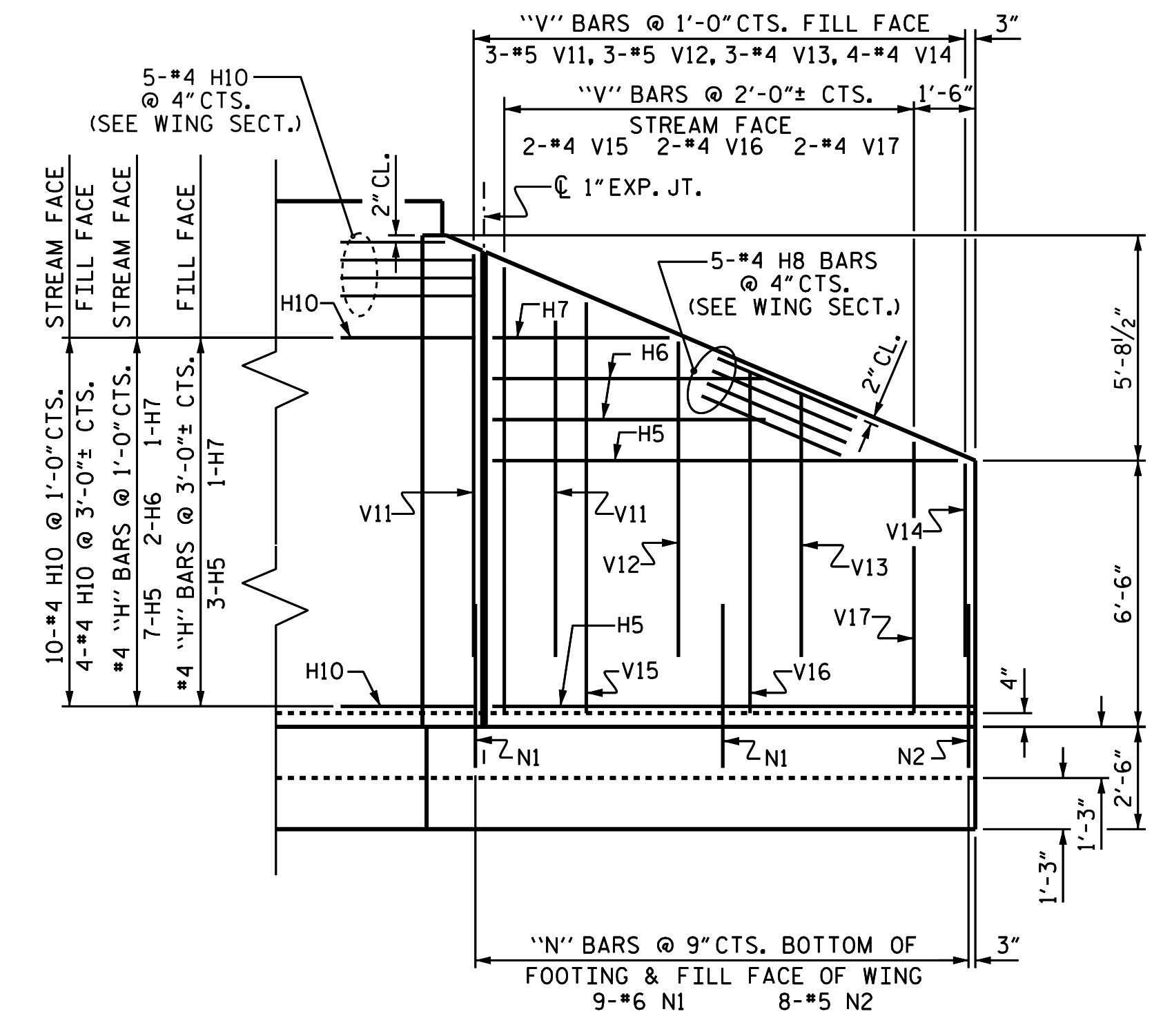


BAR TYPES

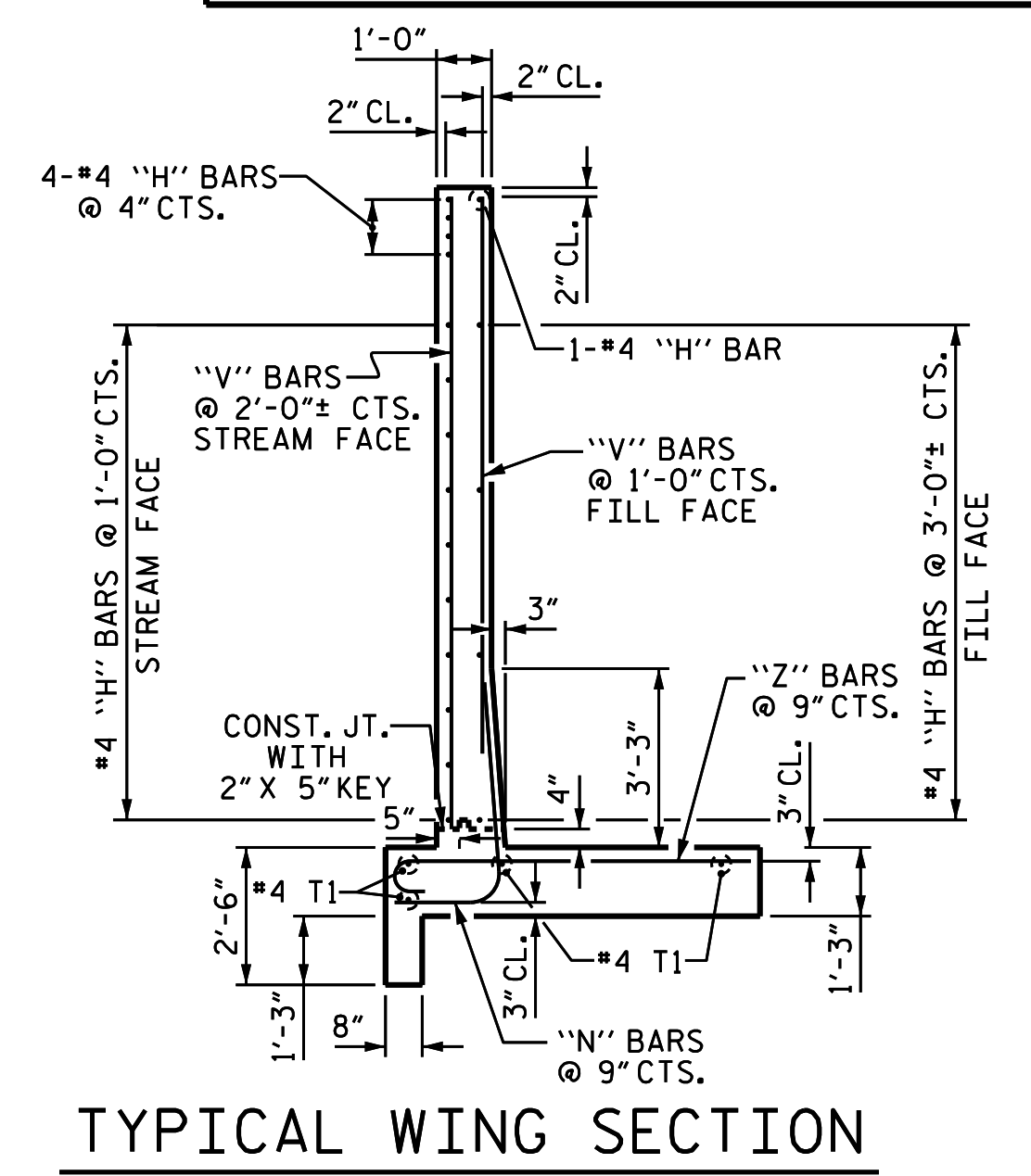
BILL OF MATERIAL PER STAGE					
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	
H1	10	4	STR	21'-8"	145
H2	2	4	STR	12'-8"	17
H3	2	4	STR	8'-2"	11
H4	5	4	STR	21'-2"	71
H5	10	4	STR	11'-7"	77
H6	2	4	STR	6'-7"	9
H7	2	4	STR	4'-1"	5
H8	5	4	STR	12'-0"	40
H9	19	4	2	3'-3"	41
H10	19	4	1	3'-3"	41
N1	25	6	3	5'-11"	222
N2	22	5	3	5'-8"	130
S1	6	6	STR	6'-0"	54
T1	4	4	STR	23'-6"	63
T2	4	4	STR	13'-6"	36
V1	4	5	STR	10'-0"	42
V2	4	5	STR	9'-0"	38
V3	5	5	STR	7'-9"	40
V4	5	4	STR	6'-3"	21
V5	5	4	STR	5'-3"	18
V6	2	4	STR	10'-9"	14
V7	2	4	STR	9'-9"	13
V8	2	4	STR	8'-9"	12
V9	2	4	STR	7'-9"	10
V10	3	4	STR	6'-3"	13
V11	3	5	STR	9'-6"	30
V12	3	5	STR	8'-3"	26
V13	3	4	STR	6'-9"	14
V14	4	4	STR	5'-3"	14
V15	2	4	STR	10'-0"	13
V16	2	4	STR	8'-3"	11
V17	2	4	STR	6'-6"	9
Z1	8	7	4	6'-5"	105
Z2	8	7	4	5'-10"	95
Z3	7	5	4	5'-1"	37
Z4	7	5	4	4'-6"	33
Z5	5	7	4	6'-4"	65
Z6	4	7	4	5'-10"	48
Z7	4	5	4	5'-1"	21
Z8	4	5	4	4'-6"	19



ELEVATION - W1



ELEVATION - W2



TYPICAL WING SECTION

REINFORCING STEEL FOR 2 WINGS	1,723 LBS
CLASS A CONCRETE	
2 WINGS	24.2 CY
1 HEADWALL	1.9 CY
1 END CURTAIN WALL	2.3 CY
TOTAL	28.4 CY

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 314+63.00 -L-

SHEET 9 OF 9

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
STANDARD WINGS FOR CONCRETE BOX CULVERT
 H = 11'-0" SLOPE = 2:1
 120° SKEW



ASSEMBLED BY: <u>A. SORSENGIH</u>	DATE: <u>10/2013</u>
CHECKED BY: _____	DATE: _____
DRAWN BY: <u>A.K. PATEL</u>	DATE: <u>12/04</u>
CHECKED BY: <u>M.K. BEARD</u>	DATE: <u>02/05</u>

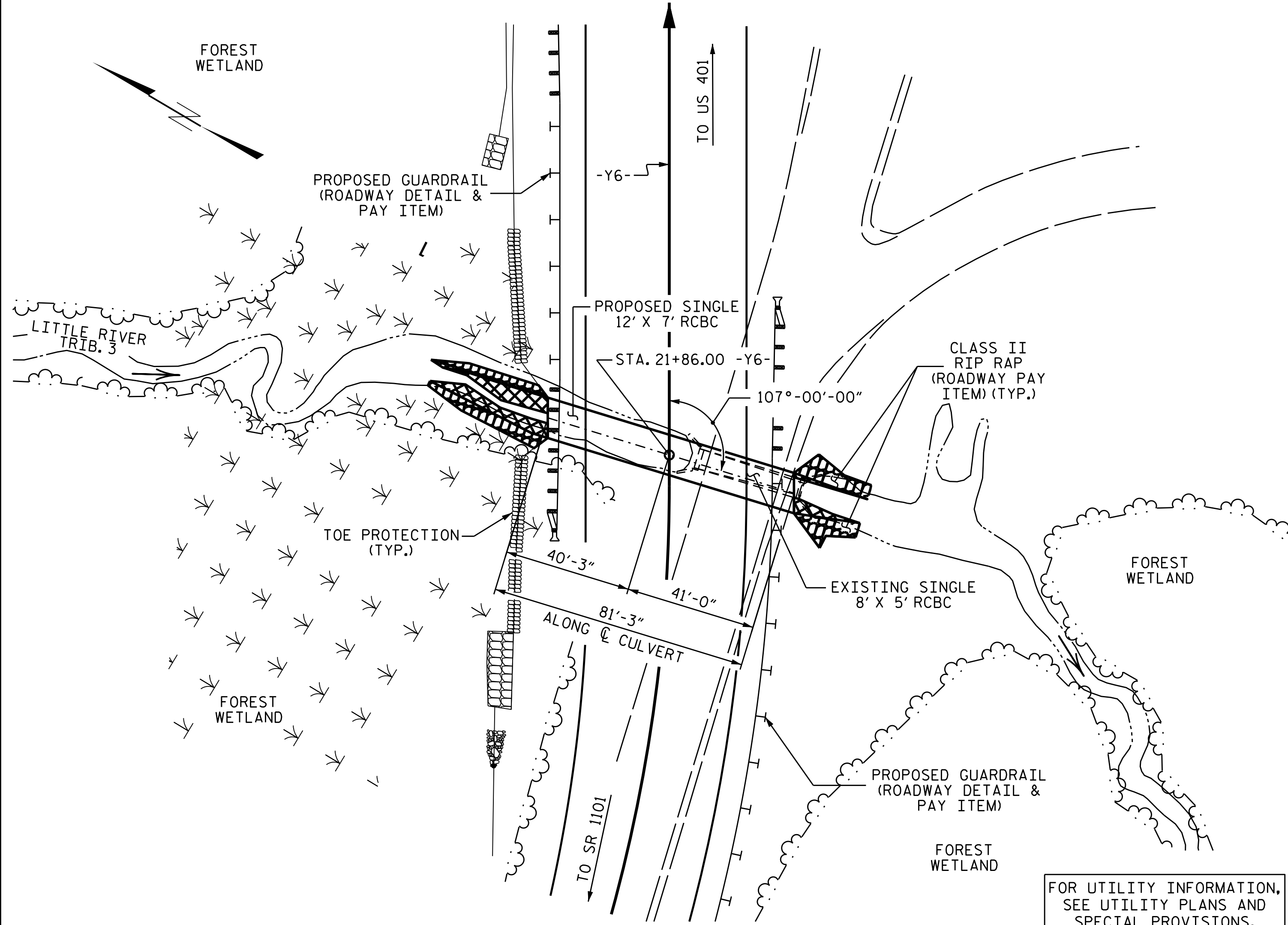
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

TOTAL SHEETS: 9

BM #54: RAIL ROAD SPIKE IN 14" GUM TREE, 633' LEFT OF -L- STA. 147+91.00, EL. 372.67

F.A. PROJECT NO.: STP-401(249)



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

NOTES

ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING.
 MAXIMUM DESIGN FILL----- 3.27'
 MINIMUM DESIGN FILL----- 1.65'
 FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTE SHEET.
 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
 CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:
 1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
 2. THE REMAINING PORTIONS OF THE WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.
 THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.
 DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.
 AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
 AT THE CONTRACTOR'S OPTION HE MAY SUBMIT, TO THE ENGINEER FOR APPROVAL, DESIGN AND DETAIL DRAWINGS FOR A PRECAST REINFORCED CONCRETE BOX CULVERT IN LIEU OF THE CAST-IN-PLACE CULVERT SHOWN ON THE PLANS. THE DESIGN SHALL PROVIDE THE SAME SIZE OF BARREL AS USED ON THE CAST-IN-PLACE DESIGN. FOR OPTIONAL PRECAST REINFORCED CONCRETE BOX CULVERT, SEE SPECIAL PROVISIONS.
 THE EXISTING STRUCTURE CONSISTING OF A REINFORCED CONCRETE CULVERT 8'(W) X 5'(D) SIZE, 30'± LONG AND LOCATED AT THE PROPOSED STRUCTURE, SHALL BE REMOVED.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.
 FOR LIMITS OF TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS. FOR PAY ITEM FOR TEMPORARY SHORING FOR MAINTENANCE OF TRAFFIC, SEE ROADWAY PLANS.
 FOR MAINTENANCE OF TRAFFIC, SEE TRAFFIC CONTROL PLANS.
 A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
 FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
 FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
 FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
 FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
 FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

HYDRAULIC DATA

DESIGN DISCHARGE	= 550 CFS
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 353.20
DRAINAGE AREA	= 374 AC.
BASE DISCHARGE (Q100)	= 650 CFS
BASE HIGH WATER ELEVATION	= 354.50

OVERTOPPING FLOOD DATA

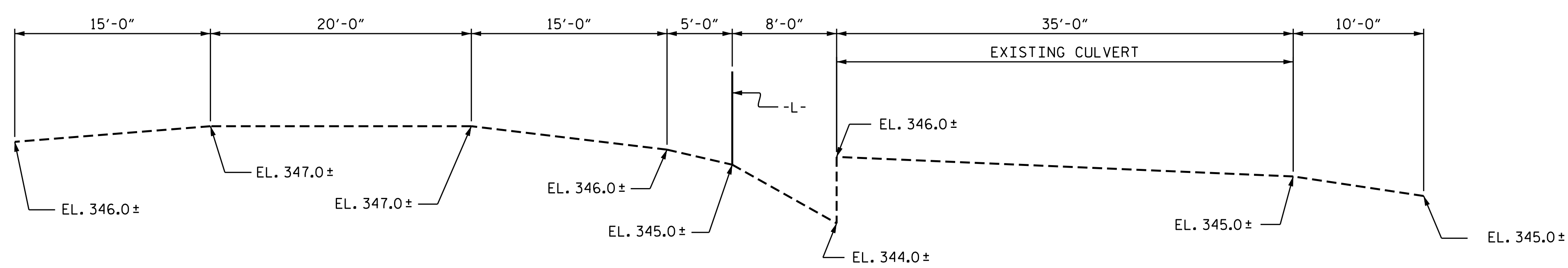
OVERTOPPING DISCHARGE	= 600 CFS
FREQUENCY OF OVERTOPPING FLOOD	= 50+ YRS.
OVERTOPPING FLOOD ELEVATION	= 353.90

GRADE DATA

GRADE POINT ELEVATION @ STA. 21+86.00 -Y6-	= 354.05'
BED ELEVATION @ STA. 21+86.00 -Y6-	= 344.98'
ROADWAY FILL SLOPES	= 2:1

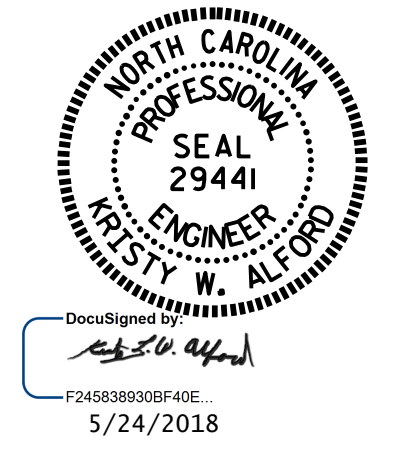
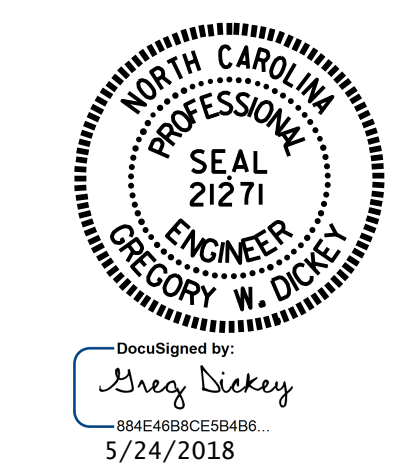
TOTAL STRUCTURE QUANTITIES			
CLASS A CONCRETE			
BARREL @	1.132	CY/FT	92.0 C.Y.
SILLS			0.9 C.Y.
WING ETC.			20.9 C.Y.
TOTAL			113.8 C.Y.
REINFORCING STEEL			
BARREL			17,819 LBS.
WINGS ETC.			1,277 LBS.
TOTAL			19,096 LBS.
FOUNDATION CONDITIONING MATERIAL			100 TON
CULVERT EXCAVATION			LUMP SUM
REMOVAL OF EXISTING STRUCTURE			LUMP SUM

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS



PROFILE ALONG CULVERT

ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : A. K. PATEL DATE : 1/2014
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 1/2014



PROJECT NO. R-2814C
 FRANKLIN COUNTY
 STATION: 21+86.00 -Y6-
 SHEET 1 OF 5

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SINGLE 12 FT. X 7 FT. CONCRETE BOX CULVERT 107° SKEW					
REVISIONS					SHEET NO. C6-1
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
TOTAL SHEETS 5					

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER		
						MOMENT				SHEAR						
						LIVE-LOAD FACTORS (ILL)	RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE		DISTANCE FROM LEFT END OF ELEMENT (ft)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	1	1.02	--	1.75	1.02	1	EXTERIOR WALL	1.56	1.03	1	TOP SLAB	0.90		
	HL-93 (OPERATING)	N/A		1.32	--	1.35	1.32	1	EXTERIOR WALL	1.56	1.34	1	TOP SLAB	0.90		
	HS-20 (INVENTORY)	36.000	2	1.28	46.24	1.75	1.34	1	EXTERIOR WALL	1.56	1.28	1	TOP SLAB	0.90		
	HS-20 (OPERATING)	36.000		1.67	59.94	1.35	1.74	1	EXTERIOR WALL	1.56	1.67	1	TOP SLAB	0.90		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH		2.33	31.50	1.40	2.47	1	EXTERIOR WALL	1.56	2.33	1	TOP SLAB	0.90		
		SNGARBS2	20.000		2.19	43.72	1.40	2.33	1	EXTERIOR WALL	1.56	2.19	1	TOP SLAB	0.90	
		SNAGRIS2	22.000		2.33	51.34	1.40	2.47	1	EXTERIOR WALL	1.56	2.33	1	TOP SLAB	0.90	
		SNCOTTS3	27.250	3	1.23	33.54	1.40	1.23	1	EXTERIOR WALL	1.56	1.29	1	TOP SLAB	0.90	
		SNAGGRS4	34.925		1.30	45.38	1.40	1.34	1	EXTERIOR WALL	6.43	1.30	1	BOTTOM SLAB	11.76	
		SNS5A	35.550		1.33	47.10	1.40	1.33	1	BOT CORNER WALL	7.40	1.35	1	BOTTOM SLAB	0.90	
		SNS6A	39.950		1.34	53.69	1.40	1.37	1	EXTERIOR WALL	6.43	1.34	1	BOTTOM SLAB	0.90	
		SNS7B	42.000		1.34	56.45	1.40	1.37	1	EXTERIOR WALL	6.43	1.34	1	BOTTOM SLAB	0.90	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.45	47.81	1.40	1.45	1	BOT CORNER WALL	7.40	1.62	1	BOTTOM SLAB	0.90	
		TNT4A	33.075		1.44	47.55	1.40	1.44	1	EXTERIOR WALL	1.56	1.53	1	TOP SLAB	0.90	
		TNT6A	41.600		1.33	55.27	1.40	1.37	1	EXTERIOR WALL	6.43	1.33	1	BOTTOM SLAB	11.76	
		TNT7A	42.000		1.41	59.33	1.40	1.41	1	EXTERIOR WALL	1.56	1.51	1	BOTTOM SLAB	11.76	
		TNT7B	42.000		1.38	57.94	1.40	1.39	1	BOT CORNER WALL	7.4	1.38	1	BOTTOM SLAB	11.76	
		TNAGRIT4	43.000		1.38	59.32	1.40	1.38	1	EXTERIOR WALL	1.56	1.46	1	TOP SLAB	0.90	
TNAGT5A	45.000		1.41	63.24	1.40	1.41	1	EXTERIOR WALL	1.56	1.50	1	TOP SLAB	11.76			
TNAGT5B	45.000		1.43	64.56	1.40	1.43	1	EXTERIOR WALL	1.56	1.53	1	TOP SLAB	0.90			

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	0.50 OR 0.90
ES	1.35	0.50 OR 0.90
LS	1.75	--
WA	1.00	--

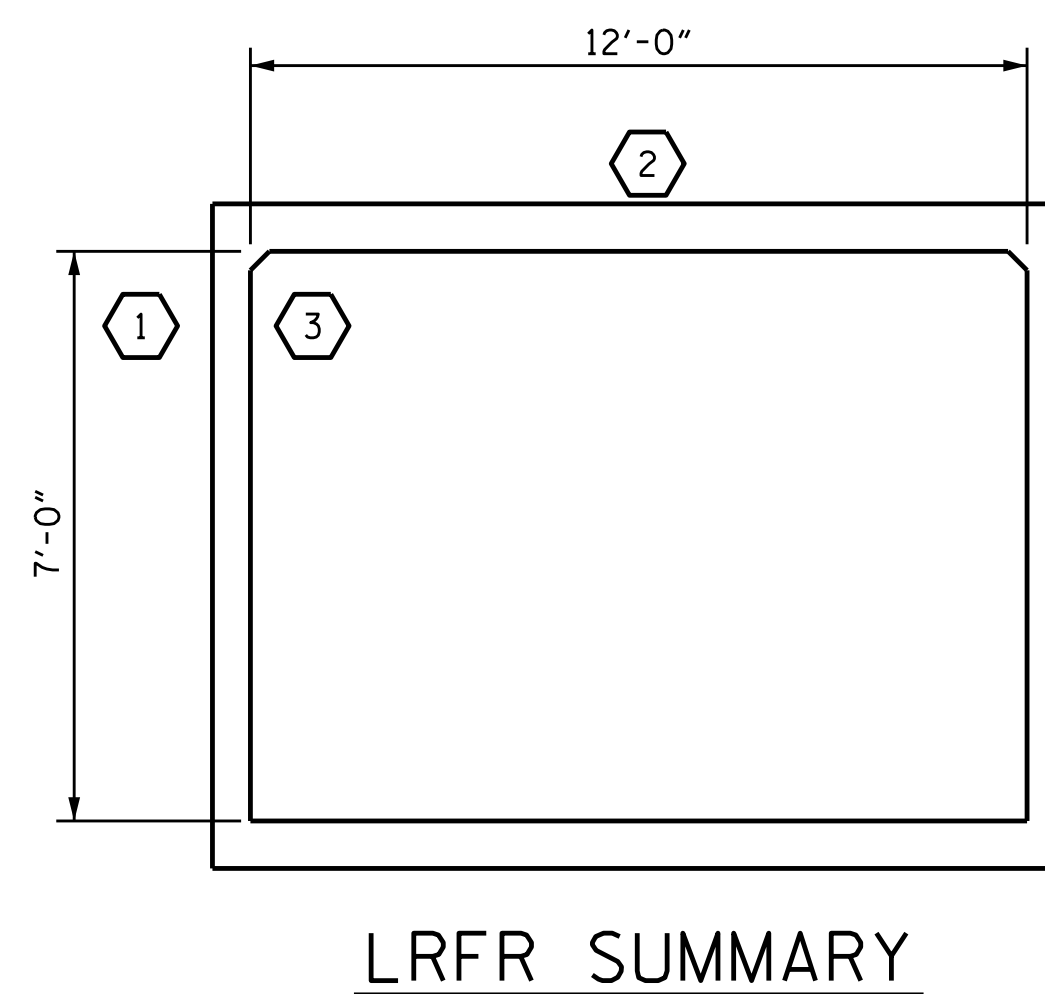
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

-
-
-
-

#	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-2814C
FRANKLIN COUNTY
 STATION: 21+86.00 -Y6-

SHEET 2 OF 5



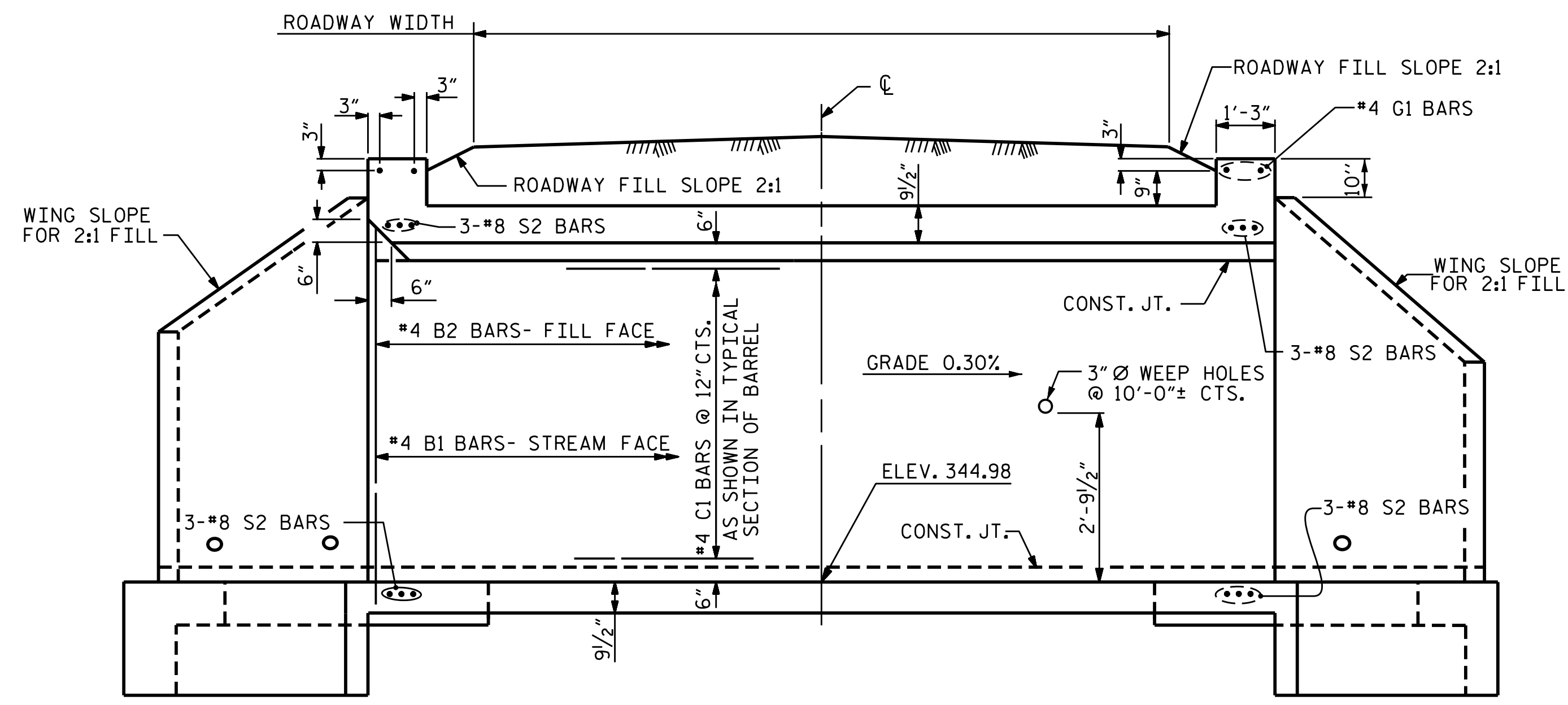
DocuSigned by:
 Kristy W. Alford
 5/24/2018

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

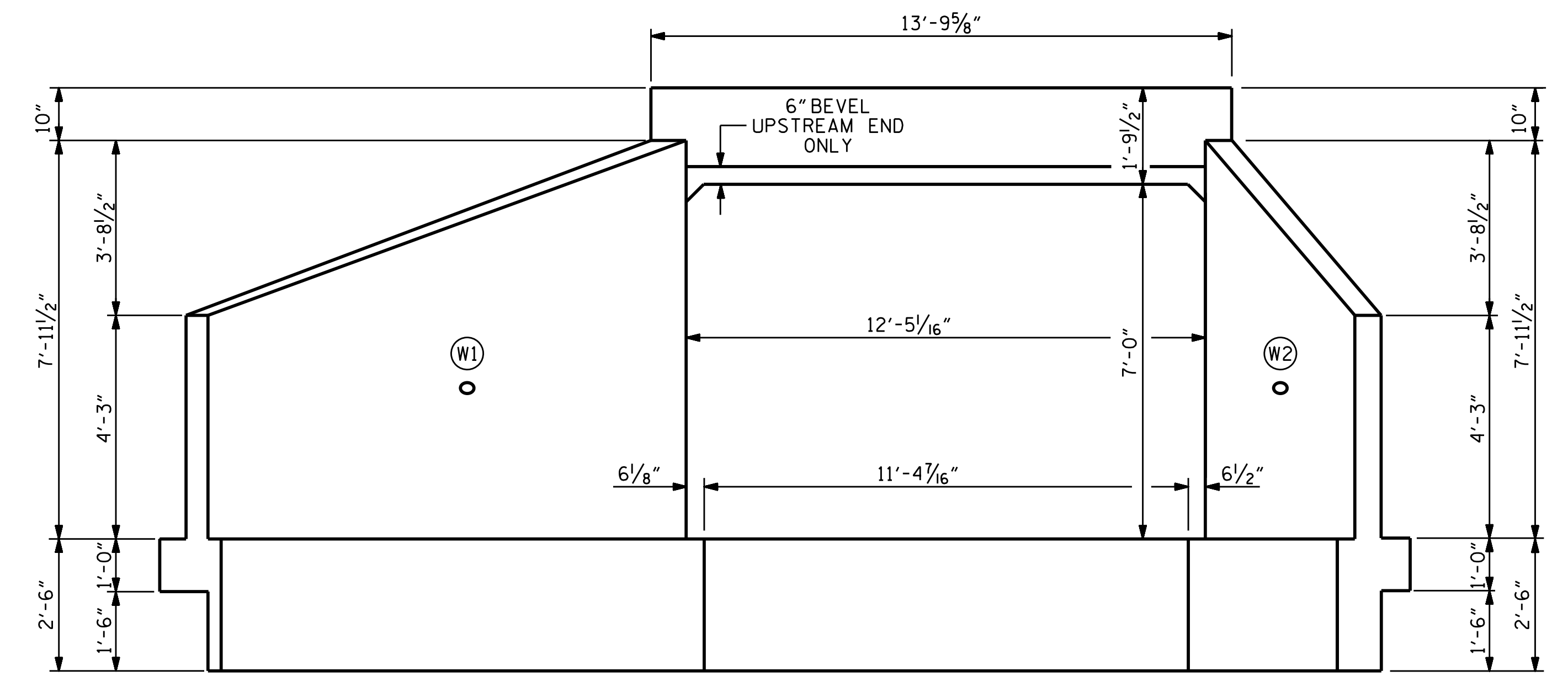
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C6-2	
1			3			TOTAL SHEETS	
2			4			5	

ASSEMBLED BY : A. SORSENGINH	DATE : 1/2014
CHECKED BY : A. K. PATEL	DATE : 1/2014
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11
REV. 10/1/11	MAA/GM

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED



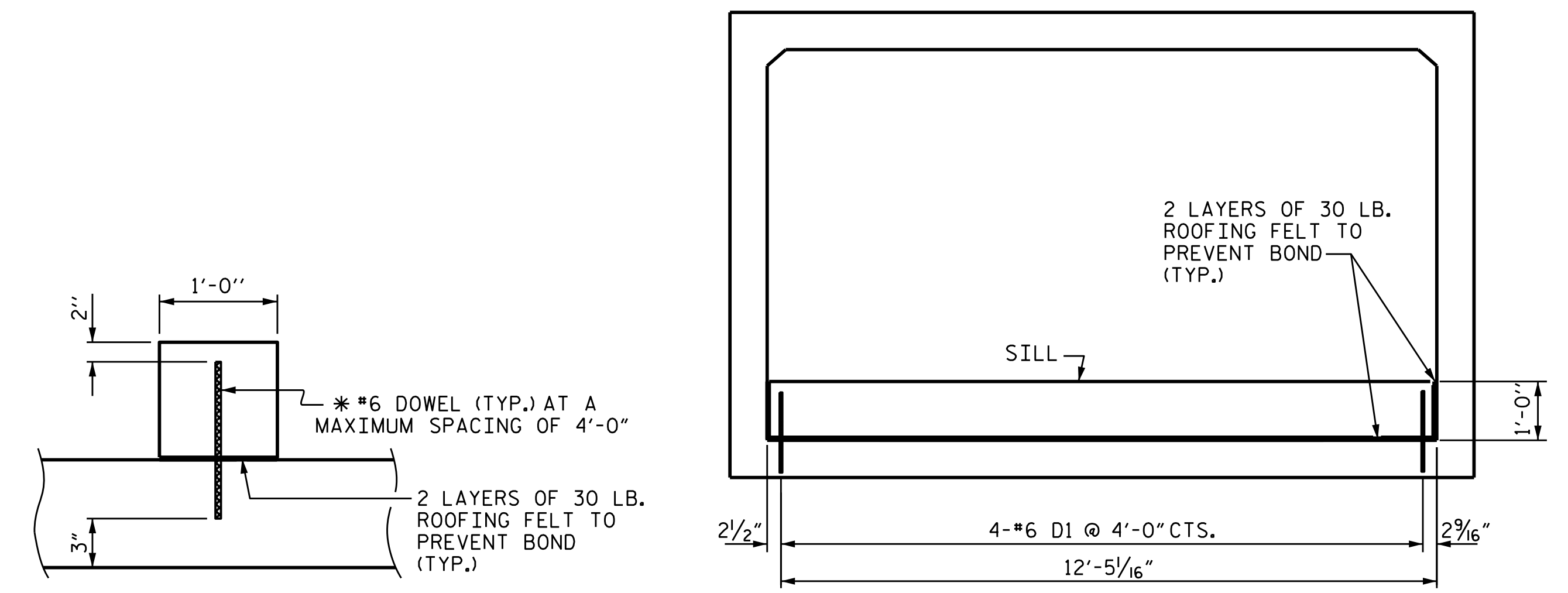
CULVERT SECTION NORMAL TO ROADWAY



INLET END ELEVATION NORMAL TO SKEW

(105°-00'-00")

I HEREBY CERTIFY THESE PLANS
 ARE THE AS-BUILT PLANS



SECTION THROUGH SILL

ELEVATION

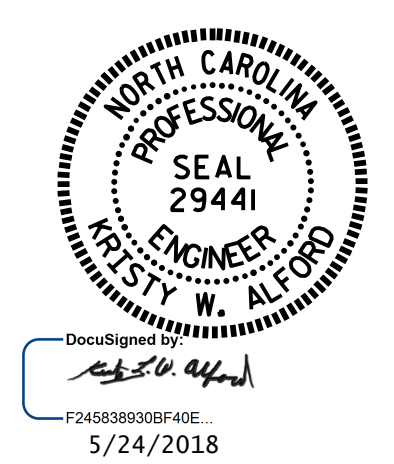
* DOWELS MAY BE PUSHED INTO GREEN CONCRETE
 AFTER SLAB HAS BEEN FLOAT FINISHED.

CULVERT SILL DETAILS

ONE SILL EACH SHALL BE PLACED ALONG SKEW
 AT INLET AND OUTLET ENDS OF CULVERT

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 21+86.00 -Y6-

SHEET 3 OF 5

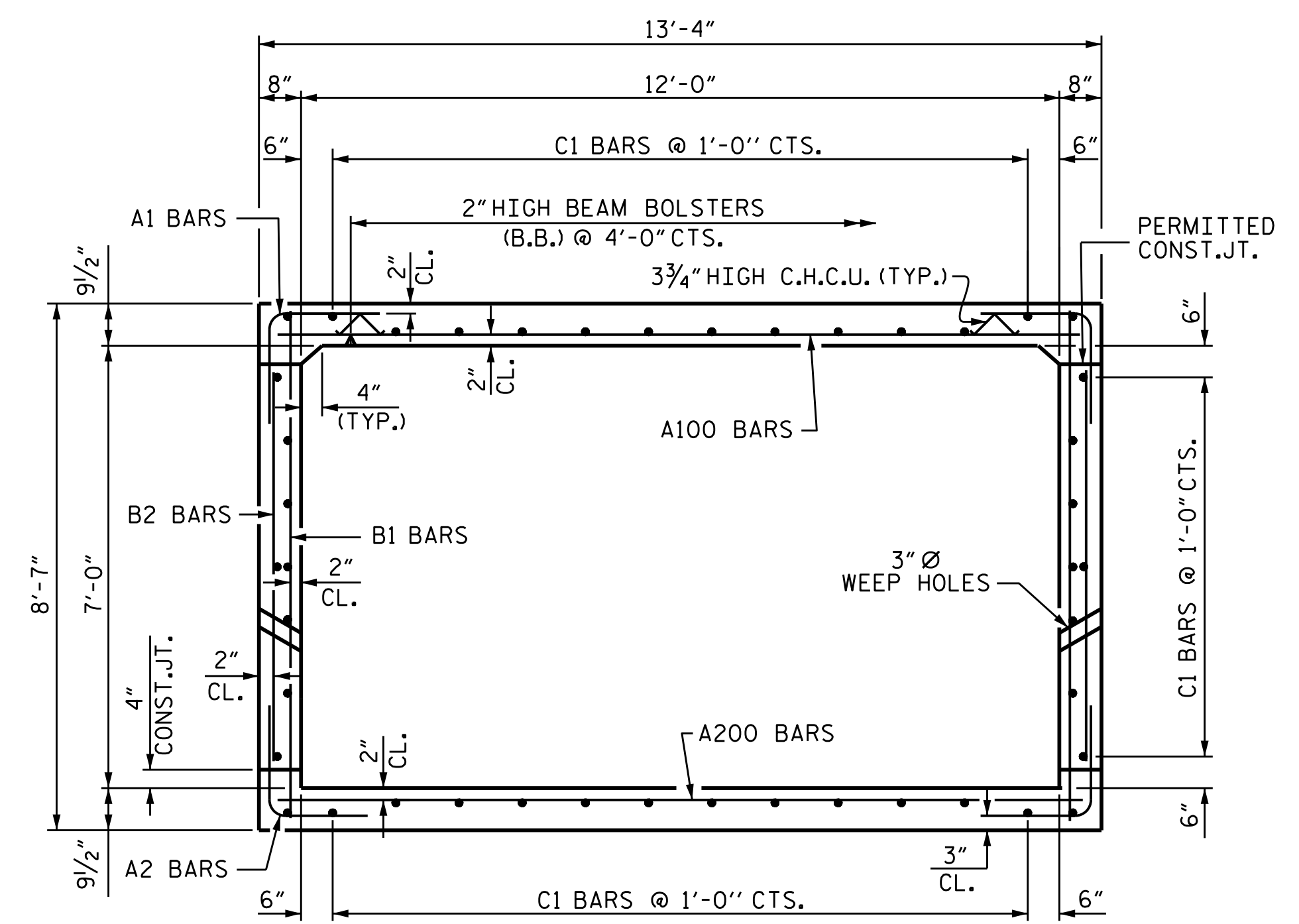


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 SINGLE 12 FT. X 7 FT.
 CONCRETE BOX CULVERT
 STAGE I
 107° SKEW

ASSEMBLED BY : A. SORSENGH DATE : 1/2014
 CHECKED BY : A. K. PATEL DATE : 1/2014
 DESIGN ENGINEER OF RECORD:
A. SORSENGH DATE : 1/2014

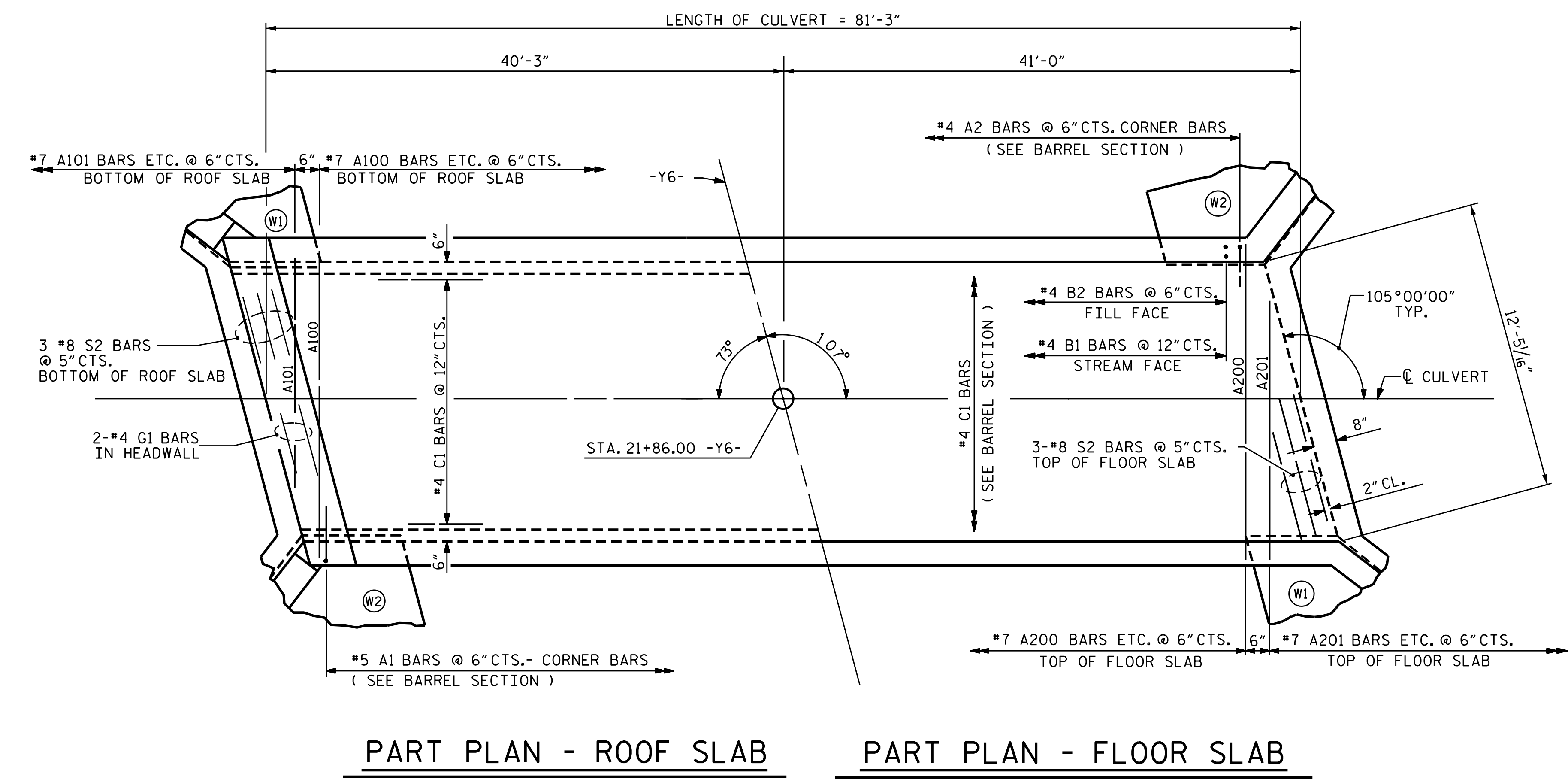
DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

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



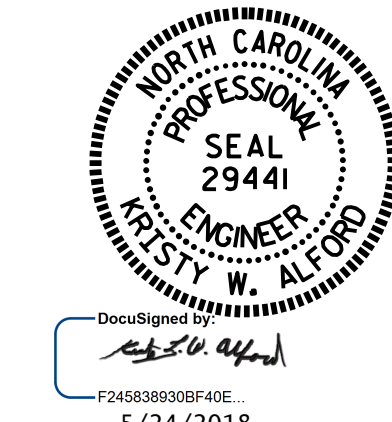
RIGHT ANGLE SECTION OF BARREL
 THERE ARE 44 C1 BARS IN SECTION OF BARREL

BAR TYPE		BAR SCHEDULE					
		BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
		A1	326	#5	1	7'-7"	2578
		A2	326	#4	1	7'-0"	1524
		A100	156	#7	STR	12'-11"	4119
		A101	4	#7	STR	8'-9"	72
		A102	4	#7	STR	5'-0"	41
		A200	156	#7	STR	12'-11"	4119
		A201	4	#7	STR	8'-9"	72
		A202	4	#7	STR	5'-0"	41
BAR DIMENSIONS ARE OUT TO OUT SPLICE LENGTH CHART		B1	164	#4	STR	8'-1"	886
		B2	326	#4	STR	6'-4"	1379
		C1	132	#4	STR	28'-5"	2506
		D1	8	#6	STR	1'-4"	16
		G1	4	#4	STR	13'-5"	36
		S2	12	#8	STR	13'-5"	430
		REINFORCING STEEL = 17,819 LBS					



PART PLAN - ROOF SLAB **PART PLAN - FLOOR SLAB**

PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 21+86.00 -Y6-
 SHEET 4 OF 5

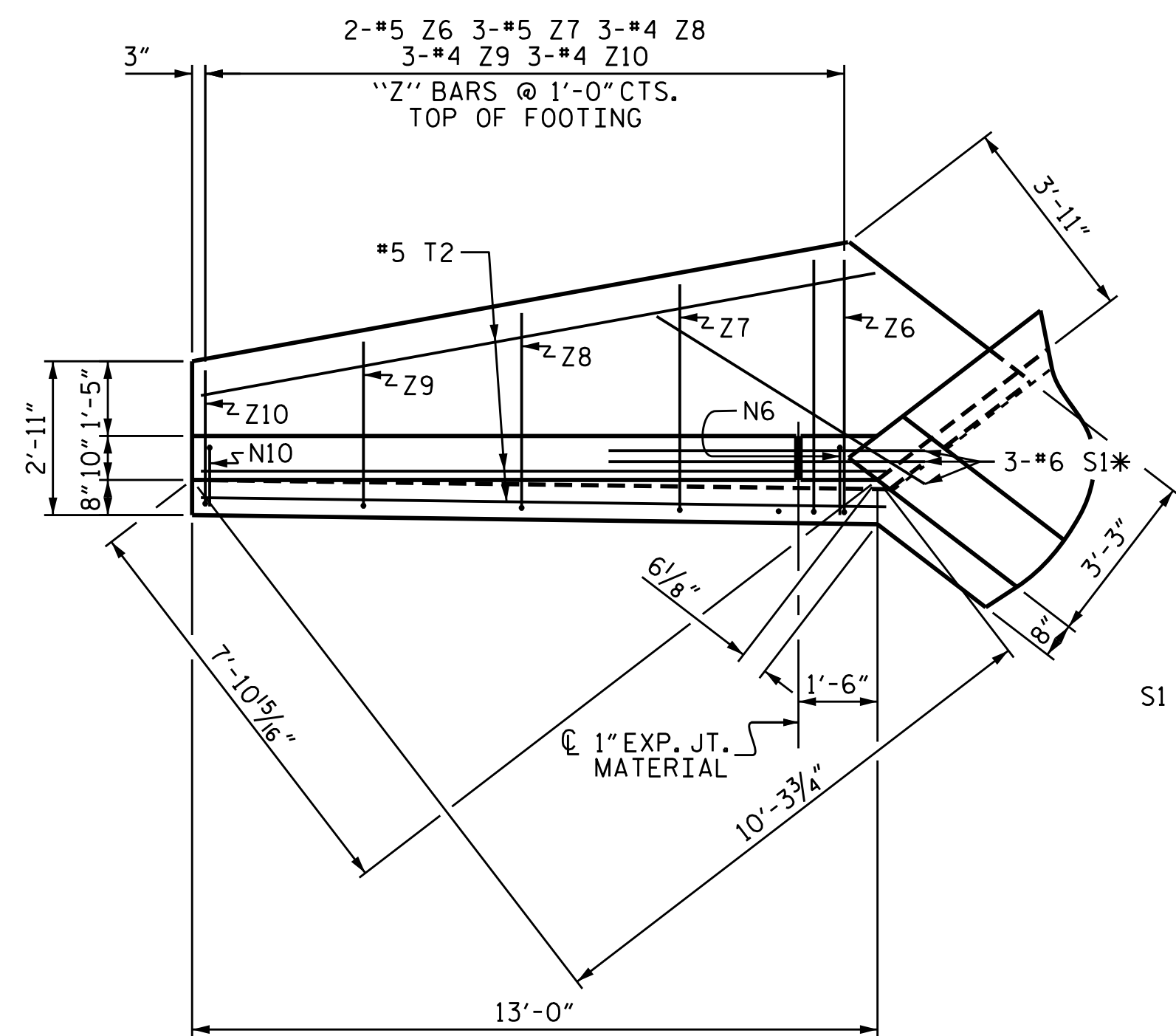


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
**SINGLE 12 FT. X 7 FT.
 CONCRETE BOX CULVERT
 107° SKEW**

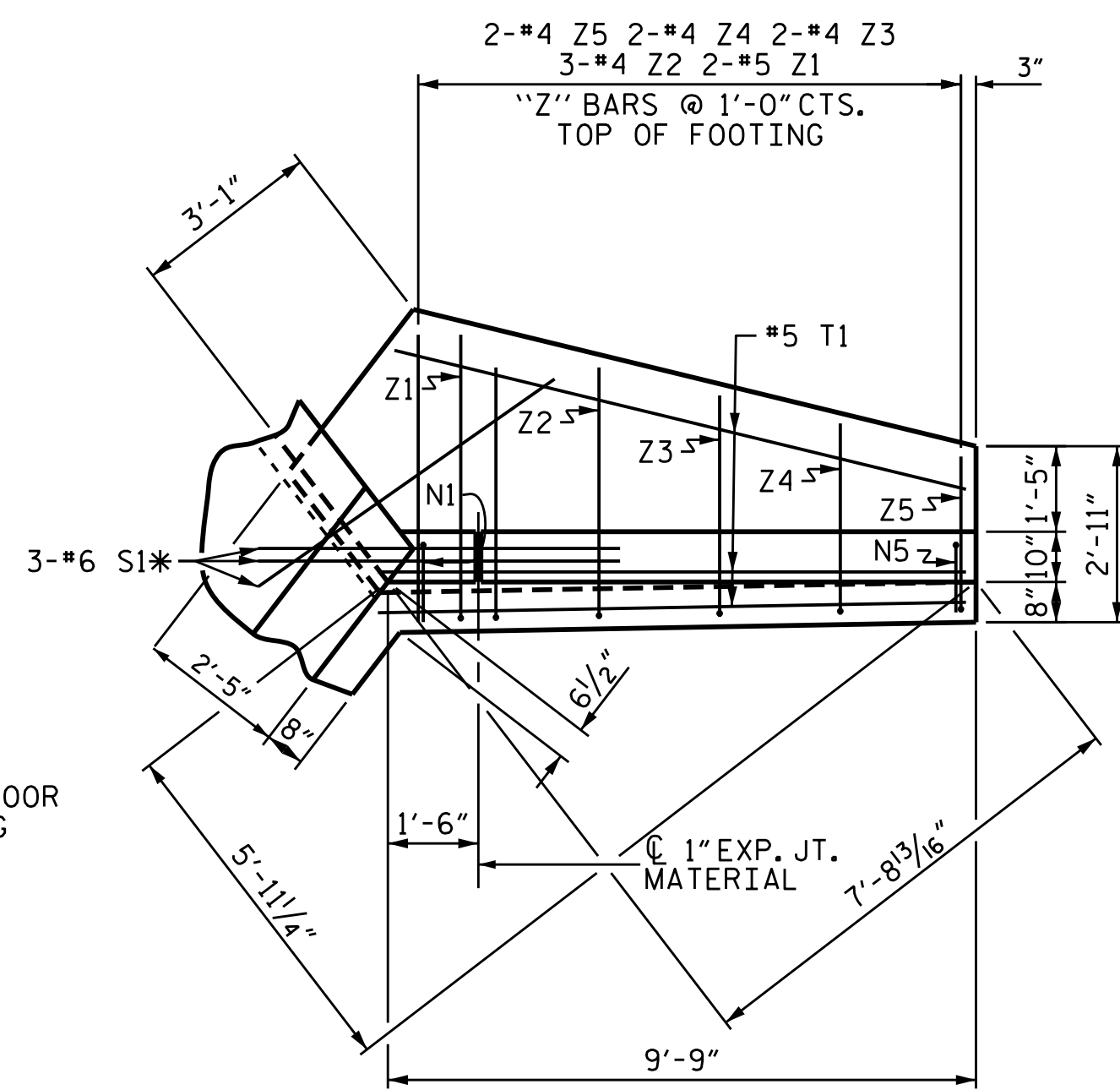
ASSEMBLED BY : A. SORSENGINH DATE : 1/2014
 CHECKED BY : A. K. PATEL DATE : 1/2014
 DESIGN ENGINEER OF RECORD:
A. SORSENGINH DATE : 1/2014

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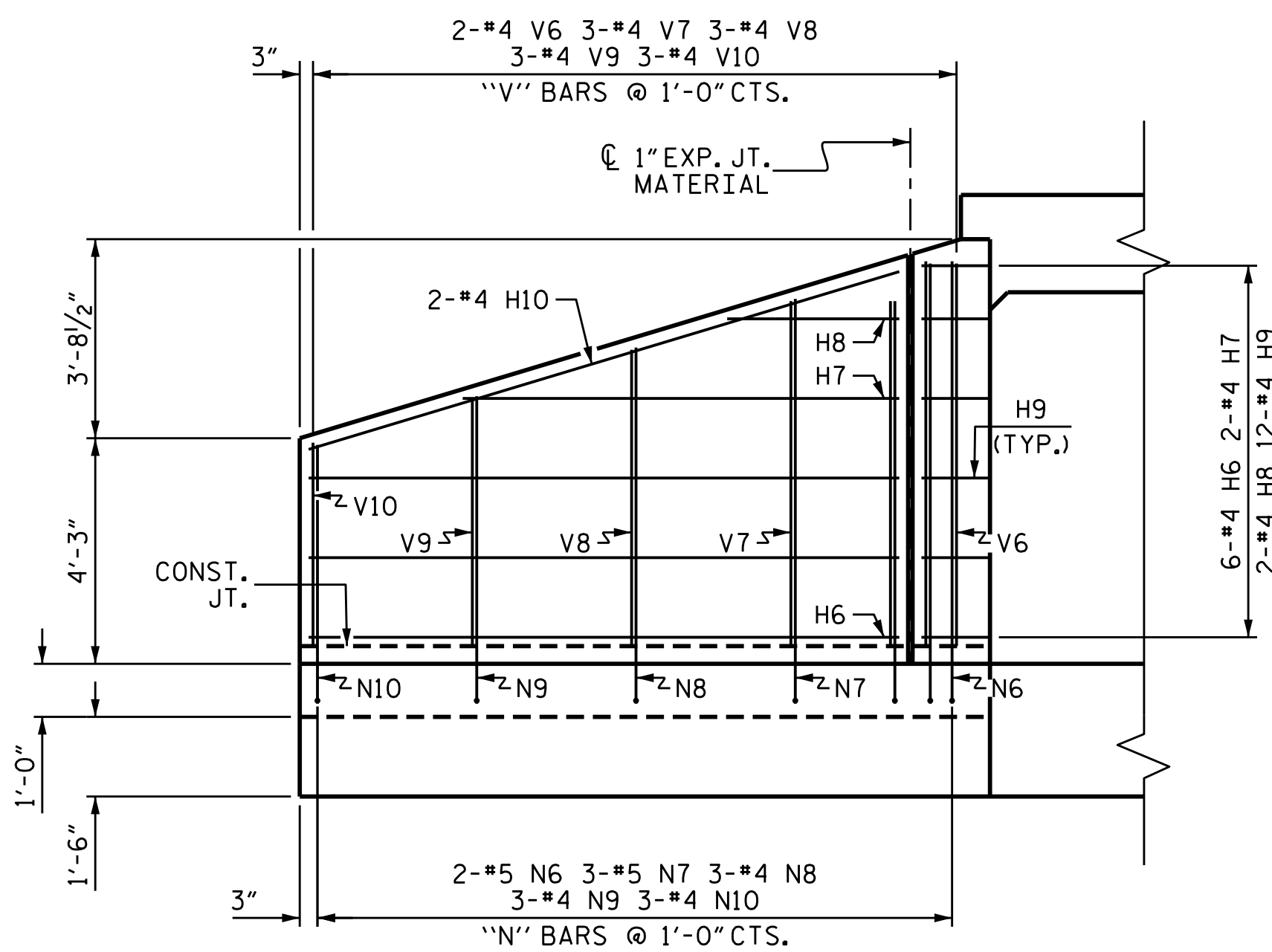
REVISIONS						SHEET NO. C6-4
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 5
2			4			



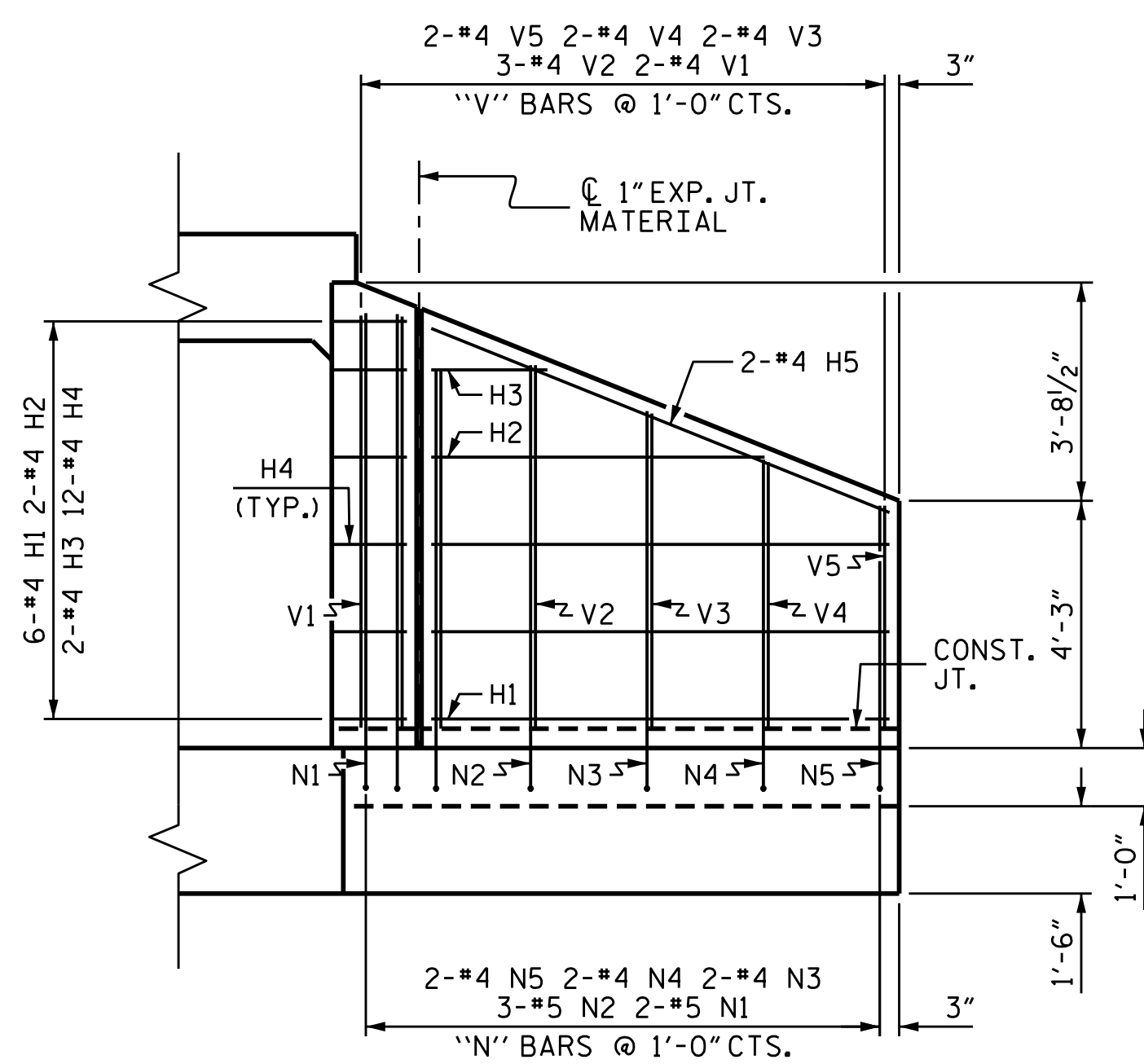
PLAN W1



PLAN W2



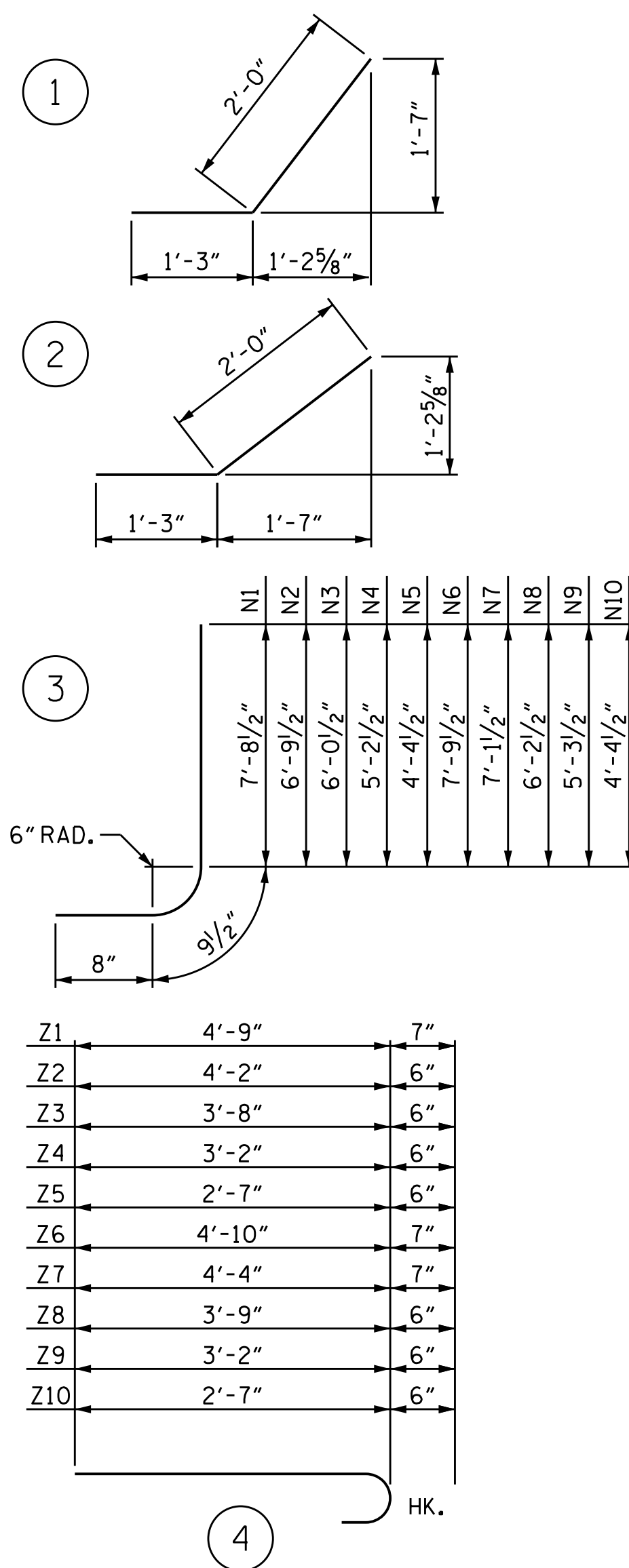
ELEVATION W1



ELEVATION W2

BAR TYPES

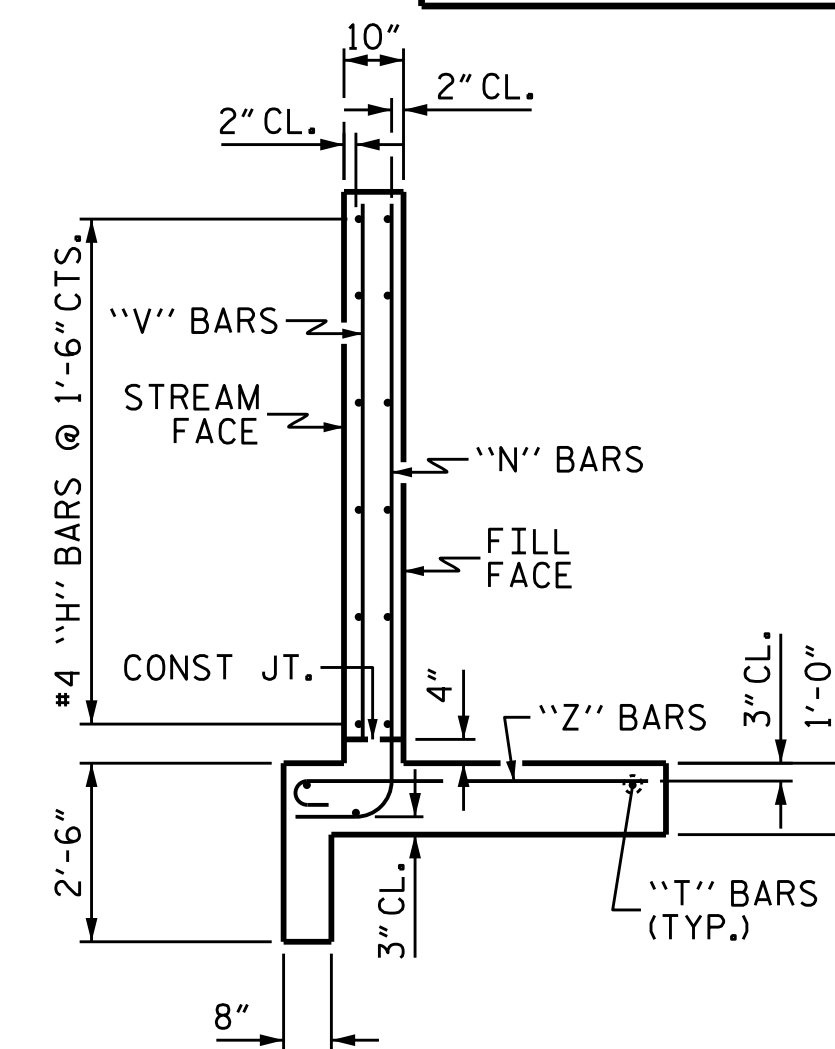
ALL BAR DIMENSIONS ARE OUT TO OUT.



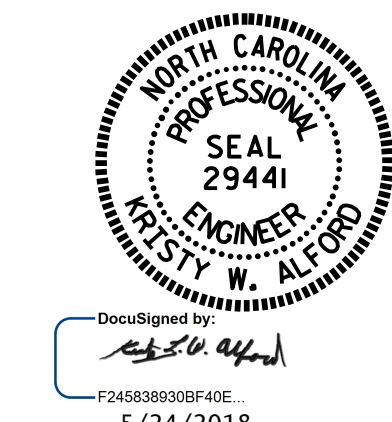
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	7'-10"	63
H2	4	#4	STR	5'-8"	15
H3	4	#4	STR	2'-0"	5
H4	24	#4	1	3'-3"	52
H5	4	#4	STR	8'-5"	22
H6	12	#4	STR	11'-1"	89
H7	4	#4	STR	8'-2"	22
H8	4	#4	STR	3'-3"	9
H9	24	#4	2	3'-3"	52
H10	4	#4	STR	11'-7"	31
N1	4	#5	3	9'-2"	38
N2	6	#5	3	8'-3"	52
N3	4	#4	3	7'-6"	20
N4	4	#4	3	6'-8"	18
N5	4	#4	3	5'-10"	16
N6	4	#5	3	9'-3"	39
N7	6	#5	3	8'-7"	54
N8	6	#4	3	7'-8"	31
N9	6	#4	3	6'-9"	27
N10	6	#4	3	5'-10"	23
S1	12	#6	STR	6'-0"	108
T1	6	#5	STR	9'-9"	61
T2	6	#5	STR	13'-0"	81
V1	4	#4	STR	7'-1"	19
V2	6	#4	STR	6'-3"	25
V3	4	#4	STR	5'-5"	14
V4	4	#4	STR	4'-7"	12
V5	4	#4	STR	3'-10"	10
V6	4	#4	STR	7'-3"	19
V7	6	#4	STR	6'-6"	26
V8	6	#4	STR	5'-7"	22
V9	6	#4	STR	4'-8"	19
V10	6	#4	STR	3'-10"	15
Z1	4	#5	4	5'-4"	22
Z2	6	#4	4	4'-8"	19
Z3	4	#4	4	4'-2"	11
Z4	4	#4	4	3'-8"	10
Z5	4	#4	4	3'-1"	8
Z6	4	#5	4	5'-5"	23
Z7	6	#5	4	4'-11"	31
Z8	6	#4	4	4'-3"	17
Z9	6	#4	4	3'-8"	15
Z10	6	#4	4	3'-1"	12

REINFORCING STEEL FOR 4 WINGS	1277 LBS
CLASS A CONCRETE	
4 WINGS	18.2 CY
2 HEADWALLS	1.3 CY
2 END CURTAIN WALLS	1.4 CY
TOTAL	20.9 CY



TYPICAL WING SECTION



PROJECT NO. R-2814C
FRANKLIN COUNTY
 STATION: 21+86.00 -Y6-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
STANDARD WINGS FOR CONCRETE BOX CULVERT
 H = 7'-0" SLOPE = 2:1
 105° SKEW

ASSEMBLED BY : A. SORSENGINH	DATE : 12/2014
CHECKED BY : A. K. PATEL	DATE : 12/2014
DRAWN BY : CCJ	12/99
CHECKED BY : RWW	03/00

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REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			5

STD. NO. CW7507

