

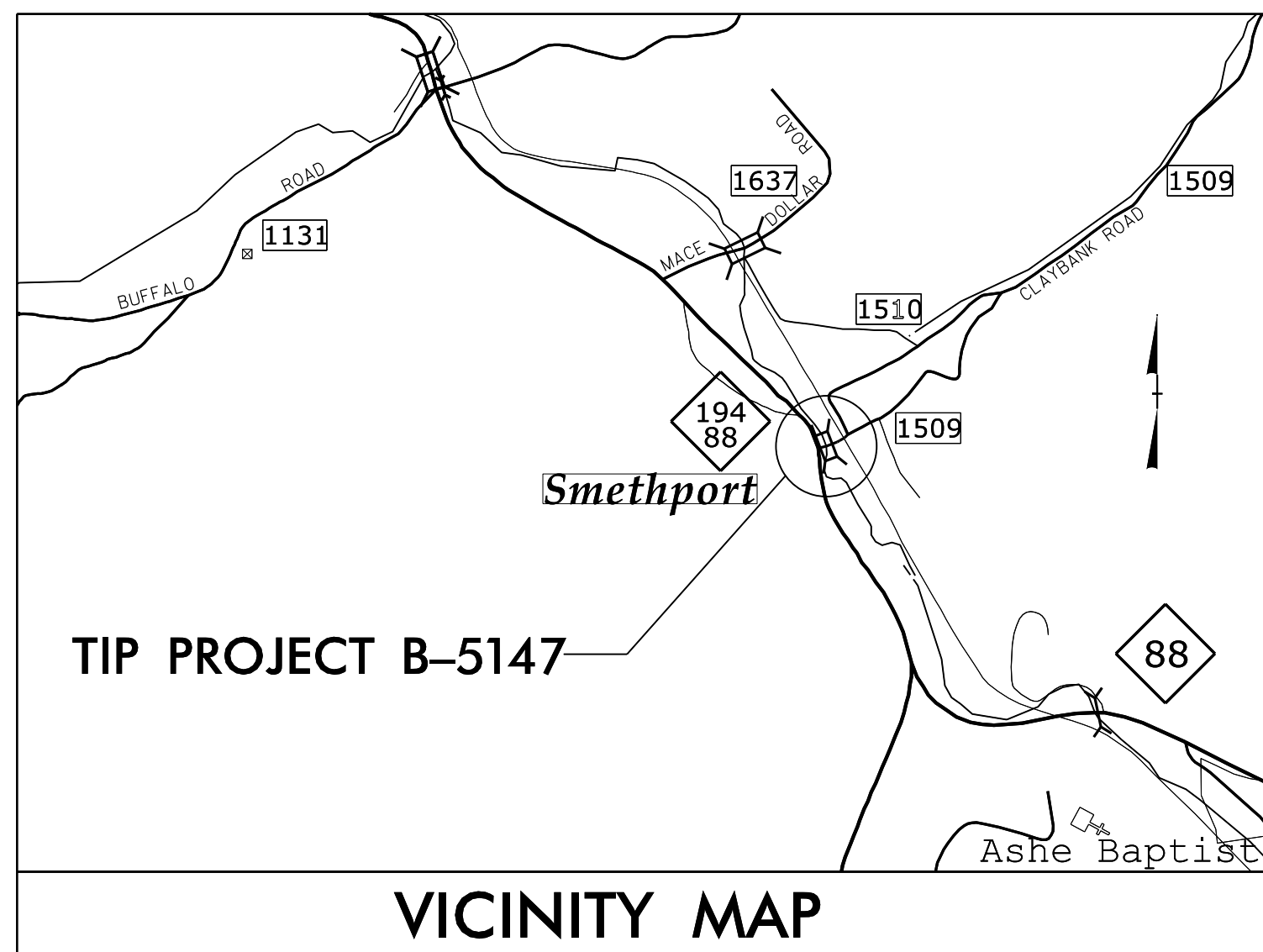
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TIP PROJECT: B-5147

CONTRACT: C203810



VICINITY MAP

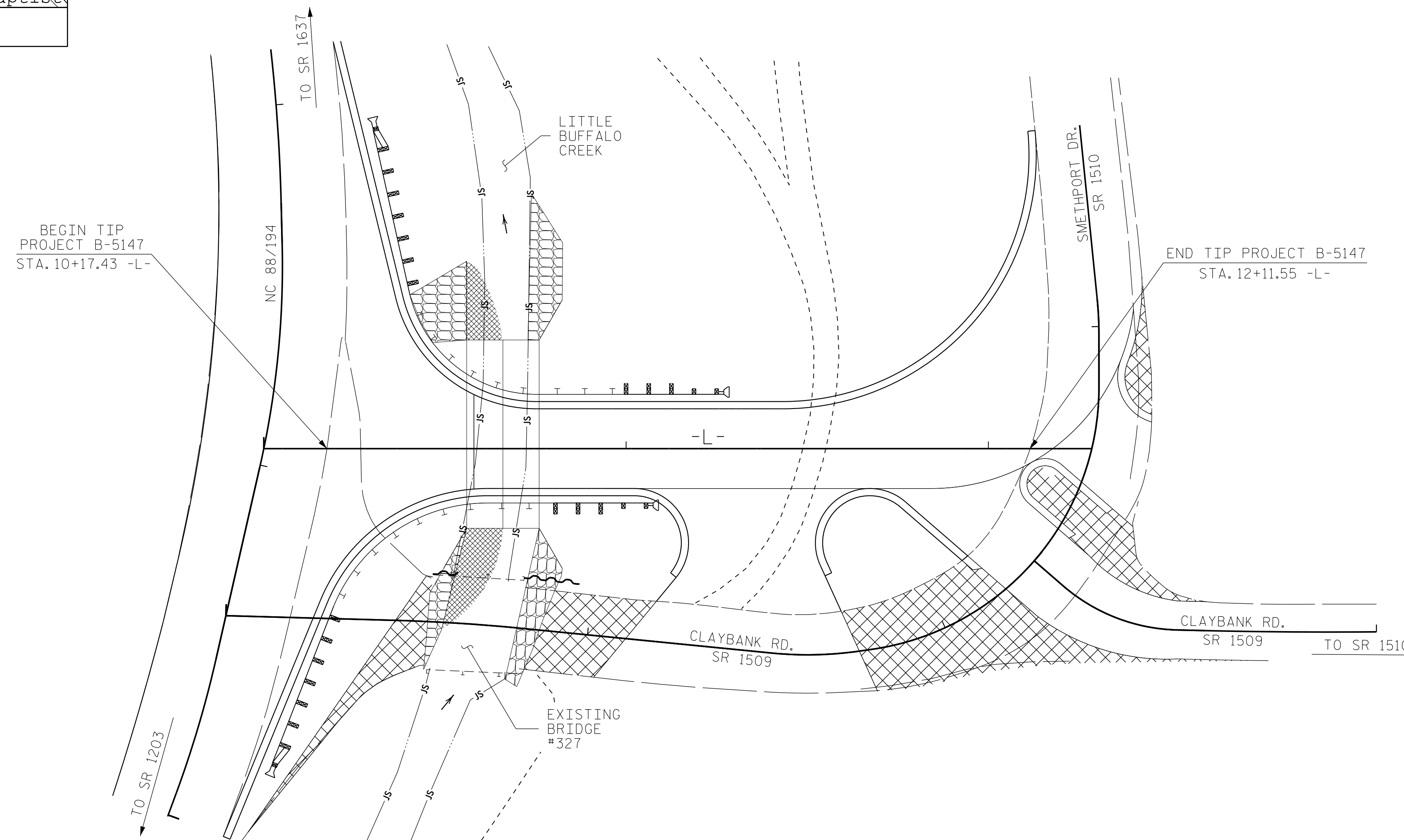
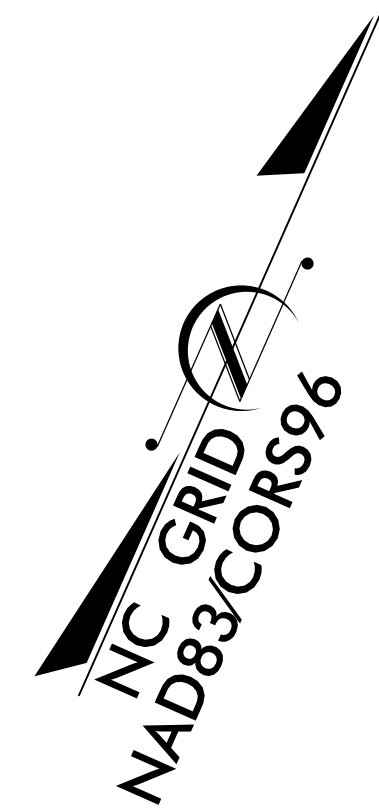
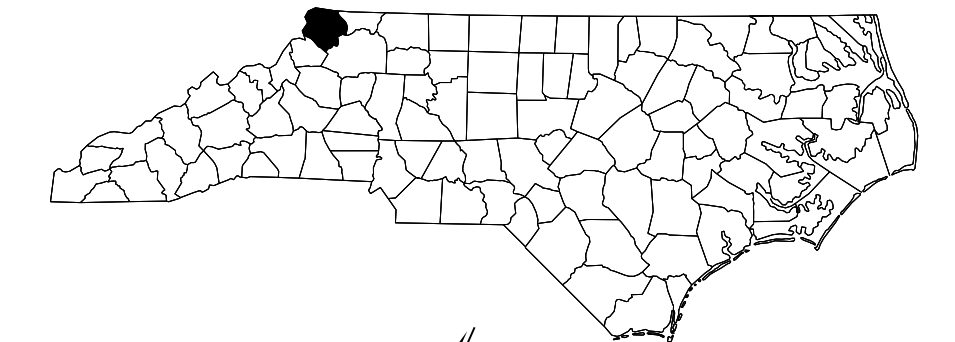
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ASHE COUNTY

**LOCATION: BRIDGE 327 OVER LITTLE BUFFALO CREEK
ON SR 1509 (CLAYBANK ROAD)**

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5147		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
42308.1.1	BRZ1509(8)	P.E.	
42308.2.1		ROW/UTIL.	
42308.3.1		CONST.	



CULVERT

DESIGN DATA

ADT 2017 = 1262
 ADT 2037 = 1415
 K = 10 %
 D = 55 %
 T = 39 % *
 V = 40 MPH
 * TTST = 1% DUAL 38%
 FUNC CLASS = LOCAL
 SUB REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-5147 = 0.037 MILES
 TOTAL LENGTH TIP PROJECT B-5147 = 0.037 MILES

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

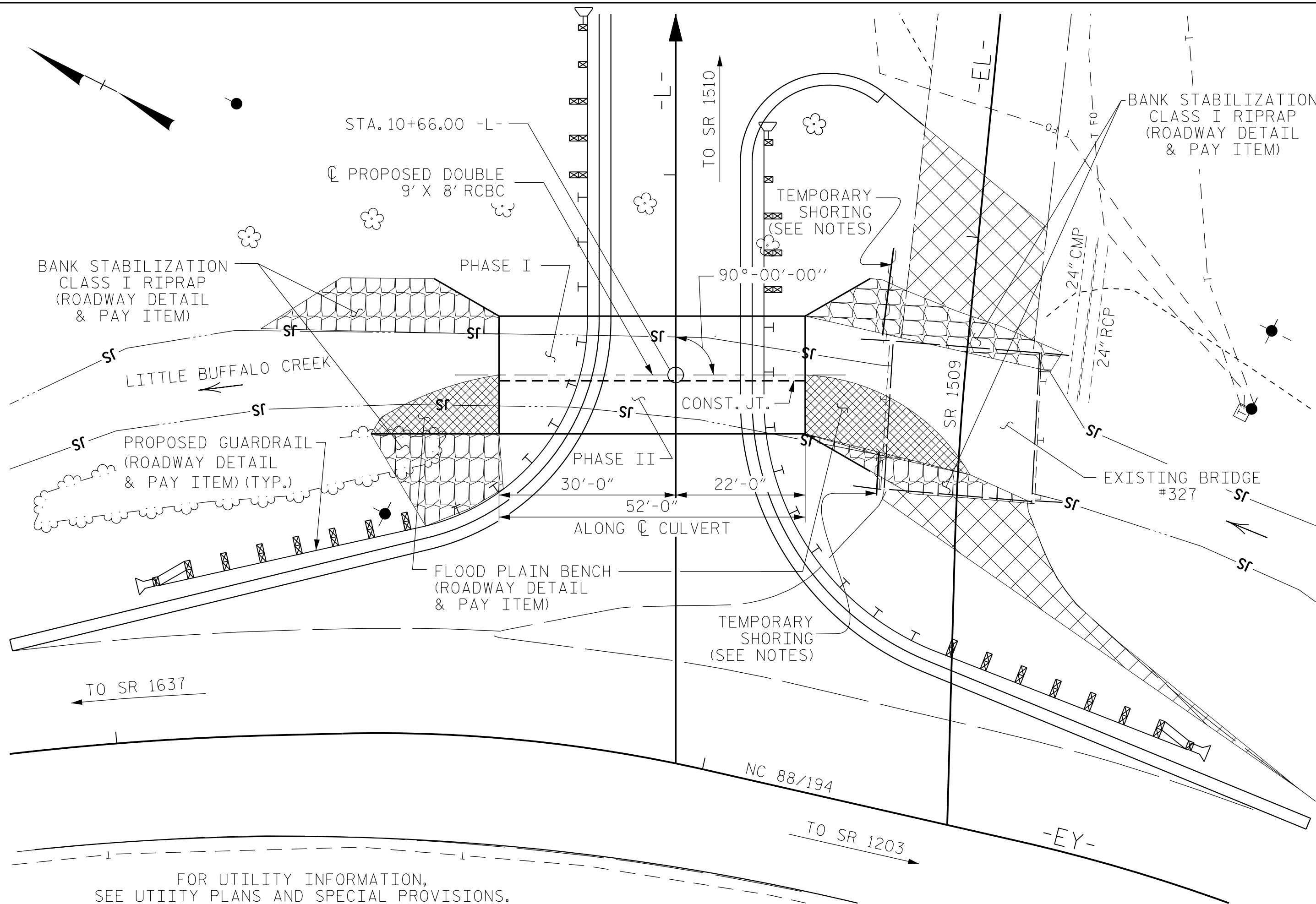
2012 STANDARD SPECIFICATIONS

LETTING DATE : MAY 17, 2016

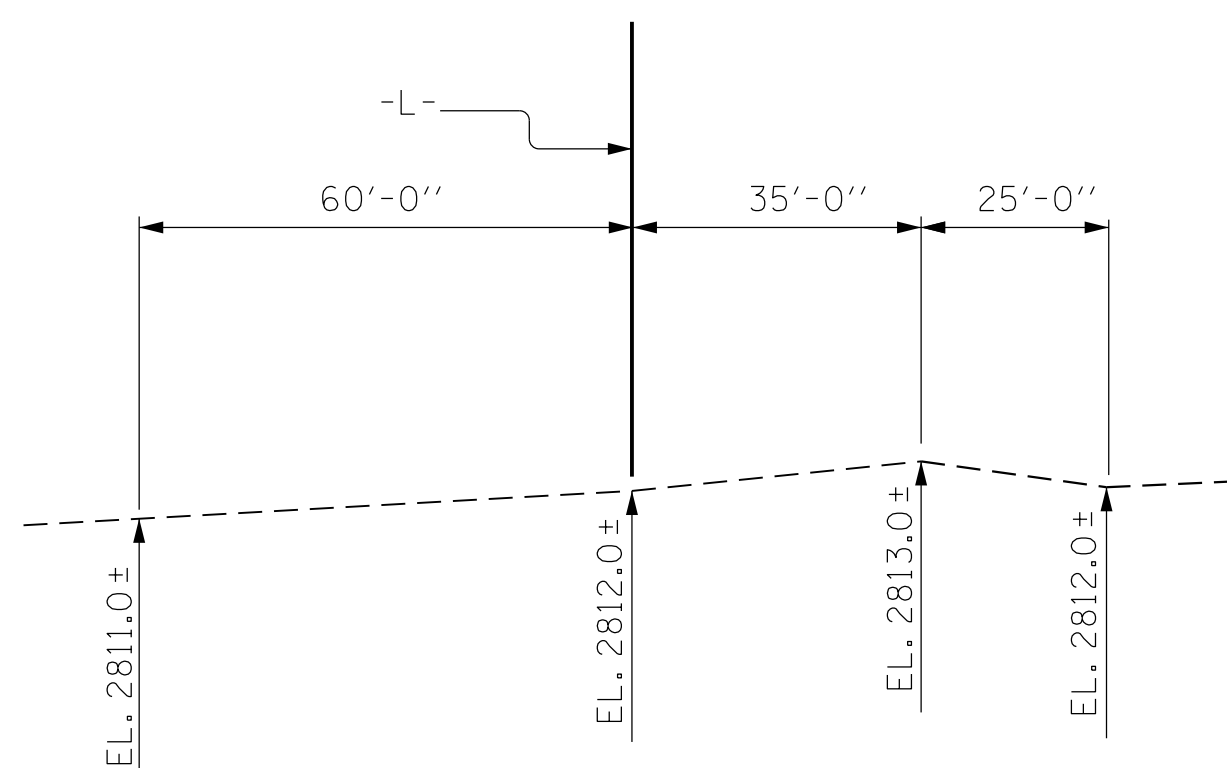
D. R. CALHOUN, P.E.
 PROJECT ENGINEER

W. S. ARAFAT, P.E.
 PROJECT DESIGN ENGINEER

B.M. #2 - RAILROAD SPIKE IN BASE OF 18" Ø PINE, N 10°-39'-14.80" E, DIST. 328.35',
 STA. 12+29.00 -L-, N 983945, E 1264211, EL. 2822.55'



LOCATION SKETCH



PROFILE ALONG CULVERT

HYDRAULIC DATA

DESIGN DISCHARGE ----- = 590 C.F.S.
 FREQUENCY OF DESIGN FLOOD ----- = 5+ YEARS
 DESIGN HIGH WATER ELEVATION = 2818.0 FT.
 DRAINAGE AREA ----- = 3.96 SQ. MI.
 BASE DISCHARGE (Q100) ----- = 1500 C.F.S.
 BASE HIGH WATER ELEVATION = 2820.92 FT.

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE ----- = 613 C.F.S.
 FREQUENCY OF OVERTOPPING FLOOD ----- = 5+ YEARS
 OVERTOPPING FLOOD ELEVATION = 2818.11 FT.

ROADWAY DATA

GRADE POINT ELEV. @ STATION 10+66.00 -L- = 2822.48 FT.
 BED ELEV. @ STATION 10+66.00 -L- = 2811.20 FT.
 ROADWAY SLOPES = 2:1

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE	
PHASE I	49.8 C.Y.
PHASE II	86.2 C.Y.
TOTAL	136.0 C.Y.
REINFORCING STEEL	
PHASE I	6018 LBS.
PHASE II	8187 LBS.
TOTAL	14205 LBS.
CULVERT EXCAVATION ----- LUMP SUM	
FOUNDATION COND. MAT'L	
PHASE I	49 TONS
PHASE II	39 TONS
TOTAL	88 TONS
REMOVAL OF EXISTING STRUCTURE ----- LUMP SUM	
ASBESTOS ASSESSMENT ----- LUMP SUM	

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
 DESIGN FILL ----- 2.43 FT. (MIN.), 3.73 FT. (MAX.)

FOR OTHER DESIGN DATA AND NOTES, SEE STANDARD NOTE SHEET.

3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.

CONCRETE IN PHASE I CULVERT TO BE POURED IN THE FOLLOWING ORDER:

1. PHASE I WING FOOTINGS, FLOOR SLAB AND CURTAIN WALL TO THE CONSTRUCTION JOINT INCLUDING 4" OF PHASE I VERTICAL WALLS.
2. THE REMAINING PORTION OF PHASE I WALLS AND PHASE I WINGS FULL HEIGHT.
3. PHASE I SILLS

CONCRETE IN PHASE II CULVERT TO BE POURED IN THE FOLLOWING ORDER:

1. PHASE II WING FOOTINGS, FLOOR SLAB AND CURTAIN WALL TO THE CONSTRUCTION JOINT INCLUDING 4" OF PHASE II VERTICAL WALLS.
2. THE REMAINING PORTION OF PHASE II WALLS AND PHASE II WINGS FULL HEIGHT.
3. PHASE II SILLS.
4. 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 SHEETS.

AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACES OF THE EXTERIOR WALLS 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 AND NUMBER OF BARRELS AS USED ON THE CAST-IN-PLACE DESIGN. FOR OPTIONAL PRECAST REINFORCED CONCRETE BOX CULVERT, SEE SPECIAL PROVISIONS.

FOR CONSTRUCTION SEQUENCE, SEE EROSION CONTROL PLANS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

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

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

AFTER SERVING AS A TEMPORARY STRUCTURE THE EXISTING STRUCTURE CONSISTING OF 2 SPANS: 1 @ 12'-10", 1 @ 12'-9" TIMBER FLOOR ON 11 LINES OF 12" STEEL I-BEAMS @ 2'-5/4" CTS.; WITH A CLEAR ROADWAY WIDTH OF 25'-1" ON END BENTS AND INTERIOR BENT WITH TIMBER CAPS, TIMBER PILES POST AND SILLS AND LOCATED APPROXIMATELY 50' UPSTREAM FROM PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY NOT POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE 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. SEE SPECIAL PROVISIONS.

FOR SALVAGE AND DELIVERY OF EXISTING 12" I-BEAMS, BEARING PLATES, TIMBER FLOORING, CRUTCH BENT, CAPS AND NEW POSTS, SEE SPECIAL PROVISIONS.

INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE."

THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING BRIDGE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

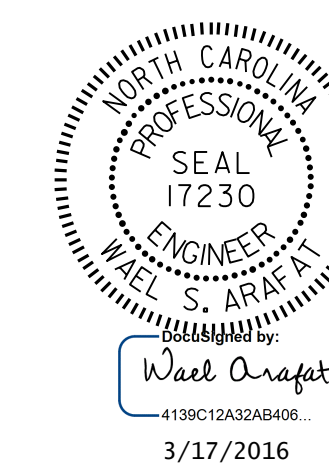
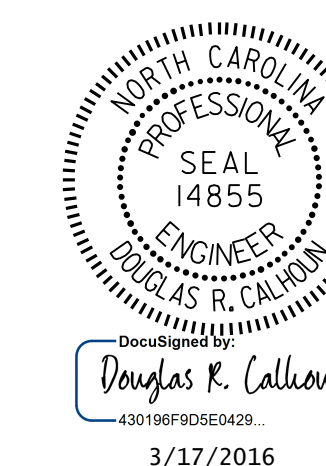
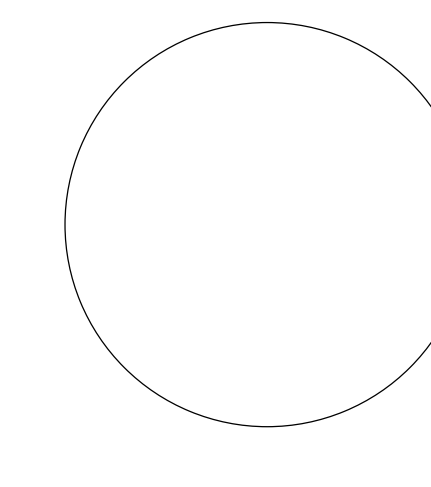
REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED IN A MANNER THAT PREVENTS DEBRIS FROM FALLING INTO THE WATER. THE CONTRACTOR SHALL SUBMIT DEMOLITION PLANS FOR REVIEW AND REMOVE THE BRIDGE IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

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 ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS

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.

I HEREBY CERTIFY THESE PLANS ARE THE AS BUILT PLANS



PROJECT NO. B-5147
ASHE COUNTY
 STATION: 10+66.00 -L-

SHEET 1 OF 9 REPLACES BRIDGE #327

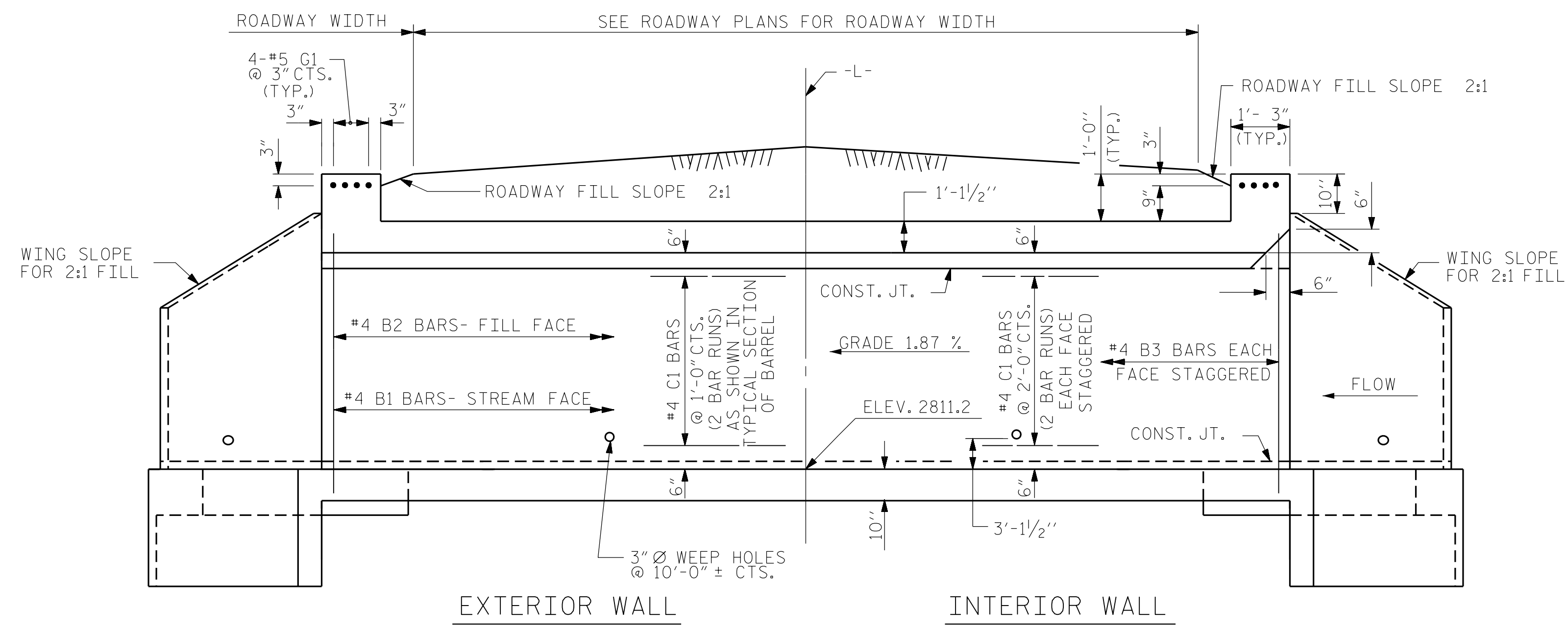
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

DOUBLE 9 FT. X 8 FT.
 CONCRETE BOX CULVERT
 90°-00'-00" SKEW

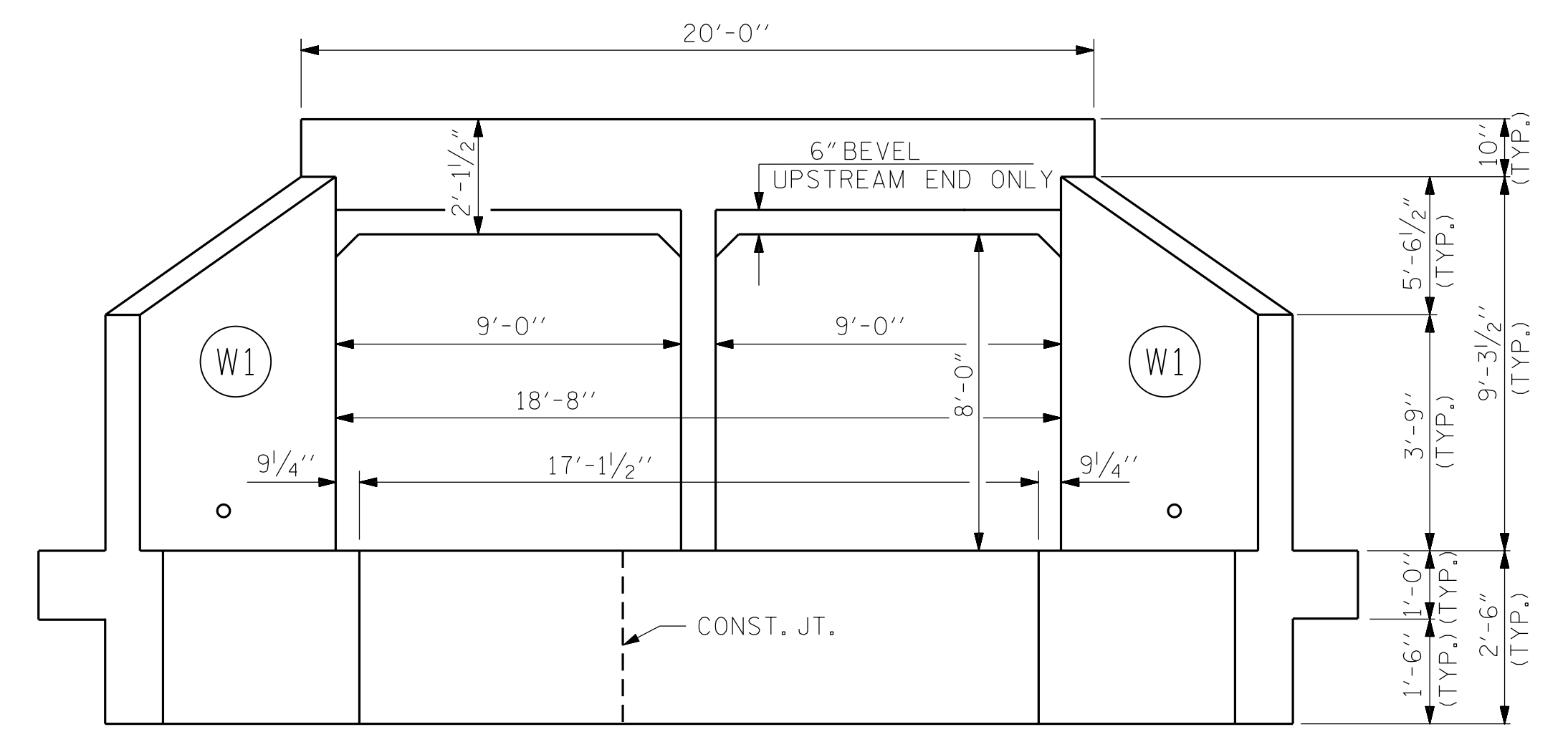
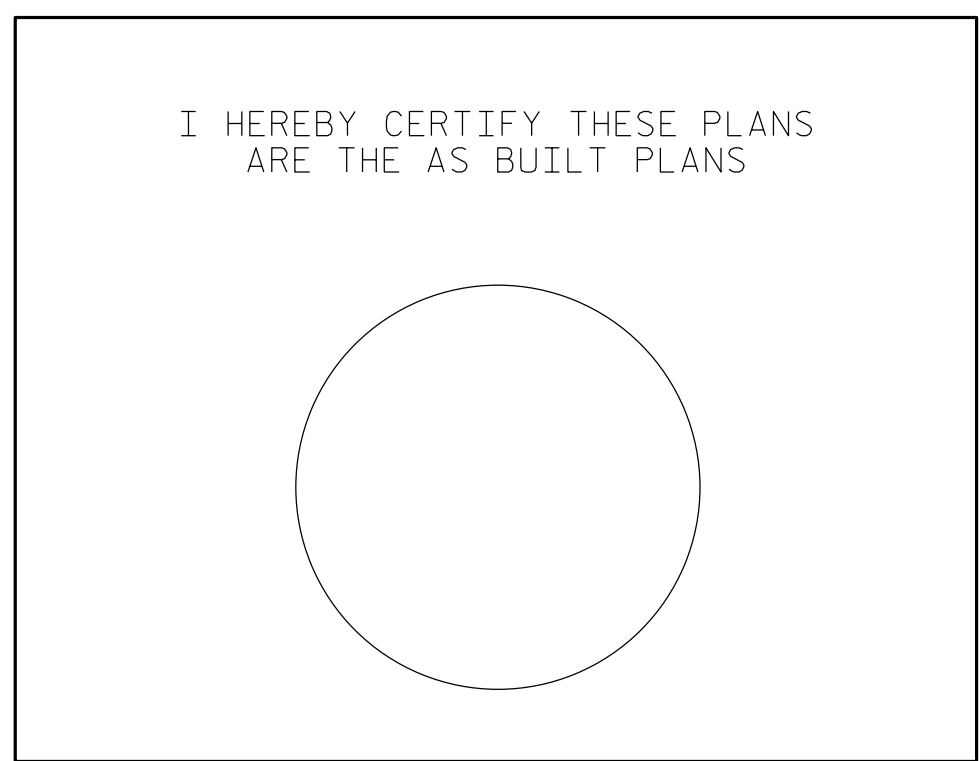
DRAWN BY : V.X. NGUYEN DATE : 12/7/15
 CHECKED BY : H.T. BARBOUR DATE : 1/4/16
 DESIGN ENGINEER OF RECORD: A. M. LEE DATE : 1/26/16

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

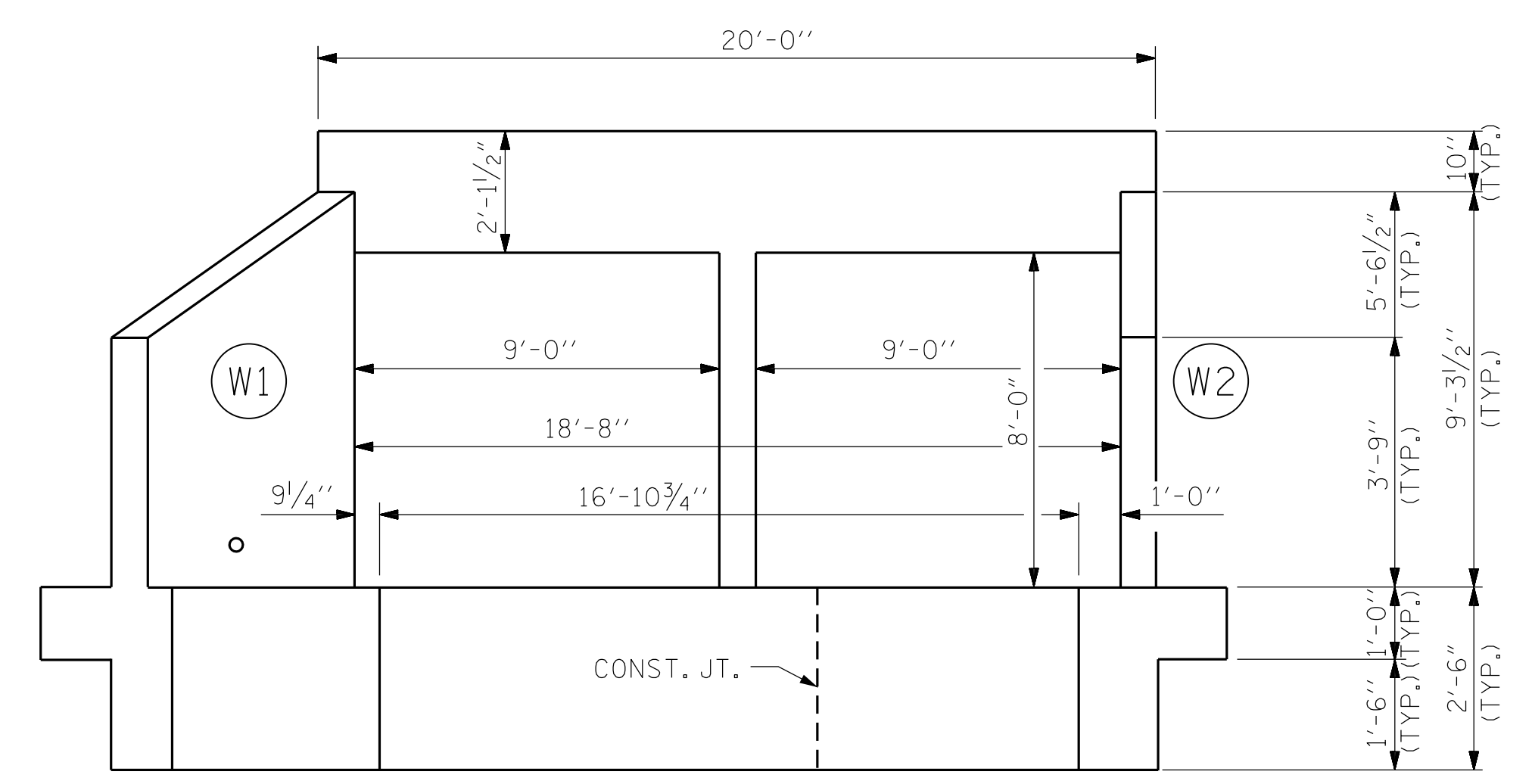
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					C-1 TOTAL SHEETS 9



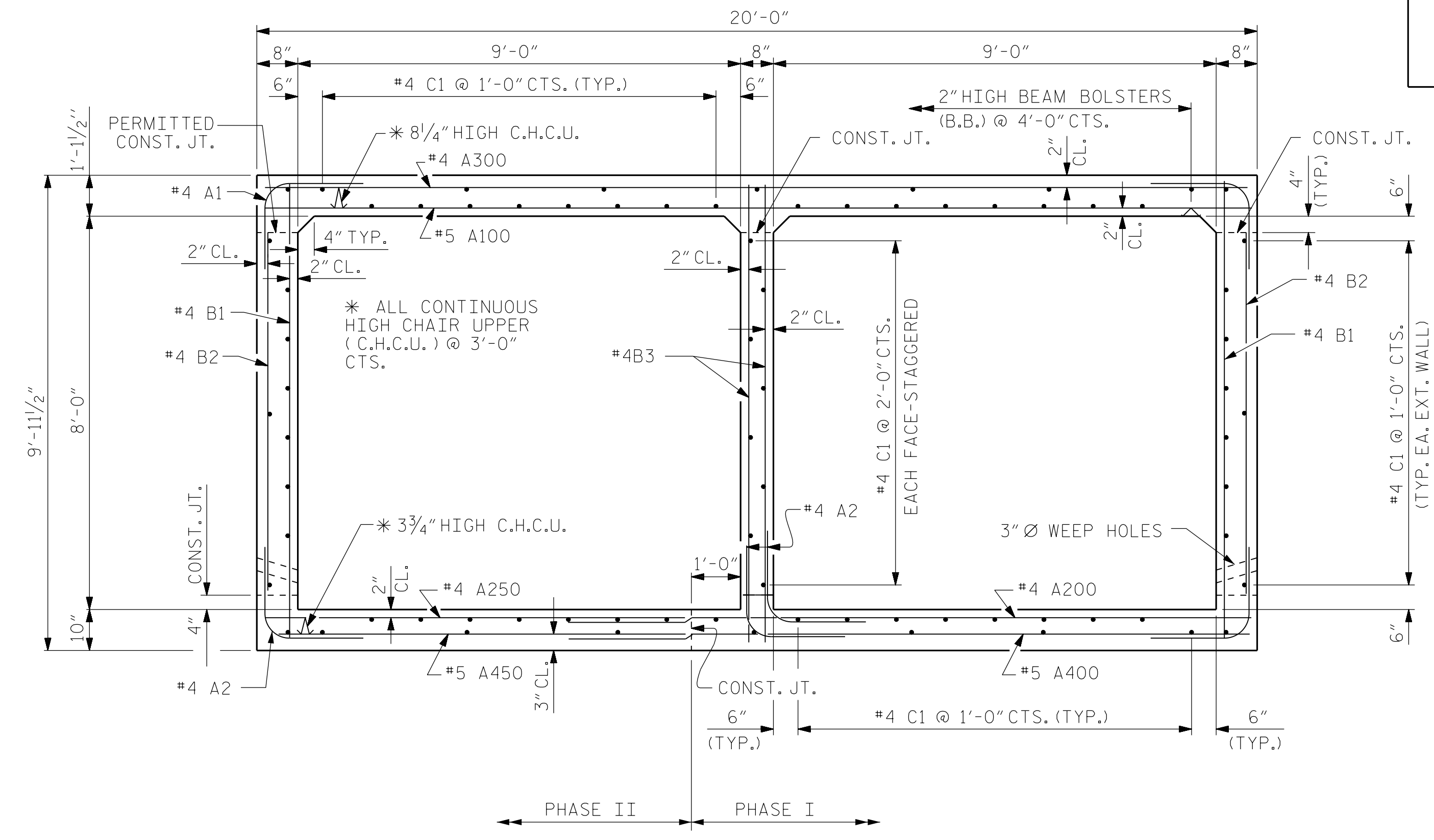
CULVERT SECTION NORMAL TO ROADWAY



INLET END ELEVATION

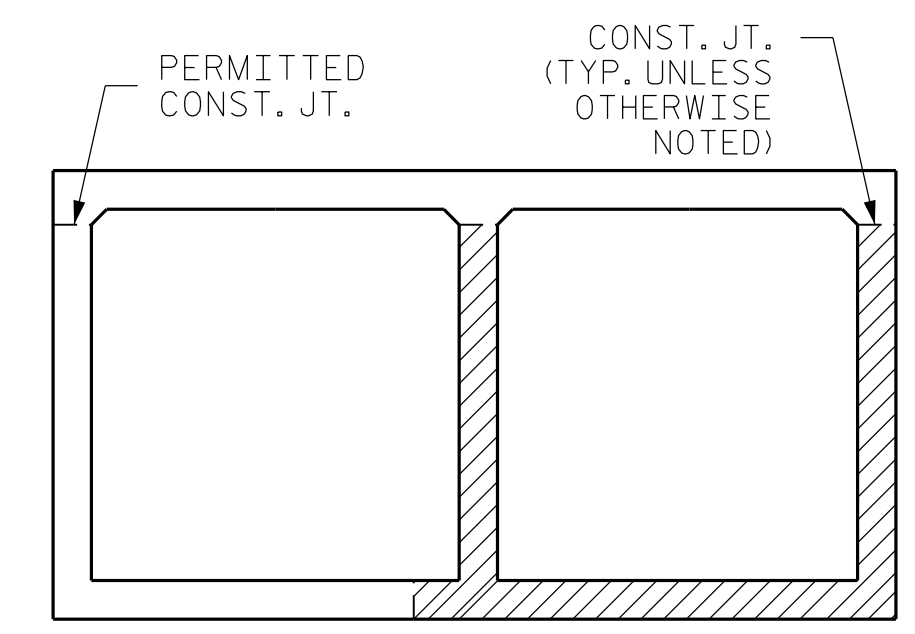


OUTLET END ELEVATION



RIGHT ANGLE SECTION OF BARREL

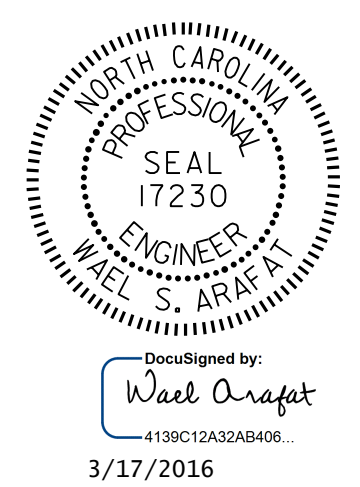
THERE ARE 76 "C" BARS IN SECTION OF BARREL.
 (LOOKING DOWNSTREAM)



PHASING SEQUENCE
 LOOKING DOWNSTREAM

PROJECT NO. B-5147
ASHE COUNTY
 STATION: 10+66.00 -L-
 SHEET 2 OF 9

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 9 FT. X 8 FT.
 CONCRETE BOX CULVERT
 90°-00'-00" SKEW



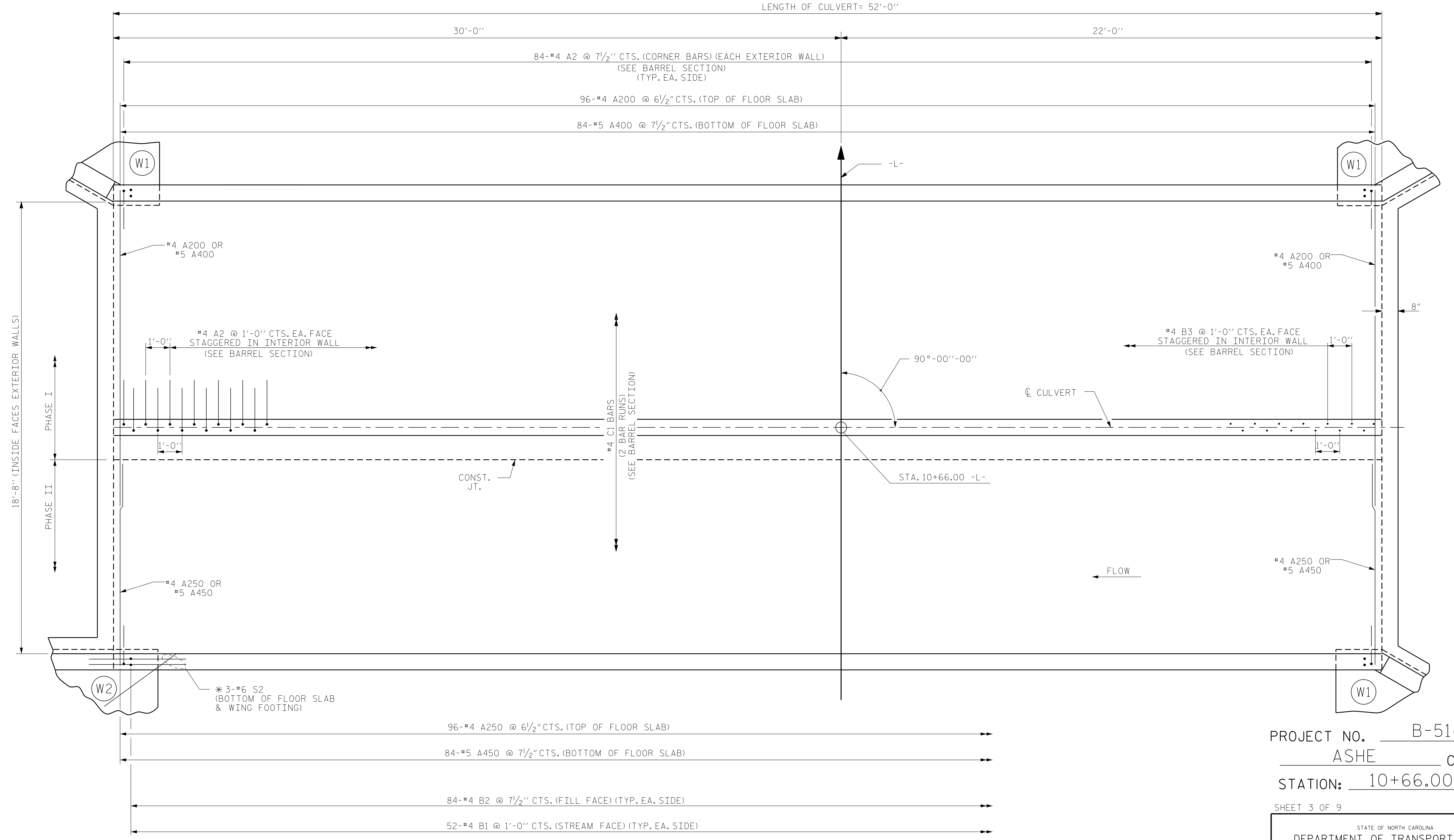
DRAWN BY: V.X. NGUYEN DATE: 12/7/15
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 DESIGN ENGINEER OF RECORD: A. M. LEE DATE: 1/26/16

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NO.	BY:	DATE:	NO.	BY:	DATE:
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2			4		

C-2
 TOTAL SHEETS
 9

LENGTH OF CULVERT= 52'-0"

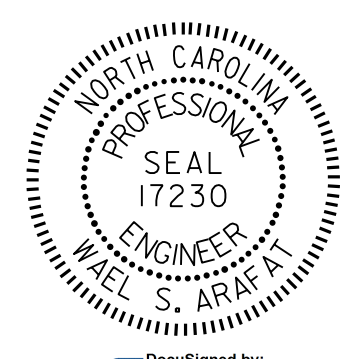


* THESE BARS INCLUDED
 IN STRAIGHT WING
 BILL OF MATERIAL.

PLAN OF FLOOR SLAB

PROJECT NO. B-5147
ASHE COUNTY
 STATION: 10+66.00 -L-
 SHEET 3 OF 9

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 9 FT. X 8 FT.
 CONCRETE BOX CULVERT
 90°-00'-00" SKEW



Designed by:
 Wael Arafa
 4139C12A32AB408
 3/17/2016

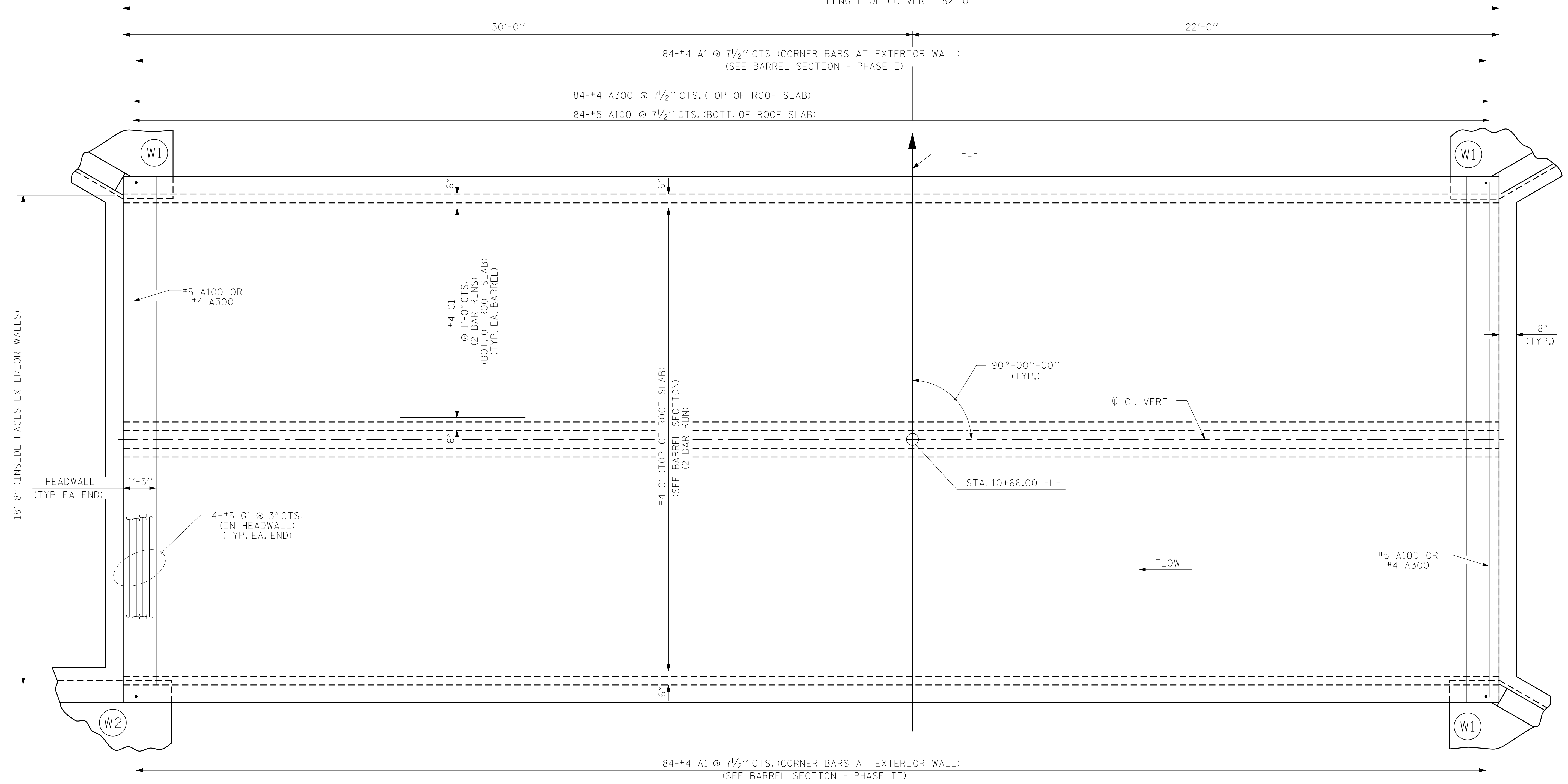
DRAWN BY : V.X. NGUYEN DATE : 12/7/15
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 DESIGN ENGINEER OF RECORD: A. M. LEE DATE : 1/26/16

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2			4		

C-3
 TOTAL SHEETS
 9

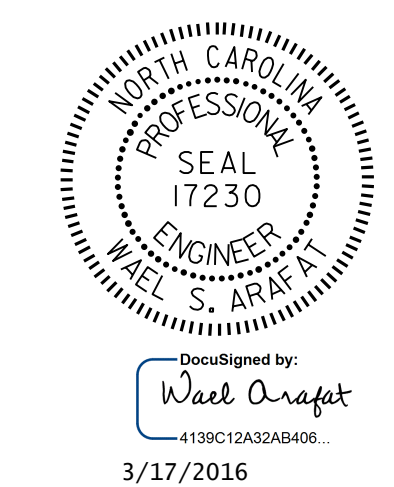
LENGTH OF CULVERT= 52'-0"



PLAN OF ROOF SLAB

PROJECT NO. B-5147
ASHE COUNTY
 STATION: 10+66.00 -L-

SHEET 4 OF 9



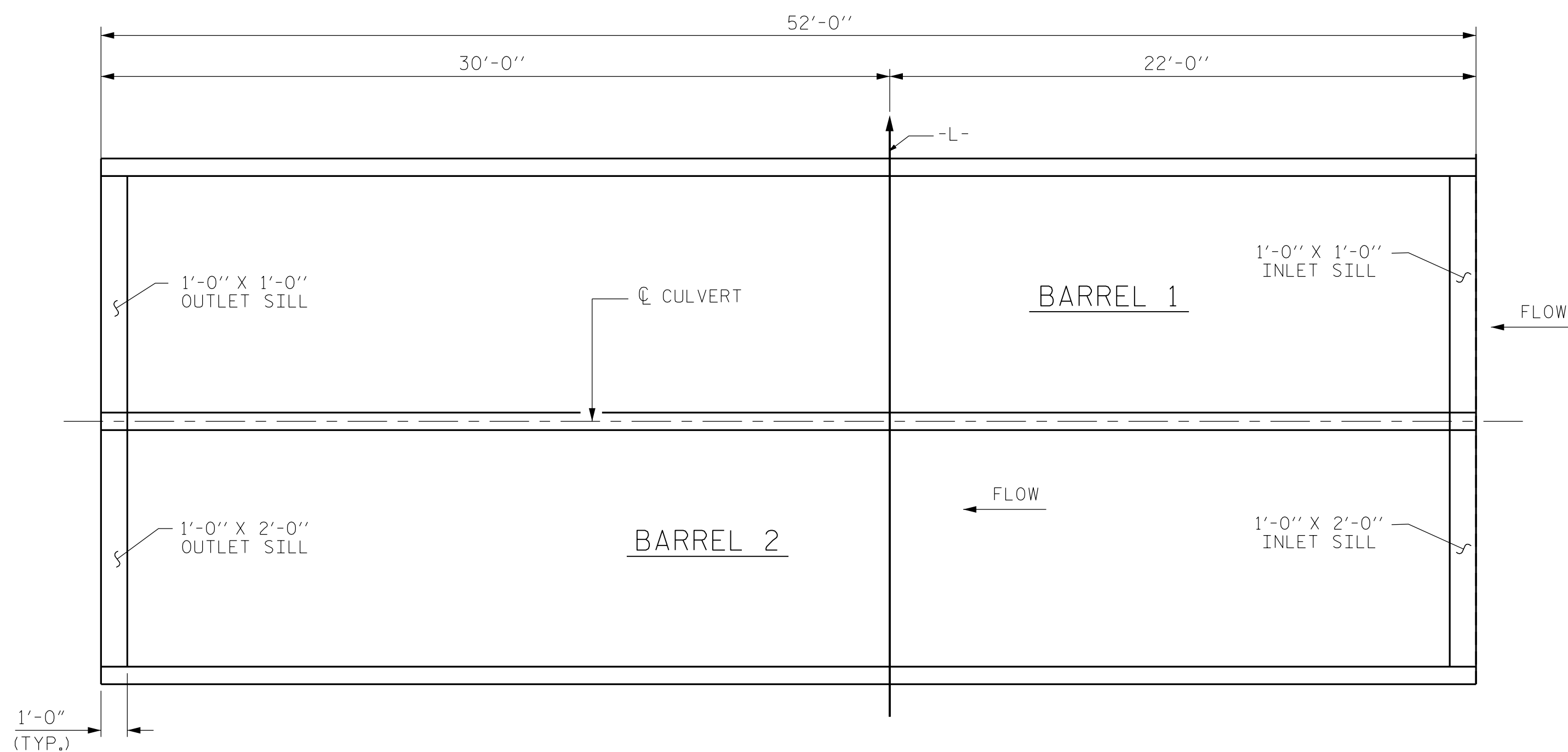
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 9 FT. X 8 FT.
 CONCRETE BOX CULVERT
 90°-00'-00" SKEW

DRAWN BY : V.X. NGUYEN DATE : 12/7/15
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C-4
 TOTAL SHEETS
 9



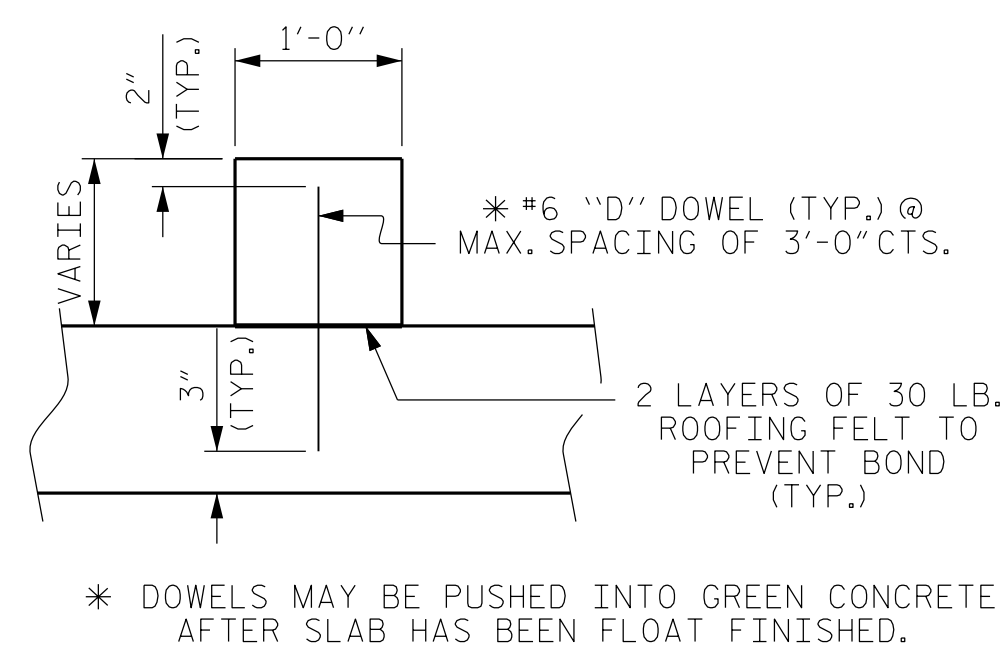
FLOOR SILL LAYOUT

BAR TYPE		REINFORCING BAR SCHEDULE									
		PHASE I					PHASE II				
		BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE
A1	84	#4	1	4'-11"	276	A1	84	#4	1	4'-11"	276
A2	188	#4	1	4'-2"	523	A2	84	#4	1	4'-2"	234
A200	96	#4	STR.	12'-9"	818	A100	84	#5	STR.	19'-8"	1723
A400	84	#5	STR.	13'-1"	1146	A250	96	#4	STR.	8'-4"	534
B1	52	#4	STR.	9'-7"	333	A300	84	#4	STR.	19'-8"	1104
B2	84	#4	STR.	7'-4"	411	A450	84	#5	STR.	8'-4"	730
B3	104	#4	STR.	9'-7"	666	B1	52	#4	STR.	9'-7"	333
C1	62	#4	STR.	26'-10"	1111	B2	84	#4	STR.	7'-4"	411
D2	6	#6	STR.	1'-5"	13	C1	90	#4	STR.	26'-10"	1613
REINFORCING STEEL					5297 LBS.	REINFORCING STEEL					7144 LBS.
G1					8	#5	STR.	19'-8"	164		
D1					6	#6	STR.	2'-5"	22		
REINFORCING STEEL						REINFORCING STEEL					7144 LBS.

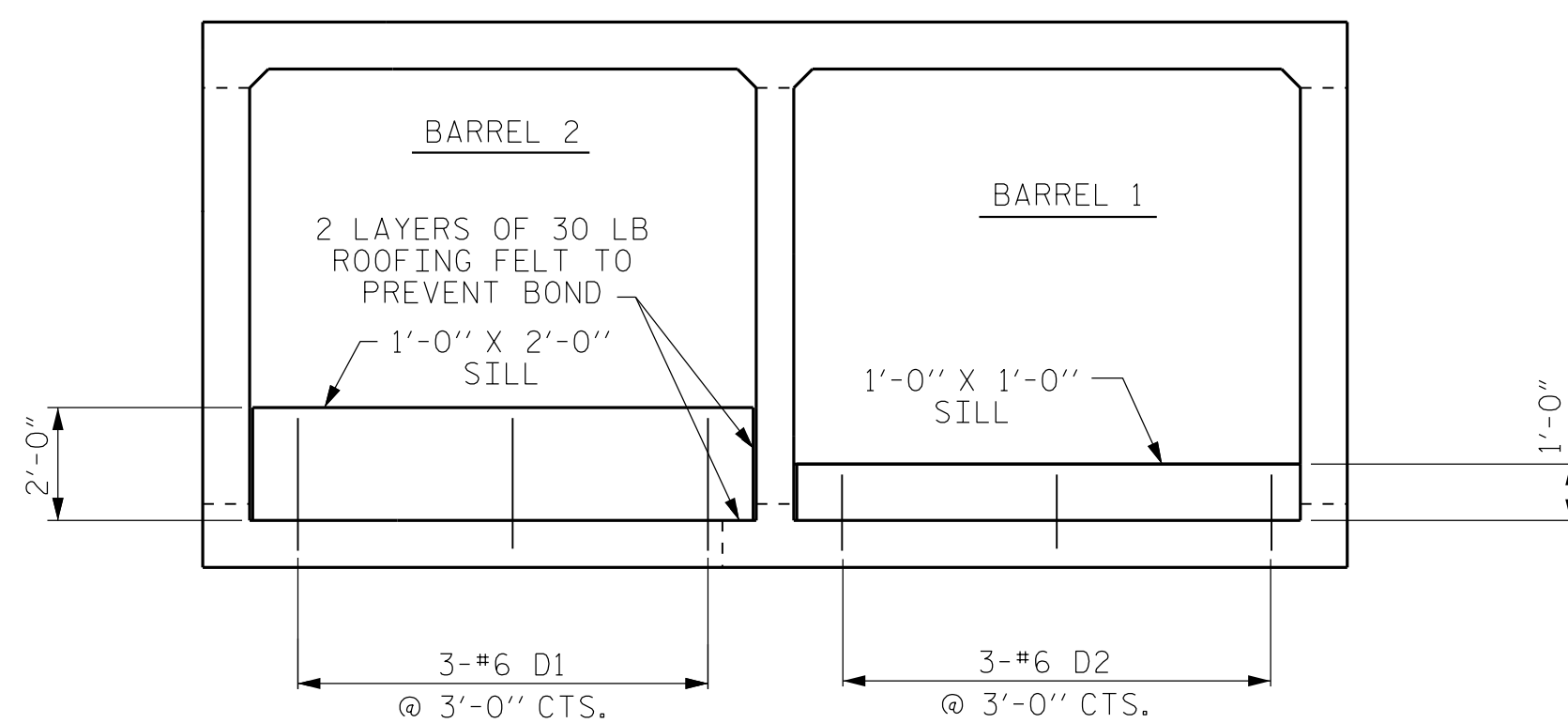
SPLICE CHART		
BAR	SIZE	SPLICE LENGTH
A200	#4	1'-5"
A400	#5	1'-9"
C1	#4	1'-11"
B1	#4	1'-5"
B3	#4	1'-5"

PHASE I STRUCTURE QUANTITIES	
CLASS A CONCRETE	
BARREL	37.9 C.Y.
WINGS ETC.	11.9 C.Y.
TOTAL	49.8 C.Y.
REINFORCING STEEL	
BARREL	5297 LBS.
WINGS ETC.	721 LBS.
TOTAL	6018 LBS.
CULVERT EXCAVATION	LUMP SUM
FOUNDATION COND. MAT'L.	49 TONS

PHASE II STRUCTURE QUANTITIES	
CLASS A CONCRETE	
BARREL	68.8 C.Y.
WINGS ETC.	17.4 C.Y.
TOTAL	86.2 C.Y.
REINFORCING STEEL	
BARREL	7144 LBS.
WINGS ETC.	1043 LBS.
TOTAL	8187 LBS.
CULVERT EXCAVATION	LUMP SUM
FOUNDATION COND. MAT'L.	39 TONS



SECTION THRU SILL



ELEVATION
LOOKING DOWNSTREAM

NOTES

BED MATERIAL PLACED IN THE CULVERT BARRELS SHALL BE MATERIAL THAT IS EXCAVATED FROM THE STREAM BED OR FLOODPLAIN DURING CONSTRUCTION OF THE CULVERT. RIP RAP MAY BE USED TO SUPPLEMENT THE BED MATERIAL IN THE HIGH FLOW BARREL. IF RIP RAP IS USED, IT SHOULD BE PLACED IN THE BOTTOM PORTION OF THE BARREL WITH BED MATERIAL PLACED ON TOP TO FILL THE VOIDS AND PROVIDE A FLAT SURFACE FOR ANIMAL PASSAGE. BED MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

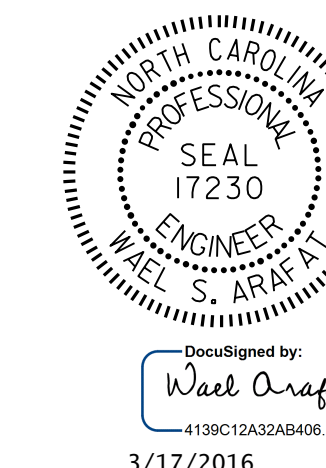
SILLS ARE TO BE 1.0 FT. WIDE AND CAST SEPARATELY AND ATTACHED BY DOWELS.

TOP OF SILL IN LOW FLOW BARREL SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM.

THE ENTIRE COST OF WORK REQUIRED TO STOCKPILE AND PLACE THE EXCAVATED MATERIAL, AND SUPPLEMENTAL MATERIAL IF USED, SHALL BE INCLUDED IN THE CONTRACT LUMP SUM PRICE BID FOR CULVERT EXCAVATION.

PROJECT NO. B-5147
ASHE COUNTY
 STATION: 10+66.00 -L-

SHEET 5 OF 9

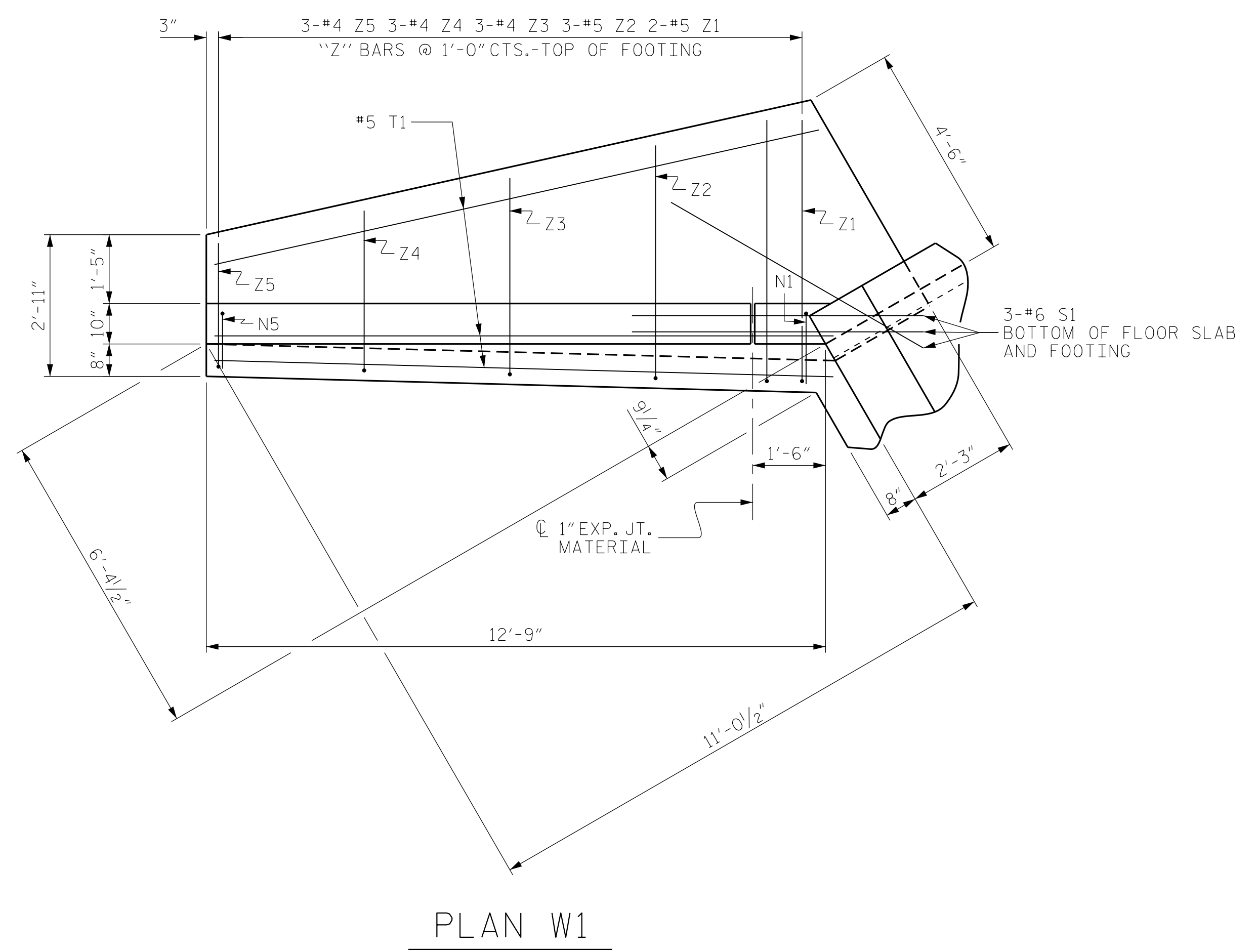


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 DOUBLE 9 FT. X 8 FT.
 CONCRETE BOX CULVERT
 90°-00'-00" SKEW

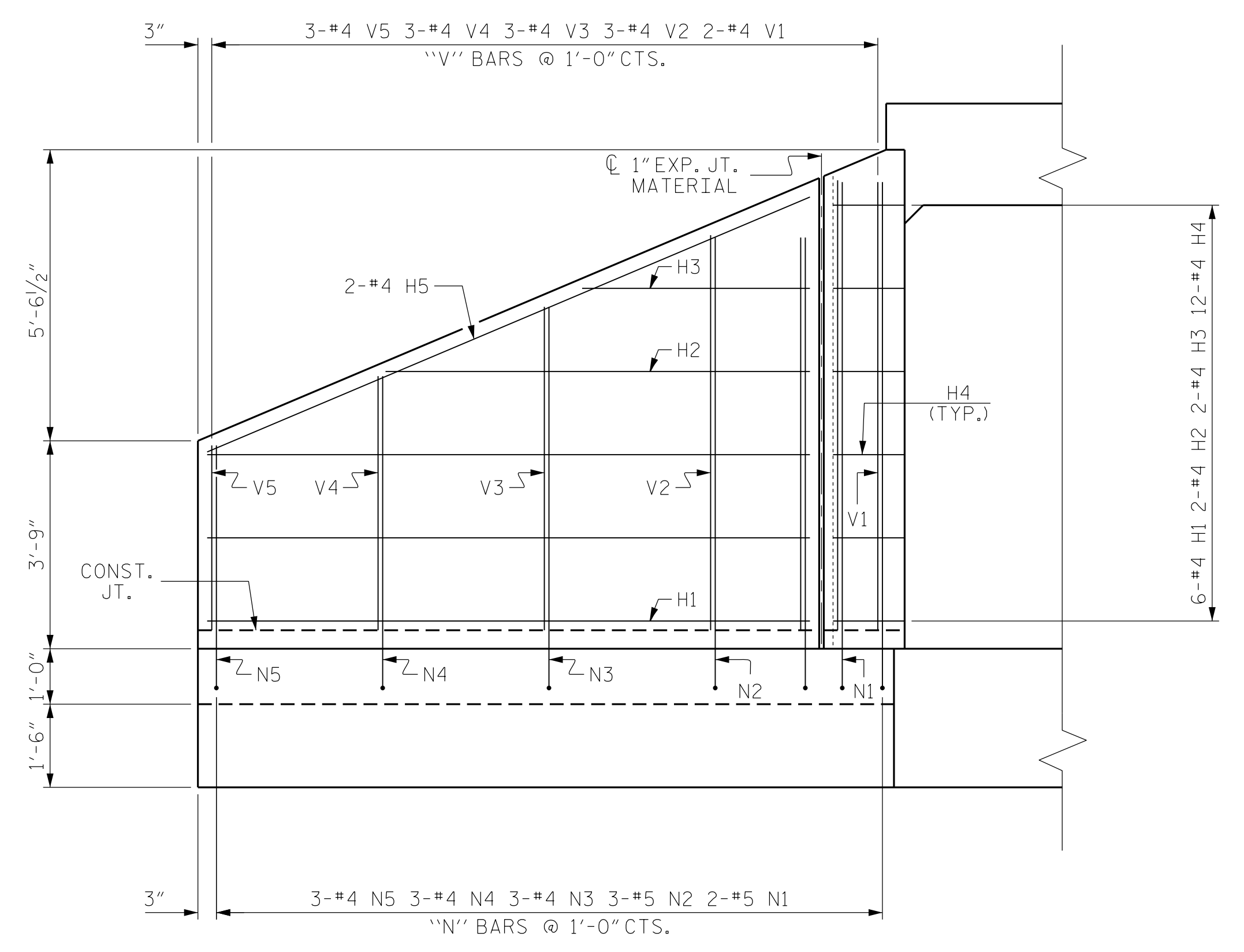
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NO.	BY:	DATE:	NO.	BY:	DATE:	C-5
1			3			TOTAL SHEETS
2			4			9

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DRAWN BY: V.X. NGUYEN DATE: 12-7-15
 CHECKED BY: H.T. BARBOUR DATE: 1-4-16
 DESIGN ENGINEER OF RECORD: A. M. LEE DATE: 1-26-16



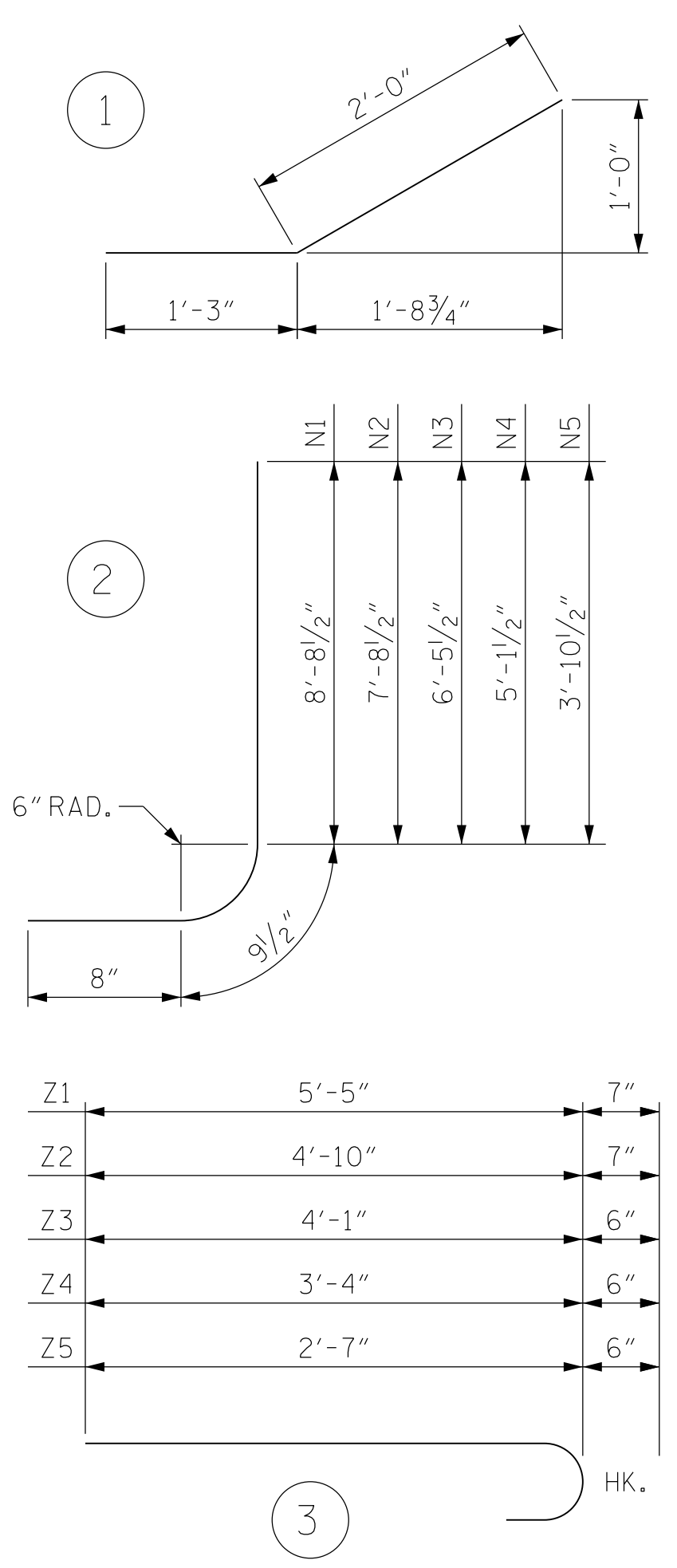
PLAN W1



ELEVATION W1

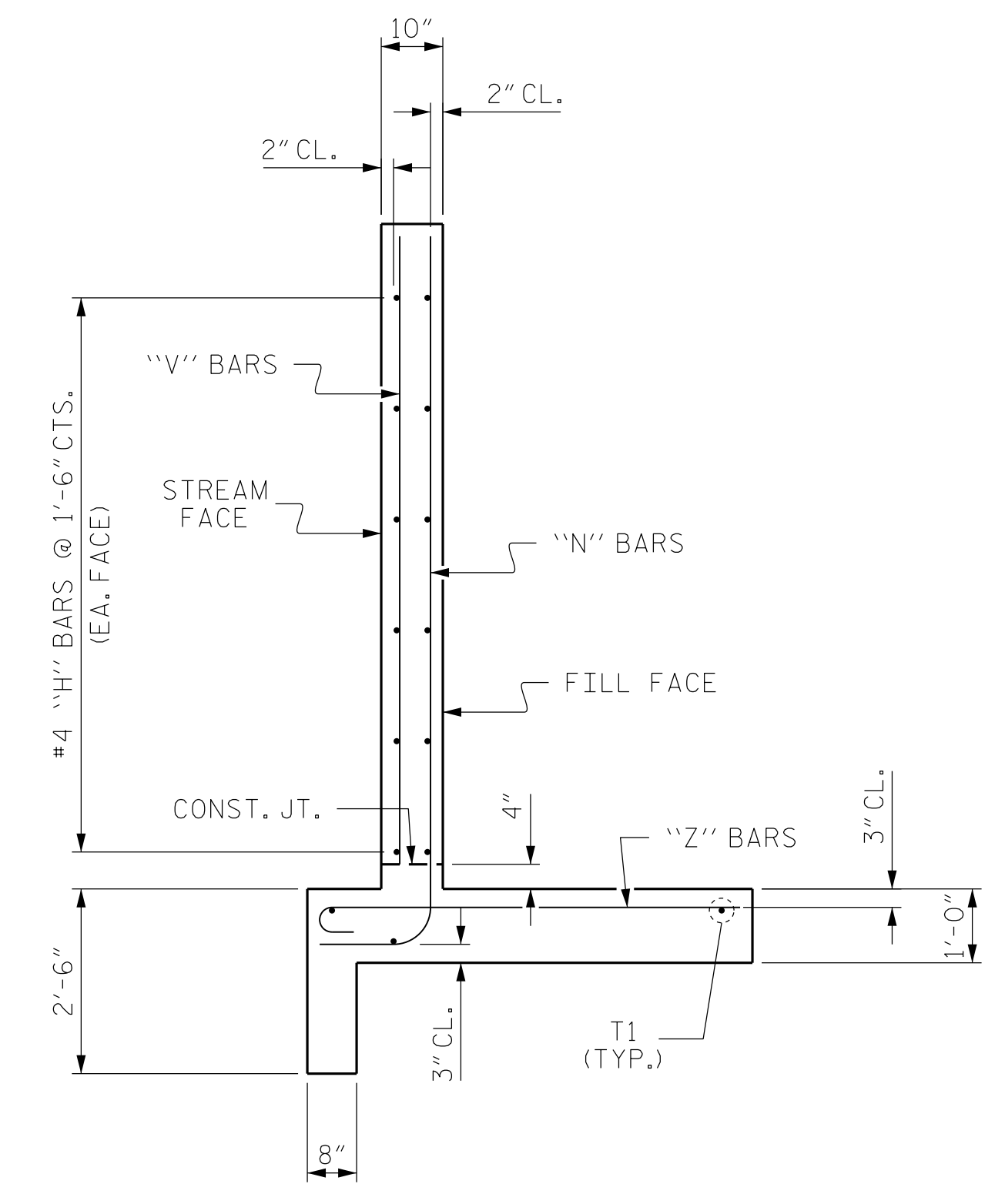
BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



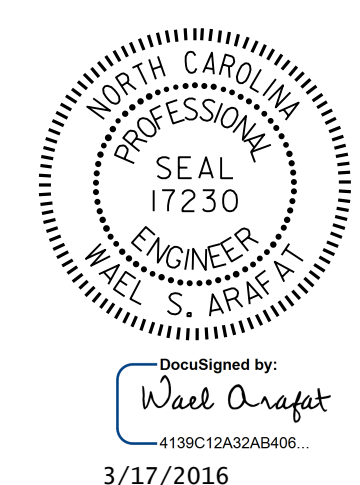
BILL OF MATERIAL

PHASE I						PHASE II					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR	10'-10"	87	H1	6	#4	STR	10'-10"	43
H2	4	#4	STR	7'-8"	20	H2	2	#4	STR	7'-8"	10
H3	4	#4	STR	4'-1"	11	H3	2	#4	STR	4'-1"	5
H4	24	#4	1	3'-3"	52	H4	12	#4	1	3'-3"	26
H5	4	#4	STR	11'-9"	31	H5	2	#4	STR	11'-9"	16
N1	4	#5	2	10'-2"	42	N1	2	#5	2	10'-2"	21
N2	6	#5	2	9'-2"	57	N2	3	#5	2	9'-2"	29
N3	6	#4	2	7'-11"	32	N3	3	#4	2	7'-11"	16
N4	6	#4	2	6'-7"	26	N4	3	#4	2	6'-7"	13
N5	6	#4	2	5'-4"	21	N5	3	#4	2	5'-4"	11
S1	6	#6	STR	6'-0"	54	S1	3	#6	STR	6'-0"	27
T1	6	#5	STR	12'-9"	80	T1	3	#5	STR	12'-9"	40
V1	4	#4	STR	8'-1"	22	V1	2	#4	STR	8'-1"	11
V2	6	#4	STR	7'-1"	28	V2	3	#4	STR	7'-1"	14
V3	6	#4	STR	5'-10"	23	V3	3	#4	STR	5'-10"	12
V4	6	#4	STR	4'-7"	18	V4	3	#4	STR	4'-7"	9
V5	6	#4	STR	3'-4"	13	V5	3	#4	STR	3'-4"	7
Z1	4	#5	3	6'-0"	25	Z1	2	#5	3	6'-0"	13
Z2	6	#5	3	5'-5"	34	Z2	3	#5	3	5'-5"	17
Z3	6	#4	3	4'-7"	18	Z3	3	#4	3	4'-7"	9
Z4	6	#4	3	3'-10"	15	Z4	3	#4	3	3'-10"	8
Z5	6	#4	3	3'-1"	12	Z5	3	#4	3	3'-1"	6
REINFORCING STEEL FOR 2 WINGS 721 LBS.						REINFORCING STEEL FOR 1 WING 363 LBS.					
CLASS A CONCRETE 2 WINGS (W1) 10.7 C.Y.						CLASS A CONCRETE 1 WING (W1) 5.4 C.Y.					
2 END CURTAIN WALLS 1.2 C.Y.						2 HEADWALLS 1.9 C.Y.					
TOTAL 11.9 C.Y.						2 END CURTAIN WALLS 0.9 C.Y.					
						TOTAL 8.2 C.Y.					



TYPICAL WING SECTION

PROJECT NO. B-5147
 ASHE COUNTY
 STATION: 10+66.00 -L-
 SHEET 6 OF 9

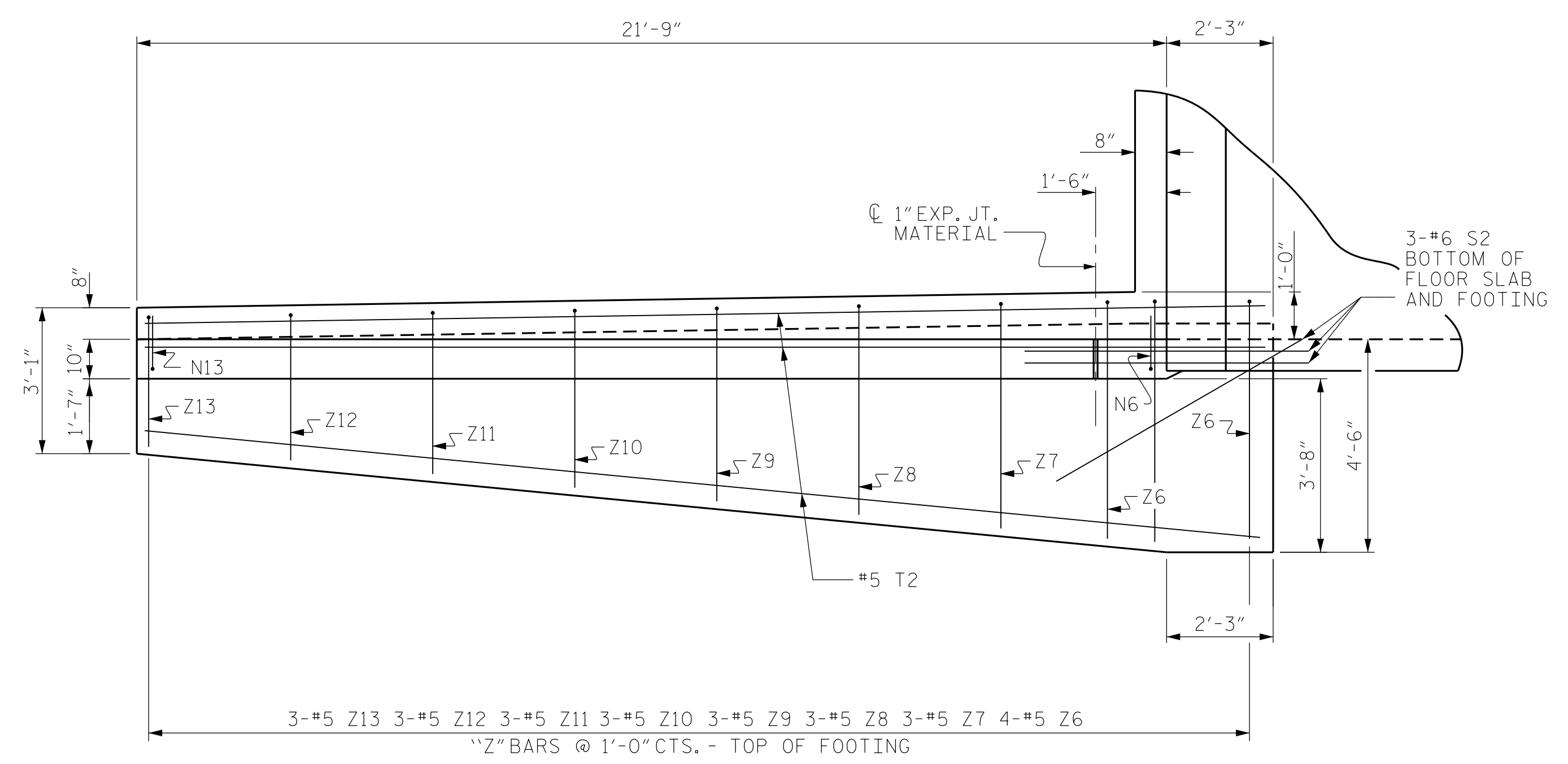


STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD WINGS
 FOR
 CONCRETE BOX CULVERT
 H = 8'-0" SLOPE = 2:1
 90°-00'-00" SKEW

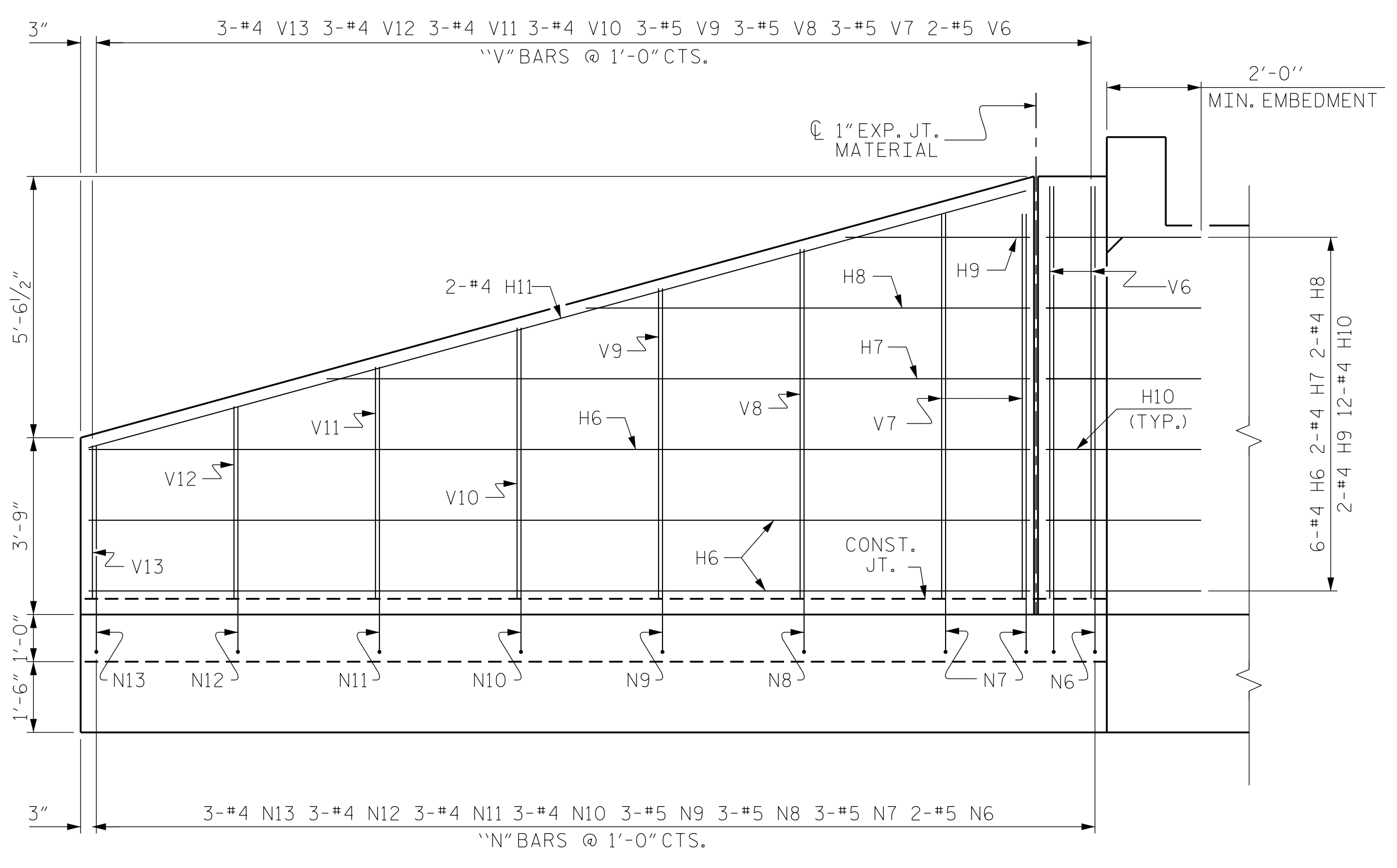
ASSEMBLED BY : V.X. NGUYEN DATE : 12-7-15
 CHECKED BY : H.T. BARBOUR DATE : 1-4-16
 DRAWN BY : CCJ 10/99
 CHECKED BY : RWJ 03/00

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

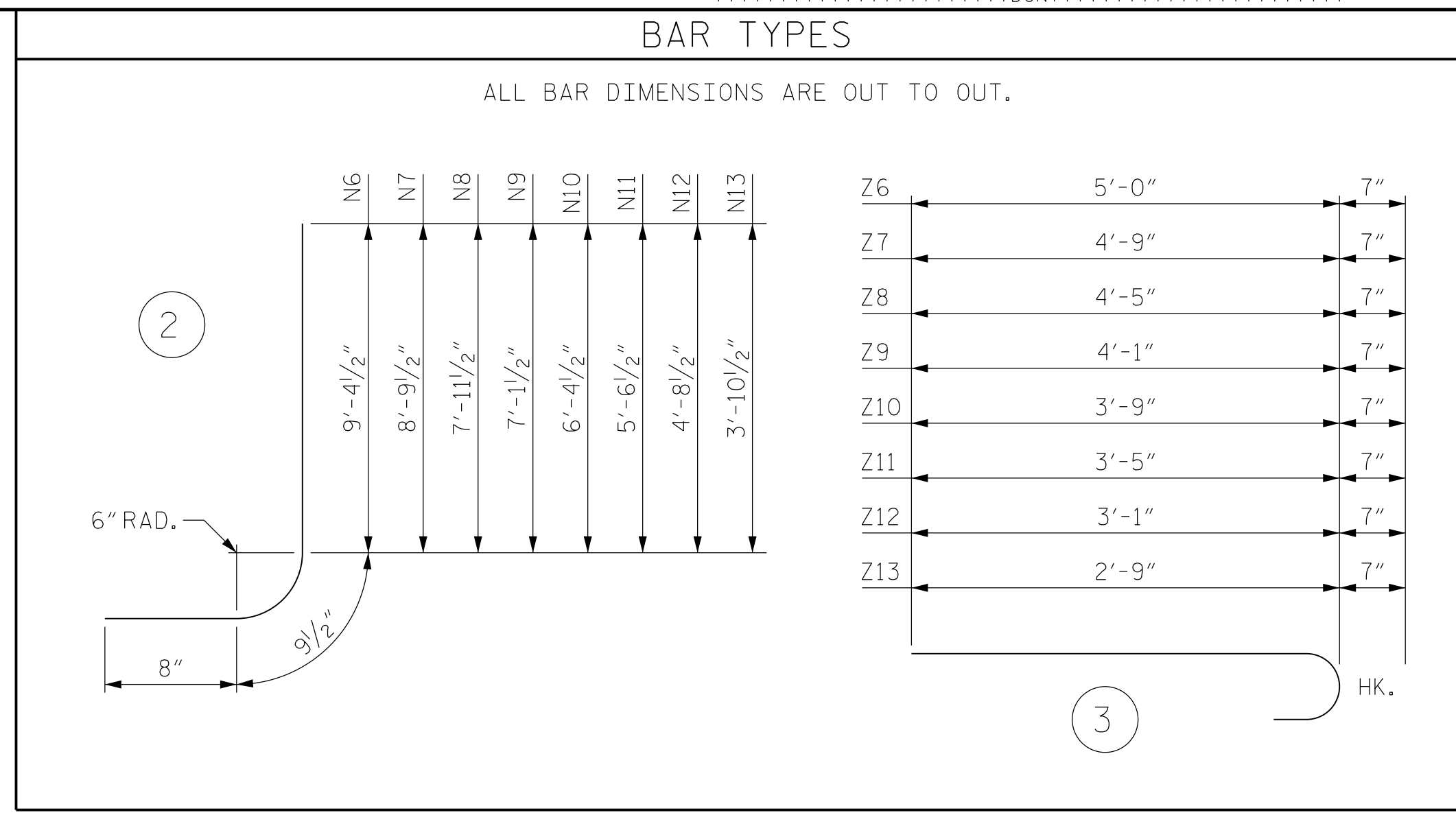
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C-6	
1			3			TOTAL SHEETS 9	
2			4				



PLAN W2

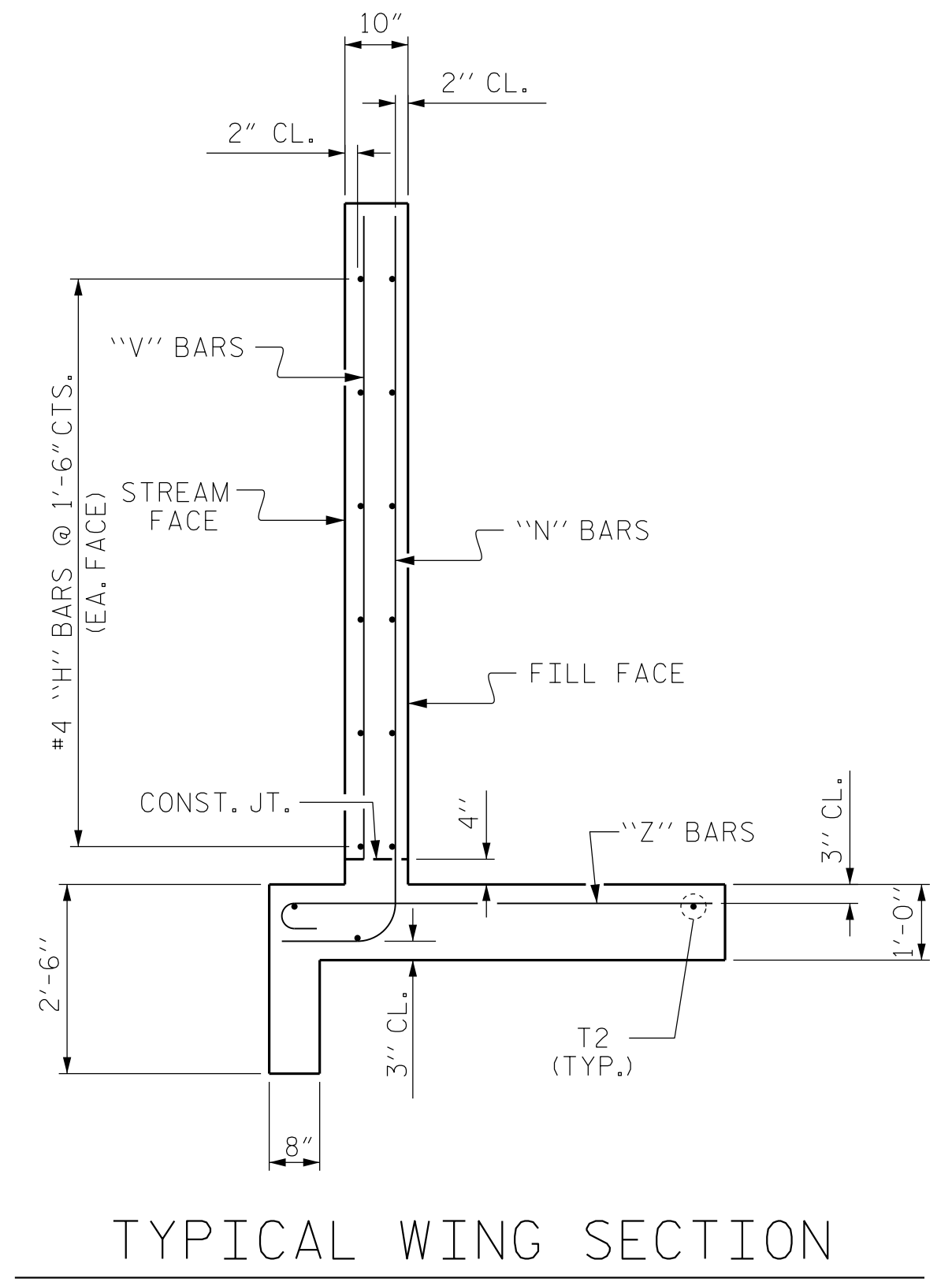


ELEVATION W2



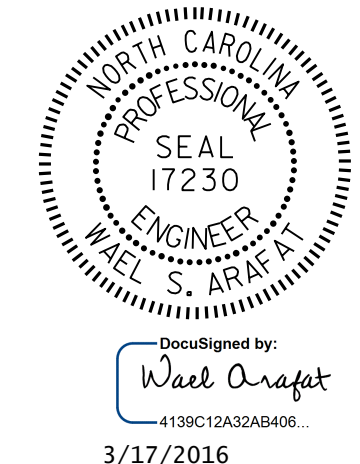
BILL OF MATERIAL					
PHASE II					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
H6	6	#4	STR	19'-11"	80
H7	2	#4	STR	14'-11"	20
H8	2	#4	STR	9'-5"	13
H9	2	#4	STR	3'-11"	5
H10	12	#4	STR	3'-3"	26
H11	2	#4	STR	20'-7"	27
N6	2	#5	2	10'-10"	23
N7	3	#5	2	10'-3"	32
N8	3	#5	2	9'-5"	29
N9	3	#5	2	8'-7"	27
N10	3	#4	2	7'-10"	16
N11	3	#4	2	7'-0"	14
N12	3	#4	2	6'-2"	12
N13	3	#4	2	5'-4"	11
S2	3	#6	STR	6'-0"	27
T2	3	#5	STR	23'-8"	74
V6	2	#5	STR	8'-9"	18
V7	3	#5	STR	8'-2"	26
V8	3	#5	STR	7'-5"	23
V9	3	#5	STR	6'-7"	21
V10	3	#4	STR	5'-9"	12
V11	3	#4	STR	4'-11"	10
V12	3	#4	STR	4'-1"	8
V13	3	#4	STR	3'-3"	7
Z6	4	#5	3	5'-7"	23
Z7	3	#5	3	5'-4"	17
Z8	3	#5	3	5'-0"	16
Z9	3	#5	3	4'-8"	15
Z10	3	#5	3	4'-4"	14
Z11	3	#5	3	4'-0"	13
Z12	3	#5	3	3'-8"	11
Z13	3	#5	3	3'-4"	10

REINFORCING STEEL FOR 1 WING 680 LBS
 CLASS A CONCRETE
 1 STRAIGHT WING (W2) 9.2 C.Y.
 TOTAL 9.2 C.Y.



TYPICAL WING SECTION

PROJECT NO. B-5147
 ASHE COUNTY
 STATION: 10+66.00 -L-
 SHEET 7 OF 9



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STRAIGHT WING FOR CONCRETE BOX CULVERT

DRAWN BY: V.X. NGUYEN DATE: 1/12/16
 CHECKED BY: H.T. BARBOUR DATE: 1/4/16
 DESIGN ENGINEER OF RECORD: A. M. LEE DATE: 1/26/16

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

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.

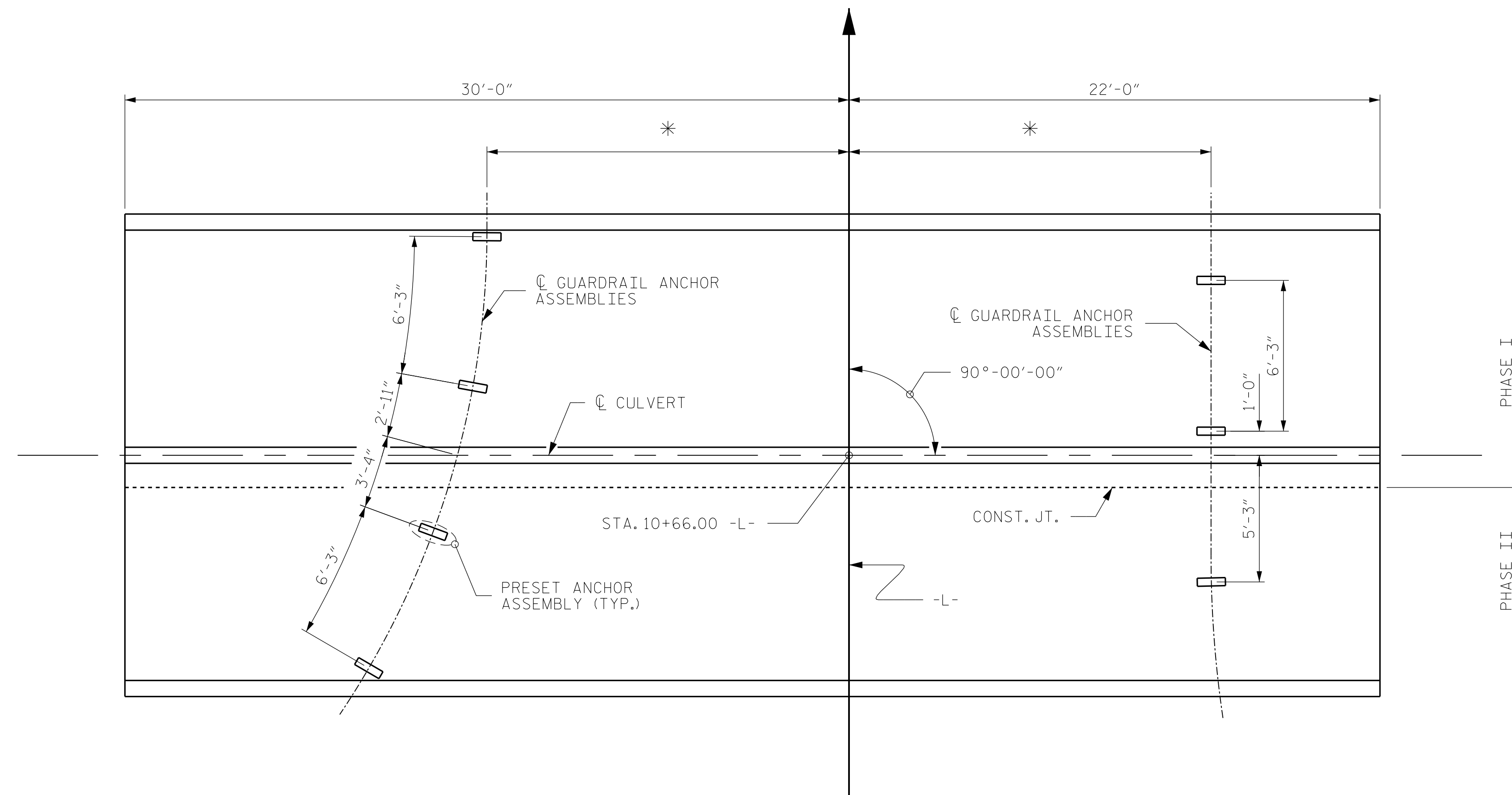
FERRULES TO BE PLUGGED DURING POURING OF SLAB AS RECOMMENDED BY THE MANUFACTURER.

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.

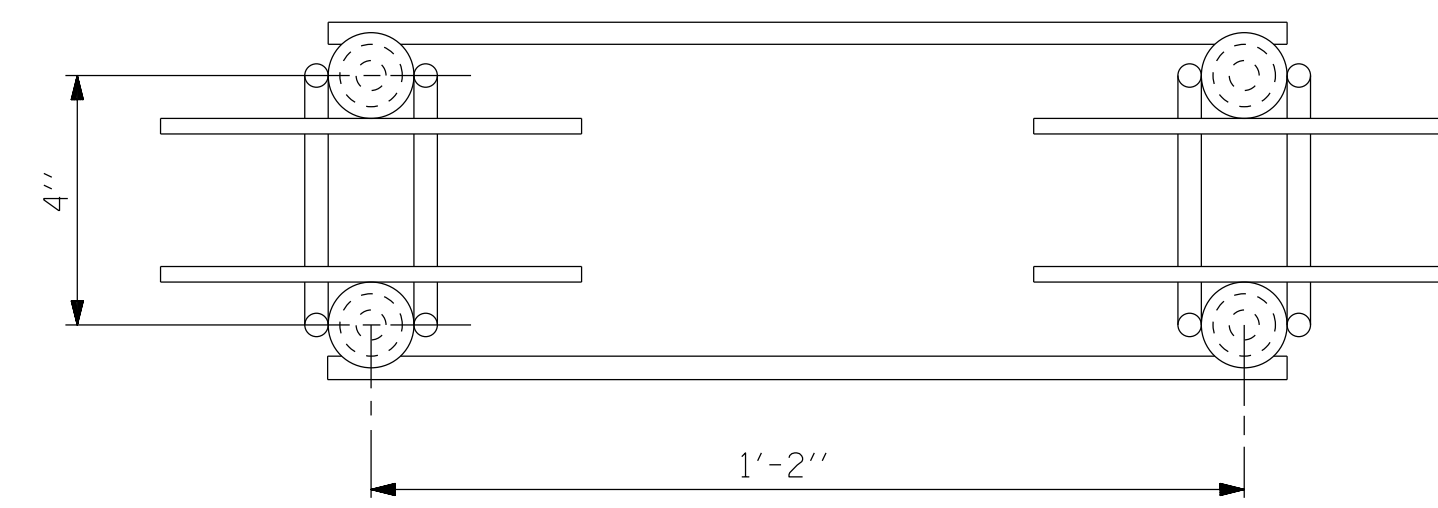
SLAB REINFORCING STEEL MAY BE SHIFTED AS NECESSARY TO CLEAR GUARDRAIL ANCHOR ASSEMBLY. CARE SHOULD BE TAKEN TO KEEP THE SHIFTING OF REINFORCING STEEL TO A MINIMUM.

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.

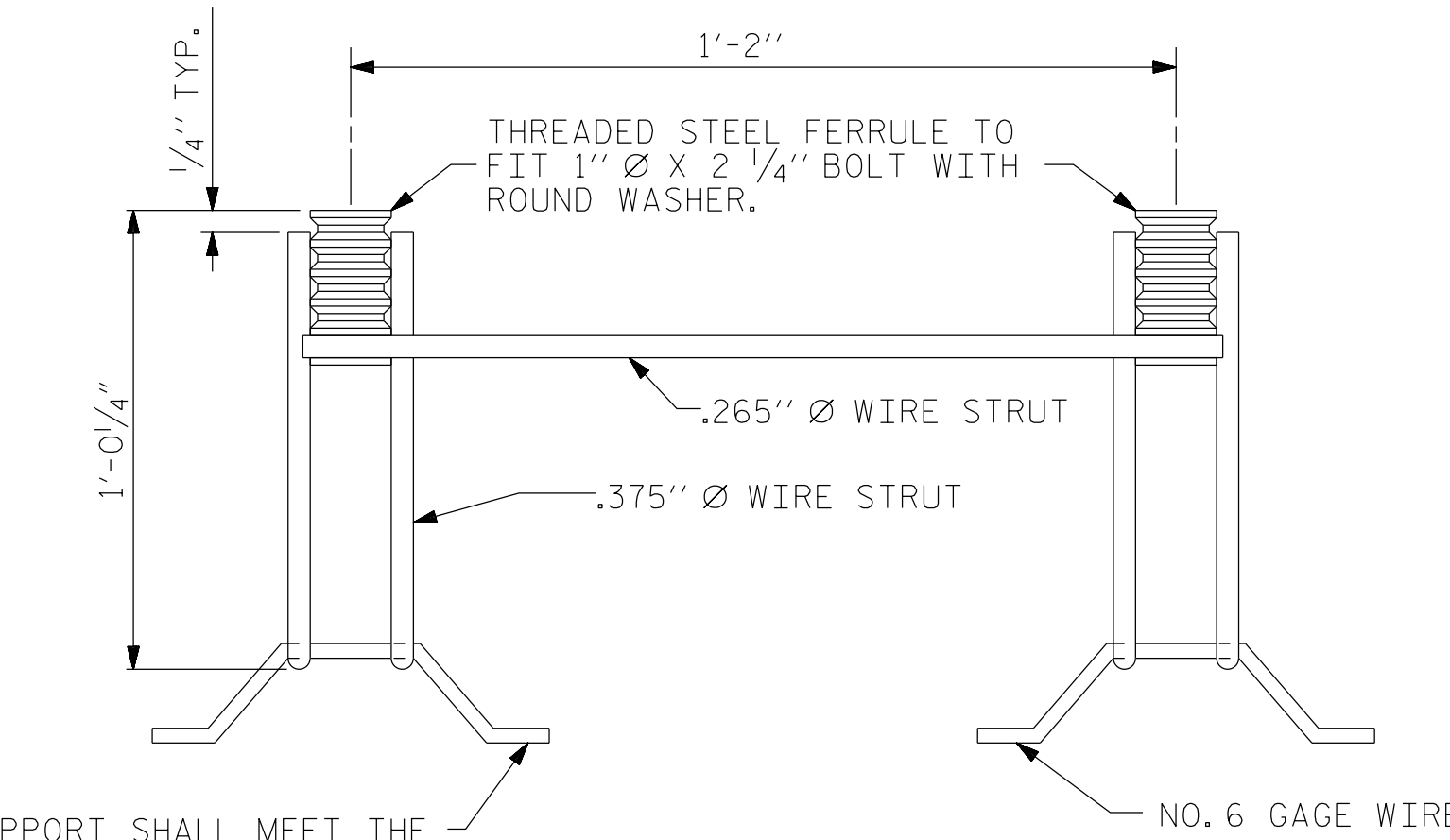


PLAN

SHOWING : GUARDRAIL ANCHOR ASSEMBLY SPACING.
* THESE DIMENSIONS TO BE FURNISHED BY THE ENGINEER

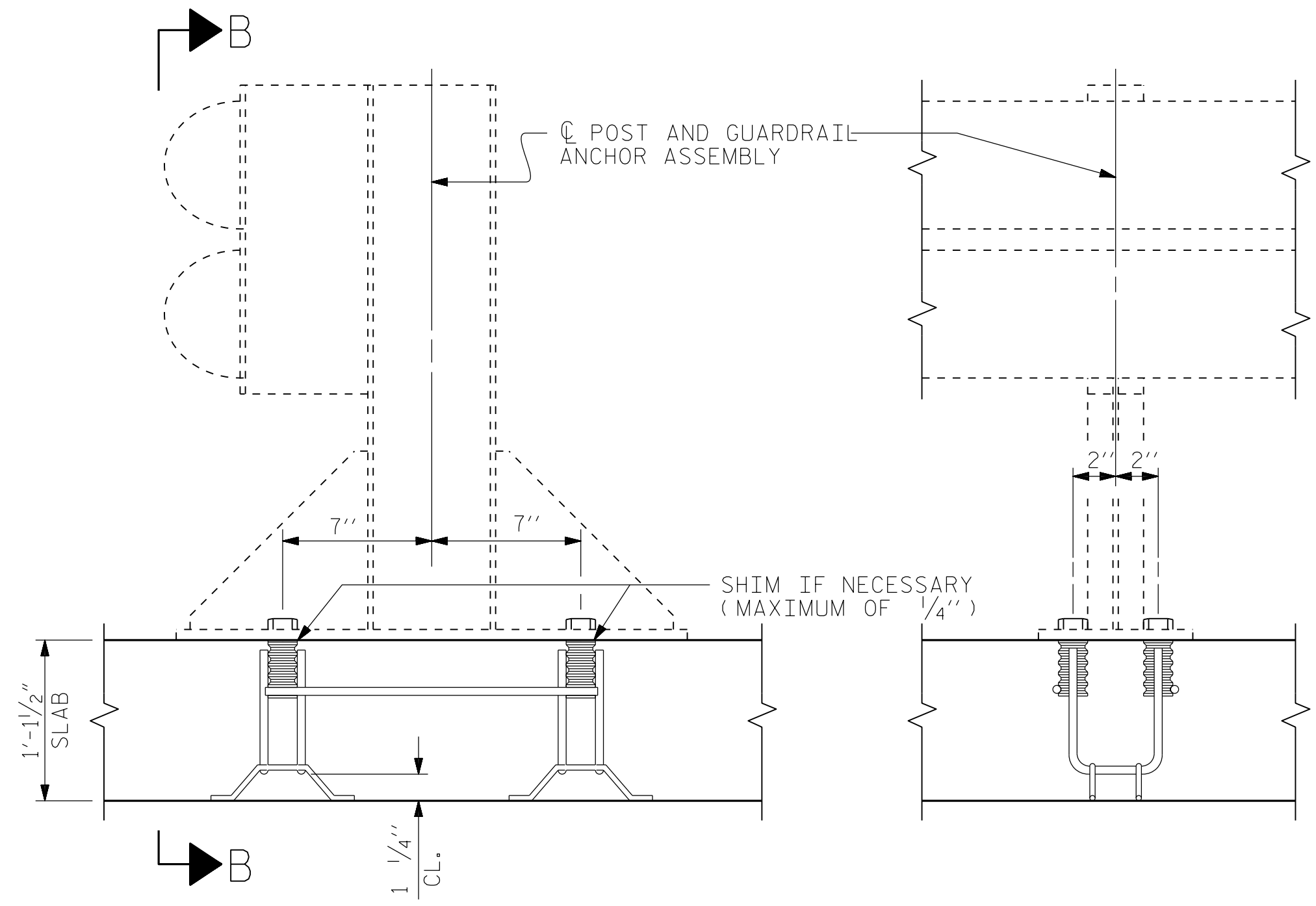


PLAN



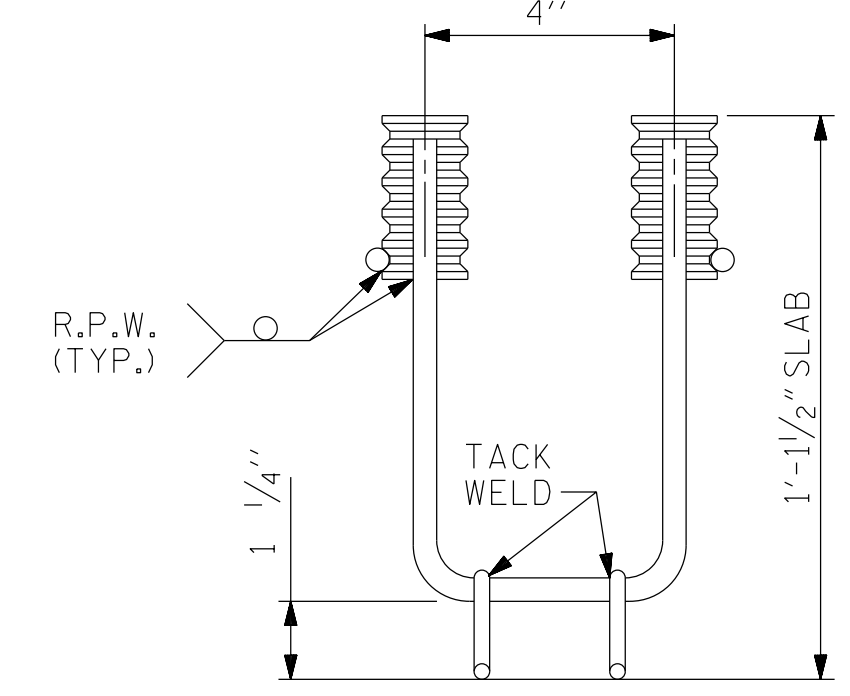
SIDE VIEW

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



SECTION A-A

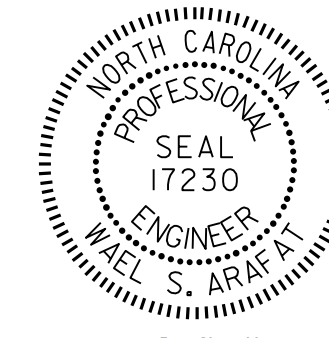
SECTION B-B



ELEVATION

PROJECT NO. B-5147
ASHE COUNTY
STATION: 10+66.00 -L-

SHEET 8 OF 9



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

ASSEMBLED BY : A.M. LEE	DATE : 2/3/2016
CHECKED BY : W.M. DEBREW	DATE : 2/3/2016
DRAWN BY : FCJ 6/88	REV. 5/7/03 RWW/JTE
CHECKED BY : ARB 6/88	REV. 5/1/06R KMM/GM
	REV. 10/1/11 MAA/GM

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

REVISIONS						SHEET NO.
						C-8
						TOTAL SHEETS
						9

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

**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	1.02	--	1.75	1.46	1	TOP SLAB	3.87	1.02	1	TOP SLAB	8.49		
	HL-93 (OPERATING)	N/A		1.33	--	1.35	1.90	1	TOP SLAB	3.87	1.33	1	TOP SLAB	8.49		
	HS-20 (INVENTORY)	36.00	②	1.13	40.51	1.75	1.47	1	TOP SLAB	4.11	1.13	1	BOTTOM SLAB	8.73		
	HS-20 (OPERATING)	36.00		1.46	52.51	1.35	1.91	1	TOP SLAB	4.11	1.46	1	BOTTOM SLAB	8.73		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.50		2.16	29.15	1.40	2.69	1	TOP SLAB	4.11	2.16	1	TOP SLAB	8.49	
		SNGARBS2	20.00		2.02	40.42	1.40	2.51	1	TOP SLAB	4.11	2.02	1	TOP SLAB	8.49	
		SNAGRIS2	22.00		2.05	45.00	1.40	2.69	1	TOP SLAB	4.11	2.05	1	BOTTOM SLAB	8.73	
		SNCOTTS3	27.25		1.29	35.08	1.40	1.83	1	TOP SLAB	3.87	1.29	1	TOP SLAB	8.49	
		SNAGGRS4	34.93		1.31	45.72	1.40	1.88	1	BOTTOM SLAB	8.94	1.31	1	BOTTOM SLAB	8.73	
		SNS5A	35.55		1.45	51.54	1.40	2.06	1	BOTTOM SLAB	8.94	1.45	1	BOTTOM SLAB	8.73	
		SNS6A	39.95		1.28	51.07	1.40	1.95	1	BOTTOM SLAB	8.94	1.28	1	BOTTOM SLAB	8.73	
		SNS7B	42.00		1.34	56.35	1.40	1.95	1	BOTTOM SLAB	8.94	1.34	1	BOTTOM SLAB	8.73	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.00		1.62	53.36	1.40	2.41	1	BOTTOM SLAB	8.94	1.62	1	BOTTOM SLAB	8.73	
		TNT4A	33.08		1.54	50.87	1.40	2.18	1	TOP SLAB	3.87	1.54	1	TOP SLAB	8.49	
		TNT6A	41.60		1.45	60.31	1.40	2.05	1	BOTTOM SLAB	8.94	1.45	1	BOTTOM SLAB	8.73	
		TNT7A	42.00		1.42	59.52	1.40	2.17	1	BOTTOM SLAB	8.94	1.42	1	BOTTOM SLAB	8.73	
		TNT7B	42.00		1.53	64.34	1.40	2.16	1	BOTTOM SLAB	8.94	1.53	1	BOTTOM SLAB	8.73	
		TNAGRIT4	43.00		1.39	59.60	1.40	1.99	1	BOTTOM SLAB	8.94	1.39	1	BOTTOM SLAB	8.73	
TNAGT5A	45.00		1.19	53.37	1.40	1.74	1	BOTTOM SLAB	8.94	1.19	1	BOTTOM SLAB	8.73			
TNAGT5B	45.00		③	1.09	48.93	1.40	1.62	1	BOTTOM SLAB	8.94	1.09	1	BOTTOM SLAB	8.73		

LOAD FACTORS:

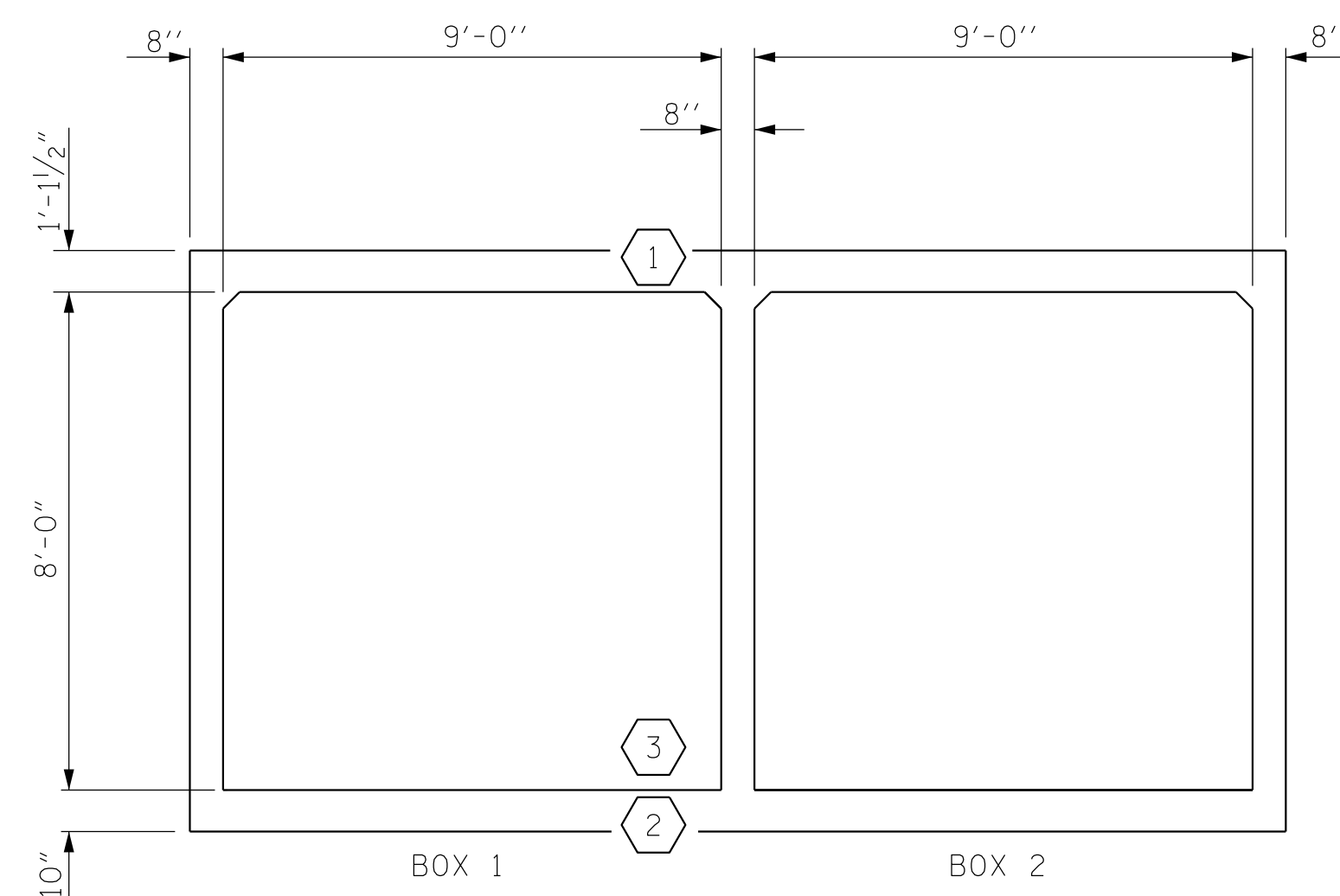
DESIGN LOAD RATING FACTORS

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

NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

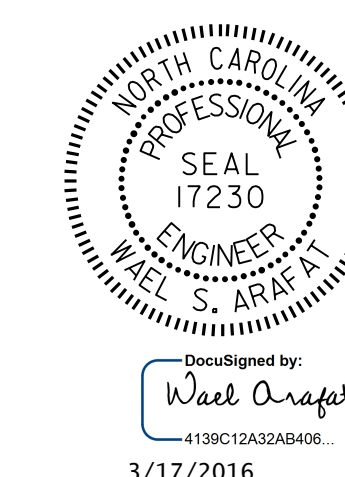
⊕	CONTROLLING LOAD RATING
①	DESIGN LOAD RATING (HL-93)
②	DESIGN LOAD RATING (HS-20)
③	LEGAL LOAD RATING **
** SEE CHART FOR VEHICLE TYPE	



LRFR SUMMARY
(LOOKING DOWNSTREAM)

PROJECT NO. B-5147
ASHE COUNTY
 STATION: 10+66.00 -L-

SHEET 9 OF 9



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

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

DOCUMENT NOT CONSIDERED
 FINAL UNLESS ALL
 SIGNATURES COMPLETED

ASSEMBLED BY : V.X. NGUYEN	DATE : 12-10-15
CHECKED BY : H.T. BABOUR	DATE : 1-4-16
DRAWN BY : WMC	7/11
CHECKED BY : GM	7/11
REV. 10/1/11	MAA/GM

STANDARD NOTES

DESIGN DATA:

SPECIFICATIONS	-----	A.A.S.H.T.O. (CURRENT)
LIVE LOAD	-----	SEE PLANS
IMPACT ALLOWANCE	-----	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF		
STRUCTURAL STEEL - AASHTO M270 GRADE 36	-	20,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50W	-	27,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50	-	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION		
GRADE 60	--	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	-----	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR	-----	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR		
UNTREATED - EXTREME FIBER STRESS	-----	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN OF TIMBER	-----	375 LBS. PER SQ. IN.
EQUIVALENT FLUID PRESSURE OF EARTH	-----	30 LBS. PER CU. FT. (MINIMUM)

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2012 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1-1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.

ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY 1/16 INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINIS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.

ENGLISH

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