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20-OCT-2017 10:52
 N:\60\08307-00\NC DOT B-4823 BRIDGE 12 OVER HOGSED CREEK SR 1538\Structures\Deliverables\B4823 BR12 Final\Drawings\Submit\10-20-17\CADD_dgms\Structures\B4823-SMU_TSHL-8700I2.dgn
 \$\$\$SERVNAME\$\$\$

TIP PROJECT: B-4823

CONTRACT: C203943

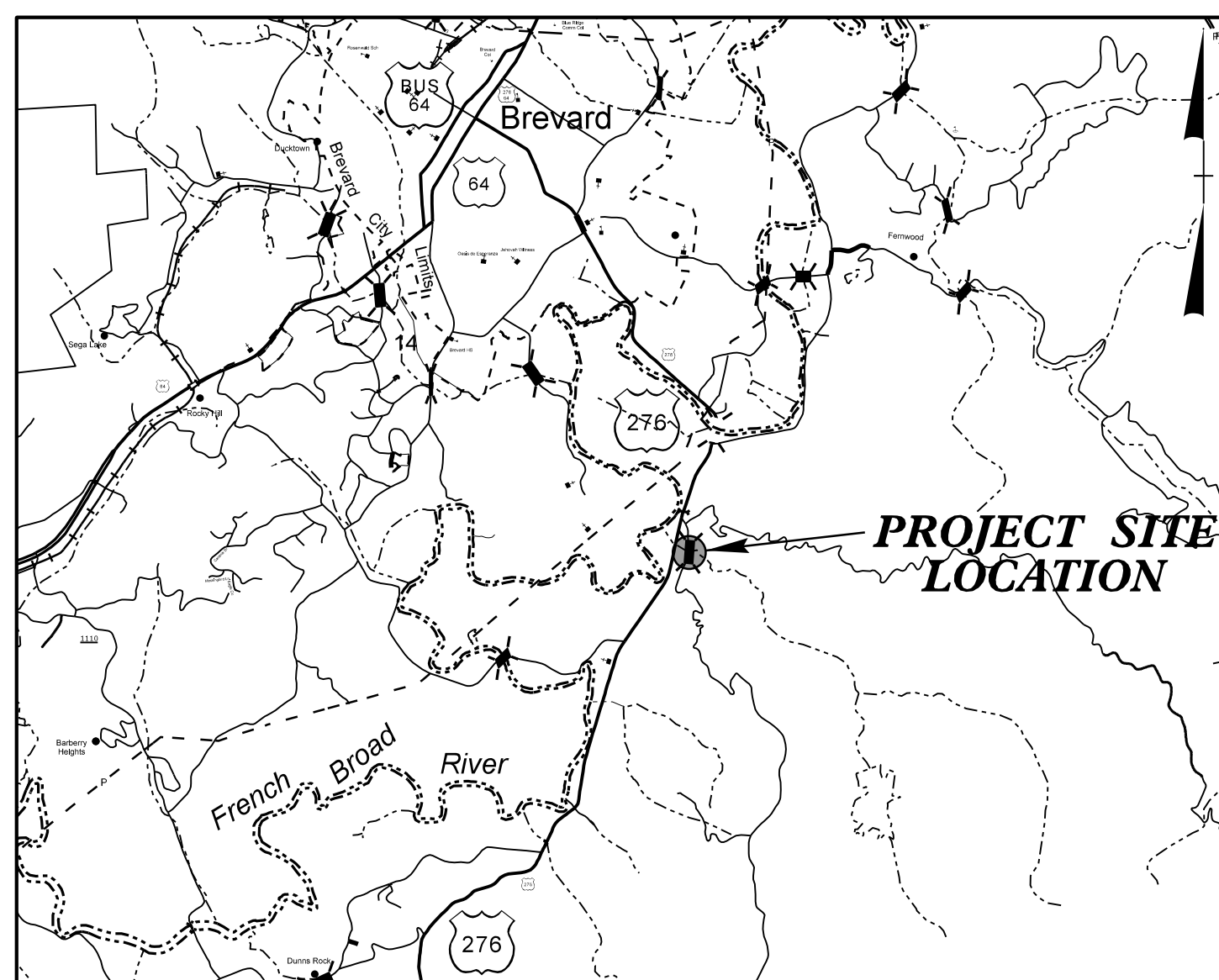
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

TRANSYLVANIA COUNTY

**LOCATION: BRIDGE NO. 12 OVER HOGSED CREEK
ON SR 1538 (BECKY MOUNTAIN ROAD)**

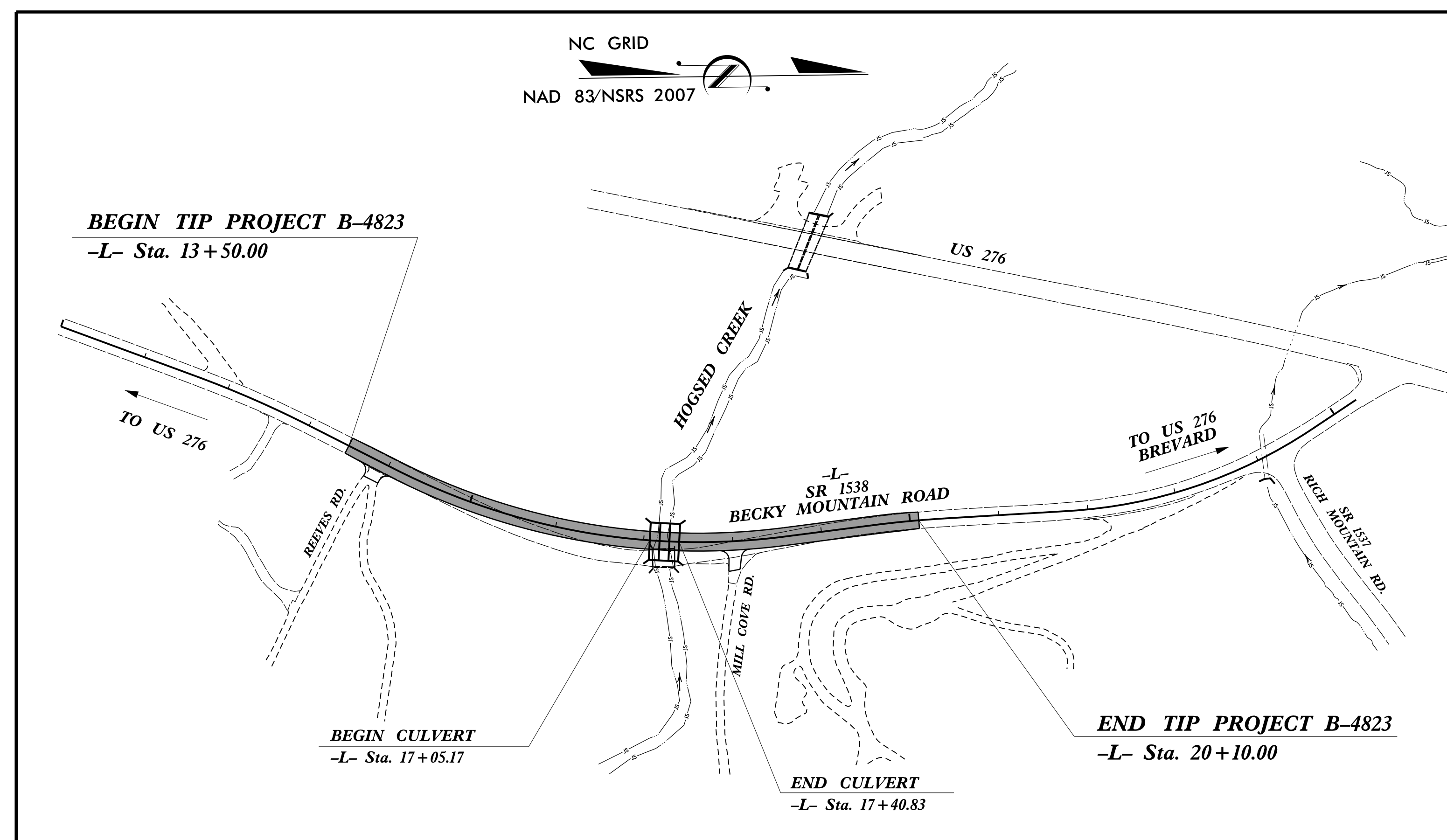
TYPE OF WORK: GRADING, PAVING, DRAINAGE AND CULVERT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4823	1	
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
38593.1.2	BRZ-1538(9)	P.E.	
38593.2.1	BRZ-1538(9)	R/W	
38593.3.1	BRZ-1538(9)	CONST.	



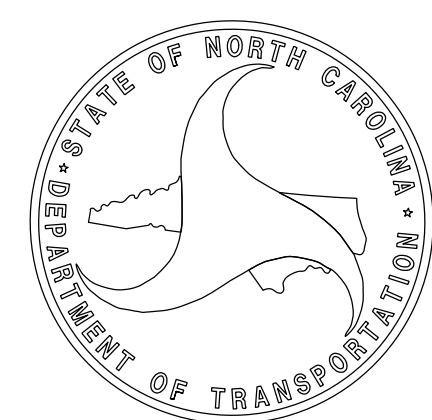
VICINITY MAP

N.T.S.



STRUCTURE

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UNLESS ALL SIGNATURES COMPLETED



DESIGN DATA

ADT 2017 = 617
 ADT 2040 = 700
 K = 11 %
 D = 65 %
 T = 3 % *
 V = 45 MPH
 * TTST = 1% DUAL 2%
 FUNC CLASS =
 LOCAL
 SUB-REGIONAL TIER

PROJECT LENGTH

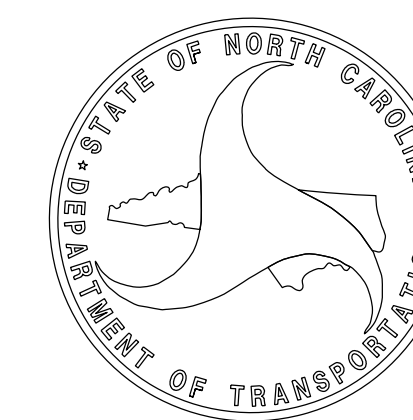
LENGTH ROADWAY TIP PROJECT B-4823 = 0.118 mi.
 LENGTH STRUCTURE TIP PROJECT B-4823 = 0.007 mi.
 TOTAL LENGTH TIP PROJECT B-4823 = 0.125 mi.

PLANS PREPARED BY:
 ms consultants, inc.
 920 Main Campus Drive
 Suite 430
 Raleigh, NC 27606
 NC License Number - C-3239

PLANS PREPARED FOR:
 DIVISION OF HIGHWAYS
 1000 Birch Ridge Dr.
 Raleigh, NC 27610

2018 STANDARD SPECIFICATIONS

LETTING DATE:
 FEBRUARY 20, 2018



BM. #2 - 8" SPIKE SET IN BASE OF 40" WHITE OAK TREE, STA. 18+16.23 -L-, 54.47' RT., EL. 2124.25

NOTES

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.
 DESIGN FILL ----- MAX. 3.62', MIN. 2.47'
 FOR OTHER DESIGN DATA AND NOTES, SEE SHEET SN.
 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
 CONCRETE IN STAGE I/STAGE II CULVERTS TO BE POURED IN THE FOLLOWING ORDER:

1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALL.
 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 WALLS ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON 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.

AFTER SERVING AS A TEMPORARY STRUCTURE THE EXISTING SINGLE SPAN (25'-6") STRUCTURE WITH A CLEAR ROADWAY WIDTH OF 19'-1" AND ASPHALT WEARING SURFACE ON A TIMBER DECK SUPPORTED BY STEEL I-BEAMS AND A TIMBER CAP AND POST SUBSTRUCTURE LOCATED UPSTREAM FROM PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED FOR LOAD LIMIT. SHOULD THE INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

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.

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.

THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. 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.

F.A. PROJECT No. : BRZ-1538(9)

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.

REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED SO AS NOT TO ALLOW DEBRIS TO FALL INTO THE WATER. THE CONTRACTOR SHALL REMOVE THE BRIDGE AND SUBMIT PLANS FOR DEMOLITION IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

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."

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

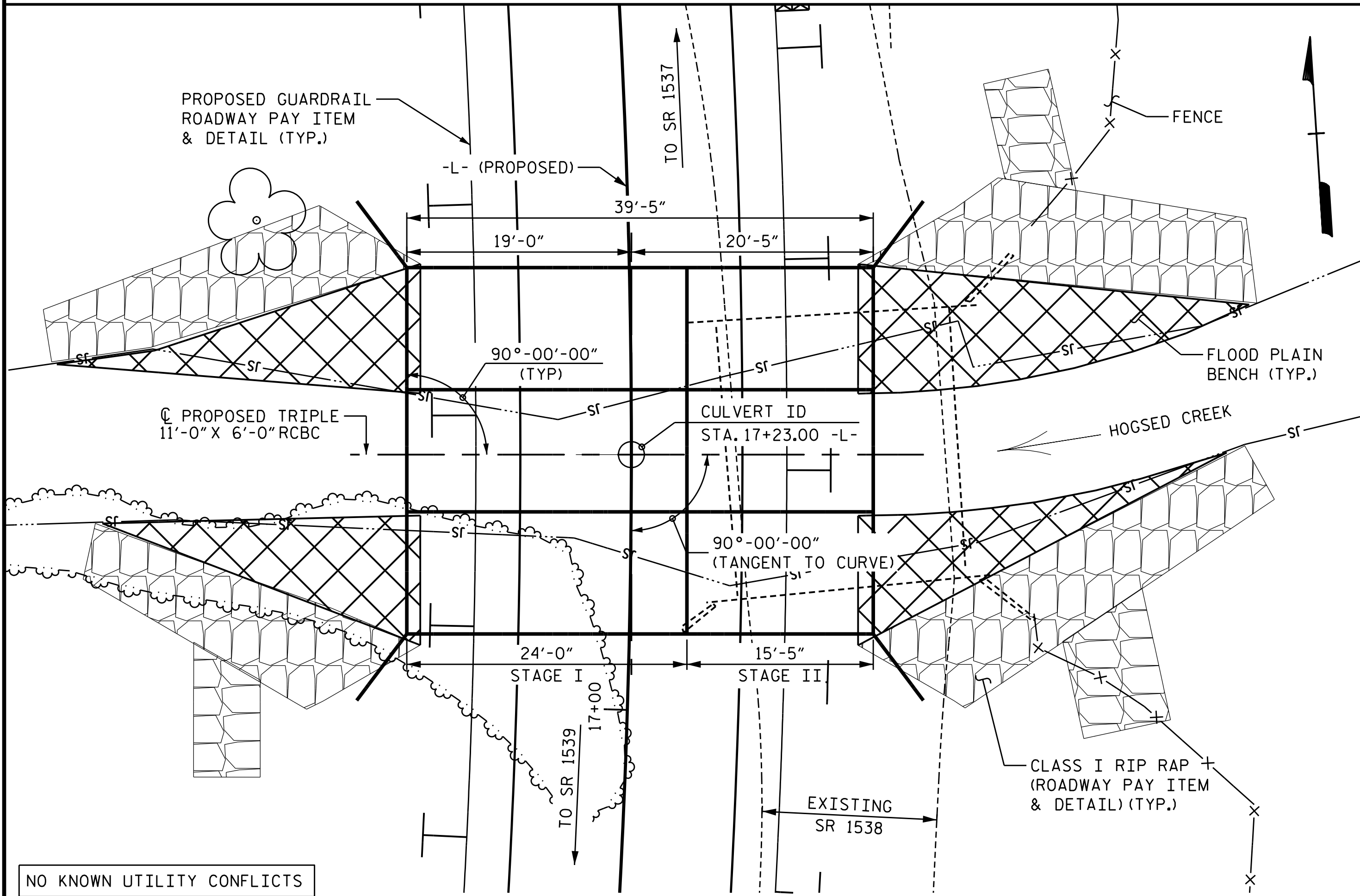
FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

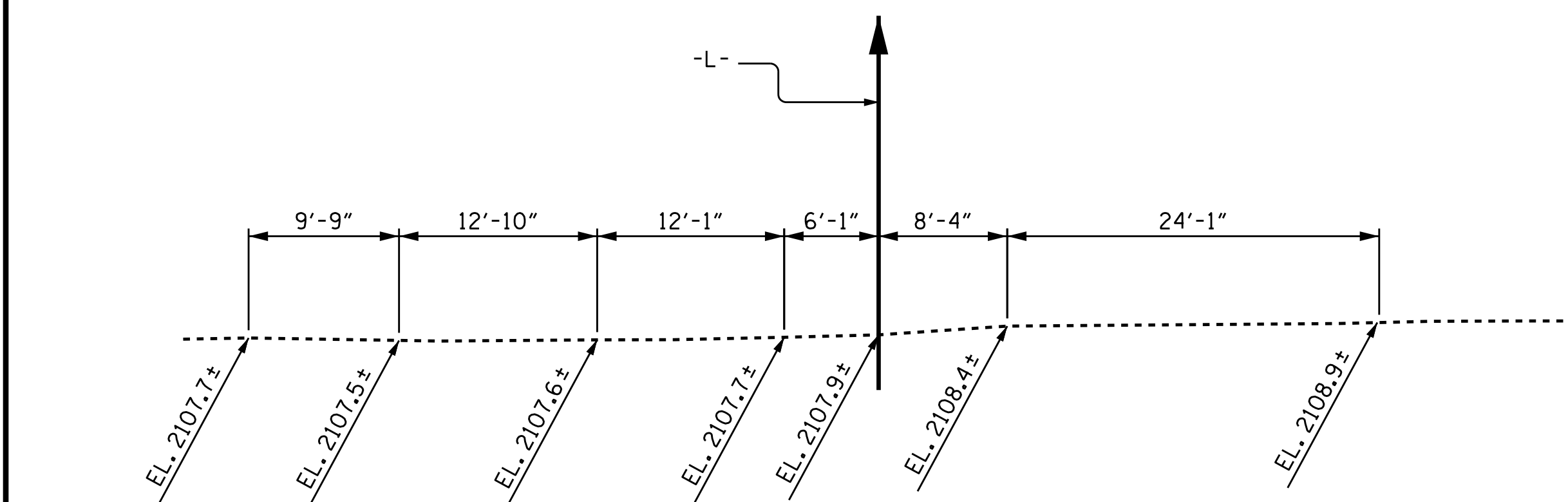
FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

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

FOR CONSTRUCTION SEQUENCE, SEE EROSION CONTROL PLANS.



LOCATION SKETCH



PROFILE ALONG CULVERT

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE..... 1400 CFS.
 FREQUENCY OF OVERTOPPING FLOOD..... 100 YRS.
 OVERTOPPING FLOOD ELEVATION..... 2115.9

ROADWAY DATA

GRADE PT. ELEV. @ STATION 17+23.00 -L- = 2115.99
 BED ELEV. @ STATION 17+23.00 = 2107.0
 ROADWAY SLOPES = 2:1

HYDRAULIC DATA

DESIGN DISCHARGE..... 1000 CFS.
 FREQUENCY OF DESIGN FLOOD..... 25 YEARS
 DESIGN HIGH WATER ELEVATION..... 2113.8
 DRAINAGE AREA..... 3.4 SQ. MI.
 BASE DISCHARGE (Q100)..... 1400 CFS.
 BASE HIGH WATER ELEVATION..... 2115.9

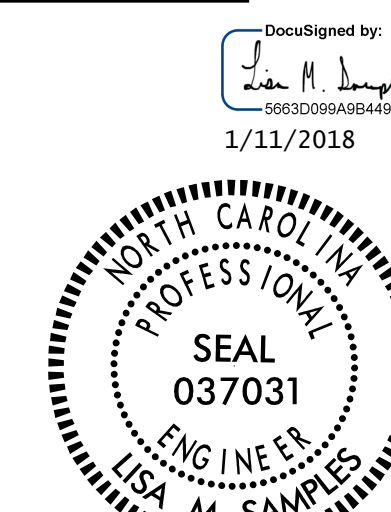
STAGE I STRUCTURE QUANTITIES		
CLASS A CONCRETE		
BARREL @ 3.47 CY/FT		83.2 C.Y.
WING ETC.		10.6 C.Y.
SILLS		2.0 C.Y.
TOTAL		95.8 C.Y.
REINFORCING STEEL		
BARREL		11508 LBS.
WING ETC.		396 LBS.
SILLS		38 LBS.
TOTAL		11942 LBS.
CULVERT EXCAVATION @ STA. 17+23.00 -L-		LUMP SUM
REMOVAL OF EXISTING STRUCTURE		LUMP SUM
FOUNDATION COND. MAT'L.		60 TONS

STAGE II STRUCTURE QUANTITIES		
CLASS A CONCRETE		
BARREL @ 3.47 CY/FT		53.5 C.Y.
WING ETC.		10.6 C.Y.
SILLS		2.0 C.Y.
TOTAL		66.1 C.Y.
REINFORCING STEEL		
BARREL		7349 LBS.
WING ETC.		396 LBS.
SILLS		38 LBS.
TOTAL		7783 LBS.
CULVERT EXCAVATION @ STA. 17+23.00 -L-		LUMP SUM
REMOVAL OF EXISTING STRUCTURE		LUMP SUM
FOUNDATION COND. MAT'L.		39 TONS

TOTAL STRUCTURE QUANTITIES	
CLASS A CONCRETE	
BARREL @ 3.47 CY/FT	136.7 C.Y.
WING ETC.	21.2 C.Y.
SILLS	4.0 C.Y.
TOTAL	161.9 C.Y.
REINFORCING STEEL	
BARREL	18857 LBS.
WING ETC.	792 LBS.
SILLS	76 LBS.
TOTAL	19725 LBS.
CULVERT EXCAVATION @ STA. 17+23.00 -L-	LUMP SUM
REMOVAL OF EXISTING STRUCTURE	LUMP SUM
FOUNDATION COND. MAT'L.	99 TONS
ASBESTOS ASSESSMENT	LUMP SUM

PROJECT NO. B-4823
TRANSYLVANIA COUNTY
 STATION: 17+23.00 -L-

SHEET 1 OF 8 REPLACES BRIDGE NO. 12



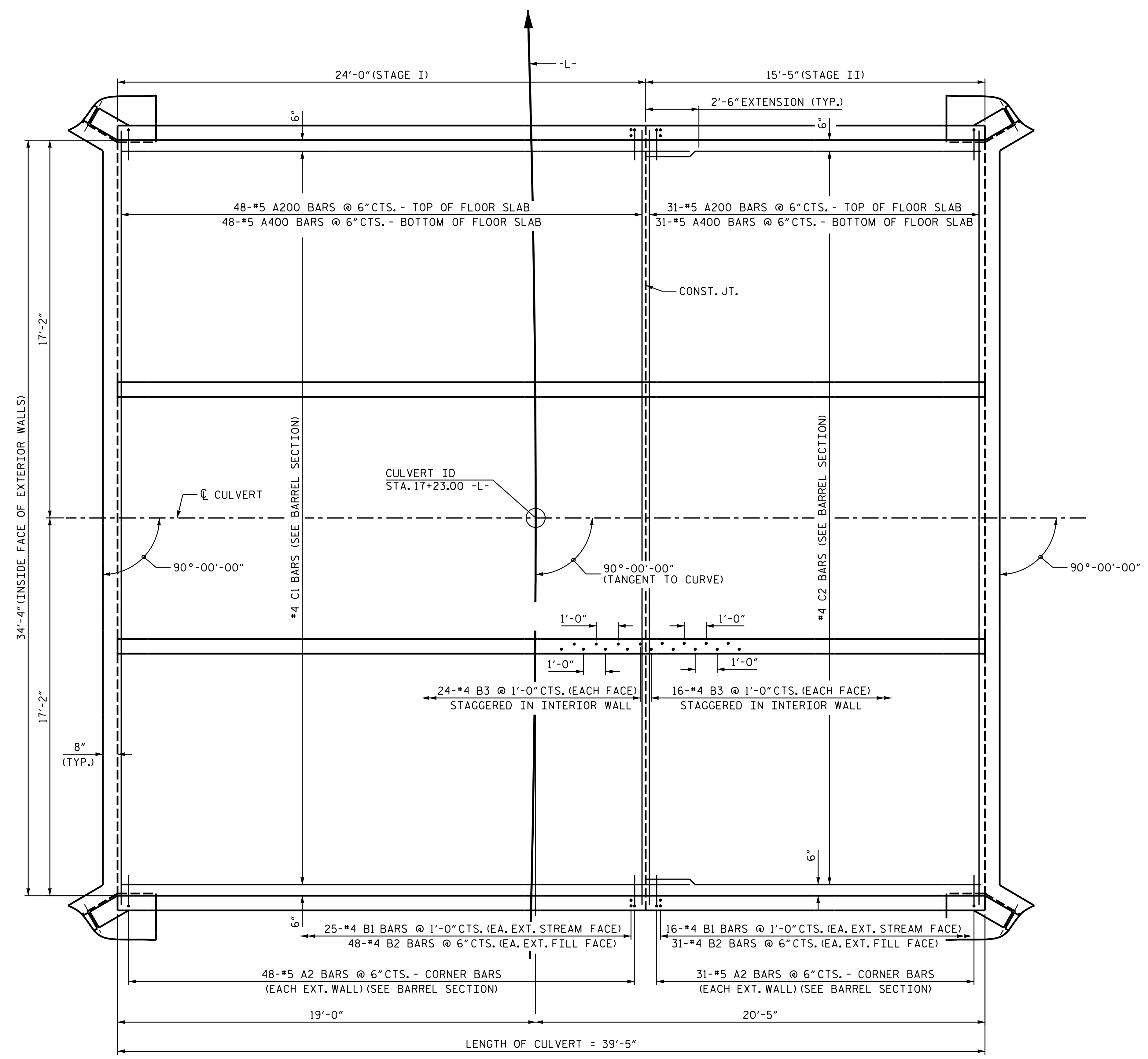
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 NC License Number : C-3239

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

DRAWN BY : J.M. KEPICH DATE : 09/17
 CHECKED BY : L.M. SAMPLES DATE : 09/17
 DESIGN ENGINEER OF RECORD : L.M. SAMPLES DATE : 10/17

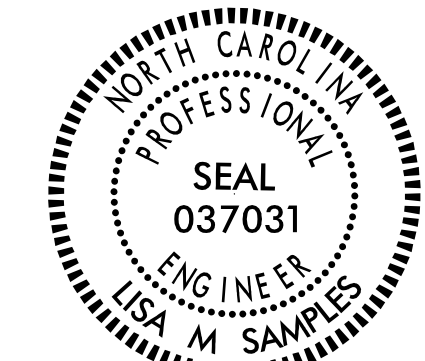
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 Kepich



PLAN - FLOOR SLAB
(STAGE I AND STAGE II SHOWN)

PROJECT NO. B-4823
TRANSYLVANIA COUNTY
 STATION: 17+23.00 -L-
 SHEET 3 OF 8

DocuSigned by:
 John H. Samples
 5663D00A9B449C
 10/20/2017



STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

TRIPLE 11'-0" X 6'-0"
CONCRETE BOX CULVERT
90° SKEW

DRAWN BY : J.M. KEPICH DATE : 09/17
 CHECKED BY : L.M. SAMPLES DATE : 09/17
 DESIGN ENGINEER OF RECORD : L.M. SAMPLES DATE : 10/17

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NOTES

BED MATERIAL PLACED BETWEEN SILLS IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL BETWEEN THE LOWER SILLS.

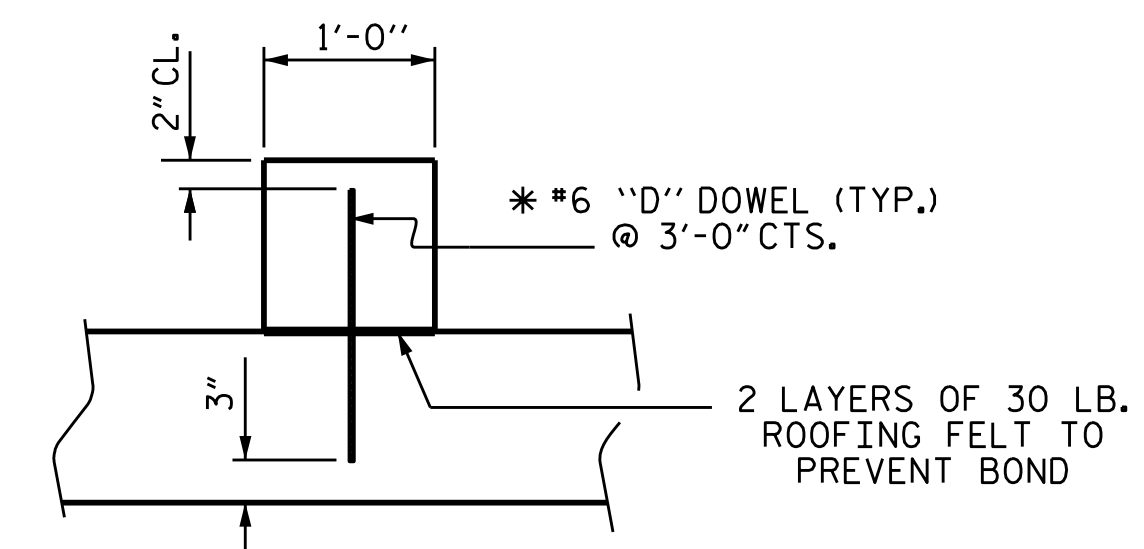
MATERIAL EXCAVATED FROM THE EXISTING STREAM BED SHALL BE STOCKPILED FOR USE IN THE PROPOSED CULVERT AS SHOWN IN THE PLAN VIEW. ONLY STOCKPILED MATERIAL MAY BE USED IN THE LOW FLOW BARREL. BED MATERIAL IN THE HIGH FLOW BARREL MAY BE SUPPLEMENTED WITH CLASS A RIP RAP. IF RIP RAP IS USED, NATIVE MATERIAL SHALL BE PLACED ON TOP TO FILL VOIDS AND PROVIDE A SMOOTH STREAM BED FOR ANIMAL PASSAGE. BED MATERIAL SHALL BE SUBJECT TO APPROVAL BY THE ENGINEER.

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

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

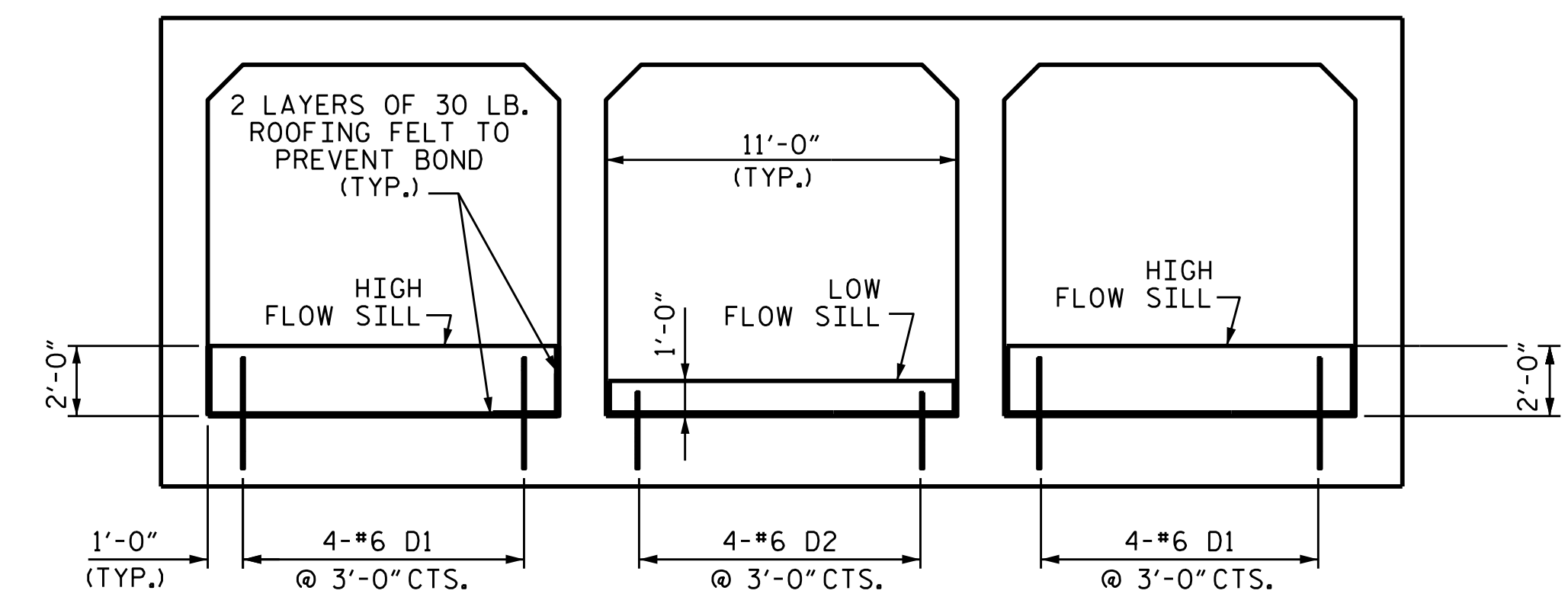
DO NOT SET ELEVATION OF HIGH SILLS ABOVE BANK FILL.

STREAM BED MATERIAL SHOULD BE PLACED LEVEL WITH THE TOP OF THE SILLS.



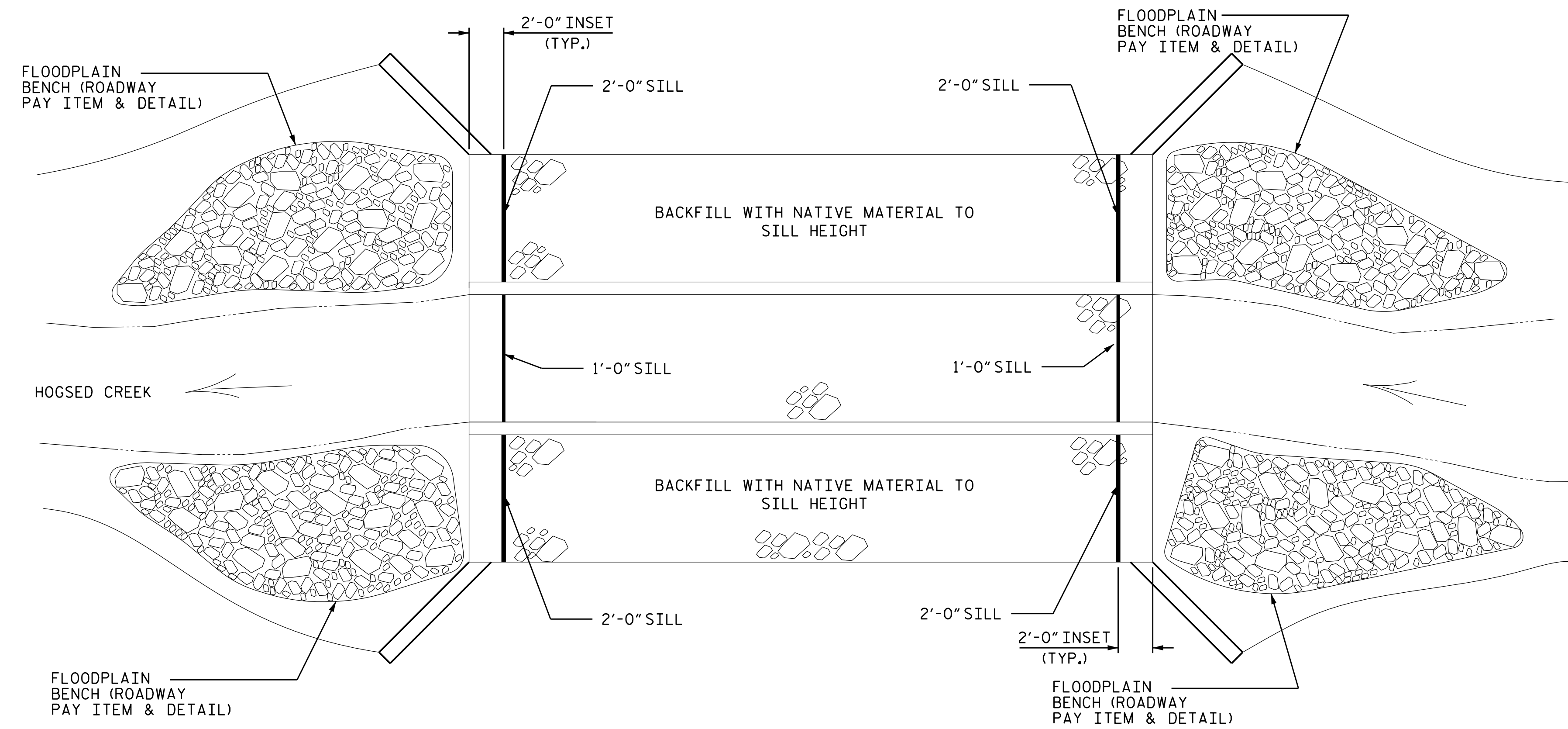
SECTION THROUGH SILL

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



ELEVATION

BILL OF MATERIALS											
STAGE I						STAGE II					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
D1	8	#6	STR	2'-5"	29	D1	8	#6	STR	2'-5"	29
D2	4	#6	STR	1'-5"	9	D2	4	#6	STR	1'-5"	9
REINFORCING STEEL (FOR STAGE I)						REINFORCING STEEL (FOR STAGE II)					
38 LBS.						38 LBS.					
CLASS A CONCRETE						CLASS A CONCRETE					
2.0 CY						2.0 CY					



PLAN VIEW

PROJECT NO. B-4823
TRANSYLVANIA COUNTY
 STATION: 17+23.00 -L-
 SHEET 5 OF 8

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

TRIPLE 11'-0" X 6'-0"
 CONCRETE BOX CULVERT
 90° SKEW



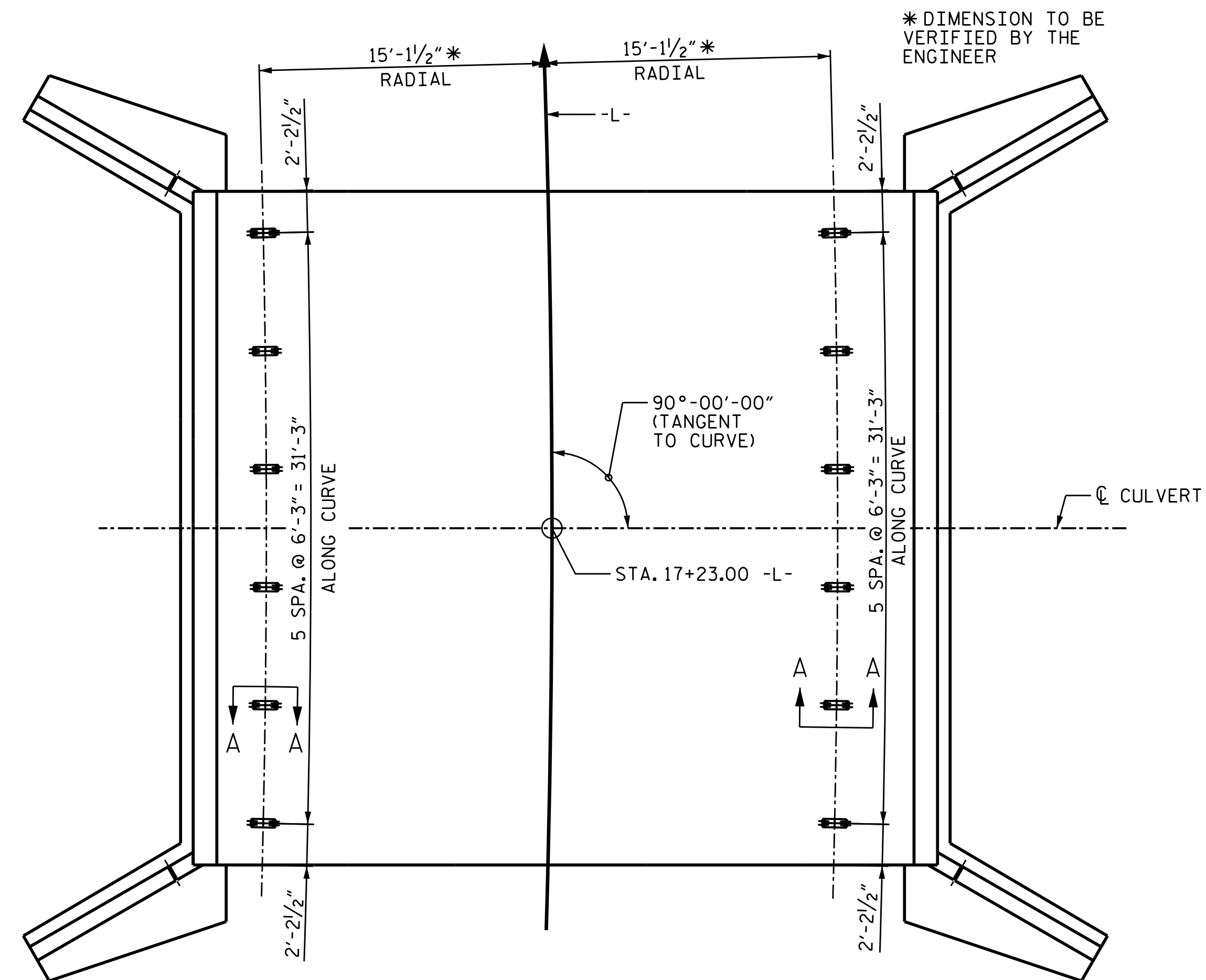
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 NC License Number : C-3239

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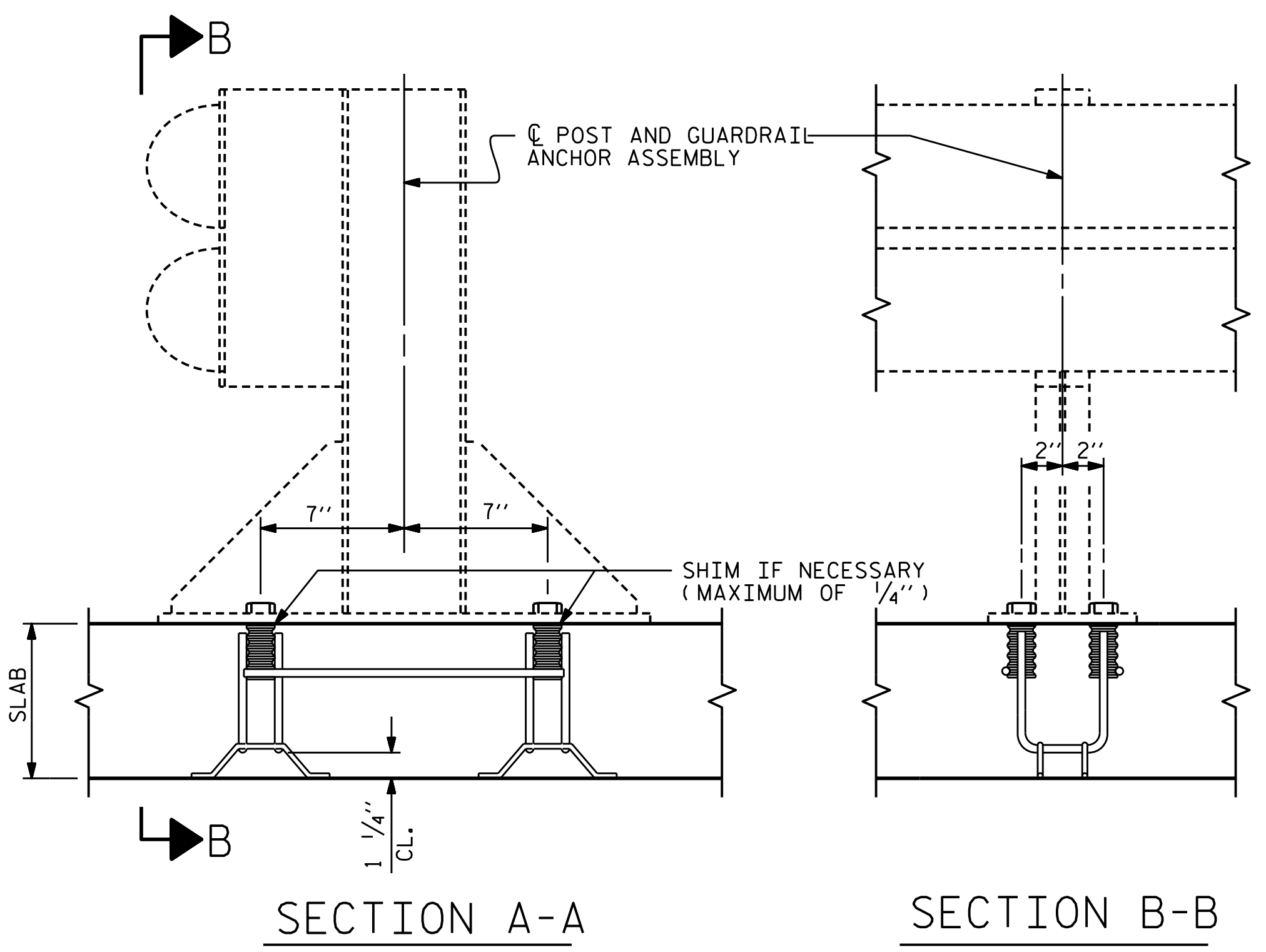
DRAWN BY : J.M. KEPICH DATE : 09/17
 CHECKED BY : L.M. SAMPLES DATE : 09/17
 DESIGN ENGINEER OF RECORD : L.M. SAMPLES DATE : 09/17

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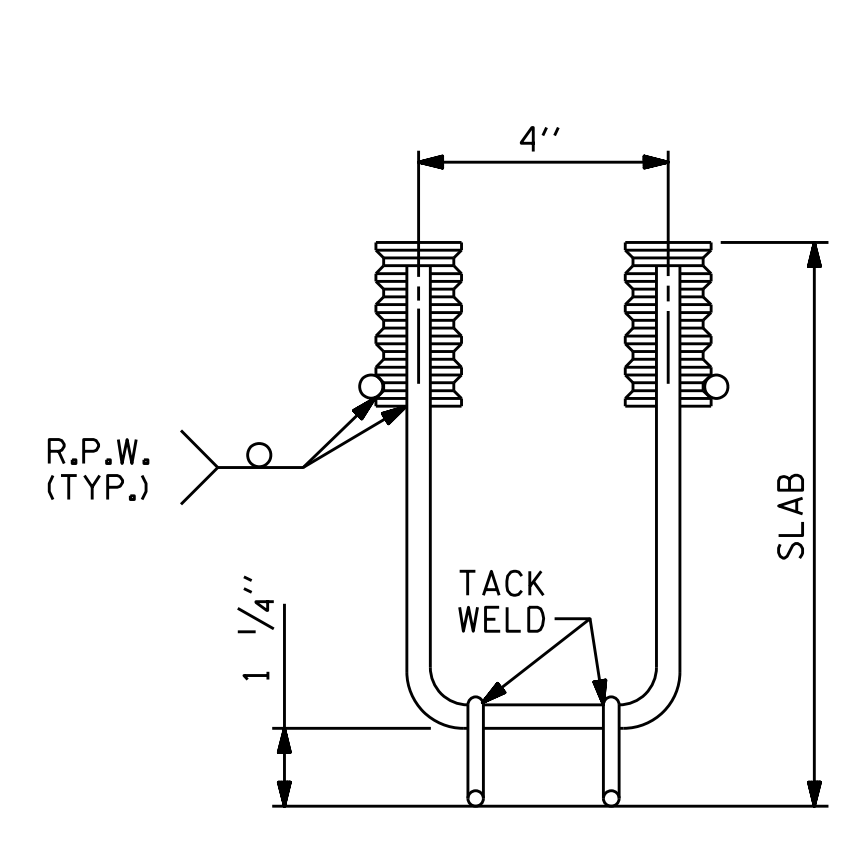


PLAN
SHOWING : GUARDRAIL ANCHOR ASSEMBLY SPACING.

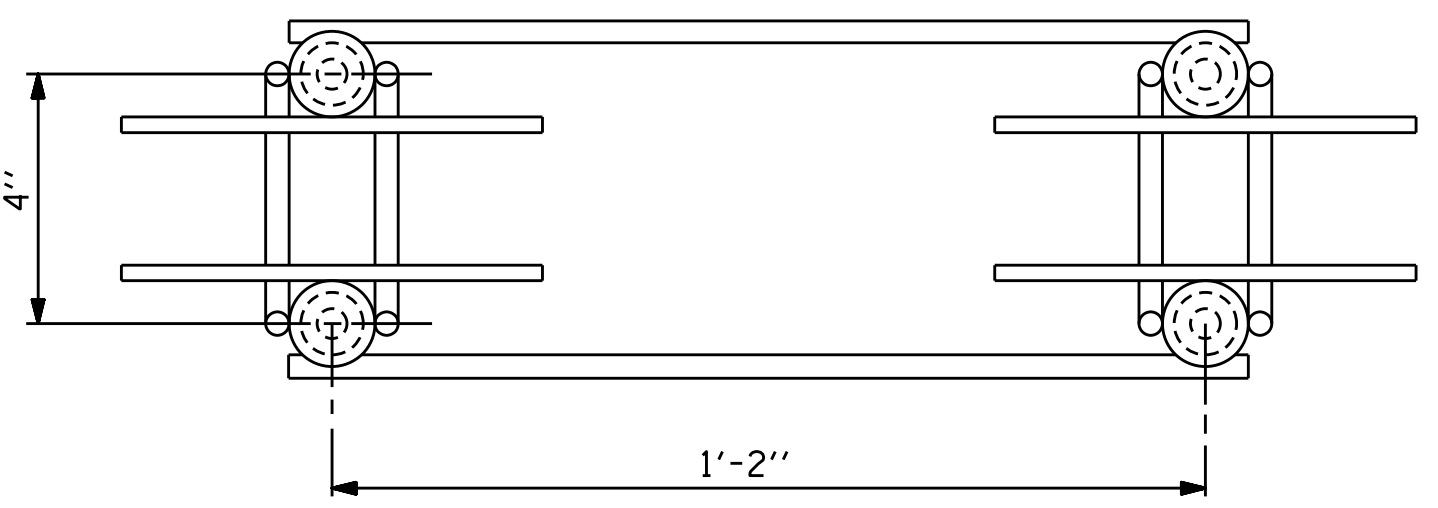


SECTION A-A

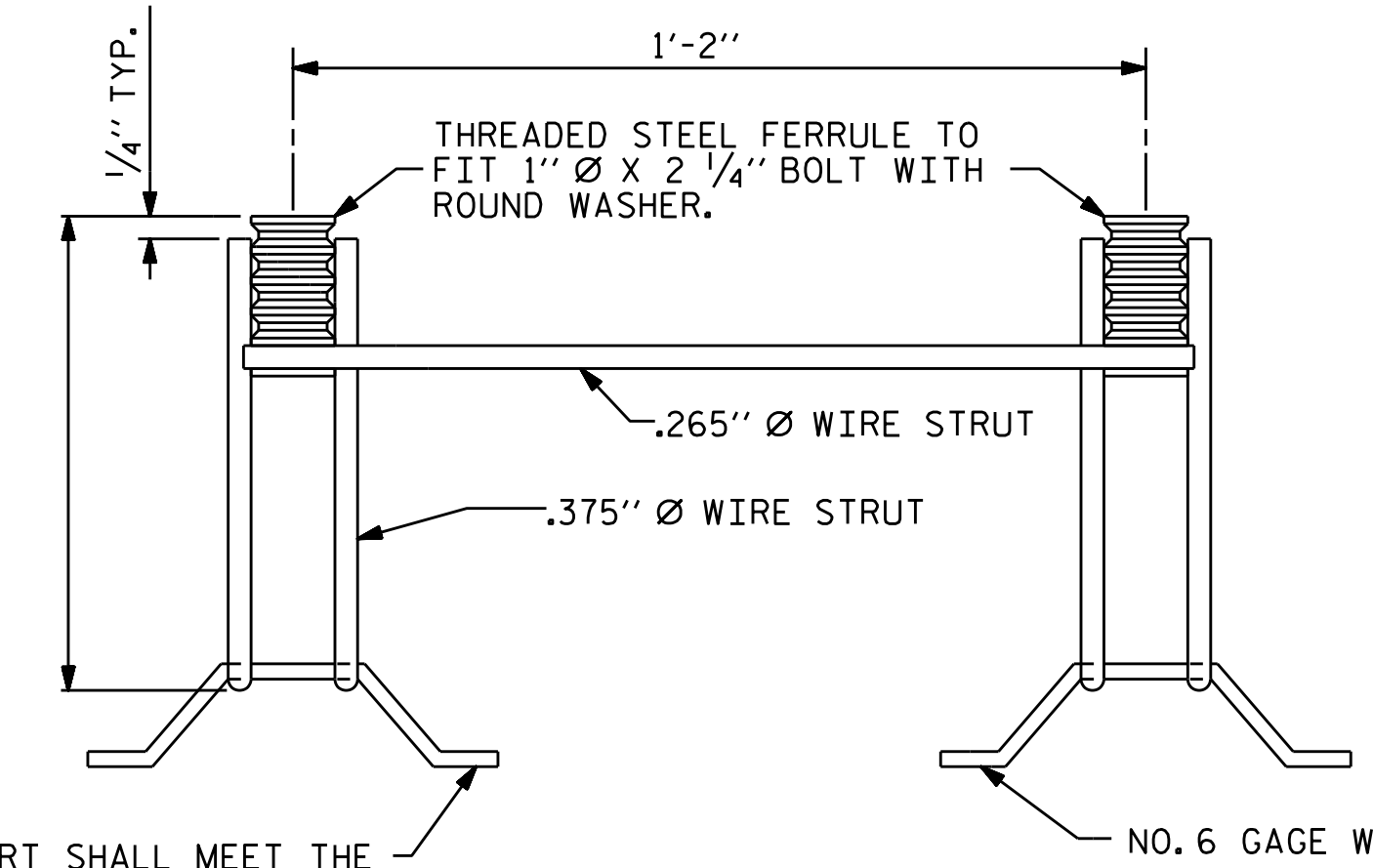
SECTION B-B



ELEVATION



PLAN



SIDE VIEW

GUARDRAIL ANCHOR ASSEMBLY FOR CULVERTS

* DIMENSION TO BE VERIFIED BY THE ENGINEER

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.

PROJECT NO. B-4823
TRANSYLVANIA COUNTY
 STATION: 17+23.00 -L-
 SHEET 6 OF 8

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



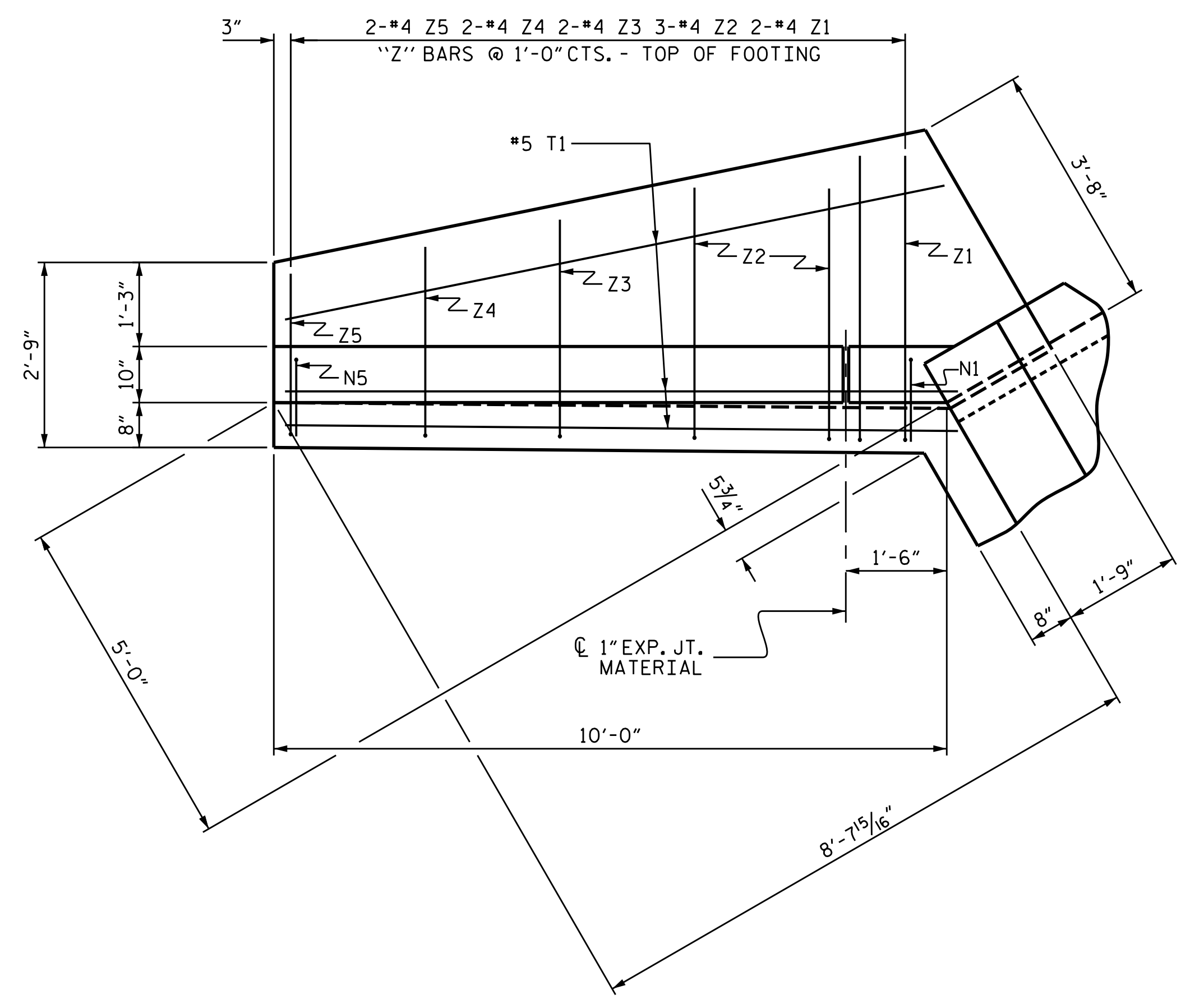
ASSEMBLED BY :	J.M. KEPICH	DATE :	09/17
CHECKED BY :	L.M. SAMPLES	DATE :	09/17
DRAWN BY :	FJB 6/88	REV. 5/7/03	RWW/JTE
CHECKED BY :	ARB 6/88	REV. 5/1/06R	KMM/GM
		REV. 10/1/11	MAA/GM

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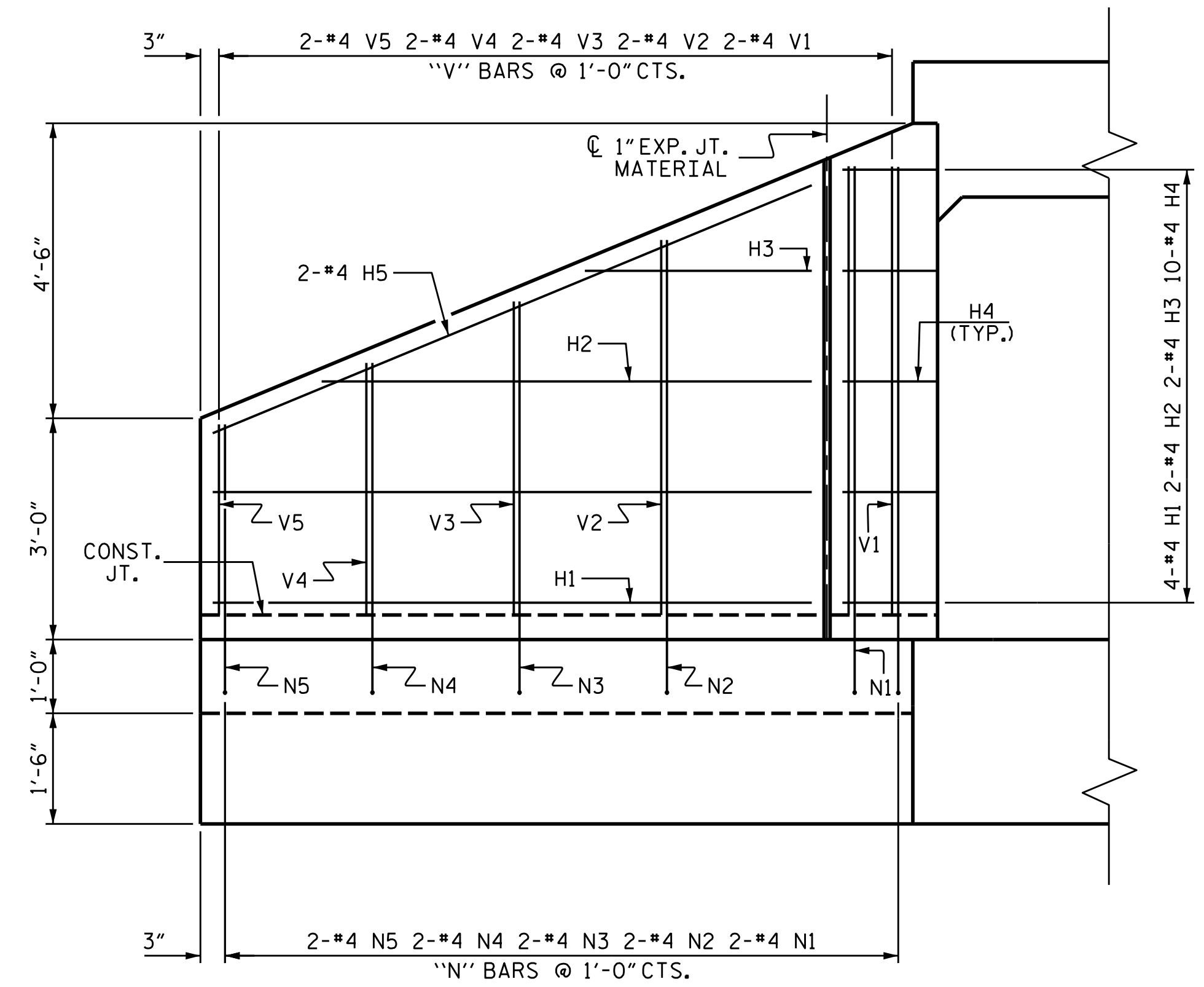
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PLAN



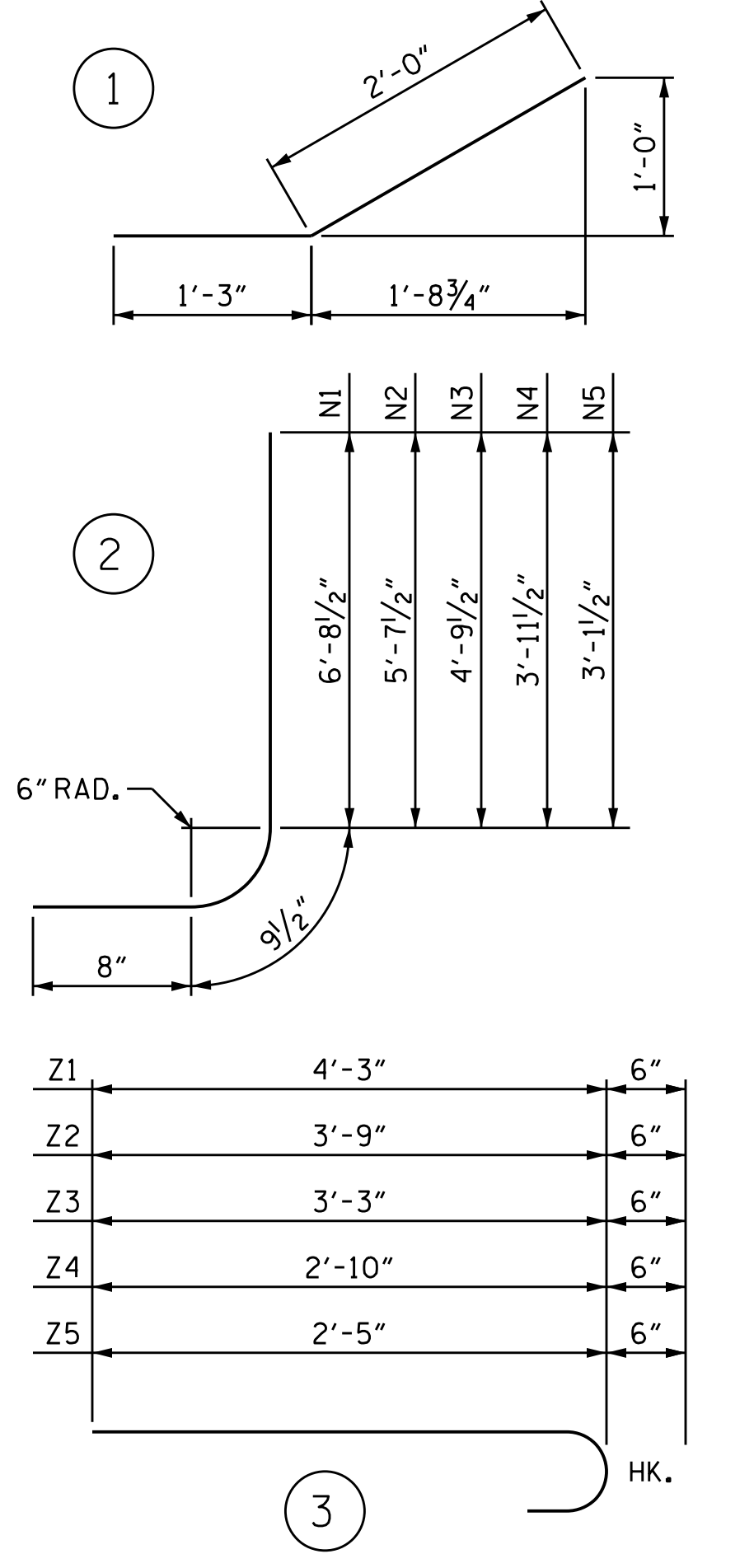
ELEVATION

NOTES

A 3'-0" STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.

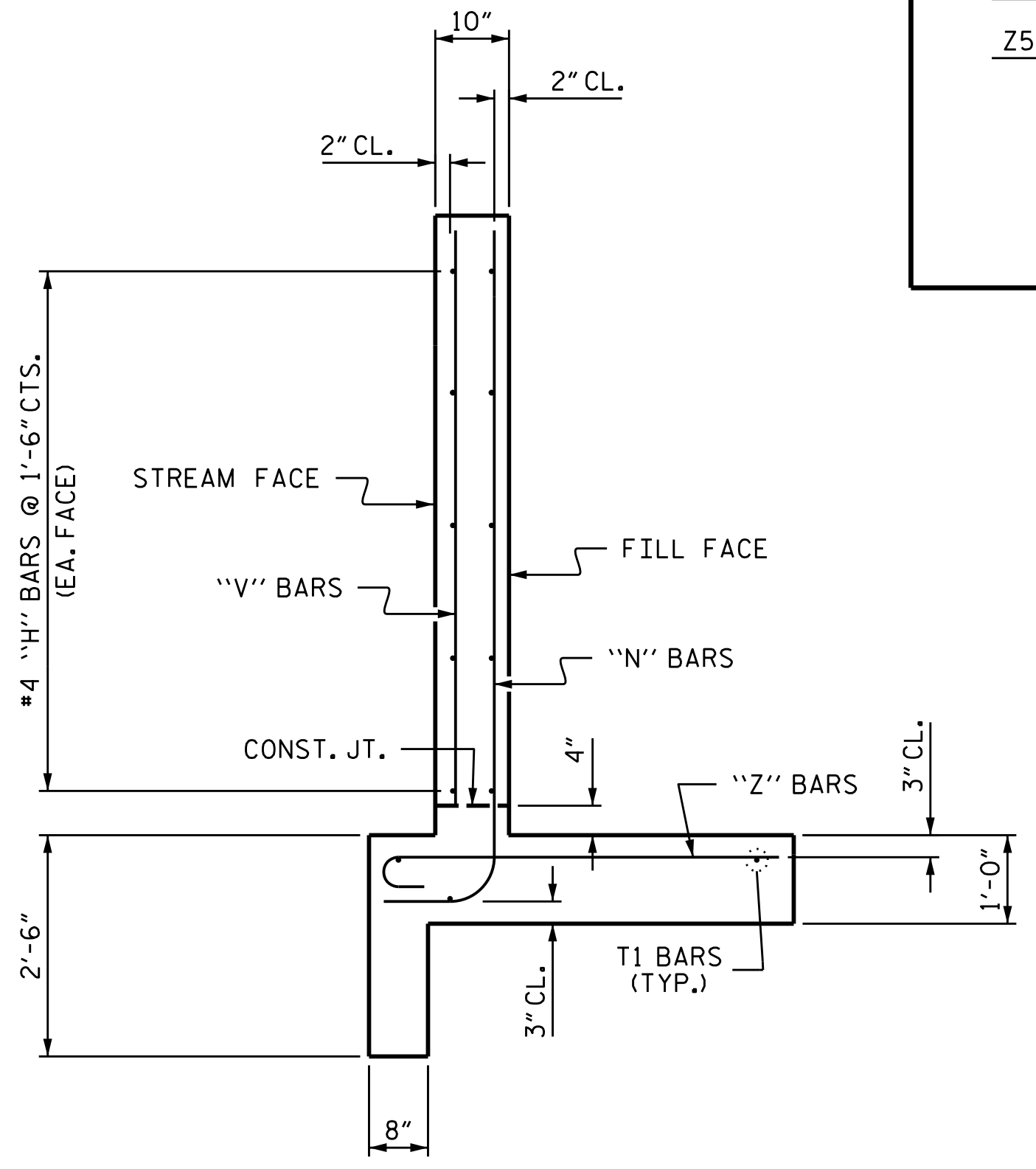


BILL OF MATERIAL EACH STAGE

BAR NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	#4	STR	8'-1"	43
H2	#4	STR	6'-8"	18
H3	#4	STR	3'-1"	8
H4	#4	STR	3'-3"	43
H5	#4	STR	8'-9"	23
N1	#4	2	8'-2"	22
N2	#4	2	7'-1"	19
N3	#4	2	6'-3"	17
N4	#4	2	5'-5"	14
N5	#4	2	4'-7"	12
T1	#5	STR	10'-0"	63
V1	#4	STR	6'-1"	16
V2	#4	STR	5'-1"	14
V3	#4	STR	4'-3"	11
V4	#4	STR	3'-5"	9
V5	#4	STR	2'-7"	7
Z1	#4	3	4'-9"	13
Z2	#4	3	4'-3"	17
Z3	#4	3	3'-9"	10
Z4	#4	3	3'-4"	9
Z5	#4	3	2'-11"	8

REINFORCING STEEL FOR 2 WINGS 396 LBS

CLASS A CONCRETE
 2 WINGS 6.9 CY
 1 HEADWALL 1.7 CY
 END CURTAIN WALL 2.0 CY
 TOTAL 10.6 CY



TYPICAL WING SECTION

PROJECT NO. B-4823
 TRANSYLVANIA COUNTY
 STATION: 17+23.00 -L-
 SHEET 7 OF 8

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 STANDARD WINGS
 FOR
 CONCRETE BOX CULVERT
 H = 6'-0" SLOPE = 2:1
 90° SKEW

ASSEMBLED BY: J.M. KEPICH DATE: 09/17
 CHECKED BY: L.M. SAMPLES DATE: 10/17
 DRAWN BY: CCJ 10/99
 CHECKED BY: RWW 03/00

ms consultants, inc.
 920 Main Campus Drive
 Suite 430
 Raleigh, NC 27606
 NC License Number : C-3239



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

TOTAL SHEETS 8

STD. NO. CW9006

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	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	1.06	--	1.75	1.40	1	BOTTOM SLAB	11.33	1.06	1	TOP SLAB	10.32		
	HL-93 (OPERATING)	N/A	--	1.38	--	1.35	1.82	1	BOTTOM SLAB	11.33	1.38	1	TOP SLAB	10.32		
	HS-20 (INVENTORY)	36.000	2	1.59	57.24	1.75	1.59	1	TOP SLAB	4.67	1.64	1	TOP SLAB	10.32		
	HS-20 (OPERATING)	36.000	--	2.06	74.16	1.35	2.06	1	TOP SLAB	4.67	2.13	1	TOP SLAB	10.32		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500	--	2.91	39.29	1.4	2.91	1	TOP SLAB	4.67	3.45	1	TOP SLAB	10.32	
		SNGARBS2	20.000	--	2.72	54.40	1.4	2.72	1	TOP SLAB	4.67	3.17	1	TOP SLAB	10.32	
		SNAGRIS2	22.000	--	2.90	63.80	1.4	2.90	1	TOP SLAB	4.67	3.38	1	TOP SLAB	10.32	
		SNCOTTS3	27.250	3	1.43	38.97	1.4	1.94	1	TOP SLAB	4.67	1.43	1	TOP SLAB	10.32	
		SNAGGRS4	34.925	--	1.77	61.82	1.4	2.17	1	BOTTOM SLAB	11.33	1.77	1	TOP SLAB	10.32	
		SNS5A	35.550	--	1.63	57.95	1.4	2.13	1	BOTTOM SLAB	11.33	1.63	1	TOP SLAB	10.32	
		SNS6A	39.950	--	1.61	64.32	1.4	1.94	1	BOTTOM SLAB	11.33	1.61	1	TOP SLAB	10.32	
	TRACTOR SEMI-TRAILER (TTST)	SNS7B	42.000	--	1.60	67.20	1.4	1.85	1	BOTTOM SLAB	11.33	1.60	1	TOP SLAB	10.32	
		TNAGRIT3	33.000	--	2.29	75.57	1.4	2.36	1	BOTTOM SLAB	11.33	2.29	2	BOTTOM SLAB	0.93	
		TNT4A	33.075	--	1.77	58.54	1.4	2.31	1	TOP SLAB	4.67	1.77	1	TOP SLAB	10.32	
		TNT6A	41.600	--	1.63	67.81	1.4	1.86	1	BOTTOM SLAB	11.33	1.63	1	TOP SLAB	10.32	
		TNT7A	42.000	--	1.70	71.40	1.4	1.86	1	BOTTOM SLAB	11.33	1.70	1	TOP SLAB	10.32	
		TNT7B	42.000	--	1.68	70.56	1.4	1.93	1	BOTTOM SLAB	11.33	1.68	1	TOP SLAB	10.32	
		TNAGRIT4	43.000	--	1.74	74.82	1.4	1.83	1	BOTTOM SLAB	11.33	1.74	1	TOP SLAB	10.32	
TNAGT5A	45.000	--	1.70	76.50	1.4	1.75	1	BOTTOM SLAB	11.33	1.70	2	BOTTOM SLAB	0.93			
TNAGT5B	45.000	--	1.67	75.15	1.4	1.73	1	BOTTOM SLAB	11.33	1.67	1	TOP SLAB	10.32			

LOAD FACTORS:

DESIGN LOAD RATING FACTORS

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

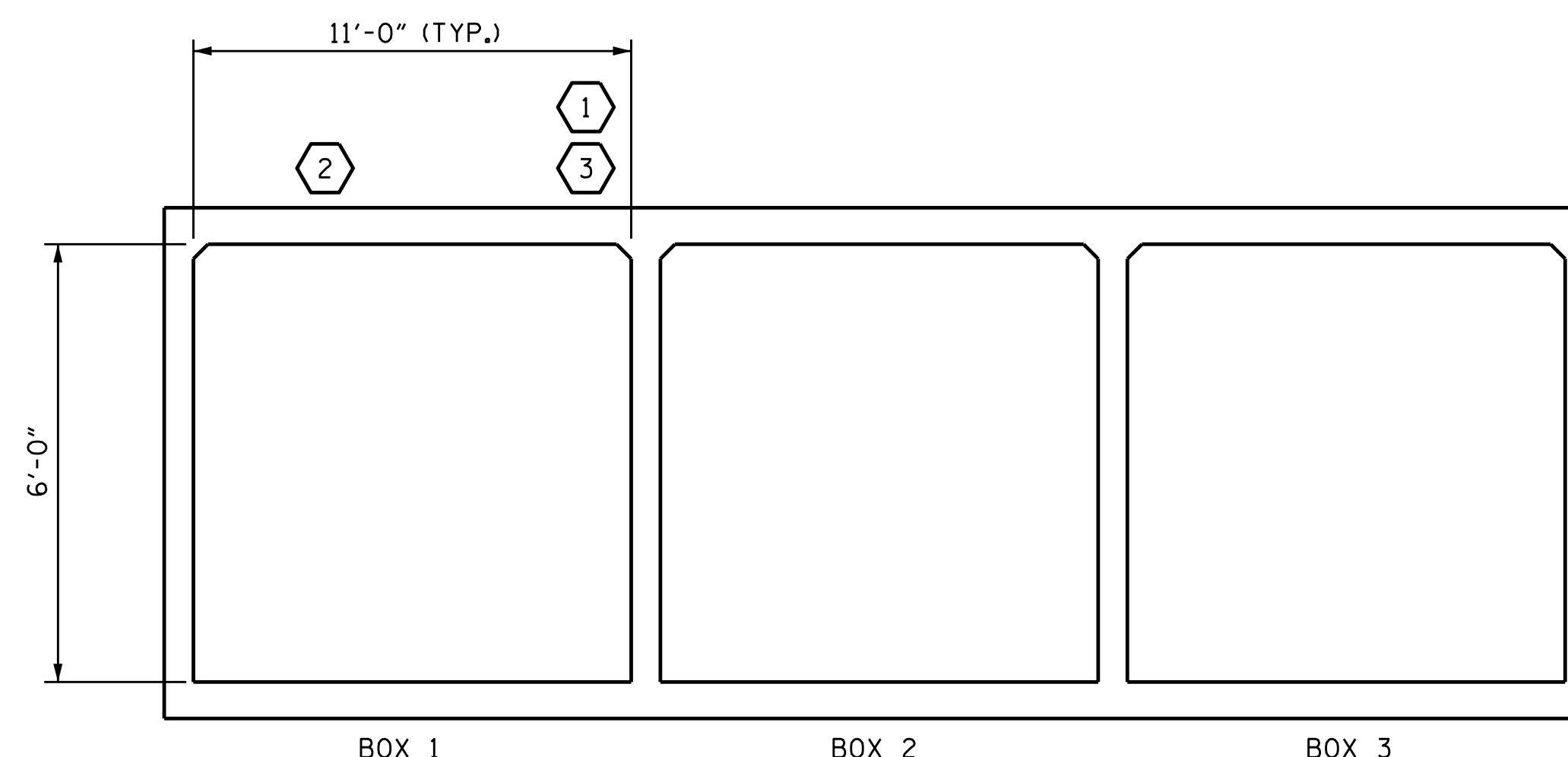
NOTE:

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

COMMENTS:

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

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



LRFR SUMMARY
(LOOKING DOWNSTREAM)

PROJECT NO. B-4823
TRANSYLVANIA COUNTY
 STATION: 17+23.00 -L-

SHEET 8 OF 8

DocuSigned by:
 John M. Samples
 5663D06A8B449C
 10/20/2017



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:	C-8
1			3			TOTAL SHEETS
2			4			8



ms consultants, inc.
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 Suite 430
 Raleigh, NC 27606
 NC License Number : C-3239

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ASSEMBLED BY : J.M. KEPICH	DATE : 09/17
CHECKED BY : L.M. SAMPLES	DATE : 09/17
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 2018 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

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

CONCRETE:

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

CONCRETE CHAMFERS:

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

DOWELS:

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

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

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE.
ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDINATE, AND ACTUAL BEAM CAMBER.
IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.
DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

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

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

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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

ENGLISH

JANUARY, 1990